QUALITY MICROELECTRONICS(SHENZHEN)CO.,LTD

Quality HeLiTai

high quality high requirement high efficiency

SPECIFICATION FOR APPROVAL

CUSTOMER ： SemiWorks

CLIENT TYPE：

PRODUCTION NO：QFG12832C-PFDNH

SHIPMENT DATE：2006-11-02

Customer Checked VALIDATED

	SIGNATURE	DATE
PREPARED		
CHECKED		
APPROVED		

Note: Please fax back after confirmation. Thanks!

TEL：0086-755-27533088 FAX：0086-755-27533880 http://www.szlcd.com

ADD: D3,4th Tianyang Avenue,Datianyang Industrial Zone,Dong Fang,Songgang,Bao'an,Shenzhen 518105,CHINA

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RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
Jul.24th, 2006	01	FIRST ISSUE			
Nov.2nd,2006	02	SECOND ISSUE			

3. GENERAL SPECIFICATIONS：

3-1 SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered by QUALITY to Customer.

3-2 PRODUCTS:

Liquid Crystal Display Module (LCM)

3-3 MODULE NAME:

QFG12832C-PFDNH

4. FEATURES：

(1) Display Type: FSTN, Transflective,6o'clock,Positive
(2) Driving Method: 1/33duty, 1/6bias
(3) Operating Voltage: VDD=3.3V, VLCD=5.0V
(4) Built-in controller: ST7565P

