Version :0.1

Preliminary

TECHNICAL SPECIFICATION

MODEL NO. : PD121XL2

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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						

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Revision History

Rev.	Eng.	Issued Date	Revised Contents
0.1	黃秀晶	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

Parameter	Specifications	Unit
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

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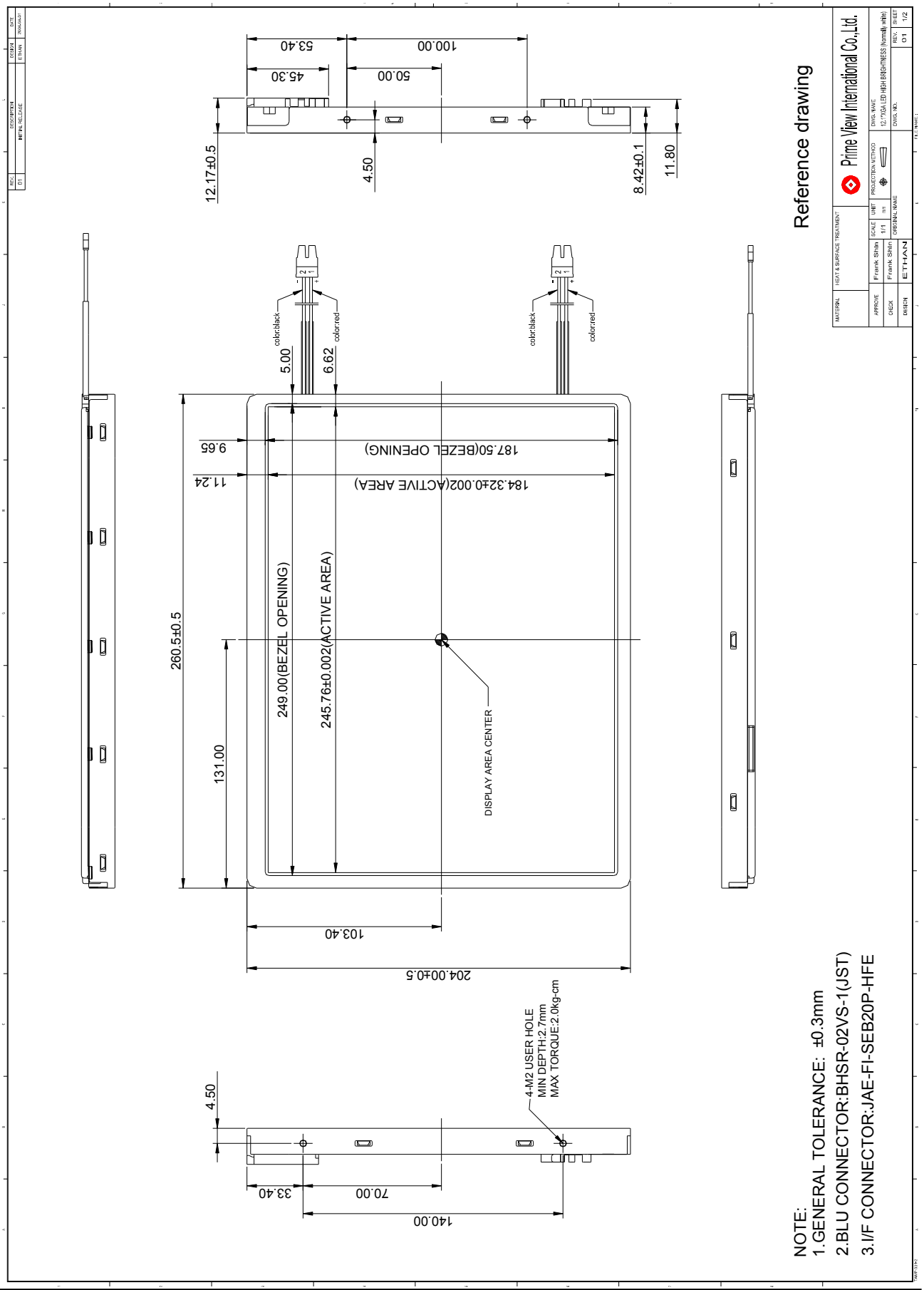
4.Mechanical Drawing of TFT-LCD Module:



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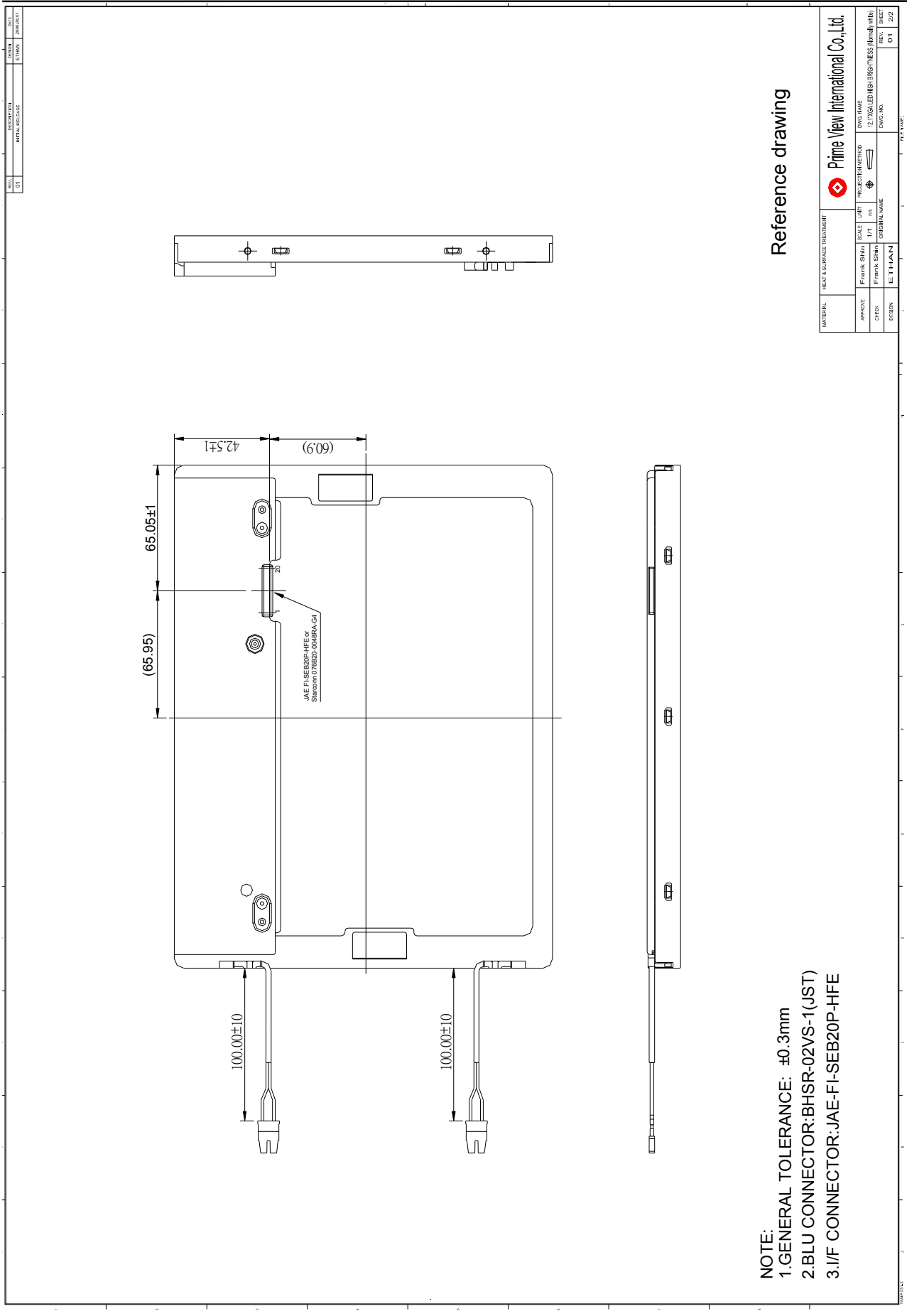

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5.Input / Output Terminals

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	RXO-	Differential Data Input, CH0 (Negative)	R0~R5,G0
6	RXO+	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℃

Parameters	Symbol	MIN.	MAX.	Unit	Remark
Supply Voltage	V_{CC}	-0.3	+4.0	V	
Logic input Voltage	Vin	-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.

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7.Electrical Characteristics

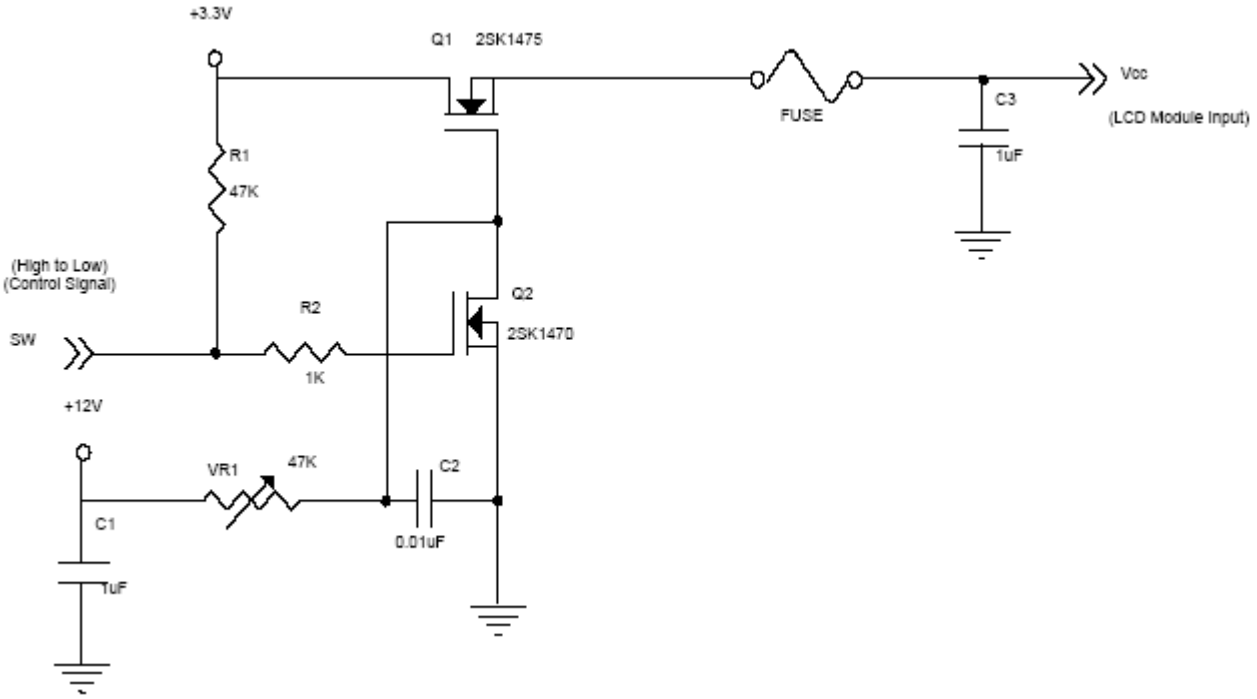
7-1) Recommended Operating Conditions:

Ta=25 ± 2℃

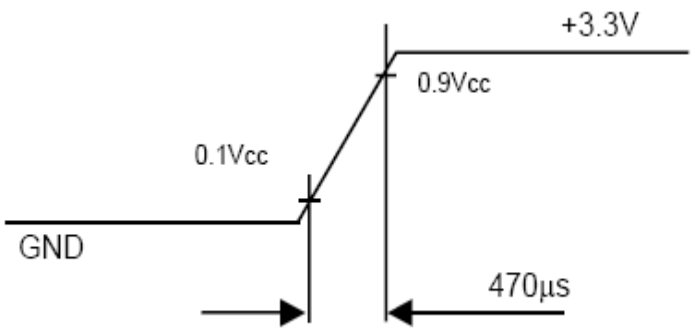
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	-
Ripple Voltage		V_{RP}	-	-	100	mV	-
Rush Current		I_{RUSH}	-	-	1.0	A	Note 7-1
Power Supply Current	White	-	-	350	490	mA	Note 7-2
	Black		-	510	650	mA	Note 7-3
LVDS differential voltage		Vid	-100	-	+100	mV	
LVDS common input voltage		Vic	-	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



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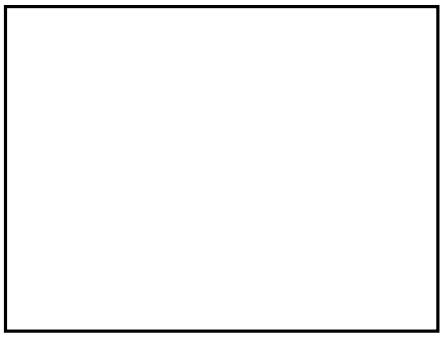
Note 7-3 : The specified power supply current is under the conditions at Vcc = 3.3 V, Ta=25±2℃, f_V = 60 Hz, where as a power dissipation check pattern below is displayed.



