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TO :

Date : Jun, 21, 2022

HannStar Product Specification

(Formal)

Model: HSD123JPW3-A15

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 “ ** ” of Model means sub-model code.

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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD123JPW3-A15 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

- TFT LCD Monitor
- Industrial Application
- Amusement
- Vehicle

1.4 General information

Item		Specification	Unit
Outline Dimension		302.0(H) x 125.4(V) x6.2(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		75 (typ.)	%
Surface treatment		HC (Glare)	
Weight		345 (Typ.)	g
Back-light		Single LED (Side-Light type)	
Power Consumption	Logic System (White Pattern)	(1.32 W) (Max.)	W
	B/L System	(11.968 W) (Max.)	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	301.5	302.0	302.5	mm
	Vertical (V)	124.9	125.4	125.9	mm
	Depth (D)	5.9	6.2	6.5	mm
Weight		—	345	378	g

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2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

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

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T _{opa}	-30	85	°C	
Storage Temperature	T _{stg}	-40	90	°C	

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3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR	Θ=0 Normal viewing angle	1100	1500	—		(1)(2)
Response time	25°C	T _R +T _F		—	25	30	msec	(1)(3)
	-20°C	T _R +T _F		—	170	250		
	-30°C	T _R +T _F		—	400	450		
White luminance (Center)		Y _L		650	850	—	cd/m ²	(1)(4) (I _L =320mA)
Color chromaticity (CIE1931)	White	W _x		(0.256)	(0.296)	(0.336)		(1)(4)
		W _y		(0.269)	(0.309)	(0.349)		
	Red	R _x		(0.591)	(0.631)	(0.671)		
		R _y		(0.282)	(0.322)	(0.362)		
	Green	G _x		(0.263)	(0.303)	(0.343)		
		G _y		(0.593)	(0.633)	(0.673)		
	Blue	B _x		(0.120)	(0.160)	(0.200)		
		B _y		(0.004)	(0.044)	(0.084)		
Viewing angle	Hor.	Θ _L	CR>10	80	85	—		
		Θ _R		80	85	—		
	Ver.	Θ _U		80	85	—		
		Θ _D		80	85	—		
Brightness uniformity		B _{UNI}	Θ=0	70	80	—	%	(5)
Optima View Direction		Free						(6)

3.2 Measuring Condition

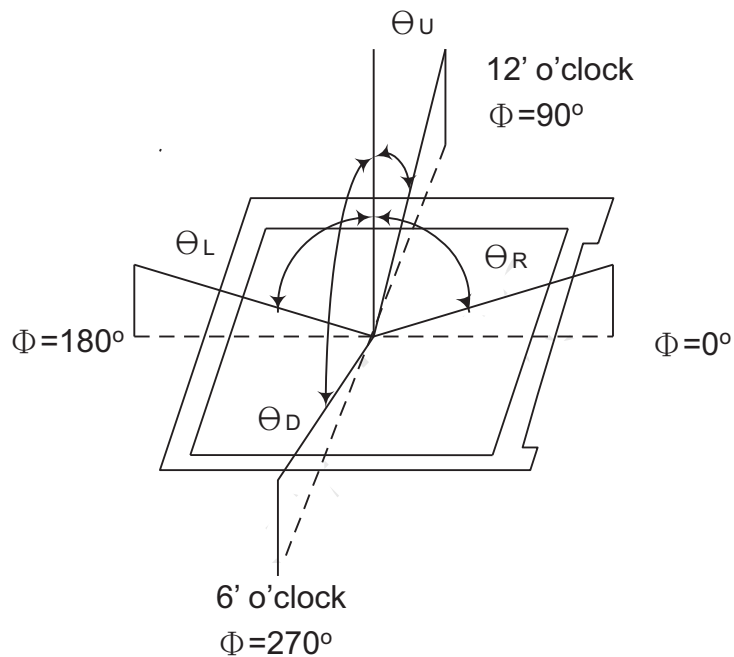
- Measuring surrounding : dark room
- LED current I_L : (320mA)
- Ambient temperature : $25\pm 2^\circ\text{C}$
- 15min. warm-up time.

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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:

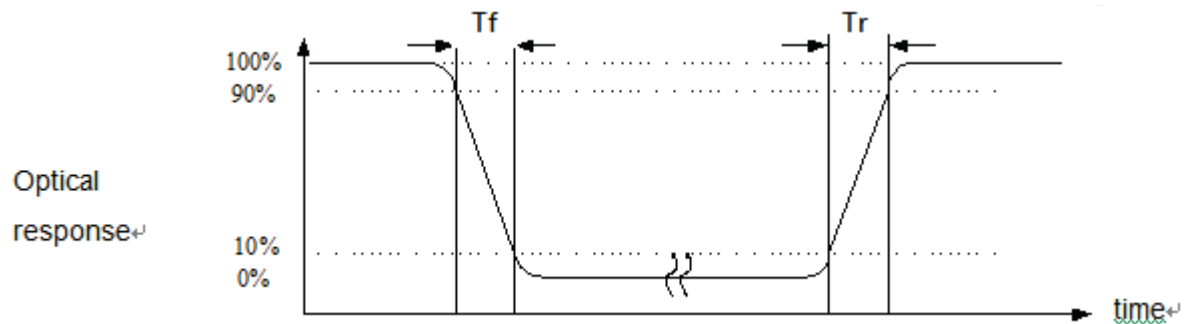


Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

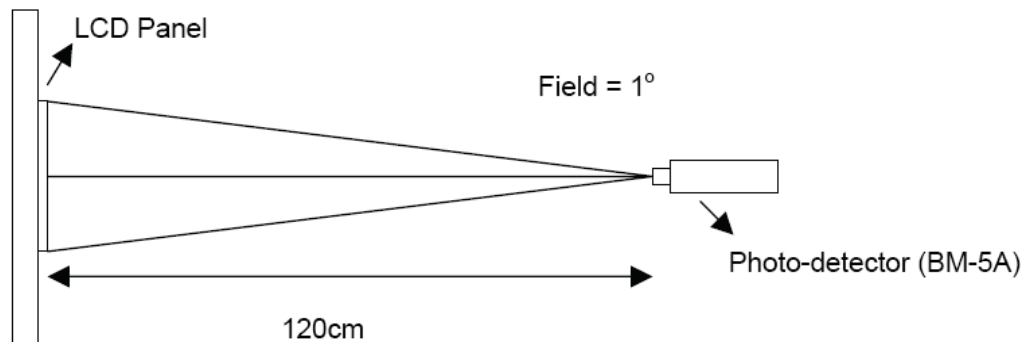
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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