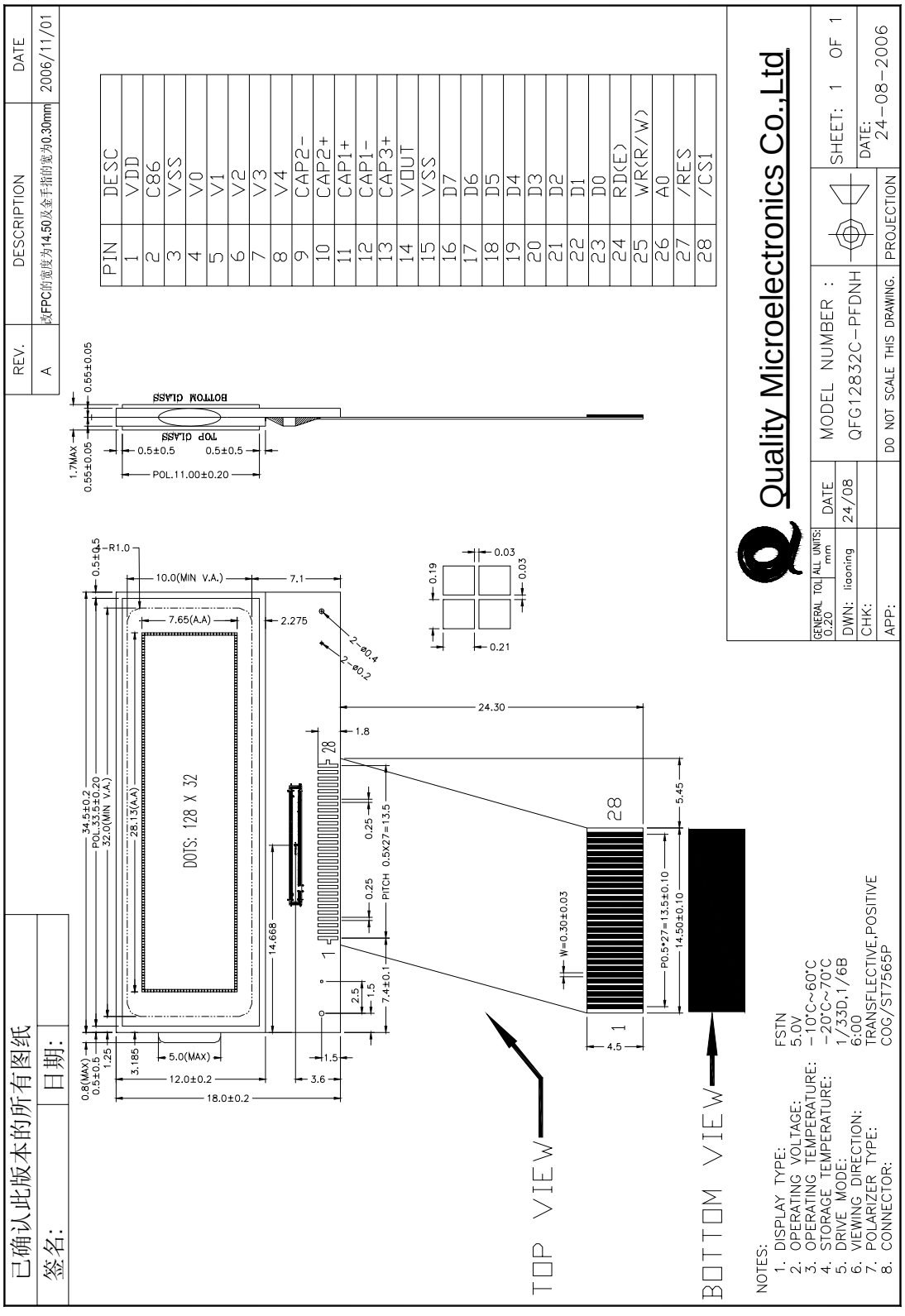
5. MACHANICAL SPECIFICATIONS：

ITEM	SPECIFICATIONS	UNIT
MODULE SIZE	35.3 (W)x42.6(H)x1.7MAX(D)	mm
VIEWING AREA	32.0 (W) x 10.0(H)	mm
ACTIVE AREA	28.13(W)x 7.65(H)	mm
DISP.CONSTRUCTION	128x 32 Dots	---
DOT SIZE	0.19(W) x 0.21 (H)	mm
DOT PITCH	0.22(W) x0.24(H)	mm
ASSY.TYPE	COG	---
WEIGHT	TBD	g

NOTES:

LCM should be grounded during handling LCM.

6. OUTLINE DIMENSIONS



7. ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN	TYP	MAX	
SUPPLY VOLTAGE	VDD	0.3	—	+5.0	V
	VOUT	0.3	—	+18.0	
OPERATION TEMPERATURE	TOPR	-10	—	+60	℃
STORAGE TEMPERATURE	TSTG	-20	—	+70	℃

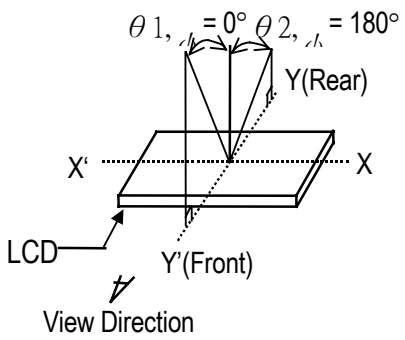
8.ELECTRICAL CHARACTERISTICS

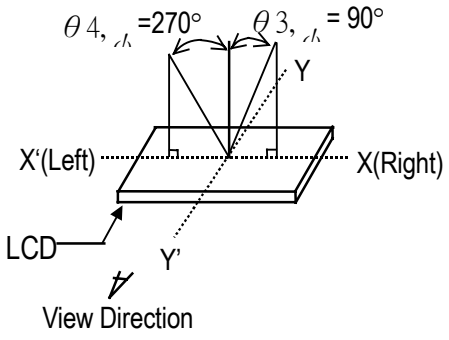
Unless otherwise specified, V_{SS} = 0 V, V_{DD} = 3.0 V ± 10%, Ta = –40 to 85°C

