

() Preliminary Specification
(V) Final Specification

Module	17.0" SXGA Color TFT-LCD
Model Name	M170EG02 V4(QD17EL0709)

Customer	Date
_____	_____
Approved by	
_____	_____
<p>Note: This Specification is subject to change without notice.</p>	

Checked & Approved by	Date
<i>CC Chiu</i>	2006/12/29
Prepared by	
<i>Gina Yu</i>	2006/12/29
<p>Desktop Display Business Group / AU Optonics corporation</p>	

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[illegible]

1. Application

This specification applies to a color TFT-LCD module, M170EG02 V4

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 1280×3×1024 dots panel with 16.2 million colors by using the LVDS (Low Voltage Differential Signaling) interface, 6-bit+FRC driving method and supplying +5V DC supply voltage for TFT-LCD panel driving.

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) SXGA resolution.
- 5) LVDS interface.
- 6) Low power consumption.
- 7) Wide viewing angle.

3. General Specifications

Parameter	Specifications	Unit
Display size	43 (17") Diagonal	cm
Active area	337.9 (H) × 270.3 (V)	mm
Pixel format	1280 (H)×1024 (V)	Pixel
	(1 pixel = R+G+B dots)	
Pixel pitch	0.264 (H) × 0.264 (V)	mm
Pixel configuration	R,G,B vertical stripe	
Display mode	Normally White	
Unit outline dimensions (typ.)*1	358.5×296.5×16.5	mm
Weight	2000	g
Surface treatment	Anti-glare and hard-coating	
	3H Low reflection (~5%)	
Lamp Quantity	4	pcs

*1.Note : excluding backlight cables.

4. Input Terminals

4-1. TFT-LCD panel driving

CN1 (LVDS signals and +5V DC power supply)

Using connector: AL2307-A0G1D-P (PⅡ)

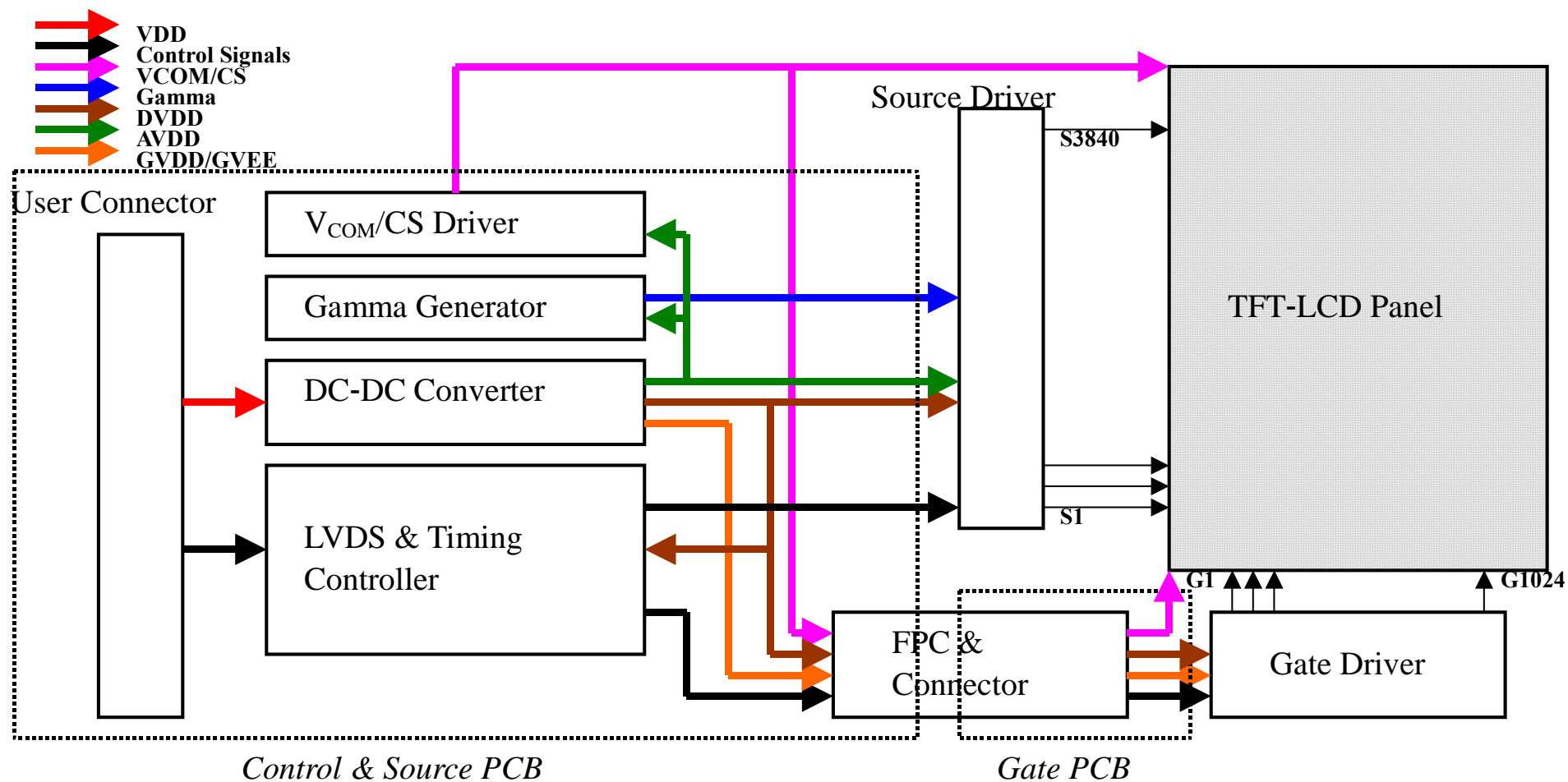
Corresponding connector: FI-X30M or FI-X30H (JAE)

