Prepared Date: 9/3/2004	**Quanta Display Inc.** **SPECIFICATION**	Doc No. QD15TL11-00
		Doc. REV.: 00
Final Specification		Issue Date:9/6/2004
		Page: 25 pages
		(Include cover page)

Specification for TFT LCD Module

Model No.
QD15TL11   Rev.:01

? **Approval By**

Quanta Display Inc.

The device listed in these technical literature sheets was designed and manufactured for use in OA equipment.

In case of using the device for applications such as control and safety equipment for transportation (aircraft, trains, automobiles, etc.), rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

Do not use the device for equipment that requires an extreme level of reliability, such as aerospace applications, telecommunication equipment (trunk lines), nuclear power control equipment and medical or other equipment for life support.

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 technical literature sheets.

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

Revision History			
REV.	Date	ECN NO.	Change Content
0	9/3/2004	N/A	Specification Initiation

1. Application

This specification applies to a color TFT-LCD module, QD15TL11.

2. Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). 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 1280× 3 × 800 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) Glare surface treatment and wide view angle.

4) High color saturation (NTSC 72%).

5) Wide Screen 15.4" WXGA

6) RoHS compliant

3. General Specifications

Parameter	Specifications	Unit
Display size	390.1 (15.4") Diagonal	mm
Active area	331.2× 207.0	mm
Pixel format	1280 (H)× 800 (V)	Pixel
	(1 pixel = R+G+B dots)	
Pixel pitch	0.2588(H) × 0.2588 (V)	mm
Pixel configuration	R, G, B vertical stripe	
Display mode	Normally white	
Unit outline dimensions (typ.)*1	344.0(W)× 222.0 (H)× 9.5(T)max.	mm
Mass	850 max.	g
Surface treatment	Haze 0; Hardness 2H; Low reflection (~2.5%)	

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

4. Input Terminals

4-1. TFT-LCD panel driving

     CN1 (1 channel, LVDS signals – NSC/Ti standard and +3.3V DC power supply)
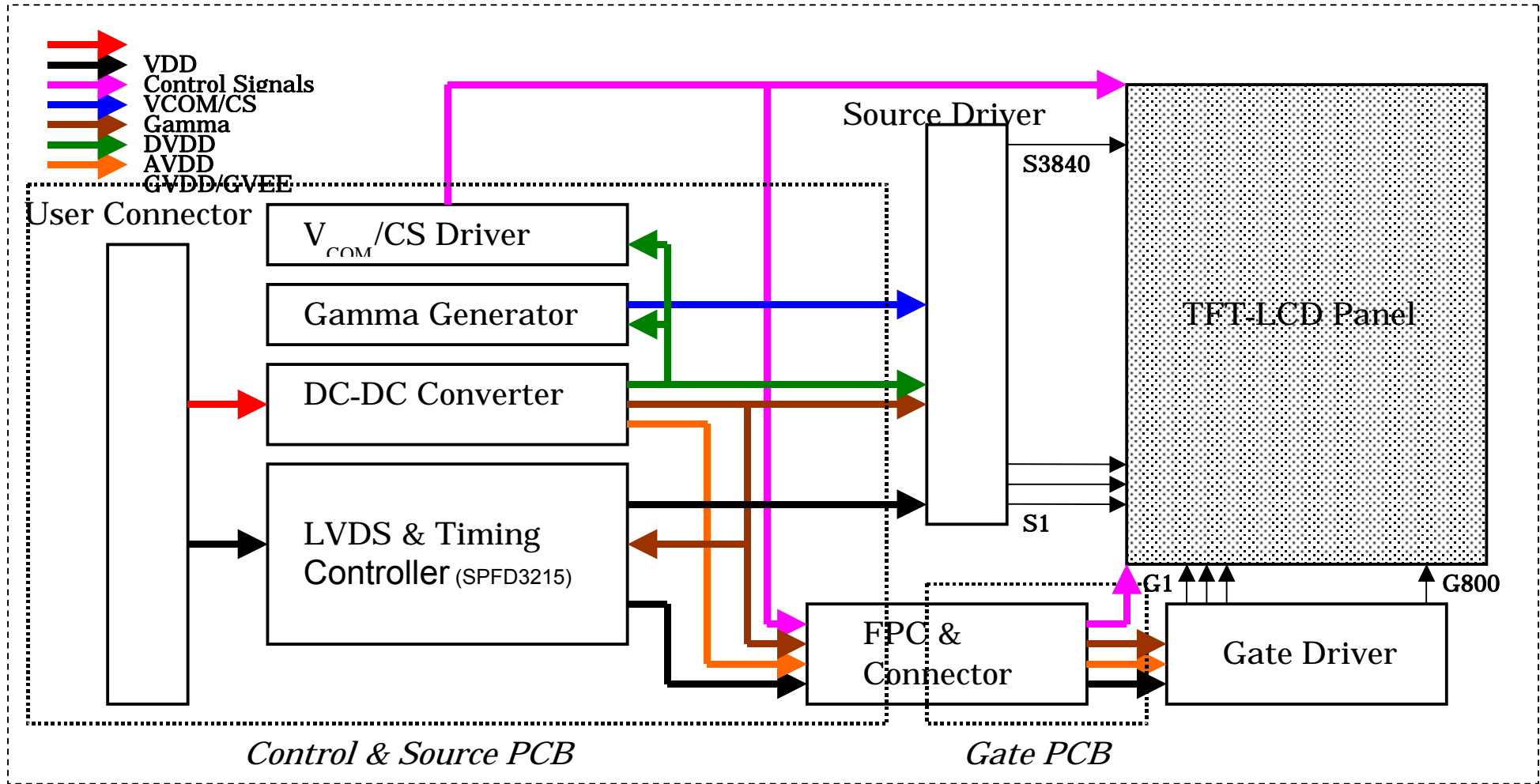   **Using connector: FI-XB30SL-HF10/equivalent (JAE)**

