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. : GFTO070YA800480L

VERSION : A

DATE : 2018.01.09

CERTIFICATION : ROHS

CUSTOMER SIGN : _____

QA Approved By	Approved By	Prepared By	Prepared By
	GIFAR 2018.01.09 SIDNEY	GIFAR 2018.01.09 HAZEL	GIFAR 2018.01.09 RITA

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Revision Record

Data(y/m/d)	Ver.	Description	Note	page
2018.01.09	A	NEW		

Contents

1. OVERVIEW

GFTO070YA800480L 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) x 3(RGB) x 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)	1.671W(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.

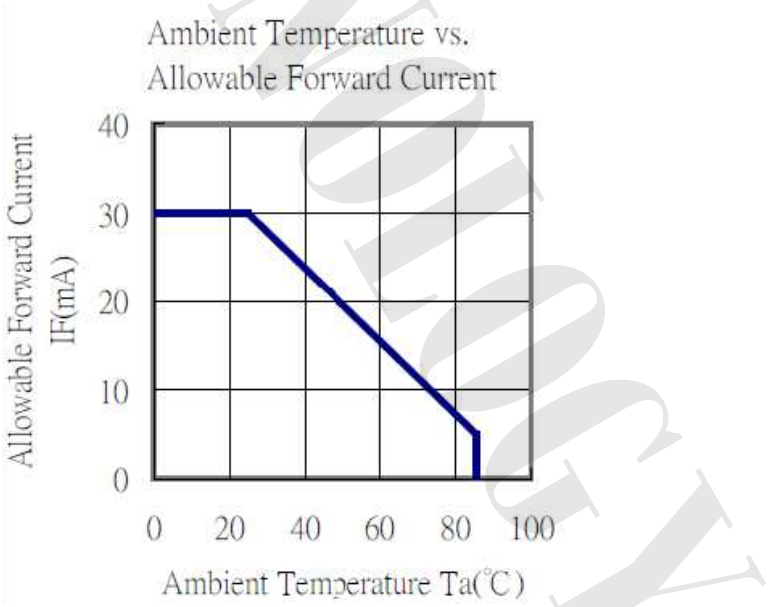
Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	+5.0	V	
Analog Supply Voltage	AVDD	-0.5	+13.5	V	
Gate On Voltage	VGH	-0.3	+42	V	
Gate Off Voltage	VGL	-20	+0.3	V	
Gate On-Gate Off Voltage	VGH-VGL	12	40	V	
Forward Current (per LED)	If	-	30	mA	
Reverse Voltage (per LED)	VR	-	5	V	
Pulse forward current (per LED)	Ifp	-	100	mA	Note *2)
Operation Temperature	T_{op}	-30	85	℃	Note *4)
Storage Temperature	T_{stg}	-40	90	℃	Note *4)

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	3.5	4	4.5	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

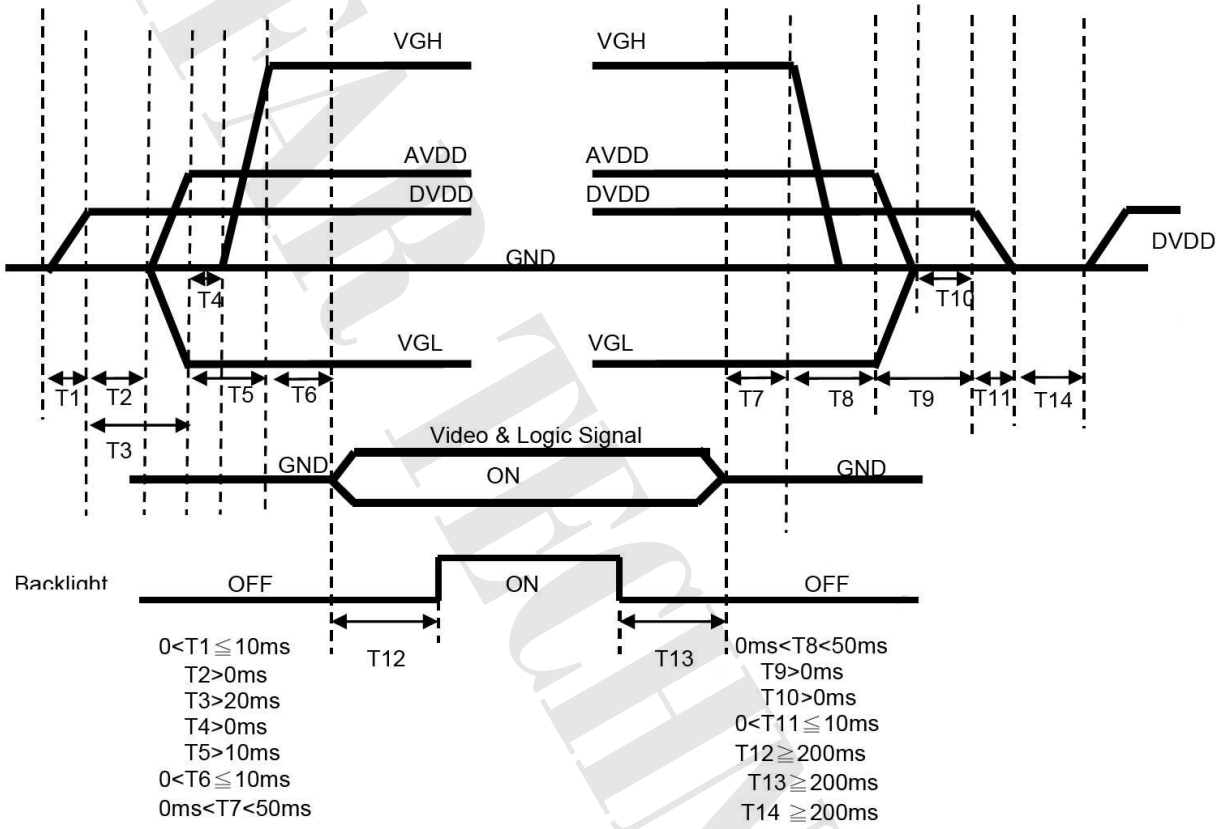
Note1 : Typical: Under 256 gray pattern
Maximum: Under black pattern

