MIKROE

PRODUCT SPECIFICATIONS

For Customer: _____   ☐ : APPROVAL FOR SPECIFICATION

Customer Model No. _____   ☐ : APPROVAL FOR SAMPLE

Module No.: _____ 5" TFT with CTP _____   *Date : 2019-10-11*

Table of Contents

For Customer's Acceptance:

Approved By	Comment

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

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared

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3. General Specifications

5" TFT with Capacitive Touch Screen is composed of a TFT - LCD panel, driver IC, FPC, TP, a back light unit. The 5" display area contains 800 x 480pixels and can display up to 16.7M colors.
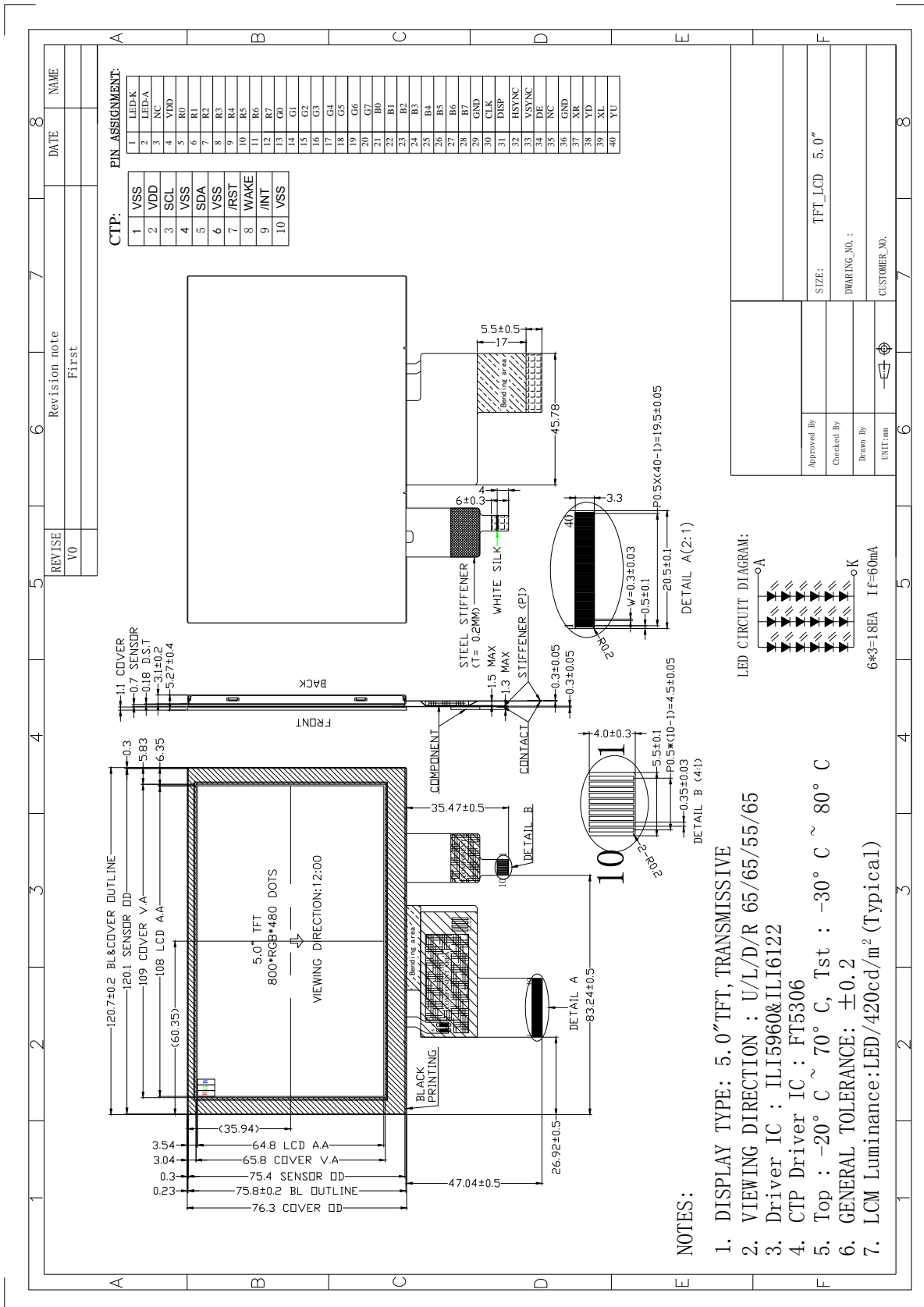
This product accords with RoHS environmental criterion.

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		
Viewing Direction	12	O'Clock	
Operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	
Module size	Refer to outline drawing	mm	
Active Area(W×H)	108X64.8	mm	
Number of Dots	800×480	dots	
LCM Controller	ILI6122/ILI5960	-	
CTP Controller	-	-	
Power Supply Voltage	3.3	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	18-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

PIN ASSIGNMENT:

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

CTP:

1	VSS
2	VDD
3	SCL
4	VSS
5	SDA
6	VSS
7	/RST
8	WAKE
9	/INT
10	VSS

SIZE: DWARING_NO.: TFT_LCD 5.0" CUSTOMER_NO.

Approved By Checked By Drawn By UNIT:mm

Revision note : First

REVISE : V0

DETAIL A(2:1)
DETAIL B (4:1)

5.5±0.5
17
45.78
6±0.3
4
3.3
40
W=0.3±0.03
0.5±0.1
20.5±0.1
P0.5X(40-1)=19.5±0.05
0.3±0.05
0.3±0.05
1.5 MAX
1.3 MAX

4.0±0.3
5.5±0.1
0.35±0.03
P0.5*(10-1)=4.5±0.05
2-R0.2
10

STEEL STIFFENER (T=0.2MM)
WHITE SILK
STIFFENER (PI)
COMPONENT
CONTACT
Bending area
FRONT
BACK

LED CIRCUIT DIAGRAM:
A
K
6*3=18EA   If=60mA

1.1 COVER
0.7 SENSOR OD
0.18 D.S.T
3.1±0.2
5.27±0.4

120.7±0.2 BL&COVER OUTLINE
120.1 SENSOR OD
109 COVER V.A
108 LCD AA
(60.35)

5.0" TFT
800*RGB*480 DOTS
VIEWING DIRECTION:12:00

BLACK PRINTING
Bending area

0.3
5.83
6.35
35.47±0.5
83.24±0.5
DETAIL A
DETAIL B
26.92±0.5
47.04±0.5

3.54 64.8 LCD A.A
3.04 65.8 COVER V.A
0.3   75.4 SENSOR OD
0.23 75.8±0.2 BL OUTLINE
      76.3 COVER OD
(35.94)

NOTES:
1. DISPLAY TYPE: 5.0"TFT, TRANSMISSIVE
2. VIEWING DIRECTION : U/L/D/R 65/65/55/65
3. Driver IC : ILI5960&ILI6122
4. CTP Driver IC : FT5306
5. Top : -20° C ~ 70° C, Tst : -30° C ~ 80° C
6. GENERAL TOLERANCE: ±0.2
7. LCM Luminance:LED/420cd/m² (Typical)

5. Absolute Maximum Ratings(Ta=25℃)

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

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.

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℃:85%RH MAX.

Ta>=40℃:Absolute humidity must be lower than the humidity of 85%RH at 40℃.

6. Electrical Specifications and Instruction Code

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}	VDD=3.3V	0.8VDD	-	VDD	V	
	'L'	V_{IL}	VDD=3.3V	0	-	0.2VDD	V	
Current Consumption		I_{DD1}	Normal mode	-	-	-	mA	
		I_{DD2}	Sleep mode	-	-	-	mA	

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

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	Vf	If=20X3mA	-	18	-	V	
Uniformity	△Bp	If=20X3mA	75			%	

I_{LED} VS TEMP
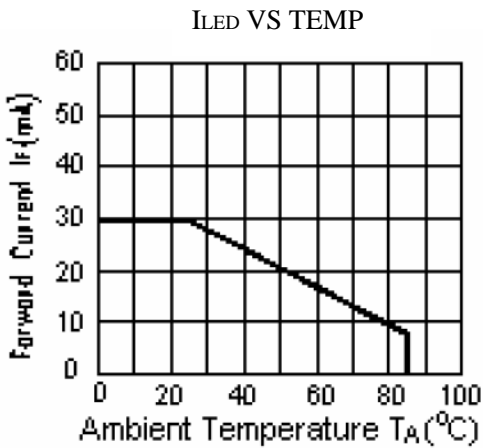
6.3 Interface signals

Pin No.	Symbol	I/O	Function
1	LED-K	I	LED backlight(Cathode)
2	LED-A	I	LED backlight(anode)
3	NC	-	NC
4	VDD	I	Power supply(Digital +3.0V)
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	I	Ground
30	CLK	I	Clodk
31	DISP	I	Display on/off
32	HSYNC	I	Horizontal synchronous signal
33	VSUNC	I	Vertical synchronous signal
34	DEN	I	Data Enable
35	NC	-	NC
36	GND	I	Ground
37	XR	I	Touch panel pin
38	YD	I	Touch panel pin
39	XL	I	Touch panel pin
40	YU	I	Touch panel pin

CTP　interface

Pin No	Symbol	I/O	Function
1	VSS	P	Ground
2	VDD	P	CTP Power supply
3	SCL	I	Serial clock
4	VSS	P	Ground
5	SDA	I	Serial Inputloupt data bus
6	VSS	P	Ground
7	/RST	I	Reset PIN
8	WAKE	-	NC
9	/INT	-	External Interrupt to the IC of CTP
10	VSS	p	Ground

6.4 Display Timing characteristics
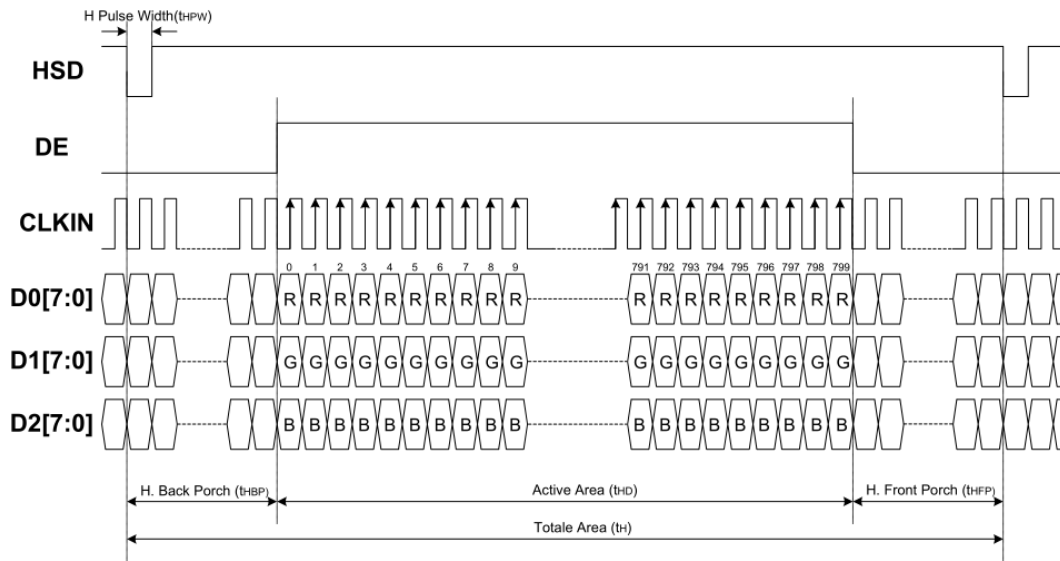
Horizontal Input Timing

Parameter		Symbol	Value			Unit
			Min.	Typ.	Max.	
Horizontal display area		t_{HD}	--	800	--	CLKIN
CLKIN frequency		f_{CLK}	--	33.3	50	MHz
1 Horizontal line period		t_H	862	1056	1200	CLKIN
HSD pulse width	Min.	t_{HPW}	--	1	--	CLKIN
	Typ.		--	--	--	CLKIN
	Max.		--	40	--	CLKIN
HSD back porch	SYNC	t_{HBP}	46	46	46	CLKIN
HSD front porch	SYNC	t_{HFP}	16	210	354	CLKIN
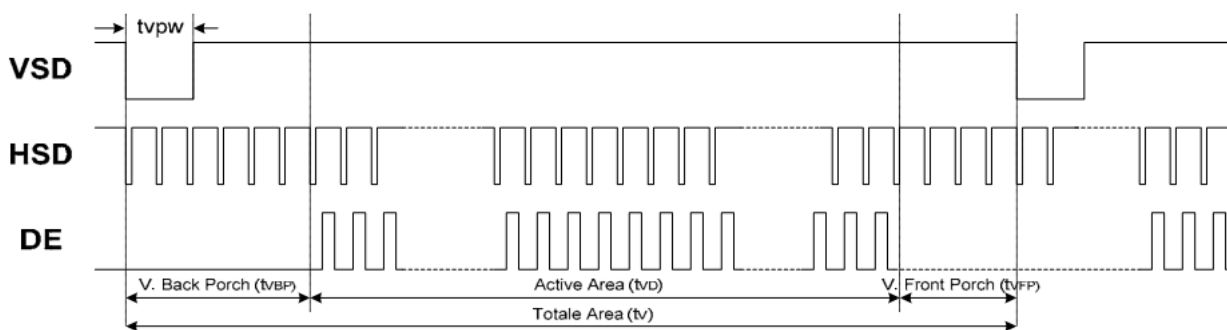
Vertical Input Timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	t_{VD}	--	480	--	HSD
VSD period time	t_V	510	525	650	HSD
VSD pulse width	t_{VPW}	1	--	20	HSD
VSD back proch	t_{VBP}	23	23	23	HSD
VSD front porch	t_{VFP}	7	22	147	HSD

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7. *Optical Characteristics*

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness (with TP)	Bp		θ=0° Φ=0°	-	420	-	Cd/m^2	1
Uniformity	⊿Bp			75	-	-	%	1,2
Viewing Angle	3:00		Cr≥10	-	65	-	Deg	3
	6:00			-	55	-		
	9:00			-	65	-		
	12:00			-	65	-		
Contrast Ratio	Cr		θ=0° Φ=0°	300	500		-	4
Response Time	T$_r$			-	10	-	ms	5
	T$_f$			-	10	-	ms	
Color of CIE Coordinate	W	x	θ=0° Φ=0°	-	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	-	-	
NTSC Ratio	S			50	60	-	%	

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: 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.
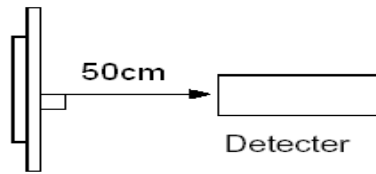
Note 2: The luminance uniformity is calculated by using following formula.
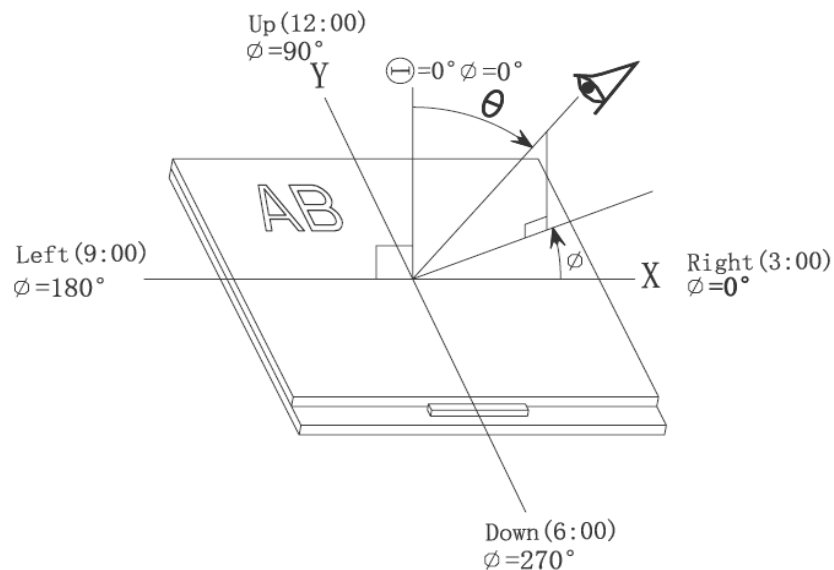
$\angle Bp = Bp\ (Min.) / Bp\ (Max.) \times 100\ (\%)$

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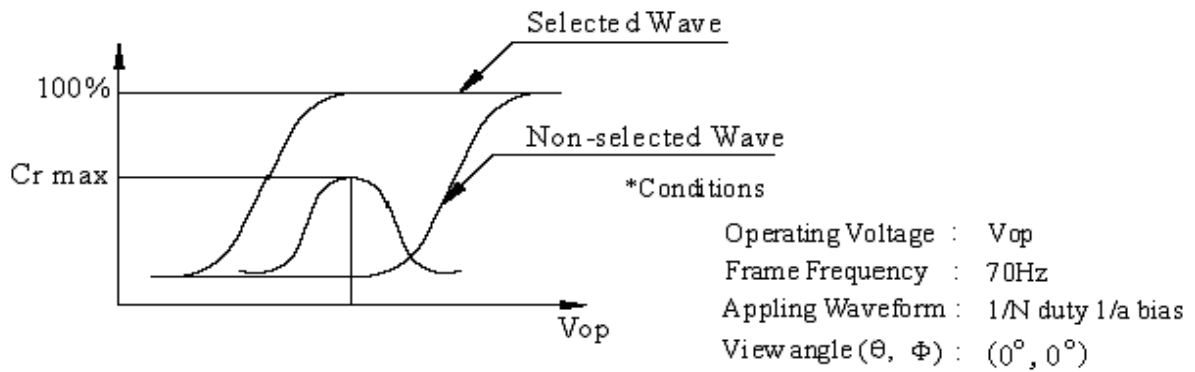
Bp (Min.) = Minimum brightness in 9 measured spots.
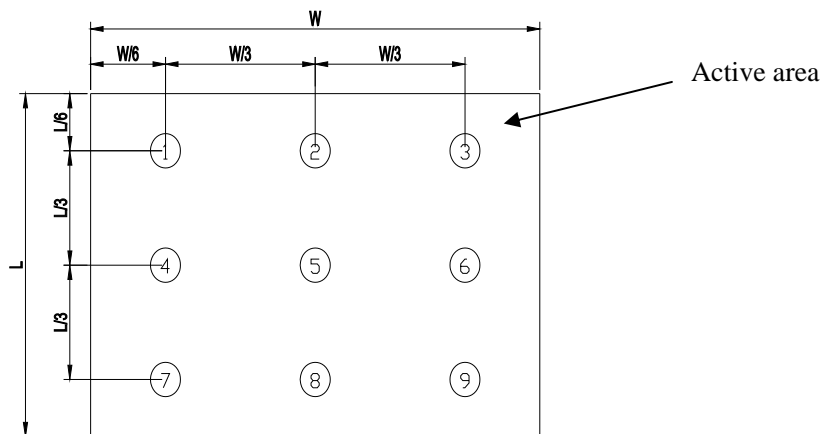
Note 3: The definition of viewing angle:

Refer to the graph below marked by ϑ and Φ

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

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.
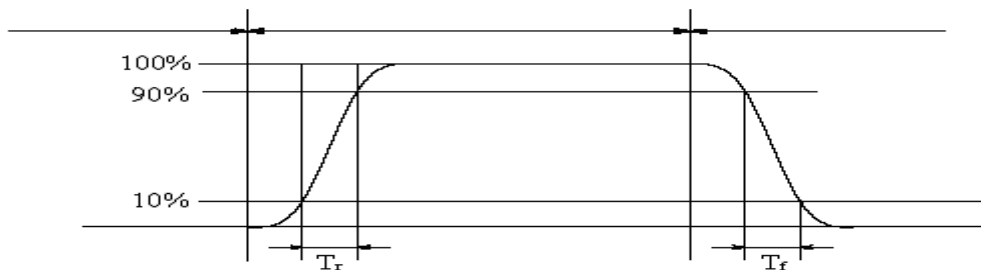
The definition of response time

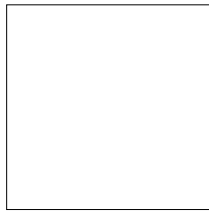*Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.*

1931 CIE Chromaticity Diagram
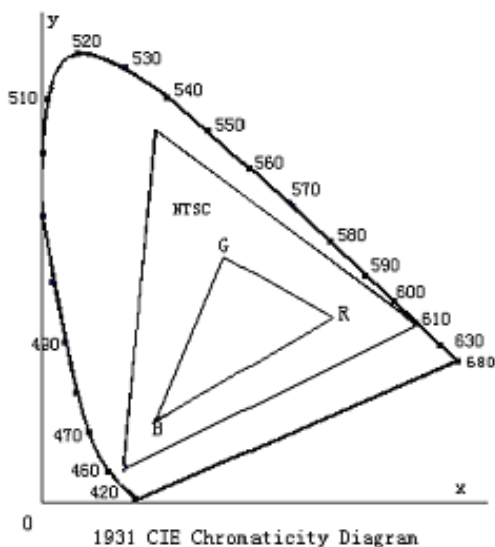
Color gamut:

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

Note 7: Definition of cross talk.

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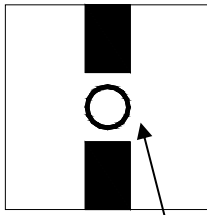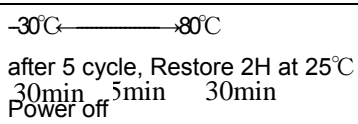
Pattern A   Pattern B

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	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	-30℃±2℃ 96H Restore 2H at 25℃ Power off	
3	High Temperature Operation	70℃±2℃ 96H Restore 2H at 25℃ Power on	
4	Low Temperature Operation	-20℃±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.
8	Shock Test	Half- sine wave,300m/s2,11ms	

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

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.

END