宁波奇美电子
NINGBO CHI MEI OPTOELECTRONICS LTD.

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文 件 名 稱

TFT-LCD Preliminary Specification
Model No.: N121I6-L02 Ver 1.1

APPROVED BY

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No:FM-D004-Ver.06

Preliminary

TFT LCD Preliminary Specification

MODEL NO.: N121I6 - L02

Customer : _____

Approved by : _____

Note :

記錄	工作	審核	角色	投票
2007-08-03 09:39:08 CST	PMMD Director	cs_lee(李志聖 /56510/44926)	Director	Accept

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

- CONTENTS -

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 1.0	Jul.04,'07	All	All	Preliminary specification first issued.
Ver 1.1	Jul.20,'07	P.7	3.1	Update Electrical characteristics.
		P.14	6.1	Update EDID Data Structure.
		P.16	6.2	Update input connector pin assignment comments.

Version 1.1

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Preliminary

1 GENERAL DESCRIPTION

1.1 OVERVIEW

N121I6-L02 is a 12.1" TFT Liquid Crystal Display module with LED Backlight unit and 20 pins LVDS interface. This module supports 1280 x 800 Wide-XGA 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

- Thin and light.

- 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	264.12 (H) x 166.2 (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)	179	179.5	180	mm	
	Depth(D)	-	4.7	5.0	mm	
Weight		-	220	228	g	(2)

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

(2) Max weight including converter.

Version 1.1

Preliminary

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}	-	200/2	G/ms	(3), (5)
Vibration (Non-Operating)	V_{NOP}	-	1.5	G	(4), (5)

Note (1)   (a) 90 %RH Max. (Ta $\leqq$ 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)
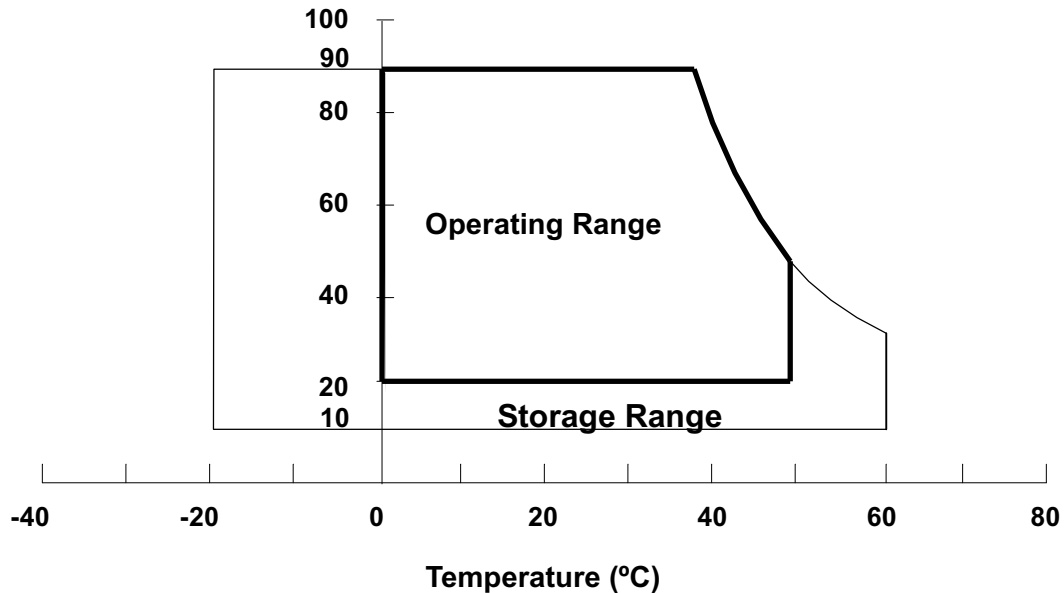

Note (3)   1 time for ± X, ± Y, ± Z. for Condition (200G / 2ms) is half Sine Wave,.

Note (4)   10 ~ 500 Hz, 30 min/cycle,1cycles 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:

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary
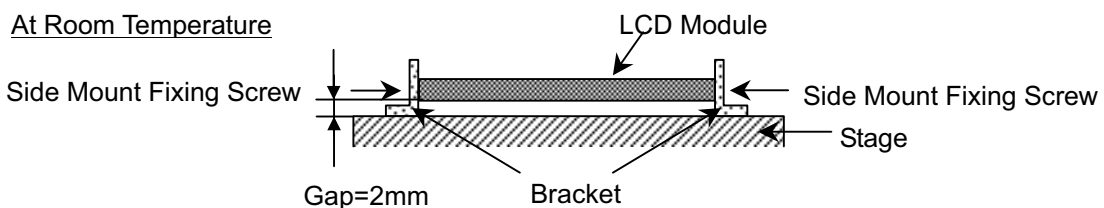
2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

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

2.2.2 BACKLIGHT UNIT

Item	Value			Unit	Note
	Min	Typ.	Max.		
LED Light Bar Input voltage	-	25.6	-	V_{DC}	(1), (2)
LED Light Bar Input Current	-	105	-	mA_{DC}	

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 Section 3.2 for further information).

Version 1.1

CHI MEI OPTOELECTRONICS CORP.

Preliminary

3 ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	-
Ripple Voltage		V_{RP}	-		100	mV	-
Rush Current		I_{RUSH}	-	1.2	1.5	A	(2)
Initial Stage Current		I_{IS}			1.0	A	(2)
Power Supply Current	White	Icc	-	280	310	mA	(3)a
	Black		-	340	370	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}	-	1.69		W	(4)

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

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

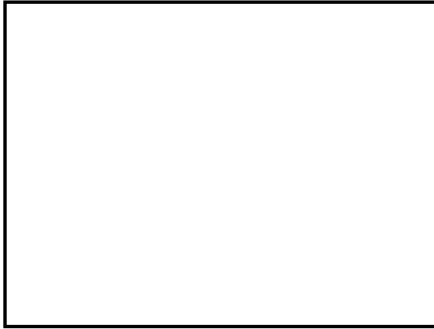I_{IS}: the maximum current of the first 100ms after power-on

