TO :

Date : Aug, 1, 2008

HannStar Product Specification

(Preliminary)

10” Color TFT-LCD Module

Model: **HSD100IFW1**

-C**

Note: 1. The information contained herein is tentative 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.

Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Aug., 1, 2008	-	Preliminary Product Specification was first released.

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD100IFW1-C 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 10 (17:10) inch diagonally measured active display area with WSVGA (1024 horizontal by 600 vertical pixel) resolution.

1.2 Features

- 10 (17:10 diagonal) inch configuration
- 6 bits driver with 1channel TTL interface
- RoHS and Halogen-Free Compliance

1.3 Applications

- Portable DVD
- Digital Photo frame
- Display terminal for AV application

1.4 General information

Item		Specification	Unit
Outline Dimension		235 x 145.8 x 5.5 (Typ.)	mm
Display area		220.416(H) x 129.15(V)	mm
Number of Pixel		1024 RGB (H) x 600(V)	pixels
Pixel pitch		0.21525(H) x 0.21525(V)	mm
Pixel arrangement		RGB Vertical stripe	
Display mode		Normally white	
Surface treatment		Antiglare, Hard-Coating (3H) with EWV film	
Weight		(235) (Typ.)	g
Back-light		Single LED (Side-Light type)	
Power Consumption	Logic System	(0.6) (Max.)	W
	B/L System	(2.4) (Max.)	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	234.5	235	235.5	mm
	Vertical (V)	145.3	145.8	146.3	mm
	Depth (D)	—	5.5	5.8	mm
Weight		—	(235)	—	g

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Digital Supply voltage	VCC	-0.5	5	V	
Analog Supply voltage	AVDD	-0.5	13.5	V	
Supply voltage	V1~V7	0.4AVDD	AVDD+0.3	V	
	V8~V14	-0.3	0.6AVDD	V	
Digital input voltage	-	-0.5	VCC+0.5	V	

2.1.2 Back-Light Unit

Item	Symbol	Typ.	Max.	Unit	Note
LED current	I_L	200	—	mA	(1) (2)(3)
LED voltage	V_L	9.9	10.6	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) Ta =25±2℃

(3) Test Condition: LED current 200 mA. The LED lifetime could be decreased if operating I_L is larger than 200mA.

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	0	50	℃	
Storage Temperature	T_{stg}	-20	60	℃	

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR	Θ=0 Normal viewing angle	400	500	—		(1)(2)
Response time	Rising	T_R		—	5	7	msec	(1)(3)
	Falling	T_F		—	20	28		
White luminance (Center)		Y_L		200	250	—	cd/m^2	(1)(4) (I_L=200mA)
Color chromaticity (CIE1931)	White	W_x		0.260	0.310	0.360		(1)(4)
		W_y		0.280	0.330	0.380		
Viewing angle	Hor.	Θ_L	CR>10	60	70	—		
		Θ_R		60	70	—		
	Ver.	Θ_U		40	50	—		
		Θ_D		50	60	—		
Brightness uniformity		B_{UNI}	Θ=0	70	—	—	%	(5)
Optima View Direction		6 O' clock						(6)

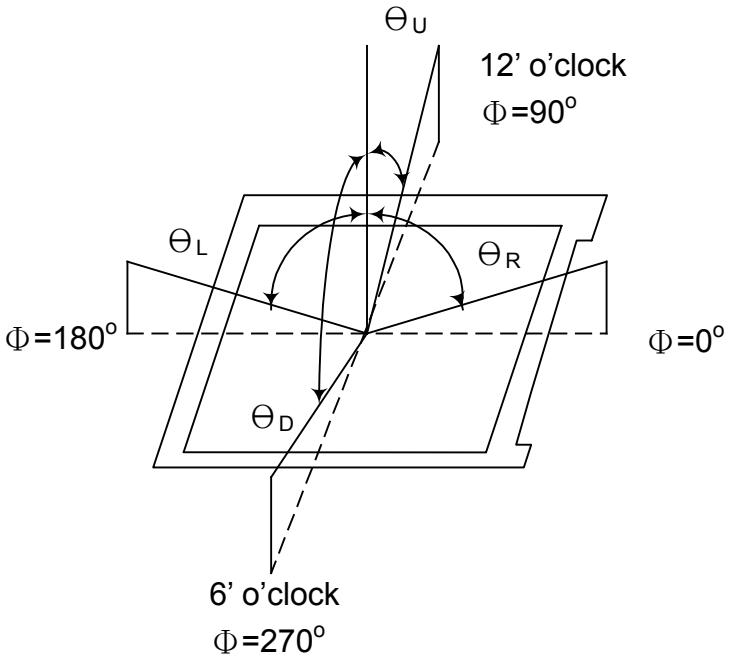
3.2 Measuring Condition

- Measuring surrounding：dark room
- LED current I_L：200mA
- 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

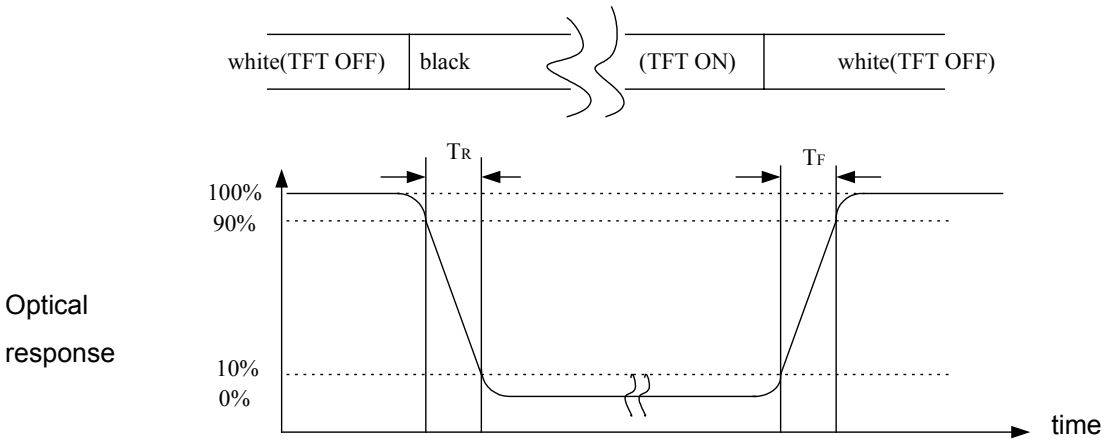
Note (1) Definition of Viewing Angle:



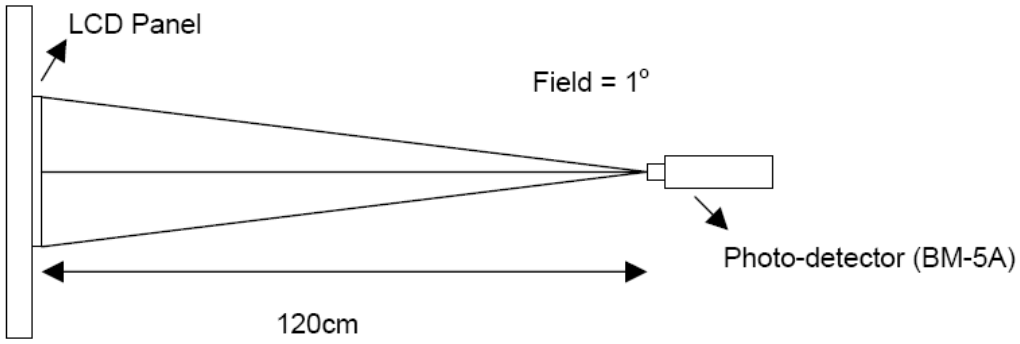
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

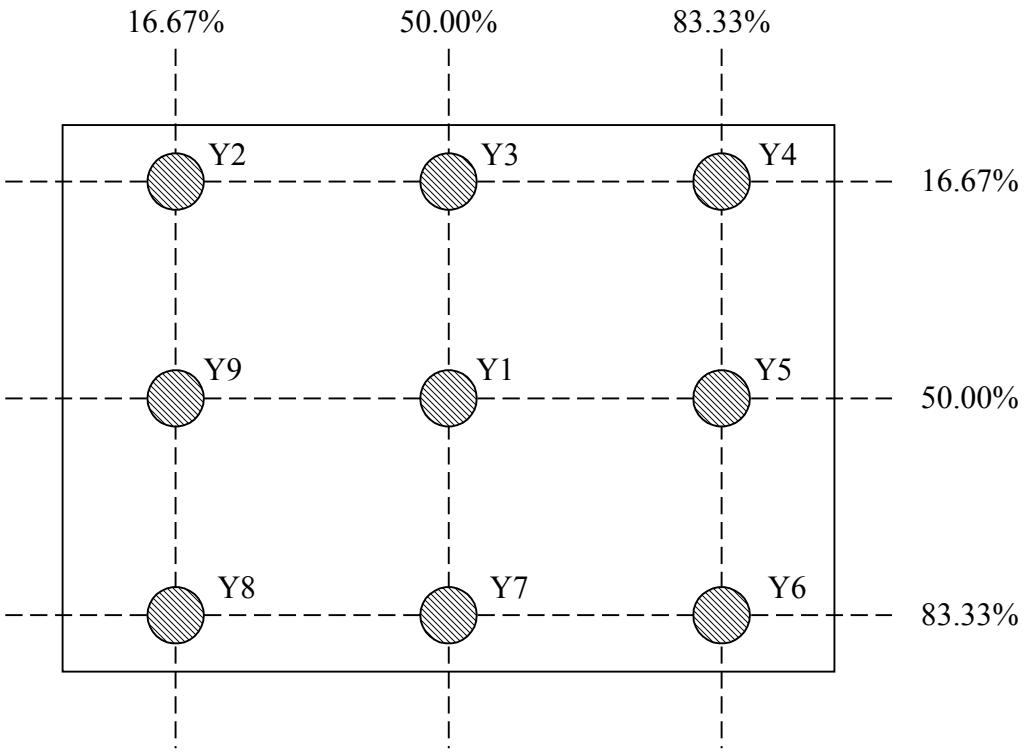
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity

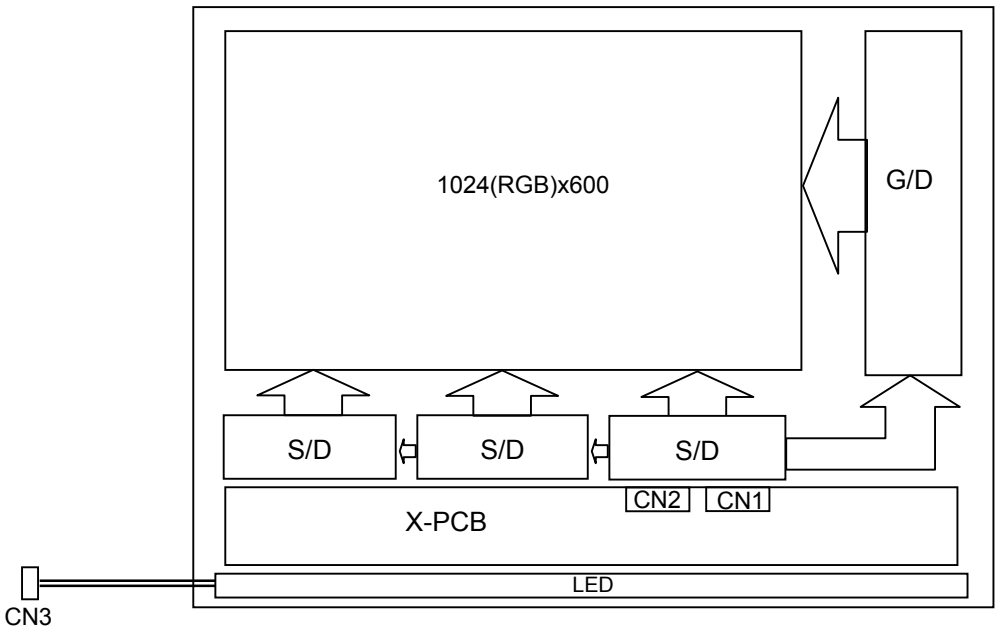


$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

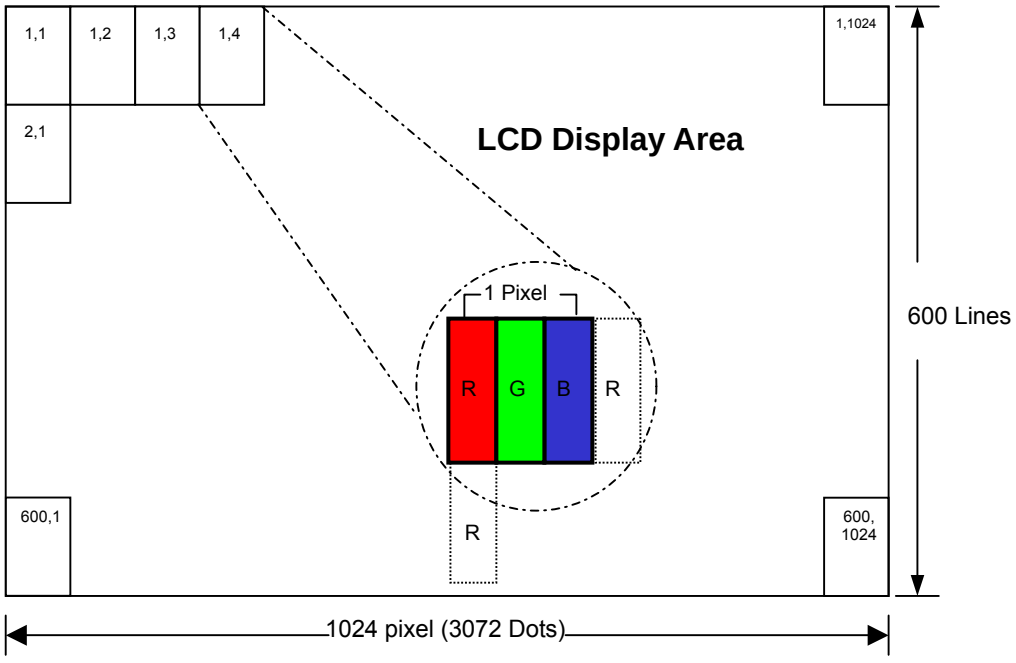
Note (6)：Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



5.0 INTERFACE PIN CONNECTION

5.1 TFT LCD Module：

CN1 (Input signal): 30pin, 0.5mm pitch, 196033-30041-3 (P-TWO or equivalent)

Pin No.	Signal	Description
1	POL	Polarity Setting
2	STVD	Vertical Line start pulse I/O signal
3	OE123R	Vertical Line output Enable signal
4	G-CLKR	Vertical Line Clock
5	STVU	Vertical Line start pulse I/O signal
6	GND	Digital Power Ground
7	EDGSEL	Define clock edge select input, default EDGSEL=L. EDGSEL=L Latch data by rising edge of clock EDGSEL=H Latch data by rising and falling edges of clock
8	VCC	Digital Voltage Input
9	V9	Gamma Voltage Input
10	VGL	Gate OFF Voltage
11	V2	Gamma Voltage Input
12	VGH	Gate ON Voltage
13	V6	Gamma Voltage Input
14	UDC	Shift up/down control signal UDC = "H", up shift: STVD (Input) →G1 ~ G600→STVU (Output) UDC= "L", down shift: STVU (Input) →G600~G1→STVD (Output)
15	VCOM	Common Voltage
16	AGND	Analog Power Ground
17	AVDD	Analog Voltage Input
18	V14	Gamma Voltage Input
19	V11	Gamma Voltage Input
20	V8	Gamma Voltage Input
21	V5	Gamma Voltage Input
22	V3	Gamma Voltage Input
23	GND	Digital Power Ground
24	R5	Red Data Bus Input (MSB)
25	R4	Red Data Bus Input
26	R3	Red Data Bus Input
27	R2	Red Data Bus Input
28	R1	Red Data Bus Input
29	R0	Red Data Bus Input (LSB)
30	GND	Digital Power Ground

CN2 (Input signal): 30pin, 0.5mm pitch,196033-30041-3 (P-TWO or equivalent)

Pin No.	Signal	Description
1	GND	Digital Power Ground
2	G5	Green Data Bus Input (MSB)
3	G4	Green Data Bus Input
4	G3	Green Data Bus Input
5	G2	Green Data Bus Input
6	G1	Green Data Bus Input
7	G0	Green Data Bus Input (LSB)
8	DIO2_COF3	Horizontal Line start pulse I/O signal (STHR)
9	REV	Data Invert signal
10	GND	Digital Power Ground
11	CLK	Pixel clock
12	VCC	Digital Voltage Input
13	DIO1_COF1	Horizontal Line start pulse I/O signal (STHL)
14	LD	Polarity latch and re-flash new data to output
15	B5	Blue Data Bus Input (MSB)
16	B4	Blue Data Bus Input
17	B3	Blue Data Bus Input
18	B2	Blue Data Bus Input
19	B1	Blue Data Bus Input
20	B0	Blue Data Bus Input (LSB)
21	LRC	Select left or right shift, normally pulled high. SHL="1": DIO1→ OUT1,2,3→OUT4,5,6→ OUT1198,1199,1200 = DIO2 SHL="0": DIO1= OUT1,2,3 ← OUT4,5,6← OUT1198,1199,1200←DIO2
22	V1	Gamma Voltage Input
23	V4	Gamma Voltage Input
24	V7	Gamma Voltage Input
25	V10	Gamma Voltage Input
26	V12	Gamma Voltage Input
27	V13	Gamma Voltage Input
28	AVDD	Analog Voltage Input
29	AGND	Analog Power Ground
30	VCOM	Common Voltage

5.2 Back-Light Unit

CN3 LED Power Source (**BHSR-02VS-1**) or equivalent

Mating Connector: (**SBHT-002T-P0.5**) or equivalent

Terminal no.	Symbol	Function
1	V_L	LED power supply (high voltage)
2	G_L	LED power supply (low voltage)

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	Note (2), Note (3)
	V_{GH}	14.55	15	15.45	V	Note (2), Note (3)
	V_{GL}	-7.35	-7	-6.65	V	Note (2), Note (3)
	AV_{DD}	9.22	9.48	9.75	V	Note (2), Note (3)
VCOM	V_{COMin}	-	3.41	-	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_{CC}	-	5	-	mA	Vcc = 3.3V
	I_{ADD}	-	60	-	mA	AV_{DD}= 9.5 V (Black)
	I_{GH}	-	0.3	-	mA	V_{GH}= 15 V
	I_{GL}	-	0.6	-	mA	V_{GL}= -7 V
Input level of V1~V5	Vx	AVDD/2	-	AVDD-0.1	V	
Input level of V6~V10	Vx	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.

