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Custom Display

Production Custom designs Installation

Mechanical design



LCD MODULE

SPECIFICATION

Customer: _____

Model Name: **ET101WU04-J**

Date: **2020/03/05**

Version: **V0**

☒ **Preliminary Specification**

☐ **Final Specification**

For customer's Acceptance

APPROVED BY	Comment

APPROVED BY	Reviewed BY	Prepared BY

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1. General Specifications

NO	Item	Specification	Remark
1	LCD Size	10.1 inch (Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1920(H) x 3(RGB) x 1200(V)	
4	Display mode	Normally Black, Transmissive	
5	Dot pitch	0.03764(H)×RGB×0.11292(V)	
6	Active area	216.8064(H)*135.504(V)	
7	Module size	228.47(W) x149.3(H) x4.6 (D)mm	Note 1
8	Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Interface	LVDS	
11	Backlight power consumption	6720	mW
12	Panel power consumption	660(Typ.)	mW
13	Weight	TBD	

Note 1: Refer to Mechanical Drawing

2. Pin Assignment

TFT LCD Panel Driving Section

FPC Connector is used for the module electronics interface. The recommended model is FH34SRJ-45S-0.5SH(50) (HRS) or equivalent.

Pin No. Symbol I/O Function Remark

Pin NO	Symbol	I/O	Function	Remark
1	NC	-	NC	
2	NC	-	NC	
3	NC	-	NC	
4	NC	-	NC	
5	NC	NC	-	
6	GND	P	Ground	
7	ELV3P	I	Odd LVDS Positive data signal (+)	
8	ELV3N	I	Odd LVDS Negative data signal (-)	
9	GND	P	Ground	
10	ELV2P	I	Odd LVDS Positive data signal (+)	
11	ELV2N	I	Odd LVDS Negative data signal (-)	
12	GND	P	Ground	
13	ELVCLKP	I	Odd LVDS Positive data signal (+)	
14	ELVCLKN	I	Odd LVDS Negative data signal (-)	
15	GND	P	Ground	
16	ELV1P	I	Odd LVDS Positive data signal (+)	
17	ELV1N	I	Odd LVDS Negative data signal (-)	
18	GND	P	Ground	
19	ELV0P	I	Odd LVDS Positive data signal (+)	
20	ELV0N	I	Odd LVDS Negative data signal (-)	
21	GND	P	Ground	
22	OLV3P	I	Odd LVDS Positive data signal (+)	
23	OLV3N	I	Odd LVDS Negative data signal (-)	
24	GND	P	Ground	
25	OLV2P	I	Odd LVDS Positive data signal (+)	
26	OLV2N	I	Odd LVDS Negative data signal (-)	
27	GND	P	Ground	
28	OLVCLKP	I	Odd LVDS Positive data signal (+)	
29	OLVCLKN	I	Odd LVDS Negative data signal (-)	

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30	GND	P	Ground	
31	OLV1P	I	Odd LVDS Positive data signal (+)	
32	OLV1N	I	Odd LVDS Negative data signal (-)	
33	GND	P	Ground	
34	OLV0P	I	Odd LVDS Positive data signal (+)	
35	OLV0N	I	Odd LVDS Negative data signal (-)	
36	GND	P	Ground	
37	I2C_SDA	I	OTP_SDA	
38	I2C_SCL	I	OTP_SCL	
39	VDD_OTP	P	OTP Power supply VDD OTP=8.6V	
40	EEPEN	I	NC	
41-45	VDDIN	P	Power Supply, VDDIN=3.3V (Typ.)	

3. Operation Specifications

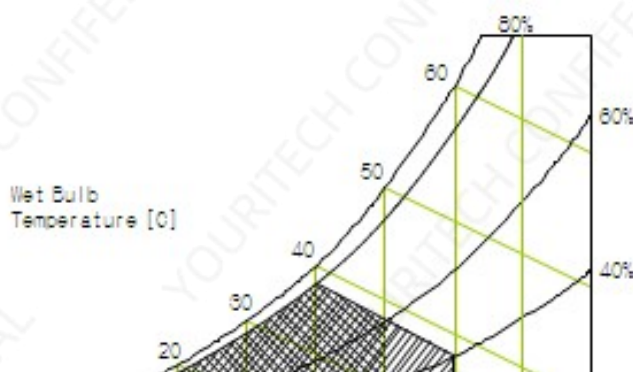
3.1. Absolute Maximum Ratings

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

Parameter		Symbol	Min.	Max.	Unit	Remarks
Power Supply	LCD Module	VDD	VSS-0.3	3.6	V	Ta = 25 °C Note 1&2
Operating Temperature		TOP	-20	+70	°C	Note 3
		TSUR	-20	+70	°C	
Storage Temperature		TST	-30	+85	°C	
Operating Ambient Humidity		Hop	10	90	%RH	
Storage Humidity		Hst	10	90	%RH	

