



SPECIFICATION FOR TFT LCD MODULE

CUSTOMER : _____

CUSTOMER MODULE : _____

HL MODEL : HG097XG011

Preliminary Specification

Final Specification

Customer Confirmation column:

Approved by : _____ Dept. : _____ Data : _____

Please return one of the copies of the specification with your signature to us within two weeks after you receive this document. If it is not returned, we will assume that you agree to the entire contents of this specification document.

Designed by	Checked by	Approved by



Contents

1.0	General description	p.3
2.0	Absolute maximum ratings.....	p.4
3.0	Optical characteristics.....	p.5
4.0	Interface pin connection	p.9
5.0	Electrical characteristics	p.10
6.0	Reliability test items	p.15
7.0	Outline dimension	p.16
8.0	General precaution	p.17



1.0 GENERAL DESCRIPTION

1.1 Introduction

TOPVIEW model HG097XG011 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 9.7inch diagonally measured active display area with HD (1024 horizontal by 768 vertical pixel) resolution.

1.2 Features

- 9.7 (4:3 diagonal) inch configuration
- Support Color : 16.2M
- ROHS / Halogen Free Compliance

1.3 Applications

- TFT-LCD Monitor
- Industrial applications
- Factory Application

1.4 General information

Item	Specification	Unit
Outline Dimension	210.1 (H) x 164.15 (V) x 2.85 (D)	mm
Display area	196.608(H) x 147.456(V)	mm
Number of Pixel	1024(H) x 768(V)	pixels
Pixel pitch	0.192(H) x 0.192(V)	mm
Pixel arrangement	RGB Vertical Stripe	
Display mode	Normally Black	
NTSC	50(Typ.)	%
Surface treatment	AG25	
Weight	TBD	g
Back-light	Single LED (Side-Light type)	

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	209.8	210.1	210.4	mm
	Vertical (V)	163.85	164.15	164.45	mm
	Depth (D)(W/O PCBA)	2.65	2.85	3.05	mm



2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	Vcom	2.45	4.45	V	
	V _{ADD}		8.42	V	
	V _{GH}	17	19	V	
	V _{GL}	-8.5	-6.5	V	

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T _{opa}	-20	70	°C	
Storage Temperature	T _{stg}	-30	80	°C	



3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast	CR	$\Theta=0^\circ$ Normal viewing angle	600	900	—		(1)(2)	
Response time	Rising		TR+TF	—	20	30	msec	(1)(3)
	Falling							
White luminance (Center)	Y_L			300	350	—	cd/m ²	(1)(4) ($I_L=120mA$)
Color chromaticity (CIE1931) Under C-light	White		W_x					(1) (4) Viewing normal angle $\Theta X=\Theta Y=0^\circ$ Color Filter only, Base on C Light
			W_y					
	Red		R_x	0.596	0.616	0.636		
			R_y	0.309	0.329	0.349		
	Green		G_x	0.265	0.285	0.305		
			G_y	0.525	0.545	0.565		
	Blue	B_x	0.119	0.139	0.159			
		B_y	0.136	0.156	0.176			
Viewing angle	Hor.	Θ_L	80	89	—			
		Θ_R	80	89	—			
	Ver.	Θ_U	80	89	—			
		Θ_D	80	89	—			
Brightness uniformity	B_{UNI}	$\Theta=0$	70	80	—	%	(5)	
Optima View Direction	Free						(6)	

3.2 Measuring Condition

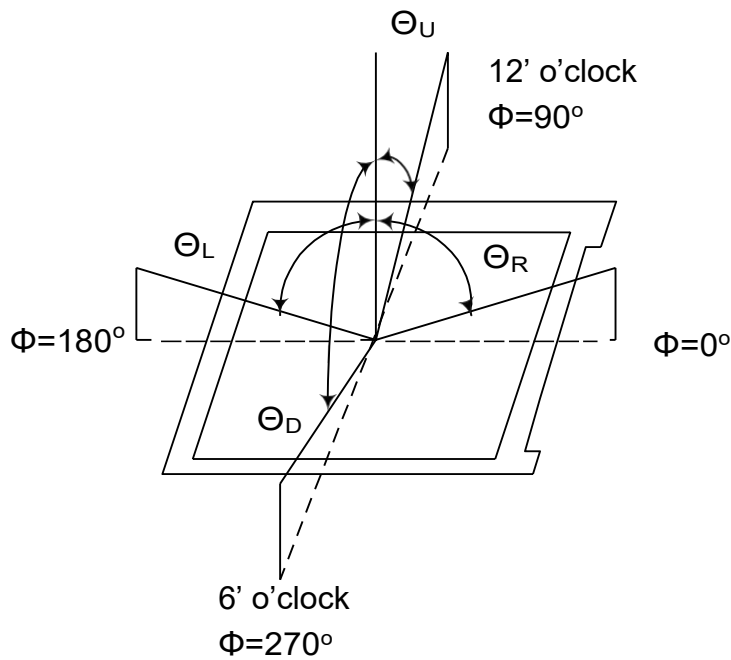
- Measuring surrounding: dark room
- LED current I_L : 120mA
- Ambient temperature: $25\pm 2^\circ C$
- 15min. warm-up time.