Interface Cable Pin Assignments

PIN NO	. SYMBOL	FUNCTION
1	VSS	Ground
2	VDD	Power Supply, 3.3 V (typical)
3	VDD	Power Supply, 3.3 V (typical)
4	V EEDID	DDC 3.3V power
5	NC	Reserved for supplier test point (BIST)
6	Clk EEDID	DDC Clock
7	DATA EEDID	DDC Data
8	RxIN0-	- LVDS differential data input (R0-R5, G0) (odd pixels)
9	RxIN0+	+ LVDS differential data input (R0-R5, G0) (odd pixels)
10	GND	Ground
11	RxIN1-	- LVDS differential data input (G1-G5, B0-B1) (odd pixels)
12	RxIN1+	+ LVDS differential data input (G1-G5, B0-B1) (odd pixels)
13	GND	Ground
14	RxIN2-	- LVDS differential data input (B2-B5, HS, VS, DE) (odd pixels)
15	RxIN2+	+ LVDS differential data input (B2-B5, HS, VS, DE) (odd pixels)
16	GND	Ground
17	RxClkIN-	- LVDS differential clock input (odd pixels)
18	RxClkIN+	+ LVDS differential clock input (odd pixels)
19	GND	Ground
20	NC	No connect
21	NC	No connect
22	GND	Ground
23	NC	No connect
24	NC	No connect
25	GND	Ground
26	NC	No connect
27	NC	No connect
28	GND	Ground
29	NC	No connect
30	NC	No connect

  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

Legend:
- VDD
- Control Signals
- VCOM/CS
- Gamma
- DVDD
- AVDD
- GVDD/GVEE

User Connector

V_{COM}/CS Driver

Gamma Generator

DC-DC Converter

LVDS & Timing Controller (SPFD3215)

Source Driver

S3840

S1

TFT-LCD Panel

FPC & Connector

Gate Driver

G1

G800

Control & Source PCB

Gate PCB

4-3. Backlight driving

CN2: BHR-04VS-1(JST)

Mating connector: SM04 (4.0) B-BHS-1-TB (JST)

Pin No.	Symbol	Function
1	BLH	Power supply for lamp (High voltage side)
2	BLH	Power supply for lamp (High voltage side)
3	N.C	No connect
4	BLC	Power supply for lamp (Low voltage side)

Note) VBLH and VBLC must be connected correctly. If user connects wrongly, the user will be hurt and the module will be broken.

5. Absolute Maximum Ratings

5-1 LCD module

Parameter	Symbol	Condition	Ratings		Unit	Remark
Input voltage	V_I	Ta=25	0.3	VDD+0.3		Note1
+3.3V supply voltage	VDD	Ta=25	0	4		
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.

6. Electrical Characteristics

6-1.TFT-LCD panel driving   Ta 25

| Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
VDD	Supply voltage	VDD	+3.0	+3.3	+3.6		Note2
	Current dissipation	IDD		*450*	*600*		Note3
Permissive input ripple voltage		V_{RP}			100	mV p-p	Vcc=+3.3V
Differential input	High	V_{TH}			+100	mV	V_{CM}=+1.2V
Threshold voltage	Low	V_{TL}	−100			mV	Note1
Terminal resistor		R_T		100			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

