TOPLAND ELECTRONICS (H.K) CO.,LIMITED

PRODUCT SPECIFICATIONS

For Customer: _____   □ : APPROVAL FOR SPECIFICATION

Customer Model No. _____   □ : APPROVAL FOR SAMPLE

Module No.: *TIAN-T050H01-02*   *Date : 2018-11-30*

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For Customer's Acceptance:

Approved By	Comment

PREPARED	CHECKED	VERIFIED BY QA DEPT	VERIFIED BY R&D DEPT
GZH	JOHN		Dmjiang

2. Revision Record

| Date	Rev.No.	Page	Revision Items	Prepared
2018-11-30	**V0**		**The first release**	**GZH**

3. General Specifications

TIAN-T050H01-02 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a backlight unit. The 5.0′′ display area contains 800X480 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		
Viewing Direction	ALL	O'Clock	
Operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	
Module size	Refer to outline drawing	mm	
Active Area(W×H)	108.00X64.80	mm	
Number of Dots	800x480	dots	
Controller	ST7262	-	
Power Supply Voltage	3.3	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	6X3-LEDs (white)	pcs	
Weight	---	g	
Interface	RGB	-	

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

Note 2:   Without FPC and Solder.

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4.Outline Drawing
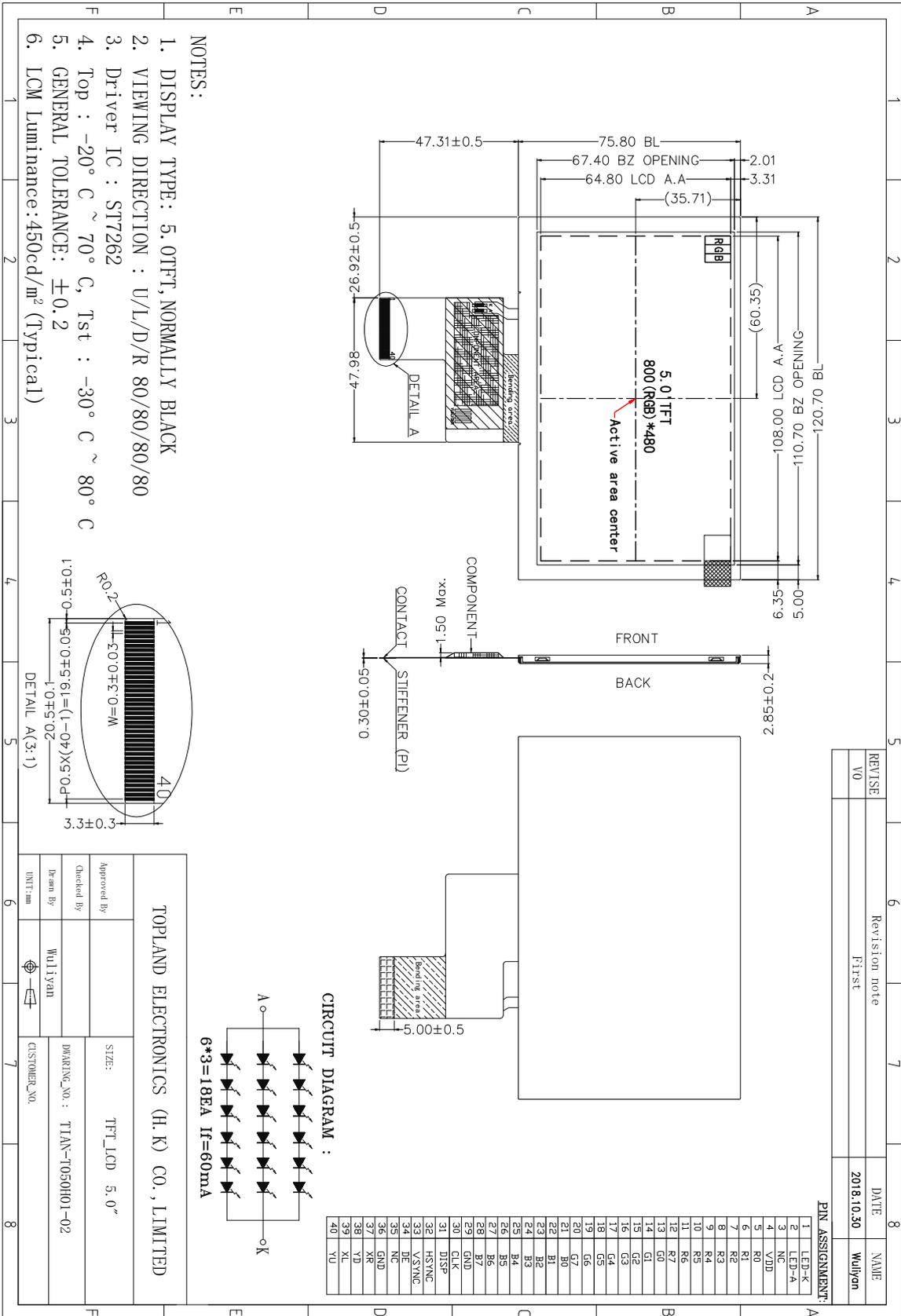
NOTES：