3.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.
- Measuring spot size: 20 ~ 21 mm

Note (1) Definition of Viewing Angle:

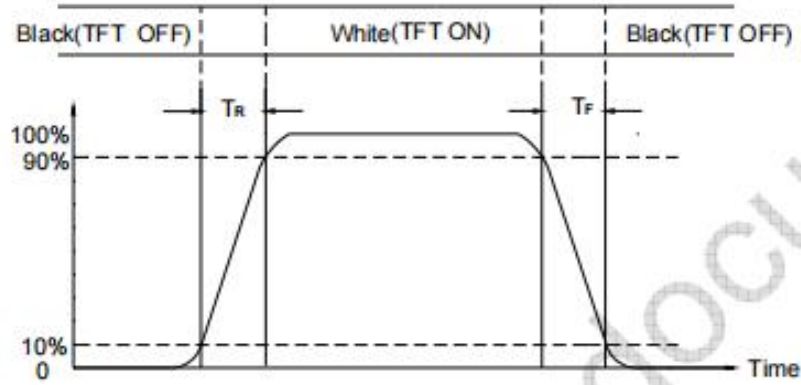


Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

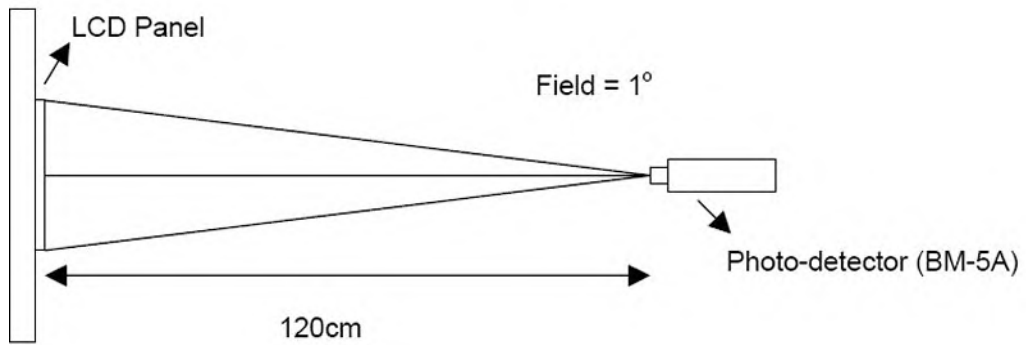
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$



Note (3) Definition of Response Time : Sum of T_R and T_F

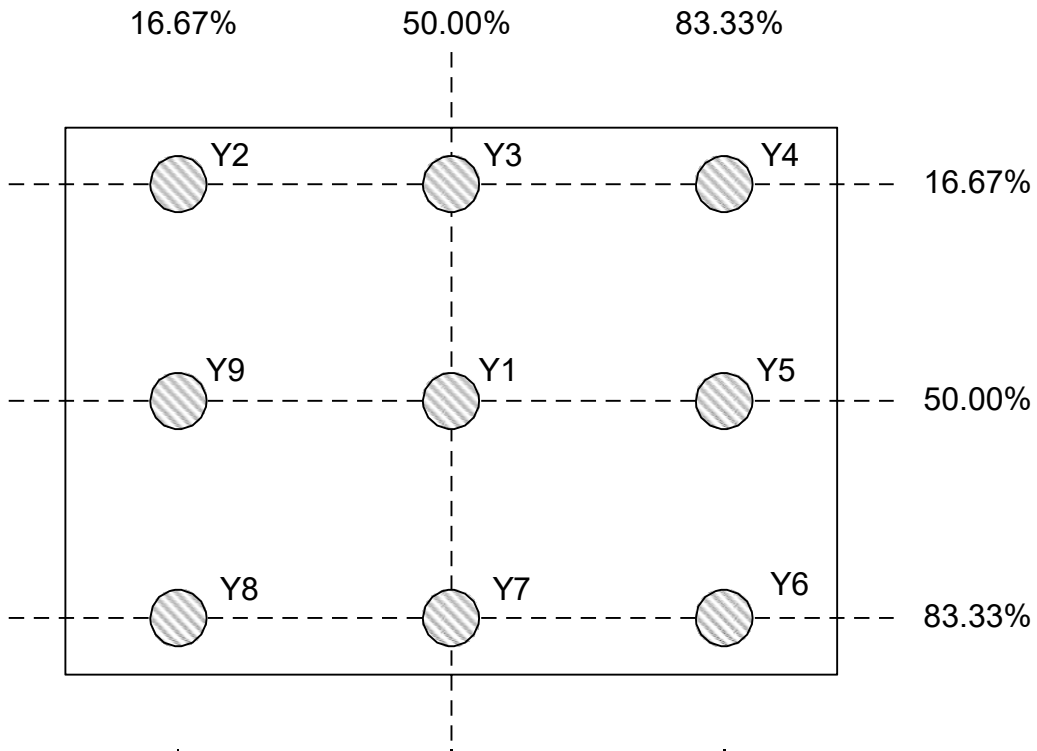


Note (4) Definition of optical measurement setup





Note (5) Definition of brightness uniformity



$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

Note (6): Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.)



4.0 INTERFACE PIN CONNECTION

No.	Symbol	Function	Remark
1	NC	NC	
2	VCCS	Power Supply, 3.3V(typ)	
3	VCCS	Power Supply, 3.3V(typ)	
4	BIST	No connection	
5	RESET	No connection	
6	CLKEDID	EDID Clock Input	
7	DATAEDID	EDID Data Input	
8	Rxin0-	LVDS differential data input	
9	Rxin0+	LVDS differential data input	
10	GND	Ground	
11	Rxin1-	LVDS differential data input	
12	Rxin1+	LVDS differential data input	
13	GND	Ground	
14	Rxin2-	LVDS differential data input	
15	Rxin2+	LVDS differential data input	
16	GND	Ground	
17	RxCLK-	LVDS differential clock input	
18	RxCLK+	LVDS differential clock input	
19	GND	Ground	
20	NC	No connection	
21	Vdc	LED Annode(Positive)	
22	Vdc	LED Annode(Positive)	
23	NC	No connection	
24	Vdc1	LED Cathode1(Negative)	
25	Vdc2	LED Cathode2(Negative)	
26	Vdc3	LED Cathode3(Negative)	
27	Vdc4	LED Cathode4(Negative)	
28	Vdc5	LED Cathode5(Negative)	
29	Vdc6	LED Cathode6(Negative)	
30	NC	No connection	



5.0 ELECTRICAL CHARACTERISTICS

5.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	Vcom	2.45	3.45	4.45	V	
	VGH	17	18	19	V	Note (1)
	VGL	-8.5	-7.5	-6.5	V	Note (2)
	Vadd	-	8.42	-	V	
	Vdl	0	0.2	0.7	V	
	VdhL	7	8.2	8.7	V	

Note:

(1): VGH is TFT Gate operating Voltage.

(2): VGL is TFT Gate operating Voltage.



5.2 Bit LVDS input

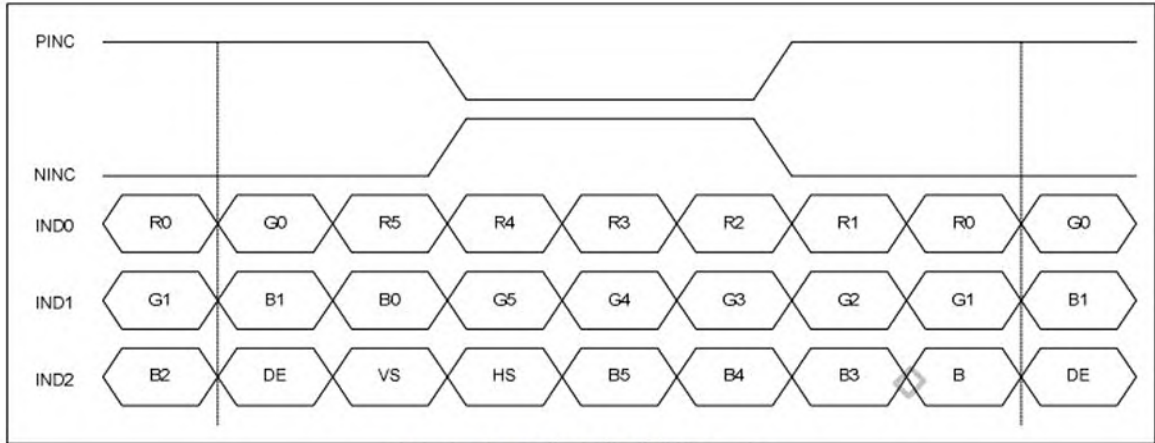


Figure 10.4: 6-bit LVDS input

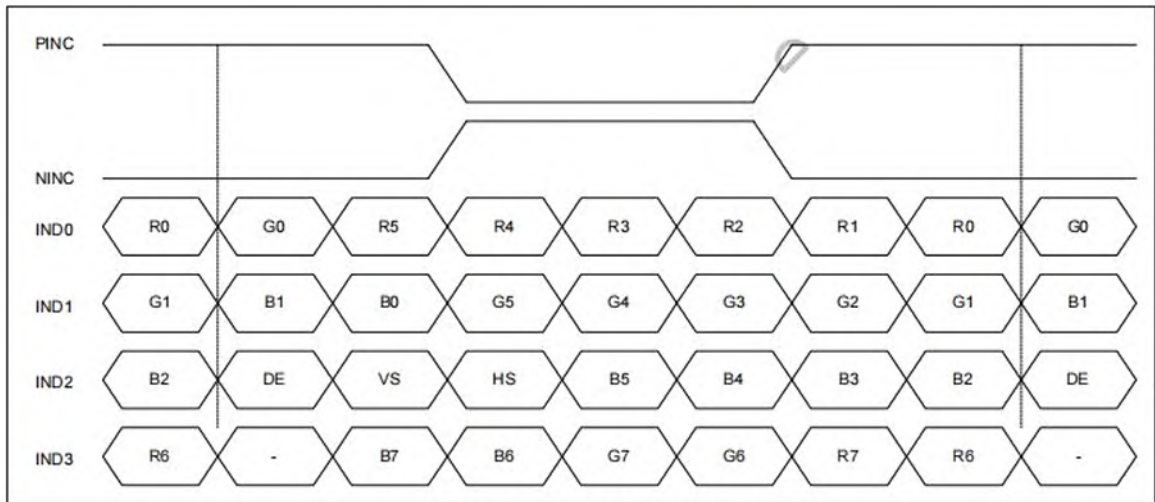


Figure 10.5: 8-bit LVDS Input



5.3 Interface Timing (DE mode)

- DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	52	65	71	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1114	1344	1400	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd	768			T _H
VSD Period	tv	778	806	845	T _H
VSD Blanking	tvbp+ tvfp	10	38	77	T _H

Table 10.7: DE mode (1024x768)

- HV mode

Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	57	65	70.5	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp	160			DCLK
HSD Front Porch	thfp	16	160	216	DCLK

Table 10.8: HV mode horizontal timing (1024x768)

Vertical timing

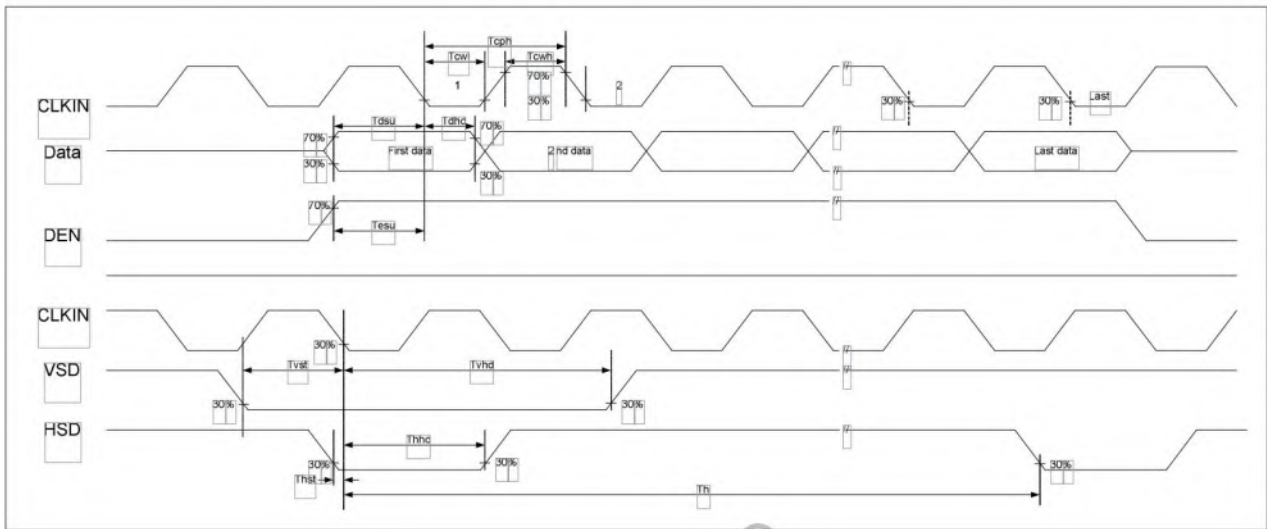
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd	768			T _H
VSD Period	tv	792	806	840	T _H
VSD Pulse Width	tvpw	1	-	20	T _H
VSD Back Porch	tvbp	23			T _H
VSD Front Porch	tvfp	1	15	49	T _H

Table 10.9: HV mode vertical timing (1024x768)



5.4 Timing diagram

Input clock and data timing diagram





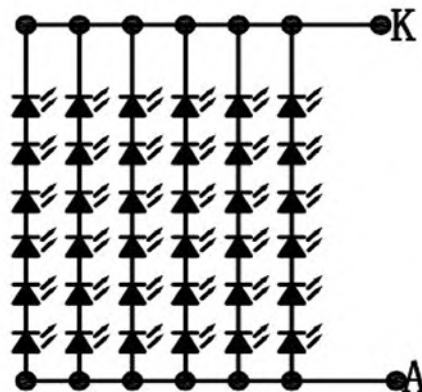
5.5 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_L	--	120	--	mA	$T_a=25^{\circ}\text{C}$
LED Voltage	V_L	--	18.0	19.8	Volt	$T_a=25^{\circ}\text{C}$
LED Life-Time	N/A	30,000	--	--	Hour	$T_a=25^{\circ}\text{C}$ $I_F=20\text{mA}$ Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25\pm 3^{\circ}\text{C}$, typical I_L value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_L=120\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 120mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit



$$6*6=36\text{LED}$$



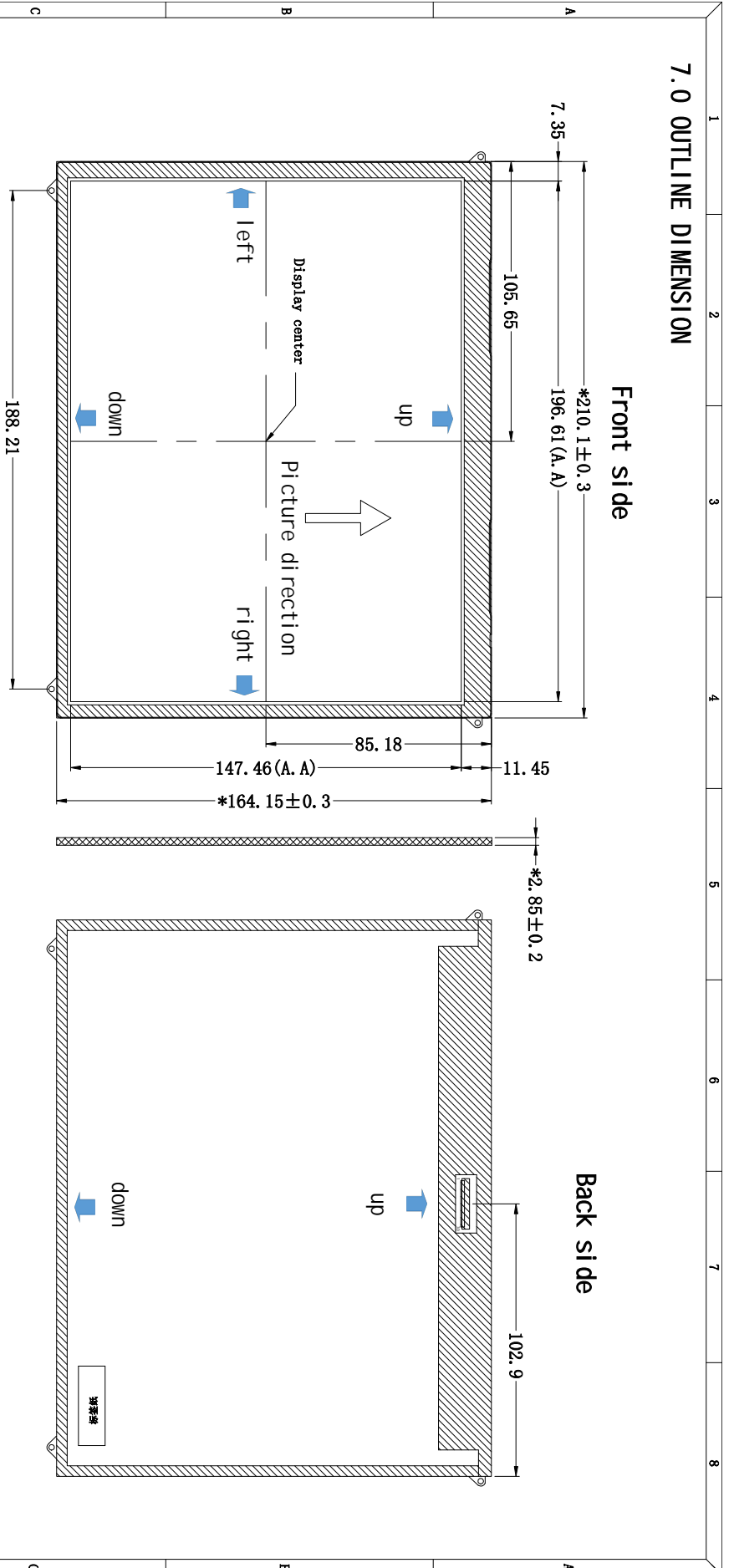
6.0 Reliability test items

No.	Item	Condit ions	Remark
1	High Temperature Storage	Ta=+80°C, 120hrs	
2	Low Temperature Storage	Ta=-30°C, 120hrs	
3	High Temperature Operation	Ta=+70°C, 120hrs	
4	Low Temperature Operation	Ta=-20°C, 120hrs	
5	High Temperature and High Humidity (operation)	Ta=+50°C, 90%RH, 120hrs	
6	Thermal Cycling Test (non operation)	-20°C(30min) → +70°C(30min), 10 cycles	

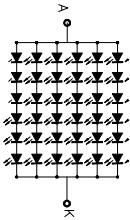
Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.



7.0 OUTLINE DIMENSION



- Notes:
- Unit: mm,
 - Do not scale drawing,
 - General tolerance: ± 0.3 ,
 - " Δ " Modification rev. number.
 - *For important dimension, () for reference dimension.
 - Rolls must be completed. (Use Lead-free process).



ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Luminous (LCM)	AVG	300	350	—	cd/m ²	T=25° C 所有测试 误差为5% 以恒定电 流测试。
Chromaticity	X	0.26	—	0.34	—	
	Y	0.27	—	0.35	—	
Uniformity	MIN	75	—	%	—	
	VF	17.4	18	19.8	V	
Backlight voltage	VF	17.4	18	19.8	V	
Backlight current	IF	—	120	—	mA	

LED 6串6并18V 120mA	模组成品图	材料 (MATERIAL)	版本号 (EDITION)	日期 (DATE)	页次 (PAGE)	设计 (DESIGNED)
	HG097XG011		A	2021.03.01	1/1	

客户型号 (CST' S CODE)	模组成品图	材料 (MATERIAL)	版本号 (EDITION)	日期 (DATE)	页次 (PAGE)	设计 (DESIGNED)
	HG097XG011		A	2021.03.01	1/1	



8.0 GENERAL PRECAUTION

8.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

8.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. HannStar does not warrant the module, if customers disassemble or modify the module.

8.3 Breakage of LCD Panel

8.3.1 If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

8.3.2 If liquid crystal contacts mouth or eyes, rinse out with water immediately.

8.3.3 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

8.3.4 Handle carefully with chips of glass that may cause injury, when the glass is broken.

8.4 Electric Shock

8.4.1 Disconnect power supply before handling LCD module.

8.4.2 Do not pull or fold the LED cable.

8.4.3 Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

8.5 Absolute Maximum Ratings and Power Protection Circuit

8.5.1 Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

8.5.2 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

8.5.3 It's recommended to employ protection circuit for power supply.

8.6 Operation

8.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

8.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

8.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.



8.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

8.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

8.7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

8.8 Static Electricity

8.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

8.8.2 Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

8.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

8.10 Disposal

When disposing LCD module, obey the local environmental regulations.