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MediaTek MT7688 Datasheet

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Document Revision History

Revision	Date	Description
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1.1	18 th July 2012	Updated SPI_WP/SPI_HOLD table
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1.3	12 th September 2012	Added IR reflow guideline
1.4	15 th April 2016	Added registers and controller information

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1. Overview

MediaTek MT7688 chipset integrates a 1T1R 802.11n Wi-Fi radio, a 580MHz MIPS® 24KEc™ CPU, 1-port fast Ethernet PHY, USB2.0 host, PCIe, SD-XC, I2S/PCM and multiple low-speed IOs in a single SOC. The MT7688 supports two operation modes – IoT gateway and IoT device mode. In IoT gateway mode, the PCIe interface can connect to an 802.11ac chipset and be used as an 11ac dual-band concurrent gateway. The high-performance USB 2.0 allows MT7688 to add 3G/LTE modem support or a H.264 ISP for wireless IP camera. The IoT gateway mode also supports touch panel and Bluetooth Low Energy, Zigbee/Z-Wave and Sub-1 GHz RF for smart home control. In IoT device mode, MT7688 supports eMMC, SD-XC and USB 2.0 in addition to Wi-Fi high quality audio via 192Kbps/24bits I2S interface and VoIP application through PCM, as well as peripheral interfaces including PWM, SPI slave, 3rd UART and more GPIOs.

1.1 Features

- Embedded MIPS24KEc (575/580 MHz) with 64 KB I-Cache and 32 KB D-Cache
- 1T1R 2.4 GHz with 150 Mbps PHY data rate
- Legacy 802.11b/g and HT 802.11n modes
- 20/40 MHz channel bandwidth
- 802.11v
- Space Time Block Coding (STBC)
- 16-bit DDR1/2 up to 128/256 Mbytes
- x1 USB 2.0 Host, x1 PCIe Root Complex
- 1-port 10/100 FE PHY
- SD-XC, eMMC, I2C, PCM, I2S(192K/24bits), PWM, SPI master/slave, UART lite, JTAG, GPIO
- Internet Of Things
- Embedded PMU
- Green AP/STA
 - Intelligent Clock Scaling (exclusive)
 - DDRII: ODT off, Self-refresh mode
- QoS: WMM, WMM-PS
- 16 Multiple BSSID
- iPA/iLNA and ePA/eLNA
- 24 STA-Proxy
- AES128/256-CBC
- WEP64/128, TKIP, AES, WPA, WPA2, WAPI
- WPS: PBC, PIN
- AP/STA Firmware: Linux 2.6.36 SDK, OpenWrt 3.10 SDK, eCOS with IPv6

Figure 1-1 illustrates the function diagram in IoT device mode.

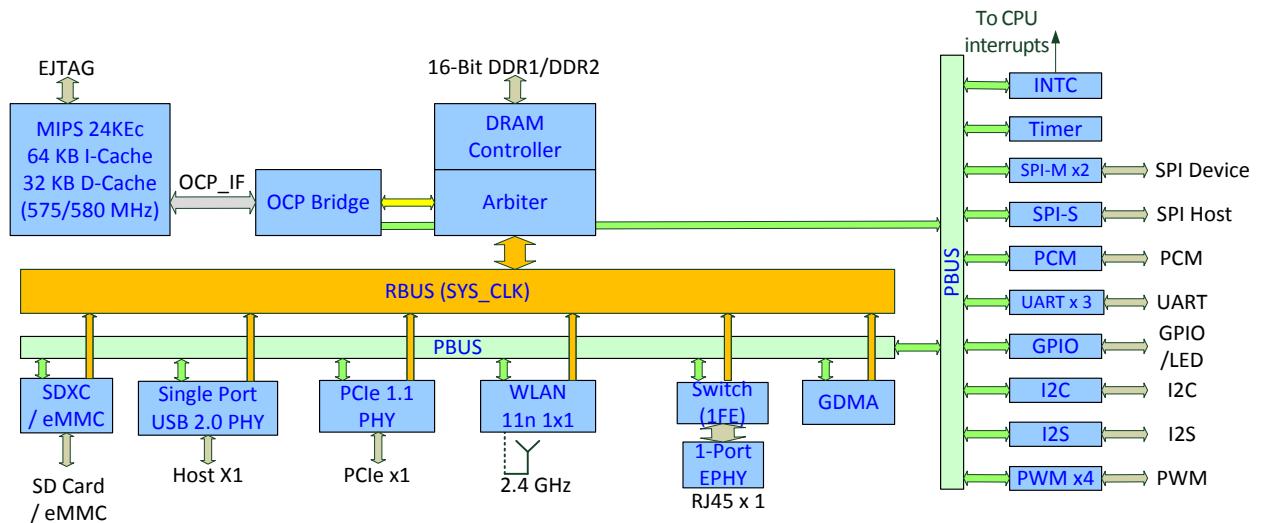


Figure 1-1 IoT Device Mode Fuctional Block Diagram

Figure 1-2 illustrates the functional block diagram in IoT device mode.

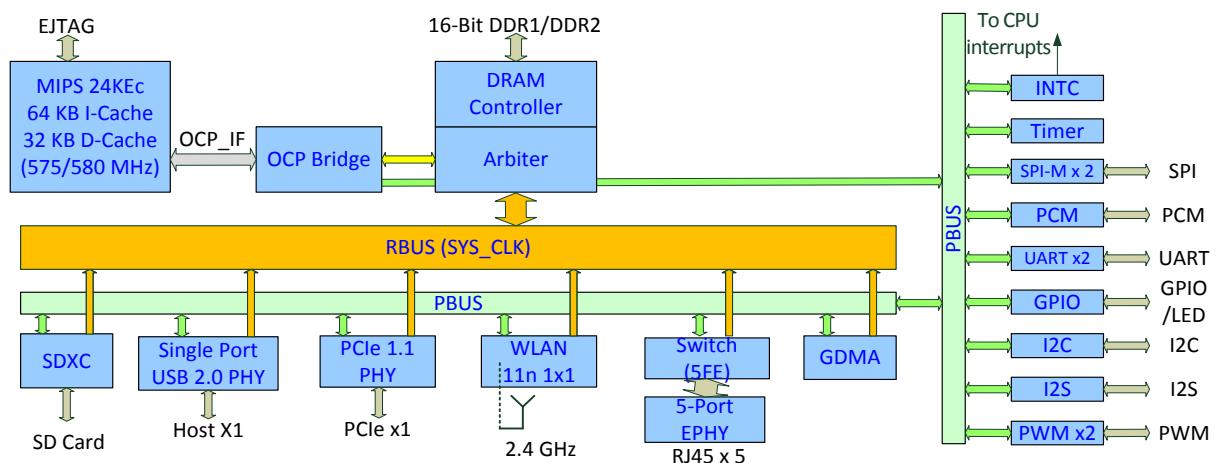


Figure 1-2 IoT Gateway Mode Functional Block Diagram

2. Main Features

The following table covers the main features offered by the MT7688KN and MT7688AN. Overall, the MT7688KN supports the requirements of an entry-level AP/router, while the more advanced MT7688AN supports a number of interfaces together with a large maximum RAM capacity.

Features	MT7688KN	MT7688AN
CPU	MIPS24KEc (580 MHz)	MIPS24KEc (580 MHz)
Total DMIPs	580 x 1.6 DMIPs	580 x 1.6 DMIPs
I-Cache, D-Cache	64 KB, 32 KB	64 KB, 32 KB
L2 Cache	n/a	n/a
Memory		
DRAM Device width support	16 bits	16 bits
DDR1	64 Mb (MCM), 193 MHz	2 Gb, 193 MHz
DDR2	n/a	2 Gb, 193 MHz
SPI Flash	3B addr mode (max 128Mbit) 4B addr mode (max 512Mbit)	3B addr mode (max 128Mbit) 4B addr mode (max 512Mbit)
SD	n/a	SD-XC (class 10)
RF	1T1R 802.11n 2.4 GHz	1T1R 802.11n 2.4 GHz
PCIe	1	1
USB 2.0	1	1
Switch	5p FE SW	5p FE SW
I2S	1	1
PCM	1	1
I2C	1	1
UART	2 (Lite)	2 (Lite)
JTAG	1	1
Package	DR-QFN120- 10 mm x 10 mm	DR-QFN156- 12 mm x 12 mm

Table 2-1 Main Features

3. Pins

3.1 MT7688AN DR-QFN (12 mm x 12 mm) 156-Pin Package Diagram

3.1.1 Up-left side

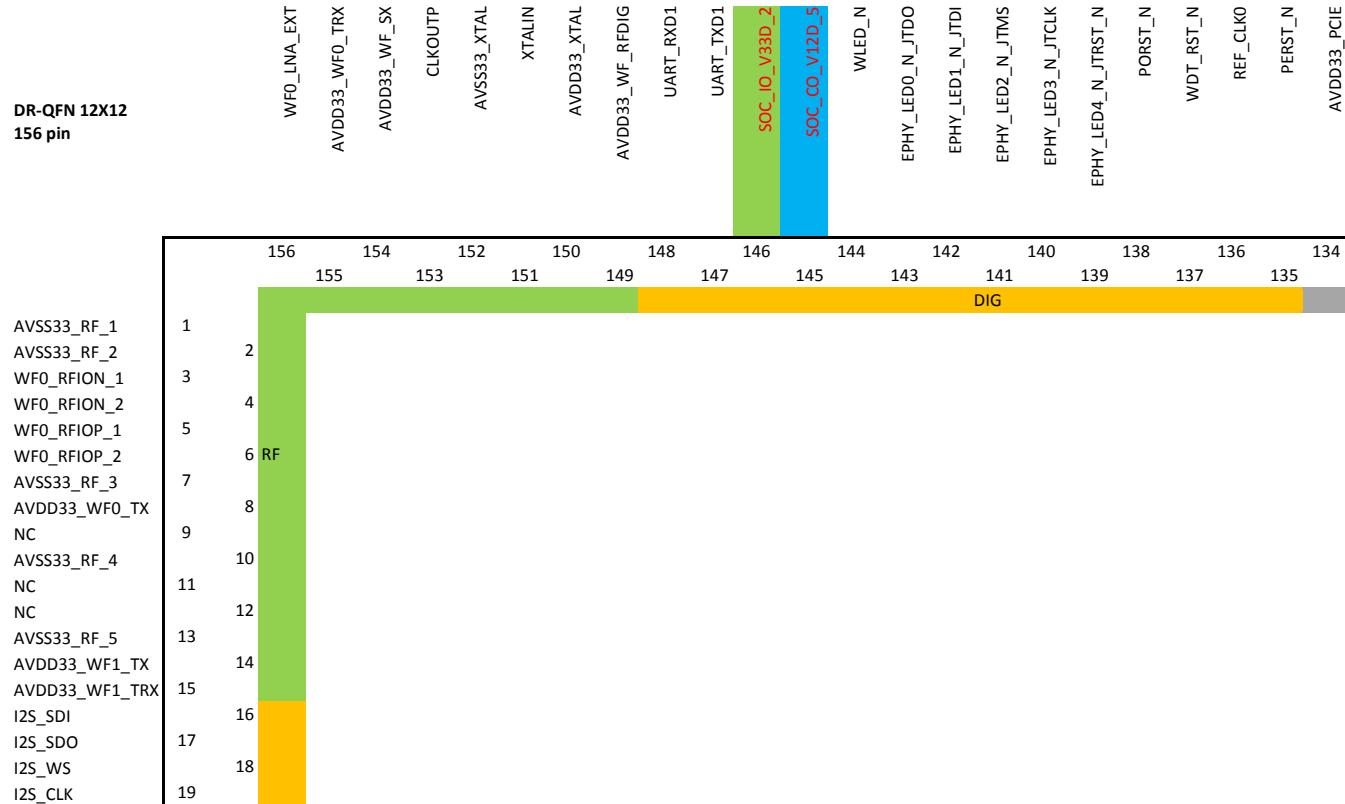


Figure 3-1 MT7688AN DR-QFN Pin Diagram (up-left view)

3.1.2 Down-left side

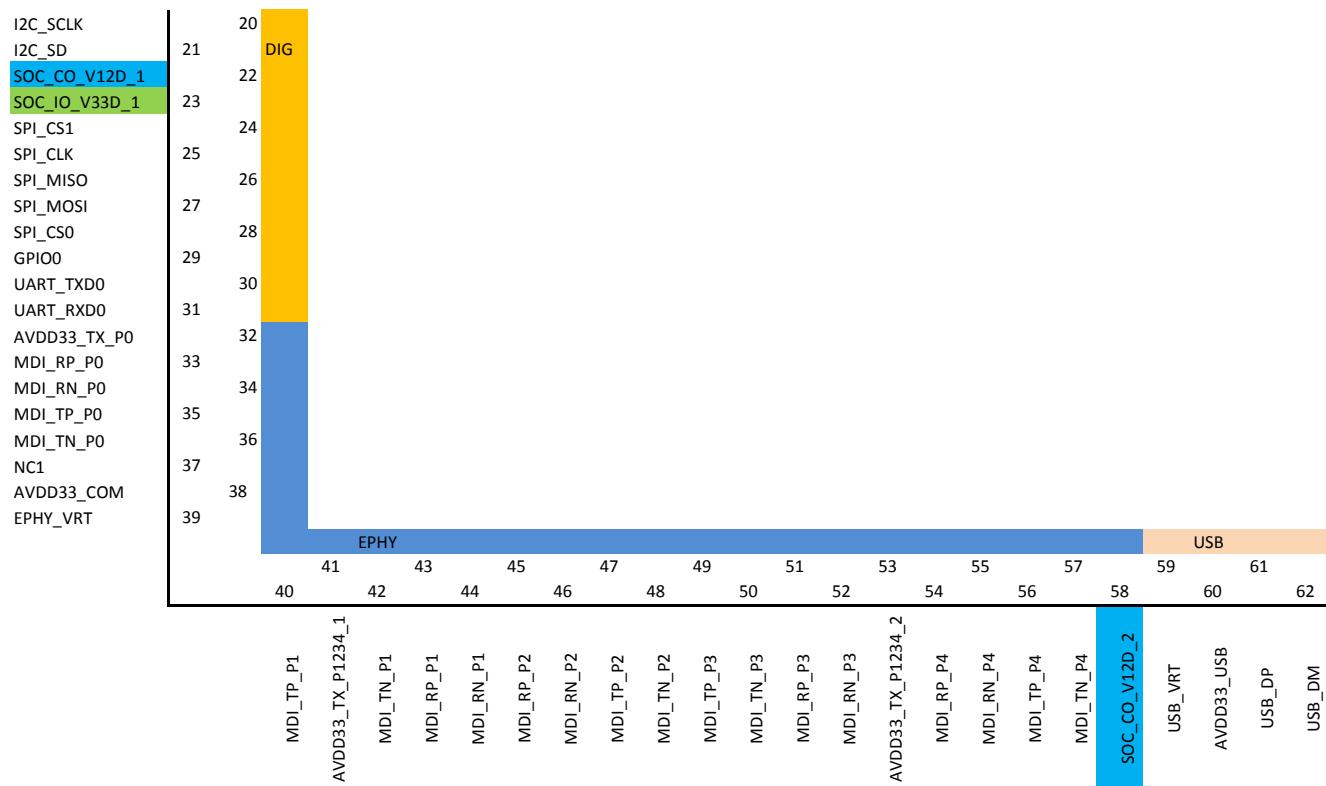


Figure 3-2 MT7688AN DR-QFN Pin Diagram (down-left view)

3.1.3 Down-right side

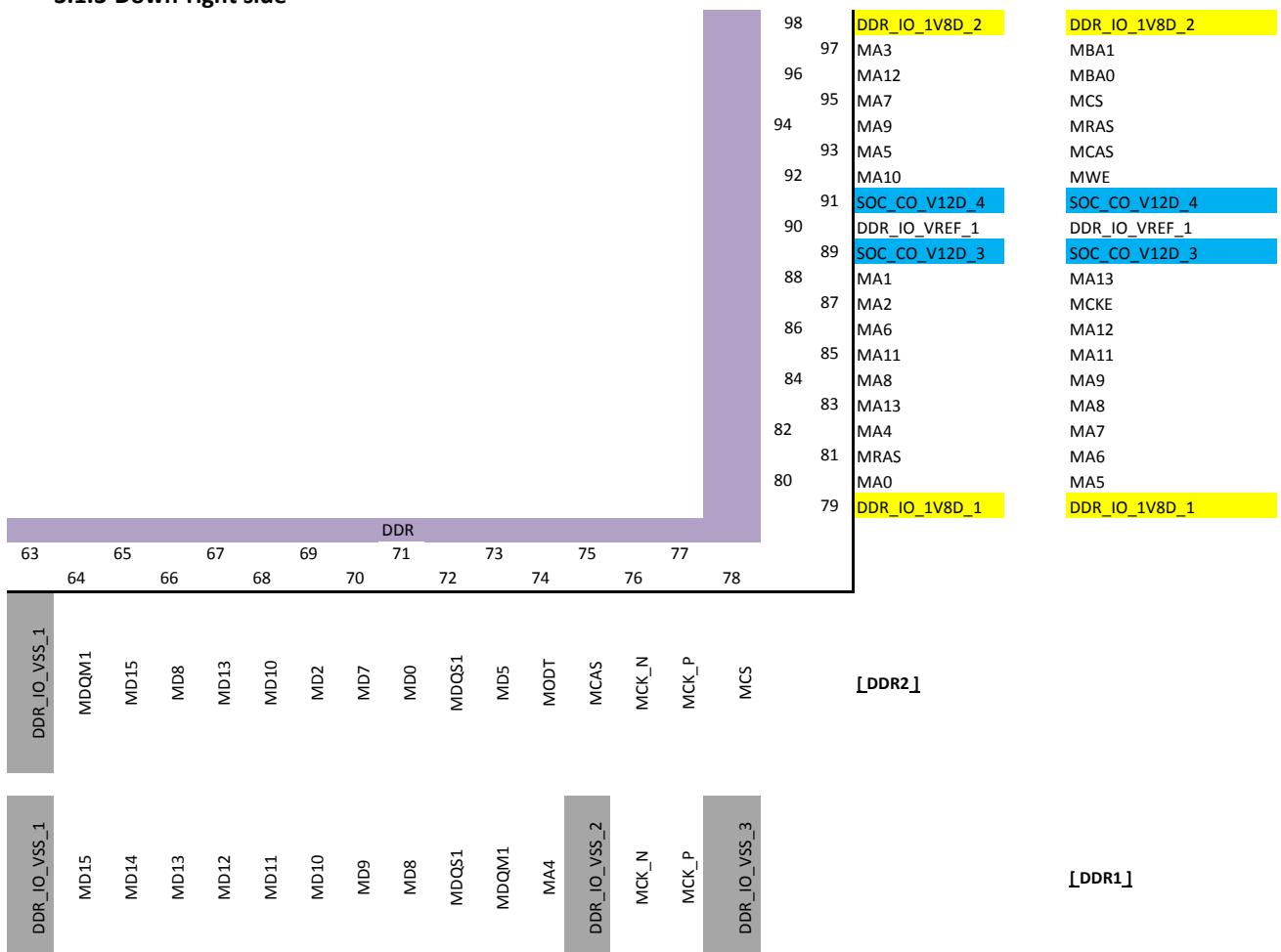


Figure 3-3 MT7688AN DR-QFN Pin Diagram (down-right view)

Note: DR-QFN support DDR1 and DDR2 pin shuffle depend on the bootstrap.

3.1.4 Up-right side

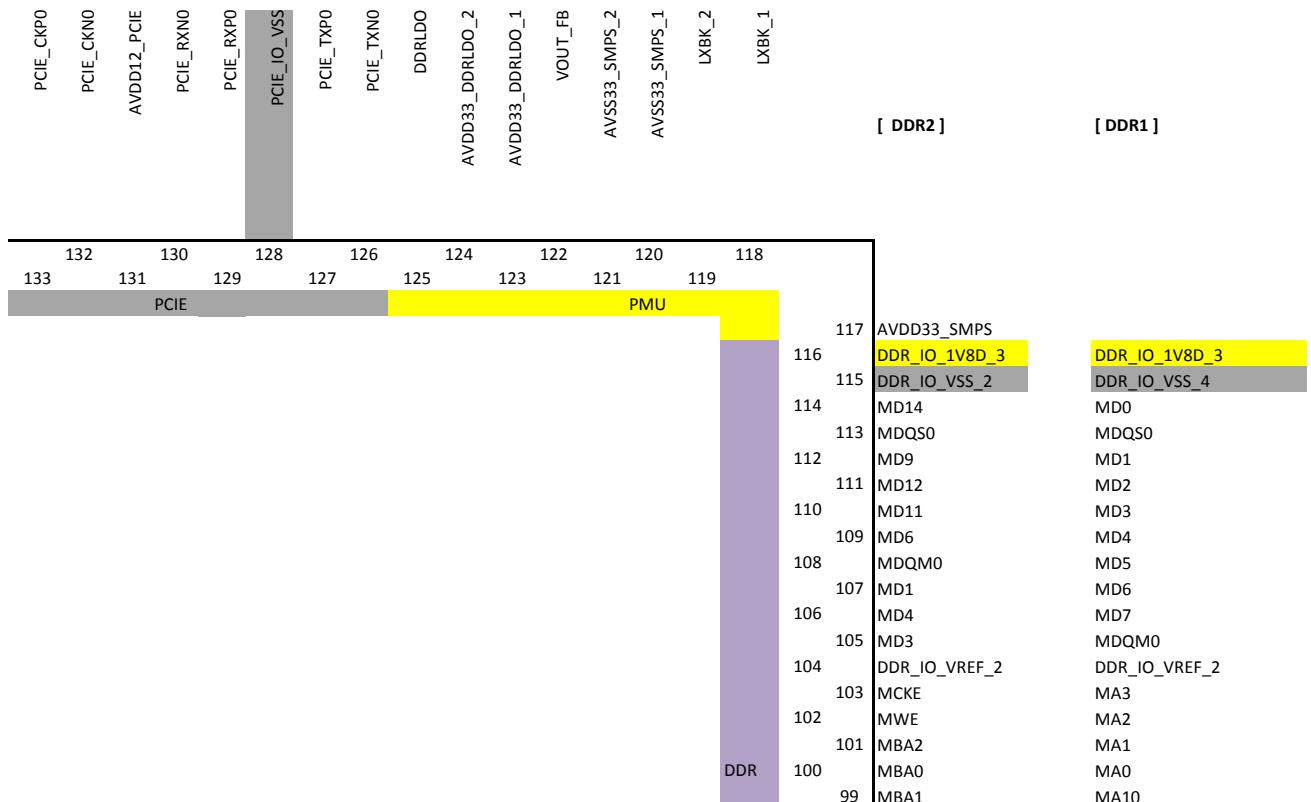


Figure 3-4 MT7688AN DR-QFN Pin Diagram (up-right view)

3.1.5 Pin Description

Pins	Name	Type	Driv.	Description
RF				
3,4	WF0_RFION_1 WF0_RFION_2	A		WF0 main path RF I/O
5,6	WF0_RFIOP_1 WF0_RFIOP_2	A		WF0 main path RF I/O
11	NC			
12	NC			
9	NC			
156	WF0_LNA_EXT	A		WF0 aux. path LNA input
151	XTALIN	I		Crystal oscillator input
153	CLKOUTP	O		XO reference clock output
150	AVDD33_XTA	P		3.3V XTAL Power Supply Pin
152	AVSS33_XTAL	G		3.3V XTAL Ground Pin
8	AVDD33_WF0_TX	P		3.3V RF Channel 0 Supply Power
14	AVDD33_WF1_TX	P		3.3V RF Channel 1 Supply Power
15	AVDD33_WF1_TRX	P		1.65V to 3.3V RF Channel 1 Supply Power
149	AVDD33_WF_RFDIG	P		1.65V to 3.3V RF DIG and AFE Supply Power
154	AVDD33_WF_SX	P		1.65V to 3.3V RF Supply Power
155	AVDD33_WF0_TRX	P		1.65V to 3.3V RF Channel 0 Supply Power
1,2 7, 10,13	AVSS33_RF	G		3.3V RF Shielding Ground Pin
WLAN LED				
144	WLED_N	O	4 mA	WLAN Activity LED
UART0 Lite				
31	RXD0	I	4 mA	UART0 Lite RXD
30	TXD0	O, IPD	4 mA	UART0 Lite TXD
UART1 Lite				
147	TXD1	O, IPU	4 mA	UART1 Lite TXD
148	RXD1	I	4 mA	UART1 Lite RXD
I2S				
16	I2S_SDI	I	4 mA	I2S data input
17	I2S_SDO	O, IPD	4 mA	I2S data output
18	I2S_WS	I/O	4 mA	I2S word select
19	I2S_CLK	I/O	4 mA	I2S clock
I2C				
21	I2C_SD	I/O	4 mA	I2C Data
20	I2C_SCLK	I/O	4 mA	I2C Clock
SPI				
26	SPI_MISO	I/O	4 mA	SPI Master input/Slave output
27	SPI_MOSI	I/O, IPD	4 mA	SPI Master output/Slave input
25	SPI_CLK	O, IPU	4 mA	SPI clock
28	SPI_CS0	O	4 mA	SPI chip select0
24	SPI_CS1	O, IPD	4 mA	SPI chip select1

Pins	Name	Type	Driv.	Description
GPIO				
29	GPIO0	I/O, IPD	4 mA	General Purpose I/O
5-Port EPHY				
143	EPHY_LED0_N_JTDO	I/O	4 mA	10/100 PHY Port #0 activity LED, JTAG_TDO
142	EPHY_LED1_N_JTDI	I/O	4 mA	10/100 PHY Port #1 activity LED, JTAG_TDI
141	EPHY_LED2_N_JTMS	I/O	4 mA	10/100 PHY Port #2 activity LED, JTAG_TMS
140	EPHY_LED3_N_JTCLK	I/O	4 mA	10/100 PHY Port #3 activity LED, JTAG_CLK
139	EPHY_LED4_N_JTRST_N	I/O,	4 mA	10/100 PHY Port #4 activity LED, JTAG_TRST_N
39	EPHY_VRT	A		Connect to an external resistor to provide accurate bias current
33	MDI_RP_P0	A		10/100 PHY Port #0 RXP
34	MDI_RN_P0	A		10/100 PHY Port #0 RXN
35	MDI_TP_P0	A		10/100 PHY Port #0 TXP
36	MDI_TN_P0	A		10/100 PHY Port #0 TXN
40	MDI_TP_P1	A		General purpose IO (SD-XC, eMMC...etc)
42	MDI_TN_P1	A		General purpose IO (SD-XC, eMMC...etc)
43	MDI_RP_P1	A		General purpose IO (SD-XC, eMMC...etc)
44	MDI_RN_P1	A		General purpose IO (SD-XC, eMMC...etc)
45	MDI_RP_P2	A		General purpose IO (SD-XC, eMMC...etc)
46	MDI_RN_P2	A		General purpose IO (SD-XC, eMMC...etc)
47	MDI_TP_P2	A		General purpose IO (SD-XC, eMMC...etc)
48	MDI_TN_P2	A		General purpose IO (SD-XC, eMMC...etc)
49	MDI_TP_P3	A		General purpose IO (SD-XC, eMMC...etc)
50	MDI_TN_P3	A		General purpose IO (SD-XC, eMMC...etc)
51	MDI_RP_P3	A		General purpose IO (SD-XC, eMMC...etc)
52	MDI_RN_P3	A		General purpose IO (SD-XC, eMMC...etc)
54	MDI_RP_P4	A		General purpose IO (SD-XC, eMMC...etc)
55	MDI_RN_P4	A		General purpose IO (SD-XC, eMMC...etc)
56	MDI_TP_P4	A		General purpose IO (SD-XC, eMMC...etc)
57	MDI_TN_P4	A		General purpose IO (SD-XC, eMMC...etc)
32	AVDD33_TX_P0	P		3.3V Supply Power for P0
38	AVDD33_COM	P		3.3V Supply Power for EPHY COM
41, 53	AVDD33_TX_P1234_1 AVDD33_TX_P1234_2	P		3.3V Supply Power for P1 ~ P4
Misc.				
136	REF_CLKO	O, IPD	4 mA	Reference Clock Output
138	PORST_N	I, IPU	4 mA	Power on reset
137	WDT_RST_N	O	4 mA	Watchdog timeout reset
USB PHY				
60	AVDD33_USB	P		3.3 V USB PHY analog power supply
59	USB_VRT	I/O		Connect to an external 5.1 kΩ resistor for band-gap reference circuit
62	USB_DM	I/O		USB Port0 data pin Data-
61	USB_DP	I/O		USB Port0 data pin Data+

Pins	Name	Type	Drv.	Description
PCIe PHY				
135	PERST_N	O, IPD	4mA	PCIe device reset
134	AVDD33_PCIE	P		3.3 V PCIe PHY analog power supply
131	AVDD12_PCIE	P		1.2 V PCIe PHY digital power supply
128	PCIE_IO_VSS	G		PCIe PHY Ground Pin
133	PCIE_CKPO	I/O		External reference clock output (positive)
132	PCIE_CKNO	I/O		External reference clock output (negative)
127	PCIE_TXPO	I/O		PCIe0 differential transmit TX +
126	PCIE_TXNO	I/O		PCIe0 differential transmit TX -
129	PCIE_RXPO	I/O		PCIe0 differential receiver RX +
130	PCIE_RXNO	I/O		PCIe0 differential receiver RX -
DDR2				
65	MD15	I/O	8 mA	DDR2 Data bit #15
114	MD14	I/O	8 mA	DDR2 Data bit #14
67	MD13	I/O	8 mA	DDR2 Data bit #13
111	MD12	I/O	8 mA	DDR2 Data bit #12
110	MD11	I/O	8 mA	DDR2 Data bit #11
68	MD10	I/O	8 mA	DDR2 Data bit #10
112	MD9	I/O	8 mA	DDR2 Data bit #9
66	MD8	I/O	8 mA	DDR2 Data bit #8
70	MD7	I/O	8 mA	DDR2 Data bit #7
109	MD6	I/O	8 mA	DDR2 Data bit #6
73	MD5	I/O	8 mA	DDR2 Data bit #5
106	MD4	I/O	8 mA	DDR2 Data bit #4
105	MD3	I/O	8 mA	DDR2 Data bit #3
69	MD2	I/O	8 mA	DDR2 Data bit #2
107	MD1	I/O	8 mA	DDR2 Data bit #1
71	MD0	I/O	8 mA	DDR2 Data bit #0
83	MA13	O	8 mA	DDR2 Address bit #13
96	MA12	O	8 mA	DDR2 Address bit #12
85	MA11	O	8 mA	DDR2 Address bit #11
92	MA10	O	8 mA	DDR2 Address bit #10
94	MA9	O	8 mA	DDR2 Address bit #9
84	MA8	O	8 mA	DDR2 Address bit #8
95	MA7	O	8 mA	DDR2 Address bit #7
86	MA6	O	8 mA	DDR2 Address bit #6
93	MA5	O	8 mA	DDR2 Address bit #5
82	MA4	O	8 mA	DDR2 Address bit #4
97	MA3	O	8 mA	DDR2 Address bit #3
87	MA2	O	8 mA	DDR2 Address bit #2
88	MA1	O	8 mA	DDR2 Address bit #1
80	MA0	O	8 mA	DDR2 Address bit #0
101	MBA2	O	8 mA	DDR2 MBA #2
99	MBA1	O	8 mA	DDR2 MBA #1

Pins	Name	Type	Driv.	Description
100	MBA0	O	8 mA	DDR2 MBA #0
74	MODT	O	8 mA	DDR2 ODT
81	MRAS	O	8 mA	DDR2 MRAS_N
75	MCAS	O	8 mA	DDR2 MCAS_N
102	MWE	O	8 mA	DDR2 MWE_N
77	MCK_P	O	8 mA	DDR2 MCK_P
76	MCK_N	O	8 mA	DDR2 MCK_N
64	MDQM1	O	8 mA	DDR2 MDQM#1
108	MDQM0	O	8 mA	DDR2 MDQM#0
78	MCS	O	8 mA	DDR2 MCS
72	MDQS1	I/O	8 mA	DDR2 MDQS#1
113	MDQS0	I/O	8 mA	DDR2 MDQS#0
103	MCKE	O	8 mA	DDR2 MCKE
63	DDR_IO_VSS_1	G		DDR IO Ground pins
115	DDR_IO_VSS_2			
79	DDR_IO_1V8D_1	P		DDR IO Supply power
98	DDR_IO_1V8D_2			
116	DDR_IO_1V8D_3			
90	DDR_IO_VREF_1	A		DDR reference voltage
104	DDR_IO_VREF_2			
DDR1				
64	MD15	I/O	8 mA	DDR1 Data bit #15
65	MD14	I/O	8 mA	DDR1 Data bit #14
66	MD13	I/O	8 mA	DDR1 Data bit #13
67	MD12	I/O	8 mA	DDR1 Data bit #12
68	MD11	I/O	8 mA	DDR1 Data bit #11
69	MD10	I/O	8 mA	DDR1 Data bit #10
70	MD9	I/O	8 mA	DDR1 Data bit #9
71	MD8	I/O	8 mA	DDR1 Data bit #8
106	MD7	I/O	8 mA	DDR1 Data bit #7
107	MD6	I/O	8 mA	DDR1 Data bit #6
108	MD5	I/O	8 mA	DDR1 Data bit #5
109	MD4	I/O	8 mA	DDR1 Data bit #4
110	MD3	I/O	8 mA	DDR1 Data bit #3
111	MD2	I/O	8 mA	DDR1 Data bit #2
112	MD1	I/O	8 mA	DDR1 Data bit #1
114	MD0	I/O	8 mA	DDR1 Data bit #0
88	MA13	O	8 mA	DDR1 Address bit #13
86	MA12	O	8 mA	DDR1 Address bit #12
85	MA11	O	8 mA	DDR1 Address bit #11
99	MA10	O	8 mA	DDR1 Address bit #10
84	MA9	O	8 mA	DDR1 Address bit #9
83	MA8	O	8 mA	DDR1 Address bit #8
82	MA7	O	8 mA	DDR1 Address bit #7
81	MA6	O	8 mA	DDR1 Address bit #6

Pins	Name	Type	Driv.	Description
80	MA5	O	8 mA	DDR1 Address bit #5
74	MA4	O	8 mA	DDR1 Address bit #4
103	MA3	O	8 mA	DDR1 Address bit #3
102	MA2	O	8 mA	DDR1 Address bit #2
101	MA1	O	8 mA	DDR1 Address bit #1
100	MA0	O	8 mA	DDR1 Address bit #0
97	MBA1	O	8 mA	DDR1 MBA #1
96	MBA0	O	8 mA	DDR1 MBA #0
94	MRAS	O	8 mA	DDR1 MRAS_N
93	MCAS	O	8 mA	DDR1 MCAS_N
92	MWE	O	8 mA	DDR1 MWE_N
77	MCK_P	O	8 mA	DDR1 MCK_P
76	MCK_N	O	8 mA	DDR1 MCK_N
73	MDQM1	O	8 mA	DDR1 MDQM#1
105	MDQM0	O	8 mA	DDR1 MDQM#0
95	MCS	O	8 mA	DDR1 MCS
72	MDQS1	I/O	8 mA	DDR1 MDQS#1
113	MDQS0	I/O	8 mA	DDR1 MDQS#0
87	MCKE	O	8 mA	DDR1 MCKE
63	DDR_IO_VSS_1	G		DDR IO Ground pins
75	DDR_IO_VSS_2			
78	DDR_IO_VSS_3			
115	DDR_IO_VSS_4			
79	DDR_IO_1V8D_1	P		DDR IO Supply power
98	DDR_IO_1V8D_2			
116	DDR_IO_1V8D_3			
90	DDR_IO_VREF_1	A		DDR reference voltage
104	DDR_IO_VREF_2			
PMU				
118	LXBK_1	O		Buck Switching node
119	LXBK_2			
122	VOUT_FB	A		Buck vout feedback pin
117	AVDD33_SMPS	P		Buck 3.3V Supply power
120	AVSS33_SMPS_1	G		Buck Gound pin
121	AVSS33_SMPS_2			
123	AVDD33_DDRRLDO_1	P		DDRRLDO 3.3V Supply power
124	AVDD33_DDRRLDO_2			
125	DDRRLDO	O		DDRRLDO 1.8V/2.5V output voltage
Power				
23	SOC_IO_V33D_1	P		3.3 V digital I/O power supply
146	SOC_IO_V33D_2			
22	SOC_CO_V12D_1	P		1.2 V digital core power supply
58	SOC_CO_V12D_2			
89	SOC_CO_V12D_3			
91	SOC_CO_V12D_4			
145	SOC_CO_V12D_5			
EPAD	GND	G		Ground pin

Pins	Name	Type	Driv.	Description
------	------	------	-------	-------------

Total: 156 pins

Note:

IPD : Internal pull-down

IPU : Internal pull-up

I : Input

O : Output

IO : Bi-directional

P : Power

G : Ground

NC : Not connected

3.2 MT7688KN DR-QFN (10 mm x 10 mm) 120-Pin Package Diagram

3.2.1 Left side vie

DR-QFN 10X10
120 pin

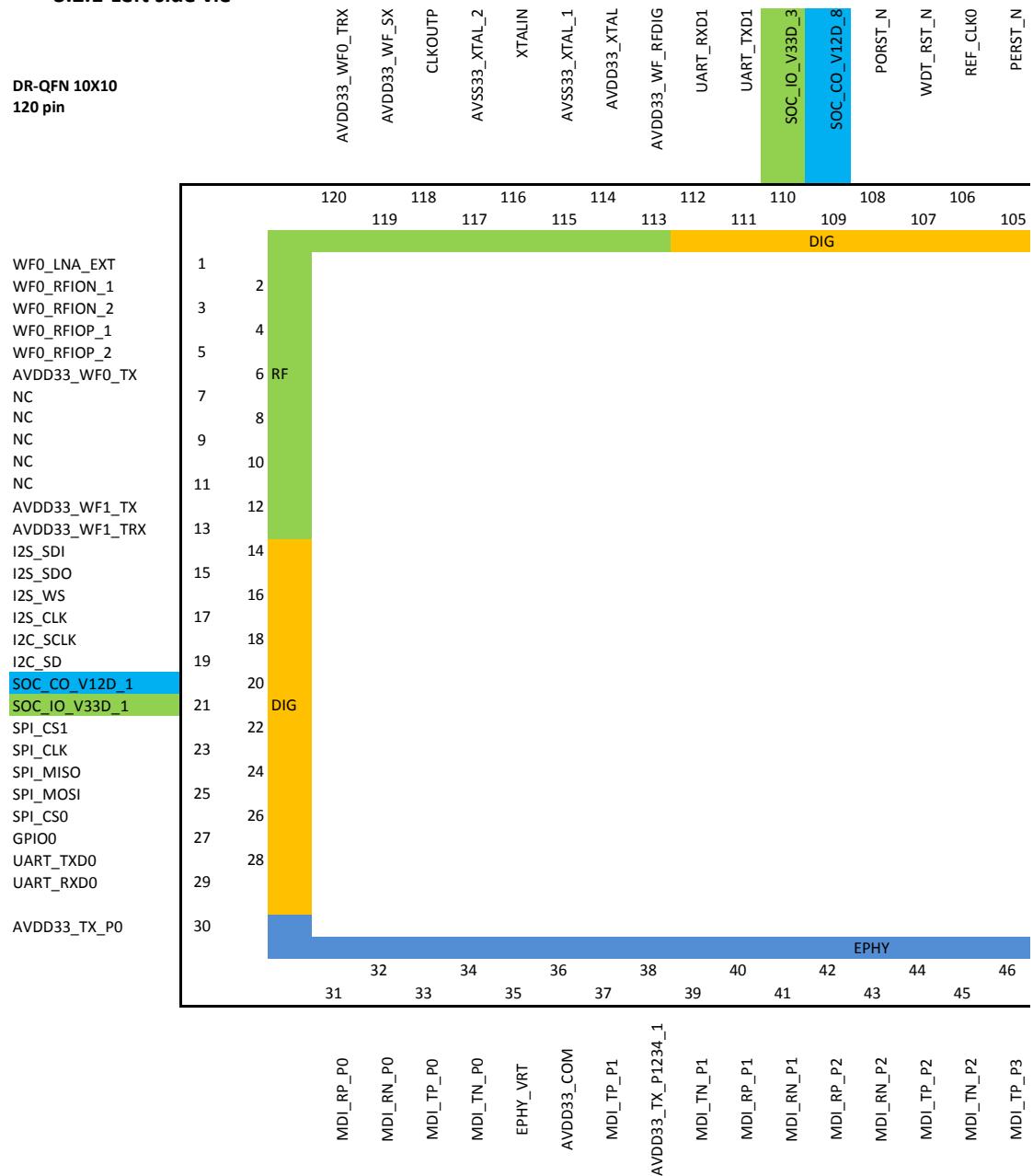


Figure 3-5 MT7688KN DR-QFN Pin Diagram (left view)

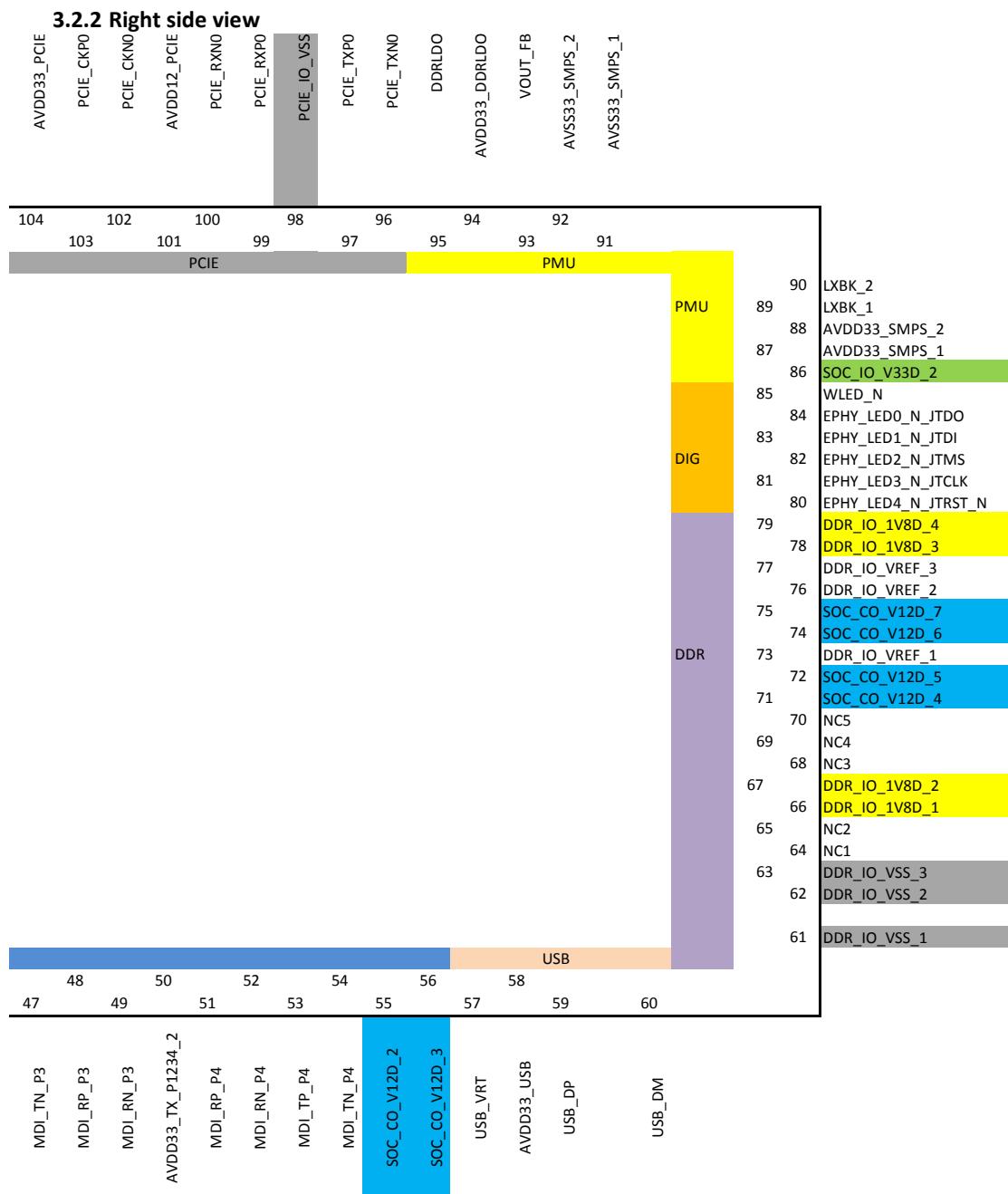


Figure 3-6 MT7688KN DR-QFN Pin Diagram (right side view)

3.2.3 Pin Description

Pins	Name	Type	Driv.	Description
RF				
2	WF0_RFION_1	A		WF0 main path RF I/O
3	WF0_RFION_2			
4	WF0_RFIOP_1	A		WF0 main path RF I/O
5	WF0_RFIOP_2			
8	NC			
9	NC			
10	NC			
11	NC			
7	NC			
1	WF0_LNA_EXT	A		WF0 aux. path LNA input
116	XTALIN	I		Crystal oscillator input
118	CLKOUTP	O		XO reference clock output
114	AVDD33_XTAL	P		3.3V XTAL Power Supply Pin
115	AVS33_XTAL_1	G		3.3V XTAL Ground Pin
117	AVS33_XTAL_2			
6	AVDD33_WF0_TX	P		3.3V RF Channel 0 Supply Power
12	AVDD33_WF1_TX	P		3.3V RF Channel 1 Supply Power
13	AVDD33_WF1_TRX	P		1.65V to 3.3V RF Channel 1 Supply Power
113	AVDD33_WF_RFDIG	P		1.65V to 3.3V RF DIG and AFE Supply Power
119	AVDD33_WF_SX	P		1.65V to 3.3V RF Supply Power
120	AVDD33_WF0_TRX	P		1.65V to 3.3V RF Channel 0 Supply Power
WLAN LED				
85	WLED_N	O	4 mA	WLAN Activity LED
UART0 Lite				
28	TXD0	O, IPD	4 mA	UART0 Lite TXD
29	RXD0	I		UART0 Lite RXD
UART1 Lite				
111	TXD1	O, IPU	4 mA	UART1 Lite TXD
112	RXD1	I		UART1 Lite RXD
I2S				
14	I2S_SDI	I/O	4 mA	I2S data input
15	I2S_SDO	O, IPD	4 mA	I2S data output
16	I2S_WS	I/O	4 mA	I2S word select
17	I2S_CLK	I/O	4 mA	I2S clock
I2C				
19	I2C_SD	I/O	4 mA	I2C Data
18	I2C_SCLK	I/O	4 mA	I2C Clock
SPI				
24	SPI_MISO	I/O	4 mA	SPI Master input/Slave output
25	SPI_MOSI	I/O, IPD	4 mA	SPI Master output/Slave input
23	SPI_CLK	O, IPU	4 mA	SPI clock
26	SPI_CS0	O	4 mA	SPI chip select0

Pins	Name	Type	Driv.	Description
22	SPI_CS1	O, IPD	4 mA	SPI chip select1
GPIO				
27	GPIO0	I/O, IPD	4 mA	General Purpose I/O
5-Port EPHY				
84	EPHY_LED0_N_JTDO	I/O	4 mA	10/100 PHY Port #0 activity LED, JTAG_TDO
83	EPHY_LED1_N_JTDI	I/O	4 mA	10/100 PHY Port #1 activity LED, JTAG_TDI
82	EPHY_LED2_N_JTMS	I/O	4 mA	10/100 PHY Port #2 activity LED, JTAG_TMS
81	EPHY_LED3_N_JTCLK	I/O	4 mA	10/100 PHY Port #3 activity LED, JTAG_CLK
80	EPHY_LED4_N_JTRST_N	I/O,	4 mA	10/100 PHY Port #4 activity LED, JTAG_TRST_N
35	EPHY_VRT	A		Connect to an external resistor to provide accurate bias current
31	MDI_RP_P0	A		10/100 PHY Port #0 RXP
32	MDI_RN_P0	A		10/100 PHY Port #0 RXN
33	MDI_TP_P0	A		10/100 PHY Port #0 TXP
34	MDI_TN_P0	A		10/100 PHY Port #0 TXN
37	MDI_TP_P1	A		General purpose IO (SD-XC, eMMC...etc)
39	MDI_TN_P1	A		General purpose IO (SD-XC, eMMC...etc)
40	MDI_RP_P1	A		General purpose IO (SD-XC, eMMC...etc)
41	MDI_RN_P1	A		General purpose IO (SD-XC, eMMC...etc)
42	MDI_RP_P2	A		General purpose IO (SD-XC, eMMC...etc)
43	MDI_RN_P2	A		General purpose IO (SD-XC, eMMC...etc)
44	MDI_TP_P2	A		General purpose IO (SD-XC, eMMC...etc)
45	MDI_TN_P2	A		General purpose IO (SD-XC, eMMC...etc)
46	MDI_TP_P3	A		General purpose IO (SD-XC, eMMC...etc)
47	MDI_TN_P3	A		General purpose IO (SD-XC, eMMC...etc)
48	MDI_RP_P3	A		General purpose IO (SD-XC, eMMC...etc)
49	MDI_RN_P3	A		General purpose IO (SD-XC, eMMC...etc)
51	MDI_RP_P4	A		General purpose IO (SD-XC, eMMC...etc)
52	MDI_RN_P4	A		General purpose IO (SD-XC, eMMC...etc)
53	MDI_TP_P4	A		General purpose IO (SD-XC, eMMC...etc)
54	MDI_TN_P4	A		General purpose IO (SD-XC, eMMC...etc)
30	AVDD33_TX_P0	P		3.3V Supply Power for P0
36	AVDD33_COM	P		3.3V Supply Power for EPHY COM
38	AVDD33_TX_P1234_1	P		3.3V Supply Power for P1 ~ P4
50	AVDD33_TX_P1234_2			
Misc.				
106	REF_CLKO	O, IPD	4 mA	Reference Clock Output
108	PORST_N	I		Power on reset
107	WDT_RST_N	O	4 mA	Watchdog Reset
USB PHY				
58	AVDD33_USB	P		3.3 V USB PHY analog power supply
57	USB_VRT	A		Connect to an external 5.1 kΩ resistor for band-gap reference circuit

Pins	Name	Type	Driv.	Description
60	USB_DM	I/O		USB Port0 data pin Data-
59	USB_DP	I/O		USB Port0 data pin Data+
PCIe PHY				
105	PERST_N	O, IPD	4mA	PCIe device reset
98	PCIE_IO_VSS	G		PCIe Ground pin
101	AVDD12_PCIE	P		1.2 V PCIe PHY digital power supply
104	AVDD33_PCIE	P		3.3 V PCIe PHY analog power supply
103	PCIE_CKPO	O		External reference clock output (positive)
102	PCIE_CKNO	O		External reference clock output (negative)
97	PCIE_TXPO	I/O		PCIe0 differential transmit TX +
96	PCIE_TXNO	I/O		PCIe0 differential transmit TX -
99	PCIE_RXPO	I/O		PCIe0 differential receiver RX +
100	PCIE_RXNO	I/O		PCIe0 differential receiver RX -
PMU				
89	LXBK_1	O		Buck Switching node
90	LXBK_2			
93	VOUT_FB	A		Buck vout feedback pin
87	AVDD33_SMPS_1	P		Buck 3.3V Supply power
88	AVDD33_SMPS_2			
91	AVSS33_SMPS_1	G		Buck Ground pin
92	AVSS33_SMPS_2			
94	AVDD33_DDRLD0	P		DDR LD0 3.3V Supply power
95	DDR LD0	O		DDR LD0 1.8V/2.5V output voltage
Power/Ground				
21	SOC_IO_V33D_1	P		3.3 V digital I/O power supply
86	SOC_IO_V33D_2			
110	SOC_IO_V33D_3			
61	DDR_IO_VSS_1	G		DDR IO Ground pins
62	DDR_IO_VSS_2	G		DDR IO Ground pins
63	DDR_IO_VSS_3	G		DDR IO Ground pins
66	DDR_IO_1V8D_1	P		DDR IO 1.8V Supply power
67	DDR_IO_1V8D_2	P		DDR IO 1.8V Supply power
78	DDR_IO_1V8D_3	P		DDR IO 1.8V Supply power
79	DDR_IO_1V8D_4	P		DDR IO 1.8V Supply power
73	DDR_IO_VREF_1	A		DDR reference voltage
76	DDR_IO_VREF_2	A		DDR reference voltage
77	DDR_IO_VREF_3	A		DDR reference voltage
20	SOC_CO_V12D_1	P		1.2 V digital core power supply
55	SOC_CO_V12D_2			
56	SOC_CO_V12D_3			
71	SOC_CO_V12D_4			
72	SOC_CO_V12D_5			
74	SOC_CO_V12D_6			
75	SOC_CO_V12D_7			
109	SOC_CO_V12D_8			
EPAD	GND	G		Ground pin
NC				

Pins	Name	Type	Drv.	Description
64	NC_1	NC		No connected
65	NC_2			
68	NC_3			
69	NC_4			
70	NC_5			

Total: 120 pins

Note:

IPD : Internal pull-down
 IPU : Internal pull-up
 I : Input
 O : Output
 IO : Bi-directional
 P : Power
 G : Ground
 NC : Not connected

3.3 Pin Sharing Schemes

Some pins are shared with GPIO to provide maximum flexibility for system designers. The MT7688 provides up to 41 GPIO pins. Users can configure GPIO1_MODE and GPIO2_MODE registers in the System Control block to specify the pin function, or they can use the registers specified below. For more information, see the Programmer's Guide. Unless specified explicitly, all the GPIO pins are in input mode after reset.

3.3.1 GPIO pin share scheme

I/O Pad Group	Normal Mode	GPIO Mode
UART1	UART_RXD1	GPIO#46
	UART_TXD1	GPIO#45
WLED_AN	WLED_N (7688AN)	GPIO#44
P0_LED_AN	EPHY_LED0_N_JTDO (7688AN)	GPIO#43
P1_LED_AN	EPHY_LED1_N_JTDI (7688AN)	GPIO#42
P2_LED_AN	EPHY_LED2_N_JTMS (7688AN)	GPIO#41
P3_LED_AN	EPHY_LED3_N_JTCLK (7688AN)	GPIO#40
P4_LED_AN	EPHY_LED4_N_JTRST_N (7688AN)	GPIO#39
WDT	WDT_RST_N	GPO#38
REFCLK	REF_CLKO	GPIO#37
PERST	PERST_N	GPIO#36
WLED_KN	WLED_N (7688KN)	GPIO#35
P0_LED_KN	EPHY_LED0_N_JTDO (7688KN)	GPIO#34
P1_LED_KN	EPHY_LED1_N_JTDI (7688KN)	GPIO#33
P2_LED_KN	EPHY_LED2_N_JTMS (7688KN)	GPIO#32
P3_LED_KN	EPHY_LED3_N_JTCLK (7688KN)	GPIO#31
P4_LED_KN	EPHY_LED4_N_JTRST_N (7688KN)	GPIO#30
SD / eMMC	MDI_TN_P4	GPIO#29
	MDI_TP_P4	GPIO#28
	MDI_RN_P4	GPIO#27
	MDI_RP_P4	GPIO#26
	MDI_RN_P3	GPIO#25
	MDI_RP_P3	GPIO#24
	MDI_TN_P3	GPIO#23

I/O Pad Group	Normal Mode	GPIO Mode
	MDI_TP_P3	GPIO#22
UART2 / eMMC	MDI_TN_P2	GPIO#21
	MDI_TP_P2	GPIO#20
PWM1 / eMMC	MDI_RN_P2	GPO#19
PWM0 / eMMC	MDI_RP_P2	GPO#18
SPIS	MDI_RN_P1	GPIO#17
	MDI_RP_P1	GPIO#16
	MDI_TN_P1	GPO#15
	MDI_TP_P1	GPIO#14
UART0	UART_RXD0	GPIO#13
	UART_TXD0	GPIO#12
GPIO	GPIO0	GPIO#11
SPI	SPI_CS0	GPIO#10
	SPI_MISO	GPIO#9
	SPI莫斯	GPIO#8
	SPI_CLK	GPIO#7
SPI_CS1	SPI_CS1	GPIO#6
I2C	I2C_SD	GPO#5
	I2C_SCLK	GPO#4
I2S	I2S_CLK	GPIO#3
	I2S_WS	GPIO#2
	I2S_SDO	GPIO#1
	I2S_SDI	GPO#0

3.3.2 UART1 pin share scheme

Controlled by the UART1_MODE register.

Pin Name	2'b00 UART-Lite #1	2'b01 GPIO	2'b10 PWM	2'b11 TRX_SW
UART1_RXD	UART1_RXD	GPIO#46	PWM_CH1	
UART1_TXD	UART1_TXD	GPIO#45	PWM_CH0	

3.3.3 MT7688AN EPHY LED pin share scheme

Controlled by the P#_LED_AN_MODE registers

Pin Name	Bootstrapping (DBG_JTAG_MODE=1)	Bootstrapping (DBG_JTAG_MODE=0)	
		P4_LED_AN_MODE =2'b00	P4_LED_AN_MODE =2'b01
EPHY_LED4_N_JTRST_N	JTAG_RST_N	EPHY_LED4_N	GPIO#39
		P3_LED_AN_MODE =2'b00	P3_LED_AN_MODE =2'b01
EPHY_LED3_N_JTCLK	JTAG_CLK	EPHY_LED3_N	GPIO#40
		P2_LED_AN_MODE =2'b00	P2_LED_AN_MODE =2'b01
EPHY_LED2_N_JTMS	JTAG_TMS	EPHY_LED2_N	GPIO#41

		P1_LED_AN_MODE =2'b00	P1_LED_AN_MODE =2'b01
EPHY_LED1_N_JTDI	JTAG_TDI	EPHY_LED1_N	GPIO#42
		P0_LED_AN_MODE =2'b00	P0_LED_AN_MODE =2'b01
EPHY_LED0_N_JTDO	JTAG_TDO	EPHY_LED0_N	GPIO#43

3.3.4 MT7688AN WLAN LED pin share scheme

Controlled by the WLED_AN_MODE registers

Pin Name	2'b00	2'b01
WLED_N	WLED_N	GPIO#44

3.3.5 MT7688KN EPHY LED pin share scheme

Controlled by the P#_LED_KN_MODE registers

Pin Name	Bootstrapping (DBG_JTAG_MODE=1)	Bootstrapping (DBG_JTAG_MODE=0)	
		P4_LED_KN_MODE =2'b00	P4_LED_KN_MODE =2'b01
EPHY_LED4_N_JTRST_N	JTAG_RST_N	EPHY_LED4_N	GPIO#30
		P3_LED_KN_MODE =2'b00	P3_LED_KN_MODE =2'b01
EPHY_LED3_N_JTCLK	JTAG_CLK	EPHY_LED3_N	GPIO#31
		P2_LED_KN_MODE =2'b00	P2_LED_KN_MODE =2'b01
EPHY_LED2_N_JTMS	JTAG_TMS	EPHY_LED2_N	GPIO#32
		P1_LED_KN_MODE =2'b00	P1_LED_KN_MODE =2'b01
EPHY_LED1_N_JTDI	JTAG_TDI	EPHY_LED1_N	GPIO#33
		P0_LED_KN_MODE =2'b00	P0_LED_KN_MODE =2'b01
EPHY_LED0_N_JTDO	JTAG_TDO	EPHY_LED0_N	GPIO#34

3.3.6 MT7688KN WLAN LED pin share scheme

Controlled by the WLED_KN_MODE registers

Pin Name	2'b00	2'b01
WLED_N	WLED_N	GPIO#35

3.3.7 PERST_N pin share scheme

Controlled by the PERST_MODE register.

Pin Name	1'b0	1'b1
PERST_N	PERST_N	GPIO#36

3.3.8 WDT_RST_N pin share scheme

Controlled by the WDT_MODE register.

Pin Name	1'b0	1'b1
WDT_RST_N	WDT_RST_N	GPIO#38

3.3.9 REF_CLKO pin share scheme

Controlled by the REFCLK_MODE register.

Pin Name	1'b0	1'b1
REF_CLKO	REF_CLKO	GPIO#37

3.3.10 UART0 pin share scheme

Controlled by the UART0_MODE register.

Pin Name	1'b0	1'b1
UART_TXD0	UART_TXD0	GPIO#12
UART_RXD0	UART_RXD0	GPIO#13

3.3.11 GPIO0 pin share scheme

Controlled by GPIO_MODE register.

Pin Name	2'b00	2'b01	2'b10	2'b11
GPIO0	GPIO#11	GPIO#11	REF_CLKO	PERST_N

3.3.12 SPI pin share scheme

Controlled by SPI_MODE register.

Pin Name	1'b0	1'b1
SPI_CLK	SPI_CLK	GPO#7
SPI_MOSI	SPI_MOSI	GPO#8
SPI_MISO	SPI_MISO	GPIO#9
SPI_CS0	SPI_CS0	GPIO#10

3.3.13 SPI_CS1 pin share scheme

Controlled by SPI_CS1_MODE register.

Pin Name	2'b00	2'b01	2'b10
SPI_CS1	SPI_CS1	GPIO#6	REF_CLKO

3.3.14 I2C pin share scheme

Controlled by I2C_MODE register.

Pin Name	2'b00	2'b01
I2C_SCLK	I2C_SCLK	GPIO#4
I2C_SD	I2C_SD	GPIO#5

3.3.15 I2S pin share scheme

Controlled by I2S_MODE register.

Pin Name	2'b00	2'b01	2'b10
I2S_SDI	I2S_SDI	GPIO#0	PCMDRX
I2S_SDO	I2S_SDO	GPIO#1	PCMDTX
I2S_WS	I2S_WS	GPIO#2	PCMCLK
I2S_CLK	I2S_CLK	GPIO#3	PCMFS

3.3.16 SD pin share scheme

Controlled by the EPHY_APGPIO_AIO_EN[4:1] and SD_MODE registers

Pin Name	EPHY_APGPIO_AIO_EN[4:1] =4'b0000	EPHY_APGPIO_AIO_EN[4:1] =4'b1111	SD_MODE =2'b00	SD_MODE =2'b01
MDI_TP_P3	MDI_TP_P3	SD_WP	GPIO#22	
MDI_TN_P3	MDI_TN_P3	SD_CD	GPIO#23	
MDI_RP_P3	MDI_RP_P3	SD_D1	GPIO#24	
MDI_RN_P3	MDI_RN_P3	SD_D0	GPIO#25	
MDI_RP_P4	MDI_RP_P4	SD_CLK	GPIO#26	
MDI_RN_P4	MDI_RN_P4	SD_CMD	GPIO#27	
MDI_TP_P4	MDI_TP_P4	SD_D3	GPIO#28	
MDI_TN_P4	MDI_TN_P4	SD_D2	GPIO#29	

3.3.17 eMMC pin share scheme

Controlled by the EPHY_APGPIO_AIO_EN[4:1] and SD_MODE registers

Pin Name	EPHY_APGPIO_AIO_EN[4:1] =4'b0000	EPHY_APGPIO_AIO_EN[4:1] =4'b1111	SD_MODE =2'b00	SD_MODE =2'b01
MDI_TP_P3	MDI_TP_P3	eMMC_WP	GPIO#22	
MDI_TN_P3	MDI_TN_P3	eMMC_CD	GPIO#23	
MDI_RP_P3	MDI_RP_P3	eMMC_D1	GPIO#24	
MDI_RN_P3	MDI_RN_P3	eMMC_D0	GPIO#25	
MDI_RP_P4	MDI_RP_P4	eMMC_CLK	GPIO#26	
MDI_RN_P4	MDI_RN_P4	eMMC_CMD	GPIO#27	
MDI_TP_P4	MDI_TP_P4	eMMC_D3	GPIO#28	
MDI_TN_P4	MDI_TN_P4	eMMC_D2	GPIO#29	

3.3.18 UART2 pin share scheme

Controlled by the EPHY_APGPIO_AIO_EN[4:1] and UART2_MODE registers

Pin Name	4'b0000	4'b1111	2'b00	2'b01	2'b10	2'b11
MDI_TP_P2	MDI_TP_P2	UART_RXD2	GPIO#20	PWM_CH2	eMMC_D5	
MDI_TN_P2	MDI_TN_P2	UART_RXD2	GPIO#21	PWM_CH3	eMMC_D4	

3.3.19 PWM_CH0 pin share scheme

Controlled by the EPHY_APGPIO_AIO_EN[4:1] and PWM0_MODE registers

Pin Name	4'b0000	4'b1111	2'b00	2'b01	2'b10	2'b11
MDI_RP_P2	MDI_RP_P2	PWM_CH0	GPIO#18		eMMC_D7	

3.3.20 PWM_CH1 pin share scheme

Controlled by the EPHY_APGPIO_AIO_EN[4:1] and PWM1_MODE registers

4'b0000	4'b1111
---------	---------

Pin Name		2'b00	2'b01	2'b10	2'b11
MDI_RN_P2	MDI_RN_P2	PWM_CH1	GPIO#19		eMMC_D6

3.3.21 SPIS pin share scheme

Controlled by the EPHY_APPIO_AIO_EN[4:1] and SPIS_MODE registers

	4'b0000	4'b1111			
Pin Name		2'b00	2'b01	2'b10	2'b11
MDI_TP_P1	MDI_TP_P1	SPIS_CS	GPIO#14		PWM_CH0
MDI_TN_P1	MDI_TN_P1	SPIS_CLK	GPIO#15		PWM_CH1
MDI_RP_P1	MDI_RP_P1	SPIS_MISO	GPIO#16		UART_RXD2
MDI_RN_P1	MDI_RN_P1	SPIS_MOSI	GPIO#17		UART_RXD2

3.3.22 Pin share function description

Pin Share Name	I/O	Pin Share Function description
PCMDTX	O	PCM Data Transmit DATA signal sent from the PCM host to the external codec.
PCMDRX	I	PCM Data Receive DATA signal sent from the external codec to the PCM host.
PCMCLK	I/O	PCM Clock The clock signal can be generated by the PCM host (Output direction), or provided by an external clock (input direction). The clock frequency should match the slot configuration of the PCM host. e.g. 4 slots, PCM clock out/in should be 256 kHz. 8 slots, PCM clock out/in should be 512 kHz. 16 slots, PCM clock out/in should be 1.024 MHz. 32 slots, PCM clock out/in should be 2.048 MHz. 64 slots, PCM clock out/in should be 4.096 MHz. 128 slots, PCM clock out/in should be 8.192 MHz.
PCMFS	I/O	PCM SYNC signal. In our design, the direction of this signal is independent of the direction of PCMCLK. Its direction and mode is configurable.
PWM_CH0	O	Pulse Width Modulation Channle 0
PWM_CH1	O	Pulse Width Modulation Channle 1
PWM_CH2	O	Pulse Width Modulation Channle 2
PWM_CH3	O	Pulse Width Modulation Channle 3

3.4 Bootstrapping Pins Description

Pin Name	Boot Strapping Signal Name	Description
UART_RXD1	DBG_JTAG_MODE	0: JTAG_MODE 1: EPHY_LED (default)
PERST_N	XTAL_FREQ_SEL	0: 25 MHz DIP 1: 40 MHz SMD
I2S_SDO	DRAM_TYPE	1: DDR1 0: DDR2 [note] This pin is valid for MT7688AN only. It needs to be pull-low for 7688KN which only supports DDR1.

