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TO :

Date : Mar., 20, 2008

HannStar Product Specification **(Preliminary)**

8.9” Color TFT-LCD Module

Model: HSD089IFW1

-A**

- 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	Mar., 28, 2008	-	Preliminary Product Specification was first released.



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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD100IFW1-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 8.9 (17:10) inch diagonally measured active display area with 3072 x 600 dot (1024 horizontal by 600 vertical pixel) resolution.

1.2 Features

- 8.9 (17:10 diagonal) inch configuration
- One channel LVDS interface
- RoHS Compliance

1.3 Applications

- Mobile NB
- Digital Photo frame
- Display terminal for AV application

1.4 General information

Item	Specification	Unit	
Outline Dimension	213.36x 129.55 x 5.15 (Typ.)	mm	
Display area	195.072(H) x 113.4(V)	mm	
Number of Pixel	1024 RGB(H) x600(V)	pixels	
Pixel pitch	190.5(H) x 189(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display mode	Normally white		
Surface treatment	Antiglare, Hard-Coating (3H) with EWV film		
Weight	200 (Typ.)	g	
Back-light	Single LED (Side-Light type)		
Power Consumption	Logic System	(TBD)(Typ.)	mW
	B/L System	(TBD)(Max.)	W

1.5 Mechanical Information

Item	Min.	Typ.	Max.	Unit	
Module Size	Horizontal (H)	213.06	213.36	213.66	mm
	Vertical (V)	129.25	129.55	129.85	mm
	Depth (D)	—	5.15	5.45	mm
Weight	—	(200)	—	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
LED Power Supply voltage	V_{LED}	4.5	5.5	V	GND=0
Logic Supply voltage	V_{DD}	3.0	3.6	V	

2.1.2 Back-Light Unit

Item	Symbol	Typ.	Max.	Unit	Note
LED current	I_L	160	--	mA	(1) (2)
LED voltage	V_L	10.0	TBD	V	(1) (2)(3)

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) $T_a = 25 \pm 2^\circ\text{C}$

(3) Test Condition: LED current 160 mA

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	0	50	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-20	60	$^\circ\text{C}$	

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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	TBD	500	—		(1)(2)
Response time	Rising	T_R		—	5	TBD	msec	(1)(3)
	Falling	T_F		—	20	TBD		
White luminance (Center)		Y_L		—	180	—	cd/m ²	(1)(4) ($I_L=160mA$)
Color chromaticity (CIE1931)	White	W_x	$\theta=0$ Normal viewing angle	TBD	0.310	TBD		(1)(4)
		W_y		TBD	0.330	TBD		
	Green	G_x		TBD	TBD	TBD		
		G_y		TBD	TBD	TBD		
	Blue	B_x		TBD	TBD	TBD		
		B_y		TBD	TBD	TBD		
	Red	R_x		TBD	TBD	TBD		
		R_y		TBD	TBD	TBD		
Viewing angle	Hor.	θ_L	CR>10	TBD	(70)	—		
		θ_R		TBD	(70)	—		
	Ver.	θ_U		TBD	(50)	—		
		θ_D		TBD	(60)	—		
Brightness uniformity		B_{UNI}	$\theta=0$	70	—	—	%	(5)
Optima View Direction		6 O' clock						(6)

3.2 Measuring Condition

- Measuring surrounding : dark room
- LED current I_L : 160mA
- Ambient temperature : 25±2°C
- 15min. warm-up time.

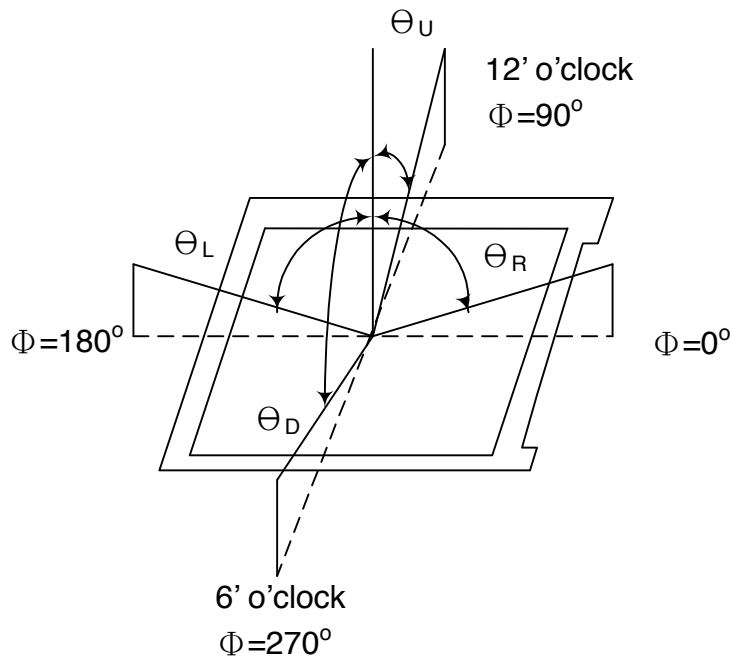
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3.3 Measuring Equipment

- 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:

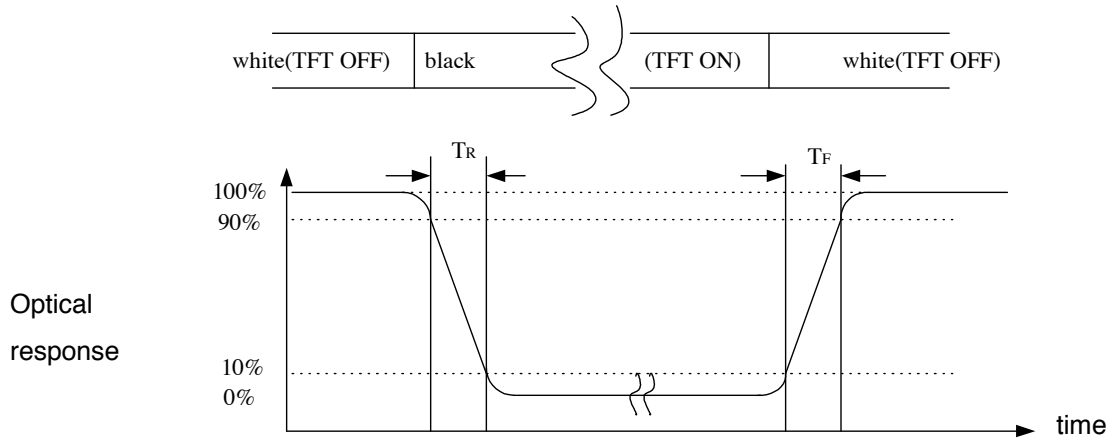


Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

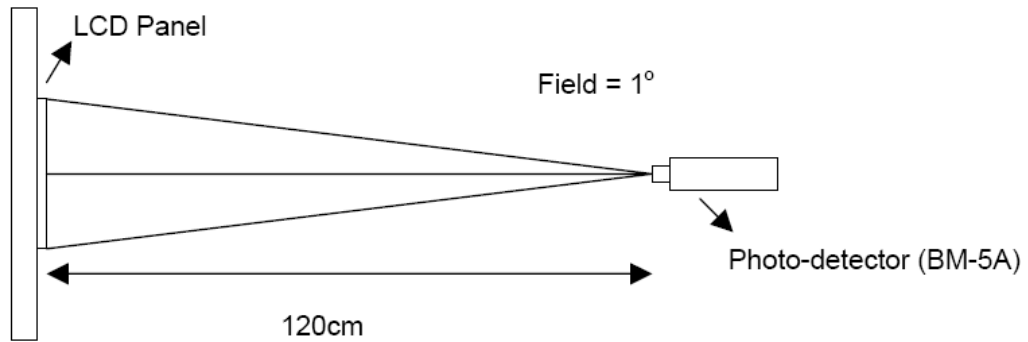
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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

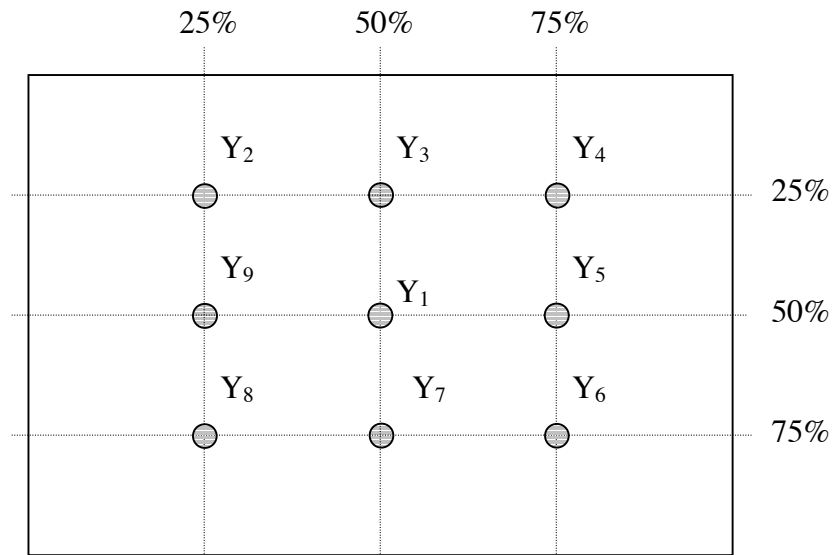


Note (4) Definition of optical measurement setup



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Note (5) Definition of brightness uniformity



(Min Luminance of 9 points)

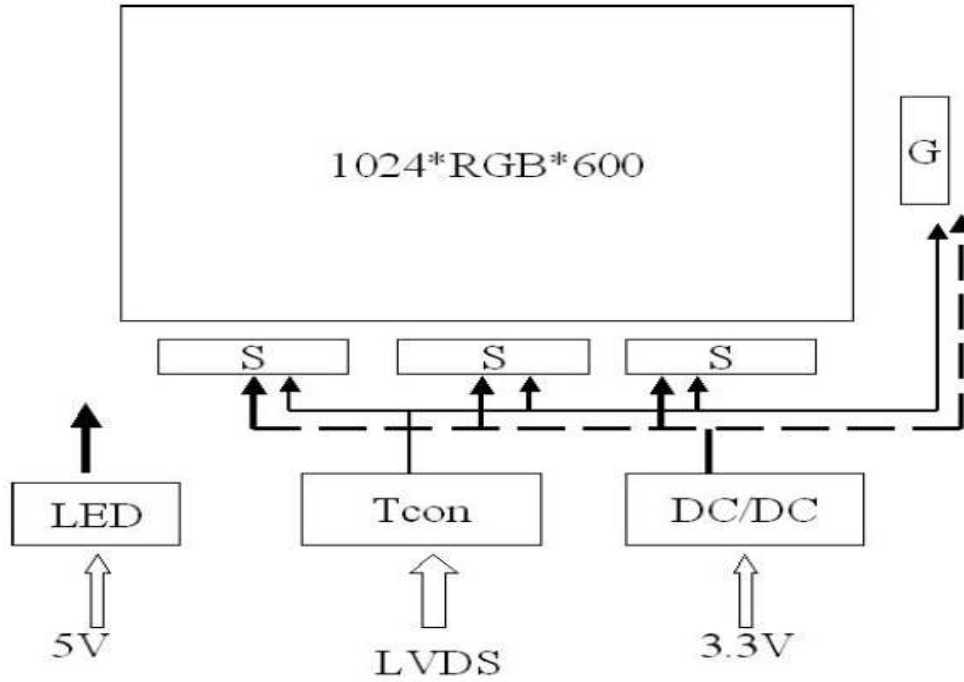
$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