0 t1 10 ms

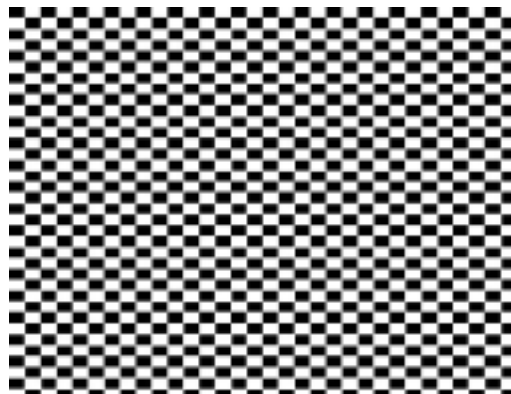0 t2 50 ms

0 t3 50 ms

400 ms t4

200 ms t5

200 ms t6
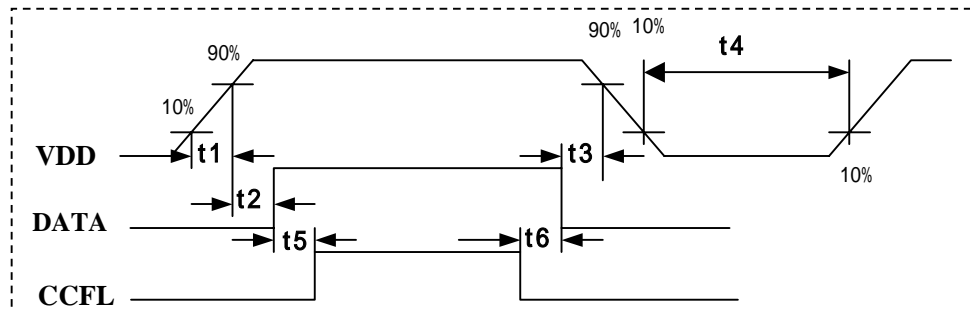
Vcc-dip conditions

1) 2.5 V Vcc 3.0 V
    td 10 ms

2) Vcc 2.5 V
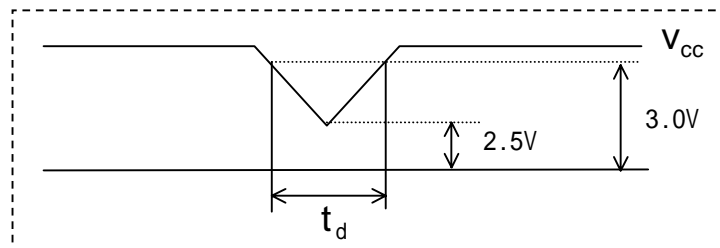
Vcc-dip conditions should also follow the On-off conditions for supply voltage

Note3   Typical current situation : 32x36 Mosaic pattern.

VDD=+3.3V

6-2. Backlight driving

The backlight system is an edge-lighting type with two 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	657	730	803	Vrms		
Lamp power consumption	P_L		4.38			I_L=6.0mA Note2	
Lamp frequency	F_L	54	60	66	kHz	Note3	
Kick-off voltage	Vs			1460	Vrms	Ta=25	
				1650	Vrms	Ta=0	Note4
Lamp life time	L_L	15000			hour	Note5	

Note1   Lamp current is measured with current meter for high frequency as shown below.
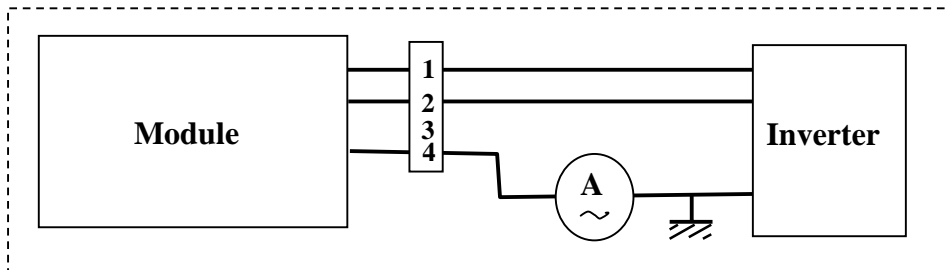
Note2   Calculated Value for reference ($I_L \times V_L$)

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   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   or   occurs in the continuous operation under the condition of Ta = 25   and I_L = 6.0 mArms.
         Brightness becomes 50 % of the original value under standard condition.
         Kick-off voltage at Ta = 0   exceeds maximum value.

Note6   Please use the rate of unsymmetrical of a lamplighting waveform (lamp current waveform and lamp voltage waveform) at 5% or less.
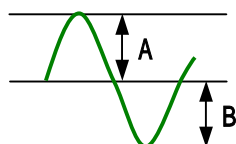
Unsymmetrical ratio: (|A|-|B|) / |C| 5%
A: Lamp current or lamp voltage o-p of positive side
B: Lamp current or lamp voltage o-p of negative side
C: Max.(A,B) this is bigger in A or B

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.)
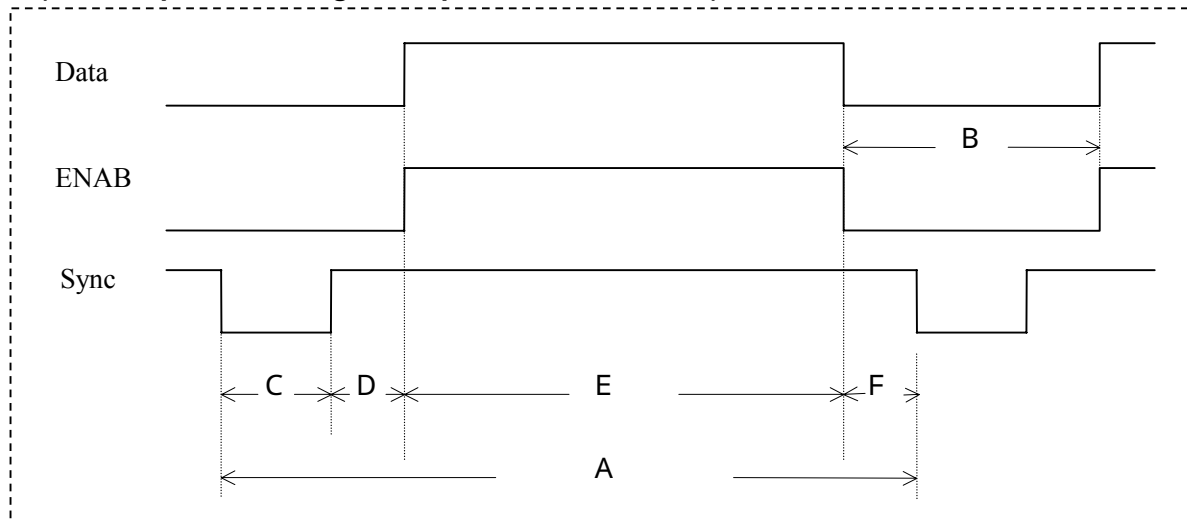
Vertical

