 HannStar Display Corp.			
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TO :

Date : Sep., 18, 2015

HannStar Product Specification **(Preliminary Specification)**

Model: HSD101PFW7-A-0299**

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 for any intellectual property claims or other problems that may result from application based on the module described herein.
4. The mark “ **” of Model means sub-model code.



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Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Sep, 18, 2015	-A	Preliminary Product Specification was first released.



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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD101PFW7-A-0299 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 (16:9) inch diagonally measured active display area with WSVGA (1024 horizontal by 600 vertical pixel) resolution.

1.2 Features

- 10.1 inch (16:9 diagonal) configuration
- 16.2M color by 6 bit +Hi-FRC input
- RoHS/ Halogen Free Compliance

1.3 Applications

- Automotive

1.4 TFT LCD General information

Item	Specification	Unit
Outline Dimension	230.4 x 134.2 (typ)	mm
Display area	222.72(H) x 125.28(V)	mm
Number of Pixel	1024 RGB (H) x 600(V)	pixels
Pixel pitch	0.2175(H) x 0.2088(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display mode	Normally Black	
Surface treatment	AG	
Weight	90g(Max)	g

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2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	V_{DD}	-0.3	5.0	V	
	V_{GH}	-0.3	40.0	V	
	V_{GL}	-20.0	0.3	V	
	AV_{DD}	6.5	13.5	V	
	V_I	-0.3	$V_{DD} + 0.3$	V	
Logic Signal Input Level	V_{DD}	-0.3	5.0	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) $T_a = 25 \pm 2^\circ\text{C}$

2.1.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-20	70	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-30	80	$^\circ\text{C}$	

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3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (With PZ)	T		—	(5.8)	—	%	
Contrast	CR		(600)	(800)	—		(1)(2)(4)
Response time	Tr+Tf		—	(40)	(50)	msec	(1)(3)
Color chromaticity (CIE1931)	Red	R_x	$\theta=0$ Normal viewing angle	(0.593)			CF c-light
		R_y		(0.33)			
	Green	G_x		(0.289)			
		G_y		(0.513)			
	Blue	B_x		(0.152)			
		B_y		(0.152)			
	White	W_x		(0.305)			
		W_y		(0.367)			
Viewing angle	Hor.	θ_L	CR>10	80	85	—	(1)(4)
		θ_R		80	85	—	
	Ver.	θ_U		80	85	—	
		θ_D		80	85	—	

3.2 Measuring Condition

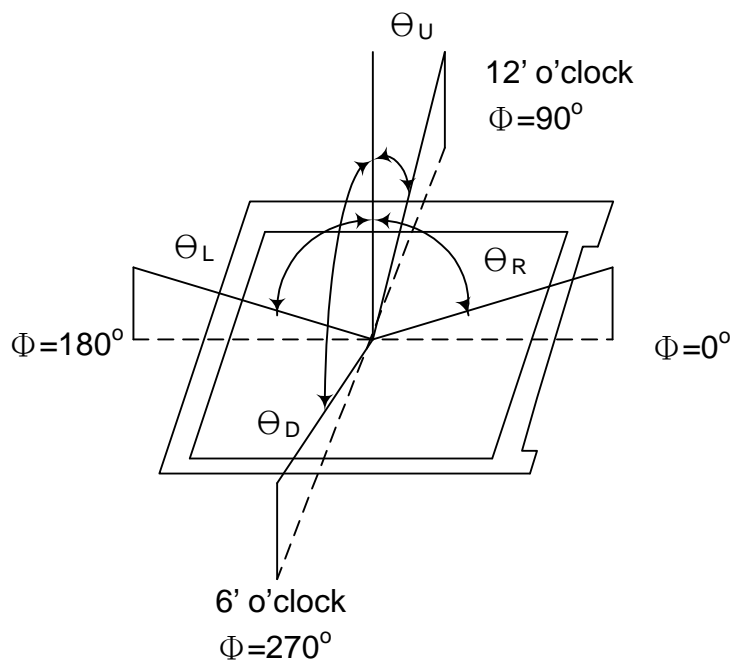
- Measuring surrounding : dark room
- Ambient temperature : 25±2°C
- 15min. warm-up time.

