

# RTD 2271W / 2281W Family Dual-Input LCD Display Controller Brief Spec

Version 1.02 Last updated: 2009/12/22

1.	FEATURES	3
	ORDERING INFORMATION	
3.	CHIP DATA PATH BLOCK DIAGRAM	5
4.	PIN DIAGRAM	6
	128 Pin LQFP	6 7
5.	ELECTRIC SPECIFICATION	13
	DC Characteristics	13
6.	MECHANICAL SPECIFICATION	. 14



### 1. Features

### General

- Embedded 2 DDC with DDC1/2B/CI
- Zoom scaling up and down
- Embedded one MCU with SPI flash controller.
- It contains 4 ADCs in key pad application
- Require only one crystal to generate all timing.
- Programmable internal low-voltage-reset (LVR)
- High resolution 6 channels PWM output, and wide range selectable PWM frequency.
- Support input format up to FHD
- Support 27MHz/24MHz/14.318MHz crystal type

### **Analog RGB Input Interface**

- 1 Analog input supported
- Integrated 8-bit triple-channel 210MHz ADC/PLL
- Embedded programmable Schmitt trigger of HSYNC
- Support Sync-On-Green (SOG) and various kinds of composite sync modes
- On-chip high-performance hybrid PLLs
- High resolution true 64 phase ADC PLL
- YPbPr support up to HDTV 1080p resolution

### **Digital Input Interface with HDCP**

- Single link on-chip TMDS receiver support to 165Mhz
- Adaptive algorithm for TMDS capability
- Data enable only mode support
- High-Bandwidth Digital Content Protection (HDCP 1.3)
- Enhanced protection of HDCP secret key

### **Embedded MCU**

- Industrial standard 8051 core with external serial flash
- Low speed ADC for various application
- I2C Master or Slave hardware supported

### **Auto Detection / Auto Calibration**

- Input format detection
- Compatibility with standard VESA mode and support user-defined mode
- Smart engine for Phase/Image position/Color calibration

### **Scaling**

- Fully programmable zoom ratios
- Independent horizontal/vertical scaling
- Advanced zoom algorithm provides high image quality
- Sharpness/Smooth filter enhancement
- Support non-linear scaling from 4:3 to 16:9 or 16:9 to 4:3

### **Color Processor**

- True 10 bits color processing engine
- xvYCC supported
- sRGB compliance
- Advanced dithering logic for 18-bit panel color depth enhancement
- Dynamic overshoot-smear canceling engine
- Brightness and contrast control
- Programmable 10-bit gamma support
- Peaking/Coring function for video sharpness

### VividColor<sup>TM</sup>

- Independent color management (ICM)
- Dynamic contrast control (DCC)
- Precise color mapping (PCM)

### **Output Interface**

- Fully programmable display timing generator
- Flexible data pair swapping for easier system design.
- 1 and 2 pixel/clock panel support and up to FHD resolution. 135MHz for single LVDS. 210MHz for dual LVDS.
- LVDS -output interface on single PCB
- Support 8-bit LVDS output
- Spread-Spectrum DPLL to reduce EMI
- Fixed Last Line output for perfect panel capability

### **Embedded OSD**

- Embedded 20K SRAM dynamically stores OSD command and fonts
- Support multi-color RAM font, 1, 2 and 4-bit per pixel
- 64 color palette
- Maximum 18 window with alpha-blending/ gradient / gradient target color / gradient reversed color/ dynamic fade-in/fade-out, bordering/ shadow/3D window type
- Rotary 90,180,270 degree
- Independent row shadowing/bordering
- Programmable blinking effects for each character
- OSD-made internal pattern generator for factory mode
- Support 12x18~4x18 proportional font
- Hardware decompression for OSD font
- Support OSD scrolling
- Support 2 independent font based OSD

### **Power Supply**

- $\bullet$  3.3V / 1.2V power supply
- Low standby current (<4mA)

# 2. Ordering Information

Part No.	VGA	DVI	HDMI	DP	HDCP	Audio	OD	FRC	Max.	Output	PKG
									Resolution		
RTD2281W-	Yes	Yes	No	No	Yes	No	No	No	1920*1080	Dual-LVDS	QFP128
GR	(210MHz)								@ 75Hz		(green package)
RTD2271W-	Yes	Yes	No	No	Yes	No	No	No	1680*1050	Dual-LVDS	QFP128
GR	(210MHz)								@ 75Hz		(green package)



