



10.4" XGA, MVA

High brightness color TFT-LCD module

Model: CH104CLGL-001

Date: Aug. 24th, 2012

**Note: This specification is subject to change
without notice**

Customer : _____

Date : _____

Approved

Prepared

Date:

Date:

Product Specification

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Product Specification

RECORD OF REVISION

Version and Date	Page	Old description	New description	Remark
0.1 2012/08/24	All	First Edition for customer		

Product Specification

0. HANDLING PRECAUTIONS

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open or modify the Module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) In case if a Module has to be put back into the packing container slot after once it was taken out from the container, do not press the center of TFT LCD panel.
- 10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 11) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

Product Specification

1.General Specifications

No.	Item	Specification	Remark
1	LCD size	10.4 inch	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1024 × 3(RGB) × 768	
4	Display mode	Normally black, Super MVA	
5	Pixel pitch	0.0685 × 0.2055(H) mm	
6	Active area	210.4(W) × 157.8(H) mm	
7	Module size	238.6(W) × 175.8(H) × 7.5(D) mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-vertical stripe	
10	Display colors	16.2 M (RGB 8-bit)	
11	Brightness	800 nits	Note 2,3
12	Interface	1 ch LVDS	
13	Backlight power consumption	7.1 W (TBD)	
14	Panel power consumption	1.9 W	
15	Weight	280 g (Typ.)	

Note 1: Refer to Mechanical Drawing.

Note 2: Refer to sec.4 Optical Specifications.

Note 3: By thermal conduction to chassis, this panel can be operated at 1000 nits
brightness

Product Specification

2. Absolute maximum ratings.

2.1. Absolute ratings of environment

Item	Symbol	Value		Unit	Note
		Max.	Min.		
Storage Temperature	TST	-20	70	°C	(1)
Operating Ambient Temperature	TOP	-20	70	°C	(1), (2)

Note (1) (a) 90 %RH Max. ($T_a \leq 40$ °C).

(b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40$ °C).

(c) No condensation.

Note (2) The temperature of panel surface should be 0 °C min. and 70 °C max.

Note (3) Please be sure the conductive thermal management at top edge of panel.

2.2. Electrical absolute ratings

TFT LCD module

Item	Symbol	Value		Unit	Note
		Max.	Min.		
Power Supply Voltage	VCC	-0.3	7.0	V	(1)
Logic Input Voltage	V _{IN}	-0.3	3.6	V	(1)

Backlight Unit

Item	Symbol	Value			Unit	Note
		Min	Typ	Max.		
LED Forward Current	IF	0		480	mA	(1), (2) Duty=100%

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for input pin of LED light bar at $T_a = 25 \pm 2$ °C (Refer to 4.3.3 and 4.3.4 for further information).

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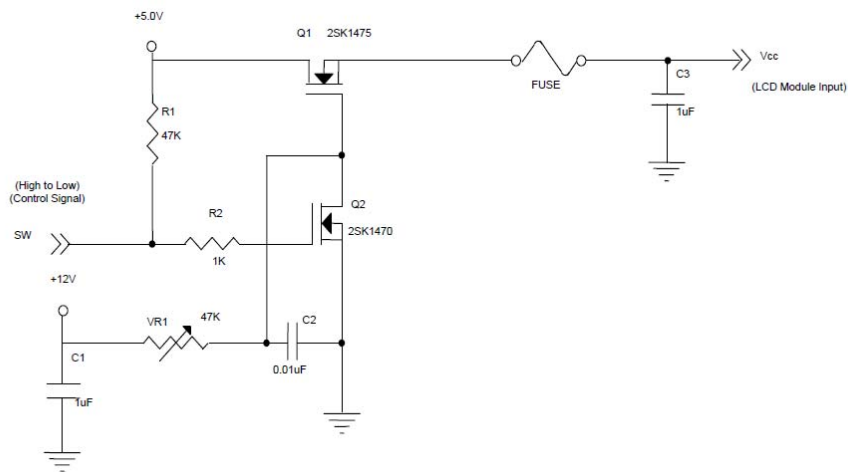
3. Electrical Specification

3.1 TFTLCD Module

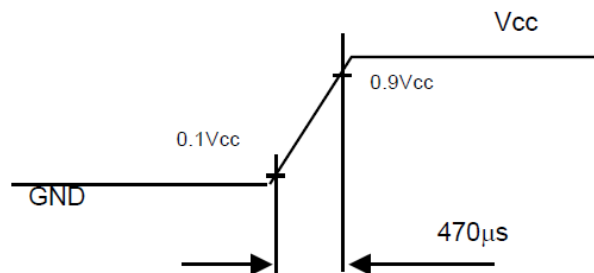
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V_{CC}	3.0	3.3	3.6	V	(1)
Rush Current	I_{RUSH}	-	-	4.0	A	(2)
Power Supply Current	White	530	570	620	mA	(3)
	Black	380	420	460	mA	
Power Consumption	P_L	---	1.9	---	W	
LVDS differential input voltage	$ VID $	100	-	600	mV	-
LVDS common input voltage	V_{ICM}	0.7	-	1.6	V	-

Note (1) The ambient temperature is $T_a = 25 \pm 2 \text{ }^\circ\text{C}$.