Note:

1. These range above is maximum value not the actual operating temperature . Actual Operating temperature is no more than 40°C and temperature refers to the LCM surface temperature ; Length of operation: No more than 8 hours per day, and no more than 4 hours of continuous use one time.
2. BOE is not responsible for product problems beyond the use conditions.
3. Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be 39 °C max. and no condensation of water.



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3.2. Typical Operation conditions

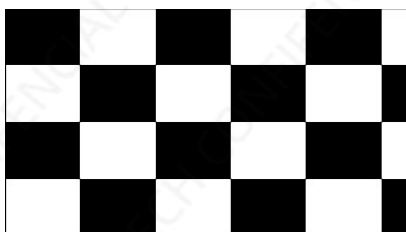
Parameter		Symbol	Values			Unit	Notes
			Min.	Typ.	Max.		
Power Supply Voltage		VDD	3.0	3.3	3.6	V	
		VRP			300	mV	Ripple
Power Supply Current		IDD	-	200	700	mA	Note 1
Power Consumption		PLCD	-	0.7	2.3	W	
Rush current		IRUSH	-	-	3.0	A	Note 2
CMOS Interface	Input Voltage	VIH	2.7		3.3	V	
		VIL	0		0.5	V	
	Output Voltage	VOH	2.7		3.3	V	
		VOL	0		0.5	V	

Note :

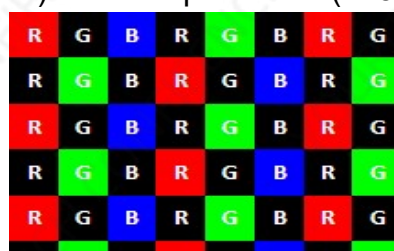
1 The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for VDD=3.3V, Frame rate $f_v=60\text{Hz}$ and Clock frequency = 72.4MHz. Test Pattern of power supply current

a) Typ : Mosaic 8 x 6 Pattern(L0/L255)



b) Max : skip subPixel(L255)



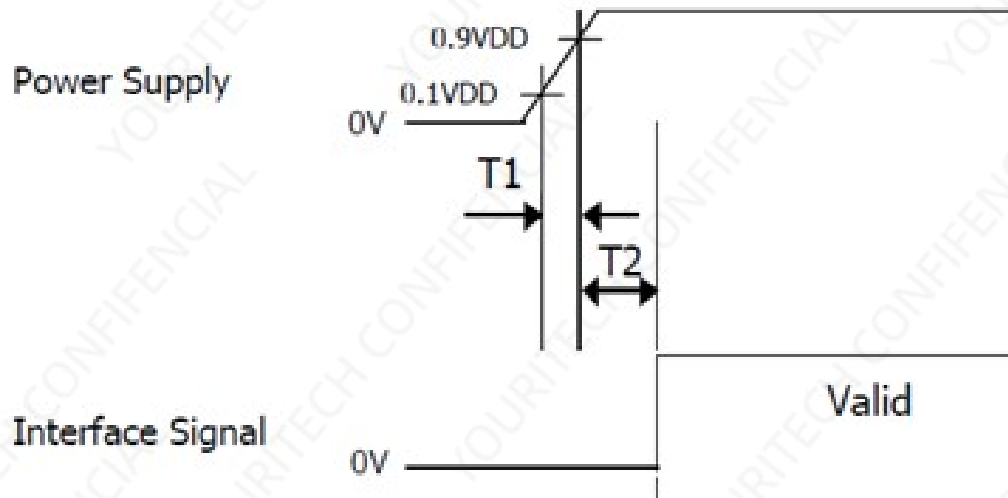
3.3. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max		
Voltage for LED backlight	VL	-	(24)	(26)	V	Note1
Current for LED backlight	IL	-	(280)	-	mA	
LED life time	-	-	20,000	-	Hr	Note2

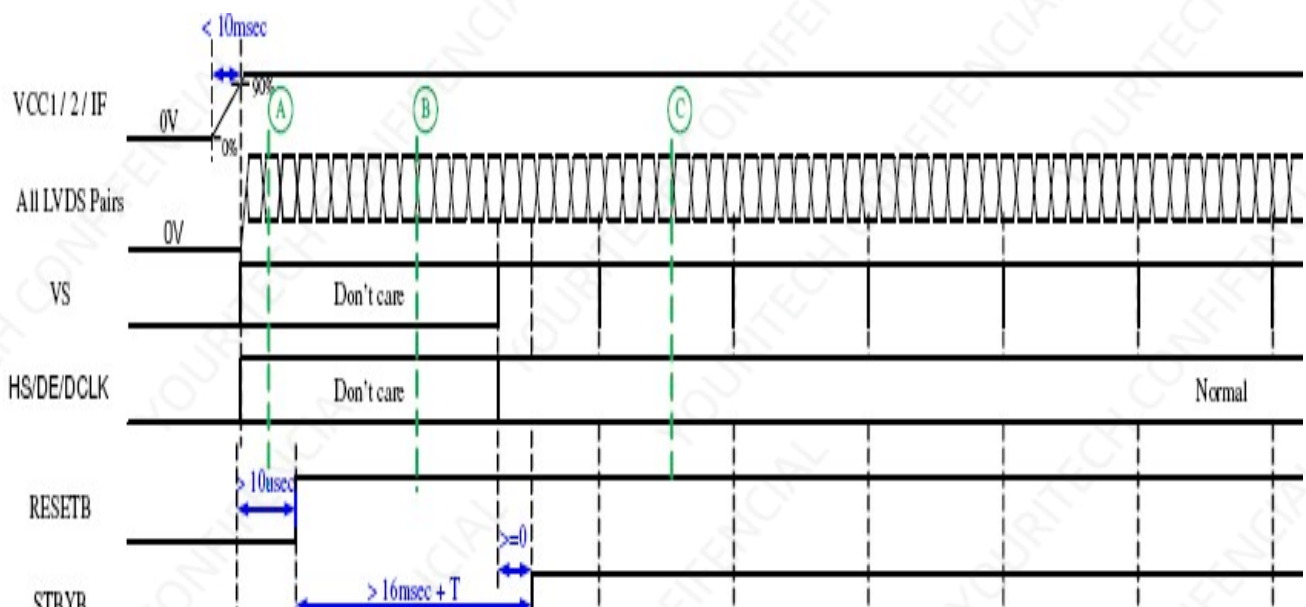
Note1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IL =280mA.

Note1: The LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃、60±20%RH and IL =280mA.The LED lifetime could be decreased if operating IL is lager than 280mA

3.4. Power Sequence



Parameter	Values			Units
	Min	Typ	Max	
T1	0	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	500	-	-	ms
T5	0	-	50	ms
T6	0	-	10	ms
T7	500	-	-	ms

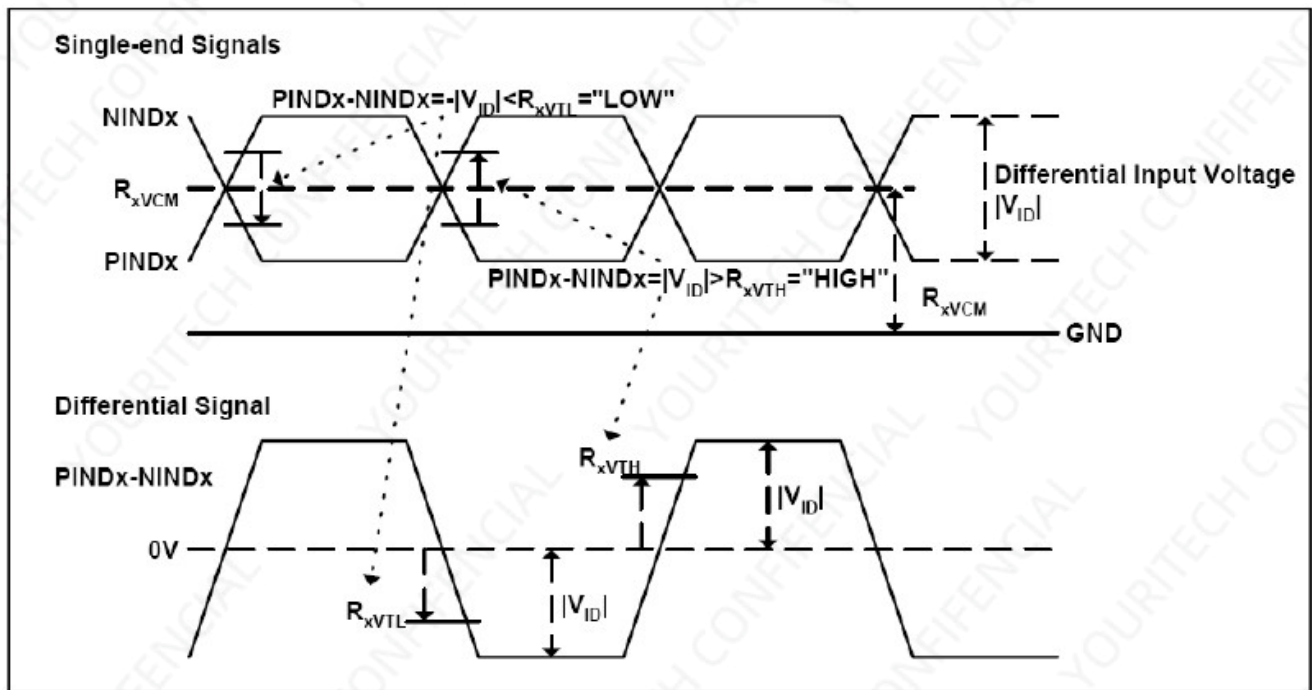


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3.5. LVDS Signal Timing Characteristics

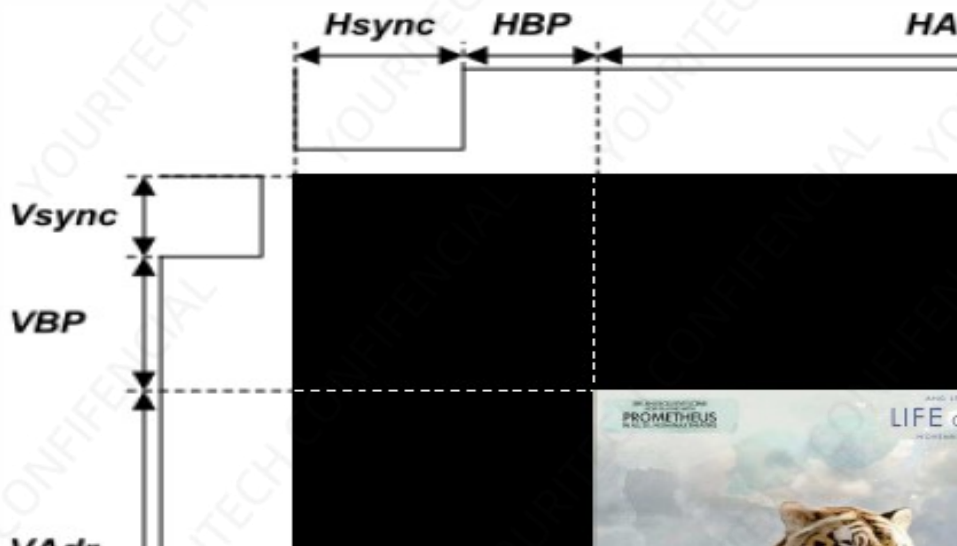
3.5.1. Ac Electrical characteristics

Item	Symbol	Values			Unit	Remark
		Min	Typ	Max		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
LVDS Differential input common mode voltage	R_{xVCM}	0.7	-	1.6	V	
LVDS Differential voltage	$ V_{ID} $	200	-	600	mV	



3.5.2. Data Input Format

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK Frequency	Fdclk	71.6	74.1	85	MHz
Horizontal display area	Thd	960			DCLK
HSYNC period time	Th	989	1002	1248	DCLK
HSYNC pulse width	Thp	10	12	255	DCLK
HSYNC back porch	thbp	5	16	255	DCLK
HSYNC Front porch	thfp	24	26	260	DCLK
Vertical display area	Tvd	1200			H
VSYNC period time	Tv	1207	1232	1560	H
VSYNC Pluse width	Tvp	1	3	20	H
VSYNC back porch	Tvbp	2	24	255	H
VSYNC front porch	Tvfp	5	8	260	H
Frequency	fV	-	60	-	Hz



4. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max		
Viewing angle (CR≥10)	θ_L	$\Phi=180^\circ$	70	80	-	degree	Note1
	θ_R	$\Phi=0^\circ$	70	80	-		
	θ_T	$\Phi=90^\circ$	70	80	-		
	θ_B	$\Phi=270^\circ$	70	80	-		
Response time	Ton	Normal $\theta = \Phi = 0^\circ$	-	10	20	msec	Note3
	Toff		-	15	30	msec	Note3
Contrast ratio	CR		700	900	-	-	Note4
Color chromaticity	Wx		0.26	0.31	0.36	-	Note2 Note5
	Wy		0.28	0.33	0.38	-	Note6
Luminance	L		-	1000	-	Cd/m2	Note6
Luminance uniformity	Yu		70	75	-	%	Note7
NTSC Ratio	NTSC	CIE1931		72		%	Note8

Test Conditions:

1. VDD=3.3V, IBL=280mA(Backlight current), the ambient temperature is 25°C.
2. The test systems refer to Note2.

Note 1: Definition of viewing angle range

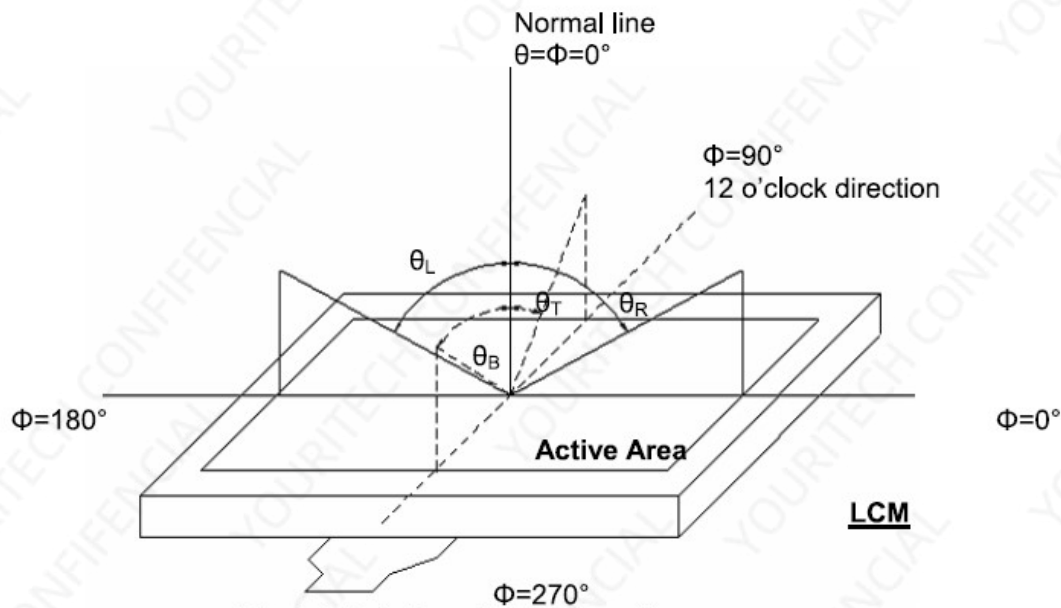


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° /Height: 500mm.)

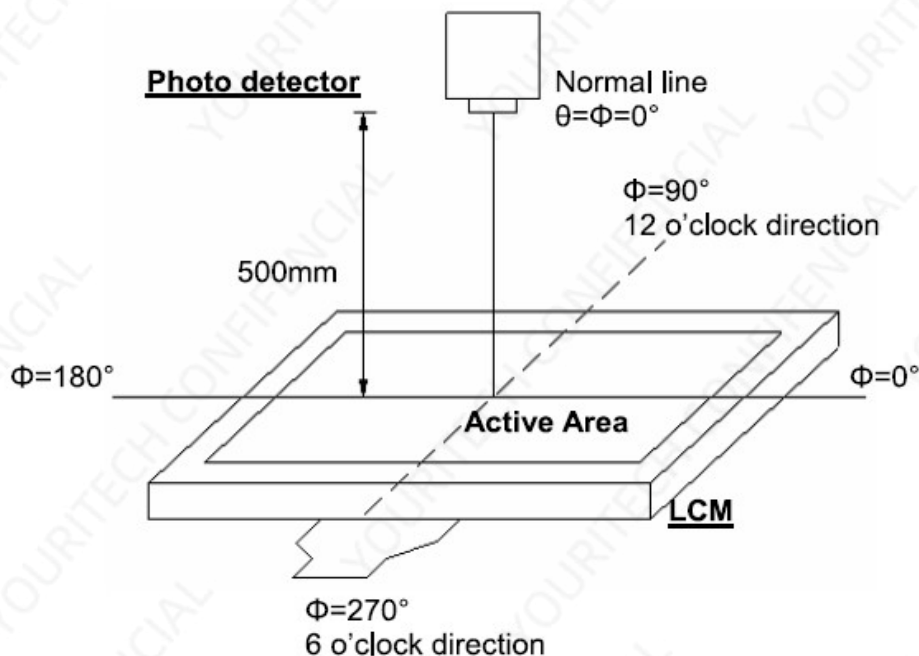


Fig. 4-2 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detect output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

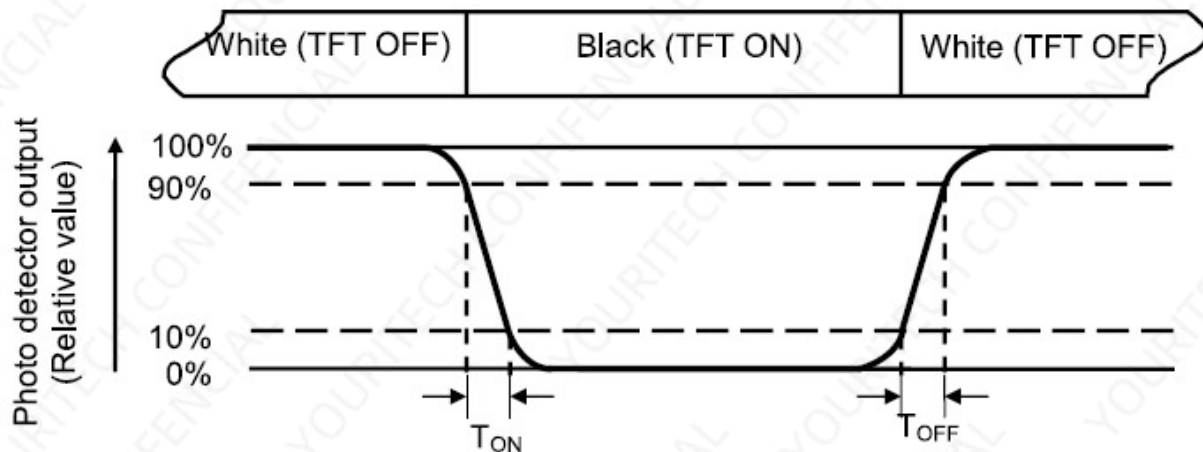


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is $I_L=280\text{mA}$.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{\min}}{B_{\max}}$$

