

# TFT SPECIFICATION

Part Number	USMP-LPS-T070-128076MFW-A0
Size	7"
Resolution	1280 x 768
Brightness	1300 cd/m <sup>2</sup>
Contrast	1400:1
Viewing Angle	80/80/80/80
Operating Temp.	-30 ~ 85°C

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### 3. General Specifications

*USMP-LPS-T070-128076MFW-A0 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light and CTP unit. The 7.0 "display area contains 1280x768 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.*

#### 3.1 LCD Parameter

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		
Viewing Direction	ALL	O'Clock	
Operating temperature	-30~+85	°C	
Storage temperature	-30~+85	°C	
Module size	Refer to outline drawing	mm	
Active Area(W×H)	152.45X91.47	mm	
Number of Dots	1280 (RGB) x768	dots	
Driver IC	HX8290*2	-	
Power Supply Voltage	3.3	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	6S5P-LEDs (white)	pcs	
Interface	LVDS	-	

### 3.2 CTP Parameter

Item	Contents	Unit	Note
Outline Size	170.81(H)X116.47(V)X1.9(T)	mm	
Cover View Area	153.45(H)X92.47(V)		
CTP Resolution	1280x768	dots	
Interface Mode	IIC	-	
Touch Mode	10 Human fingers multi-touch	-	
Surface hardness	$\geq 7H$	-	
Transparency	$\geq 85\%$	-	
Accuracy	Entre +/-1.5mm,Edge +/-2.5mm	mm	
CTP Controller	ATMXT1066T2	-	
Power Supply Voltage	3.3	V	
Surface treatment	Etched-AG		



## 5. Absolute Maximum Ratings( $T_a=25^\circ\text{C}$ )

### 5.1 Electrical Absolute Maximum Ratings.( $V_{ss}=0\text{V}$ , $T_a=25^\circ\text{C}$ )

Item	Symbol	Min.	Max.	Unit	Note
TFT Power Supply Voltage	VCC	-0.3	4.0	V	1, 2
CTP Power Supply Voltage	VDD	-0.3	3.6	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.  $V_{DD} > V_{SS}$  must be maintained.
3. Please be sure users are grounded when handing LCD Module.

### 5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	$-30^\circ\text{C}$	$85^\circ\text{C}$	$-30^\circ\text{C}$	$85^\circ\text{C}$
Humidity	-	-	-	-

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.  $T_a \leq 40^\circ\text{C}$ : 85%RH MAX.  
 $T_a > 40^\circ\text{C}$ : Absolute humidity must be lower than the humidity of 85%RH at  $40^\circ\text{C}$ .

## 6. Electrical Specifications and Instruction Code

### 6.1 Electrical characteristics ( $V_{SS}=0V, T_a=25^\circ C$ )

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note	
TFT Power supply voltage	VCC	Ta=25°C	3.0	3.3	3.6	V		
TFT Power supply current	ICC	VCC=3.3V	-	180	240	mA	White display pattern	
TFT Logic Input voltage	'H'	V <sub>IH</sub>	Ta=25°C	0.7*VCC	-	VCC	V	
	'L'	V <sub>IL</sub>	Ta=25°C	0	-	0.3*VCC	V	
CTP Power supply voltage	VDD	Ta=25°C	3.0	3.3	3.47	V		
CTP Power supply current	IDD	VDD=3.3V	-	30	-	mA		
TFT Logic Input voltage	'H'	V <sub>IH</sub>	Ta=25°C	0.7*VCC	-	VCC	V	
	'L'	V <sub>IL</sub>	Ta=25°C	0	-	0.3*VCC	V	

Note: If one of the above items is exceeded its maximum limitation momentarily, the quality of the product may be degraded. Absolute maximum limitation, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the recommend range.

