晶 發 科 技 股 份 有 限 公 司
GI FAR TECHNOLOGY CO.,LTD.
No. 81, Dongfeng St, Shulin District, 23874, New Taipei City, Taiwan, R.O.C.

SPECIFICATIONS

CUSTOMER : _____

MODEL NO. : GFTO070XA800480L

VERSION : A

DATE : 2018.01.08

CERTIFICATION : ROHS

CUSTOMER SIGN : _____

QA Approved By	Approved By	Prepared By	Prepared By
	GIFAR 2018.01.08 SIDNEY	GIFAR 2018.01.08 HAZEL	GIFAR 2018.01.08 RITA

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Revision Record

Data(y/m/d)	Ver.	Description	Note	page
2018.01.08	A	NEW		

Contents

1. OVERVIEW

GFTO070XA800480L is 7" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs ,control circuit and LED backlight. By applying 800×480 images are displayed on the 7" diagonal screen. Display 16.2M colors by R.G.B signal input.

General specifications are summarized in the following table:

Item	**Specification**			
Display Area (mm)	154.08(H) × 85.92(V)			
Number of Pixels	800(H) × 3(RGB) × 480(V)			
Pixel Pitch(mm)	0.1926(H) × 0.1790(V)			
Color Pixel Arrangement	RGB vertical stripe			
Display Mode	Normally White			
Number of color	16.2M			
Brightness (cd/m^2)	450nit(typ)			
Response Time (ms)	25ms(typ.)			
Contrast Ratio	min. 400 typ. 500			
Viewing Angle (CR＞10)	150 degree (Horizontal)，130 degree(Vertical)			
Color Saturation	45%(min.) / 50%(typ.)			
Optimum Viewing Direction	6 O'clock (Max. contrast ratio, Gray level inversion)			
Power Consumption(W)	1.692W(typ)			
Interface connection	TTL			
Module Size (mm)		Min.	Typ.	Max
	Horizontal (H)	164.6	164.9	165.2
	Vertical (V)	99.7	100	100.3
	Depth (D)	5.4	5.7	6.0
Module Weight (g)	150g(Typ)			
Backlight	LED			
Surface Treatment	Anti-Glare, 3H			

2. ABSOLUTE MAXIMUM RATINGS

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

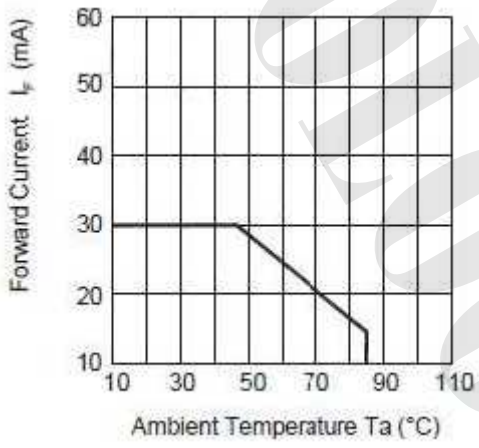
Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	+5.0	V	
Analog Supply Voltage	AVDD	-0.5	+13.5	V	
Gate On Voltage	VGH	-0.3	+42	V	
Gate Off Voltage	VGL	-20	+0.3	V	
Gate On-Gate Off Voltage	VGH-VGL	12	40	V	
Forward Current (per LED)	If	-	30	mA	
Reverse Voltage (per LED)	VR	-	5	V	
Pulse forward current (per LED)	Ifp	-	100	mA	Note *2)
Operation Temperature (LCD panel surface overall)	T_{op1}	-20	80	℃	Note *1)
Operation Temperature (Ambeit temoerature)	T_{op2}	-20	70	℃	Note *1)
Storage Temperature	T_{stg}	-30	80	℃	Note *1)

Note：

*1) If the product were used out of the operation and storage range, it will have quality issue.

*2) Ifp Conditions： Pulse Width≤10msec，Duty≤1/10.

*3) Each one of LED operation must be follow diagram of Ambient Temperature and Allowable Forward Current.



*4) If users use the product out off the environmemtal operation range (temperature and humidity)，it will have visual quality concerns.

3. ELECTRICAL CHARACTERISTICS

3.1 TFT-LCD

Ta=25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	DVDD	3	3.3	3.6	V	
Analog Supply Voltage	AVDD	9.4	9.6	9.8	V	
Gate On Voltage	VGH	17	18	19	V	
Gate Off Voltage	VGL	-6.6	-6	-5.4	V	
Common Voltage	VCOM	3.95	4.15	4.35	V	Note1
Logic Input Voltage	VIL	0.7DVDD	-	DVDD	V	
	VIH	GND	-	0.3 DVDD	V	

Note1：Please adjust VCOM to make the flicker level be minimum.

3.2 TFT-LCD Power Supply Current

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Gate on Current	IVGH	VGH =18V	-	0.5	1	mA	Note1
Gate off Current	IVGL	VGL= -6V	-	0.5	1	mA	Note1
Digital Current	IDVDD	VDD = 3.3V	-	8	15	mA	Note1
Analog Current	IAVDD	AVDD = 9.6V	-	30	40	mA	Note1
Total Power Consumption	PC		-	327	458	mW	Note1

