QUALITY MICROELECTRONICS(SHENZHEN)CO.,LTD

high quality high requirement high efficiency

SPECIFICATION FOR APPROVAL

CUSTOMER ：

CLIENT TYPE:

PRODUCTION NO：QFG12832-09-PFUSBH-R

SHIPMENT DATE：2009-06-13

Customer Checked	
VALIDATED	

	SIGNATURE	DATE
PREPARED	王力明	2009-06-13
CHECKED	罗锦伟	2009-06-13
APPROVED	刘程	2009-06-13

Note: Please fax back after confirmation. Thanks!

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RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
13.06.2009	01	FIRST 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:

QFG12832-09-PFUSBH-R

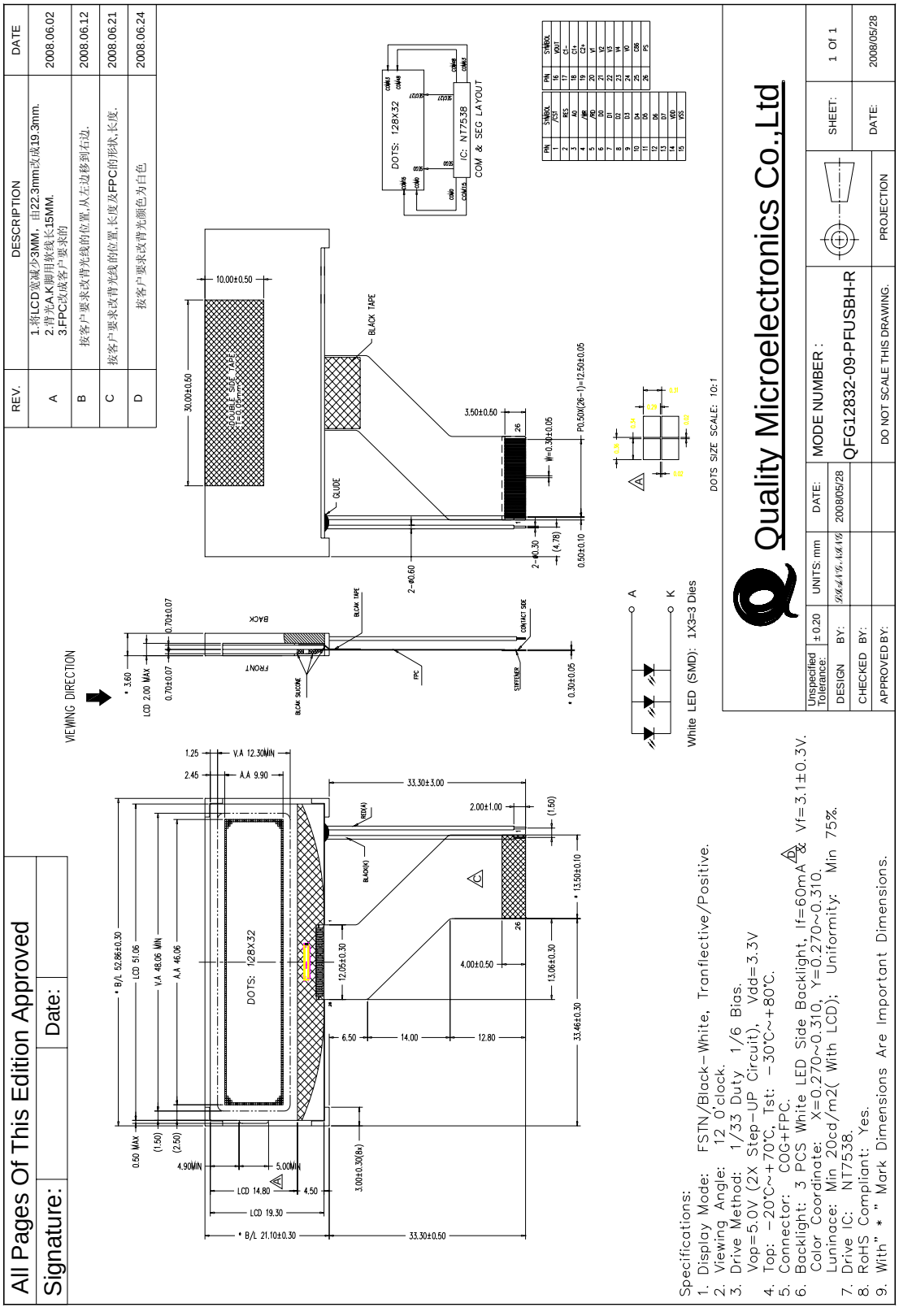
4. FEATURES：

(1) Display Type: FSTN/Black-White/Tranflective/Positive, 12 O'CLOCK.
(2) Driving Method: 1/33 DUTY, 1/6 BIAS
(3) Built-in controller: NT7538H
(4) VDD=3.3V, VOP=5.0V

5. MACHANICAL SPECIFICATIONS：

ITEM	SPECIFICATIONS	UNIT
MODULE SIZE	52.86(W)x21.10(H)x3.60MAX(D)	mm
VIEWING AREA	48.06 (W) x 12.30H)	mm
ACTIVE AREA	46.06(W) x 9.90(H)	mm
DOT SIZE	0.34(W) x 0.29(H)	mm
DOT PITCH	0.36(W) x 0.31(H)	mm
BACKLIGHT	White	—
ASSY.TYPE	FPC	---
WEIGHT	TBD	g

6. OUTLINE DIMENSIONS



7. ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN	TYP	MAX	
DC Supply Voltage	VDD	-0.3	—	4.0	V
	Vout	-0.3	—	15.0	V
	V0	-0.3	—	15.0	V
Input Voltage	VIN	-0.3	—	VDD+0.3	V
Operating temperature	TOPR	-20	—	+70	℃
Storage temperature Bare chip	TSTR	-30	—	+80	℃

