



SPECIFICATION

ORTUSTECH

COM32H3N89ULC

3.2" TFT - WVGA - SPI

Version: 4.0

Date: 26.06.2016

Note: This specification is subject to change without prior notice



Specifications for

Blanview TFT-LCD Monitor

(3.2" WVGA 480 x RGB x 800 Portrait)

Version 4.0

MODEL COM32H3N89ULC

(Please be sure to check the specifications latest version.)

Customer's Approval
Signature:
Name:
Section:
Title:
Date:

ORTUSTECH

ORTUS TECHNOLOGY CO., LTD.

Approved by

Checked by

Prepared by

SPECIFICATIONS № 15TLM003 Issue: Aug. 26, 2016

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1. Application

This Specification is applicable to 80.5mm (3.2 inch) Blanview TFT-LCD monitor for non-military use.

- © ORTUS TECHNOLOGY makes no warranty or assume no liability that use of this Product and/or any information including drawings in this Specification by Purchaser is not infringing any patent or other intellectual property rights owned by third parties, and ORTUS TECHNOLOGY shall not grant to Purchaser any right to use any patent or other intellectual property rights owned by third parties. Since this Specification contains ORTUS TECHNOLOGY's confidential information and copy right, Purchaser shall use them with high degree of care to prevent any unauthorized use, disclosure, duplication, publication or dissemination of ORTUS TECHNOLOGY'S confidential information and copy right.
- © If Purchaser intends to use this Products for an application which requires higher level of reliability and/or safety in functionality and/or accuracy such as transport equipment (aircraft, train, automobile, etc.), disaster-prevention/security equipment or various safety equipment, Purchaser shall consult ORTUS TECHNOLOGY on such use in advance.
- This Product shall not be used for application which requires extremely higher level of reliability and/or safety such as aerospace equipment, telecommunication equipment for trunk lines, control equipment for nuclear facilities or life-support medical equipment.
- It must be noted as an mechanical design manner, especial attention in housing design to prevent arcuation/flexureor caused by stress to the LCD module shall be considered.
- ORTUS TECHNOLOGY assumes no liability for any damage resulting from misuse, abuse, and/or miss-operation of the Product deviating from the operating conditions and precautions described in the Specification.
- It shall be mutually conferred if nonconforming defect which result from unspecified cause in this specification arises.
- © If any issue arises as to information provided in this Specification or any other information, ORTUS TECHNOLOGY and Purchaser shall discuss them in good faith and seek solution.
- ORTUS TECHNOLOGY assumes no liability for defects such as electrostatic discharge failure occurred during peeling off the protective film or Purchaser's assembly process.

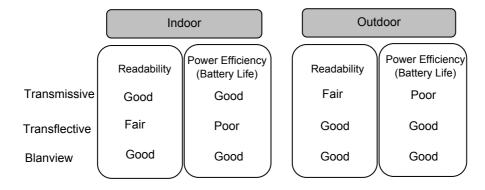
Object substance	Maximum content [ppm]
Cadmium and its compound	100
Hexavalent Chromium Compound	1000
Lead & Lead compound	1000
Mercury & Mercury compound	1000
Polybrominated biphenyl series (PBB series)	1000
Polybrominated biphenyl ether series (PBDE series)	1000

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2. Outline Specifications

2.1 Features of the Product

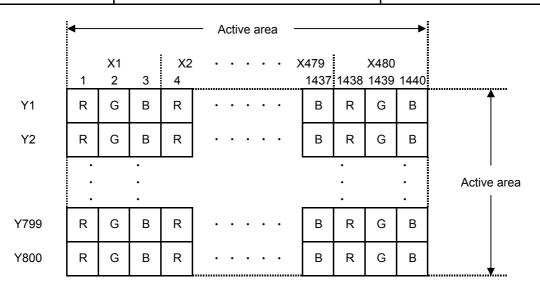
- 3.2 inch diagonal display, 1,440 [H] x 800 [V] dots.
- 8-bit 16,777,216 color display capability.
- System Interface (Register setting)
- Serial Peripheral Interface (SPI)
- RGB interface with 24-bit data bus (VSYNC, HSYNC, ENABLE, DOTCLK, D23-0)
- Internal booster for various voltage levels to drive LC





2.2 Display Method

Items	Specifications	Remarks
Display type	16,777,216 colors.	
	Blanview, Normally Black	
Driving method	a-Si TFT Active matrix	
	Line-scanning, Non-interlace	
Dot arrangement	RGB stripe arrangement	Refer to "Dot arrangement"
Signal input method	Register : Serial Peripheral Interface (SPI)	
	Data : 24 bit RGB interface	
Backlight type	Long life & High bright white LED.	
NTSC ratio	35%	



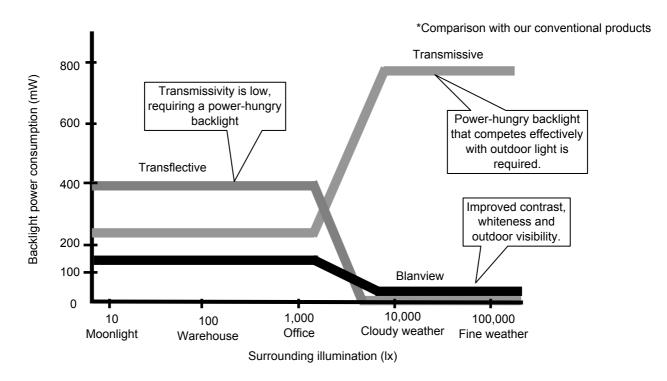
Dot arrangement (When LSI is placed at the bottom)

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<Features of Blanview>

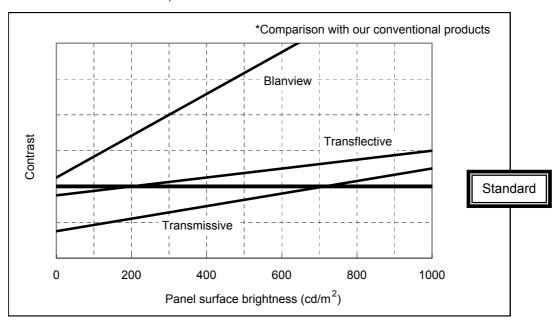
- Backlight power consumption required to assure visibility. (equivalent to 3.5"QVGA)



- Contrast characteristics under 100,000lx. (same condition as direct sunlight.)

With better contrast (higher contrast ratio), Blanview TFT-LCD has the best outdoor readability in three different types of TFT-LCD.

Below chart shows contrast value against panel surface brightness. (Horizontal: Panel surface brightness/ Vertical: Contrast value) LCD panel has enough outdoor readability above our Standard line. (ORTUS TECHNOLOGY criteria)



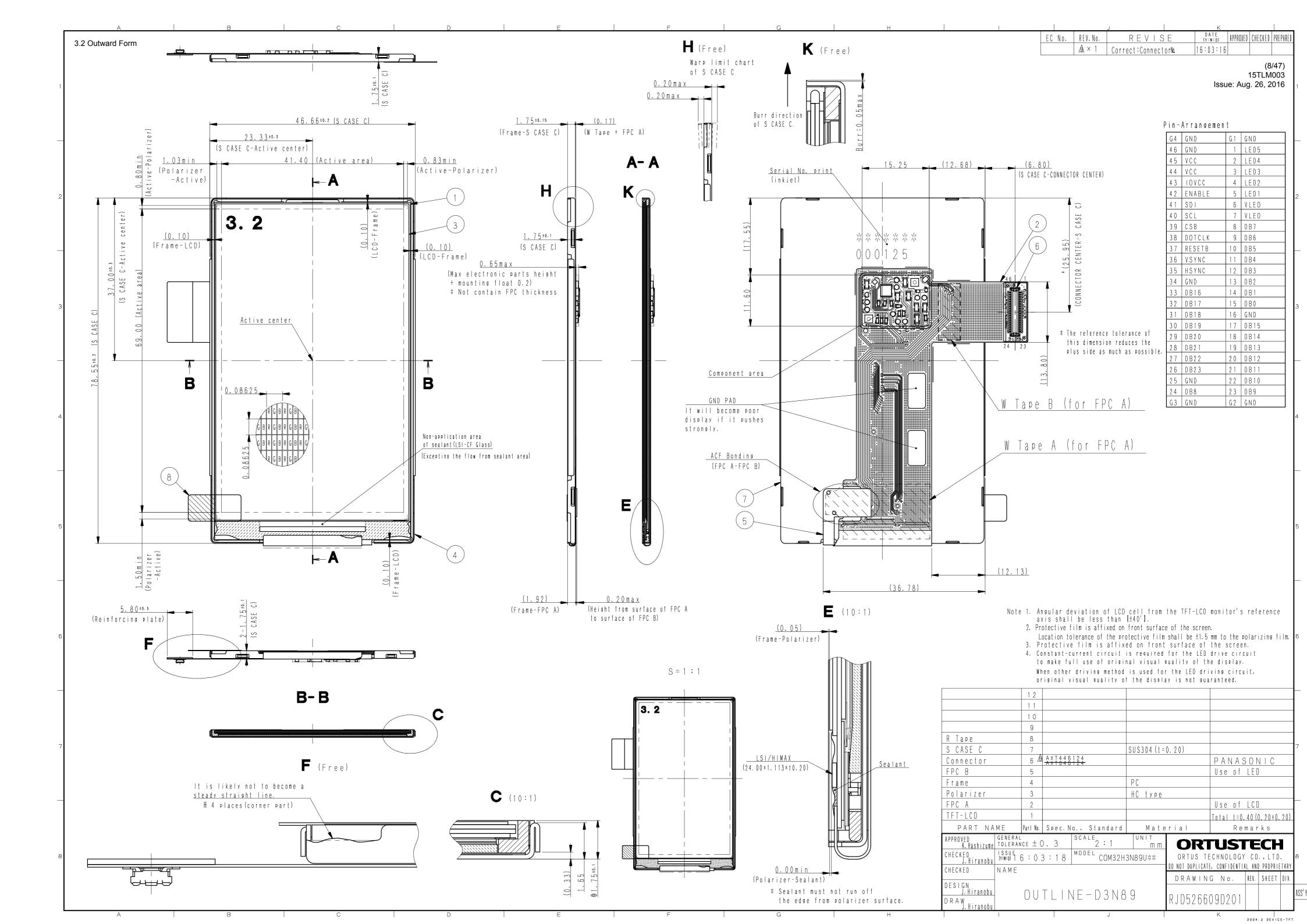
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3. Dimensions and Shape



3.1 Dimensions

Items	Specifications	Unit	Remarks
Outline dimensions	46.66[H] × 78.55[V] ×1.75[D]	mm	Exclude FPC cable and
			parts on FPC
Active area	41.40[H] × 69.00[V]	mm	80.5mm diagonal
Number of dots	1440[H] × 800[V]	dot	
Dot pitch	28.75[H] × 86.25[V]	μm	
Surface hardness of the polarizer	3	Н	Load:2.0N
Weight	14	g	Include FPC cable



3.3 Serial № print (S-print)

1) Display Items

S-print indicates the least significant digit of manufacture year (1digit), manufacture month with below alphabet (1letter), model code (4characters), serial number (6digits).