Pin No.	Symbol	Function	Remark
1	R1IN0-	Receiver signal of Odd side pixels (-)	LVDS
2	R1IN0+	Receiver signal of Odd side pixels (+)	LVDS
3	R1IN1-	Receiver signal of Odd side pixels (-)	LVDS
4	R1IN1+	Receiver signal of Odd side pixels (+)	LVDS
5	R1IN2-	Receiver signal of Odd side pixels (-)	LVDS
6	R1IN2+	Receiver signal of Odd side pixels (+)	LVDS
7	GND		
8	CK1IN-	Clock signal of Odd side pixels (-)	LVDS
9	CK1IN+	Clock signal of Odd side pixels (+)	LVDS
10	R1IN3-	Receiver signal of Odd side pixels (-)	LVDS
11	R1IN3+	Receiver signal of Odd side pixels (+)	LVDS
12	R2IN0-	Receiver signal of Even side pixels (-)	LVDS
13	R2IN0+	Receiver signal of Even side pixels (+)	LVDS
14	GND		
15	R2IN1-	Receiver signal of Even side pixels (-)	LVDS
16	R2IN1+	Receiver signal of Even side pixels (+)	LVDS
17	GND		
18	R2IN2-	Receiver signal of Even side pixels (-)	LVDS
19	R2IN2+	Receiver signal of Even side pixels (+)	LVDS
20	CK2IN-	Clock signal of Even side pixels (-)	LVDS
21	CK2IN+	Clock signal of Even side pixels (+)	LVDS
22	R2IN3-	Receiver signal of Even side pixels (-)	LVDS
23	R2IN3+	Receiver signal of Even side pixels (+)	LVDS
24	GND		
25	GND		
26	NC		
27	GND		
28	V _{DD}	+5V power supply	Power
29	V _{DD}	+5V power supply	Power
30	V _{DD}	+5V power supply	Power

【Note 1】 All GND(ground) pins should be connected together.

【Note 2】 All V_{DD} (power supply) pins should be connected together.

