Final Specification	Quanta Display Inc. SPECIFICATION	Doc No. QD14FL0703 Doc. REV. : 02 Issue Date : 8/15/2005 RoHS compliant

Specification for TFT LCD Module

Model No.
QD14FL07 Rev.:03

□ **Approved By**

	Quanta Display Inc.
	Andy Cheng

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QDI assumes no responsibility for any damage resulting from the use of the device which does not comply with the instructions and the precautions specified in these specification sheets.

Contact and consult with a QDI sales representative for any questions about this device.

Revision History		
REV.	Date	Change Content
0	3/31/2005	Preliminary Specification Initiation
1	4/28/2005	Add EDID contents
2	6/17/2005	1. Revise reliability test condition as Sony request at page 20 2. Add packing form at page 22 3. Add the torque of screw into outline drawing at page 23

1. Application

This specification applies to a color TFT-LCD module, QD14FL0703.

2. Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). This module is based on the standards of SPWG (Standard Panels Working Group).

It is composed of a color TFT-LCD panel, driver ICs, control circuit and power supply circuit and a backlight unit. Graphics and texts can be displayed on a 1400×3×1050 dots panel with 262,144 colors by using LVDS (Low Voltage Differential Signaling) to interface and supplying +3.3V DC supply voltage for TFT-LCD panel driving and supply voltage for backlight.

The TFT-LCD panel used for this module has very high aperture ratio. A low-reflection and higher-color-saturation type color filter is also used for this panel. Therefore, high-brightness and high-contrast image, which is suitable for the multimedia use, can be obtained by using this module.

Optimum viewing direction is 6 o'clock.

[Features]

1) High aperture panel; high-brightness or low power consumption.
2) Brilliant and high contrast image.
3) Small footprint and thin shape.
4) Light weight.
5) RoHS compliant (w/ lead free compliant, and pb contained is less than 1000ppm)

3. Mechanical Specifications

Parameter	Specifications	Unit
Display size	36 (14.1") Diagonal	cm
Active area	285.7 (H)×214.3 (V)	mm
Pixel format	1400 (H)×1050 (V)	Pixel
	(1 pixel = R+G+B dots)	
Pixel pitch	0.204 (H) × 0.204 (V)	mm
Pixel configuration	R, G, B vertical stripe	
Display mode	Normally white	
Unit outline dimensions (typ.)*1	299(W)×228 (H)×5.2(D) 5.5 Max	mm
Mass	Max: 460	g
Surface treatment	Anti-glare; Hardness 3H and low reflection (~5%)	

*1.Note : excluding backlight cables. Outline dimensions is shown in this specification

4. Input Terminals

4-1. TFT-LCD panel driving

CN1 (LVDS signals and +3.3V DC power supply)

Using connector: FI-XB30SL-HFxx/ FI-X30Sx-HFxx (JAE) or equivalent

Corresponding connector: TBD

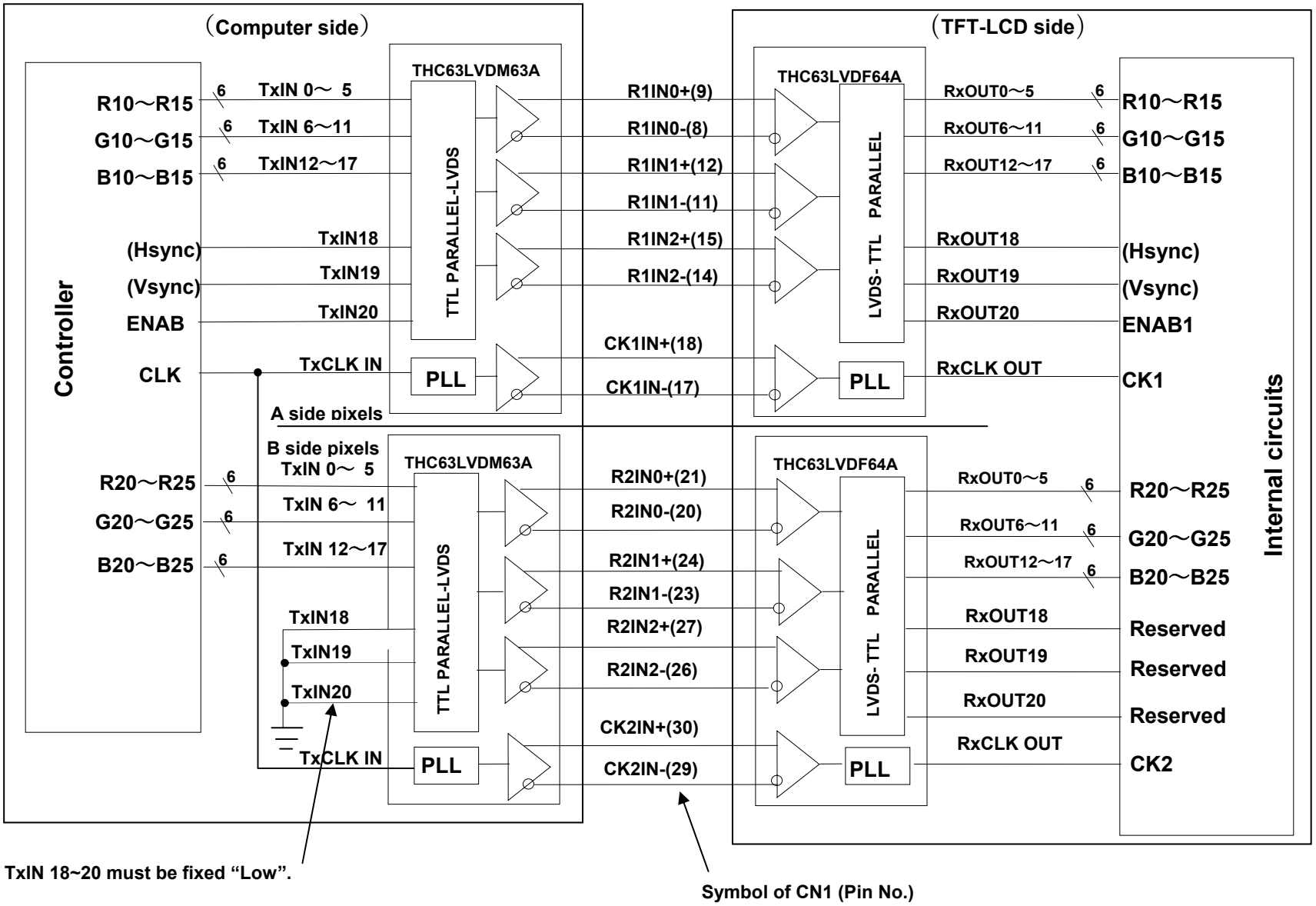
Pin No.	Symbol	Function	Remark
1	GND		
2	Vcc	+3.3V power supply	
3	Vcc	+3.3V power supply	
4	Vedid	DCC +3.3V power supply	
5	NC	Reserved	
6	CLKedid	DCC Clock	
7	DATAedid	DDC Data	
8	R1IN0-	Receiver signal of A side pixels (-)	LVDS
9	R1IN0+	Receiver signal of A side pixels (+)	LVDS
10	GND		
11	R1IN1-	Receiver signal of A side pixels (-)	LVDS
12	R1IN1+	Receiver signal of A side pixels (+)	LVDS
13	GND		
14	R1IN2-	Receiver signal of A side pixels (-)	LVDS
15	R1IN2+	Receiver signal of A side pixels (+)	LVDS
16	GND		
17	CK1IN-	Clock signal of A side pixels (-)	LVDS
18	CK1IN+	Clock signal of A side pixels (+)	LVDS
19	GND		
20	R2IN0-	Receiver signal of B side pixels (-)	LVDS
21	R2IN0+	Receiver signal of B side pixels (+)	LVDS
22	GND		
23	R2IN1-	Receiver signal of B side pixels (-)	LVDS
24	R2IN1+	Receiver signal of B side pixels (+)	LVDS
25	GND		
26	R2IN2-	Receiver signal of B side pixels (-)	LVDS
27	R2IN2+	Receiver signal of B side pixels (+)	LVDS
28	GND		
29	CK2IN-	Clock signal of B side pixels (-)	LVDS
30	CK2IN+	Clock signal of B side pixels (+)	LVDS

