

NCT5567D-B
Nuvoton LPC I/O

Date: November 15th, 2018 Revision 1.3

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1. GENERAL DESCRIPTION

The NCT5567D-B is a member of Nuvoton's Super I/O product line. The NCT5567D-B monitors several critical parameters in PC hardware, including power supply voltages, fan speeds, and temperatures. In terms of temperature monitoring, the NCT5567D-B adopts the Current Mode (dual current source) and thermistor sensor approach. The NCT5567D-B also supports the Smart Fan control system, including "SMART FAN™ I and SMART FAN™ IV, which makes the system more stable and user-friendly.

The NCT5567D-B provides one high-speed serial communication port (UART), which includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem-control capability, and a processor interrupt system. The UART supports legacy speeds up to 115.2K bps as well as even higher baud rates of 230K, 460K, or 921K bps to support higher speed modems.

The NCT5567D-B provides flexible I/O control functions through a set of general purpose I/O (GPIO) ports. These GPIO ports may serve as simple I/O ports or may be individually configured to provide alternative functions.

The NCT5567D-B supports the Intel® PECI (Platform Environment Control Interface) and AMD® SB-TSI interface. The NCT5567D-B supports AMD® CPU power on sequence, and it also supports Intel® Deep Sleep Well glue logic to help customers to reduce the external circuits needed while using Deep Sleep Well function.

The NCT5567D-B supports Consumer IR function for remote control purpose. It also supports Advanced Power Saving function to further reduce the power consumption while the system is at S5 state.

The configuration registers inside the NCT5567D-B support mode selection, function enable and disable, and power-down selection. Furthermore, the configurable PnP features are compatible with the plug-and-play feature in Windows, making the allocation of the system resources more efficient than ever.

2. FEATURES

General

- Meet LPC Specification 1.1
- Support AMD power on sequence
- Support SERIRQ (Serialized IRQ)
- Integrated hardware monitor functions
- Support DPM (Device Power Management), ACPI (Advanced Configuration and Power Interface)
- Programmable configuration settings
- Single 24-MHz clock input
- Support selective pins of 5 V tolerance

UART

One high-speed, 16550-compatible UART with 16-byte send / receive FIFO

Support RS485

- Supports auto flow control

Fully programmable serial-interface characteristics:

- 5, 6, 7 or 8-bit characters
- Even, odd or no parity bit generation / detection
- 1, 1.5 or 2 stop-bit generation

Internal diagnostic capabilities:

- Loop-back controls for communications link fault isolation
- Break, parity, overrun, framing error simulation

Programmable baud rate generator allows division of clock source by any value from 1 to $(2^{16}-1)$

Maximum baud rate for clock source 14.769 MHz is up to 921K bps. The baud rate at 24 MHz is 1.5 M bps.

Keyboard Controller

8042-based keyboard controller

Asynchronous access to two data registers and one status register

Software-compatible with 8042

Support PS/2 mouse

Support Port 92

Support both interrupt and polling modes

Fast Gate A20 and Hardware Keyboard Reset

12MHz operating frequency

Hardware Monitor Functions

Smart Fan control system

Programmable threshold temperature to speed fan fully while current temperature exceeds this threshold in the Thermal Cruise™ mode

Support Current Mode (dual current source) temperature sensing method

Nine voltage inputs (CPUVCORE, VIN2~4, 3VCC, AVSB, 3VSB, VTT and VBAT)

Four fan-speed monitoring inputs

- Four fan-speed controls
- Dual mode for fan control (PWM and DC) for SYSFANOUT
- Built-in case-open circuit
- Programmable hysteresis and setting points for all monitored items
- Issue SMI#, OVT# (Over-temperature) to activate system protection
- Nuvoton Health Manager support
- Provide I²C master / slave interface to read / write registers

CIR

- Support IrDA version 1.0 SIR protocol with maximum baud rate up to 115.2K bps
- Support SHARP ASK-IR protocol with maximum baud rate up to 57,600 bps
- Support Consumer IR, including CIRRX

General Purpose I/O Ports

- GPIO programmable general purpose I/O ports
- Two access channels, indirect (via 2E/2F or 4E/4F) and direct (Base Address) access.

ACPI Configuration

- Support Glue Logic functions
- Support general purpose Watch Dog Timer functions

OnNow Functions

- Keyboard Wake-Up by programmable keys
- Mouse Wake-Up by programmable buttons
- OnNow Wake-Up from all of the ACPI sleeping states (S1-S5)

PECI Interface

- Support PECI 1.1, 2.0 and 3.0 specification
- Support 2 CPU addresses and 2 domains per CPU address

AMD SB-TSI Interface

- Support AMD[®] SB-TSI specification

SMBus Interface

- Support SMBus Slave interface to report Hardware Monitor device data
- Support SMBus Master interface to get thermal data from PCH
- Support SMBus Master interface to get thermal data from MXM module

Power Measurement

Fading LED driver control for power status and diagnostic indications

AMD® CPU Power on Sequence

Support AMD® CPU power on sequence

Advanced Power Saving

Advanced Sleep State Control to save motherboard Stand-by power consumption

Operation voltage

3.3 voltage

Package

64-pin LQFP

Green

3. BLOCK DIAGRAM

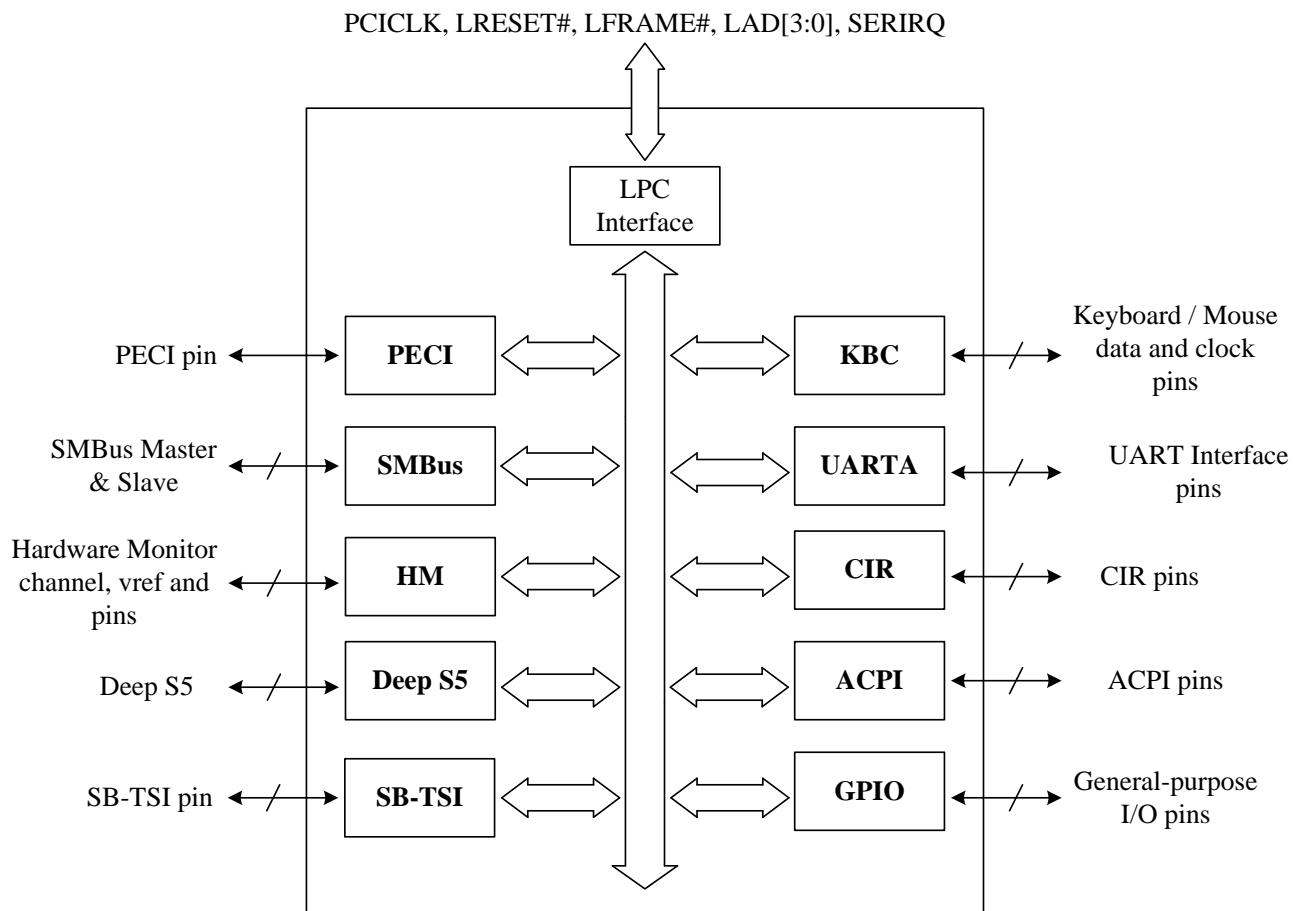


Figure 3-1 NCT5567D-B Block Diagram

4. PIN LAYOUT

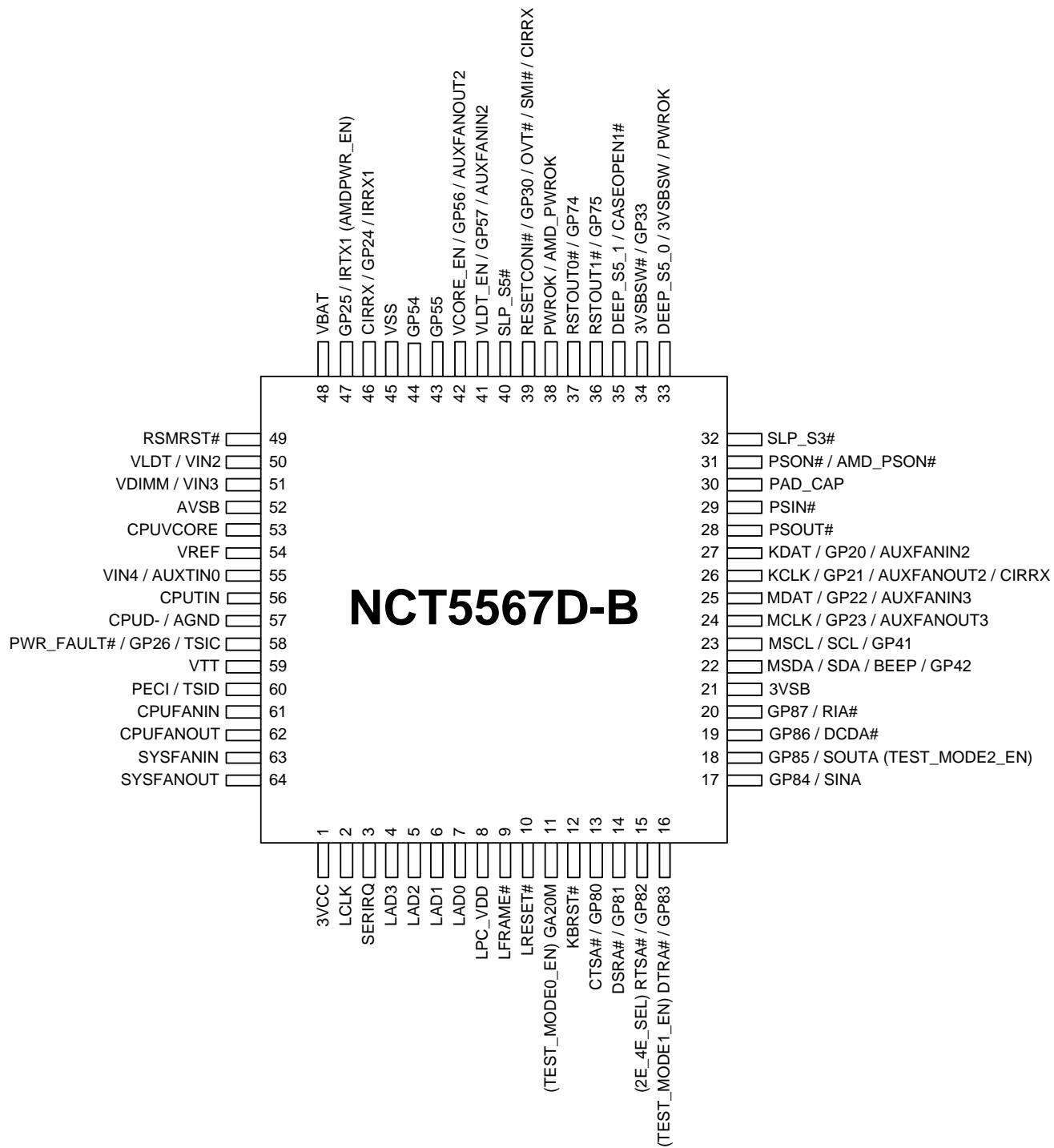


Figure 4-1 NCT5567D-B Pin Layout

5. PIN DESCRIPTION

Note: Please refer to 22.2 DC CHARACTERISTICS for details.

AOUT	- Analog output pin
AIN	- Analog input pin
IN _{tp318}	- 3.3V/1.8V TTL-level input pin
IN _{sp318}	- 3.3V/1.8V TTL-level, Schmitt-trigger input pin
IN _{tp3}	- 3.3V TTL-level input pin
IN _{sp3}	- 3.3V TTL-level, Schmitt-trigger input pin
IN _{gp3}	- 3.3V GTL-level input pin
IN _{tp5}	- 5V TTL-level input pin
IN _{tcup5}	- 5V TTL-level, input buffer with controllable pull-up
IN _{tscup5}	- 5V TTL-level, Schmitt-trigger, input buffer with controllable pull-up
IN _{tsp5}	- 5V TTL-level, Schmitt-trigger input pin
IN _{tdp5}	- 5V TTL-level input pin with internal pull-down resistor
O ₈	- output pin with 8-mA source-sink capability
OD ₈	- open-drain output pin with 8-mA sink capability
O ₁₂	- output pin with 12-mA source-sink capability
OD ₁₂	- open-drain output pin with 12-mA sink capability
O ₁₆	- output pin with 16-mA source-sink capability
OD ₁₆	- open-drain output pin with 16-mA sink capability
O ₂₄	- output pin with 24-mA source-sink capability
OD ₂₄	- open-drain output pin with 24-mA sink capability
O ₄₈	- output pin with 48-mA source-sink capability
OD ₄₈	- open-drain output pin with 48-mA sink capability
I/O _{v3}	- Bi-direction pin with source capability of 6 mA and sink capability of 1 mA
I/O _{v4}	- Bi-direction pin with source capability of 6 mA
O _{12cu}	- output pin 12-mA source-sink capability with controllable pull-up
OD _{12cu}	- open-drain 12-mA sink capability output pin with controllable pull-up
OX ₈	- output pin with 8-mA source-sink capability and output voltage high level depend LPC_VDD
ODX ₈	- open-drain output pin with 8-mA sink capability and output voltage high level depend LPC_VDD

5.1 LPC Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
2	LCLK	I	IN _{tp318}	LPC_VDD	Low Pin Count interface clock, 19.2MHZ~33MHz.
3	SERIRQ	I/O	IN _{tp3} O ₈ OD ₈	VSB	Serialized IRQ input / output.
4-7	LAD[3:0]	I/O	IN _{tp318} ODX ₈	LPC_VDD	These signal lines communicate address, control, and data information over the LPC bus between a host and a peripheral.
9	LFRAME#	I	IN _{sp318}	LPC_VDD	Indicates the start of a new cycle or the termination of a broken cycle.
10	LRESET#	I	IN _{sp318}	VSB	Reset signal. It can be connected to the PCIRST# signal on the host.

5.2 Serial Port Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
20	RIA#	I	IN _{tp5}	VSB	Ring Indicator. An active-low signal indicates that a ring signal is being received from the modem or the data set.
19	DCDA#	I	IN _{tp5}	VSB	Data Carrier Detection. An active-low signal indicates the modem or data set has detected a data carrier.
18	SOUTA	O	O ₁₂	VSB	UART A Serial Output. This pin is used to transmit serial data out to the communication link.
17	SINA	I	IN _{tp5}	VSB	Serial Input. This pin is used to receive serial data through the communication link.
16	DTRA#	O	O ₁₂	VSB	UART A Data Terminal Ready. An active-low signal informs the modem or data set that the controller is ready to communicate.
15	RTSA#	O	O ₁₂	VSB	UART A Request To Send. An active-low signal informs the modem or data set that the controller is ready to send data.
14	DSRA#	I	IN _{tp5}	VSB	Data Set Ready. An active-low signal indicates the modem or data set is ready to establish a communication link and transfer data to the UART.
13	CTSA#	I	IN _{tp5}	VSB	Clear To Send. This is the modem-control input. The function of these pins can be tested by reading bit 4 of the handshake status register.

5.3 KBC Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
11	GA20M	O	O ₁₂ OD ₁₂	VSB	Gate A20 output. This pin is high after system reset. (KBC P21)
12	KBRST#	O	O ₁₂ OD ₁₂	VSB	Keyboard reset. This pin is high after system reset. (KBC P20)
26	KCLK	I/O	IN _{tsp5} OD ₁₂	VSB	Keyboard Clock. Pull up is recommended if useless.
27	KDAT	I/O	IN _{tsp5} OD ₁₂	VSB	Keyboard Data. Pull up is recommended if useless.
24	MCLK	I/O	IN _{tsp5} OD ₁₂	VSB	PS2 Mouse Clock. Pull up is recommended if useless.
25	MDAT	I/O	IN _{tsp5} OD ₁₂	VSB	PS2 Mouse Data. Pull up is recommended if useless.

5.4 CIR Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
26	CIRRX	I	IN _{tsp5}	VSB	CIR input for long length
39	CIRRX	I	IN _{tp5}	VSB	CIR input for long length
46	CIRRX	I	IN _{tsp5}	VSB	CIR input for long length

5.5 Hardware Monitor Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
35	CASEOPEN1#	I	IN _{tp5}	VRRTC	CASE OPEN 1 detection. An active-low input from an external device when the case is open. This signal can be latched if pin VBAT is connected to the battery, even if the system is in G3 state. Pulling up a 2-MΩ resistor to VBAT is recommended if not in use.
55	VIN4	I	AIN	AVSB	Analog input for voltage measurement (Range: 0 to 2.048 V)
51	VIN3	I	AIN	AVSB	Analog input for voltage measurement (Range: 0 to 2.048 V)
50	VIN2	I	AIN	AVSB	Analog input for voltage measurement (Range: 0 to 2.048 V)
53	CPUVCORE	I	AIN	AVSB	Analog input for voltage measurement (Range: 0 to 2.048 V)
54	VREF	O	AOUT	AVSB	Reference Voltage (around 2.048 V).

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
55	AUXTINO	I	AIN	AVSB	The input of temperature sensor 3. It is used for AUX0 temperature sensing.
56	CPUTIN	I	AIN	AVSB	The input of temperature sensor 2. It is used for CPU temperature sensing.
39	OVT#	O	OD ₁₂	VSB	The output of over temperature Shutdown. This pin indicates the temperature is over the temperature limit. (Default after LRESET#)
	SMI#	O	OD ₁₂	VSB	System Management Interrupt channel output.
41	AUXFANIN2	I	IN _{tsp5}	VSB	0 to +5 V amplitude fan tachometer input.
27	AUXFANIN2	I	IN _{tsp5}	VSB	0 to +5 V amplitude fan tachometer input.
25	AUXFANIN3	I	IN _{tsp5}	VSB	0 to +5 V amplitude fan tachometer input.
42	AUXFANOUT2	O	O ₁₂ OD ₁₂	VSB	PWM duty-cycle signal for fan speed control.
26	AUXFANOUT2	O	O ₁₂ OD ₁₂	VSB	PWM duty-cycle signal for fan speed control.
24	AUXFANOUT3	O	O ₁₂ OD ₁₂	VSB	PWM duty-cycle signal for fan speed control.
61	CPUFANIN	I	IN _{tsp5}	VSB	0 to +5 V amplitude fan tachometer input.
62	CPUFANOUT	O	O ₁₂ OD ₁₂	VSB	PWM duty-cycle signal for fan speed control.
63	SYSFANIN	I	IN _{tsp5}	VSB	0 to +5 V amplitude fan tachometer input.
64	SYSFANOUT	O	O ₁₂ OD ₁₂ AOUT	VSB	PWM duty-cycle signal for fan speed control. DC voltage output for fan speed control.
22	BEEP	O	OD ₁₂	VSB	Beep function for hardware monitor.

5.6 Intel® PECl Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
60	PECl	I/O	I/O _{V3}	VTT	INTEL® CPU PECl interface. Connect to CPU.

5.7 Advanced Configuration & Power Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
29	PSIN#	I	IN _{tp5}	VSB	Panel Switch Input. This pin is active-low with an internal pulled-up resistor.

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
28	PSOUT#	O	OD ₁₂	VSB	Panel Switch Output. This signal is used to wake-up the system from S3/S5 state.
49	RSMRST#	O	OD ₈	VRTC	Resume reset signal output.
32	SLP_S3#	I	IN _{tp318}	VSB	SLP_S3# input.
40	SLP_S5#	I	IN _{tp318}	VSB	SLP_S5# input.
31	PSON#	O	OD ₁₂	VSB	Power supply on-off output.
38	PWROK	O	O ₈ OD ₈	VRTC	3VCC PWROK signal.
33	PWROK	O	OD ₂₄	VRTC	3VCC PWROK signal.
38	AMD_PWROK	O	OD ₈	VRTC	3VCC AMD PWROK signal.
39	RESETCONI#	I	IN _{tp5}	VSB	Connect to the reset button. This pin has internal de-bounce circuit whose de-bounce time is at least 16 mS.
33	3VSBSW	O	OD ₂₄	VRTC	Switch 3VSB power to memory when in S3 state.
34	3VSBSW#	O	O ₂₄ OD ₂₄	VSB	Switch 3VSB power to memory when in S3 state.
37	RSTOUT0#	O	O ₁₆ OD ₁₆	VSB	PCI Reset Buffer 0. (from pin LRESET#)
36	RSTOUT1#	O	O ₁₆ OD ₁₆	VSB	PCI Reset Buffer 1. (from pin LRESET#) This pin default is push-pull output and could be programmed to open-drain output by register Logic Device A, CRF7 bit6.

5.8 Advanced Sleep State Control Control

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
33	DEEP_S5_0	O	OD ₂₄	VRTC	This pin is to control system power for entering "more power saving mode".
35	DEEP_S5_1	O	OD ₁₂	VRTC	This pin is to control system power for entering "more power saving mode".

5.9 SMBus Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
23	SCL	I/O	IN _{sp318} OD ₁₂	VSB	SMBus slave clock.
22	SDA	I/O	IN _{sp318} OD ₁₂	VSB	SMBus slave bi-directional Data.

23	MSCL	I/O	IN _{sp318} OD ₁₂	VSB	SMBus master clock.
22	MSDA	I/O	IN _{sp318} OD ₁₂	VSB	SMBus master bi-directional Data.

5.10 Power Pins

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
21	3VSB	I			+3.3 V stand-by power supply for the digital circuits.
48	VBAT	I			+3 V on-board battery for the digital circuits.
1	3VCC	I			+3.3 V power supply for driving 3 V on host interface.
8	LPC_VDD	I			+3.3 V / +1.8 V power supply for the LPC interface.
52	AVSB	I			Analog +3.3 V power input. Internally supply power to all analog circuits.
57	CPUD- / AGND	I			Analog ground. The ground reference for all analog input. Internally connected to all analog circuits. This pin should be connected to ground.
45	VSS	I			Ground.
59	VTT	I			INTEL® CPU VTT power.
30	PAD_CAP	O			External Filter Capacitor 4.7u (for internal VSB 1.8V)

5.11 AMD Power-On Sequence

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
53	CPUVCORE	I	AIN	AVSB	Power sequence group B signal
50	VLDT	I	AIN	AVSB	Power sequence group C signal
51	VDIMM	I	AIN	AVSB	Memory power enable
42	VCORE_EN	O	OD ₁₂	VSB	CPU Vcore power enable
41	VLDT_EN	O	OD ₁₂	VSB	Hyper transport I/O power enable
38	AMD_PWROK	O	OD ₈	VSB	AMD power on sequence ok signal
31	AMD_PSON#	O	OD ₁₂	VSB	Power supply on/off output to enable ATX

5.12 AMD SB-TSI Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
58	TSIC	O	OD ₁₂	VSB	AMD SB-TSI clock output.
60	TSID	I/O	IN _{sp3} OD ₁₂	VSB	AMD SB-TSI data input / output.

5.13 IR

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
46	IRRX1	I	IN _{tsp5}	VSB	IR Receiver input.
47	IRTX1	O	O ₁₂	VSB	IR Transmitter output.

5.14 Power Fault

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
58	PWR_FAULT#	O	OD ₁₂	VSB	Intel Power Fault output.

5.15 General Purpose I/O Port

5.15.1 GPIO-2 Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
27	GP20	I/O	IN _{tsp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 2 bit 0.
26	GP21	I/O	IN _{tsp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 2 bit 1.
25	GP22	I/O	IN _{tsp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 2 bit 2.
24	GP23	I/O	IN _{tsp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 2 bit 3.
46	GP24	I/O	IN _{tsp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 2 bit 4.
47	GP25	I/O	IN _{tsp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 2 bit 5.
58	GP26	I/O	IN _{tp3} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 2 bit 6.

5.15.2 GPIO-3 Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
39	GP30	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 3 bit 0.
34	GP33	I/O	IN _{tp5} O ₂₄ OD ₂₄	VRTC	General-purpose I/O port 3 bit 3.

5.15.3 GPIO-4 Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
23	GP41	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 4 bit 1.
22	GP42	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 4 bit 2.

5.15.4 GPIO-5 Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
44	GP54	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 5 bit 4.
43	GP55	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 5 bit 5.
42	GP56	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 5 bit 6.
41	GP57	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 5 bit 7.

5.15.5 GPIO-7 Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
37	GP74	I/O	IN _{tp5} O ₁₆ OD ₁₆	VSB	General-purpose I/O port 7 bit 4.
36	GP75	I/O	IN _{tp5} O ₁₆ OD ₁₆	VSB	General-purpose I/O port 7 bit 5.

5.15.6 GPIO-8 Interface

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
13	GP80	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 8 bit 0.
14	GP81	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 8 bit 1.
15	GP82	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 8 bit 2.
16	GP83	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 8 bit 3.
17	GP84	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 8 bit 4.
18	GP85	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 8 bit 5.
19	GP86	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 8 bit 6.
20	GP87	I/O	IN _{tp5} O ₁₂ OD ₁₂	VSB	General-purpose I/O port 8 bit 7.

5.16 Strapping Pins

PIN	SYMBOL	I/O	BUFFER TYPE	POWER WELL	DESCRIPTION
15	2E_4E_SEL	I	IN _{tdp5}	VSB	SIO I/O address selection. (Strapped by LRESET#) Strapped to high: SIO I/O address is 4Eh/4Fh. Strapped to low: SIO I/O address is 2Eh/2Fh.
16	TEST_MODE1_EN	I	IN _{tdp5}	VSB	TEST_MODE1_EN function. (Strapped by VCC : internal Power OK signal without any delay.) Strapped to high: TEST_MODE1_EN. Strapped to low: Please strapped to low.
18	TEST_MODE2_EN	I	IN _{tdp5}	VSB	TEST_MODE2_EN function. (Strapped by VCC : internal Power OK signal without any delay.) Strapped to high: TEST_MODE2_EN. Strapped to low: Please strapped to low.
47	AMDPWR_EN	I	IN _{tdp5}	VSB	Enable AMD power sequence function. (Strapped by VSB power: internal RSMRST# signal.) Strapped to high: Enable AMD power sequence Strapped to low: Disable AMD power sequence
11	TEST_MODE0_EN	I	IN _{tdp5}	VSB	TEST_MODE0_EN function. (Strapped by VSB power: internal RSMRST# signal.) Strapped to high: TEST_MODE0_EN. Strapped to low: Please strapped to low.

Note . All Strapping results can be programming by LPC Interface. There are three conditions below:

- 1) VSB Strapping result can be programming by LPC, and reset by RSMRST#.
- 2) VCC Strapping result can be programming by LPC, and reset by PWROK.
- 3) LRESET# strapping (2E_4E_SEL) can be programming by LPC, and reset by LRESET#.

5.17 Internal pull-up, pull-down pins

Signal	Pin(s)	Power well	Type	Resistor	Note
Strapping Pins					
2E_4E_SEL	15	3VSB	Pull-down	47.4K	1
TEST_MODE1_EN	16	3VSB	Pull-down	47.4K	1
TEST_MODE2_EN	18	3VSB	Pull-down	47.4K	1
AMDPWR_EN	47	3VSB	Pull-down	47.4K	2
TEST_MODE0_EN	11	3VSB	Pull-down	47.4K	2
Advanced Configuration & Power Interface					

Signal	Pin(s)	Power well	Type	Resistor	Note
PSIN#	29	3VSB	Pull-up	47.03K	

Note1. Active only during VCC Power-up reset

Note2. Active only during VSB Power-up reset

5.18 Strapping multi function pin control

AMDPWR_EN	Pin31 function Selection		
	AMDPWR_EN	Pin31	
	0	PSON#	
	1	AMD_PSON#	
Pin38 function Selection			
AMDPWR_EN	Pin38		
0	PWROK		
1	AMD_PWROK		
Pin41 function Selection			
AMDPWR_EN	CR1B [Bit5]	Pin41	
0	0	GP57	
1	0	VLDT_EN	
x	1	AUXFANIN2	
Pin42 function Selection			
AMDPWR_EN	CR2D [Bit7]	Pin42	
0	0	GP56	
1	0	VCORE_EN	
x	1	AUXFANOUT2	

6. GLUE LOGIC

6.1 ACPI Glue Logic

Table 6-1 Pin Description

SYMBOL	PIN	DESCRIPTION
SLP_S5#	40	SLP_S5# input.
RESETCONI#	39	RESETCONI# input signal. This pin has internal de-bounce circuit whose de-bounce time is at least 16 mS.
PWROK	38	This pin generates the PWROK signals while 3VCC is present.
RSMRST#	49	The RSMRST# signal is a reset output and is used as the VSB power on reset signal for the South Bridge. When the NCT5567D-B detects the 3VSB voltage rises to "V1", it then starts a delay – "t1" before the rising edge of RSMRST# asserting. If the 3VSB voltage falls below "V2", the RSMRST# de-asserts immediately.

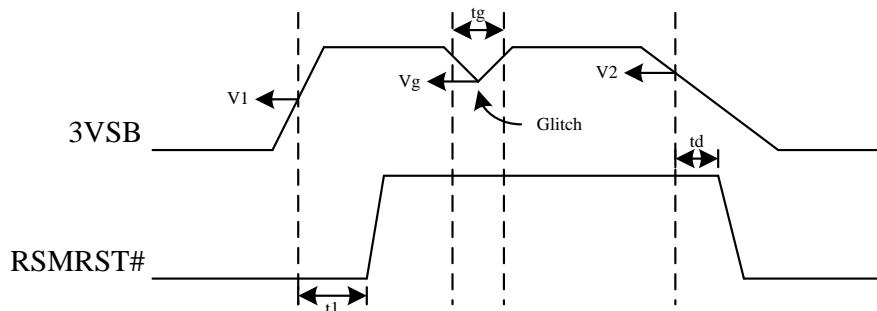


Figure 6-1 RSMRST#

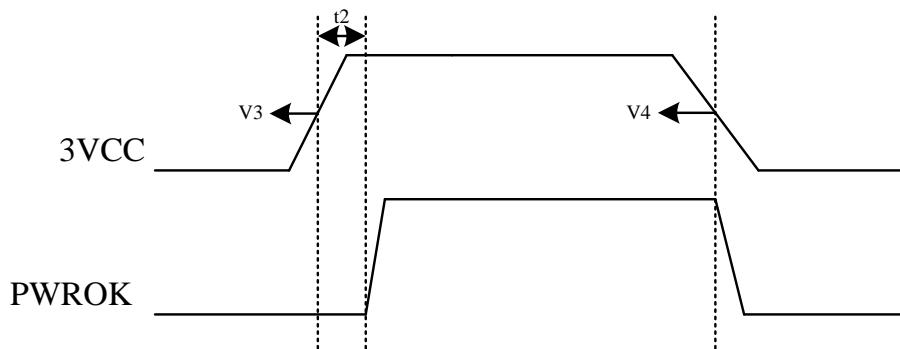


Figure 6-2 PWROK

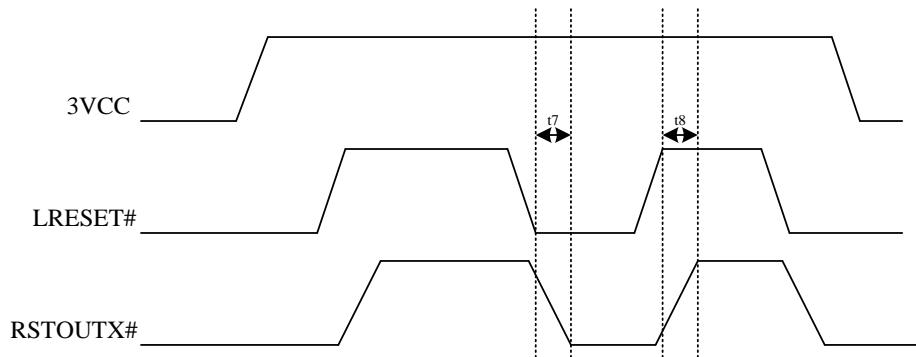


Figure 6-3 RSTOUTX# and LRESET#

TIMING	PARAMETER	MIN	MAX	UNIT
t1	Valid 3VSB to RSMRST# inactive	200	300	mS
tg	3VSB Glitch allowance		1	uS
td	Falling 3VSB supply Delay		5	uS
t2	Valid 3VCC to PWROK active	50	500	mS
t7	LRESET# active to RSTOUTX# active	0	80	nS
t8	LRESET# inactive to RSTOUTX# inactive	0	80	nS

DC	PARAMETER	MIN	MAX	UNIT
V1	3VSB Valid Voltage		3.10	Volt
V2	3VSB Ineffective Voltage	2.92		Volt
V3	3VCC Valid Voltage	-	2.75	Volt
V4	3VCC Ineffective Voltage	2.40	-	Volt
Vg	3VSB drops by Power noise	2	-	Volt

Note : 1. The values above are the worst-case results of R&D simulation.

6.2 3VSBSW#

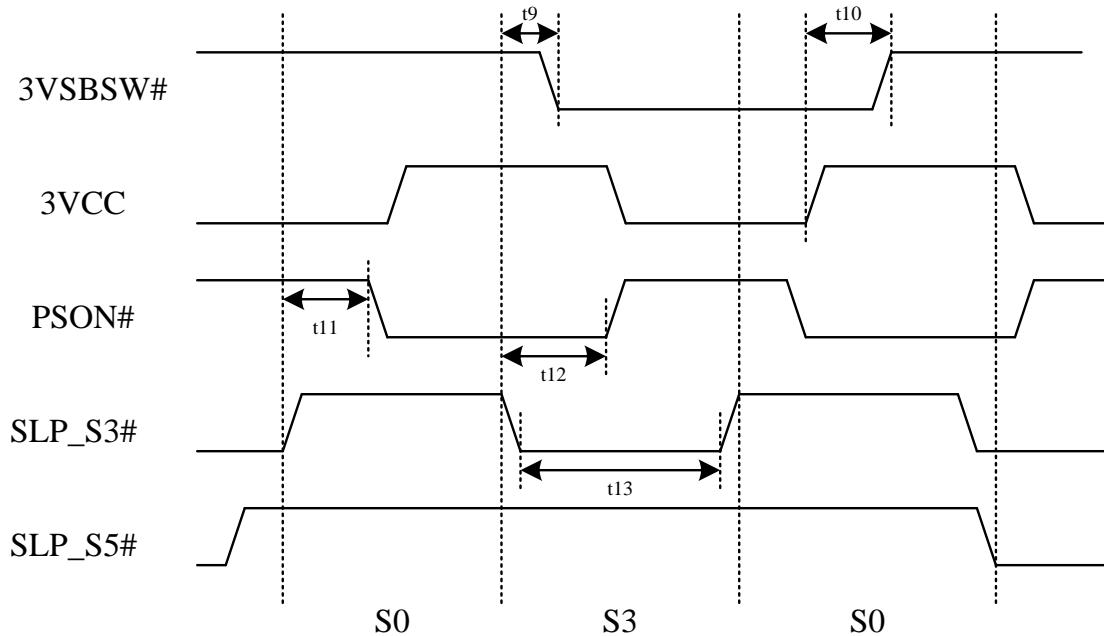


Figure 6-4 3VSBSW#

TIMING	PARAMETER	MIN	MAX	UNIT
t9	SLP_S3# active to 3VSBSW# active	0	10	mS
t10	3VCC active to 3VSBSW# inactive	120	190	mS
t11	SLP_S3# inactive to PSON# active	0	200	nS
t12	SLP_S3# active to PSON# inactive	15	45	mS
t13	SLP_S3# minimal Low Time	40	-	mS

6.3 PSON# Block Diagram

The PSON# function controls the main power on/off. The main power is turned on when PSON# is low. Please refer to the figure below.

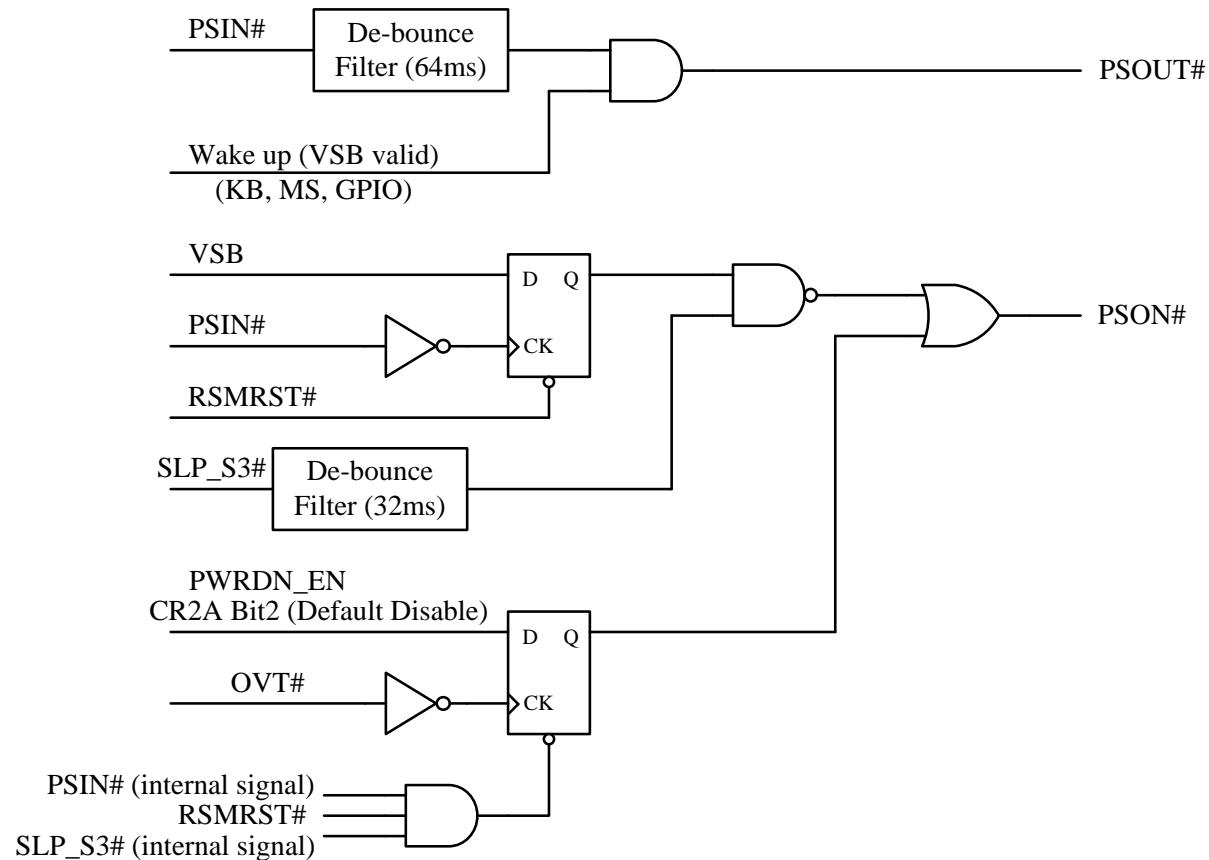


Figure 6-5 PSON# Block Diagram

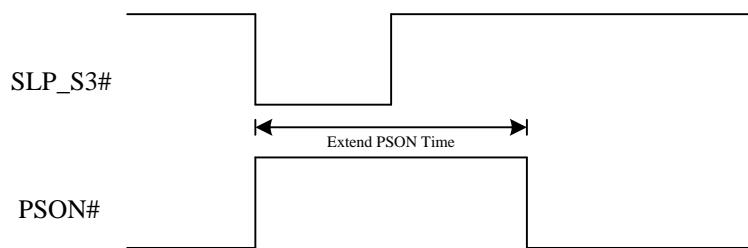
6.4 Extend PSON# after power off

When system goes from S0 state to S3/S5 state (ie. SLPS3# from high to low), PSON# is de-asserted (ie. From low to high). Then if SLPS3# goes back to high immediately, less than a certain period of time (LD12, CREA[1:0]), the PSON# signal should be kept high for above-mentioned duration.

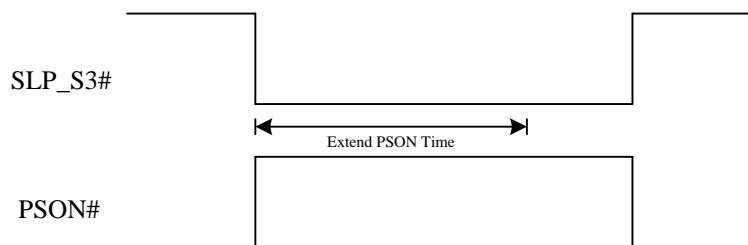
If SLPS3# stays at high longer than the certain period of time, PSON# follows state of SLPS3# again after said duration.

This certain period of time could be set to Disable 2/3/4 seconds. (Disable = 0 seconds).

Condition1 :



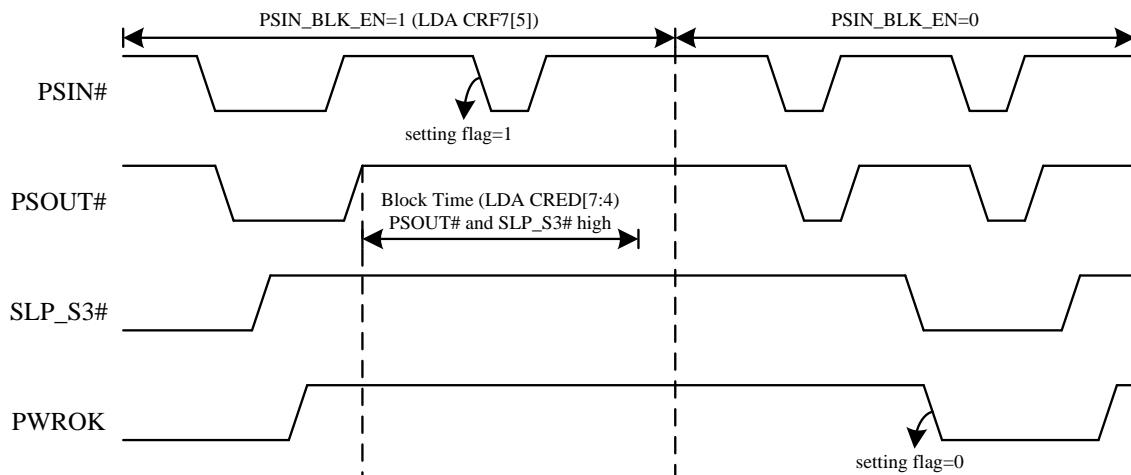
Condition2 :



6.5 PSIN#

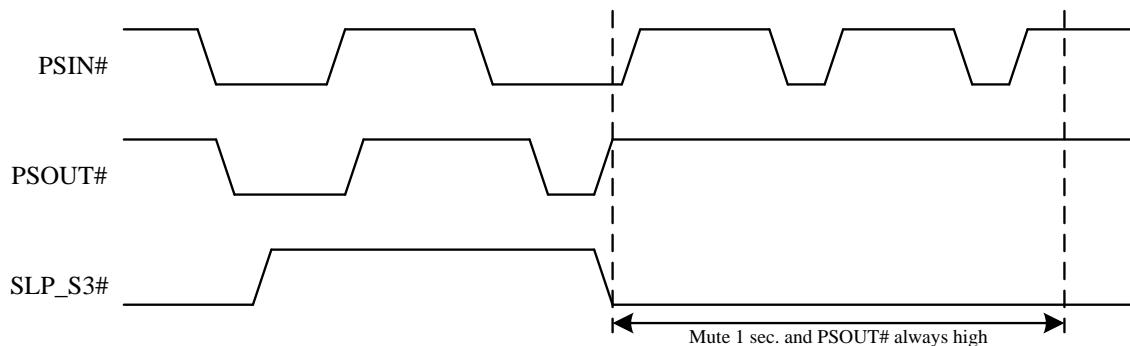
6.5.1 PSIN# Block Diagram (S5 → S0)

When system is at S5 to S0 state, we add block time to avoid system enter S5 again by PSIN# glitch. The block time can be set by LDA_CRED[7:4] and the default is 0.5sec. If the glitch happen in the block time, the flag (LDA_CREC[2]) will set high and can be observe when user enter S0 state. The function need to set enable bit (LDA_CRF7[5]: PSIN_BLK_EN).



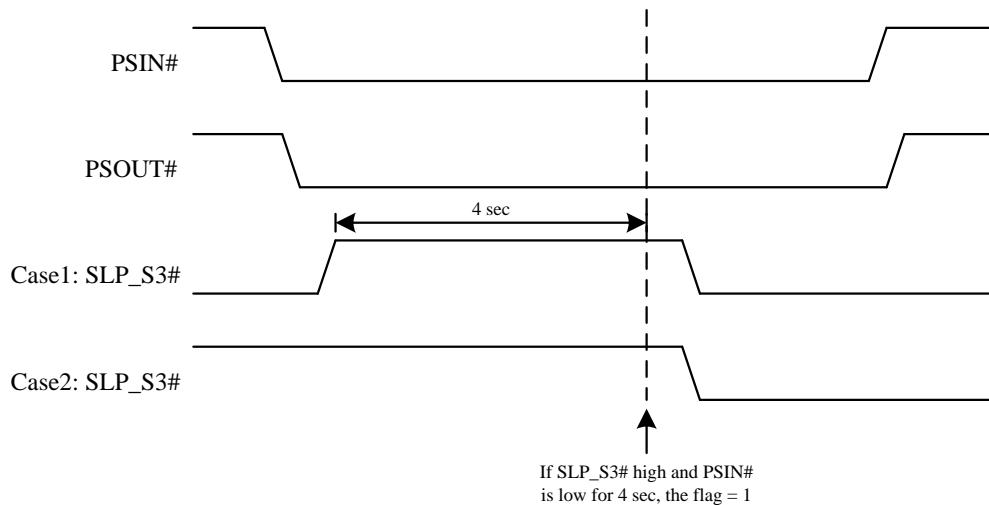
6.5.2 PSIN# Block 1sec Diagram (S0 → S5)

When system is at S0 to S5 state, we add block 1 sec to avoid system enter S0 again by PSIN# glitch. The block time is fix and can't be set. The function need to set enable bit (LDA_CRF7[5]: PSIN_BLK_EN).



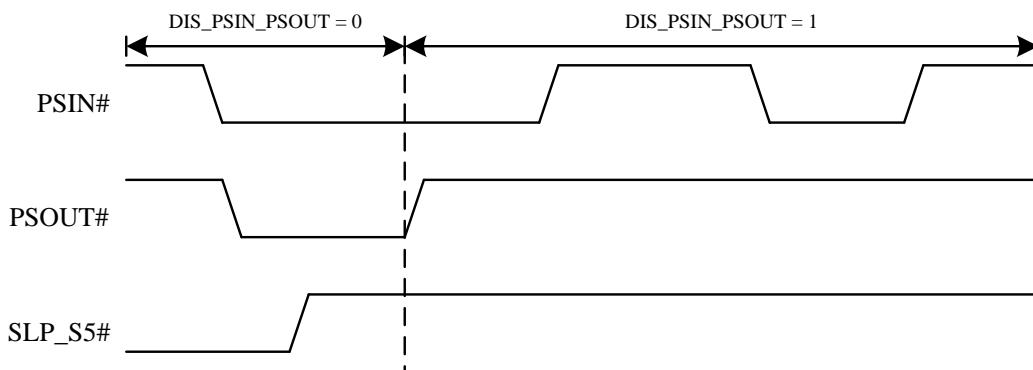
6.5.3 PSIN# 4sec Status Diagram

When user push PSIN button sustainably more than 4 sec, the system will enter S5 state and we have a flag to monitor (LDA_CREC[0]).



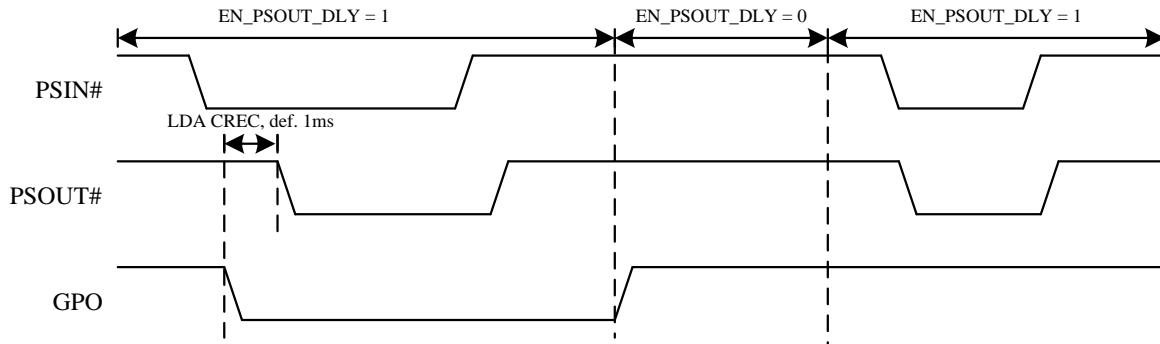
6.5.4 Disable PSIN# to PSOUT# Diagram

When system enter S0 from S5, user can monitor PSIN status by register (LDA_CREC[7]) for several application. For example, user can set DIS_PSIN_PSOUT (LDA_CREC[1]) to disconnect PSIN and PSOUT. If DIS_PSIN_PSOUT = 1, PSOUT will not follow PSIN. To avoid BIOS not clear this bit abnormally, it can be cleared automatically by PSIN rising signal to set LDA_CREC[3] = 1.



6.5.5 Enable PSOUT# Delay Diagram

Normally, PSOUT follows PSIN. For particular case, we can add PSOUT delay from PSIN when system enters S0 state. The delay time can be set by LDA_CREC[6:5], and need to enable by LDA_CREC[4](EN_PSOUT_DLY). As system enter S0 state, the enable bit need to clear to release GP73 bus, otherwise, GP73 will keep low. When system enter S5 state from S0, the function will not work even we set the enable bit.



6.6 PWROK

PWROK Signal indicates the main power (VCC Power) is valid. Besides, valid PWROK signal also requires the following conditions, as shown in the figure below.

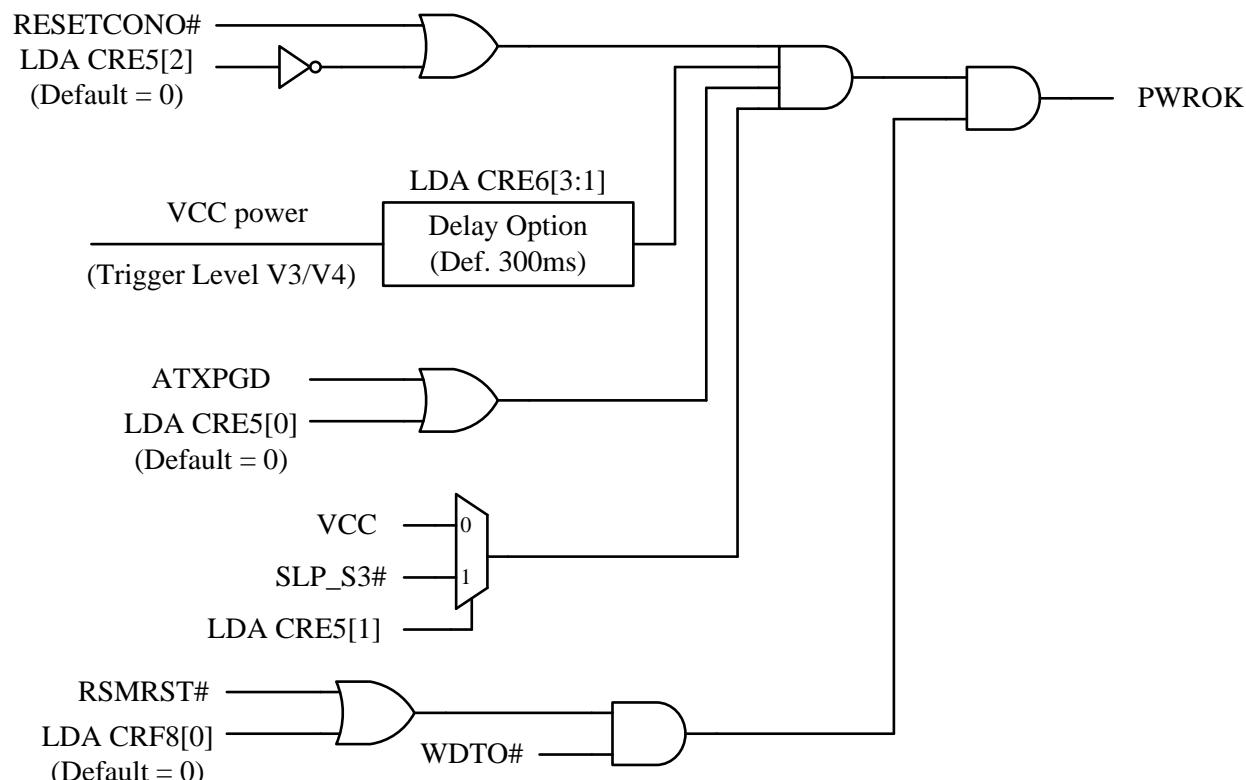


Figure 6-6 PWROK Block Diagram

6.7 Front Panel LEDs

NCT5567D-B supports two LED control pins – GRN_LED and YLW_LED.

For dual-color LED application:

(1)GRN_LED pin is connected to a 470ohm resistor to 5VSB, and the cathode of the green LED and the anode of the yellow LED.

(2)YLW_LED pin is connected to a 470ohm resistor to 5VSB, and the cathode of the yellow LED and the anode of the green LED.

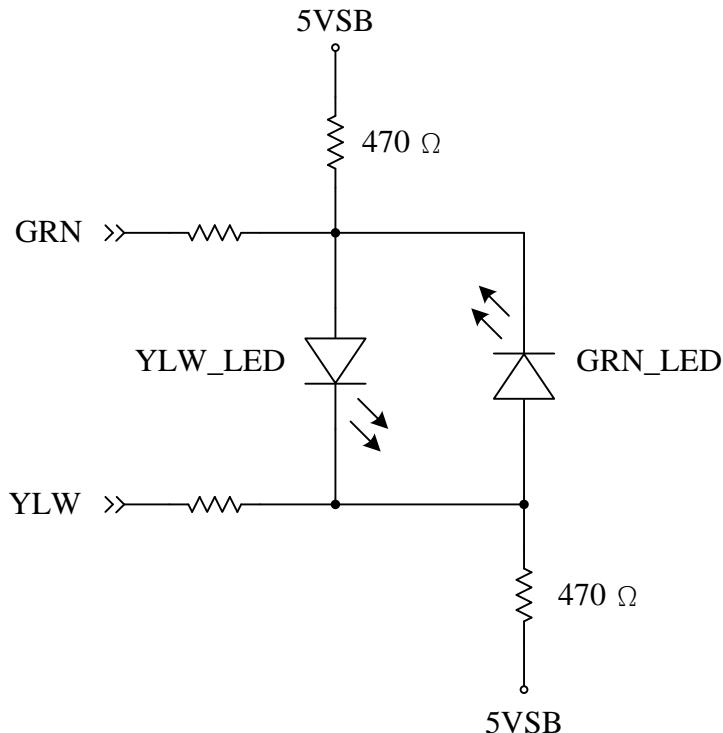


Figure 6-7 Illustration of Dual Color LED application

GRN_LED and YLW_LED pins are designed to show currently power states. There are Manual Mode and Automatic Mode:

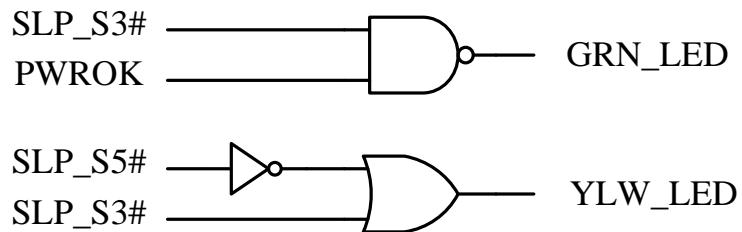
6.7.1 Automatic Mode

Power state is S0 or S1: GRN_LED will be asserted by default.

Power state is S3: YLW_LED will be asserted by default.

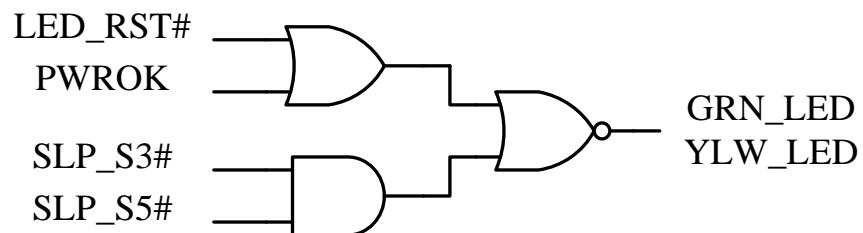
Power state is S4 or S5: Both GRN_LED and YLW_LED will be de-asserted by default.

AUTO_EN	GRN_LED_RST (YLW_LED_RST)	Pwr State	SLP_S3#	SLP_S5#	GRN_LED	YLW_LED
1	X	S0,S1	1	1	GRN_BLK_FREQ	HIGH-Z
1	X	S3	0	1	HIGH-Z	YLW_BLK_FREQ
1	X	S4,S5	X	0	HIGH-Z	HIGH-Z



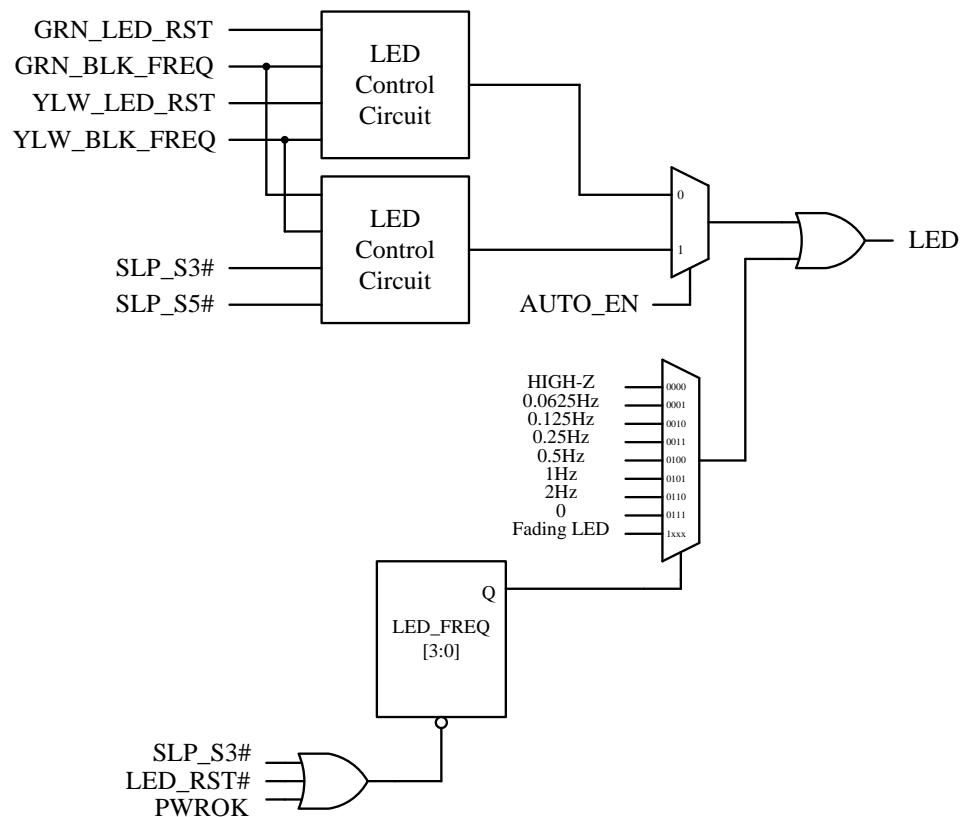
6.7.2 Manual Mode

AUTO_EN	GRN_LED_RST# (YLW_LED_RST#)	Pwr State	SLP_S3#	SLP_S5#	GRN_LED	YLW_LED
0	0	S0,S1	1	1	GRN_BLK_FREQ	YLW_BLK_FREQ
0	0	S3	0	1	HIGH-Z	HIGH-Z
0	0	S4,S5	X	0	HIGH-Z	HIGH-Z
0	1	S0,S1	1	1	GRN_BLK_FREQ	YLW_BLK_FREQ
0	1	S3	0	1	GRN_BLK_FREQ	YLW_BLK_FREQ
0	1	S4,S5	X	0	GRN_BLK_FREQ	YLW_BLK_FREQ



Register Name	Register Location
AUTO_EN	Logic Device B, CRF7h, bit7
GRN_BLK_FREQ	Logic Device B, CRF7h, bit3~0
YLW_BLK_FREQ	Logic Device B, CRF8h, bit3~0
GRN_LED_RST#	Logic Device B, CRF7h, bit6
YLW_LED_RST#	Logic Device B, CRF8h, bit6

6.7.3 S0~S5 LED Blink Block Diagram



6.7.4 LED Pole (LED_POL)

Set to 0b, GRN_LED output is active low, as the following Figure(a)

Set to 1b, GRN_LED output is active high, as the following Figure(b)

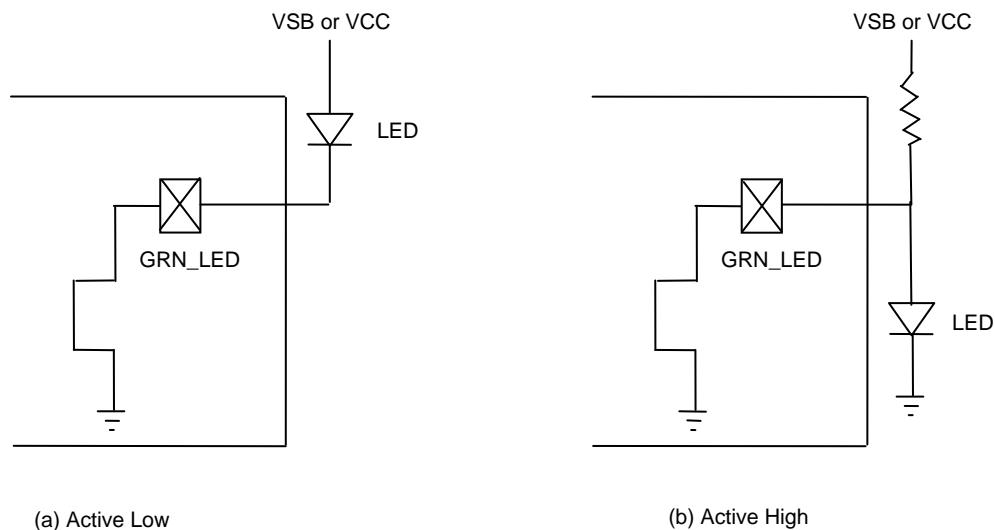


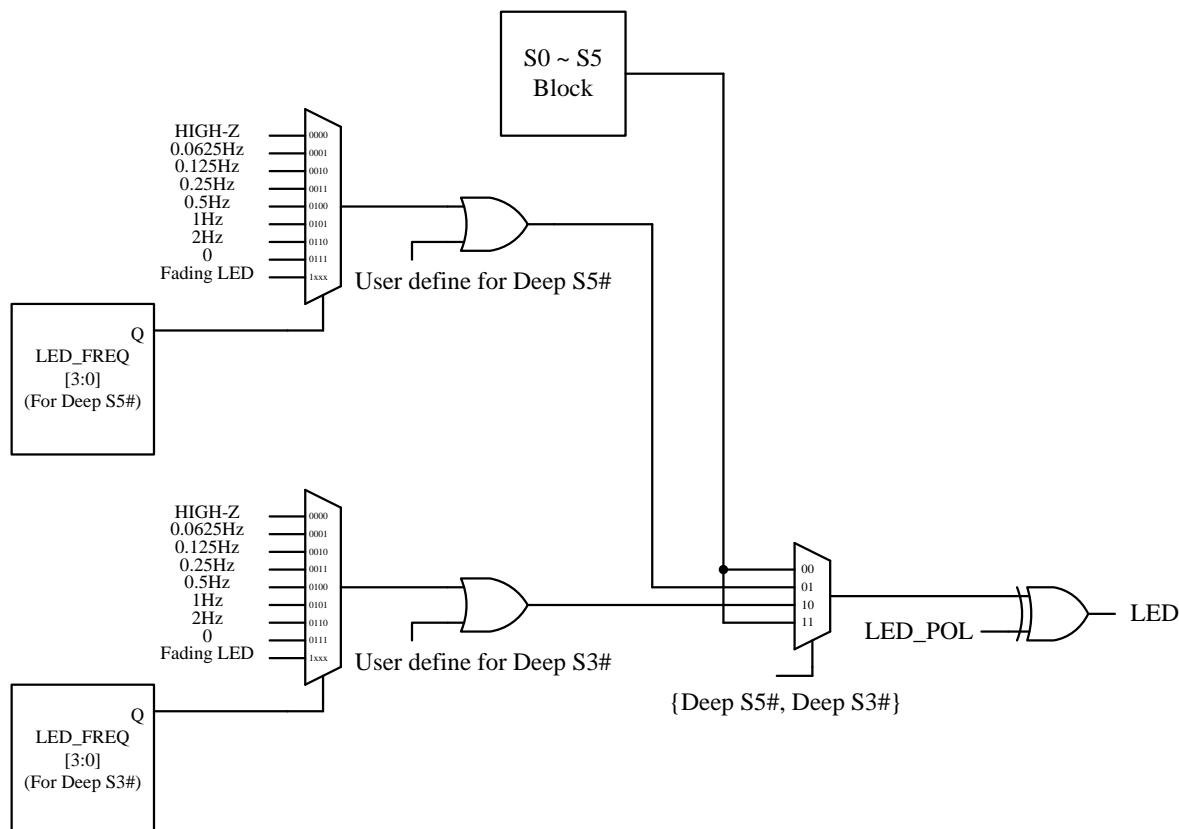
Figure 6-8 Illustration of LED polarity

6.7.5 Deeper Sleeping State Detect Function

These two LED pins could also be used to indicate if the system is in Deeper Sleeping State. For more detail, please refer to the section of Advanced Sleep State Control Function.

Enable_DEEP_S5	GRN_DEEPS#_Disable (YLW_DEEPS#_Disable)	Pwr State	GRN_LED	YLW_LED
1	0	DEEP_S5	DeepS5_GRN_BLK_FREQ	DeepS5_YLW_BLK_FREQ
1	1	DEEP_S5	HIGH-Z	HIGH-Z
0	X	S0~S5	S0~S5 behavior	S0~S5 behavior

Enable_DEEP_S3	GRN_DEEPS#_Disable (YLW_DEEPS#_Disable)	Pwr State	GRN_LED	YLW_LED
1	0	DEEP_S3	DeepS3_GRN_BLK_FREQ	DeepS3_YLW_BLK_FREQ
1	1	DEEP_S3	HIGH-Z	HIGH-Z
0	X	S0~S5	S0~S5 behavior	S0~S5 behavior



6.8 Advanced Sleep State Control (ASSC) Function

Advanced Sleep State Control (ASSC) Function is used to control the system power at S3 or S5 state. The purpose of this function is to provide a method to reduce power consumption at S3 or S5 state. This function is disabled by default. When VCC power is first supplied, BIOS can program the register to enable ASSC Function. The register is powered by 3VSB_IO and some is powered by VBAT. The related registers are located at Logic Device 16 CRE0h ~ CRE3h.

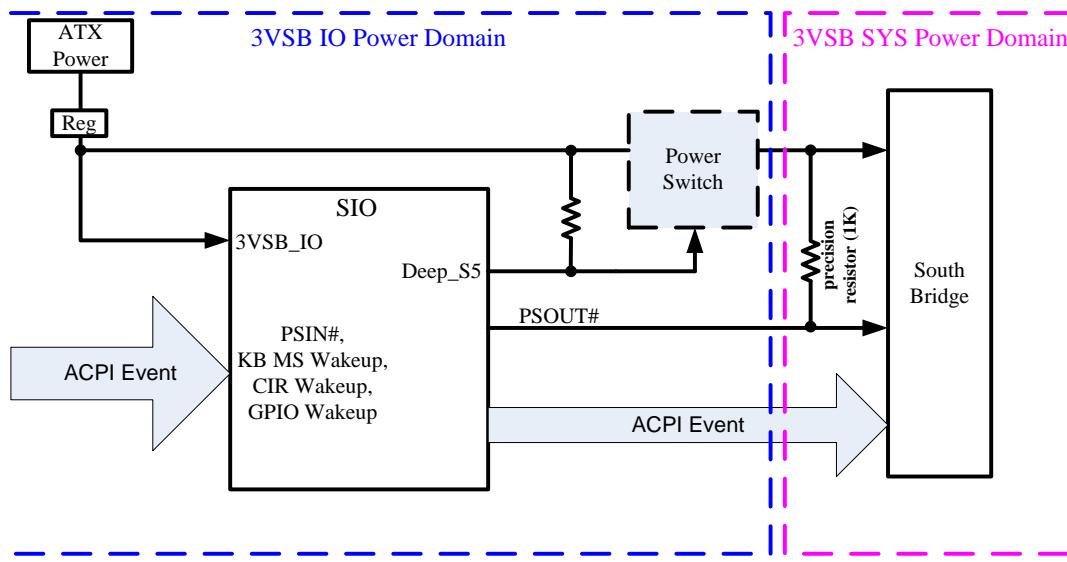
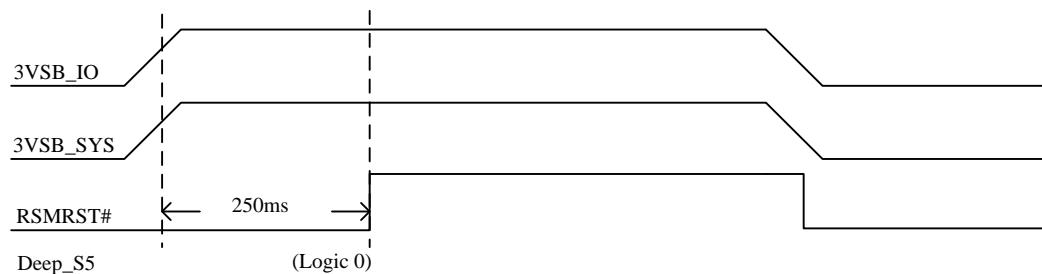


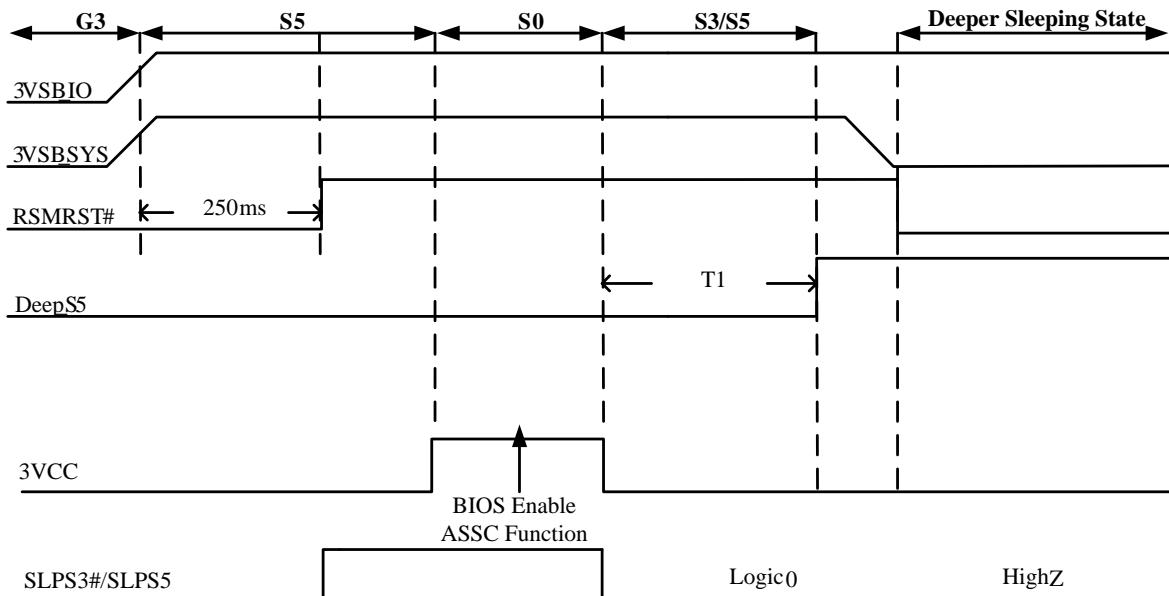
Figure 6-9 ASSC Application Diagram

6.8.1 When ASSC is disabled



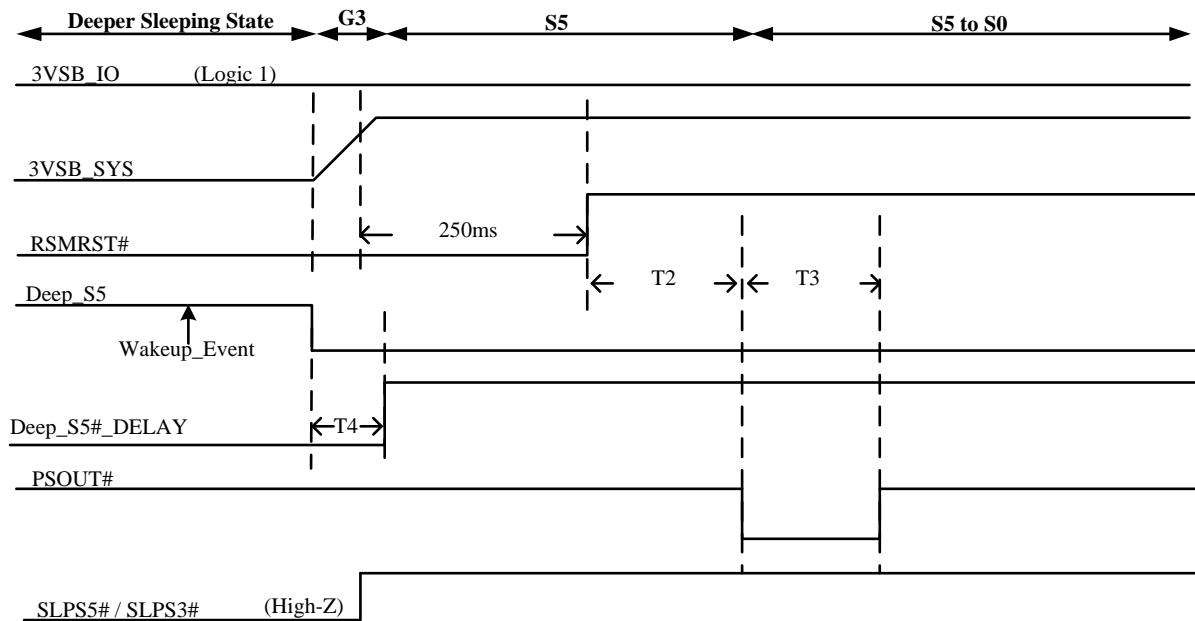
When ASSC is disabled, ACPI function is as same as the normal ACPI behavior.

6.8.2 When ASSC is enabled (Enter into Deeper Sleeping State)



When the first time AC plug in and enter into S0 State, BIOS can enable ASSC Function (DeepS3 or DeepS5), when the system enters S3/S5 state, the pin DEEP_S5 will be asserted after pre configuration delay time (power_off_dly_time, LD16 CRE2) to make the system entering the “Deeper Sleeping State (DSS)” where system’s VSB power is cut off. When pin DEEP_S5 asserts, the pin RSMRST# will de-assert by detecting PSOUT# signal (monitor 3VSB SYS Power).

6.8.3 When ASSC is enabled (Exit Deeper Sleeping State)

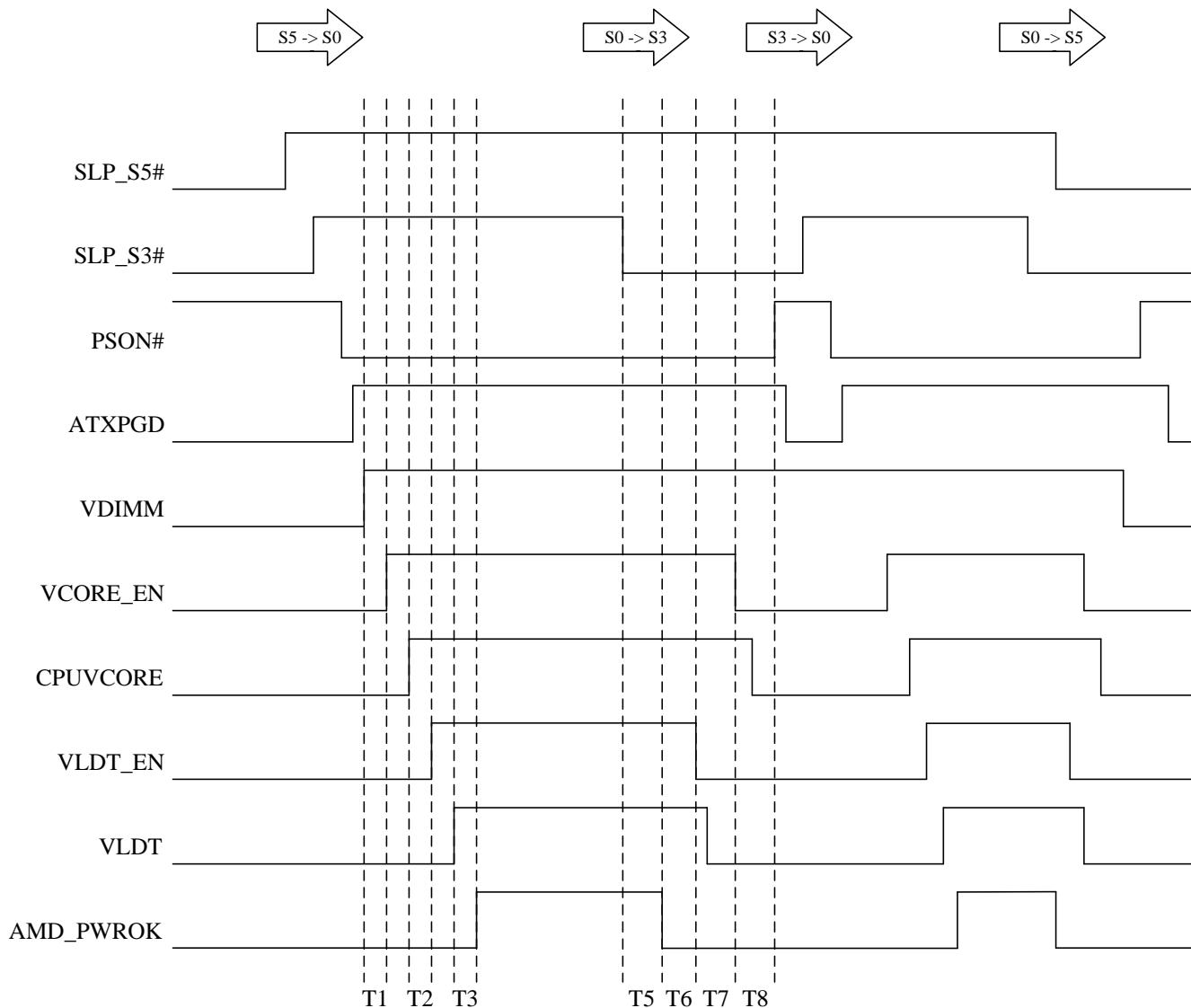


When any Wakeup Event (PSIN#, KB MS Wakeup, CIR wakeup, GPIO Wakeup) happened, pin DEEP_S5 will be de-asserted to turn on the VSB power to the system. The pin RSMRST# will de-assert when 3VSB_SYS power reach valid voltage. And then the pin PSOUT# will issue a low pulse (T3) turn on the system after T2 time

(wakeup delay time, LD16 CRE0). The PSOUT# low pulse is also programmable (LD16 CRE1). The T4 time is the delay from Deep_S5 ds-assert to Deeo_S5#_DELAY de-assert.