1. DISPLAY TYPE：5.0TFT, NORMALLY BLACK
2. VIEWING DIRECTION：U/L/D/R 80/80/80/80
3. Driver IC：ST7262
4. Top：-20°C ～ 70°C, Tst：-30°C ～ 80°C
5. GENERAL TOLERANCE：±0.2
6. LCM Luminance:450cd/㎡(Typical)

CIRCUIT DIAGRAM：

6*3=18EA If=60mA
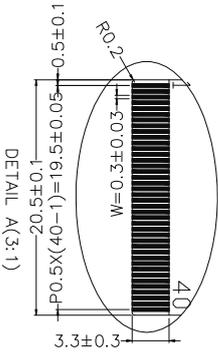
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Approved By	
Checked By	
Drawn By	Wuliyan
UNIT:mm	

SIZE: TFT_LCD 5.0"

DRAWING_NO.: TIAN-T050H01-02

CUSTOMER_NO.:

REVISE	Revision note
V0	First

	DATE	NAME
	2018.10.30	Wuliyan

PIN ASSIGNMENT:

1	LED-K
2	LED-A
3	NC
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	CLK
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	NC
36	GND
37	XR
38	YD
39	XL
40	YU

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5. Absolute Maximum Ratings(Ta=25℃)

5.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25℃)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	-0.3	4.0	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		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-30℃	80℃	-20℃	70℃	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. Ta<=40℃:90%RH MAX.

   Ta>=40℃:Absolute humidity must be lower than the humidity of 90%RH at 40℃.

6. Electrical Specifications

6.1 Electrical characteristics(Vss=0V ,Ta=25℃)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VDD	Ta=25℃	3.0	3.3	3.6	V	
Input voltage	'H'	V_{IH}	V_{DD}=3.3V	$0.7V_{DD}$	-	V_{DD}	V	
	'L'	V_{IL}	V_{DD}=3.3V	DGND	-	$0.3V_{DD}$	V	
Output voltage	'H'	V_{OH}	V_{DD}=3.3V	VDD-0.4	-	V_{DD}	V	
	'L'	V_{OL}	V_{DD}=3.3V	DGND	-	DGND+0.4	V	

Note:

1: Tested in 1×1 chessboard pattern.

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

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	Vf	If=60mA	-	18	-	V	
Uniformity	△Bp	If=60mA	75			%	
LED life time	–	If=60mA	50000	-	-	Hours	

Note:

1：The"LED Life time" is defined as the module brightnees decrease to 50% original brightness at T=25℃ and I_{LED} =60mA. TheLED Life time could be decreased if operating I_{LED} is larger than 60mA

6.3 Interface signals

Pin No.	Symbol	I/O	Function
1	LEDK	P	LED power cathode
2	LEDA	P	LED power anode
3	NC	I	No connection
4	VDD	P	System power
5-12	R0-R7	I	Red data bus
13-20	G0-G7	I	Green data bus
21-28	B0-B7	I	Blue data bus
29	GND	P	Ground
30	CLK	I	pixel clock input pin
31	DISP	I	DISP sets the display mode. L :Standby mode H :Normal display mode
32	HSYNC	I	Horizontal sync input
33	VSYNC	I	Vertical sync input
34	DE	I	Data enable pin
35	NC	I	No connection
36	GND	I	Ground
37	XR	O	Touch panel control pin
38	YD	O	
39	XL	O	
40	YU	O	

