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TO : Solomon

Date : SEP, 03, 2010

HannStar Product Specification **(Tentative)**

7.0” Color TFT-LCD Module

Model: HSD070ISN1-B**

- Note:
- 1.The information contained herein is preliminary and may be changed without prior notices
 2. Please contact HannStar Display Corp. before designing your product based on this module specification.
 - 3.The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by HannStar for any intellectual property claims or other problems that may result from application based on the module described herein.
 - 4.The mark “ ** ” of Model means sub-model code.



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Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.9	Aug, 11,2010	B**	Tentative Product Specification was first released.



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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD070ISN1-B** 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 7 (4:3) inch diagonally measured active display area with SVGA (800 horizontal by 600 vertical pixel) resolution.

1.2 Features

- 7.0 (4:3 diagonal) inch configuration
- 6 bits + FRC driver with 1channel TTL interface
- LED Backlight
- Up/Down, Left/Right reversion selection
- RoHS/ Halogen Free Compliance

1.3 Applications

- E-Book/ Digital Photo frame

1.4 General information

Item	Specification	Unit	
Outline Dimension	156.4 x 122.25 x 3.2 (Typ.)	mm	
Display area	141.6(H) x 106.2(V)	mm	
Number of Pixel	800 RGB (H) x 600(V)	pixels	
Pixel pitch	0.177(H) x 0.177(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display mode	Normally white		
Surface treatment	Antiglare, Hard-Coating(3H) with EWV film		
Weight	125 (Typ.)	g	
Back-light	Side-Light type		
Power Consumption	B/L System	0.77 (Max.)	W
	Logic System	0.20 (Max.)	

1.5 Mechanical Information

Item	Min.	Typ.	Max.	Unit	
Module Size	Horizontal(H)	156.1	156.4	156.7	mm
	Vertical (V)	121.95	122.25	122.55	mm
	Depth(D)	—	3.2	3.5	mm
Weight (Without inverter)	—	125	—	g	

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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	V_{DD}	-0.3	7.0	V	GND=0
Logic Signal Input Level	V_i	-0.3	$V_{DD} + 0.3$	V	

2.1.2 Back-Light Unit

Item	Symbol	Typ.	Max.	Unit	Note
LED current	I_L	112	—	mA	(1) (2)(3)
LED voltage	V_L	6.2	—	V	(1) (2)(3)

Note

- (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.
- (2) $T_a = 25 \pm 2^\circ\text{C}$
- (3) Test Condition: LED current 112 mA. The LED lifetime could be decreased if operating I_L is larger than 112mA.

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-20	70	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-30	80	$^\circ\text{C}$	

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3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast		CR	Normal viewing angle	480	600	—		(1)(2)	
Response time	Rising	T _R		—	2.4	4.8	msec	(1)(3)	
	Falling	T _F		—	5.6	11.2			
NTSC		-		-	50	-	%		
White luminance (Center)		Y _L		Θ=0	170	200	—	cd/m ²	(1)(4) (I _L =112mA)
Color chromaticity (CIE1931)	Red	R _x		Normal viewing angle	0.563	0.593	0.623		(1)(4)
		R _y			0.329	0.359	0.389		
	Green	G _x			0.300	0.330	0.360		
		G _y			0.529	0.559	0.589		
	Blue	B _x			0.128	0.158	0.188		
		B _y	0.079		0.109	0.139			
	White	W _x	0.280		0.310	0.340			
		W _y	0.300		0.330	0.360			
Viewing angle	Hor.	Θ _L	CR>10	50	60	—			
		Θ _R		60	70	—			
	Ver.	Θ _U		65	75	—			
		Θ _D		65	75	—			
Brightness uniformity		B _{UNI}	Θ=0	73	78	—	%	(5)(7)	
Optima View Direction		3 O' clock						(6)	

3.2 Measuring Condition

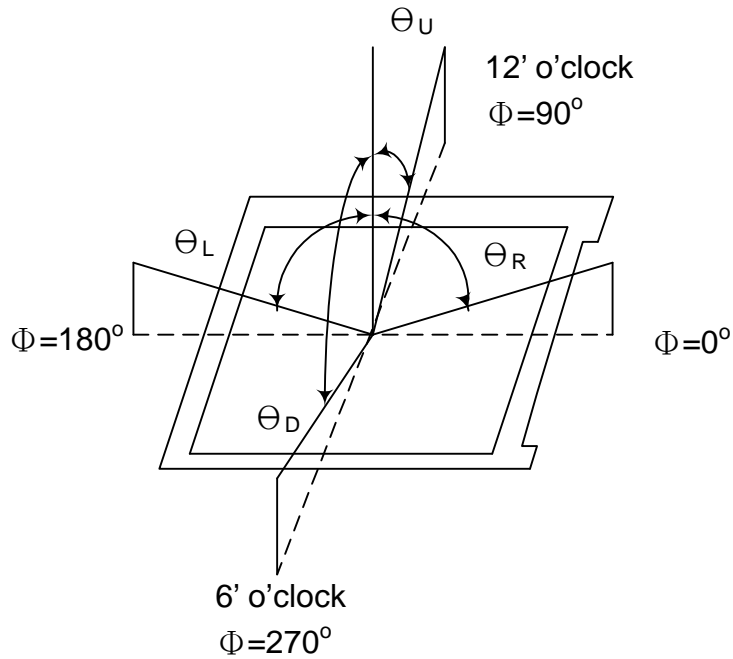
- Measuring surrounding: dark room
- LED current I_L : 112mA
- Ambient temperature: 25±2°C
- 15min. warm-up time.