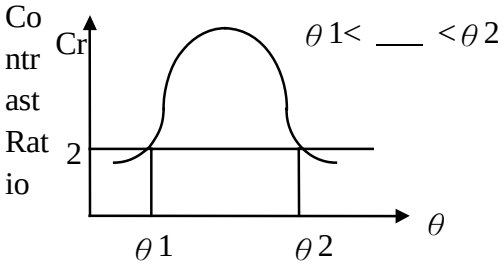
ITEM		SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Operating Voltage (1)		VDD			1.8	—	3.3	V
Operating Voltage (2)		VDD2	(Relative to VSS)		2.4	—	3.3	V
High-level Input Voltage		VIHC			0.8 x VDD	—	VDD	V
Low-level Input Voltage		VILC			VSS	—	0.2 x VDD	V
High-level Output Voltage		VOHC	IOH = –0.5 mA		0.8 x VDD	—	VDD	V
Low-level Output Voltage		VOLC	IOL = 0.5 mA		VSS	—	0.2 x VDD	V
Input leakage current		ILI	VIN = VDD or VSS		–1.0	—	1.0	μA
Output leakage current		ILO	VIN = VDD or VSS		–3.0	—	3.0	μA
Liquid Crystal Driver ON Resistance		RON	a = 25°C (Relative To VDD)	V0 = 13.0 V	—	2.0	3.5	KΩ
			V0 = 8.0 V	—	3.2	5.4		
Static Consumption Current		ISSQ	V0 = 13.0 V(Relative To VDD)		—	0.01	2	μA
Output Leakage Current		I5Q			—	0.01	10	μA
Input Terminal Capacitance		CIN	Ta = 25°C , f = 1 MHz		—	5.0	8.0	pF
Oscillator Frequency	Internal Oscillator	fOSC	1/65 duty 1/33 duty	Ta = 25°C	17	20	24	kHz
	External Input	fCL			17	20	24	kHz
	Internal Oscillator	fOSC	1/49 duty 1/53 duty 1/55 duty	Ta = 25°C	25	30	35	kHz
	External Input	fCL			25	30	35	kHz

