HannStar Product Information

Model: **HSD101PUW1 -D00**

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.

Contents

Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Aug, 18, 2014	D00	Product Information was first released.

1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD101PUW1-D00 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 10.1 (16:10) inch diagonally measured active display area with WUXGA (1920 horizontal by 1200 vertical pixel) resolution.

1.2 Features

- 10.1 (16:10 diagonal) inch configuration
- MIPI
- 8 bit(6bit+Hi-FRC)
- RoHS Compliance
- Halogen Free

1.3 Applications

- Tablet
- Notebook

1.4 General information

Item		Specification	Unit
Outline Dimension		227.72(H) x 148.66(V)	mm
Display area		216.576(H) x 135.36(V)	mm
Number of Pixel		1920 RGB (H) x 1200(V)	pixels
Pixel pitch		0.1695(H) x 0.1695(V)	mm
Pixel arrangement		RGB Vertical stripe	
Display mode		Normally Black	
NTSC		50	%
Surface treatment		HC	
Weight		140(Max.)	g
Back-light		White LED	
Power Consumption	Logic	(3W) V_{DD} =3.3V、white pattern Logic: (0.95W)	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	227.52	227.72	227.92	mm
	Vertical (V)	148.46	148.66	148.86	mm
	Depth (D)			4.4	mm
Weight		—	—	140	g

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Logic Supply voltage	V_{DD}	0	5	V	

2.1.2 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	800	1000	—		(1)(2)(4)
Response time	Rising	Tr+Tf		—	25	35	msec	(1)(3)
White luminance (center point)		Y_1		340	400	—	cd/m^2	(1)(4)(5) (I_L=22mA)
Color chromaticity (CIE1931)	Red	R_x		-0.03	0.589	+0.03		
		R_Y			0.359			
	Green	G_x			0.315			
		G_Y			0.584			
	Blue	B_x			0.153			
		B_Y			0.119			
	White	W_x			0.30			
		W_y			0.32			
Viewing angle	Hor.	Θ_L	CR>10	80	89	—		(1)(4)
		Θ_R		80	89	—		
	Ver.	Θ_U		80	89	—		
		Θ_D		80	89	—		
Brightness uniformity		B_{UNI}	Θ=0 (5point)	—	—	1.25		(6)
Brightness Uniformity		B_{UNI}	Θ=0 (13 points)	—	—	1.5		(6)

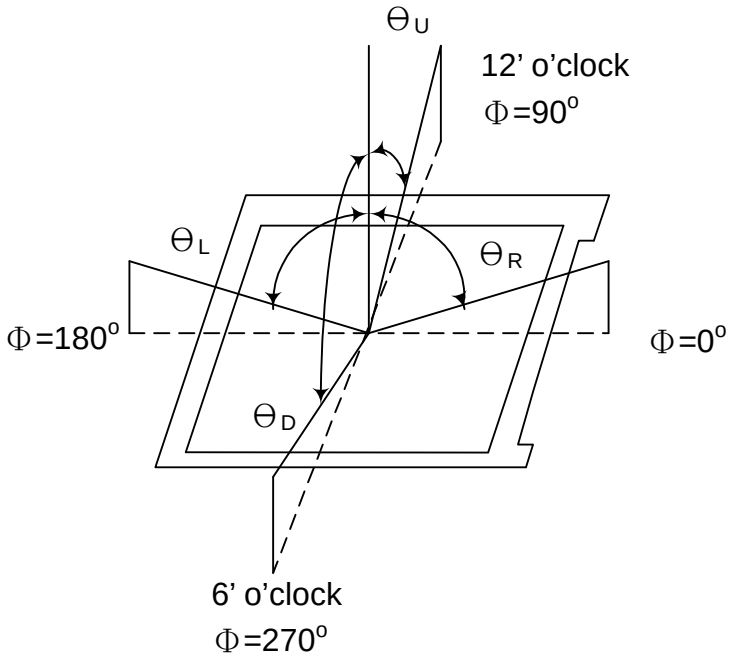
3.2 Measuring Condition

- Measuring surrounding：dark room
- 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

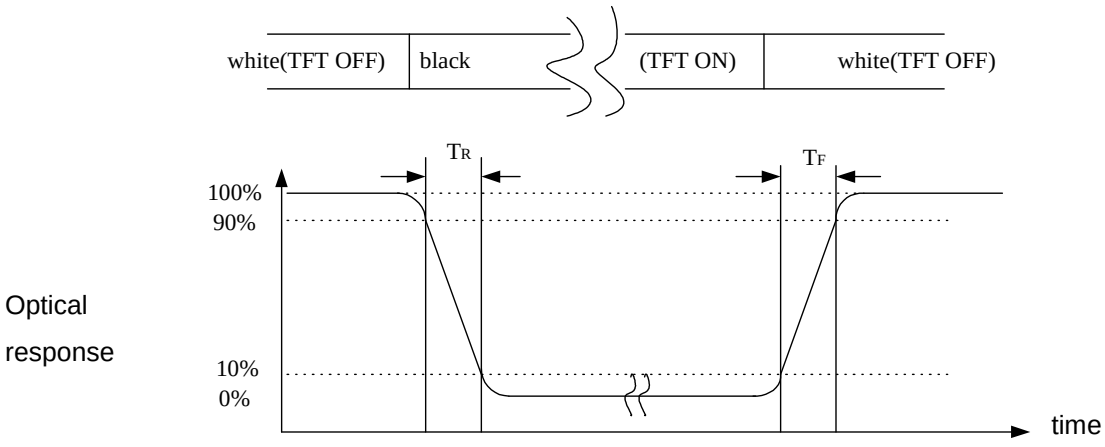
Note (1) Definition of Viewing Angle:



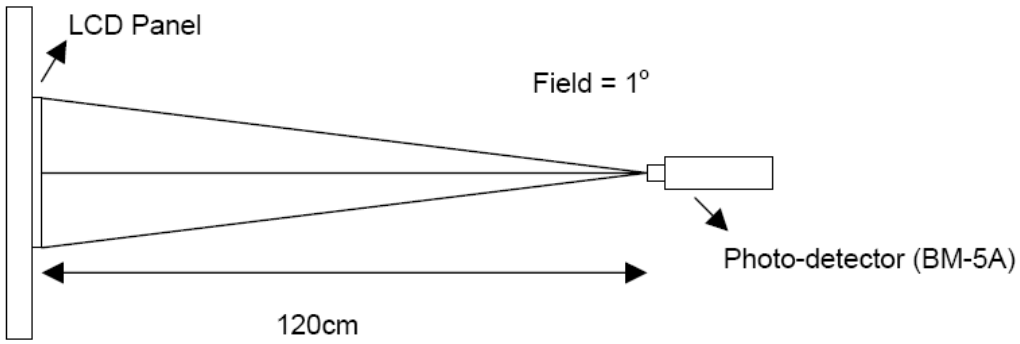
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

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



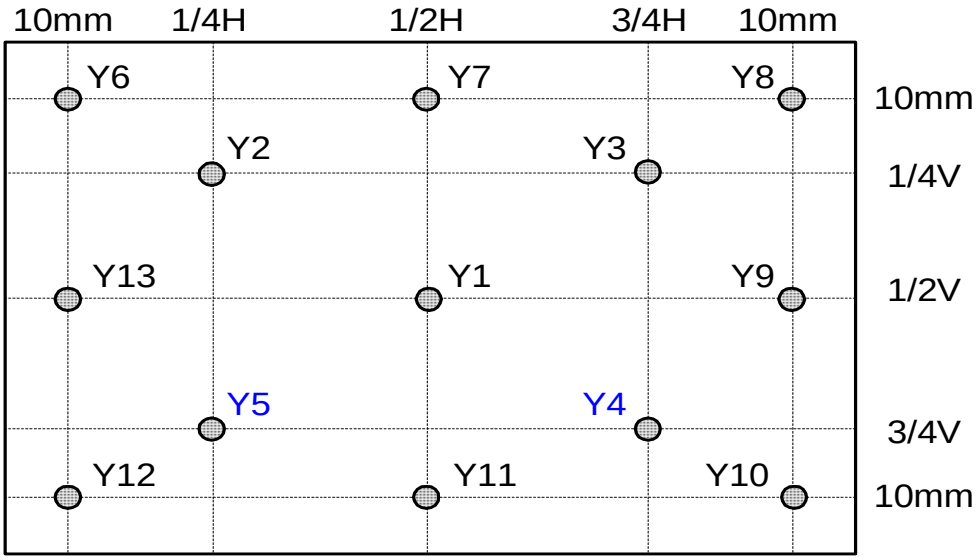
Note (4) Definition of optical measurement setup



Note (5) Definition of Average Luminance Uniformity of White (5 Point)

$$\text{Average Luminance Uniformity} = \frac{Y_1+Y_2+Y_3+Y_4+Y_5}{5}$$

*Center luminance = Y1 luminance



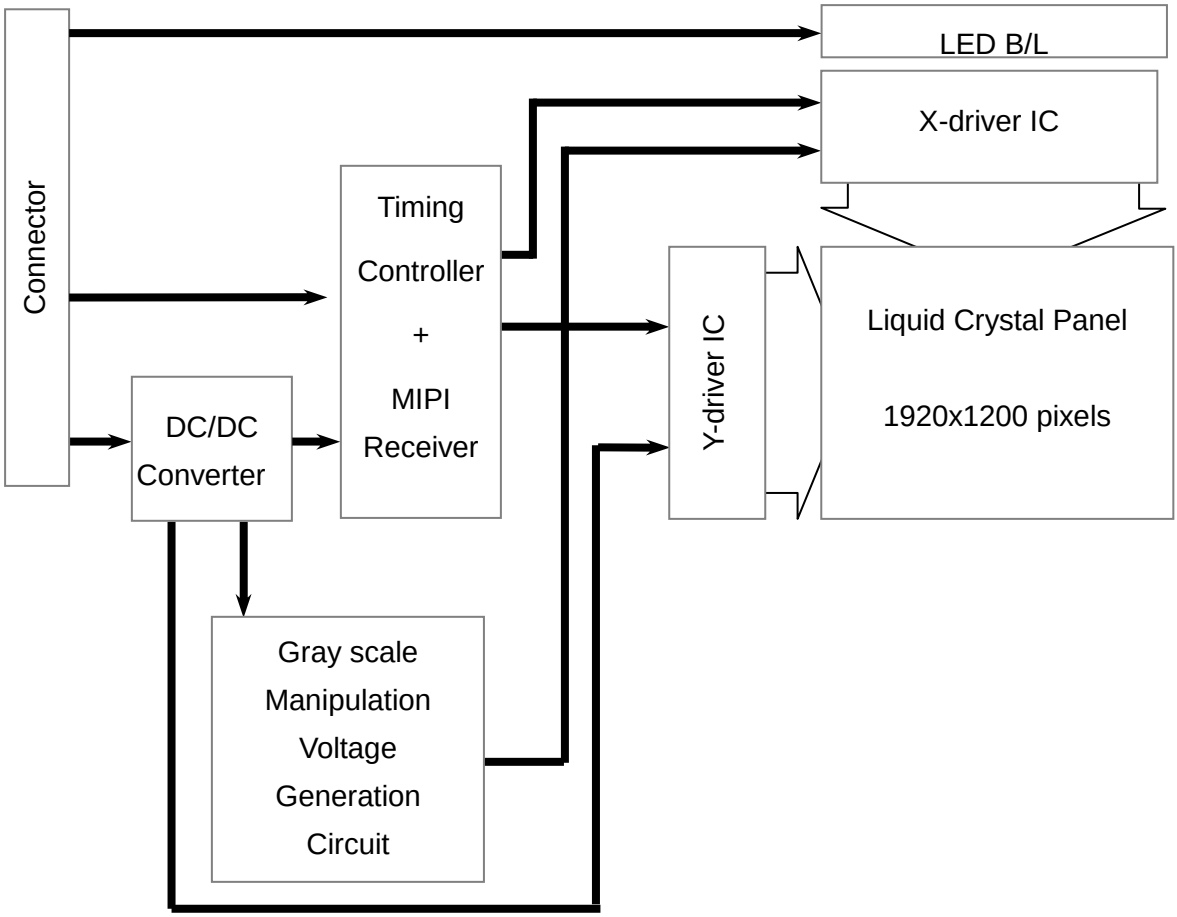
Note (6) Definition of brightness uniformity

$$\text{Luminance uniformity(5 points)} = \frac{\text{(Max Luminance of 5 points)}}{\text{(Min Luminance of 5 points)}}$$