Pin Name	Boot Strapping Signal Name	Description
{SPI_MOSI SPI_CLK, SPI_CS1}	CHIP_MODE[2:0]	A vector to set chip function/test/debug modes. 000: Boot from PLL (boot from SPI 3-Byte Addr) 001: Boot from PLL (boot from SPI 4-Byte Addr) 010: Boot from XTAL (boot from SPI 3-Byte Addr) 011: Boot from XTAL (boot from SPI 4-Byte Addr)
PAD_TXD0	EXT_BGCK	1: Test Mode 0: Normal (default)

4. Maximum Ratings and Operating Conditions

4.1 Absolute Maximum Ratings

I/O supply voltage	3.63 V
Input, Output, or I/O Voltage	GND -0.3 V to Vcc +0.3 V

Table 4-1 Absolute Maximum Ratings

4.2 Maximum Temperatures

Maximum Junction Temperature (Plastic Package)	125 °C
Maximum Lead Temperature (Soldering 10 s)	260 °C

Table 4-2 Maximum Temperatures

4.3 Operating Conditions

I/O supply voltage	3.3 V +/- 10%
DDR1 supply voltage	2.5 V +/- 5%
DDR2 supply voltage	1.8 V +/- 5%
Core supply voltage	1.2 V +/- 10%
Ambient Temperature Range	-20 to 55 °C

Table 4-3 Operating Conditions

4.4 Thermal Characteristics

Thermal characteristics without an external heat sink in still air conditions.

MT7688KN:

Thermal Resistance θ_{JA} (°C /W) for JEDEC 2L system PCB	26.1°C/W
Thermal Resistance θ_{JA} (°C /W) for JEDEC 4L system PCB	17.72°C/W
Thermal Resistance θ_{JC} (°C /W) for JEDEC	6.5°C/W
Thermal Resistance ψ_{Jt} (°C /W) for JEDEC 2L system PCB	1.81°C/W
Thermal Resistance ψ_{Jt} (°C /W) for JEDEC 4L system PCB	1.18°C/W

MT7688AN:

Thermal Resistance θ_{JA} (°C /W) for JEDEC 2L system PCB	27.01°C/W
Thermal Resistance θ_{JA} (°C /W) for JEDEC 4L system PCB	18.15°C/W
Thermal Resistance θ_{JC} (°C /W) for JEDEC	6.9°C/W
Thermal Resistance ψ_{Jt} (°C /W) for JEDEC 2L system PCB	2.41 °C/W
Thermal Resistance ψ_{Jt} (°C /W) for JEDEC 4L system PCB	1.51 °C/W

Table 4-4 Thermal Characteristics

4.5 Storage Conditions

The calculated shelf life in a sealed bag is 12 months if stored between 0 °C and 40 °C at less than 90% relative humidity (RH). After the bag is opened, devices that are subjected to solder reflow or other high temperature processes must be handled in the following manner:

- Mounted within 168 hours of factory conditions, i.e. < 30 °C at 60% RH.
- Storage humidity needs to maintained at < 10% RH.

- Baking is necessary if the customer exposes the component to air for over 168 hrs, baking conditions: 125 °C for 8 hrs.

4.6 External Xtal Specification

Frequency	25 MHz/ 40 Mhz
Frequency offset	+/-20 ppm
VIH/VIL	Vcc-0.3 V/0.3 V
Duty cycle	45% to 55%

Table 4-5 External Xtal Specifications

4.7 DC Electrical Characteristics

Parameters	Sym	Conditions	Min	Typ	Max	Unit
3.3 V supply voltage (IO)	Vddc33		2.97	3.3	3.63	V
2.5V supply voltage (DDR1)	Vdd25		2.375	2.5	2.625	V
1.8 V supply voltage (DDR2)	Vdd18		1.71	1.8	1.89	V
1.2 V supply voltage	Vdd12		1.08	1.2	1.32	V
3.3 V current consumption	Icc33					mA
1.5 V current consumption	Icc15					mA
1.2 V current consumption	Icc12					mA
DDR2 Current	Icc18					mA

Table 4-6 DC Electrical Characteristics

Vdd=2.5V (DDR2)	Min	Typ	Max
Vdd	2.375	2.5	2.625
VIH	VREF+0.15		Vdd25+0.3
VIL	-0.3		VREF-0.15
VOH	0.8*Vdd25		
VOL		0.2*Vdd25	
IOL			
IOH			

Table 4-7 Vdd 2.5V Electrical Characteristics

Vdd=1.8V (DDR2)	Min	Typ	Max
Vdd	1.71	1.8	1.89
VIH	VREF+0.125		Vdd18+0.3
VIL	-0.3		VREF-0.125
VOH	1.42		
VOL		0.28	
IOL			
IOH			

Table 4-8 Vdd 1.8V Electrical Characteristics

Vdd=3.3V	Min	Typ	Max
Vdd	2.97V	3.3V	3.63V
VIH	2.0V		Vdd33+0.3
VIL	-0.3		0.8V
VOH	2.4V		
VOL			0.4V
IOL			
IOH			

Table 4-9 Vdd 3.3V Electrical Characteristics

4.8 AC Electrical Characteristics

4.8.1 DDR2 SDRAM Interface

The DDR2 SDRAM interface complies with 200 MHz timing requirements for standard DDR2 SDRAM. The interface drivers are SSTL_18 drivers matching the EIA/JEDEC standard JESD8-15A.

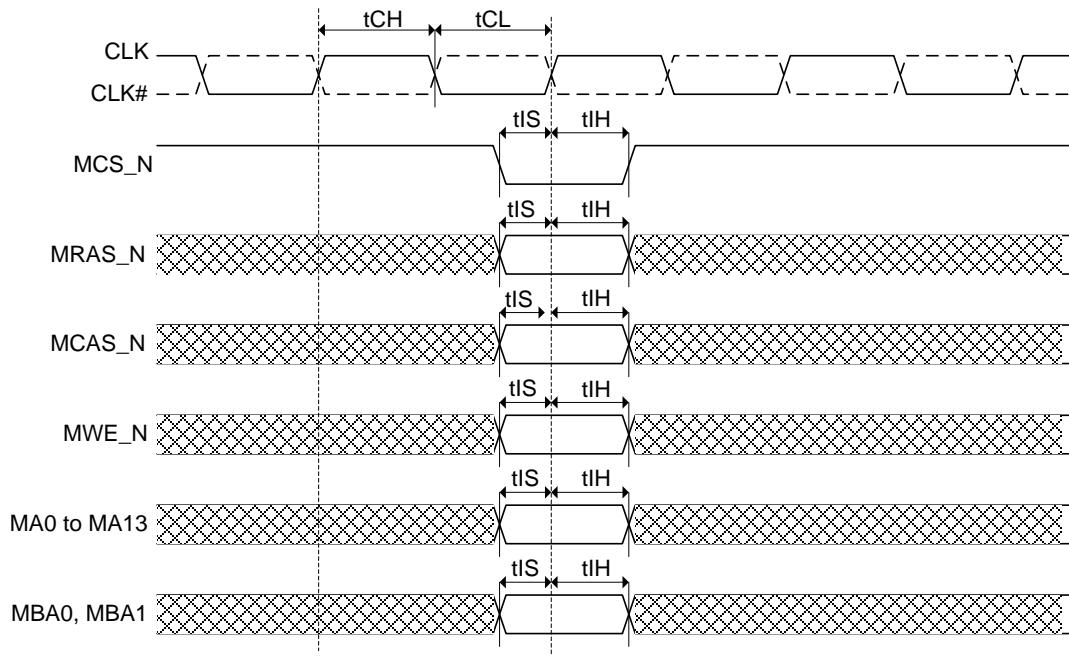


Figure 4-1 DDR2 SDRAM Command

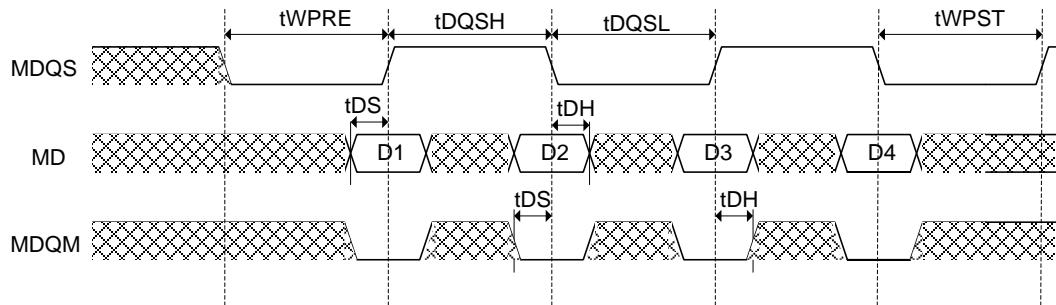


Figure 4-2 DDR2 SDRAM Write data

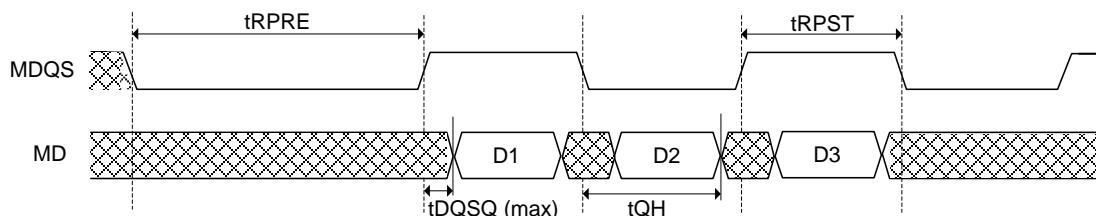


Figure 4-3 DDR2 SDRAM Read data

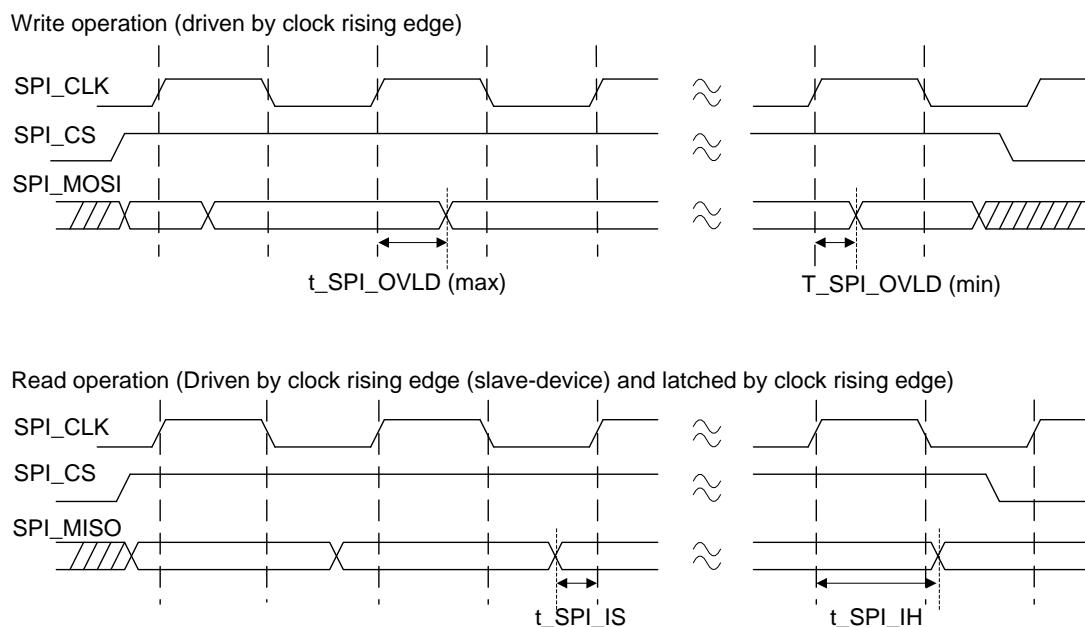
Symbol	Description	Min	Max	Unit	Remark
tCK(avg)	Clock cycle time	5	-	ns	
tAC	DQ output access time from SDRAM CLK	-0.6	0.6	ns	
tDQSCK	DQS output access time from SDRAM CLK	-0.5	0.5	ns	
tCH	SDRAM CLK high pulse width	0.48	0.52	tCK(avg)	

Symbol	Description	Min	Max	Unit	Remark
tCL	SDRAM CLK low pulse width	0.48	0.52	tCK(avg)	
tHP	SDRAM CLK half period	Min(tCH,tCL)	-	ns	
tIS	Address and control input setup time	0.75	-	ns	
tIH	Address and control input hold time	0.75	-	ns	
tDQSQ	Data skew of DQS and associated DQ	-	0.4	ns	
tQH	DQ/DQS output hold time from DQS	tHP-0.5	-	ns	
tRPRE	DQS read preamble	0.9	1.1	tCK	
tRPST	DQS read postamble	0.4	0.6	tCK	
tDQSS	DQS rising edge to CK rising edge	-0.25	0.25	tCK	
tDQSH	DQS input-high pulse width	0.35	-	tCK	
tDQLS	DQS input-low pulse width	0.35	-	tCK	
tDSS	DQS falling edge to SDRAM CLK setup time	0.2	-	tCK	
tDHS	DQS falling edge hold time from SDRAM CLK	0.2	-	tCK	
tWPRE	DQS write preamble	0.35	-	tCK	
tWPST	DQS write postamble	0.4	0.6	tCK	
tDS	DQ and DQM input setup time	*0.4	-	ns	
tDH	DQ and DQM input hold time	*0.4	-	ns	

Table 4-10 DDR2 SDRAM Interface Diagram Key

NOTE: Depends on slew rate of DQS and DQ/DQM for single ended DQS.

4.8.2 SPI Interface



NOTE: 1) SPI_CLK is a gated clock.
2) SPI_CS is controlled by software

Figure 4-4 SPI Interface

Symbol	Description	Min	Max	Unit	Remark
t_{SPI_IS}	Setup time for SPI input	6.0	-	ns	
t_{SPI_IH}	Hold time for SPI input	-1.0	-	ns	
t_{SPI_OVLD}	SPI_CLK to SPI output valid	-2.0	3.0	ns	output load: 5 pF

Table 4-11 SPI Interface Diagram Key

4.8.3 I²S Interface

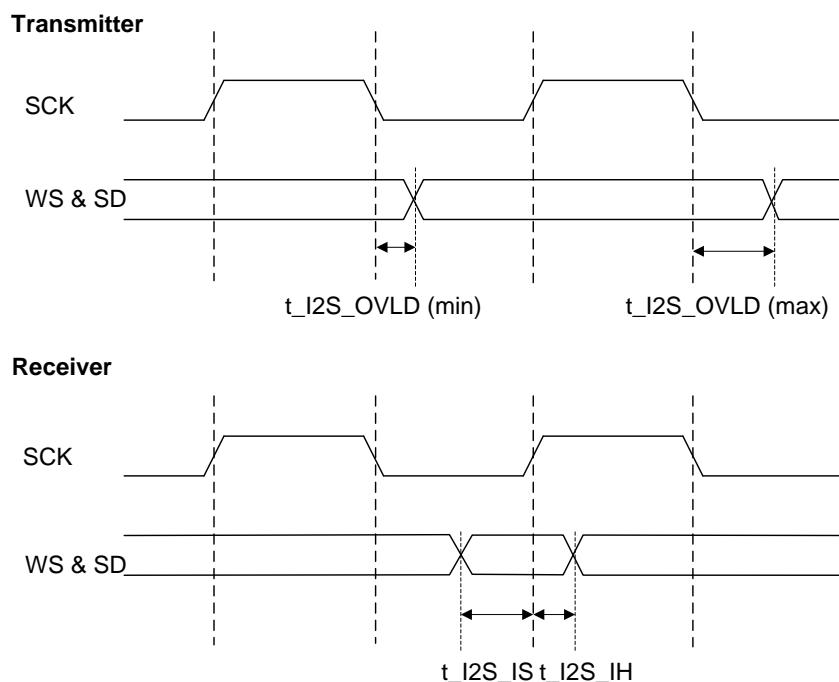


Figure-4-5 I²S Interface

Symbol	Description	Min	Max	Unit	Remark
t_I2S_IS	Setup time for I2S input (data & WS)	3.5	-	ns	
t_I2S_IH	Hold time for I2S input (data & WS)	0.5	-	ns	
t_I2S_OVLD	I2S_CLK to I2S output (data & WS) valid	2.5	10.0	ns	output load: 5 pF

Table 4-12 I²S Interface Diagram Key

4.8.4 PCM Interface

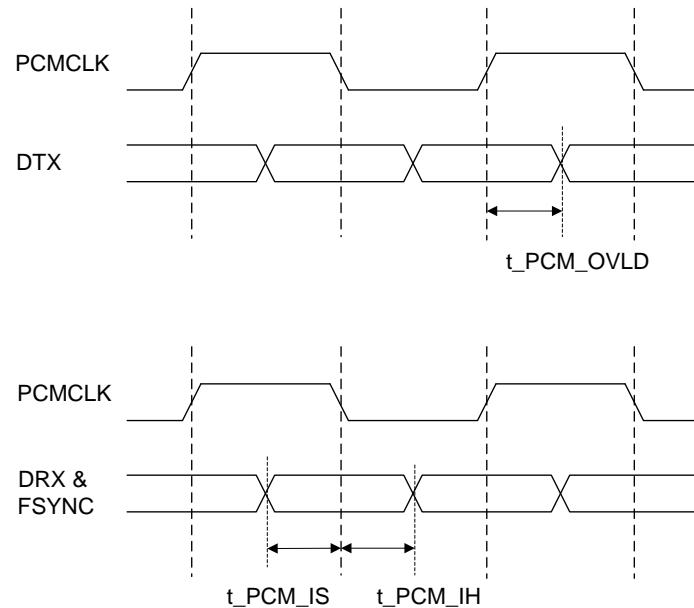


Figure 4-6 PCM Interface

Symbol	Description	Min	Max	Unit	Remark
t_{PCM_IS}	Setup time for PCM input to PCM_CLK fall	3.0	-	ns	
t_{PCM_IH}	Hold time for PCM input to PCM_CLK fall	1.0	-	ns	
t_{PCM_OVLD}	PCM_CLK rise to PCM output valid	10.0	35.0	ns	output load: 5 pF

Table 4-13 PCM Interface Diagram Key

4.8.5 Power On Sequence

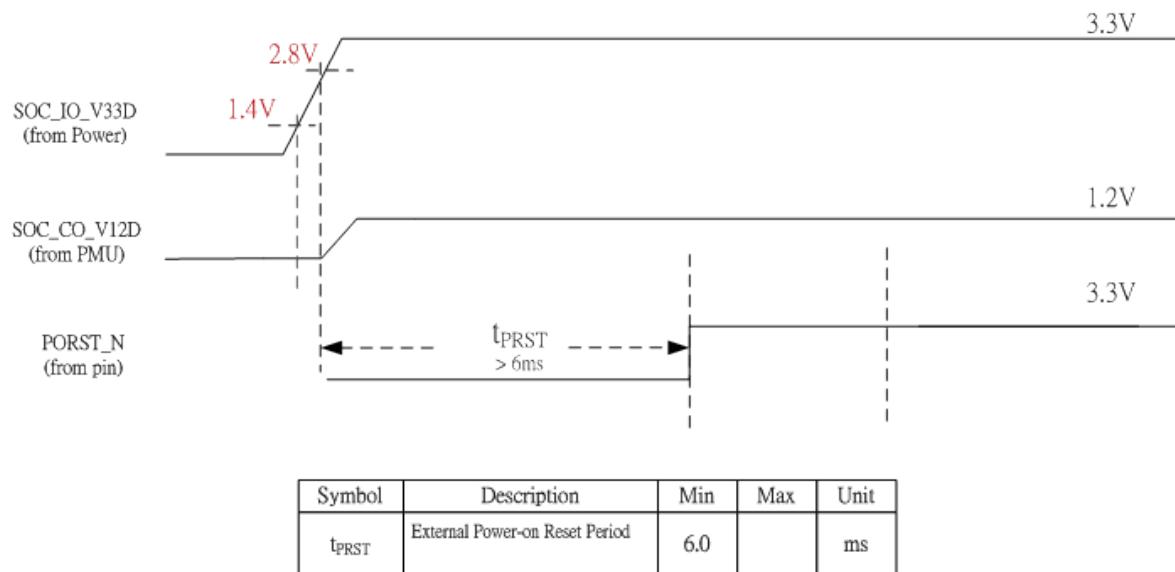


Figure 4-7 Power ON Sequence

Table 4-14 Power ON Sequence Diagram Key

4.9 Package Physical Dimensions

4.9.1 DR-QFN (10 mm x 10 mm) 128 pins

4.9.1.1 Top View

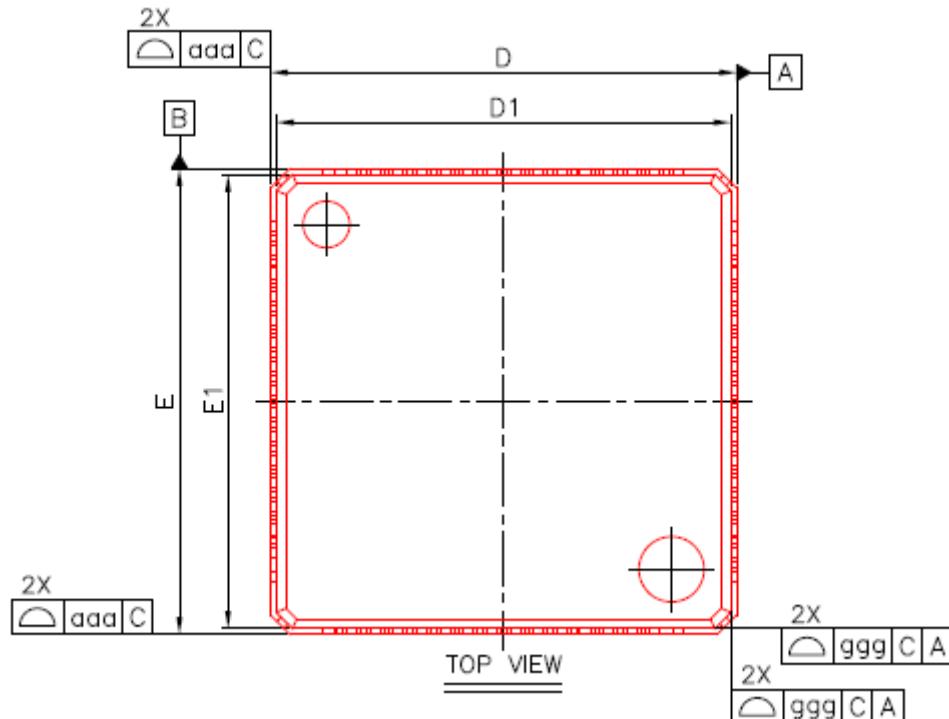


Figure 4-8 Top View

4.9.1.2 Side View

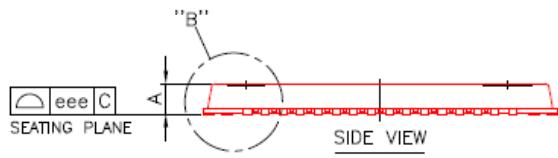


Figure 4-9 Side View

4.9.1.3 "B" Expanded

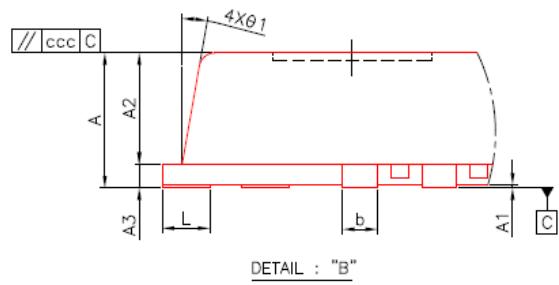


Figure 4-10 "B" Expanded

4.9.1.4 Bottom View

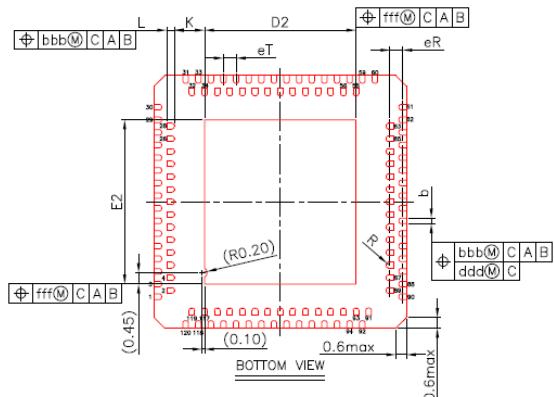


Figure 4-11 Bottom view

4.9.1.5 Package Diagram Key

ITEM	SYMBOL	MIN.	NOM.	MAX.
TOTAL THICKNESS	A	0.80	0.85	0.90
LEAD STAND OFF.	A1	0.00	0.02	0.05
MOLD THICKNESS	A2	0.65	0.70	0.75
L/F THICKNESS	A3		0.15 REF.	
LEAD WIDTH	b	0.18	0.22	0.30
PACKAGE SIZE	D	9.90	10.00	10.10
Mold Edge size	D1	9.75	BSC	
	E1	9.75	BSC	
E-PAD size	D2	5.90	6.00	6.10
	E2	6.40	6.50	6.60
LEAD LENGTH	L	0.20	0.30	0.40
LEAD PITCH (BSC.)	eT		0.50	BSC
LEAD PITCH (BSC.)	eR		0.50	BSC
ANGLE	θ1	5°	---	15°
LEAD ARC	R	0.09	---	0.14
Lead to E-PAD Tolerance	K	0.20	---	---
PKG EDGE TOLERANCE	aaa	0.10		
PACKAGE PROFILE OF A SURFACE	bbb	0.10		
LEAD PROFILE OF A SURFACE	ccc	0.10		
LEAD POSITION	ddd	0.05		
LEAD PROFILE OF A SURFACE	eee	0.08		
EPAD POSITION	fff	0.10		
Mold edge OF A & C SURFACE	ggg	0.20		

4.9.2 DR-QFN (12 mm x 12 mm) 156 pins

4.9.2.1 Top View

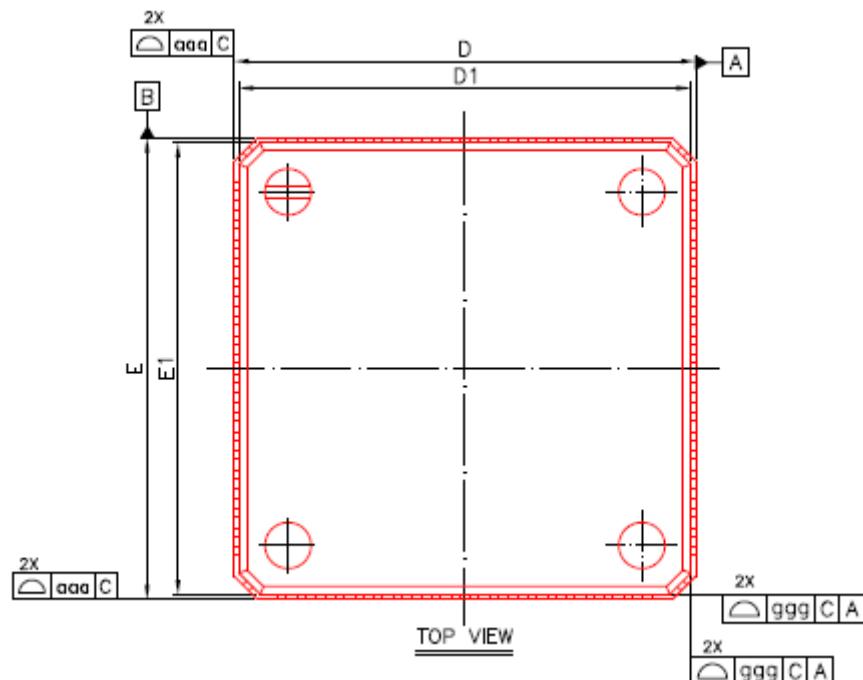


Figure 4-12 Top View

4.9.2.2 Side View

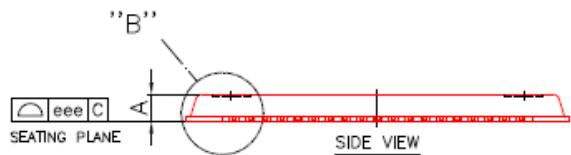


Figure 4-13 Side View

4.9.2.3 "B" Expanded

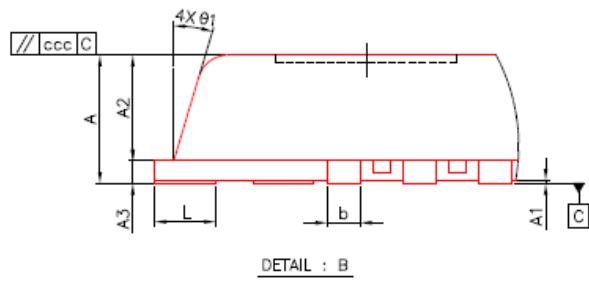


Figure 4-14 "B" Expanded

4.9.2.4 Bottom View

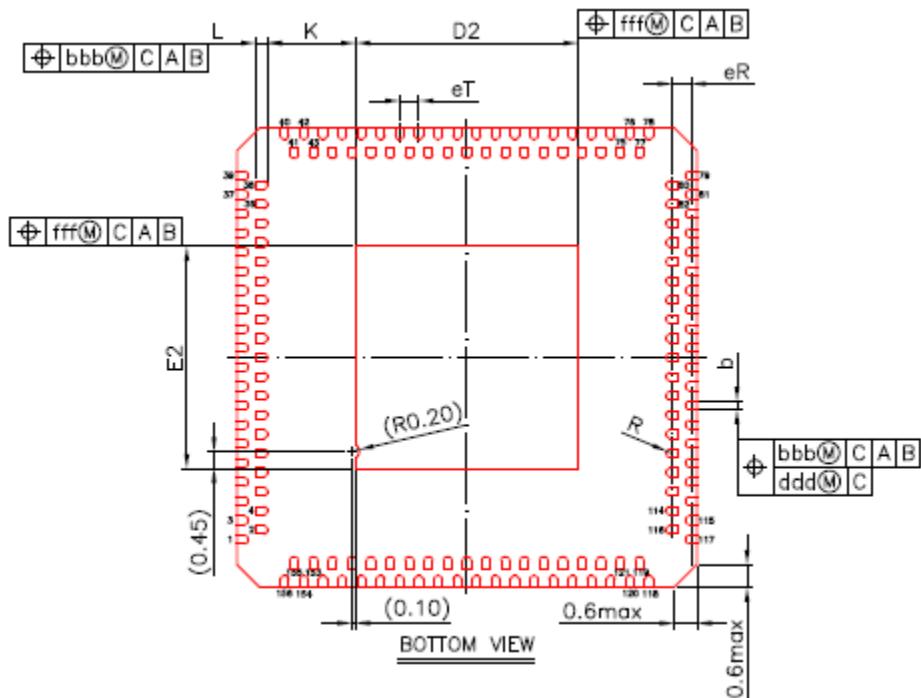


Figure 4-15 Bottom View

4.9.2.5 Package Diagram Key

ITEM	SYMBOL	MIN.	NOM.	MAX.
TOTAL THICKNESS	A	0.80	0.85	0.90
LEAD STAND OFF.	A1	0.00	0.02	0.05
MOLD THICKNESS	A2	0.65	0.70	0.75
L/F THICKNESS	A3		0.15 REF.	
LEAD WIDTH	b	0.18	0.22	0.30
PACKAGE SIZE	D	11.90	12.00	12.10
	E			
Mold Edge size	D1		11.75 BSC	
	E1		11.75 BSC	
E-PAD size	D2	5.70	5.80	5.90
	E2	5.70	5.80	5.90
LEAD LENGTH	L	0.20	0.30	0.40
LEAD PITCH (BSC.)	eT		0.50 BSC	
LEAD PITCH (BSC.)	eR		0.50 BSC	
ANGLE	θ1	5°	---	15°
LEAD ARC	R	0.09	---	0.14
Lead to E-PAD Toler-ance	K	0.20	---	---
PKG EDGE TOLER-ANCE	aaa		0.10	
PACKAGE PROFILE OF A SURFACE	bbb		0.10	
LEAD PROFILE OF A SURFACE	ccc		0.10	
LEAD POSITION	ddd		0.05	
LEAD PROFILE OF A SURFACE	eee		0.08	
EPAD POSITION	fff		0.10	
Mold edge OF A & C SURFACE	ggg		0.20	

4.9.3 MT7688 AN/KN marking



YYWW: Date code
 LLLLLLLL : Lot number
 ":" : Pin #1 dot

Figure 4-16 MT7688AN top marking



YYWW: Date code
LLLLLLLLL: Lot number
“.” : Pin #1 dot

Figure 4-17 MT7688KN top marking

4.9.4 Reflow profile guideline

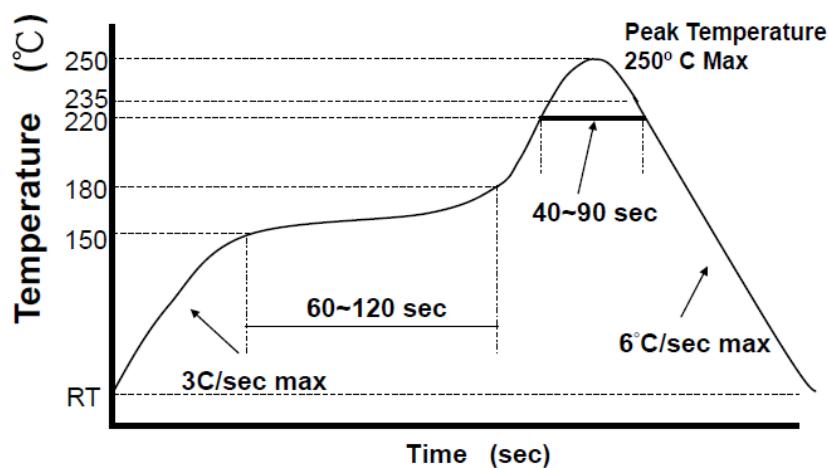


Figure 4-18 Reflow profile for MT7688

Notes:

1. Reflow profile guideline is designed for SnAgCu/lead-free solder paste.
2. Reflow temperature is defined at the solder ball of package/or the lead of package.
3. MTK would recommend customer following the solder paste vendor's guideline to design a profile appropriate your line and products.
4. Appropriate N2 atmosphere is recommended since it would widen the process window and mitigate the risk for having solder open issues.

5. Register

5.1 Nomenclature

The following nomenclature is used for register types:

RO	Read Only
WO	Write Only
RW	Read or Write
RC	Read Clear
W1C	Write One Clear
-	Reserved bit
X	Undefined binary value

5.2 System Control

5.2.1 Features

- Provides read-only chip revision registers
- Provides a window to access boot-strapping signals
- Supports memory remapping configurations
- Supports software reset to each platform building block
- Provides registers to determine GPIO and other peripheral pin muxing schemes
- Provides some power-on-reset only test registers for software programmers
- Combines miscellaneous registers (such as clock skew control, status register, memo registers, etc)

5.2.2 Block Diagram

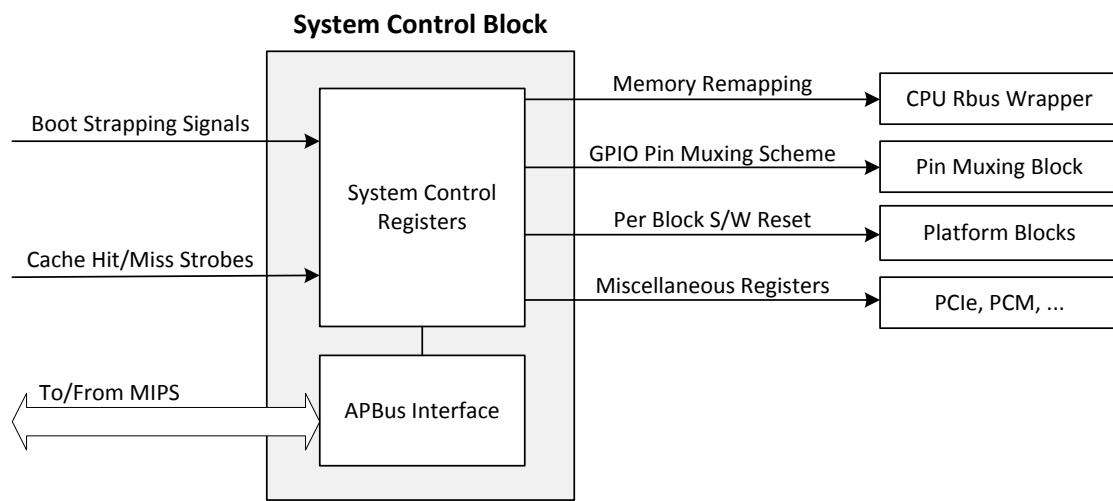


Figure 5-1 System Control Block Diagram

5.2.3 Registers

SYSCTL Changes LOG

Revision	Date	Author	Change Log
0.1	2013/10/3	PeterCT Wu	Initial for MT7628
0.2	2014/4/28	PeterCT Wu	MT7628 E2
0.3	2014/5/21	Morrie Lin	Add 4-bit SDXC on Router mode

Module name: SYSCTL Base address: (+10000000h)

Address	Name	Width	Register Function
10000000	<u>CHIPID0_3</u>	32	CHIP ID ASCII Character 0-3
10000004	<u>CHIPID4_7</u>	32	CHIP ID ASCII Character 4-7
10000008	<u>EE_CFG</u>	32	E-Fuse Configuration
1000000C	<u>CHIP_REV_ID</u>	32	Chip Revision Identification
10000010	<u>SYSCFG0</u>	32	System Configuration Register 0
10000014	<u>SYSCFG1</u>	32	System Configuration Register 1
10000018	<u>TESTSTAT</u>	32	Firmware Test Status
1000001C	<u>TESTSTAT2</u>	32	Firmware Test Status 2
10000028	<u>ROM_STATUS</u>	32	Andes ROM Status
1000002C	<u>CLKCFG0</u>	32	Clock Configuration Register 0
10000030	<u>CLKCFG1</u>	32	Clock Configuration Register 1
10000034	<u>RSTCTL</u>	32	Reset Control Register
10000038	<u>RSTSTAT</u>	32	Reset Status Register
1000003C	<u>AGPIO_CFG</u>	32	Analog GPIO Configuration
10000040	<u>N9_GPIO_INT</u>	32	Andes GPIO Interrupt
10000044	<u>N9_GPIO_MAS_K</u>	32	Andes GPIO Mask
10000060	<u>GPIO1_MODE</u>	32	GPIO1 purpose selection
10000064	<u>GPIO2_MODE</u>	32	GPIO2 purpose selection
10000068	<u>MEMO1</u>	32	Memory1
1000006C	<u>MEMO2</u>	32	Memory2
10000070	<u>EXT_MEMO1</u>	32	Extend Application #1
10000074	<u>EXT_MEMO2</u>	32	Extend Application #2
10000078	<u>EXT_MEMO3</u>	32	Extend Application #3
1000007C	<u>EXT_MEMO4</u>	32	Extend Application #4

10000000 CHIPID0_3 CHIP ID ASCII Character 0-3

3637544

D

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>CHIP_ID3</u>										<u>CHIP_ID2</u>					
Type	RO										RO					
Reset	0	0	1	1	0	1	1	0	0	0	1	1	0	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>CHIP_ID1</u>										<u>CHIP_ID0</u>					
Type	RO										RO					
Reset	0	1	0	1	0	1	0	0	0	1	0	0	1	1	0	1

Bit(s)	Name	Description
31:24	CHIP_ID3	ASCII CHIP Name Identification Character 3
23:16	CHIP_ID2	ASCII CHIP Name Identification Character 2
15:8	CHIP_ID1	ASCII CHIP Name Identification Character 1

Bit(s)	Name	Description
7:0	CHIP_ID0	ASCII CHIP Name Identification Character 0

10000004 CHIPID4_7 CHIP ID ASCII Character 4-7 2020383
2

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	CHIP_ID7										CHIP_ID6					
Type	RO										RO					
Reset	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	CHIP_ID5										CHIP_ID4					
Type	RO										RO					
Reset	0	0	1	1	1	0	0	0	0	0	1	1	0	0	1	0

Bit(s)	Name	Description
31:24	CHIP_ID7	ASCII CHIP Name Identification Character 3
23:16	CHIP_ID6	ASCII CHIP Name Identification Character 2
15:8	CHIP_ID5	ASCII CHIP Name Identification Character 1
7:0	CHIP_ID4	ASCII CHIP Name Identification Character 0

10000008 EE_CFG E-Fuse Configuration 0000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	EE_CFG1															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	EE_CFG0															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	EE_CFG1	E-Fuse Configuration 1
15:0	EE_CFG0	E-Fuse Configuration 0

1000000C CHIP_REV_ID Chip Revision Identification 0001010
2

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VER_ID										ECO_ID					
Type	RO										RO					
Reset					0	0	0	1					0	0	1	0

Bit(s)	Name	Description
16	PKG_ID	Package ID 0: DRQFN10x10-110 1: DRQFN12x12-156
11:8	VER_ID	Chip Version ID
3:0	ECO_ID	Chip ECO ID

System Configuration Register 0												00000100					
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	TEST_CODE											BS_SHADOW[8:4]					
Type	RW											RO					
Reset	0	0	0	0	0	0	0	0				0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	BS_SHADOW[3:0]								DB_G_J	TES_T_MO	XT_AL_FR_EQ_SE	EXT_B_G	TES_T_MO	CHIP_MODE			DRAM_TYPE
Type	RO								DE_1	DE_L	DE_0			RO			RO
Reset	0	0	0	0					1	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:24	TEST_CODE	Default value is from bootstrap and can be modified by software.
20:12	BS_SHADOW	BS shadow register for last boot-up value (by manual boot-strap SYSCFG1.PULL_EN)
		Displays a backup copy of the last bootup value
8	DBG_JTAG_MODE	JTAG for MIPS and Andes 1: Normal Boot-up 0: JTAG mode(MIPS & Andes)
7	TEST_MODE_1	Test Mode[1:0]
6	XTAL_FREQ_SEL	XTAL Frequency Selection 0: 25MHz DIP 1: 40MHz SMD (3225)
5	EXT_BG	External BG Clock 0: BG clock from PMU 1: BG clock from the external pin
4	TEST_MODE_0	Test Mode[1:0] 0: SUTIF 1: 3-wire SPI
3:1	CHIP_MODE	Chip Mode A vector to set chip function/test/debug modes in non-test/debug operation. For more information see the Bootstrapping Pins Description in the datasheet for this chip. 000: Boot from PLL (boot from SPI 3-Byte ADR) 001: Boot from PLL (boot from SPI 4-Byte ADR) 010: Boot from XTAL (boot from SPI 3-Byte ADR) 011: Boot from XTAL (boot from SPI 4-Byte ADR) 100: SCAN mode 101: IDDQ mode 110: Power-On mode 111: UTIF test mode
0	DRAM_TYPE	DDR type [note] This DDR attribute is not valid for KN package.. (7628KN has DDR1 KGD) 0: DDR2 1: DDR1

10000014	<u>SYSCFG1</u>	System Configuration Register 1	00000000													
			0													
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

Bit(s)	Name	Description
16	PULL_EN	Internal Manual Boot-Strap 1: enable 0: disable

Bit(s)	Name	Description
31:0	TESTSTAT	Firmware Test Status register NOTE: This register is reset only by a power-on reset.

Bit(s)	Name	Description
31:0	TESTSTAT2	Firmware Test Status Register 2 NOTE: This register is reset only by a power-on reset.

10000028 ROM STATUS Andes ROM Status **000000000**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																STATUS
Type																RO
Reset									0	0	0	0	0	0	0	0

Bit(s)	Name	Description
7:0	STATUS	Andes ROM Status 0: Power-on default

Bit(s)	Name	Description
		1: ROM initialization done 2: Wifi driver loaded

1000002C CLKCFG0 Clock Configuration Register 0 00201000

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																INT_CL_K_F_FR_AC[4:4]
Type																RW
Reset			0	0	0	0	0	0		0	1	0	0	0		0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	INT_CLK_FFRAC[3:0]				REFCLK0_RATE				DIS_N9		PCI_E_E_XT_125M	PE_RI_CL_KSEL	DIS_B_BP_SLE_EP	EN_BB_P_C_LK	CP_U_F_RM_B_BP	CP_U_F_RM_XT_AL
Type	RW				RW				RW		RW	RW	RW	RW	RW	RW
Reset	0	0	0	1	0	0	0		0		0	0	0	0	0	0

Bit(s)	Name	Description
29:24	OSC_1US_DIV	Oscillator 1 usec Divider Sets the maximum for the reference clock counter for either a 20 MHz or 40 MHz external XTAL input. The count increments each 1usec (indicating 1 MHz), up to the maximum, before resetting to zero. This counts the frequency of an external XTAL. This count is used to output a 32 KHz frequency to the REFCLK0 pin. 0: Automatically generates a 1 usec system tick regardless of whether XTAL frequency is 20 MHz or 40 MHz. 39: Default value for an external 40 MHz XTAL. 19: Default value for an external 20 MHz XTAL. Others: Manual mode for tick generation.
22:18	INT_CLK_FDIV	Internal Clock Frequency Divider for I2S/PCM The frequency divider used to generate the Fraction-N clock frequency. Valid values range from 1 to 31. Fraction-N clock frequency = $(\text{INT_CLK_FFRAC}/\text{INT_CLK_FDIV}) * \text{PLL_FREQ}$
16:12	INT_CLK_FFRAC	Internal Clock Fraction-N Frequency for I2S/PCM A parameter used in conjunction with INT_CLK_FDIV to generate the Fraction-N clock frequency. Valid values range from 0 to 31. Fraction-N clock Frequency = $(\text{INT_CLK_FFRAC}/\text{INT_CLK_FDIV}) * \text{PLL_FREQ}$
11:9	REFCLK0_RATE	Output clock rate of reference Clock 0 7: CPUPLL Clock/8 6: Off 5: Internal Fraction-N_CLK/2 (I2S/PCM) 4: 48 MHz 3: 40 MHz 2: 25 MHz 1: 12 MHz 0: Xtal clock(25/40 MHz by boot strap)
7	DIS_N9	Pause Andes Execution [Note] This bit is initialized by HW STRAP and can be changed by SW afterwards. 1: Enable 0: default
5	PCIE_EXT_125M	PCIe 125MHz Clock Source 1: Ext. 125MHz Source (EPHY)

Bit(s)	Name	Description
4	PERI_CLK_SEL	0: PCIe PHY 125M Peripheral Clock Source Select 1: XTAL input 0: 40 MHz from BBP 480 MHz divided by 12
3	DIS_BBP_SLEEP	BBPPLL Sleep Mode Control 1: Disable BBPPLL entering SLEEP mode 0: BBPPLL SLEEP mode
2	EN_BBP_CLK	BBPPLL 480MHz Clock 1: BBPPLL Clock Enable 0: BBPPLL Clock Disable
1	CPU_FRM_BBP	CPU clock from BBPPLL 1: 480MHz BBPPLL 0: 580MHz CPULL
0	CPU_FRM_XTAL	CPU clock from XTAL [Note] This bit is initialized by HW STRAP and can be changed by SW afterwards. 1: XTAL input 0: CPULL

10000030 **CLKCFG1** Clock Configuration Register 1 F69F7F00

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	PW_M_CL_K_E_N	SD_XC_CL_K_E_N	CR_YPT_O_CL_K_E_N	MIP_SC_CL_K_E_N		PCI_E_C_LK_EN	UP_HY_CL_K_E_N		ET_H_CL_K_E_N			UA_RT2_CL_K_E_N	UA_RT1_CL_K_E_N	SPI_CL_K_E_N	I2S_CL_K_E_N	I2C_CL_K_E_N
Type	RW	RW	RW	RW		RW	RW		RW			RW	RW	RW	RW	RW
Reset	1	1	1	1		1	1		1			1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GD_MA_CL_K_E_N	PIO_CL_K_E_N	UA_RT0_CL_K_E_N	PC_M_CL_K_E_N	MC_CL_K_E_N	INT_CL_K_E_N	TIMER_CL_K_E_N									
Type		RW	RW	RW	RW	RW	RW	RW								
Reset		1	1	1	1	1	1	1								

Bit(s)	Name	Description
31	PWM_CLK_EN	PWM clock control 1: Clock Enable 0: Clock Disable
30	SDXC_CLK_EN	SDXC clock control 1: Clock Enable 0: Clock Disable
29	CRYPTO_CLK_EN	AUX system tick counter clock control 1: Clock Enable 0: Clock Disable
28	MIPSC_CLK_EN	MIPS Counter clock control 1: Clock Enable 0: Clock Disable
26	PCIE_CLK_EN	PCIE2 clock control 1: Clock Enable 0: Clock Disable
25	UPHY_CLK_EN	UPHY clock control 1: Clock Enable 0: Clock Disable

Bit(s)	Name	Description
23	ETH_CLK_EN	ETH clock control 1: Clock Enable 0: Clock Disable
20	UART2_CLK_EN	UART2 clock control 1: Clock Enable 0: Clock Disable
19	UART1_CLK_EN	UART1 clock control 1: Clock Enable 0: Clock Disable
18	SPI_CLK_EN	SPI clock control 1: Clock Enable 0: Clock Disable
17	I2S_CLK_EN	I2S clock control 1: Clock Enable 0: Clock Disable
16	I2C_CLK_EN	I2C clock control 1: Clock Enable 0: Clock Disable
14	GDMA_CLK_EN	GDMA clock control 1: Clock Enable 0: Clock Disable
13	PIO_CLK_EN	PIO clock control 1: Clock Enable 0: Clock Disable
12	UART0_CLK_EN	UART0 clock control 1: Clock Enable 0: Clock Disable
11	PCM_CLK_EN	PCM clock control 1: Clock Enable 0: Clock Disable
10	MC_CLK_EN	MC clock control 1: Clock Enable 0: Clock Disable
9	INT_CLK_EN	INT clock control 1: Clock Enable 0: Clock Disable
8	TIMER_CLK_EN	TIMER clock control 1: Clock Enable 0: Clock Disable

10000034 RSTCTL Reset Control Register 04000400

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	PW_M_RS_T	SD_XC_RS_T	CR_YPT_O_RS_T	AU_X_S_TC_K_RS_T		PCI_E_R_ST		EP_HY_RS_T	ET_H_RS_T	UH_ST_RS_T		UA_RT2_RS_T	UA_RT1_RS_T	SPI_RS_T	I2S_RS_T	I2C_RS_T
Type	RW	RW	RW	RW		RW		RW	RW	RW		RW	RW	RW	RW	RW
Reset	0	0	0	0		1		0	0	0		0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GD_MA_RS_T	PIO_RS_T	UA_RT0_RS_T	PC_M_RS_T	MC_RS_T	INT_RS_T	TIME_RS_T				HIF_RS_T	WIF_I_RST	SPI_S_RST			SY_S_RST
Type		RW	RW	RW	RW	RW	RW	RW			RW	RW	RW			W1_C

Reset	0	0	0	0	1	0	0	0	0	0	0	0	0	0
--------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Bit(s)	Name	Description
31	PWM_RST	PWM reset control 1: Reset Assert 0: Reset Deassert
30	SDXC_RST	SDXC reset control 1: Reset Assert 0: Reset Deassert
29	CRYPTO_RST	Crypto engine reset control 1: Reset Assert 0: Reset Deassert
28	AUX_STCK_RST	AUX system tick counter clock control 1: Reset Assert 0: Reset Deassert
26	PCIE_RST	PCIE reset control 1: Reset Assert 0: Reset Deassert
24	EPHY_RST	EPHY reset control 1: Reset Assert 0: Reset Deassert
23	ETH_RST	ETH reset control 1: Reset Assert 0: Reset Deassert
22	UHST_RST	USB PHY reset control 1: Reset Assert 0: Reset Deassert
20	UART2_RST	UART2 reset control 1: Reset Assert 0: Reset Deassert
19	UART1_RST	UART1 reset control 1: Reset Assert 0: Reset Deassert
18	SPI_RST	SPI reset control 1: Reset Assert 0: Reset Deassert
17	I2S_RST	I2S reset control 1: Reset Assert 0: Reset Deassert
16	I2C_RST	I2C reset control 1: Reset Assert 0: Reset Deassert
14	GDMA_RST	GDMA reset control 1: Reset Assert 0: Reset Deassert
13	PIO_RST	PIO reset control 1: Reset Assert 0: Reset Deassert
12	UART0_RST	UART0 reset control 1: Reset Assert 0: Reset Deassert
11	PCM_RST	PCM reset control 1: Reset Assert 0: Reset Deassert
10	MC_RST	MC reset control 1: Reset Assert 0: Reset Deassert

Bit(s)	Name	Description
9	INT_RST	INT reset control 1: Reset Assert 0: Reset Deassert
8	TIMER_RST	TIMER reset control 1: Reset Assert 0: Reset Deassert
5	HIF_RST	WIFI HIF reset control [Note] WPDMA reset control 1: Reset Assert 0: Reset Deassert
4	WIFI_RST	WIFI reset control [Note] This bit will reset Andes and initialize XTAL and BPPPLL again, MIPS must carefully use it. 1: Reset Assert 0: Reset Deassert
3	SPIS_RST	SPI Slave control 1: Reset Assert 0: Reset Deassert
0	SYS_RST	Whole System Reset Control [Note] Except for power-on CR, this bit reset the whole system include itself. 1: Whole System Reset 0: NA

10000038 RSTSTAT Reset Status Register C003000

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	WD T2S YS RS T_E N	WD T2R ST O_ EN	WDTRSTPD													
Type	RW	RW	RW													
Reset	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name							WD RS T_T ON 9_E N	N9_ WD RS T_E N					N9S YS RS T	SW SYS RST	WD RS T	
Type							RW	RW					W1 C	W1 C	W1 C	
Reset							0	0					0	0	0	

Bit(s)	Name	Description
31	WDT2SYSRST_EN	WDT reset apply to System Reset Enables watchdog timeout to trigger a system reset. 1: Enable 0: Disable
30	WDT2RSTO_EN	WDT reset apply to watch dog reset pin out. 1: Enable 0: Disable
29:16	WDTRSTPD	Watchdog Reset Output Low Period Controls the WDT reset output low period. For example: If the pin share mode was set correctly and WDT2RSTO_EN=1, When WDTRSTPD= 0, you can see duration of 1 usec low on the WDT reset output pin. When WDTRSTPD= 3, you can see duration of 4 usec low on the WDT reset output pin.

Bit(s)	Name	Description
9	WDRST_TON9_EN	(unit: 1 usec) MIPS software reset or watch-dog reset apply to N9 subsys. When this bit is set, MIPS can reset N9 or N9 is reset when MISP watch-dog reset happen. 0: disable 1: Enable
8	N9_WDRST_EN	N9 watch-dog reset applies to MIPS subsys. When N9 WDRST happens, N9 will also reset MIPS system. 0: disable 1: Enable
3	N9SYSRST	N9 watch-dog reset occurred This bit will be set if N9 wifisys is reset by its watch-dog mechanism. Writing a '1' will clear this bit. Writing a '0' has not effect. NOTE: This register is reset only by a power on reset. 0: Has no effect. 1: Clears this bit.
2	SWSYSRST	Software system reset occurred This bit will be set if software reset the chip by writing to the RSTSYS bit in RSTCTL. Writing a '1' will clear this bit. Writing a '0' has not effect. NOTE: This register is reset only by a power on reset. 0: Has no effect. 1: Clears this bit.
1	WDRST	Watchdog reset occurred This bit will be set if the watchdog timer reset the chip. Writing a '1' will clear this bit. Writing a '0' has not effect. NOTE: This register is reset only by power-on reset. 0: Has no effect. 1: Clears this bit.

1000003C AGPIO_CFG Analog GPIO Configuration 001F001 F

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																EPHY_GPIO_AIO_EN
Type																RW
Reset																1 1 1 1 1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name				RF_OLT_MODE			EINTSEL	WLEDODEN				REF_CLK_O_AIO_EN	I2S(CL_K_AIO_EN)	I2S(W_S_A_IO_EN)	I2S(SD_O_AIO_EN)	I2S_SD_I_AI_O_EN
Type				RW			RW	RW				RW	RW	RW	RW	RW
Reset				0			0	0				1	1	1	1	1

Bit(s)	Name	Description
20:17	EPHY_GPIO_AIO_E_N	EPHY P1 ~ P4 digital PAD selection (P1 ~ P4 Disable) (note: When any bit of bit[20:17] is set to 1, P1 ~ P4 will be switched to digital PADs together.) 0: Analog PAD 1: Digital PAD
16	EPHY_P0_DIS	EPHY P0 Disable 0: Enable 1: Disable
12	RF_OLT_MODE	Enable RF OLT mode 0: Disable 1: Enable

Bit(s)	Name	Description
9	EINT_SEL	Andes EINT Source 0: from W_UTIF 1: from GPIO [23:20]
8	WLED_OD_EN	WLED Open-Drain 0: Disable 1: Open-Drain
4	REF_CLKO_AIO_EN	REF Clock Output PAD Selection 0: Analog PAD 1: Digital PAD
3	I2S_CLK_AIO_EN	I2S Clock PAD Selection 0: Analog PAD 1: Digital PAD
2	I2S_WS_AIO_EN	I2S WS PAD Selection 0: Analog PAD 1: Digital PAD
1	I2S_SDO_AIO_EN	I2S CSDO PAD Selection 0: Analog PAD 1: Digital PAD
0	I2S_SDI_AIO_EN	I2S SDI PAD Selection 0: Analog PAD 1: Digital PAD

10000040 N9 GPIO INT Andes GPIO Interrupt

0

Bit(s)	Name	Description
16:0	GPIO_INT	Analog GPIO INT

10000044 N9 GPIO MA
SK Andes GPIO Mask

0001FFF

Bit(s)	Name	Description
16:0	GPIO_MASK	Andes GPIO MASK

10000060 **GPIO1_MODE** GPIO1 purpose selection **5405040**
4

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	PWM1_MODE	PWM0_MODE	UART2_MODE	UART1_MODE					I2C_MODE				RE	FCL	K_MO	PE_RS_T_MO
Type	RW	RW	RW	RW					RW				DE	ODE	TODE	ODE
Reset	0	1	0	1	0	1	0	0		0	0		1		1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	WD_MODE		SPI_MODE	SD_MODE	UART0_MODE		I2S_MODE		SPI_CS1_MODE		SPIS_MODE		GPIO_MODE			
Type	RW		RW	RW	RW		RW		RW		RW		RW		RW	
Reset	0		0	0	1	0	0	0	0	0	0	0	0	1	0	0

Bit(s)	Name	Description
31:30	PWM1_MODE	PWM1 GPIO mode 3: SDXC D6 2: UTIF[5] 1: GPIO 0: PWM ch1
29:28	PWM0_MODE	PWM0 GPIO mode 3: SDXC D7 2: UTIF[4] 1: GPIO 0: PWM ch0
27:26	UART2_MODE	UART2 GPIO mode 3: SDXC D5/D4 2: PWM ch2/ch3 1: GPIO 0: UART-Lite #2
25:24	UART1_MODE	UART1 GPIO mode 3: SW_R, SW_T 2: PWM ch0/ch1 1: GPIO 0: UART-Lite #1
21:20	I2C_MODE	I2C GPIO mode 2: S-UART (debug) 1: GPIO 0: I2C
18	REFCLK_MODE	REFCLK GPIO mode 1: GPIO 0: REFCLK (12M)
16	PERST_MODE	PCIe RESET GPIO mode 1: GPIO 0: PCIe reset
15	ESD_MODE	SDXC Router mode 1: SDXC from I2S/I2C/GPIO0/UART1 pins 0: SDXC from EPHY pins
14	WDT_MODE	Watch dog timeout GPIO mode 1: GPIO 0: Watch dog
12	SPI_MODE	SPI GPIO mode 1: GPIO

Bit(s)	Name	Description
11:10	SD_MODE	0: SPI SDXC GPIO mode 3: Andes JTAG 2: UTIF[17:10] 1: GPIO 0: SDXC
9:8	UART0_MODE	UART0 GPIO mode 1: GPIO 0: UART-Lite #0
7:6	I2S_MODE	I2S GPIO mode 3: ANTSEL[5:2] 2: PCM 1: GPIO 0: I2S
5:4	SPI_CS1_MODE	SPI CS1 GPIO mode 2: REFCLK 1: GPIO 0: SPI CS1
3:2	SPIS_MODE	SPI Slave GPIO mode 3: PWM CH0/1 and UART2 2: UTIF[3:0] 1: GPIO 0: SPI Slave
1:0	GPIO_MODE	GPIO mode 3: PCIe Reset 2: REFCLK (12M) 1: GPIO 0: GPIO

10000064 GPIO2_MODE GPIO2 purpose selection

0555055

5

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name					P4_LED_K_N_MODE	P3_LED_K_N_MODE	P2_LED_K_N_MODE	P1_LED_K_N_MODE	P0_LED_K_N_MODE							
Type					RW	RW	RW	RW	RW							
Reset					0	1	0	1	0	1	0	1	0	1	0	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name					P4_LED_A_N_MODE	P3_LED_A_N_MODE	P2_LED_A_N_MODE	P1_LED_A_N_MODE	P0_LED_A_N_MODE							
Type					RW	RW	RW	RW	RW							
Reset					0	1	0	1	0	1	0	1	0	1	0	1

Bit(s)	Name	Description
27:26	P4_LED_KN_MODE	EPHY P4 LED GPIO mode [Note] Only valid for MT7628KN. 3: JTAG (JTRST_N) 2: UTIF[6] 1: GPIO 0: EPHY P4 LED
25:24	P3_LED_KN_MODE	EPHY P3 LED GPIO mode [Note] Only valid for MT7628KN. 3: JTAG (JTCLK) 2: UTIF[7] 1: GPIO 0: EPHY P3 LED
23:22	P2_LED_KN_MODE	EPHY P2 LED GPIO mode [Note] Only valid for MT7628KN. 3: JTAG (JTMS) 2: UTIF[8]

Bit(s)	Name	Description
		1: GPIO 0: EPHY P2 LED
21:20	P1_LED_KN_MODE	EPHY P1 LED GPIO mode [Note] Only valid for MT7628KN. 3: JTAG (JTDI) 2: UTIF[9] 1: GPIO 0: EPHY P1 LED
19:18	P0_LED_KN_MODE	EPHY P0 LED GPIO mode [Note] Only valid for MT7628KN. 3: JTAG(JTDO) 2: Reserved 1: GPIO 0: EPHY P0 LED
17:16	WLED_KN_MODE	WLED GPIO mode [Note] Only valid for MT7628KN. 3: Reserved 2: Reserved 1: GPIO 0: WLED
11:10	P4_LED_AN_MODE	EPHY P4 LED GPIO mode [Note] Only valid for MT7628AN. 3: JTAG (JTRST_N) 2: UTIF[6] 1: GPIO 0: EPHY P4 LED
9:8	P3_LED_AN_MODE	EPHY P3 LED GPIO mode [Note] Only valid for MT7628AN. 3: JTAG (JTCLK) 2: UTIF[7] 1: GPIO 0: EPHY P3 LED
7:6	P2_LED_AN_MODE	EPHY P2 LED GPIO mode [Note] Only valid for MT7628AN. 3: JTAG (JTMS) 2: UTIF[8] 1: GPIO 0: EPHY P2 LED
5:4	P1_LED_AN_MODE	EPHY P1 LED GPIO mode [Note] Only valid for MT7628AN. 3: JTAG (JTDI) 2: UTIF[9] 1: GPIO 0: EPHY P1 LED
3:2	P0_LED_AN_MODE	EPHY P0 LED GPIO mode [Note] Only valid for MT7628AN. 3: JTAG(JTDO) 2: Reserved 1: GPIO 0: EPHY P0 LED
1:0	WLED_AN_MODE	WLED GPIO mode [Note] Only valid for MT7628AN. 3: Reserved 2: Reserved 1: GPIO 0: WLED

10000068 MEMO1

Memory1

0000000
0

Bit(s)	Name	Description
31:0	MEMO1	Memory1

1000006C MEMO2 Memory2 00000000 0

Bit(s)	Name	Description
31:0	MEMO2	Memory2

10000070 EXT MEMO1 Extend Application #1 00000000
0

Bit(s)	Name	Description
31:0	MEMO1	Extend Application #1

Bit(s)	Name	Description
31:0	MEMO2	Extend Application #2

10000078 EXT_MEMO3 Extend Application #30000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	MEMO3[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	MEMO3[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	MEMO3	Extend Application #3

1000007C EXT_MEMO4 Extend Application #40000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	MEMO4[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	MEMO4[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	MEMO4	Extend Application #4

5.3 Timer

5.3.1 Features

- Independent 1usec tick pre-scale for each timer.
- Independent interrupts for each timer.
- Two general-purpose timers and a watchdog timer. Watchdog timer resets system on time-out.
- Timer Modes
 - *Periodic*
In periodic mode, the timer counts down to zero from the limited value. An interrupt is generated when the count is zero. After reaching zero, the limited value is reloaded into the timer and the timer counts down again. A limited value of zero disables the timer.
 - *Timeout*
In timeout mode, the timer counts down to zero from the limited value. An interrupt is generated when the count is zero. In this mode, the ENABLE bit is reset when the timer reaches zero, stopping the counter.
 - *Watchdog*
In watchdog mode, the timer counts down to zero from the limited value. If the load value is not reloaded or the timer is not disabled before the count is zero, the chip will be reset. When this occurs, every register in the chip is reset except the watchdog reset status bit WDRST in the RSTSTAT register in the system control block; it remains set to alert firmware of the timeout event when it re-executes its bootstrap.