4-2 Interface block diagram



4-3. Backlight driving

Using connector CN2, 3: BHSR-02VS-1 (JST)

Corresponding connector: SM02B-BHSS-1 (JST)

Pin No.	Symbol	Function
1	HIGH	High voltage side
2	GND	Ground

5. Absolute Maximum Ratings

LCD module

Parameter	Symbol	Condition	Ratings	Unit	Remark
+5V supply voltage	V _{DD}	Ta=25°C	-0.3 ~ +6.0	V	
Storage temperature	Tstg	—	-20 ~ +60	°C	【Note1】
Operating temperature (Ambient)	Topa	—	0 ~ +50	°C	

【Note1】 Humidity : 90%RH Max. at Ta≤40°C.

Maximum wet-bulb temperature at 39°C or less at Ta>40°C.
No condensation.

6. Electrical Characteristics

6-1.TFT-LCD panel driving

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

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
V_{DD}	Supply voltage	V_{DD}	+4.5	+5.0	+5.5	V	【Note2】
	Current dissipation	I_{DD}	—	750	1200	mA	【Note3】
Permissive input ripple voltage		V_{RP}	—	—	100	mV p-p	$V_{DD}=+5.5\text{V}$
Differential input threshold voltage	High	V_{TH}	—	—	+100	mV	$V_{CM}=+1.2\text{V}$ 【Note1】
	Low	V_{TL}	-100	—	—	mV	
Rush current		I_{RUSH}			3	A	Rise time 470uS

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

【Note2】

On-off conditions for supply voltage

$0 < t_1 \leq 10 \text{ ms}$

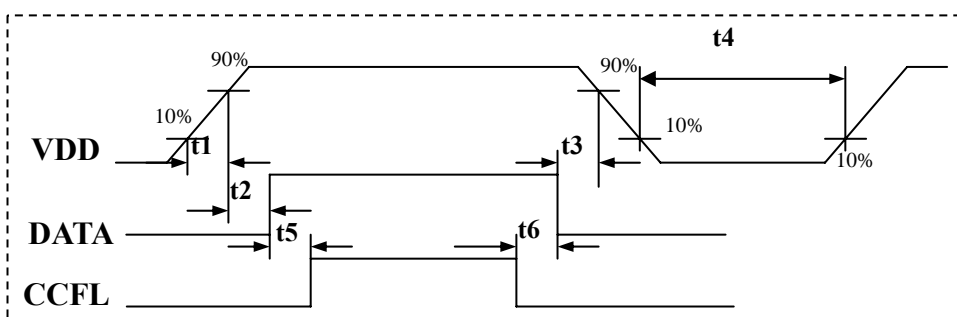
$0 < t_2 \leq 50 \text{ ms}$

$0 < t_3 \leq 1 \text{ s}$

$1 \text{ s} < t_4$

$200 \text{ ms} \leq t_5$

$200 \text{ ms} \leq t_6$

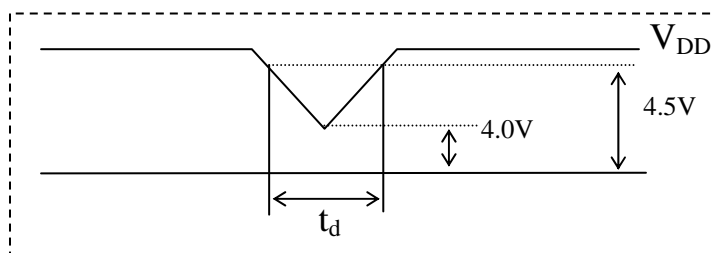


V_{DD} -dip conditions

1) $4 \text{ V} \leq V_{DD} < 4.5 \text{ V}$
 $t_d \leq 10 \text{ ms}$

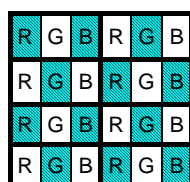
2) $V_{DD} < 4 \text{ V}$

V_{DD} -dip conditions should also follow the On-off conditions for supply voltage



【Note3】 Maximum current condition; Change to 1x1 dot checker board pattern.

$V_{DD}=+5\text{V}$



□ : 0 GS

■ : 255 GS

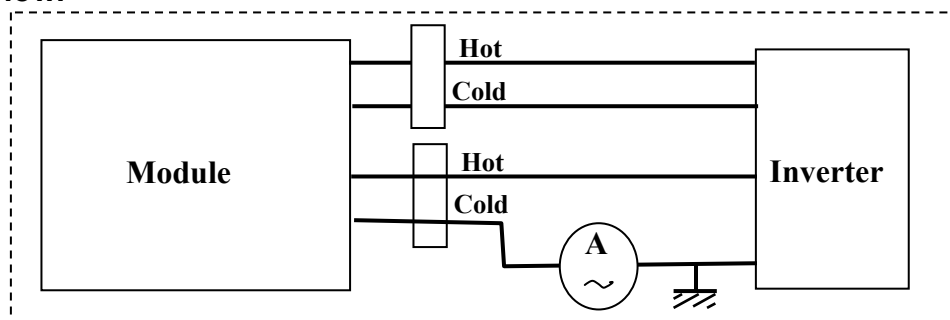
6-2. Backlight driving

The backlight system is an edge-lighting type with 2 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	7.0	8.0	mArms	【Note1】
Lamp voltage	V_L	650	725	770	Vrms	
Lamp power consumption	P_L		5.1	6.16	W	【Note2】
Lamp frequency	F_L	35	52	80	kHz	【Note3】
Established starting voltage	V_s			1100	Vrms	$T_a=25^{\circ}\text{C}$
				1420	Vrms	$T_a=0^{\circ}\text{C}$ 【Note4】
Lamp life time	L_L	40000	50000		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 ① or ② occurs in the continuous operation under the condition of $T_a = 25^{\circ}\text{C}$ and $I_L = 7.0$ mArms.

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

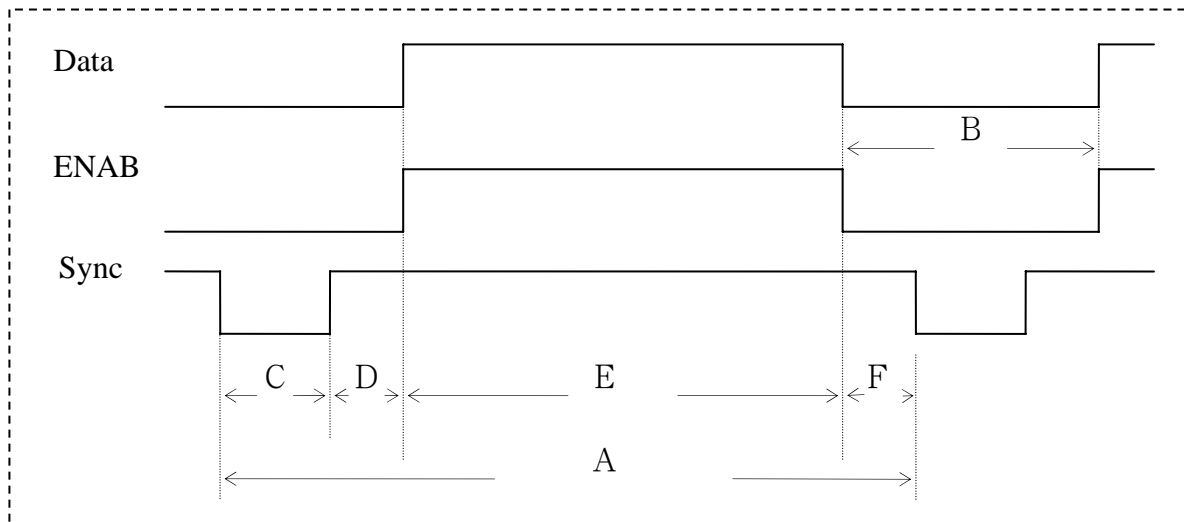
② Kick-off voltage at $T_a = 0^{\circ}\text{C}$ exceeds maximum value.

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})	—	16.7	—	ms	Postive
	1028	1066	1365	line	
Blanking period(T_{VB})	5	42	—	line	
Sync pulse width (T_{VC})	1	3	—	line	
Back porch (T_{VD})	1	38	—	line	
Sync pulse width + Back porch ($T_{VC}+T_{VD}$)	2	41	—	line	
Active display area (T_{VE})	1024	1024	1024	line	
Front porch (T_{VF})	—	1	—	line	

(Horizontal)

Item (symbol)	Min.	Typ.	Max.	Unit	Remark
Hsync cycle (T_{HA})	—	15.6	—	μ s	Postive 2dots/clock
	706	844	1320	clock	
Blanking period (T_{HB})	66	204	—	clock	
Sync pulse width (T_{HC})	8	56	—	clock	
Back porch (T_{HD})	3	124	—	clock	
Sync pulse width + Back porch ($T_{HC} + T_{HD}$)	11	180	—	clock	
Active display area (T_{HE})	640	640	640	clock	
Front porch (T_{HF})	—	24	—	clock	

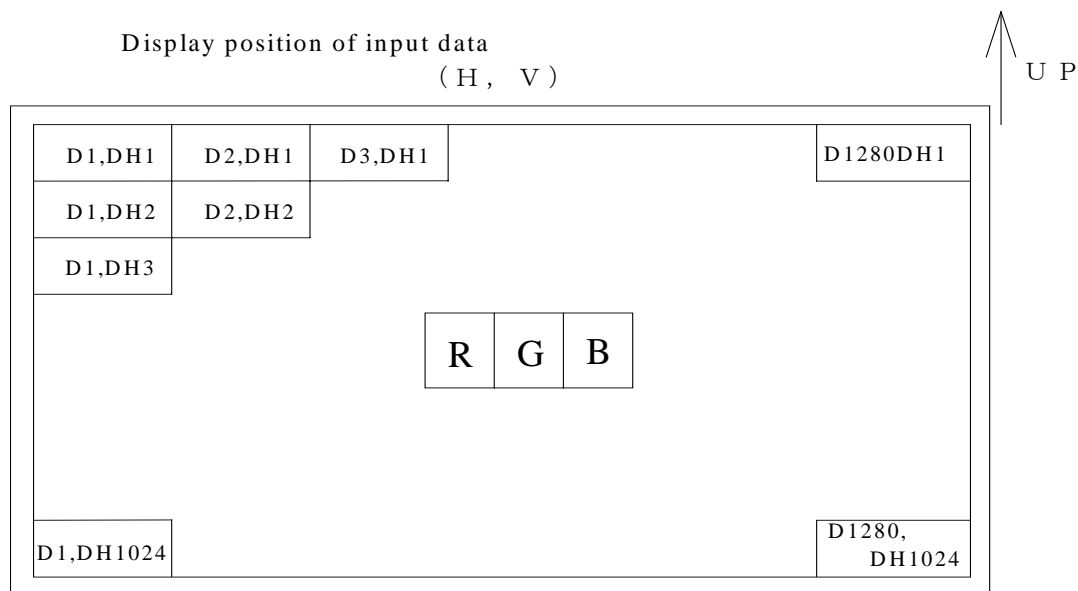
(Clock)

Item	Min.	Typ.	Max.	Unit	Remark
Frequency	40	54	67.5	MHz	【Note1】

Note)1. Typ. Timing is 1280x1024@64KHz/60Hz SXGA.

2. The panel can run at **1280x1024@79.976KHz/75Hz** as well.
3. If increase Vsync cycle too much, it may cause flicker.
4. Vsync/Hsync cycle value (T_{VA} / T_{HA}) is divided by 4.

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



8. Input Signals, Basic Display Colors and Gray Scale of Each Color

	Colors & Gray scale	Data Signal																							
		R								G								B							
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Basic Color	Black	0	0	0	0	0	0	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	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	1	1	1	1	1	1
Gray Scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑				↑								↑								↑				
	↓				↓								↓								↓				
	Bright	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↓	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑				↑								↑								↑				
	↓				↓								↓								↓				
	Bright	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	↓	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	↑				↑								↑								↑				
	↓				↓								↓								↓				
	Bright	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1
	↓	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

0 : Low level voltage, 1 : High level voltage

9. Optical Characteristics

$T_a=25^{\circ}\text{C}$, $V_{DD}=+5\text{V}$

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	θ21,θ22	CR>10	60	70		Deg.	【Note1,4】
	Vertical	θ11		55	65		Deg.	
		θ12		50	60		Deg.	
	Horizontal	θ21,θ22	CR>5	70	80		Deg.	
	Vertical	θ11		65	75		Deg.	
		θ12		60	70		Deg.	
Contrast ratio		C R n	θ=0°	300	500	—		【Note2,4】
Response time		τ	θ=0°	—	8		ms	【Note3,4】
Rise time	τr				2	TBD	ms	
Fall time	τd				6	TBD	ms	
Chromaticity of White (CIE 1931)		Wx		0.283	0.313	0.343		【Note4】
		Wy		0.299	0.329	0.359		
Chromaticity of Red (CIE 1931)		Rx		0.609	0.639	0.669		
		Ry		0.314	0.344	0.374		
Chromaticity of Green (CIE 1931)		Gx		0.257	0.287	0.317		
		Gy		0.585	0.615	0.645		
Chromaticity of Blue (CIE 1931)		Bx		0.111	0.141	0.171		
		By		0.057	0.087	0.117		
Luminance of white		Y L		200	260		Cd/m ²	IL = 7.0mArms
White Uniformity		δW		—	1.25	1.33		【Note5】

※ The measurement shall be executed 30 minutes after lighting at rating. (typical condition : IL = 7.0 mArms)

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

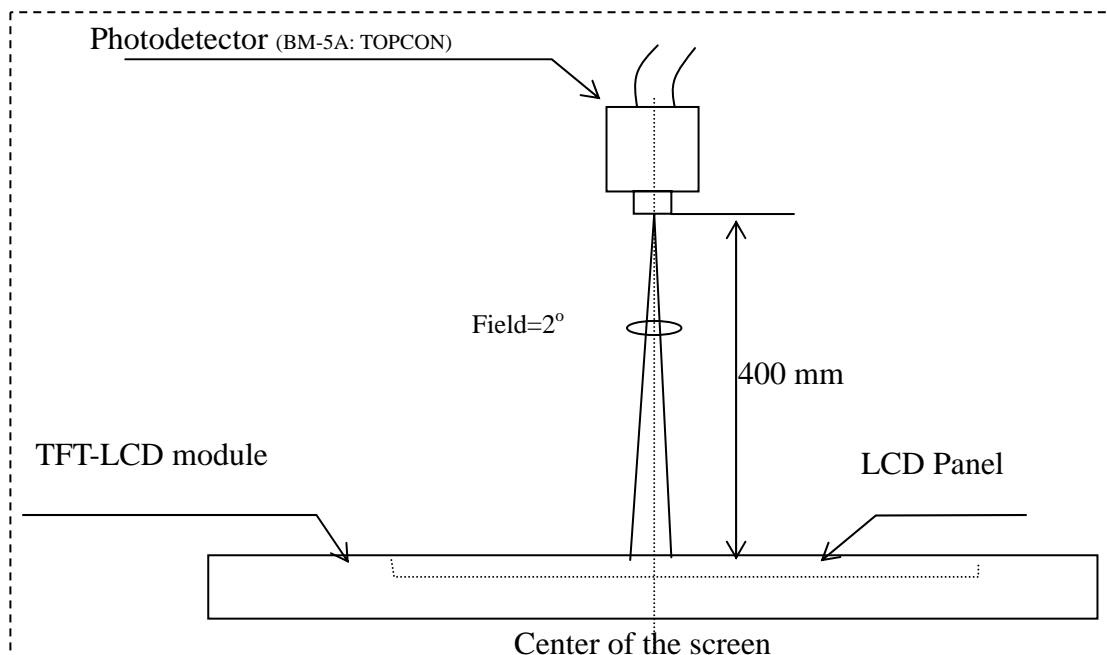
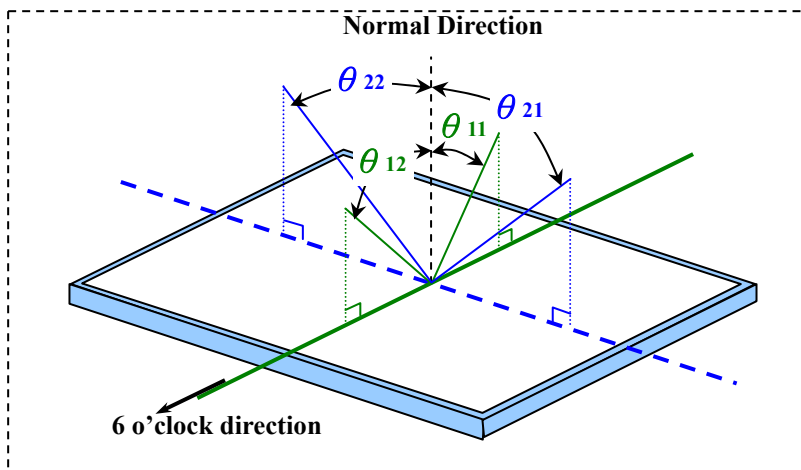


Fig 3. Optical characteristics measurement method

【Note1】 Definitions of viewing angle range:



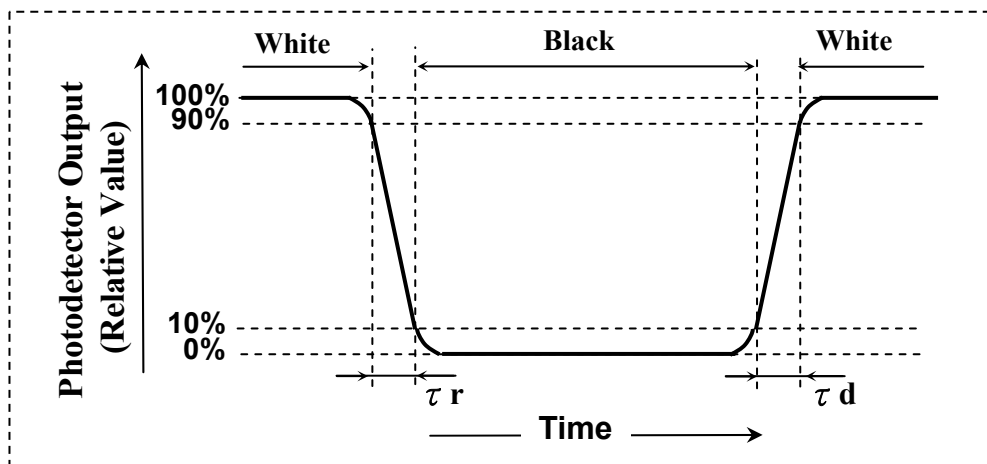
【Note2】 Definition of contrast ratio:

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:

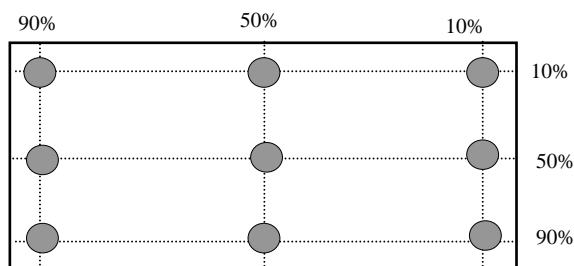
The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white" .



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

【Note5】 Definition of white uniformity:

White uniformity is defined as the following with 9 measurements



Maximum Luminance (of 9 points)

$$\delta_w = \frac{\text{Maximum Luminance (of 9 points)}}{\text{Minmum Luminance (of 9 points)}}$$

10. Display Quality

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

11 · Handling Precautions

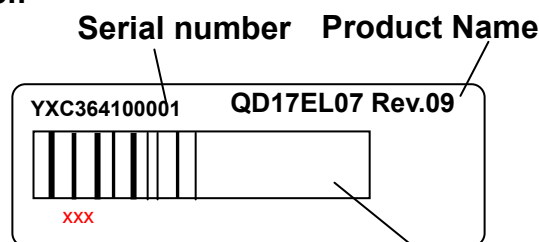
- a) Be sure to turn off the power supply when inserting or disconnecting the cable.
- b) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.
- c) Since the front polarizer is easily damaged, pay attention not to scratch it.
- d) Wipe off 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..

