

# Specification

## HSD050JDW6-A20

5" - 800 x 480 – RGB

Spec Revision: 1.0  
Revision Date: 02.08.2024

Note: This specification is subject to change without prior notice



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TO : DATA MODUL

Date : Aug.02.2024

# **HannStar Product Information**

(Preliminary)

## **5" Color TFT-LCD Module**

Model: **HSD050JDW6-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 “ \*\* ” of Model means sub-model code.



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### Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Aug.02.2024	A20	Preliminary Product information was released.

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## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

HannStar Display model HSD050JDW6-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 with a back light system. This TFT LCD has a 5" (15:9) inch diagonally measured active display area with WSVGA (800 horizontal by 480 vertical pixel) resolution. HSD050JDW6-A20 is LCD module from HannStar.

### 1.2 Features

- 5" (15:9) inch configuration
- 16.7M color by 8 bit, RGB interface
- ROHS / Halogen Free Compliance

### 1.3 Applications

- Automotive cluster

### 1.4 General information

Item	Specification	Unit	
Module Outline Dimension	121 (H) x 77.8 (V) x 7.05	mm	
Display area	108(H) x 64.8(V)	mm	
Number of Pixel	800 RGB (H) x 480(V)	pixels	
Pixel pitch	0.135 (H) x 0.135 (V)	mm	
Pixel arrangement	RGB stripes ; square pixels		
Display mode	Normally Black, IPS pro		
NTSC	70% typ.	%	
Inversion mode	1 + 2 dot*		
Surface treatment	AG on Pol. (2H)		
Weight	TBC (typ.)	G	
Back-light	LED		
Power Consumption	Logic System (White Pattern)	0.66W (Max)	W
	B/L System	3.255W (Max) (3.255V max. x 14 led x 70mA)	W

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**Note (1)** 1 + 2 dot Inversion:

1+2 dot inversion

Line 1	+	-	-	+	+
Line 2	-	+	+	-	-
Line 3	+	-	-	+	+
Line 4	-	+	+	-	-
Line 5	+	-	-	+	+
Line 6	-	+	+	-	-
Line 7	+	-	-	+	+
Line 8	-	+	+	-	-

odd frame

Line 1	-	+	+	-	-
Line 2	+	-	-	+	+
Line 3	-	+	+	-	-
Line 4	+	-	-	+	+
Line 5	-	+	+	-	-
Line 6	+	-	-	+	+
Line 7	-	+	+	-	-
Line 8	+	-	-	+	+

even frame

**1.5 Mechanical Information**

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)		121		mm
	Vertical (V)		77.8		mm
	Depth (D)		20.675		mm
Weight		—	TBC	TBC	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 Supply voltage	VDD	0.3	4.0	V	

### 2.1 Environment Absolute Rating

#### 2.2.1 Total Solution (LCD Module)

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T <sub>opa</sub>	-30	85	°C	
Storage Temperature	T <sub>stg</sub>	-40	95	°C	
De-rating Temperature (ambient)	T <sub>drat</sub>		75	°C	

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### 3.0 OPTICAL CHARACTERISTICS

#### 3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast @ 25C		CR	$\Theta=0$	700	900	—	—	(1)(2)(4)
Response time	Rising	TR	Normal viewing angle	At 25C (centre panel surface): <25ms At 0C (centre panel surface): <60ms At -10C (centre panel surface): <100ms At -20C (centre panel surface): <200ms At -30C (centre panel surface): <450ms			msec	(1)(3)
	Falling	TF						
Color gamut		S (%)		65	70	—	%	
White luminance		YL		1000	1300	—	cd/m2	Center of A.A $I_L : 150mA$
Color chromaticity (CIE1931)	White	Wx	CR>100		(0.283)		—	$\pm 0.04$ (4)
		Wy			(0.304)			
	Red	Rx			(0.628)		—	
		Ry			(0.324)			
	Green	Gx			(0.281)		—	
		Gy			(0.607)			
	Blue	Bx			(0.148)		—	
		By			(0.051)			
Viewing angle	Hor.	$\Theta_L$	CR>100	5°	—	—	degree	
		$\Theta_R$		5°	—	—		
	Ver.	$\Theta_U$		5°	—	—		
		$\Theta_D$		5°	—	—		
Brightness uniformity (FI AOI system, judged by 9 points)		White	$\Theta=0$	70	—	—	%	(6)
		Black		60	—	—	%	
Optima View Direction		Free						(5)
Flicker		< -25dB						
Gamma		2.2 $\pm$ 0.3						
Reflectance (AG)		SCI typ. 5%, max. 5.5%						
Front surface non mirror reflection (SCE)		To be defined after actual measurement data release						



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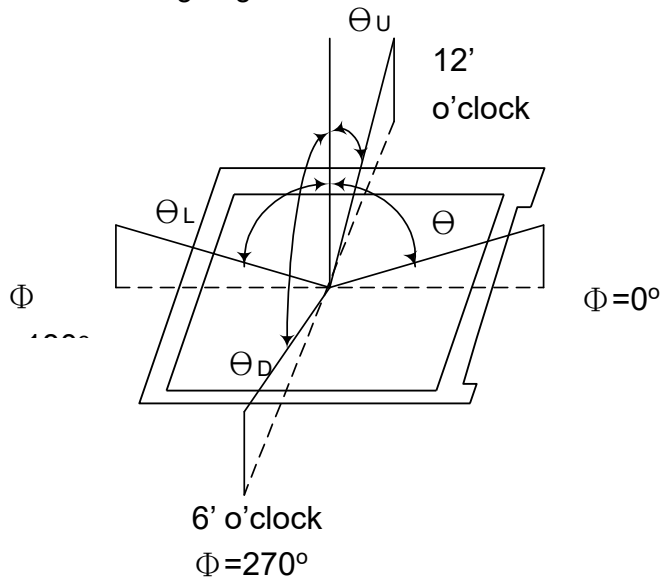
### 3.2 Measuring Condition

- Measuring surrounding : dark room
- LED current  $I_L$  : 150mA
- Ambient temperature :  $25 \pm 2^\circ\text{C}$
- 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:



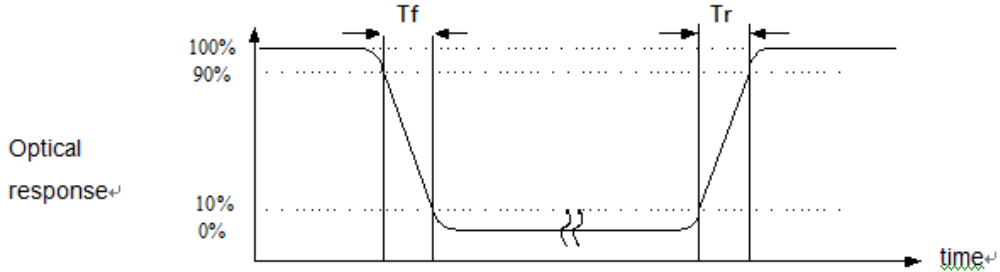
**Note (2)** Definition of Contrast Ratio (CR) :

Measured at the center point of panel  
Luminance with all pixels white

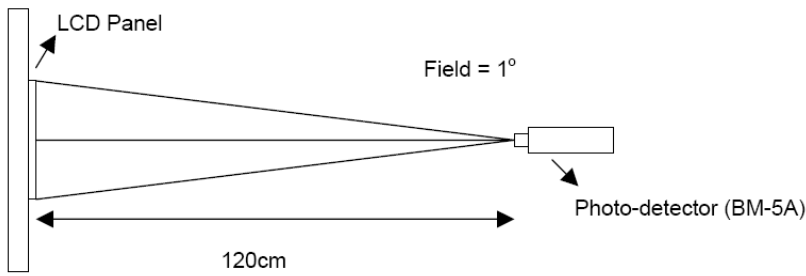
$$\text{CR} = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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



**Note (4) Definition of optical measurement setup**

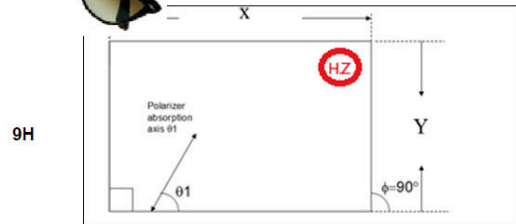


**Note (5) Sunglass Definition**

**DARK !!**



I0506D POL	Polarizing Absorption Angle $\Theta\#1$
CF	0 degree
TFT	90 degree



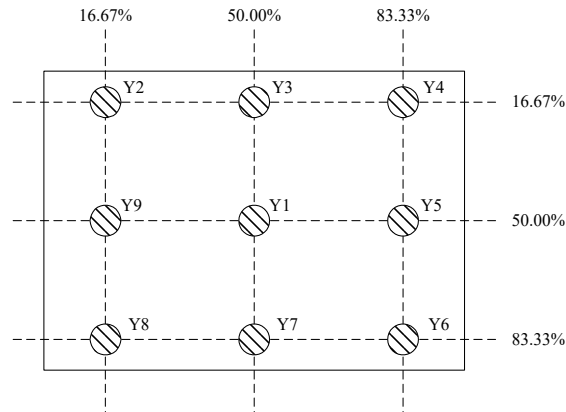
Protective film on Top. Source IC at 6H direction.



Gray Scale Inversion

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**Note (6)** Definition of brightness uniformity