5.3.2 Block Diagram

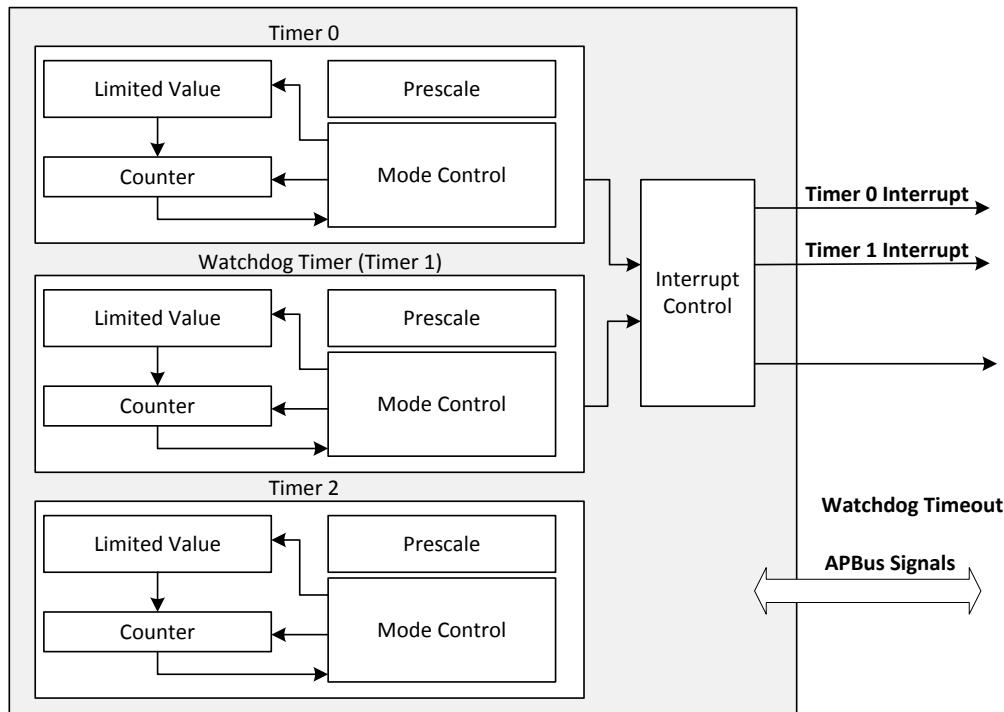


Figure 5-2 Timer Block Diagram

5.3.3 Registers

TIMER Changes LOG

Revision	Date	Author	Change Log
0.1	2012/8/24	Leon Chung	Initialization
0.2	2013/12/10	Rick Ho	1. Modify T0CTL_REG Bit[4] to WO and add Bit[3] RO 2. Modify WDTCTL_REG Bit[4] to WO and add Bit[3] RO 3. Modify T1CTL_REG Bit[4] to WO and add Bit[3] RO

Module name: TIMER Base address: (+10000100h)

Address	Name	Width	Register Function
10000100	<u>TGLB_REG</u>	32	RISC Global Control Register
10000110	<u>T0CTL_REG</u>	32	RISC Timer 0 Control Register
10000114	<u>T0LMT_REG</u>	32	RISC Timer 0 Limit Register
10000118	<u>T0_REG</u>	32	RISC Timer 0 Register
10000120	<u>WDTCTL_REG</u>	32	Watch Dog Timer Control Register
10000124	<u>WDTLMT_REG</u>	32	Watch Dog Timer Limit Register
10000128	<u>WDT_REG</u>	32	Watch Dog Timer Register
10000130	<u>T1CTL_REG</u>	32	RISC Timer 1 Control Register
10000134	<u>T1LMT_REG</u>	32	RISC Timer 1 Limit Register
10000138	<u>T1_REG</u>	32	RISC Timer 1 Register

10000100 TGLB_REG RISC Global Control Register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
<u>Name</u>																
<u>Type</u>																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<u>Name</u>																
<u>RESV1[20:5]</u>																
RO																
<u>Name</u>																
<u>RESV1[4:0]</u>																
<u>WDTRST</u>																
<u>WD TR ST</u>																
<u>T0RST</u>																
<u>RESV0</u>																
<u>T0R ST</u>																
<u>RESV0</u>																
<u>T1INT</u>																
<u>WD TIN T</u>																
<u>TOINT</u>																
<u>T0I NT</u>																
<u>WD TIN T</u>																
<u>WDTINT</u>																
<u>WDTINT</u>																
<u>T0INT</u>																
<u>W1 C</u>																
<u>W1 C</u>																
<u>W1 C</u>																
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Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV2								TOEN	RESV1		T0AL	T0A_L_S_TAT_US	RESV0		
Type	RO								RW	RO		WO	RO	RO		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	T0PRES	Timer 0 count down tick pre-scale. Unit is 1u second.
15:8	RESV2	Reserved
7	TOEN	Timer 0 count down enable
6:5	RESV1	Reserved
4	T0AL	Timer 0 auto load enable 1: Enable 0: Disable
3	T0AL_STATUS	Timer 0 auto load enable status 1: Enable 0: Disable
2:0	RESV0	Reserved

10000114 T0LMT_REG RISC Timer 0 Limit Register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV0															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	T0LMT															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV0	Reserved
15:0	T0LMT	Timer 0 Limit. When T0AL is set to 1, T0LMT will be loaded into timer 0 when timer 0 is enabled or when count down to 0.

10000118 T0_REG RISC Timer 0 Register 0000FFF F

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV0															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	T0															
Type	RW															
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:16	RESV0	Reserved
15:0	T0	RISC down-count timer 0

Bit(s)	Name	Description
31:16	WDTPRES	Watch dog timer count down tick pre-scale. Unit is 1u second.
15:8	RESV2	Reserved
7	WDTEN	Watch dog timer count down enable
6:5	RESV1	Reserved
4	WDTAL	Watch dog timer auto load enable 1: Enable 0: Disable
3	WDTAL_STATUS	Watch dog timer auto load enable status 1: Enable 0: Disable
2:0	RESV0	Reserved

Bit(s)	Name	Description
31:16	RESV0	Reserved
15:0	WDTLMT	Watch dog timer Limit. When WDTAL is set to 1, WDTLMT will be loaded into watch dog timer when watch dog timer is enabled or when count down to 0.

Bit(s)	Name	Description
31:16	RESV0	Reserved
15:0	WDT	watch dog timer.

Bit(s)	Name	Description
31:16	T1PRES	Timer 1 count down tick pre-scale. Unit is 1u second.
15:8	RESV2	Reserved
7	T1EN	Timer 1 count down enable
6:5	RESV1	Reserved
4	T1AL	Timer 1 auto load enable 1: Enable 0: Disable
3	T1AL_STATUS	Timer 1 auto load enable status 1: Enable 0: Disable
2:0	RESV0	Reserved

Bit(s)	Name	Description
31:16	RESV0	Reserved
15:0	T1LMT	Timer 1 Limit. When T1AL is set to 1, T1LMT will be loaded into timer 1 when timer 1 is enabled or when count down to 0.

**10000138 T1_REG RISC Timer 1 Register 0000FFF
F**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									T1							
Type									RW							
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:16	RESV0	Reserved
15:0	T1	RISC down-count timer 1

5.4 Interrupt Controller

5.4.1 Registers

CIRQ Changes LOG

Revision	Date	Author	Change Log
0.1	2012/6/15	YuShu Xiao	Initialization

Module name: CIRQ Base address: (+10000200h)

Address	Name	Width	Register Function
10000200	<u>IRQ_SEL0</u>	32	IRQ Selection 0 Register The registers allow the interrupt sources to be mapped onto interrupt requests IRQ. When write data to this register, the FIQ_SEL register will be update to the inverse data at the same time.
10000204	<u>IRQ_SEL1</u>	32	Reserved Reserved
10000208	<u>IRQ_SEL2</u>	32	Reserved Reserved
1000020C	<u>IRQ_SEL3</u>	32	Reserved Reserved
1000026C	<u>FIQ_SEL</u>	32	FIQ Selection Register The registers allow the interrupt sources to be mapped onto interrupt requests FIQ. When write data to this register, the IRQ_SEL0 register will be update to the inverse data at the same time.
10000270	<u>IRQ_MASK</u>	32	IRQ Mask Register This register contains a mask bit for each interrupt line in IRQ Controller.
10000274	<u>FIQ_MASK</u>	32	FIQ Mask Register This register contains a mask bit for each interrupt line in FIQ Controller
10000278	<u>IRQ_MASK CLR</u>	32	IRQ Mask Clear Register This register is used to clear bits in IRQ Mask Register.
1000027C	<u>FIQ_MASK CLR</u>	32	FIQ Mask Clear Register This register is used to clear bits in FIQ Mask Register.
10000280	<u>IRQ_MASK SET</u>	32	IRQ Mask Set Register This register is used to set bits in the IRQ Mask Register.
10000284	<u>FIQ_MASK SET</u>	32	FIQ Mask Set Register This register is used to set bits in the FIQ Mask Register.
10000288	<u>IRQ_EOI</u>	32	IRQ End of Interrupt Register This register provides a mean for software to relinquish and to refresh the interrupt controller. Writing a 1 to a specific bit results in an IRQ End of Interrupt command issued internally to the corresponding interrupt line.
1000028C	<u>FIQ_EOI</u>	32	FIQ End of Interrupt Register This register provides a mean for software to relinquish and to refresh the interrupt controller. Writing a 1 to a specific bit results in an FIQ End of Interrupt command issued internally to the corresponding interrupt line.
10000290	<u>IRQ_SENS</u>	32	IRQ Sensitive Register This register is used to set the IRQ interrupts as either edge or level sensitive.
10000294	<u>FIQ_SENS</u>	32	FIQ Sensitive Register This register is used to set the FIQ interrupts as either edge or level sensitive.
10000298	<u>INT_SOFT</u>	32	Software Interrupt Register

			Setting 1 to the specific bit position generates a software interrupt for corresponding interrupt line before interrupt input multiplex. This register is used for debug purpose.
1000029C	<u>IRQ_STAT</u>	32	IRQ Status Register Reading this register will get the IRQ interrupt sources with masking.
100002A0	<u>FIQ_STAT</u>	32	FIQ Status Register Reading this register will get the FIQ interrupt sources with masking.
100002A4	<u>INT_PURE</u>	32	Interrupt Pure Register Reading this register will get the pure interrupt sources without masking.
100002A8	<u>INT_MSEL</u>	32	Interrupt Mode Selection Register This register is used to select the interrupt modes of MIPS1004Kc.

10000200 IRQ SEL0 IRQ Selection 0 Register

0000000

1

Bit(s)	Name	Description
31:0	IRQ0	IRQ Selection 0 0: Clear IRQ_SEL0 and Set FIQ_SEL 1: Set IRQ_SEL0 and Clear FIQ_SEL

10000204 IRQ SEL1 Reserved

0000000

0

Bit(s)	Name	Description
31:0	RESV	Reserved

10000208 IRQ SEL2 Reserved

0000000

0

Bit(s)	Name	Description
31:0	RESV	Reserved

Bit(s)	Name	Description
31:0	RESV	Reserved

Bit(s)	Name	Description
31:0	FIQ	FIQ Selection 0: Clear FIQ_SEL and Set IRQ_SEL0 1: Set FIQ_SEL and Clear IRQ_SEL0

Bit(s)	Name	Description
31:0	IRQ0	IRQ Mask 0: Interrupt is disabled 1: Interrupt is enabled

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
-----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Bit(s)	Name	Description
31:0	FIQ	FIQ Mask 0: Interrupt is disabled 1: Interrupt is enabled

10000278 **IRQ MASK C** **IRQ Mask Clear Register** **00000000**
LR **0**

Bit(s)	Name	Description
31:0	IRQ0	IRQ Mask Clear 0: No effect 1: Clear the corresponding MASK bit

1000027C **FIQ MASK C** **FIQ Mask Clear Register** **00000000**
LR **0**

Bit(s)	Name	Description
31:0	FIQ	FIQ Mask Clear 0: No effect 1: Clear the corresponding MASK bit

10000280 IRQ MASK SET IRQ Mask Set Register **000000000**

Bit(s)	Name	Description
31:0	IRQ0	IRQ Mask Set 0: No effect 1: Set the corresponding MASK bit

10000284 FIQ_MASK_S ET **FIQ Mask Set Register** **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	FIQ[31:16]															
Type	WO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	FIQ[15:0]															
Type	WO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	FIQ	FIQ Mask Set 0: No effect 1: Set the corresponding MASK bit

10000288 IRQ_EOI **IRQ End of Interrupt Register** **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	IRQ0[31:16]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	IRQ0[15:0]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	IRQ0	IRQ End of Interrupt 0: No service is currently in progress or pending 1: Interrupt request is in-service

1000028C FIQ_EOI **FIQ End of Interrupt Register** **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	FIQ[31:16]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	FIQ[15:0]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	FIQ	FIQ End of Interrupt 0: No service is currently in progress or pending 1: Interrupt request is in-service

10000290 IRQ_SENS IRQ Sensitive Register 00000000
 1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:0	IRQ0	IRQ Sensitive 0: Edge sensitivity with Pos-edge Edge 1: Level sensitivity with active High

10000294 FIQ_SENS FIQ Sensitive Register 00000000
 1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:0	FIQ	FIQ Sensitive 0: Edge sensitivity with Pos-edge Edge 1: Level sensitivity with active High

10000298 INT_SOFT Software Interrupt Register 00000000
 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	INT	Software Interrupt

1000029C IRQ_STAT IRQ Status Register 00000000
 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	IRQ0	IRQ Status 0: No interrupt request is generated 1: Interrupt request is pending

100002A0 FIQ_STAT FIQ Status Register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	FIQ[31:16]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	FIQ[15:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	FIQ	FIQ Status 0: No interrupt request is generated 1: Interrupt request is pending

100002A4 INT_PURE Interrupt Pure Register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	INT[31:16]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	INT[15:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	INT	Pure Interrupt 0: No interrupt source is asserted 1: Interrupt source is asserted

100002A8 INT_MSEL Interrupt Mode Selection Register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV[30:15]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV[14:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:1	RESV	Reserved
0	SEL	Interrupt Mode Selection 0: Compatibility & Vectored Interrupt Mode 1: External Interrupt Controller Mode

5.5 EMC Controller

5.5.1 Register

EXT_MC_ARB Changes LOG

Revision	Date	Author	Change Log
0.1	2012/10/5	Lancelot	Initialization
0.2	2013/8/19	YS Xiao	Modify to MT7628

Module name: EXT_MC_ARB Base address: (+10000300h)

Address	Name	Width	Register Function
10000300	<u>SDRAM_CFG0</u>	32	SDRAM Configuration 0
10000304	<u>SDRAM_CFG1</u>	32	SDRAM Configuration 1
10000308	<u>ILL ACC ADD R</u>	32	Illegal Access Address Capture
1000030C	<u>ILL ACC TYPE</u>	32	Illegal Access Type Capture
10000310	<u>DDR SELF REFRESH</u>	32	ODT and Self-Refresh Configuration
10000314	<u>SDR DDR_PWR_SAVE_CNT</u>	32	Self-Refresh Time Count
10000320	<u>DLL_DBG</u>	32	DRAM DLL Debug Probe
10000340	<u>DDR_CFG0</u>	32	DDR1/DDR2 controller configuration 0 register
10000344	<u>DDR_CFG1</u>	32	DDR1/DDR2 controller configuration 1 register
10000348	<u>DDR_CFG2</u>	32	DDR1/DDR2 controller configuration 2 register
1000034C	<u>DDR_CFG3</u>	32	DDR1/DDR2 controller configuration 3 register
10000350	<u>DDR_CFG4</u>	32	DDR1/DDR2 controller configuration 4 register
10000360	<u>DDR_DQ_DLY</u>	32	DDR1/DDR2 DQ delay control register
10000364	<u>DDR_DQS_DLY</u>	32	DDR1/DDR2 DQS delay control register
10000368	<u>DDR_DLL_SLV</u>	32	DDR1/DDR2 DLL slave control register
1000036C	<u>DDR_DLL_MST</u>	32	DDR1/DDR2 DLL master control register
10000380	<u>MC_ARB_CFG</u>	32	MC 2 to 1 arbiter setting
10000384	<u>MC_AG_BW</u>	32	MC Channel BW/QoS_Type/DueDate Setting
10000390	<u>RB_DBG</u>	32	RB Debug
10000394	<u>RB_STATE</u>	32	RB Debug State
10000398	<u>RB_BW</u>	32	RB Bandwidth
1000039C	<u>RB_LAT</u>	32	RB Latency

10000300 SDRAM_CFG0 SDRAM Configuration 0

5192528

2

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>DIS_CL_K_GT</u>	<u>CLK_SLE_W</u>		<u>TW_R</u>	<u>TMRD</u>				<u>TRFC</u>				<u>RSV0</u>		<u>TCAS</u>	
Type	RW	RW		RW	RW				RW				RO		RW	
Reset	0	1	0	1	0	0	0	1	1	0	0	1	0	0	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>TRAS</u>			<u>RSV1</u>		<u>TRCD</u>		<u>TRC</u>				<u>RSV2</u>		<u>TRP</u>		
Type	RW			RO		RW		RW				RO		RW		
Reset	0	1	0	1	0	0	1	0	1	0	0	0	0	1	0	0

Bit(s)	Name	Description
31	DIS_CLK_GT	Disable Clock Gating Disables clock gating of the SDR DRAM controller. 0: Enable 1: Disable
30:29	CLK_SLEW	Reserved
28	TWR	Write Recovery Time (unit: system clock cycles - 1)
27:24	TMRD	Load Mode Register command to any other command delay. (unit: system clock cycles - 1)
23:20	TRFC	Auto Refresh period (unit: system clock cycles - 1)
19:18	RSV0	Reserved
17:16	TCAS	CAS Latency Time (unit: system clock cycles - 1)
15:12	TRAS	The Active To Precharge command delay. (unit: system clock cycles - 1)
11:10	RSV1	Reserved
9:8	TRCD	Active To Read or Write delay (RAS to CAS delay) (unit: system clock cycles - 1)
7:4	TRC	Active To Active command period (unit: system clock cycles - 1)
3:2	RSV2	Reserved
1:0	TRP	Precharge command period (unit: system clock cycles - 1)

10000304 SDRAM_CFG1 SDRAM Configuration 1

0112060

0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SD RA M_I NIT _ST AR T	SD RA M_I NIT _D ON E	RB C_ MA DO PPI NG	PW R_ DO WN _EN	PW R_ DO WN _M OD E	RSV0	SD RA M_ WID TH	RSV1	NUMCOLS	RSV2	NUMROW S					
Type	RW	RO	RW	RW	RW	RO	RW	RO	RO	RW	RO	RO	RO	RO	RW	
Reset	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	TREFR															
Type	RW															
Reset	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31	SDRAM_INIT_STAR T	SDRAM Initialization Start performs the SDRAM initialization sequence. Can not set this bit to 0 after initialization. 1: Start initialization
30	SDRAM_INIT_DONE E	SDRAM Initialization Done Indicates the SDRAM has been initialized. 0: Not initialized. 1: Initialized.
29	RBC_MAPPING	RBC Mapping Selects the address mapping scheme. 0: {BANK ADDR, ROW ADDR, COL ADDR} address mapping scheme 1: {ROW ADDR, BANK ADDR, COL ADDR} address mapping scheme
28	PWR_DOWN_EN	Power Down Enable Enables the SDRAM precharge power-down mode to save standby power.

Bit(s)	Name	Description
		0: Disable 1: Enable
27	PWR_DOWN_MODE	Power Down Mode 0: Precharge power down mode 1: Active power down
26:25	RSV0	Reserved
24	SDRAM_WIDTH	SDRAM Width Selects the number of SDRAM data bus bits. 0: 16 bits 1: 32 bits
23:22	RSV1	Reserved
21:20	NUMCOLS	Number of Columns Selects the number of column address bits. 0: 8 Column address bits 1: 9 Column address bits (default) 2: 10 Column address bits 3 11 Column address bits
19:18	RSV2	Reserved
17:16	NUMROWS	Number of Rows Selects the number of row address bits. 0: 11 Row address bits 1: 12 Row address bits (default) 2: 13 Row address bits 3: 14 Row address bits
15:0	TREFR	AUTO REFRESH period (unit: SDRAM clock cycles - 1).

10000308 ILL_ACC_DR Illegal Access Address Capture 00000000															
Bit 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16															
Name ILL_ACC_ADDR[31:16]															
Type RO															
Reset 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0															
Bit 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0															
Name ILL_ACC_ADDR[15:0]															
Type RO															
Reset 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0															

Bit(s)	Name	Description
31:0	ILL_ACC_ADDR	Illegal Access Address if any bus masters (including CPU) issue illegal accesses (e.g. accesses to reserved memory space, or non-double-word accesses to configuration registers), the address of the illegal transaction is captured in this register. An illegal interrupt is generated to indicate this exception.

1000030C ILL_ACC_TYP_E Illegal Access Type Capture 00000000															
Bit 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16															
Name ILL_IN_T_S_TAT_US															
Type RO															
Reset 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0															
Bit 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0															

Name	RSV1					ILL_IID			ILL_ACC_LEN							
Type	RO					RO			RO							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31	ILL_INT_STATUS	Illegal Access Interrupt Status Indicates whether the illegal access interrupt is cleared or pending. Read 0: Cleared 1: Pending Write 1: Clear both the ILL_ACC_ADDR and ILL_ACC_TYPE registers and thus clear ILL_INT_STATUS.
30	ILL_ACC_WR	Illegal Access Write Indicates the illegal access is a read or a write. 0: A read access 1: A write access
29:20	RSV0	Reserved
19:16	ILL_ACC_BSEL	Illegal Access Byte Select Indicates which bytes were illegally accessed.
15:11	RSV1	Reserved
10:8	ILL_IID	Illegal Access Initiator ID Indicates the initiator ID of the illegal access. 0: CPU 1: DMA 2: PPE 3: Ethernet PDMA Rx 4: Ethernet PDMA Tx 5: PCI/PCIE 6: Embedded WLAN MAC/BBP 7: USB
7:0	ILL_ACC_LEN	Illegal Access Length Indicates the access size of the illegal access. (unit: bytes)

DDR_SELF_REFRESH															ODT and Self-Refresh Configuration			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	1	
Name	RSV0				ODT_SRC_SEL				ODT_OFF_DLY				ODT_ON_DLY					
Type	RO				RW				RW				RW					
Reset	0	0	0	0	1	1	1	0	0	0	0	1	0	0	1	0		
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Name	RSV1												SR_AU_TO_EN	RSV2		SR_AC_K_B		
Type	RO												RW	RO		RO	RW	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		

Bit(s)	Name	Description
31:28	RSV0	Reserved
27:24	ODT_SRC_SEL	ODT Source Select Sets the DDR pad ODT control source. 0: Dasaptive[0] 1: Dasaptive[1] ... 11: Dasaptive[11] 12: DQS_WINDOW 13: ODT_LOCAL 14: Always on 15: Always off
23:20	ODT_OFF_DLY	ODT Off-Delay
19:16	ODT_ON_DLY	ODT On-Delay

Bit(s)	Name	Description
23:20	ODT_OFF_DLY	ODT Off Delay Sets the delay time of the ODT_OFF signal based on the ODT_ON signal. 0: 0 T 1: 0.5 T 2: 1.5 T 3: 2.5 T ... 15: 14.5 T
19:16	ODT_ON_DLY	ODT On Delay Sets the delay time of the ODT_ON signal based on the ODT source signal. 0: 0 T 1: 1 T 2: 2 T ... 15: 15 T
15:5	RSV1	Reserved
4	SR_AUTO_EN	Auto Self-Refresh Enable Enables auto self-refresh for power saving. 0: Disable 1: Enable
3:2	RSV2	Reserved
1	SRACK_B	Self-Refresh Acknowledge Status Indicates whether DDR2 is in self-refresh mode or has exited from self-refresh mode. When DDR2 changes from self-refresh mode to normal mode, it takes about 200 clock cycles. 0: The DDR2 is in self-refresh mode. 1: The DDR2 has exited from self-refresh mode.
0	SRREQ_B	Self-Refresh Request Control Requests DDR2 to enter or exit self-refresh mode. It is low active. 0: Enter self-refresh mode. 1: Exit self-refresh mode.

<u>SDR_DDR_P</u>															
<u>WR_SAVE_C</u>															
<u>NT</u>															
PD_CNT								SR_TAR_CNT[23:16]							
RO								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
SR_TAR_CNT[15:0]								RW							
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:24	PD_CNT	Power Down Count Counts the times self-refresh mode is entered
23:0	SR_TAR_CNT	Self-Refresh Time Count This counter is only referenced when the SDR (PWR_DOWN_EN) or DDR (SR_AUTO_EN) is set. This counter measures the period SDR or DDR is in IDLE status. When the IDLE period has reached the specified time period, the SDR or DDR automatically enter power-saving or selfrefresh mode. Use the following equations to configure the counter. DRAM_CLK_FREQ is PLL_CLK (600 MHz) divided by 3 DDR: $(SR_TAR_CNT * 256 + 255) / DRAM_CLK_FREQ$ SDR: $(SR_TAR_CNT * 256) / DRAM_CLK_FREQ$

Bit(s)	Name	Description
		DDR reference table 200 MHz: (32'h03FFFF * 256 + 255) * 5 ns ~= 335 ms SDRAM reference table 120 MHz: 32'h03FFFF * 256 * 8.3 ns ~= 560 ms

10000320 DLL_DBG DRAM DLL Debug Probe 00000000

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0												RSV1	TDC_STA BLE[5:4]		
Type	RO												RO	RO		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	TDC_STABLE[3:0]				MST_DLY_SEL								RS V2	CURR_ST ATE	AD LL LO CK _D ON E	
Type	RO				RO								RO	RO	RO	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:20	RSV0	Reserved
19:18	RSV1	Reserved
17:12	TDC_STABLE	ADLL master coarse-grain delay code
11:4	MST_DLY_SEL	ADLL master final delay code
3	RSV2	Reserved
2:1	CURR_STATE	ADLL controller FSM current state
0	ADLL_LOCK_DONE	ADLL lock done signal

10000340 DDR_CFG0 DDR1/DDR2 controller configuration 0 register 249B425

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	T_RRD				T_RAS				T_RP				T_RFC[5:3]			
Type	RW				RW				RW				RW			
Reset	0	0	1	0	0	1	0	0	1	0	0	1	1	0	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	T_RFC[2:0]				T_REFI											
Type	RW				RW											
Reset	0	1	0	0	0	0	1	0	0	1	0	1	1	0	1	1

Bit(s)	Name	Description
31:28	T_RRD	The minimum number of clock cycles from an active command to the next active command for different banks (TRRD). For DDR2 devices, this is required to be a minimum of 2 regardless of the cycle time.
27:23	T_RAS	The number of clock cycles from an active command until a pre-charge command is allowed. To obtain this value, one should divide the minimum RAS# to pre-charge delay of the SDRAM by the clock cycle time (TRAS). The sum of Active-to-Pre-charge and Pre-charge-to-Active should be equal or larger than active-to-active delay of the same bank (TRC)
22:19	T_RP	The number of clock cycles needed for the SDRAM to recover from a pre-charge command and ready to accept the next active command. To obtain this value, one should divide the RAS# pre-charge time of the SDRAM (TRP) by the clock cycle time. The sum of Active-to-Pre-charge

Bit(s)	Name	Description
18:13	T_RFC	and Pre-charge-to-Active should be equal or larger than active-to-active delay of the same bank (TRC) Half the number of clock cycles needed for the SDRAM to recover from a refresh signal to be ready to take the next command. To obtain this value, one should divide the SDRAM row cycle time (TRFC) by the clock cycle time.
12:0	T_REFI	The number of clock cycles from one refresh command to the next refresh command. To obtain this value, one should divide the periodic refresh interval (TREFI) by the clock cycle time. The actual timing of issuing a pre-charge command may be delayed by if the SDRAM is processing a normal access. However, the delay is not accumulative so there is no need to shorten the refresh interval to account for memory access time. The non-accumulative refresh delay typically increases memory bandwidth by a few percentage points.

10000344 **DDR_CFG1** DDR1/DDR2 controller configuration 1 register 222E242
4

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	T_WTR				T RTP				RSV0		US_ER_DA_TA_WID_TH	IND_SDRAM_SIZE			IND_SDRA_M_WIDTH	
Type	RW				RW				RO		RW	RW			RW	
Reset	0	0	1	0	0	0	1	0	0	0	1	0	1	1	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	EXT_BANK	TOTAL_SDRAM_WID_TH		T_WR				T_MRД				T_RCD				
Type	RW		RW		RW				RW				RW			
Reset	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	0

Bit(s)	Name	Description
31:28	T_WTR	The write-to-read delay (TWTR) (last write data to the next read command) as specified by the DDR2 data sheet
27:24	T RTP	The read-to-pre-charge delay (TRTP) as specified by the DDR2 data sheet. Note that this is a DDR2 requirement, and requires a minimum of 2 cycles. These bits are ignored in DDR mode.
23:22	RSV0	Reserved
21	USER_DATA_WIDTH	Specify user data width 0: 32-bit 1: 64-bit When user data width is 32-bit, total SDRAM width (bit[13:12]) must be 10. NOTE: This system is always 64-bit. Please do not modify this setting.
20:18	IND_SDRAM_SIZE	Specify individual SRAM size 000: Reserved 001: Individual SDRAM is 64 Mbit, (DDR only) 010: Individual SDRAM is 128 Mbit, (DDR only) 011: Individual SDRAM is 256 Mbit. 100: Individual SDRAM is 512 Mbit. 101: Individual SDRAM is 1 Gbit. 110: Individual SDRAM is 2 Gbit, (DDR2 only). 111: Reserved
17:16	IND_SDRAM_WIDTH	Specify individual SRAM data width 00: Reserved 01: 8-bit. 10: 16-bit. 11: Reserved
15:14	EXT_BANK	Specify bank/module configuration 00: 1 external bank, 1 module. (CS#[0])

Bit(s)	Name	Description
		01: 2 external bank, 1 module. (CS#[1:0]), 10: Reserved 11: 2 external banks, 2 modules. (CS#[1:0]) NOTE: only one CS pin.
13:12	TOTAL_SDRAM_WI_DTH	This field specifies the total data width to the SDRAM. For example, if four 8-bit wide DDR2 chips are used in parallel to form a 32-bit DDR2 data width, this field should be defined as 11 to indicate a 32-bit width. In this case, bit[17:16] should be defined as 01. 00: Reserved 01: Reserved 10: 16-bit 11: 32-bit. Allowed only when user data width is 64-bit (bit21 is 1).
11:8	T_WR	The clock cycles needed for the DDR to recover from a write command and be able to accept a pre-charge command. To obtain this value, divide the SDRAM write recovery time by the clock cycle time (TWR)
7:4	T_MRД	The number of clock cycles after the setting of the mode registers in the DDR and before the issue of the next command. To obtain this value, divide the Mode Register Set Cycle time (TMRD) by the clock cycle time.
3:0	T_RCD	The number of clock cycles from an active command to a read/write assertion. To obtain this value, divide the RAS# to CAS# delay time (TRCD) by the clock cycle time.

10000348 DDR_CFG2 DDR1/DDR2 controller configuration 2 register 43FFE44
3

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RE GE	DD R2 MO DE	DQS0_GA TING_WIN DOW	DQS1_GA TING_WIN DOW	RSV0[12:3]											
Type	RW	RW	RW		RO											
Reset	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV0[2:0]			PD		WR		DLL RE SET	TES TM OD E	CAS_LATENCY			BU RS T_T YP E	BURST_LENGTH		
Type	RO			RW		RW		RW	RW	RW			RO	RW		
Reset	1	1	1	0	0	1	0	0	0	1	0	0	0	0	1	1

Bit(s)	Name	Description
31	REGE	This bit should be high when external registers are inserted in the controller and address signals are sent between the controller and the DDR SDRAM. One example of such instance is when register mode SDRAM DIMM is used. This bit should be low when the control and address signals from the controller is connected to the SDRAM without register delay.
30	DDR2_MODE	This bit determines whether the memory controller is in DDR1 or DDR2 mode. 0: DDR1 mode 1: DDR2 mode
29:28	DQS0_GATING_WI_NDOW	Controls the mask for the data strobe 0 (DQS0) window leading and trailing edge. 00: Half extended cycle for the leading and trailing edge of DQS window (maximum window) 01: Only half extended cycle for leading edge of DQS window 10: Only half extended cycle for trailing edge of DQS window 11: No extended cycle for leading and trailing edge of DQS window (minimum window)
27:26	DQS1_GATING_WI_NDOW	Controls the mask for the data strobe 1 DQS1 window leading and trailing edge.

Bit(s)	Name	Description
		00: Half extended cycle for the leading and trailing edge of DQS window (maximum window) 01: Only half extended cycle for leading edge of DQS window 10: Only half extended cycle for trailing edge of DQS window 11: No extended cycle for leading and trailing edge of DQS window (minimum window)
25:13	RSV0	Reserved
12	PD	Active Memory Power Down Exit Time 0: Fast exit time (TXARD) 1: Slow exit time(TXARDS) This bit is used for DDR2 only. This bit must be 0 for DDR1.
11:9	WR	Auto Pre-charge Write Recovery (TDAL) These bits must be 0 for DDR1.
8	DLLRESET	SDRAM Delay Locked Loop (DLL) Reset 0: Normal operation 1: Normal operation with DLL reset
7	TESTMODE	Set SDRAM to run test mode. 0: Normal operation. 1: Test mode. The user must keep this bit at 0 if SDRAM does not support TESTMODE bit.
6:4	CAS_LATENCY	Specifies the number of the clock cycles from the assertion of a read/write signal to the SDRAM until the first valid data on the output from the SDRAM. The valid numbers are: 101: 1.5 for DDR1 or 5 for DDR2. 010: 2 110: 2.5 (DDR1 only) 011: 3 100: 4 (DDR2 only)
3	BURST_TYPE	This register is hardwired to 0 to indicate a sequential burst type.
2:0	BURST_LENGTH	Indicates the burst length of the read/write transaction. 010: 4 bursts 011: 8 bursts NOTE: 1. A burst of 4 is not allowed when user data is 64-bit while SDRAM data is 16-bit. 2. A burst of 8 is allowed in all user/SDRAM data width combination. 3. Other values for burst length are not allowed.

1000034C DDR_CFG3 DDR1/DDR2 controller configuration 3 register FFFE41
2

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0[18:3]															
Type	RO															
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV0[2:0]				Q_OF_F	RD_OS	DIS_FF_DQS	OCD		RTT_1	ADDITIVE_LATENCY			RTT_0	DS	DLL
Type	RO			RW	RW	RW	RW		RW	RW			RW	RW	RW	
Reset	1	1	1	0	0	1	0	0	0	0	0	1	0	0	1	0

Bit(s)	Name	Description
31:13	RSV0	Reserved
12	Q_OFF	Output Buffer Disable 0: Enabled 1: Disabled This bit is used for DDR2 only. This bit must be 0 for DDR1.

Bit(s)	Name	Description
11	RDOS	Redundant Data Strobe (DQS) This bit enables the redundant DQS function if supported by the SDRAM. 0: Disable 1: Enable This bit is used for DDR2 only and must be 0 for DDR1.
10	DIS_DIFF_DQS	Disable differential DQS 0: Enable 1: Disable This bit is used for DDR2 only and must be 0 for DDR1.
9:7	OCD	Off-Chip Driver Impedance Calibration (OCD) These bits support the OCD function if supported by the SDRAM. The value programmed in these register bits will be programmed into the SDRAM at EMR1 programming. Settings are vendor-dependant.
6	RTT1	Internal Termination Resistor (RTT) bit 1 Used together with bit 2 (RTT0) to control On-Die Termination (ODT). Combine values for (RTT1, RTT0) to select ODT settings. 00: ODT disabled. 01: 75 ohm 10: 150 ohm 11: Reserved This bit is used for DDR2 only and must be 0 for DDR1.
5:3	ADDITIVE_LATENC Y	Additive Latency 000: 0 cycle 001: 1 cycle 010: 2 cycles 011: 3 cycles 100: 4 cycles 101: 5 cycles Others: Reserved This bit is used for DDR2 only and must be 0 for DDR1.
2	RTT0	Internal Termination Resistor (RTT) bit 0 Used together with bit 6 (RTT1) to control ODT. This bit is used for DDR2 only and must be 0 for DDR1.
1	DS	SDRAM drive Strength 0: 100% drive strength. 1: 60% drive strength.
0	DLL	SDRAM Delay Locked Loop (DLL) Enable 0: Disable 1: Enable

10000350 <u>DDR_CFG4</u> DDR1/DDR2 controller configuration 4 register																FFFFF F4	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RSV0[26:11]																
Type	RO																
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RSV0[10:0]										FAW						
Type	RO										RW						
Reset	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	

Bit(s)	Name	Description
31:5	RSV0	Reserved
4:0	FAW	Four Activated Windows (FAW) Period DDR2 devices impose a restriction in that no more than 4 ACTIVE commands may be issued in a given FAW period. To obtain this value, one should divide the Four Bank Activate period (TFAW) of the DDR by the clock cycle time. These bits are ignored in 4 bank devices.

10000360 DDR_DQ_DLY DDR1/DDR2 DQ delay control register0000888
8

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DQ_GROUP1_DELAY_SEL								DQ_GROUP0_DELAY_SEL							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DQ_GROUP1_DELAY_C_OARSE_TUNING	DQ_GROUP1_DELAY_FINE_TUNING	DQ_GROUP0_DELAY_C_OARSE_TUNING	DQ_GROUP0_DELAY_FINE_TUNING												
Type	RW				RW				RW				RW			
Reset	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0

Bit(s)	Name	Description
31:24	DQ_GROUP1_DELAY_SEL	Force Data Group 1 (MD8 to MD15) Output Delay. Valid when DQ_DLY_SEL_EN is 1. bit7~4: for coarse-grain delay setting bit3~0: for fine-grain delay setting
23:16	DQ_GROUP0_DELAY_SEL	Force Data Group 0 (MD0 to MD7) Output Delay. Valid when DQ_DLY_SEL_EN is 1. bit7~4: for coarse-grain delay setting bit3~0: for fine-grain delay setting
15:12	DQ_GROUP1_DELAY_COARSE_TUNING	Data Group 1 (MD8 to MD15) Output Delay Coarse-Grain Tuning 0x0 to 0x7: Decrease delay by 250 ps per step. 0x8: Keep DLL delay. 0x9 to 0xF: Increase delay by 250 ps per step.
11:8	DQ_GROUP1_DELAY_FINE_TUNING	Data Group 1 (MD8 to MD15) Output Delay Fine-Grain Tuning 0x0 to 0x7: Decrease delay by 30 ps per step. 0x8: Keep DLL delay. 0x9 to 0xF: Increase delay by 30 ps per step.
7:4	DQ_GROUP0_DELAY_COARSE_TUNING	Data Group 0 (MD0 to MD7) Output Delay Coarse-Grain Tuning 0x0 to 0x7: Decrease delay by 250 ps per step. 0x8: Keep DLL delay. 0x9 to 0xF: Increase delay by 250 ps per step.
3:0	DQ_GROUP0_DELAY_FINE_TUNING	Data Group 0 (MD0 to MD7) Output Delay Fine-Grain Tuning 0x0 to 0x7: Decrease delay by 30 ps per step. 0x8: Keep DLL delay. 0x9 to 0xF: Increase delay by 30 ps per step.

10000364 DDR_DQS_DL DDR1/DDR2 DQS delay control register0000888
8

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DQS1_DELAY_SEL								DQS0_DELAY_SEL							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DQS1_DELAY_COARSE_TUNING	DQS1_DELAY_FINE_TUNING	DQS0_DELAY_COARSE_TUNING	DQS0_DELAY_FINE_TUNING												
Type	RW				RW				RW				RW			
Reset	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0

Bit(s)	Name	Description
31:24	DQS1_DELAY_SEL	Force Data Strobe 1 (MDQS1) Input Delay. Valid when DQS_DLY_SEL_EN is 1 bit7~4: for coarse-grain delay setting bit3~0: for fine-grain delay setting
23:16	DQS0_DELAY_SEL	Force Data Strobe 0 (MDQS0) Input Delay. Valid when DQS_DLY_SEL_EN is 1

Bit(s)	Name	Description
		bit7~4: for coarse-grain delay setting bit3~0: for fine-grain delay setting
15:12	DQS1_DELAY_COA RSE_TUNING	Data Strobe 1 Input Delay Coarse-Grain Tuning 0x0 to 0x7: Decrease delay by 250 ps per step. 0x8: Keep DLL delay. 0x9 to 0xF: Increase delay by 250 ps per step.
11:8	DQS1_DELAY_FIN E_TUNING	Data Strobe 1 Input Delay Fine-Grain Tuning 0x0 to 0x7: Decrease delay by 30 ps per step. 0x8: Keep DLL delay. 0x9 to 0xF: Increase delay by 30 ps per step.
7:4	DQS0_DELAY_COA RSE_TUNING	Data Strobe 0 Input Delay Coarse-Grain Tuning 0x0 to 0x7: Decrease delay by 250 ps per step. 0x8: Keep DLL delay. 0x9 to 0xF: Increase delay by 250 ps per step.
3:0	DQS0_DELAY_FIN E_TUNING	Data Strobe 0 Input Delay Fine-Grain Tuning 0x0 to 0x7: Decrease delay by 30 ps per step. 0x8: Keep DLL delay. 0x9 to 0xF: Increase delay by 30 ps per step.

10000368 DDR DLL SL V																	00000000 0
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RSV0[22:7]																
Type	RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RSV0[6:0]								DLL	SL	V_U	DQ	S_D	DQ	_DL	Y_S	EL
	PD	AT	E_	MO	DE	RSV1				LY	SEL	EN	RSV2				EN
Type	RO								RW	RO				RW			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:9	RSV0	Reserved
8	DLL_SLV_UPDATE_MODE	Set DLL slave update mode. 0: Update delay code only when bank is activated. 1: Continous update
7:5	RSV1	Reserved
4	DQS_DLY_SEL_EN	0: DQS Input Delay decided by DLL. 1: Force DQS Input Delay by DQS0_DELAY_SEL / DQS1_DELAY_SEL.
3:1	RSV2	Reserved
0	DQ_DLY_SEL_EN	0: DQ Output Delay decided by DLL. 1: Force DQ Output Delay by DQ_GROUP0_DELAY_SEL / DQ_GROUP1_DELAY_SEL.

1000036C DDR DLL MS T																	00000000 0	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16		
Name	DLL_M_AS	RSV0								DLL_M_AS	RSV1[11:4]							
	RE	BY																

	LO CK _EN							PA SS_ FD	PA SS_ CD											
Type	RW	RO					RW	RW	RO											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0	0		
Name	RSV1[3:0]					DLL_MAS_FIXED_FD					RSV2		DLL_MAS_FIXED_CD							
Type	RO					RW					RO		RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Bit(s)	Name	Description
31	DLL_MAS_RELLOCK_EN	Delayed Locked Loop (DLL) Master Relock Enable 0: Disable relocking scheme. 1: Enable relocking scheme. DLL supports restarting locking from initial value if DLL is not locked after waiting 512 cycles.
30:26	RSV0	Reserved
25	DLL_MAS_BYPASS_FD	DLL Bypass Fine Grain Delay 0: Fine-grain delay code is determined by DLL. 1: Fine-grain delay code is fixed by DLL_MAS_FIXED_FD.
24	DLL_MAS_BYPASS_CD	DLL Bypass Coarse Grain Delay 0: Coarse-grain delay code is determined by DLL 1: Coarse-grain delay code is fixed by DLL_MAS_FIXED_CD.
23:12	RSV1	Reserved
11:8	DLL_MAS_FIXED_FD	DLL Fixed Fine Grain Delay Specifies the fine-grain delay. The effective range is 0 to 15. Each step is about 30 ps.
7:6	RSV2	Reserved
5:0	DLL_MAS_FIXED_CD	DLL Fixed Coarse Grain Delay Specifies the coarse-grain delay. The delay = ((x-2)/4-1)*250 ps, the effective range of x is 10 to 52.

10000380 MC_ARB_CF_G MC 2 to 1 arbiter setting 07FAC6 88

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16		
Name	RSV0					pre em pt_ en	trtc _en	clas s_e n	cls_priority[23:16]									
Type	RO					RW	RW	RW	RW									
Reset	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0	
Name	cls_priority[15:0]																	
Type	RW																	
Reset	1	1	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	

Bit(s)	Name	Description
31:27	RSV0	Reserved
26	preempt_en	Preemption Enable Request preemption, higher priority requestor may change current request transaction 0: Disable Preemption 1: Enable Preemption
25	trtc_en	Two Rate Three Color Bandwidth (TRTC) Meter Enable 0: Disable TRTC 1: Enable TRTC
24	class_en	QoS Classifier Enable 0: Disable CLASS 1: Enable CLASS TRTC (0) CLASS (0) Round Robin

Bit(s)	Name	Description
23:0	cls_priority	<p>TRTC (0) CLASS (1) Fixed Priority TRTC (1) CLASS (0) BW RR TRTC (1) CLASS (1) QoS Arb</p> <p>Class Priority This field is used for class priority for second arbitration. {BEy(3'd7), LCg(3'd6), BSy(3'd5), LSy(3'd4), BEg (3'd3), BSg (3'd2), LSg(3'd1), LCgd(3'd0)}</p>

10000384 MC AG_BW MC Channel BW/QoS_Type/DueDate Setting 0110FF40

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	ag_wr	RSV0		ag_sel	RSV1		ag_qos_type	ag_duedate								
Type	WO	RO		RW	RO		RW	RW								
Reset	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	ag_pir							ag_cir								
Type	RW							RW								
Reset	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0

Bit(s)	Name	Description
31	ag_wr	Agent Write 0: Read 1: Write
30:29	RSV0	Reserved
28	ag_sel	DMA Agent Select Selects a DMA agent to configure. 0: CPU (Rbus0) 1: DMA (Rbus1)
27:26	RSV1	Reserved
25:24	ag_qos_type	Agent QoS Type 0: Latency critical 1: Latency sensitive (CPU) 2: Bandwidth sensitive (DMA) 3: Best Effort
23:16	ag_duedate	Due date for latency critical agent (unit: system bus clock cycle - system bus is 300 MHz or 225 MHz depending on bootstrap value.)
15:8	ag_pir	Peak Information Rate for the Agent The PIR is greater than or equal to the CIR. Bandwidth which exceeds PIR is marked red. 0x00: 0 MB/s 0x01: 8 MB/s ... 0x40: 512 MB/s ... 0xFF: 2040 MB/s (Max)
7:0	ag_cir	Committed Information Rate for the Agent Bandwidth which falls below the CIR is marked green. BW which exceeds the CIR but is below the EIR is marked yellow. 0x00: 0 MB/s 0x01: 8 MB/s ... 0x40: 512 MB/s (default) ... 0xFF: 2040 MB/s (Max)

Bit(s)	Name	Description
31:1	RSV0	Reserved
0	rb_sel	RB channel select for debug message dump

Bit(s)	Name	Description
31:11	RSV0	Reserved
10	rb_rw	RB channel RW
9:8	rb_state	RB channel State 2'b00: IDLE 2'b01: REQ 2'b10: ACK 2'b11: DATA
7:0	rb_length	RB channel burst length (Byte)

Bit(s)	Name	Description
31	bw_RST	Write 1 will reset BW values.
30	RSV0	Reserved
29:20	avg_bw	Average BW (MB/S)
19:10	peak_bw	Peak BW (MB/S)
9:0	rb_bw	RB channel BW (MB/S)

1000039C RB_LAT RB Latency 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	lat_rst	RS V0	avg_lat												peak_lat[9:6]	
Type	WO	RO	RO												RO	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	peak_lat[5:0]						rd_lat									
Type	RO						RO									
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31	lat_rst	Write 1 will reset latency values
30	RSV0	Reserved
29:20	avg_lat	Average read latency (T)
19:10	peak_lat	Peak read latency (T)
9:0	rd_lat	RB channel read latency (T)

5.6 R-Bus Controller

5.6.1 Features

- 8 channel QoS Arbiter
- Configurable Bandwidth and DueDate for each agent
- QoS classifier can be programmed for RR, BW RR, Fixed Priority and QoS Arb

5.6.2 Block Diagram

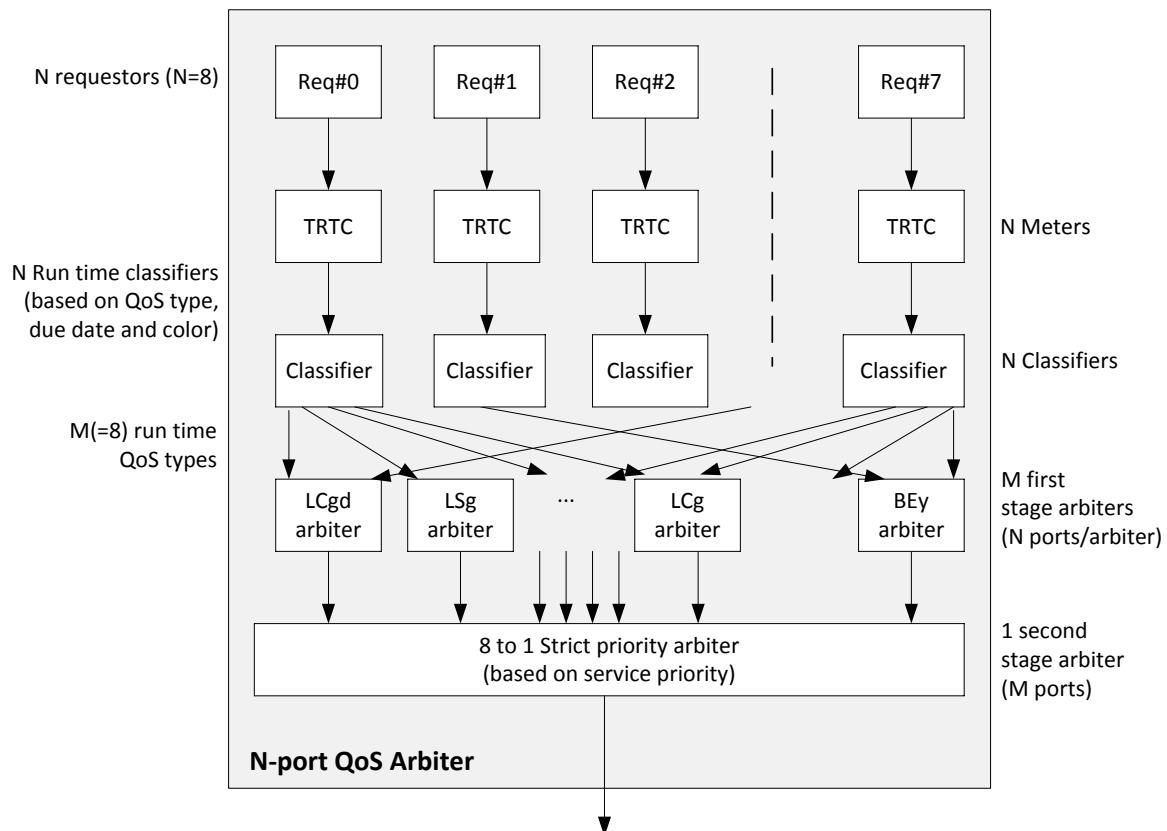


Figure 5-3 QoS Arbitration Block Diagram

5.6.3 Register

Rbus_Matrix_CTRL Changes LOG

Revision	Date	Author	Change Log
0.1	2012/10/2	Lancelot	Initialization
0.2	2013/1/3	Lancelot	Add sleep count
0.2	2013/8/19	YS Xiao	Modify to as MT7621's dma_ch_csr

Module name: Rbus_Matrix_CTRL Base address: (+10000400h)

Address	Name	Width	Register Function
10000400	<u>DMA_ARB_CF</u>	32	DMA 8 to 1 arbiter setting
10000404	<u>DMA_AG_BW</u>	32	DMA Channel BW/QoS_Type/DueDate Setting

	CFG		
1000040C	DMA_ROUTE	32	DMA Routing
10000410	DMA_MON_AG_SEL	32	DMA Monitor Agent Select
10000414	DMA_STATE	32	DMA State
10000418	DMA_BW	32	DMA Bandwidth
1000041C	DMA_LAT	32	DMA Latency
10000420	OCP_CFG0	32	OCP to Rbus configuration
10000424	OCP_CFG1	32	Read bypass write mask
10000430	R2P_MONITOR	32	Rbus to APbus monitor
10000434	R2P_ERR_ADD_R	32	Rbus to APbus error address
10000440	DYN_CFG0	32	Dynamic cpu/ocp frequency control
10000444	DYN_CFG1	32	CPU sleep step frequency control
10000448	DYN_CFG2	32	Dyn CFG Probe
1000044C	DYN_CFG3	32	SI_Sleep Serial Counter Setting
10000450	DYN_CFG4	32	SI_Sleep Issue Count Counter
10000454	DYN_CFG5	32	Sleep Time Counter for SI_Sleep
10000458	DYN_CFG6	32	Operation Time Counter for non SI_Sleep

10000400 DMA_ARB_C FG **DMA 8 to 1 arbiter setting** **04FAC6 88**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0					preempt_en	trtc_en	class_en	cls_priority[23:16]							
Type	RO					RW	RW	RW	RW							
Reset	0	0	0	0	0	1	0	0	1	1	1	1	1	0	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	cls_priority[15:0]															
Type	RW															
Reset	1	1	0	0	0	1	1	0	1	0	0	0	1	0	0	0

Bit(s)	Name	Description
31:27	RSV0	Reserved
26	preempt_en	Preemption Enable Request preemption, higher priority requestor may change current request transaction 0: Disable Preemption 1: Enable Preemption
25	trtc_en	Two Rate Three Color Bandwidth (TRTC) Meter Enable 0: Disable TRTC 1: Enable TRTC
24	class_en	QoS Classifier Enable 0: Disable CLASS 1: Enable CLASS TRTC (0) CLASS (0) Round Robin TRTC (0) CLASS (1) Fixed Priority TRTC (1) CLASS (0) BW RR TRTC (1) CLASS (1) QoS Arb
23:0	cls_priority	Class Priority This field is used for class priority for second arbitration. {BEy(3'd7), LCg(3'd6), BSy(3'd5), LSy(3'd4), BEg (3'd3), BSg (3'd2), LSg(3'd1), LCgd(3'd0)}

10000404	<u>DMA AG BW</u>	<u>CFG</u>	DMA Channel BW/QoS_Type/DueDate Setting												0220802	0	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	ag_wr	ag_sel			RSV0		ag_qos_type		ag_duedate								
Type	W1C	RW			RO		RW		RW								
Reset	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	ag_pir			ag_cir		RW											
Type	RW			RW		RW											
Reset	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

Bit(s)	Name	Description
31	ag_wr	Agent Write 0: Read 1: Write
30:28	ag_sel	DMA Agent Select Selects a DMA agent to configure. 0: SDXC 1: GDMA 2: SPI Slave/3-Wire SPI Slave/PUTIF 3: Switch 4: WLAN 5: PCIe 6: AES 7: USB20
27:26	RSV0	Reserved
25:24	ag_qos_type	Agent QoS Type 0: Latency critical 1: Latency sensitive 2: Bandwidth sensitive (default) 3: Best Effort
23:16	ag_duedate	Due date for latency critical agent (unit: system bus clock cycle - system bus is 300 MHz or 225 MHz depending on bootstrap value.)
15:8	ag_pir	Peak Information Rate for the Agent The PIR is greater than or equal to the CIR. Bandwidth which exceeds PIR is marked red. 0x00: 0 MB/s 0x01: 4 MB/s ... 0x80: 512 MB/s (default) ... 0xFF: 1020 MB/s (Max)
7:0	ag_cir	Committed Information Rate for the Agent Bandwidth which falls below the CIR is marked green. BW which exceeds the CIR but is below the EIR is marked yellow. 0x00: 0 MB/s 0x01: 4 MB/s ... 0x20: 128 MB/s (default) ... 0xFF: 1020 MB/s (Max)

1000040C	<u>DMA_ROUTE</u>	<u>DMA Routing</u>	0000000	0												
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0[30:15]												RO			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV0[14:0]															dm_a_rout_e
Type	RO															RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:1	RSV0	Reserved
0	dma_route	DMA routing 0: DMA will access to DRAM 1: DMA will access to CSR

10000410 <u>DMA_MON_A</u> DMA Monitor Agent Select 00000000 0																
Bit 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16																
Name																
Type																
Reset																
Bit 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0																
Name																
Type																
Reset																

Bit(s)	Name	Description
31:3	RSV0	Reserved
2:0	dma_sel	DMA Monitor Agent Select Selects a DMA agent to dump DMA_STATE, DMA_BW and DMA_LAT's content. 0: SDXC 1: GDMA 2: SPI Slave/3-Wire SPI Slave/PUTIF 3: Switch 4: WLAN 5: PCIe 6: AES 7: USB20

10000414 <u>DMA_STATE</u> DMA State 00000000 0																
Bit 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16																
Name																
Type																
Reset																
Bit 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0																
Name																
Type																
Reset																

Bit(s)	Name	Description
31:11	RSV0	Reserved
10	dma_rw	DMA channel RW state
9:8	dma_state	DMA channel State 2'b00: IDLE 2'b01: REQ 2'b10: ACK

Bit(s)	Name	Description
		2'b11: DATA
7:0	dma_length	DMA channel burst length (Byte) state

10000418 DMA_BW DMA Bandwidth 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	bw_rst	RS V0	avg_bw											peak_bw[9:6]			
Type	WO	RO	RO											RO			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	peak_bw[5:0]						dma_bw										
Type	RO						RO										
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31	bw_rst	Write 1 will reset BW values.
30	RSV0	Reserved
29:20	avg_bw	Average BW (MB/S)
19:10	peak_bw	Peak BW (MB/S)
9:0	dma_bw	DMA channel BW (MB/S)

1000041C DMA_LAT DMA Latency 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	lat_rst	RS V0	avg_lat											peak_lat[9:6]			
Type	WO	RO	RO											RO			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	peak_lat[5:0]						rd_lat										
Type	RO						RO										
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31	lat_rst	Write 1 will reset latency values
30	RSV0	Reserved
29:20	avg_lat	Average read latency (T)
19:10	peak_lat	Peak read latency (T)
9:0	rd_lat	DMA channel read latency (T)

10000420 OCP_CFG0 OCP to Rbus configuration 00000000
1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0[27:12]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV0[11:0]															
Type	RO															
											syn_c_met_hod	ocp_sy_nc_cm_d	rbus_a	rd_byp_ass_wr		

Reset 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1

Bit(s)	Name	Description
31:4	RSV0	Reserved
3	sync_method	OCP Synchronization Command Method 0: All empty (Wait until all FIFOs are empty) 1: CMD empty (Wait until the CMD FIFO is empty)
2	ocp_sync_cmd	OCP Synchronization Command Method Enable Remaps this RD CMD to address 0x0000_0000. Initiate DRAM control before enabling this option. 0: Disable 1: Enable
1	rbus_async	Async Mode for RBUS 0: Set HW to switch between sync or async mode dynamically. 1: Force RBUS to A.sync mode.
0	rd_bypass_wr	Read Bypass Write Enable Allows read commands to bypass write commands for OCP_IF when the address does not conflict. 0: Disable 1: Enable

Bit(s)	Name	Description
31:0	rd_bypass_wr_mask	Mask bit for read bypass write address

Bit(s)	Name	Description
31:17	RSV0	Reserved
16	r2p_inc_clr	R2APB Interrupt Clear Write 1 to clear this interrupt.
15:10	r2p_err_cnt	R2APB error counter
9:0	r2p_inc_cnt	R2APB Interrupt Countdown Timer Sets a delay timer which begins counting down when an R2P error is

Bit(s)	Name	Description
		<p>detected.</p> <p>When the timer reaches zero the R2P interrupt is then triggered.</p> <p>10'b0000000000: Disable R2P monitoring</p> <p>10'b0000000001: 20 us</p> <p>10'b0000000010: 40 us</p> <p>...</p> <p>10'b1000000000: 40 ms</p>

10000434 R2P ERR AD DR Rbus to APbus error address **00000000 0**

Bit(s)	Name	Description
31:0	r2p_err_addr	R2APB address record for previous error found

10000440 DYN_CFG0 Dynamic cpu/ocp frequency control 00030A01

Bit(s)	Name	Description
31:19	RSV0	Reserved
18:16	cpu_ocp_ratio	<p>CPU OCP Ratio</p> <p>The ratio between the system bus frequency and the CPU frequency.</p> <p>3'b011: SYS/CPU = 1/3</p> <p>3'b100: SYS/CPU = 1/4 (Not used in MT7628)</p>
15:12	RSV1	Reserved
11:8	cpu_fdiv	<p>CPU Frequency Divider</p> <p>The frequency divider is used to generate the CPU frequency. Valid values range from 1 to 15.</p> <p>NOTE1: CPU_FDIV must be equaled to N*CPU_FFRAC(N is a integer number) when rbus_async equal to 1'b0.</p> <p>NOTE2: CPU_FDIV must be larger than or equal to CPU_FFRAC when rbus_async equal to 1'b1.</p>
7:4	RSV2	Reserved
3:0	cpu_ffrac	<p>CPU Frequency Fractional</p> <p>A parameter used in conjunction with the CPU frequency divider to determine the CPU frequency. Input a value in the following equation to determine the CPU frequency.</p> $\text{CPU frequency} = \text{PLL_FREQ} * (\text{CPU_FFRAC}/\text{CPU_FDIV})$ <p>NOTE: If the chip runs in USB OHCI mode, the OCP frequency cannot be lower than 30 MHz. It means that</p> $\text{PLL_FREQ} * (\text{CPU_FFRAC}/\text{CPU_FDIV})/\text{CPU_OCP_RATIO} \geq 30 \text{ MHz.}$

10000444 DYN_CFG1 CPU sleep step frequency control 00230A0
6

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	slp_en	ste_p_en	RSV0		step_cnt							RS_V1	step_ocp_ratio			
Type	RW	RW	RO		RW							RO	RO			
Reset	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV2				step_fdiv				RSV3				step_ffrac			
Type	RO				RO				RO				RW			
Reset	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0

Bit(s)	Name	Description
31	slp_en	Sleep Mode Enable Enables sleep mode when MIPS SI_Sleep is asserted. 0: Disable 1: Enable Sleep Mode CPU Frequency = PLL_FREQ*(1/CPU_FDIV)
30	step_en	Step Jump Enable Enables step jump after MIPS exits sleep mode. The CPU will jump to the normal frequency in increments defined by STEP_FFRAC.bit[4:0] of this register. 0: Disable 1: Enable
29:28	RSV0	Reserved
27:20	step_cnt	Step Counter Sets the period of each step jump. When the counter counts down to zero, the CPU clock automatically changes to the next step frequency. The count period unit is 1 us.
19	RSV1	Reserved
18:16	step_ocp_ratio	Step OCP Ratio (Fix to cpu_ocp_ratio) The ratio between the system bus frequency and the CPU frequency. 3'b011: SYS/CPU = 1/3 3'b100: SYS/CPU = 1/4 (Not used in MT7628)
15:12	RSV2	Reserved
11:8	step_fdiv	Step Frequency Divider (Fix to CPU_FDIV) The frequency divider is used to generate the CPU frequency after the CPU exits from sleep mode and returns to normal operation. Valid values range from 1 to 15.
7:4	RSV3	Reserved
3:0	step_ffrac	Step Frequency Fraction The fractional size of the increment in CPU frequency after the CPU exits from sleep mode and returns to normal operation. This step is only valid when SLP_STEP_EN is enabled. FRAC_VALUE = PREVIOUS_FRAC_VALUE + STEP_FFRAC CPU Frequency = (FRAC_VALUE/CPU_FDIV)*PLL_FREQ

10000448 DYN_CFG2 Dyn CFG Probe 00030A0
1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RSV0					dfc_fsm				RSV1				same_freq	RS_V2	cpu_ocp_ratio	
Type	RO					RO				RO				RO			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	

Bit(s)	Name	Description
31:27	RSV0	Dynamic frequency controller's main FSM current state
26:24	dfc_fsm	Dynamic frequency controller's main FSM current state
23:21	RSV1	Reserved
20	same_freq	Indicates that the SYS and DRAM clocks are on the same frequency.
19	RSV2	Reserved
18:16	cpu_ocp_ratio	OCP ratio after changed frequency
15:12	RSV3	Reserved
11:8	cpu_fdiv	CPU fdiv after changed frequency
7:4	RSV4	Reserved
3:0	cpu_ffrac	CPU ffrac after changed frequency

1000044C DYN_CFG3 SI_Sleep Serial Counter Setting 00000000 0

Bit(s)	Name	Description
31	si_slp_cnt_en	SI_Sleep Serial Counter Enable
30:28	RSV0	Reserved
27:0	si_slp_time_unit	SI_Sleep Time Counter unit 28'h0000000: count per 1us 28'h0000001: count per 2us 28'h0000002: count per 3us ... 28'hfffffff: count per 268435456us

10000450 DYN_CFG4 SI_Sleep Issue Count Counter 00000000 0

Bit(s)	Name	Description
31:0	si_slp_cnt	SI_Sleep Issue Count Counter Write to this register will clear the counter value.

