TO : Promate

Date : Apr., 27, 2017

HannStar Product Information

(Preliminary)

Model: HSD123JPW1

-A20

Note: 1.Please contact HannStar Display Corp. before designing your product based on this module specification.
2.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.
3.The mark " –A20 " of Model means sub-model code.

Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Apr., 27, 2017	A20	Preliminary product information was first released

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD123JPW1-A20 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 12.28" (8:3) inch diagonally measured active display area with 5760 x 720 dot (1920 horizontal by 720 vertical pixel) resolution.

1.2 Features

- 12.28 (8:3 diagonal) inch configuration
- 16.7M
- ROHS / Halogen Free Compliance

1.3 Applications

- Automobile

1.4 General information

Item		Specification	Unit
Outline Dimension		308.1(H) x 130.0(V) x7.6(Typ.)	mm
Display area		292.032(H) x 109.512(V)	mm
Number of Pixel		1920 RGB (H) x 720(V)	pixels
Pixel pitch		0.1521(H) x 0.1521 (V)	mm
Pixel arrangement		RGB Vertical stripe	
Display mode		Normally Black	
NTSC		70 (typ.)	%
Surface treatment		AG	
Weight		520 (Typ.)	g
Back-light		Single LED (Side-Light type)	
Power Consumption	Logic System	2W (Max)	W
	B/L System	8.976 (Max.)	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	307.6	308.1	308.6	mm
	Vertical (V)	120.5	130.0	130.5	mm
	Depth (D)	7.3	7.6	7.9	mm
Weight		—	520	—	g

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Parameters	Symbol	Min.	Max.	Unit	Note
Power Logic	VDD	-0.3	3.6	V	

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-30	85	℃	
Storage Temperature	T_{stg}	-40	95	℃	

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR	Θ=0 Normal viewing angle		1000	—		(1)(2)
Response time	Rising	T_R		—	17		msec	(1)(3)
	Falling	T_F		—	18			
White luminance (Center)		Y_L		650	850	—	cd/m^2	(1)(4) (I_L=350mA)
Color chromaticity (CIE1931)	White	W_x		0.285	0.305	0.325		(1)(4) C-light
		W_y		0.325	0.345	0.365		
	Red	R_x		0.632	0.652	0.672		
		R_y		0.314	0.334	0.354		
	Green	G_x		0.279	0.299	0.319		
		G_y		0.590	0.610	0.630		
	Blue	B_x		0.122	0.142	0.162		
		B_y		0.087	0.107	0.127		
Viewing angle	Hor.	$Θ_L$	CR>10	—	85	—		
		$Θ_R$		—	85	—		
	Ver.	$Θ_U$		—	85	—		
		$Θ_D$		—	85	—		
Brightness uniformity		B_{UNI}	Θ=0	—	70	—	%	(5)
Optima View Direction		Free						(6)

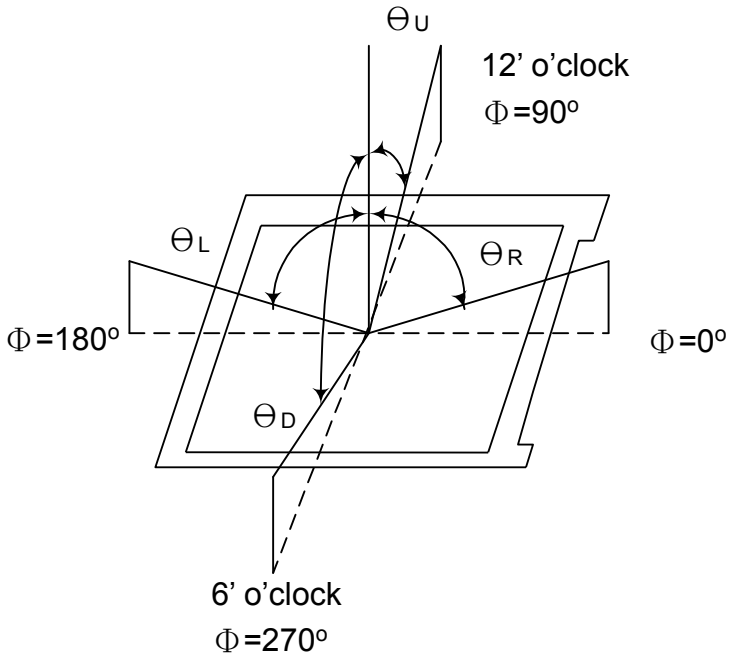
3.2 Measuring Condition

- Measuring surrounding：dark room
- LED current I_L：**240mA**
- 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