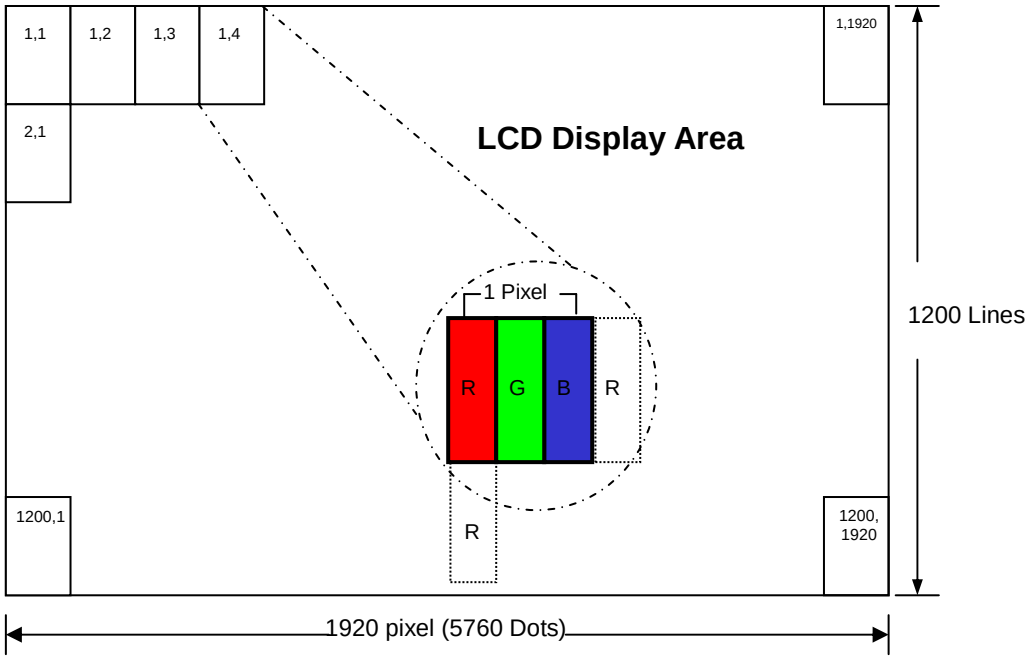
$$\text{Luminance uniformity(13points)} = \frac{\text{(Max Luminance of 13 points)}}{\text{(Min Luminance of 13 points)}}$$

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



4.3 Relationship Between Displayed Color and Input

		MSB							LSB	MSB							LSB	MSB							LSB	Gray scale
	Display	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	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
	↓	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	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
	↓	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	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
	↓	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	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
	↓	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	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

5.1 LCD Module： **CN1** FH26W-39S-0.3SHW(05) (HRS) or compatible

Pin No.	Signal	I/O	Description	Note
1	VDD	P	DC-DC circuit supply voltage(3V - 3.6V)	
2	VDD	P	DC-DC circuit supply voltage(3V - 3.6V)	
3	VDD	P	DC-DC circuit supply voltage(3V - 3.6V)	
4	VDD	P	DC-DC circuit supply voltage(3V - 3.6V)	
5	NC	--	No Connection	
6	NC	--	No Connection	
7	LED_PWMIN	I	Backlight LED driver PWMIN	VIH =2.0V
8	LED_PWMOUT	0	Backlight LED driver PWMOUT	VIH =2.0V
9	NC	--	No Connection	
10	NC	--	No Connection	
11	GND	P	Ground	
12	DSI_D2P/Rx-IN2P	I	MIPI data pair 2 positive signal	
13	DSI_D2N/Rx-IN2N	I	MIPI data pair 2 negative signal	
14	GND	P	Ground	
15	DSI_D1P/Rx-IN1P	I	MIPI data pair 1 positive signal	
16	DSI_D1N/Rx-IN1N	I	MIPI data pair 1 negative signal	
17	GND	P	Ground	
18	DSI_CLKP/Rx-CLKP	I	MIPI Clock positive signal	
19	DSI_CLKN/Rx-CLKN	I	MIPI Clock negative signal	
20	GND	P	Ground	
21	DSI_D0P/Rx-IN0P	I	MIPI data pair 0 positive signal	
22	DSI_D0N/Rx-IN0N	I	MIPI data pair 0 negative signal	
23	GND	P	Ground	
24	DSI_D3P/Rx-IN3P	I	MIPI data pair 3 positive signal	
25	DSI_D3N/Rx-IN3N	I	MIPI data pair 3 negative signal	
26	GND	P	Ground	
27	GND	P	Ground	
28	ID	I	Ground or floating	
29	NC	--	No Connection	
30	LB1	I	Cathode for light bar	
31	LB2	I	Cathode for light bar	
32	LB3	I	Cathode for light bar	
33	LB4	I	Cathode for light bar	
34	LB5	I	Cathode for light bar	
35	LB6	I	Cathode for light bar	
36	NC	--	No Connection	
37	NC	--	No Connection	
38	LED_Vout	P	Anode for ligh bar	
39	LED_Vout	P	Anode for ligh bar	

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	Note (2)
Inrush current	I_{RUSH}	-	-	2	A	Note (3)
Input signal voltage	ViH	2.	-	2.5	V	-
	ViL	0	-	0.2	V	Note (1)
VDD	I_{VDD}	-	-	287	mA	VDD = 3.3V @White Pattern

Note (1)： GND=0V

Note (2): V_{DD} dip condition:

When VDD operating within 2.7V≦VDD<3.0V，td≦10ms , the display may momentarily become abnormal.

