



# **Disea Electronics Co., LTD**

E-mail:sales@disseelec.com    URL:www.diseaelec.com

ADD: 4F, #3 Building, TianFuAn Industrial park, LeZhuJiao, ZhouShi Road, XiXiang Town, BaoAn District, ShenZhen City, Guangdong Province, China

## **PRODUCT SPECIFICATIONS**

For Customer: \_\_\_\_\_

: APPROVAL FOR SPECIFICATION

Customer Model No. \_\_\_\_\_

: APPROVAL FOR SAMPLE

Module No.: ZW-T101BAHA-06

Date : 2021-04-23

### **Table of Contents**

No.	Item	Page
1	Cover Sheet(Table of Contents)	P1
2	Revision Record	P2
3	General Specifications	P3
4	Outline Drawing	P4
5	Absolute Maximum Ratings	P5
6	Electrical Specifications	P6-P9
7	Optical Characteristics	P10-P13
8	Reliability Test Items and Criteria	P14
9	Packing Reliability	P15-P16

### **For Customer's Acceptance:**

Approved By	Comment

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT
LYY			



## 3. General Specifications

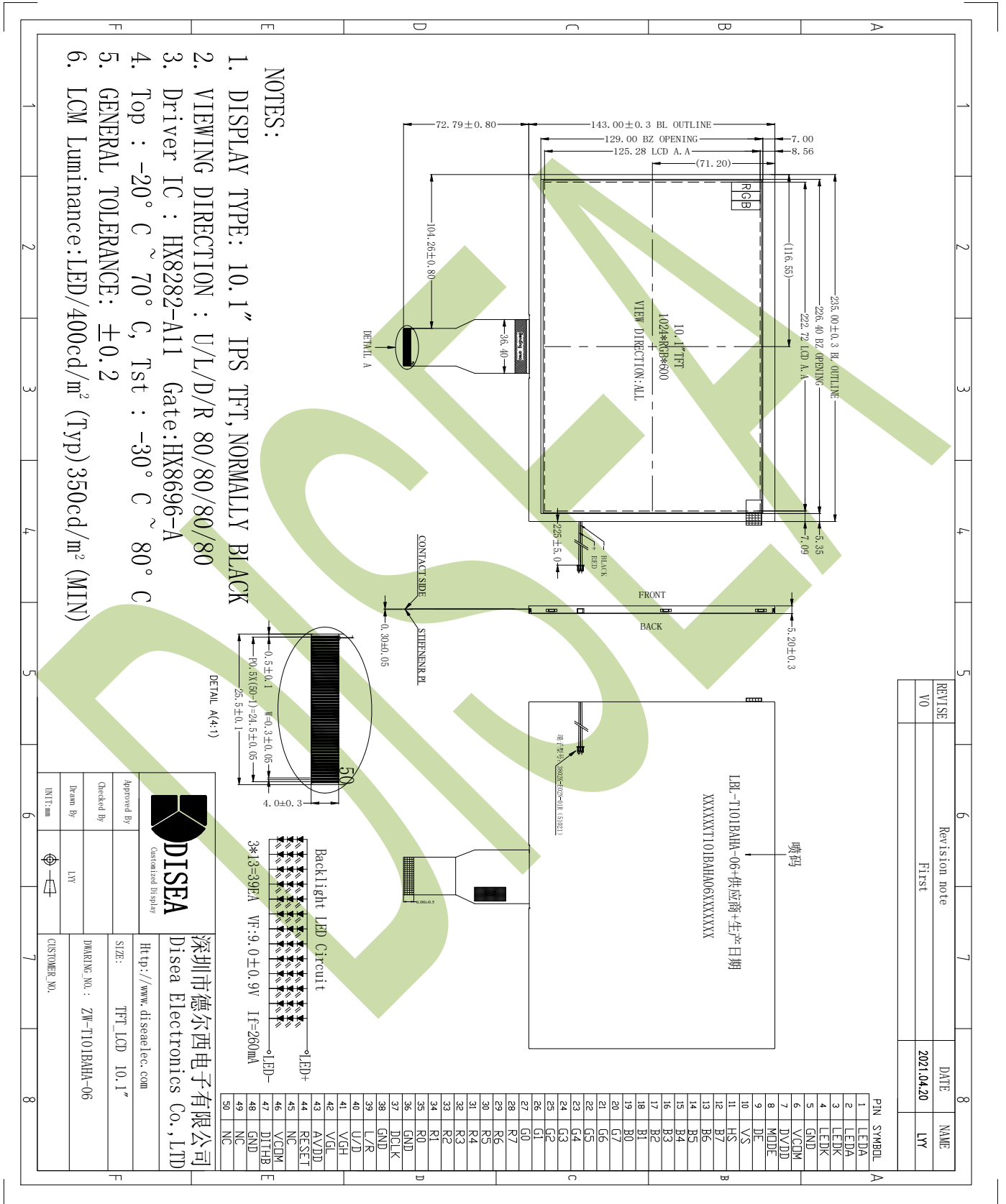
ZW-T101BAHA-06 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light unit . The 10.1'' display area contains 1024 x (RGB) x 600 pixels and can display up to 16.7M colors. This product accords with ROHS environmental criterion.