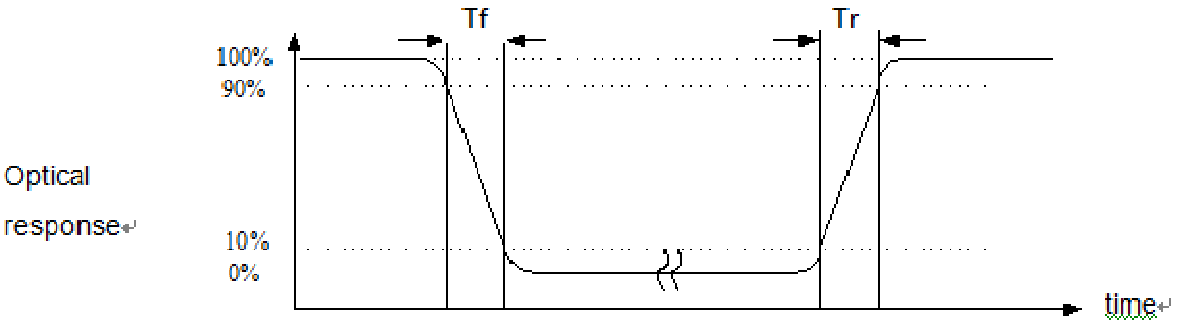
Note (1) Definition of Viewing Angle:



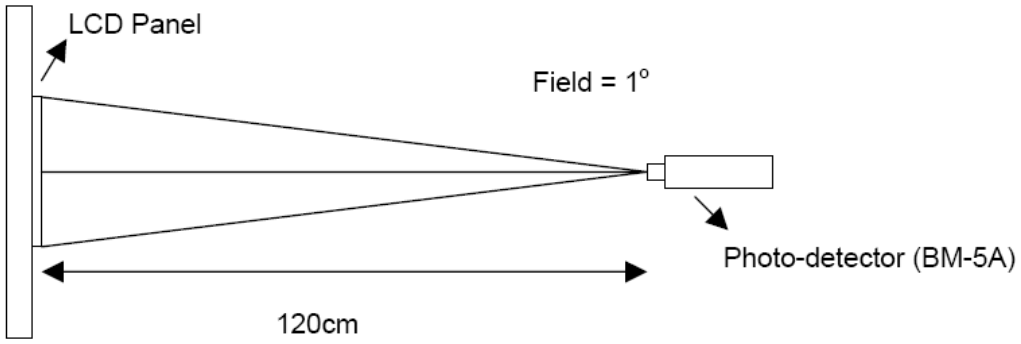
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

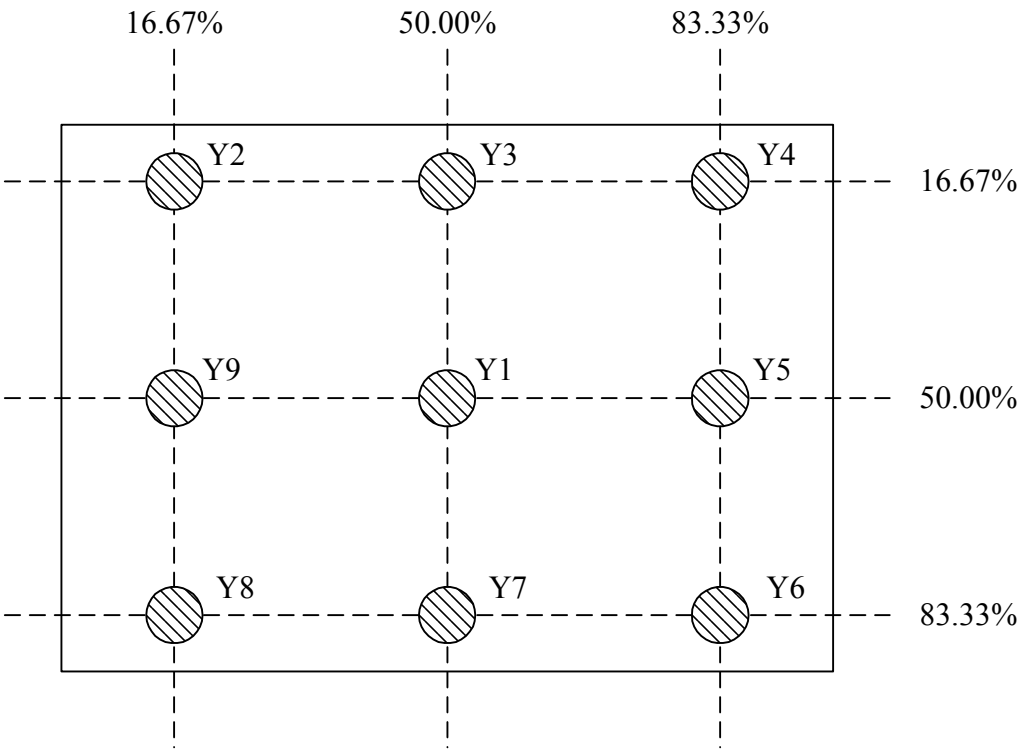
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity

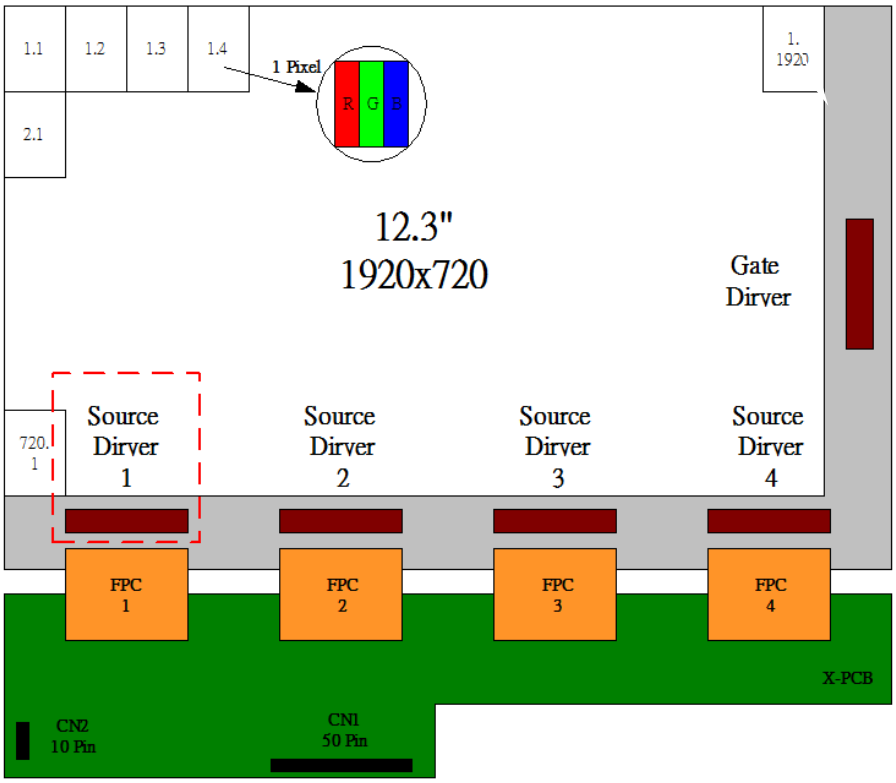


$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

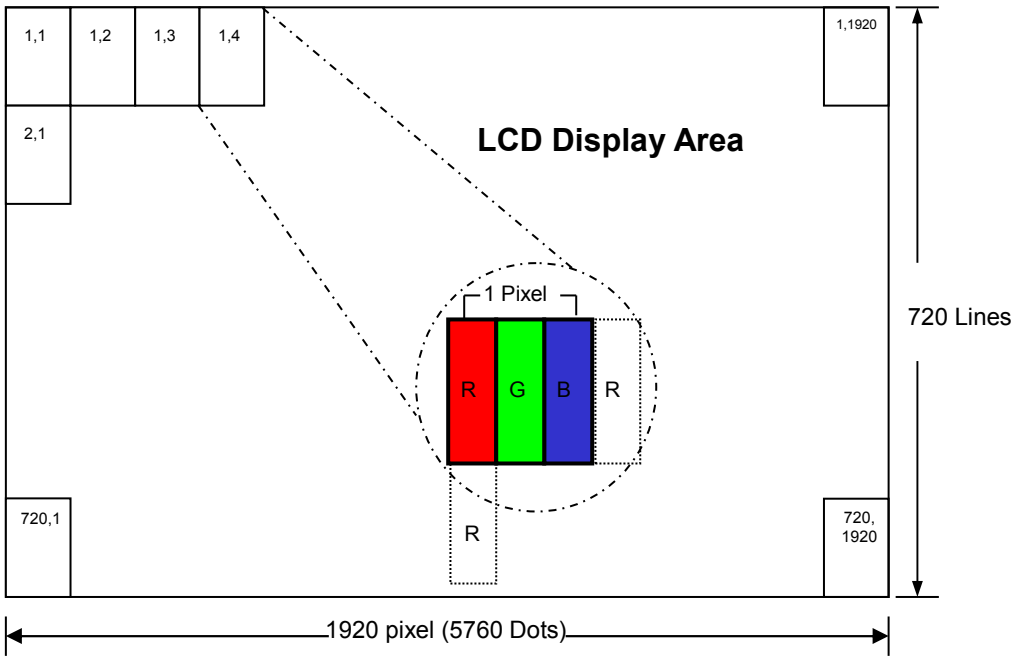
Note (6)：Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