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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:

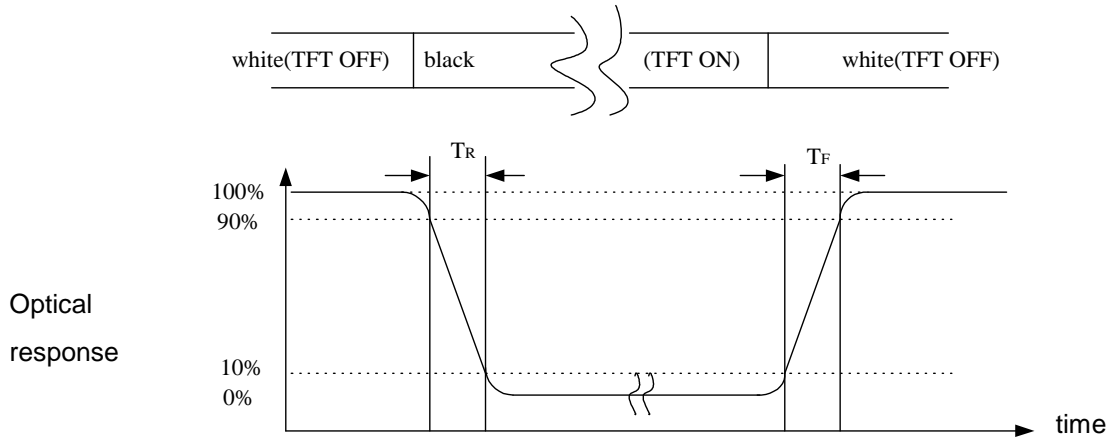


Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

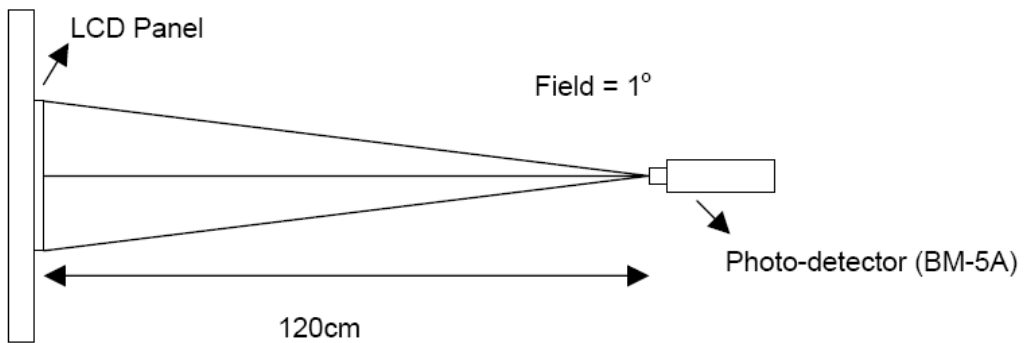
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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

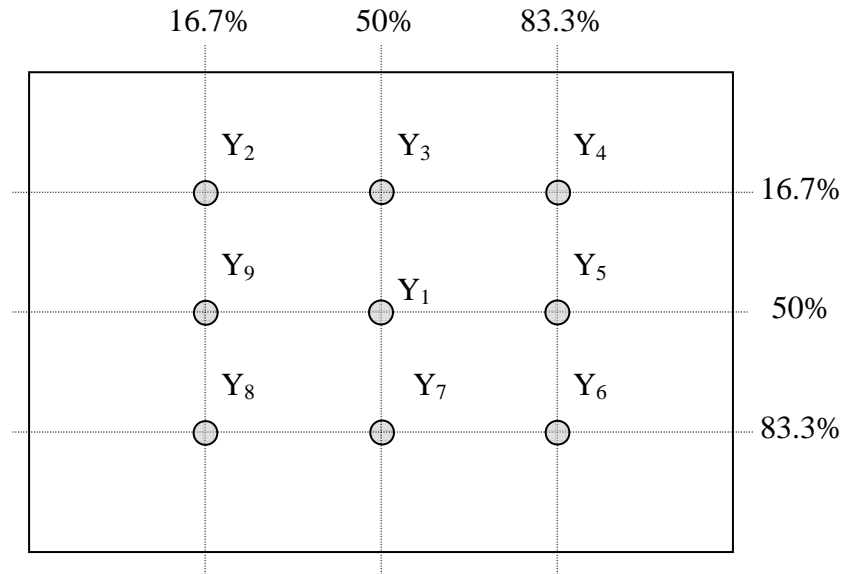


Note (4) Definition of optical measurement setup



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Note (5) Definition of Average Luminance Uniformity of White (Center)
 Definition of brightness uniformity



