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. : GFTO070DB1024600V

VERSION : A

DATE : 2018.01.11

CERTIFICATION : ROHS

CUSTOMER SIGN : _____

QA Approved By	Approved By	Prepared By	Prepared By
	GIFAR 2018.01.11 SIDNEY	GIFAR 2018.01.11 HAZEL	GIFAR 2018.01.11 RITA

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Revision Record

Data(y/m/d)	Ver.	Description	Note	page
2018.01.11	A	NEW		

Contents

1. OVERVIEW

GFTO070DB1024600V 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 1024×600 images are displayed on the 7” diagonal screen. Display 16.7M colors by R.G.B signal input.

General specifications are summarized in the following table:

Item	**Specification**			
Display Area (mm)	154.2144(H) × 85.92(V)			
Number of Pixels	1024(H) × 3(RGB) × 600(V)			
Pixel Pitch(mm)	0.1506(H) × 0.1432(V)			
Color Pixel Arrangement	RGB vertical stripe			
Display Mode	Normally Black			
Number of color	16.7M			
Brightness (cd/m^2)	600nit(typ)			
Response Time (ms)	30ms(typ.),50ms(max)			
Contrast Ratio	800(typ); 600 (min)			
Viewing Angle (CR＞10)	85°、85° / 85°、85°(Typ.)			
	80°、80° / 80°、80°(Min.)			
Color Saturation	50%(typ.)			
Optimum Viewing Direction	full			
Power Consumption(W)	2.592			
Interface connection	LVDS, 40pin			
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.

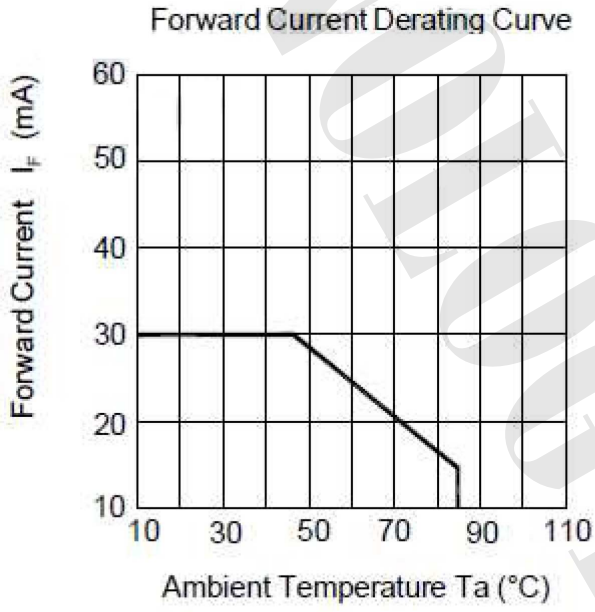
Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	4	V	
Analog Supply Voltage	AVDD	-0.5	15	V	
Gate On Voltage	VGH	-0.3	40	V	
Gate Off Voltage	VGL	-20	0.3	V	
Gate On-Gate Off Voltage	VGH-VGL	12	40	V	
Signal Input Voltage	NIND0 ~ NIND3 PIND0 ~ PIND3 NINC,PINC	-0.5	5	V	
Forward Current (per 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}	-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.

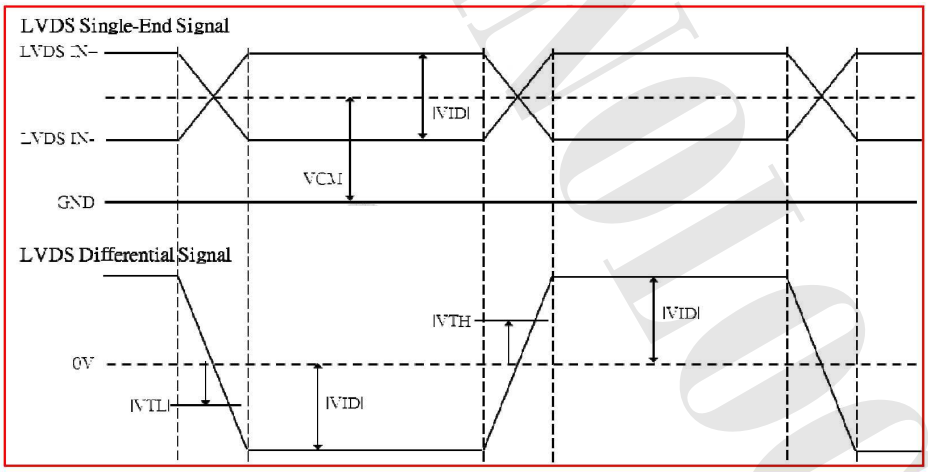
3. ELECTRICAL CHARACTERISTICS

3.1 Typical Operation Conditions

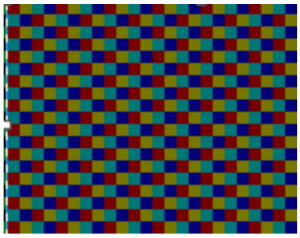
Ta=25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	DVDD	3	3.3	3.6	V	
Logic Input Voltage (LVDS:IN+,IN-)	VCM	$\frac{\lvert VID \rvert}{2}$	-	$2.4-\frac{\lvert VID \rvert}{2}$	V	Note1
	| VID |	200	-	600	mV	Note1
	VTH	-	-	100	mV	VCM=1.2V Note1
	VTL	-100	-	-	mV	
1 Data time	UI	-	tclk*1/7	-	tclk	Note3
LVDS clock to data skew	tskew	-	-	300	ps	Note3
input data eye width	teyew	1906	-	-	ps	Note3
Analog Power Supply Voltage	AVDD	9.4	9.6	9.8	V	
Gate On Power Supply Voltage	VGH	17	18	19	V	
Gate Off Power Supply Voltage	VGL	-6.6	-6	-5.4	V	
Common Power Supply Voltage	VCOM	-	3.15	-	V	Note2
Logic Input Voltage	VIL	0.7*DVDD	-	DVDD	V	
	VIH	GND	-	0.3*DVDD	V	

