QUALITY MICROELECTRONICS(SHENZHEN)CO.,LTD

Quality HeLiTai

high quality high requirement high efficiency

SPECIFICATION FOR APPROVAL

CUSTOMER ：

CLIENT TYPE:

PRODUCTION NO：QSG12864-92-BTDLWH-R

SHIPMENT DATE：2007-08-09

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

CONTENTS

RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
Aug.9th,2007	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:

QSG12864-92-BTDLWH-R

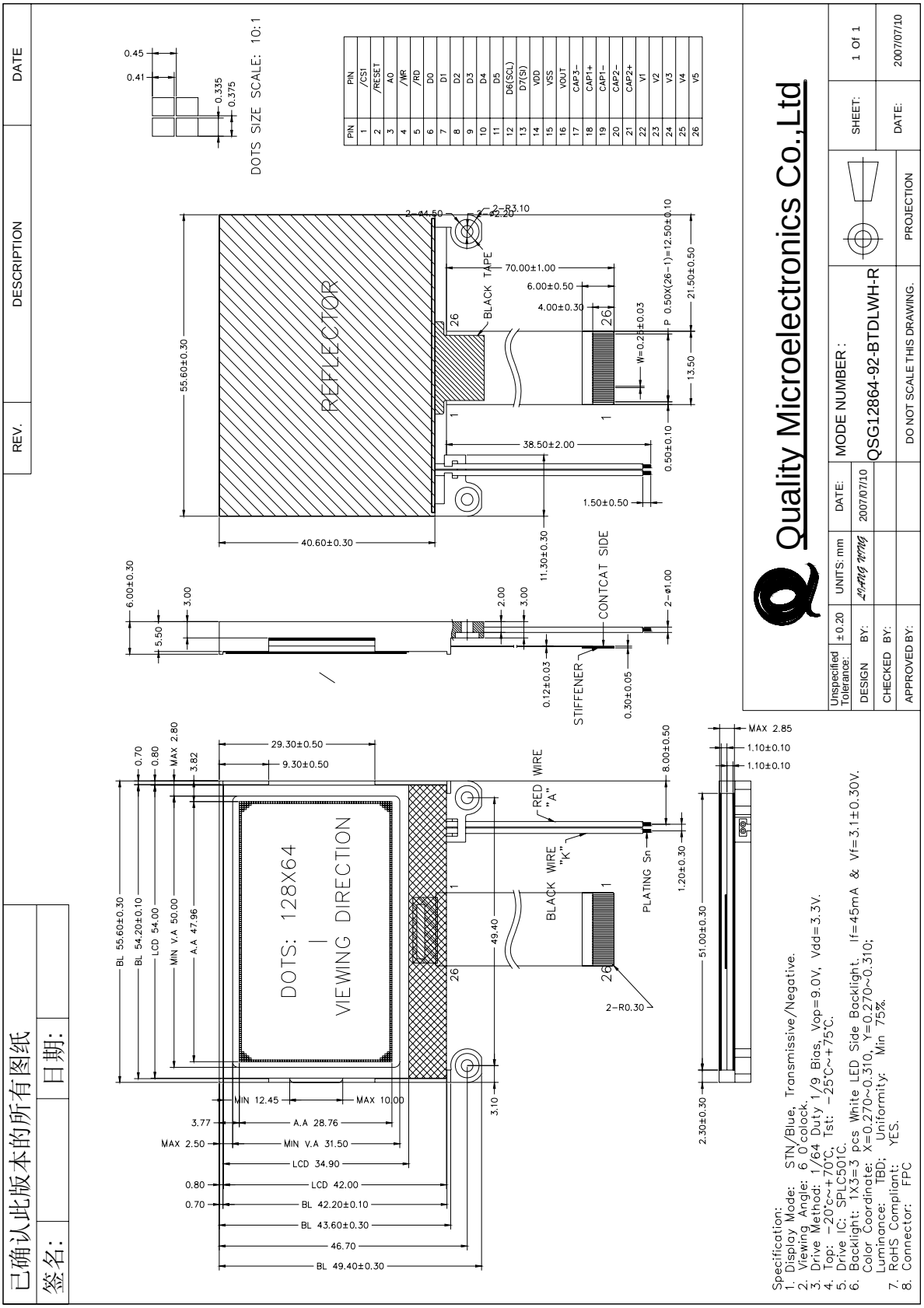
4. FEATURES：

(1) Display Type: STN(BLUE), 6 O'CLOCK, Transmissive/Negative
(2) Driving Method: 1/64 DUTY, 1/9 BIAS
(3) Built-in controller: SPLC501C
(4) LED Backlight: White, Vf= 3.1V
(5) VDD=3.3V, VOP=9.0V

