



SPECIFICATION



HSD103GPW3-90000A-MX

10.3" - 1440x1920 - MIPI

Version: 1.0

Date: 28.12.2022

Note: This specification is subject to change without prior notice

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TO : Data Modul

Date :

Hannstar Product Specification (Preliminary)

10.3” Reflective TFT-LCD Module **Model: HSD103GPW3-90000A-MX**

- 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 Display Corp. for any intellectual property claims or other problems that may result from application based on the module described herein.

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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model [HSD103GPW3-90000A-MX](#) is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is a [reflective type](#) display operating in the total reflection. This model is composed of a TFT LCD panel, driving circuit and a front light system. This TFT LCD has a [10.3](#) inch diagonally measured active display area with [1440 RGB](#) horizontal by [1920](#) vertical pixel resolution.

1.2 Features

- [10.3](#) (3:4 diagonal) inch configuration
- [256 Gray](#) signal input
- ROHS / Halogen Free Compliance

1.3 Applications

- Tablet or Industrial Control Application.

1.4 General information

Item	Specification	Unit	
Outline Dimension (LCM)	161.25(H) x 219.97(V) x 1.502(D)	mm	
Display area	157.248(H) x 209.664(V)	mm	
Number of Pixel	1440 RGB(H) x 1920(V)	pixels	
Pixel pitch	0.1092 (H) x 0.1092 (V)	mm	
Display mode	Normally White	-	
Interface	MIPI	-	
Frame rate	60 (Typ.)	Hz	
Weight	TBD	g	
Power Consumption (max)	FOG System	440 @ L0 (VCI=3.3V ,IOVCC=1.8V)	mW
	F/L System	2.52W @60nits	W

Note: Due to the special surface treatment of the light guide plate, HannStar recommend to attach by air bonding above it instead of direct bonding.

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2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage	V _{CI}	2.8	3.3	4.6	V	
Supply voltage	IOVCC	1.7	1.8	2.0	V	

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±2°C

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	

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3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

3.1.1 Optical specification (Front Light off)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR>2	Θ=0 Normal viewing angle	—	15	—		(1)(2) Base on Vop=4.5V
Response time	Rising	Tr+Tf		—	-	-	msec	(1)(3)
Reflectance (with Polarizer)		-		—	43	—	%	(4) Base on Vop=4.5V
Color Gamut		S(%)			--			Reflective
Color chromaticity (CIE1931)	White	W _x	—	0.315	—		Base on Nitto POL	
		W _y	—	0.355	—			
Viewing angle	Hor.	Θ _L	CR>2	—	-	—		Deg
		Θ _R		—	-	—		
	Ver.	Θ _U		—	-	—		
		Θ _D		—	-	—		

3.2 Optical specification (Front Light on)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR>2	Θ=0 Normal viewing angle	—	(10)	—		(1)(2)
White luminance		Y _L		—	(35)	—	cd/m ²	(1)(4)
Color Gamut		S(%)		—	TBD	—	%	Reflective
Color chromaticity (CIE1931)	White	W _x	CR>2	—	(0.2907)	—	Deg	(1)(4)
		W _y		—	(0.295)	—		
Viewing angle	Hor.	Θ _L		—	(30)	—		
		Θ _R		—	(30)	—		
	Ver.	Θ _U	—	(60)	—			
		Θ _D	—	(60)	—			

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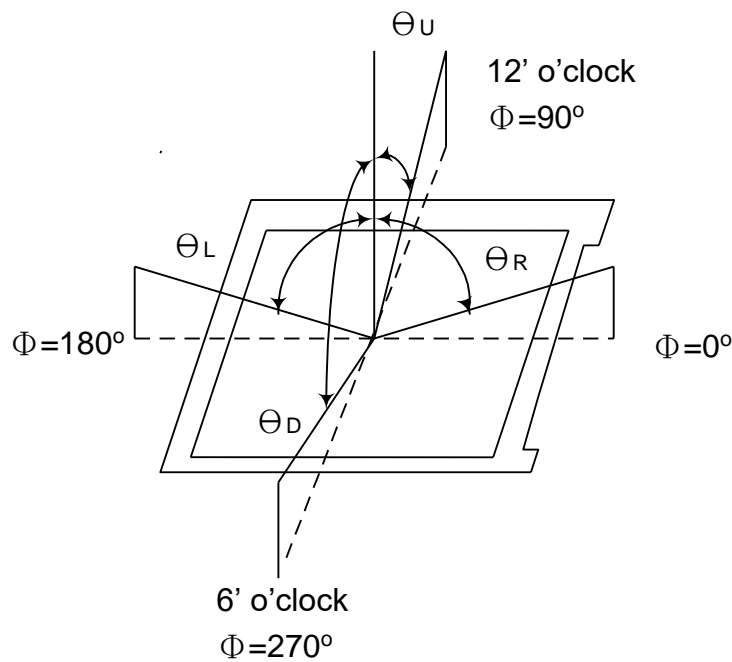
3.2 Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : $25\pm 2^{\circ}\text{C}$
- 15min. warm-up time.