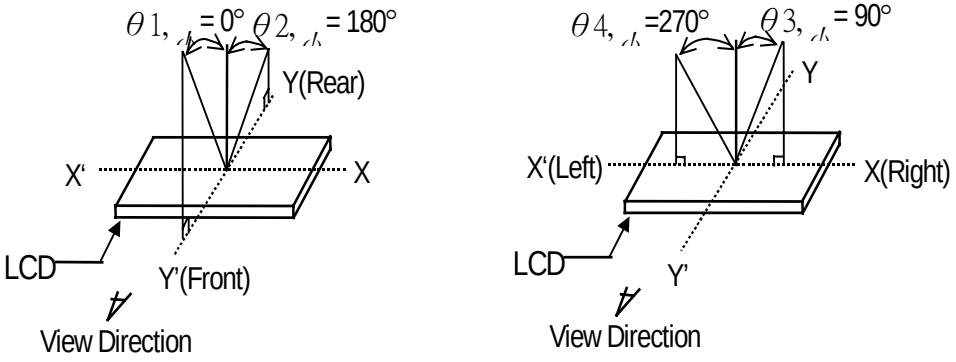
8.ELECTRICAL CHARACTERISTICS

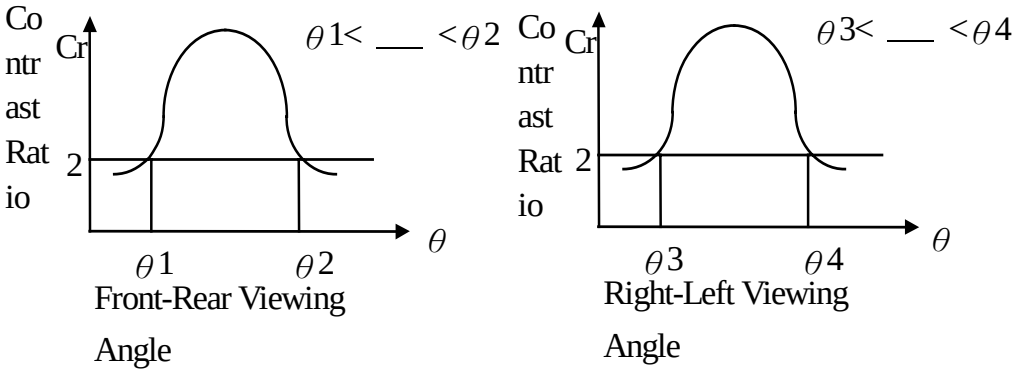
DC Characteristics (VSS = 0V, VDD = 1.8 ~ 3.6V,)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VDD VDD3	Operating Voltage	1.8	-	3.6	V	
VDD2	Operating Voltage	1.8	-	3.6	V	2X, 3X boosting
		1.8	-	3.3		4X boosting
		1.8	-	2.8		5X boosting
VOUT	Booster Voltage	6.0	-	14.2	V	
V0	Voltage Regulator Operating Voltage	4.0	-	14.2	V	
VREG	Reference Voltage	2.04	2.10	2.16	V	Ta = 25° C, -0.05%/° C
VIHC	High-Level Input Voltage	0.8 x VDD	-	VDD	V	A0, D0 - D7, /RD (E), /WR (R/W), /CS1, CS2, CLS, CL, FR, M/S, C86, P/S, /DOF, /RES, IRS and /HPM
VILC	Low-Level Input Voltage	VSS	-	0.2 x VDD	V	
VOHC	High-Level Output Voltage	0.8 x VDD	-	VDD	V	IOH = -0.5mA (D0 - D7, FR, FRS, /DOF, and CL)
VOLC	Low -Level Output Voltage	VDD	-	0.2 x VDD	V	IOL = 0.5mA (D0 - D7, FR, FRS, /DOF, and CL)