12. Reliability test items

No.	Test item	Conditions
1	High temperature storage test	Ta = 60℃ 240h
2	Low temperature storage test	Ta = -20℃ 240h
3	High temperature & high humidity operation test	Ta = 50℃ ; 50 %RH 240h (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, 1.0G 1Hr/each axis
7	Shock test (non- operating)	Gravity : 50G Pulse width : 11 ms, sine wave Direction : ±X,±Y,±Z Once for each direction.

13 · Others

1) Lot No. Label:



Serial Number Bar Code

YXC364100001 Digital code 4, 5 is Date code.

Digital 4 (Year) 1: 2001, 2: 2002, 3:2003,....

Digital 5 (Month) 1: Jan, 2: Feb,... , A:Oct, B:Nov., C: Dec.

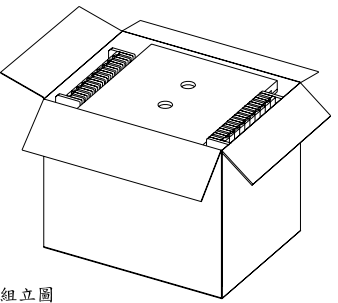
- 2) Adjusting volume has been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.
- 3) Disassembling the module can cause permanent damage and should be strictly avoided.

- 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.

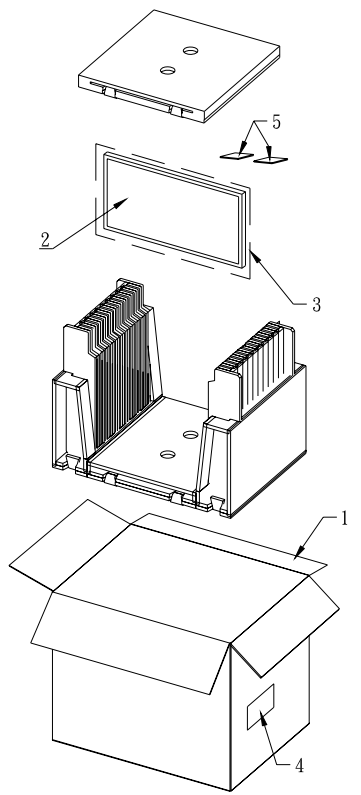
14. Package Method

i) Package quantity in one box : 10pcs

ii) Box Size : 490 (L)x 396 (W)x 440 (H) mm



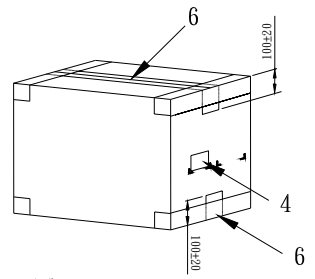
組立圖



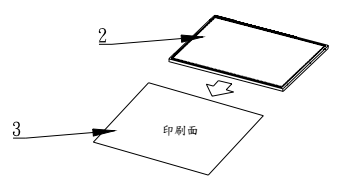
包裝爆炸圖

	PART NAME	PART CODE	Q' ty
1	Carton	441000005000	1
2	LCD Module	17" Module	10
3	PE-Bag	267000000100	10
4	Carton label	440201000000	1
5	乾燥劑	443000000000	2
6	Tape	四維 PP37 W=60mm	2

CARTON OUTLINE: 490(L) X 396(W) X 440(H) mm
TOTAL WEIGHT: 23KG



H型封箱膠帶貼付圖



STEP 1 : 將模組(S-PWB側先進入)置入靜電袋中.

DEG	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		
100-180	±0.15%	±0.2%	±0.25%		

Quanta Display Inc.		ORIGINAL MODEL	
CONFIDENTIAL		MATERIAL FINISH	
PART NAME		BAG ASSEMBLY	
PART NUMBER		DRAWING NUMBER	

15.Outline Dimension:

