InterElcom

PRODUCT SPECIFICATIONS

For Customer:_____   ☐: APPROVAL FOR SPECIFICATION

Customer Model No._____   ☐: APPROVAL FOR SAMPLE

Module No.: IE-A-1116CH03R24-C0-1   Date : 2020-09-24

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For Customer's Acceptance:

Approved By	Comment

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared
2019-08-07	V0		The first release	STONE
2020-9-24	V1		Revised the Pin Function in Item6.3	CJ

3. General Specifications

IE-A-1116CH03R24-C0-1 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a backlight, CTP unit.
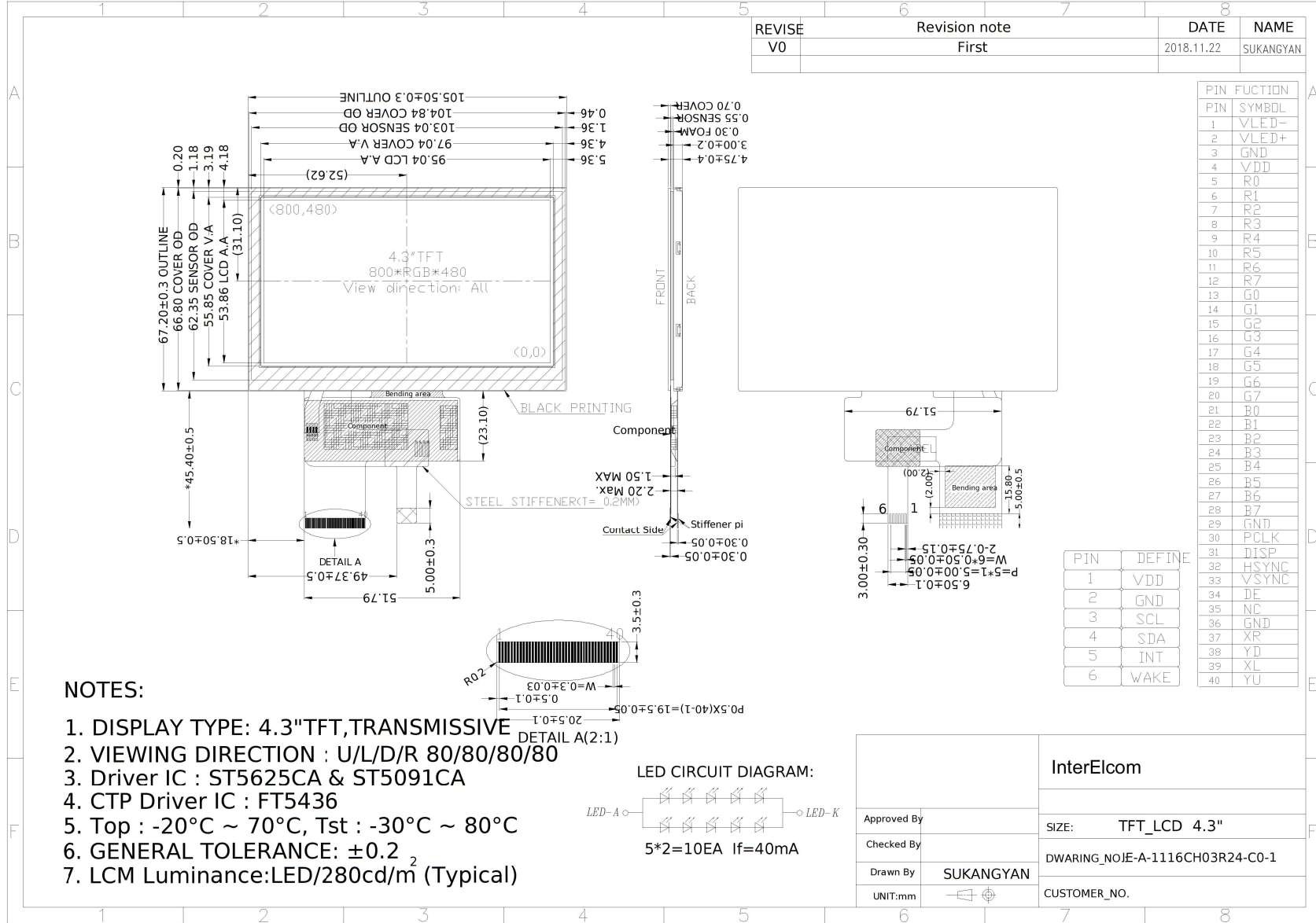The 4,3" displaya reacontains 800X480 pixel sand cand isplay up to 16.7M colors. This product accords with RoHS environmental criterion.

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)	95.04X53.86	mm	
Number of Dots	800x480	dots	
Controller	ST5625CA&ST5091CA	-	
Power Supply Voltage	3.3	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	5X2-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.

REVISE	Revision note	DATE	NAME
V0	First	2018.11.22	SUKANGYAN

105.50±0.3 OUTLINE
104.84 COVER OD 0.46
103.04 SENSOR OD 1.36
97.04 COVER V.A 4.36
95.04 LCD A.A 5.36
(52.62)

0.20
1.18
3.19
4.18

67.20±0.3 OUTLINE
66.80 COVER OD
62.35 SENSOR OD
55.85 COVER V.A
53.86 LCD A.A

(31.10)

⟨800,480⟩

4.3"TFT
800*RGB*480
View direction: All

⟨0,0⟩

Bending area
Component

BLACK PRINTING

(23.10)

STEEL STIFFENER(T= 0.2MM)

*45.40±0.5

*18.50±0.5

DETAIL A

49.37±0.5

5.00±0.3

51.79

40

R0.2

3.5±0.3

W=0.3±0.03
0.5±0.1
20.5±0.1
P0.5X(40-1)=19.5±0.05

DETAIL A(2:1)

0.70 COVER
0.55 SENSOR
0.30 FOAM
3.00±0.2
4.75±0.4

FRONT   BACK

Component

2.20 Max.
1.50 MAX

Contact Side
0.30±0.05
0.30±0.05

Stiffener pi

51.79

Component

(2.00)

15.80
5.00±0.5

Bending area

6   1

3.00±0.30
6.50±0.1
0.75±0.15
W=6*0.50±0.05
P=5*1=5.00±0.05
2-0.75±0.15
2-0.50±0.05

PIN	DEFINE
1	VDD
2	GND
3	SCL
4	SDA
5	INT
6	WAKE

PIN FUCTION	
PIN	SYMBOL
1	VLED-
2	VLED+
3	GND
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	PCLK
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	NC
36	GND
37	XR
38	YD
39	XL
40	YU

NOTES:

1. DISPLAY TYPE: 4.3"TFT,TRANSMISSIVE
2. VIEWING DIRECTION : U/L/D/R 80/80/80/80
3. Driver IC : ST5625CA & ST5091CA
4. CTP Driver IC : FT5436
5. Top : -20°C ~ 70°C, Tst : -30°C ~ 80°C
6. GENERAL TOLERANCE: ±0.2
7. LCM Luminance:LED/280cd/m^2 (Typical)

LED CIRCUIT DIAGRAM:

LED-A   LED-K

5*2=10EA If=40mA

	InterElcom
Approved By	
Checked By	SIZE: TFT_LCD 4.3"
Drawn By SUKANGYAN	DWARING_NO.JE-A-1116CH03R24-C0-1
UNIT:mm	CUSTOMER_NO.

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	5.0	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 ℃	2.7	3.3	3.6	V	
Input voltage	'H'	V_{IH}	V_{DD}=3.3V	$0.8V_{DD}$	-	V_{DD}	V	
	'L'	V_{IL}	V_{DD}=3.3V	0	-	$0.2V_{DD}$	V	
Current Consumption		I_{DD1}	Normal mode	-	TBD	-	mA	1
		I_{DD2}	Sleep mode	-	TBD	-	mA	1

Note:

1: Tested in χ11 chessboard pattern.

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

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	Vf	If=40mA	-	15	-	V	
Uniformity	Δ Bp	If=40mA	80			%	

Note:

1：The"LED Life time" is defined as the module brightnees decrease to 50% original brightness at T=25 ℃ and I_{LED}=40mA. TheLED Life time could be decreased if operating $I_{LED}$is larger than 40mA

6.3 Interface signals

Pin No.	Symbol	I/O	Function
1	LED-	P	LED power cathode
2	LED+	P	LED power anode
3	GND	P	Ground
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	PCLK	I	Clock for Input Data. Data latched at rising/falling edge of this signal.
31	DISP	I	Standby mode, Normally pull high. STBYB ="H", normal operation(Default) STBYB ="L", timing controller,TFT driver will turn off, all output are High-Z
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	

6.3.1 CTP Interface signals

Pin No.	Symbol	I/O	Function
1	VDD	P	Power supply
2	GND	P	Ground.
3	SCL	I	serial interface clock
4	SDA	I	Serial in/out signal
5	INT	I	Interrupt pin
6	WAKE	I	Wakeup request from the host

6.3 Timing Table

Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
CLKIN Frequency	Fclk	-	40	50	MHz	VDD=2.7V~3.6V
CLKIN Cycle Time	Tclk	20	25	-	ns	
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso	-	64	-	CLKIN	
Time from HSD to LD	Thld	-	64	-	CLKIN	
Time from HSD to STV	Thstv	-	2	-	CLKIN	
Time from HSD to CKV	Thckv	-	20	-	CLKIN	
Time from HSD to OEV	Thoev	-	4	-	CLKIN	
LD pulse width	Twld	-	10	-	CLKIN	
CKV pulse width	Twckv	-	66	-	CLKIN	
OEV pulse width	Twoev	-	74	-	CLKIN	

Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
VDD Power on Slew Rate	T_{POR}	-	-	20	ms	From 0V to 90% VDD
RSTB pulse width	T_{RST}	50	-	-	us	Clkin=50MHz
CLKIN cycle time	Tcph	20			ns	
CLKIN pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8	-	-	ns	
VSD hold time	Tvhd	8	-	-	ns	
HSD setup time	Thst	8	-	-	ns	
HSD hold time	Thhd	8	-	-	ns	
Data setup time	Tdsu	8	-	-	ns	D[7:0], D1[7:0], D2[7:0] to clkin
Date hold time	Tdhd	8	-	-	ns	D[7:0], D1[7:0], D2[7:0] to clkin
DE setup time	Tesu	8	-	-	ns	
DE hold time	Tehd	8	-	-	ns	
Output stable time	Tsst	-	-	6	us	10% to 90% target voltage. CL=120pF, R=10Kohm

Input Clock and Data Timing Diagram
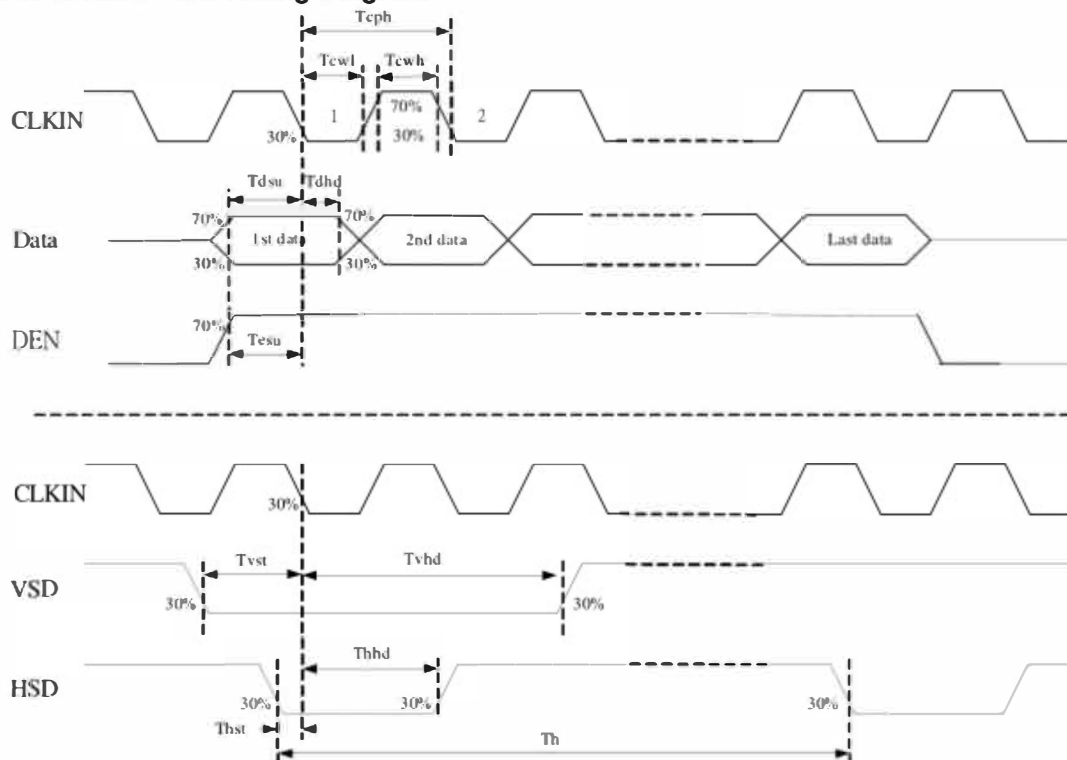
7.Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note	
Brightness	Bp		θ=0°	-	500	-	Cd/m2	1	
Uniformity	⊿ Bp		☞=0°	80	-	-	%	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° ☞=0°	640	800		-	4	
Response Time	T_r+T_f			-	30	40	ms	5	
Color of CIE Coordinate	W	x	θ=0° ☞=0°	+/-0.02	0.325	+/-0.02	-	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 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.

50cm → Detecter
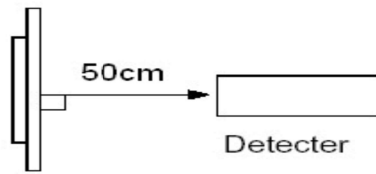
Note 2: The luminance uniformity is calculated by using following formula.

⊿Bp = Bp (Min.) / Bp (Max.)×100 (%)

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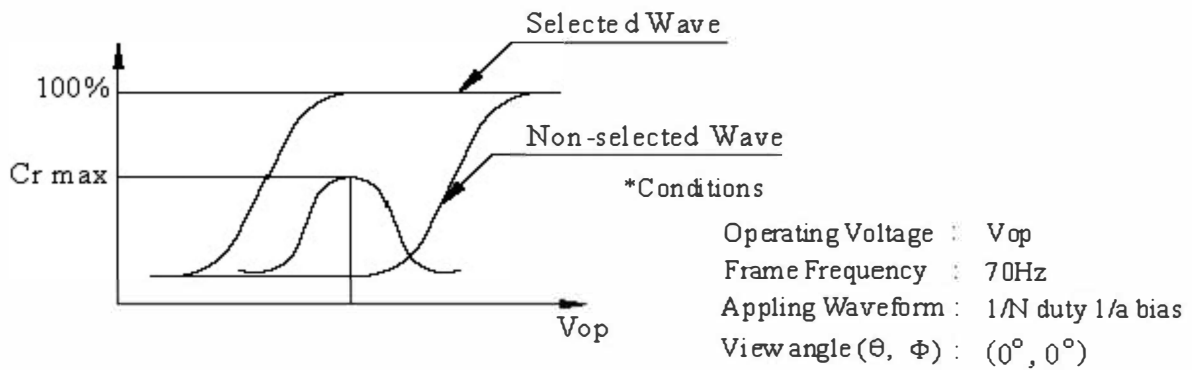
Bp (Min.) = Minimum brightness in 9 measured spots.

Active area
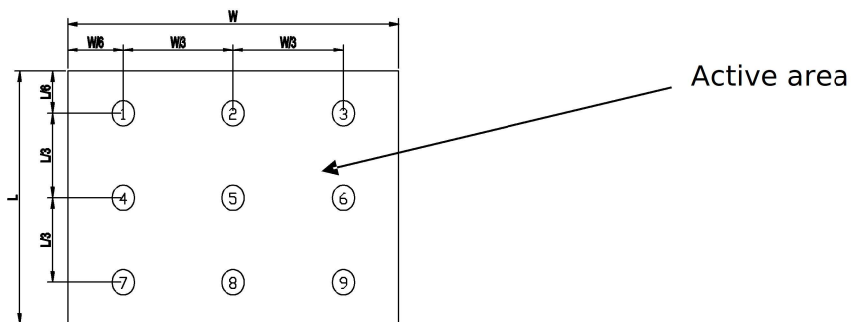
Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and Φ

Up (12:00) Ø=90°

Θ=0° Ø=0°

Left (9:00) Ø=180°

Right (3:00) Ø=0°

Down (6:00) Ø=270°
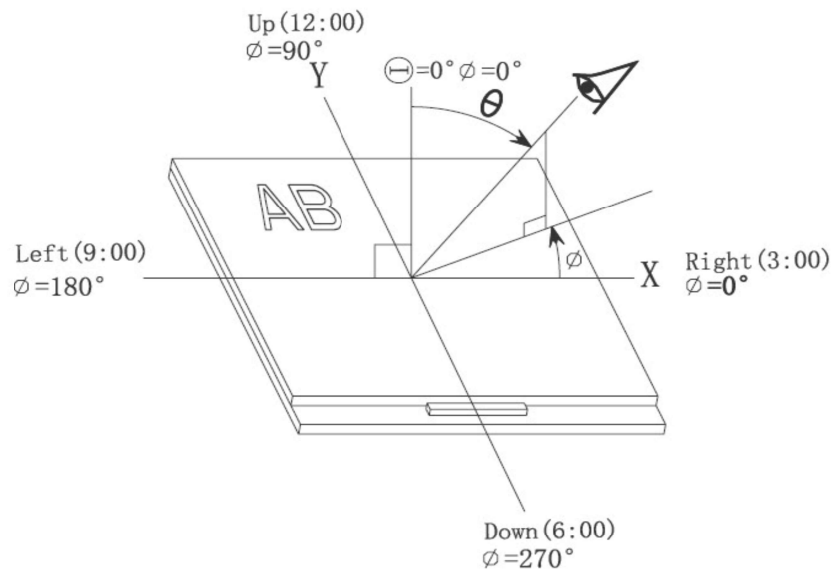
Note 4: Definition of contrast ratio.(Test LCD using DMS501)

Selected Wave

Non-selected Wave

100%

Cr max

Vop

*Conditions

Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
View angle (θ, Φ) : (0°, 0°)

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

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.

100%
90%

10%

T_r T_f
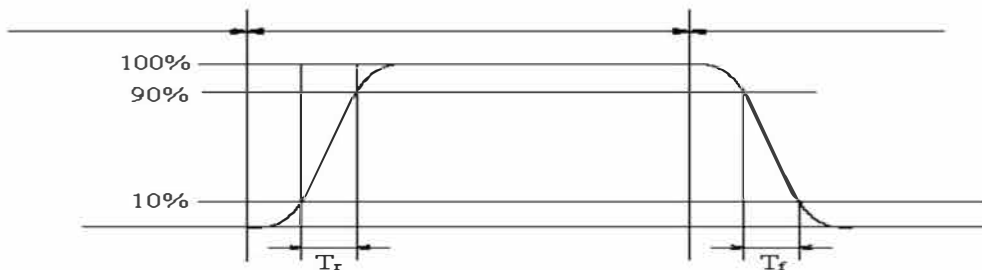
The definition of response time

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

1931 CIE Chronaticity Diagram
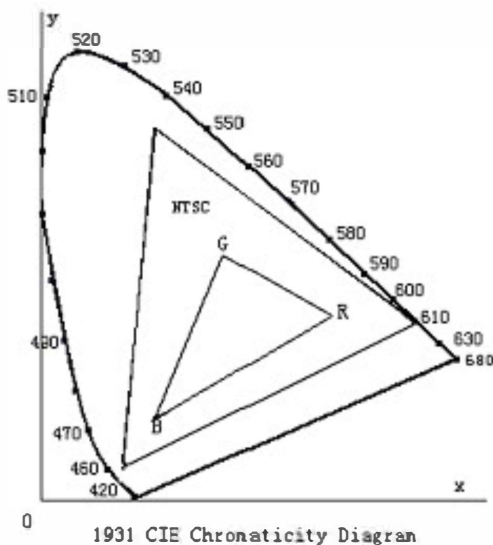
Color gamut:
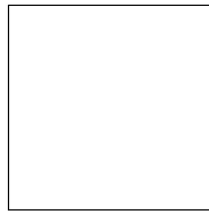
$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

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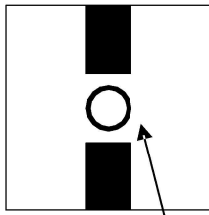
Pattern A   Pattern B

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℃ ←----------------→ 680℃ 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	
9	ESD test	Voltage:± 4kv R: 200Ω C: 150pF Air/Contact discharge, each 10time	

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.

<u>END</u>