[Note 1] Relation between LVDS signals and actual data shows below section (4-2).

[Note 2] The shielding case is connected with signal GND.

4-2 Interface block diagram

Using receiver：THC63LVDF64A (THINE), Corresponding Transmitter：THC63LVDM63A(THINE),DS90C363,DS90C383(NS)



4-3. Backlight driving

CN2: BHSR-02VS-1(JST)

Mating connector: SM02B-BHSS-1-TB (JST) or 87210-0200

Pin No.	Symbol	Function
1	V_{HIGH}	Power supply for lamp (High voltage side)
2	V_{LOW}	Power supply for lamp (Low voltage side)

5. Absolute Maximum Ratings

5-1 LCD module

Parameter	Symbol	Condition	Ratings	Unit	Remark
Input voltage	V_I	Ta=25℃	−0.3 ～ Vcc+0.3	V	【Note1】
+3.3V supply voltage	Vcc	Ta=25℃	0 ～ ＋ 4	V	
Storage temperature	Tstg	—	−25 ～ ＋60	℃	【Note2】
Operating temperature (Ambient)	Topa	—	0 ～ ＋50	℃	

【Note1】LVDS signals

【Note2】Humidity：95%RH Max. at Ta≦40℃.

Maximum wet-bulb temperature at 39℃ or less at Ta>40℃.

No condensation.

【Note3】When you apply the LCD module for OA system. Please make sure to keep the temperature of LCD module is less than 60°C.

6. Electrical Characteristics

6-1.TFT-LCD panel driving

Ta＝25℃

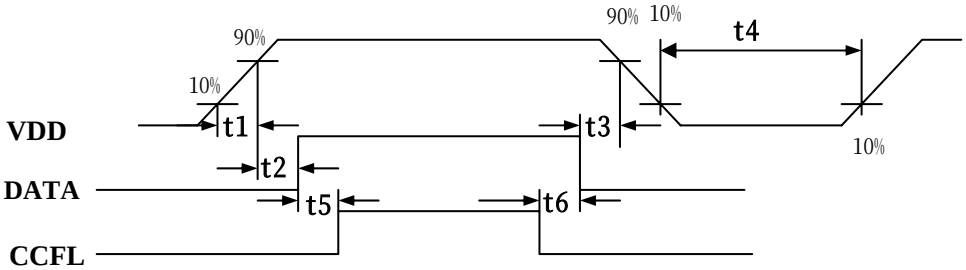
Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Vcc	Supply voltage	Vdd	+3.0	+3.3	+3.6	V	【Note2】
	Current dissipation	Idd	—	450	600	mA	【Note3】
Permissive input ripple voltage		V_{RP}	—	—	100	mV p-p	Vdd=+3.3V
Differential input Threshold voltage	High	V_{TH}	—	—	+100	mV	V_{CM}=+1.2V 【Note1】
	Low	V_{TL}	–100	—	—	mV	
Input current (High)		I_{OH}	—	—	±10	μA	V_I=2.4V Vdd=3.6V
Input current (Low)		I_{OL}	—	—	±10	μA	V_I=0V Vdd=3.6V
Terminal resistor		R_T	—	100	—	Ω	Differential input
Rush current		I_{RUSH}			1.5	A	Rise time 470uS

【Note1】 V_{CM} : Common mode voltage of LVDS driver.

【Note2】

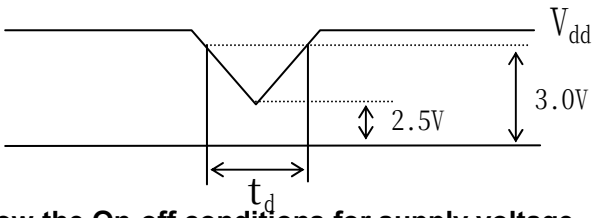
On-off conditions for supply voltage

1＜t1≦10 ms
0＜t2≦50 ms
0＜t3≦50 ms
400 ms≦t4 ;
200 ms≦t5 ;
200 ms≦t6



Vcc-dip conditions

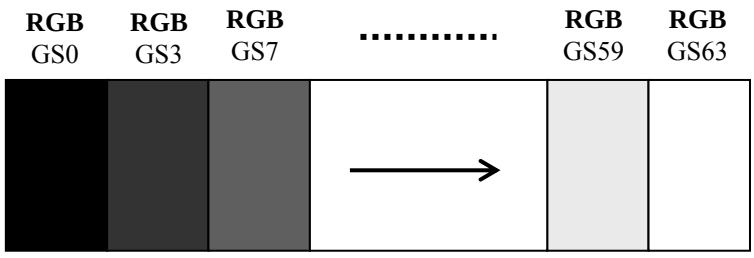
1) 2.5 V≦Vdd＜3.0 V
td≦10 ms
2) Vdd＜2.5 V



Vdd-dip conditions should also follow the On-off conditions for supply voltage

【Note3】 Typical current situation : 16-gray-bar pattern.

Vdd=+3.3V



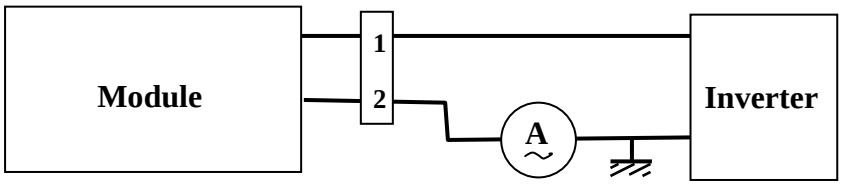
6-2. Backlight driving

The backlight system is an edge-lighting type with single CCFT (Cold Cathode Fluorescent Tube).

The characteristics of the lamp are shown in the following table.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Lamp current range	I_L	3.0	6.0	6.5	mArms	【Note1】
Lamp voltage	V_L		675		Vrms	
Lamp power consumption	P_L	—	2.7	—	W	【Note2】
Lamp frequency	F_L	50	55	60	kHz	【Note3】
Kick-off voltage	Vs	—	—	1180	Vrms	Ta=25℃
		—	—	1670	Vrms	Ta=0℃ 【Note4】
Lamp life time	L_L	*10000*	—	—	hour	【Note5】

【Note1】 Lamp current is measured with current meter for high frequency as shown below.