Note (2) Measurement Conditions:

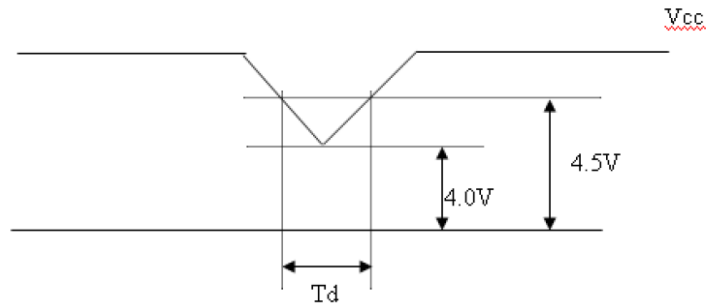


V_{CC} rising time is $470 \mu\text{s}$



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Vcc Power Dip Condition



3.2 BACKLIGHT UNIT

Item	Symbol	Value			Unit	Note
		Min	Typ	Max		
LED Light Bar Input	VPIN		19.8	21		(1), Duty=100%
LED Light Bar Current	IPIN	0	360		mA	(1), (2) Duty=100%
LED Life Time	LLED	30000			Hrs	(3)
Power Consumption	PBL		7.1		W	(1), Duty=100%

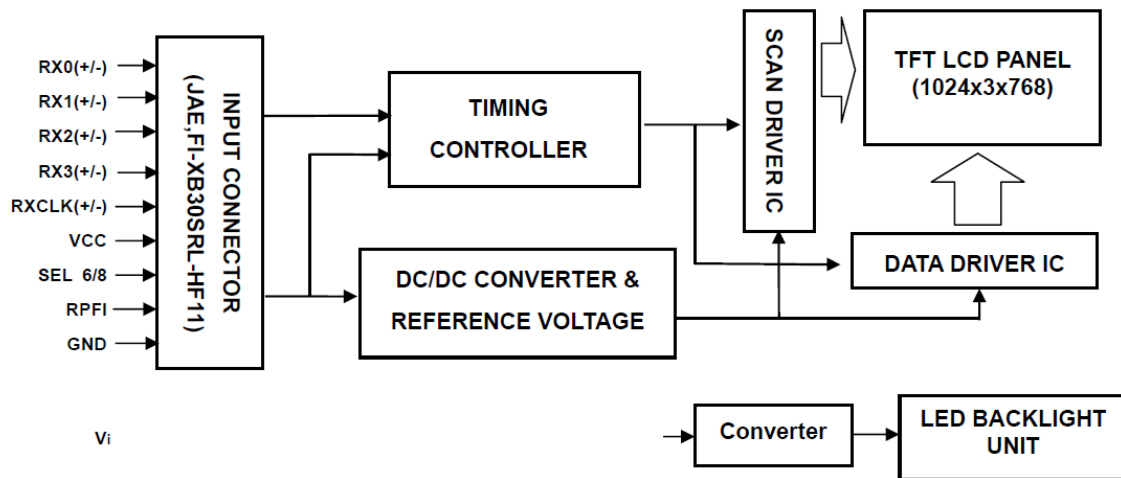
Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

Note (2) $PBL = IPIN \times VPIN$, LED light bar circuit is (6)Series, (8)Parallel.

Note (3) The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at $T_a = 25 \pm 2 \text{ }^\circ\text{C}$ and $I = (60)\text{mA}$ (per chip) until the brightness becomes $\leq 50\%$ of its original value.

Product Specification

4. BLOCK DIAGRAM



LED light bar connector
JST BHSR-02VS-1
Or compatible

Product Specification

5. INTERFACE PIN ASSIGNMENT

5.1 TFTLCD Module

CN1 Connector Pin Assignment

Pin	Name	Description
1	VCC	Power supply: +3.3V
2	VCC	Power supply: +3.3V
3	VCC	Power supply: +3.3V
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	RPFI	Reverse Panel Function (Display Rotation) (Note: 2)
8	NC	No Connection
9	NC	No Connection
10	NC	No Connection
11	SEL6/8	LVDS 6/8 bit select function control, (Note: 2) Low or NC → 8 bit Input Mode High → 6 bit Input Mode
12	GND	Ground
13	NC	No Connection
14	GND	Ground
15	RX0-	Negative LVDS differential data input. Channel 0
16	RX0+	Positive LVDS differential data input. Channel 0
17	GND	Ground
18	RX1-	Negative LVDS differential data input. Channel 1
19	RX1+	Positive LVDS differential data input. Channel 1
20	GND	Ground
21	RX2-	Negative LVDS differential data input. Channel 2
22	RX2+	Positive LVDS differential data input. Channel 2
23	GND	Ground
24	RXCLK-	Negative LVDS differential clock input.
25	RXCLK+	Positive LVDS differential clock input.
26	GND	Ground
27	RX3-	Negative LVDS differential data input. Channel 3
28	RX3+	Positive LVDS differential data input. Channel 3
29	GND	Ground