Note1：Typical: Under 256 gray pattern

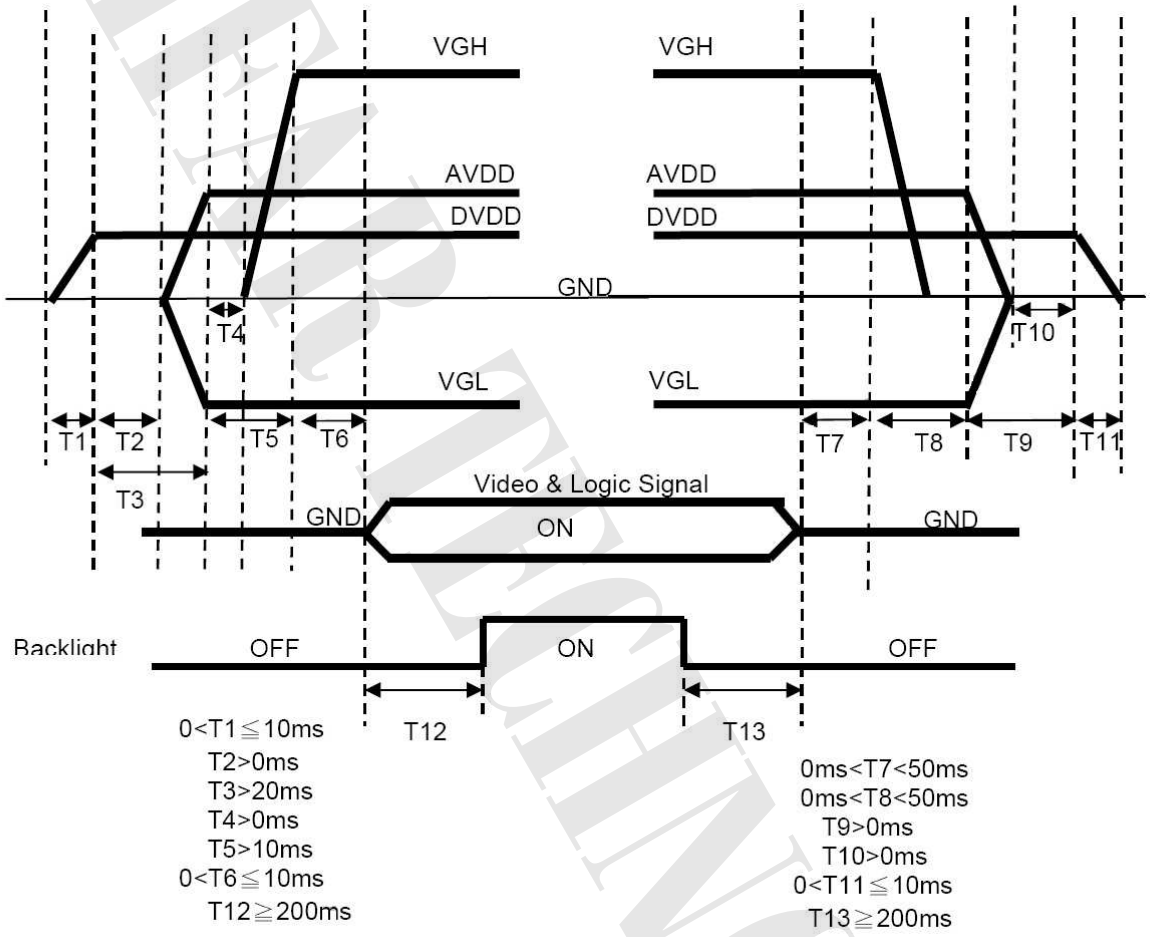
Maximum: Under black pattern

256 Gray Pattern

Black Pattern

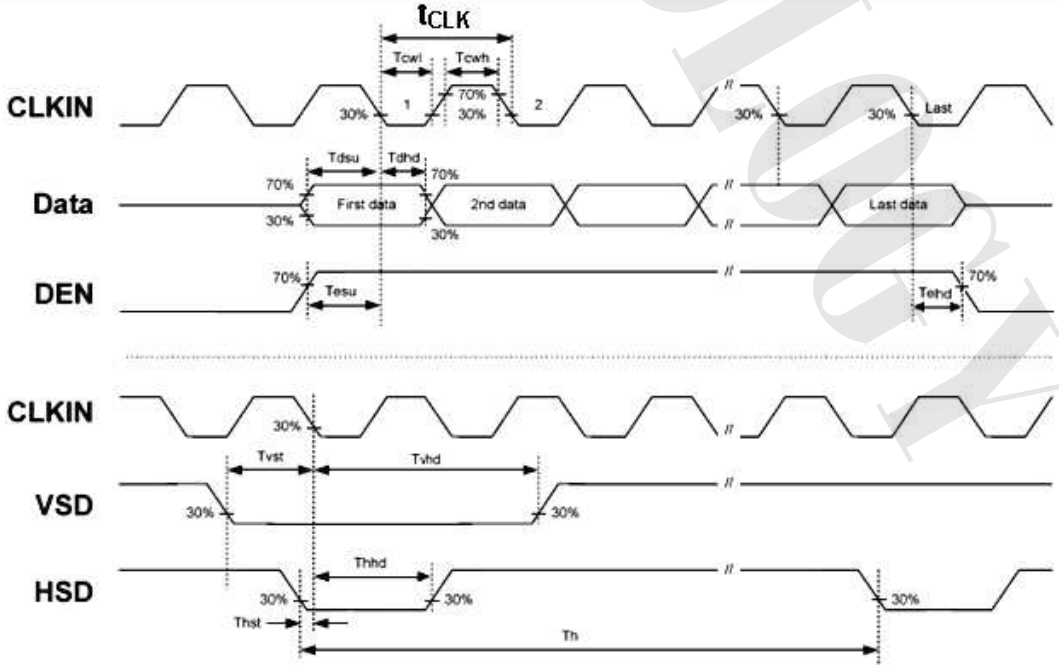
3.3 Power、Signal sequence

Power On：DVDD→AVDD/VGL→VGH→Video &Logic Signal
Power Off：Video &Logic Signal→VGH→AVDD/VGL→DVDD



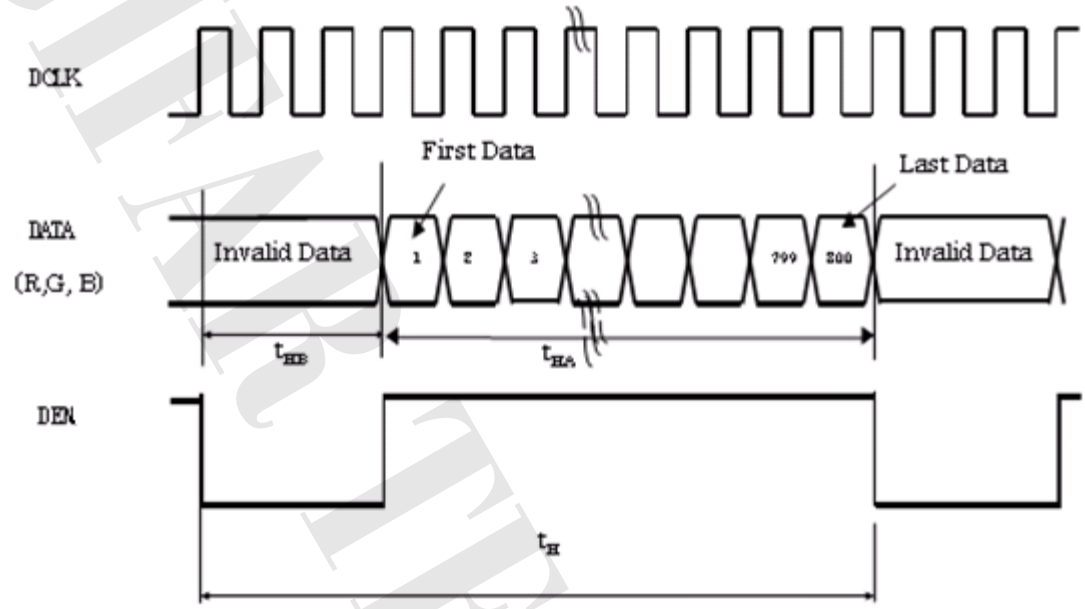
3.4 Timing characteristics of input signals

