CHI MEI
OPTOELECTRONICS CORP.

Approval

TFT LCD Approval Specification

MODEL NO.: N133I6 – P09

Customer:

Approved by:

Note:

核准時間	部門	審核	角色	投票
2010-03-10 10:24:55	NB 產品管理處	楊 2010.03.10 竣 傑	Director	Accept

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.　**Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

- CONTENTS -

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

REVISION HISTORY

Version	Date	Page (New)	Section	Description
2.0	Feb, 22,'10	All	All	Approval specification was first issued.

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Approval

1. GENERAL DESCRIPTION

1.1 OVERVIEW

N133I6 – P09 is a 13.3" TFT Liquid Crystal Display open cell with a 30 pins LVDS interface. This open cell supports 1280 x 800 WXGA mode and can display 262,144 colors. The optimum viewing angle is at 6 o'clock direction. The converter for Backlight is not built in.

1.2 FEATURES

- Thin and Light Weight

- WXGA (1280 x 800 pixels) resolution

- DE only mode

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

1.3 APPLICATION

- TFT LCD Notebook
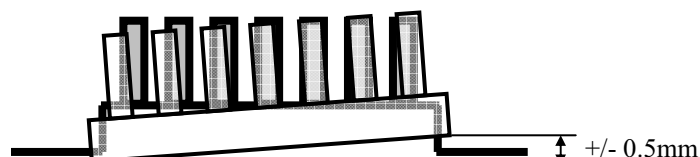
1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Active Area	286.08 (H) x 178.8 (V)	mm	(1)
CF Polarizer	289.38 (H) x 182.3 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1280 x R.G.B. x 800	pixel	-
Pixel Pitch	0.2235 (H) x 0.2235 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	262,144	color	-
Transmissive Mode	Normally white	-	-
Surface Treatment	Glare, LT4 , 3H	-	-

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	294.24	294.44	294.64	mm	(1) (2)
	Vertical (V) With PCB	201.15	202.15	203.15	mm	
	Vertical (V) W/o PCB	188.3	188.5	188.7	mm	
	Thickness (T) With PCB	1.6	1.9	2.2	mm	
	Thickness (T) W/o PCB	1.33	1.43	1.53	mm	
Weight		-	-	175	mm	

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

Note (2) Connector mounting position

+/- 0.5mm

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification. **Version 2.0**

CHI MEI OPTOELECTRONICS CORP.

Approval

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)

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

(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 surface should be 0 ºC Min. and 50 ºC Max.

Relative Humidity (%RH)
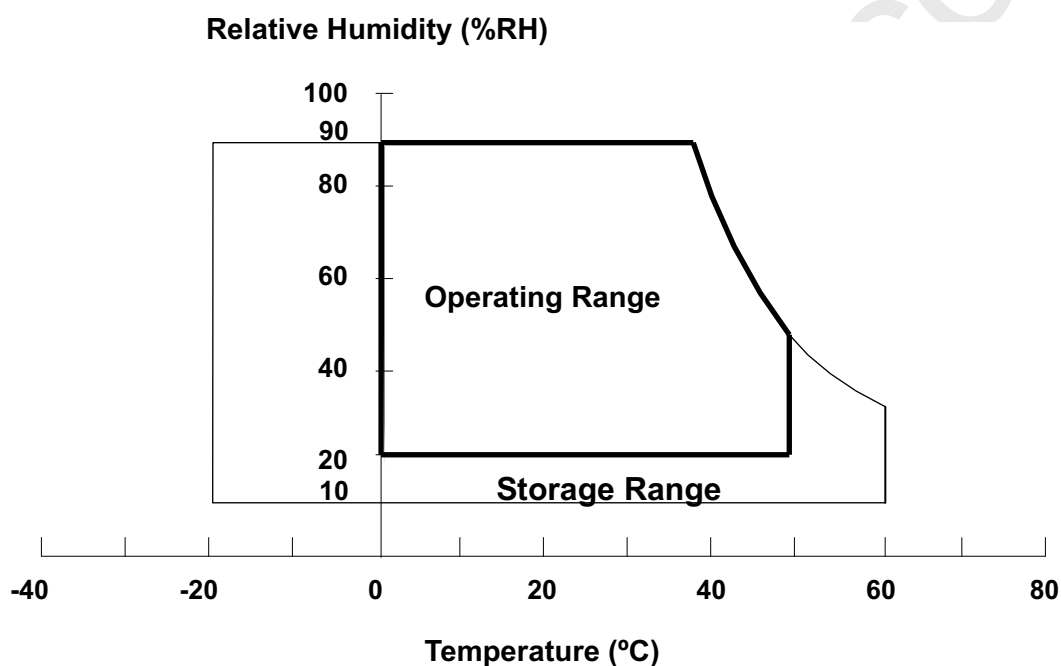
Temperature (ºC)

2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)

High temperature or humidity may reduce the performance of panel. Please store LCD panel within the specified storage conditions.

Storage Condition: With packing.

Storage temperature range: 25±5 ºC.

Storage humidity range: 50±10%RH.

Shelf life: 30days

Approval

2.3 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD OPEN CELL

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	

Note (1) Permanent damage to the device may occur if maximum or minimum values are exceeded.

Function operation should be restricted to the conditions described under Normal Operating Conditions.

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD OPEN CELL

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	-
Permissive Ripple Voltage		V_{RP}	-	50	-	mV	-
Rush Current		I_{RUSH}	-	-	1.5	A	(2)
Initial Stage Current		I_{IS}	-	-	1.0	A	(2)
Power Supply Current	White	Icc	-	190	220	mA	(3)a
	Black		-	250	280	mA	(3)b
LVDS Differential Input High Threshold		$V_{TH(LVDS)}$	-	-	+100	mV	(4), V_{CM}=1.2V
LVDS Differential Input Low Threshold		$V_{TL(LVDS)}$	-100	-	-	mV	(4) V_{CM}=1.2V
LVDS Common Mode Voltage		V_{CM}	1.125	-	1.375	V	(4)
LVDS Differential Input Voltage		$|V_{ID}|$	100	-	600	mV	(4)
Terminating Resistor		R_T	-	100	-	Ohm	