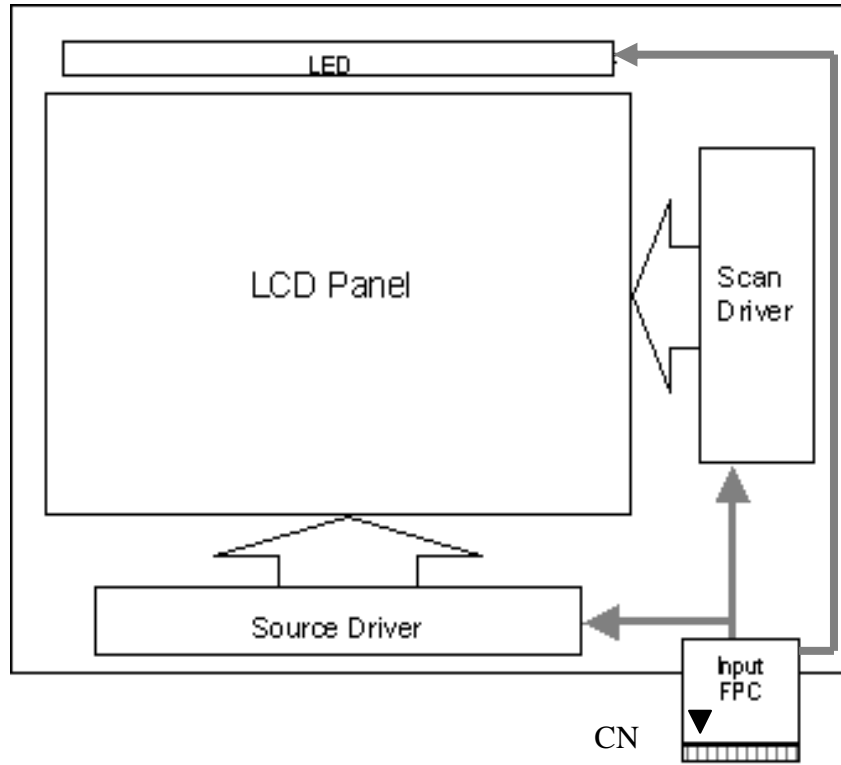
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

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

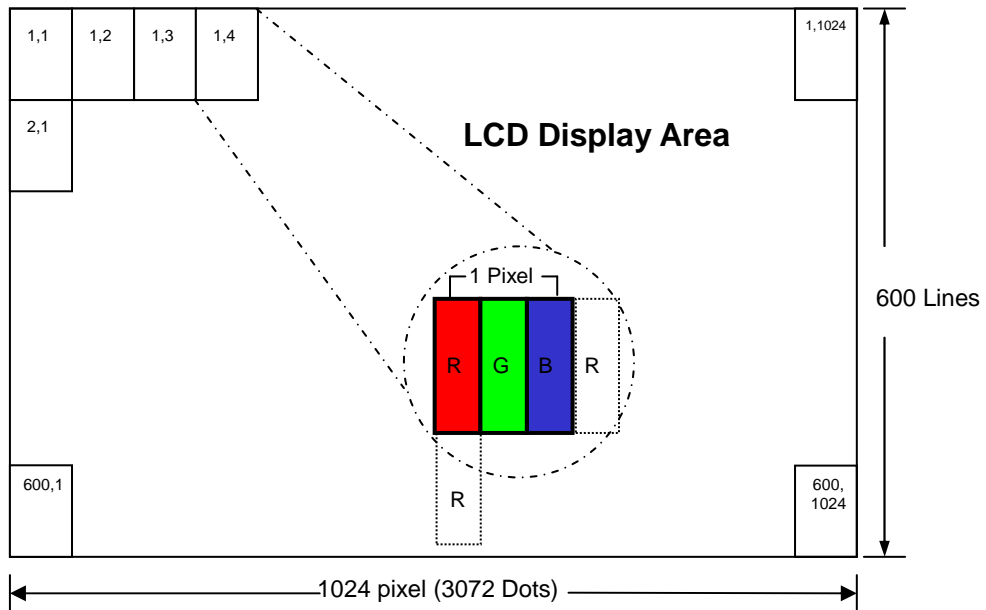
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4.0 BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 Pixel Format



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5.0 INTERFACE PIN CONNECTION

FPC connector is used for electronics interface.

The recommended model is 089K60-000100-G2-R (STARCONN).

Pin No.	Signal	Description	Note
1	GND	Ground	
2	AVDD	Power for Analog Circuit	
3	VDD	Power Voltage for digital circuit	
4	GND	Ground	
5	VCOM	Common Voltage	
6	VDD	Power Voltage for digital circuit	
7	GND	Ground	
8	V14	Gamma correction voltage reference	
9	V13	Gamma correction voltage reference	
10	V12	Gamma correction voltage reference	
11	V11	Gamma correction voltage reference	
12	V10	Gamma correction voltage reference	
13	V9	Gamma correction voltage reference	
14	V8	Gamma correction voltage reference	
15	GND	Ground	
16	VDD	Power Voltage for digital circuit	
17	GND	Ground	
18	RXIN3+	+ LVDS differential data input	
19	RXIN3-	- LVDS differential data input	
20	GND	Ground	
21	RXCLKIN+	+ LVDS differential clock input	
22	RXCLKIN-	- LVDS differential clock input	
23	GND	Ground	
24	RXIN2+	+ LVDS differential data input	
25	RXIN2-	- LVDS differential data input	
26	GND	Ground	
27	RXIN1+	+ LVDS differential data input	
28	RXIN1-	- LVDS differential data input	
29	GND	Ground	
30	RXIN0+	+ LVDS differential data input	
31	RXIN0-	- LVDS differential data input	
32	GND	Ground	
33	GND	Ground	

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Pin No.	Signal	Description	Note
34	Reset	Global reset pin.Active low to enter reset state. Suggest to connecting with RC reset circuit for stability. Normally pull high.(R=10KΩ、C=0.1uF)	Note1
35	STBYB	Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z	
36	SHLR	Left or right display control	Note2
37	VDD	Power Voltage for digital circuit	
38	UPDN	Up/down display control	Note2
39	GND	Ground	
40	AVDD	Power for Analog Circuit	
41	VCOM	Common Voltage	
42	DITH	Dithering function enable control.Normally pull low. DITHER = "1", LVDS input data is 8 bits DITHER = "0", LVDS input data is 6 bits	Note3
43	GND	Ground	
44	VDD	Power Voltage for digital circuit	
45	GND	Ground	
46	V7	Gamma correction voltage reference	
47	V6	Gamma correction voltage reference	
48	V5	Gamma correction voltage reference	
49	V4	Gamma correction voltage reference	
50	V3	Gamma correction voltage reference	
51	V2	Gamma correction voltage reference	
52	V1	Gamma correction voltage reference	
53	GND	Ground	
54	VDD	Power Voltage for digital circuit	
55	SELB	6bit/8bit mode select SELB = "0", LVDS input data is 8 bits SELB = "1", LVDS input data is 6 bits	Note3
56	VGH	Gate ON Voltage	
57	VDD	Power Voltage for gate digital circuit	
58	VGL	Gate OFF Voltage	
59	GND	Ground	
60	NC/BIST	No connection/pull high is BIST mode	



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Note1 : Global reset pin: Active low to enter reset mode. Suggest connecting with an RC reset circuit for stability. Normally pull high. (R=10K Ω , C=0.1 μ F)

Note: If RC is not added, users must follow the rule, T2 > 15ms on page 18 item 6.5 power on/off sequence.

Note2 : When L/R="0", set right to left scan direction.

When L/R="1", set left to right scan direction.

When U/D="0", set top to bottom scan direction.

When U/D="1", set bottom to top scan direction.

Note3 : If LVDS input data is 6 bits, SELB must be set to High; DITH must be set to Low. (262K Colors)

If LVDS input data is 8 bits, SELB must be set to Low; DITH must be set to High. (16.2M Colors)

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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	
	VGH	19.5	20	20.5	V	
	VGL	-10.5	-10	-9.5	V	
	AVDD	12	12.5	13	V	
VCOM	VCOMin	TBD	TBD	TBD	V	Note (1)
Input signal voltage	ViH	0.7 VDD	-	VDD	V	Note (2)
	ViL	0	-	0.3 VDD	V	
Input GAMMA voltage	V1		TBD		V	Note (3)
	V2		TBD		V	
	V3		TBD		V	
	V4		TBD		V	
	V5		TBD		V	
	V6		TBD		V	
	V7		TBD		V	
	V8		TBD		V	
	V9		TBD		V	
	V10		TBD		V	
	V11		TBD		V	
	V12		TBD		V	
	V13		TBD		V	
	V14		TBD		V	
Current of power supply	IDD	-	22	-	mA	VDD =3.3V
	IADD	-	26	-	mA	AVDD=10V
	IGH	-	0.36	-	mA	VGH=15V
	IGL	-	0.85	-	mA	VGL=-7V
	Ivcom	-	0.001	--	mA	Vcom= 4 V

Note (1): Please adjust VCOM to make the flicker level minimum.