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30	NC	Not connection
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Note (1) Connector Part No.: JAE, FI-XB30SRL-HF11 or compatible connector

Note (2) "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connected"

5.2 BACKLIGHT UNIT (Under Constructing) (Converter connector pin)

Product Specification

5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

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6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

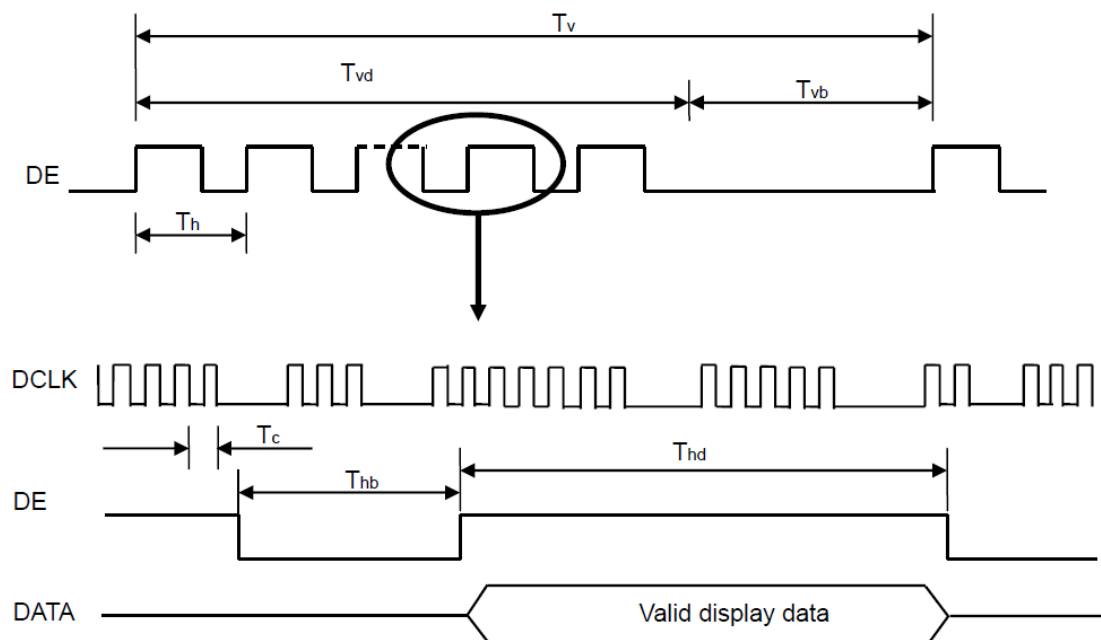
The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	Fc	55	65	75	MHz	
	Total	Tv	770	806	950	Th	Tv=Tvd+Tvb
Vertical Active Display Term	Display	Tvd	768	768	768	Th	-
	Blank	Tvb	2	38	182	Th	-
	Total	Th	1104	1344	1800	Tc	Th=Thd+Thb
Horizontal Active Display Term	Display	Thd	1024	1024	1024	Tc	-
	Blank	Thb	76	320	776	Tc	-
	Total	Tc					

Note (1) Since this assembly is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this assembly would operate abnormally.