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

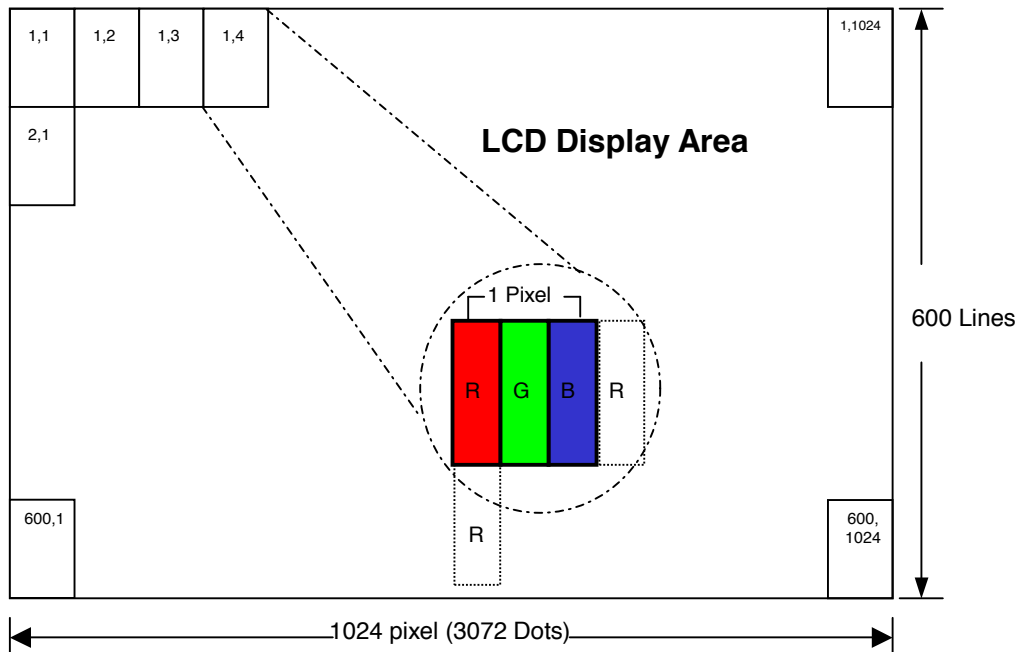
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4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



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5.0 INTERFACE PIN CONNECTION

5.1 TFT LCD Module :

CN1 (Input signal): LVDS 40PINS PITCH:0.4mm

Pin No.	Signal	Description
1	GND	Ground
2	VDD	3.3V Power
3	VDD	3.3V Power
4	V_EDID	3.3V Power for NB
5	NC	No Connection
6	CLK_EDID	EDID Clock Input
7	DATA_EDID	EDID Data Input
8	RXIN0-	LVDS Signal - channel0-
9	RXIN0+	LVDS Signal+ channel0+
10	GND	Ground
11	RXIN1-	Data Input channel1-
12	RXIN1+	Data Input channel1+
13	GND	Ground
14	RXIN2-	Data Input channel2-
15	RXIN2+	Data Input channel2+
16	GND	Ground
17	RXCLKIN-	Data Input CLK-
18	RXCLKIN+	Data Input CLK+
19	GND	Ground
20	NC	NC for RXIN3- channel3-
21	NC	NC for RXIN3+ channel3+
22	GND	Ground
23	NC	No Connection
24	NC	No Connection
25	GND	Ground
26	NC	Reserve for Hannstar test
27	NC	No Connection
28	GND	Ground
29	VLED	LED Power Supply +5V
30	VLED	LED Power Supply +5V
31	VLED_GND	LED Ground
32	VLED_GND	LED Ground
33	VLED_GND	LED Ground
34	NC	Reserve for Hannstar test
35	NC	No Connection
36	NC	Reserve for Hannstar test
37	NC	No Connection
38	ADJ	Adjust for LED brightness Note

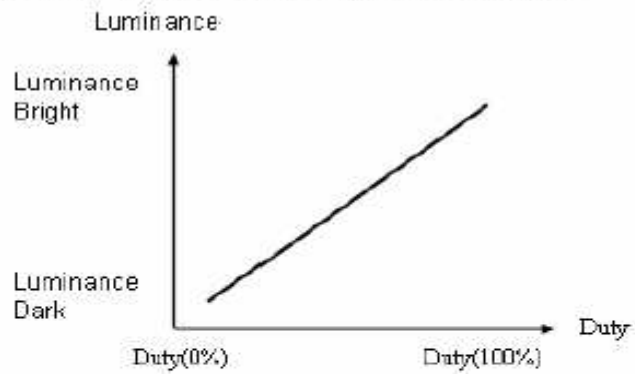
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39	NC	No Connection
40	NC	No Connection

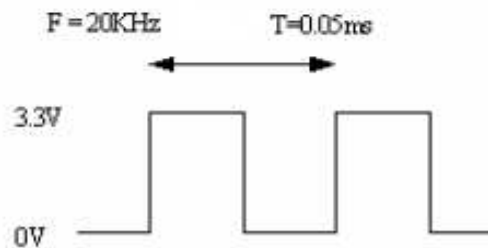
Note : The brightness of LCD panel could be changed by adjusting ADJ

【 Note 】

1) ADJ adjust brightness to control Pin · Pulse duty the bigger the brighter.