256 Gray Pattern

Black Pattern

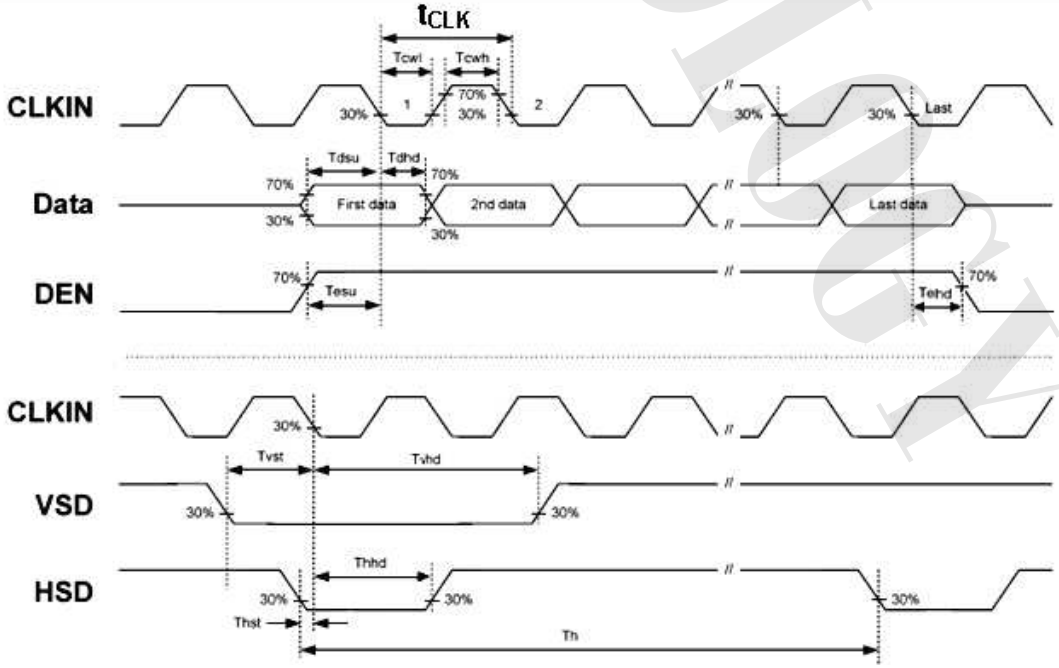
3.3 Power、Signal sequence

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



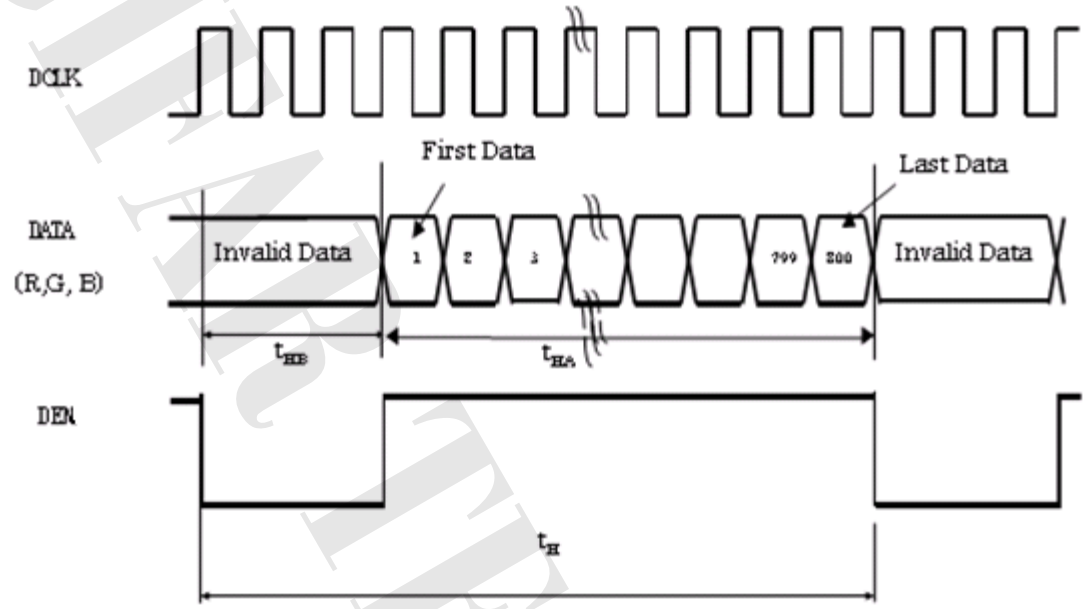
3.4 Timing characteristics of input signals