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

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Note (1) Definition of Viewing Angle:

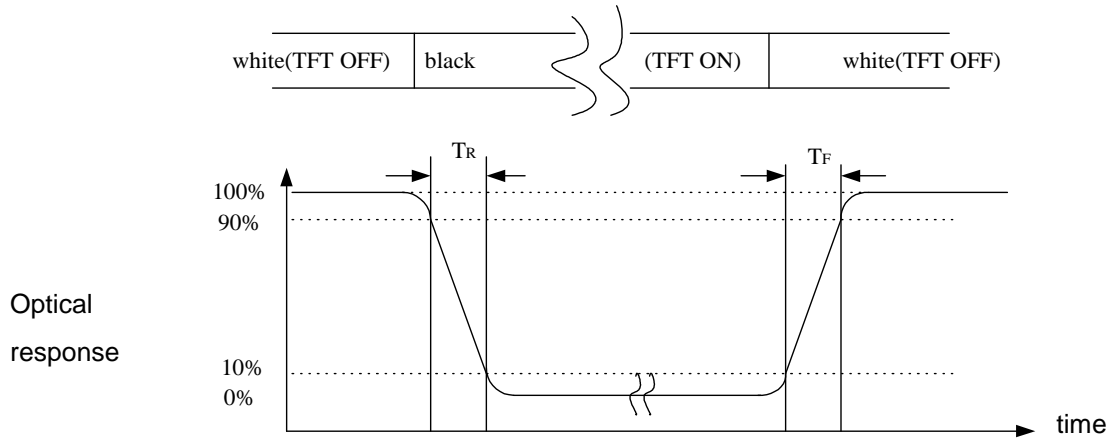


Note (2) Definition of Contrast Ratio (CR):
measured at the center point of panel

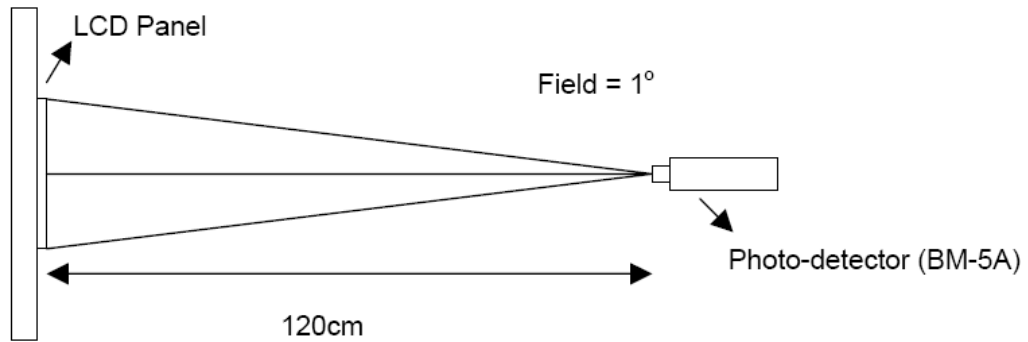
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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

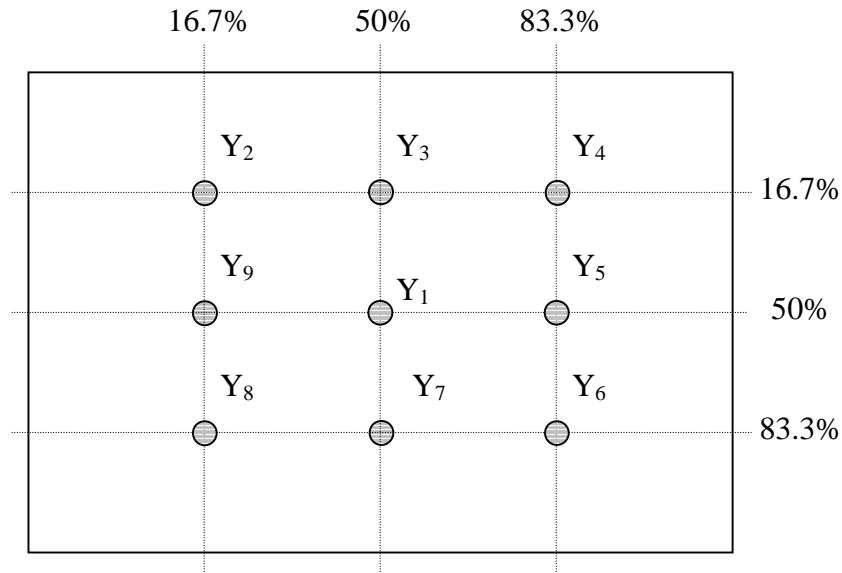


Note (4) Definition of optical measurement setup



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Note (5) Definition of brightness uniformity



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

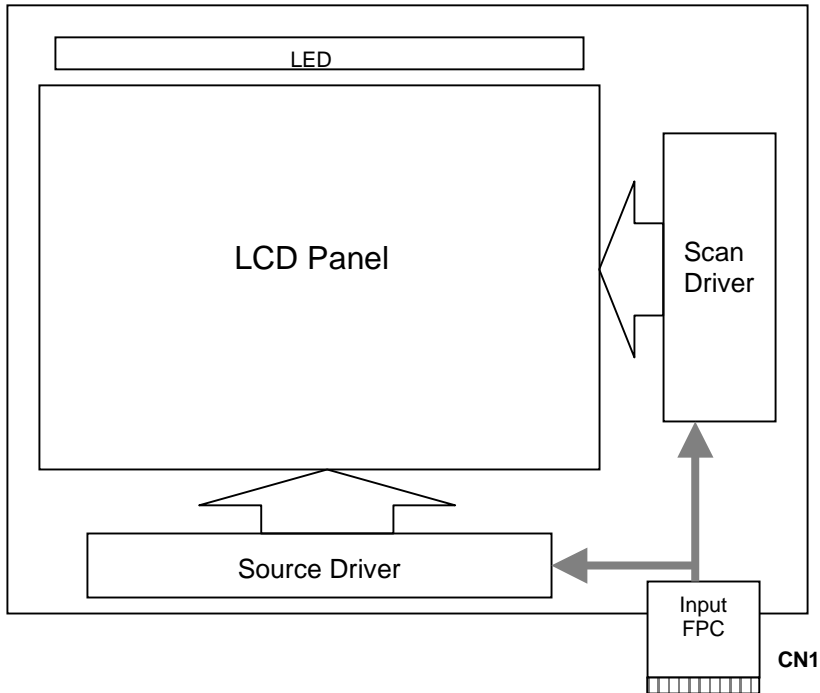
Note (6) Rubbing Direction (The different Rubbing Direction will cause the different optimal view direction.)

Note (7) Measured at the brightness of the panel when all terminals of LCD panel are electrically open.

