QUALITY MICROELECTRONICS(SHENZHEN)CO.,LTD

Quality HeLiTai

high quality high requirement high efficiency

SPECIFICATION FOR APPROVAL

CUSTOMER ：

CLIENT TYPE:

PRODUCTION NO：QSG12864-28-YFDLYH-R

SHIPMENT DATE: 2007-3-8

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

RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
Mar.8th, 2007	0.1	FIRST ISSUE			

CONTENTS

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)

3-1 MODULE NAME:

QSG12864-28-YFDLYH-R

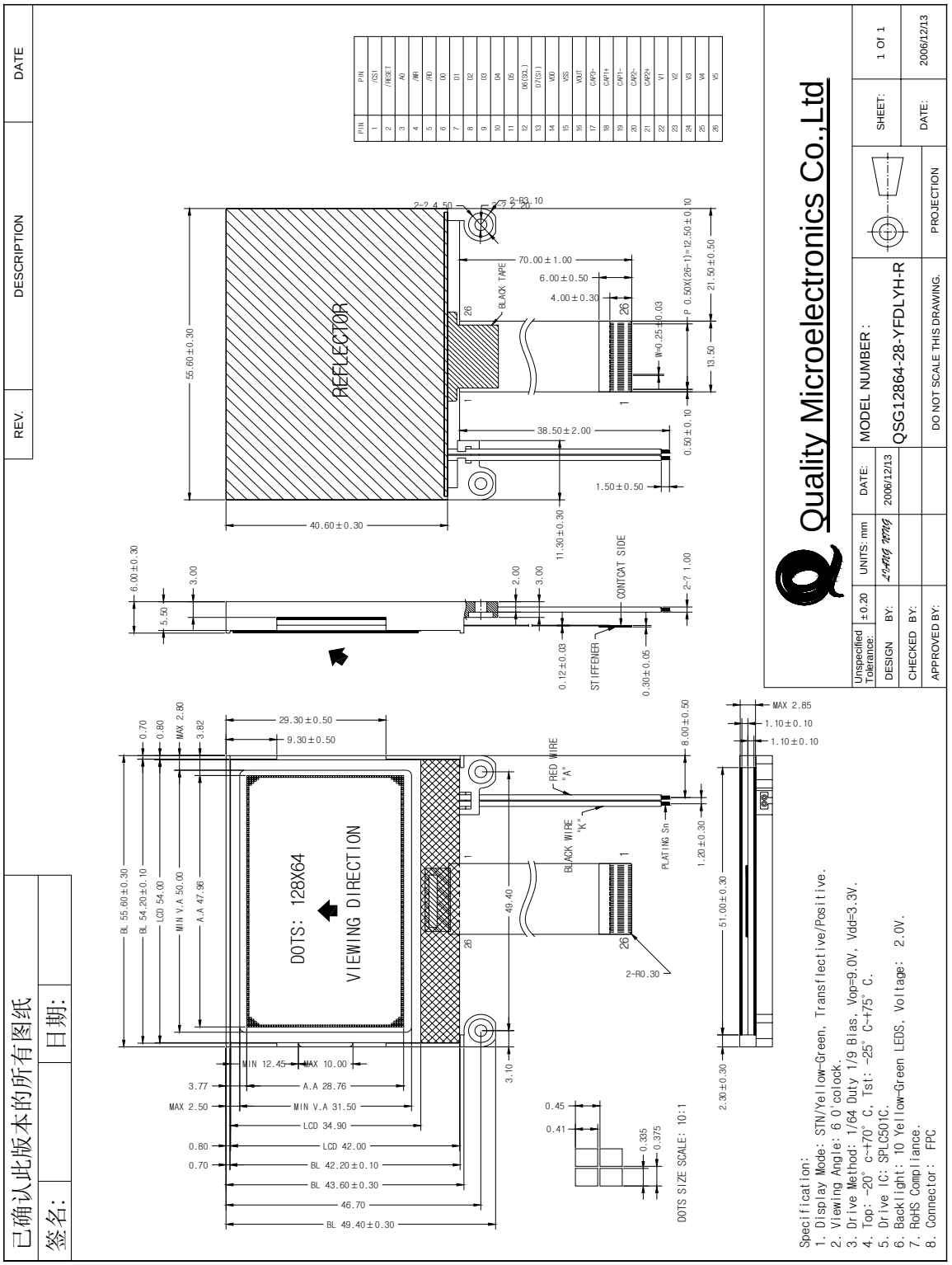
4. FEATURES：

(1) Display Type: STN, YELLOW-GREEN, 6 O'CLOCK, POSITIVE, TRANSFLECTIVE
(2) Driving Method: 1/64 DUTY, 1/9 BIAS
(3) Built-in controller: SPLC501C
(4) Backlight: YELLOW-GREEN, 2.0V
(5) VDD=3.3V,VOP=9.0V

5. MACHANICAL SPECIFICATIONS：