Note (2) : DITH、SELB、SHLR、UPDN

Note (3): The voltage of there pins must be:

AGND+0.2<V14<V13<V12<V11<V10<V9<V8<V7<V6<V5<V4<V3<V2<V1<AVDD-0.2

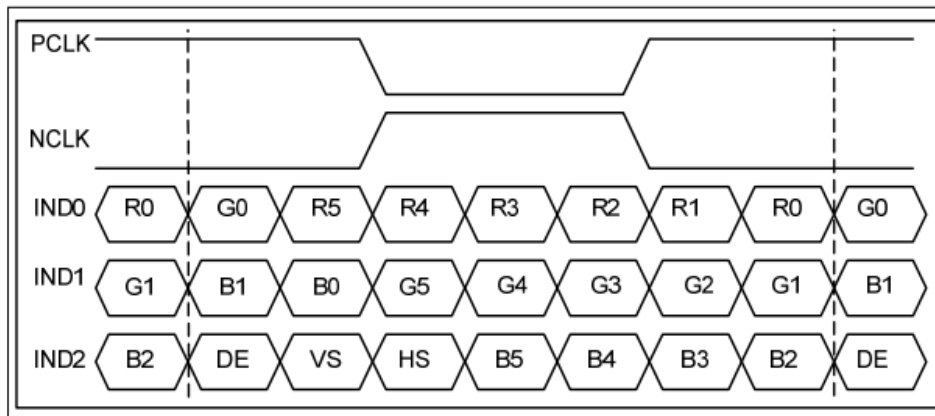
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6.2 Switching Characteristics for LVDS Receiver

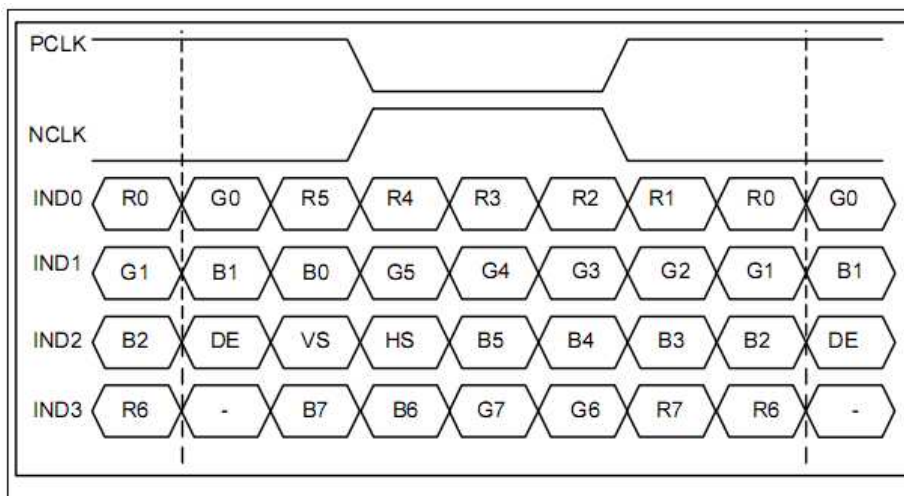
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	V _{th}	—	—	100	mV	V _{CM} =1.2V
Differential Input Low Threshold	V _{tl}	-100	—	—	mV	
Input Current	I _{IN}	-10	—	+10	uA	
Differential input Voltage	V _{ID}	0.1	—	0.6	V	
Common Mode Voltage Offset	V _{CM}	0.7	1.2	1.6	V	

6.3 Bit LVDS input

6.3.1 6bit LVDS input



6.3.2 8Bit LVDS input



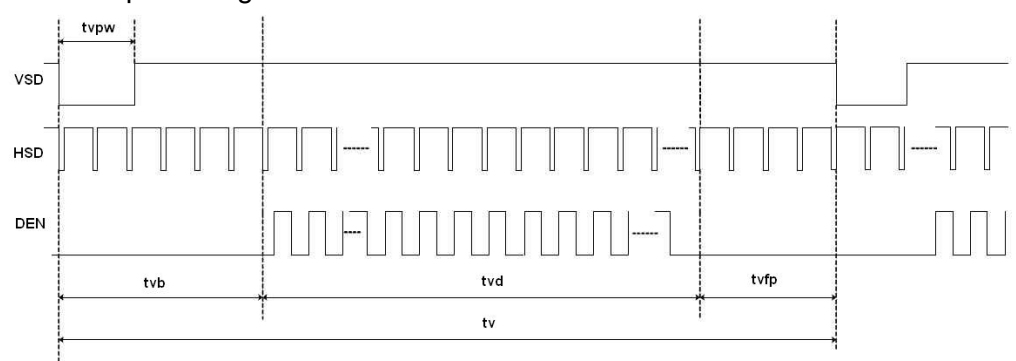
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6.4 Interface Timing (DE mode)