L——Active area length W—— Active area width

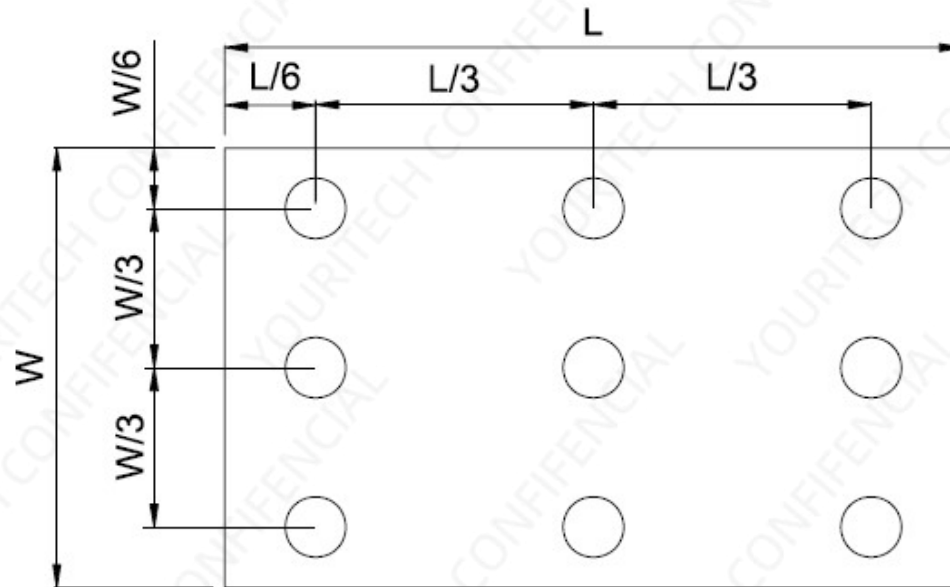


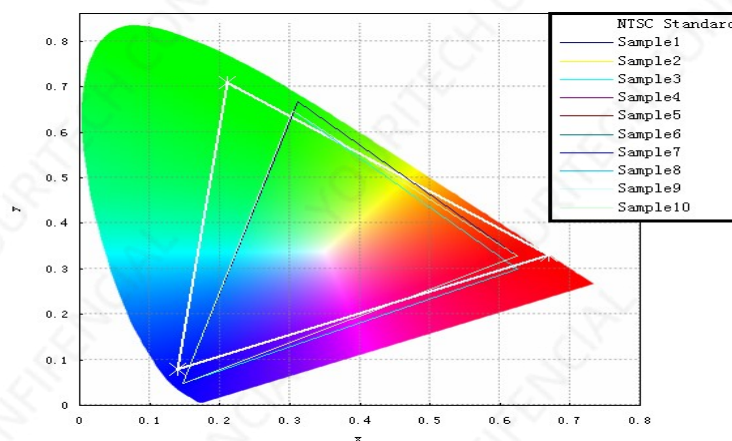
Fig. 4-4 Definition of measuring points

$B_{\max}$: The measured maximum luminance of all measurement position.

$B_{\min}$: The measured minimum luminance of all measurement position.

Note 8: Definition of Color of CIE Coordinate and NTSC Ratio.

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$



5. Reliability Test Items

Item	Test Conditions	Remark
High Temperature Storage	$T_a=80^{\circ}\text{C}$ 240hrs	Note 1, Note 4
Low Temperature Storage	$T_a=-20^{\circ}\text{C}$ 240hrs	Note 1, Note 4
High Temperature Operation	$T_s=70^{\circ}\text{C}$ 240hrs	Note 2, Note 4
Low Temperature Operation	$T_s=-20^{\circ}\text{C}$ 240hrs	Note 1, Note 4
Operate at High Temperature and Humidity	$+40^{\circ}\text{C}, 90\%\text{RH}$ 240hrs	Note 4
Thermal Shock	$-0^{\circ}\text{C}/30\text{min} \sim +50^{\circ}\text{C}/30\text{min}$ for total 100cycles, Start with cold temperature and	Note 4
Vibration Test	ISTA-3A 1Hz~200Hz, Grms=0.53 Half hours for direction of Z.	
Mechanical Shock	100G 6ms, $\pm X$, $\pm Y$, $\pm Z$ 3 times for each direction	
Electro Static Discharge	C=150pF, R=300 Ω , 8point/Panel Contact: $\pm 4\text{KV}$, 5times, Human Body Mode Air : $\pm 8\text{KV}$, 5times, Human Body Mode (Environment : $15^{\circ}\text{C} \sim 35^{\circ}\text{C}$, 30%~60%)	

Note1: T_a is the ambient temperature of samples.

Note2: T_s is the temperature of panel's surface.

Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

6. General Precautions

6.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

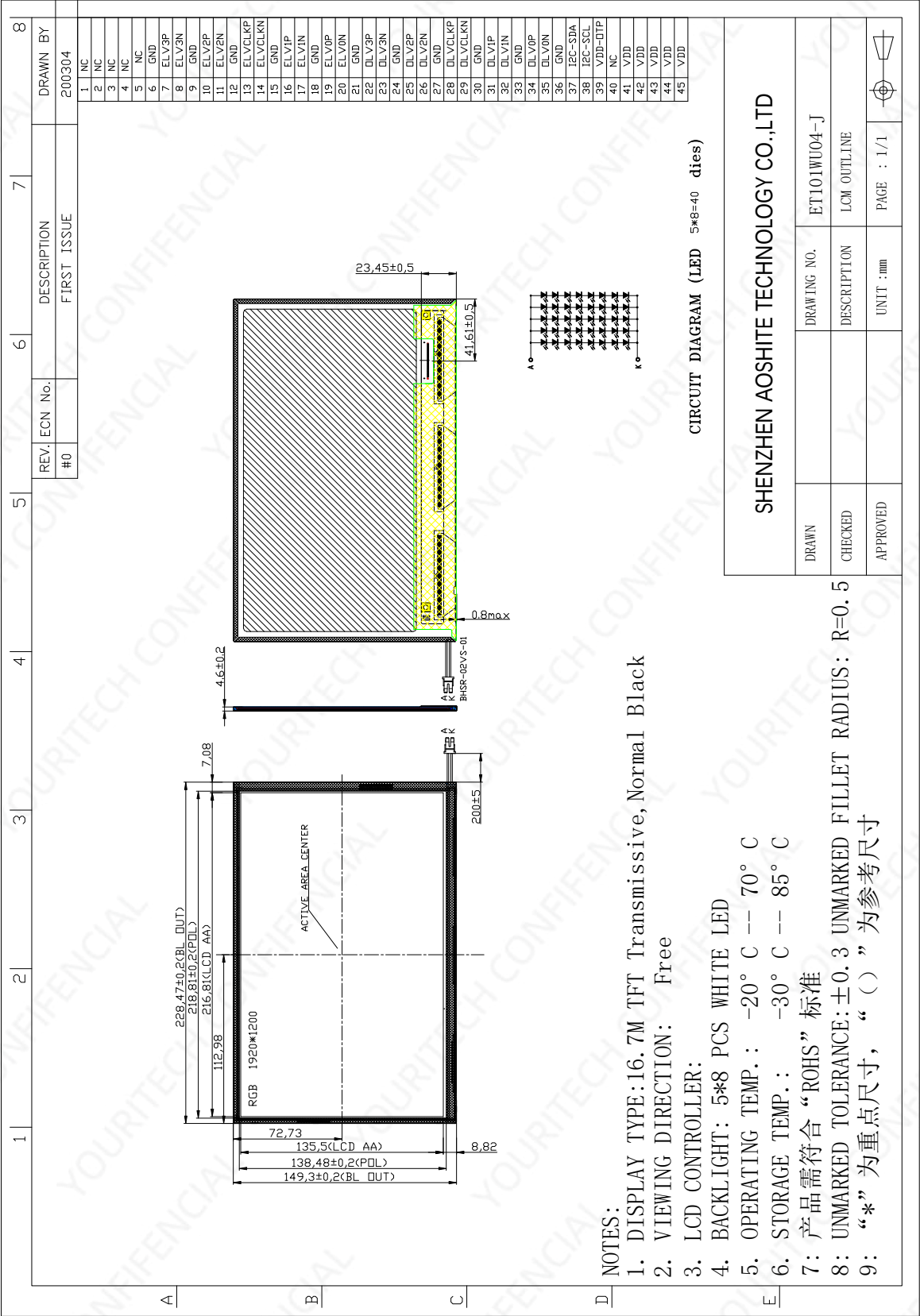
6.4. Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

6.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7. Mechanical Drawing



8.1. Packaging Material Table

No.	Item	Model (Material)	Dimensions(m m)	Unit weight (kg)	Quantity	Remark
1	LCM Module	JW101PK358-46A	TBD	TBD	40pcs	
2	Partition	BC Corrugated paper	TBD	TBD	1est	
3	Corrugated Paper	BC Corrugated paper	TBD	TBD	4pcs	
4	Corrugated Bar	BC Corrugated paper	TBD	TBD	4pcs	
5	Dust-Proof Bag	PE	TBD	TBD	1pcs	
6	A/S Bag	PE	235*155*0.2	0.002	40pcs	
7	Carton	Corrugated paper	590*360*210	TBD	1pcs	
8	Total weight	TBD				

8.2 . Packaging Drawing

