

# SPECIFICATION FOR LCD MODULE

**MODULE NO: YB-TG10801080S01A-N-A0**

**Doc.Version:00**

Customer Approval:

Accept  Reject

YEEBO	NAME	SIGNATURE	DATE
Prepare	Electronic Engineer	梁瑞华	2021/10/19
Check	Mechanical Engineer		
Verify			
Approval			

■ APPROVAL FOR SPECIFICATIONS ONLY

APPROVAL FOR SPECIFICATIONS AND SAMPLE

WIMRD005-02-D

**1. Revision History**

Sample Version	DOC. Version	DATE	DESCRIPTION		CHANGED BY
A0	00	2021-10-19	SPEC ONLY	First issue	Elaine

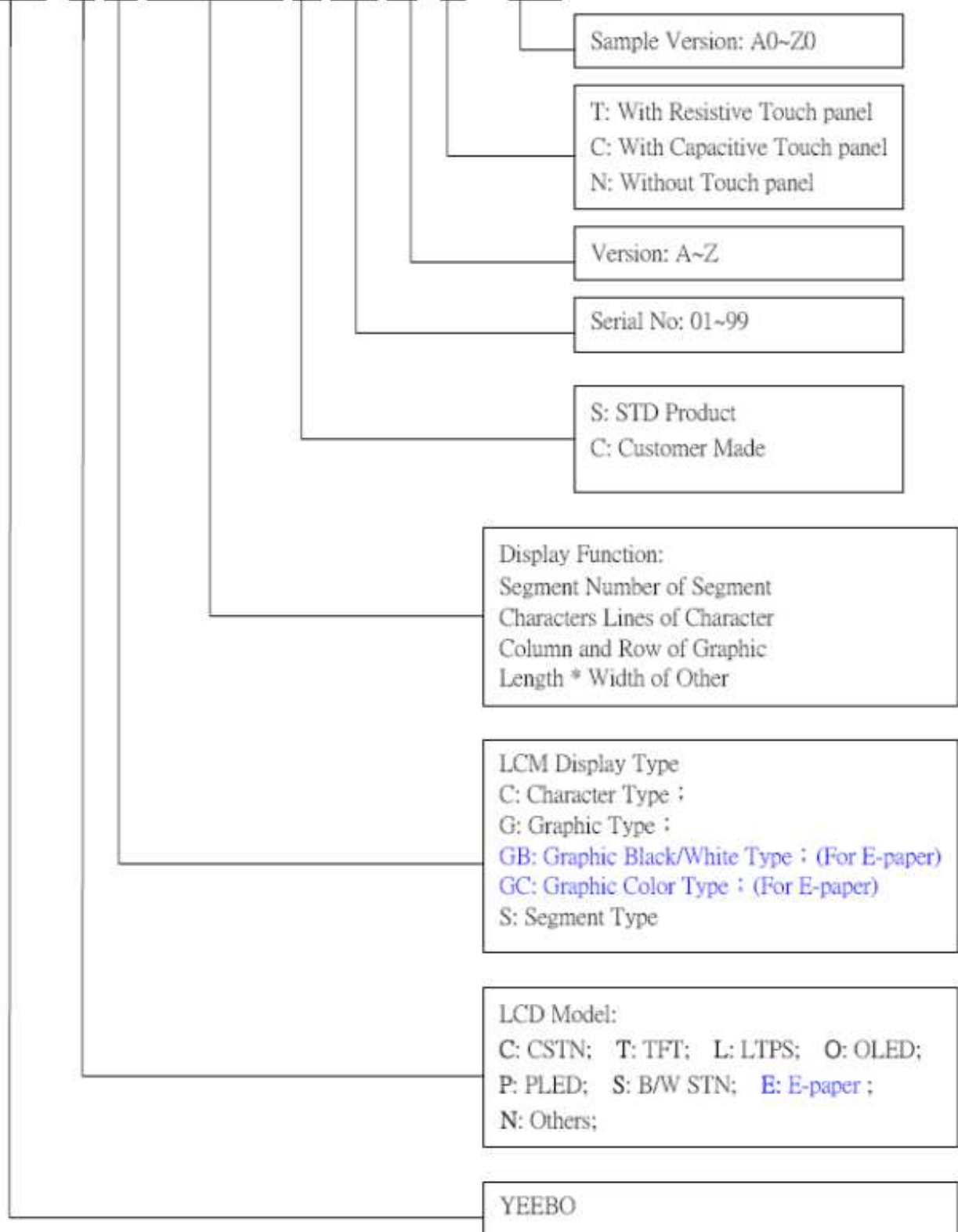
## 2. Table of Contents

<b>NO</b>	<b>CONTENTS</b>	<b>PAGE</b>
1	Revision History	1
2	Table of Contents	2
3	Module Numbering System	3
4	General Specification	4
5	LCM drawing	5
6	Electrical Characteristics	6
7	Optical Characteristics	10
8	Interface Pin Assignment	13
9	Block Diagram	14
10	Backlight Characteristics	15
11	Reliability Test Items	16
12	Handling& Cautions	17
13	Applicable Scope	20