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	

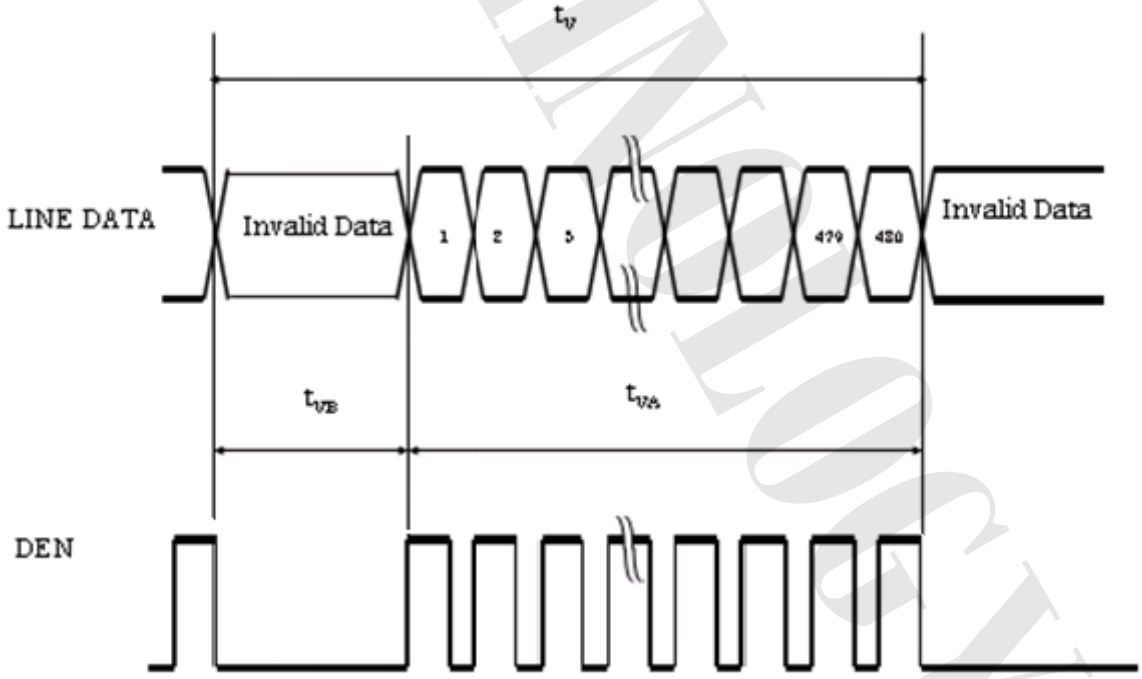


DE mode

Horizontal timing：

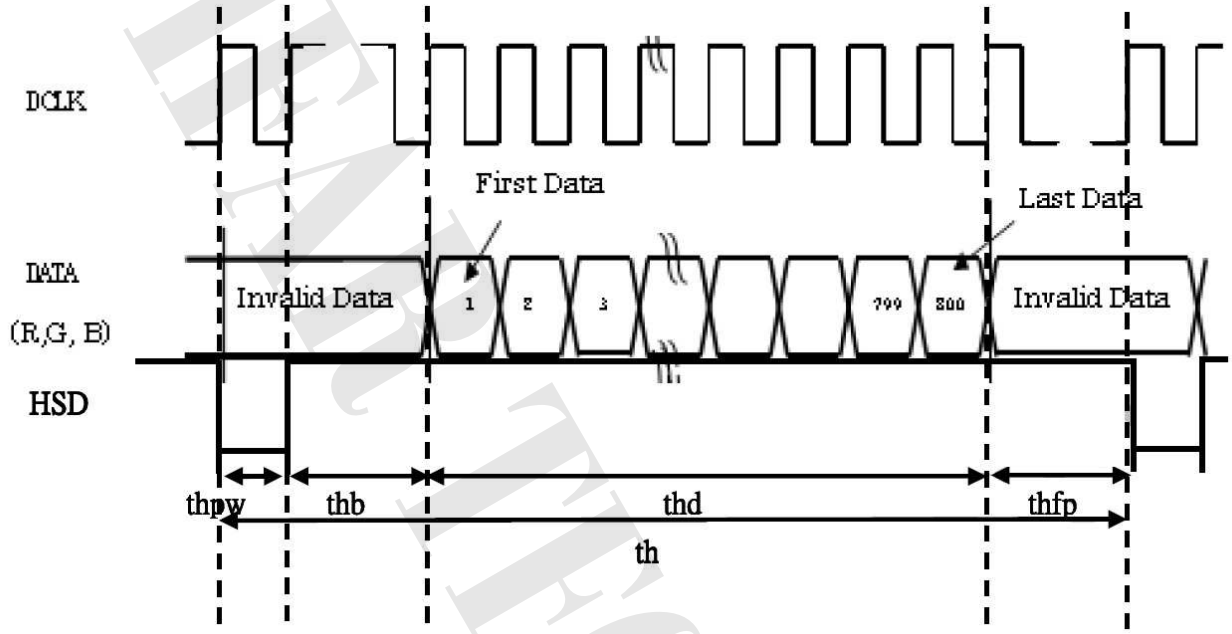


Vertical timing：

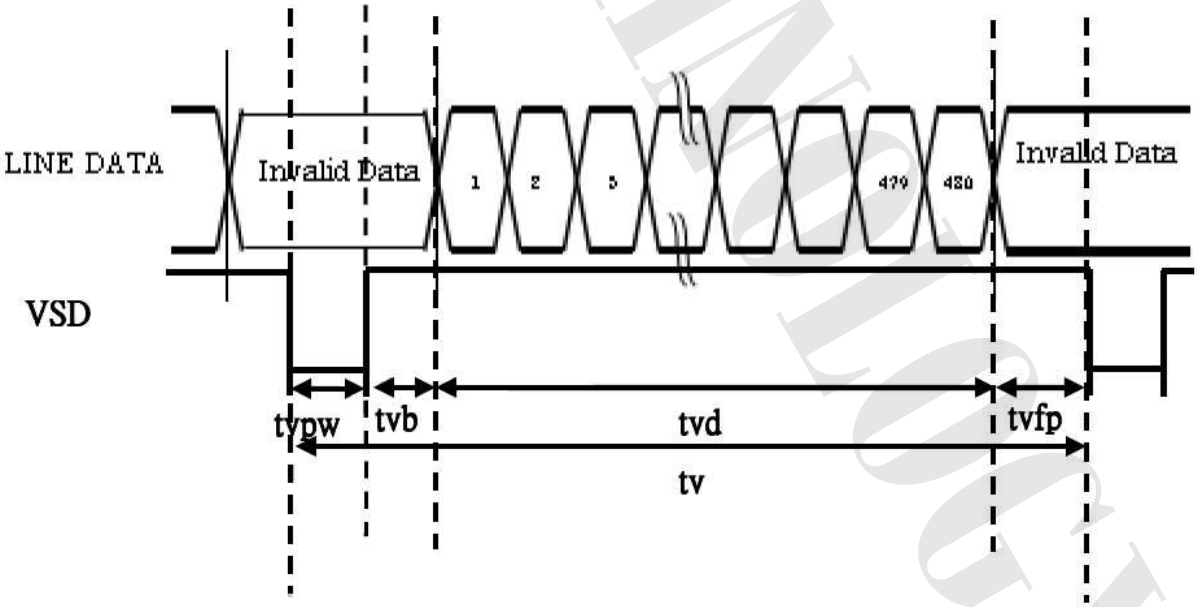


SYNC mode

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

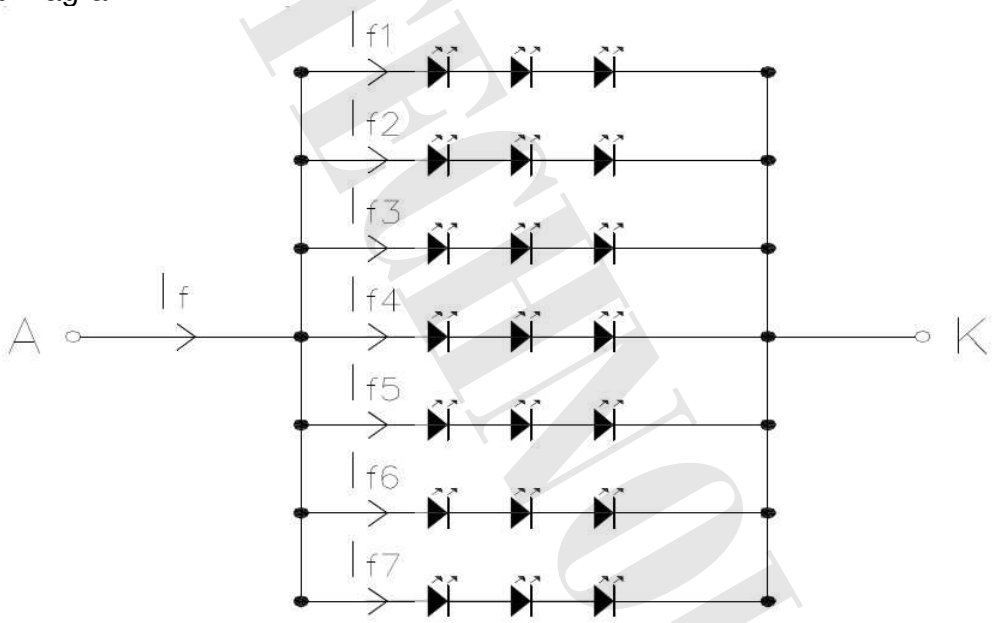
3.5 Backlight

Ta=25℃

Item	Symbol	Conditions	Min.	Min.	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	-	1.344	-	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	V_{LED+}	Power for LED backlight (Anode)
2	V_{LED+}	Power for LED backlight (Anode)
3	V_{LED-}	Power for LED backlight (Cathode)