9 .OPTICAL CHARACTERISTICS

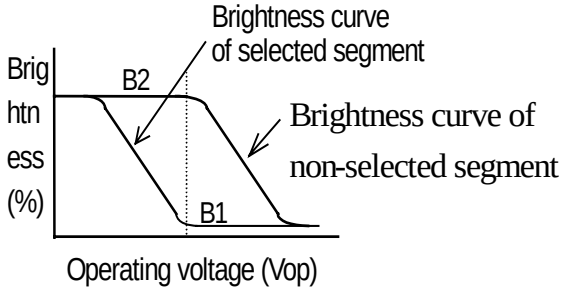
(1) DEFINITION OF VIEWING ANGLE



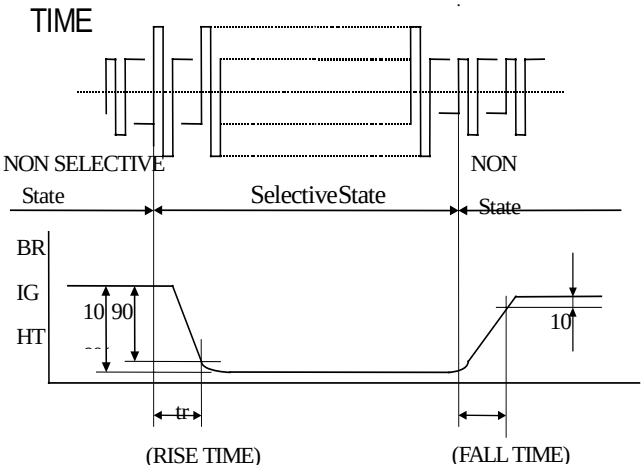


(2) DEFINITION OF CONTRAST RATIO

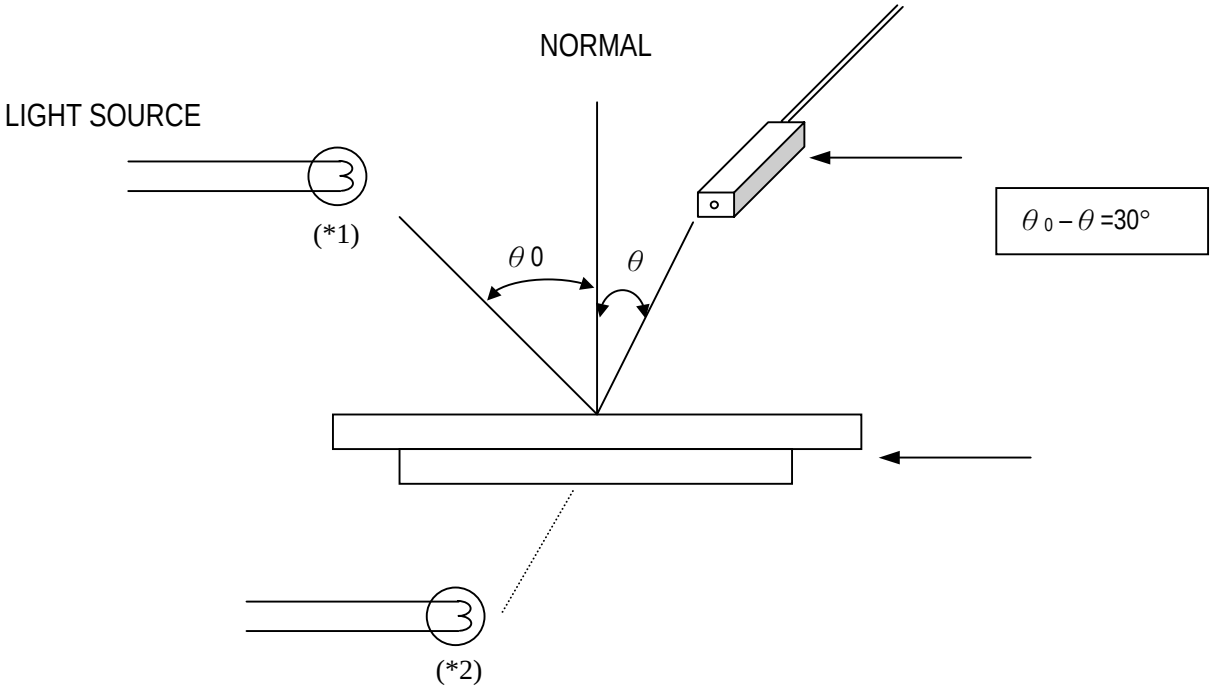
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment}}$$