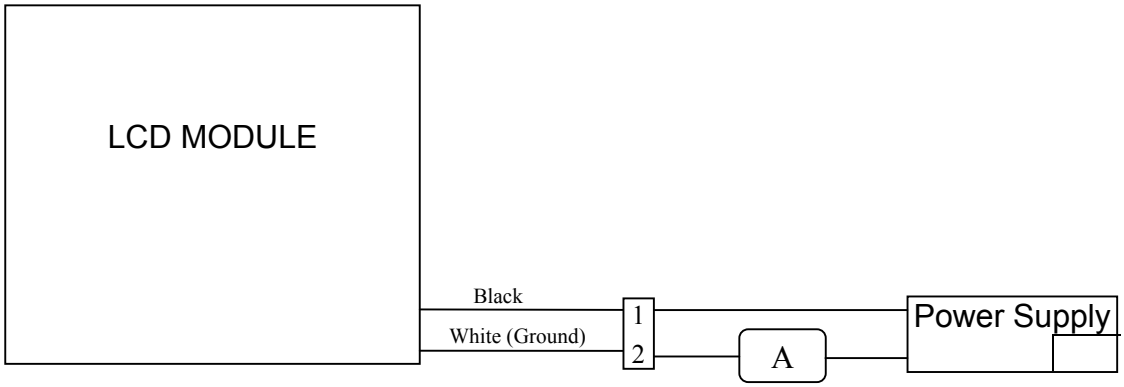
Note (3): DGND=AGND=0V

6.2 Back-Light Unit

The back-light system is an edge-lighting type with 30 LED.

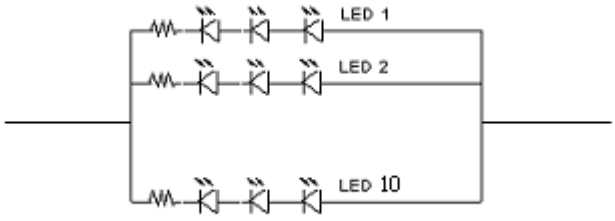
The characteristics of the LED are shown in the following tables.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED current	I_L	—	200	—	mA	(2)
LED voltage	V_L	—	9.9	10.6	V	
Operating LED life time	Hr	20000	—	—	Hour	(1)(2)



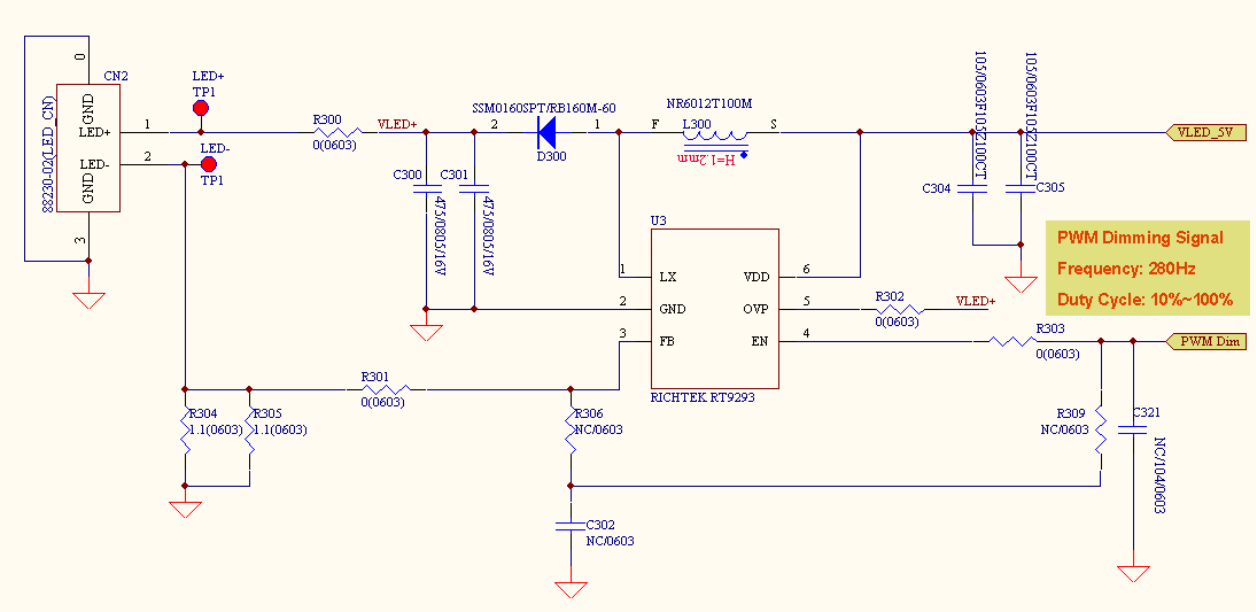
Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=200mA. The LED lifetime could be decreased if operating IL is larger than 200mA. The constant current driving method is suggested.