【Note2】 Calculated Value for reference ($I_L \times V_L$)

【Note3】 Lamp frequency may produce interference with horizontal synchronous frequency, and this may cause beat on the display. Therefore lamp frequency shall be detached as much as possible from the horizontal synchronous frequency and from the harmonics of horizontal synchronous to avoid interference.

【Note4】 It is defined at 22pF for the ballast capacitor of a DC/AC inverter.

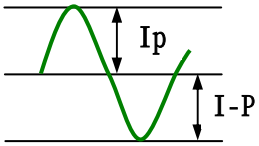
The voltage above this value should be applied to the lamp for more than 1 second to start-up. Otherwise the lamp may not be turned on.

【Note5】 Lamp life time is defined as the time when either ① or ② occurs in the continuous operation under the condition of Ta = 25℃ and I_L = 6.0 mArms.

① Brightness becomes 50 % of the original value under standard condition.

② Kick-off voltage at Ta = 0℃ exceeds maximum value, 1500V rms.

【Note6】The output of the inverter must have symmetrical waveform of voltage and current. The unsymmetric rate should be less than 10%. You don't use the inverter which has unsymmetrical voltage, unsymmetrical current and spike wave.



* Unsymmetrical ratio: $(| I_p | - | I_{-P} |) / | I_{rms} | \times 100\% \leqq 5\ \%$

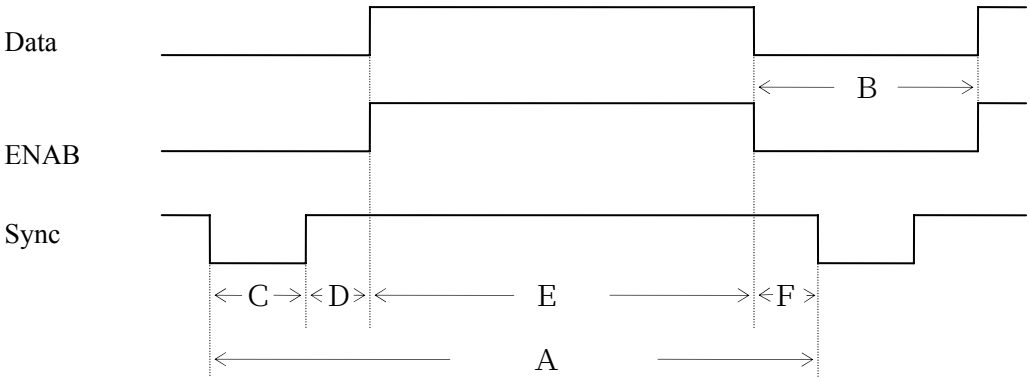
* Distortion ratio: I_p (or I_{-P}) / $I_{rms} \leqq \sqrt{2} \pm 10\%$

Note) The performance of the backlight, for example life time or brightness, is much influenced by the characteristics of the DC-AC inverter for the lamp. When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the backlight and the inverter (miss-lighting, flicker, etc.) never occur. When you confirm it, the module should be operated in the same condition as it is installed in your instrument.

7. Timing characteristics of LCD module input signals

7-1. Timing characteristics

(This is specified at digital outputs of LVDS driver.)



(Vertical)

Item (symbol)	Min.	Typ.	Max.	Unit	Remark
Vsync cycle (T_{VA})	—	16.667	—	ms	Negative
	1066	1066	1080	line	
Blanking period(T_{VB})	16	16	30	line	
Sync pulse width (T_{VC})	1	3	16	line	
Back porch (T_{VD})	0	13	15	line	
Sync pulse width + Back porch (T_{VC}+T_{VD})	16	16	16	line	
Active display area (T_{VE})	1050	1050	1050	line	
Front porch (T_{VF})	—	0	—	line	

(Horizontal)

Item (symbol)	Min.	Typ.	Max.	Unit	Remark
Hsync cycle (T_{HA})	—	15.6	—	μs	Negative
	800	844	1044	clock	
Blanking period (T_{HB})	8	144	162	clock	
Sync pulse width (T_{HC})	5	56	60	clock	
Back porch (T_{HD})	2	66	75	clock	
Sync pulse width + Back porch (T_{HC} +T_{HD})	7	122	135	clock	
Active display area (T_{HE})	700	700	700	clock	
Front porch (T_{HF})	1	22	27	clock	

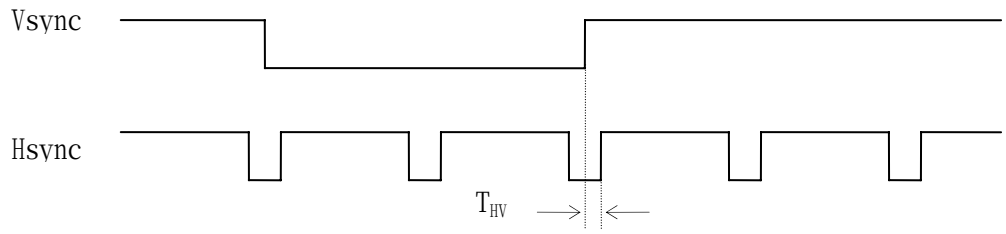
(Clock)

Item	Min.	Typ.	Max.	Unit	Remark
Frequency	—	54.0	55.0	MHz	[Note]

Note 1. In case of lower frequency, the deterioration of display quality, flicker etc., may be occurred.

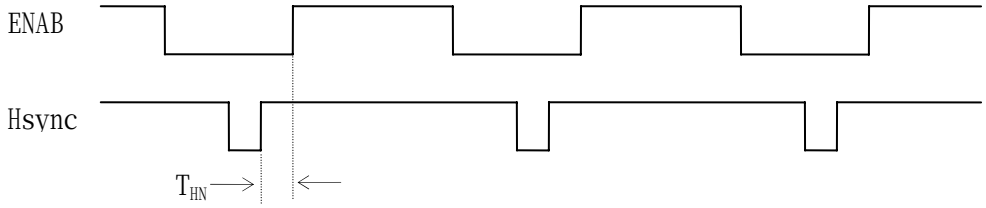
2. Two pixel-data are sampled at a same time.