3.3 Measuring Equipment

- DMS (DMS = Display Measurement System) of AUTRONIC-MELCHERS GmbH, motorized goniometer system for comprehensive display characterization

■ **Note (1)** Definition of Viewing Angle:

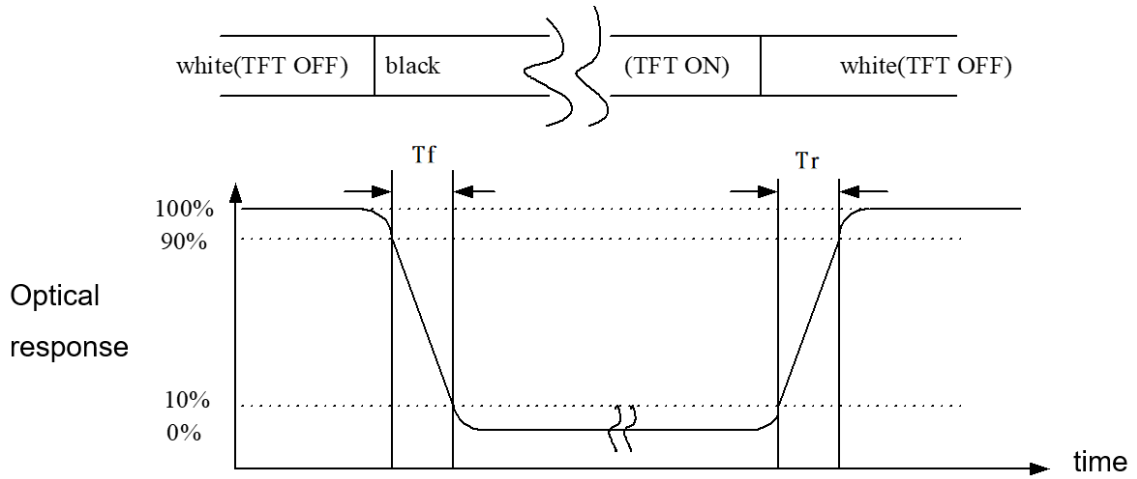


Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

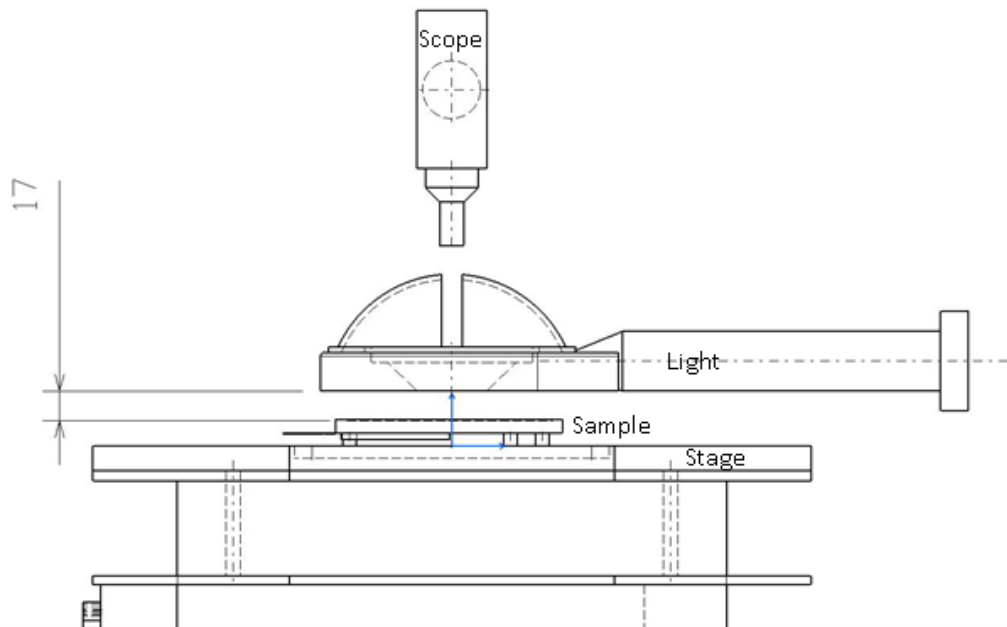
$$\text{CR} = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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Note (3) Definition of Response Time : Sum of Tr and Tf



