CHI MEI
OPTOELECTRONICS CORP.

TFT LCD Approval Specification

MODEL NO.: N121IB - L06

Customer: _____

Approved by: _____

Note:

2009-01-15 10:57:21 CST	PMMD III Director	annie_hsu(/56522 / 54873)	Director	Accept

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Version 2.2

REVISION HISTORY

Version	Date	Page (New)	Section	Description
2.0	Sep. 23, 2008	All	All	Approval specification was first issued.
2.1	Nov. 10, 2008	11	5.1	Update Pin Assignment
2.1	Nov. 10, 2008	17	6.1-6.3	Update Converter Specification
2.2	Dec. 23, 2008	20	8.2	Update Color Gamut

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1. GENERAL DESCRIPTION

1.1 OVERVIEW

N121IB - L06 is a 12.1" TFT Liquid Crystal Display module with LED Backlight unit and 40 pins LVDS interface. This module supports 1280 x 800 WXGA mode and can display 262,144 colors. The optimum viewing angle is at 6 o'clock direction. The converter module for Backlight is built in.

1.2 FEATURES

- VESA Standard

- WXGA (1280 x 800 pixels) resolution

- 3.3V LVDS (Low Voltage Differential Signaling) interface with 1 pixel/clock

- Meet RoHS requirement

- LED Backlight

1.3 APPLICATION

- TFT LCD Notebook

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Active Area	261.12 (H) x 163.2 (V) (12.1" diagonal)	mm	(1)
Bezel Opening Area	263.67 (H) x 165.75 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1280 x R.G.B. x 800	pixel	-
Pixel Pitch	0.204 (H) x 0.204 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	262,144	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)	275.3	275.8	276.3	mm	(1)
	Vertical(V)	177.4	178	178.6	mm	
	Depth(D)	---	5.0	5.3	mm	
Weight		---	270	285	g	-
I/F connector mounting position		The mounting inclination of the connector makes the screen center within ±0.5mm as the horizontal.				(2)

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

Note (2) Connector mounting position

+/- 0.5mm

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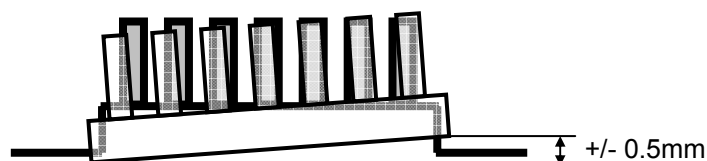
2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)
Shock (Non-Operating)	S_{NOP}	-	220/2	G/ms	(3), (5)
Vibration (Non-Operating)	V_{NOP}	-	1.5	G	(4), (5)

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

(a) 90 %RH Max. (Ta   40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

Note (2) The temperature of panel display surface area should be 0 ºC Min. and 60 ºC Max.

Relative Humidity (%RH)

Temperature (ºC)
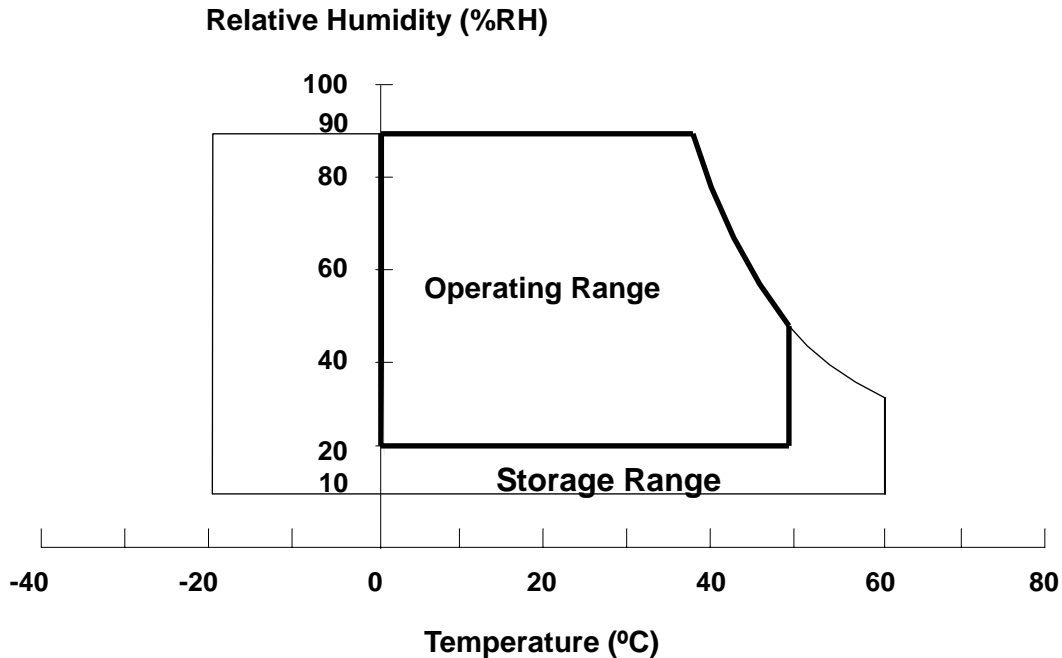
Note (3) 1 time for ± X, ± Y, ± Z. for Condition (220G / 2ms) is half Sine Wave,

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

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:
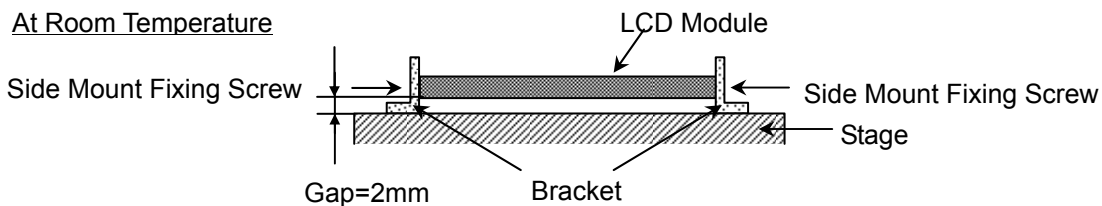
2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V_{CC}	-0.3	+4.0	V	(1)
Logic Input Voltage	V_{IN}	-0.3	V_{CC}+0.3	V	

2.2.2 BACKLIGHT UNIT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
LED Light Bar Power Supply Voltage	V_L	-35	23.8	V	(1), (2)
LED Light Bar Power Supply Current	I_L	0	150	mA	

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 LED (Refer to 3.2 for further information).

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE
Ta = 25 ± 2 ℃

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	-
Permissive 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	Icc	210	230	250	mA	(3)a
	Black		250	280	330	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}		1.57		W	(4)