(Hsync-Vsync Phase difference)



Item(symbol)	Min.	Typ.	Max.	Unit	Remark
Hsync-Vsync Phase difference (T_{HV})	1	—	$T_{HA}-T_{HC}$	clock	

(Hsync-ENAB Phase difference)



Item	Min.	Typ.	Max.	Unit	Remark
(T_{HN})	10	—	312	clock	

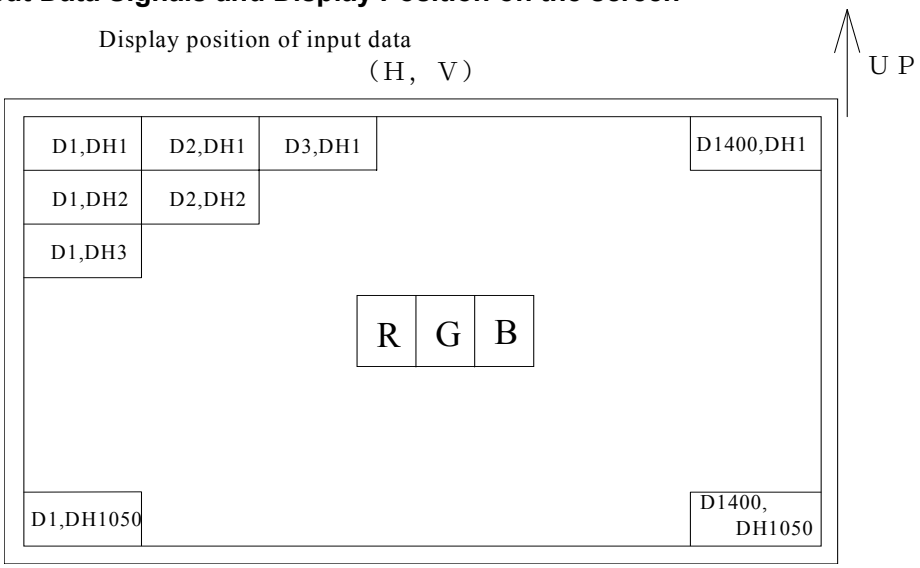
7-2 Display position

Item	Standards	Beginning	Ending	Unit	Remark
Horizontal	rising edge of ENAB	0	700	clock	

Caution

Image will not be displayed on the right position otherwise.

7-3. Input Data Signals and Display Position on the screen



8. Input Signals, Basic Display Colors and Gray Scale of Each Color & EDID Data Structure

	Colors & Gray scale	Gray Scale	Data signal																	
			R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic Color	Black	—	0	0	0	0	0	0	0	0	0	0	0	0	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
	Green	—	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	—	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	—	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	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	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓						↓						↓		
	⇩	↓				↓						↓						↓		
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	⇧	↓				↓						↓						↓		
	⇩	↓				↓						↓						↓		
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	⇩	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	⇧	↓				↓						↓						↓		
	⇩	↓				↓						↓						↓		
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	⇩	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 : Low level voltage, 1 : High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. According to the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

9. EDID data structure

This is the EDID (Extended Display Identification Data) data format to support displays as defined in the VESA Plug & Display.

Byte (decimal)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
Header				
0	00	Header	00	00000000
1	01	Header	FF	11111111
2	02	Header	FF	11111111
3	03	Header	FF	11111111
4	04	Header	FF	11111111
5	05	Header	FF	11111111
6	06	Header	FF	11111111
7	07	Header	00	00000000
Vender/Product ID/EDID Version				
8	08	EISA manufacture code=QDS	44	01000100
9	09	EISA manufacture code (Compressed ASCII)	93	10010011
10	0A	Product code:0045	2D	00101101
11	0B	Product code (hex, LSB first) TBD	00	00000000
12	0C	LCD module Serial No (fixed ”0”)	00	00000000
13	0D	LCD module Serial No (fixed ”0”)	00	00000000
14	0E	LCD module Serial No (fixed ”0”)	00	00000000
15	0F	LCD module Serial No (fixed ”0”)	00	00000000
16	10	Week of manufacture	00	00000000
17	11	Year of manufacture-1990(ex. 2004-1990=14)	0F	00001111
18	12	EDID structure version # = 1	01	00000001
19	13	EDID revision # = 3	03	00000011
Display Parameter				
20	14	Video I/P definition = Digital I/P	80	10000000
21	15	Max H image size (cm) = 28cm	1C	00011100
22	16	Max V image size (cm) = 21cm	15	00010101
23	17	Display gamma (2.2×100) –100= 120	78	01111000
24	18	Feature support (no DPMS, Active off, RGB, timing BLK 1)	0A	00001010
Panel Color Coordinaes				
25	19	Red/Green Low bits (RxRy/GxGy)	47	01000111
26	1A	Blue/White Low bits (BxBy/WxWy)	A9	10101001
27	1B	Red X Rx=0.580	94	10010100
28	1C	Red Y Ry=0.340	57	01010111
29	1D	Green X Gx=0.310	4F	01001111
30	1E	Green Y Gy=0.550	8C	10001100
31	1F	Blue X Bx=0.155	27	00100111

32	20	Blue Y By=0.155	27	00100111
33	21	White X Wx=0.315	50	01010000
34	22	White Y Wy=0.330	54	01010100
Established Timings				
35	23	Established timings 1 (00h if not used)	00	00000000
36	24	Established timings 2 (00h if not used)	00	00000000
Standard Timing ID				
37	25	Manufacture's timings (00h if not used)	00	00000000
38	26	Standard timing ID1 (01h if not used)	01	00000001
39	27	Standard timing ID1 (01h if not used)	01	00000001
40	28	Standard timing ID2 (01h if not used)	01	00000001
41	29	Standard timing ID2 (01h if not used)	01	00000001
42	2A	Standard timing ID3 (01h if not used)	01	00000001
43	2B	Standard timing ID3 (01h if not used)	01	00000001
44	2C	Standard timing ID4 (01h if not used)	01	00000001
45	2D	Standard timing ID4 (01h if not used)	01	00000001
46	2E	Standard timing ID5 (01h if not used)	01	00000001
47	2F	Standard timing ID5 (01h if not used)	01	00000001
48	30	Standard timing ID6 (01h if not used)	01	00000001
49	31	Standard timing ID6 (01h if not used)	01	00000001
50	32	Standard timing ID7 (01h if not used)	01	00000001
51	33	Standard timing ID7 (01h if not used)	01	00000001
52	34	Standard timing ID8 (01h if not used)	01	00000001
53	35	Standard timing ID8 (01h if not used)	01	00000001
Timing Descriptor #1				
54	36	Pixel Clock/10,000 (LSB) 10800=2A30h	30	00110000
55	37	Pixel Clock/10,000 (MSB)	2A	00101010
56	38	Horizontal Active 1400=578h "78"	78	01111000
57	39	Horizontal Blanking (Thbp) 288=120h "20"	20	00100000
58	3A	Horizontal Active/Horizontal Blanking (Thbp) "51h"	51	01010001
59	3B	Vertical Active 1050=41Ah "1A"	1A	00011010
60	3C	Vertical Blanking 16 (Tvbp)=010h "10"	10	00010000
61	3D	Vertical active/Vertical blanking (Tvbp) "40h"	40	01000000
62	3E	Horizontal Sync, Offset (Thfp) 44=02Ch "2C"	2C	00101100
63	3F	Horizontal Sync, Pulse Width 112=070h "70"	70	01110000
64	40	Vertical Sync, Offset (Tvfp)/Sync Width	03	00000011
65	41	Horizontal Vertical Sync Offset/Width upper 2 bits	00	00000000
66	42	Horizontal Image Size 285mm=11Dh "1D"	1D	00011101
67	43	Vertical Image Size 214mm=0D6h "D6"	D6	11010110
68	44	Horizontal Image Size / Vertical Image Size	10	00010000
69	45	Horizontal Border	00	00000000