ITEM	SPECIFICATIONS	UNIT
MODULE SIZE	55.6(W)x 49.4 (H)x6.0MAX(D)	mm
VIEWING AREA	50.0 (W) x31.5 (H)	mm
ACTIVE AREA	47.96(W) x 28.76(H)	mm
DOT SIZE	0.335 (W) x 0.41(H)	mm
DOT PITCH	0.375(W) x 0.40(H)	mm
ASSY.TYPE	COG	---
WEIGHT	TBD	g

6. OUTLINE DIMENSIONS



7. ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY FOR LOGIC	VDD	Ta=25℃	-0.3		7.0	V
OUTPUT VOLTAGE	V0	Ta=25℃	-0.3		VDD+0.3	V
INPUT VOLTAGE	VIN	Ta=25℃	-0.3		VDD+0.3	V
OPERATION TEMPERATURE	TOPR	---	-20	—	+70	℃
STORAGE TEMPERATURE	TSTG	---	-25	—	+75	℃

NOTES:

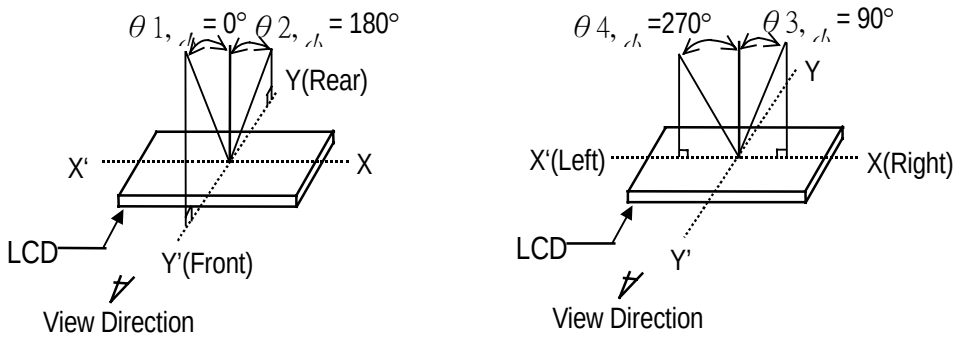
(1) LCM should be grounded during handling LCM.

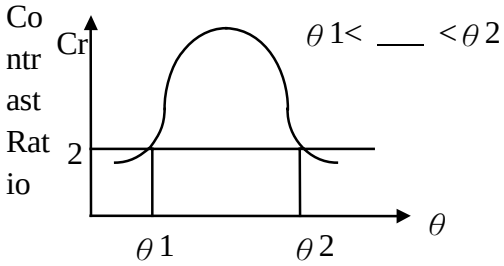
8. ELECTRICAL CHARACTERISTICS (Unless otherwise specified, VSS = 0V, VDD = 3.0V±10%, TA = 25℃)