6.9 AMD Power-On Sequence

The NCT5567D-B supports new AMD power on sequence base on ACPI power on sequence, therefore, user can choose which architecture by set the strapping AMDPWR_EN. If AMDPWR_EN is 0, only ACPI power on sequence is set, otherwise, AMD power on sequence is combined with ACPI, user can set CR2F[5] to get the same condition. To make sure CR2B[4]:GP34_SEL and CR2B[0]:GP30_SEL are “0” before running the sequence, because they are ATXPGD and SLP_S5# pin select.



When S0->S3 or S0->S5, we support two kinds of power off sequence. One is non_level detect: it means VCORE_EN will pull low as long as about 10~15ms after VLDT_EN pull low and PSON will pull high as long as about 10~15ms after VCORE_EN pull low. Two, level detect, means VCORE_EN will pull low depend on delay time and pre-power group VLDT_IN, and PSON will pull high depend on pre-power group (VDIMM_IN, ATXPGD), too. User can set CR27[1] to choose two condition and its default is “0” (level detect).

Timing Parameters

Parameter	Description	Min.	Typ.	Max.	Unit
T1	Period of VDIMM rises to 0.7V to VCORE_EN assertion	10		15	ms
T2	Period of CPUVCORE rises to 0.7V to VLDT_EN assertion	10		15	ms
T3	Period of VLDT_IN rises to 0.7V to AMD_PWROK assertion	10		15	ms
T5	Period of SLP_S3# deassertion to AMD_PWROK deassertion	10		50	ms
T6	Period of AMD_PWROK deassertion to VLDT_EN deassertion	10		15	ms
T7	Period of VLDT_EN deassertion to VCORE_EN deassertion	10		15	ms
T8	Period of VCORE_EN deassertion to PSON# deassertion	10		15	ms

VDDA: 2.5V (not controlled by SIO)

VDIMM: DDR 1.8V, DDR3 1.5V (not controlled by SIO)

VLDT: 1.2V

VCORE: 0.8V ~ 1.55V

To support AMD power on sequence, we add some Pinout as VLDT_EN, VCORE_EN, VLDT, VDIMM. The sequence is follow the figure above. CPU and NB must conform to the SPEC or else the SIO will suspend at the sequence.

7. CONFIGURATION REGISTER ACCESS PROTOCOL

The NCT5567D-B uses a special protocol to access configuration registers to set up different types of configurations. The NCT5567D-B has a total of 16 Logical Devices (from Logical Device 1 to Logical Device 16).

It would require a large address space to access all of the logical device configuration registers if they were mapped into the normal PC address space. The NCT5567D-B, then, maps all the configuration registers through two I/O addresses (2Eh/2Fh or 4Eh/4Fh) set at power on by the strap pin 2E_4E_SEL. The two I/O addresses act as an index/data pair to read or write data to the Super I/O. One must write an index to the first I/O address which points to the register and read or write to the second address which acts as a data register.

An extra level of security is added by only allowing data updates when the Super I/O is in a special mode, called the Extended Function Mode. This mode is entered by two successive writes of 87h data to the first I/O address. This special mode ensures no false data can corrupt the Super I/O configuration during a program runaway.

There are a set of global registers located at index 0h – 2Fh, containing information and configuration for the entire chip.

The method to access the control registers of the individual logical devices is straightforward. Simply write the desired logical device number into the global register 07h. Subsequent accesses with indexes of 30h or higher are directly to the logical device registers.

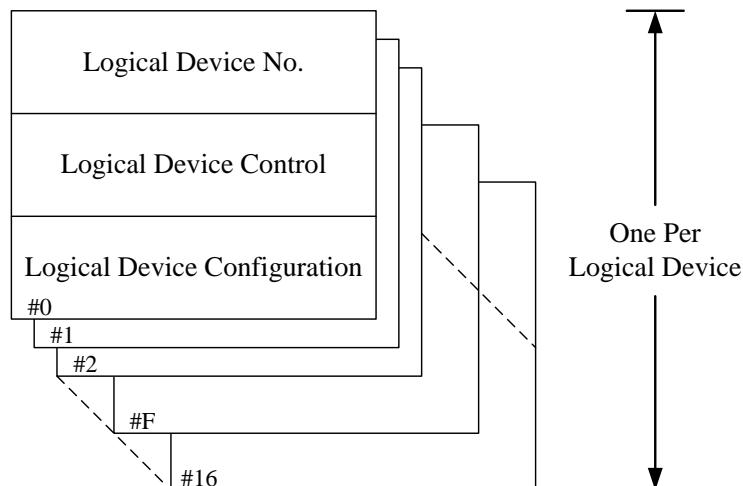


Figure 7-1 Structure of the Configuration Register

7.1 Configuration Sequence

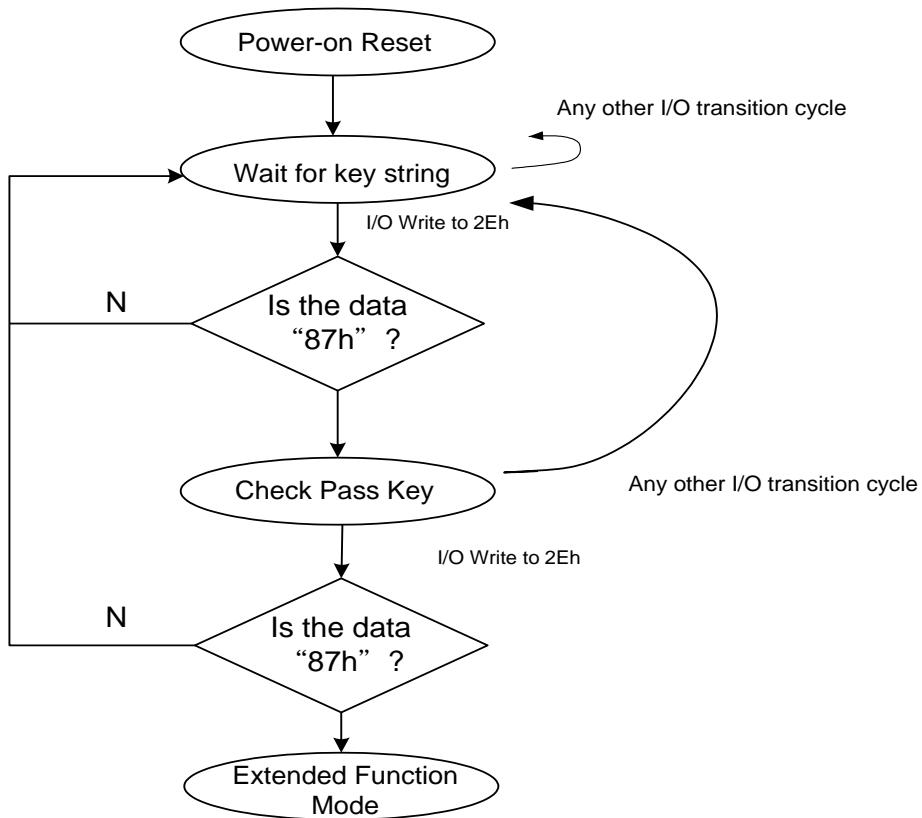


Figure 7-2 Configuration Register

To program the NCT5567D-B configuration registers, the following configuration procedures must be followed in sequence:

- (1). Enter the Extended Function Mode.
- (2). Configure the configuration registers.
- (3). Exit the Extended Function Mode.

7.1.1 Enter the Extended Function Mode

To place the chip into the Extended Function Mode, two successive writes of 0x87 must be applied to Extended Function Enable Registers (EFERs, i.e. 2Eh or 4Eh).

7.1.2 Configure the Configuration Registers

The chip selects the Logical Device and activates the desired Logical Devices through Extended Function Index Register (EFIR) and Extended Function Data Register (EFDR). The EFIR is located at the same address as the EFER, and the EFDR is located at address (EFIR+1).

First, write the Logical Device Number (i.e. 0x07) to the EFIR and then write the number of the desired Logical Device to the EFDR. If accessing the Chip (Global) Control Registers, this step is not required.

Secondly, write the address of the desired configuration register within the Logical Device to the EFIR and then write (or read) the desired configuration register through the EFDR.

7.1.3 Exit the Extended Function Mode

To exit the Extended Function Mode, writing 0xAA to the EFER is required. Once the chip exits the Extended Function Mode, it is in the normal running mode and is ready to enter the configuration mode.

7.1.4 Software Programming Example

The following example is written in Intel 8086 assembly language. It assumes that the EFER is located at 2Eh, so the EFIR is located at 2Eh and the EFDR is located at 2Fh. If the HEFRAS (CR[26h] bit 6 showing the value of the strap pin at power on) is set, 2Eh can be directly replaced by 4Eh and 2Fh replaced by 4Fh.

This example programs the configuration register F0h (clock source) of logical device 1 (UART A) to the value of 3Ch (24MHz). First, one must enter the Extended Function Mode, then setting the Logical Device Number (Index 07h) to 01h. Then program index F0h to 3Ch. Finally, exit the Extended Function Mode.

```
;-----
; Enter the Extended Function Mode
;-----
MOV DX, 2EH
MOV AL, 87H
OUT DX, AL
OUT DX, AL
;-----
; Configure Logical Device 1, Configuration Register CRF0
;-----
MOV DX, 2EH
MOV AL, 07H
OUT DX, AL      ; point to Logical Device Number Reg.
MOV DX, 2FH
MOV AL, 01H
OUT DX, AL      ; select Logical Device 1
;
MOV DX, 2EH
MOV AL, F0H
OUT DX, AL      ; select CRF0
MOV DX, 2FH
MOV AL, 3CH
OUT DX, AL      ; update CRF0 with value 3CH
;-----
; Exit the Extended Function Mode
;-----
MOV DX, 2EH
MOV AL, AAH
OUT DX, AL
```

8. HARDWARE MONITOR

8.1 General Description

The NCT5567D-B monitors several critical parameters in PC hardware, including power supply voltages, fan speeds, and temperatures, all of which are very important for a high-end computer system to work stably and properly. In addition, proprietary hardware reduces the amount of programming and processor intervention to control cooling fan speeds, minimizing ambient noise and maximizing system temperature and reliability.

The NCT5567D-B can simultaneously monitor all of the following inputs:

- Nine analog voltage inputs (Six internal voltages CPUVCORE, VBAT, VTT, 3VSB, 3VCC and AVSB; Three external voltage inputs)
- Four fan tachometer inputs
- Four remote temperatures, using either a thermistor or from the CPU thermal diode (voltage or Current Mode measurement method)
- One case-open detection signal.

These inputs are converted to digital values using the integrated, eight-bit analog-to-digital converter (ADC).

In response to these inputs, the NCT5567D-B can generate the following outputs:

- Four PWM (pulse width modulation) and one DC fan outputs for the fan speed control
- SMI#
- OVT# signals for system protection events

The NCT5567D-B provides hardware access to all monitored parameters through the LPC or I²C interface and software access through application software, such as Nuvoton's Hardware DoctorTM, or BIOS.

The rest of this section introduces the various features of the NCT5567D-B hardware-monitor capability. These features are divided into the following sections:

- Access Interfaces
- Analog Inputs
- Fan Speed Measurement and Control
- Smart Fan Control
- SMI# interrupt mode
- OVT# interrupt mode
- Registers and Value RAM

8.2 Access Interfaces

The NCT5567D-B provides two interfaces, LPC and I²C, for the microprocessor to read or write the internal registers of the hardware monitor.

8.3 LPC Interface

The internal registers of the hardware monitor block are accessible through two separate methods on the LPC bus. The first set of registers, which primarily enable the block and set its address in the CPU I/O address space are accessed by the Super I/O protocol described in Chapter 7 at address 2Eh/2Fh or 4Eh/4Fh. The bulk of the functionality and internal registers of this block are accessed from an index/data pair of CPU I/O addresses. The

standard locations are usually 295h/296h and are set by CR[60h]&CR[61h] accessed using the Super I/O protocol as described in Chapter 7.

Due to the number of internal register, it is necessary to separate the register sets into “banks” specified by register 4Eh. The structure of the internal registers is shown in the following figure.

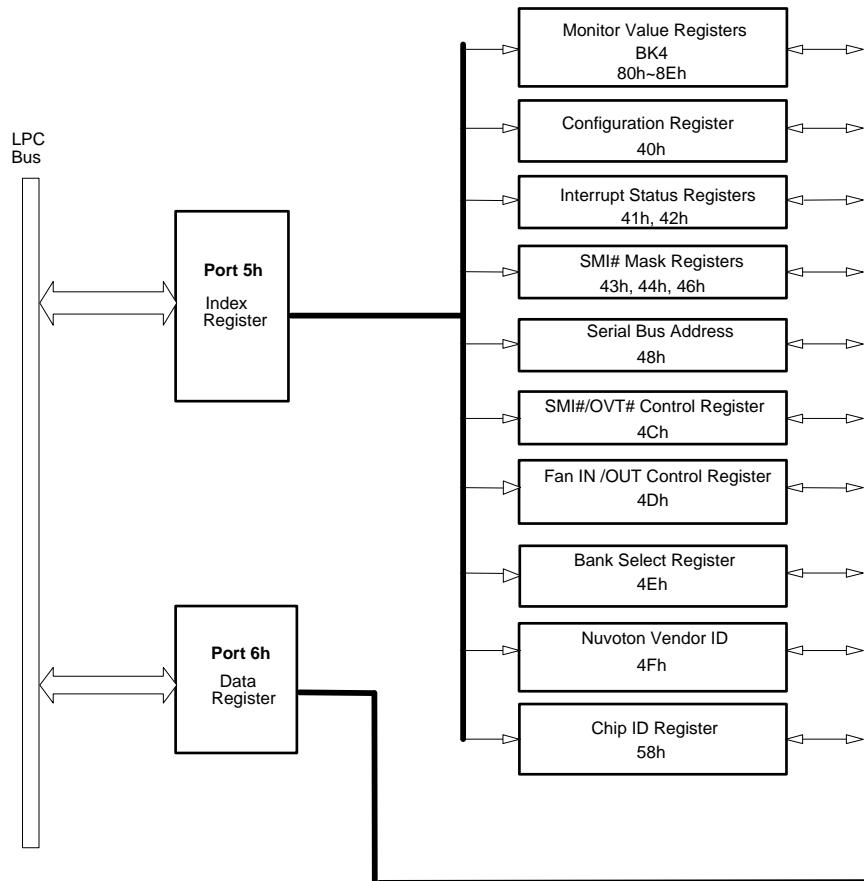


Figure 8-1 LPC Bus' Reads from / Write to Internal Registers

8.4 I²C interface

The I²C interface is a second, serial port into the internal registers of the hardware monitor function block. The interface is totally compatible with the industry-standard I²C specification, allowing external components that are also compatible to read the internal registers of the NCT5567D-B hardware monitor and control fan speeds. The address of the I²C peripheral is set by the register located at index 48h (which is accessed by the index/data pair at I/O address typically at 295h/296h)

The two timing diagrams below illustrate how to use the I²C interface to write to an internal register and how to read the value in an internal register, respectively.

(a) Serial bus write to internal address register followed by the data byte

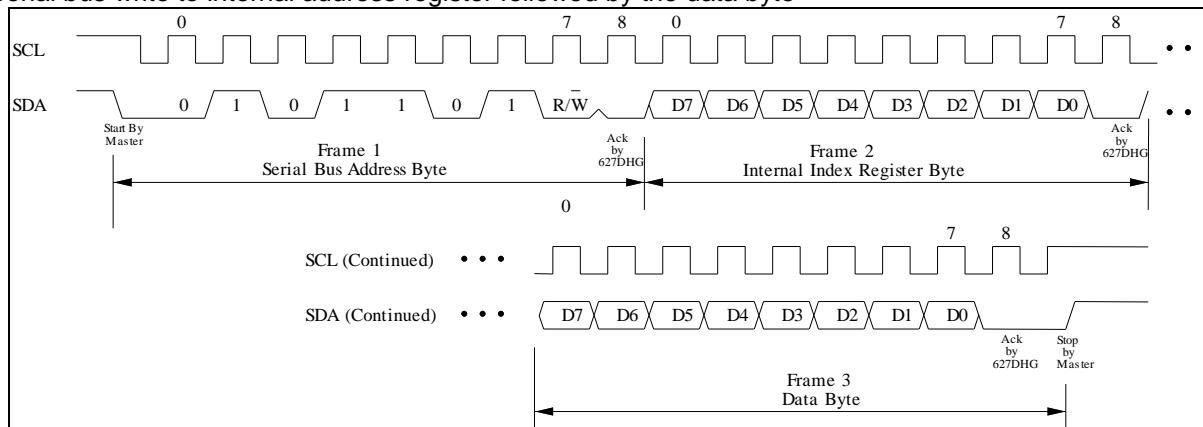


Figure 8-2 Serial Bus Write to Internal Address Register Followed by the Data Byte

(b) Serial bus read from a register

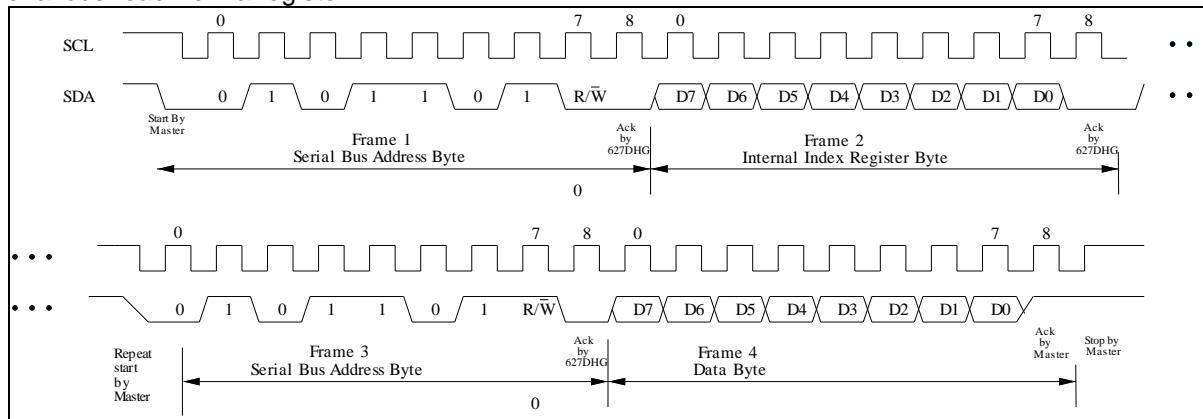


Figure 8-3 Serial Bus Read from Internal Address Register

8.5 Analog Inputs

The eight analog inputs of the hardware monitor block connect to an 8-bit Analog to Digital Converter (ADC) and consist of 8 general-purpose inputs connected to external device pins (VIN2 – VIN4) and Six internal signals connected to the power supplies (CPUVCORE, AVSB, VBAT, VTT, 3VSB and 3VCC). All inputs are limited to a maximum voltage of 2.048V due to an internal setting of 8mV LSB (256 steps x 8mV = 2.048V). All inputs to the ADC must limit the maximum voltage by using a voltage divider. The power supplies have internal resistors, while the external pins require outside limiting resistors as described below.

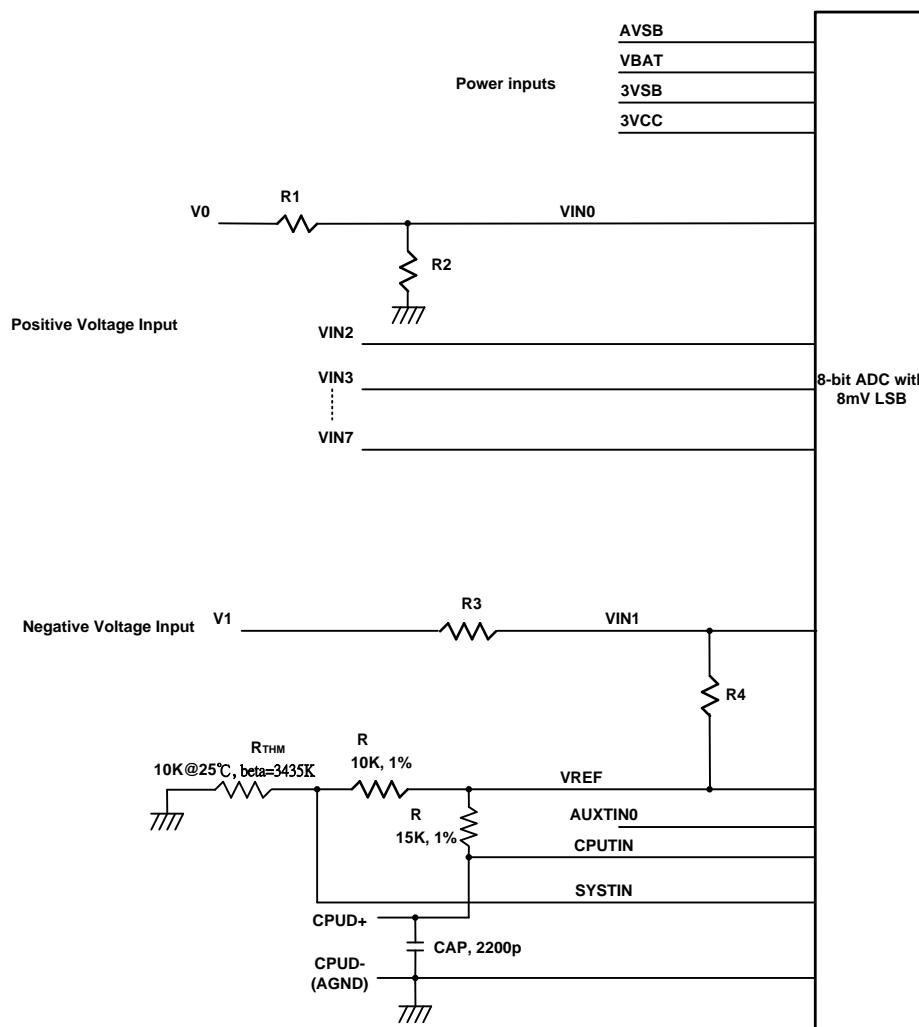


Figure 8-4 Analog Inputs and Application Circuit of the NCT5567D-B

As illustrated in the figure above, other connections may require some external circuits. The rest of this section provides more information about voltages outside the range of the 8-bit ADC, CPU Vcore voltage detection, and temperature sensing.

8.5.1 Voltages Over 2.048 V or Less Than 0 V

Input voltages greater than 2.048 V should be reduced by an external resistor divider to keep the input voltages in the proper range. For example, input voltage V_0 (+12 V) should be reduced before it is connected to VIN0 according to the following equation:

$$VIN0 = V_0 \times \frac{R_2}{R_1 + R_2}$$

R1 and R2 can be set to 56 KΩ and 10 KΩ, respectively, to reduce V_0 from +12 V to less than 2.048 V.

All the internal inputs of the ADC, AVSB, VBAT, 3VSB and 3VCC utilize an integrated voltage divider with both resistors equal to 34KΩ, yielding a voltage one half of the power supply. Since one would expect a worst-case 10% variation or a 3.63V maximum voltage, the input to the ADC will be 1.815V, well within the maximum range.

$$V_{in} = VCC \times \frac{34K\Omega}{34K\Omega + 34K\Omega} \approx 1.65V, \text{ where } VCC \text{ is set to } 3.3V$$

The CPUVCORE pin feeds directly into the ADC with no voltage divider since the nominal voltage on this pin is only 1.2V.

Negative voltages are handled similarly, though the equation looks a little more complicated. For example, negative voltage V_1 (-12V) can be reduced according to the following equation:

$$VIN1 = (V_1 - 2.048) \times \frac{R_4}{R_3 + R_4} + 2.048, \text{ where } V_1 = -12$$

R3 and R4 can be set to 232 KΩ and 10 KΩ, respectively, to reduce negative input voltage V_1 from -12 V to less than 2.048 V. Note that R4 is referenced to VREF, or 2.048V instead of 0V to allow for more dynamic range. This is simply good analog practice to yield the most precise measurements.

Both of these solutions are illustrated in the figure above.

8.5.2 Voltage Data Format

The data format for voltage detection is an eight-bit value, and each unit represents an interval of 8 mV.

$$\text{Detected Voltage} = \text{Reading} * 0.008 \text{ V}$$

If the source voltage was reduced by a voltage divider, the detected voltage value must be scaled accordingly.

8.5.2.1. Voltage Reading

NCT5567D-B has 14 voltage reading:

	CPUVCORE	VIN0	AVSB	3VCC	VIN1
Voltage reading	Bank4, Index80	Bank4, Index84	Bank4, Index82	Bank4, Index83	Bank4, Index81
	VIN2	VIN3	3VSB	VBAT	VTT
Voltage reading	Bank4, Index8C	Bank4, Index8D	Bank4, Index87	Bank4, Index88	Bank4, Index89
	VIN4	VIN5	VIN6	VIN7	
Voltage reading	Bank4, Index86	Bank4, Index8A	Bank4, Index8B	Bank4, Index8E	

Note: Bank0 CRBD bit 7:6 are lowest bit1:0 for ADC. These two bits accuracy is not guarantee.

8.5.3 Temperature Data Format

The data format for sensors SYSTIN, CPUTIN, AUXTIN0, AUXTIN1, AUXTIN2 and AUXTIN3 is 9-bit, two's-complement. This is illustrated in the table below. There are two sources of temperature data: external thermistors or thermal diodes.

Table 8-1 Temperature Data Format

TEMPERATURE	8-BIT DIGITAL OUTPUT		9-BIT DIGITAL OUTPUT	
	8-BIT BINARY	8-BIT HEX	9-BIT BINARY	9-BIT HEX
+125°C	0111,1101	7Dh	0,1111,1010	0FAh
+25°C	0001,1001	19h	0,0011,0010	032h
+1°C	0000,0001	01h	0,0000,0010	002h
+0.5°C	-	-	0,0000,0001	001h
+0°C	0000,0000	00h	0,0000,0000	000h
-0.5°C	-	-	1,1111,1111	1FFh
-1°C	1111,1111	FFh	1,1111,1110	1FFh
-25°C	1110,0111	E7h	1,1100,1110	1Ceh
-55°C	1100,1001	C9h	1,1001,0010	192h

8.5.3.1. Monitor Temperature from Thermistor

External thermistors should have a β value of 3435K and a resistance of 10 K Ω at 25°C. As illustrated in the schematic above, the thermistor is connected in series with a 10-K Ω resistor and then connects to VREF. The configuration registers to select a thermistor temperature sensor and the measurement method are found at Bank 0, index 59h, 5Dh, and 5Eh.

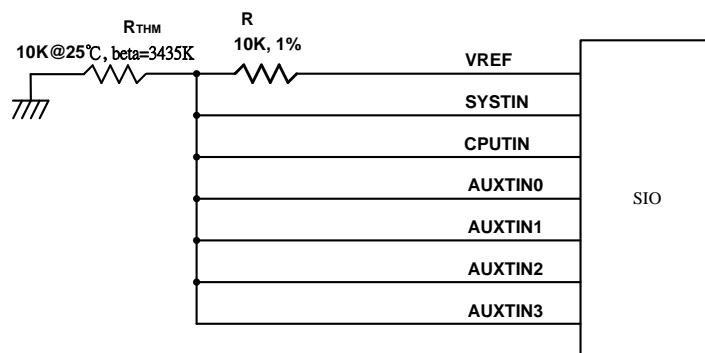


Figure 8-5 Monitoring Temperature from Thermistor

8.5.3.2. Monitor Temperature from Thermal Diode (Voltage Mode)

The thermal diode D- pin is connected to AGND, and the D+ pin is connected to the temperature sensor pin in the NCT5567D-B. A 15-K Ω resistor is connected to VREF to supply the bias current for the diode, and the 2200-pF, bypass capacitor is added to filter high-frequency noise. The configuration registers to select a thermal diode temperature sensor and the measurement method are found at Bank 0, index 5Dh, and 5Eh.

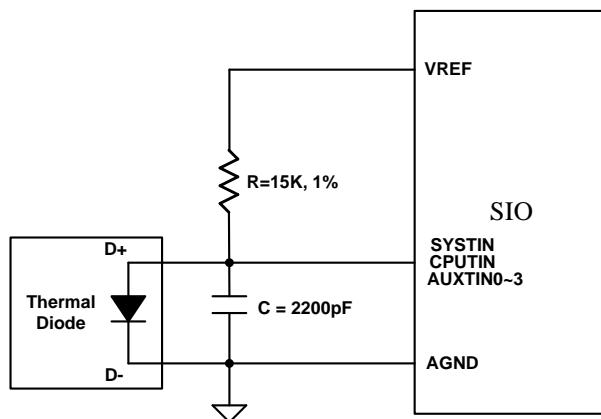


Figure 8-6 Monitoring Temperature from Thermal Diode (Voltage Mode)

8.5.3.3. Monitor Temperature from Thermal Diode (Current Mode)

The NCT5567D-B can also sense the diode temperature through Current Mode and the circuit is shown in the following figure.

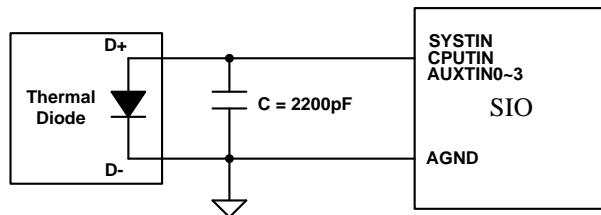


Figure 8-7 Monitoring Temperature from Thermal Diode (Current Mode)

The pin of processor D- is connected to CPUD- and the pin D+ is connected to temperature sensor pin in the NCT5567D-B. A bypass capacitor C=2200pF should be added to filter the high frequency noise. The configuration registers to select a thermal diode temperature sensor and the measurement method are found at Bank 0, index 5Dh and 5Eh.

8.5.3.4. Temperature Reading

NCT5567D-B has 6 temperature reading can monitor different temperature sources (ex. SYSTIN, CPUTIN, AUXTIN0, PECL...etc).

	SMIOVT1	SMIOVT2
Temperature source select	Bank6,index21 bit[4:0] default: SYSTIN	Bank6, index22 bit[4:0] default: CPUTIN
Temperature reading	Bank0, index27	Bank1, index50 & index51 bit7

Note. If the temperature source is selecting to PECL, please set Bank0 Index AEh first for reading correct value.

8.6 PECL

PECL (Platform Environment Control Interface) is a new digital interface to read the CPU temperature of Intel® CPUs. With a bandwidth ranging from 2 Kbps to 2 Mbps, PECL uses a single wire for self-clocking and data

transfer. By interfacing to the Digital Thermal Sensor (DTS) in the Intel® CPU, PECL reports a negative temperature (in counts) relative to the processor's temperature at which the thermal control circuit (TCC) is activated. At the TCC Activation temperature, the Intel CPU will operate at reduced performance to prevent the device from thermal damage.

PECL is one of the temperature sensing methods that the NCT5567D-B supports. The NCT5567D-B contains a PECL master and reads the CPU PECL temperature. The CPU is a PECL client.

The PECL temperature values returning from the CPU are in "counts" which are approximately linear in relation to changes in temperature in degrees centigrade. However, this linearity is approximate and cannot be guaranteed over the entire range of PECL temperatures. For further information, refer to the PECL specification. All references to "temperature" in this section are in "counts" instead of "°C".

Figure 8-8 PECL Temperature shows a typical fan speed (PWM duty cycle) and PECL temperature relationship.

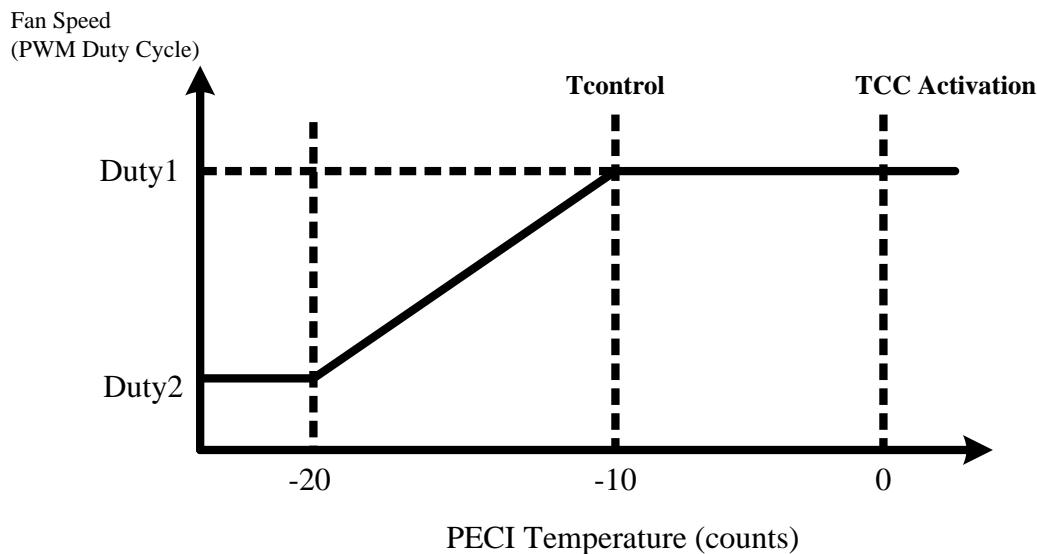


Figure 8-8 PECL Temperature

In this illustration, when PECL temperature is -20, the PWM duty cycle for fan control is at Duty2. When CPU is getting hotter and the PECL temperature is -10, the PWM duty cycle is at Duty1.

At Tcontrol PECL temperature, the recommendation from Intel is to operate the CPU fan at full speed. Therefore Duty1 is 100% if this recommendation is followed. The value of Tcontrol can be obtained by reading the related Machine Specific Register (MSR) in the Intel CPU. The Tcontrol MSR address is usually in the BIOS Writer's guide for the CPU family in question. Refer to the relevant CPU documentation from Intel for more information. In this example, Tcontrol is -10.

When the PECL temperature is below -20, the duty cycle is fixed at Duty2 to maintain a minimum (and constant) RPM for the CPU fan.

The device also provides an offset register to 'shift' the negative PECL readings to positive values. The offset registers are called "Tbase", which are located at Bank7 Index 09h for Agent0 and Bank7 Index 0Ah for Agent1. All default values of these Tbase registers are 8'h00. The unit of the Tbase register contents is "count" to match that of PECL values. The resultant value (Tbase + PECL) should not be interpreted as the "temperature" (whether in count or °C) of the PECL client (CPU).

The Figure 8-9 Temperature and Fan Speed Relation after Tbase Offsets, shows the temperature and fan-speed relationship after Tbase offset is applied (based on Figure 8-8 PECL Temperature). This view is from the perspective of the NCT5567D-B fan control circuit.

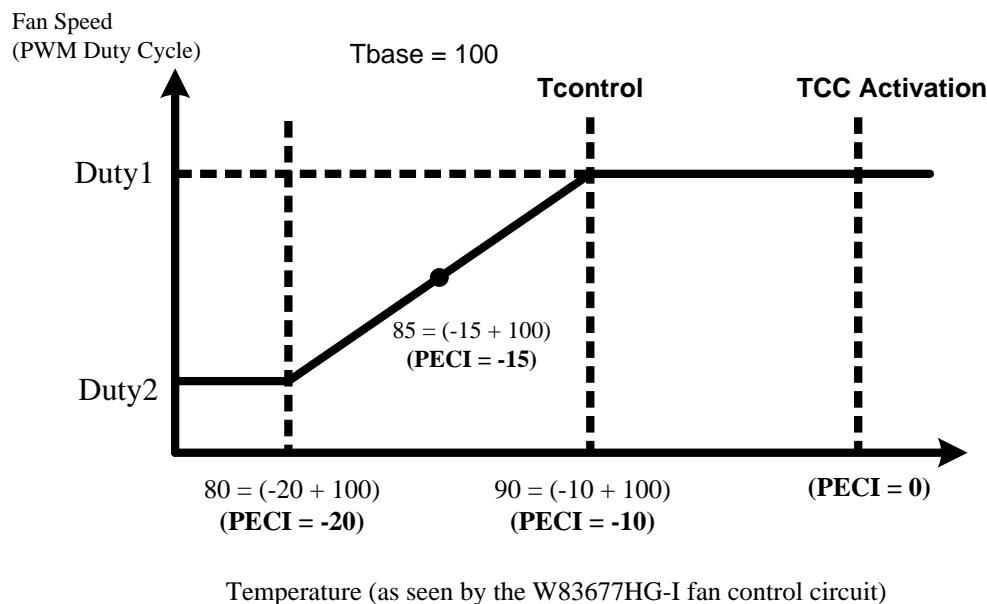


Figure 8-9 Temperature and Fan Speed Relation after Tbase Offsets

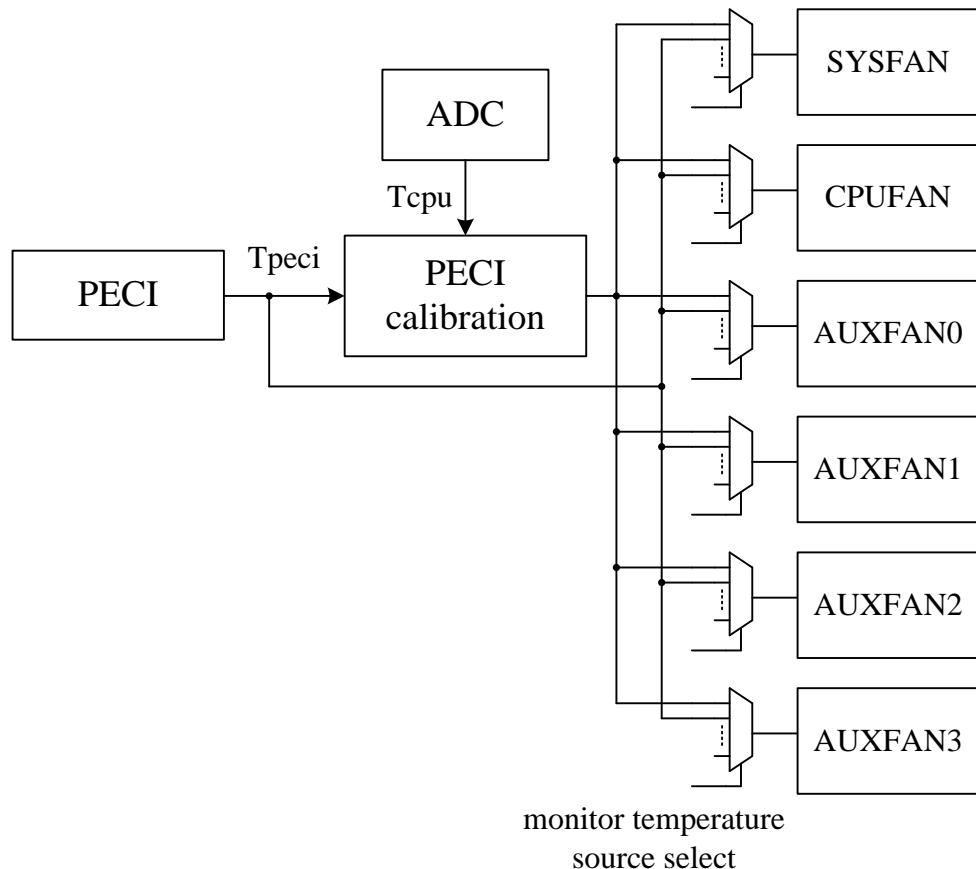
Assuming Tbase is set to 100 and the PECL temperature is -15, the real-time temperature value to the fan control circuit will be 85 (-15 + 100). The value of 55 (hex) will appear in the relevant real-time temperature register.

While using Smart Fan control function of NCT5567D-B, BIOS/software can include Tbase in determining the thresholds (limits). In this example, assuming Tcontrol is -10 and Tbase is set to 100⁽¹⁾, the threshold temperature value corresponding to the “100% fan duty-cycle” event is 90 (-10+100). The value of 5A (hex) should be written to the relevant threshold register.

Tcontrol is typically -10 to -20 for PECL-enabled CPUs. Base on that, a value of 85 ~100 for Tbase could be set for proper operation of the fan control circuit. This recommendation is applicable for most designs. In general, the concept presented in this section could be used to determine the optimum value of Tcontrol to match the specific application.

8.6.1 PECL Calibration

NCT5567D-B support PECL calibration to adjust the temperature read from CPU to thermistor because the source of thermistor is more accurate than PECL. We have several register for user to set. Bank4 Index FAh, FBh[0] is the enable bit for two agents. If user disable the function, the output will be the original source of PECL. Index FAh, FBh[7:4] is interval time for each calibrate, for example, every 0.1 sec (default) will calibrate again. Index F8h, F9h[7:3] is the max number of update times, number = 0 means only update 1 times. Index F8h, F9h[2:0] is the unit step, unit = 0 means 1 degree. Index F4h, F5h is the result of calibration. We have the overflow and underflow mechanism to protect the system.



8.7 Fan Speed Measurement and Control

This section is divided into two parts, one to measure the speed and one to control the speed.

8.7.1 Fan Speed Reading

The fan speed reading at:

	FAN COUNT READING		FAN RPM READING	
	13-bit		16-bit	
	[12:5]	[4:0]	[15:8]	[7:0]
SYSFANIN	Bank4, indexB0	Bank4, indexB1	Bank4, indexC0	Bank4, indexC1
CPUFANIN	Bank4, indexB2	Bank4, indexB3	Bank4, indexC2	Bank4, indexC3
AUXFANIN0	Bank4, indexB4	Bank4, indexB5	Bank4, indexC4	Bank4, indexC5
AUXFANIN1	Bank4, indexB6	Bank4, indexB7	Bank4, indexC6	Bank4, indexC7
AUXFANIN2	Bank4, indexB8	Bank4, indexB9	Bank4, indexC8	Bank4, indexC9
AUXFANIN3	Bank4, indexBA	Bank4, indexBB	Bank4, indexCA	Bank4, indexCB

8.7.2 Fan Speed Calculation by Fan Count Reading

In 13-bit fan count reading, please read high byte first then low byte.

Fan speed RPM can be evaluated by the following equation.

$$RPM = \frac{1.35 \times 10^6}{Count}$$

8.7.3 Fan Speed Calculation by Fan RPM Reading

In 16-bit fan RPM reading, please read high byte first then low byte.

Fan speed RPM can be evaluated by translating 16-bit RPM reading from hexadecimal to decimal.

Register reading 0x09C4h = 2500 RPM

8.7.4 Fan Speed Control

The NCT5567D-B has six output pins for fan control, Only SYSFANOUT offers PWM duty cycle and DC voltage to control the fan speed.

	SYSFANOUT	CPUFANOUT	AUXFANOUT0
Output Type Select	Bank0, index04 bit0 0: PWM output 1: DC output (default)	Only PWM output	Only PWM output
Output Type Select (in PWM output)	CR24 bit4 0: open-drain (default) 1: push-pull	CR24 bit3 0: open-drain (default) 1: push-pull	CR24 bit5 0: open-drain (default) 1: push-pull

PWM Output Frequency		Bank0, Index00	Bank0, Index02	Bank0, Index10
Fan Control Mode Select		Bank1, index02, bit[7:4] 0h: Manual mode (def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV	Bank2, index02, bit[7:4] 0h: Manual mode(def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV	Bank3, index02, bit[7:4] 0h: Manual mode (def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV
Output Value (write)	PWM output (Duty)	Bank1, index09 bit[7:0]	Bank2, index09 bit[7:0]	Bank3, index09 bit[7:0]
	DC output (Voltage)	Bank1, index09 bit[7:2]		
Current Output Value (read only)		Bank0, index01	Bank0, index03	Bank0, index11

		AUXFANOUT1	AUXFANOUT2	AUXFANOUT3
Output Type Select		Only PWM output	Only PWM output	Only PWM output
Output Type Select (in PWM output)		CR24 bit6 0: open-drain (default) 1: push-pull	CR24 bit7 0: open-drain (default) 1: push-pull	CR24 bit1 0: open-drain (default) 1: push-pull
PWM Output Frequency		Bank0, Index12	Bank0, Index14	Bank0, Index16
Fan Control Mode Select		Bank8, index02, bit[7:4] 0h: Manual mode (def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV	Bank9, index02, bit[7:4] 0h: Manual mode(def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV	BankA, index02, bit[7:4] 0h: Manual mode(def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV
Output Value (write)	PWM output (Duty)	Bank8, index09 bit[7:0]	Bank9, index09 bit[7:0]	BankA, index09 bit[7:0]
	DC output (Voltage)			
Current Output Value (read only)		Bank0, Index13	Bank0, Index15	Bank0, Index17

For PWM, the duty cycle is programmed by eight-bit registers at Bank1 Index 09h for SYSFANOUT, Bank2 Index 09h for CPUFANOUT, Bank3 Index 09h for AUXFANOUT0, Bank8 Index 09h for AUXFANOUT1, Bank9 Index 09h for AUXFANOUT2 and BankA Index 09h for AUXFANOUT3. The duty cycle can be calculated using the following equation:

$$\text{Duty cycle}(\%) = \frac{\text{Programmed 8-bit Register Value}}{255} \times 100\%$$

The default duty cycle is 7Fh, or 50% for SYSFANOUT, CPUFANOUT, AUXFANOUT0, AUXFANOUT1, AUXFANOUT2 and AUXFANOUT3.

Note. The default speed of fan output is specified in registers CR[E0h] ~ CR[E4h] and CR[E7h] of Logical Device B.

The PWM clock frequency is programmed at Bank0 Index 00h, Index 02h, Index 10, Index 12, Index14 and Index 16h.

For DC, the NCT5567D-B has a six bit digital-to-analog converter (DAC) that produces 0 to 2.048 Volts DC. The analog output is programmed at Bank1 Index 09h bit[7:2] for SYSFANOUT. The analog output can be calculated using the following equation:

$$\text{OUTPUT Voltage (V)} = V_{ref} \times \frac{\text{Programmed 6-bit Register Value}}{64}$$

The default value is 111111YY, or nearly 2.048 V, and Y is a reserved bit.

8.7.5 SMART FAN™ Control

The NCT5567D-B supports various different fan control features:

- SMART FAN™ I (Thermal Cruise & Speed Cruise)
- SMART FAN™ IV
- SMART FAN™ IV Close-Loop Fan Control RPM mode

	SYSFANOUT	CPUFANOUT	AUXFANOUT0
Fan Control Mode Select	Bank1, index02, bit[7:4] 0h: Manual mode (def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV	Bank2, index02, bit[7:4] 0h: Manual mode(def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV	Bank3, index02, bit[7:4] 0h: Manual mode (def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV

	AUXFANOUT1	AUXFANOUT2	AUXFANOUT3
Fan Control Mode Select	Bank8, index02, bit[7:4] 0h: Manual mode (def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV	Bank9, index02, bit[7:4] 0h: Manual mode(def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV	BankA, index02, bit[7:4] 0h: Manual mode(def.) 1h: Thermal Cruise 2h: Speed Cruise 4h: SMART FAN IV

8.7.6 Temperature Source & Reading for Fan Control

Select temperature source for each fan control output:

	SYSFANOUT	CPUFANOUT	AUXFANOUT0
Fan Control Temperature Source Select	Bank1, index00 bit[4:0] Default: SYSTIN	Bank2, index00 bit[4:0] Default: CPUTIN	Bank3, index00 bit[4:0] Default: AUXTINO
Fan Control Temperature Reading	Bank0, index73 & Bank0, index74 bit7	Bank0, index75 & Bank0, index76 bit7	Bank0, index77 & Bank0, index78 bit7

	AUXFANOUT1	AUXFANOUT2	AUXFANOUT3

Fan Control Temperature Source Select	Bank8, index00 bit[4:0] Default: AUXTIN0	Bank9, index00 bit[4:0] Default: AUXTIN0	BankA, index00 bit[4:0] Default: AUXTIN0
Fan Control Temperature Reading	Bank0, index79 & Bank0, index7A bit7	Bank0, index7B & Bank0, index7C bit7	Bank0, index7D & Bank0, index7E bit7

Note. If the temperature source is selecting to PECI, please set Bank0 Index AEh first for reading correct value.

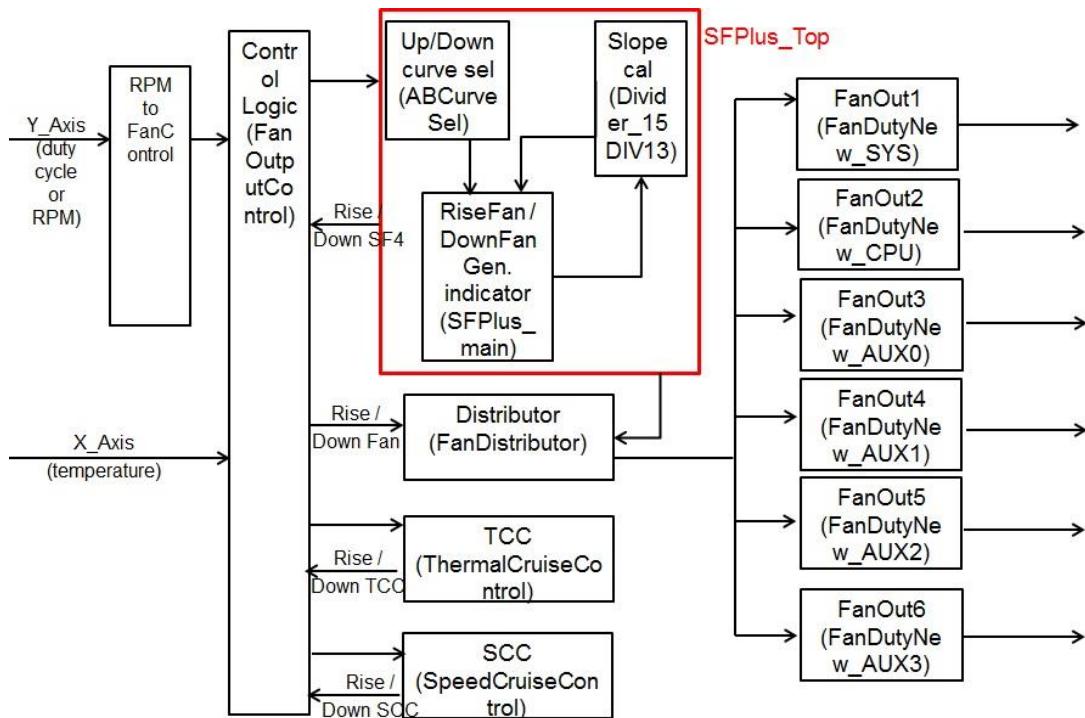


Figure 8-10 SMART FAN™ Function Block Diagram

8.8 SMART FAN™ I

8.8.1 Thermal Cruise Mode

Thermal Cruise mode controls the fan speed to keep the temperature in a specified range. First, this range is defined in BIOS by a temperature and the interval (e.g., $55^{\circ}\text{C} \pm 3^{\circ}\text{C}$). As long as the current temperature remains below the low end of this range (i.e., 52°C), the fan is off. Once the temperature exceeds the low end, the fan turns on at a speed defined in BIOS (e.g., 20% output). Thermal Cruise mode then controls the fan output according to the current temperature. Three conditions may occur:

- (1) If the temperature still exceeds the high end, fan output increases slowly. If the fan is operating at full speed but the temperature still exceeds the high end, a warning message is issued to protect the system.
- (2) If the temperature falls below the high end (e.g., 58°C) but remains above the low end (e.g., 52°C), fan output remains the same.
- (3) If the temperature falls below the low end (e.g., 52°C), fan output decreases slowly to zero or to a specified "stop value".

This "stop value" is enabled by the Bank1, Index00h, Bit7 for SYSFANOUT; Bank2, Index00h, Bit7 for CPUFANOUT; Bank3, Index00h, Bit7 for AUXFANOUT0; Bank8, Index00h, Bit7 for AUXFANOUT1; Bank9, Index00h, Bit7 for AUXFANOUT2; BankA, Index00h, Bit7 for AUXFANOUT3.

The “stop value” itself is separately specified in Bank1 Index05h, Bank2 Index05h, Bank3 Index05h, Bank8 Index05h, Bank9 Index05h and BankA Index05h..

The “stop time” means fan remains at the stop value for the period of time also separately defined in Bank1 Index07h, Bank2 Index07h, Bank3 Index07h, Bank8 Index07h, Bank9 Index07h and BankA Index07h.

Note. The function only support for Thermal Cruise Mode.

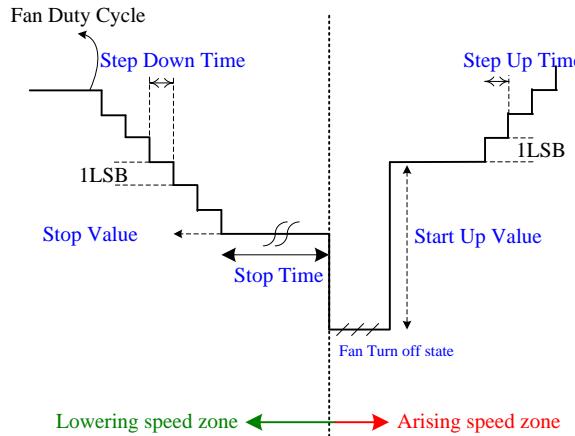


Figure 8-11 Thermal Cruise™ Mode Parameters Figure

In general, Thermal Cruise mode means

- If the current temperature is higher than the high end, increase the fan speed.
- If the current temperature is lower than the low end, decrease the fan speed.
- Otherwise, keep the fan speed the same.

The following figures illustrate two examples of Thermal Cruise mode.

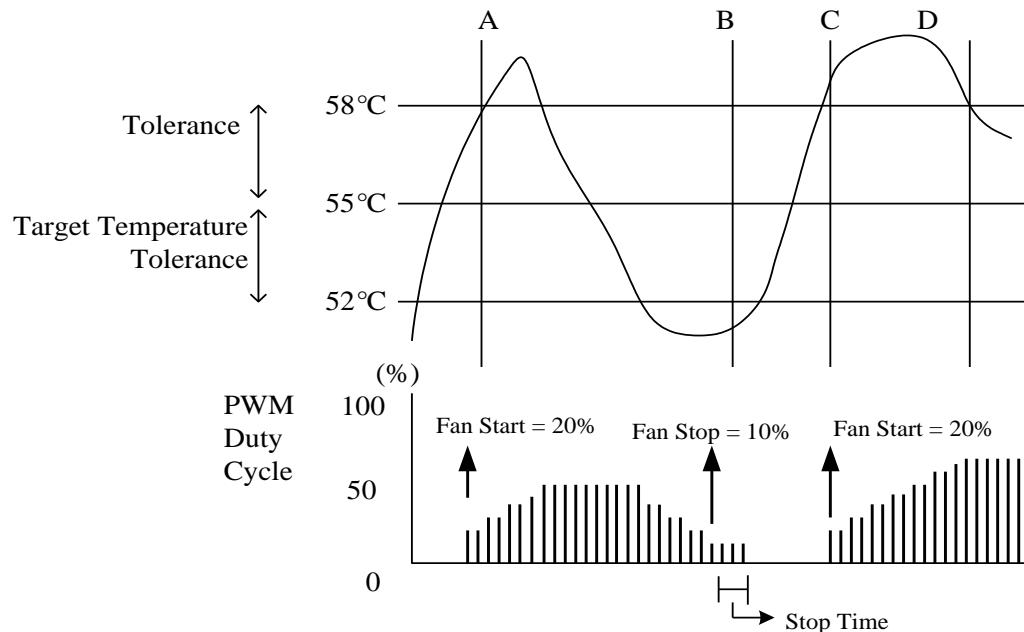


Figure 8-12 Mechanism of Thermal Cruise™ Mode (PWN Duty Cycle)

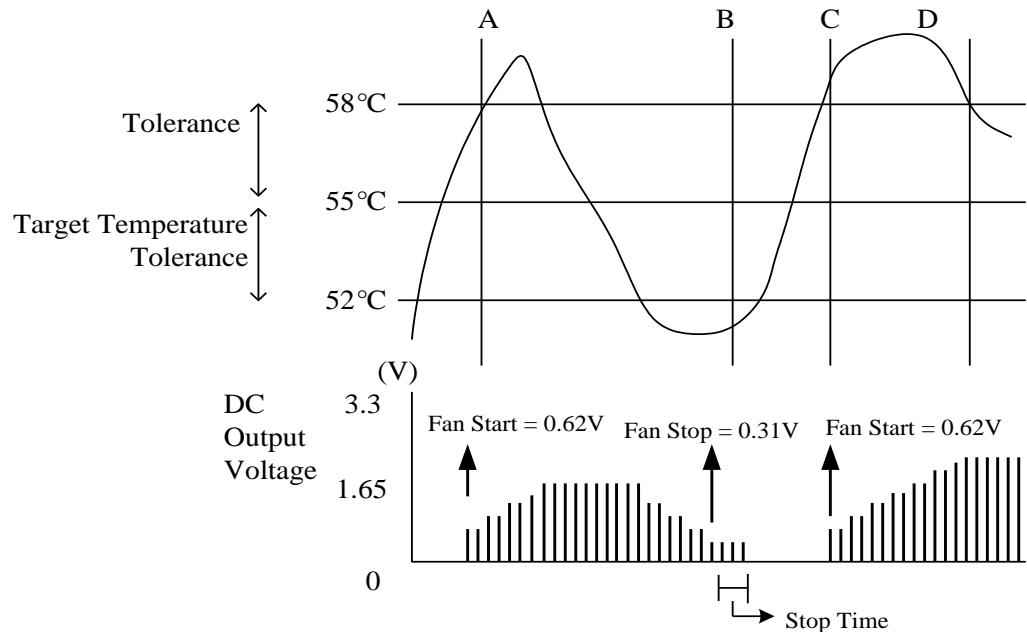


Figure 8-13 Mechanism of Thermal Cruise™ Mode (DC Output Voltage)

8.8.2 Speed Cruise Mode

Speed Cruise mode keeps the fan speed in a specified range. First, this range is defined in BIOS by a fan speed count (the amount of time between clock input signals, not the number of clock input signals in a period of time) and an interval (e.g., 160 ± 10). As long as the fan speed count is in the specified range, fan output remains the same. If the fan speed count is higher than the high end (e.g., 170), fan output increases to make the count lower. If the fan speed count is lower than the low end (e.g., 150), fan output decreases to make the count higher. One example is illustrated in this figure.

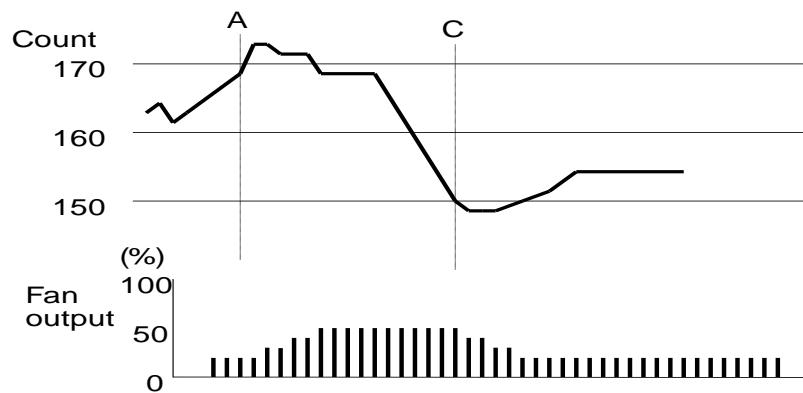


Figure 8-14 Mechanism of Fan Speed Cruise™ Mode

The following tables show current temperatures, fan output values and the relative control registers at Thermal Cruise and Fan Speed mode.

Table 8-2 Relative Registers – at Thermal CruiseTM Mode

THERMAL CRUISE MODE	TARGET TEMPERATURE	TOLERANCE	START-UP VALUE	STOP VALUE	KEEP MIN. FAN OUTPUT VALUE	STOP TIME	STEP-UP TIME	STEP-DOWN TIME
SYSFANOUT	Bank 1, index 01h bit[7:0]	Bank 1, index 02h Bit[2:0]	Bank 1, index 06h	Bank 1, index 05h	Bank 1, Index 00h, bit7	Bank 1, index 07h	Bank 1, index 03h	Bank 1, index 04h
CPUFANOUT	Bank 2, index 01h bit[7:0]	Bank 2, index 02h Bit[2:0]	Bank 2, index 06h	Bank 2, index 05h	Bank 2, Index 00h, bit7	Bank 2, index 07h	Bank 2, index 03h	Bank 2, index 04h
AUXFANOUT0	Bank 3, index 01h bit[7:0]	Bank 3, index 02h Bit[2:0]	Bank 3, index 06h	Bank 3, index 05h	Bank 3, Index 00h, bit7	Bank 3, index 07h	Bank 3, index 03h	Bank 3, index 04h
AUXFANOUT1	Bank 8, index 01h bit[7:0]	Bank 8, index 02h Bit[2:0]	Bank 8, index 06h	Bank 8, index 05h	Bank 8, Index 00h, bit7	Bank 8, index 07h	Bank 8, index 03h	Bank 8, index 04h
AUXFANOUT2	Bank 9, index 01h bit[7:0]	Bank 9, index 02h Bit[2:0]	Bank 9, index 06h	Bank 9, index 05h	Bank 9, Index 00h, bit7	Bank 9, index 07h	Bank 9, index 03h	Bank 9, index 04h
AUXFANOUT3	Bank A, index 01h bit[7:0]	Bank A, index 02h Bit[2:0]	Bank A, index 06h	Bank A, index 05h	Bank A, Index 00h, bit7	Bank A, index 07h	Bank A, index 03h	Bank A, index 04h

THERMAL CRUISE MODE	CRITICAL TEMPERATURE	ENABLE THERMAL CRUISE MODE
SYSFANOUT	Bank 1, index 35h	Bank 1, Index 02h, bit[7:4] = 01h
CPUFANOUT	Bank 2, Index 35h	Bank 2, Index 02h, bit[7:4] = 01h
AUXFANOUT0	Bank 3, Index 35h	Bank 3, Index 02h, bit[7:4] = 01h
AUXFANOUT1	Bank 8, Index 35h	Bank 8, Index 02h, bit[7:4] = 01h
AUXFANOUT2	Bank 9, Index 35h	Bank 9, Index 02h, bit[7:4] = 01h
AUXFANOUT3	Bank A, Index 35h	Bank A, Index 02h, bit[7:4] = 01h

Table 8-3 Relative Registers – at Speed CruiseTM Mode

SPEED CRUISE MODE	TARGET-SPEED COUNT_L	TARGET-SPEED COUNT_H	TOLERANCE_L	TOLERANCE2_H	STEP-UP TIME	STEP-DOWN TIME	STEP-UP VALUE	STEP-DOWN VALUE	ENABLE SPEED CRUISE MODE
SYSFANOUT	Bank 1, Index 01h	Bank 1, Index 0C bit[3:0]	Bank 1, Index 02 bit[2:0]	Bank 1, Index 0C bit[6:4]	Bank 1, Index 03h	Bank 1, Index 04h	Bank1, Index66 Bit[7:4]	Bank1, Index66 Bit[3:0]	Bank 1, Index 02h bit[7:4] = 02h
CPUFANOUT	Bank 2, Index 01h	Bank 2, Index 0C bit[3:0]	Bank 2, Index 02 bit[2:0]	Bank 2, Index 0C bit[6:4]	Bank 2, Index 03h	Bank 2, Index 04h	Bank2, Index66 Bit[7:4]	Bank2, Index66 Bit[3:0]	Bank 2, Index 02h bit[7:4] = 02h
AUXFANOUT0	Bank 3, Index 01h	Bank 3, Index 0C bit[3:0]	Bank 3, Index 02 bit[2:0]	Bank 3, Index 0C bit[6:4]	Bank 3, Index 03h	Bank 3, Index 04h	Bank3, Index66 Bit[7:4]	Bank3, Index66 Bit[3:0]	Bank 3, Index 02h bit[7:4] = 02h
AUXFANOUT1	Bank 8, Index 01h	Bank 8, Index 0C bit[3:0]	Bank 8, Index 02 bit[2:0]	Bank 8, Index 0C bit[6:4]	Bank 8, Index 03h	Bank 8, Index 04h	Bank8, Index66 Bit[7:4]	Bank8, Index66 Bit[3:0]	Bank 8, Index 02h bit[7:4] = 02h
AUXFANOUT2	Bank 9, Index 01h	Bank 9, Index 0C bit[3:0]	Bank 9, Index 02 bit[2:0]	Bank 9, Index 0C bit[6:4]	Bank 9, Index 03h	Bank 9, Index 04h	Bank9, Index66 Bit[7:4]	Bank9, Index66 Bit[3:0]	Bank 9, Index 02h bit[7:4] = 02h
AUXFANOUT3	Bank A, Index 01h	Bank A, Index 0C bit[3:0]	Bank A, Index 02 bit[2:0]	Bank A, Index 0C bit[6:4]	Bank A, Index 03h	Bank A, Index 04h	BankA, Index66 Bit[7:4]	BankA, Index66 Bit[3:0]	Bank A, Index 02h bit[7:4] = 02h

8.9 SMART FAN™ IV & Close Loop Fan Control Mode

SMART FAN™ IV and Close Loop Fan Control Mode offer 3 slopes to control the fan speed.

Set **Critical Temperature, Bank1 Index 35_{HEX}, Bank2 Index 35_{HEX}, Bank3 Index 35_{HEX}, Bank8 Index 35_{HEX}, Bank9 Index 35_{HEX}, BankA Index 35_{HEX}.**

- Set the **Relative Register-at SMART FAN™ IV Control Mode Table**
If fan control mode is set as Close Loop Fan Control, the unit step is 50RPM. So the maximum controllable RPM is $50*255=12,750$ RPM.
If Enable RPM High Mode (Bank6 index6 Bit0), unit is 100RPM.
- Set **Tolerance of Target Temperature, Bank1 Index 02_{HEX} bit[2:0], Bank2 Index 02_{HEX} bit[2:0], Bank3 Index 02_{HEX} bit[2:0], Bank8 Index 02_{HEX} bit[2:0], Bank9 Index 02_{HEX} bit[2:0], BankA Index 02_{HEX} bit[2:0].**

The 3 slopes can be obtained by setting FanDuty1/RPM1~FanDuty4/RPM4 and T1~T4 through the registers. When the temperature rises, FAN Output will calculate the target FanDuty/RPM based on the current slope. For example, assuming Tx is the current temperature and Ty is the target, then

The slope:

$$X2 = \frac{(FanDuty3 / RPM 3) - (FanDuty2 / RPM 2)}{(T3 - T2)}$$

Fan Output:

$$Target\ FanDuty\ or\ RPM = (FanDuty2\ or\ RPM\ 2) + (Tx - T2) \cdot X2$$

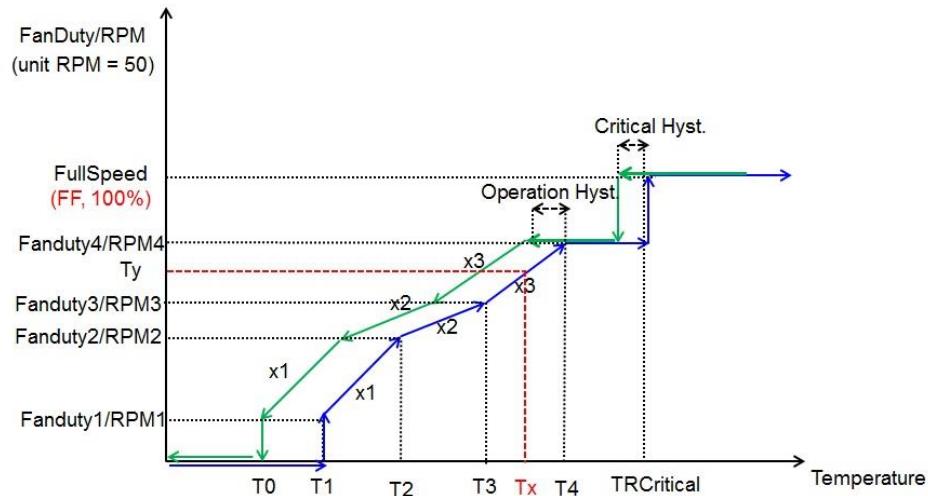


Figure 8-15 SMART FAN™ IV & Close Loop Fan Control Mechanism

Table 8-4 Relative Register-at SMART FAN™ IV Control Mode

DESCRIPTION	T1	T2	T3	T4
SYSFANOUT	Bank 1, Index 21h	Bank 1, Index 22h	Bank 1, Index 23h	Bank 1, Index 24h
CPUFANOUT	Bank 2, Index 21h	Bank 2, Index 22h	Bank 2, Index 23h	Bank 2, Index 24h
AUXFANOUT0	Bank 3, Index 21h	Bank 3, Index 22h	Bank 3, Index 23h	Bank 3, Index 24h
AUXFANOUT1	Bank 8, Index 21h	Bank 8, Index 22h	Bank 8, Index 23h	Bank 8, Index 24h
AUXFANOUT2	Bank 9, Index 21h	Bank 9, Index 22h	Bank 9, Index 23h	Bank 9, Index 24h
AUXFANOUT3	Bank A, Index 21h	Bank A, Index 22h	Bank A, Index 23h	Bank A, Index 24h
DESCRIPTION	FD1/PWM1	FD2/PWM2	FD3/PWM3	FD4/PWM4
SYSFANOUT	Bank 1, Index 27h	Bank 1, Index 28h	Bank 1, Index 29h	Bank 1, Index 2Ah
CPUFANOUT	Bank 2, Index 27h	Bank 2, Index 28h	Bank 2, Index 29h	Bank 2, Index 2Ah
AUXFANOUT0	Bank 3, Index 27h	Bank 3, Index 28h	Bank 3, Index 29h	Bank 3, Index 2Ah
AUXFANOUT1	Bank 8, Index 27h	Bank 8, Index 28h	Bank 8, Index 29h	Bank 8, Index 2Ah
AUXFANOUT2	Bank 9, Index 27h	Bank 9, Index 28h	Bank 9, Index 29h	Bank 9, Index 2Ah
AUXFANOUT3	Bank A, Index 27h	Bank A, Index 28h	Bank A, Index 29h	Bank A, Index 2Ah

DESCRIPTION	CRITICAL TEMPERATURE	CRITICAL TOLERANCE	TEMPERATURE TOLERANCE	ENABLE RPM MODE	RPM TOLERANCE	ENABLE RPM HIGH MODE
SYSFANOUT	Bank 1, Index 35h	Bank 1, Index 38h, bit[2:0]	Bank 1, Index 02h, bit[2:0]	Bank 6, Index 00h, Bit0	Bank 6, index 01h Bit[3:0]	Bank 6, Index 06h, Bit0
CPUFANOUT	Bank 2, Index 35h	Bank 2, Index 38h, bit[2:0]	Bank 2, Index 02h, bit[2:0]	Bank 6, Index 00h, Bit1	Bank 6, index 02h Bit[3:0]	Bank 6, Index 06h, Bit1
AUXFANOUT0	Bank 3, Index	Bank 3, Index 38h,	Bank 3, Index 02h,	Bank 6, Index 00h,	Bank 6, index 03h	Bank 6, Index 06h,

	35h	bit[2:0]	bit[2:0]	Bit2	Bit[3:0]	Bit2
AUXFANOUT1	Bank 8, Index 35h	Bank 8, Index 38h, bit[2:0]	Bank 8, Index 02h, bit[2:0]	Bank 6, Index 00h, Bit3	Bank 6, index 04h Bit[3:0]	Bank 6, Index 06h, Bit3
AUXFANOUT2	Bank 9, Index 35h	Bank 9, Index 38h, bit[2:0]	Bank 9, Index 02h, bit[2:0]	Bank 6, Index 00h, Bit4	Bank 6, index 05h Bit[3:0]	Bank 6, Index 06h, Bit4
AUXFANOUT3	Bank A, Index 35h	Bank A, Index 38h, bit[2:0]	Bank A, Index 02h, bit[2:0]	Bank 6, Index 00h, Bit5	Bank 6, index 23h Bit[3:0]	Bank 6, Index 06h, Bit5

DESCRIPTION	STEP- UP TIME	STEP- DOWN TIME	STEP UP VALUE	STEP DOWN VALUE	Enable SMART FAN IV	ENABLE CRITICAL DUTY	CRITICAL DUTY
SYSFANOUT	Bank 1, index 03h	Bank 1, index 04h	Bank1, index66 Bit[7:4]	Bank1, index66 Bit[3:0]	Bank 1,Index 02h bit[7:4] = 04h	Bank 1, Index 36h, Bit0	Bank 1, index 37h
CPUFANOUT	Bank 2, index 03h	Bank 2, index 04h	Bank2, index66 Bit[7:4]	Bank2, index66 Bit[3:0]	Bank 2,Index 02h bit[7:4] = 04h	Bank 2, Index 36h, Bit0	Bank 2, index 37h
AUXFANOUT0	Bank 3, index 03h	Bank 3, index 04h	Bank3 index66 Bit[7:4]	Bank3, index66 Bit[3:0]	Bank 3,Index 02h bit[7:4] = 04h	Bank 3, Index 36h, Bit0	Bank 3, index 37h
AUXFANOUT1	Bank 8, Index 03h	Bank 8, Index 04h	Bank8, index66 Bit[7:4]	Bank8, index66 Bit[3:0]	Bank 8,Index 02h bit[7:4] = 04h	Bank 8, Index 36h, Bit0	Bank 8, index 37h
AUXFANOUT2	Bank 9, Index 03h	Bank 9, Index 04h	Bank9, index66 Bit[7:4]	Bank9, index66 Bit[3:0]	Bank 9,Index 02h bit[7:4] = 04h	Bank 9, Index 36h, Bit0	Bank 9, index 37h
AUXFANOUT3	Bank A, Index 03h	Bank A, Index 04h	BankA, index66 Bit[7:4]	BankA, index66 Bit[3:0]	Bank A,Index 02h bit[7:4] = 04h	Bank A, Index 36h, Bit0	Bank A, index 37h

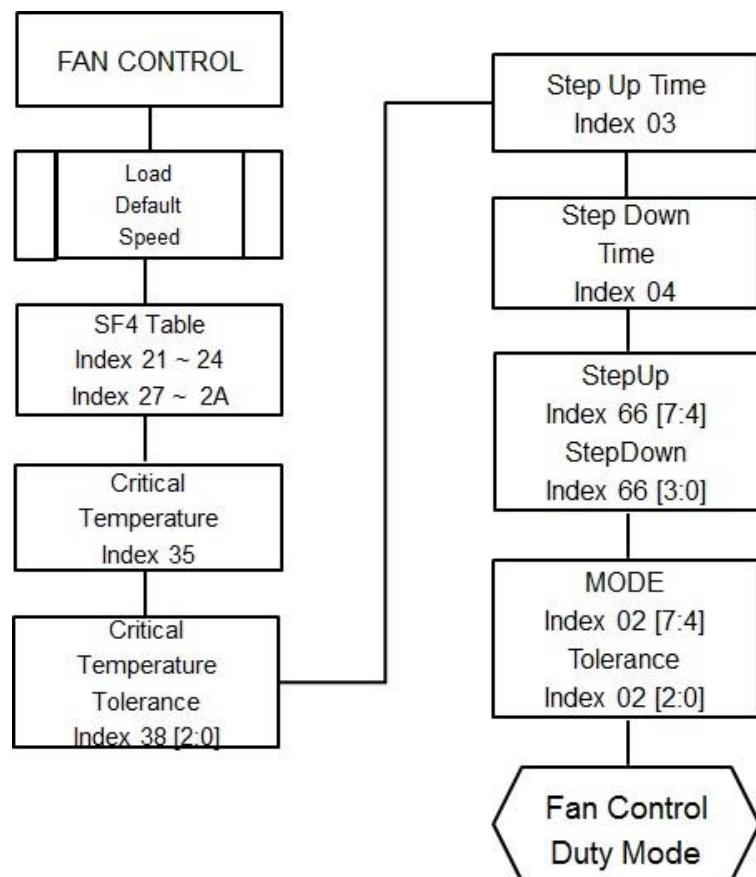


Figure 8-16 Fan Control Duty Mode Programming Flow

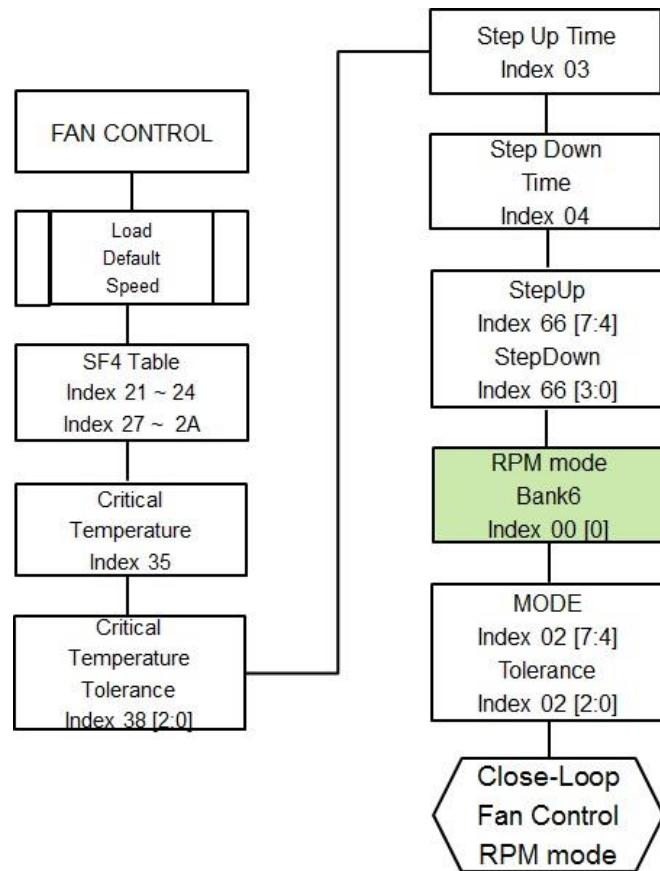


Figure 8-17 Close-Loop Fan Control RPM mode Programming Flow

8.9.1 Step Up Time / Step Down Time

SMART FAN™ IV is designed for the smooth operation of the fan. The Up Time / Down Time register defines the time interval between successive duty increases or decreases. If this value is set too small, the fan will not have enough time to speed up after tuning the duty and sometimes may result in unstable fan speed. On the other hand, if Up Time / Down Time is set too large, the fan may not work fast enough to dissipate the heat.

8.9.2 Fan Output Step

The “Fanout Step” itself is separately specified in Bank1 Index20h bit0 for SYSFANOUT, Bank2 Index20h bit0 for CPUFANOUT, Bank3 Index20h bit0 for AUXFANOUT0, Bank8 Index20h bit0 for AUXFANOUT1, Bank9 Index20h bit0 for AUXFANOUT2 and BankA Index20h bit0 for AUXFANOUT3.

This example for Fanout Step exposition:

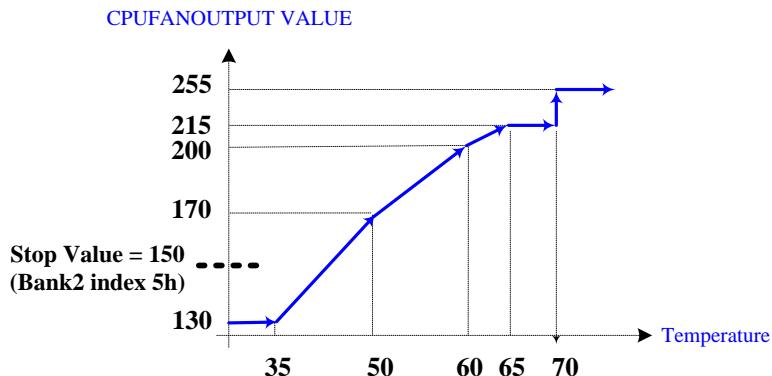


Figure 8-18 CPUFAN SMART FAN™ IV Table Parameters Figure

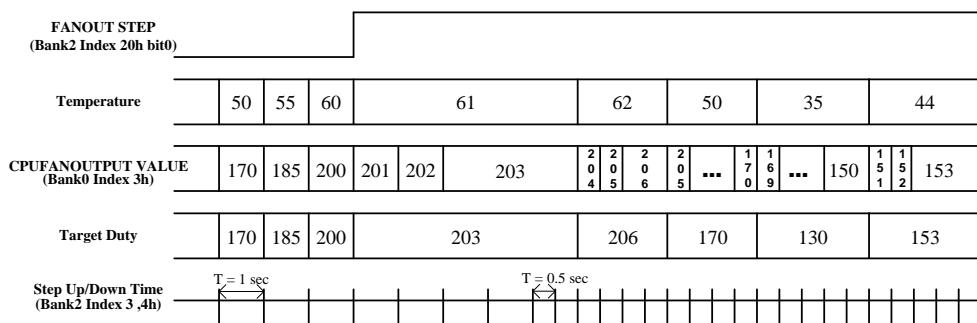


Figure 8-19 Fanout Step Relation of CPUFANOUT

8.9.3 Revolution Pulse Selection

The NCT5567D-B supports four RPM output of the pulses selection function for different type of FAN which has the character of different pulses per revolution. The others could be set by HM register at Bank6, Index44, Bit1-0 for SYSFANIN; Index45, Bit1-0 for CPUFANIN; Index46, Bit1-0 for AUXFANIN0; Index47, Bit1-0 for AUXFANIN1; Index48, Bit1-0 for AUXFANIN2; Index49, Bit1-0 for AUXFANIN3. All default value of pulse selection registers are 2 pulses of one revolution.

