深圳市勋瑞光电科技有限公司
Xunrui photoelectric technology （shenzhen）CO,.LTD.

APPROVAL SHEET 承认书

客户名称 Customer	
产品型号 Part NO.	HBM116FH11B1
产品内容 Product type	Mode: TFT LCD Module
备注栏 Remarks	□APPROVAL FOR SEPCIFICATIONS ONLY ■APPROVAL FOR SEPCIFICATIONS AND SAMPLE
客户确认签章 Signature by Customer:	
备注/ Notes:	

PREPARED BY	CHECKED BY	APPROVED BY

RECORDS OF REVISION

DATE	NO	REVISED No.	PAGE	SUMMARY	NOTE
2021-05-10		Rev01	/	-	

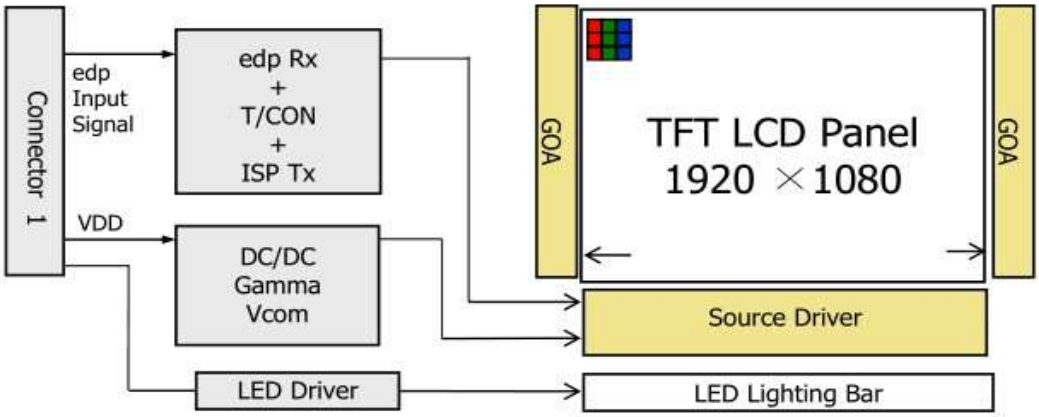
1. Application

This specification applies to a color TFT-LCD Module,

2. Overview

The TFT-LCD Module is a color active matrix TFT LCD FOB using amorphous silicon TFT's(Thin Film Transistors) as an active switching devices. This module has a 11.6 inch diagonally measured active area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical Stripe and this module can display 16.7M colors. The TFT-LCD panel used for this module is a low reflection and higher color type. The LED Driver for backlight driving is built in this model.

All input signals are eDP1.3 interface compatible.



2 lane eDP Interface with 2.7Gbps Link Rates
Thin and light weight
8 bit color depth, display 16.7M colors
Single LED Lighting Bar. (Down side/Horizontal Direction)
Green Product (RoHS & Halogen free product)
On board LED Driving circuit 6CH
Low driving voltage and low power consumption
On board EDID chip

3. Mechanical specifications.

Parameter	Specification	Unit	Note
Display size	11.6” (Diagonal)	inch	
Active area	256.32(H) ×144.18(V)	mm	
Pixel Format	1920(H) ×1080(V) （1pixel = R + G + B Dot）	pixel	
Pixel pitch	0.1335(H) x 0.1335 (V)	mm	
Pixel configuration	R, G, B vertical stripe		
Display mode	Normally black		
Surface treatment of front polarizer	Anti-glare coating: (3H)		

Outline dimensions

Parameter		Min	Typ	Max	Unit	Remark
Unit outline dimensions	Width	267.7	267.9	268.2	mm	
	Height	163.92	164.22	164.52	mm	
	Depth	2.6	2.8	3.0	mm	
Mass		-	-	-	g	

[Note 3-1]Outline dimensions is shown in page 17
[Note 3-2]Without war page and deflection.

4. Input Terminals

4-1 Driving interface of PWB

CN1 (eDP signals, +3.3V DC power supply and B/L power supply)

Pin No.	Symbol	I/O	Function	Remark
1	NC	-	Reserved for CD	
2	H_GND	P	High Speed round	
3	Lane1_N	I	Complement Signal Link Lane 1	
4	Lane1_P	I	True Signal Link Lane 1	
5	H_GND	P	High Speed round	
6	Lane0_N	I	Complement Signal Link Lane 0	
7	Lane0_P	I	True Signal Link Lane 0	
8	H_GND	P	High Speed round	
9	AUX_CH_P	I	True Signal Auxiliary Channel	
10	AUX_CH_N	I	Complement Signal Auxiliary Channel	
11	H_GND	P	High Speed round	
12	LCD_VDD	P	LCD logic and driver power(3.3V)	
13	LCD_VDD	P	LCD logic and driver power(3.3V)	
14	NC	I	Reserved for LCD manufacturer’s use	
15	LCD_GND	P	LCD logic and driver ground	
16	LCD_GND	P	LCD logic and driver ground	

17	HPD	O	HPD signal pin	
18	LED-GND	P	Backlight ground	
19	LED-GND	P	Backlight ground	
20	LED-GND	P	Backlight ground	
21	LED-GND	P	Backlight ground	
22	BL_ENABLE	I	Backlight on/off	
23	BL_PWM_DIM	I	System PWM	
24	NC	-	Reserved for LCD manufacturer’s use	
25	NC	-	Reserved for LCD manufacturer’s use	
26	Vled	P	Backlight power	
27	Vled	P	Backlight power	
28	Vled	P	Vled Backlight power	
29	Vled	P	Backlight power	
30	NC	-	Reserved for LCD manufacturer’s use	

*1 P: POWER I: Input O: Output

Note

・ Don’t input any signals or any powers into a NC pin. Keep the NC pin open.

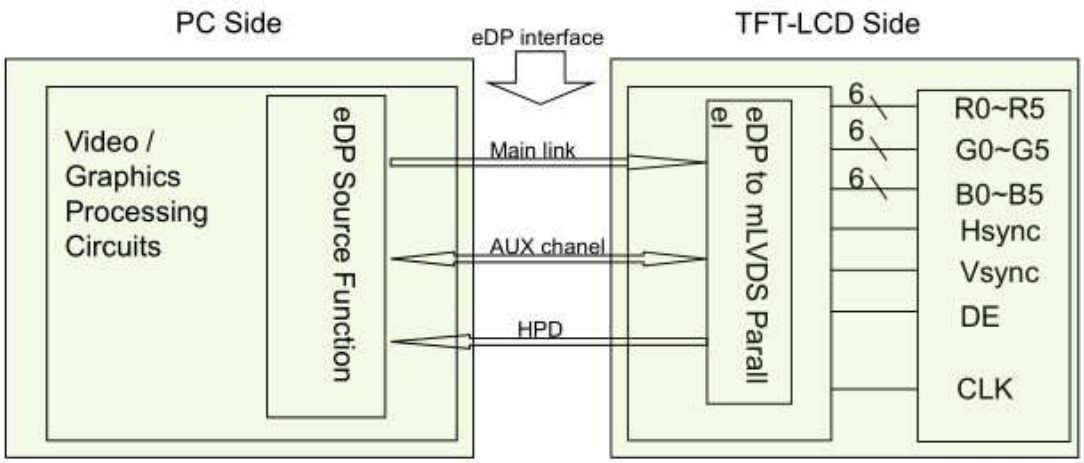
・ The shielding case is connected with signal GND. ・Connector

used :20455-030E-76(I-PEX)

・Corresponding connector : 20453-030T (I-PEX)

(Panda is not responsible to its product quality, if the user applies a connector not corresponding to the above model.)

4-2 eDP interface



5. Electrical Characteristics 5-1 Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings		Unit	Remark
			MIN	MAX		
+3.3V supply voltage	VDD	Ta=25℃	-0.3	+3.6	V	
Input voltage(eDP)	VI	Ta=25℃	-0.3	+1.5	V	[Note 5-1]
Storage temperature	Tstg		-10	+60	℃	[Note 5-2]
Operation temperature	Topa		0	+50	℃	

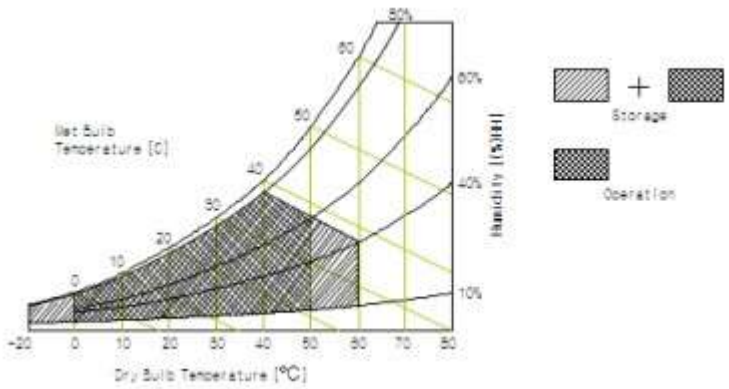
(*) “Absolute Maximum Ratings” is regulations that do not exceed it even momentarily.

(*) Stress beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device.

[Note 5-1] eDP signals

[Note 5-2] Humidity: 90%RH Max.at Ta≦+40℃.

Maximum wet-bulb temperature at +39℃ or less at Ta>+40℃, No condensation.

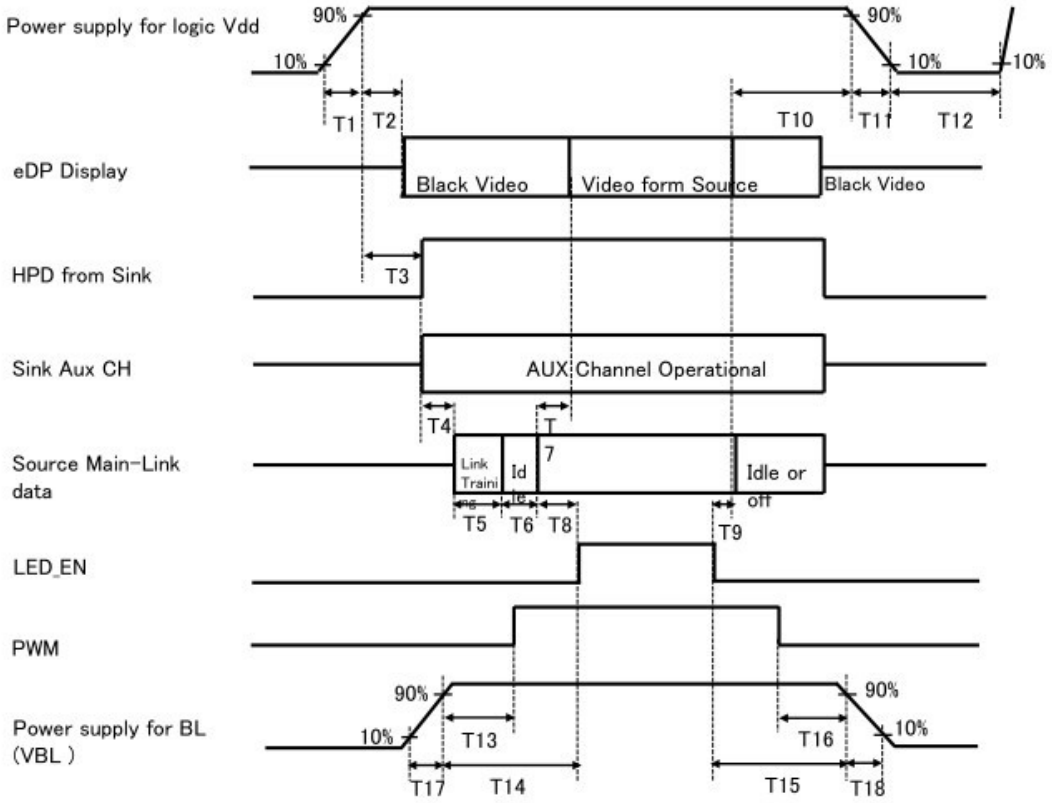


5. DC Characteristics 5-2-1. TFT-LCD panel driving

DC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
+3.3V supply voltage	VDD	+3.0	+3.3	+3.6	V	[Note 5-2-1]
Current dissipation	IDD	-	-	-	mA	[Note 5-2-2]
Permissible input ripple voltage	VRP	-	-	100	mVp-p	VDD=+3.3V
Differential Peak-to-peak Input Voltage at Rx package pins	$V_{RX-DIFFp-p}$	90		1200	mV	
Power Consumption	P_D	-	0.9	1.4	W	
	P_{BL}	-	-		W	
	P_{TOTAL}	-	-	4.4	W	

[Note 5-2-1] ON-OFF conditions for supply voltage

To prevent a latch-up or DC operation of the LCD module, the power on/off seq uence shall be as shown in below



- 0.5ms ≤ T1 ≤ 10 ms
- 0ms ≤ T2 ≤ 200 ms
- 0ms ≤ T3 ≤ 200 ms
- 0ms ≤ T13
- 0ms ≤ T14
- 0ms ≤ T17
- 200ms < T3+T4+T5+T6+T8
- 0ms ≤ T7 ≤ 50ms
- 0ms ≤ T10 ≤ 500 ms
- 3ms ≤ T11 ≤ 10 ms
- 500ms ≤ T12
- 0ms ≤ T15
- 0ms ≤ T16
- 0ms ≤ T18
- 0ms < T9

Notes:

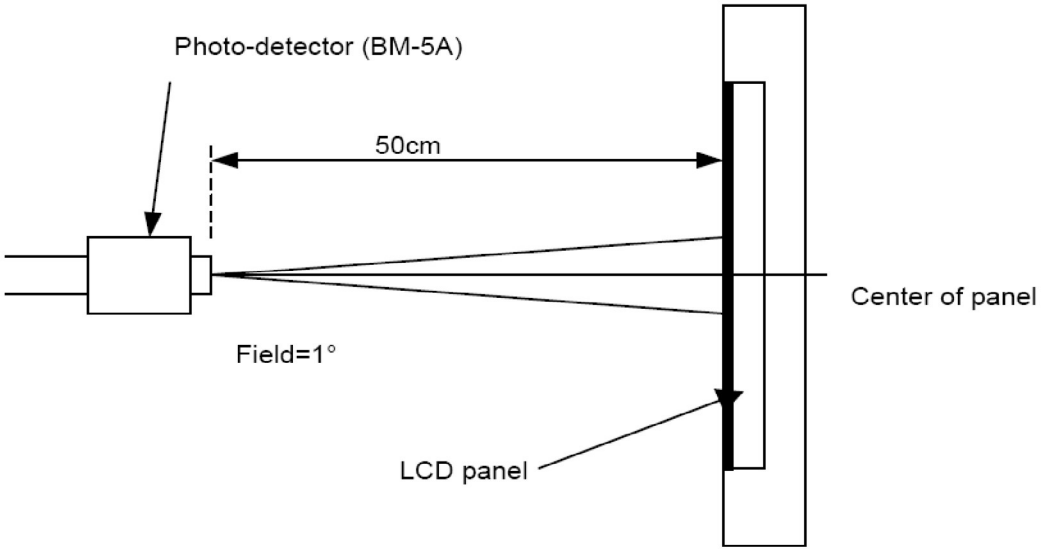
1. When the power supply VDD is 0V, keep the level of input signals on the low or k eep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

6 Backlight Characteristics

Ta=25+/-2°C

Parameter			Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage		V_F	-	-	-	V	-
LED Forward Current		I_F	0.1	-	25	mA	-
LED Power Consumption		P_{LED}		-	-	W	-
LED Life-Time		N/A	-	-	-	Hour	-
LED Driver Output Voltage		V_{OUT}	-	-	37		
Power supply voltage for LED Driver		V_{LED}	5	12	21	V	
EN Control Level	Backlight on		1.2		5.0	V	
	Backlight off		0		0.6	V	
PWM Control Level	PWM High Level		1.2		5.0	V	
	PWM Low Level		0		0.6	V	
PWM Control Frequency		F_{PWM}	200	-	20,000	Hz	
Duty Ratio		-	1	-	100	%	

Notes : 1. Power supply voltage12V for LED Driver
2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.
3. 1% duty cycle is achievable with a dimming frequency less than 1KHz.



7. Timing characteristics of input signals

7-1.Timing Characteristics

The TFT-LCD Module is operated by the DE only.

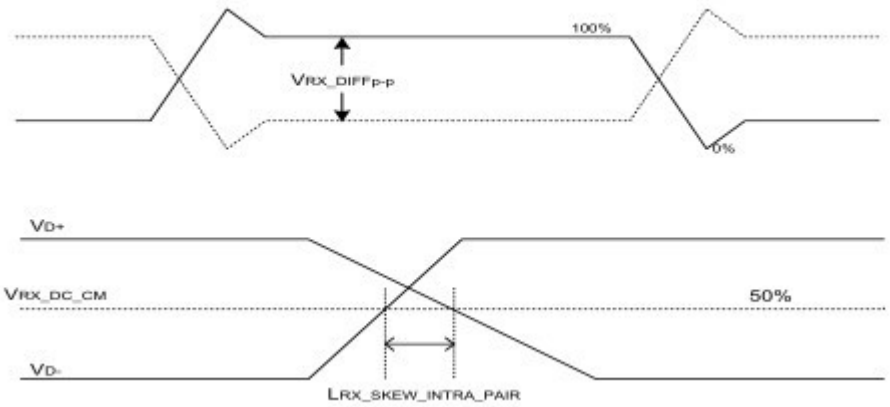
VDD=+3.3V~3.6V,Ta=-0~+60℃

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	100	141.4	160	MHz
Horizontal display area	thd		1920		pixel
HSYNC period time	th	2080	2142	2400	pixel
HSYNC blanking	thb+ thfp	-	222	-	pixel
Vertical display area	Tvd		1080		H
Frequency	fV	40	60	66	Hz
VSYNC period time	Tv	1090	1100	1238	H
VSYNC blanking	Tvb+ Tvfp	-	20	-	H

7-2. eDP Rx Interface Timing Parameter

The specification of the eDP Rx interface timing parameter is shown

Item	Symbol	Min	Typ	Max	Unit	Remark
Spread spectrum clock	ssc		0.5		%	
Differential peak-to-peak input voltage at package pins	$V_{RX-DIFFp-p}$	120		1200	mV	
Rx input DC common mode voltage	$V_{RX\_DC\_CM}$	-	GND	-	V	
Differential termination resistance	$R_{RX-DIFF}$	80	100	120	Ω	
Single-ended termination resistance	R_{RX-SE}	40	-	60	Ω	
Rx short circuit current limit	I_{RX_SHORT}	-	-	20	mA	
Intra-pair skew at Rx package pins (HBR) RX intra-pair skew tolerance at HBR	$L_{RX\_SKEW\_INTRA\_PAIR}$	-	-	150	ps	



7-3 Input sigal,basic display colors and gray scale of each color

Color & Gray Scale		Input Data Signal																							
		Red Data								Green Data								Blue Data							
		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 Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of White	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

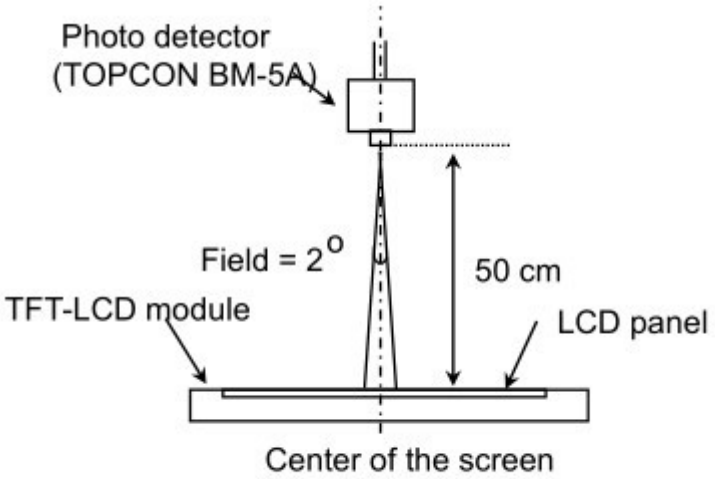
Each basic color can be displayed in 256 gray scales from 8 bit data signals.
According to the combination of 24 bit data signals, the 16.7M color display can be achieved on the screen.

8. EDID TBD

9. Optical characteristics

Paramete	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θL	-	85	-	degree	[Note9-1,93,9-4,9-6]
		θR	-	85	-		
	Vertical	θT	-	85	-		
		θB	-	85	-		
Contrast Ratio	Center		800	1000	-	-	[Note9-2,94,10-6]
Response Time	Tr+Td		-	30	35	ms	[Note9-1,95,9-6]
CF Color Chromaticity (CIE1931)	Red x		Typ. -0.05	TBD	Typ. +0.05	-	[Note 9-2,9-6] Normal operation (PWM Duty=100%)
	Red y			TBD		-	
	Green x			TBD		-	
	Green y			TBD		-	
	Blue x			TBD		-	
	Blue y			TBD		-	
	White x			TBD		-	
	White y			TBD		-	
NTSC ratio	%			(72)		-	
Center Luminance of white	Y_{LI}		**200**	**220**		cd/m	
Cross Talk	CT		=0			**2**	Note9-7

※The measurement shall be taken 30 minutes after lighting the module at the following rating.
※Condition: PWM Duty = 100%
※The optical characteristics shall be measured in a dark room or equivalent.



Optical characteristics measurement setup

[Note 9-3]Definitions of viewing angle range

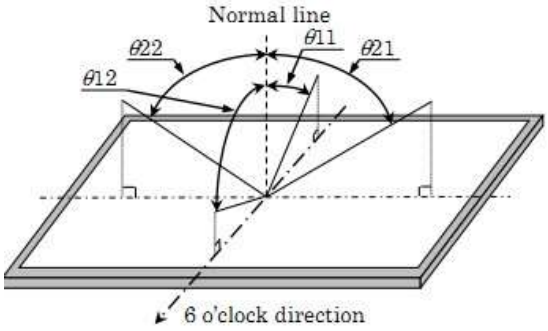


Fig.9-3 Viewing angle

[Note 9-4]Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio} = \frac{\text{Luminance(Brightness) with all pixels white}}{\text{Luminance(Brightness) with all pixels Black}}$$

[Note 9-5]Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

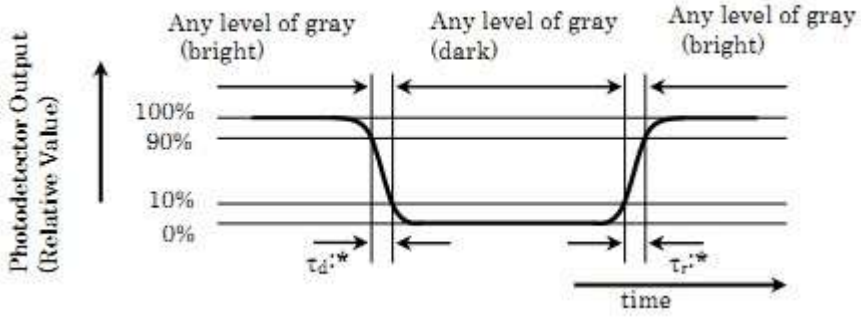
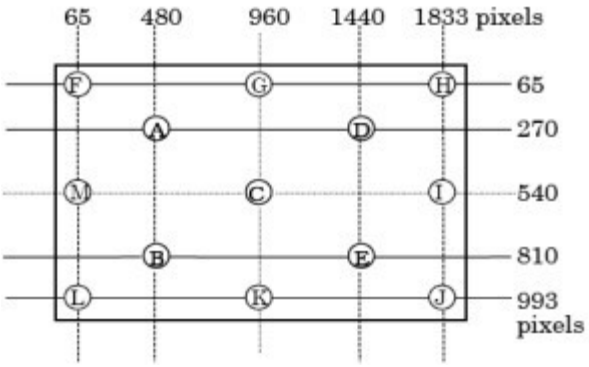


Fig.9-4Responsetime

[Note9-6]Thisshallbemeasuredatcenterofthescreen.



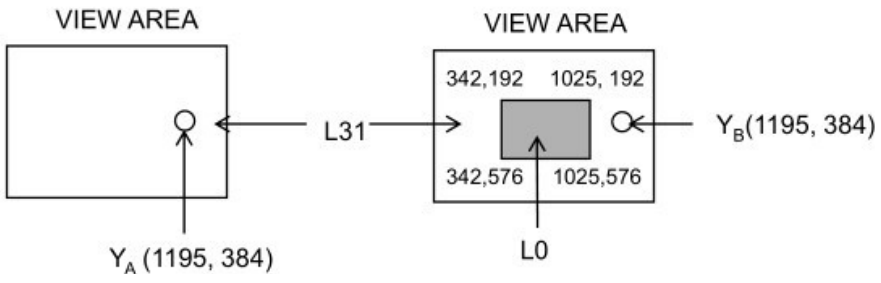
[Note9-7]Definition of white uniformity：

White uniformity is definedasthe

Following with 5 measurements(A~M)

$$\delta w = \frac{\text{Maximum Luminance of 5 Points(Brightness)}}{\text{Minimum Luminanceof 5 Points(Brightness)}}$$

[Note9-7]Cross Modulation Test Description



$$\text{Cross-Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_A} \right| \times 100$$

Where:
Y A = Initial luminance of measured area (cd/m 2)
Y B = Subsequent luminance of measured area (cd/m 2)
The location measured will be exactly the same in both patterns
Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark

10. **Display Quality**The display quality of the color TFT-LCD module shall be in compliance with the Incoming Inspection Standard.
11. **Handling Precautions**

(1) Cautions when taking out the module
Pick the pouch only, when taking out module from a shipping package.

(2) Cautions for handling the module
As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible. As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
Do not pull the interface connector in or out while the LCD module is operating.
Put the module display side down on a flat horizontal plane.
Handle connectors and cables with care.

(3) Cautions for the operation
When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

(4) Cautions for the atmosphere
Dew drop atmosphere should be avoided.
Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(5) Cautions for the module characteristics
Do not apply fixed pattern data signal to the LCD module at product aging.
Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions
Do not disassemble and/or re-assemble LCD module.
Do not re-adjust variable resistor or switch etc.
When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

12. Packaging Condition(TBD)

Piling number of cartons	
Package quantity in one carton	
Carton size	
Total mass of one carton filled with full modules	
Packing form	

13. Label (TBD)

(1) Module Bar code label:

TBD

(2) Packing bar code label

TBD

14. RoHS Directive

This LCD open-cell is compliant with RoHS Directive.