### 6.2 LED backlight specification ( $V_{SS}=0V, T_a=25^\circ C$ )

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage VLED	V <sub>f</sub>	I <sub>f</sub> =450mA	16.8	18	19.8	V	
Uniformity	Δ Bp	I <sub>f</sub> =450mA	80	-	-	%	
LED Life Time	-	-	30K	50K	-	hr	1

Note 1: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25 °C



## 6.3 Interface signals

### 6.3.1 LCM PIN

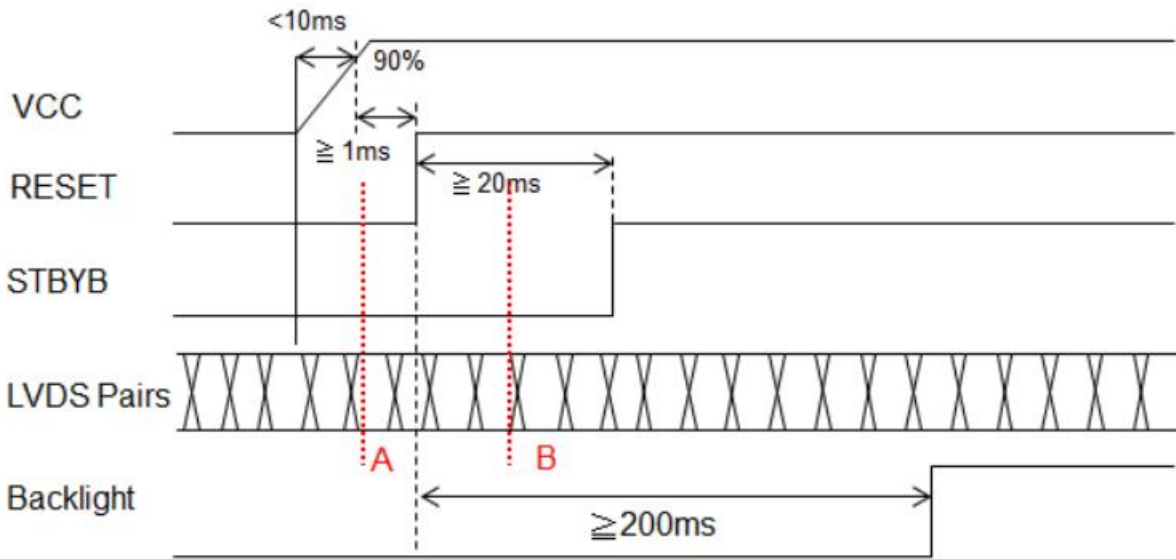
Pin No.	Symbol	I/O	Function
1-2	LEDA	P	LED back light(Anode)
3-7	LEDK1-5	P	LED back light(Cathode)
8	NTC+	P	Positive Temperature Coefficient thermistor resistor pin
9	NTC-	P	Negative Temperature Coefficient thermistor resistor pin.
10	GND	P	Ground
11	CSB	I	Serial interface chip enable signal for SPI command setting. If no use, please let it float.
12	SCL	I	Serial interface clock input signal for SPI command setting. If no use, please let it float.
13	SDA	I	Serial interface address and data input signal for SPI command setting. If no use, please let it float.
14	GND	P	Ground
15	RESET	I	Global reset signal input pin. Active low.
16	STBYB	I	Standby mode setting pin. Active low. STBYB = "Low" : Standby. STBYB = "High" : Normal display.
17	NC	-	No connection.
18	GND	P	Ground
19	Rxin3+	I	+LVDS differential data input(Data lane 3).
20	Rxin3-	I	-LVDS differential data input (Data lane 3).
21	GND	P	Ground
22	RxCLK+	I	+LVDS differential data input(Clock lane).
23	RxCLK-	I	-LVDS differential data input (Clock lane).
24	GND	P	Ground
25	Rxin2+	I	+LVDS differential data input(Data lane 2).
26	Rxin2-	I	-LVDS differential data input (Data lane 2).
27	GND	P	Ground
28	Rxin1+	I	+LVDS differential data input(Data lane 1).
29	Rxin1-	I	-LVDS differential data input (Data lane 1).
30	GND	P	Ground
31	Rxin0+	I	+LVDS differential data input(Data lane 0).
32	Rxin0-	I	-LVDS differential data input (Data lane 0).
33	GND	P	Ground
34	NC		No connection.
35-36	VCC3V3	P	TFT Analog and digital supply voltage
37	GND	P	Ground
38	UD_RL	I	Horizontal shift direction (Source output) selection. If no use, please let it float.
39	BISTEN	I	Enable built-in self test function. Let it float.
40	VDD_OTP	P	OTP power supply for test only. Let it float

6.3.2 CTP interface

Pin No.	Symbol	I/O	Function
1~2	VDD(3.3V)	P	CTP Power supply
3	RST(3.3V)	I	Reset signal
4	INT(3.3V)	O	External Interrupt pin
5	GND(3.3V)	P	Ground.
6	SCL(3.3V)	I	Serial interface clock
7	SDA(3.3V)	I/O	Serial input/output data bus
8	GND(3.3V)	P	Ground.

