
SPECIFICATION FOR LCD MODULE**MODULE NO.: HSD097DFS30P36N**

ISSUED DATE: 2012/09/26

PREPARED BY	CHECKED BY	APPROVED BY
Confirmation approved		

RECORDS OF REVISION

[illegible]

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1 通用描述

1.1 General information

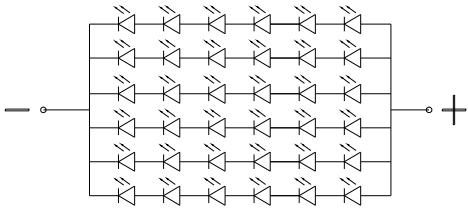
Item		Specification	Unit
Outline Dimension		210.208×164.246×2.8(Typ.)	mm
Display area		196.608(H) ×147.456(V)	mm
Number of Pixel		1024 RGB (H) ×768(V)	Pixels
Pixel pitch		0.192(H) ×0.192(V)	mm
Display mode		Normally white	
Weight		TBD (Typ)	g
Back-light		Side-Light type	
Power Consumptio	Logic System	TBD	W
	B/L System	TBD	

1.2 Mechanical Information

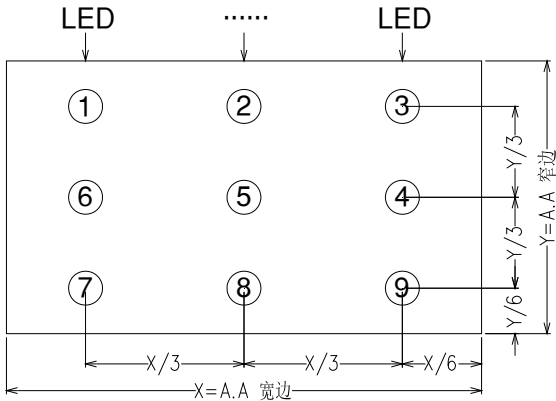
Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	209.908	210.208	210.508	mm
	Vertical (V)	163.946	164.246	164.546	mm
	Depth (D)	-	2.8	3.0	mm
Weight (Without inverter)		-	TBD	-	g

2 光电特性

2.1 测试电路(BL)



2.2 测试点位置图

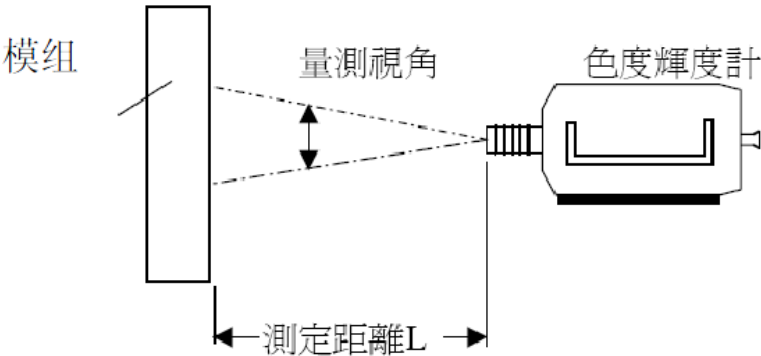


2.3 测试条件

- (1)环境条件：25±2℃，55%RH±10%，暗室照度 10LUX 以下；
- (2)测量仪器：BM-7A(TOPCON)；
- (3)测试距离：L=500mm；
- (4)测试角度：1° ；
- (5)测试条件(BL)：

Item	Symbol	Typ.	Max.	Unit	Note
LED current	I _L	120	-	mA	fixed
LED voltage	V _L	19.2	21.0	V	

- (6)测试方法(如下图)：



2.4 光电特性参数

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V _f	--	19.2	21.0	V	If=120mA
Chromaticity Coordinate	X	0.26	0.31	0.36	--	
	Y	0.28	0.33	0.38	--	
Luminance	L _v	270	300	--	cd/m ²	
Uniformity	△L _v	70	80		%	

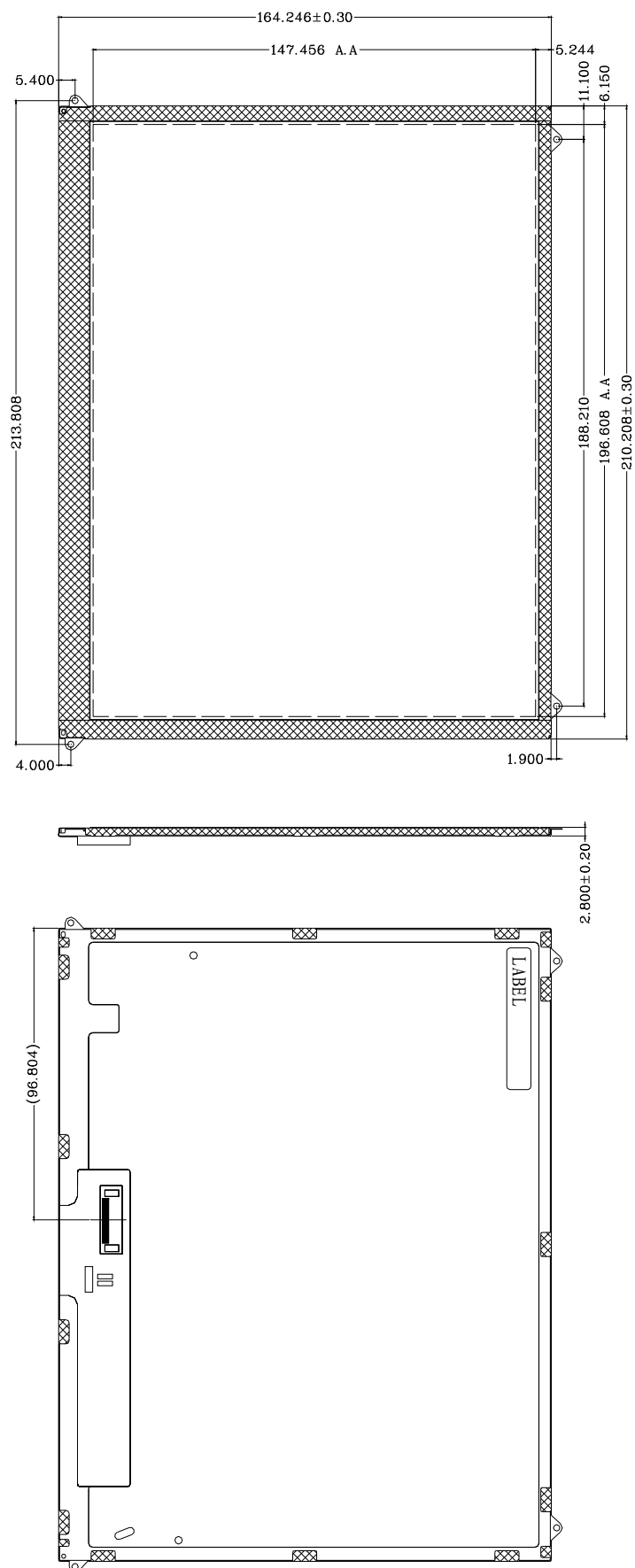
3. 信耐性测试

项目	试验方法	判定基准
高温高湿试验	50 °C±3℃, 80%±3%RH, 96 hrs	①②③④⑤
高低温保存试验	High Temperature: +65 °C±3℃, 120 hrs	①②③④⑤
	Low Temperature: -25 °C±3℃, 120 hrs	
冷热冲击试验	-25 °C (30mins) ←+5 °C (5mins)→ +65 °C (30mins) 50 cycles	①②③④⑤
振动试验(非动作)	X/Y/Z 每个方向;频率:10~50Hz;2G;1H	①②③④⑤

判定标准：①:正常点亮；
②:亮度维持在原有 80%以上；
③:均匀度变化在 30%以内；
④:色度变化在 0.02 以内；
⑤:外观无异常(破损、锈蚀、严重变形等)

备注：以上温度标准参照 CMI 原装 9.7 模组.