Item symbol	Min.	Typ.	Max.	Unit	Remark
Vsync cycle (T_{VA})		16.667		ms	Negative
	808	823	860	line	
Blanking period(T_{VB})	8	23		line	
Sync pulse width (T_{VC})	2	4		line	
Back porch (T_{VD})	5	16		line	
Sync pulse width + Back porch (T_{VC}+T_{VD})	7	20	35	line	
Active display area (T_{VE})	800	800	800	line	
Front porch (T_{VF})	1	3		line	

(Horizontal)

Item symbol	Min.	Typ.	Max.	Unit	Remark
Hsync cycle (T_{HA})		20.25		μ s	Negative
	1380	1440	1500	clock	
Blanking period (T_{HB})	100	128		clock	
Sync pulse width (T_{HC})	4	6		clock	
Back porch (T_{HD})	94	150	200	clock	
Sync pulse width + Back porch (T_{HC} +T_{HD})	98	156		clock	
Active display area (T_{HE})	1280	1280	1280	clock	
Front porch (T_{HF})	2	4		clock	

Clock

Item	Min.	Typ.	Max.	Unit	Remark
Frequency	-	71.1	73.0	MHz	Note

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

7-2. Input Data Signals and Display Position on the screen

D1, DH1	D2, DH1	D3, DH1		D1280, DH1
D1, DH2	D2, DH2			
		R G B		
D1, DH800				D1280, DH800
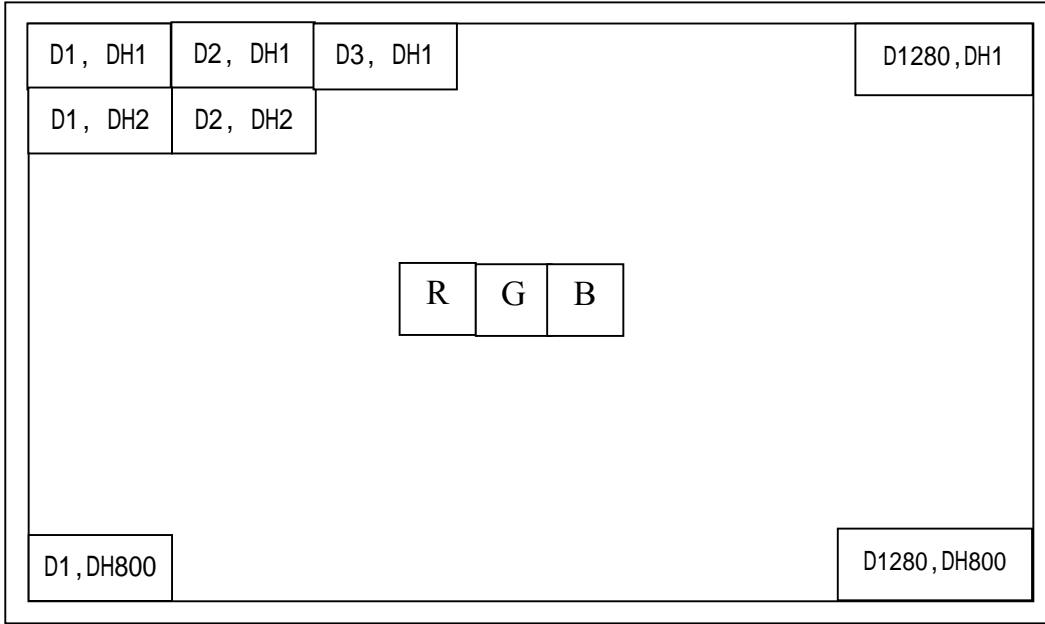
8. Input Signals, Basic Display Colors and Gray Scale of Each Color

Colors & Gray scale		Gray Scale	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	0	Header	00	0000000
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
Vender/Product ID / EDID Version				
8	8	EISA manufacturer code=QDS	44	01000100
9	9	EISA manufacturer code(Compressed ASCII)	93	10010011
10	0A	Product code (25) LSB	19	00011001
11	0B	Product code MSB	00	00000000
12	0C	ID (32bit) Serial No (zero if not used)	00	00000000
13	0D	ID (32bit) Serial No (zero if not used)	00	00000000
14	0E	ID (32bit) Serial No (zero if not used)	00	00000000
15	0F	ID (32bit) Serial No (zero if not used)	00	00000000
16	10	Week of manufacture	xx	xxxxxxxx
17	11	Year of manufacture – 1990 (ex. 2003-1990=13)	xx	xxxxxxxx
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) =33cm	21	00100001
22	16	Max V image size (cm) =21cm	15	00010101
23	17	Display gamma (2.2×100) –100	78	01111000
24	18	Features (no DPMS,Active off,RGB,timing BLK1)	0A	00001010
Panel Color Coordinates				
25	19	Red/Green Low bits (RxRy/GxGy)	8A	10001010
26	1A	Blue/White Low bits (BxBy/WxWy)	90	10010000
27	1B	Red X Rx=0.643	A4	10100100
28	1C	Red Y Ry=0.344	58	01011000
29	1D	Green X Gx=0.284	48	01001000