6.4 Timing Table
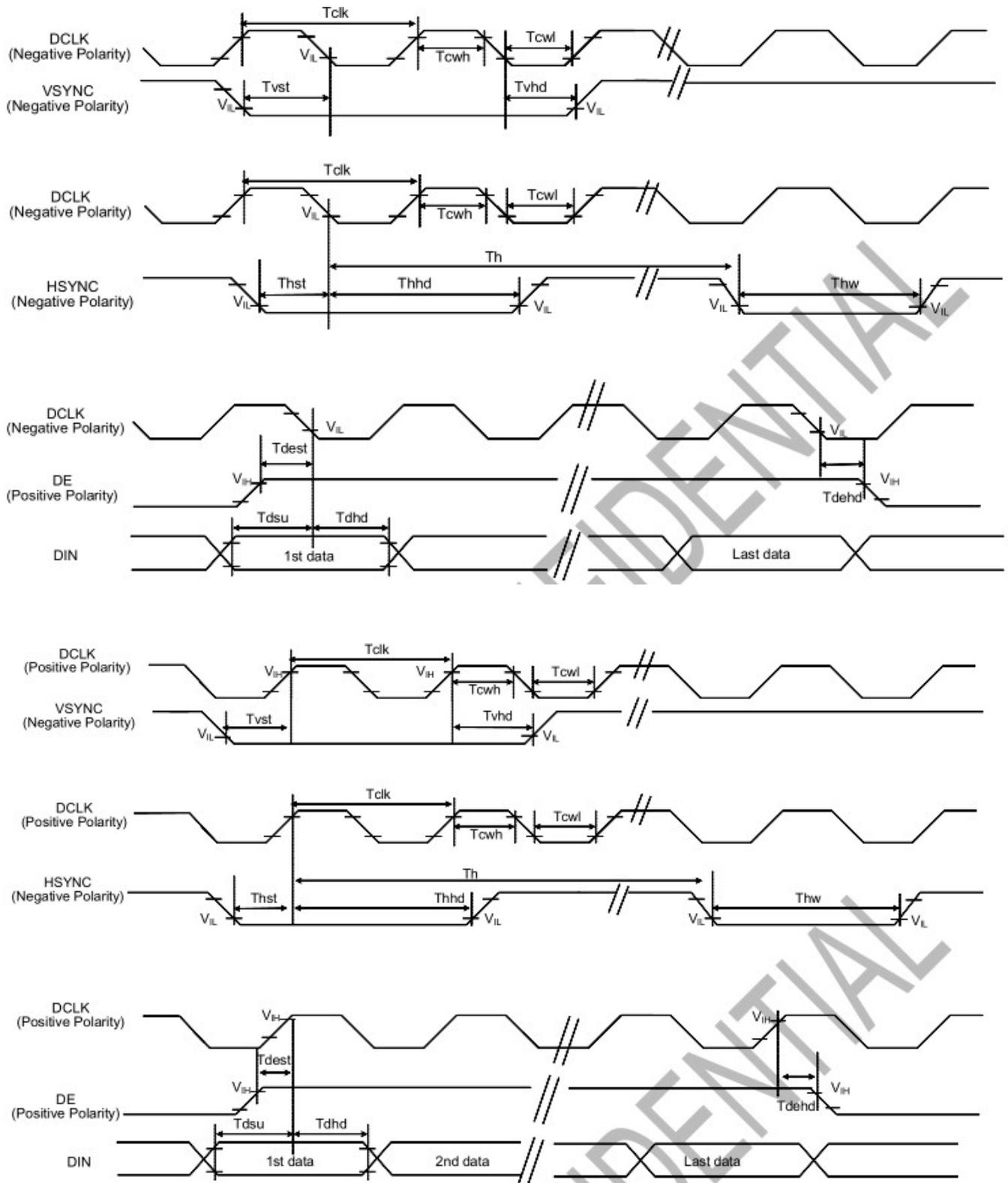
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	Tcw	40	50	60	%	
HSYNC Width	Thw	2	-	-	DCLK	
HSYNC Period	Th	55	60	65	us	
VSYNC Setup Time	Tvst	12	-	-	ns	
VSYNC Hold Time	Tvhd	12	-	-	ns	
HSYNC Setup Time	Thst	12	-	-	ns	
HSYNC Hold Time	Thhd	12	-	-	ns	
Data Setup Time	Tdsu	12	-	-	ns	
Data Hold Time	Tdhd	12	-	-	ns	
DE Setup Time	Tdest	12	-	-	ns	
DE Hold Time	Tdehd	12	-	-	ns	

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V,

Parallel 24-bit RGB Interface Timing T					
Item		Symbol	Min.	Typ.	Max.
DCLK Frequency		Fclk	23	25	27
HSYNC	Period Time	Th	808	816	896
	Display Period	Thdisp		800	
	Back Porch	Thbp	4	8	48
	Front Porch	Thfp	4	8	48
	Pulse Width	Thw	2	4	8
	Period Time	Tv	488	496	504

7.Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note	
Brightness	Bp		θ=0°	-	450	-	Cd/m^2	1	
Uniformity	$\triangle$Bp		Φ=0°	75	-	-	%	1,2	
Viewing Angle	3:00		Cr≥10	-	80	-	Deg	3	
	6:00			-	80	-			
	9:00			-	80	-			
	12:00			-	80	-			
Contrast Ratio	Cr		θ=0° Φ=0°	800	1000		-	4	
Response Time	T$_r$+T$_f$			-	30	40	ms	5	
Color of CIE Coordinate	W	x	θ=0° Φ=0°	+/-0.05	0.325	+/-0.05	-	1,6	
		y			0.348		-		
	R	x			0.620		-		
		y			0.328		-		
	G	x			0.334		-		
		y			0.544		-		
	B	x			0.136		-		
		y			0.143		-		
NTSC Ratio	S			45	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 BM-7 (Φ5mm)

Measuring condition:

- *Measuring surroundings: Dark room.*

- *Measuring temperature: Ta=25℃.*
- *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.*

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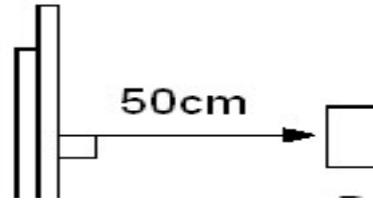
*Note 2: The luminance uniformity is calculated by using following formula.*

$\angle Bp = Bp$ *(Min.) / Bp (Max.)×100 (%)*

Bp (Max.) = Maximum brightness in 9 measured spots

Bp (Min.) = Minimum brightness in 9 measured spots.
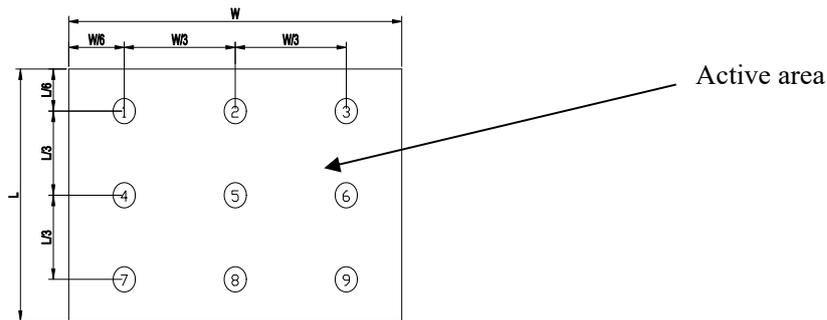
Note 3: The definition of viewing angle:

Refer to the graph below marked by ϑ and Φ
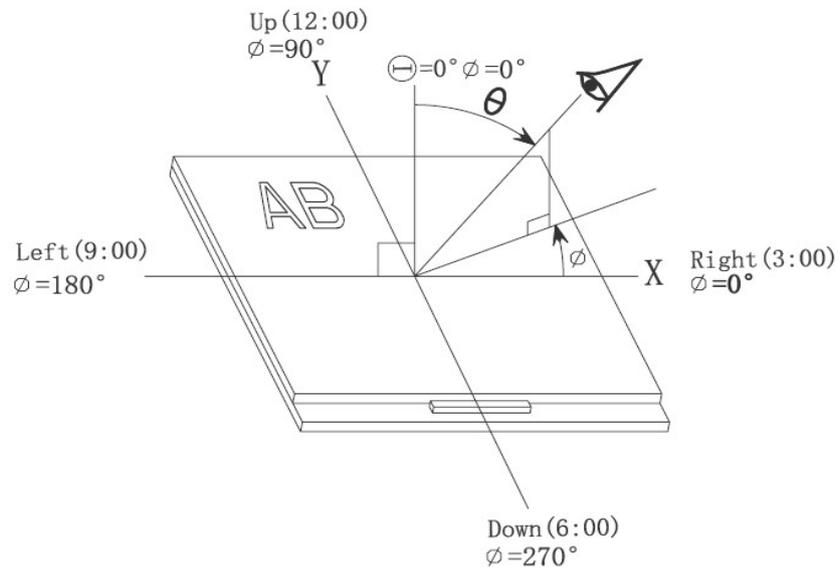
Note 4: Definition of contrast ratio.(Test LCD using DMS501)

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Selected Wave

Non-selected Wave

*Conditions

Operating Voltage :	Vop
Frame Frequency :	70Hz
Appling Waveform :	1/N duty 1/a bias
View angle (Θ, Φ) :	(0°, 0°)
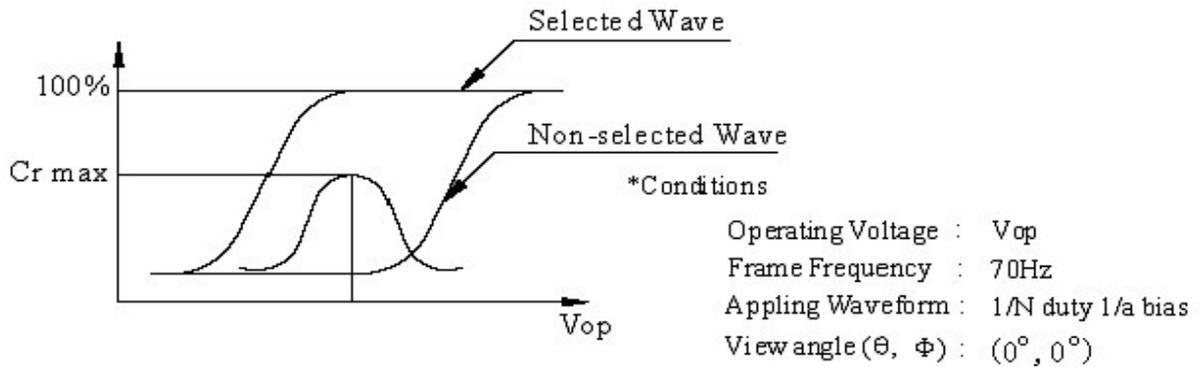
$$Contrast\ ratio(Cr) = \frac{Brightness\ of\ selected\ dots}{Brightness\ of\ non-selected\ dots}$$

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.
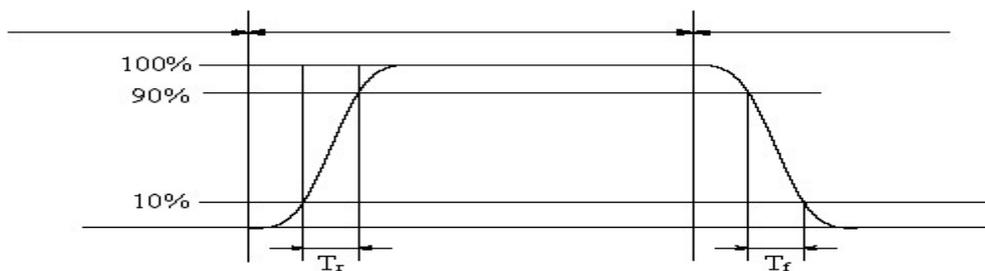
The definition of response time

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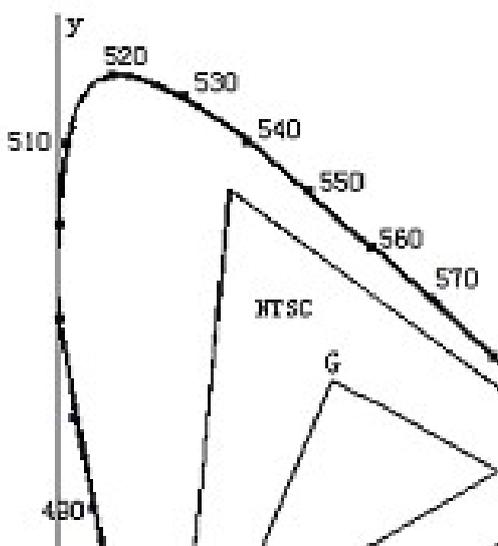
Color gamut:

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

Note 7: Definition of cross talk.

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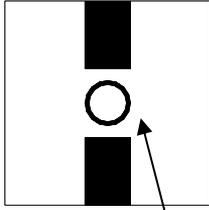
Pattern A   Pattern B

Measurement point(center)

Electric volume value=3F+/-3Hex

8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80℃±2℃ 96H Restore 2H at 25℃ Power off	Note 1 Note 2 Note 3 Note 4
2	Low Temperature Storage	-30℃±2℃ 96H Restore 2H at 25℃ Power off	
3	High Temperature Operation	80℃±2℃ 96H Restore 2H at 25℃ Power on	
4	Low Temperature Operation	-30℃±2℃ 96H Restore 4H at 25℃ Power on	
5	High Temperature/Humidity Storage	60℃±2℃ 90%RH 96H Power off	
6	Temperature Cycle	-30℃ ←————— 80℃ after 5 cycle, Restore 2H at 25℃ 30min 5min 30min Power off	
7	Vibration Test	10Hz~150Hz, 100m/s2, 120min	Not allowed cosmetic and electrical defects.
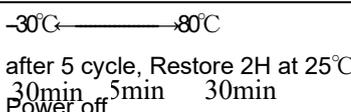
Note: Operation: Supply 3.3V for logic system.

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

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 after 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.

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℃ ～ 40℃
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.

<u>**END**</u>