4. 结构图纸



5. 产品条码内容



M.D117.01.Bx

Model No.

HSD9.7-LED36

LED
FOG

D117.01 -YYMMDD -000001

No.
Date
Model No.

6. 其他

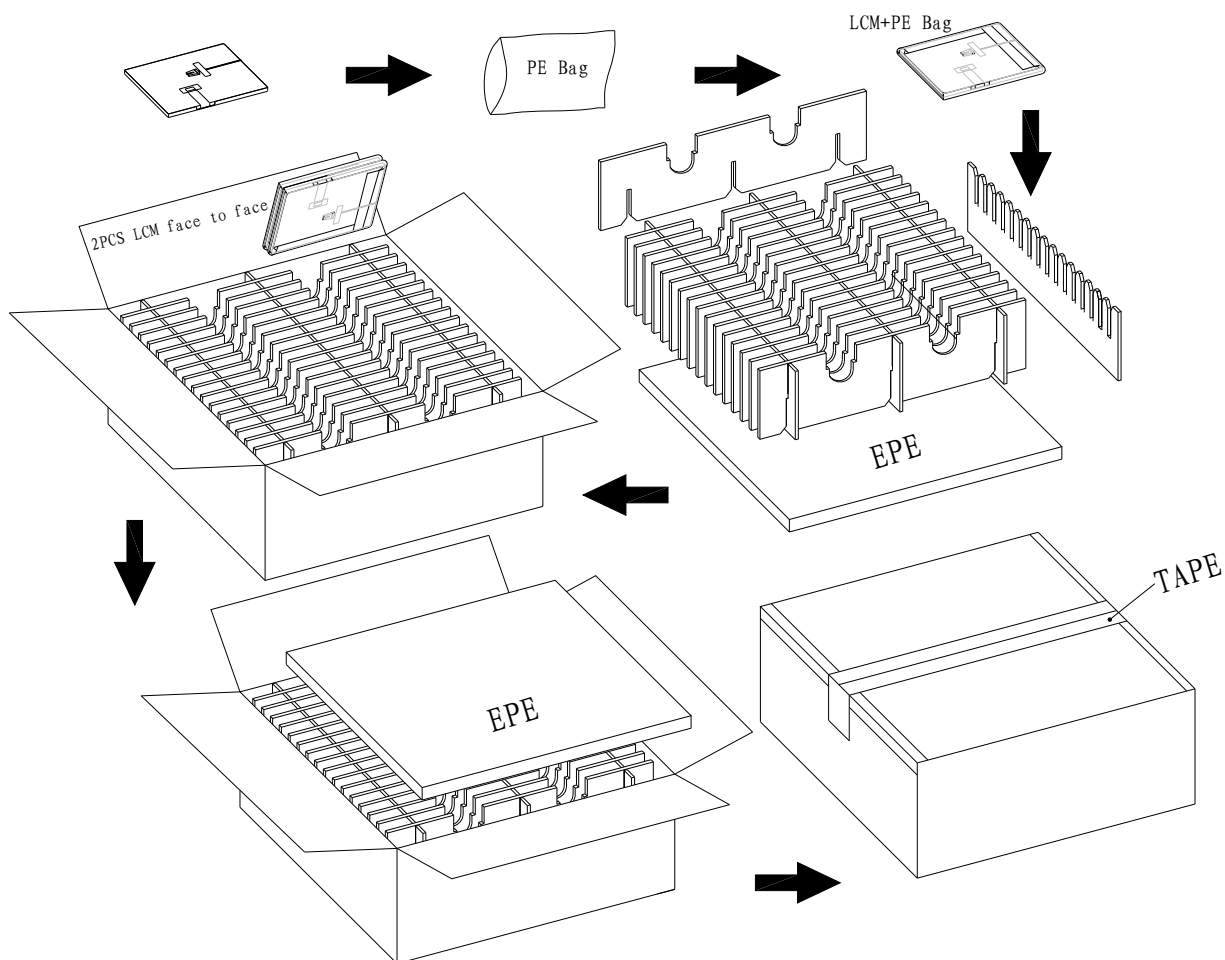
- 6.1 本模组规格书后附客供 **FOG** 规格书，**FOG** 的具体参数请参照后附 **FOG** 规格书；
- 6.2 模组外观品质标准根据双方签订的品质标准及协议进行；
- 6.3 本规格书如有疑问双方协商解决。

7. 包装规格

7.1 Packing form

LCM Model	LCM Qty. in the box	Inner Box Size(mm)	Notice
M.D117.01.Bx	TBD pcs/box	TBD	

7.2 Packing assembly drawings



8. 附件：FOG 规格书(参考)



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TO : RoadWell

Date : May, 14, 2012

HannStar Product Information **(Preliminary)**

Model: HSD097PXN1
-A00-0299

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.



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Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	May 10, 2012	A00-0299	Preliminary specification was first released.
1.1	May 10, 2012	A00-0299	Update the 8.1 2D drawing information.



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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD097PXN1-A00-0299 type 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. This TFT LCD has a 9.7 (4:3) inch diagonally measured active display area with WSVGA (1024 horizontal by 768 vertical pixel) resolution.

1.2 Features

- 9.7 (4:3 diagonal) inch configuration
- 16.7M(6bit+Hi-FRC) color by 8 bit R.G.B signal input
- RoHS Compliance
- Halogen Free

1.3 Applications

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

1.4 General information

Item	Specification	Unit
Overall Dimension	204.908 (H) x 156.756 (V) x 1.23 (Typ.) (Backlight cable and FPC are not included.)	mm
Display area	196.608(H) x 147.456(V)	mm
Number of Pixel	1024 RGB (H) x 768(V)	pixels
Pixel pitch	0.192(H) x 0.192(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display color	16.7M (6-bit+Hi-FRC)	
Display mode	Normally white	
NTSC	50	%
Surface treatment	Anti-Glare	
Weight	(78g) (typ.)	g
Power Consumption	TBD	W



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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	20.0	V	
	V_{GL}	-20.0	0.3	V	
	AV_{DD}	6.5	13.5	V	
Logic Signal Input Level	V_{DD}	-0.3	5.0	V	

2.1.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-20	60	°C	
Storage Temperature	T_{stg}	-30	70	°C	

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3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast	CR	$\Theta = 0$	(400)	(500)	—		(1)(2)(4)
Response time	Tr+ Tf	Normal viewing angle	—	(20)	(25)	msec	(1)(3)
Color chromaticity (CIE1931)	White	W_x		TBD			(1)(4) CF Glass C light
		W_y		TBD			
	Red	R_x		TBD			
		R_y		TBD			
	Green	G_x		TBD			
		G_y		TBD			
	Blue	B_x		TBD			
		B_y		TBD			
Viewing angle	Hor.	Θ_L	CR>10	60	70	—	
		Θ_R		70	80	—	
	Ver.	Θ_U		70	80	—	
		Θ_D		70	80	—	
Transmittance (with polarizer)	T		—	(5.2)	—		(5)

3.2 Measuring Condition

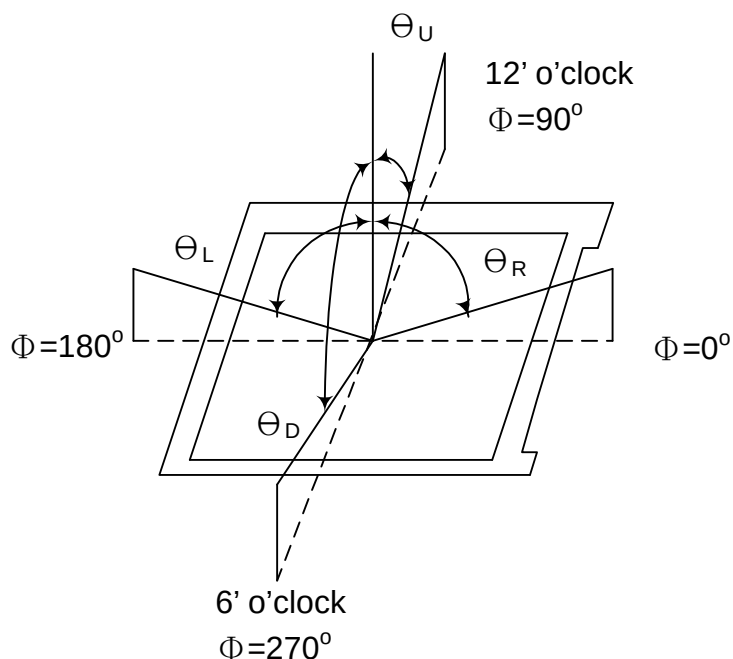
- Measuring surrounding : dark room
- Ambient temperature : $25 \pm 3^\circ\text{C}$
- 15min. warm-up time.

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

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Note (1) Definition of Viewing Angle:

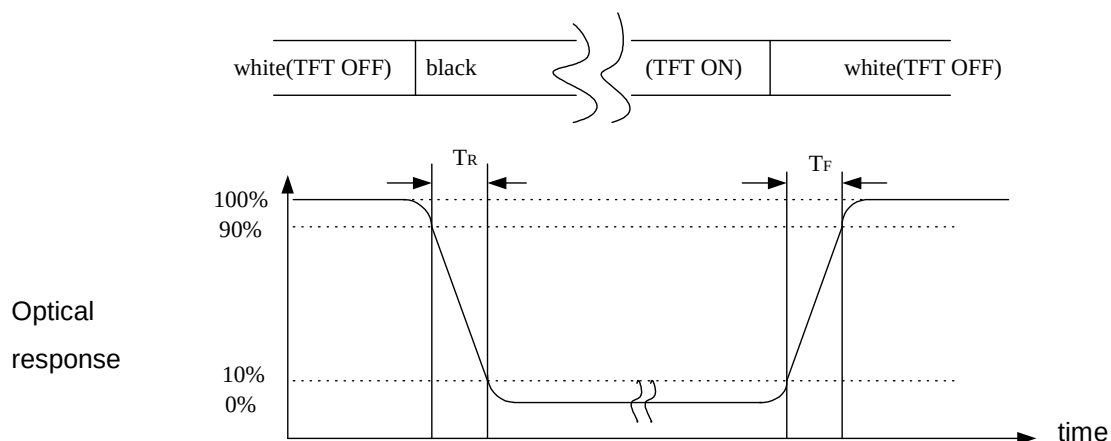


Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

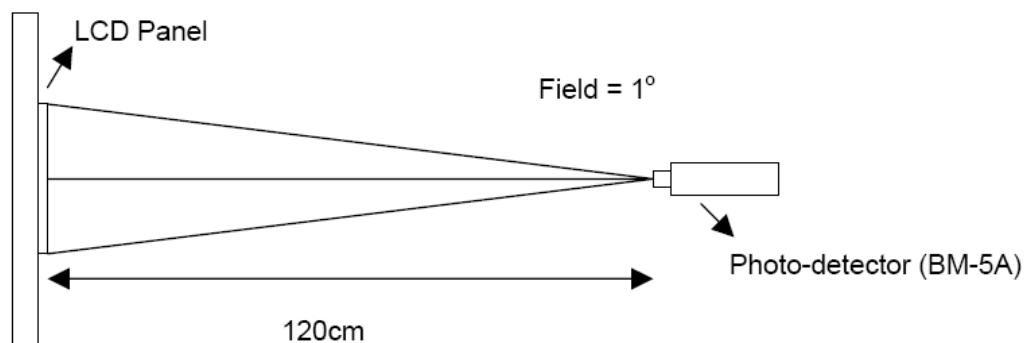
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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



Note (4) Definition of optical measurement setup

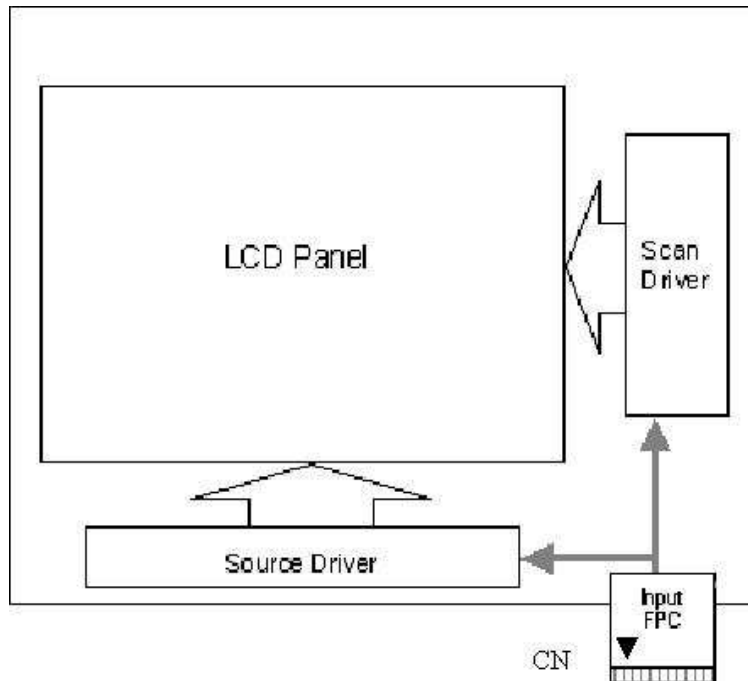


Note (5) Transmittance is measured at panel center area without signal input.

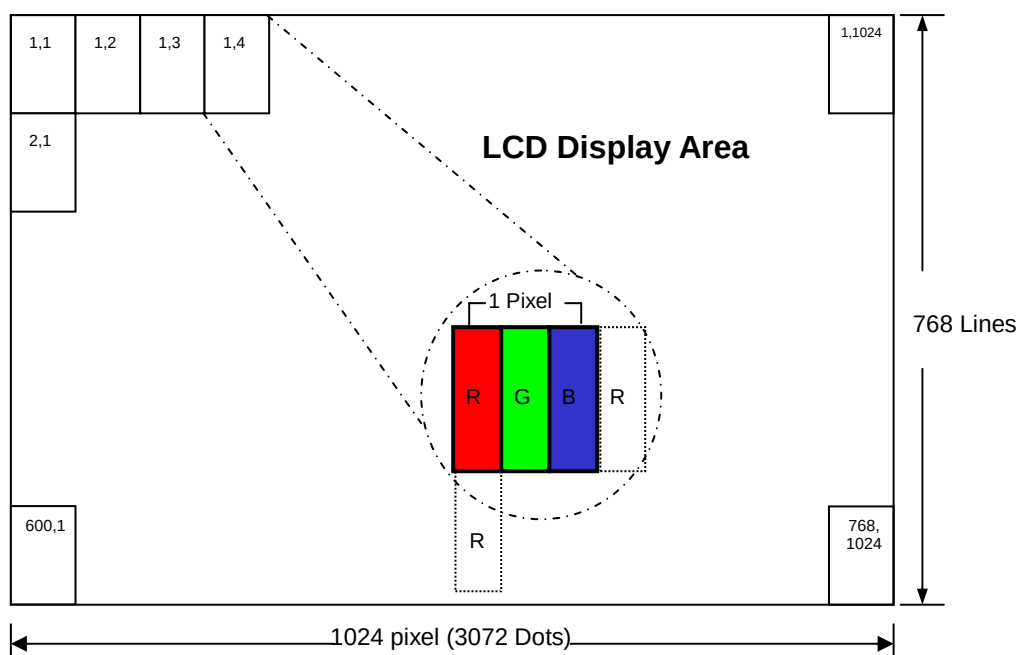
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4.0 BLOCK DIAGRAM

4.1 TFT LCD Module



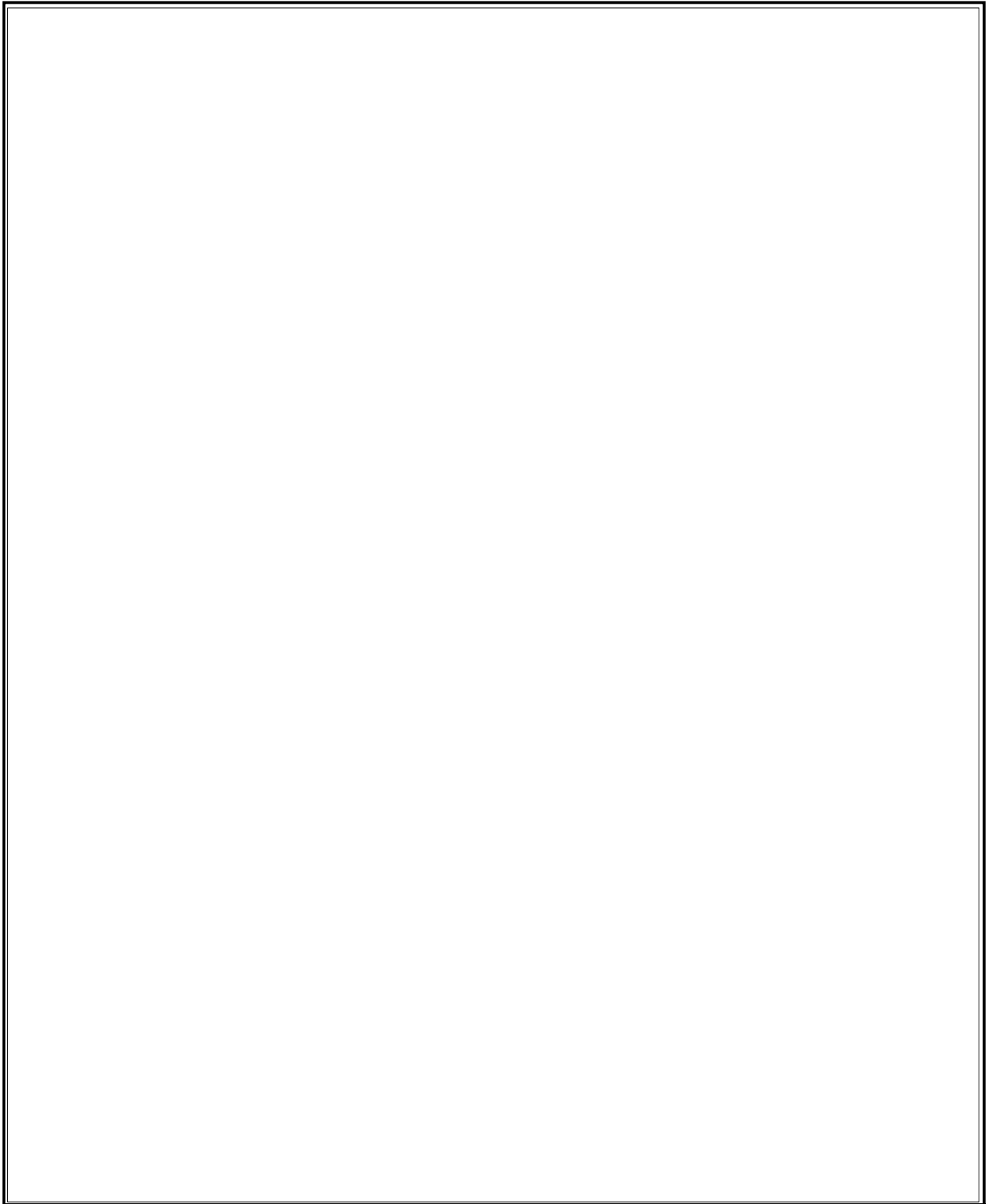
4.2 Pixel Format





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4.3 Relationship Between Displayed Color and Input

4.3.1 6bit

	Display	MSB LSB R5 R4 R3 R2 R1 R0	M L G5 G4 G3 G2 G1 G0	S S 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	-
	Blue	L L L L L L	L L L L L L	H H H H H H	-
	Green	L L L L L L	H H H H H H	L L L L L L	-
	Light Blue	L L L L L L	H H H H H H	H H H H H H	-
	Red	H H H H H H	L L L L L L	L L L L L L	-
	Purple	H H H H H H	L L L L L L	H H H H H H	-
	Yellow	H H H H H H	H H H H H H	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	-
Gray scale of Red	Black	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 H	L L L L L L	L L L L L L	L1
		L L L L H L	L L L L L L	L L L L L L	L2
		:	:	:	L3...L60
		H H H H L H	L L L L L L	L L L L L L	L61
		H H H H H L	L L L L L L	L L L L L L	L62
	Red	H H H H H H	L L L L L L	L L L L L L	Red L63
Gray scale of Green	Black	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	H L L L L L	L1
		L L L L L L	L L L L H L	L L L L L L	L2
		:	:	:	L3...L60
		L L L L L L	H H H H L H	L L L L L L	L61
		L L L L L L	H H H H H L	L L L L L L	L62
	Green	L L L L L L	H H H H H H	L L L L L L	Green L63
Gray scale of Blue	Black	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 H	L1
		L L L L L L	L L L L L L	L L L L H L	L2
		:	:	:	L3...L60
		L L L L L L	L L L L L L	H H H H L H	L61
		L L L L L L	L L L L L L	H H H H H L	L62
	Blue	L L L L L L	L L L L L L	H H H H H H	Blue L63
Gray scale of White & Black	Black	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 H	L L L L L H	L L L L L H	L1
		L L L L H L	L L L L H L	L L L L H L	L2
		:	:	:	L3...L60
		H H H H L H	H H H H L H	H H H H L H	L61
		H H H H H L	H H H H H L	H H H H H L	L62
	White	H H H H H H	H H H H H H	H H H H H H	White L63

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4.3.2 8bit

	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

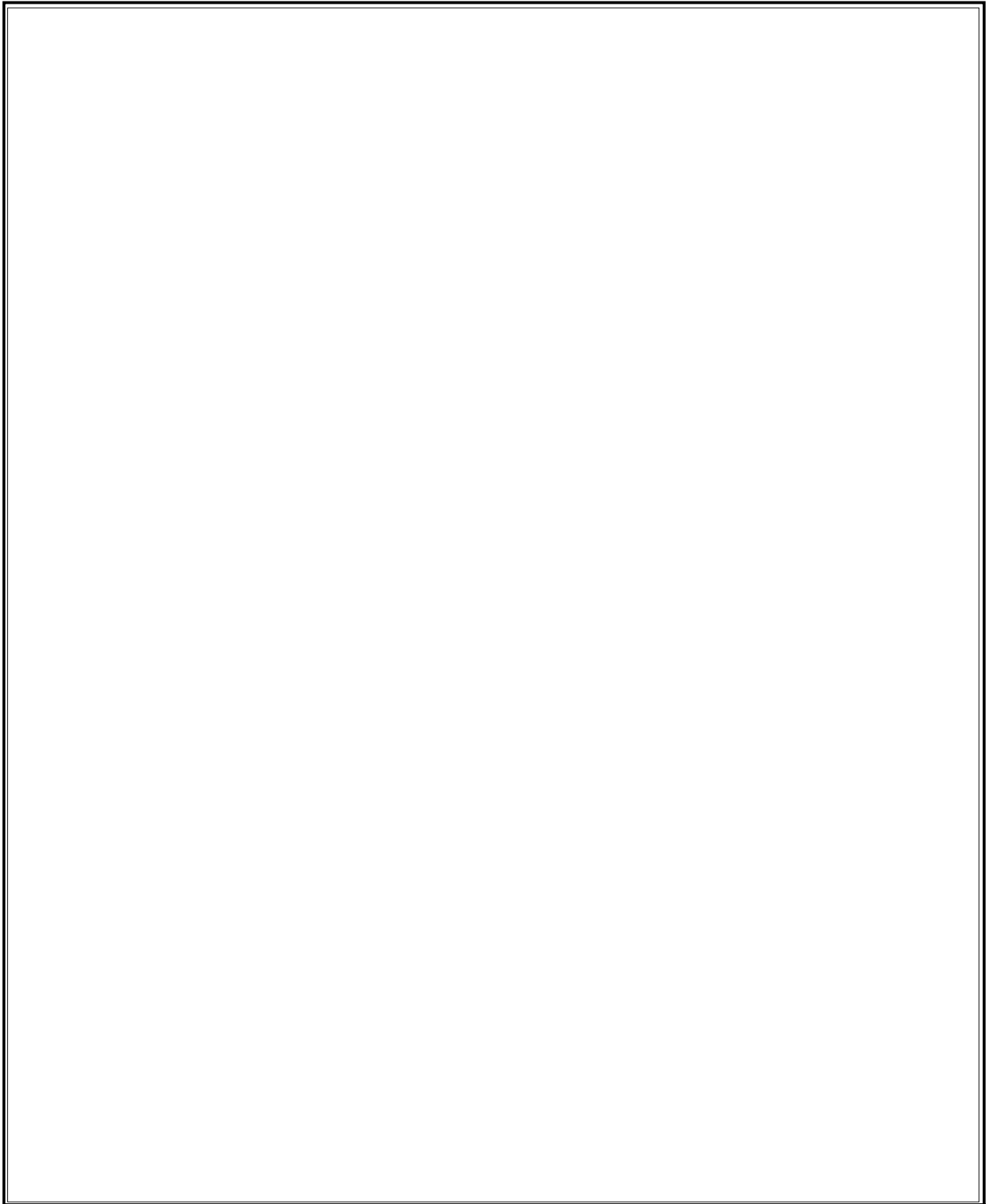
5.0 INTERFACE PIN CONNECTION

Pin NO.	Symbol	Description
1	GND	Power ground
2	VDD	Power for LED backlight (Anode)
3	VDD	No conection
4	VEDID	Power for LED backlight (Cathode)
5	NC	No conection
6	VED-SCL	Common Voltage
7	VES-SDA	Digital Power
8	D0N	-LVDS differential data input(R0-R5,G0)
9	D0P	+LVDS differential data input(R0-R5,G0)
10	GND	Power ground
11	D1N	-LVDS differential data input(G1-R5,B0-B1)
12	D1P	+LVDS differential data input(G1-R5,B0-B1)
13	GND	Power ground
14	D2N	-LVDS differential data input(B2-B5,HS,VS,DE)
15	D2P	+LVDS differential data input(B2-B5,HS,VS,DE)
16	GND	Power ground
17	LVCN	- LVDS differential clock input
18	LVCP	+LVDS differential clock input
19	GND	Power ground
20	NC	No conection
21	LED-A	Power for LED backlight (Anode)
22	LED-A	Power for LED backlight (Anode)
23	NC	No conection
24	LED-K1	Power for LED backlight (Catgode)
25	LED-K2	Power for LED backlight (Catgode)
26	LED-K3	Power for LED backlight (Catgode)
27	LED-K4	Power for LED backlight (Catgode)
28	LED-K5	Power for LED backlight (Catgode)
29	LED-K6	Power for LED backlight (Catgode)
30	BIST	Normal Operation/BIST pattern select. Normally pull low. When BIST=H, BIST(CLK input is not needed) When BIST=L, Normal Operation (Default)



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Note1 : 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.

Note2 : If LVDS input data is 6 bits, SELB must be set to High;

If LVDS input data is 8 bits, SELB must be set to Low.

Note3 : Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normal pull high. (R=10K Ω , C=0.1 μ F)

Note: If RC is not added, users must follow the rule, T2 > 50ms on page 18 item 6.5 power on/off sequence.

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	
	V _{GH}	14.55	15.0	15.45	V	
	V _{GL}	-7.25	-6.9	-6.56	V	
	AV _{DD}	8.722	8.9	9.08	V	
VCOM	VCOMin	2.98	3.18	3.38	V	
Input signal voltage	V _{IH}	0.7 V _{DD}	-	V _{DD}	V	Note (1)
	V _{IL}	0	-	0.3 V _{DD}	V	
Current of power supply	I _{DD}	-	22	-	mA	V _{DD} =3.3V
	I _{ADD}	-	26	-	mA	AV _{DD} =8.9V
	I _{GH}	-	0.36	-	mA	V _{GH} =15V
	I _{GL}	-	0.85	-	mA	V _{GL} =-6.9V
	I _{vcom}	0.5	--	--	mA	Vcom=3.18V

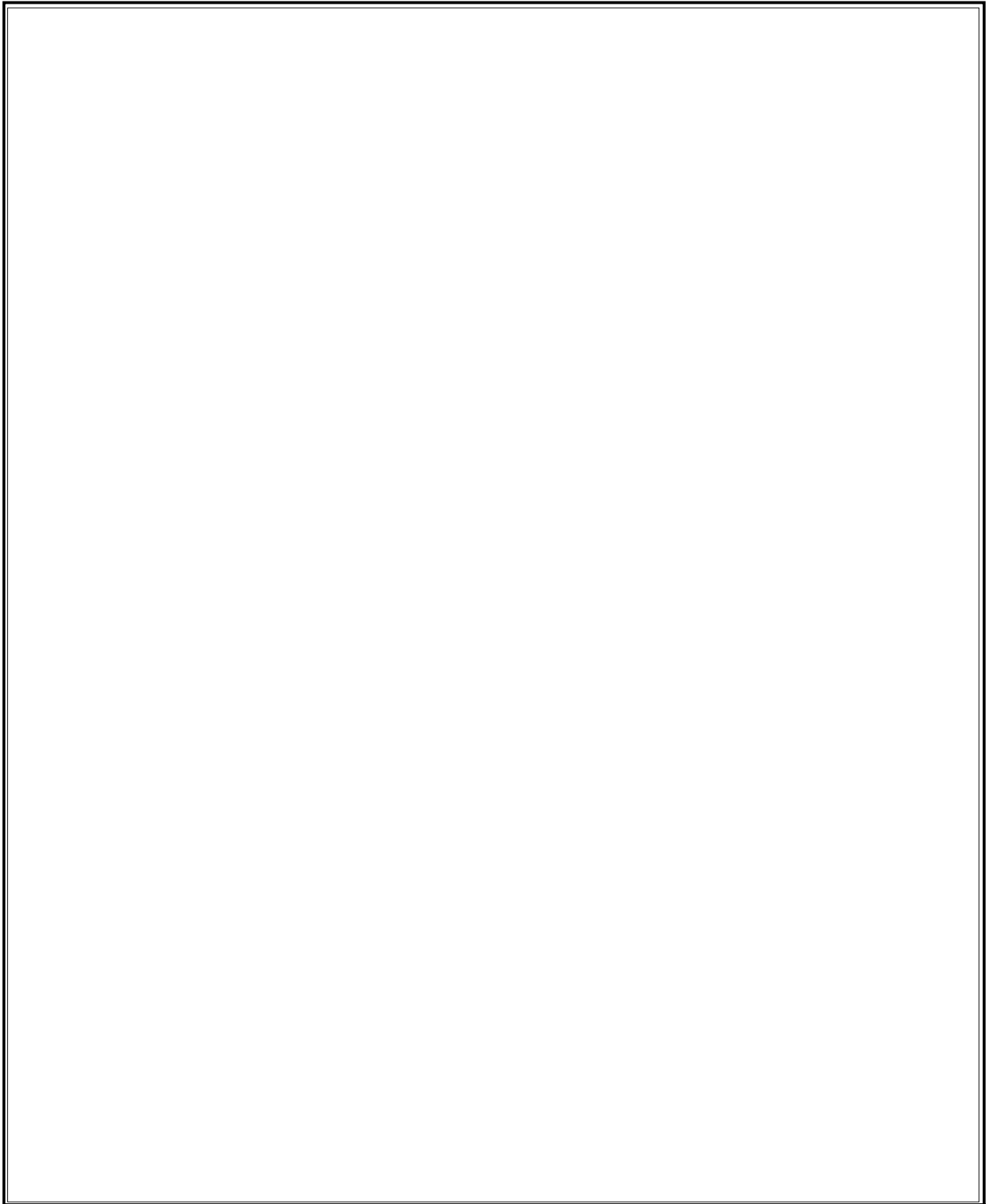
6.2 Switching Characteristics for LVDS Receiver

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	



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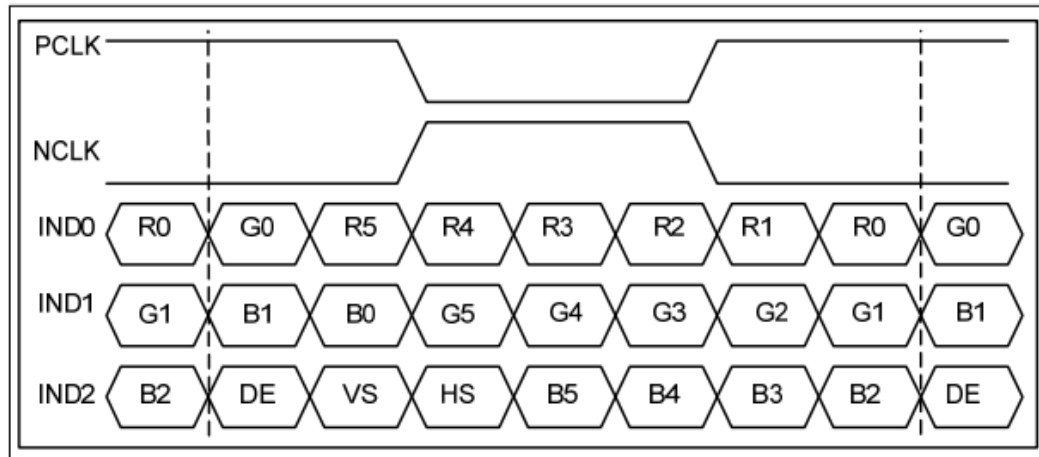


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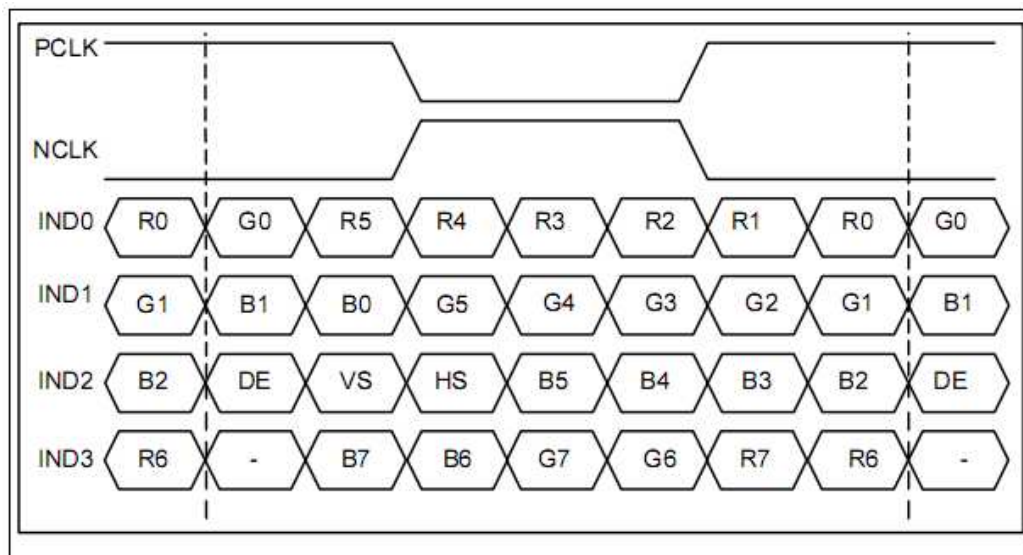
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6.3 Bit LVDS input

6.3.1 6bit LVDS input



6.3.2 8Bit LVDS input



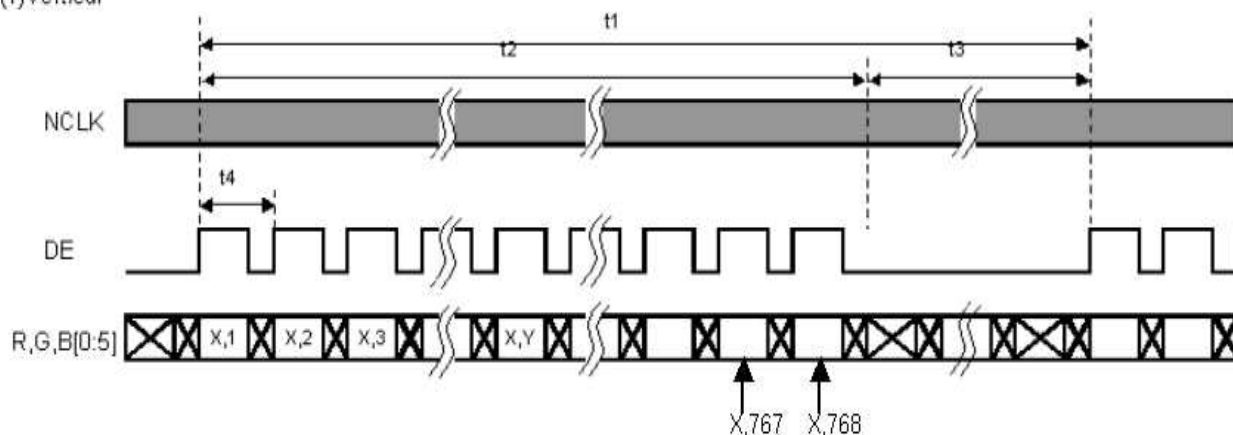
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6.4 Interface Timing (DE mode)

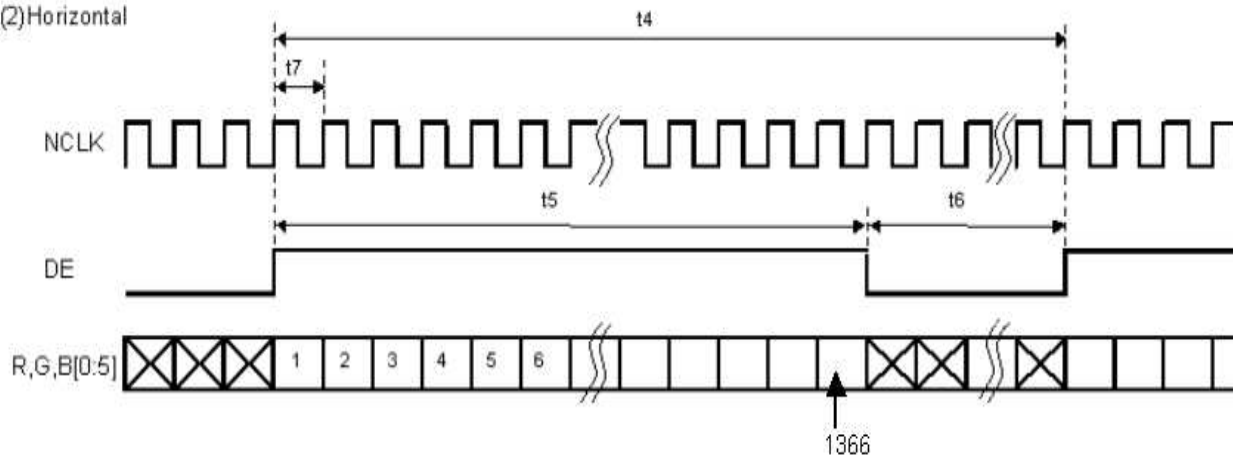
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	55	60	65	Hz
Frame Period	t1	793	806	819	line
Vertical Display Time	t2	768	768	768	line
Vertical Blanking Time	t3	25	38	51	line
1 Line Scanning Time	t4	1304	1344	1384	clock
Horizontal Display Time	t5	1024	1024	1024	clock
Horizontal Blanking Time	t6	280	320	360	clock
Clock Rate	t7	55	65	75	MHz

Timing Diagram of Interface Signal (DE mode)

(1) Vertical

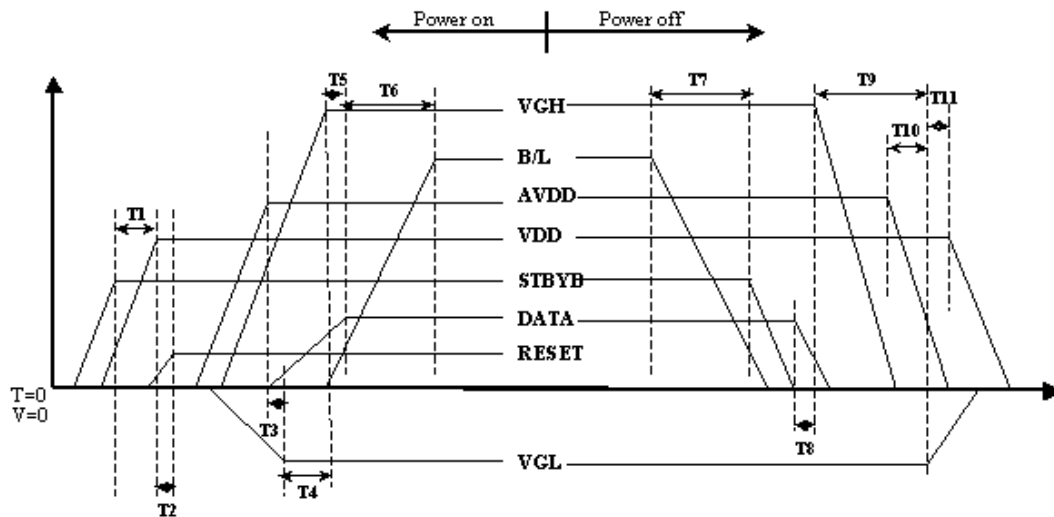


(2) Horizontal



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6.5 Power On / Off Sequence



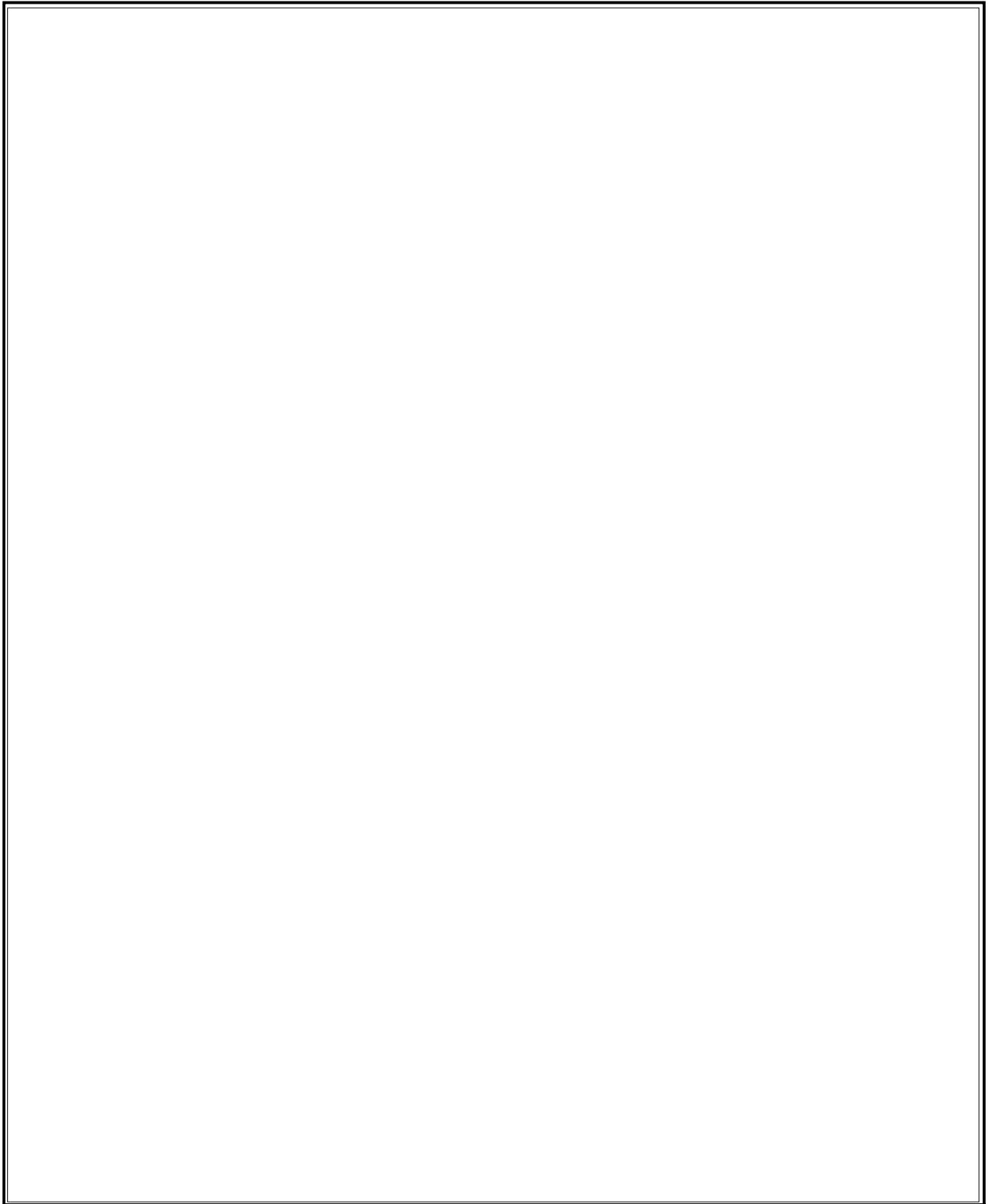
Item	Min.	Typ.	Max.	Unit
T1	0	--	--	ms
T2	50	--	--	ms
T3	5	--	--	ms
T4	10	--	--	ms
T5	20	--	--	ms
T6	50	--	--	ms
T7	20	--	--	ms
T8	10	--	--	ms
T9	20	--	--	ms
T10	10	--	--	ms
T11	20	--	--	ms

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25\pm3^\circ\text{C}$, typical IL value indicated in the above table until the brightness becomes less than 50%.