4.3 Relationship Between Displayed Color and Input

	Display	MSB R7	R6	R5	R4	R3	R2	R1	LSB R0	MSB G7	G6	G5	G4	G3	G2	G1	LSB G0	MSB B7	B6	B5	B4	B3	B2	B1	LSB B0	Gray scale Level
Basic color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	Light Blue	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Purple	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
Gray scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L1
	↑	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L2
	↓					:							:								:					L3…L251
	Light	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L252
		H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L253
		H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L254
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Red L255
Gray scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L1
	↑	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L2
	↓					:							:								:					L3…L251
	Light	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L252
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L253
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L254
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	Green L255
Gray scale of Blue	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L1
	↑	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L2
	↓					:							:								:					L3…L251
	Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L252
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L253
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L254
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	Blue L255
Gray scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L1
	↑	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L2
	↓					:							:								:					L3…L251
	Light	H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	L252
		H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	L253
		H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	L254
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L255

5.0 INTERFACE PIN CONNECTION

FPC connector is used for electronics interface.

AORORA F31L-1A7H1-21050 , 50PIN

Pin no.	Symbol	Function
1	GND	Power Ground
2	NC	No connector
3	VCC	Digital Power
4	VCC	Digital Power
5	GND	Power Ground
6	GND	Power Ground
7	NC	No connector
8	NC	No connector
9	GND	Power Ground
10	ORXIN0-	Odd pixel negative LVDS differential clock input
11	ORXIN0+	Odd pixel positive LVDS differential clock input
12	ORXIN1-	Odd pixel negative LVDS differential clock input
13	ORXIN1+	Odd pixel positive LVDS differential clock input
14	ORXIN2-	Odd pixel negative LVDS differential clock input
15	ORXIN2+	Odd pixel positive LVDS differential clock input
16	ORXCLKIN-	Odd pixel negative LVDS differential clock input
17	ORXCLKIN+	Odd pixel positive LVDS differential clock input
18	ORXIN3-	Odd pixel negative LVDS differential clock input
19	ORXIN3+	Odd pixel positive LVDS differential clock input
20	ERXIN0-	Even pixel negative LVDS differential clock input
21	ERXIN0+	Even pixel positive LVDS differential clock input
22	ERXIN1-	Even pixel negative LVDS differential clock input
23	ERXIN1+	Even pixel positive LVDS differential clock input
24	ERXIN2-	Even pixel negative LVDS differential clock input
25	ERXIN2+	Even pixel positive LVDS differential clock input
26	ERXCLKIN-	Even pixel negative LVDS differential clock input
27	ERXCLKIN+	Even pixel positive LVDS differential clock input
28	ERXIN3-	Even pixel negative LVDS differential clock input
29	ERXIN3+	Even pixel positive LVDS differential clock input
30	GND	Power Ground
31	NC	No connector
32	RESETB	Global reset pin,active low.
33	STBYB	Standby mode,active low.
34	CA3	Cascade signal pin.
35	SCL	Serial interface clock input.
36	SDA	Serial interface data input/output.
37	CSB	Serial interface chip enable.
38	GND	Power Ground
39	GND	Power Ground
40	GND	Power Ground
41	LEDA	LED power (Anode)
42	LEDA	LED power (Anode)
43	LEDA	LED power (Anode)
44	LEDK1	Cathode 1
45	LEDK2	Cathode 2
46	LEDK3	Cathode 3
47	LEDK4	Cathode 4
48	LEDK5	Cathode 5
49	NTC_A	NTC_Anode
50	NTC_K	NTC_Cathode

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

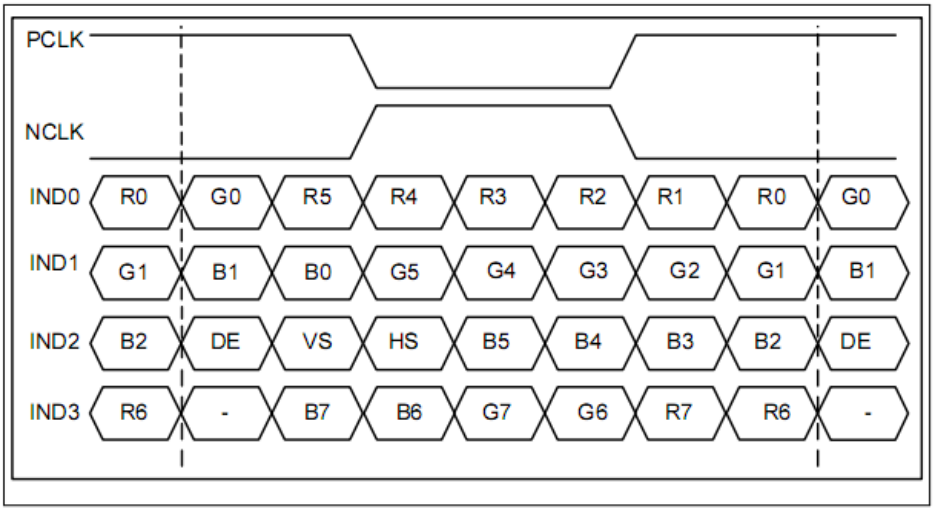
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3	3.3	3.6	V	
Input signal voltage	ViH	VDD*0.7	-	VDD	V	
	ViL	0	-	VDD*0.3	V	
Current of power supply	IDD	--	--	400	mA	VDD =3.3V

6.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	—	—	100	mV	V_{CM}=1.2V
Differential Input Low Threshold	Vtl	-100	—	—	mV	
Input Current	I_{IN}	-10	—	+10	uA	
Differential input Voltage	$\|V_{ID}\|$	0.2	—	0.6	V	
Common Mode Voltage Offset	V_{CM}	1	1.2	1.7-($\|V_{ID}\|$/2)	V	

6.1 Bit LVDS input

6.1.1 8Bit LVDS input

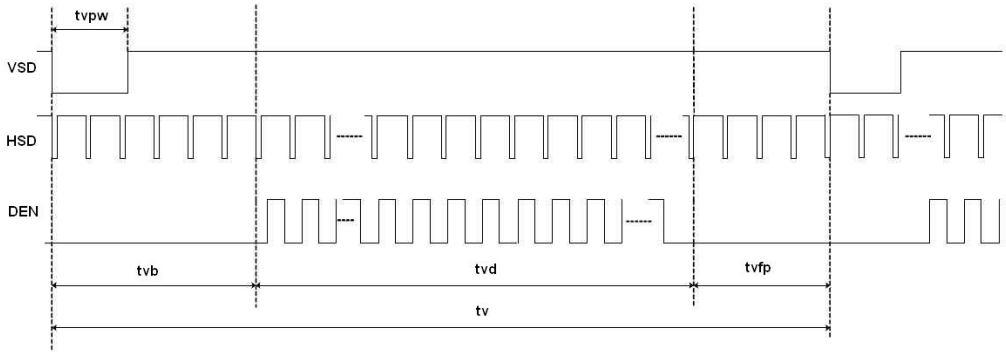


6.2 Interface Timing (DE mode)

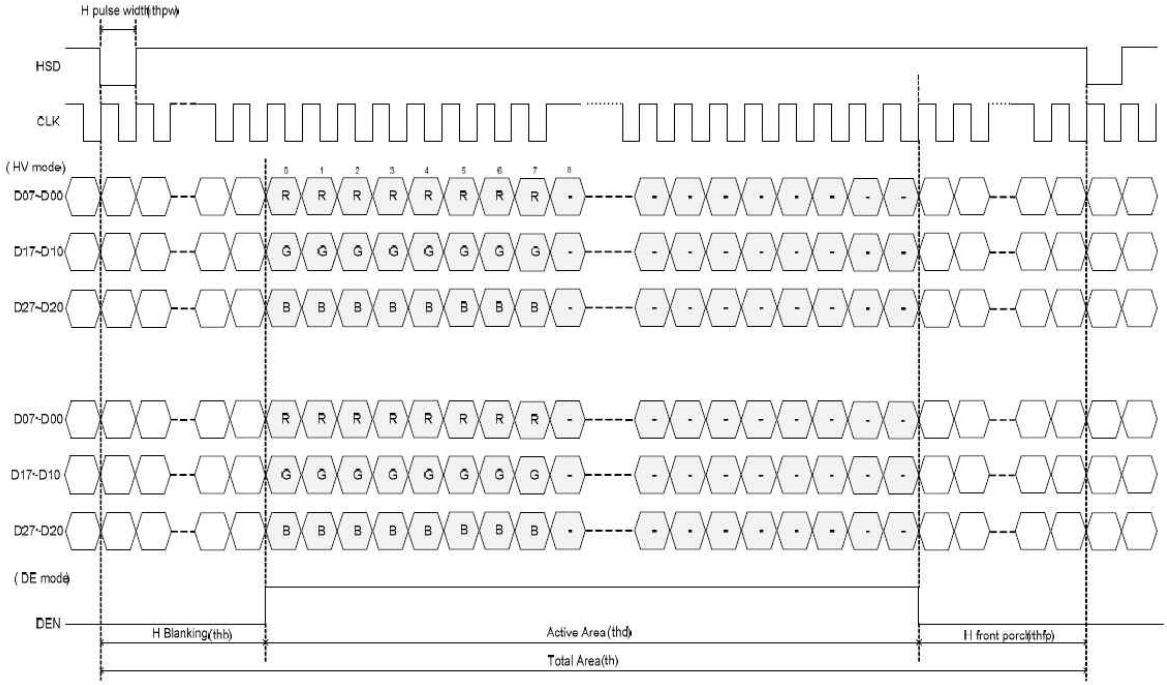
Interface Timing (DE mode)					
Parameter	Symbol	Panel Resolution 1920xRGBx720			Unit
		Min.	Typ.	Max.	
DCLK Frequency	F_{DCLK}	-	47.1	-	MHz
Horizontal valid data	T_{hd}	960			DCLK
1Horizontal Line	T_h	984	992	1104	DCLK
Vertical valid data	T_{vd}	720			H
1 Vertical field	T_v	730	792	864	H
Frame rate	FR	-	60	-	Hz