5. MACHANICAL SPECIFICATIONS：

ITEM	SPECIFICATIONS	UNIT
MODULE SIZE	55.60(W)x112.20(H)x6.0MAX(D)	mm
VIEWING AREA	50.00 (W) x31.50(H)	mm
ACTIVE AREA	47.96(W) x28.76(H)	mm
DOT SIZE	0.41(W) x 0.335 (H)	mm
DOT PITCH	0.45(W) x 0.375(H)	mm
BACKLIGHT	White	—
ASSY.TYPE	COG	---
WEIGHT	TBD	g

6. OUTLINE DIMENSIONS



7. ABSOLUTE MAXIMUM RATING

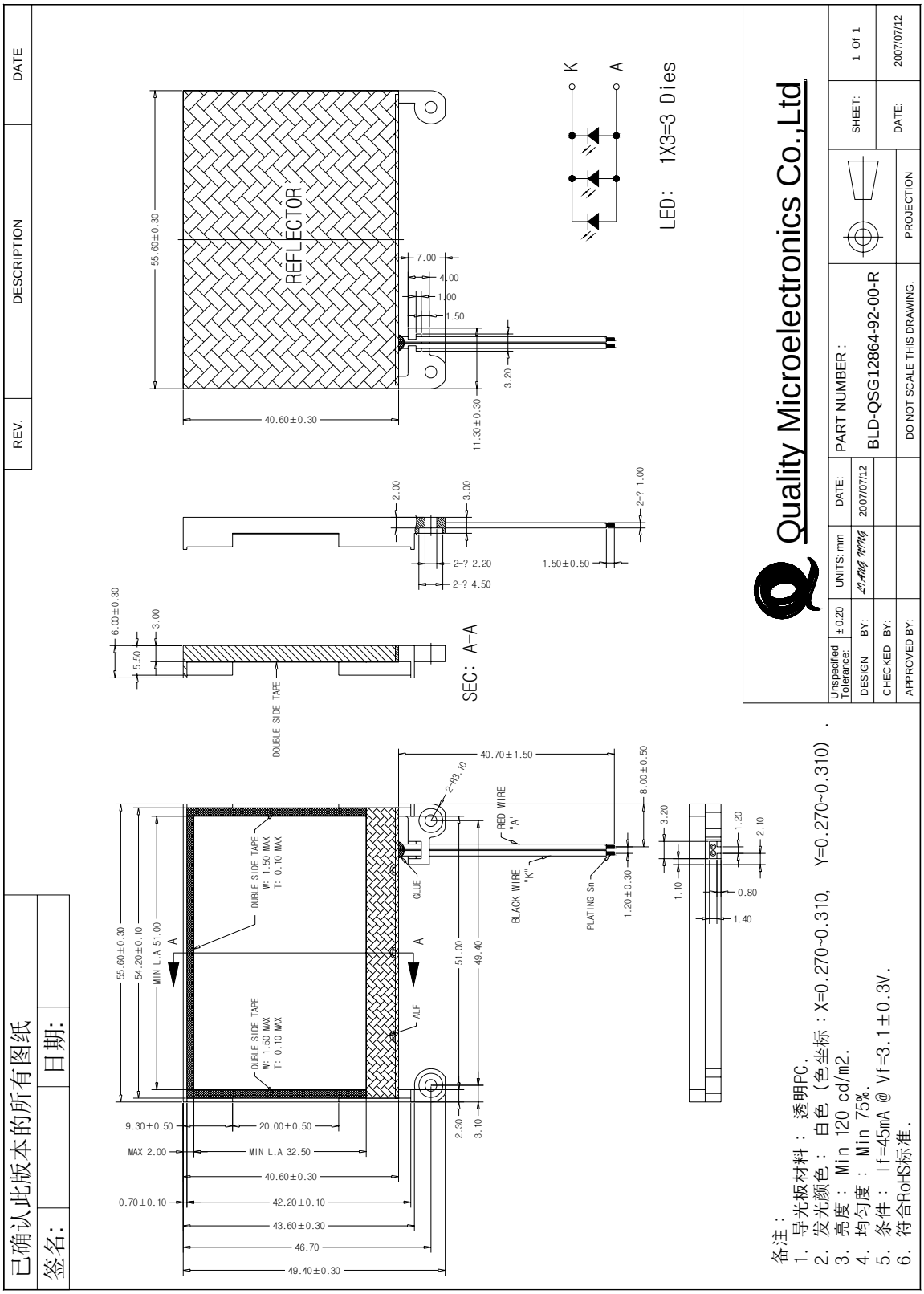
ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN	TYP	MAX	
DC Supply Voltage	VDD	-0.3	—	7.0	V
	Vout	-12.0	—	0.3	V
	V0	-12.0	—	0.3	V
Input Voltage	VIN	-0.3	—	VDD+0.3	V
Operating temperature	TOPR	-20	—	+70	℃
Storage temperature Bare chip	TSTR	-25	—	+75	℃