4	V_{LED-}	Power for LED backlight (Cathode)
5	GND	Power ground
6	VCOM	Common voltage
7	DVDD	Digital Power
8	MODE	DE/SYNC mode select. Normally pull high H: DE mode. L: HSD/VSD mode
9	DE	Data Enable signal
10	VSD	Vertical Sync Input. Negative polarity
11	HSD	Horizontal Sync Input. Negative polarity
12	B7	Blue data(MSB)
13	B6	Blue data
14	B5	Blue data
15	B4	Blue data
16	B3	Blue data
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data(LSB)
20	G7	Green data(MSB)
21	G6	Green data
22	G5	Green data
23	G4	Green data
24	G3	Green data
25	G2	Green data
26	G1	Green data
27	G0	Green data(LSB)
28	R7	Red data(MSB)
29	R6	Red data
30	R5	Red data
31	R4	Red data
32	R3	Red data
33	R2	Red data
34	R1	Red data
35	R0	Red data(LSB)
36	GND	Power Ground
37	DCLK	Clock input
38	GND	Power Ground
39	SHLR	Left or Right Display Control
40	UPDN	Up / Down Display Control
41	VDDG	Positive Power for TFT
42	VEEG	Negative Power for TFT

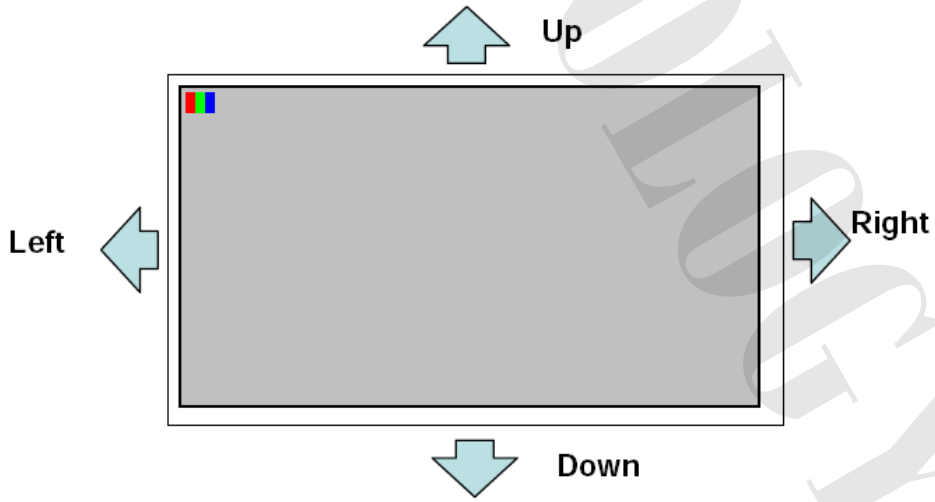
43	AVDD	Analog Power
44	RSTB	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability . Normally pull high. (R=10KΩ , C=1μF)
45	NC	No connection
46	VCOM	Common Voltage
47	DITH	Dithering setting DITH="H" 6bit resolution(last 2 bit of input data truncated) DITH="L" 8bit resolution
48	GND	Power Ground
49	NC	No connection
50	NC	No connection