Timing Diagram of Interface Signal (DE mode)

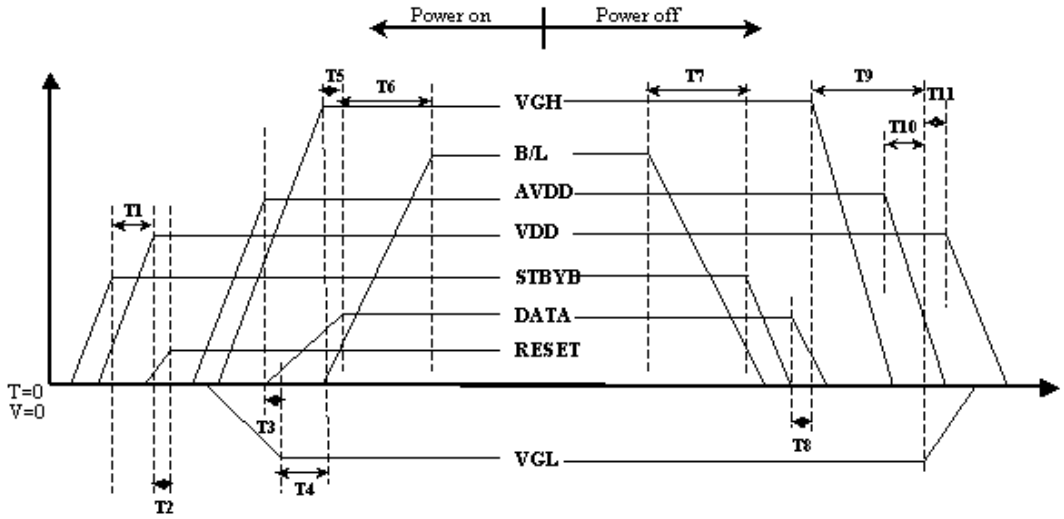
(1) Vertical input timing



(2) Horizontal Vertical input timing



6.3 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit
T1	0	--	--	ms
T2	50	--	--	ms
T3	5	--	--	ms
T4	10	--	--	ms
T5	20	--	--	ms
T6	50	--	--	ms
T7	20	--	--	ms
T8	10	--	--	ms
T9	20	--	--	ms
T10	10	--	--	ms
T11	20	--	--	ms

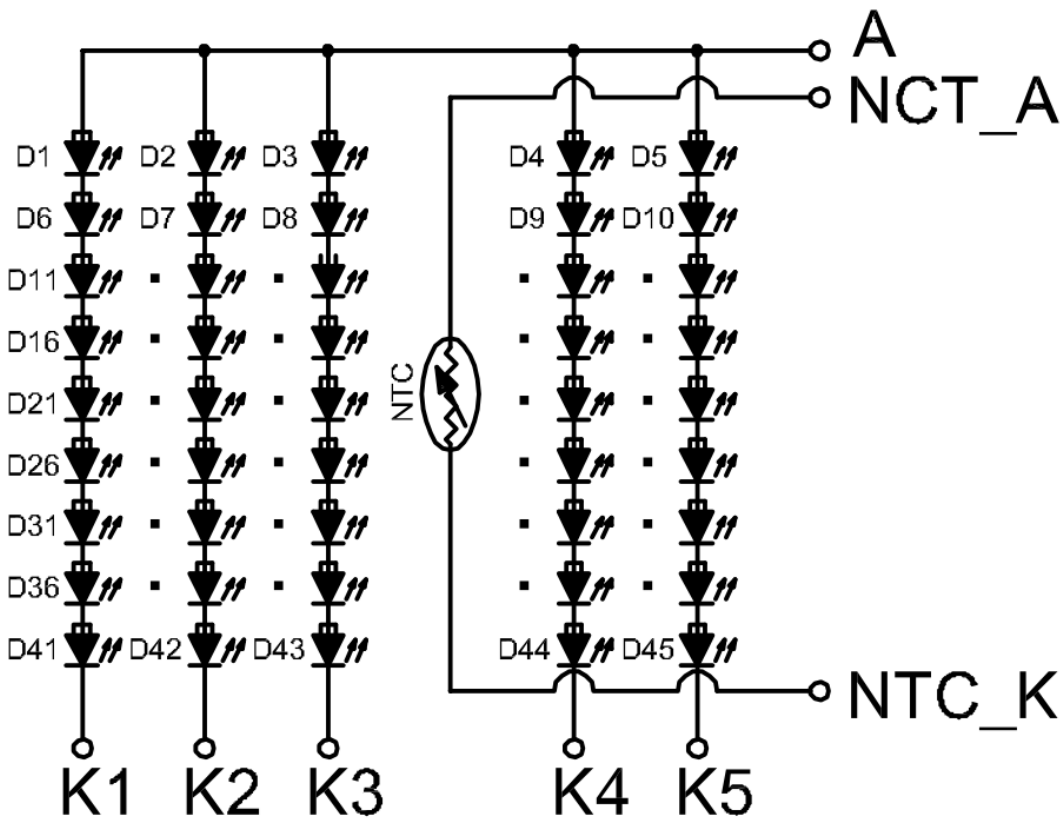
6.4 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_F	--	300	--	mA	Ta=25℃
LED Voltage	V_F	--	--	30.6	Volt	Ta=25℃
LED Life-Time	N/A	30,000	--	--	Hour	Ta=25℃ I_F=60mA Note (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 ºC, 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= 240 mA. The LED lifetime could be decreased if operating IL is larger than TDB mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit 9S5P =45pcs LED



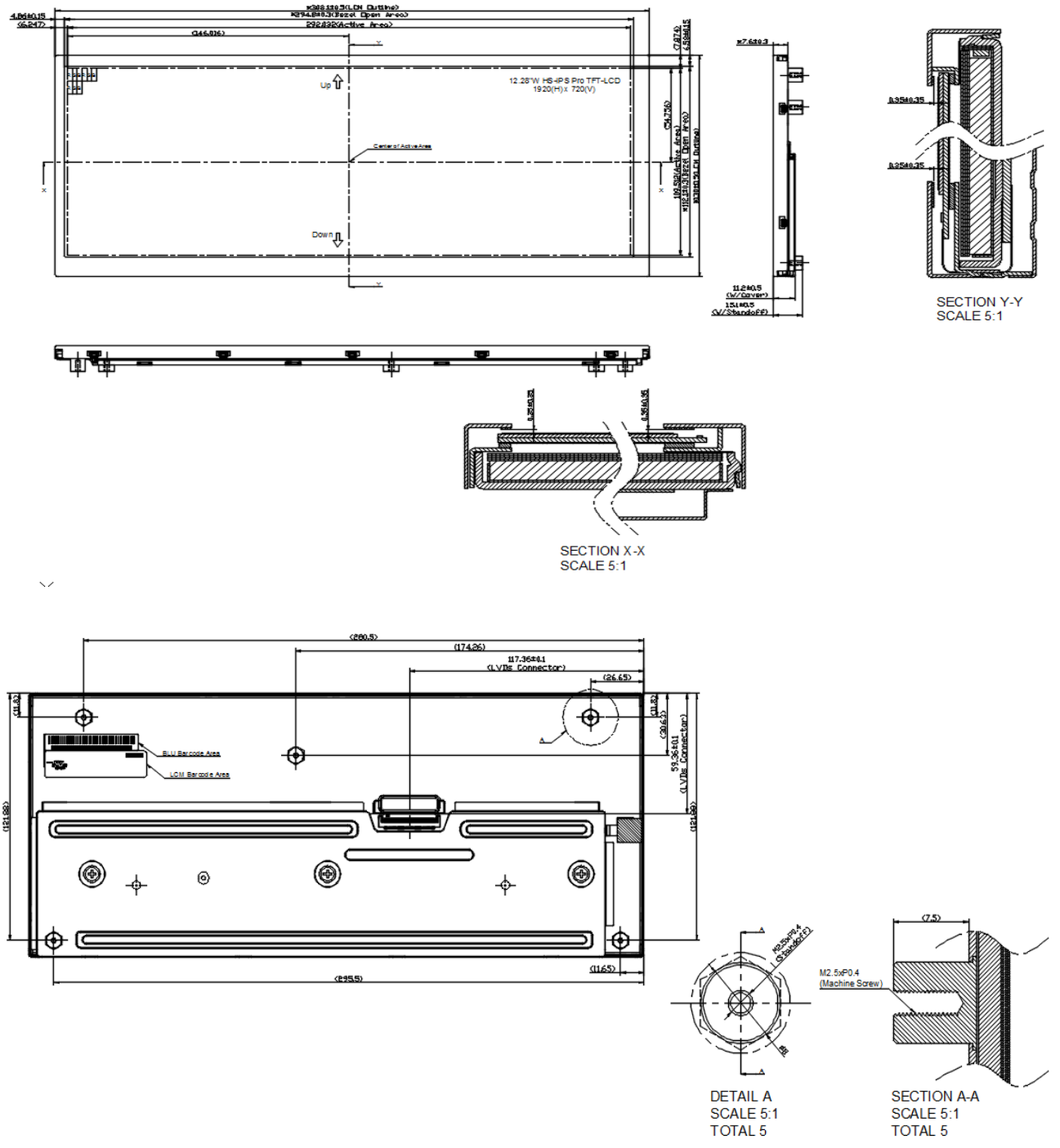
7.0 Reliability test items

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+95°C, 500hrs	
2	Low Temperature Storage	Ta=-40°C, 500hrs	
3	High Temperature Operation	Ta=+85°C, 500hrs	
4	Low Temperature Operation	Ta=-30°C, 500hrs	
5	High Temperature and High Humidity (operation)	Ta=+65°C, 90%RH, 500hrs	
6	Thermal Cycling Test (non operation)	-40°C(30min)→+85°C(30min),500 cycles	
7	Electrostatic Discharge	±200V,200pF(0Ω) 1 time/connector	
8	Vibration	1.Random: 1.04G, 10~500Hz, XYZ, 30min/each direction 2.Sine: Freq.1.5G, 8~33.3Hz, Stoke: 1.3mmhz Sweep: 2.9G, 333.3~400 X/Z: 2hrs, Y:4hrs	
9	Shock	Half-Sine, 100G, 6ms, ±XYZ, 1time	
10	Vibration (with carton)	Random: 0.015G^2/Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ 各方向 2hrs	
11	Drop (with carton)	Drop height condition, basis on the product weight and Follw QB100-0027 1 corner, 3 edges, 6 surfaces	

