

深圳市拓浦光电技术有限公司



Topview Product Specification

10.4" Color TFT-LCD Module

Model: TPV104HAH30PIL35-01

Note: 1.Please contact Topview Optoelectronics 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 Topview for any intellectual property claims or other problems that may result from application based on the module described herein.

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1.0 GENERAL DESCRIPTION

1.1 Introduction

TOPVIEW model TPV104HAH30PIL35-01 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 10.4 inch diagonally measured active display area with HD (1024 horizontal by 768 vertical pixel) resolution.

1.2 Features

- 10.4 (4:3 diagonal) inch configuration
- 16.2M
- ROHS / Halogen Free Compliance

1.3 Applications

- TFT-LCD Monitor
- Industrial applications
- Automobile
- Factory Application

1.4 General information

Item		Specification	Unit
Outline Dimension		228.4 (H) x 175.4 (V) x 6.0 (D) (W/O PCBA)	mm
Display area		211.2(H) x 158.4(V) (10.4" diagonal)	mm
Number of Pixel		1024(H) x 768(V)	pixels
Pixel pitch		0.20625(H) x 0.20625(V)	mm
Pixel arrangement		RGB Vertical Stripe	
Display mode		Normally Black	
NTSC		70(Typ.)	%
Surface treatment		Antiglare, Hard-Coating (3H)	
Weight		TBD	g
Back-light		Single LED (Side-Light type)	
Power Consumption	Logic System (White Pattern)	Logic 2.0W(max) @ $V_{D\text{VDD}}=3.3\text{V}$	W
	B/L System	TBD	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	228.1	228.4	228.7	mm
	Vertical (V)	175.1	175.4	175.7	mm
	Depth (D)(W/O PCBA)	5.7	6.0	6.3	mm

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_{DVDD}	-0.3	5	V	
	V_{DVDD_LVDS}				
	V_{AVDD}	-0.5	15	V	
	V_{GH}	-0.3	42	V	
	V_{GL}	-20	0.3	V	
	$V_{GH} - V_{GL}$	-0.3	40	V	
Logic Signal Input Level	V_{DVDD} V_{DVDD_LVDS}	-0.3	5	V	

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-20	70	°C	
Storage Temperature	T_{stg}	-30	80	°C	

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		320	350	—	cd/m ²	(1)(4) ($I_L=150mA$)
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		0.614	0.654	0.694		
		R_y		0.301	0.341	0.381		
	Green	G_x		0.264	0.304	0.344		
		G_y		0.585	0.625	0.665		
	Blue	B_x	0.104	0.144	0.184			
		B_y	0.05	0.090	0.13			
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

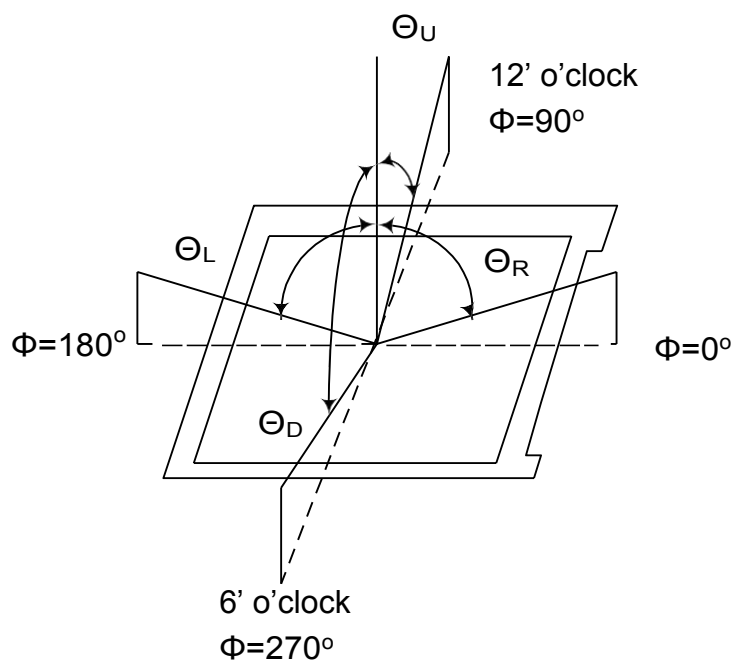
- Measuring surrounding: dark room
- LED current I_L : 150mA
- Ambient temperature: 25±2°C
- 15min. warm-up time.

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

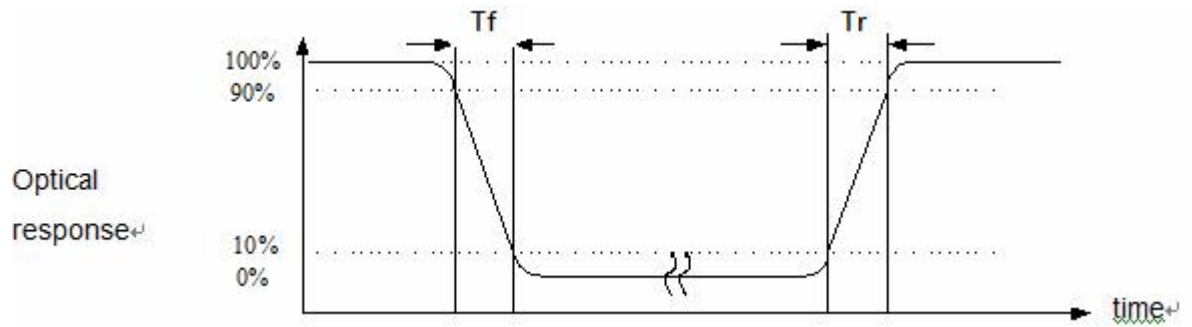
Note (1) Definition of Viewing Angle:



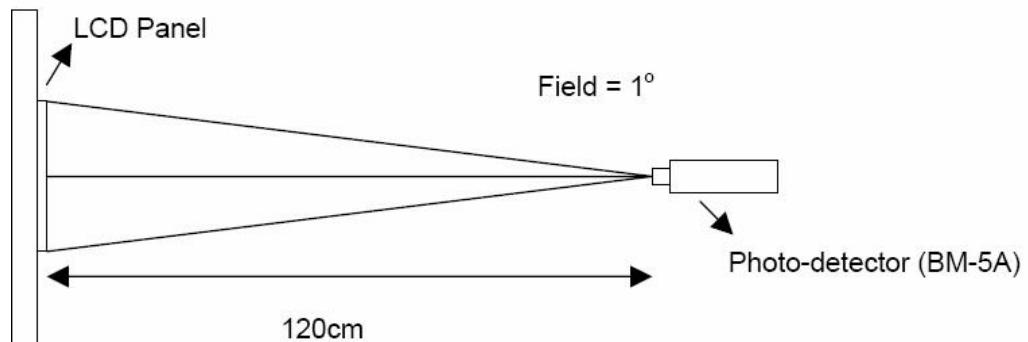
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

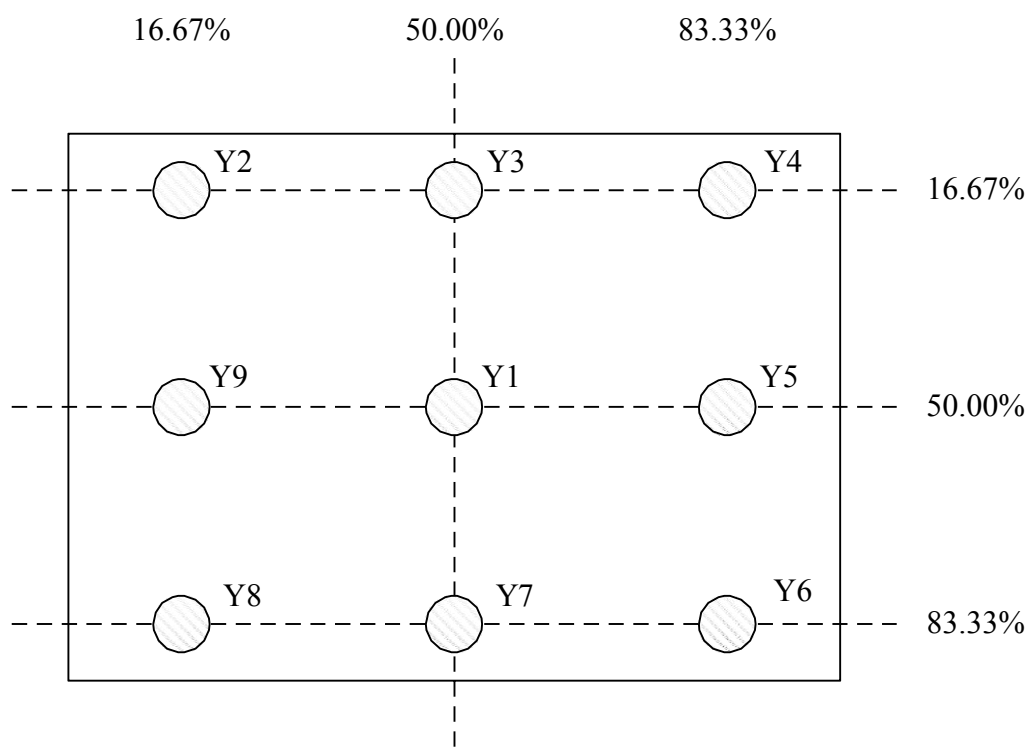
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity

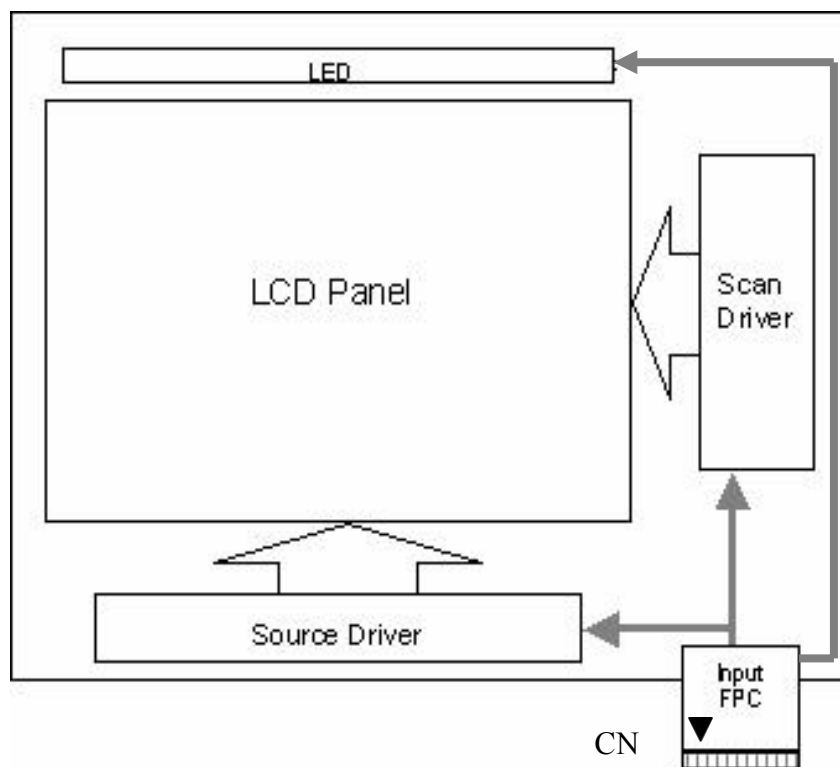


$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

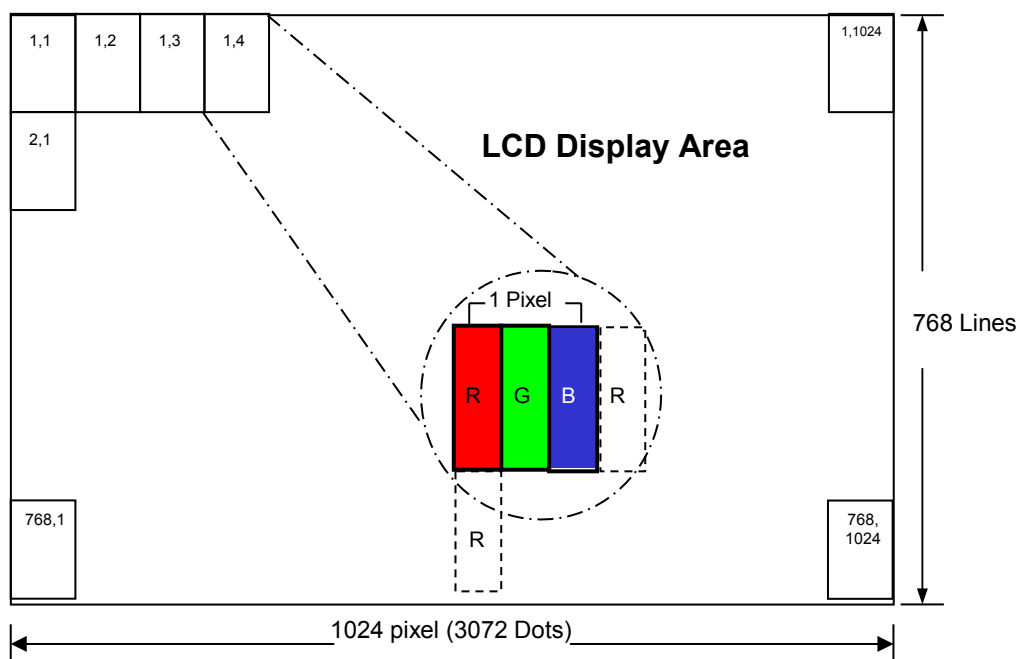
Note (6): Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.)

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



4.3 Relationship Between Displayed Color and Input

	Display	M $\times$ B LSB								M $\times$ B LSB								M $\times$ B LSB								Gray scale Level
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	
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	L	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	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L253
		H	H	H	H	H	H	L	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	H	L	L	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	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	L	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	L	H	L	L	L	L	L	L	L	L	L	L253
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	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	H	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	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	L	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	L	H	L	L253
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	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	H	L	L	L	L	L	L	L	H	L	L1
		L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L2
		:								:								:								L3...L251
		H	H	H	H	H	L	L	L	H	H	H	H	H	L	L	L	H	H	H	H	H	L	L	L	L252
	Light	H	H	H	H	H	L	H	L	H	H	H	H	H	L	H	L	H	H	H	H	H	L	H	L	L253
		H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	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

LVDS Connector JAE Model Number :FI-XB30SSLA-HF15 (Adaptable Plug:FI-X30C2EL)

No.	Symbol	Function	Remark
1	NC	No connection	
2	GND	Ground	
3	RIN3+	LVDS Signal(+)-channel 3	
4	RIN3-	LVDS Signal(-)-channel 3	
5	GND	Ground	
6	RXCLK+	LVDS Clock Signal(+)	
7	RXCLK -	LVDS Clock Signal(-)	
8	GND	Ground	
9	RIN2+	LVDS Signal(+)-channel 2	
10	RIN2-	LVDS Signal(-)-channel 2	
11	GND	Ground	
12	RIN1+	LVDS Signal(+)-channel 1	
13	RIN1-	LVDS Signal(-)-channel 1	
14	GND	Ground	
15	RIN0+	LVDS Signal(+)-channel 0	
16	RIN0-	LVDS Signal(-)-channel 0	
17	GND	Ground	
18	NC	No connection	
19	GND	Ground	
20	SEL6/8	SELB="0" 8Bit SELB="1" 6Bit	
21	NC	No connection	
22	NC	No connection	
23	NC	No connection	
24	REVERSE	Reverse Panel function	Reverse Scan Control H or NC=Normal Mode L=Horizontal/Vertical Reverse Scan
25	GND	Ground	
26	GND	Ground	
27	GND	Ground	
28	VCC	power Voltage for digital circuit 3.3V	
29	VCC	power Voltage for digital circuit 3.3V	
30	VCC	power Voltage for digital circuit 3.3V	

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{DVDD}	3	3.3	3.6	V	
	V_{DVDD_LVDS}					
	VGH	24	25	26	V	Note (1)
	VGL	-9	-10	-11	V	Note (2)
	AVDD	11.8	12.1	12.4	V	
Input signal voltage	ViH	0.8 VDD		VDD	V	
	ViL	0		0.2VDD	V	
Current of power supply	IDD		28	36.4	mA	VDD =3.3V/ Note (3)
	Iavdd		75	95	mA	AVDD=12.1V/ Note (3)
	Ivgh		0.85	1.25	mA	VGH=25V/ Note (3)
	Ivgl		1.95	2.54	mA	VGL=-10V/ Note (3)

Note:

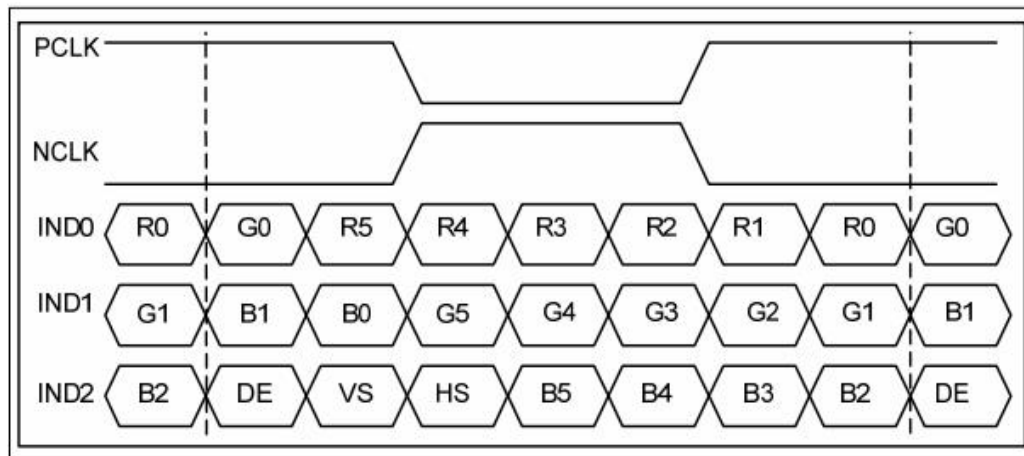
- (1): VGH is TFT Gate operating Voltage.
- (2): VGL is TFT Gate operating Voltage.
- (3): @ White Pattern & 60Hz.

6.2 Switching Characteristics for LVDS Receiver

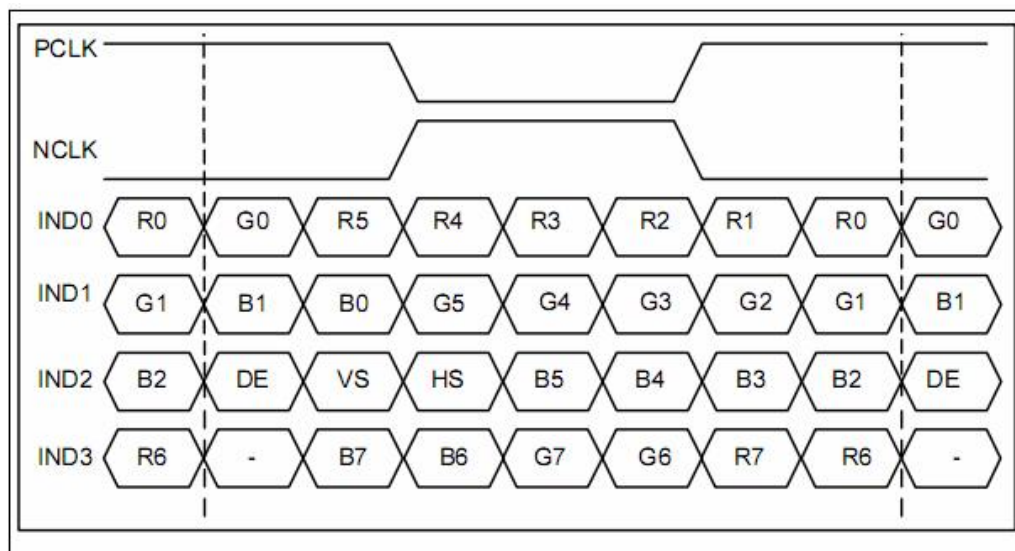
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth			100	mV	$V_{CM}=1.2V$
Differential Input Low Threshold	Vtl	-100			mV	
Input Current	I_{IN}	-10		10	uA	
Differential input Voltage	$ V_{ID} $	0.1		0.6	V	
Common Mode Voltage Offset	V_{CM}	0.7	1.2	1.6	V	

6.3 Bit LVDS input

6.3.1 6bit LVDS input



6.3.2 8Bit LVDS input

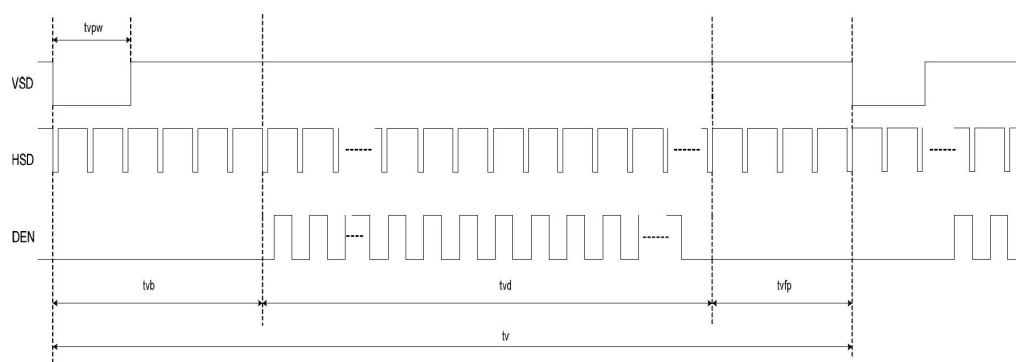


6.4 Interface Timing (DE mode)

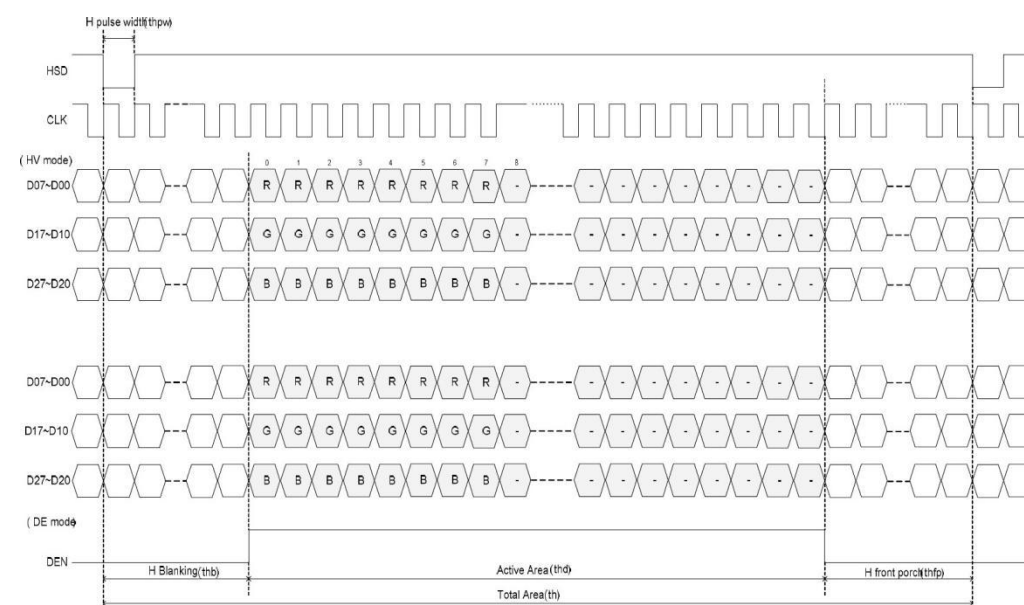
DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	52	65	71	Mhz
Horizontal display area	thd	1024			DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	768			H
VSYNC period time	tv	778	806	845	H
VSYNC blanking	tvb+tvfp	10	38	77	H

Timing Diagram of Interface Signal (DE mode)

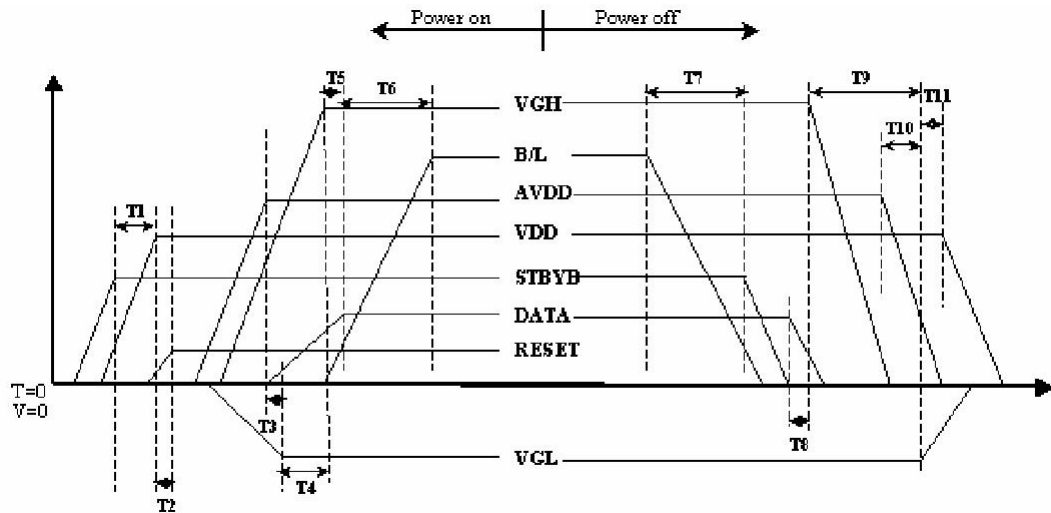
(1). Vertical input timing



(2). Horizontal input timing



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

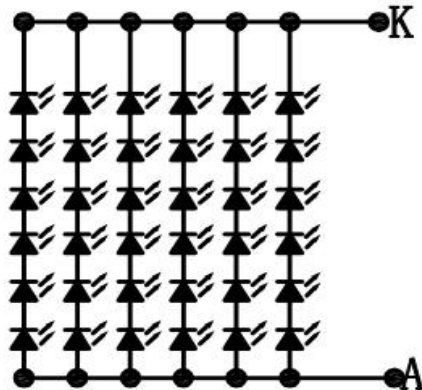
6.6 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_L	--	150	--	mA	$T_a=25^{\circ}\text{C}$
LED Voltage	V_L	--	16.0	19.8	Volt	$T_a=25^{\circ}\text{C}$
LED Life-Time	N/A	50,000	--	--	Hour	$T_a=25^{\circ}\text{C}$ $I_F=25\text{mA}$ 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 $I_L=150\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 150mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit



6.7 Electrostatic Discharge:

ITEM	CONDITON	NOTE
ESD	Air 150pF, 330Ω, +/-15kV & Contact 150 pF, 330Ω +/-8kV	Note1
	200pF, 0Ω, +/-200V contact test	Note2

Note: Measure

Note1: LCD glass and metal bezel

Note2: IF connector pins

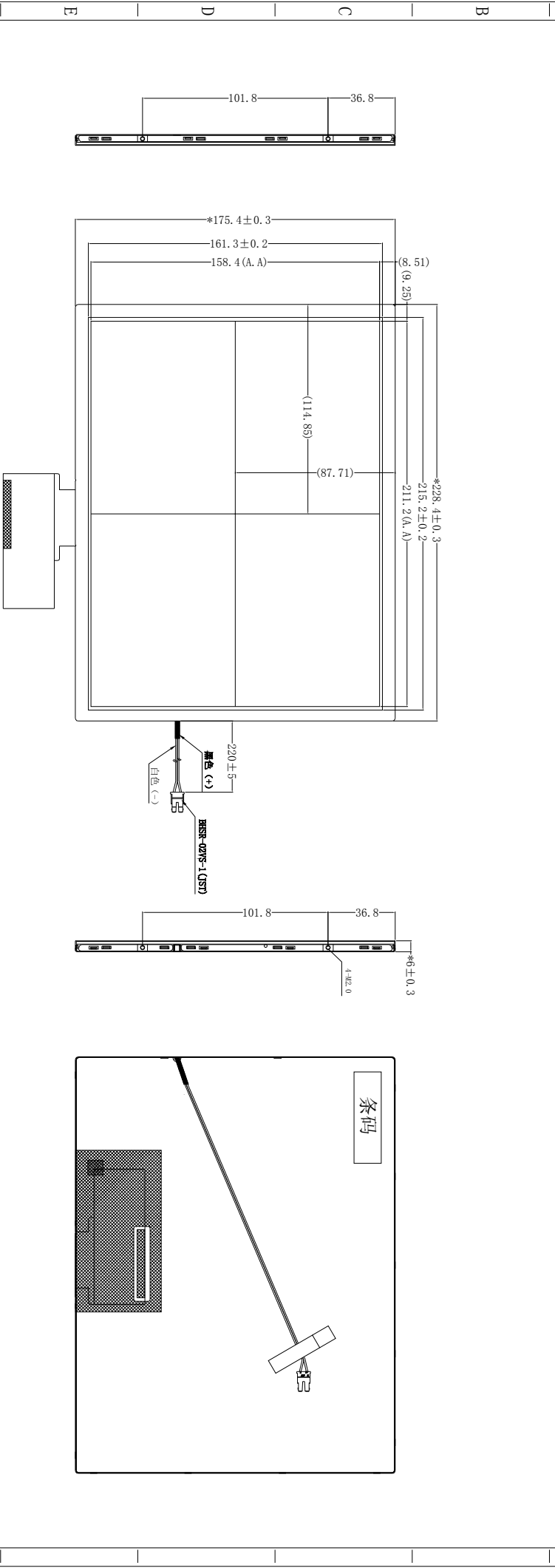
7.0 Reliability test items

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	High Temperature and High Humidity (operation)	Ta=+60°C, 90%RH, 240hrs	
6	Thermal Cycling Test (non operation)	-30°C(30min) → +80°C(30min), 200 cycles	
7	Electrostatic Discharge	±200V, 200pF(0Ω) 1 time/connector	
8	Vibration	1.Random: 1.04G, 5~500Hz, XYZ, 30min/each direction 2.Sine: Freq.1.5G, 8~33.3Hz, Stoke: 1.3mm Sweep: 2.9G, 33.3~400Hz X/Z: 2hrs, Y: 4hrs	
9	Shock	Half-Sine, 100G, 6ms, ±XYZ, 3time	
10	Vibration (with carton)	Random: 0.015G ² /Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ 各方向 2hrs	

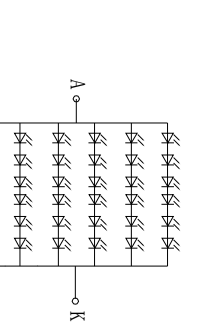
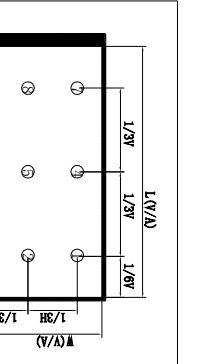
Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

8.00OUTLINE DIMENSION

客户确认			结构确认			项目确认			REV.			DESCRIPTION			REVISER			DATE		
签 名																				



- Notes:
- Unit: mm
 - Do not scale drawing
 - All radii without dimension R0.20mm, Not specified tolerance is: ± 0.5
 - All radii without dimension R0.20mm, Not specified tolerance is: ± 0.5
 - "(")" for reference dimension
 - "Δ" Modification rev. number, Draft angle 1.0° :
 - 满足可靠性试验
 - 同一片背光色度坐标/要求: 最大值与最小值相差不超过0.02.
 - 亮度、色度数据以研发BM-7为准. (9点测试)
 - Rohs must be complied. (Use Lead-free process)
 - 平整度控制到0.5MAX



LED 电路图 6串6并

ITEM			SYMBOL			MIN.			TYP.			MAX.			UNIT			Condition		
Forward Voltage			VF			—			—			20			V					
Luminance (9 Points average)			Lv			—			—			—			cd/m ²					
Uniformity			Avg			—			—			—			%					
Colour Coordinate			X			—			—			—								
(Center Point)			Y			—			—			—								
Luminance (9 Points average)			Lv			75			80			—			cd/m ²					
Uniformity			Avg			300			350			—			%					
Colour Coordinate			X			0.215			0.245			0.275								
(Center Point)			Y			0.250			0.280			0.310								
Operating Temperature			Topr			-20			—			+70			° C					
Storage Temperature			Tstg			-30			—			+80			° C					

1 2 3 4 5 6 7 8

Design by: 模组成品图 数量 比例 第三视角

Check by: 版本 A 1 1:1

Approval By: 单位 mm 页数 第_1_张 共_1_张

Customer's Code: (客户料号)

Don't scale this drawing (请勿缩放此图纸)

9.0 GENERAL PRECAUTION

9.1 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.

9.2 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.

9.3 Breakage of LCD Panel

9.3.1 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.

9.3.2 If liquid crystal contacts mouth or eyes, rinse out with water immediately.

9.3.3 If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

9.3.4 Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.4 Electric Shock

9.4.1 Disconnect power supply before handling LCD module.

9.4.2 Do not pull or fold the LED cable.

9.4.3 Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

9.5 Absolute Maximum Ratings and Power Protection Circuit

9.5.1 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.

9.5.2 Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

9.5.3 It's recommended to employ protection circuit for power supply.

9.6 Operation

9.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

19.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

9.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

9.6.4 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.

9.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

9.7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

9.8 Static Electricity

9.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

9.8.2 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.

9.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

9.10 Disposal

When disposing LCD module, obey the local environmental regulations.