(3) DEFINITION OF RESPONSE TIME



(4) Measuring Instruments For Electro-optical Characteristics

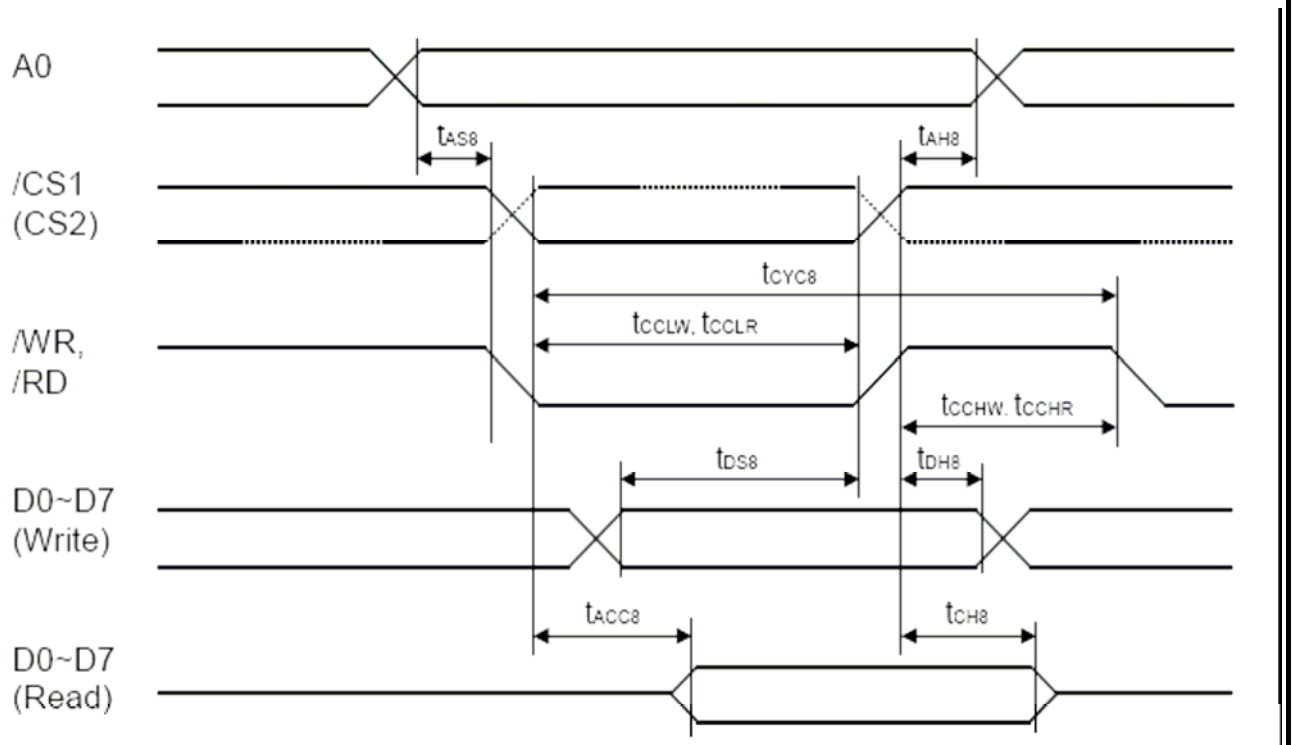


*1.Light source position for measuring the reflective type of LCD panel