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

8.0 OUTLINE DIMENSION

Unit : mm



Note: General tolerance: +/- 0.3mm

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: Code 8 is defined by the last number of the year, for example

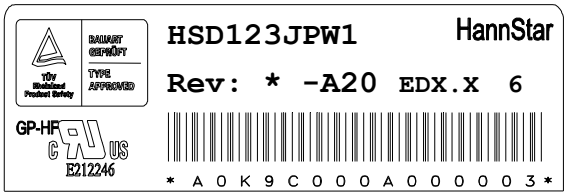
Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2015
Mark	6	7	8	9	0	1	2	3	4	5

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.



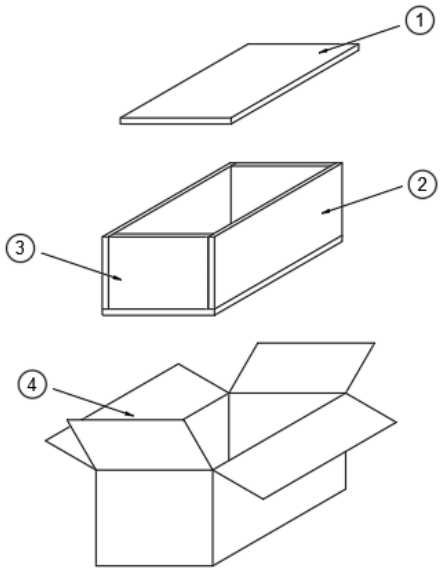
10.0 PACKAGE SPECIFICATION

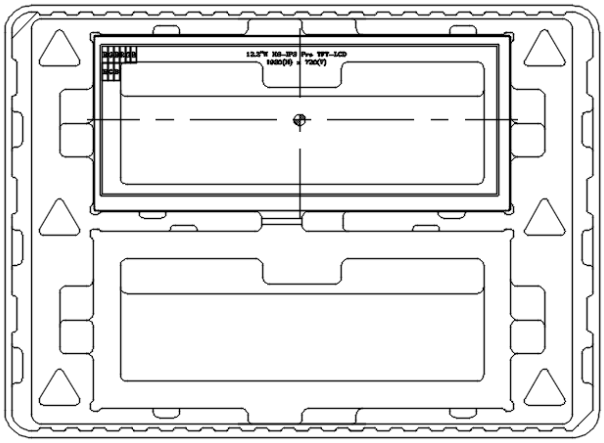
10.1 Packing form

IItem	Q'ty	Material	Size
①	2	EPE Board (T/B)	480 x 360 x 20mm
②	2	EPE Board (L/R)	325 x 235 x 20mm
③	2	EPE Board (F/RE)	480 x 235 x 20mm
④	1	Corrugated Paperboard (AB Flute)	500 x 380 x 312mm
⑤	11	PET Tray	440 x 320 x 24.1mm

(1) Package quantity in one carton: 20 pieces.

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.