Item		Symbol	Condition		Min.	Typ.	Max.	Units
erating Voltage (1)	Recommended Voltage				2.7	-	3.3	V
	Possible Operating Voltage	VDD			2.4	-	5.5	V
Operating Voltage (2)	Recommended Voltage	VSS2	(Relative to VDD)		-3.3	-	-2.7	V
	Possible Operating Voltage	VSS2	(Relative to VDD)		-6.0	-	-1.8	V
Operating Voltage (3)	Possible Operating Voltage	V5	(Relative to VDD)		-12.0	-	-4.5	V
	ssible Operating Voltage	V1, V2	(Relative to VDD)		0.4 x V5	-	VDD	V
	Possible Operating Voltage	V3, V4	(Relative to VDD)		V5	-	0.6 x V5	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 Input Voltage		VOHC	IOH = -0.5mA		0.8 x VDD	-	VDD	V
Low-level Input Voltage		VOLC	IOL = 0.5mA		VSS	-	0.2 x VDD	V
Input leakage current		ILI	VIN = VDD or VSS		-1.0	-	1.0	mA
Output leakage current		ILO			-3.0	-	3.0	mA
Liquid Crystal Driver ON Resistance		RON	TA = 25℃ (Relative To VDD)	V5 = -12V V5 = -8.0V	--	2.0 3.2	3.5 5.4	KW KW
Static Consumption Current		ISSQ			-	0.01	5	mA
Output Leakage Current		I5Q	V5 = -12V (Relative to VDD)		-	0.01	15	mA
Input Terminal Capacitance		CIN	TA = 25℃ f = 1.0MHz		-	5.0	8.0	pF
Oscillator	Internal Oscillator	fOSC	TA = 25℃		18	22	26	KHz
Frequency	External Input	fCL	SPLC501C		18	22	26	KHz