(2) Frame rate is 60Hz

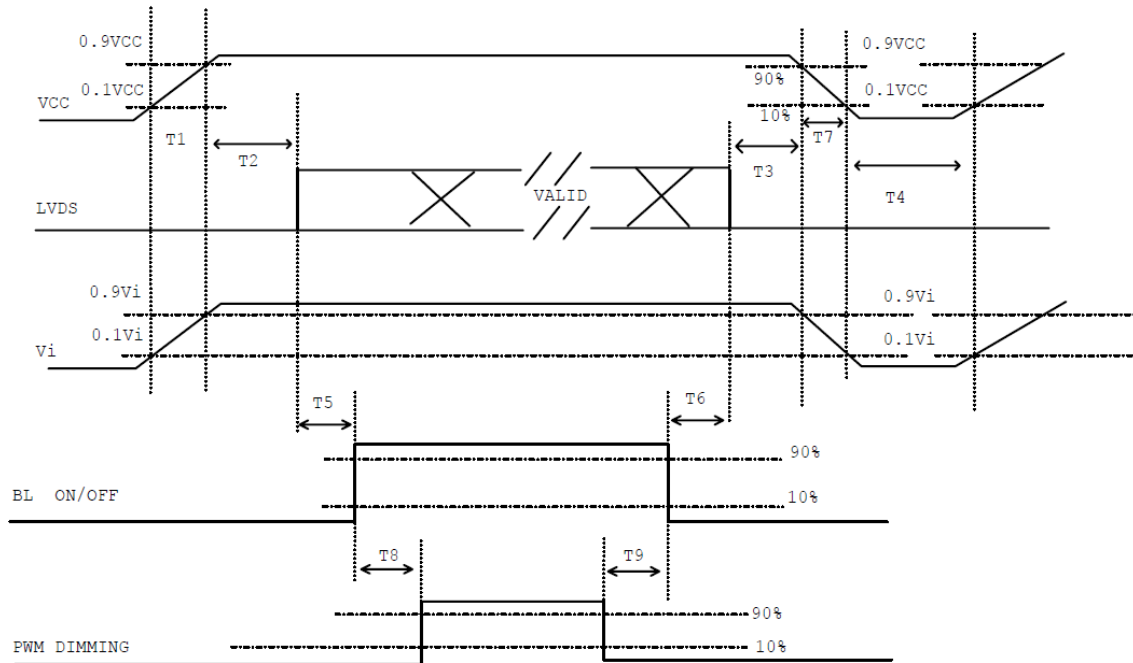
INPUT SIGNAL TIMING DIAGRAM



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6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram below.



Power ON/OFF sequence

Note (1) Please avoid floating state of interface signal at invalid period.

Note (2) When the interface signal is invalid, be sure to pull down the power supply of LCD VCC to 0 V.

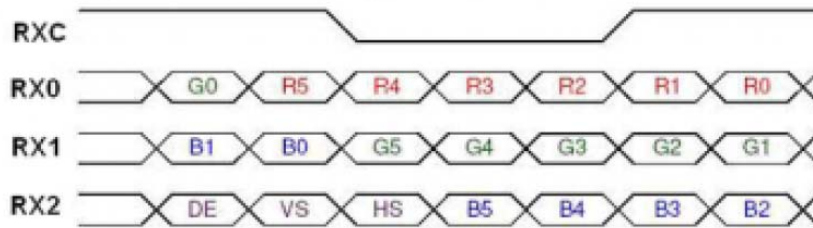
Note (3) The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

Parameter	Value			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	0	-	50	ms
T4	500	-	-	ms
T5	200	-	-	ms
T6	20	-	-	ms
T7	5	-	300	ms
T8	10	-	-	ms
T9	10	-	-	ms

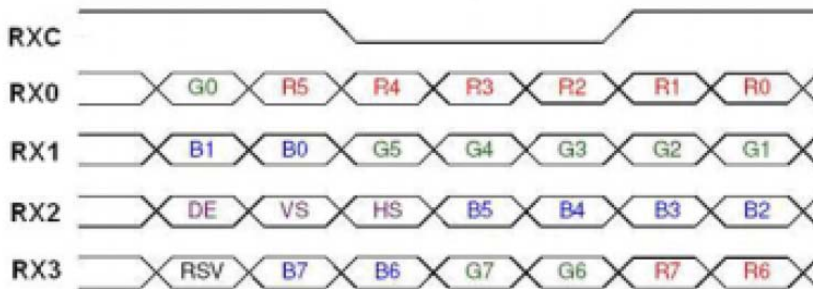
Product Specification

6.3 The Input Data Format

SEL 6/8 = "High" for 6 bits LVDS Input



SEL 6/8 = "Low" or "NC" for 8 bits LVDS Input



Note (1) R/G/B data 7: MSB, R/G/B data 0: LSB

Note (2) Please follow PSWG

Signal Name	Description	Remark
R7	Red Data 7 (MSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
R6	Red Data 6	
R5	Red Data 5	
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0 (LSB)	
G7	Green Data 7 (MSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
G6	GreenData 6	
G5	GreenData 5	
G4	GreenData 4	
G3	GreenData 3	
G2	GreenData 2	
G1	GreenData 1	
G0	GreenData 0 (LSB)	
B7	Blue Data 7 (MSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
B6	Blue Data 6	
B5	Blue Data 5	
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0 (LSB)	
RXCLKIN+ RXCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note (3) Output signals from any system shall be low or Hi-Z state when VCC is off

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7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	% RH
Supply Voltage	Vcc	5	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Converter Current	I _L	TBD	mA