**10000454 DYN_CFG5 Sleep Time Counter for SI_Sleep 00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	si_slp_time_unit_cnt[31:16]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	si_slp_time_unit_cnt[15:0]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	si_slp_time_unit_cnt	Sleep Time Counter for SI_Sleep Finally, CPU in SI_Sleep time is "si_slp_time_unit_cnt*si_slp_time_unit(us)". Write to this register will clear the counter value.

**10000458 DYN_CFG6 Operation Time Counter for non SI_Sleep 00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	si_opt_time_unit_cnt[31:16]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	si_opt_time_unit_cnt[15:0]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	si_opt_time_unit_cnt	Operation Time Counter for non SI_Sleep Finally, CPU in non SI_Sleep time is "si_opt_time_unit_cnt*si_slp_time_unit(us)". Write to this register will clear the counter value.

5.7 MIPS CNT

5.7.1 Registers

MIPS_CNT Changes LOG

Revision	Date	Author	Change Log
0.1	2013/1/14	YuShu Xiao	Initialization

Module name: MIPS_CNT Base address: (+10000500h)

Address	Name	Width	Register Function
10000500	<u>STCK_CNT_CFG</u>	32	MIPS Configuration
10000504	<u>CMP_CNT</u>	32	MIPS Compare Sets the cutoff point for the free run counter (MIPS counter). If the free run counter equals the compare counter, then the timer circuit generates an interrupt. The interrupt remains active until the compare counter is written again.
10000508	<u>CNT</u>	32	MIPS Counter The MIPS counter (free run counter) increases by 1 every 20 us (50 KHz). The counter continues to count until it reaches the value loaded into CMP_CNT.

10000500 <u>STCK_CNT_CFG</u> MIPS Configuration 00000000 0																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV[29:14]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV[13:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:2	RESV	
1	EXT_STK_EN	External System Tick Enable - Selects the system tick source. 0: Use the MIPS internal timer interrupts. 1: Use the external timer interrupt from an external MIPS counter.
0	CNT_EN	Counter Enable - Enable the free run counter (MIPS counter). 0: Disable 1: Enable

10000504 <u>CMP_CNT</u> MIPS Compare 00000000 0																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	CMP_CNT															
Type	RW															

Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Bit(s)	Name	Description
31:16	RESV	
15:0	CMP_CNT	Compare Count

10000508 CNT MIPS Counter																00000000 0			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16			
Name	RESV																		
Type	RO																		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
Name	CNT																		
Type	RW																		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

Bit(s)	Name	Description
31:16	RESV	
15:0	CNT	MIPS Counter

5.8 General Purpose IO

5.8.1 Features

- Parameterized numbers of independent inputs, outputs, and inouts
- Independent polarity controls for each pin
- Independently masked edge detect interrupt on any input transition

5.8.2 Block Diagram

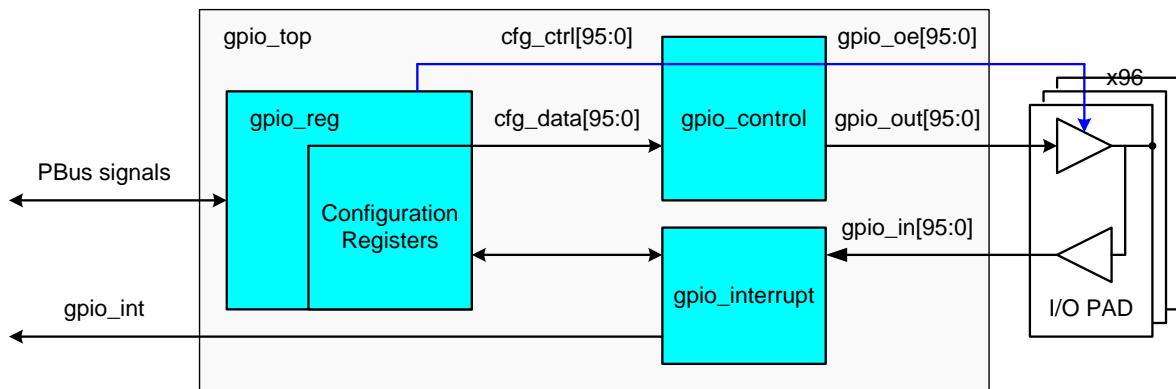


Figure 5-4 Programmable I/O Block Diagram

5.8.3 GPIO pin mapping

PAD Name	Function 0	Function 1	Function 2	Function 3	strap	pmux_group	GPIO
PAD_I2S_SDI	i2ssdi (I)	gpio (I/O)	pcmdrx (I)	antsel[5] (O)		i2s_gpio_psel[2:0]	0
PAD_I2S_SDO	i2ssdo (O)	gpio (I/O)	pcmdtx (O)	antsel[4] (O)	0	i2s_gpio_psel[2:0]	1
PAD_I2S_WS	i2sws(I/O)	gpio (I/O)	pcmclk (I/O)	antsel[3] (O)		i2s_gpio_psel[2:0]	2
PAD_I2S_CLK	i2sclk (I/O)	gpio (I/O)	pcmfs (I/O)	antsel[2] (O)		i2s_gpio_psel[2:0]	3
PAD_I2C_SCLK	i2c_sclk (I/O)	gpio (I/O)	sutif_txd (O)	ext_bgclk (I)		i2c_gpio_psel[2:0]	4
PAD_I2C_SD	i2c_sd (I/O)	gpio (I/O)	sutif_rxn (I)			i2c_gpio_psel[2:0]	5
PAD_SPI_CS1	spi_cs1 (O)	gpio (I/O)	co_clko (O)		1	spi_cs1_psel[2:0]	6
PAD_SPI_CLK	spi_clk (O)	gpio (I/O)			2	spi_gpio_psel[1:0]	7
PAD_SPI_MOSI	spi_mosi (I/O)	gpio (I/O)			3	spi_gpio_psel[1:0]	8
PAD_SPI_MISO	spi_miso (I/O)	gpio (I/O)				spi_gpio_psel[1:0]	9
PAD_SPI_CS0	spi_cs0 (O)	gpio (I/O)				spi_gpio_psel[1:0]	10
PAD_GPIO0	gpio (I/O)	gpio (I/O)	co_clko (O)	perst_n (O)	4	gpio_psel[2:0]	11
PAD_RXD0	txd0 (O)	gpio (I/O)			5	uart0_gpio_psel[2:0]	12
PAD_RXD0	rxdo (I)	gpio (I/O)				uart0_gpio_psel[2:0]	13
PAD_MDI_TP_P1	spis_cs (I)	gpio (I/O)	w_utif[0] (I/O)	pwm_ch0 (O)		spis_gpio_psel[2:0]	14
PAD_MDI_TN_P1	spis_clk (I)	gpio (I/O)	w_utif[1] (I/O)	pwm_ch1 (O)		spis_gpio_psel[2:0]	15
PAD_MDI_RP_P1	spis_miso (O)	gpio (I/O)	w_utif[2] (I/O)	txd2 (O)		spis_gpio_psel[2:0]	16
PAD_MDI_RN_P1	spis_mosi (I)	gpio (I/O)	w_utif[3] (I/O)	rxdo (I)		spis_gpio_psel[2:0]	17
PAD_MDI_RP_P2	pwm_ch0 (O)	gpio (I/O)	w_utif[4] (I/O)	sd_d7 (I/O)		pwm0_gpio_psel[2:0]	18
PAD_MDI_RN_P2	pwm_ch1 (O)	gpio (I/O)	w_utif[5] (I/O)	sd_d6 (I/O)		pwm1_gpio_psel[2:0]	19
PAD_MDI_TP_P2	txd2 (O)	gpio (I/O)	pwm_ch2 (O)	sd_d5 (I/O)		uart2_gpio_psel[2:0]	20
PAD_MDI_TN_P2	rxdo (I)	gpio (I/O)	pwm_ch3 (O)	sd_d4 (I/O)		uart2_gpio_psel[2:0]	21
PAD_MDI_TP_P3	sd_wp (I)	gpio (I/O)	w_utif[10] (I/O)	w_dbgin (I)		sd_gpio_psel[2:0]	22
PAD_MDI_TN_P3	sd_cd (I)	gpio (I/O)	w_utif[11] (I/O)	w_dbgack (O)		sd_gpio_psel[2:0]	23
PAD_MDI_RP_P3	sd_d1 (I/O)	gpio (I/O)	w_utif[12] (I/O)	w_jtclk (I)		sd_gpio_psel[2:0]	24
PAD_MDI_RN_P3	sd_d0 (I/O)	gpio (I/O)	w_utif[13] (I/O)	w_jtdi (I)		sd_gpio_psel[2:0]	25
PAD_MDI_RP_P4	sd_clk (I/O)	gpio (I/O)	w_utif[14] (I/O)	w_jtdo (O)		sd_gpio_psel[2:0]	26
PAD_MDI_RN_P4	sd_cmd (I/O)	gpio (I/O)	w_utif[15] (I/O)	dbg_uart_txd (O)		sd_gpio_psel[2:0]	27
PAD_MDI_TP_P4	sd_d3 (I/O)	gpio (I/O)	w_utif[16] (I/O)	w_jtms (I)		sd_gpio_psel[2:0]	28
PAD_MDI_TN_P4	sd_d2 (I/O)	gpio (I/O)	w_utif[17] (I/O)	w_jrst_n (I)		sd_gpio_psel[2:0]	29
PAD_EPHY_LED4_K	ephy_led4_k (O)	gpio (I/O)	w_utif_k[6] (I/O)	jtrstn_k (I)		p4_led_kn_psel[2:0]	30
PAD_EPHY_LED3_K	ephy_led3_k (O)	gpio (I/O)	w_utif_k[7] (I/O)	jtcclk_k (I)		p3_led_kn_psel[2:0]	31
PAD_EPHY_LED2_K	ephy_led2_k (O)	gpio (I/O)	w_utif_k[8] (I/O)	jtems_k (I)		p2_led_kn_psel[2:0]	32
PAD_EPHY_LED1_K	ephy_led1_k (O)	gpio (I/O)	w_utif_k[9] (I/O)	jtdi_k (I)		p1_led_kn_psel[2:0]	33
PAD_EPHY_LED0_K	ephy_led0_k (O)	gpio (I/O)		jtdo_k (I/O)		p0_led_kn_psel[2:0]	34
PAD_WLED_K	wled_k (I/O)	gpio (I/O)				wled_kn_psel[2:0]	35
PAD_PERST_N	perst_n (O)	gpio (I/O)			6	prest_gpio_psel[1:0]	36
PAD_CO_CLKO	co_clko (O)	gpio (I/O)			7	rclk_gpio_psel[1:0]	37
PAD_WDT_RST_N	wdt (I/O)	gpio (I/O)				wdt_gpio_psel[1:0]	38
PAD_EPHY_LED4_N	ephy_led4_n (O)	gpio (I/O)	w_utif_n[6] (I/O)	jtrstn_n (I)		p4_led_gpio_psel[2:0]	39
PAD_EPHY_LED3_N	ephy_led3_n (O)	gpio (I/O)	w_utif_n[7] (I/O)	jtcclk_n (I)		p3_led_gpio_psel[2:0]	40
PAD_EPHY_LED2_N	ephy_led2_n (O)	gpio (I/O)	w_utif_n[8] (I/O)	jtems_n (I)		p2_led_gpio_psel[2:0]	41
PAD_EPHY_LED1_N	ephy_led1_n (O)	gpio (I/O)	w_utif_n[9] (I/O)	jtdi_n (I)		p1_led_gpio_psel[2:0]	42
PAD_EPHY_LED0_N	ephy_led0_n (O)	gpio (I/O)		jtdo_n (I/O)		p0_led_gpio_psel[2:0]	43
PAD_WLED_N	wled_n (I/O)	gpio (I/O)				wled_gpio_psel[2:0]	44
PAD_RXD1	txd1 (O)	gpio (I/O)	pwm_ch0 (O)	antsel[1] (O)	8	uart1_gpio_psel[2:0]	45
PAD_RXD1	rxdo (I)	gpio (I/O)	pwm_ch1 (O)	antsel[0] (O)		uart1_gpio_psel[2:0]	46

5.8.4 Register

GPIO Changes LOG

Revision	Date	Author	Change Log
0.1	2012/6/21	YuShu Xiao	Initialization

Module name: GPIO Base address: (+10000600h)

Address	Name	Width	Register Function
10000600	<u>GPIO_CTRL_0</u>	32	GPIO0 to GPIO31 direction control register These direction control registers are used to select the data direction of the GPIO pin. The value driven onto the GPIO pins, are controlled by the GPIO_POL_x, and GPIO_DATA_x registers.
10000604	<u>GPIO_CTRL_1</u>	32	GPIO32 to GPIO63 direction control register These direction control registers are used to select the data direction of the GPIO pin. The value driven onto the GPIO pins, are controlled by the GPIO_POL_x, and GPIO_DATA_x registers.
10000608	<u>GPIO_CTRL_2</u>	32	GPIO64 to GPIO95 direction control register These direction control registers are used to select the data direction of the GPIO pin. The value driven onto the GPIO pins, are controlled by the GPIO_POL_x, and GPIO_DATA_x registers.
10000610	<u>GPIO_POL_0</u>	32	GPIO0 to GPIO31 polarity control register These polarity control registers are used to control the polarity of the data is driven on or read from the GPIO pin.
10000614	<u>GPIO_POL_1</u>	32	GPIO32 to GPIO63 polarity control register These polarity control registers are used to control the polarity of the data is driven on or read from the GPIO pin.
10000618	<u>GPIO_POL_2</u>	32	GPIO64 to GPIO95 polarity control register These polarity control registers are used to control the polarity of the data is driven on or read from the GPIO pin.
10000620	<u>GPIO_DATA_0</u>	32	GPIO0 to GPIO31 data register These data registers store current GPIO data value for GPIO input mode, or output driven value for GPIO output mode. Bit position stand for correspondent GPIO pin.
10000624	<u>GPIO_DATA_1</u>	32	GPIO32 to GPIO63 data register These data registers store current GPIO data value for GPIO input mode, or output driven value for GPIO output mode. Bit position stand for correspondent GPIO pin.
10000628	<u>GPIO_DATA_2</u>	32	GPIO64 to GPIO95 data register These data registers store current GPIO data value for GPIO input mode, or output driven value for GPIO output mode. Bit position stand for correspondent GPIO pin.
10000630	<u>GPIO_DSET_0</u>	32	GPIO0 to GPIO31 data set register These data set registers are used to set bits in the GPIO_DATA_x registers.
10000634	<u>GPIO_DSET_1</u>	32	GPIO32 to GPIO63 data set register These data set registers are used to set bits in the GPIO_DATA_x registers.
10000638	<u>GPIO_DSET_2</u>	32	GPIO64 to GPIO95 data set register These data set registers are used to set bits in the GPIO_DATA_x registers.
10000640	<u>GPIO_DCLR_0</u>	32	GPIO0 to GPIO31 data clear register These data set registers are used to clear bits in the GPIO_DATA_x registers.
10000644	<u>GPIO_DCLR_1</u>	32	GPIO32 to GPIO63 data clear register These data set registers are used to clear bits in the GPIO_DATA_x registers.
10000648	<u>GPIO_DCLR_2</u>	32	GPIO64 to GPIO95 data clear register These data set registers are used to clear bits in the GPIO_DATA_x registers.
10000650	<u>GINT_EDGE_0</u>	32	GPIO0 to GPIO31 rising edge interrupt enable register These registers are used to enable the condition of rising edge triggered interrupt.
10000654	<u>GINT_EDGE_1</u>	32	GPIO32 to GPIO63 rising edge interrupt enable register

	<u>1</u>		These registers are used to enable the condition of rising edge triggered interrupt.
10000658	<u>GINT_EDGE_2</u>	32	GPIO64 to GPIO95 rising edge interrupt enable register These registers are used to enable the condition of rising edge triggered interrupt.
10000660	<u>GINT_FEDGE_0</u>	32	GPIO0 to GPIO31 falling edge interrupt enable register These registers are used to enable the condition of falling edge triggered interrupt.
10000664	<u>GINT_FEDGE_1</u>	32	GPIO32 to GPIO63 falling edge interrupt enable register These registers are used to enable the condition for falling edge triggered interrupt.
10000668	<u>GINT_FEDGE_2</u>	32	GPIO64 to GPIO95 falling edge interrupt enable register These registers are used to enable the condition of falling edge triggered interrupt.
10000670	<u>GINT_HLVL_0</u>	32	GPIO0 to GPIO31 high level interrupt enable register These registers are used to enable the condition of high level triggered interrupt. The bit in this register and the corresponded bit in GINT_LLVL_0 can not be set to 1 at the same time.
10000674	<u>GINT_HLVL_1</u>	32	GPIO32 to GPIO63 high level interrupt enable register These registers are used to enable the condition of high level triggered interrupt. The bit in this register and the corresponded bit in GINT_LLVL_1 can not be set to 1 at the same time.
10000678	<u>GINT_HLVL_2</u>	32	GPIO64 to GPIO95 high level interrupt enable register These registers are used to enable the condition of high level triggered interrupt. The bit in this register and the corresponded bit in GINT_LLVL_2 can not be set to 1 at the same time.
10000680	<u>GINT_LLVL_0</u>	32	GPIO0 to GPIO31 low level interrupt enable register These registers are used to enable the condition of low level triggered interrupt. The bit in this register and the corresponded bit in GINT_HLVL_0 can not be set to 1 at the same time.
10000684	<u>GINT_LLVL_1</u>	32	GPIO32 to GPIO63 low level interrupt enable register These registers are used to enable the condition of low level triggered interrupt. The bit in this register and the corresponded bit in GINT_HLVL_1 can not be set to 1 at the same time.
10000688	<u>GINT_LLVL_2</u>	32	GPIO64 to GPIO95 low level interrupt enable register These registers are used to enable the condition of low level triggered interrupt. The bit in this register and the corresponded bit in GINT_HLVL_2 can not be set to 1 at the same time.
10000690	<u>GINT_STAT_0</u>	32	GPIO0 to GPIO31 interrupt status register These registers are used to record the GPIO current interrupt status.
10000694	<u>GINT_STAT_1</u>	32	GPIO32 to GPIO63 interrupt status register These registers are used to record the GPIO current interrupt status.
10000698	<u>GINT_STAT_2</u>	32	GPIO64 to GPIO95 interrupt status register These registers are used to record the GPIO current interrupt status.
100006A0	<u>GINT_EDGE_0</u>	32	GPIO0 to GPIO31 edge status register These registers are used to record the GPIO current interrupt's edge status. These registers are useful only in edge triggered interrupt.
100006A4	<u>GINT_EDGE_1</u>	32	GPIO32 to GPIO63 edge status register These registers are used to record the GPIO current interrupt's edge status. These registers are useful only in edge triggered interrupt.
100006A8	<u>GINT_EDGE_2</u>	32	GPIO64 to GPIO95 edge status register These registers are used to record the GPIO current interrupt's edge status. These registers are useful only in edge triggered interrupt.

Bit(s)	Name	Description
31:0	GPIOCTRL0	GPIO Pin Direction 0: GPIO input mode 1: GPIO output mode

Bit(s)	Name	Description
31:0	GPIOCTRL1	GPIO Pin Direction 0: GPIO input mode 1: GPIO output mode

Bit(s)	Name	Description
31:0	GPIOCTRL2	GPIO Pin Direction 0: GPIO input mode 1: GPIO output mode

Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	GPIOPOLO[15:0]																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GPIOPOLO	GPIO Data Polarity 0: Data is non-inverted 1: Data is inverted

10000614 GPIO_POL_1 GPIO32 to GPIO63 polarity control register **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GPIOPOL1[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GPIOPOL1[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GPIOPOL1	GPIO Data Polarity 0: Data is non-inverted 1: Data is inverted

10000618 GPIO_POL_2 GPIO64 to GPIO95 polarity control register **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GPIOPOL2[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GPIOPOL2[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GPIOPOL2	GPIO Data Polarity 0: Data is non-inverted 1: Data is inverted

10000620 GPIO_DATA_0 GPIO0 to GPIO31 data register **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GPIODATA0[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GPIODATA0[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GPIODATA0	GPIO Data

10000624	<u>GPIO DATA</u>	GPIO32 to GPIO63 data register	00000000
	<u>1</u>		0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>GPIODATA1[31:16]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>GPIODATA1[15:0]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GPIODATA1	GPIO Data

10000628	<u>GPIO DATA</u>	GPIO64 to GPIO95 data register	00000000
	<u>2</u>		0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>GPIODATA2[31:16]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>GPIODATA2[15:0]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GPIODATA2	GPIO Data

10000630	<u>GPIO DSET_0</u>	GPIO0 to GPIO31 data set register	FFFFFFFFFF
	<u>FF</u>		

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>GPIODSET0[31:16]</u>															
Type	WO															
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>GPIODSET0[15:0]</u>															
Type	WO															
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:0	GPIODSET0	GPIO Data Set
		1: Set the GPIO_DATA_0 register 0: No effect

10000634	<u>GPIO DSET_1</u>	GPIO32 to GPIO63 data set register	FFFFFFFFFF
	<u>FF</u>		

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>GPIODSET1[31:16]</u>															
Type	WO															
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>GPIODSET1[15:0]</u>															
Type	WO															

Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
--------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Bit(s)	Name	Description
31:0	GPIODSET1	GPIO Data Set 1: Set the GPIO_DATA_1 register 0: No effect

10000638 GPIO_DSET_2 GPIO64 to GPIO95 data set registerFFFFFF
FF

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:0	GPIODSET2	GPIO Data Set 1: Set the GPIO_DATA_2 register 0: No effect

10000640 GPIO_DCLR_0 GPIO0 to GPIO31 data clear registerFFFFFF
FF

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:0	GPIODCLR0	GPIO Data Clear 1: Clear the GPIO_DATA_0 register 0: No effect

10000644 GPIO_DCLR_1 GPIO32 to GPIO63 data clear registerFFFFFF
FF

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:0	GPIODCLR1	GPIO Data Clear 1: Clear the GPIO_DATA_1 register 0: No effect

**10000648 GPIO_DCLR
2** **GPIO64 to GPIO95 data clear register** **FFFFFF
FF**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GPIODCLR2[31:16]															
Type	WO															
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GPIODCLR2[15:0]															
Type	WO															
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:0	GPIODCLR2	GPIO Data Clear 1: Clear the GPIO_DATA_2 register 0: No effect

**10000650 GINT_RIDGE
0** **GPIO0 to GPIO31 rising edge interrupt enable register** **0000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTREDGE0[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTREDGE0[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTREDGE0	GPIO Rising Edge Interrupt Enable 1: Enable rising edge triggered 0: Disable rising edge triggered

**10000654 GINT_RIDGE
1** **GPIO32 to GPIO63 rising edge interrupt enable register** **0000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTREDGE1[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTREDGE1[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTREDGE1	GPIO Rising Edge Interrupt Enable 1: Enable rising edge triggered 0: Disable rising edge triggered

**10000658 GINT_RIDGE
2** **GPIO64 to GPIO95 rising edge interrupt enable register** **0000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTREDGE2[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTREDGE2[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTREDGE2	GPIO Rising Edge Interrupt Enable 1: Enable rising edge triggered 0: Disable rising edge triggered

10000660 GINT_FEDGE GPIO0 to GPIO31 falling edge interrupt enable register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTFEDGE0[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTFEDGE0[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTFEDGE0	GPIO Falling Edge Interrupt Enable 1: Enable falling edge triggered 0: Disable falling edge triggered

10000664 GINT_FEDGE GPIO32 to GPIO63 falling edge interrupt enable register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTFEDGE1[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTFEDGE1[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTFEDGE1	GPIO Falling Edge Interrupt Enable 1: Enable falling edge triggered 0: Disable falling edge triggered

10000668 GINT_FEDGE GPIO64 to GPIO95 falling edge interrupt enable register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTFEDGE2[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTFEDGE2[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTFEDGE2	GPIO Falling Edge Interrupt Enable 1: Enable falling edge triggered

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Bit(s)	Name	Description
		0: Disable falling edge triggered

10000670	GINT_HLVL_0	GPIO0 to GPIO31 high level interrupt enable register	00000000
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Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTHlvl0[31:16]															0
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTHlvl0[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTHlvl0	GPIO High Level Interrupt Enable
		1: Enable high level triggered 0: Disable high level triggered

10000674	GINT_HLVL_1	GPIO32 to GPIO63 high level interrupt enable register	00000000
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Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTHlvl1[31:16]															0
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTHlvl1[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTHlvl1	GPIO High Level Interrupt Enable
		1: Enable high level triggered 0: Disable high level triggered

10000678	GINT_HLVL_2	GPIO64 to GPIO95 high level interrupt enable register	00000000
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Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTHlvl2[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTHlvl2[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTHlvl2	GPIO High Level Interrupt Enable
		1: Enable high level triggered 0: Disable high level triggered

10000680	GINT_LLVL_0	GPIO0 to GPIO31 low level interrupt enable register	00000000
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Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTLLVL0[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTLLVL0[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTLLVL0	GPIO Low Level Interrupt Enable 1: Enable low level triggered 0: Disable low level triggered

10000684 GINT_LLVL_1 GPIO32 to GPIO63 low level interrupt enable register **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTLLVL1[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTLLVL1[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTLLVL1	GPIO Low Level Interrupt Enable 1: Enable low level triggered 0: Disable low level triggered

10000688 GINT_LLVL_2 GPIO64 to GPIO95 low level interrupt enable register **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTLLVL2[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTLLVL2[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTLLVL2	GPIO Low Level Interrupt Enable 1: Enable low level triggered 0: Disable low level triggered

10000690 GINT_STAT_0 GPIO0 to GPIO31 interrupt status register **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTSTAT0[31:16]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTSTAT0[15:0]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTSTAT0	GPIO Interrupt Status 1: Interrupt is detected 0: Interrupt is not detected

10000694 GINT_STAT_1 GPIO32 to GPIO63 interrupt status register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTSTAT1[31:16]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTSTAT1[15:0]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTSTAT1	GPIO Interrupt Status 1: Interrupt is detected 0: Interrupt is not detected

10000698 GINT_STAT_2 GPIO64 to GPIO95 interrupt status register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTSTAT2[31:16]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTSTAT2[15:0]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTSTAT2	GPIO Interrupt Status 1: Interrupt is detected 0: Interrupt is not detected

100006A0 GINT_EDGE GPIO0 to GPIO31 edge status register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	GINTEdge0[31:16]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GINTEdge0[15:0]															
Type	W1C															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	GINTEdge0	GPIO Interrupt Edge Status 1: Rising edge 0: Falling edge

**100006A4 GINT_EDGE GPIO32 to GPIO63 edge status register 00000000
1**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:0	GINTEDGE1	GPIO Interrupt Edge Status 1: Rising edge 0: Falling edge

**100006A8 GINT_EDGE GPIO64 to GPIO95 edge status register 00000000
2**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:0	GINTEDGE2	GPIO Interrupt Edge Status 1: Rising edge 0: Falling edge

5.9 SPI Slave

5.9.1 SPI Slave Control

spis_intf Changes LOG

Revision	Date	Author	Change Log
0.1	2013/9/23	Kaiping Yen	Initialization

Module name: spis_intf Base address: (+0h)

Address	Name	Width	Register Function
00000000	<u>REG00</u>	32	SPI Slave Register 00
00000004	<u>REG01</u>	32	SPI Slave Register 01
00000008	<u>REG02</u>	32	SPI Slave Register 02
0000000C	<u>REG03</u>	32	SPI Slave Register 03
00000010	<u>REG04</u>	32	SPI Slave Register 04

00000000 REG00 SPI Slave Register 00 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:0	bus_read_data	SPI Slave Register 00 for bus read data

00000004 REG01 SPI Slave Register 01 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:0	bus_write_data	SPI Slave Register 01 for bus write data

00000008 REG02 SPI Slave Register 02 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	bus_address[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:0	bus_address	SPI Slave Register 02 for bus address This address must be physical address

0000000C REG03 SPI Slave Register 03 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	reg03_31_5[26:11]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	reg03_31_5[10:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:5	reg03_31_5	reg03[31:5] reserved bit
4	bus_pb_rb_sel	Bus interface selection 0: Bus transaction is asserted by Rbus master interface, can access DRAM and peripheral registers 1: Bus transaction is asserted by Pbus master interface, can peripheral registers only
3	reg03_3	reg03[3] reserved bit
2:1	bus_size	Bus access size 00: reserved 01: reserved 10: word (4bytes) 11: reserved
0	bus_r_w	Bus access type 0: read 1: write

00000010 REG04 SPI Slave Register 04 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
0	bus_busy	Bus (Internal Rbus/Pbus Master) interface status 0: SPIS bus interface is idle for next access command 1: SPIS bus interface is busy

5.9.2 Registers

spis_pbslv Changes LOG

Revision	Date	Author	Change Log
0.1	2013/9/23	Kaiping Yen	Initialization

Module name: spis_pbslv Base address: (+10000700h)

Address	Name	Width	Register Function
10000700	SPIS_REG0	32	SPI Slave Register 0
10000704	SPIS_REG1	32	SPI Slave Register 1
10000708	SPIS_REG2	32	SPI Slave Register 2
1000070C	SPIS_REG3	32	SPI Slave Register 3
10000710	SPIS_REG4	32	SPI Slave Register 4
10000740	SPIS_CFG	32	SPI Slave Configuration

10000700 SPIS_REG0 SPI Slave Register 0 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	spis_reg0	SPI Slave Register 0

10000704 SPIS_REG1 SPI Slave Register 1 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	spis_reg1	SPI Slave Register 1

10000708 SPIS_REG2 SPI Slave Register 2 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Name	spis_reg2[15:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	spis_reg2	SPI Slave Register 2

1000070C SPIS_REG3 SPI Slave Register 3 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	spis_reg3[31:16]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	spis_reg3[15:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	spis_reg3	SPI Slave Register 3

10000710 SPIS_REG4 SPI Slave Register 4 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	spis_reg4[31:16]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	spis_reg4[15:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	spis_reg4	SPI Slave Register 4

10000740 SPIS_CFG SPI Slave Configuration 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
1:0	spis_mode	SPI slave clock polarity and phase configuration 2'b00: CPOL=0, CPHA=0 2'b01: CPOL=0, CPHA=1 2'b10: CPOL=1, CPHA=0 2'b11: CPOL=1, CPHA=1

5.10 I²C Controller

5.10.1 Features

- Programmable I²C bus clock rate
- Supports the Synchronous Inter-Integrated Circuits (I²C) serial protocol
- Bi-directional data transfer
- Programmable address width up to 8 bits
- Sequential byte read or write capability
- Device address and data address can be transmitted for device, page and address selection
- Supports Standard mode and Fast mode

5.10.2 List of Registers

I²C Changes LOG

Revision	Date	Author	Change Log
0.1	2012/10/3	Evan Chou	Initialization

Module name: I²C Base address: (+10000900h)

Address	Name	Width	Register Function
10000908	<u>SM0CFG0</u>	32	SERIAL INTERFACE MASTER 0 CONFIG 0 REGISTER
10000910	<u>SM0DOUT</u>	32	SERIAL INTERFACE MASTER 0 DATAOUT REGISTER
10000914	<u>SM0DIN</u>	32	SERIAL INTERFACE MASTER 0 DATAIN REGISTER
10000918	<u>SM0ST</u>	32	SERIAL INTERFACE MASTER 0 STATUS REGISTER
1000091C	<u>SM0AUTO</u>	32	SERIAL INTERFACE MASTER 0 AUTO-MODE REGISTER
10000920	<u>SM0CFG1</u>	32	SERIAL INTERFACE MASTER 0 CONFIG 1 REGISTER
10000928	<u>SM0CFG2</u>	32	SERIAL INTERFACE MASTER 0 CONFIG 2 REGISTER
10000940	<u>SM0CTL0</u>	32	Serial interface master 0 control 0 register
10000944	<u>SM0CTL1</u>	32	Serial interface master 0 control 1 register
10000950	<u>SM0D0</u>	32	Serial interface master 0 data 0 register
10000954	<u>SM0D1</u>	32	Serial interface master 0 data 1 register
1000095C	<u>PINTEN</u>	32	Peripheral interrupt enable register
10000960	<u>PINTST</u>	32	Peripheral interrupt status register
10000964	<u>PINTCL</u>	32	Peripheral interrupt clear register

10000908 <u>SM0CFG0</u> SERIAL INTERFACE MASTER 0 CONFIG 0 REGISTER															00000000							
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16						
Name																						
Type																						
Reset																						
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0						
Name															<u>SM0_DEVADDR</u>							
Type															RW							
Reset															0	0	0	0	0	0	0	0

Bit(s)	Name	Description
6:0	<u>SM0_DEVADDR</u>	Device address for transmission

10000910 **SM0DOUT****SERIAL INTERFACE MASTER 0 DATAOUT
REGISTER**0000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																SM0_DATAOUT
Type																RW
Reset																0 0 0 0 0 0 0 0 0

Bit(s)	Name	Description
7:0	SM0_DATAOUT	Data out register for auto mode

10000914 **SM0DIN****SERIAL INTERFACE MASTER 0 DATAIN REGISTER**0000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																SM0_DATAIN
Type																RO
Reset																0 0 0 0 0 0 0 0 0

Bit(s)	Name	Description
7:0	SM0_DATAIN	Data in register for auto mode

10000918 **SM0ST****SERIAL INTERFACE MASTER 0 STATUS REGISTER**0000000
2

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																SM0_RDATA_RDY
Type																SM0_WDATA_AT
Reset																SM0_EMP
																SM0_BUSY
																RW
																RW
																RO
																0 1 0

Bit(s)	Name	Description
2	SM0_RDATA_RDY	I2C read data is ready
1	SM0_WDATA_EMP	I2C data output register is empty
0	SM0_BUSY	State machine is busy

1000091C **SM0AUTO****SERIAL INTERFACE MASTER 0 AUTO-MODE
REGISTER**0000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																

Reset																					
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
Name																	SM 0_S TA RT_	RW			
Type																					
Reset																				0	

Bit(s)	Name	Description
0	SM0_START_RW	Written with 1 to start a read transaction, and 0 to start a write transaction. This bit is only valid at auto mode.

10000920 **SM0CFG1** SERIAL INTERFACE MASTER 0 CONFIG 1 REGISTER 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name																				
Type																				
Reset																				
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name																	SM0_BYTECNT			
Type																	RW			
Reset																	0	0	0	0

Bit(s)	Name	Description
5:0	SM0_BYTECNT	The value + 1 indicates the number of data bytes for sequential reads/writes. (word address is included in data bytes)

10000928 **SM0CFG2** SERIAL INTERFACE MASTER 0 CONFIG 2 REGISTER 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name																				
Type																				
Reset																	SM0_IS_AUTOMOD_E			
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name																				
Type																	RW			
Reset																	0			

Bit(s)	Name	Description
0	SM0_IS_AUTOMOD_E	Set 1 to configure auto mode

10000940 **SM0CTL0** Serial interface master 0 control 0 register 00008000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name	SM0_O_DR_AIN	RESV0															SM0_CLK_DIV			
Type	RW	RO																		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SIF_VS_YN_C	RE_SV1	SM0_VSYNC_MODE	RESV2								SM0_C_SS_TAT_US	SM0_S_CL_ST_AT_E	SM0_DA_ST_AT_E	SM0_E_N	SM0_ST_RE_CH
Type	RO	RO	RW	RO								RO	RO	RO	RW	RW
Reset	1	0	0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0

Bit(s)	Name	Description
31	SM0_ODRAIN	Open-drain output configuration 0: When SIF output is logic 1, the output is pulled high by outer devices. SIF output is open-drained. 1: When SIF output is logic 1, the output is pulled high by SIF master 0.
30:28	RESV0	
27:16	SM0_CLK_DIV	SIF master 0 clock divide value This is used to set the divider to generate expected SCL.
15	SIF_VSYNC	
14	RESV1	
13:12	SM0_VSYNC_MODE	Restrict SIF master 0 trigger within VSYNC pulse 00: Disable 01: Allow triggered in VSYNC pulse 10: Allow triggered at VSYNC rising edge
11:5	RESV2	
4	SM0_CS_STATUS	Clock stretching status 0: no clock stretching 1: clock stretching
3	SM0_SCL_STATE	SCL value on the bus
2	SM0_SDA_STATE	SDA value on the bus
1	SM0_EN	SIF master 0 enable bit 0: Disable SIF master 0. 1: Enable SIF master 0.
0	SM0_SCL_STRECH	Clock stretching enable 0: Not allow slaves hold SCL 1: Allow slaves hold SCL

10000944 **SM0CTL1** **Serial interface master 0 control 1 register** 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																SM0_ACK
Type																RO
Reset									0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																SM0_TRI
Type																RW
Reset									0	0	0		0			0

Bit(s)	Name	Description
23:16	SM0_ACK	Acknowledge bits ACK[7:0] is acknowledge of 8 bytes of data
10:8	SM0_PGLEN	Page length Page length of sequential read/write. The maximum is 8 bytes. Set 0 as 1 byte.
6:4	SM0_MODE	SIF master mode 001: Start

Bit(s)	Name	Description
0	SM0_TRI	010: Write data 011: Stop 100: Read data with no ack for final byte 101: Read data with ack Trigger serial interface 0: Read back as serial interface is idle. 1: Set 1 to trigger this serial interface. Read back as serial interface is busy.

10000950 SM0D0 **Serial interface master 0 data 0 register** **FFFFFFFFFF FF**

Bit(s)	Name	Description
31:24	SM0_DATA3	Serial interface data byte 3
23:16	SM0_DATA2	Serial interface data byte 2
15:8	SM0_DATA1	Serial interface data byte 1
7:0	SM0_DATA0	Serial interface data byte 0

Bit(s)	Name	Description
31:24	SM0_DATA7	Serial interface data byte 7
23:16	SM0_DATA6	Serial interface data byte 6
15:8	SM0_DATA5	Serial interface data byte 5
7:0	SM0_DATA4	Serial interface data byte 4

Reset																0
Bit(s)	Name	Description														
0	SM0_INT_EN	Serial interface master 0 interrupt enable														

Bit(s)	Name	Description
0	SM0_INT_ST	Serial interface master 0 interrupt status

Bit(s)	Name	Description
0	SM0_INT_CL	Serial interface master 0 interrupt clear

5.11 I²S Controller

5.11.1 Features

- I²S transmitter/receiver, which can be configured as master or slave.
- Supports 16-bit data, sampling rates of 8 kHz, 16 kHz, 22.05 kHz, 44.1 kHz, and 48 kHz
- Support stereo audio data transfer.
- 32-byte FIFO are available for data transmission.
- Supports GDMA access
- Supports 12 Mhz bit clock from external source (when in slave mode)

5.11.2 Block Diagram

The I²S transmitter block diagram is shown as below.

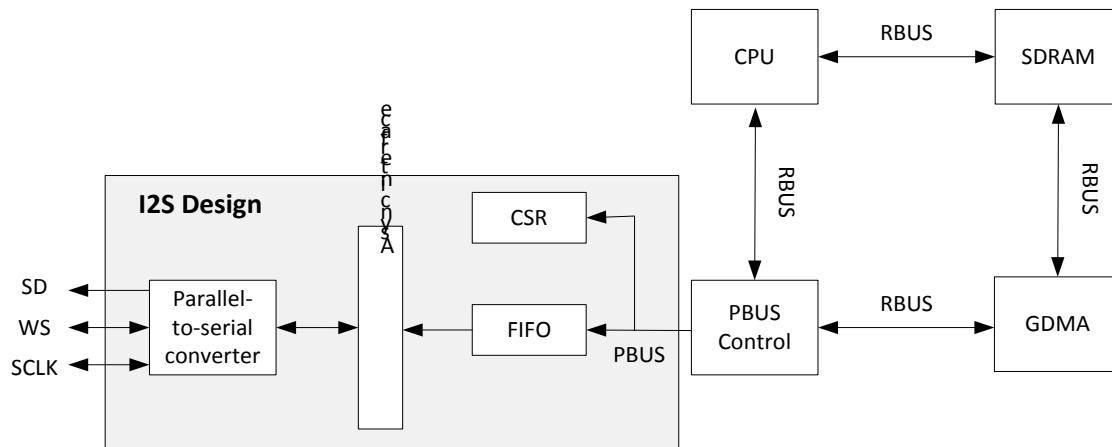


Figure 5-5 I²S Transmitter Block Diagram

The I²S interface consists of two separate cores, a transmitter and a receiver. Both can operate in either master or slave mode. The transmitter is only shown here in master or slave mode.

I²S Signal Timing For I²S Data Format

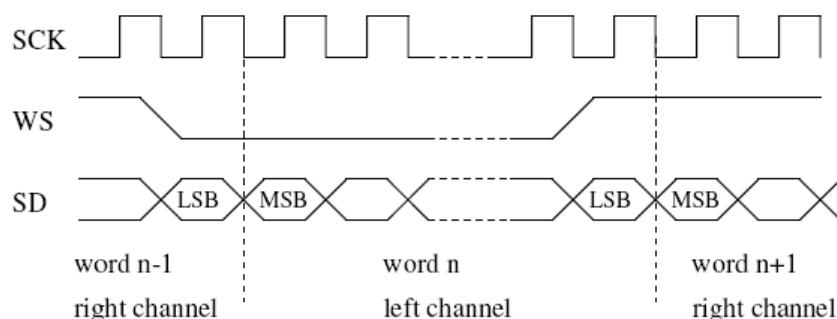


Figure 5-6 I²S Transmit/Receive

Serial data is transmitted in 2's complement with the MSB first. The transmitter always sends the MSB of the next word one clock period after the WS changes. Serial data sent by the transmitter may be synchronized with either the trailing (HIGH-to-LOW) or the leading (LOW-to-HIGH) edge of the clock signal. However, the serial data must be latched into the receiver on the leading edge of the serial clock signal, and so there are some restrictions when transmitting data that is synchronized with the leading edge.

The word select line indicates the channel being transmitted:

- WS = 0; channel 1 (left)
- WS = 1; channel 2 (right)

WS may change either on a trailing or leading edge of the serial clock, but it doesn't need to be symmetrical. In the slave, this signal is latched on the leading edge of the clock signal. The WS line changes one clock period before the MSB is transmitted. This allows the slave transmitter to derive synchronous timing of the serial data that will be set up for transmission. Furthermore, it enables the receiver to store the previous word and clear the input for the next Word.

5.11.3 Registers

I2S Changes LOG

Revision	Date	Author	Change Log
0.1	2014/1/12	Ken Wu	Initialization

Module name: I2S Base address: (+10000A00h)

Address	Name	Width	Register Function
10000A00	<u>I2S_CFG</u>	32	I2S Configuration I2S Tx/Rx Configuration Register
10000A04	<u>INT_STATUS</u>	32	Interrupt Status I2S Interrupt Status
10000A08	<u>INT_EN</u>	32	Interrupt Enable I2S Interrupt Enable Control Register
10000A0C	<u>FF_STATUS</u>	32	FIFO Status I2S Tx/Rx FIFO Status
10000A10	<u>TX_FIFO_WRE_G</u>	32	Transmit FIFO Write to Register Tx Write Data Buffer
10000A14	<u>RX_FIFO_RRE_G</u>	32	Receive FIFO Read Register DRAM PAD CONTROL 3
10000A18	<u>I2S_CFG1</u>	32	I2S Configuration 1 I2S Loopback Test Control Register
10000A20	<u>DIVCOMP_CFG</u>	32	Integer Part of the Dividor Register 1 Integer Part of the Dividor Register
10000A28	<u>DIVINT_CFG</u>	32	Integer Part of the Dividor Register 2 Integer Part of the Dividor Register

10000A00 I2S_CFG I2S Configuration 00014040

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	I2S_EN	DM_A_E_N	LIT_TIE_EN	DIA_N_DA	SY_S_E_NDI_AN			TX_EN				RX_EN		NO_RM_24_BIT	DA_TA_24B_IT	SL_AV_E_MOODE
Type	RW	RW	RW	RW				RW				RW		RW	RW	RW

Reset	0	0	0	0				0				0		0	0	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RX_FF_THRES				TX_FF_THRES											
Type	RW				RW											
Reset	0	1	0	0					0	1	0	0				

Bit(s)	Name	Description
31	I2S_EN	I2S Enable Enables I2S. When disabled, all I2S control registers are cleared to their initial values. 0: Disable 1: Enable
30	DMA_EN	DMA Enable Enables DMA access. 0: Disable 1: Enable
29	LITTLE_ENDIAN_DA TA_FMT	Little endian audio data 0: big endian audio data format 1: little endian audio data format
28	SYS_ENDIAN	System endian setting. 0: Little endian 1: Big endian
24	TX_EN	Transmitter on/off control 0: Disable 1: Enable
20	RX_EN	Receiver on/off control 0: Disable 1: Enable
18	NORM_24BIT	24-bit data format 0: compact data format 1: normal data format
17	DATA_24BIT	I2S data width 0: 16-bit data 1: 24-bit data
16	SLAVE_MODE	Sets master or slave mode. 0: Master: using internal clock 1: Slave: using external clock
15:12	RX_FF_THRES	Rx FIFO Threshold When the threshold is reached, the host/DMA is notified to fill FIFO. 2<RX_FF_THRES<6 (unit: word)
7:4	TX_FF_THRES	Tx FIFO Threshold When the threshold is reached, the host/DMA is notified to fill FIFO. 2<TX_FF_THRES<6 (unit: word)

10000A04 <u>INT_STATUS</u> Interrupt Status 00000000																0
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									RX_DM_A_F_AU_LT	RX_OV_RU_N	RX_UN_RU_N	RX_THRE_S	TX_DM_A_F_AU_LT	TX_OV_RU_N	TX_UN_RU_N	TX_THRE_S
Type									RW	RW	RW	RW	RW	RW	RW	RW
Reset									0	0	0	0	0	0	0	0

Bit(s)	Name	Description
7	RX_DMA_FAULT	Rx DMA Fault Detected Interrupt Asserts when a fault is detected in Rx DMA signals.
6	RX_OVRUN	Rx Overrun Interrupt Asserts when the Rx FIFO is overrun.
5	RX_UNRUN	Rx Underrun Interrupt Asserts when the Rx FIFO is underrun.
4	RX_THRES	Rx FIFO Below Threshold Interrupt Asserts when the Rx FIFO is lower than the defined threshold.
3	TX_DMA_FAULT	Tx DMA Fault Detected Interrupt Asserts when a fault is detected in Tx DMA signals.
2	TX_OVRUN	Tx FIFO Overrun Interrupt Asserts when the Tx FIFO is overrun.
1	TX_UNRUN	Tx FIFO Underrun Interrupt Asserts when the Tx FIFO is underrun.
0	TX_THRES	Tx FIFO Below Threshold Interrupt Asserts when the FIFO is lower than the defined threshold.

10000A08 INT_EN																Interrupt Enable			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	0		
Name																			
Type																			
Reset																			
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
Name									RX_INT_3_E_N	RX_INT_2_E_N	RX_INT_1_E_N	RX_INT_0_E_N	TX_INT_3_E_N	TX_INT_2_E_N	TX_INT_1_E_N	TX_INT_0_E_N			
Type									RW										
Reset									0	0	0	0	0	0	0	0			

Bit(s)	Name	Description
7	RX_INT3_EN	INT_STATUS[7] Enable Enables the Rx DMA Fault Detected Interrupt. This interrupt asserts when a fault is detected in Rx DMA signals.
6	RX_INT2_EN	INT_STATUS[6] Enable Enables the Rx Overrun Interrupt. This interrupt asserts when the Rx FIFO is overrun.
5	RX_INT1_EN	INT_STATUS[5] Enable Enables the Rx Underrun Interrupt. This interrupt asserts when the Rx FIFO is underrun.
4	RX_INT0_EN	INT_STATUS[4] Enable Enables the Rx FIFO Below Threshold Interrupt. This interrupt asserts when the Rx FIFO is lower than the defined threshold.
3	TX_INT3_EN	INT_STATUS[3] Enable Enables the Tx DMA Fault Detected Interrupt. This interrupt asserts when a fault is detected in Tx DMA signals.
2	TX_INT2_EN	INT_STATUS[2] Enable Enables the Tx FIFO Overrun Interrupt. This interrupt asserts when the Tx FIFO is overrun.
1	TX_INT1_EN	INT_STATUS[1] Enable Enables the Tx FIFO Underrun Interrupt. This interrupt asserts when the Tx FIFO is underrun.
0	TX_INT0_EN	INT_STATUS[0] Enable

Bit(s)	Name	Description
		Enables the Tx FIFO Below Threshold Interrupt. This interrupt asserts when the FIFO is lower than the defined threshold.

10000A0C <u>FF_STATUS</u> FIFO Status 00000001 0																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name					RX_AVCNT								TX_EPCNT			
Type					RO								RO			
Reset					0	0	0	0	0				1	0	0	0

Bit(s)	Name	Description
12:8	RX_AVCNT	Rx FIFO Available Space Count Counts the available space for reads in Rx FIFO. (unit: word)
4:0	TX_EPCNT	Tx FIFO Available Space Count Counts the available space for writes in Tx FIFO. (unit: word)

10000A10 <u>TX_FIFO_WR</u> Transmit FIFO Write to Register 00000000 0																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name					TX_FIFO_WDATA[31:16]											
Type					WO											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name					TX_FIFO_WDATA[15:0]											
Type					WO											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	TX_FIFO_WDATA	Tx FIFO Write Data Buffer Buffers data to be written to the Tx FIFO.

10000A14 <u>RX_FIFO_RR</u> Receive FIFO Read Register 00000000 0																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name					RX_FIFO_RDATA[31:16]											
Type					RO											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name					RX_FIFO_RDATA[15:0]											
Type					RO											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	RX_FIFO_RDATA	Rx FIFO Read Data Buffer Buffers data read from the Rx FIFO.

10000A18 I2S_CFG1 **I2S Configuration 1** **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	LB_K_E_N	EXT_LB_K_E_N														
Type	RW	RW														
Reset	0	0														
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																I2S_F_MT
Type																RW
Reset																0

Bit(s)	Name	Description
31	LBK_EN	Enables loopback mode. 0: Normal mode 1: Loopback mode ASYNC_TXFIFIO -> Tx -> Rx -> ASYNC_RXFIFIO
30	EXT_LBK_EN	Enables external loopback. 0: Normal mode 1: Enables external loop back. External A/D -> Rx -> Tx -> External D/A
0	I2S_FMT	I2S audio data format 0: i2s mode 1: left-justified mode

10000A20 DIVCOMP_CFG **Integer Part of the Dividor Register 1** **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	CL_K_E_N															
Type	RW															
Reset	0															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																DIVCOMP
Type																RW
Reset																0

Bit(s)	Name	Description
31	CLK_EN	Enables setting of the I2S clock based on DIVCOMP and DIVINT parameters. 0: Disable 1: Enable
8:0	DIVCOMP	A parameter in an equation which determines FREQOUT. See DIVINT_CFG.

10000A28 DIVINT_CFG **Integer Part of the Dividor Register 2** **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																DIVINT
Type																RW

Reset						0	0	0	0	0	0	0	0	0	0	0
-------	--	--	--	--	--	---	---	---	---	---	---	---	---	---	---	---

Bit(s)	Name	Description
9:0	DIVINT	Integer Divider A parameter in an equation which determines FREQOUT: $\text{FREQOUT} = \text{FREQIN} * (1/2) * \{1 / [\text{DIVINT} + \text{DIVCOMP}/(512)]\}$ FREQIN is always fixed to 480 MHz.

5.12 SPI Controller

5.12.1 Features

- Supports up to 2 SPI master operations
- Programmable clock polarity
- Programmable interface clock rate
- Programmable bit ordering
- Firmware-controlled SPI enable
- Programmable payload (address + data) length
- Supports 1/2/4 multi-IO SPI flash memory
- Supports command/user mode operation
- Supports SPI direct access
- Extends the addressable range from 24 bits to 32 bits for memory size larger than 128 Mb.

5.12.2 Block Diagram

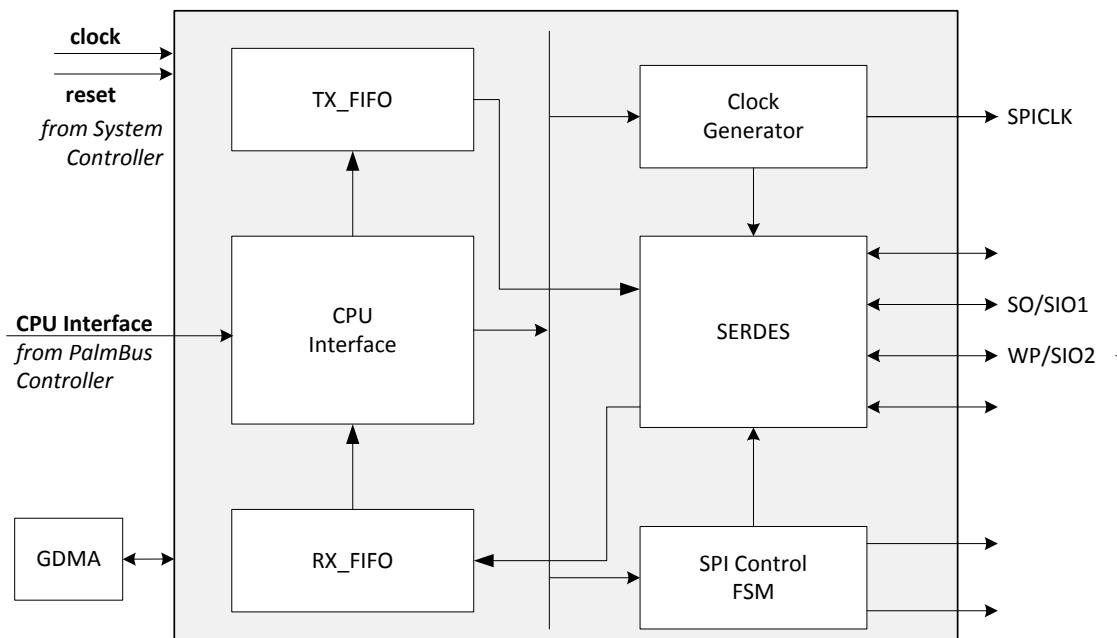


Figure 5-7 SPI Controller Block Diagram

5.12.3 Registers

SPI Changes LOG

Revision	Date	Author	Change Log
0.1	2012/8/29	Lancelot	Initialization
0.2	2012/11/6	Lancelot	1. Remove 0x38 SW_RST 2. Add CS_POLAR at 0x38
0.3	2012/11/23	Lancelot	Fix default value

Module name: SPI Base address: (+10000B00h)

Address	Name	Width	Register Function
10000B00	<u>SPI_TRANS</u>	32	SPI transaction control/status register
10000B04	<u>SPI_OP_ADDR</u>	32	SPI opcode/address register
10000B08	<u>SPI_DIDO_0</u>	32	SPI DI/DO data #0 register
10000B0C	<u>SPI_DIDO_1</u>	32	SPI DI/DO data #1 register
10000B10	<u>SPI_DIDO_2</u>	32	SPI DI/DO data #2 register
10000B14	<u>SPI_DIDO_3</u>	32	SPI DI/DO data #3 register
10000B18	<u>SPI_DIDO_4</u>	32	SPI DI/DO data #4 register
10000B1C	<u>SPI_DIDO_5</u>	32	SPI DI/DO data #5 register
10000B20	<u>SPI_DIDO_6</u>	32	SPI DI/DO data #6 register
10000B24	<u>SPI_DIDO_7</u>	32	SPI DI/DO data #7 register
10000B28	<u>SPI_MASTER</u>	32	SPI master mode register
10000B2C	<u>SPI_MORE_BUF</u>	32	SPI more buf control register
10000B30	<u>SPI_QUEUE_CTL</u>	32	SPI flash queue control register
10000B34	<u>SPI_STATUS</u>	32	SPI controller status register
10000B38	<u>SPI_CS_POLA_R</u>	32	SPI chip select polarity
10000B3C	<u>SPI_SPACE</u>	32	SPI flash space control register

10000B00 SPI_TRANS SPI transaction control/status register

0016000

1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>spi_addr_ext</u>								Reserved0		<u>spi_addr_size</u>		Reserved1		<u>spi_master_busy</u>	
Type	RW								RO		RW		RO		RO	
Reset	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	Reserved2								<u>spi_master_star_t</u>		<u>miso_byte_cnt</u>		<u>mosi_byte_cnt</u>			
Type	RO								WO		RW		RW			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:24	<u>spi_addr_ext</u>	SPI address extention Address extention for 32-bit SPI address size. Usually this field specifies the first byte of the address phase to transmit to SPI device when more_buf_mode = 0 and spi_addr_size = 3. And spi_addr[31:24], spi_addr[23:16], and spi_addr[15:0] are respectively the second, third and fourth byte of the address phase
20:19	<u>spi_addr_size</u>	SPI address size. 0: reserved. 1: spi_addr[15:0] of SPI DI data register are valid (16-bit size). 2: spi_addr[23:0] of SPI DI data register are valid (24-bit size). 3: {spi_addr_ext[7:0], spi_addr[23:0]} of SPI DI data register are valid (32-bit size) Note: The spi_addr_size is valid only when more_buf_mode = 0.
16	<u>spi_master_busy</u>	Transaction busy indication (Read-only). Writes to this bit are ignored. 0: No SPI transaction is ongoing. Software may start a new SPI transaction

Bit(s)	Name	Description
		by writing to the SPI transaction start bit within this register. 1: An SPI transaction presently is underway. Software must not try to start a new SPI transaction. Software may not alter the value of any field of the SPI master control registers.
8	spi_master_start	SPI transaction start. Only writes to this field are meaningful, reads always return 0. Writes: 0: No effect 1: Starts SPI transaction.
7:4	miso_byte_cnt	SPI MISO (rx) byte count. Determines the number of bytes received from the SPI device from the SPI opcode/address register and the SPI DI/DO data #0 register. Values of 0 ~ 8 are valid, other values are illegal. Note: The miso_byte_cnt is valid only when more_buf_mode = 0.
3:0	mosi_byte_cnt	SPI MOSI (tx) byte count. Determines the number of bytes transmitted from the SPI opcode/address register and the SPI DI/DO data #0 register to the SPI device. Values of 1 ~ 8 are valid, other values are illegal. Note: The mosi_byte_cnt is valid only when more_buf_mode = 0. The transmitted data sequence is as follows: spi_opcode, spi_addr (conditional) and d0_byte ~ d3_byte (conditional).

<u>SPI_OP_ADD</u>																00000000
R																0
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	spi_addr[23:8]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	spi_addr[7:0]								spi_opcode							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:8	spi_addr	SPI address. Usually this field specifies the 24-bits address to transmit to the SPI device when more_buf_mode = 0. 1: (16-bits SPI address size), spi_addr[23:16] is the 1st byte of the address phase and spi_addr[15:8] is the 2nd byte of the address phase. 2: (24-bits SPI address size), spi_addr[31:24] is the 1st byte of the address phase and spi_addr[23:16] is the 2nd byte of the address phase and spi_addr[15:8] is the 3rd byte of the address phase. 3: (32-bits SPI address size), spi_addr[31:24] is the 2nd byte of the address phase and spi_addr[23:16] is the 3rd byte of the address phase and spi_addr[15:8] is the 4th byte of the address phase. Note: For SPI read transaction and more_buf_mode = 0 Field [15:8] is also used to store the 6-th byte of data read phase. Field [23:16] is also used to store the 7-th byte of data read phase. Field [31:24] is also used to store the 8-th byte of data read phase.
7:0	spi_opcode	SPI opcode. Usually this field specifies the 8-bits opcode (instruction) to transmit to the SPI device as the first byte of a SPI transaction when more_buf_mode = 0. Note: For SPI read transaction and more_buf_mode = 0, this byte is also used to store the 5-th byte of data read phase according to the rx byte count miso_byte_cnt.

<u>SPI_DIDO_0</u>																00000000
R																0
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

Name	d3_byte								d2_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	d1_byte								d0_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:24	d3_byte	The 4th data byte of data read/write phase.
23:16	d2_byte	The 3th data byte of data read/write phase.
15:8	d1_byte	The 2nd data byte of data read/write phase.
7:0	d0_byte	The 1st data byte of data read/write phase.

10000B0C SPI_DIDO_1 SPI DI/DO data #1 register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	d3_byte								d2_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Bit(s)	Name	Description
31:24	d3_byte	The 4th data byte of data read/write phase.
23:16	d2_byte	The 3th data byte of data read/write phase.
15:8	d1_byte	The 2nd data byte of data read/write phase.
7:0	d0_byte	The 1st data byte of data read/write phase.

10000B10 SPI_DIDO_2 SPI DI/DO data #2 register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	d3_byte								d2_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Bit(s)	Name	Description
31:24	d3_byte	The 4th data byte of data read/write phase.
23:16	d2_byte	The 3th data byte of data read/write phase.
15:8	d1_byte	The 2nd data byte of data read/write phase.
7:0	d0_byte	The 1st data byte of data read/write phase.

10000B14 SPI_DIDO_3 SPI DI/DO data #3 register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	d3_byte								d2_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	d1_byte								d0_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:24	d3_byte	The 4th data byte of data read/write phase.
23:16	d2_byte	The 3th data byte of data read/write phase.
15:8	d1_byte	The 2nd data byte of data read/write phase.
7:0	d0_byte	The 1st data byte of data read/write phase.

10000B18 SPI_DIDO_4 SPI DI/DO data #4 register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	d3_byte								d2_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	d1_byte								d0_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:24	d3_byte	The 4th data byte of data read/write phase.
23:16	d2_byte	The 3th data byte of data read/write phase.
15:8	d1_byte	The 2nd data byte of data read/write phase.
7:0	d0_byte	The 1st data byte of data read/write phase.

10000B1C SPI_DIDO_5 SPI DI/DO data #5 register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	d3_byte								d2_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	d1_byte								d0_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:24	d3_byte	The 4th data byte of data read/write phase.
23:16	d2_byte	The 3th data byte of data read/write phase.
15:8	d1_byte	The 2nd data byte of data read/write phase.
7:0	d0_byte	The 1st data byte of data read/write phase.

10000B20 SPI_DIDO_6 SPI DI/DO data #6 register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	d3_byte								d2_byte							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	d1_byte								d0_byte							
Type	RW								RW							

Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Bit(s)	Name	Description
31:24	d3_byte	The 4th data byte of data read/write phase.
23:16	d2_byte	The 3th data byte of data read/write phase.
15:8	d1_byte	The 2nd data byte of data read/write phase.
7:0	d0_byte	The 1st data byte of data read/write phase.

10000B24 SPI_DIDO_7 SPI DI/DO data #7 register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	d3_byte										d2_byte					
Type	RW										RW					
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	d1_byte										d0_byte					
Type	RW										RW					
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:24	d3_byte	The 4th data byte of data read/write phase.
23:16	d2_byte	The 3th data byte of data read/write phase.
15:8	d1_byte	The 2nd data byte of data read/write phase.
7:0	d0_byte	The 1st data byte of data read/write phase.