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

Vcc rising time is 470us

Version 1.1

Preliminary
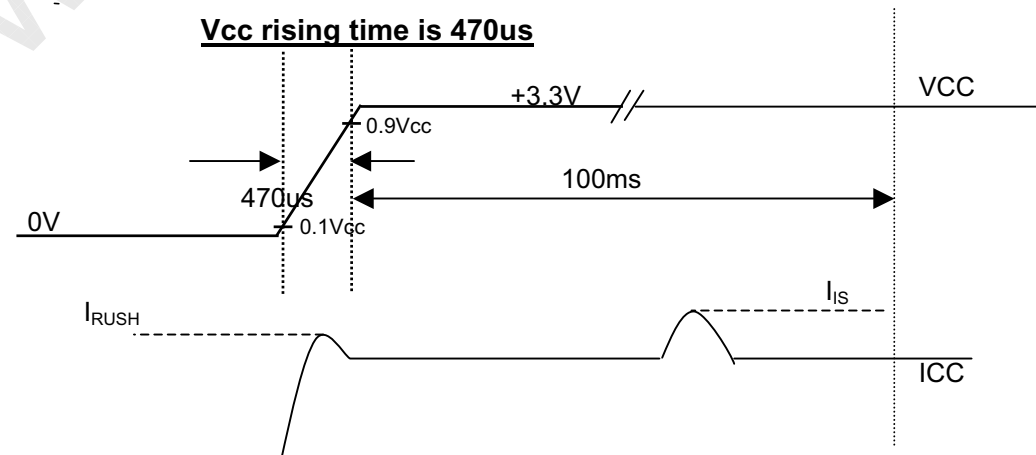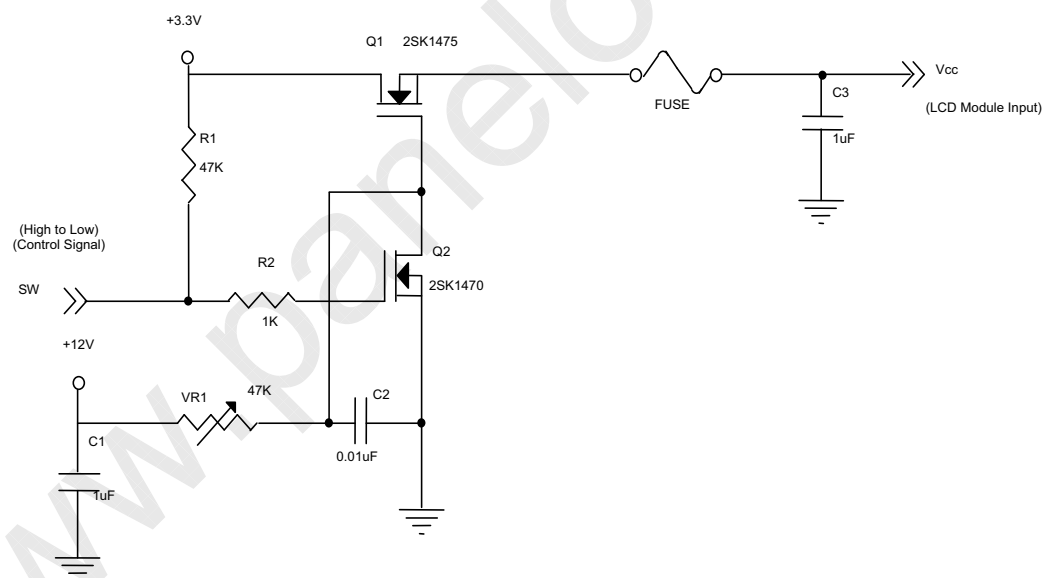
Note (3)The specified power supply current is under the conditions at Vcc = 3.3 V, Ta = 25 ± 2 ℃, f_v = 60

Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

Active Area

b. Black Pattern
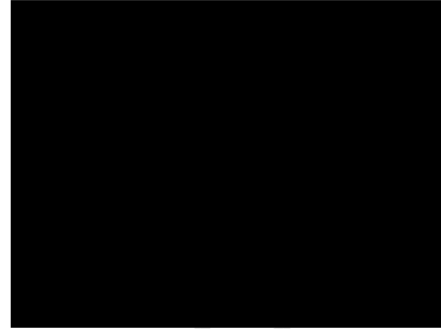
Active Area

Note (4) The specified power are the sum of LCD panel electronics input power and the converter input

power. Test conditions are as follows.

(a) Vcc = 3.3 V, Ta = 25 ± 2 ℃, 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.

(d) The converter used is provided from Sumida(CMO converter P/N:27-D016392).

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

Single Ended

V_{CM}

$|V_{ID}|$

0V

Differential

$V_{TH(LVDS)}$

$|V_{ID}|$

0V

$V_{TL(LVDS)}$

8 / 30

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary
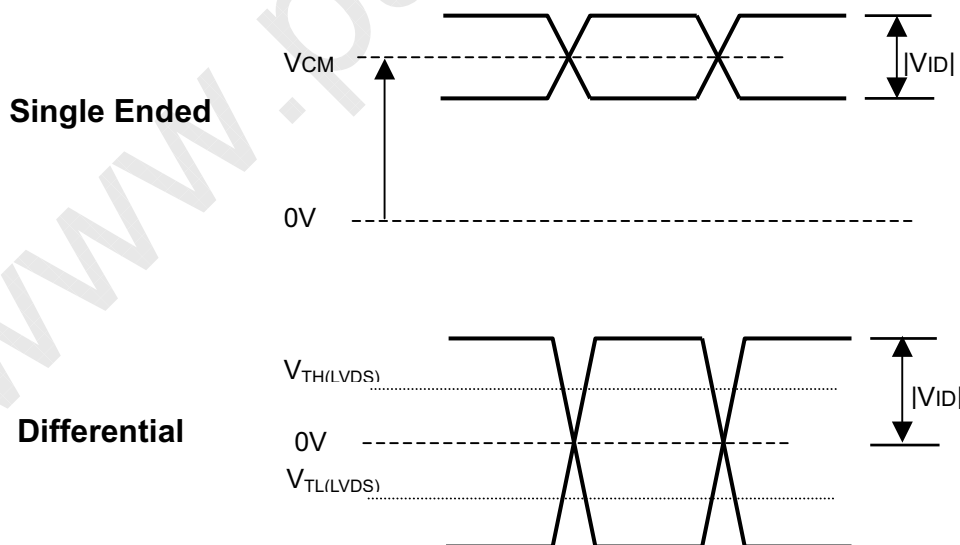
3.2 BACKLIGHT UNIT

Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
(LED light bar input voltage)	V_L	-	25.6	-	V_{DC}	(Duty 100%)
(LED light bar input current)	I_L	-	105	-	mA_{DC}	(Duty 100%)
LED Input Voltage	Vf	-	3.2	-	V_{DC}	I_f= 20 mA/EA
LED Current	I_f	-	17.5	-	mA	Per EA
LED Current Peak	I_f	-	-	100	mA_{DC}	(1)
Power Consumption	P_f	-	2.69	-	W	(2), I_f = 17.5 mA/EA
LED Life Time	L_{BL}	10000	-	-	Hrs	(3)

Note (1) LED current is measured by utilizing a high frequency current meter as shown below:
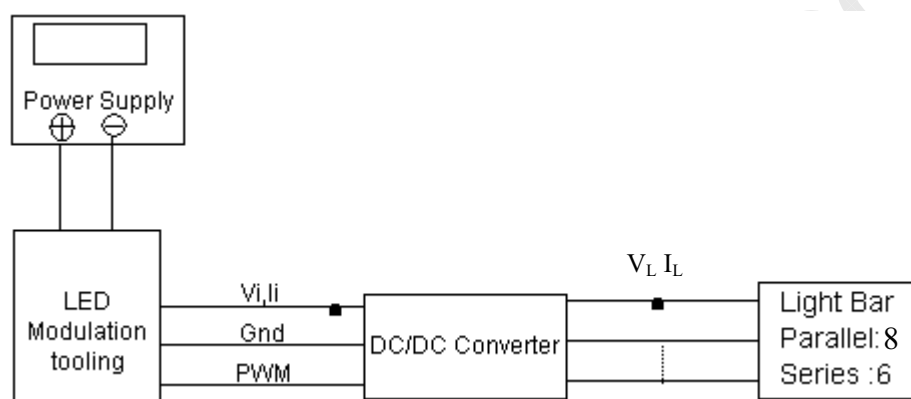
Note (2) $P_L = I_L \times V_L$

Note (3) The lifetime of LED is defined as the time when it continues to operate under the conditions at

Ta = 25 ±2 ºC and I = 17.5 mA(Per EA) until one of the following events occurs:

When the brightness becomes ≦ 50% of its original value.