# 3. Chip Data Path Block Diagram

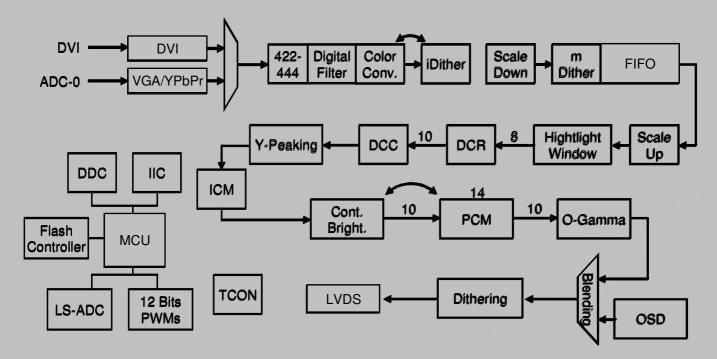
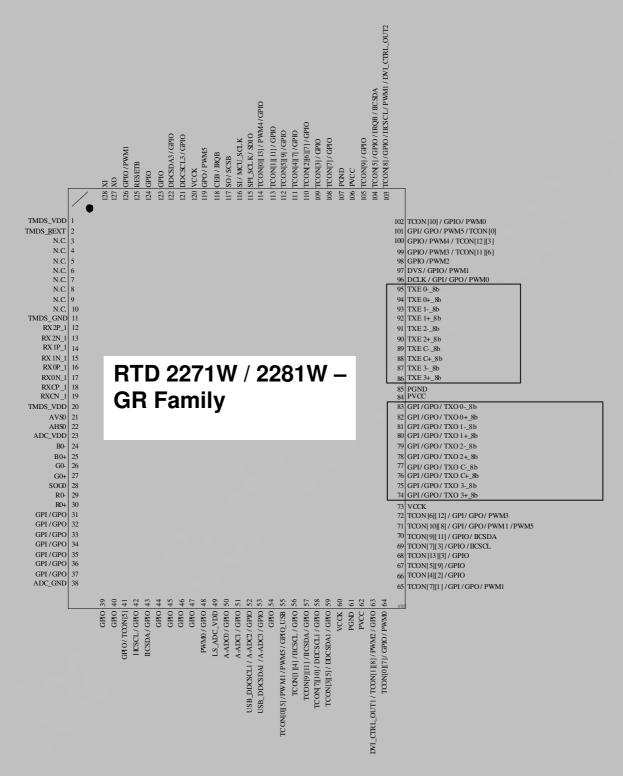


Figure1



# 4. Pin Diagram 128 Pin QFP



(Pin 119: Power on latch Pin)
(when AC Power On, Power on latch pin must be "High")

# **Table of Pin Assignment**

 $(I/O\ Legend: \quad A = Analog,\ I = Input,\ O = Output,\ P = Power,\ G = Ground)$ 

Name	I/O	Pin#	Description	Note
TMDS_VDD	AP	1	TMDS power	(3.3 V)
TMDS_REXT	AI	2	Impedance Match Reference Resistor	Ref value:
			For Scan mode, it should be pulled high	6.2 K ohm
			Scan mode:	(Reference to
			SI[7:0] is assigned to {124~121,114~111}	VCC)
			SO[7:0] is assigned to {110~108,105~101}	
			SE is assigned to 100.	
N.C.	AI	3	Not connected	
N.C.	AI	4	Not connected	
N.C.	AI	5	Not connected	
N.C.	AI	6	Not connected	
N.C.	AI	7	Not connected	
N.C.	AI	8	Not connected	
N.C.	AI	9	Not connected	
N.C.	AI	10	Not connected	
TMDS_GND	AG	11	TMDS ground	
RX2P_1	AI	12	TMDS Differential signal Input	
RX2N_1	AI	13	TMDS Differential signal Input	
RX1P_1	AI	14	TMDS Differential signal Input	
RX1N_1	AI	15	TMDS Differential signal Input	
RX0P_1	AI	16	TMDS Differential signal Input	
RX0N_1	AI	17	TMDS Differential signal Input	
RXCP_1	AI	18	TMDS Differential signal Input	
RXCN_1	AI	19	TMDS Differential signal Input	(0.0.17)
TMDS_VDD	AP	20	TMDS power	(3.3 V)
AVS0	I	21	ADC vertical sync input	5V tolerance
				even when power-off
AHS0	I	22	ADC horizontal sync input	5V tolerance
Aliso	1	22	AVS0 and AHS0 could be used to select one	even when
			of three scan chain.	power-off
			AHS0/AVS0:	power on
			2'b00: {i_chain[2:0], mcu_chain[1:0],	
			vbi_chain[2:0]}	
0.0			2'b01: d_chain	
			2'b10: vdec_chain	
			Other are reserved	
ADC_VDD	AP	23	ADC Power	(1.2V)
В0-	AI	24	Negative BLUE analog input (Pb-)	
B0+	AI	25	Positive BLUE analog input (Pb+)	
G0-	AI	26	Negative GREEN analog input (Y-)	
G0+	AI	27	Positive GREEN analog input (Y+)	
SOG0	AI	28	Sync-On-Green	
R0-	AI	29	Negative RED analog input (Pr-)	
R0+	AI	30	Positive RED analog input (Pr+)	
GPI/GPO	AI	31	MCU GPI/GPO	3.3 V
GDLIGDS			NOW GRUGDO	tolerance
GPI/GPO	AI	32	MCU GPI/GPO	3.3 V
GDL/GDO		22	May anyano	tolerance
GPI/GPO	AI	33	MCU GPI/GPO	3.3 V
GDLIGDS			NOW GRAGO	tolerance
GPI/GPO	AI	34	MCU GPI/GPO	3.3 V
				tolerance

GPI/GPO	AI	35	MCU GPI	3.3 V tolerance
GPI/GPO	AI	36	MCU GPI/GPO	3.3 V
				tolerance
GPI/GPO	AI	37	MCU GPI/GPO	3.3 V
ADC CND	A.C.	20	ADC around	tolerance
ADC_GND	AG	38	ADC ground MCU GPIO	5V tolerance
GPIO	I	39	MCU GPIO	
				even when power-off
GPIO	I	40	MCU GPIO	5V tolerance
GHO	1	40	INICO OI IO	even when
				power-off
GPIO/	AI	41	MCU GPIO/	5V tolerance
Grio	711	71	WICO GI IO/	even when
				power-off
GPIO/IICSCL	AI	42	MCU GPIO/IIC BUS	3.3 V
0110,110002			Med distance 2 de	tolerance
GPIO/IICSDA	AI	43	MCU GPIO/IIC BUS	3.3 V
				tolerance
GPIO	AI	44	MCU GPIO	3.3 V
				tolerance
GPIO	AI	45	MCU GPIO	3.3 V
				tolerance
GPIO	AI	46	MCU GPIO	3.3 V
				tolerance
GPIO	AI	47	MCU GPIO	3.3 V
				tolerance
GPIO/PWM0	AI	48	MCU GPIO/PWM	3.3 V
				tolerance
LS_ADC_VDD	AP	49	Low Speed ADC POWER	(3.3V)
A-ADC0/GPIO	IO	50	8-bit MCU ADC Input /MCU GPIO	3.3 V
				tolerance
				( GPIO
				open-drain)
A-ADC1/GPIO	IO	51	8-bit MCU ADC Input/MCU GPIO	3.3 V
				tolerance
				( GPIO
4 4 D G2 (GD10	10	7.0		open-drain)
A-ADC2/GPIO	IO	52	8-bit MCU ADC Input /MCU GPIO	3.3 V
/USB_DDCSCL1			/USB_DDCSCL1	tolerance
			When (Page 10, 0xA2[0] = 1) && (pin55 = 1) disable DDC function of rin 58, 50 and	( GPIO
			1), disable DDC function of pin 58, 59 and swap to pin 52, 53	open-drain)
A-ADC3/GPIO	IO	53	8-bit MCU ADC Input/MCU GPIO	3.3 V
/USB_DDCSDA1	10	33	/USB DDCSDA1	tolerance
/ COD_DDCODAT			When (Page 10, 0xA2[0] = 1) && (pin55 =	( GPIO
			1), disable DDC function of pin 58, 59 and	open-drain)
			swap to pin 52, 53	Transmin)
GPIO	IO	54	MCU GPIO	5V tolerance
				even when
				power-off
				( GPIO
				open-drain)
GPIO_USB/PWM1/PWM	IO	55	MCU GPIO_USB Ctrl/PWM/TCON	5V tolerance
5/TCON[5] [0]				even when
				power-off
				( GPIO
				open-drain)

GPIO/IICSCL/ TCON[4][1]					
TCON[4] [1]	GPIO/IICSCL/	IO	56	/MCU GPIOD/IIC BUS/TCON	5V tolerance
GPIO/IICSDA/TCON[11]   IO   57   MCU GPIO/IIC BUS/TCON   SV tolerance even when power-off (GPIO open-drain)					even when
Open-drain   Ope					power-off
GPIO/IICSDA/TCON[11]   IO   57   MCU GPIO/IIC BUS/TCON   SV tolerance even when power-off (GPIO open-drain)					( GPIO
GPIO/IICSDA/TCON[11]   IO   57   MCU GPIO/IIC BUS/TCON   SV tolerance even when power-off (GPIO open-drain)					open-drain)
PDCSCL1/GPIO/   TCON[10]   TON   TCON[10]   TCON[1	GPIO/IICSDA/TCON[11]	IO	57	MCU GPIO/IIC BUS/TCON	
DDCSCL1/GPIO/	[9]				even when
DDCSCL1/GPIO/   TCON[10] [7]					power-off
DDCSCLI/GPIO/ TCON[10][7]					( GPIO
TCON[10] [7]					open-drain)
TCON[10] [7]	DDCSCL1/GPIO/	IO	58	DDC1(Open drain I/O)/MCU GPIO/TCON	5V tolerance
DDCSDAI/GPIO/ TCON[5] [3]					even when
DDCSDA1/GPIO/					power-off
DDCSDAI/GPIO/ TCON[5][3]					( GPIO
DDCSDAI/GPIO/ TCON[5][3]					open-drain)
Dower-off (GPIO OPPICATION   COPIO   COPIO OPPICATION	DDCSDA1/GPIO/	IO	59	DDC1(Open drain I/O)/MCU GPIO/TCON	
VCCK	TCON[5] [3]				even when
VCCK					power-off
VCCK				A. A	_
VCCK					`
PGND	VCCK	Р	60	Digital Power	
PVCC	PGND	G	61		
TCON[8]	PVCC	P	62		(3.3V)
	GPIO/PWM2/	IO	63	MCU GPIO/PWM/TCON	5V tolerance
CGPIO   Open-drain   SV tolerance   CGPIO/PWM0   SV tolerance   SV tolerance   Even when   power-off   CGPIO   Open-drain   Open-drai	TCON[8]				even when
TCON[7] [0]/ GPIO/PWM0	[1]/DVI_CTRL_OUT1				power-off
TCON[7] [0]/   GPIO/PWM0					( GPIO
GPIO/PWM0   CPIO/PWM0   CPIO/PWM0   CPIO/PWM0   CPIO/PWM1   CPIO/PWM1   CPIO/PWM1   SV tolerance					
CPI/GPO/   TO   GPI   GPIO   Open-drain   GPI/GPO/   TO   GPI   GPIO   Open-drain   SV tolerance   TCON[7][1]/PWM1   TCON[4][2]/GPIO   IO   66   TCON/MCU GPIO   SV tolerance   TCON[5][9]/GPIO   IO   67   TCON/MCU GPIO   SV tolerance   TCON[13][3]/GPIO   IO   68   TCON/MCU GPIO   SV tolerance   TCON[7][3]/GPIO/IICSC   IO   69   TCON/MCU GPIO/IIC BUS   SV tolerance   TCON[9][11]/GPIO/IICS   IO   70   TCON /MCU GPIO/IIC bus   SV tolerance   TCON[10][8]/GPI/GPO/P   IO   71   TCON /MCU GPIO/IIC bus   SV tolerance   SV tolerance   TCON[10][8]/GPI/GPO/P   IO   71   TCON /MCU GPI/GPO/PWM   SV tolerance   TCON[10][8]/GPI/GPO   IO   72   MCU GPI/GPO/PWM/TCON   SV tolerance   TXO3+_8b/GPI/GPO   IO   74   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXOC+_8b/GPI/GPO   IO   75   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXOC+_8b/GPI/GPO   IO   76   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXOC+_8b/GPI/GPO   IO   77   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXOC+_8b/GPI/GPO   IO   78   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXOC+_8b/GPI/GPO   IO   78   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXOC+_8b/GPI/GPO   IO   78   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXOC+_8b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   79   LVDS 8bit/MCU GPIO   3.3 V tolerance   TXO28b/GPI/GPO   IO   TYO28b/GPI/GPO   IO   TYO38b/GPI/GPO   IO   TYO3		IO	64	TCON/MCU GPIO/PWM	
GPI/GPO/	GPIO/PWM0				
Open-drain   Ope					
GPI/GPO/ TCON[7][1]/PWM1				2007/00	
TCON[7][1]/PWM1					
TCON[4][2]/GPIO         IO         66         TCON/MCU GPIO         5V tolerance           TCON[5][9]/GPIO         IO         67         TCON/MCU GPIO         5V tolerance           TCON[13][3]/GPIO         IO         68         TCON/MCU GPIO         5V tolerance           TCON[7][3]/GPIO/IICSC LO         IO         69         TCON/MCU GPIO/IIC BUS         5V tolerance           TCON[9][11]/GPIO/IICS DA         IO         70         TCON /MCU GPIO/IIC bus         5V tolerance           TCON[10][8]/GPI/GPO/PWM5         IO         71         TCON /MCU GPI/GPO/PWM         5V tolerance           TCON[10][8]/GPI/GPO/PWM3/TCON[         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           GPI/GPO/PWM3/TCON[         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           12][6]         VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79		IO	65	MCU GPIO/ TCON/PWM	5V tolerance
TCON[5][9]/GPIO         IO         67         TCON/MCU GPIO         5V tolerance           TCON[13][3]/GPIO         IO         68         TCON/MCU GPIO         5V tolerance           TCON[7][3]/GPIO/IICSC LO         IO         69         TCON/MCU GPIO/IIC BUS         5V tolerance           L         TCON[9][11]/GPIO/IICS DA         IO         70         TCON /MCU GPIO/IIC bus         5V tolerance           TCON[10][8]/GPI/GPO/P         IO         71         TCON /MCU GPIO/IIC bus         5V tolerance           GPI/GPO/PWM3/TCON[         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           12][6]         VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V tolerance		10		TOONA (CIT CDIO	CX 1 . 1
