产 品 编 号 ：	
产 品 名 称 ：	32寸液晶屏(1000cd/㎡)
玻 璃 型 号 ：	**HV320FHB-N02**
版 本 ：	V1.0
日 期 ：	2020.07.21

Customer :

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Amy Zhou	Mr Yan	Zhongcai Liang

Date	Rev.	Page	Old Description	New Description	Remark
2020.07.21	1.0	All	The specification was first issued		

1.GENERAL DESCRIPTION

1.1 OVERVIEW

HV320FHB-N02 is a color active matrix TFT LCD open cell using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This open cell has a 31.5 inch diagonally measured active area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each

pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.

1.2 General Specifications

Item	Specifications	Unit	Note
Screen Diagonal	31.5 inch	[mm]	Note 1
Active Area	698.4 (H) ×392.85 (V)	[mm]	
Pixels H x V	1920(×RGB) × 1080		
Pixel Pitch	121.25(H) ×RGBx363.75(V)	[mm]	
Pixel Arrangement	R.G.B. Vertical Stripe		
Display mode	Normally Black		
Optical Response Time	8(Typ.) (G to G) ms	[msec]	
Nominal Input Voltage VDD	12V	[Volt]	
Power Consumption	25watts Backlight+4watts Opencell (white pattern)	[Watt]	
Electrical Interface	LVDS Interface with 2pixcl /clock		
Support Color	16.7M colors (8bit-TRUE)		
Surface Treatment	Anti-glare Haze 1%,Hard coating 3H		

1.3 Mechanical Specification

Item		Min	Typ	Max	Unit	Note
Weight		4800	5000	5200	g	-
Module Size	Horizontal(H)	(TYP)-1.0	725.20	(TYP)+1.0	mm	1
	Vertical (V)		422.70		mm	
	Depth(D)		14.40		mm	

Note 1: Please refer to the"outline dimension" for more information of back and front outline dimensions.

2. Absolute Maximum Ratings

2.1 Abosolute Ratings of Environment

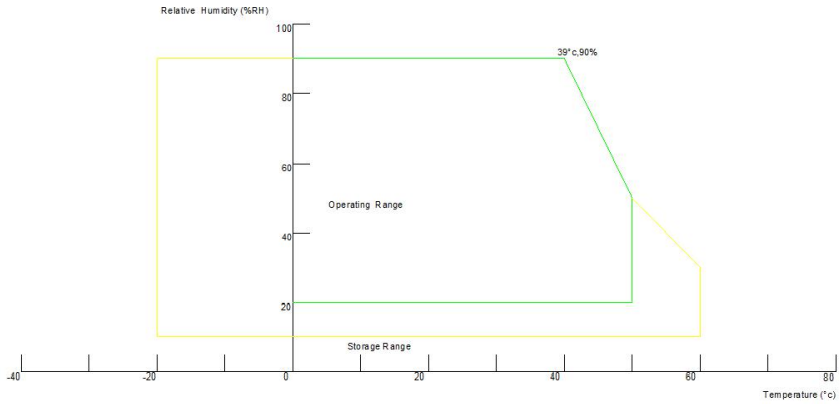
Item	Symbol	Min.	Max.	Unit	Conditions
power supply Volage	VDD	-0.3	13.2	V	Note 3
Logic supply Voltage	Vin	VSS-0.3	VDD+0.3	V	Note 3, Note 4
Operation Temperature	TOP	0	+50	℃	
Storage Temperature	TST	-20	+60	℃	
Storage Humidity	TSH	10	80	[%RH]	Note 3

Note 1: With in Ta (25C)

Note 2: Permanent damage to the device may occur if exceeding maximum values Note 3: Temperature and relative humidity range are shown as the below figure.

1. 80% RH Max (≤39C)
2. Max wet-bulb temperature

at 39 Note 4: Function Judged only



2.2 Backlight Unit

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
LED operation Voltage	V_{led}	54	–	58. 5	V_{led}	
LED operation Curent	I_{led}	–	1000	–	mA	-
BackLight Power	P_{BL}	54	–	58.5	W	
Luminance	L	800	1000	---	nit	
LED Life Time		3000			Hrs	
Luminance uniformity	△L	72	75		%	

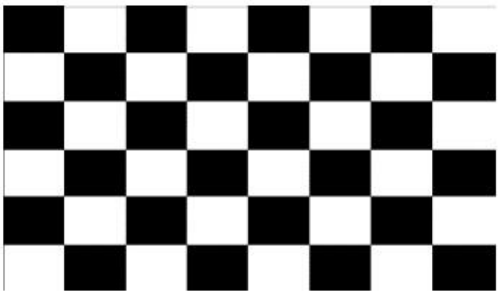
Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal operating Conditions.

The HV320FHB-N0 2 module unit requires power input which is employed to power the LCD electronics and to srive the TFT array and liquid crystal

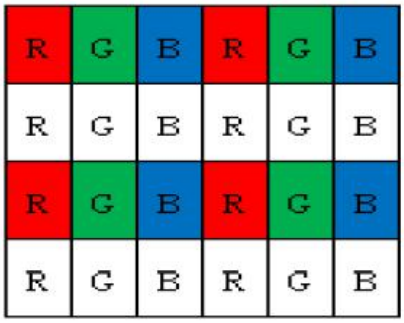
item	Symbol	Min	Typ	Max	Unit	Note
Power Supply Voltage	V_{DD}	10.8	12	13.2	V	1
In-Rush Current	I_{RUSH}	-	-	3	A	2
Permissible Input Ripple Voltage	V_{RF}	-	-	100	mV	V_{DD} = 5.0V
High Level Differential Input Threshold Voltage	V_{IH}	2.7	-	3.3	V	
Low Level Differential Input Threshold Voltage	V_{IL}	0	-	0.6	V	
Differential input voltage	|VID |	200	-	600	mV	
Differential input common mode voltage	V_{CM}	1	1.2	1.4		VIH=100mV, VIL=-100mV
Power Consumption	PD	-	TBD	TBD	W	

Note 1 : The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD=12.0V,
Frame rate f_V=60Hz and Clock frequency = 75.4MHz.
Test Pattern of power supply current

a) Typ : Mosaic 8 x 6 Pattern(L0/L255)
Pattern(L0/L255)



b) Max : H- Stripe



Note 2 : The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

4.0 INTERFACE CONNECTION.

4.1 Electrical Interface Connection

Connector :IS050-C51B-C39-S(UJU)/FI-RE51S-HF-R1500

Document No.:

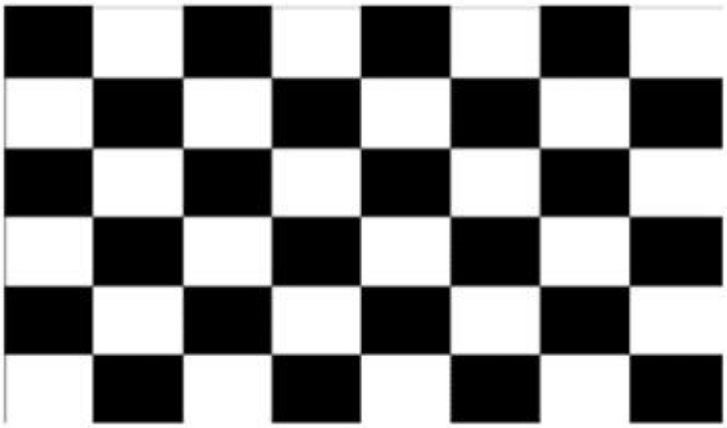
Pin No	Symbol	Description	Pin No	Symbol	Description
1	NC	No Connection	21	GND	Ground
2	SDA	I²C Data	22	CH1[3]-	First pixel negative LVDS differential data input. Pair3
3	SCL	I²C Clock	23	CH1[3]+	First pixel positive LVDS differential data input. Pair3
4	NC	Not Connected	24	NC	Not Connected
5	NC	Not Connected	25	NC	Not Connected
6	NC	Not Connected	26	NC	Not Connected
7	SELLVDS	High: JEIDA Low or Open: VESA	27	NC	Not Connected
8	NC	Not Connected	28	CH2[0]-	Second pixel negative LVDS differential data input. Pair0
9	NC	Not Connected	29	CH2[0]+	Second pixel positive LVDS differential data input. Pair0
10	NC	Not Connected	30	CH2[1]-	Second pixel negative LVDS differential data input. Pair1
11	GND	Ground	31	CH2[1]+	Second pixel positive LVDS differential data input. Pair1
12	CH1[0]-	First pixel negative LVDS differential data input. Pair0	32	CH2[2]-	Second pixel negative LVDS differential data input. Pair2
13	CH1[0]+	First pixel positive LVDS differential data input. Pair0	33	CH2[2]+	Second pixel positive LVDS differential data input. Pair2
14	CH1[1]-	First pixel negative LVDS differential data input. Pair1	34	GND	Ground
15	CH1[1]+	First pixel positive LVDS differential data input. Pair1	35	CH2CLK-	Second pixel negative LVDS clock
16	CH1[2]-	First pixel negative LVDS differential data input. Pair2	36	CH2CLK+	Second pixel positive LVDS clock
17	CH1[2]+	First pixel positive LVDS differential data input. Pair2	37	GND	Ground
18	GND	Ground	38	CH2[3]-	Second pixel negative LVDS differential data input. Pair3
19	CH1CLK-	First pixel negative LVDS clock	39	CH2[3]+	Second pixel positive LVDS differential data input. Pair3
20	CH1CLK+	First pixel positive LVDS clock			

Pin No	Symbol	Description	Pin No	Symbol	Description
40	NC	Not Connected	46	GND	Ground
41	NC	Not Connected	47	NC	Not Connected
42	NC	Not Connected	48	VCC	Input Voltage +12V
43	NC	Not Connected	49	VCC	Input Voltage +12V
44	GND	Ground	50	VCC	Input Voltage +12V
45	GND	Ground	51	VCC	Input Voltage +12V

4.2 LVDS Interface

Channel No.	Data No.	8-bit LVDS Type	
		NS	JEIDA
0	Bit-0	R0	R2
	Bit-1	R1	R3
	Bit-2	R2	R4
	Bit-3	R3	R5
	Bit-4	R4	R6
	Bit-5	R5	R7
	Bit-6	G0	G2
1	Bit-0	G1	G3
	Bit-1	G2	G4
	Bit-2	G3	G5
	Bit-3	G4	G6
	Bit-4	G5	G7
	Bit-5	B0	B2
	Bit-6	B1	B3
2	Bit-0	B2	B4
	Bit-1	B3	B5
	Bit-2	B4	B6
	Bit-3	B5	B7
	Bit-4	HS	HS
	Bit-5	VS	VS
	Bit-6	DE	DE
3	Bit-0	R6	R0
	Bit-1	R7	R1
	Bit-2	G6	G0
	Bit-3	G7	G1
	Bit-4	B6	B0
	Bit-5	B7	B1
	Bit-6	-	

4.3 Data Input Format



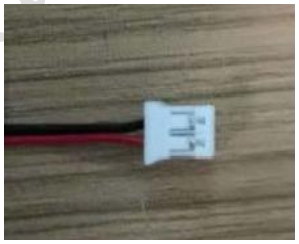
4.4 Backlight Electrical / Optical Characteristics

4.4.1 backlight

connector CN2 : PH-

2P *2

Pin#	Signal Name
1	VDD- （Black)
2	VDD+ (Red)



4.4.2 LED Bar

Parameter	Symbols	Min	Typ	Max	Unit
Forward Voltage (one circuit)	VF	3	-	3.3	V
Reverse Current (one circuit)	IR	-	-	10	μA
Forward Current	IF	-	60	100	Ma
Chromaticity Coordinates	X	0.247	0.267	0.287	
	Y	0.222	0.242	0.262	
Lumen	¢	20	22	24	LM
Viewing Angle	2θ1/2	-	120	-	Deg.
Number Of LED	Pcs	-	144	-	Pcs
Operation Voltage(LB)	VLB	54	-	58.5	V
Operation Current(LB)	ILB	-	1000	-	mA
Power Consumption	PLB	54	-	58.5	W

