PRODUCT SPECIFICATIONS

For Customer: _ ___InterElcom___   □ : APPROVAL FOR SPECIFICATION

Customer Model No. _____   □ : APPROVAL FOR SAMPLE

Module No.:   *IE-A-1819CH02LV-C0-2*   *Date : 2020.08.06*

Table of Contents

For Customer's Acceptance:

Approved By	Comment

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

2. Revision Record

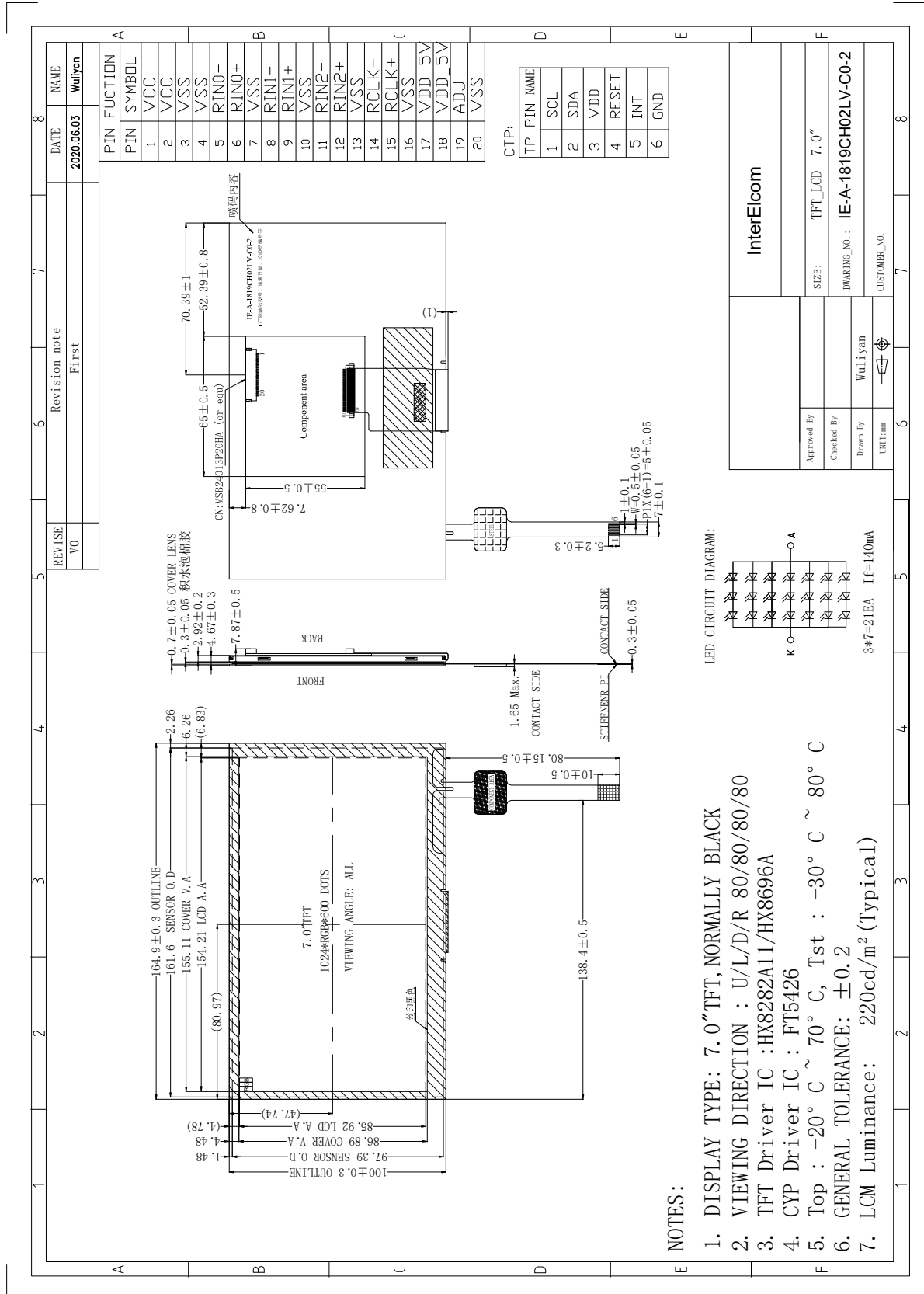| Date	Rev.No.	Page	Revision Items	Prepared
2020.08.06	V0		The first release	YGM

3. General Specifications

IE-A-1819CH02LV-C0-2 is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light ,PCB,and CTP unit. The7.0 ″display area contains 1024 x (RGB) x 600 pixels and can display up to 262K colors. This product accords with ROHS environmental criterion..

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	262K		1
Viewing Direction	ALL	O'Clock	
Gray scale inversion direction	FREE	O'Clock	
Operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	
Module size	164.9X100.0X4.67	mm	2
Active Area(W×H)	154.21 X 85.92	mm	
Number of Dots	1024 X 600	dots	
TFT Controller	HX8282A11+HX8696A01	-	
CTP driver	FT5426	-	
Power Supply Voltage	3.3	V	
Backlight	3S7P-LEDs (white)	pcs	
Weight	---	g	
Interface	LVDS	-	

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

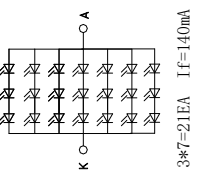Note 2:   Without PCB and Solder.With CTP.

4.Outline.Drawing

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	VCC	-0.50	3.96	V	1，2
Power Supply Voltage for CTP	VDD-CTP	1.8	3.6	V	1，2
Power Supply Voltage for backlight circuit	VDD_BL	2.4	24.0	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_{CC}>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℃:85%RH MAX.

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

6. Electrical Specifications

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

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VCC	Ta=25℃	3.0	3.3	3.6	V	
Power supply		VCC_CTP	Ta=25℃	-	3.3	3.6	V	
Power supply		VBL	Ta=25℃	-	5.0	-	V	
Input voltage	'H'	V_{IH}	VCC=3.3V	0.7*VCC	-	VCC	V	
	'L'	V_{IL}	VCC=3.3V	-0.3	-	0.3*VCC	V	

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

Item	Symbol	Min	Typ	Max	Unit	Note
Supply voltage	VBL	-	5.0	-	V	
PWM Control Frequency	F_{PWM}	100	-	30K	Hz	
PWM Control Level	ADJ(PWM)	0.3	-	5.0	V	
Uniformity	△Bp	75	80	-	%	
Life Time	time	20K	-	-	hours	1
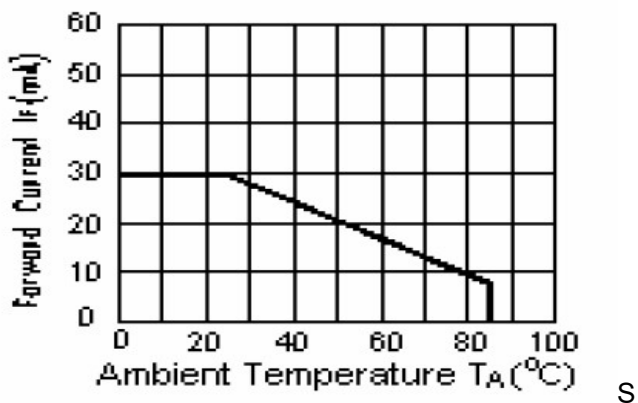
Note 1:   Brightness to be decreased to 50% of the initial value at ambient temperature TA=25℃

6.3 *Interface signals*

Pin No.	Symbol	I/O	Function
1-2	VCC	P	Power supply for LCD
3-4	VSS	P	Ground.
5	RXIN0-	I	LVDS lane0 input
6	RXIN0+	I	
7	VSS	P	Ground.
8	RXIN1-	I	LVDS lane1 input
9	RXIN1+	I	
10	VSS	P	Ground.
11	RXIN2-	I	LVDS lane2 input
12	RXIN2+	I	
13	VSS	P	Ground.
14	RXCLK-	I	LVDS CLK input
15	RXCLK+	I	
16	VSS	P	Ground.
17-18	VDD_5V	P	Power supply for backlight circuit.
19	ADJ	-	PWM dimming control input.
20	VSS	P	Ground.

CTP interface

Pin No	Symbol	I/O	Function
1	SCL	I	I2C clock
2	SDA	I	I2C data
3	VDD(3.3V)	P	CTP Power supply
4	RESET	I	CTP Reset pin,active"L"
5	INT	I	External Interrupt to the IC of CTP
6	GND	P	Ground.

CTP Characteristics

Item	Specification	Remarks
CTP Structure	COVER+ITO GLASS+FPC	-
Outline Dimension	164.9×100.0	mm
Total Thickness	1.75	mm
View Area	155.11×86.89	mm
TP size	7.0	inch
Interface Type	IIC	-
Operation Temperature	-20℃~+70℃，≤90%RH	-
Storage Temperature	-30℃~+80℃，≤90%RH	-
Glass Thickness	0.7	mm
Resolution	1024*600	Dots
Surface hardness	≥6H	-
Control IC	FT5426	-
Transparency	≥85%	-
Connection Type	FPC	-

6.4 AC Characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Clock frequency	R_{XFCLK}	-	20	-	71	MHz
Input data skew margin	T_{RSKM}	$\|V_{ID}\|$=400mV R_{XVCM}=1.2V R_{XFCLK}=71MHz	500	-	-	pS
Clock high time	T_{LVCH}	-	-	$4/(7 \times R_{XFCLK})$	-	ns
Clock low time	T_{LVCL}	-	-	$3/(7 \times R_{XFCLK})$	-	ns
PLL wake-up time	T_{enPLL}	-	-	-	150	µs

T_{RSKM} : Receiver strobe margin
R_{SPOS} : Receiver strobe position
T_{SW} : Strobe width (Internal data sampling window)
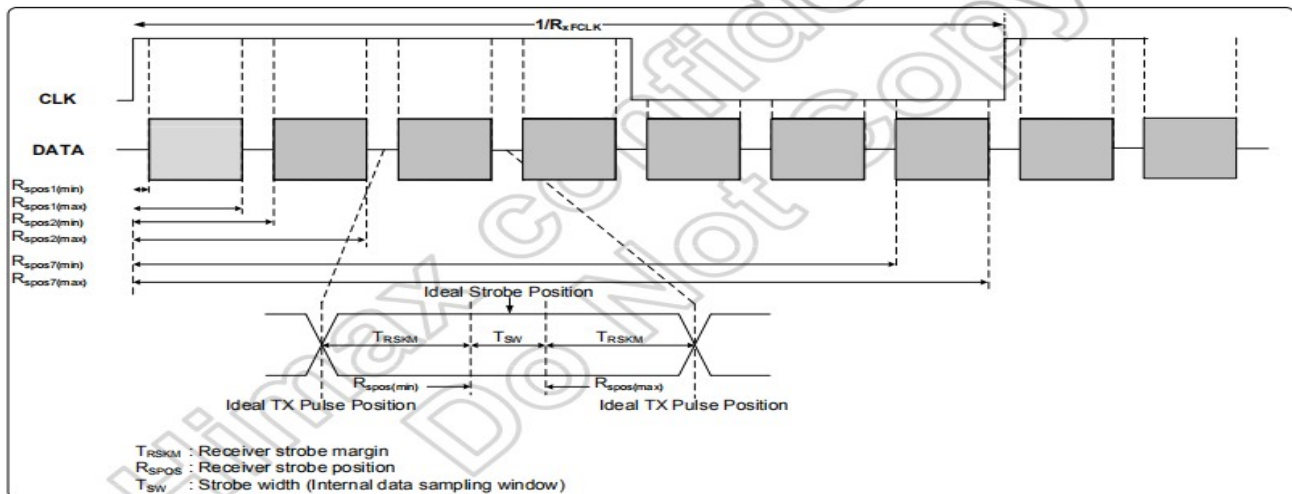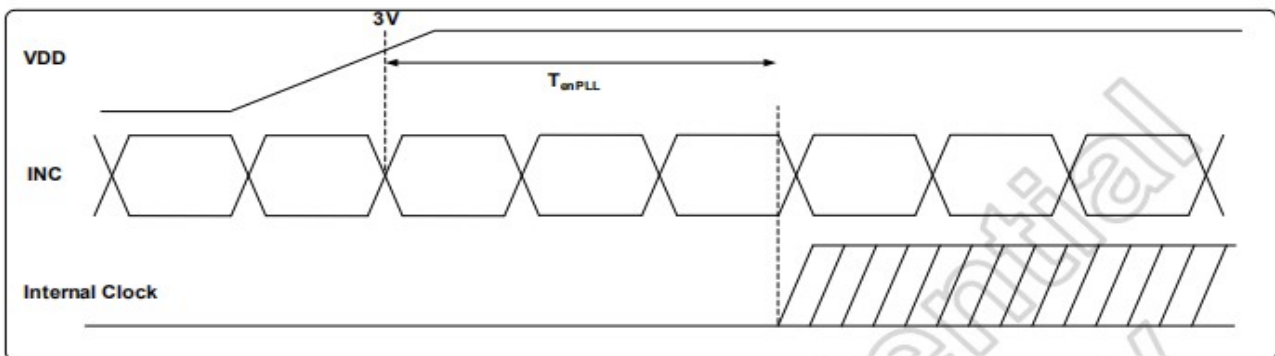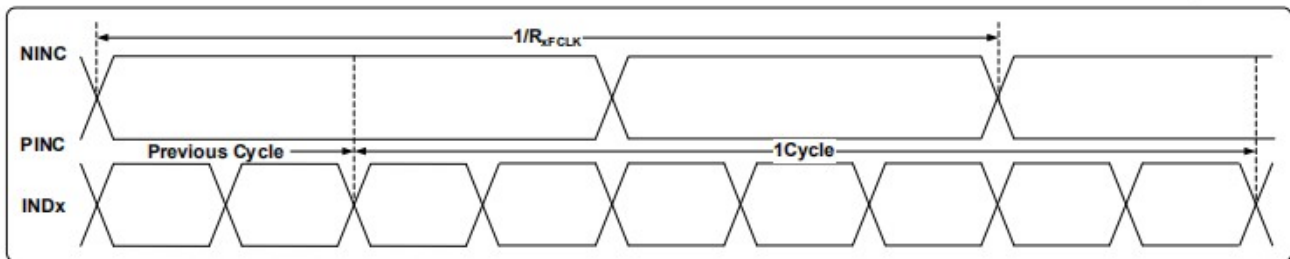
6.5 Data input format
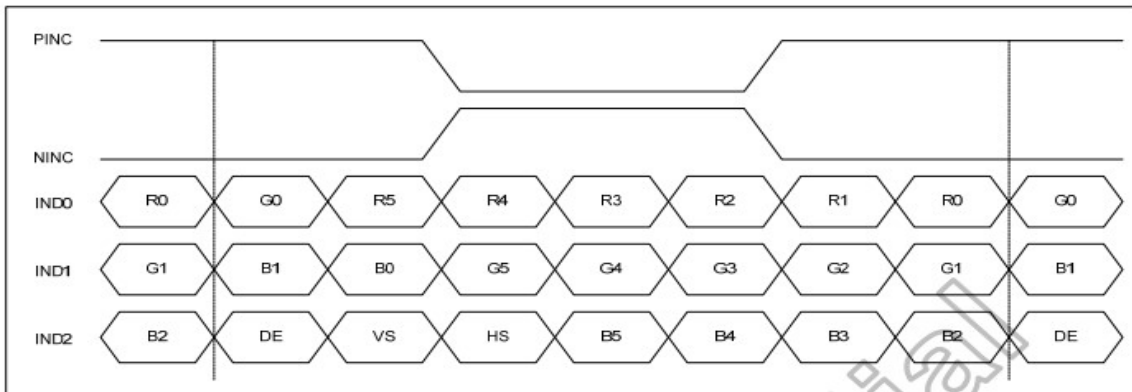
6-bit LVDS input

6.6 Input timing table

• Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	44.9	51.2	63	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1200	1344	1400	DCLK
HSD pulse Width	thpw	1	-	140	DCLK
HSD back porch	thbp		160		DCLK
HSD front porch	thfp	16	160	216	DCLK

• Vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd		600		T_H
VSD period	tv	624	635	750	T_H
VSD pulse width	tvpw	1	-	20	T_H
VSD back porch	tvbp		23		T_H
VSD front porch	tvfp	1	12	127	T_H

7. Optical Characteristics

| Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		θ=0° Φ=0°	-	220	-	Cd/m^2	1
Uniformity	⊿Bp			75	80	-	%	1,2
Viewing Angle	3:00		Cr≥10	-	80	-	Deg	3
	6:00			-	80	-		
	9:00			-	80	-		
	12:00			-	80	-		
Contrast Ratio	Cr			500	800		-	4
Response Time	T$_r$+T$_f$		Ta=25℃ Φ=0°	-	25	40	ms	5
Color of CIE Coordinate	W	x	θ=0° Φ=0°	Typ -0.05	0.295	Typ +0.05	-	1,6
		y			0.355		-	
	R	x			0.618		-	
		y			0.326		-	
	G	x			0.285		-	
		y			0.539		-	
	B	x			0.146		-	
		y			0.148		-	
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.*

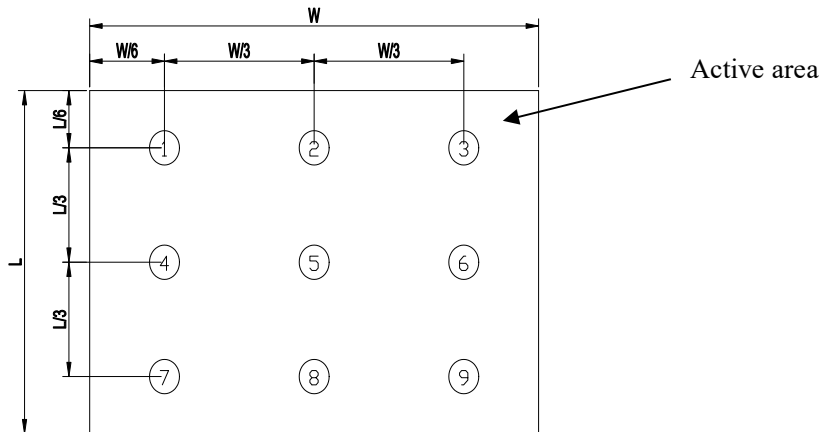   *Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.*
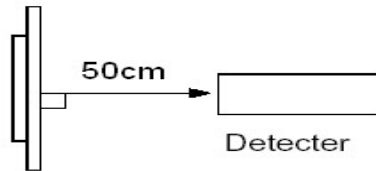
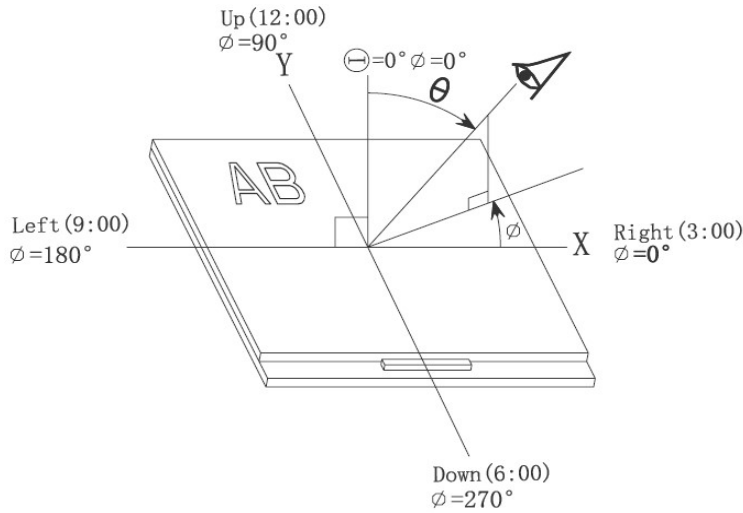*Note 2: The luminance uniformity is calculated by using following formula.*

    $\angle Bp = Bp\,(Min.) / Bp\,(Max.) \times 100\,(\%)$
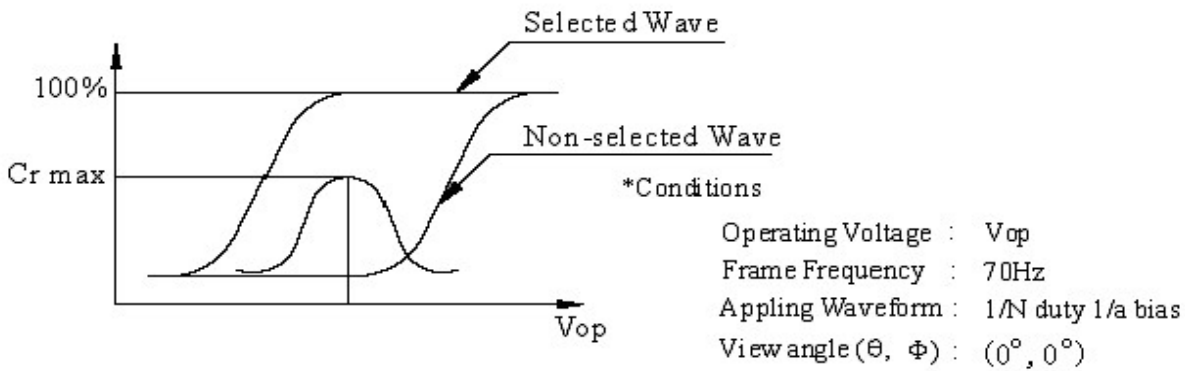
    Bp (Max.) = Maximum brightness in 9 measured spots

    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*

Up (12:00)
∅=90°
Y
⊖=0° ∅=0°
θ

AB

Left (9:00)
∅=180°
X Right (3:00)
∅=0°

∅

Down (6:00)
∅=270°

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

Selected Wave

100%

Cr max

Non-selected Wave

*Conditions

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

Vop

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

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.

100%
90%

10%

T_r T_f
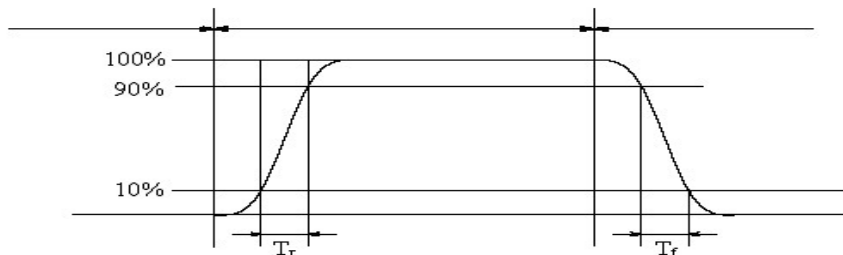
The definition of response time

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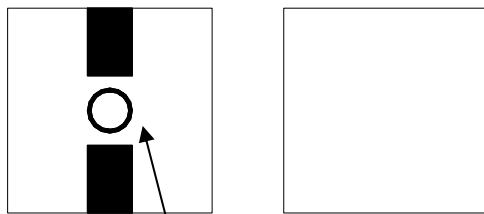

1931 CIE Chromaticity Diagram
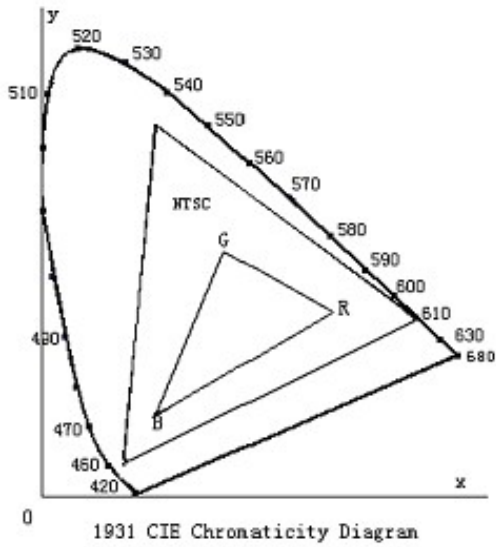
Color gamut:

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

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

Test Item	Test condition	Remark
High　Temperature Storage	Ta = 80℃　96hrs	Note1,Note3，4
Low　Temperature Storage	Ta = -30℃　96hrs	Note1,Note3，4
High　Temperature Operation	Ta = 70℃　96hrs	Note2,Note3，4
Low Temperature Operation	Ta = -20℃　96hrs	Note1,Note3，4
Operation at High Temperature/Humidity	+60℃, 90%RH 96hrs	Note3，4
Thermal Shock	-30℃/30 min ~ +80℃/30 min for a total 10 cycles, Start with cold temperature and end with high temperature.	Note3，4
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	
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	
Package Drop Test	Height:60cm 1 corner, 3 edges, 6 surfaces	
Electro Static Discharge	±2KV, Human Body Mode, 100pF/1500Ω	

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℃ ～ 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