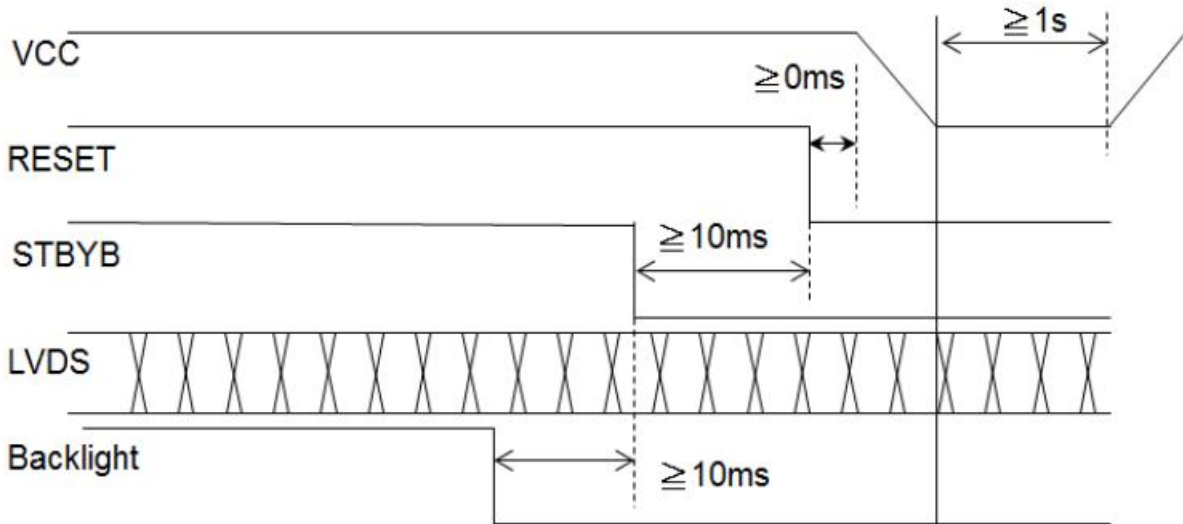
**6.4 Power Sequence**

6.4.1 Power On



**The Application system can apply LVDS signal before point A, or point B.**

6.4.2 Power off

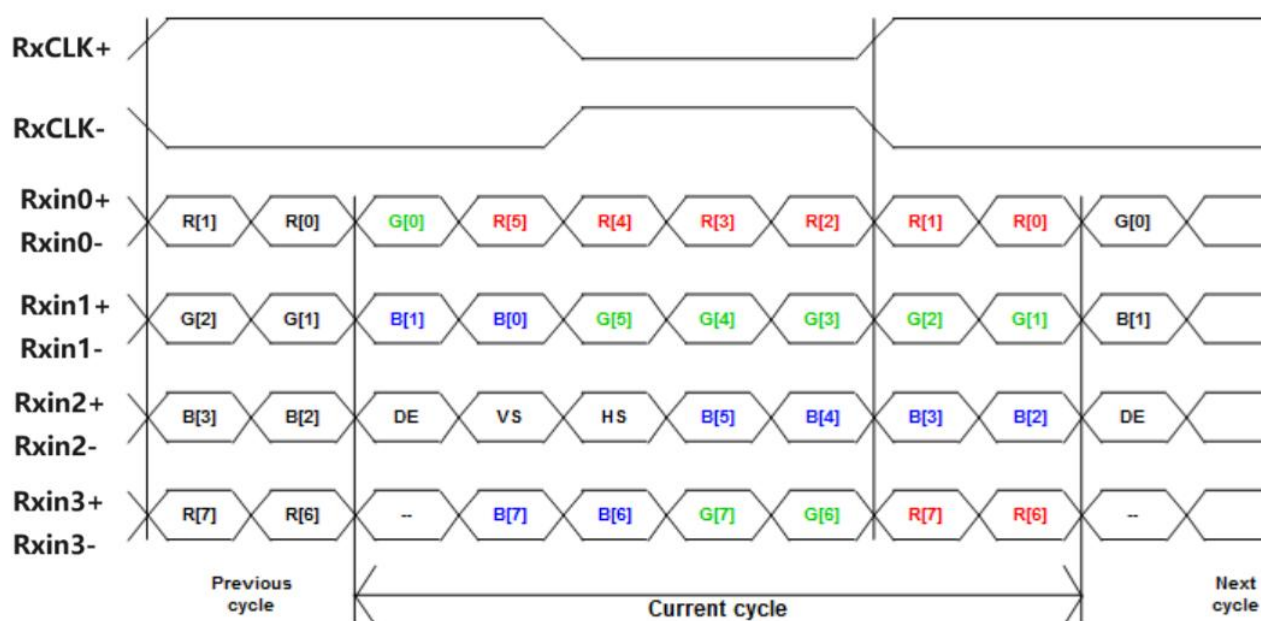


**6.5 AC Characteristics**

6.5.1 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	$V_{th}$		–	100	mV	$V_{CM}=1.2V$
Differential Input Low Threshold	$V_{tl}$	-100	–		mV	
Input Current	$I_{IN}$	-10	–	+10	$\mu A$	
Differential input Voltage	$ V_{ID} $	0.1	–	0.6	V	
Common Mode Voltage Offset	$V_{CM}$	1	1.2	$1.7-( V_{ID} /2)$	V	