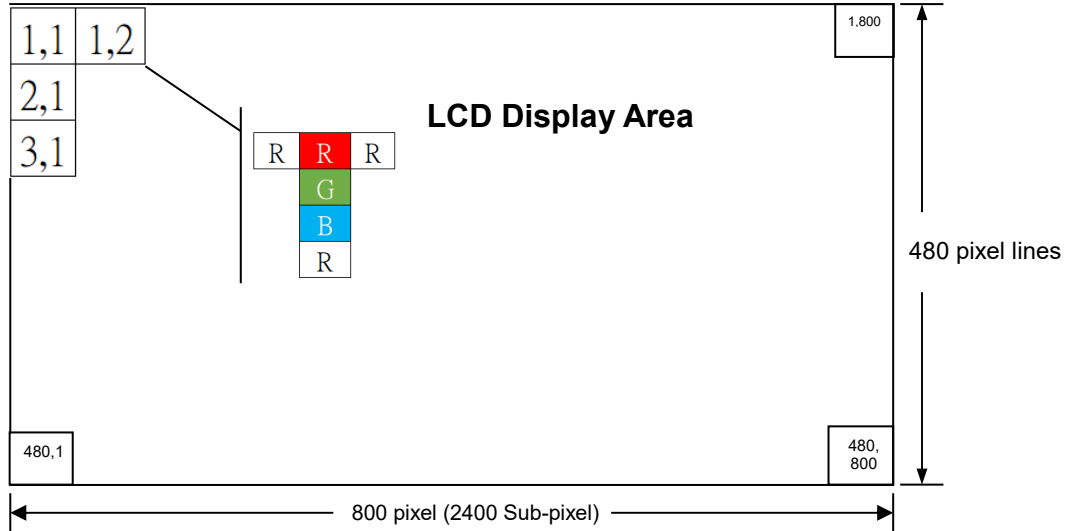


$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

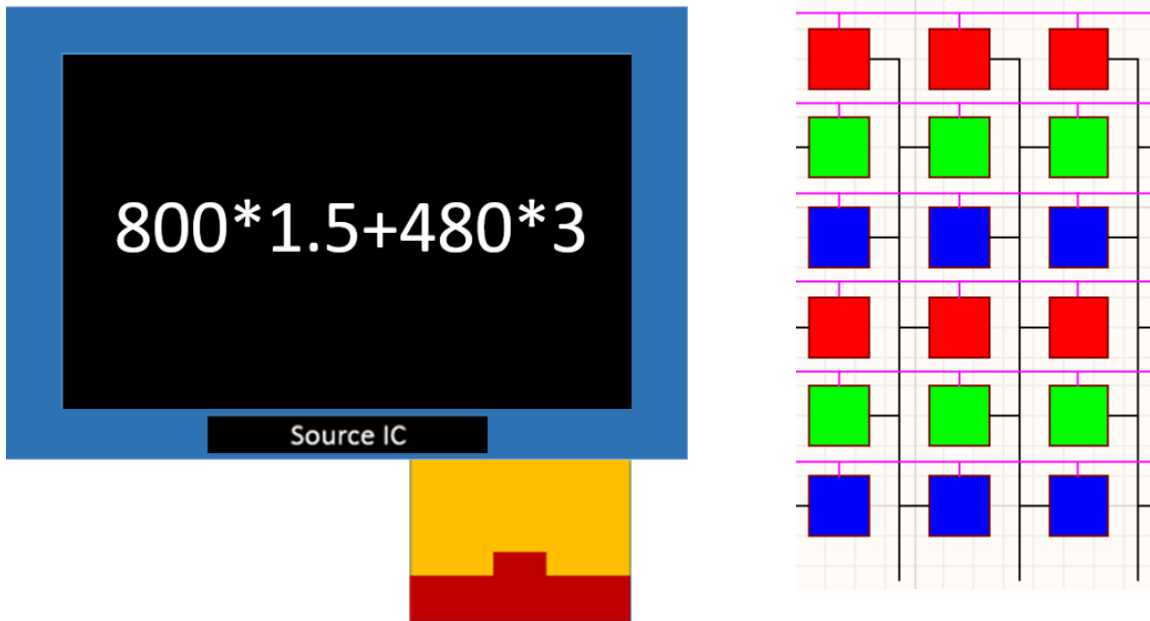
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## 4.0 BLOCK DIAGRAM

### 4.1 Pixel Format (\*ps, with 2 Domain technology to improve viewing angle color shift)



### 4.2 TFT LCD Module (Tri-gate design):



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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 ↑	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
	↓ 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	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	L	H	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	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 ↑	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	H	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	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 ↑	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	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L2
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L3...L251
	↓ Light	H	H	H	H	H	L	L	H	H	H	H	H	L	L	H	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 LCM FPC Pin Assignment

FPC connector is used for electronics interface. The recommended model is FH28K-50S-0.5SH manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Note
1	TEST1	-	Connect to 50	2
2	LED K2	P	Power for LED backlight(Cathode2)	
3	LED K1	P	Power for LED backlight(Cathode1)	
4	LED A	P	Power for LED backlight(Anode)	
5	NC	-	NO connection	
6	NTC1 -	I	Thermo-sensitive element(Cathode)	
7	NTC2 +	I	Thermo-sensitive element(Anode)	
8	VCC	P	Power Supply	
9	VCC	P	Power Supply	
10	GND	P	Ground	
11	GND	P	Ground	
12	SCL(NC)	I	SPI clock, Hannstar internal used. Please connect to GND	
13	SDA(NC)	I/O	SPI data, Hannstar internal used. Please connect to GND	
14	CSB(NC)	I	SPI chip select, Hannstar internal used. Please connect to GND	
15	STBYB	I	L Standby mode (Default)	
16	RESET	I	LCD RESET signal	
17	GND	P	Ground	
18	B7	I	Blue Data	
19	B6	I	Blue Data	
20	B5	I	Blue Data	
21	B4	I	Blue Data	
22	B3	I	Blue Data	
23	B2	I	Blue Data	
24	B1	I	Blue Data	
25	B0	I	Blue Data	
26	GND	P	Ground	
27	G7	I	Green Data	
28	G6	I	Green Data	
29	G5	I	Green Data	
30	G4	I	Green Data	

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31	G3	I	Green Data	
32	G2	I	Green Data	
33	G1	I	Green Data	
34	G0	I	Green Data	
35	GND	P	Ground	
36	R7	I	Red Data	
37	R6	I	Red Data	
38	R5	I	Red Data	
39	R4	I	Red Data	
40	R3	I	Red Data	
41	R2	I	Red Data	
42	R1	I	Red Data	
43	R0	I	Red Data	
44	GND	P	Ground	
45	CLK	I	Dot clock	
46	GND	P	Ground	
47	DE	I	DE	
48	GND	P	Ground	
49	VDD_MTP	P	POWER FOR OTP programming, please leave the pin open when not in use	
50	TEST50	-	Connect to 1	2

Note 1: I: input O: Output P: Power

Note 2: TEST1 and TEST 50 are connector test points

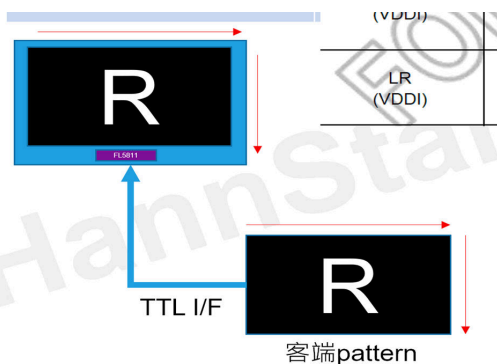
Note 3: When SHLR="0", set right to left scan direction.

When SHLR ="1", set left to right scan direction.

When UPDN="1", set top to bottom scan direction.

When UPDN ="0", set bottom to top scan direction.

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## 5.2 Light-bar FPC Pin Assignment: Back-light module FPC Pin.

Pin	Symbol*
1	LED Anode
2	LED Anode
3	NC
4	NTC+
5	NTC-
6	NC
7	LED Cathode 1
8	LED Cathode 1
9	LED Cathode 2
10	LED Cathode 2

\* Note 1 : LED pin were wired in HSD FPC and transfer to LCD FPC interface/pin out.  
It's independent from the LCD FPC pin define.



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## 6.0 ELECTRICAL CHARACTERISTICS

### 6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3.0	3.3	3.6	V	
Input signal voltage	ViH	0.7 VDD	-	VDD	V	
	ViL	0	-	0.3 VDD	V	
Current of power supply	IDD	-	-	150	mA	VDD =3.3V / Note (1)

Note :

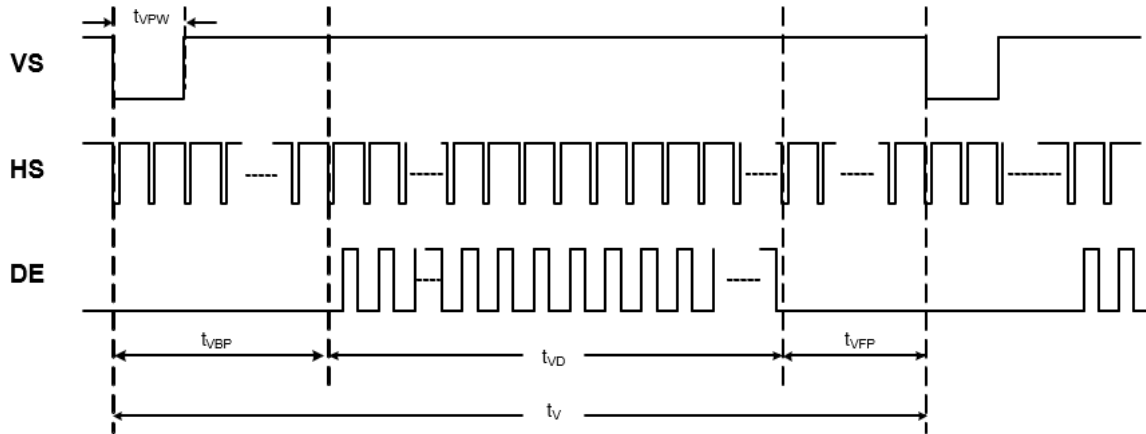
(1) : VCC = 3.3V@ White Pattern & 60Hz ◦

### 6.2 TTL AC electrical characteristics & Interface Timing (DE mode only)

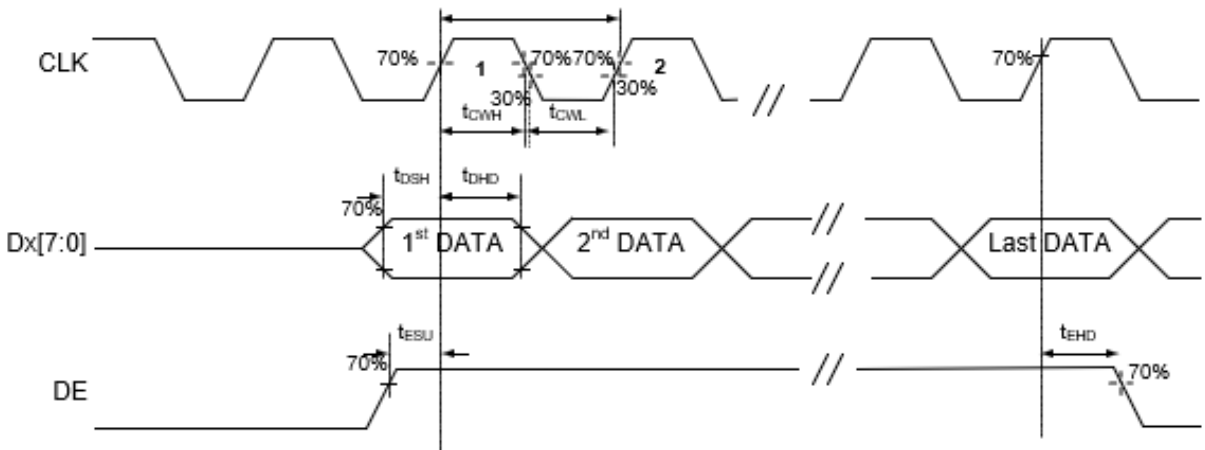
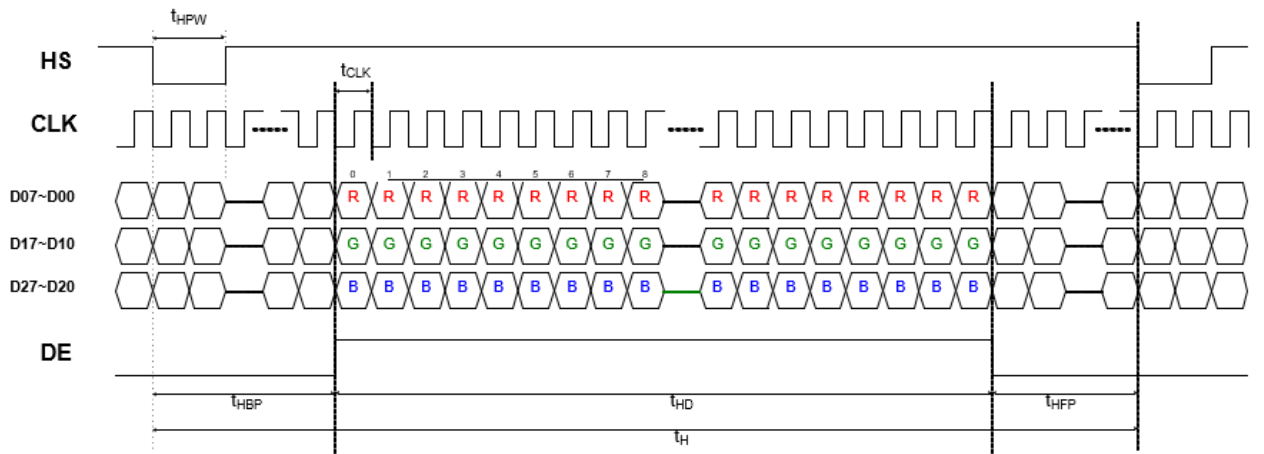
Item		Symbol	Min.	Typ.	Max.	Unit
CLK cycle time		tCPH	20	-	200	ns
CLK pulse high duty		tCWH	40	50	60	%
CLK pulse low duty		tCWL	40	50	60	%
Date hold time		tDSH	4	-	-	ns
Data setup time		tDHD	2	-	-	ns
DE setup time		tESU	4	-	-	ns
DE hold time		tEHD	2	-	-	ns
Frame Rate		FR	60	60	60	Hz
Vertical	Frame Period	tV	497	505	513	line
	Vertical Display Time	tVD	480			line
	Vertical Blanking Time	tVFP+ tVBP	17	25	33	line
Horizontal	1 Line Scanning Time	tH	855	866	877	clock
	Horizontal Display Time	tHD	800			clock
	Horizontal Blanking Time	tHFP+ tHBP	55	66	77	clock
Clock Rate		--	25.4961	26.24	26.99	MHz

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### Vertical input timing



### Horizontal input timing



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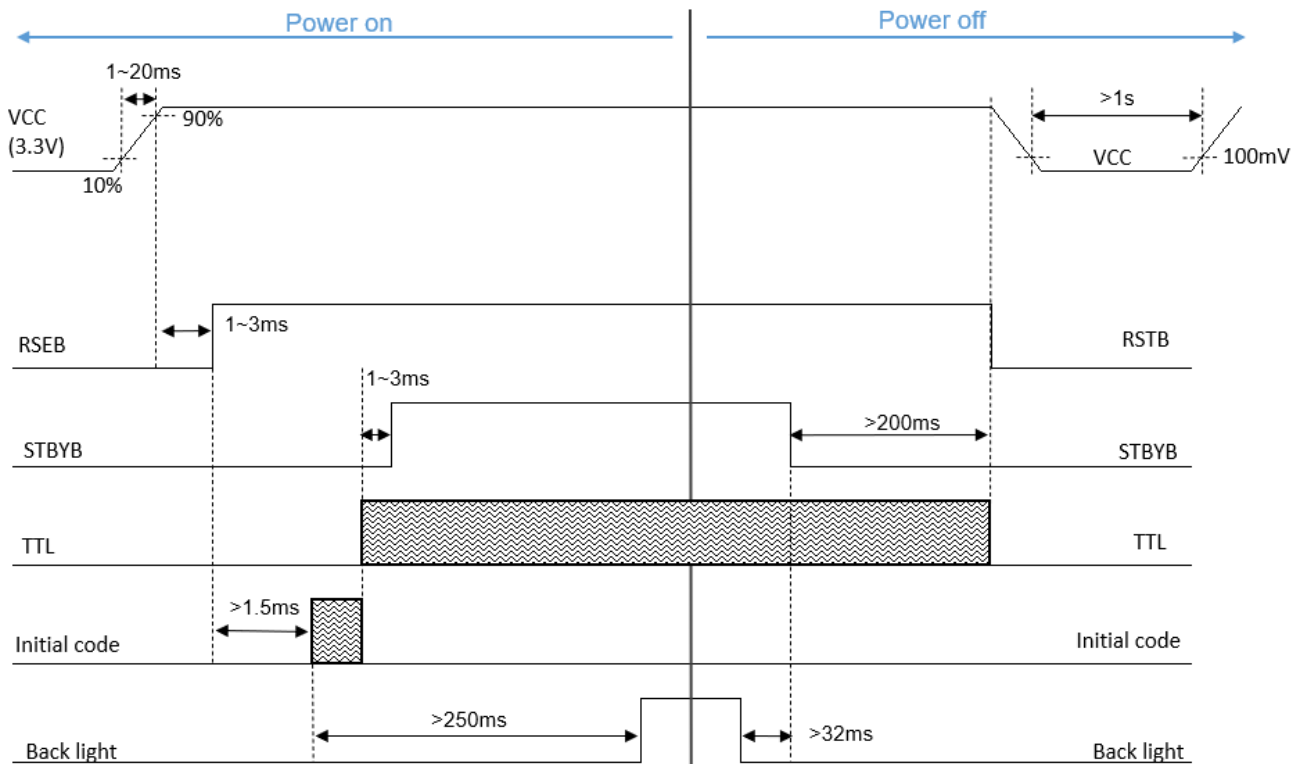
### 6.3 Spread spectrum clock

Parameter	Min	Typ.	Max.	Unit	Conditions
Modulation frequency			100	KHZ	
Modulation rate			±3	%	RxFCLK=70MHz

**Note(1):**  $F_{DCLK}$  is DCLK frequency,  $t_h$  is DCLK of 1 horizontal line.

For example,  $F_{DCLK}$  is 27.21MHz for 800xRGBx480 resolution, and  $t_h$  is 872 DCLK, thus  $SSC_{MF}$  should be larger than  $(27.21MHz/872)=31.2KHz$  (which is Horizontal line frequency).

### 6.4 Power On / Off Sequence

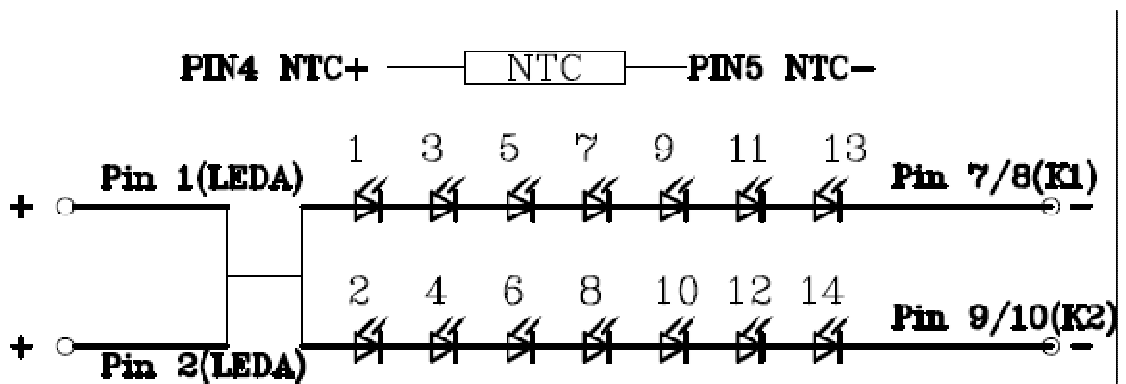


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### 6.5 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	$I_F$	--	150	--	mA	Ta=25°C
LED Voltage	$V_F$	--	--	21.7	Volt	Ta=25°C
LED Life-Time	N/A	30000	--	--	Hour	Ta=25°C, 50% luminance

7S2P = 14pcs LED.



\*Above image for reference only, LED power is with 75mA each string. Strings not internally connected.

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## 7.0 Reliability test items

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+95°C, @Judge 300h, confirm 500h	1, 2, 3
2	Low Temperature Storage	Ta=-40°C, @Judge 300h, confirm 500h	1, 2, 3
3	High Temperature Operation	Ta=+85°C, @Judge 300h, confirm 500h	1, 2, 3
4	Low Temperature Operation	Ta=-35°C, @Judge 300h, confirm 500h	1, 2, 3
5	High Temperature and High Humidity (storage)	Ta=+60°C, 90%RH, 300hrs(function only)	1, 2, 3
6	Thermal Cycling Test (non operation)	-30°C→+85°C, 500 cycles, 1hr/cycle Transfer duration: less than 5 min(function only)	1
7	Electrostatic Discharge	ESD: Follow ISO 10605: CID Power on (330pF/330Ω) Contact = ± 4KV, ± 6KV Class A; ± 8KV Class B Air = ± 6KV, ± 8KV Class A; ± 15KV Class B	
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	1
9	Mechanical Shock	Half-Sine, 100G, 6ms, ±XYZ,	

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:

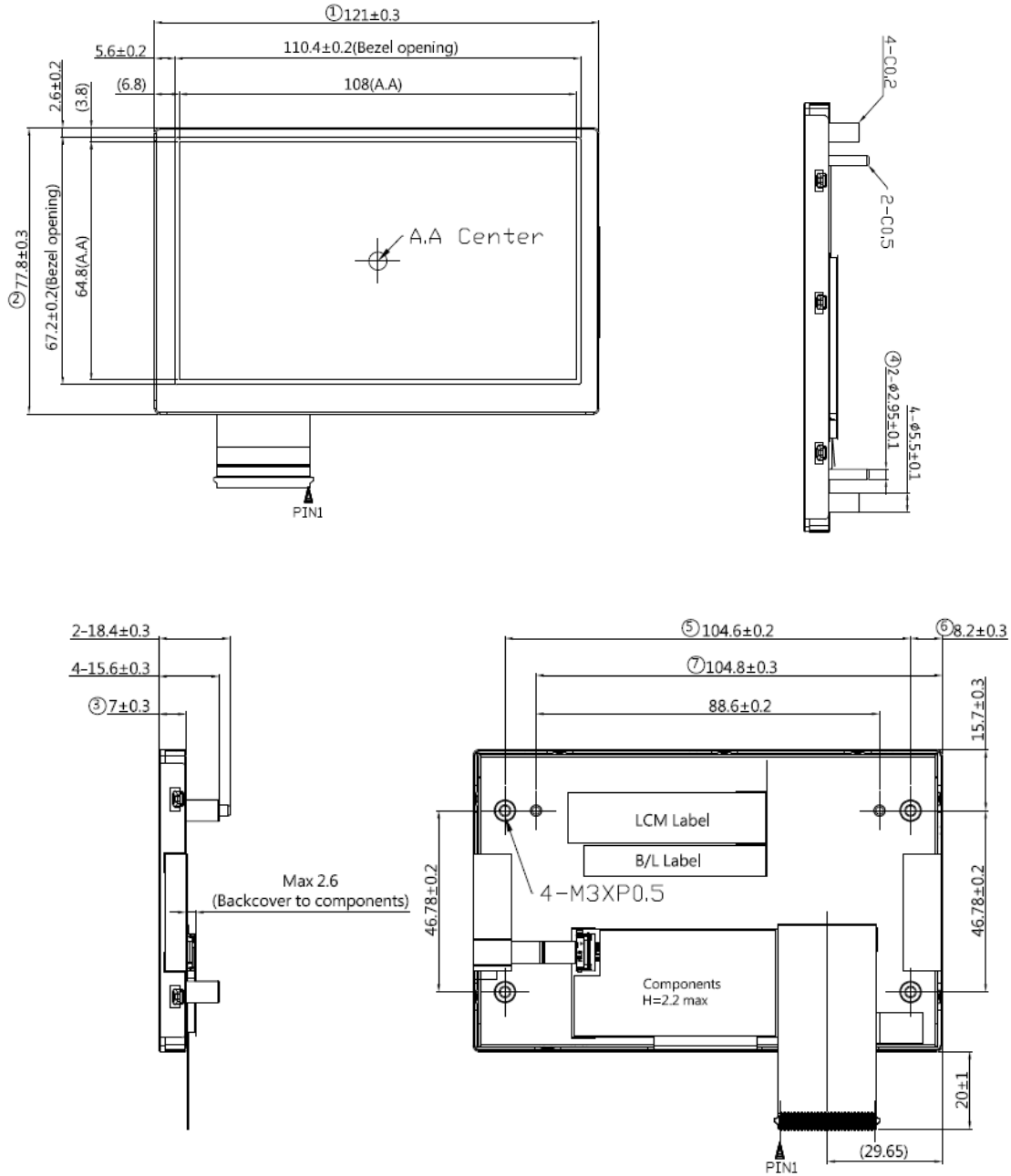
(Air bubble in the LCD、Seal leak、Non-display、Missing segments、Glass crack).

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

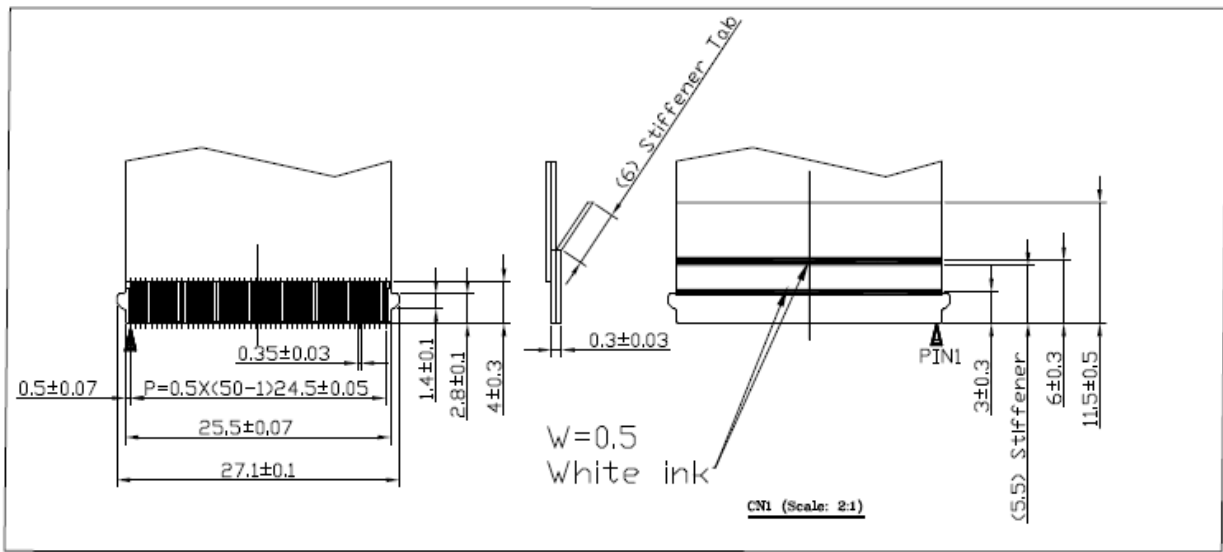
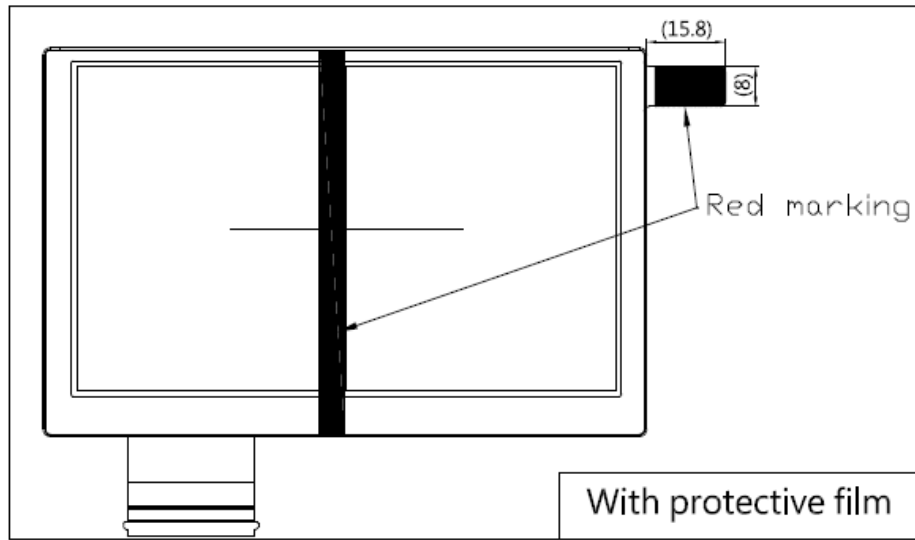
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## 8.0 OUTLINE DIMENSION

Unit : mm



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**NOTES 1:**

1. " (N) " Marks the incoming inspection dimension.
2. " ( ) " Marks the reference dimension.
3. LCM flatness SPEC 0.3 mm Max.
4. FPC Connector type: Hirose FH28D-50S-0.5SH (CN1)
5. If the tape is wrinkle, it needs to be flattened and must not have a functional impact.
6. AA area tolerance is for reference only, not for measurement
7. Measurement methods and instruments ,if there is no mutual agreement are defined by HSD
8. The stand off  $\phi 5.5\text{mm}$  M3XP0.5 (Qty 4), Torque Max 1.0N-m(10kgf-cm)

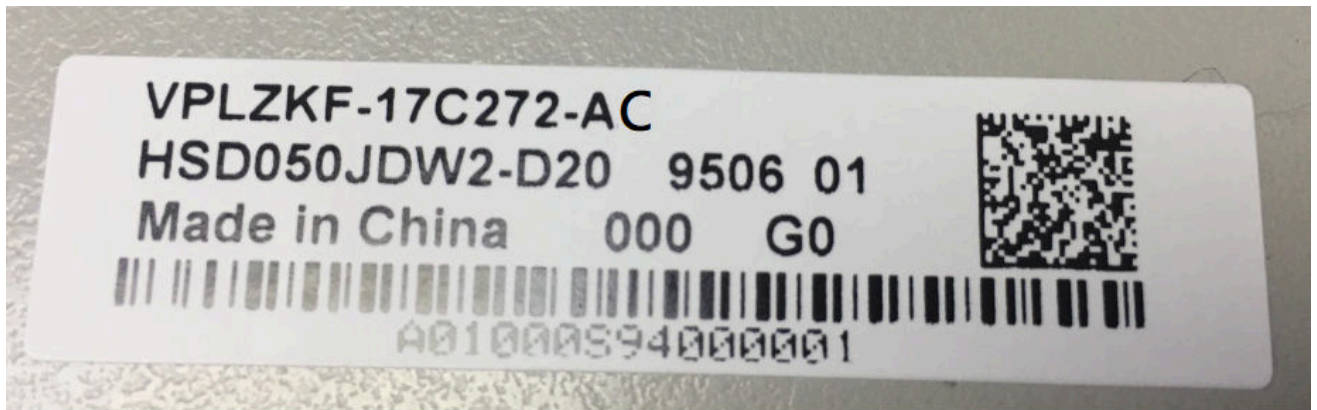
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## 9.0 LOT MARK

### 9.1 Lot Mark

LCM label with 2D barcode and printed information.

- 1) 2D barcode kindly refer to below:
  - 1-1.) Customer Part Number: TBC
  - 1-2.) Panel ID(Serial number): 15 digit from HSD
  - 1-3.) Production date: YMDD  
YMDD / M = 1~9(Jan. ~ Sep.) + A~C(Oct. ~ Dec.)
  
- 2) Printed information on label
  - 2-1.) Customer Part Number: TBC
  - 2-2.) Panel ID(S/N): 15 digit from HSD
  - 2-3.) Date = YMDD  
YMDD / M = 1~9(Jan. ~ Sep.) + A~C(Oct. ~ Dec.)
  - 2-4.) HSD Part Number: HSD050JDW6-A20
  - 2-5.) CR: 01



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

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
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



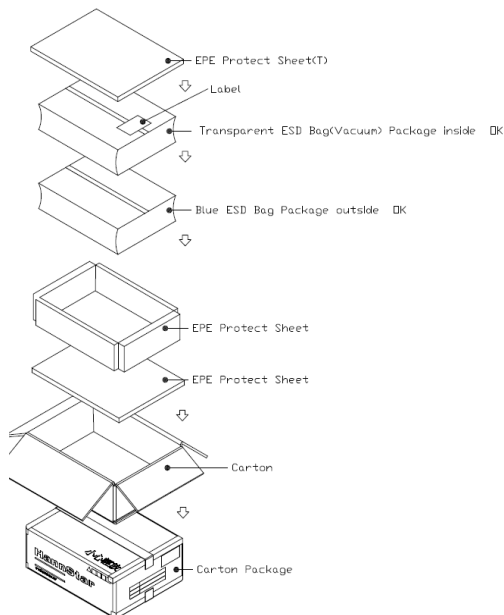
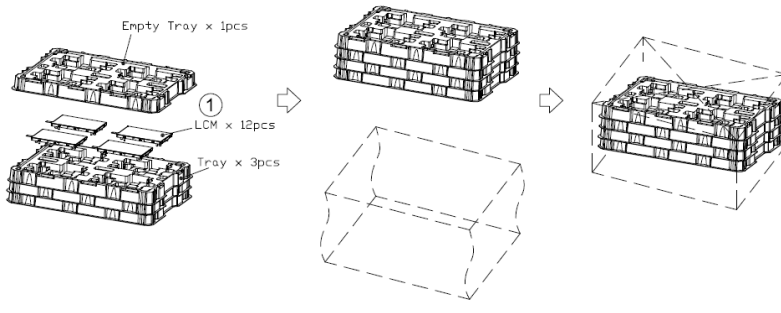
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## 10.0 PACKAGE SPECIFICATION

### 10.1 Packing form

- (1) Package quantity in one carton: 12PCS
- (2) Carton size: 456 mm×350 mm×187 mm.

### 10.2 Packing assembly drawings

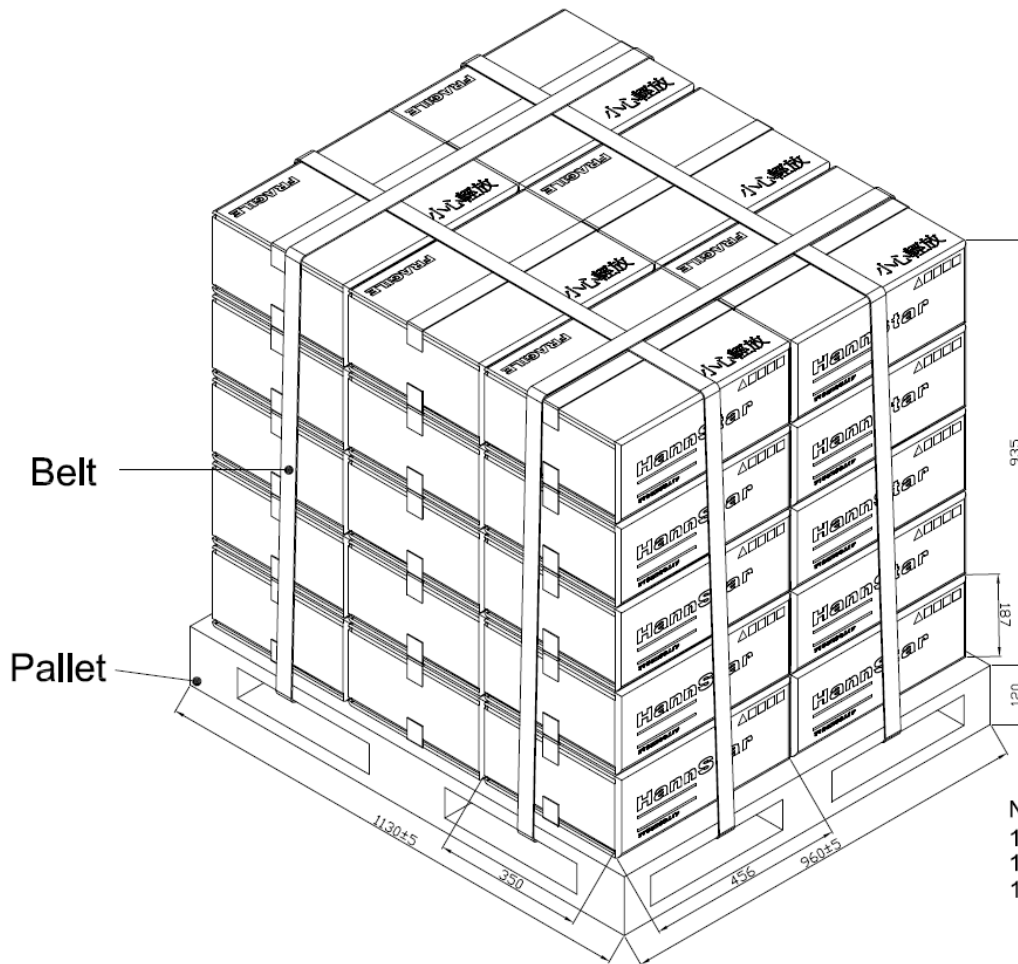


#### Notes :

- 1.1 pcs Tray : 4 pcs LCM
- 2.1 pcs Transparent vacuum electrostatic bag
- 3.1 pcs Package : 12 pcs LCM
- 4.1 pcs Anti-static bags : 12 pcs LCM & 4 pcs LCM Tray
- 5.shared Back light Tray

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### 10.3 Pallet packing



- Notes :
- 1 Pallet : 30pcs Cartons
  - 1 Carton : 12pcs LCM
  - 1 Pallet : 360pcs LCM

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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
  - 11.3.3.1.1 rinse thoroughly with water.
- 11.3.4 11.3.4.Handle carefully with chips of glass that may cause injury, when the glass is
  - 11.3.4.1.1 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**

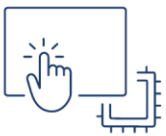
The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

### **11.10 Disposal**

When disposing LCD module, obey the local environmental regulations.

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