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

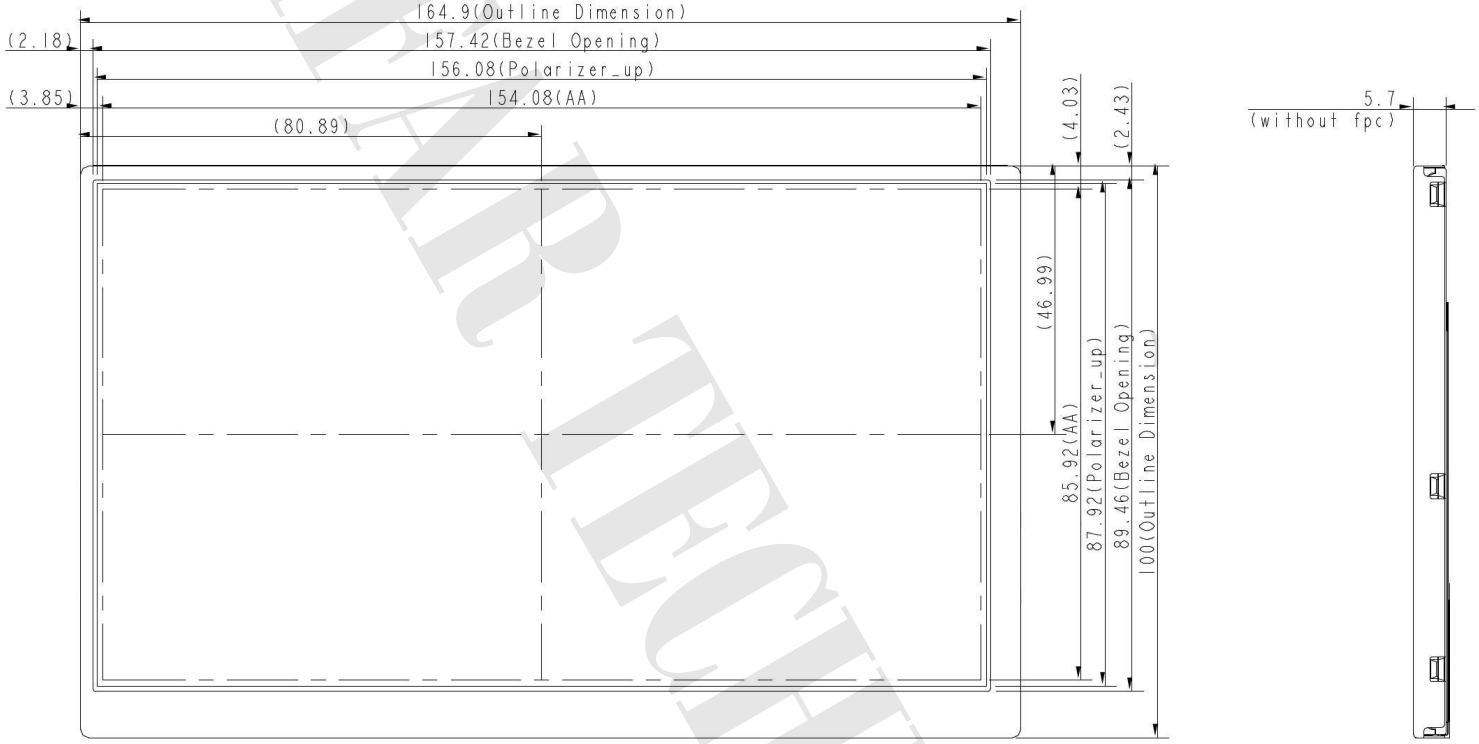
Definition of scanning direction.