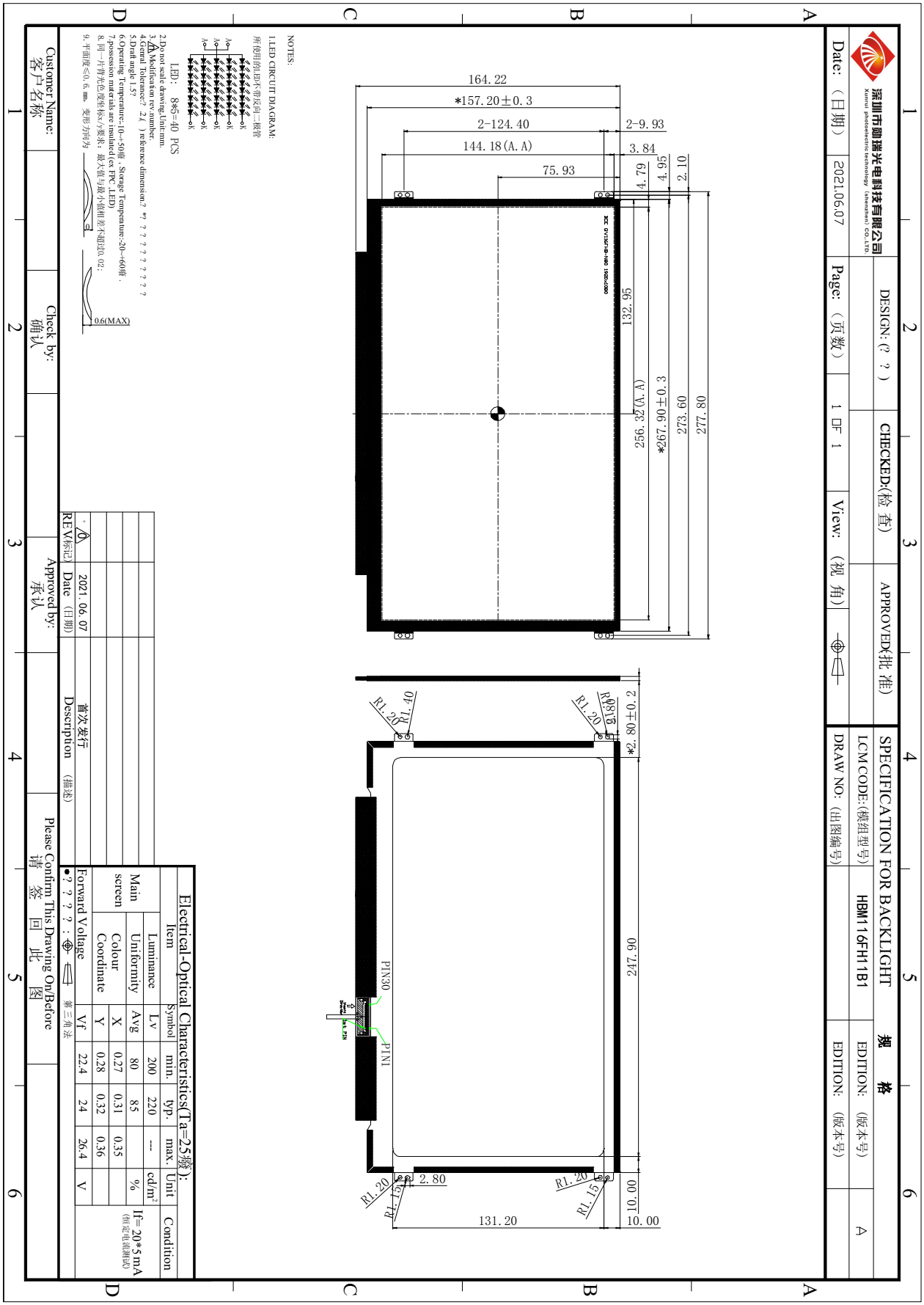
15. Reliability Test Items

No.	Test Item	Conditions
1	High temperature storage test	Ta=60℃ 72h
2	Low temperature storage test	Ta=-10℃ 72h
3	High temperature & high humidity operation test	Ta=40℃90%RH 72h (No condensation)
4	High temperature operation test	Ta=50℃ 72h
5	Low temperature operation test	Ta=0℃ 72h

[Result Evaluation Criteria] Under the display quality test condition with normal operation state.

Do not change these condition as such changes may affect practical display function.

[Normal operation state] temperature： ＋15~＋35℃，Humidity：45~ 75%，Atmospheric pressure：86~106kPa



Electrical-Optical Characteristics(Ta=25℃):

Item		Symbol	min.	typ.	max.	Unit	Condition
Main screen	Luminance	Lv	200	220	---	cd/m²	If=20*5mA (恒定电流测试)
	Uniformity	Avg	80	85		%	
	Colour Coordinate	X	0.27	0.31	0.35		
		Y	0.28	0.32	0.36		
	Forward Voltage	Vf	22.4	24	26.4	V	