* Contents of Display

	Contents of display				
а	The least significant dig	git of manufacture	year		
b	Manufacture month	Jan-A	May-E	Sep-I	
		Feb-B	Jun-F	Oct-J	
		Mar-C	Jul-G	Nov-K	
		Apr-D	Aug-H	Dec-L	
С	Model code	32SC (Mad	e in Japan)		
		32TC (Mad	e in Malaysia)		
d	Serial number				

- * Example of indication of Serial № print (S-print)
- ·Made in Japan

5H32SC000125

means "manufactured in August 2015, 3.2" S type, C specifications, serial number 000125"

· Made in Malaysia

5H32TC000125

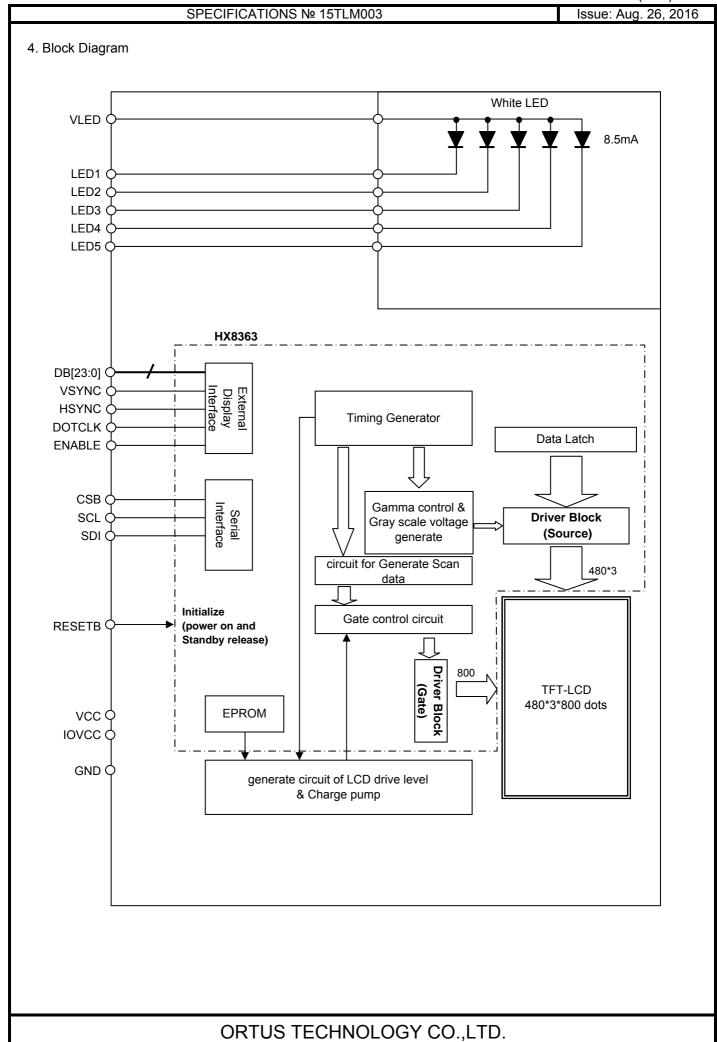
means "manufactured in August 2015, 3.2" T type, C specifications, serial number 000125"

2) Location of Serial № print (S-print)

Refer to 3.2 "Outward Form".

3)Others

Please note that it is likely to disappear with an organic solvent about the Serial print.



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5.FPC Terminals

LEDS	Nº	Symbol	Details	Remark	Ю
Second Part					
Second Part	2	LED4			4
A LED2	3				Р
Section Backlight LED Cathode1 Per	4		-		
Fig. For the color of the c	5		-		
The color of the	6				Р
B	7				Р
10	8	DB7	11.7	MSB	Τ
11	9	DB6			
12	10	DB5			
13	11	DB4	5.5.		
14	12	DB3	B_Data		
Total Content	13	DB2			
The color of the	14	DB1			
The color of the	15			LSB	
17			GROUND		Р
18				MSB	П
19	_				
DB11	-				
1	-	DB12	0.5.4		
DB9	21	DB11	G_Data		
DB9	22	DB10			
DB23	23				П
MSB	24	DB8		LSB	П
DB22	25	GND	GROUND		Р
R_Data R	26	DB23		MSB	1
DB20	27	DB22			
30	28	DB21			
31	29	DB20	D. Doto		П
32	30	DB19	R_Data		П
32	31				Ι
33 DB16 CROUND P	32				П
35 HSYNC HSYNC I 36 VSYNC VSYNC I 37 RESETB LCD Reset L:Initialize Power_ON Reset is Required when Turning on the Power I 38 DOTCLK DOTCLK I 39 CSB 3-Wire SPI Chip Select I 40 SCL 3-Wire SPI clock I 41 SDI 3-Wire SPI DATA input I 42 ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P	33	DB16			П
35 HSYNC HSYNC I 36 VSYNC VSYNC I 37 RESETB LCD Reset L:Initialize Power_ON Reset is Required when Turning on the Power I 38 DOTCLK DOTCLK I 39 CSB 3-Wire SPI Chip Select I 40 SCL 3-Wire SPI clock I 41 SDI 3-Wire SPI DATA input I 42 ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P		GND	GROUND		Р
36 VSYNC VSYNC I 37 RESETB LCD Reset L:Initialize Power_ON Reset is Required when Turning on the Power I 38 DOTCLK DOTCLK I 39 CSB 3-Wire SPI Chip Select I 40 SCL 3-Wire SPI clock I 41 SDI 3-Wire SPI DATA input I 42 ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P		HSYNC			
37 RESETB LCD Reset L:Initialize Power_ON Reset is Required when Turning on the Power I 38 DOTCLK DOTCLK I 39 CSB 3-Wire SPI Chip Select I 40 SCL 3-Wire SPI clock I 41 SDI 3-Wire SPI DATA input I 42 ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P	36				
When Turning on the Power 38 DOTCLK DOTCLK I 39 CSB 3-Wire SPI Chip Select I 40 SCL 3-Wire SPI clock I 41 SDI 3-Wire SPI DATA input I 42 ENABLE ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P P P P P P P P P				L:Initialize Power_ON Reset is Required	I
38 DOTCLK I 39 CSB 3-Wire SPI Chip Select I 40 SCL 3-Wire SPI clock I 41 SDI 3-Wire SPI DATA input I 42 ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P				_	
39 CSB 3-Wire SPI Chip Select I 40 SCL 3-Wire SPI clock I 41 SDI 3-Wire SPI DATA input I 42 ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P	38	DOTCLK	DOTCLK		I
40 SCL 3-Wire SPI clock I 41 SDI 3-Wire SPI DATA input I 42 ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P					ı
41 SDI 3-Wire SPI DATA input I 42 ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P			·		Ι
42 ENABLE ENABLE I 43 IOVCC Power P 44 VCC Power P 45 VCC Power P					I
43 IOVCC Power P 44 VCC Power P 45 VCC Power P					1
44 VCC Power P 45 VCC Power P					
45 VCC Power P					
IV OILD OILOUID	46	GND	GROUND		Р

- Recommended connector: Panasonic corporation : AXT346124
- Please make sure to check a consistency between pin assignment in "3.2 Outward Form" and your connector pin assignment when designing your circuit.

 Inconsistency in input signal assignment may cause a malfunction.
- Since FPC cable has gold plated terminals, gilt finish contact shoe connector is recommended.

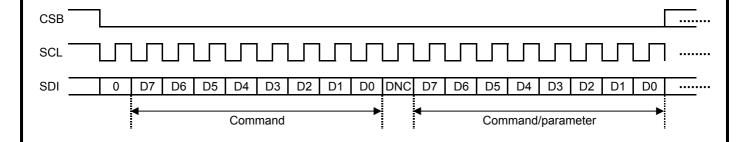
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6. Serial Data Transfer Interface

Instructions are transferred using 3 wire serial data transfer interface. The 3 wire serial bus uses chip select line (CSB), serial input data (SDI) and serial transfer clock line (SCL).

The 3 wire serial data packet is consists of control bit DNC and transmission byte. If the control bit is low, the transmission byte is command byte. If the control bit is high, the transmission byte is stored to command register. DNC should be transferred first, followed by MSB of transmission byte.

The serial interface is initialized when CSB is high, and the falling edge of CSB enables the serial interface.



7. Instruction list

(1)

										(1)
(Hex)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D0
00	NOP	0	0	0	0	0	0	0	0	0
	initial	-	-	-	-	-	-	-	-	-
	recommend	-	-	-	-	-	-	-	-	-
01	SWRESET	0	0	0	0	0	0	0	0	1
	initial	-	-	-	-	-	-	-	-	-
	recommend	-	-	-	-	-	-	-	-	-
06	RDRED	0	0	0	0	0	0	1	1	0
	initial	-	-	-	-	-	-	-	-	1 D0 0 0
	recommend	-	-	-	-	-	-	-	-	-
07	RDGREEN	0	0	0	0	0	0	1	1	1
	initial	-	-	-	-	-	-	-	-	-
00	recommend	-	-	-	-	-	-	-	-	-
80	RDBLUE	0	0	0	0	0	1	0	0	U
	initial	-	-	-	-	-	-	-	-	-
0.0	recommend	-	-	-	-	-	-	-	-	-
0A	RDDPM	0	0	0	0	0	1	0	1	U
	initial	-	-	-	-	·······	-	-	-	-
ΔD	recommend	-	-	-	-	-	-	-	- 1	-
0B	RDDMADCTL	0	0	0	0	0	1	0	1	1
	initial	-	-		-	-				
0C	recommend RDDCOLMOD	0	0	0	- 0	0 1 1 0	-			
00		U	U	U	U	U	ı	'	U	-
	initial	-	-	-	-	-	-	-	-	
0D	recommend RDDIM	0	0	0	0	0	1	1	0	1
טט	initial	U	U	U	U	U	ı	1	U	I
	recommend					ļ				
0E	RDDSM	0	0	0	0	0	1	1	1	0
OL	initial	-	-	-	-	-	-	<u>.</u>	-	-
	recommend	-		-	-	-	-			
0F	RDDSDR	0	0	0	0	0	1	1	1	1
	initial	-	-	-	-	-	-	-	-	-
	recommend	-	-	-	-	-	-	-	-	-
10	SLPIN	0	0	0	0	1	0	0	0	0
	initial	-	-	-	-	-	-	-	-	-
	recommend	-	-	-	-	-	-	-	-	-
11	SLPOUT	0	0	0	0	1	0	0	0	1
	initial	-	-	-	-	-	-	-	-	-
	recommend	-	-				-	-		-
20	INVOFF	0	0	0	1	0	0	0	0	0
	initial	-	-	-	-	-	-	-	-	-
	recommend	-	-	-	-	-	-	-	-	-
21	INVON	0	0	0	1	0	0	0	0	1
	initial	-	-	-	-	-	-	-	-	-
	recommend	-	-	-	-	-	-	-	-	-
26	GAMSET	0	0	0	1	0	0	1	1	0
		1					[7:0]			
	initial	-	0	0	0	0	0	0	0	1
	recommend	-	-	-	-	-	-	-	-	-
28	DISPOFF	0	0	0	1	0	1	0	0	0
	initial	-	-		-	-	-	-	-	
	recommend	-	-	-	-	-	-	-	-	-
29	DISPON	0	0	0	1	0	1	0	0	1
	initial	-	-	-	-	-	-	-	-	-
	recommend	-	-	-	-	-	-	-	-	-

2	١
4)