TCON[13][3]/GPIO         IO         68         TCON/MCU GPIO         5V tolerance           TCON[7][3]/GPIO/IICSC         IO         69         TCON/MCU GPIO/IIC BUS         5V tolerance           TCON[9][11]/GPIO/IICS         IO         70         TCON /MCU GPIO/IIC bus         5V tolerance           TCON[10][8]/GPI/GPO/P         IO         71         TCON /MCU GPI/GPO/PWM         5V tolerance           GPI/GPO/PWM3/TCON[         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           12][6]         VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V					
TCON[7][3]/GPIO/IICSC L         IO         69         TCON/MCU GPIO/IIC BUS         5V tolerance           TCON[9][11]/GPIO/IICS DA         IO         70         TCON /MCU GPIO/IIC bus         5V tolerance           TCON[10][8]/GPI/GPO/P         IO         71         TCON /MCU GPI/GPO/PWM         5V tolerance           WM1/PWM5         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           GPI/GPO/PWM3/TCON[12][6]         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V	E 3E 3				
L         TCON[9][11]/GPIO/IICS IO         70         TCON /MCU GPIO/IIC bus         5V tolerance           TCON[10][8]/GPI/GPO/P         IO         71         TCON /MCU GPI/GPO/PWM         5V tolerance           WM1/PWM5         SPI/GPO/PWM3/TCON[IO]         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           I2][6]         VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO38b /GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V					
DA         TCON[10][8]/GPI/GPO/P         IO         71         TCON /MCU GPI/GPO/PWM         5V tolerance           WM1/PWM5         F         72         MCU GPI/GPO/PWM/TCON         5V tolerance           GPI/GPO/PWM3/TCON[12][6]         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO38b/GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V	TCON[/][3]/GPIO/IICSC	10	69	TCON/MCU GPIO/IIC BUS	5 V tolerance
DA         TCON[10][8]/GPI/GPO/P         IO         71         TCON /MCU GPI/GPO/PWM         5V tolerance           WM1/PWM5         F         72         MCU GPI/GPO/PWM/TCON         5V tolerance           GPI/GPO/PWM3/TCON[12][6]         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO38b/GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V	TCONIOLI 11/CDIO/IICS	10	70	TCON /MCI CDIO/IIC hyg	5V tolomon oo
TCON[10][8]/GPI/GPO/P         IO         71         TCON /MCU GPI/GPO/PWM         5V tolerance           WM1/PWM5         GPI/GPO/PWM3/TCON[         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           12][6]         VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO38b /GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V		10	70	TCON/MCU GPIO/IIC bus	3 v tolerance
WM1/PWM5         GPI/GPO/PWM3/TCON[         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           12][6]         VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO38b /GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V		IO	71	TCON /MCU CDI/CDO/DW/M	5V tolorongo
GPI/GPO/PWM3/TCON[         IO         72         MCU GPI/GPO/PWM/TCON         5V tolerance           12][6]         VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO38b /GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V		10	/ 1	TCON/MCU GFI/GFO/FWM	3 v tolerance
12][6]   VCCK		IO	72	MCU CDI/CDO/DWM/TCON	5V tolerance
VCCK         P         73         Digital Power         (1.2V)           TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO38b /GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V		10	12	Wico or i/or o/r wiw/reon	3 v tolerance
TXO3+_8b/GPI/GPO         IO         74         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO38b /GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V		P	73	Digital Power	(1.2V)
TXO38b /GPI/GPO					
TXO38b /GPI/GPO         IO         75         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V	17100   _00/01 1/01 0	10	, ,	2. 30 columno di lo	
TXOC+_8b/GPI/GPO	TXO3- 8b/GPI/GPO	IO	75	LVDS 8bit/MCU GPIO	
TXOC+_8b/GPI/GPO         IO         76         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXOC8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V					
TXOC8b/GPI/GPO	TXOC+ 8b/GPI/GPO	IO	76	LVDS 8bit/MCU GPIO	
TXOC8b/GPI/GPO         IO         77         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V					
TXO2+_8b/GPI/GPO	TXOC8b/GPI/GPO	IO	77	LVDS 8bit/MCU GPIO	
TXO2+_8b/GPI/GPO         IO         78         LVDS 8bit/MCU GPIO         3.3 V tolerance           TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V					
TXO28b/GPI/GPO         IO         79         LVDS 8bit/MCU GPIO         3.3 V	TXO2+_8b/GPI/GPO	IO	78	LVDS 8bit/MCU GPIO	
TXO28b/GPI/GPO IO 79 LVDS 8bit/MCU GPIO 3.3 V					tolerance
tolerance	TXO28b/GPI/GPO	IO	79	LVDS 8bit/MCU GPIO	
					tolerance