Setting description for “Pulse Selection Bits”:

- 00:** 4 pulses per revolution
- 01:** 1 pulse per revolution
- 10:** 2 pulses per revolution (default)
- 11:** 3 pulses per revolution

8.9.4 Weight Value Control

The NCT5567D-B supports weight value control for fan duty output. By register configuration, the results of weight value circuit can be added to the fan duty of SMART FAN™ I or IV and output to the fan. Take CPUFANOUT for example, if SMART FAN™ IV is selected, CPUTIN is the temperature source, and weight value control is enabled, SMART FAN™ IV will calculate the output duty, and weight value circuit will calculate the corresponding weight value based on SYSTIN. As the SYSTIN temperature rises, its corresponding weight value increases. Then, the two values will be summed up and output to CPU fan. In other words, the CPU fan duty is affected not only by the CPUTIN but also the SYSTIN temperature.

Figure 8-20 CPU TEMP and Weight Value Relations shows the relation between the SYSTIN temperature and the weight value. Tolerance setup is offered on each change point to avoid weight value fluctuation resulted from

SYSTIN temperature change. The weight value will increase by one weight value step only when the SYSTIN temperature is higher than the point value plus tolerance. Likewise, the weight value decreases by one weight value step only when the SYSTIN temperature is lower than the point value minus tolerance.

Notes : This relative register should not be zero and not support negative temperature.

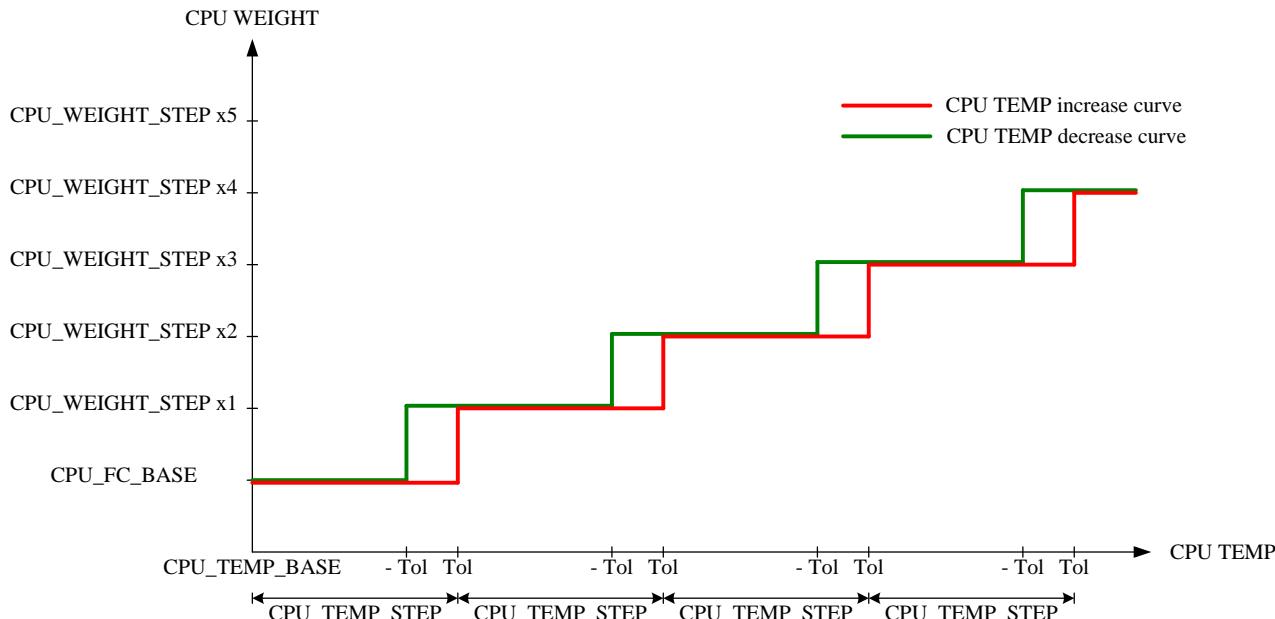


Figure 8-20 CPU TEMP and Weight Value Relations

Table 8-5 Relative Register-at Weight Value Control

DESCRIPTION	ENABLE WEIGHT MODE	WEIGHT TEMPERATURE SOURCE SELECT
CPUFANOUT	Bank 2, Index 39h, bit7	Bank 2, Index 39h, bit[4:0]

DESCRIPTION	TEMP BASE	DUTY BASE	TEMP STEP	TEMP STEP TOLERANCE	WEIGHT STEP
CPUFANOUT	Bank 2, Index 3Dh	Bank 2, Index 3Eh	Bank 2, Index 3Ah	Bank 2, Index 3Bh	Bank 2, Index 3Ch

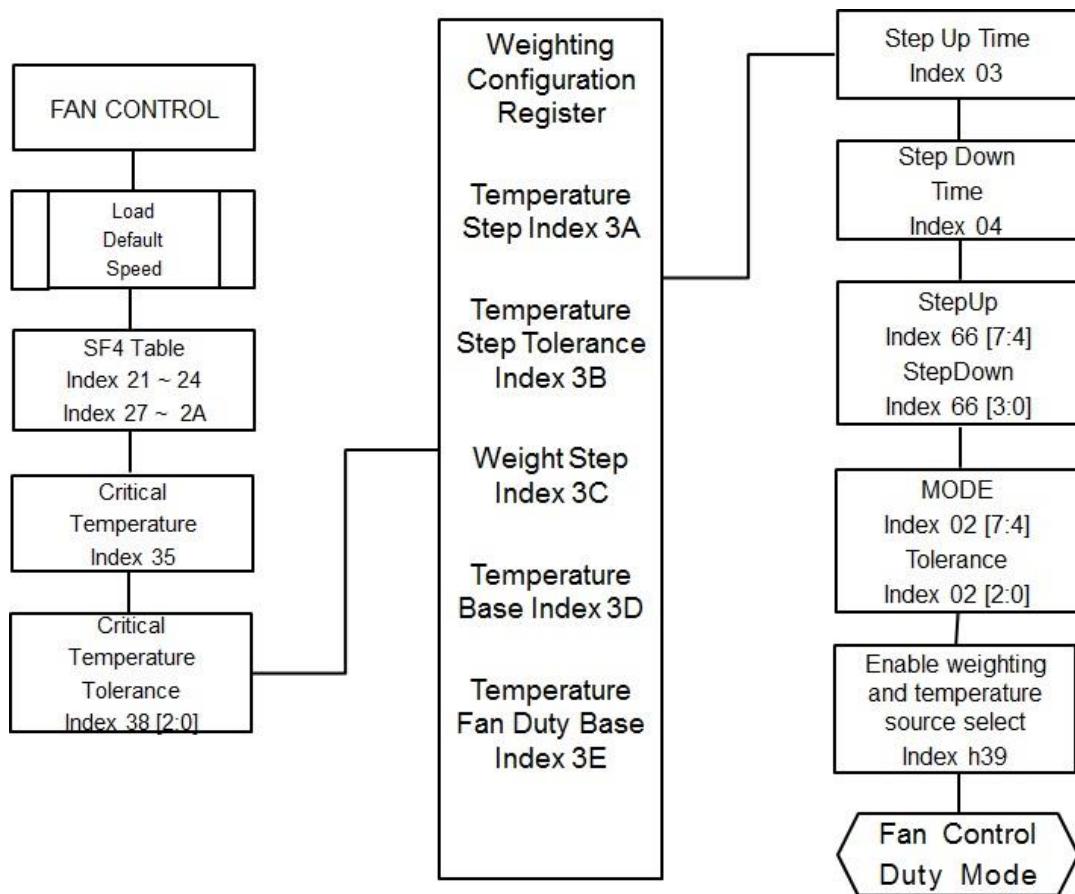


Figure 8-21 Fan Control Weighting Duty Mode Programming Flow

8.9.5 DTS2.0

When current temperature \geq Tcontrol, it will change from SMART FAN™ IV to DTS2.0, and when current temperature $<$ Tcontrol, it will change from DTS2.0 to SMART FAN™ IV. In DTS2.0, it compares the thermal margin (from PECI) and target thermal margin, when thermal margin $>$ target thermal margin, mean it's over-cooling and duty (RPM) will decrease, when thermal margin $<$ target thermal margin, mean it's poor-cooling and duty (RPM) increase.

Enable thermal margin and $T \geq T_{control}$, thermal margin correspond to duty (RPM) as follow figures

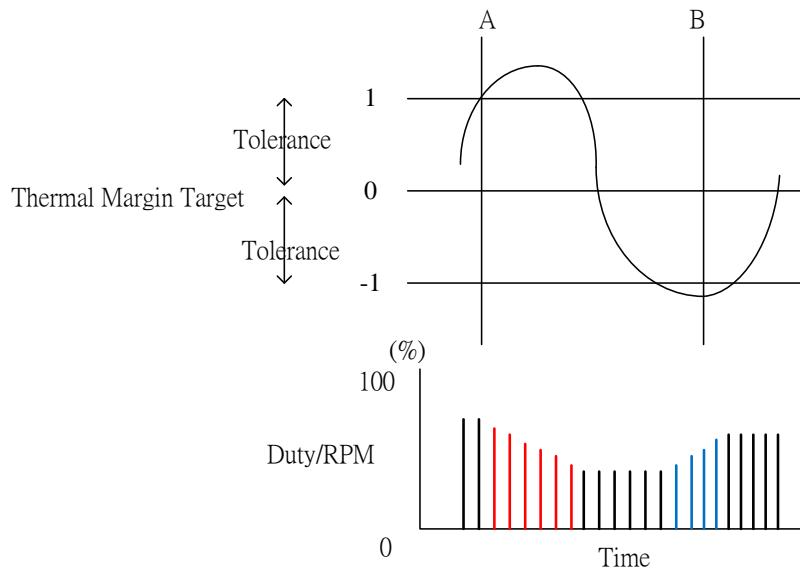


Figure 8-22 (a) Mechanism of thermal Margin

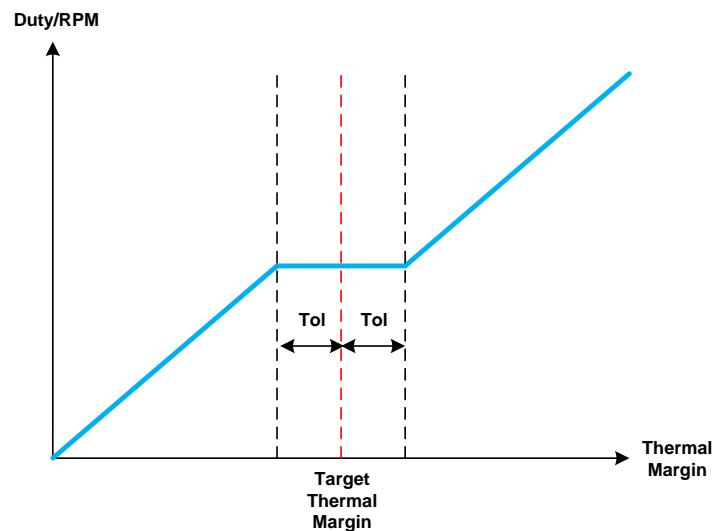


Figure 8-23 (b) Mechanism of thermal Margin

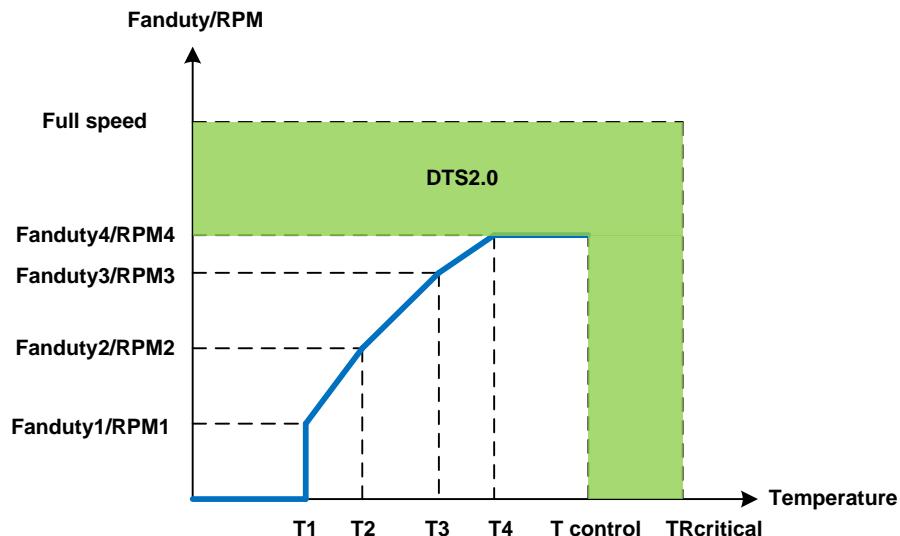


Figure 8-24 DTS2.0 region of SMART FAN™ IV

Table 8-6 Relative Registers – at DTS2.0

DESCRIPTION	THERMAL MARGIN ENABLE	T CONTROL	TARGET THERMAL MARGIN	THERMAL MARGIN TOLERANCE
CPUFANOUT	Bank 2, index 0Dh Bit[0]	Bank 2, index 0Fh	Bank2, index01	Bank2, index0D Bit[4:2]
AUXFANOUT0	Bank 3, index 0Dh Bit[0]	Bank 3, index 0Fh	Bank3, index01	Bank3, index0D Bit[4:2]

8.10 Alert and Interrupt

NCT5567D-B supports 6 Temperature Sensors for interrupt detection depending on selective monitor temperature source.

	SMIOVT1	SMIOVT2
Temperature source select	Bank6, index21 bit[4:0] default: SYSTIN	Bank6, index22 bit[4:0] default: CPUTIN
Temperature reading (2's complement)	Bank0, index27	Bank1, index50 & index51 bit7
Temperature	Bank0,	Bank1,

High Limit	index39	index55 & index56 bit7
Temperature Low Limit	Bank0, index3A	Bank1, index53 & index54 bit7

SMIOVT Relative Temperature Registers

8.10.1 SMI# Interrupt Mode

The SMI#/OVT# pin is a multi-function pin. It can be in HM_SMI# mode or in OVT# mode by setting Configuration Register CR24h, bit 2. In HM_SMI# mode, it can monitor voltages, fan counts, or temperatures.

8.10.2 Voltage SMI# Mode

The SMI# pin can create an interrupt if a voltage exceeds a specified high limit or falls below a specified low limit. This interrupt must be reset by reading all the interrupt status registers, or subsequent events do not generate interrupts. This mode is illustrated in the following figure.

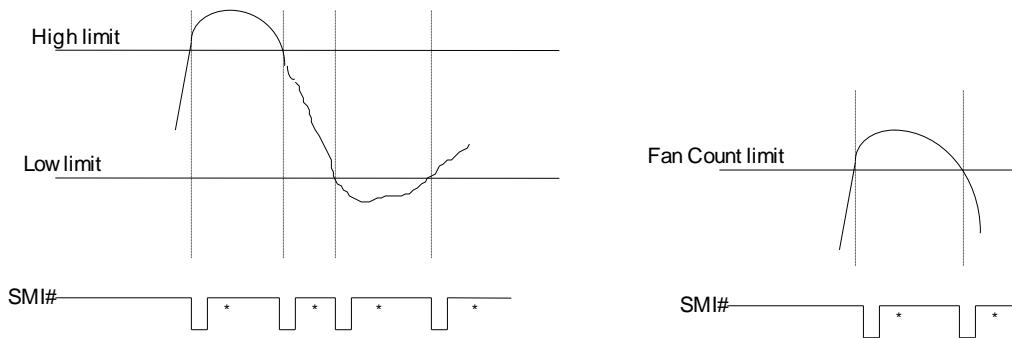


Figure 8-25 SMI Mode of Voltage and Fan Inputs

8.10.3 Fan SMI# Mode

The SMI# pin can create an interrupt if a fan count crosses a specified fan limit (rises above it or falls below it). This interrupt must be reset by reading all the interrupt status registers, or subsequent events do not generate interrupts. This mode is illustrated in the figure above.

8.10.4 Temperature SMI# Mode

The SMI# pin can create interrupts that depend on the temperatures measured by SYSTIN, CPUTIN, and AUXTINO.

8.10.4.1 Temperature Sensor 1 SMI# Interrupt (Default: SYSTIN)

The SMI# pin has four interrupt modes with Temperature Sensor 1.

(1) Shut-down Interrupt Mode

This mode is enabled by setting Bank0 Index 40h, bit 4 to one.

In this mode, the SMI# pin can create an interrupt when the current temperature rises above T_{OL} or Shut-down mode high limit temperature, and when the current temperature falls below T_{HYST} or Shut-down mode low limit temperature. Once the temperature rises above T_{OL} , however, and generates an interrupt, this mode does not generate additional interrupts, even if the temperature remains above T_{OL} , until the temperature falls below T_{HYST} . This interrupt must be reset by reading all the interrupt status registers, or subsequent events do not generate interrupts, except the first time current temperature rises above Shut-down mode high limit temperature. This is illustrated in the following figure.

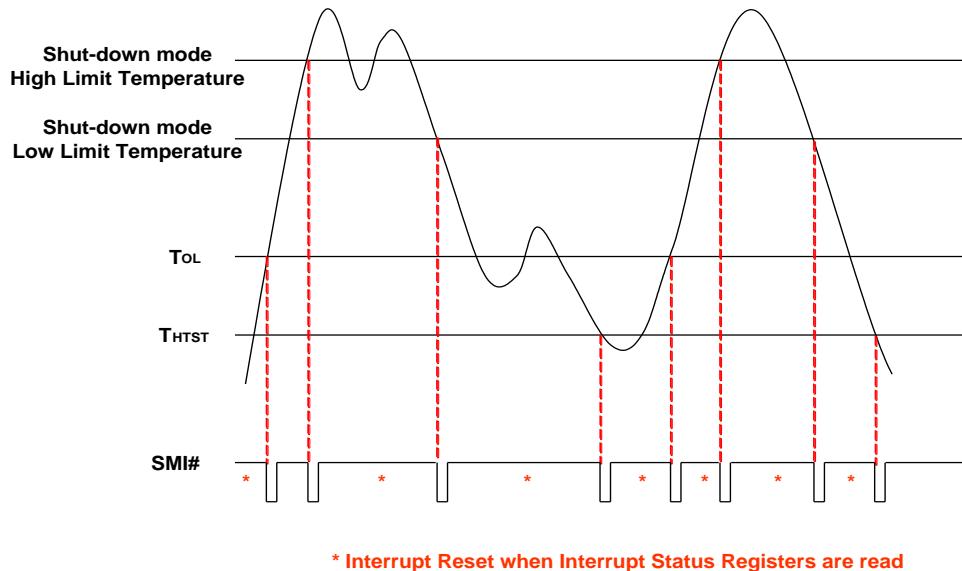


Figure 8-26 Shut-down Interrupt Mode

(2) Comparator Interrupt Mode

This mode is enabled by setting T_{HYST} (Temperature Hysteresis) to 127°C. This mode is enabled by setting Bank0 Index 40h, bit 4 to 0.

In this mode, the SMI# pin can create an interrupt as long as the current temperature exceeds T_O (Over Temperature). This interrupt can be reset by reading all the interrupt status registers, or subsequent events do not generate interrupts. If the interrupt is reset, the SMI# pin continues to create interrupts until the temperature goes below T_O . This is illustrated in the figure below.

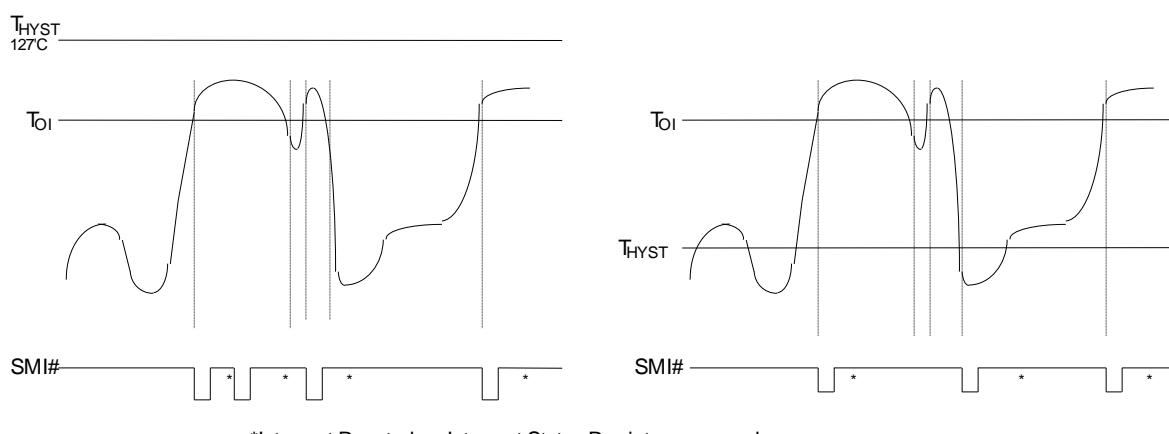


Figure 8-27 SMI Mode of Sensor1 I

(3) Two-Times Interrupt Mode

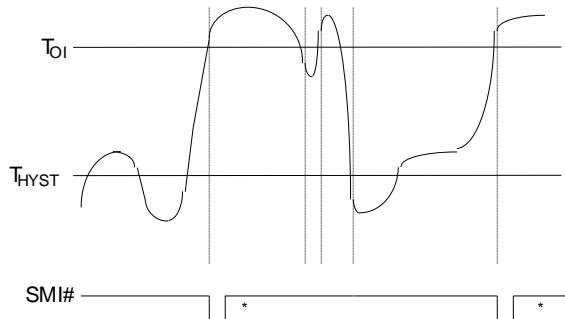
This mode is enabled by setting T_{HYST} (Temperature Hysteresis) lower than T_O and setting Bank0 Index 4Ch, bit 5 to zero. This mode is enabled by setting Bank0 Index 40h, bit 4 to 0.

In this mode, the SMI# pin can create an interrupt when the current temperature rises above T_O or when the current temperature falls below T_{HYST} . Once the temperature rises above T_O , however, and generates an interrupt, this mode does not generate additional interrupts, even if the temperature remains above T_O , until the temperature falls below T_{HYST} . This interrupt must be reset by reading all the interrupt status registers, or subsequent events do not generate interrupts. This is illustrated in the figure above.

(4) One-Times Interrupt Mode

This mode is enabled by setting T_{HYST} (Temperature Hysteresis) lower than T_O and setting Bank0 Index 4Ch, bit 5 to one. This mode is enabled by setting Bank0 Index 40h, bit 4 to 0.

In this mode, the SMI# pin can create an interrupt when the current temperature rises above T_O . Once the temperature rises above T_O , however, and generates an interrupt, this mode does not generate additional interrupts, even if the temperature remains above T_O , until the temperature falls below T_{HYST} . This interrupt must be reset by reading all the interrupt status registers, or subsequent events do not generate interrupts. This is illustrated in the following figure.



*Interrupt Reset when Interrupt Status Registers are read

One-Time Interrupt Mode

Figure 8-28 SMI Mode of Sensor1 II

8.10.4.2. SMI# Interrupt of Temperature Sensor 2

The SMI# pin has 3 interrupt modes with Temperature Sensor 2.

(1) Shut-down Interrupt Mode

This mode is enabled by Bank0 Index 40h, bit5 to one for Temperature Sensor 2.

In this mode, the SMI# pin can create an interrupt when the current temperature rises above T_{OL} or Shut-down mode high limit temperature, and when the current temperature falls below T_{HYST} or Shut-down mode low limit temperature. Once the temperature rises above T_{OL} , however, and generates an interrupt, this mode does not generate additional interrupts, even if the temperature remains above T_{OL} , until the temperature falls below T_{HYST} . This interrupt must be reset by reading all the interrupt status registers, or subsequent events do not generate interrupts, except the first time current temperature rises above Shut-down mode high limit temperature. This is illustrated in the following figure.

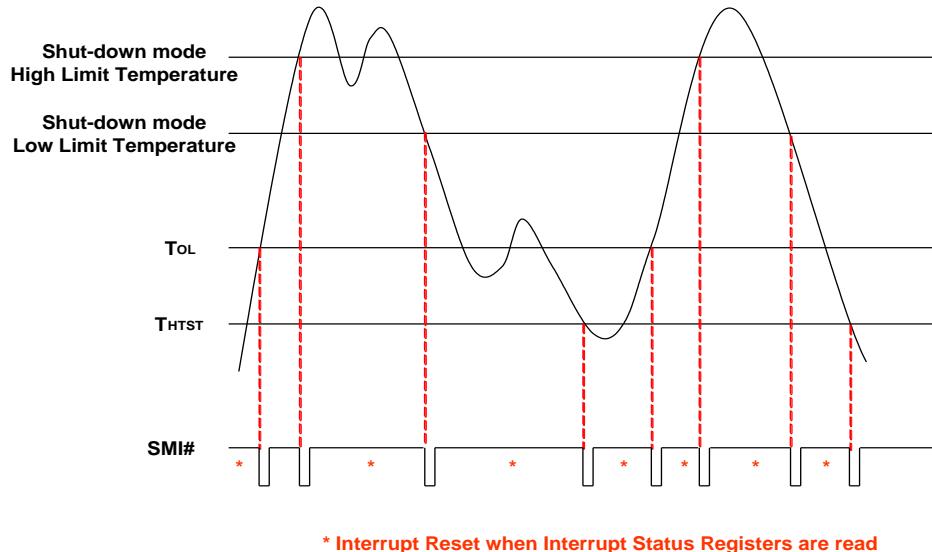


Figure 8-29 Shut-down Interrupt Mode

(2) Comparator Interrupt Mode

This mode is enabled by setting Bank0 Index 4Ch, bit 6, to one.

In this mode, the SMI# pin can create an interrupt when the current temperature exceeds T_O (Over Temperature) and continues to create interrupts until the temperature falls below T_{HYST} . This interrupt can be reset by reading all the interrupt status registers, or subsequent events do not generate interrupts. This is illustrated in the figure below.

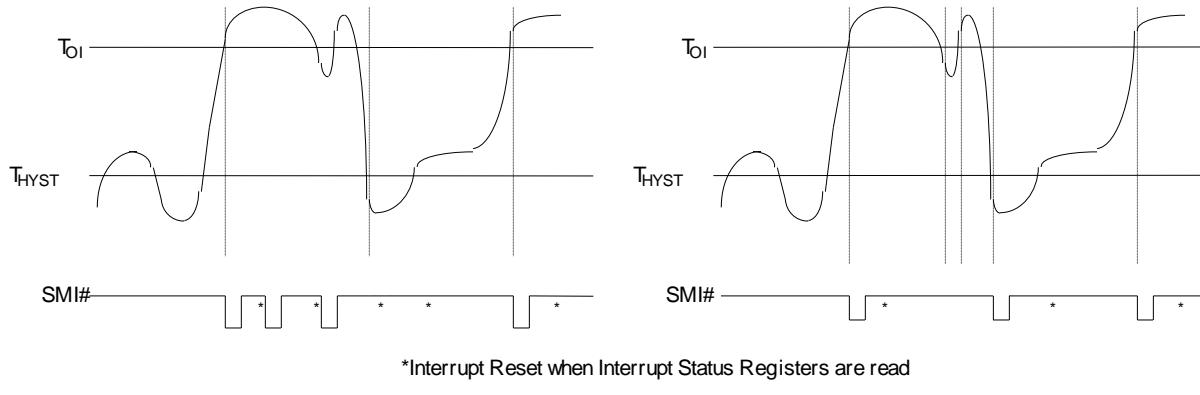


Figure 8-30 SMI Mode of Sensor2

(3) Two-Times Interrupt Mode

This mode is enabled by setting Bank0 Index 4Ch, bit 6, to zero.

In this mode, the SMI# pin can create an interrupt when the current temperature rises above T_O or when the current temperature falls below T_{HYST} . Once the temperature rises above T_O , however, and generates an interrupt, this mode does not generate additional interrupts, even if the temperature remains above T_O , until the temperature falls below T_{HYST} . This interrupt must be reset by reading all the interrupt status registers, or subsequent events do not generate interrupts. This is illustrated in the figure above.

Table 8-7 Relative Register of SMI functions

	SHUTDOWN MODE	COMPARATOR MODE	TWO-TIME INTERRUPT MODE	ONE-TIME INTERRUPT MODE
SMIOVT1	Bank0,Index40_Bit4 (EN_WS=1) Bank0,Index43_Bit4(TIN=0) Bank0,Index46_Bit3 (Shut = 0)	Bank0,Index43_Bit4 (TIN=0) Bank0,Index3A (Thyst = 8'h7F)	Bank0,Index43_Bit4 (TIN=0) Bank0,Index4C_Bit5 (EN_T1_One = 0)	Bank0,Index43_Bit4 Bank0,Index4C_Bit5
SMIOVT2	Bank0,Index40_Bit5 (EN_WS=1) Bank0,Index43_Bit5(TIN=0) Bank0,Index46_Bit 4 (Shut = 0)	Bank0,Index43_Bit5 (TIN=0) Bank0,Index4C_Bit6 (T2T3_INT=1)	Bank0,Index43_Bit5(TIN=0) Bank0,Index4C_Bit6 (T2T3_INT=0)	

Table 8-8 Relative Register of OVT functions

SMIOVT1	SMIOVT2
Bank0,Index18_Bit6=0 (Enable OVT output) Bank0,Index18_Bit4 0: Comparator Mode (def.) 1: Interrupt Mode Bank0, Index18_Bit0 0: Start to monitor the source of SMIOVT1 temperature. 1: Stop monitoring the source of SMIOVT1 temperature.	Bank1, Index52_Bit0 0: Start to monitor the source of SMIOVT2 temperature. 1: Stop monitoring the source of SMIOVT2 temperature. Bank 0, Index4C_Bit 3 0: Disable SMIOVT2 temperature sensor over temperature output 1: Enable SMIOVT2 temperature sensor over temperature output Bank 1, Index52_Bit 1 0: Comparator Mode 1: Interrupt Mode Bank 1, Index52_Bit 3~4 Number of faults to detect before setting OVT# output.

8.10.5 OVT# Interrupt Mode

The SMI#/OVT# pin is a multi-function pin. It can be in SMI# mode or in OVT# mode by setting Configuration Register CR[24h], bit 2 to one or zero, respectively. In OVT# mode, it can monitor temperatures, and OVT pin could be enabled to OVT output by Bank0 Index 18h, bit 6 for Temperature Sensor 1(default: SYSTIN); Bank1 Index 52h, bit 1 for Temperature Sensor 2(default: CPUTIN).

The OVT# pin has two interrupt modes, comparator and interrupt. The modes are illustrated in this figure.

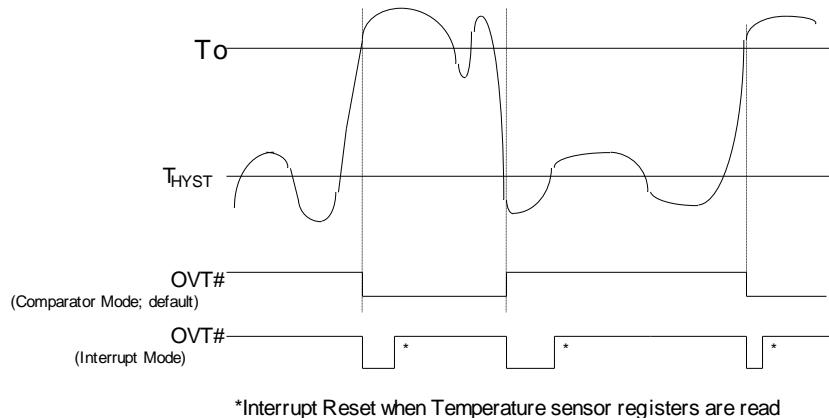


Figure 8-31 OVT# Modes of Temperature Inputs

If Bank0 Index 18h, bit 4, is set to zero, the OVT# pin is in comparator mode. In comparator mode, the OVT# pin can create an interrupt once the current temperature exceeds T_O and continues to create interrupts until the temperature falls below T_{HYST} . The OVT# pin is asserted once the temperature has exceeded T_O and has not yet fallen below T_{HYST} .

If Bank0 Index 18h, bit 4, is set to one, the OVT# pin is in interrupt mode. In interrupt mode, the OVT# pin can create an interrupt once the current temperature rises above T_O or when the temperature falls below T_{HYST} . Once the temperature rises above T_O , however, and generates an interrupt, this mode does not generate additional interrupts, even if the temperature remains above T_O , until the temperature falls below T_{HYST} . This interrupt must be reset by reading all the interrupt status registers. The OVT# pin is asserted when an interrupt is generated and remains asserted until the interrupt is reset.

8.10.6 Caseopen Detection

The purpose of Caseopen function is used to detect whether the computer case has been opened and possible tampered with. This feature must function even when there is no 3VSB power. Consequently, the power source for the circuit is from either VBAT or 3VSB. 3VSB is the default power source. If there is no 3VSB power, the power source is VBAT. This is designed to save power consumption of the battery.

When the case is closed, CASEOPEN0# or CASEOPEN1# must be pulled high by an externally pulled-up $2M\Omega$ resistor that is connected to VBAT. When the case is opened, CASEOPEN0# or CASEOPEN1# will be switched from high to low. Meanwhile, the detection circuit inside the IC latches the signal. As a result, the interrupt status and the real-time status can be read at the registers next time when the computer is powered. The CASEOPEN0# status will not be cleared unless CR[46h], bit 7, or CR[E6h] bit 5 at Logical Device A is set to "1" first and then to "0". The CASEOPEN1# status will not be cleared unless CR[46h], bit 6, or CR[Eeh] bit 0 at Logical Device A is set to "1" first and then to "0".

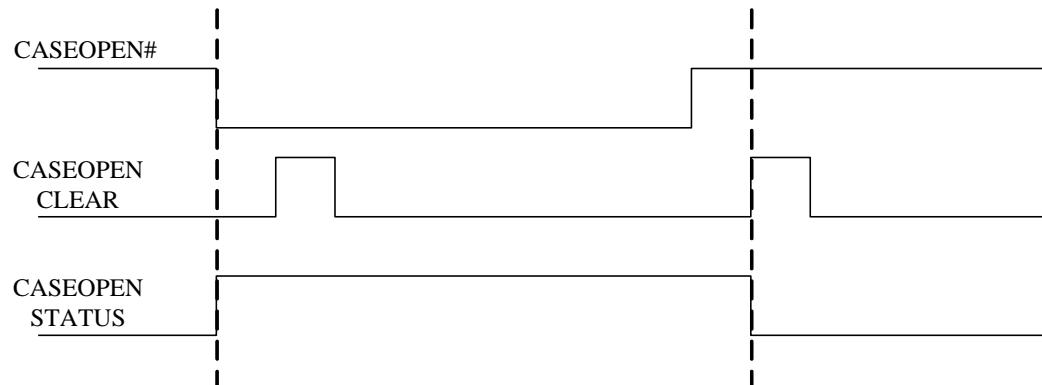


Figure 8-32 Caseopen Mechanism

9. HARDWARE MONITOR REGISTER SET

The base address of the Address Port and Data Port is specified in registers CR[60h] and CR[61h] of Logical Device B, the hardware monitor device. CR[60h] is the high byte, and CR[61h] is the low byte. The Address Port and Data Port are located at the base address, plus 5h and 6h, respectively. For example, if CR[60h] is 02h and CR[61h] is 90h, the Address Port is at 0x295h, and the Data Port is at 0x296h.

NCT5567D-B added 122byte read-only registers for Hardware Monitor. The base address is specified in registers CR[64h] and CR[65h] of Logical Device B, the hardware monitor device. CR[64h] is the high byte, and CR[65h] is the low byte. The least byte of the base address recommend to be zero. For example, {CR[64h], CR[65h]} = {XX00h}.

Remember that this access is from the host CPU I/O address range. To conserve space in the crowded CPU I/O addresses, many of the hardware monitor registers are “banked” with the bank number located at Bank0, index 04Eh.

9.1 Address Port (Port x5h)

Attribute: Bit 6:0 Read/Write , Bit 7: Reserved
Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	DATA							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7	Reserved							
6-0	READ/WRITE							

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
Reserved (Power On default 0)	Address Pointer (Power On default 00h)						
	A6	A5	A4	A3	A2	A1	A0

9.2 Data Port (Port x6h)

Attribute: Read/Write
Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	DATA							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	Data to be read from or to be written to Value RAM and Register.							

9.3 SYSFANOUT PWM Output Frequency Configuration Register – Index 00h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PWM_CLK_SEL1							
DEFAULT	0	0	0	0	0	1	0	0

The register is meaningful only when SYSFANOUT is programmed for PWM output (i.e., Bank0, Index 04h, bit 0 is 0).

BIT	DESCRIPTION
7	PWM_CLK_SEL1. SYSFANOUT PWM Input Clock Source Select. This bit selects the clock source for PWM output frequency. Refer the Divisor table.
6-0	PWM_SCALE1. SYSFANOUT PWM Pre-Scale divider. The clock source for PWM output is divided by this seven-bit value to calculate the actual PWM output frequency. Refer the Divisor table.

The clock source selected by CKSEL will be divided by the divisor and used as a fan PWM output frequency.

If CKSEL equals 0, then the output clock is simply equal to **93.9/ (Divisor[6:0]+1) KHz**

MappedDivisor depends on **Divisor[6:0]** and is described in the table below.

Divisor[6:0]	Mapped Divisor	Output Frequency	Divisor[6:0]	Mapped Divisor	Output Frequency
0000000	1	93.9KHz			
0000001	2	46.95KHz			
0000010	3	31.3KHz			
0000011	4	23.47KHz			
0000100	5	18.78KHz	0001111	16	5.86KHz
0000101	6	15.65KHz	0011111	32	2.93KHz
0000110	7	13.41KHz	0111111	64	1.46KHz
0000111	8	11.73KHz	1111111	128	734Hz

If CKSEL equals 1, then the output clock is simply equal to **1008/ Mapped Divisor Hz**

MappedDivisor depends on **Divisor[3:0]** and is described in the table below.

Divisor[3:0]	Mapped Divisor	Output Frequency	Divisor[3:0]	Mapped Divisor	Output Frequency
0000	1	1008Hz	1000	12	84Hz
0001	2	504Hz	1001	16	63Hz
0010	3	336Hz	1010	32	31.5Hz
0011	4	252Hz	1011	64	15.75Hz
0100	5	201Hz	1100	128	7.875Hz
0101	6	168Hz	1101	256	3.94Hz
0110	7	144Hz	1110	512	1.97Hz
0111	8	126Hz	1111	1024	0.98Hz

9.4 SYSFANOUT Output Value Select Register – Index 01h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANOUT Value							
DEFAULT	7Fh							

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output (Bank0, Index 04h, bit 0 is 0)	DESCRIPTION	The PWM duty cycle is equal to this eight-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							
DC Voltage Output (Bank0, Index 04h, bit 0 is 1)	DESCRIPTION	SYSFANOUT voltage control. The output voltage is calculated according to this equation.						Reserved	
This register could be programmed by Bank1, Index 09									

9.5 CPUFANOUT PWM Output Frequency Configuration Register – Index 02h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PWM_CLK_SEL2	PWM_SCALE2						
DEFAULT	0	0	0	0	0	1	0	0

The register is meaningful only when CPUFANOUT is programmed for PWM output.

BIT	DESCRIPTION
7	PWM_CLK_SEL2. CPUFANOUT PWM Input Clock Source Select. This bit selects the clock source for the PWM output. Refer the Divisor table.
6-0	PWM_SCALE2. CPUFANOUT PWM Pre-Scale divider. The clock source for PWM output is divided by this seven-bit value to calculate the actual PWM output frequency. Refer the Divisor table.

The clock source selected by CKSEL will be divided by the divisor and used as a fan PWM output frequency.

If CKSEL equals 0, then the output clock is simply equal to **93.9/ (Divisor[6:0]+1) KHz**

MappedDivisor depends on **Divisor[6:0]** and is described in the table below.

Divisor[6:0]	Mapped Divisor	Output Frequency	Divisor[6:0]	Mapped Divisor	Output Frequency
0000000	1	93.9KHz			
0000001	2	46.95KHz			
0000010	3	31.3KHz			
0000011	4	23.47KHz			
0000100	5	18.78KHz	0001111	16	5.86KHz
0000101	6	15.65KHz	0011111	32	2.93KHz

Divisor[6:0]	Mapped Divisor	Output Frequency	Divisor[6:0]	Mapped Divisor	Output Frequency
0000110	7	13.41KHz	0111111	64	1.46KHz
0000111	8	11.73KHz	1111111	128	734Hz

If CKSEL equals 1, then the output clock is simply equal to **1008/ Mapped Divisor Hz**

MappedDivisor depends on **Divisor[3:0]** and is described in the table below.

Divisor[3:0]	Mapped Divisor	Output Frequency	Divisor[3:0]	Mapped Divisor	Output Frequency
0000	1	1008Hz	1000	12	84Hz
0001	2	504Hz	1001	16	63Hz
0010	3	336Hz	1010	32	31.5Hz
0011	4	252Hz	1011	64	15.75Hz
0100	5	201Hz	1100	128	7.875Hz
0101	6	168Hz	1101	256	3.94Hz
0110	7	144Hz	1110	512	1.97Hz
0111	8	126Hz	1111	1024	0.98Hz

9.6 CPUFANOUT Output Value Select Register – Index 03h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANOUT Value							
DEFAULT	7Fh							

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output	DESCRIPTION	CPUFANOUT PWM Duty. The PWM duty cycle is equal to this 8-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and creates a duty cycle of 0%.							
This register could be programmed by Bank2, Index 09									

9.7 SYSFANOUT Configuration Register I – Index 04h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							SYSFANOUT_SEL
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-1	Reserved
0	SYSFANOUT Output Mode Selection. 0: SYSFANOUT pin produces a PWM duty cycle output. (Default) 1: SYSFANOUT pin produces DC output.

9.8 AUXFANOUT0 PWM Output Frequency Configuration Register – Index 10h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PWM_CLK_SEL3							
DEFAULT	0	0	0	0	0	1	0	0

This register is only meaningful when AUXFANOUT0 is programmed for PWM output.

BIT	DESCRIPTION
7	PWM_CLK_SEL3. AUXFANOUT0 PWM Input Clock Source Select. This bit selects the clock source of PWM output frequency. Refer the Divisor table.
6-0	PWM_CLK_SCALE3. AUXFANOUT0 PWM Pre-Scale divider. The clock source for PWM output is divided by this seven-bit value to calculate the actual PWM output frequency. Refer the Divisor table.

The clock source selected by CKSEL will be divided by the divisor and used as a fan PWM output frequency.

If CKSEL equals 0, then the output clock is simply equal to **93.9/ (Divisor[6:0]+1) KHz**

MappedDivisor depends on **Divisor[6:0]** and is described in the table below.

Divisor[6:0]	Mapped Divisor	Output Frequency	Divisor[6:0]	Mapped Divisor	Output Frequency
0000000	1	93.9KHz			
0000001	2	46.95KHz			
0000010	3	31.3KHz			
0000011	4	23.47KHz			
0000100	5	18.78KHz	0001111	16	5.86KHz
0000101	6	15.65KHz	0011111	32	2.93KHz
0000110	7	13.41KHz	0111111	64	1.46KHz
0000111	8	11.73KHz	1111111	128	734Hz

If CKSEL equals 1, then the output clock is simply equal to **1008/ Mapped Divisor Hz**

MappedDivisor depends on **Divisor[3:0]** and is described in the table below.

Divisor[3:0]	Mapped Divisor	Output Frequency	Divisor[3:0]	Mapped Divisor	Output Frequency
0000	1	1008Hz	1000	12	84Hz
0001	2	504Hz	1001	16	63Hz
0010	3	336Hz	1010	32	31.5Hz
0011	4	252Hz	1011	64	15.75Hz
0100	5	201Hz	1100	128	7.875Hz
0101	6	168Hz	1101	256	3.94Hz
0110	7	144Hz	1110	512	1.97Hz
0111	8	126Hz	1111	1024	0.98Hz

9.9 AUXFANOUT0 Output Value Select Register – Index 11h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT0 Value							
DEFAULT	7Fh							

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output	DESCRIPTION	AUXFANOUT0 PWM Duty Cycle. The PWM duty cycle is equal to this 8-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							
This register could be programmed by Bank3, Index 09									

9.10 AUXFANOUT1 PWM Output Frequency Configuration Register – Index 12h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0	
NAME	PWM_CLK_SEL4	PWM_SCALE4							
DEFAULT	0	0	0	0	0	1	0	0	

This register is only meaningful when AUXFANOUT1 is programmed for PWM output.

BIT	DESCRIPTION
7	PWM_CLK_SEL4. AUXFANOUT1 PWM Input Clock Source Select. This bit selects the clock source of PWM output frequency. Refer the Divisor table.
6-0	PWM_CLK_SCALE4. AUXFANOUT1 PWM Pre-Scale divider. The clock source for PWM output is divided by this seven-bit value to calculate the actual PWM output frequency. Refer the Divisor table.

The clock source selected by CKSEL will be divided by the divisor and used as a fan PWM output frequency.

If CKSEL equals 0, then the output clock is simply equal to **93.9/ (Divisor[6:0]+1) KHz**

MappedDivisor depends on **Divisor[6:0]** and is described in the table below.

Divisor[6:0]	Mapped Divisor	Output Frequency	Divisor[6:0]	Mapped Divisor	Output Frequency
0000000	1	93.9KHz			
0000001	2	46.95KHz			
0000010	3	31.3KHz			
0000011	4	23.47KHz			
0000100	5	18.78KHz	0001111	16	5.86KHz
0000101	6	15.65KHz	0011111	32	2.93KHz
0000110	7	13.41KHz	0111111	64	1.46KHz
0000111	8	11.73KHz	1111111	128	734Hz

If CKSEL equals 1, then the output clock is simply equal to **1008/ Mapped Divisor Hz**

MappedDivisor depends on **Divisor[3:0]** and is described in the table below.

Divisor[3:0]	Mapped Divisor	Output Frequency	Divisor[3:0]	Mapped Divisor	Output Frequency
0000	1	1008Hz	1000	12	84Hz
0001	2	504Hz	1001	16	63Hz

Divisor[3:0]	Mapped Divisor	Output Frequency	Divisor[3:0]	Mapped Divisor	Output Frequency
0010	3	336Hz	1010	32	31.5Hz
0011	4	252Hz	1011	64	15.75Hz
0100	5	201Hz	1100	128	7.875Hz
0101	6	168Hz	1101	256	3.94Hz
0110	7	144Hz	1110	512	1.97Hz
0111	8	126Hz	1111	1024	0.98Hz

9.11 AUXFANOUT1 Output Value Select Register – Index 13h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT1 Value							
DEFAULT	7Fh							

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output	DESCRIPTION	AUXFANOUT1 PWM Duty Cycle. The PWM duty cycle is equal to this 8-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							
This register could be programmed by Bank8, Index 09									

9.12 AUXFANOUT2 PWM Output Frequency Configuration Register – Index 14h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PWM_CLK_SEL5							
DEFAULT	0 0 0 0 0 1 0 0							

This register is only meaningful when AUXFANOUT2 is programmed for PWM output.

BIT	DESCRIPTION
7	PWM_CLK_SEL5. AUXFANOUT2 PWM Input Clock Source Select. This bit selects the clock source of PWM output frequency. Refer the Divisor table.
6-0	PWM_CLK_SCALE5. AUXFANOUT2 PWM Pre-Scale divider. The clock source for PWM output is divided by this seven-bit value to calculate the actual PWM output frequency. Refer the Divisor table.

The clock source selected by CKSEL will be divided by the divisor and used as a fan PWM output frequency.

If CKSEL equals 0, then the output clock is simply equal to **93.9 / (Divisor[6:0]+1) KHz**

MappedDivisor depends on **Divisor[6:0]** and is described in the table below.

Divisor[6:0]	Mapped Divisor	Output Frequency	Divisor[6:0]	Mapped Divisor	Output Frequency
0000000	1	93.9KHz			
0000001	2	46.95KHz			
0000010	3	31.3KHz			

Divisor[6:0]	Mapped Divisor	Output Frequency	Divisor[6:0]	Mapped Divisor	Output Frequency
0000011	4	23.47KHz			
0000100	5	18.78KHz	0001111	16	5.86KHz
0000101	6	15.65KHz	0011111	32	2.93KHz
0000110	7	13.41KHz	0111111	64	1.46KHz
0000111	8	11.73KHz	1111111	128	734Hz

If CKSEL equals 1, then the output clock is simply equal to **1008/ Mapped Divisor Hz**

MappedDivisor depends on **Divisor[3:0]** and is described in the table below.

Divisor[3:0]	Mapped Divisor	Output Frequency	Divisor[3:0]	Mapped Divisor	Output Frequency
0000	1	1008Hz	1000	12	84Hz
0001	2	504Hz	1001	16	63Hz
0010	3	336Hz	1010	32	31.5Hz
0011	4	252Hz	1011	64	15.75Hz
0100	5	201Hz	1100	128	7.875Hz
0101	6	168Hz	1101	256	3.94Hz
0110	7	144Hz	1110	512	1.97Hz
0111	8	126Hz	1111	1024	0.98Hz

9.13 AUXFANOUT2 Output Value Select Register – Index 15h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT2 Value							
DEFAULT	7Fh							

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output	DESCRIPTION	AUXFANOUT2 PWM Duty Cycle. The PWM duty cycle is equal to this 8-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							
This register could be programmed by Bank9, Index 09									

9.14 AUXFANOUT3 PWM Output Frequency Configuration Register – Index 16h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0	
NAME	PWM_CLK_SEL6	PWM_SCALE6							
DEFAULT	0	0	0	0	0	1	0	0	

This register is only meaningful when AUXFANOUT3 is programmed for PWM output.

BIT	DESCRIPTION
7	PWM_CLK_SEL6. AUXFANOUT3 PWM Input Clock Source Select. This bit selects the clock source of PWM output frequency.

	Refer the Divisor table.
6-0	PWM_CLK_SCALE6. AUXFANOUT3 PWM Pre-Scale divider. The clock source for PWM output is divided by this seven-bit value to calculate the actual PWM output frequency. Refer the Divisor table.

The clock source selected by CKSEL will be divided by the divisor and used as a fan PWM output frequency.

If CKSEL equals 0, then the output clock is simply equal to **93.9/ (Divisor[6:0]+1) KHz**

MappedDivisor depends on **Divisor[6:0]** and is described in the table below.

Divisor[6:0]	Mapped Divisor	Output Frequency	Divisor[6:0]	Mapped Divisor	Output Frequency
0000000	1	93.9KHz			
0000001	2	46.95KHz			
0000010	3	31.3KHz			
0000011	4	23.47KHz			
0000100	5	18.78KHz	0001111	16	5.86KHz
0000101	6	15.65KHz	0011111	32	2.93KHz
0000110	7	13.41KHz	0111111	64	1.46KHz
0000111	8	11.73KHz	1111111	128	734Hz

If CKSEL equals 1, then the output clock is simply equal to **1008/ Mapped Divisor Hz**

MappedDivisor depends on **Divisor[3:0]** and is described in the table below.

Divisor[3:0]	Mapped Divisor	Output Frequency	Divisor[3:0]	Mapped Divisor	Output Frequency
0000	1	1008Hz	1000	12	84Hz
0001	2	504Hz	1001	16	63Hz
0010	3	336Hz	1010	32	31.5Hz
0011	4	252Hz	1011	64	15.75Hz
0100	5	201Hz	1100	128	7.875Hz
0101	6	168Hz	1101	256	3.94Hz
0110	7	144Hz	1110	512	1.97Hz
0111	8	126Hz	1111	1024	0.98Hz

9.15 AUXFANOUT3 Output Value Select Register – Index 17h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT3 Value							
DEFAULT	7Fh							

FUNCTION MODE	DESCRIPTION	7	6	5	4	3	2	1	0
PWM Output	AUXFANOUT3 PWM Duty Cycle. The PWM duty cycle is equal to this 8-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.								
This register could be programmed by Bank9, Index 09									

9.16 OVT# Configuration Register – Index 18h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
BIT	Reserved	DIS_OVT1	Reserved	OVT1_Mode	Reserved			STOP
DEFAULT	0	1	0	0	0	0	0	0

BIT	DESCRIPTION
7	Reserved
6	DIS_OVT1. 0: Enable SMIOVT1 OVT# output. (Default) 1: Disable temperature sensor SMIOVT1 over-temperature (OVT#) output.
5	Reserved
4	OVT1_Mode. SMIOVT1 Mode Select. 0 : Compare Mode. (Default) 1 : Interrupt Mode.
3-1	Reserved
0	STOP. 0: Monitor SMIOVT1 temperature source. 1: Stop monitoring SMIOVT1 temperature source.

9.17 Value RAM — Index 27h ~ 3Fh (Bank 0)

ADDRESS A6-A0	DESCRIPTION
27h	SMIOVT1 temperature source reading.
2Bh	CPUVCORE High Limit
2Ch	CPUVCORE Low Limit
2Dh	VIN1 High Limit
2Eh	VIN1 Low Limit
2Fh	AVSB High Limit
30h	AVSB Low Limit
31h	3VCC High Limit
32h	3VCC Low Limit
33h	VIN0 High Limit
34h	VIN0 Low Limit
35h	Reserved
36h	Reserved
37h	VIN4 High Limit
38h	VIN4 Low Limit
39h	SMIOVT1 temperature sensor High Limit
3Ah	SMIOVT1 temperature sensor Hysteresis Limit

9.18 Configuration Register – Index 40h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	INITIALIZATION	Reserved	EN_WS1	EN_WS	INT_CLEAR	Reserved	SMI#ENABLE	START
DEFAULT	0	0	0	0	0	0	1	1

BIT	DESCRIPTION
7	Initialization. A one restores the power-on default values to some registers. This bit clears itself since the power-on default of this bit is zero.
6	Reserved
5	Output type of SMIOVT2: 1: SMI# output type of SMIOVT Source2 temperature (Default: CPUTIN) is Shut-down Interrupt Mode. 0: Depond on the value of Bank0, Index 4C, bit6.
4	Output type of SMIOVT1 1: SMI# output type of SMIOVT Source1 temperature (Default: SYSTIN) is Shut-down Interrupt Mode. 0: Depond on the value of Bank0, Index 4C, bit5.
3	INT_Clear. A one disables the SMI# output without affecting the contents of Interrupt Status Registers. The device will stop monitoring. It will resume upon clearing of this bit.
2	Reserved
1	SMI# Enable. A one enables the SMI# Interrupt output. 1: Enable SMI# function (Deafult) 0: Disable SMI# function
0	Start. A one enables startup of monitoring operations. A zero puts the part in standby mode. Note: Unlike the “INT_Clear” bit, the outputs of interrupt pins will not be cleared if the user writes a zero to this location after an interrupt has occurred.

9.19 Interrupt Status Register 1 – Index 41h (Bank 0)

Attribute: Read Clear

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANIN	SYSFANIN	SOURCE2 _SMI	SOURCE1 _SMI	3VCC	AVSB	VIN1	CPUVCORE
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	CPUFANIN. A one indicates the fan count limit of CPUFANIN has been exceeded.
6	SYSFANIN. A one indicates the fan count limit of SYSFANIN has been exceeded.
5	SMIOVT2. A one indicates the high limit of SMIOVT2 temperature has been exceeded. (CPUTIN is default temperature)
4	SMIOVT1. A one indicates the high limit of SMIOVT1 temperature has been exceeded. (SYSTIN is default temperature)
3	3VCC. A one indicates the high or low limit of 3VCC has been exceeded.
2	AVSB. A one indicates the high or low limit of AVSB has been exceeded.
1	VIN1. A one indicates the high or low limit of VIN1 has been exceeded.

0	CPUVCORE. A one indicates the high or low limit of CPUVCORE has been exceeded.
---	--

9.20 Interrupt Status Register 2 – Index 42h (Bank 0)

Attribute: Read Clear

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	CASEOPEN1	Reserved	CASEOPEN0	AUXFANIN0	Reserved	VIN4	VIN0
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7	Reserved							
6	CASEOPEN1. A one indicates the case has been opened.							
5	Reserved							
4	CASEOPEN0. A one indicates the case has been opened.							
3	AUXFANIN0. A one indicates the fan count limit of AUXFANIN0 has been exceeded.							
2	Reserved							
1	VIN4. A one indicates the high or low limit of VIN4 has been exceeded.							
0	VIN0. A one indicates the high or low limit of VIN0 has been exceeded.							

9.21 SMI# Mask Register 1 – Index 43h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANIN	SYSFANIN	SMIOVT2	SMIOVT1	3VCC	AVSB	VIN1	CPUVCORE
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION							
7	CPUFANIN.							
6	SYSFANIN.							
5	SMIOVT2.							
4	SMIOVT1.							
3	3VCC.							
2	AVSB.							
1	VIN1.							
0	CPUVCORE.							

9.22 SMI# Mask Register 2 – Index 44h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	TAR2	TAR1	Reserved	CASEOPEN0	AUXFANIN0	VIN4	Reserved	VIN0
DEFAULT	1	1	0	1	1	1	1	1

BIT	DESCRIPTION
7	TAR2. TAR1. Reserved CASEOPEN0. AUXFANIN0. VIN4. Reserved VIN0.
6	
5	
4	
3	
2	
1	
0	

9.23 Interrupt Status Register 4 – Index 45h (Bank 0)

Attribute: Read Clear

Size: 8 bits

BIT	7	6	5	4	3	2	1	0	
NAME	Reserved		AUX FANOUT0	CPU FANOUT	SYS FANOUT	Reserved		Shut_SOURCE2_SMI	Shut_SOURCE1_SMI
DEFAULT	0	0	0	0	0	0	0	0	

BIT	DESCRIPTION
7	Reserved
6	Reserved
5	AUXFANOUT0. “1” indicates that AUXFANOUT0 works for three minutes at the full fan speed.
4	CPUFANOUT. “1” indicates that CPUFANOUT works for three minutes at the full fan speed.
3	SYSFANOUT. “1” indicates that SYSFANOUT works for three minutes at the full fan speed.
2	Reserved
1	Shut_SOURCE2_SMI. “1” indicates the high limit of SMIOVT_SOURCE2 temperature of SMI# Shut-down mode has been exceeded. (CPUTIN is default temperature)
0	Shut_SOURCE1_SMI. “1” indicates the high limit of SMIOVT_SOURCE1 temperature of SMI# Shut-down mode has been exceeded. (SYSTIN is default temperature)

9.24 SMI# Mask Register 3 – Index 46h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CASEOPEN CLEAR0	CASEOPEN CLEAR1	AUXFANIN3	Shut_CPU	Shut_SYS	AUXFANIN2	AUXFANIN1	CASEOPEN1
DEFAULT	0	0	1	1	1	1	1	1

BIT	DESCRIPTION
7	CASEOPEN0 Clear Control. Writing 1 to this bit will clear CASEOPEN status. This bit will be cleared itself. The function is the same as LDA, CR[E6h], bit 5.
6	CASEOPEN1 Clear Control. Writing 1 to this bit will clear CASEOPEN status. This bit will be cleared itself. The function is the same as LDA, CR[E6h], bit 5..
5	AUXFANIN3 “1” disables the corresponding interrupt status bit for the SMI interrupt.

4	Shut_SOURCE2_SMI	"1" disables the corresponding interrupt status bit for the SMI interrupt. (See Interrupt Status Register 4 – Index 45h (Bank 0)).
3	Shut_SOURCE1_SMI	"1" disables the corresponding interrupt status bit for the SMI interrupt.
2	AUXFANIN2	"1" disables the corresponding interrupt status bit for the SMI interrupt.
1	AUXFANIN1	"1" disables the corresponding interrupt status bit for the SMI interrupt
0	CASEOPEN1	"1" disables the corresponding interrupt status bit for the SMI interrupt.

9.25 Serial Bus Address Register – Index 48h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	SERIAL BUS ADDRESS						
DEFAULT	0	0	1	0	1	1	0	1

BIT	DESCRIPTION
7	Reserved (Read Only).
6-0	Serial Bus Address <7:1>

9.26 SMI/OVT Control Register1 – Index 4Ch (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	T2ToT6_INT MODE	EN_T1 _ONE	Reserved	DIS_OVT2	OVTOL	Reserved	
DEFAULT	0	0	0	0	1	0	0	0

BIT	DESCRIPTION
7	Reserved
6	T2ToT6_INTMode. 1: SMI# output type of Temperature SMIOVT2 temperature source is in Comparator Interrupt mode. 0: SMI# output type of Temperature SMIOVT2 temperature source is in Two-Times Interrupt mode. (Default)
5	EN_T1_ONE. 1: SMI# output type of SMIOVT Source1 temperature (Default: SYSTIN) is One-Time Interrupt Mode. 0: SMI# output type is in Two-Times Interrupt Mode. (Default)
4	Reserved
3	DIS_OVT2. 1: Disable SMIOVT Source2 temperature sensor (Default: CPUTIN) over-temperature (OVT) output. 0: Enable SMIOVT Source2 temperature OVT output through pin OVT#. (Default)
2	OVTOL (Over-temperature polarity). 1: OVT# is active high. 0: OVT# is active low (Default).
1-0	Reserved

9.27 FAN IN/OUT Control Register – Index 4Dh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANOPV4	FANINC4	FANOPV3	FANINC3	FANOPV2	FANINC2	FANOPV1	FANINC1
DEFAULT	0	1	0	1	0	1	0	1

BIT	DESCRIPTION
7	FANOPV4. AUXFANIN1 output value , only if bit 2 is set to zero. 1: AUXFANIN1 generates a logic-high signal. 0: AUXFANIN1 generates a logic-low signal. (Default)
6	FANINC4. AUXFANIN1 Input Control . 1: AUXFANIN1 acts as a fan tachometer input. (Default) 0: AUXFANIN1 acts as a fan control signal, and the output value is set by bit 1.
5	FANOPV3. AUXFANIN0 output value , only if bit 2 is set to zero. 1: AUXFANIN0 generates a logic-high signal. 0: AUXFANIN0 generates a logic-low signal. (Default)
4	FANINC3. AUXFANIN0 Input Control . 1: AUXFANIN0 acts as a fan tachometer input. (Default) 0: AUXFANIN0 acts as a fan control signal, and the output value is set by bit 1.
3	FANOPV2. CPUFANIN output value , only if bit 2 is set to zero. 1: CPUFANIN generates a logic-high signal. 0: CPUFANIN generates a logic-low signal. (Default)
2	FANINC2. CPUFANIN Input Control . 1: CPUFANIN acts as a fan tachometer input. (Default) 0: CPUFANIN acts as a fan control signal, and the output value is set by bit 3.
1	FANOPV1. SYSFANIN output value , only if bit 0 is set to zero. 1: SYSFANIN generates a logic-high signal. 0: SYSFANIN generates a logic-low signal. (Default)
0	FANINC1. SYSFANIN Input Control . 1: SYSFANIN acts as a fan tachometer input. (Default) 0: SYSFANIN acts as a fan control signal, and the output value is set by bit 1.

9.28 Bank Select Register – Index 4Eh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	HBACS	Reserved			BANK SEL3	BANK SEL2	BANK SEL1	BANK SEL0
DEFAULT	1	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	HBACS. HBACS – High Byte Access . 1: Access Index 4Fh high-byte register. (Default) 0: Access Index 4Fh low-byte register.

6	Reserved							
5	Reserved							
4	Reserved							
3	BANKSEL3.							
2	BANKSEL2.							
1	BANKSEL1.							
0	BANKSEL0.							

Bank Select for Bank0 to Bank7. The Three -bit binary value corresponds to the bank number. For example, "0010" selects bank2.

9.29 Nuvoton Vendor ID Register – Index 4Fh (Bank 0)

Attribute: Read Only

Size: 16 bits

BIT	15	14	13	12	11	10	9	8
NAME	VIDH							
DEFAULT	0	1	0	1	1	1	0	0

BIT	7	6	5	4	3	2	1	0
NAME	VIDL							
DEFAULT	1	0	1	0	0	0	1	1

BIT	DESCRIPTION							
15-8	Vendor ID High-Byte, if Index 4Eh, bit 7 is 1. Default 5Ch.							
7-0	Vendor ID Low-Byte, if Index 4Eh, bit 7 is 0. Default A3h.							

9.30 FAN IN/OUT Control Register – Index 50h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved				FANOPV6	FANINC6	FANOPV5	FANINC5
DEFAULT	0	0	0	0	0	1	0	1

BIT	DESCRIPTION							
7-4	Reserved							
3	FANOPV6. AUXFANIN3 output value , only if bit 0 is set to zero. 1: AUXFANIN3 generates a logic-high signal. 0: AUXFANIN3 generates a logic-low signal. (Default)							
2	FANINC6. AUXFANIN3 Input Control . 1: AUXFANIN3 acts as a fan tachometer input. (Default) 0: AUXFANIN3 acts as a fan control signal, and the output value is set by bit 1.							
1	FANOPV5. AUXFANIN2 output value , only if bit 0 is set to zero. 1: AUXFANIN2 generates a logic-high signal. 0: AUXFANIN2 generates a logic-low signal. (Default)							
0	FANINC5. AUXFANIN2 Input Control . 1: AUXFANIN2 acts as a fan tachometer input. (Default) 0: AUXFANIN2 acts as a fan control signal, and the output value is set by bit 1.							

9.31 Chip ID – Index 58h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CHIPID							
DEFAULT	1	1	0	0	0	0	0	1

BIT	DESCRIPTION
7-0	Nuvoton Chip ID number. Default C1h.

9.32 VBAT Monitor Control Register – Index 5Dh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	DIODES6	DIODES5	DIODES4	DIODES3	DIODES2	DIODES1	EN_VBAT_MNT
DEFAULT	0	0	0	0	0	1	0	0

BIT	DESCRIPTION
7	Reserved
6	DIODES 6. Sensor type selection for AUXTIN3. 1: Diode sensor. 0: Thermistor sensor. (default)
5	DIODES 5. Sensor type selection for AUXTIN2. 1: Diode sensor. 0: Thermistor sensor. (default)
4	DIODES 4. Sensor type selection for AUXTIN1. 1: Diode sensor. 0: Thermistor sensor. (default)
3	DIODES 3. Sensor type selection for AUXTIN0. 1: Diode sensor. 0: Thermistor sensor. (default)
2	DIODES 2. Sensor type selection for CPUTIN. 1: Diode sensor. (default) 0: Thermistor sensor.
1	DIODES 1. Sensor type selection for SYSTIN. 1: Diode sensor. 0: Thermistor sensor. (default)
0	EN_VBAT_MNT. 1: Enable battery voltage monitor. When this bit changes from zero to one, it takes one monitor cycle time to update the VBAT reading value register. 0: Disable battery voltage monitor.

9.33 Current Mode Enable Register – Index 5Eh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	EN_ AUXTIN3 CURRENT MODE	EN_ AUXTIN2 CURRENT MODE	EN_ AUXTIN1 CURRENT MODE	EN_ AUXTIN0 CURRENT MODE	EN_ CPUTIN CURRENT MODE	EN_ SYSTIN CURRENT MODE	Reserved
DEFAULT	0	0	0	0	0	1	0	0

BIT	DESCRIPTION
7	Reserved
6	Enable AUXTIN3 Current Mode. With AUXTIN3 is selected to Diode sensor (Bank0, Index 5Dh, Bit 3 = 1). 1: Temperature sensing of AUXTIN3 by Current Mode. 0: Temperature sensing of AUXTIN3 depends on the setting of Index 5Dh. (Default)
5	Enable AUXTIN2 Current Mode. With AUXTIN2 is selected to Diode sensor (Bank0, Index 5Dh, Bit 3 = 1). 1: Temperature sensing of AUXTIN2 by Current Mode. 0: Temperature sensing of AUXTIN2 depends on the setting of Index 5Dh. (Default)
4	Enable AUXTIN1 Current Mode. With AUXTIN1 is selected to Diode sensor (Bank0, Index 5Dh, Bit 3 = 1). 1: Temperature sensing of AUXTIN1 by Current Mode. 0: Temperature sensing of AUXTIN1 depends on the setting of Index 5Dh. (Default)
3	Enable AUXTIN0 Current Mode. With AUXTIN0 is selected to Diode sensor (Bank0, Index 5Dh, Bit 3 = 1). 1: Temperature sensing of AUXTIN0 by Current Mode. 0: Temperature sensing of AUXTIN0 depends on the setting of Index 5Dh. (Default)
2	Enable CPUTIN Current Mode. With CPUTIN is selected to Diode sensor (Bank0, Index 5Dh, Bit 2 = 1). 1: Temperature sensing of CPUTIN by Current mode. (Default) 0: Temperature sensing of CPUTIN depends on the setting of Index 5Dh.
1	Enable SYSTIN Current Mode. With SYSTIN is selected to Diode sensor (Bank0, Index 5Dh, Bit 1 = 1). 1: Temperature sensing of SYSTIN by Current Mode. 0: Temperature sensing of SYSTIN depends on the setting of Index 5Dh. (Default)
0	Reserved

9.34 PORT 80 DATA INPUT Register – Index 60 (Bank 0)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	P80_IN							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	PORT 80 DATA INPUT

9.35 MONITOR TEMPERATURE 1 Register (Integer Value)- Index 73h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 1 [8:1]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 1 [8:1] SYSFANOUT fan control temperature reading. (Source is selected by Bank1, Index00 bit[4:0])

9.36 MONITOR TEMPERATURE 1 Register (Fractional Value)- Index 74h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 1 [0]	Reserved						
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	MONITOR TEMPERATURE 1 [0] SYSFANOUT fan control temperature reading. (Source is selected by Bank1, Index00 bit[4:0])
6-0	Reserved

9.37 MONITOR TEMPERATURE 2 Register (Integer Value)- Index 75h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 2 [8:1]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 2 [8:1] CPUFANOUT fan control temperature reading. (Source is selected by Bank2, Index00 bit[4:0])

9.38 MONITOR TEMPERATURE 2 Register (Fractional Value)- Index 76h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 2	Reserved						

	[0]								
DEFAULT	0	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	MONITOR TEMPERATURE 2 [0] CPUFANOUT fan control temperature reading. (Source is selected by Bank2, Index00 bit[4:0])
6-0	Reserved

9.39 MONITOR TEMPERATURE 3 Register (Integer Value)- Index 77h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 3 [8:1]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 3 [8:1] AUXFANOUT0 fan control temperature reading. (Source is selected by Bank3, Index00 bit[4:0])

9.40 MONITOR TEMPERATURE 3 Register (Fractional Value)- Index 78h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 3 [0]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 3 [0] AUXFANOUT0 fan control temperature reading. (Source is selected by Bank3, Index00 bit[4:0])
6-0	Reserved

9.41 MONITOR TEMPERATURE 4 Register (Integer Value)- Index 79h (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 4 [8:1]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 4 [8:1] AUXFANOUT1 fan control temperature reading. (Source is selected by Bank8, Index00 bit[4:0])

9.42 MONITOR TEMPERATURE 4 Register (Fractional Value)- Index 7Ah (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 4 [0]	Reserved						
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 4 [0] AUXFANOUT1 fan control temperature reading. (Source is selected by Bank8, Index00 bit[4:0])
6-0	Reserved

9.43 MONITOR TEMPERATURE 5 Register (Integer Value)- Index 7Bh (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 5 [8:1]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 5 [8:1] AUXFANOUT2 fan control temperature reading. (Source is selected by Bank9, Index00 bit[4:0])

9.44 MONITOR TEMPERATURE 5 Register (Fractional Value)- Index 7Ch (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 5 [0]	Reserved						
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 5 [0] AUXFANOUT2 fan control temperature reading. (Source is selected by Bank9, Index00 bit[4:0])
6-0	Reserved

9.45 MONITOR TEMPERATURE 6 Register (Integer Value)- Index 7Dh (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 6 [8:1]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 6 [8:1] AUXFANOUT3 fan control temperature reading. (Source is selected by BankA, Index00 bit[4:0])

9.46 MONITOR TEMPERATURE 6 Register (Fractional Value)- Index 7Eh (Bank 0)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	MONITOR TEMPERATURE 6 [0]	Reserved						
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	MONITOR TEMPERATURE 6 [0] AUXFANOUT3 fan control temperature reading. (Source is selected by BankA, Index00 bit[4:0])
6-0	Reserved

9.47 PECL Temperature Reading Enable for SMIOVT and SMART FAN Control Register – Index AEh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						EN_PECI1	EN_PECIO
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-2	Reserved
1	Enable PECL Agent1
0	Enable PECL Agent0

Note. If the temperature source is selecting to PECL, please set Bank0 Index AEh first for reading correct value.

9.48 BEEP Control Register 1 – Index B2h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	En3VSB_BP	EnVIN4_BP	Reserved	EnVIN0_BP	En3VCC_BP	EnAVSB_BP	EnVIN1_BP	EnCPUVCORE_BP
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7	En3VSB_BP 1 : Enable 3VSB Beep function 0 : Disable 3VSB Beep function							
6	EnVIN4_BP 1 : Enable VIN4 Beep function 0 : Disable VIN4 Beep function							
5	Reserved							
4	EnVIN0_BP 1 : Enable VIN0 Beep function 0 : Disable VIN0 Beep function							
3	En3VCC_BP 1 : Enable 3VCC Beep function 0 : Disable 3VCC Beep function							
2	EnAVSB_BP 1 : Enable AVSB Beep function 0 : Disable AVSB Beep function							
1	EnVIN1_BP 1 : Enable VIN1 Beep function 0 : Disable VIN1 Beep function							
0	EnCPUVCORE_BP 1 : Enable CPUVCORE Beep function 0 : Disable CPUVCORE Beep function							

9.49 BEEP Control Register 2 – Index B3h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	EnVIN7_BP	EnVIN3_BP	EnVIN2_BP	EnVIN6_BP	EnVIN5_BP	EnVTT_BP	EnVBAT_BP
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7	Reserved							
6	EnVIN7_BP 1 : Enable VIN7 Beep function 0 : Disable VIN7 Beep function							
5	EnVIN3_BP							

	1 : Enable VIN3 Beep function 0 : Disable VIN3 Beep function
4	EnVIN2_BP 1 : Enable VIN2 Beep function 0 : Disable VIN2 Beep function
3	EnVIN6_BP 1 : Enable VIN6 Beep function 0 : Disable VIN6 Beep function
2	EnVIN5_BP 1 : Enable VIN5 Beep function 0 : Disable VIN5 Beep function
1	EnVTT_BP 1 : Enable VTT Beep function 0 : Disable VTT Beep function
0	EnVBAT_BP 1 : Enable VBAT Beep function 0 : Disable VBAT Beep function

Note: For each beep alarm event, please set “Bank0, Index B5, bit0” to 1.

9.50 BEEP Control Register 3 – Index B4h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	User Mode	Reserved	Reserved	Reserved	Reserved	Reserved	EnT2_BP	EnT1_BP
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	User control for Beep alarm 1 : Enable 0 : Disable
6-2	Reserved
1	EnT2_BP 1 : Enable SMIOVT2 Beep function 0 : Disable SMIOVT2 Beep function
0	EnT1_BP 1 : Enable SMIOVT1 Beep function 0 : Disable SMIOVT1 Beep function

Note: For each beep alarm event, please set “Bank0, Index B5, bit0” to 1.

9.51 BEEP Control Register 4 – Index B5h (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	En Caseopen1_BP	En Caseopen0_BP	En AUXFANIN2_BP	En AUXFANIN1_BP	En AUXFANIN0_BP	En CPUFANIN_BP	En SYSFANIN_BP	En_Beep

DEFAULT	0	0	0	0	0	0	0	0
---------	---	---	---	---	---	---	---	---

BIT	DESCRIPTION
7	En Caseopen1_BP 1 : Enable Caseopen1 Beep function 0 : Disable Caseopen1 Beep function
6	En Caseopen0_BP 1 : Enable Caseopen0_bp Beep function 0 : Disable Caseopen0_bp Beep function
5	En AUXFANIN2_BP 1 : Enable AUXFANIN2 Beep function 0 : Disable AUXFANIN2 Beep function
4	En AUXFANIN1_BP 1 : Enable AUXFANIN1 Beep function 0 : Disable AUXFANIN1 Beep function
3	En AUXFANIN0_BP 1 : Enable AUXFANIN0 Beep function 0 : Disable AUXFANIN0 Beep function
2	En CPUFANIN_BP 1 : Enable CPUFANIN Beep function 0 : Disable CPUFANIN Beep function
1	En SYSFANIN_BP 1 : Enable SYSFANIN Beep function 0 : Disable SYSFANIN Beep function
0	Enable Beep Function: 1 : Enable Beep Function 0 : Disable Beep Function

Note: For each beep alarm event, please set “Bank0, Index B5, bit0” to 1.

9.52 BEEP Control Register 5 – Index BFh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	En AUXFANIN3_BP						
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-1	Reserved
0	En AUXFANIN3_BP 1 : Enable AUXFANIN2 Beep function 0 : Disable AUXFANIN2 Beep function

Note: For each beep alarm event, please set “Bank0, Index B5, bit0” to 1.

9.53 SYSFAN Virtual Temperature Register – Index EAh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN Virtual Temperature							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	SYSFAN Virtual TEMP

9.54 CPUFAN Virtual Temperature Register – Index EBh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN Virtual Temperature							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	CPUFAN Virtual TEMP

9.55 AUXFAN0 Virtual Temperature Register – Index ECh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 Virtual Temperature							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFAN0 Virtual TEMP

9.56 AUXFAN1 Virtual Temperature Register – Index EDh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 Virtual Temperature							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFAN1 Virtual TEMP

9.57 AUXFAN2 Virtual Temperature Register – Index EEh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 Virtual Temperature							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFAN2 Virtual TEMP

9.58 AUXFAN3 Virtual Temperature Register – Index EFh (Bank 0)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 Virtual Temperature							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFAN3 Virtual TEMP

9.59 SYSFAN Monitor Temperature Source Select Register/ STOPDUTY Enable Register – Index 00h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Stopduty_En	Reserved			SYSFAN SOURCE[4:0]			
DEFAULT	0	0	0	0	0	0	0	1

BIT	DESCRIPTION
7	Stopduty_En: 0: FANOUT will decrease to zero value at most if necessary. 1: FANOUT will decrease to SYSFANOUT Stop Value (Bank1, index05h) at most if necessary. (This function is for Thermal Cruise mode.)
6-5	Reserved
4-0	SYSFAN Temperature Source Select: Bits 4 3 2 1 0 0 0 0 0 1: Select SYSTIN as SYSFAN monitoring source. 0 0 0 1 0: Select CPUTIN as SYSFAN monitoring source. 0 0 0 1 1: Select AUXTIN0 as SYSFAN monitoring source. 0 0 1 0 0: Select AUXTIN1 as SYSFAN monitoring source. 0 0 1 0 1: Select AUXTIN2 as SYSFAN monitoring source.