70	46	Vertical Border	00	00000000
71	47	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
Timing Descriptor #2 Manufacturer Specified Range Timing Descriptor				
72	48	Flag	00	00000000
73	49	Flag	00	00000000
74	4A	Flag	00	00000000
75	4B	Data Type Tag: Descriptor Defined by Manufacturer	0F	00001111
76	4C	Flag	00	00000000
77	4D	Value = $HSPW_{min}$ /2 (pixel clks) =10/2 =5 5h	05	00000101
78	4E	Value = $HSPW_{max}$ /2 (pixel clks) =240/2 = 120 78h	78	01111000
79	4F	Value = $Thbp_{min}$ /2 (pixel clks) =42/2 =21 15h	15	00010101
80	50	Value = $Thbp_{max}$ /2 (pixel clks) =144/2 =72 48h	48	01001000
81	51	Value = $VSPW_{min}$ /2 (line pulses)= 2/2 =1 1h	01	00000001
82	52	Value = $VSPW_{max}$ /2 (line pulses)= 16/2 =8 8h	08	00001000
83	53	Value = $Tvbp_{min}$ /2 (line pulses)= 16/2 =8 8h	08	00001000
84	54	Value = $Tvbp_{max}$ /2 (line pulses)= 16/2 =8 8h	08	00001000
85	55	Thp_{min} = value*2 + HA $_{pixel\ clks}$ (pixel clks)= 1442 5A2h	A2	10100010
86	56	Thp_{max}= value*2 + $HA_{pixel\ clk}$ (pixelclks) =1544 608h	08	00001000
87	57	Tvp_{min} = value*2 + VA $_{lines}$ (line pulses) =1066 42Ah	2A	00101010
88	58	Tvp_{max} = value*2 + VA $_{lines}$ (line pulses) =1066 42Ah	2A	00101010
89	59	Module "A" Revision	02	00000010
Timing Descriptor #3 ASCII String : Supplier name				
90	5A	Flag	00	00000000
91	5B	Flag	00	00000000
92	5C	Flag	00	00000000
93	5D	Data Type Tag : ASCII Strings	FE	11111110
94	5E	Flag	00	00000000
95	5F	1st character of String="Q"	51	01010001
96	60	2nd character of String="U"	55	01010101
97	61	3rd character of String="A"	41	01000001
98	62	4th character of String="N"	4E	01001110
99	63	5th character of String="T"	54	01010100
100	64	6th character of String="A"	41	01000001
101	65	7th character of String="D"	44	01000100
102	66	8th character of String="I"	49	01001001
103	67	9th character of String="S"	53	01010011
104	68	10th character of String="P"	50	01010000
105	69	11th character of String="L"	4C	01001100
106	6A	12th character of String="A"	41	01010001
107	6B	13th character of String="Y"	59	01011001

Timing Descriptor #4 ASCII String : Supplier P/N				
108	6C	Flag	00	00000000
109	6D	Flag	00	00000000
110	6E	Flag	00	00000000
111	6F	Data Type Tag : Module name	FE	11111110
112	70	Flag	00	00000000
113	71	Q	51	01010001
114	72	D	44	01000100
115	73	1	31	00110001
116	74	4	34	00110100
117	75	F	46	01000110
118	76	L	4C	01001100
119	77	0	30	00110000
120	78	7	37	00110111
121	79	Product revision (ex :2)	33	00100001
122	7A	Terminate with ASCII code 0Ah	0A	00001010
123	7B	Pad field with ASCII code 20h	20	00100000
124	7C	Pad field with ASCII code 20h	20	00100000
125	7D	Pad field with ASCII code 20h	20	00100000
126	7E	Extension flag	00	00000000
127	7F	Checksum	2F	00101111

10. Optical Characteristics

Ta=25℃, VDD=+3.3V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Left,Right	CR>10	40	45	—	Deg.	【Note1,4】
	Vertical	Up		10	15	—	Deg.	
		Down		30	35	—	Deg.	
Contrast ratio		CRn	θ=0 °	300	350	—		【Note2,4】
Response Time	Rise	τr	θ=0 °	—	5	10	ms	【Note3,4】
	Decay	τd		—	20	25	ms	
Chromaticity of White		Wx		0.285	0.315	0.345		【Note4】
		Wy		0.300	0.330	0.360		
Chromaticity of Red		Rx		0.550	0.580	0.610		
		Ry		0.310	0.340	0.370		
Chromaticity of Green		Gx		0.280	0.310	0.340		
		Gy		0.520	0.550	0.580		
Chromaticity of Blue		Bx		0.125	0.155	0.185		
		By		0.125	0.155	0.185		
Luminance of white【Note4】		YL2	5P Ave.	150	175	—	Cd/m^2	IL = 6.0mArms F_L=60kHz
White Uniformity		δW	13 Points	—	—	1.53		【Note5】

※ The measurement shall be executed 30 minutes after lighting at rating. (typical condition: IL = 6.0mArms)

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in Fig.2 below.

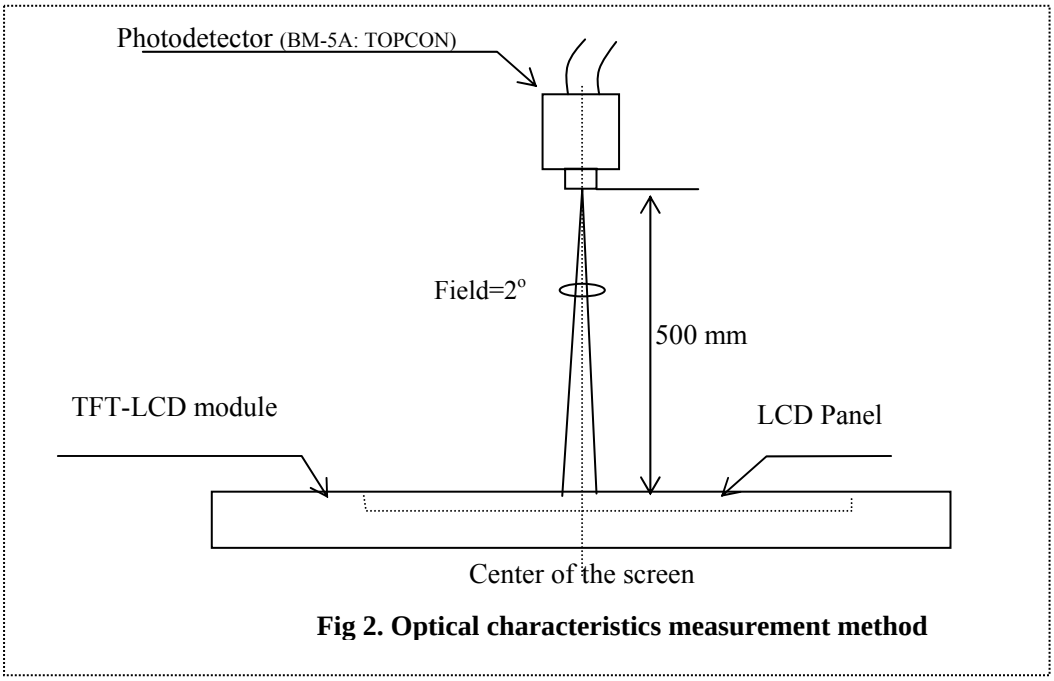
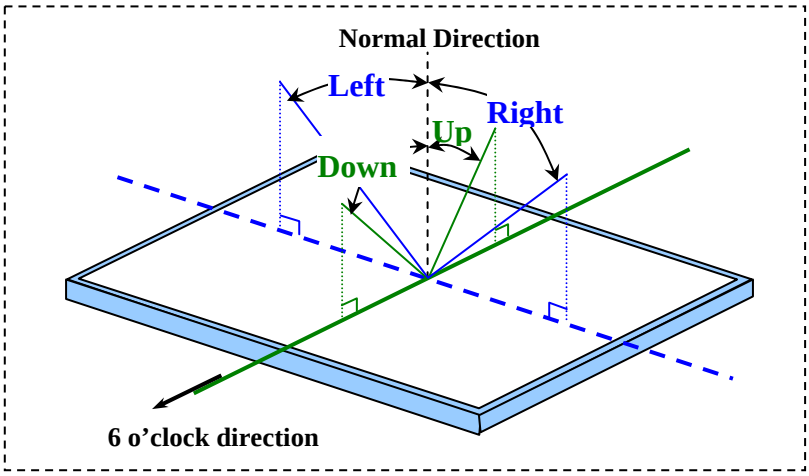


Fig 2. Optical characteristics measurement method

【Note1】Definitions of viewing angle range:



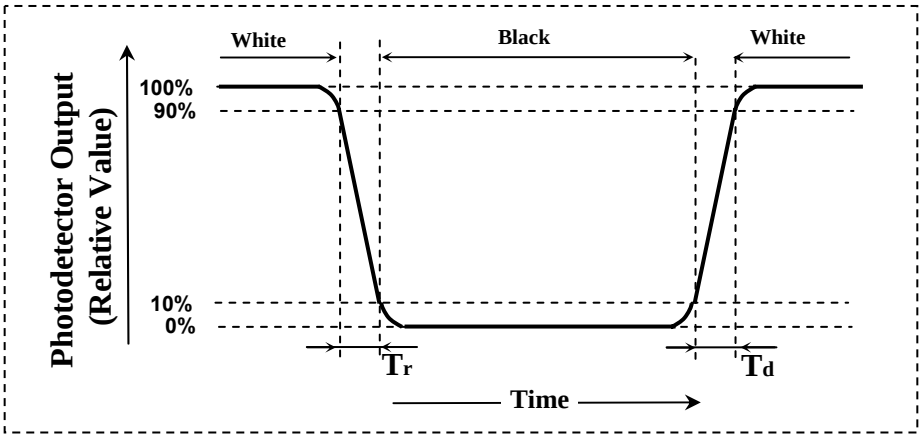
【Note2】Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

【Note3】Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white" .



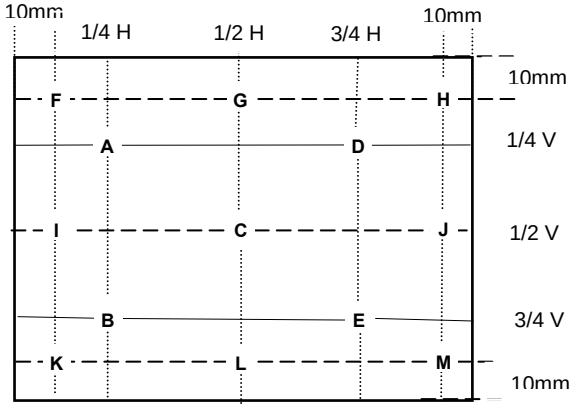
【Note4】This shall be measured at center of the screen.

【Note5】Definition of white uniformity:

$$\delta w = \frac{\text{Maximun Luminance of 5/13 points}}{\text{Minimum Luminance of 5/13 points}}$$

*1) 5 Points are A~E

*2) 13 Points are A~M



10. Display Quality

The display quality of the color TFT-LCD module shall be in compliance with the Incoming Inspection Standard.

11. Handling Precautions

a) Be sure to turn off the power supply when inserting or disconnecting the cable.

b) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.

c) Since the front polarizer is easily damaged, pay attention not to scratch it.

d) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

e) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

f) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

g) Since CMOS LSI is used in this module, take care of static electricity and injure the human earth when handling.

h) Observe all other precautionary requirements in handling components.

i) This module has its circuitry PCBs on the rear side and should be handled carefully in order not to be stressed.

j) Laminated film is attached to the module surface to prevent it from being scratched. Peel the film off slowly just before the use with strict attention to electrostatic charges. Ionized air shall be blown over during the action. Blow off the 'dust' on the polarizer by using an ionized nitrogen gun, etc..

k) Cold cathode fluorescent lamp in LCD panel contains a small amount of mercury, please follow local ordinance or regulation for disposal.

12. Reliability test items

No.	Test item	Conditions
1	High temperature storage test	Ta = 65℃ 48h
2	Low temperature storage test	Ta = -30℃ 48h
3	High temperature & High humidity operation test	Ta = 45℃ ; 90 %RH 48h ; (As remark #3) (No condensation)
	High temperature & High humidity storage test	Ta = 50℃ ; 90 %RH 48h ; (As remark #3) (No condensation)
4	High temperature operation test	Ta = 50℃ 48h (The panel temp. must be less than 60℃)
5	Low temperature operation test	Ta = 0℃ 48h
6	Thermal shock	-30℃ <-> 65℃ (2h/ 1cycle); 12 cycles; temperature slope : 10℃/min
6	Vibration test (non- operating)	Frequency: 10～500Hz, 1.5G, Test period : 3 hours (1 hour for each direction of X,Y,Z)
7	Shock test (Non- operating)	Max. Gravity: 210G Pulse width: 3 ms, Half sine wave Direction : ±X,±Y,±Z Once for each direction.
8	Altitude test (Operating)	700 mbar / 48hrs
9	Altitude test (non-Operating)	260 mbar / 48hrs

Remark:

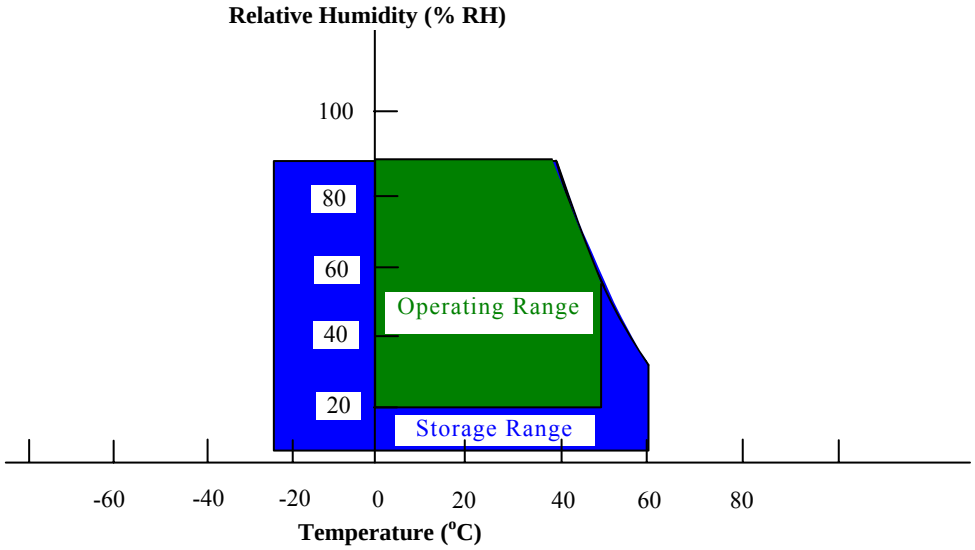
(1) A failure is defined as the appearance of pixel failured on any color layer or the appearance of horizontal or vertical lines, bars etc.

(2) Low temperature storage " Panel must return to operating temperature range prior to activation."

(3) Hi temperature / Humidity test

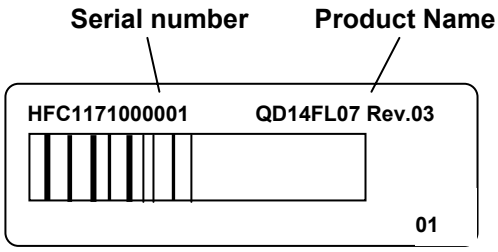
Max. wet-bulb temperature is less than 39°C ; At glass temperature high than 40 °C.

Temperature and relative humidity range is shown in the figure below.



13. Others

1) Lot No. Label:



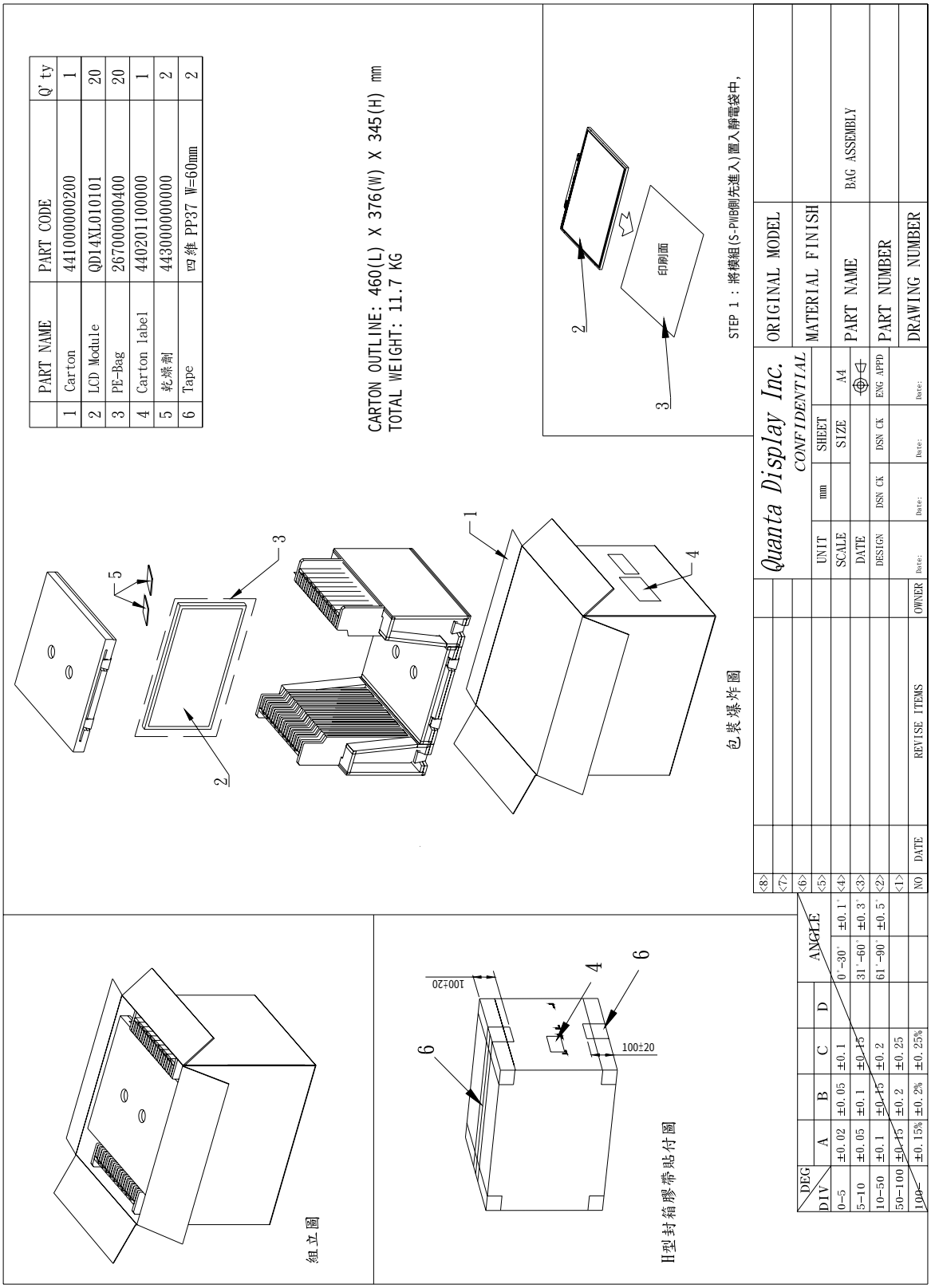
2) Adjusting volume has been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.

3) Disassembling the module can cause permanent damage and should be strictly avoided.

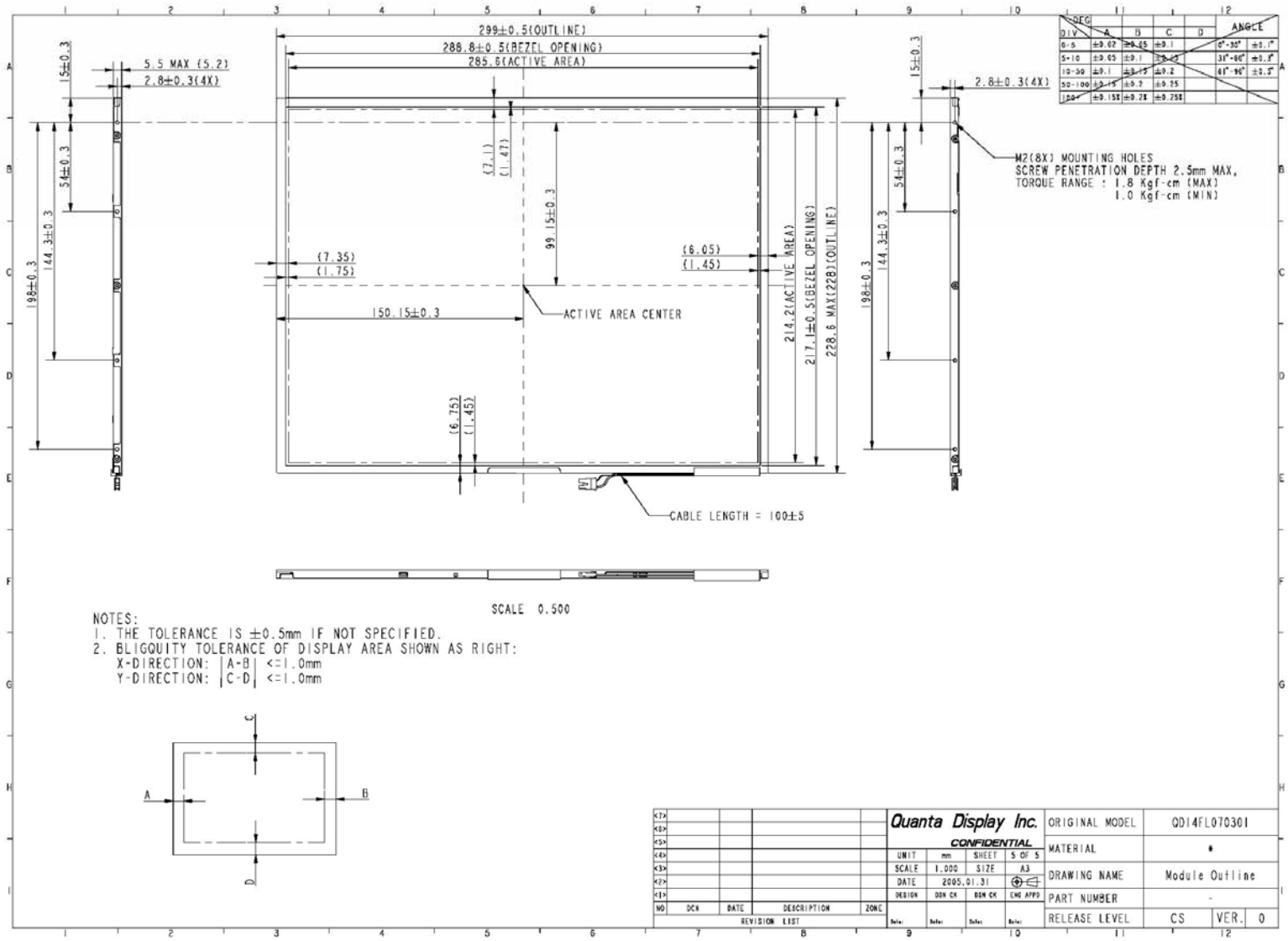
4) Please be careful since image retention may occur when a fixed pattern is displayed for a long time.

