



FORMIKE ELECTRONIC CO.,LTD

PRDUCT SPECIFICATON

MONO LCD MODULE

MODEL : WG1206H8FSW6G-B VER:1.0

Preliminary Specification

Finally Specification

CUSTOMER'S APPROVAL	
SIGNATURE:	DATE:

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- This specification is subject to change withouth notice.Please contact FORMIKE or it's representative before designing your product based on this specification.

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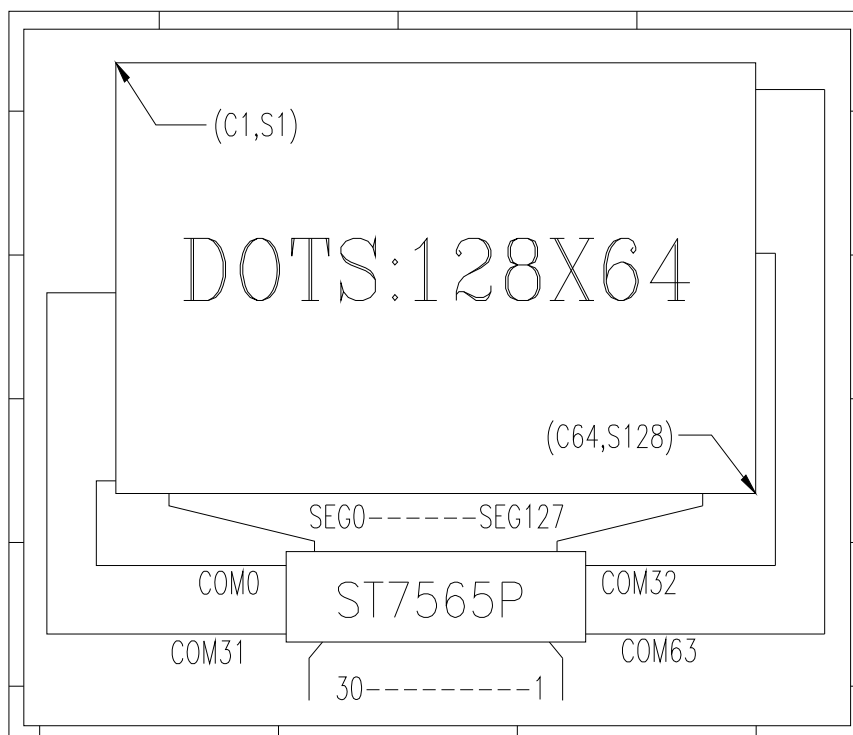
CONTENTS

1 FUNCTION & FEATURES	1
2 BLOCK DIAGRAM.....	1
3 DIMENSIONAL CD DRAWING	2
4 POWER SUPPL	3
5 PIN DESCRIPTION	3
6 MAXIMUM ABSOLUTE LIMIT (T=25).....	5
7 ELECTRICAL CHARACTERISTICS	5
7.1DC Characteristics(T=25°C)	5
7.2 Backlight Specifications (Ta=25°C)	5
7.3 AC Characteristics	6
9 QUALITY SPECIFICATIONS.....	10
9.1 Defect classification.....	10
9.2 Note on defect classification.....	11
9.3. Reliability of LCM.....	17
10.DESCRIBE TO THE PART NO:	17
11 GUARTANTEE	17

1 FUNCTION & FEATURES

ITEM	Normal dimensions
Display Format	128*64 Dots Graphic
Module dimension	77.4(W)*52.4(H)*6.5 (T) mm
Viewing area	70.0(W)*38.5(H) mm
Duty/bias	1/65Duty,1/9Bias
LCD mode	FSTN/POSITIVE/TRANSFLECTIVE
Viewing direction	6:00 O'clock

2 BLOCK DIAGRAM



REV.	DESCRIPTION OF MODIFY	MODIFY BY:	DATE
A0	1'ST,DESIGN	DZQ	2012.07.06

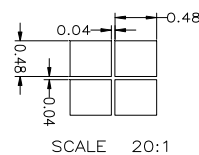
COG PINOUT :														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CS1B	RST	RS	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	VDD	V0
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
VSS	YOUT	NC	C3+	C1-	C1+	C2+	C2-	V4	V3	V2	V1	V0	C86	P

1	2	3	4
x1	y2	x2	y1

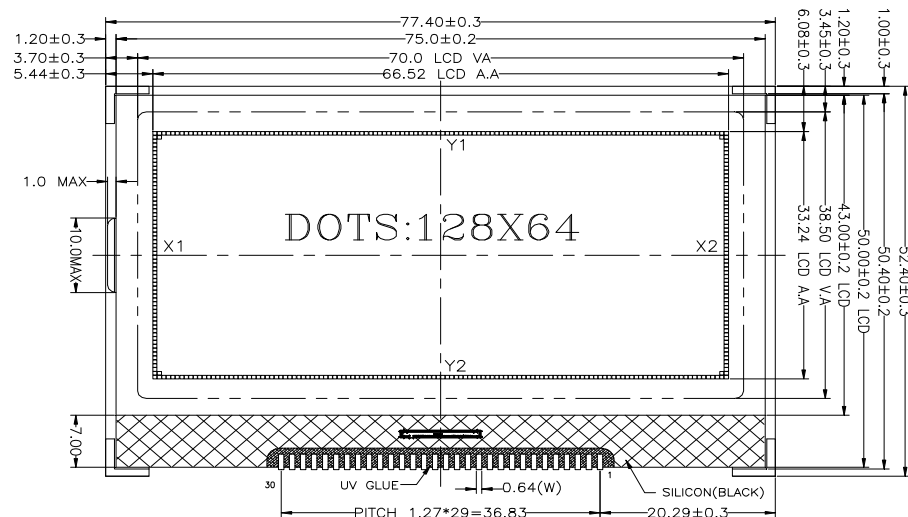
The diagram illustrates the internal structure of the ST7565P display module. It features a central display area labeled "DOTS:128X64". Above the display, a label "(C1,S1)" points to the top-left corner. Below the display, a label "(C64,S128)" points to the bottom-right corner. The display is connected to a central control chip labeled "ST7565P". This chip has four pins: "COM0" on the left, "COM32" on the right, "COM31" on the bottom left, and "COM63" on the bottom right. A horizontal line labeled "SEG0" on the left and "SEG127" on the right connects the top of the display to the top of the chip. A bracket at the bottom of the chip indicates a range from "30" to "1".

- 1.DISPLAY TYPE:
- 2.LCD POLARIZER TYPE:
- 3.VIEWING DIRECTION:
- 4.LCD OPERATING VOLTAGE:
- 5.OPERATING TEMP:
- 6.STORAGE TEMP:
- 7.DRIVE METHOD:
- 8.LCD CONNECTOR:
- 9.DISPLAY DRIVER:
- 10.BACK LIGHT:
- 11.Unspecified tolerance is $\pm 0.20\text{mm}$
- 12.ROHS Request

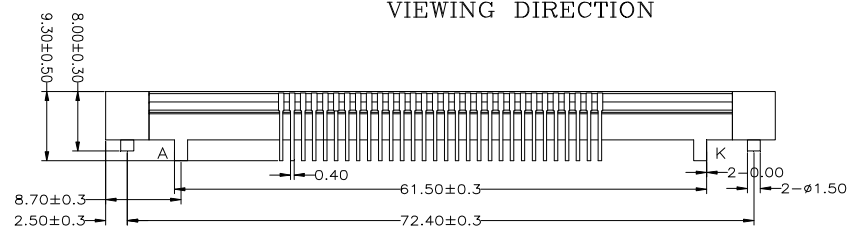
FSTN\POSITIVE
TRANSFLECTIVE
6.00 O'CLOCK
VDD=3.3V;VOP=9.0V
-20~+70°C
-30~+80°C
1/65DUTY,1/9BIAS
COG/PIN+BL
ST7565P
White Edge(LED*4)



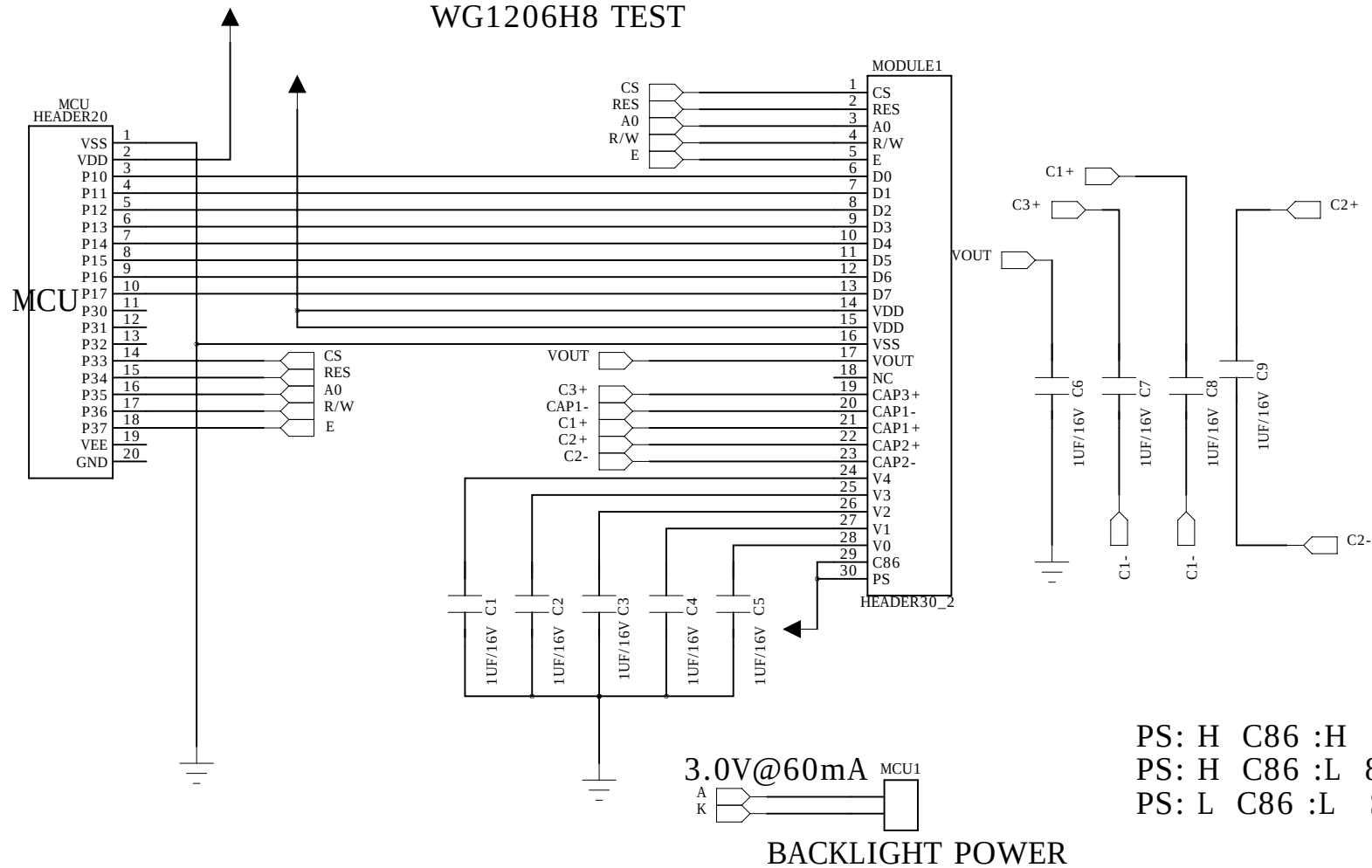
						CD					
				UNIT: MM		SIZE: A4					
				SHEET: 1		OF 1					
LCM NO. :WG1206H8FSW6G-B				DWG NO. :WG1206H8FSW6G-B-02				REV: A0			
DRAWN BY :				CHECKED BY :				APPROVED BY :			



VIEWING  DIRECTION



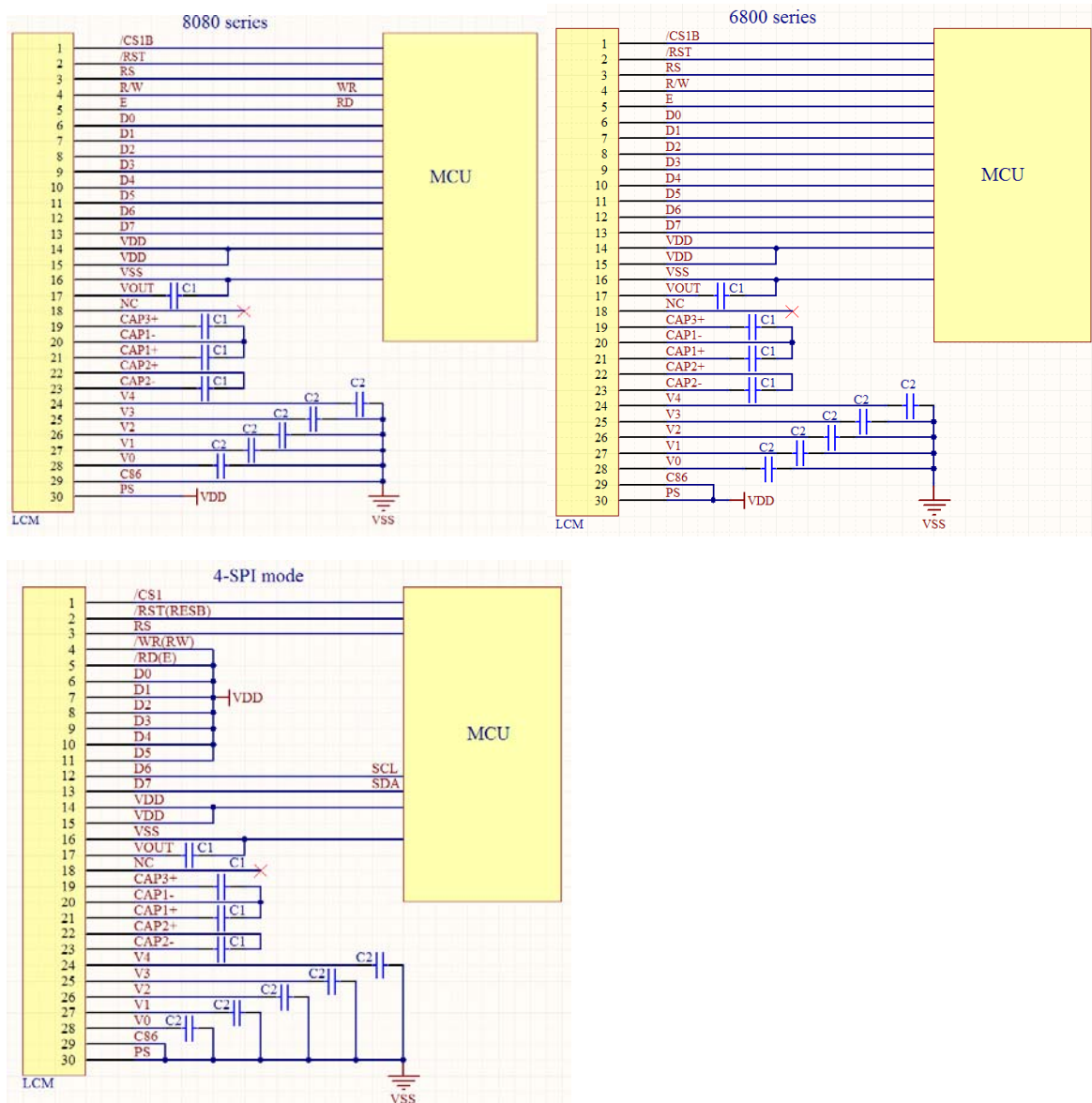
WG1206H8 TEST



PS: H C86 :H 6800 interface
 PS: H C86 :L 8080 interface
 PS: L C86 :L SPI interface

SPI interface contact us for detail reference circuit

4 POWER SUPPL



5 PIN DESCRIPTION

Pin no.	Symbol	Function
1	CS1B	chip select signal.
2	RST	When /RES is set to "L", the register settings are initialized (cleared).
3	RS	This is connect to the least significant bit of the normal MPU address bus, and it determines whether the data bits are data or command. A0 = "H": Indicates that D0 to D7 are display data. A0 = "L": Indicates that D0 to D7 are control data.
4	R/W	- When connected to 8080 series MPU, this pin is treated as the "/WR" signal of the 8080 MPU and is LOW-active. - The signals on the data bus are latched at the rising edge of the /WR signal. - When connected to 6800 series MPU, this pin is treated as the "R/W" signal of the 6800 MPU and decides the access type : - When R/W = "H": Read. When R/W = "L": Write.

5	E	- When connected to 8080 series MPU, this pin is treated as the "/RD" signal of the 8080 MPU and is LOW-active. The data bus is in an output status when this signal is "L". - When connected to 6800 series MPU, this pin is treated as the "E" signal of the 6800 MPU and is HIGH-active. This is the enable clock input terminal of the 6800 Series MPU.
6~13	DB[0..7]	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 (SPI-4) is selected (P/S = "L") : D7 : serial data input (SI) ; D6 : the serial clock input (SCL). D0 to D5 should be connected to VDD or floating. When the chip select is not active, D0 to D7 are set to high impedance.
14~15	VDD	Power supply.
16	VSS	Ground.
17	VOUT	DC/DC voltage converter. Connect a capacitor between this terminal and VSS or VDD.
18	NC	No connecting..
19	C3+	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.
20	C1-	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1P terminal.
21	C1+	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.
22	C2+	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2N terminal.
23	C2-	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2P terminal.
24~28	V[4..0]	This is a multi-level power supply for the liquid crystal drive. The voltage Supply 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 Vss, and must maintain the relative magnitudes shown below. V0 V1 V2 V3 V4 Vss
29	C86	This is the MPU interface selection pin. C86 = "H": 6800 Series MPU interface. C86 = "L": 8080 Series MPU interface.
30	PS	This pin configures the interface to be parallel mode or serial mode. P/S = "H": Parallel data input/output. P/S = "L": Serial data input.

6 MAXIMUM ABSOLUTE LIMIT (T=25)

Item	Symbol	Standard value	Unit
supply voltage	V _{DD}	0.3~+3.6	V
Input voltage	V _{LCD}	0.3~+13.0	V
Operating temperature	Topr	-20~+70	°C
Storage temperature	Tstg	-30~+80	°C

Note: Voltage greater than above may damage the module. All voltages are specified relative to VSS=0V

7 ELECTRICAL CHARACTERISTICS

7.1DC Characteristics(T=25°C)

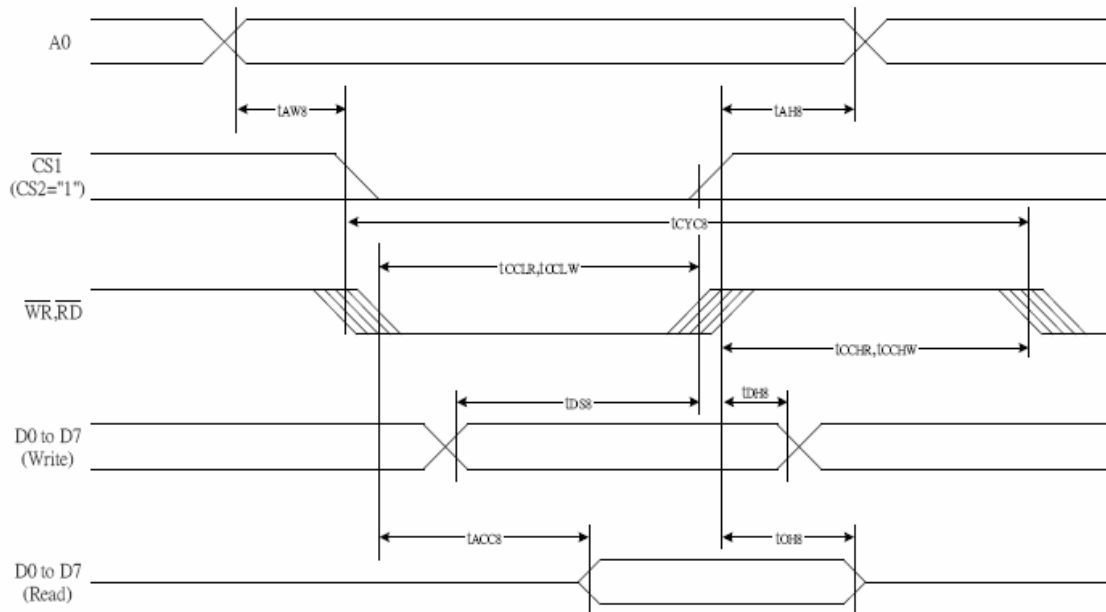
Item	Symbol	Min	Typ	Max	Unit	Applicable terminal	Test condition
Operating voltage	V _{DD}	3.1	3.3	3.5	V	-	Ta=25°C
Supply current	I _{DD}	-	-	3	mA	-	Ta=25°C
Input voltage	V _{IL}	VSS	-	0.2 V _{DD}	V	-	Ta=25°C
	V _{IH}	0.8 V _{DD}	-	V _{DD}	V		Ta=25°C
Output voltage	V _{OL}	VSS	-	0.2 V _{DD}	V	-	Ta=25°C
	V _{OH}	0.8 V _{DD}	-	V _{DD}	V		Ta=25°C
Input leakage current	I _{IKG}	-1.0	-	1.0	μA	-	Ta=25°C
LCD driving voltage	V _{LCD}	8.8	9.0	9.2	V	-	Ta=25°C

7.2 Backlight Specifications (Ta=25°C)

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward voltage	V _f	-	3.1	-	V	If=60mA
Color	white					

7.3 AC Characteristics

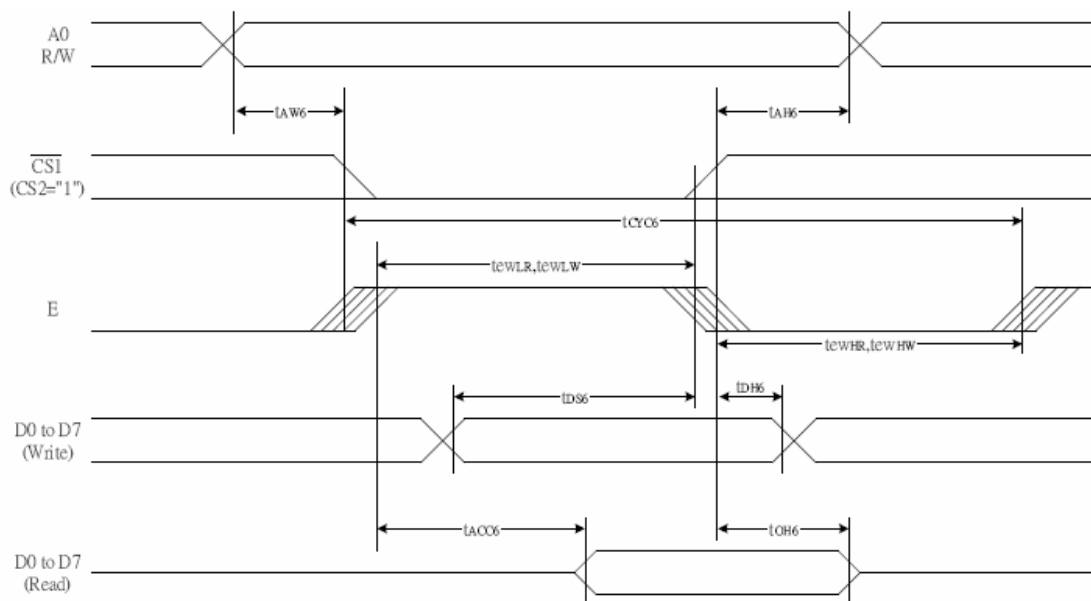
System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH8		0	—	Ns
Address setup time		tAW8		0	—	
System cycle time		tCYC8		240	—	
Enable L pulse width (WRITE)	WR	tCCLW		80	—	
Enable H pulse width (WRITE)		tCCHW		80	—	
Enable L pulse width (READ)	RD	tCCLR		140	—	
Enable H pulse width (READ)		tCCHR		80	—	
WRITE Data setup time	D0 to D7	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	

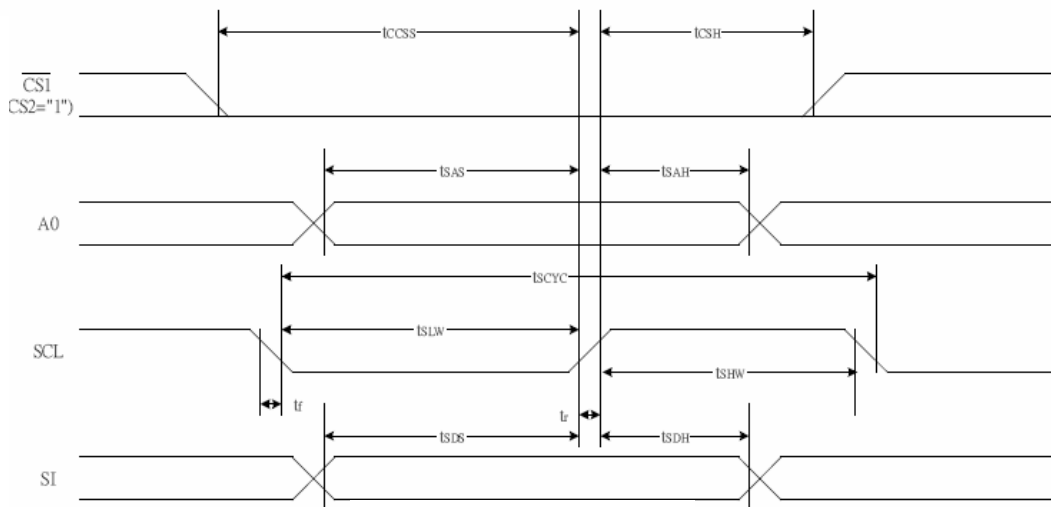


System Bus Read/Write Characteristics 2 (For the 6800 Series MPU)



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6		0	—	ns
Address setup time		tAW6		0	—	
System cycle time		tCYC6		240	—	
Enable L pulse width (WRITE)	WR	tEWLW		80	—	
Enable H pulse width (WRITE)		tEWHW		80	—	
Enable L pulse width (READ)	RD	tEWLR		80	—	
Enable H pulse width (READ)		tEHRW		140	—	
WRITE Data setup time	D0 to D7	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	

Serial Interface



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period		T_{scyc}		50	—	ns
SCL "H" pulse width	SCL	T_{shw}		25	—	
SCL "L" pulse width		T_{slw}		25	—	
Address setup time	A0	T_{sas}		20	—	
Address hold time		T_{sah}		10	—	
Data setup time	SI	T_{sds}		20	—	
Data hold time		T_{sdh}		10	—	
CS-SCL time	CS	T_{css}		20	—	
CS-SCL time		T_{csh}		40	—	

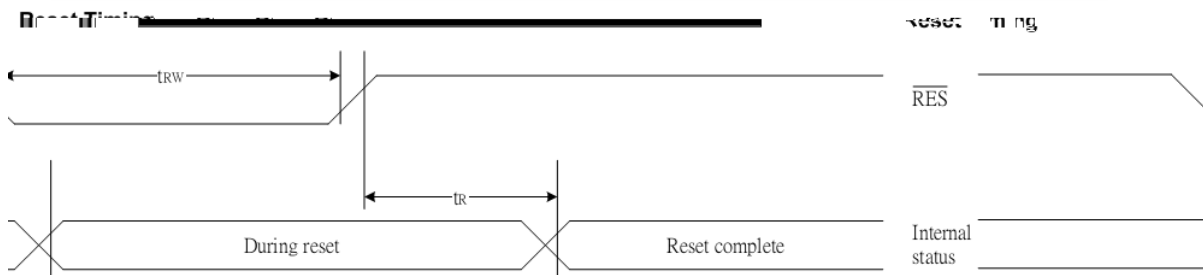


Figure 41

Table 36

 ($V_{DD} = 3.3V$, $T_a = -30$ to $85^\circ C$)

Signal	Symbol	Condition	Rating			Units
			Min.	Typ.	Max.	
$\overline{RES}$	t_r		—	—	1.0	us
	t_{rw}		1.0	—	—	us

Item
Reset time
Reset "L" pulse width

8 Instruction Description

(Note) *: disabled data

Command	Command Code										Function	
	A0	/RD	/WR	D7	D6	D5	D4	D3	D2	D1		D0
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0 1	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address					Sets the display RAM display start line address	
(3) Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address
(4) Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address.
Column address set lower bit	0	1	0	0	0	0	0	Least significant column address				Sets the least significant 4 bits of the display RAM column address.
(5) Status read	0	0	1	Status				0	0	0	0	Reads the status data
(6) Display data write	1	1	0	Write data							Writes to the display RAM	
(7) Display data read	1	0	1	Read data							Reads from the display RAM	
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0 1	Sets the display RAM address SEG output correspondence 0: normal, 1: reverse
(9) Display normal/reverse	0	1	0	1	0	1	0	0	1	1	0 1	Sets the LCD display normal/reverse 0: normal, 1: reverse
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0 1	Display all points 0: normal display 1: all points ON
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0 1	Sets the LCD drive voltage bias ratio 0: 1/9 bias, 1: 1/7 bias (ST7565P)
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	Column address increment At write: +1 At read: 0
(13) End	0	1	0	1	1	1	0	1	1	1	0	Clear read/modify/write
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	Internal reset
(15) Common output mode select	0	1	0	1	1	0	0	0	*	*	*	Select COM output scan direction 0: normal direction 1: reverse direction
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode		Select internal power supply operating mode	
(17) V ₀ voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio		Select internal resistor ratio(Rb/Ra) mode	
(18) Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	1	Set the V ₀ output voltage electronic volume register
Electronic volume register set				0	0	Electronic volume value						
(19) Static indicator ON/OFF	0	1	0	1	0	1	0	1	1	0	0	0: OFF, 1: ON Set the flashing mode
Static indicator register set				0	0	0	0	0	0	0	0	
(20) Booster ratio set	0	1	0	1	1	1	1	1	0	0	0	select booster ratio 00: 2x,3x,4x 01: 5x 11: 6x
(21) Power saver												Display OFF and display all points ON compound command
(22) NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation
(23) Test	0	1	0	1	1	1	1	*	*	*	*	Command for IC test. Do not use this command

```

//--6800 interface
void wr_cmd(uchar wrcmd)
{
    CS=0;
    RS =0;    //select instruction
    RW =0;    //to write
    LCD_DATA=wrcmd;
    E =1;
    delay_us(1);
    E =0;
    delay_us(1);
}

//-----
void wr_data(uchar wrdata)
{
    CS=0;
    RS =1;    //select data
    RW =0;    //to write
    LCD_DATA=wrdata;
    E =1;
    delay_us(1);
    E =0;
    delay_us(1);
}

void ST7565P_initial()
{
    RST=0;
    delay_ms(10);
    RST=1;
    delay_ms(20);
    wr_cmd(0xA4);    //ALL Point normal
    wr_cmd(0xA6);    //Normal display
    wr_cmd(0xA0);    //ADC,    0xA0:seg normal; 0xA1: seg reverse
    wr_cmd(0xC8);    //SHL    0xC0:com normal; 0xC8: com reverse
    wr_cmd(0x40);    //Initial display line for COM0

    wr_cmd(0x25);    //SET Ra/Rb    ,0x20:3.0; 0x21:3.5; 0x22:4.0; 0x23:4.5; 0x24:5.0; 0x25:5.5; 0x26:6.0;
0x27:6.5
    wr_cmd(0x81);    //SET Register
    wr_cmd(constr);    //SET constrast=26 DEFAUIT IT SHOULD BE ADJUST
    wr_cmd(0xA2);    //SET BIAS    when Duty    1/65    1/55    1/49    1/33
//                Bias: 0xA2:    1/9    1/8        1/8        1/6
//                0xA3:    1/7    1/6        1/6        1/5
    wr_cmd(0x2C);    //SET POWER CONTROL
    wr_cmd(0x2E);
    wr_cmd(0x2F);

    wr_cmd(0xaf);    //dispaly on
}

```

```

void disp_bmp(uchar *dat) //WRITE 128*64 PICTURE
{
    uchar ii,jj;
    wr_cmd(0x40);
    for(ii=0;ii<8;ii++)
    {
        wr_cmd(0XB0+ii); //select page
        wr_cmd(0x10);      //set MSB
        wr_cmd(0x00);      //set LSB
        for(jj=0;jj<128;jj++)
        {
            wr_data(*(dat++));
        }
    }
}

void main (void)
{
    ST7565P_initial() ;
    disp_bmp(PIC1);
}

```