

TFT LCD Approval Specification

MODEL NO.: G141C1 - L01

Customer:
Approved by:
Note:

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Approval	Approval

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REVISION HISTORY

Version	Date	Page (New)	Section	Description
2.0	Aug. 02,'10	All	All	Approval specification was first issued.

1 GENERAL DESCRIPTION

1.1 OVERVIEW

G141C1 - L01 is a 14.1" TFT Liquid Crystal Display module with LED Backlight unit and LVDS interface. This module supports 1440 x (3 RGB) x 900 WXGA+ MVA mode and can display 262,144 colors. The LED converter module for backlight is built in.

1.2 FEATURES

- Thin and Light Weight
- WXGA+ (1440 x 900 pixels) resolution
- DE only mode
- 3.3V LVDS (Low Voltage Differential Signaling) interface with 2 pixel/clock
- RoHS compliance

1.3 APPLICATION

- TFT LCD display

1.4 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	303.48(H) X 189.675(V) (14.1 inch Diagonal)	mm	(1)
Bezel Opening Area	306.76 (H) x 193.0 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1440 x R.G.B. x 900	pixel	-
Pixel Pitch	0.21075 (H) x 0.21075 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	262,144	color	-
Transmissive Mode	Normally Black	-	-
Surface Treatment	Glare	-	-

1.5 MECHANICAL SPECIFICATIONS

Item	Min.	Typ.	Max.	Unit	Note	
Module Size	Horizontal(H)	319.1	319.5	319.9	mm	(1)
	Vertical(V)	205.1	205.5	205.9	mm	
	Depth(D)	--	5.2	5.5	mm	
Weight	--	406	421	g		

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

(2) The Module Power Consumption is specified at 3.3V, white pattern and 100% duty for LED backlight.

2 ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-20	+60	°C	(1)
Operating Ambient Temperature	T _{OP}	0	+50	°C	(1), (2)
Shock (Non-Operating)	S _{NOP}	-	220/2	G/ms	(3), (5)
Vibration (Non-Operating)	V _{NOP}	-	1.5	G	(4), (5)

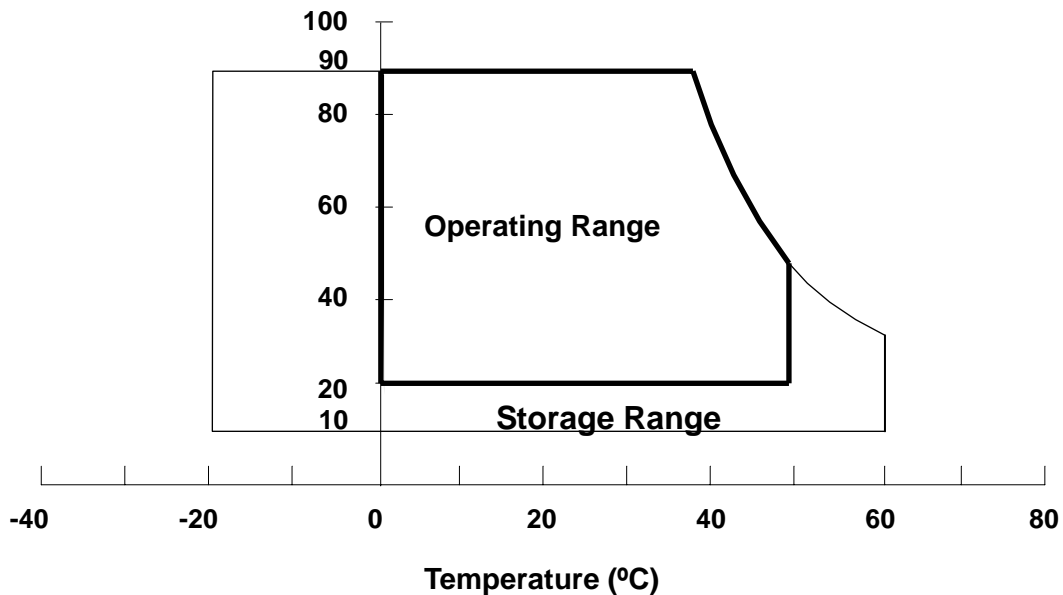
Note (1) (a) 90 %RH Max. (Ta = 40 °C).

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

(c) No condensation.

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

Relative Humidity (%RH)



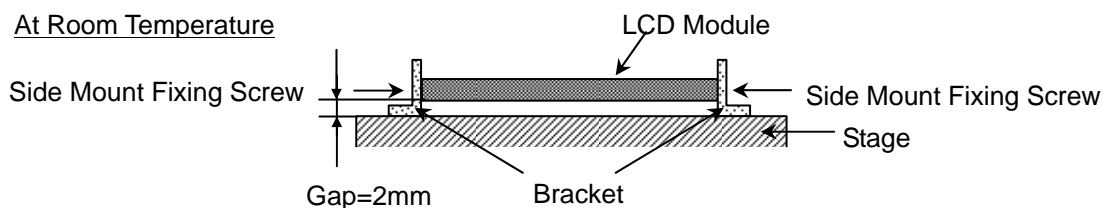
Note (3) 1 time for ± X, ± Y, ± Z. for Condition (220G / 2ms) is half Sine Wave,.

Note (4) 10 ~ 500 Hz, 30 min / Cycle, 1 cycles for each X, Y, Z axis.

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

The fixing condition is shown as below:

At Room Temperature



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCC	- 0.3	+5.5	V	(1)

2.2.2 BACKLIGHT UNIT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Converter Voltage	LED_VCC	-0.3	18	V	(1), (2)
Enable Voltage	BLU_EN	---	5.5	V	
Backlight Adjust	BLU_ADJ	---	5.5	V	

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

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

3 ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

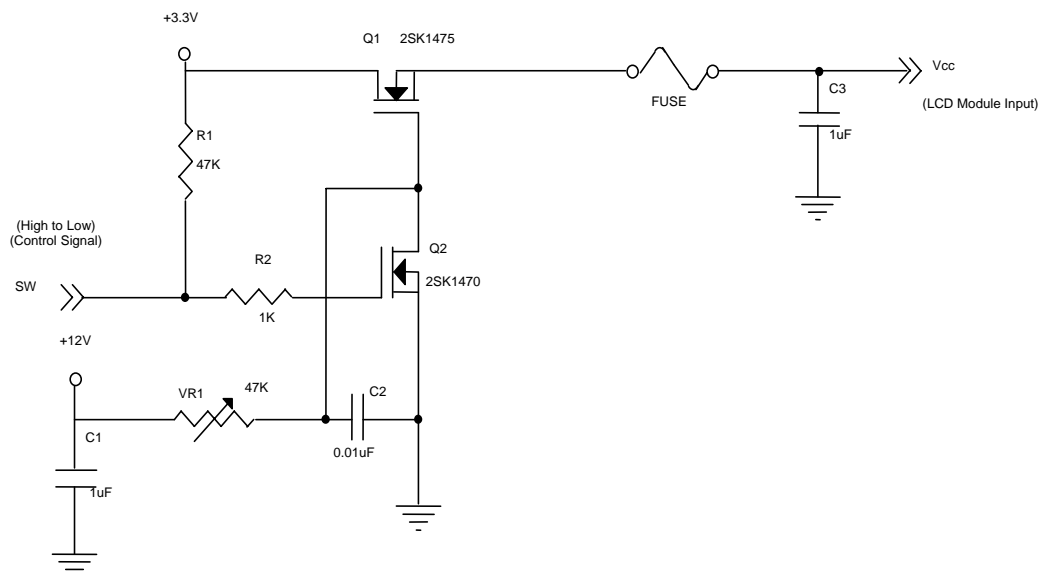
Ta = 25 ± 2 °C

Parameter	Symbol	Value			Unit	Note	
		Min.	Typ.	Max.			
Power Supply Voltage	VCC	3.0	3.3	3.6	V	at VCC=3.3V	
Rush Current	I _{RUSH}	---	---	1.5	A	(2), at VCC=3.3V	
Power Supply Current	White	I _{vcc}	---	550	---	mA	(3)a, at VCC=3.3V, 60Hz
	Black		---	450	---		
Power Consumption	P _L	---	1.815	---	W	VCC=3.3V, 60Hz, White Pattern	
Differential Input High Threshold	V _{TH}	---	50	100	mV	VICM=1.2V	
Differential Input Low Threshold	V _{TL}	-100	-50	---	mV	VICM=1.2V	
LVDS differential input voltage	V _{ID}	100	---	600	mV	-	
LVDS common input voltage	VICM	0.7	1.2	1.6	V	-	

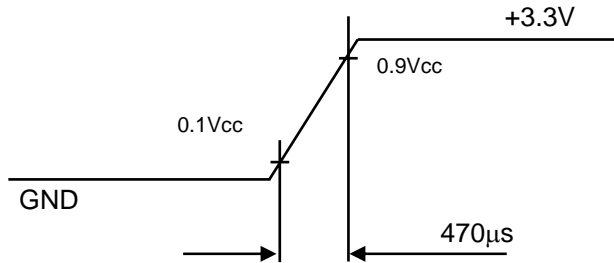
Note (1) The module is recommended to operate within specification ranges listed above for normal function..