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
DCLK	Dot Clock	$1/t_{CLK}$	29	33	38	MHz	
	DCLK pulse duty	Tcwh	40	50	60	%	
DE	Setup Time	Tesu	8	-	-	ns	
	Hold time	Tehd	8	-	-	ns	
	Horizontal Period	t_H	1026	1056	1086	t_{CLK}	
	Horizontal Valid	t_{HA}		800		t_{CLK}	
	Horizontal Blank	t_{HB}	226	256	286	t_{CLK}	
	Vertical Period	t_V	515	525	535	t_H	
	Vertical Valid	t_{VA}		480		t_H	
	Vertical Blank	t_{VB}	35	45	55	t_H	
SYNC	HSYNC Setup Time	Thst	8	-	-	ns	
	HSYNC Hold Time	Thhd	8	-	-	ns	
	VSYNC Setup Time	Tvst	8	-	-	ns	
	VSYNC Hold Time	Tvhd	8	-	-	ns	
	Horizontal Period	th	1026	1056	1086	t_{CLK}	
	Horizontal Pulse Width	thpw	-	30	-	t_{CLK}	thb + thpw= 46DCLK is fixed
	Horizontal Back Porch	thb	-	16	-	t_{CLK}	
	Horizontal Front Porch	thfp	180	210	240	t_{CLK}	
	Horizontal Valid	thd		800		t_{CLK}	
	Vertical Period	tv	515	525	535	th	
	Vertical Pulse Width	tvpw	-	13	-	th	tvpw + tvb = 23th is fixed
	Vertical Back Porch	tvb	-	10	-	th	
	Vertical Front Porch	tvfp	12	22	32	th	
	Vertical Valid	tvd		480		th	
DATA	Setup Time	Tdsu	8	-	-	ns	
	Hold Time	Tdhd	8	-	-	ns	