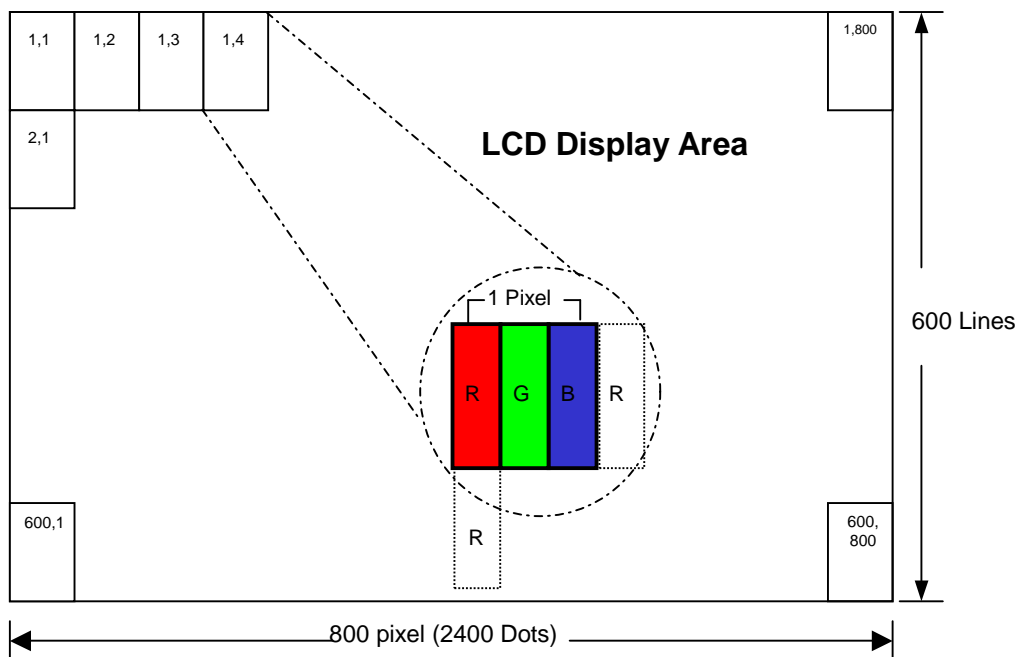
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4.0 BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 Pixel Format



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5.0 INTERFACE PIN CONNECTION

5.1 TFT LCD Module

CN1 (Input signal): FPC Down Connector, (FH28-60S-0.5SH (HIROSE), 60pin,pitch = 0.5mm)

Terminal no.	Symbol	I/O	Function
1	AGND	P	Analog Ground
2	VCC	P	Digital Power
3	AVDD	P	Analog Power
4	R0	I	Data Input(LSB)
5	R1	I	Data Input
6	R2	I	Data Input
7	R3	I	Data Input
8	R4	I	Data Input
9	R5	I	Data Input
10	R6	I	Data Input
11	R7	I	Data Input(MSB)
12	G0	I	Data Input(LSB)
13	G1	I	Data Input
14	G2	I	Data Input
15	G3	I	Data Input
16	G4	I	Data Input
17	G5	I	Data Input
18	G6	I	Data Input
19	G7	I	Data Input(MSB)
20	B0	I	Data Input(LSB)
21	B1	I	Data Input
22	B2	I	Data Input
23	B3	I	Data Input
24	B4	I	Data Input
25	B5	I	Data Input
26	B6	I	Data Input
27	B7	I	Data Input(MSB)
28	GND	P	Digital Ground
29	DCLK	I	Clock input
30	GND	P	Digital Ground

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Terminal no.	Symbol	I/O	Function
31	DE	I	Data Enable signal. Active High to enable the data input bus under "DE Mode"
32	HSD	I	Horizontal sync input. Negative polarity
33	VSD	I	Vertical sync input. Negative polarity
34	NC	-	Not connect For test
35	RSTB	I	Global reset pin. Active low to enter reset state. suggest to connecting with an RC reset circuit for stability .normally pull high.
36	STBY	I	standby mode, normally pull high STBYB="1",normal operation STBYB="0",timming control , source driver will turn off, all output are high-Z
37	SHLR	I	Left or Right Display Control
38	VCC	P	Digital Power
39	UPDN	I	Up/ Down/ Display Control
40	AGND	P	Analog Ground
41	AVDD	P	Analog Power
42	VCOM	I	Common Voltage
43	V10	P	Gamma correction voltage reference
44	V9	P	Gamma correction voltage reference
45	V8	P	Gamma correction voltage reference
46	V7	P	Gamma correction voltage reference
47	V6	P	Gamma correction voltage reference
48	V5	P	Gamma correction voltage reference
49	V4	P	Gamma correction voltage reference
50	V3	P	Gamma correction voltage reference
51	V2	P	Gamma correction voltage reference
52	V1	P	Gamma correction voltage reference
53	VGH	P	Positive Power for TFT
54	VCC	P	Digital Power
55	VGL	P	Negative Power for TFT
56	GND	P	Digital Ground
57	LED-	P	Power for LED backlight (Cathode)
58	LED-	P	Power for LED backlight (Cathode)
59	LED+	P	Power for LED backlight (Anode)
60	LED+	P	Power for LED backlight (Anode)

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6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VCC	3.0	3.3	3.6	V	
	VGH	15.5	16.5	17.5	V	
	VGL	-11	-10	-9	V	
	AVDD	9.4	9.5	9.6	V	
VCOM	VCOMin	2.869	3.02	3.171	V	
Input signal voltage	V _{IH}	0.7 VCC	-	VCC	V	Note (1)
	V _{IL}	0	-	0.3 VCC	V	
Current of power supply	I _{DD}	-	16.853	-	mA	VCC =3.3V
	I _{ADD}	-	17.352	-	mA	AVDD =9.5 V (Black)
	I _{GH}	-	0.286	-	mA	VGH =16.5V
	I _{GL}	-	1.103	-	mA	VGL = -10V
Input level of V1~V5	V _X	AVDD/2-		AVDD-0.1-	V	
Input level of V6~V10	V _X	0.1-		AVDD/2-	V	

Note (1): HSYNC, VSYNC, DE, Digital Data

Note (2): Be sure to apply the power voltage as the power sequence spec.