7.2 OPTICAL SPECIFICATIONS

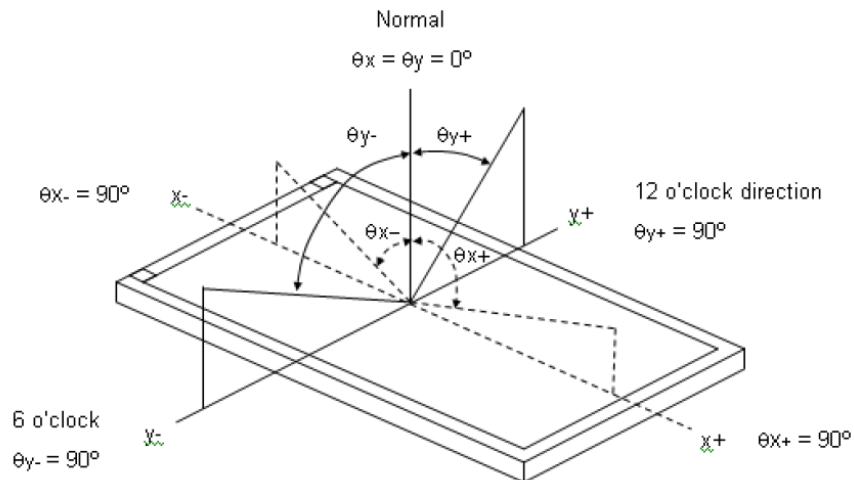
The relative measurement methods of optical characteristics are shown in 7.2.

The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Color Chromaticity (CIE 1931)	Red	Rx	Typ-0.03	0.60	Ty+0.03		(5)
		Ry					
	Green	Gx					
		Gy					
	Blue	Bx					
		By					
	White	Wx					
		Wy					
Center Luminance of White (Center of Screen)		L _C	700	800		Cd/m ²	(4)
Contrast Ratio		CR	700	1000			(2)
Response Time		TR	θ _X =0 ⁰ , θ _Y =0 ⁰	14	19	ms	(3)
		TF		11	16		
View angle	Horizontal	θ _{X-} - θ _{X+}	CR ≥ 10	160	176	Deg.	(1)
	Vertical	θ _{Y-} - θ _{Y+}		160	176		

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Note (1) Definition of Viewing Angle (θ_x , θ_y)



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

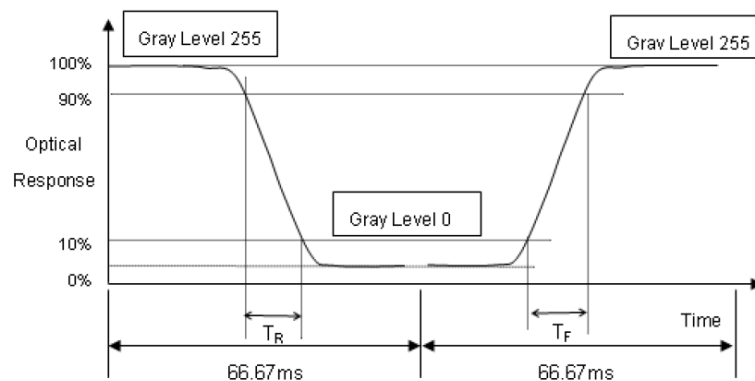
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

$$\text{CR} = \text{CR} (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R , T_F):



Note (4) Definition of Luminance of White (LC):