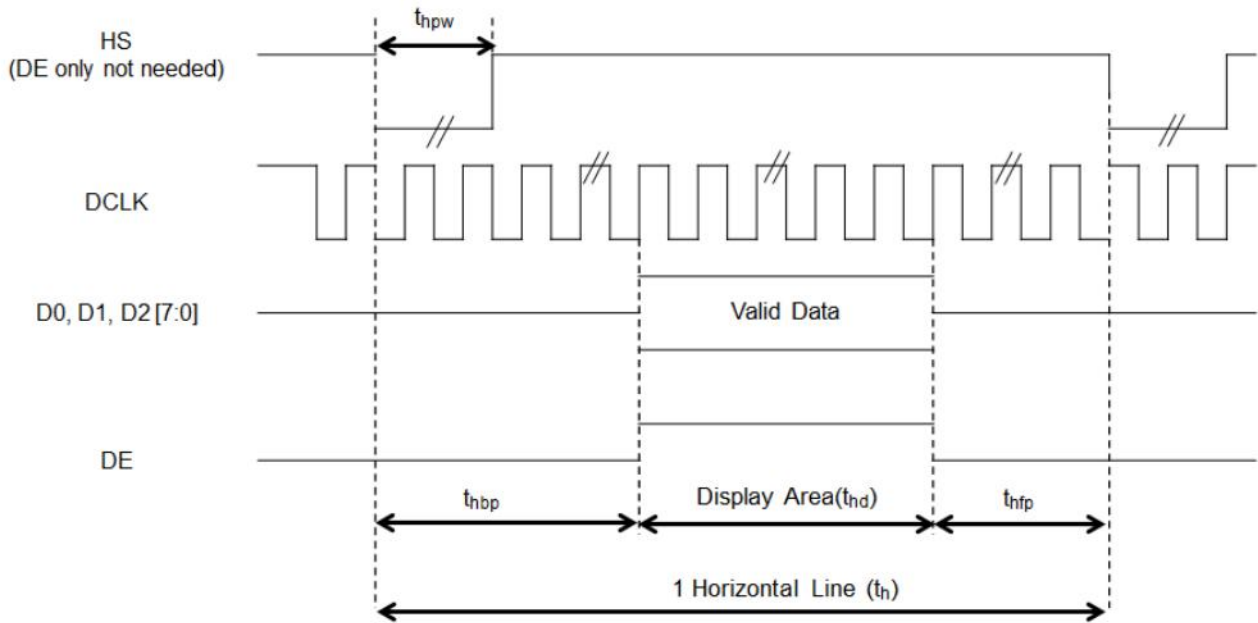
### 6.5.2 8bit LVDS input



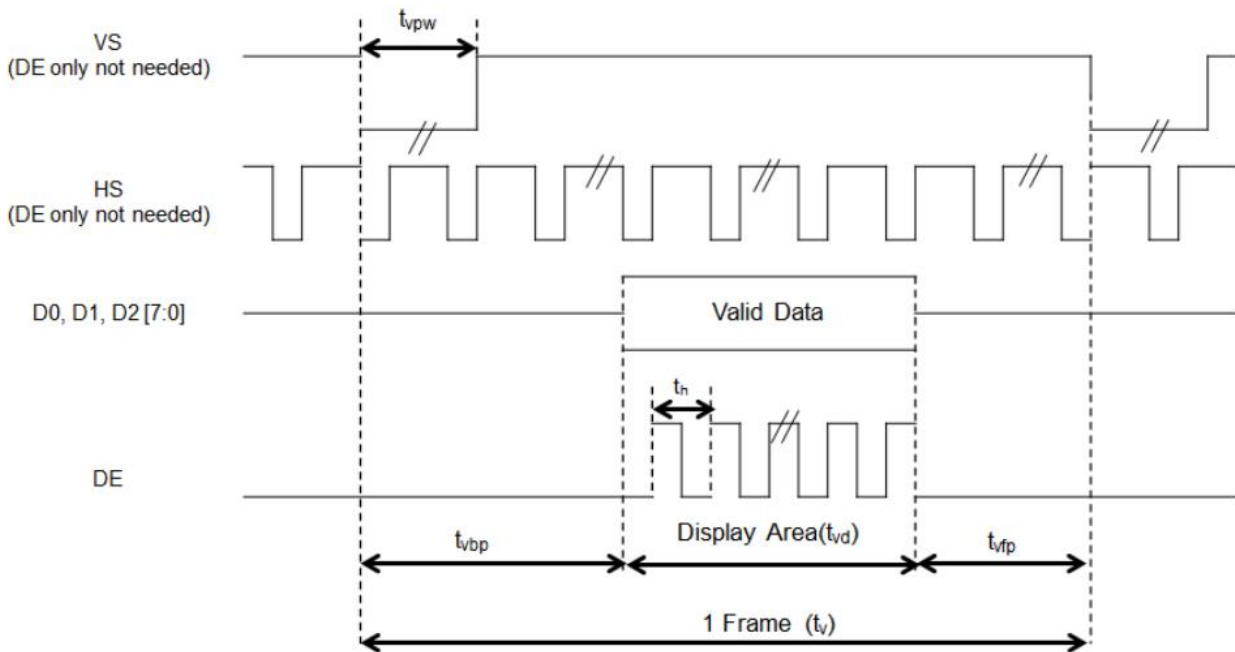
### 6.5.2 Timing Diagram of Interface Signal (DE mode)

Interface Timing (DE mode)					
One Port LVDS Timing.(1280xRGBx768)					
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	FR	55	60	65	Hz
Vertical Display Time	$T_{vd}$	768			H
Vertical pulse width	$T_{vpw}$	4	4	20	H
Vertical back porch	$T_{vbp}$	24	24	42	H
Vertical front porch	$T_{vfp}$	20	20	40	H
Frame Period	$T_v$	812	812	850	H
Horizontal Display Time	$T_{hd}$	1280			DCLK
Horizontal pulse width	$T_{hpw}$	10	12	180	DCLK
Horizontal back porch	$T_{hbp}$	5	16	192	DCLK
Horizontal front porch	$T_{hfp}$	24	26	192	DCLK
1 Horizontal line	$T_h$	1309	1322	1664	DCLK
Clock Rate	$F_{DCLK}$	58.5	64.4	85	MHz