0 0 1 1 0: Select AUXTIN3 as SYSFAN monitoring source.
0 0 1 1 1: Reserved
0 1 0 0 0: Select SMBUSMASTER 0 as SYSFAN monitoring source.
0 1 0 0 1: Select SMBUSMASTER 1 as SYSFAN monitoring source.
0 1 0 1 0: Reserved
0 1 0 1 1: Reserved
0 1 1 0 0: Reserved
0 1 1 0 1: Reserved
0 1 1 1 0: Reserved
0 1 1 1 1: Reserved
1 0 0 0 0: Select PECI Agent 0 as SYSFAN monitoring source.
1 0 0 0 1: Select PECI Agent 1 as SYSFAN monitoring source.
1 0 0 1 0: Select PCH_CHIP_CPU_MAX_TEMP as SYSFAN monitoring source.
1 0 0 1 1: Select PCH_CHIP_TEMP as SYSFAN monitoring source.
1 0 1 0 0: Select PCH_CPU_TEMP as SYSFAN monitoring source.
1 0 1 0 1: Select PCH_MCH_TEMP as SYSFAN monitoring source.
1 0 1 1 0: Select Agent0 Dimm0 as SYSFAN monitoring source.
1 0 1 1 1: Select Agent0 Dimm1 as SYSFAN monitoring source.
1 1 0 0 0: Select Agent1 Dimm0 as SYSFAN monitoring source.
1 1 0 0 1: Select Agent1 Dimm1 as SYSFAN monitoring source.
1 1 0 1 0: Select BYTE_TEMP0 as SYSFAN monitoring source.
1 1 0 1 1: Select BYTE_TEMP1 as SYSFAN monitoring source.
1 1 1 0 0: Select PECI Agent 0 Calibration as SYSFAN monitoring source.
1 1 1 0 1: Select PECI Agent 1 Calibration as SYSFAN monitoring source.
1 1 1 1 1: Select Virtual_TEMP as SYSFAN monitoring source.

Note. If the temperature source is selecting to PECI, please set Bank0 Index AEh first for reading correct value.

9.60 SYSFAN Target Temperature Register / SYSFANIN Target Speed_L Register – Index 01h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSTIN Target Temperature / SYSFANIN Target Speed_L / CPUFANIN Target Thermal Margin							
DEFAULT	0	0	0	0	0	0	0	0

FUNCTION MODE	DESCRIPTION	7	6	5	4	3	2	1	0
Thermal Cruise TM	DESCRIPTION	SYSFAN Target Temperature							
Fan Speed Cruise TM	DESCRIPTION	SYSFANIN Target Speed [7:0], [11:8] associate index 0C [3:0]							
SMART FAN TM IV	DESCRIPTION	CPUFANIN Target Thermal Margin							

9.61 SYSFAN MODE Register / SYSFAN TOLERRANCE Register – Index 02h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#(Bit2-0)

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN MODE						Tolerance of SYSFAN Target Temperature or	
Reserved								

SYSFANIN Target Speed_L								
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-4	SYSFANOUT Mode Select. 0000: SYSFANOUT is in Manual Mode. (Default) 0001: SYSFANOUT is in Thermal Cruise Mode. 0010: SYSFANOUT is in Speed Cruise Mode. 0100: SYSFANOUT is in SMART FAN IV Mode.
3	Reserved
2-0	Tolerance of SYSFAN Target Temperature or SYSFANIN Target Speed_L.

9.62 SYSFANOUT Step Up Time Register – Index 03h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANOUT Value Step Up Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time SYSFANOUT takes to increase its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

(2) For DC output:

The units are intervals of 0.4 second. The default time is 4 seconds.

9.63 SYSFANOUT Step Down Time Register – Index 04h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANOUT Value Step Down Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time SYSFANOUT takes to decrease its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

(2) For DC output:

The units are intervals of 0.4 second. The default time is 4 seconds.

9.64 SYSFANOUT Stop Value Register – Index 05h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANOUT Stop Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, the SYSFANOUT value decreases to this eight-bit value if the temperature stays below the lowest temperature limit. This value should not be zero.

Please note that Stop Value does not mean that the fan really stops. It means that if the temperature keeps below low temperature limit, then the fan speed keeps on decreasing until reaching a minimum value, and this is Stop Value.

9.65 SYSFANOUT Start-up Value Register – Index 06h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANOUT Start-Up Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, SYSFANOUT value increases from zero to this eight-bit register value to provide a minimum value to turn on the fan. This value should not be zero.

9.66 SYSFANOUT Stop Time Register – Index 07h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANOUT Value Stop Time							
DEFAULT	0	0	1	1	1	1	0	0

In Thermal Cruise mode, this register determines the amount of time it takes SYSFANOUT value to fall from the stop value to zero.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

(2) For DC output:

The units are intervals of 0.4 second. The default time is 4 seconds.

9.67 SYSFANOUT Output Value Select Register – Index 09h (Bank 1)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANOUT Value							
DEFAULT	0	1	1	1	1	1	1	1

The default speed of fan output is specified in registers CR[E0h] to CR[E4h] of Logical Device B, CR[E0h] is the Default Speed Configuration Register of SYSFANOUT.

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output (Bank0, Index 04h, bit 0 is 0)	DESCRIPTION	The PWM duty cycle is equal to this eight-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							
DC Voltage Output (Bank0, Index 04h, bit 0 is 1)	DESCRIPTION	SYSFANOUT voltage control. The output voltage is calculated according to this equation.						Reserved	
		$\text{OUTPUT Voltage} = V_{ref} * \frac{FANOUT}{64}$						Note. VREF is approx 2.048V.	

9.68 SYSFANIN Tolerance_H / Target Speed_H Register – Index 0Ch (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0	
NAME	Reserved	SYSFANIN TOL_H				SYSFANIN Target Speed_H			
DEFAULT	0	0	0	0	0	0	0	0	

BIT	DESCRIPTION							
7	Reserved							
6-4	SYSFANIN Tolerance_H [5:3]							
3-0	SYSFANIN Target Speed_H [11:8]							

9.69 SYSFAN (SMART FAN™ IV) Temperature 1 Register(T1) – Index 21h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN (SMART FAN™ IV) Temperature 1							
DEFAULT	0	0	0	1	1	0	0	1

BIT	DESCRIPTION							
7-0	SYSFAN (SMART FAN™ IV) Temperature 1 Register (T1).							

9.70 SYSFAN (SMART FAN™ IV) Temperature 2 Register(T2) – Index 22h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN (SMART FAN™ IV) Temperature 2							
DEFAULT	0	0	1	0	0	0	1	1

BIT	DESCRIPTION							
7-0	SYSFAN (SMART FAN™ IV) Temperature 2 Register (T2).							

9.71 SYSFAN (SMART FAN™ IV) Temperature 3 Register(T3) – Index 23h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN (SMART FAN™ IV) Temperature 3							
DEFAULT	0	0	1	0	1	1	0	1

BIT	DESCRIPTION							
7-0	SYSFAN (SMART FAN™ IV) Temperature 3 Register (T3).							

9.72 SYSFAN (SMART FAN™ IV) Temperature 4 Register(T4) – Index 24h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN (SMART FAN™ IV) Temperature 4							
DEFAULT	0	0	1	1	0	1	1	1

BIT	DESCRIPTION							
7-0	SYSFAN (SMART FAN™ IV) Temperature 4 Register (T4).							

9.73 SYSFAN (SMART FAN™ IV) DC/PWM 1 Register – Index 27h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN (SMART FAN™ IV) DC/PWM 1							
DEFAULT	1	0	0	0	1	1	0	0

BIT	DESCRIPTION
7-0	SYSFAN (SMART FAN™ IV) DC/PWM 1 Register.

9.74 SYSFAN (SMART FAN™ IV) DC/PWM 2 Register – Index 28h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN (SMART FAN™ IV) DC/PWM 2							
DEFAULT	1	0	1	0	1	0	1	0

BIT	DESCRIPTION
7-0	SYSFAN (SMART FAN™ IV) DC/PWM 2 Register.

9.75 SYSFAN (SMART FAN™ IV) DC/PWM 3 Register – Index 29h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN (SMART FAN™ IV) DC/PWM 3							
DEFAULT	1	1	0	0	1	0	0	0

BIT	DESCRIPTION
7-0	SYSFAN (SMART FAN™ IV) DC/PWM 3 Register.

9.76 SYSFAN (SMART FAN™ IV) DC/PWM 4 Register – Index 2Ah (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN (SMART FAN™ IV) DC/PWM 4							
DEFAULT	1	1	1	0	0	1	1	0

BIT	DESCRIPTION
7-0	SYSFAN (SMART FAN™ IV) DC/PWM 4 Register.

9.77 SYSFAN (SMART FAN™ IV) Critical Temperature Register – Index 35h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN (SMART FAN™ IV) Temperature Critical							
DEFAULT	0	0	1	1	1	1	0	0

BIT	DESCRIPTION
7-0	SYSFAN (SMART FAN™ IV) Critical Temperature Register.

9.78 SYSFAN Enable Critical Duty – Index 36h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							En_SYS_CRITICAL_DUTY
DEFAULT	0							0

BIT	DESCRIPTION
7-1	Reserved
0	En_SYS_CRITICAL_DUTY (set 0 in manual mode) 0: Load default Full Speed 8'hFF for SYSFANOUT. 1: Used Index 37 CRITICAL_DUTY Value for SYSFANOUT.

9.79 SYSFAN Critical Duty Register – Index 37h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN Critical Duty							
DEFAULT	CC							

BIT	DESCRIPTION
7-0	SYSFAN Critical Duty.

9.80 SYSFANOUT Critical Temperature Tolerance Register – Index 38h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							SYSFANOUT Critical Temperature Tolerance
DEFAULT	0							0

BIT	DESCRIPTION
7-0	SYSFANOUT Critical Temperature Tolerance.

7-3	Reserved
2-0	SYSFANOUT Critical Temperature Tolerance

9.81 SYSFAN PECIERR DUTY Enable Register – Index 3Fh (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							EN_SYS_PECIERR_DUTY
DEFAULT	0							0

BIT	DESCRIPTION
7-2	Reserved
1-0	EN_SYS_PECIERR_DUTY 00: Disable PECEIERR DUTY FANOUT (default) 01: Enable PECEIERR DUTY FANOUT, Used Index 41 PECI_ERR_SYSOUT Value for SYSFANOUT. 10,11: Keep Full Speed

9.82 SYSFANOUT Pre-Configured Register For PECEI Error – Index 41h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANOUT pre-configured register for PECEI error (PECI_ERR_SYSOUT)							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION
7-0	SYSFANOUT pre-configured register for PECEI error.

9.83 SMIOVT2 Temperature Source (High Byte) Register – Index 50h (Bank 1)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	TEMP<8:1>							

BIT	DESCRIPTION
7-0	Temperature <8:1> (default: CPUTIN temperature source). The nine-bit value is in units of 0.5°C.

9.84 SMIOVT2 Temperature Source (Low Byte) Register – Index 51h (Bank 1)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0

NAME	TEMP<0>	RESERVED
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BIT	DESCRIPTION
7	Temperature <0> (default: CPUTIN temperature source). The nine-bit value is in units of 0.5°C.
6-0	Reserved

9.85 SMIOVT2 Temperature Source Configuration Register – Index 52h (Bank 1)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved			FAULT		Reserved	OVTMOD	STOP
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-5	Reserved This bit should be set to zero.
4-3	Fault. Number of faults to detect before setting OVT# output. This avoids false strapping due to noise.
2	Reserved This bit should be set to zero.
1	OVTMOD. SMIOVT2 Mode Select. 0 : Compare Mode. (Default) 1: Interrupt Mode.
0	STOP. 0: Monitor SMIOVT2 temperature source. 1: Stop monitoring SMIOVT2 temperature source.

9.86 SMIOVT2 Temperature Source Hysteresis (High Byte) Register – Index 53h (Bank 1)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	THYST<8:1>							
DEFAULT	0	1	0	0	1	0	1	1

BIT	DESCRIPTION
7-0	THYST<8:1>. Hysteresis temperature bits 8-1. The nine-bit value is in units of 0.5°C, and the default is 75°C.

9.87 SMIOVT2 Temperature Source Hysteresis (Low Byte) Register – Index 54h (Bank 1)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0	
NAME	THYST<0>	Reserved							
DEFAULT	0	0	0	0	0	0	0	0	

BIT	DESCRIPTION
-----	-------------

7	THYST<0>. Hysteresis temperature bit 0. The nine-bit value is in units of 0.5°C.
6-0	Reserved

9.88 SMIOVT2 Temperature Source Over-temperature (High Byte) Register – Index 55h (Bank1)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	TOVF<8:1>							
DEFAULT	0	1	0	1	0	0	0	0

BIT	DESCRIPTION
7-0	TOVF<8:1>. Over-temperature bits 8-1. The nine-bit value is in units of 0.5°C, and the default is 80°C.

9.89 SMIOVT2 Temperature Source Over-temperature (Low Byte) Register – Index 56h (Bank 1)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	TOVF<0>		Reserved					
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	TOVF<0>. Over-temperature bit 0. The nine-bit value is in units of 0.5°C.
6-0	Reserved

9.90 DUTY PER STEP Register – Index 66h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	UP_STEP				DOWN_STEP			
DEFAULT	0	0	0	1	0	0	0	1

BIT	DESCRIPTION
7-4	UP unit.
3-0	DOWN unit.

9.91 T1 Delay Time Register – Index 67h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	T1 Delay time							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	T1 Delay time for FAN. 1 bit = 0.1 sec.

9.92 SYSFAN Max Duty compare Source Select Register – Index 68h (Bank 1)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-3	Reserved
2	SYSFAN Max Duty Source Select 0: Disable AUXFAN1 Duty 1: Enable AUXFAN1 Duty
1	SYSFAN Max Duty Source Select 0: Disable AUXFAN0 Duty 1: Enable AUXFAN0 Duty
0	SYSFAN Max Duty Source Select 0: Disable CPUFAN Duty 1: Enable CPUFAN Duty

9.93 SYSFAN Max Duty Output Register – Index 69h (Bank 1)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	SYSFAN Max Duty Output							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
0	SYSFAN Max Duty Output

9.94 CPUFAN Monitor Temperature Source Select Register/ STOPDUTY Enable Register – Index 00h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Stopduty_En	Reserved			CPUFAN SOURCE[4:0]			
DEFAULT	0	0	0	0	0	0	1	0

BIT	DESCRIPTION
7	<p>Stopduty_En: 0: FANOUT will decrease to zero value at most if necessary. 1: FANOUT will decrease to CPUFANOUT Stop Value (Bank2, index05h) at most if necessary. (This function is for Thermal Cruise mode.)</p>
6-5	Reserved
4-0	<p>CPUFAN Temperature Source Select: Bits 4 3 2 1 0</p> <p>0 0 0 0 1: Select SYSTIN as CPUFAN monitoring source. 0 0 0 1 0: Select CPUTIN as CPUFAN monitoring source. 0 0 0 1 1: Select AUXTIN0 as CPUFAN monitoring source. 0 0 1 0 0: Select AUXTIN1 as CPUFAN monitoring source. 0 0 1 0 1: Select AUXTIN2 as CPUFAN monitoring source. 0 0 1 1 0: Select AUXTIN3 as CPUFAN monitoring source. 0 0 1 1 1: Reserved 0 1 0 0 0: Select SMBUSMASTER 0 as CPUFAN monitoring source. 0 1 0 0 1: Select SMBUSMASTER 1 as CPUFAN monitoring source. 0 1 0 1 0: Reserved 0 1 0 1 1: Reserved 0 1 1 0 0: Reserved 0 1 1 0 1: Reserved 0 1 1 1 0: Reserved 0 1 1 1 1: Reserved 1 0 0 0 0: Select PECI Agent 0 as CPUFAN monitoring source. 1 0 0 0 1: Select PECI Agent 1 as CPUFAN monitoring source. 1 0 0 1 0: Select PCH_CHIP_CPU_MAX_TEMP as CPUFAN monitoring source. 1 0 0 1 1: Select PCH_CHIP_TEMP as CPUFAN monitoring source. 1 0 1 0 0: Select PCH_CPU_TEMP as CPUFAN monitoring source. 1 0 1 0 1: Select PCH_MCH_TEMP as CPUFAN monitoring source. 1 0 1 1 0: Select Agent0 Dimm0 as CPUFAN monitoring source. 1 0 1 1 1: Select Agent0 Dimm1 as CPUFAN monitoring source. 1 1 0 0 0: Select Agent1 Dimm0 as CPUFAN monitoring source. 1 1 0 0 1: Select Agent1 Dimm1 as CPUFAN monitoring source. 1 1 0 1 0: Select BYTE_TEMP0 as CPUFAN monitoring source. 1 1 0 1 1: Select BYTE_TEMP1 as CPUFAN monitoring source. 1 1 1 0 0: Select PECI Agent 0 Calibration as CPUFAN monitoring source. 1 1 1 0 1: Select PECI Agent 1 Calibration as CPUFAN monitoring source. 1 1 1 1 1: Select Virtual_TEMP as CPUFAN monitoring source.</p>

Note. If the temperature source is selecting to PECI, please set Bank0 Index AEh first for reading correct value.

9.95 CPUFAN Target Temperature Register / CPUFANIN Target Speed_L Register – Index 01h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN Target Temperature / CPUFANIN Target Speed_L							
DEFAULT	0	0	0	0	0	0	0	0

FUNCTION MODE		7	6	5	4	3	2	1	0
Thermal Cruise™	DESCRIPTION	CPUFAN Target Temperature							
Fan Speed Cruise™	DESCRIPTION	CPUFANIN Target Speed [7:0], [11:8] associate index 0C [3:0]							

9.96 CPUFAN MODE Register / CPUFAN TOLERRANCE Register – Index 02h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#(Bit2-0)

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN MODE				Reserved	Tolerance of CPUFAN Target Temperature or CPUFANIN Target Speed_L		
DEFAULT	0	0	0	0	0	0	1	0

BIT	DESCRIPTION
7-4	CPUFANOUT Mode Select. 0000: CPUFANOUT is in Manual Mode. (Default) 0001: CPUFANOUT is in Thermal Cruise Mode. 0010: CPUFANOUT is in Speed Cruise Mode. 0100: CPUFANOUT is in SMART FAN IV Mode.
3	Reserved
2-0	Tolerance of CPUFAN Target Temperature or CPUFANIN Target Speed_L.

9.97 CPUFANOUT Step Up Time Register – Index 03h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANOUT Value Step Up Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time CPUFANOUT takes to increase its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.98 CPUFANOUT Step Down Time Register – Index 04h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANOUT Value Step Down Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time CPUFANOUT takes to decrease its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.99 CPUFANOUT Stop Value Register – Index 05h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANOUT Stop Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, the CPUFANOUT value decreases to this eight-bit value if the temperature stays below the lowest temperature limit. This value should not be zero.

Please note that Stop Value does not mean that the fan really stops. It means that if the temperature keeps below low temperature limit, then the fan speed keeps on decreasing until reaching a minimum value, and this is Stop Value.

9.100 CPUFANOUT Start-up Value Register – Index 06h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANOUT Start-Up Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, CPUFANOUT value increases from zero to this eight-bit register value to provide a minimum value to turn on the fan. This value should not be zero.

9.101 CPUFANOUT Stop Time Register – Index 07h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANOUT Value Stop Time							
DEFAULT	0	0	1	1	1	1	0	0

In Thermal Cruise mode, this register determines the amount of time it takes CPUFANOUT value to fall from the stop value to zero.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.102 CPUFANOUT Output Value Select Register – Index 09h (Bank 2)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANOUT Value							
DEFAULT	0	1	1	1	1	1	1	1

The default speed of fan output is specified in registers CR[E0h] to CR[E4h] of Logical Device B, CR[E1h] is the Default Speed Configuration Register of CPUFANOUT.

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output Only	DESCRIPTION	The PWM duty cycle is equal to this eight-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							

9.103 CPUFANIN Tolerance_H / Target Speed_H Register – Index 0Ch (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0	
NAME	Reserved	CPUFANIN TOL_H				CPUFANIN Target Speed_H			
DEFAULT	0	0				0			

BIT	DESCRIPTION							
7	Reserved							
6-4	CPUFANIN Tolerance_H [5:3]							
3-0	CPUFANIN Target Speed_H [11:8]							

9.104 CPUFAN MODE Register / THERMAL MARGIN Register – Index 0Dh (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0	
NAME	Reserved				Thermal Margin tolerance			Reserved	Thermal Margin enable
DEFAULT	0	0	0	0				0	0

BIT	DESCRIPTION							
7-5	Reserved							
4-2	Thermal Margin tolerance							

1	Reserved
0	Thermal Margin enable

9.105 CPUFAN MODE Register / T control Register – Index 0Fh (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	T control							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION
7-0	T control

9.106 CPUFAN (SMART FANTM IV) Temperature 1 Register(T1) – Index 21h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN (SMART FAN TM IV) Temperature 1							
DEFAULT	0	0	1	0	1	0	0	0

BIT	DESCRIPTION
7-0	CPUFAN (SMART FAN TM IV) Temperature 1 Register (T1).

9.107 CPUFAN (SMART FANTM IV) Temperature 2 Register(T2) – Index 22h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN (SMART FAN TM IV) Temperature 2							
DEFAULT	0	0	1	1	0	0	1	0

BIT	DESCRIPTION
7-0	CPUFAN (SMART FAN TM IV) Temperature 2 Register (T2).

9.108 CPUFAN (SMART FANTM IV) Temperature 3 Register(T3) – Index 23h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0

NAME	CPUFAN (SMART FAN™ IV) Temperature 3							
DEFAULT	0	0	1	1	1	1	0	0

BIT	DESCRIPTION
7-0	CPUFAN (SMART FAN™ IV) Temperature 3 Register (T3).

9.109 CPUFAN (SMART FAN™ IV) Temperature 4 Register(T4) – Index 24h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN (SMART FAN™ IV) Temperature 4							
DEFAULT	0	1	0	0	0	1	1	0

BIT	DESCRIPTION
7-0	CPUFAN (SMART FAN™ IV) Temperature 4 Register (T4).

9.110 CPUFAN (SMART FAN™ IV) PWM1 Register – Index 27h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN (SMART FAN™ IV) PWM 1							
DEFAULT	1	0	0	0	1	1	0	0

BIT	DESCRIPTION
7-0	CPUFAN (SMART FAN™ IV) PWM1 Register.

9.111 CPUFAN (SMART FAN™ IV) PWM2 Register – Index 28h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN (SMART FAN™ IV) PWM 2							
DEFAULT	1	0	1	0	1	0	1	0

BIT	DESCRIPTION
7-0	CPUFAN (SMART FAN™ IV) PWM2 Register.

9.112 CPUFAN (SMART FAN™ IV) PWM3 Register – Index 29h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN (SMART FAN™ IV) PWM 3							
DEFAULT	1	1	0	0	1	0	0	0

BIT	DESCRIPTION							
7-0	CPUFAN (SMART FAN™ IV) PWM3 Register.							

9.113 CPUFAN (SMART FAN™ IV) PWM4 Register – Index 2Ah (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN (SMART FAN™ IV) PWM4							
DEFAULT	1	1	1	0	0	1	1	0

BIT	DESCRIPTION							
7-0	CPUFAN (SMART FAN™ IV) PWM4 Register.							

9.114 CPUFAN (SMART FAN™ IV) Critical Temperature Register – Index 35h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN (SMART FAN™ IV) Temperature Critical							
DEFAULT	0	1	0	0	1	0	1	1

BIT	DESCRIPTION							
7-0	CPUFAN (SMART FAN™ IV) Critical Temperature Register.							

9.115 CPUFAN Enable Critical Duty – Index 36h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							En_CPU_CRITICAL_DUTY
DEFAULT	0							0

BIT	DESCRIPTION							
7-1	Reserved							

0	En_CPU_CRITICAL_DUTY (set 0 in manual mode) 0: Load default Full Speed 8'hFF for CPUFANOUT. 1: Used Index 37 CRITICAL_DUTY Value for CPUFANOUT.
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9.116 CPUFAN Critical Duty Register – Index 37h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN Critical Duty							
DEFAULT	CC							

BIT	DESCRIPTION							
7-0	CPUFAN Critical Duty.							

9.117 CPUFANOUT Critical Temperature Tolerance Register – Index 38h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved					CPUFANOUT Critical Temperature Tolerance		
DEFAULT	0					0	0	0

BIT	DESCRIPTION							
7-3	Reserved							
2-0	CPUFANOUT Critical Temperature Tolerance							

9.118 Weight value Configuration Register – Index 39h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	EN_CPUFAN_WEIGHT	Reserved				CPU_WEIGHT_SEL		
DEFAULT	0	0				0	0	0

BIT	DESCRIPTION							
7	EN_CPUFAN_WEIGHT. 0: Disable Weight Value Control for CPUFAN. 1: Enable Weight Value Control for CPUFAN.							
6-5	Reserved							
4-0	CPUFAN Weighting Temperature Source Select: Bits							

4 3 2 1 0
0 0 0 0 1: Select SYSTIN as CPUFAN monitoring source. (Default)
0 0 0 1 0: Select CPUTIN as CPUFAN monitoring source.
0 0 0 1 1: Select AUXTIN0 as CPUFAN monitoring source.
0 0 1 0 0: Select AUXTIN1 as CPUFAN monitoring source.
0 0 1 0 1: Select AUXTIN2 as CPUFAN monitoring source.
0 0 1 1 0: Select AUXTIN3 as CPUFAN monitoring source.
0 0 1 1 1: Reserved
0 1 0 0 0: Select SMBUSMASTER 0 as CPUFAN monitoring source.
0 1 0 0 1: Select SMBUSMASTER 1 as CPUFAN monitoring source.
0 1 0 1 0: Reserved
0 1 0 1 1: Reserved
0 1 1 0 0: Reserved
0 1 1 0 1: Reserved
0 1 1 1 0: Reserved
0 1 1 1 1: Reserved
1 0 0 0 0: Select PECI Agent 0 as CPUFAN monitoring source.
1 0 0 0 1: Select PECI Agent 1 as CPUFAN monitoring source.
1 0 0 1 0: Select PCH_CHIP_CPU_MAX_TEMP as CPUFAN monitoring source.
1 0 0 1 1: Select PCH_CHIP_TEMP as CPUFAN monitoring source.
1 0 1 0 0: Select PCH_CPU_TEMP as CPUFAN monitoring source.
1 0 1 0 1: Select PCH_MCH_TEMP as CPUFAN monitoring source.
1 0 1 1 0: Select Agent0 Dimm0 as CPUFAN monitoring source.
1 0 1 1 1: Select Agent0 Dimm1 as CPUFAN monitoring source.
1 1 0 0 0: Select Agent1 Dimm0 as CPUFAN monitoring source.
1 1 0 0 1: Select Agent1 Dimm1 as CPUFAN monitoring source.
1 1 0 1 0: Select BYTE_TEMP0 as CPUFAN monitoring source.
1 1 0 1 1: Select BYTE_TEMP1 as CPUFAN monitoring source.
1 1 1 0 0: Select PECI Agent 0 Calibration as CPUFAN monitoring source.
1 1 1 0 1: Select PECI Agent 1 Calibration as CPUFAN monitoring source.

9.119 CPUFANOUT Temperature Step Register – Index 3Ah (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
CPUFANOUT Temperature Step (CPU_TEMP_STEP)								
DEFAULT	0							

BIT	DESCRIPTION
7-0	CPUFANOUT Temperature Step

9.120 CPUFANOUT Temperature Step Tolerance Register – Index 3Bh (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
CPUFANOUT Temperature Step Tolerance (CPU_TEMP_STEP_TOL)								

DEFAULT	0
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BIT	DESCRIPTION
7-0	CPUFANOUT Temperature Step Tolerance

9.121 CPUFANOUT Weight Step Register – Index 3Ch (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
CPUFANOUT Weight Step (CPU_WEIGHT_STEP)								
DEFAULT	0							

BIT	DESCRIPTION
7-0	CPUFANOUT Weight Step

9.122 CPUFANOUT Temperature Base Register – Index 3Dh (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
CPUFANOUT Temperature Base (CPU_TEMP_BASE)								
DEFAULT	0							

BIT	DESCRIPTION
7-0	CPUFANOUT Temperature Base

9.123 CPUFANOUT Temperature Fan Duty Base Register – Index 3Eh (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
CPUFANOUT Temperature Base (CPU_FC_BASE)								
DEFAULT	0							

BIT	DESCRIPTION
7-0	CPUFANOUT Start point of Fan Duty increasing

9.124 CPUFAN PECIERR DUTY Enable Register – Index 3Fh (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						EN_CPU_PECIERR_DUTY	
DEFAULT	0						0	0

BIT	DESCRIPTION
7-2	Reserved
1-0	EN_CPU_PECIERR_DUTY 00: Disable PECIERR DUTY FANOUT (default) 01: Enable PECIERR DUTY FANOUT, Used Index 41 PECI_ERR_CPUOUT Value for CPUFANOUT. 10,11: Keep Full Speed

9.125 CPUFANOUT Pre-Configured Register For PECI Error – Index 41h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANOUT pre-configured register for PECI error (PECI_ERR_CPUOUT)							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION
7-0	CPUFANOUT pre-configured register for PECI error.

9.126 DUTY PER STEP Register – Index 66h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	UP_STEP					DOWN_STEP		
DEFAULT	0	0	0	1	0	0	0	1

BIT	DESCRIPTION
7-4	UP unit.
3-0	DOWN unit.

9.127 T1 Delay Time Register – Index 67h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	T1 Delay time							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	T1 Delay time for FAN. 1 bit = 0.1 sec.							

9.128 CPUFAN Max Duty compare Source Select Register – Index 68h (Bank 2)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						CPUFAN Max Duty compare Source Select	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-3	Reserved							
2	CPUFAN Max Duty Source Select 0: Disable AUXFAN1 Duty 1: Enable AUXFAN1 Duty							
1	CPUFAN Max Duty Source Select 0: Disable AUXFAN0 Duty 1: Enable AUXFAN0 Duty							
0	CPUFAN Max Duty Source Select 0: Disable SYSFAN Duty 1: Enable SYSFAN Duty							

9.129 CPUFAN Max Duty Output Register – Index 69h (Bank 2)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFAN Max Duty Output							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
0	CPUFAN Max Duty Output							

9.130 AUXFAN0 Monitor Temperature Source Select Register/ STOPDUTY Enable Register – Index 00h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0	
NAME	Stopduty_En	Reserved			AUXFAN0 SOURCE[4:0]				
DEFAULT	0	0	0	0	0	0	1	1	

BIT	DESCRIPTION
7	<p>Stopduty_En: 0: FANOUT will decrease to zero value at most if necessary. 1: FANOUT will decrease to AUXFANOUT0 Stop Value (Bank3, index05h) at most if necessary. (This function is for Thermal Cruise mode.)</p>
6-5	Reserved
4-0	<p>AUXFAN0 Temperature Source Select: Bits 4 3 2 1 0</p> <p>0 0 0 0 1: Select SYSTIN as AUXFAN0 monitoring source. 0 0 0 1 0: Select CPUTIN as AUXFAN0 monitoring source. 0 0 0 1 1: Select AUXTIN0 as AUXFAN0 monitoring source. 0 0 1 0 0: Select AUXTIN1 as AUXFAN0 monitoring source. 0 0 1 0 1: Select AUXTIN2 as AUXFAN0 monitoring source. 0 0 1 1 0: Select AUXTIN3 as AUXFAN0 monitoring source. 0 0 1 1 1: Reserved 0 1 0 0 0: Select SMBUSMASTER 0 as AUXFAN0 monitoring source. 0 1 0 0 1: Select SMBUSMASTER 1 as AUXFAN0 monitoring source. 0 1 0 1 0: Reserved 0 1 0 1 1: Reserved 0 1 1 0 0: Reserved 0 1 1 0 1: Reserved 0 1 1 1 0: Reserved 0 1 1 1 1: Reserved 1 0 0 0 0: Select PECI Agent 0 as AUXFAN0 monitoring source. 1 0 0 0 1: Select PECI Agent 1 as AUXFAN0 monitoring source. 1 0 0 1 0: Select PCH_CHIP_CPU_MAX_TEMP as AUXFAN0 monitoring source. 1 0 0 1 1: Select PCH_CHIP_TEMP as AUXFAN0 monitoring source. 1 0 1 0 0: Select PCH_CPU_TEMP as AUXFAN0 monitoring source. 1 0 1 0 1: Select PCH_MCH_TEMP as AUXFAN0 monitoring source. 1 0 1 1 0: Select Agent0 Dimm0 as AUXFAN0 monitoring source. 1 0 1 1 1: Select Agent0 Dimm1 as AUXFAN0 monitoring source. 1 1 0 0 0: Select Agent1 Dimm0 as AUXFAN0 monitoring source. 1 1 0 0 1: Select Agent1 Dimm1 as AUXFAN0 monitoring source. 1 1 0 1 0: Select BYTE_TEMP0 as AUXFAN0 monitoring source. 1 1 0 1 1: Select BYTE_TEMP1 as AUXFAN0 monitoring source. 1 1 1 0 0: Select PECI Agent 0 Calibration as AUXFAN0 monitoring source. 1 1 1 0 1: Select PECI Agent 1 Calibration as AUXFAN0 monitoring source. 1 1 1 1 1: Select Virtual_TEMP as AUXFAN0 monitoring source.</p>

Note. If the temperature source is selecting to PECI, please set Bank0 Index AEh first for reading correct value.

9.131 AUXFAN0 Target Temperature Register / AUXFANIN0 Target Speed_L Register – Index 01h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXTIN0 Target Temperature / AUXFANIN0 Target Speed_L / AUXFAN0 Target Thermal Margin							
DEFAULT	0	0	0	0	0	0	0	0

FUNCTION MODE		7	6	5	4	3	2	1	0
Thermal Cruise™	DESCRIPTION	AUXFAN0 Target Temperature							
Fan Speed Cruise™	DESCRIPTION	AUXFAN0 Target Speed [7:0], [11:8] associate index 0C [3:0]							
SMART FAN™ IV	DESCRIPTION	AUXFAN0 Target Thermal Margin							

9.132 AUXFAN0 MODE Register / AUXFAN0 TOLERRANCE Register – Index 02h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#(Bit2-0)

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 MODE					Reseved	Tolerance of AUXFAN0 Target Temperature or AUXFAN0 Target Speed_L	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-4	AUXFANOUT0 Mode Select. 0000: AUXFANOUT0 is in Manual Mode. (Default) 0001: AUXFANOUT0 is in Thermal Cruise Mode. 0010: AUXFANOUT0 is as Speed Cruise Mode. 0100: AUXFANOUT0 is in SMART FAN IV Mode.
3	Reseved
2-0	Tolerance of AUXFAN0 Target Temperature or AUXFAN0 Target Speed_L.

9.133 AUXFANOUT0 Step Up Time Register – Index 03h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT0 Value Step Up Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time AUXFANOUT0 takes to increase its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.134 AUXFANOUT0 Step Down Time Register – Index 04h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0

NAME	AUXFANOUT0 Value Step Down Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time AUXFANOUT0 takes to decrease its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.135 AUXFANOUT0 Stop Value Register – Index 05h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT0 Stop Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, the AUXFANOUT0 value decreases to this eight-bit value if the temperature stays below the lowest temperature limit. This value should not be zero.

Please note that Stop Value does not mean that the fan really stops. It means that if the temperature keeps below low temperature limit, then the fan speed keeps on decreasing until reaching a minimum value, and this is Stop Value.

9.136 AUXFANOUT0 Start-up Value Register – Index 06h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT0 Start-Up Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, AUXFANOUT0 value increases from zero to this eight-bit register value to provide a minimum value to turn on the fan. This value should not be zero.

9.137 AUXFANOUT0 Stop Time Register – Index 07h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT0 Value Stop Time							
DEFAULT	0	0	1	1	1	1	0	0

In Thermal Cruise mode, this register determines the amount of time it takes AUXFANOUT0 value to fall from the stop value to zero.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.138 AUXFANOUT0 Output Value Select Register – Index 09h (Bank 3)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT0 Value							
DEFAULT	1	1	1	1	1	1	1	1

The default speed of fan output is specified in registers CR[E0h] to CR[E4h] of Logical Device B, CR[E2h] is the Default Speed Configuration Register of AUXFANOUT0.

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output	DESCRIPTION	The PWM duty cycle is equal to this eight-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							

9.139 AUXFANIN0 Tolerance_H / Target Speed_H Register – Index 0Ch (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	AUXFANIN0 TOL_H			AUXFANIN0 Target Speed_H			
DEFAULT	0	0			0			

BIT	DESCRIPTION							
7	Reserved							
6-4	AUXFANIN0 Tolerance_H [5:3]							
3-0	AUXFANIN0 Target Speed_H [11:8]							

9.140 AUXFAN0 MODE Register / THERMAL MARGIN Register – Index 0Dh (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved			Thermal Margin tolerance			Reserve d	Thermal Margin enable
DEFAULT	0	0	0	0			0	0

BIT	DESCRIPTION							
7-5	Reserved							
4-2	Thermal Margin tolerance							
1	Reserved							

0	Thermal Margin enable
---	-----------------------

9.141 AUXFAN0 MODE Register / T control Register – Index 0Fh (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	T control							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION							
7-0	T control							

9.142 AUXFAN0 (SMART FAN™ IV) Temperature 1 Register(T1) – Index 21h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 (SMART FAN™ IV) Temperature 1							
DEFAULT	0	0	0	1	1	0	0	1

BIT	DESCRIPTION							
7-0	AUXFAN0 (SMART FAN™ IV) Temperature 1 Register (T1).							

9.143 AUXFAN0 (SMART FAN™ IV) Temperature 2 Register(T2) – Index 22h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 (SMART FAN™ IV) Temperature 2							
DEFAULT	0	0	1	0	0	0	1	1

BIT	DESCRIPTION							
7-0	AUXFAN0 (SMART FAN™ IV) Temperature 2 Register (T2).							

9.144 AUXFAN0 (SMART FAN™ IV) Temperature 3 Register(T3) – Index 23h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 (SMART FAN™ IV) Temperature 3							

DEFAULT	0	0	1	0	1	1	0	1
---------	---	---	---	---	---	---	---	---

BIT	DESCRIPTION
7-0	AUXFAN0 (SMART FAN TM IV) Temperature 3 Register (T3).

9.145 AUXFAN0 (SMART FANTM IV) Temperature 4 Register(T4) – Index 24h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 (SMART FAN TM IV) Temperature 4							
DEFAULT	0	0	1	1	0	1	1	1

BIT	DESCRIPTION
7-0	AUXFAN0 (SMART FAN TM IV) Temperature 4 Register (T4).

9.146 AUXFAN0 (SMART FANTM IV) PWM 1 Register – Index 27h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 (SMART FAN TM IV) PWM 1							
DEFAULT	1	0	0	0	1	1	0	0

BIT	DESCRIPTION
7-0	AUXFAN0 (SMART FAN TM IV) PWM 1 Register.

9.147 AUXFAN0 (SMART FANTM IV) PWM 2 Register – Index 28h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 (SMART FAN TM IV) PWM 2							
DEFAULT	1	0	1	0	1	0	1	0

BIT	DESCRIPTION
7-0	AUXFAN0 (SMART FAN TM IV) PWM 2 Register.

9.148 AUXFAN0 (SMART FANTM IV) PWM 3 Register – Index 29h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 (SMART FAN™ IV) PWM 3							
DEFAULT	1	1	0	0	1	0	0	0

BIT	DESCRIPTION
7-0	AUXFAN0 (SMART FAN™ IV) PWM 3 Register.

9.149 AUXFAN0 (SMART FAN™ IV) PWM 4 Register – Index 2Ah (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 (SMART FAN™ IV) PWM 4							
DEFAULT	1	1	1	0	0	1	1	0

BIT	DESCRIPTION
7-0	AUXFAN0 (SMART FAN™ IV) PWM 4 Register.

9.150 AUXFAN0 (SMART FAN™ IV) Critical Temperature Register – Index 35h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 (SMART FAN™ IV) Temperature Critical							
DEFAULT	0	0	1	1	1	1	0	0

BIT	DESCRIPTION
7-0	AUXFAN0 (SMART FAN™ IV) Critical Temperature Register

9.151 AUXFAN0 Enable Critical Duty – Index 36h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							En_AUX0_CRITICAL_DUTY
DEFAULT	0							0

BIT	DESCRIPTION
7-1	Reserved
0	En_AUX0_CRITICAL_DUTY (set 0 in manual mode)

	0: Load default Full Speed 8'hFF for AUXFANOUT0. 1: Used Index 37 CRITICAL_DUTY Value for AUXFANOUT0.
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9.152 AUXFAN0 Critical Duty Register – Index 37h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 Critical Duty							
DEFAULT	CC							

BIT	DESCRIPTION
7-0	AUXFAN0 Critical Duty.

9.153 AUXFANOUT0 Critical Temperature Tolerance Register – Index 38h (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						AUXFANOUT0 Critical Temperature Tolerance	
DEFAULT	0						0	0

BIT	DESCRIPTION
7-3	Reserved
2-0	AUXFANOUT0 Critical Temperature Tolerance

9.154 AUXFAN0 PECIERR DUTY Enable Register – Index 3Fh (Bank 3)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						EN_AUX0_PECIERR_DUTY	
DEFAULT	0						0	0

BIT	DESCRIPTION
7-2	Reserved
1-0	EN_AUX0_PECIERR_DUTY 00: Disable PECCIERR DUTY FANOUT (default) 01: Enable PECCIERR DUTY FANOUT, Used Index 41 PECI_ERR_AUXOUT0 Value for AUXFANOUT0. 10,11: Keep Full Speed

9.155 AUXFANOUT0 Pre-Configured Register For PECL Error – Index 41h (Bank 3)

Attribute: Read/Write
 Size: 8 bits
 Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT0 pre-configured register for PECL error (PECL_ERR_AUXOUT0)							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION							
7-0	AUXFANOUT0 pre-configured register for PECL error.							

9.156 DUTY PER STEP Register – Index 66h (Bank 3)

Attribute: Read/Write
 Size: 8 bits
 Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	UP_STEP				DOWN_STEP			
DEFAULT	0	0	0	1	0	0	0	1

BIT	DESCRIPTION							
7-4	UP unit.							
3-0	DOWN unit.							

9.157 T1 Delay Time Register – Index 67h (Bank 3)

Attribute: Read/Write
 Size: 8 bits
 Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	T1 Delay time							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	T1 Delay time for FAN. 1 bit = 0.1 sec.							

9.158 AUXFAN0 Max Duty compare Source Select Register – Index 68h (Bank 3)

Attribute: Read/Write
 Size: 8 bits
 Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved					AUXFAN0 Max Duty compare Source Select		
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-3	Reserved
2	AUXFAN0 Max Duty Source Select 0: Disable AUXFAN1 Duty 1: Enable AUXFAN1 Duty
1	AUXFAN0 Max Duty Source Select 0: Disable CPUFAN Duty 1: Enable CPUFAN Duty
0	AUXFAN0 Max Duty Source Select 0: Disable SYSFAN Duty 1: Enable SYSFAN Duty

9.159 AUXFAN0 Max Duty Output Register – Index 69h (Bank 3)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN0 Max Duty Output							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFAN0 Max Duty Output

9.160 PCH_CHIP_CPU_MAX_TEMP Register – Index 00h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_CHIP_CPU_MAX_TEMP							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	PCH_CHIP_CPU_MAX_TEMP: The maximum temperature in absolute degree C, of the CPU and MCH.

9.161 PCH_CHIP_TEMP Register – Index 01h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_CHIP_TEMP							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	PCH_CHIP_TEMP The IBX_CHIP temperature in degree C.

9.162 PCH_CPU_TEMP_H Register – Index 02h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_CPU_TEMP_H							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	PCH_CPU_TEMP_H The CPU temperature in degree C. (Integer Part)							

9.163 PCH_CPU_TEMP_L Register – Index 03h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_CPU_TEMP_L						Reserved	Reading_Flag
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-2	PCH_CPU_TEMP_L The CPU temperature in degree C. (Fractional Part)							
1	Reserved							
0	Reading_Flag: If there is an error when the IBX read the data from the CPU, then Bit0 is set to '1'.							

9.164 PCH_MCH_TEMP Register – Index 04h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_MCH_TEMP							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	PCH_MCH_TEMP The MCH temperature in degree C.							

9.165 Agent0 Dimm0 Register – Index 05h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Agent0 Dimm0							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	Agent0 Dimm0 The Agent0 Dimm0 temperature.							

9.166 Agent0 Dimm1 Register – Index 06h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Agent0 Dimm1							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	Agent0 Dimm1 The Agent0 Dimm1 temperature.							

9.167 Agent1 Dimm0 Register – Index 07h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Agent1 Dimm0							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	Agent1 Dimm0 The Agent1 Dimm0 temperature.							

9.168 Agent1 Dimm1 Register – Index 08h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Agent1 Dimm1							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	Agent1 Dimm1 The Agent1 Dimm1 temperature.							

9.169 PCH_TSI0_TEMP_H Register – Index 09h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI0_TEMP_H							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	PCH_TSI0_TEMP_H The TSI High-Byte temperature in degree C.							

9.170 PCH_TSI0_TEMP_L Register – Index 0Ah (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI0_TEMP_L							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-5	PCH_TSI0_TEMP_L The TSI Low-Byte temperature in degree C.							
4-0	Reserved							

9.171 PCH_TSI1_TEMP_H Register – Index 0Bh (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI1_TEMP_H							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	PCH_TSI1_TEMP_H The TSI High-Byte temperature in degree C.							

9.172 PCH_TSI1_TEMP_L Register – Index 0Ch (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI1_TEMP_L							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-5	PCH_TSI1_TEMP_L The TSI Low-Byte temperature in degree C.							
4-0	Reserved							

9.173 PCH_TSI2_TEMP_H Register – Index 0Dh (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI2_TEMP_H							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	PCH_TSI2_TEMP_H The TSI High-Byte temperature in degree C.							

9.174 PCH_TSI2_TEMP_L Register – Index 0Eh (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI2_TEMP_L				Reserved			
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-5	PCH_TSI2_TEMP_L The TSI Low-Byte temperature in degree C.							
4-0	Reserved							

9.175 PCH_TSI3_TEMP_H Register – Index 0Fh (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI3_TEMP_H				PCH_TSI3_TEMP_H			
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	PCH_TSI3_TEMP_H The TSI High-Byte temperature in degree C.							

9.176 PCH_TSI3_TEMP_L Register – Index 10h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI3_TEMP_L				Reserved			
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-5	PCH_TSI3_TEMP_L The TSI Low-Byte temperature in degree C.							
4-0	Reserved							

9.177 PCH_TSI4_TEMP_H Register – Index 11h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI4_TEMP_H				PCH_TSI4_TEMP_H			

DEFAULT	0	0	0	0	0	0	0	0
---------	---	---	---	---	---	---	---	---

BIT	DESCRIPTION							
7-0	PCH_TSI4_TEMP_H The TSI High-Byte temperature in degree C.							

9.178 PCH_TSI4_TEMP_L Register – Index 12h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI4_TEMP_L							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-5	PCH_TSI4_TEMP_L The TSI Low-Byte temperature in degree C.							
4-0	Reserved							

9.179 PCH_TSI5_TEMP_H Register – Index 13h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI5_TEMP_H							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	PCH_TSI5_TEMP_H The TSI High-Byte temperature in degree C.							

9.180 PCH_TSI5_TEMP_L Register – Index 14h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI5_TEMP_L							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-5	PCH_TSI5_TEMP_L The TSI Low-Byte temperature in degree C.							
4-0	Reserved							

9.181 PCH_TSI6_TEMP_H Register – Index 15h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
-----	---	---	---	---	---	---	---	---

NAME	PCH_TSI6_TEMP_H							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	PCH_TSI6_TEMP_H The TSI High-Byte temperature in degree C.							

9.182 PCH_TSI6_TEMP_L Register – Index 16h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI6_TEMP_L							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-5	PCH_TSI6_TEMP_L The TSI Low-Byte temperature in degree C.							
4-0	Reserved							

9.183 PCH_TSI7_TEMP_H Register – Index 17h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI7_TEMP_H							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	PCH_TSI7_TEMP_H The TSI High-Byte temperature in degree C.							

9.184 PCH_TSI7_TEMP_L Register – Index 18h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PCH_TSI7_TEMP_L							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-5	PCH_TSI7_TEMP_L The TSI Low-Byte temperature in degree C.							
4-0	Reserved							

9.185 ByteTemp0 Register – Index 19h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	ByteTemp_H							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION								
7-0	ByteTemp0	The Byte format Device0 Byte temperature in degree C.							

9.186 ByteTemp1 Register – Index 1Ah (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	ByteTemp_L							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION								
7-0	ByteTemp1	The Byte format Device1 Byte temperature in degree C.							

9.187 VIN1 High Limit Compared Voltage Register – Index 23h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	VIN1 High Limit Compared Voltage (VIN1_LimtH)							
DEFAULT	1	0	0	1	0	1	1	0

BIT	DESCRIPTION								
7-0	VIN1 High Limit Compared Voltage. Default: 0x96h (1.2V)								

9.188 VIN1 Low Limit Compared Voltage Register – Index 24h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	VIN1 Low Limit Compared Voltage (VIN1_LimtH)							
DEFAULT	0	1	1	0	0	1	0	0

BIT	DESCRIPTION								
7-0	VIN1 Low Limit Compared Voltage. Default: 0x64h (0.8V)								

9.189 VIN0 High Limit Compared Voltage Register – Index 25h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	VIN0 High Limit Compared Voltage (VIN0_LimtH)							
DEFAULT	1	0	0	1	0	1	1	0

BIT	DESCRIPTION
7-0	VIN0 High Limit Compared Voltage. Default: 0x96h (1.2V)

9.190 VIN0 Low Limit Compared Voltage Register – Index 26h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	VIN0 Low Limit Compared Voltage (VIN0_LimtH)							
DEFAULT	0	1	1	0	0	1	0	0

BIT	DESCRIPTION
7-0	VIN0 Low Limit Compared Voltage. Default: 0x64h (0.8V)

9.191 AVSB High Limit Compared Voltage Register – Index 27h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AVSB High Limit Compared Voltage (AVSB_LimtH)							
DEFAULT	1	1	1	0	0	0	0	1

BIT	DESCRIPTION
7-0	AVSB High Limit Compared Voltage. Default: 0xE1h (1.8V *2)

9.192 AVSB Low Limit Compared Voltage Register – Index 28h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AVSB Low Limit Compared Voltage (AVSB_LimtH)							
DEFAULT	1	0	0	1	0	1	1	0

BIT	DESCRIPTION
7-0	AVSB Low Limit Compared Voltage (AVSB_LimtH). Default: 0x96h (1.2V *2)

9.193 Voltage Comparation Interrupt Status Register - Index 42h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved					AVSB_Warn	VIN0_Warn	VIN1_Warn
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-3	Reserved
2	AVSB_Warn. A one indicates the limit of AVSB voltage has been exceeded.
1	VIN0_Warn. A one indicates the limit of VIN0 voltage has been exceeded.
0	VIN1_Warn A one indicates the limit of VIN1 voltage has been exceeded.

9.194 AUXTIN1 Temperature Sensor Offset Register – Index 4Ah (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	OFFSET<7:0>							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXTIN1 Temperature Offset Value. The value in this register is added to the monitored value so that the read value will be the sum of the monitored value and this offset value.

9.195 AUXTIN2 Temperature Sensor Offset Register – Index 4Bh (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	OFFSET<7:0>							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXTIN2 Temperature Offset Value. The value in this register is added to the monitored value so that the read value will be the sum of the monitored value and this offset value.

9.196 AUXTIN3 Temperature Sensor Offset Register – Index 4Ch (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	OFFSET<7:0>							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXTIN3 Temperature Offset Value. The value in this register is added to the monitored value so that the read value will be the sum of the monitored value and this offset value.

9.197 Interrupt Status Register 3 – Index 50h (Bank 4)

Attribute: Read Clear

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT2	AUXFANOUT1	AUXFANIN2	AUXFANIN1	Reserved		VBAT	3VSB
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	AUXFANOUT2. “1” indicates that AUXFANOUT2 works for three minutes at the full fan speed.
6	AUXFANOUT1. “1” indicates that AUXFANOUT1 works for three minutes at the full fan speed.
5	AUXFANIN2. A one indicates the fan count limit of AUXFANIN2 has been exceeded.
4	AUXFANIN1. A one indicates the fan count limit of AUXFANIN1 has been exceeded.
2-3	Reserved
1	VBAT. A one indicates the high or low limit of VBAT has been exceeded.
0	3VSB. A one indicates the high or low limit of 3VSB has been exceeded.

9.198 SMI# Mask Register 4 – Index 51h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	TAR5	TAR4	TAR3	Reserved		SMSKVBAT	SMSKVSB
DEFAULT	1	1	1	1	0	0	1	1

BIT	DESCRIPTION
7	Reserved
6	TAR5. A one disables the corresponding interrupt status bit for the <u>SMI</u> interrupt. (See Interrupt Status Register 3 – Index 50h (Bank 4))
5	TAR4. A one disables the corresponding interrupt status bit for the <u>SMI</u> interrupt. (See Interrupt Status Register 3 – Index 50h (Bank 4))
4	TAR3. A one disables the corresponding interrupt status bit for the <u>SMI</u> interrupt. (See Interrupt Status Register 3 – Index 45h (Bank 0))
3-2	Reserved
1	SMSKVBAT. A one disables the corresponding interrupt status bit for the <u>SMI</u> interrupt. (See Interrupt Status Register 3 – Index 50h (Bank 4))
0	SMSKVSB. A one disables the corresponding interrupt status bit for the <u>SMI</u> interrupt. (See Interrupt Status Register 3 – Index 50h (Bank 4))

9.199 SYSTIN Temperature Sensor Offset Register – Index 54h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	OFFSET<7:0>							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	SYSTIN Temperature Offset Value. The value in this register is added to the monitored value so that the read value will be the sum of the monitored value and this offset value.

9.200 CPUTIN Temperature Sensor Offset Register – Index 55h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	OFFSET<7:0>							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	CPUTIN Temperature Offset Value. The value in this register will be added to the monitored value so that the read value is the sum of the monitored value and this offset value.

9.201 AUXTIN0 Temperature Sensor Offset Register – Index 56h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	OFFSET<7:0>							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXTIN0 Temperature Offset Value. The value in this register is added to the monitored value so that the read value is the sum of the monitored value and this offset value.

9.202 Real Time Hardware Status Register I – Index 59h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANIN_STS	SYSFANIN_STS	CPUTIN_STS	SYSTIN_STS	3VCC_STS	AVSB_STS	VIN1_STS	CPUVCORE_STS
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	CPUFANIN_STS. CPUFANIN Status. 1: Fan speed count is over the threshold value.

	0: Fan speed count is in the allowed range.
6	SYSFANIN_STS. SYSFANIN Status. 1: Fan speed count is over the threshold value. 0: Fan speed count is in the allowed range.
5	CPUTIN_STS. CPUTIN Temperature Sensor Status. 1: Temperature exceeds the over-temperature value. 0: Temperature is under the hysteresis value.
4	SYSTIN_STS. SYSTIN Temperature Sensor Status. 1: Temperature exceeds the over-temperature value. 0: Temperature is under the hysteresis value.
3	3VCC_STS. 3VCC Voltage Status. 1: 3VCC voltage is over or under the allowed range. 0: 3VCC voltage is in the allowed range.
2	AVSB_STS. AVSB Voltage Status. 1: AVSB voltage is over or under the allowed range. 0: AVSB voltage is in the allowed range.
1	VIN1_STS. VIN1 Voltage Status. 1: VIN1 voltage is over or under the allowed range. 0: VIN1 voltage is in the allowed range.
0	CPUVCORE_STS. CPUVCORE Voltage Status. 1: CPUVCORE voltage is over or under the allowed range. 0: CPUVCORE voltage is in the allowed range.

9.203 Real Time Hardware Status Register II – Index 5Ah (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	TAR2_STS	TAR1_STS	Reserved	CASEOPEN0_STS	AUXFANIN0_STS	AUXFANIN1_STS	CASEOPEN1_STS	VIN0_STS
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	TAR2_STS. Smart Fan of CPUFANIN Warning Status. 1: Selected temperature has been over the target temperature for three minutes at full fan speed in Thermal Cruise Mode and SMART FAN™ IV. 0: Selected temperature has not reached the warning range.
6	TAR1_STS. Smart Fan of SYSFANIN Warning Status. 1: SYSTIN temperature has been over the target temperature for three minutes at full fan speed in Thermal Cruise Mode and SMART FAN™ IV. 0: SYSTIN temperature has not reached the warning range.
5	Reserved
4	CASEOPEN0_STS. CaseOpen Status. 1: Caseopen is detected and latched. 0: Caseopen is not latched.
3	AUXFANIN0_STS. AUXFANIN0 Status. 1: Fan speed count is over the threshold value. 0: Fan speed count is in the allowed range.
2	AUXFANIN1_STS. AUXFANIN1 Status. 1: Fan speed count is over the threshold value.

	0: Fan speed count is in the allowed range.
1	CASEOPEN1_STS. CaseOpen Status. 1: Caseopen is detected and latched. 0: Caseopen is not latched.
0	VIN0_STS. VIN0 Voltage Status. 1: VIN0 voltage is over or under the allowed range. 0: VIN0 voltage is in the allowed range.

9.204 Real Time Hardware Status Register III – Index 5Bh (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN2_STS	TAR5_STS	Reserved	VIN4_STS	TAR4_STS	TAR3_STS	VBAT_STS	VSB_STS
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	AUXFANIN2_STS. AUXFANIN2 Status. 1: Fan speed count is over the threshold value. 0: Fan speed count is in the allowed range.
6	TAR5_STS. Smart Fan of AUXFANIN2 Warning Status. 1: The selected temperature has been over the target temperature for three minutes at full fan speed in Thermal Cruise Mode and SMART FAN™ IV. 0: The selected temperature has not reached the warning range.
5	Reserved
4	VIN4_STS. VIN4 Voltage Status. 1: VIN4 voltage is over or under the allowed range. 0: VIN4 voltage is in the allowed range.
3	TAR4_STS. Smart Fan of AUXFANIN1 Warning Status. 1: The selected temperature has been over the target temperature for three minutes at full fan speed in Thermal Cruise Mode and SMART FAN™ IV. 0: The selected temperature has not reached the warning range.
2	TAR3_STS. Smart Fan of AUXFANIN0 Warning Status. 1: The selected temperature has been over the target temperature for three minutes at full fan speed in Thermal Cruise Mode and SMART FAN™ IV. 0: The selected temperature has not reached the warning range.
1	VBAT_STS. VBAT Voltage Status. 1: The VBAT voltage is over or under the allowed range. 0: The VBAT voltage is in the allowed range.
0	VSB_STS. 3VSB Voltage Status. 1: The 3VSB voltage is over or under the allowed range. 0: The 3VSB voltage is in the allowed range.

9.205 Real Time Hardware Status Register III – Index 5Dh (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	AUXFANIN3	TAR6

							<u>_STS</u>	<u>_STS</u>
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-2	Reserved
1	AUXFANIN3 Status. 1: Fan speed count is over the threshold value. 0: Fan speed count is in the allowed range.
0	TAR6_STS. Smart Fan of AUXFANIN3 Warning Status. 1: The selected temperature has been over the target temperature for three minutes at full fan speed in Thermal Cruise Mode and SMART FAN™ IV. 0: The selected temperature has not reached the warning range.

9.206 Is<8:1> Current Register – Index 60h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
Is<8:1>								
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	Is<8:1>. Current measure by current measure IC (1LSB=31.25mA)

9.207 Is<0> Current Register – Index 61h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
Reserved								
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-1	Reserved
0	Is<0>. Current measure by current measure IC (1LSB=31.25mA)

9.208 POWER <9:2> Register – Index 62h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
POWER <9:2>								
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	POWER <9:2>. Power calculate by IO (1LSB=0.25W)

9.209 POWER<1:0> Register – Index 63h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						POWER<1:0>	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-1	Reserved
1:0	POWER<1:0>. Power calculate by IO (1LSB=0.25W)

9.210 VIN Register – Index 64h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	VIN							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	VIN. Power voltage given by customer. (1LSB=128mV)

9.211 Rreg Setting Register – Index 65h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Rreg							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	Rreg. Equivalent electric impedance in order to calculate Is. (1LSB=1m ohm)

9.212 Reg_Ratio_K and POWER_Voltage Enable Register – Index 66h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reg_Ration_K				Reserved			Power_Volt_En
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-4	Reg_Ration_K: The ration in order to make power voltage input to IO is below 2.048. Reg_Ration_K=(R1+R2)/(R1)
3-1	Reserved
0	Power_Volt_En 0:Power voltage is monitored by IO 1:Power voltage is given by customer

9.213 POWER_V Register – Index 67h (Bank 4)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	POWER_V							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	POWER_V: Power voltage (1LSB=128mV)

9.214 Value RAM — Index 80h ~ 96h (Bank 4)

ADDRESS A6-A0	DESCRIPTION
80h	CPUVCORE reading
81h	VIN1 reading
82h	AVSB reading
83h	3VCC reading
84h	VIN0 reading
85h	Reserved
86h	VIN4 reading
87h	3VSB reading
88h	VBAT reading
89h	VTT reading
8Ah	VIN5 reading
8Bh	VIN6 reading
8Ch	VIN2 reading
8Dh	VIN3 reading
8Eh	VIN7 reading
8Fh	Reserved
90h	SYSTIN temperature reading
91h	CPUTIN temperature reading
92h	AUXTIN0 temperature reading

ADDRESS A6-A0	DESCRIPTION
80h	CPUVCORE reading
81h	VIN1 reading
82h	AVSB reading
83h	3VCC reading
84h	VIN0 reading
85h	Reserved
93h	AUXTIN1 temperature reading
94h	AUXTIN2 temperature reading
95h	AUXTIN3 temperature reading

9.215 (SYSFANIN) FANIN1 COUNT High-byte Register – Index B0h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANCNT1 [12:5]							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION
7-0	FANCNT1_H: 13-bit SYSFANIN Fan Count, High Byte

9.216 (SYSFANIN) FANIN1 COUNT Low-byte Register – Index B1h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved				FANCNT1 [4:0]			
DEFAULT	0				1F			

BIT	DESCRIPTION
7-5	Reserved
4-0	FANCNT1_L: 13-bit SYSFANIN Fan Count, Low Byte

9.217 (CPUFANIN) FANIN2 COUNT High-byte Register – Index B2h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANCNT2 [12:5]							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION

7-0	FANCNT2_H: 13-bit CPUFANIN Fan Count, High Byte
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9.218 (CPUFANIN) FANIN2 COUNT Low-byte Register – Index B3h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0	
NAME	Reserved			FANCNT2 [4:0]					
DEFAULT	0			1F					

BIT	DESCRIPTION							
7-5	Reserved							
4-0	FANCNT2_L: 13-bit CPUFANIN Fan Count, Low Byte							

9.219 (AUXFANIN0) FANIN3 COUNT High-byte Register – Index B4h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANCNT3 [12:5]							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION							
7-0	FANCNT3_H: 13-bit AUXFANIN0 Fan Count, High Byte							

9.220 (AUXFANIN0) FANIN3 COUNT Low-byte Register – Index B5h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0	
NAME	Reserved			FANCNT3 [4:0]					
DEFAULT	0			1F					

BIT	DESCRIPTION							
7-5	Reserved							
4-0	FANCNT3_L: 13-bit AUXFANIN0 Fan Count, Low Byte							

9.221 (AUXFANIN1) FANIN4 COUNT High-byte Register – Index B6h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANCNT4 [12:5]							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION
7-0	FANCNT4_H: 13-bit AUXFANIN0 Fan Count, High Byte

9.222 (AUXFANIN1) FANIN4 COUNT Low-byte Register – Index B7h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						FANCNT4 [4:0]	
DEFAULT	0						1F	

BIT	DESCRIPTION
7-5	Reserved
4-0	FANCNT4_L: 13-bit AUXFANIN0 Fan Count, Low Byte

9.223 (AUXFANIN2) FANIN5 COUNT High-byte Register – Index B8h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANCNT5 [12:5]							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION
7-0	FANCNT5_H: 13-bit AUXFANIN2 Fan Count, High Byte

9.224 (AUXFANIN2) FANIN5 COUNT Low-byte Register – Index B9h (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						FANCNT5 [4:0]	
DEFAULT	0						1F	

BIT	DESCRIPTION
7-5	Reserved
4-0	FANCNT5_L: 13-bit AUXFANIN2 Fan Count, Low Byte

9.225 (AUXFANIN3) FANIN6 COUNT High-byte Register – Index BAh (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANCNT6 [12:5]							

DEFAULT	1	1	1	1	1	1	1	1
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BIT	DESCRIPTION
7-0	FANCNT6_H: 13-bit AUXFANIN3 Fan Count, High Byte

9.226 (AUXFANIN3) FANIN6 COUNT Low-byte Register – Index BBh (Bank 4)

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	1F							

BIT	DESCRIPTION
7-5	Reserved
4-0	FANCNT6_L: 13-bit AUXFANIN3 Fan Count, Low Byte

9.227 SYSFANIN SPEED HIGH-BYTE VALUE (RPM) - Index C0h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANIN SPEED HIGH-BYTE VALUE							
DEFAULT	0 0 0 0 0 0 0 0							

BIT	DESCRIPTION
7-0	SYSFANIN SPEED HIGH-BYTE VALUE.

9.228 SYSFANIN SPEED LOW-BYTE VALUE (RPM) - Index C1h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANIN SPEED LOW-BYTE VALUE							
DEFAULT	0 0 0 0 0 0 0 0							

BIT	DESCRIPTION
7-0	SYSFANIN SPEED LOW-BYTE VALUE.

9.229 CPUFANIN SPEED HIGH-BYTE VALUE (RPM) – Index C2h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
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NAME	CPUFANIN SPEED HIGH-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	CPUFANIN SPEED HIGH-BYTE VALUE.

9.230 CPUFANIN SPEED LOW-BYTE VALUE (RPM) – Index C3h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANIN SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	CPUFANIN SPEED LOW-BYTE VALUE.

9.231 AUXFANIN0 SPEED HIGH-BYTE VALUE (RPM) – Index C4h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN0 SPEED HIGH-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN0 SPEED HIGH-BYTE VALUE.

9.232 AUXFANIN0 SPEED LOW-BYTE VALUE (RPM) – Index C5h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN0 SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN0 SPEED LOW-BYTE VALUE.

9.233 AUXFANIN1 SPEED HIGH-BYTE VALUE (RPM) – Index C6h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0

NAME	AUXFANIN1 SPEED HIGH -BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN1 SPEED HIGH-BYTE VALUE.

9.234 AUXFANIN1 SPEED LOW-BYTE VALUE (RPM) – Index C7h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN1 SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN1 SPEED LOW-BYTE VALUE.

9.235 AUXFANIN2 SPEED HIGH-BYTE VALUE (RPM) – Index C8h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN2 SPEED HIGH –BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN2 SPEED HIGH-BYTE VALUE.

9.236 AUXFANIN2 SPEED LOW-BYTE VALUE (RPM) – Index C9h (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN2 SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN2 SPEED LOW-BYTE VALUE.

9.237 AUXFANIN3 SPEED HIGH-BYTE VALUE (RPM) – Index CAh (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0

NAME	AUXFANIN3 SPEED HIGH -BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN3 SPEED HIGH-BYTE VALUE.

9.238 AUXFANIN3 SPEED LOW-BYTE VALUE (RPM) – Index CBh (Bank 4)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN3 SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN3 SPEED LOW-BYTE VALUE.

9.239 PECL Agent0 Calibration Temp – Index F4h (Bank 4)

Attribute: Read / Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Agent0 Calibration Temperature							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The temperature is after PECL Agent0 Calibration

9.240 PECL Agent1 Calibration Temp – Index F5h (Bank 4)

Attribute: Read / Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Agent1 Calibration Temperature							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The temperature is after PECL Agent1 Calibration

9.241 PECL Agent0 Calibration Control Register – Index F8h (Bank 4)

Attribute: Read / Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0

NAME	UP or Down Times					Adjust unit		
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-3	UP or Down Times For PECL Agent0 Calibration
2-0	Adjust unit for PECL Agent0 Calibration

9.242 PECL Agent1 Calibration Control Register – Index F9h (Bank 4)

Attribute: Read / Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	UP or Down Times					Adjust unit		
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-3	UP or Down Times For PECL Agent1 Calibration
2-0	Adjust unit for PECL Agent1 Calibration

9.243 PECL Agent0 Calibration Control Register – Index FAh (Bank 4)

Attribute: Read / Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Update Time					Reserved		Enable
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-3	Update Times For PECL Agent0 Calibration (0.1~3.2sec)
2-1	Reserved
0	Function Enable for PECL Agent0 Calibration

9.244 PECL Agent1 Calibration Control Register – Index FBh (Bank 4)

Attribute: Read / Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Update Time					Reserved		Enable
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-3	Update Times For PECL Agent1 Calibration (0.1~3.2sec)
2-1	Reserved
0	Function Enable for PECL Agent1 Calibration

9.245 Value RAM 2 — Index 50h-5Fh (Bank 5)

ADDRESS A6-A0	DESCRIPTION
54h	3VSB High Limit
55h	3VSB Low Limit
56h	VBAT High Limit
57h	VBAT Low Limit
58h	VTT High Limit
59h	VTT Low Limit
5Ah	VIN5 High Limit
5Bh	VIN5 Low Limit
5Ch	VIN6 High Limit
5Dh	VIN6 Low Limit
5Eh	VIN2 High Limit
5Fh	VIN2 Low Limit
60h	VIN3 High Limit
61h	VIN3 Low Limit
62h	VIN7 High Limit
63h	VIN7 Low Limit

9.246 SMI# Mask Register 1 – Index 66h (Bank 5)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	Reserved	VIN7	VIN3	VIN2	VIN6	VIN5	VTT
DEFAULT	0	1	1	1	1	1	1	1

BIT	DESCRIPTION
7	Reserved
6	Reserved
5	VIN7
4	VIN3
3	VIN2
2	VIN6
1	VIN5
0	VTT

A one disables the corresponding interrupt status bit for the SMI interrupt. (See Interrupt Status Register 1 – Index 41h (Bank0))

9.247 Interrupt Status Register – Index 67h (Bank 5)

Attribute: Read Clear

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	Reserved	VIN7	VIN3	VIN2	VIN6	VIN5	VTT
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	Reserved
6	Reserved
5	VIN7. A one indicates the high or low limit of VIN7 has been exceeded.
4	VIN3. A one indicates the high or low limit of VIN3 has been exceeded.
3	VIN2. A one indicates the high or low limit of VIN2 has been exceeded.
2	VIN6. A one indicates the high or low limit of VIN6 has been exceeded.
1	VIN5. A one indicates the high or low limit of VIN5 has been exceeded.
0	VTT. A one indicates the high or low limit of VTT has been exceeded.

9.248 Real Time Hardware Status Register – Index 68h (Bank 5)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	Reserved	VIN7_STS	VIN3_STS	VIN2_STS	VIN6_STS	VIN5_STS	VTT_STS
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	Reserved
6	Reserved
5	VIN7_STS. VIN7 Voltage Status. 1: VIN7 voltage is over or under the allowed range. 0: VIN7 voltage is in the allowed range.
4	VIN3_STS. VIN3 Voltage Status. 1: VIN3 voltage is over or under the allowed range. 0: VIN3 voltage is in the allowed range.
3	VIN2_STS. VIN2 Voltage Status. 1: VIN2 voltage is over or under the allowed range. 0: VIN2 voltage is in the allowed range.
2	VIN6_STS. VIN6 Voltage Status. 1: VIN6 voltage is over or under the allowed range. 0: VIN6 voltage is in the allowed range.
1	VIN5_STS. VIN5 Voltage Status. 1: VIN5 voltage is over or under the allowed range. 0: VIN5 voltage is in the allowed range.
0	VTT_STS. VTT Voltage Status. 1: VTT voltage is over or under the allowed range. 0: VTT voltage is in the allowed range.

9.249 Close-Loop Fan Control RPM mode Register – Index 00 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	En_AUX3_RPM	En_AUX2_RPM	En_AUX1_RPM	En_AUX0_RPM	En_CPU_RPM	En_SYS_RPM	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-6	Reserved							
5	En_AUX3_RPM 0: Disable SMART FAN™ IV Close Loop Fan Control RPM Mode. 1: Enable SMART FAN™ IV Close Loop Fan Control RPM Mode.							
4	En_AUX2_RPM 0: Disable SMART FAN™ IV Close Loop Fan Control RPM Mode. 1: Enable SMART FAN™ IV Close Loop Fan Control RPM Mode.							
3	En_AUX1_RPM 0: Disable SMART FAN™ IV Close Loop Fan Control RPM Mode. 1: Enable SMART FAN™ IV Close Loop Fan Control RPM Mode.							
2	En_AUX0_RPM 0: Disable SMART FAN™ IV Close Loop Fan Control RPM Mode. 1: Enable SMART FAN™ IV Close Loop Fan Control RPM Mode.							
1	En_CPU_RPM 0: Disable SMART FAN™ IV Close Loop Fan Control RPM Mode. 1: Enable SMART FAN™ IV Close Loop Fan Control RPM Mode.							
0	En_SYS_RPM 0: Disable SMART FAN™ IV Close Loop Fan Control RPM Mode. 1: Enable SMART FAN™ IV Close Loop Fan Control RPM Mode.							

9.250 SYSFAN RPM Mode Tolerance Register – Index 01 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved				Generic_Tol_SYS_RPM			
DEFAULT	0				0			

BIT	DESCRIPTION							
7-4	Reserved							
3-0	Tolerance of RPM mode, unit 50 RPM. If Enable RPM High Mode (Bank6 index6 bit0) , unit is 100 RPM.							

9.251 CPUFAN RPM Mode Tolerance Register – Index 02 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved				Generic_Tol_CPU_RPM			
DEFAULT	0				0			

BIT	DESCRIPTION
7-4	Reserved
3-0	Tolerance of RPM mode, unit 50 RPM. If Enable RPM High Mode (Bank6 index6 bit1) , unit is 100 RPM.

9.252 AUXFAN0 RPM Mode Tolerance Register – Index 03 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	0							

BIT	DESCRIPTION
7-4	Reserved
3-0	Tolerance of RPM mode, unit 50 RPM. If Enable RPM High Mode (Bank6 index6 bit2) , unit is 100 RPM.

9.253 AUXFAN1 RPM Mode Tolerance Register – Index 04 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	0							

BIT	DESCRIPTION
7-4	Reserved
3-0	Tolerance of RPM mode, unit 50 RPM. If Enable RPM High Mode (Bank6 index6 bit3) , unit is 100 RPM.

9.254 AUXFAN2 RPM Mode Tolerance Register – Index 05 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	0							

BIT	DESCRIPTION
7-4	Reserved
3-0	Tolerance of RPM mode, unit 50 RPM. If Enable RPM High Mode (Bank6 index6 bit4) , unit is 100 RPM.

9.255 Enable RPM High Mode Register – Index 06 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	En_AUX3_RPM _HIGH	En_AUX2_RPM _HIGH	En_AUX1_RPM _HIGH	En_AUX0_RPM _HIGH	En_CPU_RPM _HIGH	En_SYS_RPM _HIGH	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-6	Reserved							
5	En_AUX3_RPM_HIGH For High Speed Fan Control at RPM Mode, the unit is 100 RPM. Support 100 rpm ~ 25500 rpm Fan, 0: Disable 1: Enable							
4	En_AUX2_RPM_HIGH For High Speed Fan Control at RPM Mode, the unit is 100 RPM. Support 100 rpm ~ 25500 rpm Fan, 0: Disable 1: Enable							
3	En_AUX1_RPM_HIGH For High Speed Fan Control at RPM Mode, the unit is 100 RPM. Support 100 rpm ~ 25500 rpm Fan, 0: Disable 1: Enable							
2	En_AUX0_RPM_HIGH For High Speed Fan Control at RPM Mode, the unit is 100 RPM. Support 100 rpm ~ 25500 rpm Fan, 0: Disable 1: Enable							
1	En_CPU_RPM_HIGH For High Speed Fan Control at RPM Mode, the unit is 100 RPM. Support 100 rpm ~ 25500 rpm Fan, 0: Disable 1: Enable							
0	En_SYS_RPM_HIGH For High Speed Fan Control at RPM Mode, the unit is 100 RPM. Support 100 rpm ~ 25500 rpm Fan, 0: Disable 1: Enable							

9.256 SMIOVT1 Temperature Source Select Register – Index 21 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved			SMIOVT_SRC1				
DEFAULT	0	0	0	0	0	0	0	1

BIT	DESCRIPTION
7-5	Reserved
4-0	<p>SMIOVT1 Temperature selection.</p> <p>Bits</p> <p>4 3 2 1 0</p> <p>0 0 0 0 1: Select SYSTIN as SMIOVT1 monitoring source. (Default)</p> <p>0 0 0 1 0: Select CPUTIN as SMIOVT1 monitoring source.</p> <p>0 0 0 1 1: Select AUXTIN0 as SMIOVT1 monitoring source.</p> <p>0 0 1 0 0: Select AUXTIN1 as SMIOVT1 monitoring source.</p> <p>0 0 1 0 1: Select AUXTIN2 as SMIOVT1 monitoring source.</p> <p>0 0 1 1 0: Select AUXTIN3 as SMIOVT1 monitoring source.</p> <p>0 0 1 1 1: Reserved</p> <p>0 1 0 0 0: Select SMBUSMASTER 0 as SMIOVT1 monitoring source.</p> <p>0 1 0 0 1: Select SMBUSMASTER 1 as SMIOVT1 monitoring source.</p> <p>0 1 0 1 0: Reserved</p> <p>0 1 0 1 1: Reserved</p> <p>0 1 1 0 0: Reserved</p> <p>0 1 1 0 1: Reserved</p> <p>0 1 1 1 0: Reserved</p> <p>0 1 1 1 1: Reserved</p> <p>1 0 0 0 0: Select PECI Agent 0 as SMIOVT1 monitoring source.</p> <p>1 0 0 0 1: Select PECI Agent 1 as SMIOVT1 monitoring source.</p> <p>1 0 0 1 0: Select PCH_CHIP_CPU_MAX_TEMP as SMIOVT1 monitoring source.</p> <p>1 0 0 1 1: Select PCH_CHIP_TEMP as SMIOVT1 monitoring source.</p> <p>1 0 1 0 0: Select PCH_CPU_TEMP as SMIOVT1 monitoring source.</p> <p>1 0 1 0 1: Select PCH_MCH_TEMP as SMIOVT1 monitoring source.</p> <p>1 0 1 1 0: Select Agent0 Dimm0 as SMIOVT1 monitoring source.</p> <p>1 0 1 1 1: Select Agent0 Dimm1 as SMIOVT1 monitoring source.</p> <p>1 1 0 0 0: Select Agent1 Dimm0 as SMIOVT1 monitoring source.</p> <p>1 1 0 0 1: Select Agent1 Dimm1 as SMIOVT1 monitoring source.</p> <p>1 1 0 1 0: Select BYTE_TEMP0 as SMIOVT1 monitoring source.</p> <p>1 1 0 1 1: Select BYTE_TEMP1 as SMIOVT1 monitoring source.</p> <p>1 1 1 0 0: Select PECI Agent 0 Calibration as SMIOVT1 monitoring source.</p> <p>1 1 1 0 1: Select PECI Agent 1 Calibration as SMIOVT1 monitoring source.</p>

9.257 SMIOVT2 Temperature Source Select Register – Index 22 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved			SMIOVT_SRC2				
DEFAULT	0	0	0	0	0	0	1	0

BIT	DESCRIPTION
7-5	Reserved
4-0	<p>SMIOVT2 Temperature selection.</p> <p>Bits</p> <p>4 3 2 1 0</p> <p>0 0 0 0 1: Select SYSTIN as SMIOVT2 monitoring source.</p> <p>0 0 0 1 0: Select CPUTIN as SMIOVT2 monitoring source. (Default)</p>

0 0 0 1 1: Select AUXTIN0 as SMIOVT2 monitoring source.
0 0 1 0 0: Select AUXTIN1 as SMIOVT2 monitoring source.
0 0 1 0 1: Select AUXTIN2 as SMIOVT2 monitoring source.
0 0 1 1 0: Select AUXTIN3 as SMIOVT2 monitoring source.
0 0 1 1 1: Reserved
0 1 0 0 0: Select SMBUSMASTER 0 as SMIOVT2 monitoring source.
0 1 0 0 1: Select SMBUSMASTER 1 as SMIOVT2 monitoring source.
0 1 0 1 0: Reserved
0 1 0 1 1: Reserved
0 1 1 0 0: Reserved
0 1 1 0 1: Reserved
0 1 1 1 0: Reserved
0 1 1 1 1: Reserved
1 0 0 0 0: Select PECI Agent 0 as SMIOVT2 monitoring source.
1 0 0 0 1: Select PECI Agent 1 as SMIOVT2 monitoring source.
1 0 0 1 0: Select PCH_CHIP_CPU_MAX_TEMP as SMIOVT2 monitoring source.
1 0 0 1 1: Select PCH_CHIP_TEMP as SMIOVT2 monitoring source.
1 0 1 0 0: Select PCH_CPU_TEMP as SMIOVT2 monitoring source.
1 0 1 0 1: Select PCH_MCH_TEMP as SMIOVT2 monitoring source.
1 0 1 1 0: Select Agent0 Dimm0 as SMIOVT2 monitoring source.
1 0 1 1 1: Select Agent0 Dimm1 as SMIOVT2 monitoring source.
1 1 0 0 0: Select Agent1 Dimm0 as SMIOVT2 monitoring source.
1 1 0 0 1: Select Agent1 Dimm1 as SMIOVT2 monitoring source.
1 1 0 1 0: Select BYTE_TEMP0 as SMIOVT2 monitoring source.
1 1 0 1 1: Select BYTE_TEMP1 as SMIOVT2 monitoring source.
1 1 1 0 0: Select PECI Agent 0 Calibration as SMIOVT2 monitoring source.
1 1 1 0 1: Select PECI Agent 1 Calibration as SMIOVT2 monitoring source.

