



## Product Specification

<b>Model Name</b>	KS121XGH03HS
<b>Description</b>	Standard LCD Module 12.1" WSVGA 1024(RGB)x768 XGA
<b>Date</b>	2020/7/29
<b>Version</b>	1.0

<b>Approved by/Date</b>	<b>Check by/Date</b>	<b>Prepared by/Date</b>
Borger 2020/7/29	Kevin 2020/7/29	Evan 2020/7/29

<b>Customer Approval</b>	
<b>Date</b>	

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**1. Record of Revision**

<b>Rev</b>	<b>Issued Date</b>	<b>Description</b>	<b>Editor</b>
1.0	2020/7/29	First Release.	Evan

## 2. General Specifications

### 2.1 DESCRIPTION

HannStar Display model HSD121KXN1-A10 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 12.1 inch diagonally measured active display area with XGA (1024 horizontal by 768 vertical pixel) resolution.

### 2.2 Features

- 12.1 (4:3 diagonal) inch configuration
- 16.7M
- ROHS / Halogen Free Compliance

### 2.3 Applications

- Automobile

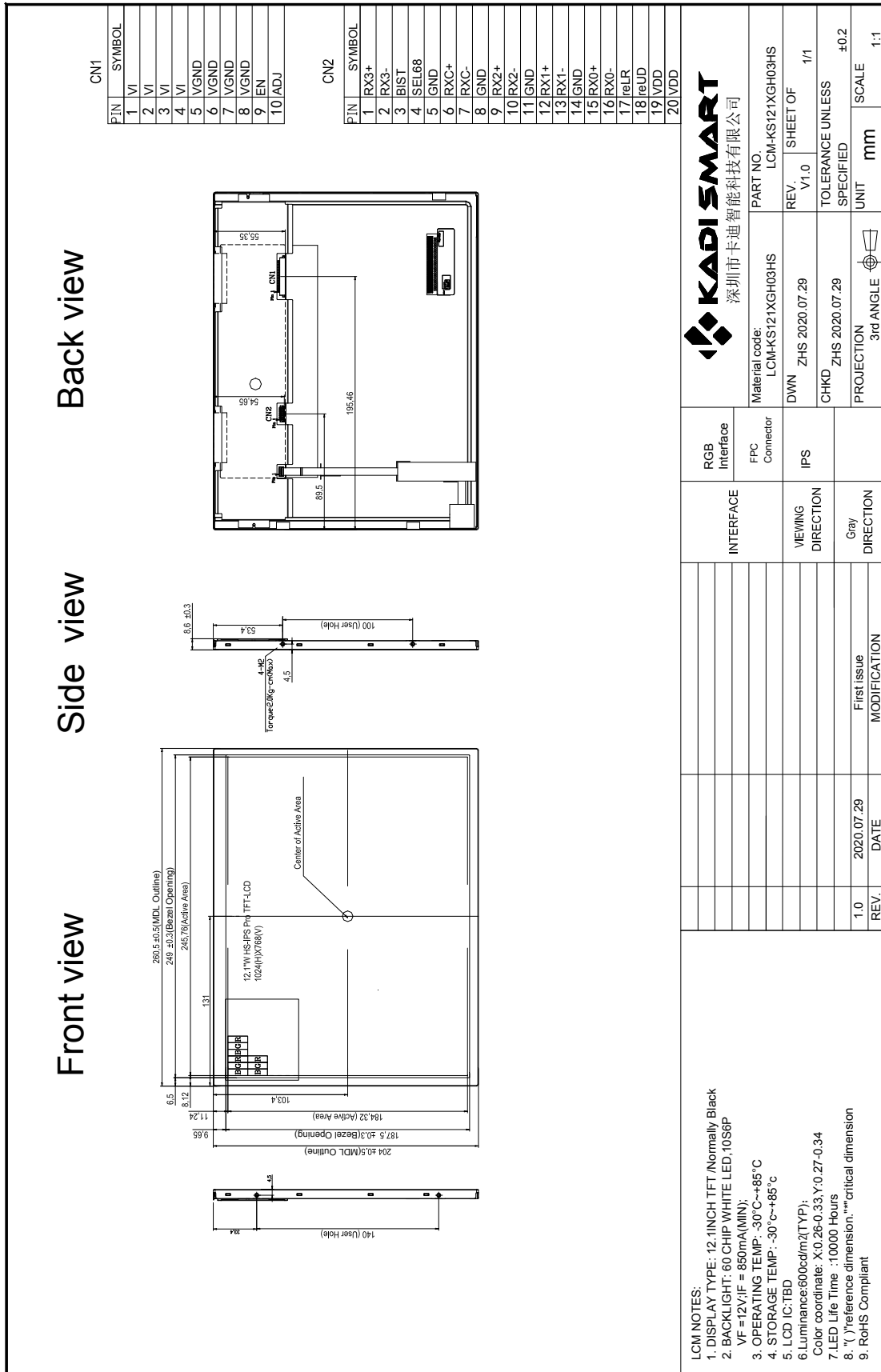
### 2.4 General information

Item		Specification	Unit
Outline Dimension		260.5 (H) x 204 (V) x 8.6 (D) (Typ)	mm
Display area		245.76(H)x184.32(V) (12.1" diagonal)	mm
Number of Pixel		1024(H) x 768(V)	pixels
Pixel pitch		0.2400(H) x 0.2400(V)	mm
Pixel arrangement		RGB Vertical Stripe	
Display mode		Normally Black	
NTSC		70(Typ.)	%
Surface treatment		Antiglare, Hard-Coating (3H)	
Weight		520(Max.)	g
Back-light		Single LED (Side-Light type)	
Power Consumption	Logic System (White Pattern)	Logic 0.8W(typ) 1.2W(max)	W
	B/L System	10.8W(max.)	W

### 2.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	260.0	260.5	261.0	mm
	Vertical (V)	203.5	204	204.5	mm
	Depth (D)	8.3	8.6	8.9	mm
Weight		—	500	520	g

### 3. Mechanical Drawing



**LCM NOTES:**

- DISPLAY TYPE: 12.1INCH TFT (Normally Black)
- BACKLIGHT: 60 CHIP WHITE LED, 10S6P  
VF=12V, IF=850mA (MIN);
- OPERATING TEMP: -30°C~+85°C
- STORAGE TEMP: -30°C~+85°C
- LCD IC: TBD
- Luminance: 600cd/m<sup>2</sup>(TYP);
- Color coordinate: X:0.26-0.33; Y:0.27-0.34
- LED Life Time :10000 Hours
- (\*)reference dimension, (\*\*)critical dimension
- RoHS Compliant