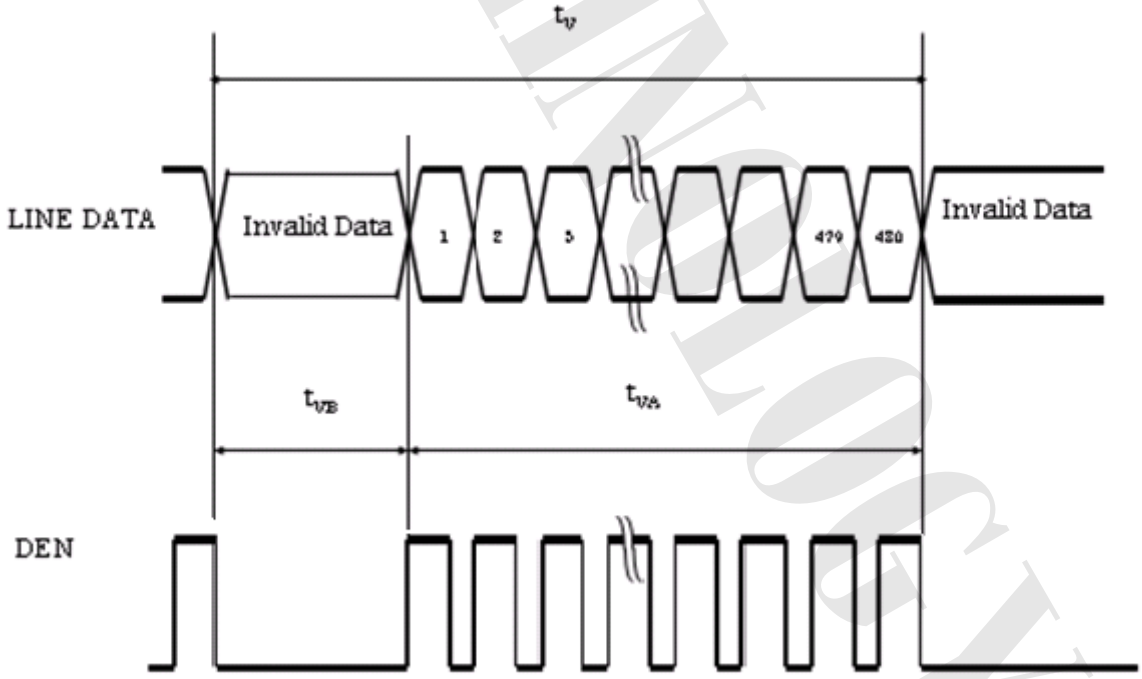


DE mode

Horizontal timing：

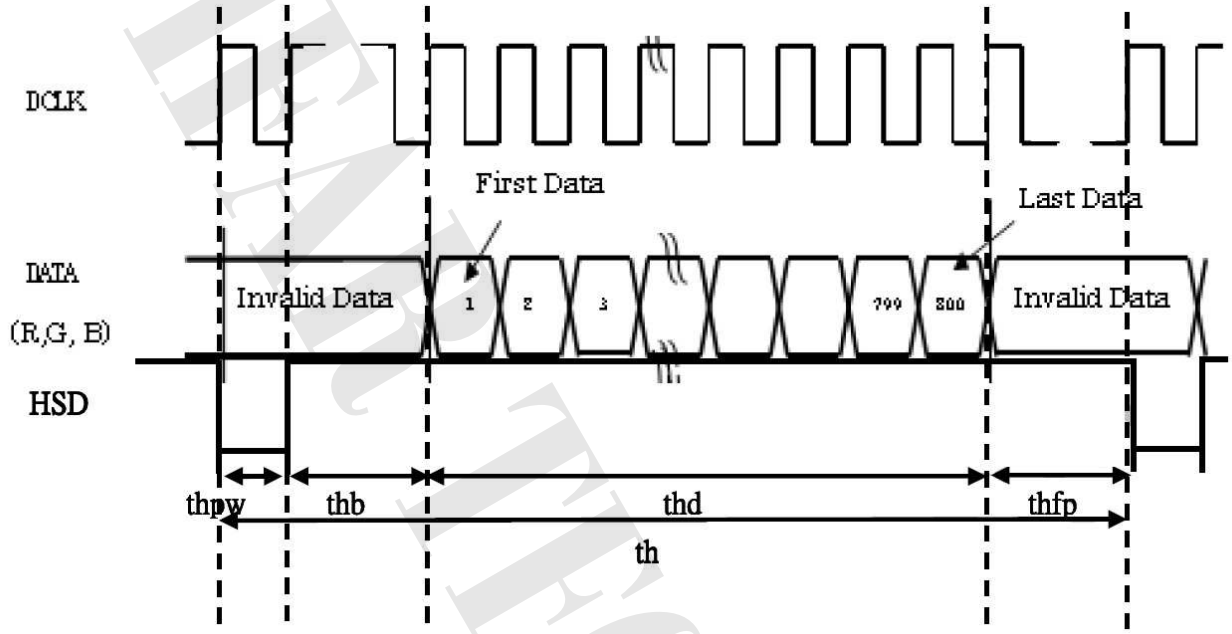


Vertical timing：

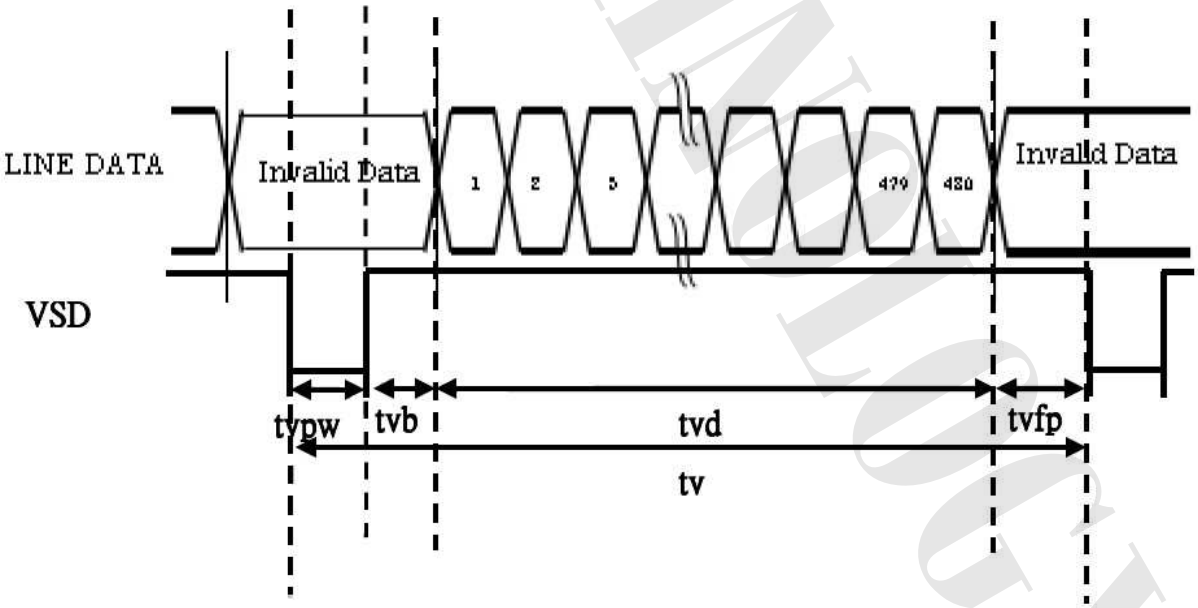


SYNC mode

Horizontal timing：



Vertical timing：



Color Data Reference

COLOR	INPUT DATA	R DATA								G DATA								B 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
		MSB							LSB	MSB							LSB	MSB							LSB
BASIC COLOR	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(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
	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
	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
	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
RED	RED(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
	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
	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
GREEN	GREEN(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
	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
	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
BLUE	BLUE(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
	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
	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. Gray level：Color (n): n means level of gray scale. Larger n means brighter level.
2. Data：1= High, 0 = Low

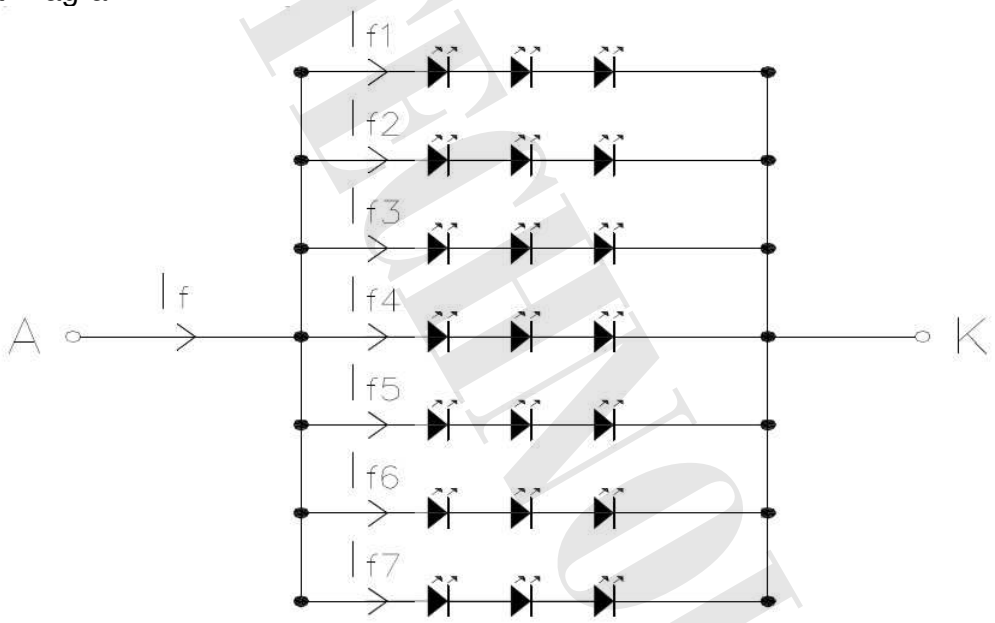
3.5 Backlight

Ta=25℃

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
LED Current	IL	Ta=25℃ Each serial=20mA	-	140	-	mA	
LED Voltage	VL	Ta=25℃ Each serial=20mA	8.7	9.75	10.8	V	
Power consumption	WL	V Ta=25℃ Each serial=20mA	-	1.365	-	W	
LED Lifetime	-	Ta=25℃ Each serial=20mA	30000			Hr	

Remarks :

*1) LED Circuit Diagram



*2) A : Anode(+) , K : Cathode(-)

*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.