a. White Pattern

b. Black Pattern

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

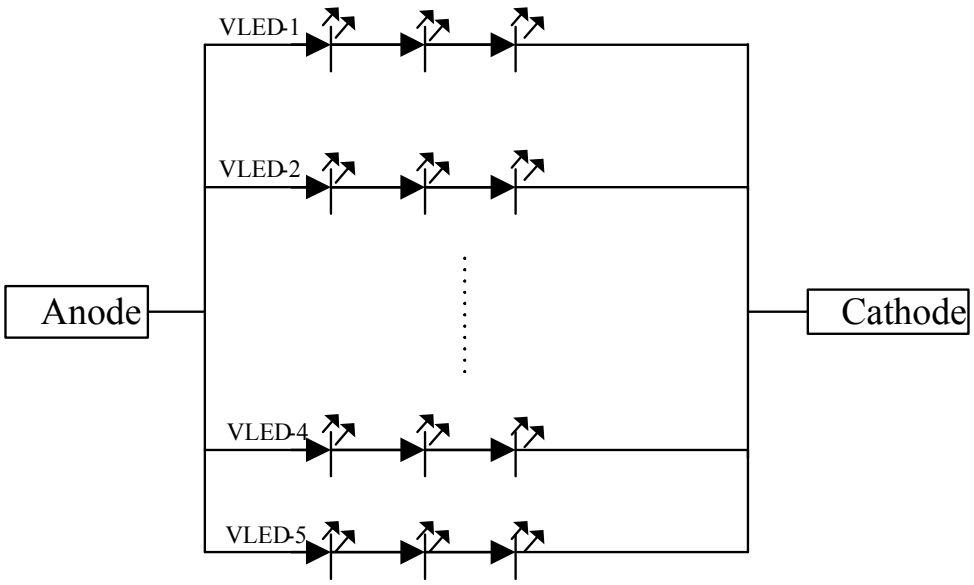
Ta = 25℃

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} = 150mA(Constant Current).

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

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



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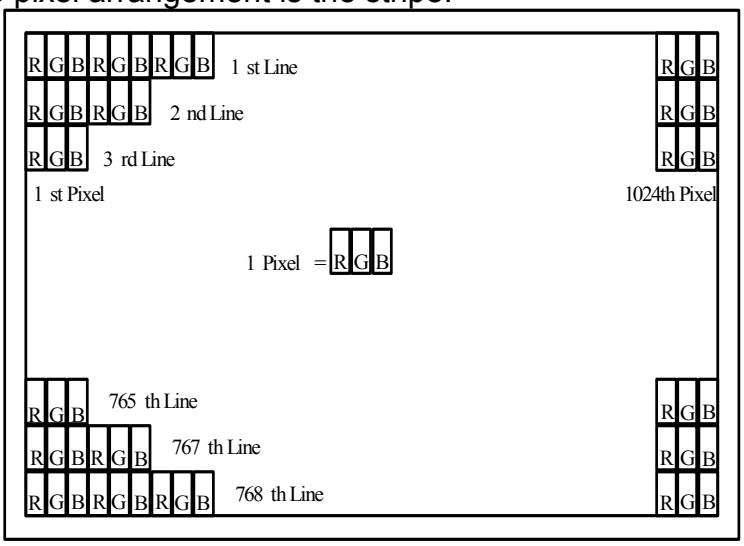
8. Pixel Arrangement

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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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

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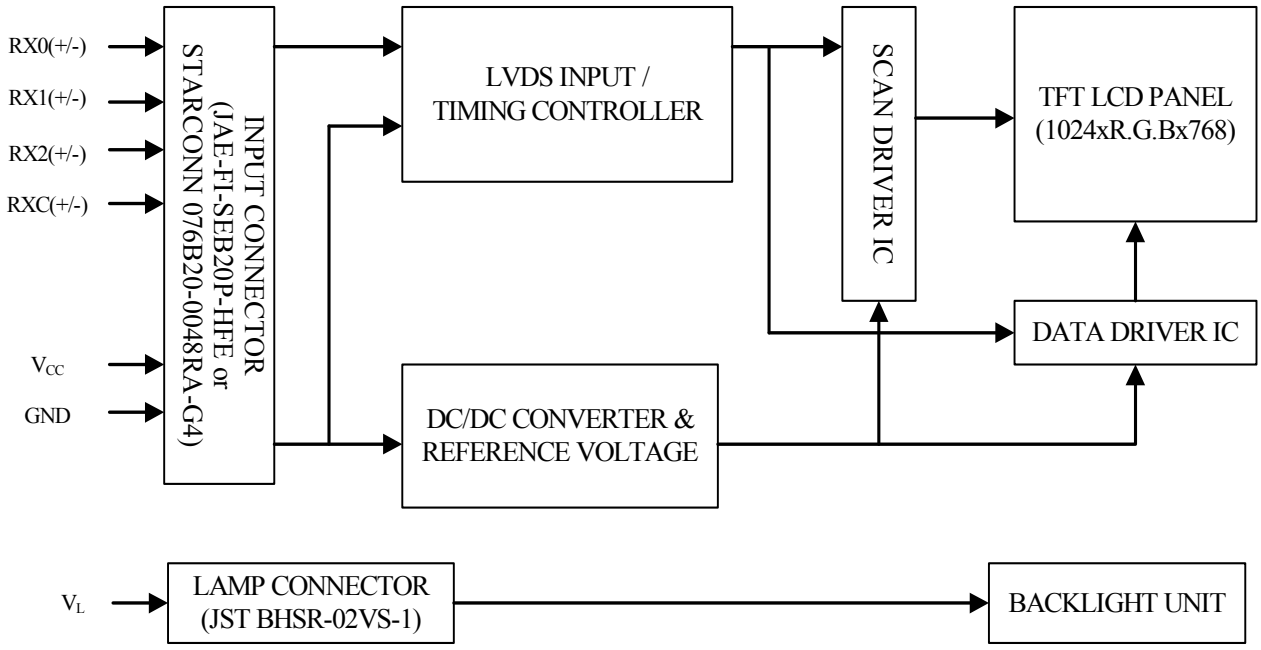
10. Block Diagram

10-1) TFT-module Block Diagram



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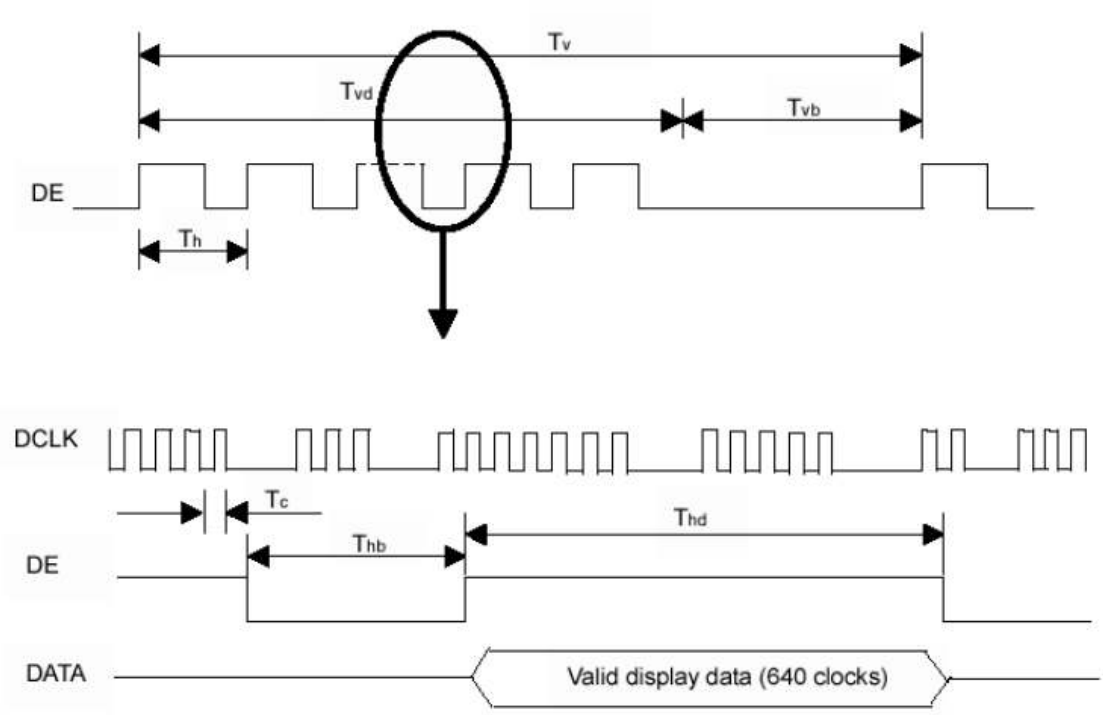
11. Interface Timing

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	
	Blank	Tvb	Tv-Tvd	38	Tv-Tvd	Th	
Horizontal Active Display Term	Total	Th	1240	1344	1464	Tc	Th=Thd+Thb
	Display	Thd	1024	1024	1024	Tc	
	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



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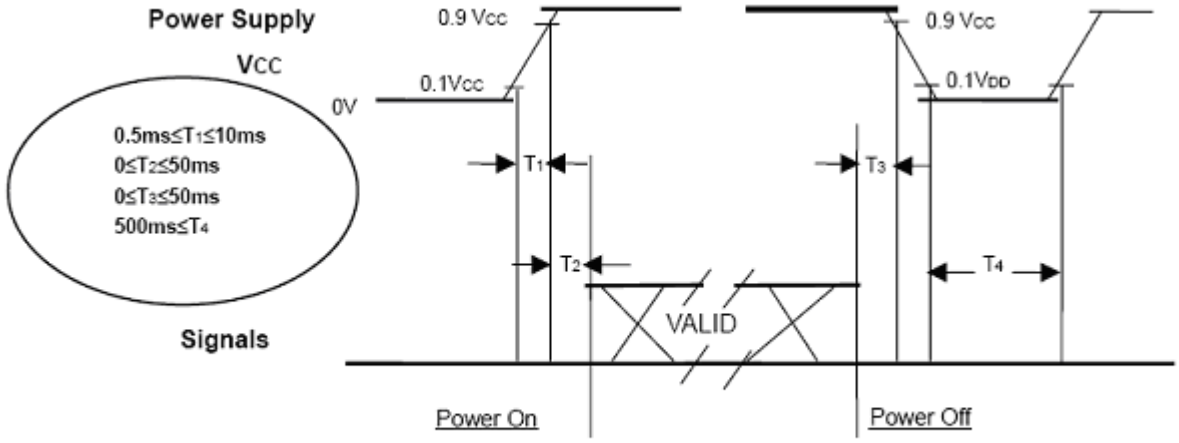
12. Power On Sequence

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.