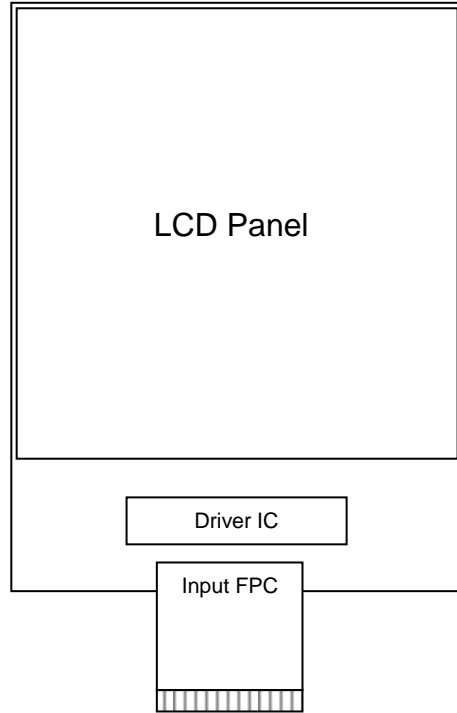
Note (4) Definition of optical measurement setup



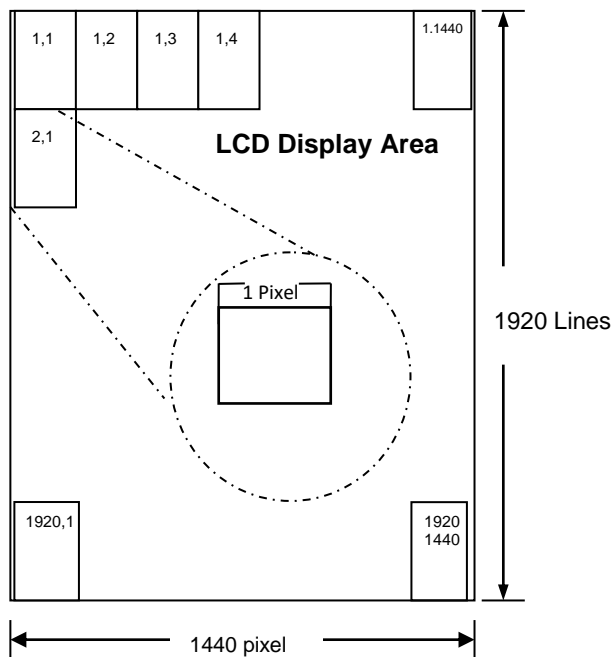
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4.0 BLOCK DIAGRAM

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	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	L	L	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
	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	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	L	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	L	L	L	L	L	L	L	L	L	L	L252	
	L	L	L	L	L	L	L	L	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	L	L	L	L	L	L	L	L	L	L254		
Green	L	L	L	L	L	L	L	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	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	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	L	L	L252	
	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	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	L	L254		
Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	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	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L1
		L	L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L2	
		:	:	:	:	:	:	:	:	:	:	:	:	:	L3...L251											
		H	H	H	H	H	L	L	H	H	H	H	L	L	H	H	H	H	L	L	L252					
	H	H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	H	L253						
	H	H	H	H	H	H	L	H	H	H	H	H	L	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	White L255			

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5.0 INTERFACE PIN CONNECTION

5.1 FPC Pin Assignment

Pin Assignment [Ptwo-196070-30041-3 , 30PIN , pitch = 0.5mm]

Pin NO.	Symbol	I/O	Description	Note
1	NC	I	None connect ,Floating.	for HSD
2	GND	P	Ground	
3	DSI_D3P	I	MIPI data input pin.	
4	DSI_D3N	I	MIPI data input pin.	
5	GND	P	Ground	
6	DSI_D2P	I	MIPI data input pin.	
7	DSI_D2N	I	MIPI data input pin.	
8	GND	P	Ground	
9	DSI_D1P	I	MIPI data input pin.	
10	DSI_D1N	I	MIPI data input pin.	
11	GND	P	Ground	
12	DSI_D0P	I	MIPI data input pin.	
13	DSI_D0N	I	MIPI data input pin.	
14	GND	P	Ground	
15	DSI_CLKP	I	MIPI clock input pin.	
16	DSI_CLKN	I	MIPI clock input pin.	
17	GND	P	Ground	
18	NC	I	None connect ,Floating.	
19	NC	I	None connect ,Floating.	
20	NC	I	None connect ,Floating.	
21	NC	I	None connect ,Floating.	
22	GND	P	Ground	
23	RESX	I	Global reset.(LOW reset)	
24	NC	I	None connect ,Floating.	
25	VCI	P	Power supply(3.3V)	
26	IOVCC	P	Power supply(1.8V)	
27	NC	I	None connect ,Floating.	
28	GND	P	Ground.	
29	NC	P	None connect ,Floating.	
30	NC	P	None connect ,Floating.	