*4) Definition of Led lifetime : Luminance < Initial luminance 50%..

4. INTERFACE CONNECTION

4.1 CN1 (Input Signal)

Pin NO.	SYMBOL	DESCRIPTION
1	AGND	Analog Ground
2	VDDA	Analog Power
3	DVDD	Digital Power
4	R0	Red data Input (LSB)
5	R1	Red data Input
6	R2	Red data Input
7	R3	Red data Input
8	R4	Red data Input
9	R5	Red data Input
10	R6	Red data Input
11	R7	Red data Input (MSB)
12	G0	Green data Input (LSB)
13	G1	Green data Input
14	G2	Green data Input
15	G3	Green data Input
16	G4	Green data Input
17	G5	Green data Input
18	G6	Green data Input
19	G7	Green data Input (MSB)
20	B0	Blue data Input (LSB)
21	B1	Blue data Input
22	B2	Blue data Input
23	B3	Blue data Input
24	B4	Blue data Input
25	B5	Blue data Input
26	B6	Blue data Input
27	B7	Blue data Input (MSB)
28	DCLK	Pixel clock
29	DE	Data Enable signal
30	HSD	Horizontal sync input. Negative polarity
31	VSD	Vertical sync input. Negative polarity
32	MODE	DE/SYNC mode selec，Normal pull high H: DE mode.　L: HSD/VSD mode
33	RSTB	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=47KΩ，C=1μF)
34	STBYB	Standby mode, normally pull high STBYB=”1”, normal operation STBYB=”0”,timing control, source driver will turn off, all output are high-Z
35	SHLR	Left or Right Display Control
36	DVDD	Digital Power

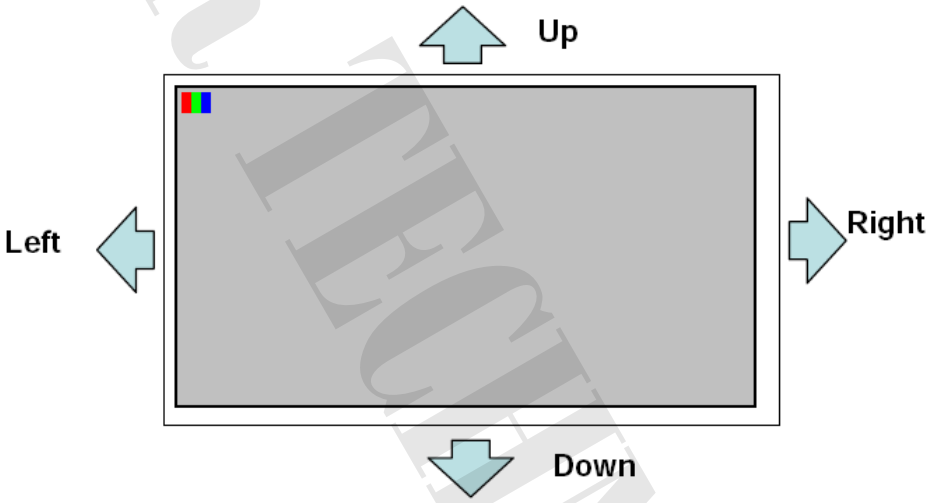
37	UPDN	Up / Down Display Control
38	GND	Digital Ground
39	AGND	Analog Ground
40	AVDD	Analog Power
41	VCOM	Common Voltage
42	DITH	Dithering function enable control. DITH="H" 6bit resolution(last 2 bit of input data truncated) (default setting) DITH="L" 8bit resolution
43	NC	Not connect
44	NC	Not connect
45	NC	Not connect
46	NC	Not connect
47	NC	Not connect
48	NC	Not connect
49	NC	Not connect
50	NC	Not connect
51	NC	Not connect
52	NC	Not connect
53	NC	Not connect
54	NC	Not connect
55	NC	Not connect
56	VDDG	Positive Power for TFT
57	DVDD	Digital Power
58	VEEG	Negative Power for TFT
59	GND	Digital Ground
60	NC	Not connect

【Note1】SHLR：left or right setting

UPDN：up or down setting

SHLR	UPDN	Data shifting
DVDD	GND	Left→Right，Up→Down(default)
GND	GND	Right→Left，Up→Down
DVDD	DVDD	Left→Right，Down→Up
GND	DVDD	Right→Left，Down→Up

Definition of scanning direction.