										(2)
(Hex)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D0
36	MADCTL	0	0	0	1	1	0	1	1	0
		1	-	-	-	-	BGR	-	SS	GS
	initial	-	0	0	0	0	0	0	0	0
	recommend	-	0	0	0	0	0	0	0	0
3A	COLMOD	0	0	0	1	1	1	0	1	0
		1	-	C	SEL_RGB[2	:0]	-	-	-	-
	initial	-	0	1	1	1	0	0	0	0
	recommend	-	0	1	1	1	0	0	0	0
B1	SETPOWER	0	1	0	1	1	0	0	0	1
		1	-	VSN_EN	VSP_EN	VGL_EN	VGH_EN	_	VDDN_HZ	SLP
	initial	-	1	0	0	0	0	0	0	1
	recommend	-	0	1	1	1	1	0	0	0
		1	-	FS12	FS11	FS10	-	AP2	AP1	AP0
	initial	-	0	0	1	1	0	0	0	0
	recommend	-	0	0	1	0	0	1	0	0 GS 0 0 0 0 0 0 1 1 1 1 0 0 0 0 0 0 0 0 0 0
		1	-	-	-	-	BT3	BT2	BT1	
	initial	-	0	0	0	0	0	0	0	
	recommend	-	0	0	0	0	0	1	0	
	1000111110110	1	DT1	DT0	DC1	DC0	DC DIV3	DC DIV2	DC DVI1	
	initial	-	0	0	1	1	0	0	0	_
	recommend	_	0	0	0	0	0	0	1	0 0 0 1 SLP 1 0 0 0 0 BTO 0 0 0 DTPO 0 0 DTNO 0 D
	recommend	1	-	DTPS2	DTPS1	DTPS0	0	DTP2	DTP1	
	initial	-	0	0	0	0	0			
	recommend		0	0	0	0	0		0 1 0	
	recommend	1	-	DTNS2	DTNS1	DTNS0				
	initial		0	0	0	1				
		-								
	recommend	- 1	0	0	0	0 DTD4		0 1 1 0		
	initial	1	-	-	-	BTP4				
	initial	-	0	0	0	0	1	1	1	
	recommend	-	0	0	0	1 DTN4	0	0 DTNO	0	
		1	-	-	-	BTN4	BTN3	BTN2	BTN1	
	initial .	-	0	0	0	0	1	1	1	
	recommend	-	0	0	0	1	0	0	0	
		1	VRHP7	VRHP6	VRHP5	VRHP4	VRHP3	VRHP2	VRHP1	0 APO 0 O O O O O O O O O O O O O O O O O O
	initial	-	0	0	1	0	0	1	0	
	recommend	-	0	0	1	1	0	1	0	
		1	VRHN7	VRHN6	VRHN5	VRHN4	VRHN3	VRHN2	VRHN1	
	initial .	-	0	0	1	0	1	1	0	
	recommend	-	0	0	1	1	1	1	0	
		1	-	-	VRMP5	VRMP4	VRMP3	VRMP2	VRMP1	
	initial	-	0	0	0	1	1	0	0	
	recommend	-	0	0	1	1	1	1	1	
		1	-	-	VRMN5	VRMN4	VRMN3	VRMN2	VRMN1	VRMN0
	initial	-	0	0	0	1	1	0	0	
	recommend		0	0	1	1	1	1	1	
В3	SETRGBIF	0	1	0	1	1	0	0	1	1
		1	-	-	-	-	DPL	HSPL	VSPL	EPL
	initial	-	0	0	0	0	0	0	0	
	recommend		0	0	0	0	0	0	0	

										(14/47)
		SPEC	IFICATIO	NS № 15	TLM003				Issu	e: Aug. 26,
										(0)
(Hov)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	(3) D0
(Hex) B4	SETRGBIF	0	1	0	1	1	0	1	0	0
D4	OLINOBII	1	<u> </u>	-	-	-	-	/[1:0]	-	-
	initial	-	0	0	0	0	1	0	0	0
	recommend	-	0	0	0	0	0	0	0	0
		1					I[7:0]			
	initial	-	0	0	0	1	0	0	1	0
	recommend	-	0	0	0		1	0	0	0
		1	•	,			F[7:0]	1 . 1		1 0
	initial	-	0	1	1		0	0	1	0
	recommend	1	0	1	0	1 FOS	0 [7:0]	1	1	0
	initial	-	0	0	0		0	0	1	0
	recommend	-	0	0	0	0		1		1
		1					N[7:0]			
	initial	-	0	0	0	0	0	1	1	0
	recommend	-	0	0	0	0	0	0	0	1
		1					N[7:0]			
	initial	-	0	0	0		0	0	1	1
	recommend	-	0	0	0		0	0	0	1
	initial	1	0	1	1	1	F[7:0] 0	0	0	0
	initial recommend	- -	0	1 1	0		1		0	1
	recommend	1	0		U		P1[7:0]	1	0	'
	initial	-	0	0	0	0	0	0	1	1
	recommend	-	0	0	0	0	0	0	0	1
		1				GVSS	P2[7:0]			
	initial	-	0	1	0	1	1	0	1	0
	recommend	-	0	1	0	0	0	0	1	0
B9	SETRGBIF	0	1	0	1	1	1	0	0	1
	initial	1	0	0	0	0	(1[7:0] 0	0	0	0
	initial recommend	-	1	1	1	1	1	1	0 1	1
	recommend	1	'		'		2[7:0]	1	'	'
	initial	-	0	0	0	0	0	0	0	0
	recommend	-	1	0	0	0	0	0	1	1
		1			•	EXTO	3[7:0]			
	initial	-	0	0	0	0	0	0	0	0
	recommend	-	0	1	1	0	0	0	1	1
C1	SETDGCLUT	0	1	1	0	0	0	0	0	1
		1	-	-	-	-	-	-	-	DGC_EN
	initial	-	0	0	0	0	0	0	0	0
	recommend	1	0	0	0	0 D1I	7:0]	0	0	1
	initial		0	0	0	0	0	0	0	0
	recommend	-	1	1	1	0	1	1	01	1
	. 100	1					7:0]			
	initial	-	0	0	0	0	1	0	0	0
	recommend	-	1	1	0	1	0	1	1	1

initial recommend

initial recommend

D3[7:0]

D4[7:0]

1	-	Ī:		•				7		(4)	
(Hex)	Register	DNC	D7	D6	D5	D4		D2	D1	D0	
C1	SETDGCLUT	1	0		1	D5[0	0	0	
	initial		0	0	1			0 0 1 0 1 0 0 0 1 0 0 0 1 0 1 0 1 0 0 0 1 0 0 0 1 0 1 0 1 0 1 0 0 0 1 0 0 0 1 0 0 1 1 0 0 0 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 0 1 1 0 0 0 0 1 0 0 0 0 0 0 0 0		0	
C1 C1	recommend	1	0	1	1	1 D6[Ü	1	0	
	initial	-	0	0	1	0		0	0	0	
	recommend		0	1	0	1				1	
	recommend	1	U	· ·	U	D7[U			
	initial		0	0	1			n	n	0	
	recommend	-	0		1					1	
	recommend	1		U		D8[U	•	
	initial	-	0	0	1	1	_	0	0	0	
	recommend	-	0	0	1					1	
		1				D9[•			
	initial	-	0	1	0	0	-	0	0	0	
	recommend	-	0	0	0	0	1			1	
		1				D10		-			
	initial	-	0	1	0		1	0	0	0	
	recommend	-	1	1	1	0	1	1	0	0	
		1				D11	[7:0]				
	initial	-	0	1	0		0	0	0	0	
	recommend	-	1	1	0	1	0	0	1	0	
		1				D12	[7:0]	•			
	initial	-	0	1	0	1	1	0	0	0	
	recommend	-	1	0	1	1	0	1	0	0	
		1	D13[7:0] 0 1 1 0 0 0 0								
	initial	-	0	1	1	0	0	0	0	0	
	recommend	-	1	0	0	1	1	0	1	0	
		1				D14	-				
	initial	-	0	1	1	0	1	0	0	0	
	recommend	-	0	1	1	1	1	1	1	1	
		1				D15		Ī			
	initial	-	0	1	1	1	0	0	0	0	
	recommend	-	0	1	1	0		1	0	1	
		1				D16					
	initial	-	0	1	1		1			0	
	recommend	-	0	1	0	0		0	0	0	
		1		_	_	D17	-			-	
	initial	-	1	0	0		0			0	
	recommend	-	0	0	1		1	1	0	1	
	1-141-1	1	4	1 ^	_	D18		0	0	0	
	initial	-	1	0	0		1			0	
	recommend	-	0	0	0	1		1	0	0	
	initial	1	1	0	0	D19	[7:0]	0	0	0	
	initial										
	recommend	1	1	1	1	1		ļ.	1	0	
	initial	1	1	0	0	D20	[7:0] 1	0	0	0	
		-	1	1	0				0	0	
	recommend	1			U	D21			J	U	
	initial	-	1	0	1	0		0	0	0	
	recommend	-	1	1	0	0			0	1	
	recommend	1		1	U	D22		U	U	1	
	initial	-	1	0	1	0	1	0	0	0	
	recommend		1	0	1		1	0	0	0	
	Teconiniena			U		U		OGCLUT con	-		

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SPE	(.11-1)(.42)		Mo	าราเ	11/11/11/1.5	

										(5
	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D
Hex) C1	SETDGCLUT	1					[7:0]			
	initial	-	1	0	1	1	0	0	0	(
	recommend	-	1	0	0		1	1	0	(
		1					[7:0]			1
	initial	-	1	0	1	+	1	0	0	(
	recommend	-	0	1	0		1	0	0	1
		1					[7:0]			
	initial	-	1	1	0	•	0	0	0	(
	recommend	-	0	0	1		0	1	1	(
		1					[7:0]			1
	initial	-	1	1	0	0	1	0	0	С
	recommend	-	0	0	0	1	0	1	0	1
		1		•			[7:0]			
	initial	-	1	1	0	1	0	0	0	С
	recommend	-	1	1	1	1	0	0	1	1
1		1					[7:0]			
	initial	-	1	1	0	1	1	0	0	(
	recommend	-	1	1	0		0	0	1	(
		1					[7:0]			
	initial	-	1	1	1	0	0	0	0	(
	recommend	-	1	0	1		1	0	1	1
		1					[7:0]			
	initial	-	1	1	1	0	1	0	0	С
	recommend	-	1	0	0	0	1	1	1	(
		1				D31	[7:0]			
	initial	-	1	1	1	1	0	0	0	C
	recommend	-	0	0	0	0	1	1	1	1
		1				D32	[7:0]			
	initial	-	1	1	1	1	1	0	0	(
	recommend	-	0	0	0	0	1	0	0	1
	-	1				D33	[7:0]			
	initial	-	1	1	1	1	1	1	1	1
	recommend	-	0	0	0	0	0	0	0	С
	•	1				D34	[7:0]			
	initial	-	0	0	0	0	0	0	0	C
	recommend	-	1	1	1	1	1	1	1	1
		1				D35	[7:0]			
	initial	-	0	0	0	0	0	0	0	(
	recommend	-	1	1	1	1	1	1	1	1
		1				D36	[7:0]			
	initial	-	0	0	0	0	0	0	0	C
1	recommend	-	1	1	1	0	1	0	1	C
		1				D37	[7:0]			
1	initial		0	0	0	0	0	0	0	(
	recommend	-	1	0	1	0	1	0	1	(
		1					[7:0]			
	initial	-	0	0	0	0	0	0	0	(
	recommend	-	<u>ٽ</u> 1	0	1	•	0	1	0	
	. ooo.iiiiiond	1		•			[7:0]			
	initial	-	0	0	0	0	0	0	0	(
	recommend		0	1	0	•	0	1	0	1

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ORTUS TECHNOLOGY CO.,LTD.