**3. Module Numbering System**

(Example)

**YB-TG240320S01D-T-A0**

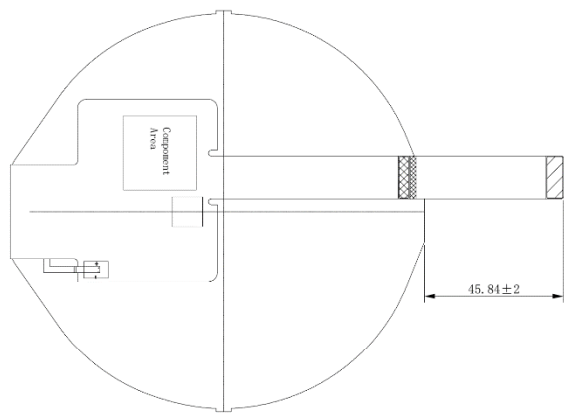
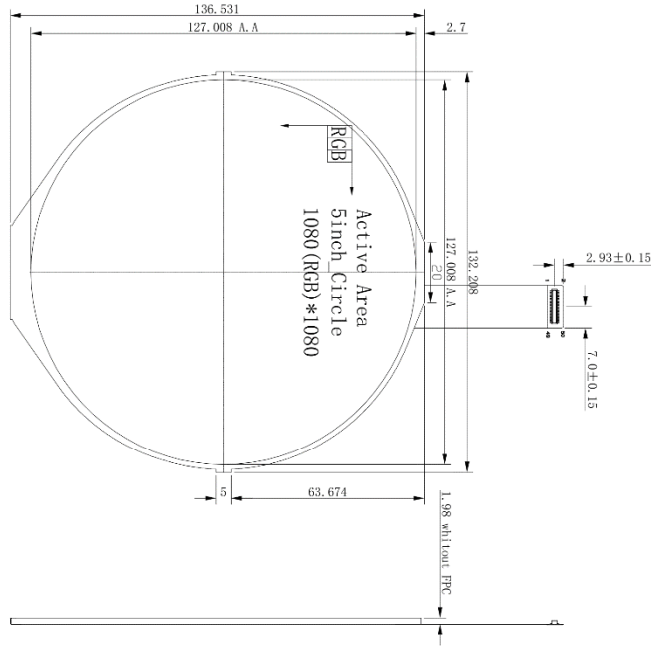


#### **4. General Specification**

ITEM	CONTENTS
Module Size	132.208 (W) * 136.531 (H) * 1.98 (T) mm
Module Size(With FPC)	132.208 (W) * 182.371(H) * 1.98(T) mm
Display Size(Diagonal)	5 inch
Display Format	1080(RGB) *1080 Pixels
Active Area	127.008 (W) *127.008 (H) mm
Pixel Pitch	0.1176*0.1176mm
LCD Type	16.7M Color / Transmissive / Normal Black
View Direction	Free
Controller IC	HX8399-C

### 5. LCM drawing

Count drawing & Spec. revision record during discussion with customer	
Rec. #1	Revision content description
	FIRST ISSUE
Date	2021-10-19



- NOTES:
1. DISPLAY MODE: ADS Normal Black.
  2. OPERATING TEMPERATURE: -20° C TO 60° C.
  3. STORAGE TEMPERATURE: -30° C TO 70° C.
  4. IC
  5. LCD IC: HX8399C.
  6. BACKLIGHT: 6 CHIP WHITE LEDS.
  7. CONNECTOR: DF40C-50DP-0, 4V (5I), Hirose.
  7. GENERAL TOLERANCE: ±0.3.

A → B → C → D → E → F → G → H → I → J → K  
VF=37.2V, IF=20mA  
BACKLIGHT CIRCUIT

LCD MODULE			
NO.	SYMBOL	NO.	SYMBOL
49	GND	50	GND
47	GND	48	RESET
45	NC	46	TE
43	NC	44	LEDPWM
41	NC	42	GND
39	NC	40	NC
37	GND	38	VDD(+5)
35	NC	36	VDD(+5)
33	NC	34	NC
31	GND	32	VDD(-5)
29	LAN3_N	30	VDD(-5)
27	LAN3_P	28	NC
25	GND	26	GND
23	LAN0_N	24	IOVCC
21	LAN0_P	22	IOVCC
19	GND	20	GND
17	CLK_N	18	ID_P1N1
15	CLK_P	16	ID_P1N2
13	GND	14	GND
11	LAN1_N	12	LEDA
9	LAN1_P	10	LEDA
7	GND	8	GND
5	LAN2_N	6	LEDB
3	LAN2_P	4	LEDB
1	GND	2	GND