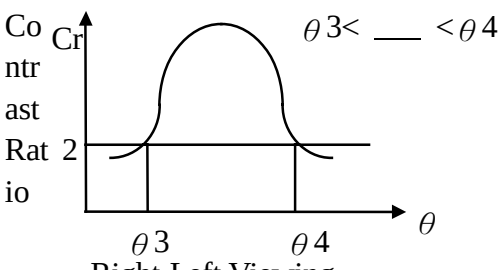
9.OPTICAL CHARACTERISTICS

(1) DEFINITION OF VIEWING ANGLE





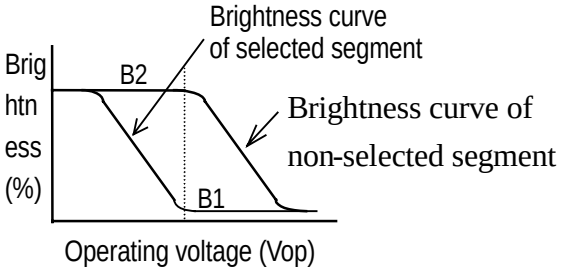
Front-Rear Viewing Angle



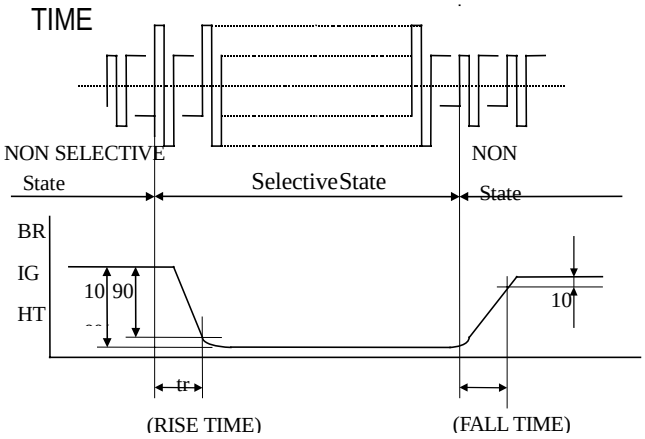
Right-Left Viewing Angle

(2) DEFINITION OF CONTRAST RATIO

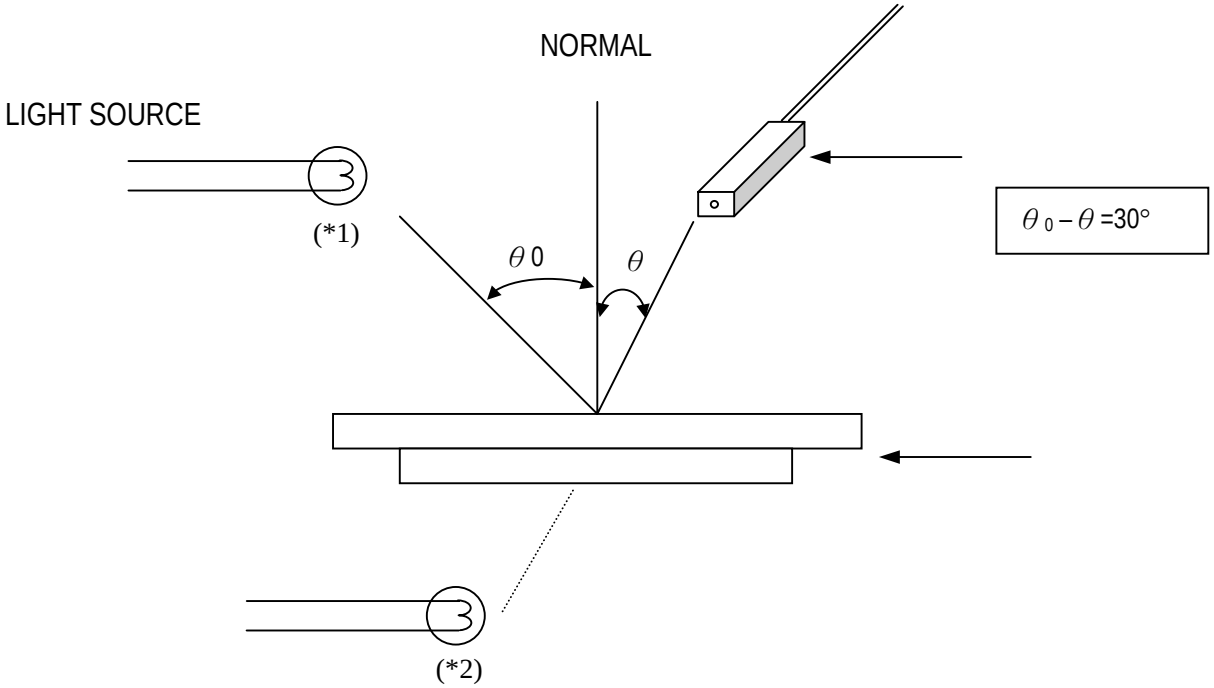
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment}}$$