9.258 AUXFAN3 RPM Mode Tolerance Register – Index 23 (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved				Generic_Tol_AUX3_RPM			
DEFAULT	0				0			

BIT	DESCRIPTION
7-4	Reserved
3-0	Tolerance of RPM mode, unit 50 RPM. If Enable RPM High Mode (Bank6 index6 bit5), unit is 100 RPM.

9.259 (SYSFANIN) Fan Count Limit High-byte Register – Index 3Ah (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANIN1_HL [12:5]							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION

7-0	FANIN1_HL: 13-bit SYSFANIN Fan Count Limit, High Byte
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9.260 (SYSFANIN) Fan Count Limit Low-byte Register – Index 3Bh (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0	
NAME	Reserved			FANIN1_HL [4:0]					
DEFAULT	000			11111					

BIT	DESCRIPTION							
7-5	Reserved							
4-0	FANIN1_HL: 13-bit SYSFANIN Fan Count Limit, Low Byte							

9.261 (CPUFANIN) Fan Count Limit High-byte Register – Index 3Ch (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANIN2_HL [12:5]							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION							
7-0	FANIN2_HL: 13-bit CPUFANIN Fan Count Limit, High Byte							

9.262 (CPUFANIN) Fan Count Limit Low-byte Register – Index 3Dh (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0	
NAME	Reserved			FANIN2_HL [4:0]					
DEFAULT	000			11111					

BIT	DESCRIPTION							
7-5	Reserved							
4-0	FANIN2_HL: 13-bit CPUFANIN Fan Count Limit, Low Byte							

9.263 (AUXFANIN0) Fan Count Limit High-byte Register – Index 3Eh (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANIN3_HL [12:5]							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION							
7-0	FANIN3_HL: 13-bit AUXFANIN0 Fan Count Limit, High Byte							

9.264 (AUXFANIN0) Fan Count Limit Low-byte Register – Index 3Fh (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	000							

BIT	DESCRIPTION							
7-5	Reserved							
4-0	FANIN3_HL: 13-bit AUXFANIN0 Fan Count Limit, Low Byte							

9.265 (AUXFANIN1) Fan Count Limit High-byte Register – Index 40h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION							
7-0	FANIN4_HL: 13-bit AUXFANIN1 Fan Count Limit, High Byte							

9.266 (AUXFANIN1) Fan Count Limit Low-byte Register – Index 41h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	000							

BIT	DESCRIPTION							
7-5	Reserved							
4-0	FANIN4_HL: 13-bit AUXFANIN1 Fan Count Limit, Low Byte							

9.267 (AUXFANIN2) Fan Count Limit High-byte Register – Index 42h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION
7-0	FANIN5_HL: 13-bit AUXFANIN2 Fan Count Limit, High Byte

9.268 (AUXFANIN2) Fan Count Limit Low-byte Register – Index 43h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved				FANIN5_HL [4:0]			
DEFAULT	000				11111			

BIT	DESCRIPTION
7-5	Reserved
4-0	FANIN5_HL: 13-bit AUXFANIN2 Fan Count Limit, Low Byte

9.269 SYSFANIN Revolution Pulses Selection Register – Index 44h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved					HM_Rev_Pulse_Fan1_Sel		
DEFAULT	0	0	0	0	0	0	1	0

BIT	DESCRIPTION
7-2	Reserved
1-0	SYSFANIN Revolution Pulses Selection = 00, four pulses per revolution. = 01, one pulse per revolution. = 10, two pulses per revolution. (default) = 11, three pulses per revolution.

9.270 CPUFANIN Revolution Pulses Selection Register – Index 45h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved					HM_Rev_Pulse_Fan2_Sel		
DEFAULT	0	0	0	0	0	0	1	0

BIT	DESCRIPTION
7-2	Reserved
1-0	CPUFANIN Revolution Pulses Selection = 00, four pulses per revolution. = 01, one pulse per revolution.

	= 10, two pulses per revolution. (default)
	= 11, three pulses per revolution.

9.271 AUXFANIN0 Revolution Pulses Selection Register – Index 46h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						HM_Rev_Pulse_Fan3_Sel	
DEFAULT	0	0	0	0	0	0	1	0

BIT	DESCRIPTION							
7-2	Reserved							
1-0	AUXFANIN0 Revolution Pulses Selection = 00, four pulses per revolution. = 01, one pulse per revolution. = 10, two pulses per revolution. (default) = 11, three pulses per revolution.							

9.272 AUXFANIN1 Revolution Pulses Selection Register – Index 47h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						HM_Rev_Pulse_Fan4_Sel	
DEFAULT	0	0	0	0	0	0	1	0

BIT	DESCRIPTION							
7-2	Reserved							
1-0	AUXFANIN1 Revolution Pulses Selection = 00, four pulses per revolution. = 01, one pulse per revolution. = 10, two pulses per revolution. (default) = 11, three pulses per revolution.							

9.273 AUXFANIN2 Revolution Pulses Selection Register – Index 48h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						HM_Rev_Pulse_Fan5_Sel	
DEFAULT	0	0	0	0	0	0	1	0

BIT	DESCRIPTION							
7-2	Reserved							
1-0	AUXFANIN2 Revolution Pulses Selection							

	= 00, four pulses per revolution. = 01, one pulse per revolution. = 10, two pulses per revolution. (default) = 11, three pulses per revolution.
--	--

9.274 AUXFANIN3 Revolution Pulses Selection Register – Index 49h (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						HM_Rev_Pulse_Fan6_Sel	
DEFAULT	0	0	0	0	0	0	1	0

BIT	DESCRIPTION							
7-2	Reserved							
1-0	AUXFANIN3 Revolution Pulses Selection = 00, four pulses per revolution. = 01, one pulse per revolution. = 10, two pulses per revolution. (default) = 11, three pulses per revolution.							

9.275 (AUXFANIN3) Fan Count Limit High-byte Register – Index 4Ah (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FANIN6_HL [12:5]							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION							
7-0	FANIN6_HL: 13-bit AUXFANIN3 Fan Count Limit, High Byte							

9.276 (AUXFANIN3) Fan Count Limit Low-byte Register – Index 4Bh (Bank 6)

Attribute: Read /Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						FANIN6_HL [4:0]	
DEFAULT	000						11111	

BIT	DESCRIPTION							
7-5	Reserved							
4-0	FANIN6_HL: 13-bit AUXFANIN3 Fan Count Limit, Low Byte							

9.277 AUXFANIN3 SPEED HIGH-BYTE VALUE (RPM) - Index 54h (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN3 SPEED HIGH-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	AUXFANIN3 SPEED HIGH-BYTE VALUE.							

9.278 AUXFANIN3 SPEED LOW-BYTE VALUE (RPM) - Index 55h (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN3 SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	AUXFANIN3 SPEED LOW-BYTE VALUE.							

9.279 SYSFANIN SPEED HIGH-BYTE VALUE (RPM) - Index 56h (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANIN SPEED HIGH-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	SYSFANIN SPEED HIGH-BYTE VALUE.							

9.280 SYSFANIN SPEED LOW-BYTE VALUE (RPM) - Index 57h (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	SYSFANIN SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	SYSFANIN SPEED LOW-BYTE VALUE.							

9.281 CPUFANIN SPEED HIGH-BYTE VALUE (RPM) - Index 58h (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANIN SPEED HIGH-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	CPUFANIN SPEED HIGH-BYTE VALUE.

9.282 CPUFANIN SPEED LOW-BYTE VALUE (RPM) - Index 59h (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	CPUFANIN SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	CPUFANIN SPEED LOW-BYTE VALUE.

9.283 AUXFANIN0 SPEED HIGH-BYTE VALUE (RPM) - Index 5Ah (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN0 SPEED HIGH-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN0 SPEED HIGH-BYTE VALUE.

9.284 AUXFANIN0 SPEED LOW-BYTE VALUE (RPM) - Index 5Bh (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN0 SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN0 SPEED LOW-BYTE VALUE.

9.285 AUXFANIN1 SPEED HIGH-BYTE VALUE (RPM) - Index 5Ch (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN1 SPEED HIGH-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN1 SPEED HIGH-BYTE VALUE.

9.286 AUXFANIN1 SPEED LOW-BYTE VALUE (RPM) - Index 5Dh (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN1 SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN1 SPEED LOW-BYTE VALUE.

9.287 AUXFANIN2 SPEED HIGH-BYTE VALUE (RPM) - Index 5Eh (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN2 SPEED HIGH-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN2 SPEED HIGH-BYTE VALUE.

9.288 AUXFANIN2 SPEED LOW-BYTE VALUE (RPM) - Index 5Fh (Bank 6)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANIN2 SPEED LOW-BYTE VALUE							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	AUXFANIN2 SPEED LOW-BYTE VALUE.

9.289 PECl Enable Function Register – Index 01h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI_En	Dimm_En	Margin_En	Reserved		Is_PECI30	Manual_En	Routine_En
DEFAULT	0	0	0	1	0	1	0	0

BIT	READ / WRITE	DESCRIPTION
7	R / W	Enable PECI Function. (PECI_En)
6	R / W	Enable PECI Dimm Function. (Dimm_En)
5	R / W	Enable PECI Margin Function. (Margin_En)
4-3	R / W	Reserved
2	R / W	Enable PECI 3.0 Command function (Is_PECI30)
1	R / W	Enable PECI 3.0 Manual Function (Manual_En) (One-shot clear)
0	R / W	Enable PECI 3.0 Routine Function (Routine_En)

9.290 PECI Timing Config Register – Index 02h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved		TN_Extend			Adj[2:0]		PECI_DC
DEFAULT	0	0	0	0	0	0	1	0

BIT	READ / WRITE	DESCRIPTION
7-6	R / W	Reserved
5	R / W	TN_Extend[1:0] Adjust Transaction Rate. 00 _{BIN} = 1.5 MHz (Default) 01 _{BIN} = 750 KHz 10 _{BIN} = 375 KHz 11 _{BIN} = 187.5 KHz
4	R / W	
3	R / W	Adj[2:0]
2	R / W	Compensate the effect of rising time on physical bus
1	R / W	Default Value = 001
0	R / W	Adjust PECI Tbit Duty cycle selection. (PECI_DC) 0 = 75% Tbit high duty cycle time. (Default) 1 = 68% Tbit high duty cycle time.

9.291 PECI Agent Config Register – Index 03h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved		En_Agt[1:0]			Reserved		Domain1_Agt1
DEFAULT	0	0	0	0	0	0	0	0

BIT	READ / WRITE	DESCRIPTION
7-6	R / W	Reserved
5	R / W	En_Agt[1:0] Enable Agent 00 = Disable Agent. 01= Enable Agent0. 10 = Reserved 11 = Enable Agent0 and Agent1.
4	R / W	
3-2	R / W	Reserved
1	R / W	Enable domain 1 for Agent1 0 = Agent1 without domain1 1 = Agent1 with domain 1
0	R / W	Enable domain 1 for Agent0 0 = Agent0 without domain 1 1 = Agent0 with domain 1

9.292 PECL Temperature Config Register – Index 04h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Virtual_En	Reserved		Clamp	Reserved	RtDmn_Agt[1:0]		RtHigher
DEFAULT	0	0	0	0	0	0	0	0

BIT	READ / WRITE	DESCRIPTION
7	R / W	Virtual Temp Function Enable.(Virtual_En) When enable this function, the temperature raw data can use LPC to write raw data to CR 17 _{HEX} ~ CR 1E _{HEX}
6-5	R / W	Reserved
4	R / W	When temperature data reading is positive or less than -128, can enable this function to clamp temperature data.(Clamp)
3	R / W	Reserved
2	R / W	RtDmn_Agt[1:0] Agent 1 – Agent 0 always return the relative domain Temperature.
1	R / W	0 = Agent always returns the relative temperature from domain 0. 1 = Agent always returns the relative temperature from domain 1.
0	R / W	Return High Temperature of doamin0 or domain1.(RtHigher) 0 = The temperature of each agent is returned from domain 0 or domain 1, which is controlled by (CR 04 _{HEX}) 1 = Return the highest temperature in domain 0 and domain 1 of individual Agent.

9.293 PECL Command Address Register – Index 05h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Command Address							

DEFAULT	0	0	0	0	0	0	0	0
---------	---	---	---	---	---	---	---	---

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.294 PECL Command Write Length Register – Index 06h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Command Write Length							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.295 PECL Command Read Length Register – Index 07h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Command Read Length							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.296 PECL Command Code Register – Index 08h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Command Code							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.297 PECL Command Tbase0 Register – Index 09h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Tbase 0							

DEFAULT	0	0	0	0	0	0	0	0
---------	---	---	---	---	---	---	---	---

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.298 PECI Command Tbase1 Register – Index 0Ah (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Tbase 1							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.299 PECI Command Write Data 1 Register – Index 0Bh (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Write Data 1							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.300 PECI Command Write Data 2 Register – Index 0Ch (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Write Data 2							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.301 PECI Command Write Data 3 Register – Index 0Dh (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Write Data 3							

DEFAULT	0	0	0	0	0	0	0	0
---------	---	---	---	---	---	---	---	---

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.302 PECL Command Write Data 4 Register – Index 0Eh (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Write Data 4							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.303 PECL Command Write Data 5 Register – Index 0Fh (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Write Data 5							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.304 PECL Command Write Data 6 Register – Index 10h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Write Data 6							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.305 PECL Command Write Data 7 Register – Index 11h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Write Data 7							

DEFAULT	0	0	0	0	0	0	0	0
---------	---	---	---	---	---	---	---	---

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.306 PECL Command Write Data 8 Register – Index 12h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Write Data 8							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.307 PECL Command Write Data 9 Register – Index 13h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Write Data 9							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.308 PECL Command Write Data 10 Register – Index 14h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Write Data 10							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX}.

9.309 PECL Command Write Data 11 Register – Index 15h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Write Data 11							

DEFAULT	0	0	0	0	0	0	0	0
---------	---	---	---	---	---	---	---	---

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX} .

9.310 PECL Command Write Data 12 Register – Index 16h (Bank 7)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECL Write Data 12							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be sent to client. Default value is 00_{HEX} .

9.311 PECL Agent Relative Temperature Register (ARTR) – Index 17h-1Eh (Bank 7)

These registers return the “raw data” retrieved from PECL GetTemp() command. These data could be the error codes (range: 8000H~81FFH) or relative temperatures to process the defined Tbase. The error code will only be updated in **ARTR**; while “Temperature Reading Register”, Bank7 Index 20h and 21h, will not be updated when the error code is received. If the **RtHigher** mechanism is activated, the normal temperature will always be returned first. In case both 2 domains return errors, the return priority will be Overflow Error > Underflow Error > Missing Diode > General Error. The reset value is 8001_{HEX}, in that PECL is defaulted to be off. In PECL, 8001_{HEX} means the diode is missing.

Attribute: Read / Write(When Virtual_En enable)

ADDRESS 17-1E	DESCRIPTION
17h[15:8],18h[7:0]	Domain0 Relative Temperature Agent0 [15:0]
19h[15:8],1Ah[7:0]	Domain1 Relative Temperature Agent0 [15:0]
1Bh[15:8],1Ch[7:0]	Domain0 Relative Temperature Agent1 [15:0]
1Dh[15:8],1Eh[7:0]	Domain1 Relative Temperature Agent1 [15:0]

GetTemp() PECL Temperature format:

BIT	DESCRIPTION
15	Sign Bit. (Sign) In PECL Protocol, this bit should always be 1 to represent a negative temperature.
14-6	The integer part of the relative temperature. (Temperature[8:0])
5	TEMP_2. 0.5°C unit.
4	TEMP_4. 0.25°C unit.
3	TEMP_8. 0.125°C unit.
2	TEMP_16. 0.0625°C unit.
1	TEMP_32. 0.03125°C unit.
0	TEMP_64. 0.015625°C unit.

GetTemp() Response Definition:

RESPONSE	MEANING
General Sensor Error (GSE)	Thermal scan did not complete in time. Retry is appropriate.
0x0000	Processor is running at its maximum temperature or is currently being reset.
All other data	Valid temperature reading, reported as a negative offset from the TCC activation temperature. The valide temperature reading is referred to GetTemp() PECL Temperature format

Error Code	Description	Host operation
8000 _{HEX}	General Sensor Error	No further processing.
8001 _{HEX}	Sensing Device Missing	
8002 _{HEX}	Operational, but the temperature is lower than the sensor operation range.	Compulsorily write 0°C back to the temperature readouts.
8003 _{HEX}	Operational, but the temperature is higher than the sensor operation range.	Compulsorily write 127 °C back to the temperature readouts.
8004 _{HEX}	Reserved	No further operation.
81FF _{HEX}		

9.312 PECL Alive Agent Register – Index 1Fh (Bank 7)

Attribute: Read only

Size: 8 bits

Record which agentis able to respond to Ping().**Default value is 00_{HEX}.**

1: agent is able to respond to Ping() command. Agent alive

0: agent isn't able to respond to Ping() command. Agent is not alive

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						PECL Alive Agent	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-2	Reserve
1	1: agent1 is able to respond to Ping() command. Agent alive 0: agent1 isn't able to respond to Ping() command. Agent is not alive
0	1: agent0 is able to respond to Ping() command. Agent alive 0: agent0 isn't able to respond to Ping() command. Agent is not alive

9.313 PECL Temperature Reading Register (Integer) – Index 20h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0

NAME	PECI Temperature Reading--Integer [9:2]							
DEFAULT	0	0	1	0	1	0	0	0

BIT	DESCRIPTION
7-0	Temperature value [9] (Sign bit) Temperature value [8:2] (Integer bits) Temperature value [1:0] (Fraction bits)

Note. Temperature reading register is count from raw data and Tbase, for example:

Raw data	+	Tbase	=	Temp Reading
Bank7, Index [17][18]	+	Bank7, Index [09]	=	Bank7, Index [20][21]

9.314 PECI Temperature Reading Register (Fraction) – Index 21h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						PECI Temperature Value[1:0]	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	Temperature value [9] (Sign bit) Temperature value [8:2] (Integer bits) Temperature value [1:0] (Fraction bits)

9.315 PECI Command TN Count Value Register – Index 22h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Timing Negotiation count Value[7:0]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00 _{HEX} .

9.316 PECI Command TN Count Value Register – Index 23h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved					PECI Timing Negotiation count Value[11:8]		
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00 _{HEX} .

7-0	The data would be get from client. Default value is 00_{HEX}.
-----	--

9.317 PECI Command Warning Flag Register – Index 24h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						Alert Value[1:0]	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
1-0	Agent Alert Bit (Default value is 0) 0: Agent has valid FCS. 1: Agent has invalid FCS in the previous 3 transactions. Default value is 00_{HEX}.							

9.318 PECI Command FCS Data Register – Index 25h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserve		Wrining	CC_Fail	ZeroWFCS	AbortWFCS	BadRFCS	BadWFCS
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
5-0	Retrieve PECI related data from client and host. Default value is 00_{HEX}.							

9.319 PECI Command WFCS Data Register – Index 26h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI WFCS							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	Retrieve PECI WFCS related data from client. Default value is 00_{HEX}.							

9.320 PECI RFCS Data Register – Index 27h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI RFCS							

DEFAULT	0	0	0	0	0	0	0	0
---------	---	---	---	---	---	---	---	---

BIT	DESCRIPTION
7-0	Retrieve PECl related data from client. Default value is 00_{HEX}.

9.321 PECl AWFCs Data Register – Index 28h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECl AWFCs							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	Retrieve PECl related data from client. Default value is 00_{HEX}.

9.322 PECl CRC OUT WFCS Data Register – Index 29h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECl CRC OUT WFCS							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	Retrieve PECl related data from client. Default value is 00_{HEX}.

9.323 PECl Command Read Data 1 Register – Index 2Ah (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECl Read Data 1							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00_{HEX}.

9.324 PECl Command Read Data 2 Register – Index 2Bh (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Data 2							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00_{HEX} .

9.325 PECI Command Read Data 3 Register – Index 2Ch (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Data 3							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00_{HEX} .

9.326 PECI Command Read Data 4 Register – Index 2Dh (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Data 4							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00_{HEX} .

9.327 PECI Command Read Data 5 Register – Index 2Eh (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Data 5							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00_{HEX} .

9.328 PECI Command Read Data 6 Register – Index 2Fh (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Data 6							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00_{HEX} .

9.329 PECI Command Read Data 7 Register – Index 30h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Data 7							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00_{HEX} .

9.330 PECI Command Read Data 8 Register – Index 31h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Data 8							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00_{HEX} .

9.331 PECI Command Read Data 9 Register – Index 32h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Data 9							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data would be get from client. Default value is 00_{HEX} .

9.332 PECI Read Dimm Data 1 Register – Index 33h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read CPU Agent0 Dimm0 Temp							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data will update when PECI Dimm enable. LSB bit is decimal point.

9.333 PECI Read Dimm Data 2 Register – Index 34h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read CPU Agent0 Dimm1 Temp							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data will update when PECI Dimm enable. LSB bit is decimal point.

9.334 PECI Read Dimm Data 3 Register – Index 35h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read CPU Agent1 Dimm0 Temp							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data will update when PECI Dimm enable. LSB bit is decimal point.

9.335 PECI Read Dimm Data 4 Register – Index 36h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read CPU Agent1 Dimm1 Temp							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data will update when PECI Dimm enable. LSB bit is decimal point.

9.336 PECI Read Margin Data 1 Register – Index 37h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						PECI Read CPU Agent0 Margin Temp[9:8]	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data will update when PECI Margin enable. MSB bit is sign bit.

9.337 PECI Read Margin Data 2 Register – Index 38h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read CPU Agent0 Margin Temp[7:0]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data will update when PECI Margin enable

9.338 PECI Read Margin Data 3 Register – Index 39h (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						PECI Read CPU Agent1 Margin Temp[9:8]	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data will update when PECI Margin enable. MSB bit is sign bit.

9.339 PECI Read Margin Data 4 Register – Index 3Ah (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read CPU Agent1 Margin Temp[7:0]							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	The data will update when PECI Margin enable

9.340 PECI Read Dimm Index Data Register – Index 3Bh (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Dimm Index data							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	When PECI Read Dimm enable, the register will be index data

9.341 PECI Read Dimm Index Data Register – Index 3Ch (Bank 7)

Attribute: Read only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	PECI Read Margin Index data							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	When PECI Read Margin enable, the register will be index data

PECI Manual Command Address Table

Command Bank 7	Address CR 05 _{HEX}	WriteLength CR 06 _{HEX}	Read Length CR 07 _{HEX}	Command Code CR 08 _{HEX}
Ping	Addr	00	00	
GetDIB		01	08	F7
GetTemp		01	02	01
PCIRd30		06	02 / 03 / 05	61
PCIWr30		08 / 09 / 0B	01	65
PCIRdLocal30		05	02 / 03 / 05	E1
PCIWrLocal30		07 / 08 / 0A	01	E5
PKGrd30		05	02 / 03 / 05	A1
PKGWr30		07 / 08 / 0A	01	A5
IAMSRRd30		05	02 / 03 / 05 / 09	B1
IAMSRRwr30		07 / 08 / 0A / 0E	01	B5

PECI Manual Command Read Data Table

Command	PCI Rd30	PCI Wr30	PCIRd Local30	PCIWr Local30	PKG Rd30	PKG Wr30	IAMS Rd30	IAMS Wr30	GetDIB	GetTemp
Command Code	61	65	E1	E5	A1	A5	B1	B5	F7	01

RdData 1 CR 2A_{HEX}	Ccode	Ccode	Ccode	Ccode	Ccode	Ccode	Ccode	Ccode	X	X
RdData 2 CR 2B_{HEX}	X	X	X	X	X	X	Data LSB_1	X	Device Info	X
RdData 3 CR 2C_{HEX}	X	X	X	X	X	X	Data LSB_2	X	Revision Number	X
RdData 4 CR 2D_{HEX}	X	X	X	X	X	X	Data LSB_3	X	Reserved 1	X
RdData 5 CR 2E_{HEX}	X	X	x	X	X	X	Data LSB_4	X	Reserved 2	X
RdData 6 CR 2F_{HEX}	Data LSB_1	X	Data LSB_1	X	Data LSB_1	X	Data LSB_5	X	Reserved 3	X
RdData 7 CR 30_{HEX}	Data LSB_2	X	Data LSB_2	X	Data LSB_2	X	Data LSB_6	X	Reserved 4	X
RdData 8 CR 31_{HEX}	Data LSB_3	X	Data LSB_3	X	Data LSB_3	X	Data LSB_7	X	Reserved 5	Temp_LB
RdData 9 CR 32_{HEX}	Data MSB	x	Data MSB	X	Data MSB	X	Data MSB	X	Reserved 6	Temp_HB

PECI Manual Command Write Data Table

Command	PCI Rd30	PCI Wr30	PCI Rd Local30	PCI Wr Local30	PKG Rd30	PKG Wr30	IAMSR Rd30	IAMSR Wr30
Command Code	61	65	E1	E5	A1	A5	B1	B5
WrData 1 CR 0B_{HEX}	Host ID	Host ID	Host ID	Host ID	Host ID	Host ID	Host ID	Host ID
WrData 2 CR 0C_{HEX}	Addr LSB_1	Addr LSB_1	Addr LSB_1	Addr LSB_1	Index	Index	Processor ID	Processor ID
WrData 3 CR 0D_{HEX}	Addr LSB_2	Addr LSB_2	Addr LSB_2	Addr LSB_2	Param LSB	Param LSB	Addr LSB	Addr LSB
WrData 4 CR 0E_{HEX}	Addr LSB_3	Addr LSB_3	Addr MSB	Addr MSB	Param MSB	Param MSB	Addr MSB	Addr MSB
WrData 5 CR 0F_{HEX}	Addr MSB	Addr MSB	X	Data LSB_1	X	Data LSB_1	X	Data LSB_1
WrData 6 CR 10_{HEX}	X	Data LSB_1	X	Data LSB_2	X	Data LSB_2	X	Data LSB_2
WrData 7 CR 11_{HEX}	X	Data LSB_2	X	Data LSB_3	X	Data LSB_3	X	Data LSB_3
WrData 8 CR 12_{HEX}	X	Data LSB_3	X	Data MSB	X	Data MSB	X	Data LSB_4
WrData 9 CR 13_{HEX}	X	Data MSB	X	X	X	X	X	Data LSB_5

WrData10 CR 14 _{HEX}	X	X	X	X	X	X	X	Data LSB_6
WrData11 CR 15 _{HEX}	X	X	X	X	X	X	X	Data LSB_7
WrData12 CR 16 _{HEX}	X	X	X	X	X	X	X	Data MSB

9.342 AUXFAN1 Monitor Temperature Source Select Register/ STOPDUTY Enable Register – Index 00h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Stopduty_En	Reserved			AUXFAN1 SOURCE[4:0]			
DEFAULT	0	0	0	0	0	0	1	1

BIT	DESCRIPTION
7	<p>Stopduty_En: 0: FANOUT will decrease to zero value at most if necessary. 1: FANOUT will decrease to AUXFANOUT1 Stop Value (Bank8, index05h) at most if necessary. (This function is for Thermal Cruise mode.)</p>
6-5	Reserved
4-0	<p>AUXFAN1 Temperature Source Select:</p> <p>Bits</p> <p>4 3 2 1 0</p> <p>0 0 0 0 1: Select SYSTIN as AUXFAN1 monitoring source. 0 0 0 1 0: Select CPUTIN as AUXFAN1 monitoring source. 0 0 0 1 1: Select AUXTIN0 as AUXFAN1 monitoring source. 0 0 1 0 0: Select AUXTIN1 as AUXFAN1 monitoring source. 0 0 1 0 1: Select AUXTIN2 as AUXFAN1 monitoring source. 0 0 1 1 0: Select AUXTIN3 as AUXFAN1 monitoring source. 0 0 1 1 1: Reserved 0 1 0 0 0: Select SMBUSMASTER 0 as AUXFAN1 monitoring source. 0 1 0 0 1: Select SMBUSMASTER 1 as AUXFAN1 monitoring source. 0 1 0 1 0: Reserved 0 1 0 1 1: Reserved 0 1 1 0 0: Reserved 0 1 1 0 1: Reserved 0 1 1 1 0: Reserved 0 1 1 1 1: Reserved 1 0 0 0 0: Select PECI Agent 0 as AUXFAN1 monitoring source. 1 0 0 0 1: Select PECI Agent 1 as AUXFAN1 monitoring source. 1 0 0 1 0: Select PCH_CHIP_CPU_MAX_TEMP as AUXFAN1 monitoring source. 1 0 0 1 1: Select PCH_CHIP_TEMP as AUXFAN1 monitoring source. 1 0 1 0 0: Select PCH_CPU_TEMP as AUXFAN1 monitoring source. 1 0 1 0 1: Select PCH_MCH_TEMP as AUXFAN1 monitoring source. 1 0 1 1 0: Select Agent0 Dimm0 as AUXFAN1 monitoring source. 1 0 1 1 1: Select Agent0 Dimm1 as AUXFAN1 monitoring source.</p>

	1 1 0 0 0: Select Agent1 Dimm0 as AUXFAN1 monitoring source.
	1 1 0 0 1: Select Agent1 Dimm1 as AUXFAN1 monitoring source.
	1 1 0 1 0: Select BYTE_TEMP0 as AUXFAN1 monitoring source.
	1 1 0 1 1: Select BYTE_TEMP1 as AUXFAN1 monitoring source.
	1 1 1 0 0: Select PECI Agent 0 Calibration as AUXFAN1 monitoring source.
	1 1 1 0 1: Select PECI Agent 1 Calibration as AUXFAN1 monitoring source.
	1 1 1 1 1: Select Virtual_TEMP as AUXFAN1 monitoring source.

Note. If the temperature source is selecting to PECI, please set Bank0 Index AEh first for reading correct value.

9.343 AUXFAN1 Target Temperature Register / AUXFANIN1 Target Speed_L Register – Index 01h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXTIN1 Target Temperature / AUXFANIN1 Target Speed_L							
DEFAULT	0	0	0	0	0	0	0	0

FUNCTION MODE		7	6	5	4	3	2	1	0
Thermal Cruise TM	DESCRIPTION	AUXFAN1 Target Temperature							
Fan Speed Cruise TM	DESCRIPTION	AUXFANIN1 Target Speed [7:0], [11:8] associate index 0C [3:0]							

9.344 AUXFAN1 MODE Register / AUXFAN1 TOLERRANCE Register – Index 02h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#(Bit2-0)

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 MODE					Reseved	Tolerance of AUXFAN1 Target Temperature or AUXFANIN1 Target Speed_L	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-4	AUXFANOUT1 Mode Select. 0000: AUXFANOUT1 is in Manual Mode. (Default) 0001: AUXFANOUT1 is in Thermal Cruise Mode. 0010: AUXFANOUT1 is as Speed Cruise Mode. 0100: AUXFANOUT1 is in SMART FAN IV Mode.
3	Reseved
2-0	Tolerance of AUXFAN1 Target Temperature or AUXFANIN1 Target Speed_L.

9.345 AUXFANOUT1 Step Up Time Register – Index 03h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT1 Value Step Up Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time AUXFANOUT1 takes to increase its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.346 AUXFANOUT1 Step Down Time Register – Index 04h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT1 Value Step Down Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time AUXFANOUT1 takes to decrease its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.347 AUXFANOUT1 Stop Value Register – Index 05h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT1 Stop Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, the AUXFANOUT1 value decreases to this eight-bit value if the temperature stays below the lowest temperature limit. This value should not be zero.

Please note that Stop Value does not mean that the fan really stops. It means that if the temperature keeps below low temperature limit, then the fan speed keeps on decreasing until reaching a minimum value, and this is Stop Value.

9.348 AUXFANOUT1 Start-up Value Register – Index 06h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT1 Start-Up Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, AUXFANOUT1 value increases from zero to this eight-bit register value to provide a minimum value to turn on the fan. This value should not be zero.

9.349 AUXFANOUT1 Stop Time Register – Index 07h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT1 Value Stop Time							
DEFAULT	0	0	1	1	1	1	0	0

In Thermal Cruise mode, this register determines the amount of time it takes AUXFANOUT1 value to fall from the stop value to zero.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.350 AUXFANOUT1 Output Value Select Register – Index 09h (Bank 8)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT1 Value							
DEFAULT	1	1	1	1	1	1	1	1

The default speed of fan output is specified in registers CR[E0h] to CR[E4h] of Logical Device B, CR[E3h] is the Default Speed Configuration Register of AUXFANOUT1.

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output	DESCRIPTION	The PWM duty cycle is equal to this eight-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							

9.351 AUXFANIN1 Tolerance_H / Target Speed_H Register – Index 0Ch (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0	
NAME	Reserved	AUXFANIN1 TOL_H				AUXFANIN1 Target Speed_H			
DEFAULT	0	0				0			

BIT	DESCRIPTION
7	Reserved
6-4	AUXFANIN1 Tolerance_H [5:3]
3-0	AUXFANIN1 Target Speed_H [11:8]

9.352 AUXFAN1 (SMART FAN™ IV) Temperature 1 Register(T1) – Index 21h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 (SMART FAN™ IV) Temperature 1							
DEFAULT	0	0	0	1	1	0	0	1

BIT	DESCRIPTION							
7-0	AUXFAN1 (SMART FAN™ IV) Temperature 1 Register (T1).							

9.353 AUXFAN1 (SMART FAN™ IV) Temperature 2 Register(T2) – Index 22h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 (SMART FAN™ IV) Temperature 2							
DEFAULT	0	0	1	0	0	0	1	1

BIT	DESCRIPTION							
7-0	AUXFAN1 (SMART FAN™ IV) Temperature 2 Register (T2).							

9.354 AUXFAN1 (SMART FAN™ IV) Temperature 3 Register(T3) – Index 23h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 (SMART FAN™ IV) Temperature 3							
DEFAULT	0	0	1	0	1	1	0	1

BIT	DESCRIPTION							
7-0	AUXFAN1 (SMART FAN™ IV) Temperature 3 Register (T3).							

9.355 AUXFAN1 (SMART FAN™ IV) Temperature 4 Register(T4) – Index 24h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 (SMART FAN™ IV) Temperature 4							
DEFAULT	0	0	1	1	0	1	1	1

BIT	DESCRIPTION
7-0	AUXFAN1 (SMART FAN TM IV) Temperature 4 Register (T4).

9.356 AUXFAN1 (SMART FANTM IV) PWM 1 Register – Index 27h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 (SMART FAN TM IV) PWM 1							
DEFAULT	1	0	0	0	1	1	0	0

BIT	DESCRIPTION
7-0	AUXFAN1 (SMART FAN TM IV) PWM 1 Register.

9.357 AUXFAN1 (SMART FANTM IV) PWM 2 Register – Index 28h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 (SMART FAN TM IV) PWM 2							
DEFAULT	1	0	1	0	1	0	1	0

BIT	DESCRIPTION
7-0	AUXFAN1 (SMART FAN TM IV) PWM 2 Register.

9.358 AUXFAN1 (SMART FANTM IV) PWM 3 Register – Index 29h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 (SMART FAN TM IV) PWM 3							
DEFAULT	1	1	0	0	1	0	0	0

BIT	DESCRIPTION
7-0	AUXFAN1 (SMART FAN TM IV) PWM 3 Register.

9.359 AUXFAN1 (SMART FANTM IV) PWM 4 Register – Index 2Ah (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 (SMART FAN™ IV) PWM 4							
DEFAULT	1	1	1	0	0	1	1	0

BIT	DESCRIPTION
7-0	AUXFAN1 (SMART FAN™ IV) PWM 4 Register.

9.360 AUXFAN1 (SMART FAN™ IV) Critical Temperature Register – Index 35h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 (SMART FAN™ IV) Temperature Critical							
DEFAULT	0	0	1	1	1	1	0	0

BIT	DESCRIPTION
7-0	AUXFAN1 (SMART FAN™ IV) Critical Temperature Register

9.361 AUXFAN1 Enable Critical Duty – Index 36h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	0							

BIT	DESCRIPTION
7-1	Reserved
0	En_AUX1_CRITICAL_DUTY (set 0 in manual mode) 0: Load default Full Speed 8'hFF for AUXFANOUT1. 1: Used Index 37 CRITICAL_DUTY Value for AUXFANOUT1.

9.362 AUXFAN1 Critical Duty Register – Index 37h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 Critical Duty							
DEFAULT	CC							

BIT	DESCRIPTION
7-0	CC

7-0	AUXFAN1 Critical Duty.
-----	------------------------

9.363 AUXFANOUT1 Critical Temperature Tolerance Register – Index 38h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						AUXFANOUT1 Critical Temperature Tolerance	
DEFAULT	0			0		0		0

BIT	DESCRIPTION
7-3	Reserved
2-0	AUXFANOUT1 Critical Temperature Tolerance

9.364 AUXFAN1 PECLERR DUTY Enable Register – Index 3Fh (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						EN_AUX1_PECLERR_DUTY	
DEFAULT	0			0		0		0

BIT	DESCRIPTION
7-2	Reserved
1-0	EN_AUX1_PECLERR_DUTY 00: Disable PECLERR DUTY FANOUT (default) 01: Enable PECLERR DUTY FANOUT, Used Index 41 PECLERR_AUXOUT1 Value for AUXFANOUT1. 10,11: Keep Full Speed

9.365 AUXFANOUT1 Pre-Configured Register For PECL Error – Index 41h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT1 pre-configured register for PECL error (PECLERR_AUXOUT1)							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION
7-0	AUXFANOUT1 pre-configured register for PECL error.

9.366 DUTY PER STEP Register – Index 66h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	UP_STEP				DOWN_STEP			
DEFAULT	0	0	0	1	0	0	0	1

BIT	DESCRIPTION
7-4	UP unit.
3-0	DOWN unit.

9.367 T1 Delay Time Register – Index 67h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	T1 Delay time							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	T1 Delay time for FAN. 1 bit = 0.1 sec.

9.368 AUXFAN1 Max Duty compare Source Select Register – Index 68h (Bank 8)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved					AUXFAN1 Max Duty compare Source Select		
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-3	Reserved
2	AUXFAN1 Max Duty Source Select 0: Disable AUXFAN0 Duty 1: Enable AUXFAN0 Duty
1	AUXFAN1 Max Duty Source Select 0: Disable CPUFAN Duty 1: Enable CPUFAN Duty
0	AUXFAN1 Max Duty Source Select 0: Disable SYSFAN Duty 1: Enable SYSFAN Duty

9.369 AUXFAN1 Max Duty Output Register – Index 69h (Bank 8)

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN1 Max Duty Output							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
0	AUXFAN1 Max Duty Output

9.370 AUXFAN2 Monitor Temperature Source Select Register/ STOPDUTY Enable Register – Index 00h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Stopduty_En	Reserved			AUXFAN2 SOURCE[4:0]			
DEFAULT	0	0	0	0	0	0	1	1

BIT	DESCRIPTION
7	Stopduty_En: 0: FANOUT will decrease to zero value at most if necessary. 1: FANOUT will decrease to AUXFANOUT2 Stop Value (Bank9, index05h) at most if necessary. (This function is for Thermal Cruise mode.)
6-5	Reserved
4-0	AUXFAN2 Temperature Source Select: Bits 4 3 2 1 0 0 0 0 0 1: Select SYSTIN as AUXFAN2 monitoring source. 0 0 0 1 0: Select CPUTIN as AUXFAN2 monitoring source. 0 0 0 1 1: Select AUXTIN0 as AUXFAN2 monitoring source. 0 0 1 0 0: Select AUXTIN1 as AUXFAN2 monitoring source. 0 0 1 0 1: Select AUXTIN2 as AUXFAN2 monitoring source. 0 0 1 1 0: Select AUXTIN3 as AUXFAN2 monitoring source. 0 0 1 1 1: Reserved 0 1 0 0 0: Select SMBUSMASTER 0 as AUXFAN2 monitoring source. 0 1 0 0 1: Select SMBUSMASTER 1 as AUXFAN2 monitoring source. 0 1 0 1 0: Reserved 0 1 0 1 1: Reserved 0 1 1 0 0: Reserved 0 1 1 0 1: Reserved 0 1 1 1 0: Reserved 0 1 1 1 1: Reserved 1 0 0 0 0: Select PECI Agent 0 as AUXFAN2 monitoring source. 1 0 0 0 1: Select PECI Agent 1 as AUXFAN2 monitoring source. 1 0 0 1 0: Select PCH_CHIP_CPU_MAX_TEMP as AUXFAN2 monitoring source. 1 0 0 1 1: Select PCH_CHIP_TEMP as AUXFAN2 monitoring source. 1 0 1 0 0: Select PCH_CPU_TEMP as AUXFAN2 monitoring source. 1 0 1 0 1: Select PCH_MCH_TEMP as AUXFAN2 monitoring source. 1 0 1 1 0: Select Agent0 Dimm0 as AUXFAN2 monitoring source.

	1 0 1 1 1: Select Agent0 Dimm1 as AUXFAN2 monitoring source.
	1 1 0 0 0: Select Agent1 Dimm0 as AUXFAN2 monitoring source.
	1 1 0 0 1: Select Agent1 Dimm1 as AUXFAN2 monitoring source.
	1 1 0 1 0: Select BYTE_TEMP0 as AUXFAN2 monitoring source.
	1 1 0 1 1: Select BYTE_TEMP1 as AUXFAN2 monitoring source.
	1 1 1 0 0: Select PECI Agent 0 Calibration as AUXFAN2 monitoring source.
	1 1 1 0 1: Select PECI Agent 1 Calibration as AUXFAN2 monitoring source.
	1 1 1 1 1: Select Virtual_TEMP as AUXFAN2 monitoring source.

Note. If the temperature source is selecting to PECI, please set Bank0 Index AEh first for reading correct value.

9.371 AUXFAN2 Target Temperature Register / AUXFANIN2 Target Speed_L Register – Index 01h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXTIN2 Target Temperature / AUXFANIN2 Target Speed_L							
DEFAULT	0	0	0	0	0	0	0	0

FUNCTION MODE		7	6	5	4	3	2	1	0
Thermal Cruise TM	DESCRIPTION	AUXFAN2 Target Temperature							
Fan Speed Cruise TM	DESCRIPTION	AUXFANIN2 Target Speed [7:0], [11:8] associate index 0C [3:0]							

9.372 AUXFAN2 MODE Register / AUXFAN2 TOLERRANCE Register – Index 02h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#(Bit2-0)

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 MODE				Reseved	Tolerance of AUXFAN2 Target Temperature or AUXFANIN2 Target Speed_L		
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-4	AUXFANOUT2 Mode Select. 0000: AUXFANOUT2 is in Manual Mode. (Default) 0001: AUXFANOUT2 is in Thermal Cruise Mode. 0010: AUXFANOUT2 is as Speed Cruise Mode. 0100: AUXFANOUT2 is in SMART FAN IV Mode.
3	Reseved
2-0	Tolerance of AUXFAN2 Target Temperature or AUXFANIN2 Target Speed_L.

9.373 AUXFANOUT2 Step Up Time Register – Index 03h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT2 Value Step Up Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time AUXFANOUT2 takes to increase its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.374 AUXFANOUT2 Step Down Time Register – Index 04h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT2 Value Step Down Time							
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time AUXFANOUT2 takes to decrease its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.375 AUXFANOUT2 Stop Value Register – Index 05h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT2 Stop Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, the AUXFANOUT2 value decreases to this eight-bit value if the temperature stays below the lowest temperature limit. This value should not be zero.

Please note that Stop Value does not mean that the fan really stops. It means that if the temperature keeps below low temperature limit, then the fan speed keeps on decreasing until reaching a minimum value, and this is Stop Value.

9.376 AUXFANOUT2 Start-up Value Register – Index 06h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT2 Start-Up Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, AUXFANOUT2 value increases from zero to this eight-bit register value to provide a minimum value to turn on the fan. This value should not be zero.

9.377 AUXFANOUT2 Stop Time Register – Index 07h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT2 Value Stop Time							
DEFAULT	0	0	1	1	1	1	0	0

In Thermal Cruise mode, this register determines the amount of time it takes AUXFANOUT2 value to fall from the stop value to zero.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.378 AUXFANOUT2 Output Value Select Register – Index 09h (Bank 9)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT2 Value							
DEFAULT	1	1	1	1	1	1	1	1

The default speed of fan output is specified in registers CR[E0h] to CR[E4h] of Logical Device B, CR[E4h] is the Default Speed Configuration Register of AUXFANOUT2.

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output	DESCRIPTION	The PWM duty cycle is equal to this eight-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							

9.379 AUXFANIN2 Tolerance_H / Target Speed_H Register – Index 0Ch (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	AUXFANIN2 TOL_H			AUXFANIN2 Target Speed_H			
DEFAULT	0		0			0		

BIT	DESCRIPTION
7	Reserved
6-4	AUXFANIN2 Tolerance_H [5:3]
3-0	AUXFANIN2 Target Speed_H [11:8]

9.380 AUXFAN2 (SMART FAN™ IV) Temperature 1 Register(T1) – Index 21h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 (SMART FAN™ IV) Temperature 1							
DEFAULT	0	0	0	1	1	0	0	1

BIT	DESCRIPTION							
7-0	AUXFAN2 (SMART FAN™ IV) Temperature 1 Register (T1).							

9.381 AUXFAN2 (SMART FAN™ IV) Temperature 2 Register(T2) – Index 22h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 (SMART FAN™ IV) Temperature 2							
DEFAULT	0	0	1	0	0	0	1	1

BIT	DESCRIPTION							
7-0	AUXFAN2 (SMART FAN™ IV) Temperature 2 Register (T2).							

9.382 AUXFAN2 (SMART FAN™ IV) Temperature 3 Register(T3) – Index 23h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 (SMART FAN™ IV) Temperature 3							
DEFAULT	0	0	1	0	1	1	0	1

BIT	DESCRIPTION							
7-0	AUXFAN2 (SMART FAN™ IV) Temperature 3 Register (T3).							

9.383 AUXFAN2 (SMART FAN™ IV) Temperature 4 Register(T4) – Index 24h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 (SMART FAN™ IV) Temperature 4							
DEFAULT	0	0	1	1	0	1	1	1

BIT	DESCRIPTION
7-0	AUXFAN2 (SMART FAN TM IV) Temperature 4 Register (T4).

9.384 AUXFAN2 (SMART FANTM IV) PWM 1 Register – Index 27h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 (SMART FAN TM IV) PWM 1							
DEFAULT	1	0	0	0	1	1	0	0

BIT	DESCRIPTION
7-0	AUXFAN2 (SMART FAN TM IV) PWM 1 Register.

9.385 AUXFAN2 (SMART FANTM IV) PWM 2 Register – Index 28h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 (SMART FAN TM IV) PWM 2							
DEFAULT	1	0	1	0	1	0	1	0

BIT	DESCRIPTION
7-0	AUXFAN2 (SMART FAN TM IV) PWM 2 Register.

9.386 AUXFAN2 (SMART FANTM IV) PWM 3 Register – Index 29h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 (SMART FAN TM IV) PWM 3							
DEFAULT	1	1	0	0	1	0	0	0

BIT	DESCRIPTION
7-0	AUXFAN2 (SMART FAN TM IV) PWM 3 Register.

9.387 AUXFAN2 (SMART FANTM IV) PWM 4 Register – Index 2Ah (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 (SMART FAN™ IV) PWM 4							
DEFAULT	1	1	1	0	0	1	1	0

BIT	DESCRIPTION
7-0	AUXFAN2 (SMART FAN™ IV) PWM 4 Register.

9.388 AUXFAN2 (SMART FAN™ IV) Critical Temperature Register – Index 35h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 (SMART FAN™ IV) Temperature Critical							
DEFAULT	0	0	1	1	1	1	0	0

BIT	DESCRIPTION
7-0	AUXFAN2 (SMART FAN™ IV) Critical Temperature Register

9.389 AUXFAN2 Enable Critical Duty – Index 36h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	0							

BIT	DESCRIPTION
7-1	Reserved
0	En_AUX2_CRITICAL_DUTY (set 0 in manual mode) 0: Load default Full Speed 8'hFF for AUXFANOUT2. 1: Used Index 37 CRITICAL_DUTY Value for AUXFANOUT2.

9.390 AUXFAN2 Critical Duty Register – Index 37h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN2 Critical Duty							
DEFAULT	CC							

BIT	DESCRIPTION

7-0	AUXFAN2 Critical Duty.
-----	------------------------

9.391 AUXFANOUT2 Critical Temperature Tolerance Register – Index 38h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						AUXFANOUT2 Critical Temperature Tolerance	
DEFAULT	0				0	0	0	0

BIT	DESCRIPTION
7-3	Reserved
2-0	AUXFANOUT2 Critical Temperature Tolerance

9.392 AUXFAN2 PECLERR DUTY Enable Register – Index 3Fh (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						EN_AUX2_PECLERR_DUTY	
DEFAULT	0				0	0	0	0

BIT	DESCRIPTION
7-2	Reserved
1-0	EN_AUX2_PECLERR_DUTY 00: Disable PECLERR DUTY FANOUT (default) 01: Enable PECLERR DUTY FANOUT, Used Index 41 PECLERR_AUXOUT2 Value for AUXFANOUT2. 10,11: Keep Full Speed

9.393 AUXFANOUT2 Pre-Configured Register For PECL Error – Index 41h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT2 pre-configured register for PECL error (PECLERR_AUXOUT2)							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION
7-0	AUXFANOUT2 pre-configured register for PECL error.

9.394 DUTY PER STEP Register – Index 66h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	UP_STEP				DOWN_STEP			
DEFAULT	0	0	0	1	0	0	0	1

BIT	DESCRIPTION
7-4	UP unit.
3-0	DOWN unit.

9.395 T1 Delay Time Register – Index 67h (Bank 9)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	T1 Delay time							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	T1 Delay time for FAN. 1 bit = 0.1 sec.

9.396 AUXFAN3 Monitor Temperature Source Select Register/ STOPDUTY Enable Register – Index 00h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Stopduty_En	Reserved			AUXFAN3 SOURCE[4:0]			
DEFAULT	0	0	0	0	0	0	1	1

BIT	DESCRIPTION
7	Stopduty_En: 0: FANOUT will decrease to zero value at most if necessary. 1: FANOUT will decrease to AUXFANOUT2 Stop Value (Bank9, index05h) at most if necessary. (This function is for Thermal Cruise mode.)
6-5	Reserved
4-0	AUXFAN3 Temperature Source Select: Bits 4 3 2 1 0 0 0 0 0 1: Select SYSTIN as AUXFAN3 monitoring source. 0 0 0 1 0: Select CPUTIN as AUXFAN3 monitoring source. 0 0 0 1 1: Select AUXTIN0 as AUXFAN3 monitoring source. 0 0 1 0 0: Select AUXTIN1 as AUXFAN3 monitoring source. 0 0 1 0 1: Select AUXTIN2 as AUXFAN3 monitoring source.

0 0 1 1 0: Select AUXTIN3 as AUXFAN3 monitoring source.
0 0 1 1 1: Reserved
0 1 0 0 0: Select SMBUSMASTER 0 as AUXFAN3 monitoring source.
0 1 0 0 1: Select SMBUSMASTER 1 as AUXFAN3 monitoring source.
0 1 0 1 0: Reserved
0 1 0 1 1: Reserved
0 1 1 0 0: Reserved
0 1 1 0 1: Reserved
0 1 1 1 0: Reserved
0 1 1 1 1: Reserved
1 0 0 0 0: Select PECI Agent 0 as AUXFAN3 monitoring source.
1 0 0 0 1: Select PECI Agent 1 as AUXFAN3 monitoring source.
1 0 0 1 0: Select PCH_CHIP_CPU_MAX_TEMP as AUXFAN3 monitoring source.
1 0 0 1 1: Select PCH_CHIP_TEMP as AUXFAN3 monitoring source.
1 0 1 0 0: Select PCH_CPU_TEMP as AUXFAN3 monitoring source.
1 0 1 0 1: Select PCH_MCH_TEMP as AUXFAN3 monitoring source.
1 0 1 1 0: Select Agent0 Dimm0 as AUXFAN3 monitoring source.
1 0 1 1 1: Select Agent0 Dimm1 as AUXFAN3 monitoring source.
1 1 0 0 0: Select Agent1 Dimm0 as AUXFAN3 monitoring source.
1 1 0 0 1: Select Agent1 Dimm1 as AUXFAN3 monitoring source.
1 1 0 1 0: Select BYTE_TEMP0 as AUXFAN3 monitoring source.
1 1 0 1 1: Select BYTE_TEMP1 as AUXFAN3 monitoring source.
1 1 1 0 0: Select PECI Agent 0 Calibration as AUXFAN3 monitoring source.
1 1 1 0 1: Select PECI Agent 1 Calibration as AUXFAN3 monitoring source.
1 1 1 1 1: Select Virtual_TEMP as AUXFAN3 monitoring source.

Note. If the temperature source is selecting to PECI, please set Bank0 Index AEh first for reading correct value.

9.397 AUXFAN3 Target Temperature Register / AUXFANIN3 Target Speed_L Register – Index 01h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXTIN3 Target Temperature / AUXFANIN2 Target Speed_L							
DEFAULT	0	0	0	0	0	0	0	0

FUNCTION MODE	DESCRIPTION	7	6	5	4	3	2	1	0
Thermal Cruise TM	DESCRIPTION	AUXFAN3 Target Temperature							
Fan Speed Cruise TM	DESCRIPTION	AUXFANIN3 Target Speed [7:0], [11:8] associate index 0C [3:0]							

9.398 AUXFAN3 MODE Register / AUXFAN2 TOLERRANCE Register – Index 02h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#(Bit2-0)

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 MODE					Reseved	Tolerance of AUXFAN3 Target Temperature or AUXFANIN3 Target Speed_L	

DEFAULT	0	0	0	0	0	0	0	0
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BIT	DESCRIPTION
7-4	AUXFANOUT3 Mode Select. 0000: AUXFANOUT3 is in Manual Mode. (Default) 0001: AUXFANOUT3 is in Thermal Cruise Mode. 0010: AUXFANOUT3 is as Speed Cruise Mode. 0100: AUXFANOUT3 is in SMART FAN IV Mode.
3	Reseved
2-0	Tolerance of AUXFAN3 Target Temperature or AUXFANIN3 Target Speed_L.

9.399 AUXFANOUT3 Step Up Time Register – Index 03h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
AUXFANOUT3 Value Step Up Time								
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time AUXFANOUT3 takes to increase its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.400 AUXFANOUT3 Step Down Time Register – Index 04h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
AUXFANOUT3 Value Step Down Time								
DEFAULT	0	0	0	0	1	0	1	0

In SMART FAN™ mode, this register determines the amount of time AUXFANOUT3 takes to decrease its value by one step.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.401 AUXFANOUT3 Stop Value Register – Index 05h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
AUXFANOUT3 Stop Value								
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, the AUXFANOUT3 value decreases to this eight-bit value if the temperature stays below the lowest temperature limit. This value should not be zero.

Please note that Stop Value does not mean that the fan really stops. It means that if the temperature keeps below low temperature limit, then the fan speed keeps on decreasing until reaching a minimum value, and this is Stop Value.

9.402 AUXFANOUT3 Start-up Value Register – Index 06h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT3 Start-Up Value							
DEFAULT	0	0	0	0	0	0	0	1

In Thermal Cruise mode, AUXFANOUT3 value increases from zero to this eight-bit register value to provide a minimum value to turn on the fan. This value should not be zero.

9.403 AUXFANOUT3 Stop Time Register – Index 07h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT3 Value Stop Time							
DEFAULT	0	0	1	1	1	1	0	0

In Thermal Cruise mode, this register determines the amount of time it takes AUXFANOUT3 value to fall from the stop value to zero.

(1) For PWM output:

The units are intervals of 0.1 second. The default time is 1 second.

9.404 AUXFANOUT3 Output Value Select Register – Index 09h (Bank A)

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT3 Value							
DEFAULT	1	1	1	1	1	1	1	1

The default speed of fan output is specified in registers CR[E0h] to CR[E4h] of Logical Device B, CR[E4h] is the Default Speed Configuration Register of AUXFANOUT3.

FUNCTION MODE		7	6	5	4	3	2	1	0
PWM Output	DESCRIPTION	The PWM duty cycle is equal to this eight-bit value, divided by 255, times 100%. FFh creates a duty cycle of 100%, and 00h creates a duty cycle of 0%.							

9.405 AUXFANIN3 Tolerance_H / Target Speed_H Register – Index 0Ch (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	AUXFANIN3 TOL_H					AUXFANIN3 Target Speed_H	
DEFAULT	0	0					0	

BIT	DESCRIPTION							
7	Reserved							
6-4	AUXFANIN3 Tolerance_H [5:3]							
3-0	AUXFANIN3 Target Speed_H [11:8]							

9.406 AUXFAN3 (SMART FAN™ IV) Temperature 1 Register(T1) – Index 21h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 (SMART FAN™ IV) Temperature 1							
DEFAULT	0	0	0	1	1	0	0	1

BIT	DESCRIPTION							
7-0	AUXFAN3 (SMART FAN™ IV) Temperature 1 Register (T1).							

9.407 AUXFAN3 (SMART FAN™ IV) Temperature 2 Register(T2) – Index 22h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 (SMART FAN™ IV) Temperature 2							
DEFAULT	0	0	1	0	0	0	1	1

BIT	DESCRIPTION							
7-0	AUXFAN3 (SMART FAN™ IV) Temperature 2 Register (T2).							

9.408 AUXFAN3 (SMART FAN™ IV) Temperature 3 Register(T3) – Index 23h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
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NAME	AUXFAN2(SMART FAN™ IV) Temperature 3							
DEFAULT	0	0	1	0	1	1	0	1

BIT	DESCRIPTION
7-0	AUXFAN3 (SMART FAN™ IV) Temperature 3 Register (T3).

9.409 AUXFAN3 (SMART FAN™ IV) Temperature 4 Register(T4) – Index 24h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 (SMART FAN™ IV) Temperature 4							
DEFAULT	0	0	1	1	0	1	1	1

BIT	DESCRIPTION
7-0	AUXFAN3 (SMART FAN™ IV) Temperature 4 Register (T4).

9.410 AUXFAN3 (SMART FAN™ IV) PWM 1 Register – Index 27h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 (SMART FAN™ IV) PWM 1							
DEFAULT	1	0	0	0	1	1	0	0

BIT	DESCRIPTION
7-0	AUXFAN3 (SMART FAN™ IV) PWM 1 Register.

9.411 AUXFAN3 (SMART FAN™ IV) PWM 2 Register – Index 28h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 (SMART FAN™ IV) PWM 2							
DEFAULT	1	0	1	0	1	0	1	0

BIT	DESCRIPTION
7-0	AUXFAN3 (SMART FAN™ IV) PWM 2 Register.

9.412 AUXFAN3 (SMART FAN™ IV) PWM 3 Register – Index 29h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 (SMART FAN™ IV) PWM 3							
DEFAULT	1	1	0	0	1	0	0	0

BIT	DESCRIPTION
7-0	AUXFAN3 (SMART FAN™ IV) PWM 3 Register.

9.413 AUXFAN3 (SMART FAN™ IV) PWM 4 Register – Index 2Ah (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 (SMART FAN™ IV) PWM 4							
DEFAULT	1	1	1	0	0	1	1	0

BIT	DESCRIPTION
7-0	AUXFAN3 (SMART FAN™ IV) PWM 4 Register.

9.414 AUXFAN3 (SMART FAN™ IV) Critical Temperature Register – Index 35h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 (SMART FAN™ IV) Temperature Critical							
DEFAULT	0	0	1	1	1	1	0	0

BIT	DESCRIPTION
7-0	AUXFAN3 (SMART FAN™ IV) Critical Temperature Register

9.415 AUXFAN3 Enable Critical Duty – Index 36h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							
DEFAULT	0							

BIT	DESCRIPTION
7-1	Reserved

0	En_AUX3_CRITICAL_DUTY (set 0 in manual mode) 0: Load default Full Speed 8'hFF for AUXFANOUT3. 1: Used Index 37 CRITICAL_DUTY Value for AUXFANOUT3.
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9.416 AUXFAN3 Critical Duty Register – Index 37h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFAN3 Critical Duty							
DEFAULT	CC							

BIT	DESCRIPTION
7-0	AUXFAN3 Critical Duty.

9.417 AUXFANOUT3 Critical Temperature Tolerance Register – Index 38h (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved						AUXFANOUT3 Critical Temperature Tolerance	
DEFAULT	0						0	0

BIT	DESCRIPTION
7-3	Reserved
2-0	AUXFANOUT3 Critical Temperature Tolerance

9.418 AUXFAN3 PECLERR DUTY Enable Register – Index 3Fh (Bank A)

Attribute: Read/Write

Size: 8 bits

Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	Reserved							EN_AUX3_PECLERR_DUTY
DEFAULT	0							0

BIT	DESCRIPTION
7-2	Reserved
1-0	EN_AUX3_PECLERR_DUTY 00: Disable PECLERR DUTY FANOUT (default) 01: Enable PECLERR DUTY FANOUT, Used Index 41 PECLERR_AUXOUT3 Value for AUXFANOUT2. 10,11: Keep Full Speed

9.419 AUXFANOUT3 Pre-Configured Register For PECL Error – Index 41h (Bank A)

Attribute: Read/Write
 Size: 8 bits
 Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	AUXFANOUT3 pre-configured register for PECL error (PECL_ERR_AUXOUT3)							
DEFAULT	1	1	1	1	1	1	1	1

BIT	DESCRIPTION							
7-0	AUXFANOUT3 pre-configured register for PECL error.							

9.420 DUTY PER STEP Register – Index 66h (Bank A)

Attribute: Read/Write
 Size: 8 bits
 Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	UP_STEP				DOWN_STEP			
DEFAULT	0	0	0	1	0	0	0	1

BIT	DESCRIPTION							
7-4	UP unit.							
3-0	DOWN unit.							

9.421 T1 Delay Time Register – Index 67h (Bank A)

Attribute: Read/Write
 Size: 8 bits
 Reset by: RSMRST#

BIT	7	6	5	4	3	2	1	0
NAME	T1 Delay time							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	T1 Delay time for FAN. 1 bit = 0.1 sec.							

10. UART PORT

10.1 UART Control Register (UCR) (Read/Write)

The UART Control Register defines and controls the protocol for asynchronous data communications, including data length, stop bit, parity, and baud rate selection.

BIT	7	6	5	4	3	2	1	0
NAME	BDLAB	SSE	PBFE	EPE	PBE	MSBE	DLS1	DLS0
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	BDLAB (Baud Rate Divisor Latch Access Bit). When this bit is set to logic 1, designers can access the divisor (in 16-bit binary format) from the divisor latches of the baud-rate generator during a read or write operation. When this bit is set to logic 0, the Receiver Buffer Register, the Transmitter Buffer Register, and the Interrupt Control Register can be accessed.
6	SSE (Set Silence Enable). A logic 1 forces the Serial Output (SOUT) to a silent state (a logical 0). Only IRTX is affected by this bit; the transmitter is not affected.
5	PBFE (Parity Bit Fixed Enable). When PBE and PBFE of UCR are both set to logic 1, (1) if EPE is logic 1, the parity bit is logical 0 when transmitting and checking; (2) if EPE is logic 0, the parity bit is logical 1 when transmitting and checking.
4	EPE (Even Parity Enable). When PBE is set to logic 1, this bit counts the number of logic 1's in the data word bits and determines the parity bit. When this bit is set to logic 1, the parity bit is set to logic 1 if an even number of logic 1's are sent or checked. When the bit is set to logic 0, the parity bit is logic 1, if an odd number of logic 1's are sent or checked.
3	PBE (Parity Bit Enable). When this bit is set to logic 1, the transmitter inserts a stop bit between the last data bit and the stop bit of the SOUT, and the receiver checks the parity bit in the same position.
2	MSBE (Multiple Stop Bit Enable). Defines the number of stop bits in each serial character that is transmitted or received. (1) If MSBE is set to logic 0, one stop bit is sent and checked. (2) If MSBE is set to logic 1 and the data length is 5 bits, one-and-a-half stop bits are sent and checked. (3) If MSBE is set to logic 1 and the data length is 6, 7, or 8 bits, two stop bits are sent and checked.
1	DLS1 (Data Length Select Bit 1). Defines the number of data bits that are sent or checked in each serial character.
0	DLS0 (Data Length Select Bit 0). Defines the number of data bits that are sent or checked in each serial character.

DLS1	DLS0	DATA LENGTH
0	0	5 bits
0	1	6 bits
1	0	7 bits

DLS1	DLS0	DATA LENGTH
1	1	8 bits

The following table identifies the remaining UART registers. Each one is described separately in the following sections.

Table 10-1 Register Summary for UART

Bit Number										
Register Address Base		0	1	2	3	4	5	6	7	
+ 0 BDLAB = 0	Receiver Buffer Register (Read Only)	RBR	RX Data Bit 0	RX Data Bit 1	RX Data Bit 2	RX Data Bit 3	RX Data Bit 4	RX Data Bit 5	RX Data Bit 6	RX Data Bit 7
+ 0 BDLAB = 0	Transmitter Buffer Register (Write Only)	TBR	TX Data Bit 0	TX Data Bit 1	TX Data Bit 2	TX Data Bit 3	TX Data Bit 4	TX Data Bit 5	TX Data Bit 6	TX Data Bit 7
+ 1 BDLAB = 0	Interrupt Control Register	ICR	RBR Data Ready Interrupt Enable (ERDRI)	TBR Empty Interrupt Enable (ETBREI)	USR Interrupt Enable (EUSRI)	HSR Interrupt Enable (EHSRI)	0	0	0	0
+ 2	Interrupt Status Register (Read Only)	ISR	"0" if Interrupt Pending	Interrupt Status Bit (0)	Interrupt Status Bit (1)	Interrupt Status Bit (2)**	0	0	FIFOs Enabled **	FIFOs Enabled **
+ 2	UART FIFO Control Register (Write Only)	UFR	FIFO Enable	RCVR FIFO Reset	XMIT FIFO Reset	DMA Mode Select	Reserved	Reversed	RX Interrupt Active Level (LSB)	RX Interrupt Active Level (MSB)
+ 3	UART Control Register	UCR	Data Length Select Bit 0 (DLS0)	Data Length Select Bit 1 (DLS1)	Multiple Stop Bits Enable (MSBE)	Parity Bit Enable (PBE)	Even Parity Enable (EPE)	Parity Bit Fixed Enable (PBFE)	Set Silence Enable (SSE)	Baudrate Divisor Latch Access Bit (BDLAB)
+ 4	Handshake Control Register	HCR	Data Terminal Ready (DTR)	Request to Send (RTS)	Loopback RI Input	IRQ Enable	Internal Loopback Enable	0	0	0
+ 5	UART Status Register	USR	RBR Data Ready (RDR)	Overrun Error (OER)	Parity Bit Error (PBER)	No Stop Bit Error (NSER)	Silent Byte Detected (SBD)	TBR Empty (TBRE)	TSR Empty (TSRE)	RX FIFO Error Indication (RFEI) **
+ 6	Handshake Status Register	HSR	CTS Toggling (TCTS)	DSR Toggling (TDSR)	RI Falling Edge (FERI)	DCD Toggling (TDCD)	Clear to Send (CTS)	Data Set Ready (DSR)	Ring Indicator (RI)	Data Carrier Detect (DCD)
+ 7	User Defined Register	UDR	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
+ 0 BDLAB = 1	Baudrate Divisor Latch Low	BLL	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
+ 1 BDLAB = 1	Baudrate Divisor Latch High	BHL	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15

*: Bit 0 is the least significant bit. The least significant bit is the first bit serially transmitted or received.

**: These bits are always 0 in 16450 Mode.

10.2 UART Status Register (USR) (Read/Write)

This 8-bit register provides information about the status of data transfer during communication.

BIT	7	6	5	4	3	2	1	0
NAME	RF EI	TSRE	TBRE	SBD	NSER	PBER	OER	RDR
DEFAULT	0	1	1	0	0	0	0	0

BIT	DESCRIPTION
7	RF EI (RX FIFO Error Indication). In 16450 mode, this bit is always set to logical 0. in 16550 mode, this bit is set to logical 1 when there is at least one parity-bit error and no stop0bit error or silent-byte detected in the FIFO. In 16550 mode, this bit is cleared to logical 0 by reading from the USR if there are no remaining errors left in the FIFO.
6	TSRE (Transmitter Shift Register Empty). In 16450 mode, this bit is set to logical 1 when TBR and TSR are both empty. In 16550 mode, it is set to logical 1 when the transmit FIFO and TSR are both empty. Otherwise, this bit is set to logical 0.
5	TBRE (Transmitter Buffer Register Empty). In 16450 mode, when a data character is transferred from TBR to TSR, this bit is set to logical 1. If ETREI of ICR is high, and interrupt is generated to notify the CPU to write next data. In 16550 mode, this bit is set to logical 1 when the transmit FIFO is empty. It is set to logical 0 when the CPU writes data into TBR or the FIFO.
4	SBD (Silent Byte Detected). This bit is set to logical 1 to indicate that received data are kept in silent state for the time it takes to receive a full word, which includes the start bit, data bits, parity bit, and stop bits. In 16550 mode, it indicates the same condition for the data on the top of the FIFO. When the CPU reads USR, it sets this bit to logical 0.
3	NSER (No Stop Bit Error). This bit is set to logical 1 to indicate that the received data have no stop bit. In 16550 mode, it indicates the same condition for the data on the top of the FIFO. When the CPU reads USR, it sets this bit to logical 0.
2	PBER (Parity Bit Error). This bit is set to logical 1 to indicate that the received data has the wrong parity bit. In 16550 mode, it indicates the same condition for the data on the top of the FIFO. When the CPU reads USR, it sets this bit to logical 0.
1	OER (Overrun Error). This bit is set to logical 1 to indicate that the received data have been overwritten by the next received data before they were read by the CPU. In 16550 mode, it indicates the same condition, instead of FIFO full. When the CPU reads USR, it sets this bit to logical 0.
0	RDR (RBR Data Ready). This bit is set to logical 1 to indicate that the received data are ready to be read by the CPU in the RBR or FIFO. When no data are left in the RBR or FIFO, the bit is set to logical 0.

10.3 Handshake Control Register (HCR) (Read/Write)

This register controls pins used with handshaking peripherals such as modems and also controls the diagnostic mode of the UART.

BIT	7	6	5	4	3	2	1	0
NAME	RESERVED			INTERNAL LOOPBACK ENABLE	IRQ ENABLE	LOOPBACK RI INPUT	RTS	DTR
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-5	Reserved
4	<p>Internal Loopback Enable. When this bit is set to logic 1, the UART enters diagnostic mode, as follows:</p> <ol style="list-style-type: none"> (1) SOUT is forced to logic 1, and SIN is isolated from the communication link. (2) The modem output pins are set to their inactive state. (3) The modem input pins are isolated from the communication link and connect internally as DTR (bit 0 of HCR) → DSR#, RTS (bit 1 of HCR) → CTS#, Loopback RI input (bit 2 of HCR) → RI# and IRQ enable (bit 3 of HCR) → DCD#. <p>Aside from the above connections, the UART operates normally. This method allows the CPU to test the UART in a convenient way.</p>
3	IRQ Enable. The UART interrupt output is enabled by setting this bit to logic 1. In diagnostic mode, this bit is internally connected to the modem control input DCD#.
2	Loopback RI Input. This bit is only used in the diagnostic mode. In diagnostic mode, this bit is internally connected to the modem control input RI#.
1	RTS (Request to Send). This bit controls the RTS# output. The value of this bit is inverted and output to RTS#.
0	DTR (Data Terminal Ready). This bit controls the DTR# output. The value of this bit is inverted and output to DTR#.

10.4 Handshake Status Register (HSR) (Read/Write)

This register reflects the current state of four input pins used with handshake peripherals such as modems and records changes on these pins.

BIT	7	6	5	4	3	2	1	0
NAME	DCD	RI	DSR	CTS	TDCD	FERI	TDSR	TCTS
DEFAULT	NA	NA	NA	NA	NA	NA	NA	NA

BIT	DESCRIPTION
7	DCD (Data Carrier Detect). This bit is the inverse of the DCD# input and is equivalent to bit 3 of HCR in Loopback mode.
6	RI (Ring Indicator). This bit is the inverse of the RI# input and is equivalent to bit 2 of HCR in Loopback mode.
5	DSR (Data Set Ready). This bit is the inverse of the DSR# input and is equivalent to bit 0 of HCR in Loopback mode.
4	CTS (Clear to Send). This bit is the inverse of the CTS# input and is equivalent to bit 1 of HCR in Loopback mode.
3	TDCD (DCD# Toggling). This bit indicates that the state of the DCD# pin has changed after HSR is read by the CPU.
2	FERI (RI Falling Edge). This bit indicates that the RI# pin has changed from low to high after HSR is read by the CPU.
1	TDSR (DSR# Toggling). This bit indicates that the state of the DSR# pin has changed after HSR is read by the CPU.
0	TCTS (CTS# Toggling). This bit indicates that the state of the CTS# pin has changed after HSR is read by the CPU.

10.5 UART FIFO Control Register (UFR) (Write only)

This register is used to control the FIFO functions of the UART.

BIT	7	6	5	4	3	2	1	0
NAME	MSB	LSB	RESERVED		DMA MODE SELECT	TRANSMITTER FIFO RESET	RECEIVER FIFO RESET	FIFO ENABLE
DEFAULT	0	0	NA	NA	0	0	0	0

BIT	DESCRIPTION		
7	MSB (RX Interrupt Active Level).	These two bits are used to set the active level of the receiver FIFO interrupt. The active level is the number of bytes that must be in the receiver FIFO to generate an interrupt.	
6			
5-4	RESERVED		
3	DMS MODE SELECT. When this bit is set to logic 1, DMA mode changes from mode 0 to mode 1 if UFR bit 0 = 1.		
2	TRANSMITTER FIFO RESET. Setting this bit to logic 1 resets the TX FIFO counter logic to its initial state. This bit is automatically cleared afterwards.		
1	RECEIVER FIFO RESET. Setting this bit to logic 1 resets the RX FIFO counter logic to its initial state. This bit is automatically cleared afterwards.		
0	FIFO ENABLE. This bit enables 16550 (FIFO) mode. This bit should be set to logic 1 before other UFR bits are programmed.		

BIT 7	BIT 6	RX FIFO INTERRUPT ACTIVE LEVEL (BYTES)
0	0	01
0	1	04
1	0	08
1	1	14

10.6 Interrupt Status Register (ISR) (Read only)

This register reflects the UART interrupt status.

BIT	7	6	5	4	3	2	1	0
NAME	FIFOS ENABLED		RESERVED		INTERRUPT STATUS BIT 2	INTERRUPT STATUS BIT 1	INTERRUPT STATUS BIT 0	0 IF INTERRUPT PENDING
DEFAULT	0	0	0	0	0	0	0	1

BIT	DESCRIPTION	
7-6	FIFOS ENABLED. Set to logical 1 when UFR, bit 0 = 1.	
5-4	RESERVED	
3	INTERRUPT STATUS BIT 2. In 16450 mode, this bit is logical 0. In 16550 mode, bits 3 and 2 are set to logical 1 when a time-out interrupt is pending. Please see the table	

	below.						
2	INTERRUPT STATUS BIT 1.				These two bits identify the priority level of the pending interrupt, as shown in the table below.		
1	INTERRUPT STATUS BIT 0.						
0	0 IF INTERRUPT PENDING. This bit is logic 1 if there is no interrupt pending. If one of the interrupt sources has occurred, this bit is set to logical 0.						

ISR				INTERRUPT SET AND FUNCTION				
Bit 3	Bit 2	Bit 1	Bit 0	Interrupt priority	Interrupt Type	Interrupt Source	Clear Interrupt	
0	0	0	1	-	-	No Interrupt pending	-	
0	1	1	0	First	UART Receive Status	1. OER = 1 2. PBER =1 3. NSER = 1 4. SBD = 1	Read USR	
0	1	0	0	Second	RBR Data Ready	1. RBR data ready 2. FIFO interrupt active level reached	1. Read RBR 2. Read RBR until FIFO data under active level	
1	1	0	0	Second	FIFO Data Timeout	Data present in RX FIFO for 4 characters period of time since last access of RX FIFO.	Read RBR	
0	0	1	0	Third	TBR Empty	TBR empty	1. Write data into TBR 2. Read ISR (if priority is third)	
0	0	0	0	Fourth	Handshake status	1. TCTS = 1 2. TDSR = 1 3. FERI = 1 4. TDCCD = 1	Read HSR	

** Bit 3 of ISR is enabled when bit 0 of UFR is logical 1.

10.7 Interrupt Control Register (ICR) (Read/Write)

This 8-bit register enables and disables the five types of controller interrupts separately. A selected interrupt can be enabled by setting the appropriate bit to logical 1. The interrupt system can be totally disabled by setting bits 0 through 3 to logical 0.

BIT	7	6	5	4	3	2	1	0
NAME	En_address_byte	RX_ctrl	RESERVED		EHSRI	EUSRI	ETBREI	ERDRI
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	En_address_byte. 0: Tx block will send data byte. (If enable 9bit mode function CRF2 Bit0=1) 1: Tx block will send address byte. (If enable 9bit mode function CRF2 Bit0=1)
6	RX_ctrl. 0: Rx block could receive data byte. (If enable 9bit mode function CRF2 Bit0=1) 1: Rx block could receive address byte. (If enable 9bit mode function CRF2 Bit0=1)
5-4	RESERVED
3	EHSRI (Handshake Status Interrupt Enable). Set this bit to logical 1 to enable the handshake status register interrupt.
2	EUSRI (UART Receive Status Interrupt Enable). Set this bit to logical 1 to enable the UART status register interrupt.

BIT	DESCRIPTION
1	ETBREI (TBR Empty Interrupt Enable). Set this bit to logical 1 to enable the TBR empty interrupt.
0	ERDRI (RBR Data Ready Interrupt Enable). Set this bit to logical 1 to enable the RBR data ready interrupt.

10.8 Programmable Baud Generator (BLL/BHL) (Read/Write)

Two 8-bit registers, BLL and BHL, compose a programmable baud generator that uses 24 MHz to generate a 1.8461 MHz frequency and divide it by a divisor from 1 to $(2^{16} - 1)$. The output frequency of the baud generator is the baud rate multiplied by 16, and this is the base frequency for the transmitter and receiver. The table below illustrates the use of the baud generator with a frequency of 1.8461 MHz. In high-speed UART mode, the programmable baud generator directly uses 24 MHz and the same divisor as the normal speed divisor. As a result, in high-speed mode, the data transmission rate can be as high as 1.5M bps.

BAUD RATE FROM DIFFERENT PRE-DIVIDER				
PRE-DIV: 13 1.8461M HZ	PRE-DIV: 1.625 14.769M HZ	PRE-DIV: 1.0 24M HZ	DECIMAL DIVISOR USED TO GENERATE 16X CLOCK	ERROR PERCENTAGE
50	400	650	2304	**
75	600	975	1536	**
110	880	1430	1047	0.18%
134.5	1076	1478.5	857	0.099%
150	1200	1950	768	**
300	2400	3900	384	**
600	4800	7800	192	**
1200	9600	15600	96	**
1800	14400	23400	64	**
2000	16000	26000	58	0.53%
2400	19200	31200	48	**
3600	28800	46800	32	**
4800	38400	62400	24	**
7200	57600	93600	16	**
9600	76800	124800	12	**
19200	153600	249600	6	**
38400	307200	499200	3	**
57600	460800	748800	2	**
115200	921600	1497600	1	**

** Unless specified, the error percentage for all of the baud rates is 0.16%.

Note: Pre-Divisor is determined by CRF0 of UART A and B.