## 4. Input/Output Terminals

### 4.1 LCM connector pin assignment (CN1) : STARCONN 076B20-0048RA-G4 or JAE FI-SEB20P-HFE (or equivalent)

Pin NO.	Symbol	Description	Note
1	RX3+	Differential Data Input, CH3 ( Positive )	
2	RX3-	Differential Data Input, CH3 (Negative )	
3	BIST	Normal operation/BIST pattern select. BIST="1" : BIST mode. BIST="0" : Normal operation.	Note*
4	SEL68	6bit/8bit mode select, SELB = "1" : LVDS input data is 8bits SELB = "0" : LVDS input data is 6bits	Note*
5	GND	Ground	
6	RXC+	Differential Clock Input ( Positive )	
7	RXC-	Differential Clock Input ( Negative )	
8	GND	Ground	
9	RX2+	Differential Data Input , CH2 ( Positive )	
10	RX2-	Differential Data Input , CH2 ( Negative )	
11	GND	Ground	
12	RX1+	Differential Data Input , CH1 ( Positive )	
13	RX1-	Differential Data Input, CH1 ( Negative )	
14	GND	Ground	
15	RX0+	Differential Data Input, CH0 ( Positive )	
16	RX0-	Differential Data Input, CH0 (Negative )	
17	reLR	Left or right display control SHLR="1" : Right → Left SHLR="0" :Left → Right	Note*
18	reUD	Up / down display control UPDN="1" : Down → Up UPDN="0" : Up → Down	Note*
19	VDD	Power supply, 3.3V	
20	VDD	Power supply, 3.3V	

Note\* : The high level voltage "1" is 3.3V, and the low level voltage "0" is GND.

#### Note 1 : UPDN and SHLR control function

reLR	reUD	Data shifting
0	0	Left→Right, Up→Down
1	0	Right→Left, Up→Down
0	1	Left→Right, Down→Up
1	1	Right→Left, Down→Up

#### 4.2 Backlight Pin Assignment (CN2) : ACES 91208-01001-H01 (or equivalent)

Pin NO.	Symbol	Description	Note
1	Vi	Converter input voltage	12V
2	Vi	Converter input voltage	12V
3	Vi	Converter input voltage	12V
4	Vi	Converter input voltage	12V
5	VGND	Converter ground	Ground
6	VGND	Converter ground	Ground
7	VGND	Converter ground	Ground
8	VGND	Converter ground	Ground
9	EN	Enable pin	3.3V
10	ADJ	Backlight Adjust	PWM Dimming (100Hz-30KHz, Hi: 2.0~3.3V,Lo : 0~0.8V)

## 5. Absolute Maximum Rating

### 5.1 Electrical Absolute Rating

#### 5.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Logic supply voltage	$V_{DD}$	-0.3	5.0	V	
Back-light supply voltage	$V_i$	-0.3	28.0	V	