4.4.3 Arry Mode Of LED Bar

5并9串*4PCS

5.0 SIGNAL TIMING SPECIFICATION

5.1 The HV320FHB-N02 is operated by the DE only.

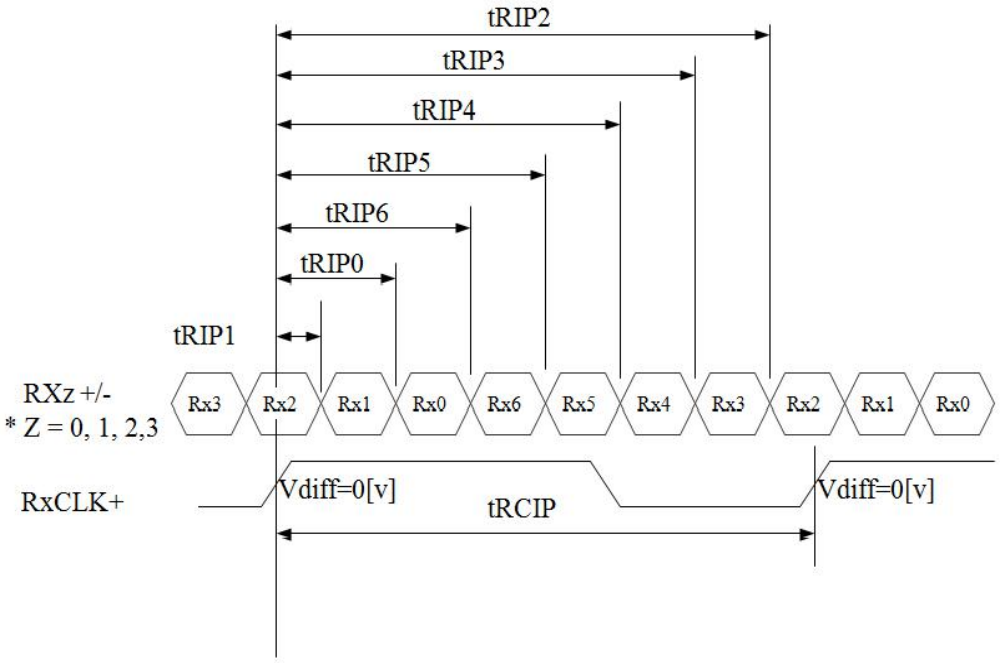
Item		Symbols		Min	Typ	Max	Unit
Clock	Frequency	1/Tc		63	74.25 (92.8)	97	MHz
	High Time	Tch		-	4/7Tc	-	
	Low Time	Tcl		-	4/7Tc	-	
Frame Period		Tv		1100	1125	1149	lines
				57	60 (75)	78	Hz
Horizontal Active Display Term		Valid	t_{HV}	-	960	-	t_{CLK}
		Total	t_{HP}	1060	1100	1200	t_{CLK}
Vertical Active Display Term		Valid	t_{VV}	-	1080	-	t_{HP}
		Total	t_{VP}	1100	1125	1149	t_{HP}

Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

5.2 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table .

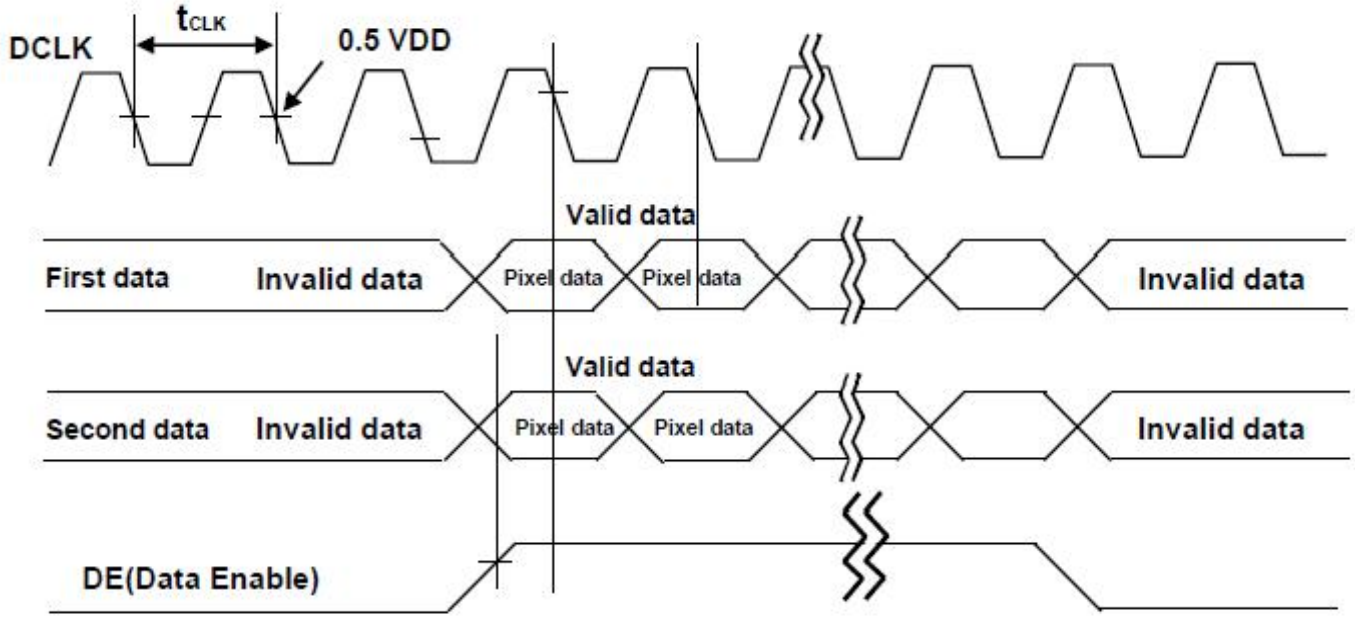
Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCIP	10.31	13.47(10.78)	15.87	nsec	
Input Data 0	tRIP1	-0.42	0.0	+0.42	nsec	
Input Data 1	tRIP0	tRCIP/7-0.42	tRCIP/7	tRCIP/7+0.42	nsec	
Input Data 2	tRIP6	2 ×tRCIP/7-0.42	2 ×tRCIP/7	2 ×tRCIP/7+0.42	nsec	
Input Data 3	tRIP5	3 ×tRCIP/7-0.42	3 ×tRCIP/7	3 ×tRCIP/7+0.42	nsec	
Input Data 4	tRIP4	4 ×tRCIP/7-0.42	4 ×tRCIP/7	4 ×tRCIP/7+0.42	nsec	
Input Data 5	tRIP3	5 ×tRCIP/7-0.42	5 ×tRCIP/7	5 ×tRCIP/7+0.42	nsec	
Input Data 6	tRIP2	6 ×tRCIP/7-0.42	6 ×tRCIP/7	6 ×tRCIP/7+0.42	nsec	

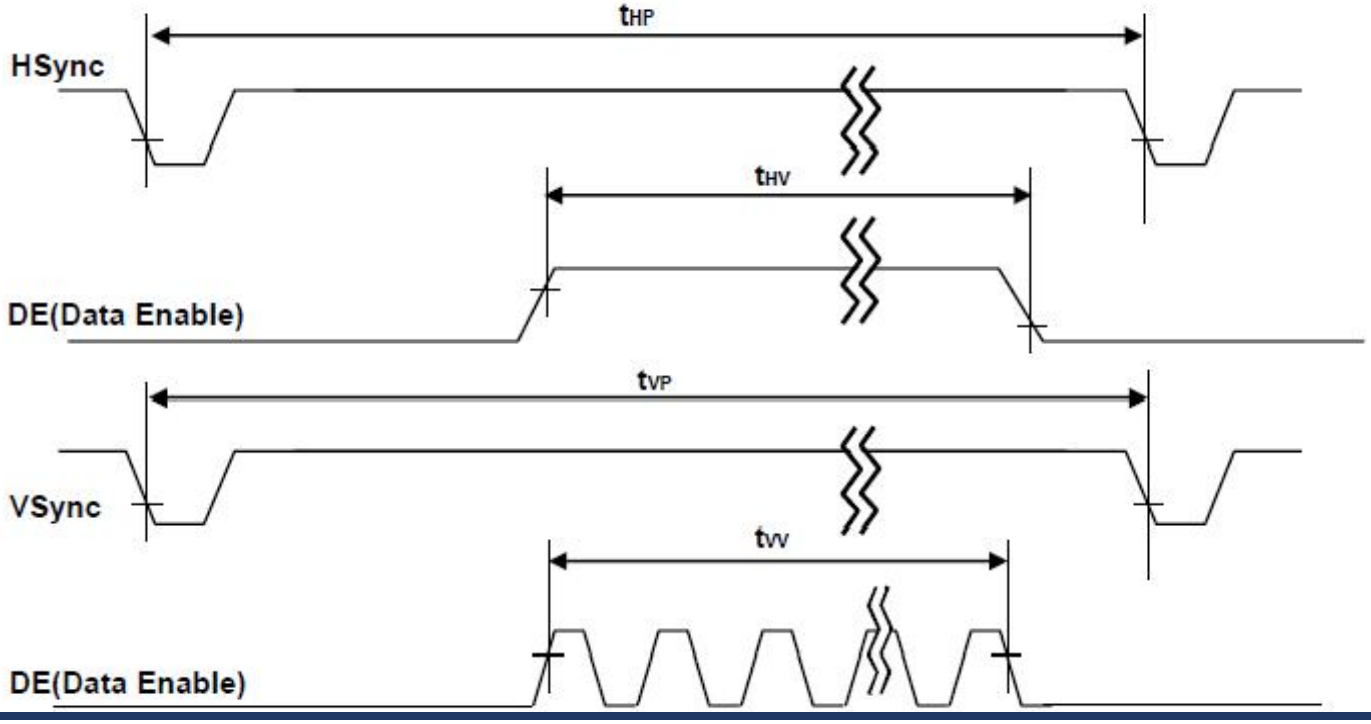


* Vdiff = (RXz+)-(RXz-),…. ,(RXCLK+)-(RXCLK-)

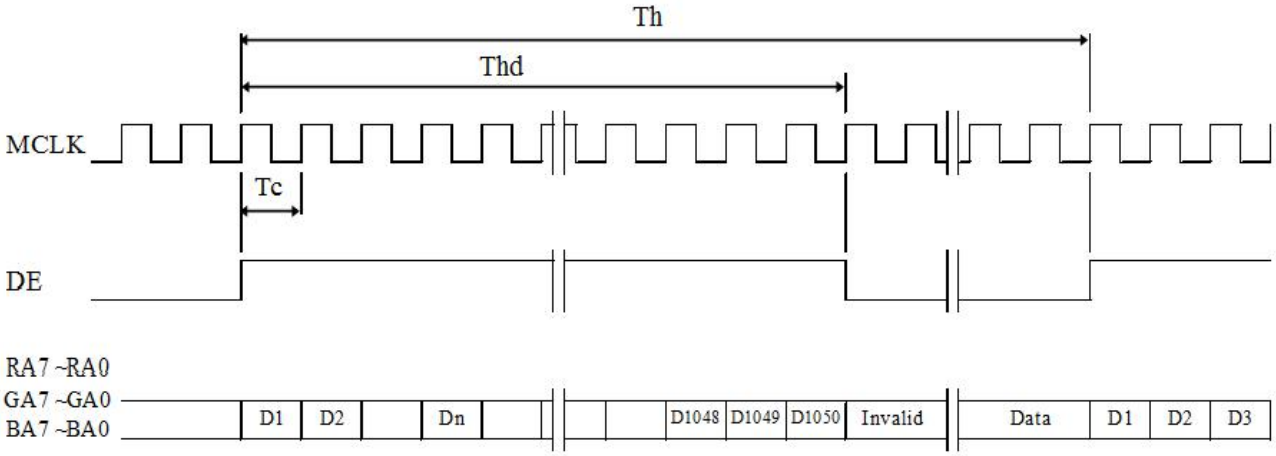
5.3 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL

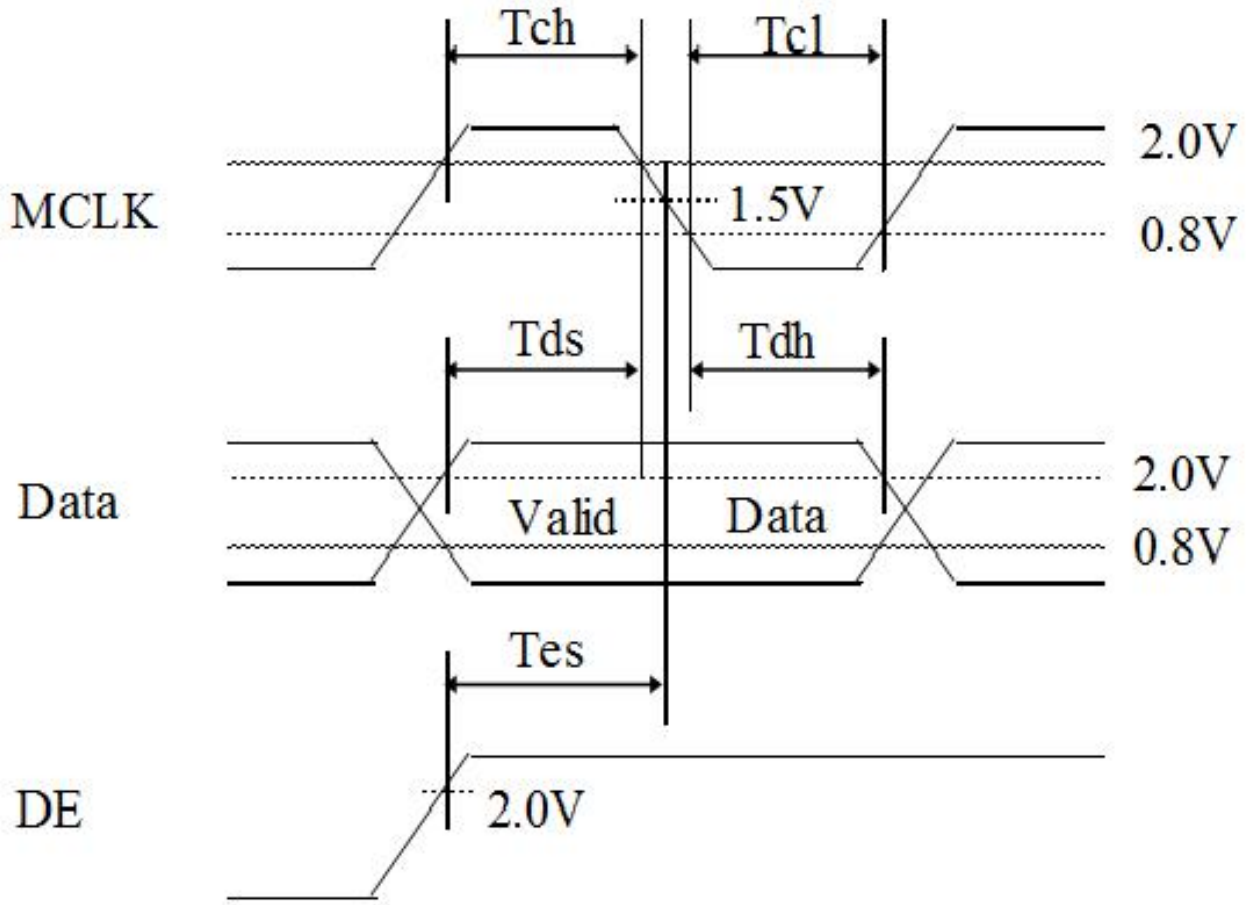
5.3.1 Sync Timing Waveforms





5.3.3 Horizontal Timing Waveforms



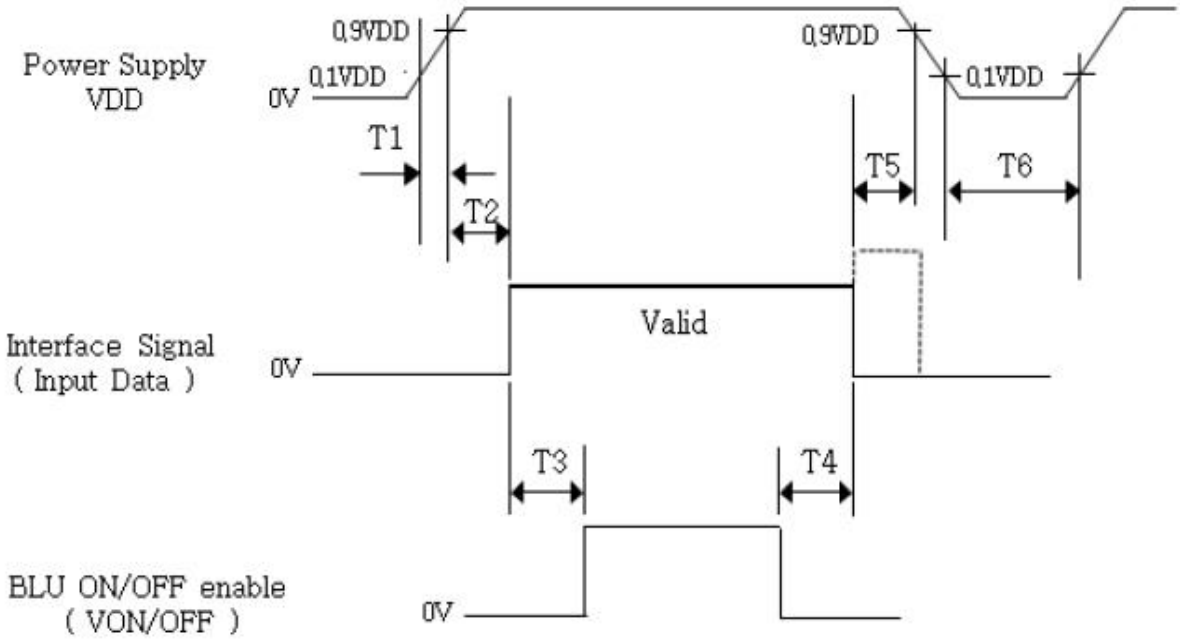


5.4 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

Color & Gray Scale		RED DATA								GREEN DATA								BLUE DATA							
		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
	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
	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
	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
	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
	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	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
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	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	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	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
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	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	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	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
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of WHITE	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
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	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

6.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the Open Cell, the power on/off sequence shall be as shown in below



< Table 8. Sequence Table >

Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	20	ms
T2	10	-	100	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0	-	-	ms
T6	1	-	-	s

Notes: 1. Back Light must be turn on after power for logic and interface signal are valid.
2. Even though T1 is out of SPEC, it is still ok if the inrush current of VDD is below the limit.

7.0 Optical Characteristics

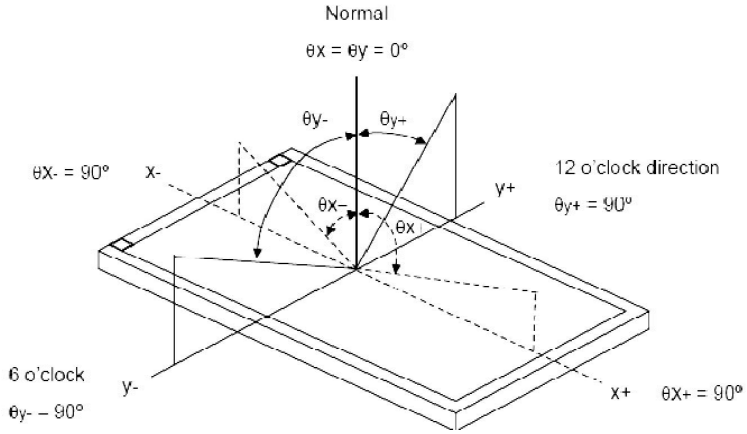
7.1 Test Condition

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25 ± 2	℃
Ambient Humidity	Ha	50 ± 10	%RH
Supply Voltage	Vcc	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Input Voltage	V_{LED}	58.5	V
LED Input Curent	I_{LED}	1000	mA
Power Consumption	Pw	58.5	W

7.2 Optical Characteristics

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Θ_3	CR > 10		89		Deg.	Note 1
		Θ_9			89		Deg.	
	Vertical	Θ_{12}			89		Deg.	
		Θ_6			89		Deg.	
Contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	900:1	1200:1	-		Note 2
Reproduction of color	White	W_x		TYP. - 0.03	0.269	TYP. + 0.03		Note 3 (With BOE BLU)
		W_y			0.271			
	Red	R_x			0.620			
		R_y			0.346			
	Green	G_x			0.318			
		G_y			0.634			
	Blue	B_x			0.154			
		B_y			0.037			
Response Time	G to G	T_g		-	8	10	ms	Note 4
Gamma Scale				2.0	2.2	2.4		
Cell Transmittance					5.0		%	Note 5

Note 1: The definition of viewing angle



ote 2: Definition of luminance , CR measured positions and brightness uniformity

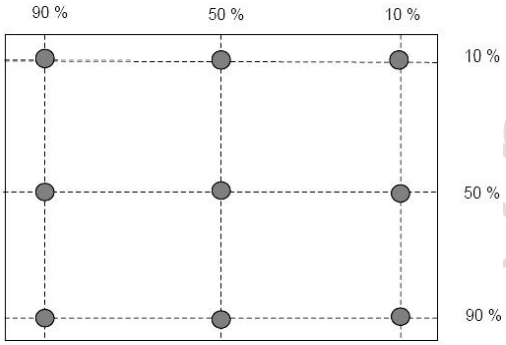
(a) Measure White luminance on the below 9 points and take the average value .

(b) CR : measures the same 9 points and take the average value .The Definition of Contrast Ratio is as folows :

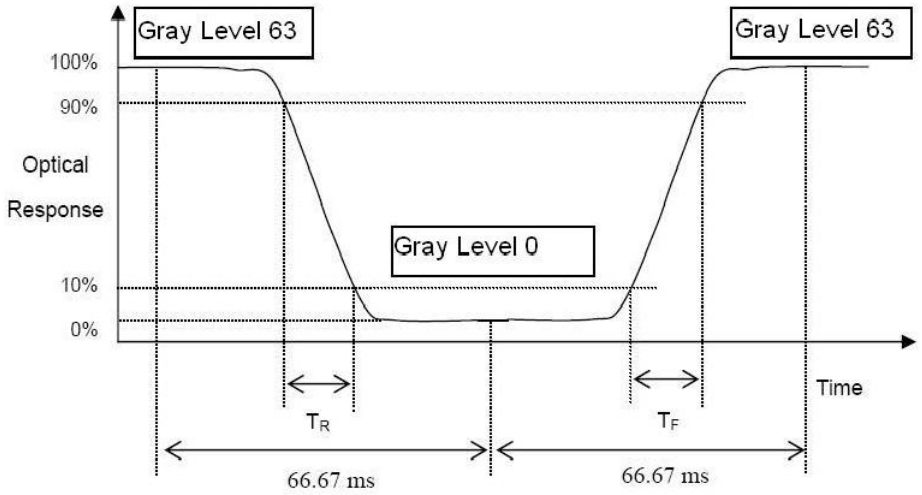
CR = ON(white L63)Luninance / OFF (Black L0)Luminance

(c) The definition of White Vibration

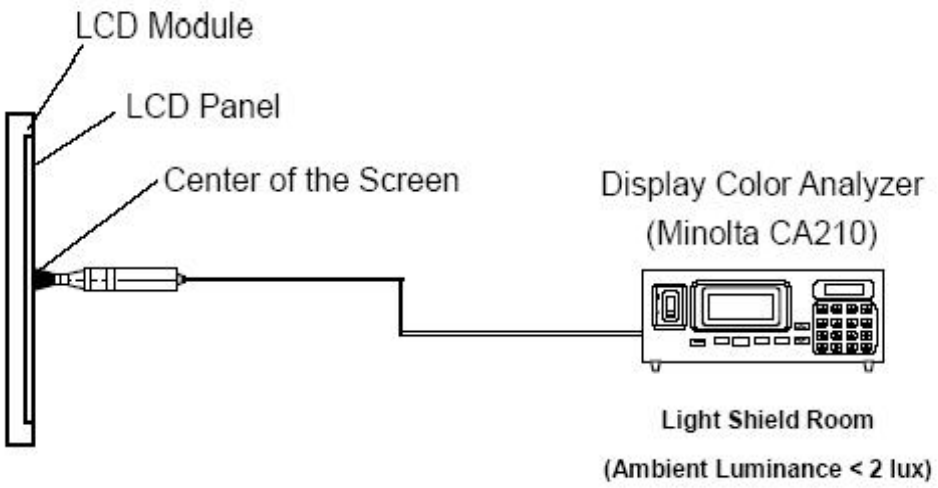
$$\frac{\text{The minimum brightness of 9 dot}}{\text{The maximum brightness of 9 dot}} \times 100\%$$



Note 3:Definition of Response Time (TR, TF):



Note 4: The measure method



(a) : The measurement point is the center of the active area except for the measurement of Luminance Uniformity

(b) : Photometer :CA-210

8.0 Reliability Test

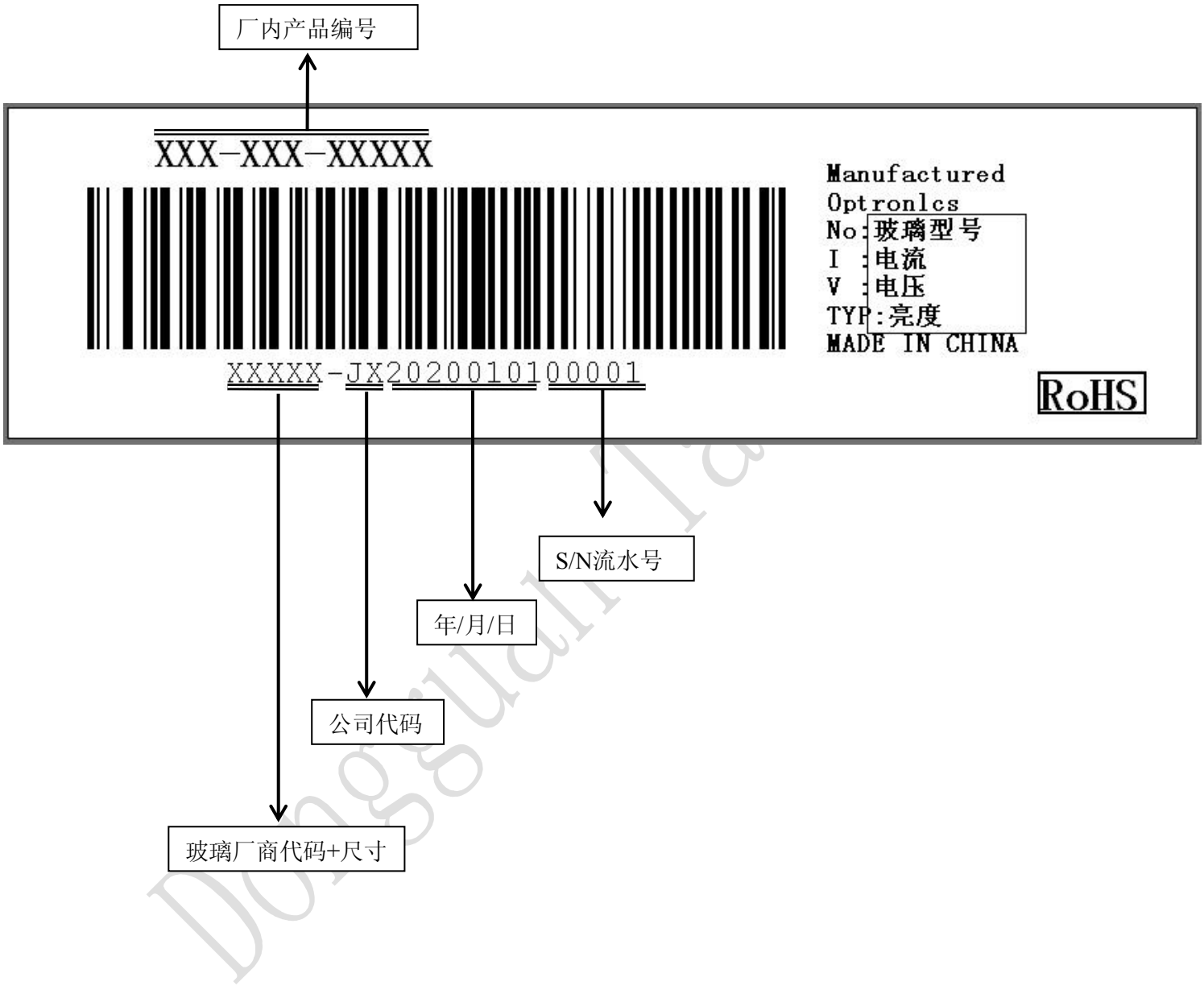
Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias(THB	Ta= 50℃， 80%RH, 240hours	
High Temperature Operation (HT	Ta= 50℃， 50%RH, 240hours	
Low Temperature Operation (LTO	Ta= 0℃， 240hours	
High Temperature Storage (HTS)	Ta= 60℃， 240hours	
Low Temperature Storage (LTS)	Ta= -20℃， 240hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Random Frequency: 10 - 200 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 20 ms Direction:±X,±Y,±Z(one time for each Axis)	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20℃/30min, 60℃/30min, 100 cycles	1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 8KV, 150pF(330) 1sec, 8 points, 25 times/ point. Air Discharge: ± 15KV, 150pF(330) 1sec 8 points, 25 times/ point.	2
Altitude Test	Operation:18,000 ft Non-Operation:40,000 ft	

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℃ to 60℃, 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: EN61000-4-2, ESD class B: Certain performance degradation allowed
No data lost
Self-
recoverable
No hardware failures.

9.0 Shipping Label

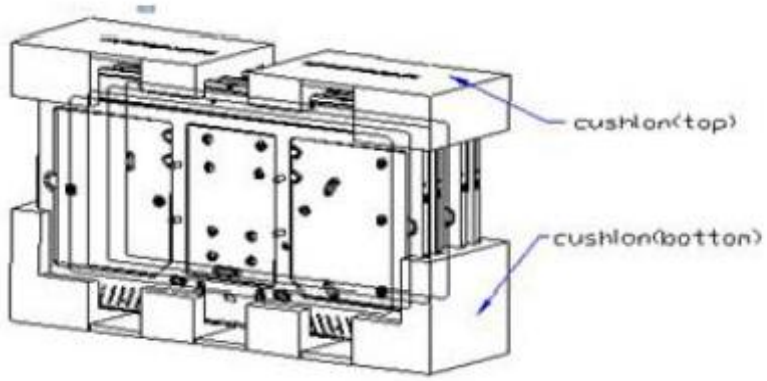


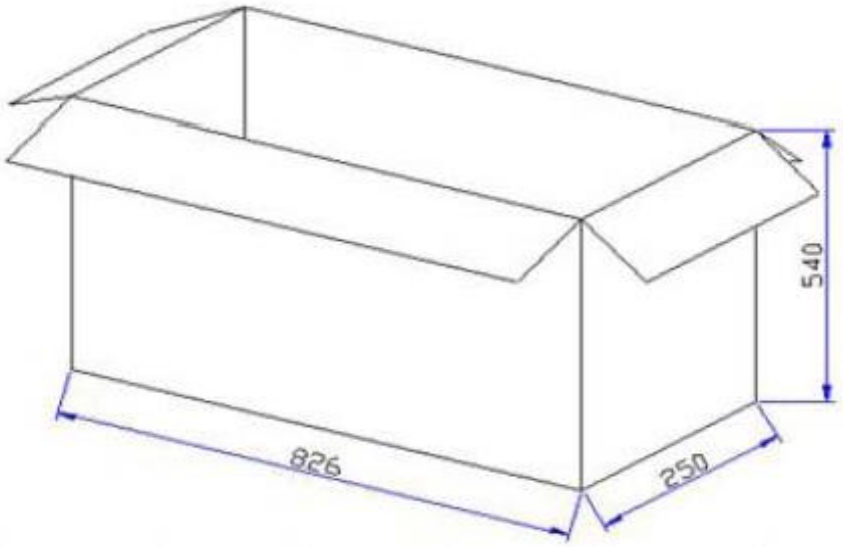
10. Packaging

9.1 Carton(internal package)

(1)Packaging Form

(2) Packaging Method





Note 1) Acceptable number of piling : 6 sets

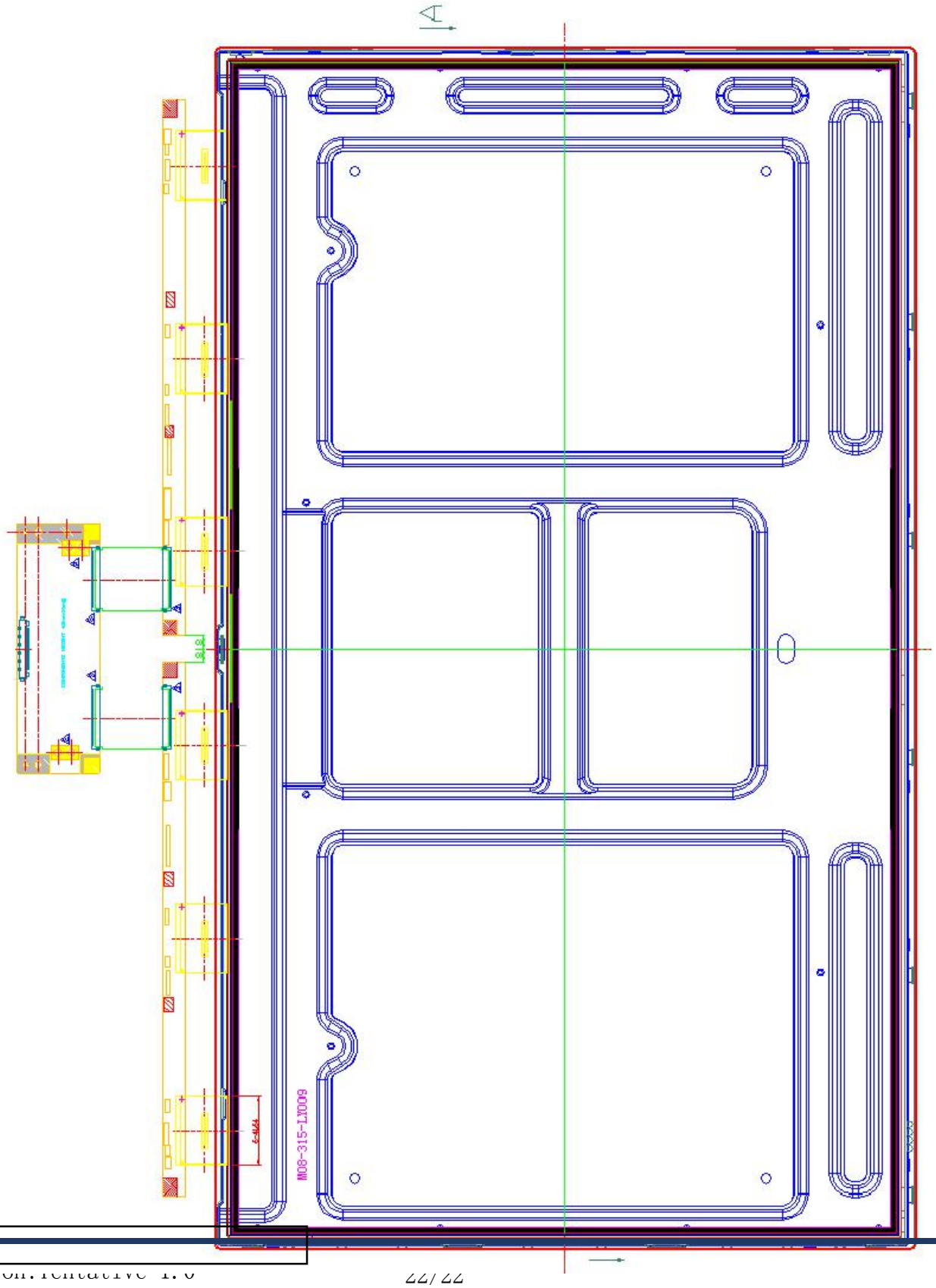
11.0 PRECAUTION

11.1 ASSEMBLY AND HANDLING PRECAUTIONS

1 Do not apply rough force such as bending or twisting to the module during assembly.
2 To assemble or install module into user's system can be in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
3 It's not permitted to have pressure or impulse on the module because the LCD panel and Bac- klight will will be damaged.
4 Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
5 Do not pull the I/F connector in or out while the module is operating . 6 Do not disassemble themodule.
Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very 7 soft and easily scratched.
8 It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
9 High temperature or humidity may reduce the performance of module. Please store LCD mo- dule within the specified storaged conditions.
10 When ambient temperature is lower than 10 ℃ may reduce the display quality. For example, the response time will become slowly.

11.2 SAFETY PRECAUTIONS

1 It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
2 If the liquid crystal material leaks from the panel,it should be kept away from the eyes or mouth, in case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
3 After the modlule's end of life, it is not harmful in case of normal operation and storage.


M08-315-LW009