LED Light Bar Circuit

Note (3) Suggested Schematic of LED Back-Light Driver



Suggested Schematic of LED Back-Light Driver

6.3 AC Characteristics

Source Driver Timing

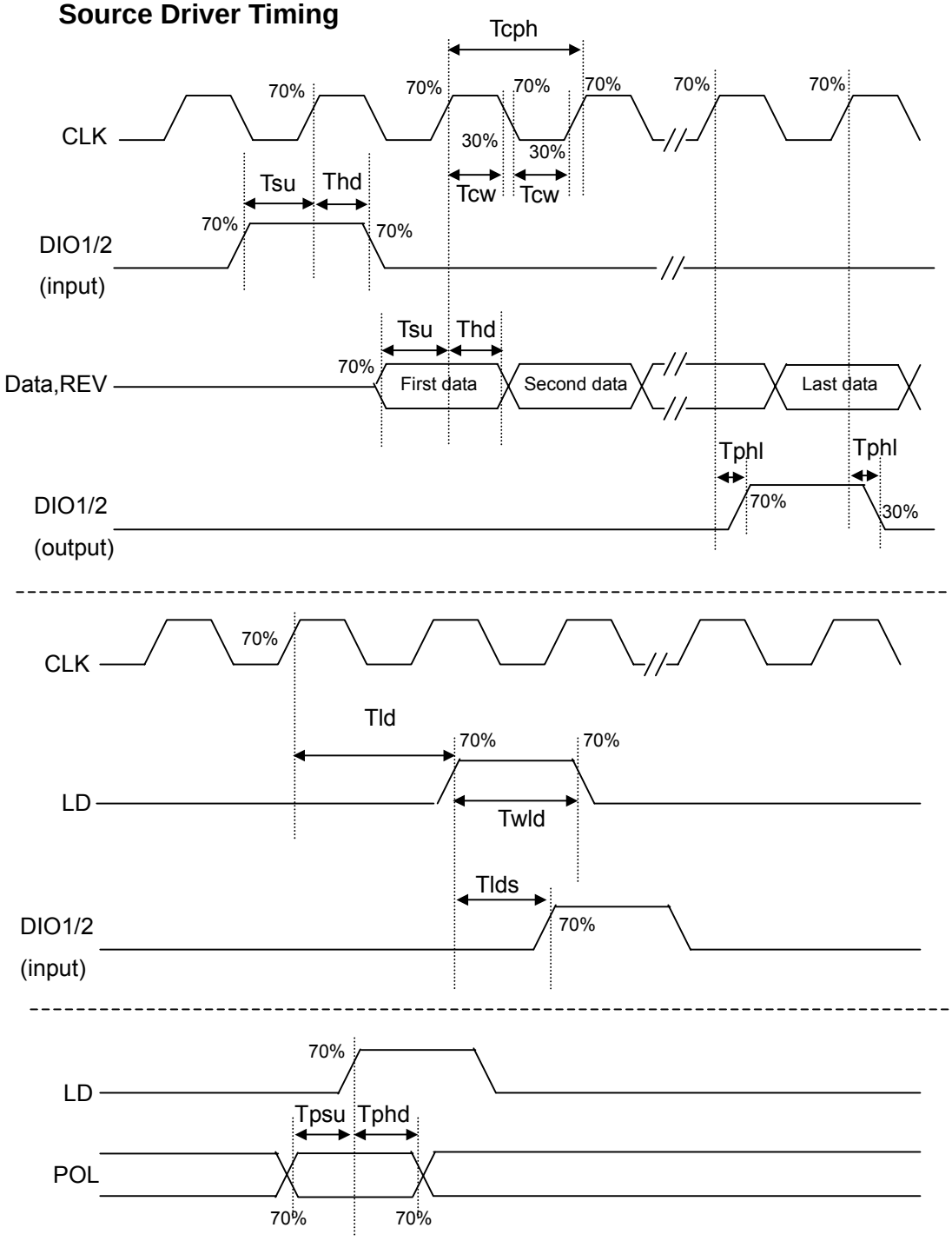
Item	Symbol	Min.	Typ.	Max.	Unit	Note
CLK frequency	Fclk	-	55	70	MHz	-
CLK pulse width	Tcw	6	-	-	ns	-
Data set-up time	Tsu	4	-	-	ns	-
Data hold time	Thd	2	-	-	ns	-
Propagation delay of DIO2/1	Tphl	6	10	15	ns	CL=25pF (Output)
Time that the last data to LD	Tld	1	-	-	Tcph	-
Pulse width of LD	Twld	2	-	-	Tcph	-
Time that LD to DIO1/2	Tlds	5	-	-	Tcph	-
POL set-up time	Tpsu	6	-	-	ns	POL to LD
POL hold time	Tphd	6			ns	POL to LD

Gate Driver Timing

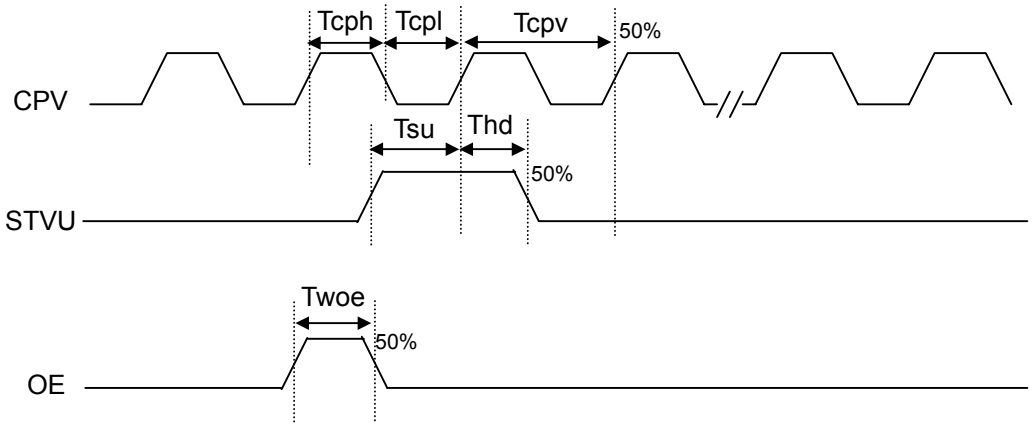
Item	Symbol	Min.	Typ.	Max.	Unit	Note
CPV period	Tcpv	5	-	-	us	-
CPV pulse width	Tcpvh, Tcpvl	2.5	-	-	us	50% duty cycle
OE pulse width	Twoe	1	-	-	us	-
Data setup time	Tsu	0.7	-	-	us	-
Data hold time	Thd	0.7	-	-	us	-

