



TFT LCD Approval Specification

MODEL NO.: N201J4 - L01

Customer : _____

Approved by : _____

Note :

記錄	工作	審核	角色	投票
2007-12-12 14:04:41 CST	PMMD Director	cs_lee(李志聖 /56510/44926)	Director	Accept



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**REVISION HISTORY**

Version	Date	Page (New)	Section	Description
Ver 2.0	Dec. 05,2007	All	All	Approval specification is first issued



1. GENERAL DESCRIPTION

1.1 OVERVIEW

N201J4 - L01 is a 20.1" TFT Liquid Crystal Display module with two CCFLs Backlight unit and 40 pins LVDS interface. This module supports 1920 x 1200 Wide-WUXGA mode and can display 16,777,216 colors. The optimum viewing angle is at 6 o'clock direction. The inverter module for Backlight is not built in.

1.2 FEATURES

- Thin and High Brightness
- WUXGA (1920 x 1200 pixels) resolution
- DE only mode
- 5.0V LVDS (Low Voltage Differential Signaling) interface with 2 pixel/clock
- 2 CCFLs

1.3 APPLICATION

- TFT LCD Notebook

1.4 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	433.44 (H) x 270.9 (V) (20.1" diagonal)	mm	(1)
Bezel Opening Area	437.2 (H) x 274.7 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1920 x R.G.B. x 1200	pixel	-
Pixel Pitch	0.22575 (H) x 0.22575 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16,777,216	color	-
Transmissive Mode	Normally white	-	-
Surface Treatment	Hard coating (3H), Glare Type	-	-

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	453	453.5	454	mm	(1)
	Vertical (V)	296	296.5	297	mm	
	Depth (D)	---	8.3	8.6	mm	
Weight		---	1385	1400	g	-

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

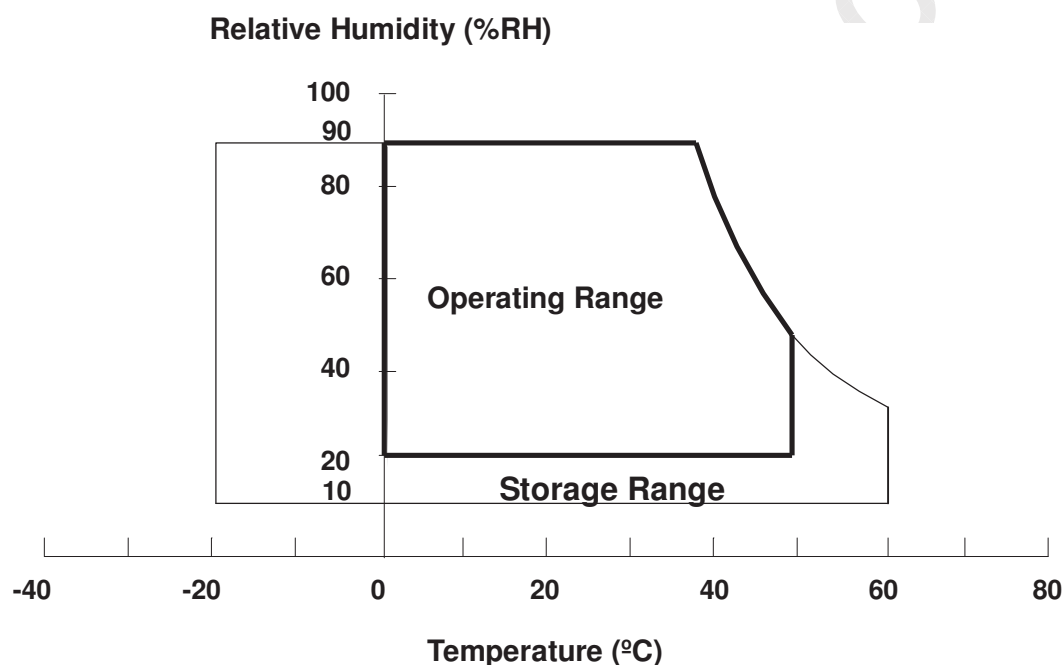
Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-20	+60	°C	(1)
Storage Humidity	H _{ST}	10	90	%	
Operating Ambient Temperature	T _{OP}	0	+50	°C	(1), (2)
Operating Humidity	H _{OP}	20	90	%	
Shock (Non-Operating)	H _{ST}	-	200/2	G/ms	(3), (5)
Vibration (Non-Operating)	V _{NOP}	-	1.5	G	(4), (5)

Note (1) Temperature and relative humidity range is shown below.

(a) 90 %RH Max. ($T_a \leq 40$ °C).

(b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40$ °C).

(c) No condensation.



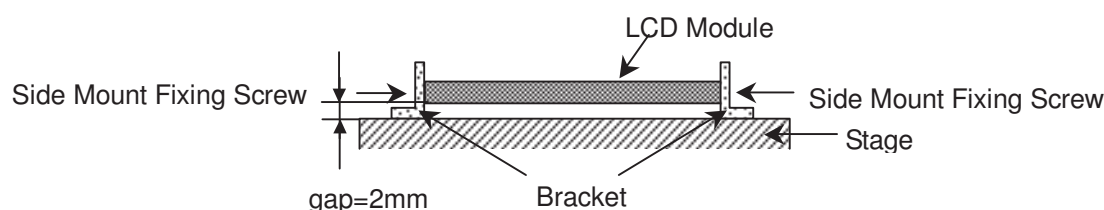
Note (2) The ambient temperature means the temperature of panel surface.

Note (3) 1 time for $\pm X$, $\pm Y$, $\pm Z$. for Condition (200G / 2ms) is half Sine Wave.

Note (4) 10 ~ 500 Hz, 0.5 Hr / Cycle, 1 cycles for each X, Y, Z axis.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

The fixing condition is shown as below:



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V_{CC}	-0.3	+6.0	V	(1)
Logic Input Voltage	V_{IN}	-0.3	4.3	V	

2.2.2 BACKLIGHT UNIT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Lamp Voltage	V_L	—	1400	V_{RMS}	(1), (2), $I_L = 7.5 \text{ mA}$
Lamp Current	I_L	—	8	mA_{RMS}	(1), (2)
Lamp Frequency	F_L	—	80	KHz	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for lamp (Refer to 3.2 for further information).



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3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

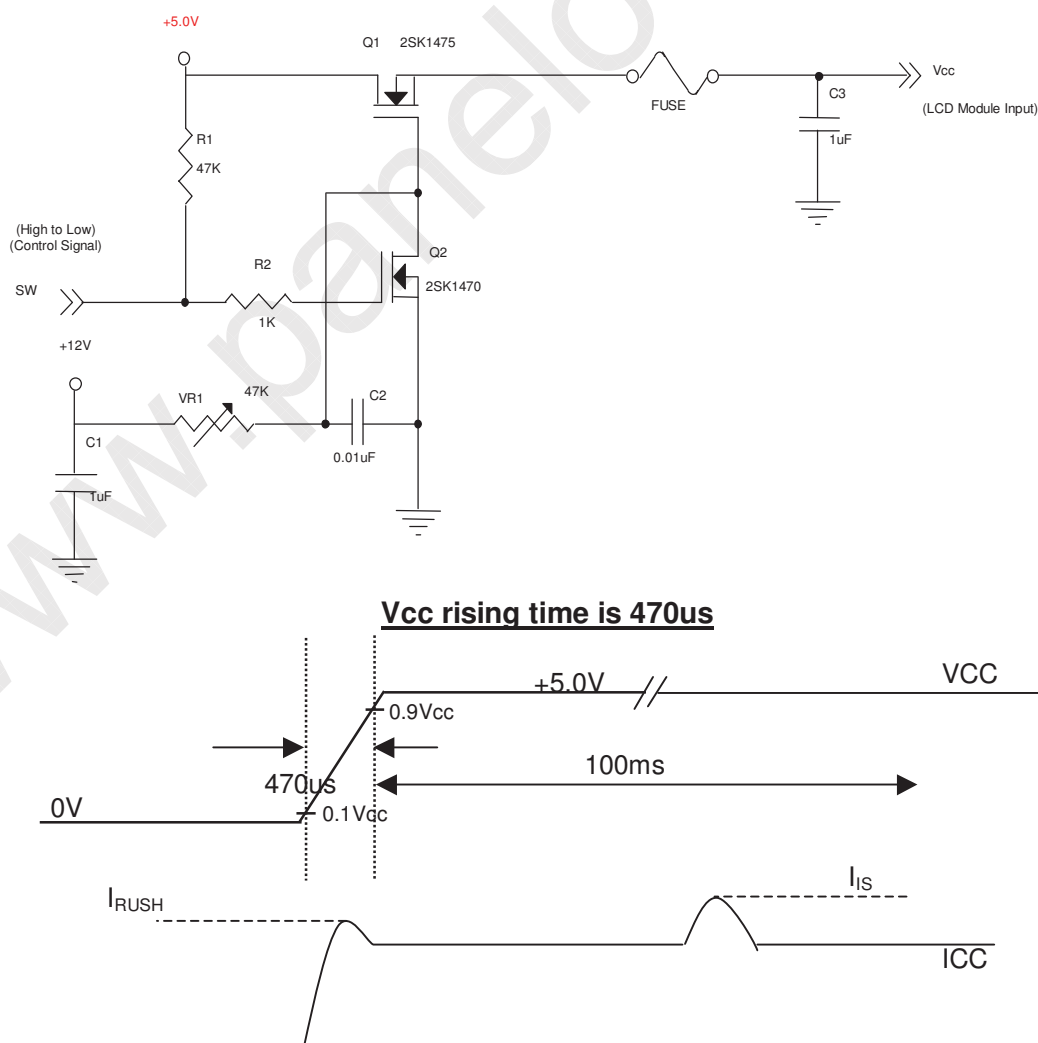
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V _{CC}	4.5	5.0	5.5	V	-
Permissible Ripple Voltage	V _{RP}		100		mV	-
Rush Current	I _{RUSH}			1.5	A	(2)
Initial Stage Current	I _{IS}			1.0	A	(2)
Power Supply Current	White	I _{CC}	480		mA	(3)a
	Black		760		mA	(3)b
LVDS Differential Input High Threshold	V _{TH(LVDS)}			+100	mV	(5), V _{CM} =1.2V
LVDS Differential Input Low Threshold	V _{TL(LVDS)}	-100			mV	(5), V _{CM} =1.2V
LVDS Common Mode Voltage	V _{CM}	1.125		1.375	V	(5)
LVDS Differential Input Voltage	V _{ID}	100		600	mV	(5)
Terminating Resistor	R _T		100		Ohm	
Power per EBL WG	P _{EBL}	-	7.54	-	W	(4)

Note (1) The ambient temperature is Ta = 25 ± 2 °C.

Note (2) I_{RUSH}: the maximum current when VCC is rising

I_{IS}: the maximum current of the first 100ms after power-on

Measurement Conditions: Shown as the following figure. Test pattern: black.





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Note (3) The specified power supply current is under the conditions at $V_{CC} = 5.0\text{ V}$, $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$, $f_v = 60\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



Active Area

b. Black Pattern



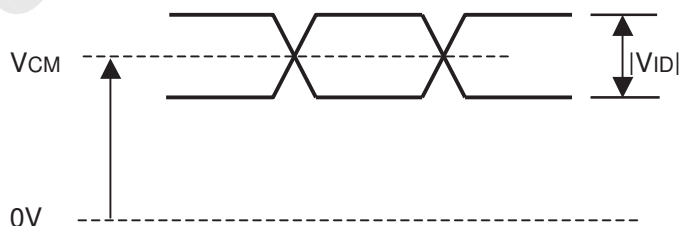
Active Area

Note (4) The specified power are the sum of LCD panel electronics input power and the inverter input power. Test conditions are as follows.

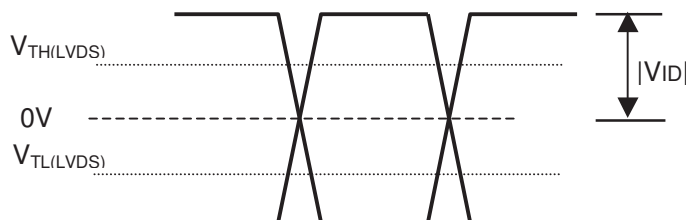
- (a) $V_{CC} = 5.0\text{ V}$, $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$, $f_v = 60\text{ Hz}$,
- (b) The pattern used is a black and white 32 x 36 checkerboard, slide #100 from the VESA file "Flat Panel Display Monitor Setup Patterns", FPDMSU.ppt.
- (c) Luminance: 60 nits.
- (d) The inverter used is provided from _____. Please contact them for detail information.
CMO doesn't provide the inverter in this product.

Note (5) The parameters of LVDS signals are defined as the following figures.

Single Ended



Differential

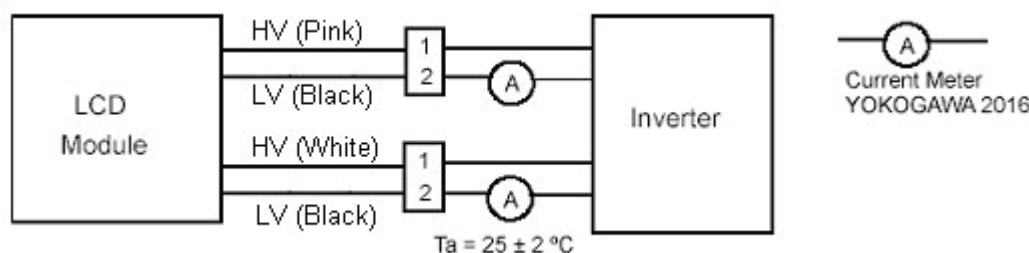


3.2 BACKLIGHT UNIT

 $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$

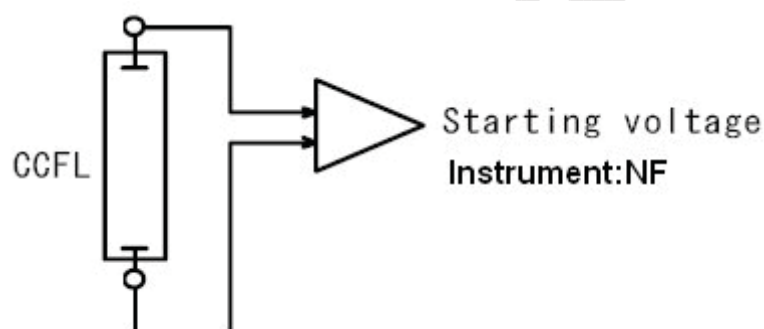
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Input Voltage	V_L	670	750	830	V_{RMS}	$I_L = 7.5\text{ mA}$
Lamp Current	I_L	3.0	7.5	8.0	mA_{RMS}	(1)
Lamp Turn On Voltage	V_S	—	—	1250 (25 $^{\circ}\text{C}$)	V_{RMS}	(2)
		—	—	1400 (0 $^{\circ}\text{C}$)	V_{RMS}	(2)
Operating Frequency	F_L	50	—	80	KHz	(3)
Lamp Life Time	L_{BL}	15,000	—	—	Hrs	(5)
Power Consumption	P_L	—	11.25	—	W	(4), $I_L = 7.5\text{ mA}$

Note (1) Lamp current is measured by utilizing a high frequency current meter as shown below:



Note (2) The voltage that must be larger than V_S should be applied to the lamp for more than 1 second after startup. Otherwise, the lamp may not be turned on normally.

(a)



(b) Instrument : NF AS-129

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency from the display, and this may cause line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) $P_L = I_L \times V_L \times 2$



Note (5) The lifetime of lamp can be defined as the time in which it continues to operate under the condition

$T_a = 25 \pm 2^\circ\text{C}$ and $I_L = 7.5 \text{ mA}$ until one of the following events occurs:

- (a) When the brightness becomes or lower than 50% of its original value.
- (b) When the effective ignition length becomes or lower than 80% of its original value.

(The effective ignition length is a scope that luminance is over 70% of that at the center point.)

Note (6) The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the Backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be carefully designed to avoid generating too much current leakage from high voltage output of the inverter. When designing or ordering the inverter please make sure that a poor lighting caused by the mismatch of the Backlight and the inverter (miss-lighting, flicker, etc.) never occurs. If the above situation is confirmed, the module should be operated in the same manners when it is installed in your instrument.



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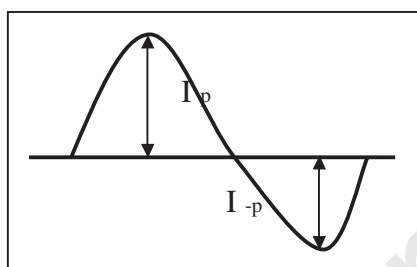
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The output of the inverter must have symmetrical (negative and positive) voltage waveform and symmetrical current waveform. (Unsymmetrical ratio is less than 10%) Please do not use the inverter, which has unsymmetrical voltage and unsymmetrical current and spike wave. Lamp frequency may produce interface with horizontal synchronous frequency and as a result this may cause beat on the display. Therefore lamp frequency shall be as away possible from the horizontal synchronous frequency and from its harmonics in order to prevent interference.

Requirements for a system inverter design, which is intended to have a better display performance, a better power efficiency and a more reliable lamp. It shall help increase the lamp lifetime and reduce its leakage current.

- The asymmetry rate of the inverter waveform should be 10% below;
- The distortion rate of the waveform should be within $\sqrt{2} \pm 10\%$;
- The ideal sine wave form shall be symmetric in positive and negative polarities.



* Asymmetry rate:

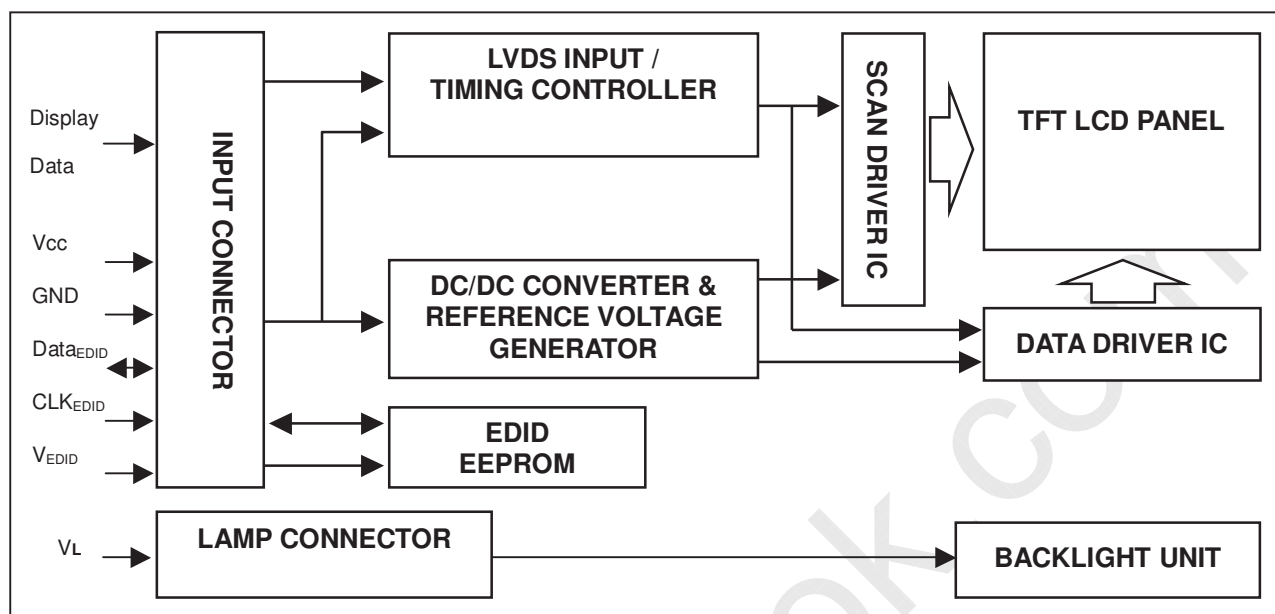
$$|I_p - I_{-p}| / I_{rms} * 100\%$$

* Distortion rate

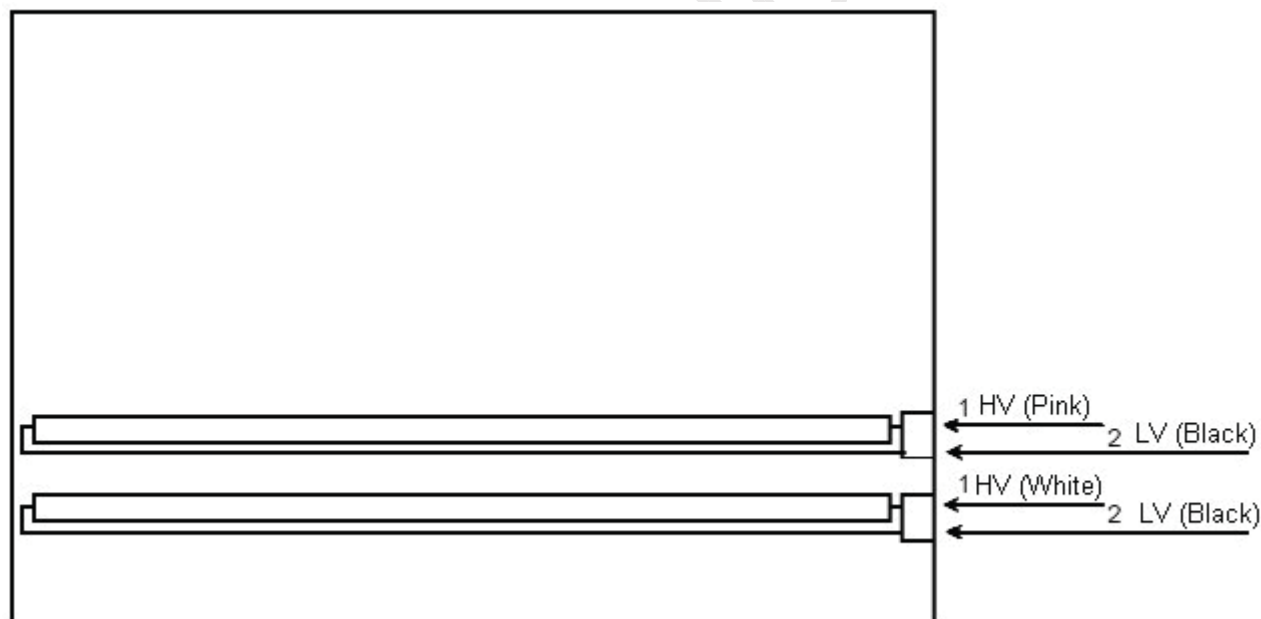
$$I_p \text{ (or } I_{-p}) / I_{rms}$$

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT





5. INPUT TERMINAL PIN ASSIGNMENT

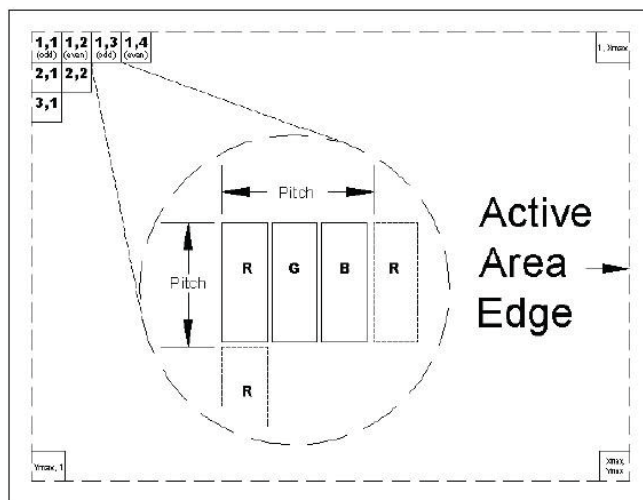
5.1 TFT LCD MODULE

Pin #	Symbol	Function
1	GND	Ground
2	GND	Ground
3	AVDD	Analog Power Supply
4	AVDD	Analog Power Supply
5	AVDD	Analog Power Supply
6	DVDD	Digital Power Supply
7	DVDD	Digital Power Supply
8	DDC_SCL	Two wire serial interface clock
9	DDC_SDA	Two wire serial interface data
10	RXinO0-	- LVDS differential data input, Chan 0-Odd
11	RXinO0+	+ LVDS differential data input, Chan 0-Odd
12	HGND	Ground
13	RXinO1-	- LVDS differential data input, Chan 1-Odd
14	RXinO1+	+ LVDS differential data input, Chan 1-Odd
15	HGND	Ground
16	RXinO2-	- LVDS differential data input, Chan 2-Odd
17	RXinO2+	+ LVDS differential data input, Chan 2-Odd
18	HGND	Ground
19	RXCLKO-	- LVDS Differential Clock input (Odd)
20	RXCLKO+	+ LVDS Differential Clock input (Odd)
21	HGND	Ground
22	RXinO3-	- LVDS differential data input, Chan 3-Odd
23	RXinO3+	+ LVDS differential data input, Chan 3-Odd
24	HGND	Ground
25	RXinE0-	- LVDS differential data input, Chan 0-Even
26	RXinE0+	+ LVDS differential data input, Chan 0-Even
27	HGND	Ground
28	RXinE1-	- LVDS differential data input, Chan 1-Even
29	RXinE1+	+ LVDS differential data input, Chan 1-Even
30	HGND	Ground
31	RXinE2-	- LVDS differential data input, Chan 2-Even
32	RXinE2+	+ LVDS differential data input, Chan 2-Even
33	HGND	Ground
34	RXCLKE-	- LVDS Differential Clock input (Even)
35	RXCLKE+	+ LVDS Differential Clock input (Even)
36	HGND	Ground
37	RXinE3-	- LVDS differential data input, Chan 3-Even
38	RXinE3+	+ LVDS differential data input, Chan 3-Even
39	HGND	Ground
40	NC	No Connection

Note (1) Connector Part No: JAE-FI-NXB40SL-HF10 or equivalent

Note (2) User's connector Part No: JAE-FI-NX40CL-SH02-4 + FI-NX40CL-4 or equivalent

Note (3) The first pixel is odd as shown in the following figure.



5.2 BACKLIGHT UNIT

Pin	Symbol	Description	Color
1	HV	High Voltage	Pink
2	LV	Ground	Black
1	HV	High Voltage	White
2	LV	Ground	Black

Note (1) Connector Part No.: JST-BHSR-02VS-1 or equivalent.

Note (2) User's connector Part No: JST-SM02B-BHSS-1-TB or equivalent.

5.3 TIMING DIAGRAM OF LVDS INPUT SIGNAL

LVDS Channel E0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	EG0	ER5	ER4	ER3	ER2	ER1	ER0
LVDS Channel E1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	EB1	EB0	EG5	EG4	EG3	EG2	EG1
LVDS Channel E2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	EB5	EB4	EB3	EB2
LVDS Channel E3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	EB7	EB6	EG7	EG6	ER7	ER6
LVDS Channel O0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	OG0	OR5	OR4	OR3	OR2	OR1	OR0
LVDS Channel O1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	OB1	OB0	OG5	OG4	OG3	OG2	OG1
LVDS Channel O2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	OB5	OB4	OB3	OB2
LVDS Channel O3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	OB7	OB6	OG7	OG6	OR7	OR6

5.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	G5	G4	G3	G2	G1	G0	R7	R6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	Green(253)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

5.5 EDID DATA STRUCTURE

The EDID (Extended Display Identification Data) data formats are to support displays as defined in the VESA Plug & Display and FPD1 standards.

Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
0	Header	00	00000000
1	Header	FF	11111111
2	Header	FF	11111111
3	Header	FF	11111111
4	Header	FF	11111111
5	Header	FF	11111111
6	Header	FF	11111111
7	Header	00	00000000
8	EISA ID manufacturer name ("CMO")	0D	00001101
9	EISA ID manufacturer name (Compressed ASCII)	AF	10101111
0A	ID product code (N201J4-L01)	00	00000000
0B	ID product code (hex LSB first; N201J4-L01)	20	00100000
0C	ID S/N (fixed "0")	00	00000000
0D	ID S/N (fixed "0")	00	00000000
0E	ID S/N (fixed "0")	00	00000000
0F	ID S/N (fixed "0")	00	00000000
10	Week of manufacture (fixed "00H")	09	00001001
11	Year of manufacture (fixed "00H")	10	00010000
12	EDID structure version # ("1")	01	00000001
13	EDID revision # ("3")	03	00000011
14	Video I/P definition ("digital")	80	10000000
15	Max H image size ("44cm")	2C	00101100
16	Max V image size ("28cm")	1C	00011100
17	Display Gamma (Gamma = "2.2")	78	01111000
18	Feature support ("Active off, RGB Color")	0A	00001010
19	Red/Green (Rx1, Rx0, Ry1, Ry0, Gx1, Gx0, Gy1, Gy0)	3B	00111011
1A	Blue/White (Bx1, Bx0, By1, By0, Wx1, Wx0, Wy1, Wy0)	95	10010101
1B	Red-x (Rx = "0.660")	A9	10101001
1C	Red-y (Ry = "0.335")	55	01010101
1D	Green-x (Gx = "0.209")	35	00110101
1E	Green-y (Gy = "0.679")	AD	10101101
1F	Blue-x (Bx = "0.143")	24	00100100
20	Blue-y (By = "0.099")	19	00011001
21	White-x (Wx = "0.313")	50	01010000
22	White-y (Wy = "0.329")	54	01010100
23	Established timings 1	00	00000000
24	Established timings 2	00	00000000
25	Manufacturer's reserved timings	00	00000000



26	Standard timing ID # 1	01	00000001
27	Standard timing ID # 1	01	00000001
28	Standard timing ID # 2	01	00000001
29	Standard timing ID # 2	01	00000001
2A	Standard timing ID # 3	01	00000001
2B	Standard timing ID # 3	01	00000001
2C	Standard timing ID # 4	01	00000001
2D	Standard timing ID # 4	01	00000001
2E	Standard timing ID # 5	01	00000001
2F	Standard timing ID # 5	01	00000001
30	Standard timing ID # 6	01	00000001
31	Standard timing ID # 6	01	00000001
32	Standard timing ID # 7	01	00000001
33	Standard timing ID # 7	01	00000001
34	Standard timing ID # 8	01	00000001
35	Standard timing ID # 8	01	00000001
36	Detailed timing description # 1 Pixel clock ("154MHz", According to VESA CVT Rev1.1)	28	00101000
37	# 1 Pixel clock (hex LSB first)	3C	00111100
38	# 1 H active ("1920")	80	10000000
39	# 1 H blank ("160")	A0	10100000
3A	# 1 H active : H blank ("1920 : 160")	70	01110000
3B	# 1 V active ("1200")	B0	10110000
3C	# 1 V blank ("35")	23	00100011
3D	# 1 V active : V blank ("1200 : 35")	40	01000000
3E	# 1 H sync offset ("48")	30	00110000
3F	# 1 H sync pulse width ("32")	20	00100000
40	# 1 V sync offset : V sync pulse width ("3 : 6")	36	00110110
41	# 1 H sync offset : H sync pulse width : V sync offset : V sync width ("48: 32 : 3 : 6")	00	00000000
42	# 1 H image size ("434 mm")	B2	10110010
43	# 1 V image size ("271 mm")	0F	00001111
44	# 1 H image size : V image size ("434 : 271")	11	00010001
45	# 1 H boarder ("0")	00	00000000
46	# 1 V boarder ("0")	00	00000000
47	# 1 Non-interlaced, Normal, no stereo, Separate sync, H/V pol Negatives	18	00011000
48	Detailed timing description # 2	00	00000000
49	# 2 Flag	00	00000000
4A	# 2 Reserved	00	00000000
4B	# 2 FE (hex) defines ASCII string (Model Name "N201J4-L01", ASCII)	FE	11111110
4C	# 2 Flag	00	00000000
4D	# 2 1st character of name ("N")	4E	01001110
4E	# 2 2nd character of name ("2")	32	00110010
4F	# 2 3rd character of name ("0")	30	00110000
50	# 2 4th character of name ("1")	31	00110001
51	# 2 5th character of name ("J")	4A	01001010
52	# 2 6th character of name ("4")	34	00110100



53	# 2 7th character of name ("-")	2D	00101101
54	# 2 8th character of name ("L")	4C	01001100
55	# 2 9th character of name ("O")	30	00110000
56	# 2 9th character of name ("1")	31	00110001
57	# 2 New line character indicates end of ASCII string	0A	00001010
58	# 2 Padding with "Blank" character	20	00100000
59	# 2 Padding with "Blank" character	20	00100000
5A	Detailed timing description # 3	00	00000000
5B	# 3 Flag	00	00000000
5C	# 3 Reserved	00	00000000
5D	# 3 FE (hex) defines ASCII string (Vendor "CMO", ASCII)	FE	11111110
5E	# 3 Flag	00	00000000
5F	# 3 1st character of string ("C")	43	01000011
60	# 3 2nd character of string ("M")	4D	01001101
61	# 3 3rd character of string ("O")	4F	01001111
62	# 3 New line character indicates end of ASCII string	0A	00001010
63	# 3 Padding with "Blank" character	20	00100000
64	# 3 Padding with "Blank" character	20	00100000
65	# 3 Padding with "Blank" character	20	00100000
66	# 3 Padding with "Blank" character	20	00100000
67	# 3 Padding with "Blank" character	20	00100000
68	# 3 Padding with "Blank" character	20	00100000
69	# 3 Padding with "Blank" character	20	00100000
6A	# 3 Padding with "Blank" character	20	00100000
6B	# 3 Padding with "Blank" character	20	00100000
6C	Detailed timing description # 4	00	00000000
6D	# 4 Flag	00	00000000
6E	# 4 Reserved	00	00000000
6F	# 4 FE (hex) defines ASCII string (Model Name "N201J4-L01", ASCII)	FE	11111110
70	# 4 Flag	00	00000000
71	# 4 1st character of name ("N")	4E	01001110
72	# 4 2nd character of name ("2")	32	00110010
73	# 4 3rd character of name ("O")	30	00110000
74	# 4 4th character of name ("1")	31	00110001
75	# 4 5th character of name ("J")	4A	01001010
76	# 4 6th character of name ("4")	34	00110100
77	# 4 7th character of name ("-")	2D	00101101
78	# 4 8th character of name ("L")	4C	01001100
79	# 4 9th character of name ("O")	30	00110000
7A	# 4 9th character of name ("1")	31	00110001
7B	# 4 New line character indicates end of ASCII string	0A	00001010



7C	# 4 Padding with "Blank" character	20	00100000
7D	# 4 Padding with "Blank" character	20	00100000
7E	Extension flag	00	00000000
7F	Checksum	A2	10100010

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

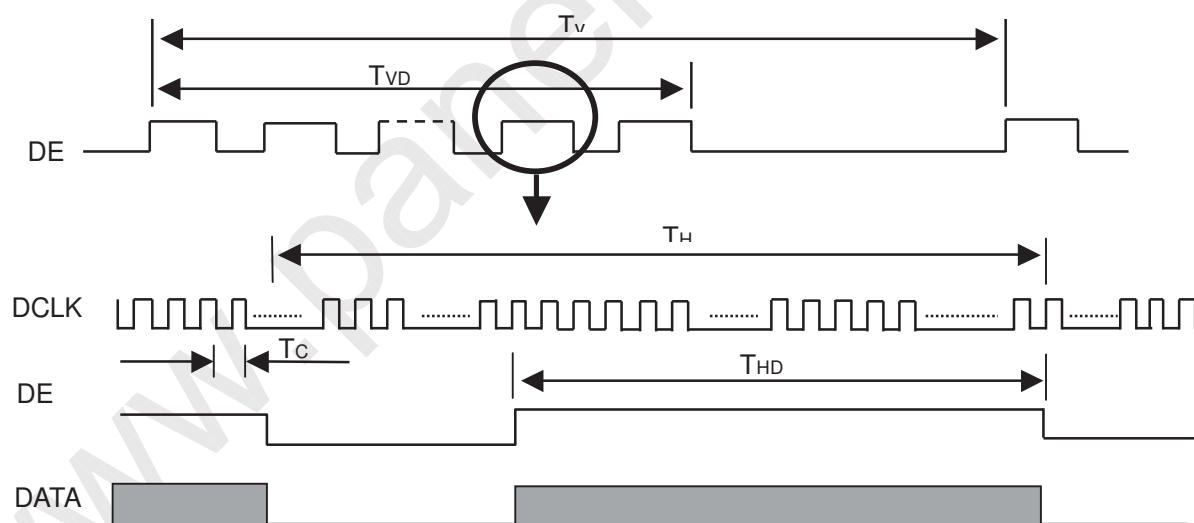
The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	1/Tc	50	77.1	82.5	MHz	(2)
DE	Vertical Total Time	TV	1205	1235	1500	TH	-
	Vertical Active Display Period	TVD	1200	1200	1200	TH	-
	Vertical Active Blanking Period	TVB	TV-TVD	35	TV-TVD	TH	
	Horizontal Total Time	TH	1020	1040	1200	Tc	(2)
	Horizontal Active Display Period	THD	960	960	960	Tc	(2)
	Horizontal Active Blanking Period	THB	TH-THD	80	TH-THD	Tc	(2)

Note (1) Because this module is operated by DE only mode, Hsync and Vsync are ignored.

(2) 2 channels LVDS input.

INPUT SIGNAL TIMING DIAGRAM



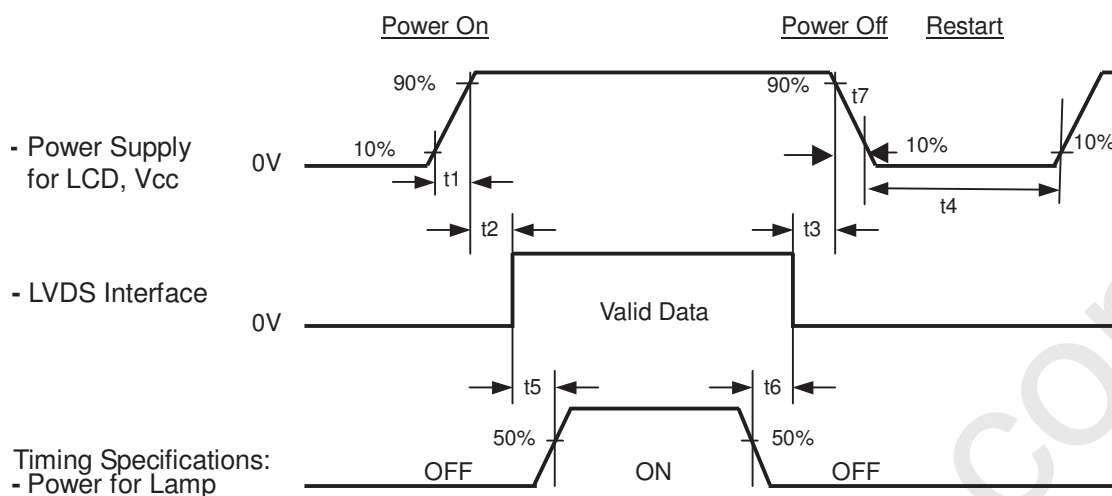


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6.2 POWER ON/OFF SEQUENCE



$$0.5 \leq t1 \leq 10 \text{ ms}$$

$$0 \leq t2 \leq 50 \text{ ms}$$

$$0 \leq t3 \leq 50 \text{ ms}$$

$$t4 \geq 500 \text{ ms}$$

$$t5 \geq 200 \text{ ms}$$

$$t6 \geq 200 \text{ ms}$$

Note (1) Please follow the power on/off sequence described above. Otherwise, the LCD module might be damaged.

Note (2) Please avoid floating state of interface signal at invalid period. When the interface signal is invalid, be sure to pull down the power supply of LCD Vcc to 0 V.

Note (3) The Backlight inverter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight inverter power must be turned off before the power supply for the logic and the interface signal is invalid.

Note (4) Sometimes some slight noise shows when LCD is turned off (even backlight is already off). To avoid this phenomenon, we suggest that the Vcc falling time is better to follow $5 \leq t7 \leq 300 \text{ ms}$.



7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

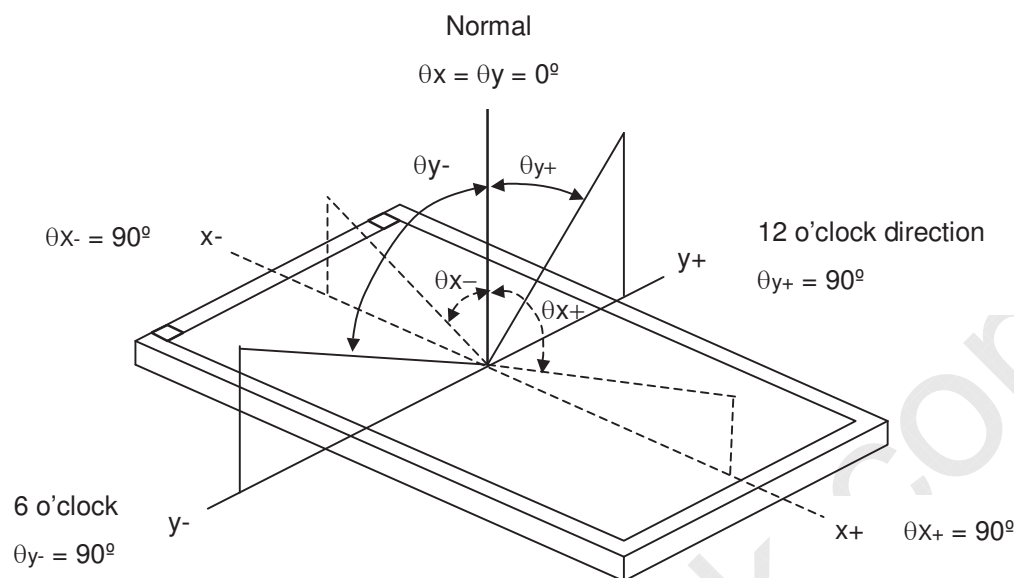
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V _{CC}	3.3	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Inverter Current	I _L	7.5	mA
Inverter Driving Frequency	F _L	55	KHz
Inverter	NEC/Tokin D7318-B001-M1-F2		

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

7.2 OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	R _x	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	Typ – 0.03	0.661	Typ + 0.03	—	(1), (6)
		R _y			0.334			
	Green	G _x			0.203			
		G _y			0.683			
	Blue	B _x			0.142			
		B _y			0.096			
	White	W _x			0.313			
		W _y			0.329			
Center Luminance of White		L _{AVG}		230	270	—	cd/m ²	(4), (6)
Contrast Ratio		CR		420	600	—	—	(2), (6)
Response Time		T _R	—	2	7	ms	(3)	
		T _F	—	8	13	ms		
White Variation		δW	—	1.25	1.40	—	(5)	
Viewing Angle	Horizontal	θ _{x+}	CR ≥ 10	60	70	—	Deg.	(1)
		θ _{x-}		60	70	—		
	Vertical	θ _{y+}		50	60	—		
		θ _{y-}		50	60	—		

Note (1) Definition of Viewing Angle (θ_x , θ_y):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

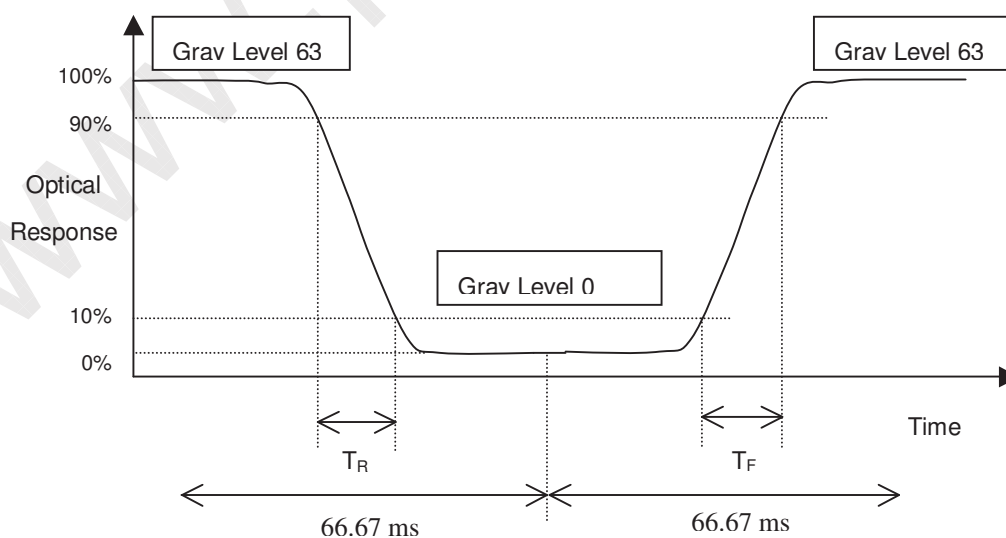
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

$$\text{CR} = \text{CR} (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

Note (3) Definition of Response Time (T_R , T_F) and measurement method:





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Note (4) Definition of Center Luminance of White (L_{CEN}):

Measure the luminance of gray level 63 at center points

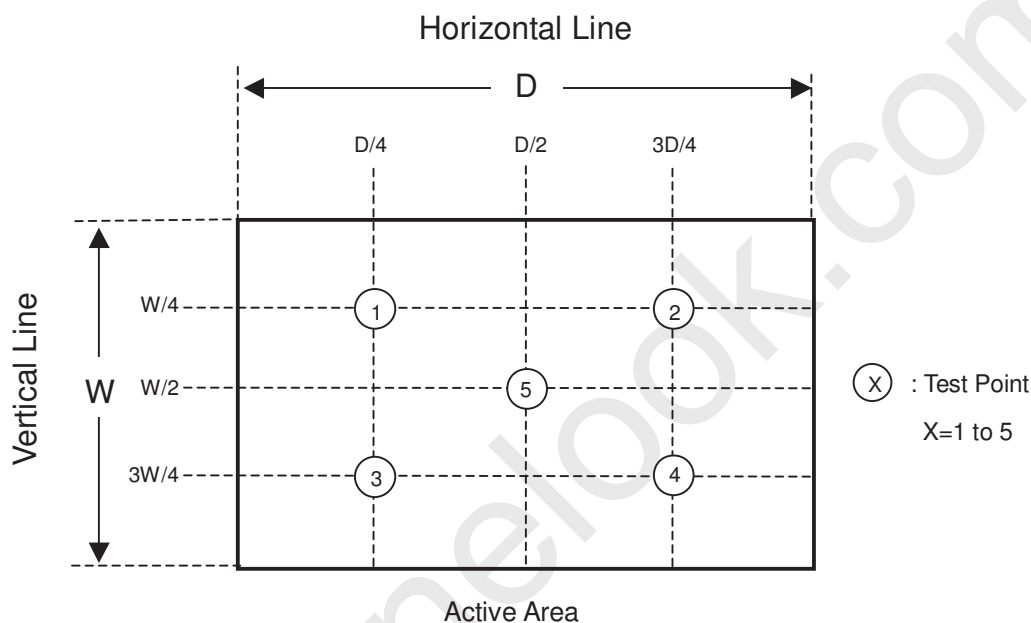
$$L_{CEN} = L(5)$$

$L(x)$ is corresponding to the luminance of the point X at Figure in Note (5)

Note (5) Definition of White Variation (δW):

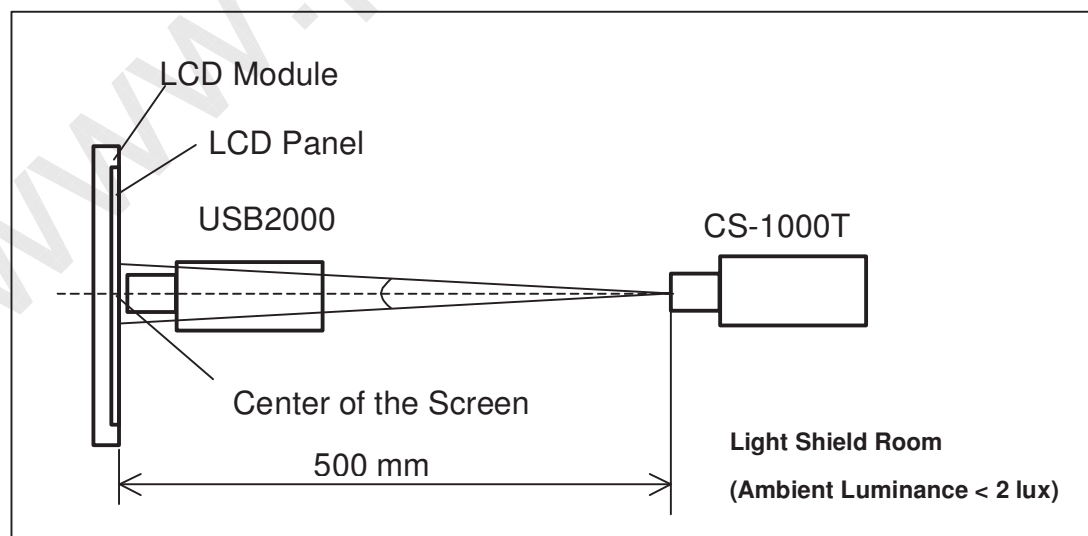
Measure the luminance of gray level 63 at 5 points

$$\delta W = \text{Maximum } [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum } [L(1), L(2), L(3), L(4), L(5)]$$



Note (6) Measurement Setup:

The LCD module should be stabilized at given temperature for (20) minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for (20) minutes in a windless room.



8. PRECAUTIONS

8.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
- (4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- (5) Do not pull the I/F connector in or out while the module is operating.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
- (9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (10) When ambient temperature is lower than 10°C may reduce the display quality. For example, the response time will become slowly, and the starting voltage of CCFL will be higher than room temperature.

8.2 SAFETY PRECAUTIONS

- (1) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with inverter. Do not disassemble the module or insert anything into the Backlight unit.
- (2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (3) After the module's end of life, it is not harmful in case of normal operation and storage.

9.2 PALLET

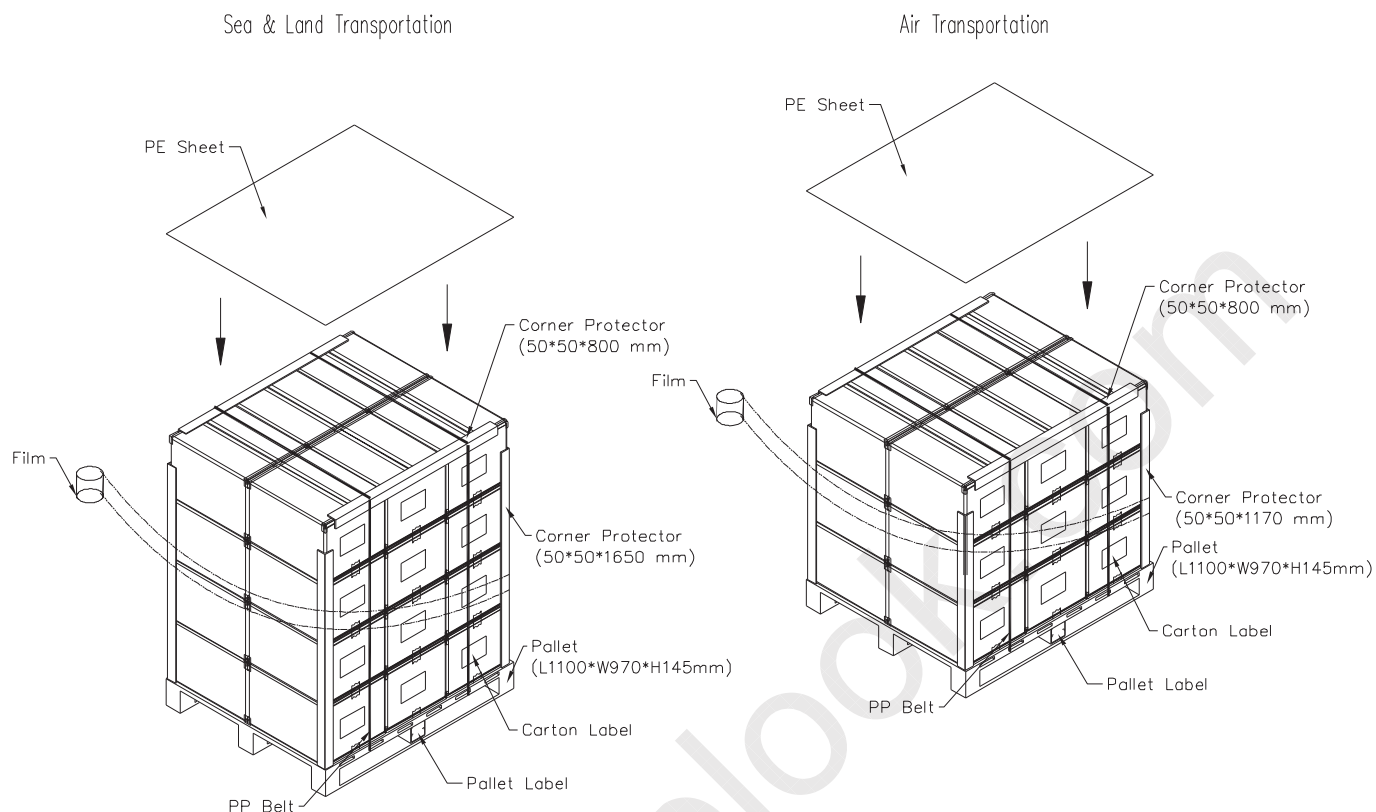


Figure. 9-2 Packing method

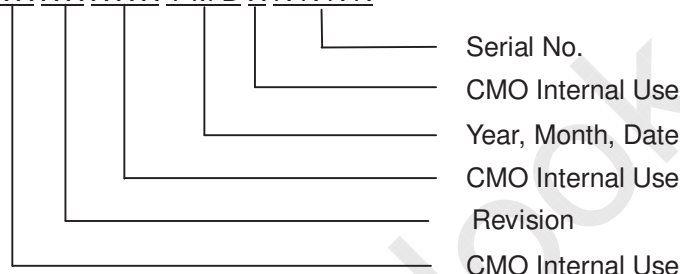
10. DEFINITION OF LABELS

10.1 CMO MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



- (a) Model Name: N201J4 - L01
 (b) Revision: Rev. XX, for example: A1, ..., C1, C2 ...etc.
 (c) Serial ID: X X X X X X Y M D X N N N N



- (d) Production Location: MADE IN XXXX. XXXX stands for production location.
 (e) UL logo: LEOO especially stands for panel manufactured by CMO NingBo satisfying UL requirement.
 The panel without LEOO mark stands for manufactured by CMO Taiwan satisfying UL requirement.


Serial ID includes the information as below:

- (a) Manufactured Date: Year: 1~9, for 2001~2009
 Month: 1~9, A~C, for Jan. ~ Dec.
 Day: 1~9, A~Y, for 1st to 31st, exclude I, O and U
 (b) Revision Code: cover all the change
 (c) Serial No.: Manufacturing sequence of product

HP CT label bar code definition:

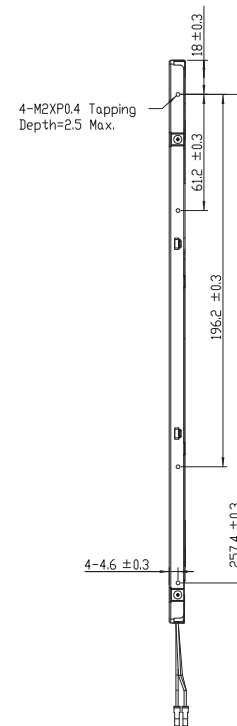
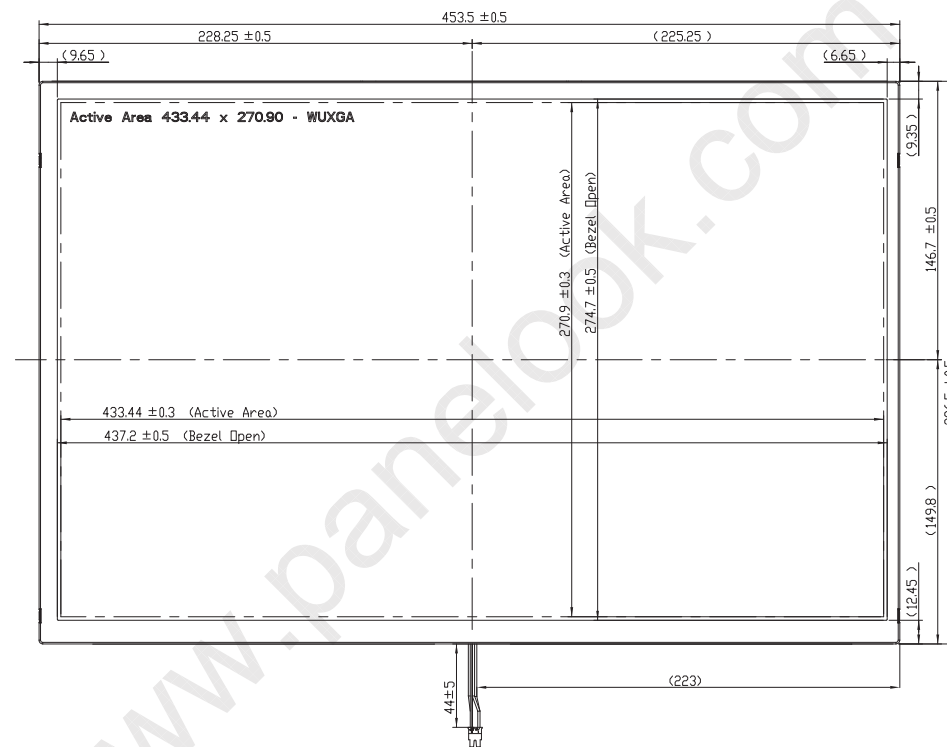
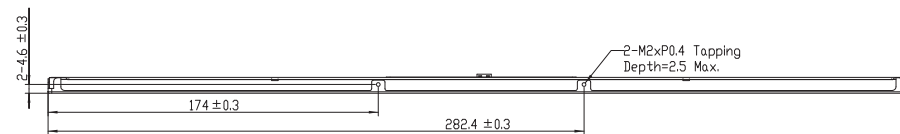
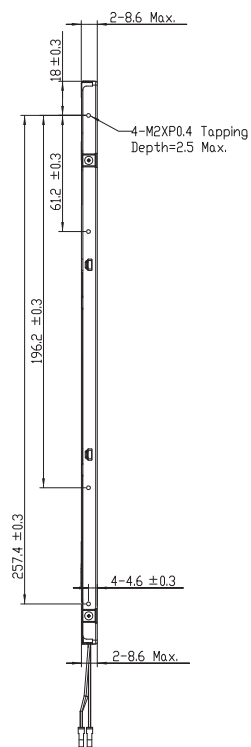
- 甲、C: Consistent display module code
 乙、AAAA: Consistent assembly code for this CMO model
 丙、00: Revision code, begin from "01" and so on when version updated
 丁、DD: Production location code
 戊、WW: production week
 己、XXX: serial numbers

10.2 CARTON LABEL



The image shows a template for a carton label. At the top left is the CHI MEI logo and the text "CHI MEI OPTOELECTRONICS". Below this are four lines for labeling: "PO.NO.", "Part ID.", "Model Name", and "Carton ID." followed by a line for "Quantities". At the bottom left, it says "Made in XXXX". At the bottom right, there is a circular logo with "GP" inside and "RoHS" below it. A large, faint watermark "www.panelook.com" is visible diagonally across the page.

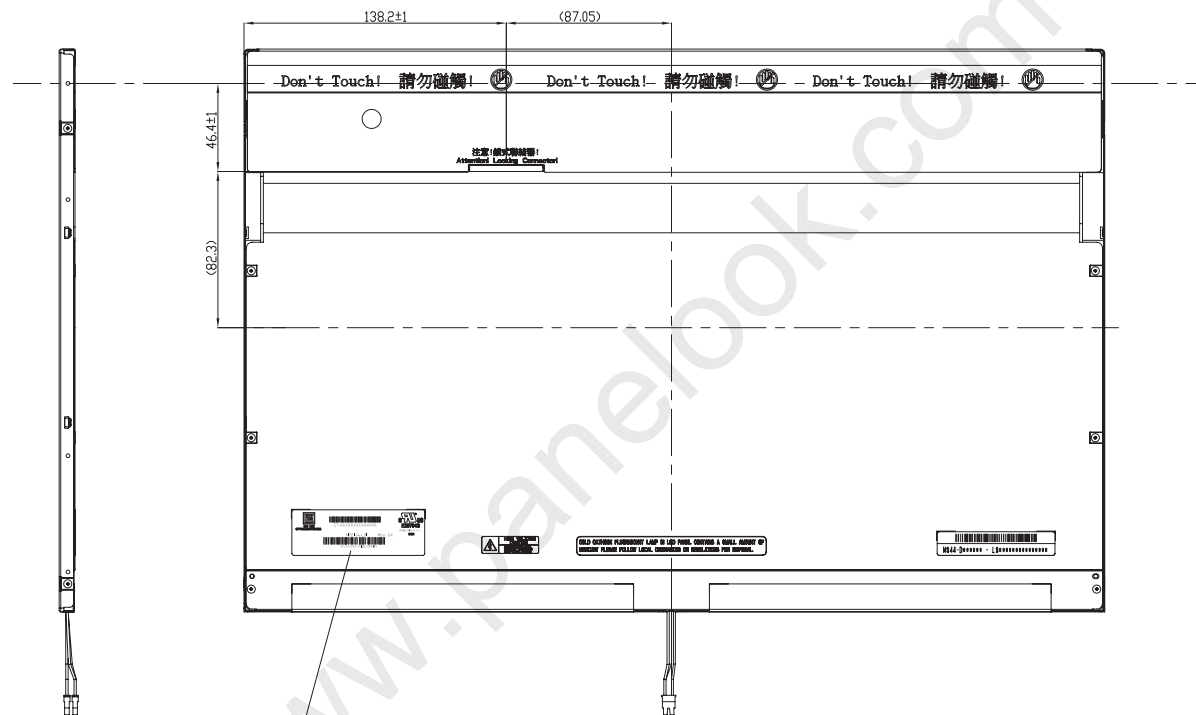
(a) Production location: Made In XXXX. XXXX stands for production location.



- Notes:
- 1.General tolerance: ±0.5mm.
 - 2.Screw torque: Max. 2.5 kgf-cm.
 - 3.Backlight lamp connector: BHSR-02-VS-1 (JST).
 - 4.LCD module input connector: FI-NXB40SL-HF10 (JAE).
 - 5.Gap between bezel and panel: Max 0.5mm.

Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark
1						
2						
3						

TITLE		OUTLINE NOB/LA-LA		REV. 1.0 UP REV. 1.0	
Approved	DAVIS WANG	Drawing No.	N0024100A		
Checked	SHAWN CHING	Part No.	NA		
Drawn	BRIAN JI	Material	NA	Sheet	1 / 2
Designer	KALEN YE	Date	27-Mar-2007	Scale	1:1
 CHI MEI OPTOELECTRONICS CORP.		ALL RIGHTS RESERVED. COPYING FORBIDDEN.			



Notes:
1.General tolerance: $\pm 0.5\text{mm}$.
2.Screw torque: Max. 2.5 kgf-cm.
3.Backlight lamp connector: BHSR-02-VS-1 (JST).
4.LCD module input connector: FI-NXB40SL-HF10 (JAE).
5.Gap between bezel and panel: Max 0.5mm.

TITLE		OUTLINE: NISOL-J-LIN		2D REV: A 3D REV: 1.0	
Approved	DAVIS WING	Drawing No.	N2025-400A		
Checked	SHUNNIN CHUNG	Part No.	NA		
Drafter	WISAL JU	Material	NA		Sheet 2 / 2
Designer	KALLEN KE	Date	27-Mar-2007	Scale	1:1 Unseen @

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