initial recommend

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										(6)
(Hex)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D0
C1	SETDGCLUT	1				D41				
	initial	-	0	0	0	0	0	0		0
	recommend	-	0	0	0	0	0	0		0
		1	•			D42		•		•
	initial	-	0	0	0	0	0	0	0	0
	recommend	-	0	0	0	0	0	0	0	0
		1					3[7:0]			
	initial	-	0	0	0	0	0	0		0
	recommend	-	1	1	1	0	1	0	1	0
		1				D44	[7:0]			
	initial	-	0	0	0	0	1	0		0
	recommend	-	1	1	0	0	1	1	1	1
		1					[7:0]			
	initial	-	0	0	0		0	0		0
	recommend	-	1	0	1	0	1	0	0	0
		1					[7:0]			
	initial	-	0	0	0	1	1	0	0	0
	recommend	-	1	0	0	0	0	0	0	1
		1					[7:0]			
	initial	-	0	0	1		0	0		0
	recommend	-	0	1	0	1	1	1	1	1
		1					3[7:0]			
	initial	-	0	0	1	0	1	0	0	0
	recommend	-	0	0	1	1	1	1	1	0
		1				D49	[7:0]			
	initial	-	0	0	1	1	0	0	0	0
	recommend	-	0	0	1		0	1	0	1
		1					[7:0]			
	initial	-	0	0	1	1	1	0	0	0
	recommend	-	0	0	0	0	0	1	1	0
		1					[7:0]			
	initial	-	0	1	0		0	0	0	0
	recommend	-	0	0	0	0	0	0	0	0
		1					2[7:0]			
	initial	-	0	1	0	0		0		0
	recommend	-	1	1	0	1	0	0	0	0
		1					[7:0]			
	initial	-	0	1	0	1		0		0
	recommend	-	1	0	1	1		0	1	1
		1	, 1				[7:0]		-	
	initial .	-	0	1	0		1	0		0
	recommend	-	1	0	0		0	1	1	1
		1					[7:0]			
	initial .	-	0	1	1	0		0		0
	recommend	-	0	1	1		1	1	1	1
		1					[7:0]			
	initial .	-	0	1	1			0		0
	recommend	-	0	1	1	0	0	1	0	1
		1					[7:0]			
	initial	-	0	1	1			0		0
	recommend	-	0	1	0	0	1	0	1	0
		1					[7:0]			
	initial	-	0	1	1	1	1	0		0
	recommend	-	0	0	1	0	1	1		1
							057	2001117		

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(Hass)	Dominton	DNO	D-2	DA	D.C	D4	D2	D0	D4	(7)
(Hex)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D0
C1	SETDGCLUT	1					[7:0]			
	initial	-	1	0	0	0	0	0	1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0
	recommend	-	0	0	0	1	0	1	1	0
		1				D60	[7:0]			
	initial	-	1	0	0	0	1			0
	recommend		1	1	1	1	1			1
		1								
	initial		1	0	0		1 0 0 0 0 0 0 D62[7:0] 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0		
				•		•				
	recommend	-	0	0	0			0	0	0
		1				D62	[7:0]			
	initial	-	1	0	0	1				0
	recommend	-	1	1	0	0			1	0
		1			•	D63	[7:0]		•	
	initial	-	1	0	1	0		0	0	0
	recommend	-	1		1	•				1
	recommend	1	•	U	'					
		1	4					•	•	•
	initial	-	1	0	1	•				0
	recommend	-	1	0	0	1	1	0	0	1
		1				D65	[7:0]			
	initial	-	1	0	1	1	0			0
	recommend	-	0	1	1	1	0			0
		1				D66	[7:0]			
	initial	_	1	0	1			0	0	0
						· + ······				1
	recommend	-								
		1							Ī	
	initial	-	1	1	0	0	0	0	0	0
	recommend	-	0	0	1	0	1	1	0	0
	-	1				D68	[7:0]			
	initial	-	1	1	0	0	1	0	0	0
	recommend	-	0	0	0	0	1	0	0	1
	1000111110110	1								•
	initial	<u> </u>	1	1	0			0	0	0
	initial	-				•				0
	recommend	-	1	1	1			0	0	1
		1				D70	[7:0]			
	initial	-	1	1	0	1	1	0		0
	recommend	-	1	1	0	1	0	0		1
		1				D71	[7:0]			
	initial	-	1	1	1	0	0	0	0	0
	recommend	-	1	1	0	0	0			<u>ٽ</u>
	Toominicitu	1	•							
		1					[7:0]			
	initial	-	1	1	1	•	1			0
	recommend	-	1	0	1	0	0	0	1	0
		1				D73	[7:0]			
	initial	-	1	1	1	1	0			0
	recommend	-	0	1	1	0	1			1
		1					[7:0]			
	initial		1	1	1		1	n	n	0
		-				·				
	recommend	-	0	0	0	1	0	0	0	0
		1				D75	[7:0]			
	initial	-	1	1	1	1	1	1	1	1
	recommend	-	0	0	0	0	0	0	0	0
		1				D76				
	initial		0	0	0	0	0	0	0	0
						•				
	recommend	-	1	1	1	1	1	1	1	1

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										(8)		
(Hex)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D0		
C1	SETDGCLUT	1				D77	[7:0]					
	initial	-	0	0	0	0	0	0	0	0		
	recommend	-	1	1	1	1	1	1	1	1		
, ,		1				D78	[7:0]					
	initial	-	0	0	0	0	0	0	0	0		
	recommend	-	0	0	1	0	1	0	1	0		
		1				D79	[7:0]					
	initial	-	0	0	0	0	0	0	0	0		
	recommend	-	1	0	1	0	1	0	1	0		
		1				D80	[7:0]	•	•			
	initial	-	0	0	0	0	0	0	0	0		
	recommend	-	1	0	0	1	0	0	0	1		
		1				D81	[7:0]					
	initial	-	0	0	0	0	0	0	0	0		
	recommend		0	1	0	1	0	1	0	1		
		1				D82	[7:0]					
	initial	-	0	0	0	0	0	0	0	0		
	recommend	-	0	1	0	1	0	0	0	0		
		1					[7:0]					
	initial	-	0	0	0		0	0	0	0		
	recommend		0	0	0	0	0	0	0	0		
	1000111110110	1					·[7:0]	· ·		· ·		
	initial	-	0	0	0	0	0	0	0	0		
	recommend	-								0		
	recommend	1	- 0 0 0 0 0 0 0 0 0 1 1 D85[7:0] - 0 0 0 0 0 0 0 0									
	initial	'	0	0	0			0	0	0		
	recommend		0	0	0	0	0	0	0	0		
	recommend	1	U	U	U		[7:0]	U	U	U		
	initial	'	0	0	0	0	1	0	0	0		
		<u>-</u> -		0 1	0	0	1	0				
	recommend		1	<u> </u>	U	-		U	0	1		
	initial	1	0	0	0		[7:0] 0	0	0	0		
	initial		0	0	0	• • • • • • • • • • • • • • • • • • • •		0	0	0		
	recommend	-	1	0	0	1	1	1	0	0		
	1-141-1	1	0	0	0		[7:0]		0	^		
	initial	-	0	0	0	1		0	0	0		
	recommend	-	0	1	1	1	0	1	1	1		
	i 111 - 1	1			_1_		[7:0]					
	initial	-	0	0	1	0	0	0	0	0		
	recommend	-	0	1	0	1 000	0	0	1	1		
		1					[7:0]					
	initial	-	0	0	1	• • • • • • • • • • • • • • • • • • • •	1	0	0	0		
	recommend	-	0	0	1	1	0	1	0	0		
		1					[7:0]					
	initial .	-	0	0	1	1		0	0	0		
	recommend	-	0	0	0		1	1	0	0		
		1					[7:0]					
	initial	-	0	0	1			0	0	0		
	recommend	-	1	1	1		1	0	1	1		
		1					[7:0]					
	initial	-	0	1	0		0	0	0	0		
	recommend	-	0	0	1	0	0	0	0	0		
		1				D94	[7:0]					
	initial	-	0	1	0	0	1	0	0	0		
	recommend	-	1	1	0	0	0	1	0	1		
							OFT	OGCLUT cor	e	-		

SETDGCLUT continues to the next page.

11	Di-t	DNG	D-7	D.0	F	Г.	D.0	P.0	D.1	(9)	
Hex)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D0	
C1	SETDGCLUT	1	•	1 .	1 .	D95		•			
	initial	-	0	1	0		0	0			
Hex)	recommend	-	1	0	1	0	1	0	1	0	
		1				D96	[7:0]				
	initial	-	0	1	0	1	1	0		0	
	recommend	-	1	0	0	0	1	1		0	
		1				D97	[7:0]			•	
	initial	_	0	1	1		0	0	0	0	
		•••••	0			1	0	0			
	recommend	-	U					U		, I	
		1	•		1 ,		[7:0]	•	•	_	
	initial	-	0	1	1	0	1	0			
	recommend	-	0	1	0	1	1	0	0	1	
		1				D99	[7:0]				
	initial	-	0	1	1	1	0	0		0	
	recommend	-	0	1	0	0	0	0		1	
		1				D100)[7:0]			•	
	initial	_	0	1	1	1	1	0	0	0	
			0	0	1	0	1	0			
	recommend	-	U	U				U	U	U	
		1					1[7:0]	-		I .	
	initial	-	1	0	0	0	0	0			
	recommend	-	0	0	0	1	0	0	0	0	
	-	1				D102	2[7:0]				
	initial	-	1	0	0	0	1	0	0	0	
	recommend	-	1	1	1	1	0	1	1		
		1	D103[7:0]								
	initial	'	1	0	0			٥	0	0	
	initial .	-				•					
	recommend	-	1	1	0	1	1	1	0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
		1					1[7:0]				
	initial	-	1	0	0	1	1	0	0		
	recommend	-	1	1	0	0	0	1	0		
	<u>, </u>	1				D10	5[7:0]				
	initial	-	1	0	1	0	0	0	0	0	
	recommend	-	1	0	1	0	1	0	1		
		1					[7:0]				
	initial	'	1	0	1	0	1	0	0	0	
	initial			. 							
	recommend	-	1	0	0	1	0	0	1	1	
		1					7[7:0]				
	initial	-	1	0	1	1	0	0	0	0	
	recommend	-	0	1	1	0	1	0	1	0	
		1				D108	3[7:0]				
	initial	-	1	0	1	1	1	0	0	0	
	recommend	-	0	1	0	0	0	0			
	recommend	1		· ·			9[7:0]			U	
	initial	1	4	1 1				^	^		
	initial	-	1	1	0	0		0			
	recommend	-	0	0	1	0	0	1	0	1	
		1				D110	0[7:0]				
	initial	-	1	1	0	0	1	0			
	recommend	-	0	0	0	0	0	0			
		1				D11	1[7:0]				
	initial	·	1	1 1	0	1 1		0	n	0	
						•				•	
	recommend	-	1	1	1	0	1	0	0	U	
		1				D112					
I	initial	-	1	1	0	1	1	0	0	0	