Note (3): DGND=AGND=0V,)

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6.2 Back-Light Unit

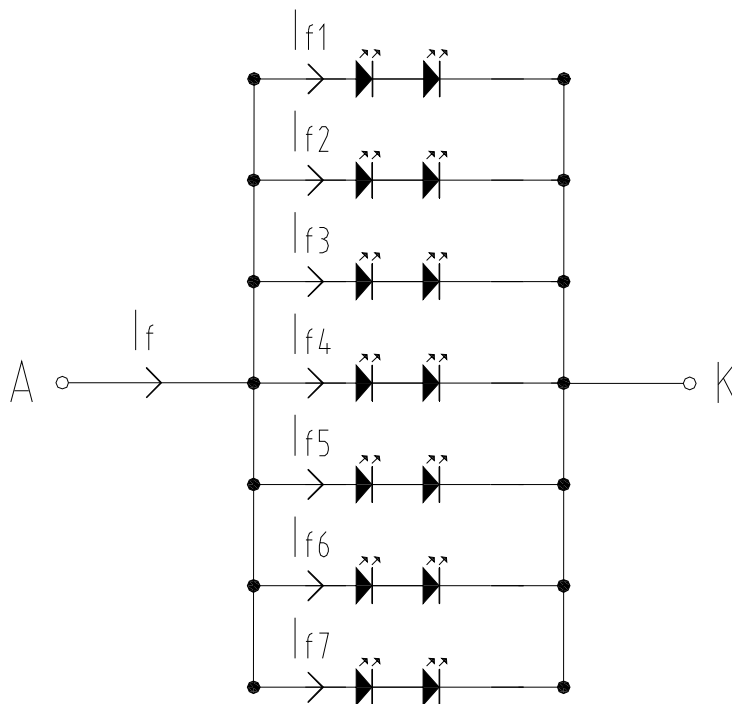
The backlight system is an edge-lighting type with 14 LED.

The characteristic of the LED is shown in the following tables.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED current	If	—	112	—	mA	(2)
LED voltage	VL	5.64	6.2	6.84	V	
Operating LED life time	Hr	20,000	—	—	Hour	(1)(2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25\pm3^\circ\text{C}$, typical If 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 $I_f=112\text{mA}$. The LED lifetime could be decreased if operating If is larger than 112mA. The constant current driving method is suggested.



LED Light Bar Circuit

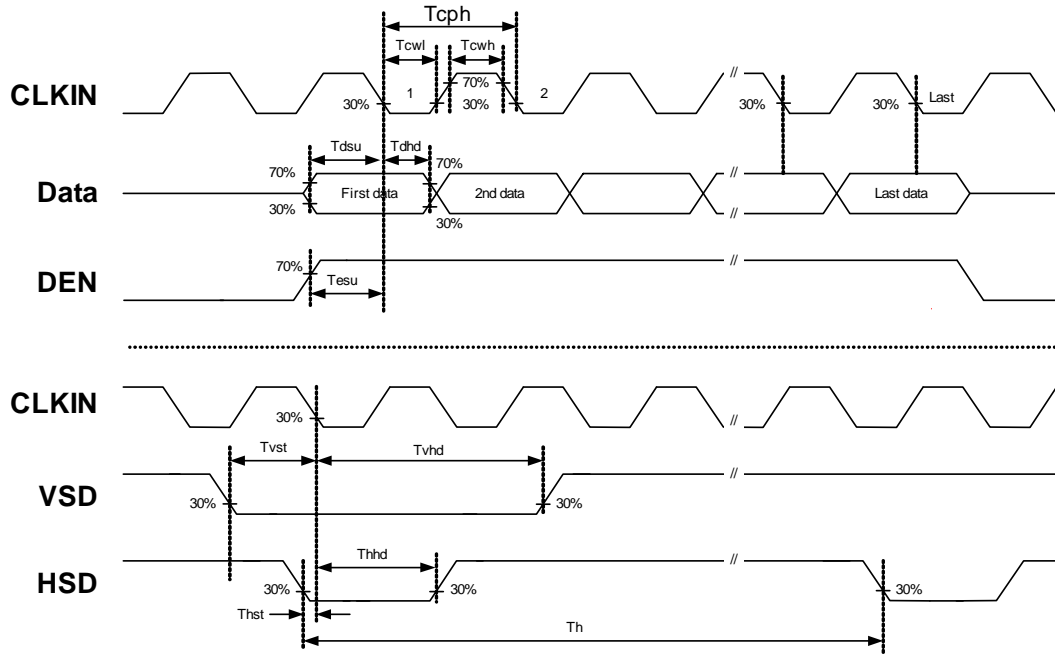
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6.3 AC Characteristics

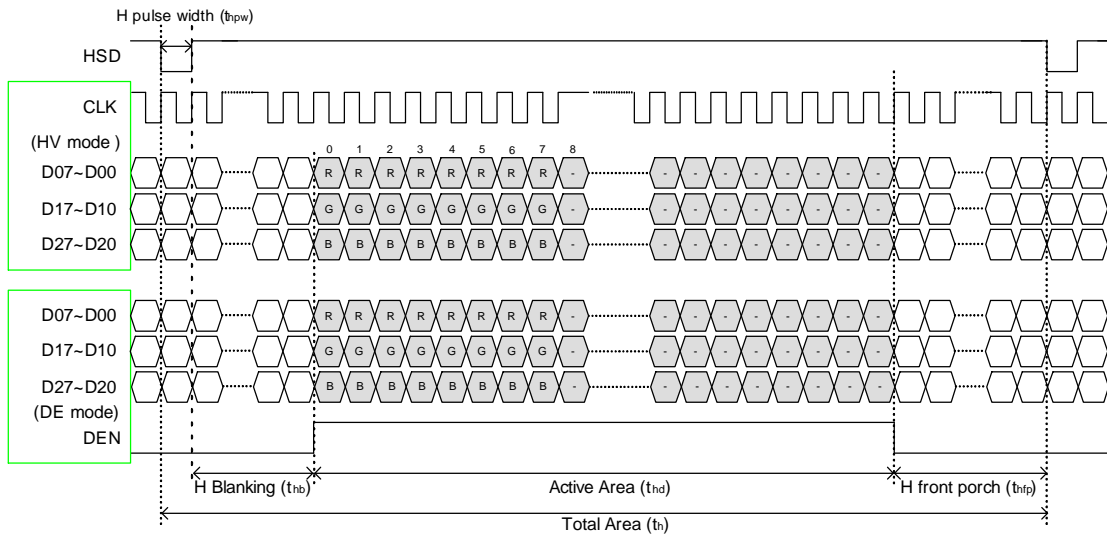
Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK cycle time	Tcph	20	-	-	ns	
DCLK frequency	fclk	35	40	50	MHz	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8	-	-	ns	
VSD hold time	Tvhd	8	-	-	ns	
HSD setup time	Thst	8	-	-	ns	
HSD hold time	Thhd	8	-	-	ns	
Data setup time	Tdsu	8	-	-	ns	
Data hold time	Tdhd	8	-	-	ns	
DE setup time	Tesu	8	-	-	ns	
DE hold time	Tehd	8	-	-	ns	
Horizontal display area	thd	-	800	-	Tcph	
HSD period time	th	908	1000	1088	Tcph	
HSD pulse width	thpw	1	48	87	Tcph	Thb+thpw=88
HSD back porch	thb	87	40	1	Tcph	Tcph is fixed
HSD front porch	thfp	20	112	200	Tcph	
Vertical display area	tvd	-	600	-	th	
VSD period time	tv	644	660	839	th	
VSD pulse width	tvpw	1	1	3	th	Tvpw+tvb=39 th
VSD back porch	tvb	38	38	36	th	is fixed
VSD front porch	tvfp	5	21	200	th	