【Note1】LVDS DC electrical characteristics



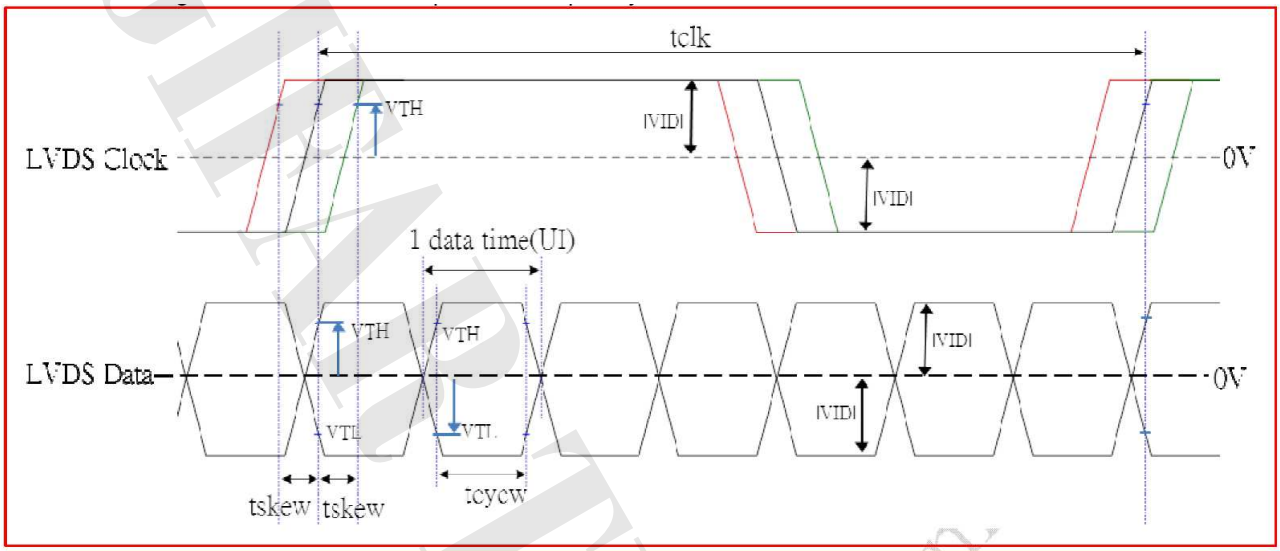
【Note2】Vcom is supplied from FPCA, it could be adjusted by VR to make the flicker level be minimum



Flicker pattern

【Note3】LVDS AC electrical characteristics

The following conditon is base on operation frequency at 57MHz



3.2 TFT-LCD Current Consumption

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	-	30	45	mA	Note1
Analog Current	IAVDD	AVDD = 9.6V	-	35	45	mA	Note1
Total Power Consumption	PC		-	447	604	mW	Note1