9.OPTICAL CHARACTERISTICS

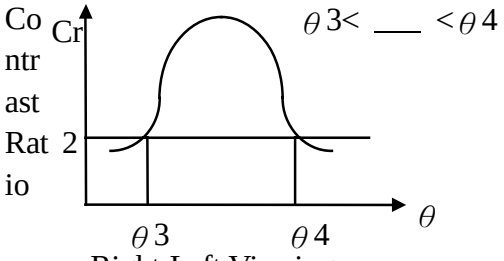
(1) DEFINITION OF VIEWING ANGLE







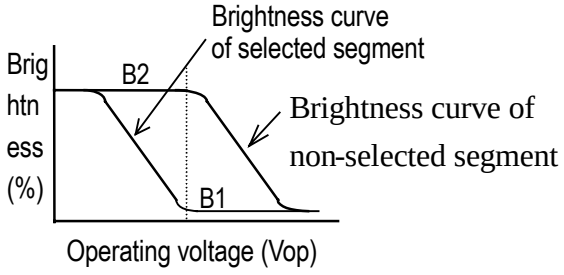
Front-Rear Viewing Angle



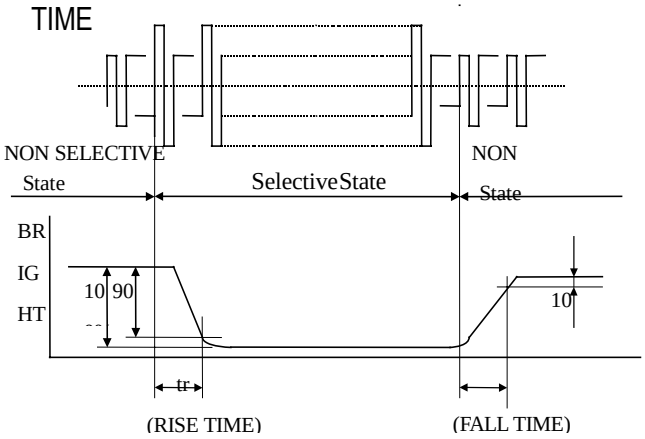
Right-Left Viewing Angle

(2) DEFINITION OF CONTRAST RATIO

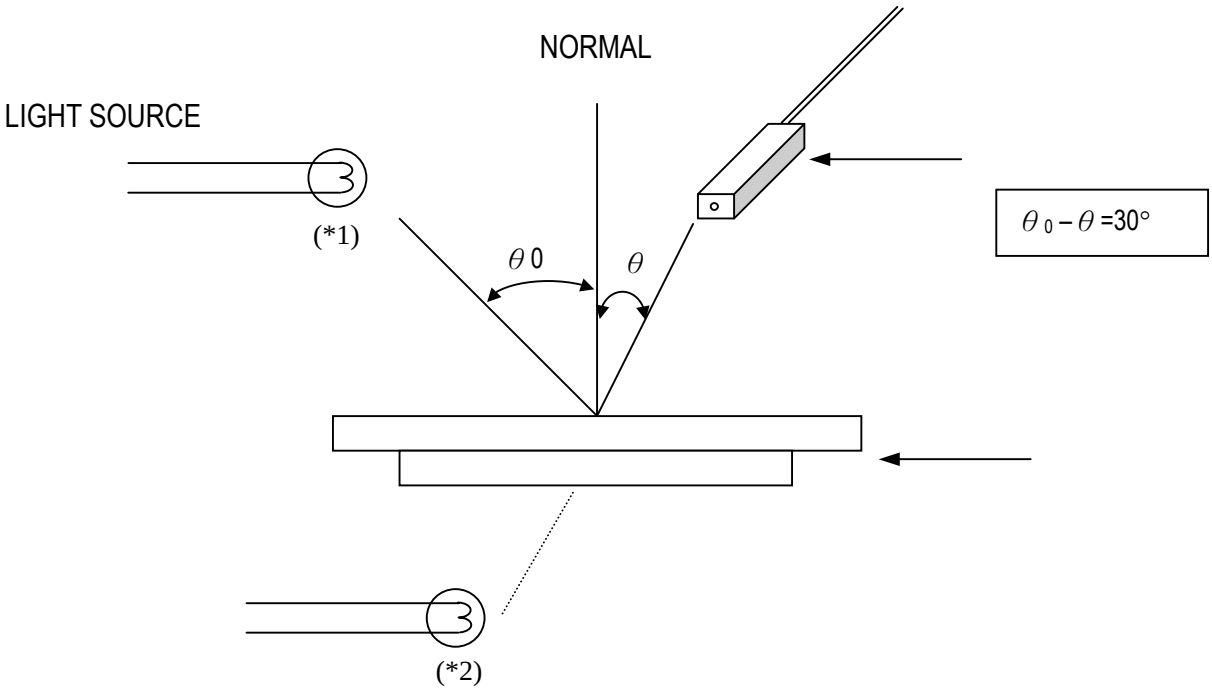
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment}}$$



(3) DEFINITION OF RESPONSE TIME



(4) Measuring Instruments For Electro-optical Characteristics



*1.Light source position for measuring the reflective type of LCD panel

*2.Light source position for measuring the transflective / transmissive types of LCD panel

10.TIMING CHARACTERISTICS (VDD = 3.3V Ta=25℃)

System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Address hold time	tAH8		0		—	Ns
Address setup time	tAW8		0		—	
System cycle time	tCYC8		240		—	
Enable L pulse width (WRITE)	tCCLW		80		—	
Enable H pulse width (WRITE)	tCCHW		80		—	
Enable L pulse width (READ)	tCCLR		140		—	
Enable H pulse width (READ)	tCCHR		80			
WRITE Data setup time	tDS8		40		—	
WRITE Address hold time	tDH8		0		—	
READ access time	tACC8	CL = 100 pF	—		70	
READ Output disable time	tOH8	CL = 100 pF	5		50	

System Bus Read/Write Characteristics 2 (For the 6800 Series MPU)

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Address hold time	tAH6		0		—	ns
Address setup time	tAW6		0		—	
System cycle time	tCYC6		240		—	
Enable L pulse width (WRITE)	tEWLW		80		—	
Enable H pulse width (WRITE)	tEWHW		80		—	
Enable L pulse width (READ)	tEWLR		80		—	
Enable H pulse width (READ)	tEWHR		140			
WRITE Data setup time	tDS6		40		—	
WRITE Address hold time	tDH6		0		—	
READ access time	tACC6	CL = 100 pF	—		70	
READ Output disable time	tOH6	CL = 100 pF	5		50	

The Serial Interface

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Serial Clock Period	Tscyc		50		—	ns
SCL “H” pulse width	Tshw		25		—	
SCL “L” pulse width	TSLW		25		—	
Address setup time	TSAS		20		—	
Address hold time	Tsah		10		—	
Data setup time	Tsds		20		—	
Data hold time	TSDH		10		—	
CS-SCL time	Tcss		20		—	
CS-SCL time	Tcsh		40		—	