10000B28 SPI_MASTER SPI master mode register 000D888 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	rs_slave_sel				clk_mode	rs_clk_sel										
Type	RW				RW	RW										
Reset	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	cs_dsel_cnt					full_dupe_x	int_en	spi_start_sel	spi_prefetch	bidi_r_mode	cpha	cpol	lsb_fir_st	more_buf_mode	serial_mod_e	
Type	RW					RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	
Reset	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:29	rs_slave_sel	select SPI device 0: select SPI device 0 (default is flash) 1: select SPI device 1 ... 7: select SPI device 7
28	clk_mode	This register is used to specify that period of SCLK HIGH is longer or period of SCLK LOW is longer when clock divisor(clk_sel) is odd. 0: period of SCLK LOW is longer. 1: period of SCLK HIGH is longer.
27:16	rs_clk_sel	Register Space SPI clock frequency select. 0: SPI clock frequency is hclk/2. (50% duty cycle, duty cycle is the ratio of the output high time to the total cycle time) 1: SPI clock frequency is hclk/3. (33.33% or 66.67% duty cycle) 2: SPI clock frequency is hclk/4. (50% duty cycle)

Bit(s)	Name	Description
15:11	cs_dsel_cnt	3: SPI clock frequency is hclk/5. (40% or 60% duty cycle) 4095: SPI clock frequency is hclk/4097. De-select time of SPI chip select is configured to occupy the number of cycles of AHB clock
10	full_duplex	Full duplex or half duplex mode. 0: half duplex mode. 1: full duplex mode. Full duplex timing diagram Note: The full_duplex is valid only when more_buf_mode = 1. The transmission is always as half duplex when more_buf_mode = 0;
9	int_en	Interrupt enable. 0: disable SPI interrupt. 1: enable SPI interrupt.
8	spi_start_sel	The interval between spi_cs_n and spi_sclk. 0: 3 clk 1: 6 clk
7	spi_prefetch	SPI pre-fetch buffer enable 0: disable pre-fetch buffer. 1: enable pre-fetch buffer.
6	bidir_mode	Bi-direction mode. In this mode, the SPI uses only one serial data pin for interface with external devices. The MOSI pin becomes the serial data I/O pin for the SPI transaction and MISO pin is not used. Bi-direction mode is used for the application with only 1 bi-direction serial pin for SPI transaction. 0: normal mode (both MOSI and MISO pins are used). 1: bi-direction mode (only MOSI pin is used). SPI host controller must operate in half duplex mode if bidir_mode = 1. Note: The bidir_mode is valid only when more_buf_mode = 1.
5	cpha	(CPHA, clock phase). Initial SPI clock phase for SPI transaction. There are four SPI modes used to latch data. These SPI modes latch data in one of four ways, and are defined by the logic state combinations of the CLK Polarity (CPOL) in relation to the CLK Phase (CPHA). The valid logic combinations identify and determine the SPI modes supported by the SPI device. SPI mode At CPOL=0 the base value of the clock is zero For CPHA=0 (mode 0), data is read on the clock's rising edge and data is changed on a falling edge. For CPHA=1 (mode 1), data is read on the clock's falling edge and data is changed on a rising edge. At CPOL=1 the base value of the clock is one (inversion of CPOL=0) For CPHA=0 (mode 2), data is read on clock's falling edge and data is changed on a rising edge. For CPHA=1 (mode 3), data is read on clock's rising edge and data is changed on a falling edge.
4	cpol	cpol (CPOL, clock polarity). Initial SPI clock polarity for SPI transaction.
3	lsb_first	0: MSB(most significant bit) is transferred first for SPI transaction. 1: LSB(least significant bit) is transferred first for SPI transaction.
2	more_buf_mode	Select 2 words buffer or 8 words buffer for SPI transaction. 0: SPI transfer data buffer size is only 2 words. In this mode, SPI DI/DO data #0 register and SPI opcode/address register are the data buffer for SPI transaction. And, SPI master follows mosi_byte_cnt and miso_byte_cnt to complete the transmission and reception, respectively. This kind of transaction must operate in half duplex mode. 1: SPI transfer data buffer size is 8 words. In this mode, SPI opcode/address register are the data buffer for SPI transaction and follows cmd_bit_cnt to complete the transaction. SPI DI/DO data #0~#7 register are the data buffer for SPI transaction and follows do_bit_cnt and di_bit_cnt to complete the transmission and reception, respectively. In half duplex mode, transmitted data are loaded from SPI opcode/address register and SPI DI/DO data #0~#7

Bit(s)	Name	Description
1:0	serial_mode	<p>registers. And, the received data will overwrite the SPI DI/DO data #0~#7 registers. In full duplex mode, SPI DI/DO data #0~#3 registers are used for transmission and SPI DI/DO #4~#7 registers are used for receipt.</p> <p>This mode is designed for Winbond SPI flash W25Q80/16/32 and W25X10/20/40/80/16/32/64 series.</p> <p>0: standard serial. 1: dual serial. 2: quad serial. 3: reserved.</p> <p>Note: The serial_mode is valid only when more_buf_mode = 0. The transaction mode is always as standard serial when more_buf_mode = 1.</p>

10000B2C SPI MORE B																SPI more buf control register	00000000
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	UF
Name	Reserved0							cmd_bit_cnt							Reserved1	miso_bit_cnt[8:4]	
Type	RO							RW							RW		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	miso_bit_cnt[3:0]				Reserved2				mosi_bit_cnt								
Type	RW				RO				RW								
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
29:24	cmd_bit_cnt	<p>SPI command phase MOSI (tx) bit count. Determines the number of command bits transmitted from the SPI opcode/address register to the SPI device. Values of 0 ~ 32 are valid, but other values are illegal.</p> <p>Note: The cmd_bit_cnt is valid only when more_buf_mode = 1 and the SPI opcode/address register is treated as a command register.</p>
20:12	miso_bit_cnt	<p>SPI data phase MISO (rx) bit count. Determines the number of bits received from the SPI device into the SPI DI/DO data #0~#7 register. Values of 0 ~ 256 are valid, but other values are illegal. Maximum value is 256 for half duplex mode and 128 for full duplex mode. Please note that do_bit_cnt must be equal to di_bit_cnt in full duplex mode.</p> <p>Note: The miso_bit_cnt is valid only when more_buf_mode = 1.</p>
8:0	mosi_bit_cnt	<p>SPI data phase MOSI (tx) bit count. Determines the number of data bits transmitted from the SPI DI/DO data #0~#7 register to the SPI device. Values of 0 ~ 256 are valid, but other values are illegal. Maximum value is 256 for half duplex mode and 128 for full duplex mode.</p> <p>Note: The mosi_bit_cnt is valid only when more_buf_mode = 1.</p>

10000B30 SPI QUEUE																SPI flash queue control register	00000E4
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	CTL
Name	fs_page_sel							Reserved0[12:3]									
Type	RW							RO									
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	Reserved0[2:0]				fs_bus_y	fs_addr_si_ze_r	fs_addr_si_ze	fs_di_ph_byc							Reserv ed1	fast_spi_sel	
Type	RO				RO	RO	RW	RW							RO	RW	
Reset	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0

Bit(s)	Name	Description
31:26	fs_page_sel	<p>Flash Space Page Selection.</p> <p>0: (Page 0 space) 0x0000_0000 - 0x03ff_ffff 1: (Page 1 space) 0x0400_0000 - 0x07ff_ffff</p>

Bit(s)	Name	Description
12	fs_busy	<p>... 63: (Page 63 space) 0xffc0_0000 - 0xffff_ffff</p> <p>Transaction busy indication (Read-only) in flash space. Writes to this bit are ignored.</p> <p>0: No SPI flash space access is ongoing. Software may change the configuration related to flash space. 1: SPI flash space access presently is underway. Software may not alter the configuration related to flash space.</p>
11:10	fs_addr_size_r	Latched fs_addr_size indication from internal spimc logic
9:8	fs_addr_size	<p>SPI address. This field specifies the 24-bits/16-bits address to transmit to the SPI device for SPI Flash Space Read operation only.</p> <p>0: 25-bit SPI address size 1: 16-bit SPI address size Reserved. 2: 24-bit SPI address size (default for 3B SPI flash) 3: 26-bit SPI address size (default for 4B SPI flash)</p> <p>If the change of the fs_addr_size is needed, the sequence below must be followed. Otherwise, the new fs_addr_size configuration will not be updated to the internal spimc logic.</p> <p>Step 1: Set new fs_addr_size. Step 2: Transmit mode change command (ex. En4B or Ex4B of MX25L25635E)</p> <p>Note: 1. The value fs_addr_size is not valid in Register Space. 2. The Spimc now only supports 3-Byte mode (24 bits) and 4-Byte mode (25 or 26 bits) switch.</p>
7:4	fs_di_ph_byc	<p>Determines the number of data bytes transmitted from the SPI master controller to the SPI device for SPI Flash Space Read operation. This field is similar to mosi_byte_cnt in STCSR but is used for setting of flash space access control path.</p> <p>Note: this field should</p> <ul style="list-style-type: none"> (if fs_addr_size_r = 2, 24-bit fs_addr_size) <ul style="list-style-type: none"> = 4 (OP + ADDR) if fast_spi_sel = 0 (0x03) = 5 (OP + ADDR + dummy) if fast_spi_sel = 1 (0x0b) = 5 (OP + ADDR + dummy) if fast_spi_sel = 2 (0x3b) = 5 (OP + ADDR + M7-0) if fast_spi_sel = 3 (0xbb) = 5 (OP + ADDR + dummy) if fast_spi_sel = 4 (0x6b) = 7 (OP + ADDR + M7-0 + dummy) if fast_spi_sel = 5 (0xeb) = 5 (OP + ADDR + M7-0) if fast_spi_sel = 6 (0xe3) (if fs_addr_size_r = 0 or 3, 25 or 26-bit fs_addr_size) <ul style="list-style-type: none"> = 5 (OP + ADDR) if fast_spi_sel = 0 (0x03) = 6 (OP + ADDR + dummy) if fast_spi_sel = 1 (0x0b) = 6 (OP + ADDR + dummy) if fast_spi_sel = 2 (0x3b) = 6 (OP + ADDR + M7-0) if fast_spi_sel = 3 (0xbb) = 6 (OP + ADDR + dummy) if fast_spi_sel = 4 (0x6b) = 8 (OP + ADDR + M7-0 + dummy) if fast_spi_sel = 5 (0xeb) = 6 (OP + ADDR + M7-0) if fast_spi_sel = 6 (0xe3) <p>Select SPI flash read instruction for Flash Space</p> <p>0: standard read data instruction (0x03). 1: standard fast read data instruction (0x0b). 2: fast read dual output instruction defined in Winbond W25Qxx series SPI flash (0x03b). 3: fast read dual I/O instruction defined in Winbond W25Qxx series SPI flash (0xbb). 4: fast read quad output instruction defined in Winbond W25Qxx series SPI flash (0x6b). 5: fast read quad I/O instruction defined in Winbond W25Qxx series SPI flash (0xeb). 6: burst read quad I/O instruction defined in Winbond W25Qxx series SPI flash (0xe3).</p> <p>Note: serial_mode and more_buf_mode are don't care for this flash space access control path.</p>
2:0	fast_spi_sel	

10000B34 SPI_STATUS SPI controller status register 0000003
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	Reserved0[25:10]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	Reserved0[9:0]										spi_flash_mode	Reserved1			spi_ok	
Type	RO										RO	RO			RC	
Reset	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0

Bit(s)	Name	Description
5:4	spi_flash_mode	0: no SPI flash. 1: standard SPI flash. 2: specific SPI flash with dual interface capability. 3: specific SPI flash with quad interface capability.
0	spi_ok	When SPI transaction complete, SPI master controller will set this bit and assert SPI interrupt to notify software. Reading this register will clear this bit and de-assert SPI interrupt.

10000B38 SPI_CS_POL AR SPI chip select polarity 0000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type	AR															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name											cs_polar					
Type											RW					
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
7:0	cs_polar	Chip select default polarity set cs_polar[n]=1'b0 for cs[n] low active (SPI Flash) set cs_polar[n]=1'b1 for cs[n] high active

10000B3C SPI_SPACE SPI flash space control register 0000003
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	Reserved[16:1]																
Type	RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	Reserv ed[0:0]	fs_slave_sel				fs_clk_sel											
Type	RO	RW				RW											
Reset	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	

Bit(s)	Name	Description
14:12	fs_slave_sel	(Flash Space Slave Select) 0: select SPI device #0. (default is flash) 1: select SPI device #1. ... 7: select SPI device #7.
11:0	fs_clk_sel	Flash Space SPI clock frequency select.

Bit(s)	Name	Description
0:		SPI clock frequency is hclk/2. (50% duty cycle, duty cycle is the ratio of the output high time to the total cycle time)
1:		SPI clock frequency is hclk/3. (33.33% or 66.67% duty cycle)
2:		SPI clock frequency is hclk/4. (50% duty cycle)
3:		SPI clock frequency is hclk/5. (40% or 60% duty cycle)
4095:		SPI clock frequency is hclk/4097.

5.13 UART Lite

5.13.1 Features

- 2-pin UART
- 16550-compatible register set, except for Divisor Latch register
- 5-8 data bits
- 1-2 stop bits (1 or 2 stop bits are supported with 5 data bits)
- Even, odd, stick or no parity
- All standard baud rates up to 345600 b/s
- 16-byte receive buffer
- 16-byte transmit buffer
- Receive buffer threshold interrupt
- Transmit buffer threshold interrupt
- False start bit detection in asynchronous mode
- Internal diagnostic capabilities
- Break simulation
- Loop-back control for communications link fault isolation

5.13.2 Registers

n = 1; for uart1 only.

UARTn+0000h RX Buffer Register

UARTn_RBR

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																RBR[7:0]
Type																RO

RBR RX Buffer Register. Read-only register. The received data can be read by accessing this register.

Modified when LCR[7] = 0.

UARTn+0000h TX Holding Register

UARTn_THR

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																THR[7:0]
Type																WO

THR TX Holding Register. Write-only register. The data to be transmitted is written to this register, and then sent to the PC via serial communication.

Modified when LCR[7] = 0.

UARTn+0004h Interrupt Enable Register

UARTn_IER

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									CTSI	RTSI	XOFFI	X	EDSSI	ELSI	ETBEI	ERBF
Type																R/W
Reset																0

IER By storing a ‘1’ to a specific bit position, the interrupt associated with that bit is enabled. Otherwise, the interrupt is disabled.

IER[3:0] are modified when LCR[7] = 0.

IER[7:4] are modified when LCR[7] = 0 & EFR[4] = 1.

CTSI Masks an interrupt that is generated when a rising edge is detected on the CTS modem control line.

Note: This interrupt is only enabled when hardware flow control is enabled.

0 Unmask an interrupt that is generated when a rising edge is detected on the CTS modem control line.

1 Mask an interrupt that is generated when a rising edge is detected on the CTS modem control line.

RTSI Masks an interrupt that is generated when a rising edge is detected on the RTS modem control line.

Note: This interrupt is only enabled when hardware flow control is enabled.

- 0** Unmask an interrupt that is generated when a rising edge is detected on the RTS modem control line.
- 1** Mask an interrupt that is generated when a rising edge is detected on the RTS modem control line.

XOFFI Masks an interrupt that is generated when an XOFF character is received.

Note: This interrupt is only enabled when software flow control is enabled.

- 0** Unmask an interrupt that is generated when an XOFF character is received.
- 1** Mask an interrupt that is generated when an XOFF character is received.

EDSSI When set ("1"), an interrupt is generated if DDCD, TERI, DDSR or DCTS (MSR[4:1]) becomes set.

- 0** No interrupt is generated if DDCD, TERI, DDSR or DCTS (MSR[4:1]) becomes set.
- 1** An interrupt is generated if DDCD, TERI, DDSR or DCTS (MSR[4:1]) becomes set.

ELSI When set ("1"), an interrupt is generated if BI, FE, PE or OE (LSR[4:1]) becomes set.

- 0** No interrupt is generated if BI, FE, PE or OE (LSR[4:1]) becomes set.
- 1** An interrupt is generated if BI, FE, PE or OE (LSR[4:1]) becomes set.

ETBEI When set ("1"), an interrupt is generated if the TX Holding Register is empty or the contents of the TX FIFO have been reduced to its Trigger Level.

- 0** No interrupt is generated if the TX Holding Register is empty or the contents of the TX FIFO have been reduced to its Trigger Level.
- 1** An interrupt is generated if the TX Holding Register is empty or the contents of the TX FIFO have been reduced to its Trigger Level

ERBFI When set ("1"), an interrupt is generated if the RX Buffer contains data.

- 0** No interrupt is generated if the RX Buffer contains data.
- 1** An interrupt is generated if the RX Buffer contains data.

UARTn+0008h Interrupt Identification Register

UARTn_IIR

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									FIFOE	ID4	ID3	ID2	ID1	ID0	NINT	
Type															RO	
Reset									0	0	0	0	0	0	0	1

IIR Identify if there are pending interrupts; ID4 and ID3 are presented only when EFR[4] = 1.

The following table gives the IIR[5:0] codes associated with the possible interrupts:

IIR[5:0]	Priority Level	Interrupt	Source
000001	-	No interrupt pending	
000110	1	Line Status Interrupt	BI, FE, PE or OE set in LSR
000100	2	RX Data Received	RX Data received or RX Trigger Level reached.
001100	2	RX Data Timeout	Timeout on character in RX FIFO.
000010	3	TX Holding Register Empty	TX Holding Register empty or TX FIFO Trigger Level reached.
000000	4	Modem Status change	DDCD, TERI, DDSR or DCTS set in MSR
010000	5	Software Flow Control	XOFF Character received
100000	6	Hardware Flow Control	CTS or RTS Rising Edge

Table 5-1 The IIR[5:0] codes associated with the possible interrupts

Line Status Interrupt: A RX Line Status Interrupt (IIR[5:0] == 000110b) is generated if ELSI (IER[2]) is set and any of BI, FE, PE or OE (LSR[4:1]) becomes set. The interrupt is cleared by reading the Line Status Register.

RX Data Received Interrupt: A RX Received interrupt (IER[5:0] == 000100b) is generated if EFRBI (IER[0]) is set and either RX Data is placed in the RX Buffer Register or the RX Trigger Level is reached. The interrupt is cleared by reading the RX Buffer Register or the RX FIFO (if enabled).

RX Data Timeout Interrupt:

When virtual FIFO mode is disabled, RX Data Timeout Interrupt is generated if all of the following apply:

1. FIFO contains at least one character;
2. The most recent character was received longer than four character periods ago (including all start, parity and stop bits);
3. The most recent CPU read of the FIFO was longer than four character periods ago.

The timeout timer is restarted on receipt of a new byte from the RX Shift Register, or on a CPU read from the RX FIFO.

The RX Data Timeout Interrupt is enabled by setting EFRBI (IER[0]) to 1, and is cleared by reading RX FIFO.

When virtual FIFO mode is enabled, RX Data Timeout Interrupt is generated if all of the following apply:

1. FIFO is empty;
2. The most recent character was received longer than four character periods ago (including all start, parity and stop bits);
3. The most recent CPU read of the FIFO was longer than four character periods ago.

The timeout timer is restarted on receipt of a new byte from the RX Shift Register.

RX Holding Register Empty Interrupt: A TX Holding Register Empty Interrupt (IIR[5:0] = 000010b) is generated if ETRBI (IER[1]) is set and either the TX Holding Register or, if FIFOs are enabled, the TX FIFO becomes empty.

The interrupt is cleared by writing to the TX Holding Register or TX FIFO if FIFO enabled.

Modem Status Change Interrupt: A Modem Status Change Interrupt (IIR[5:0] = 000000b) is generated if EDSSI (IER[3]) is set and either DDCD, TERI, DDSR or DCTS (MSR[3:0]) becomes set. The interrupt is cleared by reading the Modem Status Register.

Software Flow Control Interrupt: A Software Flow Control Interrupt (IIR[5:0] = 010000b) is generated if Software Flow Control is enabled and XOFFI (IER[5]) becomes set, indicating that an XOFF character has been received. The interrupt is cleared by reading the Interrupt Identification Register.

Hardware Flow Control Interrupt: A Hardware Flow Control Interrupt (IIR[5:0] = 100000b) is generated if Hardware Flow Control is enabled and either RTSI (IER[6]) or CTSI (IER[7]) becomes set indicating that a rising edge has been detected on either the RTS/CTS Modem Control line. The interrupt is cleared by reading the Interrupt Identification Register.

UARTn+0008h FIFO Control Register

UARTn_FCR

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									RFTL1	RFTL0	TFTL1	TFTL0	DMA1	CLRT	CLRR	FIFOE
Type																WO

FCR FCR is used to control the trigger levels of the FIFOs, or flush the FIFOs.

FCR[7:6] is modified when LCR != BFh

FCR[5:4] is modified when LCR != BFh & EFR[4] = 1

FCR[4:0] is modified when LCR != BFh

FCR[7:6] RX FIFO trigger threshold

0 1

1 6

2 12

3 **RXTRIG**

FCR[5:4] TX FIFO trigger threshold

0 1

1 4

2 8**3** 14 (FIFOSIZE - 2)

DMA1 This bit determines the DMA mode, which the TXRDY and RXRDY pins support. TXRDY and RXRDY act to support single-byte transfers between the UART and memory (DMA mode 0) or multiple byte transfers (DMA mode1). Note that this bit has no effect unless the FIFOE bit is set as well

0 The device operates in DMA Mode 0.

1 The device operates in DMA Mode 1.

TXRDY – mode0: Goes active (low) when the TX FIFO or the TX Holding Register is empty.

Becomes inactive when a byte is written to the Transmit channel.

TXRDY – mode1: Goes active (low) when there are no characters in the TX FIFO. Becomes inactive when the TX FIFO is full.

RXRDY – mode0: Becomes active (low) when at least one character is in the RX FIFO or the RX Buffer Register is full. Becomes inactive when there are no more characters in the RX FIFO or RX Buffer register.

RXRDY – mode1: Becomes active (low) when the RX FIFO Trigger Level is reached or an RX FIFO Character Timeout occurs. Goes inactive when the RX FIFO is empty.

CLRT Clear Transmit FIFO. This bit is self-clearing.

0 Leave TX FIFO intact.

1 Clear all the bytes in the TX FIFO.

CLRR Clear Receive FIFO. This bit is self-clearing.

0 Leave RX FIFO intact.

1 Clear all the bytes in the RX FIFO.

FIFOE FIFO Enabled. This bit must be set to 1 for any of the other bits in the registers to have any effect.

0 Disable both the RX and TX FIFOs.

1 Enable both the RX and TX FIFOs.

UARTn+000Ch Line Control Register

UARTn_LCR

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									DLAB	SB	SP	EPS	PEN	STB	WLS1	WLS0
Type																R/W
Reset									0	0	0	0	0	0	0	0

LCR Line Control Register. Determines characteristics of serial communication signals.

Modified when LCR[7] = 0.

DLAB Divisor Latch Access Bit.

- 0** The RX and TX Registers are read/written at Address 0 and the IER register is read/written at Address 4.
- 1** The Divisor Latch LS is read/written at Address 0 and the Divisor Latch MS is read/written at Address 4.

SB Set Break

- 0** No effect
- 1** SOUT signal is forced into the “0” state.

SP Stick Parity

- 0** No effect.
- 1** The Parity bit is forced into a defined state, depending on the states of EPS and PEN:
If EPS=1 & PEN=1, the Parity bit is set and checked = 0.
If EPS=0 & PEN=1, the Parity bit is set and checked = 1.

EPS Even Parity Select

- 0** When EPS=0, an odd number of ones is sent and checked.

1 When EPS=1, an even number of ones is sent and checked.

PEN Parity Enable

0 The Parity is neither transmitted nor checked.

1 The Parity is transmitted and checked.

STB Number of STOP bits

0 One STOP bit is always added.

1 Two STOP bits are added after each character is sent; unless the character length is 5 when 1 STOP bit is added.

WLS1, 0 Word Length Select.

0 5 bits

1 6 bits

2 7 bits

3 8 bits

UARTn+0010h Modem Control Register

UARTn_MCR

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									XOFF STATUS		X	DCM_EN	OUT2	OUT1	RTS	DTR
Type																R/W
Reset									0		0	0	0	0	0	0

MCR Modem Control Register. Control interface signals of the UART.

MCR[4:0] are modified when LCR[7] = 0,

MCR[7:6] are modified when LCR[7] = 0 & EFR[4] = 1.

XOFF Status This is a read-only bit.

0 When an XON character is received.

1 When an XOFF character is received.

DCM_EN UART DCM function enable bit

0 UART DCM is disabled.

1 UART DCM is enabled.

OUT2 Controls the state of the output NOUT2, even in loop mode.

0 NOUT2=1.

1 NOUT2=0.

OUT1 Controls the state of the output NOUT1, even in loop mode.

0 NOUT1=1.

1 NOUT1=0.

RTS Controls the state of the output NRTS, even in loop mode.

0 NRTS=1.

1 NRTS=0.

DTR Control the state of the output NDTR, even in loop mode.

0 NDTR=1.

1 NDTR=0.

UARTn+0014h Line Status Register

UARTn_LSR

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									FIFOE RR	TEMPT	THRE	BI	FE	PE	OE	DR
Type																R/W
Reset									0	1	1	0	0	0	0	0

LSR Line Status Register.

Modified when LCR[7] = 0.

FIFOERR RX FIFO Error Indicator.

- 0** No PE, FE, BI set in the RX FIFO.
- 1** Set to 1 when there is at least one PE, FE or BI in the RX FIFO.

TEM_T TX Holding Register (or TX FIFO) and the TX Shift Register are empty.

- 0** Empty conditions below are not met.
- 1** If FIFOs are enabled, the bit is set whenever the TX FIFO and the TX Shift Register are empty. If FIFOs are disabled, the bit is set whenever TX Holding Register and TX Shift Register are empty.

THRE Indicates if there is room for TX Holding Register or TX FIFO is reduced to its Trigger Level.

- 0** **Reset whenever the contents of the TX FIFO are more than its Trigger Level (FIFOs are enabled), or whenever TX Holding Register is not empty(FIFOs are disabled).**
- 1** Set whenever the contents of the TX FIFO are reduced to its Trigger Level (FIFOs are enabled), or whenever TX Holding Register is empty and ready to accept new data (FIFOs are disabled).

BI Break Interrupt.

- 0** Reset by the CPU reading this register
- 1** If the FIFOs are disabled, this bit is set whenever the SIN is held in the 0 state for more than one transmission time (START bit + DATA bits + PARITY + STOP bits).
If the FIFOs are enabled, this error is associated with a corresponding character in the FIFO and is flagged when this byte is at the top of the FIFO. When a break occurs, only one zero character is loaded into the FIFO: the next character transfer is enabled when SIN goes into the marking state and receives the next valid start bit.

FE Framing Error.

- 0** Reset by the CPU reading this register
- 1** If the FIFOs are disabled, this bit is set if the received data did not have a valid STOP bit. If the FIFOs are enabled, the state of this bit is revealed when the byte it refers to is the next to be read.

PE Parity Error

- 0** Reset by the CPU reading this register
- 1** If the FIFOs are disabled, this bit is set if the received data did not have a valid parity bit. If the FIFOs are enabled, the state of this bit is revealed when the referred byte is the next to be read.

OE Overrun Error.

- 0** Reset by the CPU reading this register.
- 1** If the FIFOs are disabled, this bit is set if the RX Buffer was not read by the CPU before new data from the RX Shift Register overwrote the previous contents.
If the FIFOs are enabled, an overrun error occurs when the RX FIFO is full and the RX Shift Register becomes full. OE is set as soon as this happens. The character in the Shift Register is then overwritten, but not transferred to the FIFO.

DR Data Ready.

- 0** Cleared by the CPU reading the RX Buffer or by reading all the FIFO bytes.
- 1** Set by the RX Buffer becoming full or by a byte being transferred into the FIFO.

UARTn+0018h Modem Status Register

UARTn_MSR

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									DCD	RI	DSR	CTS	DDCD	TERI	DDSR	DCTS
Type									R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W
Reset									Input	Input	Input	Input	0	0	0	0

Note: After a reset, D4-D7 are inputs. A modem status interrupt can be cleared by writing '0' or set by writing '1' to this register. D0-D3 can be written to.

Modified when LCR[7] = 0.

MSR Modem Status Register

DCD Data Carry Detect.

When Loop = "0", this value is the complement of the NDCD input signal.

When Loop = "1", this value is equal to the OUT2 bit in the Modem Control Register.

RI Ring Indicator.

When Loop = "0", this value is the complement of the NRI input signal.

When Loop = "1", this value is equal to the OUT1 bit in the Modem Control Register.

DSR Data Set Ready

When Loop = "0", this value is the complement of the NDSR input signal.

When Loop = "1", this value is equal to the DTR bit in the Modem Control Register.

CTS Clear To Send.

When Loop = "0", this value is the complement of the NCNTS input signal.

When Loop = "1", this value is equal to the RTS bit in the Modem Control Register.

DDCD Delta Data Carry Detect.

- 0** The state of DCD has not changed since the Modem Status Register was last read
- 1** Set if the state of DCD has changed since the Modem Status Register was last read.

TERI Trailing Edge Ring Indicator

- 0** The NRI input does not change since this register was last read.
- 1** Set if the NRI input changes from "0" to "1" since this register was last read.

DDSR Delta Data Set Ready

- 0** Cleared if the state of DSR has not changed since this register was last read.
- 1** Set if the state of DSR has changed since this register was last read.

DCTS Delta Clear To Send

- 0** Cleared if the state of CTS has not changed since this register was last read.
- 1** Set if the state of CTS has changed since this register was last read.

UARTn+001Ch Scratch Register

UARTn_SCR

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SCR[7:0]															
Type	R/W															

A general purpose read/write register. After reset, its value is un-defined.

Modified when LCR[7] = 0.

UARTn+0000h Divisor Latch (LS)

UARTn_DLL

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DLL[7:0]															
Type	R/W															
Reset	1															

UARTn+0004h Divisor Latch (MS)

UARTn_DLM

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DLM[7:0]															
Type	R/W															
Reset	0															

Note: DLL & DLM can only be updated if DLAB is set ("1").. Note too that division by 1 generates a BAUD signal that is constantly high.

Modified when LCR[7] = 1.

The table below shows the divisor needed to generate a given baud rate from CLK inputs of 13, 26 MHz and 52 MHz. The effective clock enable generated is 16 x the required baud rate.

BAUD	13MHz	26MHz	52MHz

110	7386	14773	29545
300	2708	5417	10833
1200	677	1354	2708
2400	338	677	1354
4800	169	339	677
9600	85	169	339
19200	42	85	169
38400	21	42	85
57600	14	28	56
115200	6	14	28

Table 5-2 Divisor needed to generate a given baud rate

UARTn+0008h Enhanced Feature Register**UARTn_EFR**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									AUTO CTS	AUTO RTS	D5	ENABLE -E	SW FLOW CONT[3:0]			
Type									R/W	R/W	R/W	R/W		R/W		
Reset									0	0	0	0		0		

*NOTE: Only when LCR=BF'h

Auto CTS Enables hardware transmission flow control

- 0** Disabled.
- 1** Enabled.

Auto RTS Enables hardware reception flow control

- 0** Disabled.
- 1** Enabled.

Enable-E Enable enhancement features.

- 0** Disabled.
- 1** Enabled.

CONT[3:0] Software flow control bits.

- 00xx** No TX Flow Control
- 10xx** Transmit XON1/XOFF1 as flow control bytes
- 01xx** Transmit XON2/XOFF2 as flow control bytes
- 11xx** Transmit XON1 & XON2 and XOFF1 & XOFF2 as flow control words
- xx00** No RX Flow Control
- xx10** Receive XON1/XOFF1 as flow control bytes
- xx01** Receive XON2/XOFF2 as flow control bytes
- xx11** Receive XON1 & XON2 and XOFF1 & XOFF2 as flow control words

UARTn+0010h XON1**UARTn_XON1**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name													XON1[7:0]			
Type													R/W			
Reset													0			

UARTn+0014h XON2**UARTn_XON2**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name													XON2[7:0]			
Type													R/W			

Reset															0
-------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---

UARTn+0018h XOFF1**UARTn_XOFF1**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name												XOFF1[7:0]				
Type												R/W				
Reset												0				

UARTn+001Ch XOFF2**UARTn_XOFF2**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name												XOFF2[7:0]				
Type												R/W				
Reset												0				

UARTn+0024h HIGH SPEED UART**UARTn_HIGHSPEED**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name															SPEED [1:0]	
Type															R/W	
Reset															0	

SPEED UART sample counter base

- 0 based on 16*baud_pulse, baud_rate = system clock frequency/16/{DLH, DLL}
- 1 based on 8*baud_pulse, baud_rate = system clock frequency/8/{DLH, DLL}
- 2 based on 4*baud_pulse, baud_rate = system clock frequency/4/{DLH, DLL}
- 3 based on sample_count * baud_pulse, baud_rate = system clock frequency / sample_count

When HIGHSPEED=3, the value (A * B) means ({DLM, DLL} * SAMPLE_COUNT).

When the Baudrate is more than 115200, it will be more accurate if we set HIGHSPEED=3.

The table below shows the divisor needed to generate a given baud rate from CLK inputs of 13MHz based on different HIGHSPEED value.

BAUD	HIGHSPEED = 0	HIGHSPEED = 1	HIGHSPEED = 2	HIGHSPEED = 3
110	7386	14773	29545	7386 * 16
300	2708	7386	14773	2708 * 16
1200	677	2708	7386	677 * 16
2400	338	677	2708	338 * 16
4800	169	338	677	169 * 16
9600	85	169	338	85 * 16
19200	42	85	169	9 * 75
38400	21	42	85	13 * 26
57600	14	21	42	8 * 28
115200	7	14	21	4 * 28
230400	*	7	14	2 * 28
460800	*	*	7	1 * 28
921600	*	*	*	1 * 14

Table 5-3 Divisor needed to generate a given baud rate from 13MHz based on different HIGHSPEED value

The table below shows the divisor needed to generate a given baud rate from CLK inputs of 26 MHz based on different HIGHSPEED value.

BAUD	HIGHSPEED = 0	HIGHSPEED = 1	HIGHSPEED = 2	HIGHSPEED = 3
110	14773	29545	59091	7386 * 32
300	5417	14773	29545	2708 * 32
1200	1354	5417	14773	677 * 32
2400	677	1354	5417	338 * 32
4800	339	677	1354	169 * 32
9600	169	339	667	85 * 32
19200	85	169	339	18 * 75
38400	42	85	169	26 * 26
57600	28	42	85	16 * 28
115200	14	28	42	8 * 28
230400	7	14	28	4 * 28
460800	*	7	14	2 * 28
921600	*	*	7	1 * 28

Table 5-4 Divisor needed to generate a given baud rate from 26 MHz based on different HIGHSPEED value

The table below shows the divisor needed to generate a given baud rate from CLK inputs of 52MHz based on different HIGHSPEED value.

BAUD	HIGHSPEED = 0	HIGHSPEED = 1	HIGHSPEED = 2	HIGHSPEED = 3
110	29545	59091	118182	14773 * 32
300	10833	29545	59091	5417 * 32
1200	2708	10833	29545	1354 * 32
2400	1354	2708	10833	667 * 32
4800	677	1354	2708	339 * 32
9600	339	677	1354	169 * 32
19200	169	339	677	36 * 75
38400	85	169	339	52 * 26
57600	56	85	169	32 * 28
115200	28	56	85	16 * 28
230400	14	28	56	8 * 28
460800	7	14	28	4 * 28
921600	*	7	14	2 * 28

Table 5-5 Divisor needed to generate a given baud rate from 52 MHz based on different HIGHSPEED value

UARTn+0028h SAMPLE_COUNT

UARTn_SAMPLE_COUNT

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SAMPLECOUNT [7:0]															
Type	R/W															
Reset	0															

When HIGHSPEED=3, the sample_count is the threshold value for UART sample counter (sample_num).

Count from 0 to sample_count.

UARTn+002Ch SAMPLE_POINT

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SAMPLEPOINT [7:0]															
Type	R/W															
Reset	Ffh															

When HIGHSPEED=3, UART gets the input data when sample_count=sample_num.

e.g. system clock = 13MHz, 921600 = 13000000 / 14

sample_count = 14 and sample point = 7 (sample the central point to decrease the inaccuracy)

The SAMPLE_POINT is usually (SAMPLE_COUNT/2).

UARTn+0034h Rate Fix Address

UARTn_RATEFIX_AD

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RXTE_FIX															
Type	R/W															
Reset	0															

rate_fix When you set "rate_fix"(34H[0]), you can transmit and receive data only if

the input **f16m_en** is enable.

UARTn+003Ch Guard time added register

UARTn_GUARD

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GUARD_EN															
Type	R/W															
Reset	0															

GUARD_CNT Guard interval count value. Guard interval = (1/(system clock / **div_step** / div)) *

GUARD_CNT.

GUARD_EN Guard interval add enable signal.

0 No guard interval added.

1 Add guard interval after stop bit.

UARTn+0040h Escape character register

UARTn_ESCAPE_DAT

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	ESCAPE_DAT[7:0]															
Type	WO															
Reset	FFh															

ESCAPE_DAT Escape character added before software flow control data and escape character, i.e. if tx data is xon (31h), with esc_en =1, uart transmits data as esc + CEh (~xon).

UARTn+0044h Escape enable register

UARTn_ESCAPE_EN

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	ESC_EN															
Type	R/W															
Reset	0															

ESC_EN Add escape character in transmitter and remove escape character in receiver by UART.

- 0** Do not deal with the escape character.
- 1** Add escape character in transmitter and remove escape character in receiver.

UARTn+0048h Sleep enable register**UARTn_SLEEP_EN**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																SELLP_EN
Type																R/W
Reset																0

SLEEP_EN For sleep mode issue

- 0** Do not deal with sleep mode indicate signal
- 1** To activate hardware flow control or software control according to software initial setting when chip enters sleep mode. Releasing hardware flow when chip wakes up; but for software control, UART sends xon when awaken and when FIFO does not reach threshold level.

UARTn+004Ch Virtual FIFO enable register**UARTn_VFIFO_EN**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																VFIFO_EN
Type																R/W
Reset																0

VFIFO_EN Virtual FIFO mechanism enable signal.

- 0** Disable VFIFO mode.
- 1** Enable VFIFO mode. When virtual mode is enabled, the flow control is based on the DMA threshold, and generates a timeout interrupt for DMA.

UARTn+0050h Rx Trigger Address**UARTn_RXTRIG_AD**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																RXTRIG[3:0]
Type																R/W
Reset																0

RXTRIG When {rtm,rtl}=2'b11, The Rx FIFO threshold will be Rxtrig.

UARTn+0054h Fractional Divider LSB Address**UARTn_FRACDIV_L**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																FRACDIV_L
Type																R/W
Reset										0	0	0	0	0	0	0

FRACDIV_L Add sampling count (+1) from state data7 to state data0, in order to contribute fractional divisor.

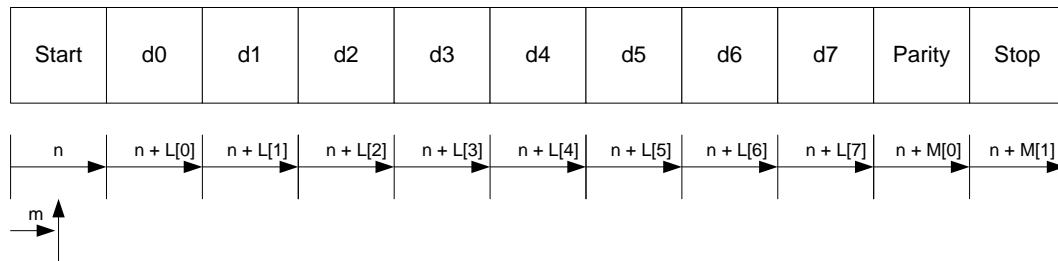
UARTn+0058h Fractional Divider MSB Address**UARTn_FRACDIV_M**

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																FRACDIV_M
Type																R/W
Reset																0 0

FRACDIV_M Add sampling count in state stop and state parity, in order to contribute fractional divisor.

FRACDIV_L / FRACDIV_L Add one sampling period to each symbol, in order to increase the baud rate accuracy.

bit_extend register = FRACDIV_L[7:0]
FRACDIV_M[1:0]



UARTn+005Ch FIFO Control Register

UARTn_FCR_RD

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									RFTL1	RFTL0	TFTL1	TFTL0	DMA1			FIFOE
Type											RO					RO

Read out UARTn_FCR register.

UARTn+0060h TX Active Enable Address

UARTn_TX_ACTIVE_EN

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name															TX_PU_EN	TX_OE_EN
Type															R/W	R/W
Reset															0	0

TX_OE_EN Enable UART_TX_OE switching function. TX_OE is to control UART_TX output enable.

TX_PU_EN Enable UART_TX_PU switching function. TX_PU is to control UART_TX pull up enable.

5.14 PCM Controller

5.14.1 Features

- Two clock sources are reserved for PCM circuit. (From internal clock generator, INT_PCM_CLK and EXT_PCM_CLK)
- PCM module can drive a clock out (with fraction-N divisor) to an external codec.
- Up to 4 channels PCM are available. 4 to 128 slots are configurable.
- Each channel supports a-law (8-bit)/u-law (8-bit)/raw-PCM (8-bit and 16-bit) transfer.
- Hardware converter of a-law<->raw-16 and u-law <-> raw-16 are implemented in design.
- Support long (8 cycle)/short (1 cycle)/configurable (intervals are configurable, use to emulate I²S interface) FSYNC.
- DATA & FSYNC can be driven and sampled by either rising/falling of clock.
- Last bit of DTX can be configured as tri-stated on falling edge.
- Beginning of each slot is configurable by 10-bit registers on each channel.
- 32-byte FIFO are available for each channel
- PCM interface can emulate I²S interface (only 16-bit data-width supported).
- MSB/LSB order is configurable.
- Supports both a-law/u-law (8-bits) → linear PCM(16-bit) and linear PCM(16-bit) → a-law/u-law (8-bit)

5.14.2 Block Diagram

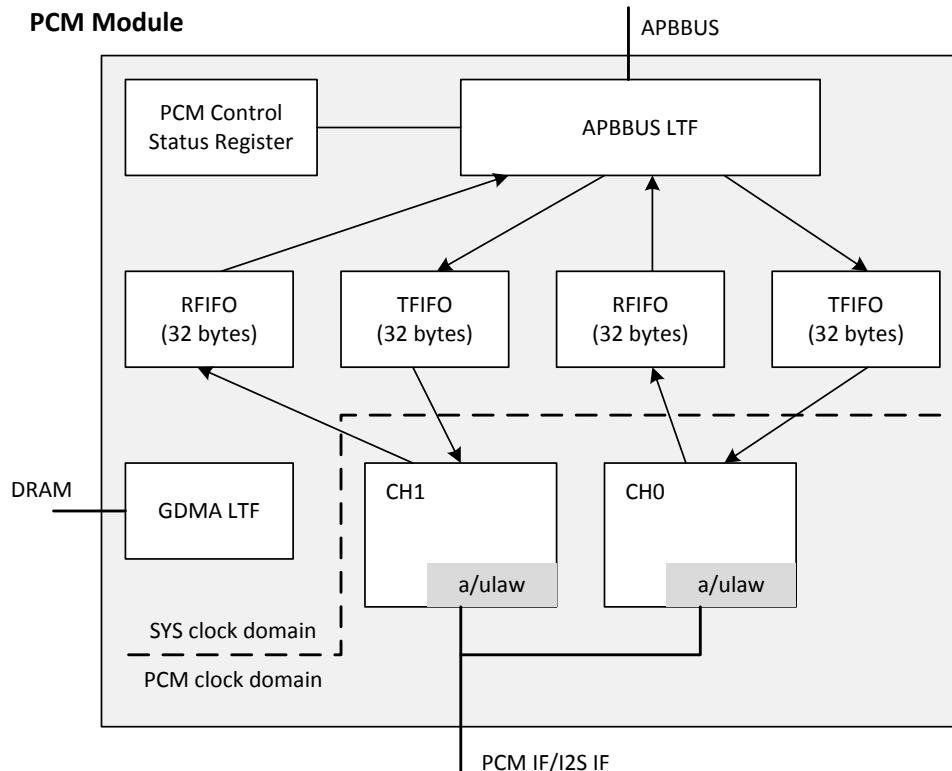


Figure 5-8 PCM Controller Block Diagram

Two clock domains are partitioned in this design. PCM converter (u-law <=> raw-16-bit and A-law <=> raw 16-bit) are implemented in PCM. The threshold of FIFO is configurable. When the threshold is reached, PCM (a) triggers the DMA interface to notify external DMA engine to transfer data, and (b) triggers an interrupt to the host.

The interrupt sources include:

- The threshold is reached.
- FIFO is under-run or over-run.
- A fault is detected at the DMA interface.

The A-law and u-law converter is implemented based on the ITU-G.711 A-law and u-law table. In this design, both A-law/u-law(8-bit) → linear PCM (16-bit) and linear PCM (16-bit) → A-law/u-law (8-bit) are supported.

The data-flow from codec to PCM-controller (Rx-flow) is shown as below:

- The PCM controller latches the data from DRX at the indicated time slot and then writes it to FIFO. If FIFO is full, the data is lost.
- When the Rx-FIFO reaches the threshold, two actions may be taken:
 - When DMA_ENA=1, DMA_REQ is asserted to request a burst transfer. It rechecks the FIFO threshold after DMA_END is asserted by GDMA. (GDMA should be configured before channel is enabled.)
 - Assert the interrupt source to notify the host. The host can check RFIFO_AVAIL information then get back the data from FIFO.

The data flow from the PCM controller to codec (Tx-flow) is shown below. After GDMA is configured, software should configure and enable the PCM channel. The empty FIFO should behave as follows.

- When DMA_ENA=1, DMA_REQ is triggered to request a burst transfer. It then re-checks the FIFO threshold after DMA_END is asserted by GDMA (a burst is completed).
- The Interrupt source is asserted to notify HOST. HOST writes the data to Tx-FIFO. After that, HOST rechecks TFIFO_EMPTY information, and then writes more data if available.

NOTE: When DMA_ENA=1, the burst size of GDMA should be less than the threshold value.

5.14.3 List of Registers

5.14.4 PCM Configuration

PCM Initialization Flow

1. Set PCM_CFG
2. Set CH0/1_CFG
3. Write PCM data to FIFO CH0/1_FIFO
4. Set GLB_CFG to enable the PCM and channel.
5. Set divisor clock
6. Enable clock
7. Monitor FF_STATUS to receive/transmit the other PCM data.

PCM Configuration Examples

Below are some examples of PCM configuration.

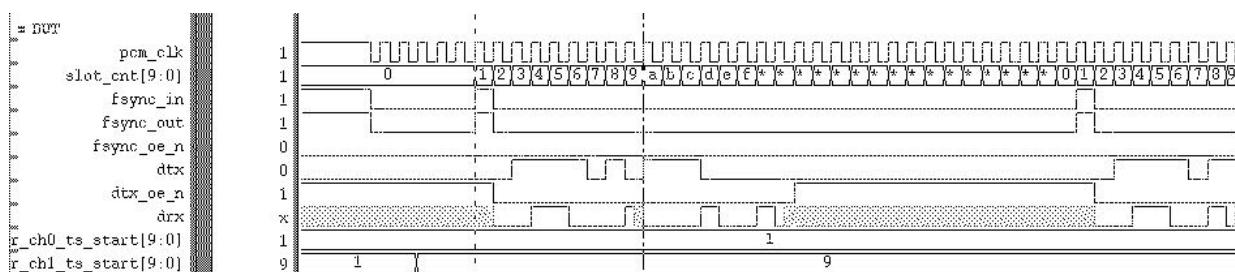
Case 1:

CFG_FSYNC Register: CFG_FSYNC_EN = 0 (PS: fsync is always driven at SLOT_CNT=1)

CH0_CFG Register: TS_START=1

CH1_CFG Register: TS_START=9

PCM_CFG Register: LONG_FSYNC=1'b0, FSYNC_POL=1'b1, DRX_TRI=1'b0, SLOT_MODE=3'b0



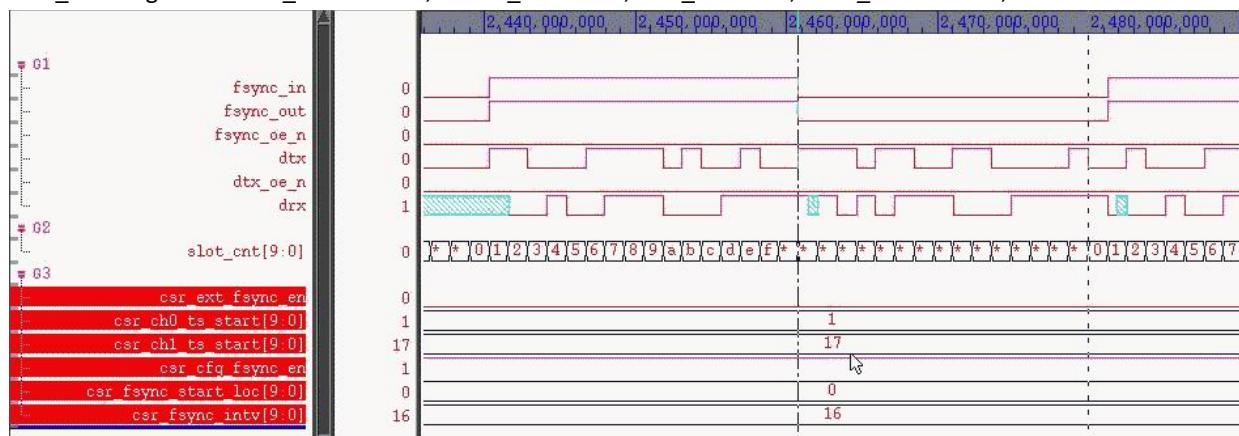
Case 2:

CFG_FSYNC Register: CFG_FSYNC_EN = 1, START_LOC=0, interval=16

CH0_CFG Register: TS_START=1

CH1_CFG Register: TS_START=17

PCM_CFG Register: LONG_FSYNC=1'b0, FSYNC_POL=1'b1, DRX_TRI=1'b0, SLOT_MODE=3'b0, RAW16-bits



Case 3:

CFG_FSYNC Register: CFG_FSYNC_EN = 1, START_LOC=0x1A, interval=2

CH0_CFG Register: TS_START=1 (disable)

CH1_CFG Register: TS_START=0x1A

PCM_CFG Register: LONG_FSYNC=1'b0, FSYNC_POL=1'b0 (LOW active), DRX_TRI=1'b0, SLOT_MODE=3'b0, RAW16-bits



5.14.5 Register

PCM Changes LOG

Revision	Date	Author	Change Log
0.1	2012/10/8	Paddy Wu	Initialization

Module name: PCM Base address: (+10002000h)

Address	Name	Width	Register Function
10002000	<u>GLB CFG</u>	32	Global Config
10002004	<u>PCM CFG</u>	32	PCM configuration
10002008	<u>INT STATUS</u>	32	Interrupt status
1000200C	<u>INT EN</u>	32	Interrupt enable

10002010	<u>CHA0 FF STA TUS</u>	32	Channel A0(represents channel 0) FIFO status
10002014	<u>CHB0 FF STA TUS</u>	32	Channel B0(represents channel 1) FIFO status
10002020	<u>CHA0 CFG</u>	32	Channel A0(represents channel 0) Config
10002024	<u>CHB0 CFG</u>	32	Channel B0(represents channel 1) Config
10002030	<u>FSYNC CFG</u>	32	FSYNC config
10002034	<u>CHA0 CFG2</u>	32	Channel A0(represents channel 0) Config
10002038	<u>CHB0 CFG2</u>	32	Channel B0(represents channel 1) Config
10002040	<u>IP INFO</u>	32	IP version info
10002044	<u>RSV REG16</u>	32	SPARE REG 16 bits
10002050	<u>DIVCOMP CFG</u>	32	Dividor Compensation part config
10002054	<u>DIVINT CFG</u>	32	Dividor Integer part config
10002060	<u>DIGDELAY CFG</u>	32	Digital delay config
10002080	<u>CH0 FIFO</u>	32	Channel 0 FIFO access point
10002084	<u>CH1 FIFO</u>	32	Channel 1 FIFO access point
10002088	<u>CH2 FIFO</u>	32	Channel 2 FIFO access point
1000208C	<u>CH3 FIFO</u>	32	Channel 3 FIFO access point
10002110	<u>CHA1 FF STA TUS</u>	32	Channel A1(represents channel 3) FIFO status
10002114	<u>CHB1 FF STA TUS</u>	32	Channel B1(represents channel 4) FIFO status
10002120	<u>CHA1 CFG</u>	32	Channel A1(represents channel 3) Config
10002124	<u>CHB1 CFG</u>	32	Channel B1(represents channel 1) Config
10002134	<u>CHA1 CFG2</u>	32	Channel A1(represents channel 3) Config
10002138	<u>CHB1 CFG2</u>	32	Channel B1(represents channel 4) Config

Bit(s)	Name	Description
31	PCM_EN	<p>PCM Enable</p> <p>When disabled, all FSM of PCM are cleared to their default value.</p> <p>0: disable 1: enable</p>
30	DMA_EN	<p>DMA Enable</p> <p>0: Disable the DMA interface, transfer data using software. 1: Enable the DMA interface, transfer data using DMA.</p> <p>0: disable 1: enable</p>
29	LBK_EN	<p>loopback enable, loopback path is shown as (Asyn-TXFIFO ->DTX -> DRX->Asyn-RXFIFO)</p> <p>0: disable 1: enable</p>
28	EXT_LBK_EN	<p>loopback enable, loopback path is shown as (Ext-Codec->DRX->DTX->Asyn-RXFIFO)</p>

Bit(s)	Name	Description
		>Ext-Codec 0: disable 1: enable
27:23	RSV0	Reserved
22:20	RFF_THRES	RXFIFO Threshold When the threshold is reached, the host/DMA is notified to fill FIFO. The threshold should be >2 and <6. When data in FIFO is under the threshold, the following interrupts and GDMA are triggered. CH0T_THRES, CH0R_THRES, CH1T_THRES, CH1R_THRES (unit: word)
19	RSV1	Reserved
18:16	TFF_THRES	TXFIFO Threshold When the threshold is reached, the host/DMA is notified to fill FIFO. It should be >2 and <6. When data in FIFO is over the threshold, an interrupt and DMA are triggered. (unit: word)
15:4	RSV2	Reserved
3:0	CH_EN	Channels 3 to 0 Tx and Rx Enable 0: disable 1: enable

PCM_CFG																PCM configuration			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	0		
Name	RS_V0	CL_KO_UT_EN	RSV1		EXT_FS_YN_C	LO_NG_NC	FSY_NC_P	DT_X_T_RI	RSV2[20:13]										
Type	RO	RW	RO		RW	RW	RW	RW	RO										
Reset	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0		
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
Name	RSV2[12:0]										SLOT_MODE								
Type	RO										RW								
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Bit(s)	Name	Description
31	RSV0	Reserved
30	CLKOUT_EN	PCM Clock Out Enable 0: A PCM clock is provided from the external Codec/OSC. 1: A PCM clock is provided from the internal divisor. NOTE: Normally, the register should be asserted to 1. Also, it should be asserted after configuring the divider and enabling the divider clock. 0: EXT_CLK 1: INT_DIV
29:28	RSV1	Reserved
27	EXT_FSYNC	FSYNC is provided externally 0: FSYNC is generated by internal circuit. 1: FSYNC is provided externally
26	LONG_SYNC	FSYNC Mode 0: Short FSYNC 1: Long FSYNC
25	FSYNC_POL	FSYNC Polarity 0: FSYNC is low active 1: FSYNC is high active
24	DTX_TRI	DTX Tri-State Tristates DTX when the clock signal on the last bit has a falling edge. 0: Non-tristate DTX

Bit(s)	Name	Description
23:3	RSV2	1: Tristate DTX Reserved
2:0	SLOT_MODE	Sets the number of slots in each PCM frame. 0: 4 slots, PCM clock out/in should be 256 KHz. 1: 8 slots, PCM clock out/in should be 512 KHz. 2: 16 slots, PCM clock out/in should be 1.024 MHz. 3: 32 slots, PCM clock out/in should be 2.048 MHz. 4: 64 slots, PCM clock out/in should be 4.096 MHz. 5:128 slots, PCM clock out/in should be 8.192 MHz. Other: Reserved. NOTE: When using the external clock, the frequency clock should be equal to PCM_clock out. Otherwise, the PCM_CLKin should be 8.192 MHz. 0: _4_SLOT 1: _8_SLOT 2: _16_SLOT 3: _32_SLOT 4: _64_SLOT 5: _128_SLOT

Bit(s)	Name	Description
31:8	RSV0	Reserved
7	CHT_DMA_FAULT	Channel Tx DMA Fault Interrupt , Asserts when a fault has been detected in a CH-Tx DMA signal.
6	CHT_OVRUN	Channel Tx FIFO Overrun Interrupt , Asserts when the CH-Tx FIFO is overrun.
5	CHT_UNRUN	Channel Tx FIFO Underrun Interrupt , Asserts when the CH-Tx FIFO is underrun.
4	CHT_THRES	Channel Tx Threshold Interrupt , Asserts when the CH-Tx FIFO is lower than the defined threshold.
3	CHR_DMA_FAULT	Channel Rx DMA Fault Interrupt , Asserts when a fault is detected in a CH-Rx DMA signal.
2	CHR_OVRUN	Channel Rx Overrun Interrupt , Asserts when the CH-Rx FIFO is overrun.
1	CHR_UNRUN	Channel Rx Underrun Interrupt , Asserts when the CH-Rx FIFO is underrun.
0	CHR_THRES	Channel Rx Threshold Interrupt , Asserts when the CH-Rx FIFO is lower than the defined threshold.

1000200C	<u>INT_EN</u>	Interrupt enable	00000000													
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

Name	RSV0[23:8]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV0[7:0]															
Type	INT_7_E_N, INT_6_E_N, INT_5_E_N, INT_4_E_N, INT_3_E_N, INT_2_E_N, INT_1_E_N, INT_0_E_N															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:8	RSV0	Reserved
7	INT7_EN	INT_STATUS[7] Enable,Enables the Channel Tx DMA Fault Interrupt. This interrupt asserts when a fault has been detected in a CH-Tx DMA signal.
6	INT6_EN	INT_STATUS[6] Enable,Enables the Channel Tx FIFO Overrun Interrupt. This interrupt asserts when the CH-Tx FIFO is overrun.
5	INT5_EN	INT_STATUS[5] Enable,Enables the Channel Tx FIFO Underrun Interrupt. This interrupt asserts when the CH-Tx FIFO is underrun.
4	INT4_EN	INT_STATUS[4] Enable,Enables the Channel Tx Threshold Interrupt. This interrupt when the CH-Tx FIFO is lower than the defined threshold.
3	INT3_EN	INT_STATUS[3] Enable,Enables the Channel Rx DMA Fault Interrupt. This interrupt when a fault is detected in a CH-Rx DMA signal.
2	INT2_EN	INT_STATUS[2] Enable,Enables the Channel Rx Overrun Interrupt. This interrupt when the CH-Rx FIFO is overrun.
1	INT1_EN	INT_STATUS[1] Enable,Enables the Channel Rx Underrun Interrupt. This interrupt when the CH-Rx FIFO is under-run.
0	INT0_EN	INT_STATUS[0] Enable,Enables the Channel Rx Threshold Interrupt. This interrupt asserts when the CH-Rx FIFO is lower than the defined threshold.

10002010 CHA0_FF_STATUS Channel A0(represents channel 0) FIFO status 00100008

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0															
CH_TX_DM_A_F_AU_LT	CH_TX_OV_RU_N	CH_TX_UNRU_N	CH_TX_THRE_S	CH_RX_DM_A_F_AU_LT	CH_RX_OV_RU_N	CH_RX_UNRU_N	CH_RX_THRE_S									
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV1															
Type	CHRFF_AVCNT, CHTFF_EPCNT															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Bit(s)	Name	Description
31:24	RSV0	Reserved
23	CTX_DMA_FAULT	Tx DMA Fault Detected Interrupt,Asserts when a fault is detected in a Channel A0 Tx DMA signal.
22	CTX_OVRUN	Tx Overrun Interrupt,Asserts when the Channel A0 Tx FIFO is overrun.
21	CTX_UNRUN	Tx FIFO Underrun Interrupt,Asserts when the Channel A0 Tx FIFO is underrun.
20	CTX_THRES	Tx FIFO Below Threshold Interrupt,Asserts when the Channel A0 FIFO is lower than the defined threshold.
19	CHR_X_DMA_FAULT	Rx DMA Fault Detected Interrupt,Asserts when a fault is detected in a Channel A0 Rx DMA signal.

Bit(s)	Name	Description
18	CHRX_OVRUN	Rx FIFO Overrun Interrupt,Asserts when the Channel A0 Rx FIFO is overrun.
17	CHRX_UNRUN	Rx FIFO Underrun Interrupt,Asserts when the Channel A0 Rx FIFO is underrun.
16	CHRX_THRES	Rx FIFO Below Threshold Interrupt,Asserts when the Channel A0 FIFO is lower than the defined threshold.
15:8	RSV1	Reserved
7:4	CHRFF_AV_CNT	Channel A0 RXFIFO Available Space Count,Counts the available space for reads in channel A0 RXFIFO.(unit: word)
3:0	CHTFF_EPCNT	Channel A0 TXFIFO Available Space Count,Counts the available space for writes in channel A0 TXFIFO.(unit: word)

10002014	<u>CHB0 FF ST ATUS</u>	Channel B0(represents channel 1) FIFO status	00100008													
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0								CH TX_DM_A_F_AU_LT	CH TX_OV_RU_N	CH TX_UN_RU_N	CH TX_TH_RE_S	CH RX_DM_A_F_AU_LT	CH RX_OV_RU_N	CH RX_UN_RU_N	CH RX_TH_RE_S
Type	RO								W1 C	W1 C	W1 C	W1 C	W1 C	W1 C	W1 C	W1 C
Reset	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV1								CHRFF_AVCNT				CHTFF_EPCNT			
Type	RO								RO				RO			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Bit(s)	Name	Description
31:24	RSV0	Reserved
23	CHTX_DMA_FAULT	Tx DMA Fault Detected Interrupt, Asserts when a fault is detected in a Channel B0 Tx DMA signal.
22	CHTX_OVRUN	Tx Overrun Interrupt, Asserts when the Channel B0 Tx FIFO is overrun.
21	CHTX_UNRUN	Tx FIFO Underrun Interrupt, Asserts when the Channel B0 Tx FIFO is underrun.
20	CHTX_THRES	Tx FIFO Below Threshold Interrupt, Asserts when the Channel B0 FIFO is lower than the defined threshold.
19	CHRX_DMA_FAULT	Rx DMA Fault Detected Interrupt, Asserts when a fault is detected in a Channel B0 Rx DMA signal.
18	CHRX_OVRUN	Rx FIFO Overrun Interrupt, Asserts when the Channel B0 Rx FIFO is overrun.
17	CHRX_UNRUN	Rx FIFO Underrun Interrupt, Asserts when the Channel B0 Rx FIFO is underrun.
16	CHRX_THRES	Rx FIFO Below Threshold Interrupt, Asserts when the Channel B0 FIFO is lower than the defined threshold.
15:8	RSV1	Reserved
7:4	CHRFF_AV_CNT	Channel B0 RXFIFO Available Space Count, Counts the available space for reads in channel B0 RXFIFO.(unit: word)
3:0	CHTFF_EPCNT	Channel B0 TXFIFO Available Space Count, Counts the available space for writes in channel B0 TXFIFO.(unit: word)

Name	RSV0		CMP_MODE					RSV1[16:6]									
Type	RO		RW					RO									
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0
Name	RSV1[5:0]										TS_START						
Type	RO										RW						
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:30	RSV0	Reserved
29:27	CMP_MODE	Compression Mode Sets the conversion method for the hardware converter to compress raw data. 000: Disable HW converter, linear raw data (16-bit) 010: Disable HW converter, linear raw data (8-bit), A-law or u-law (8-bit) 011: Reserved 100: Enable HW converter, raw data(16-bit) U-law mode (8-bit) (PCM bus in compressed format) 101: Enable HW converter, u-law mode (8-bit) raw data (16-bit) (PCM bus in raw, 16-bit format) 110: Enable HW converter, raw data (16-bit) A-law mode (8-bit) (PCM bus in compressed format) 111: Enable HW converter, A-law mode (8-bit) raw data (16-bit) (PCM bus in raw, 16-bit format) 0: DIS_CONV16 2: DIS_CONV8 4: EN_ULW2R 5: EN_R2ULW 6: EN_ALW2R 7: EN_R2ALW
26:10	RSV1	Reserved
9:0	TS_START	Timeslot starting location (unit: clock cycles)

10002024 CHB0_CFG Channel B0(represents channel 1) Config															0000000		
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	1
Name	RSV0		CMP_MODE					RSV1[16:6]									
Type	RO		RW					RO									
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0
Name	RSV1[5:0]										TS_START						
Type	RO										RW						
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:30	RSV0	Reserved
29:27	CMP_MODE	Compression Mode Sets the conversion method for the hardware converter to compress raw data. 000: Disable HW converter, linear raw data (16-bit) 010: Disable HW converter, linear raw data (8-bit), A-law or u-law (8-bit) 011: Reserved 100: Enable HW converter, raw data(16-bit) U-law mode (8-bit) (PCM bus in compressed format) 101: Enable HW converter, u-law mode (8-bit) raw data (16-bit) (PCM bus in raw, 16-bit format) 110: Enable HW converter, raw data (16-bit) A-law mode (8-bit) (PCM bus in compressed format) 111: Enable HW converter, A-law mode (8-bit) raw data (16-bit) (PCM bus in raw, 16-bit format) 0: DIS_CONV16

Bit(s)	Name	Description
		2: DIS_CONV8 4: EN_ULW2R 5: EN_R2ULW 6: EN_ALW2R 7: EN_R2ALW
26:10	RSV1	Reserved
9:0	TS_START	Timeslot starting location (unit: clock cycles)

10002030 FSYNC_CFG FSYNC config 28000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	CF_G_F	PO_S_C	PO_S_D	PO_S_C	PO_S_D	PO_S_D	PO_S_D	PO_S_D	PO_S_D	PO_S_D	PO_S_D	PO_S_D	PO_S_D	PO_S_D	PO_S_D	PO_S_D	
Type	RW	RW	RW	RW	RW	RSV0						RSV1[11:6]					
Reset	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RSV1[5:0]					FSYNC_INTV											
Type	RO					RW											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31	CFG_FSYNC_EN	Enables configurable FSYNC.
30	POS_CAP_DT	Positive Edge Capture Data, Sets the PCM controller to capture data on the negative or positive edge of the PCM clock. NOTE: This configuration should be 0 if DTX_TRI=1.
29	POS_DRV_DT	Positive Edge Drive Data, Sets the PCM controller to drive data on the negative or positive edge of the PCM clock.
28	POS_CAP_FSYNC	Positive Edge Capture FSYNC, Sets the PCM controller to capture FSYNC on the positive or negative edge of the PCM clock.
27	POS_DRV_FSYNC	Positive Edge Driver FSYNC, Sets the PCM controller to drive FSYNC on the negative or positive edge of the PCM clock.
26:22	RSV0	Reserved
21:10	RSV1	Reserved
9:0	FSYNC_INTV	Interval when FSYNC may be configured. (unit: clock cycles)

10002034 CHA0_CFG2 Channel A0(represents channel 0) Config 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0[27:12]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV0[11:0]											CH_RX_FF_CL_R	CH_TX_FF_CL_R	RS_V1	CH_LS_B	
Type	RO											RW	RW	RO	RW	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description

Bit(s)	Name	Description
31:4	RSV0	Reserved
3	CH_RXFF_CLR	Channel A0 Rx FIFO Clear 0: Normal operation 1: Clear this bit
2	CH_TXFF_CLR	Channel A0 Tx FIFO Clear 0: Normal operation 1: Clear this bit
1	RSV1	Reserved
0	CH_LSB	Enable CH A0 Tx in LSB order.

10002038 CHB0_CFG2 Channel B0(represents channel 1) Config 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSV0[27:12]																
RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RSV0[11:0]																
RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH_RXFF_CLR CH_TXFF_CLR RS_V1 CH_LSB																
RW RW RO RW																

Bit(s)	Name	Description
31:4	RSV0	Reserved
3	CH_RXFF_CLR	Channel B0 Rx FIFO Clear 0: Normal operation 1: Clear this bit
2	CH_TXFF_CLR	Channel B0 Tx FIFO Clear 0: Normal operation 1: Clear this bit
1	RSV1	Reserved
0	CH_LSB	Enable CH B0 Tx in LSB order.