Measure the luminance of gray level 255 at center point

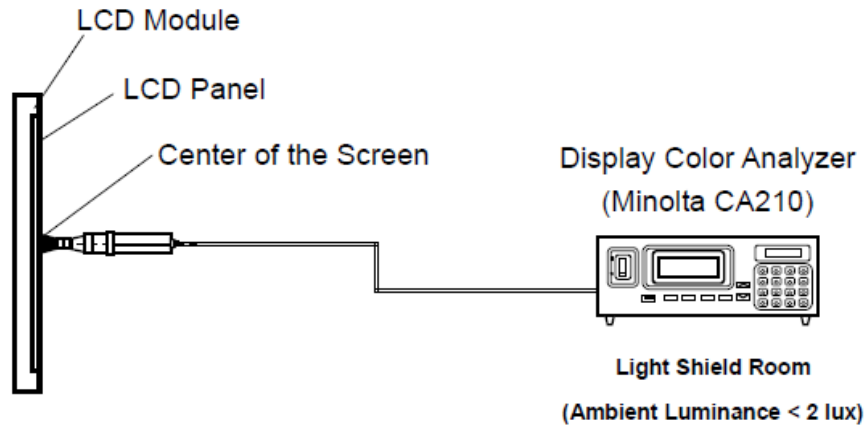
$$\text{LC} = L (5)$$

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

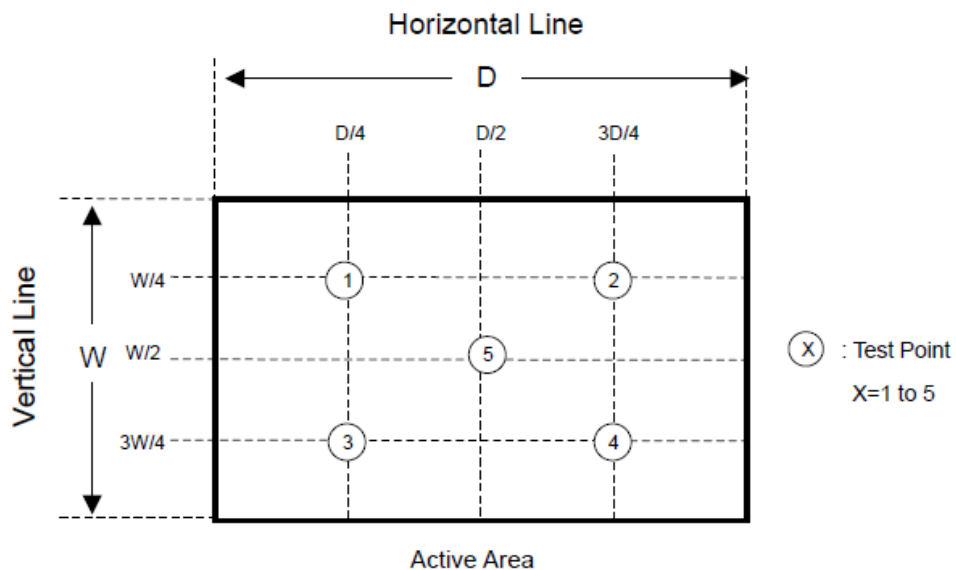
Product Specification

Note (5): Measurement method

The LCD module should be stabilized at given temperature for 0.5 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.



Note (6): Luminance uniformity of these 5 points is defined as below and measured by Topcon BM-7



$$\text{Uniformity} = (\text{Min. Luminance of 5 points}) / (\text{Max. Luminance of 5 points})$$

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8. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50°C , 80%RH, 240hours	
High Temperature Operation (HTO)	Ta= 70°C , 50%RH, 240hours	
Low Temperature Operation (LTO)	Ta= -20°C , 240hours	
High Temperature Storage (HTS)	Ta= 70°C , 240hours	
Low Temperature Storage (LTS)	Ta= -20°C , 240hours	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20°C/30min, 70°C/30min, 100 cycles	1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (ElectroStatic Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω) 1sec, 9 points, 25 times/ point.	2
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 9 points, 25 times/ point.	2

Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -20°C to 60°C , and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

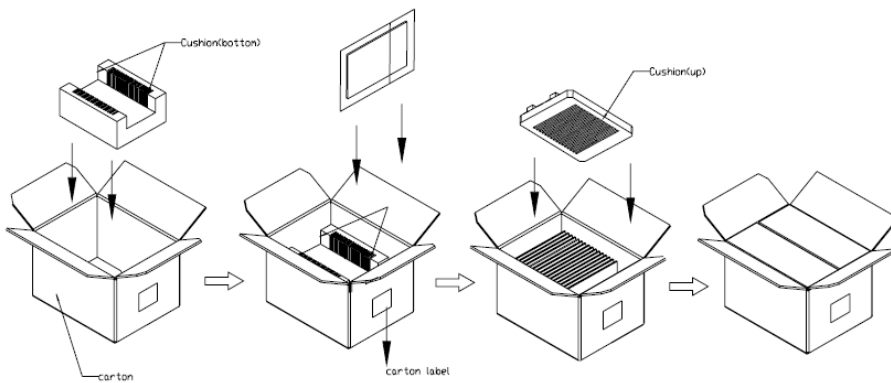
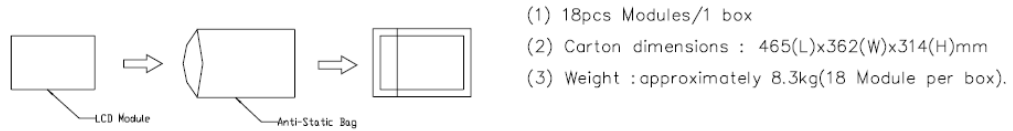
Note 2: According to EN61000-4-2 , ESD class B: Some performance degradation allowed. No data lost. Self-recoverable. No hardware failures.

Note 3: The test items are tested by open frame type chassis.