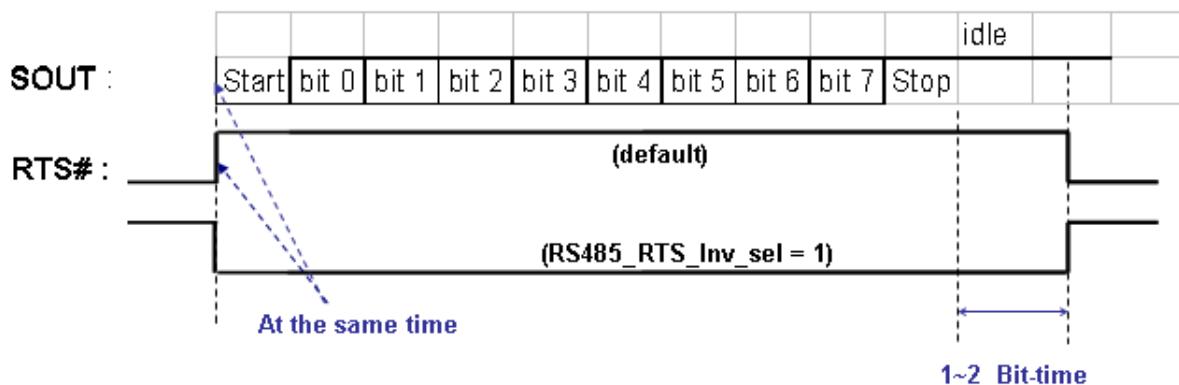
10.9 User-defined Register (UDR) (Read/Write)

This is a temporary register that can be accessed and defined by the user.

10.10 UART RS485 Auto Flow Control

NCT5567D-B supports RS485 auto flow control function for UARTA and UARTB. When enabling the RS485 auto control function, it will automatically drive RTS# pin to logic high or low for UARTA and UARTB when UART TX block transmits the data.

The diagram shown below illustrates the RS485 auto flow control function for UARTA andn UARTB.



The default behavior of RTS# pin will drive logic high the time edge between **Start bit** and **bit0** when the UART TX Block start to transmits the data on SOUT pin. Then the RTS# pin will drive logic low later than **Stop bit** about 1~2 x Bit-time when UART TX Block completes the data transmission. The driving behavior of RTS# will be inverted when we set RS485_RTS_Inv_sel bit = 1'b1. (Bit-time: Depends on the baud rate of transmission)

The bellowing control register table relates to the RS485 auto flow control function for UARTA and UARTB.

	UARTA	UARTB
RTS485_enable	Logic Device 2, CRF2_Bit7	Logic Device 3, CRF2_Bit7
RTS485_inv_sel	Logic Device 2, CRF2_Bit6	Logic Device 3, CRF2_Bit6

11. KEYBOARD CONTROLLER

The NCT5567D-B KBC (8042 with licensed KB BIOS) circuit is designed to provide the functions needed to interface a CPU with a keyboard and/or a PS/2 mouse and can be used with IBM®-compatible personal computers or PS/2-based systems. The controller receives serial data from the keyboard or PS/2 mouse, checks the parity of the data, and presents the data to the system as a byte of data in its output buffer. Then, the controller asserts an interrupt to the system when data are placed in its output buffer. The keyboard and PS/2 mouse are required to acknowledge all data transmissions. No transmission should be sent to the keyboard or PS/2 mouse until an acknowledgement is received for the previous data byte.

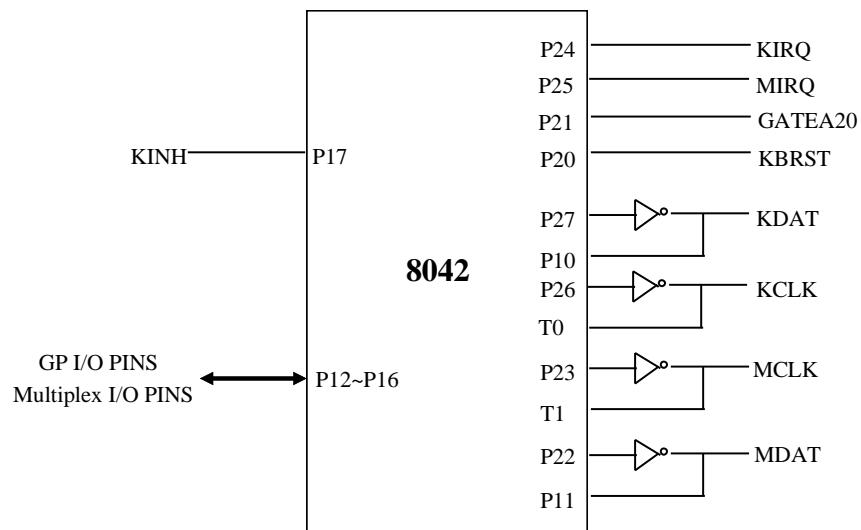


Figure 11-1 Keyboard and Mouse Interface

11.1 Output Buffer

The output buffer is an 8-bit, read-only register at I/O address 60H (Default, PnP programmable I/O address LD5-CR60 and LD5-CR61). The keyboard controller uses the output buffer to send the scan code (from the keyboard) and required command bytes to the system. The output buffer can only be read when the output buffer full bit in the register (in the status register) is logical 1.

11.2 Input Buffer

The input buffer is an 8-bit, write-only register at I/O address 60h or 64h (Default, PnP programmable I/O address LD5-CR60, LD5-CR61, LD5-CR62, and LD5-CR63). Writing to address 60h sets a flag to indicate a data write; writing to address 64h sets a flag to indicate a command write. Data written to I/O address 60h is sent to the keyboard (unless the keyboard controller is expecting a data byte) through the controller's input buffer only if the input buffer full bit (in the status register) is logical 0.

11.3 Status Register

The status register is an 8-bit, read-only register at I/O address 64h (Default, PnP programmable I/O address LD5-CR62 and LD5-CR63) that holds information about the status of the keyboard controller and interface. It may be read at any time.

Table 11-1 Bit Map of Status Register

BIT	BUT FUNCTION	DESCRIPTION
0	Output Buffer Full	0: Output buffer empty 1: Output buffer full
1	Input Buffer Full	0: Input buffer empty 1: Input buffer full
2	System Flag	This bit may be set to 0 or 1 by writing to the system flag bit in the command byte of the keyboard controller. It defaults to 0 after a power-on reset.
3	Command/Data	0: Data byte 1: Command byte
4	Inhibit Switch	0: Keyboard is inhibited 1: Keyboard is not inhibited
5	Auxiliary Device Output Buffer	0: Auxiliary device output buffer empty 1: Auxiliary device output buffer full
6	General Purpose Time-out	0: No time-out error 1: Time-out error
7	Parity Error	0: Odd parity 1: Even parity (error)

11.4 Commands

Table 11-2 KBC Command Sets

COMMAND	FUNCTION																		
20h	Read Command Byte of Keyboard Controller																		
60h	<p>Write Command Byte of Keyboard Controller</p> <table border="1"> <thead> <tr> <th>BIT</th><th>BIT DEFINITION</th></tr> </thead> <tbody> <tr> <td>7</td><td>Reserved</td></tr> <tr> <td>6</td><td>IBM Keyboard Translate Mode</td></tr> <tr> <td>5</td><td>Disable Auxiliary Device</td></tr> <tr> <td>4</td><td>Disable Keyboard</td></tr> <tr> <td>3</td><td>Reserve</td></tr> <tr> <td>2</td><td>System Flag</td></tr> <tr> <td>1</td><td>Enable Auxiliary Interrupt</td></tr> <tr> <td>0</td><td>Enable Keyboard Interrupt</td></tr> </tbody> </table>	BIT	BIT DEFINITION	7	Reserved	6	IBM Keyboard Translate Mode	5	Disable Auxiliary Device	4	Disable Keyboard	3	Reserve	2	System Flag	1	Enable Auxiliary Interrupt	0	Enable Keyboard Interrupt
BIT	BIT DEFINITION																		
7	Reserved																		
6	IBM Keyboard Translate Mode																		
5	Disable Auxiliary Device																		
4	Disable Keyboard																		
3	Reserve																		
2	System Flag																		
1	Enable Auxiliary Interrupt																		
0	Enable Keyboard Interrupt																		
A4h	<p>Test Password</p> <p>Returns 0Fah if Password is loaded</p> <p>Returns 0F1h if Password is not loaded</p>																		
A5h	<p>Load Password</p> <p>Load Password until a logical 0 is received from the system</p>																		
A6h	<p>Enable Password</p> <p>Enable the checking of keystrokes for a match with the password</p>																		
A7h	Disable Auxiliary Device Interface																		
A8h	Enable Auxiliary Device Interface																		
A9h	<p>Interface Test</p> <table border="1"> <thead> <tr> <th>BIT</th><th>BIT DEFINITION</th></tr> </thead> <tbody> <tr> <td>00</td><td>No Error Detected</td></tr> <tr> <td>01</td><td>Auxiliary Device "Clock" line is stuck low</td></tr> <tr> <td>02</td><td>Auxiliary Device "Clock" line is stuck high</td></tr> <tr> <td>03</td><td>Auxiliary Device "Data" line is stuck low</td></tr> <tr> <td>04</td><td>Auxiliary Device "Data" line is stuck high</td></tr> </tbody> </table>	BIT	BIT DEFINITION	00	No Error Detected	01	Auxiliary Device "Clock" line is stuck low	02	Auxiliary Device "Clock" line is stuck high	03	Auxiliary Device "Data" line is stuck low	04	Auxiliary Device "Data" line is stuck high						
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03	Auxiliary Device "Data" line is stuck low																		
04	Auxiliary Device "Data" line is stuck high																		
Aah	<p>Self-test</p> <p>Returns 055h if self-test succeeds</p>																		
Abh	<p>Interface Test</p> <table border="1"> <thead> <tr> <th>BIT</th><th>BIT DEFINITION</th></tr> </thead> <tbody> <tr> <td>00</td><td>No Error Detected</td></tr> <tr> <td>01</td><td>Keyboard "Clock" line is stuck low</td></tr> <tr> <td>02</td><td>Keyboard "Clock" line is stuck high</td></tr> <tr> <td>03</td><td>Keyboard "Data" line is stuck low</td></tr> <tr> <td>04</td><td>Keyboard "Data" line is stuck high</td></tr> </tbody> </table>	BIT	BIT DEFINITION	00	No Error Detected	01	Keyboard "Clock" line is stuck low	02	Keyboard "Clock" line is stuck high	03	Keyboard "Data" line is stuck low	04	Keyboard "Data" line is stuck high						
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02	Keyboard "Clock" line is stuck high																		
03	Keyboard "Data" line is stuck low																		
04	Keyboard "Data" line is stuck high																		
Adh	Disable Keyboard Interface																		

COMMAND	FUNCTION
Aeh	Enable Keyboard Interface
C0h	Read Input Port (P1) and send data to the system
C1h	Continuously puts the lower four bits of Port1 into the STATUS register
C2h	Continuously puts the upper four bits of Port1 into the STATUS register
D0h	Send Port 2 value to the system
D1h	Only set / reset GateA20 line based on system data bit 1
D2h	Send data back to the system as if it came from the Keyboard
D3h	Send data back to the system as if it came from Auxiliary Device
D4h	Output next received byte of data from system to Auxiliary Device
E0h	Reports the status of the test inputs
FXh	Pulse only RC (the reset line) low for 6µs if the Command byte is even

11.5 Hardware GATEA20/Keyboard Reset Control Logic

The KBC includes hardware control logic to speed-up GATEA20 and KBRESET. This control logic is controlled by LD5-CRF0 as follows:

11.5.1 KB Control Register (Logic Device 5, CR-F0)

BIT	7	6	5	4	3	2	1	0
NAME	KCLKS1	KCLKS0	RESERVED			P92EN	HGA20	HKBRST#
DEFAULT	1	0	0	0	0	0	0	0

BIT	DESCRIPTION	
7	KCLKS1.	Select the KBC clock rate. Bits 7 6 0 0: Reserved 0 1: Reserved 1 0: KBC clock input is 12 MHz. 1 1: Reserved
6	KCLKS0.	
5-3	RESERVED	
2	P92EN (Port 92 Enable). 1: Enables Port 92 to control GATEA20 and KBRESET. 0: Disables Port 92 functions.	
1	HGA20 (Hardware GATEA 20). 1: Selects hardware GATE A20 control logic to control GATE A20 signal. 0: Disables GATEA20 control logic functions.	
0	HKBRST# (Hardware Keyboard Reset). 1: Selects hardware KB RESET control logic to control KBRESET signal. 0: Disables hardware KB RESET control logic function.	

When the KBC receives data that follows a “D1” command, the hardware control logic sets or clears GATE A20 according to received data bit 1. Similarly, the hardware control logic sets or clears KBRESET depending on received data bit 0. When the KBC receives an “FE” command, the KBRESET is pulse low for 6 μ s (Min.) with a 14 μ s (Min.) delay.

GATE A20 and KBRESET are controlled by either software or hardware logic, and they are mutually exclusive. Then, GATE A20 and KBRESET are merged with Port92 when the P92EN bit is set.

11.5.2 Port 92 Control Register (Default Value = 0x00)

BIT	7	6	5	4	3	2	1	0
NAME	RESERVED						SGA20	PLKBRST#
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-2	RESERVED.
1	SGA20 (Special GATE A20 Control) 1: Drives GATE A20 signal to high. 0: Drives GATE A20 signal to low.
0	PLKBRST# (Pulled-low KBRESET). A logical 1 on this bit causes KBRESET to drive low for 6 μ S(Min.) with a 14 μ S(Min.) delay. Before issuing another keyboard-reset command, the bit must be cleared.

12. CONSUMER INFRARED REMOTE (CIR)

Regarding the receiving of IR Block, the hardware uses the sampling rates of 1us, 25us, 50us and 100us to calculate the widths of H Level and L Level. The results are saved/stored in 32*8 RX FIFO. The max widths of H Level and L Level will be determined by Sample Limit Count Register. During the receiving, the hardware will reflect the FIFO status in RX FIFO Status Register. In addition, the hardware also generates status, such as Data Ready, Trigger Level Reach, FIFO Overrun and FIFO underrun, in RC Status Register.

As for the transmission, the user has to set up the Carrier frequency and the transmission mode first and then writes the widths of H Level and L Level via TX FIFO. The hardware will add Carrier to H Level according to the transmission mode.

12.1 CIR Register Table

Table 12-1 CIR Register Table

RC Block														
ExtAddr	Name	7	6	5	4	3	2	1	0					
base+0	IRCON	Reserved			RXEN	Reserved	RXINV	Sample Period Select						
base+1	IRSTS	RDR	RTR	PE	RFO	Reserved			GH					
base+2	IREN	RDR	RTR	PE	RFO	Reserved			GH					
base+3	RXFCONT	RXFIFO Count												
base+4	CP	Reserved												
base+5	CC	Reserved												
base+6	SLCH	Sample Limit Count High Byte												
base+7	SLCL	Sample Limit Count Low Byte												
base+8	FIFOCON	TXFIFOCLR	R	Tx Trigger Level		RXFIFOCLR	R	Rx Trigger Level						
base+9	IRFIFOSTS	IR_Pending	RX_GS	RX_FTA	RX_Empty	RX_Full	Reserved							
base+A	SRXFIFO	Sample RX FIFO												
base+B	TXFCONT	Reserved												
base+C	STXFIFO	Reserved												
base+D	FCCH	Reserved												
base+E	FCCL	Reserved												
base+F	IRFSM	R	Decoder FSM			Reserved								

12.1.1 IR Configuration Register – Base Address + 0

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Received			RXEN	Reserved	RXINV	Sample Period Select	
DEFAULT	0	0	0	0	0	1	0	0

BIT	DESCRIPTION
7-5	Reserved
4	RX Enable

3	Reserved
2	IR Rx Invert Enable 0: Dongle Carrier ON is high, OFF (Idle) is low. 1: Dongle Carrier ON is low, OFF (Idle) is high.
1-0	Sample Period Select 00:1us, 01: 25us, 10: 50us, 11: 100us Note: In the 1us mode, the pulse mode will not function due to the IR regulations.

12.1.2 IR Status Register – Base Address + 1

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
Name	RDR	RTR	PE	RFO	Reserved			GH
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	RX Data Ready (Writing 1 will clear the bit).
6	RX FIFO Trigger Level Reach (Writing 1 will clear the bit).
5	Packet End (Writing 1 will clear the bit).
4	RX FIFO Overrun (Overrun and Data Ready will be simultaneously generated. Writing 1 will clear the bit).
3-1	Reserved
0	Min Length Detected (Writing 1 will clear the bit) 1: The IR Data length received is shorter than the default value. 0: The IR Data length received is longer than the default value.

12.1.3 IR Interrupt Configuration Register – Base Address + 2

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	RDR	RTR	PE	RFO	Reserved			GH
DEFAULT	0	0	0	0	0	0	0	0

1: Enable interrupt; 0: Disable interrupt

BIT	DESCRIPTION
7	RX Data Ready
6	RX FIFO Trigger Level Reach
5	Packet End
4	RX FIFO Overrun (Overrun and Data Ready will be simultaneously generated).

3-1	Reserved
0	Min Length Detected

Note. When an Interrupt occurs, it only can be cleared by writing IR Status Register to 1.

12.1.4 RX FIFO Count– Base Address + 3

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FIFO Count							
DEFAULT	0	0	0	0	0	0	0	0

1: Enable; 0: Disable

BIT	DESCRIPTION							
7-0	RX FIFO Count							

12.1.5 IR RX Sample Limited Count High Byte Register (RCLCH) – Base Address + 6

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Sample Limited Count High Byte							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	This byte is defined as the high byte of the limited count in the IR RX mode.							

12.1.6 IR RX Sample Limited Count Low Byte Register (RCLCL) – Base Address + 7

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Sample Limited Count low Byte							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7-0	This byte is defined as the low byte of the limited count in the IR RX mode.							

Note. (RCLCH, RCLCL) is defined as 16 bits value of the limited count in the IR RX mode. When the RX date length reaches the limited count, Packet End status will appear.

12.1.7 IR FIFO Configuration Register (FIFOCON) – Base Address + 8

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	TXFIFOCLR	Reserved	TX Trigger Level		RXFIFOCLR	Reserved	RX Trigger Level	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	TX FIFO Cleared.
6	Reserved
5-4	TX Trigger Level Bits 5 4 0 0: 31 0 1: 24 1 0: 16 1 1: 8
3	RX FIFO Cleared.
2	Reserved
1-0	RX Trigger Level Bits 1 0 0 0: 1 0 1: 8 1 0: 16 1 1: 24

12.1.8 IR Sample RX FIFO Status Register – Base Address + 9

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	IR_Pending	RX_GS	RX_FTA	RX_Empty	RX_Full	Reserved		
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	IR Pending 1: No Interrupt 0: Interrupt issue
6	Minimum Length Detect Status. This bit will be cleared when Packet End appears.
5	RX FIFO Trigger Level Active.
4	RX FIFO Empty Flag.
3	RX FIFO Full Flag.
2-0	Reserved

12.1.9 IR Sample RX FIFO Register – Base Address + A

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Voltage Level							
	Sample RX FIFO							

BIT	DESCRIPTION							
7	Voltage Level 0: Low, 1: High							
6-0	RX data length (Unit : Sample Period) Note: 1. 0x80 is Packet End. The hardware enters the Idle state after checking Rx Channel. 2. When 0x00 represents the glitch packet, it means pulses shorter than 3/4 sample period are received. 3. Pulses that are shorter than 1/4 sample periods will be ignored automatically.							

12.1.10 IR FSM Status Register (IRFSM) – Base Address + F

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Decoder FSM				Reserved			
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							
7	Reserved							
6	Decoder over status							
5	Decoder continuing status							
4	Decoder wait H status 1: idle, 0: RX busy							
3-0	Encoder Level Output Status							

12.1.11 IR Minimum Length Register – Base Address + F

Attribute: Write Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Min Length Register							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION							

7-0

Min Length Register. Set up the shortest expected length of each carrier on the RX receiver (Unit: Sample Clock).

13. CONSUMER INFRARED REMOTE (CIR) WAKE-UP

One of the features of the NCT5567D-B is system boot-up by a remote controller. The hardware will store a specifically appointed key command from the IR remote controller in the FIFO of 67Byte.

The same key is required to re-boot the system after the computer shut-down. Such way can be applied to any remote controllers. Learning is necessary only at the first time.

13.1 CIR WAKE-UP Register Table

RC Block															
ExtAddr	Name	7	6	5	4	3	2	1	0						
base+0	IRCON	DEC_RST	Mode[1]	Mode[0]	RXEN	IgnoreEN	RXINV	Sample Period Select							
base+1	IRSTS	RDR	RTR	PE	RFO	GH	R	R	IR Pending						
base+2	IREN	RDR	RTR	PE	RFO	GH	R								
Base+3	FIFO_COMPARE_DEEP														
base+4	FIFO_COMPARE_TOLERANCE														
base+5	FIFO_Count														
Base+6	SLCH	Sample Limit Count High Byte													
base+7	SLCL	Sample Limit Count Low Byte													
base+8	FIFOCON	R				RXFIFOCLR	R	Rx Trigger Level							
base+9	SRXFSTS	GS	FTA	Empty	Full	R									
base+A	Sample RX FIFO														
base+B	WR_FIFO_DATA														
Base+C	Read FIFO Only														
Base+D	Read FIFO Only Index														
Base+E	FIFO_Ignore														
Base+F	IRFSM	R	Decoder FSM				R	Wakeup Event							

13.1.1 IR Configuration Register – Base Address + 0

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	DEC_RST	Mode[1]	Mode[0]	RXEN	Received	RXINV	Sample Period Select	
DEFAULT	0	0	1	0	0	1	1	0

BIT	DESCRIPTION
7	Reset CIR DECODER (Write 1 to clear)
6	Mode[1] : 0: FIFO can't be written 1: FIFO can be written
5	Mode[0] 0: Learning Mode

BIT	DESCRIPTION
	1: Wake up Mode (Before enter in Power S3 state, this bit should be set) This bit reset by VCC.
4	RX Enable
3	Ignore Bit Enable
2	IR Rx Invert Enable 0: Dongle Carrier ON is high, OFF (Idle) is low. 1: Dongle Carrier ON is low, OFF (Idle) is high.
1-0	Sample Period Select 00:1us, 01: 25us, 10: 50us, 11: 100us Note: In the 1us mode, the pulse mode will not function due to the IR regulations.

13.1.2 IR Status Register – Base Address + 1

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	RDR	RTR	PE	RFO	GH	Received		IR_Pending
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	RX Data Ready (Writing 1 will clear the bit).
6	RX FIFO Trigger Level Reach (Writing 1 will clear the bit).
5	Packet End (Writing 1 will clear the bit).
4	RX FIFO Overrun (Overrun and Data Ready will be simultaneously generated. Writing 1 will clear the bit).
3	Min Length Detected (Writing 1 will clear the bit) 1: The IR Data length received is shorter than the default value. 0: The IR Data length received is longer than the default value.
2-1	Reserved
0	IR Pending 1: No Interrupt 0: Interrupt issue

13.1.3 IR Interrupt Configuration Register – Base Address + 2

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	RDR	RTR	PE	RFO	GH	Reserved		
DEFAULT	0	0	0	0	0	0	0	0

1: Enable interrupt; 0: Disable interrupt

BIT	DESCRIPTION
7	RX Data Ready
6	RX FIFO Trigger Level Reach
5	Packet End
4	RX FIFO Overrun (Overrun and Data Ready will be simultaneously generated).
3	Min Length Detected
2-0	Reserved

Note. When an Interrupt occurs, it only can be cleared by writing IR Status Register to 1.

13.1.4 IR TX Configuration Register – Base Address + 3

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FIFO Compare Deep							
DEFAULT	0	1	0	0	0	0	1	1

1: Enable; 0: Disable

BIT	DESCRIPTION
7-0	When in S3 state, how many bytes need to compare. Default is 67 bytes.

13.1.5 IR FIFO Compare Tolerance Configuration Register – Base Address + 4

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FIFO Compare Tolerance							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	FIFO Data Tolerance between Learning mode and Wakeup mode. (Every byte) FIFO Date Tolerance = (Learning mode data) – (Wakeup mode data)

13.1.6 RX FIFO Count– Base Address + 5

Attribute: Read

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FIFO Count							
DEFAULT	0	0	0	0	0	0	0	0

1: Enable; 0: Disable

BIT	DESCRIPTION
7-0	RX FIFO Count

13.1.7 IR RX Sample Limited Count High Byte Register (RCLCH) – Base Address + 6

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Sample Limited Count High Byte							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	This byte is defined as the high byte of the limited count in the IR RX mode.

13.1.8 IR RX Sample Limited Count Low Byte Register (RCLCL) – Base Address + 7

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Sample Limited Count low Byte							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	This byte is defined as the low byte of the limited count in the IR RX mode.

Note. (RCLCH, RCLCL) is defined as 16 bits value of the limited count in the IR RX mode. When the RX date length reaches the limited count, Packet End status will appear.

13.1.9 IR FIFO Configuration Register (FIFOCON) – Base Address + 8

Attribute: Read/Write

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved				RXFIFOCLR	Reserved	RX Trigger Level	
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-4	Reserved
3	RX FIFO Cleared.
2	Reserved
1-0	RX Trigger Level Bits 1 0 0 0: 67

	0 1: 66
	1 0: 65
	1 1: 64

13.1.10IR Sample RX FIFO Status Register – Base Address + 9

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	GS	FTA	Empty	Full	Reserved			
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	Minimum Length Detect Status. This bit will be cleared when Packet End appears.
6	RX FIFO Trigger Level Active.
5	RX FIFO Empty Flag.
4	RX FIFO Full Flag.
3-0	Reserved

13.1.11IR Sample RX FIFO Register – Base Address + A

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Voltage Level	Sample RX FIFO						

BIT	DESCRIPTION
7-6	Voltage Level 0: Low, 1: High
0	RX data length (Unit : Sample Period) Note: 1. 0x80 is Packet End. The hardware enters the Idle state after checking Rx Channel. 2. When 0x00 represents the glitch packet, it means pulses shorter than 3/4 sample period are received. 3. Pulses that are shorter than 1/4 sample periods will be ignored automatically.

13.1.12Write FIFO – Base Address + B

Attribute: Write Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Voltage Level	Write Sample RX FIFO						

BIT	DESCRIPTION
7-6	Voltage Level 0: Low, 1: High
0	RX data length (Unit : Sample Period)

Note. Before writing FIFO Data, mode[1] register should be set.

13.1.13 Read FIFO Only – Base Address + C

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Sample RX FIFO							

BIT	DESCRIPTION
7-6	Voltage Level 0: Low, 1: High
0	RX data length (Unit : Sample Period)

Note. Only Read FIFO Data.

13.1.14 Read FIFO Index – Base Address + D

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	FIFO Index							

BIT	DESCRIPTION
7-0	Indicate that FIFO Index when only read FIFO data(Base Address + C)

Note. Only Read FIFO Data.

13.1.15 Reserved – Base Address + E

13.1.16 IR FSM Status Register (IRFSM) – Base Address + F

Attribute: Read Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Reserved	Decoder FSM			Reserved			Wake up event
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7	Reserved
6-4	CIR State Machine
3-1	Reserved
0	Wake up event: 0: CIR wake up event has not been triggered. 1: CIR wake up event has been triggered. (Wake up event Read clear.)

13.1.17 IR Minimum Length Register – Base Address + F

Attribute: Write Only

Size: 8 bits

BIT	7	6	5	4	3	2	1	0
NAME	Min Length Register							
DEFAULT	0	0	0	0	0	0	0	0

BIT	DESCRIPTION
7-0	Min Length Register. Set up the shortest expected length of each carrier on the RX receiver (Unit: Sample Clock).

14. POWER MANAGEMENT EVENT

14.1 Power Control Logic

This chapter describes how the NCT5567D-B implements its ACPI function via these power control pins: PSIN#, PSOUT#, SLP_S3# and PSON#. The following figure illustrates the relationships.

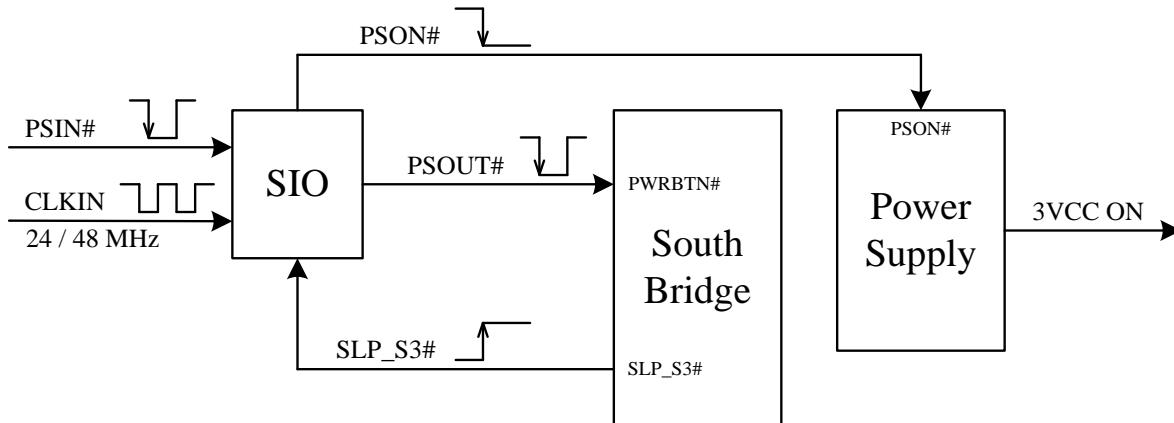


Figure 14-1 Power Control Mechanism

14.1.1 PSON# Logic

14.1.1.1 Normal Operation

The PSOUT# signal will be asserted low if the PSIN# signal is asserted low. The PSOUT# signal is held low for as long as the PSIN# is held low. The South Bridge controls the SLP_S3# signal through the PSOUT# signal. The PSON# is directly connected to the power supply to turn on or off the power.

Figure 14-2 shows the power on and off sequences.

The ACPI state changes from S5 to S0, then to S5

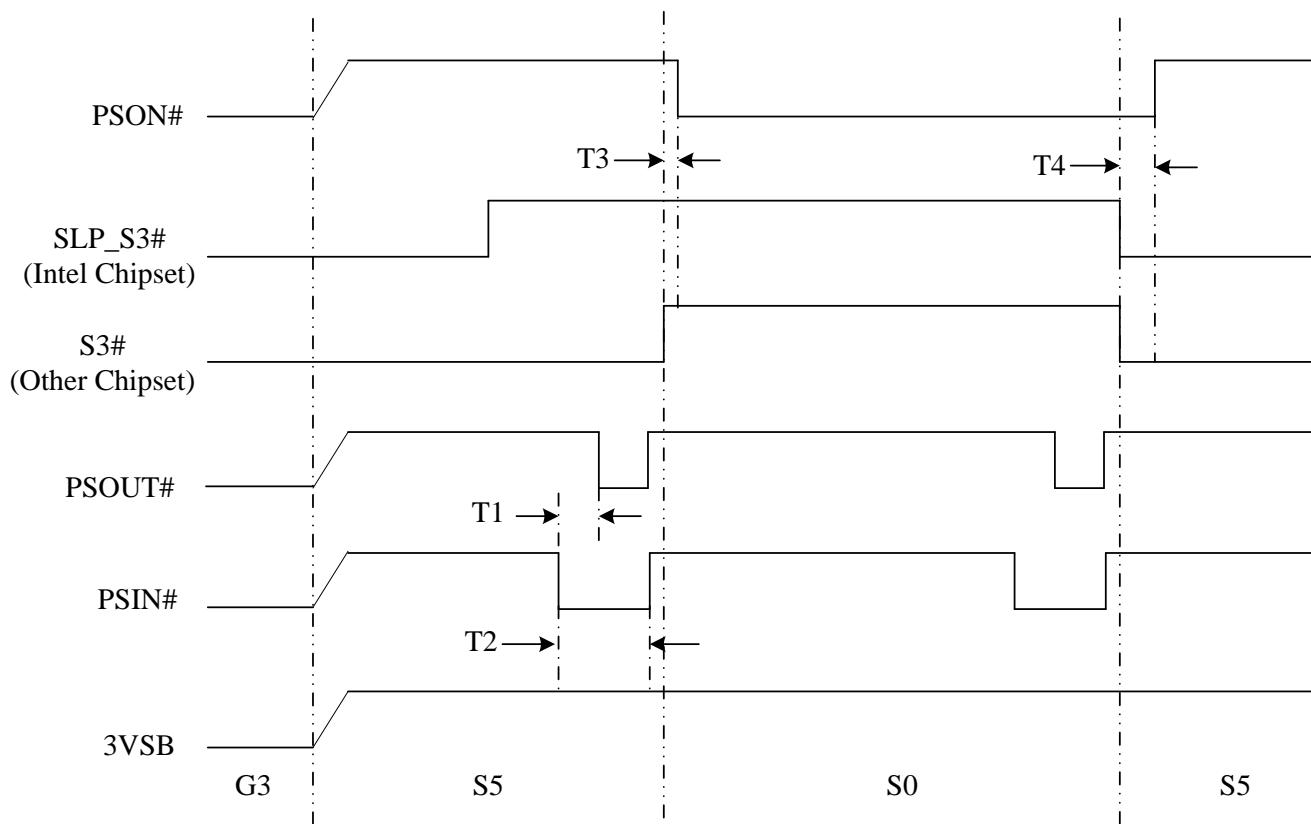


Figure 14-2 Power Sequence from S5 to S0, then Back to S5

14.1.2 AC Power Failure Resume

By definition, AC power failure means that the standby power is removed. The power failure resume control logic of the NCT5567D-B is used to recover the system to a pre-defined state after AC power failure. Two control bits at Logical Device A, CR[E4h], bits[6:5] indicate the pre-defined state. The definition of these two bits is listed in the following table:

Table 14-1 Bit Map of Logical Device A, CR[E4h], Bits[6:5]

LOGICAL DEVICE A, CR[E4H], BITS[6 :5]	DEFINITION
00	System always turns off when it returns from AC power failure
01	System always turns on when it returns from AC power failure
10	System turns off / on when it returns from power failure depending on the state before the power failure. (Please see Note 1)

LOGICAL DEVICE A, CR[E4H], BITS[6 :5]	DEFINITION
11	User defines the state before the power failure. (The previous state is set at CRE6[4]. Please see Note 2)

Note1. The NCT5567D-B detects the state before power failure (on or off) through the SLP_S3# signal and the 3VCC power. The relation is illustrated in the following two figures.

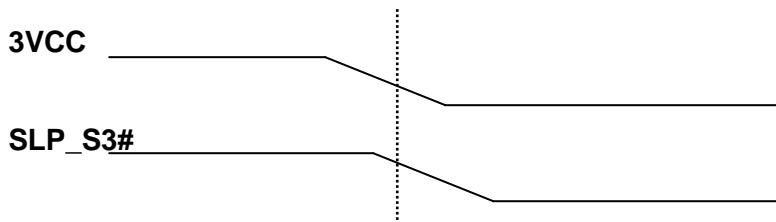


Figure 14-3 The previous state is “on”
3VCC falls to 2.6V and SLP_S3# keeps at 2.0V.

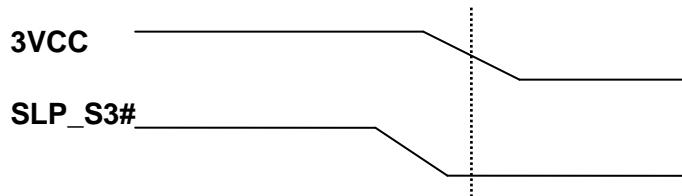


Figure 14-4 The previous state is “off”.
3VCC falls to 2.6V and SLP_S3# keeps at 0.8V.

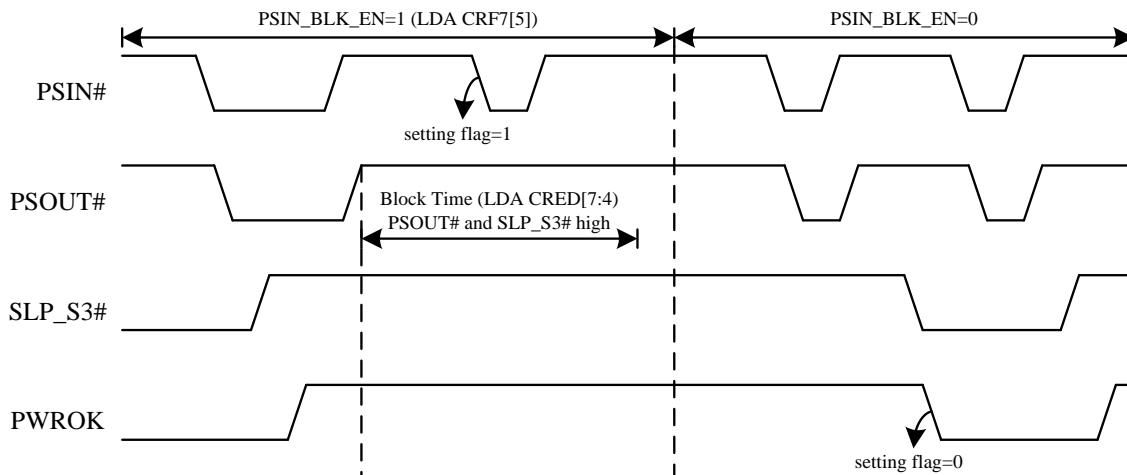
Note 2.

Logical Device A, CR[E6h] bit [4]	Definition
0	User defines the state to be “on”
1	User defines the state to be “off”

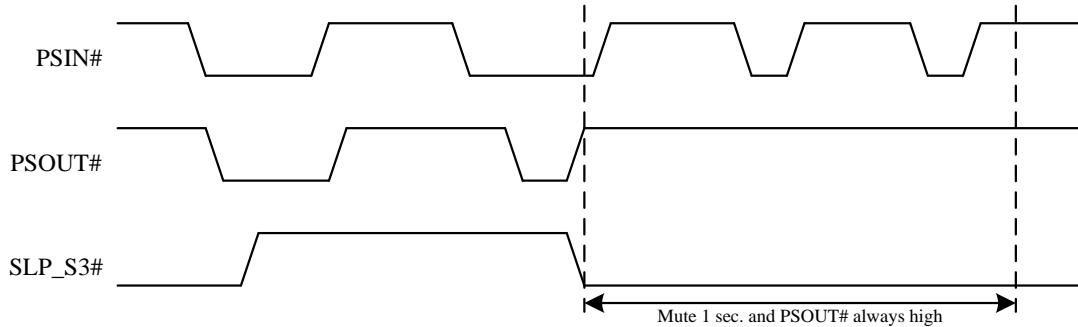
To ensure that VCC does not fall faster than VSB in various ATX Power Supplies, the NCT5567D-B adds the option of “user define mode” for the pre-defined state before AC power failure. BIOS can set the pre-defined state to be “On” or “Off”. According to this setting, the system is returned to the pre-defined state after the AC power recovery.

14.1.3 PSOUT Blocking Time

When PSOUT# and SLP_S3# signal is given, the time set by the user to block, the PSIN# signal will be not reaction PSOUT#, but can be recorded. When the system was S0 back to S5 and SLP_S3# Low, PSIN# signal will be isolated in one second, then PSOUT for high.



When the system was S0 back to S5 and SLP_S3 Low, PSIN# signal will be isolated in one second, the PSOUT# for high.



14.2 Wake Up the System by Keyboard and Mouse

The NCT5567D-B generates a low pulse through the PSOUT# pin to wake up the system when it detects a key code pressed or mouse button clicked. The following sections describe how the NCT5567D-B works.

14.2.1 Waken up by Keyboard events

The keyboard Wake-Up function is enabled by setting Logical Device A, CR[E0h], bit 6 to "1".

There are two keyboard events can be used for the wake-up

- 1) Any key – Set bit 0 at Logical Device A, CR[E0h] to "1" (Default).
- 2) Specific keys (Password) – Set bit 0 at Logical Device A, CR[E0h] to "0".

Three sets of specific key combinations are stored at Logical Device A. CR[E1h] is an index register to indicate which byte of key code storage (0x00h ~ 0x0Eh, 0x30h ~ 0x3Eh, 0x40h ~ 0x4Eh) is going to be read or written through CR[E2h]. According to IBM 101/102 keyboard specification, a complete key code contains a 1-byte make code and a 2-byte break code. For example, the make code of "0" is 0x45h, and the corresponding break code is 0xF0h, 0x45h.

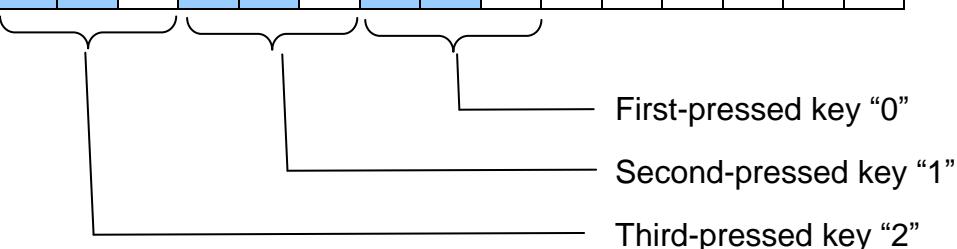
First sets of specific key can be set to serial or simultaneous password mode, second and third sets of specific keys only serial password mode. In simultaneous password mode, assume that we want to set "L Ctrl + L Alt + A" or "R Ctrl + R Alt + A" as the password (the password of simultaneous mode must be avoid ghost keys). The storage only fill the make code, except for the prefixed scan code of the password. The detail setting shows as below. Serial password mode descript as under section.

Index(CRE1)→	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E
Data(CRE2)→	14	11	1C	00	00	00	00	00	00	00	00	00	00	00	00

- L Ctrl / R Ctrl : 0x14h, 0xF0h, 0x14h / 0xE0h, 0x14h, 0xE0h, 0xF0h, 0x14h
- L Alt / R Alt : 0x11h, 0xF0h, 0x11h / 0xE0h, 0x11h, 0xE0h, 0xF0h, 0x11h
- A : 0x1Ch, 0xF0h, 0x1Ch

The approach to implement Keyboard Password Wake-Up Function is to fill key codes into the password storage. Assume that we want to set “012” as the password. The storage should be filled as below. Please note that index 0x09h ~ 0x0Eh must be filled as 0x00h since the password has only three numbers.

Index(CRE1)→	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E
Data(CRE2)→	1E	F0	1E	16	F0	16	45	F0	45	00	00	00	00	00	00



14.2.2 Waken up by Mouse events

The mouse Wake-Up function is enabled by setting Logical Device A, CR[E0h], bit 5 to “1”.

The following specific mouse events can be used for the wake-up:

- Any button clicked or any movement
- One click of the left or the right button
- One click of the left button
- One click of the right button
- Two clicks of the left button
- Two clicks of the right button.

Three control bits (ENMDAT_UP, MSRKEY, MSXKEY) define the combinations of the mouse wake-up events. Please see the following table for the details.

Table 14-2 Definitions of Mouse Wake-Up Events

ENMDAT_UP (LOGICAL DEVICE A, CR[E6H], BIT 7)	MSRKEY (LOGICAL DEVICE A, CR[E0H], BIT 4)	MSXKEY (LOGICAL DEVICE A, CR[E0H], BIT 1)	WAKE-UP EVENT
1	x	1	Any button clicked or any movement.
1	x	0	One click of the left or right button.
0	0	1	One click of the left button.
0	1	1	One click of the right button.

ENMDAT_UP (LOGICAL DEVICE A, CR[E6H], BIT 7)	MSRKEY (LOGICAL DEVICE A, CR[E0H], BIT 4)	MSXKEY (LOGICAL DEVICE A, CR[E0H], BIT 1)	WAKE-UP EVENT
0	0	0	Two clicks of the left button.
0	1	0	Two clicks of the right button.

14.3 Resume Reset Logic

The RSMRST# signal is a reset output and is used as the VSB power on reset signal for the South Bridge.

When the NCT5567D-B detects the 3VSB voltage rises to “V1”, it then starts a delay – “t1” before the rising edge of RSMRST# asserting. If the 3VSB voltage falls below “V2”, the RSMRST# de-asserts immediately.

Timing and voltage parameters are shown in Figure 14-5 and Table 14-3.

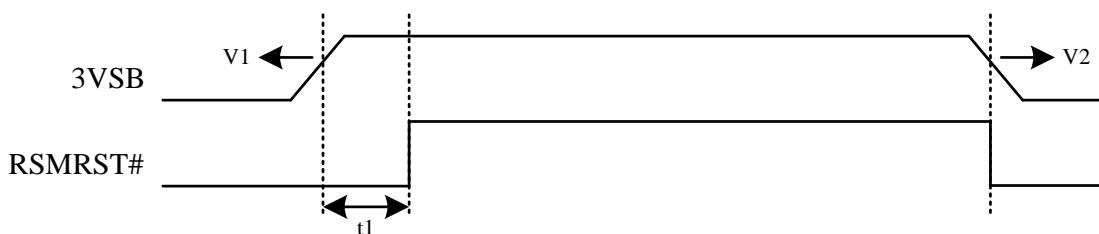


Figure 14-5 Mechanism of Resume Reset Logic

Table 14-3 Timing and Voltage Parameters of RSMRST#

NAME	PARAMETER	MIN.	MAX.	UNIT
V1	3VSB Valid Voltage	2.94	3.00	V
V2	3VSB Ineffective Voltage	2.90	2.96	V
t1	Valid 3VSB to RSMRST# inactive	200	300	ms

15. SERIALIZED IRQ

The NCT5567D-B supports a serialized IRQ scheme. This allows a signal line to be used to report the parallel interrupt requests. Since more than one device may need to share the signal serial SERIRQ signal, an open drain signal scheme is employed. The clock source is the PCI clock. The serialized interrupt is transferred on the SERIRQ signal, one cycle consisting of three frames types: the Start Frame, the IRQ/Data Frame, and the Stop Frame.

15.1 Start Frame

There are two modes of operation for the SERIRQ Start Frame: Quiet mode and Continuous mode.

In the Quiet mode, the NCT5567D-B drives the SERIRQ signal active low for one clock, and then tri-states it. This brings all the state machines of the NCT5567D-B from idle to active states. The host controller (the South Bridge) then takes over driving SERIRQ signal low in the next clock and continues driving the SERIRQ low for programmable 3 to 7 clock periods. This makes the total number of clocks low 4 to 8 clock periods. After these clocks, the host controller drives the SERIRQ high for one clock and then tri-states it.

In the Continuous mode, the START Frame can only be initiated by the host controller to update the information of the IRQ/Data Frame. The host controller drives the SERIRQ signal low for 4 to 8 clock periods. Upon a reset, the SERIRQ signal is defaulted to the Continuous mode for the host controller to initiate the first Start Frame.

Please see the diagram below for more details.

Start Frame Timing with source sampled a low pulse on IRQ1.

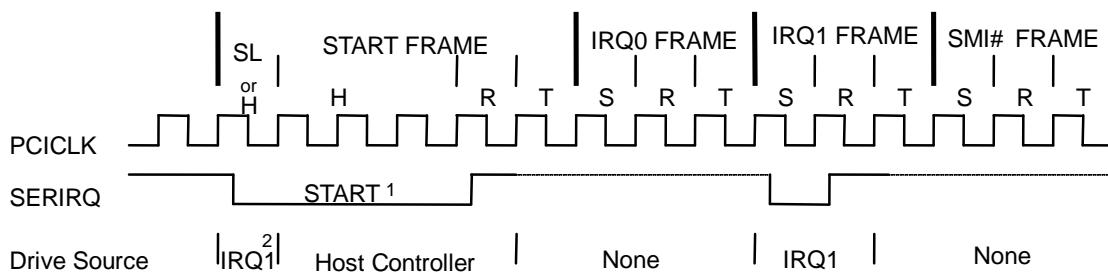


Figure 15-1 Start Frame Timing with Source Sampled A Low Pulse on IRQ1

H=Host Control

SL=Slave Control

R=Recovery

T=Turn-around

S=Sample

Note:

1. The Start Frame pulse can be 4-8 clocks wide.
2. The first clock of Start Frame is driven low by the NCT5567D-B because IRQ1 of the NCT5567D-B needs an interrupt request. Then the host takes over and continues to pull the SERIRQ low.

15.2 IRQ/Data Frame

Once the Start Frame has been initiated, the NCT5567D-B must start counting frames based on the rising edge of the start pulse. Each IRQ/Data Frame has three clocks: the Sample phase, the Recovery phase, and the Turn-around phase.

During the Sample phase, the NCT5567D-B drives SERIRQ low if the corresponding IRQ is active. If the corresponding IRQ is inactive, then SERIRQ must be left tri-stated. During the Recovery phase, the NCT5567D-B device drives the SERIRQ high. During the Turn-around phase, the NCT5567D-B device leaves the SERIRQ tri-stated. The NCT5567D-B starts to drive the SERIRQ line from the beginning of “IRQ0 FRAME” based on the rising edge of PCICLK.

The IRQ/Data Frame has a specific numeral order, as shown in Table 15-1.

Table 15-1 SERIRQ Sampling Periods

SERIRQ SAMPLING PERIODS			
IRQ/DATA FRAME	SIGNAL SAMPLED	# OF CLOCKS PAST START	EMPLOYED BY
1	IRQ0	2	Reserved
2	IRQ1	5	Keyboard
3	SMI#	8	H/W Monitor & SMI
4	IRQ3	11	IR
5	IRQ4	14	UART A
6	IRQ5	17	-
7	IRQ6	20	FDC
8	IRQ7	23	LPT
9	IRQ8	26	-
10	IRQ9	29	-
11	IRQ10	32	-
12	IRQ11	35	-
13	IRQ12	38	Mouse
14	IRQ13	41	Reserved
15	IRQ14	44	-
16	IRQ15	47	-
17	IOCHCK#	50	-
18	INTA#	53	-
19	INTB#	56	-
20	INTC#	59	-
21	INTD#	62	-
32:22	Unassigned	95	-

15.3 Stop Frame

After all IRQ/Data Frames have completed, the host controller will terminate SERIRQ with a Stop frame. Only the host controller can initiate the Stop Frame by driving SERIRQ low for 2 or 3 clocks. If the Stop Frame is low for 2 clocks, the Sample mode of next SERIRQ cycle's Sample mode is the Quiet mode. If the Stop Frame is low for 3 clocks, the Sample mode of next SERIRQ cycle is the Continuous mode.

Please see the diagram below for more details.

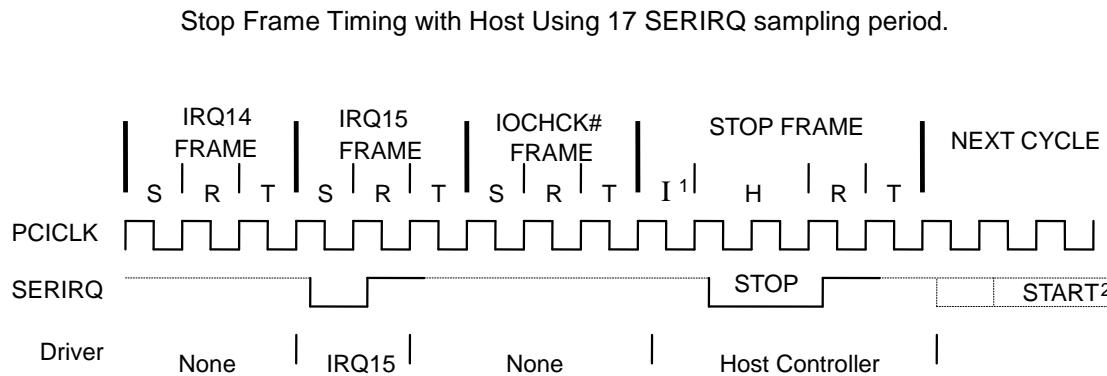


Figure 15-2 Stop Frame Timing with Host Using 17 SERIRQ Sampling Period

H=Host Control R=Recovery T=Turn-around S=Sample I=Idle.

Note:

1. There may be none, one or more Idle states during the Stop Frame.
2. The Start Frame pulse of next SERIRQ cycle may or may not start immediately after the turn-around clock of the Stop Frame.

16. WATCHDOG TIMER

The Watchdog Timer 1 of the NCT5567D-B consists of an 8-bit programmable time-out counter and a control and status register. GPIO0, GPIO2, GPIO3, GPIO4, GPIO5, GPIO6, GPIO7 provides an alternative WDT1 function. This function can be configured by the relative GPIO control register. The units of Watchdog Timer counter can be selected at Logical Device 8, CR[F5h], bit[3]. The time-out value is set at Logical Device 8, CR[F6h]. Writing zero disables the Watchdog Timer function. Writing any non-zero value to this register causes the counter to load this value into the Watchdog Timer counter and start counting down.

When Watchdog Timer 1 time-out event is occurring, GPIO0, GPIO2, GPIO4, GPIO6, bit[0],[4], GPIO3, bit[3], GPIO7, bit[0], PWROK and RESETCONO# will trigger a low pulse apporx 100mS or low level by Logical Device 8 CR[F5h], bit[0] and RSMRST# will trigger a low pulse approx 250ms. The PWROK, SLP_S3# and RSMRST# event also relate to acpi sequence, that can be control by Logical Device D, CR[F0h], bit[7] and bit[0], Logical Device D, CR[F0h], bit[7] and bit[0] as 2'b00 is normal acpi function, others timing illustrations are define in Figure 16-1 to Figure 16-3 In other words, when the value is counted down to zero, the timer stops, and the NCT5567D-B sets the WDT1 status bit in Logical Device 8, CR[F7h], bit[4]. Writing a zero will clear the status bit. It. This bit will also be cleared if LRESET# or PWROK signal is asserted.

The Watchdog Timer 3 of the NCT5567D-B consists of an 8-bit programmable time-out counter and a control and status register. The units of Watchdog Timer counter can be selected at Logical Device 8, CR[F8h], bit[3]. The time-out value is set at Logical Device 8, CR[F9h]. Writing zero disables the Watchdog Timer function. Writing any non-zero value to this register causes the counter to load this value into the Watchdog Timer counter and start counting down.

When Watchdog Timer 3 time-out event is occurring, PWROK and RESETCONO# will trigger a low pluse apporx 100mS or low level by Logical Device 8 CR[F8h], bit[0]. In other words, when the value is counted down to zero, the timer stops, and the NCT5567D-B sets the WDT3 status bit in Logical Device 8, CR[FAh], bit[4]. Writing a zero will clear the status bit. It. This bit will also be cleared if LRESET# or PWROK signal is asserted.

The Watchdog Timer 4 of the NCT5567D-B consists of an status register (Logic Device D, CR[E7h] bit[6]). The timeout event will trigger RESETCONO pin to gerenate a pulse when WDTRST_EN set to one. CR[2Fh], bit[0] is WDTRST_EN enable bit. When WDTRST_EN set to one, if VCC3V is good, the timer will start count down, after 5 second, the timer time-out and to issue about 100ms low pulse to trigger pin.

Watchdog Timer Time-Out Trigger Event	Watchdog Timer 1	Watchdog Timer 3	Watchdog Timer 4
			WDTRST_EN strapping, 5sec to issue RESETCON# if VCC3V is High
KBRST#	✓	✗	✗
PWROK	✗	✓	✗
GPIO Pin	✓	✗	✗
RESETCONO# Pin	✓	✓	✓

RSMRST# Event	✓	✗	✗
PWROK Event Then Into Deep S5	✓	✗	✗
Internal SLP_S3# Event Then Into Deep S5	✓	✗	✗

Table 16-1 Watchdog Timer 1/3/4 Time-Out Trigger event

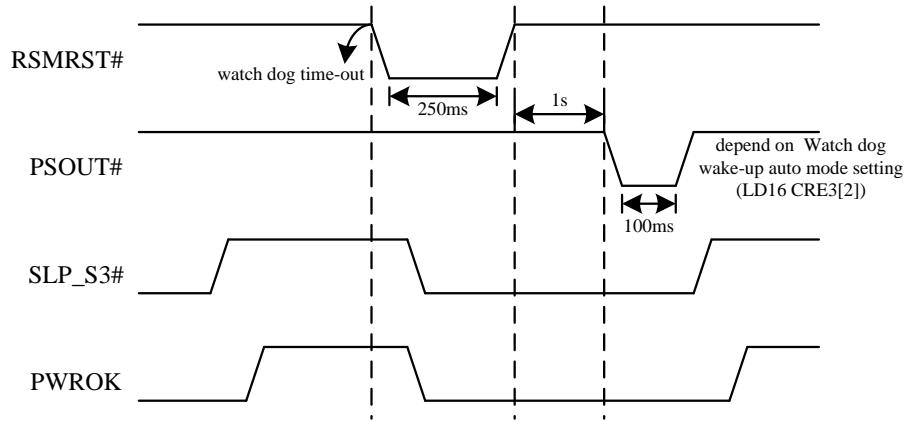


Figure 16-1 RSMRST# Event When Logical Device D CRF0 Bit[7] and Bit[0] as 2'b01

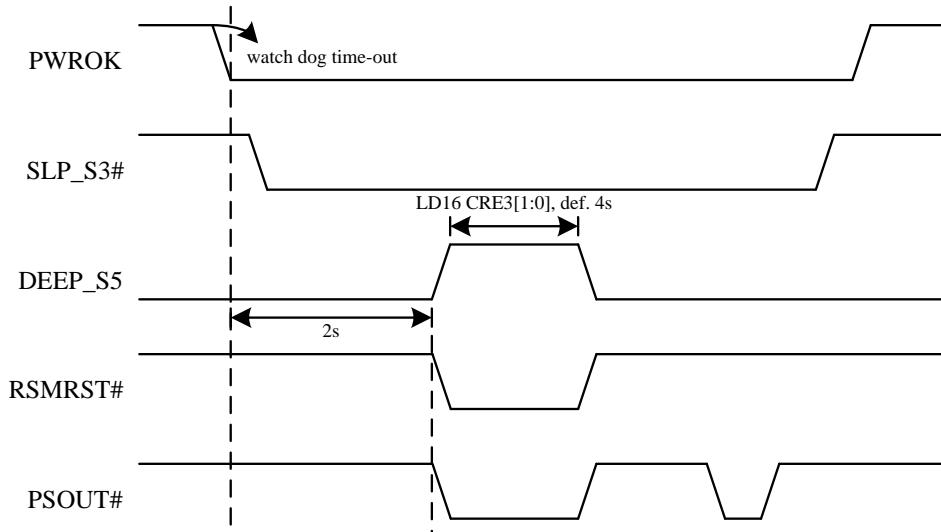


Figure 16-2 PWROK Event When Logical Device D CRF0 Bit[7] and Bit[0] as 2'b10

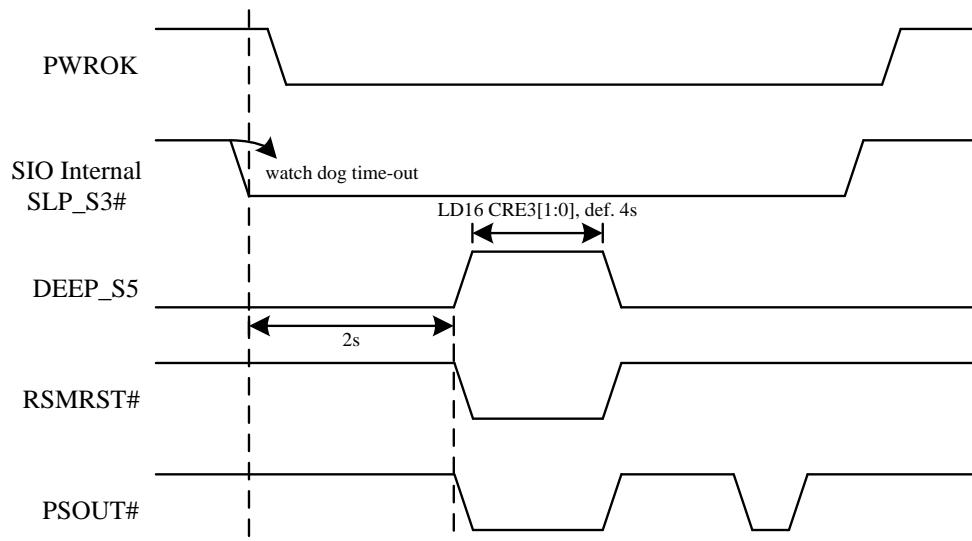


Figure 16-3 SLP_S3# Event When Logical Device D CRF0 Bit[7] and Bit[0] as 2'b11

17. GENERAL PURPOSE I/O

17.1 GPIO ARCHITECTURE

The NCT6792D provides input/output ports that can be individually configured to perform a simple basic I/O function or alternative, pre-defined function. Users can configure each individual port to be an input or output port by programming respective bit in selection register (0 = output, 1 = input). Invert port value by setting inversion register (0 = non-inverse, 1 = inver-se). Port value is read/write through data register.

In addition, only **GP41** are designed to be able to assert **PSOUT#** signal to wake up the system if any of them has falling transitions. The following table gives more detailed register map on GP41.

Table 17-1 Relative Control Registers of GPIO 41 that Support Wake-Up Function

	EVENTROUTE I (PSOUT#)
	0 : DISABLE 1 : ENABLE
GPIO41	LDA, CR[FEh] bit[7]

Table 17-2 GPIO Group Programming Table

GPIO2 Group

Enable: Logic Device 9, CR30[0]

Data: Logic Device 9, E0~E3

Multi-function: WDT1, SMI, BEEP, GRN, OVT (Logic Device 9, CRE9[0~7])

Reset: Logic Device A, CRE9[2]

OD/PP: Logic Device F, CRE1

Name	Pin	Default function	Default type	GPIO power plane	Switch default function to GPIO
GP20	27	KDAT	Bi-direction	3VSB	
GP21	26	KCLK	Bi-direction	3VSB	CR2A[0]=1
GP22	25	MDAT	Bi-direction	3VSB	
GP23	24	MCLK	Bi-direction	3VSB	CR2A[1]=1
GP24	46	CIRRX	Input	3VSB	CR1B[4]=0, CR27[3]=0
GP25	47	GP25	Input	3VSB	
GP26	58	TSIC	Input	3VSB	CR2C[1]=1

GPIO3 Group

Enable: Logic Device 9, CR30[1]

Data: Logic Device 9, E4~E7

Multi-function: SMI, BEEP, GRN, WDT1 (Logic Device 9, CREA[0~6])

Reset: Logic Device A, CRE9[3]

OD/PP: Logic Device F, CRE2

Name	Pin	Default function	Default type	GPIO power plane	Switch default function to GPIO

GP30	39	RESETCONI#	Input	3VSB	CR1A[7:6]=01
GP33	34	VSB#	Output (OD)	3VSB	CR2C[6:5]=01

GPIO4 Group

Enable: Logic Device 9, CR30[2]

Data: Logic Device 9, F0~F2, E8

Multi-function: WDT1, SMI, BEEP, YLW (Logic Device 9, CREE[0~7])

Reset: Logic Device A, CRE9[4]

OD/PP: Logic Device F, CRE3

Name	Pin	Default function	Default type	GPIO power plane	Switch default function to GPIO
GP41	23	MSCL	Output (OD)	3VSB	CR1A[3:2]=10, CR27[4]=0
GP42	22	MSDA	Output (OD)	3VSB	CR1B[2:1]=11, CR27[4]=0

GPIO5 Group

Enable: Logic Device 9, CR30[3]

Data: Logic Device 9, F4~F7

Multi-function: GRN, YLW, SLPS5_LCH (Logic Device 8, CREB[0~7])

Reset: Logic Device A, CRE9[5]

OD/PP: Logic Device F, CRE4

Name	Pin	Default function	Default type	GPIO power plane	Switch default function to GPIO
GP54	44	GP54	Input		
GP55	43	GP55	Input		
GP56	42	{AMDPWR_EN}	{AMDPWR_EN}	3VSB	
		0 GP56	0 Input		
GP57	41	1 VCORE_EN	1 Output (OD)		
		{AMDPWR_EN}	{AMDPWR_EN}		
		0 GP57	0 Input		
		1 VLDT_EN	1 Output (OD)		

GPIO7 Group

Enable: Logic Device 7, CR30[1]

Data: Logic Device 7, E0~E3

Multi-function: MLED, GRN, BEEP, SMI, WDT1 (Logic Device 7, CREC[0~7])

Reset: Logic Device A, CRE5[4]

OD/PP: Logic Device F, CRE6

Name	Pin	Default function	Default type	GPIO power plane	Switch default function to GPIO
GP74	37	RSTOUT0#	Output	3VSB	CR2B[3]=1
GP75	36	RSTOUT1#	Output	3VSB	CR2B[5:4]=01

GPIO8 Group

Enable: Logic Device 7, CR30[2]

Data: Logic Device 7, E4~E7

Multi-function: YLW, BEEP, SMI, WDT1 (Logic Device 7, CRED[0~7])

Reset: Logic Device A, CRE5[5]

OD/PP: Logic Device F, CRE7

Name	Pin	Default function	Default type	GPIO power plane	Switch default function to GPIO
GP80	13	GP80	Input	3VSB	
GP81	14	GP81	Input	3VSB	
GP82	15	GP82	Input	3VSB	
GP83	16	GP83	Input	3VSB	
GP84	17	GP84	Input	3VSB	
GP85	18	GP85	Input	3VSB	
GP86	19	GP86	Input	3VSB	
GP87	20	GP87	Input	3VSB	

17.2 ACCESS CHANNELS

There are two different channels to set up/access the GPIO ports. The first one is the indirect access via register 2E/2F (4E/4F, it depends by HEFRAS trapping). The registers can be read / written only when the respective logical device ID and port number are selected.

The other is the direct access through GPIO register table that can be configured by {CR61, CR60} of logic device 8. The mapped 7 registers are defined in table 17-2. Base address plus 0 to 4 are GPIO registers, base address plus 5 and 6 are watchdog registers. Since the base address is set, the GPIO number can be selected by writing the group number to GSR [INDEX] (GPIO Select Register, #0~#7 for GPIO0 ~ GPIO7 respectively). Then the I/O register, the Data register and the Inversion register are mapped to addresses Base+0, Base+1 and Base+2 respectively. Only one GPIO can be accessed at one time.

Table 17-3 GPIO Register Addresses

ADDRESS	ABBR	BIT NUMBER										
		7	6	5	4	3	2	1	0			
Base + 0	GSR	Reserved					INDEX					
Base + 1	IOR	GPIO I/O Register										
Base + 2	DAT	GPIO Data Register										
Base + 3	INV	GPIO Inversion Register										
Base + 4	DST	GPIO Status Register										
Base + 5	Wdtmod	Watchdog Timer 1 (WDT1) and KBC P20 Control Mode Register										
Base + 6	Wdttim	Watchdog Timer 1 (WDT1) Control Register										

18. SMBUS MASTER INTERFACE

18.1 General Description

The SMBus interface module is two wire serial interface compatible to the SMBus physical layer. It is also compatible with Intel's SMBus and Philips' I²C bus.

The rest of this section introduces the various features of the SMBus master capability. These features are divided into the following sections:

- ◆ SMBus and I²C compliant
- ◆ AMD-TSI
- ◆ PCH
- ◆ SMBus master

18.2 Introduction to the SMBus Master

18.2.1 Data Transfer Format

Every byte transferred on the bus consists of 8 bits. After the start condition, the master places the 7-bit address to the slave device it wants to address on the bus. The address followed an eight bit indicating the direction of the data transfer (R/W#); a zero indicates a transmission for data while a one indicates a request for data. Each byte is transferred with the most significant bit first, and after each byte, an acknowledge signal must follow. A data transfer is always terminated by stop condition generated by master.

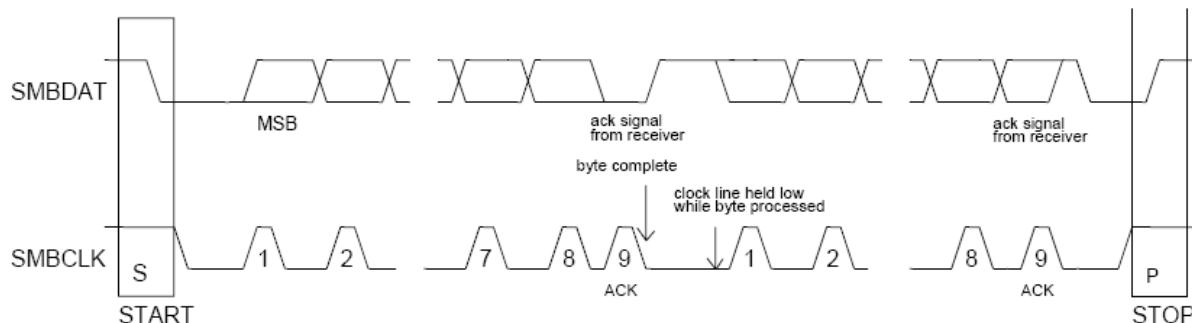


Figure 18-1 Data Transfer Format

18.2.2 Arbitration

Arbitration takes place on the SMBDAT data line while the SMBCLK line is high. Two devices may generate a start condition at the same time and enter the arbitration procedure. Arbitration continues until one master generates a HIGH level on the SMBDAT line while another competing master generates a LOW level on the SMBDAT line while SMBCLK is high. The master device which generated the HIGH level on SMBDAT loses arbitration. If a device loses arbitration during the first byte following a start condition i.e. while transmitting a slave address it becomes a slave receiver and monitors the address for a potential match. Arbitration may also be lost in the master receive mode during the acknowledge cycle.

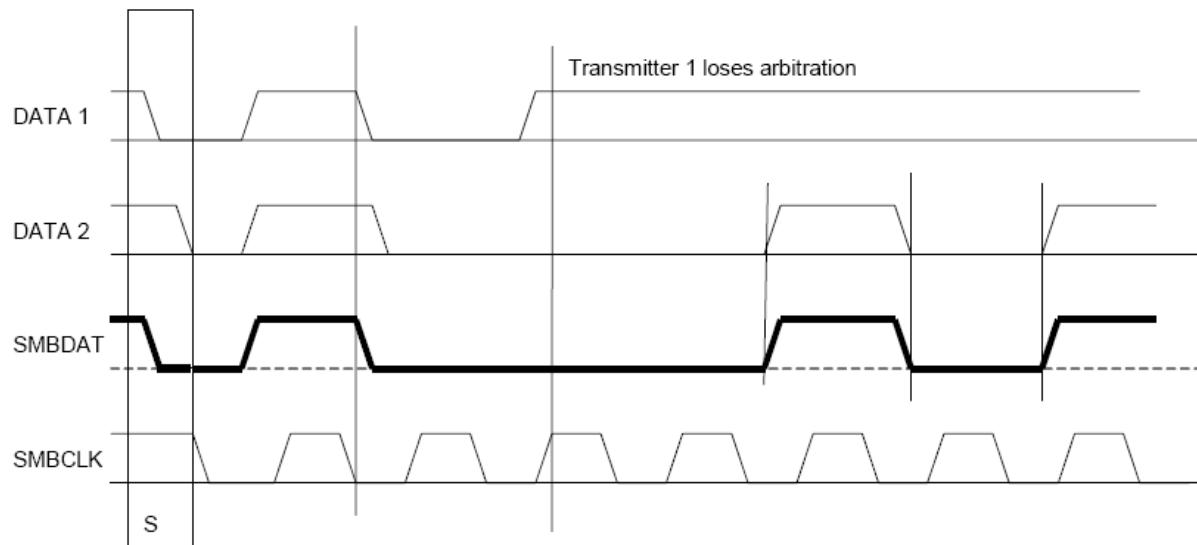


Figure 18-2 SMBus Arbitration

18.2.3 Clock Synchronization

Clock synchronization is performed while the arbitration procedure described above is in effect. Clock Synchronization takes place between two competing devices by utilizing the wired-AND nature of the SMBCLK line. The SMBCLK line will go low as soon as the master with the shortest high time pulls SMBCLK low. SMBCLK will remain low until the device with the longest SMBCLK low time relinquishes the SMBCLK line. Therefore the SMBCLK high time is determined by device with the shortest high time while the SMBCLK low time is determined by the device with the longest low time.

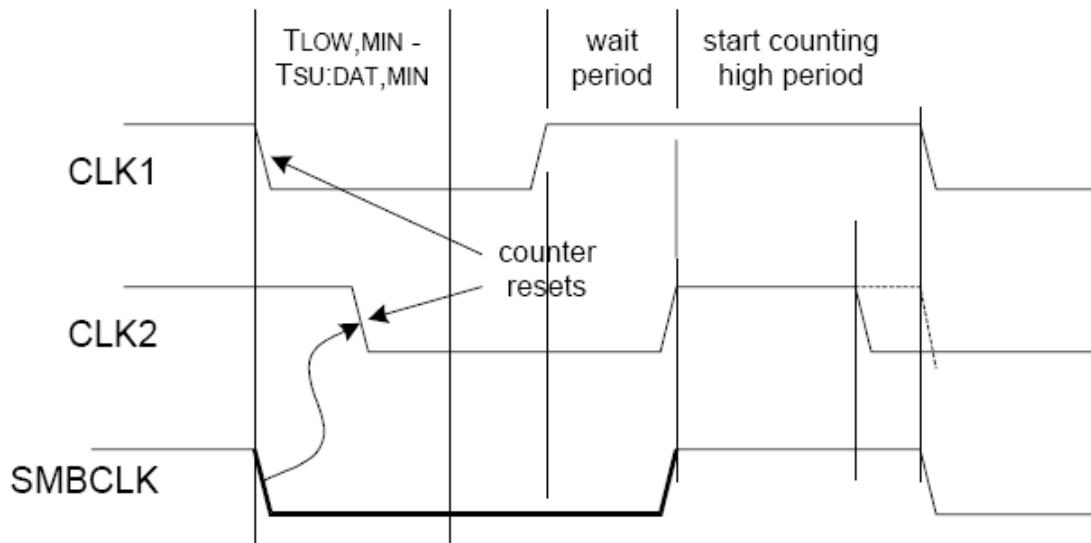


Figure 18-3 Clock synchronization

18.3 SB-TSI

The combined-format repeated start sequence is not supported in standard-mode and fast-mode.

- ◆ Only 7-bit SMBus addresses are supported.
- ◆ SB-TSI implements the Send/Receive Byte and Read/Write Byte protocols.
- ◆ SB-TSI registers can only be written using a write byte command.
- ◆ Address Resolution Protocol (ARP) is not implemented.
- ◆ Packet Error Checking (PEC) is not supported.

18.3.1 SB-TSI Address

The SMBus address is really 7 bits. The SB-TSI address is normally 98h or 4Ch. The address could vary with address select bits.

Table 18-1 SB-TSI Address Encoding

Address Select Bits	SB-TSI Address
000b	98h
001b	9Ah
010b	9Ch
011b	9Eh
100b	90h
101b	92h
110b	94h
111b	96h

18.4 PCH

The PCH provide system thermal data to EC. The EC can manage the fans and other cooling elements based on this data. A subset of the thermal collection is that the PCH can be programmed to alert the EC when a device has gone outside of its temperature limits.

18.4.1 Command Summary

Table 18-2 PCH Command Summary

Trans-action	Slave Addr.	Data Byte 0 =Com mand	Data Byte 1 =Byte Count	Data Byte 2	Data Byte 3	Data Byte 4	Data Byte 5	Data Byte 6	Data Byte 7
Write STS Preferences	I2C	0x41	0x6	STS [47:40]	STS [39:32]	STS [31:24]	STS [23:16]	STS [15:8]	STS [7:0]
Write CPU Temp Limits	I2C	0x42	0x6	Lower Limit [15:8]	Lower Limit [7:0]	Upper Limit [15:8]	Upper Limit [15:8]		
Write MCH	I2C	0x43	0x2	Lower	Upper	na	na		

Temp Limits				Limit [7:0]	Limit [7:0]				
Write IBX Temp Limits	I2C	0x44	0x2	Lower Limit [7:0]	Upper Limit [7:0]	na	na		
Write DIMM Temp Limits	I2C	0x45	0x2	Lower Limit [7:0]	Upper Limit [7:0]	na	na		
Write MPC CPU Power Clamp	I2C	0x50	0x2	Lower Limit [7:0]	Power Clamp [7:0]				
Block Read	Block Read Address	0x40	Block Read Address	Byte Count	Data 0	Data N	PEC (optional)		

18.5 SMBus Master

18.5.1 Block Diagram

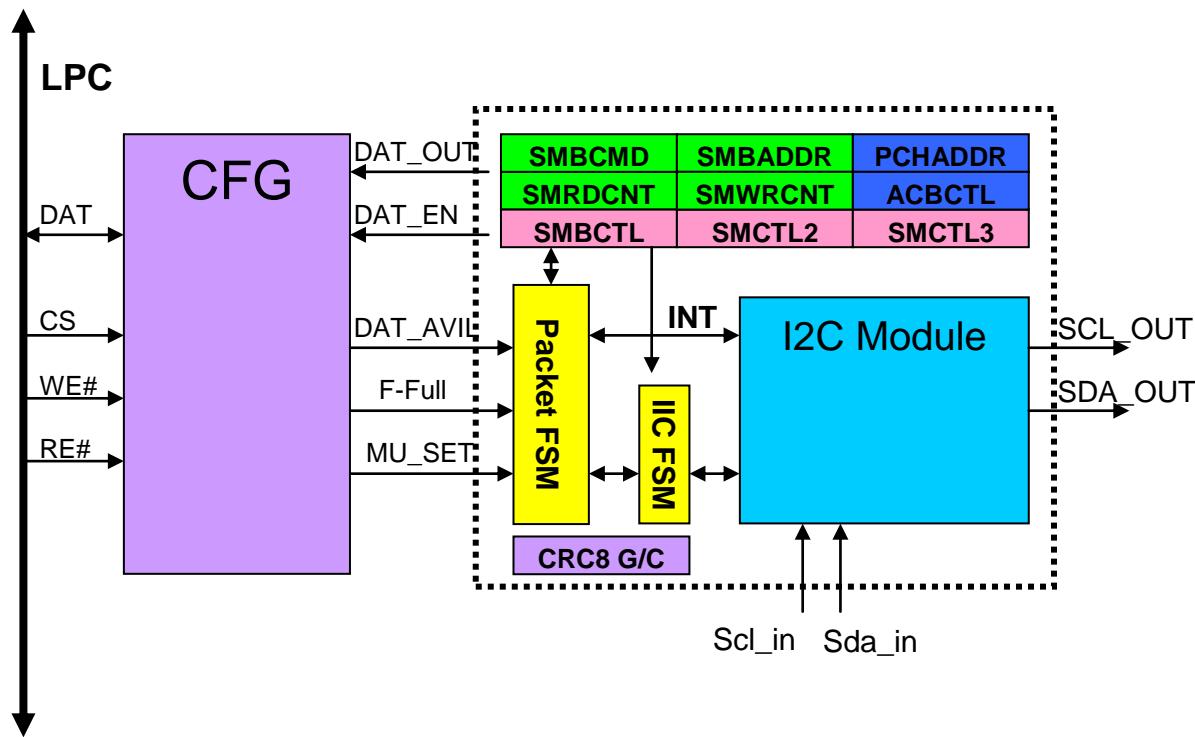


Figure 18-4 SMBus Master Block Diagram

18.5.2 Programming Flow

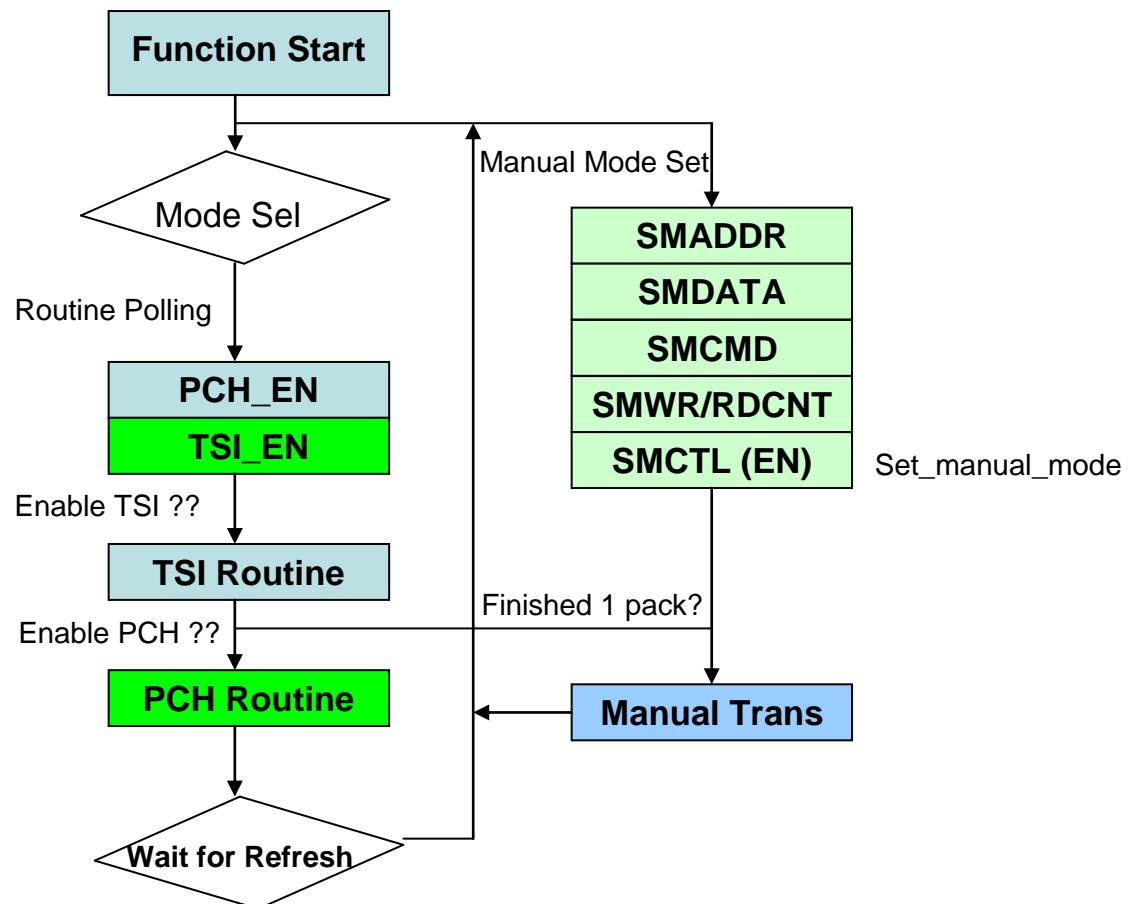


Figure 18-5 Programming Flow

18.5.3 TSI Routine

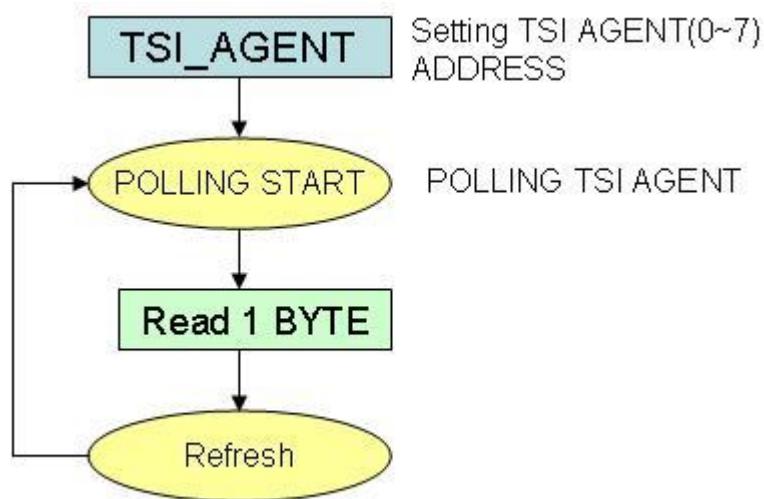


Figure 18-6 TSI Routine

18.5.4 PCH Routine

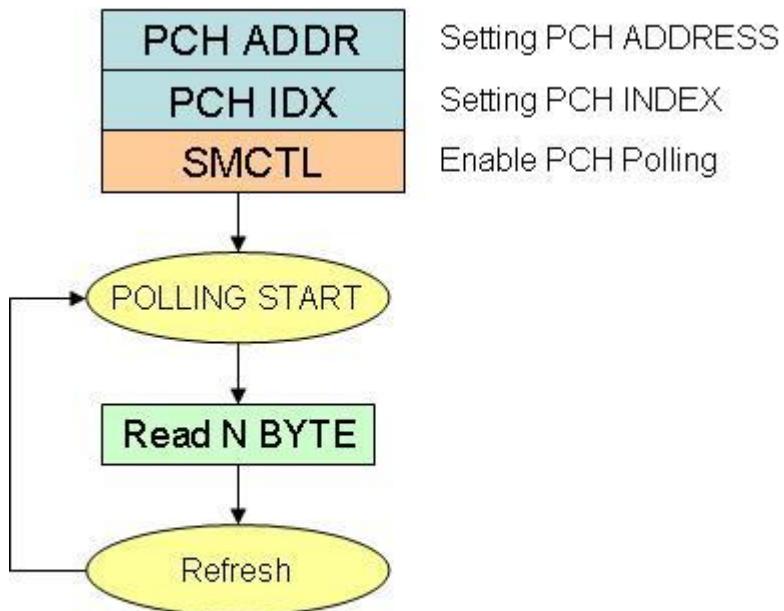


Figure 18-7 PCH Routine

18.5.5 BYTE Routine

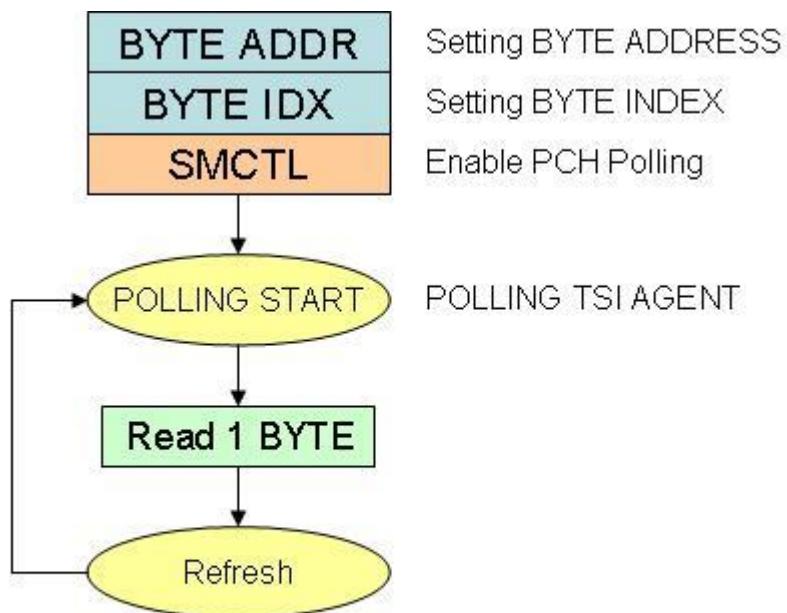


Figure 18-8 PCH Routine

18.5.6 Manual Mode interface

The SMBus host supports Block/Word/Byte Write and Block/Word/Byte read with PEC. The SMBus host can use the interface to access the smbus slave. The timing diagrams below illustrate how to use the smbus interface to write the data or read the data to the smbus slave.