5. MECHANICAL SPECIFICATION

5.1 Front Side

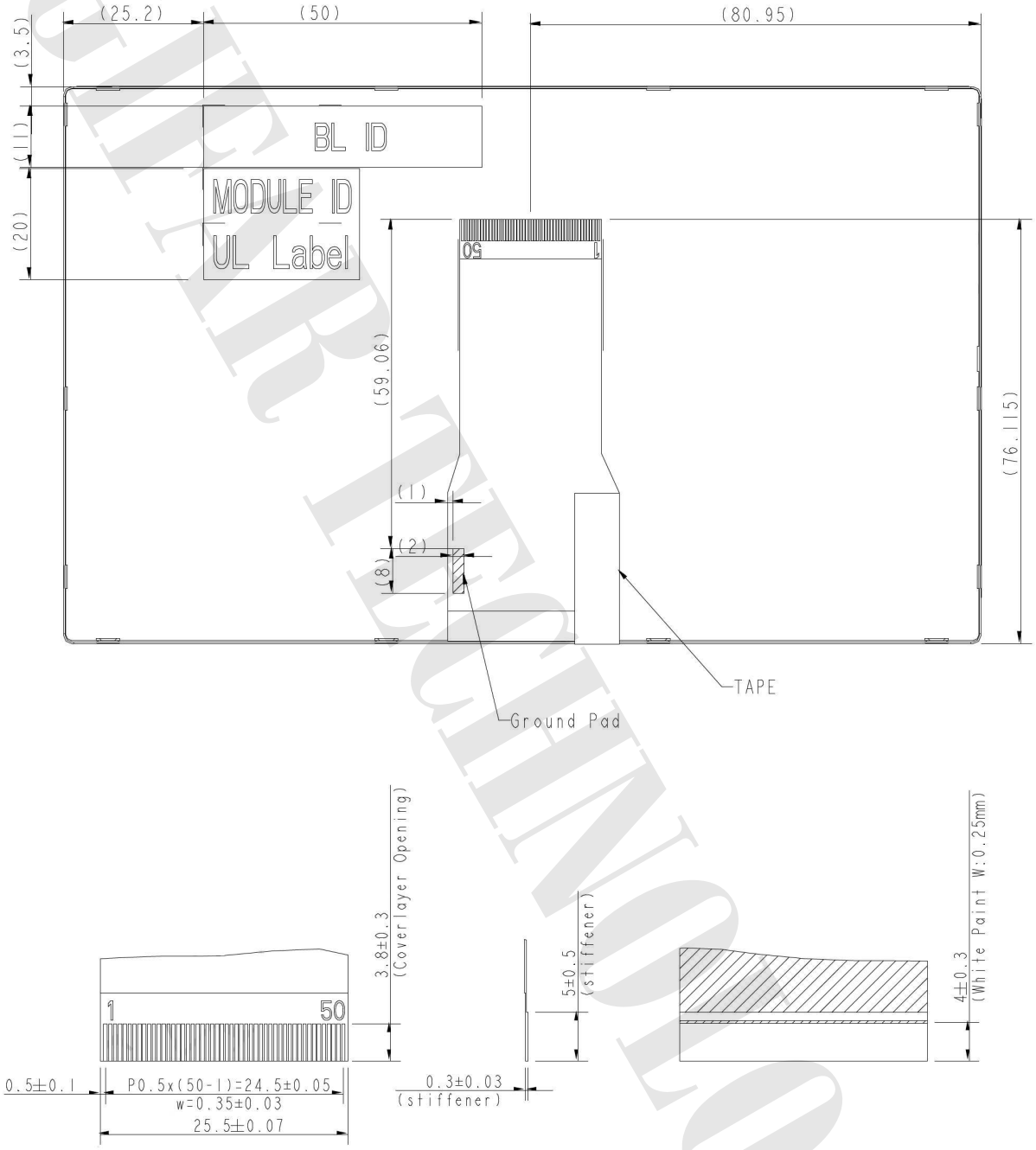
[Unit：mm]



NOTE: General tolerance=±0.3mm

5.2 Rear View

[Unit：mm]



NOTE:

1.General tolerance=±0.3mm.

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

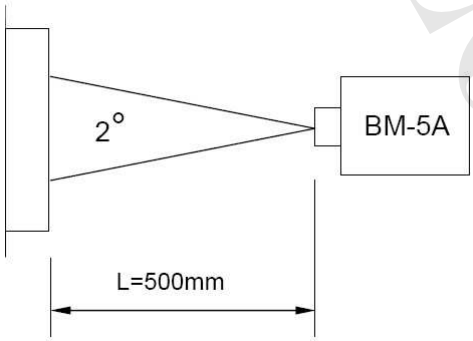
3.bending times：maxmun 3 times

6. OPTICAL CHARACTERISITCS

Ta=25℃ VCC=3.3V

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
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		0.556	0.596	0.636		
		Ry		0.294	0.334	0.374		
	Green	Gx		0.333	0.373	0.413		
		Gy		0.537	0.577	0.617		
	Blue	Bx		0.116	0.156	0.196		
		By		0.053	0.093	0.133		

Note1： Measuring conditions：25℃ ±2℃，60±10%RH，under 1 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