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6.4 Timing Diagram of Interface Signal

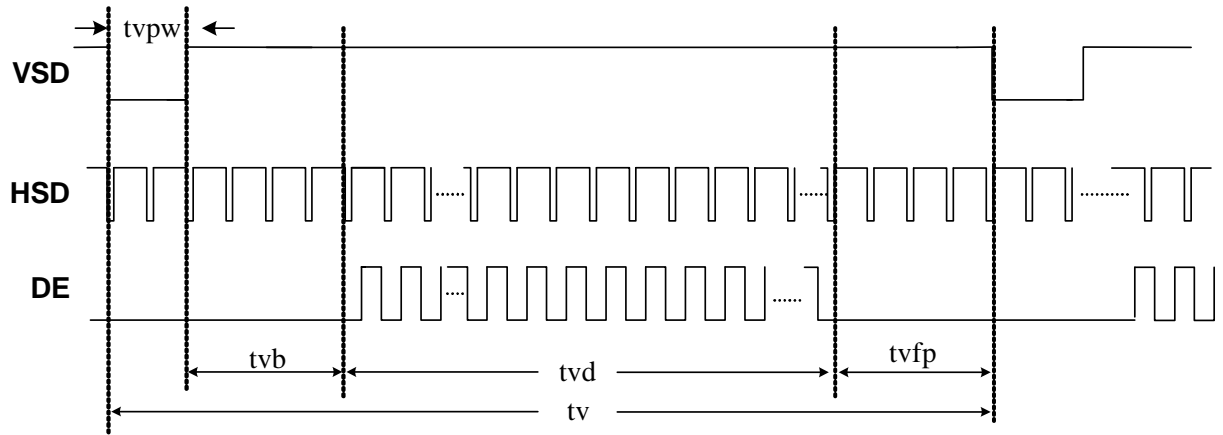


Sampling clock timing



Horizontal display timing range

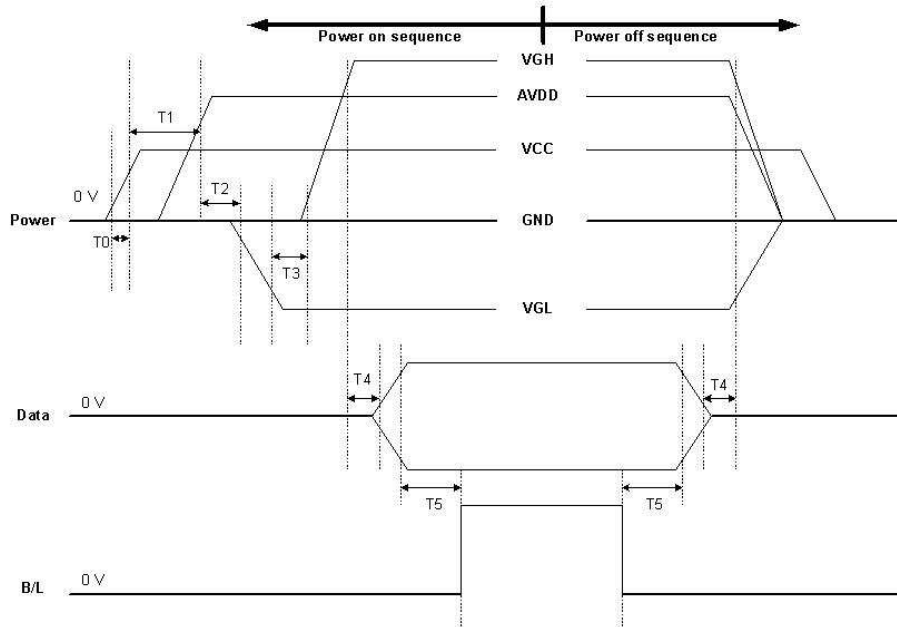
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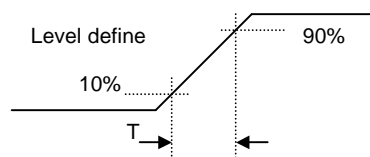
Vertical timing

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6.5 Power Sequence



Item	Min.	Typ.	Max.	Unit
T0	0.5	--	20	msec
T1	1			msec
T2	0			msec
T3	3			msec
T4	0		10	msec
T5	50			msec



