



HTG9664F-31W-18C05

产品名称 (Product name) : 黑白点阵 COG
型号 (Model) : HTG9664F-31W-18C05
编号 (Part number) : 20140810
日期 (Date) : 2014-08-20

深圳市鑫洪泰电子科技有限公司

Shenzhen Hot Display Technology Co.,Ltd

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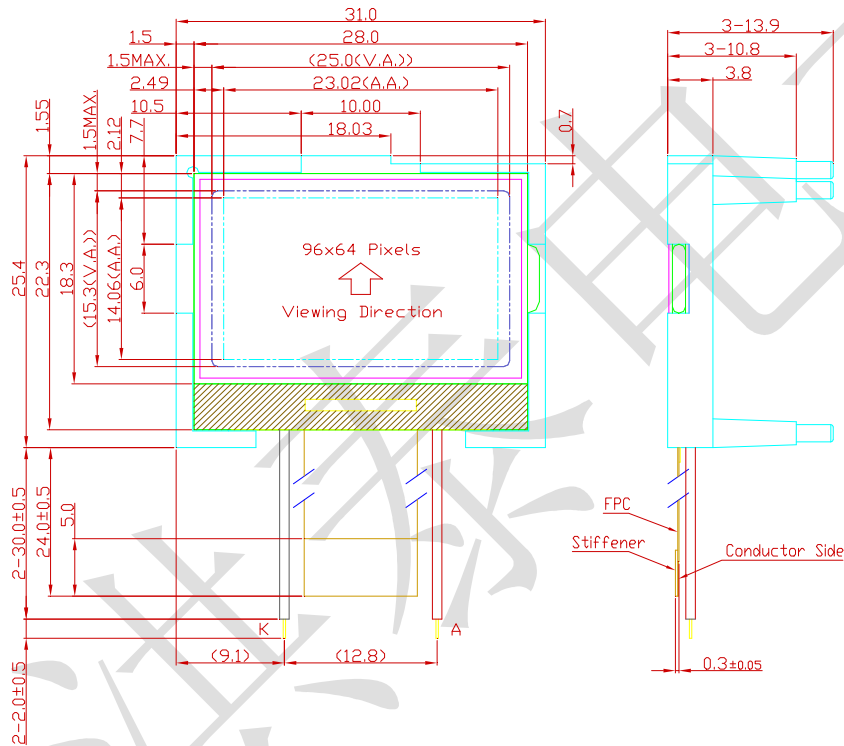
1. Basic Specifications

1.1 Display Specifications

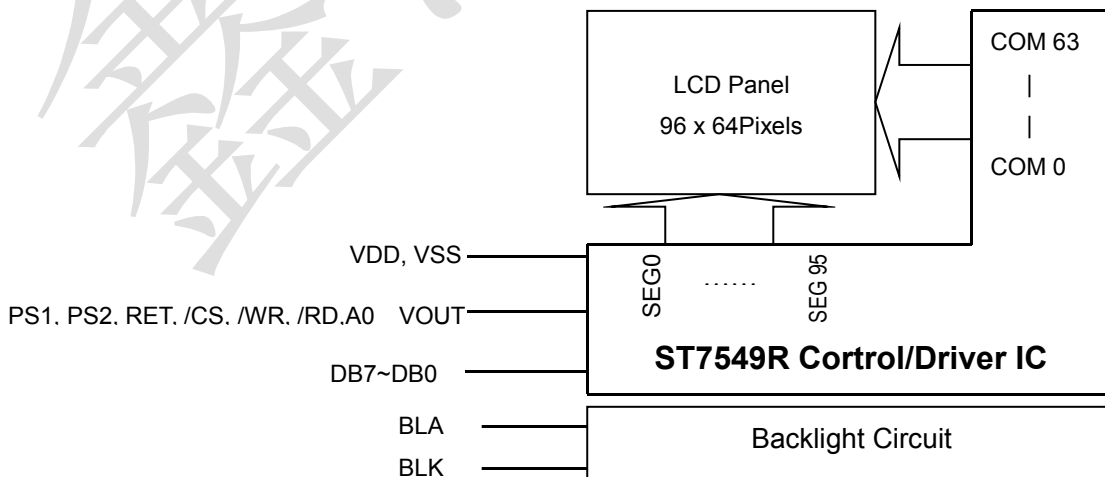
- 1>LCD Display Mode : FSTN, Positive, Transflective
- 2>Viewing Angle : 6H
- 3>Driving Method : 1/65 Duty, 1/9 Bias
- 4>Backlight : White LED

1.2 Mechanical Specifications

- 1>Outline Dimension : 31.0x 25.4 x 13.9mm (See attached Outline Drawing for Details)