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

4 BLOCK DIAGRAM

4.1 TFT LCD MODULE

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary
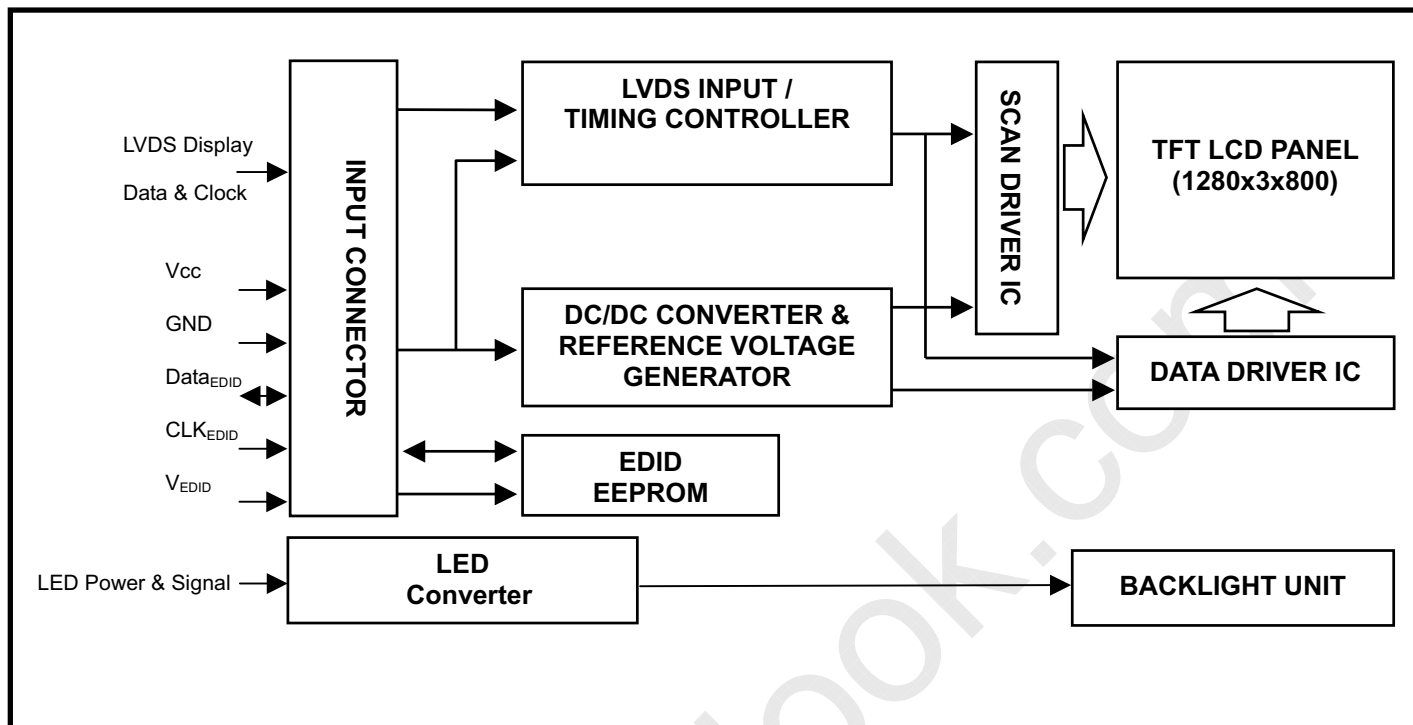
5 INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin	Symbol	Description	Polarity	Remark
1	VSS	Ground		-
2	VDD	Power Supply +3.3 V		-
3	VDD	Power Supply +3.3 V		-
4	V_{EDID}	DDC +3.3 V		
5	TEST	Panel Self Test		
6	CLK_{EDID}	DDC Clock		
7	$Data_{EDID}$	DDC Data		
8	Rxin0-	LVDS Differential Data Input	Negative	R0~R5,G0-
9	Rxin0+	LVDS Differential Data Input	Positive	
10	VSS	Ground		
11	Rxin1-	LVDS Differential Data Input	Negative	
12	Rxin1+	LVDS Differential Data Input	Positive	G1~G5,B0,B1
13	VSS	Ground		
14	Rxin2-	LVDS Differential Data Input	Negative	-
15	Rxin2+	LVDS Differential Data Input	Positive	B2~B5,Hsync,Vsync,DE
16	VSS	Ground		
17	CLK-	LVDS Clock Data Input	Negative	LVDS Level
18	CLK+	LVDS Clock Data Input	Positive	
19	VSS	Ground	-	-
20	VSS	Ground	-	-

Note (1) Connector Part No.: DF19KR-20P-1H or equivalent

Note (2) User's connector Part No: DF19G-20S-1C or equivalent

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

Version 1.1
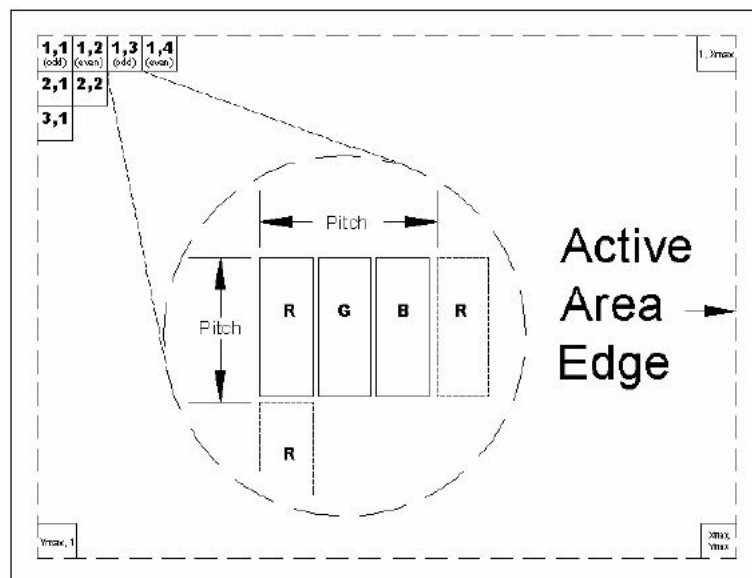
Preliminary

5.2 TIMING DIAGRAM OF LVDS INPUT SIGNAL

12 / 30

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

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.
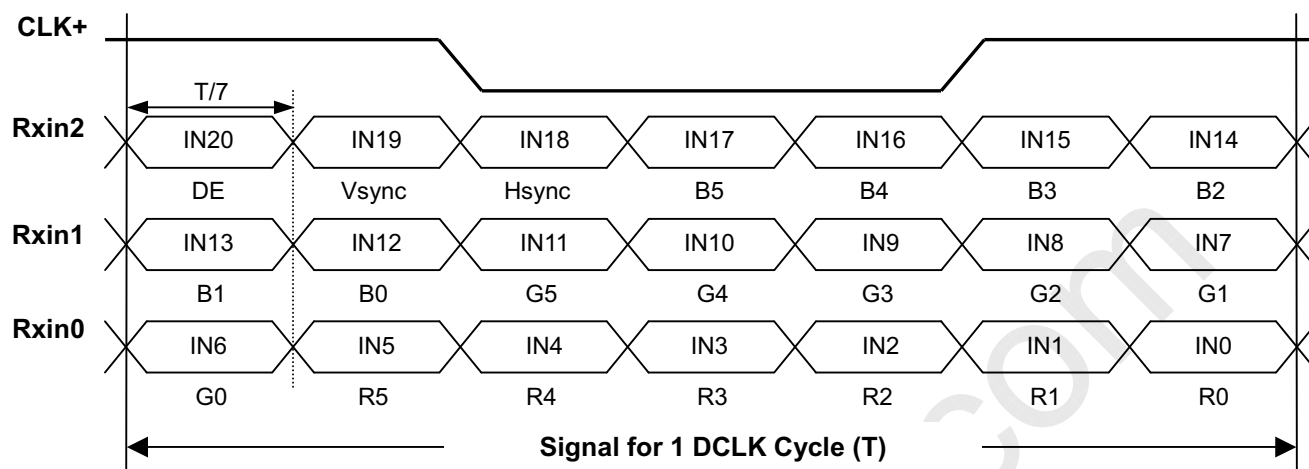
Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	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