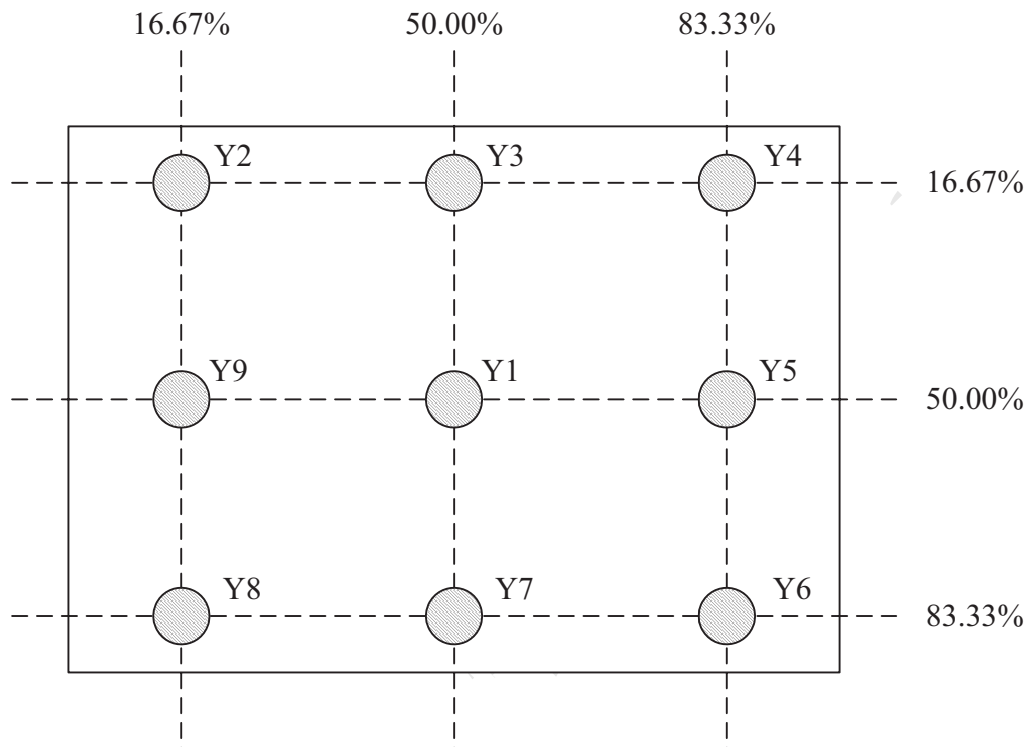


Note (4) Definition of optical measurement setup



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Note (5) Definition of brightness uniformity



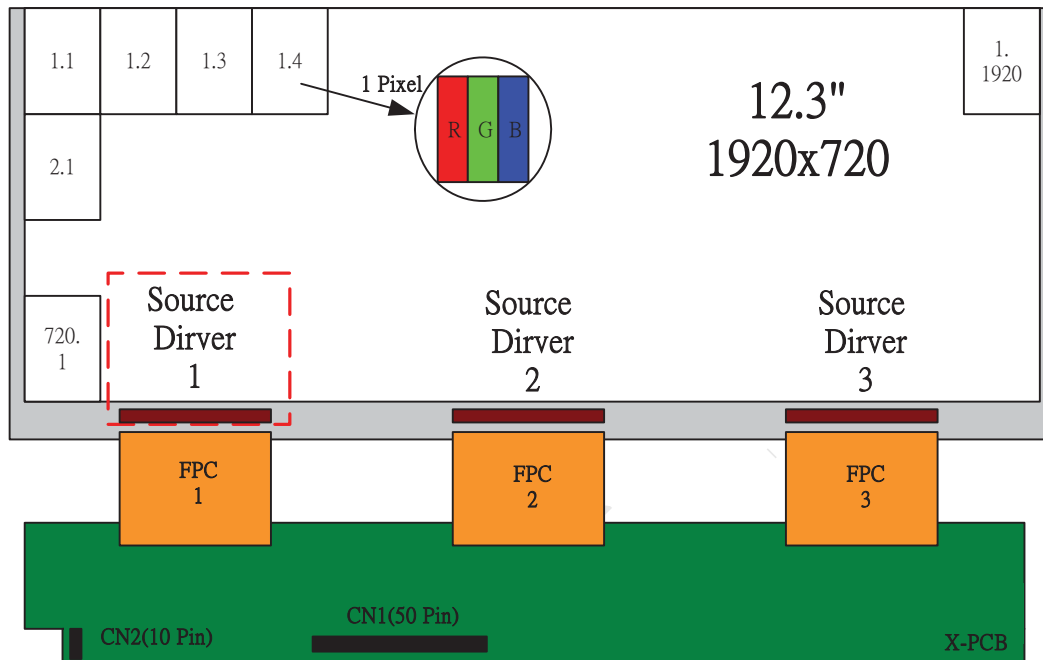
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

