

# ( ) Preliminary Specification

# (V) Final Specification

Module	17.0" SXGA Color TFT-LCD
Model Name	M170EG02 V3(QD17EL0711)

Customer Date	Checked & Date Approved by
	CC Chiu 2006/7/17
Approved by	Prepared by
	Katy Chang 2006/7/17
Note: This Specification is subject to chang without notice.	e Desktop Display Business Group / AU Optronics corporation



These specification sheets are the proprietary product of Quanta Display Inc. ("QDI") and include materials protected under copyright of QDI. Do not reproduce or cause any third party to reproduce them in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of QDI.

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	Change Content									
00	03/24/2005	Specification Initiation									
01	04/20/2005	Update the optical specification									
02	06/20/2005	Update the timing specification									



#### 1. Application

This specification applies to a color TFT-LCD module, QD17EL07 Rev.11

# 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  $1280 \times 3 \times 1024$  dots panel with 16.2 million colors by using LVDS (Low Voltage Differential Signaling) to interface and supplying +5V 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 ratio, high-brightness & low power consumption.
- 2) Brilliant and high contrast image.
- 3) Small footprint and thin shape.
- 4) SXGA resolution (1024 vertical by 1280 horizontal pixel array).
- 5) LVDS interface.
- 6) PSWG type.
- 7) Wide viewing angle.
- 8) RoHS compliant

3.	General	<b>Specifications</b>
----	---------	-----------------------

Parameter	Specifications	Unit
Display size	43(17") Diagonal	mm
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) $ imes$ 0.264 (V)	mm
Pixel configuration	R, G, B vertical stripe	
Display mode	Normally white	
Unit outline dimensions (typ.)*1	296.5(W)×358.5(H)×17(T)max.	mm
Mass	1700 max.	g
Surface treatment	Anti-glare and hard-coating 3H	

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



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)

#### Interface Cable Pin Assignments

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 <sub>DD</sub>	+5V power supply	Power
29	V <sub>DD</sub>	+5V power supply	Power
30	V <sub>DD</sub>	+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: BHSR-02VS-1 (JST)

Corresponding connector: SM02B-BHSS-1 (JST)

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

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	VI	<b>Ta=25℃</b>	$-$ 0.3 $\sim$ VDD+0.3	v	[Note1]
+5V supply voltage	VDD	<b>Ta=25℃</b>	-0.3 $\sim$ $+$ 6.0	v	
Storage temperature	Tstg	_	$-$ 20 $\sim$ +60	°C	[Note2]
Operating temperature	Тора	_	0 $\sim$ +50	°C	[Note3]
(Ambient)					

[Note1] LVDS signals

[Note2] Humidity : 95%RH Max. at Ta $\leq$ 40°C.

Maximum wet-bulb temperature at 39  $^\circ\!\mathrm{C}$  or less at Ta>40  $^\circ\!\mathrm{C}$  . 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

-1.TFT-LCD	1.TFT-LCD panel driving								
	Parameter		Sym.	Min.	Тур.	Max.	Unit	Remark	
VDD	Supply voltag	e	VDD	+4.5	+5.0	+5.5	V	[Note2]	
Current	@ Full Back pat	tern	IDD	—	760	1200	mA	[Note3]	
dissipation	@ Full White pa	ttern		_	480		mA		
	@ 1-line on/off		_	700		mA			
	@ 1-dot on/off p	oattern		_	860		mA		
	@ Mosaic patte	rn		_	630		mA		
Permissive	input ripple volt	age	V <sub>RP</sub>	—	—	100	mV p-p	VDD=+5.5V	
Differential	input	High	V <sub>TH</sub>	—	—	+100	mV	V <sub>CM</sub> =+1.2V	
Threshold	d voltage	Low	V <sub>TL</sub>	-100	—	—	mV	[Note1]	
Terminal	resistor		R <sub>T</sub>	—	100	_	Ω	Differential	
								input	
Rush cur	rent	I <sub>RUSH</sub>			3	Α	Rise time		
								470uS	

[Note1]  $V_{CM}$ : Common mode voltage of LVDS driver.