TXO1+_8b/GPI/GPO	IO	80	LVDS 8bit/MCU GPIO	3.3 V
				tolerance
TXO18b/GPI/GPO	IO	81	LVDS 8bit/MCU GPIO	3.3 V
_				tolerance
TXO0+ 8b/GPI/GPO	IO	82	LVDS 8bit/MCU GPIO	3.3 V
	10	ŭ <b>-</b>	2,22,001,110,001,10	tolerance
TXO08b/GPI/GPO	IO	83	LVDS 8bit/MCU GPIO	3.3 V
17/0080/011/010	10	65	LVD3 6010WCO GI IO	tolerance
DVCC	D	0.4	D I	
PVCC	P	84	Pad power	3.3V
PGND	G	85	Pad ground	
TXE3+_8b	О	86	LVDS 8bit	3.3 V
				tolerance
TXE38b	О	87	LVDS 8bit	3.3 V
				tolerance
TXEC+_8b	О	88	LVDS 8bit	3.3 V
11120.500			2+25 0010	tolerance
TXEC8b	О	89	LVDS 8bit	3.3 V
1AEC60		09	LVD3 out	tolerance
TEXTE 2 : 01		00	TADO 01.	
TXE2+_8b	О	90	LVDS 8bit	3.3 V
				tolerance
TXE28b	О	91	LVDS 8bit	3.3 V
				tolerance
TXE1+_8b	О	92	LVDS 8bit	3.3 V
				tolerance
TXE18b	О	93	LVDS 8bit	3.3 V
		, ,		tolerance
TXE0+_8b	О	94	LVDS 8bit	3.3 V
1AE0+_60		24	LVDS out	tolerance
TVEO 01		0.5	TADC 01.4	
TXE08b	О	95	LVDS 8bit	3.3 V
		0.4	LIGHT CRITE CRITE IN A LINE CRITE CR	tolerance
GPI/GPO/PWM0/DCLK	IO	96	MCU GPIO/PWM/Display clock	5V tolerance
GPIO/PWM1/DVS	IO	97	MCU GPIO/PWM/Display V-sync	5V tolerance
GPIO/PWM2	IO	98	MCU GPIO/PWM	5V tolerance
GPIO/PWM3/TCON[11][	IO	99	MCU GPIO/PWM/TCON	5V tolerance
6]				
GPIO/PWM4/TCON[12][	IO	100	MCU GPIO/PWM/TCON	
3]	10	100	Wice of fort with reort	5V toloron oo
_	10	101	MOU ONO DWA FEGON	5V tolerance
GPI/GPO/PWM5/TCON[	IO	101	MCU GPIO/PWM/TCON	5V tolerance
0]				
TCON[10]/GPIO/PWM0	IO	102	TCON/MCU GPIO/ PWM	5V tolerance
TCON[8]/GPIO/IICSCL/	IO	103	TCON[8]/MCU GPIO/IICSCL/PWM1	5V tolerance
PWM1/DVI_CTRL_OUT				
2				
TCON[5]/GPIO	IO	104	TCON[5]/MCU GPIO/IRQ Bar/IICSDA	5V tolerance
/IRQB/IICSDA				C , tolorulec
TCON[9]/GPIO	IO	105	TCON/MCU GPIO	5V tolerance
PVCC	P	105	Pad 3.3V power	3.3V
				3.3 V
PGND	G	107	Pad 3.3V GND	
TCON[7]/GPIO	IO	108	TCON/MCU GPIO	5V tolerance
TCON[3]/	IO	109	TCON/MCU GPIO	5V tolerance
GPIO				
TCON[7][6][2]/GPIO	IO	110	TCON/MCU GPIO	5V tolerance
				even when
				power-off
				( GPIO
				,
TOONIZITALIONO	10	111	TOONAGUCDIO	open-drain)
TCON[7][4]/GPIO	IO	111	TCON/MCU GPIO	5V tolerance
				even when