2) ADJ signal=0~3.3V · operation frequency : 20KHZ





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6.0 ELECTRICAL CHARACTERISTICS

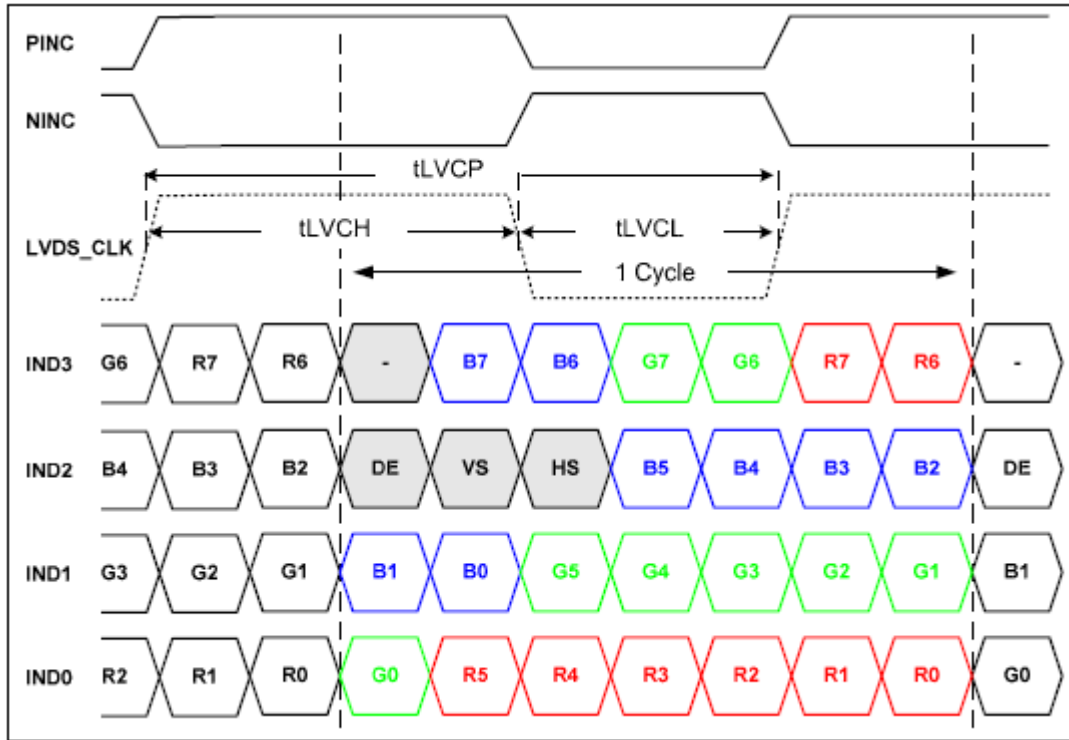
6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V _{DD}	3.0	3.3	3.6	V	
Input signal voltage	V _{iH}	1.4	-	V _{DD}	V	
	V _{iL}	0	-	0.4	V	
Current of power supply	I _{DD}	-	TBD	-	uA	V _{DD} = 3.3V、L0 pattern

Note : (1) The brightness of LCD panel could be changed by adjusting ADJ.

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6.2 Timing Diagram of Interface Signal

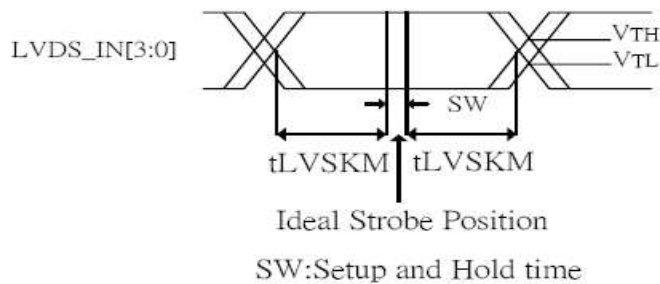


for 6bits LVDS input

for 8bits LVDS input

IND0= channel0 RXIN0-/+
 IND1= channel1 RXIN1-/+
 IND2= channel2 RXIN2-/+
 IND3= channel3 function off

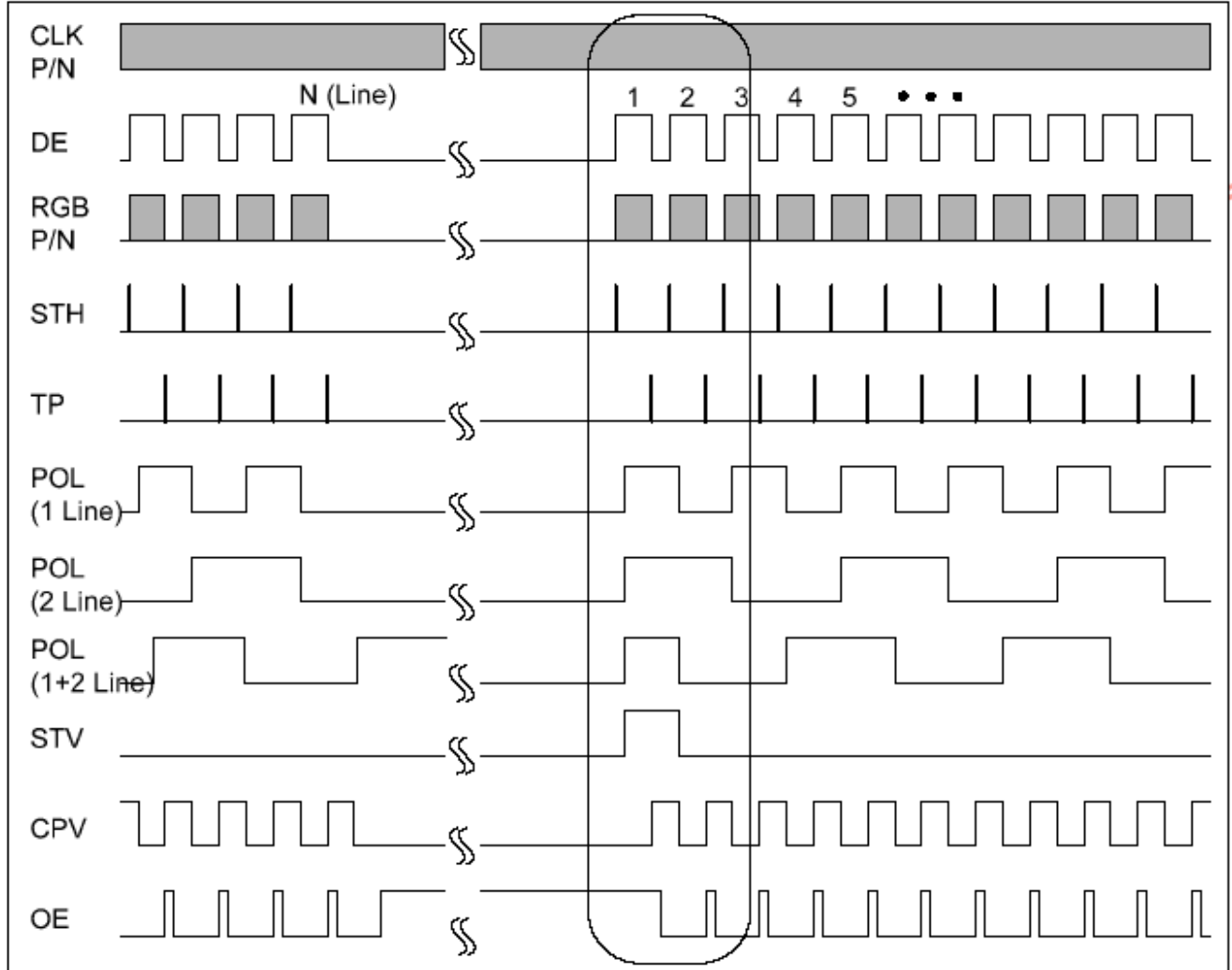
IND0= channel0 RXIN0-/+
 IND1= channel1 RXIN1-/+
 IND2= channel2 RXIN2-/+
 IND3= channel3 RXIN3-/+
 (need change BOM for 8bits)



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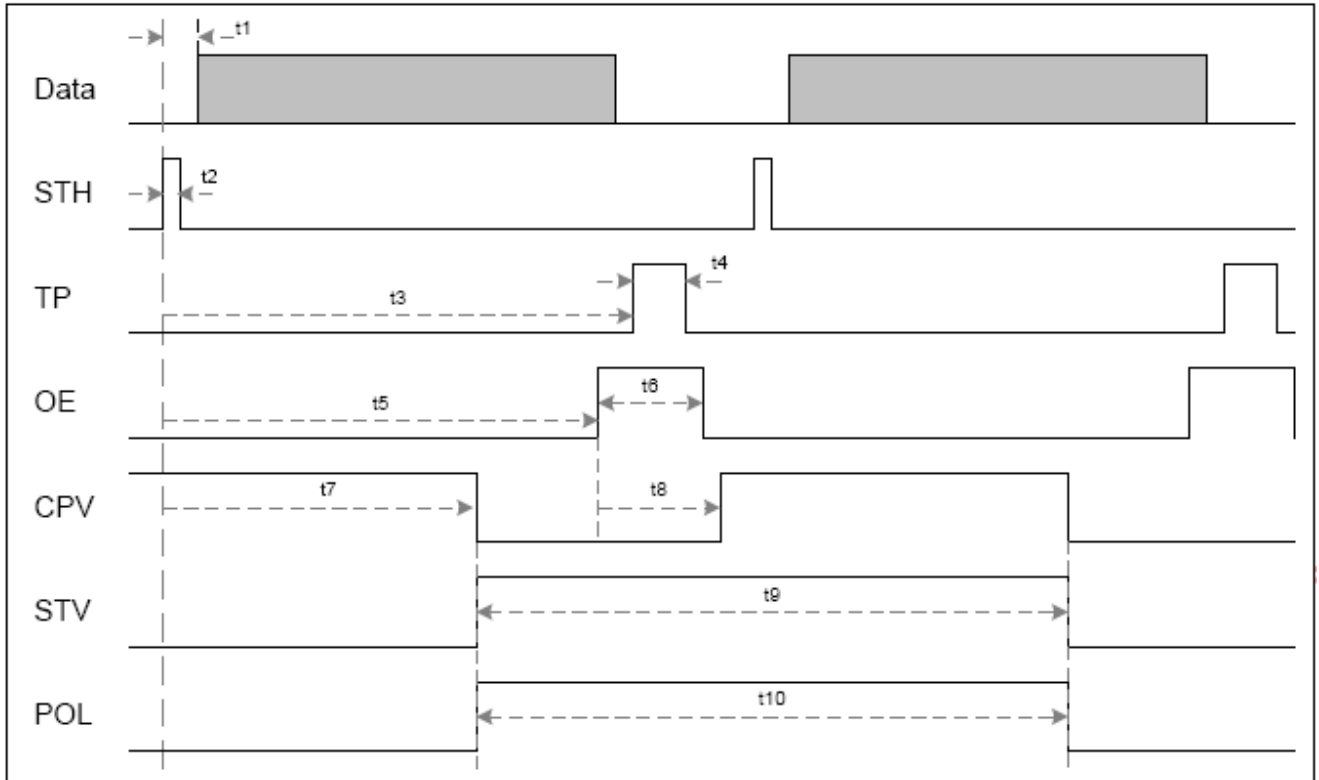
Output Timing Characteristics

