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TO :

Date : Aug., 9, 2016

HannStar Product Specification **(Preliminary)**

8" Color TFT-LCD Module

Model: **HSD080IHW1 – A10**

Note:

- (1) The information contained herein is tentative 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.

Record of Revisions			
Rev.	Date	Sub-Model	Description of change
1.0	Aug., 9, 2016	A**	Preliminary Product Specification was first released.

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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD080IHW1-A 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 8 inch diagonally measured active display area with HD (1280 horizontal by 720 vertical pixel) resolution.

1.2 Features

- 8 (16:9 diagonal) inch configuration
- 16.7M
- ROHS / Halogen Free Compliance

1.3 Applications

- Automobile

1.4 General information

Item		Specification	Unit
Outline Dimension		186.5 (H) x 117.22 (V) x 6.2 (D) (Typ)	mm
Display area		177.024(H) x 99.576(V) (8" diagonal)	mm
Number of Pixel		1280(H) x 720(V)	pixels
Pixel pitch		0.1383(H) x 0.1383(V)	mm
Pixel arrangement		RGB Vertical Stripe	
Display mode		Normally Black	
NTSC		70(Typ.)	%
Surface treatment		Antiglare, Hard-Coating (3H)	
Weight		195	g
Back-light		Single LED (Side-Light type)	
Power Consumption	Logic System (White Pattern)	Logic 0.9W(typ) TBD(max)	W
	B/L System	3.9(Max.)	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	186.2	186.5	186.8	mm
	Vertical (V)	116.92	117.22	117.52	mm
	Depth (D)	5.9	6.2	6.5	mm
Weight		—	195	—	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}	-0.5	15	V	
	V_I	-0.3	$V_{DD} + 0.3$	V	
Logic Signal Input Level	V_{DD}	-0.3	5.0	V	

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-30	85	°C	
Storage Temperature	T_{stg}	-30	85	°C	

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3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR	$\Theta=0$ Normal viewing angle	600	900	—		(1)(2)
Response time	Rising	TR+TF		—	30	40	msec	(1)(3)
	Falling							
White luminance (Center)		Y_L		400	600	—	cd/m ²	(1)(4) ($I_L=240mA$)
Color chromaticity (CIE1931)	White	W_x		0.273	0.313	0.353		(1)(4)
		W_y		0.289	0.329	0.369		
	Red	R_x		0.602	0.642	0.682		
		R_y		0.291	0.331	0.371		
	Green	G_x		0.254	0.294	0.334		
		G_y		0.560	0.600	0.640		
	Blue	B_x		0.106	0.146	0.186		
		B_y		0.016	0.056	0.096		
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}	$\Theta=0$	70	80	—	%	(5)
Optima View Direction		Free						(6)

3.2 Measuring Condition

- Measuring surrounding : dark room
- LED current I_L : 240mA
- Ambient temperature : $25\pm 2^\circ\text{C}$
- 15min. warm-up time.

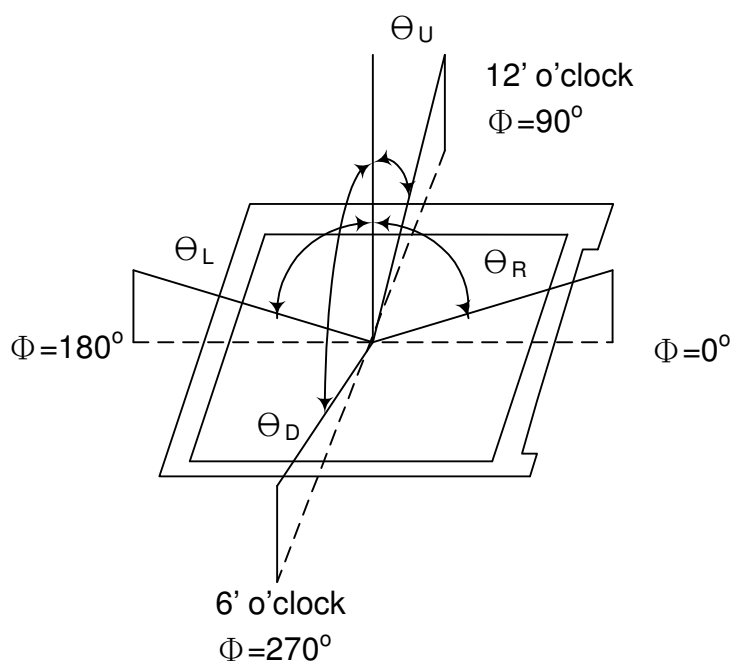
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3.3 Measuring Equipment

- 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:

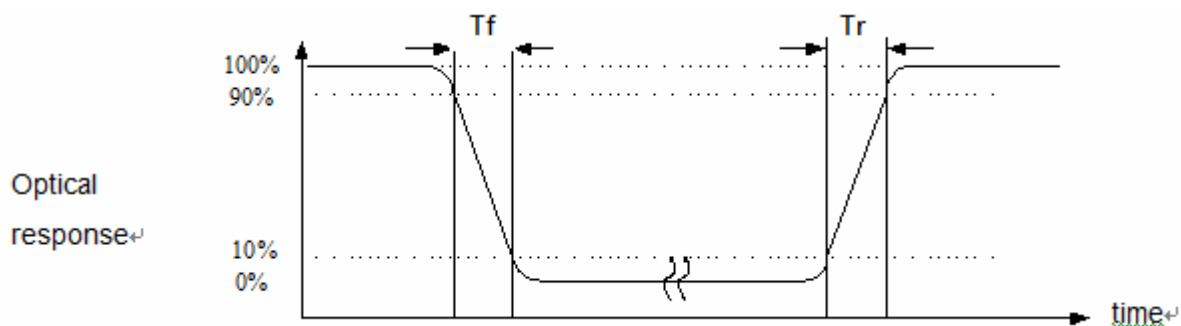


Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

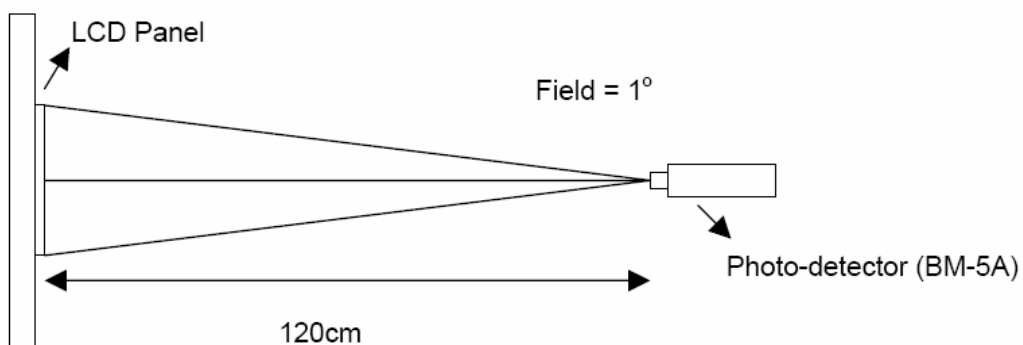
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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

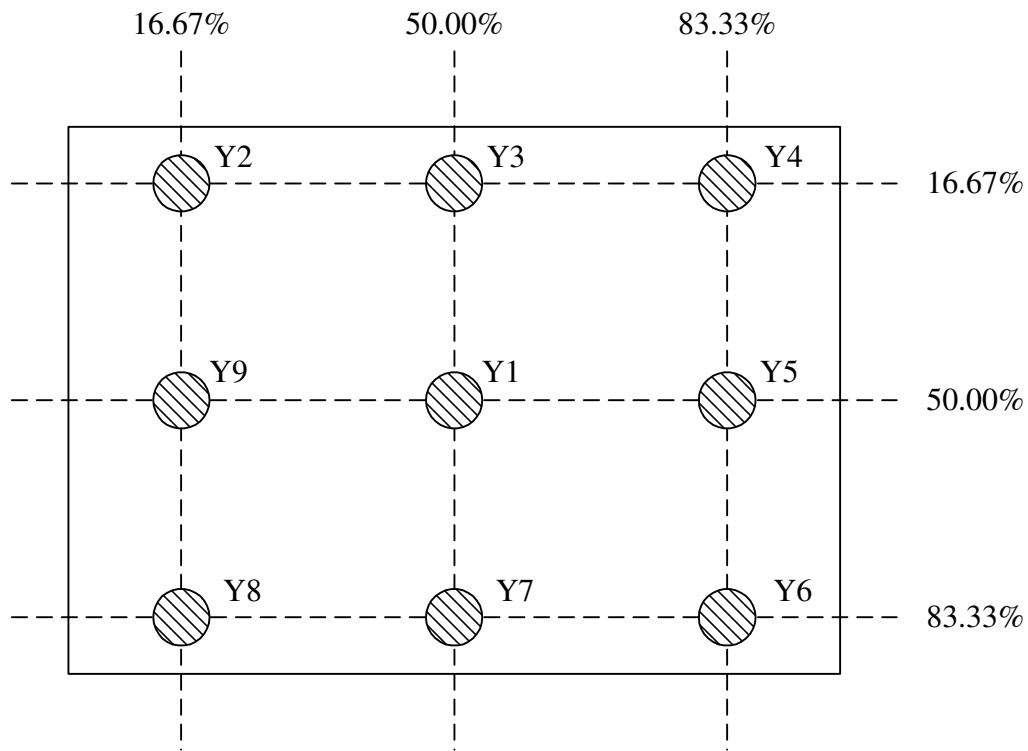


Note (4) Definition of optical measurement setup



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Note (5) Definition of brightness uniformity



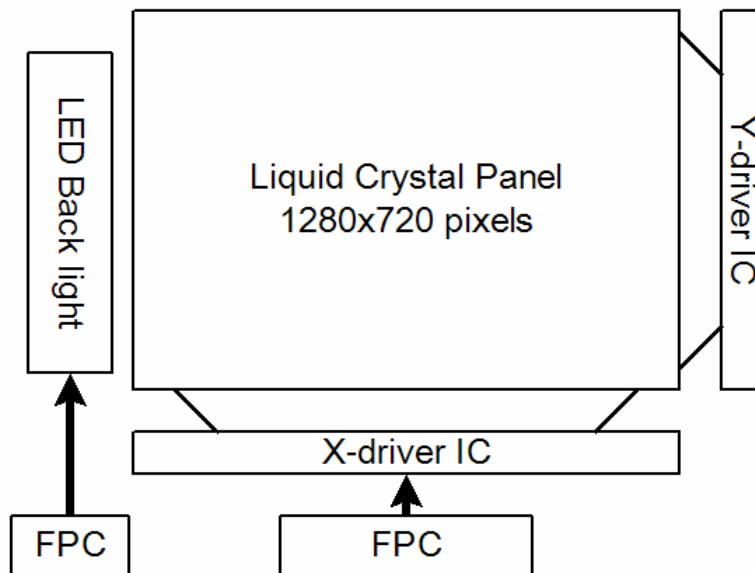
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