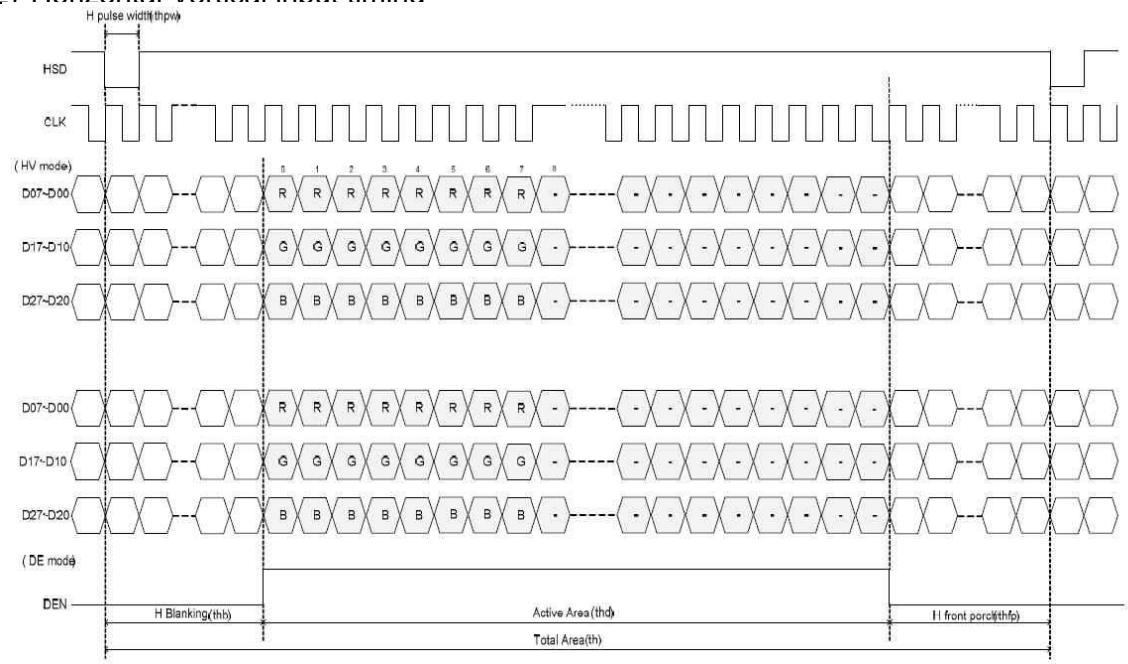
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	55	60	65	Hz
Frame Period	t1	610	635	800	line
Vertical Display Time	t2	600	600	600	line
Vertical Blanking Time	t3	10	35	200	line
1 Line Scanning Time	t4	1164	1344	1400	clock
Horizontal Display Time	t5	1024	1024	1024	clock
Horizontal Blanking Time	t6	140	320	376	clock
Clock Rate	t7	42.6	51.2	72.8	MHz

Timing Diagram of Interface Signal (DE mode)

(1) Vertical input timing

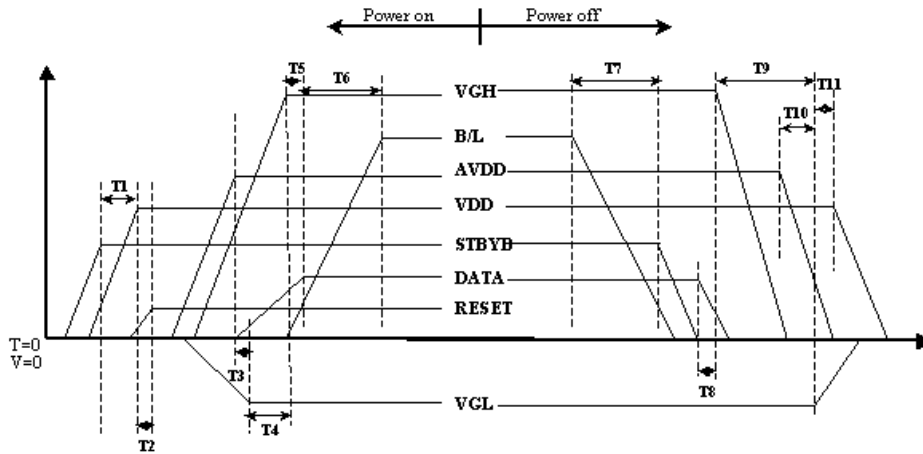


(2) Horizontal Vertical input timing



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6.5 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit
T1	0	--	--	ms
T2	15	--	--	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