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

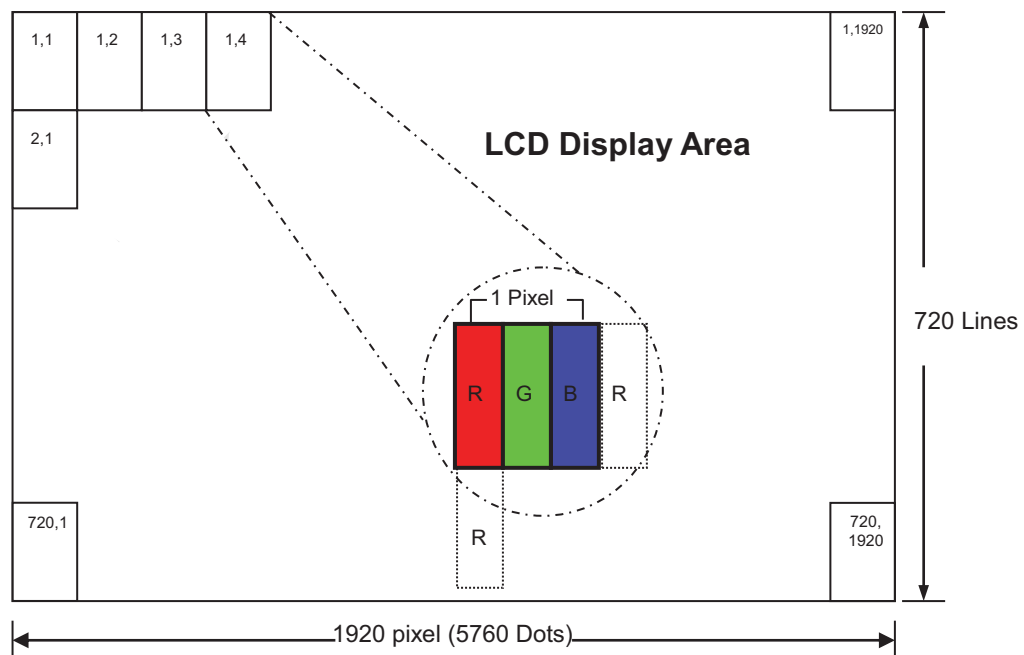
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4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



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4.3 Relationship Between Displayed Color and Input

	Display	MSB LSB								MSB LSB								MSB LSB								Gray scale Level
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	
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 ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L2
		:								:								:								L3...L251
		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
	Light	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 ↑ ↓ Light	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	H	L	L	L	L	L	L	L	L	L	L	L2
		:								:								:								L3...L251
		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
	Light	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 ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L2
		:								:								:								L3...L251
		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
	Light	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 ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L2
		:								:								:								L3...L251
		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
	Light	H	H	H	H	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	L253
		H	H	H	H	H	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	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

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5.0 INTERFACE PIN CONNECTION

CN1 FPC connector is used for electronics interface.

AORORA F31L-1A7H1-21050 or BJD-101049-205050, 50PIN

No.	Symbol	Function	Note
1	GND	Power ground	
2	NC/BIST	No connector(BIST Pin)	
3	VCC	Digital Power/Vin = 3.3V	
4	VCC	Digital Power/Vin = 3.3V	
5	GND	Power ground	
6	GND	Power ground	
7	NC	No connector(Serial interface OTP Power)	
8	NC	No connector	
9	GND	Power ground	
10	ORXIN0-	Negative LVDS differential data input (Odd data)	
11	ORXIN0+	Positive LVDS differential data input (Odd data)	
12	ORXIN1-	Negative LVDS differential data input (Odd data)	
13	ORXIN1+	Positive LVDS differential data input (Odd data)	
14	ORXIN2-	Negative LVDS differential data input (Odd data)	
15	ORXIN2+	Positive LVDS differential data input (Odd data)	
16	ORXCLKIN-	Negative LVDS differential clock input (Odd clock)	
17	ORXCLKIN+	Positive LVDS differential clock input (Odd clock)	
18	ORXIN3-	Negative LVDS differential data input (Odd data)	
19	ORXIN3+	Positive LVDS differential data input (Odd data)	
20	ERXIN0-	Negative LVDS differential data input (Even data)	
21	ERXIN0+	Positive LVDS differential data input (Even data)	
22	ERXIN1-	Negative LVDS differential data input (Even data)	
23	ERXIN1+	Positive LVDS differential data input (Even data)	
24	ERXIN2-	Negative LVDS differential data input (Even data)	
25	ERXIN2+	Positive LVDS differential data input (Even data)	
26	ERXCLKIN-	Negative LVDS differential clock input (Even clock)	
27	ERXCLKIN+	Positive LVDS differential clock input (Even clock)	
28	ERXIN3-	Negative LVDS differential data input (Even data)	
29	ERXIN3+	Positive LVDS differential data input (Even data)	
30	GND	Power ground	
31	FAULT	FAULT signal output(normal=H, abnormal=L)	note1
32	RESET	Global reset pin, active low.	
33	STBYB	Standby mode setting pin, active low.	

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34	NC	No connector(Serial interface chip enable.CSB)	
35	NC	No connector(Serial interface clock input.SCL)	
36	NC	No connector(Serial interface data input/output.CDA)	
37	NC	No connector(Serial interface data input/output.CDA)	
38	GND	Power ground	
39	GND	Power ground	
40	NC	No connector	
41	LEDA	LED power (Anode)	
42	LEDA	LED power (Anode)	
43	LEDA	LED power (Anode)	
44	NC	No connector	
45	LEDK	Cathode 1	
46	LEDK	Cathode 2	
47	LEDK	Cathode 3	
48	LEDK	Cathode 4	
49	NTC_A	NTC_Anode	note2
50	NTC_K	NTC_Cathode	note2

Note1: IC Enter self-protection mode. (No HS/VS/DE/CLK)[Lower than 40Hz]

Note2: Murata NCU15XH103F6SRC

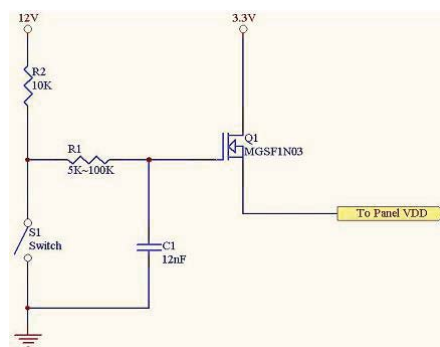
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6.0 ELECTRICAL CHARACTERISTICS