				power-off
				( GPIO
				open-drain)
TCON[9][5]/GPIO	IO	112	TCON/MCU GPIO	
TCON[9][3]/GPIO	10	112	TCON/MCU GPIO	5V tolerance
				even when
				power-off
				( GPIO
				open-drain)
TCON[11][1]/GPIO	IO	113	TCON/MCU GPIO	5V tolerance
				even when
				power-off
				( GPIO
				open-drain)
TCON[13][0]/GPIO/PW	IO	114	TCON/MCU GPIO/PWM	5V tolerance
M4				even when
112.				power-off
				( GPIO
				`
CDI CCI IVICDIO	10	115	CDI Clark and all all destroyed MCII and all	open-drain)
SPI_SCLK/SDIO	IO	115	SPI flash serial clock /external MCU serial	3.3 V
			control I/F data in	tolerance
				(push pull)
SI/MCU_SCLK	IO	116	SPI flash serial data input /external MCU	3.3 V
			serial control I/F clock	tolerance
				(push pull)
SO/SCSB	IO	117	SPI flash serial data output /external MCU	3.3 V
			serial control I/F chip select	tolerance
CEB/IRQB	IO	118	SPI flash chip enable bar/IRQ Bar	3.3 V
			Note:It should be pulled down to 0 v or	tolerance
			pulled up to 3.3 v in order to designate the	(push pull)
			MCU type(Internal MCU(3.3 volts) or	(pusii puii)
			External MCU(0 volts)).	
GPO/PWM5	Ю	119	MCU GPO/PWM	5V tolerance
01 0/1 //112	10	117	(Power on latch Pin.)	even when
			(when AC Power On , Power on latch Pin	power-off
			must be "High")	power-on
VCCK	Р	120	Digital 1.2V Power	1.2V
DDCSCL3/GPIO	IO	121	DDC3(Open drain I/O)/MCU GPIO	5V tolerance
DDCSCL3/GI IO	10	121		even when
				power-off
				( GPIO
DD GGD + 2 / GDV 2	7.0	100	PDG2/O	open-drain)
DDCSDA3/GPIO	IO	122	DDC3(Open drain I/O)/MCU GPIO	5V tolerance
				even when
				power-off
				( GPIO
				open-drain)
GPIO	IO	123	MCU GPIO	5V tolerance
				even when
				power-off
				( GPIO
				open-drain)
GPIO	IO	124	MCU GPIO	5V tolerance
3110	10	127	11100 01 10	even when
				power-off
				( GPIO
DEGLER	-	107	CILL D. L.D.	open-drain)
RESETB	I	125	Chip Reset Bar	Low active;
				5V tolerance