Note1 : Typical: Under 256 gray pattern

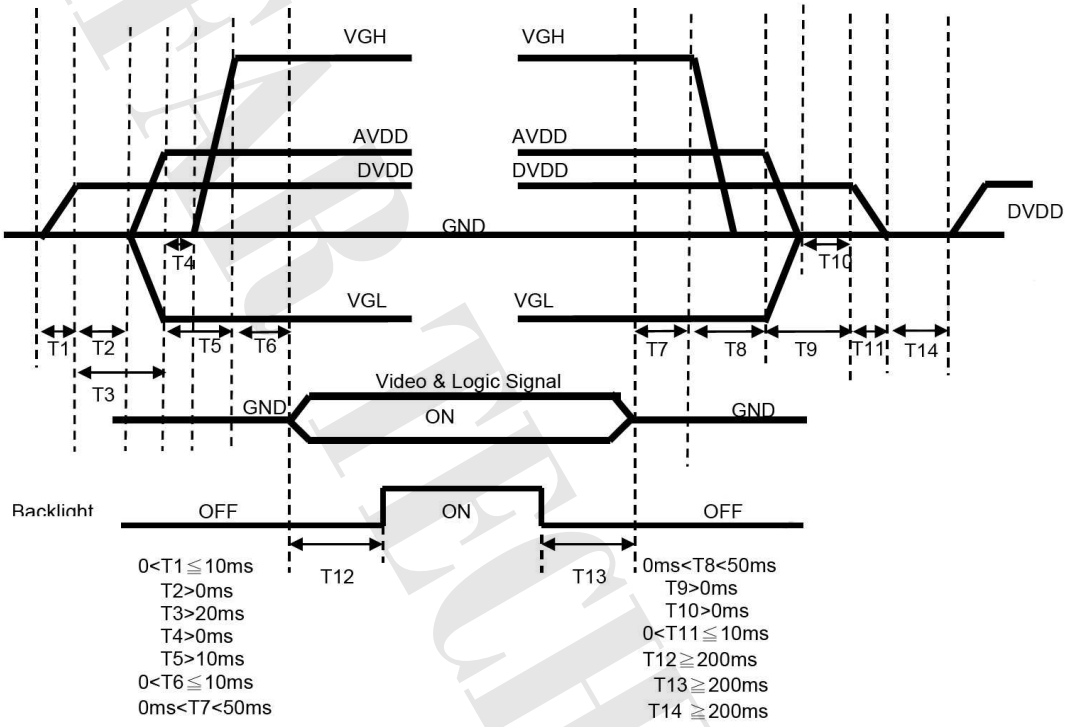
Maximum: Under White pattern

256 Gray Pattern

White Pattern

3.3 Power、Signal sequence

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



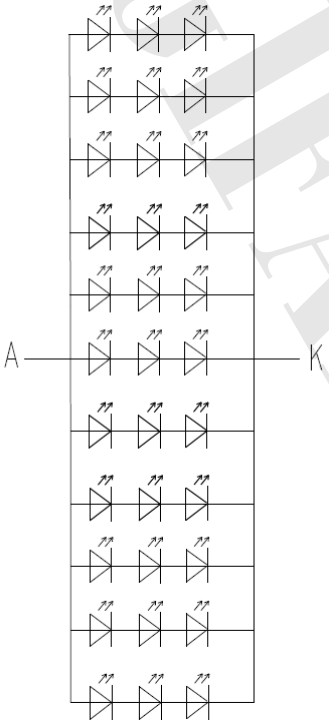
3.4 Backlight

Ta=25℃

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	NOTE
LED Current	IL	Ta=25℃ Each serial=20mA	-	(220)	-	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	-	(2.145)	-	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

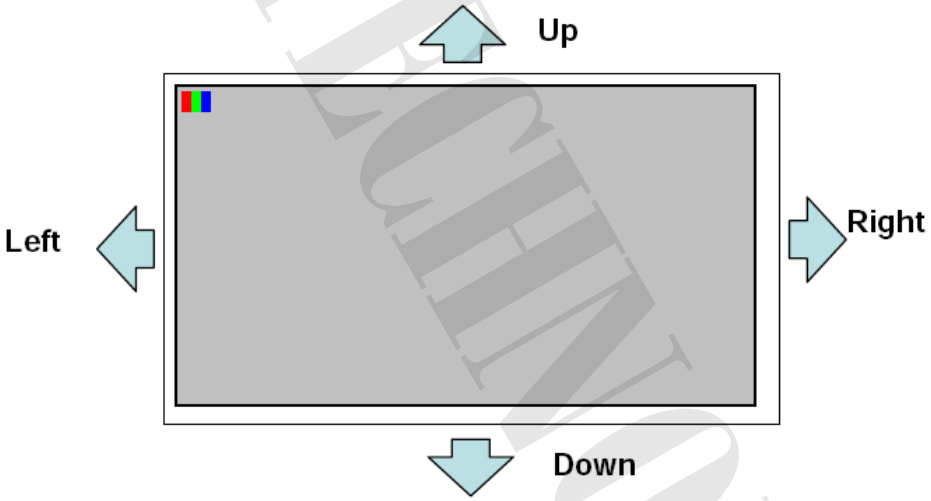
4.1 CN1 (Input Signal)

Pin NO.	SYMBOL	DESCRIPTION
1	NC	Not connect
2	DVDD	Digital Power(TYP=3.3V)
3	DVDD	Digital Power(TYP=3.3V)
4	NC	Not connect
5	RESET	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)
6	UPDN	Vertical inversion
7	SHLR	Horizontal inversion
8	STBYB	Standby mode, normally pull high STBYB="1", normal operation STBYB="0",timing control, source driver will turn off, all output are high-Z
9	GND	Ground
10	NINC	Negative LVDS differential clock input
11	PINC	Positive LVDS differential clock input
12	GND	Ground
13	NIND0	Negative LVDS differential clock input
14	PIND0	Positive LVDS differential clock input
15	GND	Ground
16	NIND1	Negative LVDS differential clock input
17	PIND1	Positive LVDS differential clock input
18	GND	Ground
19	NIND2	Negative LVDS differential clock input
20	PIND2	Positive LVDS differential clock input
21	GND	Ground
22	NIND3	Negative LVDS differential clock input
23	PIND3	Positive LVDS differential clock input
24	GND	Ground
25	SELB	6bit/8bit mode select if LVDS input data is 6bits,SELB set to High if LVDS input data is 8bits,SELB set to Low
26	GND	Ground
27	AVDD	Power for Analog Circuit (TYP 9.6V)
28	GND	Ground
29	VGH	Positive power for TFT(TYP 18V)
30	NC	Not connect
31	NC	Not connect
32	VGL	Negative power for TFT(TYP -6V)
33	GND	Ground
34	NC	Not connect
35	NC	Not connect

36	NC	Not connect
37	NC	Not connect
38	NC	Not connect
39	NC	Not connect
40	NC	Not connect

Note1：UPDN and SHLR control function

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



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)

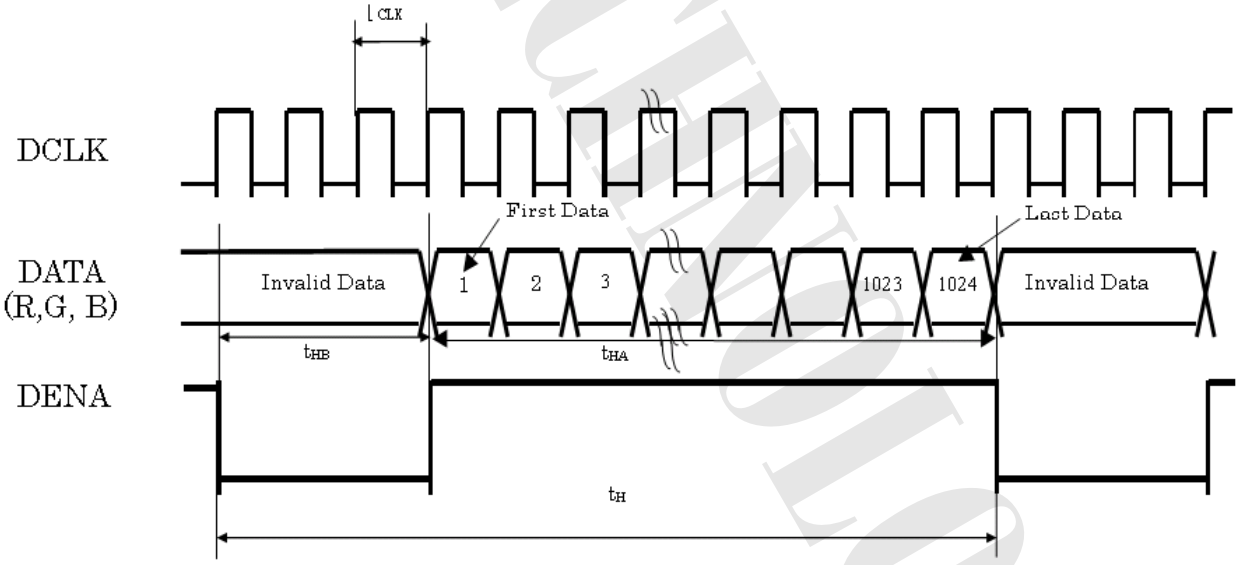
5. INPUT SIGNAL(DE ONLY MODE)

5.1 Timing Specification

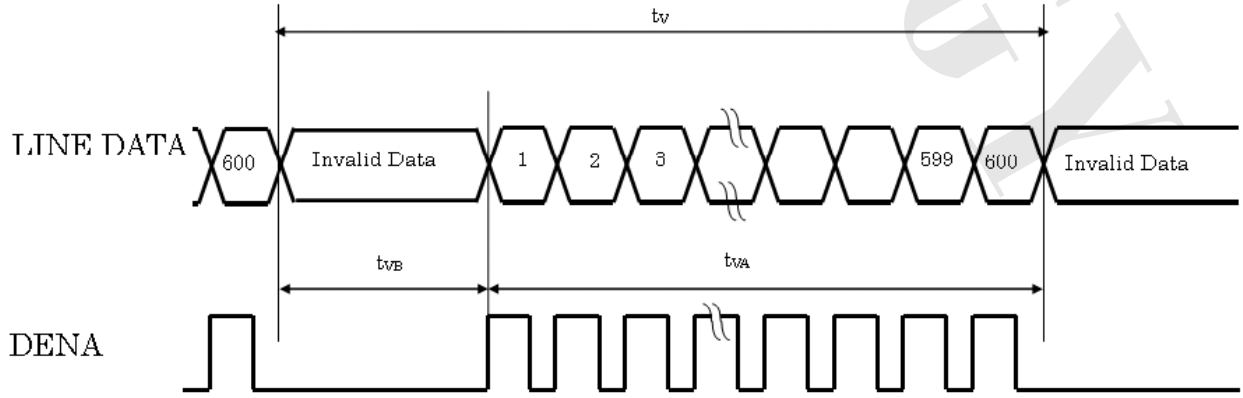
Item				Symbol	Min.	Typ.	Max.	Unit
LVDS input signal sequence	CLK Frequency			tclk	45	51.2	57	MHz
LCD input signal sequence (Input LVDS Transmitter)	DENA	Horizontal	Horizontal total Time	t_H	1324	1344	1364	tCLK
			Horizontal effective Time	t_{HA}	1024			tCLK
			Horizontal Blank Time	t_{HB}	300	320	340	tCLK
		Vertical	Vertical total Time	t_V	625	635	645	t_H
			Vertical effective Time	t_{VA}	600			t_H
			Vertical Blank Time	t_{VB}	25	35	45	t_H

5.2 Timing sequence(Timing chart)

5.2.1 Horizontal Timing Sequence

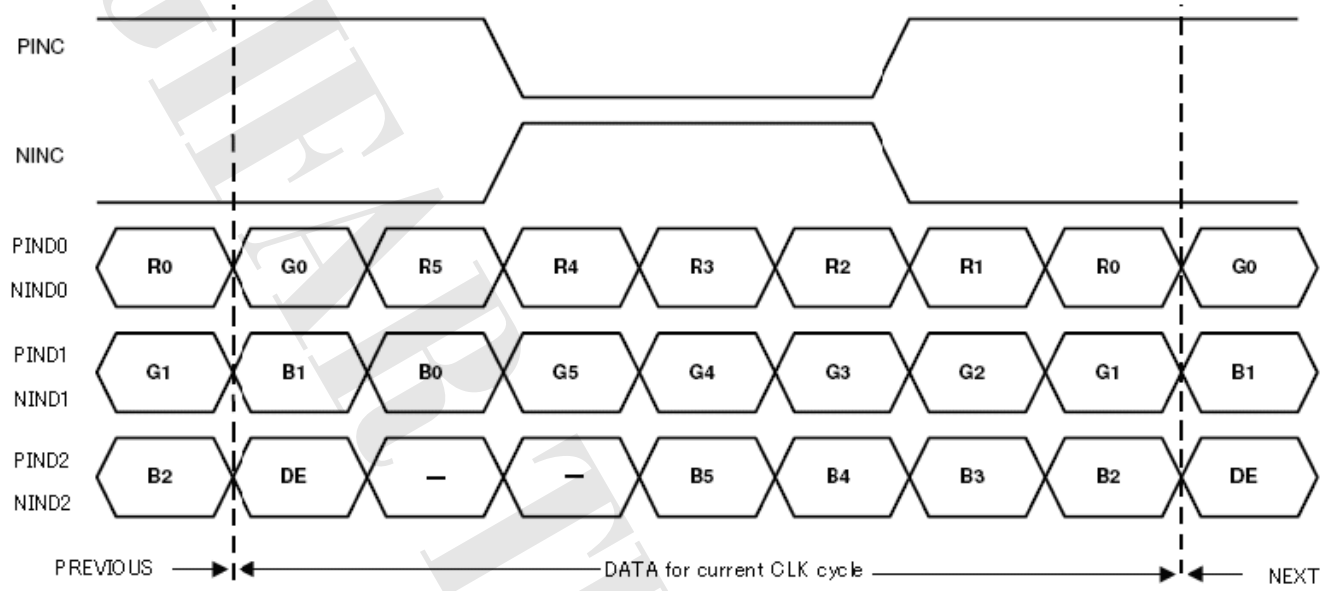


5.2.2 Vertical Timing Sequence

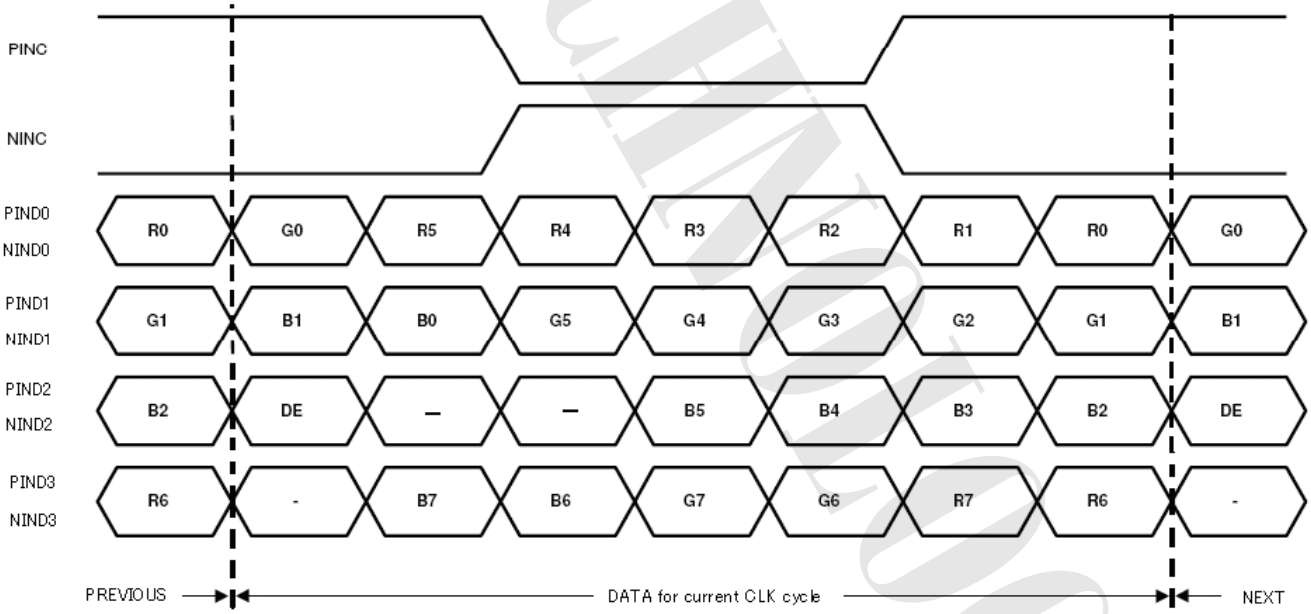


5.2.3 LVDS Input Data mapping

6 Bit LVDS input



8 Bit LVDS input



5.2.4 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

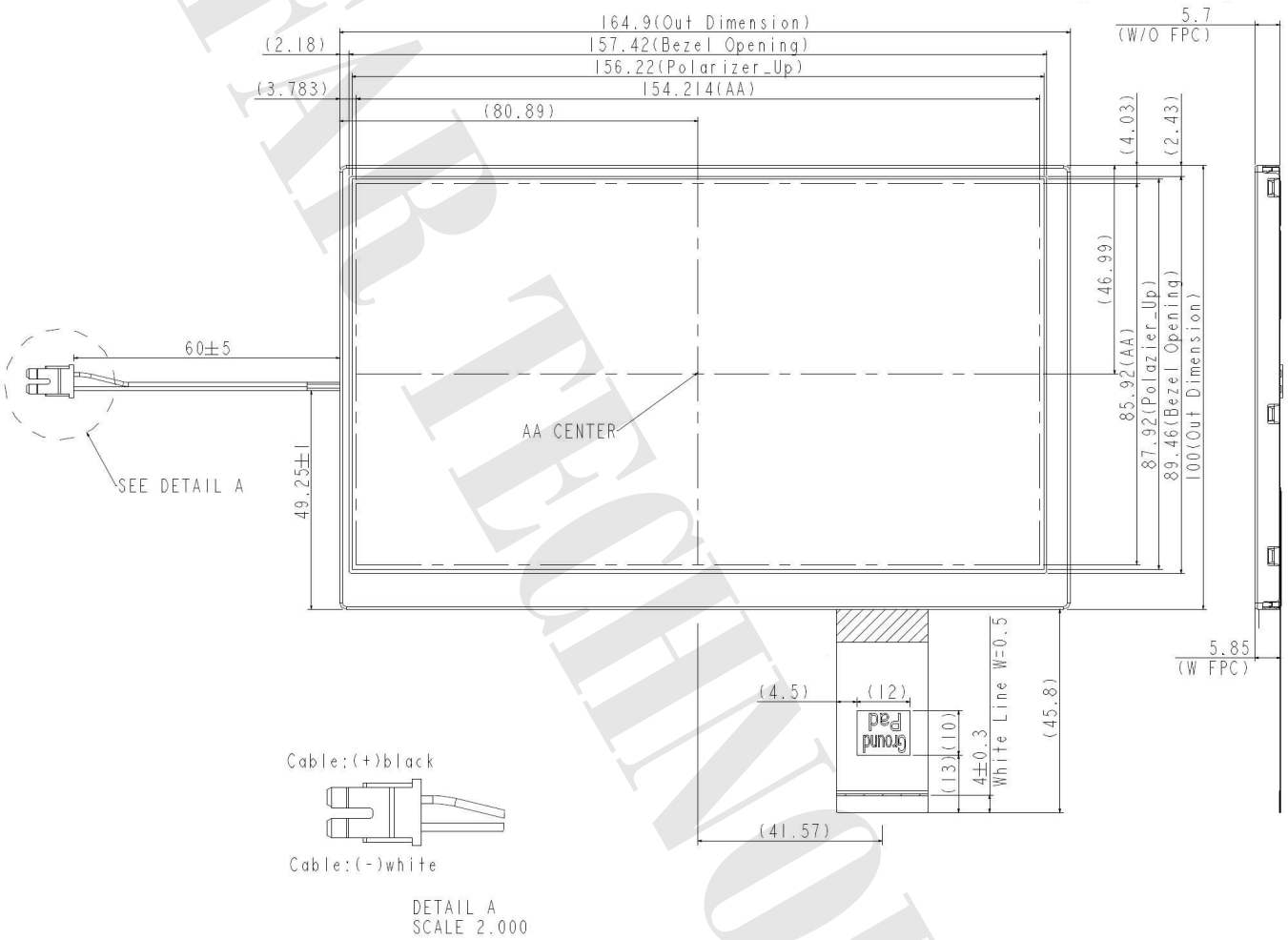
【Note】

1. Gray level：Color (n): n means level of gray scale. Larger n means brighter level.
2. Data：1= High, 0 = Low

6. MECHANICAL DIMENSION

6.1 Front Side

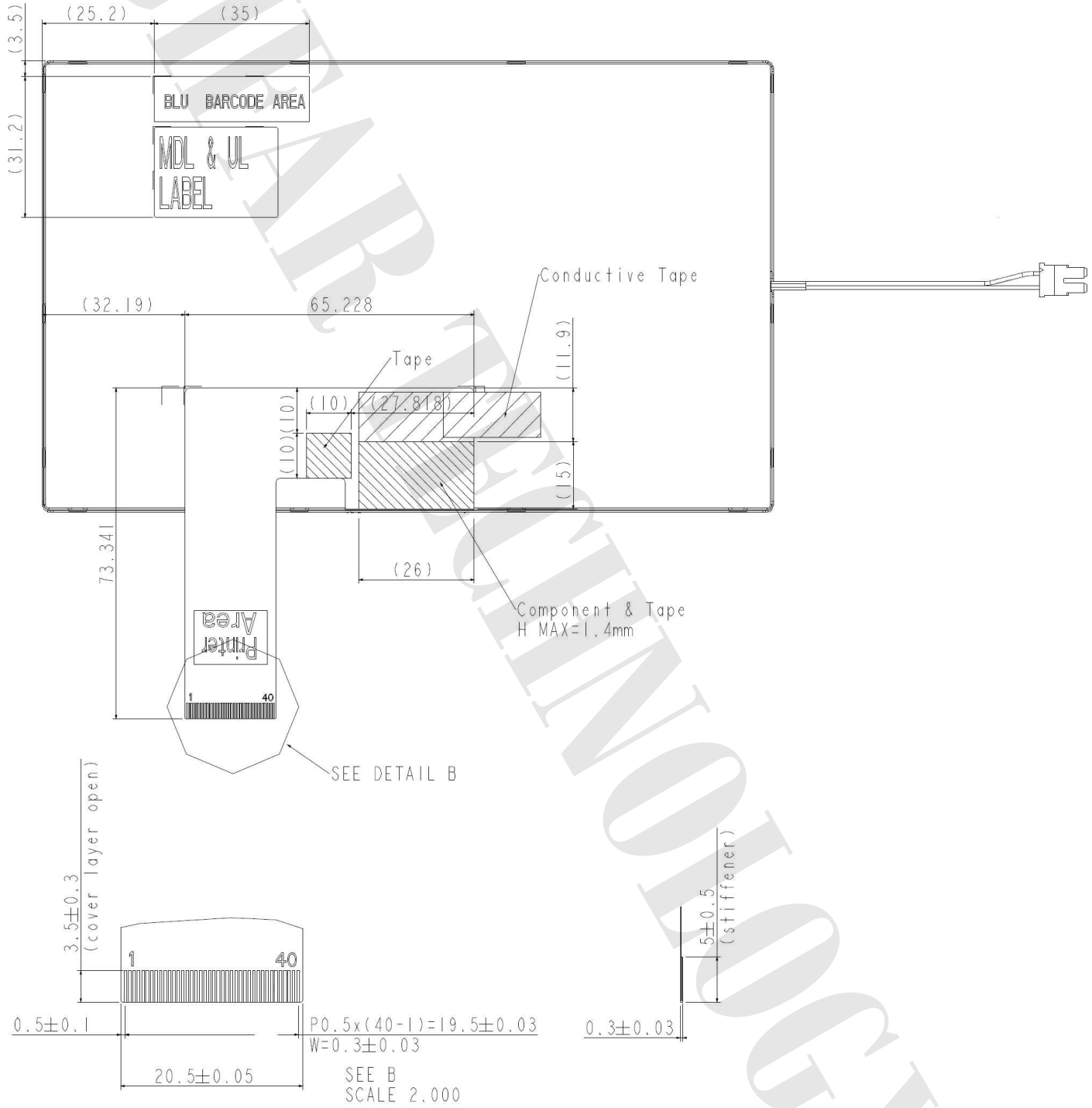
[Unit：mm]



NOTE: General tolerance=±0.3mm

6.2 Rear Side

[Unit : mm]



NOTE:

1.General tolerance=±0.3mm.

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

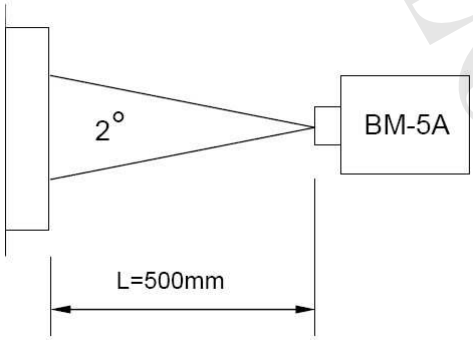
3.bending times：maxmun 3 times

7. OPTICAL CHARACTERISITCS

Ta=25℃ VCC=3.3V

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
Constrast Ratio		CR	Point-5	640	800	-	-	1, 2, 3
Luminance(CEN)		Lw	Point-5	500	600	-	cd/m²	1, 3
Luminance Uniformity		ΔL		70	80	-	%	1, 3
Response Time (White - Black)		Tr+Tf	Point-5	-	30	50	ms	1, 3, 5
NTSC		-	Point-5	45	50		%	1, 4
Viewing Angle	Vertical	Upper(θ)	CR≧10 Point-5	80	85	-	°	1, 4
		Down(θ)		80	85	-	°	1, 4
	Horizontal	Left (Φ)		80	85	-	°	1, 4
		Right(Φ)		80	85	-	°	1, 4
MDI Chromacicity	White	x	θ=Φ=0°	(0.273)	(0.313)	(0.353)		
		y		(0.289)	(0.329)	(0.369)		
	Red	x	θ=Φ=0°	(0.582)	(0.622)	(0.662)		
		y		(0.288)	(0.328)	(0.368)		
	Green	x	θ=Φ=0°	(0.317)	(0.357)	(0.397)		
		y		(0.528)	(0.568)	(0.608)		
	Blue	x	θ=Φ=0°	(0.111)	(0.151)	(0.191)		
		y		(0.074)	(0.114)	(0.154)		

Note1： Measuring conditions：25℃ ±2℃，60±10%RH，under 10Lunx in the darkroom。
BM-5A (TOPCON)，view cone=2° IL=220mA (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.7-1

Definition of Luminance Uniformity: Measure white luminance on the point1~9 as figure.7-1

ΔL = [L(MIN)/L(MAX)]×100

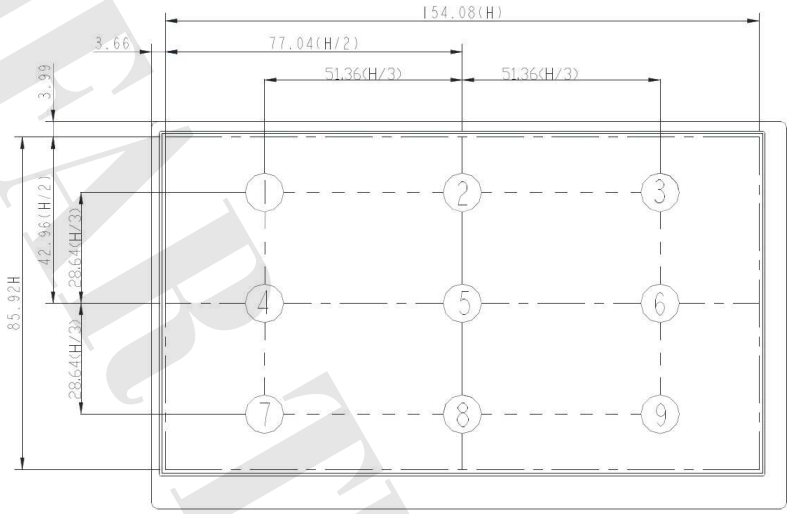


Fig.7-1 Measuring point

Note 4: Definition of Viewing Angle (θ , Φ), refer to Fig.7-2 as below

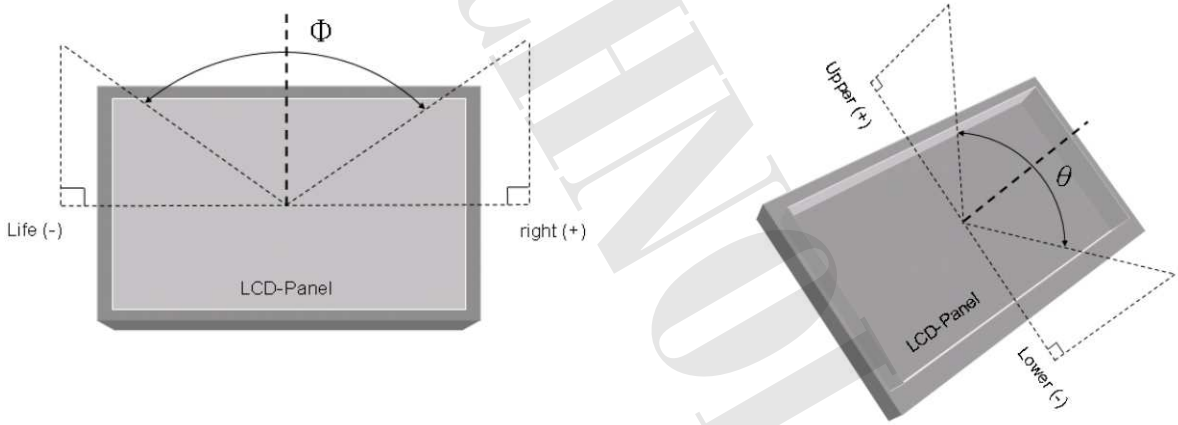


Fig.7-2 Definition of Viewing Angle

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

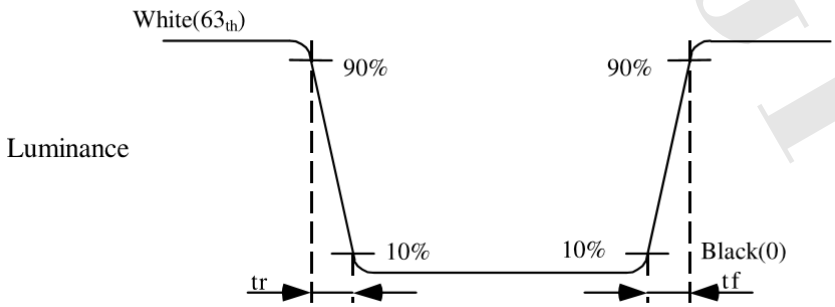


Fig.7-3 Definition of Response Time(White-Black)

8. RELIABILITY TEST

8.1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	70℃, 240hrs	
High Temperature Operation	80℃Tp, 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 1

Note 1. Condition of Image Sticking test：25℃±2℃

Operation with test pattern sustained for 2 hrs, then change to mid-gray pattern immediately. After 5 mins, the mura must be disappeared completely .

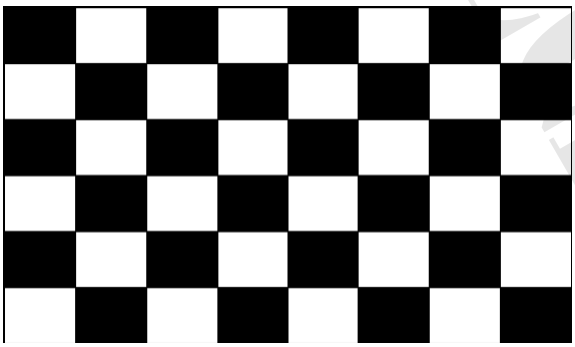


Image Sticking –pattern

Mid-Gray pattern

8.2 Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non Operation)	● Shock level: 980m/s^2 (equal to 100G). ● Waveform: half sinusoidal wave,6ms. ● Number of shocks: ±X，±Y，±Z axis 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

8.3 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

8.4. Judgment standard

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

Pass：Normal display image with no obvious non-uniformity

Fail：No display image, obvious non-uniform.

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.