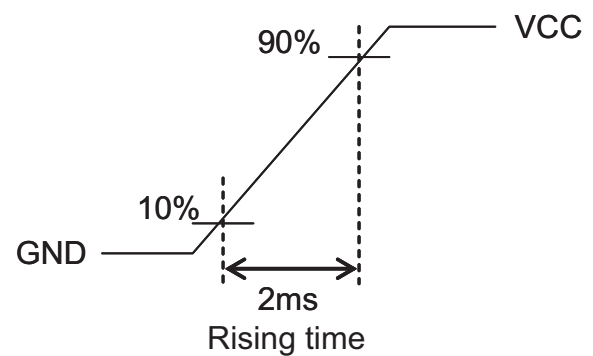
6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VCC	3	3.3	3.6	V	
Input signal voltage	ViH	VCC*0.7	-	VCC	V	
	ViL	0	-	VCC*0.3	V	
Current of power supply	I _{DD}	(--)	(--)	400	mA	VCC =3.3V White pattern
Inrush current	I _{RUSH}	(--)	(--)	2.0	A	Note*

Note* : Inrush current test circuit and rising time setting (power on)



Test circuit



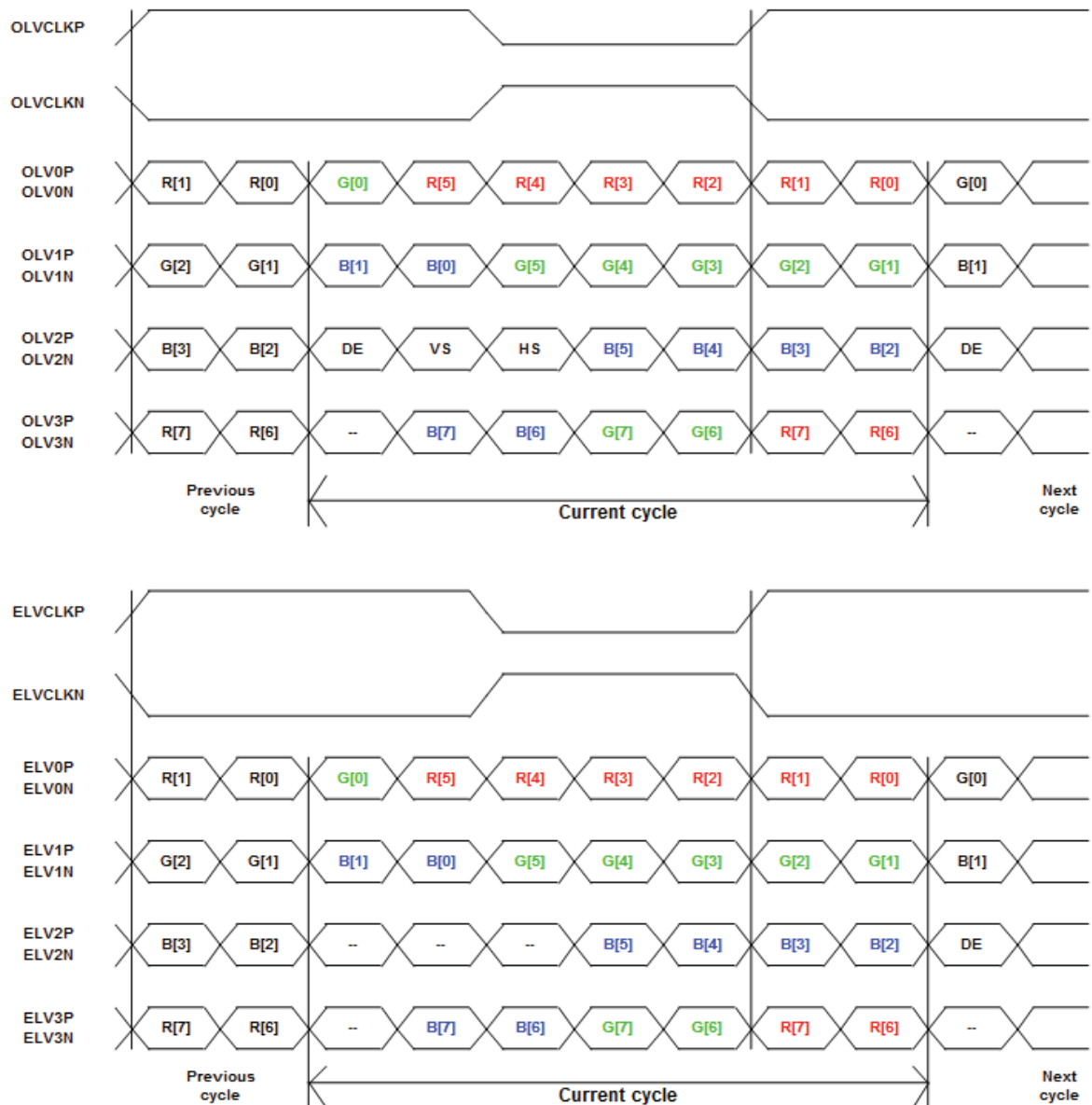
6.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	V _{th}		—	100	mV	V _{CM} =1.2V
Differential Input Low Threshold	V _{tl}	-100	—		mV	
Input Current	I _{IN}	-10	—	+10	uA	
Differential input Voltage	V _{ID}	0.1	—	0.6	V	
Common Mode Voltage Offset	V _{CM}	1	1.2	1.7-(V _{ID} /2)	V	

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6.3 Bit LVDS input

6.3.1 8Bit LVDS input



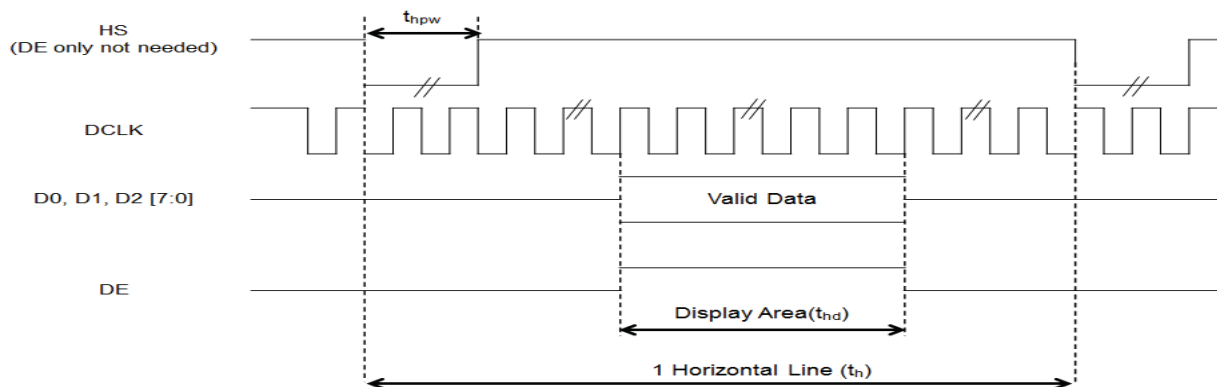
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6.4 Interface Timing (DE mode)

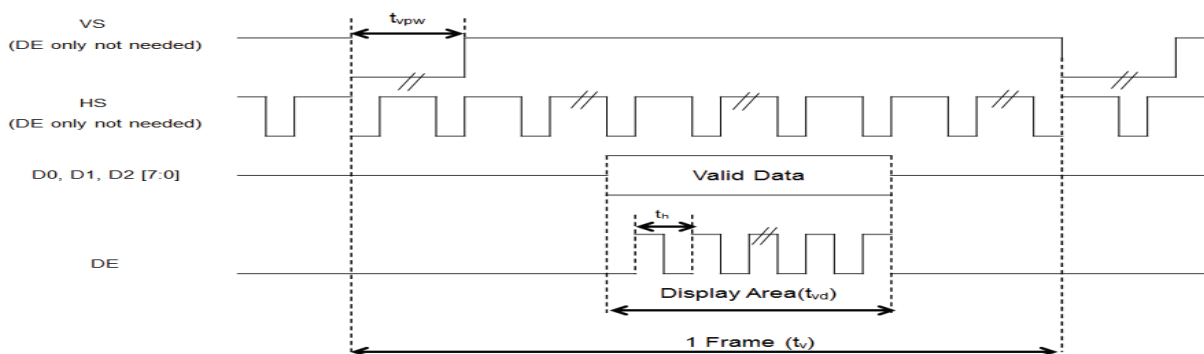
Interface Timing (DE mode) Two Port LVDS Timing.(1920xRGBx720)					
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	FR	-	60	-	Hz
Vertical Display Time	T_{vd}	720			H
Vertical pulse width	T_{vpw}	(1)	(2)	(4)	H
Vertical back porch	T_{vbp}	(5)	(5)	(5)	H
Vertical front porch	T_{vfp}	(2)	(8)	(81)	H
Frame Period	T_v	(727)	(733)	(806)	H
Horizontal Display Time	T_{hd}	960			DCLK
Horizontal pulse width	T_{hpw}	(1)	(8)	(15)	DCLK
Horizontal back porch	T_{hbp}	(16)	(16)	(16)	DCLK
Horizontal front porch	T_{hfp}	(13)	(26)	(308)	DCLK
1 Horizontal line	T_v	(989)	(1002)	(1284)	DCLK
Clock Rate	F_{DCLK}	(43.14)	(44.07)	(62.09)	MHz

Timing Diagram of Interface Signal (DE mode)

(1) Horizontal input timing



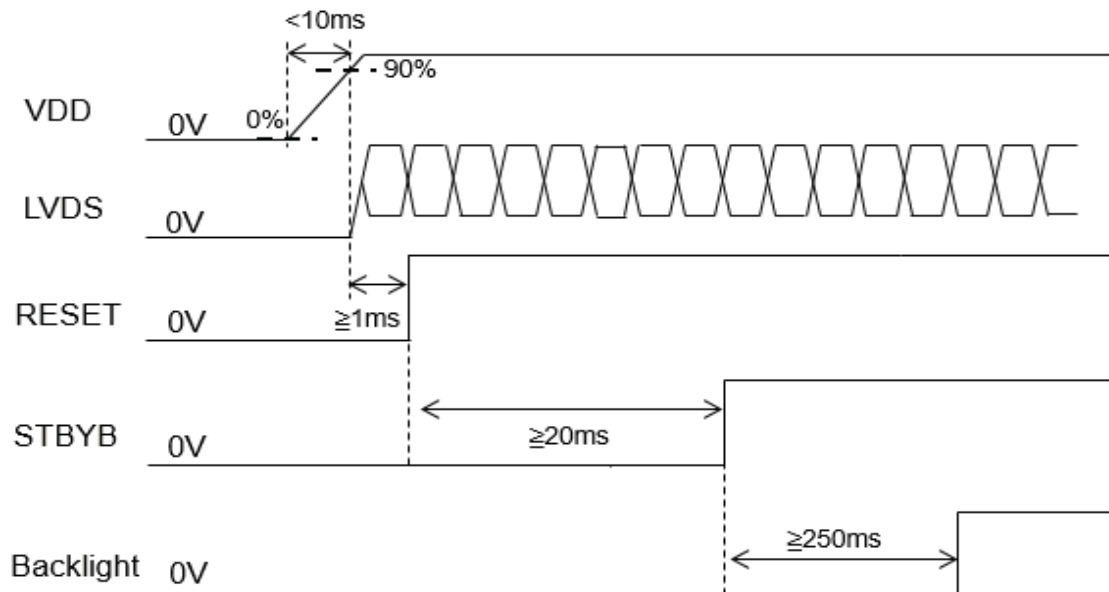
(2) Vertical input timing



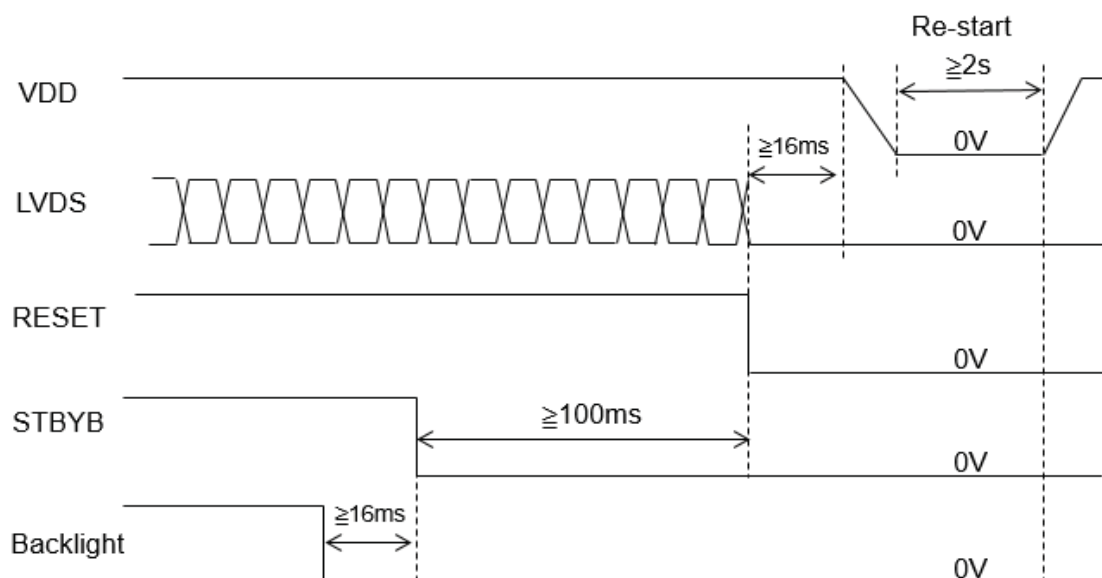
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6.5 Power On / Off Sequence

Power on Sequence



Power off Sequence



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6.6 Backlight Unit

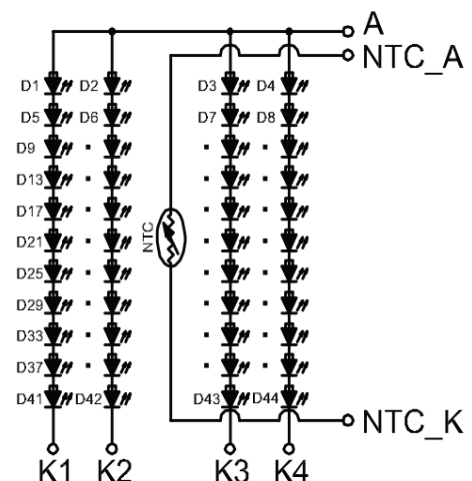
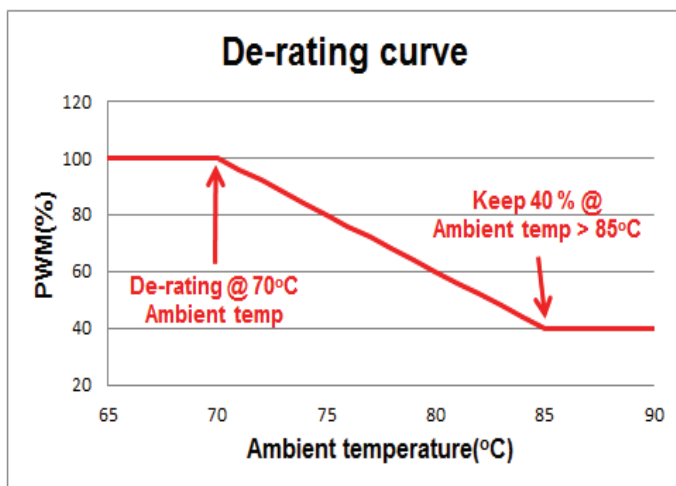
Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_F	(--)	(320)	(--)	mA	$T_a=25^{\circ}\text{C}$
LED Voltage	V_F	(--)	(--)	(37.4)	Volt	$T_a=25^{\circ}\text{C}$
LED Life-Time	N/A	30,000	--	--	Hour	$T_a=25^{\circ}\text{C}$ $I_F=(80)\text{mA}$ Note (2)

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 $I_L= (320)\text{ mA}$. The LED lifetime could be decreased if operating I_L is larger than 300 mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit 11S4P =44pcs LED

Note (4) LED temperature current curve, The temperature at 70 degrees before the output Duty 100%,70 degrees to 85 degrees when the linear drop to Duty 40%.



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7.0 RELIABILITY TEST ITEMS

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+90°C, 500hrs	1, 2, 3
2	Low Temperature Storage	Ta=-40°C, 500hrs	1, 2, 3
3	High Temperature Operation	Ta=+85°C, 500hrs	1, 2, 3
4	Low Temperature Operation	Ta=-30°C, 500hrs	1, 2, 3,
5	High Temperature and High Humidity (operation)	Ta=+65°C, 90%RH, 240hrs	1, 2, 3
6	Thermal Cycling Test (non operation)	-30°C(30min)→+80°C(30min),100 cycles	1, 2, 3
7	Electrostatic Discharge	Contact = ± 8 kV, class B; (R=330Ω,C=150pF) ; Air = ± 15 kV, class B (R=330Ω,C=150pF) ; 1 time for each point.	
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, 33.3~400 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	

Note1: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

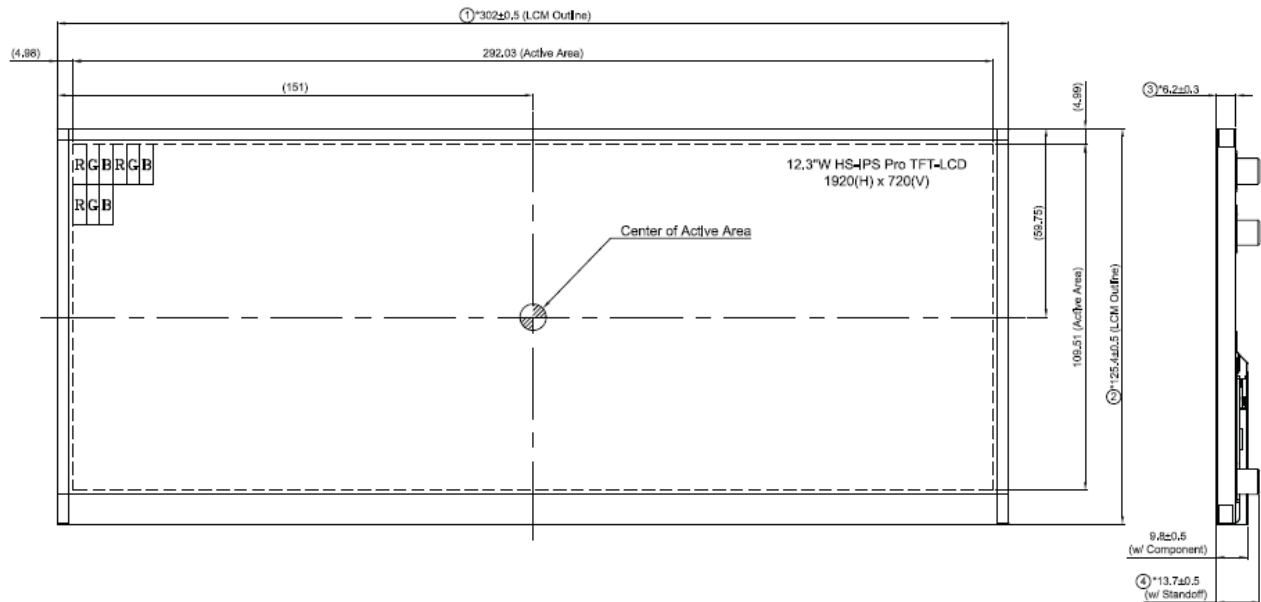
Note2: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample shall be free from defects:
(Air bubble in the LCD 、 Seal leak 、 Non-display 、 Missing segments 、 Glass crack).

Note3: The test condition definition panel's surface temperature.

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8.0 OUTLINE DIMENSION

Unit : mm



Notes
 1. 未標注尺寸公差為±0.2mm, 內R為0.1mm.
 2. *為重要管理尺寸
 3. 號碼球①-④

Note: General tolerance: +/- 0.3mm



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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 6 is defined by the last number of the year, for example

Year	2031	2022	2023	2024	2025	2026	2027	2028	2029	2030
Mark	1	2	3	4	5	6	7	8	9	0

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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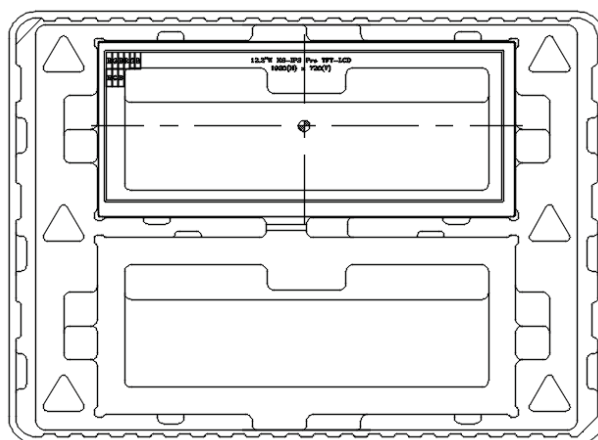
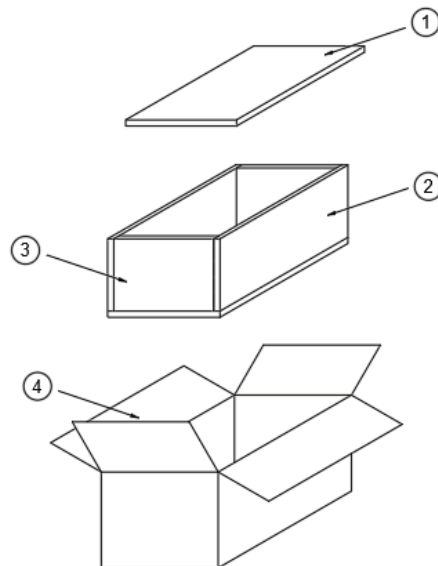
10.0 PACKAGE SPECIFICATION

10.1 Packing form

Item	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

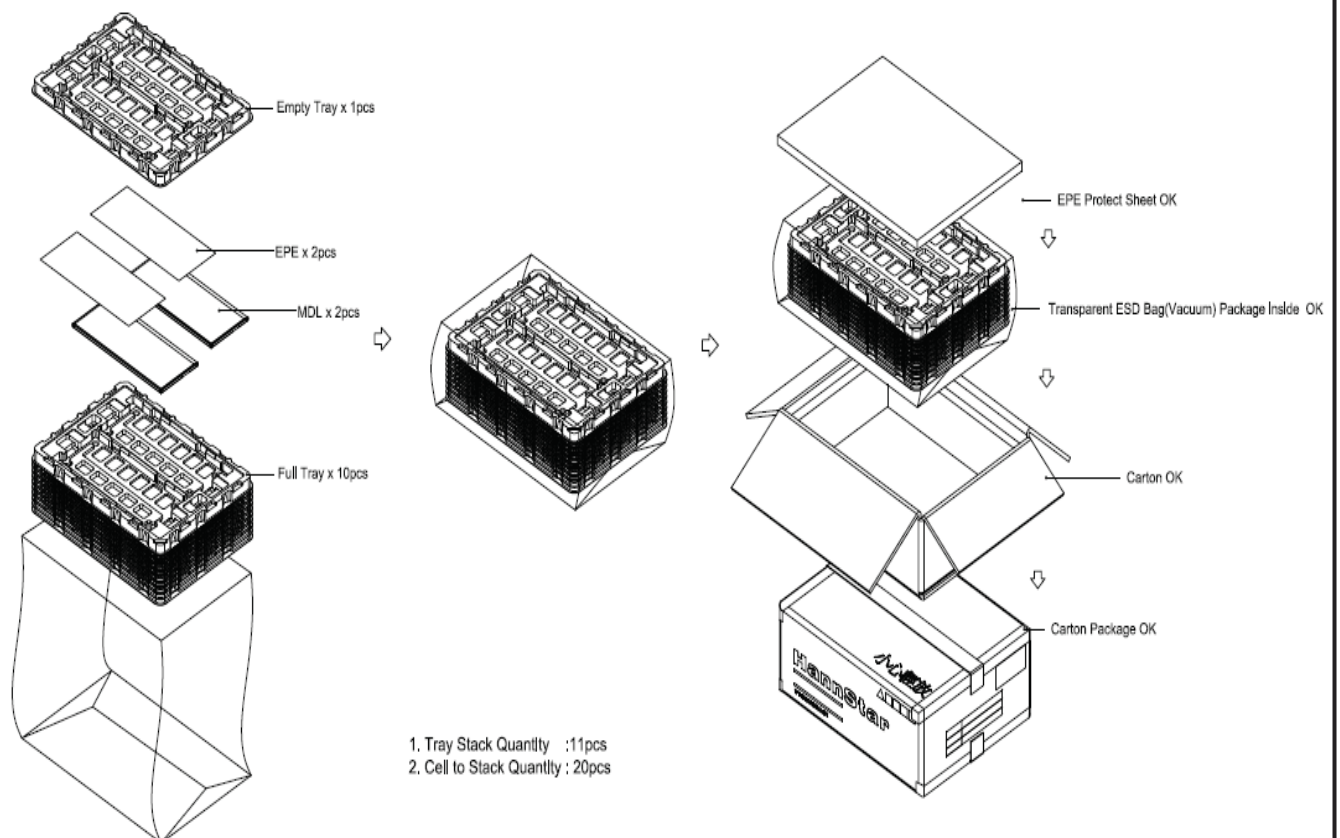
(1) Package quantity in one carton: 20 pieces.

10.2 Packing assembly drawings



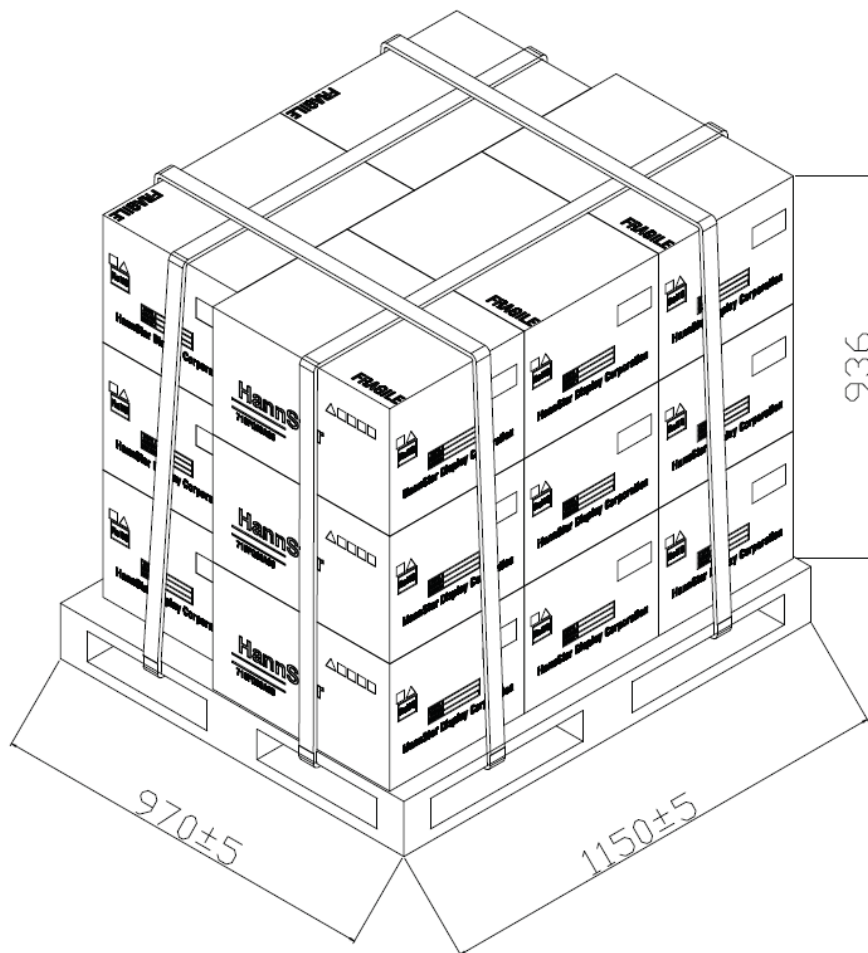
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10.3 Packing assembly drawings



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10.4 Packing assembly drawings



Notes :
 1 Pallet : 15pcs Cartons
 1 Carton : 20pcs MDL
 1 Pallet : 300pcs MDL

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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

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.

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- 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.

11.11 Optical Bonding

Before CL / TP bonding, LCM must be baked at 95 degrees for 2 hours and the bonding time shall be completed within 4 hours.