10002040 IP_INFO IP version info 0000040 1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RSV0																
RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
MAX_CH VER																
RO																
Reset	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:16	RSV0	Reserved
15:8	MAX_CH	Maximum channel number.
7:0	VER	Version of this PCM Controller

Bit(s)	Name	Description
31:16	RSV0	Reserved
15:0	SPARE_REG	Spare register for future use

Bit(s)	Name	Description
31	CLK_EN	Clock Enable Enables setting of the PCM interface clock based on DIVCOMP and DIVINT parameters.
30:8	RSV0	Reserved
7:0	DIVCOMP	A parameter in an equation which determines FREQOUT. See DIVINT.

Bit(s)	Name	Description
31:10	RSV0	Reserved
9:0	DIVINT	A parameter in an equation which determines FREQOUT. Formula: $\text{FREQOUT} = 1/(\text{FREQIN}^*2^*(\text{DIVINT}+\text{DIVCOMP }/(2^8)))$ FREQIN is always fixed to 40 MHz.

10002060 DIGDELAY_C Digital delay config **00000000**

FG

2

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	TX_D_CL_R_GL_T	CH_EN_CL_R_GL_T	RSV0			TX_D_GL_T_S_T	RSV1			CH_EN_N_GL_T_S_T	RSV2			CH_EN_P_GL_T_S_T	RS_V3	CH_EN_PD_GL_T_S_T
Type	RW	RW	RO			RW	RO			RW	RO			RW	RO	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	TX_D_DIG_DL_Y_E_N	RSV4		TXD_DLYVAL					CH_EN_DIG_DL_Y_E_N	RSV5		CHEN_DLYVAL				
Type	RW	RO		RW					RW	RO		RW				
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0

Bit(s)	Name	Description
31	TXD_CLR_GLT	TXD Clear Glitch Flag Clears the glitch detected flag for TXD. 0: No effect. 1: Clear the flag.
30	CHEN_CLR_GLT	Channel Enable (CHEN) Clear Glitch Flag Clears the glitch detected flag for CHEN. 0: No effect . 1: Clear the flag.
29:27	RSV0	Reserved
26	TXD_GLT_ST	TXD Glitch Status Indicates if a glitch is detected in a TXD signal. It can be cleared by bit[31]. 0: Not detected. 1: Detected
25:23	RSV1	Reserved
22	CHENN_GLT_ST	CHEN Negative Glitch Status Indicates if a glitch is detected in a CHEN signal. It can be cleared by bit[30] (negedge sample). 0: Not detected. 1: Detected
21:19	RSV2	Reserved
18	CHENP_GLT_ST	CHEN Positive Glitch Status Indicates if a glitch is detected in a CHEN signal. It can be cleared by bit[30] (posedge sample). 0: Not detected. 1: Detected
17	RSV3	Reserved
16	CHENPD_GLT_ST	CHEN Positive Delay Glitch Status Indicates if a glitch is detected in a CHEN signal. It can be cleared by bit[30] (posedge sample, delay 1 cycle). 0: Not detected. 1: Detected
15	TXD_DIGDLY_EN	TXD Digital Delay Enable Enables digital delay path. 0: Disable 1: Enable
14:13	RSV4	Reserved
12:8	TXD_DLYVAL	Delay Count Value The description is the same as the CHEN_DLYVAL field in this register. CHEN Digital Delay Enable, Enables the digital delay path. 0: Disable 1: Enable

Bit(s)	Name	Description
7	CHEN_DIGDLY_EN	CHEN Digital Delay Enable Enables the digital delay path. 0: Disable 1: Enable
6:5	RSV5	Reserved
4:0	CHEN_DLYVAL	Delay Count Value The delay error = $CLK_PERIOD * (SYNC_DELAY + SYNC_DELTA + (DLYCNT_CFG) + 1)$ For example, DLYCNT_CFG = 4, (SYNC_DELAY is always fixed to 4) Final Delay = $CLK_PERIOD * (2 + (-1/0/+1) + (4) + 1)$ = $CLK_PERIOD * (6/7/8) = CLK_PERIOD * (6 \text{ to } 8)$ = 25 ns to 33.3 ns NOTE: Period is 1/240 MHz = 4.1667 ns in MT7620.

10002080 CH0_FIFO Channel 0 FIFO access point 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
CH0_FIFO[31:16]																
RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CH0_FIFO[15:0]																
RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	CH0_FIFO	Channel 0 FIFO access point

10002084 CH1_FIFO Channel 1 FIFO access point 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
CH1_FIFO[31:16]																
RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CH1_FIFO[15:0]																
RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	CH1_FIFO	Channel 1 FIFO access point

10002088 CH2_FIFO Channel 2 FIFO access point 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
CH2_FIFO[31:16]																
RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CH2_FIFO[15:0]																
RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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Bit(s)	Name	Description
31:0	CH2_FIFO	Channel 2 FIFO access point

1000208C CH3_FIFO Channel 3 FIFO access point 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	CH3_FIFO[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	CH3_FIFO[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	CH3_FIFO	Channel 3 FIFO access point

10002110 CHA1_FF_ST ATUS Channel A1(represents channel 3) FIFO status 0010000 8

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0															
Type	RO															
Reset	0	0	0	0	0	0	0	0	W1 C	W1 C	W1 C	W1 C	W1 C	W1 C	W1 C	W1 C
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV1								CHRFF_AVCNT				CHTFF_EPCNT			
Type	RO								RO				RO			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Bit(s)	Name	Description
31:24	RSV0	Reserved
23	CHTX_DMA_FAULT	Tx DMA Fault Detected Interrupt, Asserts when a fault is detected in a Channel A1 Tx DMA signal.
22	CHTX_OVRUN	Tx Overrun Interrupt, Asserts when the Channel A0 Tx FIFO is overrun.
21	CHTX_UNRUN	Tx FIFO Underrun Interrupt, Asserts when the Channel A1 Tx FIFO is underrun.
20	CHTX_THRES	Tx FIFO Below Threshold Interrupt, Asserts when the Channel A0 FIFO is lower than the defined threshold.
19	CHRX_DMA_FAULT	Rx DMA Fault Detected Interrupt, Asserts when a fault is detected in a Channel A1 Rx DMA signal.
18	CHRX_OVRUN	Rx FIFO Overrun Interrupt, Asserts when the Channel A1 Rx FIFO is overrun.
17	CHRX_UNRUN	Rx FIFO Underrun Interrupt, Asserts when the Channel A1 Rx FIFO is underrun.
16	CHRX_THRES	Rx FIFO Below Threshold Interrupt, Asserts when the Channel A1 FIFO is lower than the defined threshold.
15:8	RSV1	Reserved
7:4	CHRFF_AVCNT	Channel A1 RXFIFO Available Space Count, Counts the available space for reads in channel A1 RXFIFO.(unit: word)

Bit(s)	Name	Description
3:0	CHTFF_EPCNT	Channel A1 TXFIFO Available Space Count,Counts the available space for writes in channel A1 TXFIFO.(unit: word)

10002114		CHB1_FF_ST ATUS	Channel B1(represents channel 4) FIFO status												0010000 8				
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16			
Name	RSV0												CH_TX_DM_A_F_LT	CH_TX_OV_RUN	CH_TX_UNRUN	CH_RX_DM_A_F_LT	CH_RX_OV_RUN	CH_RX_UNRUN	CH_RX_THRES
Type	RO												W1C	W1C	W1C	W1C	W1C	W1C	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0	0	
Name	RSV1								CHRFF_AVCNT				CHTFF_EPCNT						
Type	RO								RO				RO						
Reset	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	

Bit(s)	Name	Description
31:24	RSV0	Reserved
23	CHTX_DMA_FAULT	Tx DMA Fault Detected Interrupt,Asserts when a fault is detected in a Channel B1 Tx DMA signal.
22	CHTX_OVRUN	Tx Overrun Interrupt,Asserts when the Channel B0 Tx FIFO is overrun.
21	CHTX_UNRUN	Tx FIFO Underrun Interrupt,Asserts when the Channel B1 Tx FIFO is underrun.
20	CHTX_THRES	Tx FIFO Below Threshold Interrupt,Asserts when the Channel B1 FIFO is lower than the defined threshold.
19	CHRX_DMA_FAULT	Rx DMA Fault Detected Interrupt,Asserts when a fault is detected in a Channel B1 Rx DMA signal.
18	CHRX_OVRUN	Rx FIFO Overrun Interrupt,Asserts when the Channel B1 Rx FIFO is overrun.
17	CHRX_UNRUN	Rx FIFO Underrun Interrupt,Asserts when the Channel B1 Rx FIFO is underrun.
16	CHRX_THRES	Rx FIFO Below Threshold Interrupt,Asserts when the Channel B1 FIFO is lower than the defined threshold.
15:8	RSV1	Reserved
7:4	CHRFF_AVCNT	Channel B1 RXFIFO Available Space Count,Counts the available space for reads in channel B1 RXFIFO.(unit: word)
3:0	CHTFF_EPCNT	Channel B1 TXFIFO Available Space Count,Counts the available space for writes in channel B1 TXFIFO.(unit: word)

10002120		CHA1_CFG	Channel A1(represents channel 3) Config												0000000 1	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RSV0		CMP_MODE				RSV1[16:6]									
Type	RO		RW				RO									
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RSV1[5:0]								TS_START							
Type	RO								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:30	RSV0	Reserved

Bit(s)	Name	Description
29:27	CMP_MODE	<p>Compression Mode</p> <p>Sets the conversion method for the hardware converter to compress raw data.</p> <p>000: Disable HW converter, linear raw data (16-bit) 010: Disable HW converter, linear raw data (8-bit), A-law or u-law (8-bit) 011: Reserved 100: Enable HW converter, raw data(16-bit) U-law mode (8-bit) (PCM bus in compressed format) 101: Enable HW converter, u-law mode (8-bit) raw data (16-bit) (PCM bus in raw, 16-bit format) 110: Enable HW converter, raw data (16-bit) A-law mode (8-bit) (PCM bus in compressed format) 111: Enable HW converter, A-law mode (8-bit) raw data (16-bit) (PCM bus in raw, 16-bit format)</p> <p>0: DIS_CONV16 2: DIS_CONV8 4: EN_ULW2R 5: EN_R2ULW 6: EN_ALW2R 7: EN_R2ALW</p>
26:10	RSV1	Reserved
9:0	TS_START	Timeslot starting location (unit: clock cycles)

10002124 <u>CHB1_CFG</u> Channel B1(represents channel 1) Config																00000000			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	1		
Name	RSV0																RSV1[16:6]		
Type	RO																RO		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
Name	RSV1[5:0]																TS_START		
Type	RO																RW		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		

Bit(s)	Name	Description
31:30	RSV0	Reserved
29:27	CMP_MODE	<p>Compression Mode</p> <p>Sets the conversion method for the hardware converter to compress raw data.</p> <p>000: Disable HW converter, linear raw data (16-bit) 010: Disable HW converter, linear raw data (8-bit), A-law or u-law (8-bit) 011: Reserved 100: Enable HW converter, raw data(16-bit) U-law mode (8-bit) (PCM bus in compressed format) 101: Enable HW converter, u-law mode (8-bit) raw data (16-bit) (PCM bus in raw, 16-bit format) 110: Enable HW converter, raw data (16-bit) A-law mode (8-bit) (PCM bus in compressed format) 111: Enable HW converter, A-law mode (8-bit) raw data (16-bit) (PCM bus in raw, 16-bit format)</p> <p>0: DIS_CONV16 2: DIS_CONV8 4: EN_ULW2R 5: EN_R2ULW 6: EN_ALW2R 7: EN_R2ALW</p>
26:10	RSV1	Reserved
9:0	TS_START	Timeslot starting location (unit: clock cycles)

Bit(s)	Name	Description
31:4	RSV0	Reserved
3	CH_RXFF_CLR	Channel A1 Rx FIFO Clear 0: Normal operation 1: Clear this bit
2	CH_TXFF_CLR	Channel A1 Tx FIFO Clear 0: Normal operation 1: Clear this bit
1	RSV1	Reserved
0	CH_LSB	Enable CH A1 Tx in LSB order.

Bit(s)	Name	Description
31:4	RSV0	Reserved
3	CH_RXFF_CLR	Channel B1 Rx FIFO Clear 0: Normal operation 1: Clear this bit
2	CH_TXFF_CLR	Channel B1 Tx FIFO Clear 0: Normal operation 1: Clear this bit
1	RSV1	Reserved
0	CH_LSB	Enable CH B1 Tx in LSB order.

5.15 Generic DMA Controller

5.15.1 Features

- Supports 16 DMA channels
- Supports 32 bit address.
- Maximum 65535 byte transfer
- Programmable DMA burst size (1, 2, 4, 8, 16 double word burst)
- Supports memory to memory, memory to peripheral, peripheral to memory, peripheral to peripheral transfers.
- Supports continuous mode.
- Supports division of target transfer count into 1 to 256 segments
- Support for combining different channels into a chain.
- Programmable hardware channel priority.
- Interrupts for each channel.

5.15.2 Block Diagram

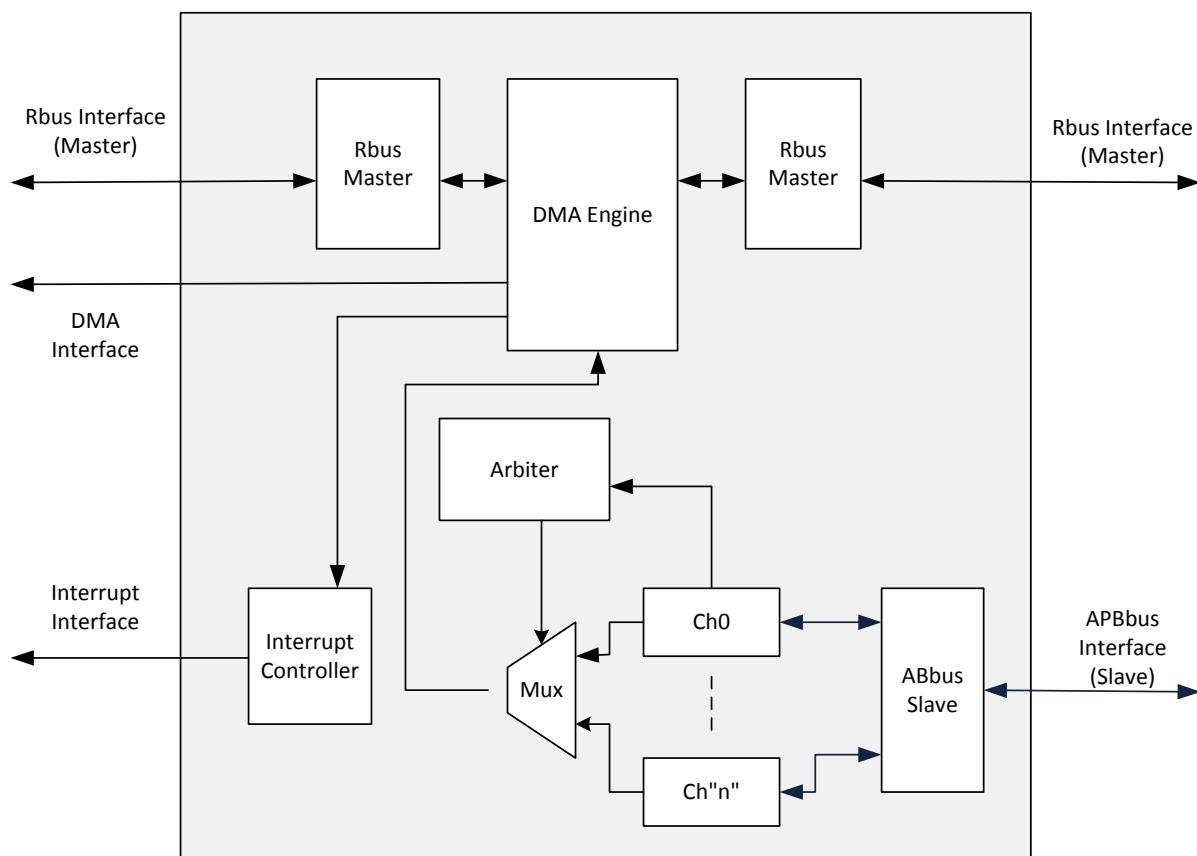


Figure 5-9 Generic DMA Controller Block Diagram

5.15.3 Peripheral Channel Connection

Channel number	Peripheral
0	Reserved
1	Reserved
2	I2S Controller (TXDMA)
3	I2S Controller (RXDMA)
4	PCM Controller (RDMA, channel-0)

Channel number	Peripheral
5	PCM Controller (RDMA, channel-1)
6	PCM Controller (TDMA, channel-0)
7	PCM Controller (TDMA, channel-1)
8	PCM Controller (RDMA, channel-2)
9	PCM Controller (RDMA, channel-3)
10	PCM Controller (TDMA, channel-2)
11	PCM Controller (TDMA, channel-3)
12	SPI Controller (RXDMA)
13	SPI Controller (TXDMA)
8 to 15	Reserved

5.15.4 Registers

GDMA Changes LOG

Revision	Date	Author	Change Log
0.1	2012/10/15	Mark Wang	Initialization

Module name: GDMA Base address: (+10002800h)

Address	Name	Width	Register Function
10002800	<u>GDMA_SA_0</u>	32	Source Address of GDMA Channel 0
10002804	<u>GDMA_DA_0</u>	32	Destination Address of GDMA Channel 0
10002808	<u>GDMA_CT0_0</u>	32	Control Register 0 of GDMA Channel 0
1000280C	<u>GDMA_CT1_0</u>	32	Control Register 1 of GDMA Channel 0
10002810	<u>GDMA_SA_1</u>	32	Source Address of GDMA Channel 1
10002814	<u>GDMA_DA_1</u>	32	Destination Address of GDMA Channel 1
10002818	<u>GDMA_CT0_1</u>	32	Control Register 0 of GDMA Channel 1
1000281C	<u>GDMA_CT1_1</u>	32	Control Register 1 of GDMA Channel 1
10002820	<u>GDMA_SA_2</u>	32	Source Address of GDMA Channel 2
10002824	<u>GDMA_DA_2</u>	32	Destination Address of GDMA Channel 2
10002828	<u>GDMA_CT0_2</u>	32	Control Register 0 of GDMA Channel 2
1000282C	<u>GDMA_CT1_2</u>	32	Control Register 1 of GDMA Channel 2
10002830	<u>GDMA_SA_3</u>	32	Source Address of GDMA Channel 3
10002834	<u>GDMA_DA_3</u>	32	Destination Address of GDMA Channel 3
10002838	<u>GDMA_CT0_3</u>	32	Control Register 0 of GDMA Channel 3
1000283C	<u>GDMA_CT1_3</u>	32	Control Register 1 of GDMA Channel 3
10002840	<u>GDMA_SA_4</u>	32	Source Address of GDMA Channel 4
10002844	<u>GDMA_DA_4</u>	32	Destination Address of GDMA Channel 4
10002848	<u>GDMA_CT0_4</u>	32	Control Register 0 of GDMA Channel 4
1000284C	<u>GDMA_CT1_4</u>	32	Control Register 1 of GDMA Channel 4
10002850	<u>GDMA_SA_5</u>	32	Source Address of GDMA Channel 5
10002854	<u>GDMA_DA_5</u>	32	Destination Address of GDMA Channel 5
10002858	<u>GDMA_CT0_5</u>	32	Control Register 0 of GDMA Channel 5
1000285C	<u>GDMA_CT1_5</u>	32	Control Register 1 of GDMA Channel 5
10002860	<u>GDMA_SA_6</u>	32	Source Address of GDMA Channel 6
10002864	<u>GDMA_DA_6</u>	32	Destination Address of GDMA Channel 6
10002868	<u>GDMA_CT0_6</u>	32	Control Register 0 of GDMA Channel 6
1000286C	<u>GDMA_CT1_6</u>	32	Control Register 1 of GDMA Channel 6

10002870	<u>GDMA SA 7</u>	32	Source Address of GDMA Channel 7
10002874	<u>GDMA DA 7</u>	32	Destination Address of GDMA Channel 7
10002878	<u>GDMA CT0 7</u>	32	Control Register 0 of GDMA Channel 7
1000287C	<u>GDMA CT1 7</u>	32	Control Register 1 of GDMA Channel 7
10002880	<u>GDMA SA 8</u>	32	Source Address of GDMA Channel 8
10002884	<u>GDMA DA 8</u>	32	Destination Address of GDMA Channel 8
10002888	<u>GDMA CT0 8</u>	32	Control Register 0 of GDMA Channel 8
1000288C	<u>GDMA CT1 8</u>	32	Control Register 1 of GDMA Channel 8
10002890	<u>GDMA SA 9</u>	32	Source Address of GDMA Channel 9
10002894	<u>GDMA DA 9</u>	32	Destination Address of GDMA Channel 9
10002898	<u>GDMA CT0 9</u>	32	Control Register 0 of GDMA Channel 9
1000289C	<u>GDMA CT1 9</u>	32	Control Register 1 of GDMA Channel 9
100028A0	<u>GDMA SA 10</u>	32	Source Address of GDMA Channel 10
100028A4	<u>GDMA DA 10</u>	32	Destination Address of GDMA Channel 10
100028A8	<u>GDMA CT0 10</u>	32	Control Register 0 of GDMA Channel 10
100028AC	<u>GDMA CT1 10</u>	32	Control Register 1 of GDMA Channel 10
100028B0	<u>GDMA SA 11</u>	32	Source Address of GDMA Channel 11
100028B4	<u>GDMA DA 11</u>	32	Destination Address of GDMA Channel 11
100028B8	<u>GDMA CT0 11</u>	32	Control Register 0 of GDMA Channel 11
100028BC	<u>GDMA CT1 11</u>	32	Control Register 1 of GDMA Channel 11
100028C0	<u>GDMA SA 12</u>	32	Source Address of GDMA Channel 12
100028C4	<u>GDMA DA 12</u>	32	Destination Address of GDMA Channel 12
100028C8	<u>GDMA CT0 12</u>	32	Control Register 0 of GDMA Channel 12
100028CC	<u>GDMA CT1 12</u>	32	Control Register 1 of GDMA Channel 12
100028D0	<u>GDMA SA 13</u>	32	Source Address of GDMA Channel 13
100028D4	<u>GDMA DA 13</u>	32	Destination Address of GDMA Channel 13
100028D8	<u>GDMA CT0 13</u>	32	Control Register 0 of GDMA Channel 13
100028DC	<u>GDMA CT1 13</u>	32	Control Register 1 of GDMA Channel 13
100028E0	<u>GDMA SA 14</u>	32	Source Address of GDMA Channel 14
100028E4	<u>GDMA DA 14</u>	32	Destination Address of GDMA Channel 14
100028E8	<u>GDMA CT0 14</u>	32	Control Register 0 of GDMA Channel 14
100028EC	<u>GDMA CT1 14</u>	32	Control Register 1 of GDMA Channel 14
100028F0	<u>GDMA SA 15</u>	32	Source Address of GDMA Channel 15
100028F4	<u>GDMA DA 15</u>	32	Destination Address of GDMA Channel 15
100028F8	<u>GDMA CT0 15</u>	32	Control Register 0 of GDMA Channel 15
100028FC	<u>GDMA CT1 15</u>	32	Control Register 1 of GDMA Channel 15
10002A00	<u>GDMA UNMAS K INTSTS</u>	32	Unmask Fail Interrupt Status
10002A04	<u>GDMA DONE I NTSTS</u>	32	Segment Done Interrupt Status
10002A20	<u>GDMA GCT</u>	32	Global Control
10002A30	<u>GDMA PERI A DDR START 0</u>	32	Peripheral Region 0 Starting Address
10002A34	<u>GDMA PERI A DDR END 0</u>	32	Peripheral Region 0 End Address
10002A38	<u>GDMA PERI A DDR START 1</u>	32	Peripheral Region 1 Starting Address
10002A3C	<u>GDMA PERI A DDR END 1</u>	32	Peripheral Region 1 End Address
10002A40	<u>GDMA PERI A DDR START 2</u>	32	Peripheral Region 2 Starting Address
10002A44	<u>GDMA PERI A DDR END 2</u>	32	Peripheral Region 2 End Address
10002A48	<u>GDMA PERI A</u>	32	Peripheral Region 3 Starting Address

	<u>DDR_START_3</u>		
10002A4C	<u>GDMA PERI A</u> <u>DDR_END_3</u>	32	Peripheral Region 3 End Address

10002800 GDMA_SA_0 Source Address of GDMA Channel 0 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>SOURCE_ADDR[31:16]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>SOURCE_ADDR[15:0]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Source address

10002804 GDMA_DA_0 Destination Address of GDMA Channel 0 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>DEST_ADDR[31:16]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>DEST_ADDR[15:0]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

10002808 GDMA_CT0_0 Control Register 0 of GDMA Channel 0 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>TARGET_BYTE_CNT</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>CURR_SEGMENT</u>															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	<u>TARGET_BYTE_CN</u>	The number of bytes to be transferred
15:8	<u>CURR_SEGMENT</u>	Indicates the current segment (0 to 255)
7	<u>SOURCE_ADDR_MODE</u>	Sets the source address mode 0: Incremental mode 1: Fix mode

Bit(s)	Name	Description
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

1000280C GDMA_CT1_0 Control Register 1 of GDMA Channel 0 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESERVED						NUM_SEGMENT			SOURCE_DMA_REQ						
Type	RO						RW			RW						
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RE SE RV ED	CO NT_ MO DE_ EN	DEST_DMA_REQ						NEXT_CH2UNMASK						CH U NM AS K_F AIL IN T_E N	CH M AS K
Type	RO	RW	RW						RW						RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled

Bit(s)	Name	Description
13:8	DEST_DMA_REQ	<p>Selects the destination DMA request</p> <p>0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)</p>
7:3	NEXT_CH2UNMASK	<p>Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself.</p> <p>0: Channel 0 1: Channel 1 n: Channel n</p>
2	COHERENT_INT_EN	<p>If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO)</p> <p>0: Disable 1: Enable</p>
1	CH_UNMASK_FAIL_INT_EN	<p>If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it.</p> <p>0: Disable 1: Enable</p>
0	CH_MASK	<p>When this field is set, the transfer of this channel is gated until this field is clear by HW/SW.</p> <p>0: Channel is not masked 1: Channel is masked</p>

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Source address

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

10002818 GDMA_CT0_1 Control Register 0 of GDMA Channel 10000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	TARGET_BYTE_CNT																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	CURR_SEGMENT								SO UR CE AD DR _M OD E	DE ST _AD DR _M OD E	BURST_SIZE				SE GM EN T_D ON E_I NT _EN	CH _EN	SW _M OD E_E N
Type	RO								RW	RW	RW				RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

1000281C GDMA_CT1_1 Control Register 1 of GDMA Channel 10000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESERVED								NUM_SEGMENT				SOURCE_DMA_REQ				
Type	RO								RW				RW				
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RE	CO	DEST_DMA_REQ								NEXT_CH2UNMASK				CO	CH	CH

	SE RV ED	NT MO DE EN													HE RE NT _INT _EN	U _NM AS K_F AIL IN T_E N	M AS K
Type	RO	RW	RW								RW				RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

10002820 GDMA_SA_2 Source Address of GDMA Channel 2 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SOURCE_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Name	SOURCE_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Source address

10002824 GDMA_DA_2 Destination Address of GDMA Channel 2 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

10002828 GDMA_CT0_2 Control Register 0 of GDMA Channel 2 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	TARGET_BYTE_CNT																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	CURR_SEGMENT								SO UR CE AD DR _M OD E	DE ST _AD DR _M OD E	BURST_SIZE				SE GM EN T_D ON E_I NT _EN	CH _EN	SW M OD E_E N
Type	RO								RW	RW	RW				RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined

Bit(s)	Name	Description
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

1000282C GDMA_CT1_2 Control Register 1 of GDMA Channel 2

0000000

0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESERVED					NUM_SEGMENT				SOURCE_DMA_REQ							
Type	RO					RW				RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RESETED	CONT_MODE_EN	DEST_DMA_REQ					NEXT_CH2UNMASK					COHE	CHU	CHM	CHAS	CHASK
Type	RO	RW	RW					RW					RW	RW	RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1

Bit(s)	Name	Description
		n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

10002830 GDMA_SA_3 Source Address of GDMA Channel 3 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SOURCE_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SOURCE_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s) Name Description
31:0 SOURCE_ADDR Souce address

10002834 GDMA_DA_3 Destination Address of GDMA Channel 3 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s) Name Description
31:0 DEST_ADDR Destination address

10002838 GDMA_CT0_3 Control Register 0 of GDMA Channel 3 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	TARGET_BYTE_CNT																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	CURR_SEGMENT								SO UR CE_	DE ST_ AD	BURST_SIZE				SE GM EN	CH EN	SW M OD

									AD DR _M OD E	DR _M OD E					T_D ON E_I NT_ EN		E_E N
Type	RO								RW	RW	RW				RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

1000283C GDMA_CT1_3 Control Register 1 of GDMA Channel 300000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESERVED						NUM_SEGMENT				SOURCE_DMA_REQ						
Type	RO						RW				RW						
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RE SE RV ED	CO NT MO DE EN	DEST_DMA_REQ						NEXT_CH2UNMASK						CH U NM AS K_F AIL IN T_E N	CH M AS K	
Type	RO	RW	RW						RW						RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
--------	------	-------------

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

10002840 GDMA_SA_4 Source Address of GDMA Channel 4 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
<u>Name</u>																
<u>Type</u>																
<u>Reset</u>																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<u>Name</u>																
<u>Type</u>																
<u>Reset</u>																

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Source address

10002844 GDMA_DA_4 Destination Address of GDMA Channel 4 **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

10002848 GDMA_CT0_4 Control Register 0 of GDMA Channel 4 **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	TARGET_BYTE_CNT																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	CURR_SEGMENT								SO	DE	BURST_SIZE				SE	SW	
								UR	ST	AD	DR	M	OD	EN	GM	_M	
								CE	AD	DR	M	OD	E	T_D	CH	OD	
								AD	DR	M	OD	E	I	ON	_EN	E_E	
Type	RO								RW	RW	RW				RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer

Bit(s)	Name	Description
		starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

1000284C GDMA_CT1_4 Control Register 1 of GDMA Channel 4 **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESERVED						NUM_SEGMENT						SOURCE_DMA_REQ				
Type	RO						RW						RW				
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RE SE RV ED	CO NT MO DE EN	DEST_DMA_REQ						NEXT_CH2UNMASK						CO HE RE NT INT EN	CH U NM AS K_F AIL IN T_E N	CH M AS K
Type	RO	RW	RW						RW						RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it.

Bit(s)	Name	Description
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked
		0: Disable 1: Enable

10002850 GDMA_SA_5 Source Address of GDMA Channel 5 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SOURCE_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SOURCE_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Souce address

10002854 GDMA_DA_5 Destination Address of GDMA Channel 5 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

10002858 GDMA_CT0_5 Control Register 0 of GDMA Channel 5 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	TARGET_BYTE_CNT															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	CURR_SEGMENT															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
									SO	DE				SE		
									UR	ST				GM		
									CE	AD				EN		
									AD	DR				T_D		
									DR	M				ON		
									M	OD				E_I		
									OD	E				NT		
									E	EN				EN		
														SW		
														M		
														OD		
														E		
														E		
														N		

Bit(s)	Name	Description
31:16	TARGET_BYTE_CN	The number of bytes to be transferred
T		

Bit(s)	Name	Description
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

1000285C GDMA_CT1_5 Control Register 1 of GDMA Channel 500000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESERVED						NUM_SEGMENT			SOURCE_DMA_REQ						
Type	RO						RW			RW						
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RE	CO	DEST_DMA_REQ						NEXT_CH2UNMASK						CH_U_NM_AS_K_F_AIL_IN_T_E_N	CH_M_AS_K
Type	RO	RW	RW						RW						RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of

Bit(s)	Name	Description
		bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN.
		0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Source address

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

**1000286C GDMA_CT1_6 Control Register 1 of GDMA Channel 6 00000000
0**

Name	RESERVED						NUM_SEGMENT				SOURCE_DMA_REQ					
Type	RO						RW				RW					
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RE SE RV ED	CO NT_ MO DE_ EN	DEST_DMA_REQ						NEXT_CH2UNMASK						CH _U NM AS K_F AIL _IN T_E N	CH _M AS K
Type	RO	RW	RW						RW						RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SOURCE_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SOURCE_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Souce address

10002874 GDMA_DA_7 Destination Address of GDMA Channel 7 **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

10002878 GDMA_CT0_7 Control Register 0 of GDMA Channel 7 **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	TARGET_BYTE_CNT															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	CURR_SEGMENT															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SO		UR		CE		AD		DE		ST		AD		SE		
DR		M		DR		M		DR		M		OD		GM		
_M		OD		_M		OD		DE		_I		ON		T_D		
OE		E		OE		E		EN		NT		EN		CH		
BURST_SIZE																
RO	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs

Bit(s)	Name	Description
		4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

1000287C GDMA_CT1_7 Control Register 1 of GDMA Channel 7

00000000

0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESERVED					NUM_SEGMENT				SOURCE_DMA_REQ							
Type	RO					RW				RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RESETED	CONT_MODE_EN	DEST_DMA_REQ					NEXT_CH2UNMASK					COHE	CHU	CH_MAS		
Type	RO	RW	RW					RW					RW	RW	RW		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this

Bit(s)	Name	Description
		field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

10002880 GDMA_SA_8 Source Address of GDMA Channel 8 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SOURCE_ADDR[31:16]															0
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SOURCE_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s) Name Description

31:0	SOURCE_ADDR	Souce address
------	-------------	---------------

10002884 GDMA_DA_8 Destination Address of GDMA Channel 8 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															0
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s) Name Description

31:0	DEST_ADDR	Destination address
------	-----------	---------------------

10002888 GDMA_CT0_8 Control Register 0 of GDMA Channel 8 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	TARGET_BYTE_CNT															0
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Name	CURR_SEGMENT								SO UR CE AD DR _M OD E	DE ST _AD DR _M OD E	BURST_SIZE				SE GM EN T_D ON E_I NT _EN	CH _EN	SW _M OD E_E N
Type	RO								RW	RW	RW				RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

1000288C GDMA_CT1_8 Control Register 1 of GDMA Channel 8

00000000

0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESERVED						NUM_SEGMENT	SOURCE_DMA_REQ									
Type	RO						RW	RW									
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RE SE RV ED	CO NT _MO DE _EN	DEST_DMA_REQ						NEXT_CH2UNMASK						CH U NM AS K_F AIL IN T_E N	CH _M AS K	
Type	RO	RW	RW						RW						RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

10002890 GDMA_SA_9 Source Address of GDMA Channel 9 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
<u>Name</u>																
<u>Type</u>																
<u>Reset</u>																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<u>Name</u>																
<u>Type</u>																
<u>Reset</u>																

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Source address

10002894 GDMA_DA_9 Destination Address of GDMA Channel 9 **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

10002898 GDMA_CT0_9 Control Register 0 of GDMA Channel 9 **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	TARGET_BYTE_CNT																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	CURR_SEGMENT								SO	DE	BURST_SIZE				SE	SW	
								UR	ST	AD	DR	M	OD	EN	GM	_M	
								CE	AD	DR	M	OD	E	T_D	CH	OD	
								AD	DR	M	OD	E	I	ON	_EN	E_E	
Type	RO								RW	RW	RW				RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer

Bit(s)	Name	Description
		starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

1000289C GDMA_CT1_9 Control Register 1 of GDMA Channel 9 **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESERVED						NUM_SEGMENT						SOURCE_DMA_REQ				
Type	RO						RW						RW				
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RE SE RV ED	CO NT MO DE EN	DEST_DMA_REQ						NEXT_CH2UNMASK						CO HE RE NT INT EN	CH U NM AS K_F AIL IN T_E N	CH M AS K
Type	RO	RW	RW						RW						RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it.

Bit(s)	Name	Description
0	CH_MASK	0: Disable 1: Enable When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

100028A0 GDMA_SA_10 Source Address of GDMA Channel 10 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SOURCE_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SOURCE_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Souce address

100028A4 GDMA_DA_10 Destination Address of GDMA Channel 10 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

100028A8 GDMA_CT0_1 Control Register 0 of GDMA Channel 10 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	TARGET_BYTE_CNT															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	CURR_SEGMENT															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
									SO	DE				SE		
									UR	ST				GM		
									CE	AD				EN		
									AD	DR				T_D		
									DR	M				ON		
									M	OD				E_I		
									OD	E				NT		
									E	EN				EN		
														SW		
														M		
														OD		
														E		
														E		
														N		

Bit(s)	Name	Description
31:16	TARGET_BYTE_CN	The number of bytes to be transferred
T		

Bit(s)	Name	Description
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

GDMA CT1_1 Control Register 1 of GDMA Channel 10																
00000000 0																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESERVED						NUM_SEGMENT			SOURCE_DMA_REQ						
Type	RO						RW			RW						
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
Name	RE SE RV ED	CO NT MO DE EN	DEST_DMA_REQ						NEXT_CH2UNMASK						CH U NM AS K_F AIL IN T_E N	
Type	RO	RW	RW						RW						RW	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of

Bit(s)	Name	Description
		bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMAS K	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_E N	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL _INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

100028B0 GDMA_SA_11 Source Address of GDMA Channel 11 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SOURCE_ADDR[31:16]															RW
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SOURCE_ADDR[15:0]															RW
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Source address

100028B4 GDMA_DA_11 Destination Address of GDMA Channel 11 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															RW
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															RW
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

100028B8	<u>GDMA_CT0_1</u>	Control Register 0 of GDMA Channel 11	00000000														
			0														
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name																	TARGET_BYTE_CNT
Type																	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name									SO	DE				SE		SW	
								UR	ST	_AD	DR			GM		M	
								CE	_AD	_M	_M			EN		OD	
								AD	DR	OD	E			T_D		E_N	
								DR	M	OD	E			ON		OD	
								M	OD	E				E_I		E_N	
Type																	RO
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	RW
									RW	RW				RW		RW	
														RW		RW	

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

100028BC	<u>GDMA_CT1_1</u>	Control Register 1 of GDMA Channel 11	00000000													
			0													
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

Name	RESERVED						NUM_SEGMENT				SOURCE_DMA_REQ					
Type	RO						RW				RW					
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RE SE RV ED	CO NT_ MO DE_ EN	DEST_DMA_REQ						NEXT_CH2UNMASK						CH _U NM AS K_F AIL _IN T_E N	CH _M AS K
Type	RO	RW	RW						RW						RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

100028C0 GDMA_SA_12 Source Address of GDMA Channel 1200000000
0

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Souce address

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

100028C8 **GDMA CT0_1** Control Register 0 of GDMA Channel 12 **00000000**
2

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs

Bit(s)	Name	Description
		4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

100028CC <u>GDMA_CT1_1</u> Control Register 1 of GDMA Channel 12																00000000 0				
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name	RESERVED						NUM_SEGMENT				SOURCE_DMA_REQ									
Type	RO								RW				RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name	RE_SE_RV_ED	CO_NT_MO_DE_EN	DEST_DMA_REQ						NEXT_CH2UNMASK								CO_HE_RE_NT_INT_EN	CH_U_NM_AS_K_F_AIL_IN_T_E_N	CH_M_AS_K	
Type	RO	RW	RW						RW								RW	RW	RW	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this

Bit(s)	Name	Description
		field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

100028D0 GDMA_SA_13 Source Address of GDMA Channel 13

00000000

0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Source address

100028D4 GDMA_DA_13 Destination Address of GDMA Channel 13

00000000

0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

100028D8 GDMA_CT0_1 Control Register 0 of GDMA Channel 13

00000000

0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Name	CURR_SEGMENT								SO UR CE AD DR _M OD E	DE ST _AD DR _M OD E	BURST_SIZE				SE GM EN T_D ON E_I NT _EN	CH _EN	SW _M OD E_E N
Type	RO								RW	RW	RW				RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

GDMA_CT1_1																Control Register 1 of GDMA Channel 13		
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	0	
Name	RESERVED								NUM_SEGMENT				SOURCE_DMA_REQ					
Type	RO								RW				RW					
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Name	RE SE RV ED	CO NT _MO DE _EN	DEST_DMA_REQ								NEXT_CH2UNMASK				CO HE RE NT _INT _EN	CH U NM AS K_F AIL IN T_E N	CH _M AS K	
Type	RO	RW	RW								RW				RW	RW	RW	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

100028E0 GDMA_SA_14 Source Address of GDMA Channel 1400000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Source address

100028E4 GDMA_DA_14 Destination Address of GDMA Channel 14 00000000
 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

100028E8 GDMA_CT0_1 Control Register 0 of GDMA Channel 14 00000000
 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	TARGET_BYTE_CNT																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	CURR_SEGMENT								SO	DE	BURST_SIZE				SE	SW	
								UR	ST	AD	DR	M	OD	EN	GM	_M	
								CE	AD	DR	M	OD	E	T_D	CH	OD	
								AD	DR	M	OD	E	I	ON	_EN	E_E	
Type	RO								RW	RW	RW				RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	TARGET_BYTE_CNT	The number of bytes to be transferred
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer

Bit(s)	Name	Description
		starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

100028EC **GDMA_CT1_1** Control Register 1 of GDMA Channel 14 **00000000**
4 **0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16		
Name	RESERVED						NUM_SEGMENT				SOURCE_DMA_REQ							
Type	RO						RW				RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0	
Name	RE SE RV ED	CO NT MO DE EN	DEST_DMA_REQ						NEXT_CH2UNMASK						CO HE RE NT INT EN	CH U NM AS K_F AIL IN T_E N	CH M AS K	
Type	RO	RW	RW						RW						RW	RW	RW	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMASK	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_EN	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL_INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it.

Bit(s)	Name	Description
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked
		0: Disable 1: Enable

100028F0 GDMA_SA_15 Source Address of GDMA Channel 15 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SOURCE_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SOURCE_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SOURCE_ADDR	Souce address

100028F4 GDMA_DA_15 Destination Address of GDMA Channel 15 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DEST_ADDR[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DEST_ADDR[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	DEST_ADDR	Destination address

100028F8 GDMA_CT0_1 Control Register 0 of GDMA Channel 15 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	TARGET_BYTE_CNT															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	CURR_SEGMENT															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
									SO	DE				SE		
									UR	ST				GM		
									CE	AD				EN		
									AD	DR				T_D		
									DR	M				ON		
									M	OD				E_I		
									OD	E				NT		
									E	EN				EN		
														SW		
														M		
														OD		
														E		
														E		
														N		

Bit(s)	Name	Description
31:16	TARGET_BYTE_CN	The number of bytes to be transferred
T		

Bit(s)	Name	Description
15:8	CURR_SEGMENT	Indicates the current segment (0 to 255)
7	SOURCE_ADDR_MODE	Sets the source address mode 0: Incremental mode 1: Fix mode
6	DEST_ADDR_MODE	Sets the destination address mode 0: Incremental mode 1: Fix mode
5:3	BURST_SIZE	Sets the number of double words in each burst transaction 0: 1 DW 1: 2 DWs 2: 4 DWs 3: 8 DWs 4: 16 DWs 5: Undefined 6: Undefined 7: Undefined
2	SEGMENT_DONE_INTERRUPT_EN	Enable the segment done interrupt. This interrupt asserts after transfer of each segment is done. 0: Disable 1: Enable
1	CH_EN	If CONT_MODE_EN=0, this bit is de-asserted by hardware after the number of bytes transferred reaches the TARGET_BYTE_CNT 0: Disable 1: Enable
0	SW_MODE_EN	Software mode enable. If software mode enable is set, the data transfer starts when the CH_EN bit is set. Otherwise, the data transfer starts when the DMA request is asserted. 0: Hardware mode 1: Software mode

GDMA CT1_1																Control Register 1 of GDMA Channel 15			
5																00000000			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16			
Name	RESERVED										NUM_SEGMENT				SOURCE_DMA_REQ				
Type	RO										RW				RW				
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
Name	RE	CO	DEST_DMA_REQ										NEXT_CH2UNMASK				CH_U	CH_M	
	SE	NT															NM_AS	AS_K	
	RV	MO															K_F	M_A	
	DE	EN															AIL_IN	A_S	
																	T_E_N	S_K	
Type	RO	RW	RW										RW				RW	RW	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
25:22	NUM_SEGMENT	the number of segments=2N, where N is the value of this field. Valid values for this field are N=0 to 8. The segment size=(TARGET_BYTE_CNT/2N). If the TARGET_BYTE_CNT is not a multiple of 2N, the segment size = {(TARGET_BYTE_CNT/2N) + 1}.
21:16	SOURCE_DMA_REQ	Selects the source DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The source of the transfer is memory (always ready)
14	CONT_MODE_EN	If CONT_MODE_EN=1, HW will NOT clear CH_EN after the number of

Bit(s)	Name	Description
		bytes transferred reaches TARGET_BYTE_CNT. Otherwise, HW will clear CH_EN will clear the CH_EN. 0: Continuous mode is disabled 1: Continuous mode is enabled
13:8	DEST_DMA_REQ	Selects the destination DMA request 0: DMA_REQ0 1: DMA_REQ1 2: DMA_REQ2 32: The destination of the transfer is memory (always ready)
7:3	NEXT_CH2UNMAS K	Selects the channel to clear the CH_MASK bit. When the number of bytes transferred reaches the TARGET_BYTE_CNT, the hardware will clear the CH_MASK field of the NEXT_CH2UNMASK channel. If the hardware does not need to clear CH_MASK field of any channel, this field should be set to the channel itself. 0: Channel 0 1: Channel 1 n: Channel n
2	COHERENT_INT_E N	If COHERENT_INT_EN is set, GDMA will issue a dummy read to destination after the last write to destination to avoid data coherent problem. Note: DO NOT set this field if the destination is not MEM. (may corrupt data, if destination is a FIFO) 0: Disable 1: Enable
1	CH_UNMASK_FAIL _INT_EN	If this field is set, an interrupt will be assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it. 0: Disable 1: Enable
0	CH_MASK	When this field is set, the transfer of this channel is gated until this field is clear by HW/SW. 0: Channel is not masked 1: Channel is masked

10002A00 GDMA UNMA SK INTSTS Unmask Fail Interrupt Status																00000000 0				
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name	UNMASK_FAIL_INTSTS[31:16]																W1C			
Type																	W1C			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name	UNMASK_FAIL_INTSTS[15:0]																W1C			
Type																	W1C			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	UNMASK_FAIL_INT STS	This field is the bit-map of unmask fail interrupt status of each channel. The unmask fail interrupt will assert when HW detect the CH_MASK field of NEXT_CH2UNMASK channel is 1'b0 while trying to clear it.

10002A04 GDMA DONE INTSTS Segment Done Interrupt Status																00000000 0				
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name	SEGMENT_DONE_INTSTS[31:16]																W1C			
Type																	W1C			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name	SEGMENT_DONE_INTSTS[15:0]																W1C			
Type																	W1C			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Reset 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Bit(s)	Name	Description
31:0	SEGMENT_DONE_I_NTSTS	This field is the bit-map of segment done interrupt status of each channel. The segment done interrupt will assert when each segment is transferred completely.

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESERVED[26:11]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESERVED[10:0]											TOTAL_C_H_NUM		IP_VER		AR B MO DE
Type	RO											RO		RO		RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0

Bit(s)	Name	Description
4:3	TOTAL_CH_NUM	Total channel number supported 0: 8 channels 1: 16 channels 2: 32 channels 3: Undefined
2:1	IP_VER	GDMA core version
0	ARB_MODE	Arbitration mode selection 0: channel 0 has highest priority and others are round-robin 1: All channel are round-robin

10002A30	<u>GDMA PERI</u>			
	<u>ADDR START</u>	Peripheral Region 0 Starting Address		
	0		10000000	0

Bit(s)	Name	Description
31:0	PERI_ADDR_STAR_T_0	GDMA request will direct to peripheral bus if the request address >= PERI_ADDR_START_x & < PERI_ADDR_END_x

Bit(s)	Name	Description
31:0	PERI_ADDR_END_0	GDMA request will direct to peripheral bus if the request address >= PERI_ADDR_START_x & < PERI_ADDR_END_x

Bit(s)	Name	Description
31:0	PERI_ADDR_STAR_T_1	GDMA request will direct to peripheral bus if the request address >= PERI_ADDR_START_x & < PERI_ADDR_END_x

Bit(s)	Name	Description
31:0	PERI_ADDR_END_1	GDMA request will direct to peripheral bus if the request address >= PERI_ADDR_START_x & < PERI_ADDR_END_x

Bit(s)	Name	Description
31:0	PERI_ADDR_STAR_T_2	GDMA request will direct to peripheral bus if the request address >= PERI_ADDR_START_x & < PERI_ADDR_END_x

Bit(s)	Name	Description
31:0	PERI_ADDR_END_2	GDMA request will direct to peripheral bus if the request address >= PERI_ADDR_START_x & < PERI_ADDR_END_x

Bit(s)	Name	Description
31:0	PERI_ADDR_STAR_T_3	GDMA request will direct to peripheral bus if the request address >= PERI_ADDR_START_x & < PERI_ADDR_END_x

Bit(s)	Name	Description
31:0	PERI_ADDR_END_3	GDMA request will direct to peripheral bus if the request address >= PERI_ADDR_START_x & < PERI_ADDR_END_x

5.16 AES Controller

5.16.1 Registers

AES Changes LOG

Revision	Date	Author	Change Log
0.1	2013/4/30	Morrie Lin	Initialization
0.2	2013/6/5	Morrie Lin	Add desc_5dw_info_en register
0.3	2013/6/7	Morrie Lin	Update AES base address

Module name: AES Base address: (+10004000h)

Address	Name	Width	Register Function
10004000	<u>TX_BASE_PTR</u> 0	32	TX_BASE_PTR0 Used for DMA base address of TX ring0
10004004	<u>TX_MAX_CNT0</u>	32	TX_MAX_CNT0 Used for DMA max number of TX ring0
10004008	<u>TX_CTX_IDX0</u>	32	TX_CTX_IDX0 Used for CPU pointer of TX ring0
1000400C	<u>TX_DTX_IDX0</u>	32	TX_DTX_IDX0 Used for DMA pointer of TX ring0
10004100	<u>RX_BASE_PTR</u> 0	32	RX_BASE_PTR0 Used for DMA base address of RX ring0
10004104	<u>RX_MAX_CNT0</u>	32	RX_MAX_CNT0 Used for DMA max number of RX ring0
10004108	<u>RX_CALC_IDX</u> 0	32	RX_CALC_IDX0 Used for CPU pointer of RX ring0
1000410C	<u>FS_DRX_IDX0</u>	32	FS_DRX_IDX0 Used for DMA pointer of RX ring0
10004200	<u>PDMA_INFO</u>	32	PDMA_INFO used for PDMA information
10004204	<u>PDMA_GLO_CFG</u>	32	PDMA_GLO_CFG used for PDMA setting
10004208	<u>PDMA_RST_ID</u> X	32	PDMA_RST_ID used for PDMA setting
1000420C	<u>DELAY_INT_CFG</u>	32	DELAY_INT_CFG used for PDMA setting
10004210	<u>PDMA_Q_CFG</u>	32	PDMA_Q_CFG used for PDMA setting
10004220	<u>PDMA_INT_STA</u> A	32	PDMA_INT_STA used for PDMA setting
10004228	<u>PDMA_INT_MSK</u> K	32	PDMA_INT_MSK used for PDMA setting

10004000	TX_BASE_PT R0	TX_BASE_PTR0	00000000 0
Bit	31	30	29 28 27 26 25 24 23 22 21 20 19 18 17 16
Name		RESV	
Type		RO	
Reset	0	0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Bit	15	14	13 12 11 10 9 8 7 6 5 4 3 2 1 0
Name		TX_BASE_PTR0	
Type		RW	
Reset	0	0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Bit(s)	Name	Description
31:16	RESV	Reserved
15:0	TX_BASE_PTR0	Tx Base Pointer 0 Points to the base address of TX_Ring 0 (If enable desc_5dw_info_en 8-DWORD aligned address, else 4-DWORD aligned address).

10004004 **TX_MAX_CNT** TX_MAX_CNT0 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RESV																
RO																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
TX_MAX_CNT0																
RW																
Reset																
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV	Reserved
15:0	TX_MAX_CNT0	Tx Maximum TXD Count 0 The maximum TXD count in TXD_Ring 0.

10004008 **TX_CTX_IDX0** TX_CTX_IDX0 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RESV																
RO																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
TX_MAX_CNT0																
RW																
Reset																
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV	Reserved
15:0	TX_MAX_CNT0	Tx CPU TXD Index n Points to the next TXD to be used by the CPU. (If enable desc_5dw_info_en, 8-DWORD aligned address, else 4-DWORD aligned address).

1000400C **TX_DTX_IDX0** TX_DTX_IDX0 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RESV[23:8]																
RO																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RESV[7:0]																
RO																
Reset																
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV	Reserved
15:0	TX_DTX_IDX0	Tx DTX Index 0

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Bit(s)	Name	Description
31:8	RESV	Reserved
7:0	TX_DTX_IDX0	Tx DMA TXD Index n Points to the next TXD to be used by the DMA. (If enable desc_5dw_info_en, 8-DWORD aligned address, else 4-DWORD aligned address).

10004100 RX_BASE_PT R0																RX_BASE_PTR0			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16			
Name																	RESV		
Type																	RO		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
Name																	RX_BASE_PTR0		
Type																	RW		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:16	RESV	Reserved
15:0	RX_BASE_PTR0	Rx Base Pointer 0 Points to the base address of RXD Ring 0 (If enable desc_5dw_info_en, 8-DWORD aligned address, else 4-DWORD aligned address).

10004104 RX_MAX_CNT 0																RX_MAX_CNT0			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16			
Name																	RESV		
Type																	RO		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
Name																	RX_MAX_CNT0		
Type																	RW		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:16	RESV	Reserved
15:0	RX_MAX_CNT0	Rx Maximum Count 0 The maximum RXD count in RXD Ring 0.

10004108 RX_CALC_ID X0																RX_CALC_IDX0			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16			
Name																	RESV		
Type																	RO		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
Name																	RX_CALC_IDX0		
Type																	RW		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:16	RESV	Reserved

Bit(s)	Name	Description
15:0	RX_CALI_IDX0	Rx CPU RXD Index 0 Points to the next RXD the CPU will allocate to RXD Ring 0. (If enable desc_5dw_info_en, 8-DWORD aligned address, else 4-DWORD aligned address).

1000410C FS_DRX_IDX0 FS_DRX_IDX0 00000000 0

Bit(s)	Name	Description
31:8	RESV	Reserved
7:0	RX_DRX_IDX0	Rx DMA RXD Index n Points to the next RXD that the DMA will use in FDS Ring 0. (If enable_desc_5dw_info_en, 8-DWORD aligned address, else 4-DWORD aligned address).

10004200 PDMA_INFO PDMA_INFO 4C00010 1

Bit(s)	Name	Description
31:28	VERSION	PDMA controller version.
27:24	INDEX_WIDTH	RX Ring index width
23:16	BASE_PTR_WIDTH	Base Pointer Width
15:8	RX_RING_NUM	Rx ring number
7:0	TX_RING_NUM	Tx ring number

10004204 PDMA_GLO_CFG PDMA_GLO_CFG 00000450

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RX_2B_OF_FSET	CL_KG_AT_E_B_YP	BY_TE_SW_AP	RESV[16:4]												
Type	RW	RO	RO	RO												
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV[3:0]				des_c_5_dw	mul_ti_d_ma	sha_re_f_ifo	des_c_3_2b	BIG_EN_DIA	TX_WB_D	WPDMA_BT_SIZE	RX_DM_A	RX_DM_A_E	TX_DM_A	TX_DM_A_E	

		<u>info_en</u>	<u>_en</u>	<u>en</u>	<u>en</u>	<u>N</u>	<u>DO_NE</u>		<u>BU_SY</u>	<u>N</u>	<u>BU_SY</u>	<u>N</u>
Type	RO	RW	RW	RW	RW	RW	RW	RW	RO	RW	RO	RW
Reset	0 0 0 0	0 1 0 0	0 0 0 1	0 1 0 1	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0

Bit(s)	Name	Description
31	RX_2B_OFFSET	Rx 2 Byte Offset Sets the byte size of the Rx buffer offset. 0: 4 bytes 1: 2 bytes. 0
30	CLKGATE_BYP	Clock Gating Control Status Register Controls gating of the PDMA clock. 0: PDMA clock operates in freerun mode. 1: PDMA clock is gated when idle.
29	BYTE_SWAP	Byte Swap The DMA applies the endian rule to convert the descriptor. 0: Byte swap not applied. 1: Apply byte swap.
28:12	RESV	Reserved
11	desc_5dw_info_en	Support extension tx_info/rx_info to to 20 byte and the total length of descriptor is 32 byte. 0: Disable 1: Enable
10	multi_dma_en	
9	share_fifo_en	
8	desc_32b_en	Support 32 Byte alignment descriptor Enables support for 32 Byte alignment PDMA descriptors. 0: Disable 1: Enable
7	BIG_ENDIAN	Selects the Endian mode for the SoC platform section. DMA applies the endian rule to convert payload and Tx/Rx information. DMA does not apply the endian rule to registers or descriptors. 0: Little endian 1: Big endian
6	TX_WB_DDONE	Tx Write Back DDONE Enables TX_DMA writing back DDONE into TXD. 0: Disable 1: Enable
5:4	WPDMA_BT_SIZE	PDMA Burst Size Defines the burst size of PDMA. 0 : 4 DWORD (16bytes). 1 : 8 DWORD (32 bytes). 2 : 16 DWORD (64 bytes). 3 : 32 DWORD (128 bytes)
3	RX_DMA_BUSY	1 : RX_DMA is busy. 0 : RX_DMA is not busy
2	RX_DMA_EN	Rx DMA Enable Enables Rx DMA. When disabled, Rx DMA finishes the current receiving packet, and then stops. 0: Disable 1: Enable
1	TX_DMA_BUSY	Indicates whether Tx DMA is busy. 0: Not busy 1: Busy
0	TX_DMA_EN	Tx DMA Enable Enables Tx DMA. When disabled, Tx DMA finishes the current sending packet, and then stops. 0: Disable 1: Enable

10004208	<u>PDMA_RST_I</u>	<u>PDMA_RST_IDX</u>	00000000
	<u>DX</u>		0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																RO
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																RESV[15:0]
Type																RO
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	RESV	Reserved

1000420C	<u>DELAY_INT_C</u>	<u>DELAY_INT_CFG</u>	00000000
	<u>FG</u>		0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	TX_DL_Y_I_NT_EN															TXMAX_PINT
Type	RW															RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RX_DL_Y_I_NT_EN															RXMAX_PINT
Type	RW															RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31	TXDLY_INT_EN	Tx Delay Interrupt Enable Enables the Tx delayed interrupt mechanism. 0: Disable 1: Enable
30:24	TXMAX_PINT	Tx Maximum Pending Interrupts Specifies the maximum number of pending interrupts. When the number of pending interrupts is equal to or greater than the value specified here or the interrupt pending time has reached the limit (see below), a final TX_DLY_INT is generated. 0: Disable this feature.
23:16	TXMAX_PTIME	Tx Maximum Pending Time Specifies the maximum pending time for the internal TX_DONE_INT0 and TX_DONE_INT1. When the pending time is equal to or greater than TXMAX_PTIME x 20us or the number of pending TX_DONE_INT0 and TX_DONE_INT1 is equal to or greater than TXMAX_PINT (see above), a final TX_DLY_INT is generated 0: Disable this feature.
15	RXDLY_INT_EN	Rx Delay Interrupt Enable Enables the Rx delayed interrupt mechanism. 0: Disable 1: Enable
14:8	RXMAX_PINT	Rx Maximum Pending Interrupts Specifies the maximum number of pending interrupts. When the number of pending interrupts is equal to or greater than the value specified here or the interrupt pending time has reached the limit (see below), a final RX_DLY_INT is generated. 0: Disable this feature.

Bit(s)	Name	Description
7:0	RXMAX_PTIME	Rx Maximum Pending Time Specifies the maximum pending time for the internal RX_DONE_INT. When the pending time is equal to or greater than RXMAX_PTIME x 20 us, or the number of pended RX_DONE_INT is equal to or greater than RXMAX_PCNT (see above), a final RX_DLY_INT is generated. 0: Disable this feature.

10004210 PDMA_Q_CF PDMA_Q_CFG																00000000	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESV[27:12]																
Type	RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RESV[11:0]																
Type	RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:4	RESV	
3:0	RST_DRX_IDX1	Will stop to block interface as RX-descriptors reach this threshold

10004220 PDMA_INT_S PDMA_INT_STA																00000000	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RX_CO	RX_DL	TX_CO	TX_DL	RESV1												RX DONE INT
Type	RW	RW	RW	RW	RO												RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RESV																TX DONE INT
Type	RO																RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31	RX_COHERENT	Rx Coherent Interrupt Asserts when the Rx DMA is ready to handle a queue, but cannot access the queue because the driver is not ready.
30	RX_DLY_INT	Rx Delay Interrupt Asserts when the number of pended Rx interrupts has reached a specified level, or when the pending time is reached. Configure this interrupt using the DELAY_INT_CFG register.
29	TX_COHERENT	Tx Coherent Interrupt Asserts when the Tx DMA is ready to handle a queue, but cannot access the queue because the driver is not ready.
28	TX_DLY_INT	Tx Delay Interrupt Asserts when the number of pended Tx interrupts has reached a specified level, or when the pending time is reached. Configure this interrupt using the DELAY_INT_CFG register.
27:17	RESV1	
16	RX_DONE_INT	Rx Queue 0 Done Interrupt

Bit(s)	Name	Description
		Asserts when an Rx packet is received on Queue 0.
15:1	RESV	
0	TX_DONE_INT	Tx Queue 0 Done Interrupt Asserts when a Tx Queue 0 packet is transmitted.

10004228 <u>PDMA_INT_M</u> <u>PDMA_INT_MSK</u>				00000000 0												
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RX_CO HE RE NT_EN	RX_DL Y_I NT_EN	TX_CO HE RE NT_EN	TX_DL Y_I NT_EN	RESV1											
Type	RW	RW	RW	RW	RO											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV															TX_DO NE_INT_EN
Type	RO															RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31	RX_COHERENT_EN	Masks the Rx Coherent interrupt. This interrupt asserts when the Rx DMA is ready to handle a queue, but cannot access the queue because the driver is not ready.
30	RX_DLY_INT_EN	Masks the Rx Delay interrupt. This interrupt asserts when the number of pending Rx interrupts has reached a specified level, or when the pending time is reached.
29	TX_COHERENT_IN_T_EN	Masks the Tx Coherent interrupt. This interrupt asserts when the Tx DMA is ready to handle a queue, but cannot access the queue because the driver is not ready.
28	TX_DLY_INT_EN	Masks the Tx Delay interrupt. This interrupt asserts when the number of pending Tx interrupts has reached a specified level, or when the pending time is reached.
27:17	RESV1	
16	RX_DONE_INT_EN	Masks the Rx Queue 0 Done interrupt. This interrupt asserts when an Rx packet is received on Queue 0.
15:1	RESV	
0	TX_DONE_INT_EN	Masks the Tx Queue 0 Done interrupt. This interrupt asserts when a Tx packet is transmitted on Queue 0.