6.6 Gamma circuit

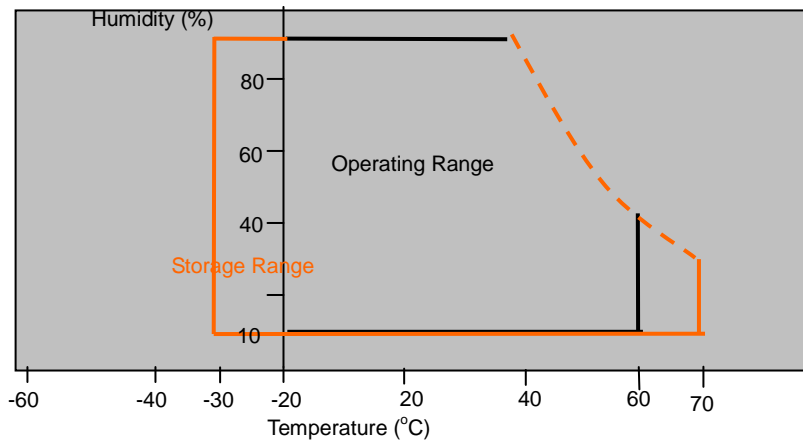
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7.0 Reliability test items

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80°C, 240hrs	
2	Low Temperature Storage	Ta=-30°C, 240hrs	
3	High Temperature Operation	Ta=+70°C, 240hrs	
4	Low Temperature Operation	Ta=-20°C, 240hrs	
5	Thermal Cycling Test (non operation)	-20°C(30min)→+70°C(30min),100 cycles	
6	Vibration	Sine Wave 1.5G, 5~500Hz, XYZ 30min/each direction	
7	Shock	Half-Sine, 200G, 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



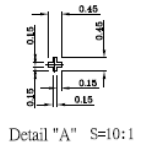
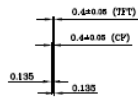
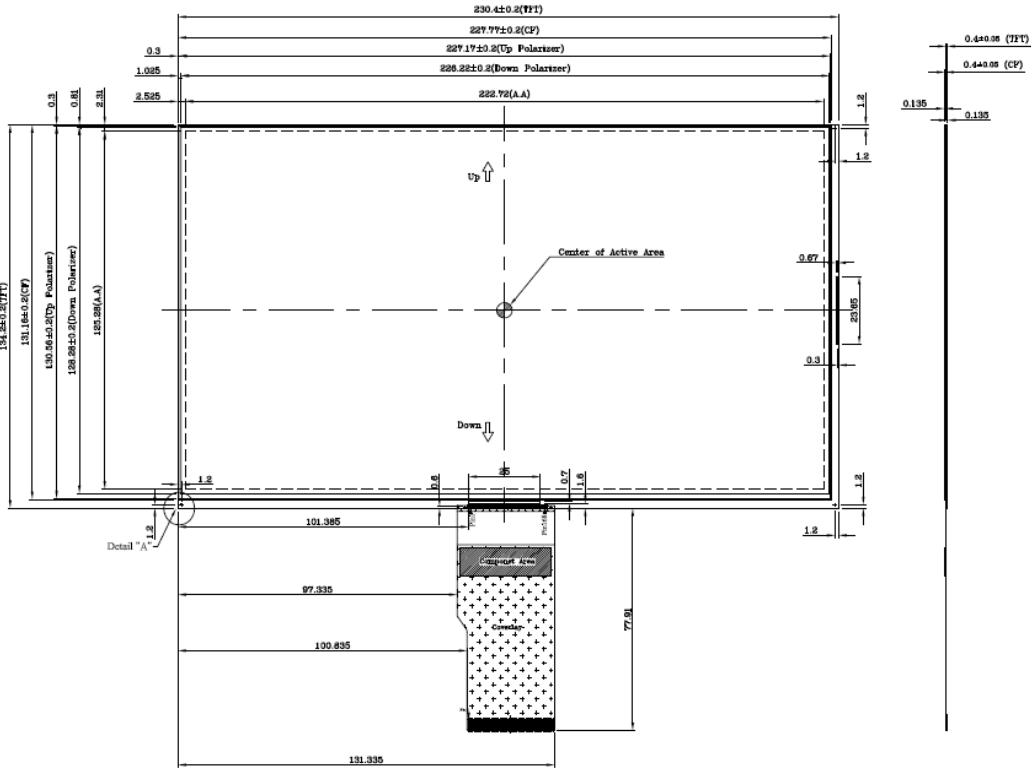
Note .Max wet bulb temp.=39°C

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8.0 OUTLINE DIMENSION

8.1 Front View Outline Dimension

Unit : mm



Note:
General Tolerance $\pm 0.3\text{mm}$

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9 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) Location: The lot mark is attached to the back side of the LCD module. See Product back view. (Section 8.0 : OUTLINE DIMENSION)
- (2) Detail of the Lot mark: Print 15 code as lot mark (see 9.1 Lot Mark)
- (3) This is subject to change without prior notice.



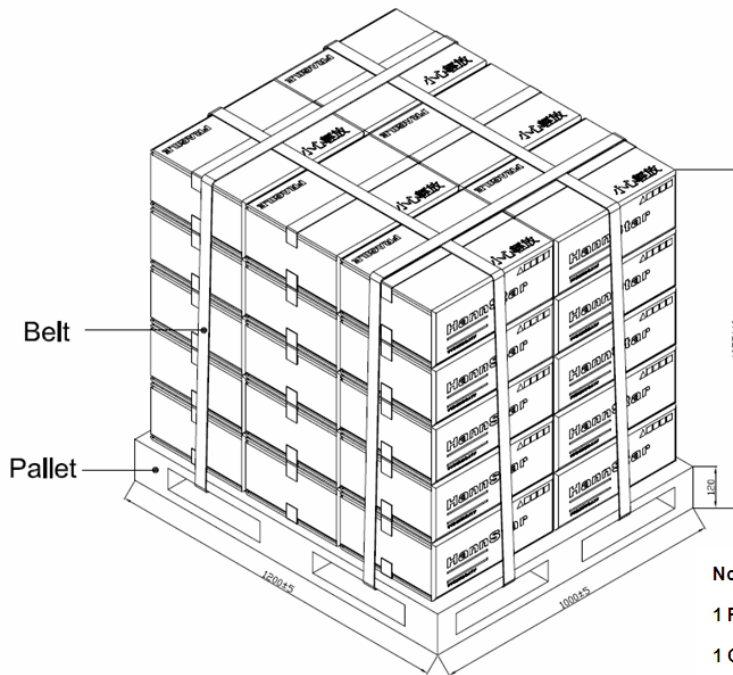
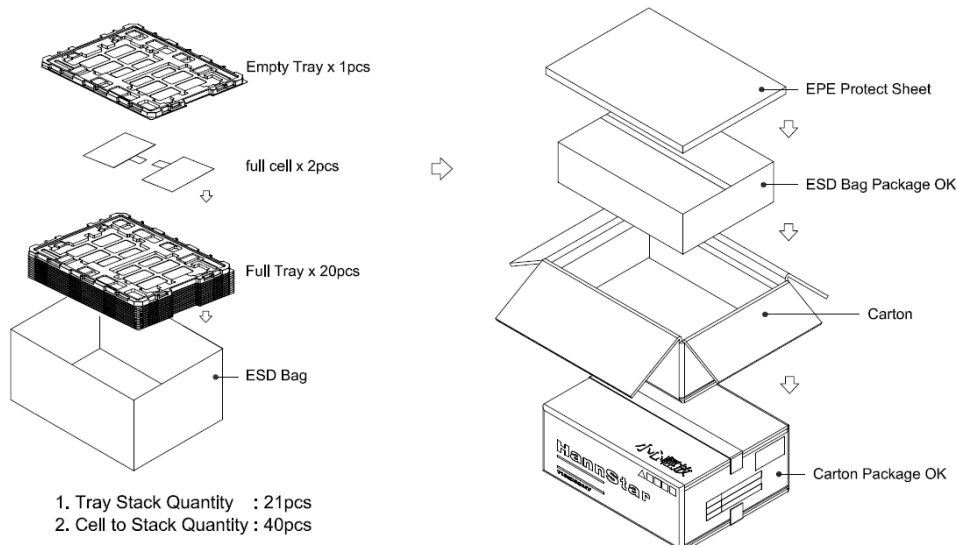
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10.0 PACKAGE SPECIFICATION

10.1 Packing form

LCM Model	LCM Qty. in the Box	Inner Box Size(mm)	Notice
HSD101PFW7-A00-0299	40pcs/Box	556mmx376mmx183	--

10.2 Packing assembly drawings



Notes:

- 1 Pallet : 30pcs Cartons
- 1 Carton : 40pcs cells
- 1 Pallet : 1200pcs cells

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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.