13 / 30

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

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	24	00100100
11	0B	ID product code	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)	01	00000001
17	11	Year of manufacture (fixed year code)	10	00010000
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 ("26cm")	1A	00011010
22	16	Max V image size ("16cm")	10	00010000
23	17	Display Gamma (Gamma = "2.2")	78	01111000
24	18	Feature support ("Active off, RGB Color")	0A	00001010
25	19	Red/Green (Rx1, Rx0, Ry1, Ry0, Gx1, Gx0, Gy1, Gy0)	E2	11100010
26	1A	Blue/White (Bx1, Bx0, By1, By0, Wx1, Wx0, Wy1, Wy0)	05	00000101
27	1B	Red-x (Rx = "0.562")	8F	10001111
28	1C	Red-y (Ry = "0.354")	5A	01011010
29	1D	Green-x (Gx = "0.355")	5B	01011011
30	1E	Green-y (Gy = "0.580")	94	10010100
31	1F	Blue-x (Bx = "0.152")	27	00100111
32	20	Blue-y (By = "0.137")	23	00100011
33	21	White-x (Wx = "0.313")	50	01010000
34	22	White-y (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

14 / 30

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

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 ("69.4MHz", According to VESA CVT Rev1.1)	1B	00011011
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 : 130")	50	01010000
59	3B	# 1 V active ("800")	20	00100000
60	3C	# 1 V blank ("19")	13	00010011
61	3D	# 1 V active : V blank ("800 :19")	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 ("2 : 5")	25	00100101
65	41	# 1 H sync offset : H sync pulse width : V sync offset : V sync width ("40: 26 : 2 : 5")	00	00000000
66	42	# 1 H image size ("261 mm")	05	00000101
67	43	# 1 V image size ("163 mm")	A3	10100011
68	44	# 1 H image size : V image size ("261 : 163")	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, DE only note: LSB is set to "1" if panel is DE-timing only. H/V can be ignored.	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 "N121I6-L01", 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 ("6")	36	00110110
83	53	# 2 7th character of name ("-")	2D	00101101
84	54	# 2 8th character of name ("L")	4C	01001100

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

85	55	# 2 9th character of name ("0")	30	00110000
86	56	# 2 10th character of name ("2")	32	00110010
87	57	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	0A	00001010
88	58	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
89	59	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	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	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	0A	00001010
99	63	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
100	64	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
101	65	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
102	66	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
103	67	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
104	68	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
105	69	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
106	6A	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
107	6B	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	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"N121I6-L02", 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 ("6")	36	00110110
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 10th character of name ("2")	32	00110010
123	7B	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	0A	00001010
124	7C	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
125	7D	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
126	7E	Extension flag	00	00000000
127	7F	Checksum	63	01100011

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

6 CONVERTER SPECIFICATION

6.1 Connector type

Input connector type: **Aces 87213 (or JST   SM07B-SRSS-TB)**

Output connector: **HIROSE FH19SC-8S-0.5SH(0.5)**

6.2 Input connector pin assignment

Input Connector pin assignment:

Input connector		Comments
Aces	**87213**	
Pin	**Function**	
1	ALS signal	ALS control (enable:5V, disable:0V)
2	BL-ADJ(output)	Brightness 20%min ~ 100% Max,17.5KHz
3	SW5V	and LED driver board IC enable pin(high enable, low disable.)
4	GND	Ground
5	GND	Ground
6	VIN	Input voltage Power Supply + (7~21V)
7	VIN	Input voltage Power Supply + (7~21V)

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

7 INTERFACE TIMING

7.1 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	66	71	73	MHz	(2)
DE	Vertical Total Time	TV	802	823	840	TH	-
	Vertical Addressing Time	TVD	800	800	800	TH	-
	Vertical Active Blanking Period	TVB	TV-TVD	23	TV-TVD	TH	-
	Horizontal Total Time	TH	1380	1440	1450	Tc	(2)
	Horizontal Addressing Time	THD	1280	1280	1280	Tc	(2)
	Horizontal Active Blanking Period	THB	TH-THD	160	TH-THD	Tc	(2)

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

(2) 1 channels LVDS input.

INPUT SIGNAL TIMING DIAGRAM

18 / 30

Version 1.1
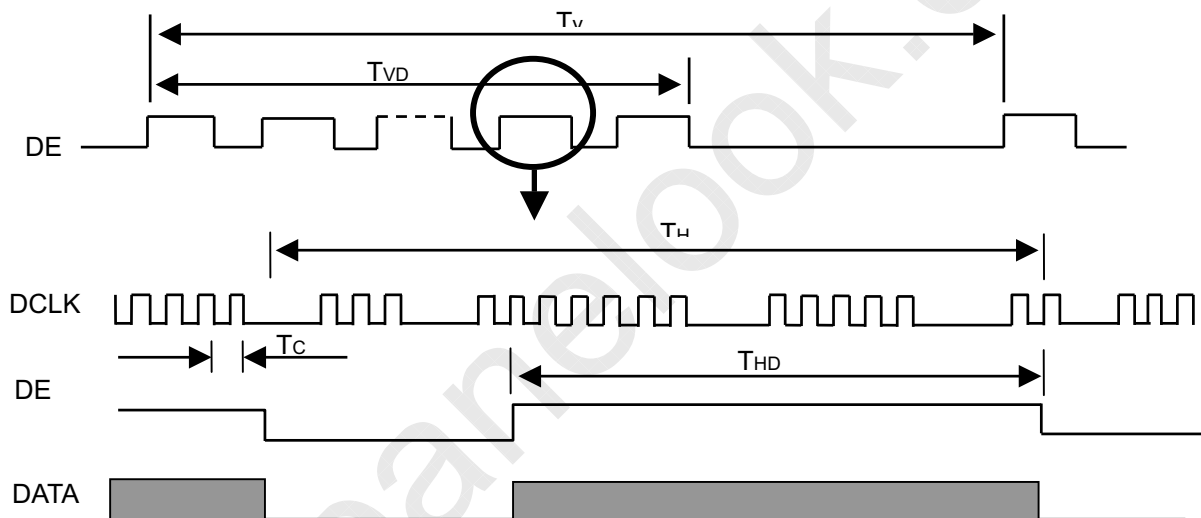
7.2 POWER ON/OFF SEQUENCE
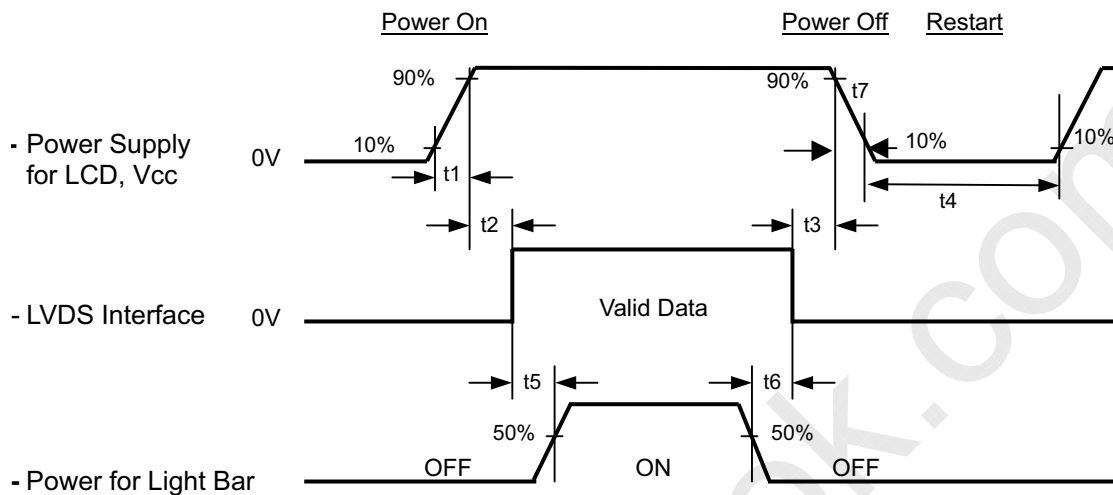
Timing Specifications:

$0.5 \leqq t1 \leqq 10$ ms

$0 \leqq t2 \leqq 50$ ms

$0 \leqq t3 \leqq 50$ ms

$t4 \geqq 500$ ms

$t5 \geqq 200$ ms

$t6 \geqq 200$ 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 had better to follow $5 \leqq t7 \leqq 300$ ms.

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

8 OPTICAL CHARACTERISTICS

8.1 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"		
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 (6).

8.2 OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR		200	300	-	-	(2), (5)
Response Time		T_R		-	5	10	ms	(3)
		T_F		-	11	16	ms	
Luminance of White (5P)		L_{AVE}		160	200	-	cd/m^2	(4), (5)
White Variation		δW		-	-	1.40	-	(5), (6)
Color Chromaticity	Red	Rx	$\theta_x=0°$, $\theta_Y=0°$ Viewing Normal Angle	Typ.- 0.05	0.562	Typ.+ 0.05	-	(1), (5)
		Ry			0.354		-	
	Green	Gx			0.355		-	
		Gy			0.580		-	
	Blue	Bx			0.152		-	
		By			0.137		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
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	-		

Version 1.1

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

Normal

θx = θy = 0º

θy- θy+

θX- = 90º   x-   12 o'clock direction

θx-   y+ θy+ = 90º

θx+

6 o'clock   y-

θy- = 90º   x+ θX+ = 90º
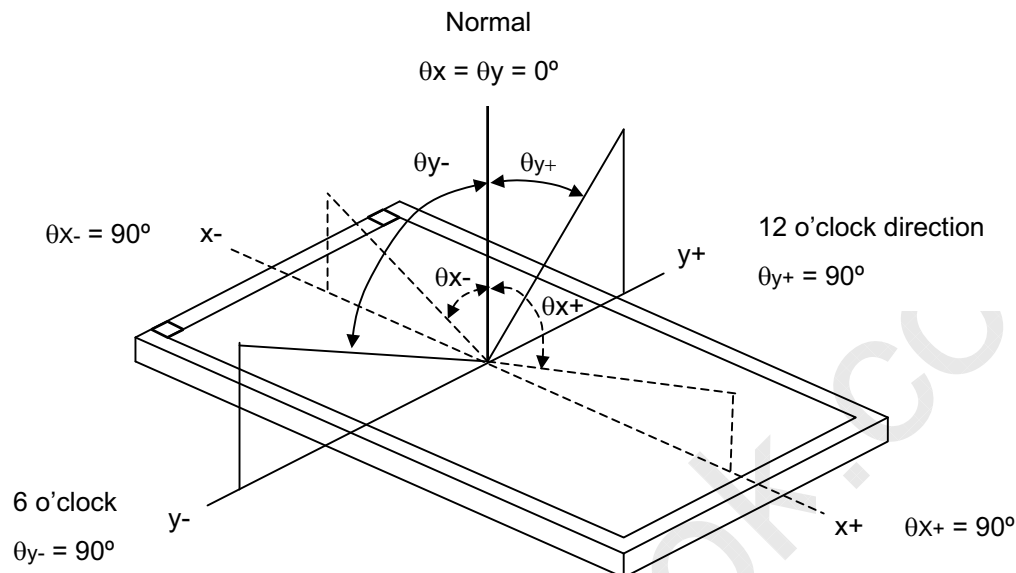
Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.
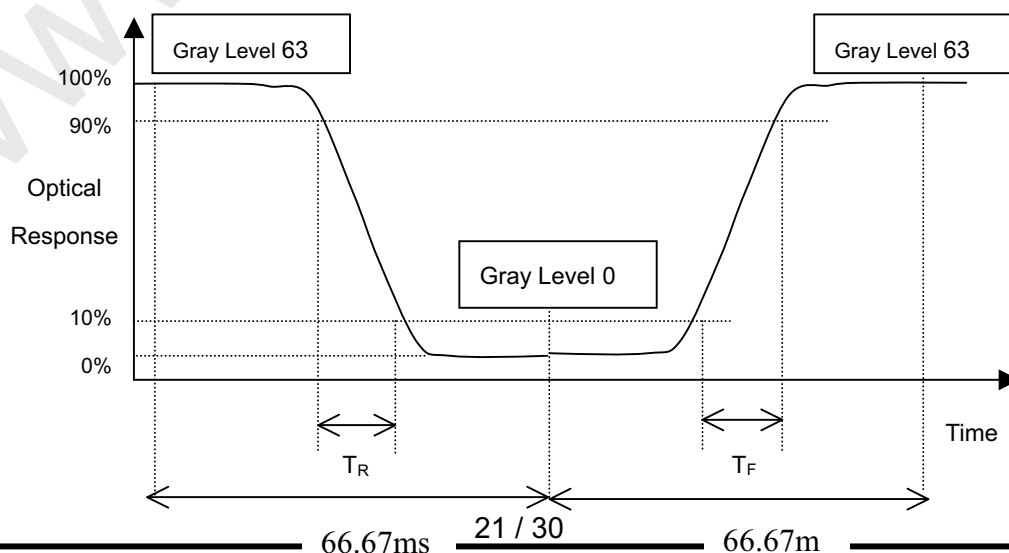
Contrast Ratio (CR) = L63 / L0

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):

Gray Level 63   Gray Level 63

100%

90%

Optical

Response

Gray Level 0

10%

0%

Time

T_R T_F

66.67ms   21 / 30   66.67m

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

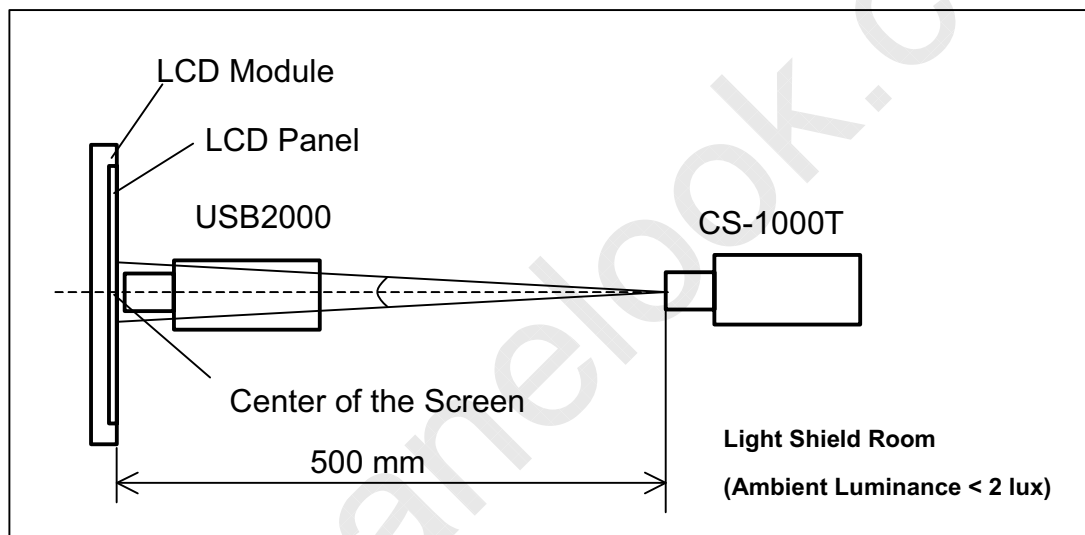Note (4) Definition of Average Luminance of White (L_{AVE}):