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

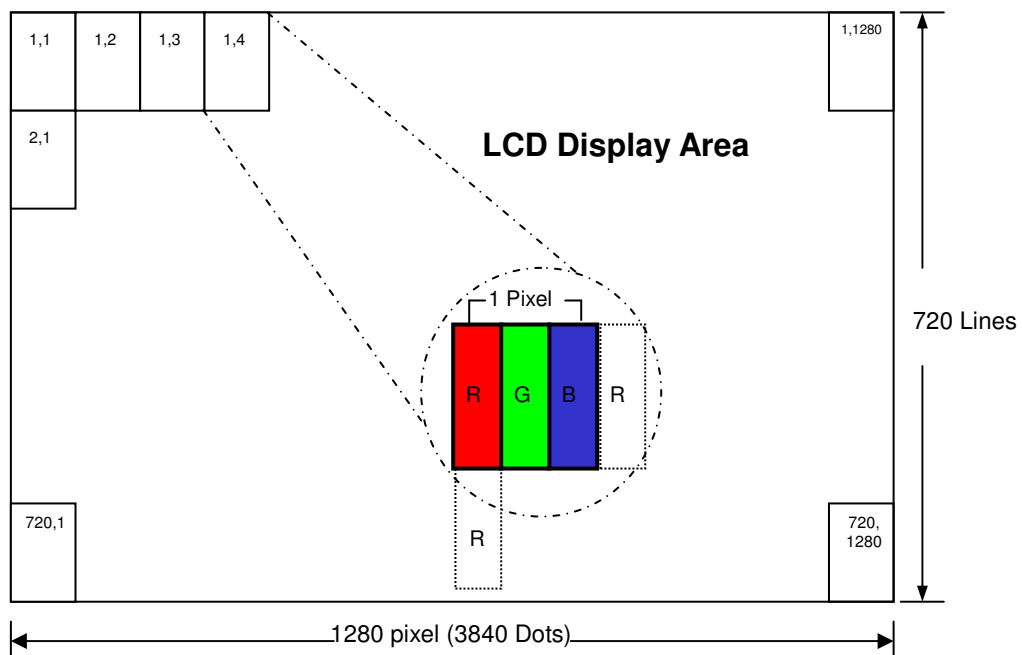
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4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



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4.3 Relationship Between Displayed Color and Input

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

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5.0 INTERFACE PIN CONNECTION

5.1 FPC Pin Assignment:

FPC connector is used for electronics interface. The recommended model is CN1 (Input signal): FH52-60S-0.5SH (HRS)

Pin NO.	Symbol	Description	Note
1	AGND	Analog ground	
2	AVDD	Analog power	
3	DVDD	Digital power	
4	GND	Digital ground	
5	VCOM	Common voltage	
6	DVDD	Digital power	
7	GND	Digital ground	
8	NC	None connect	
9	NC	None connect	
10	NC	None connect	
11	NC	None connect	
12	NC	None connect	
13	NC	None connect	
14	NC	None connect	
15	GND	Digital ground	
16	DVDD	Digital power	
17	GND	Digital ground	
18	PIND3	Positive LVDS differential data input	
19	NIND3	Negative LVDS differential data input	
20	GND	Digital ground	
21	PINCLK	Positive LVDS differential data input	
22	NINCLK	Negative LVDS differential data input	
23	GND	Digital ground	
24	PIND2	Positive LVDS differential data input	
25	NIND2	Negative LVDS differential data input	
26	GND	Digital ground	
27	PIND1	Positive LVDS differential data input	
28	NIND1	Negative LVDS differential data input	
29	GND	Digital ground	
30	PIND0	Positive LVDS differential data input	

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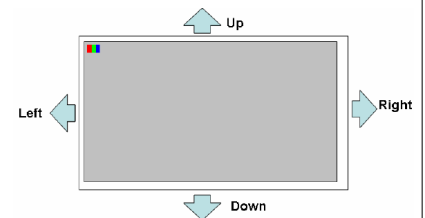
Pin NO.	Symbol	Description	Note
31	NIND0	Negative LVDS differential data input	
32	GND	Digital ground	
33	GND_LVDS	LVDS ground	
34	GRB	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ,C=0.1uF)	
35	STBYB 3.3V	Standby mode STBYB= 1, normal operation STBYB=0 ,timing control, source driver will turn off, all output are high-Z	
36	SHLR 3.3V	Left or right display control SHLR="1"(3.3V): Left → Right SHLR="0"(GND): Right → Left	Note 1
37	DVDD	Digital power	
38	UPDN 3.3V	Up / down display control UPDN="1"(3.3V): Up → Down UPDN="0"(GND): Down → Up	Note 1
39	AGND	Analog ground	
40	AVDD	Analog power	
41	VCOM	Common voltage	
42	NC	None connect	
43	GND	Digital ground	
44	DVDD	Digital Power	
45	GND	Digital ground	
46	NC	None connect	
47	NC	None connect	
48	NC	None connect	
49	NC	None connect	
50	NC	None connect	
51	NC	None connect	
52	NC	None connect	
53	GND	Digital ground	
54	DVDD	Digital power	
55	SELB 3.3V	6bit/8bit mode select, SELB = "1"(3.3V): LVDS input data is 8bits SELB = "0"(GND): LVDS input data is 6bits	