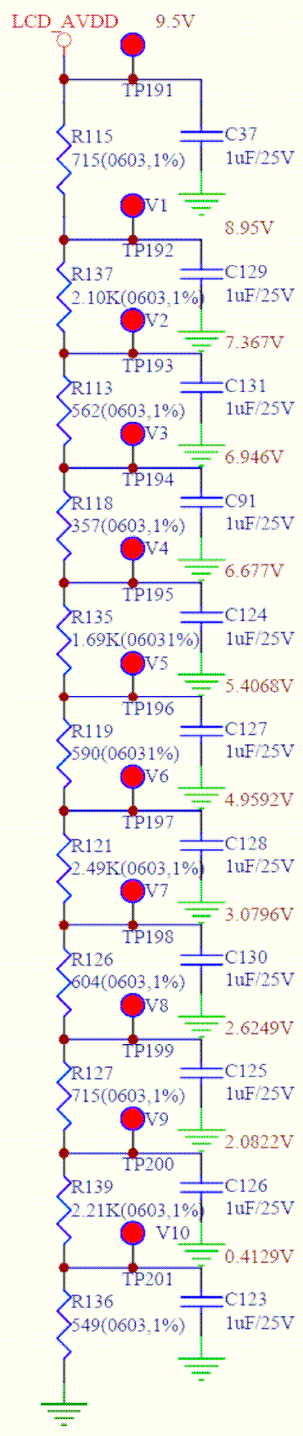
Power On Sequence: VCC-> AVDD/VGL -> VGH -> Data -> B/L

Power Off Sequence: B/L-> Data -> VGH -> VGL/AVDD -> VCC

Notes: Data include R0~R7, G0~G7, B0~B7, HSD, VSD, DCLK, SHLR, UPDN, DE MODE, RSTB, STBYB, SHLR, UPDN, DITH

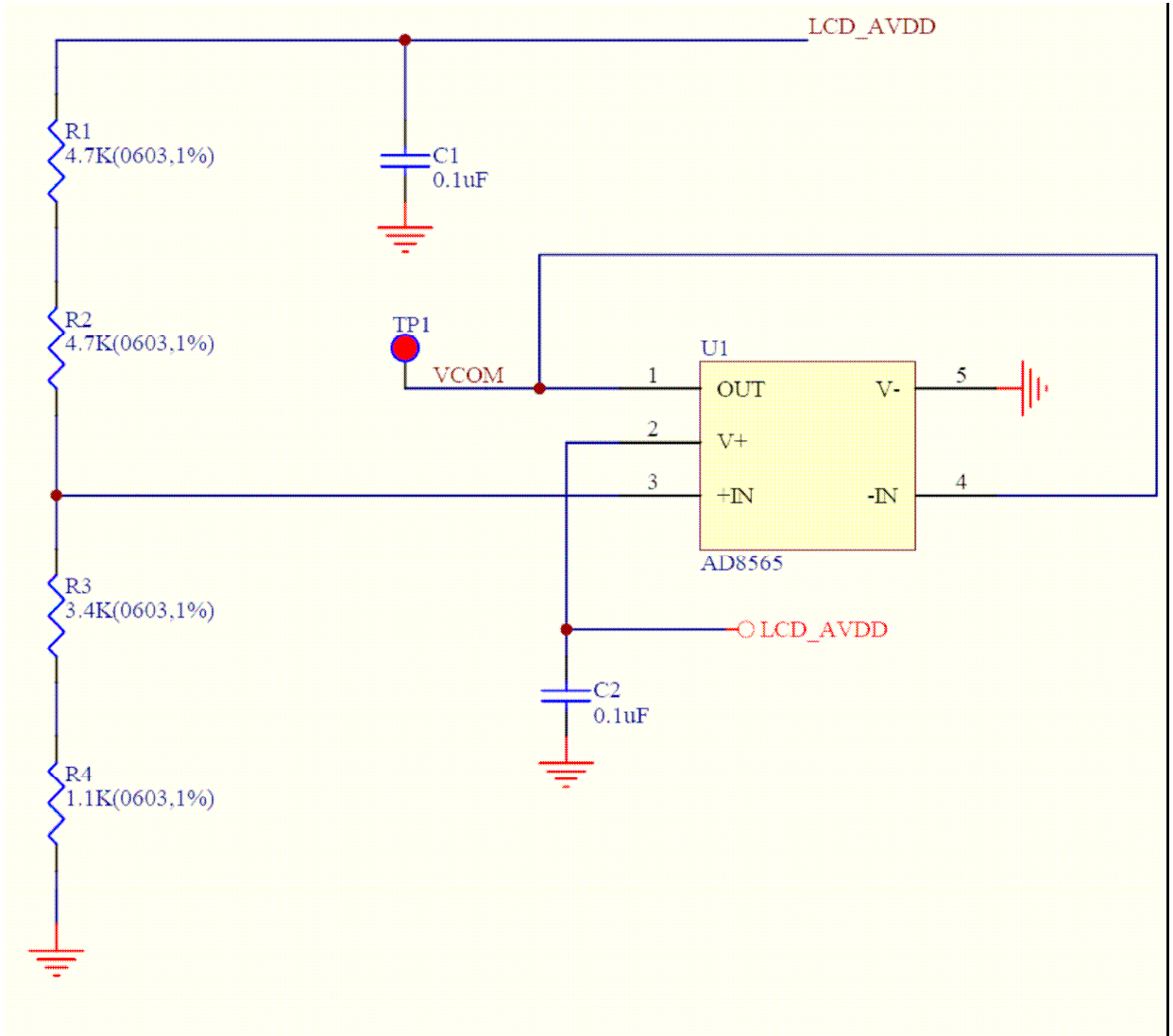
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6.6 Gamma circuit