YEEBO		UNIT	SIZE	SCALE	DESIGNED	CHECKED	VERIFIED	APPROVED	FILE NAME
		mm	A4	N-T-S	梁瑞华 2021-10-19	邵志刚 2021/10/19		梁瑞华 2021/10/19	Count Dwg.
MOD. Name		YB-TG10801080S01A-N-A							
Sheet		1							
Of		1							

## 6. Electrical Characteristics

### 6-1 Absolute Maximum Ratings

(Ta=25°C)

Item	Symbol	Min.	Type	Max.	Unit	Remark
Power Supply Voltage	V <sub>DD</sub>	-0.3	-	3.6	V	
Logic Input Voltage Range	V <sub>IN</sub>	-	-	I <sub>ovcc</sub> +0.3	V	
Logic Output Voltage Range	V <sub>O</sub>	-	-	I <sub>ovcc</sub> +0.3	V	
Operating Temperature	T <sub>opr</sub>	-20	-	+60	°C	
Storage Temperature	T <sub>stg</sub>	-30	-	+75	°C	

Note : Even if the absolute maximum rating of one of the above parameters is exceeded only for a short while, the quality of the product may be degraded. Therefore, be sure to use the product within the range of the absolute maximum ratings.

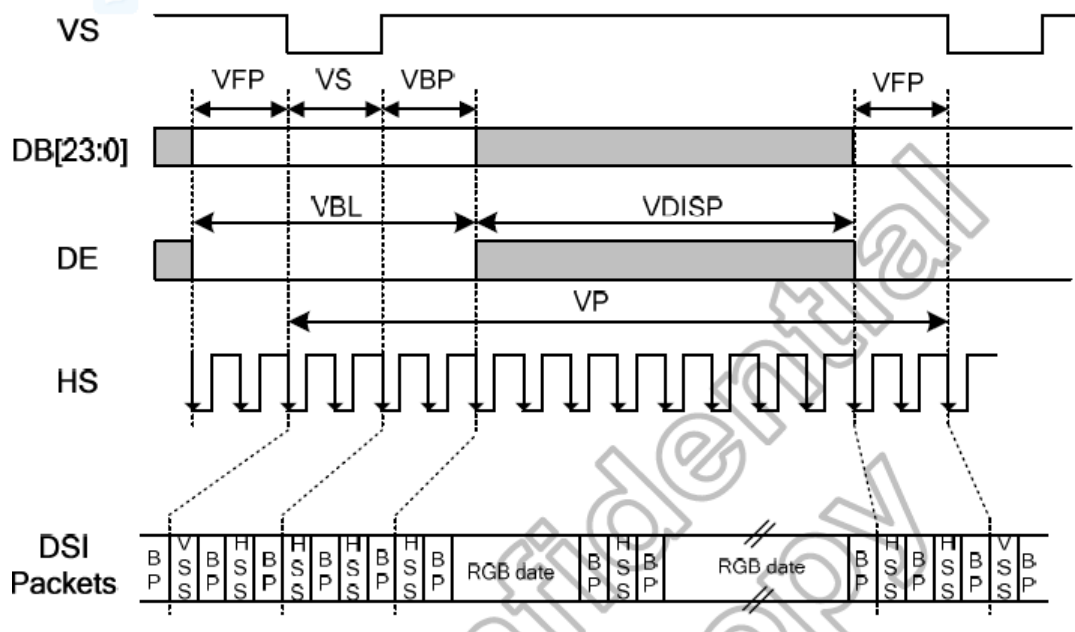
### 6-2 Operating Conditions

(Ta=25°C )

Item	Symbol	Condition	Min.	Type	Max.	Unit	Remark
Power Supply Voltage	V <sub>DD</sub>	-	1.65	1.8	3.3	V	
IO Supply Voltage	V <sub>IH</sub>	-	0.7 V <sub>DD</sub>	-	V <sub>DD</sub>	V	
	V <sub>IL</sub>	-	V <sub>SS</sub>	-	0.3 V <sub>DD</sub>	V	
	V <sub>OH</sub>	-	0.8 V <sub>DD</sub>	-	V <sub>DD</sub>	V	
	V <sub>OL</sub>	-	V <sub>SS</sub>	-	0.2 V <sub>DD</sub>	V	
Power Supply Current	I <sub>DD</sub>	V <sub>DD</sub> =1.8V	-	-	-	mA	