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Pin NO.	Symbol	Description	Note
56	VGH	Positive power for TFT	
57	DVDD	Digital power for Gate IC	
58	VGL	Negative power for TFT	
59	GND	Digital ground for Gate IC	
60	BIST 3.3V	Normal operation/BIST pattern select. BIST="1"(3.3V): Normal operation. BIST="0"(GND): BIST mode	

Note 1 : UPDN and SHLR control function

SHLR	UPDN	Data shifting
DVDD	GND	Left→Right→Down→Up
GND	GND	Right→Left ; Down→Up
DVDD	DVDD	Left→Right ; Up→Down(default)
GND	DVDD	Right→Left ; Up→Down(default)



5.2 LED Board Pin Assignment:

CN2: FH52-10S-0.5SH (HRS)

Pin NO.	Function	Remark
1	ANODE	A
2	ANODE	A
3	ANODE	A
4	Dummy	NC
5	CATHODE1	K1
6	CATHODE2	K2
7	CATHODE3	K3
8	CATHODE4	K4
9	Dummy	NC
10	Dummy	NC

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6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3	3.3	3.6	V	
	VGH		20		V	Note (1)
	VGL		-10		V	Note (2)
	AVDD		12.5		V	
	VCOM		5.2		V	Note (3)
Current of power supply	IDD	TBD	TBD	TBD	mA	VDD =3.3V
	IADD	TBD	TBD	TBD	mA	AVDD=12.5V
	IGH	TBD	TBD	TBD	mA	VGH=18
	IGL	TBD	TBD	TBD	mA	VGL=-10V
	Ivcom	TBD	TBD	TBD	mA	VCOM=5.1

Note :

- (1) : VGH is TFT Gate operating Voltage.
- (2) : VGL is TFT Gate operating Voltage.
- (3) : VCOM must be adjusted to optimize display quality _ Flicker Pattern ◦
- (4) : @ White Pattern & 60Hz ◦

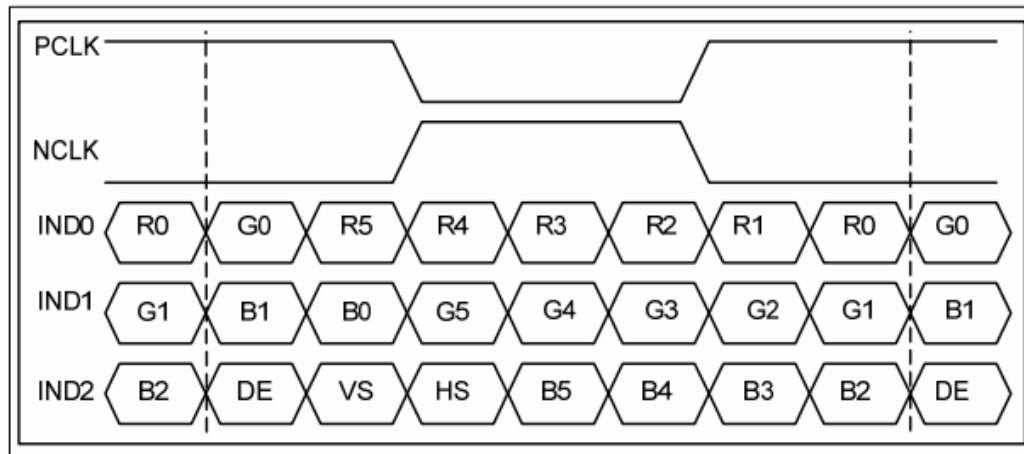
6.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	V_{TH}			100	mV	
Differential Input Low Threshold	V_{TL}	-100			mV	
Differential input common mode voltage	V_{CM}	0.6	0.9	1.2	V	
Input Current	I_{IN}	-10		10	uA	RX+/-, RXC+/-
Differential input Voltage	V_{IH}/ V_{IL}	100		300	mV	

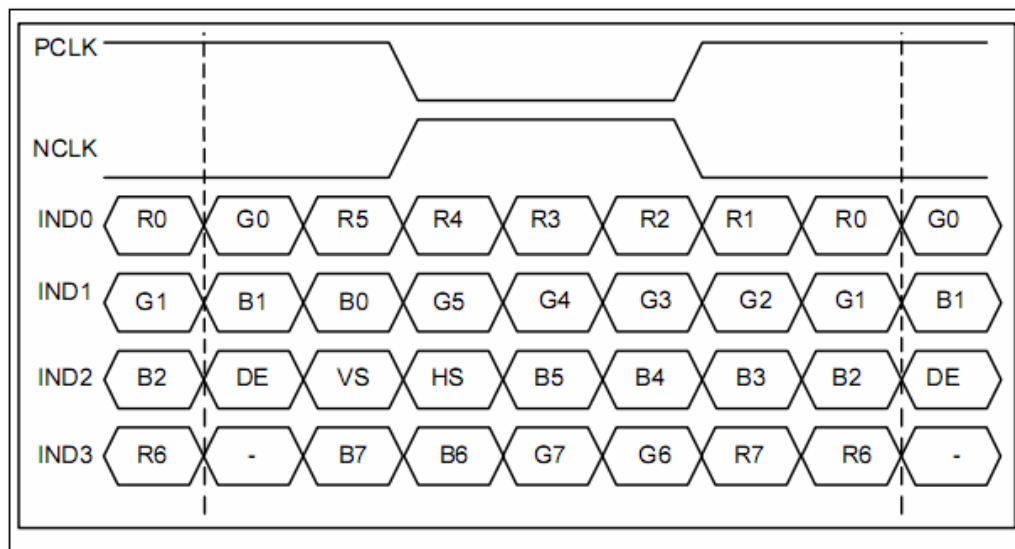
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6.3 Bit LVDS input