VDD<2.7V , VDD dip condition should also follow the Power On/Off conditions for supply voltage.

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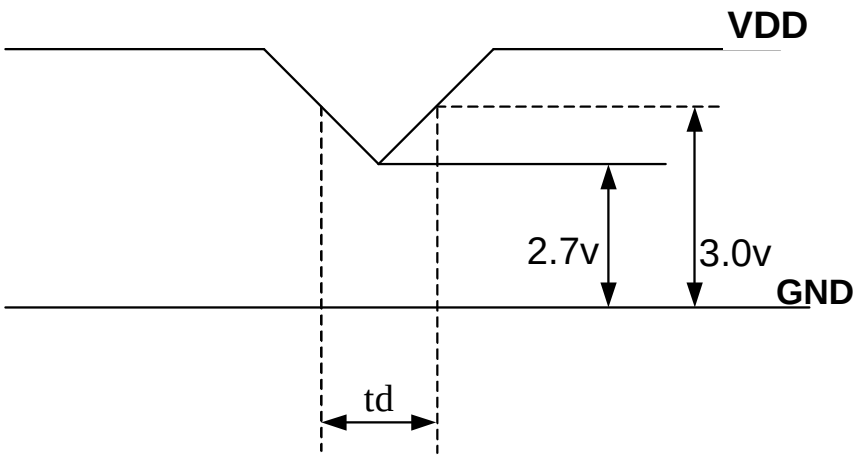
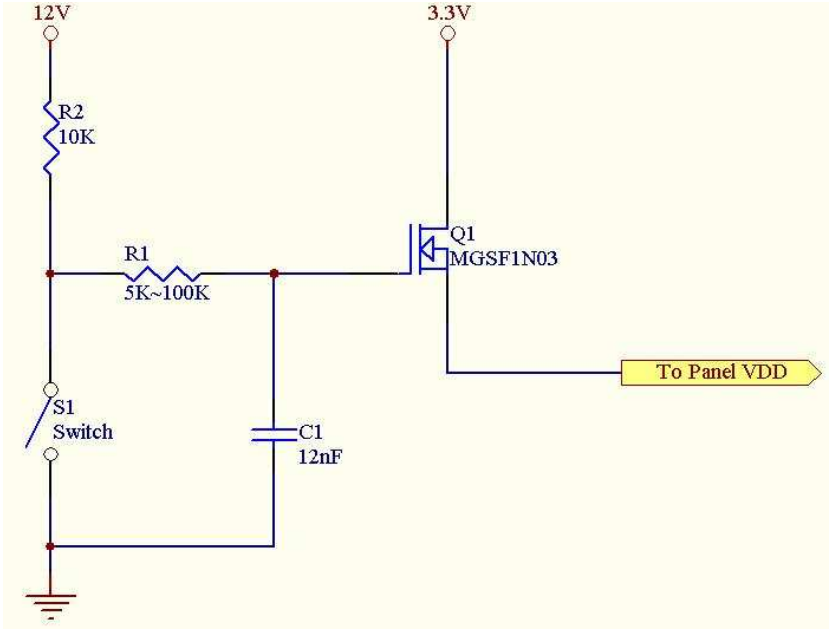
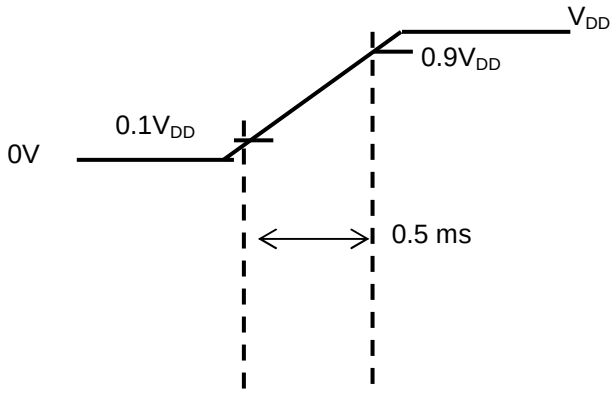


Note ：**(3)** Power on Inrush current test circuit





V_{in} rising time

6.2 DC Characteristics

6.2.1 DC CHARACTERISTICS FOR DSI HS MODE

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Common mode voltage	V_{CMRX}	DSI-CLK+/-, DSI-D0+/-	70		330	mV
Hi-Speed transmit voltage	$\lvert V_{IDM} \rvert$	DSI-CLK+/-, DSI-D0+/-	100	200	270	mV
Single-ended input low voltage	V_{ILHS}	DSI-CLK+/-, DSI-D0+/-	-40	-	-	mV
Single-ended input high voltage	V_{IHHS}	DSI-CLK+/-, DSI-D0+/-	-	-	460	mV
Differential input impedence	Z_{ID}	DSI-CLK+/-, DSI-D0+/-	80	100	125	Ω