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).
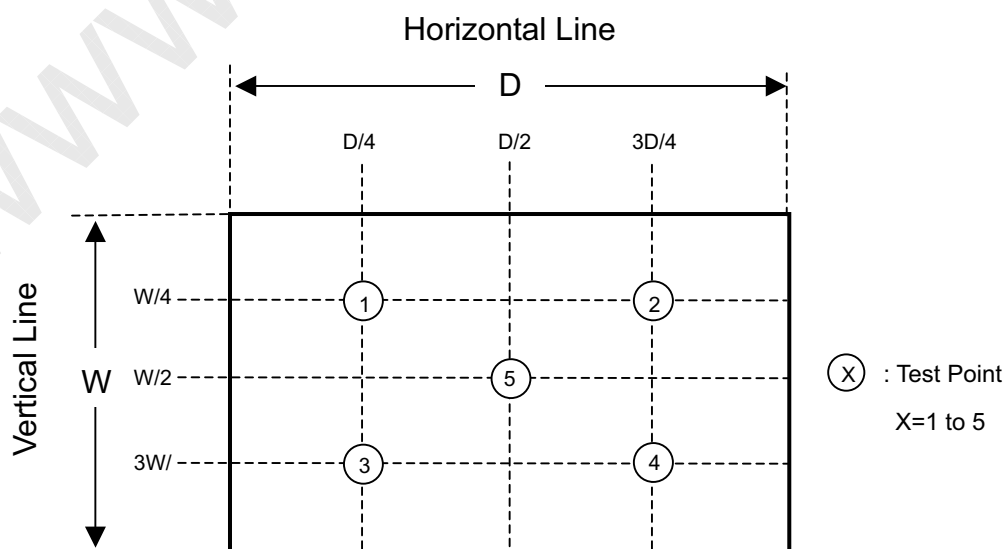
Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 15 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/   ③   ④

Ⓧ : Test Point

X=1 to 5

Active Area

22 / 30

Version 1.1

Preliminary

Version 1.1

Preliminary

9 PRECAUTIONS

9.1 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 STORAGE PRECAUTIONS

(1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

(2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.

(3) It may reduce the display quality if the ambient temperature is lower than 10 ºC. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

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.

Version 1.1

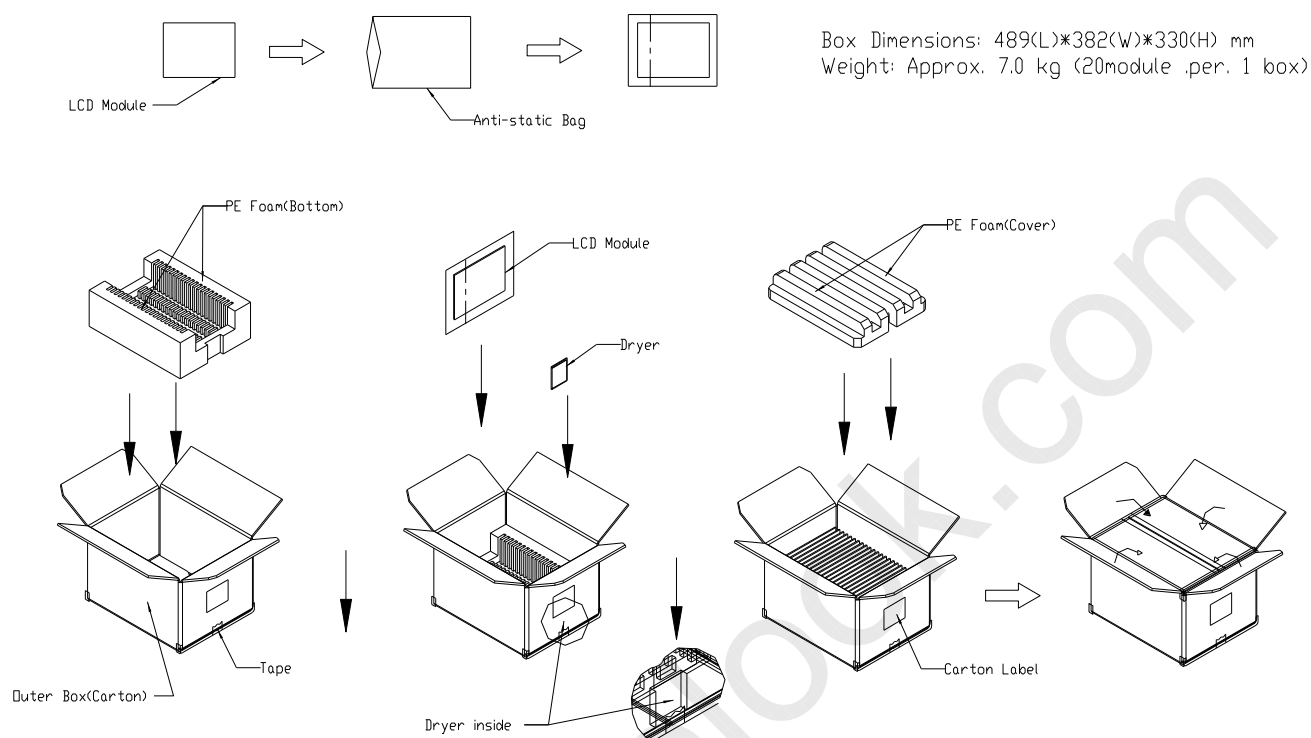Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

10 PACKING

10.1 CARTON

Box Dimensions: 489(L)*382(W)*330(H) mm
Weight: Approx. 7.0 kg (20module ,per. 1 box)

Figure. 10-1 Packing method

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

10.2 PALLET FOR SEA FREIGHT

NOTES:
Pallet:L1200*W1000*H135mm
Pallet Stock Dim:L1200*W1000*H1795mm
Weight:Approx.350kg

PE Sheet

Corner Protector
(50*50*1130 mm)

Corner Protector
(50*50*1400 mm)

Film

PP Belt

CMO Carton Label

Dell Carton Label

Pallet Label

Pallet Label
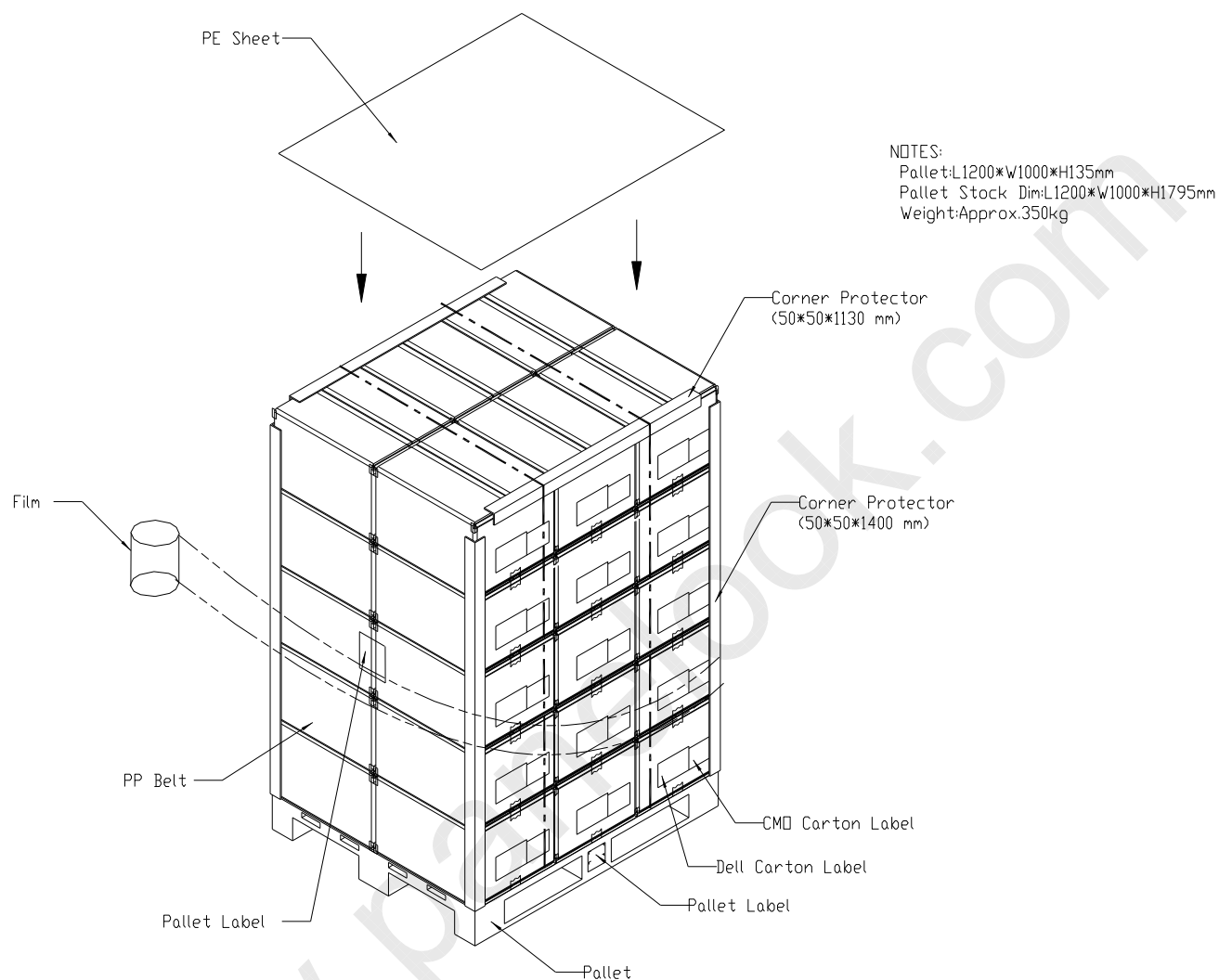
Pallet

Figure. 10-2 Packing method

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

10.3 PALLET FOR AIR FREIGHT

NOTES:
 Pallet:L1200*W1000*H135mm
 Pallet Stock Dim:L1200*W1000*H1465mm
 Weight:Approx.284kg

PE Sheet

Film

PP Belt

Corner Protector
(50*50*1130 mm)

Corner Protector
(50*50*1250 mm)

CMO Carton Label

Pallet Label

Pallet

Figure. 10-3 Packing method

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

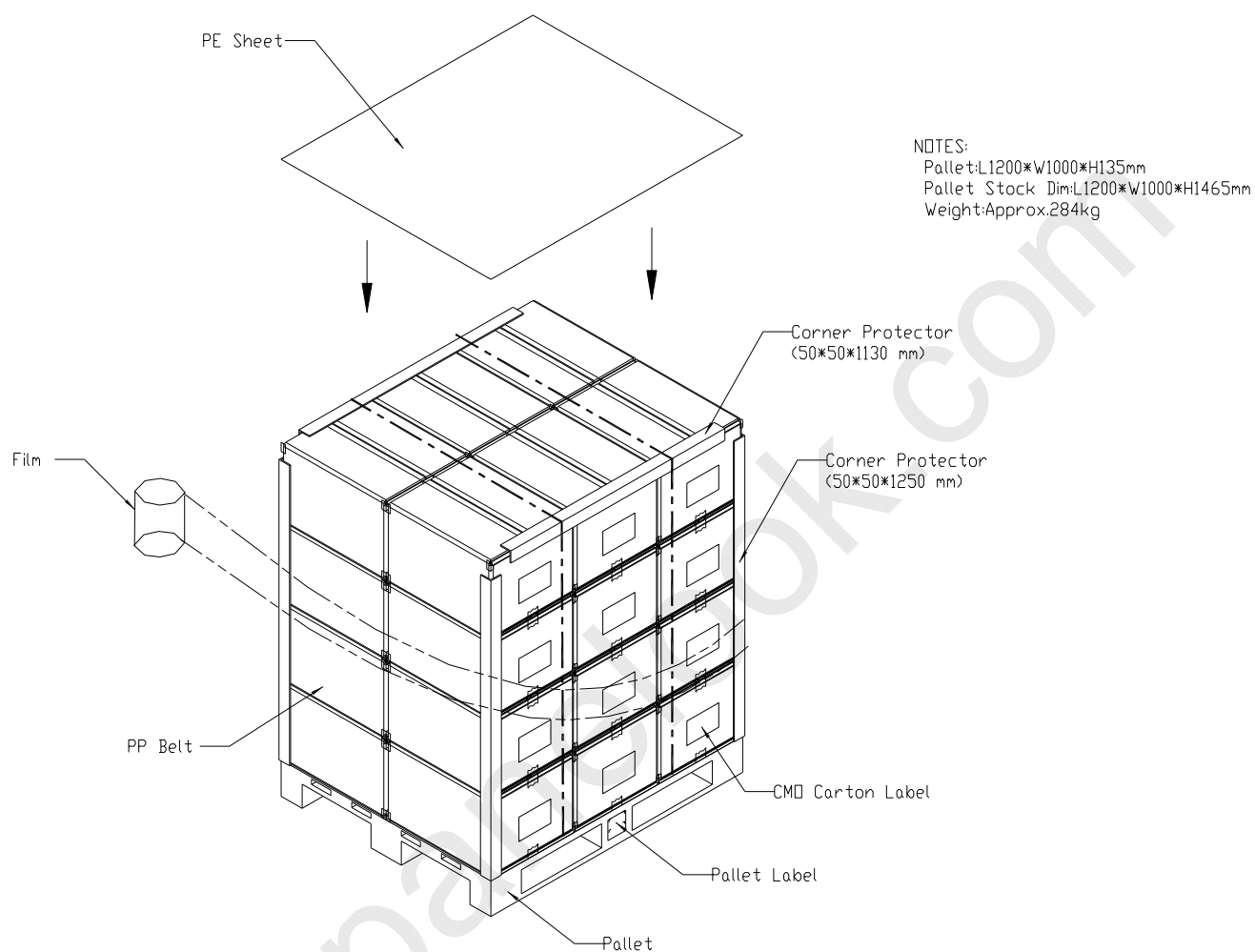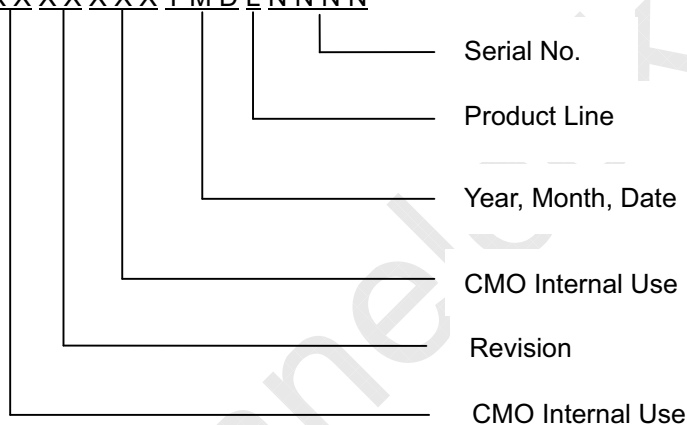## 11 EFINITION OF LABELS

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: N121I6 - L02

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

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

```
                                                    Serial No.

                                                    Product Line

                                                    Year, Month, Date

                                                    CMO Internal Use

                                                    Revision

                                                    CMO Internal Use
```
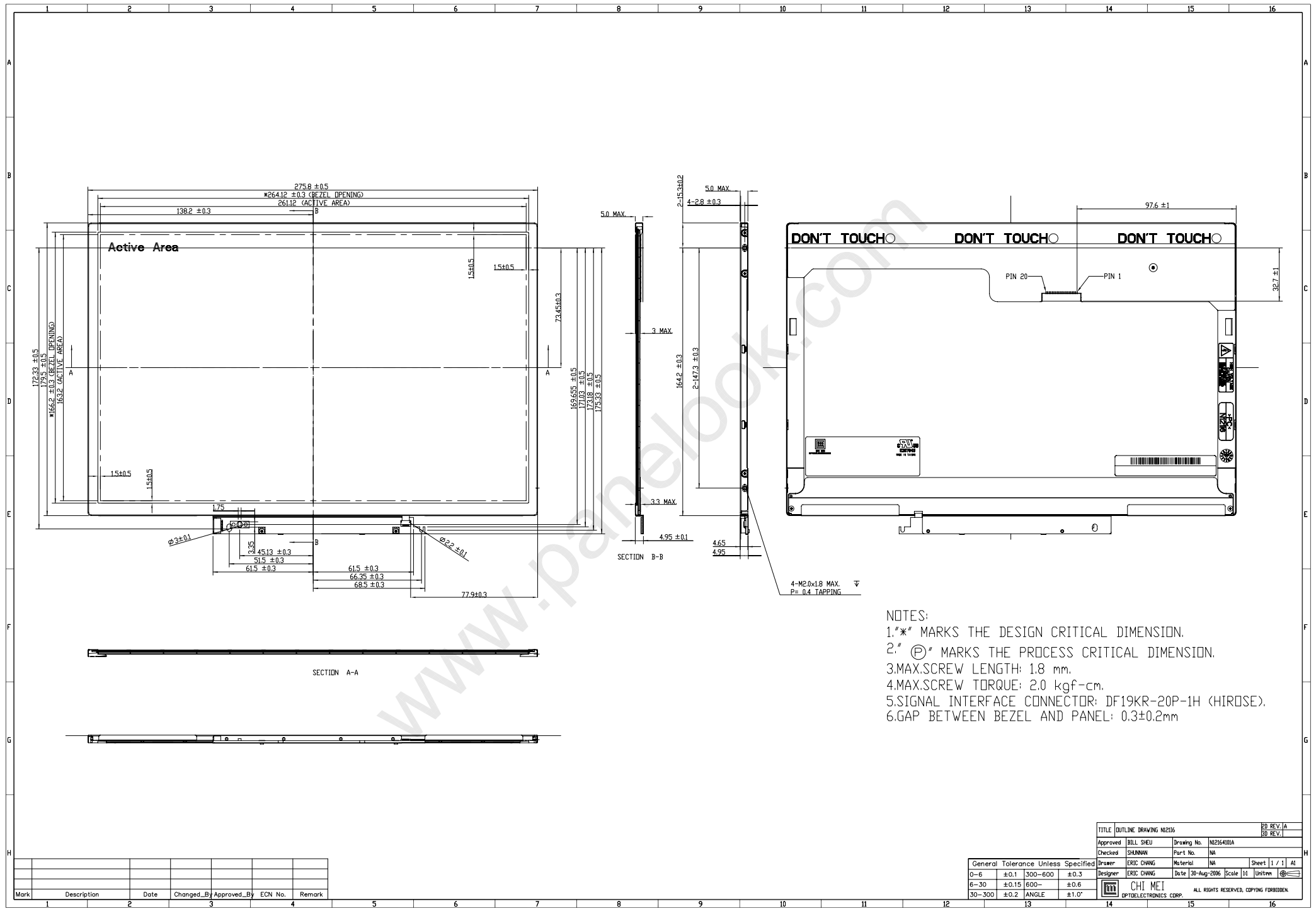
Serial ID includes the information as below:

(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

(d) Serial ID line two is for internal production control.

Version 1.1

Doc No.: 14077242
Issued Date:Jul. 20, 2007
Model No.: N121I6 -L02

Preliminary

11.2 CARTON LABEL

(a) Model Name: N121I6-L02

(b) Production year and month: shown at left down corner

(c) Production location: Made in XXXX

Version 1.1

Active Area

275.8 ±0.5
*264.12 ±0.3 (BEZEL OPENING)
261.12 (ACTIVE AREA)
138.2 ±0.3

1.5±0.5
1.5±0.5
73.45±0.3

172.33 ±0.5
179.5 ±0.5
*166.2 ±0.3 (BEZEL OPENING)
163.2 (ACTIVE AREA)

169.655 ±0.5
171.03 ±0.5
173.18 ±0.5
175.33 ±0.5

1.5±0.5
1.5±0.5

1.75
Ø3±0.1
3.35
45.13 ±0.3
51.5 ±0.3
61.5 ±0.3
61.5 ±0.3
66.35 ±0.3
68.5 ±0.3
77.9±0.3
Ø2.2 ±0.1

SECTION A-A

SECTION B-B

2-15.3±0.2
5.0 MAX.
4-2.8 ±0.3
5.0 MAX.
5.0 MAX.
3 MAX.
164.2 ±0.3
2-147.3 ±0.3
3.3 MAX.
4.95 ±0.1
4.65
4.95

4-M2.0x1.8 MAX.
P= 0.4 TAPPING

97.6 ±1

DON'T TOUCH   DON'T TOUCH   DON'T TOUCH

PIN 20   PIN 1

32.7 ±1

NOTES:
1."*" MARKS THE DESIGN CRITICAL DIMENSION.
2." Ⓟ " MARKS THE PROCESS CRITICAL DIMENSION.
3.MAX.SCREW LENGTH: 1.8 mm.
4.MAX.SCREW TORQUE: 2.0 kgf-cm.
5.SIGNAL INTERFACE CONNECTOR: DF19KR-20P-1H (HIROSE).
6.GAP BETWEEN BEZEL AND PANEL: 0.3±0.2mm

TITLE	OUTLINE DRAWING N12116		2D REV.	A
			3D REV.	
Approved	BILL SHEU	Drawing No.	N12164101A	
Checked	SHUNNAN	Part No.	NA	
Drawer	ERIC CHANG	Material	NA	Sheet 1 / 1 A1
Designer	ERIC CHANG	Date 30-Aug-2006	Scale 1:1	Unit:mm

General	Tolerance	Unless	Specified
0-6	±0.1	300-600	±0.3
6-30	±0.15	600-	±0.6
30-300	±0.2	ANGLE	±1.0°

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