8.ELECTRICAL CHARACTERISTICS

DC Characteristics (VSS = 0V, VDD = 3.0V,)

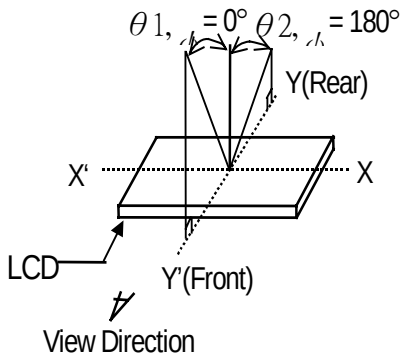
Item		Symbol	Condition		Rating			Units	Applicable PIN
					Min.	Typ.	Max.		
Operating Voltage (1)	Recommended Voltage	VDD			2.7	-	3.3	V	VDD*1
	Possible Operating Voltage				2.4	-	5.5	V	VDD*1
Operating Voltage (2)	Recommended Voltage	VSS2	(Relative to VDD)		-3.3	-	-2.7	V	VSS2
	Possible Operating Voltage	VSS2	(Relative to VDD)		-5.0	-	-1.8	V	VSS2
Operating Voltage (3)	Possible Operating Voltage	V_5	(Relative to VDD)		-12.0	-	-4.5	V	V_5*2
	Possible Operating Voltage	V_1, V_2	(Relative to VDD)		0.4 x V_5	-	VDD	V	V_1, V_2
	Possible Operating Voltage	V_3, V_4	(Relative to VDD)		V_5	-	0.6 x V_5	V	V_3, V_4
High-level Input Voltage		V_{IHC}			0.8 x VDD	-	VDD	V	*3
Low-level Input Voltage		V_{ILC}			VSS	-	0.2 x VDD	V	*3
High-level Input Voltage		V_{OHC}	I_{OH} = -0.5mA		0.8 x VDD	-	VDD	V	*4
Low-level Input Voltage		V_{OLC}	I_{OL} = 0.5mA		VSS	-	0.2 x VDD	V	*4
Input leakage current		I_{LI}	V_{IN} = VDD or VSS		-1.0	-	1.0	µA	*5
Output leakage current		I_{LO}			-3.0	-	3.0	µA	*6
Liquid Crystal Driver ON Resistance		R_{ON}	T_A = 25℃ (Relative To VDD)	V_5 = -12V	-	2.0	3.5	KΩ	SEGn
				V_5 = -8V	-	3.2	5.4	KΩ	COMn*7
Static Consumption Current		I_{SSQ}			-	0.01	5	µA	VSS, VSS2
Output Leakage Current		I_{SQ}	V_5 = -12V (Relative to VDD)		-	0.01	15	µA	V_5
Input Terminal Capacitance		C_{IN}	T_A = 25℃ f = 1.0MHz		-	5.0	8.0	pF	
Oscillator Frequency	Internal Oscillator	f_{OSC}	T_A = 25℃		18	22	26	KHz	*8
	External Input	f_{CL}	SPLC501C		18	22	26	KHz	CL