11. PIN ASSIGNMENT

PIN NO.	FUNCTION DESCRIPTIONS	SYMBOL
1	Power Supply	VDD
2	This is the MPU interface switch terminal. C86 = "H": 6800 Series MPU interface. C86 = "L": 8080 MPU interface.	C86
3	Ground	VSS
4 5 6 7 8	LCD driver supply voltages The Voltage determined by LCD pixel is impedance-converted by an operational amplication. Voltages should have the following relationship: V0≥V1≥V2≥V3≥V4≥VSS When the internal power circuit is active,these voltages are generated as following table according to the state of LCD Bias	V0 V1 V2 V3 V4
9	Capacitor 2 positive connection pin for voltage converter	CAP2-
10	Capacitor 2 negative connection pin for voltage converter	CAP2+
11	Capacitor 1 positive connection pin for voltage converter	CAP1+
12	Capacitor 1 negative connection pin for voltage converter	CAP1-
13	Capacitor 3 positive connection pin for voltage converter	CAP3+
14	Voltage converter input/output pin	VOUT
15	Ground	VSS
16-23	Used as data bus	D7-D0
24	When connected to an 8080 MPU, this is active LOW. (E) This pin is connected to the /RD signal of the 8080 MPU, and the ST7565P series data bus is in an output status when this signal is "L" When connected to a 6800 Series MPU, this is active HIGH. This is the 6800 Series MPU enable clock input terminal.	RD(E)
25	This is the 6800 Series MPU enable clock input terminal. (R/W) This terminal connects to the 8080 MPU /WR signal. The signals on the data bus are latched at the rising edge of the /WR signal. When connected to a 6800 Series MPU: This is the read/write control signal input terminal. When R/W = "H": Read. When R/W = "L": Write.	WR(R/W)
26	This is connect to the least significant bit of the normal MPU address bus, This is connect to the least significant bit of the normal MPU address bus, A0 = "H": Indicates that D0 to D7 are display data. A0 = "L": Indicates that D0 to D7 are control data.	A0
27	A0 = "L": Indicates that D0 to D7 are control data. The reset operation is performed by the /RES signal level.	/RES
28	The reset operation is performed by the /RES signal level. C86 = "H": 6800 Series MPU interface. C86 = "L": 8080 MPU interface.	/CS1

12. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-10℃～+60℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-20℃～+70℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

13.RELIABILITY

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERTURE +60℃ 24HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE 10℃ 24HRS	
STORAGE TEMPERATURE	HIGH TEMPERTURE +70℃ 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE - 20℃ 240HRS	
HUMIDITY	40℃ 90%RH 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	• Operating Time: thirty minutes exposure for each direction (X,Y,Z) • Sweep Frequency: 10～55Hz (1 min) • Amplitude: 1.5mm	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
THERMAL SHOCK	-20℃(30mins) ←→+65℃(30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

*NOTE: TEST CONDITION

(1)TEMPERATURE AND HUMIDITY: IF NO SPECIFICATION, TEMP. SET AT 25±2℃, HUMIDITY SET AT 60±5%RH

(2) OPERATING STATE: SAMPLES SUBJECT TO THE TESTS SHALL BE IN " OPERATING" CONDITION

14. Precaution for Use

The following precautions should be followed, since this module contains precise parts.

(1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.

(2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.

(3) Use protective finger covers when handling the module to avoid scratching or staining the module.

(4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.

(5) The LSI is sensitive to light.
The user's product should be designed so that LSI is not exposed to any light during operation.

(6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.

(7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells.
Do not use a module, which has experienced strong mechanical shock.

(8) Care should be taken when the power supply turns on as following.
(a) Do not apply any input signals before the supplying voltage is applied.
(b)Do not turn off the power supply while any input signals are applied.

Caution

(1) Dangerous. Do not shock glass because glass can break.

(2) If module breaks, do not touch it directly.
(Glass could stick or cut skin.)

(3) Do not swallow Liquid Crystal.
(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that liquid crystal is poisonous.)

(4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.

(5) When disposing of the product, please observe industrial waste disposal laws in each country and district.

(6) In case of injury, give immediate treatment and consult with a doctor.

(7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials