

## ***TFT-Display Datenblatt***

Modell PD121XL2

### **Kurzdaten**

Hersteller	PrimeView
Diagonale	12,1" / 30,7cm
Format	4:3
Auflösung	1024x768
Backlight	LED/1200cd/m <sup>2</sup>
Temperatur	-30...+70°C (Betrieb)

Version :0.1

Preliminary



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TECHNICAL SPECIFICATION  
MODEL NO. : PD121XL2

The content of this information is subject to be changed without notice.  
Please contact PVI or its agent for further information.

Customer's Confirmation

Customer \_\_\_\_\_

Date \_\_\_\_\_

By \_\_\_\_\_

PVI's Confirmation

Dep	FAE	Panel Design	Electronic Design	Mechanical Design	Product Verification	Prepared by
SIGN						

## *Revision History*

<b>Rev.</b>	<b>Eng.</b>	<b>Issued Date</b>	<b>Revised</b>	<b>Contents</b>
0.1	黄秀晶	Oct 24, 2007		Preliminary SPEC

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**TECHNICAL SPECIFICATION****CONTENTS**

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### 1.Application

The PD121XL2 is a 12.1" TFT-LCD module with a 2-LED Backlight Unit and a 20-pin 1ch-LVDS interface. This module supports 1024 x768 XGA mode and displays 262,144 colors. The inverter module for the Backlight Unit is not built in.

This module can apply TFT-LCD monitor, TV, Factory application, Amusement Vehicle, and so on.

### 2. Features

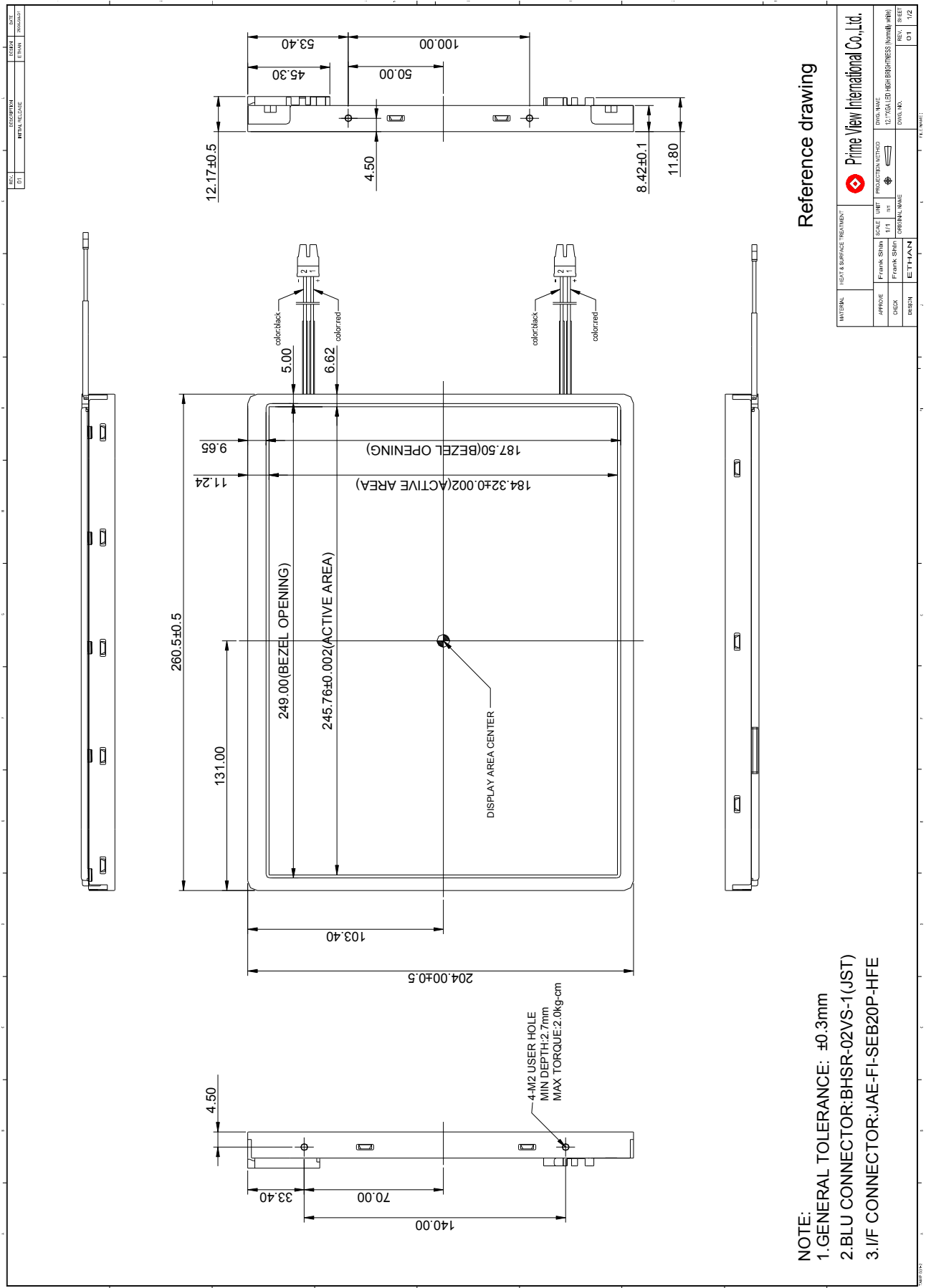
- Wide viewing angle
- High contrast ratio
- High Brightness project
- Fast response time
- High color saturation
- XGA (1024 x768 pixels) resolution
- Wide operating temperature
- DE (Data Enable) mode
- LVDS (Low Voltage Differential Signaling) interface
- RoHS Compliance

### 3.Mechanical Specifications

<b>Parameter</b>	<b>Specifications</b>	<b>Unit</b>
Screen Size	12.1 (diagonal)	inch
Display Format	1024×(R, G, B)×768	dot
Display Colors	262,144	
Active Area	245.76(H)×184.32(V)	mm
Pixel Pitch	0.240(H)×0.240(V)	mm
Pixel Configuration	Stripe	
Outline Dimension	260.5(W)×204.0(H)×12.17(typ.) (D)	mm
Weight	(660±20)	g
Back-light	Middle power LED 20pcs *2	
Surface treatment	Anti-glare & Hard Coating	
Display mode	Normally White	

( )- reference only data

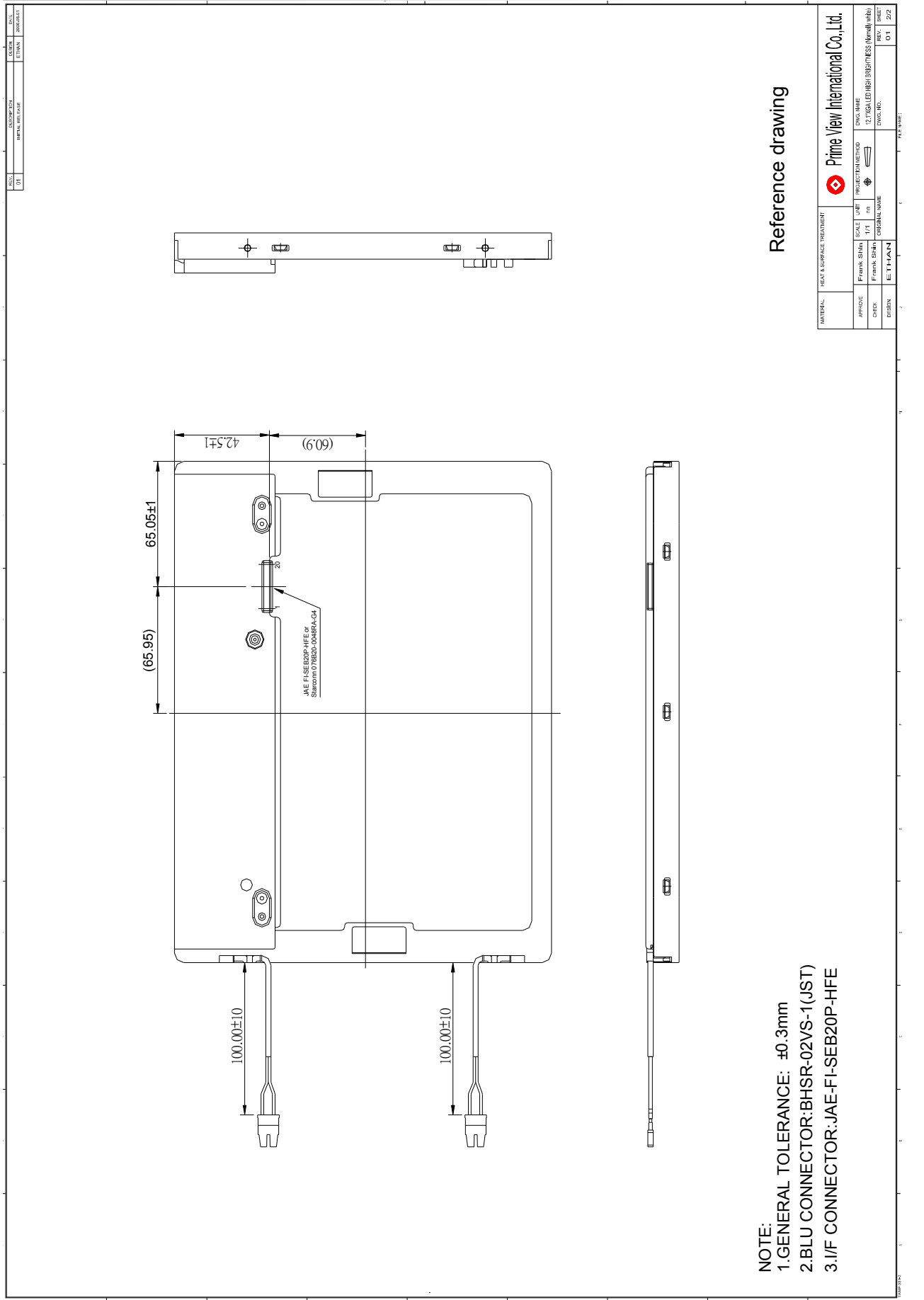
**4. Mechanical Drawing of TFT-LCD Module:**



Reference drawing

MATERIAL		HEAT & SURFACE TREATMENT		PROJECT NUMBER		DRAWING DATE		DESIGNER		CHECKER		DATE	
FRONT		SCALE		UNIT		PROJECT NAME		DRAWING NO.		REV.		REV. DATE	
APPROVE		FRANK SHIN		1/1		22" TFT-LCD HIGH BRIGHTNESS Normal White		0001		D1		1/2	
DESIGN		ETHAN		FRANK SHIN		0001		0001		D1		1/2	
DRAWN		ETHAN		FRANK SHIN		0001		0001		D1		1/2	

- NOTE:
1. GENERAL TOLERANCE: ±0.3mm
  2. BLU CONNECTOR: BHSR-02VS-1 (JST)
  3. I/F CONNECTOR: JAE-FI-SEB20P-HFE



REV.	DESCRIPTION	DATE	BY
1	INITIAL RELEASE		

MATERIAL	HEAT & SURFACE TREATMENT	APPROVE	SCALE	UNIT	PROJECT/METHOD	DWG. NAME
		Frank SHAN	1:1	mm		
CHIEF	DESIGN	ORIGINAL NAME				
		E THIAN				

Prime View International Co., Ltd.

DWG. NO.	DWG. DATE	REV.	SHEET
		01	2/2

**5. Input / Output Terminals**
**5-1) TFT-LCD Panel Driving**

Connector type: JAE-FI-SEB20P-HFE or STARCONN 076B20-0048RA-G4.

Pin No.	Symbol	Function	Remark
1	Vcc_IN	Power Supply ( 3.3V)	
2	Vcc_IN	Power Supply ( 3.3V)	
3	GND	Ground	
4	GND	Ground	
5	RX0-	Differential Data Input, CH0 (Negative )	R0~R5,G0
6	RX0+	Differential Data Input, CH0 ( Positive )	
7	GND	Ground	
8	RX1-	Differential Data Input, CH1 ( Negative )	G1~G5,B0,B1
9	RX1+	Differential Data Input , CH1 ( Positive )	
10	GND	Ground	
11	RX2-	Differential Data Input , CH2 (Negative )	B2~B5,DE,Hsync,Vsync
12	RX2+	Differential Data Input , CH2 (Positive )	
13	GND	Ground	
14	CLK-	Differential Clock Input ( Negative )	LVDS Level clock
15	CLK+	Differential Clock Input (Positive)	
16	GND	Ground	
17	NA	Non-connection	
18	NA	Non-connection	
19	GND	Ground	
20	GND	Ground	

**5-2) Backlight driving**

Connector type: JST BHSR-02VS-1, PIN No 2 pin

Pin No	Symbol	Description	Remark
1	+	Input terminal (Anode)	Wire color : Red
2	-	Input terminal (Cathode)	Wire Color : Black

**6. Absolute Maximum Ratings:**

The followings are maximum values, which if exceeded, may cause faulty operation or damage to the unit.

GND=0V, Ta=25°C

Parameters	Symbol	MIN.	MAX.	Unit	Remark
Supply Voltage	V <sub>CC</sub>	-0.3	+4.0	V	
Logic input Voltage	V <sub>in</sub>	-0.3	+2.7	V	Note 6-1

Note 6-1: 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.

7. Electrical Characteristics

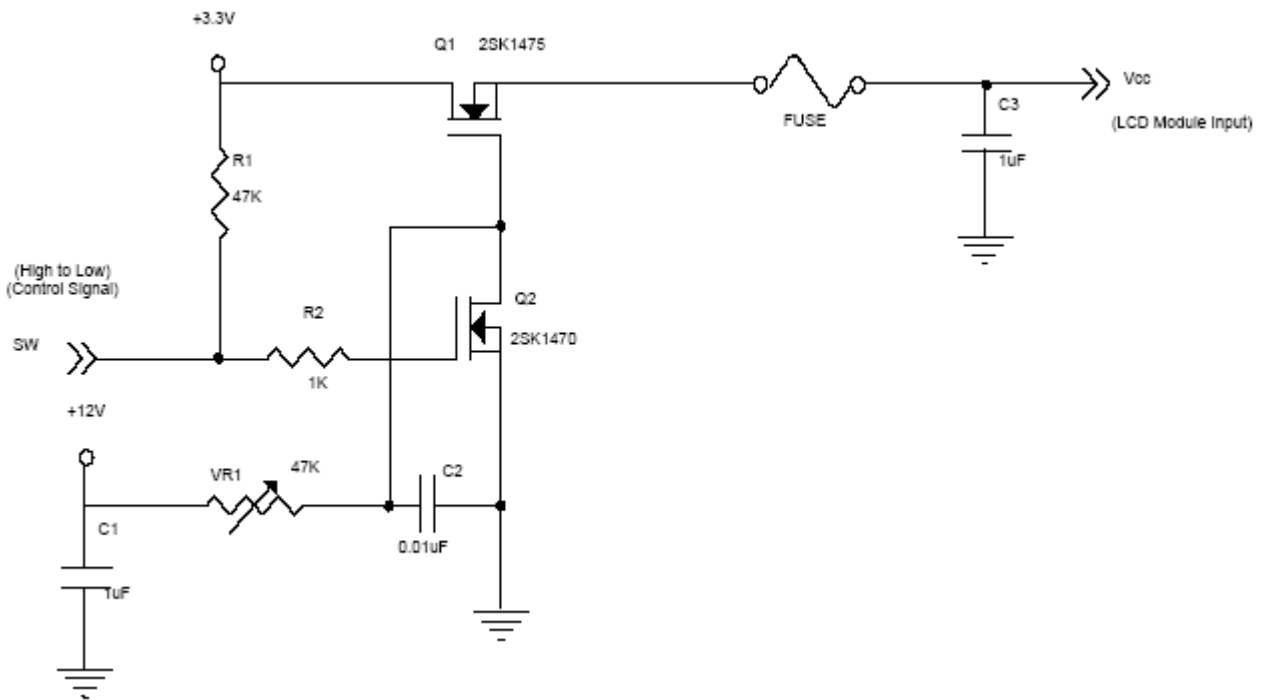
7-1) Recommended Operating Conditions:

Ta=25 ± 2°C

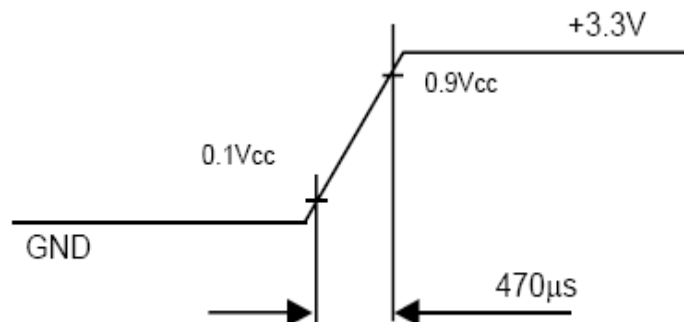
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V <sub>CC</sub>	3.0	3.3	3.6	V	-
Ripple Voltage	V <sub>RP</sub>	-	-	100	mV	-
Rush Current	I <sub>RUSH</sub>	-	-	1.0	A	Note 7-1
Power Supply Current	White	-	350	490	mA	Note 7-2
	Black	-	510	650	mA	Note 7-3
LVDS differential voltage	V <sub>id</sub>	-100	-	+100	mV	
LVDS common input voltage	V <sub>ic</sub>	-	1.2	-	V	

Note7-1 The module is recommended to operate within specification ranges listed above for normal function.

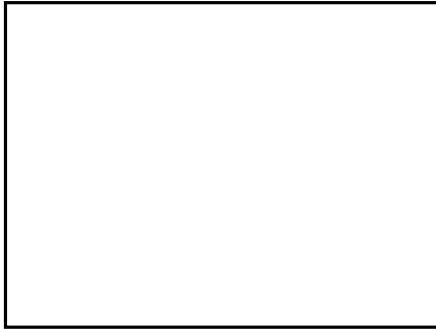
Note 7-2 Measurement Conditions:



**Vcc rising time is 470s**



Note 7-3 : The specified power supply current is under the conditions at  $V_{CC} = 3.3\text{ V}$ ,  $T_a = 25 \pm 2^\circ\text{C}$ ,  $f_v = 60\text{ Hz}$ , where as a power dissipation check pattern below is displayed.



a. White Pattern



b. Black Pattern

7-2) Recommended driving condition for LED backlight: ( )- reference only data

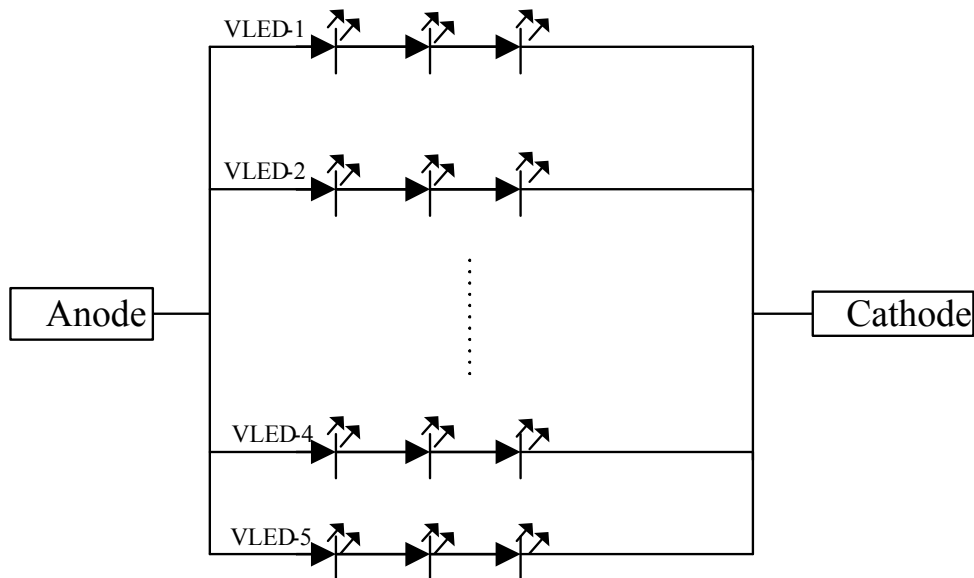
$T_a = 25^\circ\text{C}$

Parameter	Symbol	Min	TYP	MAX	Unit	Remark
Supply voltage of LED backlight	$V_{LED1\sim5}$	-	(9.9)	-	V	Note 7-3
Supply current of LED backlight	$I_{LED1\sim5}$	-	150	-	mA	Note 7-4
Backlight Power Consumption	$P_{LED}$	-	(7.425)	-	W	Note 7-5

Note 7-3 :  $I_{LED} = 150\text{mA}$ (Constant Current).

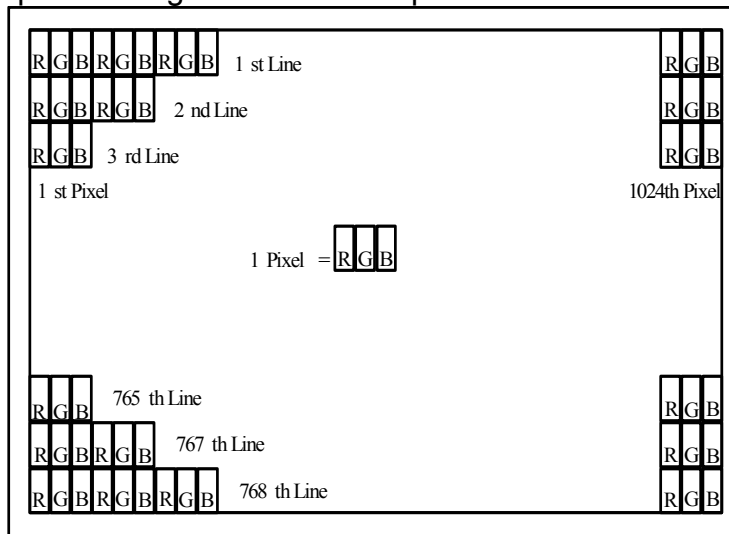
Note 7-4: The LED driving condition is defined for each LED module. (4 LED Serial)  
 Input current =  $150\text{mA} * 5 = 750\text{mA}$

Note 7-5:  $P_{LED} = (V_{LED1} * I_{LED1} + V_{LED2} * I_{LED2} + \dots + V_{LED4} * I_{LED4} + V_{LED5} * I_{LED5}) * 2$  (light bar)



**8. Pixel Arrangement**

The LCD module pixel arrangement is the stripe.



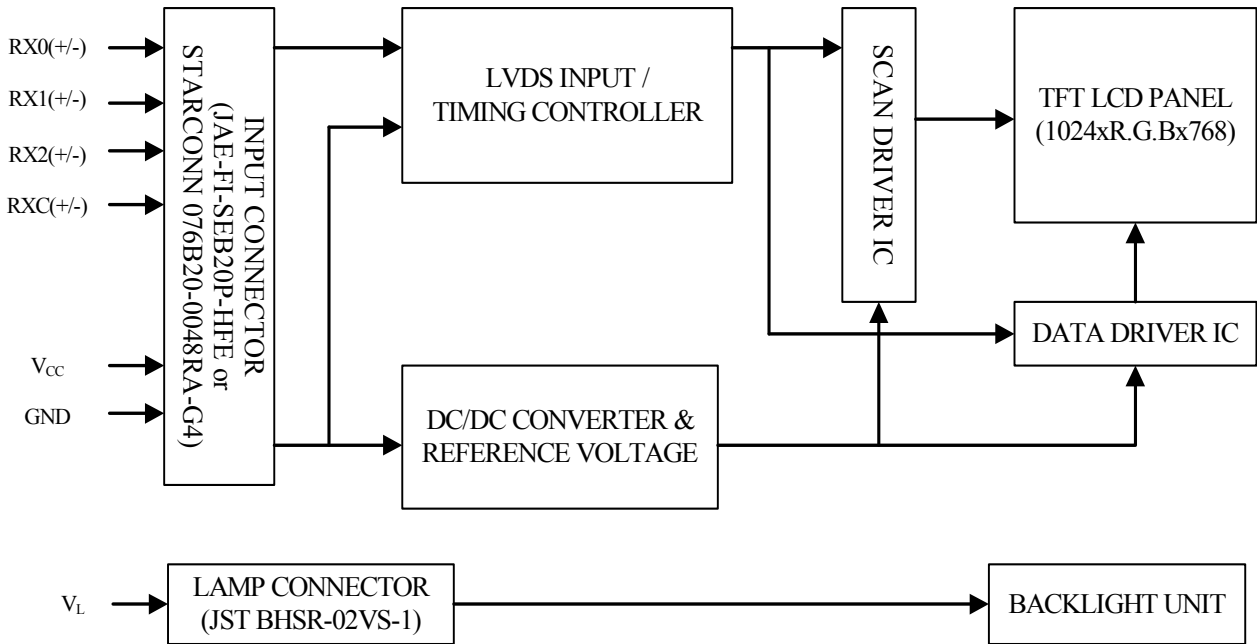
**9. Display Color and Gray Scale Reference**

Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	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
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
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
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Red(63)	1	1	1	1	1	1	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
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
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	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	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
	Blue(1)	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	1
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	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	

Note 9-1: 0: Low Level Voltage, 1: High Level Voltage

10. Block Diagram

10-1) TFT-module Block Diagram



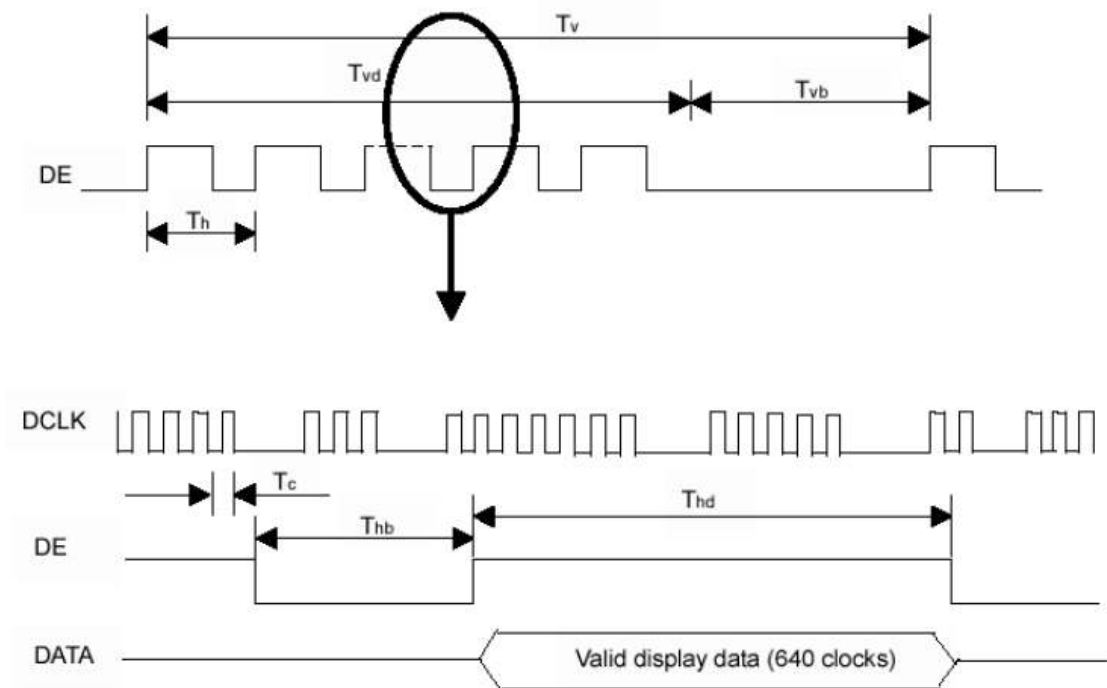
11. Interface Timing

11-1) Timing Parameters

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	Fc	57.5	64.9	74.4	MHz	
	Period	Tc	13.4	15.4	17.3	ns	
Vertical Active Display Term	Frame Rate	Fr	56	60	75	Hz	
	Total	Tv	774	806	848	Th	Tv=Tvd+Tvb
	Display	Tvd	768	768	768	Th	
Horizontal Active Display Term	Blank	Tvb	Tv-Tvd	38	Tv-Tvd	Th	
	Total	Th	1240	1344	1464	Tc	Th=Thd+Thb
	Display	Thd	1024	1024	1024	Tc	
Horizontal Active Display Term	Blank	Thb	Th-Thd	320	Th-Thd	Tc	

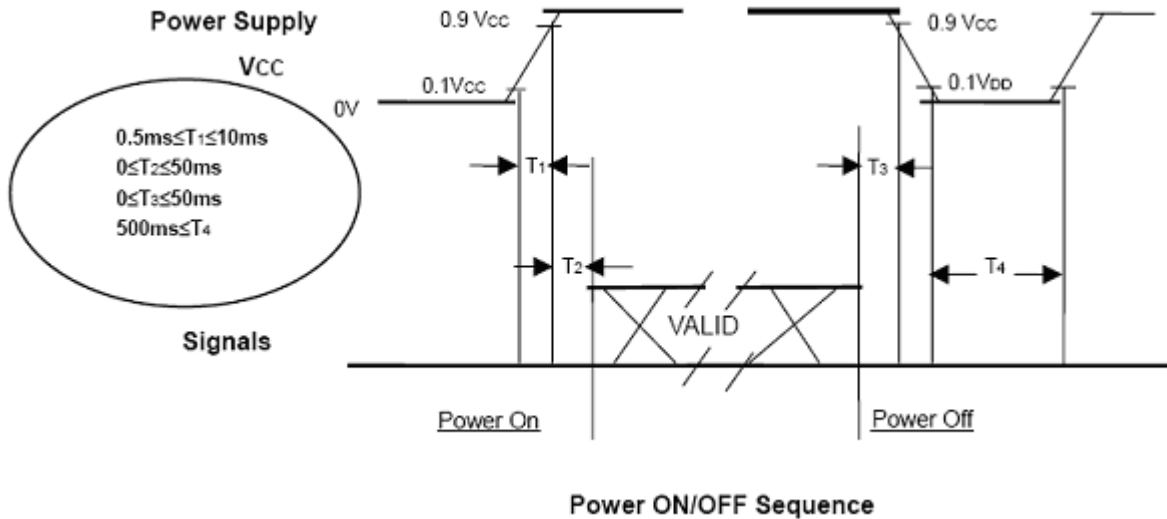
Note11-1 : Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

**INPUT SIGNAL TIMING DIAGRAM**



**12. Power On Sequence**

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should follow the conditions shown in the following diagram.



Note 12-1 Please avoid floating state of interface signal at invalid period.

Note 12-2 When the interface signal is invalid, be sure to pull down the power supply of LCD Vcc to 0 V.

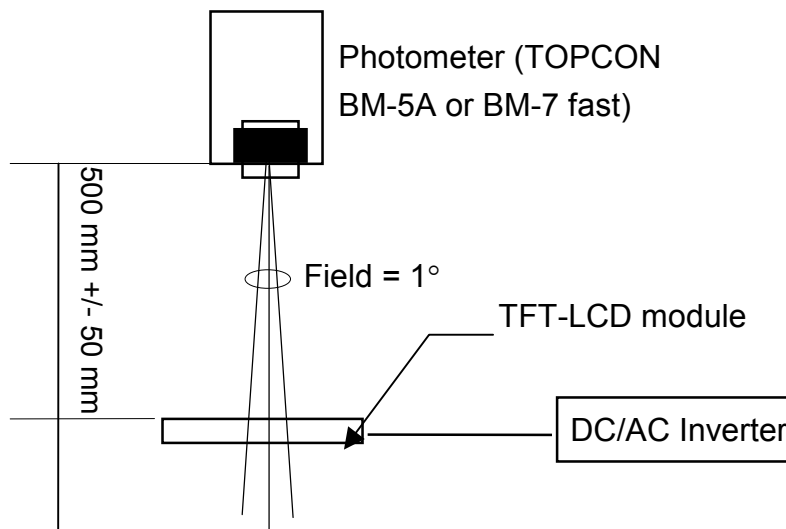
13. Optical Characteristics

13.1) Specification: ( ) - reference only data

Ta=25°C

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	$\theta$ 21.22	70	80	-	deg	Note 13-2
	Vertical	$\theta$ 12 (12 o'clock)	70	80	-	deg	
		$\theta$ 11 (6 o'clock)	70	80	-	deg	
Contrast Ratio	CR	$\theta = 0^\circ$	(800)	(1000)		-	Note 13-4
Response time	Rise	Tr	-	13	18	ms	Note 13-3
	Fall	Tf	-	12	17	ms	
Brightness	L	$\theta = 0^\circ / \varphi = 0$	(1000)	(1200)	-	cd/m <sup>2</sup>	Note 13-1
LED Life Time	-	-	TBD	-	-	hr	Note 13-6
White Chromaticity	x	$\theta = 0^\circ / \varphi = 0$	TBD	TBD	TBD	-	Note 13-1
	y	$\theta = 0^\circ / \varphi = 0$	TBD	TBD	TBD	-	
White Variation	W	-	-	1.25	1.4	-	Note 13-5

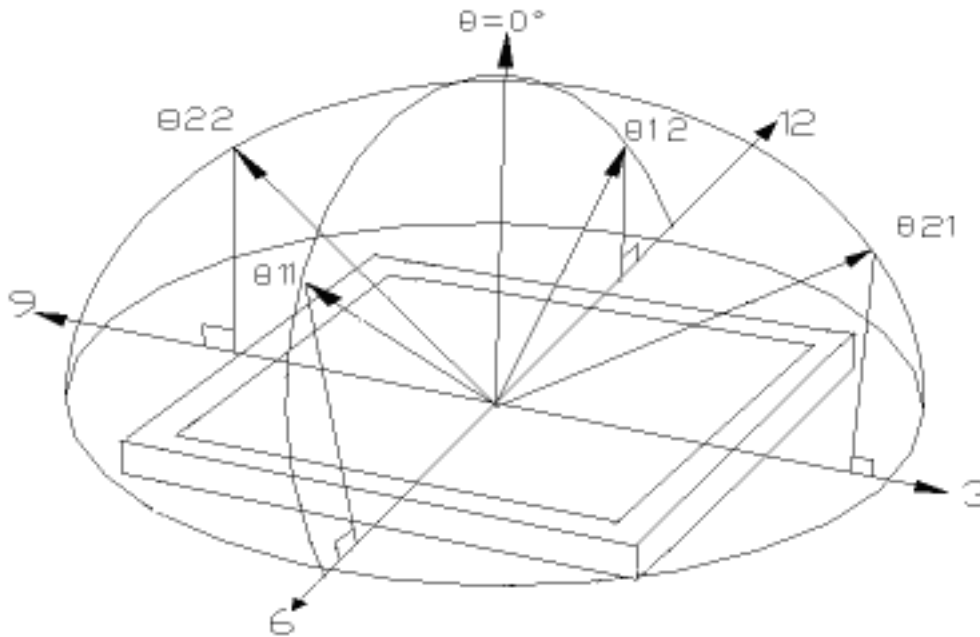
All the optical measurement shall be executed 30 minutes after backlight being turn-on. The optical characteristics shall be measured in dark room (ambient illumination on panel surface less than 1 Lux). The measuring configuration shows as following figure.



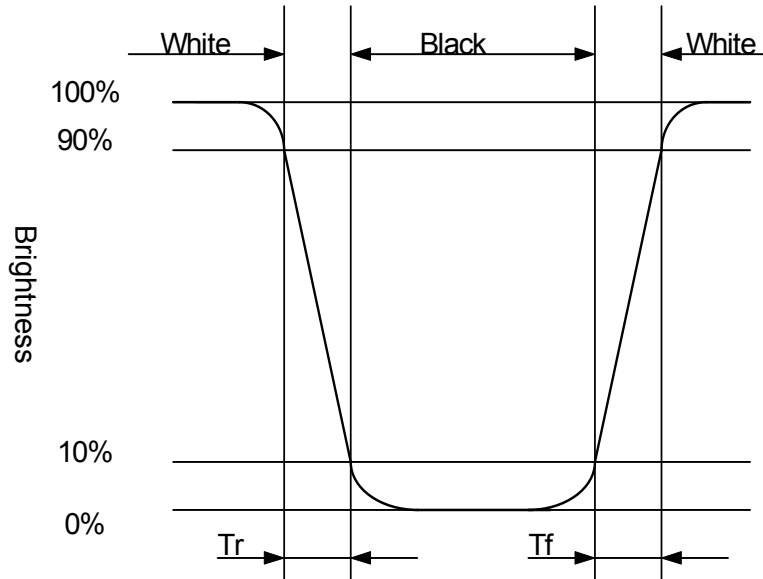
Optical characteristics measuring configuration

Note 13-1: Topcon BM-5A or BM-7 fast luminance meter 1° field of view is used in the testing (after 30 minutes' operation). The typical luminance value is measured at led current 750 mA.

Note 13-2: The definitions of viewing angles are as follow



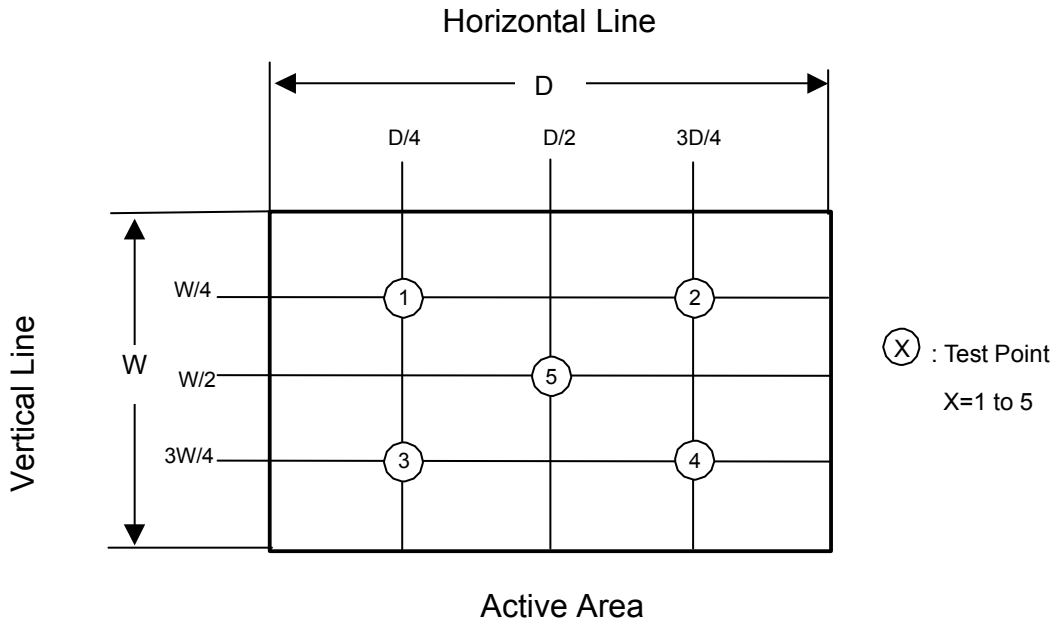
Note 13-3: Definition of Response Time  $T_r$  and  $T_f$



Note 13-4: The definition of contrast ratio  $CR = \frac{\text{Luminance at gray level 63}}{\text{Luminance at gray level 0}}$

Note 13-5: Definition of White Variation (W):  
 Measure the luminance of gray level 63 at

$$W = \frac{\text{Maximum [L (1), L (2), L (3), L (4), L (5)]}}{\text{Minimum [L (1), L (2), L (3), L (4), L (5)]}}$$



Note 13-6: The “LED Life time “ is defined as the module brightness decrease to 50% original Brightness that the ambient temperature is 25°C and I<sub>LED</sub> =150mA.

**14. Handling Cautions****14-1) Mounting of module**

- a) Please power off the module when you connect the input/output connector.
- b) Polarizer which is made of soft material and susceptible to flaw must be handled carefully.
- c) Protective film (Laminator) is applied on surface to protect it against scratches and dirt. It is recommended to peel off the laminator before use and taking care of static electricity.

**14-2) Precautions in mounting**

- a) When metal part of the TFT-LCD module (shielding lid and rear case) is soiled, wipe it with soft dry cloth.
- b) Wipe off water drops or finger grease immediately. Long contact with water may cause discoloration or spots.
- c) TFT-LCD module uses glass which breaks or cracks easily if dropped or bumped on hard surface. Please handle with care.
- d) Since CMOS LSI is used in the module. So take care of static electricity and earth yourself when handling.

**14-3) Adjusting module**

- a) Adjusting volumes on the rear face of the module have been set optimally before shipment.
- b) Therefore, do not change any adjusted values. If adjusted values are changed, the specifications described may not be satisfied.

**14-4) Others**

- a) Do not expose the module to direct sunlight or intensive ultraviolet rays for many hours.
- b) Store the module at a room temperature place.
- c) The voltage of beginning electric discharge may over the normal voltage because of leakage current from approach conductor by to draw lump read lead line around.
- d) If LCD panel breaks, it is possibly that the liquid crystal escapes from the panel. Avoid putting it into eyes or mouth. When liquid crystal sticks on hands, clothes or feet. Wash it out immediately with soap.
- e) Observe all other precautionary requirements in handling general electronic components.
- f) Please adjust the voltage of common electrode as material of attachment by 1 module.

**15. Reliability Test**

No	Test Item	Test Condition
1	High Temperature Storage Test	Ta = +80°C, 240 hrs
2	Low Temperature Storage Test	Ta = -40°C, 240 hrs
3	High Temperature Operation Test	(Ta = +70°C, 240 hrs)
4	Low Temperature Operation Test	Ta = -30°C, 240 hrs
5	High Temperature & High Humidity Operation Test	Ta = 60°C, 90%RH, 240 hrs
6	Thermal Cycling Test (non-operating)	-40°C, 0.5hour→+80°C, 0.5hour, 100Cycles,1hr/cycle
7	Vibration Test (non-operating)	5G,10 ~ 300 Hz, 10min/cycle , 3cycles each X, Y, Z
8	Shock Test (non-operating)	200G, 2ms, half sine wave Direction: ±X, ±Y, ±Z Cycle: 1 time
9	Electrostatic Discharge Test (Operation)	150pF, 330Ω, 1sec/cycle Panel contact ±8KV Panel non-contact ±15KV

Ta: ambient temperature

**[Criteria]**

In the standard conditions, there is not display function NG issue occurred. (including : line defect ,no image). All the cosmetic specification is judged before the reliability stress.

16.Packing Diagram

ZONE	REV.	DOCUMENT NO.	DESCRIPTION	DATE	REV.BY																														
<p><b>NOTE:</b>                      1.Q'TY: 15 pcs panel/carton.                      2.Dimension: 465*362*314 mm                      3.Weight: 12 Kg                      4.Reference drawing</p>																																			
		<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>ITEM</th> <th>PART NO.</th> <th>DESCRIPTION</th> <th>QTY</th> <th>REMARK</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>50-0100291</td> <td>CARTON</td> <td>1</td> <td></td> </tr> <tr> <td>4</td> <td>50-0500301</td> <td>Anti-static Bag</td> <td>15</td> <td>抗靜電</td> </tr> <tr> <td>3</td> <td></td> <td>12.1"XGA(LED type)</td> <td>15</td> <td></td> </tr> <tr> <td>2</td> <td>50-0200100</td> <td>PE FOAM</td> <td>1</td> <td>底座</td> </tr> <tr> <td>1</td> <td>50-0200099</td> <td>PE FOAM</td> <td>2</td> <td>上蓋</td> </tr> </tbody> </table>		ITEM	PART NO.	DESCRIPTION	QTY	REMARK	5	50-0100291	CARTON	1		4	50-0500301	Anti-static Bag	15	抗靜電	3		12.1"XGA(LED type)	15		2	50-0200100	PE FOAM	1	底座	1	50-0200099	PE FOAM	2	上蓋		
ITEM	PART NO.	DESCRIPTION	QTY	REMARK																															
5	50-0100291	CARTON	1																																
4	50-0500301	Anti-static Bag	15	抗靜電																															
3		12.1"XGA(LED type)	15																																
2	50-0200100	PE FOAM	1	底座																															
1	50-0200099	PE FOAM	2	上蓋																															
MTL.SPEC.		UNSPECIFIED TOL'S ANGLE ROUGHNESS		REMARK																															
APPROVE	Frank	SCALE	UNIT	SHEET	DWG.TITLE																														
CHECK	Frank			1 OF 1	12.1"XGA(LED type) module																														
DRAWN	Ethan	MTL.NO.		DWG FILE:	REV. 01 A4 SIZE																														
	'07.07.03																																		