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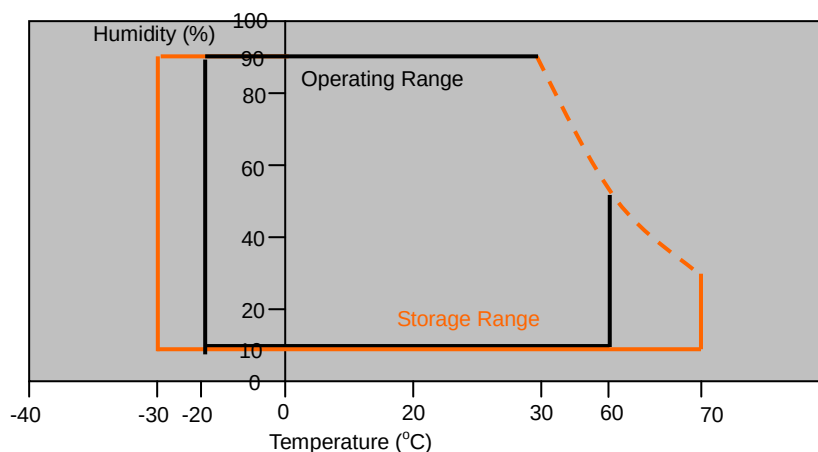
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7.0 Reliability test items

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta= +70°C, 240hrs	
2	Low Temperature Storage	Ta= -30°C, 240hrs	
3	High Temperature Operation	Ta= +60°C, 240hrs	
4	Low Temperature Operation	Ta= -20°C, 240hrs	
5	Thermal Cycling Test (non operation)	-30°C(30min)→+70°C(30min),200 cycles	
6	Vibration	Sine Wave 1.04G, 5~500Hz, XYZ 30min/each direction	
7	Shock	Half-Sine, 100G, 6ms, ±XYZ, 3 cycle	

Storage / Operating temperature



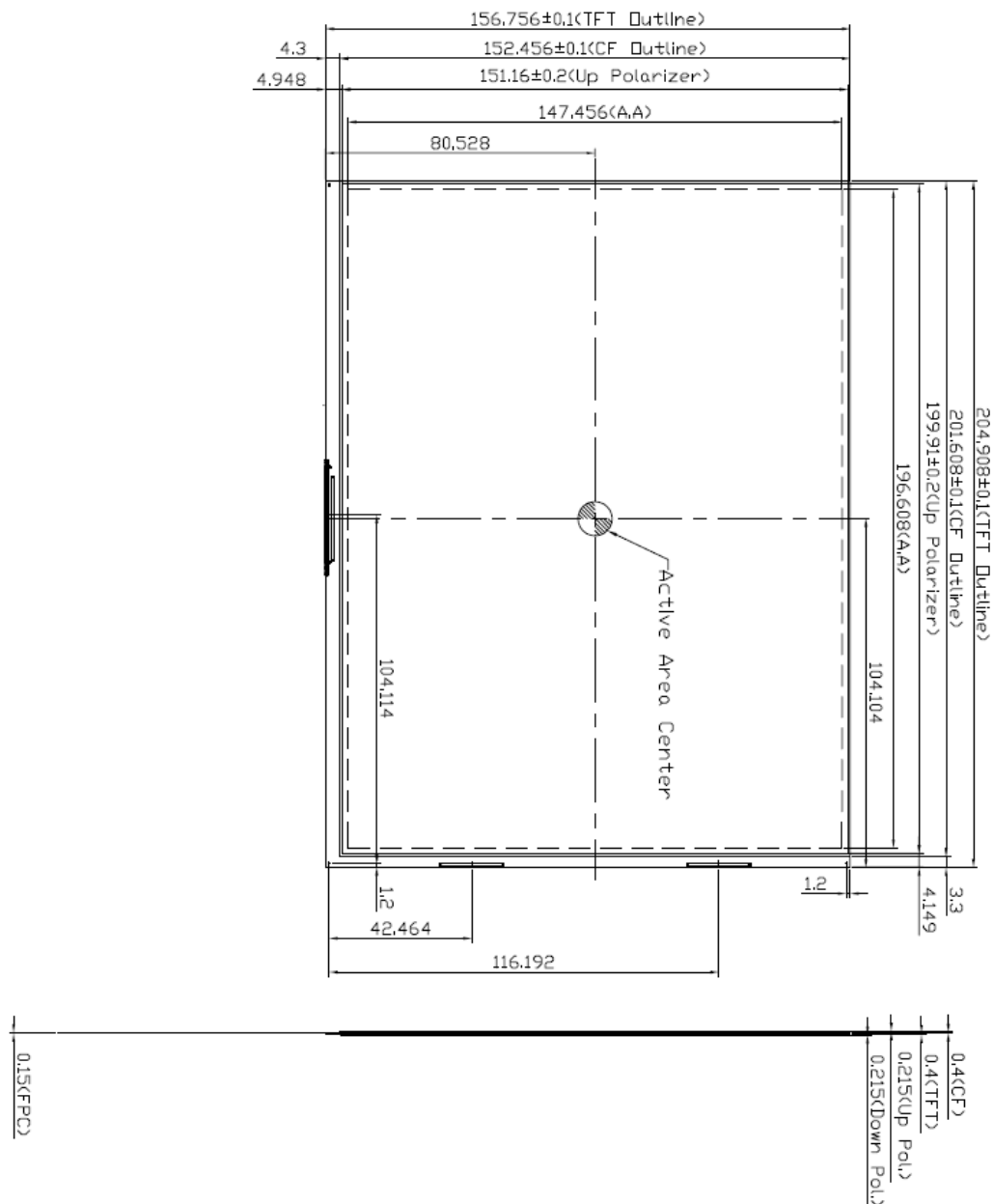
Note .Max wet bulb temp.=39°C

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8.0 OUTLINE DIMENSION

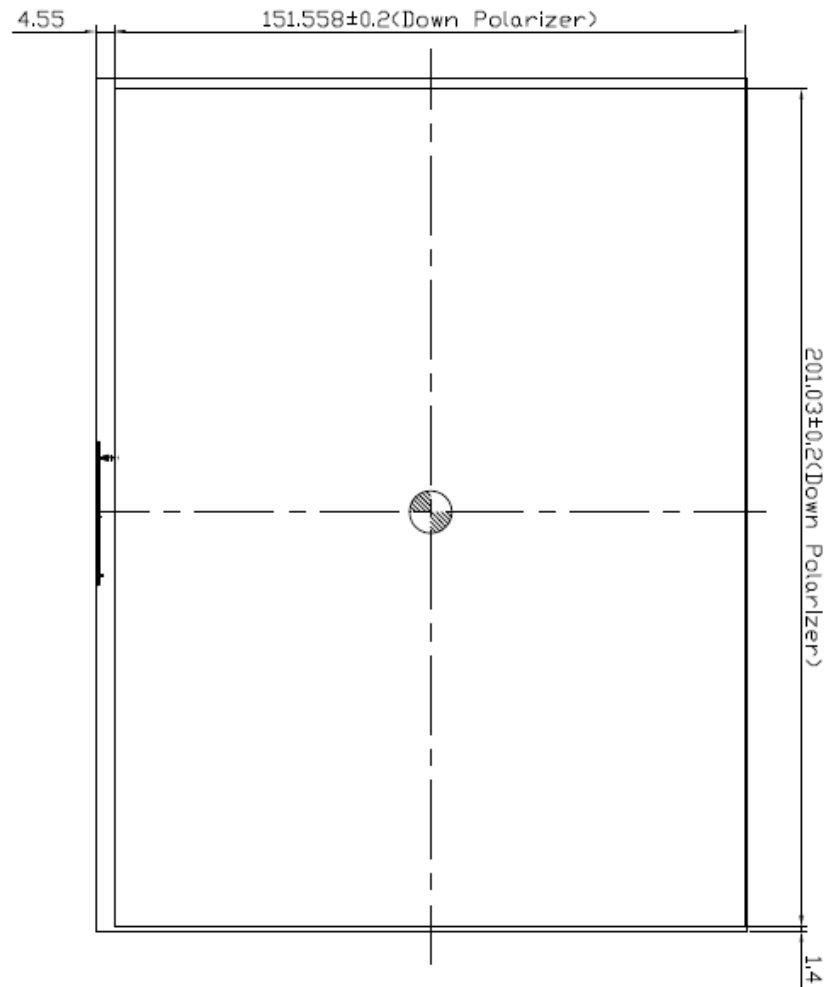
Unit : mm

8.1 Front View Outline Dimension



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8.2 Back View Outline Dimension



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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
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----

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 label is attached to the backside of the LCD module. See Product back view. (Section 8.0 : OUTLINE DIMENSION)
- (2) Detail of the Mark : As attached below
- (3) This is subject to change without prior notice.



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10.0 PACKAGE SPECIFICATION

10.1 Packing form

(TBD)

10.2 Packing assembly drawings

(TBD)

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.



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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.