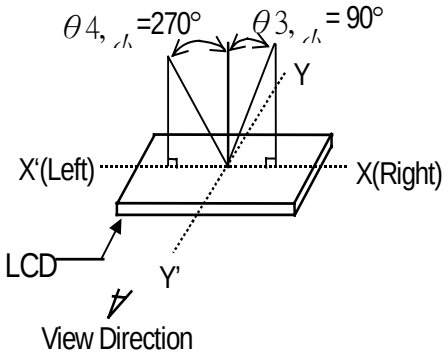
9. LED BACKLIGHT

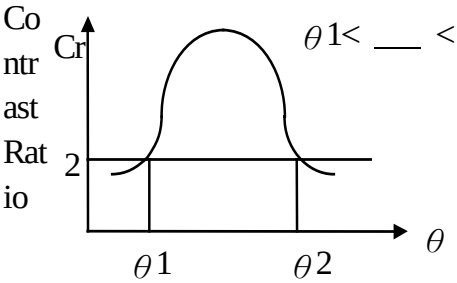


10 .OPTICAL CHARACTERISTICS

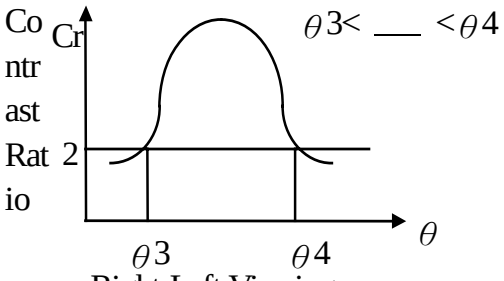
(1) DEFINITION OF VIEWING ANGLE







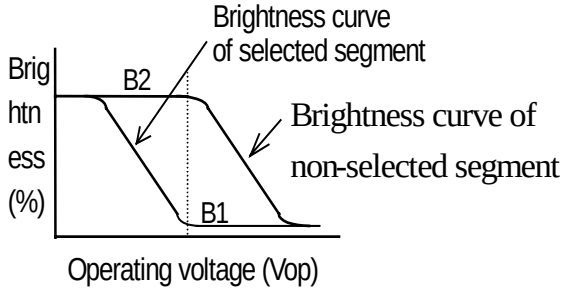
Front-Rear Viewing Angle



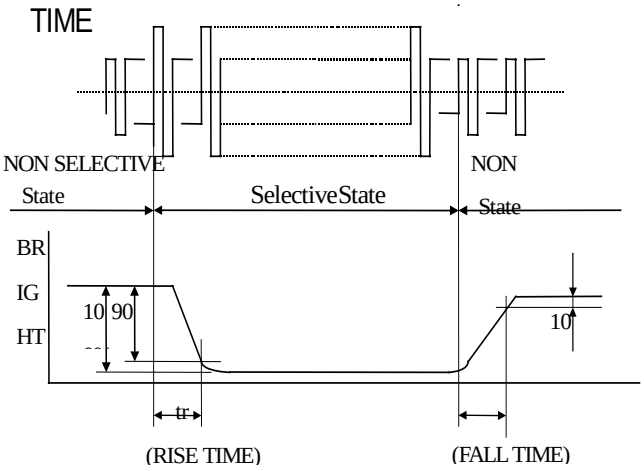
Right-Left Viewing Angle

(2) DEFINITION OF CONTRAST RATIO

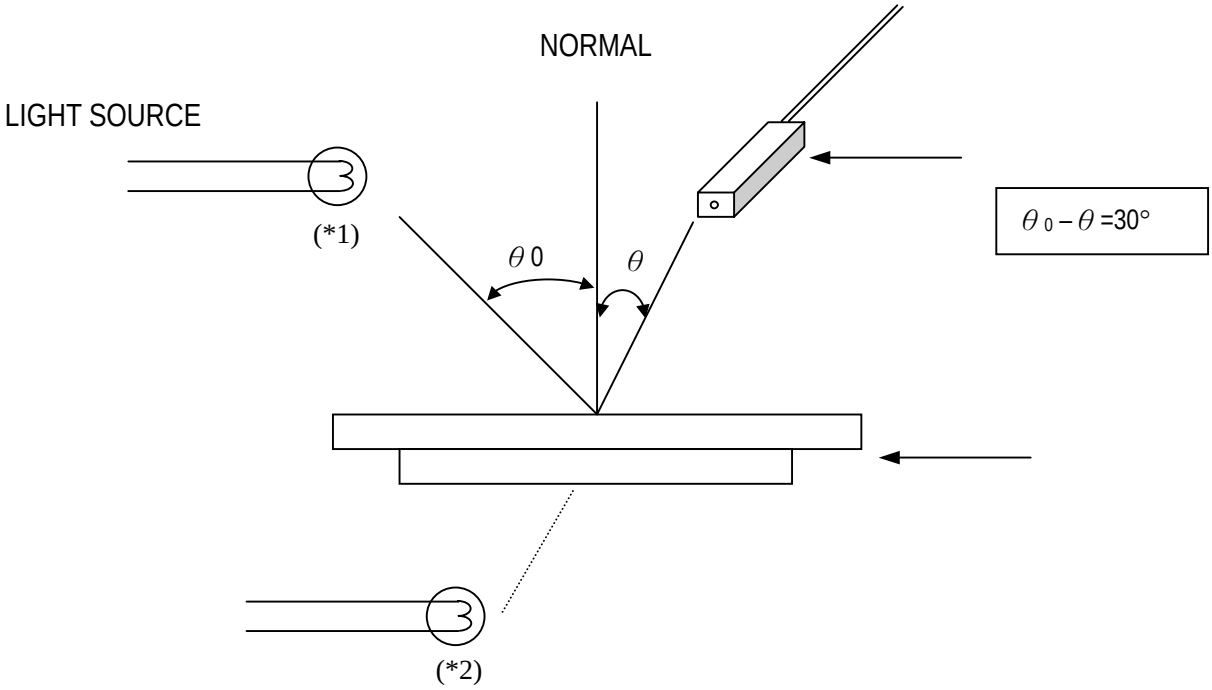
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment}}$$



(3) DEFINITION OF RESPONSE TIME



(3) Measuring Instruments For Electro-optical Characteristics

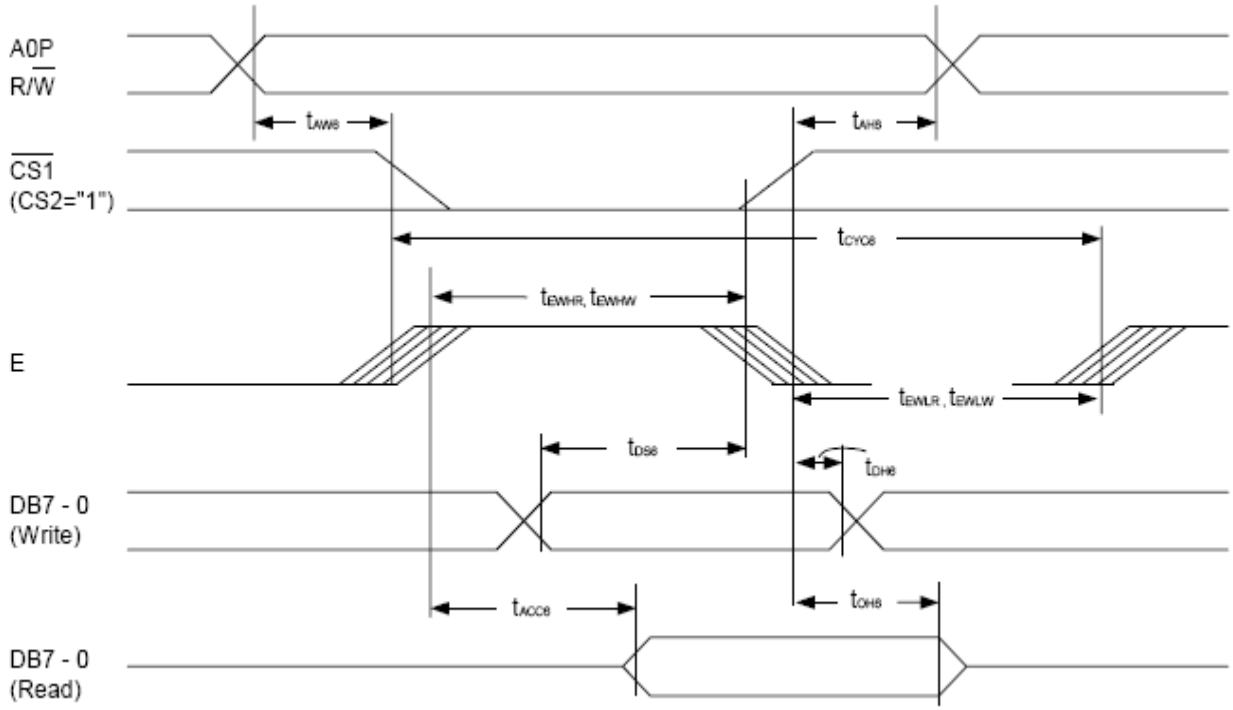


*1.Light source position for measuring the reflective type of LCD panel