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

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification. **Version 2.0**

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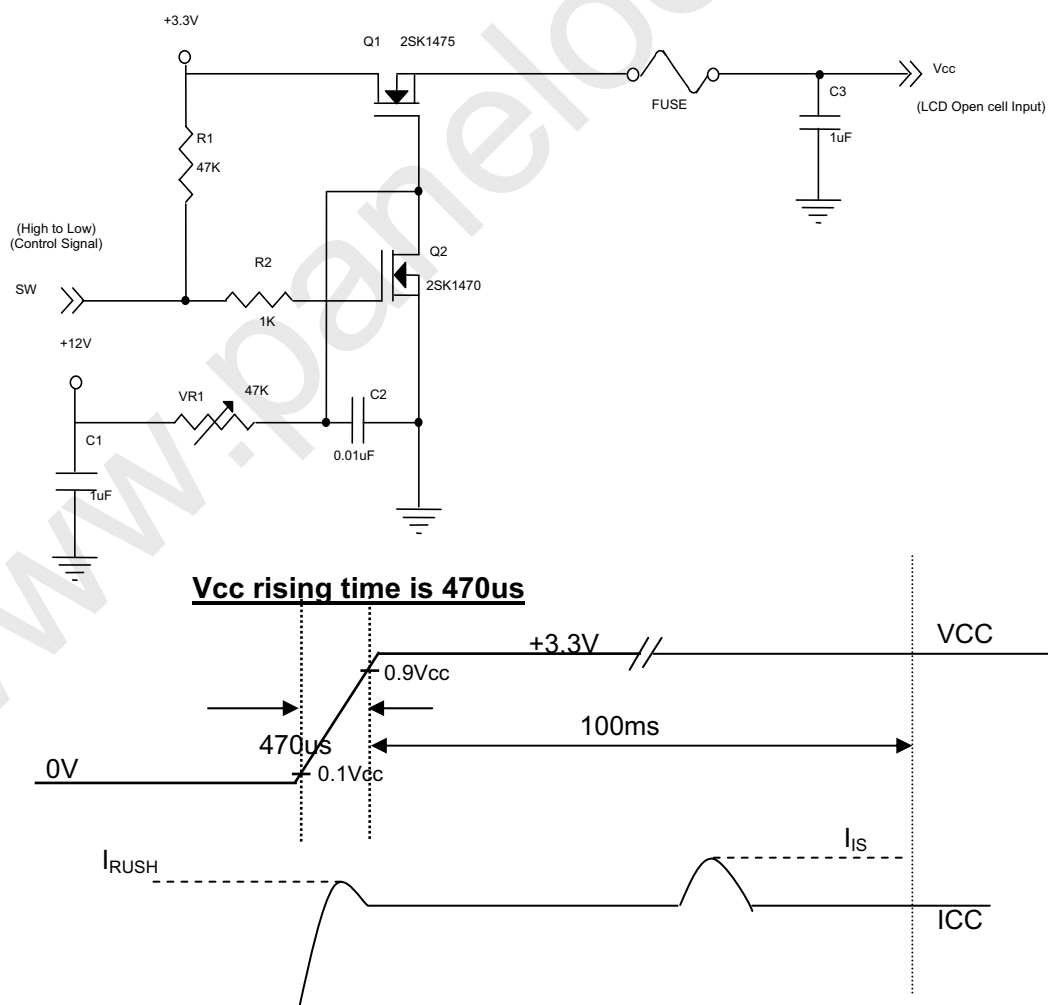
Note (3) The specified power supply current is under the conditions at Vcc = 3.3 V, Ta = 25 ± 2 ºC, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

b. Black Pattern

Active Area
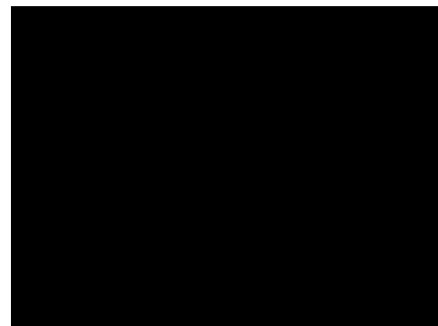
Active Area

Note (4) The parameters of LVDS signals are defined as the following figures.

Single Ended

VCM

0V

|VID|

Differential

$V_{TH(LVDS)}$

0V

$V_{TL(LVDS)}$

|VID|

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

CHI MEI
OPTOELECTRONICS CORP.