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5.1 Light bar Pin Assignment
(Connector: HRS FH52-10S-0.5SH)

No.	Symbol	Description
1	Vc	Input Power
2	Vc	Input Power
3	Vc	Input Power
4	Vc	Input Power
5	NC	No Connection
6	CH1	Feedback Channel 1
7	CH2	Feedback Channel 2
8	CH3	Feedback Channel 3
9	CH4	Feedback Channel 4
10	NC	No Connection

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6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage (I/O)	VCI	3.0	3.3	3.6	V	
	IOVCC	1.7	1.8	2.0	V	
Input signal voltage (VCI)	ViH	1.3		4.8	V	
	ViL	0		0.3	V	
Input signal voltage (IOVCC)	ViH	0.8*IOVCC	-	IOVCC	V	
	ViL	0	-	0.2*IOVCC	V	
Input signal voltage (RESX)	ViH	1.7	1.8	2.0	V	
	ViL	0	-	-	V	

6.2 Front light Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I _L	--	28	--	mA	Ta=25°C
LED Voltage	V _F	--	--	12.4	Volt	Ta=25°C
LED Life-Time	N/A	--	15,000	--	Hour	Ta=25°C Note (2)

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6.3 MIPI characteristics

6.2.1 The electrical specifications of HS and LP

6.2.2 Burst Mode Data Transmission

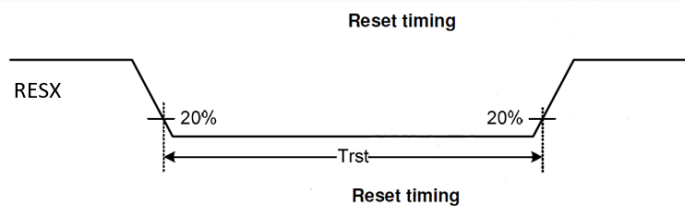
6.2.3 Switching the Clock Lane between Clock Transmission and Low-Power Mode

6.2.4 Timings FOR DSI Video mode

Item	Symbol	Value			Unit
		Min.	Typ.	Max.	
HS low pulse width	HW	-	10	-	DCK
Horizontal back porch	HBP	-	20	-	DCK
Horizontal front porch	HFP	-	100	-	DCK
Horizontal blanking period	HBLK	-	-	-	DCK
Horizontal active area	HDISP		1200	-	DCK
Pixel Clock	PCLK	-	131.5	-	MHz
Vertical low pulse width	VW	-	4	-	Line
Vertical front porch	VFP	-	24	-	Line
Vertical back porch	VBP	-	29	-	Line
Vertical blanking period	VBK	-	-	-	Line
Vertical active area	-		1600		Line
Vertical Refresh rate	VRR		60		Hz

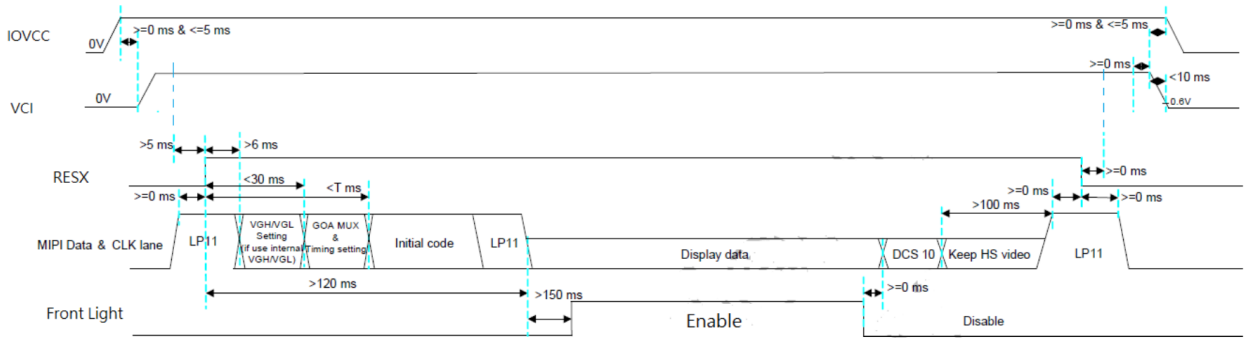
6.4 Reset input timings

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Reset low pulse width	Trst	-	20	-	-	μs



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6.5 Power on/off Sequence



Power on/off sequence

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7.0 RELIABILITY TEST ITEMS

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80°C, 240hrs	1, 2, 3
2	Low Temperature Storage	Ta=-30°C, 240hrs	1, 2, 3
3	High Temperature Operation	Ta=+70°C, 240hrs	1, 2, 3
4	Low Temperature Operation	Ta=-20°C, 240hrs	1, 2, 3
5	High Temperature and High Humidity (operation)	Ta=+60°C, 90%RH, 240hrs	1, 2, 3
6	Thermal Cycling Test (non operation)	-30°C(30min)→+80°C(30min),200 cycles	1, 2, 3

Note 1: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

Note 2: All of the function & cosmetic Judgment basis base on IIS Spec. at room temperature. (The tested module must have enough recovery time at least 2 hours at room temperature.)