# [Note2]

On-off conditions for supply voltage





# [Note3] Test pattern of current dissipation

[F	[Full white pattern]											V	DE	)=	+5	5V	
R	G	В	R	G	В	R	G	В	R	G	В	R	G	В	R	G	B
R	G	В	R	G	В	R	G	В	R	G	В	R	G	В	R	G	В
R	G	В	R	G	В	R	G	В	R	G	В	R	G	В	R	G	В
R	G	В	R	G	В	R	G	В	R	G	В	R	G	В	R	G	В
R	G	в	R	G	В	R	G	в	R	G	в	R	G	в	R	G	В



[1 line on/off pattern] VDD=+5V

R	G	в	R	G	R	G	В	R	G	R	G	В	R	G	В
R	G	В	R	G	R	G	В	R	G	R	G	В	R	G	
R	G	В	R	G	R	G	в	R	G	R	G	в	R	G	В
R	G	в	R	G	R	G	в	R	G	R	G	в	R	G	В
R	G	в	R	G	R	G	в	R	G	R	G	в	R	G	В

[32x32 Mosaic pattern] VDD=+5V



[1 dot on/off pattern] VDD=+5V





#### 6-2. Backlight driving

The backlight system is an edge-lighting type with 2 CCFT (Cold Cathode Fluorescent Tube).

Parameter	Symbol	Min.	Тур.	Max.	Unit	Re	mark
Lamp current range	١L	4.0	7.0	8.0	mArms	[Note1]	
Lamp voltage	۷L	550.8	612	673.2	Vrms		
Lamp power	P∟		4.28	_	W	[Note2]	
consumption							
Lamp frequency	FL	_	47	_	kHz	[Note3]	
Kick-off voltage	Vs		_	1200	Vrms	<b>Ta=25℃</b>	
			_	1500	Vrms	<b>Та=0°</b> С	[Note4]
Lamp life time	LL	40000	50000	_	hour	[Note5]	

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

[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 Ta =  $25^{\circ}$ C and I<sub>L</sub> = 7.0 mArms.
  - ① Brightness becomes 50 % of the original value under standard condition.
  - ② Kick-off voltage at Ta =  $0^{\circ}$ C exceeds maximum value.
- [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: 
$$(||_p|-||_P|)/||_{rms} |x|100\% \le 10\%$$
  
\* Distortion ratio:  $|_p(or|_P) / |_{rms} \le \sqrt{2 \pm 10\%}$ 

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.)



**DE MODE:** 

	Item	Description	Condition	Min.	Тур.	Max.	Unit
Frame	T <sub>V_TOTAL</sub>	V total line number	-	1032	1066	1536	н
	$T_{V_{-}DATA}$	Data daration	-	-	1024	-	н
Line	$T_{H_{-}TOTAL}$	H total pixel number	-	672	844	1022	CLK
	$T_{H_{-}DATA}$	Data duration	-	-	640	-	CLK

(Clock)

Item	Min.	Тур.	Max.	Unit	Remark		
Frequency	45	54	67.5	MHz			

Note)1. Typ. Timing is <u>1280X1024@64KHz/60Hz</u> SXGA

2. The panel can run at <u>1280X1024@79.976KHz/75Hz</u> as well.



3. If increase Vsync cycle too much, it may cause flicker.

4. Vsync/Hsync cycle value (TVA / THA) 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 &	Data Signal																							
	Gray scale	RO	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	<b>G4</b>	G5	G6	G7	BO	B1	B2	B3	B4	B5	B6	B7
	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
Ba	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
Isic	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
Col	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
or	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
	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
Gr	æ	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ay S	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
scal	æ	Æ							Æ							Æ									
e of																									
Rec	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
2		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
	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
Gr	æ	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ay S	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
òcale	æ	Æ							Æ							Æ									
of (	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
àree		0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
ä	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
	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
Gra	æ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
y Sc	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
sale (	æ				A	Ε				Æ							Æ								
yf Bl	Dui ab 4		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1
ue	Dright	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Dluc	0	0	U 0	0	U 0	U 0	U 0	0	0	U 0	0	U 0	0	0	0	0	1	1	1	1	1	1	1	1
	blue	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1	1	1	1	I	1	I	1