Vertical output timing diagram



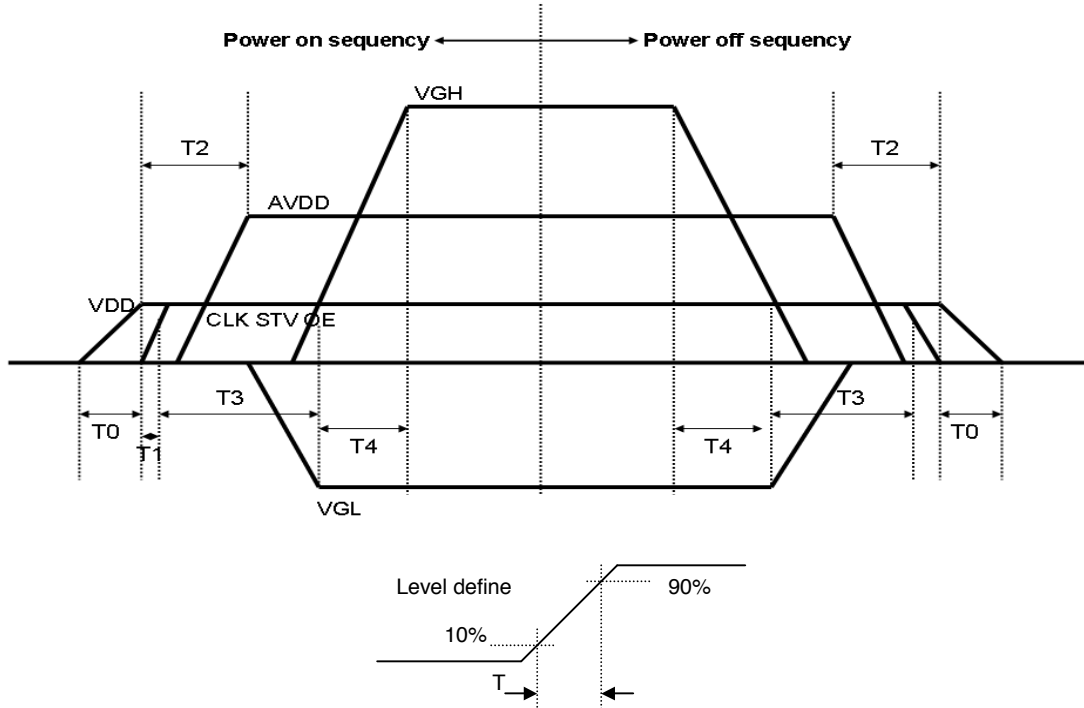
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Horizontal output timing diagram



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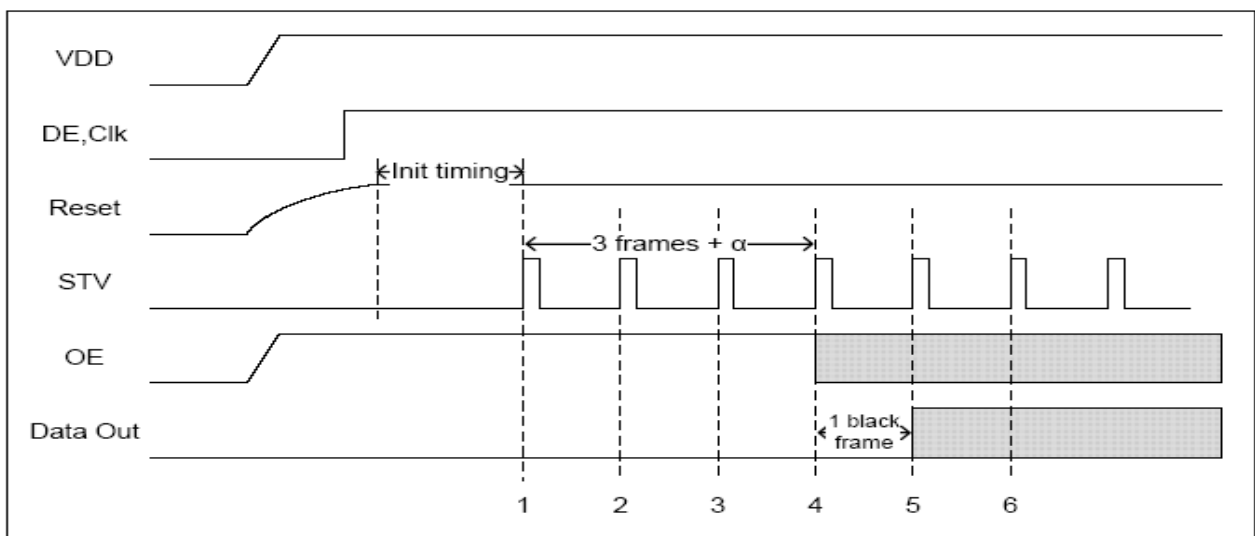
6.3 Power Sequence



Power On Sequence : $V_{DD} \rightarrow AV_{DD} \rightarrow VGL \rightarrow VGH$

Power Off Sequence : $VGH \rightarrow VGL \rightarrow AV_{DD} \rightarrow V_{DD}$

Power on Sequence



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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, 240hrs	
4	Low Temperature Operation	Ta=-0°C, 240hrs	
5	High Temperature and High Humidity (operation)	Ta=+60°C, 90%RH, 240hrs	
6	Thermal Cycling Test (non operation)	-10°C → +60°C, 50 cycles, 2hrs/cycle	
7	Electrostatic Discharge	±200V,200pF(0Ω) 1 time/connector	
8	Vibration	1.Random: 1.04G, 10~500Hz, X/Y/Z, 30min/each direction 2.Sweep sine: 1.5G, 5~500Hz, X/Y/Z, 30min/each direction	
9	Shock	100G, 6ms, ±X, ±Y, ±Z 3 time for each direction	JIS C7021, A-10 (Condition A)
10	Vibration (with carton)	Random: 1.04G, 10~500Hz, X/Y/Z 45min/each direction Fixed: 1.5G, 5Hz, X/Y/Z 45min/each direction	
11	Drop (with carton)	Height : 60 cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

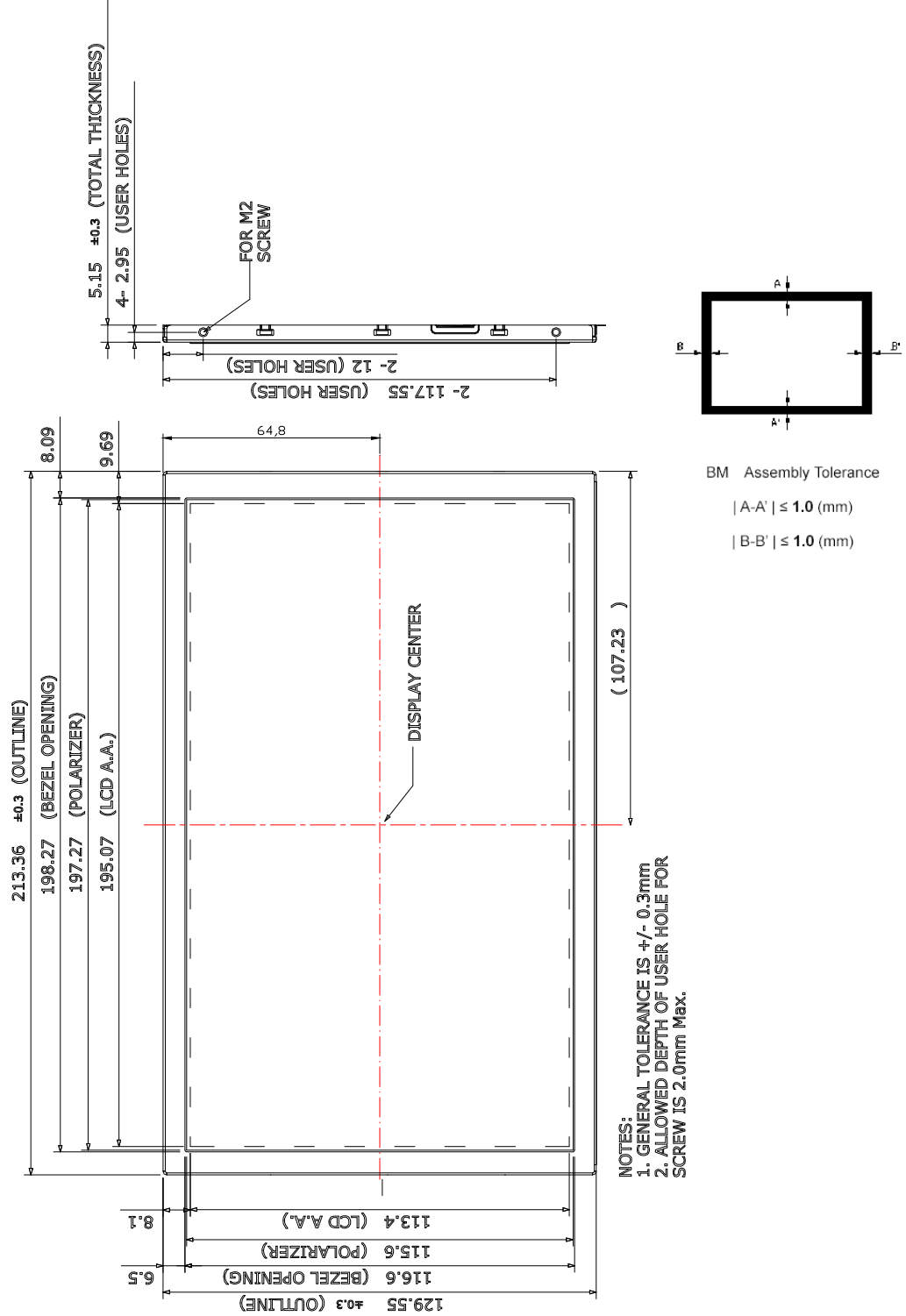
Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

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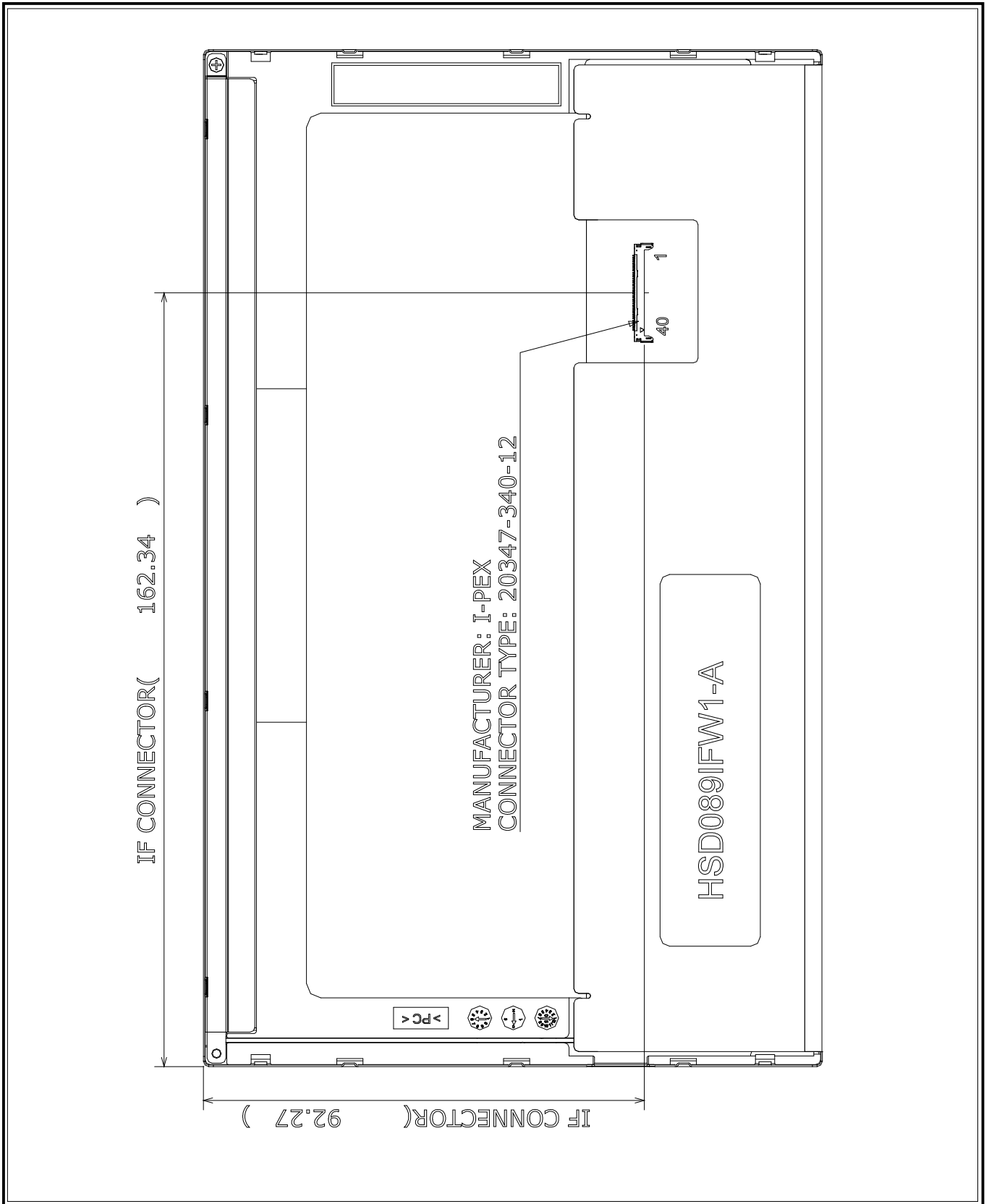
8.0 OUTLINE DIMENSION

8.1 Outline Dimension

Unit : mm



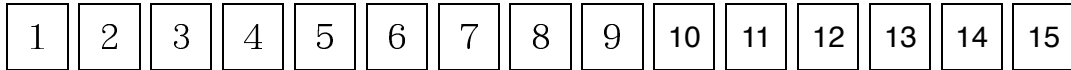
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9.0 LOT MARK

9.1 Lot Mark



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	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mark	9	0	1	2	3	4	5	6	7	8

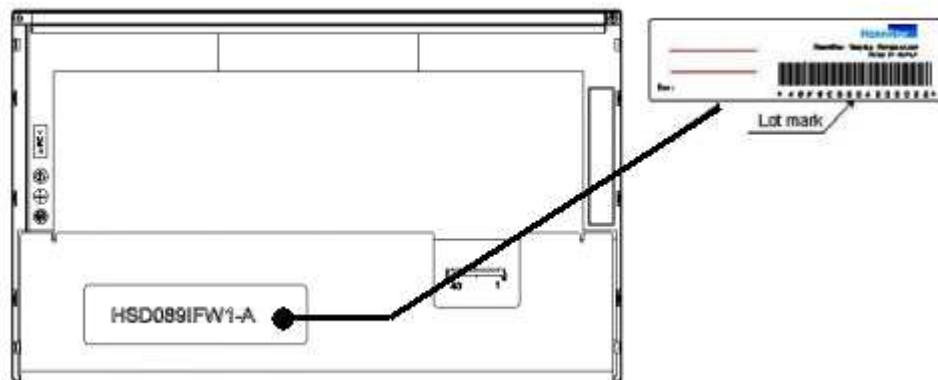
Note (2) Production Month

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

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.



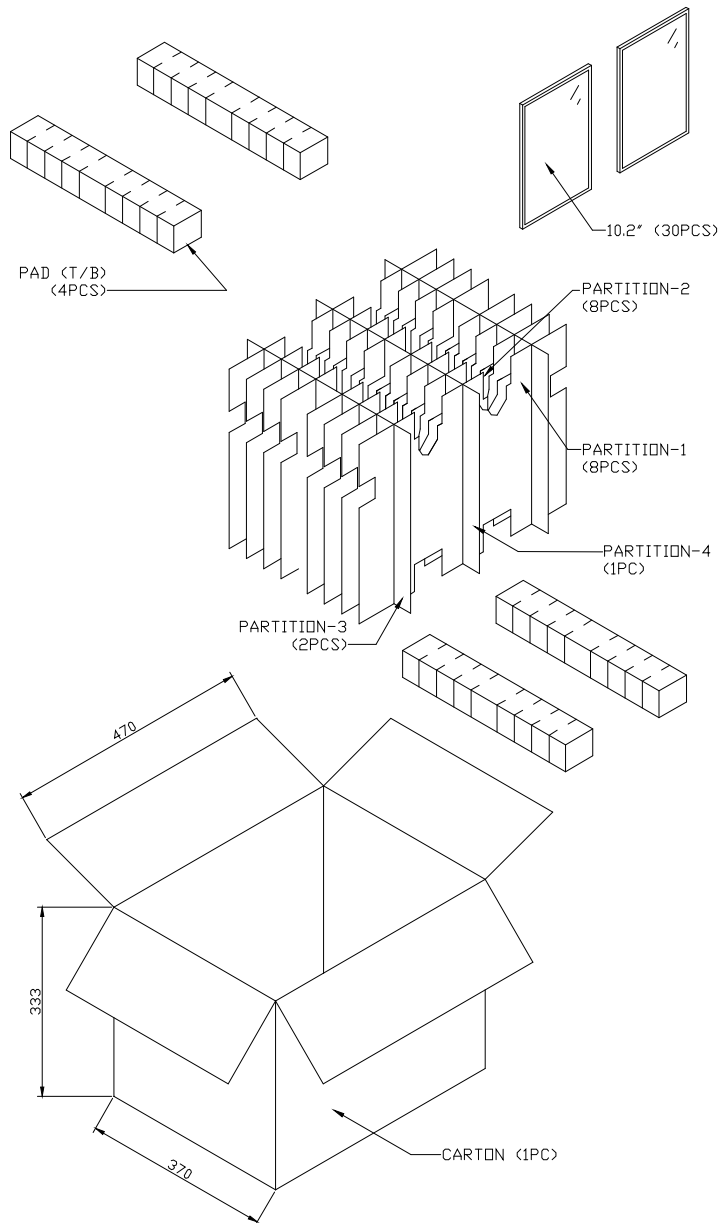
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10.0 PACKAGE SPECIFICATION

10.1 Packing form

- (1) Package quantity in one carton: 30 pieces.(TBD)
- (2) Carton size: 460±3 mm×361±3 mm×321±3 mm.
- (3) For domestic transportation only.

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.