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

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.
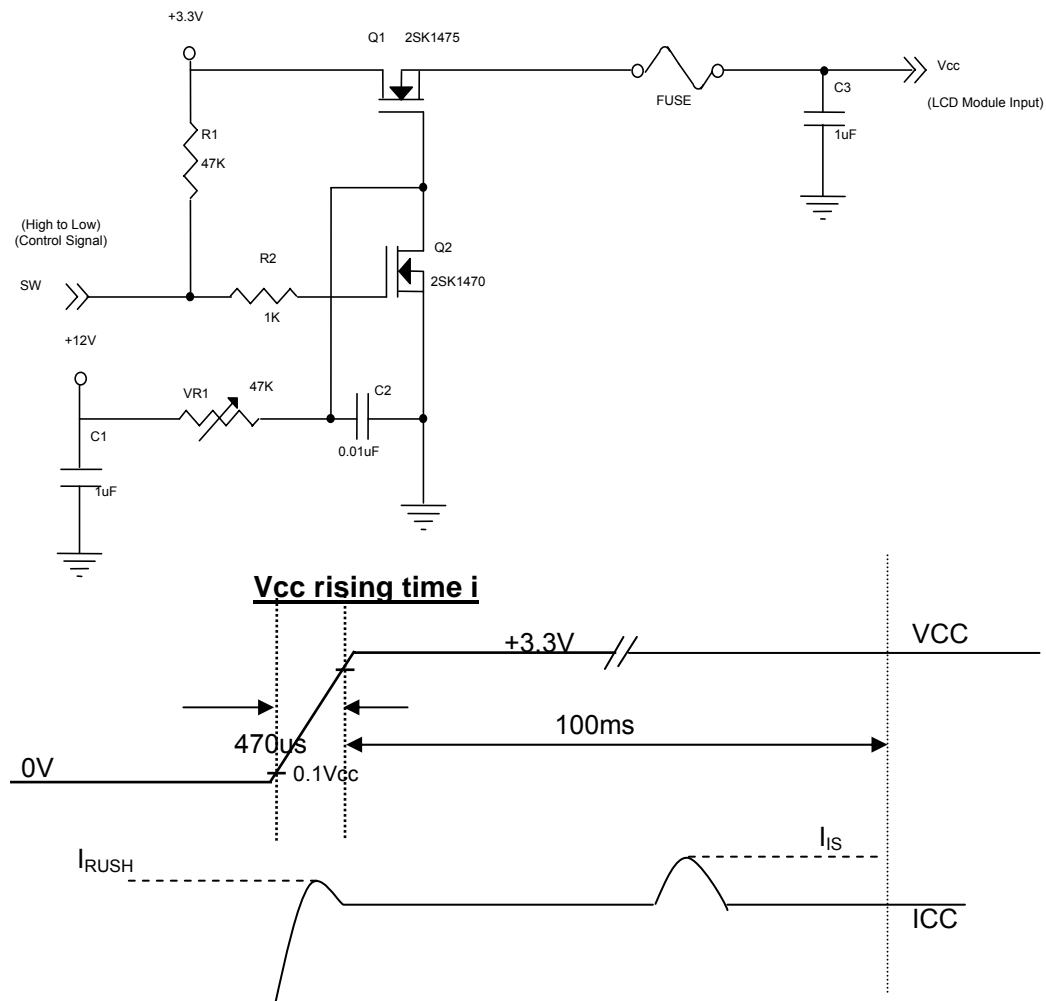
Note (3) The specified power supply current is under the conditions at Vcc = 3.3 V, Ta = 25 ± 2 °C, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern
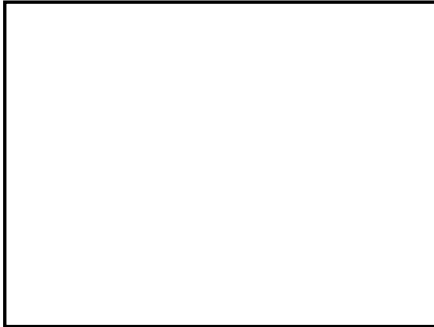
b. Black Pattern

Active Area
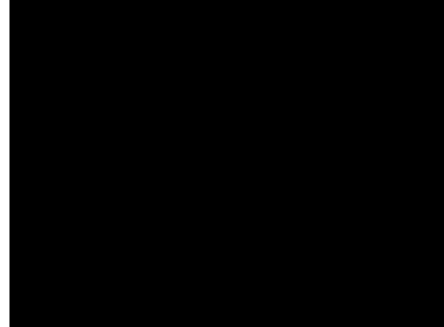
Active Area

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

(a) Vcc = 3.3 V, Ta = 25 ± 2 °C, f_v = 60 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.

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

Single Ended

V_{CM}

0V

$|V_{ID}|$

Differential

$V_{TH(LVDS)}$

0V

$V_{TL(LVDS)}$

$|V_{ID}|$

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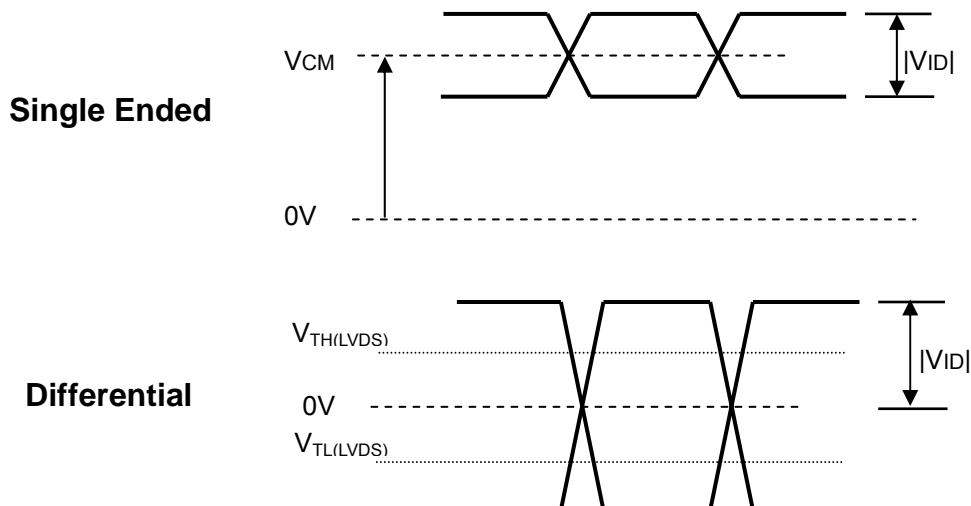
3.2 BACKLIGHT UNIT   Ta = 25 ± 2 ℃

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED light bar Power Supply Voltage	V_L	-	22.4	23.8	V_{dc}	(1), (2)
LED light bar Power Supply Current	I_L	-	105	150	mA	
LED Life Time	L_{BL}	12,000	-	-	Hrs	(4)
Power Consumption	P_L	-	2.35	-	W	(3), I_L = 105mA

Note (1) LED light bar configuration is shown as below:

$V_{L,} I_L$

Light Bar Feedback
Channels

LED
Light Bar
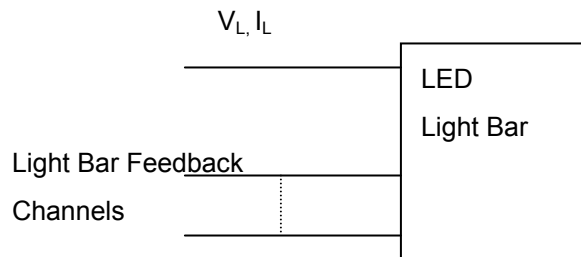
Note (2) For better LED light bar driving quality, it is recommended to utilize the adaptive boost converter with current balancing function to drive LED light-bar.

Note (3) $P_L = I_L \times V_L$

Note (4) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ±2 ℃ and I_L = 17.5 mA(Per EA) until the brightness becomes   50% of its original value.