5.17 PWM (Pulse Width Modulation)

5.17.1 Registers

PWM Changes LOG

Revision	Date	Author	Change Log
1	2013/11/26	Rick Ho	Initial Version

Module name: PWM Base address: (+10005000h)

Address	Name	Width	Register Function
10005000	<u>PWM_ENABLE</u>	32	PWM Enable register
10005010	<u>PWM0_CON</u>	32	PWM0 Control register
10005014	<u>PWM0_HDURATION</u>	32	PWM0 High Duration register
10005018	<u>PWM0_LDURATION</u>	32	PWM0 Low Duration register
1000501C	<u>PWM0_GDURATION</u>	32	PWM0 Guard Duration register
10005030	<u>PWM0_SEND_DATA0</u>	32	PWM0 Send Data0 register
10005034	<u>PWM0_SEND_DATA1</u>	32	PWM0 Send Data1 register
10005038	<u>PWM0_WAVENUM</u>	32	PWM0 Wave Number register
1000503C	<u>PWM0_DATA_WIDTH</u>	32	PWM0 Data Width register
10005040	<u>PWM0_THRES_H</u>	32	PWM0 Thresh register
10005044	<u>PWM0_SEND_WAVENUM</u>	32	PWM0 Send Wave Number register
10005050	<u>PWM1_CON</u>	32	PWM1 Control register
10005054	<u>PWM1_HDURATION</u>	32	PWM1 High Duration register
10005058	<u>PWM1_LDURATION</u>	32	PWM1 Low Duration register
1000505C	<u>PWM1_GDURATION</u>	32	PWM1 Guard Duration register
10005070	<u>PWM1_SEND_DATA0</u>	32	PWM1 Send Data0 register
10005074	<u>PWM1_SEND_DATA1</u>	32	PWM1 Send Data1 register
10005078	<u>PWM1_WAVENUM</u>	32	PWM1 Wave Number register
1000507C	<u>PWM1_DATA_WIDTH</u>	32	PWM1 Data Width register
10005080	<u>PWM1_THRES_H</u>	32	PWM1 Thresh register
10005084	<u>PWM1_SEND_WAVENUM</u>	32	PWM1 Send Wave Number register
10005090	<u>PWM2_CON</u>	32	PWM2 Control register
10005094	<u>PWM2_HDURATION</u>	32	PWM2 High Duration register
10005098	<u>PWM2_LDURATION</u>	32	PWM2 Low Duration register
1000509C	<u>PWM2_GDURATION</u>	32	PWM2 Guard Duration register

100050B0	<u>PWM2 SEND DATA0</u>	32	PWM2 Send Data0 register
100050B4	<u>PWM2 SEND DATA1</u>	32	PWM2 Send Data1 register
100050B8	<u>PWM2 WAVE NUM</u>	32	PWM2 Wave Number register
100050BC	<u>PWM2 DATA WIDTH</u>	32	PWM2 Data Width register
100050C0	<u>PWM2 THRES H</u>	32	PWM2 Thresh register
100050C4	<u>PWM2 SEND WAVENUM</u>	32	PWM2 Send Wave Number register
100050D0	<u>PWM3 CON</u>	32	PWM3 Control register
100050D4	<u>PWM3 HDURATION</u>	32	PWM3 High Duration register
100050D8	<u>PWM3 LDURATION</u>	32	PWM3 Low Duration register
100050DC	<u>PWM3 GDURATION</u>	32	PWM3 Guard Duration register
100050F0	<u>PWM3 SEND DATA0</u>	32	PWM3 Send Data0 register
100050F4	<u>PWM3 SEND DATA1</u>	32	PWM3 Send Data1 register
100050F8	<u>PWM3 WAVE NUM</u>	32	PWM3 Wave Number register
100050FC	<u>PWM3 DATA WIDTH</u>	32	PWM3 Data Width register
10005100	<u>PWM3 THRES H</u>	32	PWM3 Thresh register
10005104	<u>PWM3 SEND WAVENUM</u>	32	PWM3 Send Wave Number register
1000520C	<u>PWM EN STATUS</u>	32	PWM Enable Status register

10005000 <u>PWM ENABL E</u> PWM Enable register																00000000 0				
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name	RESV[27:12]																			
Type	RO																			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name	RESV[11:0]																<u>PW M3_EN</u>	<u>PW M2_EN</u>	<u>PW M1_EN</u>	<u>PW M0_EN</u>
Type	RO																RW	RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:4	RESV	RESERVED
3	PWM3_EN	0: disable PWM3 1: enable PWM3
2	PWM2_EN	0: disable PWM2 1: enable PWM2
1	PWM1_EN	0: disable PWM1 1: enable PWM1
0	PWM0_EN	0: disable PWM0 1: enable PWM0

10005010 PWM0_CON PWM0 Control register 00007E00

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																
OL_D_P_WM_M_ODE																
STOP_BITPOS																
GU_AR_D_V_AL UE																
IDL_E_V_AL UE																
RESV1																
CLKSEL																
CLKDIV																

Bit(s)	Name	Description
31:16	RESV0	RESERVED
15	OLD_PWM_MODE	0: New PWM mode 1: Old PWM mode
14:9	STOP_BITPOS	The stop bit position for source data in periodical mode. In FIFO mode, it's used to indicate the stop bit position in total 64 bits. In Memory mode, it's for the stop bit position in the last 32 bits.
8	GUARD_VALUE	PWM0 output value when guard time.
7	IDLE_VALUE	PWM0 output value when idle state.
6:4	RESV1	RESERVED
3	CLKSEL	Select PWM0 clock 0: CLK= 100KHz 1: CLK= 40MHz
2:0	CLKDIV	Select PWM0 clock scale. 000: CLK Hz 001: CLK/2 Hz 010: CLK/4 Hz 011: CLK/8 Hz 100: CLK/16 Hz 101: CLK/32 Hz 110: CLK/64 Hz 111: CLK/128 Hz

10005014 PWM0_HDURATION PWM0 High Duration register 00000001

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
HDURATION																
RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	HDURATION	PWM0 pulse duration based on the current clock when PWM output is high. If duration =N, need to program N-1 in this register. Note: The duration of PWM must not be 0.

10005018 PWM0_LDUR PWM0 Low Duration register 00000000

ACTION

1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	LDURATION	PWM0 pulse duration based on the current clock when PWM output is low. If duration =N, need to program N-1 in this register. Note: The duration of PWM must not be 0.

1000501C PWM0_GDURATION **PWM0 Guard Duration register** **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	GUARD_DURATION	

10005030 PWM0_SEND_DATA0 **PWM0 Send Data0 register** **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SEND_DATA0	PWM0 local buffer0 of pulse sequence data to be generated. Note: This value should be written only in periodically FIFO mode. In other mode, this buffer is for internal memory access.

10005034 PWM0_SEND_DATA1 **PWM0 Send Data1 register** **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																

Bit(s)	Name	Description
31:0	SEND_DATA1	<p>PWM0 local buffer0 of pulse sequence data to be generated.</p> <p>Note: This value should be written only in periodically FIFO mode. In other mode, this buffer is for internal memory access.</p>

10005038 **PWM0_WAVE_NUM** PWM0 Wave Number register **000000000**

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	WAVE_NUM	The number by which PWM0 will generate from the pulse data repeatedly. Note: If WAVE_NUM=0, the waveform generation will not stop until it is disabled.

1000503C **PWM0_DATA_WIDTH** PWM0 Data Width register **000000000**

Bit(s)	Name	Description
31:13	RESV	RESERVED
12:0	DATA_WIDTH	The PWM0 pulse data width in the old PWM mode.

10005040 **PWM0 THRE SH** PWM0 Thresh register **00000000 0**

Bit(s)	Name	Description
31:13	RESV	RESERVED
12:0	THRESH	The PWM0 pulse data high/low switching threshold in the old PWM

Bit(s)	Name	Description
		mode.

10005044	<u>PWM0_SEND_WAVENUM</u>	PWM0 Send Wave Number register	00000000 0
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Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	SEND_WAVENUM	The number by which PWM0 has already generated from the specified data source in the periodical mode.

10005050	<u>PWM1_CON</u>	PWM1 Control register	000007E0 0
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Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name																	
Type																	
Reset																	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	OL	D_P	WM	M	OD	E	STOP_BITPOS				GU	IDL	RESV1				
	R	W	A	R	D	V	G	A	R	E	V	AL	C	K	S	EL	
Type		RW						RW		RW		RO		RW		RW	
Reset		0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV0	RESERVED
15	OLD_PWM_MODE	Use old PWM mode Note: Using old PWM mode also means periodical mode. So SRCSEL and MODE is ignored in this situation. Only old PWM mode with 32 KHz clock source (however could not work in the system sleep-mode). 0: New PWM mode 1: Old PWM mode
14:9	STOP_BITPOS	Note: Using old PWM mode also means periodical mode. So SRCSEL and MODE is ignored in this situation. Only old PWM mode with 32 KHz clock source (however could not work in the system sleep-mode).
8	GUARD_VALUE	PWM1 output value when guard time.
7	IDLE_VALUE	PWM1 output value when idle state.
6:4	RESV1	Select Random Generator mode
3	CLKSEL	Select PWM1 clock 0: CLK= 100KHz 1: CLK= 40MHz
2:0	CLKDIV	Select PWM1 clock scale. 000: CLK Hz 001: CLK/2 Hz 010: CLK/4 Hz 011: CLK/8 Hz 100: CLK/16 Hz

Bit(s)	Name	Description
		101: CLK/32 Hz
		110: CLK/64 Hz
		111: CLK/128 Hz

10005054 PWM1_HDUR PWM1 High Duration register 00000001

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	HDURATION	PWM1 pulse duration based on the current clock when PWM output is high. If duration =N, need to program N-1 in this register. Note: The duration of PWM must not be 0.

10005058 PWM1_LDUR PWM1 Low Duration register 00000001

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	LDURATION	PWM1 pulse duration based on the current clock when PWM output is low. If duration =N, need to program N-1 in this register. Note: The duration of PWM must not be 0.

1000505C PWM1_GDUR PWM1 Guard Duration register 00000000

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	GUARD_DURATION	N

**10005070 PWM1_SEND
DATA0** PWM1 Send Data0 register **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SEND_DATA0[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SEND_DATA0[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SEND_DATA0	PWM1 local buffer0 of pulse sequence data to be generated. Note: This value should be written only in periodically FIFO mode. In other mode, this buffer is for internal memory access.

**10005074 PWM1_SEND
DATA1** PWM1 Send Data1 register **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SEND_DATA1[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SEND_DATA1[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SEND_DATA1	PWM1 local buffer0 of pulse sequence data to be generated. Note: This value should be written only in periodically FIFO mode. In other mode, this buffer is for internal memory access.

**10005078 PWM1_WAVE
NUM** PWM1 Wave Number register **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	WAVE_NUM															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	WAVE_NUM	The number by which PWM1 will generate from the pulse data repeatedly. Note: If WAVE_NUM=0, the waveform generation will not stop until it is disabled.

**1000507C PWM1_DATA
WIDTH** PWM1 Data Width register **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV[18:3]															

Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV[2:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:13	RESV	RESERVED
12:0	DATA_WIDTH	The PWM1 pulse data width in the old PWM mode.

10005080 PWM1_THRE PWM1 Thresh register 00000000
SH

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RESV[18:3]																
RO																
RESV[2:0]																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	THRESH															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:13	RESV	RESERVED
12:0	THRESH	The PWM1 pulse data high/low switching threshold in the old PWM mode.

10005084 PWM1_SEND_WAVENUM PWM1 Send Wave Number register 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RESV																
RO																
SEND_WAVENUM																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RO															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	SEND_WAVENUM	The number by which PWM1 has already generated from the specified data source in the periodical mode.

10005090 PWM2_CON PWM2 Control register 000007E0
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
RESV0																
RO																
OL_D_P_WM_M_OD_E																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	STOP_BITPOS								GU_AR_D_V_AL_U	RESV1				CLKDIV		
Type	RW	RW								RO				RW		

Reset	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
--------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Bit(s)	Name	Description
31:16	RESV0	RESERVED
15	OLD_PWM_MODE	Use old PWM mode Note: Using old PWM mode also means periodical mode. So SRCSEL and MODE is ignored in this situation. Only old PWM mode with 32 KHz clock source (however could not work in the system sleep-mode). 0: New PWM mode 1: Old PWM mode
14:9	STOP_BITPOS	Note: Using old PWM mode also means periodical mode. So SRCSEL and MODE is ignored in this situation. Only old PWM mode with 32 KHz clock source (however could not work in the system sleep-mode).
8	GUARD_VALUE	PWM2 output value when guard time.
7	IDLE_VALUE	PWM2 output value when idle state.
6:4	RESV1	Select Random Generator mode
3	CLKSEL	Select PWM2 clock 0: CLK= 100KHz 1: CLK= 40MHz
2:0	CLKDIV	Select PWM2 clock scale. 000: CLK Hz 001: CLK/2 Hz 010: CLK/4 Hz 011: CLK/8 Hz 100: CLK/16 Hz 101: CLK/32 Hz 110: CLK/64 Hz 111: CLK/128 Hz

10005094 PWM2_HDUR PWM2 High Duration register 00000001

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																
RESV																
RO																
HDURATION																
RW																

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	HDURATION	PWM2 pulse duration based on the current clock when PWM output is high. If duration =N, need to program N-1 in this register. Note: The duration of PWM must not be 0.

10005098 PWM2_LDUR PWM2 Low Duration register 00000001

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																
RESV																
RO																
LDURATION																
RW																

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	LDURATION	PWM2 pulse duration based on the current clock when PWM output is low. If duration =N, need to program N-1 in this register. Note: The duration of PWM must not be 0.

1000509C PWM2_GDURATION PWM2 Guard Duration register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	GUARD_DURATION_N	

100050B0 PWM2_SEND_DATA0 PWM2 Send Data0 register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:0	SEND_DATA0	PWM2 local buffer0 of pulse sequence data to be generated. Note: This value should be written only in periodically FIFO mode. In other mode, this buffer is for internal memory access.

100050B4 PWM2_SEND_DATA1 PWM2 Send Data1 register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:0	SEND_DATA1	PWM2 local buffer0 of pulse sequence data to be generated. Note: This value should be written only in periodically FIFO mode. In other mode, this buffer is for internal memory access.

100050B8 PWM2_WAVE_NUM PWM2 Wave Number register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	WAVE_NUM															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	WAVE_NUM	The number by which PWM2 will generate from the pulse data repeatedly. Note: If WAVE_NUM=0, the waveform generation will not stop until it is disabled.

100050BC PWM2_DATA_WIDTH PWM2 Data Width register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV[18:3]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV[2:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:13	RESV	RESERVED
12:0	DATA_WIDTH	The PWM2 pulse data width in the old PWM mode.

100050C0 PWM2_THRE_SH PWM2 Thresh register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV[18:3]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV[2:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:13	RESV	RESERVED
12:0	THRESH	The PWM2 pulse data high/low switching threshold in the old PWM mode.

100050C4 PWM2_SEND_WAVENUM PWM2 Send Wave Number register 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

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Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	SEND_WAVENUM	The number by which PWM2 has already generated from the specified data source in the periodical mode.

Bit(s)	Name	Description
31:16	RESV0	RESERVED
15	OLD_PWM_MODE	<p>Use old PWM mode</p> <p>Note: Using old PWM mode also means periodical mode. So SRCSEL and MODE is ignored in this situation. Only old PWM mode with 32 KHz clock source (however could not work in the system sleep-mode).</p> <p>0: New PWM mode 1: Old PWM mode</p>
14:9	STOP_BITPOS	<p>Note: Using old PWM mode also means periodical mode. So SRCSEL and MODE is ignored in this situation. Only old PWM mode with 32 KHz clock source (however could not work in the system sleep-mode).</p>
8	GUARD_VALUE	PWM3 output value when guard time.
7	IDLE_VALUE	PWM3 output value when idle state.
6:4	RESV1	Select Random Generator mode
3	CLKSEL	<p>Select PWM3 clock</p> <p>0: CLK= 100KHz 1: CLK= 40MHz</p>
2:0	CLKDIV	<p>Select PWM3 clock scale.</p> <p>000: CLK Hz 001: CLK/2 Hz 010: CLK/4 Hz 011: CLK/8 Hz 100: CLK/16 Hz 101: CLK/32 Hz 110: CLK/64 Hz 111: CLK/128 Hz</p>

100050D4 PWM3 HDUR PWM3 High Duration register **00000000**
ATION **1**

Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	HDURATION																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	HDURATION	PWM3 pulse duration based on the current clock when PWM output is high. If duration =N, need to program N-1 in this register. Note: The duration of PWM must not be 0.

**100050D8 PWM3_LDUR
ATION** **PWM3 Low Duration register** **00000001**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	LDURATION															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	LDURATION	PWM3 pulse duration based on the current clock when PWM output is low. If duration =N, need to program N-1 in this register. Note: The duration of PWM must not be 0.

**100050DC PWM3_GDUR
ATION** **PWM3 Guard Duration register** **00000000**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GUARD_DURATION															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	GUARD_DURATION	

**100050F0 PWM3_SEND
DATA0** **PWM3 Send Data0 register** **00000000**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SEND_DATA0[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SEND_DATA0[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	SEND_DATA0	PWM3 local buffer0 of pulse sequence data to be generated. Note: This value should be written only in periodically FIFO mode. In other mode, this buffer is for internal memory access.

100050F4 <u>PWM3_SEND DATA1</u>																00000000 0	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	SEND_DATA1[31:16]																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	SEND_DATA1[15:0]																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:0	SEND_DATA1	PWM3 local buffer0 of pulse sequence data to be generated. Note: This value should be written only in periodically FIFO mode. In other mode, this buffer is for internal memory access.

100050F8 <u>PWM3_WAVE NUM</u>																00000000 0	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESV																
Type	RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	WAVE_NUM																
Type	RW																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	WAVE_NUM	The number by which PWM3 will generate from the pulse data repeatedly. Note: If WAVE_NUM=0, the waveform generation will not stop until it is disabled.

100050FC <u>PWM3_DATA WIDTH</u>																00000000 0	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	RESV[18:3]																
Type	RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RESV[2:0]																
Type	RO																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:13	RESV	RESERVED
12:0	DATA_WIDTH	The PWM3 pulse data width in the old PWM mode.

10005100 PWM3_THRE PWM3 Thresh register **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV[18:3]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV[2:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:13	RESV	RESERVED
12:0	THRESH	The PWM3 pulse data high/low switching threshold in the old PWM mode.

10005104 PWM3_SEND_WAVENUM PWM3 Send Wave Number register **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	SEND_WAVENUM															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	RESV	RESERVED
15:0	SEND_WAVENUM	The number by which PWM3 has already generated from the specified data source in the periodical mode.

1000520C PWM_EN_STATUS PWM Enable Status register **00000000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESV[27:12]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESV[11:0]															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:4	RESV	RESERVED
3	PWM3_EN_ST	PWM3 enable status
2	PWM2_EN_ST	PWM2 enable status
1	PWM1_EN_ST	PWM1 enable status
0	PWM0_EN_ST	PWM0 enable status

5.18 Frame Engine

5.18.1 Registers

SDM Changes LOG

Revision	Date	Author	Change Log
0.1	2013/5/27	PeterCT WU	Initialization

Module name: SDM Base address: (+10100000h)

Address	Name	Width	Register Function
10100800	<u>TX_BASE_PTR_0</u>	32	TX Ring #0 Base Pointer
10100804	<u>TX_MAX_CNT_0</u>	32	TX Ring #0 Maximum Count
10100808	<u>TX_CTX_IDX_0</u>	32	TX Ring #0 CPU pointer
1010080C	<u>TX_DTX_IDX_0</u>	32	TX Ring #0 DMA poitner
10100810	<u>TX_BASE_PTR_1</u>	32	TX Ring #1 Base Pointer
10100814	<u>TX_MAX_CNT_1</u>	32	TX Ring #1 Maximum Count
10100818	<u>TX_CTX_IDX_1</u>	32	TX Ring #1 CPU pointer
1010081C	<u>TX_DTX_IDX_1</u>	32	TX Ring #1 DMA poitner
10100820	<u>TX_BASE_PTR_2</u>	32	TX Ring #2 Base Pointer
10100824	<u>TX_MAX_CNT_2</u>	32	TX Ring #2 Maximum Count
10100828	<u>TX_CTX_IDX_2</u>	32	TX Ring #2 CPU pointer
1010082C	<u>TX_DTX_IDX_2</u>	32	TX Ring #2 DMA poitner
10100830	<u>TX_BASE_PTR_3</u>	32	TX Ring #3 Base Pointer
10100834	<u>TX_MAX_CNT_3</u>	32	TX Ring #3 Maximum Count
10100838	<u>TX_CTX_IDX_3</u>	32	TX Ring #3 CPU pointer
1010083C	<u>TX_DTX_IDX_3</u>	32	TX Ring #3 DMA poitner
10100900	<u>RX_BASE_PTR_0</u>	32	RX Ring #0 Base Pointer
10100904	<u>RX_MAX_CNT_0</u>	32	RX Ring #0 Maximum Count
10100908	<u>RX_CRX_IDX_0</u>	32	RX Ring #0 CPU pointer
1010090C	<u>RX_DRX_IDX_0</u>	32	RX Ring #0 DMA poitner
10100910	<u>RX_BASE_PTR_1</u>	32	RX Ring #1 Base Pointer
10100914	<u>RX_MAX_CNT_1</u>	32	RX Ring #1 Maximum Count
10100918	<u>RX_CRX_IDX_1</u>	32	RX Ring #1 CPU pointer
1010091C	<u>RX_DRX_IDX_1</u>	32	RX Ring #1 DMA poitner
10100A00	<u>PDMA_INFO</u>	32	PDMA Information
10100A04	<u>PDMA_GLO_CFG</u>	32	PDMA Global Configuration
10100A0C	<u>DELAY_INT_CF_G</u>	32	Delay Interrupt Configuration
10100A10	<u>FREEQ_THRES</u>	32	Free Queue Threshold
10100A20	<u>INT_STATUS</u>	32	Interrupt Status
10100A28	<u>INT_MASK</u>	32	Interrupt Mask

10100A80	<u>PDMA SCH</u>	32	Scheduler Configuration for Q0&Q1
10100A84	<u>PDMA WRR</u>	32	Scheduler Configuration for Q2&Q3
10100C00	<u>SDM CON</u>	32	Switch DMA Control
10100C04	<u>SDM RING</u>	32	Switch DMA Rx Ring
10100C08	<u>SDM TRING</u>	32	Switch DMA TX Ring
10100C0C	<u>SDM MAC AD RL</u>	32	Switch MAC Address LSB
10100C10	<u>SDM MAC AD RH</u>	32	Switch MAC Address MSB
10100D00	<u>SDM TPCNT</u>	32	Switch DMA Tx Packet Count
10100D04	<u>SDM TBCNT</u>	32	Switch DMA TX Byte Count
10100D08	<u>SDM RPCNT</u>	32	Switch DMA RX Packet Count
10100D0C	<u>SDM RBCNT</u>	32	Switch DMA RX Byte Count
10100D10	<u>SDM CS_ERR</u>	32	Switch DMA RX Checksum Error

10100800 TX_BASE_PT_R_0 TX Ring #0 Base Pointer **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	<u>TX_BASE_PTR[31:16]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>TX_BASE_PTR[15:0]</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	TX_BASE_PTR	Point to the base address of TX Ring #0 (4-DW aligned address)

10100804 TX_MAX_CNT_0 TX Ring #0 Maximum Count **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>TX_MAX_CNT</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_MAX_CNT	The maximum number of TXD count in TX Ring #0

10100808 TX_CTX_IDX_0 TX Ring #0 CPU pointer **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	<u>TX_CTX_IDX</u>															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_CTX_IDX	Point to the next TXD CPU wants to use

1010080C TX_DTX_IDX TX Ring #0 DMA poitner **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_DTX_IDX	Point to the next TXD DMA wants to use

10100810 TX_BASE_PT TX Ring #1 Base Pointer **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	TX_BASE_PTR	Point to the base address of TX Ring #0 (4-DW aligned address)

10100814 TX_MAX_CNT TX Ring #1 Maximum Count **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_MAX_CNT	The maximum number of TXD count in TX Ring #0

10100818 TX_CTX_IDX TX Ring #1 CPU pointer **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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Bit(s)	Name	Description
11:0	TX_CTX_IDX	Point to the next TXD CPU wants to use

1010081C TX_DTX_IDX_1 TX Ring #1 DMA poitner **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_DTX_IDX	Point to the next TXD DMA wants to use

10100820 TX_BASE_PTR_R_2 TX Ring #2 Base Pointer **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	TX_BASE_PTR	Point to the base address of TX Ring #0 (4-DW aligned address)

10100824 TX_MAX_CNT_2 TX Ring #2 Maximum Count **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_MAX_CNT	The maximum number of TXD count in TX Ring #0

10100828 TX_CTX_IDX_2 TX Ring #2 CPU pointer **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																TX_CTX_IDX
Type																RW
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_CTX_IDX	Point to the next TXD CPU wants to use

1010082C TX_DTX_IDX_2 TX Ring #2 DMA poitner 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																TX_DTX_IDX
Type																RO
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_DTX_IDX	Point to the next TXD DMA wants to use

10100830 TX_BASE_PT_R_3 TX Ring #3 Base Pointer 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																TX_BASE_PTR[31:16]
Type																RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																TX_BASE_PTR[15:0]
Type																RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	TX_BASE_PTR	Point to the base address of TX Ring #0 (4-DW aligned address)

10100834 TX_MAX_CNT_3 TX Ring #3 Maximum Count 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																TX_MAX_CNT
Type																RW
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_MAX_CNT	The maximum number of TXD count in TX Ring #0

10100838 TX_CTX_IDX_3 TX Ring #3 CPU pointer 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
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Bit(s)	Name	Description
11:0	TX_CTX_IDX	Point to the next TXD CPU wants to use

1010083C TX DTX IDX TX Ring #3 DMA poitner **00000000 0**

Bit(s)	Name	Description
11:0	TX_DTX_IDX	Point to the next TXD DMA wants to use

10100900 RX_BASE_PT RX Ring #0 Base Pointer **00000000**
R_0 0

Bit(s)	Name	Description
31:0	RX_BASE_PTR	Point to the base address of RX Ring #0 (4-DW aligned address)

Bit(s)	Name	Description
11:0	TX_MAX_CNT	The maximum number of RXD count in RX Ring #0

10100908 RX CRX IDX RX Ring #0 CPU pointer 00000000

0																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name					TX_CTX_IDX											
Type					RW											
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_CTX_IDX	Point to the next RXD CPU wants to use

1010090C	RX_DRX_IDX	RX Ring #0 DMA poitner	00000000
	0		0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name					RX_DRX_IDX											
Type					RO											
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	RX_DRX_IDX	Point to the next RXD DMA wants to use

10100910	RX_BASE_PT	RX Ring #1 Base Pointer	00000000
	R_1		0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name					RX_BASE_PTR[31:16]											
Type					RW											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name					RX_BASE_PTR[15:0]											
Type					RW											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	RX_BASE_PTR	Point to the base address of RX Ring #0 (4-DW aligned address)

10100914	RX_MAX_CNT	RX Ring #1 Maximum Count	00000000
	1		0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name					TX_MAX_CNT											
Type					RW											
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_MAX_CNT	The maximum number of RXD count in RX Ring #0

10100918	RX_CRX_IDX	RX Ring #1 CPU pointer	00000000
	1		0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	TX_CTX_IDX	Point to the next RXD CPU wants to use

1010091C	RX_DRX_IDX	RX Ring #1 DMA pointer	00000000
	1		0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset					0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
11:0	RX_DRX_IDX	Point to the next RXD DMA wants to use

10100A00	PDMA_INFO	PDMA Information	1C00020
			4

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset					1	1	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0

Bit(s)	Name	Description
27:24	INDEX_WIDTH	Point to the next RXD CPU wants to use
23:16	BASE_PTR_WIDTH	Base pointer width, x Base_addr[31:32-x] is shared with all ring base adderss. Only ring #0 base address[31:32-x] field is writabl. [note]: "0" means no bit of base_address is shared.
15:8	RX_RING_NUM	Rx ring number
7:0	TX_RING_NUM	Tx ring number

10100A04	PDMA_GLO_CFG	PDMA Global Configuration	0000005
			0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																

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Reset			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0	0
Name									BIG_EN_DIAN	TX_WB_D_DON	PDMA_BT_SIZE	RX_DM_A_BU_Sy	RX_DM_A_E_N	TX_DM_A_BU_Sy	TX_DM_A_E_N			
Type									RW	RW	RW	RO	RW	RO	RW			
Reset									0	1	0	1	0	0	0	0	0	0

Bit(s)	Name	Description
29:16	HDR_SEG_LEN	Header Segment Length Specify the header segment size in byte to support RX header/payload scattering function, when set to a non-zero value. When set to zero, the header/payload scattering feature is disabled.
7	BIG_ENDIAN	Big endian 0: PDMA will not do byte swapping for TX/RX packet header and payload 1: PDMA will do byte swapping for TX/RX packet header and payload
6	TX_WB_DDONE	0: Disable TX_DMA writing back DDONE into TXD 1: Enable TX_DMA writing back DDONE into TXD
5:4	PDMA_BT_SIZE	The burst size of PDMA 0: 4 DWORDs (16-bytes) 1: 8 DWORDs (32-bytes) 2: 16 DWORDs (64-bytes) 3: Reserved
3	RX_DMA_BUSY	0: RX_DMA is not busy 1: RX_DMA is busy
2	RX_DMA_EN	0: Disable RX_DMA (when disabled, RX_DMA will finish the current receiving packet, then stop) 1: Enable RX_DMA
1	TX_DMA_BUSY	0: TX_DMA is not busy 1: TX_DMA is busy
0	TX_DMA_EN	0: Disable TX_DMA (when disabled, TX_DMA will finish the current sending packet, then stop) 1: Enable TX_DMA

10100A0C DELAY_INT_C Delay Interrupt Configuration 00000000

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name	TX_DL_Y_I_NT_EN	TXMAX_PINT								TXMAX_PTIME							
Type	RW	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	RX_DL_Y_I_NT_EN	RXMAX_PINT								RXMAX_PTIME							
Type	RW	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31	TXDLY_INT_EN	Delay interrupt mechanism 0: Disable TX delayed interrupt mechanism 1: Enable Tx delayed interrupt mechanism
30:24	TXMAX_PINT	Specified Max. number of pended interrupts When the number of pended interrupts is equal or greater than the value

Bit(s)	Name	Description
23:16	TXMAX_PTIME	<p>specified here or interrupt pending time reach the limit (see below), an final TX_DLY_INT is generated.</p> <p>[Note] reset to 0 can disable pending interrupt count check.</p> <p>Specified Max. pended time</p> <p>When the pending time is equal or greater than TXMAX_PTIME x 20us or the number of pended TX_DONE is equal or greater than TXMAX_PINT (see above), an final TX_DLY_INT is generated.</p> <p>[Note] reset to 0 can disable pending interrupt time check.</p>
15	RXDLY_INT_EN	0: Disable Rx delayed interrupt mechanism 1: Enable Rx delayed interrupt mechanism
14:8	RXMAX_PINT	<p>Specified Max. number of pended interrupts</p> <p>When the number of pended interrupts is equal or greater than the value specified here or interrupt pending time reach the limit (see below), an final RX_DLY_INT is generated.</p> <p>[Note] reset to 0 can disable pending interrupt count check.</p>
7:0	RXMAX_PTIME	<p>Specified Max. pended time</p> <p>When the pending time is equal or greater than RXMAX_PTIME x 20us or the number of pended RX_DONE is equal or greater than RXMAX_PINT (see above), an final RX_DLY_INT is generated.</p> <p>[Note] reset to 0 can disable pending interrupt time check.</p>

10100A10 <u>FREEQ_THRE</u> Free Queue Threshold																0000000		
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	S	2
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	FREEQ_THRES	
Name																	RW	
Type																		
Reset													0	0	1	0		

Bit(s)	Name	Description
3:0	FREEQ_THRES	<p>Rx free queue threshold</p> <p>PDMA will stop DMA interface when left RX descriptors reach this threshold</p>

10100A20 <u>INT_STATUS</u> Interrupt Status																0000000	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	0
Bit	RX_CO HE RE NT	RX_DL Y_I NT	TX_CO HE RE NT	TX_DL Y_I NT												TX_DO NE_INT 1	RX_DO NE_INT 0
Name	W1 C	W1 C	W1 C	W1 C												W1 C	W1 C
Type	0	0	0	0												0	0
Reset																	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name													TX_DO NE_INT 3	TX_DO NE_INT 2	TX_DO NE_INT 1	TX_DO NE_INT 0	
Type													W1 C	W1 C	W1 C	W1 C	
Reset													0	0	0	0	

Bit(s)	Name	Description
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Bit(s)	Name	Description
31	RX_COHERENT	RX_DMA finds data coherent event while checking ddone bit.
30	RX_DLY_INT	Summary of the whole PDMA Rx related interrupts.
29	TX_COHERENT	TX_DMA finds data coherent event while checking ddone bit.
28	TX_DLY_INT	Summary of the whole PDMA Tx related interrupts.
17	RX_DONE_INT1	Rx ring #1 packet receive interrupt
16	RX_DONE_INT0	Rx ring #0 packet receive interrupt
3	TX_DONE_INT3	Tx ring #3 packet transmit interrupt
2	TX_DONE_INT2	Tx ring #2 packet transmit interrupt
1	TX_DONE_INT1	Tx ring #1 packet transmit interrupt
0	TX_DONE_INT0	Tx ring #0 packet transmit interrupt

10100A28 <u>INT MASK</u> Interrupt Mask																00000000			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16			
Name	RX_CO HE RE NT	RX_DL Y_I RE NT	TX_CO HE RE NT	TX_DL Y_I RE NT												RX_DO NE INT 1	RX_DO NE INT 0		
Type	RW	RW	RW	RW												RW	RW		
Reset	0	0	0	0												0	0		
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
Name																TX_DO NE INT 3	TX_DO NE INT 2	TX_DO NE INT 1	TX_DO NE INT 0
Type																RW	RW	RW	RW
Reset																0	0	0	0

Bit(s)	Name	Description
31	RX_COHERENT	Interrupt enable for RX_DMA data coherent vent 0: Disable interrupt 1: Enable interrupt
30	RX_DLY_INT	Summary of the whole PDMA Rx related interrupts. 0: Disable interrupt 1: Enable interrupt
29	TX_COHERENT	Interrupt enable for TX_DMA data coherent vent 0: Disable interrupt 1: Enable interrupt
28	TX_DLY_INT	Summary of the whole PDMA Tx related interrupts. 0: Disable interrupt 1: Enable interrupt
17	RX_DONE_INT1	Rx ring #1 packet receive interrupt 0: Disable interrupt 1: Enable interrupt
16	RX_DONE_INT0	Rx ring #0 packet receive interrupt 0: Disable interrupt 1: Enable interrupt
3	TX_DONE_INT3	Tx ring #3 packet transmit interrupt 0: Disable interrupt 1: Enable interrupt
2	TX_DONE_INT2	Tx ring #2 packet transmit interrupt 0: Disable interrupt 1: Enable interrupt
1	TX_DONE_INT1	Tx ring #1 packet transmit interrupt

Bit(s)	Name	Description
0	TX_DONE_INTERRUPT	0: Disable interrupt 1: Enable interrupt
0	Tx ring #0 packet transmit interrupt	0: Disable interrupt 1: Enable interrupt

10100A80 PDMA_SCH Scheduler Configuration for Q0&Q1 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name							SCH_MODE_E									
Type							RW									
Reset							0 0									
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
25:24	SCH_MODE	Scheduling Mode
		00: WRR
		01: Strict priority, Q3>Q2,Q1>Q0
		10: Mixed mode, Q3>WRR(Q2,Q1,Q0)
		11: Mixed mode, Q3>Q2>WRR(Q1,Q0)

10100A84 PDMA_WRR Scheduler Configuration for Q2&Q3 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name			SCH_WT_Q3				SCH_WT_Q2			SCH_WT_Q1			SCH_WT_Q0			
Type			RW				RW			RW			RW			
Reset	0	0	0				0	0	0		0	0	0		0	0

Bit(s)	Name	Description
14:12	SCH_WT_Q3	Scheduling Weight of TX Q3
10:8	SCH_WT_Q2	Scheduling Weight of TX Q2
6:4	SCH_WT_Q1	Scheduling Weight of TX Q1
2:0	SCH_WT_Q0	Scheduling Weight of TX Q0

10100C00 SDM_CON Switch DMA Control 00078100

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name									PD_MA_FC	PO_RT_MA_P	LO_OP_EN	TC_O_8_1xx	UND_ROPE_N	UDPC_S	TCPC_S	IPCS
Type									RW	RW	RW	RW	RW	RW	RW	RW
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									EXT_VLAN							
Type									RW							

Reset	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Bit(s)	Name	Description														
31:24	REV0	Reserved														
23	PDMA_FC	TX PDMA Flow Control Enable														
		When this bit is set, the downstream flow control is enabled on PDMA 4 TX Ring (SDM_TRGING) 0: Disable 1: Enable														
22	PORT_MAP	RX Ring Selection														
		The received frame will be collected into the corresponding PDMA RX Ring based on the source port priority tag. 0: Priority Tag (SDMRRING[7:0]) 1: Source Port (SDM_RRING[12:8])														
21	LOOP_EN	Frame Engine Loop-back Mode Enable														
20	TCO_81xx	Special tag Reorganization Enable														
		When this bit is set, PDI(0x81xx) is recognized by the first byte (0x81) only. The second byte could be used for the specific purpose like the incoming source port.														
19	UN_DROP_EN	Drop Unknown MAC Address														
		0: Disable 1: Enable														
18	UDPCS	UDP Packet Checksum RX Offload Enable														
		0: disable, checksum result is showed on RX descriptor 1: enable, drop checksum error packet														
17	TCPCS	TCP Packet Checksum RX Offload Enable														
		0: disable, checksum result is showed on RX descriptor 1: enable, drop checksum error packet														
16	IPCS	IP Header Checksum RX Offload Enable														
		0: disable, checksum result is showed on RX descriptor 1: enable, drop checksum error packet														
15:0	EXT_VLAN	Outer VLAN Protocol ID														
		The specific value is used to recognize the outer VLAN protocol ID only. Per inner VLAN or the general VLAN-tagged frame, the value PID=0x8100 is the unique protocol ID.														

10100C04 SDM_RING Switch DMA Rx Ring 00000000

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	REV0														QU	
Type	RO														RW	
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
Name	PO RT4 RI NG														PRI 7_R ING	
Type	RW														RW	
Reset	0														0	

Bit(s)	Name	Description
31:20	REV0	Reserved
19	QUE3_RING_FC	Pause Switch Queue 3 by RX Ring## When RX Ring# reaches the reserved free threshold(FREEQ_THRES), the queue 3 to CPU will be paused.

Bit(s)	Name	Description
18	QUE2_RING_FC	<p>1: RX Ring #0 0: RX Ring #1</p> <p>Pause Switch Queue 2 by RX Ring##</p> <p>When RX Ring# reaches the reserved free threshold(FREEQ_THRES), the queue 3 to CPU will be paused.</p> <p>1: RX Ring #0 0: RX Ring #1</p>
17	QUE1_RING_FC	<p>Pause Switch Queue 1 by RX Ring##</p> <p>When RX Ring# reaches the reserved free threshold(FREEQ_THRES), the queue 3 to CPU will be paused.</p> <p>1: RX Ring #0 0: RX Ring #1</p>
16	QUE0_RING_FC	<p>Pause Switch Queue 0 by RX Ring##</p> <p>When RX Ring# reaches the reserved free threshold(FREEQ_THRES), the queue 3 to CPU will be paused.</p> <p>1: RX Ring #0 0: RX Ring #1</p>
12	PORT4_RING	<p>Source Port 4 to RX Ring##</p> <p>The received frames from the source port 4 will be sent to RX Ring# [Note] To use the source port, the special tag between FE and SW should be enabled.</p> <p>1: RX Ring #0 0: RX Ring #1</p>
11	PORT3_RING	<p>Source Port 3 to RX Ring##</p> <p>The received frames from the source port 4 will be sent to RX Ring# [Note] To use the source port, the special tag between FE and SW should be enabled.</p> <p>1: RX Ring #0 0: RX Ring #1</p>
10	PORT2_RING	<p>Source Port 2 to RX Ring##</p> <p>The received frames from the source port 4 will be sent to RX Ring# [Note] To use the source port, the special tag between FE and SW should be enabled.</p> <p>1: RX Ring #0 0: RX Ring #1</p>
9	PORT1_RING	<p>Source Port 1 to RX Ring##</p> <p>The received frames from the source port 4 will be sent to RX Ring# [Note] To use the source port, the special tag between FE and SW should be enabled.</p> <p>1: RX Ring #0 0: RX Ring #1</p>
8	PORT0_RING	<p>Source Port 0 to RX Ring##</p> <p>The received frames from the source port 4 will be sent to RX Ring# [Note] To use the source port, the special tag between FE and SW should be enabled.</p> <p>1: RX Ring #0 0: RX Ring #1</p>
7	PRI7_RING	<p>Priority 7 to RX Ring##</p> <p>The received frames with priority tag 7 will be sent to RX Ring#</p> <p>1: RX Ring #0 0: RX Ring #1</p>
6	PRI6_RING	<p>Priority 6 to RX Ring##</p> <p>The received frames with priority tag 6 will be sent to RX Ring#</p> <p>1: RX Ring #0 0: RX Ring #1</p>
5	PRI5_RING	<p>Priority 5 to RX Ring##</p> <p>The received frames with priority tag 5 will be sent to RX Ring#</p> <p>1: RX Ring #0 0: RX Ring #1</p>
4	PRI4_RING	<p>Priority 4 to RX Ring##</p> <p>The received frames with priority tag 4 will be sent to RX Ring#</p>

Bit(s)	Name	Description
3	PRI3_RING	<p>1: RX Ring #0 0: RX Ring #1</p> <p>Priority 3 to RX Ring## The received frames with priority tag 3 will be sent to RX Ring# 1: RX Ring #0 0: RX Ring #1</p>
2	PRI2_RING	<p>Priority 2 to RX Ring## The received frames with priority tag 2 will be sent to RX Ring# 1: RX Ring #0 0: RX Ring #1</p>
1	PRI1_RING	<p>Priority 1to RX Ring## The received frames with priority tag 1 will be sent to RX Ring# 1: RX Ring #0 0: RX Ring #1</p>
0	PRI0_RING	<p>Priority 0 to RX Ring## The received frames with priority tag 0 will be sent to RX Ring# 1: RX Ring #0 0: RX Ring #1</p>

10100C08 SDM TRING Switch DMA TX Ring 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RING3_WAN_FC				RING2_WAN_FC				RING1_WAN_FC				RING0_WAN_FC			
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RING3_LAN_FC				RING2_LAN_FC				RING1_LAN_FC				RING0_LAN_FC			
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:28	RING3_WAN_FC	<p>Pause TX Ring 3 by WAN Port TX Ring# will be paused when the corresponding switch egress queue on WAN port is congested. Bit.3: WAN port Queue#3 Bit.2: WAN port Queue#2 Bit.1: WAN port Queue#1 Bit.0: WAN port Queue#0</p>
27:24	RING2_WAN_FC	<p>Pause TX Ring 2 by WAN Port TX Ring# will be paused when the corresponding switch egress queue on WAN port is congested. Bit.3: WAN port Queue#3 Bit.2: WAN port Queue#2 Bit.1: WAN port Queue#1 Bit.0: WAN port Queue#0</p>
23:20	RING1_WAN_FC	<p>Pause TX Ring 1 by WAN Port TX Ring# will be paused when the corresponding switch egress queue on WAN port is congested. Bit.3: WAN port Queue#3 Bit.2: WAN port Queue#2 Bit.1: WAN port Queue#1 Bit.0: WAN port Queue#0</p>
19:16	RING0_WAN_FC	<p>Pause TX Ring 0 by WAN Port TX Ring# will be paused when the corresponding switch egress queue on WAN port is congested. Bit.3: WAN port Queue#3 Bit.2: WAN port Queue#2 Bit.1: WAN port Queue#1 Bit.0: WAN port Queue#0</p>

Bit(s)	Name	Description
15:12	RING3_LAN_FC	Pause TX Ring 3 by LAN Port TX Ring# will be paused when the corresponding switch egress queue on WAN port is congested. Bit.3: LAN port Queue#3 Bit.2: LAN port Queue#2 Bit.1: LAN port Queue#1 Bit.0: LAN port Queue#0
11:8	RING2_LAN_FC	Pause TX Ring 2 by LAN Port TX Ring# will be paused when the corresponding switch egress queue on WAN port is congested. Bit.3: LAN port Queue#3 Bit.2: LAN port Queue#2 Bit.1: LAN port Queue#1 Bit.0: LAN port Queue#0
7:4	RING1_LAN_FC	Pause TX Ring 1 by LAN Port TX Ring# will be paused when the corresponding switch egress queue on WAN port is congested. Bit.3: LAN port Queue#3 Bit.2: LAN port Queue#2 Bit.1: LAN port Queue#1 Bit.0: LAN port Queue#0
3:0	RING0_LAN_FC	Pause TX Ring 0 by LAN Port TX Ring# will be paused when the corresponding switch egress queue on WAN port is congested. Bit.3: LAN port Queue#3 Bit.2: LAN port Queue#2 Bit.1: LAN port Queue#1 Bit.0: LAN port Queue#0

10100C0C SDM_MAC_A DRL Switch MAC Address LSB																00000000 0				
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name	MAC_ADDR_LSB[31:16]																			
Type	RW																			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name	MAC_ADDR_LSB[15:0]																			
Type	RW																			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:0	MAC_ADDR_LSB	MAC Address bit[31:0]

10100C10 SDM_MAC_A DRH Switch MAC Address MSB																00000000 0				
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name	MAC_ADDR_MSB																			
Type	RW																			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name	MAC_ADDR_MSB																			
Type	RW																			
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
15:0	MAC_ADDR_MSB	MAC Address bit[47:32]

10100D00 SDM_TPCNT Switch DMA Tx Packet Count **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	TX_PCNT	Transmit Packet Count

10100D04 SDM_TBCNT Switch DMA TX Byte Count **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	TX_BCNT	Transmit Byte Count

10100D08 SDM_RPCNT Switch DMA RX Packet Count **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	RX_PCNT	Receive Packet Count

10100D0C SDM_RBCNT Switch DMA RX Byte Count **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0		

Bit(s)	Name	Description
31:0	RX_BCNT	Receive Byte Count

Bit(s)	Name	Description
31:0	CS_ERR_CNT	Receive Checksum Error Count

5.19 Switch Controller

5.19.1 Registers

ESW Changes LOG

Revision	Date	Author	Change Log
0.1	2013/5/29	PeterCT WU	Initialization

Module name: ESW Base address: (+10110000h)

Address	Name	Width	Register Function
10110000	<u>ISR</u>	32	Interrupt Status
10110004	<u>IMR</u>	32	Interrupt Mask
10110008	<u>FCT0</u>	32	Flow Control Threshold 0
1011000C	<u>FCT1</u>	32	Flow Control Threshold 1
10110010	<u>PFC0</u>	32	Priority Flow Control 0
10110014	<u>PFC1</u>	32	Priority Flow Control 1
10110018	<u>PFC2</u>	32	Priority Flow Control 2
1011001C	<u>GQS0</u>	32	Global Queue Status 0
10110020	<u>GQS1</u>	32	Global Queue Status 1
10110024	<u>ATS</u>	32	Address Table Search
10110028	<u>ATS0</u>	32	Address Table Status 0
1011002C	<u>ATS1</u>	32	Address Table Status 1
10110030	<u>ATS2</u>	32	Address Table Status 2
10110034	<u>WMAD0</u>	32	WT_MAC_AD0
10110038	<u>WMAD1</u>	32	WT_MAC_AD1
1011003C	<u>WMAD2</u>	32	WT_MAC_AD2
10110040	<u>PVIDC0</u>	32	PVID Configuration 0
10110044	<u>PVIDC1</u>	32	PVID Configuration 1
10110048	<u>PVIDC2</u>	32	PVID Configuration 2
1011004C	<u>PVIDC3</u>	32	PVID Configuration 3
10110050	<u>VLANI0</u>	32	VLAN Identifier 0
10110054	<u>VLANI1</u>	32	VLAN Identifier 1
10110058	<u>VLANI2</u>	32	VLAN Identifier 2
1011005C	<u>VLANI3</u>	32	VLAN Identifier 3
10110060	<u>VLANI4</u>	32	VLAN Identifier 4
10110064	<u>VLANI5</u>	32	VLAN Identifier 5
10110068	<u>VLANI6</u>	32	VLAN Identifier 6
1011006C	<u>VLANI7</u>	32	VLAN Identifier 7
10110070	<u>VMSC0</u>	32	VLAN Member Port Configuration 0
10110074	<u>VMSC1</u>	32	VLAN Member Port Configuration 1
10110078	<u>VMSC2</u>	32	VLAN Member Port Configuration 2
1011007C	<u>VMSC3</u>	32	VLAN Member Port Configuration 3
10110080	<u>POA</u>	32	Port Ability Offset
10110084	<u>FPA</u>	32	Force Port4 - Port0 Ability
10110088	<u>PTS</u>	32	Port Status
1011008C	<u>SOCPC</u>	32	SoC Port Control
10110090	<u>POC0</u>	32	Port Control 0
10110094	<u>POC1</u>	32	Port Control 1
10110098	<u>POC2</u>	32	Port Control 2

1011009C	<u>SGC</u>	32	Switch Global Control
101100A0	<u>STRT</u>	32	Switch Reset
101100A4	<u>LEDP0</u>	32	LED Port0
101100A8	<u>LEDP1</u>	32	LED Port1
101100AC	<u>LEDP2</u>	32	LED Port2
101100B0	<u>LEDP3</u>	32	LED Port3
101100B4	<u>LEDP4</u>	32	LED Port4
101100B8	<u>WDTR</u>	32	Watch Dog Trigger Reset
101100BC	<u>DES</u>	32	Debug Signal
101100C0	<u>PCR0</u>	32	PHY Control Register 0
101100C4	<u>PCR1</u>	32	PHY Control Register 1
101100C8	<u>FPA1</u>	32	Force P5P6 Ability
101100CC	<u>FCT2</u>	32	Flow Control Threshold 2
101100D0	<u>QSS0</u>	32	Queue Status 0
101100D4	<u>QSS1</u>	32	Queue Status 1
101100D8	<u>DEC</u>	32	Debug Control
101100DC	<u>MTI</u>	32	Memory Test Information
101100E0	<u>PPC</u>	32	Packet Counter
101100E4	<u>SGC2</u>	32	Switch Global Control 2
101100E8	<u>P0PC</u>	32	Port 0 Packet Counter
101100EC	<u>P1PC</u>	32	Port 1 Packet Counter
101100F0	<u>P2PC</u>	32	Port 2 Packet Counter
101100F4	<u>P3PC</u>	32	Port 3 Packet Counter
101100F8	<u>P4PC</u>	32	Port 4 Packet Counter
101100FC	<u>P5PC</u>	32	Port 5 Packet Counter
10110100	<u>VUB0</u>	32	VLAN Untag Block 0
10110104	<u>VUB1</u>	32	VLAN Untag Block 1
10110108	<u>VUB2</u>	32	VLAN Untag Block 2
1011010C	<u>VUB3</u>	32	VLAN Untag Block 3
10110110	<u>BMU_CTRL</u>	32	BC/MC/UN Rate Limit Control
10110114	<u>BMU_LMT_NU_M1</u>	32	BC/MC/UN Rate Limit Frame Number
10110118	<u>BMU_LMT_NU_M2</u>	32	BC/MC/UN Rate Limit Frame Number
1011011C	<u>P01_ING_CTRL</u>	32	Port 0&1 Ingress Rate Limit Control
10110120	<u>P23_ING_CTRL</u>	32	Port 2&3 Ingress Rate Limit Control
10110124	<u>P45_ING_CTRL</u>	32	Port 4&5 Ingress Rate Limit Control
10110128	<u>P0_ING_THRESH</u>	32	Port 0 Ingress Rate Limit Threshold
1011012C	<u>P1_ING_THRESH</u>	32	Port 1 Ingress Rate Limit Threshold
10110130	<u>P2_ING_THRESH</u>	32	Port 2 Ingress Rate Limit Threshold
10110134	<u>P3_ING_THRESH</u>	32	Port 3 Ingress Rate Limit Threshold
10110138	<u>P4_ING_THRESH</u>	32	Port 4 Ingress Rate Limit Threshold
1011013C	<u>P5_ING_THRESH</u>	32	Port 5 Ingress Rate Limit Threshold
10110140	<u>P01_EG_CTRL</u>	32	Port 0/1 Egress Rate Limit Control
10110144	<u>P23_EG_CTRL</u>	32	Port 2/3 Egress Rate Limit Control
10110148	<u>P45_EG_CTRL</u>	32	Port 4/5 Egress Rate Limit Control
1011014C	<u>PCRI</u>	32	Packet Counter Recycle Indication
10110150	<u>P0TPC</u>	32	Port 0 TX Packet Counter

10110154	P1TPC	32	Port 1 TX Packet Counter
10110158	P2TPC	32	Port 2 TX Packet Counter
1011015C	P3TPC	32	Port 3 TX Packet Counter
10110160	P4TPC	32	Port 4 TX Packet Counter
10110164	P5TPC	32	Port 5 TX Packet Counter
10110168	LEDC	32	LED Control

		Interrupt Status																00000000
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16		0
Name	REV0		WA TC HD OG 1_T MR EX PIR ED	WA TC HD OG 0_T MR EX PIR ED	HA S_I NT RU DE R	PO RT ST CH G	BC ST OR M	MU ST DR OP _LA N	GL OB AL QU E_F ULL				LA N QU E_F ULL _6	LA N QU E_F ULL _5	LA N QU E_F ULL _4	LA N QU E_F ULL _3	LA N QU E_F ULL _2	
Type	RO		W1 C	W1 C	W1 C	W1 C	W1 C	W1 C	W1 C			W1 C	W1 C	W1 C	W1 C	W1 C		
Reset	0	0	0	0	0	0	0	0	0			0	0	0	0	0		
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Name	LA N QU E_F ULL _1	LA N QU E_F ULL _0																
Type	W1 C	W1 C																
Reset	0	0																

Bit(s)	Name	Description
31:30	REV0	Reserved
29	WATCHDOG1_TMR _EXPIRED	P5 no transmit packet alert. This bit indicating that P5 don't transmit packet for 3 seconds when P5 need to transmit packet. Write one clear. [Note] This feature is only valid when port 5 Giga MAC is implemented.
28	WATCHDOG0_TMR _EXPIRED	Abnormal Alert This bit indicating that global queue block counts is less than buf_starvation_th for 3 seconds. Write one clear.
27	HAS_INTRUDER	Intruder Alert This bit indicating that an unsecured packet is coming into a secured port. Write one clear.
26	PORT_ST_CHG	Port status change Any port from link status change. Write one clear.
25	BC_STORM	BC storm The device is undergoing broadcast storm. Write one clear.
24	MUST_DROP_LAN	Queue exhausted The global queue is used up and all packets are dropped. Write one clear.
23	GLOBAL_QUE_FUL L	Global Queue Full. Write one clear.
20	LAN_QUE_FULL_6	Port 6 out queue full. Write one clear. [Note]: This feature is only valid when port 5 Giga MAC is implemented.
19	LAN_QUE_FULL_5	Port 5 out queue full. Write one clear.
18	LAN_QUE_FULL_4	Port 4 out queue full. Write one clear.
17	LAN_QUE_FULL_3	Port 3 out queue full. Write one clear.

Bit(s)	Name	Description
16	LAN_QUE_FULL_2	Port 2 out queue full. Write one clear.
15	LAN_QUE_FULL_1	Port 1 out queue full. Write one clear.
14	LAN_QUE_FULL_0	Port 0 out queue full. Write one clear.

10110004 IMR **Interrupt Mask** **FFFFFF FF**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name			WA TC HD OG 1_T MR _EX PIR ED	WA TC HD OG 0_T MR _EX PIR ED	HA S_I NT RU DE	PO RT ST CH G	BC ST OR M	MU ST DR OP _LA N	GL OB AL QU E_F ULL	REV1	LA N QU E_F ULL _6	LA N QU E_F ULL _5	LA N QU E_F ULL _4	LA N QU E_F ULL _3	LA N QU E_F ULL _2	
Type			RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW
Reset			1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	LA N QU E_F ULL _1	LA N QU E_F ULL _0														
Type	RW	RW														
Reset	1	1														

Bit(s)	Name	Description
29	WATCHDOG1_TMR _EXPIRED	P5 no transmit packet alert. This bit indicating that P5 don't transmit packet for 3 seconds when P5 need to transmit packet. Write one clear. [Note]: This feature is only valid when port 5 Giga MAC is implemented.
28	WATCHDOG0_TMR _EXPIRED	Abnormal Alert This bit indicating that global queue block counts is less than buf_starvation_th for 3 seconds. Write one clear.
27	HAS_INTRUDER	Intruder Alert This bit indicating that an unsecured packet is coming into a secured port. Write one clear.
26	PORT_ST_CHG	Port status change Any port from link status change. Write one clear.
25	BC_STORM	BC storm The device is undergoing broadcast storm. Write one clear.
24	MUST_DROP_LAN	Queue exhausted The global queue is used up and all packets are dropped. Write one clear.
23	GLOBAL_QUE_FUL L	Global Queue Full. Write one clear.
22:21	REV1	Port 6 out queue full. Write one clear. [Note]: This feature is only valid when port 5 Giga MAC is implemented.
20	LAN_QUE_FULL_6	Port 6 out queue full. Write one clear. [Note]: This feature is only valid when port 5 Giga MAC is implemented.
19	LAN_QUE_FULL_5	Port 5 out queue full. Write one clear.
18	LAN_QUE_FULL_4	Port 4 out queue full. Write one clear.
17	LAN_QUE_FULL_3	Port 3 out queue full. Write one clear.
16	LAN_QUE_FULL_2	Port 2 out queue full. Write one clear.
15	LAN_QUE_FULL_1	Port 1 out queue full. Write one clear.

Bit(s)	Name	Description
14	LAN_QUE_FULL_0	Port 0 out queue full. Write one clear.

10110008 FCT0 **Flow Control Threshold 0** **FFC86E
5A**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	1	1	0	1	1	1	0	0	1	0	1	1	0	1	0

Bit(s)	Name	Description
31:24	FC_RLS_TH	Flow Control Release Threshold Flow control will be disabled when the global queue block counts is greater than the release threshold
23:16	FC_SET_TH	Flow Control Set Threshold Flow control will be enabled when the global queue block counts is less than the set threshold
15:8	DRO_RLS_TH	Drop Release Threshold Switch will stop dropping packets when the global queue block counts is greater than the drop-release threshold
7:0	DROP_SET_TH	Drop Set Threshold Switch will start dropping packets when the global queue block counts is less than the drop-set threshold.

1011000C FCT1 **Flow Control Threshold 1** **0000001
4**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset									0	0	0	1	0	1	0	0

Bit(s)	Name	Description
7:0	PORT_TH	Per Port Output Threshold When the global queue reaches the flow control or drop threshold on register FCT0, per port output threshold will be checked to enable flow-control or packet-drop depending on per queue minimum reserved blocks of the register PFC2.

10110010 PFC0 **Priority Flow Control 0** **0F00000
0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset					1	1	1	1		0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																
VO_NUM																
CL_NUM																
BE_NUM																
BK_NUM																
RW																

Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Bit(s)	Name	Description
27:24	MTCC_LMT	MTCC LIMIT The maximum Back-off count limit to drop excessive collision packets.
22:16	TURN_OFF_FC	Turn off FC When Receiving High Packet Auto-turn-off FC when the programmed ports receive one of the highest priority packet. 0: Disable 1: Enable
15:12	VO_NUM	The proportional number of WRR for Voice Queue After transmit exactly the number of packets then proceed to next queue. If equal to 0, only this queue is forced to the strict priority mode
11:8	CL_NUM	The proportional number of WRR for Control-Load Queue After transmit exactly the number of packet then proceed to next queue.
7:4	BE_NUM	The proportional number of WRR for Best-Effort Queue After transmit exactly the number of packet then proceed to next queue.
3:0	BK_NUM	The proportional number of WRR for Background Queue After transmit exactly the number of packet then proceed to next queue.

10110014 **PFC1** Priority Flow Control 1 0000155
5

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	CP_U_US_E_Q1_EN								IGMP_P_T_O_CP_U							
Type	RW								RW							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	PRI_ORI_TY_OP_TIO_N			PORT_PRI_6	PORT_PRI_5	PORT_PRI_4	PORT_PRI_3	PORT_PRI_2	PORT_PRI_1	PORT_PRI_0						
Type	RW			RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW
Reset	0		0	1	0	1	0	1	0	1	0	1	0	1	0	1

Bit(s)	Name	Description
31	CPU_USE_Q1_EN	CPU Port only use q1 enable 0: default priority resolution 1: packets forwarded to CPU port uses Best-Effort Queue
30:24	EN_TOS	Port6 ~ port0 TOS_en. Check TOS field of IP packets for priority resolution. [Note] Port 5 function is only valid when port 5 Giga MAC is implemented 0: Disable 1: Enable
23	IGMP_TO_CPU	IGMP forward to CPU enable 0: IGMP message will be flooded to all ports 1: IGMP message will be forwarded to CPU port only.
22:16	EN_VLAN	Enable per port VLAN-tag VID membership and priority tag check. [Note] Port 5 function is only valid when port 5 Giga MAC is implemented 0: disable. 1: enable
15	PRIORITY_OPTION	Priority Resolution Option 0: 802.1p -> TOS -> Per port 1: TOS -> 802.1p -> Per port

Bit(s)	Name	Description
13:12	PORT_PRI6	Port priority By setting this register to assign per port's default priority queue.
11:10	PORT_PRI5	Port priority By setting this register to assign per port's default priority queue. [Note] This feature is only valid when port 6 Giga MAC is implemented
9:8	PORT_PRI4	Port priority By setting this register to assign per port's default priority queue.
7:6	PORT_PRI3	Port priority By setting this register to assign per port's default priority queue.
5:4	PORT_PRI2	Port priority By setting this register to assign per port's default priority queue.
3:2	PORT_PRI1	Port priority By setting this register to assign per port's default priority queue.
1:0	PORT_PRI0	Port priority By setting this register to assign per port's default priority queue.

10110018 PFC2**Priority Flow Control 2**

0303030

3

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1

Bit(s)	Name	Description
31:24	PRI_TH_VO	Voice Threshold (Highest Priority) The minimum reserved packet block count which outout queue can store when the flow-control/drop threshold of registers FTC0 and FCT1 is reached. If the queued blocks exceed the threshold, the incoming packet will be paused or dropped.
23:16	PRI_TH_CL	Control Load Threshold The minimum reserved packet block count which outout queue can store when the flow-control/drop threshold of registers FTC0 and FCT1 is reached. If the queued blocks exceed the threshold, the incoming packet will be paused or dropped.
15:8	PRI_TH_BE	Best Effort threshold The minimum reserved packet block count which outout queue can store when the flow-control/drop threshold of registers FTC0 and FCT1 is reached. If the queued blocks exceed the threshold, the incoming packet will be paused or dropped.
7:0	PRI_TH_BK	Background Threshold (Lowest Priority) The minimum reserved packet block count which outout queue can store when the flow-control/drop threshold of registers FTC0 and FCT1 is reached. If the queued blocks exceed the threshold, the incoming packet will be paused or dropped.

1011001C GQS0**Global Queue Status 0**

FA41016

E

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	PRI7_QUE	PRI6_QUE	PRI5_QUE	PRI4_QUE	PRI3_QUE	PRI2_QUE	PRI1_QUE	PRI0_QUE								
Type	RW															
Reset	1	1	1	1	1	0	1	0	0	1	0	0	0	0	0	1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																EMPTY_CNT
Type																RO
Reset																1 0 1 1 0 1 1 1 0

Bit(s)	Name	Description
31:30	PRI7_QUE	Queue mapping for Priority Tag #7
29:28	PRI6_QUE	Queue mapping for Priority Tag #6
27:26	PRI5_QUE	Queue mapping for Priority Tag #5
25:24	PRI4_QUE	Queue mapping for Priority Tag #4
23:22	PRI3_QUE	Queue mapping for Priority Tag #3
21:20	PRI2_QUE	Queue mapping for Priority Tag #2
19:18	PRI1_QUE	Queue mapping for Priority Tag #1
17:16	PRI0_QUE	Queue mapping for Priority Tag #0
8:0	EMPTY_CNT	Global Queue Block Counts This field indicates the number of block count left in the global free queue.