6.3.1 6bit LVDS input



6.3.2 8Bit LVDS input



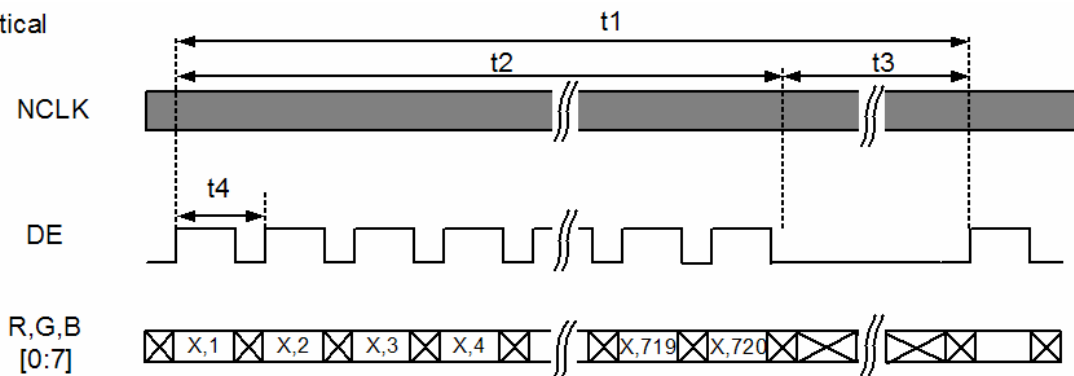
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6.4 Interface Timing (DE mode)

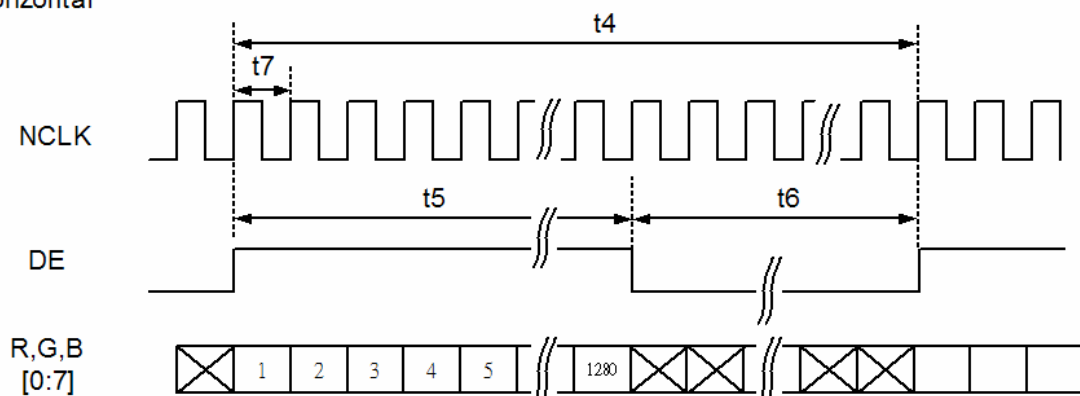
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	59.35	59.99	60.65	Hz
Vertical Total Time	T_v	726	728	730	line
Vertical Display Time	T_{vD}	720			
Vertical Blanking Time	T_{vB}	6	8	10	line
Horizontal Total Time	T_H	1340	1344	1348	clock
Horizontal Display Time	T_{HD}	1280			
Horizontal Blanking Time	T_{HB}	60	64	68	clock
Clock Rate	$1/T_{\text{Clock}}$	58.4	58.7	59.0	MHz

Timing Diagram of Interface Signal (DE mode)