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4. BLOCK DIAGRAM

4.1 TFT LCD MODULE

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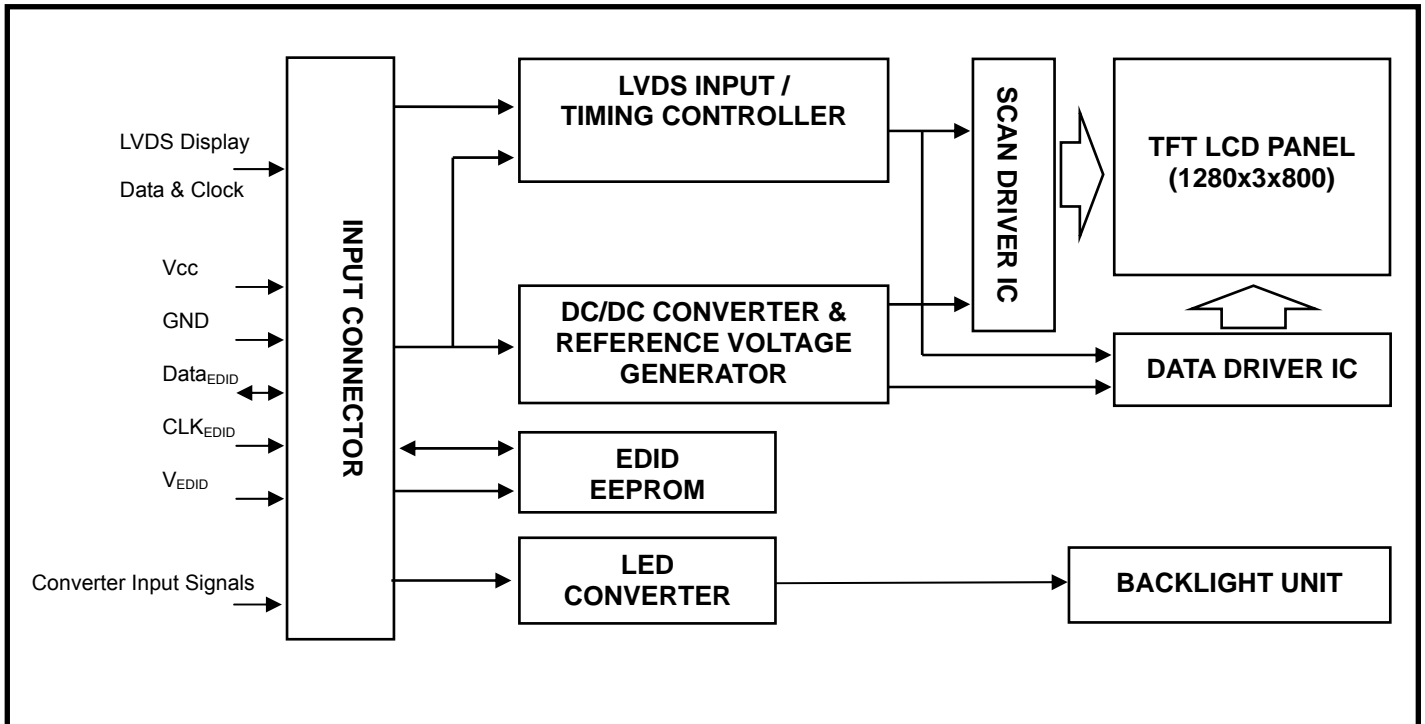
5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin	Symbol	Description	Polarity	Remark
1	NC	No Connection (Reserved for supplier)		-
2	VCCS	Power Supply, 3.3V (typical)		-
3	VCCS	Power Supply, 3.3V (typical)		-
4	EE_VDD	DDC 3.3V power		
5	BIST	Panel Self Test		
6	EE_SC	DDC Clock		
7	EE_SD	DDC Data		
8	Rin0-	- LVDS differential data input (R0-R5, G0)	Negative	R0~R5,G0-
9	Rn0+	+ LVDS differential data input (R0-R5, G0)	Positive	
10	GND	Ground		
11	Rin1-	- LVDS differential data input (G1-G5, B0-B1)	Negative	
12	Rn1+	+ LVDS differential data input (G1-G5, B0-B1)	Positive	G1~G5,B0,B1
13	GND	Ground		
14	Rin2-	- LVDS differential data input (B2-B5,HS,VS, DE)	Negative	-
15	Rn2+	+ LVDS differential data input (B2-B5,HS,VS, DE)	Positive	B2~B5,Hsync,Vsync,DE
16	GND	Ground		
17	CLK-	- LVDS differential clock input	Negative	LVDS Level
18	CLK+	+ LVDS differential clock input	Positive	
19	GND	Ground	-	-
20	NC	No Connection	-	-
21	NC	No Connection		
22	GND	Ground		
23	NC	No Connection		
24	NC	No Connection		
25	GND	Ground		
26	NC	No Connection		
27	NC	No Connection		
28	GND	Ground		
29	NC	No Connection		
30	NC	No Connection		
31	GND	LED Ground		
32	GND	LED Ground		
33	GND	LED Ground		
34	NC	Non-Connection		
35	LED_VCCS	LED Power		
36	LED_VCCS	LED Power		
37	LED_VCCS	LED Power		
38	LED_PWM	PWM Control Signal of LED Converter		
39	LED_EN	Enable Control Signal of LED Converter		)
40	NC	Non-Connection		

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

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

Note (3) The first pixel is odd as shown in the following figure.
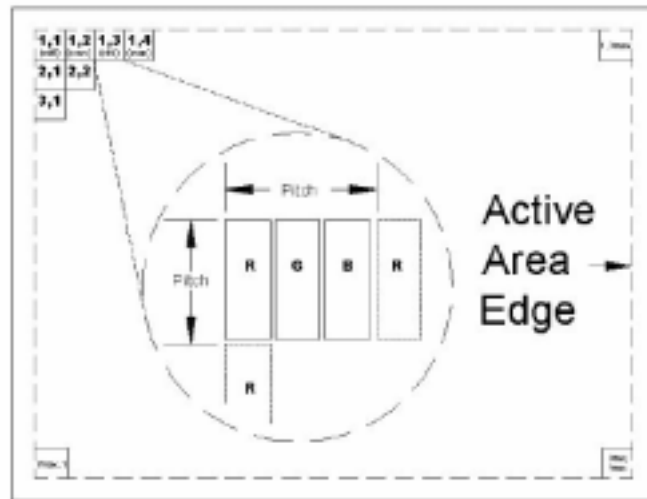
5.2 TIMING DIAGRAM OF LVDS INPUT SIGNAL

5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-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.

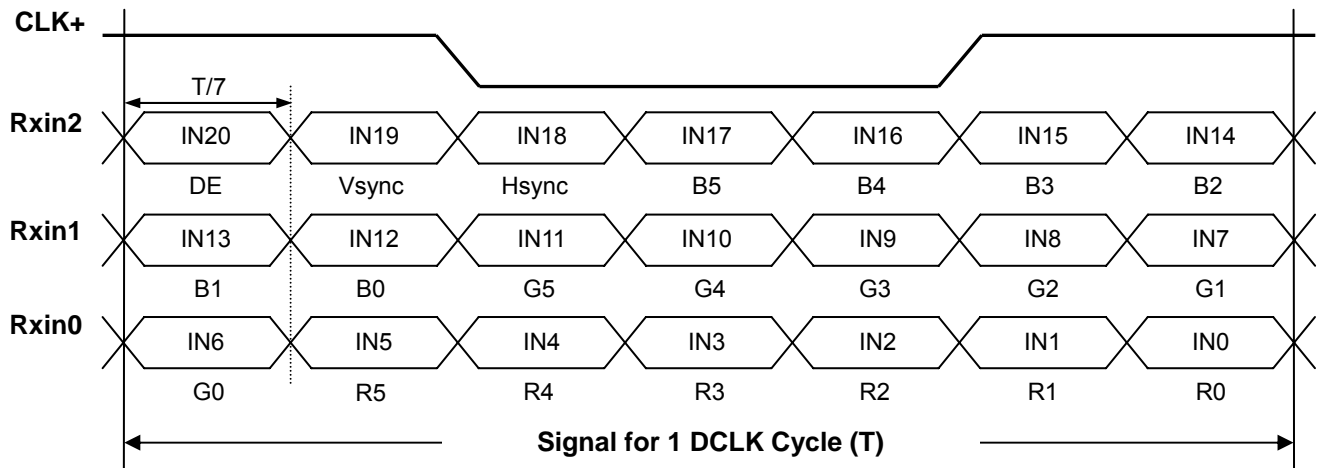| Color		Data Signal																		
		Red						Green						Blue						
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
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
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	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
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	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
	Blue(1)	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	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

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

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5.4 EDID DATA STRUCTURE

The EDID (Extended Display Identification Data) data formats are to support displays as defined in the

VESA Plug & Display and FPDI standards.

Byte # (decimal)	Byte # (hex)	Field Name and Comments	Value (hex)	Value (binary)
0	0	Header	00	00000000
1	1	Header	FF	11111111
2	2	Header	FF	11111111
3	3	Header	FF	11111111
4	4	Header	FF	11111111
5	5	Header	FF	11111111
6	6	Header	FF	11111111
7	7	Header	00	00000000
8	8	EISA ID manufacturer name ("CMO")	0D	00001101
9	9	EISA ID manufacturer name (Compressed ASCII)	AF	10101111
10	0A	ID product code (N121IB-L06)	33	00110011
11	0B	ID product code (hex LSB first; N121IB-L06)	12	00010010
12	0C	ID S/N (fixed "0")	00	00000000
13	0D	ID S/N (fixed "0")	00	00000000
14	0E	ID S/N (fixed "0")	00	00000000
15	0F	ID S/N (fixed "0")	00	00000000
16	10	Week of manufacture (fixed week code)	2D	00101101
17	11	Year of manufacture (fixed year code)	12	00010010
18	12	EDID structure version # ("1")	01	00000001
19	13	EDID revision # ("3")	03	00000011
20	14	Video I/P definition ("digital")	80	10000000
21	15	Max H image size ("26.112cm")	1A	00011010
22	16	Max V image size ("16.575cm")	11	00010001
23	17	Display Gamma (Gamma = "2.2")	78	01111000
24	18	Feature support ("Active off, RGB Color")	0A	00001010
25	19	Rx1 Rx0 Ry1 Ry0 Gx1 Gx0 Gy1 Gy0	61	01100001
26	1A	Bx1 Bx0 By1 By0 Wx1 Wx0 Wy1 Wy0	C5	11000101
27	1B	Rx=0.560	8F	10001111
28	1C	Ry=0.350	59	01011001
29	1D	Gx=0.340	57	01010111
30	1E	Gy=0.560	8F	10001111
31	1F	Bx=0.159	28	00101000
32	20	By=0.137	23	00100011
33	21	Wx=0.313	50	01010000
34	22	Wy=0.329	54	01010100
35	23	Established timings 1	00	00000000
36	24	Established timings 2	00	00000000
37	25	Manufacturer's reserved timings	00	00000000
38	26	Standard timing ID # 1	01	00000001
39	27	Standard timing ID # 1	01	00000001
40	28	Standard timing ID # 2	01	00000001

41	29	Standard timing ID # 2	01	00000001
42	2A	Standard timing ID # 3	01	00000001
43	2B	Standard timing ID # 3	01	00000001
44	2C	Standard timing ID # 4	01	00000001
45	2D	Standard timing ID # 4	01	00000001
46	2E	Standard timing ID # 5	01	00000001
47	2F	Standard timing ID # 5	01	00000001
48	30	Standard timing ID # 6	01	00000001
49	31	Standard timing ID # 6	01	00000001
50	32	Standard timing ID # 7	01	00000001
51	33	Standard timing ID # 7	01	00000001
52	34	Standard timing ID # 8	01	00000001
53	35	Standard timing ID # 8	01	00000001
54	36	Detailed timing description # 1 Pixel clock ("69.3MHz", According to VESA CVT Rev1.1)	12	00010010
55	37	# 1 Pixel clock (hex LSB first)	1B	00011011
56	38	# 1 H active ("1280")	00	00000000
57	39	# 1 H blank ("132")	84	10000100
58	3A	# 1 H active : H blank ("1280 : 132")	50	01010000
59	3B	# 1 V active ("800")	20	00100000
60	3C	# 1 V blank ("18")	12	00010010
61	3D	# 1 V active : V blank ("800 :18")	30	00110000
62	3E	# 1 H sync offset ("40")	28	00101000
63	3F	# 1 H sync pulse width ("26")	1A	00011010
64	40	# 1 V sync offset : V sync pulse width ("3 : 4")	34	00110100
65	41	# 1 H sync offset : H sync pulse width : V sync offset : V sync width ("40: 26 : 3 : 4")	00	00000000
66	42	# 1 H image size ("260 mm")	04	00000100
67	43	# 1 V image size ("170 mm")	AA	10101010
68	44	# 1 H image size : V image size ("260 : 170")	10	00010000
69	45	# 1 H boarder ("0")	00	00000000
70	46	# 1 V boarder ("0")	00	00000000
71	47	# 1 Non-interlaced, Normal, no stereo, Separate sync, H/V pol Negatives	18	00011000
72	48	Detailed timing description # 2	00	00000000
73	49	# 2 Flag	00	00000000
74	4A	# 2 Reserved	00	00000000
75	4B	# 2 FE (hex) defines ASCII string (Model Name "N121IB-L06", ASCII)	FE	11111110
76	4C	# 2 Flag	00	00000000
77	4D	# 2 1st character of name ("N")	4E	01001110
78	4E	# 2 2nd character of name ("1")	31	00110001
79	4F	# 2 3rd character of name ("2")	32	00110010
80	50	# 2 4th character of name ("1")	31	00110001
81	51	# 2 5th character of name ("I")	49	01001001
82	52	# 2 6th character of name ("B")	42	01000010
83	53	# 2 7th character of name ("-")	2D	00101101
84	54	# 2 8th character of name ("L")	4C	01001100
85	55	# 2 9th character of name ("0")	30	00110000
86	56	# 2 9th character of name ("6")	36	00110110

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87	57	# 2 New line character indicates end of ASCII string	0A	00001010
88	58	# 2 Padding with "Blank" character	20	00100000
89	59	# 2 Padding with "Blank" character	20	00100000
90	5A	Detailed timing description # 3	00	00000000
91	5B	# 3 Flag	00	00000000
92	5C	# 3 Reserved	00	00000000
93	5D	# 3 FE (hex) defines ASCII string (Vendor "CMO", ASCII)	FE	11111110
94	5E	# 3 Flag	00	00000000
95	5F	# 3 1st character of string ("C")	43	01000011
96	60	# 3 2nd character of string ("M")	4D	01001101
97	61	# 3 3rd character of string ("O")	4F	01001111
98	62	# 3 New line character indicates end of ASCII string	0A	00001010
99	63	# 3 Padding with "Blank" character	20	00100000
100	64	# 3 Padding with "Blank" character	20	00100000
101	65	# 3 Padding with "Blank" character	20	00100000
102	66	# 3 Padding with "Blank" character	20	00100000
103	67	# 3 Padding with "Blank" character	20	00100000
104	68	# 3 Padding with "Blank" character	20	00100000
105	69	# 3 Padding with "Blank" character	20	00100000
106	6A	# 3 Padding with "Blank" character	20	00100000
107	6B	# 3 Padding with "Blank" character	20	00100000
108	6C	Detailed timing description # 4	00	00000000
109	6D	# 4 Flag	00	00000000
110	6E	# 4 Reserved	00	00000000
111	6F	# 4 FE (hex) defines ASCII string (Model Name"N121IB-L06", ASCII)	FE	11111110
112	70	# 4 Flag	00	00000000
113	71	# 4 1st character of name ("N")	4E	01001110
114	72	# 4 2nd character of name ("1")	31	00110001
115	73	# 4 3rd character of name ("2")	32	00110010
116	74	# 4 4th character of name ("1")	31	00110001
117	75	# 4 5th character of name ("I")	49	01001001
118	76	# 4 6th character of name ("B")	42	01000010
119	77	# 4 7th character of name ("-")	2D	00101101
120	78	# 4 8th character of name ("L")	4C	01001100
121	79	# 4 9th character of name ("0")	30	00110000
122	7A	# 4 9th character of name ("6")	36	00110110
123	7B	# 4 New line character indicates end of ASCII string	0A	00001010
124	7C	# 4 Padding with "Blank" character	20	00100000
125	7D	# 4 Padding with "Blank" character	20	00100000
126	7E	Extension flag	00	00000000
127	7F	Checksum	C4	11000100

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6. CONVERTER SPECIFICATION

6.1 ABSOLUTE MAXIMUM RATINGS

Symbol	Ratings
Vin	28V
Gnd	+/-0.3V
PWM, EN	-0.3V~5.5V

6.2 RECOMMENDED OPERATING RATINGS

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Input power supply voltage		V_{in}	6.0	12.0	20.0	V	
EN Control Level	Backlight On		2.0	---	5.5	V	
	Backlight Off		0	---	0.8	V	
PWM Control Level	PWM High Level		2.0	---	5.5	V	
	PWM Low Level		0	---	0.8	V	
PWM Control Duty Ratio			20	---	100	%	
PWM Control Ripple Voltage		V_{PWM_pp}		---	100	mV	
PWM Control Frequency		f_{PWM}	190	210	230	Hz	
LED Power Current	Vin=6V	I_{BL}	418	510	602	mA	(1)
	Vin=12V		209	255	301	mA	(1)
	Vin=20V		125	153	180	mA	(1)

Note (1) The specified LED power supply current is under the conditions at "LED_VCCS = Min, Typ, Max",

Ta = 25 ± 2 ºC, f_{PWM} = 200 Hz, Duty=100%.

6.3 LED BACKLIGHT CONTROLL POWER SEQUENCE

Timing Specifications:

T_A 0ms

T_B 0ms

T_C 0ms

T_D 0ms
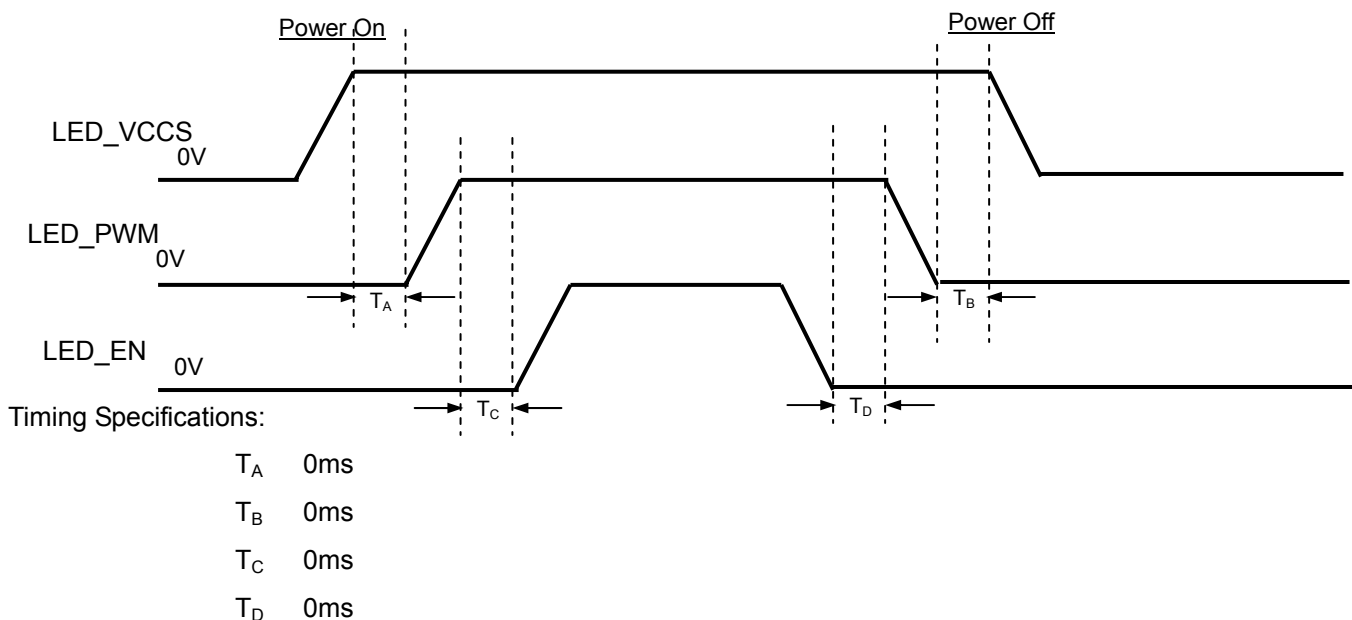
Note (1)   Please follow the LED backlight power sequence as above. If the customer could not follow, it might cause backlight flash issue during display ON/OFF or damage the LED backlight controller

Version 2.2

7. INTERFACE TIMING

7.1 INPUT SIGNAL TIMING SPECIFICATIONS

he specifications of input signal timing are as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	1/Tc	65.835	69.3	72.765	MHz	-
DE	Vertical Total Time	TV	802	818	1023	TH	-
	Vertical Active Display Period	TVD	800	800	800	TH	-
	Vertical Active Blanking Period	TVB	TV-TVD	18	TV-TVD	TH	
	Horizontal Total Time	TH	1380	1412	1600	Tc	-
	Horizontal Active Display Period	THD	1280	1280	1280	Tc	-
	Horizontal Active Blanking Period	THB	TH-THD	132	TH-THD	Tc	

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

INPUT SIGNAL TIMING DIAGRAM
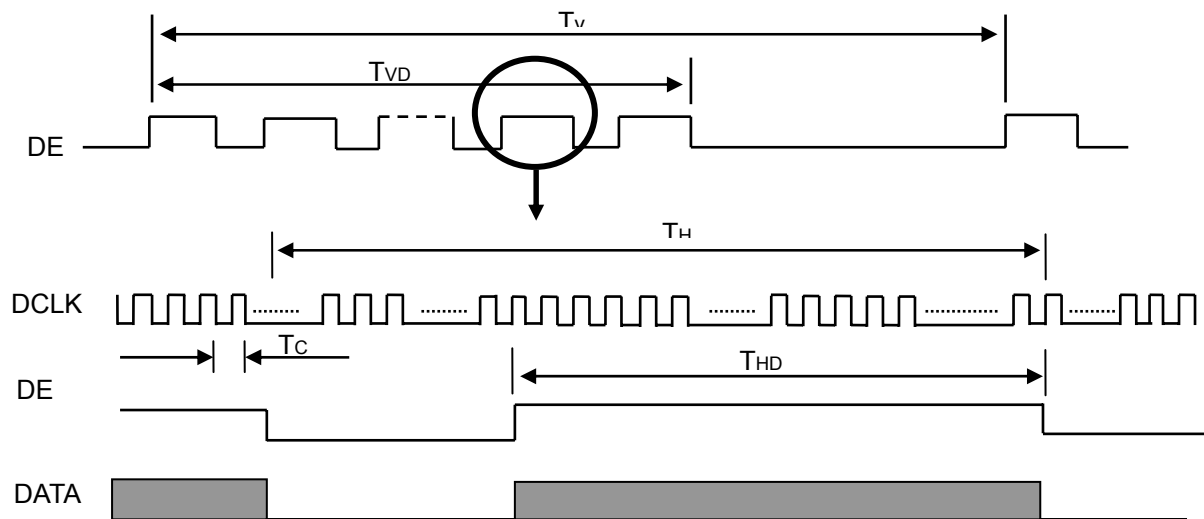
7.2 POWER ON/OFF SEQUENCE
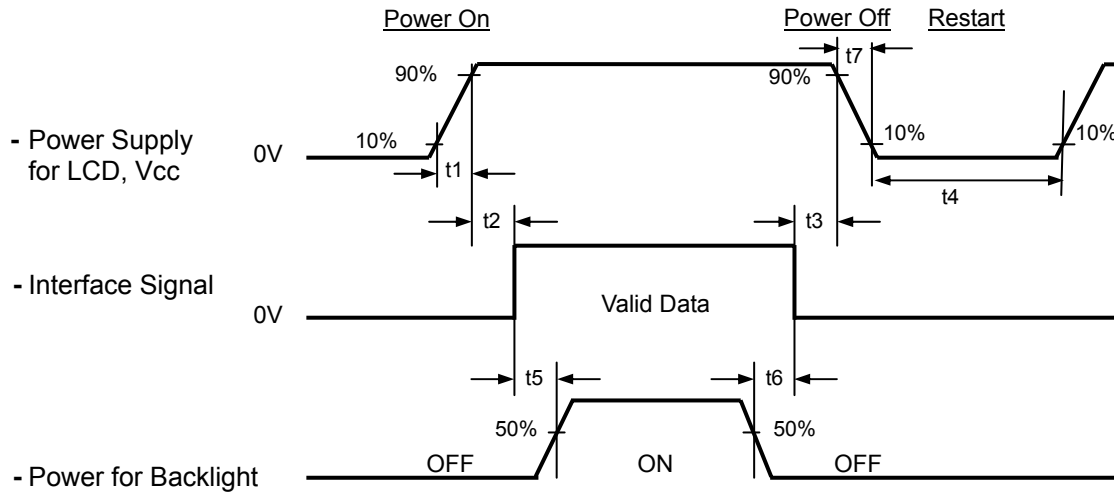
Timing Specifications:

0.5	t1	10 ms
0	t2	50 ms
0	t3	50 ms
	t4	500 ms
	t5	200 ms
	t6	200 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 converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter 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 50us   t7   10ms.
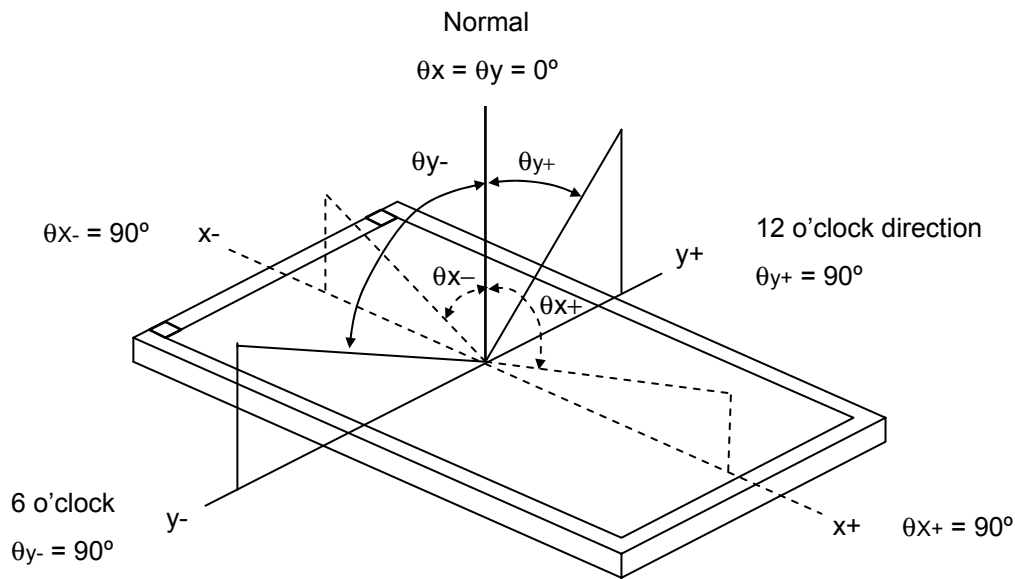
8. OPTICAL CHARACTERISTICS

8.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	^{o}C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	3.3	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current	I_L	105	mA

The measurement methods of optical characteristics are shown in Section 8.2. The following items should be measured under the test conditions described in Section 8.1 and stable environment shown in Note (5).

8.2 OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR		500	600	-	-	(2), (5)
Response Time		T_R		-	3	8	ms	(3)
		T_F		-	7	12	ms	
Luminance of White (5P)		L_{AVE}		190	220	-	cd/m^2	(4), (5)
White Variation		δW		-	-	1.40	-	(5), (6)
Color Chromaticity	Red	Rx	θ_x=0°, θ_Y=0° Viewing Normal Angle	Typ.- 0.05	0.550	Typ.+ 0.05	-	(1), (5)
		Ry			0.354		-	
	Green	Gx			0.355		-	
		Gy			0.563		-	
	Blue	Bx			0.160		-	
		By			0.127		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
	Color Gamut	C.G		38	40	42	%	(7)
Viewing Angle	Horizontal	θ_x+	CR≥10	40	45	-	Deg.	(1), (5)
		θ_x-		40	45	-		
	Vertical	θ_Y+		15	20	-		
		θ_Y-		40	45	-		

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Note (1)   Definition of Viewing Angle (θx, θy):

Normal

$\theta x = \theta y = 0°$

$\theta y-$ $\theta y+$

$\theta x- = 90°$ x-

12 o'clock direction

$\theta y+ = 90°$

y+

$\theta x-$ $\theta x+$

6 o'clock   y-

x+ $\theta x+ = 90°$

$\theta y- = 90°$

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

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0
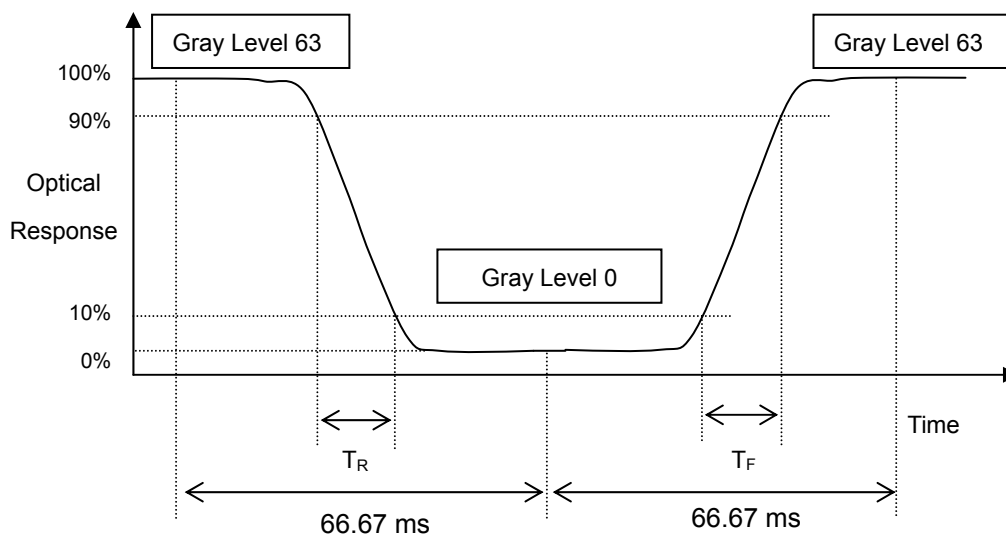
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

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

Gray Level 63   Gray Level 63

100%

90%

Optical

Response

Gray Level 0

10%

0%

Time

T_R T_F

66.67 ms   66.67 ms

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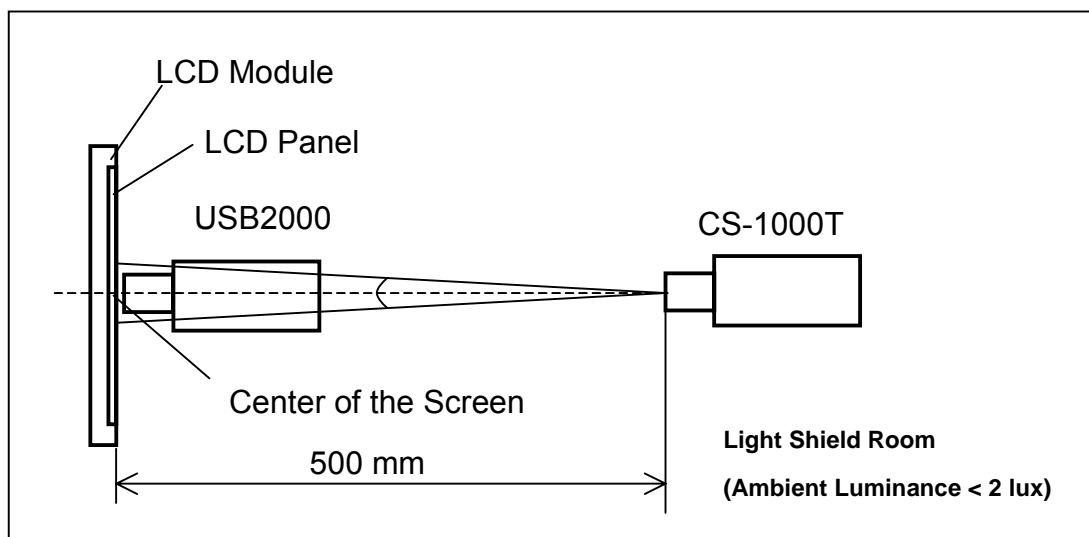Note (4) Definition of Average Luminance of White (L_{AVE}):

Measure the luminance of gray level 63 at 5 points

L_{AVE} = [L (1)+ L (2)+ L (3)+ L (4)+ L (5)] / 5

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) 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.

LCD Module

LCD Panel

USB2000

CS-1000T

Center of the Screen

500 mm

Light Shield Room

(Ambient Luminance < 2 lux)

Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 63 at 5 points

δW = Maximum [L (1), L (2), L (3), L (4), L (5)] / Minimum [L (1), L (2), L (3), L (4), L (5)]

Horizontal Line

D

D/4   D/2   3D/4

Vertical Line

W

W/4 .... ① .... ②

W/2 .... ⑤

3W/4 .... ③ .... ④

Ⓧ : Test Point

X=1 to 5

Active Area

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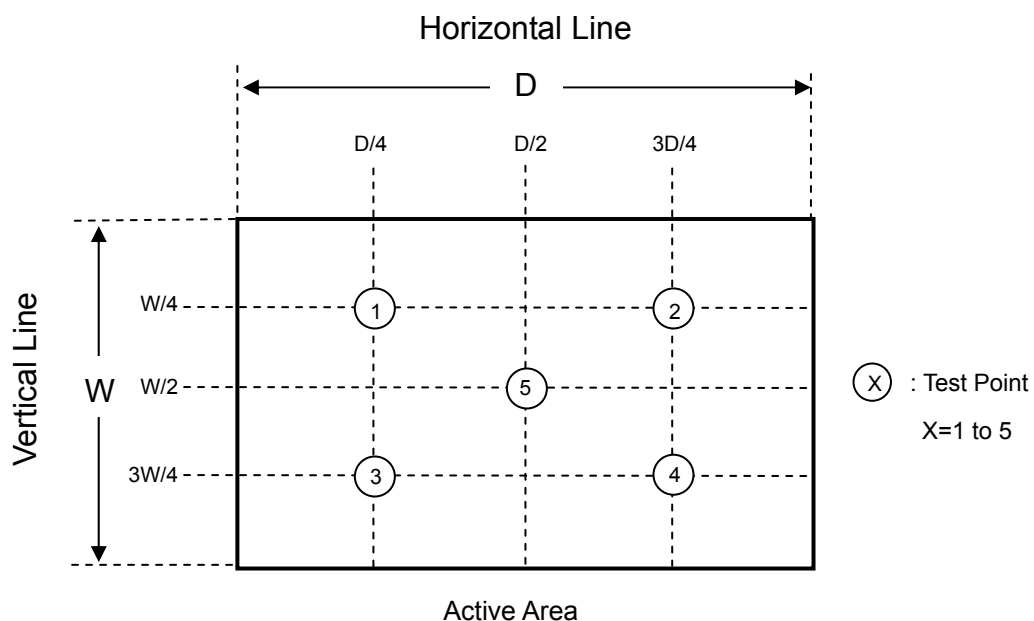
Note (7) Definition of color gamut (C.G%):

C.G%=　R G B /　R_0 G_0 B_0,*100%

R_0, G_0, B_0 : color coordinates of red, green, and blue defined by NTSC, respectively.

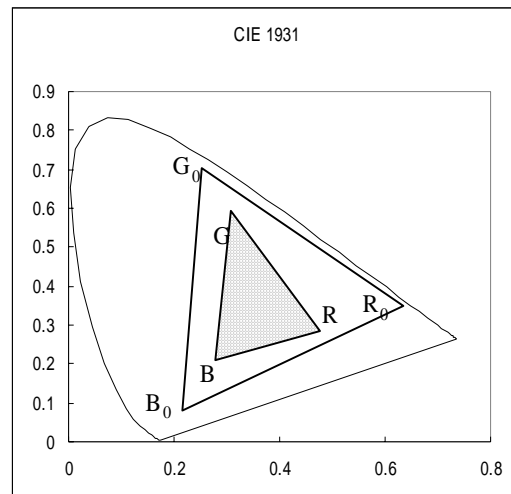R, G, B : color coordinates of module on 63 gray levels of red, green, and blue, respectively.

R_0 G_0 B_0 : area of triangle defined by R_0, G_0, B_0

R G B: area of triangle defined by R, G, B

9. PRECAUTIONS

9.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.

(2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.

(3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.

(4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.

(5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.

(6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.

(9) Do not disassemble the module.

(10) Do not pull or fold the lamp wire.

(11) Pins of I/F connector should not be touched directly with bare hands.

9.2 SAFETY PRECAUTIONS

(1) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with converter. 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.

9.3 OPERATION PRECAUTIONS

(1) Do not pull the I/F connector in or out while the module is operating.

(2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.

(3) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with converter. Do not disassemble the module or insert anything into the Backlight unit.

9.4 OTHER PRECAUTIONS

(1) When fixed patterns are displayed for a long time, remnant image is likely to occur.

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10. PACKAGING

10.1 CARTON

Note
1. Bill of Material
   Box assembly
   ├ Outer box (x1)
   ├ Holder (x20)
   ├ Top (x1)
   └ Inner box (x1)
2. Don't remove/insert the LCD module
   from/into inner box without Holder.
3. Don't lift up Inner box including the LCD module
4. Box Dimensions: 374(L)*334(W)*348(H) mm
5. Weight: Approx. 7.3kg (20module .per. 1 box)
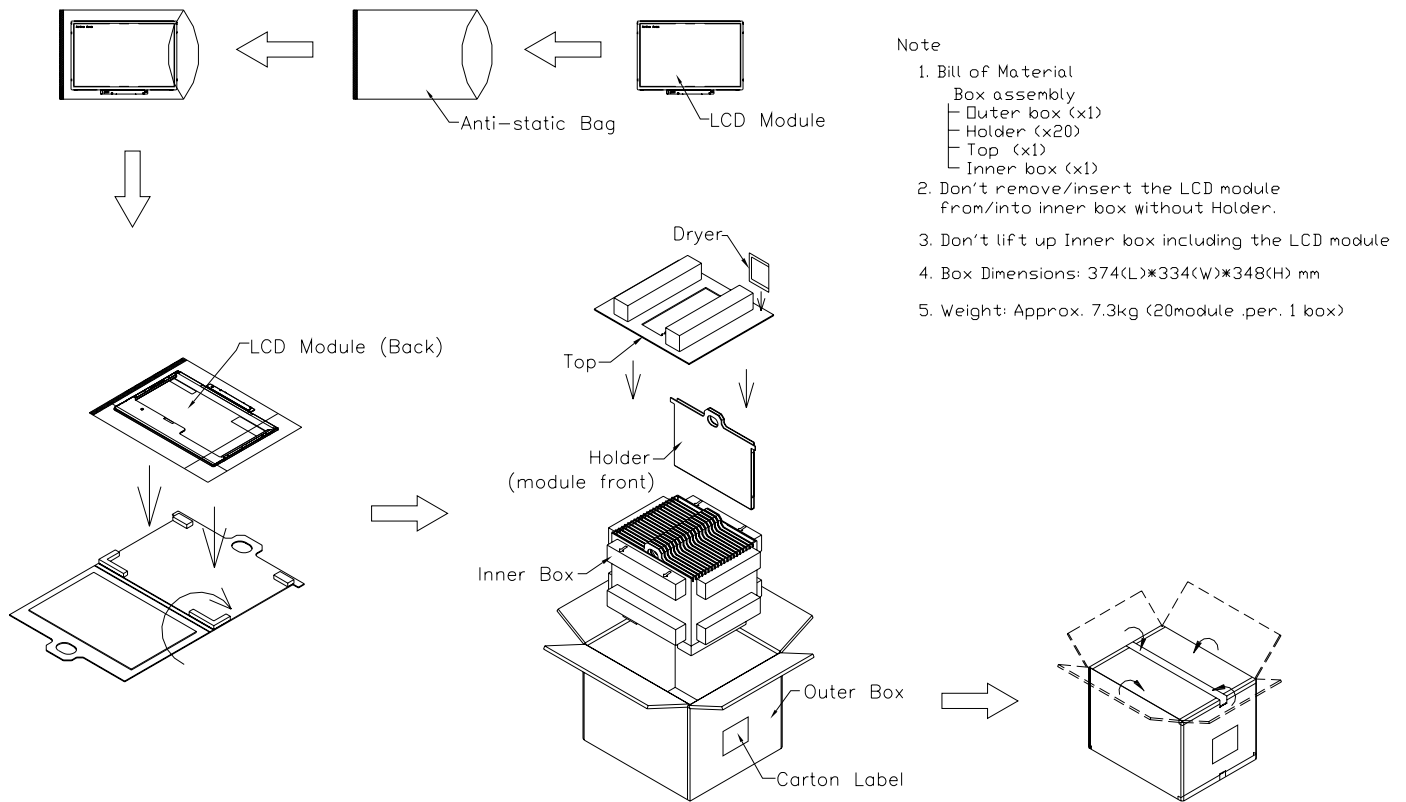
Figure. 10-1 Packing method

10.2 PALLET

Sea & Land Transportation

Air Transportation

PE Sheet

PE Sheet

Corner Protector
(50*50*1130mm)

Corner Protector
(50*50*1130mm)

Corner Protector
(50*50*1400mm)

Corner Protector
(50*50*1170mm)

Film

Film

PP Belt

PP Belt

Carton Lable

Carton Lable

PP Belt

Pallet
(L1180*W1000*H135mm)

Pallet
(L1180*W1000*H135mm)

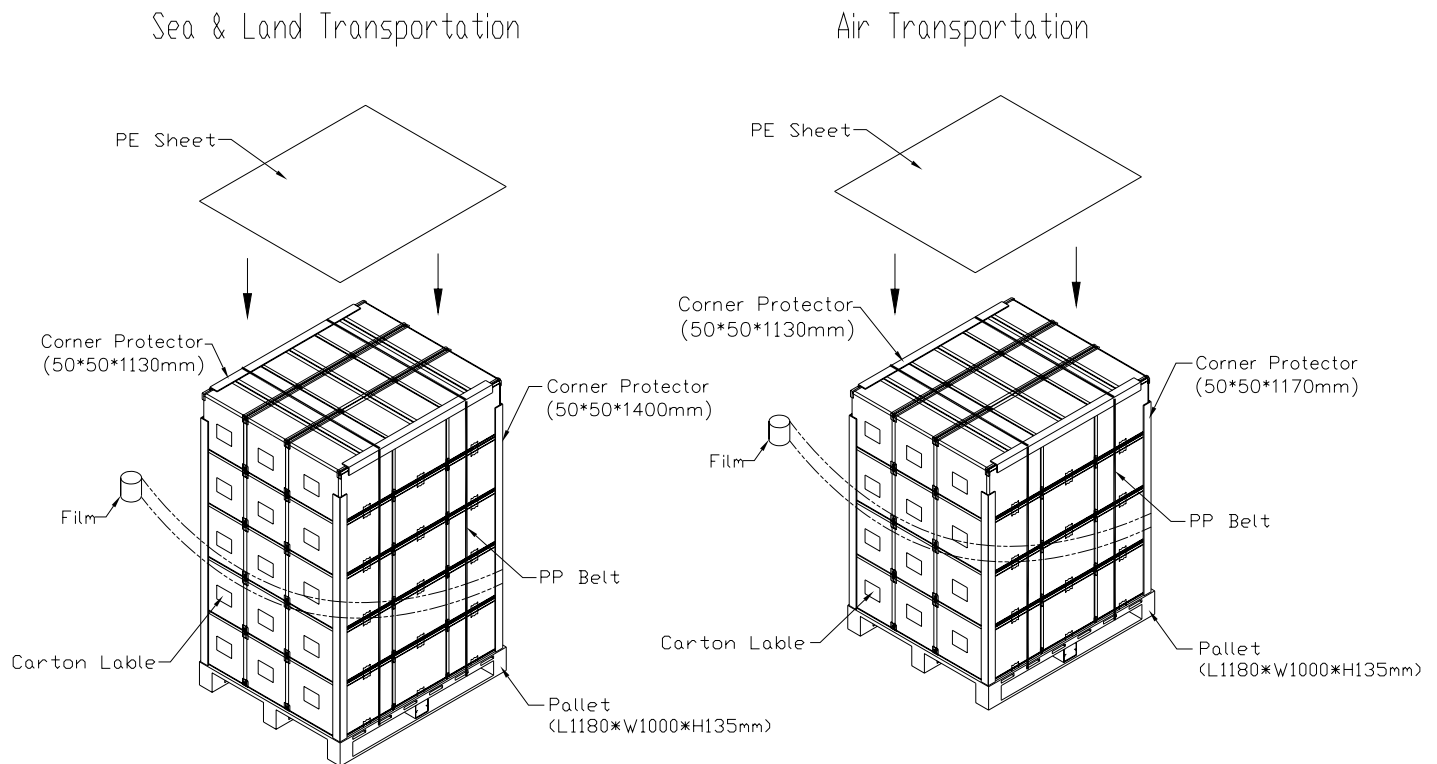**Figure. 10-2 Packing method**

11. DEFINITION OF LABELS

11.1 CMO MODULE LABEL

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

(a) Model Name: N121IB - L06

(b) Revision: Rev. XX, for example: A1, …, C1, C2 …etc.

(c) Serial ID: X X X X X X X Y M D X N N N N

```
                                        Serial No.
                                        CMO Internal Use
                                        Year, Month, Date
                                        CMO Internal Use
                                        Revision
                                        CMO Internal Use
```
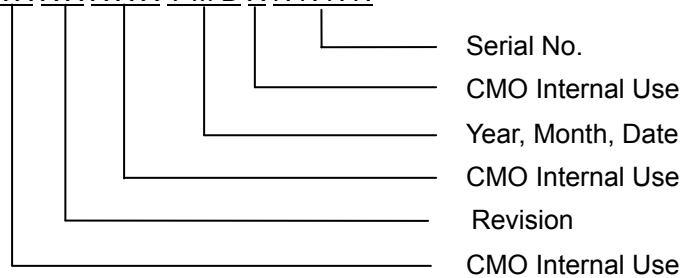
(d) Production Location: MADE IN XXXX. XXXX stands for production location.

(e) UL/CB logo: LEOO especially stands for panel manufactured by CMO NingBo satisfying UL/CB requirement. The panel without LEOO mark stands for manufactured by CMO Taiwan satisfying UL/CB 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

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11.2 CMO CARTON LABEL

Version 2.2

Active Area

2758 ±0.5 (MIDDLE OUTLINE)
26367 ±0.3 (BEZEL OPENING)
26132 ±0.3 (ACTIVE AREA)
1382 ±0.3

4-2.8 ±0.3

4-M2.0x2.0 MAX
P=0.4 TAPPING

FI-NX840SL-HF10X(JAE)

Pin1

97.6 ±1

5.0TYP (5.3MAX)
5.3MAX

NOTES:
1.UNIT:MM.
2.GENERAL TOLERENCE:±0.5MM.
3.SCREW TORQUE:MAX 2.0 kgf-cm.
4.CONVERTER'S INPUT CONNECTOR TYPE:59453-08210ECBHLF(FCD).

TITLE ASSY_MODULE_DRAWING_N125B_LB6
Approved SHUNNAN
Checked JACKSON_CHEN
Drawing No. N125143DA
Part No. NA
Material NA
Drawer ERWIN
Designer ERWIN
Date 04-Sep-2008
Sheet 1 / 2 A1
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NOTES:
1.In order to avoid abnormal display, pooling and white spot, no overlapping is suggested at cables, antennas, camera,
WLAN, WAN or other foreign objects over COF driver IC, TCON and VR locations.

245.765±0.3(T-CON IC POSITION)
211.44±0.3(T-CON IC POSITION)
107.5±0.5(VR CENTER)
5-57.8±0.5
29.5±2±0.5
27.8±0.5
18±0.5
192.26±0.5

145.936±0.5(IC CENTER)
233.248±0.5(IC CENTER)
320.56±0.5(IC CENTER)
407.872±0.5(IC CENTER)
495.184±0.5(IC CENTER)
58.624±0.5(IC CENTER)

TITLE ASSY_MODULE_DRAWING_N125B_LB6
Approved SHUNNAN
Checked JACKSON_CHEN
Drawing No. N125143DA
Part No. NA
Material NA
Drawer ERWIN
Designer ERWIN
Date 17-Oct-2008
Sheet 2 / 2 A1
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