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6.7 VCOM Application Note



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7.0 Reliability test items

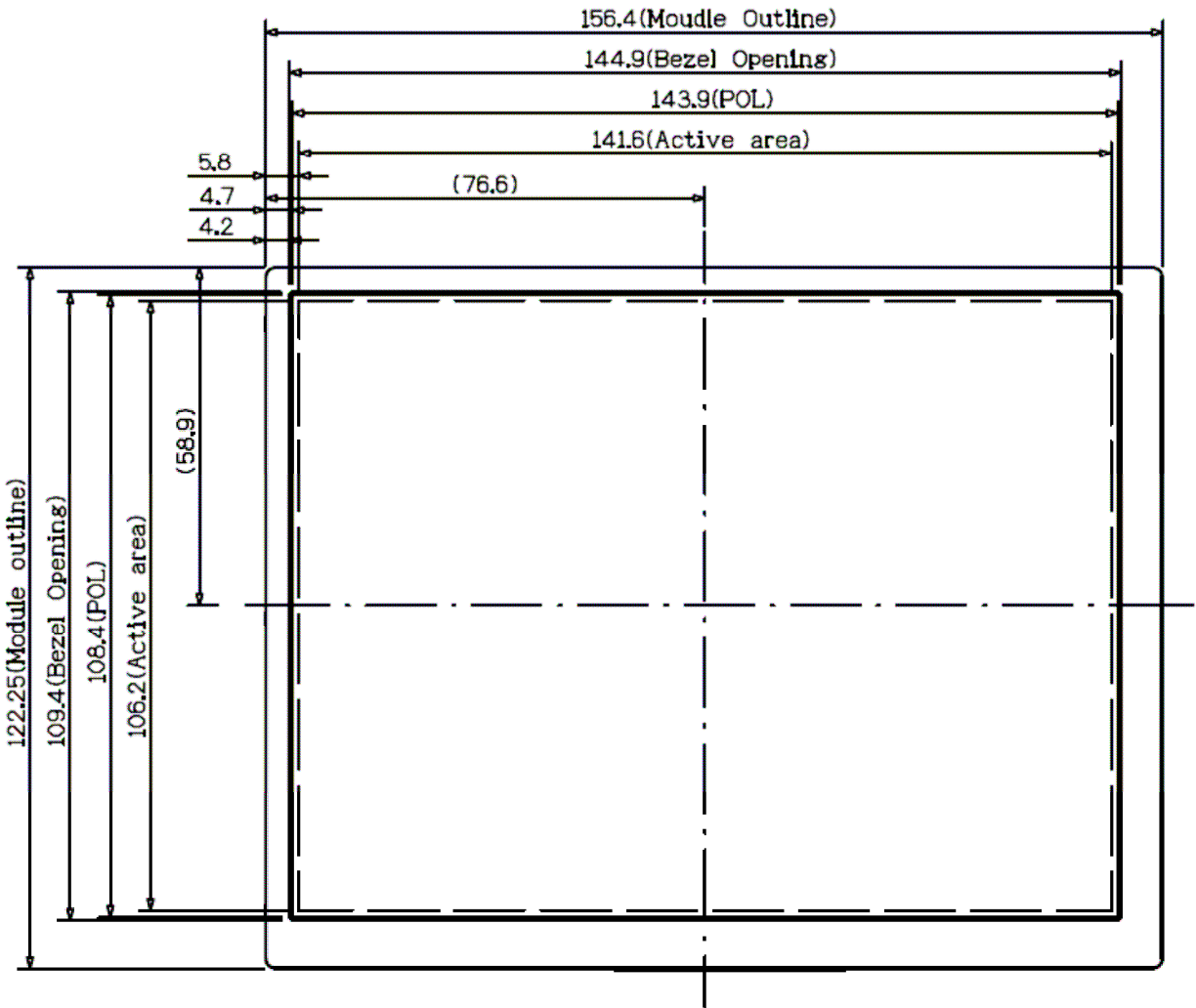
No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80°C, 240hrs	
2	Low Temperature Storage	Ta=-30°C, 240hrs	
3	High Temperature Operation	Ta=+70°C, 240hrs	
4	Low Temperature Operation	Ta=-20°C, 240hrs	
5	High Temperature and High Humidity (operation)	Ta=+60°C, 90%RH, 240hrs	
6	Thermal Cycling Test (non operation)	-30°C(30min) → +80°C(30min), 200cycles	
7	Electrostatic Discharge	±200V,200pF(0Ω) 1 time/each terminal	
8	Vibration	1.Random: 1.04Grms, 5~500Hz, X/Y/Z, 30min/each direction 2. Sine: Freq. Range: 8~33.3Hz Stoke: 1.3mm Sweep: 2.9G, 33.3~400Hz X/Z: 2hr, Y: 4hr, cyc: 15min	
9	Shock	100G, 6ms, ±X, ±Y, ±Z 3 time for each direction	JIS C7021, A-10 (Condition A)
10	Vibration (with carton)	Random: 0.015G ² /Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ each direction: 2hr	
11	Drop (with carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

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

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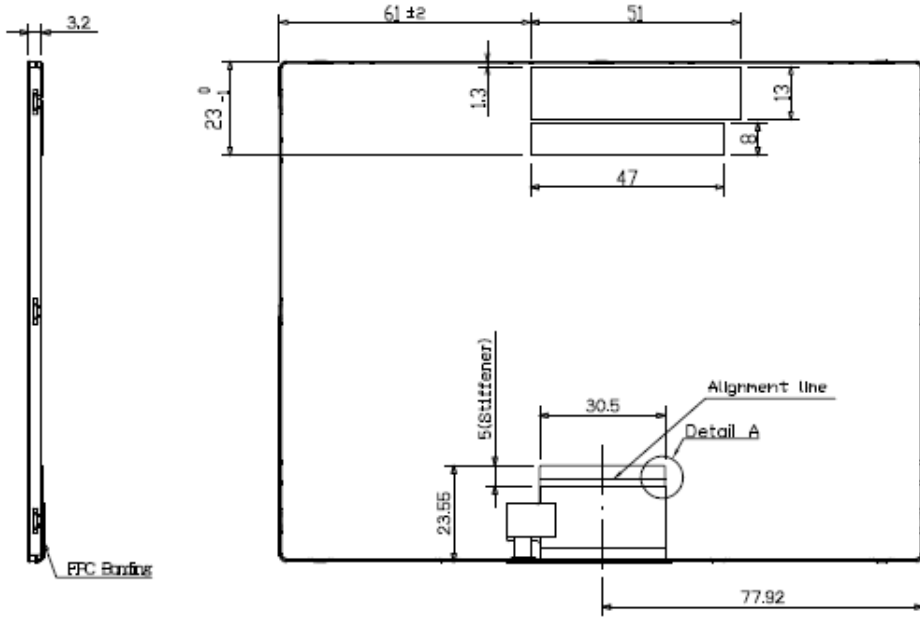
8.0 OUTLINE DIMENSION