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		(SPECIFICAT	ΓIONS № 1	5TLM003				Issu	e: Aug. 26, 2
										(10)
(Hex)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D0
C1	SETDGCLUT	1								
	initial	-	1	1	1	0	0	0		0
	recommend	Register	1							
		1								
	initial	-	1	1	1	0	1	0	0	0
	recommend	-	1	0	0	1	1	1	0	0
		1								
		-	-+		·	1	0		 	0
	recommend	-	0	0	0			0	1	0
		1								
		-				1	1			0
	recommend	-	0	0	0			1	0	1
		1								
		-				1	1		ļ	1
	recommend		0	0	0			0	0	0
		1								
		-	- .			0	0		,	0
	recommend		0	0	1			1	1	1
	initial	1	0					0	0	
		-			1	1	1			0
	recommend	1	•							U
	initial	-	0	0	0			0	0	0
		-		4		0	1	4		0
								-		
	initial	-	0	0	0			0	0	0
	recommend		1	0	1	0	1	0	1	0
		1		•			2[7:0]			
	initial	-	0	0	0	0	0	0	0	0
	recommend	-	1		0	1	0	1	0	1
		1								
	initial	-	0	0	0	0	0	0	0	0
	recommend	-	0		0	1	0	1	0	1
		1								
	initial	-	0	0	0	0	0	0	0	0
	recommend	-	0	1	0			0	0	0
		1				D12	5[7:0]			
		-				0	0			0
	recommend		0	0	0			0	0	0
		1								
	initial		0	0	0		0	0	,	0
	recommend	-	0	0	0	0	0	0		0
CC	SETDGCLUT	0	1	1	0	0	1	1	-	0 DOD DANEL
	1-141-1	1	-	-	-		SS_PANEL		REV_PANEL	
	initial	-	0	0	0	0	0	0	0	0
	recommend	-	0	0	0	0	1	0	1	1

1	1	١	

										(11)
(Hex)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D0
E0	SET SIP READ INDEX	0	1	1	1	0	0	0	0	0
	1-141-1	1	-	-	0	0		RP0[5:0]	0	4
	initial	-	0	0	0	0	0	1 0	0	1
	recommend	1	0	0 MP0[1:0]	0	0			0	1
	initial	1	0	0	0	1	0	RP1[5:0] 0	0	1
	initial	1	0	1	0	0			0	0
	recommend	1		MP1[1:0]	U	U		0 RP2[5:0]	U	U
	initial	-	0	0	0	1	0	1	0	1
	recommend	1	0	1	0	0	1	1	0	1
		1	G1_CG	MP2[1:0]		•	G1_VF	RP3[5:0]		
	initial	-	0	0	1	0	0	1	0	0
	recommend	1	0	1	0	0	1	1	1	0
		1	G1_CG	MP3[1:0]			G1_VF	RP4[5:0]		
	initial	-	0	0	1	0	0	1	1	1
	recommend	1	0	1	0	1	1	0	0	0
		1		G1_CGMP4			G1_VF	RP5[5:0]		
	initial	-	0	0	1	0	0	1	1	1
	recommend	1	1	1	1	1	0	1	1	0
		1	-	G1_PRP0[6]	-			G1_PKP0[4:0]		
	initial	-	0	0	0	0	0	1	1	0
	recommend	1	0	0	0	0	1	0	1	1
		1		RP0[5:4]	-			G1_PKP1[4:0]		
	initial	-	1		0	0	1	1	0	1
	recommend	1	0	1	0	0	1	1	1	0
		1		RP0[3:2]	-			G1_PKP2[4:0]		
	initial	-	0		0	1	0	0	0	1
	recommend	1	0	0	0	1	0	0	1	0
	1-141-1	1		RP0[1:0]	0	4	٥	G1_PKP3[4:0]		4
	initial	-	1	1		1	0	1	0	1
	recommend	-	1	1	0	1	0	1 04 DKD4(4-0)	0	1
	initial	1	- 0	G1_PRP1[6] 0	0	1	1	G1_PKP4[4:0]	0	1
	initial	- -	0	0	0	1	0	1	0	
	recommend	1		P1[5:4]	-	1	U	G1_PKP5[4:0]		1
	initial	·	1	1	0	1	0		1	0
	recommend		1	0	0	1	0	1 1	0	1
	recommend	1		RP1[3:2]	-			04 BUBOLLO		
	initial	-	1	0	0	1	0	1 G1_PKP6[4:0]	1	1
	recommend	-	0	1	0	1	0	1	0	1
	· oooond	1		RP1[1:0]	-			G1_PKP7[4:0]		
	initial	-	0	0	0	0	1	0	0	1
	recommend	-	1	0	0	0		1		
		1		-				G1_PKP8[4:0]		
	initial	-	0	0	0	0	1	0	0	1
	recommend	-	0	0	0	1	0	0	0	1
		1		-			G1_VF	N0[5:0]		
	initial	-	0	0	0	0	0	1	0	1
	recommend	-	0	0	0	0	0	0	0	1
		1	G1_CGI	MN0[1:0]			G1_VF	N1[5:0]		
	initial	-	0	0	0	1	0	0	0	1
	recommend	-	0	1	0	0	1	0	0	0

SET SPI READ INDEX continues to the next page.

				TIONS № 15					13346	e: Aug. 26,
										(12)
Hex)	Register	DNC	D7	D6	D5	D4	D3	D2	D1	D0
		1		MN1[1:0]				/RN2[5:0]		
	initial	-	0	0	0	1	0	1	0	1
	recommend	-	0	1	0	0	1 21 1	1 1	0	1
	11411	1	0 0	MN2[1:0]	4	0		/RN3[5:0]	٥	
	initial	-	0	0	1 0	0	0	1	0	0
	recommend	1		1 MN3[1:0]	U	1	0 G1 \	/RN4[5:0]	0	1
	initial	-	0	0	1	0	0 0		1	1
	recommend		0	1	0	1	1		1	<u>.</u> 1
		1		G1 CGMN4	•			/RN5[5:0]		· ·
	initial	-	0	- 0	1	0	0	1	1	1
	recommend	-	1	1	1	1	1	1	0	1
		1	-	G1_PRN0[6]	-		•	G1_PKN0[4:0]		
	initial	-	0	0	0	0	0	1	1	0
	recommend	-	0	0	0	0	1	0	1	0
		1		RN0[5:4]	-			G1_PKN1[4:0]		
	initial	-	1	0	0	0	1	1	0	1
	recommend	-	0	1	0	0	1	1	1	0
		1		RN0[3:2]	-			G1_PKN2[4:0]		
	initial .	-		0	0	1	0	0	0	1
	recommend	-	0	1	0	1	0	0	0	1
	initial	1	1	RN0[1:0]	0	1	0	G1_PKN3[4:0]	0	1
	recommend	-	1	1	0	1	0	1	1	<u>'</u> 1
	recommend	1	-	G1_PRN1[6]	-	ı	U	G1_PKN4[4:0]		
	initial	-	0	0	0	1	0	1	1	0
	recommend	-		0	0	1	0	1	1	1
		1	G1 PF	RN1[5:4]	-			G1_PKN5[4:0]		
	initial	-	1	1	0	1	0	1	1	0
	recommend	-	1	0	0	1	0	1	0	1
		1		RN1[3:2]	-		•	G1_PKN6[4:0]		
	initial	-	1	0	0	1	0	G1_PKN6[4:0]	1	1
	recommend	-	1	0	0	1	0	1	1	0
		1		RN1[1:0]				G1_PKN7[4:0]		
	initial	-	0	0	0	0	1	0	0	1
	recommend	-	0	1	0	0	1	1	1	0
	initial	1	0	- 0	0	0	1	G1_PKN8[4:0]	0	4
	initial recommend	-	0	0	0	1	0	0	0	1 1
FE	SET SPI READ INDEX	0	1	1	1	1	1	1	1	0
٠- ا	OLT OF TREAD INDEX	1	'	<u> </u>	'	l .	L' ADD[7:0]	<u>'</u>	<u> </u>	
	initial	-	-	_	-	-	-	-	-	-
	recommend	-	-	-	-	-	-	-	-	-
FF	SPIREAD	0	1	1	1	1	1	1	1	1
		1				CMD_D/	ATA1[7:0]	1	•	
	initial	-	-	-	-	-	_	-	-	-
	recommend	-	-	-	-	-	-	-	-	-
		1				•				
	initial	-	-	-	-	-	-	-	-	-
	recommend	-	-	-	-	-	-	-	-	-
		1				_	ATAN[7:0]			
	initial .	-	-	-	-	-	-		-	-
	recommend	-	-	-	-	-	-	-	-	-

SPECIFICATIONS № 15TLM003

8. Sequence

Power on sequence

Nº		Function	DNC	Command/Parameter
	i	RESETB=0		
	Wait	wait 1 msec or more		
	Power on	IOVCC, VCC on		
	Wait	wait 10 msec or more		
		RESETB=1		
-	Wait	wait 10 msec or more		
	RGB signals	RGB signals start		
	Wait	wait 2 frames or more		
1	Enable extended commands	Enable extended commands	0	B9h
·		Parameter 1	1	FFh
	<u> </u>	Parameter 2	1	83h
	<u> </u>	Parameter 3	1	63h
2	Set power	Set power	0	B1h
_	Get power	Parameter 1	1	81h
		Parameter 2	1	24h
		Parameter 3	1	04h
	ļ-	Parameter 4	1	02h
	ļ-	Parameter 5	1	02h
	ļ-	Parameter 6	1	03h
	Ļ	Parameter 7	1	10h
	Ļ	Parameter 8	1	10h
	<u> </u>	Parameter 9	1	34h
	<u> </u>	Parameter 10	1	3Ch
		Parameter 11	1	3Fh
		Parameter 12	1	3Fh
3	Sleep out	Sleep out	0	11h
	Wait	wait 5 msec or more		
4	Display inversion off	Display inversion off	0	20h
5	Memory access control	Memory access control	0	36h
		Parameter 1	1	00h
6	Interface pixel format	Interface pixel format	0	3Ah
		Parameter 1	1	70h
	Wait	wait 120 msec or more		
7	Set power	Set power	0	B1h
	·	Parameter 1	1	78h
		Parameter 2	1	24h
	Ţ.	Parameter 3	1	04h
	<u> </u>	Parameter 4	1	02h
	<u> </u>	Parameter 5	1	02h
	<u> </u>	Parameter 6	1	03h
	ŀ	Parameter 7	1	10h
	ŀ	Parameter 8	1	10h
	F	Parameter 9	1	34h
	ŀ	Parameter 10	1 1	3Ch
	ŀ	Parameter 11	1	3Fh
	ŀ	Parameter 12		3Fh
0	Cot DCB interface valeted vasiets:		0	
8	Set RGB interface related register	Set RGB interface related register		B3h
	Cot displayments and	Parameter 1	1	01h
9	Set display waveform cycle	Set display waveform cycle	1	B4h
	Ļ	Parameter 1	1	00h
	Ļ	Parameter 2	1	08h
	<u> </u>	Parameter 3	1	56h
	<u> </u>	Parameter 4	1	07h
		Parameter 5	1	01h
		Parameter 6	1	01h
	Γ	Parameter 7	1	4Dh
	Γ	Parameter 8	1	01h
	F	Parameter 9	1	42h