#### 5.1.2 Environment Absolute Rating

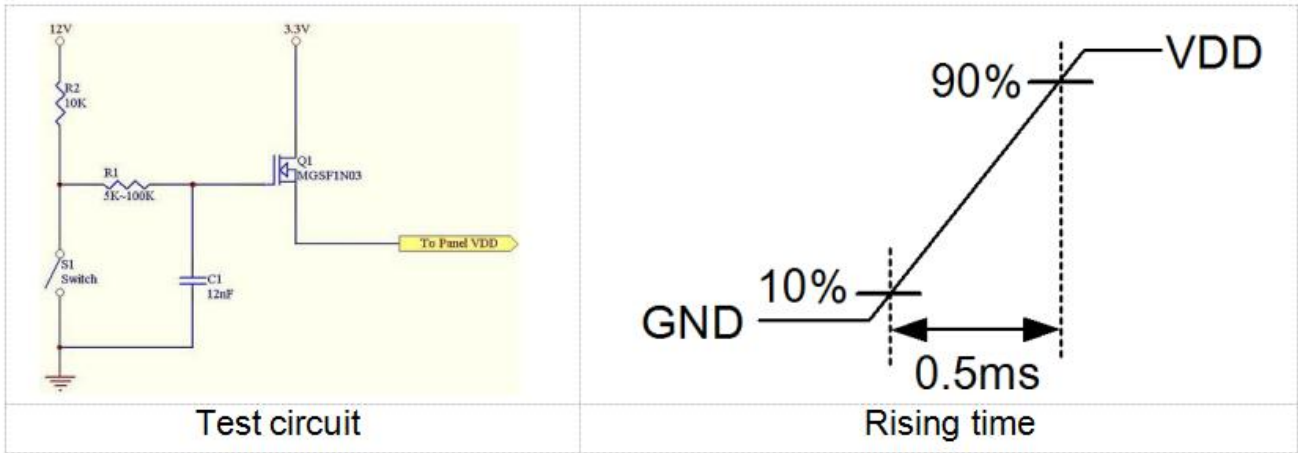
Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	$T_{opa}$	-30	85	°C	
Storage Temperature	$T_{stg}$	-30	85	°C	

## 6. 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	
Current of power supply	$I_{DD}$	—	0.25	—	A	$V_{DD}=3.3V$ 、white pattern (L255)
VDD Power	$P_{DD}$	—	0.8	1.2	W	$V_{DD}=3.3V$ 、white pattern (L255)
Inrush current	$I_{RUSH}$	—	—	2.0	A	Note*

Note\* : Inrush current test circuit and rising time setting (power on)

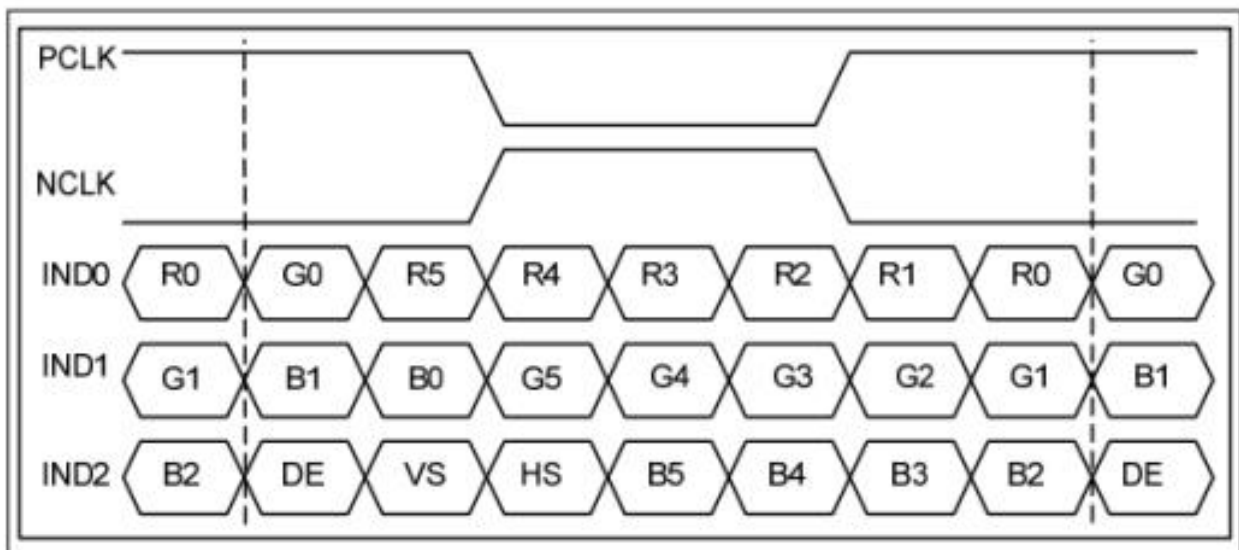


## 6.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	$V_{TH}$	100	-	300	mV	
Differential Input Low Threshold	$V_{TL}$	-300	-	100	mV	
Differential input common mode voltage	$V_{CM}$	1.0	1.2	$1.7 -  V_{ID}  / 2$	V	
Input Current	$I_{IN}$	-10	-	10	uA	RX+/-, RXC+/-
Differential input Voltage	$ V_{ID} $	200	-	600	mV	