6.4 Timing Diagram of Interface Signal

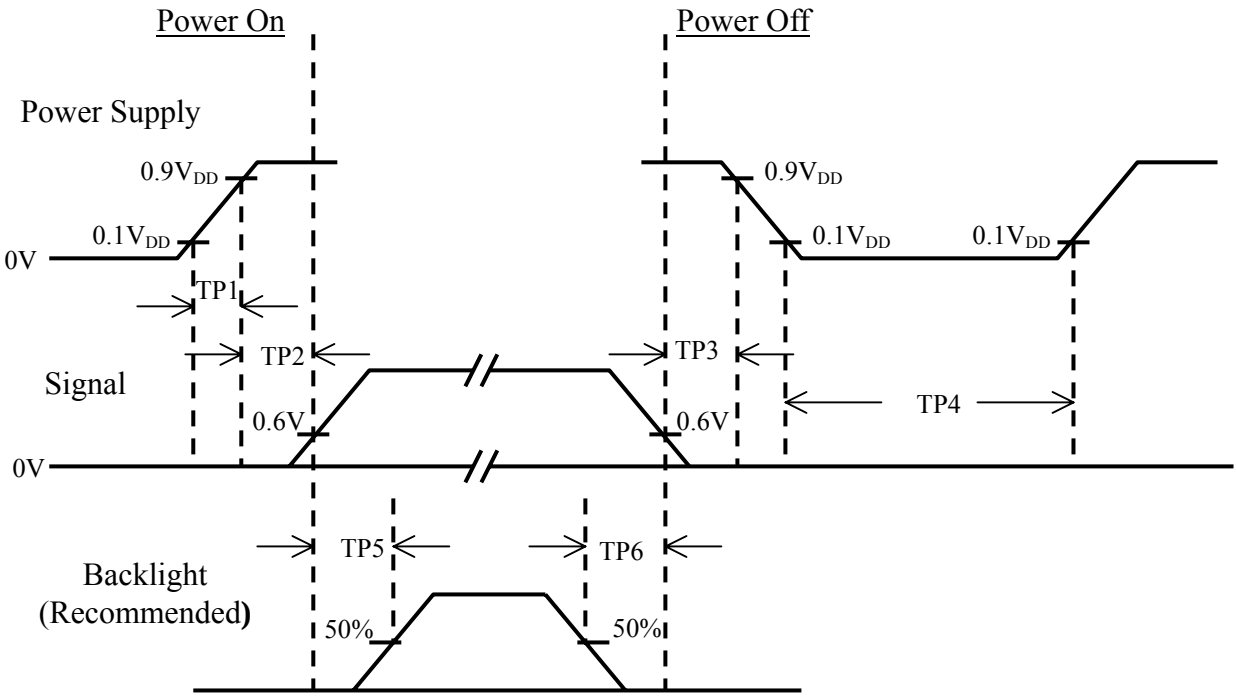
Source Driver Timing



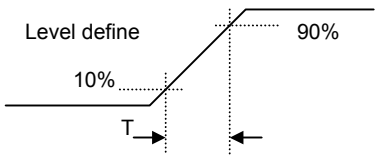
Gate Driver Timing



6.5 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit	Remark
TP1	0.5	--	10	msec	
TP2	0	--	50	msec	
TP3	0	--	50	msec	
TP4	500	--	--	msec	
TP5	200	--	--	msec	
TP6	200	--	--	msec	

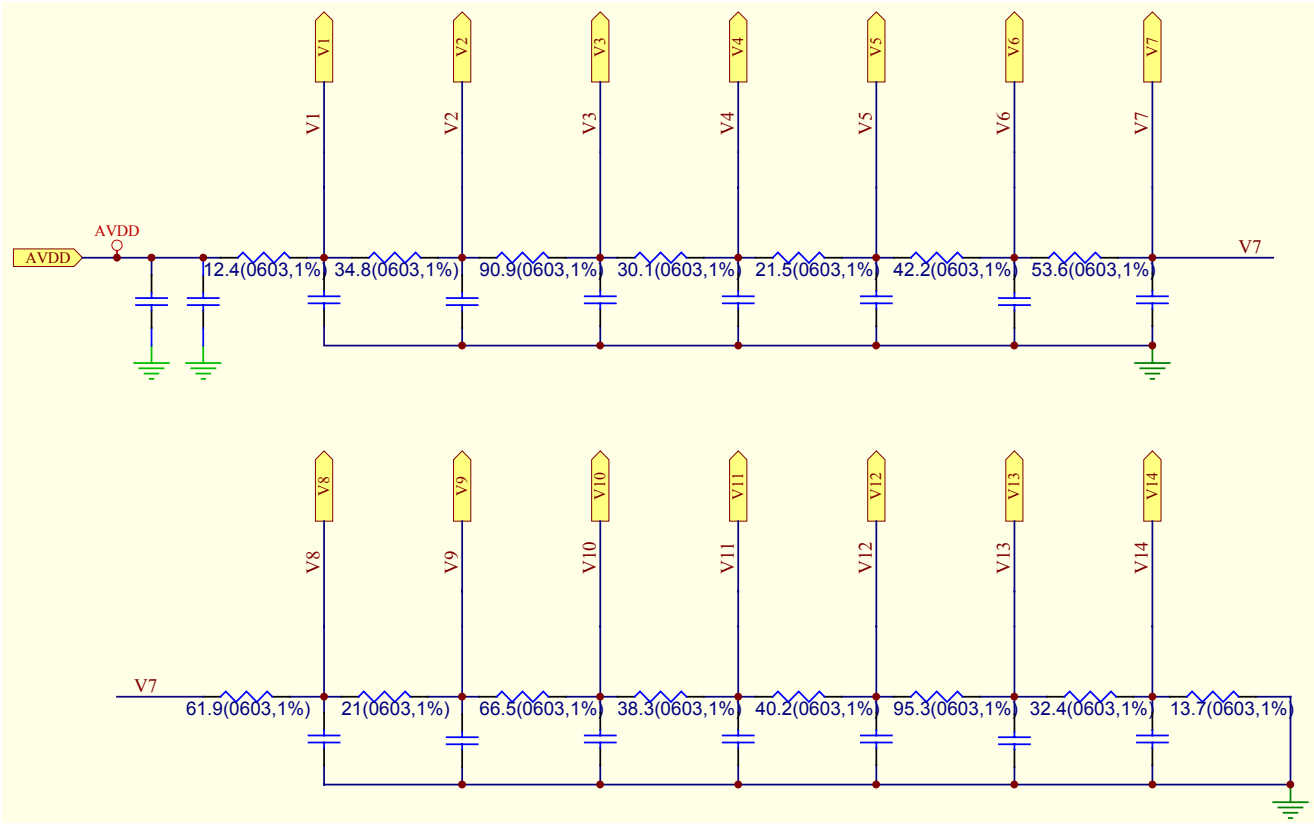


Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

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

6.6 Gamma circuit



*Suggested Gamma Circuit.