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		1
Viewing Direction	ALL	O'Clock	
Operating temperature	-20 ~ +70	°C	
Storage temperature	-30 ~ +80	°C	
Module size	235.00 X 143.00 X 5.20	mm	2
Active Area(W×H)	222.72 X 125.28	mm	
Number of Dots	1024 X 600	dots	
TFT Controller	HX8282-A11 & HX8696-A	-	
Power Supply Voltage	3.3	V	
Backlight	3S13P-LEDs (white)	pcs	
Weight	---	g	
Interface	RGB-24bit	-	

Note 1: Color tune is slightly changed by temperature and driving voltage.

Note 2: Without FPC and Solder .

## 4 Outline.Drawing



## 5. Absolute Maximum Ratings(Ta=25°C)

### 5.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25°C)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	DVDD	-0.5	3.96	V	1, 2
	AVDD	-0.5	14.85	V	1, 2
	VGH	-0.3	42.0	V	1, 2
	VGL	VGH-42.0	0.3	V	1, 2

Notes:

- If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
- $D_{VDD} > V_{SS}$  must be maintained.
- Please be sure users are grounded when handing LCD Module

### 5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30°C	80°C	-20°C	70°C	1,2
Humidity	-	-	-	-	3

Notes:

- The response time will become lower when operated at low temperature.
- Background color changes slightly depending on ambient temperature.  
The phenomenon is reversible.
- $T_a \leq 40^\circ\text{C}$ :85%RH MAX.  
 $T_a \geq 40^\circ\text{C}$ :Absolute humidity must be lower than the humidity of 85%RH at 40°C.

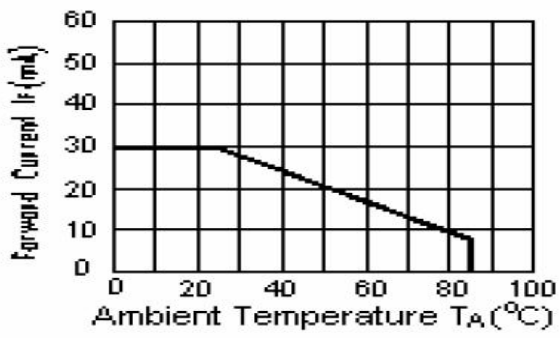
## 6. Electrical Specifications

### 6.1 Electrical characteristics(V<sub>SS</sub>=0V ,T<sub>a</sub>=25°C)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note	
Power supply	DVDD	T <sub>a</sub> =25°C	3.0	3.3	3.6	V		
	AVDD	T <sub>a</sub> =25°C	9.1	9.6	10.1	V		
	VCOM	T <sub>a</sub> =25°C	4.0	4.2	4.4	V		
	VGH	T <sub>a</sub> =25°C	17.0	18.0	19.0	V		
	VGL	T <sub>a</sub> =25°C	-7.0	-6.0	-5.0	V		
Input voltage	'H'	V <sub>IH</sub>	T <sub>a</sub> =25°C	0.7*DVDD	-	DVDD	V	
	'L'	V <sub>IL</sub>	T <sub>a</sub> =25°C	0	-	0.3*DVDD	V	

### 6.2 LED backlight specification(V<sub>SS</sub>=0V ,T<sub>a</sub>=25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	V <sub>f</sub>	I <sub>f</sub> =260mA	8.1	9.0	9.9	V	
Uniformity	Δ Bp	I <sub>f</sub> =260mA	75	80	-	%	
Life Time	time	I <sub>f</sub> =260mA	30K	-	-	hours	1



Note 1: Brightness to be decreased to 50% of the initial value at ambient temperature  $T_A=25^\circ\text{C}$

DISEA

## 6.3 Interface signals

Pin No.	Symbol	I/O	Function
1-4	NC	-	No Connection
5	GND	P	Ground
6	VCOM	P	Common voltage
7	DVDD	P	Power supply for digital circuits
8	MODE	I	DE/SYNC mode select. Normally pull high MODE=H:DE mode; MODE=L:SYNC mode
9	DE	I	Data Input Enable
10	VS	I	Vertical sync input signal
11	HS	I	Horizontal sync input signal
12-19	B7-B0	I	Blue data input
20-27	G7-G0	I	Green data input
28-35	R7-R0	I	Red data input
36	GND	P	Ground
37	DCLK	I	Clock for Input Data.
38	GND	P	Ground
39	L/R	I	Source Driver internal shift register is controlled by this pin as shown below: Normally pull high. SHLR = "L", S1←S2.....←S1536 SHLR = "H", S1→S2.....→S1536
40	U/D	I	Gate Up or Down scan control. Normally pull low. UPDN = "L", STV2 output vertical start pulse and UD pin output logical "0" to Gate driver. UPDN = "H", STV1 output vertical start pulse and UD pin output logical "1" to Gate driver.
41	VGH	P	Power supply for Gate on output
42	VGL	P	Power supply for Gate off output
43	AVDD	P	Analog power
44	RESET	I	Reset pin
45	NC	-	No Connection
46	VCOM	P	Common voltage
47	DITHB	I	Dithering function enable control. Normally pull low DITHB=H:Enable internal dithering function. DITHB=L:Disable internal dithering function.
48	GND	P	Ground
49-50	NC	-	No Connection

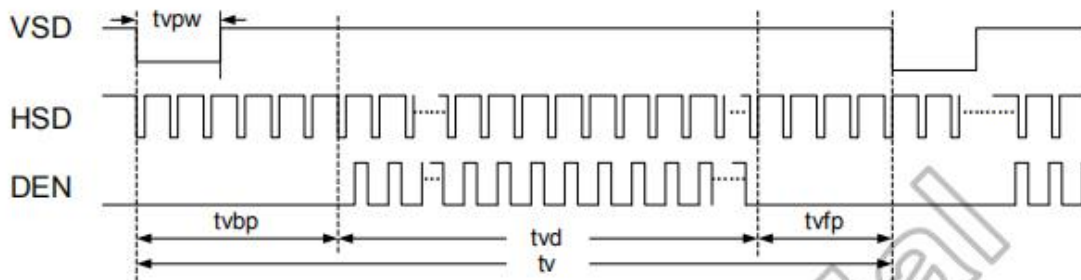


## 6.4 AC Characteristics

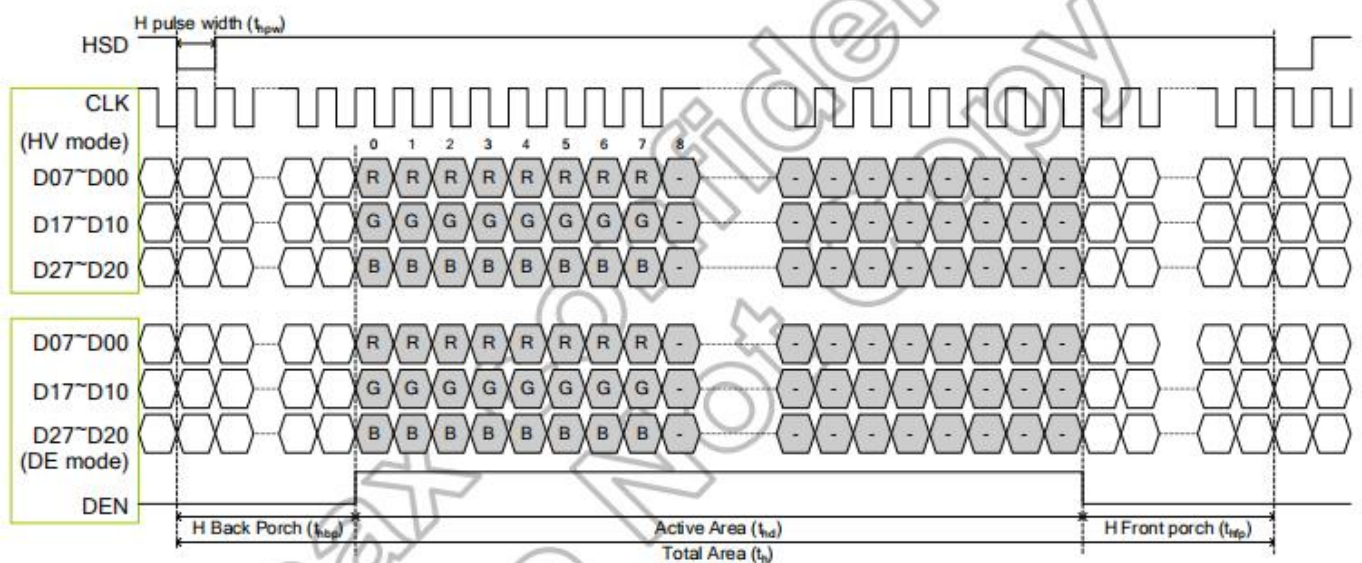
Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
VDD power on slew rate	$T_{POR}$	From 0V to 90% VDD	-	-	20	ms
GRB pulse width	$T_{GRB}$	-	50	-	-	$\mu$ s
DCLK cycle time	$T_{cph}$	-	14	-	-	ns
DCLK pulse duty	$T_{cwh}$	-	40	50	60	%
VSD setup time	$T_{vst}$	-	5	-	-	ns
VSD hold time	$T_{vhd}$	-	5	-	-	ns
HSD setup time	$T_{hst}$	-	5	-	-	ns
HSD hold time	$T_{hhd}$	-	5	-	-	ns
Data setup time	$T_{dsu}$	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
Data hold time	$T_{dhd}$	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
DE setup time	$T_{esu}$	-	5	-	-	ns
DE hold time	$T_{ehd}$	-	5	-	-	ns
Output stable time	$T_{sst}$	10% to 90% target voltage. CL=90pF, R=10K $\Omega$ (Cascade)	-	-	6	$\mu$ s
		Dual gate	-	-	3	

### 6.4.1 Data Input Format

#### • Vertical timing



#### • Horizontal timing



## 6.4.2 Input Timing Table

### DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	40.8	51.2	67.2	MHz
Horizontal display area	thd	1024			DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	600			T <sub>H</sub>
VSD period	tv	610	635	800	T <sub>H</sub>
VSD blanking	tvbp+tvfp	10	35	200	T <sub>H</sub>

### HV mode

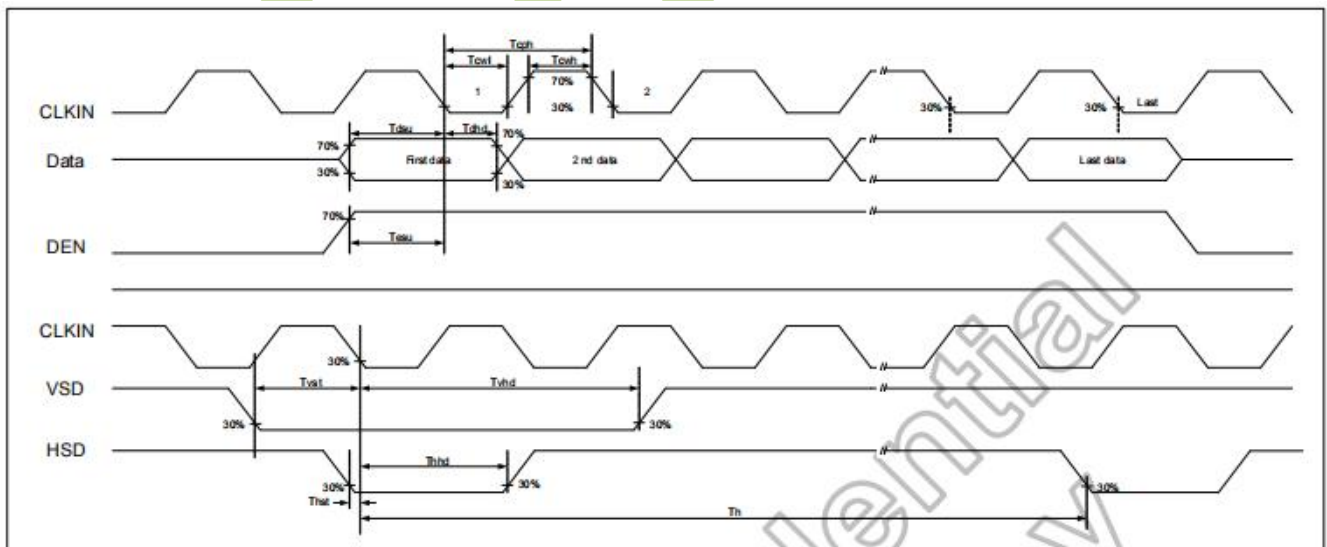
- Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	44.9	51.2	63	MHz
Horizontal display area	thd	1024			DCLK
HSD period	th	1200	1344	1400	DCLK
HSD pulse Width	thpw	1	-	140	DCLK
HSD back porch	thbp	160			DCLK
HSD front porch	thfp	16	160	216	DCLK

- Vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	600			T <sub>H</sub>
VSD period	tv	624	635	750	T <sub>H</sub>
VSD pulse width	tvpw	1	-	20	T <sub>H</sub>
VSD back porch	tvbp	23			T <sub>H</sub>
VSD front porch	tvfp	1	12	127	T <sub>H</sub>

## 6.4.3 Input clock and date timing diagram



## 7. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp	$\theta=0^\circ$ $\Phi=0^\circ$	350	400	-	Cd/m <sup>2</sup>	1
Uniformity	$\Delta$ Bp		75	80	-	%	1,2
Viewing Angle	3:00	Cr $\geq$ 10	-	80	-	Deg	3
	6:00		-	80	-		
	9:00		-	80	-		
	12:00		-	80	-		
Contrast Ratio	Cr	$\theta=0^\circ$ $\Phi=0^\circ$	-	800	-	-	4
Response Time	T <sub>r</sub> +T <sub>f</sub>		-	30	40	ms	5
Color of CIE Coordinate	W	x	Typ -0.05	0.298	Typ +0.05	-	1,6
		y		0.323		-	
	R	x		0.605		-	
		y		0.336		-	
	G	x		0.297		-	
		y		0.552		-	
	B	x		0.139		-	
		y		0.132		-	
NTSC Ratio	S	-	50	-	%		

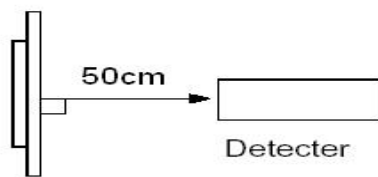
Note: The parameter is slightly changed by temperature, driving voltage and materiel

**Note 1:** The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ8mm)

**Measuring condition:**

- Measuring surroundings: Dark room.
- Measuring temperature:  $T_a=25\text{ }^\circ\text{C}$ .
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

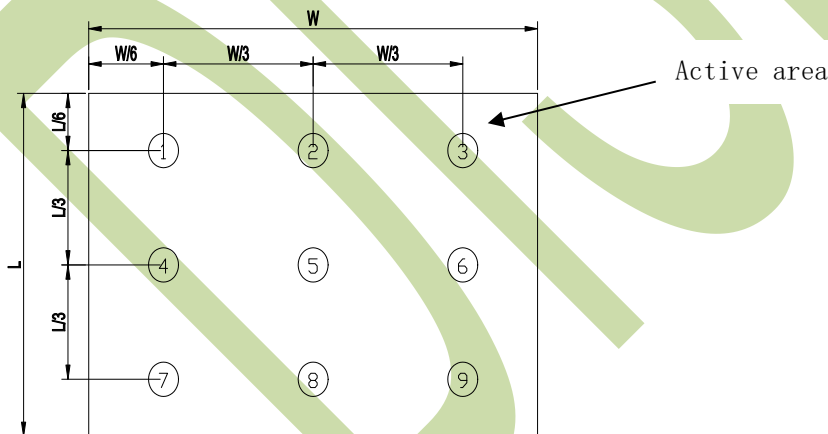


**Note 2:** The luminance uniformity is calculated by using following formula.

$$\Delta Bp = Bp (\text{Min.}) / Bp (\text{Max.}) \times 100 (\%)$$

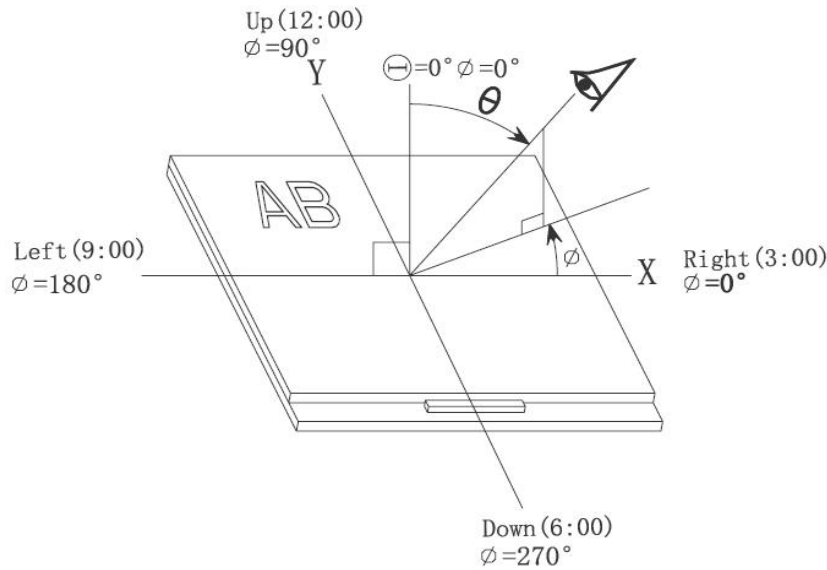
$Bp (\text{Max.})$  = Maximum brightness in 9 measured spots

$Bp (\text{Min.})$  = Minimum brightness in 9 measured spots.

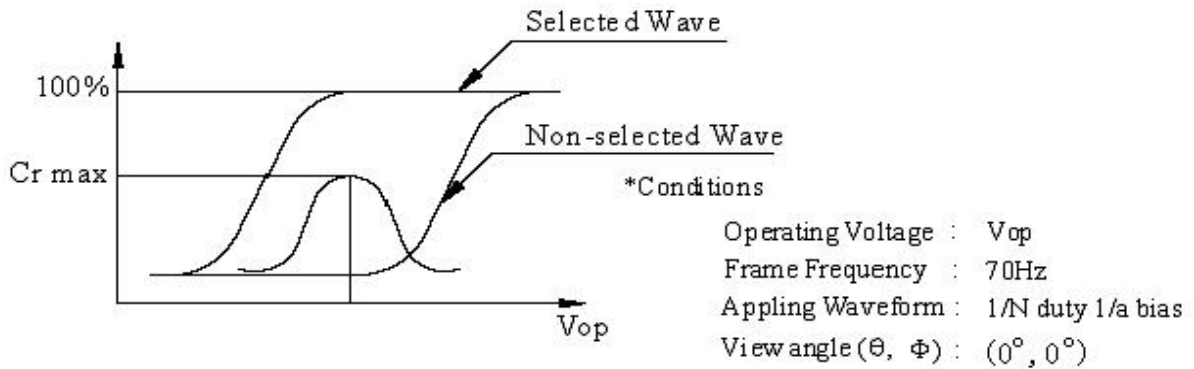


**Note 3:** The definition of viewing angle:

Refer to the graph below marked by  $\theta$  and  $\Phi$



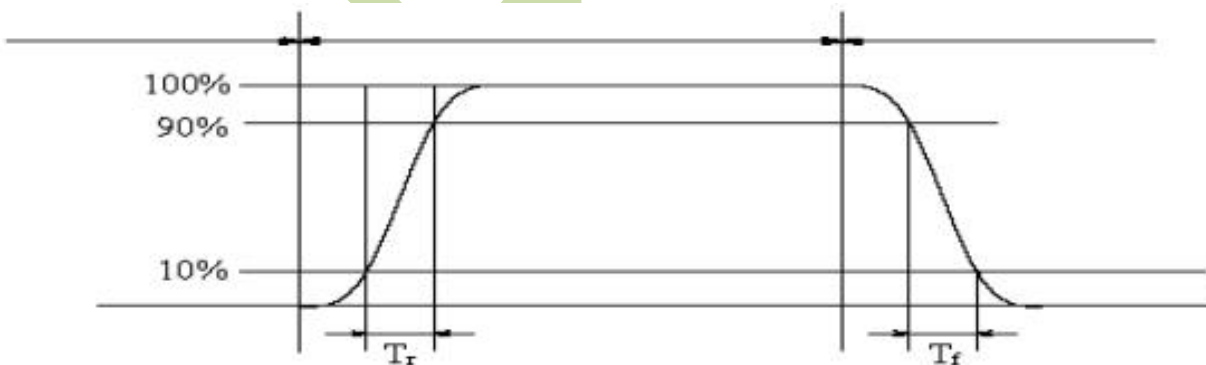
Note 4: Definition of contrast ratio.( Test LCD using DMS501)



$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

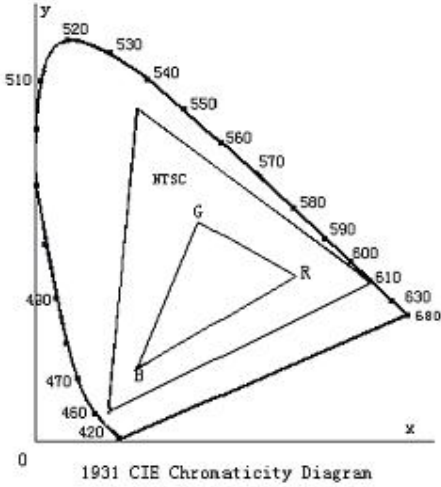
Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from "black" to "white" (falling time) and from "white" to "black" (rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

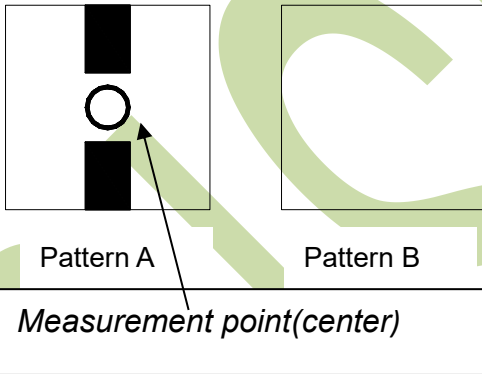


Color gamut:

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

Note 7: Definition of cross talk.

$$\text{Cross talk ratio}(\%) = \frac{|\text{pattern A Brightness} - \text{pattern B Brightness}|}{\text{pattern A Brightness}} \times 100$$



**Electric volume value=3F+/-3Hex**

## 8. Reliability Test Items and Criteria

Test Item	Test condition	Remark
High Temperature Storage	Ta = 80°C 96hrs	Note1,Note3, 4
Low Temperature Storage	Ta = -30°C 96hrs	Note1,Note3, 4
High Temperature Operation	Ta = 70°C 96hrs	Note2,Note3, 4
Low Temperature Operation	Ta = -20°C 96hrs	Note1,Note3, 4
Operation at High Temperature/Humidity	+60°C, 90%RH 96hrs	Note3, 4
Thermal Shock	-30°C/30 min ~ +80°C/30 min for a total 10 cycles, Start with cold temperature and end with high temperature.	Note3, 4
Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	±2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: 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.

Note 4: Before cosmetic and function test, the product must have enough recovery time,at least 2 hours at room temperature

## **9. Precautions for Use of LCD Modules**

### **9.1 Handling Precautions**

9.1.1 *The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.*

9.1.2 *If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.*

9.1.3 *Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.*

9.1.4 *The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.*

9.1.5 *If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:*

— Isopropyl alcohol      — Ethyl alcohol

*Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:*

— Water      — Ketone      — Aromatic solvents

9.1.6 *Do not attempt to disassemble the LCD Module.*

9.1.7 *If the logic circuit power is off, do not apply the input signals.*

9.1.8 *To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.*

*a. Be sure to ground the body when handling the LCD Modules.*

*b. Tools required for assembly, such as soldering irons, must be properly ground.*

*c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.*

*d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.*



## **9.2 Storage precautions**

9.2.1 *When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.*

9.2.2 *The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:*

*Temperature :           0 °C ~ 40 °C*

*Relatively humidity: ≤ 80%*

9.2.3 *The LCD modules should be stored in the room without acid, alkali and harmful gas.*

**9.3 *The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.***

**END**