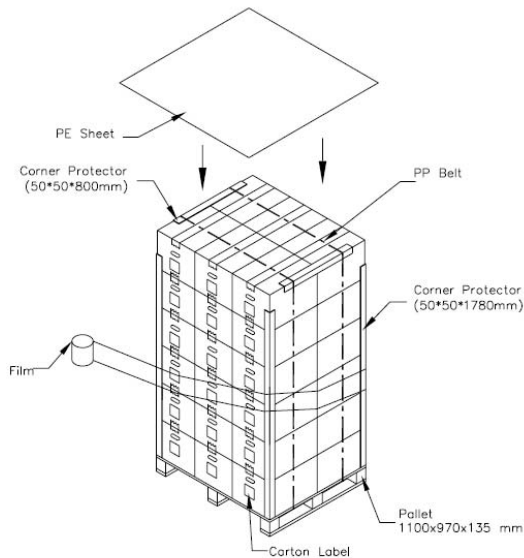
Product Specification

9. Shipping Label & Package

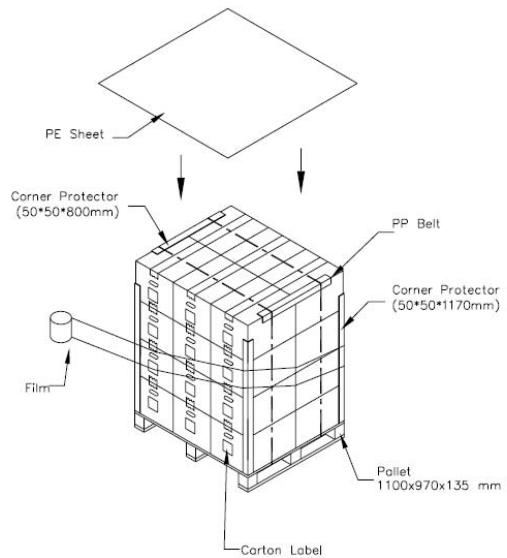
- (1) 18pcs LCD modules / 1 Box
- (2) Box dimensions: 465 (L) X 362 (W) X 314 (H) mm
- (3) Weight: approximately 8.3Kg (18 modules per box)



Sea / Land Transportation (40ft Container)

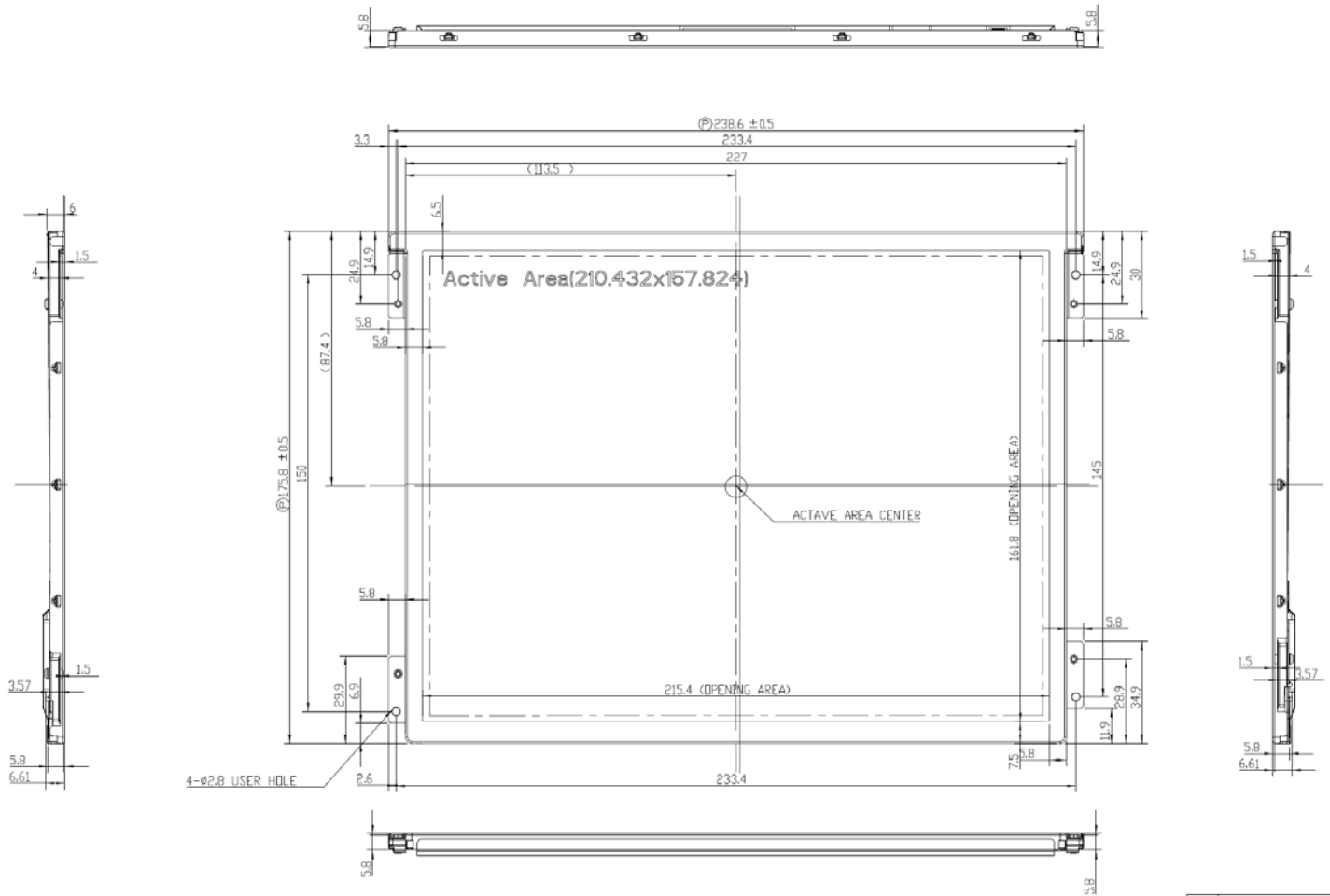


Air Transportation

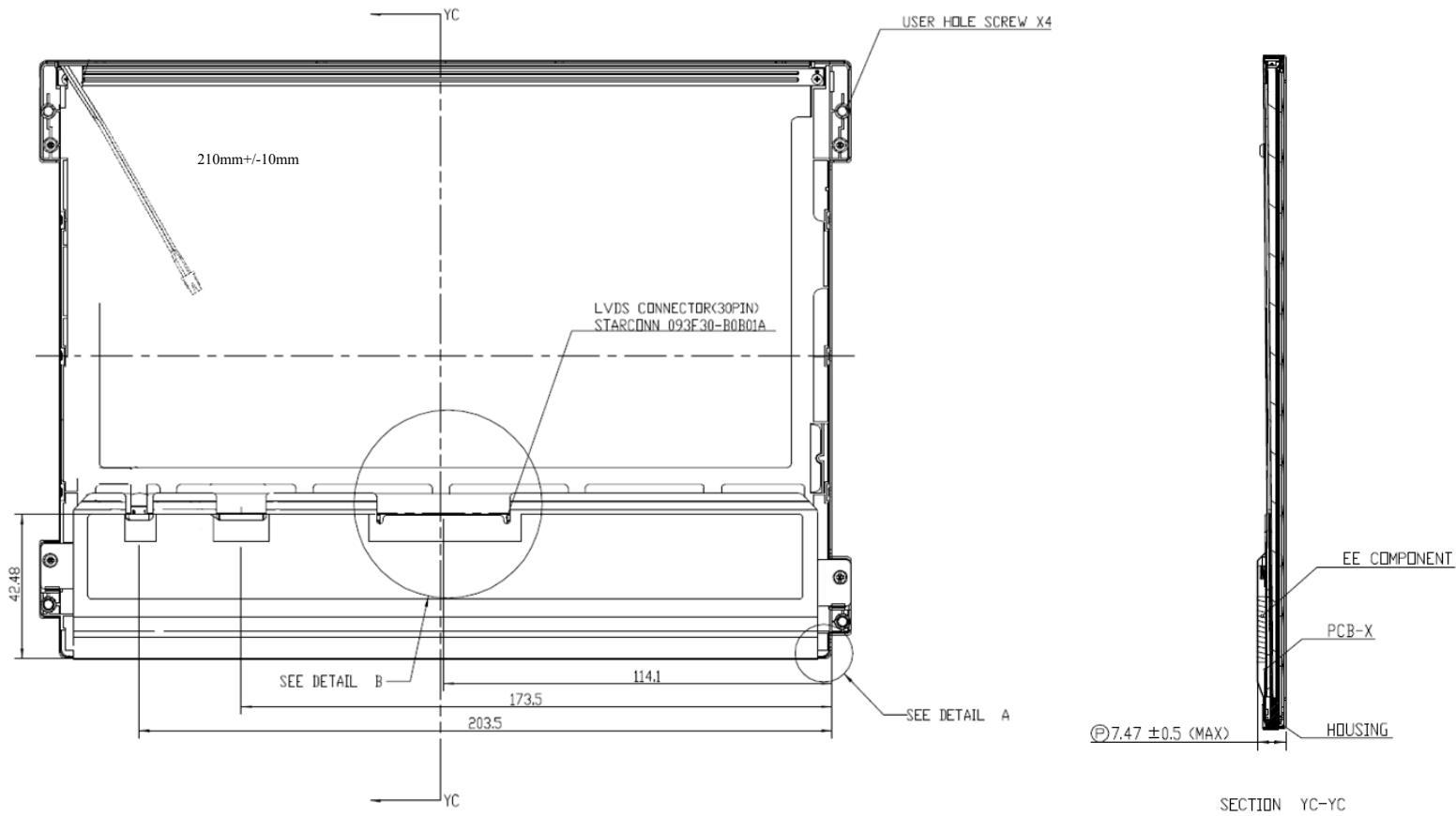


Product Specification

10. Mechanical Characteristic



Product Specification



Product Specification