Unit: mm



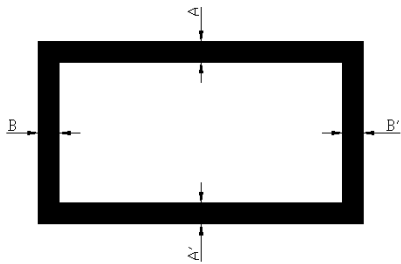
Note: General Tolerance: +/- 0.3mm

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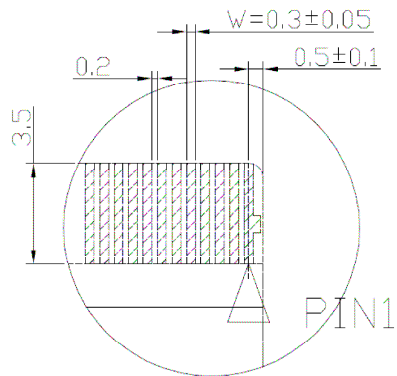


右視圖

後視圖



BM Assembly Tolerance
 | A - A' | ≤ 1 (mm)
 | B - B' | ≤ 1 (mm)

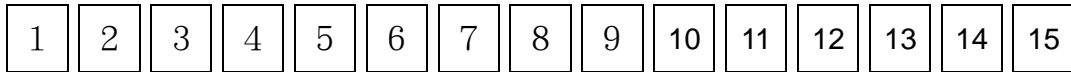


Detail A 透視圖
 (5:1)

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9.0 LOT MARK

9.1 Lot Mark



Code 1,2,3,4,5,6: HannStar internal flow control code.

Code 7: production location.

Code 8: production year.

Code 9: production month.

Code 10,11,12,13,14,15: serial number.

Note (1) Production Year: Code 8 is defined by the last number of the year, for example

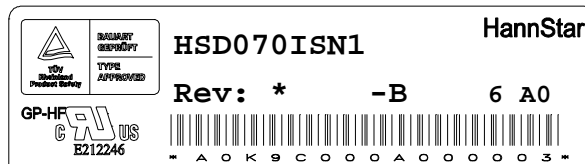
Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mark	6	7	8	9	0	1	2	3	4	5

Note (2) Production Month

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

9.2 Detail of Lot Mark

- (1) Below label is attached on the backside of the LCD module. See Section 8.0: Outline Dimension.
- (2) The detail of Lot Mark is attached as below.
- (3) This is subject to change without prior notice.



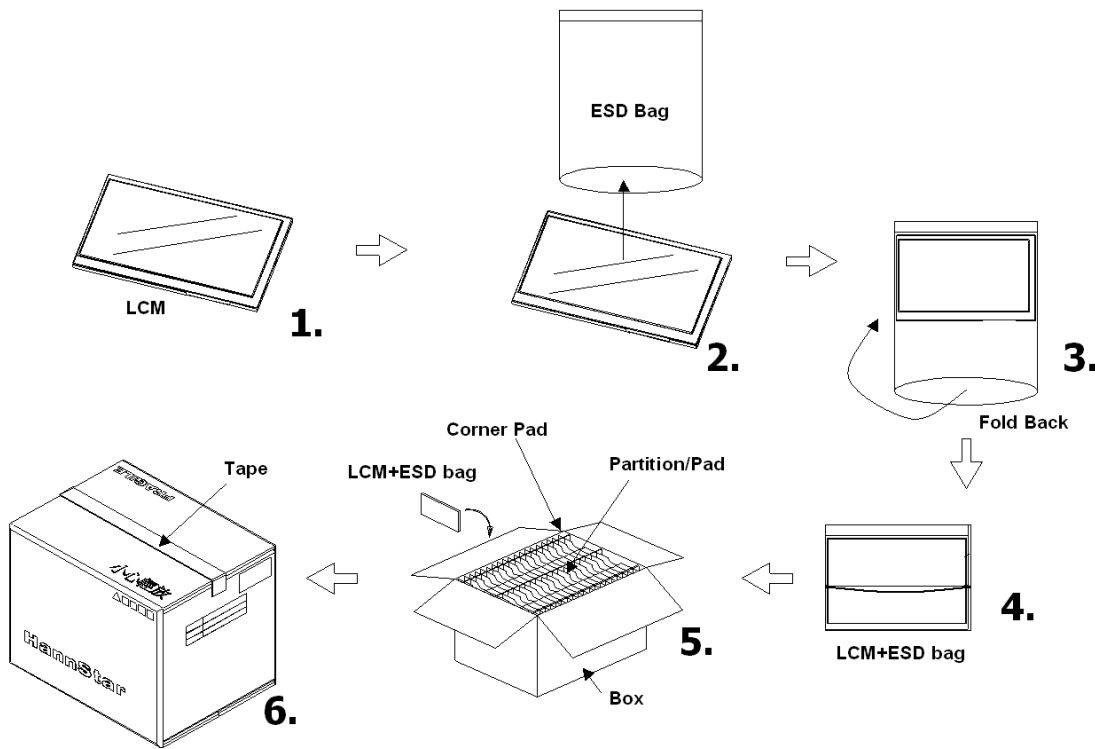
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10.0 PACKAGE SPECIFICATION

10.1 Packing form

- (1) Package quantity in one carton: 66 pieces.
- (2) Carton size: 473x374x249 mm

10.2 Packing assembly drawings



	Material	Notice
Box	Corrugated Paper Board	(AB Flute)
Partition/Pad	Corrugated Paper Board	(B Flute)
Corner Pad	Corrugated Paper Board	(AB Flute)
ESD bag	PE	

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11.0 GENERAL PRECAUTION

11.1 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.

11.2 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.

11.3 Breakage of LCD Panel

- 12.3.1. 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.
- 12.3.2 If liquid crystal contacts mouth or eyes, rinse out with water immediately.
- 12.3.3 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
- 12.3.4 Handle carefully with chips of glass that may cause injury, when the glass is broken.

11.4 Electric Shock

- 12.4.1 Disconnect power supply before handling LCD module.
- 12.4.2 Do not pull or fold the LED cable.
- 12.4.3 Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

11.5 Abso

11.6 lute Maximum Ratings and Power Protection Circuit

- 11.6.1 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.
- 11.6.2 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
- 11.6.3 It's recommended to employ protection circuit for power supply.

11.7 Operation

- 11.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.
- 11.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
- 11.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft

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material.

11.6.4 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.

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

11.8 Mechanism

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

11.9 Static Electricity

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

12.8.2. 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.

11.10 Strong Light Exposure

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

11.11 Disposal

When disposing LCD module, obey the local environmental regulations.