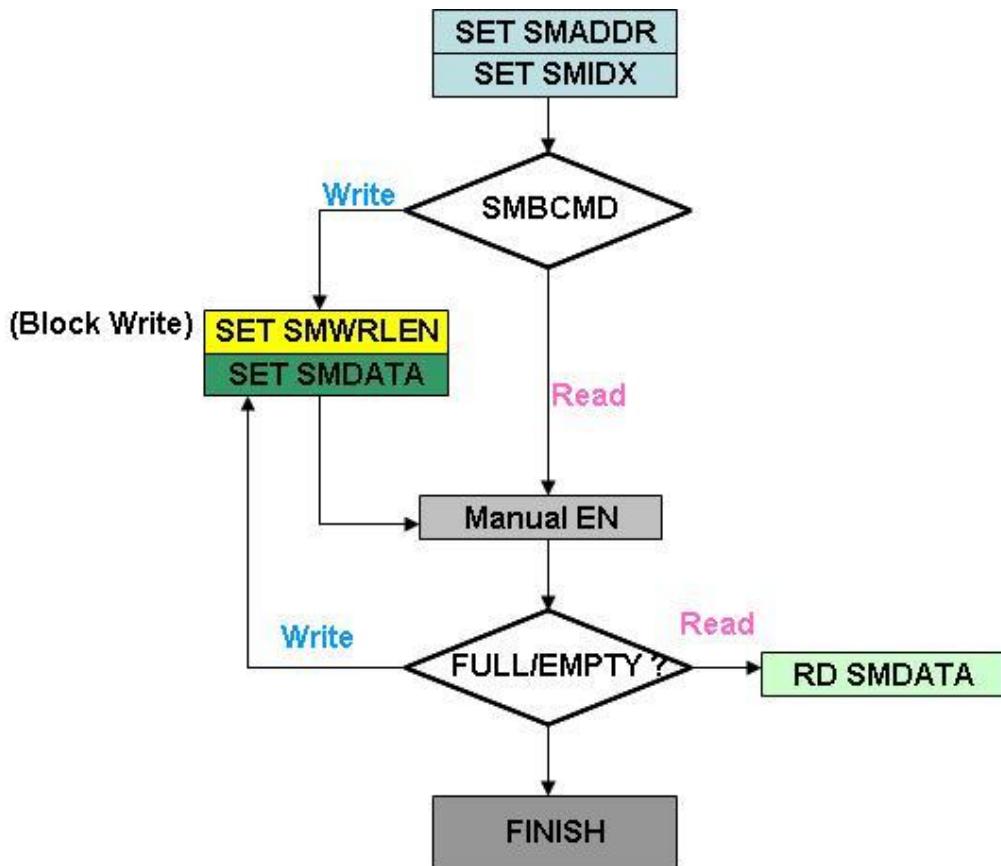


Figure 18-9 Manual Mode Programming Flow

18.6 Register Type Abbreviations

The following abbreviations are used to indicate the Register Type:

- ◆ R/W = Read/Write.
- ◆ R = Read from register.
- ◆ W = Write.
- ◆ RO = Read-only.

To program the SMBus master configuration registers, the following configuration procedures must be followed in sequence:

- (1). Enter the Extended Function Mode.
- (2). Configure the configuration registers.

18.6.1 Enter the Extended Function Mode

To place the chip into the Extended Function Mode, two successive writes of 0x26 must be applied to Extended Function Enable Registers (EFERs, i.e. 2Eh or 4Eh).

18.6.2 Configure the Configuration Registers

The chip selects the Logical Device and activates the desired Logical Devices through Extended Function Index Register (EFIR) and Extended Function Data Register (EFDR). The EFIR is located at the same address as the EFER, and the EFDR is located at address (EFIR+1).

First, write the Logical Device Number (i.e. 0x07) to the EFIR and then write the number of the desired Logical Device to the EFDR. If accessing the Chip (Global) Control Registers, this step is not required.

Secondly, write the address of the desired configuration register within the Logical Device to the EFIR and then write (or read) the desired configuration register through the EFDR.

18.7 SMBus Master Register Set

18.7.1 SMBus Register Map

SMBus Master base address in register Logic Device B CR62h(MSB), CR63h(LSB).

Table 18-3 SMBus Master Bank 0 Registers

Offset	Type	Name	Section
0	R/W	SMBus Data	19.7.2
1	R/W	SMBus Write Data Size	19.7.3
2	R/W	SMBus Command	19.7.4
3	R/W	SMBus Index	19.7.5
4	R/W	SMBus Control	19.7.6
5	R/W	SMBus Address	19.7.7
6	R/W	SMBCLK Frequency	19.7.8
7	RO	Reserved	--
8	R/W	PCH Address	19.7.9
9	R/W	Error status	19.7.10
A	R/W	Reserved	--
B	R/W	PCH Command	19.7.11
D	R/W	TSI Agent Enable	19.7.12
E	R/W	SMBus Control 3 Register	19.7.13
F	R/W	SMBus Control 3 Register	19.7.14
10	R/W	BYTE_ADDR	19.7.15
11	R/W	BYTE Index High Byte	19.7.16
12	R/W	BYTE Index Low Byte	19.7.17
13-15	R/W	Reserved	
16	R/W	TSI AGENT0 Address	19.7.19
17	R/W	TSI AGENT1 Address	19.7.20

18.7.2 SMBus Data (SMDATA) – Bank 0

This 32 bits register is the data in and out register of SMBus data register. Before writing to SMDATA register, this register contains the input data, after writing to SMDATA register, this register contains the output data.

Offset: 0h

Type: R/W

Byte	3	2	1	0
Name	SMFIFO3	SMFIFO2	SMFIFO1	SMFIFO0
Default	00h	00h	00h	00h

Byte	Description
3	SMFIFO3 (SMBus FIFO 3) . This byte represents the high byte of the 32 bits SMBus data.
2	SMFIFO2 (SMBus FIFO 2) . This byte represents the second byte of the 32 bits SMBus data.
1	SMFIFO1 (SMBus FIFO 1) . This byte represents the first byte of the 32 bits SMBus data.
0	SMFIFO0 (SMBus FIFO 0) . This byte represents the low byte of the 32 bits SMBus data.

18.7.3 SMBus Write Data Size (SMWRSIZE) – Bank 0

Offset: 1h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	Reserved			SMWRSIZE				
Default	0	0	0	0	0	0	0	0

Bit	Description
7-5	Reserved
4-0	SMWRSIZE (SMBus Write Byte Counter) . This field sets the write byte counter, the max counter size is 32 bytes, and the minimal size is 1 bytes.

18.7.4 SMBus Command (SMCMD) – Bank 0

Offset: 2h

Type: R/W

Bit	7	6	5	4	3	2	1	0
NAME	REV				SMBus CMD			
Default	0	0	0	0	0	0	0	0

Bit	Description
7-4	Reserved

3-0	SMBCMD (SMBus Command). This field sets SMBus Command: 0000 : Read Byte (Default) 0001 : Read Word 0010 : Read Block 0011 : Block Write and Read Process Call 0100 : Process Call 1000 : Write Byte 1001 : Write Word 1010 : Write Block
-----	--

18.7.5 SMBus INDEX (SMIDX) – Bank 0

Offset: 3h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	SMCMD							
Default	0	0	0	0	0	0	0	0

Bit	Description
7-0	SMIDX (SMBus INDEX). This field represents the index data of the SMBus.

18.7.6 SMBus Control (SMCTL) – Bank 0

Offset: 4h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	MMODE_S	S_RST	CRC8_EN	REFLASH_CLK			BYTE_EN	PCH_EN
Default	0	0	0	0	0	0	0	0

Bit	Description
7	MMODE_S (Manual Mode Set). 0 : Disable. 1 : Enable.
6	S_RST (Soft Reset SMBus). 0 : Disable. 1 : Enable.
5	CRC8_EN (CRC8 Enable). 0 : CRC8 function is disable. 1 : CRC8 function is enable.

4-2	REFRASH_CLK (Refresh Clock Select). 000, 100 – 128ms 001, 101 – 256ms 010, 110 – 512ms 011, 111 – 64ms (1KHz)
1	BYTE_EN (BYTE Enable). 0 : BYTE function is disable. 1 : BYTE function is enable.
0	PCH_EN (PCH Enable). 0 : PCH function is disable. 1 : PCH function is enable.

18.7.7 SMBus Address (SMADDR) – Bank 0

Offset: 5h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	SMADDR							REV
Default	0	0	0	0	0	0	0	0

Bit	Description
7-1	SMADDR (SMBus Address). AMD-TSI only supports 7-bit SMBus address.
0	Reserved: 0 : Write. If the protocol is write, the WR_SIZE can't be zero. (Default)

18.7.8 SCL FREQ (SCLFREQ) – Bank 0

Offset: 7h

Type: R/W

Bit	7	6	5	4	3	2	1	0
	Reserved:					SCLFREQ		
Default	0	0	0	0	0	1	1	1

Bit	Description
7-4	Reserved

3-0	SCLFQ (SMBCLK Frequency). This field defines the SMBCLK period (low time and high time). The clock low time and high time are defined as follows: 0000 : 365KHz 0001 : 261KHz 0010 : 200KHz 0011 : 162KHz 0100 : 136KHz 0101 : 117KHz 0110 : 103KHz 0111 : 99KHz (Default) 1000 : 83KHz 1001 : 76KHz 1010 : 71KHz 1011 : 65KHz 1100 : 61KHz 1101 : 57KHz 1110 : 53KHz 1111 : 47KHz
-----	---

18.7.9 PCH Address (PCHADDR) – Bank 0

Offset: 8h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	PCHADDR							
Default	1	0	0	1	0	1	0	0

Bit	Description							
7-1	PCHADDR (PCH Address). PCH supports 8-bit SMBus address. The default address is 94h. The last bit is read or write bit. It needs to set to "0".							

18.7.10 SMBus Error Status (Error_status) – Bank 0

Offset: 9h

Type: RO/W1C

Bit	7	6	5	4	3	2	1	0
Name	REV		ADNACK	Timeout	Reserved	BER	NACK	Reserve
Default	1	0	0	1	0	1	0	0

Bit	Description							
7-6	Reserved							
5	ADDR Non ACK. This bit reflects SMBus occurred ADDRESS NON ACK in Manual mode..							
4	Timeout. This bit reflects when SMBus occurs timeout.							

3	Reserved
2	BER (Bus Error). This bit reflects when a start or stop condition is detected during data transfer, or when an arbitration problem is detected.
1	NACK (Negative acknowledge). This bit is set by hardware when a transmission is not acknowledged on the ninth clock. While NACK is set SCL will be drive low and subsequent bus transactions are stalled until NACK is cleared.
0	Reserved

18.7.11PCH Command (PCHCMD) – Bank 0

Offset: Bh

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	PCHCMD							
Default	0	1	0	0	0	0	0	0

Bit	Description
7-0	PCHCMD (PCH Command). This field represents the command data of the PCH. The default command is block read (40h).

18.7.12TSI Agent Enable Register (TSI_AGENT) – Bank

Offset: Dh

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	Reserved							AG1
Default	0	0	0	0	0	0	0	0

Bit	Description
7-2	Reserved
1	TSI AGENT1 Enable. : This bit reflects AMD-TSI Agent enable. 0: Diable 1: Enable
0	TSI AGENT0 Enable. : This bit reflects AMD-TSI Agent enable. 0: Diable 1: Enable

18.7.13SMBus Control 3 Register (SMCTL3) – Bank 0

Offset: Eh

Type: RO

Bit	7	6	5	4	3	2	1	0
Name	Reserved				CRC_CHK	M_MODE	F_FULL	F_EMPT
Default	0	0	0	0	0	0	0	0

Bit	Description
7-4	Reserved
3	CRC_CHK (CRC Check). 0 : incorrect 1 : correct
2	M_MODE (Manual Mode). 0 : Non-active 1 : Active
1	F_FULL (fifo_full). : This bit reflects SMBus data fifo is full. 0 : Non-full 1 : Full
0	F_EMPT (fifo empty). : This bit reflects the SMBus data fifo is empty. 0 : Non-empty 1 : Empty

18.7.14 SMBus Control 2 Register (SMCTL2) – Bank 0

Offset: Fh

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	Reserved		INT_LCH_E	Reserved		BYTE_SEL	BANKSEL	
Default	0	0	0	0	0	0	0	0

Bit	Description
7-6	Reserved
5	INT_LCH_E (Interrupt Latch Enable). : This bit will latch the I2CSTA register. 0 : Disable. 1 : Enable.
2	BYTE_SEL : This field represents byte polling 8-bit/16bit select bits. 0: BYTE_TEMP is 16 bit data 1: BYTE_TEMP is 8 bit data
1-0	BANKSEL (Bank Select). 00 – Bank 0. 01 – Bank 1. 10 – Bank 2.

18.7.15BYTE ADDRESS0 (BYTE ADDR) – Bank 0

Offset: 10h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	BYTE_ADDRESS							
Default	0	0	0	0	0	0	0	0

Bit	Description
7-0	BYTE ADDRESS (BYTE ADDR). This field represents the address data of the BYTE.

18.7.16BYTE ADDRESS1 (BYTE ADDR) – Bank 0

Offset: 11h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	BYTE_ADDRESS							
Default	0	0	0	0	0	0	0	0

Bit	Description
7-0	BYTE ADDRESS1 (BYTE ADDR). This field represents the address data of the BYTE.

18.7.17BYTE INDEX0 (BYTE_IDX0) – Bank 0

Offset: 12h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	BYTE_IDX_H							
Default	0	0	0	0	0	0	0	1

Bit	Description
7-0	BYTE_IDX_H (High BYTE INDEX). This field represents the high byte index of the Byte polling. The default command is byte read (01h).

18.7.18BYTE INDEX1 (BYTE_IDX1) – Bank 0

Offset: 13h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	BYTE_IDX_L							
Default	0	0	0	1	0	0	0	0

Bit	Description
7-0	BYTE_IDX_L (LOW BYTE INDEX). This field represents the low byte index of the Byte polling. The default command is byte read (10h).

18.7.19TSI AGENT0 ADDRESS (TSI_AGENT0 ADDR) – Bank 0

Offset: 16h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	TSI_AGNET0_ADDRESS							
Default	1	0	0	1	1	0	0	0

Bit	Description
7-1	TSI AGENT0 ADDRESS (TSI AGENT0 ADDR). This field represents the address data of the BYTE.
0	Reserved

18.7.20SI AGENT1 ADDRESS (TSI_AGENT1 ADDR) – Bank 0

Offset: 17h

Type: R/W

Bit	7	6	5	4	3	2	1	0
Name	TSI_AGNET1_ADDRESS							
Default	1	0	0	1	1	0	1	0

Bit	Description
7-1	TSI AGENT1 ADDRESS (TSI AGENT1 ADDR). This field represents the address data of the BYTE.
0	Reserved

The EC may read thermal information from IBX using the SMBus block read command. The IBX doesn't support byte-read or word-read SMBus commands. The read use a different address than the writes. The address must be different so that the IBX knows which target is intended, either the I2C target or the block read buffer.

The IBX and EC are set up by BIOS with the length of the read that is supported by the platform. The EC must always do reads of the lengths set up by BIOS. There is no way to change the length of the read after BIOS has set things up.

An EC that only wants the single highest temperature among MCH, and CPU could read one byte. A 2 byte read would provide both IBX and CPU/MCH package temperature. An EC that wanted each components temperature would do a 4 byte read. An EC that also wanted DIMM information would read 9 bytes. If an EC wanted to read the HOST STS status, it must read 19 bytes. An EC can also read the energy data provided by the CPU by reading 12 bytes.

19. POWER FAULT

The NCT5567D-B supports over/under voltage for system protection. When this function is activated and after TIME_PWRD timing, system began to monitor 3VCC and VIN2 voltage channels. If ATXPGD=0, system only support over-voltage (OV) protection and forced PSON# 'high' then shut-down the system. As shown in the figure below.

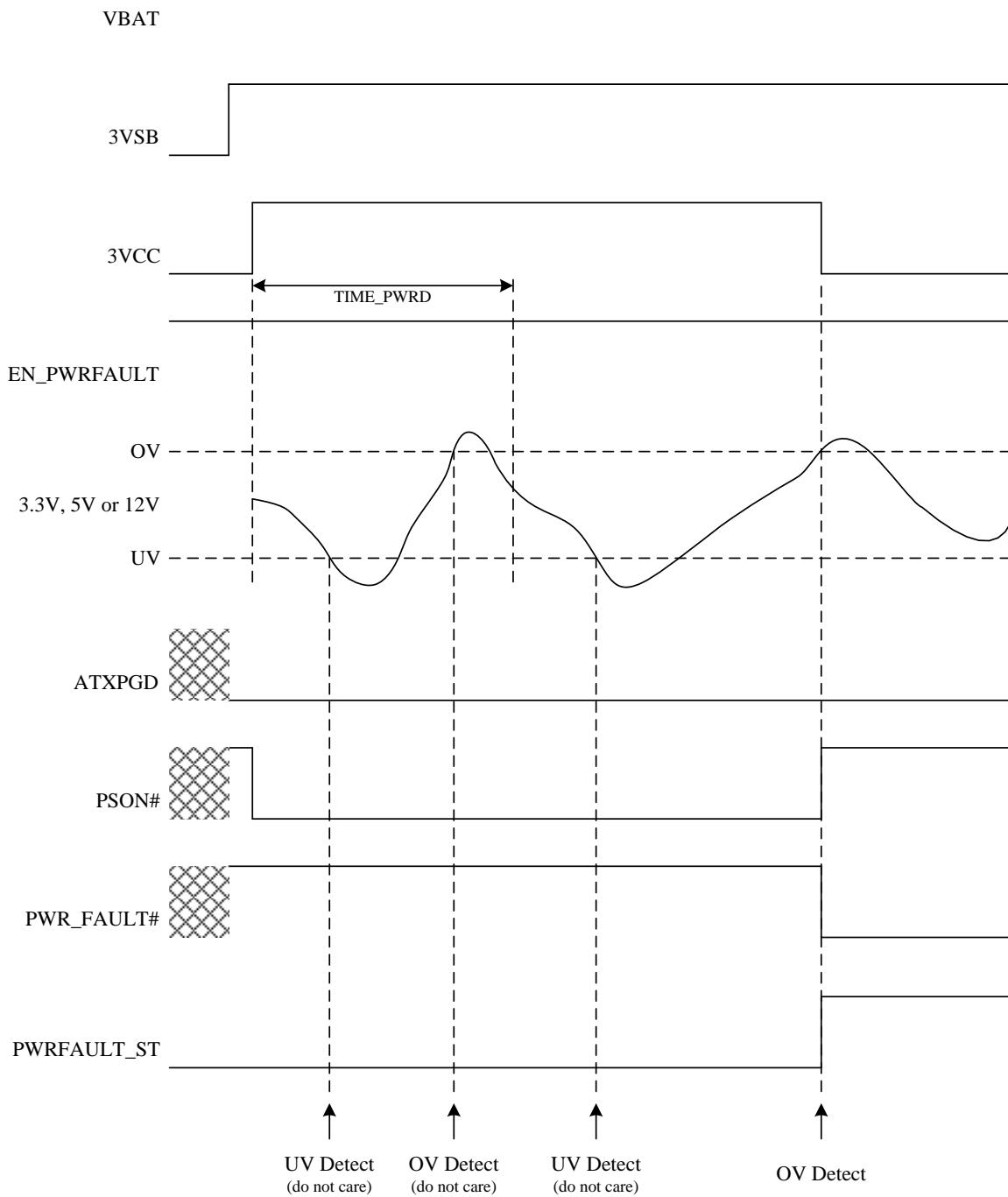


Figure 19-1 Power Fault (Power Fault Enable, ATXPGD=0)

If ATXPGD=1, the system support over-voltage (OV) and under-voltage (UV) protection. Users can restart the system until 3VSB drop or PSIN#=0 to release protection event. Please refer to the figure below.

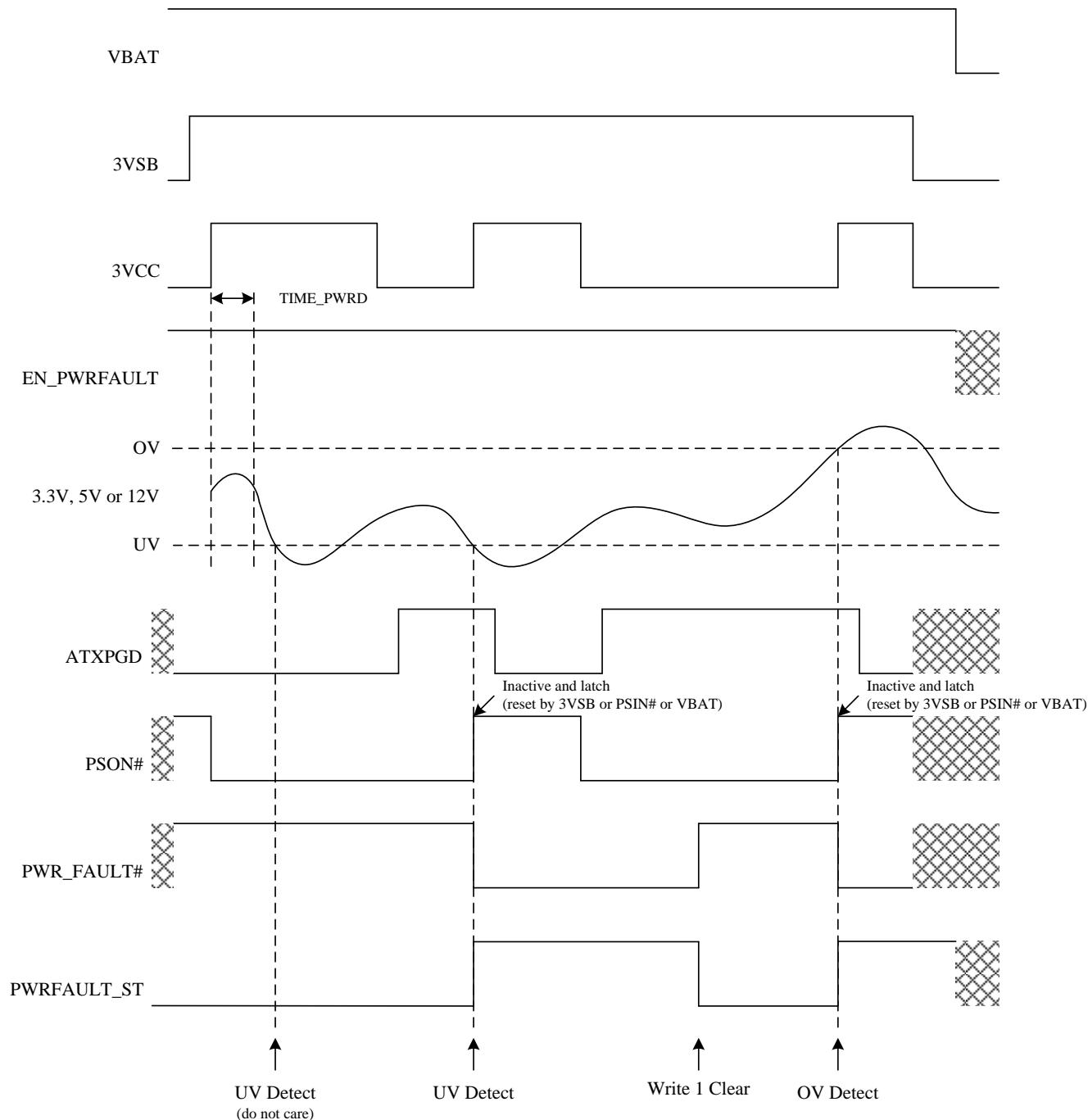


Figure 19-2 Power Fault (Power Fault Enable, ATXPGD=1)

20. FADING LED

The NCT5567D-B provide Fading led interface that can be change led speed of bright or dark through different frequency or duty cycle. Furthermore, the contrast of led bright or dark can be decided by maximum duty cycle, minimum duty cycle, and middle value.

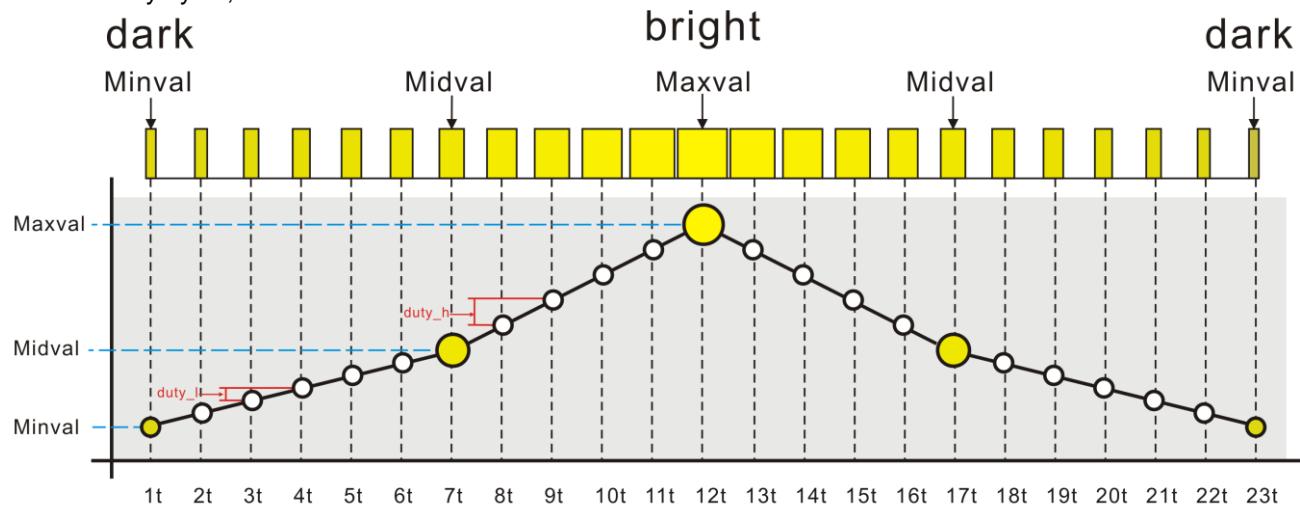


Figure 20-1 Example of Fading LED

NCT5567D-B GRN/YLW and White LED support fading led function. In White LED, the fading led is active at S3 mode; the duty cycle can be increase and decrease from 1, 1.5 (default), 2, to 4 second, which can be control by LD15 CRF3 and CRF4, when increase and decrease time is select 1 second, LD15 CRF3 and CRF4 must be set to 0x88, other choice are CRF3 and CRF4 set to 0x56 for 1.5 second, CRF3 and CRF4 set to 0x44 for 2 second, CRF3 and CRF4 set to 0x22 for 4 second. Besides LD15 CRF7 also supports White LED dark extend control, when LD15 CRF7 set to 0x0F, the dark time can be extend to 1 second (default), LD15 CRF7 set to 0x17, the dark time can be extend to 1.5 second, and LD15 CRF7 set to 0x1E, the dark time can be extend to 2 second,

21. CONFIGURATION REGISTER

21.1 Chip (Global) Control Register

Default Value of Global Control Register:

Register	Default	Register	Default	Register	Default
CR 07h	00h	CR 20h	D1h (ID_H)	CR 2Bh	00h
CR 10h	FFh	CR 21h	21h (ID_L)	CR 2Ch	01h
CR 11h	FFh	CR 22h	FFh	CR 2Dh	0s00_0000b
CR 13h	00h	CR 24h	04h	CR 2Fh	ssss_ssssb
CR 14h	00h	CR 25h	00h		
CR 1Ah	30h	CR 26h	0s00_0000b		
CR 1Bh	50h	CR 27h	03h		
CR 1Ch	10h	CR 28h	00h		
CR 1Dh	00h	CR 2Ah	C0h		

Note. The value of "s" means hardware strapping result: strapping high will report 1; strapping low will report 0.

In addition, BIOS can write the value of strapping result after hardware strapping.

Note. The CR21h is low-byte of the Chip-ID; the "X" means IC version. EX. 11=A version, 12=B version, 13=C version.

Reserved Registers of Global Control Register:

Register	Default	Register	Default
CR 02h	00h	CR 1Eh	FFh
CR 12h	FFh	CR 1Fh	FFh
CR 15h	FFh	CR 23h	00h
CR 16h	FFh	CR 29h	FFh
CR 17h	FFh	CR 2Eh	00h
CR 18h	FFh		
CR 19h	FFh		

Note. All reserved registers must keep default value.

Note. Before accessing CR10, CR11, CR13 and CR14, CR26 [Bit4] must be set to logic 1.

CR 07h. Logical Device Selection

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	Logical Device Number.

CR 10h. Device IRQ TYPE Selection

Attribute: Read/Write
 Power Well: VSB
 Reset by: LRESET#
 Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	
5	R / W	UARTA IRQ TYPE SELECT (note1.) 0: Edge. 1: Level.
4	Reserved	
3	R / W	KBC IRQ TYPE SELECT (note1.) 0: Edge. 1: Level.
2	R / W	MOUSE IRQ TYPE SELECT (note1.) 0: Edge. 1: Level.
1	R / W	CIR IRQ TYPE SELECT (note1.) 0: Edge. 1: Level.
0	R / W	CIRWAKUP IRQ TYPE SELECT (note1.) 0: Edge. 1: Level.

Note1: Before accessing CR10, CR11, CR13 and CR14, CR26 [Bit4] must be set to logic 1.

CR 11h. Device IRQ TYPE Selection

Attribute: Read/Write
 Power Well: VSB
 Reset by: LRESET#
 Default : FFh

BIT	READ / WRITE	DESCRIPTION
7	R / W	HM IRQ TYPE SELECT (note1.) 0: Edge. 1: Level.
6	R / W	WDT1 IRQ TYPE SELECT (note1.) 0: Edge. 1: Level.
5	R / W	WDT3 IRQ TYPE SELECT (note1.) 0: Edge. 1: Level.
4-2	Reserved	

BIT	READ / WRITE	DESCRIPTION
1	R / W	SMI IRQ TYPE SELECT (note1.) 0: Edge. 1: Level.
0	Reserved	

Note1: Before accessing CR10, CR11, CR13 and CR14, CR26 [Bit4] must be set to logic 1.

CR 13h. Device IRQ Polarity Selection

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	IRQ Channel<15:8> Polarity (note1.) 0: High. 1: Low.

Note1: Before accessing CR10, CR11, CR13 and CR14, CR26 [Bit4] must be set to logic 1.

CR 14h. Device IRQ Polarity Selection

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	IRQ Channel<7:0> Polarity (note1.) 0: High. 1: Low.

Note1: Before accessing CR10, CR11, CR13 and CR14, CR26 [Bit4] must be set to logic 1.

CR 1Ah.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 30h

BIT	READ / WRITE	DESCRIPTION

BIT	READ / WRITE	DESCRIPTION		
7-6	R / W	Pin39 function selection		
		LD12 CREB[Bit6]	CR1A [Bit7-6]	Pin39
		1	x	CIRRX
		0	00	RESETCONI#
		0	01	GP30
		0	10	OVT#
		0	11	SMI#
5-4	Reserved			
3-2	R / W	Pin23 function selection		
		CR27 [Bit4]	CR1A [Bit3-2]	Pin23
		1	xx	Reserved
		0	00	MSCL
		0	01	SCL
		0	10	GP41
		0	11	MSCL
1	Reserved			
0	R / W	GA20M and KBRST# output type selection 0: push pull 1: OD		

CR 1Bh.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 50h

BIT	READ / WRITE	DESCRIPTION			
7-6	Reserved				
5	R / W	Pin41 function Selection			
		CR1C [Bit5]	AMDPWR_EN	CR1B [Bit5]	Pin41
		x	0	0	GP57
		x	1	0	VLDT_EN
		1	x	1	AUXFANIN2
4	R / W	Pin46 function selection			
		CR1B [Bit4]	CR27 [Bit3]	Pin46	
		1	x	CIRRX	
		0	0	GP24	
		0	1	IRRX1	
3	Reserved				

BIT	READ / WRITE	DESCRIPTION		
2-1	R / W	Pin22 function selection		
		CR27 [Bit4]	CR1B [Bit2-1]	Pin22
		1	x	Reserved
		0	00	MSDA
		0	01	SDA
		0	10	BEEP
0	Reserved			

CR 1Ch.

Attribute: Read/Write

Power Well: VSB

Reset by: PWROK

Default : 10h

BIT	READ / WRITE	DESCRIPTION		
7	R / W	AUXFANIN2 function selection		
		CR1C [Bit7]	AUXFANIN2	
		0	Disable	
		1	Enable	
6-0	Reserved			

CR 20h. Chip ID (High Byte)

Attribute: Read Only

Power Well: VSB

Reset by: None

Default : D1h

BIT	READ / WRITE	DESCRIPTION	
7-0	Read Only	Chip ID number = D1h (high byte).	

CR 21h. Chip ID (Low Byte)

Attribute: Read Only

Power Well: VSB

Reset by: None

Default : 21h

BIT	READ / WRITE	DESCRIPTION	
7-0	Read Only	Chip ID number = 21h (low byte)	

*There is a Sub ID in HWM register Bank[0] Index[F9h] Bit[3] to identify the 128pin/64pin SIO package:

0 = 128 pin SIO package

1 = 64 pin SIO package

CR 22h. Device Power Down

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-5	Reserved	
4	R / W	UARTA Power Down. 0: Powered down. 1: Not powered down.
3-0	Reserved	

CR 24h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 04h

BIT	READ / WRITE	DESCRIPTION
7	R / W	Select output type of AUXFANOUT2 =0 AUXFANOUT2 is Open-drain. =1 AUXFANOUT2 is Push-pull.
6-5	Reserved	
4	R / W	Select output type of SYSFANOUT =0 SYSFANOUT is Open-drain. =1 SYSFANOUT is Push-pull.
3	R / W	Select output type of CPUFANOUT =0 CPUFANOUT is Open-drain. =1 CPUFANOUT is Push-pull.
2	Reserved	
1	R / W	Select output type of AUXFANOUT3 =0 AUXFANOUT3 is Open-drain. =1 AUXFANOUT3 is Push-pull.
0	R / W	PNPCVS => = 0 The compatible PNP address-select registers have default values. = 1 The compatible PNP address-select registers have no default values.

CR 25h. Interface Tri-state Enable

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-3	Reserved	

BIT	READ / WRITE	DESCRIPTION
2	R / W	UARTATRI
1-0	Reserved	

CR 26h. s: value by strapping

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 0s00_0000b

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6	R / W	HEFRAS => = 0 Write 87h to location 2E twice. = 1 Write 87h to location 4E twice. The corresponding power-on strapping pin is RTSA#.
5	R / W	LOCKREG => = 0 Enable R/W configuration registers. = 1 Disable R/W configuration registers.
4-2	Reserved	
1	R / W	DSUALGRQ => = 0 Enable UART A legacy mode for IRQ selection. Then HCR register (base address + 4) bit 3 is effective when selecting IRQ. = 1 Disable UART A legacy mode for IRQ selection. Then HCR register (base address + 4) bit 3 is not effective when selecting IRQ.
0	R / W	DSUBLGRQ => = 0 Enable IR legacy mode for IRQ selection. Then HCR register (base address + 4) bit 3 is effective when selecting IRQ. = 1 Disable IR legacy mode for IRQ selection. Then HCR register (base address + 4) bit 3 is not effective when selecting IRQ.

CR 27h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 03h

BIT	READ / WRITE	DESCRIPTION
7-5	Reserved	

BIT	READ / WRITE	DESCRIPTION																																				
4	R / W	Pin22 function selection <table border="1"> <tr><td>CR27 [Bit4]</td><td>CR1B [Bit2-1]</td><td>Pin22</td></tr> <tr><td>1</td><td>x</td><td>Reserved</td></tr> <tr><td>0</td><td>00</td><td>MSDA</td></tr> <tr><td>0</td><td>01</td><td>SDA</td></tr> <tr><td>0</td><td>10</td><td>BEEP</td></tr> <tr><td>0</td><td>11</td><td>GP42</td></tr> </table> Pin23 function selection <table border="1"> <tr><td>CR27 [Bit4]</td><td>CR1A [Bit3-2]</td><td>Pin23</td></tr> <tr><td>1</td><td>xx</td><td>Reserved</td></tr> <tr><td>0</td><td>00</td><td>MSCL</td></tr> <tr><td>0</td><td>01</td><td>SCL</td></tr> <tr><td>0</td><td>10</td><td>GP41</td></tr> <tr><td>0</td><td>11</td><td>MSCL</td></tr> </table>	CR27 [Bit4]	CR1B [Bit2-1]	Pin22	1	x	Reserved	0	00	MSDA	0	01	SDA	0	10	BEEP	0	11	GP42	CR27 [Bit4]	CR1A [Bit3-2]	Pin23	1	xx	Reserved	0	00	MSCL	0	01	SCL	0	10	GP41	0	11	MSCL
CR27 [Bit4]	CR1B [Bit2-1]	Pin22																																				
1	x	Reserved																																				
0	00	MSDA																																				
0	01	SDA																																				
0	10	BEEP																																				
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1	xx	Reserved																																				
0	00	MSCL																																				
0	01	SCL																																				
0	10	GP41																																				
0	11	MSCL																																				
3	R / W	Pin46 function selection <table border="1"> <tr><td>CR1B [Bit4]</td><td>CR27 [Bit3]</td><td>Pin46</td></tr> <tr><td>1</td><td>x</td><td>CIRRX</td></tr> <tr><td>0</td><td>0</td><td>GP24</td></tr> <tr><td>0</td><td>1</td><td>IRRX1</td></tr> </table> Pin47 function selection <table border="1"> <tr><td>CR27 [Bit3]</td><td>Pin47</td></tr> <tr><td>0</td><td>GP25</td></tr> <tr><td>1</td><td>IRTX1</td></tr> </table>	CR1B [Bit4]	CR27 [Bit3]	Pin46	1	x	CIRRX	0	0	GP24	0	1	IRRX1	CR27 [Bit3]	Pin47	0	GP25	1	IRTX1																		
CR1B [Bit4]	CR27 [Bit3]	Pin46																																				
1	x	CIRRX																																				
0	0	GP24																																				
0	1	IRRX1																																				
CR27 [Bit3]	Pin47																																					
0	GP25																																					
1	IRTX1																																					
2		Reserved																																				
1	R / W	LV_DETECT_L 0: AMD power sequence detect level and time delay 1: AMD power sequence non detect level but time delay																																				
0		Reserved																																				

CR 28h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-5	Reserved	

BIT	READ / WRITE	DESCRIPTION
4	R / W	HM IO space lock enable 0 : Disable 1 : Enable
3-0	Reserved	

CR 2Ah.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#, GP2X_MRST(Bit1-0)

Default : C0h

BIT	READ / WRITE	DESCRIPTION
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BIT	READ / WRITE	DESCRIPTION																																																
7	R / W	<p>Pin13 function selection</p> <table border="1"> <tr><td>CR2A [Bit7]</td><td>Pin13</td></tr> <tr><td>0</td><td>CTSA#</td></tr> <tr><td>1</td><td>GP80</td></tr> </table> <p>Pin14 function selection</p> <table border="1"> <tr><td>CR2A [Bit7]</td><td>Pin14</td></tr> <tr><td>0</td><td>DSRA#</td></tr> <tr><td>1</td><td>GP81</td></tr> </table> <p>Pin15 function selection</p> <table border="1"> <tr><td>CR2A [Bit7]</td><td>Pin15</td></tr> <tr><td>0</td><td>RTSA#</td></tr> <tr><td>1</td><td>GP82</td></tr> </table> <p>Pin16 function selection</p> <table border="1"> <tr><td>CR2A [Bit7]</td><td>Pin16</td></tr> <tr><td>0</td><td>DTRA#</td></tr> <tr><td>1</td><td>GP83</td></tr> </table> <p>Pin17 function selection</p> <table border="1"> <tr><td>CR2A [Bit7]</td><td>Pin17</td></tr> <tr><td>0</td><td>SINA</td></tr> <tr><td>1</td><td>GP84</td></tr> </table> <p>Pin18 function selection</p> <table border="1"> <tr><td>CR2A [Bit7]</td><td>Pin18</td></tr> <tr><td>0</td><td>SOUTA</td></tr> <tr><td>1</td><td>GP85</td></tr> </table> <p>Pin19 function selection</p> <table border="1"> <tr><td>CR2A [Bit7]</td><td>Pin19</td></tr> <tr><td>0</td><td>DCDA#</td></tr> <tr><td>1</td><td>GP86</td></tr> </table> <p>Pin20 function selection</p> <table border="1"> <tr><td>CR2A [Bit7]</td><td>Pin20</td></tr> <tr><td>0</td><td>RIA#</td></tr> <tr><td>1</td><td>GP87</td></tr> </table>	CR2A [Bit7]	Pin13	0	CTSA#	1	GP80	CR2A [Bit7]	Pin14	0	DSRA#	1	GP81	CR2A [Bit7]	Pin15	0	RTSA#	1	GP82	CR2A [Bit7]	Pin16	0	DTRA#	1	GP83	CR2A [Bit7]	Pin17	0	SINA	1	GP84	CR2A [Bit7]	Pin18	0	SOUTA	1	GP85	CR2A [Bit7]	Pin19	0	DCDA#	1	GP86	CR2A [Bit7]	Pin20	0	RIA#	1	GP87
CR2A [Bit7]	Pin13																																																	
0	CTSA#																																																	
1	GP80																																																	
CR2A [Bit7]	Pin14																																																	
0	DSRA#																																																	
1	GP81																																																	
CR2A [Bit7]	Pin15																																																	
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CR2A [Bit7]	Pin16																																																	
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1	GP86																																																	
CR2A [Bit7]	Pin20																																																	
0	RIA#																																																	
1	GP87																																																	
6-3	Reserved																																																	

BIT	READ / WRITE	DESCRIPTION																															
2	R/W	<p>Enable Over Temperature shutdown Protection (OVT#)</p> <p>= 0 The thermal shutdown function is disabled. (Default)</p> <p>= 1 Enable thermal shutdown function.</p> <p>(If set this bit to 1, the relative registers of OVT# event are: Bank0, CR18 ,Bit6 → SMIOVT1 OVT# Bank0, CR4C ,Bit3 → SMIOVT2 OVT#</p> <p>If current temperature exceeds high-limit setting, OVT# event will be triggered and PSON# will inactive immediately.)</p>																															
1	R / W	<p>Pin24 function selection</p> <table border="1"> <tr> <td>LD12 CREB [Bit2]</td> <td>CR2A [B t1]</td> <td>Pin24</td> </tr> <tr> <td></td> <td>x</td> <td>AUXFANOUT3</td> </tr> <tr> <td>0</td> <td>0</td> <td>MCLK</td> </tr> <tr> <td>0</td> <td>1</td> <td>GP23</td> </tr> </table> <p>Pin25 function selection</p> <table border="1"> <tr> <td>LD12 CREB [Bit3]</td> <td>CR2A [Bit1]</td> <td>Pin25</td> </tr> <tr> <td>1</td> <td>x</td> <td>AUXFANIN3</td> </tr> <tr> <td>0</td> <td>0</td> <td>MDAT</td> </tr> <tr> <td>0</td> <td>1</td> <td>GP22</td> </tr> </table>	LD12 CREB [Bit2]	CR2A [B t1]	Pin24		x	AUXFANOUT3	0	0	MCLK	0	1	GP23	LD12 CREB [Bit3]	CR2A [Bit1]	Pin25	1	x	AUXFANIN3	0	0	MDAT	0	1	GP22							
LD12 CREB [Bit2]	CR2A [B t1]	Pin24																															
	x	AUXFANOUT3																															
0	0	MCLK																															
0	1	GP23																															
LD12 CREB [Bit3]	CR2A [Bit1]	Pin25																															
1	x	AUXFANIN3																															
0	0	MDAT																															
0	1	GP22																															
0	R / W	<p>Pin26 function selection</p> <table border="1"> <tr> <td>LD12 CREB [Bit4]</td> <td>CR2A [Bit0]</td> <td>Pin26</td> </tr> <tr> <td>0</td> <td>0</td> <td>KCLK</td> </tr> <tr> <td>0</td> <td>1</td> <td>GP21</td> </tr> <tr> <td>1</td> <td>0</td> <td>AUXFANOUT2</td> </tr> <tr> <td>1</td> <td>1</td> <td>CIRRX</td> </tr> </table> <p>Pin27 function selection</p> <table border="1"> <tr> <td>CR1C [Bit7]</td> <td>LD12 CREB [Bit5]</td> <td>CR2A [Bit0]</td> <td>Pin27</td> </tr> <tr> <td>1</td> <td>1</td> <td>x</td> <td>AUXFANIN2</td> </tr> <tr> <td>x</td> <td>0</td> <td>0</td> <td>KDAT</td> </tr> <tr> <td>x</td> <td>0</td> <td>1</td> <td>GP20</td> </tr> </table>	LD12 CREB [Bit4]	CR2A [Bit0]	Pin26	0	0	KCLK	0	1	GP21	1	0	AUXFANOUT2	1	1	CIRRX	CR1C [Bit7]	LD12 CREB [Bit5]	CR2A [Bit0]	Pin27	1	1	x	AUXFANIN2	x	0	0	KDAT	x	0	1	GP20
LD12 CREB [Bit4]	CR2A [Bit0]	Pin26																															
0	0	KCLK																															
0	1	GP21																															
1	0	AUXFANOUT2																															
1	1	CIRRX																															
CR1C [Bit7]	LD12 CREB [Bit5]	CR2A [Bit0]	Pin27																														
1	1	x	AUXFANIN2																														
x	0	0	KDAT																														
x	0	1	GP20																														

CR 2Bh.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	

BIT	READ / WRITE	DESCRIPTION	
5-4	R / W	Pin36 function selection	
		CR2B [Bit5-4]	Pin36
		00	RSTOUT1#
		01	GP75
		10	Tri-state
3	R / W	Pin37 function selection	
		CR2B [Bit3]	Pin37
		0	RSTOUT0#
		1	GP74
2-0	Reserved		

CR 2Ch.

Attribute: Read/Write

Power Well: VSB, VRTC(Bit0)

Reset by: RSMRST#, Battery reset(Bit0)

Default : 01h

BIT	READ / WRITE	DESCRIPTION	
7	Reserved		
6-5	R / W	Pin34 function selection	
		CR2C [Bit6-5]	Pin34
		00	3VSBSW# (OD)
		01	GP33
		10	Tri-state
4-2	R / W	Pin58 function selection	
		CR2C [Bit1]	CR2C [Bit0]
		1	x
		0	PWR_FAULT#
1	R / W		
		0	1

BIT	READ / WRITE	DESCRIPTION																				
0	R / W	Pin58 function selection <table border="1"> <tr><td>CR2C [Bit1]</td><td>CR2C [Bit0]</td><td>Pin58</td></tr> <tr><td>1</td><td>x</td><td>GP26</td></tr> <tr><td>0</td><td>0</td><td>PWR_FAULT#</td></tr> <tr><td>0</td><td>1</td><td>TSIC</td></tr> </table> Pin60 function selection <table border="1"> <tr><td>CR2C [Bit0]</td><td>Pin60</td></tr> <tr><td>0</td><td>PECI</td></tr> <tr><td>1</td><td>TSID</td></tr> </table>			CR2C [Bit1]	CR2C [Bit0]	Pin58	1	x	GP26	0	0	PWR_FAULT#	0	1	TSIC	CR2C [Bit0]	Pin60	0	PECI	1	TSID
CR2C [Bit1]	CR2C [Bit0]	Pin58																				
1	x	GP26																				
0	0	PWR_FAULT#																				
0	1	TSIC																				
CR2C [Bit0]	Pin60																					
0	PECI																					
1	TSID																					

CR 2Dh.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#(Bit6), RSMRST#(Bit4-0)

Default : 0s00_0000b

BIT	READ / WRITE	DESCRIPTION														
7	R / W	Pin42 function Selection <table border="1"> <tr><td>AMDPWR_EN</td><td>CR2D [Bit7]</td><td>Pin42</td></tr> <tr><td>0</td><td>0</td><td>GP56</td></tr> <tr><td>1</td><td>0</td><td>VCORE_EN</td></tr> <tr><td>x</td><td>1</td><td>AUXFANOUT2</td></tr> </table>			AMDPWR_EN	CR2D [Bit7]	Pin42	0	0	GP56	1	0	VCORE_EN	x	1	AUXFANOUT2
AMDPWR_EN	CR2D [Bit7]	Pin42														
0	0	GP56														
1	0	VCORE_EN														
x	1	AUXFANOUT2														
6-0	Reserved															

CR 2Fh. Strapping Function Result

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#(Bit5-2), PWROK(Bit0), LRESET#(Bit7-6, 1)

Default : ssss_ssssb

BIT	READ / WRITE	DESCRIPTION	
7-6	Reserved		
5	R / W	AMDPWR_EN Strapping result reading	
4	R / W	TEST_MODE0_EN Strapping result reading	
3-2	Reserved		
1	R / W	TEST_MODE2_EN Strapping result reading	
0	R / W	TEST_MODE1_EN Strapping result reading	

Note . All Strapping results can be programming by LPC Interface. There are three conditions below:

- 4) VSB Strapping result can be programming by LPC, and reset by RSMRST#
- 5) VCC Strapping result can be programming by LPC, and reset by PWROK
- 6) LRESET Strapping (2E_4E_SEL) : No change

21.2 Logical Device 2

CR 30h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 01h

BIT	READ / WRITE	DESCRIPTION
7-1	Reserved	
0	R / W	0: The UARTA logical device is inactive. 1: The UARTA logical device is active.

CR 60h, 61h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 03h, F8h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	These two registers select Serial Port 1 I/O base address <100h: FF8h> on 8 bytes boundary.

CR 70h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 04h

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	
3-0	R / W	These bits select IRQ resource for Serial Port 1.

CR F0h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6	R / W	0: IRQ is the level mode. 1: IRQ is the pulse mode for IRQ sharing function.
5-2	Reserved	

BIT	READ / WRITE	DESCRIPTION
1-0	R / W	<p>Bits 1 0</p> <p>0 0: UART A clock source is 1.8462 MHz (24 MHz / 13). 0 1: UART A clock source is 2 MHz (24 MHz / 12). 1 0: UART A clock source is 24 MHz (24 MHz / 1). 1 1: UART A clock source is 14.769 MHz (24 MHz / 1.625).</p>

CR F2h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	<p>UARTA_RS485_enable</p> <p>0: Disable RS485 auto flow control function for UARTA 1: Enable RS485 auto flow control function for UARTA</p>
6	R / W	<p>UARTA_RS485_inv_sel (Available only when CRF2_Bit7=1)</p> <p>0: Do not invert the behavior of RTSA# pin for RS485 auto flow control. 1: Invert the behavior of RTSA# pin for RS485 auto flow control.</p>
5-0	Reserved	

21.3 Logical Device 3

CR 30h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 01h

BIT	READ / WRITE	DESCRIPTION
7-1	Reserved	
0	R / W	0: The IR logical device is inactive. 1: The IR logical device is active.

CR 60h, 61h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 02h, F8h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	These two registers select IR I/O base address <100h: FF8h> on eight-byte boundary.

CR 70h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 03h

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	
3-0	R / W	These bits select IRQ resource for IR.

CR F0h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6	R / W	0: IRQ is the level mode. 1: IRQ is the pulse mode for IRQ sharing function.
5-2	Reserved	

BIT	READ / WRITE	DESCRIPTION
1-0	R / W	<p>Bits 1 0</p> <p>0 0: IR clock source is 1.8462 MHz (24 MHz / 13). 0 1: IR clock source is 2 MHz (24 MHz / 12). 1 0: IR clock source is 24 MHz (24 MHz / 1). 1 1: IR clock source is 14.769 MHz (24 MHz / 1.625).</p>

CR F1h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6	R / W	IRLOCSEL => IR I/O pins' location selection. 0: Reserved 1: Through IRRX / IRTX.
5-3	R / W	IRMODE => IR function mode selection. See the table below.
2	R / W	IR half / full duplex function selection. 0: IR function is Full Duplex. 1: IR function is Half Duplex.
1	R / W	0: IRTX pin of IR function in normal condition. 1: Inverse IRTX pin of IR function.
0	R / W	0: IRRX pin of IR function in normal condition. 1: Inverse IRRX pin of IR function.

IR MODE	IR FUNCTION	IRTX	IRRX
00X	Disable	Tri-state	High
010*	IrDA	Active pulse 1.6 μ S	Demodulation into SINB/IRRX
011*	IrDA	Active pulse 3/16 bit time	Demodulation into SINB/IRRX
100	ASK-IR	Inverting IRTX/SOUTB pin	Routed to SINB/IRRX
101	ASK-IR	Inverting IRTX/SOUTB & 500 KHZ clock	Routed to SINB/IRRX
110	ASK-IR	Inverting IRTX/SOUTB	Demodulation into SINB/IRRX
111*	ASK-IR	Inverting IRTX/SOUTB & 500 KHZ clock	Demodulation into SINB/IRRX

Note: The notation is normal mode in the IR function.

CR F2h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	UARTB_RS485_enable 0: Disable RS485 auto flow control function for UARTB 1: Enable RS485 auto flow control function for UARTB
6	R / W	UARTB_RS485_inv_sel (Available only when CRF2_Bit7=1) 0: Do not invert the behavior of RTSB# pin for RS485 auto flow control. 1: Invert the behavior of RTSB# pin for RS485 auto flow control.
5-0	Reserved	

21.4 Logical Device 5

CR 30h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-1	Reserved	
0	R / W	0: The KBC logical device is inactive. 1: The KBC logical device is active.

CR 60h, 61h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h, 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	These two registers select the first KBC I/O base address <100h: FFFh> on 1-byte boundary.

CR 62h, 63h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h, 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	These two registers select the second KBC I/O base address <100h: FFFh> on 1 byte boundary.

CR 70h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	
3-0	R / W	These bits select IRQ resource for KINT. (Keyboard interrupt)

CR 72h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	
3-0	R / W	These bits select IRQ resource for MINT. (PS/2 Mouse interrupt)

CR F0h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 83h

BIT	READ / WRITE	DESCRIPTION
7-6	R / W	<p>KBC clock rate selection</p> <p>Bits</p> <p>7 6</p> <p>0 0: Reserved</p> <p>0 1: Reserved</p> <p>1 0: 12MHz</p> <p>1 1: Reserved</p>
5-3	Reserved	
2	R / W	0: Port 92 disabled. 1: Port 92 enabled.
1	R / W	0: Gate A20 software control. 1: Gate A20 hardware speed up.
0	R / W	0: KBRST# software control. 1: KBRST# hardware speed up.

21.5 Logical Device 6

CR 30h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-1	Reserved	
0	R / W	0: CIR Interface is inactive. 1: CIR Interface is active.

CR 60h, 61h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h, 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	These two registers select CIR Interface I/O base address <100h: FF8h> on 1 byte boundary.

CR 70h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	
3-0	R / W	These bits select IRQ resource for CIR.

21.6 Logical Device 7

CR 30h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION	
7-3	Reserved		
2	R / W	0: GPIO8 is inactive.	1: GPIO8 is active.
1	R / W	0: GPIO7 is inactive.	1: GPIO7 is active.
0	Reserved		

CR E0h. GPIO7 I/O Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP7X_MRST

Default : FFh

BIT	READ / WRITE	DESCRIPTION	
7-0	R / W	GPIO7 I/O register	0: The respective GPIO7 PIN is programmed as an output port 1: The respective GPIO7 PIN is programmed as an input port.

CR E1h. GPIO7 Data Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP7X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION	
7-0	R / W	GPIO7 Data register	For output ports, the respective bits can be read/written and produced to pins.
	Read Only		For input ports, the respective bits can be read only from pins. Write accesses will be ignored.

CR E2h. GPIO7 Inversion Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP7X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION	
7-0	R / W	GPIO7 Inversion register	0: The respective bit and the port value are the same. 1: The respective bit and the port value are inverted. (Both Input & Output ports)

CR E3h. GPIO7 Status Register

Attribute: Read Only

Power Well: VSB

Reset by: GP7X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	Read Only Read-Clear	GPIO7 Event Status Bit 7-0 corresponds to GP77-GP70, respectively. 0 : No active edge has been detected 1 : An active edge has been detected Read the status bit clears it to 0.

CR E4h. GPIO8 I/O Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP8X_MRST

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO8 I/O register 0: The respective GPIO8 PIN is programmed as an output port 1: The respective GPIO8 PIN is programmed as an input port.

CR E5h. GPIO8 Data Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP8X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO8 Data register For output ports, the respective bits can be read/written and produced to pins.
	Read Only	For input ports, the respective bits can be read only from pins. Write accesses will be ignored.

CR E6h. GPIO8 Inversion Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP8X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO8 Inversion register 0: The respective bit and the port value are the same. 1: The respective bit and the port value are inverted. (Both Input & Output ports)

CR E7h. GPIO8 Status Register

Attribute: Read Only

Power Well: VSB

Reset by: GP8X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	Read Only Read-Clear	GPIO8 Event Status Bit 7-0 corresponds to GP87-GP80, respectively. 0 : No active edge has been detected 1 : An active edge has been detected Read the status bit clears it to 0.

CR ECh. GPIO7 Multi-function Select Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP7X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	
5	R / W	0: GPIO75 1: GPIO75 → BEEP (Please also set this GPIO to “output” type.)
4	R / W	0: GPIO74 1: GPIO74 → GRN (Please also set this GPIO to “output” type.)
3-0	Reserved	

CR EDh. GPIO8 Multi-function Select Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP8X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	0: GPIO87 1: GPIO87 → YLW
6	R / W	0: GPIO86 1: GPIO86 → BEEP
5	R / W	0: GPIO85 1: GPIO85 → SMI
4	R / W	0: GPIO84 1: GPIO84 → WDT1
3	R / W	0: GPIO83 1: GPIO83 → YLW

BIT	READ / WRITE	DESCRIPTION
2	R / W	0: GPIO82 1: GPIO82 → BEEP
1	R / W	0: GPIO81 1: GPIO81 → SMI
0	R / W	0: GPIO80 1: GPIO80 → WDT1

21.7 Logical Device 8

CR 30h.

Attribute: Read/Write

Power Well: VSB, VSB

Reset by: LRESET#, RSMRST# (Bit7)

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-5	Reserved	
4	R / W	0: WDT3 is inactive. 1: WDT3 is active.
3	R / W	0: GPIO Base Address mode is inactive 1: GPIO Base Address mode is active
2-1	Reserved	
0	R / W	0: WDT1 is inactive. 1: WDT1 is active.

CR 60h, 61h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h, 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	These two registers select GPIO Interface I/O base address <100h: FF8h> on 1 byte boundary.

CR F5h. Watchdog Timer 1(WDT1) and KBC P20 Control Mode Register

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET# or PWROK(see LDA CRE7[3])

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-5	Reserved	
4	R / W	Watchdog Timer 1 count mode is 1000 times faster. 0: Disable. 1: Enable. (If bit-3 is 0, the count mode is 1/1000 seconds mode.) (If bit-3 is 1, the count mode is 1/1000 minutes mode.)
3	R / W	Select Watchdog Timer 1 count mode. 0: Second Mode. 1: Minute Mode.
2	Reversed	
1	R / W	Disable / Enable the Watchdog Timer 1 output low pulse to the KBRST# pin 0: Disable. 1: Enable.

BIT	READ / WRITE	DESCRIPTION
0	R / W	Pulse or Level mode select 0: Pulse mode 1: Level mode

CR F6h. Watchdog Timer 1(WDT1) Counter Register

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET# or PWROK(see LDA CRE7[3])

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	Watch Dog Timer I Time-out value. Writing a non-zero value to this register causes the counter to load the value into the Watch Dog Counter and start counting down. The accuracy of watchdog timer 1 about one cycle deviation. If CR F7h, bits 7 and 6 are set, any Mouse Interrupt or Keyboard Interrupt event causes the previously-loaded, non-zero value to be reloaded to the Watch Dog Counter and the count down resumes. Reading this register returns the current value in the Watch Dog Counter, not the Watch Dog Timer Time-out value. 00h: Time-out Disable 01h: Time-out occurs after one cycle time, the cycle time is base on LD8 CRF5, bit[3], by analogy.

CR F7h. Watchdog Timer 1(WDT1) Control & Status Register

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET# or PWROK(see LDA CRE7[3])

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	Mouse interrupt reset enables watch-dog timer reload 0: Watchdog Timer 1 is not affected by mouse interrupt. 1: Watchdog Timer 1 is reset by mouse interrupt.
6	R / W	Keyboard interrupt reset enables watch-dog timer reload 0: Watchdog Timer 1 is not affected by keyboard interrupt. 1: Watchdog Timer 1 is reset by keyboard interrupt.
5	Write "1" Only	Trigger Watchdog Timer 1 event. This bit is self-clearing.
4	R / W Write "0" Clear	Watchdog Timer 1 status bit 0: Watchdog Timer 1 is running. 1: Watchdog Timer 1 issues time-out event.
3-0	R / W	These bits select the IRQ resource for the Watchdog Timer 1

CR F8h. Watchdog Timer 3(WDT3) Control Mode Register

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET# or PWROK(see LDA CREE[2])

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-5	Reserved	
4	R / W	Watchdog Timer 3 count mode is 1000 times faster. 0: Disable. 1: Enable. (If bit-3 is 0, the count mode is 1/1000 seconds mode.) (If bit-3 is 1, the count mode is 1/1000 minutes mode.)
3	R / W	Select Watchdog Timer 3 count mode. 0: Second Mode. 1: Minute Mode.
2-1	Reserved	
0	R / W	Pulse or Level mode select 0: Pulse mode 1: Level mode

CR F9h. Watchdog Timer 3(WDT3) Counter Register

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET# or PWROK(see LDA CREE[2])

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	Watchdog Timer 3 Time-out value. Writing a non-zero value to this register causes the counter to load the value into the Watchdog Counter and start counting down. The accuracy of watchdog timer 3 about one cycle deviation. Reading this register returns the current value in the Watchdog Counter, not the Watchdog Timer 3 Time-out value. 00h: Time-out Disable 01h: Time-out occurs after one cycle time, the cycle time is base on LD8 CRF8, bit[3], by analogy.

CR FAh. Watchdog Timer 3(WDT3) Control & Status Register

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET# or PWROK(see LDA CREE[2])

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	
5	R / W Write "1" Only	Trigger Watchdog Timer 3 event. This bit is self-clearing.
4	R / W Write "0" Clear	Watchdog Timer 3 status bit 0: Watchdog Timer 3 is running. 1: Watchdog Timer 3 issues time-out event.
3-0	R / W	These bits select the IRQ resource for Watchdog Timer 3

CR FEh. Watchdog Timer 1(WDT1) Timeout Counter Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W Write “1” Clear	Watchdog Timer 1 Timeout Counter.

CR FFh. Watchdog Timer 3(WDT3) Timeout Counter Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W Write “1” Clear	Watchdog Timer 3 Timeout Counter.

21.8 Logical Device 9

CR 30h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION	
7-4	Reserved		
3	R / W	0: GPIO5 is inactive.	1: GPIO5 is active
2	R / W	0: GPIO4 is inactive.	1: GPIO4 is active.
1	R / W	0: GPIO3 is inactive.	1: GPIO3 is active.
0	R / W	0: GPIO2 is inactive.	1: GPIO2 is active.

CR E0h. GPIO2 I/O Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP2X_MRST

Default : FFh

BIT	READ / WRITE	DESCRIPTION	
7-0	R / W	GPIO2 I/O register 0: The respective GPIO2 PIN is programmed as an output port 1: The respective GPIO2 PIN is programmed as an input port.	

CR E1h. GPIO2 Data Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP2X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION	
7-0	R / W	GPIO2 Data register For output ports, the respective bits can be read and written by the pins.	
	Read Only	For Input ports, the respective bits can only be read by the pins. Write accesses are ignored.	

CR E2h. GPIO2 Inversion Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP2X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION	
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BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO2 Inversion register 0: The respective bit and the port value are the same. 1: The respective bit and the port value are inverted. (Applies to both input and output ports)

CR E3h. GPIO2 Status Register

Attribute: Read Only

Power Well: VSB

Reset by: GP2X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	Read Only Read-Clear	GPIO2 Event Status Bit 7-0 corresponds to GP27-GP20, respectively. 0 : No active edge has been detected 1 : An active edge has been detected Read the status bit clears it to 0.

CR E4h. GPIO3 I/O Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP3X_MRST

Default : 7Fh

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6-0	R / W	GPIO3 I/O register 0: The respective GPIO3 PIN is programmed as an output port 1: The respective GPIO3 PIN is programmed as an input port.

CR E5h. GPIO3 Data Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP3X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6-0	R / W	GPIO3 Data register For output ports, the respective bits can be read and written by the pins.
	Read Only	For Input ports, the respective bits can only be read by the pins. Write accesses are ignored.

CR E6h. GPIO3 Inversion Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP3X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6-0	R / W	GPIO3 Inversion register 0: The respective bit and the port value are the same. 1: The respective bit and the port value are inverted. (Applies to both input and output ports)

CR E7h. GPIO3 Status Register

Attribute: Read Only

Power Well: VSB

Reset by: GP3X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6-0	Read Only Read-Clear	GPIO3 Event Status Bit 7-0 corresponds to GP36-GP30, respectively. 0 : No active edge has been detected 1 : An active edge has been detected Read the status bit clears it to 0.

CR E9h. GPIO2 Multi-function Select Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP2X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6	R / W	0: GPIO26 1: GPIO26 → BEEP (Please also set this GPIO to “output” type.)
5	R / W	0: GPIO25 1: GPIO25 → SMI (Please also set this GPIO to “output” type.)
4	R / W	0: GPIO24 1: GPIO24 → OVT (Please also set this GPIO to “output” type.)
3	R / W	0: GPIO23 1: GPIO23 → GRN (Please also set this GPIO to “output” type.)
2	R / W	0: GPIO22 1: GPIO22 → BEEP (Please also set this GPIO to “output” type.)
1	R / W	0: GPIO21 1: GPIO21 → SMI (Please also set this GPIO to “output” type.)

BIT	READ / WRITE	DESCRIPTION
0	R / W	0: GPIO20 1: GPIO20 → WDT1 (Please also set this GPIO to “output” type.)

CR EAh. GPIO3 Multi-function Select Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP3X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	
3	R / W	0: GPIO33 1: GPIO33 → WDT1 (Please also set this GPIO to “output” type.)
2-1	Reserved	
0	R / W	0: GPIO30 1: GPIO30 → WDT1 (Please also set this GPIO to “output” type.)

CR EBh. GPIO5 Multi-function Select Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP5X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	0: GPIO57 1: GPIO57 → YLW (Please also set this GPIO to “output” type.)
6	R / W	0: GPIO56 1: GPIO56 → GRN (Please also set this GPIO to “output” type.)
5	R / W	0: GPIO55 1: GPIO55 → SLPS5_LCH (Please also set this GPIO to “output” type.)
4	R / W	0: GPIO54 1: GPIO54 → WDT1 (Please also set this GPIO to “output” type.)
3-0	Reserved	

CR F0h. GPIO4 I/O Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP4X_MRST

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO4 I/O register 0: The respective GPIO4 PIN is programmed as an output port 1: The respective GPIO4 PIN is programmed as an input port.

CR F1h. GPIO4 Data Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP4X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO4 Data register For output ports, the respective bits can be read and written by the pins.
	Read Only	For Input ports, the respective bits can only be read by the pins. Write accesses are ignored.

CR F2h. GPIO4 Inversion Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP4X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO4 Inversion register 0: The respective bit and the port value are the same. 1: The respective bit and the port value are inverted. (Applies to both input and output ports)

CR E8h. GPIO4 Status Register

Attribute: Read Only

Power Well: VSB

Reset by: GP4X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	Read Only Read-Clear	GPIO4 Event Status Bit 7-0 corresponds to GP47-GP40, respectively. 0 : No active edge has been detected 1 : An active edge has been detected Read the status bit clears it to 0.

CR EEh. GPIO4 Multi-function Select Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP4X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-3	Reserved	

BIT	READ / WRITE	DESCRIPTION
2	R / W	0: GPIO42 1: GPIO42 → BEEP (Please also set this GPIO to “output” type.)
1	R / W	0: GPIO41 1: GPIO41 → SMI (Please also set this GPIO to “output” type.)
0	Reserved	

CR F4h. GPIO5 I/O Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP5X_MRST

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO5 I/O register 0: The respective GPIO5 PIN is programmed as an output port 1: The respective GPIO5 PIN is programmed as an input port.

CR F5h. GPIO5 Data Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP5X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO5 Data register For output ports, the respective bits can be read and written by the pins.
	Read Only	For input ports, the respective bits can only be read by the pins. Write accesses are ignored.

CR F6h. GPIO5 Inversion Register

Attribute: Read/Write

Power Well: VSB

Reset by: GP5X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GPIO5 Inversion register 0: The respective bit and the port value are the same. 1: The respective bit and the port value are inverted. (Applies to both input and output ports)

CR F7h. GPIO5 Status Register

Attribute: Read Only

Power Well: VSB

Reset by: GP5X_MRST

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	Read Only Read-Clear	GPIO5 Event Status Bit 7-0 corresponds to GP57-GP50, respectively. 0 : No active edge has been detected 1 : An active edge has been detected Read the status bit clears it to 0.

21.9 Logical Device A

CR E0h.

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 01h

BIT	READ / WRITE	DESCRIPTION																												
7	R / W	DIS_PSIN => Disable the panel switch input to turn on the system power supply. 0: PSIN is wire-AND and connected to PSOUT#. 1: PSIN is blocked and cannot affect PSOUT#.																												
6	R / W	Enable KBC wake-up 0: Disable keyboard wake-up function via PSOUT#. 1: Enable keyboard wake-up function via PSOUT#.																												
5	R / W	Enable Mouse wake-up 0: Disable mouse wake-up function via PSOUT#. 1: Enable mouse wake-up function via PSOUT#.																												
4	R / W	MSRKEY => Three keys (ENMDAT_UP, CRE6[7]; MSRKEY, CRE0[4]; MSXKEY, CRE0[1]) define the combinations of the mouse wake-up events. Please see the following table for the details. <table border="1"> <thead> <tr> <th>ENMDAT_UP</th><th>MSRKEY</th><th>MSXKEY</th><th>Wake-up event</th></tr> </thead> <tbody> <tr> <td>1</td><td>x</td><td>1</td><td>Any button clicked or any movement.</td></tr> <tr> <td>1</td><td>x</td><td>0</td><td>One click of left or right button.</td></tr> <tr> <td>0</td><td>0</td><td>1</td><td>One click of the left button.</td></tr> <tr> <td>0</td><td>1</td><td>1</td><td>One click of the right button.</td></tr> <tr> <td>0</td><td>0</td><td>0</td><td>Two clicks of the left button.</td></tr> <tr> <td>0</td><td>1</td><td>0</td><td>Two clicks of the right button.</td></tr> </tbody> </table>	ENMDAT_UP	MSRKEY	MSXKEY	Wake-up event	1	x	1	Any button clicked or any movement.	1	x	0	One click of left or right button.	0	0	1	One click of the left button.	0	1	1	One click of the right button.	0	0	0	Two clicks of the left button.	0	1	0	Two clicks of the right button.
ENMDAT_UP	MSRKEY	MSXKEY	Wake-up event																											
1	x	1	Any button clicked or any movement.																											
1	x	0	One click of left or right button.																											
0	0	1	One click of the left button.																											
0	1	1	One click of the right button.																											
0	0	0	Two clicks of the left button.																											
0	1	0	Two clicks of the right button.																											
3	R / W	Enable CIR wake-up 0: Disable CIR wake-up function via PSOUT#. 1: Enable CIR wake-up function via PSOUT#.																												
2	R / W	Keyboard / Mouse swap enable 0: Normal mode. 1: Keyboard / Mouse ports are swapped.																												
1	R / W	MSXKEY => Three keys (ENMDAT_UP, CRE6[7]; MSRKEY, CRE0[4]; MSXKEY, CRE0[1]) define the combinations of the mouse wake-up events. Please check out the table in CRE0[4] for the detailed.																												
0	R / W	KBXKEY => 0: Only the pre-determined key combination in sequence can wake up the system. 1: Any character received from the keyboard can wake up the system.																												

CR E1h. KBC Wake-Up Index Register

Attribute: Read/Write
 Power Well: VSB
 Reset by: RSMRST#
 Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	Keyboard wake-up index register. This is the index register of CRE2, which is the access window for the keyboard's pre-determined key key-combination characters. The first set of wake-up keys is in of 0x00 – 0x0E, the second set 0x30 – 0x3E, and the third set 0x40 – 0x4E. Incoming key combinations can be read through 0x10 – 0x1E.

CR E2h. KBC Wake-Up Data Register

Attribute: Read/Write
 Power Well: VSB
 Reset by: RSMRST#
 Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	Keyboard wake-up data register. This is the data register for the keyboard's pre-determined key-combination characters, which is indexed by CRE1.

CR E3h. Event Status Register

Attribute: Read Only
 Power Well: VRTC
 Reset by: Battery reset
 Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-5	Reserved	
4	Read Only Read-Clear	This status flag indicates VSB power off/on.
3	Read Only Read-Clear	Thermal shutdown status. 0: No thermal shutdown event issued. 1: Thermal shutdown event issued.
2	Read Only Read-Clear	PSIN_STS 0: No PSIN event issued. 1: PSIN event issued.
1	Read Only Read-Clear	MSWAKEUP_STS => The bit is latched by the mouse wake-up event. 0: No mouse wake-up event issued. 1: Mouse wake-up event issued.
0	Read Only Read-Clear	KBWAKEUP_STS => The bit is latched by the keyboard wake-up event. 0: No keyboard wake-up event issued. 1: Keyboard wake-up event issued.

CR E4h.

Attribute: Read/Write
 Power Well: VRTC

Reset by: Battery reset, PWROK(Bit4), LRESET#(Bit3-2)

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6-5	R / W	<p>Power-loss control ^{Note} (These two bits will determine the system turn on or off after AC resume, from G3 to S5 state.)</p> <p>Bits 6 5</p> <p>0 0: Always turn off. 0 1: Always turn on. (PSON# will active when S3# is high.) 1 0: Pre-state. (System turns On or Off which depends on the state before the power loss. Please check the definition of the pre-state is “ON” or “OFF” in chapter 26.2.) 1 1: User defined mode for power loss last-state. (The last-state flag is located on “CRE6h, bit4.”)</p>
4	R / W	<p>3VSBSW# enable bit</p> <p>0: Disable. 1: Enable.</p>
3	R / W	<p>Keyboard wake-up options.</p> <p>0: Password or sequence hot keys programmed in the registers. 1: Any key.</p>
2	R / W	<p>Enable the hunting mode for wake-up events set in CRE0. This bit is cleared when any wake-up event is captured. (Note. This bit is use for KB and MS to generate PSOUT# while VCC valid, for example, wake-up from S1 to S0 via PSOUT#.)</p> <p>0: Disable.(Default) 1: Enable.</p>
1-0	Reserved	

Note. Whether “Always turn on”, “Pre-state” or “User defined mode”, the PSON#’s active condition for system to turn-on is S3# goes high. For south-bridge which S3# default is low while AC resume, please refer “CRE7h, bit4” to achieve the power-loss control application.