4.2 CN2 (backlight)

Pin No.	SYMBOL	FUNCTION
1	A	Anode
2	K	Cathode

Note：

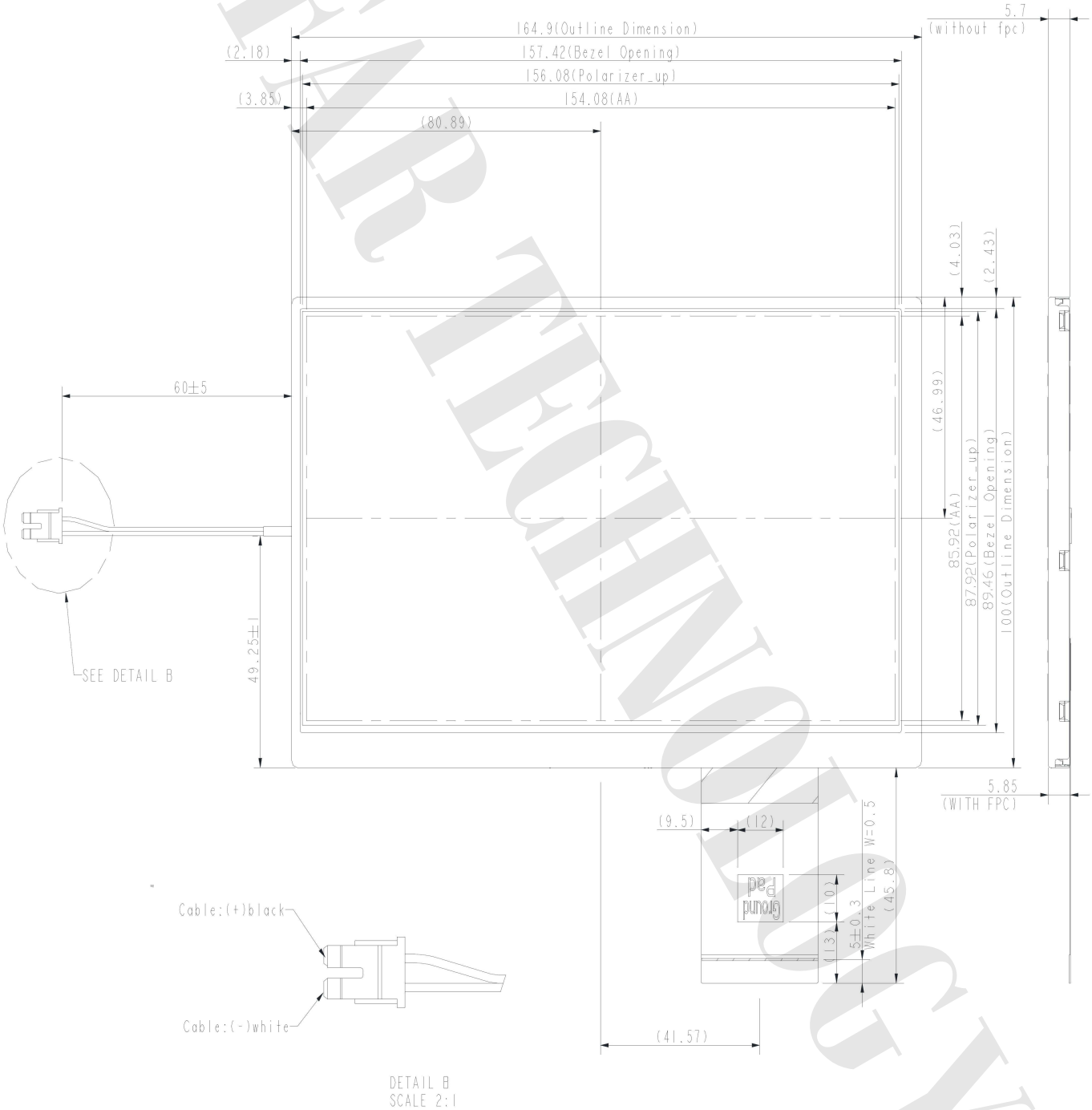
Input connector : BHSR-02VS-1(JST)

Outlet connector: SM02B-BHSS-1(JST)

5. MECHANICAL SPECIFICATION

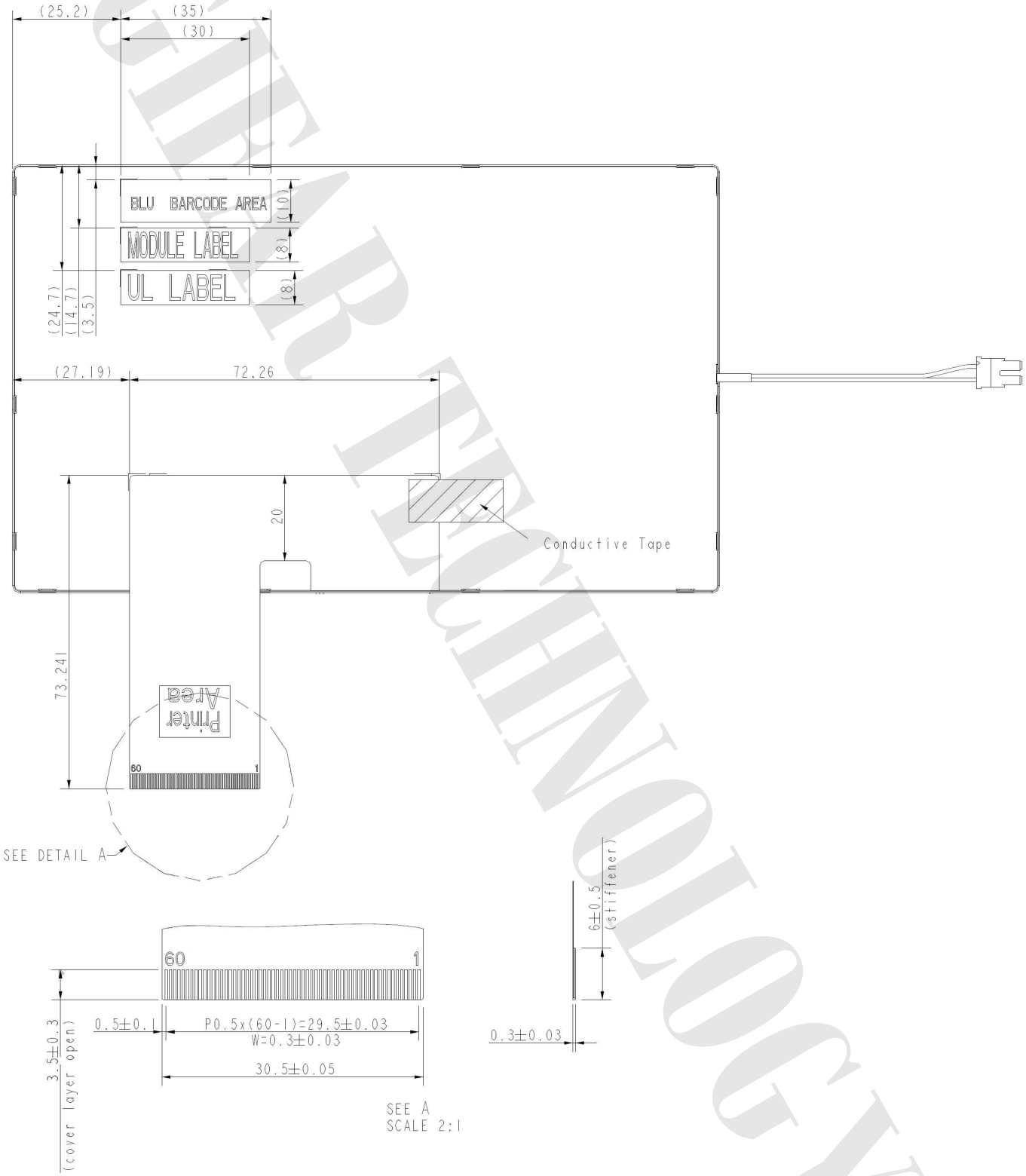
5.1 Front View

[Unit：mm]



NOTE: General tolerance=±0.3mm

5.2 Rear View



NOTE:

1.General tolerance=±0.3mm.