Nº		Function	DNC	Command/Parameter	
10	Set panel	Set panel	0	CCh	
		Parameter 1	1	0Bh	
11 Set gamma cu	Set gamma curve related setting	Set gamma curve related setting	0	E0h	
		Parameter 1	1	01h	
		Parameter 2	1	48h	
		Parameter 3	1	4Dh	
		Parameter 4	1	4Eh	
		Parameter 5	1	58h	
		Parameter 6	1	F6h	
		Parameter 7	1	0Bh	
		Parameter 8	1	4Eh	
		Parameter 9	1	12h	
		Parameter 10	1	D5h	
		Parameter 11	1	15h	
		Parameter 12	1	95h	
			Parameter 13	1	55h
			Parameter 14	1	8Eh
		Parameter 15	1	11h	
		Parameter 16	1	01h	
		Parameter 17	1	48h	
		Parameter 18	1	4Dh	
		Parameter 19	1	55h	
		Parameter 20	1	5Fh	
		Parameter 21	1	FDh	
		Parameter 22	1	0Ah	
		Parameter 23	1	4Eh	
		Parameter 24	1	51h	
		Parameter 25	1	D3h	
		Parameter 26	1	17h	
		Parameter 27	1	95h	
		Parameter 28	1	96h	
		Parameter 29	1	4Eh	
		Parameter 30	1	11h	
ľ	Wait	wait 5 msec or more			
12	Display on	Display on	0	29h	

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Power off sequence

Nº		Function	DNC	Command/Parameter
1	Display off	Display off	0	28h
	Wait	wait 5 msec or more		
2	Sleep in	Sleep in	0	10h
	Wait	wait 2 frames or more		
3	RGB signals	RGB signals stop		
	<u> </u>			

★ Power off

Sleep sequence

Nº		Function	DNC	Command/Parameter
1	Sleep in	Sleep in	0	10h
	Wait	wait 2 frames or more		
2	RGB signals	RGB signals stop		

Sleep release sequence

Nº		Function	DNC	Command/Parameter
1	RGB signals	RGB signals start		
	Wait	wait 2 frames or more		
2	Sleep out	Sleep out	0	11h

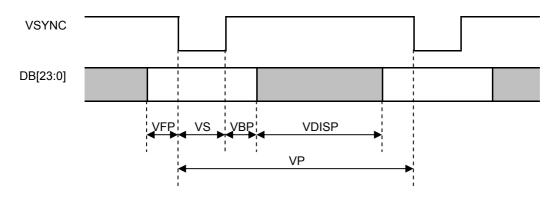
SPECIFICATIONS № 15TLM003

9. RGB Interface

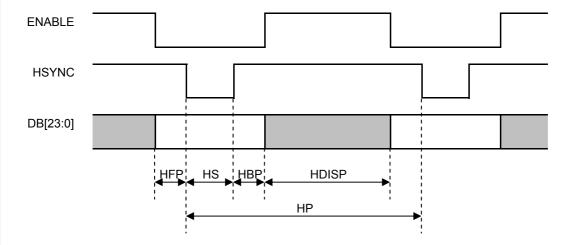
Recommended RGB interface timing

Item	Symbol	Recommended	Unit	
Vertical cycle	VP	806	Line	
Vertical low pulse width	VS	2	Line	
Vertical front porch	VFP	2	Line	
Vertical back porch	VBP	2	Line	
Vertical active area	VDISP	800	Line	
Vertical refresh rate	VRR	60	Hz	
HS cycle	HP	508	DOTCLK	
HS low pulse width	HS	10	DOTCLK	
Horizontal back porch	HBP	10	DOTCLK	
Horizontal front porch	HFP	8	DOTCLK	
Horizontal active area	HDISP	480	DOTCLK	
Pixel clock frequency	DCK	24.57	MHz	

Vertical timing



Horizontal timing



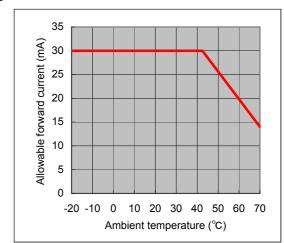
10. Absolute Maximum Rating

Item	Symbol	Condition	Rating		Unit	Terminal
			MIN	MAX		
Power supply voltage	VCC		-0.3	4.6	V	VCC
IO logic voltage	IOVCC		-0.3	4.6	٧	IOVCC
						RESETB, SDI, SCL,
Input voltage	VI		-0.3	IOVCC+0.3	V	CSB, VSYNC, HSYNC,
						DOTCLK, ENABLE, DB[23:0]
LED	IL25	Ta=25°C		30	mΑ	VLED — LEDn
Forward current	IL70	Ta=70°C		14	mΑ	
Storage temperature	Tstg		-30	+80	°C	

11. Recommended Operating Conditions

Item		Symbol	Rating		Unit	Terminal	
			MIN	TYP	MAX		
Supply volta	age	VCC	2.6	2.7	2.9	V	VCC
IO logic volta	age	IOVCC	1.7	1.8	1.9	V	IOVCC (VCC≧IOVCC)
Operation temp	erature	Тор	-20	+25	+70	°C	Temperature at the surface of the display
LED *1	Ta=25 °C	IL25	_	8.5	30	mA	VLED — LEDn
Forward current	Ta=70 °C	IL70	_		14	mA	
Forward voltage	Ta=25 °C	VL	_	2.8	3.16	V	
(Reference value)	IL=8.5mA						

- *1: The maximum value of LED Forward current "IL", do not exceed the following allowable current value.
- The lifetime of the LED is defined as a period till the brightness of the LED decreases to the half of its initial value.
- This figure is estimated for an LED operating alone.
 As the performance of an LED may differ when assembled as a monitor together with a TFT panel due to different environmental temperature.
- Estimated lifetime could vary on a different temperature and usually higher temperature could reduce the life significantly.



12. Electrical Characteristics

12.1 DC Characteristics

Items	Symbol	Condition	Rating			Unit	Terminal
			MIN	TYP	MAX		
High level input	VIH1		0.7 IOVCC		IOVCC	V	RESETB, SDI, SCL,
voltage							CSB, VSYNC, HSYNC,
Low level input	VIL1		0		0.3 IOVCC	V	DOTCLK, ENABLE,
voltage							DB[23:0]
	ICC1	VCC=2.7V,IOVCC=1.8V		12.0		mA	VCC
		Still image *					
	ICC2	VCC=2.7V,IOVCC=1.8V		10.0		μΑ	
Current		stand by					
Consumption	IOICC1	VCC=2.7V,IOVCC=1.8V		12.0		μΑ	IOVCC
		Still image *					
	IOICC2	VCC=2.7V,IOVCC=1.8V		1.0		μΑ	
		stand by					

^{*} A still image (color bar) on display, when accessing to the driver by RGB interface mode.

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Issue: Aug. 26, 2016

12.2 AC Characteristics

RESET timing

RESETB

t RES

Reset low pulse width shorter than 10us do not make reset. It means undesired short pulse such as glitch, bouncing noise or electrostatic discharge do not cause irregular system reset. Please refer to the table below.

RESET timing spec

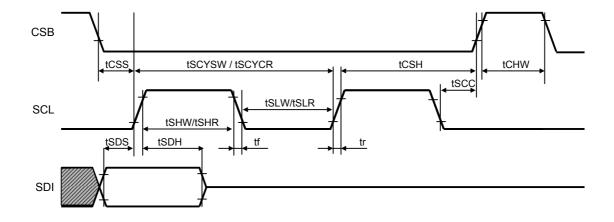
Item	Symbol	Condition	Rating			Unit
			MIN	TYP	MAX	
Reset low pulse width	tRES		10	-	-	μs

tRES Pulse	Action
Shorter than 5µs	No reset
Longer than 10µs	Reset
Between 5µs and 10µs	Not determined

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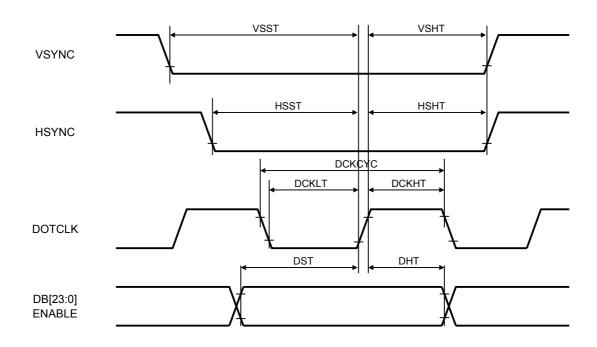
Serial Peripheral Interface(SPI)



Item	Symbol	Condition	Rating		Unit	
			MIN	TYP	MAX	
Serial Clock Write Cycle	tSCYCW		100		=.	ns
Serial Clock Read Cycle	tSCYCR		200		-	ns
Pulse Width High at Write	tSHW		50		-	ns
Pulse Width High at Read	tSHR		100		-	ns
Pulse Width Low at Write	tSLW		50		-	ns
Pulse Width Low at Read	tSLR		100		-	ns
CSB Setup Time at Write	tCSS		50		-	ns
CSB Setup Time at Read	tCSS		100		-	ns
CSB Hold Time at Write	tSCH		50		-	ns
CSB Hold Time at Read	tSCH		100		-	ns
SDI Setup Time	tSIDS		50		-	ns
SDI Hold Time	tSIDH		50		-	ns
Rising/Falling Time	tR, tF		-		10	ns

Remarks 1. All timing data is specified at 30 to 70% of VCCIO.

24 bit RGB interface



Item	Symbol	Condition	Rating		Unit	
			MIN	TYP	MAX	
VSYNC Setup Time	VSST		10	-	-	ns
VSYNC Hold Time	VSHT		10	-	-	ns
HSYNC Setup Time	HSST		10	-	-	ns
HSYNC Hold Time	HSHT		10	-	-	ns
DOTCLK Clock Cycle	DCKCYC	Frame Frequency=	31	-	49.2	ns
		50 to 70 Hz				
DOTCLK Low Time	DCKLT		10	-	-	ns
DOTCLK High Time	DCKHT		10	-	-	ns
Data Setup Time for DB[23:0]	DST		10	-	-	ns
Data Hold Time for DB[23:0]	DHT		10	_	_	ns

Note: (1) Signal rise and fall times are equal to or less than 20 ns.

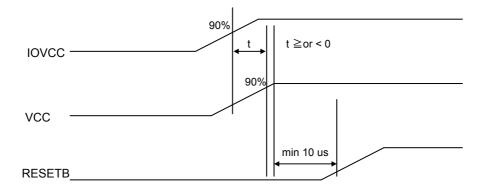
⁽²⁾ Input signals are measured by 0.30 x IOVCC for low state and 0.70 x IOVCC for high state.

13. External Power on / off Sequence

13.1 External Power On sequence

VCC and IOVCC can be applied in any order.

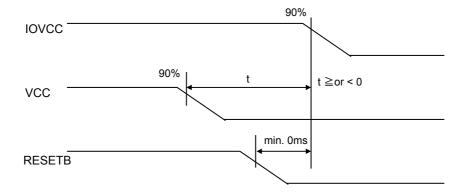
RESETB must be kept low for minimum 10 usec after both VCC and IOVCC have reached it's target voltage.



13.2 External Power Off sequence

VCC and IOVCC can be powered down in any order.

If the module is in "Sleep In" mode, IOVCC and VCC can be powered down minimum 0 msec after RESETB has been released.