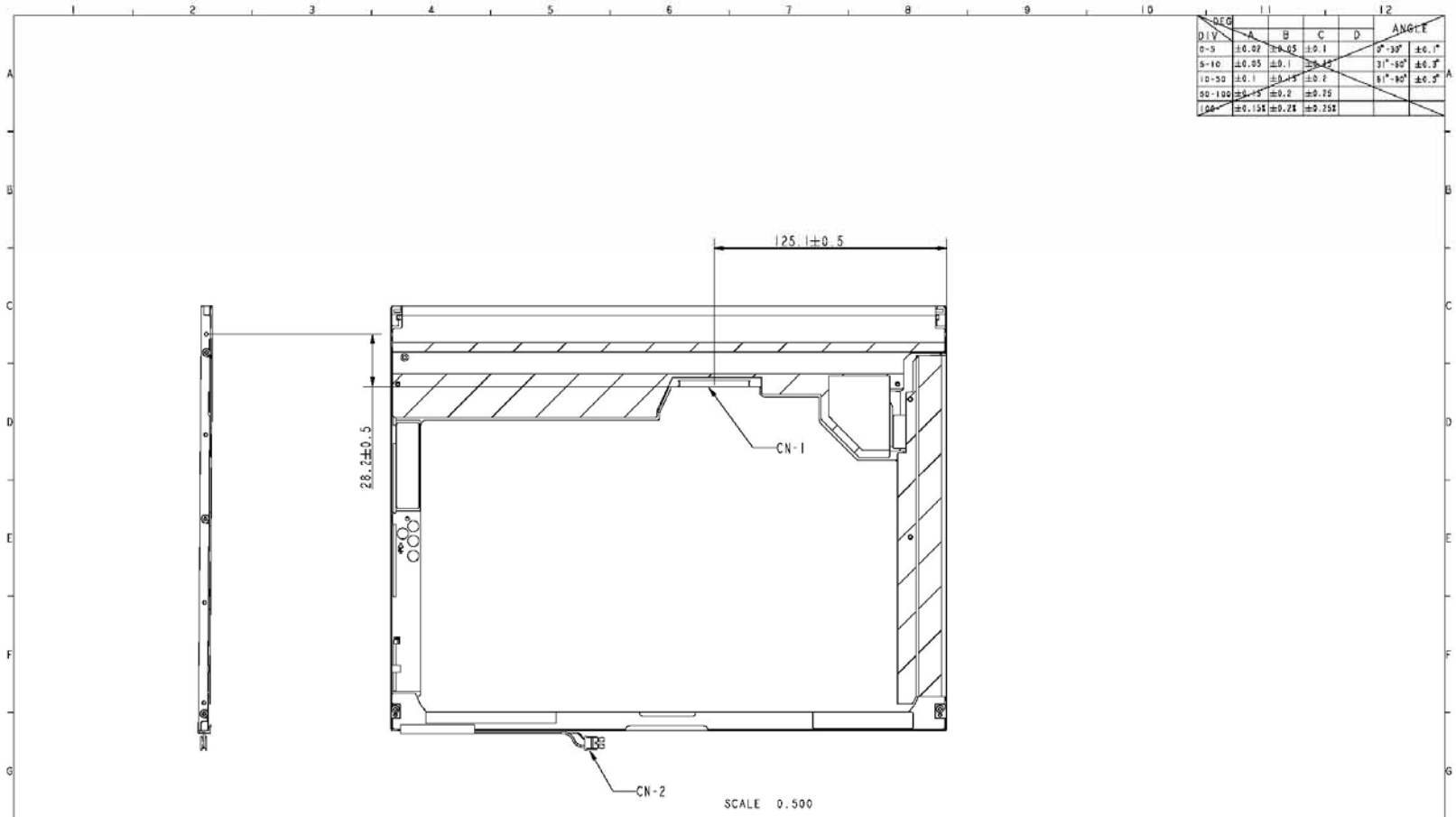
5) If any problem occurs in relation to the description of this specification, it shall be resolved through discussion with spirit of cooperation.

14. Packing form



15. Mechanical Outline Dimensions





NOTE:
(1) CN-1: INTERFACE CONNECTOR
FI-XB30SL-HF10(JAE)
(2) CN-2: CCFL CONNECTOR
BHSR-02VS-01(JAT)

DIV	A	B	C	D	ANGLE	
0-5	±0.02	±0.05	±0.1		0°-30°	±0.1°
5-10	±0.05	±0.1	±0.15		31°-60°	±0.3°
10-50	±0.1	±0.15	±0.2		61°-90°	±0.5°
50-100	±0.15	±0.2	±0.25			
100-	±0.15%	±0.2%	±0.25%			

NO	DCN	DATE	DESCRIPTION	ZONE
<7>				
<6>				
<5>				
<4>				
<3>				
<2>				
<1>				

REVISION LIST

Quanta Display Inc.
CONFIDENTIAL

UNIT	mm	SHEET	4 OF 5
SCALE	1.000	SIZE	A3
DATE	2005.01.31		
DESIGN	DSN CK	DSN CK	ENG APPD

ORIGINAL MODEL	QD14FL070301
MATERIAL	*
DRAWING NAME	Module Outline
PART NUMBER	-
RELEASE LEVEL	CS VER. 0