CR E5h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 02h

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	
5	R / W	<p>GP8X_MRST</p> <p>0: GP8X reset by RSMRST#. (Default) 1: GP8X reset by SLPS5.</p>
4	R / W	<p>GP7X_MRST</p> <p>0: GP7X reset by RSMRST#. (Default) 1: GP7X reset by SLPS5.</p>
3	Reserved	

BIT	READ / WRITE	DESCRIPTION
2	R / W	RESETCONO# signal to control PWROK 0: Disable (Default) 1: Enable
1	R / W	Route to PWROK source selection. 0: PSON#. 1: SLP_S3#. (Default)
0	R / W	ATXPGD signal to control PWROK 0: Enable. (Default) 1: Disable.

CR E6h.

Attribute: Read/Write

Power Well: VRTC

Reset by: RSMRST#(Bit7, Bit5, Bit3-1), Battery reset(Bit6, Bit4), PWROK(Bit0)

Default : 1Ah

BIT	READ / WRITE	DESCRIPTION
7	R / W	ENMDAT => Three keys (ENMDAT_UP, CRE6[7]; MSRKEY, CRE0[4]; MSXKEY, CRE0[1]) define the combinations of the mouse wake-up events. Please see the table in CRE0, bit 4 for the details.
6-5	Reserved	
4	R / W	Power-loss Last State Flag. 0: ON 1: OFF. (Default)
3-1	R / W	PWROK_DEL Set the delay time when rising from 3VCC to PWROK Bits 3 2 1 0 0 0: 50mS 0 0 1: 100mS 0 1 0: 150mS 0 1 1: 200mS 1 0 0: 250mS 1 0 1: 300mS (Default) 1 1 0: 500mS 1 1 1: 700mS
0	Reserved	

CR E7h.

Attribute: Read/Write

Power Well: VRTC

Reset by: RSMRST#(Bit7-5, Bit3-2), Battery reset(Bit4, Bit1-0)

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	<p>ENKD3 => Enable the third set of keyboard wake-up key combination. Its values are accessed through keyboard wake-up index register (CRE1) and keyboard wake-up data register (CRE2) at the index from 40h to 4eh. 0: Disable the third set of the key combinations. 1: Enable the third set of the key combinations.</p>
6	R / W	<p>ENKD2 => Enable the second set of keyboard wake-up key combination. Its values are accessed through keyboard wake-up index register (CRE1) and keyboard wake-up data register (CRE2) at the index from 30h to 3eh. 0: Disable the second set of the key combinations. 1: Enable the second set of the key combinations.</p>
5	R / W	<p>ENWIN98KEY => Enable Win98 keyboard dedicated key to wake-up system via PSOUT# when keyboard wake-up function is enabled. 0: Disable Win98 keyboard wake-up. 1: Enable Win98 keyboard wake-up.</p>
4	R / W	<p>EN_ONPSOUT (VBAT) Disable/Enable to issue a 0.5s delay PSOUT# level when system returns from power loss state and is supposed to be on as described in CRE4[6:5], logic device A. (For southbridge which S3# default is low when AC resume, like VIA, AMD...etc.) 0: Disable. (Default) 1: Enable.</p>
3	R / W	<p>Select Watchdog Timer 1 Reset Source 0: Watchdog timer 1 is reset by LRESET#. 1: Watchdog timer 1 is reset by PWROK.</p>
2-1	Reserved	
0	R / W	<p>Hardware Monitor RESET source select 0: PWROK or internal PWROK (LDA CRED[3]). 1: LRESET#.</p>

CR E9h. GPIOs Reset Source Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	
5	R / W	<p>GP5X_MRST 0: GP5X reset by RSMRST#. 1: GP5X reset by SLPS5.</p>
4	R / W	<p>GP4X_MRST 0: GP4X reset by RSMRST#. 1: GP4X reset by SLPS5.</p>

BIT	READ / WRITE	DESCRIPTION
3	R / W	GP3X_MRST 0: GP3X reset by RSMRST#. 1: GP3X reset by SLPS5.
2	R / W	GP2X_MRST 0: GP2X reset by RSMRST#. 1: GP2X reset by SLPS5.
1-0	Reserved	

CR ECh. ACPI Control and Status Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R	PSIN real time Status
6-4	Reserved	
3	R / W	Auto clear PSOUT# to disconnect to PSIN# function select 0: Disable. Clear by RSMRST 1: Enable. Clear by PSIN rising and RSMRST
2	R / W1C	Block PSIN# event, when PSOUT blocking time and push PSIN. (write "1" clear, and clear by PWROK) 0: No PSIN# event. 1: Have PSINT# event.
1	R / W	Enable to disconnect PSIN to PSOUT 0: Disable , PSOUT will bypass PSIN. 1: Enable.
0	R / W1C	PSIN# 4 sec status when PSIN is low and SLPS3 is high. (write "1" clear) 0: No 4 sec power down event. 1: 4 sec power down event

CR EDh.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 01h

BIT	READ / WRITE	DESCRIPTION
7-4	R / W	PSIN# blocking time register from S5 to S0. 1bit for 0.5sec.. Min: 0.5sec Max: 8sec
3	R / W	Hardware monitor reset source select. 0: internal PWROK (no delay). 1: PWROK.
2-0	Reserved	

CR E Eh.

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	RESCON Reset source selection. 0: LRESET# 1: PWROK
6	R / W	RIA Wakeup Enable 0: Disable 1: Enable
5-3	Reserved	
2	R / W	Watchdog Timer 3 Reset Source Selection 0: LRESET# 1: PWROK
1	R / W	CASEOPEN polarity 0: None inverse CASEOPEN1 INPUT 1: Inverse CASEOPEN1 INPUT
0	R / W	CASEOPEN1 Clear Control. Write 1 to this bit to clear CASEOPEN1 status. This bit will clear the status itself.

CR F0h.

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 10h

BIT	READ / WRITE	DESCRIPTION												
7-5	R / W	Pin33 function selection <table border="1" data-bbox="489 1415 914 1679"> <tr> <td>LDA CRF0 [Bit7-5]</td> <td>Pin33</td> </tr> <tr> <td>000</td> <td>DEEP_S5_0</td> </tr> <tr> <td>001</td> <td>3VSBSW</td> </tr> <tr> <td>010</td> <td>Tri-state</td> </tr> <tr> <td>011</td> <td>Reserved</td> </tr> <tr> <td>1xx</td> <td>PWROK</td> </tr> </table>	LDA CRF0 [Bit7-5]	Pin33	000	DEEP_S5_0	001	3VSBSW	010	Tri-state	011	Reserved	1xx	PWROK
LDA CRF0 [Bit7-5]	Pin33													
000	DEEP_S5_0													
001	3VSBSW													
010	Tri-state													
011	Reserved													
1xx	PWROK													
4	R / W	Pin35 function selection <table border="1" data-bbox="489 1722 914 1870"> <tr> <td>LDA CRF0 [Bit4]</td> <td>Pin35</td> </tr> <tr> <td>0</td> <td>CASEOPEN1#</td> </tr> <tr> <td>1</td> <td>DEEP_S5_1</td> </tr> </table>	LDA CRF0 [Bit4]	Pin35	0	CASEOPEN1#	1	DEEP_S5_1						
LDA CRF0 [Bit4]	Pin35													
0	CASEOPEN1#													
1	DEEP_S5_1													
3	Reserved													

BIT	READ / WRITE	DESCRIPTION
2	Reserved	
1	R / W	PSIN de-bounce 0: 62.4ms 1: 206ms
0	R / W	Keyboard Auto-Swap Detect Enable. 0: Disable 1: Enable

CR F2h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 5Ch

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	
5	R / W	Block SLP_S3# to PSON# 0: Disable 1: Enable
4	Reserved	
3	R / W	Enable RSTOUT1# function. 0: Disable RSTOUT1#. 1: Enable RSTOUT1#. (Default)
2	R / W	Enable RSTOUT0# function. 0: Disable RSTOUT0#. 1: Enable RSTOUT0#. (Default)
1-0	Reserved	

CR F3h.

Attribute: Read/Write

Power Well: VSB

Reset by: WDT_L_RST(bit6), RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6	R / W Write "1" Clear	Watchdog Timer 4 status. When this bit is set to 1, it means timeout event occurs.
5-0	Reserved	

CR F6h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#(Bit7), RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	0: Disable KB, MS interrupt of the KBC password event. 1: Enable KB, MS interrupt of the KBC password event.
6-0	Reserved	

CR F7h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : C0h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6	R / W	RSTOUT1# Push-Pull/OD select 0: Open Drain 1: Push-Pull (Default)
5	R / W	PSIN_BLK_EN. When S5->S0 or S0->S5, SIO will filter PSIN# a specific time. 0: Disable 1: Enable
4-0	Reserved	

CR FCh.

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 80h

BIT	READ / WRITE	DESCRIPTION
7-3	Reserved	
2	R / W	TIME_PWRD (Power Fault function) 00: 3us ~ 4us(LDA CRFC[2]=0), 20ms ~35ms(LDA CRFC[2]=1) 01: 1.5s ~ 2s 10: 93.75ms ~ 125ms (Default) 11: 187.5ms ~ 250ms
1	Reserved	
0	R / W	Enable AMD compare 0: Disable. 1: Enable.

CR FEh. GPIO41 Event Route Selection Register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	0: Disable GP41 event route to PSOUT#. 1: Enable GP41 event route to PSOUT#.
6-0	Reserved	

21.10 Logical Device B

CR 30h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-1	Reserved	
0	R / W	0: Hardware Monitor & SB-TSI device is inactive. 1: Hardware Monitor & SB-TSI device is active.

CR 60h, 61h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h, 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	These two registers select the HM base address <100h : FFEh> along a two-byte boundary.

CR 62h, 63h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h, 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	These two registers select the SB-TSI base address <100h : FFEh> along a two-byte boundary.

CR 70h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	
3-0	R / W	These bits select the IRQ resource for HM.

CR E0h. SYSFAN Duty Cycle Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 7Fh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	SYSFAN Duty Cycle Register

CR E1h. CPUFAN Duty Cycle Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 7Fh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	CPUFAN Duty Cycle Register

CR E4h. AUXFAN2 Duty Cycle Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 7Fh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	AUXFAN2 Duty Cycle Register

CR E5h. Power Fault Voltage Channel Configuration Register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : A8h

BIT	READ / WRITE	DESCRIPTION
7-6	R / W	3VCC high / low limit voltage setting 00: UV -10%, OV +9.8% 01: UV -15%, OV +14.8% 10: UV -19.9%, OV +19.8% 11: UV -24.9%, OV + 24.1%
5-0	Reserved	

CR E6h. Configuration Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#(Bit7, Bit4-0), WDT1&PWROK(Bit6), AMD_PWROK(Bit5)

Default : 08h

BIT	READ / WRITE	DESCRIPTION
7	R / W	CR2A Bit1-0 reset source selection 0: WDT1 & PWROK 1: RSMRST#

BIT	READ / WRITE	DESCRIPTION						
6	R / W	RESETCONI# and PSIN# input block 0: Enable 1: Disable						
5	R / W	AMD Power Sequence VCORE detect selection 0: Disable 1: Enable						
4	R / W	Block OVP/UVP detect signal by S5#. 0: Disable 1: Enable						
3	R / W	Pin43 function selection <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>LDB CRE6 [Bit3]</td> <td>Pin43</td> </tr> <tr> <td>x</td> <td>Reserved</td> </tr> <tr> <td>0</td> <td>GP55</td> </tr> </table>	LDB CRE6 [Bit3]	Pin43	x	Reserved	0	GP55
LDB CRE6 [Bit3]	Pin43							
x	Reserved							
0	GP55							
2-1	Reserved							
0	R / W	Block OVP/UVP detect signal by VCC or S3#. 0: VCC and S3# 1: VCC						

CR E7h. AUXFAN3 Duty Cycle Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 7Fh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	AUXFAN3 Duty Cycle Register

CR E8h. Power Fault Control Register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : F0h

BIT	READ / WRITE	DESCRIPTION
7	R / W	VIN2 Detect Enable 0: Disable 1: Enable
6-5	Reserved	
4	R / W	3VCC Detect Enable 0: Disable 1: Enable

BIT	READ / WRITE	DESCRIPTION
3-2	R / W	PSON# lock reset source 00: PSIN# and RSMRST# 01: RSMRST# 10: Battery reset 11: Reserved
1	R / W	Power Fault Status. Write 1 Clear
0	R / W	Power Fault Enable 0: Disable 1: Enable

CR F0h. FANIN De-bouncer Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#(Bit7), LRESET#(Bit6-1)

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6	R / W	1: Enable AUXFANIN3 input de-bouncer. 0: Disable AUXFANIN3 input de-bouncer.
5	R / W	1: Enable AUXFANIN2 input de-bouncer. 0: Disable AUXFANIN2 input de-bouncer.
4-3	Reserved	
2	R / W	1: Enable CPUFANIN input de-bouncer. 0: Disable CPUFANIN input de-bouncer.
1	R / W	1: Enable SYSFANIN input de-bouncer. 0: Disable SYSFANIN input de-bouncer.
0	Reserved	

CR F1h. SMI IRQ and PORT80 display select Register

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	SMI IRQ Enable
6-0	Reserved	

CR F2h. Deep S3 Sleeping State Front panel Green & Yellow LED control register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-4	R / W	Deep S3_YLW_BLK_FREQ bits (This function affects by LDB CRF9 Bit 7) 0000: High-Z. (The output type of YLW_LED is open-drain.) (Default) 0001: YLW_LED outputs 0.0625Hz. 0010: YLW_LED outputs 0.125Hz. 0011: YLW_LED outputs 0.25Hz. 0100: YLW_LED outputs 0.5Hz 0101: YLW_LED outputs 1Hz. 0110: YLW_LED outputs 2Hz. 0111: YLW_LED outputs low. 1XXX: Fading LED.
3-0	R / W	Deep S3_GRN_BLK_FREQ bits (This function affects by LDB CRF9 Bit 6) 0000: High-Z. (The output type of YLW_LED is open-drain.) (Default) 0001: GRN_LED outputs 0.0625Hz. 0010: GRN_LED outputs 0.125Hz. 0011: GRN_LED outputs 0.25Hz. 0100: GRN_LED outputs 0.5Hz 0101: GRN_LED outputs 1Hz. 0110: GRN_LED outputs 2Hz. 0111: GRN_LED outputs low. 1XXX: Fading LED.

CR F4h.

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 02h

BIT	READ / WRITE	DESCRIPTION
7-2	Reserved	
1-0	R / W	VIN2 high / low limit voltage setting 00: UV -9.9%, OV +9.6% 01: UV -15%, OV +14.7% 10: UV -20.1%, OV +19.8% 11: UV -25.2%, OV + 24.9%

CR F5h. SMBus de-bouncer Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#, PWROK(Bit7-5)

Default : 10h

BIT	READ / WRITE	DESCRIPTION
7-2	Reserved	

BIT	READ / WRITE	DESCRIPTION
1	R / W	1: Enable SCL input de-bouncer 160ns. 0: Disable SCL input de-bouncer.
0	R / W	1: Enable SDA input de-bouncer 160ns. 0: Disable SDA input de-bouncer.

CR F6h. Deep S5 Front Panel Green & Yellow LED control register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-4	R / W	Deep S5_YLW_BLK_FREQ bits (This function affects by LDB CRF9 Bit 5) 0000: High-Z. (The output type of YLW_LED is open-drain.) (Default) 0001: YLW_LED outputs 0.0625Hz. 0010: YLW_LED outputs 0.125Hz. 0011: YLW_LED outputs 0.25Hz. 0100: YLW_LED outputs 0.5Hz 0101: YLW_LED outputs 1Hz. 0110: YLW_LED outputs 2Hz. 0111: YLW_LED outputs low. 1XXX: Fading LED.
3-0	R / W	Deep S5_GRN_BLK_FREQ bits (This function affects by LDB CRF9 Bit 4) 0000: High-Z. (The output type of YLW_LED is open-drain.) (Default) 0001: GRN_LED outputs 0.0625Hz. 0010: GRN_LED outputs 0.125Hz. 0011: GRN_LED outputs 0.25Hz. 0100: GRN_LED outputs 0.5Hz 0101: GRN_LED outputs 1Hz. 0110: GRN_LED outputs 2Hz. 0111: GRN_LED outputs low. 1XXX: Fading LED.

CR F7h. Front Panel Green LED (GRN_LED) control register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 87h

BIT	READ / WRITE	DESCRIPTION
7	R / W	AUTO_EN (Powered by VSB, RSMRST# reset , default = 1) 0: GRN_LED and YLW_LED are controlled by GRN_LED_RST, GRN_BLK_FREQ and YLW_LED_RST, YLW_BLK_FREQ bits. 1: GRN_LED and YLW_LED are controlled by "SLP_S5#" and "SLP_S3#".

BIT	READ / WRITE	DESCRIPTION
6	R / W	GRN_LED_RST# (Default= 0) 0: GRN_BLK_FREQ will be set to “0000” (High-Z) when into S3~S5 state. 1: GRN_BLK_FREQ will be kept when into S3~S5 state.
5	R / W	GRN_LED_POL 0: GRN_LED output is active low. (Default) 1: GRN_LED output is active high.
4	Reserved	
3-0	R / W	GRN_BLK_FREQ bits (The reset depends on bit6, GRN_LED_RST#) 0000: High-Z. (The output type of YLW_LED is open-drain.) 0001: GRN_LED outputs 0.0625Hz. 0010: GRN_LED outputs 0.125Hz. 0011: GRN_LED outputs 0.25Hz. 0100: GRN_LED outputs 0.5Hz 0101: GRN_LED outputs 1Hz. 0110: GRN_LED outputs 2Hz. 0111: GRN_LED outputs low. (Default) 1XXX: Fading LED.

CR F8h. Front Panel Yellow LED (YLW_LED) control register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 47h

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6	R / W	YLW_LED_RST# (Default =1) 0: YLW_BLK_FREQ will be set to “0000” (High-Z) when into S3~S5 state. 1: YLW_BLK_FREQ will be kept when into S3~S5 state.
5	R / W	YLW_LED_POL 0: YLW_LED output is active low. (Default) 1: YLW_LED output is active high.
4	Reserved	
3-0	R / W	YLW_BLK_FREQ bits (The reset depends on bit6, YLW_LED_RST#) 0000: High-Z. (The output type of YLW_LED is open-drain.) 0001: YLW_LED outputs 0.0625Hz. 0010: YLW_LED outputs 0.125Hz. 0011: YLW_LED outputs 0.25Hz. 0100: YLW_LED outputs 0.5Hz 0101: YLW_LED outputs 1Hz. 0110: YLW_LED outputs 2Hz. 0111: YLW_LED outputs low. (Default) 1XXX: Fading LED.

CR F9h. Deep Sleep LED Eanble register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	Deep S3_YLW_BLK_FREQ : 0: Depend on setting of CRF2h, bit7~4. 1: Always output high.
6	R / W	Deep S3_GRN_BLK_FREQ : 0: Depend on setting of CRF2h, bit3~0. 1: Always output high.
5	R / W	Deep S5_YLW_BLK_FREQ : 0: Depend on setting of CRF6h, bit7~4. 1: Always output high.
4	R / W	Deep S5_GRN_BLK_FREQ : 0: Depend on setting of CRF2h, bit3~0. 1: Always output high.
3	Reserved	
2-0	R / W	RSMRST# V1/V2 adjust register 000: normal V1/V2 001: -3% ~ -6% of normal 011: -6% ~ -9% of normal 111: -9% ~ -12% of normal

CR FAh.RESETCONO# and PWROK active Pulse width selection

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	
3-2	R / W	RESETCONO# and PWROK active Pulse width selection 00:50ms ~ 60ms 01:100ms ~ 130ms 10:200ms ~ 260ms 11:200ms ~ 260ms
1-0	Reserved	

CR FCCh.

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 02h

BIT	READ / WRITE	DESCRIPTION
7-3	Reserved	

BIT	READ / WRITE	DESCRIPTION
2	R / W	Keyboard First Set Wake-Up Key Type Select.. 0: Serial Mode 1: Simultaneous Mode
1-0	Reserved	

21.11 Logical Device D

CR E7h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 10h

BIT	READ / WRITE	DESCRIPTION
7-5	Reserved	
4	R / W	RSTOUT0# Push-Pull/OD select 0: Open Drain 1: Push-Pull (Default)
3-0	Reserved	

CR F0h. Watchdog Timer Mask Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W	Mask Watchdog Timer 1 to affect PWROK, then enter Deep_S5 0: Mask enable. (WDT1 not affect PWROK) 1: Mask disable. (WDT1 default affect PWROK)
6	R / W	Mask Watchdog Timer 1 to affect RESETCONO# 0: Mask enable. (WDT1 not affect RESETCONO#) 1: Mask disable. (WDT1 default affect RESETCONO#)
5	Reserved	
4	R / W	Mask Watchdog Timer 3 to affect PWROK 0: Mask enable. (WDT3 not affect PWROK) 1: Mask disable. (WDT3 default affect PWROK)
3	R / W	Mask Watchdog Timer 3 to affect RESETCONO# 0: Mask enable. (WDT3 not affect RESETCONO#) 1: Mask disable. (WDT3 default affect RESETCONO#)
2-1	Reserved	
0	R / W	Mask Watchdog Timer 1 to affect RSMRST# 0: Mask enable. (WDT1 not affect RSMRST #) 1: Mask disable. (WDT1 default affect RSMRST#)

CR F3h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-1	Reversed	
0	R	KBC Auto-Swap Detect Status. 0: Keyboard 1: MOUSE

21.12 Logical Device E

CR 30h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-1	Reserved	
0	R / W	0: CIR Wake-up is inactive. 1: CIR Wake-up Interface is active.

CR 60h, 61h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h, 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	These two registers select CIR Wake-up Interface I/O base address <100h: FF8h> on 1 byte boundary.

CR 70h.

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	
3-0	R / W	These bits select IRQ resource for CIR Wake-up.

21.13 Logical Device F

CR E1h.

Attribute: Read/Write

Power Well: VSB

Reset by: GP2X_MRST

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GP2 Push-Pull/OD select 0:Push-Pull 1:Open Drain

CR E2h.

Attribute: Read/Write

Power Well: VSB

Reset by: GP3X_MRST

Default : 7Fh

BIT	READ / WRITE	DESCRIPTION
7	Reserved	
6-0	R / W	GP3 Push-Pull/OD select 0:Push-Pull 1:Open Drain

CR E3h.

Attribute: Read/Write

Power Well: VSB

Reset by: GP4X_MRST

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GP4 Push-Pull/OD select 0:Push-Pull 1:Open Drain

CR E4h.

Attribute: Read/Write

Power Well: VSB

Reset by: GP5X_MRST

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GP5 Push-Pull/OD select 0:Push-Pull 1:Open Drain

CR E6h.

Attribute: Read/Write

Power Well: VSB

Reset by: GP7X_MRST

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GP7 Push-Pull/OD select 0:Push-Pull 1:Open Drain

CR E7h.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	GP8 Push-Pull/OD select 0:Push-Pull 1:Open Drain

CR F0h. I2C Control & Address Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 9Dh

BIT	READ / WRITE	DESCRIPTION
7	R / W	Enable I2C_Slave
6-0	R / W	I2C Address

21.14 Logical Device 11

CR E1h. GPIO, RI PSOUT Wake-Up Status Register

Attribute: Read/Write

Power Well: VRTC

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7	R / W-Clear	PSOUT status of the GP41 event. Write 1 to clear this status.
6-4	Reserved	
3	R / W-Clear	PSOUT status of the RIA event. Write 1 to clear this status.
2-0	Reserved.	

CR E2h. GPIO, RI PSOUT Wake-Up Control Register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-2	Reserved	
1	R / W	GPIO and RI PSOUT Wake-Up Group Select. 0: GPIO 1: GPIO+RI
0	R / W	GPIO and RI PSOUT Wake-Up Mode Select 0: Sleep 1: Sleep+Deep

CR E9h.

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-1	Reserved	
0	R / W	SERIRQ operating power 0: 3.3V 1: 1.8V

21.15 Logical Device 12

CR E7h. KBC Short Detection Register

Attribute: Read/Write

Power Well: VSB

Reset by: LRESET#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-1	Reserved.	
0	R / W	KBC Short Detection Enable. 0: Disable KBC Short Detection. 1: Enable KBC Short Detection.

CR EAh.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#, LRESET#(Bit3)

Default : 10h

BIT	READ / WRITE	DESCRIPTION
7-2	Reserved.	
1-0	R / W	Extend PSON time When system power off (S0->S3/S5), PSON# can keep high for a certain time to avoid power on signal coming immediately. 00: 0 sec 01: 2 sec 10: 3 sec 11: 4 sec

CR EBh.

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION																		
7	Reserved																			
6	R / W	Pin39 function selection <table border="1" data-bbox="481 1648 1110 1901"> <tr> <td>LD12 CREB[Bit6]</td> <td>CR1A [Bit7-6]</td> <td>Pin39</td> </tr> <tr> <td>1</td> <td>x</td> <td>CIRRX</td> </tr> <tr> <td>0</td> <td>00</td> <td>RESETCONI#</td> </tr> <tr> <td>0</td> <td>01</td> <td>GP30</td> </tr> <tr> <td>0</td> <td>10</td> <td>OVT#</td> </tr> <tr> <td>0</td> <td>11</td> <td>SMI#</td> </tr> </table>	LD12 CREB[Bit6]	CR1A [Bit7-6]	Pin39	1	x	CIRRX	0	00	RESETCONI#	0	01	GP30	0	10	OVT#	0	11	SMI#
LD12 CREB[Bit6]	CR1A [Bit7-6]	Pin39																		
1	x	CIRRX																		
0	00	RESETCONI#																		
0	01	GP30																		
0	10	OVT#																		
0	11	SMI#																		

BIT	READ / WRITE	DESCRIPTION			
5	R / W	Pin27 function selection			
		CR1C [Bit7]	LD12 CREB [Bit5]	CR2A [Bit0]	Pin27
		1	1	x	AUXFANIN2
		x	0	0	KDAT
		x	0	1	GP20
4	R / W	Pin26 function selection			
		LD12 CREB [Bit4]	CR2A [Bit0]	Pin26	
		0	0	KCLK	
		0	1	GP21	
		1	0	AUXFANOUT2	
3	R / W	Pin25 function selection			
		LD12 CREB [Bit3]	CR2A [Bit1]	Pin25	
		1	x	AUXFANIN3	
		0	0	MDAT	
		0	1	GP22	
2	R / W	Pin24 function selection			
		LD12 CREB [Bit2]	CR2A [Bit1]	Pin24	
		1	x	AUXFANOUT3	
		0	0	MCLK	
		0	1	GP23	
1-0	Reserved				

21.16 Logical Device 15

CR F0h. Fading Led Maximun Duty Cycle Value Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : FFh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	<p>Fading_led_maxval</p> <p>This byte reference fading led clk select, CRF5 bit[1] and fading led clk enable, CRF5 bit[0], fading led clk select bit has higher priority, the combination of fading led clk select and fading led clk enable describe below. When solid led mode, this byte is duty cycle control register, and frequency control by CRF8.</p> <p>fading led clk select = 1 (250KHz) and fading led enable = 1 is fading led The maximum duty cycle value.</p> <p>fading led clk select = 1 (250KHz) and fading led enable = 0 is solid led duty cycle</p> <p>8'h01: 1/255 = 0.3% 8'h02: 2/255 = 0.7% ... 8'h40: 64/255 = 25.1% ... 8'hFF: 255/255 = 100%</p> <p>fading led clk select = 0 (4Hz) is solid led duty cycle</p> <p>8'h01: 1/255 = 0.3% 8'h02: 2/255 = 0.7% ... 8'h40: 64/255 = 25.1% ... 8'hFF: 255/255 = 100%</p>

CR F1h. Fading Led Middle Duty Cycle Value Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 7Fh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	<p>Fading_led_midval</p> <p>This byte is the turning point duty cycle value between minimum and maximum duty cycle value.</p>

CR F2h. Fading Led Minimun Duty Cycle Value Register

Attribute: Read/Write
 Power Well: VSB
 Reset by: RSMRST#
 Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	Fading_led_minval This byte is the minimum duty cycle value.

CR F3h. Fading Led Increase Duty Cycle Value Register

Attribute: Read/Write
 Power Well: VSB
 Reset by: RSMRST#
 Default : 56h

BIT	READ / WRITE	DESCRIPTION
7-4	R / W	Fading_led_duty_inc_h The increased duty cycle value between the turning point and the maximum duty cycle value.
3-0	R / W	Fading_led_duty_inc_l The increased duty cycle value between the minimum duty cycle value and turning point.

CR F4h. Fading Led Decrease Duty Cycle Value Register

Attribute: Read/Write
 Power Well: VSB
 Reset by: RSMRST#
 Default : 56h

BIT	READ / WRITE	DESCRIPTION
7-4	R / W	Fading_led_duty_dec_h The decreased duty cycle value between the maximum duty cycle value and the turning point.
3-0	R / W	Fading_led_duty_dec_l The decreased duty cycle value between the turning point and the minimum duty cycle value.

CR F5h. Fading Led Control Register

Attribute: Read/Write
 Power Well: VSB
 Reset by: RSMRST#
 Default : 17h

BIT	READ / WRITE	DESCRIPTION
7-4	R / W	Fading_led_prgval Repeat each duty cycle value for a few time.

BIT	READ / WRITE	DESCRIPTION
3-2	R / W	Fading led extend enable bits 00 : No extend. 01 : Only extend the minimum duty cycle. 10 : Only extend the maximum duty cycle. 11 : Both extend the minimum and the maximum duty cycle.
1	R / W	Fading led clk select 0 : 4Hz 1 : 250KHz
0	R / W	Fading led enable 0 : Solid Led 1 : Fading Led

CR F6h. Fading Led Light extend Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	This byte is the time for extend the maximum duty cycle value.

CR F7h. Fading Led Dark extend Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 0Fh

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	This byte is the time for extend the minimum duty cycle value. 00h : 0s 0Fh : 1s 17h : 1.5s 1Eh : 2s

CR F8h. Fading Led Frequency Divider Register

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 10h

BIT	READ / WRITE	DESCRIPTION

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	<p>Fading_led freq_div when fading led clk select = 1: 250KHz</p> <p>8'h01: 250Khz/1=250Khz 8'h02: 250Khz/2=125Khz ... 8'hFF: 250Khz/255=0.98Khz</p> <p>When fading led clk select = 0: 4Hz 8'h00: high-z 8'h01: output low 8'h02: 4Hz 8'h03: 2Hz 8'h04: 1Hz 8'h05: 1/2Hz 8'h06: 1/4Hz 8'h07: high-z others : output low</p>

21.17 Logical Device 16

CR 30h. Deep Sleep configuration register

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : a0h

BIT	READ / WRITE	DESCRIPTION
7-5	Reserved	
4	R / W	<p>dsw_wake_opt (test mode)</p> <p>0: The PSOUT# will assert until SLPS3# high when deep s5 wakeup event happened.</p> <p>1: The PSOUT# will assert until RSMRST# high when deep s5 wakeup event happened.</p> <p>PS. This bit only active when PCH_DSW_EN & (Deep S5 Enable Deep S3 Enable)</p>
3-2	Reserved	
1	R / W	<p>Deep S3 Enable</p> <p>0: If SLP_S3# state will not enter Deep S3 state.</p> <p>1: If SLP_S3# state will enter Deep S3 state.</p>
0	R / W	<p>Deep S5 Enable</p> <p>0: Disable Deep S5 function when into S5 state (SLP_S5#).</p> <p>1: Enable Deep S5 function when into S5 state (SLP_S5#).</p>

CR E0h. Deep Sleep wake up PSOUT# delay time

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : **20h** (Default: 512ms)

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	
5-0	R / W	<p>Deep Sleep wake up PSOUT# delay time.</p> <p>When system wake up from deep sleep state, IO will issue a low pulse via PSOUT# after SYS_3VSB and wait a delay time.</p> <p>DELAY TIME = (Setting Value) * 16ms</p> <p>Example : maximum delay time = (3F)_{hex} * 16ms = 1008ms</p>

CR E1h. Deep Sleep wake up PSOUT# pulse width

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : **04h** (Default: 128 ms)

BIT	READ / WRITE	DESCRIPTION
7-4	Reserved	

BIT	READ / WRITE	DESCRIPTION
3-0	R / W	Deep Sleep wake up PSOUT# pulse width. When system wake up from deep sleep state, IO will issue a low pulse via PSOUT#.. Pulse Width = (Setting Value) * 32ms Example : maximum pulse width = (F) _{hex} * 32ms = 480ms

CR E2h. Deep Sleep Delay Time Control

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 05h

BIT	READ / WRITE	DESCRIPTION
7	R / W	0: The unit of deep sleep delay time is second. 1: The unit of deep sleep delay time is Minute.
6-0	R / W	Deep Sleep Delay Time Control. When system leaves S0 State, IO will wait a delay time before entering into Deep Sleep State. Example: maximum delay time = 127 second/minute

CR E3h. WDT1 to Deep Sleep Delay Time Control

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery reset

Default : 01h

BIT	READ / WRITE	DESCRIPTION
7-3	Reserved	
2	R / W	Watchdog Timer 1 wake up auto mode. 0: SIO will not wake up system after RSMRST release 1: SIO will wake up system after RSMRST release.
1-0	R / W	Deep Sleep Watchdog Timer 1 Delay Time Control. When system will enter DeepS5 by watchdog timer 1, SIO will set a delay time to control. Delay time: 2, 4, 6, 8 sec = register: 0, 1, 2, 3

CR F0h. Clock Calibration Configuration Result

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 02h

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	
5-0	R	Calibration data to read from.

CR F3h. LCLK Reference Data (Low Byte)

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 10h

BIT	READ / WRITE	DESCRIPTION
7-0	R / W	<p>LCLK_FRQ[7:0]</p> <p>$LCLK / (31.25\text{KHz} * 2) = LCLK_FRQ$</p> <p>Example:</p> <p>$33\text{MHz} / (31.25\text{KHz} * 2) = 11'\text{h}210 = 11'\text{d}528$</p>

CR F4h. LCLK Reference Data (High Byte)

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 02h

BIT	READ / WRITE	DESCRIPTION
7-3	Reserved	
2-0	R / W	<p>LCLK_FRQ[10:8]</p> <p>$LCLK / (31.25\text{KHz} * 2) = LCLK_FRQ$</p> <p>Example:</p> <p>$33\text{MHz} / (31.25\text{KHz} * 2) = 11'\text{h}210 = 11'\text{d}528$</p>

CR F5h. Calibration Control

Attribute: Read/Write

Power Well: VSB

Reset by: RSMRST#

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-5	R / W	Calibration period configuration. Please write 110b in these bits.
4-1	Reserved	
0	R / W	<p>EN_START_CALI</p> <p>0: Stop Oscillator free calibrate</p> <p>1: Start Oscillator free calibrate</p>

CR F6h. Calibration Effectiveness Control

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery Reset

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-1	Reserved	
0	R / W	CALI_Data_Active 0: Inactivate the calibrated data 1: Activate the calibrated data

CR F7h. Configuration for Internal Clock

Attribute: Read/Write

Power Well: VRTC

Reset by: Battery Reset

Default : 00h

BIT	READ / WRITE	DESCRIPTION
7-6	Reserved	
5-0	R / W	Calibration data to write to.

22. SPECIFICATIONS

22.1 Absolute Maximum Ratings

SYMBOL	PARAMETER	RATING	UNIT
3VCC	Power Supply Voltage (3.3V)	-0.3 to 3.6	V
VI	Input Voltage	-0.3 to 3VCC+0.3	V
	Input Voltage (5V tolerance)	-0.3 to 5.5	V
TA	Operating Temperature	0 to +70	°C
TSTG	Storage Temperature	-55 to +150	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

22.2 DC CHARACTERISTICS

($T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$, $V_{DD} = 3.3\text{V} \pm 5\%$, $V_{DD} = 1.8\text{V} \pm 5\%$, $V_{SS} = 0\text{V}$)

PARAMETER	SYM	MIN	TYP	MAX.	UNIT	CONDITIONS
Battery Quiescent Current	IBAT			2.4	µA	$V_{BAT} = 2.5\text{ V}$
ACPI Stand-by Power Supply Quiescent Current	IVSB			8.0	mA	$V_{SB} = 3.3\text{ V}$, All ACPI pins are not connected.
VCC Quiescent Current	IVCC			25	mA	$V_{SB} (AVSB) = 3.3\text{ V}$ $V_{CC} = 3.3\text{ V}$ $LRESET = High$ $IOCLK = 48\text{MHz}$ $CASEOPEN$ Pull-Up to V_{BAT}
VTT Quiescent Current	IVTT			1	mA	$V_{SB} (AVSB) = 3.3\text{ V}$ $V_{CC} = 3.3\text{ V}$ $V_{TT} = 1.2\text{V}$ $LRESET = High$ $IOCLK = 48\text{MHz}$ $CASEOPEN$ Pull-Up to V_{BAT}
AIN – Analog input						
AOUT – Analog output						
IN _{tp3} – 3.3V TTL-level input pin						

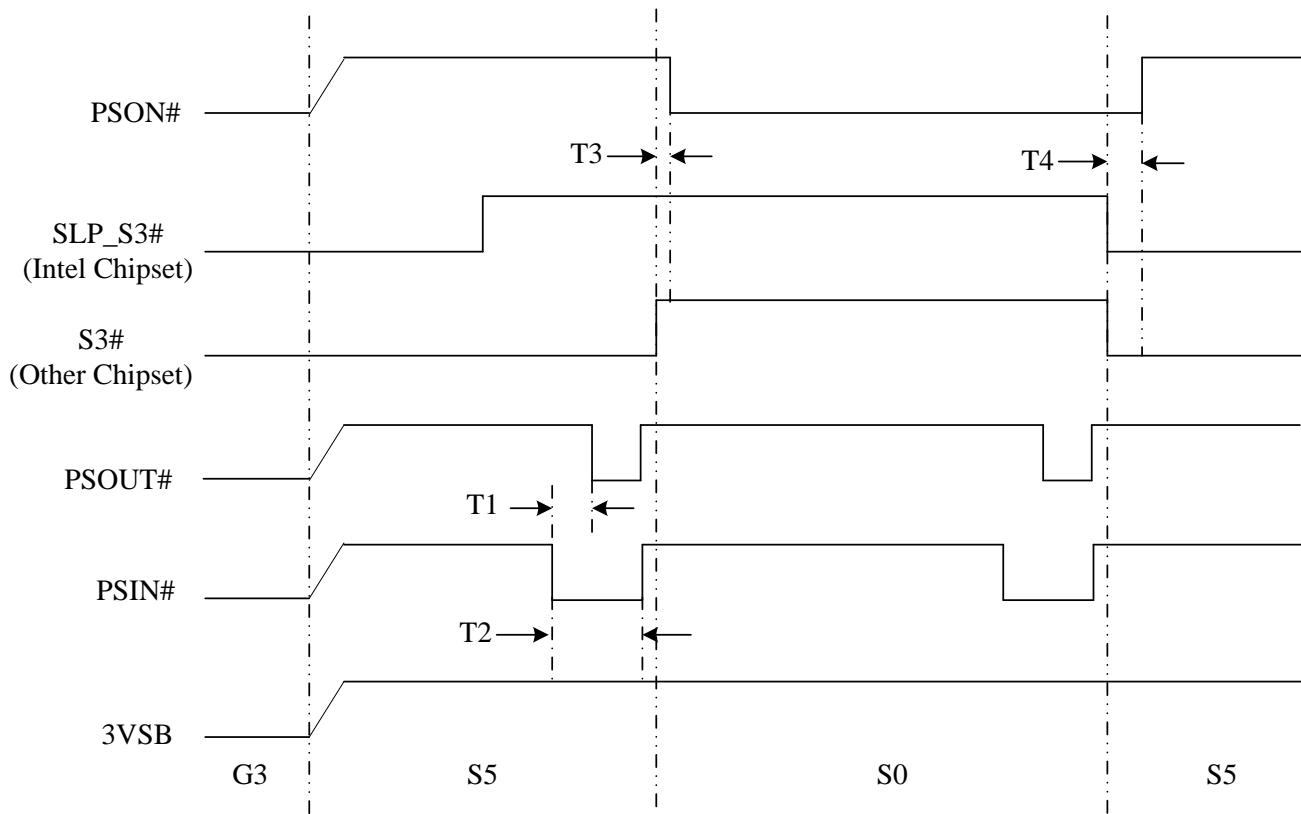
PARAMETER	SYM	MIN	TYP	MAX.	UNIT	CONDITIONS
Input Low Voltage	V _{IL}			0.8	V	
Input High Voltage	V _{IH}	2.0			V	
Input High Leakage	I _{LIH}			+10	µA	V _{IN} = 3.3V
Input Low Leakage	I _{LIL}			-10	µA	V _{IN} = 0 V
IN_{sp3} – 3.3V Schmitt-trigger input for AMD SB-TSI						
Input Low Threshold Voltage	V _{t-}			0.4*V _{TT}	V	
Input High Threshold Voltage	V _{t+}	0.6*V _{TT}			V	
Hystersis	V _{TH}		0.2*V _{TT}		V	
Input High Leakage	I _{LIH}			+10	µA	V _{IN} = V _{TT}
Input Low Leakage	I _{LIL}			-10	µA	V _{IN} = 0 V
IN_{tp318} – 3.3V/1.8V input pin						
Input Low Voltage	V _{IL}			0.8	V	
Input High Voltage	V _{IH}	1.5			V	
Input High Leakage	I _{LIH}			+10	µA	V _{IN} = 3.3V
Input Low Leakage	I _{LIL}			-10	µA	V _{IN} = 0 V
IN_{sp318} – 3.3V/1.8V Schmitt-trigger input pin						
Input Low Threshold Voltage	V _{t-}	0.8	0.9	1.1	V	
Input High Threshold Voltage	V _{t+}	1.1	1.2	1.4	V	
Hystersis	V _{TH}		0.2		V	
Input High Leakage	I _{LIH}			+10	µA	V _{IN} = 3.3V
Input Low Leakage	I _{LIL}			-10	µA	V _{IN} = 0 V
IN_{gp3} – 3.3V GTL-level input pin						
Input Low Voltage	V _{IL}		0.72		V	
Input High Voltage	V _{IH}		0.72		V	
Input High Leakage	I _{LIH}			+10	µA	V _{IN} = 3.3V
Input Low Leakage	I _{LIL}			-10	µA	V _{IN} = 0 V
IN_{tp5} – 5V TTL-level input pin						
Input Low Voltage	V _{IL}			0.8	V	
Input High Voltage	V _{IH}	2.0			V	
Input High Leakage	I _{LIH}			+10	µA	V _{IN} = 3.3V
Input Low Leakage	I _{LIL}			-10	µA	V _{IN} = 0 V
IN_{tscup5} – 5V TTL-level, Schmitt-trigger input buffer with controllable pull-up						
Input Low Threshold Voltage	V _{t-}	0.5	0.8	1.1	V	V _{IN} = 3.3 V
Input High Threshold Voltage	V _{t+}	1.6	2.0	2.4	V	V _{IN} = 3.3 V
Hystersis	V _{TH}	0.5	1.2		V	V _{IN} = 3.3 V

PARAMETER	SYM	MIN	TYP	MAX.	UNIT	CONDITIONS
Input High Leakage	ILIH			+10	µA	VIN = 3.3 V
Input Low Leakage	ILIL			-10	µA	VIN = 0 V
IN_{tsp5} – 5V TTL-level, Schmitt-trigger input pin						
Input Low Threshold Voltage	V _{t-}	0.5	0.8	1.1	V	VIN = 3.3 V
Input High Threshold Voltage	V _{t+}	1.6	2.0	2.4	V	VIN = 3.3 V
Hysteresis	V _{TH}	0.5	1.2		V	VIN = 3.3 V
Input High Leakage	ILIH			+10	µA	VIN = 3.3 V
Input Low Leakage	ILIL			-10	µA	VIN = 0 V
IN_{tdp5} – 5V TTL-level input pin with internal pull-down resistor						
Input Low Voltage	V _{IL}			0.8	V	
Input High Voltage	V _{IH}	2.0			V	
Input High Leakage	ILIH			+10	µA	VIN = 3.3V
Input Low Leakage	ILIL			-10	µA	VIN = 0 V
O8 – Output pin with 8mA source-sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 8 mA
Output High Voltage	V _{OH}	2.4			V	I _{OH} = -8 mA
OD8 – Open-drain output pin with 8mA sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 8 mA
OX8 – Output pin with 8mA source-sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 8 mA
Output High Voltage	V _{OH}	2.4			V	I _{OH} = -8 mA, LPC_VDD=3.3V
Output High Voltage	V _{OH}	1.31			V	I _{OH} = -8 mA, LPC_VDD=1.8V
ODX8 – Output pin with 8mA source-sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 8 mA
O12 – Output pin with 12mA source-sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 12 mA
Output High Voltage	V _{OH}	2.4			V	I _{OH} = -12 mA
OD12 – Open-drain output pin with 12mA sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 12 mA
O16 – Output pin with 16mA source-sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 16 mA
Output High Voltage	V _{OH}	2.4			V	I _{OH} = -16 mA
OD16 – Open-drain output pin with 16mA sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 16 mA

PARAMETER	SYM	MIN	TYP	MAX.	UNIT	CONDITIONS
O24 – Output pin with 24mA source-sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 24 mA
Output High Voltage	V _{OH}	2.4			V	I _{OH} = -24 mA
OD24 – Open-drain output pin with 24mA sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 24 mA
O48 – Output pin with 48mA source-sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 48 mA
Output High Voltage	V _{OH}	2.4			V	I _{OH} = -48 mA
OD48 – Open-drain output pin with 48mA sink capability						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 48 mA
I/O_{V3} – Bi-direction pin with source capability of 6 mA and sink capability of 1 mA for INTEL® PECL						
Input Low Voltage	V _{IL}	0.275*V _{TT}		0.5*V _{TT}	V	
Input High Voltage	V _{IH}	0.55*V _{TT}		0.725*V _{TT}	V	
Output Low Voltage	V _{OL}			0.25*V _{TT}	V	
Output High Voltage	V _{OH}	0.75*V _{TT}			V	
Hysteresis	V _{Hys}	0.1*V _{TT}			V	
O12cu – Output pin 12mA source-sink capability with controllable pull-up						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 12 mA
Output High Voltage	V _{OH}	2.4			V	I _{OH} = -12 mA
OD12cu – Open-drain 12mA sink capability output pin with controllable pull-up						
Output Low Voltage	V _{OL}			0.4	V	I _{OL} = 12 mA

23. AC CHARACTERISTICS

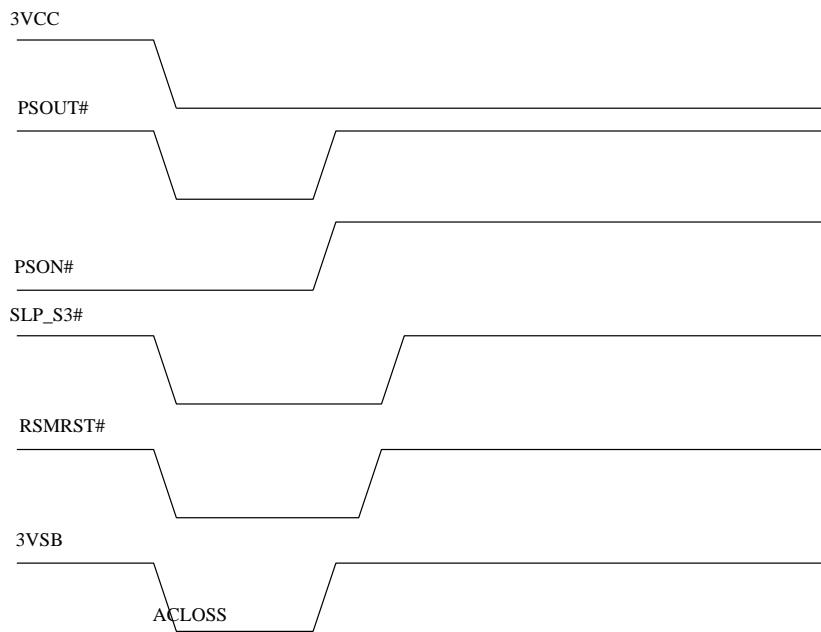
23.1 Power On / Off Timing



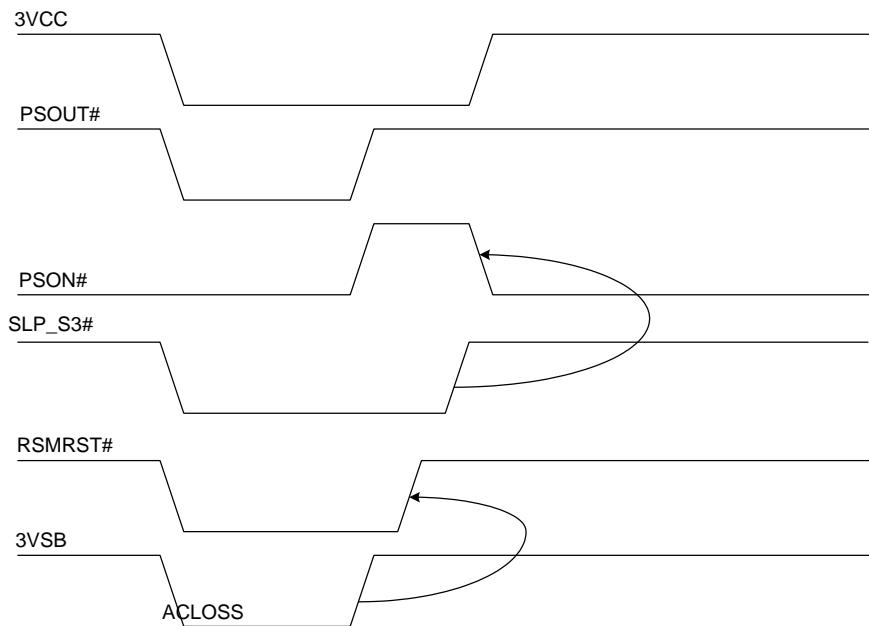
	T1	T2	T3	T4
IDEAL TIMING	48ms~66ms	Over 64ms at least	< 200ns	15ms~32ms

23.2 AC Power Failure Resume Timing

- (1) Logical Device A, CR [E4h] bits [6:5] =00 means “OFF” state
 (“OFF” means the system is always turned off after the AC power loss recovered.)



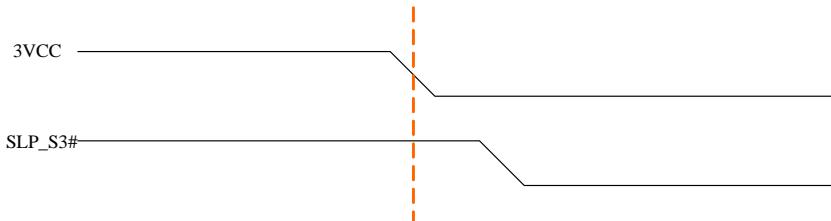
(2) Logical Device A, CR [E4h] bits [6:5]=01 means “ON” state.
 (“ON” means the system is always turned on after AC power loss recovered.)



** What's the definition of former state at AC power failure?

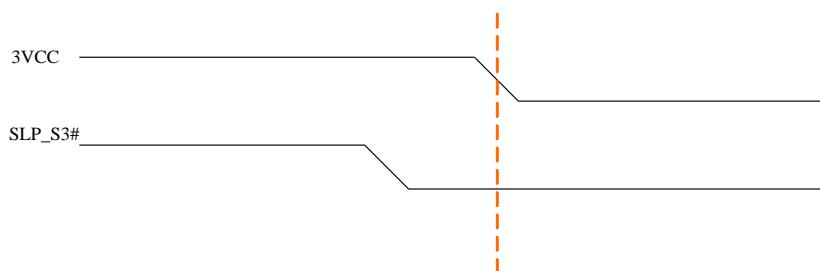
- 1) The previous state is "ON"

VCC falls to 2.6V and SLP_S3# keeps at VIH 2.0V



- 2) The previous state is "OFF"

VCC fall to 2.6V and SLP_S3# keeps at VIL 0.8V



To ensure that VCC does not fall faster than VSB in various ATX Power Supplies, the NCT5567D-B adds the option of "user define mode" for the pre-defined state before AC power failure. BIOS can set the pre-defined state for the system to be "On" or "Off". According to this setting, the system chooses the state after the AC power recovery.

Please refer to the descriptions of bit 6~5 of CR E4h and bit 4 of CR E6h in Logical Device A.

CR E4h

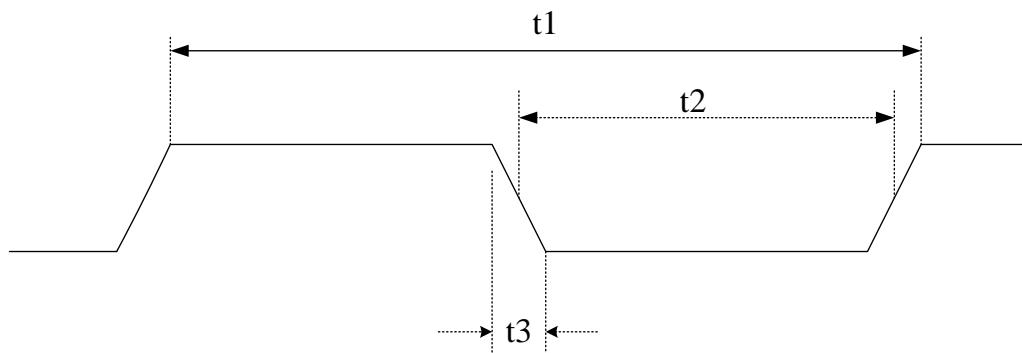
BIT	READ/WRITE	DESCRIPTION
6-5	R / W	Power-loss control bits => (VBAT) 0 0: System always turns off when it returns from power-loss state. 0 1: System always turns on when it returns from power-loss state. 1 0: System turns off / on when it returns from power-loss state depending on the state before the power loss. 1 1: User defines the resuming state before power loss.(refer to Logic Device A, CRE6[4])

CR E6h

BIT	READ/WRITE	DESCRIPTION
4	R / W	Power loss Last State Flag. (VBAT) 0: ON 1: OFF

23.3 Clock Input Timing

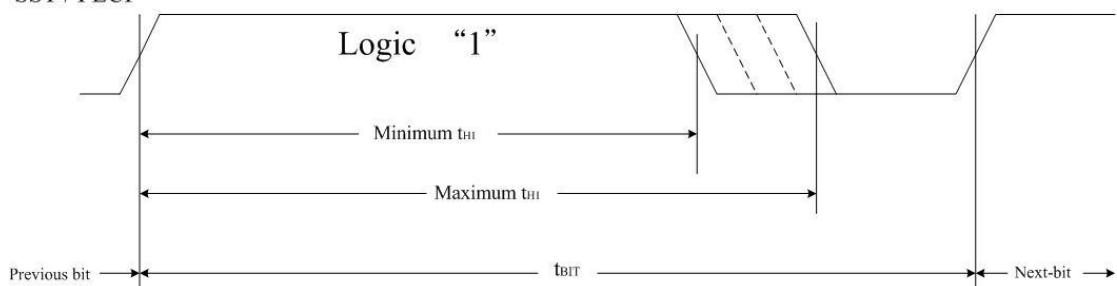
PARAMETER	24MHZ		UNIT
	MIN	MAX	
Cycle to cycle jitter		500	ps
Duty cycle	45	55	%



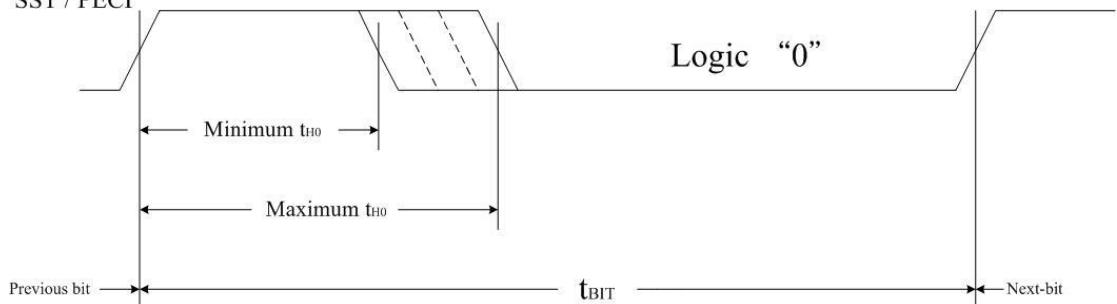
PARAMETER	DESCRIPTION	24MHZ			UNIT
		MIN	TYP	MAX	
t_1	Clock cycle time		41.7		ns
t_2	Clock high time/low time	19	21		ns
t_3	Clock rising time/falling time (0.4V~2.4V)			3	ns

23.4 PECI Timing

SST / PECI

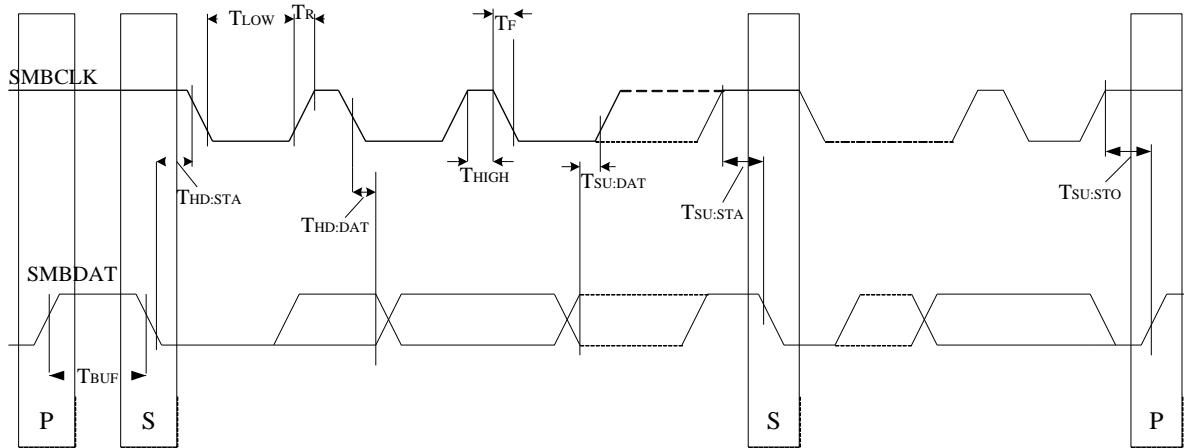


SST / PECI



SYMBOL		MIN	TYP	MAX	UNITS
t_{BIT}	Client	0.495		500	μ s
	Originator	0.495		250	
t_{H1}		0.6	3/4	0.8	$\times t_{BIT}$
t_{H0}		0.2	1/4	0.4	$\times t_{BIT}$

23.5 SMBus Timing

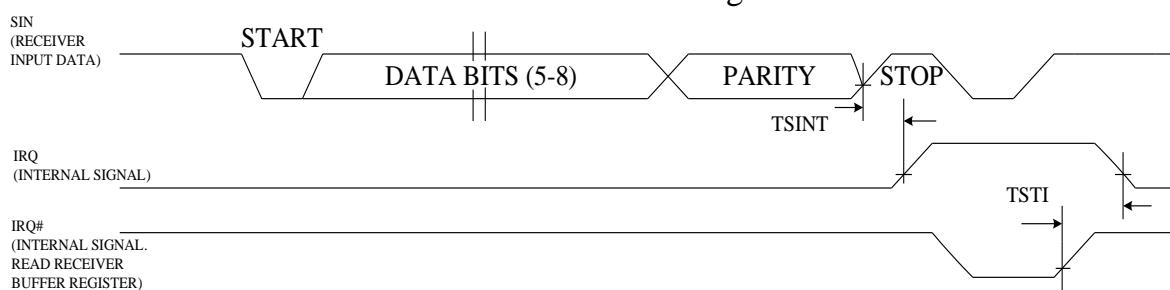


23.6 UART Port

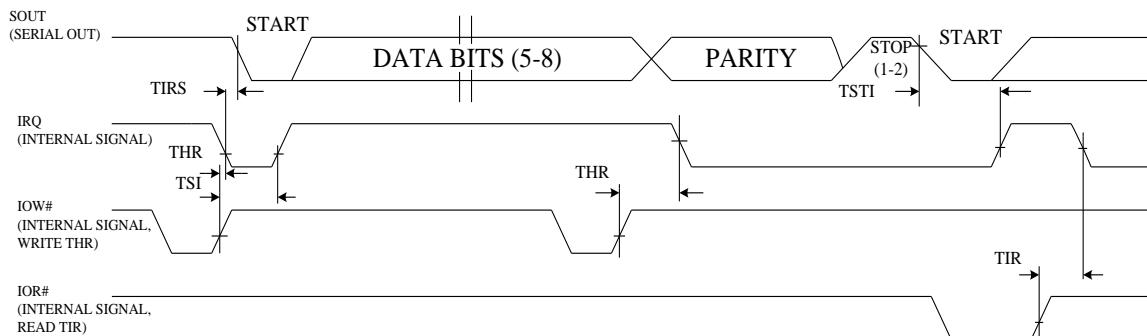
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	MAX.	UNIT
Delay from Stop to Set Interrupt	TSINT		9/16		Baud Rate
Delay from <u>IOR</u> Reset Interrupt	TRINT		9	1000	nS
Delay from Initial IRQ Reset to Transmit Start	TIRS		1/16	8/16	Baud Rate
Delay from to Reset interrupt	THR			175	nS
Delay from Initial <u>IOW</u> to interrupt	TSI		9/16	16/16	Baud Rate
Delay from Stop to Set Interrupt	TSTI			8/16	Baud Rate
Delay from <u>IOR</u> to Reset Interrupt	TIR		8	250	nS
Delay from <u>IOR</u> to Output	TMWO		6	200	nS
Set Interrupt Delay from Modem Input	TSIM		18	250	nS
Reset Interrupt Delay from <u>IOR</u>	TRIM		9	250	nS
Baud Divisor	N	100 pF Loading		$2^{16}-1$	

UART Receiver Timing

Receiver Timing



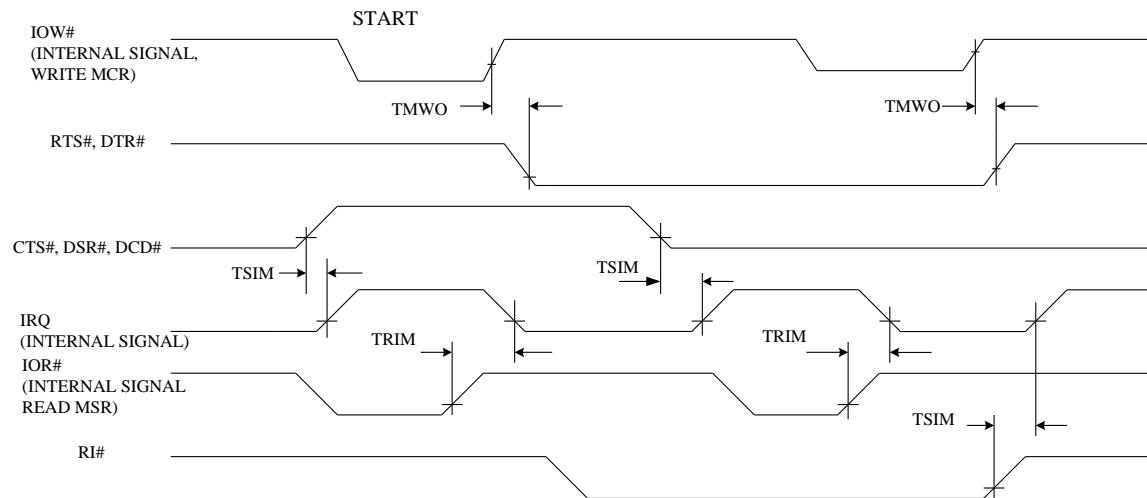
UART Transmitter Timing



23.7 Modem Control Timing

Modem Control Timing

MODEM Control Timing



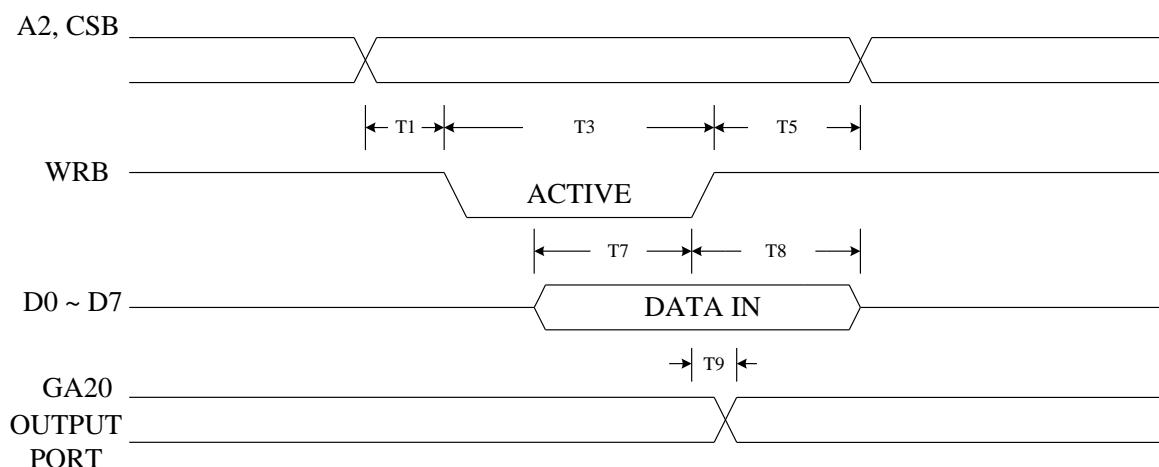
23.7.1 KBC Timing Parameters

NO.	DESCRIPTION	MIN.	MAX.	UNIT
T1	Address Setup Time from WRB	0		nS
T2	Address Setup Time from RDB	0		nS
T3	WRB Strobe Width	20		nS
T4	RDB Strobe Width	20		nS
T5	Address Hold Time from WRB	0		nS
T6	Address Hold Time from RDB	0		nS
T7	Data Setup Time	50		nS

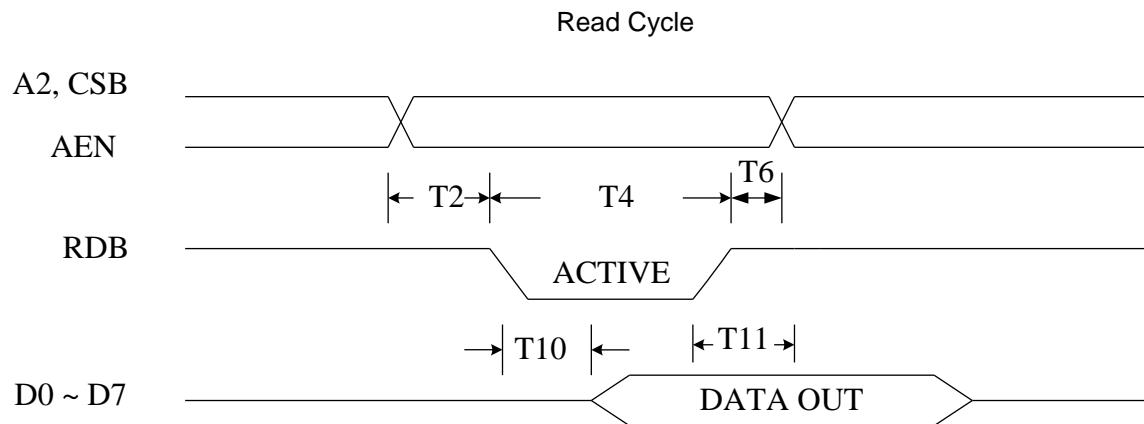
NO.	DESCRIPTION	MIN.	MAX.	UNIT
T8	Data Hold Time	0		nS
T9	Gate Delay Time from WRB	10	30	nS
T10	RDB to Drive Data Delay		40	nS
T11	RDB to Floating Data Delay	0	20	nS
T12	Data Valid After Clock Falling (SEND)		4	μS
T13	K/B Clock Period	20		μS
T14	K/B Clock Pulse Width	10		μS
T15	Data Valid Before Clock Falling (RECEIVE)	4		μS
T16	K/B ACK After Finish Receiving	20		μS
T19	Transmit Timeout		2	mS
T20	Data Valid Hold Time	0		μS
T21	Input Clock Period (6–16 Mhz)	63	167	nS
T22	Duration of CLK inactive	30	50	μS
T23	Duration of CLK active	30	50	μS
T24	Time from inactive CLK transition, used to time when the auxiliary device sample DATA	5	25	μS
T25	Time of inhibit mode	100	300	μS
T26	Time from rising edge of CLK to DATA transition	5	T28-5	μS
T27	Duration of CLK inactive	30	50	μS
T28	Duration of CLK active	30	50	μS
T29	Time from DATA transition to falling edge of CLK	5	25	μS

23.7.2 Writing Cycle Timing

Write Cycle Timing

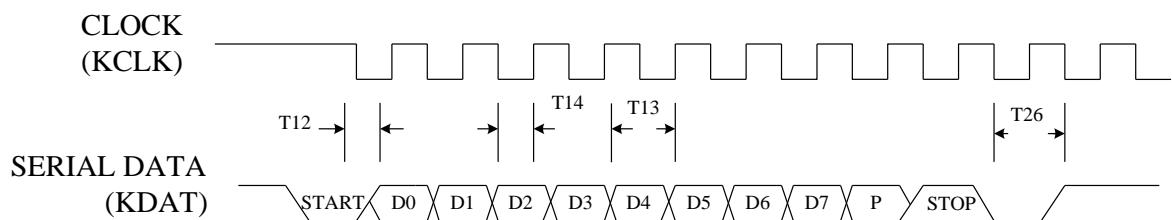


23.7.3 Read Cycle Timing



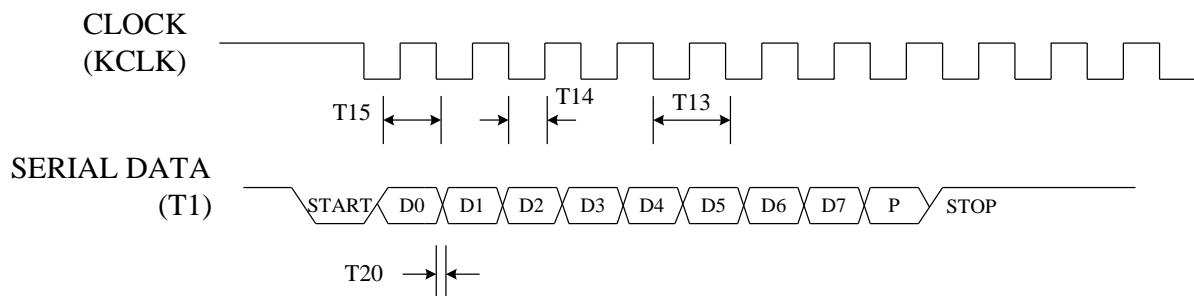
23.7.4 Send Data to K/B

Send Data to K/B



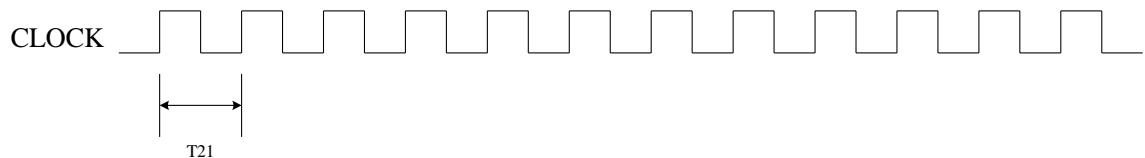
23.7.5 Receive Data from K/B

Receive Data from K/B



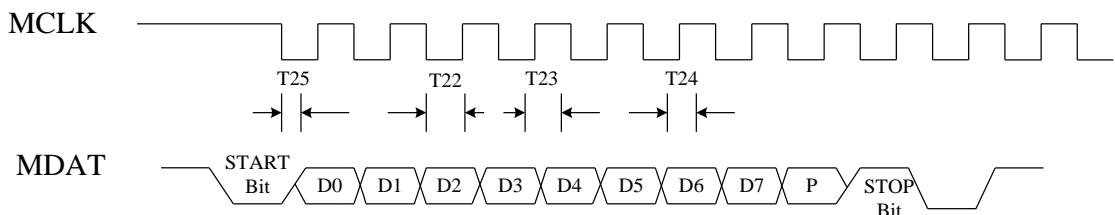
23.7.6 Input Clock

Input Clock



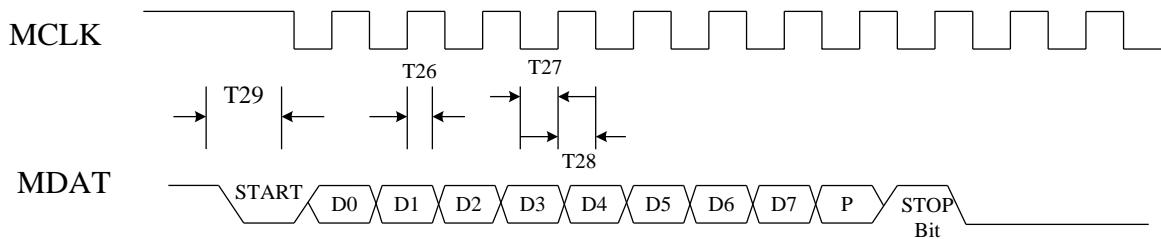
23.7.7 Send Data to Mouse

Send Data to Mouse



23.7.8 Receive Data from Mouse

Receive Data from Mouse



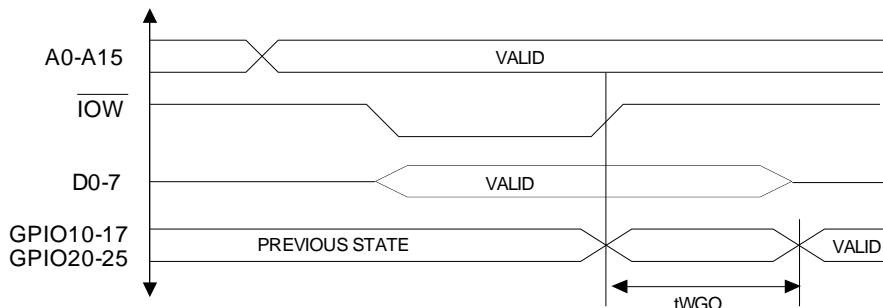
23.8 GPIO Timing Parameters

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
t_{WGO}	Write data to GPIO update		300(Note 1)	ns

Note: Refer to Microprocessor Interface Timing for Read Timing.

23.8.1 GPIO Write Timing

GPIO Write Timing diagram



23.9 LPC timing

LPC AC Specification					
Symbol	Parameter	MIN	Typical	MAX	Units
PCICLK	Clock frequency	19.2		36	MHz
T_{CO}	Tx Rising Clock to Data Output Delay	3.5		8.5	ns
T_{SU}	Rx Data Setup Time to CLK Rising Edge	18			ns
T_{HD}	Rx Data Hold Time to CLK Rising Edge	-7.6			ns

24. TOP MARKING SPECIFICATIONS

1st line: Nuvoton logo

2nd line: part number NCT5567D-B

3rd line: wafer production series lot number 28201234

4th line: tracking code 123G9AFA

123: packages made in 2011, week 23

G: assembly house ID; G means GR, A means ASE, etc.

9: code version; 9 means code 009

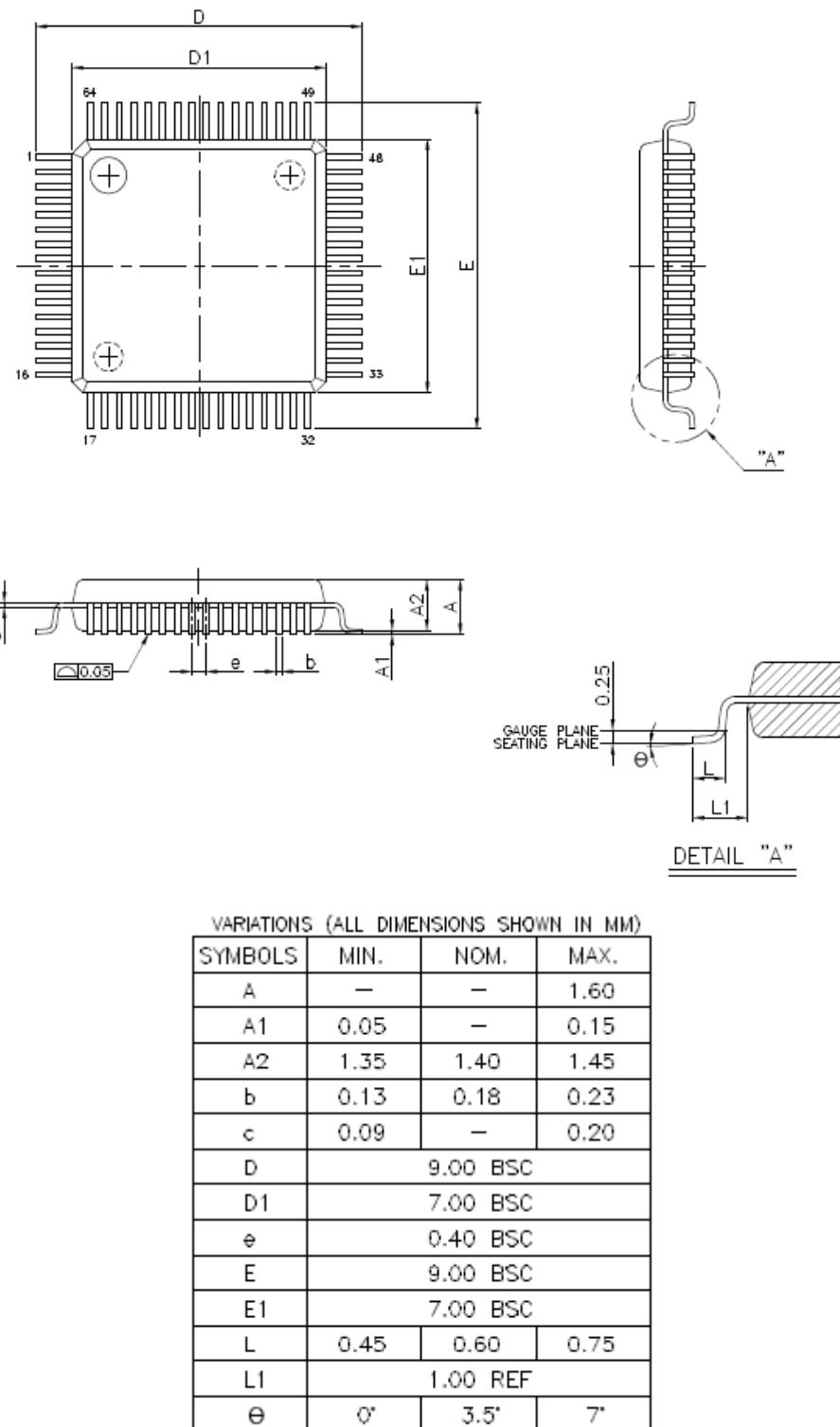
A: IC revision; A means version A; B means version B, and C means version C

FA: Nuvoton internal use.

25. ORDERING INFORMATION

PART NUMBER	PACKAGE TYPE	PRODUCTION FLOW
NCT5567D-B	64Pin LQFP (Green package)	Commercial, 0°C to +70°C

26. PACKAGE SPECIFICATION



64-pin LQFP (7mm x 7mm x 1.4mm)

27. REVISION HISTORY

VER SIO N	DATE	PAGE	DESCRIPTION
0.1	3/25/2015	N.A.	Draft datasheet to define features and pin configuration
1.0	06/29/2015	6, 8	Chnage PCICLK to LCLK in chapter 4 and chapter 5; also update the description
1.1	10/26/2015	2, 4, 6, 12, 17 72,257, 290 324,342,351	<ol style="list-style-type: none">1. Remove DSW function.2. Remove Power Measurement3. Modify 22.3 Clock Input Timing
1.2	12/09/2015	N.A.	Correct POWER_FAULT# function description
1.21	12/10/2015	276, 325, 326	Modify POWER_FAULT# function description
1.22	12/22/2016	282.283.289. 341	Modify AUXFANIN2 register
1.23	07/22/2017	16 366	<ol style="list-style-type: none">1. Modify Strapping pin number2. Add LPC timing
1.3	11/15/2018	11, 290	<ol style="list-style-type: none">1. Modify Pin34 3VSBSW# type

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