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Brighten The Future

NEXT VISION DISPLAY

SPECIFICATION

CUSTOMER : _____

MODULE NO.: NT088-N001ML

Version	01
Engineer	
Date	2020.8.20

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Customer:
Approved by

NEXT VISION DISPLAY CO., LTD.

地址: 中國上海小木橋路600號
ADD: 600 XIAO MU QIAO ROAD, SHANGHAI, CHINA

WEB: www.nextvisiondisplay.com

TECHNICAL: technical@nextvisiondisplay.com
MARKETING: marketing@nextvisiondisplay.com
SALES: sales@nextvisiondisplay.com

Represented by:

first FC components
FIRST Components s.r.l.
www.first-components.com
sales@first-components.com
+39 0332 1888005

General Specifications

NT088-N001ML is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light unit . The 8.8'' display area contains 1920 x (RGB)x 480 pixels and can display up to 16.7M colors. This product accords with ROHS environmental Criterion.

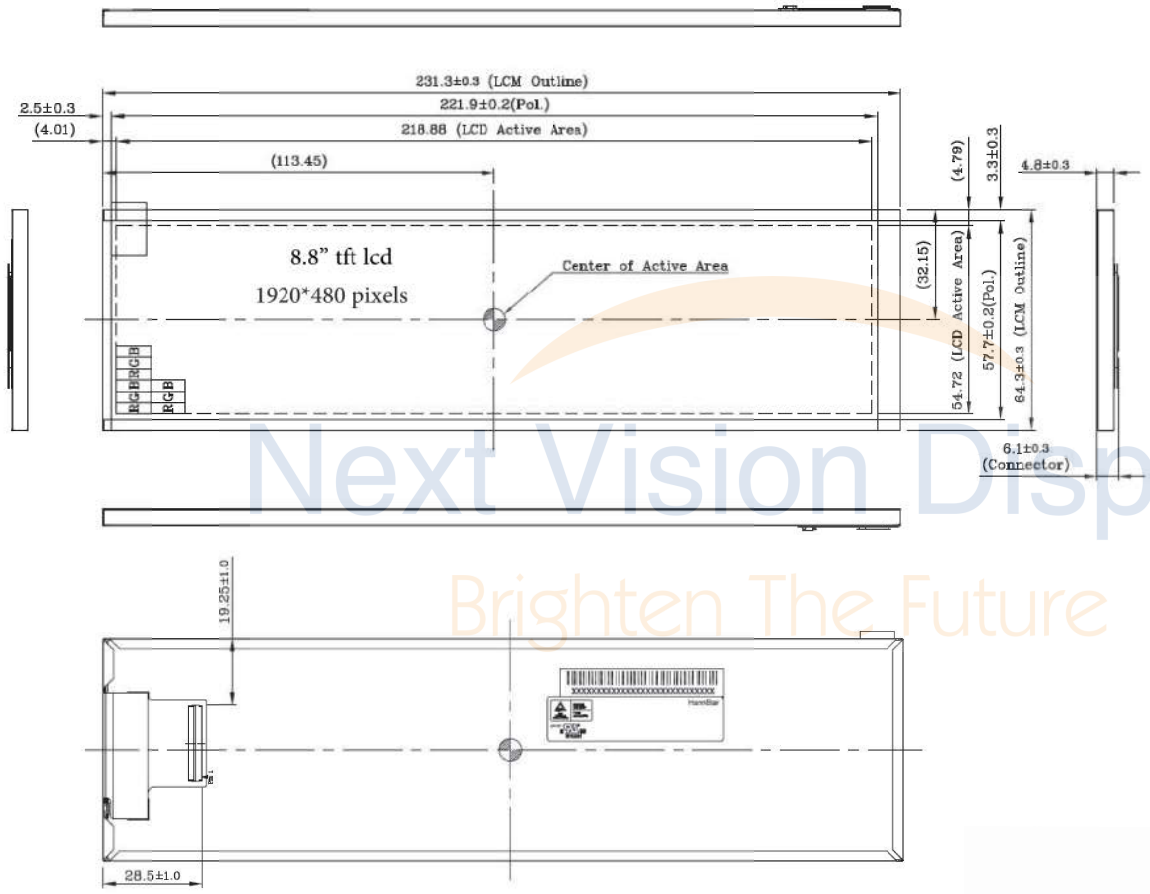
Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	16.7M		1
Viewing Direction	ALL	O'Clock	
Operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	
Module size	231.30*64.30*4.80	mm	2
Active Area(W×H)	218.88*54.72	mm	
Number of Dots	1920×480	dots	
Controller	/	-	
Backlight	White LED	pcs	
Weight	100	g	
Interface	MIPI	-	

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

Note 2: Without FPC and Solder .

Outline Drawing



Pin No.	Symbol	Pin No.	Symbol
1	GND	21	RESET
2	NC	22	VDD
3	LED+	23	STBYB
4	LED+	24	TP_SYNC
5	NC	25	GND
6	LED-	26	D0P
7	LED-	27	D0N
8	NC	28	GND
9	GND	29	D1P
10	NC	30	D1N
11	AVDD	31	GND
12	NC	32	CLKP
13	VGH	33	CLKN
14	NC	34	GND
15	VGL	35	D2P
16	NC	36	D2N
17	GND	37	GND
18	VCOM	38	D3P
19	GND	39	D3N
20	GND	40	GND

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P/N: NT088-N001ML

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Absolute Maximum Ratings(Ta=25℃)

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

TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	V_{DD}	-0.5	4.0	V	
	V_{GH}	15	26	V	
	V_{GL}	-11.5	-4	V	
	AV_{DD}	7	12.5	V	
Logic Signal Input Level	V_{DD}	-0.5	4.0	V	

Backlight unit

Item	Symbol	Typ.	Max.	Unit	Note
LED current	I_L	160	-	mA	(1) (2)(3)
LED voltage	V_L	16	17.5	V	(1) (2)(3)
LED reverse voltage	V_R	--	5	V	
LED forward current	I_F		80	mA	

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Note:

(1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2) Ta =25±2ď

(3) Test Condition: LED current 160 mA. The LED lifetime could be decreased if operating IL is larger than 160mA.

Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-20	70	℃	
Storage Temperature	T_{stg}	-30	80	℃	

Electrical Specifications

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

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3.0	3.3	3.6	V	
	VGH	19.0	20	21.0	V	
	VGL	-11	-10	-9	V	
	AVDD	11.8	12	12.2	V	
VCOM	VCOM	4.5	4.88	5.2	V	Note (1)
Input signal voltage	ViH	0.7 VDD	-	VDD	V	Note (2)
	ViL	0	-	0.3 VDD	V	
Current of power supply	IDD	-	-	35	mA	VDD =3.3V
	IADD	-	-	30	mA	AVDD=12V
	IGH	-	-	5	mA	VGH=18V
	IGL	-	-	-5	mA	VGL= -10V
	Ivcom	-	-	0.1	mA	Vcom= 4.88V

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

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_F	--	160	--	mA	Ta=25℃
LED Voltage	V_F	--	--	17.5	Volt	Ta=25℃
LED Life-Time	N/A	--	30,000	--	Hour	Ta=25℃ I_F=160mA Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 oC, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25ơ and IL=160mA. The LED lifetime could be decreased if operating IL is larger than 160mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit

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MIPI DC Characteristics
HS Receiver DC Specification

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Operation Voltage	VDD	1.5-10%	1.5	1.5+10%	mV	
Differential Input Voltage	|VID|	70	200	260	mV	
Common Mode Voltage	$V_{CMRX(DC)}$	70	-	330	mV	
Differential Input High Threshold Voltage	VTH	-	-	70	mV	
Differential Input Low Threshold Voltage	VTL	-70	-	-	mV	
Singled-ended input high voltage	V_{IHHS}	-	-	460	mV	
Singled-ended input low voltage	V_{ILHS}	-40	-	-	mV	
Singled-ended threshold for HS termination enable	$V_{TERM-EN}$	-	-	450	mV	
Differential input impedance	Z_{ID}	80	100	125	ohm	
Pin leakage current	I_{LEAK}	-10	-	10	uA	
Common-mode interference beyond 450MHz	$\Delta V_{CMRX(HF)}$	-	-	100	mV	
Common-mode interference 50MHz - 450MHz	$\Delta V_{CMRX(LF)}$	-50	-	50	mV	
Common-mode termination	C_{CM}	-	-	60	pF	
Embedded Termination	R_T	90	100	110	ohm	2bits RT_SEL[1: 0] for termination resistor selection 00 → 200ohm 10 , 01→ 150ohm 11 → 100ohm (default) 1bit ERMR_EN for termination resistor enable TERMR_EN=0, termr disable R=(OPEN) TERMR_EN=1, termr enable

Note:

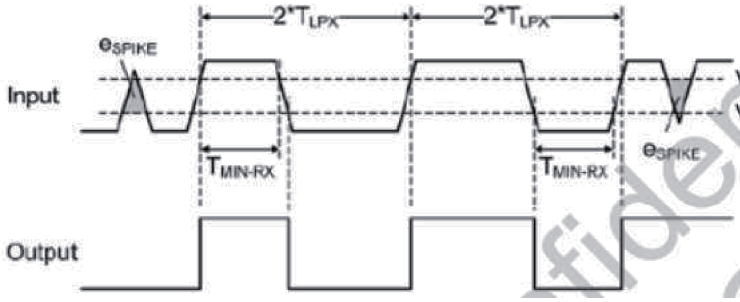
(1) Excluding possible additional RF interference of 100mV peak sine wave beyond 450MHz.

(2) This table value includes a ground difference of 50mV between the transmitter and the receiver, the static common-mode level tolerance and variations below 450MHz.

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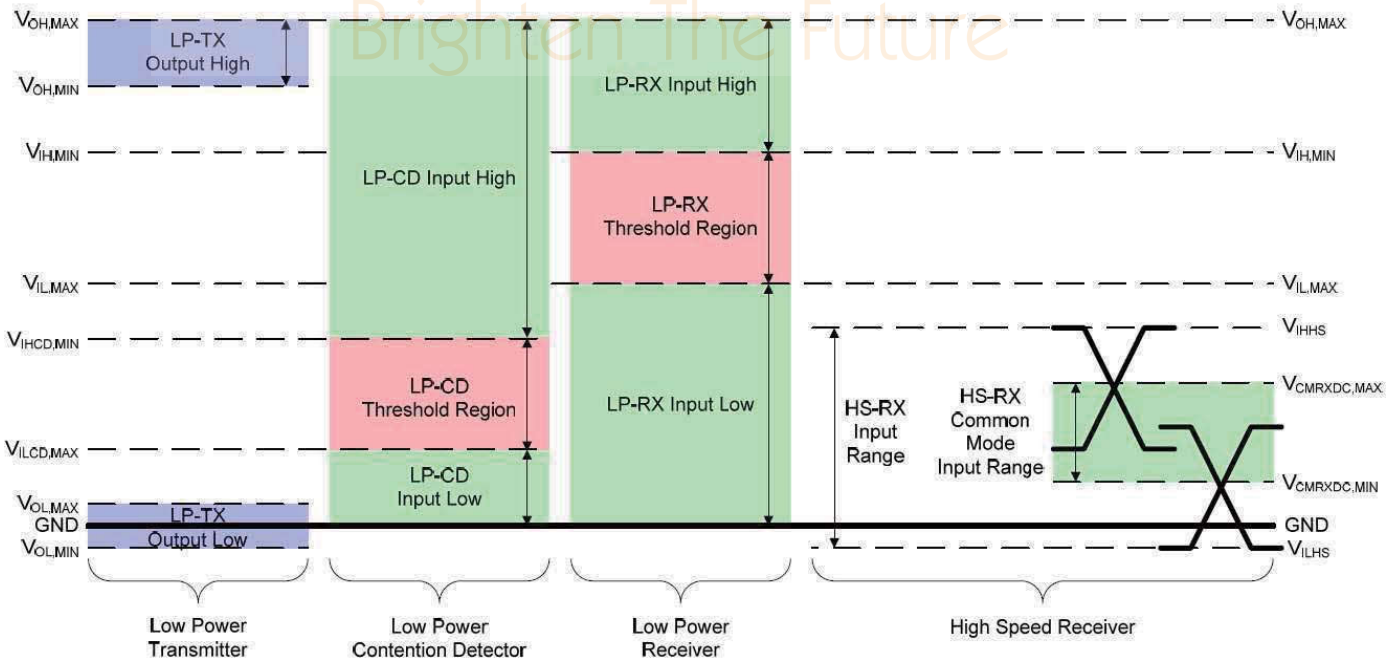
LP Receiver DC Specification

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Logic 1 input voltage	V_{IH}	880	-	-	mV	
Logic 0 input voltage, not in ULP State	V_{IL}	-	-	550	mV	
Input hysteresis	V_{HYST}	25	-	-	mV	



Line Contention Detection

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Logic 1 contention threshold	V_{IHCD}	450	-	-	mV	
Logic 0 contention threshold	VILCD	-	-	200	mV	



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Interface signals

Pin	Symbol	I/O	Function
1	GND	P	Gtound
2	NC	-	No connection
3	LED+	P	LED Anode
4	LED+	P	LED Anode
5	NC	-	No connection
6	LED-	P	LED Cathode
7	LED-	P	LED Cathode
8	NC	-	No connection
9	GND	P	Gtound
10	NC	-	No connection
11	AVDD	P	Power supply for analog circuit
12	NC	-	No connection
13	VGH	P	Power supply for analog circuit
14	NC	-	No connection
15	VGL	P	Power supply for analog circuit
16	NC	-	No connection
17	GND	P	Gtound
18	VCOM	P	Power supply for common voltage
19	GND	P	Gtound
20	GND	P	Gtound
21	RESET	I	Global reset
22	VDD	P	Power supply for digital circuits
23	STBYB	I	Standby mode
24	TP_Sync	O	Sync signal for touch panel
25	GND	P	Gtound
26	D0P	I	MIPI Data Input Lane0 positive-end
27	D0N	I	MIPI Data Input Lane0 negtive-end
28	GND	P	Gtound
29	D1P	I	MIPI Data Input Lane1 positive-end
30	D1N	I	MIPI Data Input Lane1 negtive-end
31	GND	P	Gtound
32	CLKP	I	MIPI Clock Input positive-end
33	CLKN	I	MIPI Clock Input negtive-end
34	GND	P	Gtound
35	D2P	I	MIPI Data Input Lane2 positive-end

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36	D2N	I	MIPI Data Input Lane2 negtive-end
37	GND	P	Gtound
38	D3P	I	MIPI Data Input Lane3 positive-end
39	D3N	I	MIPI Data Input Lane3 negtive-end
40	GND	P	Gtound

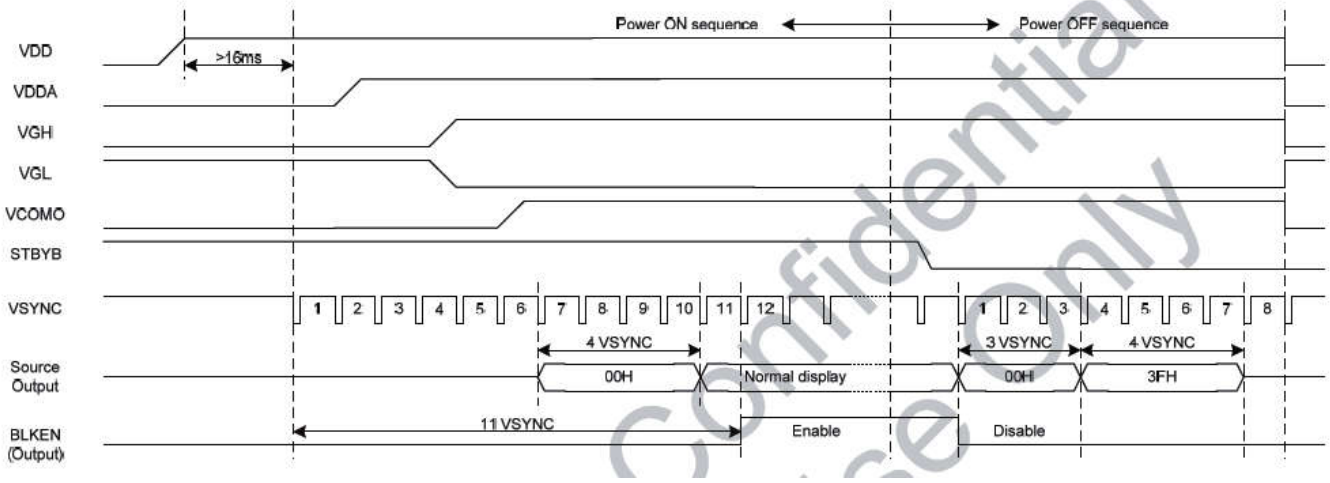
Interface Timing

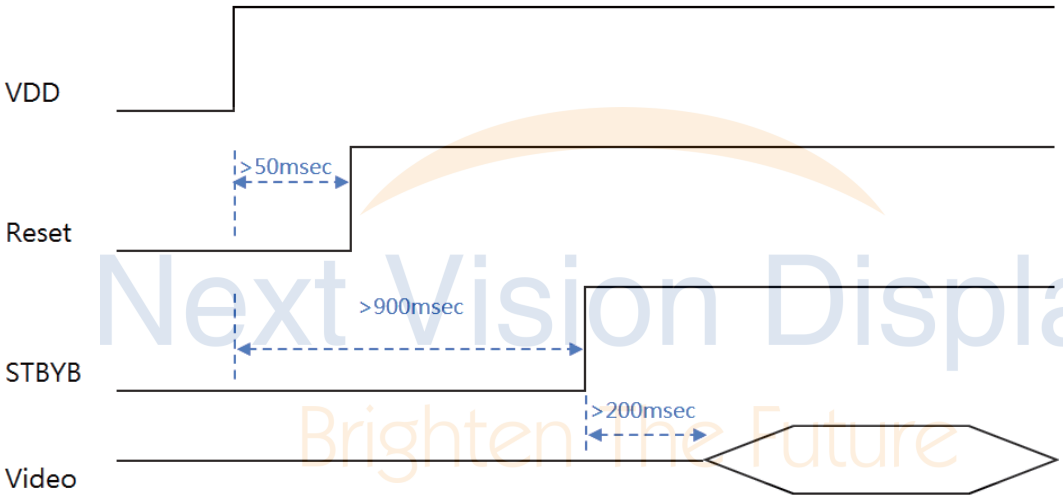
Item	Symbol	Min.	Typ.	Max.	Unit
MIPI Video data rate(4 lane)	-	-	397.7	-	Mbps
PCLK Frequency	FPCLK	-	66.3	-	MHz
Horizontal Synchronization	Hsync	-	30	-	PCLK
Horizontal Back Porch	HBP	-	30	-	PCLK
Horizontal Front Porch	HFP	-	30	-	PCLK
Hsync+HBP+HFP	-	75	90	-	PCLK
HorizontalAddress(Display Area)	Hadr	-	480	-	PCLK
Horizontal cycle	-	555	570	-	PCLK
Vertical Synchronization	Vsync	-	6	-	Line
Vertical Back Porch	VBP	-	6	-	Line
Vertical Front Porch	VFP	-	6	-	Line
Vsync+VBP+VFP	-	15	18	-	Line
Vertical Address(Display Area)	Vadr	-	1920	-	Line
Vertical cycle	-	1935	1938	-	Line
Frame Rate	-	-	60	-	Hz

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Power On / Off Sequence

Power-On/Off Timing Sequence:





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Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		θ=0° Φ=0°	480	600	-	Cd/m^2	1
Uniformity	⊿Bp			70	80	-	%	1,2
Viewing Angle	3:00		Cr≥10	75	85	-	Deg	3
	6:00			75	85	-		
	9:00			75	85	-		
	12:00			75	85	-		
Contrast Ratio	Cr		θ=0° Φ=0°	600	800	-	-	4
Response Time	$T_{r+}T_f$			-	30	40	ms	5
Color of CIE Coordinate	W	x	θ=0° Φ=0°	0.250	0.300	0.350	-	1,6
		y		0.272	0.322	0.372	-	
	R	x		0.576	0.626	0.676	-	
		y		0.295	0.345	0.395	-	
	G	x		0.262	0.312	0.362	-	
		y		0.493	0.543	0.593	-	
	B	x		0.097	0.147	0.197	-	
		y		0.059	0.109	0.159	-	
NTSC Ratio	S			-	60	-	%	

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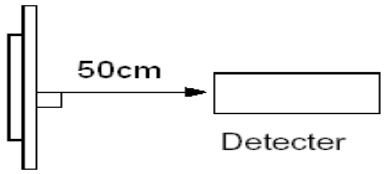
Note：The parameter is slightly changed by temperature, driving voltage and materiel

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.

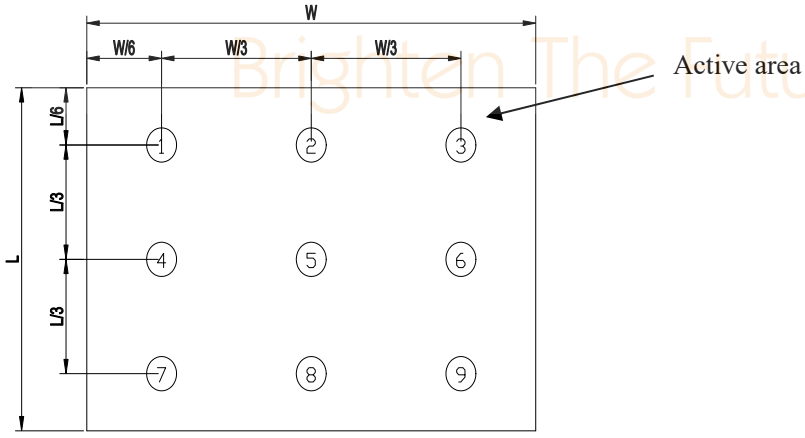


Note 2: The luminance uniformity is calculated by using following formula.

⊿Bp = Bp (Min.) / Bp (Max.)×100 (%)

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

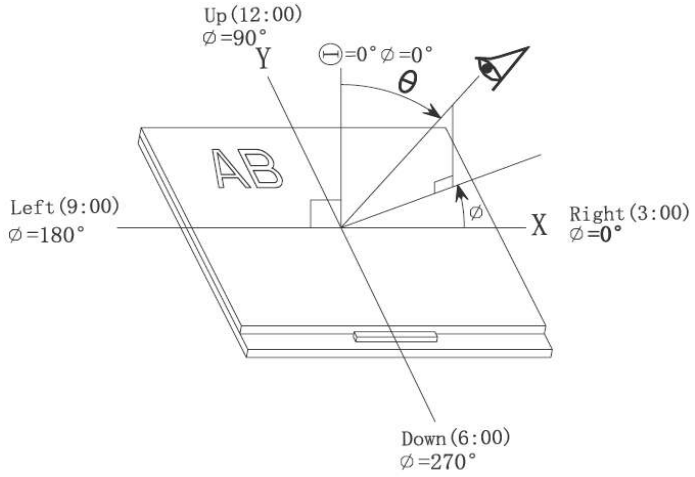
Bp (Min.) = Minimum brightness in 9 measured spots.



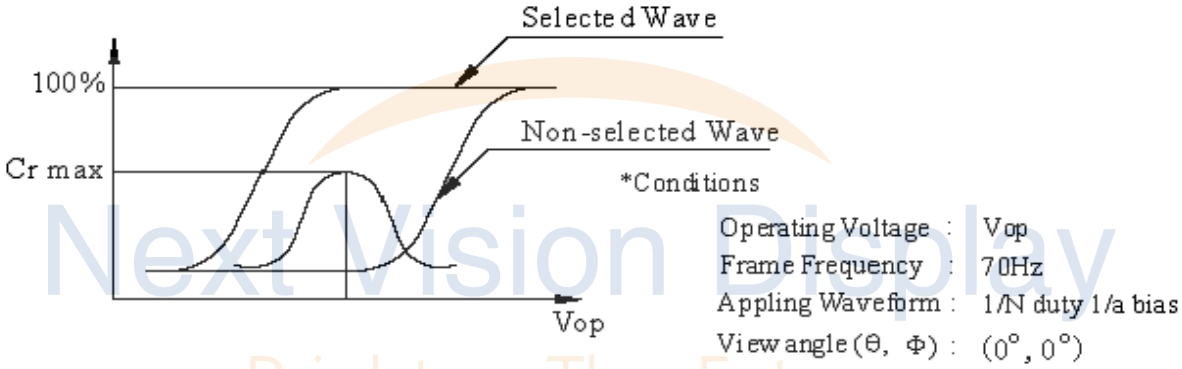
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Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and Φ



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

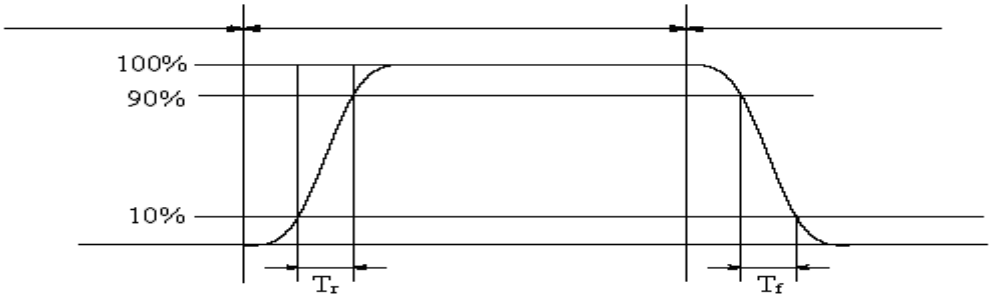


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$$Contrast\ ratio(Cr) = \frac{Brightness\ of\ selected\ dots}{Brightness\ of\ non-selected\ dots}$$

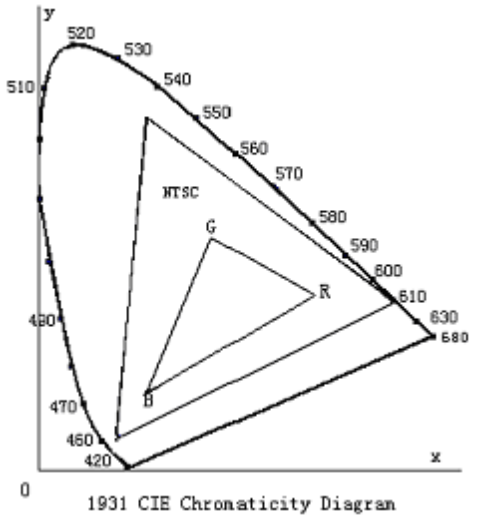
Note 5: Definition of Response time. (Test LCD using DMS501):

TThe 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.



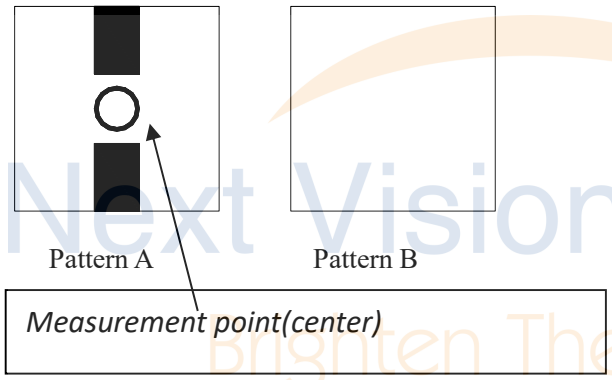
1931 CIE Chromaticity Diagran

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

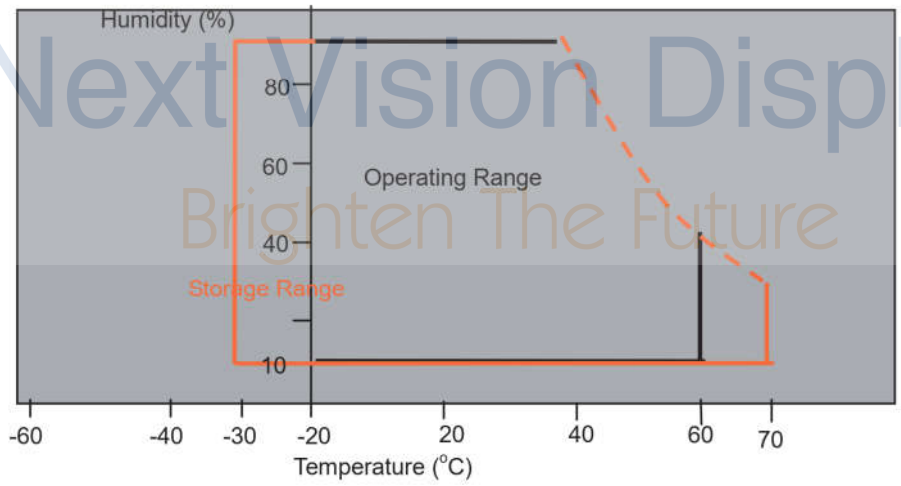
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Reliability Test Items and Criteria

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80°C, 240hrs	
2	Low Temperature Storage	Ta=-30°C, 240hrs	
3	High Temperature Operation	Ta=+70°C, 240hrs	
4	Low Temperature Operation	Ta=-20°C, 240hrs	
5	High Temperature and High Humidity (operation)	Ta=+60°C, 90%RH, 240hrs	
6	Thermal Cycling Test (non operation)	-20°C(30min)→+70°C(30min),100 cycles	
7	Vibration	Sine Wave 1.5G, 5~500Hz, XYZ 30min/each direction	
8	Shock	Half-Sine, 200G, 2ms, ±XYZ, 1time	

Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

Storage / Operating temperature



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Note . Max wet bulb temp.=39°C

Precautions for Use of LCD Modules

Handling Precautions

The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

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.

Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

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

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Do not attempt to disassemble the LCD Module.

If the logic circuit power is off, do not apply the input signals.

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.

Storage precautions

When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

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%

The LCD modules should be stored in the room without acid, alkali and harmful gas.

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

END

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