1. Vertical

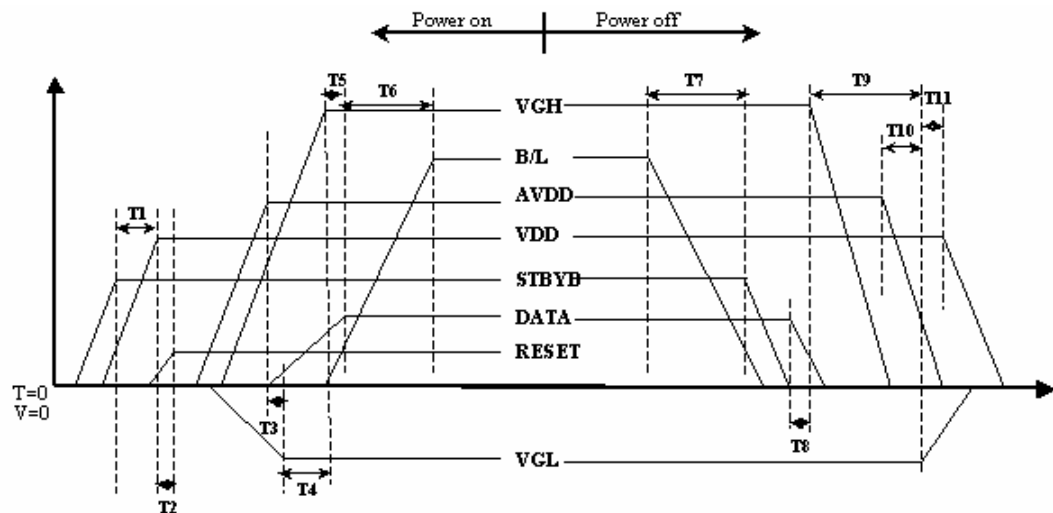


2. Horizontal



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6.5 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit
T1	0	--	--	ms
T2	50	--	--	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

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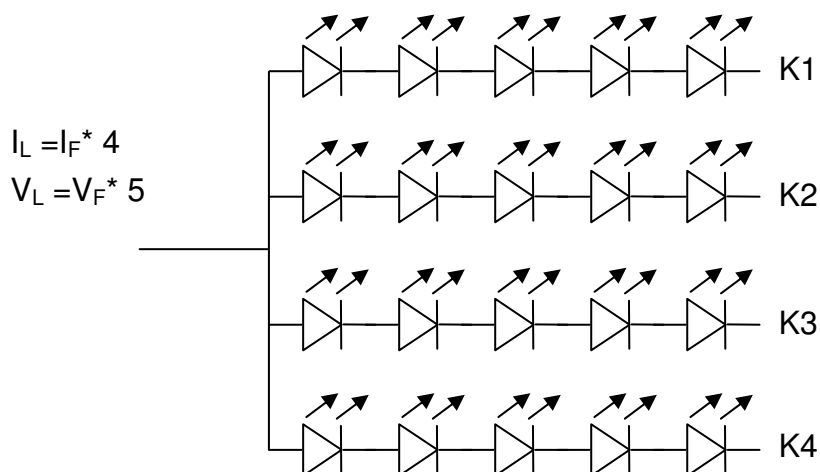
6.6 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_L	--	240	--	mA	$T_a=25^{\circ}\text{C}$
LED Voltage	V_L	--	15	16.28	Volt	$T_a=25^{\circ}\text{C}$
LED Life-Time	N/A	30,000	--	--	Hour	$T_a=25^{\circ}\text{C}$ $I_F=60\text{mA}$ 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 $I_L=240\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 240mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit



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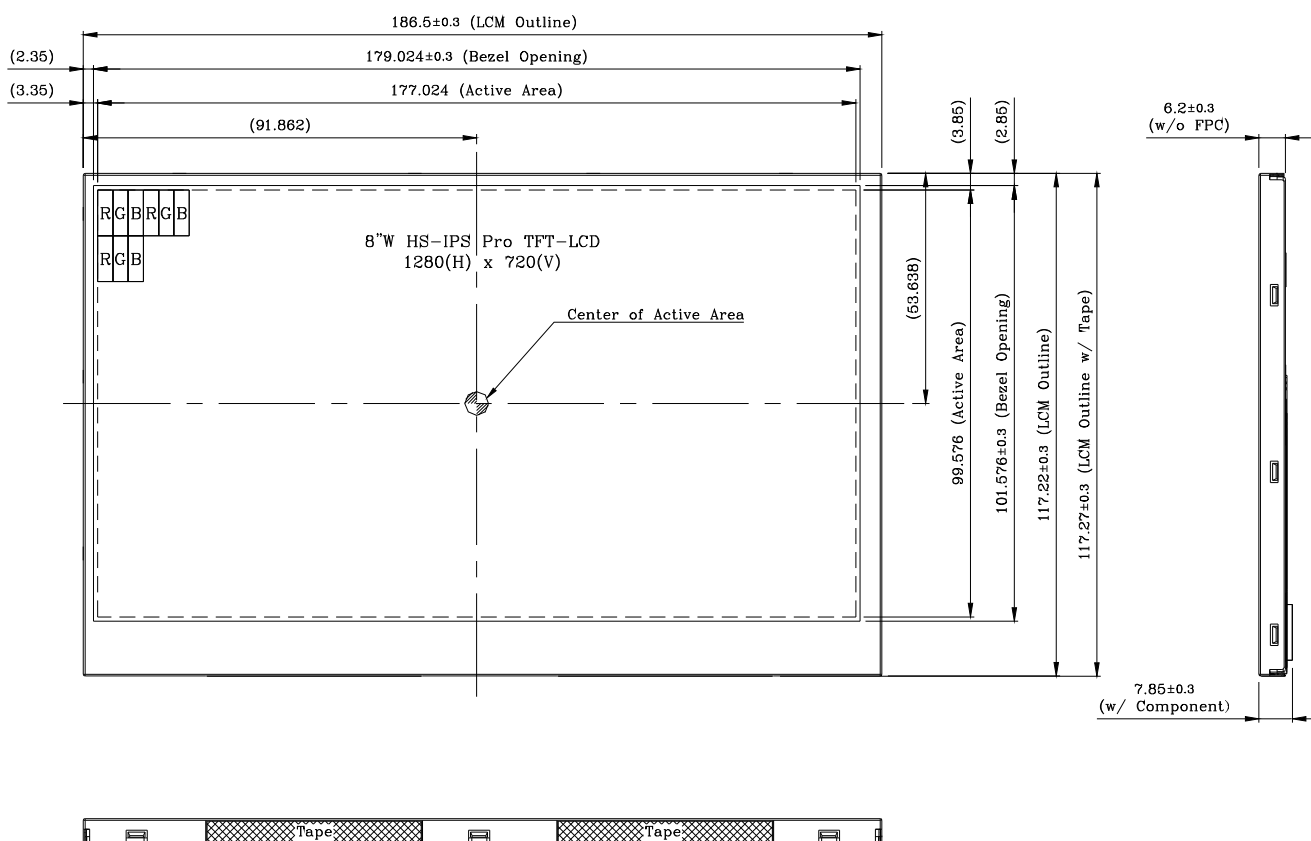
7.0 RELIABILITY TEST ITEMS