7.0 Reliability test items

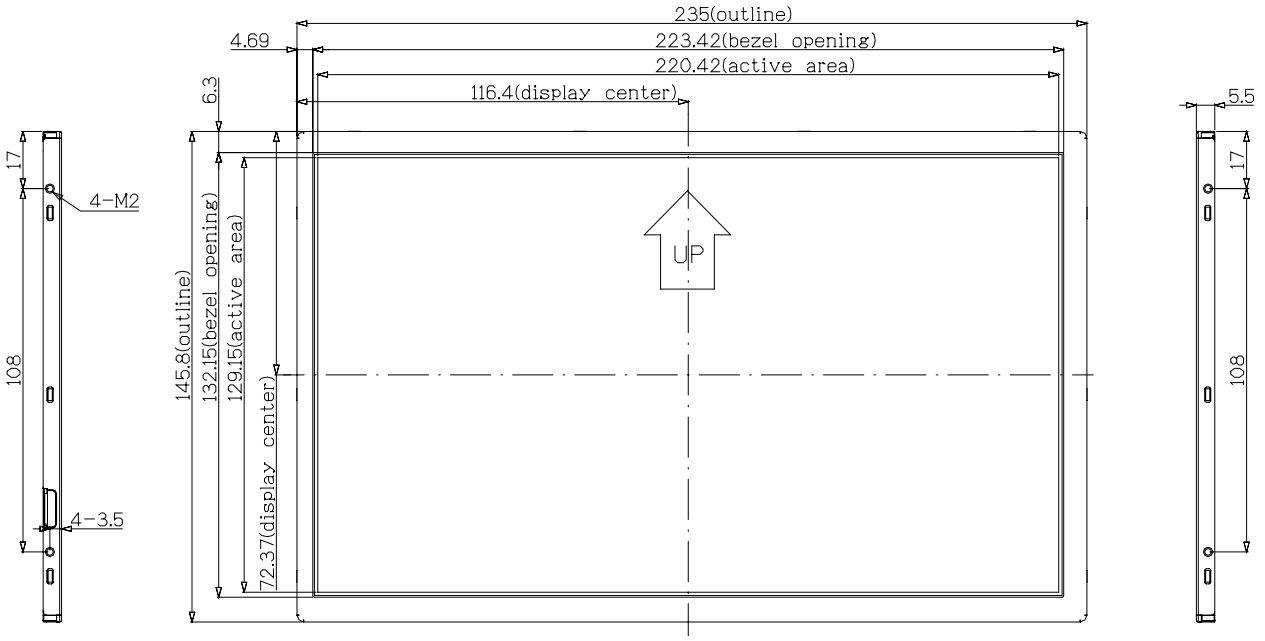
No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+60°C, 240hrs	
2	Low Temperature Storage	Ta=-20°C, 240hrs	
3	High Temperature Operation	Ta=+50°C, 500hrs	
4	Low Temperature Operation	Ta=0°C, 500hrs	
5	High Temperature and High Humidity (operation)	Ta=+50°C, 80%RH, 500hrs	
6	Thermal Cycling Test (non operation)	-20°C(30min) → +60°C(30min), 100 cycles	
7	Electrostatic Discharge	±200V,200pF(0Ω) 1 time/connector	
8	Vibration	1.Random: 1.04G, 10~500Hz, XYZ, 30min/each direction 2.Sine: 1.5G, 5~500Hz, XYZ 30min/each direction	
9	Shock	Half-Sine, 220G, 2ms, ±XYZ, 1time	
10	Vibration (with carton)	Random: 1.04G, 10~500Hz, XYZ, 45min/each direction	
11	Drop (with carton)	Height：60 cm 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.

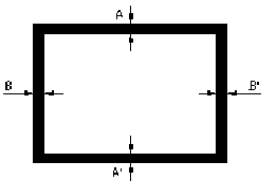
8.0 OUTLINE DIMENSION

8.1 Outline Dimension

Unit : mm



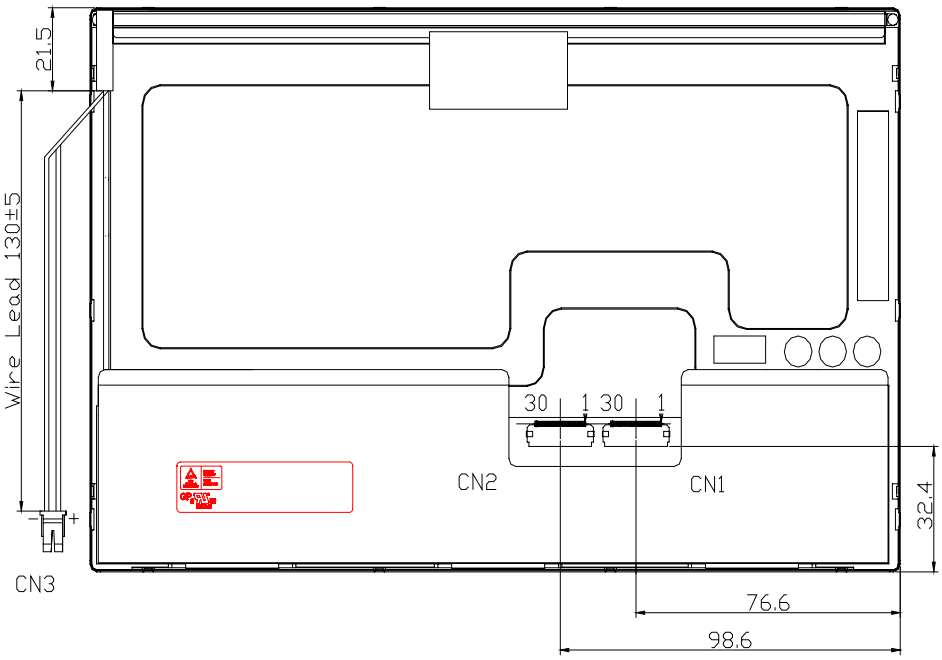
NOTE:
1. GENERAL TOLERANCE : ±0.3mm.
2. ALLOWED DEPTH OF USERHOLE SCREW INSERTION IS 1.5mm Max.
3. USERHOLE SCREW OF TORQUE = 2.0kgf/cm Max.