### 6-3 Timing Characteristics

#### Vertical Timing



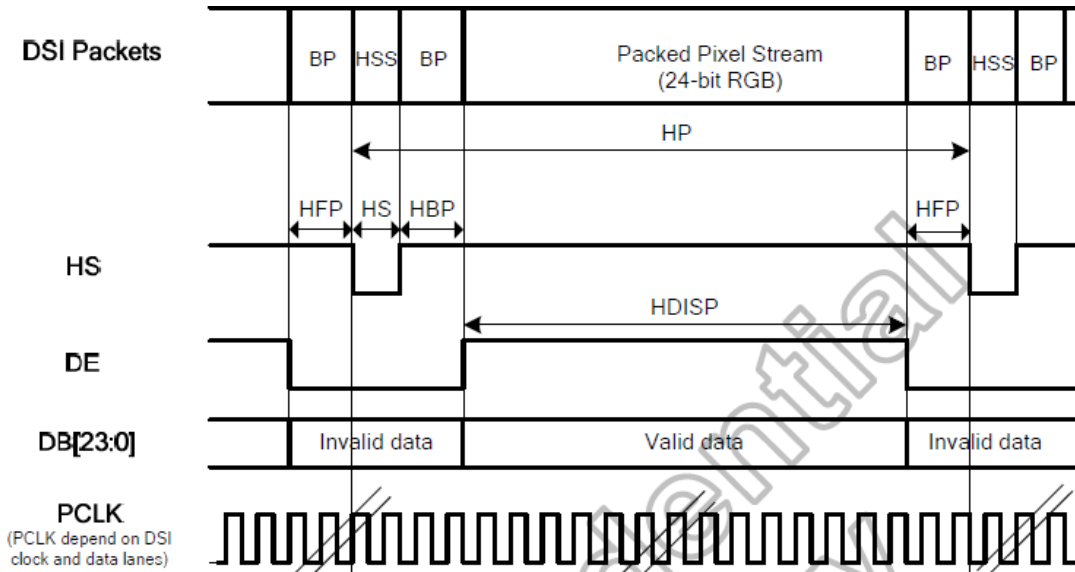
Vertical Resolution=528+8xNL (VSSA=0V, VDD1=1.8V, VDD3=2.8V, T<sub>A</sub>=25°C)

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Vertical cycle	VP	-	534+8xNL	-	-	Line
Vertical low pulse width	VS	-	2	-	Note <sup>(1)</sup>	Line
Vertical front porch	VFP	-	2	-	-	Line
Vertical back porch	VBP	-	2	-	Note <sup>(1)</sup>	Line
Vertical data start point	-	VS+VBP	4	-	Note <sup>(1)</sup>	Line
Vertical blanking period	VBL	VS+VBP+VFP	6	-	-	Line
Vertical active area	-	VDISP	-	528+8xNL	-	Line
Vertical Refresh rate	VRR	-	-	60	-	Hz

**Note:** (1) The VS and VBP pulse width are related to GSP and GCK timing. The GSP and GCK must be set at corresponding position for LCD normal display.



Horizontal Timing



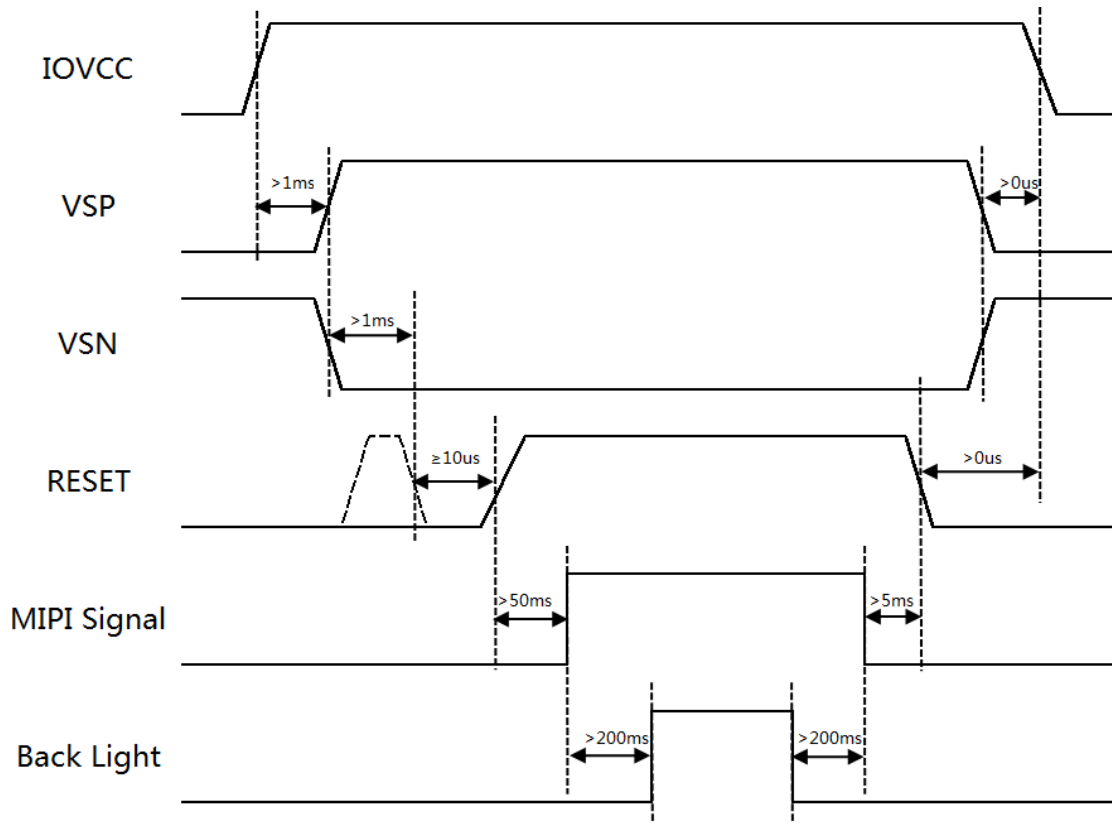
Horizontal Resolution=H\_RES(1080/1024/960/900/800/720) (VSSA=0V, VDD1=1.8V, VDD3 = HS\_VCC =2.8V, T<sub>A</sub>=25°C)