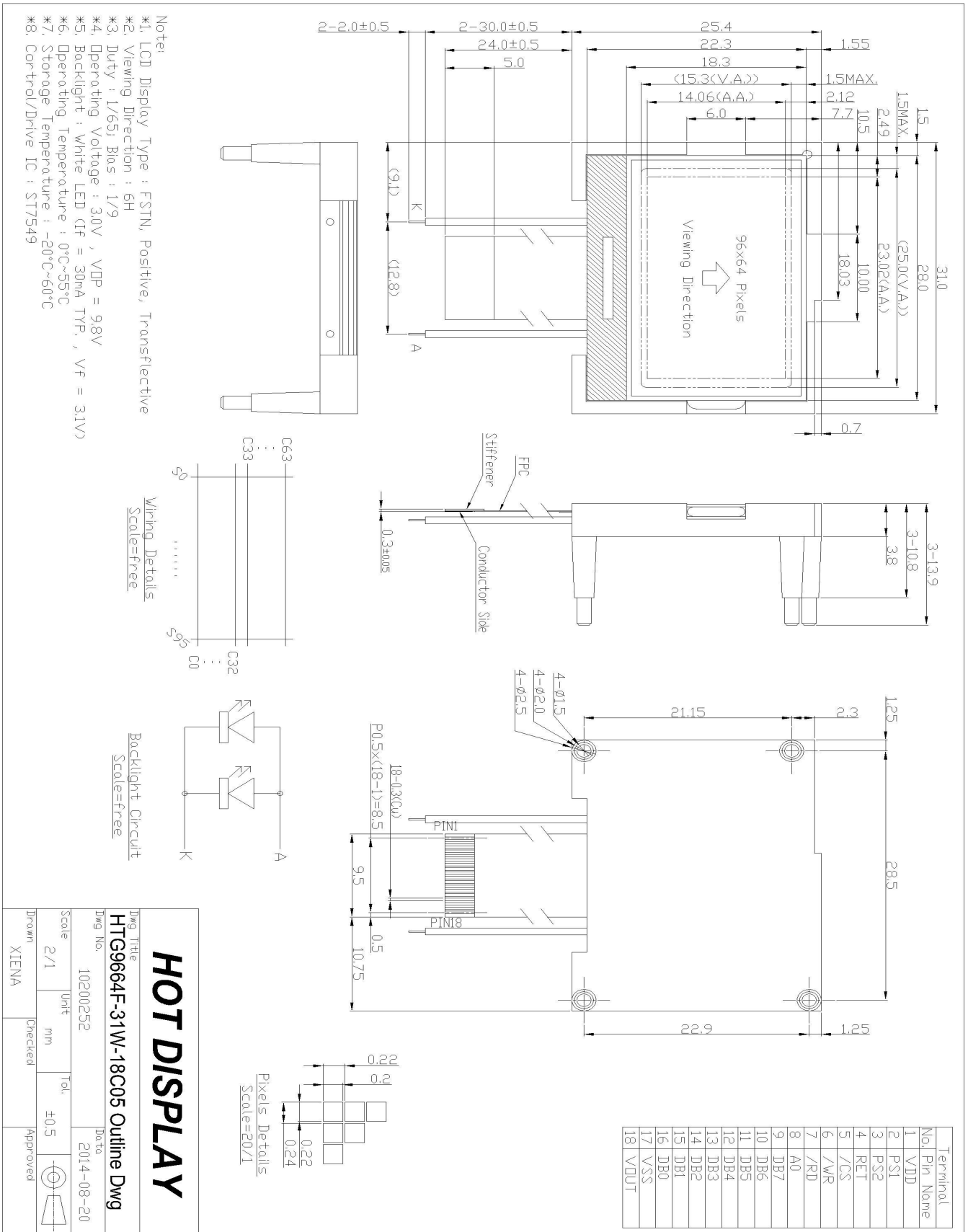
1.3 Circuit Diagram



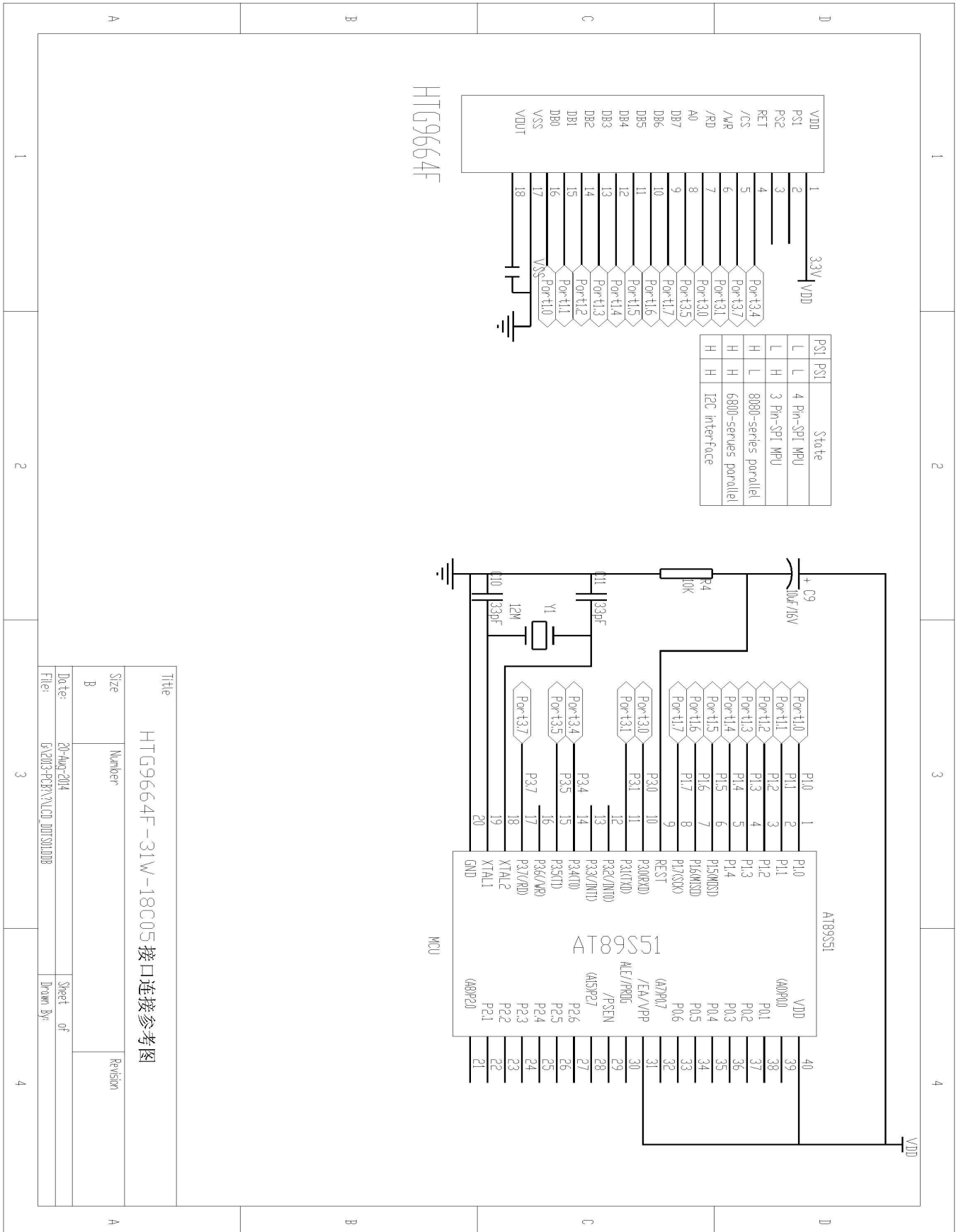
1.4 Terminal Function

Pin No.	Pin Name	Function												
1	VDD	Power Supply												
2	PS1	Microprocessor interface select input pin												
		<table border="1"> <thead> <tr> <th>PS1</th> <th>PS2</th> <th>State</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>L</td> <td>4-pin-SPI MPU interface</td> </tr> <tr> <td>L</td> <td>H</td> <td>3-pin-SPI MPU interface</td> </tr> </tbody> </table>	PS1	PS2	State	L	L	4-pin-SPI MPU interface	L	H	3-pin-SPI MPU interface			
PS1	PS2	State												
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L	H	3-pin-SPI MPU interface												
3	PS2	<table border="1"> <tbody> <tr> <td>H</td> <td>L</td> <td>8080-series parallel MPU interface</td> </tr> <tr> <td>H</td> <td>H</td> <td>6800-series parallel MPU interface</td> </tr> <tr> <td>H</td> <td>H</td> <td>I2C interface</td> </tr> </tbody> </table>	H	L	8080-series parallel MPU interface	H	H	6800-series parallel MPU interface	H	H	I2C interface			
		H	L	8080-series parallel MPU interface										
		H	H	6800-series parallel MPU interface										
H	H	I2C interface												
4	RET	Reset input pin When RET is " L ", initialization is executed.												
5	/CS	Chip select input pins												
6	/WR	Read/Write execution control pin (PS[0:1]=[L:H])												
		<table border="1"> <thead> <tr> <th>PS2</th> <th>MPU type</th> <th>/WR(R/W)</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>6800-series</td> <td>R/W</td> <td>Read/Write control input pin R/W=" H ": read ;R/W=" L ": write</td> </tr> <tr> <td>L</td> <td>8080-series</td> <td>/WR</td> <td>Write enable clock input pin The data on D0 to D7 are latched at the rising edge of the /WR signal</td> </tr> </tbody> </table>	PS2	MPU type	/WR(R/W)	Description	H	6800-series	R/W	Read/Write control input pin R/W=" H ": read ;R/W=" L ": write	L	8080-series	/WR	Write enable clock input pin The data on D0 to D7 are latched at the rising edge of the /WR signal
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L	8080-series	/RD	Read enable clock input pin When /RD is " L ", D0 to D7 are in an output status.											
8	A0	It determines whether the data bits are data or a command. A0=" H ": Indicates that D0 to D7 are display data. A0=" L ": Indicates that D0to D7 are control data.												
9~16	DB7~DB0	8-Bit data bus lines												
17	VSS	Ground.												
18	VOUT	If the internal voltage generator is used, the VLCDIN& VLCDOUT must be connected together and series one capacitor to VSS .If an external supply is used this pin must be left open												

1.5 Product Outline



1.6 Schematic Diagram



Title		HTG9664F-31W-18C05接口连接参考图	
Size	Number	Revision	
B			
Date:	20-Aug-2014	Sheet	of
File:	GA2013-PC27\LCD_001\001.DWG	Drawn By:	

2. Absolute Maximum Ratings

Items	Symbol	MIN.	MAX.	Unit	Condition
Supply Voltage	V _{DD}	-0.3	+3.6	V	V _{SS} = 0V
Input Voltage	V _{IN}	-0.3	V _{DD} +0.3	V	V _{SS} = 0V
Operating Temperature	T _{OP}	0	+55	°C	No Condensation
Storage Temperature	T _{st}	-20	+60	°C	No Condensation

3. Electrical Characteristics

3.1 DC Characteristics

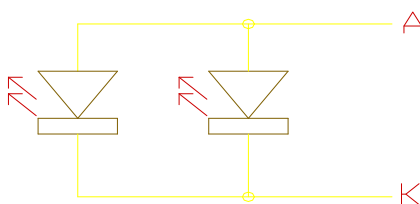
V_{SS} = 0V, T_{OP} = 25°C

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Operating Voltage	V _{DD}	1.7	-	3.3	V	V _{DD}
Input High Voltage	V _{IH}	0.7 x V _{DD}	-	V _{DD}	V	/CS1,/RES,A0,E , R/W,D0~D7,C86
Input Low Voltage	V _{IL}	V _{SS}	-	0.3 x V _{DD}	V	
Output High Voltage	V _{OH}	0.7 x V _{DD}	-	V _{DD}	V	D0~D7
Output Low Voltage	V _{OL}	V _{SS}	-	0.3 x V _{DD}	V	D0~D7
Operation Current	I _{OP}	100	-	220	μA	V _{DD} =3.0V
Input leakage current	I _{LI}	-1.0	-	1.0	μA	T _a =25°C
Output leakage current	I _{LO}	-3.0	-	3.0	μA	T _a =25°C
Supply step-up output Voltage circuit	VLCDOUT	-	-	13	V	Relative to V _{SS}
Voltage regulator circuit Operating voltage	VLCDIN	-	-	13	V	Relative to V _{SS}

3.2 LED Backlight Circuit

V_{SS} = 0V, T_{OP} = 25°C

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Forward Voltage	V _f BLA	-	3.1	-	V	V _{DD}
Forward Current	I _f BLA	-	30	35	mA	V _{DD}



3.3 AC Characteristics

3.3.1 8080 Mode System Bus Timing

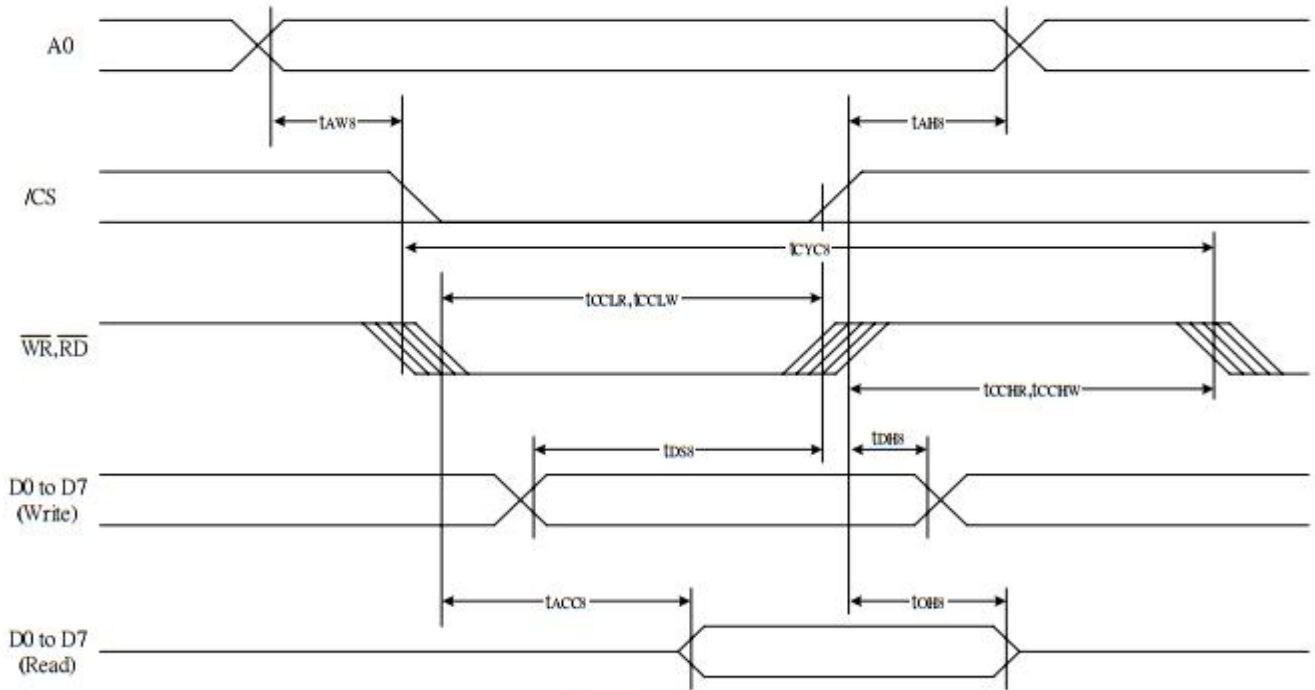


Figure 26.

(VDD = 3.3V , Ta = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH8		10	—	ns
Address setup time		tAW8		100	—	
System cycle time		tCYC8		400	—	
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		80	—	
WRITE Address hold time		tDH8		10	—	
READ access time		tACC8	CL = 100 pF	—	70	
READ Output disable time		tOH8	CL = 100 pF	5	50	

3.3.2 6800 Mode System Bus Timing

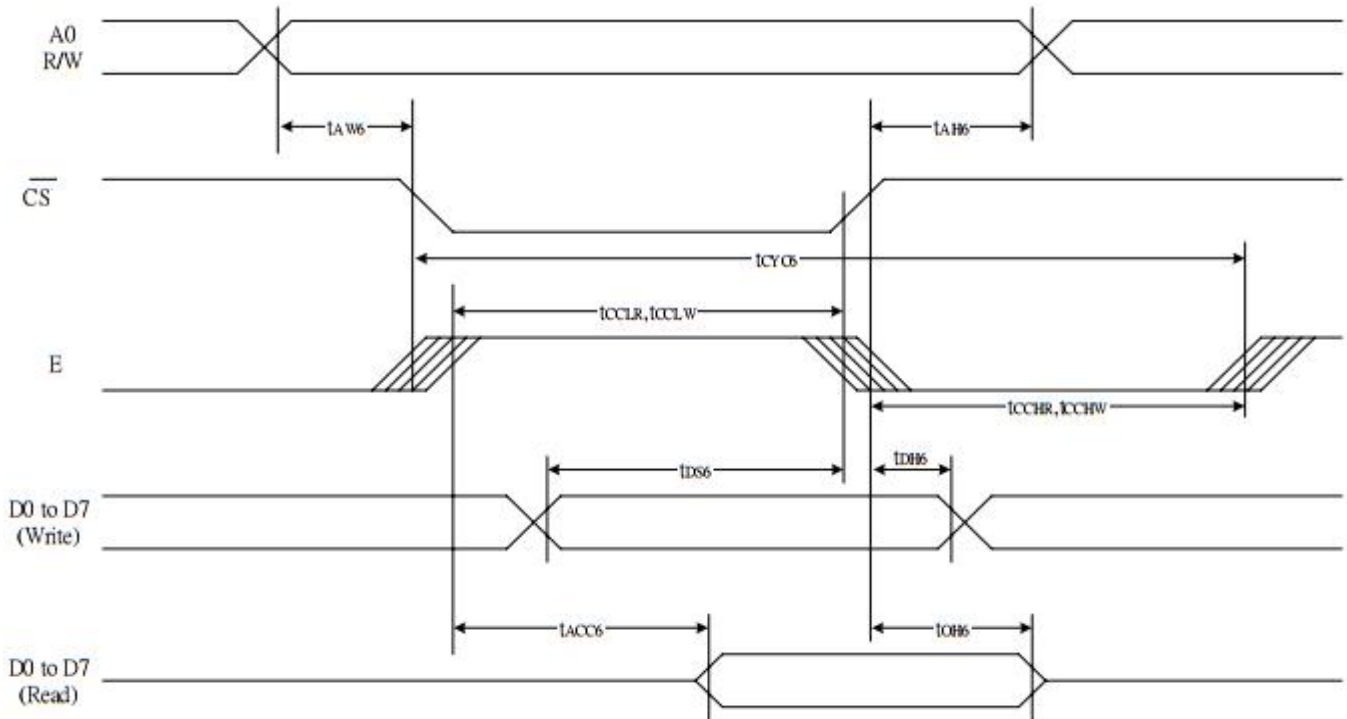


Figure 27.

(V_{DD} = 3.3 V , T_a = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6		10	—	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)		tEWHR		140	—	
WRITE Data setup time	D0 to D7	tDS6		80	—	
WRITE Address hold time		tDH6		10	—	
READ access time		tACC6	CL = 100 pF	—	70	
READ Output disable time		tOH6	CL = 100 pF	5	50	

3.3.3 Serial Mode Interface (4-Line Interface)

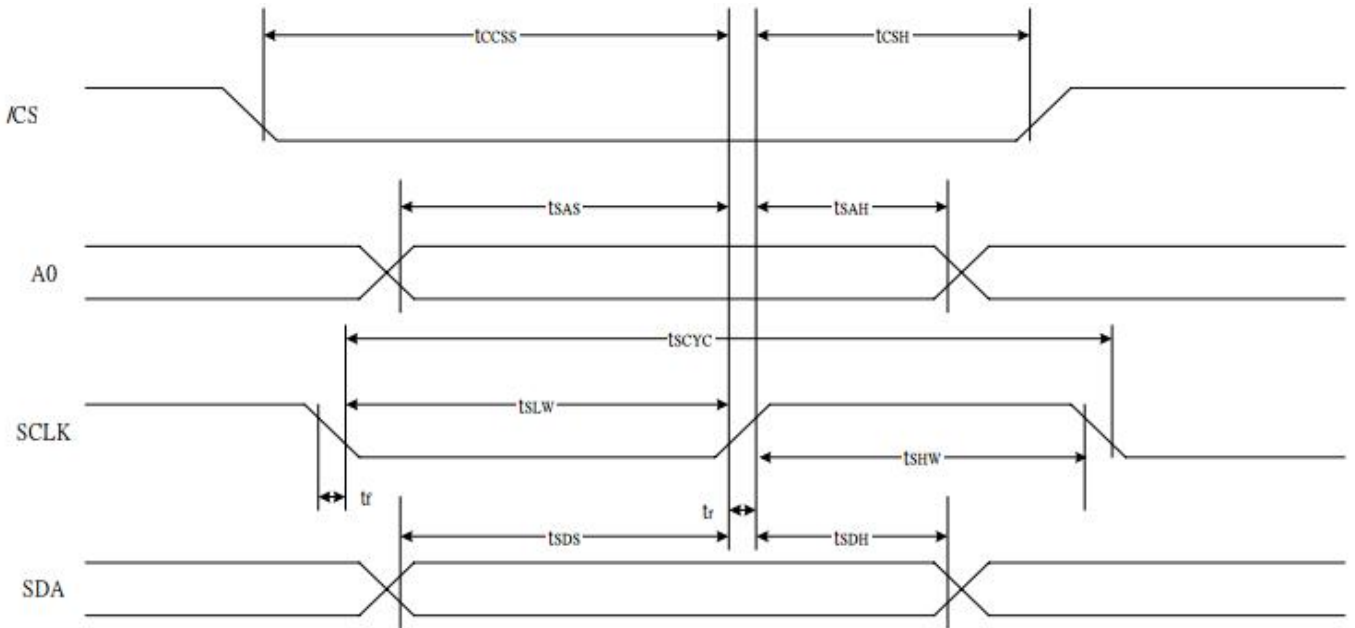


Fig 28.

($V_{DD}=3.3V, T_a=25^{\circ}C$)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	tSCYC		150	—	ns
SCL "H" pulse width		tSHW		75	—	
SCL "L" pulse width		tSLW		75	—	
Address setup time	A0	tSAS		20	—	
Address hold time		tSAH		100	—	
Data setup time	SI	tSDS		20	—	
Data hold time		tSDH		10	—	
CS-SCL time	CSB	tCSS		20	—	
CS-SCL time		tCSH		140	—	

3.3.4 Serial Mode Interface (3-Line Interface)

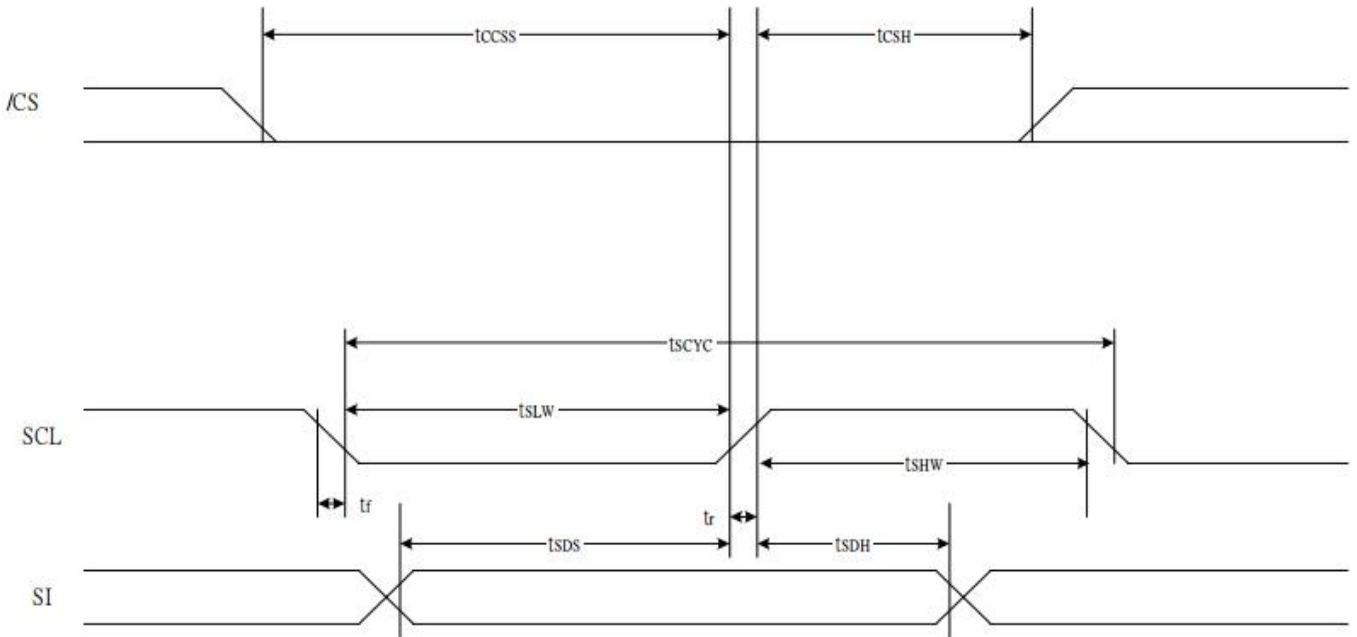
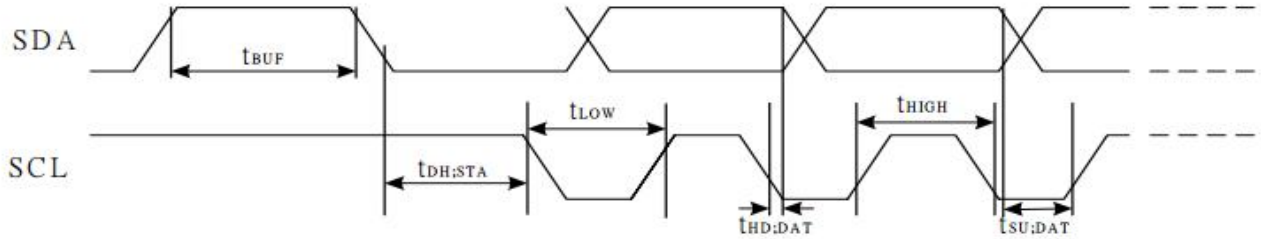


Fig 28.

(V_{DD}=3.3V, Ta=25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	tSCYC		150	—	ns
SCL "H" pulse width		tSHW		75	—	
SCL "L" pulse width		tSLW		75	—	
Data setup time	SI	tSDS		20	—	
Data hold time		tSDH		10	—	
CS-SCL time	CSB	tCSS		20	—	
CS-SCL time		tCSH		140	—	

3.3.4 Serial Mode Interface (I2C Interface)



(V_{DD}=3.3V, Ta=25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
SCL clock frequency	SCL	FSCLK		-	400	kHZ
SCL clock low period	SCL	TLOW		1.3	-	us
SCL clock high period	SCL	THIGH		0.6	-	us
Data set-up time	SI	TSU;Data		100	-	ns
Data hold time	SI	THD;Data		0	0.9	us
SCL,SDA rise time	SCL	TR		20+0.1Cb	300	ns
SCL,SDA fall time	SCL	TF		20+0.1Cb	300	ns
Capacitive load represented by each bus line		Cb		-	400	pF
Setup time for a repeated START condition	SI	TSU;SUA		0.6	-	us
Start condition hold time	SI	THD;STA		0.6	-	us
Setup time for STOP condition		TSU;STO		0.6	-	us
Tolerable spike width on bus		TSW		-	50	ns
BUS free time between a STOP and START condition	SCL	TBUF		1.3		us

3.4 Reset Timing

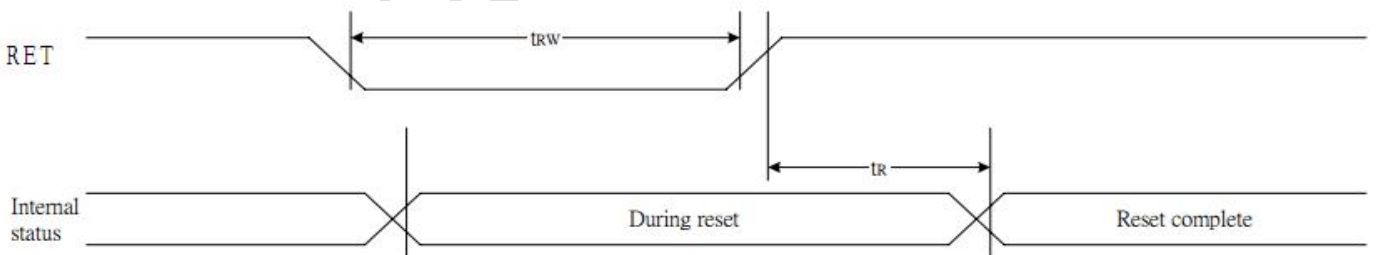


Fig 29.

(V_{DD} = 3.3V , Ta = -40 to 85°C)

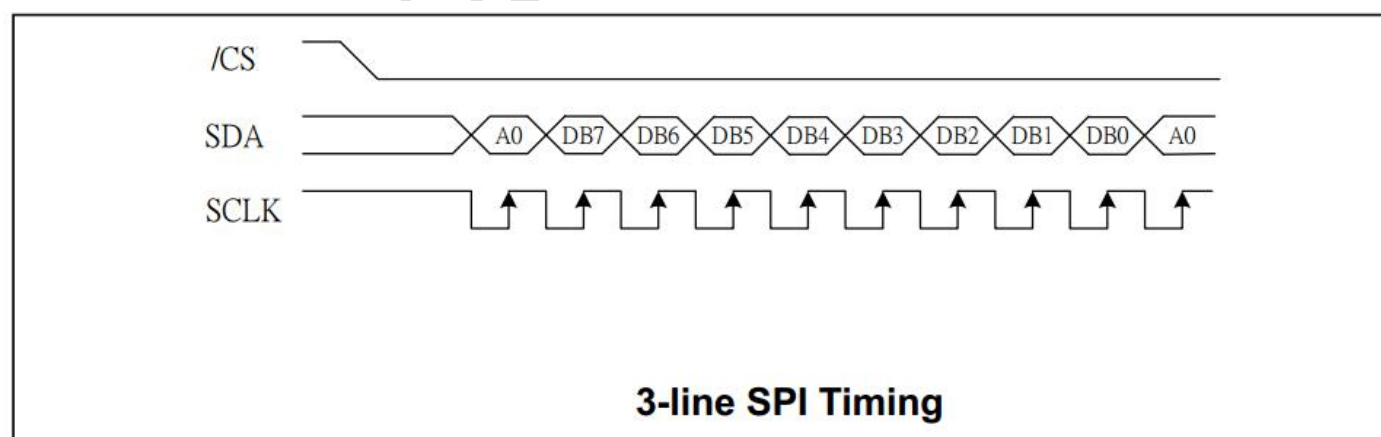
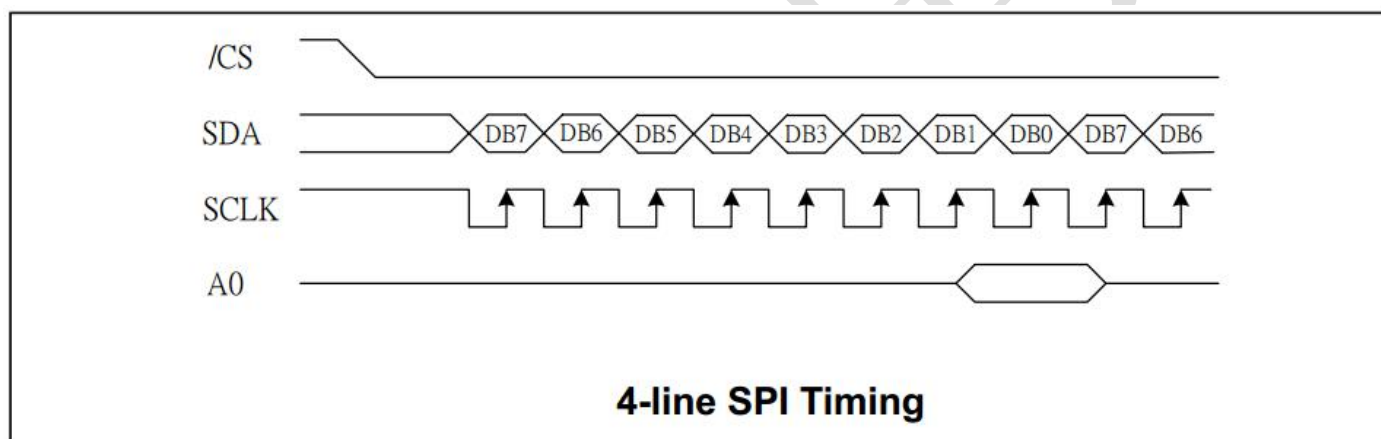
Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		tR		-	-	1	us
Reset "L" pulse width	RESB	tRW		1	-	-	us

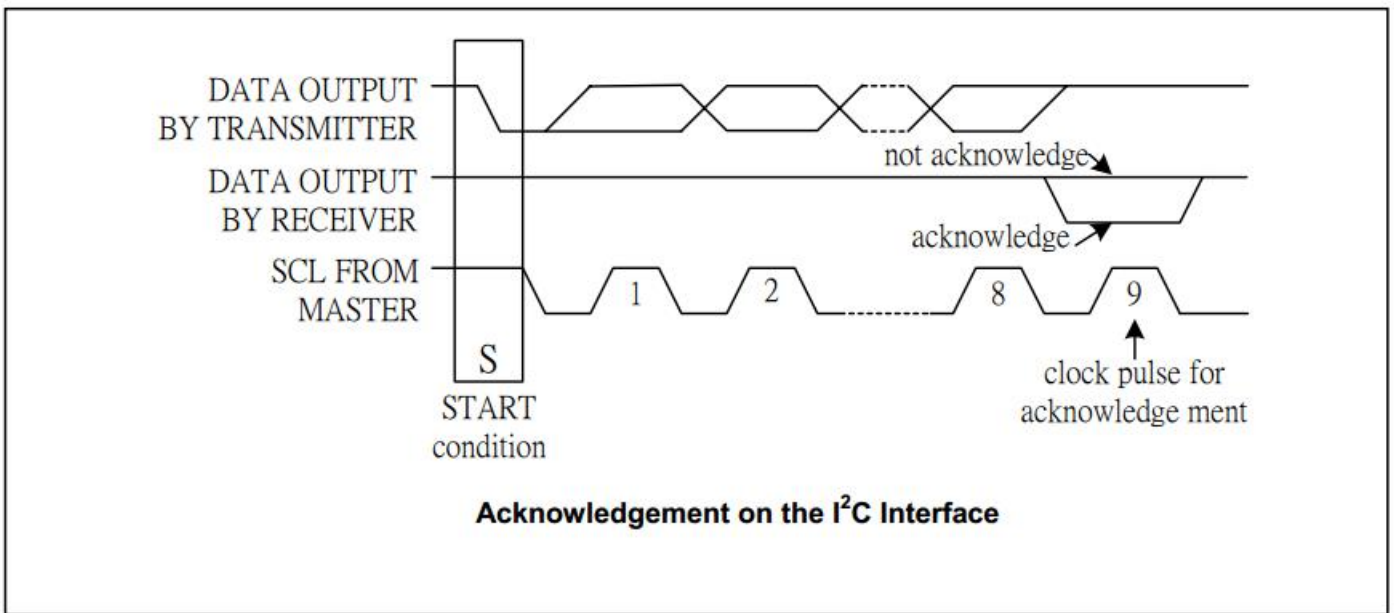
4. Function specifications

4.1 The Parallel Interface

Shared	6800 Mode		8080 Mode		Function
A0	R/W	E	/RD	/WR	
H	H	H	L	H	Reads the display data
H	L	H	H	L	Writes the display data
L	H	H	L	H	Status read
L	L	H	H	L	Write Command data

4.2 The Serial Interface





4.3 Basic Setting

To drive the LCD module correctly and provide normally display, please use the following setting

- 1> ADC = 0 (normal)
- 2> SHL select = 1(reverse)
- 3> LCD Bias Select = 1/9
- 4> Initial Display Line = 0
- 5> Entire Display ON/OFF = OFF(normal)
- 6> Reverse Display ON/OFF = OFF(normal)
- 7> Set Power Control Set:
Voltage follower = ON, voltage converter = ON, Voltage regulator = ON
- 8> Display ON/OFF = ON

4.4 Resetting the LCD module

The LCD module should be initialized by using /RES terminal.

While turning on the VDD and VSS power supply, maintain /RES terminal at LOW level, After the Power supply stabilized, release the reset terminal(/RES = High)

4.5 Display Memory Map

Page address	data	LCD Display (front view)		
0	D0 : D7			
1	D0 : D7			
2	D0 : D7			
3	D0 : D7			
4	D0 : D7	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 96 × 64 </div>		
5	D0 : D7			
6	D0 : D7			
7	D0 : D7			
8	D0 : D7			
Column Address		00h	→	7f h

4.6 Display Commands

INSTRUCTION	A0	WR (R/W)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
H independent instruction											
NOP	0	0	0	0	0	0	0	0	0	0	No operation
Reserved	0	0	0	0	0	0	0	0	0	1	Do not use
Function set	0	0	0	0	1	MX	MY	PD	H1	H0	Power-down; entry mode; Extended instruction control
Read status byte	0	1	PD	0	0	D	E	MX	MY	DO	Read status byte
Read data	1	1	D ₇	D ₆	D ₅	D ₄	D ₃	D ₂	D ₁	D ₀	Read data to RAM
Write data	1	0	D ₇	D ₆	D ₅	D ₄	D ₃	D ₂	D ₁	D ₀	Write data to RAM

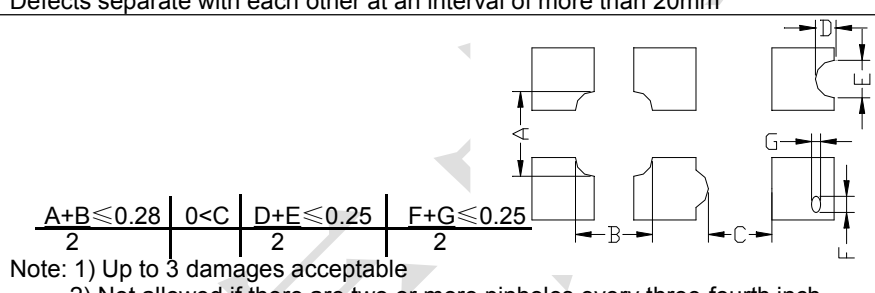
INSTRUCTION	A0	WR (R/W)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
H[1:0]=[0:0]											
Reserved	0	0	0	0	0	0	0	0	1	X	Do not use
Set V _{LCD} range	0	0	0	0	0	0	0	1	0	PRS	V _{LCD} range L/H select
END	0	0	0	0	0	0	0	1	1	0	Release read/modify/write
Read/modify/write	0	0	0	0	0	0	0	1	1	1	RAM address at R:+0, W:+1
Display control	0	0	0	0	0	0	1	D	0	E	Sets display configuration
Reserved	0	0	0	0	0	1	0	0	X	X	Do not use
Set Y address of RAM	0	0	0	1	0	0	Y ₃	Y ₂	Y ₁	Y ₀	Sets Y address of RAM 0 ≤ Y ≤ 9
Set X address of RAM	0	0	1	X ₆	X ₅	X ₄	X ₃	X ₂	X ₁	X ₀	Sets X address of RAM 0 ≤ X ≤ 101
H[1:0]=[0:1]											
Reserved	0	0	0	0	0	0	0	0	1	X	Do not use
Display configuration	0	0	0	0	0	0	1	DO	X	X	Top/bottom row mode set data order
Bias system	0	0	0	0	0	1	0	BS ₂	BS ₁	BS ₀	Sets bias system (BSx)
Set Start line	0	0	0	1	S5	S4	S3	S2	S1	S0	Specify the initial display line to realize vertical scrolling
Set V _{OP}	0	0	1	V _{OP6}	V _{OP5}	V _{OP4}	V _{OP3}	V _{OP2}	V _{OP1}	V _{OP0}	Write V _{OP} to register

INSTRUCTION	A0	WR (R/W)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
H[1:0]=[1:0]											
Reserved	0	0	0	0	0	0	0	0	1	X	Do not use
Partial screen mode	0	0	0	0	0	0	0	1	0	PS	Partial screen enable
Partial screen size	0	0	0	0	0	0	1	0	0	WS	Set partial screen size
Display part	0	0	0	0	0	1	0	DP2	DP1	DP0	Set display part for partial screen mode
H[1:0]=[1:1]											
RESET	0	0	0	0	0	0	0	0	1	1	Software reset
Display control	0	0	0	0	0	0	1	FR2	FR1	FR0	Frame rate control
N line inversion	0	0	0	1	0	NL4	NL3	NL2	NL1	NL0	Sets N line inversion
Booster Efficiency & Booster Stage	0	0	1	0	0	1	BE1	BE0	PC1	PC0	Booster Efficiency Set
Reserved	0	0	1	X	X	X	X	X	X	X	Do not use

4.7 Basic Operating Sequence

```
void intial(void)
{
    delay(500);
    comwrite(0x29);
    delay(10);
    comwrite(0x12);
    delay(10);
    comwrite(0x08);
    delay(10);
    comwrite(0xc8);
    delay(10);
    comwrite(0x40);
    delay(10);
    comwrite(0x28);
    delay(10);
    comwrite(0x05);
    delay(10);
    comwrite(0x0C);
    delay(10);
}
```

5. Inspection Standards

Item	Criterion for defects	Defect type
1) Display on inspection	(1) Non display (2) Vertical line is deficient (3) Horizontal line is deficient (4) Cross line is deficient	Major
2) Black / White spot	Size Φ (mm) Acceptable number $\Phi \leq 0.3$ Ignore (note) $0.3 < \Phi \leq 0.45$ 3 $0.45 < \Phi \leq 0.6$ 1 $0.6 < \Phi$ 0	Minor
3) Black / White line	Length (mm) Width (mm) Acceptable number $L \leq 10$ $W \leq 0.03$ Ignore $5.0 \leq L \leq 10$ $0.03 < W \leq 0.04$ 3 $5.0 \leq L \leq 10$ $0.04 < W \leq 0.05$ 2 $1.0 \leq L \leq 10$ $0.05 < W \leq 0.06$ 2 $1.0 \leq L \leq 10$ $0.06 < W \leq 0.08$ 1 $L \leq 10$ $0.08 < W$ follows 2) point defect Defects separate with each other at an interval of more than 20mm	Minor
4) Display pattern	 <p>Note: 1) Up to 3 damages acceptable 2) Not allowed if there are two or more pinholes every three-fourth inch.</p>	Minor
5) Spot-like contrast irregularity	Size Φ (mm) Acceptable Number $\Phi \leq 0.7$ Ignore (note) $0.7 < \Phi \leq 1.0$ 3 $1.0 < \Phi \leq 1.5$ 1 $1.5 < \Phi$ 0 Note: 1) Conformed to limit samples. 2) Intervals of defects are more than 30mm.	Minor
6) Bubbles in polarizer	Size Φ (mm) Acceptable Number $\Phi \leq 0.4$ Ignore (note) $0.4 < \Phi \leq 0.65$ 2 $0.65 < \Phi \leq 1.2$ 1 $1.2 < \Phi$ 0	Minor
7) Scratches and dent on the polarizer	Scratches and dent on the polarizer shall be in the accordance with "2) Black/white spot", and "3) Black/White line".	Minor
8) Stains on the surface of LCD panel	Stains which cannot be removed even when wiped lightly with a soft cloth or similar cleaning.	Minor
9) Rainbow color	No rainbow color is allowed in the optimum contrast on state within the active area.	Minor
10) Viewing area encroachment	Polarizer edge or line is visible in the opening viewing area due to polarizer shortness or sealing line.	Minor
11) Bezel appearance	Rust and deep damages that are visible in the bezel are rejected.	Minor
12) Defect of land surface contact	Evident crevices that are visible are rejected.	Minor
13) Parts mounting	(1) Failure to mount parts (2) Parts not in the specifications are mounted (3) For example: Polarity is reversed, HSC or TCP falls off.	Minor
14) Part alignment	(1) LSI, IC lead width is more than 50% beyond pad outline. (2) More than 50% of LSI, IC leads is off the pad outline.	Minor
15) Conductive foreign matter (solder ball, solder hips)	(1) $0.45 < \Phi$, $N \geq 1$ (2) $0.3 < \Phi \leq 0.45$, $N \geq 1$, Φ : Average diameter of solder ball (unit: mm) (3) $0.5 < L$, $N \geq 1$, L: Average length of solder chip (unit: mm)	Minor
16) Bezel flaw	Bezel claw missing or not bent	Minor
17) Indication on name plate (sampling indication label)	(1) Failure to stamp or label error, or not legible.(all acceptable if legible) (2) The separation is more than 1/3 for indication discoloration, in which the characters can be checked.	Minor

6. Handling Precautions

6.1 Mounting method

A panel of LCD module made by our company consists of two thin glass plates with polarizers that easily get damaged.

And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board (PCB), extreme care should be used when handling the LCD modules.

6.2 Cautions of LCD handling and cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.

- Isopropyl alcohol
- Ethyl alcohol
- Trichlorotrifluoroethane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Ketene
- Aromatics

6.3 Caution against static charge

The LCD module uses C-MOS LSI drivers. So we recommend you:

Connect any unused input terminal to V_{dd} or V_{ss} . Do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

6.4 Packaging

- Module employs LCD elements, and must be treated as such. Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity.

6.5 Caution for operation

It is an indispensable condition to drive LCD module within the limits of the specified voltage since the higher voltage over the limits may cause the shorter life of LCD module.

-An electrochemical reaction due to DC (direct current) causes LCD undesirable deterioration so that the uses of DC (direct current) drive should be avoided.

-Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD module may show dark color in them. However those phenomena do not mean malfunction or out of order of LCD module, which will come back in the specified operating temperature.

6.6 Storage

In the case of storing for a long period of time, the following ways are recommended:

- Storage in polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with not desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light is. Keeping the storage temperature range.
- Storing with no touch on polarizer surface by any thing else.

6.7 Safety

-It is recommendable to crush damaged or unnecessary LCD into pieces and to wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.

-When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well at once with soap and water.

7. Packaging Specifications

	<h3>Packaging Specifications</h3> <h4>HTG9664</h4>	Approved	Checked	Designed

7.1 Packaging Material

No	Item	Dimensions (mm)	1PCS Weight (KG)	Quantity	Total Weight
1	COG	28.0*22.3*3.9	0.012	400	4.8
2	PE Bag	60*60	0.001	400	0.4
3	Foam Rubber Cushion	310*170	0.0175	8	0.14
4	Partition A1	310*170*100	0.30	4	1.2
5	Product Box	330*180*120 (neutral packing)	0.45	4	1.8
6	Carton	480*390*330 (neutral packing)	0.9	1	0.9
7	Tape			AR	
8	Label Specifications			1	
9	Label Rohs			1	
10	Label ESD			1	

7.2. Total LCD Weight in carton: 9.5 KG±10%

7.3. Packaging Specifications and Quantity:

(1) Quantity Of Spacer: A1*4

(2) Total LCM quantity in carton: quantity per box 100* no of boxes 4 = 400