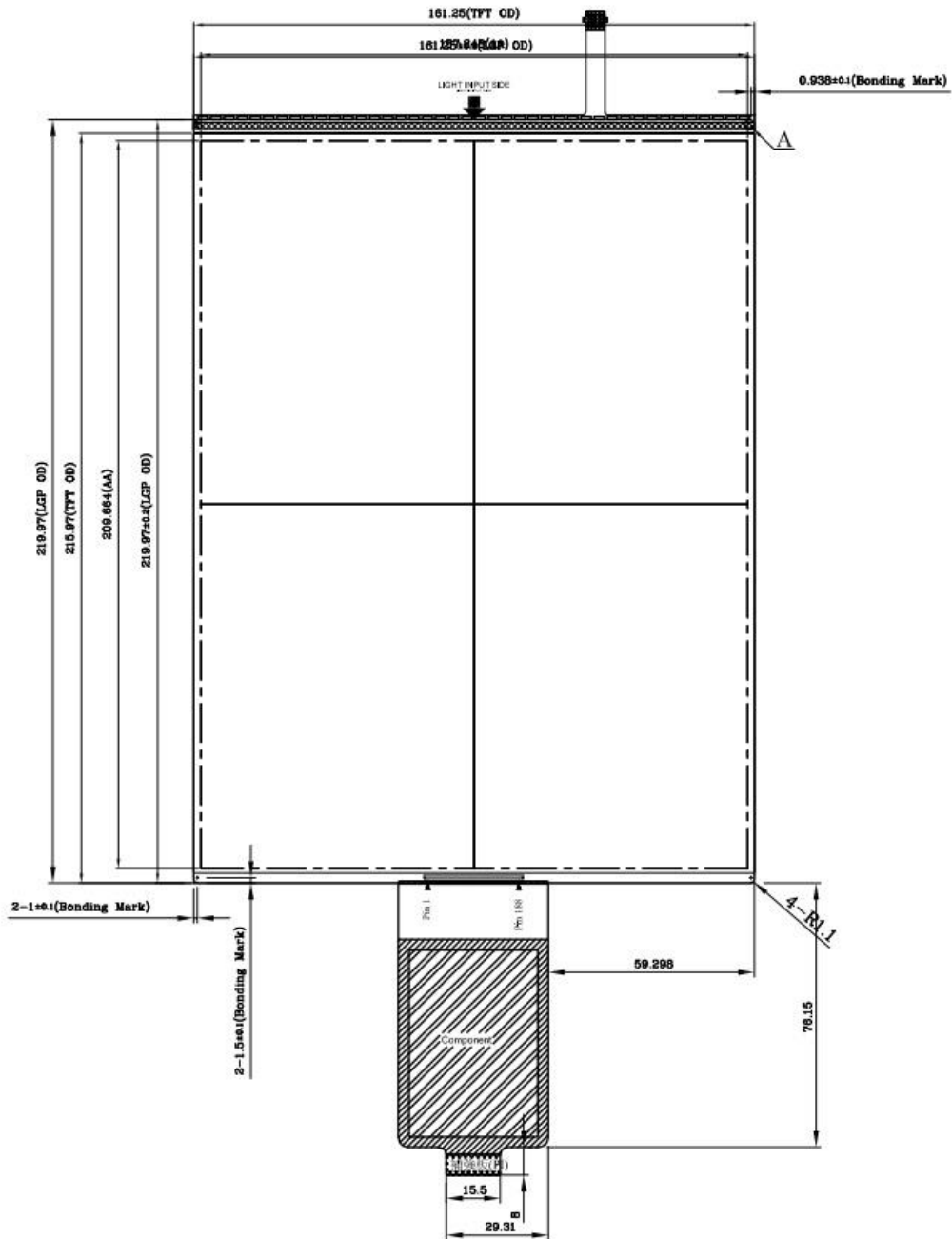
Note 3: The test condition definition panel's surface temperature

Note 4: [Cannot guarantee reliability without UV protection](#)