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+85°C, 240hrs	
2	Low Temperature Storage	Ta=-30°C, 240hrs	
3	High Temperature Operation	Ta=+85°C, 240hrs	
4	Low Temperature Operation	Ta=-30°C, 240hrs	
5	High Temperature and High Humidity (operation)	Ta=+60°C, 90%RH, 240hrs	
6	Thermal Cycling Test (non operation)	-30°C(30min) → +85°C(30min), 100 cycles	
7	Electrostatic Discharge	±200V,200pF(0Ω) 1 time/connector	
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, 333.3~400 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 follow QB100-0027 1 corner, 3 edges, 6 surfaces	

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

Unit : mm

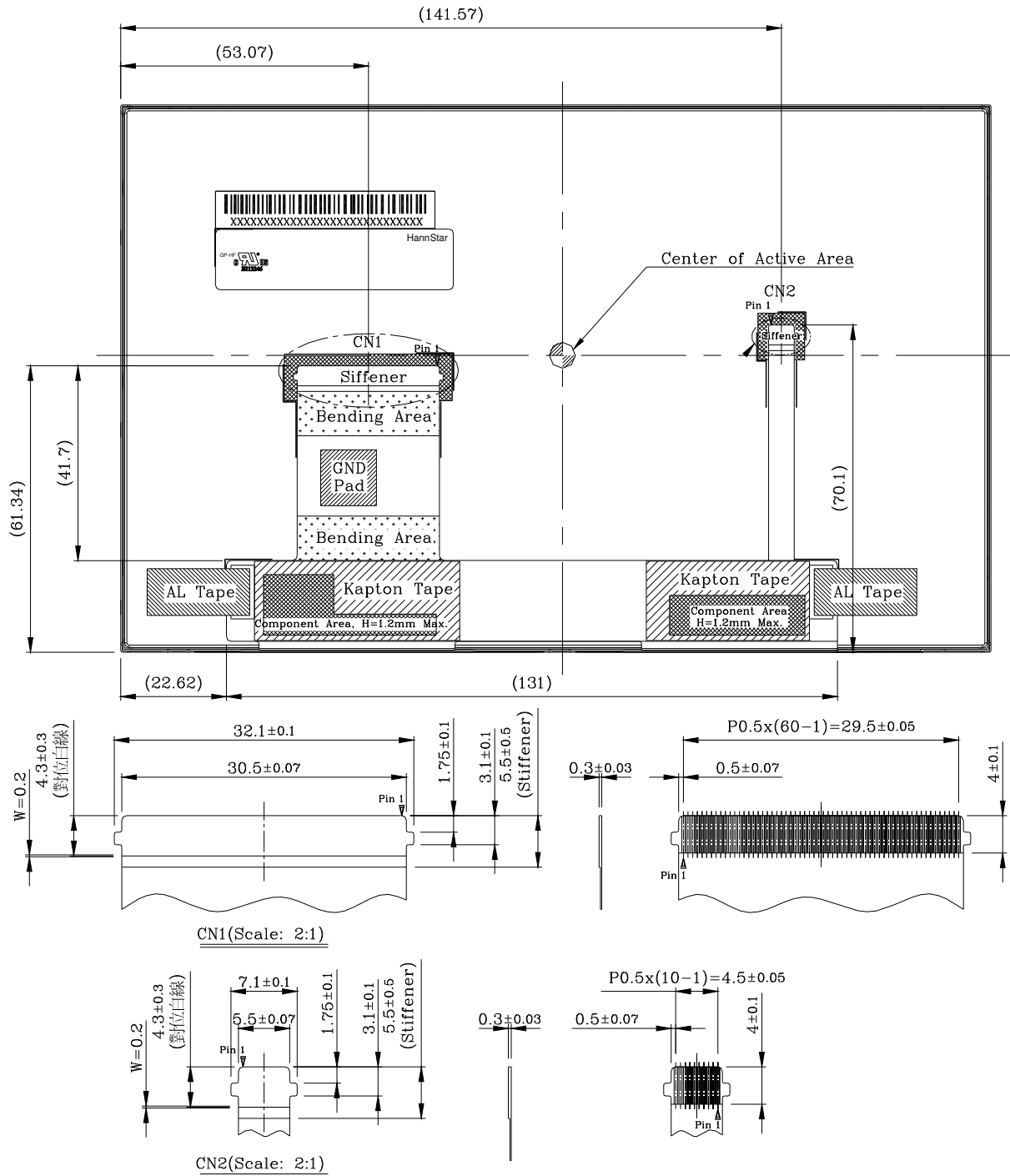
8.1 Front View:



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8.1 Rear View:



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

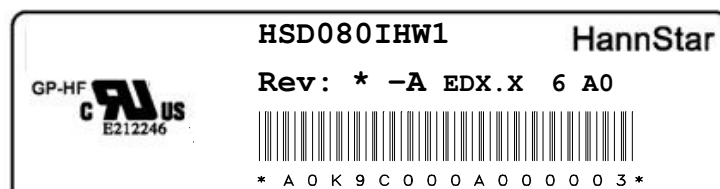
Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Mark	6	7	8	9	0	1	2	3	4	5

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 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.



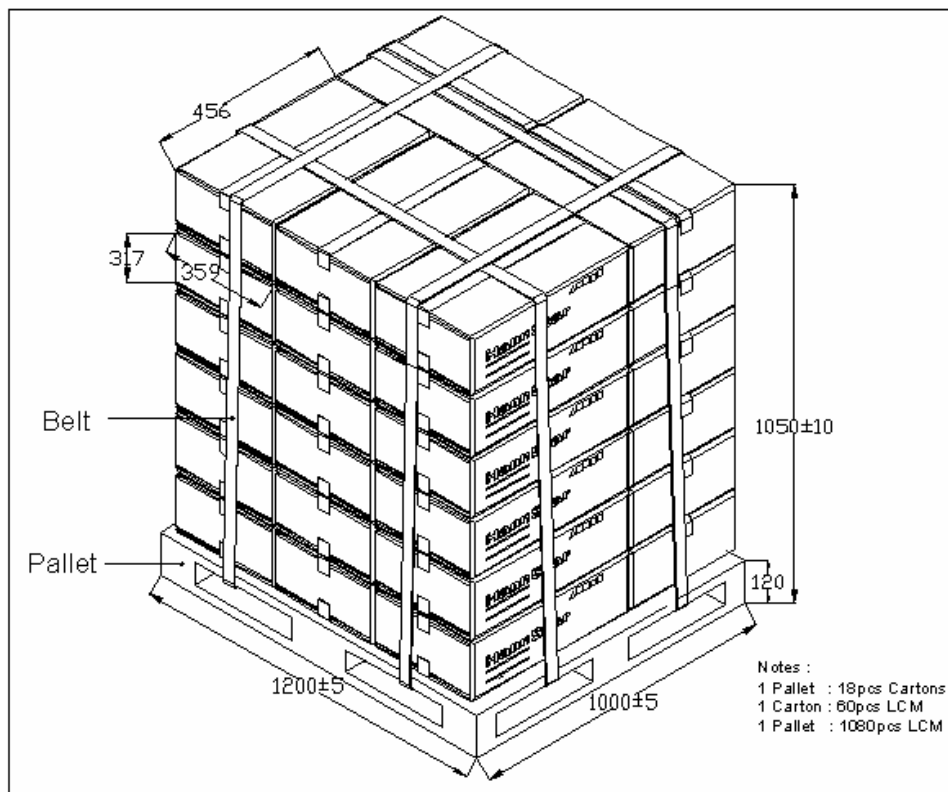
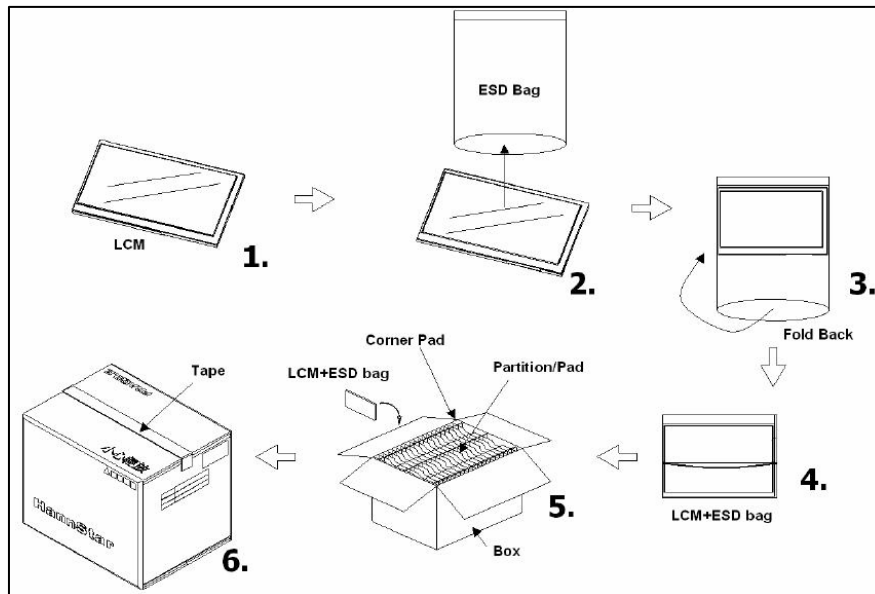
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10.0 PACKAGE SPECIFICATION

10.1 Packing form

LCM Model	Qty. in the Box	Inner Box Size(mm)	Notice
HSD080IHW1-A00	60 pcs/Box	Ref. 464 x 359 x 317 ^H	--

10.2 Packing assembly drawings



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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.