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

10.TIMING CHARACTERISTICS

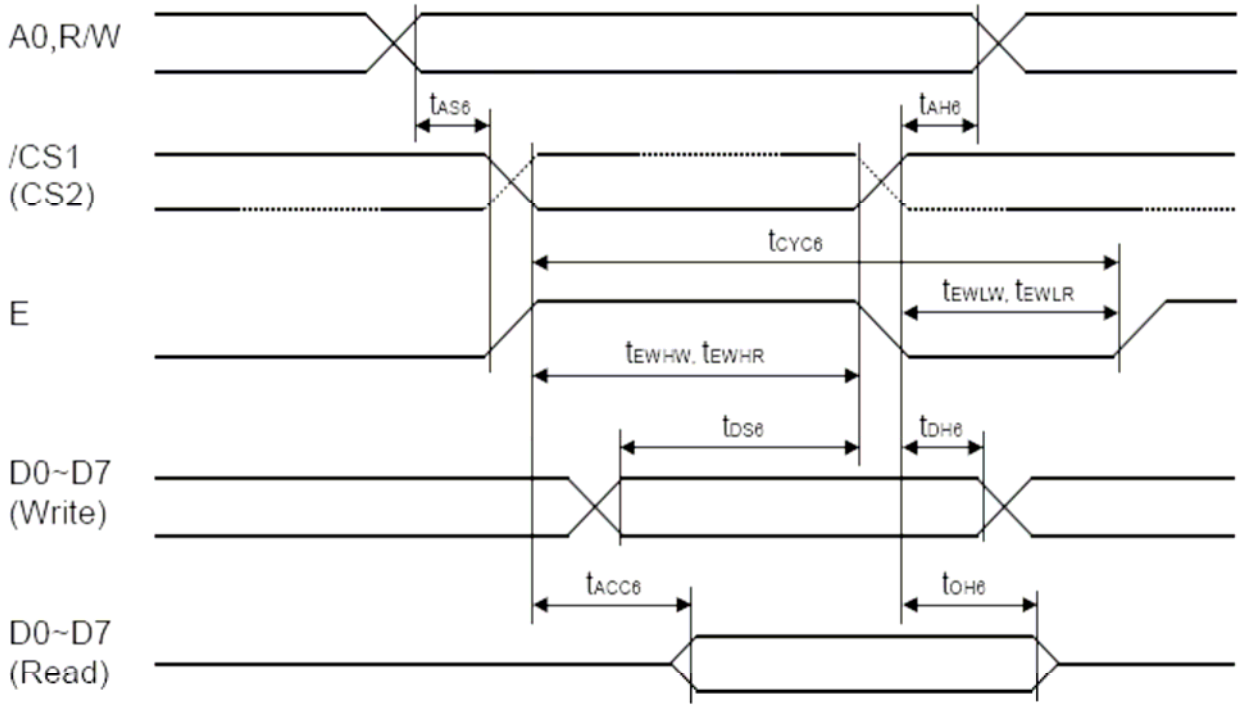
System Buses Read/Write Characteristics (for 8080 Series MPU)