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
HS cycle	HP	-	H_RES+66	-	-	DCK
HS low pulse width	HS	-	25	-	-	DCK
Horizontal back porch	HBP	-	25	-	-	DCK
Horizontal front porch	HFP	-	16	-	-	DCK
Horizontal data start point	-	HS+HBP	50 Note <sup>(1)</sup>	-	-	DCK
Horizontal blanking period	HBLK	HS+HBP+HFP	66	-	-	DCK
Horizontal active area	HDISP	-	-	H_RES	-	DCK

Note: (1) HS+HBP must larger than 50 PCLK.

## 6-4 Power Sequence

### Power on/off Sequence



## 7. Optical Characteristics

Using CMO LCD+ Normal Polarizer+Corresponding Backlight, reference only (Note 1, Note 2)

Item	Symbol	Conditions	Specifications			Unit	Note
			Min	Typ	Max		
Transmittance	T(%)	-	-	-	-	-	-
Contrast Ratio	CR	$\theta=1\pm$ Normal Viewing Angle	800	1300			(2)
Response time	TR+TF		-	-	40	ms	(6)
Viewing Angle	Hor.	$\theta_{x+}$	70	80	-	deg.	(1)
		$\theta_{x-}$	70	80	-		
	Ver.	$\theta_{y+}$	70	80	-		
		$\theta_{y-}$	70	80	-		

Color of CIE Coordinate:

Note: Test in White

(Ta=25°C)

Item	Symbol	Condition	Min.	Typ.	Max.
Chromaticity Coordinates (Transmissive)	Red	x	0.656	0.686	0.716
		y	0.274	0.304	0.334
	Green	x	0.234	0.264	0.294
		y	0.599	0.629	0.659
	Blue	x	0.117	0.147	0.177
		y	0.017	0.047	0.077
	White	x	0.276	0.306	0.336
		y	0.288	0.318	0.348

Measuring Condition

1. Measuring surrounding: dark room
2. Ambient temperature: 25±2°C
3. 30 min. Warm-up time.

**Note:**

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIG.1).
2. Contrast measurements shall be made at viewing angle of  $\Theta = 0^\circ$  and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIG. 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

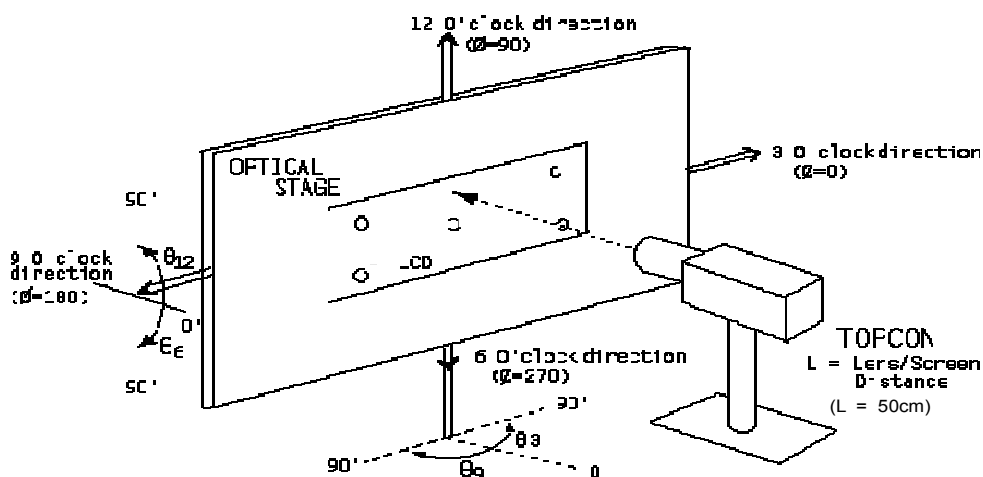
3. Surface luminance is the center point across the LCD surface 50cm from the surface with all pixels displaying white. This measurement shall be taken at the locations shown in FIG. 1.
4. Uniformity measurement shall be taken at the locations shown in FIG. 2, for a total of the measurements per display, measure surface luminance of these nine points across the LCD surface 50cm from the surface with all pixels displaying white.

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

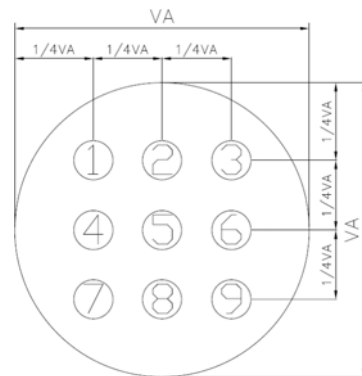
5. The color chromaticity coordinates specified in Table1 shall be calculated from The spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the Module.
6. The electro-optical response time measurements shall be made as FIG.3 by switching the “data” input signal ON and OFF.

The times needed for the luminance to change from 10% to 90% is  $T_r$  and 90% to 10% is  $T_f$ .

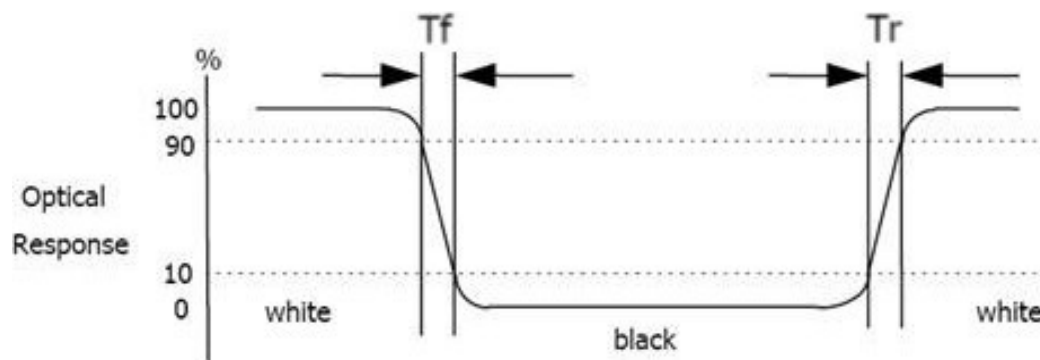
**Figure 1. Measurement Set Up**



**Figure 2. Uniformity Measurement Locations**



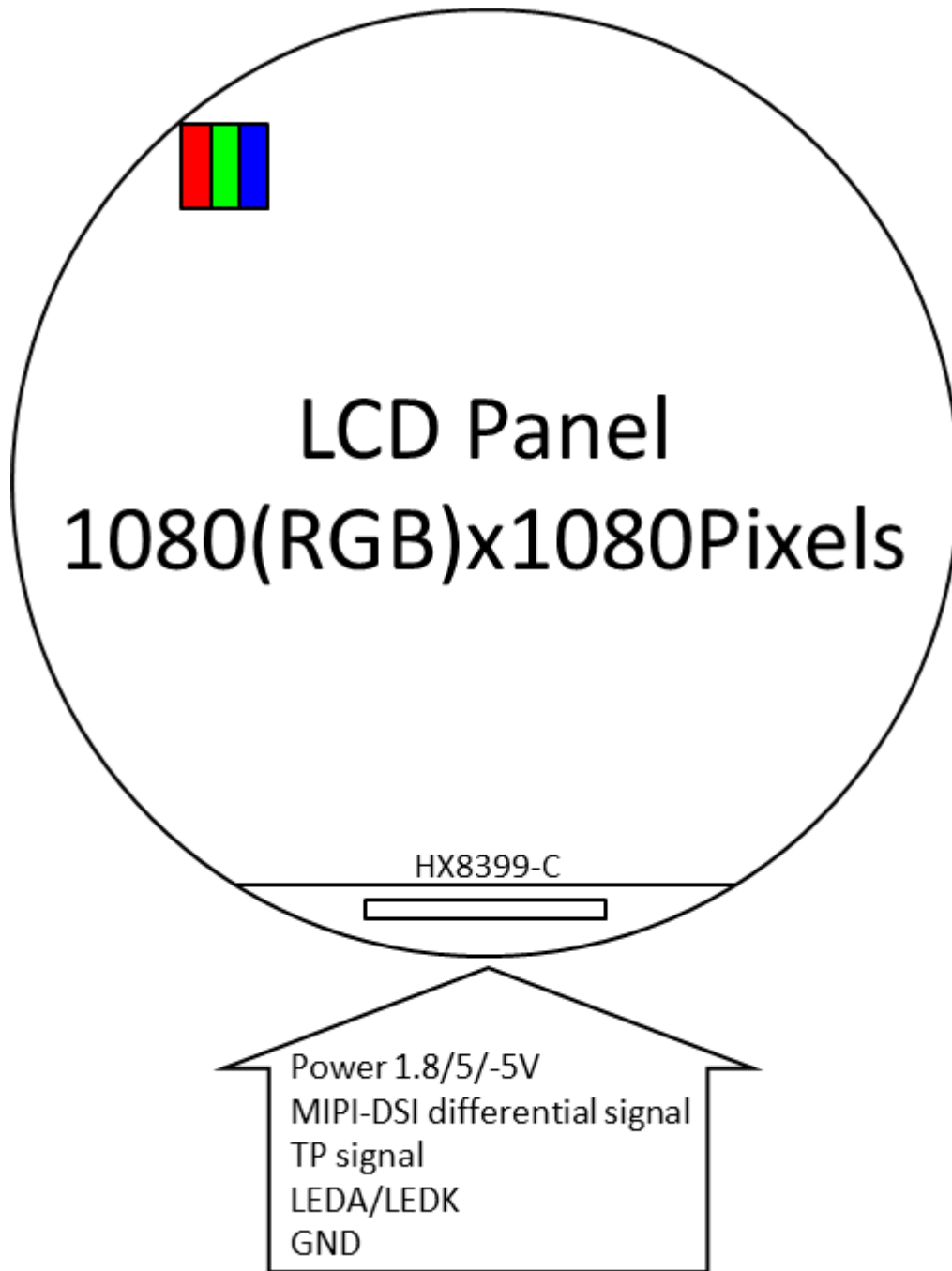
**Figure 3. Response Time Testing**



## **8. Interface Pin Assignment**

<b>Pin NO.</b>	<b>Pin name</b>	<b>Function</b>	<b>Pin NO.</b>	<b>Pin name</b>	<b>Function</b>
49	GND	Ground	50	GND	Ground
47	GND	Ground	48	RESET	Disp reset
45	NC	NC	46	TE	Disp tearing effect out
43	NC	NC	44	LEDPW M	Backlight pwm output
41	NC	NC	42	GND	Ground
39	NC	NC	40	NC	NC
37	GND	Ground	38	VDD(+5)	Disp +5V analog rail
35	NC	NC	36	VDD(+5)	Disp +5V analog rail
33	NC	NC	34	NC	NC
31	GND	Ground	32	VDD(-5)	Display -5V analog rail
29	LAN3_N	Disp MIPI lane 3-	30	VDD(-5)	Display -5V analog rail
27	LAN3_P	Disp MIPI lane 3+	28	NC	NC
25	GND	Ground	26	GND	Ground
23	LAN0_N	Disp MIPI lane 0-	24	IOVCC	Disp digital power
21	LAN0_P	Disp MIPI lane 0+	22	IOVCC	Disp digital power
19	GND	Ground	20	GND	Ground
17	CLK_N	Disp MIPI CLK -	18	ID_PIN1	ID pd to GND (BOE)
15	CLK_P	Disp MIPI CLK +	16	ID_PIN2	ID pu to 1.8V (BOE)
13	GND	Ground	14	GND	Ground
11	LAN1_N	Disp MIPI lane 1-	12	LEDA	LED Anode
9	LAN1_P	Disp MIPI lane 1+	10	LEDA	LED Anode
7	GND	Ground	8	GND	Ground
5	LAN2_N	Disp MIPI lane 2-	6	LEDK	LED cathode
3	LAN2_P	Disp MIPI lane 2+	4	LEDK	LED cathode
1	GND	Ground	2	GND	Ground

9. Block Diagram



## 10. Backlight Characteristic

1. Standard Lamp Styles (Edge Lighting Type):  
The LED chips are distributed over the edge light area of the illumination unit, which gives the less power consumption:
2. The Main Advantages of the LED Backlight are as following:
  - 2.1 The brightness of the backlight can simply be adjusted.  
By a resistor or a potentiometer.

### 3. Data About LED Backlight:

(Ta=25°C)

PARAMETER	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
Supply Current	I	-	25	-	mA	-	-
Supply Voltage	V	-	37.2	38.4	V		-
Luminous Intensity for LCM	IV	300	350	-	cd/m <sup>2</sup>		2
Uniformity for LCM	-	70	-	-	%		3
Life Time	-		30000	-	Hr.		4
Color	White						

NOTE:

1. Backlight Only
2. Average Luminous Intensity of P1-P9
3. Uniformity = Min/Max \* 100%
4. LED life time defined as follows: The final brightness is at 50% of original brightness

### Internal Circuit Diagram



**6\*1=6 LEDs**

### (Effective spatial Distribution)

Using aperture of 1° ,distance 50cm



## 11. Reliability Test Items

NO.	Test Item	Test Condition
1	High Temp Operation	60 °C for 240 hours
2	Low Temp Operation	-20 °C for 240 hours
3	High Temp/ High humidity Operation	60 °C/ 90% RH for 100 hours
4	High Temp Storage	75 °C for 240 hours
5	High Temp/ High Humidity Storage	65 °C/ 90% RH for 100 hours
6	Low Temp Storage	-30 °C for 240 hours
7	Thermal Shock	-30 °C for 45min and then 75 °C for 45 min, 5 cycles
8	ESD test	Contact=4KV,Air=8KV

## **12. Handling & Cautions**

### **12.1. Mounting Method**

1. The panel of the LCM consists of two thin glasses with polarizer which easily get damaged. So extreme care should be taken when handling the LCM.
2. Excessive stress or pressure on the glass of the LCM should be avoided. Care must be taken to insure that no torsional or compressive forces are applied to the LCM unit when it is mounted.
3. If the customer's set presses the main parts of the LCM, the LCM may show the abnormal display. But this phenomenon does not mean the malfunction of the LCM and should be pressed by the way of mutual agreement.
4. To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
5. Mount a LCM with the specified mounting parts.