(3) DEFINITION OF RESPONSE TIME



(4) Measuring Instruments For Electro-optical Characteristics

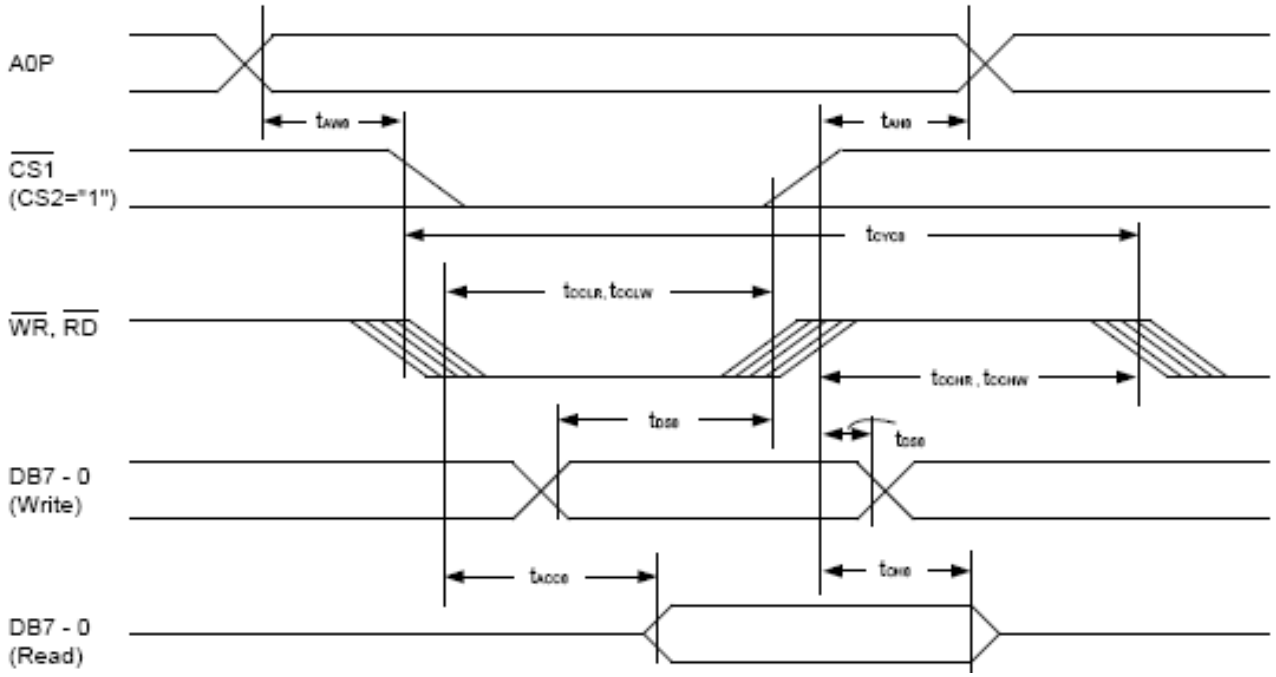


*1.Light source position for measuring the reflective type of LCD panel

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

10.TIMING CHARACTERISTICS

System bus read/write characteristics 1 (For the 8080 Series MPU)

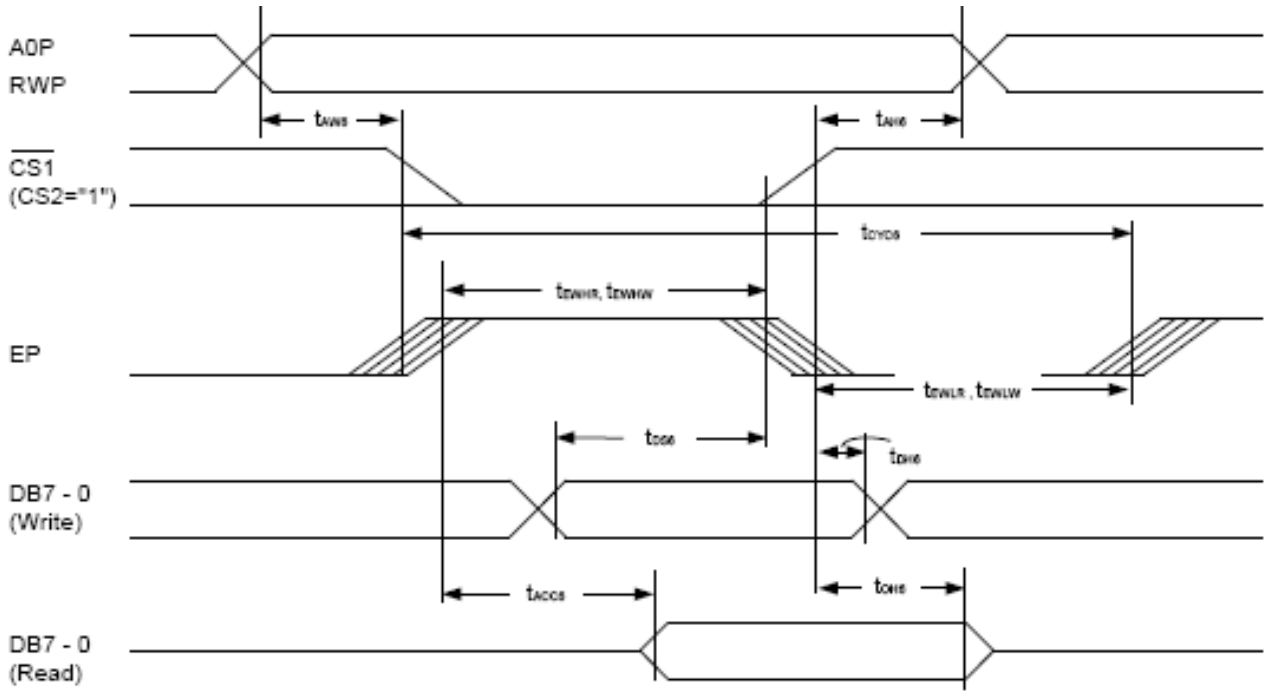


(

VDD = 2.7V to 4.5V, TA = 25℃)

Item	Signal	Symbol	Condition	Min.	Typ.	Max.
Address hold time Address setup time	A0P	tAH8 tAW8		0 0	--	ns ns
System cycle time	A0P	tCYC8		300	-	ns
Control L pulse width (WR) Control L pulse width (RD) Control H pulse width (WR) Control H pulse width (RD)	WR RD WR RD	tCCLW tCCLR tCCHW tCCHR		60 120 60 60	----	ns ns ns ns
Data setup time Address hold time	DB7 - 0	tDS8 tDH8		40 15	- -	ns ns
RD access time Output disable time		tACC8 tOH8	CL = 100pF	-10	140 100	ns ns

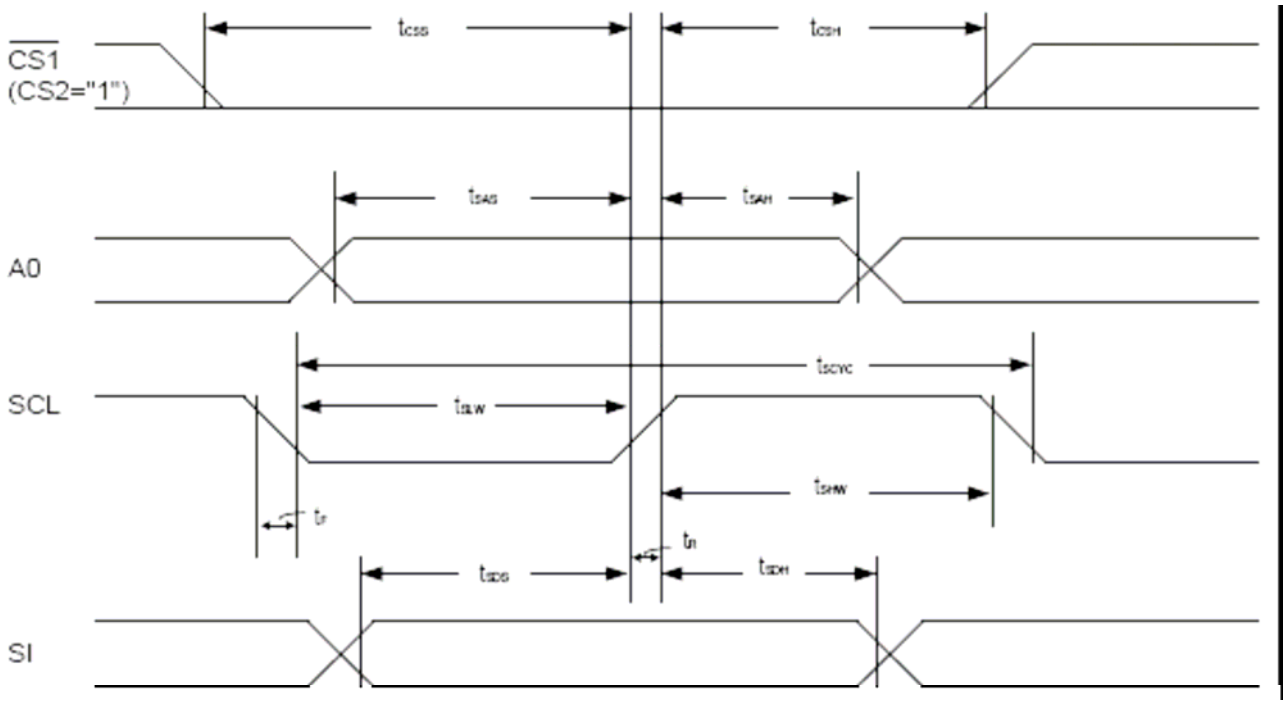
System bus read/write characteristics 2 (6800 series MPU)



(VDD = 2.7V to 4.5V, TA = 25℃)

Item		Symbol	Condition	Min.	Typ.	Max.
Address hold time Address setup time		tAH6 tAW6		0 0	--	ns ns
System cycle time		tCYC6		300	-	ns
Data setup time Data hold time		tDS6 tDH6	CL = 100 pF	40 15	--	ns ns
Access time		tACC6		-	140	ns
Output disable time		tOH6		10	100	ns
Enable H pulse time	Read Write	tEWHR tEWHW		120 60	--	ns ns
Enable L pulse time	Read Write	tEWLR tEWLW		60 60	--	ns ns

The serial interface



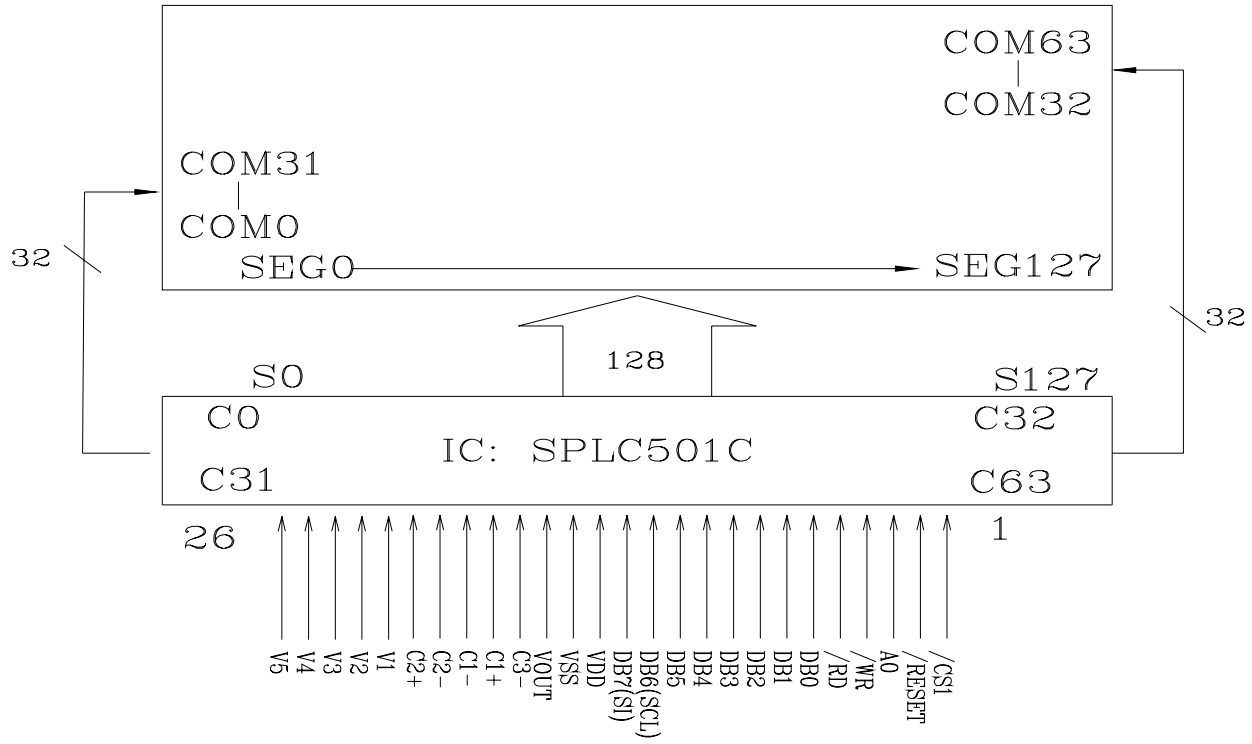
(VDD = 2.7V to 4.5V, TA = 25℃)

Item	Symbol	Condition	Min.	Typ.	Max.
Serial Clock Period	tSCYC	-	250	-	ns
SCL 'H' pulse width SCL 'L' pulse width	TSHW tSLW	--	100 100	--	ns ns
Address setup time Address hold time	TSAS tSAH	--	150 150	--	ns ns
Data setup time Data hold time	TSDS tSDH	--	100 100	--	ns ns
CS-SCL time	TCSS tCSH	--	150 150	--	ns ns

11. PIN ASSIGNMENT

<table>
<tr><th>PIN NO.</th><th>FUNCTION DESCRIPTIONS</th><th>SYMBOL</th></tr>
<tr><td>3</td><td>Chip select input pins(Low active)</td><td>/CS1</td></tr>
<tr><td>4</td><td>Reset input pin When /RESET is "L", initialization is executed.</td><td>/RESET</td></tr>
<tr><td>5</td><td>Register select input pin</td><td>A0</td></tr>
<tr><td>6</td><td>Read/Write execution control pin</td><td>/WR</td></tr>
<tr><td>7</td><td>Read/Write execution control pin</td><td>/RD</td></tr>
<tr><td>8</td><td rowspan="8">8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus. When the serial interface selected (PS=”L”);
-DB0 to DB5:high impedance
-DB6:serial input clock(SCL)
-DB7:serial input data(SI)
When chip select is not active ,DB0 to DB7 are set tohigh impedance</td><td>DB0</td></tr>
<tr><td>9</td><td>DB1</td></tr>
<tr><td>10</td><td>DB2</td></tr>
<tr><td>11</td><td>DB3</td></tr>
<tr><td>12</td><td>DB4</td></tr>
<tr><td>13</td><td>DB5</td></tr>
<tr><td>14</td><td>DB6(SCL)</td></tr>
<tr><td>15</td><td>DB7(SI)</td></tr>
<tr><td>16</td><td>Power Supply</td><td>VDD</td></tr>
<tr><td>17</td><td>Ground</td><td>VSS</td></tr>
<tr><td>18</td><td>Voltage converter input / output pin Connect this pin to Vss through capacitor.</td><td>VOUT</td></tr>
<tr><td>19</td><td>Capacitor 3 negative connection pin for voltage converter</td><td>C3-</td></tr>
<tr><td>20</td><td>Capacitor 1 positive connection pin for voltage converter</td><td>C1+</td></tr>
<tr><td>21</td><td>Capacitor 1 negative connection pin for voltage converter</td><td>C1-</td></tr>
<tr><td>22</td><td>Capacitor 2 negative connection pin for voltage converter</td><td>C2-</td></tr>
<tr><td>23</td><td>Capacitor 2 positive connection pin for voltage converter</td><td>C2+</td></tr>
<tr><td>25</td><td rowspan="5">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 (= V0) ≧V1≧V2≧V3≧V4≧V5
Master operation: When the power supply turns ON, the internal power supply circuits generate the V1 to V4 voltages shown below. The voltage settings are selected by the LCD bias command.
<table><tr><th></th><th colspan="2">SPLC501C</th></tr><tr><td>V1</td><td>1/9．V5</td><td>1/7．V5</td></tr><tr><td>V2</td><td>2/9．V5</td><td>2/7．V5</td></tr><tr><td>V3</td><td>7/9．V5</td><td>5/7．V5</td></tr><tr><td>V4</td><td>8/9．V5</td><td>6/7．V5</td></tr></table></td><td>V1</td></tr>
<tr><td>26</td><td>V2</td></tr>
<tr><td>27</td><td>V3</td></tr>
<tr><td>28</td><td>V4</td></tr>
<tr><td>29</td><td>V5</td></tr>
</table>

12. BLOCK DIAGRAM



(C O G)

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