10110020 GQS1 Global Queue Status 1 00000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																OUTQUE_FULL_VO
Type																RO
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																OUTQUE_FULL_BE
Type																RO
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:24	OUTQUE_FULL_VO	Congested Voice Queue The corresponding queue is congested
23:16	OUTQUE_FULL_CL	Congested Control Load Queue The corresponding queue is congested
15:8	OUTQUE_FULL_BE	Congested Best Effort Queue The corresponding queue is congested
7:0	OUTQUE_FULL_BK	Congested Background Queue The corresponding queue is congested

10110024 ATS Address Table Search 00000000
4

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																AT_LK_UP_IDL_E
Type																SE_AR_CH_NX_T_A_DD_R
Reset																RO
																W1_C
																W1_C

Bit(s)	Name	Description
2	AT_LKUP_IDLE	Address Lookup Idle This field indicates that Address Table engine is in IDLE state.
1	SEARCH_NXT_AD DR	Search For The Next Address (Self_Clear)
0	BEGIN_SEARCH_A DDR	Start Searching The Address Table (Self_Clear)

10110028 ATS0 **Address Table Status 0** **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name														R_PORT_MAP[6:4]		
Type															RO	
Reset	0	0	0	0	0	0	0	0	0	0				0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	R_PORT_MAP[3:0]													R_MC_IN_GR_ESS	AT_TA_BL_E_E_ND	SE_AR_CH_R_DY
Type		RO						RO						RO	RO	RC
Reset	0	0	0	0				0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:22	HASH_ADD_LU	Address table lookup address
18:12	R_PORT_MAP	Port map The MAC existing in the bit =1.
10:7	R_VLD	VLAN index
6:4	R_AGE_FIELD	Aging field
2	R_MC_INGRESS	MC Ingress
1	AT_TABLE_END	Search to the end of address table
0	SEARCH_RDY	Data is ready (read clear)

1011002C ATS1 **Address Table Status 1** **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name														MAC_AD_SER0		
Type														RO		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
15:0	MAC_AD_SER0	Read MAC Address [15:0]

10110030 ATS2 **Address Table Status 2** **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name														MAC_AD_SER0[31:16]		
Type														RO		
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																MAC_AD_SER0[15:0]
Type																RO
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	MAC_AD_SER0	Read MAC Address [31:16]

10110034 WMAD0 WT_MAC_ADO **00080000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																HASH_ADD_LU
Type																RO
Reset	0	0	0	0	0	0	0	0	0	0			1	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																W_PORT_MAP[3:0]
Type																RW
Reset	0	0	0	0				0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:22	HASH_ADD_LU	Address table configuration address
19	AT_CFG_IDLE	Address Table Configuration SM IDLE
18:12	W_PORT_MAP	Write Port map
10:7	W_INDEX	VLAN index 0: VLAN 0 1-14: ... 15: VLAN 15
6:4	W_AGE_FIELD	Write Aging field 3'b111: static address, 3'b001 - 3'b110: the entry is valid and will be aged out 2'b000: default, entry is invalid
3	SA_FILTER	SA_FILTER 0: default 1: The corresponding packet will be dropped when the SA is matched
2	W_MC_INGRESS	Write MC Ingress
1	W_MAC_DONE	MAC Write Done 0: default 1: MAC address write OK (read clear)
0	W_MAC_CMD	MAC Address write Command 0: default 1: the MAC write data is ready and write to MAC table now(self_clear)

10110038 WMAD1 WT_MAC_AD1 **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																

Name	W_MAC_15_0															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
15:0	W_MAC_15_0	Write MAC Address[15:0]

1011003C WMAD2 WT_MAC_AD2 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	W_MAC_47_16[31:16]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	W_MAC_47_16[15:0]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	W_MAC_47_16	Write MAC Address[47:16]

10110040 PVIDC0 PVID Configuration 0 0000100 1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	P1_PVID[11:4]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P1_PVID[3:0]															
Type	RW															
Reset	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
23:12	P1_PVID	Port1 PVID Setting
11:0	P0_PVID	Port0 PVID Setting

10110044 PVIDC1 PVID Configuration 1 0000100 1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	P3_PVID[11:4]															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P3_PVID[3:0]															
Type	RW															
Reset	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
23:12	P3_PVID	Port3 PVID Setting
11:0	P2_PVID	Port2 PVID Setting

10110048 PVIDC2 PVID Configuration 2 0000100 1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																P5_PVID[11:4]
Type																RW
Reset									0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P5_PVID[3:0]				P4_PVID											
Type	RW				RW											
Reset	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
23:12	P5_PVID	Port5 PVID Setting [Note] This feature is only valid when port 5 Giga MAC is implemented.
11:0	P4_PVID	Port4 PVID Setting

**1011004C PVIDC3 PVID Configuration 3 7502000
1**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	QUE3_PRIT				QUE2_PRIT				QUE1_PRIT				QUE0_PRIT			
Type	RW															
Reset	1	1	1		1	0	1		0	0	0		0	1	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P6_PVID												RW			
Type	RW												RW			
Reset					0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
30:28	QUE3_PRIT	Priority Tag Egress Mapping for Voice Queue#3
26:24	QUE2_PRIT	Priority Tag Egress Mapping for Control Load Queue#2
22:20	QUE1_PRIT	Priority Tag Egress Mapping for Best Effort Queue#1
18:16	QUE0_PRIT	Priority Tag Egress Mapping for Back Ground Queue#0
11:0	P6_PVID	Port6 PVID Setting

**10110050 VLANI0 VLAN Identifier 0 0000200
1**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	VID1[11:4]												RW			
Type	RW												RW			
Reset									0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VID1[3:0]												VID0			
Type	RW												RW			
Reset	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
23:12	VID1	VLAN Field Identifier for VLAN 1
11:0	VID0	VLAN Field Identifier for VLAN 0

**10110054 VLANI1 VLAN Identifier 1 0000400
3**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	VID3[11:4]												RW			
Type	RW												RW			
Reset									0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VID3[3:0]												VID2			

Bit(s)	Name	Description
23:12	VID3	VLAN Field Identifier for VLAN 3
11:0	VID2	VLAN Field Identifier for VLAN 2

10110058 VLANI2

VLAN Identifier 2

0000600

5

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name													VID5[11:4]			
Type													RW			
Reset									0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VID5[3:0]				VID4											
Type	RW				RW											
Reset	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1

Bit(s)	Name	Description
23:12	VID5	VLAN Field Identifier for VLAN 5
11:0	VID4	VLAN Field Identifier for VLAN 4

1011005C VLAN13

VI AN Identifier 3

0000800

7

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name															VID7[11:4]	
Type															RW	
Reset									0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VID7[3:0]				VID6											
Type	RW				RW											
Reset	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1

Bit(s)	Name	Description
23:12	VID7	VLAN Field Identifier for VLAN 7
11:0	VID6	VLAN Field Identifier for VLAN 6

10110060 VLAN14

VLAN Identifier 4

0000A00

9

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name													VID9[11:4]			
Type													RW			
Reset									0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VID9[3:0]				VID8											
Type	RW				RW											
Reset	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1

Bit(s)	Name	Description
23:12	VID9	VLAN Field Identifier for VLAN 9
11:0	VID8	VLAN Field Identifier for VLAN 8

10110064 VLAN15

VLAN Identifier 5

0000C00

B

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																VID11[11:4]
Type																RW
Reset									0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VID11[3:0]				VID10											
Type	RW				RW											
Reset	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1

Bit(s)	Name	Description
23:12	VID11	VLAN Field Identifier for VLAN 11
11:0	VID10	VLAN Field Identifier for VLAN 10

10110068 VLAN16

VLAN Identifier 6

0000E00

D

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																VID13[11:4]
Type																RW
Reset									0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VID13[3:0]				VID12											
Type	RW				RW											
Reset	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1

Bit(s)	Name	Description
23:12	VID13	VLAN Field Identifier for VLAN 13
11:0	VID12	VLAN Field Identifier for VLAN 12

1011006C VLAN17

VLAN Identifier 7

0001000

F

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																VID15[11:4]
Type																RW
Reset									0	0	0	0	0	0	0	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VID15[3:0]				VID14											
Type	RW				RW											
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1

Bit(s)	Name	Description
23:12	VID15	VLAN Field Identifier for VLAN 15
11:0	VID14	VLAN Field Identifier for VLAN 14

10110070 VMSC0

VLAN Member Port Configuration 0

FFFF

FF

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	VLAN_MEMSET_3								VLAN_MEMSET_2							
Type	RW								RW							
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VLAN_MEMSET_1								VLAN_MEMSET_0							
Type	RW								RW							
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:24	VLAN_MEMSET_3	VLAN 3 Member Port
23:16	VLAN_MEMSET_2	VLAN 2 Member Port
15:8	VLAN_MEMSET_1	VLAN 1 Member Port
7:0	VLAN_MEMSET_0	VLAN 0 Member Port

10110074 VMSC1 VLAN Member Port Configuration 1 FFFFFF FF

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	VLAN_MEMSET_7										VLAN_MEMSET_6					
Type	RW										RW					
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VLAN_MEMSET_5										VLAN_MEMSET_4					
Type	RW										RW					
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:24	VLAN_MEMSET_7	VLAN 7 Member Port
23:16	VLAN_MEMSET_6	VLAN 6 Member Port
15:8	VLAN_MEMSET_5	VLAN 5 Member Port
7:0	VLAN_MEMSET_4	VLAN 4 Member Port

10110078 VMSC2 VLAN Member Port Configuration 2 FFFFFF FF

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	VLAN_MEMSET_11										VLAN_MEMSET_10					
Type	RW										RW					
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VLAN_MEMSET_9										VLAN_MEMSET_8					
Type	RW										RW					
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:24	VLAN_MEMSET_11	VLAN 11 Member Port
23:16	VLAN_MEMSET_10	VLAN 10 Member Port
15:8	VLAN_MEMSET_9	VLAN 9 Member Port
7:0	VLAN_MEMSET_8	VLAN 8 Member Port

1011007C VMSC3 VLAN Member Port Configuration 3 FFFFFF FF

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	VLAN_MEMSET_15										VLAN_MEMSET_14					
Type	RW										RW					
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VLAN_MEMSET_13										VLAN_MEMSET_12					
Type	RW										RW					
Reset	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:24	VLAN_MEMSET_15	VLAN 15 Member Port

Bit(s)	Name	Description
31:24	VLAN_MEMSET_15	VLAN 15 Member Port
23:16	VLAN_MEMSET_14	VLAN 14 Member Port
15:8	VLAN_MEMSET_13	VLAN 13 Member Port
7:0	VLAN_MEMSET_12	VLAN 12 Member Port

10110080 POA Port Ability Offset **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	G1_LIN_K	G0_LIN_K	LINK				G1_TXC		G0_TXC		XFC					
Type	RO	RO	RO				RO		RO		RO					
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	DUPLEX						G1_SPD	G0_SPD	SPEED							
Type	RO						RO	RO	RO							
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31	G1_LINK	Port 6 Link Status 1: Link up 0: Link down
30	G0_LINK	Port 5 Link Status [Note] This feature is only valid when port 5 giga MAC is implemented. 1: Link up 0: Link down
29:25	LINK	Port 4 ~ port0 Link Status 1: Link up 0: Link down
24:23	G1_TXC	Flow Control Status fo Port6 The flow control capability status bit after Auto-negotiation or force mode. 1xb: full duplex and tx flow control ON x1b: full duplex and rx flow control ON 00b: flow control off
22:21	G0_TXC	Flow Control Status fo Port5 The flow control capability status bit after Auto-negotiation or force mode. [Note] This feature is only valid when port 5 giga MAC is implemented. 1xb: full duplex and tx flow control ON x1b: full duplex and rx flow control ON 00b: flow control off
20:16	XFC	Flow Control Status of port 0 ~ 4 The flow control capability status bit after Auto-negotiation or force mode. 0: flow control off 1: full duplex and 802.3x flow control ON (after AN or forced)
15:9	DUPLEX	Port6 ~ port0 Duplex Mode [Note]: Port5 funciton is only valid when port 5 Giga MAC is implemented. 0: half duplex 1: full duplex
8:7	G1_SPD	MII port 6 Speed:Mode 10: 1000M 01: 100M 00: 10M
6:5	G0_SPD	MII port 5 Speed:Mode [Note] This feature is only valid when port 5 Giga MAC is implemented 10: 1000M 01: 100M 00: 10M

Bit(s)	Name	Description
4:0	SPEED	Port4 ~ port0 Speed Mode 0: 10M 1: 100M

10110084 FPA **Force Port4 - Port0 Ability** **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	FORCE_MODE					FORCE_LINK					FORCE_XFC					
Type	RW					RW					RW					
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name				FORCE_DPX							XT AL CO MP	FORCE_SPD				
Type				RW							RW	RW				
Reset				0	0	0	0	0			0	0	0	0	0	0

Bit(s)	Name	Description
31:27	FORCE_MODE	Port4 ~ port 0 force mode 0: default 1: force mode. Auto-negotiation status is ignored. All the port ability are forced according to the following fields of the register FPA.
26:22	FORCE_LINK	Port 4 ~ port 0 PHY Link This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. 1: Link up 0: Link down
20:16	FORCE_XFC	Port 4 ~ port 0 Flow control of PHY port This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. 0: default OFF 1: 802.3x flow control ON
12:8	FORCE_DPX	Flow Control Status of port 0 ~ 4 The flow control capability status bit after Auto-negotiation or force mode. 0: flow control off 1: full duplex and 802.3x flow control ON (after AN or forced)
5	XTAL_COMP	Crystal rate compensation 0: Disable 1: When the switch has transmitted 20000 bytes, the switch will compensate for the loss of crystal rate.
4:0	FORCE_SPD	Port4 ~ port0 Speed: This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. 1: 100M 0: 10M

10110088 PTS **Port Status** **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name							G1_ TX C_S TAT	G0_ TX C_S TAT		SECURED_ST						

Bit(s)	Name	Description
9	G1_TXC_STATUS	Port 6 TXC status 0: no alert 1: error, no TXC
8	G0_TXC_STATUS	Port 5 TXC status [Note] This feature is only valid when port 5 Giga MAC is implemented. 0: no alert 1: error, no TXC
6:0	SECURED_ST	Security Status 0: no alert 1: has intruder coming if turn on the SA_secured mode, read clear

Bit(s)	Name	Description
25	CRC_PADDING	<p>CRC padding from CPU</p> <p>If this bit is set , all packets from CPU don't need to append CRC and the outgoing LAN/WAN port will calculate and append CRC.</p> <p>0: packets from CPU need CRC appending 1: packets from CPU without CRC appending</p>
24:23	CPU_SELECTION	<p>CPU Selection</p> <p>00b: Port 6 01b: Port 0 10b: Port 4 11b: Port 5</p>
22:16	DISBC2CPU	<p>Disable BC to CPU</p> <p>When this bit = 1, BC frames from the corresponding port will not be forward to CPU.</p> <p>[Note] Port5 funciton is only valid when port 5 Giga MAC is implemented.</p> <p>0: Includes CPU port. 1: Excludes CPU port</p>
14:8	DISMC2CPU	<p>Disable MC to CPU</p> <p>When this bit =1, MC frames from the corresponding port will not forward to CPU.</p> <p>[Note] Port5 funciton is only valid when port 5 Giga MAC is implemented.</p> <p>0: Includes CPU port. 1: Excludes CPU port</p>
6:0	DISUN2CPU	<p>Disable UN to CPU</p> <p>When this bit =1, Unkonwn frames from the corresponding port will not forward to CPU.</p> <p>[Note] Port5 funciton is only valid when port 5 Giga MAC is implemented.</p> <p>0: Includes CPU port. 1: Excludes CPU port</p>

10110090 POC0

Port Control 0

3F807F7
F

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	HASH_AD DR_SHIFT		DIS_G MII_ PO RT_1	DIS_G MII_ PO RT_0												
Type	RW	RW	RW													
Reset	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name									MAC_F CP_OP TIO_N							
Type									RW							
Reset	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1

Bit(s)	Name	Description
31:30	HASH_ADDR_SHIF T	Address table hashing algorithm option for member set index
29	DIS_GMII_PORT_1	Disable port 6 0: port enable 1: port disable
28	DIS_GMII_PORT_0	Disable port 5 [Note] This feature is only valid when port 5 Giga MAC is implemented. 0: port enable 1: port disable
27:23	DIS_PORT	Disable phy port 0: port enable 1: port disable
22:16	DISRMC2_CPU	Unknown Reserved Multicast Frame Excludes CPU [Note] Port5 funciton is only valid when port 5 Giga MAC is implemented. 0: Unknown Reserved Multicast Forward Rule (SGC.RMC_RULE) 1: Excludes CPU port
14:8	EN_FC	Apply 802.3x status after Auto-negotiation This field can individually control the 802.3x capability after Auto-negotiation is done. [Note] Port5 funciton is only valid when port 5 Giga MAC is implemented. 0: ignore the AN stats for 802.3x capability 1: follow the AN status for 802.3x capability
7	MAC_FCP_OPTION	Multicast Flow control/Backpressure option 0: When all ports are fc/bp disable, the switch will use drop_threshold to drop frames only. If not, the switch will use fc_threshold and drop_threshold. 1: When only the destination TX port is fc/bp disable, the switch will use drop_threshold to drop frames only . If not, that TX port uses fc_threshold and drop_threshold.
6:0	EN_BP	Apply back pressure capability [Note] Port5 funciton is only valid when port 5 Giga MAC is implemented. 0: ignore the back pressure mode (default OFF) 1: apply back pressure based on SGC.BP_MODE.

10110094 POC1

Port Control 1

0000000
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
-----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Name		DISIPMC2CPU								BLOCKING_STATE								
Type		RW								RW								
Reset		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0	
Name	DIS_LRNING								SA_SECURED_PORT									
Type	RW								RW									
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
29:23	DISIPMC2CPU	Unknown IP Multicast Frame Excludes CPU 0: Unknown IP Multicast Forward Rule (SGC.IP_MULT_RULE) 1: Excludes CPU port
22:16	BLOCKING_STATE	Port State for Spanning Tree Protocol [Note]: Port5 funciton is only valid when port 5 Giga MAC is implemented. 0: normal state 1: blocking state, forwarding rmc packet to cpu(need programming address table)
14:8	DIS_LRNING	Disable SA learning [Note] Port5 funciton is only valid when port 5 Giga MAC is implemented. 0: default enabled 1: disable Source MAC learning
6:0	SA_SECURED_PORT	SA secured mode [Note*1]: Must set dis_learn and sa_secured at the same time. [Note*2] Port5 funciton is only valid when port 5 Giga MAC is implemented. 0: don't care SA match, 1: the packets' SA needs match, otherwise discard the packets

10110098 POC2 Port Control 2												00007F00					
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name		G1_TX C_CH EC_K	G0_TX C_CH EC_K				ML D2 CP U_E N	IPV6_MUL T_RULE		DIS_UC_PAUSE							
Type	RW	RW					RW	RW		RW							
Reset	0	0					0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	PE_R_V LA_N_UN TA_G_EN	ENAGING_PORT								UNTAG_EN							
Type	RW	RW								RW							
Reset	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	

Bit(s)	Name	Description
30	G1_TXC_CHECK	Check the port 6 TXC if no txc clock, then disable MII port 0: disable 1: enable, check TXC
29	G0_TXC_CHECK	Check the port 5 TXC if no txc clock, then disable MII port [Note] This feature is only valid when port 5 Giga MAC is implemented. 0: disable 1: enable, check TXC
25	MLD2CPU_EN	MLD Message Packets forward to CPU 0: MLD message will be flooded

Bit(s)	Name	Description
24:23	IPV6_MULT_RULE	1: MLD message will be forward to CPU port only Unknown IPV6 Multicast Frame Forward Rule If no match in the address table, then following the rule 00: BC 01: to CPU 10: drop 11: Reserved
22:16	DIS_UC_PAUSE	Disable Unicast Pause Frame [Note] Port5 function is only valid when port 5 Giga MAC is implemented. 0: switch will consider pause frame when DA!=0180c20001 but unicast to CPU, 1: switch will not consider pause frame when DA!= 0180c20001 and unicast to CPU
15	PER_VLAN_UNTAG_EN	Per port per vlan untag enable VLAN tag removal option. 0: Use per port UNTAG_EN 1: Use untag enable bitmap in VLAN table
14:8	ENAGING_PORT	Port aging [Note] Port5 function is only valid when port 5 Giga MAC is implemented. 0: disable aging that the MAC address is belong to programmed port(s) 1: enable aging
6:0	UNTAG_EN	Per Port VLAN Tag Removal [Note] Port5 function is only valid when port 5 Giga MAC is implemented. 0: disable 1: enable VLAN tag field removal.

1011009C SGC

Switch Global Control

6008A04

1

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name		BK_OF_F_A_LG	LE_N_E_RR_C_HK	IP_MULT_RULE	RMC_RUL_E	LED_FLAS_H_TIME		BISH_TH		BIS_H_DIS		BP_MODE	DISMIIPORT_WASTX			
Type		RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW
Reset		1	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	BP_JAM_CNT				DIS_AB LE_TX_BA CK_OF_F	ADDRESS_S_HASH_ALG	DIS_PK_T_T_X_A_BO_RT	PKT_MAX_LEN	BC_STOR_M_PROT	AGING_INTERNAL						
Type	RW				RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW	RW
Reset	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1

Bit(s)	Name	Description
30	BKOFF_ALG	Backoff Algorithm Option 0: default 1: comply with UNH test
29	LEN_ERR_CHK	Length of Received Frame Check Enable When the bit is set, the received packet length will be checked for length encapsulated frames. 0: default disabled 1: comply with UNH test
28:27	IP_MULT_RULE	Unknown IP Multicase Frame Forward Rule If no match in the address table, then following the rules. 00: BC 01: to cpu

Bit(s)	Name	Description
		10: drop 11: reserved
26:25	RMC_RULE	Unknown Reserved Multicast Frame Forward Rule If no match in the address table, then follow the rules. 00: to all port(not include blocking state port) 01: to cpu 10: drop 11: reserved
24:23	LED_FLASH_TIME	The Frequency Of LED Flash 00: 30ms 01: 60ms 10: 240ms 11: 480ms
22:21	BISH_TH	The Threshold Of Memory Bisshop 11: skip if fail 8 blocks, 0 00: skip if fail 16 (default, from pins) 01: skip if fail 48 10: skip if fail 64
20	BISH_DIS	Build In Self Hop 0: enable skip function 1: disable
19:18	BP_MODE	Back Pressure Mode 00: disable 01: BP jam, the jam number is set by bp_num 10: BP jamALL, jam packet until the BP condition is released(default), 11: BP carrier, use carrier insertion to do back pressure
17:16	DISMIIPORT_WAST_X	GMII Port Disable Was_Transmit [Note] This feature is only valid when port 5 Giga MAC is implemented. 1: disable was_transmit (good for late CRS PHY, like HPNA2.0 or power-LAN), 0: enable
15:12	BP_JAM_CNT	Back Pressure Jam Number The consecutive jam count when back pressure is enabled, The default is 10 packet jam then one no-jam packet.
11	DISABLE_TX_BAC_KOFF	Disable The Collision Back Off Timer 0: default 1: re-transmit immediately after collision
10:9	ADDRESSSS_HASH_ALG	MAC Address Hashing Algorithm 00: direct mode, using last 10-bit as hashing address 01: XOR48 mode 10: XOR32 mode 11: reserved
8	DIS_PKT_TX_ABO_RT	Disable Packet TX Abort 1: Disable collision 16 packet abort and late collision abort 0: enable both abort
7:6	PKT_MAX_LEN	Maximum Packet Length Untagged / VLAN-taged 00: 1536 Bytes / 1536 Bytes 01: 1518 Bytes / 1522 Bytes 10: 1522 Bytes / 1526 Bytes 11: Reserved / Reserved
5:4	BC_STORM_PROT	Global Broadcast Storm Protection BC will be blocked, if the following number of BC blocks in in output queues 00: disable 01: 64 10: 96 11: 128
3:0	AGING_INTERNAL	Aging Timer 0000: disable age 0001: 300sec

Bit(s)	Name	Description
0010 - 0111: 600 ~ 38400sec 1xxx: Fast Age (60sec)		

101100A0 STRT **Switch Reset** **00000000**
0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	RESET_SW[31:16]															
Type	WO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RESET_SW[15:0]															
Type	WO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:0	RESET_SW	Reset switch engine, data, address, link memory , cpu port and ahb interface when writing data to the STRT register.

101100A4 LEDP0 **LED Port0** **00000000**
5

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P0_LED															
Type	RW															
Reset													0	1	0	1

Bit(s)	Name	Description
3:0	P0_LED	port0 LED state, default = link/activity 0000: link 0001: 100M speed 0010: duplex 0011: activity 0100: collision 0101: link/activity 0110: duplex/collision 0111: 10M speed/activity 1000: 100M speed/activity 1011: off 1100: on 1010: blink

101100A8 LEDP1 **LED Port1** **00000000**
5

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P1_LED															
Type	RW															
Reset													0	1	0	1

Bit(s)	Name	Description
--------	------	-------------

Bit(s)	Name	Description
3:0	P1_LED	port1 LED state, default = link/activity

101100AC LEDP2 LED Port2 0000000 5

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset													0	1	0	1

Bit(s)	Name	Description
3:0	P2_LED	port2 LED state, default = link/activity

101100B0 LEDP3 LED Port3 0000000 5

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset													0	1	0	1

Bit(s)	Name	Description
3:0	P3_LED	port3 LED state, default = link/activity

101100B4 LEDP4 LED Port4 0000000 5

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset													0	1	0	1

Bit(s)	Name	Description
3:0	P4_LED	port4 LED state, default = link/activity

101100B8 WDTR Watch Dog Trigger Reset 0000001 E

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset													0	1	0	1

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Reset	0	0	0	1	1	1	1	0
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Bit(s)	Name	Description
7:0	BUF_STARV_TH	Buffer starvation threshold Switch will interrupt CPU when the global queue block counts is less than the threshold for 3 seconds.

101100BC DES Debug Signal 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
15:0	DEBUG_SIGNAL	Port 5 Debug Signal

101100C0 PCR0 PHY Control Register 0 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	RE SV0	RD PH Y_C MD	WT PH Y_C MD													
Type	RO	RW	RW													
Reset	0	0	0	0	0	0	0	0				0	0	0	0	0

Bit(s)	Name	Description
31:16	WT_NWAY_DATA	The Data Be Written into PHY
15	RESV0	Reserved
14	RD_PHY_CMD	Read command To enable read command on PHY, write 1 to this bit . After command is completed, this bit is self-cleared.
13	WT_PHY_CMD	Write command To enable write command on PHY, write 1 to this bit . After command is completed, this bit is self-cleared
12:8	CPU_PHY_REG	PHY register address
4:0	CPU_PHY_ADDR	PHY address (Note: The internal 5-ports PHY reserves the PHY address starting from 5'd0 ~ 5'd4. For the external PHY, the PHY address from 5'd5 to 5'd31 can be applied. The default PHY address of Port 5 is 5'd5 for auto-polling function.)

101100C4 PCR1 PHY Control Register 1 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																

Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name															RD _R DY	WT _D ON E
Type															RC	RC
Reset															0	0

Bit(s)	Name	Description
31:16	RD_DATA	The Read Data
1	RD_RDY	Read Operation is Done
0	WT_DONE	Write Operation is Done

101100C8 FPA1

Force P5P6 Ability

0550032

8

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name			AP_EN	EXT_PHY_ADDR_BASE					G0_RXCLK_SEL	G0_TXCLK_SEL			TU_RB_O_MII_CLK				
Type			RW	RW					RW	RW			RW				
Reset			0	0	0	1	0	1	0	1	0	1		0			
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name			FO_RC_E_R_GMI_I_LI_NK_1	FO_RC_E_R_GMI_I_LI_NK_0	FO_RC_E_R_GMI_I_E_N1	FO_RC_E_R_GMI_I_E_NO	FORCE_R_GMII_XFC1		FORCE_R_GMII_XFC0		FO_RC_E_R_GMI_LD_PX1	FO_RC_E_R_GMI_LD_PX0	FORCE_R_GMII_SPD_1	FORCE_R_GMII_SPD_0			
Type			RW	RW	RW	RW	RW		RW		RW	RW	RW		RW		
Reset			0	0	0	0	1	1	0	0	1	0	1	0	0	0	

Bit(s)	Name	Description
29	AP_EN	Port 5 Auto Polling Enable [Note] This feature is only valid when port 5 Giga MAC is implemented.
28:24	EXT_PHY_ADDR_BASE	Port 5 External PHY Base Address [Note] This feature is only valid when port 5 Giga MAC is implemented.
23:22	G0_RXCLK_SEL	Port 5 RXCLK Skew Selection [Note] This feature is only valid when port 5 Giga MAC is implemented.
21:20	G0_TXCLK_SEL	Port 5 TXCLK Skew Selection [Note] This feature is only valid when port 5 Giga MAC is implemented.
18	TURBO_MII_CLK	Port 5 revMII Mode Clock Selection [Note] This feature is only valid when port 5 Giga MAC is implemented. 0: 25MHz output clock 1: 31.25MHz output clock
13	FORCE_RGMII_LIN_K1	Force Port 6 Link This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. 0: link down 1: link up
12	FORCE_RGMII_LIN_K0	Force Port 5 Link This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. [Note] This feature is only valid when port 5 Giga MAC is implemented. 0: link down 1: link up
11	FORCE_RGMII_EN	Force Port 6 Enable

Bit(s)	Name	Description
1		0: reserved 1: force mode. Auto-negotiation status is ignored. Port 5 ability is forced according to the following fields of the register FPA1.
10	FORCE_RGMII_EN 0	Force Port 5 Enable [Note] This feature is only valid when port 5 Giga MAC is implemented. 0: default 1: force mode. Auto-negotiation status is ignored. Port 5 ability is forced according to the following fields of the register FPA1.
9:8	FORCE_RGMII_XF C1	Force port 6 flow control ability This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. 1x: for tx x1: for rx
7:6	FORCE_RGMII_XF C0	Force port 5 flow control ability This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. [Note] This feature is only valid when port 5 Giga MAC is implemented. 1x: for tx x1: for rx
5	FORCE_RGMII_DP X1	Force port 6 duplex This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. 0: half duplex 1: full duplex
4	FORCE_RGMII_DP X0	Force port 5 duplex This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. [Note] This feature is only valid when port 5 Giga MAC is implemented. 0: half duplex 1: full duplex
3:2	FORCE_RGMII_SP D1	Force port 6 speed This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. 1x: 1GbpsMHz 01: 100MbpsMHz 00: 10MbpsMHz
1:0	FORCE_RGMII_SP D0	Force port 5 speed This field is valid only FORCE_MDOE is set. The final resolution is reported to POA register. [Note] This feature is only valid when port 5 Giga MAC is implemented. 1x: 1GbpsMHz 01: 100MbpsMHz 00: 10MbpsMHz

101100CC		<u>FCT2</u>		Flow Control Threshold 2												0000A30	
Bit		31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	DIS_IPV6MC2CPU												MUST_DR OP_RLS_T H[4:3]				
Type	RW												RW				
Reset	0												0		0		
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name	MUST_DROP_RL S_TH[2:0]		MUST_DROP_SET_TH						MC_PER_PORT_TH								
Type	RW		RW						RW								
Reset	1	0	1	0	0	0	1	1	0						1	0	

Bit(s)	Name	Description
24:18	DIS_IPV6MC2CPU	Unknown IPv6 Multicast Frame Excludes CPU

Bit(s)	Name	Description
		0: Unknown IPv6 Multicast Forward Rule (POC2.IPV6_MULT_RULE) 1: Exclude CPU port
17:13	MUST_DROP_RLS_TH	If the global queue pointer higher than the threshold. The must drop condition will be released.
12:8	MUST_DROP_SET_TH	If the global queue pointer reach msut drop threshold. All incoming packets have to be dropped.
5:0	MC_PER_PORT_THRESHOLD	MC packets per port threshold. When the global queue reaches the flow control threshold on register FCT0, per port output threshold for MC packet will be checked to enable flow-control or packet-drop on imncoming MC packets.

Bit(s)	Name	Description
23:15	BE_CNT_R	Link control best effort queue block counter monitor.
14:5	BK_CNT_R	Link control background queue block counter monitor.
4:0	SEE_CNT_PORT_SEL	Link control block couontor port selection

Bit(s)	Name	Description
17:9	VO_CNT_R	Link control voice queue block counter monitor.
8:0	CL_CNT_R	Link control control queue block counter monitor.

101100D8	<u>DEC</u>	Debug Control	40400100													
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	SW2FE_IPG								FE2SW_IPG							
Type	RW								RW							
Reset	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Name							BRI DG E_E N							
Type							RW							
Reset							1							

Bit(s)	Name	Description
31:24	SW2FE_IPG	SW2FE Bridge IPG Byte Count Inter-Frame Byte Count between the consecutive frames flowing from Switch to Frame Engine
23:16	FE2SW_IPG	FE2SW Bridge IPG byte count Inter-Frame Byte Count between the consecutive frames flowing from Frame Engine to Switch
8	BRIDGE_EN	Enable FE2SW Bridge IPG Prevention 1'b0: Disable 1'b1: Enable IPG Prevention when FE2SW_BRIDGE_IPG is too short (8'd16) to receive the next frame.

101100DC MTI**Memory Test Information****0000006****A**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name										SW_R AM_TES ST_DON_E DO_NE	LK_RA_M_TES_T_DON_E LK_RA_M_TES_T_FAIL AT_RA_M_TES_T_DON_E AT_RA_M_TEST_FA DT_RA_M_TES_T_DON_E DT_RA_M_TES_T_FAIL					
Type										RO	RO	RO	RO	RO	RO	RO
Reset										1	1	0	1	0	1	0

Bit(s)	Name	Description
6	SW_RAM_TEST_DONE	Switch Memory Ram Test Done
5	LK_RAM_TEST_DONE	Link Ram Test Done
4	LK_RAM_TEST_FAIL	Link Ram Test Fail
3	AT_RAM_TEST_DONE	Address Table Ram Test Done
2	AT_RAM_TEST_FAIL	Address Table Ram Test Fail
1	DT_RAM_TEST_DONE	Data Buffer Ram Test Done
0	DT_RAM_TEST_FAIL	Data Buffer Ram Test Fail

101100E0 PPC**Packet Counter****0000000****0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																

SW2FE_CNT
RO

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	FE2SW_CNT															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
31:16	SW2FE_CNT	SW2FE_CNT Switch to frame engine packet counter
15:0	FE2SW_CNT	FE2SW_CNT Frame engine to switch packet counter

101100E4 SGC2 **Switch Global Control 2** **00000000 0**

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	P6_RX_FC_QU_E_E_N	P6_TXF_C_WL_EN	LAN_PMAP						SP_ECI_AL_TA_G_EN	TX_CPU_TPID_BIT_MAP						
Type	RW	RW	RW						RW	RW						
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name				P6_TXF_C_NE_N	AR_BIT_ER_LA_N_E_N	CP_U_T_PID_EN	AR_BIT_ER_GP_T_E_N	SL_OT_4TO_1		DOUBLE_TAG_EN						
Type				RW	RW	RW	RW	RW		RW						
Reset				0	0	0	0	0		0	0	0	0	0	0	0

Bit(s)	Name	Description
31	P6_RXFC_QUE_EN	Port 6 RX flow control on per egress queue 0: Port 6 RX flow control will pause all 4 egress queue 1: Port 6 RX flow control will pause 4 egress queue independently according to the corresponding congestion signals.
30	P6_TXFC_WL_EN	Port 6 TX flow control by Switch WAN/LAN port 0: Port 6 TX flow control is decided by any port and any queue of the Switch congestion 1: Port 6 TX flow control is decided by WAN/LAN port of the Switch congestion separately.
29:24	LAN_PMAP	Lan port bit map This field indicates per port attribute used for flow control. (Note: Port5 funciton is only valid when port 5 Giga MAC is implemented) 1: Lan port 0: Wan port
23	SPECIAL_TAG_EN	Special Tag enable 0: default; RX special tag is enabled according to the global control bit-CPU_TPID_EN. TX special tag is enabled according to the per-port TX_CPU_TPID_BIT_MAP 1: CPU_TPID_EN is not used. Both TX and RX special tag feature are decided by the per-port TX_CPU_TPID_BIT_MAP
22:16	TX_CPU_TPID_BIT_MAP	Transmit CPU TPID(810x) port bit map 0: default (TPID=0x8100) 1: TPID=0x810? depending on TX/RX usages (Note: Port5 funciton is only valid when port 5 Giga MAC is implemented)
12	P6_TXFC_QUE_EN	Port 6 per queue TX flow control This bit is only valid when P6_TXFC_WL_EN is enabled. 0: 4 congest signals to Frame Engine are decided by the wired-or result of all egress queues on Switch WAN/LAN ports. 1: 4 congest signals to Frame Engine are decided by the individual and the corresponding 4 egress queues on Switch WAN/LAN ports.

Bit(s)	Name	Description
11	ARBITER_LAN_EN	Memory arbiter only for P0~P4 enable 0: default 1: memory arbiter only for P0~P4.
10	CPU_TPID_EN	CPU TPID(81xx) enable 0: disable. CPU TPID=8100 1: enable. CPU TPID=810x.
9	ARBITER_GPT_EN	Memory Arbiter only for P5 and P6 0: default 1: Enable
8	SLOT_4TO1	Memory Arbiter Ratio Selection 0: (P5,P6) : (P0-P4) = 3:2 1: (P5,P6) : (P0-P4) = 4:1
6:0	DOUBLE_TAG_EN	Insert double tag field When this bit is set , the incoming packet is allowed to insert outer or double tag. 1: enable double tag field 0: disable the double tag field. (Note: Port5 funciton is only valid when port 5 Giga MAC is implemented)

Bit(s)	Name	Description
31:16	BAD_PKT_CNT0	Port 0 Receive Bad Packet Counter
15:0	GOOD_PKT_CNT0	Port 0 Receive Good Packet Counter

Bit(s)	Name	Description
31:16	BAD_PKT_CNT1	Port 1 Receive Bad Packet Counter
15:0	GOOD_PKT_CNT1	Port 1 Receive Good Packet Counter

101100F0	P2PC	Port 2 Packet Counter	00000000													
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GOOD_PKT_CNT2															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT2	Port 2 Receive Bad Packet Counter
15:0	GOOD_PKT_CNT2	Port 2 Receive Good Packet Counter

101100F4 P3PC Port 3 Packet Counter 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	BAD_PKT_CNT3															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GOOD_PKT_CNT3															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT3	Port 3 Receive Bad Packet Counter
15:0	GOOD_PKT_CNT3	Port 3 Receive Good Packet Counter

101100F8 P4PC Port 4 Packet Counter 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	BAD_PKT_CNT4															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GOOD_PKT_CNT4															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT4	Port 4 Receive Bad Packet Counter
15:0	GOOD_PKT_CNT4	Port 4 Receive Good Packet Counter

101100FC P5PC Port 5 Packet Counter 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	BAD_PKT_CNT5															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GOOD_PKT_CNT5															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT5	Port 5 Receive Bad Packet Counter
15:0	GOOD_PKT_CNT5	Port 5 Receive Good Packet Counter

Bit(s)	Name	Description
27:21	VLAN_3_UNTAG_E N	Port 0 ~ 6 untag_en of VLAN 3
20:14	VLAN_2_UNTAG_E N	Port 0 ~ 6 untag_en of VLAN 2
13:7	VLAN_1_UNTAG_E N	Port 0 ~ 6 untag_en of VLAN 1
6:0	VLAN_0_UNTAG_E N	Port 0 ~ 6 untag_en of VLAN 0

Bit(s)	Name	Description
27:21	VLAN_7_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 7
20:14	VLAN_6_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 6
13:7	VLAN_5_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 5
6:0	VLAN_4_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 4

10110108	<u>VUB2</u>	VLAN Untag Block 2												00000000		
Name		VLAN_11_UNTAG_EN												VLAN_10_UNTAG_EN[6:2]		
Type		RW												RW		
Reset		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0												0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	VLAN_10_UNTAG_E_N[1:0]	VLAN_9_UNTAG_EN												VLAN_8_UNTAG_EN		

Bit(s)	Name	Description
27:21	VLAN_11_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 11
20:14	VLAN_10_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 10
13:7	VLAN_9_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 9
6:0	VLAN_8_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 8

1011010C VUB3 VLAN Untag Block 3 00000000 0

Bit(s)	Name	Description
27:21	VLAN_15_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 15
20:14	VLAN_14_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 14
13:7	VLAN_13_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 13
6:0	VLAN_12_UNTAG_EN	Port 0 ~ 6 untag_en of VLAN 12

10110110 BMU_CTRL BC/MC/UN Rate Limit Control 7C000000

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	ONE_US_CYCLE_NUM								P5_RATE_LIMIT_CTRL			P4_RATE_LIMIT_CTRL				
Type	RW								RW			RW				
Reset	1 1 1 1 1 0 0								0 0 0			0 0 0				
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P3_RATE_LIMIT_CTRL			P2_RATE_LIMIT_CTRL			P1_RATE_LIMIT_CTRL			P0_RATE_LIMIT_CTRL			P0_RATE_LIMIT_CTRL			
Type	RW			RW			RW			RW			RW			
Reset	0 0 0			0 0 0			0 0 0			0 0 0			0 0 0			

Bit(s)	Name	Description
30:24	ONE_US_CYCLE_N UM	One micro-second Cycle Number This field is used to calculate 1us period
22:20	P5_RATE_LIMIT_C TRL	Port 5 rate Limit Control (Note: This feature is only valid when port 5 GMAC is implemented)
18:16	P4_RATE_LIMIT_C TRL	Port 4 rate Limit Control
14:12	P3_RATE_LIMIT_C	Port 3 rate Limit Control

Bit(s)	Name	Description
10:8	P2_RATE_LIMIT_C TRL	Port 2 rate Limit Control
6:4	P1_RATE_LIMIT_C TRL	Port 1 rate Limit Control
2:0	P0_RATE_LIMIT_C TRL	Port 0 rate Limit Control 2: Broadcast frame enable 1: Multicast frame enable 0: Unknown frame enable

10110114 <u>BMU_LMT_N</u> BC/MC/UN Rate Limit Frame Number FFFFFFFF FF UM1																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31:16	RATE_LIMIT_NUM_100M	Rate Limit Received BC/MC/UN frame number in 100M in 100ms duration
15:0	RATE_LIMIT_NUM_10M	Rate Limit Received BC/MC/UN frame number in 10M in 1s duration

10110118 <u>BMU_LMT_N</u> BC/MC/UN Rate Limit Frame Number 1818FFF F UM2																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset																
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset																

Bit(s)	Name	Description
31	IG_RATE_BYTE_OPT	Ingress Rate Byte Option 0: Add 1: Minus
30:24	IG_RATE_BYTE_NUM	Ingress Rate Byte Number
23	EG_RATE_BYTE_OPT	Egress Rate Byte Option 0: Add 1: Minus
22:16	EG_RATE_BYTE_NUM	Egress Rate Byte Number
15:0	RATE_LIMIT_NUM_	Rate Limit Received BC/MC/UN frame number in 1000M in 10ms

Bit(s)	Name	Description
1000M	duration	(note: This feature is only valid whe port 5 GMAC is implemented))

1011011C <u>P01_ING_CTR</u>			Port 0&1 Ingress Rate Limit Control												00000000			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16		
Name			P1_ING_RE_SS_CT_RL	P1_MN_G_PK_T_B_Y_P_A_S_S_C_T_R_L_O_W_C_T_R_L_O_N	P1_ING_RE_SS_FL_OW_C_T_R_L_O_N	P1_TIMER_TICK											P1_TOKEN	
Type		RW	RW	RW	RW		RW											
Reset		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Name			P0_ING_RE_SS_CT_RL	P0_MN_G_PK_T_B_Y_P_A_S_S_C_T_R_L_O_W_C_T_R_L_O_N	P0_ING_RE_SS_FL_OW_C_T_R_L_O_N	P0_TIMER_TICK											P0_TOKEN	
Type		RW	RW	RW	RW		RW											
Reset		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
30	P1_INGRESS_CTR_L	Port1 Ingress Limit Control 0: OFF 1: ON
29	P1_MNG_PKT_BYPASS	Port1 Management Packet ByPass 0: All packet included 1: Mangement Frame Excluded
28	P1_INGRESS_FLOW_CTRL_ON	Port 1 Ingress rate Flow Control When the bit is set, the pause frame is used prior to packet dropped according to P1_ING_THRES. If the bucket is empty, then P1 will start to discard the received packets except those specific packet in P1_MNG_PKY_BYPASS mode. 0: OFF 1: ON
27:26	P1_TIMER_TICK	Port 1 Timer Tick 0: 512us 1: 128us 2: 32us 3: 8us
25:16	P1_TOKEN	Port 1 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes
14	P0_INGRESS_CTR_L	Port 0 Ingress Limit Control 0: OFF 1: ON
13	P0_MNG_PKT_BYPASS	Port 0 Management Packet ByPass 0: All packet included 1: Mangement Frame Excluded
12	P0_INGRESS_FLOW_CTRL_ON	Port 0 Ingress rate Flow Control When the bit is set, the pause frame is used prior to packet dropped

Bit(s)	Name	Description
11:10	P0_TIMER_TICK	<p>according to P0_ING_THRES. If the bucket is empty, then P0 will start to discard the received packets except those specific packet in P0_MNG_PKY_BYPASS mode.</p> <p>0: OFF 1: ON</p>
9:0	P0_TOKEN	<p>Port 0 Timer Tick 0: 512us 1: 128us 2: 32us 3: 8us</p> <p>Port 0 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes</p>

10110120 P23 ING_CTR L Port 2&3 Ingress Rate Limit Control															00000000 0			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16		
Name		P3_ING_RE_SS_CT_RL	P3_MN_G_PK_T_B_Y_P_A_S_S_	P3_ING_RE_SS_FL_OW_CT_RL_ON	P3_TIMER_TICK												P3_TOKEN	
Type		RW	RW	RW	RW		RW											
Reset		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Name		P2_ING_RE_SS_CT_RL	P2_MN_G_PK_T_B_Y_P_A_S_S_	P2_ING_RE_SS_FL_OW_CT_RL_ON	P2_TIMER_TICK												P2_TOKEN	
Type		RW	RW	RW	RW		RW											
Reset		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
30	P3_INGRESS_CTR_L	<p>Port 3 Ingress Limit Control</p> <p>0: OFF 1: ON</p>
29	P3_MNG_PKT_BYPASS	<p>Port 3 Management Packet ByPass</p> <p>0: All packet included 1: Management Frame Excluded</p>
28	P3_INGRESS_FLOW_CTRL_ON	<p>Port 3 Ingress rate Flow Control</p> <p>When the bit is set, the pause frame is used prior to packet dropped according to P3_ING_THRES. If the bucket is empty, then P3 will start to discard the received packets except those specific packet in P3_MNG_PKY_BYPASS mode.</p> <p>0: OFF 1: ON</p>
27:26	P3_TIMER_TICK	<p>Port 3 Timer Tick</p> <p>0: 512us 1: 128us 2: 32us 3: 8us</p>
25:16	P3_TOKEN	Port 3 Token

Bit(s)	Name	Description
		Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes
14	P2_INGRESS_CTR_L	Port 2 Ingress Limit Control 0: OFF 1: ON
13	P2_MNG_PKT_BYPASS	Port 2 Management Packet ByPass 0: All packet included 1: Mangement Frame Excluded
12	P2_INGRESS_FLOW_CTRL_ON	Port 2 Ingress rate Flow Control When the bit is set, the pause frame is used prior to packet dropped according to P2_ING_THRES. If the bucket is empty, then P2 will start to discard the received packets except those specific packet in P2_MNG_PKY_BYPASS mode. 0: OFF 1: ON
11:10	P2_TIMER_TICK	Port 2 Timer Tick 0: 512us 1: 128us 2: 32us 3: 8us
9:0	P2_TOKEN	Port 2 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes

P45 ING CTR_L Port 4&5 Ingress Rate Limit Control															00000000			
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	0	
Name		P5_INGRESS_SS_CTR_ON	P5_MNG_PKT_T_BYP_AS_S	P5_INGRESS_SS_FLOW_CTRL	P5_TIMER_TICK												P5_TOKEN	
Type		RW	RW	RW	RW		RW											
Reset		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Name		P4_INGRESS_SS_CTR_ON	P4_MNG_PKT_T_BYP_AS_S	P4_INGRESS_SS_FLOW_CTRL	P4_TIMER_TICK												P4_TOKEN	
Type		RW	RW	RW	RW		RW											
Reset		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
30	P5_INGRESS_CTR_L	Port 5 Ingress Limit Control 0: OFF 1: ON
29	P5_MNG_PKT_BYPASS	Port 5 Management Packet ByPass 0: All packet included 1: Mangement Frame Excluded
28	P5_INGRESS_FLOW_CTRL	Port 5 Ingress rate Flow Control

Bit(s)	Name	Description
	W_CTRL_ON	When the bit is set, the pause frame is used prior to packet dropped according to P5_ING_THRES. If the bucket is empty, then P5 will start to discard the received packets except those specific packet in P5_MNG_PKY_BYPASS mode. 0: OFF 1: ON
27:26	P5_TIMER_TICK	Port 5 Timer Tick 0: 512us 1: 128us 2: 32us 3: 8us
25:16	P5_TOKEN	Port 5 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes
14	P4_INGRESS_CTR_L	Port 4 Ingress Limit Control 0: OFF 1: ON
13	P4_MNG_PKT_BYPASS	Port 4 Management Packet ByPass 0: All packet included 1: Mangement Frame Excluded
12	P4_INGRESS_FLOW_CTRL_ON	Port 4 Ingress rate Flow Control When the bit is set, the pause frame is used prior to packet dropped according to P4_ING_THRES. If the bucket is empty, then P4 will start to discard the received packets except those specific packet in P4_MNG_PKY_BYPASS mode. 0: OFF 1: ON
11:10	P4_TIMER_TICK	Port 4 Timer Tick 0: 512us 1: 128us 2: 32us 3: 8us
9:0	P4_TOKEN	Port 4 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes

10110128 P0_ING_THRE_S																Port 0 Ingress Rate Limit Threshold				AAAA55 55	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16					
Name																	P0_IN_FCOFF_THRES				
Type																	RW				
Reset	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0					
Name																	P0_IN_FCON_THRES				
Type																	RW				
Reset	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0

Bit(s)	Name	Description
31:16	P0_IN_FCOFF_THRES	Port 0 ingress rate limit flow control off. If P0_INGRESS_FLOW_CTRL_ON = 1 and P0 Flow control capability is on (XFC status in 0x80), then P0 will initiate PAUSE OFF frame or stop backpressure.
15:0	P0_IN_FCON_THRES	Port 0 ingress rate limit flow control on. If P0_INGRESS_FLOW_CTRL_ON = 1 and P0 Flow control capability is on (XFC status in 0x80), then P0 will initiate PAUSE ON frame or backpressure.

1011012C P1_ING_THRE_S Port 1 Ingress Rate Limit Threshold AAAAA55
55

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	P1_IN_FCOFF_THRES															
Type	RW															
Reset	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P1_IN_FCON_THRES															
Type	RW															
Reset	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Bit(s)	Name	Description
31:16	P1_IN_FCOFF_THRES	Port 1 ingress rate limit flow control off. If P1_INGRESS_FLOW_CTRL_ON = 1 and P1 Flow control capability is on (XFC status in 0x80), then P2 will initiate PAUSE OFF frame or stop backpressure.
15:0	P1_IN_FCON_THRES	Port 1 ingress rate limit flow control on. If P1_INGRESS_FLOW_CTRL_ON = 1 and P1 Flow control capability is on (XFC status in 0x80), then P1 will initiate PAUSE ON frame or backpressure.

10110130 P2_ING_THRE_S Port 2 Ingress Rate Limit Threshold AAAAA55
55

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	P2_IN_FCOFF_THRES															
Type	RW															
Reset	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P2_IN_FCON_THRES															
Type	RW															
Reset	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Bit(s)	Name	Description
31:16	P2_IN_FCOFF_THRES	Port 2 ingress rate limit flow control off. If P2_INGRESS_FLOW_CTRL_ON = 1 and P2 Flow control capability is on (XFC status in 0x80), then P2 will initiate PAUSE OFF frame or stop backpressure.
15:0	P2_IN_FCON_THRES	Port 2 ingress rate limit flow control on. If P2_INGRESS_FLOW_CTRL_ON = 1 and P2 Flow control capability is on (XFC status in 0x80), then P2 will initiate PAUSE ON frame or backpressure.

10110134 P3_ING_THRE_S Port 3 Ingress Rate Limit Threshold AAAAA55
55

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	P3_IN_FCOFF_THRES															
Type	RW															
Reset	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	P3_IN_FCON_THRES															
Type	RW															
Reset	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Bit(s)	Name	Description
31:16	P3_IN_FCOFF_THRES	Port 3 ingress rate limit flow control off. If P3_INGRESS_FLOW_CTRL_ON = 1 and P3 Flow control capability is on (XFC status in 0x80), then P3 will initiate PAUSE OFF frame or stop backpressure.

Bit(s)	Name	Description
15:0	P3_IN_FCON_THR_ES	Port 3 ingress rate limit flow control on. If P3_INGRESS_FLOW_CTRL_ON = 1 and P3 Flow control capability is on (XFC status in 0x80), then P3 will initiate PAUSE ON frame or backpressure.

10110138 P4_ING_THRE_S Port 4 Ingress Rate Limit Threshold AAAA55 55

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
P4_IN_FCOFF_THRES																
RW																
Reset	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
P4_IN_FCON_THRES																
RW																
Reset	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Bit(s)	Name	Description
31:16	P4_IN_FCOFF_THR_ES	Port 4 ingress rate limit flow control off. If P4_INGRESS_FLOW_CTRL_ON = 1 and P4 Flow control capability is on (XFC status in 0x80), then P4 will initiate PAUSE OFF frame or stop backpressure.
15:0	P4_IN_FCON_THR_ES	Port 4 ingress rate limit flow control on. If P4_INGRESS_FLOW_CTRL_ON = 1 and P4 Flow control capability is on (XFC status in 0x80), then P4 will initiate PAUSE ON frame or backpressure.

1011013C P5_ING_THRE_S Port 5 Ingress Rate Limit Threshold AAAA55 55

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
P5_IN_FCOFF_THRES																
RW																
Reset	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
P5_IN_FCON_THRES																
RW																
Reset	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Bit(s)	Name	Description
31:16	P5_IN_FCOFF_THR_ES	Port 5 ingress rate limit flow control off. If P5_INGRESS_FLOW_CTRL_ON = 1 and P5 Flow control capability is on (XFC status in 0x80), then P5 will initiate PAUSE OFF frame or stop backpressure. (note: This feature is only valid when port 5 Giga MAC is implemented)
15:0	P5_IN_FCON_THR_ES	Port 5 ingress rate limit flow control on. If P5_INGRESS_FLOW_CTRL_ON = 1 and P5 Flow control capability is on (XFC status in 0x80), then P5 will initiate PAUSE ON frame or backpressure. (note: This feature is only valid when port 5 Giga MAC is implemented)

10110140 P01_EG_CTR_L Port 0/1 Egress Rate Limit Control 0000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name				P1_EG_SS_CT_RL	P1_TIMER_TICK								P1_TOKEN			

Type				RW	RW		RW													
Reset				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name				P0_EG_SS_CTR_L	P0_TIMER_TICK		P0_TOKEN													
Type				RW	RW		RW													
Reset				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
28	P1_EGRESS_CTRL	Port 1 Egress Control 1: ON 0: OFF
27:26	P1_TIMER_TICK	Port 1 Timer Tick 0: 512us 1: 128us 2: 32us 3: 8us
25:16	P1_TOKEN	Port 1 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes 1: ON 0: OFF
12	P0_EGRESS_CTRL	Port 0 Egress Control 0: 512us 1: 128us 2: 32us 3: 8us
11:10	P0_TIMER_TICK	Port 0 Timer Tick 1: ON 0: OFF
9:0	P0_TOKEN	Port 0 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes

10110144	P23_EG_CTR_L	Port 2/3 Egress Rate Limit Control	000000000																	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16				
Name				P3_EG_SS_CTR_L	P3_TIMER_TICK		P3_TOKEN													
Type				RW	RW		RW													
Reset				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
Name				P2_EG_SS_CTR_L	P2_TIMER_TICK		P2_TOKEN													
Type				RW	RW		RW													
Reset				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Bit(s)	Name	Description
28	P3_EGRESS_CTRL	Port 3 Egress Control

Bit(s)	Name	Description
		1: ON 0: OFF
27:26	P3_TIMER_TICK	Port 3 Timer Tick 0: 512us 1: 128us 2: 32us 3: 8us
25:16	P3_TOKEN	Port 3 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes 1: ON 0: OFF
12	P2_EGRESS_CTRL	Port 2 Egress Control 0: 512us 1: 128us 2: 32us 3: 8us
11:10	P2_TIMER_TICK	Port 2 Timer Tick 1: ON 0: OFF
9:0	P2_TOKEN	Port 2 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes

P45 EG CTR																00000000	
<u>L</u>																<u>0</u>	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	
Name				P5_EG_SS_CTR		P5_TIMER_TICK											P5_TOKEN
Type				RW		RW											RW
Reset				0		0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
Name				P4_EG_SS_CTR		P4_TIMER_TICK											P4_TOKEN
Type				RW		RW											RW
Reset				0		0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
28	P5_EGRESS_CTRL	Port 5 Egress Control (Note: This feature is only valid when port 5 Giga MAC is implemented) 1: ON 0: OFF
27:26	P5_TIMER_TICK	Port 5 Timer Tick (Note: This feature is only valid when port 5 Giga MAC is implemented) 0: 512us 1: 128us 2: 32us 3: 8us
25:16	P5_TOKEN	Port 5 Token Every timer tick, Token number bytes will be added into the bucket. (Unit :

Bit(s)	Name	Description
		Byte) The maximum space of this bucket is 16'hFFFF bytes (Note: This feature is only valid when port 5 Giga MAC is implemented) 1: ON 0: OFF
12	P4_EGRESS_CTRL	Port 4 Egress Control 0: 512us 1: 128us 2: 32us 3: 8us
11:10	P4_TIMER_TICK	Port 4 Timer Tick 1: ON 0: OFF
9:0	P4_TOKEN	Port 4 Token Every timer tick, Token number bytes will be added into the bucket. (Unit : Byte) The maximum space of this bucket is 16'hFFFF bytes

1011014C <u>PCRI</u> 00000000 0																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	PK_T_C		TCOL_PKT_REC										TXOK_PKT_REC			
Type	WO		RO										RO			
Reset	0		0	0	0	0	0	0		0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name			BAD_PKT_REC							GOOD_PKT_REC						
Type			RO							RO						
Reset			0	0	0	0	0	0		0	0	0	0	0	0	0

Bit(s)	Name	Description
31	PKT_CNT_CLR	Tx/Rx Packet Counters Write One Clear When this bit is set, all Tx/Rx packet counters will be clear. This bit can be self-clear automatically.
29:24	TCOL_PKT_REC	Per Port Transmitted Collision Packet Counter Recycle This bit indicates that the per port transmitted collision packet counter recycles the count. Write one clear.
22:16	TXOK_PKT_REC	Per Port Transmitted Good Packet Counter Recycle This bit indicates that the per port transmitted good packet counter recycles the count. Write one clear.
13:8	BAD_PKT_REC	Per Port Received Bad Packet Counter Recycle This bit indicates that the per port received bad packet counter recycles the count. Write one clear.
6:0	GOOD_PKT_REC	Per Port Received Good Packet Counter Recycle This bit indicates that the per port received good packet counter recycles the count. Write one clear.

10110150 <u>P0TPC</u> 00000000 0																
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	BAD_PKT_CNT0															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Name	GOOD_PKT_CNT0															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT0	Port 0 packet counte for transmitted packets with collisionautomatically.
15:0	GOOD_PKT_CNT0	Port 0 packet counter for transmitted packets successfully

10110154 P1TPC Port 1 TX Packet Counter 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	BAD_PKT_CNT1															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GOOD_PKT_CNT1															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT1	Port 1 packet counte for transmitted packets with collisionautomatically.
15:0	GOOD_PKT_CNT1	Port 1 packet counter for transmitted packets successfully

10110158 P2TPC Port 2 TX Packet Counter 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	BAD_PKT_CNT2															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GOOD_PKT_CNT2															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT2	Port 2 packet counte for transmitted packets with collisionautomatically.
15:0	GOOD_PKT_CNT2	Port 2 packet counter for transmitted packets successfully

1011015C P3TPC Port 3 TX Packet Counter 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name	BAD_PKT_CNT3															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name	GOOD_PKT_CNT3															
Type	RO															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT3	Port 3 packet counte for transmitted packets with collisionautomatically.

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Bit(s)	Name	Description
15:0	GOOD_PKT_CNT3	Port 3 packet counter for transmitted packets successfully

10110160 P4TPC Port 4 TX Packet Counter 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT4	Port 4 packet counte for transmitted packets with collisionautomatically.
15:0	GOOD_PKT_CNT4	Port 4 packet counter for transmitted packets successfully

10110164 P5TPC Port 5 TX Packet Counter 00000000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31:16	BAD_PKT_CNT5	Port 5 packet counte for transmitted packets with collisionautomatically. (Note: This feature is only valid when port 5 Giga MAC is implemented)
15:0	GOOD_PKT_CNT5	Port 5 packet counter for transmitted packets successfully (Note: This feature is only valid when port 5 Giga MAC is implemented)

10110168 LEDC LED Control 00E0000 0

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Name																
Type																
Reset	OL_T_MO_DE								EPHY_GPIO_8_5				EPHY_GPIO_4_0			
Bit	15	14	13	12	11	10	9	8	0	1	1	1	0	0	0	0
Name	LED_SEL															
Type	RW															
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Name																
Type																
Reset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bit(s)	Name	Description
31	OLT_MODE	EPHY OLT Mode 0: Disable 1: Enable

Bit(s)	Name	Description
24:21	EPHY_GPIO_8_5	EPHY GPIO[8:5] EPHY_GPIO[8:5] is used to set EPHY initial state which is latched by EPHY SW reset.
20:16	EPHY_GPIO_4_0	EPHY GPIO[4:0] EPHY_GPIO[4:0] is used to set EPHY MDIO address which is latched by EPHY SW reset.
10:8	LED_SEL	LED Source 0: ESW LED Control 1: EPHY LED Control[0] 2: EPHY LED Control[1] 3: EPHY LED Control[2]
4:0	LED_POLARITY	Per Port LED Polarity Control 0: Low Active 1: High Active

6. Abbreviations

Abbrev.	Description
AC	Access Category
ACK	Acknowledge/ Acknowledgement
ACPR	Adjacent Channel Power Ratio
AD/DA	Analog to Digital/Digital to Analog converter
ADC	Analog-to-Digital Converter
AES	Advanced Encryption Standard
AGC	Auto Gain Control
AIFS	Arbitration Inter-Frame Space
AIFSN	Arbitration Inter-Frame Spacing Number
ALC	Asynchronous Layered Coding
A-MPDU	Aggregate MAC Protocol Data Unit
A-MSDU	Aggregation of MAC Service Data Units
AP	Access Point
ASIC	Application-Specific Integrated Circuit
ASME	American Society of Mechanical Engineers
ASYNC	Asynchronous
BA	Block Acknowledgement
BAC	Block Acknowledgement Control
BAR	Base Address Register
BBP	Baseband Processor
BGSEL	Band Gap Select
BIST	Built-In Self-Test
BSC	Basic Spacing between Centers
BJT	
BSSID	Basic Service Set Identifier
BW	Bandwidth
CCA	Clear Channel Assessment
CCK	Complementary Code Keying
CCMP	Counter Mode with Cipher Block Chaining Message Authentication Code Protocol
CCX	Cisco Compatible Extensions
CF-END	Control Frame End
CF-ACK	Control Frame Acknowledgement
CLK	Clock
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CSR	Control Status Register
CTS	Clear to Send

Abbrev.	Description
CW	Contention Window
CWmax	Maximum Contention Window
CWmin	Minimum Contention Window
DAC	Digital-To-Analog Converter
DCF	Distributed Coordination Function
DDONE	DMA Done
DDR	Double Data Rate
DFT	Discrete Fourier Transform
DIFS	DCF Inter-Frame Space
DMA	Direct Memory Access
DSP	Digital Signal Processor
DW	DWORD
EAP	Expert Antenna Processor
EDCA	Enhanced Distributed Channel Access
EECS	EEPROM chip select
EEDI	EEPROM data input
EEDO	EEPROM data output
EEPROM	Electrically Erasable Programmable Read-Only Memory
eFUSE	electrical Fuse
EESK	EEPROM source clock
EIFS	Extended Inter-Frame Space
EIV	Extend Initialization Vector
EVM	Error Vector Magnitude
FDS	Frequency Domain Spreading
FEM	Front-End Module
FEQ	Frequency Equalization
FIFO	First In First Out
FSM	Finite-State Machine
GF	Green Field
GND	Ground
GP	General Purpose
GPO	General Purpose Output
GPIO	General Purpose Input/Output
HCCA	HCF Controlled Channel Access
HCF	Hybrid Coordination Function
HT	High Throughput
HTC	High Throughput Control
ICV	Integrity Check Value
IFS	Inter-Frame Space
iNIC	Intelligent Network Interface Card
IV	Initialization Vector
I ² C	Inter-Integrated Circuit
I ² S	Integrated Inter-Chip Sound

Abbrev.	Description
I/O	Input/Output
IPI	Idle Power Indicator
IQ	In phase/Quadrature phase
JEDEC	Joint Electron Devices Engineering Council
JTAG	Joint Test Action Group
kbps	kilo (1000) bits per second
KB	Kilo (1024) Bytes
LDO	Low-Dropout Regulator
LDODIG	LDO for DIGItal part output voltage
LED	Light-Emitting Diode
LNA	Low Noise Amplifier
LO	Local Oscillator
L-SIG	Legacy Signal Field
MAC	Medium Access Control
MCU	Microcontroller Unit
MCS	Modulation and Coding Scheme
MDC	Management Data Clock
MDIO	Management Data Input/Output
MEM	Memory
MFB	MCS Feedback
MFS	MFB Sequence
MIC	Message Integrity Code
MIMO	Multiple-Input Multiple-Output
MLNA	Monolithic Low Noise Amplifier
MM	Mixed Mode
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
MPDU	MAC Protocol Data Units
MSB	Most Significant Bit
NAV	Network Allocation Vector
NAS	Network-Attached Server
NAT	Network Address Translation
NDP	Null Data Packet
NVM	Non-Volatile Memory
ODT	On-die Termination
Oen	Output Enable
OFDM	Orthogonal Frequency-Division Multiplexing
OSC	Open Sound Control
PA	Power Amplifier
PAPE	Provider Authentication Policy Extension
PBC	Push Button Configuration
PBF	Packet Buffer

Abbrev.	Description
PCB	Printed Circuit Board
PCF	Point Coordination Function
PCM	Pulse-Code Modulation
PHY	Physical Layer
PIFS	PCF Interframe Space
PLCP	Physical Layer Convergence Protocol
PLL	Phase-Locked Loop
PME	Physical Medium Entities
PMU	Power Management Unit
PN	Packet Number
PROM	Programmable Read-Only Memory
PSDU	Physical layer Service Data Unit
PSI	Power supply Strength Indication
PSM	Power Save Mode
PTN	Packet Transport Network
QoS	Quality of Service
RDG	Reverse Direction Grant
RAM	Random Access Memory
RF	Radio Frequency
RGMII	Reduced Gigabit Media Independent Interface
RH	Relative Humidity
RoHS	Restriction on Hazardous Substances
ROM	Read-Only Memory
RSSI	Received Signal Strength Indication (Indicator)
RTS	Request to Send
RvMII	Reverse Media Independent Interface
Rx	Receive
RXD	Received Data
RXINFO	Receive Information
RXWI	Receive Wireless Information
S	Stream
SDXC	Secure Digital eXtended Capacity
SDIO	Secure Digital Input Output
SDRAM	Synchronous Dynamic Random Access Memory
SEC	Security
SGI	Short Guard Interval
SIFS	Short Inter-Frame Space
SoC	System-on-a-Chip
SPI	Serial Peripheral Interface
SRAM	Static Random Access Memory
SSCG	Spread Spectrum Clock Generator
STBC	Space-Time Block Code

Abbrev.	Description
SW	Switch Regulator
TA	Transmitter Address
TBTT	Target Beacon Transmission Time
TDLS	Tunnel Direct Link Setup
TKIP	Temporal Key Integrity Protocol
TRSW	Tx/Rx Switch
TSF	Timing Synchronization Function
TSSI	Transmit Signal Strength Indication
Tx	Transmit
TxBF	Transmit Beamforming
TXD	Transmitted Data
TXDAC	Transmit Digital-Analog Converter
TXINFO	Transmit Information
TXOP	Opportunity to Transmit
TXWI	Tx Wireless Information
UART	Universal Asynchronous Rx/Tx
USB	Universal Serial Bus
UTIF	Universal Test Interface
VGA	Variable Gain Amplifier
VCO	Voltage Controlled Amplifier
VIH	High Level Input Voltage
VIL	Low Level Input Voltage
VoIP	Voice over IP
WCID	Wireless Client Identification
WEP	Wired Equivalent
WI	Wireless Information
WIV	Wireless Information Valid
WMM	Wi-Fi Multimedia
WPA	Wi-Fi Protected Access
WPDMA	Wireless Polarization Division Multiple Access
WS	Word Select

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