2.bending angel：minimum R=0.4 with 180 degrees

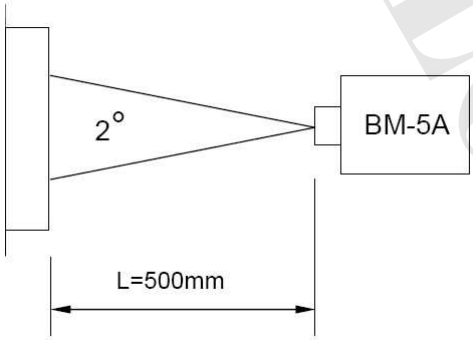
3.bending times：maxmun 3 times

6. OPTICAL CHARACTERISITCS

Ta=25℃ VCC=3.3V

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Constrast Ratio		CR	Point-5	400	500	-	-	1, 2, 3
Luminance(CEN)		Lw	Point-5	350	450	-	cd/m^2	1, 3
Luminance Uniformity		ΔL		70	80	-	%	1, 3
Response Time (White - Black)		Tr+Tf	Point-5	-	25	40	ms	1, 3, 5
NTSC		-	Point-5	40	50		%	1, 4
Viewing Angle	Vertical	Upper(θ)	CR≧10 Point-5	50	60	-	°	1, 4
		Down(θ)		60	70	-	°	1, 4
	Horizontal	Left (Φ)		65	75	-	°	1, 4
		Right(Φ)		65	75	-	°	1, 4
Color Coordinate	White	Wx	Point-5	0.264	0.304	0.344	-	1, 3
		Wy		0.295	0.335	0.375		
	Red	Rx		0.551	0.591	0.631		
		Ry		0.300	0.340	0.380		
	Green	Gx		0.293	0.333	0.373		
		Gy		0.565	0.605	0.645		
	Blue	Bx		0.115	0.155	0.195		
		By		0.064	0.104	0.144		

Note1： Measuring conditions：25℃ ±2℃，60±10%RH，under 10 Lunx in the darkroom。
BM-5A (TOPCON)，view cone=2° IL=140mA (Backlight current)，mesurement after 10 minutes operation.



Note2: Definition of contrast ratio：
Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

Note3: Definition of luminance：Measure white luminance on the point 5 as figure.6-1

Definition of Luminance Uniformity: Measure white luminance on the point1~9 as figure.6-1

ΔL = [L(MIN)/L(MAX)]×100

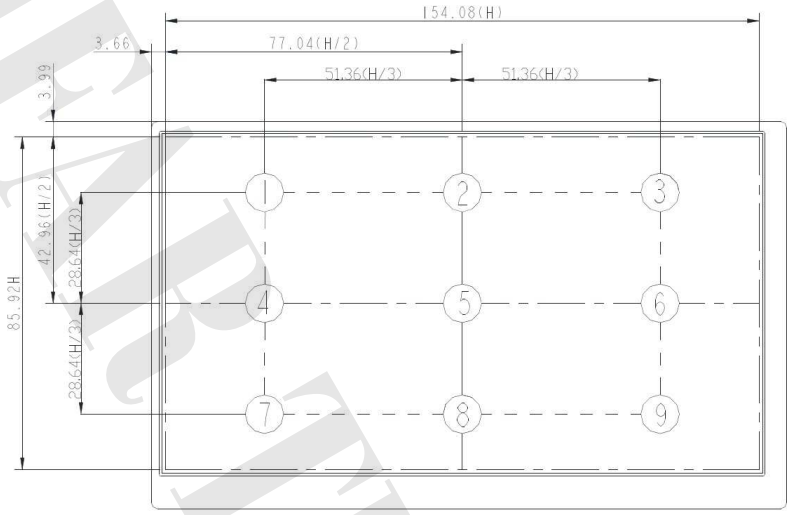


Fig.6-1 Measuring point

Note 4: Definition of Viewing Angle (θ , Φ), refer to Fig.6-2 as below

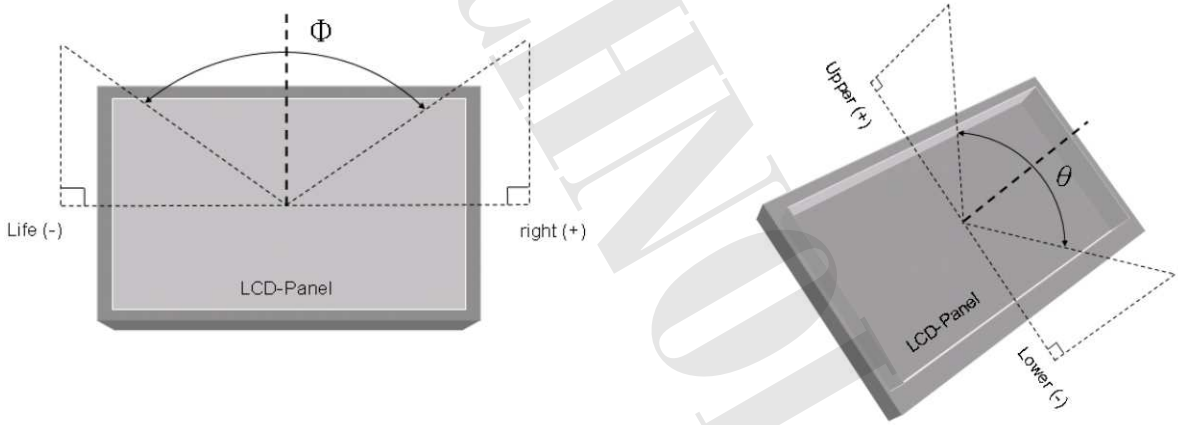


Fig.6-2 Definition of Viewing Angle

Note 5: Definition of Response Time. (White - Black)