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

11.TIMING CHARACTERISTICS

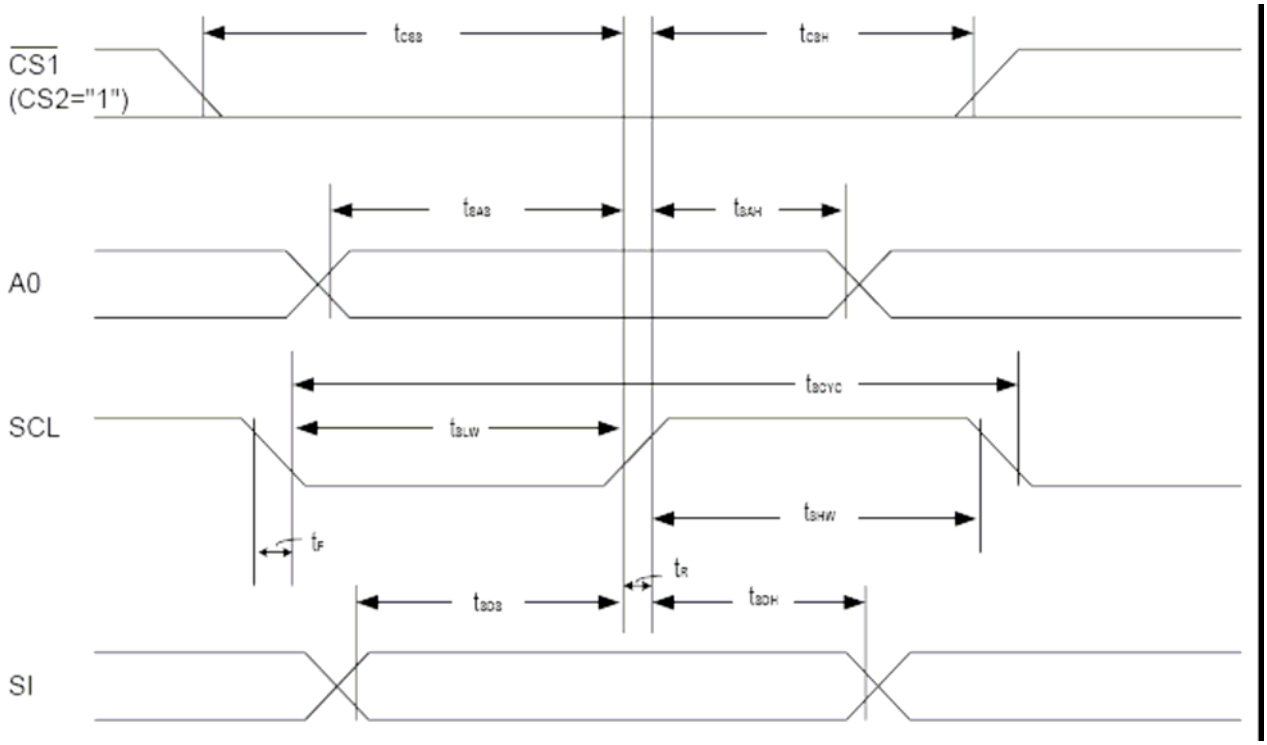
System Buses Read/Write Characteristics (for 8080 Series MPU)



(VDD = 2.7 ~ 4.5V)

Item		Signal	Symbol	Condition	Rating		Units
					Min.	Max.	
Address hold time		A0P	t_{AH6}		0	-	ns
Address setup time			t_{AW6}		0	-	ns
System cycle time		A0P	t_{CYC6}		300	-	ns
Data setup time		DB7 - 0	t_{DS6}	C_L = 100 pF	40	-	ns
Data hold time			t_{DH6}		15	-	ns
Access time			t_{ACC6}		-	140	ns
Output disable time			t_{OH6}		10	100	ns
Enable H pulse time	Read	EP	t_{EWHR}		120	-	ns
	Write		t_{EWHW}		60	-	ns
Enable L pulse time	Read	EP	t_{EWLR}		60	-	ns
	Write		t_{EWLW}		60	-	ns

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

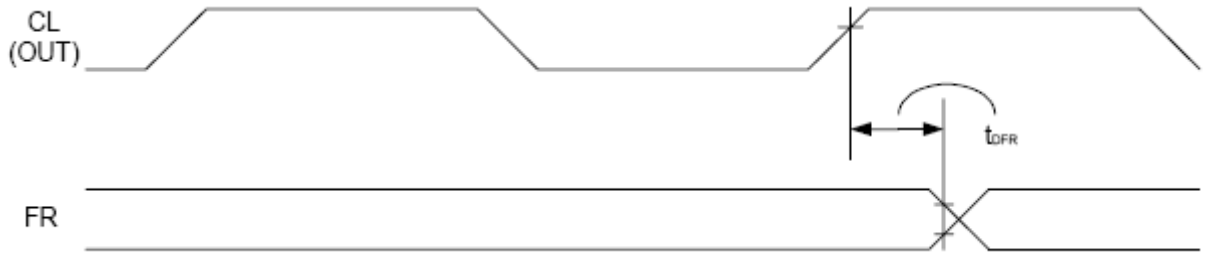


(VDD = 2.7 ~ 4.5V)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	tSCYC	-	250	-	ns
SCL 'H' pulse width		tSHW	-	100	-	ns
SCL 'L' pulse width		tSLW	-	100	-	ns
Address setup time	A0P	tSAS	-	150	-	ns
Address hold time		tSAH	-	150	-	ns
Data setup time	SI	tSDS	-	100	-	ns
Data hold time		tSDH	-	100	-	ns
CS-SCL time	CS	tCSS	-	150	-	ns
		tCSH	-	150	-	ns

DISPLAY CONTROL OUTPUT TIMING

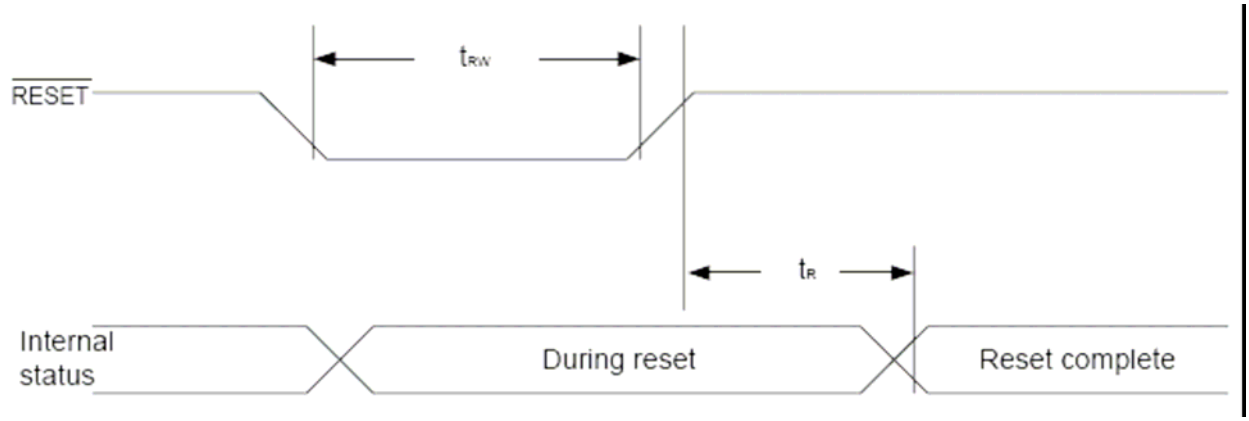
(VDD = 2.7 ~ 4.5V)



(VDD = 2.7 ~ 4.5V)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
FR delay time	FR	t_{DFR}	C_L = 50pF	-	20	80	ns

RESET TIMING



(VDD = 2.7 ~ 4.5V)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		t_R	-	-	-	1.0	µs
Reset 'L' pulse width	RES	t_{RW}		1.0	-	-	µs

12. PIN ASSIGNMENT

PIN NO.	FUNCTION DESCRIPTIONS	SYMBOL
1	This is the chip select signal.	/CS
2	When RESET is set to 'L', the settings are initialized. The RESET signal level performs the reset operation.	/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. A0P = 'H': Indicates DB7 - 0 is display data. A0P = 'L': Indicates DB7 - 0 is control data.	A0
4	When connected to an 8080 MPU, this is LOW active. 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 RWP = 'H': Read. When RWP = 'L': Write.	/WR
5	When connected to an 8080 MPU, this is LOW active. This pin is connected to the RD signal of the 8080 MPU, and the SPLC501C data bus is in an output status when this signal is 'L'. When connected to a 6800 Series MPU, this is HIGH active. This is the 68000 Series MPU enable clock input terminal.	/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. When the serial interface is selected (PS = 'L'), DB7 serves as the serial data input terminal (SI) and DB6 serves as the serial clock input terminal (SCL). At the same time, DB5 - 0 are set to high impedance. When the chip select is inactive, DB0 to DB7 are set to high impedance.	D0-D7
14	VDD Shared with MPU power supply terminal VCC	VDD
15	0V terminal connected to the system GND.	VSS
16	DC/DC voltage converter. A capacitor is connected between this terminal and VSS.	VOUT
17	DC/DC voltage converter. A capacitor is connected between this terminal and the CAP1P terminal.	CAP3-
18	DC/DC voltage converter. A capacitor is connected between this terminal and the CAP1N terminal.	CAP1+
19	DC/DC voltage converter. A capacitor is connected between this terminal and the CAP1P terminal.	CAP1-
20	DC/DC voltage converter. A capacitor is connected between this terminal and the CAP2P terminal.	CAP2-
21	DC/DC voltage converter. A capacitor is connected between this terminal and the CAP2N terminal.	CAP2+

22-26	A multi-level power supply for the liquid crystal drive. The voltage applied is determined by the liquid crystal cell, and is changed through the use of a resistive voltage divided or through changing the impedance using an op. amp. Voltage levels are determined based on VDD, and must maintain the relative magnitudes shown below. VDD (= V_0) $\geqq V_1 \geqq V_2 \geqq V_3 \geqq V_4 \geqq V_5$ Master operation: When the power supply turns ON, the internal power supply circuits generate the V_1 to V_4 voltages shown below. The voltage settings are selected by the LCD bias command.	V1-V5

	SPLC501C	
V_1	1/9 . V_5	1/7 . V_5
V_2	2/9 . V_5	2/7 . V_5
V_3	7/9 . V_5	5/7 . V_5
V_4	8/9 . V_5	6/7 . V_5

13. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-20℃～+70℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-25℃～+75℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

14.RELIABILITY

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERTURE +70℃ 24HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE -20℃ 24HRS	
STORAGE TEMPERATURE	HIGH TEMPERTURE +75℃ 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE -25℃ 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

15. 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