0 : Low level voltage, 1 : High level voltage



# 9.Optical Characteristics

							Т	<b>a=25℃</b> ,	VDD=+5V
Para	met	ter	Symbol	Condition	Min.	Тур.	Max.	Unit	Remark
Horizontal		θ 21, θ 22	CR>10	60	70		Deg.	[Note1,4]	
Vertical		θ 11		55	65		Deg.		
Viewing			θ <b>12</b>		50	60		Deg.	
Angle	Angle Horizontal		θ 21, θ 22	CR>5	70	80		Deg.	
Range	Range Vertical		θ 11		65	75		Deg.	
			θ <b>12</b>		60	70		Deg.	
Contrast ratio			C R <b>n</b>	<b>θ =0°</b>	400	600	—		[Note2,4]
Response time			τ	θ <b>=0</b> °	_	8	16	ms	[Note3,4]
Rise time	е	τ <b>r</b>				2		ms	
Fall time	;	τ <b>d</b>				6		ms	
Chromaticity of			Wx		0.283	0.313	0.343		[Note4]
White (CIE	19	31)	Wy		0.299	0.329	0.359		
Chromatic	ity (	of	Rx		0.612	0.642	0.672		
Red (CIE 1	931	)	Ry		0.311	0.341	0.371		
Chromatic	ity (	of	Gx		0.249	0.279	0.309		
Green (CIE 1931)			Gy		0.580	0.610	0.640		
Chromaticity of			Bx		0.113	0.143	0.173		
Blue (CIE 1931)			Ву		0.053	0.083	0.113		
Luminanc	e c	of white	YL		240	300		Cd/m <sup>2</sup>	IL = 7.0mArms
White Uniformity			δW		_	1.25	1.3		[Note5]

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







#### [Note1] Definitions of viewing angle range:

[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:

9 points measurements





δw =-

Maximun Luminance of 9 points

Minimum Luminance of 9 points

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



## 13. Reliability test items

	Test item	Conditions
No.		
1	High temperature storage test	Ta = 60℃ 240h
2	Low temperature storage test	Ta = -20℃ 240h
3	High temperature	Ta = $40^{\circ}$ C; 90 %RH 240h; (As remark #3)
	& High humidity operation test	(No condensation)
4	High temperature operation test	Ta = 50℃ 240h
		(The panel temp. must be less than 60 $^\circ\!\mathrm{C}$ )
5	Low temperature operation test	Ta = 0℃ 240h
6	Vibration test	Frequency: 10 $\sim$ 500Hz, 1.0G, Test period : 3 hours
	(non- operating)	(1 hour for each direction of X,Y,Z)
7	Shock test	Max. Gravity: 50G
	(Non- operating)	Pulse width: 11 ms, Half sine wave
		<b>Direction</b> : $\pm X, \pm Y, \pm Z$
		Once for each direction.

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  $39^{\circ}$ C; At glass temperature high than  $40^{\circ}$ C. Temperature and relative humidity range is shown in the figure below.





1) Lot No. Label



Serial Number Bar Code

KNMXXXXXXXXX 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. Lot No.

- 1) Disassembling the module can cause permanent damage and should be strictly avoided.
- 2) Please be careful since image retention may occur when a fixed pattern is displayed for a long time.
- 3) 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

i) Package quantity in one box : 10pcs

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





M170EG02 v3(QD17EL0711) Page 20/21

#### 15.0utline Dimension:



![](_page_20_Picture_0.jpeg)

#### M170EG02 v3(QD17EL0711) Page 21/21

![](_page_20_Figure_2.jpeg)