

PRODUCT SPECIFICATIONS

 For Customer: _____ : APPROVAL FOR SPECIFICATION

 Customer Model No. _____ : APPROVAL FOR SAMPLE

Module No.: XH-T101QIH-25

Date : 2017-07-04

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For Customer's Acceptance:

Approved By	Comment

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT
John	Techshu		Dmjiaang

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared
2017-07-04	V0		The first release	JOHN

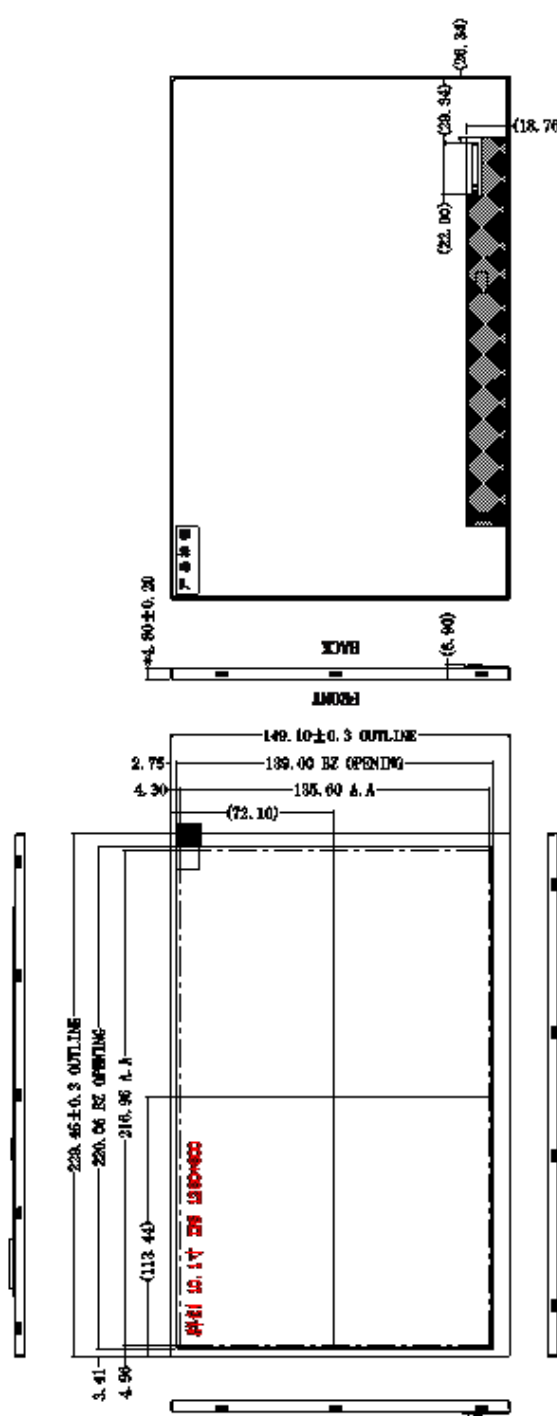
3. General Specifications

XH -T101QIH-25 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 1280X800pixels and can display up to 16.7M colors. This product accords with RoHS

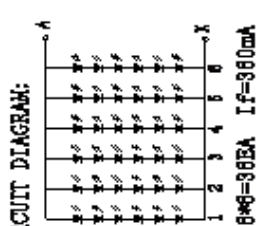
Item	Contents	Unit	Note
LCD Type	TFT IPS	-	
Display color	16.7M		1
Viewing Direction	Free viewing	O'Clock	
Operating temperature	0~+50	°C	
Storage temperature	-20~+60	°C	
Module size	Refer to outline drawing	mm	2
Active Area(W×H)	216.96X135.6	mm	
Number of Dots	1280×800	dots	
Controller	--	-	
Power Supply Voltage	2.5	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	6X6-LEDs (white)	pcs	
Weight	---	g	
Interface	LVDS	-	

4. Outline Drawing

PIN	FUNCTION	SYMBOL
1	VCOM	VCOM
2	VDD	VDD
3	VDD	VDD
4	NC	NC
5	NC	NC
6	NC	NC
7	GND	R×im0-
8	GND	R×im0-
9	GND	R×im0+
10	GND	GND
11	GND	R×im1-
12	GND	R×im1+
13	GND	GND
14	GND	R×im2-
15	GND	R×im2+
16	GND	GND
17	GND	R×CLK-
18	GND	R×CLK+
19	GND	GND
20	GND	R×ip3-
21	GND	R×ip3+
22	GND	GND
23	NC	NC
24	NC	NC
25	GND	GND
26	NC	NC
27	LED_PWM	LED_PWM
28	NC	NC
29	AVDD	AVDD
30	GND	GND
31	LED-	LED-
32	LED-	LED-
33	NC	NC
34	NC	NC
35	VGL	VGL
36	NC	NC
37	CABC_EN	CABC_EN
38	VGH	VGH
39	LED+	LED+
40	LED+	LED+



LED CIRCUIT DIAGRAM:



NOTES:

1. DISPLAY TYPE: 10.1TFT, TRANSMISSIVE
2. VIEWING DIRECTION : U/L/D/R 80/80/80/80
3. Driver IC :
4. Top : 0° C ~ 50° C, Tst : -20° C ~ 60° C
5. GENERAL TOLERANCE: ±0.2
6. LCM Luminance:LED/800cd/m²(Typical)

UNIT:mm	Checked By	Approved By
TFT COG MODULE	Wuliyun	
PART NO.	2016.06.19	
DRAWING NO.	V0	

VER	REVISED DESCRIPTION	DATE	NAME

5. Absolute Maximum Ratings(Ta=25°C)

5.1 Electrical Absolute Maximum Ratings.(V_{SS}=0V ,T_a=25°C)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V _{CC}	-0.3	2.8	V	1, 2

Notes:

1. 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.
2. V_{CC} > V_{SS} must be maintained.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-20°C	60°C	0°C	50°C	1,2
Humidity	-	-	-	-	3

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.

The phenomenon is reversible.

3. T_a ≤ 40°C: 85%RH MAX.

T_a > 40°C: Absolute humidity must be lower than the humidity of 85%RH at 40°C.

6. Electrical Specifications and Instruction Code

6.1 Electrical characteristics(V_{ss}=0V ,T_a=25°C)

Parameter	Symbol	Min	Typ	Max	Unit	Note
Power supply	VDD	2.3	2.5	2.7	V	
	AVDD	8.0	8.2	8.4	V	
	VGH	21.7	22	22.3	V	
	VGL	-7.3	-7	-6.7	V	
Input signal voltage	VCOM	3.0	3.3	3.6	V	
Input logic high voltage	VIH	0.8VDD		VDD	V	
Input logic low voltage	VIL	0		0.2VDD	V	
Clock frequency	1/TC		71		MHZ	

6.2 LED backlight specification(VSS=0V ,Ta=25°C)

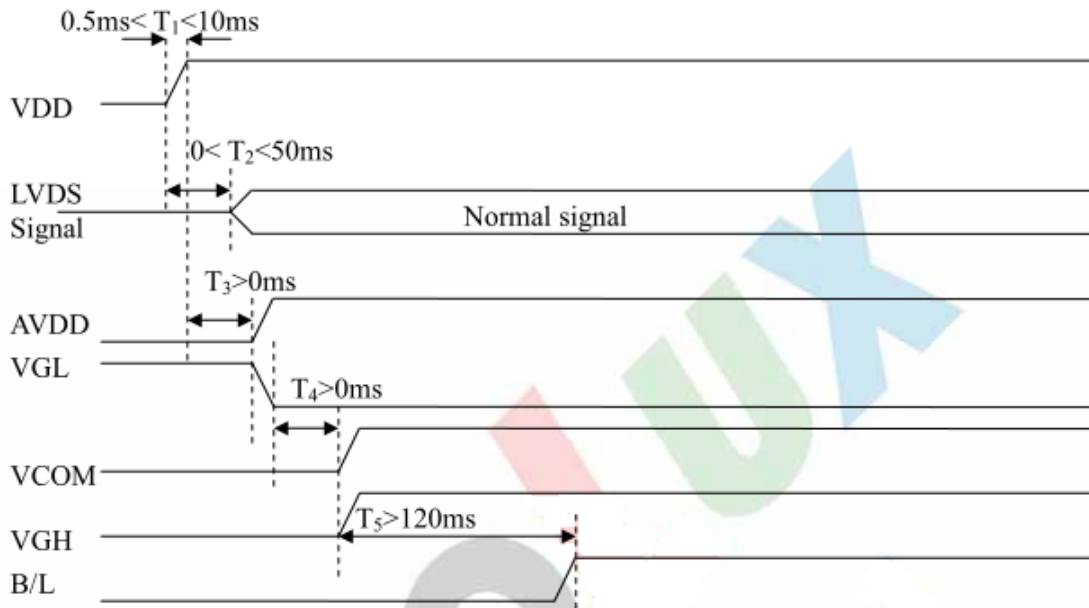
Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	V_f	$I_f=360mA$	16.8	19.2	21.0	V	1
Uniformity	ΔBp	$I_f=360mA$	75			%	
Luminance for LCD	L_v	$I_f=360mA$		800		Cd/m ²	

6.3 Interface signals

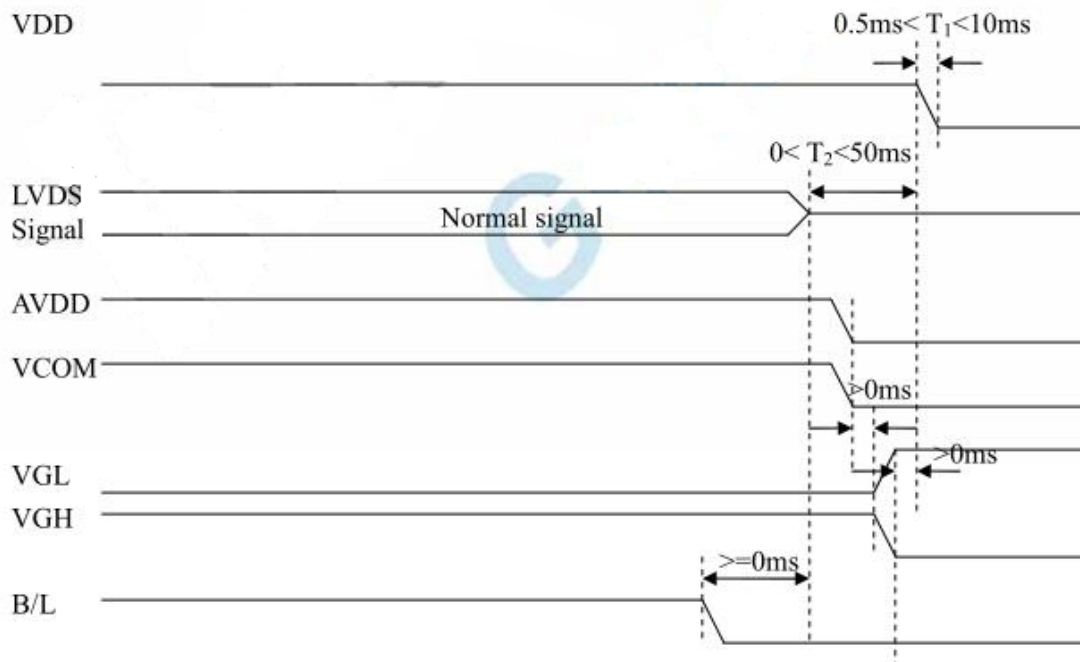
Pin No.	Symbol	I/O	Function
1	VCOM	P	COMMON voltage
2~3	VDD	P	Power supply.
4~6	NC	-	No connection.
7	GND	P	Ground.
8	Rxin0-	I	-LVDS differential data input
9	Rxin0+	I	+LVDS differential data input
10	GND	P	Ground.
11	Rxin1-	I	-LVDS differential data input
12	Rxin1+	I	+LVDS differential data input
13	GND	P	Ground.
14	Rxin2-	I	-LVDS differential data input
15	Rxin2+	I	+LVDS differential data input
16	GND	P	Ground.
17	RxCLK-	I	-LVDS differential data input
18	RxCLK+	I	+LVDS differential data input
19	GND	P	Ground.
20	Rxin3-	I	-LVDS differential data input
21	Rxin3+	I	+LVDS differential data input
22	GND	P	Ground.
23~24	NC	-	No connection.
25	GND	P	Ground.
26	NC	-	No connection.
27	LED_PWM	I	CABC controller signal output for backlight
28	NC	-	No connection.
29	AVDD	P	Power for analog circuit.
30	GND	P	Ground.
31~32	LED-	P	LED cathode
33~34	NC	-	No connection.
35	VGL	P	Gate off voltage
36	NC	-	No connection.
37	CABC_EN	I	CABC enable input.
38	VGH	P	Gate on voltage
39~40	LED+	P	LED anode.

6.4 Power Sequence

a. Power on:



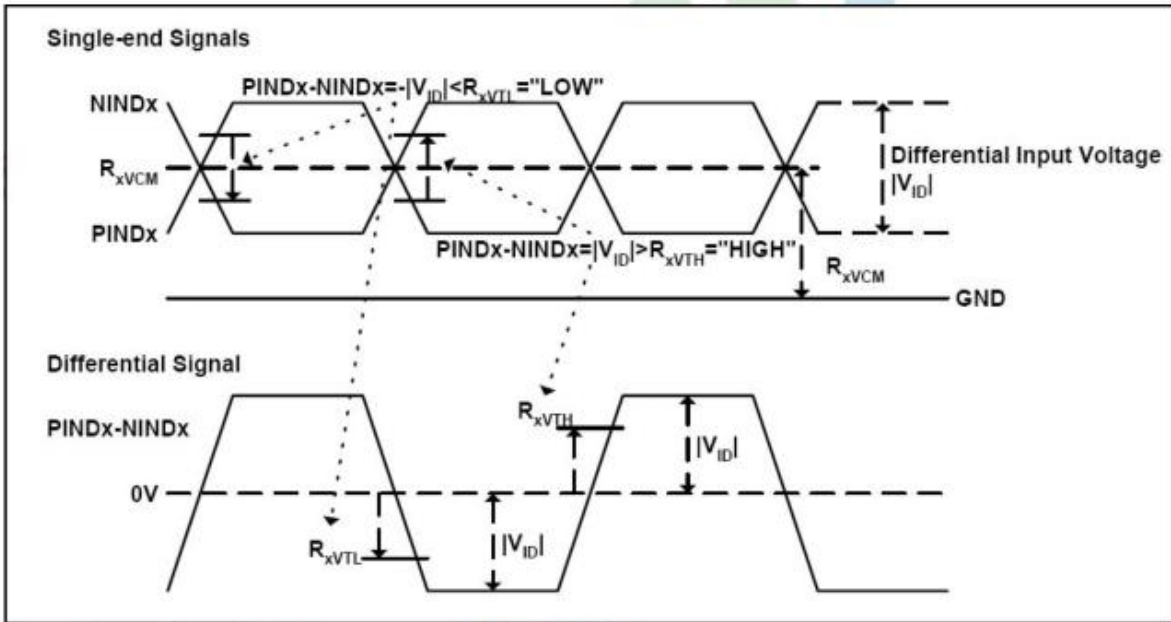
b. Power off:



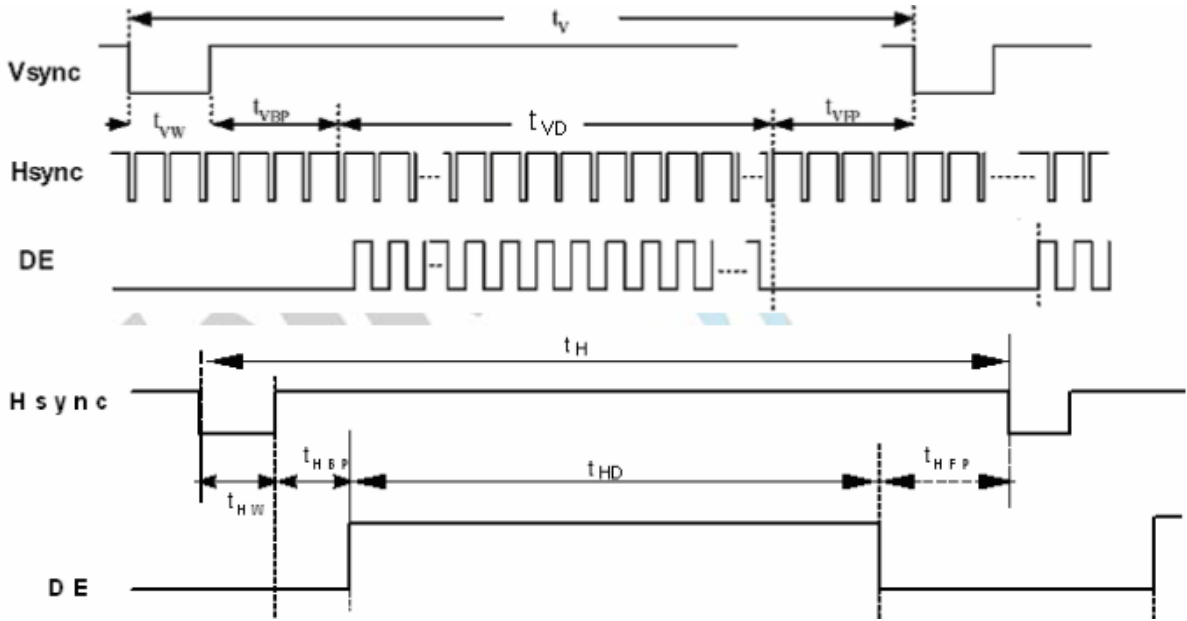
6.5 Timing Characteristics

6.5.1 AC Electrical Characteristics

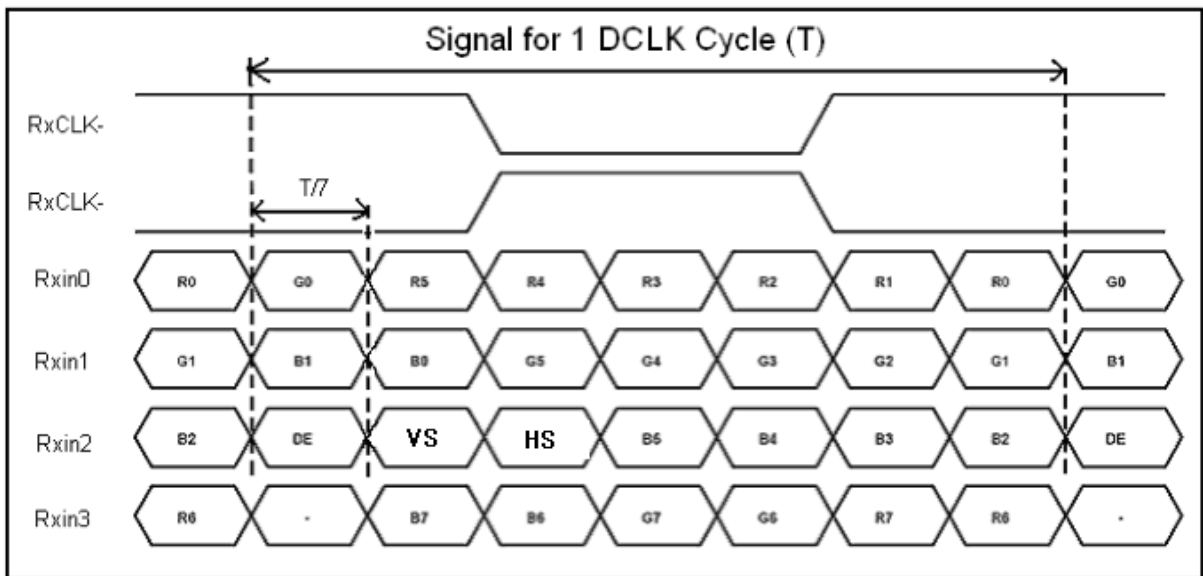
Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xvth}	-	-	+100	mV	$R_{xvcm}=1.2V$
LVDS Differential input low Threshold voltage	R_{xvtl}	-100	-	-	mV	
LVDS Differential input common mode voltage	R_{xvcm}	0.7	-	1.6	V	
LVDS Differential voltage	$ V_{ID} $	200	-	600	mV	


6.5.2 Timing Table

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	$1/T_c$	68.9	71.1	73.4	MHz	Frame rate =60Hz
Horizontal display area	t_{HD}	1280			T_c	
HS period time	t_H	1410	1440	1470	T_c	
HS Width +Back Porch +Front Porch	$t_{HW} + t_{HBP} + t_{HFP}$	130	160	190	T_c	
Vertical display area	t_{VD}	800			t_H	
VS period time	t_V	815	823	833	t_H	
VS Width +Back Porch +Front Porch	$t_{VW} + t_{VBP} + t_{VFP}$	15	23	33	t_H	



6.5.3 LVDS Data Input Format



7. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp	$\theta=0^\circ$	-	800	-	Cd/m ²	1
Uniformity	Δ Bp	$\Phi=0^\circ$	75	-	-	%	1,2
Viewing Angle	3:00	Cr \geq 10	-	85	-	Deg	3
	6:00		-	85	-		
	9:00		-	85	-		
	12:00		-	85	-		
Contrast Ratio	Cr	$\theta=0^\circ$ $\Phi=0^\circ$	600	800		-	4
Response Time	T _r		-	10	20	ms	5
	T _f		-	15	30	ms	
Color of CIE Coordinate	W	x		0.28		-	1,6
		y		0.33		-	
	R	x		0.51		-	
		y		0.34		-	
	G	x		0.31		-	
		y		0.56		-	
	B	x		0.15		-	
		y		0.14		-	

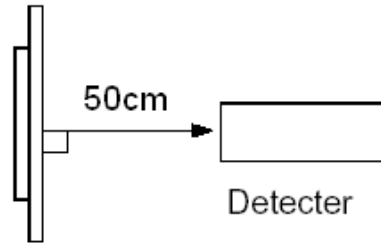
Note: The parameter is slightly changed by temperature, driving voltage and material

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 (Φ 8mm)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25°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.

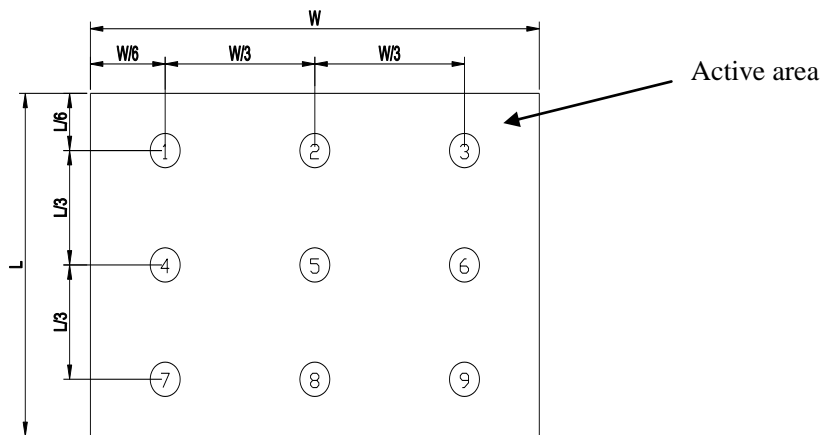


Note 2: The luminance uniformity is calculated by using following formula.

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

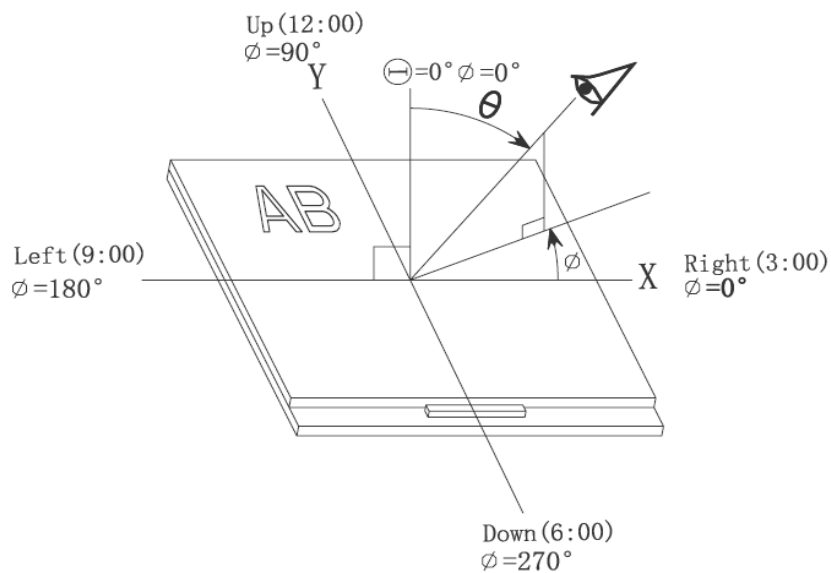
$Bp (\text{Max.})$ = Maximum brightness in 9 measured spots

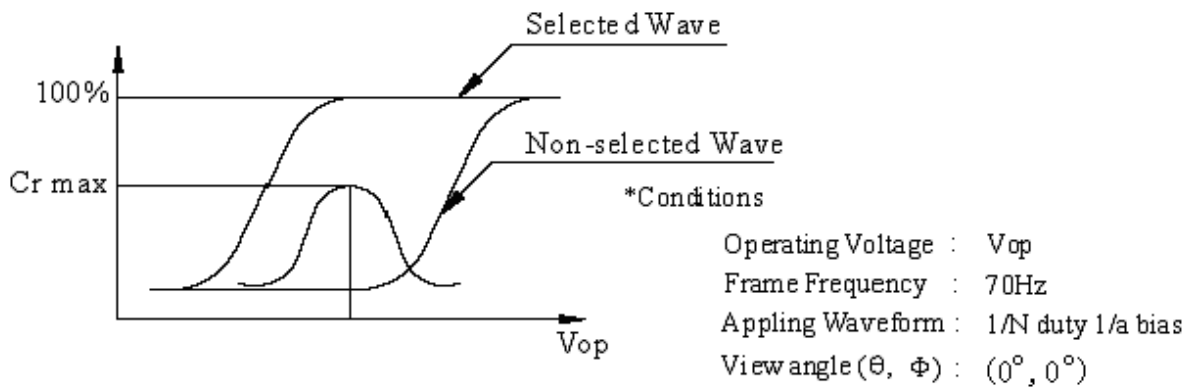
$Bp (\text{Min.})$ = Minimum brightness in 9 measured spots.



Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and ϕ

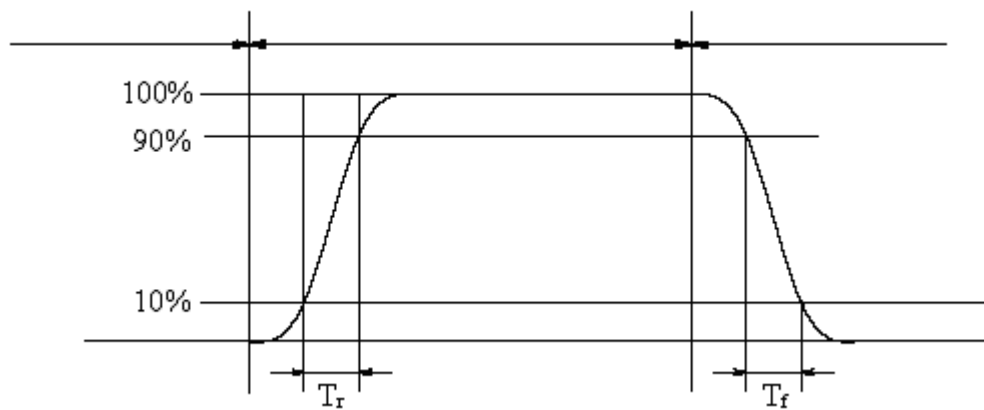


Note 4: Definition of contrast ratio.(Test LCD using DMS501)


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

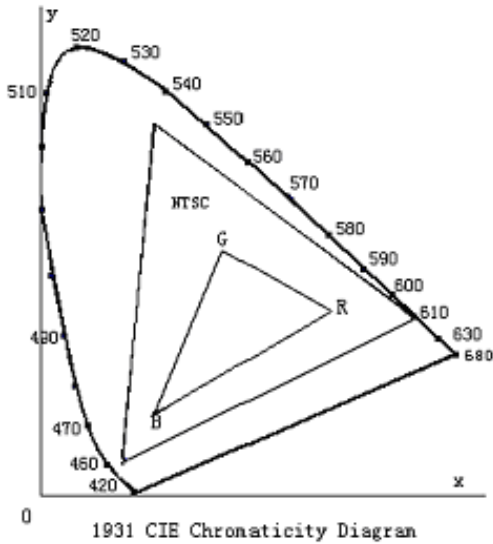
Note 5: Definition of Response time. (Test LCD using DMS501):

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.

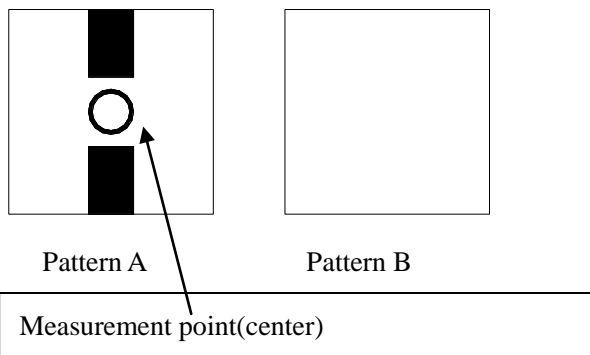


Color gamut:

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

Note 7: Definition of cross talk.

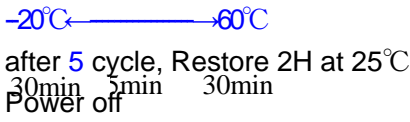
Cross talk ratio(%)=|pattern A Brightness-pattern B Brightness|/pattern A Brightness*100



Electric volume value=3F+/-3Hex

8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	60°C±2°C 96H Restore 2H at 25°C Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-20°C±2°C 96H Restore 2H at 25°C Power off	
3	High Temperature Operation	50°C±2°C 96H Restore 2H at 25°C Power on	

4	Low Temperature Operation	0°C±2°C 96H Restore 4H at 25°C Power on	Not allowed cosmetic and electrical defects.
5	High Temperature/Humidity Operation	50°C±2°C 90%RH 96H Power on	
6	Temperature Cycle	 after 5 cycle, Restore 2H at 25°C Power off	
7	Vibration Test	10Hz~150Hz, 100m/s ² , 120min	
8	Shock Test	Half- sine wave, 300m/s ² , 11ms	

Note: Operation: Supply 2.5V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

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.