Power ON/OFF Sequence

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.

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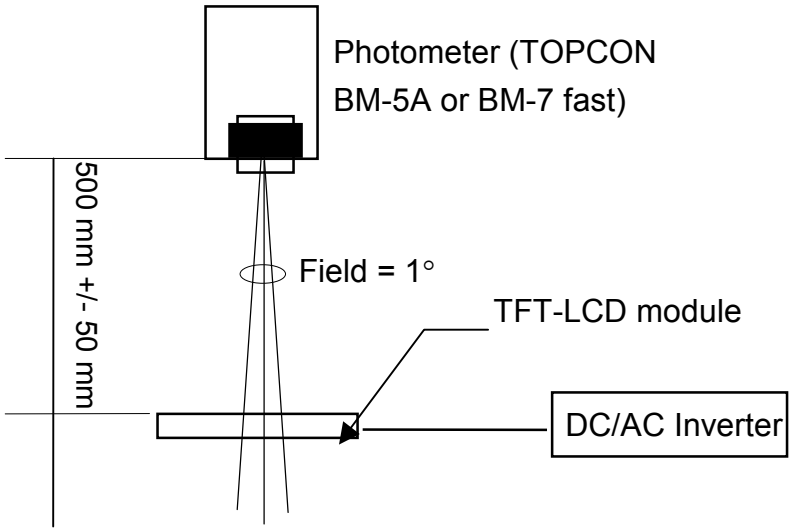
13. Optical Characteristics

13.1) Specification: ( )- reference only data

Ta=25℃

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ 21.22	CR≧10	70	80	-	deg	Note 13-2
	Vertical	θ 12 (12 o'clock)		70	80	-	deg	
		θ 11 (6 o'clock)		70	80	-	deg	
Contrast Ratio		CR	θ =0°	(800)	(1000)		-	Note 13-4
Response time	Rise	Tr	θ =0°	-	13	18	ms	Note 13-3
	Fall	Tf		-	12	17	ms	
Brightness		L	θ =0°/ φ =0	(1000)	(1200)	-	cd/㎡	Note 13-1
LED Life Time		-	-	TBD	-	-	hr	Note 13-6
White Chromaticity		x	θ =0°/ φ =0	TBD	TBD	TBD	-	Note 13-1
		y	θ =0°/ φ =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.

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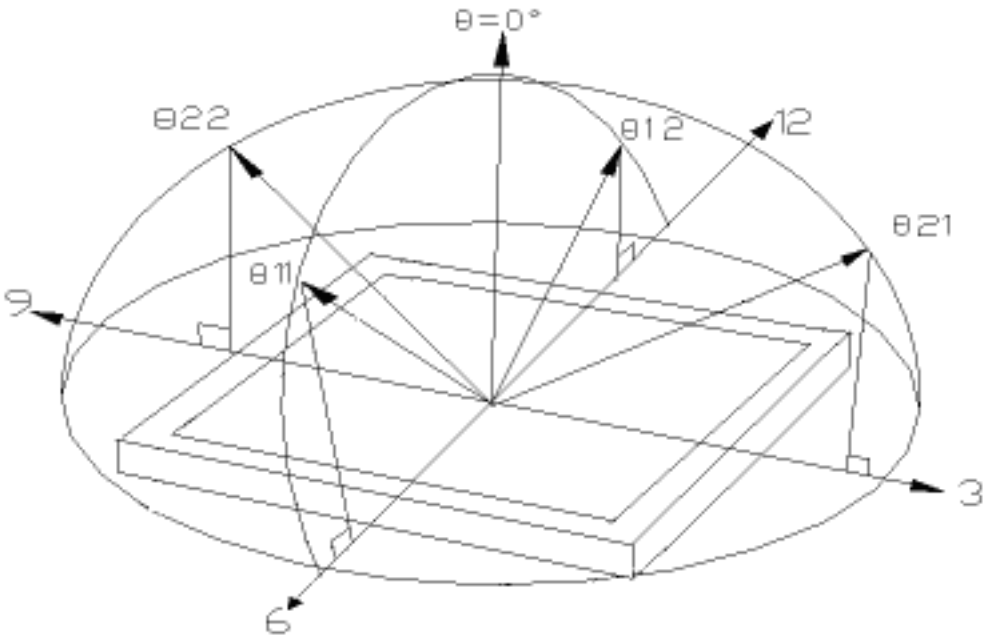
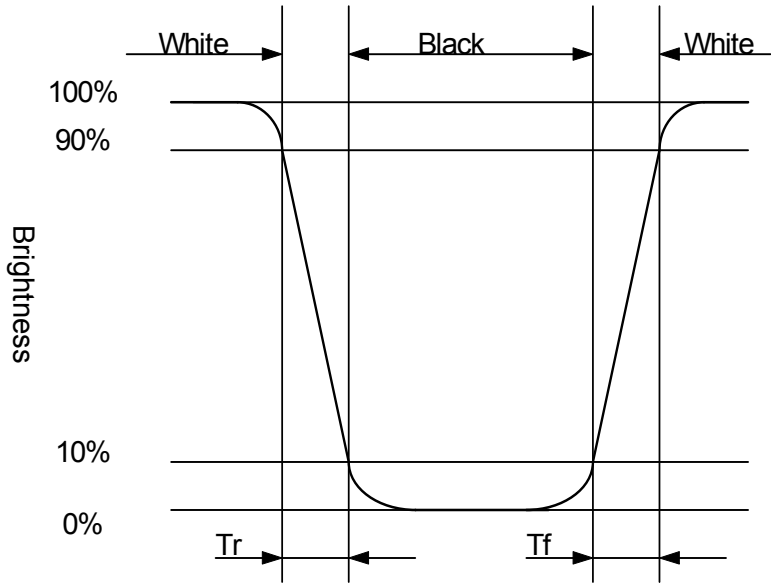
Note 13-2: The definitions of viewing angles are as follow



Note 13-3: Definition of Response Time Tr and Tf



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

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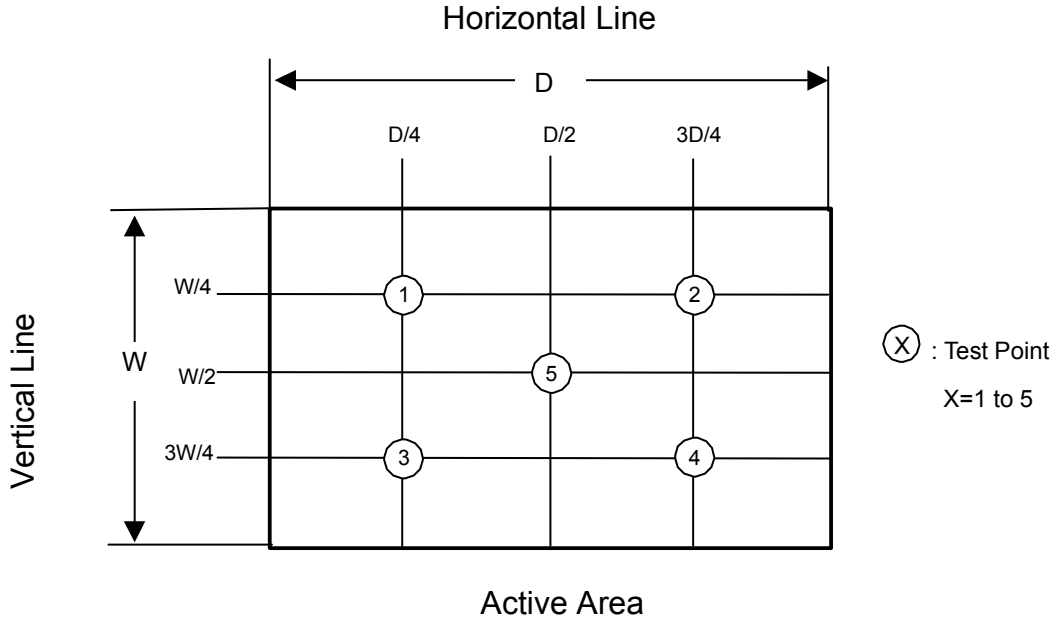
Note 13-5: Definition of White Variation (W):

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℃ and I_{LED} =150mA.

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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.

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15. Reliability Test

No	Test Item	Test Condition
1	High Temperature Storage Test	Ta = +80℃, 240 hrs
2	Low Temperature Storage Test	Ta = -40℃, 240 hrs
3	High Temperature Operation Test	(Ta = +70℃, 240 hrs)
4	Low Temperature Operation Test	Ta = -30℃, 240 hrs
5	High Temperature & High Humidity Operation Test	Ta = 60℃, 90%RH, 240 hrs
6	Thermal Cycling Test (non-operating)	-40℃, 0.5hour→+80℃, 0.5hour, 100Cycles,1hr/cycle
7	Vibration Test (non-operating)	5G,10 ~ 300 H_Z,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.

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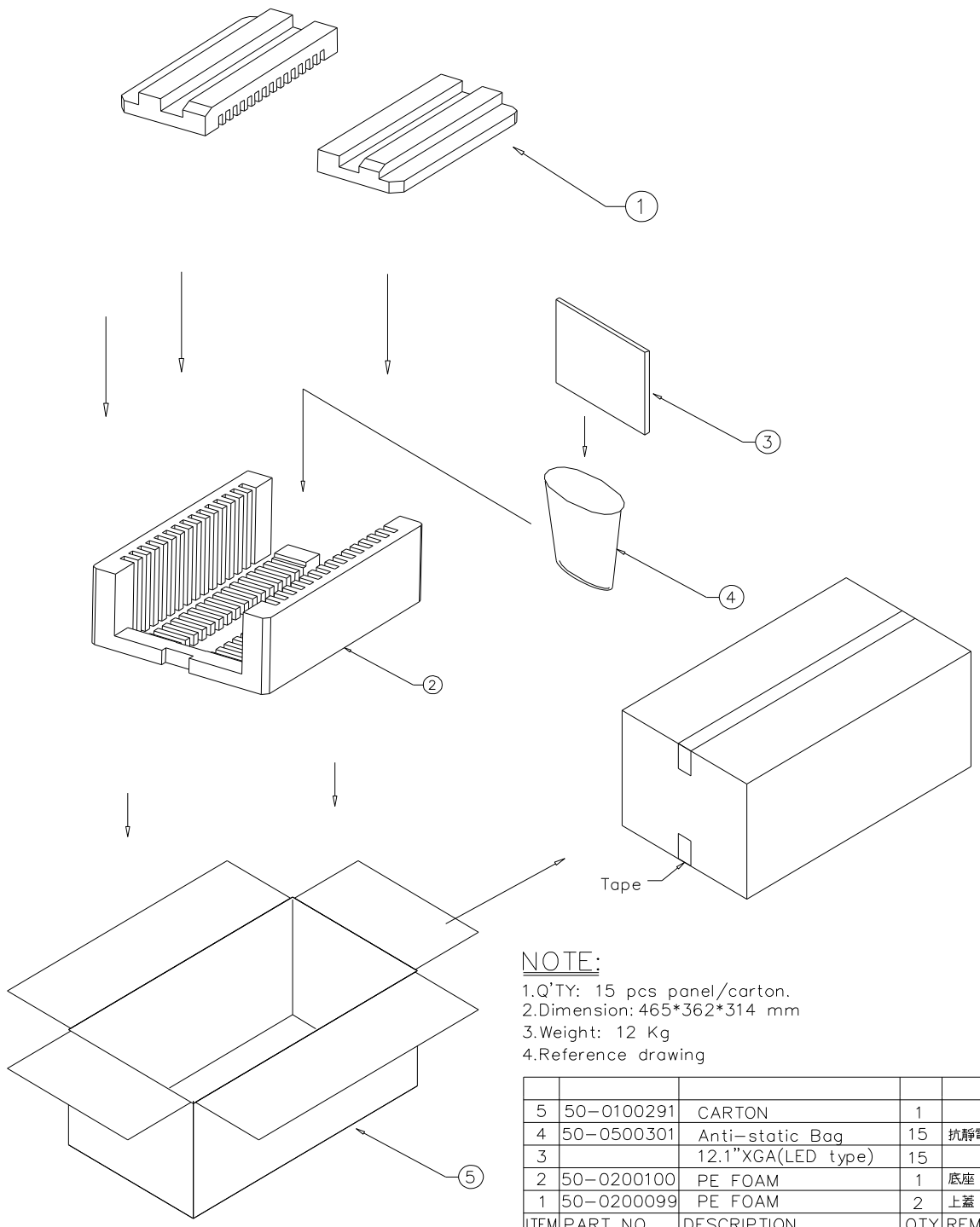
16.Packing Diagram

ZONE	REV.	DOCUUMENT NO.	DESCRIPTION	DATE	REV.BY



NOTE:

1.Q'TY: 15 pcs panel/carton.
2.Dimension: 465*362*314 mm
3.Weight: 12 Kg
4.Reference drawing

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	元太科技工業股份有限公司 Prime View International Co., Ltd.

			SCALE	UNIT	SHEET	DWG.TITLE		
APPROVE	Frank				1 OF 1	12.1"XGA(LED type) module		
CHECK	Frank							
DRAWN	Ethan	'07.07.03	MTL.NO.			DWG FILE:	REV. 01	A4 SIZE

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