30	1E	Green Y Gy=0.616	9D	10011101
31	1F	Blue X Bx=0.143	24	00100100
32	20	Blue Y By=0.091	17	00010111
33	21	White X Wx=0.313	50	01010000
34	22	White Y Wy=0.329	54	01010100

Established Timings

35	23	Established timings 1 (00h if not used)	00	00000000
36	24	Established timings 2 (1024×768@60Hz)	00	00000000

Standard Timing ID

37	25	Manufacturer'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(71.1M)/10,000 (LSB)	C5	11000101
55	37	Pixel Clock(71.1M)/10,000 (MSB)	1B	00011011
56	38	Horizontal Active=1280 pixels (lower 8 bits)	00	00000000
57	39	Horizontal Blanking=128 pixels (lower 8bits)	80	10000000
58	3A	Horizontal Active: Horizontal Blanking (upper 4:4 bits)	50	01010000
59	3B	Vertical Active =800 lines (lower 8bits)	20	00100000
60	3C	Vertical Blanking=23 lines (lower 8bits)	17	00010111
61	3D	Vertical Active : Vertical Banking (upper 4:4 bits)	30	00110000
62	3E	Horizontal Sync.Offset =4 pixels	04	00000100
63	3F	Horizontal Sync.Width=6 pixels	06	00000110
64	40	Vertical Sync. Offset: lines Sync. Width	34	00110100
65	41	Horizontal/Vertical Sync Offset/Width upper 2 bits	00	00000000
66	42	Horizontal Image Size=331.2mm (lower 8 bits)	4B	01001011

67	43	Vertical Image Size=207mm (lower 8 bits)	CF	11001111
68	44	Horizontal : Vertical Image Size (upper 4:4 bits)	10	00010000
69	45	Horizontal Border (zero for internal LCD)	00	00000000
70	46	Vertical Border (zero for internal LCD)	00	00000000
71	47	Non-interlaced,Normal,no stereo,Separate sync,H/V pol negatives	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	00	00000000
76	4C	Flag	00	00000000
77	4D	Value=HSPW min/2 (pixel clks)	02	00000010
78	4E	Value=HSPW max/2 (pixel clks)	00	00000000
79	4F	Value=Thbp min/2 (pixel clks)	31	00110001
80	50	Value=Thbp max/2 (pixel clks)	00	00000000
81	51	Value=VSPW min/2 (line pulses)	01	00000001
82	52	Value=VSPW max/2 (line pulses)	00	00000000
83	53	Value=Tvbp min/2 (line pulses)	04	00000100
84	54	Value=Tvbp max/2 (line pulses)	12	00010010
85	55	Thp min=value*2+HA pixel clks (pixel clks)	32	00110010
86	56	Thp max=value*2+HA pixel clks (pixel clks)	6E	01101110
87	57	Tvp min=value*2+VA lines	04	00000100
88	58	Tvp max=value*2+VA lines	1E	00011110
89	59	Module revision	00	00000000

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 : Module serial number	FE	11111110
94	5E	Flag	00	00000000
95	5F	Module serial number (product ID exJ)	4A	01001010
96	60	Module serial number (product ID exO)	4F	01001111
97	61	Module serial number (product ID ex1)	31	00110001
98	62	Module serial number (year of manufacture ex4)	34	00110100
99	63	Module serial number (month of manufacture ex5)	35	00110101
100	64	Module serial number (product purpose ex1)	31	00110001
101	65	Module serial number (factory no. ex1)	31	00110001
102	66	Module serial number (serial no. ex0)	30	00110000
103	67	Module serial number (serial no. ex0)	30	00110000

104	68	Module serial number (serial no. ex3)	33	00110011
105	69	Module serial number (serial no. ex0)	30	00110000
106	6A	Module serial number (serial no. ex0)	30	00110000
107	6B	Module serial number (serial no. ex4)	34	00110100
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	5	35	00110101
117	75	T	54	01010100
118	76	L	4C	01001100
119	77	1	31	00110001
120	78	1	31	00110001
121	79	Product revision (ex :1)	31	00110001
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	XX	xxxxxxxx

Note : XX means variable values generated by QDI production system for EEDID file based on module's information.

10.Optical Characteristics

Ta=25   , Vcc=+3.3V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing	Horizontal	21， 22	CR>10	60	70		Deg.	Note1,4
Angle	Vertical	11		50	60		Deg.	
Range		12		50	60		Deg.	
Contrast ratio		n	=0°	350	500			Note2,4
Response	Rise	Tr	=0°		5	10	ms	Note3,4
Time	Decay	Td			20	25	ms	
Chromaticity of White		Wx		0.283	0.313	0.343		Note4
		Wy		0.299	0.329	0.359		
Chromaticity of Red		Rx		0.613	0.643	0.673		
		Ry		0.314	0.344	0.374		
Chromaticity of Green		Gx		0.254	0.284	0.314		
		Gy		0.586	0.616	0.646		
Chromaticity of Blue		Bx		0.113	0.143	0.173		
		By		0.061	0.091	0.121		
Luminance of white Note4			Center	260	320		Cd/m^2	IL = 6.0 mArms F_L=55kHz
White Uniformity		1	5 Points			1.33		Note5
		2	13 points			1.45		

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in Fig.3.

Photodetector (BM-5A: TOPCON)

Field=2°

400 mm

TFT-LCD module

LCD Panel

Center of the screen
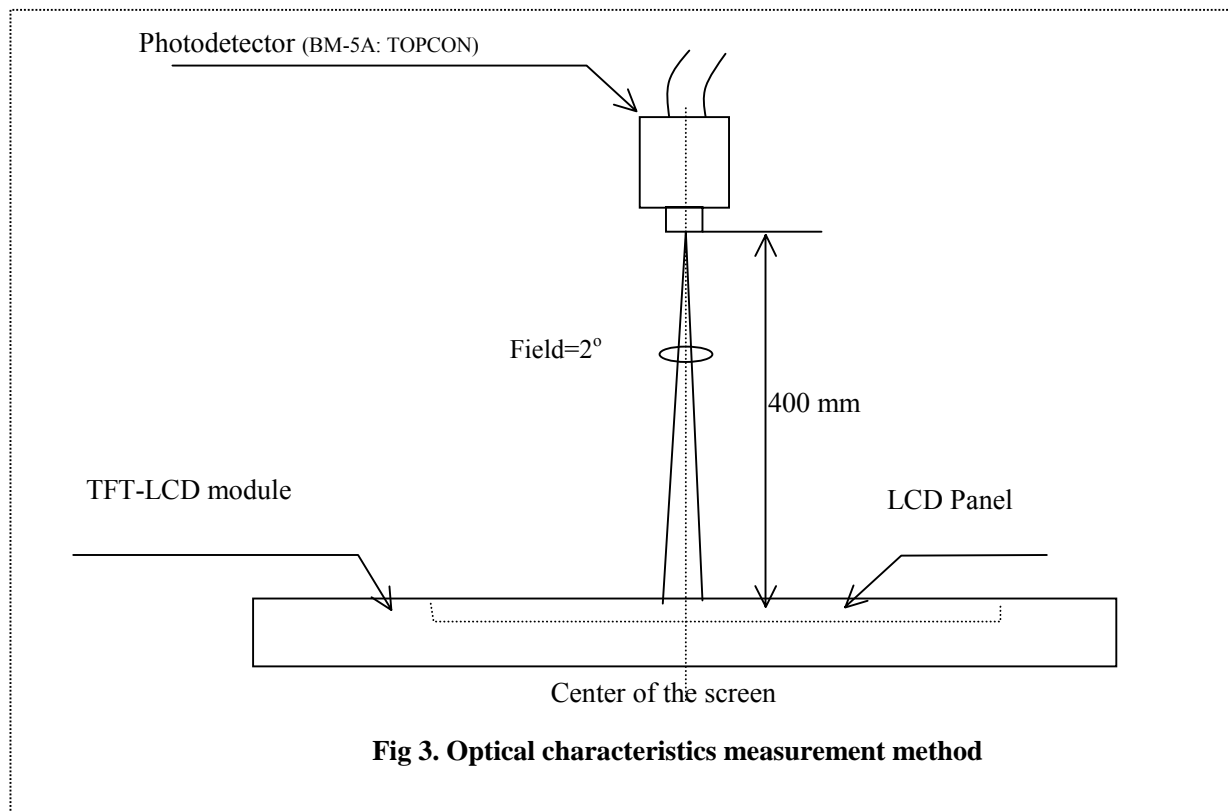
Fig 3. Optical characteristics measurement method

Note1   Definitions of viewing angle range:

Normal Direction

6 o'clock direction
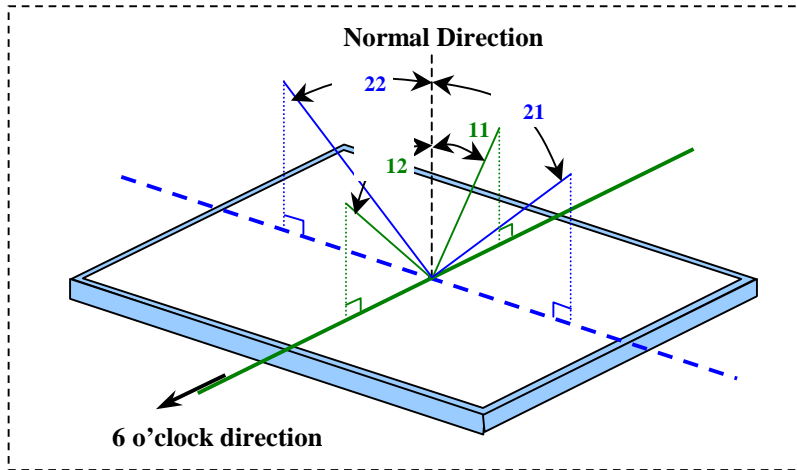
Note2   Definition of contrast ratio:

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" .
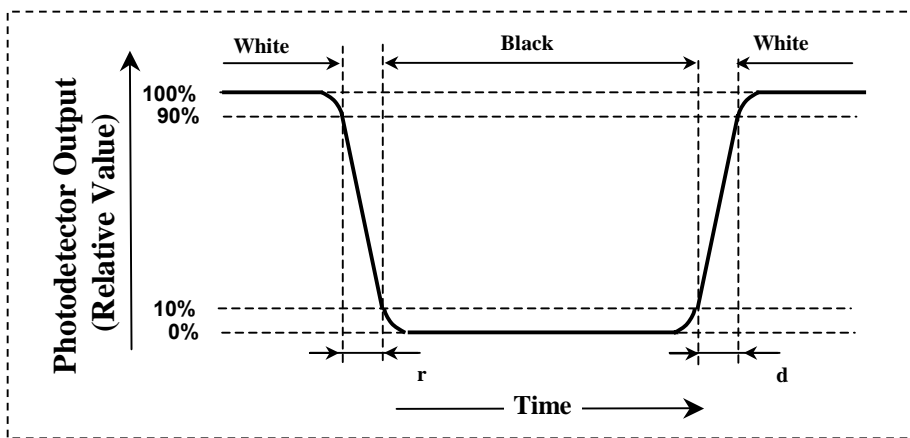
Note4   This shall be measured at center of the screen.

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**

***1) 13 Points are A~M**
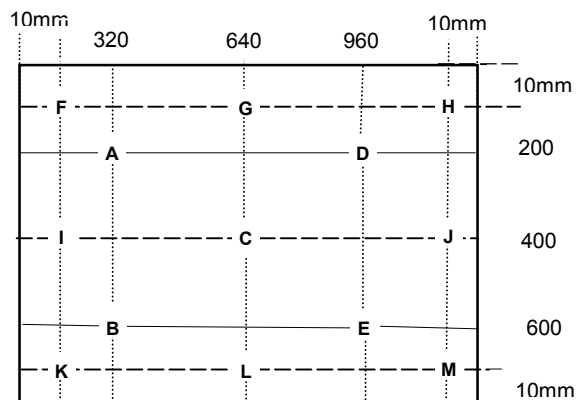
11. Display Quality

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

12. 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) Mounting screw hole can stand torque 1.3~1.5 Kgf-cm.

13. Reliability test items

No.	Test item	Conditions
1	High temperature storage test	Ta = 60 240h
2	Low temperature storage test	Ta = -25 240h
3	High temperature & High humidity operation test	Ta = 40 ; 90 %RH 240h ; (As remark #3) (No condensation)
4	High temperature operation test	Ta = 50 240h (The panel temp. must be less than 60)
5	Low temperature operation test	Ta = 0 240h
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: 50G Pulse width: 11 ms, Half sine wave Direction : ± X,± Y,± Z Once for each direction.
8	Altitude test (Operating)	0-10000 feet (3048m) / -20°C/+60°C / 24 hr
9	Altitude test (Storage)	0-40000 feet (12192m) / 0°C/+55°C / 24 hr

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 ^{o}C.
Temperature and relative humidity range is shown in the figure below.

14. Others

1) Lot No. Label:

Serial number   Product Name

JO14111000001   QD15TL11 Rev.01

01

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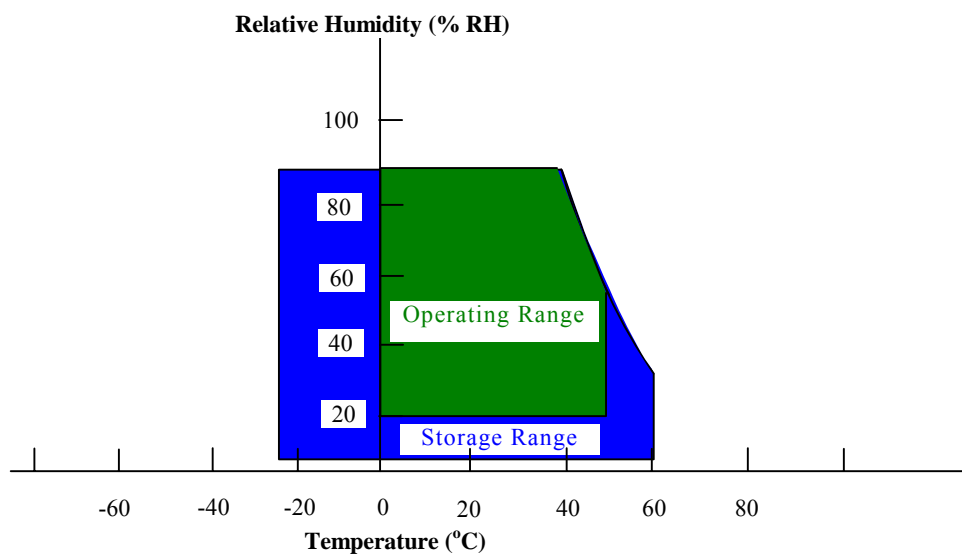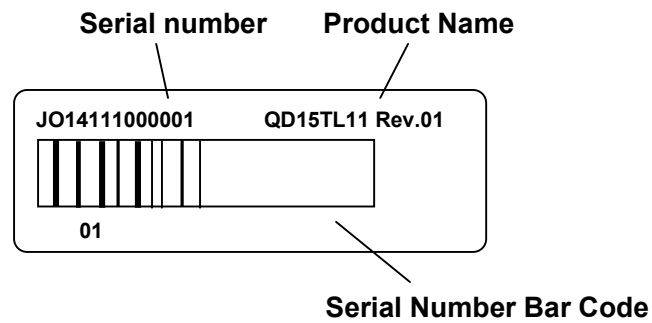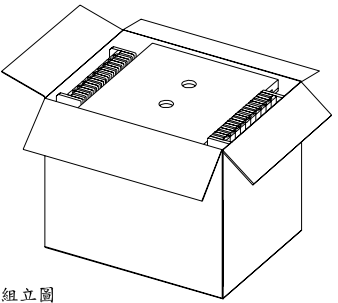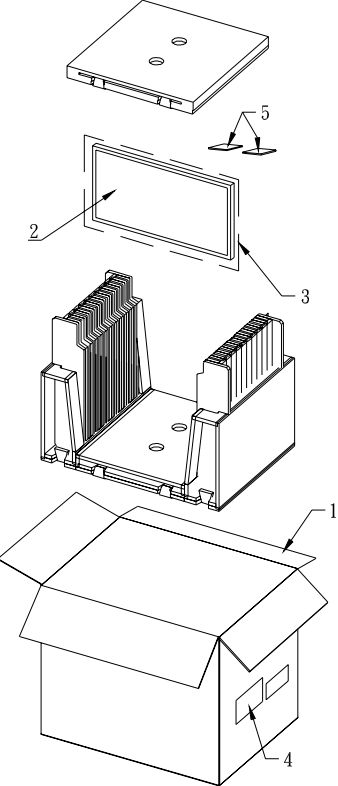
2) Adjusting volume has been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.