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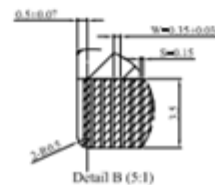
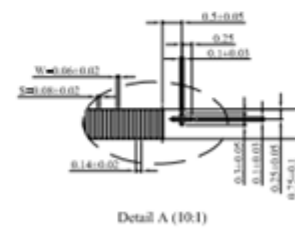
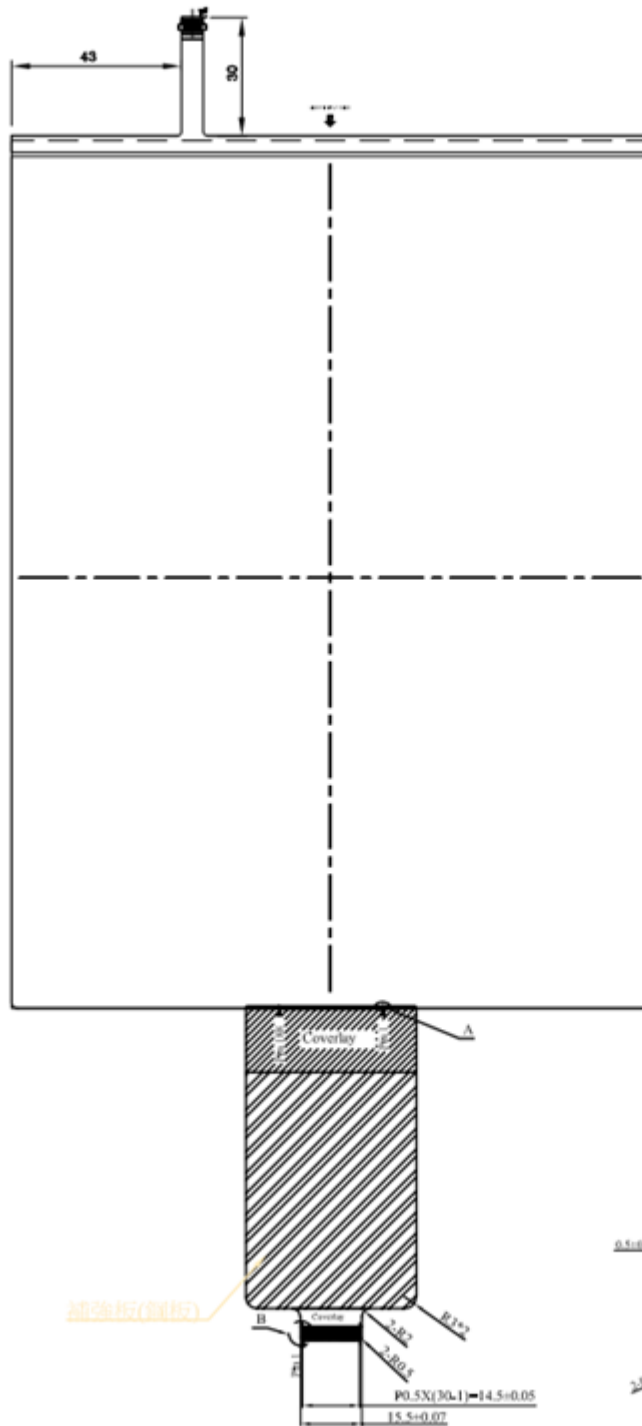
8.0 OUTLINE DIMENSION

Unit : mm



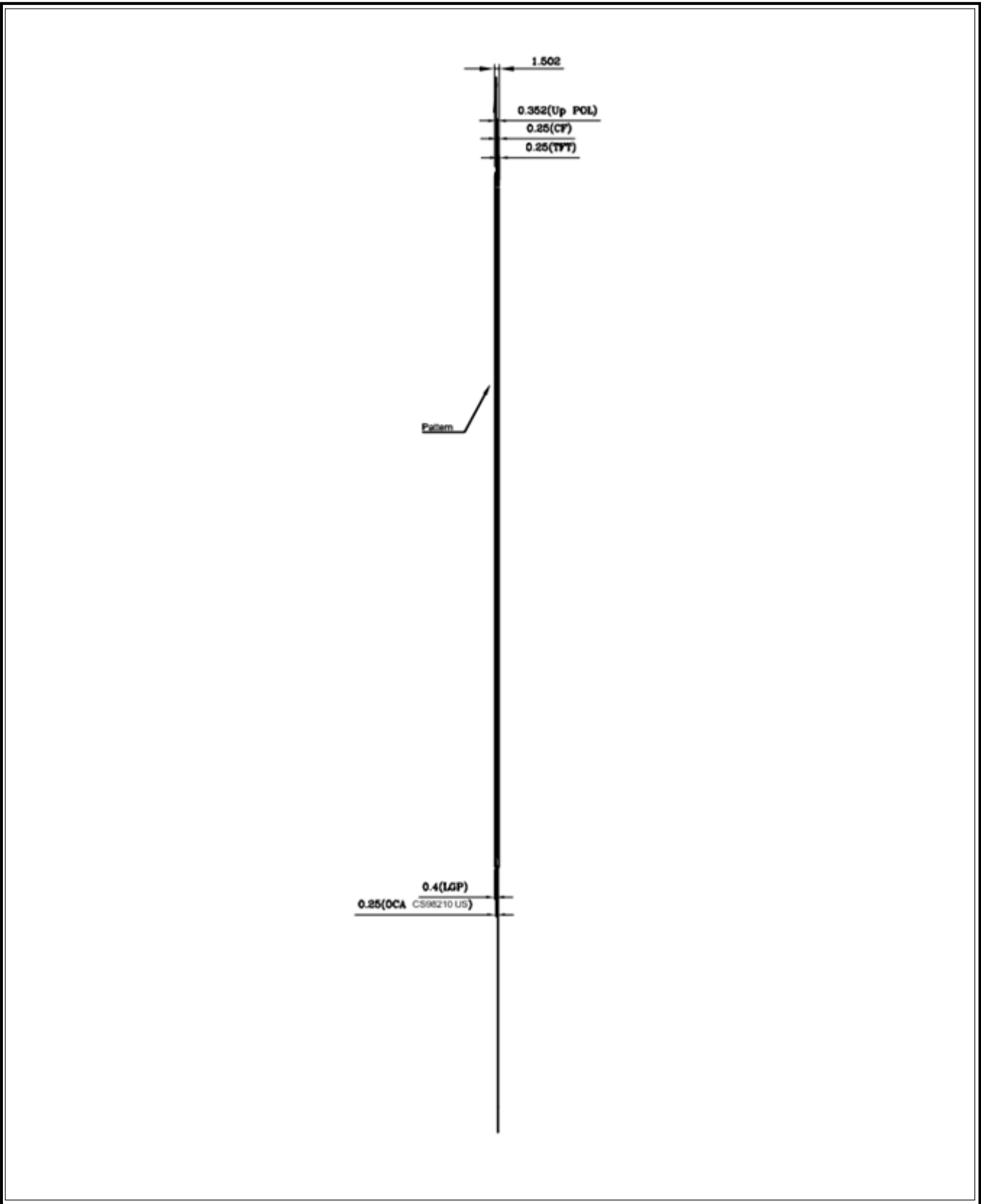
Note: General tolerance: +/- 0.3mm

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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	
---	---	---	---	---	---	---	---	---	----	----	----	----	--

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

Code 4: production location.

Code 5: production category

Code 6: production year

Code 7: production month.

Code 8,9,10,11,12,13: 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	2025
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 FPC.
- (2) The detail of Lot Mark is attached as below.
- (3) This is subject to change without prior notice.



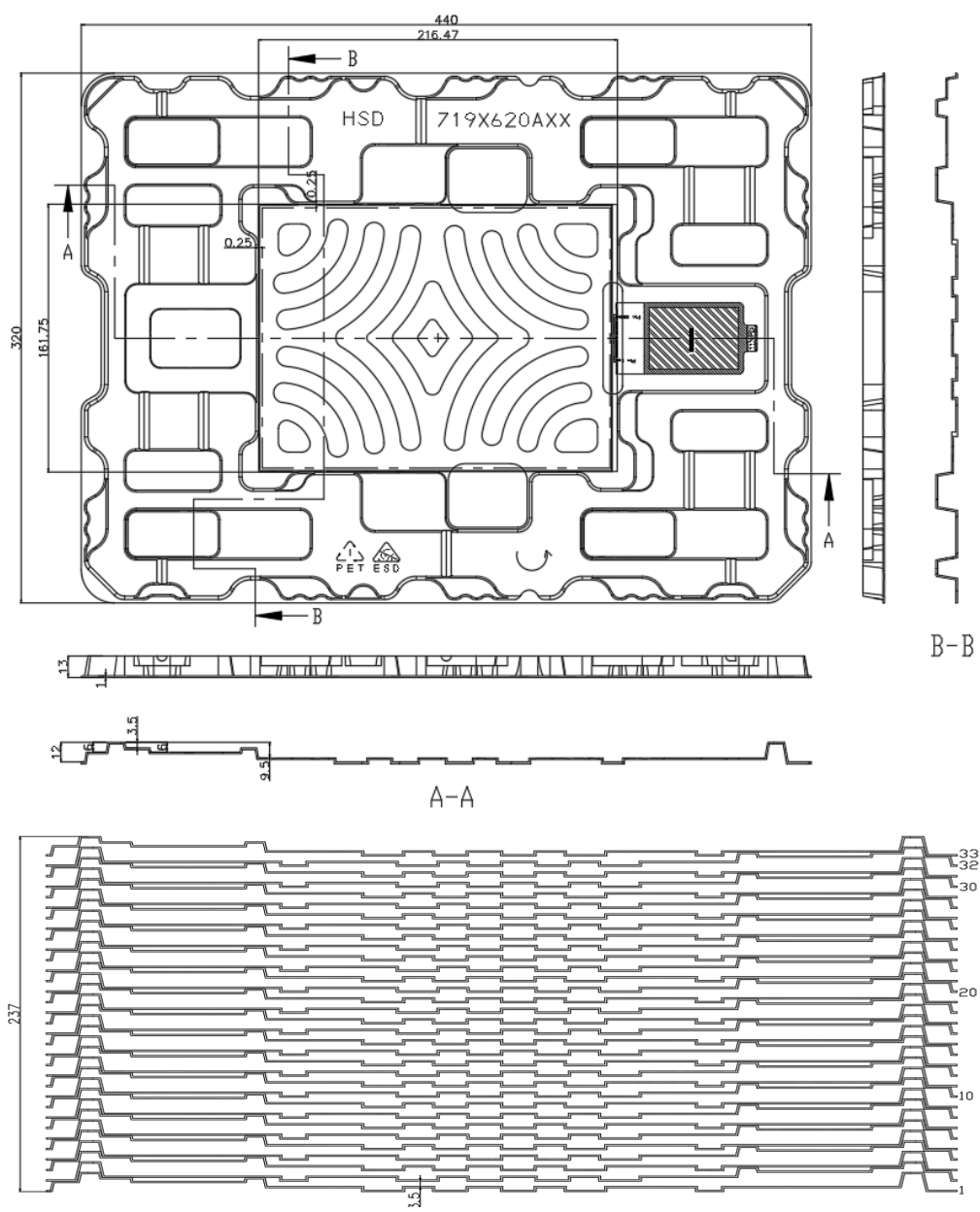
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10.0 PACKAGE SPECIFICATION

10.1 Packing form

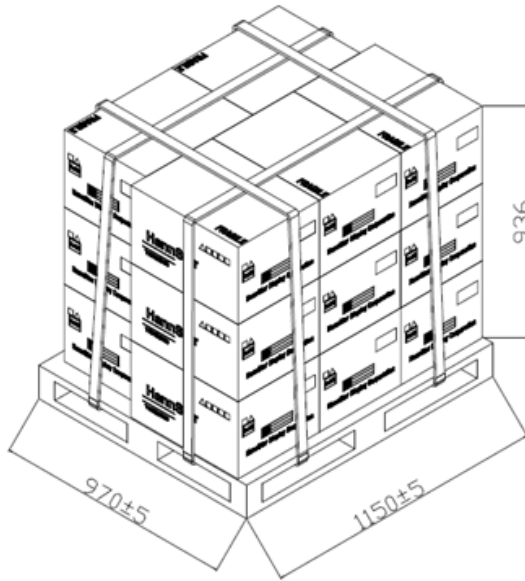
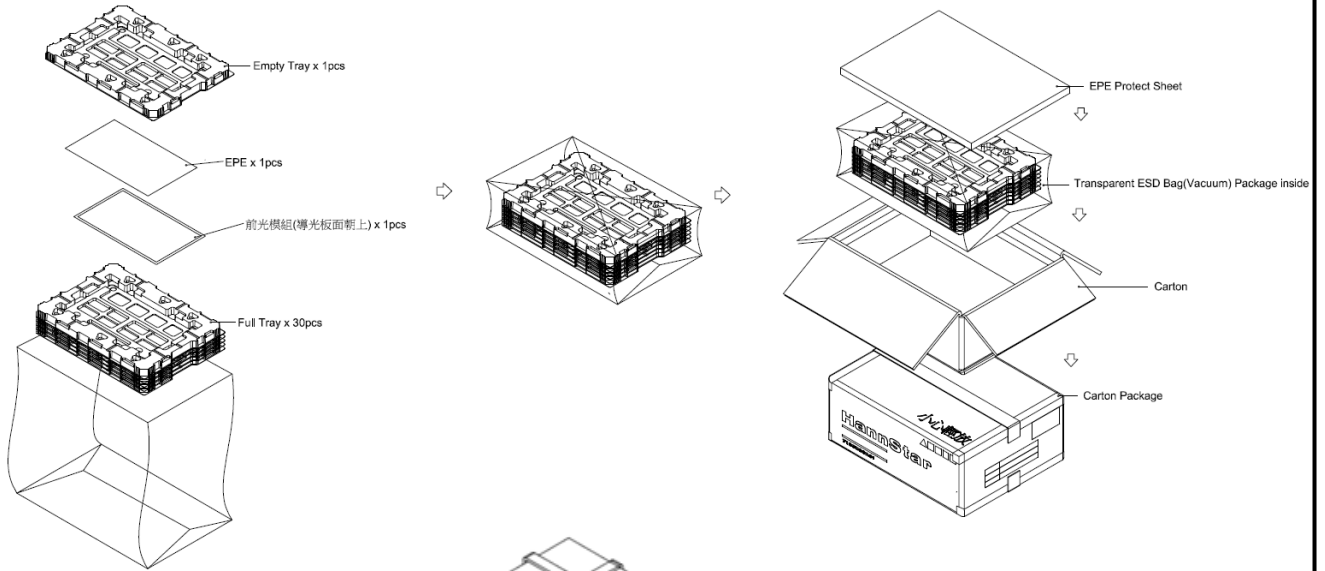
LCM Mode	Qty. in the Box	Inner Box Size(mm)	Weight	Notice
P1023	29CS	500*380*312mm	TBD	--

10.2 Tray drawing



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10.3 Packing assembly drawings



總箱數: 3 X 5 = 15箱/Per 棧板

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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

11.7.1 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.



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