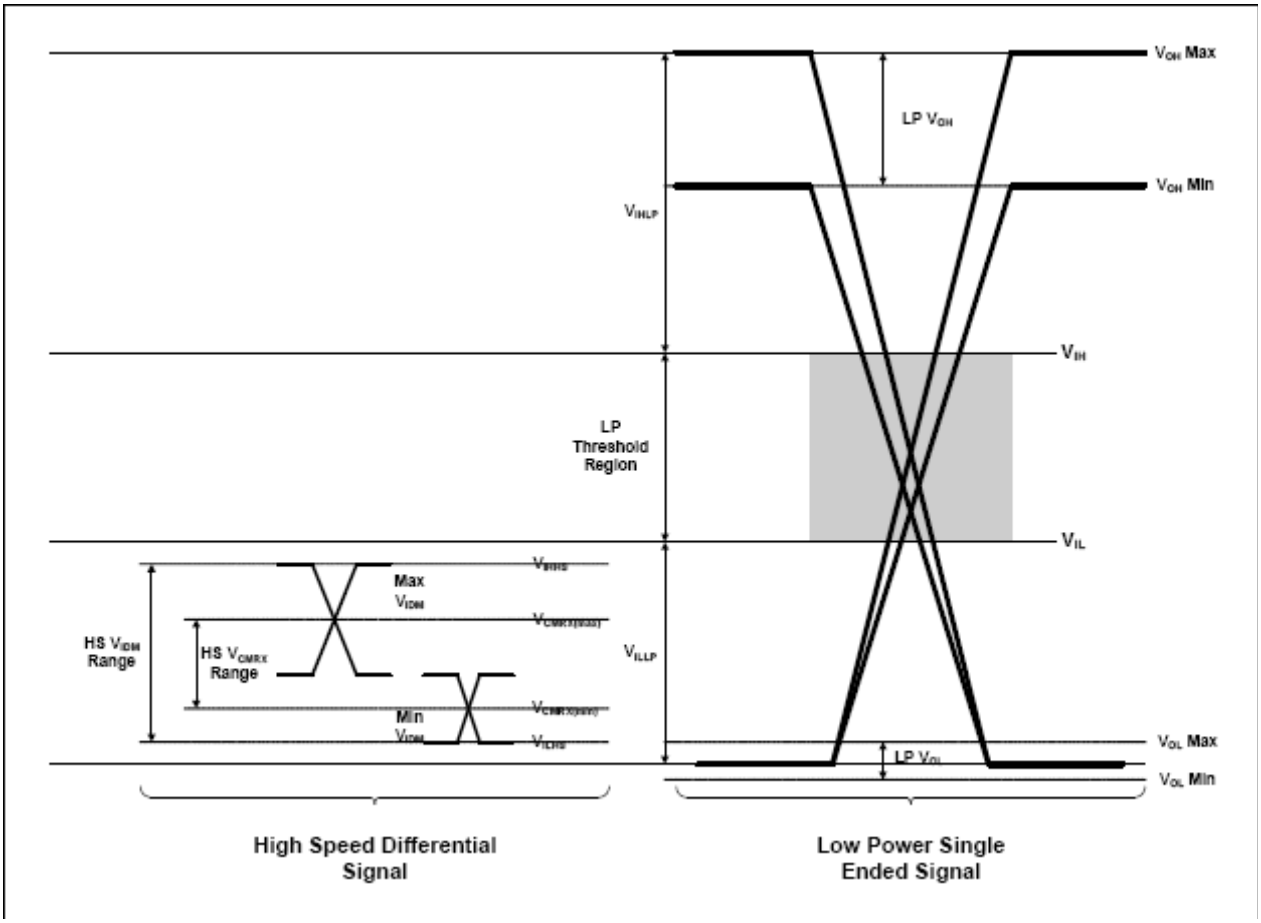
Note (1) IOVCC=1.65~3.3V, VCC=2.6 to 3.8V, GND=0V, Ta=-30 to 70 ºC

6.2.2 DC CHARACTERISTICS FOR DSI LP MODE

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
LPDT Logic 1 input threshold	V_{IH}	LP-RX (CLK, D0)	880	-	1600	mV
LPDT Logic 0 input threshold	V_{IL}	LP-RX (CLK, D0)	0	-	550	mV
LPDT Output high level	V_{OH}	LP-TX (D0)	1.1	1.2	1.3	V
LPDT Output low level	V_{OL}	LP-TX (D0)	-50		50	mV

Note (1) VDD=3.3V, GND=0V, Ta=-30 to 70 ºC

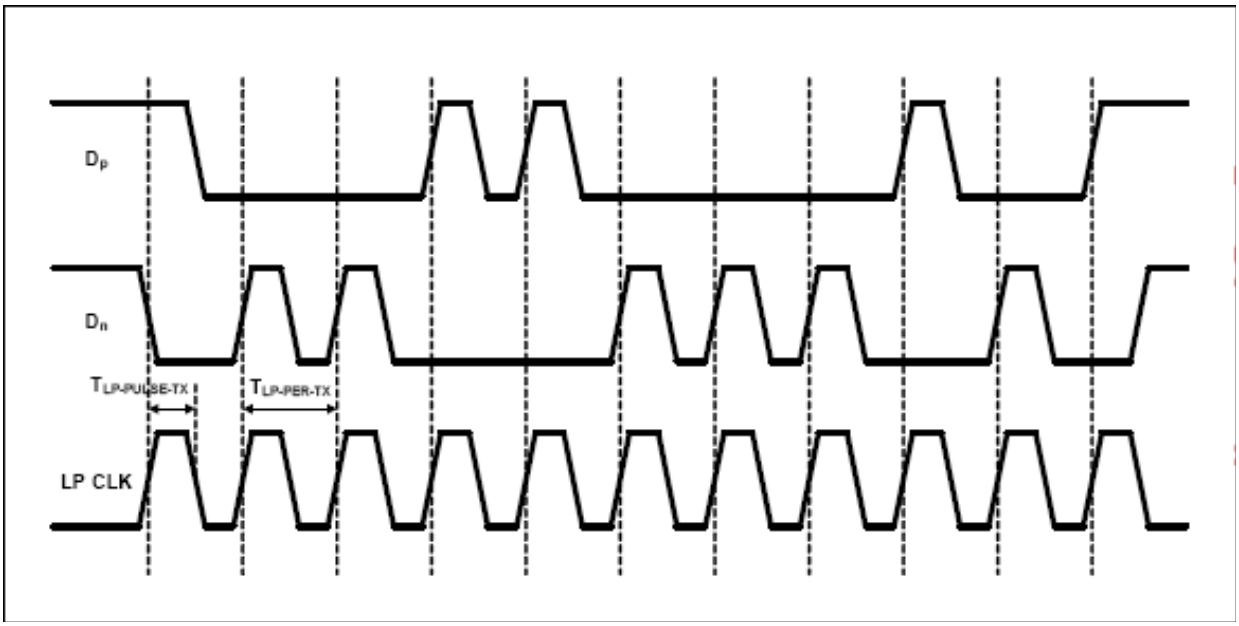
Note (2) Includes 50mV (-50mV to 50mV) ground difference.