### **12.2. Caution of LCM Handling and Cleaning**

1. Since the LCM is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it falls from a high place or receives a strong shock, the glass may be broken.
2. The polarizer on the surface of panel are made from organic substances. Be very careful for chemicals not to touch the polarizer or it leads the polarizer to be deteriorated.
3. If the use of a chemical is unavoidable, use soft cloth with solvent recommended below to clean the LCM's surface with wipe lightly.  
-IPA (Isopropyl Alcohol), Ethyl Alcohol, Tri-chloro, tri-fluoroethane.
4. Do not wipe the LCM's surface with dry or hard materials that will damage the polarizer and others. Do not use the following solvent—Water, acetone, Aromatics.
5. It is recommended that the LCM be handled with soft gloves during assembly, etc. The polarizer on the LCM's surface are vulnerable to scratch and thus to be damaged by shape particles.
6. Do not drop water or any chemicals onto the LCM's surface.
7. A protective film is supplied on the LCM and should be left in place until the LCM is required for operation.
8. The ITO pad area needs special careful caution because it could be easily corroded. Do not contact the ITO pad area with HCFC, Soldering flux, Chlorine, Sulfur, saliva or fingerprint. To prevent from the ITO corrosion, customers are recommended that the ITO area would be covered by UV or silicon.
9. Please handle FPC with care.

### **12.3. Caution Against Static Charge**

1. The LCM use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly area, assembly equipments to protect against static electricity.
2. Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, if possible, under ESD control device like ion blower,

and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.

3. Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
4. In handling the LCM, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

#### **12.4. Caution For Operation**

1. It is indispensable to drive the LCM within the specified voltage limit since the higher voltage than the limit causes LCM's life shorter. An electro-chemical reaction due to DC causes undesirable deterioration of the LCM so that the use of DC drive should avoid.
2. Do not connect or disconnect the LCM to or from the system when power is on.
3. Never use the LCM under abnormal conditions of high temperature and high humidity.
4. When expose to drastic fluctuation of temperature(hot to cold or cold to hot), the LCM may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCM's surface which may affect the operation of the polarizer on the LCM.
5. Response time will be extremely delay at lower temperature than the operating temperature range and on the other hand LCM may turn black at temperature above its operational range. However those phenomenon do not mean malfunction or out of order with the LCM. The LCM will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.
6. Do not display the fixed pattern for a long time because it may develop image sticking due to the LCM structure. If the screen is displayed with fixed pattern, use a screen saver.
7. Do not disassemble and/or re-assemble LCM module

#### **12.5. Packaging**

Modules use LCM element, and must be treated as such.

1. Avoid intense shock and falls from a height.
2. To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity for long periods.

#### **12.6. Storage**

1. A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit. Relative humidity of the environment should therefore be kept below 60%RH.
2. Original protective film should be used on LCM's surface (polarizer). Adhesive type protective film should be avoided, because it may change color and/or properties of the polarizer.
3. Do not store the LCM near organic solvents or corrosive gasses.
4. Keep the LCM safe from vibration, shock and pressure.
5. Black or white air-bubbles may be produced if the LCM is stored for long time in the lower temperature or mechanical shocks are applied onto the LCM.
6. In the case of storing for a long period of time for the purpose or replacement use, the following ways are recommended.
  - a. Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.
  - b. Store in a dark place where neither exposure to direct sunlight nor light is.
  - c. Keep temperature in the specified storage temperature range.
  - d. Store with no touch on polarizer surface by the anything else. If possible, store the LCM in the packaging situation when it was delivered.

### **12.5. Safety**

1. For the crash damaged or unnecessary LCM, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol and should be burned up later.
2. In the case of LCM is broken, watch out whether liquid crystal leaks out or not. If your hands touch the liquid crystal, wash your hands cleanly with water and soap as soon as possible.
3. If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then drink a lot of water and induce vomiting, and then, consult a physician.
4. If the liquid crystal get in your eyes, flush your eyes with running water for at least fifteen minutes.
5. If the liquid crystal touches your skin or clothes, remove it and wash the affected part of your skin or clothes with soap and running water.

### **13. Applicable Scope**

1. This product specification only applies to the products manufactured and sold by our company.
2. Any specification, quality etc. about other parts mentioned in this product spec are no concern of our company.