				even when power-off ( GPIO open-drain )
GPIO/PWM1	I/O	126	MCU GPIO/PWM	5V tolerance ( GPIO
				open-drain)
XO	AO	127	Crystal Output	
XI	AI	128	Crystal Input	



# 5. Electric Specification

## **DC** Characteristics

Table 1 Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
	STWIDOL	IVIIIN	111	WIAA	UNIIS
Voltage on Input (5V tolerant)	$V_{\rm IN}$	-1		5	V
Supply Voltage	PVCC	3.0	3.3	3.6	V
	VCCK	1.08	1.2	1.32	V
Electrostatic Discharge	$V_{\mathrm{ESD}}$			±2.5	kV
Latch-Up	$I_{LA}$			±100	mA
Ambient Operating Temperature	$T_{A}$	0		70	°C
Storage temperature (plastic)	$T_{STG}$	-55		125	°C
Thermal Resistance (Junction to Air)	$\theta_{ m JA}$			38	°C/W
Junction Acceptable Temperature	$T_{j}$			125	°C

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
Reset pulse period	Trst-en <sup>1</sup>	1120			ns
Power on reset period	Tpor-rst <sup>2</sup>	293			ms
				$\forall$	

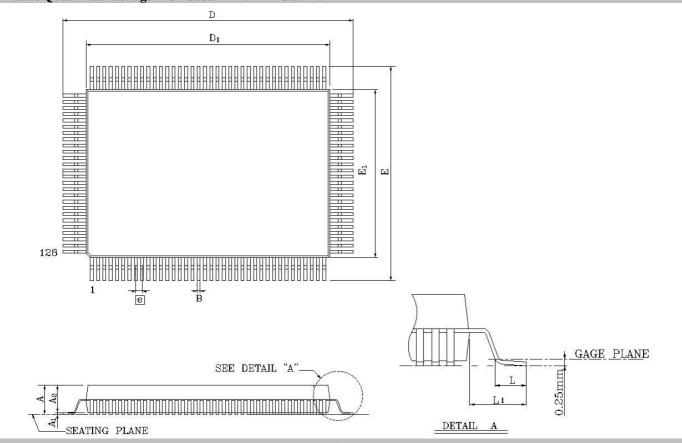
<sup>1. 16 \*</sup> x'tal\_cycle(1/14.3Mhz)

<sup>2. 65536\*64\*</sup>Xtal\_cycle(1/14.3Mhz)



# 6. Mechanical Specification

128 Pin Package (QFP)
Plastic Quad Flat Package 128 Leads 14x20mm<sup>2</sup> Outline



Symbol	Ι	Dimension in mi	m	Dimension in inch				
Symbol	Min	Nom	Max	Min	Nom	Max		
A		1	3.40	_	_	0.134		
$A_1$	0.25			0.010	_	_		
$A_2$	2.50	2.70	2.90	0.100	0.106	0.114		
b	0.17	0.22	0.27	0.007	0.009	0.011		
D		23.2BSC		0.913BSC				
$D_1$		20.00BSC		0.787BSC				
Е		17.20BSC		0.677BSC				
$E_1$		14.00BSC 0.551BSC						
e		0.50BSC		0.020BSC				
L	0.73	0.88	1.03	0.029	0.035	0.041		
L1	1.60REF 0.063REF							

Notes: CONTROLLING DIMENSION: MILLIMETER(mm).