6.2.3 AC CHARACTERISTICS

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Minimum pulse width response (LP RX mode)	T_{MIN-RX}	50	-	-	ns	
Pulse width of the LP exclusive-OR clock	$P_{LD-PLUSE-TX}$	50	55	58	ns	Note (1)
15%~85% rise time and fall time (LP Tx mode)	T_{RLP}/T_{FLP}	-	-	25	ns	
30%~85% rise time and fall time of EOT (LP Tx mode)	TREOT	-	-	35	ns	
Period of the LP exclusive-OR clock	$T_{LP-PER-TX}$	90	-	-	ns	
Data to clock setup time	T_{SETUP}	0.15			UI	
Data to clock setup time	T_{HOLD}	0.15			UI	

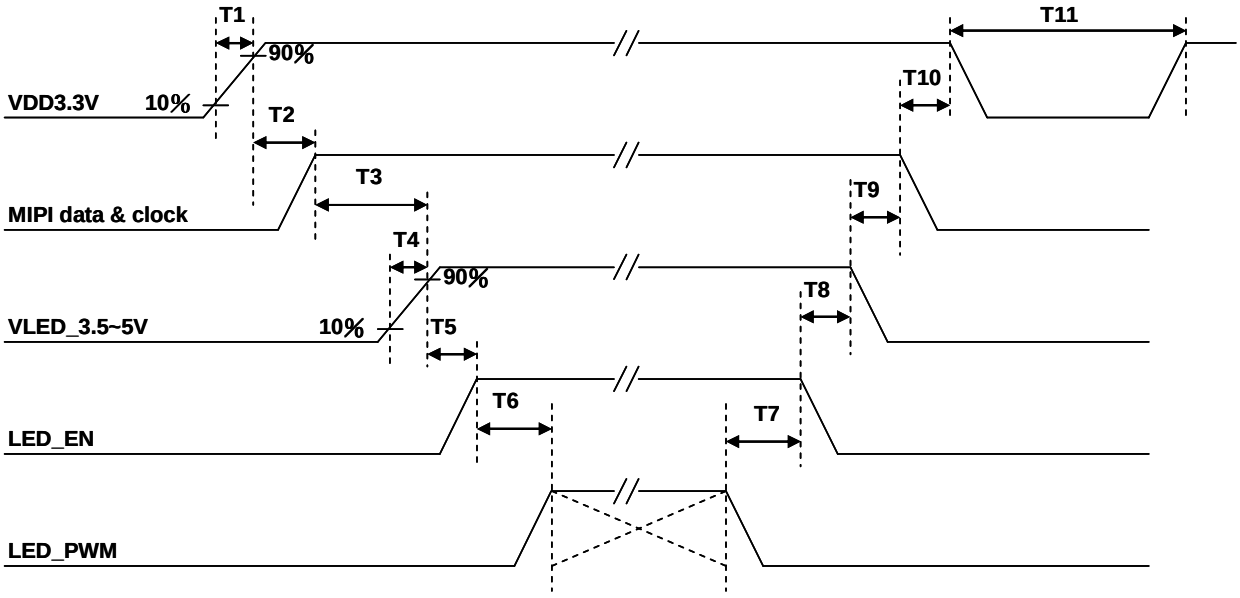
Note (1) : 1ST clock pulse after STOP state or last clock pulse before STOP state/all other pulse.



6.4 Interface Timing

Item	Symbol	Min.	Typ.	Max.	Unit
PCLK Frequency	FPCLK	-	147.01	-	MHz
Horizontal Synchronization	Hsync	-	16	-	PCLK
Horizontal Back Porch	HBP	-	32	-	PCLK
Horizontal Front Porch	HFP	-	16	-	PCLK
Hsync+HBP+HFP	-	-	64	-	PCLK
Horizontal Address(Display Area)	Hadr	-	1920	-	PCLK
Horizontal cycle	-	-	1984	-	PCLK
Vertical Synchronization	Vsync	-	2	-	Line
Vertical Back Porch	VBP	-	18	-	Line
Vertical Front Porch	VFP	-	15	-	Line
Vsync+VBP+VFP	-	-	35	-	Line
Vertical Address(Display Area)	Vadr	-	1200	-	Line
Vertical cycle	-	-	1235	-	Line
Frame Rate	-	-	60	-	Hz

6.5 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit
T1	0.5	--	10	ms
T2	100	--	--	ms
T3	200	--	--	ms
T4	0.5	--	10	ms
T5	0	--	5	ms
T6	0	--	5	ms
T7	0	--	5	ms
T8	0	--	5	ms
T9	5	--	--	ms
T10	85	--	--	ms
T11	1000	--	--	ms

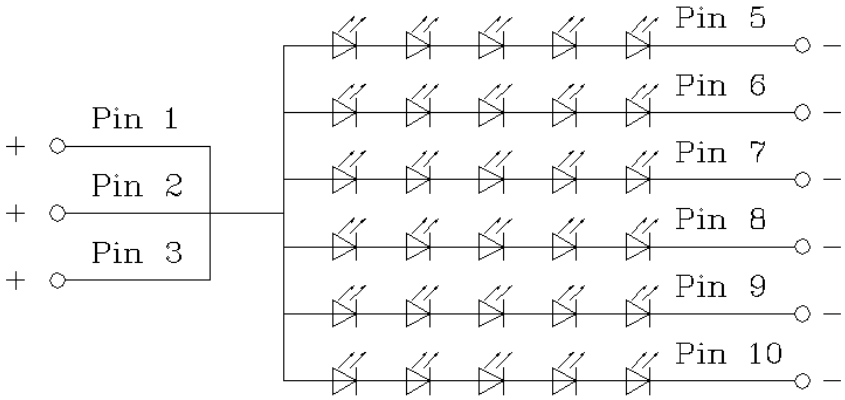
6.6 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_F	--	22	--	mA	Ta=25℃
LED Voltage	V_F	--	2.8	3.1	Volt	Ta=25℃
LED Power consumption	P_{LED}	--		2.046	Watt	Ta=25℃ Note (1)
LED Life-Time	N/A	10,000	--	--	Hour	Ta=25℃ Note (2)

Note (1): Calculator value for reference $P=I_F \times V_F \times N$ (LED Qty')

Note (2): The LED lifetime defines as the estimated time to 50% degradation of final luminous.

Note (3): LED light bar is 5 series and 6 parallel.



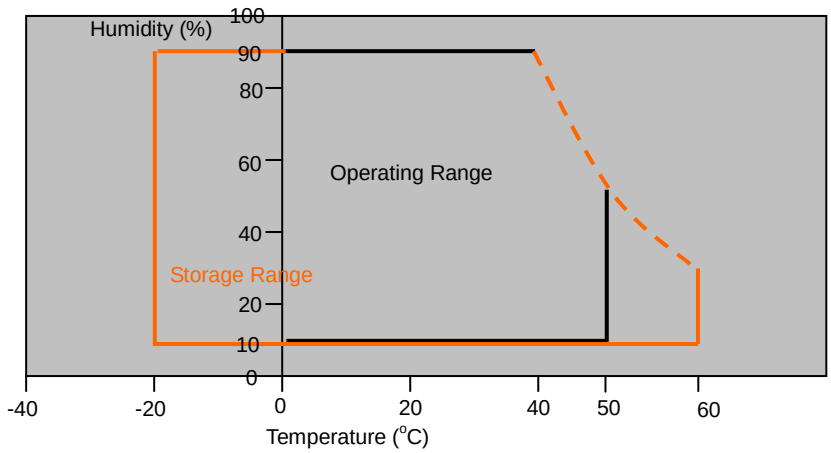
30Chip White LED Circuit Diagram

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, 300hrs	
4	Low Temperature Operation	Ta=0°C, 300hrs	
5	Thermal Cycling Test (non operation)	-20°C(30min)→+60°C(30min),100 cycles	
6	Vibration	Sine Wave 1.5G, 5~500Hz, XYZ 30min/each direction	
7	Shock	Half-Sine, 220G, 2ms, ±XYZ, 1time	