### Horizontal



### Vertical



## 7. Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Brightness	Bp	$\theta=0^\circ$	1100	1300	-	cd/m <sup>2</sup>	1	
Uniformity	$\Delta Bp$	$\Phi=0^\circ$	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	$\theta=0^\circ$	1000	1400	-	-	4	
Response Time	T <sub>r</sub> +T <sub>f</sub>	$\Phi=0^\circ$	-	30	40	ms	5	
Color of CIE Coordinate	W	x	$\theta=0^\circ$ $\Phi=0^\circ$	Typ-0 .05	0.300	Typ+0. 05	-	1,6
		y			0.320		-	
	R	x			0.645		-	
		y			0.330		-	
	G	x			0.315		-	
		y			0.615		-	
	B	x			0.145		-	
		y			0.077		-	
NTSC Ratio	S		65	70	-	%		

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

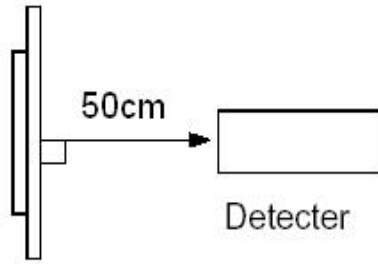
Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment BM-7 ( $\Phi$ 5mm)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: T<sub>a</sub>=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.