BM Assembly Tolerance

| A-A' | ≤ **1.0** (mm)

| B-B' | ≤ **1.0** (mm)



9.0 LOT MARK

9.1 Lot Mark

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

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

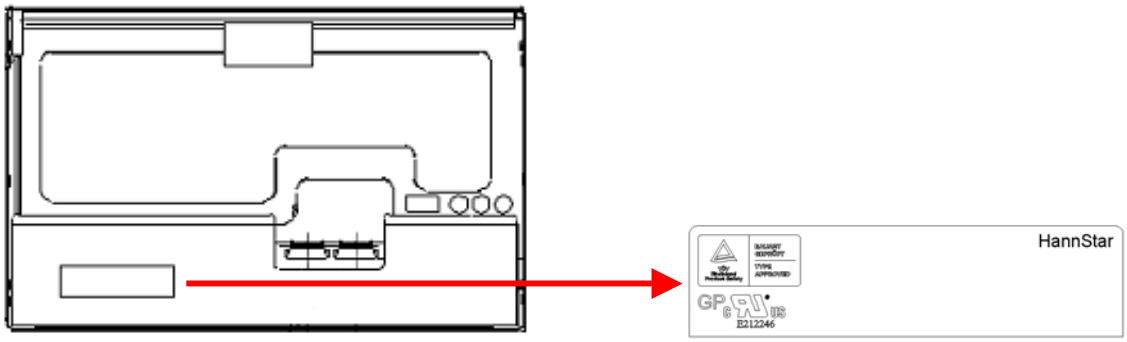
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mark	9	0	1	2	3	4	5	6	7	8

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 Location of Lot Mark

(1) The label is attached to the backside of the LCD module.
(2) This is subject to change without prior notice.



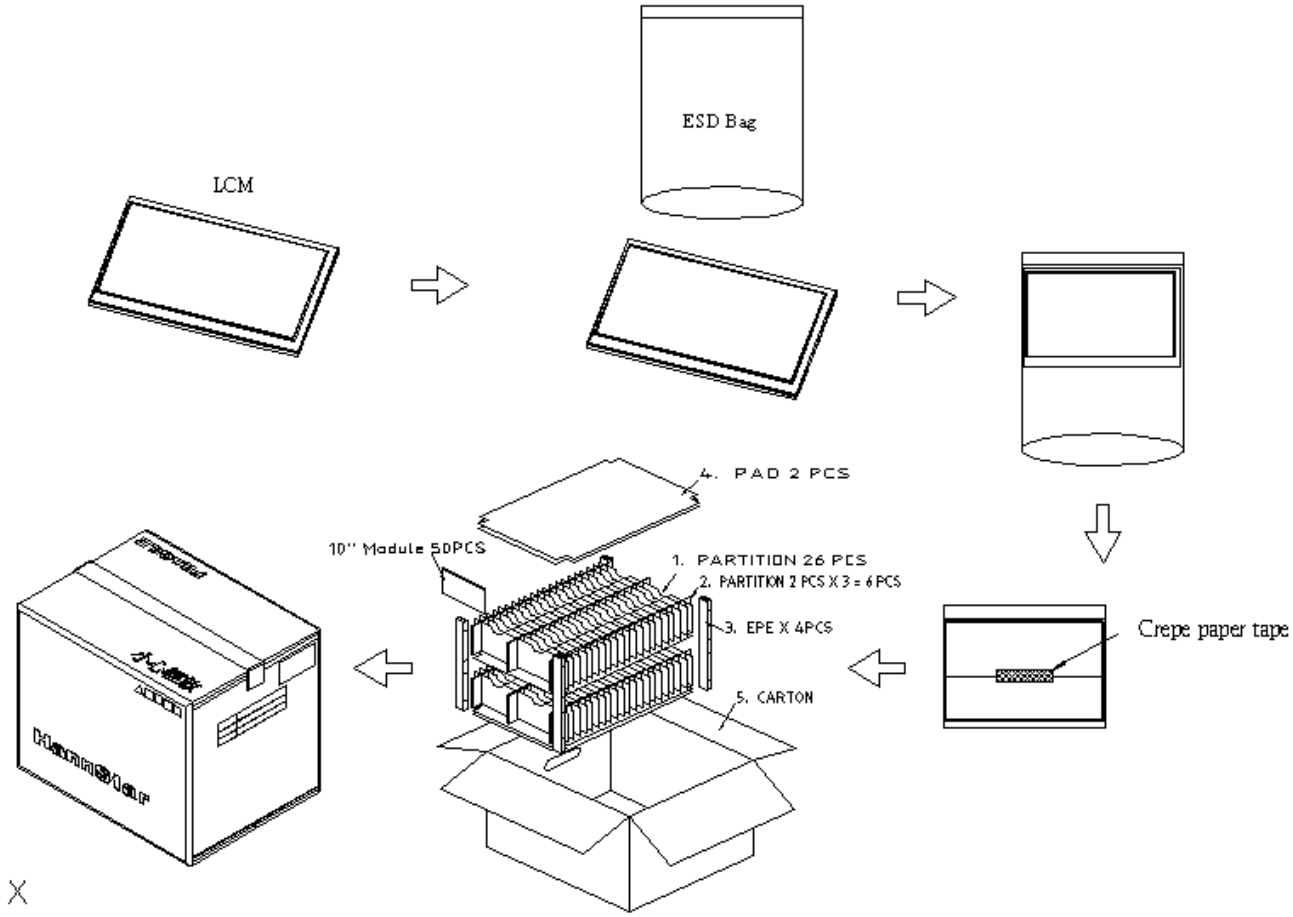
10.0 PACKAGE SPECIFICATION

10.1 Packing form

(1) Package quantity in one carton: 30 pieces.

(2) Carton size: 460 mm×361 mm×321 mm.

10.2 Packing assembly drawings



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

11.3.1. 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.

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

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

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

11.4 Electric Shock

11.4.1. Disconnect power supply before handling LCD module.

11.4.2. Do not pull or fold the LED cable.

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

11.5 Absolute Maximum Ratings and Power Protection Circuit

11.5.1. 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.

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

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

11.6 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 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.

11.7 Mechanism

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

11.8 Static Electricity

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

11.8.2 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.

11.9 Strong Light Exposure

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

11.10 Disposal

When disposing LCD module, obey the local environmental regulations.