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

Measurement Conditions: Shown as the following figure.

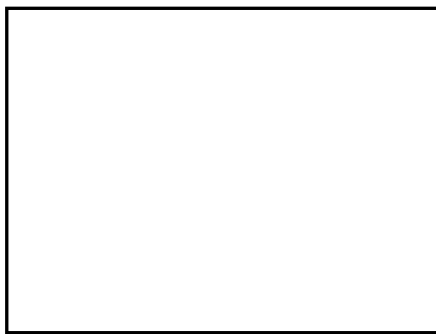


Vcc rising time is 470μs



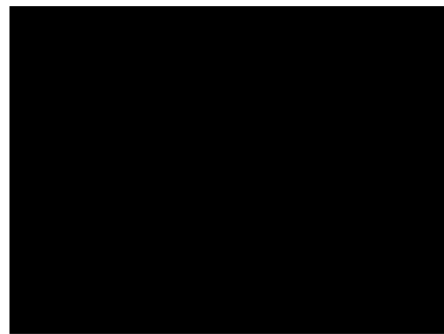
Note (3) The specified power supply current is under the conditions at $V_{cc} = 3.3\text{ V}$, $T_a = 25 \pm 2\text{ }^\circ\text{C}$, $f_v = 60\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



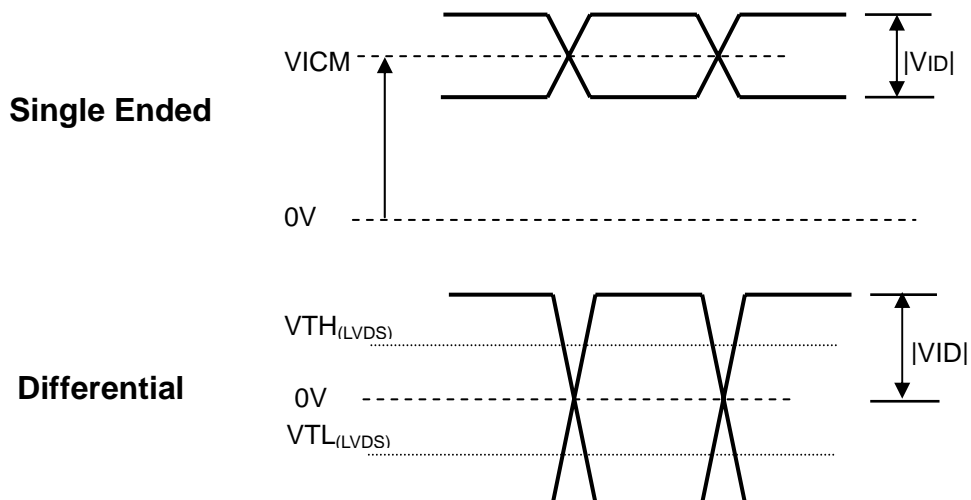
Active Area

b. Black Pattern



Active Area

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



3.2 LED CONVERTER

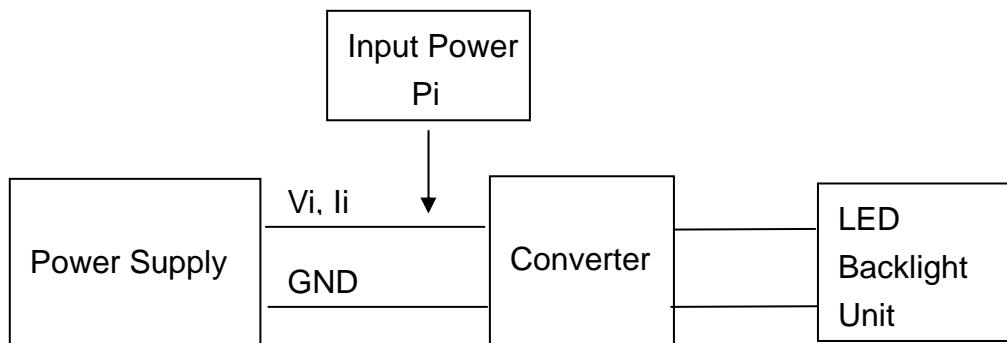
 $T_a = 25 \pm 2 \text{ }^\circ\text{C}$

Parameter	Symbol	Value			Unit	Note	
		Min.	Typ.	Max.			
Converter Power Supply Voltage	V_i	7	12.0	20	V	(Duty 100%)	
Converter Power Supply Current	I_i	0.49	0.44	0.4	A	@ $V_i = 12\text{V}$ (Duty 100%)	
LED Power Consumption	P_{LED}	---	4.48	---	W	@ $V_i = 12\text{V}$ (Duty 100%)	
EN Control Level	Backlight on	BLU_EN	2.0	---	3.3	V	
	Backlight off		0	---	0.8	V	
PWM Control Level	PWM High Level	BLU_ADJ	2.0	---	3.3	V	
	PWM Low Level		0	---	0.15	V	
PWM Control Duty Ratio			20		100	%	
PWM Control Frequency	f_{PWM}		190	200	210	Hz	
LED Life Time	L_L		30,000			Hrs	(2)

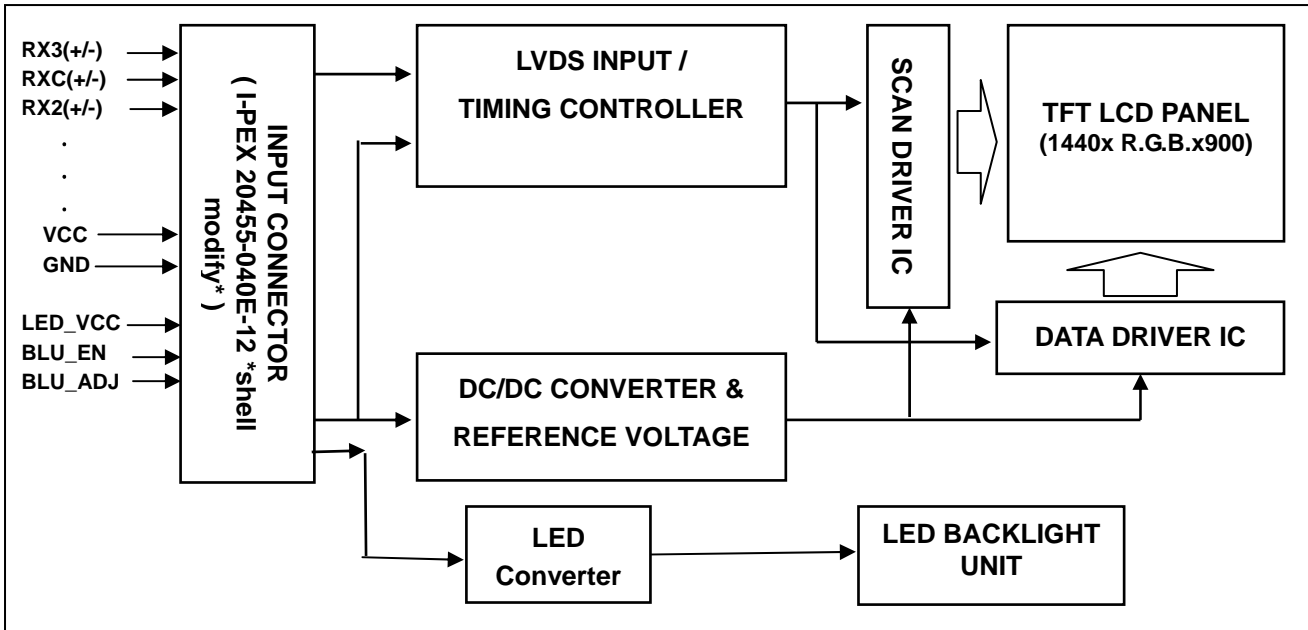
Note (1) The module is recommended to operate within specification ranges listed above for normal function..

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

Measurement Conditions: Shown as the following figure.



4 BLOCK DIAGRAM
 4.1 TFT LCD MODULE



5 INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

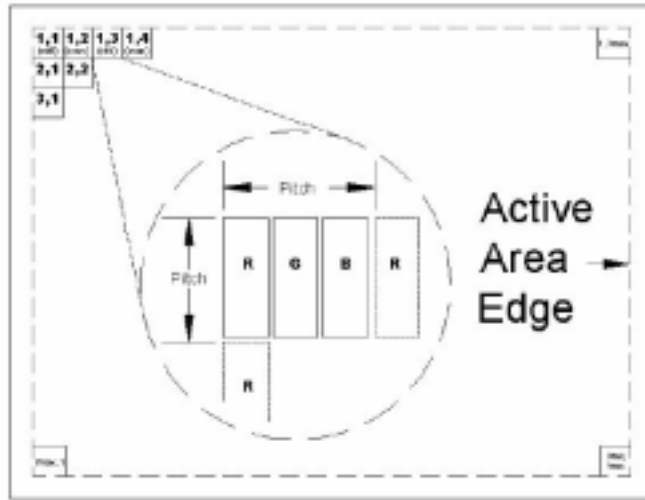
Pin	Symbol	Description	Polarity	Remark
1	GND	Ground		
2	VCC	Power Supply +3.3 V (typical)		
3	VCC	Power Supply +3.3 V (typical)		
4	EE_VDD	EDID Power supply		
5	NC	Non-Connection		
6	EE_SC	I2C Clock for EDID		
7	EE_SD	I2C Data for EDID		-
8	RX00-	LVDS Differential Data Input (Odd)	Negative	
9	RX00+	LVDS Differential Data Input (Odd)	Positive	
10	GND	Ground		
11	RX01-	LVDS Differential Data Input (Odd)	Negative	
12	RX01+	LVDS Differential Data Input (Odd)	Positive	
13	GND	Ground		
14	RX02-	LVDS Differential Data Input (Odd)	Negative	
15	RX02+	LVDS Differential Data Input (Odd)	Positive	
16	GND	Ground		
17	RXOC-	LVDS Clock Data Input (Odd)	Negative	
18	RXOC+	LVDS Clock Data Input (Odd)	Positive	
19	GND	Ground		
20	RxE0-	LVDS Differential Data Input (Even)	Negative	
21	RxE0+	LVDS Differential Data Input (Even)	Positive	
22	GND	Ground		
23	RxE1-	LVDS Differential Data Input (Even)	Negative	
24	RxE1+	LVDS Differential Data Input (Even)	Positive	
25	GND	Ground		
26	RxE2-	LVDS Differential Data Input (Even)	Negative	
27	RxE2+	LVDS Differential Data Input (Even)	Positive	
28	GND	Ground		
29	RXEC-	LVDS Clock Data Input (Even)	Negative	
30	RXEC+	LVDS Clock Data Input (Even)	Positive	
31	GND	Ground		
32	GND	Ground		
33	GND	Ground		
34	NC	Non-Connection		
35	BLU_ADJ	Backlight Adjust		Note (3)
36	BLU_EN	Enable BLU		Note (3)
37	NC	Non-Connection		
38	LED_VCC	Power Supply +12V (typical)		
39	LED_VCC	Power Supply +12V (typical)		
40	LED_VCC	Power Supply +12V (typical)		

Note (1) Connector Part No.: 20455-040E-12 *shell modify* (I-PEX)

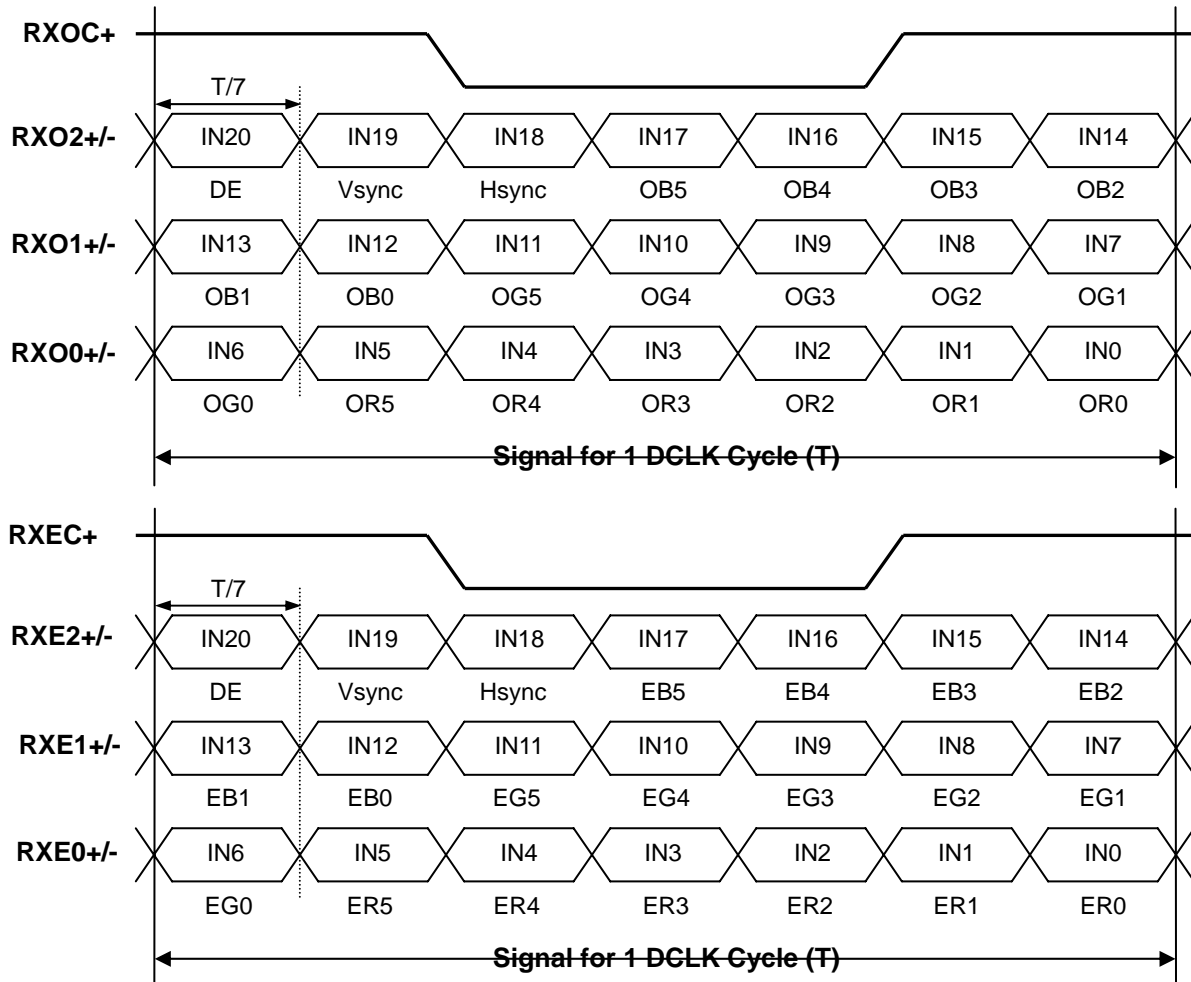
Note (2) User's connector Part No: 20453-040T-12

Note (3) "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connected".

Note (4) 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	0	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	
	Red(1)	0	0	0	0	0	1	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	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Red(61)	1	1	1	1	0	1	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	
Red(63)	1	1	1	1	1	1	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	
	Green(1)	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	1	0	0	0	0	0	0	0	
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	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	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		
Gray Scale Of Blue	Blue(0)/Dark	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	1	
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Blue(61)	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	1	1	1	1	1	0	
Blue(63)	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

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 FPGDI standards

	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 (G141C1-L01)	10	00010000
11	0B	ID product code (hex LSB first; G141C1-L01)	14	00010100
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)	06	00000110
17	11	Year of manufacture (fixed year code)	14	00010100
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	Active area horizontal 30.348cm	1E	00011110
22	16	Active area vertical 18.9675cm	13	00010011
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	0E	00001110
26	1A	Bx1 Bx0 By1 By0 Wx1 Wx0 Wy1 Wy0	05	00000101
27	1B	Rx=0.590	97	10010111
28	1C	Ry=0.340	57	01010111
29	1D	Gx=0.319	51	01010001
30	1E	Gy=0.541	8A	10001010
31	1F	Bx=0.152	27	00100111
32	20	By=0.125	20	00100000
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 ("106.5MHz", According to VESA Rev12)	9A	10011010
55	37	# 1 Pixel clock (hex LSB first)	29	00101001
56	38	# 1 H active ("1440")	A0	10100000
57	39	# 1 H blank ("464")	D0	11010000
58	3A	# 1 H active : H blank ("1440 : 464")	51	01010001
59	3B	# 1 V active ("900")	84	10000100
60	3C	# 1 V blank ("34")	22	00100010
61	3D	# 1 V active : V blank ("900 :34")	30	00110000
62	3E	# 1 H sync offset ("80")	50	01010000
63	3F	# 1 H sync pulse width ("152")	98	10011000
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 ("80: 152 : 3 : 6")	00	00000000
66	42	# 1 H image size ("303 mm")	2F	00101111
67	43	# 1 V image size ("190 mm")	BE	10111110
68	44	# 1 H image size : V image size ("303 : 190")	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 "G141C1-L01", ASCII)	FE	11111110
76	4C	# 2 Flag	00	00000000
77	4D	# 2 1st character of name ("G")	47	01000111
78	4E	# 2 2nd character of name ("1")	31	00110001
79	4F	# 2 3rd character of name ("4")	34	00110100
80	50	# 2 4th character of name ("1")	31	00110001
81	51	# 2 5th character of name ("C")	43	01000011
82	52	# 2 6th character of name ("1")	31	00110001
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 ("1")	31	00110001
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"G141C3-L01", ASCII)	FE	11111110
112	70	# 4 Flag	00	00000000
113	71	# 4 1st character of name ("G")	47	01000111
114	72	# 4 2nd character of name ("1")	31	00110001
115	73	# 4 3rd character of name ("4")	34	00110100
116	74	# 4 4th character of name ("1")	31	00110001
117	75	# 4 5th character of name ("C")	43	01000011
118	76	# 4 6th character of name ("1")	31	00110001
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 ("1")	31	00110001
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	84	10000100

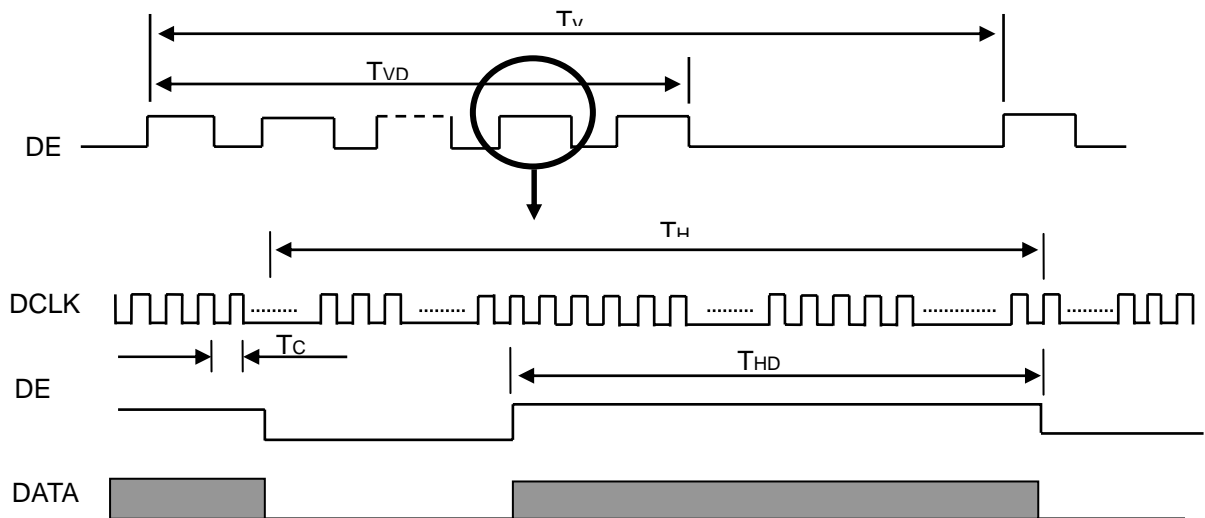
6 INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

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

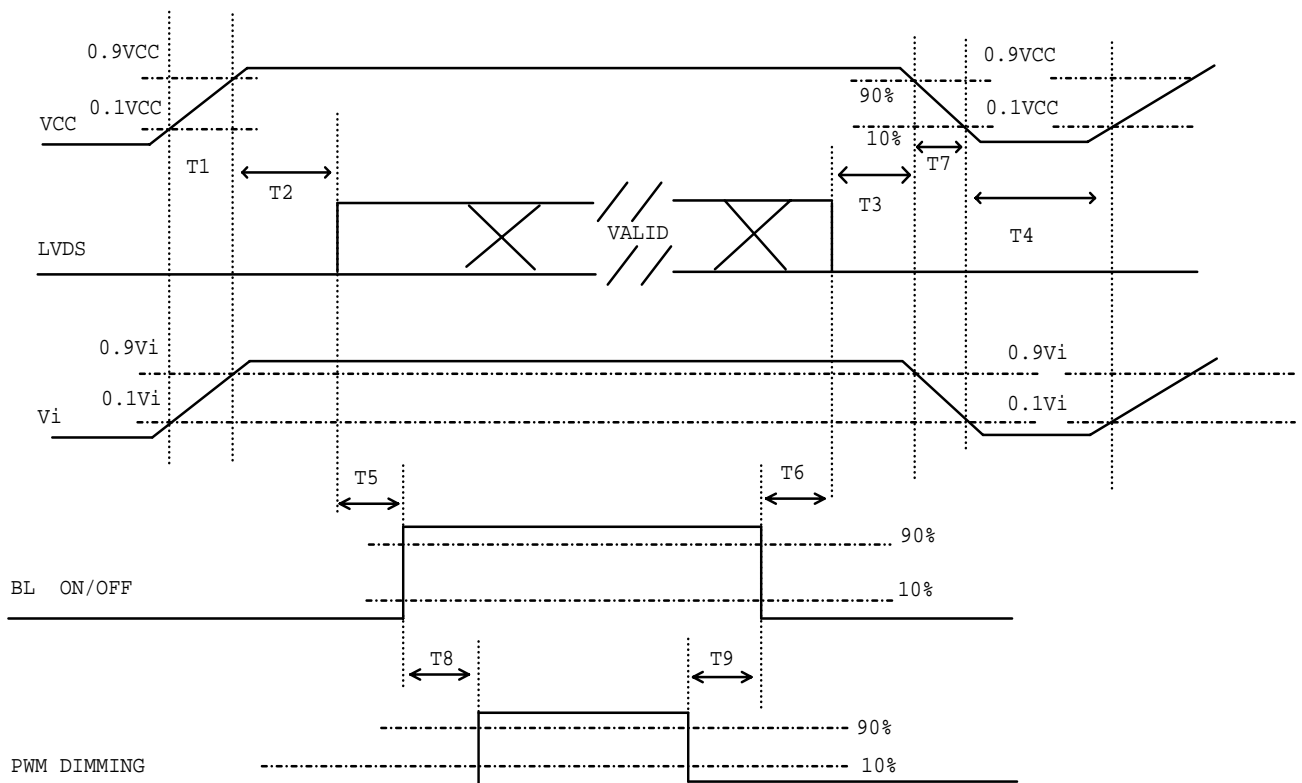
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	Fc	40	53.25	65	MHz	
	Total	Tv	915	934	990	Th	Tv=Tvd+Tvb
Vertical Active Display Term	Display	Tvd	900	900	900	Th	
	Blank	Tvb	Tv-Tvd	34	Tv-Tvd	Th	
	Total	Th	1700	1904	2100	Tc	Th=Thd+Thb
Horizontal Active Display Term	Display	Thd	1440	1440	1440	Tc	
	Blank	Thb	Th-Thd	464	Th-Thd	Tc	

INPUT SIGNAL TIMING DIAGRAM



6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should follow the conditions shown in the following diagram.



Power ON/OFF sequence

Note (1) Please avoid floating state of interface signal at invalid period.

Note (2) 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.

Parameter	Value			Units
	Min	Typ	Max	
T1	0.5	---	10	ms
T2	0	---	50	ms
T3	0	---	50	ms
T4	500	---	---	ms
T5	200	---	---	ms
T6	20	---	---	ms
T7	5	---	300	ms
T8	10	---	---	ms
T9	10	---	---	ms

7 OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

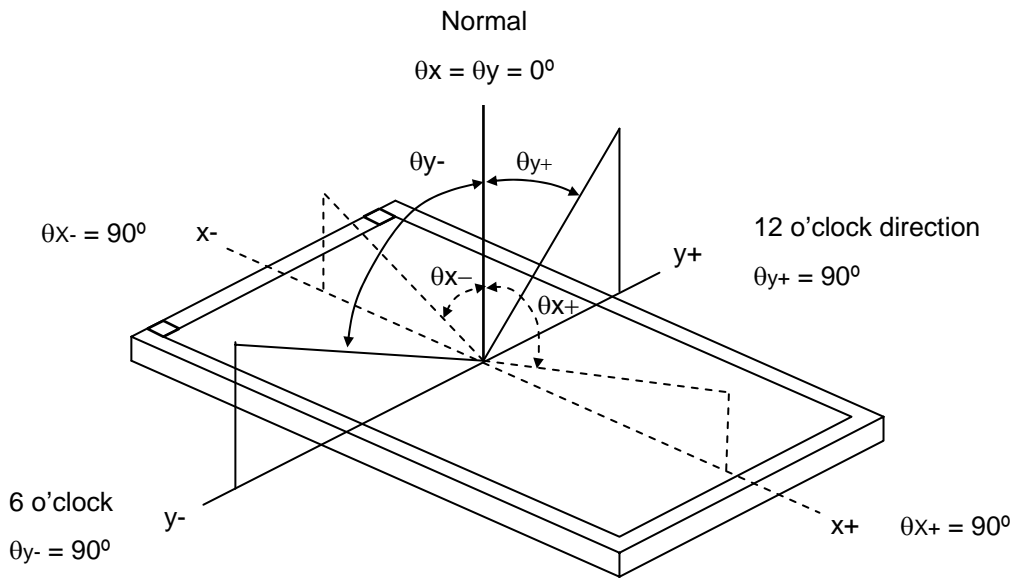
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V _{CC}	3.3	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Inverter Current	I _L	20	mA
Inverter Driving Frequency	F _L	61	KHz
Inverter	Sumida H05-4915		

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

7.2 OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle		1000	-	-	(2), (6)
Response Time		T_R		-	14	19	ms	(3)
		T_F		-	11	16	ms	
Average Luminance of White		L_{AVE}			250	-	cd/m ²	(4), (6)
White Variation		δW 5pts			-	-	1.4	-
Color Chromaticity	Red	Rx	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	TYP -0.05	0.580	TYP +0.05	-	(1), (6)
		Ry			0.365		-	
	Green	Gx			0.360		-	
		Gy			0.553		-	
	Blue	Bx			0.152		-	
		By			0.127		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
Viewing Angle	Horizontal	θ_{x+}	CR \geq 10	80	88	-	Deg.	
		θ_{x-}		80	88	-		
	Vertical	θ_{y+}		80	88	-		
		θ_{y-}		80	88	-		

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



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

The contrast ratio can be calculated by the following expression.

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

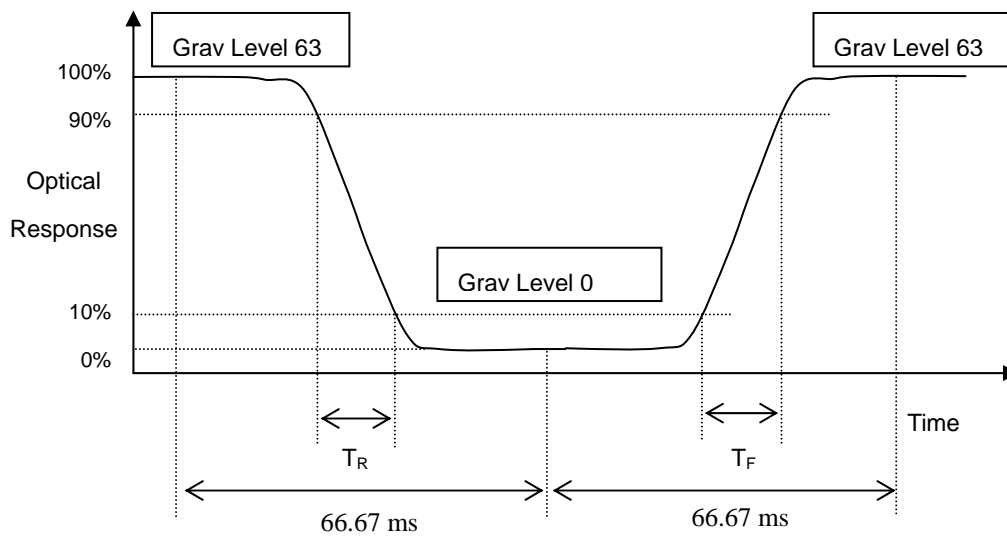
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

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

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

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



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

Measure the luminance of gray level 63 at 5 points

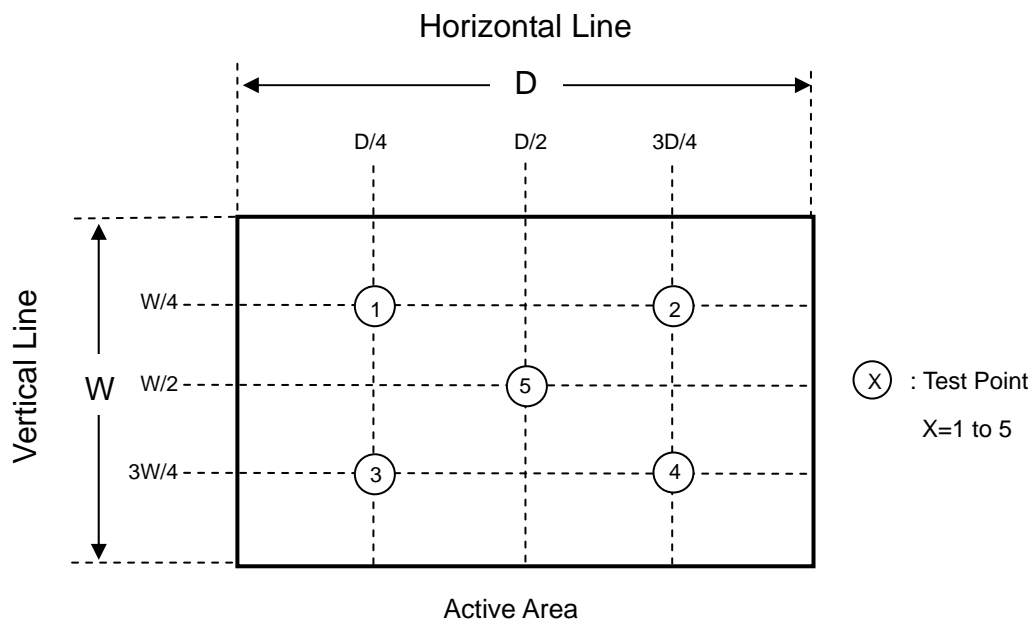
$$L_{AVE} = [L(1) + L(2) + L(3) + L(4) + L(5)] / 5$$

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

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

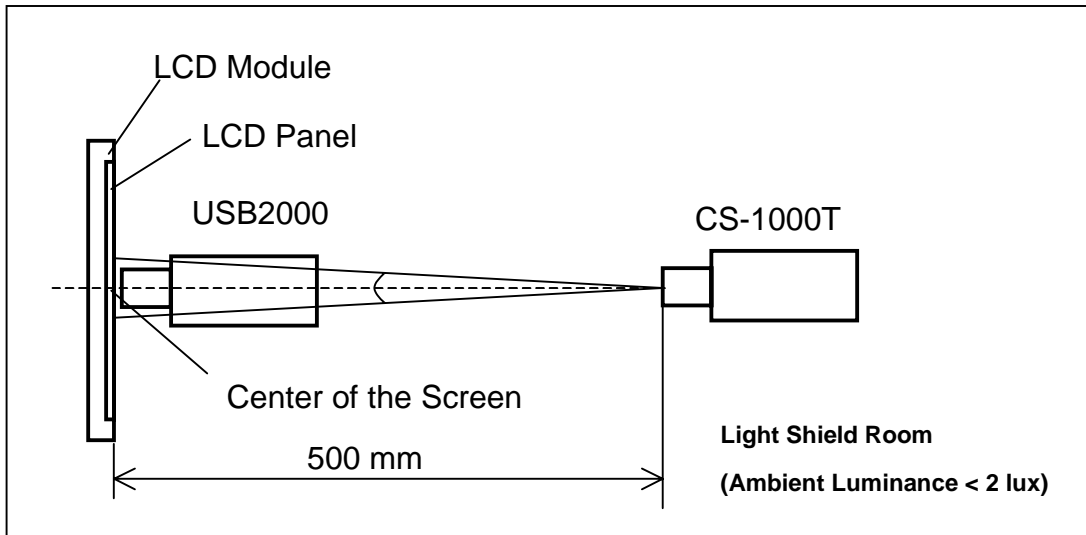
Measure the luminance of gray level 63 at 5 points

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



Note (6) Measurement Setup:

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



8 PRECAUTIONS

8.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) 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.

8.2 SAFETY 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 °C. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

8.3 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 inverter. Do not disassemble the module or insert anything into the Backlight unit.

9 PACKAGING
9.1 CARTON

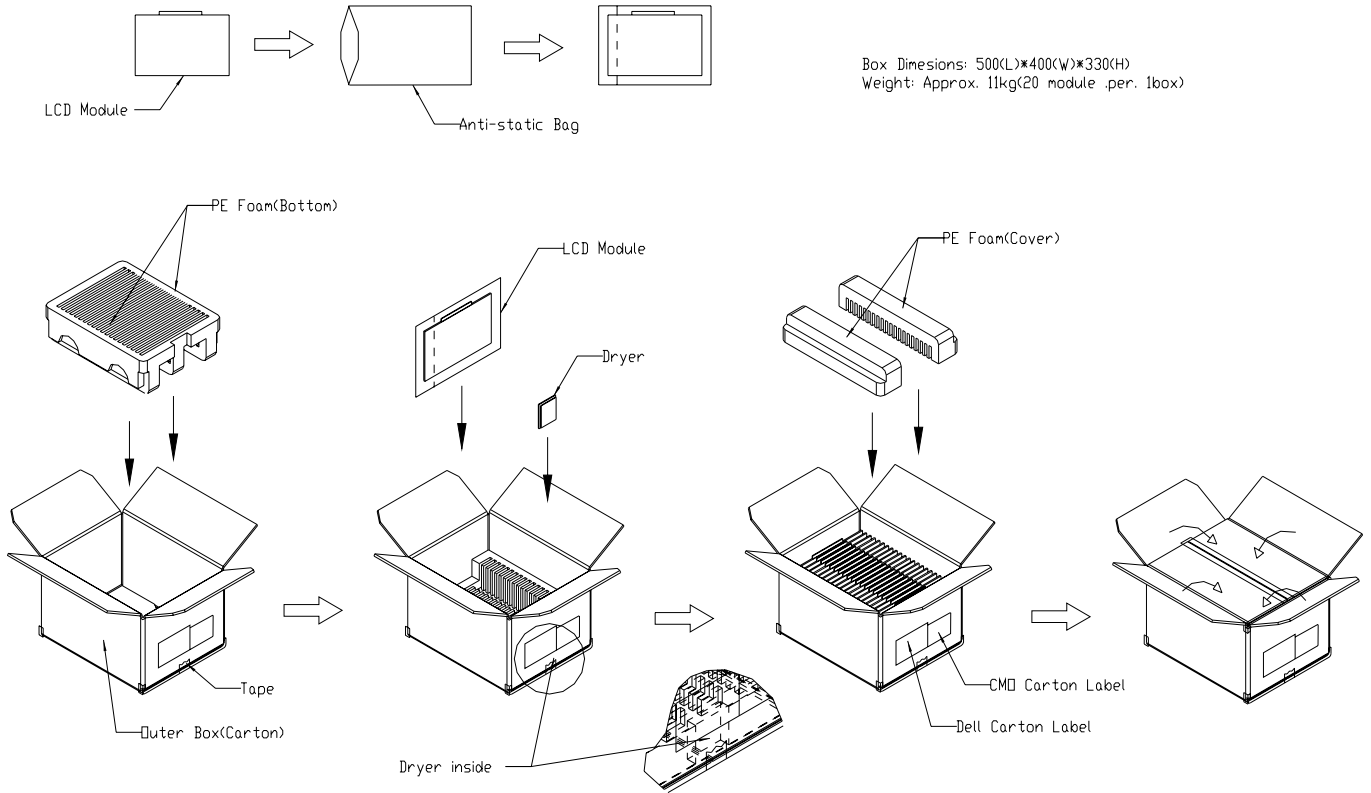


Figure. 9-1 Packing method

9.2 PALLET FOR SEA FREIGHT

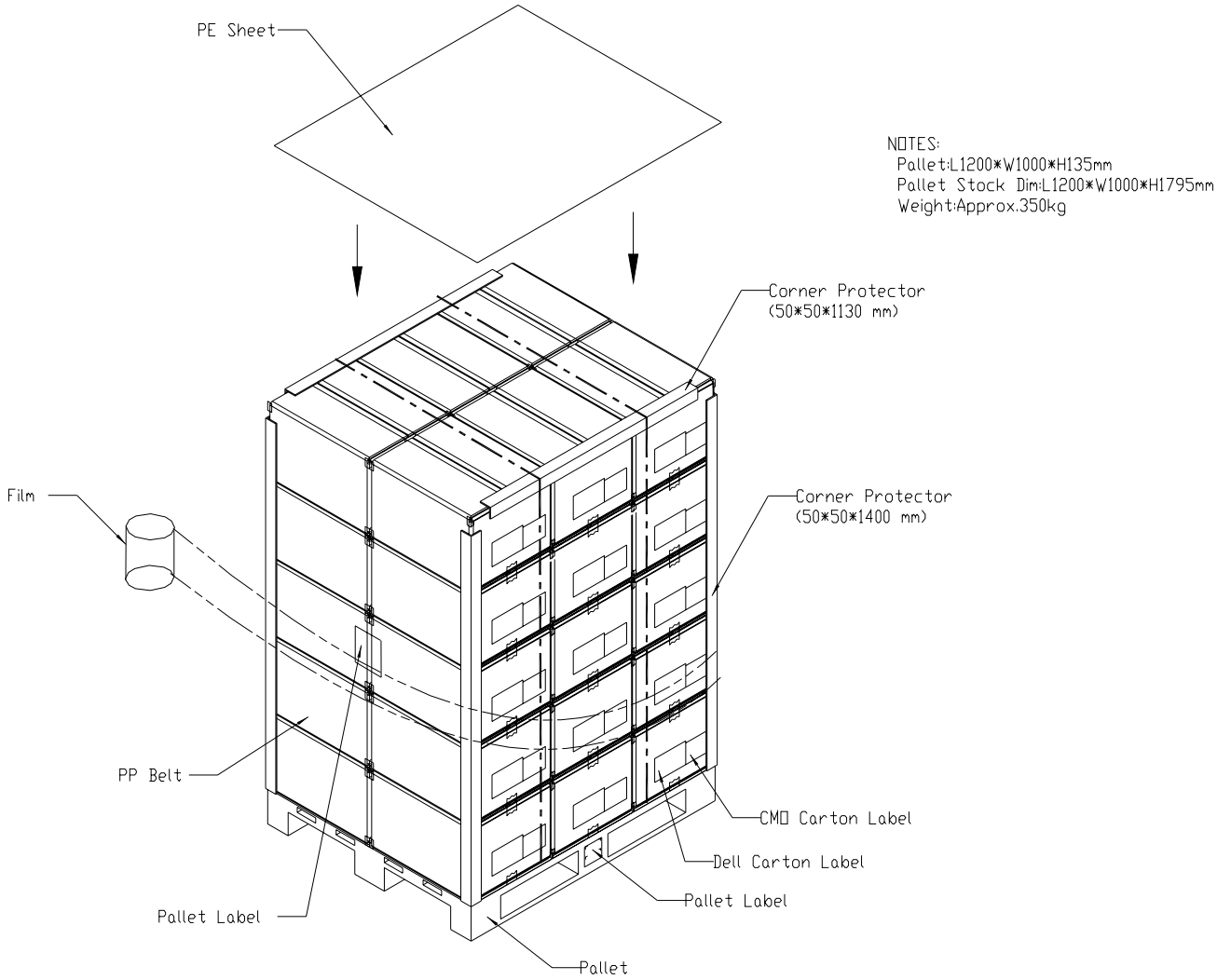


Figure. 9-2 Packing method

9.3 PALLET FOR AIR FREIGHT

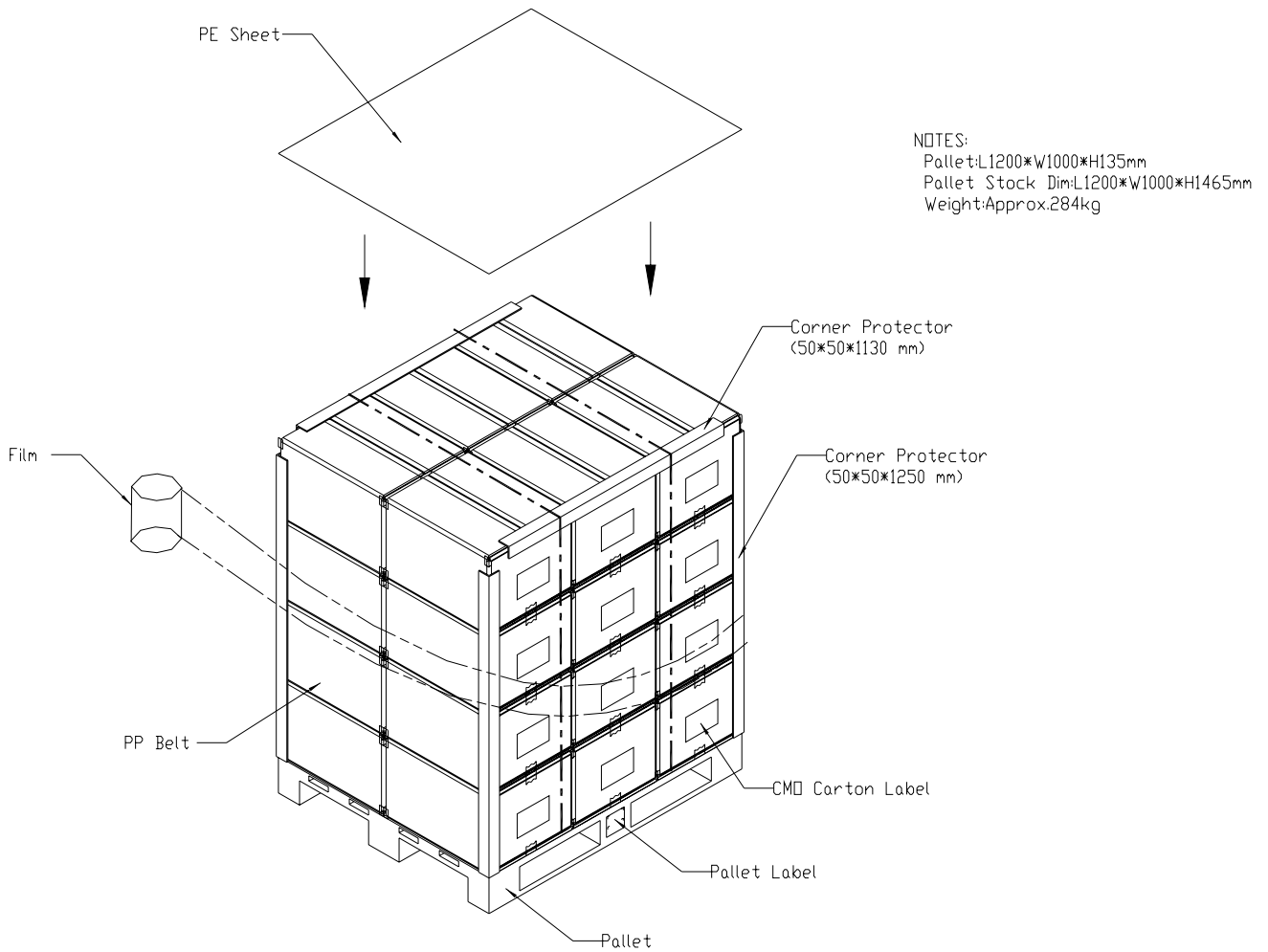


Figure. 9-3 Packing method

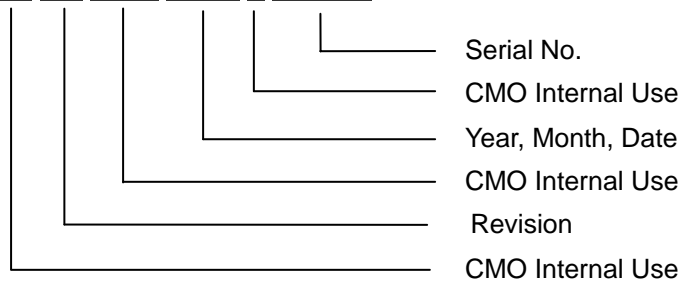
10 DEFINITION OF LABELS

10.1 CMO MODULE LABEL

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

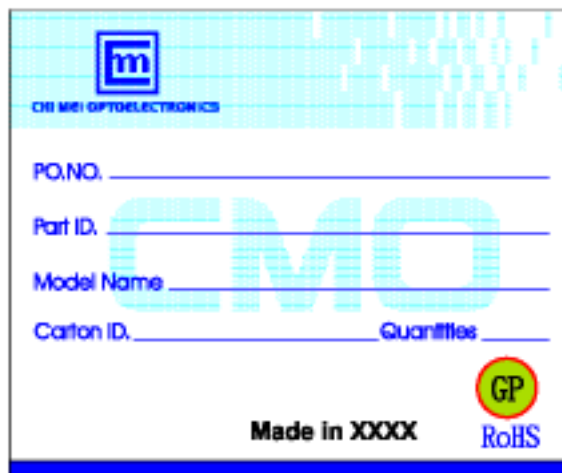


- (a) Model Name: G141C1 - L01
- (b) Revision: Rev. XX, for example: A1, ..., C1, C2 ...etc.
- (c) Serial ID: XXXXXXYMDXXXX

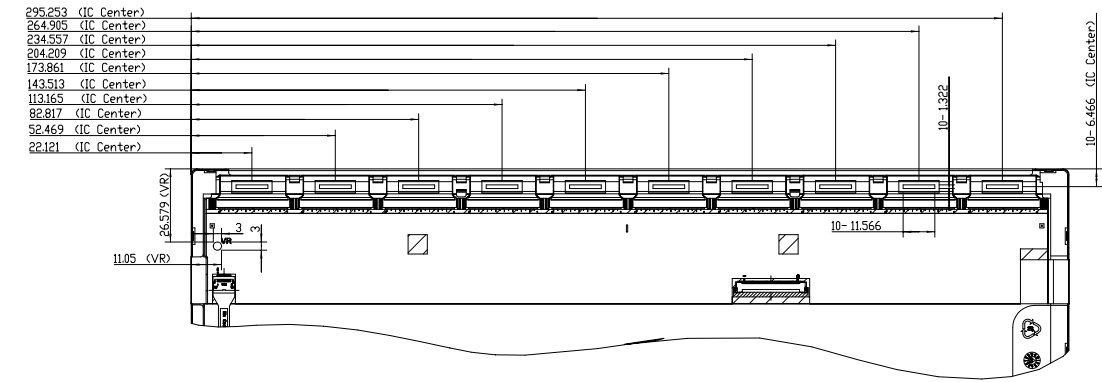
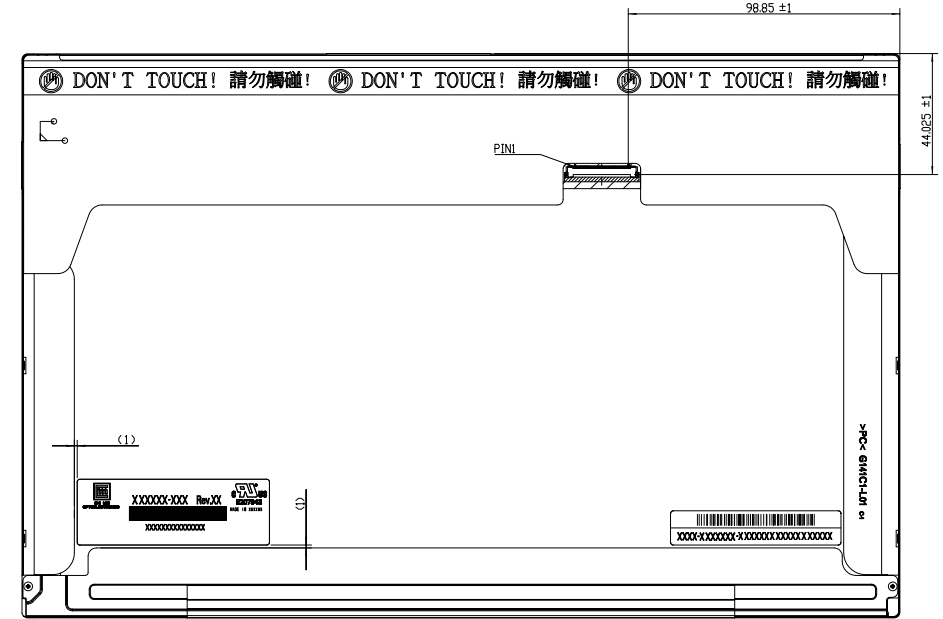
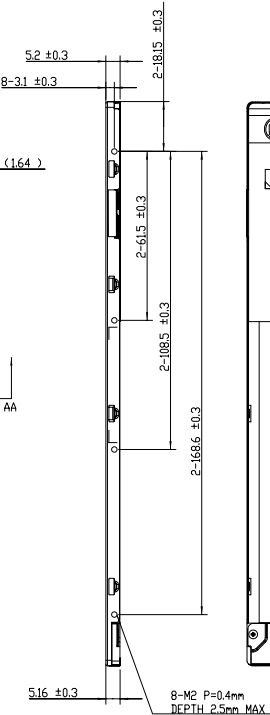
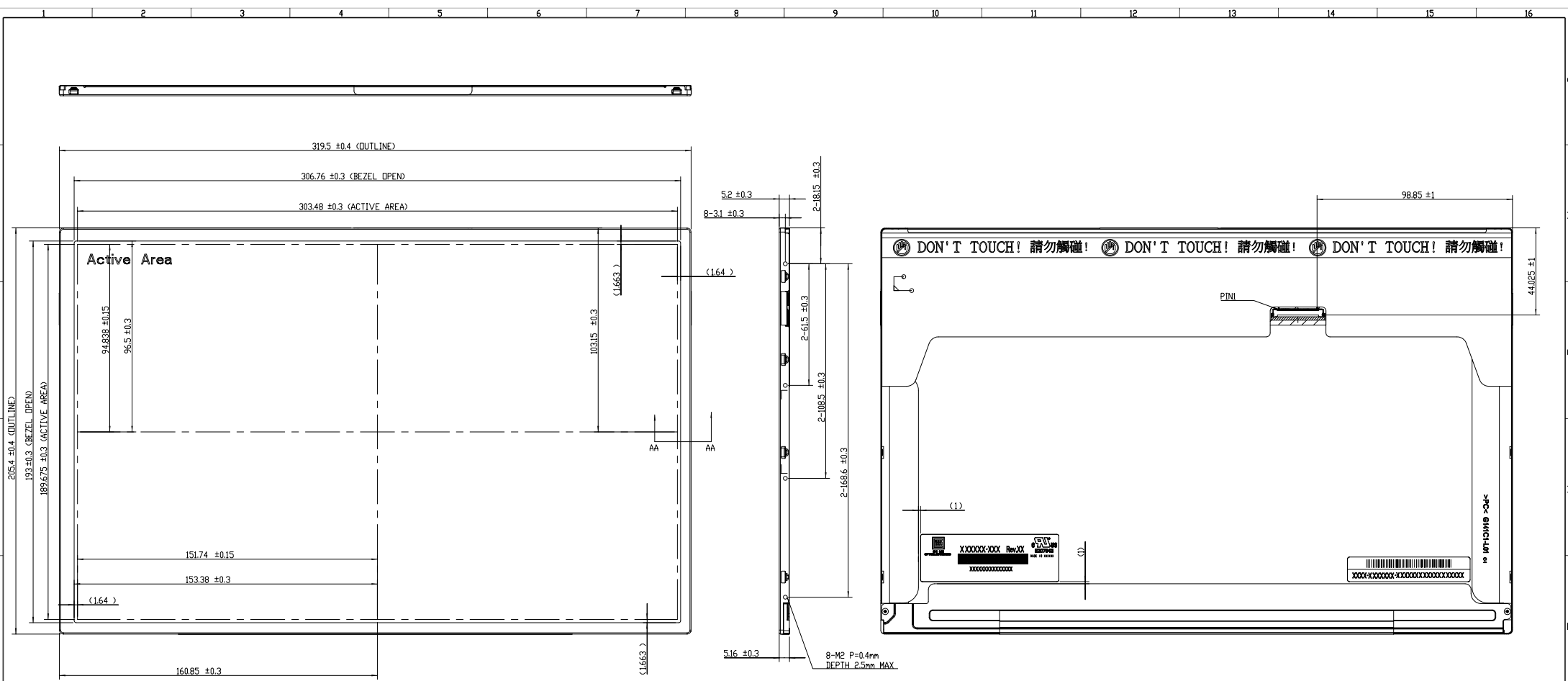


- (d) Production Location: MADE IN XXXX. XXXX stands for production location.
- (e) Serial ID includes the information as below:
 - (a) Manufactured Date: Year: 1~9, for 2001~2009
Month: 1~9, A~C, for Jan. ~ Dec.
Day: 1~9, A~Y, for 1st to 31st, exclude I , O and U
 - (b) Revision Code: cover all the change
 - (c) Serial No.: Manufacturing sequence of product

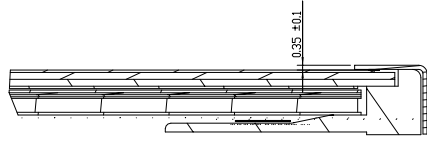
10.2 CMO CARTON LABEL



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



- NOTES:
1. MAX. SCREW DEPTH: 2.5mm.
 2. MAX SCREW TORQUE: 2 kgf-cm.
 3. LCD MODULE INPUT CONNECTOR : IPEX 20455-040E-12
 4. IN ORDER TO AVOID ABNORMAL DISPLAY, POOLING AND WHITE SPOT, NO OVERLAPPING IS SUGGESTED AT CABLES, ANTENNAS, CAMERA, WLAN, WAM OR OTHER FOREIGN OBJECTS OVER TCON AND VR LOCATION.
 5. MODULE FLATNESS 0.3mm MAX.
 6. '(X)' MARKS THE REFERENCE DIMENSIONS.



SECTION AA-AA
SCALE 5:1

Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark
△	Modified note description	2010/07/30	Morris Lin	Shunnan	EA0061932	

TITLE: MODULE OUTLINE DRAWING G141C1-L01			RD REV: 1.0
			SD REV: 1.0
Approved	Shunnan	Drawing No.	G14124024
Checked	Shunnan	Part No.	NA
Drawer	Morris_Lin	Material	NA
Designer	Morris_Lin	Date	30-JULY-2010 Scale 1:1 Unit:mm

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