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__1 |}\bigc\rightarrow{1}

14. Characteristics

14.1 Optical Characteristics < Measurement Condition >

Measuring instruments: CS1000 (KONICA MINOLTA) , LCD7200(OTSUKA ELECTRONICS) ,

EZcontrast160D (ELDIM)

Driving condition: VCC=2.7V, IOVCC=1.8V

Optimized VCOMDC

Backlight: IL=8.5mA Measured temperature: Ta=25° C

	Item Symbol		Condition	MIN	TYP	MAX	Unit	Note No.	Remark
onse	Rise time	TON	[Data]= 00h → FFh	_	_	40	ms	1	
Response time	Fall time	TOFF	[Data]= FFh → 00h			60	ms		
Contrast ratio	ಕ್ಟ್ರಂ Backlight ON		[Data]= FFh / 00h	600	1000	1		2	
Con	Backlight OFF			Ī	2.9	1			
С	Left	θL	[Data]=	80			deg	3	
Viewing angle	Right	θR	FFh / 00h	80	_	_	deg		
/je	Up	φU	CR≧10	80	_		deg		
	Down	φD		80			deg		
\/\/hite	e Chromaticity	Х	[Data]=FFh	White ch	romaticit	y range		4	
VVIIIC	Onfornations	у							
	Burn-in			should I	oticeable be observ indow pa	ed after	2 hours	5	
Center brightness [Data]=FFh		[Data]=FFh	240	380	-	cd/m ²	6		
Brightness distribution [Data]=FFh			70	_	_	%	7		

^{*} Note number 1 to 7: Refer to the APPENDIX of "Reference Method for Measuring Optical Characteristics".

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0.40 0.38 0.36 0.34 > 0.32 0.30 0.28 0.26 0.24 0.22 0.24 0.26 0.28 0.30 0.32 0.34 0.36 0.38 0.40

[White Chromaticity Range]

х	у
0.29	0.37
0.26	0.34
0.26	0.27
0.34	0.27
0.36	0.29
0.36	0.37

White Chromaticity Range

<u>6</u>

14.2 Temperature Characteristics

< Measurement Condition >

Measuring instruments: CS1000 (KONICA MINOLTA) , LCD7200(OTSUKA ELECTRONICS)

Driving condition: VCC=2.7V, IOVCC=1.8V

Optimized VCOMDC

Backlight: IL=8.5mA

Item			Specif	ication	Remark	
'	lem		Ta=-10° C	Ta=70° C	Remark	
Contrast ratio		CR	40 or more	40 or more	Backlight ON	
Response time	Rise time	TON	200 msec or less	30 msec or less		
response time	Fall time	TOFF	300 msec or less	50 msec or less		
Display Quality			No noticeable display d should be observed.	efect or ununiformity		

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15. Criteria of Judgment



△ 15.1 Defective Display and Screen Quality

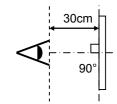
Test Condition: Observed TFT-LCD monitor from front during operation

with the following conditions

Driving Signal Raster Patter (RGB in monochrome, white, black)

Signal condition [Data] = FFh, BCh, 00h (3steps)

Observation distance 30 cm Illuminance 200 to 350 lx IL=8.5mA Backlight



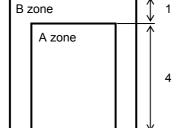
D	efect item		Defect content	Criteria
	Line defect	Black, white or color	line, 3 or more neighboring defective dots	Not exists
Display Quality	Dot defect	TFT or CF, or dust i (brighter dot, darker High bright dot: Visil Low bright dot: Visi Dark dot: Appear da	on dot-by-dot base due to defective s counted as dot defect dot) ble through 2% ND filter at [Data]=00h ble through 5% ND filter at [Data]=8Ch ND filter at [Data]=8Ch	Refer to table 1
	Dirt	· ·	(white stain, black stain etc)	Acceptable Invisible through 5% ND filter at Black screen. Invisible through 1% ND filter at other screen.
iŧ		Point-like	0.25mm< φ	N=0
Quality	Coroian		0.20mm< φ ≦0.25mm	N≦2
n C	Foreign particle		φ ≦0.20mm	Acceptable
Screen		Liner	3.0mm <length 0.08mm<width<="" and="" td=""><td>N=0</td></length>	N=0
Sc		length≦3.0mm or width≦0.08mm		Acceptable
	Others			Use boundary sample for judgment when necessary

 ϕ (mm): Average diameter = (major axis + minor axis)/2 Permissible number: N

Table 1

1

Area	High bright dot	Low bright dot	Dark dot	Total	Criteria
Α	0	2	2	3	Permissible distance between same color bright dots (includes neighboring dots): 3 mm or more
В	2	4	4	6	Permissible distance between same color high bright dots (includes neighboring dots): 5 mm or more
Total	2	4	4	6	



4

1

<Portrait model>

Division of A and B areas B area: Active area

Dimensional ratio between A and B areas: 1: 4: 1 (Refer to the left figure)

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15.2 Screen and Other Appearance

Testing conditions

Observation distance 30cm

Illuminance 1200~2000 lx

	Item	Criteria	Remark
Polarizer	Flaw Stain Bubble Dust Dent	Ignore invisible defect when the backlight is on.	Applicable area: Active area only (Refer to the section 3.2 "Outward form")
	S-case	No functional defect occurs	
	FPC cable	No functional defect occurs	

Item	Appearance	Criteria
Glass Chipping	Corner area	Unit: mm $ X \leqq 3 \\ Y \leqq 3 \\ Z \leqq t \text{(t:glass thickness)} \\ X,Y \leqq 0.5 \text{ is ignored.} $
	Others Z X	Unit: mm $ X \leqq 5 \\ Y \leqq 1 \\ Z \leqq t \text{(t:glass thickness)} \\ X,Y \leqq 0.5 \text{ is ignored.} $
	Progressive crack	None

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16. Reliability Test

Test item		Test condition	number of failures /number of examinations
	High temperature storage	Ta=80° C 240H	0/3
	Low temperature storage	Ta=-30° C 240H	0/3
st	High temperature & high	Ta=60° C, RH=90% 240H	0/3
Ourability test	humidity storage	non condensing	
billit	High temperature operation	Tp=70° C 240H	0/3
ural	Low temperature operation	Tp=-20° C 240H	0/3
△	High temp & humid operation	Tp=40°C, RH=90% 240H	0/3
	riigir terrip a riarriia operation	non condensing	
	Thermal shock storage	-30←→80° C(30min/30min) 100 cycles	0/3
		Confirms to EIAJ ED-4701/300	0/3
	Electrostatic discharge test (Non operation)	C=200pF,R=0Ω,V=±200V	
est		Each 3 times of discharge on and power supply	
Vechanical environmental test		and other terminals.	
ent	Surface discharge test (Non operation)	C=250pF, R=100Ω, V=±6kV	0/3
nn		Each 5 times of discharge in both polarities	
viro	(rion operation)	on the center of screen with the case grounded.	
en	Vibration test	Total amplitude 1.5mm, f=10∼55Hz, X,Y,Z	0/3
cal	violation toot	directions for each 2 hours	
ani		Use ORTUS TECHNOLOGY original jig	0/3
ech		(see next page)and make an impact with	
ž	Impact test	peak acceleration of 1000m/s2 for 6 msec with	
		half sine-curve at 3 times to each X, Y, Z directions	
		in conformance with JIS C 60068-2-27-2011.	
st		Acceleration of 19.6m/s ² with frequency of	0 ∕ 1 Packing
g te	Packing vibration-proof test	10→55→10Hz, X,Y, Zdirection for each	
kinç		30 minutes	
Packing test	Packing drop test	Drop from 75cm high.	0 ∕ 1 Packing
Щ	. doming drop toot	1 time to each 6 surfaces, 3 edges, 1 corner	

Note:Ta=ambient temperature

Tp=Panel temperature

% The profile of high temperature/humidity storage and High Temperature/humidity operation (Pure water of over 10M Ω ·cm shall be used.)

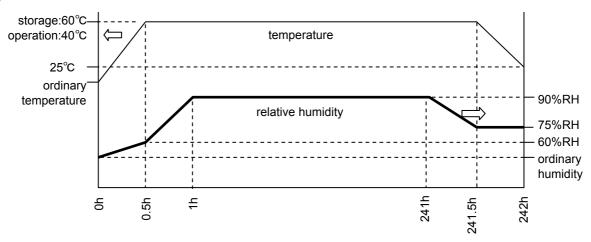
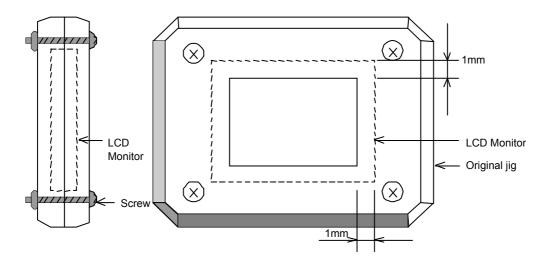


Table2.Reliability Criteria

The parameters should be measured after leaving the monitor at the ordinary temperature for 24 hours or more after the test completion.

item	Standard	Remarks
Display quality	No visible abnormality shall be seen.	
Contrast ratio	40 or more	Backlight ON

ORTUS TECHNOLOGY Original Jig



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17. Packing Specifications

Step1. Each lower product is placed in one of the cut-outs of the tray with the LCD surface facing upward, and foam sheet is put on products, and upper products are placed facing downward.

(30 pieces / 1 tray)

Step2. 5 trays containing products are stacked.

One empty tray is put on the top of the stack of 5 trays.

Step3. Driers are placed on the top tray as shown in the drawing. The stack of 6 trays is wrapped in a sealing bag.

Step4. The opening of the sealing bag is folded and sealed with air out from the sealing bag.

The B sheet A and sealed adhesive tape.

Step5. A inner board is placed on the bottom of the sealing bag covered with the B sheet A.
 The inner board and the sealing bag covered with the B sheet A are inserted into an outer carton.

Step6. The outer carton is sealed with packing tape as shown in the drawing.

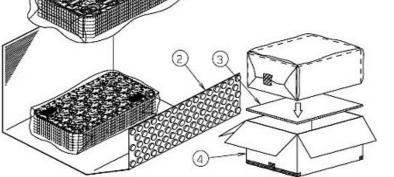
The model number, quantity of products, and shipping date are printed on the outer carton.

If necessary, shipping labels or impression markings are put on the outer carton.

Step7. The outer carton is inserted into a extra outer carton with same direction.

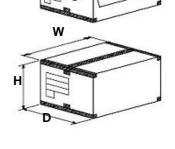
put on the extra outer carton.

Step8. The extra outer carton is sealed with packing tape as shown in the drawing.
 The model number, quantity of products, and shipping date are printed on the extra outer carton.
 If necessary, shipping labels or impression markings are





	Packing item name	Specs., Material
1	TRAY	A-PET
2	B SHEET A	Anti-static air bubble sheet
3	INNER BOARD	Corrugated cardboard
4	OUTER CARTON	Corrugated cardboard
⑤	SEALING BAG	
6	Drier	Moisture absorber
7	EXTRA OUTER CARTON	Corrugated cardboard
8	SEALING BAG	
9	FOAM SHEET	Anti-static polyethylene



Dimension of extra	Dimension of extra outer carton			
D : Approx.	(337mm)			
W : Approx.	(618mm)			
H : Approx.	(179mm)			
Quantity of products packed i	n one carton:	150		
Gross weight : Approx.	5.0kg			

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18. Handling Instruction

18.1 Cautions for Handling LCD panels



Caution

- (1) Do not make an impact on the LCD panel glass because it may break and you may get injured from it.
- (2) If the glass breaks, do not touch it with bare hands.
 (Fragment of broken glass may stick you or you cut yourself on it.
- (3) If you get injured, receive adequate first aid and consult a medial doctor.
- (4) Do not let liquid crystal get into your mouth.
 (If the LCD panel glass breaks, try not let liquid crystal get into your mouth even toxic property of liquid crystal has not been confirmed.
- (5) If liquid crystal adheres, rinse it out thoroughly.
 (If liquid crystal adheres to your cloth or skin, wipe it off with rubbing alcohol or wash it thoroughly with soap. If liquid crystal gets into eyes, rinse it with clean water for at least 15 minutes and consult an eye doctor.
- (6) If you scrap this products, follow a disposal standard of industrial waste that is legally valid in the community, country or territory where you reside.
- (7) Do not connect or disconnect this product while its application products is powered on.
- (8) Do not attempt to disassemble or modify this product as it is precision component.
- (9) If a part of soldering part has been exposed, and avoid contact (short-circuit) with a metallic part of the case etc. about FPC of this model, please. Please insulate it with the insulating tape etc. if necessary. The defective operation is caused, and there is a possibility to generation of heat and the ignition.
- (10) Since excess current protection circuit is not built in this TFT module, there is the possibility that LCD module or peripheral circuit become feverish and burned in case abnormal operation is generated. We recommend you to add excess current protection circuit to power supply.
- (11) The devices on the FPC are damageable to electrostatic discharge, because the terminals of the devices are exposed. Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static charge and discharge when handling the TFT monitors. Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.



Caution

This mark is used to indicate a precaution or an instruction which, if not correctly observed, may result in bodily injury, or material damages alone.

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18.2 Precautions for Handling

- Wear finger tips at incoming inspection and for handling the TFT monitors to keep display quality and keep the working area clean.
 - Do not touch the surface of the monitor as it is easily scratched.
- Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static charge and discharge when handling the TFT monitors as the LED in this TFT monitors is damageable to electrostatic discharge.
 - Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.
- 3) Avoid strong mechanical shock including knocking, hitting or dropping to the TFT monitors for protecting their glass parts. Do not use the TFT monitors that have been experienced dropping or strong mechanical shock.
- 4) Do not use or storage the TFT monitors at high temperature and high humidity environment. Particularly, never use or storage the TFT monitors at a location where condensation builds up.
- 5) Avoid using and storing TFT monitors at a location where they are exposed to direct sunlight or ultraviolet rays to prevent the LCD panels from deterioration by ultraviolet rays.
- 6) Do not stain or damage the contacts of the FPC cable .
 - FPC cable needs to be inserted until it can reach to the end of connector slot.
 - During insertion, make sure to keep the cable in a horizontal position to avoid an oblique insertion.
 - Otherwise, it may cause poor contact or deteriorate reliability of the FPC cable.
- 7) The FPC cable is a design very weak to the bend and the pull as it is fixed with the tape. Do not bend or pull the FPC cable or carry the TFT monitor by holding the FPC cable.
- Peel off the protective film on the TFT monitors during mounting process. Refer to the section 18.5 on how to peel off the protective film. We are not responsible for electrostatic discharge failures or other defects
 - occur when peeling off the protective film.
- 9) Please make it to the structure to suppress surroundings of the front polarizer for the display irregularity prevention.

18.3 Precautions for Operation

- Since this TFT monitors are not equipped with light shielding for the driver IC,
 do not expose the driver IC to strong lights during operation as it may cause functional failures.
- 2) In case of powering up or powering off this LCD module, be sure to comply the sequence as instructed in this specification.
- Optimize VCOMDC within recommended operating conditions.
 - * When VCOMDC is not an optimal value, flicker and image sticking will be occurred.
- 4) Do not plug in or out the FPC cable while power supply is switch on. Plug the FPC cable in and out while power supply is switched off.
- 5) Do not operate the TFT monitors in the strong magnetic field. It may break the TFT monitors.
- 6) Do not display a fixed image on the screen for a long time. Use a screen-saver or other measures to avoid a fixed image displayed on the screen for a long time. Otherwise, it may cause burn-in image on the screen due the characteristics of liquid crystal.

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18.4 Storage Condition for Shipping Cartons

Storage environment

Temperature 0 to 40°CHumidity 60%RH or less

No-condensing occurs under low temperature with high humidity condition.

Atmosphere No poisonous gas that can erode electronic components and/or

wiring materials should be detected.

Time period 3 months

Unpacking To prevent damages caused by static electricity, anti-static precautionary measures

(e.g. earthing, anti-static mat) should be implemented.

After unpack, keep product in the appropriate condition,

otherwise bubble seal of Protective film may be printed on Polarizer.

Maximum piling up 7 cartons

*Conditions to storage after unpacking

Storage environment

Temperature 0 to 40°CHumidity 60%RH or less

No-condensing occurs under low temperature with high humidity condition.

Atmosphere No poisonous gas that can erode electronic components and/or

wiring materials should be detected.

Time period 1 year (Shelf life)

Others Keep/ store away from direct sunlight

Storage goods on original tray made by ORTUS.



The followings work environment and work method are recommended to prevent the TFT monitors from static damage or adhesion of dust when peeling off the protective films.

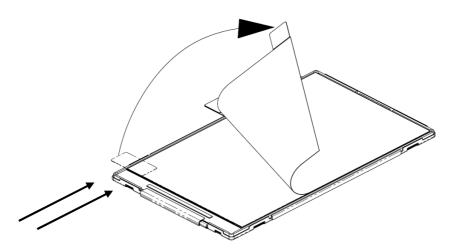
A) Work Environment

- a) Humidity: 50 to 70 %RH, Temperature15 to 27 °C
- b) Operators should wear conductive shoes, conductive clothes, conductive finger tips and grounded wrist-straps. Use an electrostatic neutralization blower.
 - Anti-static treatment should be implemented to work area's floor.
- c) Use a room shielded against outside dust with sticky floor mat laid at the entrance to eliminate dirt.

B) Work Method

The following procedures should taken to prevent the driver ICs from charging and discharging.

- a) Use an electrostatic neutralization blower to blow air on the TFT monitors to its lower left when LSI is placed at the bottom.
 - Optimize direction of the blowing air and the distance between the TFT monitors and the electrostatic neutralization blower.
- b) Peel off the tab slowly (spending more than 2 secs to complete) by pulling it to opposite direction.



Direction of blowing air (Optimize air direction and the distance)



18.6 Warranty

ORTUS is only liable to defective goods which is stored and used under the condition complying with this specifications and returned within 1 (one) year.

Warranty caused by manufacturing defect shall be conducted by replacement of goods or refundment at unit price.

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APPENDIX

Reference Method for Measuring Optical Characteristics and Performance

1. Measurement Condition (Backlight ON)

Measuring instruments: CS1000 (KONICA MINOLTA) , LCD7200(OTSUKA ELECTRONICS) ,EZcontrast160D (ELDIM)

Driving condition: Refer to the section "Optical Characteristics"

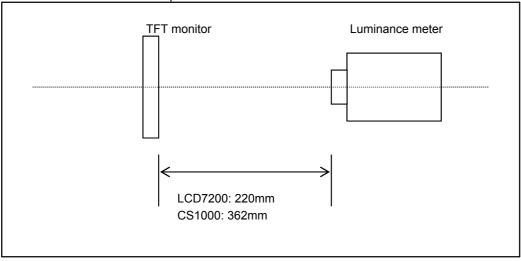
Measured temperature: 25°C unless specified

Measurement system: See the chart below. The luminance meter is placed on the normal line of

measurement system.

Measurement point: At the center of the screen unless otherwise specified

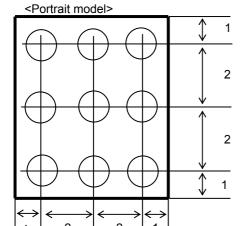
Dark box at constant temperature



Measurement is made after 30 minutes of lighting of the backlight.

Measurement point: At the center point of the screen

Brightness distribution: 9 points shown in the following drawing.



Dimensional ratio of active area

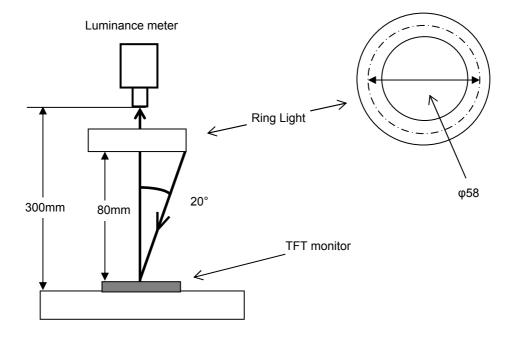
Backlight IL=8.5mA

Measurement Condition (Contrast ratio Backlight OFF only)

Measuring instruments: LCD7200(OTSUKA ELECTRONICS),Ring Light(40,000 lx,φ58)

Driving condition: Refer to the section "Optical Characteristics"

Measurement system: 25°C unless specified
Measurement system: See the chart below.
Measurement point: At the center of the screen.



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Notice	Item	Test method	Measuring instrument	Remark
1	Response time	Measure output signal waveform by the luminance meter when raster of window pattern is changed from white to black and from black to white. Black White Black	LCD7200	Black display [Data]=00h White display [Data]=FFh TON Rise time
		Black White Black		TOFF
		White brightness		Fall time
		100% 90% 10% 0% Black brightness TON TOFF		
2	Contrast ratio	Measure maximum luminance Y1([Data]=FFh) and minimum luminance Y2([Data]=00h) at the center of the screen by displaying raster or window pattern. Then calculate the ratio between these two values. Contrast ratio = Y1/Y2	CS1000 LCD7200	Backlight ON Backlight OFF
3	Viewing angle Horizontalθ Verticalφ	Diameter of measuring point: 8mmφ Move the luminance meter from right to left and up and down and determine the angles where contrast ratio is 10.	EZcontrast160D	
4	White chromaticity	Measure chromaticity coordinates x and y of CIE1931 colorimetric system at [Data] = FFh Color matching faction: 2°view	CS1000	
5	Burn-in	Visually check burn-in image on the screen after 2 hours of "window display" ([Data]=00h/FFh).		
6	Center brightness	Measure the brightness at the center of the screen.	CS1000	
7	Brightness distribution	(Brightness distribution) = 100 x B/A % A : max. brightness of the 9 points	CS1000	

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Version History

Ver.	Date	Page			
1.0	Feb. 18, 2015	_	- First issue		
2.0	May. 13, 2015	P.35		14.1 Optical Characteristics	
	^		Change	White chromaticity range	
	<u>∕</u> A ×1			3.	
3.0	Mar. 31, 2016	P.8		3.2 Outward Form	
0.0	10101. 01, 2010	' .	Correct	Error correct (Connecter model number)	
	<u> </u>		Conect		
4.0		D.4			
4.0	Aug. 26, 2016	P.1		Cover	
	A x14		Add	Model outline	
	∠C∆ ×14	P.2		Contents	
			Change	Page number	
		P.3		1. Application	
			Correct	Note	
		P.4		2.2 Display Method	
			Add	NTSC ratio	
		P.7		3.1 Dimensions	
		' .,	Change	Remarks (Active area: cm ⇒ mm)	
		P.27	Change	9. RGB Interface	
		F.Z1	Corroct	:	
		D 00	Correct	Recommended(Vertical refresh rate/ Pixel clock frequency)	
		P.28		10. Absolute Maximum Rating	
			Add	LED Forward current	
				11. Recommended Operating Conditions	
			Add	LED Forward current	
			Add	Forward voltage / Note	
		P.34		14.1 Optical Characteristics	
			Delete	Note	
		P.35		14.2 Temperature Characteristics	
			Delete	Note	
		P.36	20.010	15.1 Defective Display and Screen Quality	
		1 .00	Add	Reference diagram	
			Correct	•	
		D 40	Correct	Criteria (Dirt)	
		P.43	l	18.4 Storage Condition for Shipping Cartons	
			Add	Conditions to storage after unpacking	
		P.44		18.5 Precautions for Peeling off the Protective film	
			Correct	Work Environment	
				18.6 Warranty	
			Add	Content	
	1	Ī			

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