(VDD = 2.7 ~ 3.6V)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
T_{AH8}	Address hold time	0	-	-	ns	A0
T_{AS8}	Address setup time	0	-	-	ns	
t_{CYC8}	System cycle time	240	-	-	ns	
t_{CCLW}	Control low pulse width (write)	90	-	-	ns	/WR
t_{CCLR}	Control low pulse width (read)	120	-	-	ns	/RD
t_{CCHW}	Control high pulse width (write)	100	-	-	ns	/WR
t_{CCHR}	Control high pulse width (read)	60	-	-	ns	/RD
T_{DS8}	Data setup time	40	-	-	ns	D0~D7
T_{DH8}	Data hold time	0	-	-	ns	
t_{ACC8}	/RD access time	-	-	140	ns	D0~D7, CL = 100pF
T_{CH8}	Output disable time	5	-	50	ns	

System Buses Read/Write Characteristics (for 6800 Series MPU)



(VDD = 2.7 ~ 3.6V)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t_{AH6}	Address hold time	0	-	-	ns	A0, R/W
t_{AS6}	Address setup time	0	-	-	ns	
t_{CYC6}	System cycle time	240	-	-	ns	
t_{EWHW}	Control high pulse width (write)	90	-	-	ns	E
t_{EWHR}	Control high pulse width (read)	120	-	-	ns	E
t_{EWLW}	Control low pulse width (write)	100	-	-	ns	E
t_{EWLR}	Control low pulse width (read)	60	-	-	ns	E
t_{DS6}	Data setup time	40	-	-	ns	D0~D7
t_{DH6}	Data hold time	0	-	-	ns	
t_{ACC6}	/RD access time	-	-	140	ns	D0~D7 CL = 100pF
t_{OH6}	Output disable time	5	-	50	ns	

11. PIN ASSIGNMENT

PIN NO.	FUNCTION DESCRIPTIONS	SYMBOL
1	This is the chip select signal. When /CS1="L" and CS2="H", then the chip select becomes active, and data/command I/O is enabled.	/CS1
2	When /RES is set to "L", the settings are initialized. The reset operation is performed by the /RES signal level	/RESET
3	This is connected to the least significant bit of the normal MPU address bus, and it determines whether the data bits are data or a command. A0 = "H": Indicate that D0 to D7 are display data A0 = "L": Indicates that D0 to D7 are control data	A0
4	When connected to an 8080 MPU, this is active LOW. 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.	/WR
5	When connected to an 8080 MPU, it is active LOW. This pad is connected to the /RD signal of the 8080MPU,	/RD
6-13	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus.	DB0-DB7
14	Power supply output for pad option	VDD
15	Ground output for pad option.	VSS
16	DC/DC voltage converter output	VOUT
17	Capacitor 1- pad for internal DC/DC voltage converter.	CAP1-
18	Capacitor 1+ pad for internal DC/DC voltage converter.	CAP1+
19	Capacitor 2+ pad for internal DC/DC voltage converter.	CAP2+
20-24	LCD driver supplies voltages. The voltage determined by the LCD cell is impedance-converted by a resistive driver or an operation amplifier for application. Voltages should be according to the following relationship: $V0 \geq V1 \geq V2 \geq V3 \geq V4 \geq VSS2$ When the on-chip operating power circuit is on, the following voltages are supplied to V1 to V4 by the on-chip power circuit. Voltage selection is performed by the LCD Bias Set command.	V0-V4
25	This is the MPU interface switch terminal C86 = "H": 6800 Series MPU interface C86 = "L": 8080 Series MPU interface	C86
26	This is the parallel data input/serial data input switch terminal P/S = "H": Parallel data input P/S = "L": Serial data input	PS

12. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-20℃～+70℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-30℃～+80℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

13.RELIABILITY

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERTURE +70℃ 96HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE -20℃ 96HRS	
STORAGE TEMPERATURE	HIGH TEMPERTURE +80℃ 96HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE -30℃ 96HRS	
HUMIDITY	40℃ 90%RH 96HRS	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) ←→+70℃(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