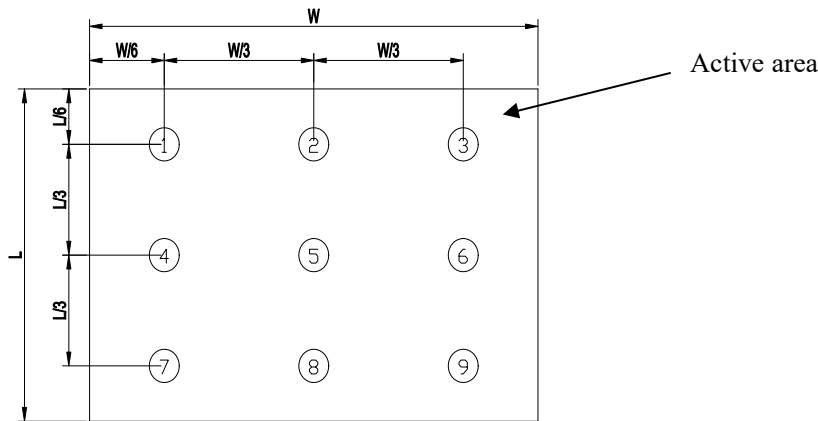


Note 2: The luminance uniformity is calculated by using following formula.

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

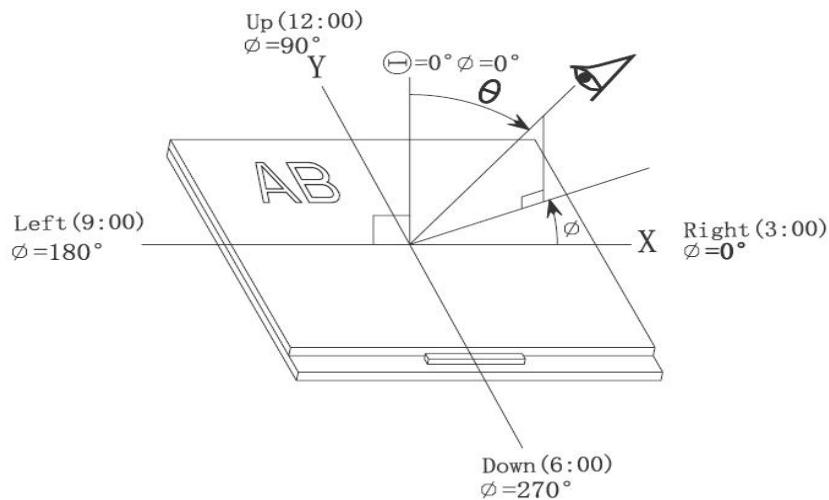
$Bp (\text{Max.})$  = Maximum brightness in 9 measured spots

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



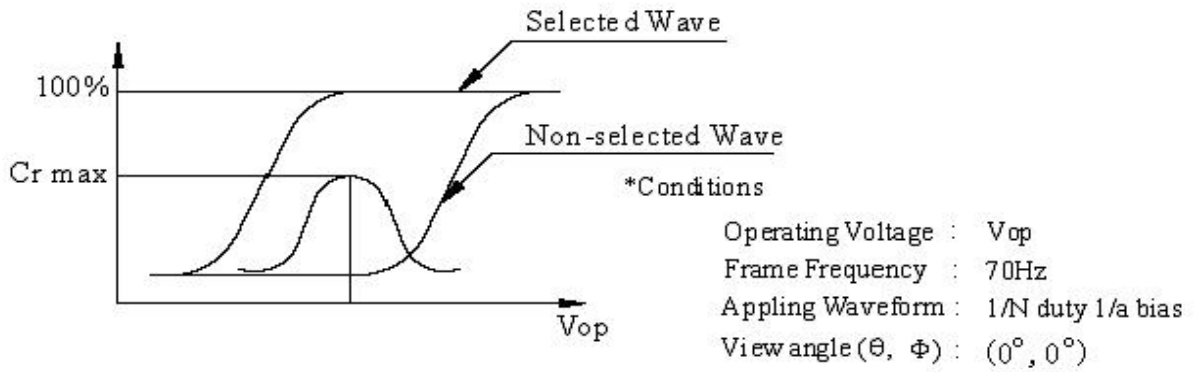
Note 3: The definition of viewing angle:

Refer to the graph below marked by  $\vartheta$  and  $\phi$



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

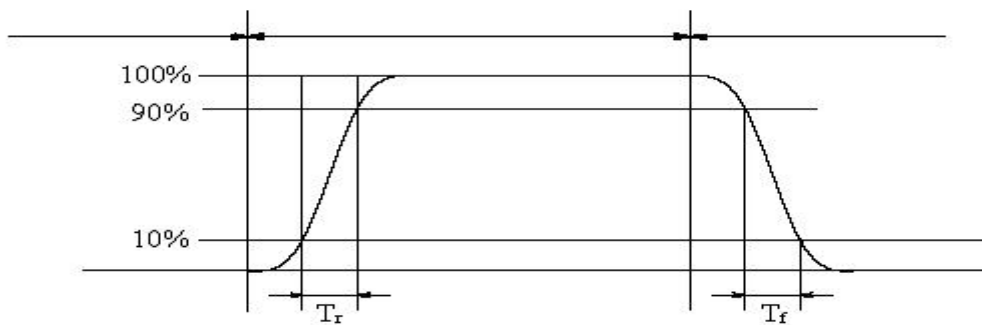




$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

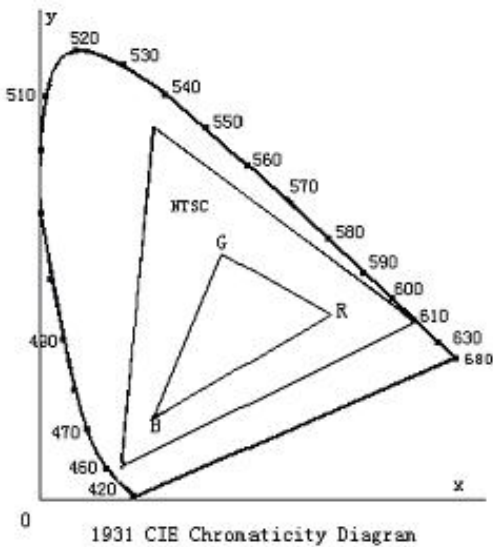
Note 5: Definition of Response time. (Test LCD using DMS501):

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.



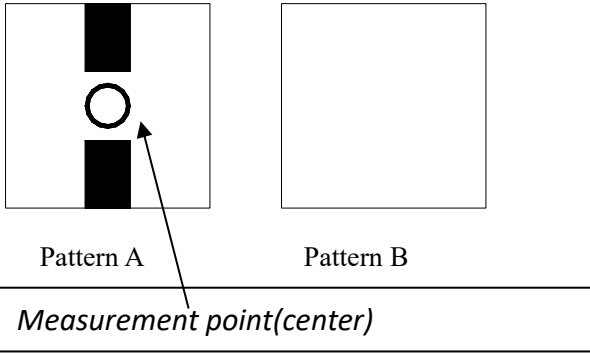
Color gamut:

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

Note 7: Definition of cross talk



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



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

## 8. Reliability Test Items and Criteria

Test Item	Test condition	Remark
High Temperature Storage	Ta = 85°C 240hrs	Note1,Note3, 4
Low Temperature Storage	Ta = -30°C 240hrs	Note1,Note3, 4
High Temperature Operation	Ta = 85°C 240hrs	Note2,Note3, 4
Low Temperature Operation	Ta = -30°C 240hrs	Note1,Note3, 4
Operation at High Temperature/Humidity	+60°C, 90%RH 240hrs	Note3, 4
Thermal Shock	-30°C/30 min ~ +85°C/30 min for a total 20 cycles, Start with cold temperature and end with high temperature.	Note3, 4
Package Drop Test	Height:60cm 1 corner, 3 edges, 6 surfaces	
ESD	C=150pF,R=330Ω ,5point/panel Air: ±8Kv,10times; Contact: ±4Kv,10times (Environment: 15°C~35°C, 30%~60%.86Kpa~106Kpa)	(IEC-61000-4-2)
Package 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	

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**