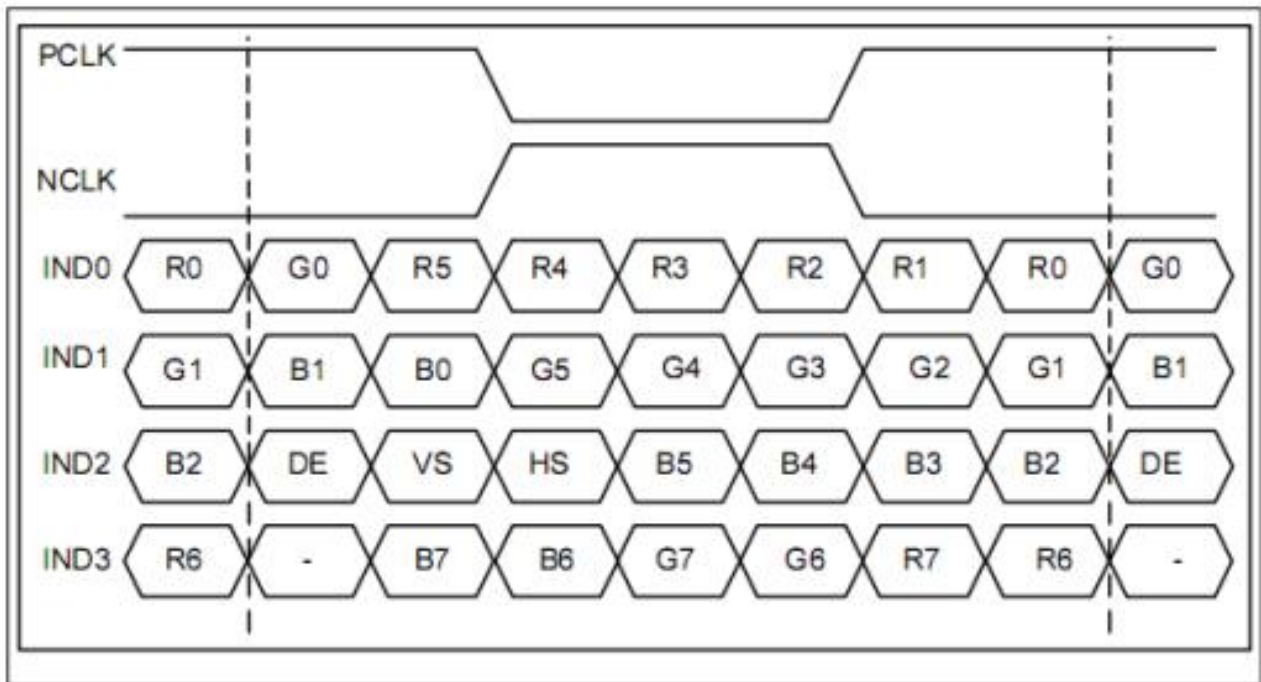
## 6.3 Bit LVDS input

### 6.3.16bit LVDS input





### 6.3.2 8Bit LVDS input

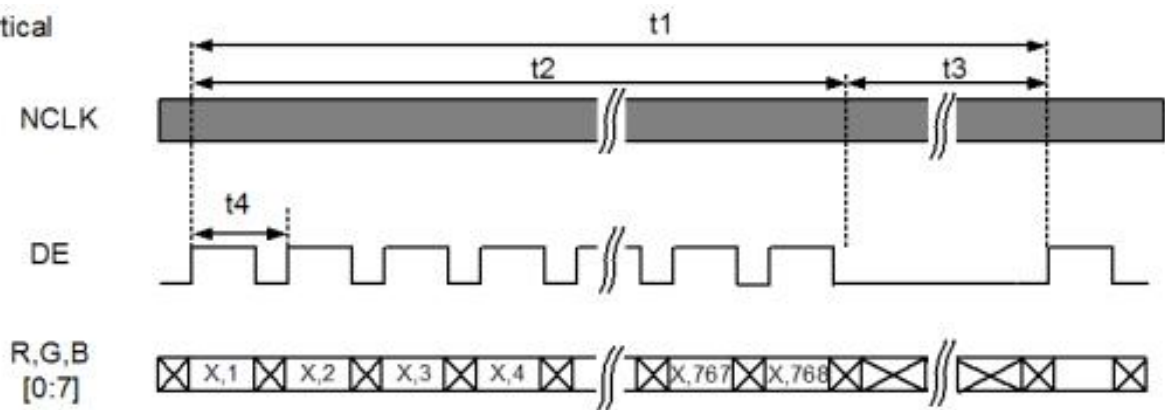


### 6.4 Interface Timing (DE mode)

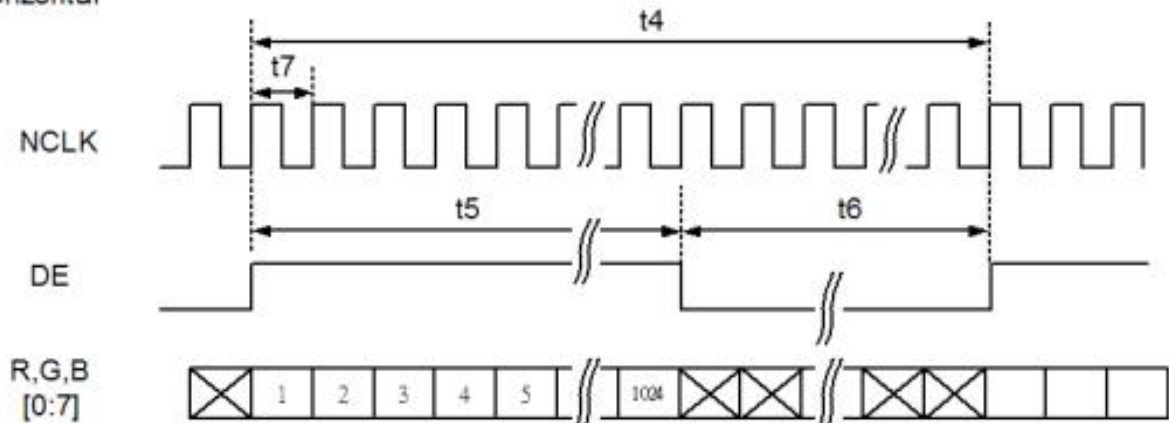
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	59.95	60.05	60.15	Hz
Vertical Total Time	$T_v$	774	776	778	line
Vertical Display Time	$T_{vD}$	768			line
Vertical Blanking Time	$T_{vB}$	6	8	10	line
Horizontal Total Time	$T_H$	1084	1088	1092	clock
Horizontal Display Time	$T_{HD}$	1024			clock
Horizontal Blanking Time	$T_{HB}$	60	64	68	clock
Clock Rate	$1/T_{Clock}$	50.3	50.7	51.1	MHz

## Timing Diagram of Interface Signal (DE mode)

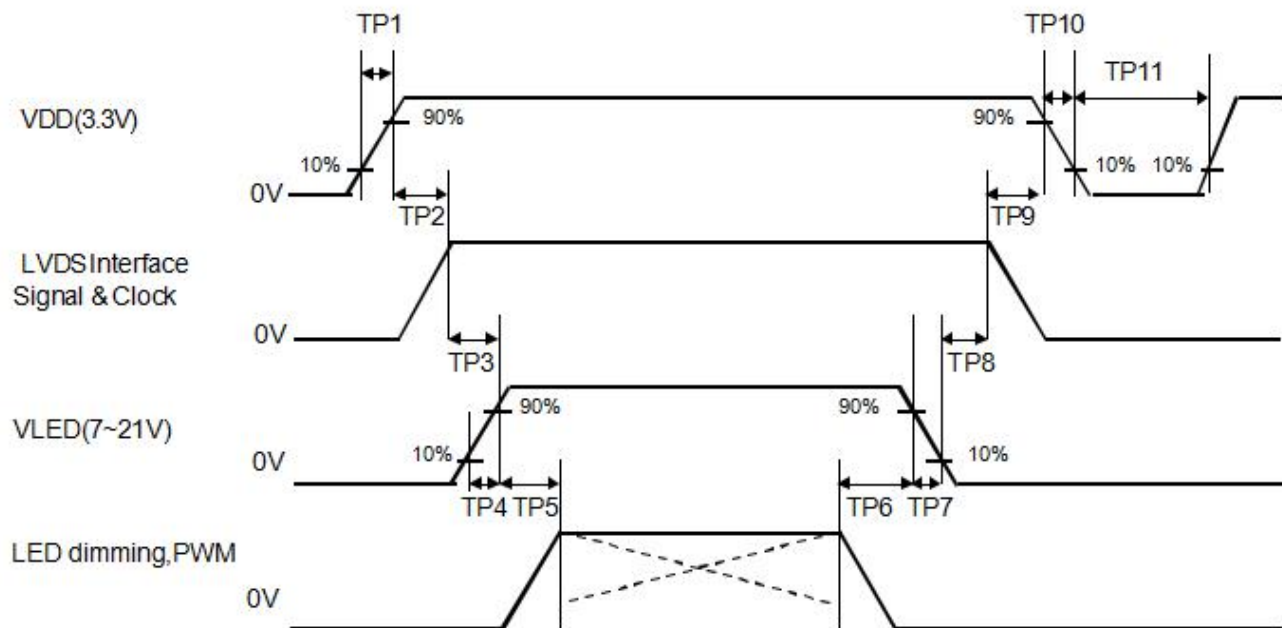
### 1. Vertical



### 2. Horizontal



## 6.5 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit
TP1	0.5	--	10	msec
TP2	0	--	50	msec
TP3	200	--	--	msec
TP4	0.5	--	10	msec
TP5	10	--	--	msec
TP6	10	--	--	msec
TP7	0	--	10	msec
TP8	200	--	--	msec
TP9	0	--	50	msec
TP10	1	--	10	msec
TP11	1000	--	--	msec

## 6.6 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
Input Current	$I_i$	--	850	1200	mA	Ta=25°C
Input Voltage	$V_i$	10	12	16	Volt	Ta=25°C
LED Life-Time	N/A	30,000	--	--	Hour	Ta=25°C I <sub>F</sub> =52.5mA Note (2)

## 6.7 Backlight DC Electrical Characteristics

Parameter	Symbol	Min		Typ	Max	Units	Note
Backlight Power Supply	$V_i$	10		12	16	Volt.	
LED_EN High Threshold	$V_{ENH}$	1.4		3.3	5.0	Volt.	
LED_EN Low Threshold	$V_{ENL}$	0		--	0.8	Volt.	
PWM High Threshold	$V_{PWMH}$	2.0		3.3	6.0	Volt.	
PWM Low Threshold	$V_{PWML}$	0		--	0.8	Volt.	
PWM Frequency	$F_{PWM}$	100		--	30K	Hz	Note (4)
PWM Duty Cycle	$T_D$	10		--	100	%	

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 IL value indicated in the above table until the brightness becomes less than 50%.

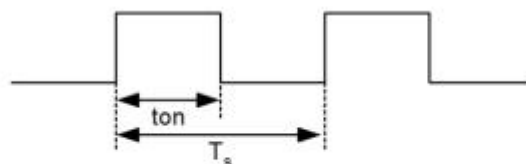
Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at  $T_a=25^\circ\text{C}$  and  $I_f=850\text{mA}$ , the LED lifetime could be decreased if operating IL is larger than 850mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit



BLU circuit : 11S-4P

Note (4) Dimming controller waveform



$$T_D = \text{ton} \div T_s \times 100\%$$

$$F_{PWM} = 1 \div T_s$$

## 7. Optical Characteristic

### 7.1 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 <sup>2</sup>	(1)(4) ( $I_L=850mA$ )
Color chromaticity (CIE1931)	White	$W_x$		0.251	0.291	0.331	(1)(4)	
		$W_y$		0.288	0.328	0.368		
	Red	$R_x$		0.613	0.653	0.703		
		$R_y$		0.302	0.342	0.382		
	Green	$G_x$		0.264	0.304	0.344		
		$G_y$		0.581	0.621	0.661		
	Blue	$B_x$	0.104	0.144	0.184			
		$B_y$	0.054	0.094	0.134			
Viewing angle	Hor.	$\Theta_L$	80	85	—			
		$\Theta_R$	80	85	—			
	Ver.	$\Theta_U$	80	85	—			
		$\Theta_D$	80	85	—			
Brightness uniformity		$B_{UNI}$	$\Theta=0$	70	80	—	%	(5)
Optima View Direction		Free						(6)

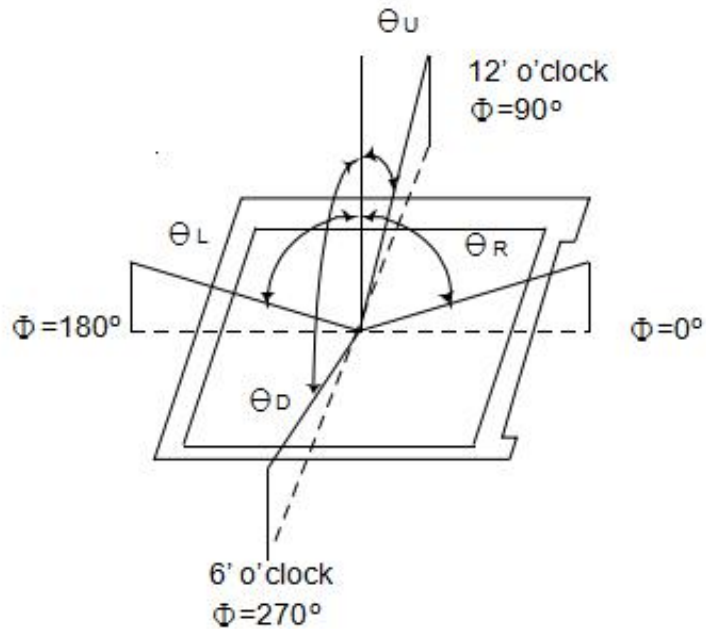
### 7.2 Measuring Condition

- Measuring surrounding : dark room
- LED current  $I_L$  : 850mA
- Ambient temperature :  $25\pm 2^{\circ}C$
- 15min. warm-up time.

### 7.3 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

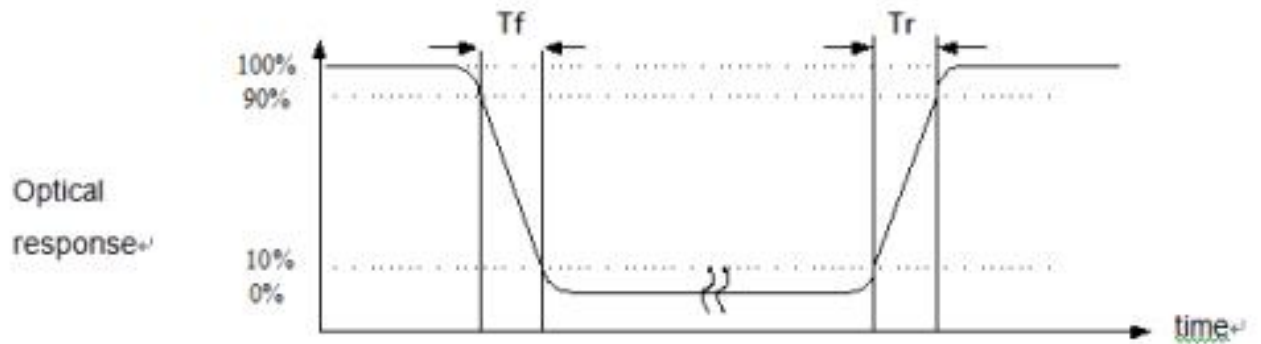
**Note (1)** Definition of Viewing Angle:



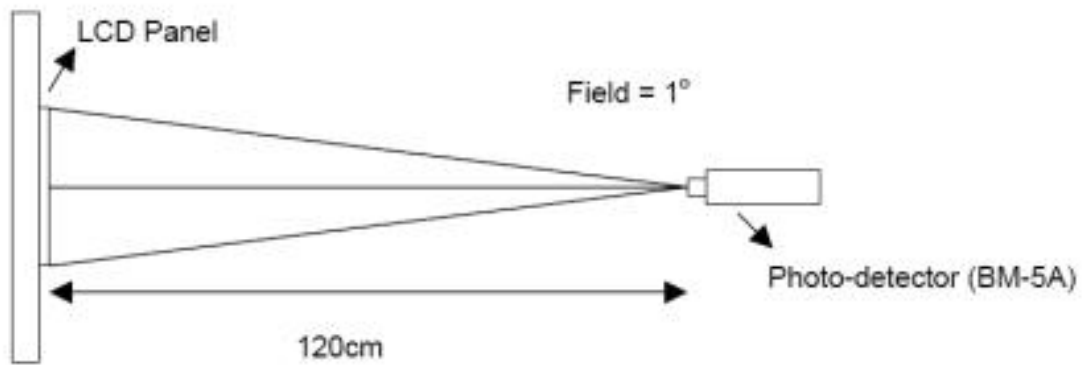
**Note (2)** Definition of Contrast Ratio (CR) :  
measured at the center point of panel

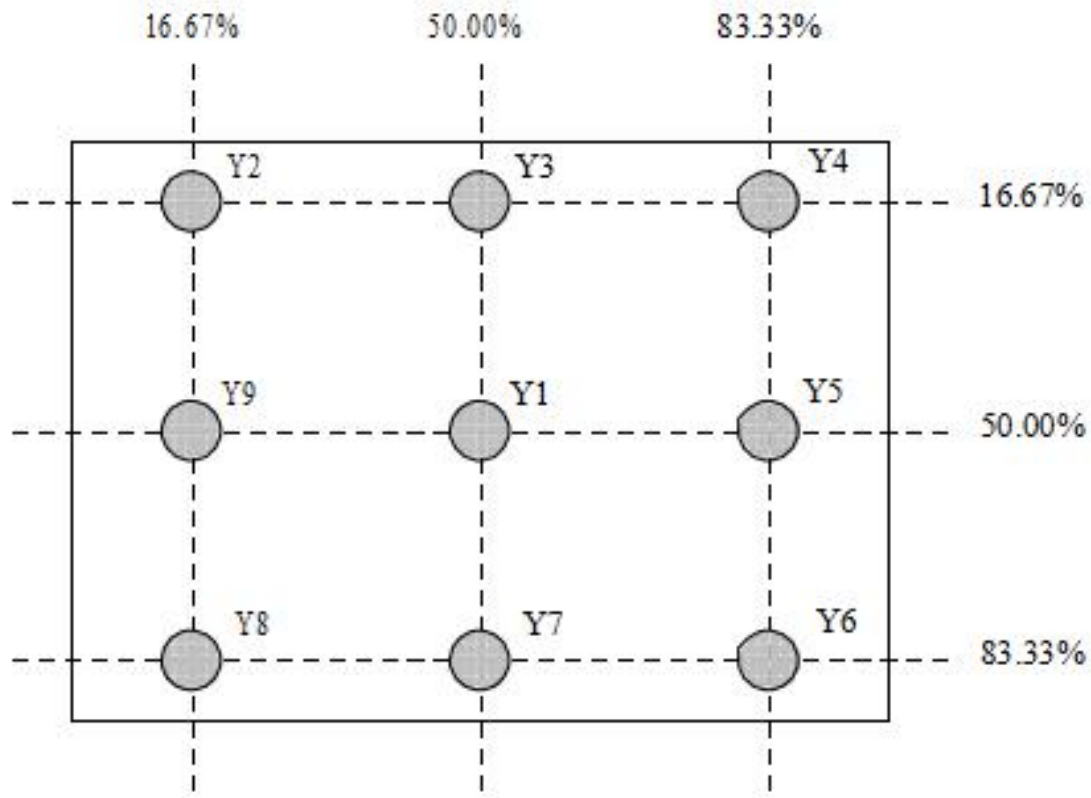
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

**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.)



## 8. Environmental / Reliability Tests

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=+65°C, 90%RH, 240hrs	
6	Thermal Cycling Test (non operation)	-30°C(30min) → +85°C(30min), 500 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 <sup>2</sup> /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	

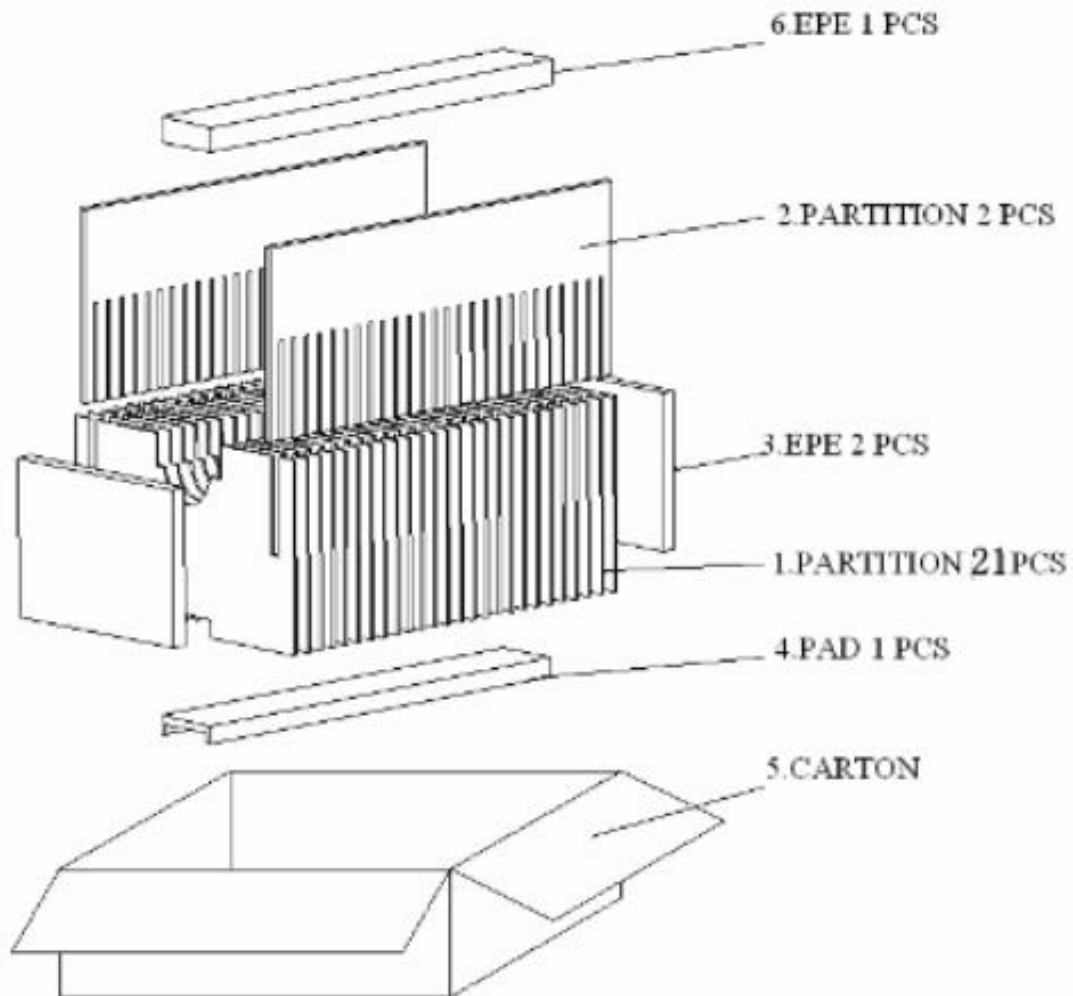
Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

## 9. Packing

### 9.1 Packing form

LCM Model	Qty. in the Box	Inner Box Size(mm)	Notice
JH121XSH-L02	20 pcs/Box	Ref. 360 x 345 x 285 <sup>H</sup>	--

### 9.2 Packing assembly drawings



## 10. GENERAL PRECAUTION

### 10.1 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.

### 10.2 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.

### 10.3 Breakage of LCD Panel

- 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.
- If liquid crystal contacts mouth or eyes, rinse out with water immediately.
- If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
- Handle carefully with chips of glass that may cause injury, when the glass is broken.

### 10.4 Electric Shock

- Disconnect power supply before handling LCD module.
- Do not pull or fold the LED cable.
- Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

### 10.5 Absolute Maximum Ratings and Power Protection Circuit

- 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.
- Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
- It's recommended to employ protection circuit for power supply.

### 10.6 Operation

- Do not touch, push or rub the polarizer with anything harder than HB pencil lead.
- Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
- When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
- 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.

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

### **10.7 Mechanism**

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

### **10.8 Static Electricity**

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

10.8.2 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.

### **10.9 Strong Light Exposure**

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

### **10.10 Disposal**

When disposing LCD module, obey the local environmental regulations.