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.

15. Packing form

Package q'ty: 15pcs LCD unit
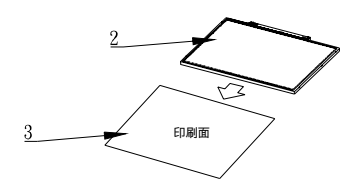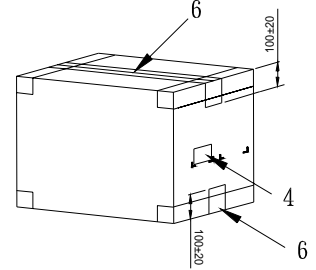
	PART NAME	PART CODE	Q'ty
1	Carton	441000001400	1
2	LCD Module	QD15TL110101	15
3	PE-Bag	267000000800	15
4	Carton label	440201100000	1
5	乾燥劑	443000000000	2
6	Tape	四維 PP37 W=60mm	6

CARTON OUTLINE: 454(L) X 356(W) X 336(H) mm
TOTAL WEIGHT: 14.4KG

組立圖

H型封箱膠帶貼付圖

包裝爆炸圖

STEP 1 : (S-PWB)

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DEG 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%			

<8>		
<7>		
<6>		
<5>		
<4>		
<3>		
<2>		
<1>		
NO	DATE	REVISE ITEMS	OWNER

UNIT	mm	SHEET	
SCALE		SIZE	A4
DATE	2004.06.03		
DESIGN	DSN CK	DSN CK	ENG APPD
Date:	Date:	Date:	Date:

ORIGINAL MODEL	
MATERIAL FINISH	
PART NAME	BAG ASSEMBLY
PART NUMBER	
DRAWING NUMBER	

Carton label:

370±5

Open side

(235)

310±5

(145)

04

PE - LD

WARNING
PLASIC BAGS CAN BE DANGEROUS
TO AVOID DANGER OF SUFFOCATION
KEEP THIS BAG AWAY FROM BABIES
AND CHILDREN

■Do not touch contents
without body grounding.
■Do not touch the surface of
display by hand, sharp and
hard materials.

CAUTION
ELECTROSTATIC
SENSITIVE
DEVICES
DO NOT OPEN OR HANDLE
EXCEPT AT A
STATIC FREE WORKSTATION

65±10

Note:
1.Material FC2009-00 t=0.06
2.Antl-statlc-electric
3.Bag color:red
4.Bag print color:black
5.Reslstor:10E9~10E11

60±10

8+2

Hot weld line

<8>			
<7>			
<6>			
<5>			
<4>			
<3>			
<2>			
<1>			
NO	DATE	REVISE ITEMS	OWNER

Quanta Display Inc.

CONFIDENTIAL

UNIT	mm	SHEET	
SCALE	free	SIZE	A4
DATE	2004,06,03		
DESIGN	DSN CK	DSN CK	ENG APPD

Date: 04/05/05   Date: Date: Date:

ORIGINAL MODEL

MATERIAL FINISH

PART NAME   PE-bag

PART NUMBER

DRAWING NUMBER

16. Mechanical Outline Dimension

NOTE:
1.CN1:INTERFACE CONNECTOR: JAE FI-XB30SL-HF10
2.CN2:CCFT CONNECTOR: JST BHR-04VS-1
3.UNSPECIFIED DIMENSIONAL TOLERANCE IS ±0.5 mm

CN2:BHR-04VS-1
1 Pin, 2 Pin ---- Hot
3 Pin ---N.C.
4 Pin---GND

SCALE 1.300

125.1±1

39.95±0.5

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DEG					ANGLE	
DIV	A	B	C	D		
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
			REVISION LIST	

UNIT	mm	SHEET	2 OF 2
SCALE	1.000	SIZE	A2
DATE	2004/06/24		
DESIGN	DSN CK	DSN CK	ENG APPD

ORIGINAL MODEL	QD15TL110101
MATERIAL FINISH	-
PART NAME	MODULE OUTLINE
PART NUMBER	-
RELEASE LEVEL	TS	REV.	00