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

Storage / Operating temperature

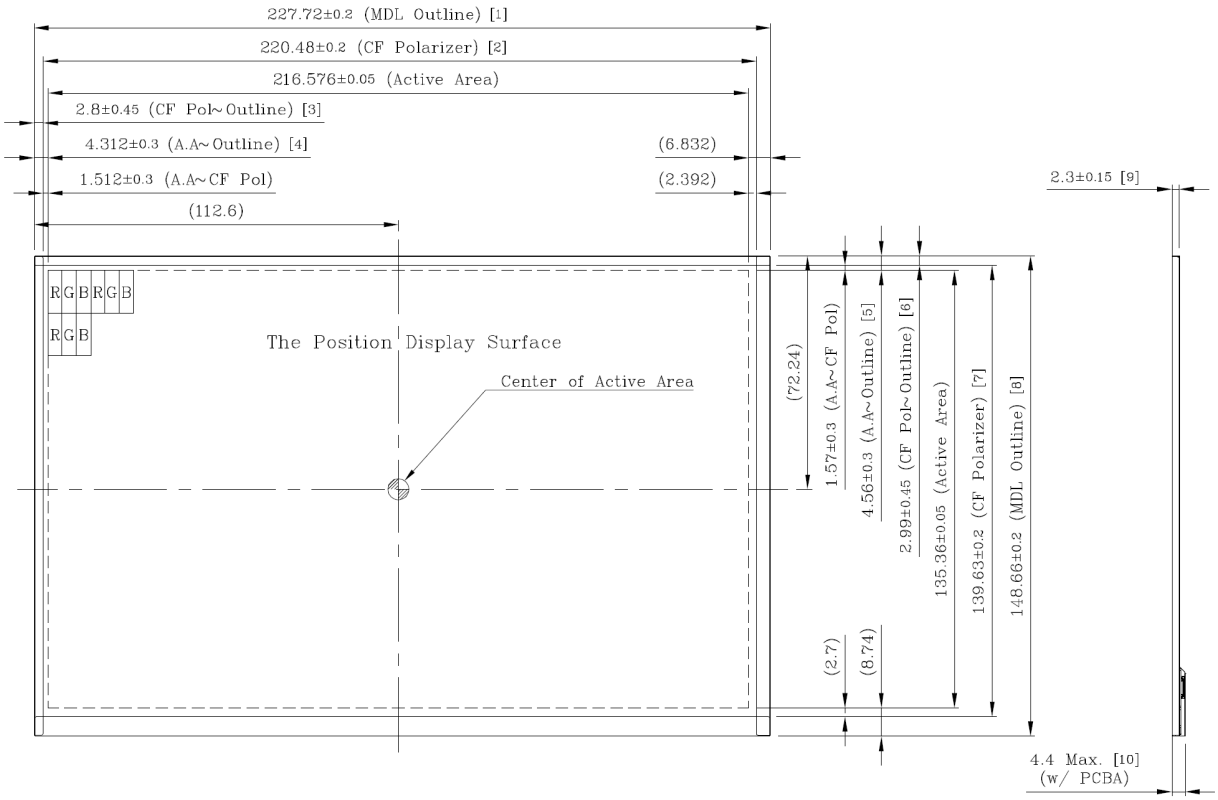


Note . Max wet bulb temp.=39°C

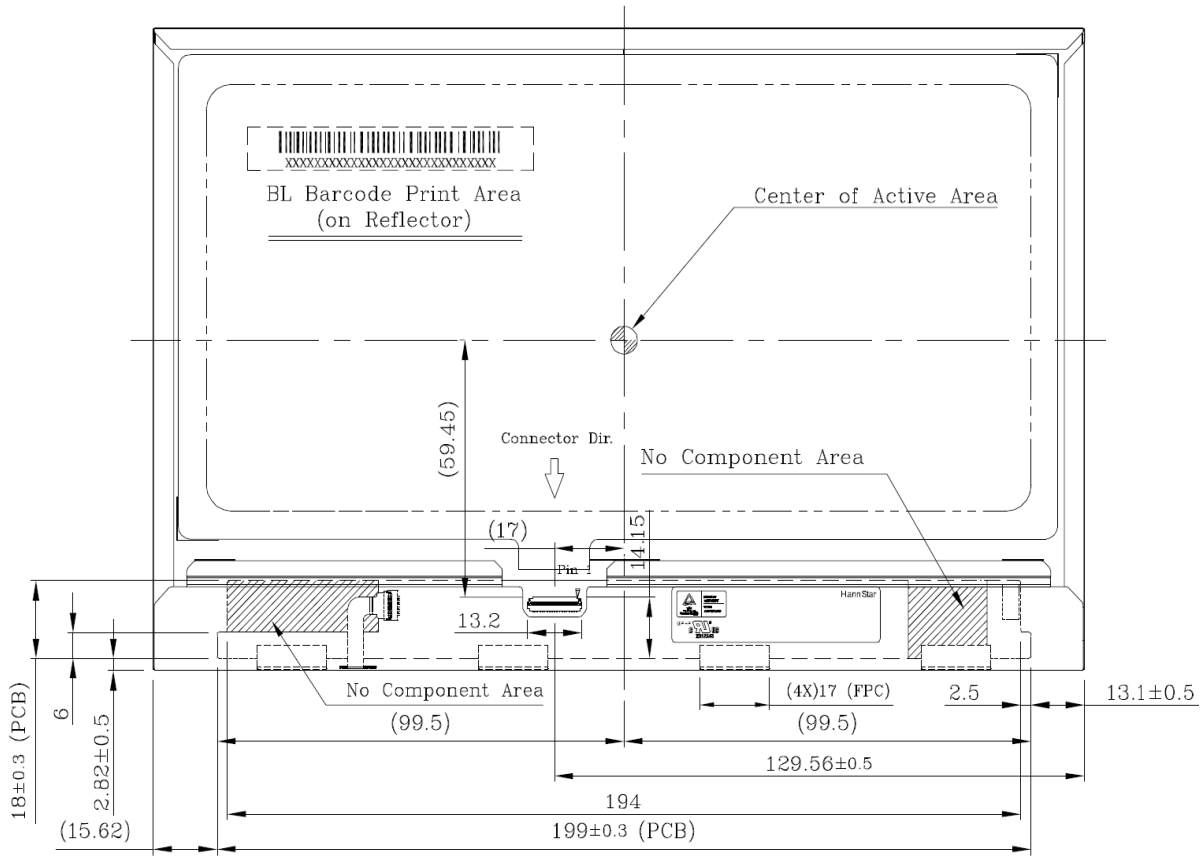
8.0 OUTLINE DIMENSION

Unit : mm

8.1 Front View Outline Dimension



8.2 Back View Outline Dimension



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	2006	2007	2008	2009	2010	2011	2012	2013	2014	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 Location of Lot Mark

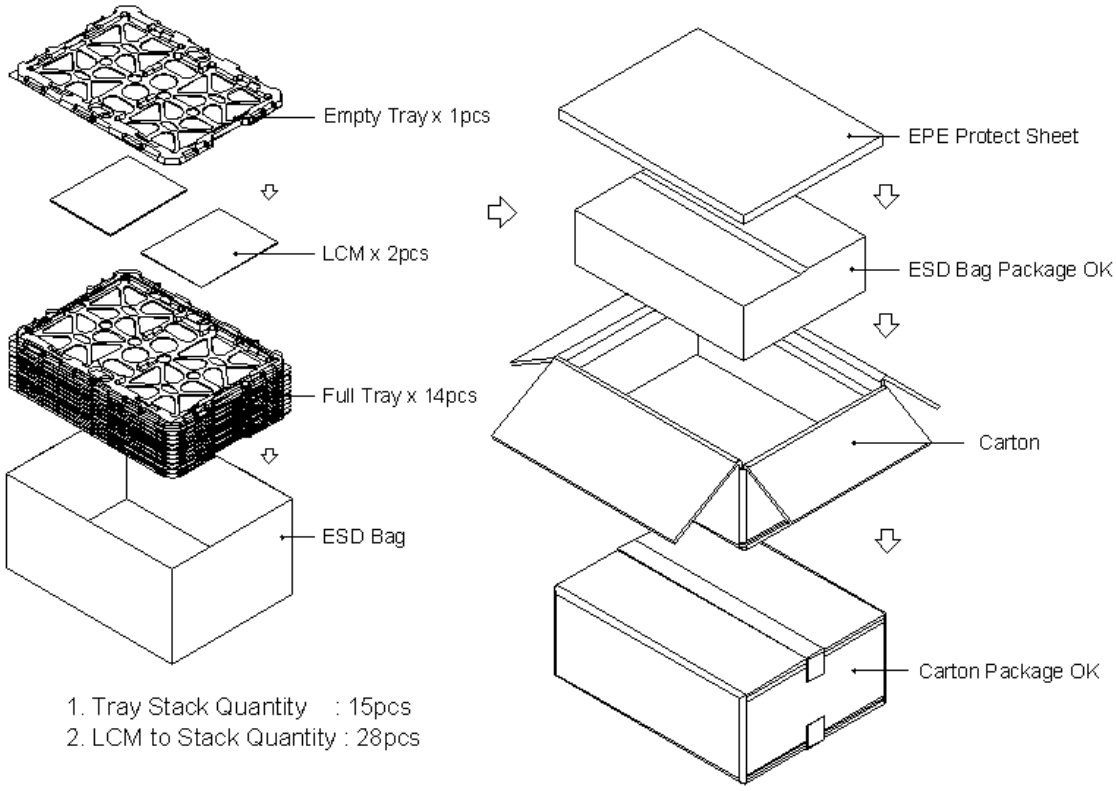
(1) The label is attached to the backside of the LCD module.
(2) This is subject to change without prior notice.

10.0 PACKAGE SPECIFICATION

10.1 Packing form

LCM Model	LCM Qty. in the box	Inner Box Size (mm)	Notice
HSD101PUW1-D	28 pcs/box	456(L)X350(W)X187(H)	

10.2 Packing assembly drawings



1. Tray Stack Quantity : 15pcs
2. LCM to Stack Quantity : 28pcs

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.