Approval
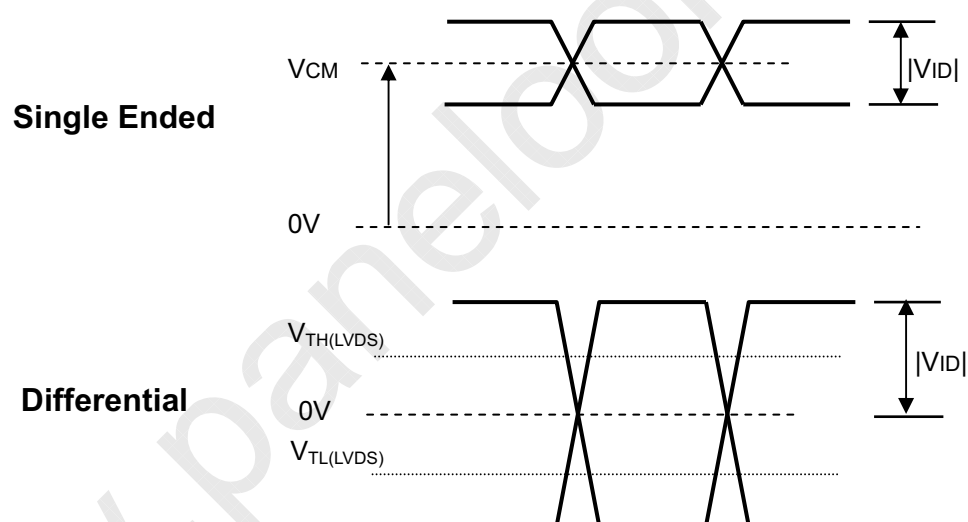
4. BLOCK DIAGRAM

4.1 TFT LCD OPEN CELL

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification. **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval
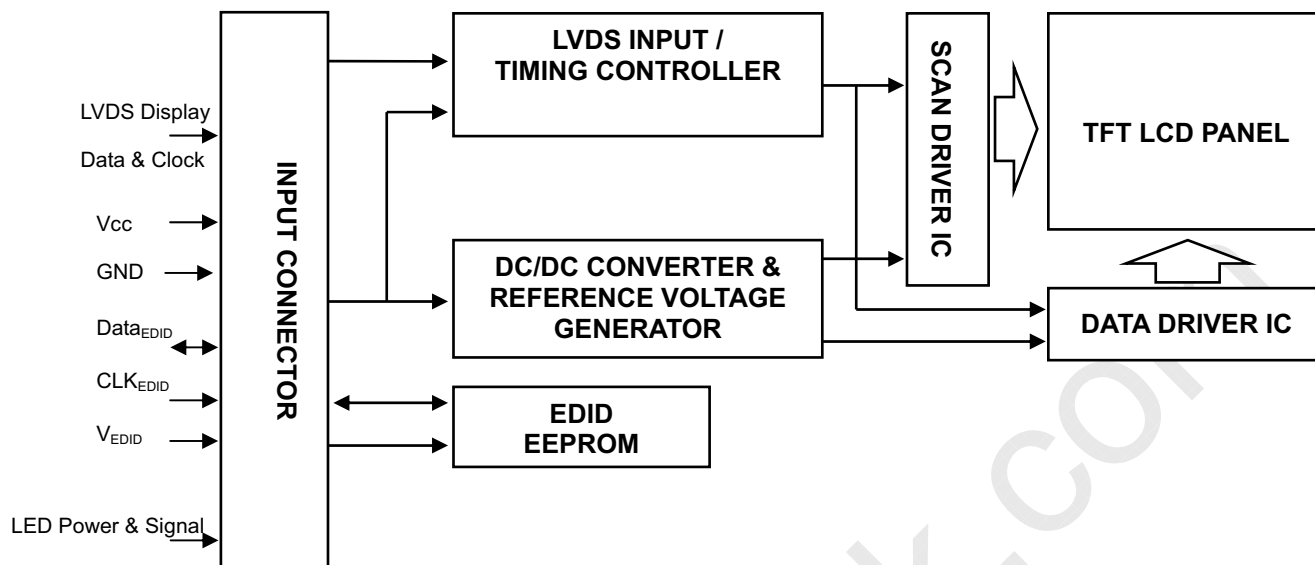
5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD OPEN CELL

Pin	Symbol	Description	Polarity	Remark
1	Vss	Ground		
2	Vcc	Power Supply +3.3 V (typical)		
3	Vcc	Power Supply +3.3 V (typical)		
4	V_{EDID}	DDC 3.3V Power		DDC 3.3V Power
5	NC	No connect		
6	CLK_{EDID}	DDC Clock		DDC Clock
7	$DATA_{EDID}$	DDC Data		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	G1~G5, B0, B1
12	Rxin1+	LVDS Differential Data Input	Positive	-
13	Vss	Ground		
14	Rxin2-	LVDS Differential Data Input	Negative	B2~B5, DE, Hsync, Vsync
15	Rxin2+	LVDS Differential Data Input	Positive	
16	Vss	Ground		
17	CLK-	LVDS Clock Data Input	Negative	LVDS Level Clock
18	CLK+	LVDS Clock Data Input	Positive	LVDS Level Clock
19	Vss	Ground		
20	Vss	Ground		
21	Vdc(1&2&3)	LED Annold (Positive)		
22	Vdc(4&5&6)	LED Annold (Positive)		
23	NC	No connect		
24	Vdc1	LED Cathode (Negative)		
25	Vdc2	LED Cathode (Negative)		
26	Vdc3	LED Cathode (Negative)		
27	Vdc4	LED Cathode (Negative)		
28	Vdc5	LED Cathode (Negative)		
29	Vdc6	LED Cathode (Negative)		
30	Vss	Ground		

Note (1) Connector Part No.: 20474-030E-12(I-PEX) or equivalent

Note (2) User's connector Part No: 20472-030T-10(I-PEX) or equivalent

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Approval

5.2 TIMING DIAGRAM OF LVDS INPUT SIGNAL

CLK+							

T/7

Rxin2	IN20	IN19	IN18	IN17	IN16	IN15	IN14
	DE	Vsync	Hsync	B5	B4	B3	B2

Rxin1	IN13	IN12	IN11	IN10	IN9	IN8	IN7
	B1	B0	G5	G4	G3	G2	G1

Rxin0	IN6	IN5	IN4	IN3	IN2	IN1	IN0
	G0	R5	R4	R3	R2	R1	R0

Signal for 1 DCLK Cycle (T)

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

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

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification. **Version 2.0**

Approval

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 ("APP")	06	00000110
9	9	EISA ID manufacturer name (Compressed ASCII)	10	00010000
10	0A	ID product code (N133I6-L09)	C1	11000001
11	0B	ID product code (hex LSB first; N133I6-L09)	9C	10011100
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 "24")	18	00011000
17	11	Year of manufacture (fixed "2009")	13	00010011
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 ("29.7cm")	1D	00011101
22	16	Max V image size ("19.2cm")	13	00010011
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)	5C	01011100
26	1A	Blue/White (Bx1, Bx0, By1, By0, Wx1, Wx0, Wy1, Wy0)	80	10000000
27	1B	Red-x (Rx = "0.595")	98	10011000
28	1C	Red-y (Ry = "0.345")	58	01011000
29	1D	Green-x (Gx = "0.320")	51	01010001
30	1E	Green-y (Gy = "0.555")	8E	10001110
31	1F	Blue-x (Bx = "0.155")	27	00100111
32	20	Blue-y (By = "0.145")	25	00100101
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 (1280x800@60Hz)	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

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Approval

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 ("72.5MHz", According to VESA CVT Rev1.1)	52	01010010
55	37	# 1 Pixel clock (hex LSB first)	1C	00011100
56	38	# 1 H active ("1280")	00	00000000
57	39	# 1 H blank ("160")	A0	10100000
58	3A	# 1 H active : H blank ("1280 : 160")	50	01010000
59	3B	# 1 V active ("800")	20	00100000
60	3C	# 1 V blank ("23")	17	00010111
61	3D	# 1 V active : V blank ("800 :23")	30	00110000
62	3E	# 1 H sync offset ("48")	30	00110000
63	3F	# 1 H sync pulse width ("32")	20	00100000
64	40	# 1 V sync offset : V sync pulse width ("3 : 6")	36	00110110
65	41	# 1 H sync offset : H sync pulse width : V sync offset : V sync width ("48: 32 : 3 : 6")	00	00000000
66	42	# 1 H image size ("286.08 mm")	1E	00011110
67	43	# 1 V image size ("178.8 mm")	B2	10110010
68	44	# 1 H image size : V image size ("286 : 178")	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/monitor	00	00000000
73	49	descriptor #2	00	00000000
74	4A		00	00000000
75	4B		01	00000001
76	4C	Version	00	00000000
77	4D	Apple edid signature	06	00000110
78	4E	Apple edid signature	10	00010000
79	4F	Link Type (LVDS Link,MSB justified)	20	00100000
80	50	Pixel and link component format (6-bit panel interface)	00	00000000
81	51	Panel features (No inverter)	00	00000000
82	52		00	00000000
83	53		00	00000000
84	54		00	00000000
85	55		00	00000000
86	56		00	00000000
87	57		00	00000000