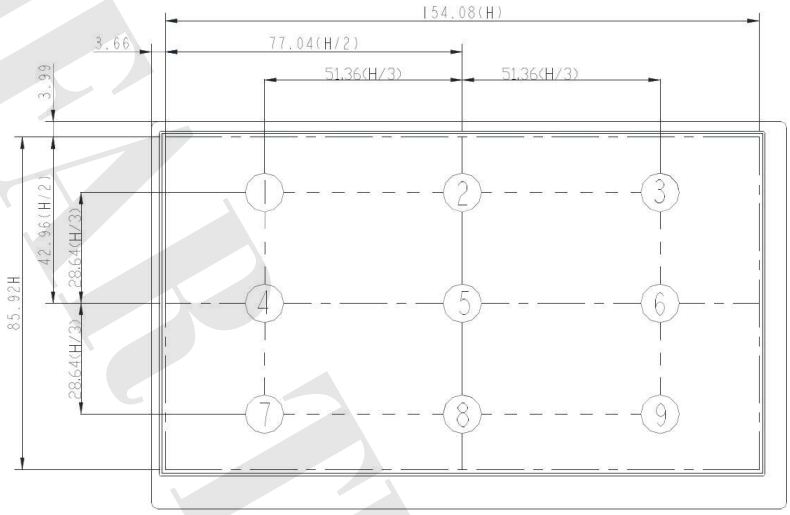


Fig.6-1 Measuring point

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

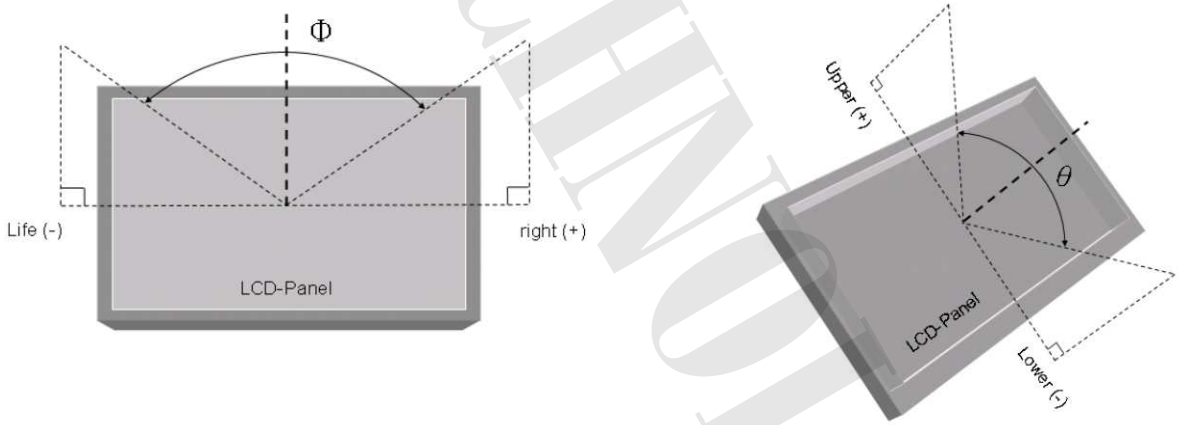


Fig.6-2 Definition of Viewing Angle

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

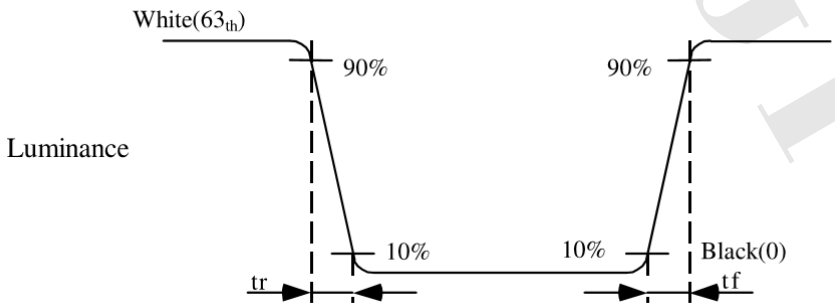


Fig.6-3 Definition of Response Time(White-Black)

7. RELIABILITY TEST

7.1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	85℃, 240hrs	
High Temperature Storage	90℃, 240hrs	
High Temperature High Humidity Operation	60℃, 90%RH, 240hrs	
Low Temperature Operation	-30℃, 240hrs	
Low Temperature Storage	-40℃, 240hrs	
Thermal Shock	-30℃(1hr)~ 80℃(1hr); 100 Cycle	Non-Operating
Image Sticking	25℃, 4hrs	Note 1
MTBF	50000hrs	

Note 1 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 .

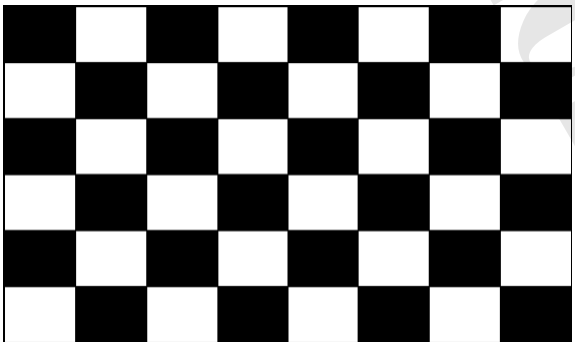


Image Sticking –pattern

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. ● Number 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 Electrostatic Discharge

Item	Conditions	Remarks
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.

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

8 WARRANTY

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

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