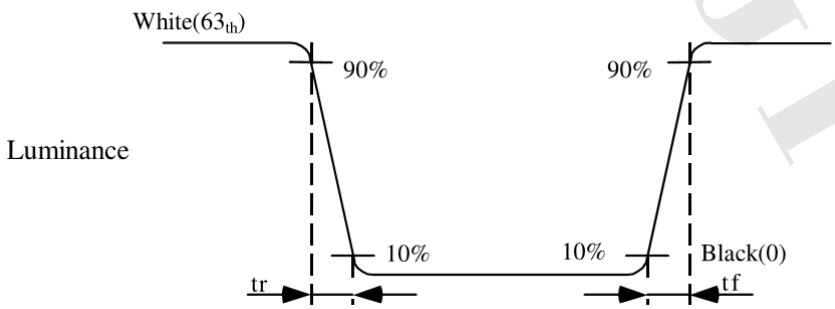


Fig.6-3 Definition of Response Time(White-Black)

7. RELIABILITY TEST

7.1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70℃, 240hrs	
High Temperature Operation	80℃Tp, 240hrs	Note1
High Temperature Storage	80℃, 240hrs	
High Temperature High Humidity Operation	60℃, 90%RH, 240hrs	
Low Temperature Operation	-20℃, 240hrs	
Low Temperature Storage	-30℃, 240hrs	
Thermal Shock	-30℃(0.5hr)~ 80℃(0.5hr); 200 Cycle	Non-Operating
Image Sticking	25℃, 4hrs	Note 2
MTBF	20000hrs	

Note 1. Tp: panel surface temperature overall.

Note 2. Condition of Image Sticking test：25℃±2℃

Operation with test pattern sustained for 4 hrs, then change to Mid-gray pattern immediately. After 5 mins, the mura must be disappeared completely .

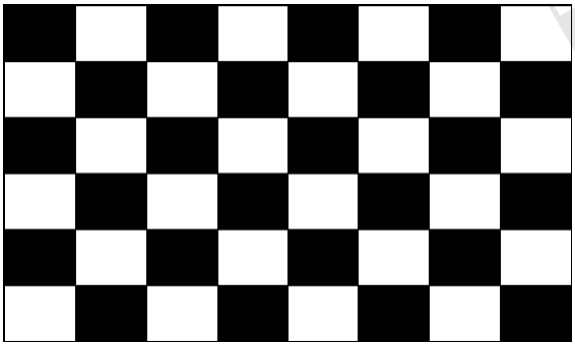


Image Sticking –pattern

Mid-Gray pattern

7.2 Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non Operation)	● Shock level: 980m/s (equal to 100G). ● Waveform: half sinusoidal wave,6ms. ● 1Number of shocks: X,±Y,±Z axes for a total of six shock inputs.
Vibration (Non Operation)	● Frequency range：8~33.3Hz ● Stroke：1.3 mm ● Vibration: sinusoidal wave, perpendicular axis(both x, z axis: 2hrs ,y axis: 4hrs). ● weep: 2.9G,33.3 Hz -400 Hz ● Cycle:15 min

7.3 ESD

Item	Conditions	Note
ESD (power off)	150 pF、330Ω、±8KV,±15KV air & contact test	1
	200 pF、0Ω 、±200V contact test	2

Note：Measure

1: LCD glass and metal bezel

2: IF connector pins

7.4. Judgment standard

The judgment of the above test should be made as follow：

Pass：Normal display image with no line defect.

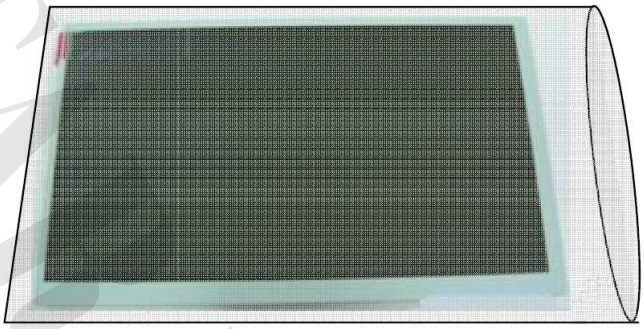
Partial transformation of the module parts should be ignored. Partial transformation of the module parts should be ignored.

Fail：No display image, Function NG, or line defects.

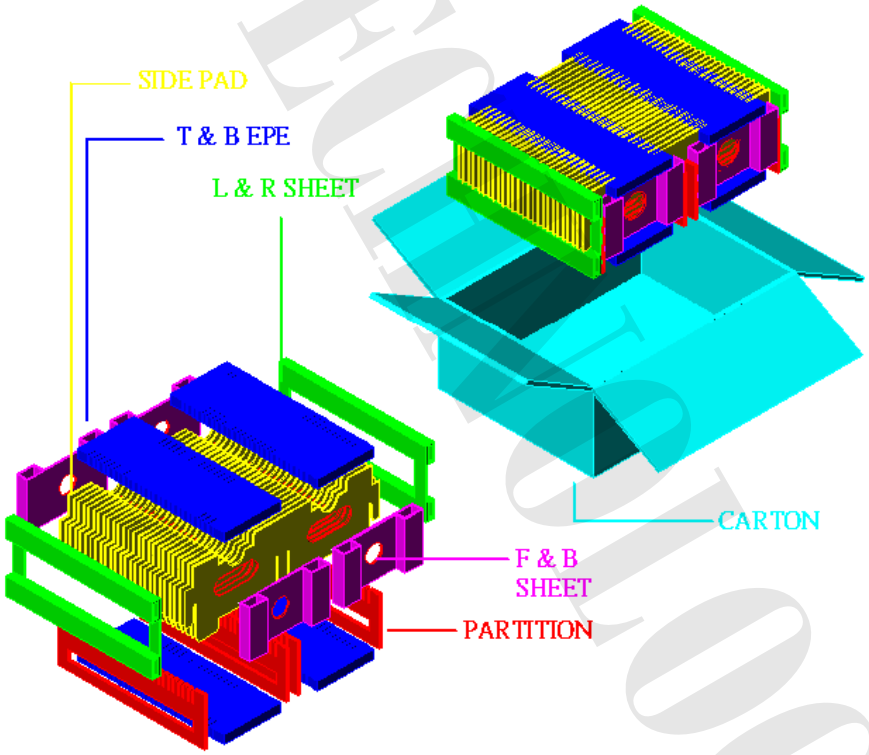
8. PACKING

(1) Fix FPC and B/L leading wire

(2) Put the Module into ANTI-STATIC BAGS



(3) Put the panels with Anti-static bags inside the box in sequence
There are 50 pcs panels per box.



9. WARRANTY

9.1. The period is within 12 months since the date of shipping out under normal using and storage conditions.

9.2. The warranty will be avoided in case of defect induced by customer.