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

88	58		0A	00001010
89	59		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 (Model Name "N133I6-L09", ASCII)	FE	11111110
94	5E	# 3 Flag	00	00000000
95	5F	# 3 1st character of name ("N")	4E	01001110
96	60	# 3 2nd character of name ("1")	31	00110001
97	61	# 3 3rd character of name ("3")	33	00110011
98	62	# 3 4th character of name ("3")	33	00110011
99	63	# 3 5th character of name ("I")	49	01001001
100	64	# 3 6th character of name ("6")	36	00110110
101	65	# 3 7th character of name ("-")	2D	00101101
102	66	# 3 8th character of name ("L")	4C	01001100
103	67	# 3 9th character of name ("0")	30	00110000
104	68	# 3 9th character of name ("9")	39	00111001
105	69	# 3 New line character indicates end of ASCII string	0A	00001010
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 FC (hex) defines Monitor name ("Color LCD", ASCII)	FC	11111100
112	70	# 4 Flag	00	00000000
113	71	# 4 1st character of name ("C")	43	01000011
114	72	# 4 2nd character of name ("o")	6F	01101111
115	73	# 4 3rd character of name ("l")	6C	01101100
116	74	# 4 4th character of name ("o")	6F	01101111
117	75	# 4 5th character of name ("r")	72	01110010
118	76	# 4 6th character of name (<space>)	20	00100000
119	77	# 4 7th character of name ("L")	4C	01001100
120	78	# 4 8th character of name ("C")	43	01000011
121	79	# 4 9th character of name ("D")	44	01000100
122	7A	# 4 New line character # 4 indicates end of Monitor name	0A	00001010
123	7B	# 4 Padding with "Blank" character	20	00100000
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	FD	11111101

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

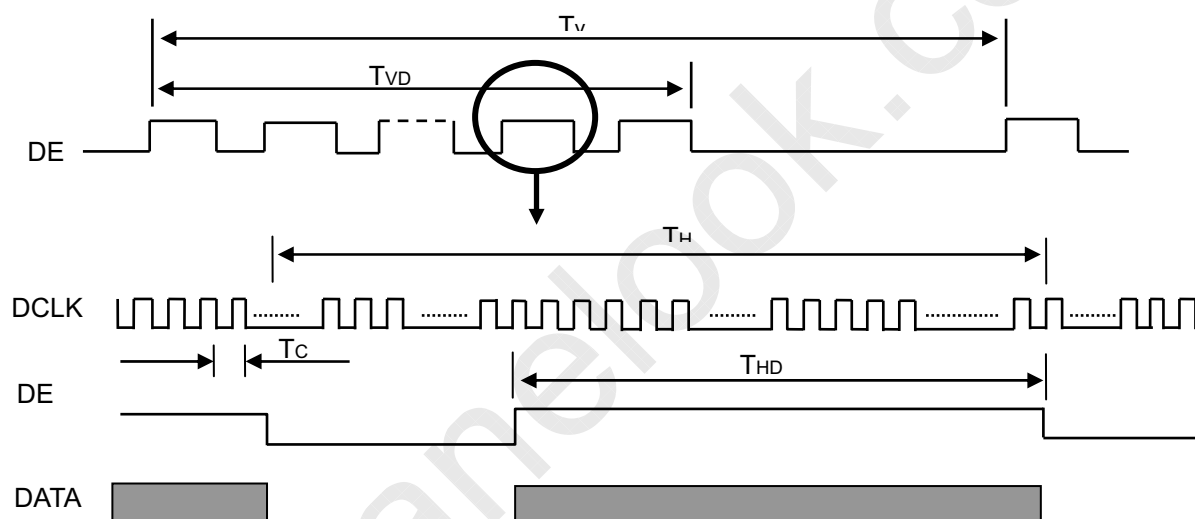**Approval**

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

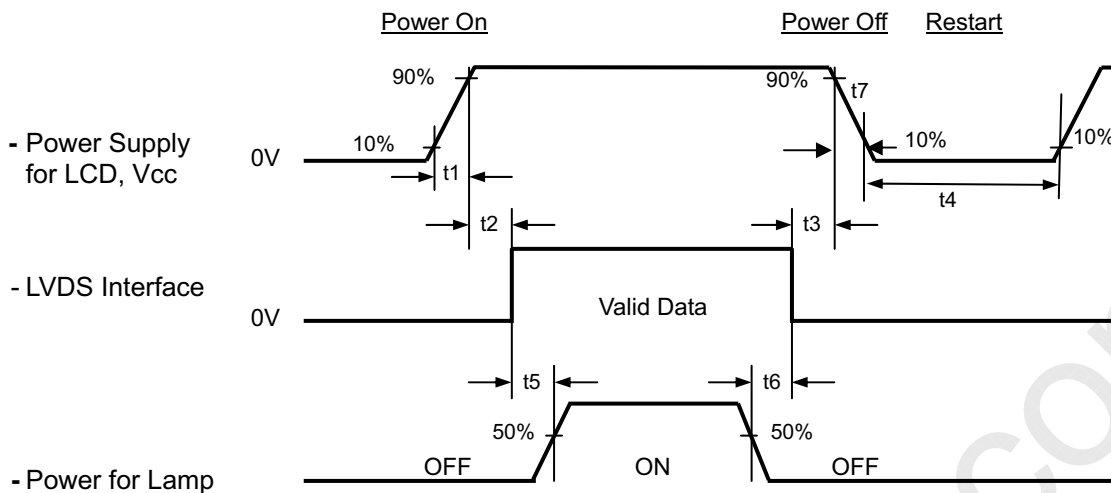The specifications of input signal timing are as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	1/Tc	50	71	80	MHz	-
DE	Vertical Total Time	TV	803	823	1028	TH	-
	Vertical Addressing Time	TVD	800	800	800	TH	-
	Vertical Active Blanking Period	TVB	TV-TVD	23	TV-TVD	TH	
	Horizontal Total Time	TH	1362	1440	1800	Tc	-
	Horizontal Addressing Time	THD	1280	1280	1280	Tc	-
	Horizontal Active Blanking Period	THB	TH-THD	160	TH-THD	Tc	

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

INPUT SIGNAL TIMING DIAGRAM

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification. **Version 2.0**

Approval

6.2 POWER ON/OFF SEQUENCE

Power On   Power Off   Restart

- Power Supply for LCD, Vcc

- LVDS Interface

Valid Data

- Power for Lamp

OFF   ON   OFF

Timing Specifications:

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

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

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

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

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

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

Note (1) Please follow the power on/off sequence described above. Otherwise, the LCD open cell 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 $5 \leqq t7 \leqq 300$ ms.

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

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"		

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).
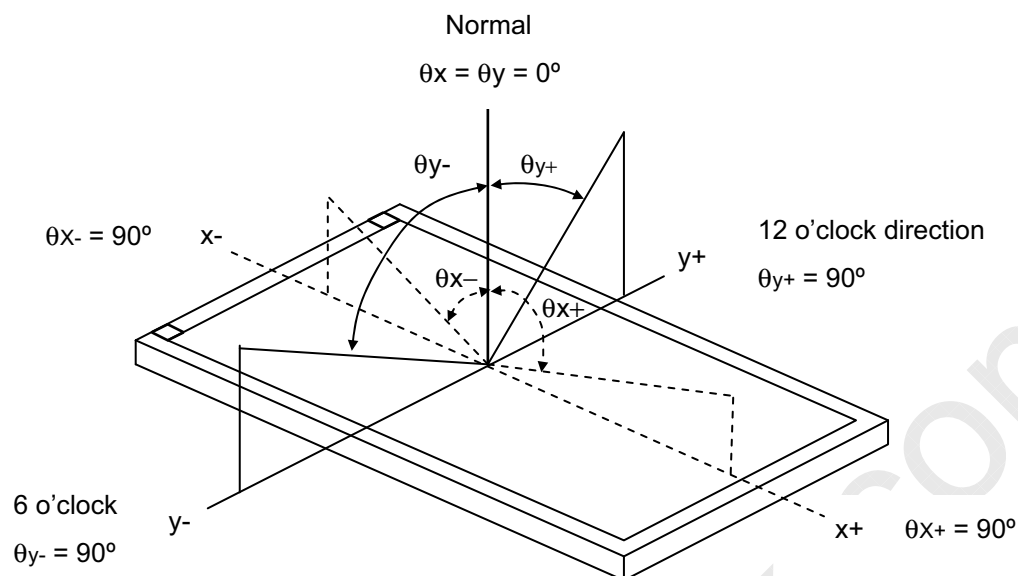
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	Rcx	$\theta_x=0°$, $\theta_Y=0°$ CS-1000T Standard light source "C"	Typ - 0.03	0.603	Typ + 0.03	-	(0),(6)
		Rcy			0.330		-	
	Green	Gcx			0.289		-	
		Gcy			0.546		-	
	Blue	Bcx			0.144		-	
		Bcy			0.184		-	
	White	Wcx			0.303		-	
		Wcy			0.353		-	
Center Transmittance		T%	$\theta_x=0°$, $\theta_Y=0°$	4.5	5.8	-		(1), (8)
Contrast Ratio		CR	CS-1000T, CMO BLU	400	500	-	-	(1), (3)
Response Time		T_R	$\theta_x=0°$, $\theta_Y=0°$	-	3	8	ms	(4)
		T_F		-	7	12	ms	
Transmittance uniformity		δT%	$\theta_x=0°$, $\theta_Y=0°$ BM-5A	--	--	1.25	-	(1), (7)
Viewing Angle	Horizontal	θ_x+	CR≥10 BM-5A	65	70	-	Deg.	(1), (3) (6)
		θ_x-		65	70	-		
	Vertical	θ_Y+		50	55	-		
		θ_Y-		50	55	-		

Note (0) Light source is the standard light source "C" which is defined by CIE and driving voltages are based on suitable gamma voltages. The calculating method is as following：

1. Measure Module's and BLU's spectrums. White is without signal input and R, G, B are with signal input. BLU is supplied by CMO.
2. Calculate cell's spectrum.
3. Calculate cell's chromaticity by using the spectrum of standard light source "C"

Note (1) Light source is the BLU which is supplied by CMO and driving voltages are based on suitable gamma voltages. White is without signal input and R, G, B are with signal input. SPEC is judged by CMO's golden sample.

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

Note (2) Definition of Viewing Angle (θx, θy):

Normal

$\theta x = \theta y = 0°$

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

$\theta x- = 90°$ x-

$\theta x-$

$\theta x+$

y+

12 o'clock direction

$\theta y+ = 90°$

6 o'clock

y-

x+ $\theta x+ = 90°$

$\theta y- = 90°$

Note (3) Definition of Contrast Ratio (CR):

$CR_{AVE}= [CR(1)+ CR(2)+ CR(3)+ CR(4)+ CR(5)] / 5$

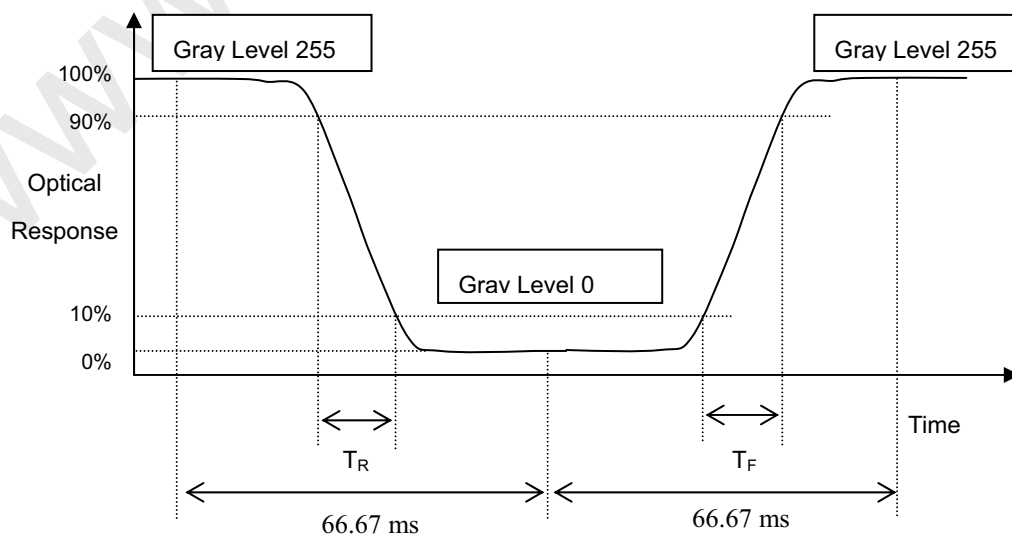CR_{max}=Max value of CR at whole Viewing Angle

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

$$CR = \frac{\text{Luminance with all pixel white (Gmax)}}{\text{Luminance with all pixel black (Gmin)}}$$

Gmax: Luminance of gray max at the center point of panel.

Gmin: Luminance of gray min at the center point of panel.

Note (4) Definition of Response Time (T_R, T_F):

Gray Level 255   Gray Level 255

100%

90%

Optical

Response

Grav Level 0

10%

0%

Time

T_R T_F

66.67 ms   66.67 ms

19 / 27

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

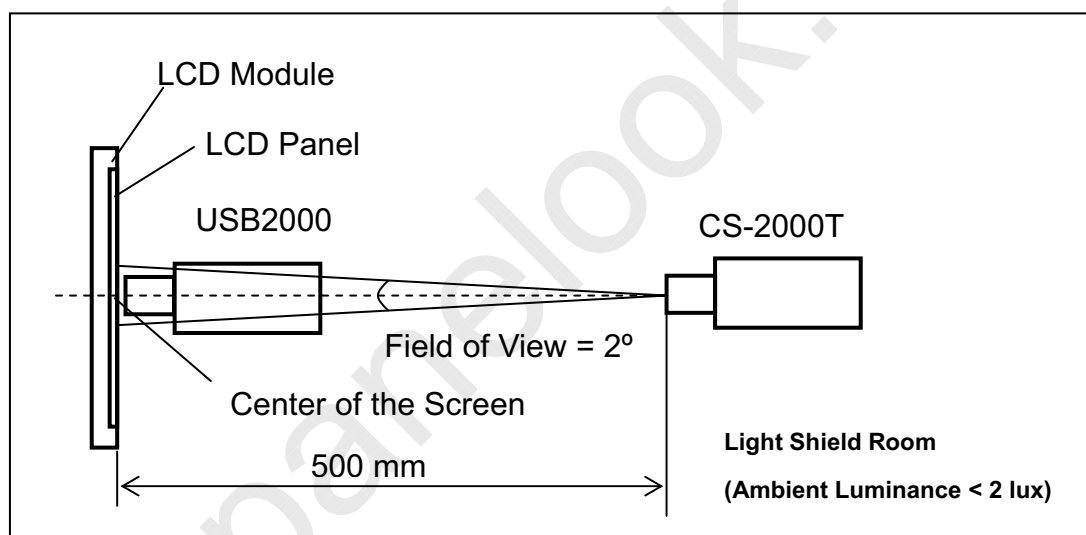Note (5) Definition of Luminance of White (L_C):

　　　Measure the luminance of gray level 255 at center point

　　　$L_C = L (5)$

　　　L (x) is corresponding to the luminance of the point X at Figure in Note (7).
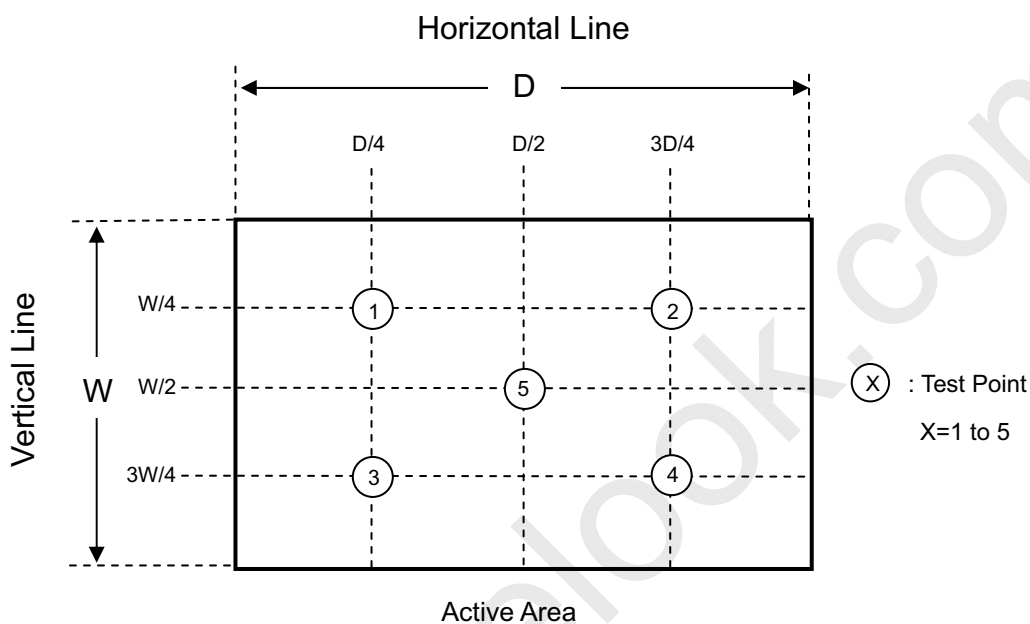
Note (6) Measurement Setup:

　　　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.

LCD Module

LCD Panel

USB2000　　　　　　　CS-2000T

Field of View = 2º

Center of the Screen

500 mm

Light Shield Room

(Ambient Luminance < 2 lux)

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.　**Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

Note (7) Definition of Transmittance Variation (δT%):

Measure the transmittance at 5 points

$$\delta\,T\% = \frac{\text{Maximum}\,[T\%(1),\,T\%(2),\,\ldots\,T\%(5)]}{\text{Minimum}\,[T\%(1),\,T\%(2),\,\ldots\,T\%(5)]}$$

Horizontal Line

Active Area

Ⓧ : Test Point

X=1 to 5

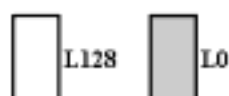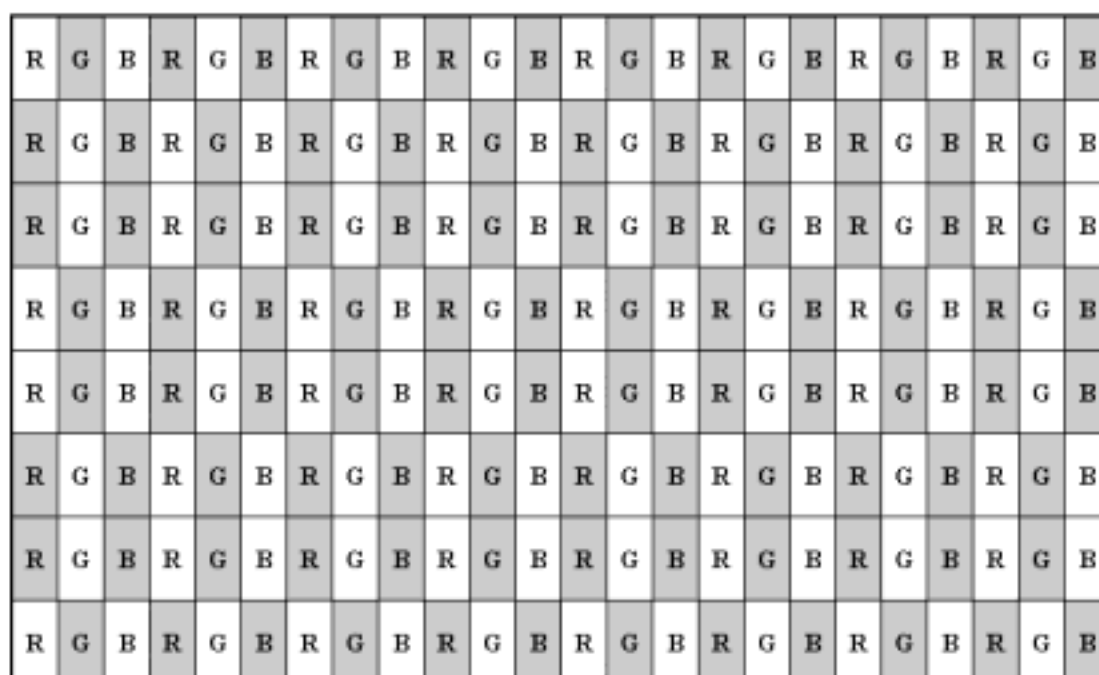Note (8) Definition of Transmittance (T%):

Module is without signal input.

BLU is supplied by CMO.

$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

7.3 Flicker Adjustment

(1) Adjustment Pattern: 2H1V checker pattern as follows.

R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B
R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B	R	G	B

☐ L128   ▨ L0

(2) Adjustment Method:

Flicker should be adjusted by turning the volume for flicker adjustment by the ceramic driver. It is adjusted to the point with least flickering of the whole screen. After making it surely overrun at once, it should be adjusted to the optimum point.

22 / 27

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval
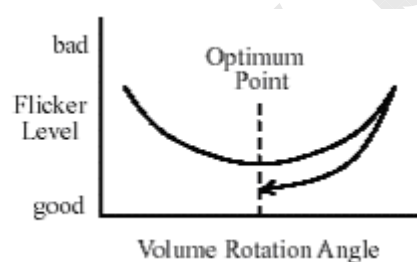
8. PRECAUTIONS

8.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the open cell during assembly.

(2) To assemble or install open cell 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 open cell because the LCD panel and Backlight will be damaged.

(4) Always follow the correct power sequence when LCD open cell 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 open cell is operating.

(6) Do not disassemble the open cell.

(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 open cell, because moisture may damage LCD open cell when it is operating.

(9) High temperature or humidity may reduce the performance of open cell. Please store LCD open cell within the specified storage conditions.

(10) When ambient temperature is lower than 10ºC 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 converter. Do not disassemble the open cell 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 open cell's end of life, it is not harmful in case of normal operation and storage.

8.3 OPERATION PRECAUTIONS

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

(2) Always follow the correct power on/off sequence when LCD open cell 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 open cell or insert anything into the Backlight unit.

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

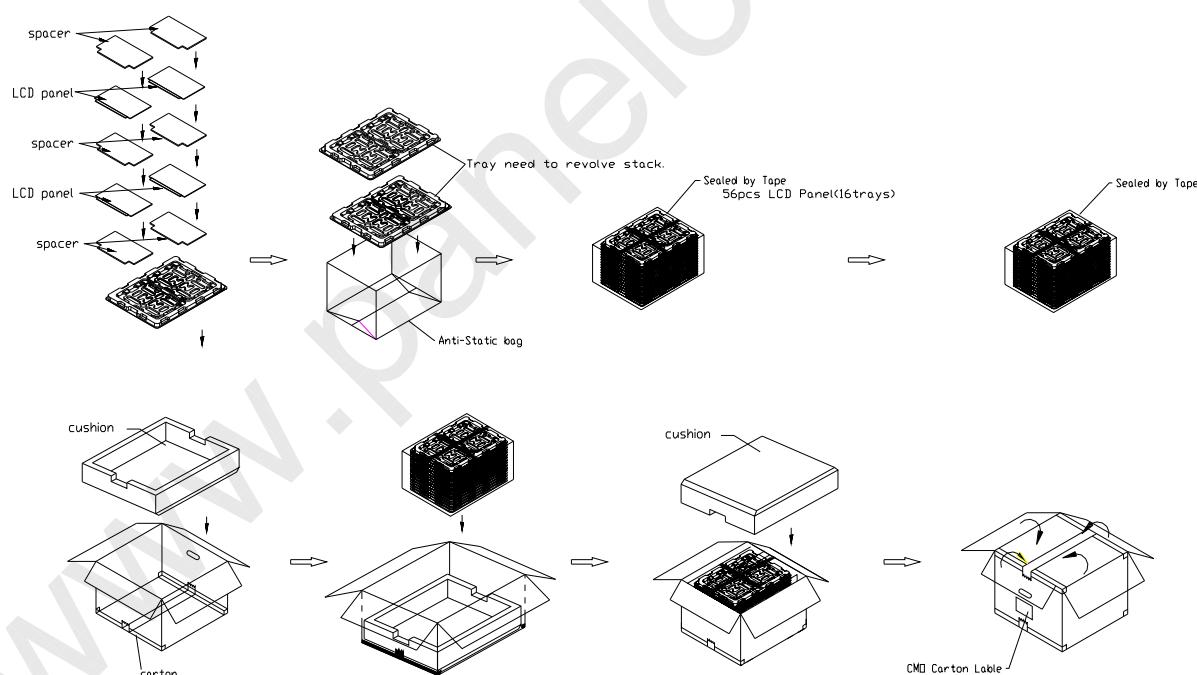**Approval**

9. PACKAGING

9.1 PACKING SPECIFICATIONS

(1) 56 open cells / 1 Box

(2) Box dimensions: 650mm(L) X 495mm(W) X 320mm(H)

(3) Weight: approximately 12.3Kg (56 open cells per box)

9.2 PACKING METHOD

(1) Carton Packing should have no failure in the following reliability test items

Test Item	Test Conditions	Note
Packing Vibration	ISTA STANDARD Random, Frequency Range: 1 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z), Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y)	Non Operation

(2) Packing method.

(1) Carton Dimensions: 650(L)x495(W)x320(H)mm

(2) 56 LCD Cells+PCB/Carton

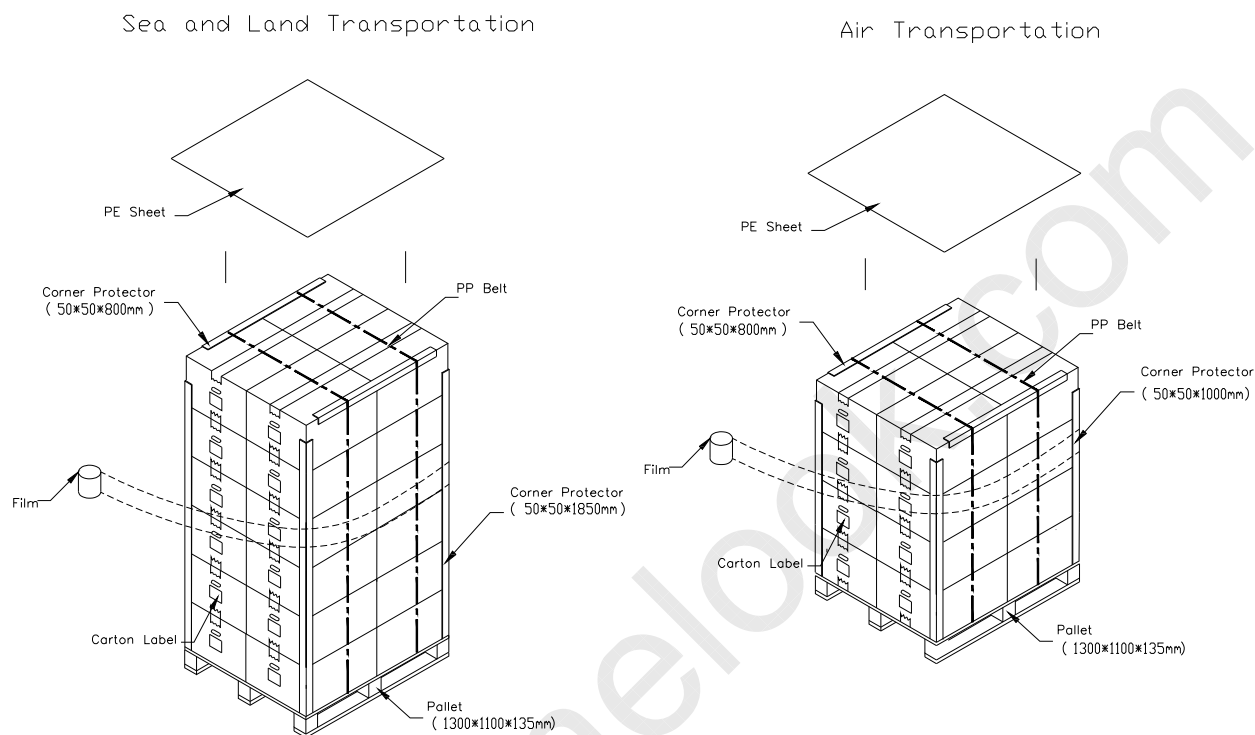The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

9.2 PALLET

Sea and Land Transportation

Air Transportation

PE Sheet

Corner Protector
(50*50*800mm)

PP Belt

Film

Corner Protector
(50*50*1850mm)

Carton Label

Pallet
(1300*1100*135mm)

PE Sheet

Corner Protector
(50*50*800mm)

PP Belt

Corner Protector
(50*50*1000mm)

Film

Carton Label

Pallet
(1300*1100*135mm)

Figure. 9-2 Packing method

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification. **Version 2.0**

Issued Date:Mar. 02, 2010
Model No.: N133I6 - P09

Approval

10. DEFINITION OF LABELS

10.1 CMO CARTON LABEL

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

(a) Model Name: N133I6 –P09

(b) Carton ID: CMO internal control

(c) Quantities: 56

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO's representative while your product design is based on this specification.   **Version 2.0**

DETAIL E
SCALE 5:1

DETAIL L
PANEL ID
SCALE 5:1

DETAIL K
SCALE 80:1

DETAIL M
QUICK PAD
SCALE 5:1

NOTES:
1. '*' MARKS THE CRITICAL DIMENSION.
2. '@' MARKS THE CPK DIMENSION.
3.1.GENERAL TOLERANCE:±0.2mm

TITLE ASSY_CELL_NL36021C
Drawing No.
Part No. NL36021C
Material TBD
Date 07-Dec-2009 Scale Uniform
Sheet 1 / 1 A1
2D REV:C
3D REV:

Approved SHUNWN
Checked JACKSON.CHEN
Drawer FR.Ku
Designer YADZHEN
CHI MEI
CHI MEI OPTOELECTRONICS CORP.
ALL RIGHTS RESERVED. COPYING FORBIDDEN

CF Polarizer
TFT Polarizer

DETAIL D
SCALE 10:1

DETAIL C
SCALE 5:1

SCALE 8:1

DETAIL J
SCALE 80:1

DETAIL I
SCALE 40:1

DETAIL H
SCALE 40:1

DETAIL G
SCALE 20:1

DETAIL F
SCALE 20:1

DETAIL B
SCALE 5:1

DETAIL A
SCALE 10:1

Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark
	modify TFT Polarizer thickness	2009/12/07	FR.Ku	Bill.Sheu		
	modify CF Polarizer dimension	2009/09/01	FR.Ku	Bill.Sheu		