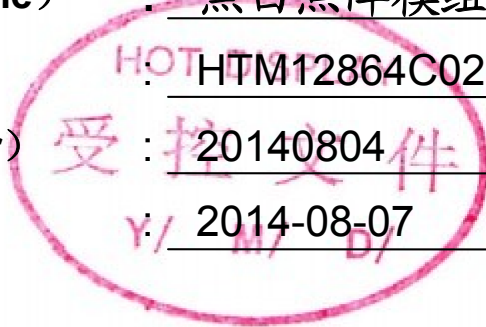




HTM12864C02-31W-N3P

产品名称 (Product name) : 黑白点阵模组
 型号 (Model) : HTM12864C02-31W-N3P
 编号 (Part number) : 20140804
 日期 (Date) : 2014-08-07



深圳市鑫洪泰电子科技有限公司

Shenzhen Hot Display Technology Co.,Ltd

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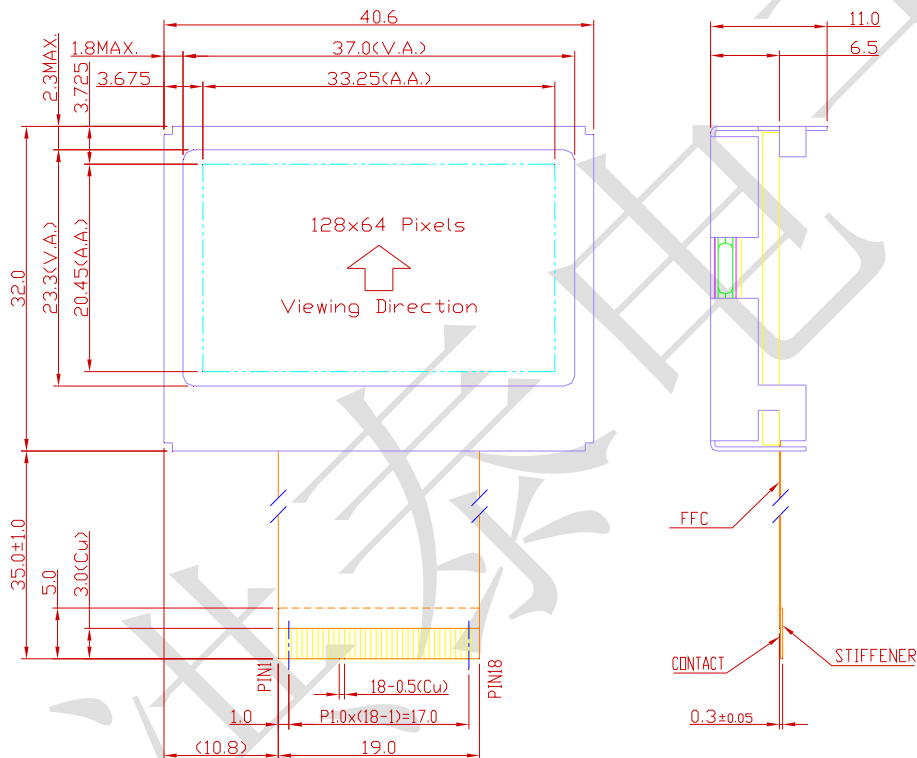
1. Basic Specifications

1.1 Display Specifications

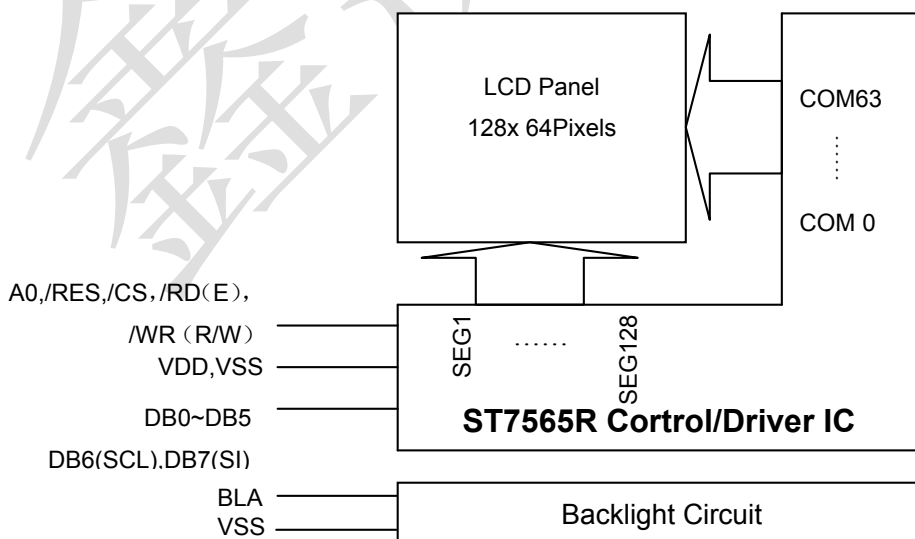
- 1>LCD Display Mode : FSTN, Positive, Transflective
- 2>Viewing Angle : 6H
- 3>Driving Method : 1/64 Duty, 1/9 Bias
- 4 >Backlight : White

1.2 Mechanical Specifications

- 1>Outline Dimension : 40.6X32.0 X 11.0mm (See attached Outline Drawing for Date)



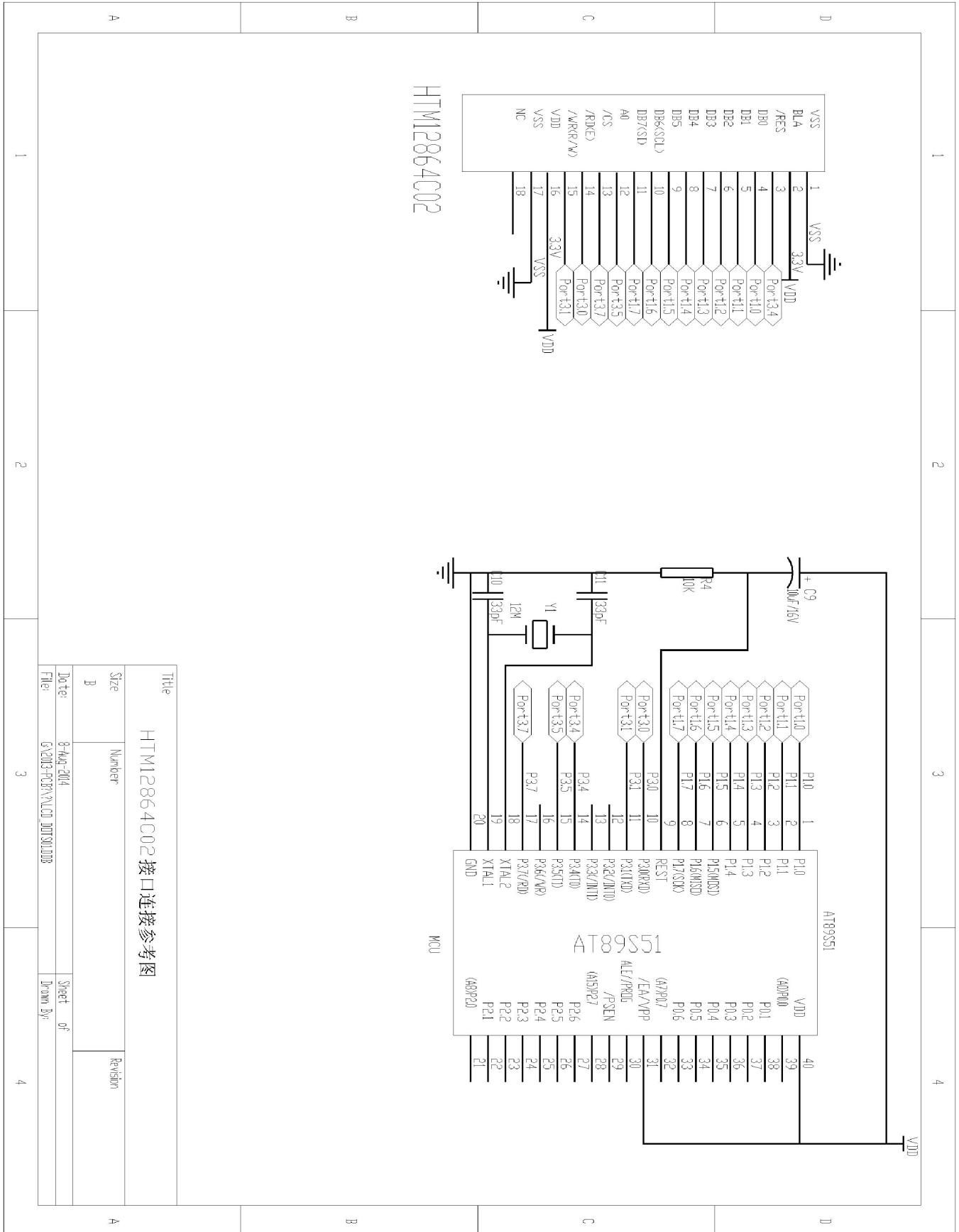
1.3 Circuit Diagram



1.4 Terminal Function

Pin No.	Pin Name	Function
1	VSS	Negative power supply,0V
2	BLA	Power supply voltage (Backlight)
3	/RES	Reset Pin (L->H)
4~11	DB0~DB5 DB6 (SCL) CB7 (SI)	8 bit data bus When the serial interface (SPI-4) is selected (P/S = "L") : D6 : the serial clock input (SCL) D7 : serial data input (SI) ;
12	A0	A0 = "H": Indicates that DB0to DB7 are display data. A0 = "L": Indicates that DB0to DB7 are control data
13	/CS	This is the chip select signal
14	/RE (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.
15	/WR (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.
16	VDD	Power supply voltage(3.3V)
17	VSS	Negative power supply,0V
18	NC	NC

1.6 Schematic Diagram



Title		HTM12864C02 接口连接参考图	
Size	Number	Revision	
B			
Date:	8-Aug-2014	Sheet of	
File:	GV2013-PCB/VLCD_001501.DWG	Drawn By:	

2. Absolute Maximum Ratings

Items	Symbol	MIN.	MAX.	Unit	Condition
Supply Voltage	V _{DD}	2.7	+3.3	V	V _{SS} = 0V
Input Voltage	V _{IN}	-0.3	V _{DD} +0.3	V	V _{SS} = 0V
Operating Temperature	T _{OP}	-10	+60	°C	No Condensation
Storage Temperature	T _{st}	-20	+70	°C	No Condensation

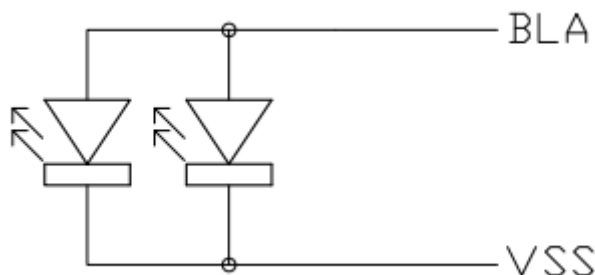
3. Electrical Characteristics

3.1 DC Characteristics

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Operating Voltage	V _{DD}	2.7	3.0	3.3	V	V _{DD}
Input High Voltage	V _{IH}	0.8 x V _{DD}	-	V _{DD}	V	/RES,A0, /RD (E),
Input Low Voltage	V _{IL}	V _{SS}	-	0.2 x V _{DD}	V	/WR (R/W), /CS,
Output High Voltage	V _{OH}	0.8 x V _{DD}	-	V _{DD}	V	DB0~DB7
Output Low Voltage	V _{OL}	V _{SS}	-	0.2 x V _{DD}	V	
Operation Current (Without LED)	I _{op}	100		200	μA	V _{DD} =3.3V
Input Leakage Current	I _{LI}	-1.0	-	1.0	μA	V _{DD}
Output Leakage Current	I _{Lo}	-3.0	-	3.0	μA	V _{DD}

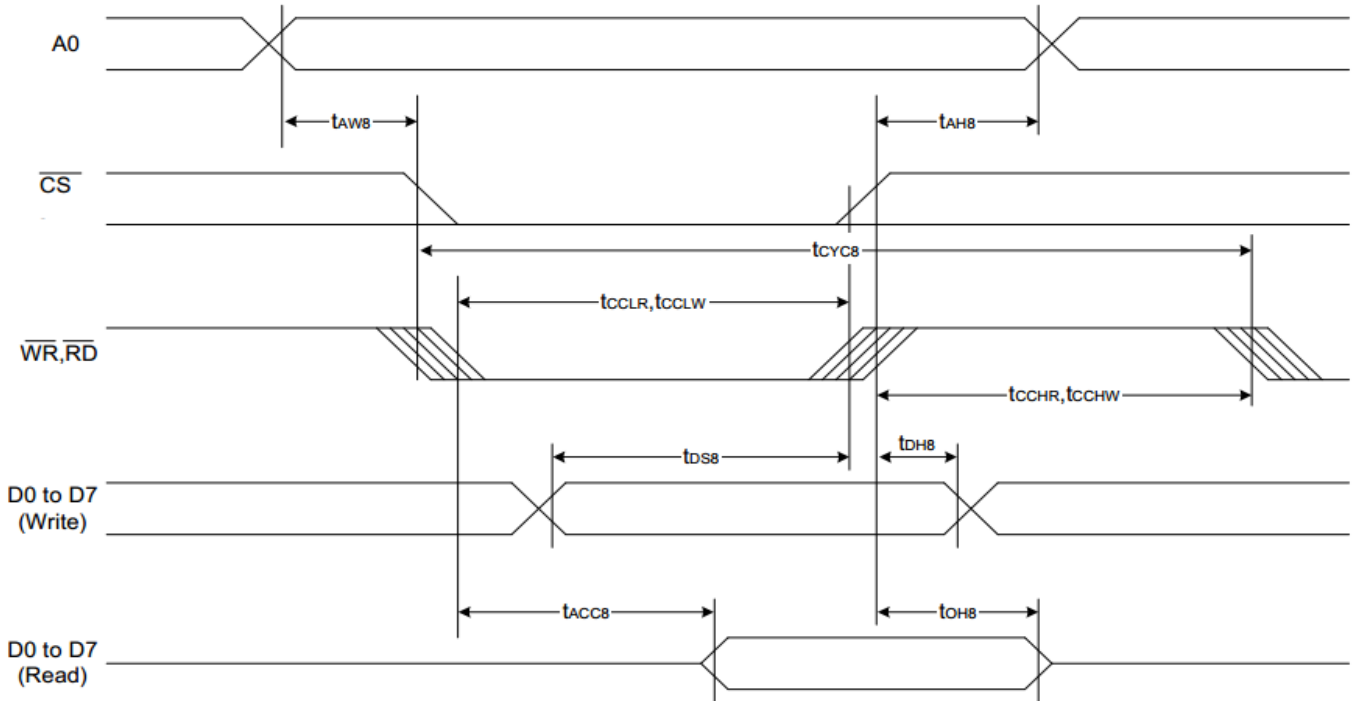
3.2 LED Backlight Circuit

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Forward Voltage	V _f BLA	-	3.3	-	V	-
Forward Current	I _f BLA	-	30	35	mA	-



3.3 AC Characteristics

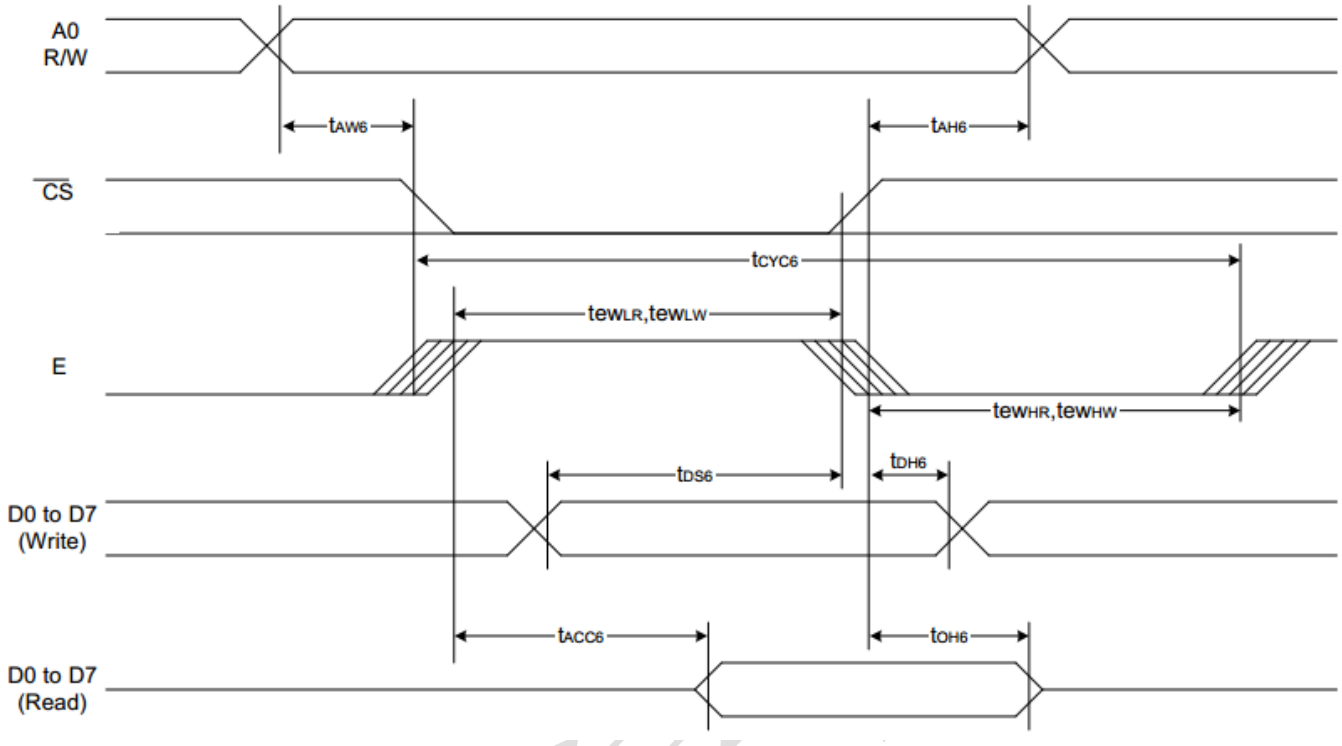
3.3.1 The 8080 Series MPU



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

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH8}		0	—	Ns
Address setup time		t_{AW8}		0	—	
System cycle time		t_{CYC8}		240	—	
Enable L pulse width (WRITE)	WR	t_{CCLW}		80	—	
Enable H pulse width (WRITE)		t_{CCHW}		80	—	
Enable L pulse width (READ)	RD	t_{CCLR}		140	—	
Enable H pulse width (READ)		t_{CCHR}		80	—	
WRITE Data setup time	D0 to D7	t_{DS8}		40	—	
WRITE Address hold time		t_{DH8}		0	—	
READ access time		t_{ACC8}	$C_L = 100$ pF	—	70	
READ Output disable time		t_{OH8}	$C_L = 100$ pF	5	50	

3.3.2 The 6800 Series MPU



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

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH6}		0	—	ns
Address setup time		t_{AW6}		0	—	
System cycle time		t_{CYC6}		240	—	
Enable L pulse width (WRITE)	WR	t_{EWLW}		80	—	
Enable H pulse width (WRITE)		t_{EWHW}		80	—	
Enable L pulse width (READ)	RD	t_{EWLR}		80	—	
Enable H pulse width (READ)		t_{EWHR}		140	—	
WRITE Data setup time	D0 to D7	t_{DS6}		40	—	
WRITE Address hold time		t_{DH6}		0	—	
READ access time		t_{ACC6}	$CL = 100 \text{ pF}$	—	70	
READ Output disable time		t_{OH6}	$CL = 100 \text{ pF}$	5	50	

3.3.3 Serial Mode Interface

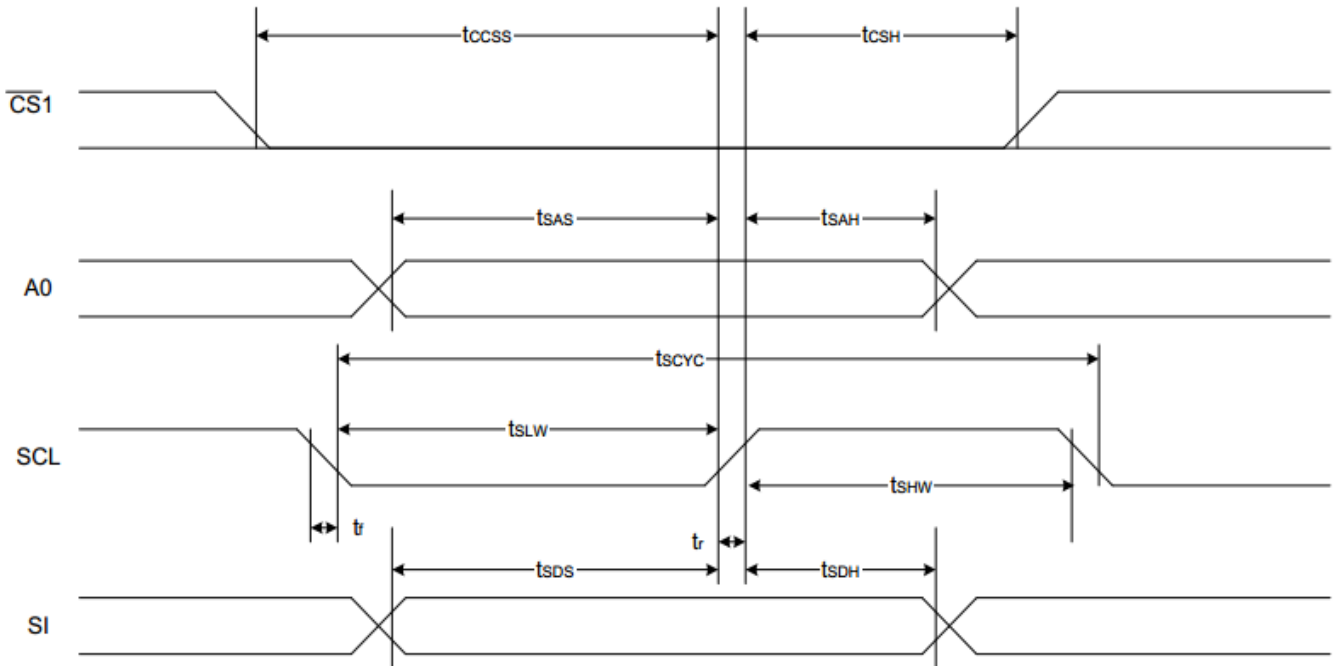


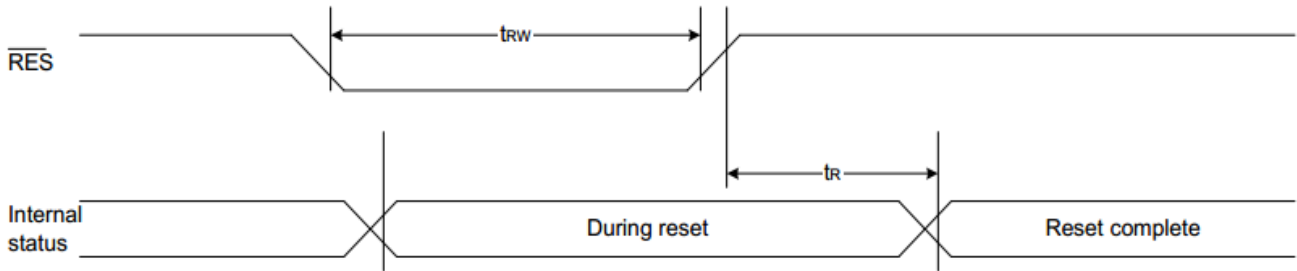
Figure 39

Table 30

(V_{DD} = 3.3V, T_a = -30 to 85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
4-line SPI Clock Period	SCL	T _{scyc}		50	—	ns
SCL "H" pulse width		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	—	

3.4 Rest Timing



(VDD = 3.3V, Ta = -30 to 85°C)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		tr		—	—	1.0	us
Reset "L" pulse width	/RES	trw		1.0	—	—	us

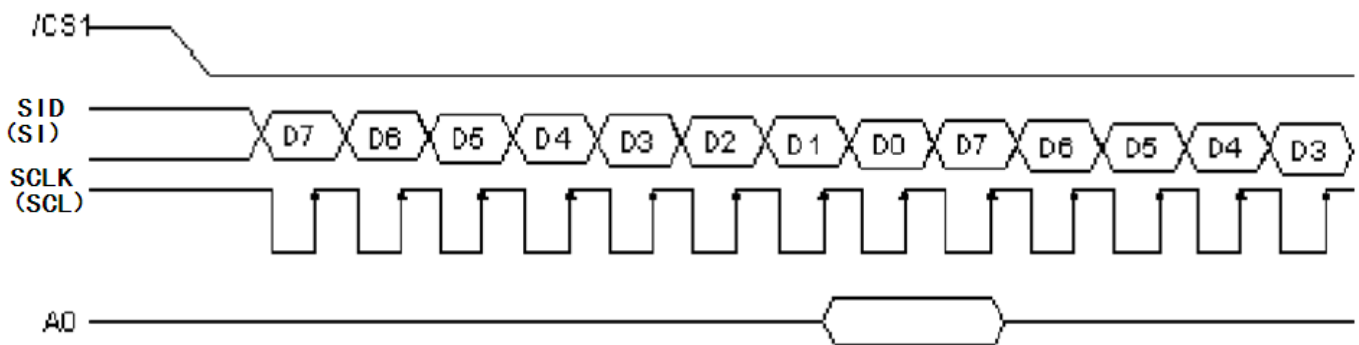
4. Function specifications

4.1 The parallel interface

Shared	6800 Series	8080 Series		Function
	A0	R/W	/RD	
1	1	0	1	Reads the display data
1	0	1	0	Writes the display data
0	1	0	1	Status read
0	0	1	0	Write control data (command)

4.2 The serial Interface

When the serial interface has been selected then when the chip is in active state the serial data input(SI) and the serial clock(SCL) can be received. The serial data is read from the serial data input pin in the rising edge of the serial clock . When "A0"="H", the data is display data, and when "A0"="L", the data is command.



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 = 0(normal)
- 3> LCD Bias Select = 1/9
- 4> Initial Display Line = 1
- 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 bu 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

	COL						
PAGE	SEG0	SEG1	-----	SEG125	SEG126	SEG127	
PAGE0	D7 D0	D7 D0	-----		D7 D0	D7 D0	
PAGE1			Pixels:128X64				
PAGE6							
PAGE7	D7 D0	D7 D0	-----		D7 D0	D7 D0	

4.6 Display Commands

No.	Instrctions	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	1	DON	DON=0,display off DON=1,display on	
2	Display start line set	0	1	0	0	1	Display start address							Set the display RAM display start line address	
3	Set Page Address	0	1	0	1	0	1	1	Page address						Set the display RAM Page address
4	Ser Column Address (Upper-4 bits)	0	1	0	0	0	0	1	Col. Add						Set the upper-4-bit of column address counter
	Ser Column Address (Lower-4 bits)	0	1	0	0	0	0	0	Col. Add						Set the low-4-bit of column address counter
5	Read Staus	0	0	1	Status				0	0	0	0		Read the status data	
6	Write Display Data	1	1	0	Write Data									Write data into the display RAM	
7	Read Display Data	1	0	1	Read Data									Read data from the display RAM	
8	ADC Select	0	1	0	1	0	1	0	0	0	0	0	ADC	Set the display RAM address SEG output Correspondence ADC = 0,Normal. ADC = 1,Reverse	
9	Normal/Reverse Display	0	1	0	1	0	1	0	0	1	1	REV	REV = 0, Normal REV = 1, Reverse		
10	Entire Display ON/OFF	0	1	0	1	0	1	0	0	1	0	EON	EON = 0, Normal EON = 1, Entire display ON		
11	Set LCD Bias	0	1	0	1	0	1	0	0	0	1	BIAS	Bias = 0, 1/9 Bias Bias = 1, 1/7 Bias		
12	Set Read-Modify-Write	0	1	0	1	1	1	0	0	0	0	0		Enter the "Read-Modify-Write" mode	
13	Reset Read-Modify-Write	0	1	0	1	1	1	0	1	1	1	0		Clear the "Read-Modify-Write" mode	
14	Reset	0	1	0	1	1	1	0	0	0	1	0		Resets the LCD module	
15	SHL S elect	0	1	0	1	1	0	0	SHL	*	*	*		Set the COM scanning direction SHL = 0, Normal SHL = 1, Flipped in y-direction * = don't care terms	
16	Power Control Set	0	1	0	0	0	1	0	1	VC	VR	VF		Set the power circuit operation mode VF : LCD Supply Voltage Follower VR : LCD Supply Voltage Regulator VF : LCD Supply Voltage Converter (1 = ON, 0 = OFF)	
17	Regulator Resistor Select	0	1	0	0	0	1	0	0	Ratio				Set the built-in resistor ratio (Rb/Ra)	
18	Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	1		Set reference voltage mode	
	Electronic volume register set	0	1	0	*	*	Electronic Control value						Set reference voltage register		
19	Power Save		-	-	-	-	-	-	-	-	-	-		Compound instruction Display OFF + Entire Display ON	
20	NOP	0	1	0	1	1	1	0	0	0	1	1		Non-operation command	

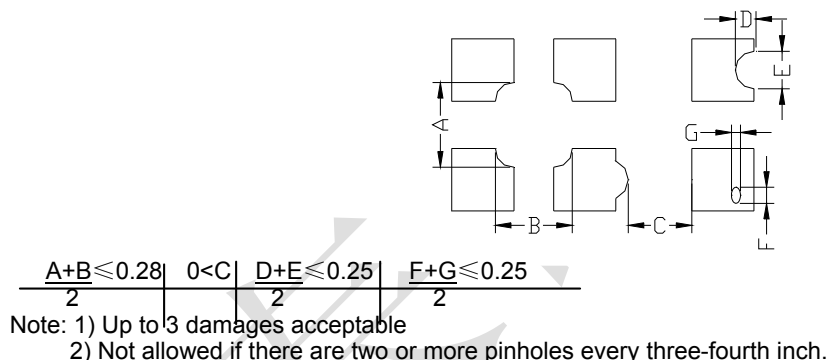
Note:

*a. For the details of the Display Commands, please refer to ST7565R data sheet

4.7 Basic Operating Sequence Initialization Sequence

	Code Function										Note	
	A0	D7	D6	D5	D4	D3	D2	D1	D0	hex		
Turn on Power Supply VDD & VSS While maintaining /RES at LOW	-	-	-	-	-	-	-	-	-	-	-	
Wait until power supply is stabilized	-	-	-	-	-	-	-	-	-	-	-	
Release the /RES Reset Signal (/RES = High)	-	-	-	-	-	-	-	-	-	-	-	See AC Characteristics section for timing details
LCD Bias = 1/9	0	1	0	1	0	0	0	1	0	0	A2H	LCD Characteristics
ADC = Reverse	0	1	0	1	0	0	0	0	0	0	A0H	No flip on x-direction (SEG)
SHL = Reverse	0	1	1	0	0	0	0	0	0	0	C0H	Flip on y- direction (COM)
Initial Display Line = 0	0	0	1	0	0	0	0	0	0	0	40H	i.e. Display RAM "Page 0-D0" Matched to top line of the LCD
Power Control Voltage Follower = OFF Voltage Regulator = OFF Voltage Converter = ON Delay 50ms	0	0	0	1	0	1	1	0	0	0	2CH	Turn on the internal Voltage Converter and wait until VOUT stable
	-	-	-	-	-	-	-	-	-	-	-	
Power Control Voltage Follower = OFF Voltage Regulator = OFF Voltage Converter = ON Delay 50ms	0	0	0	1	0	1	1	1	0	0	2EH	Turn on the internal Voltage Regulator and wait until VOUT stable
	-	-	-	-	-	-	-	-	-	-	-	
Power Control Voltage Follower = OFF Voltage Regulator = OFF Voltage Converter = ON Delay 50ms	0	0	0	1	0	1	1	1	1	0	2FH	Turn on the internal Voltage Follower and wait until VOUT stable
	-	-	-	-	-	-	-	-	-	-	-	
Regulator Resistor Select	0	0	0	1	0	0	1	0	1	0	25H	Set the built-in resistor ratio to middle
Set Reference Voltage Mode Set Reference Voltage Resistor	0	1	0	0	0	0	0	0	1	0	81H	Set to the middle of the range it may be adjusted For achieving the best display contrast
	0	0	0	1	0	0	0	0	0	0	20H	
Display ON	0	1	0	1	0	1	1	1	1	1	AFH	Turn on the LCD display
Set Page Address = 0	0	1	0	1	1	0	0	0	0	0	B0H	Specify the display data RAM page address to 00H
Set Column Address (Upper -4bit = 0) Set Column Address (Lower-4bit =4)	0	0	0	0	1	0	0	0	0	0	10H	Specify the display data RAM column address to 00H
	0	0	0	0	0	0	1	0	0	0	04H	
Write Display Data	1	Display Data									-	
Write Other Display Data												

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 style="text-align: center;"> $\frac{A+B \leq 0.28}{2}$ $0 < C$ $\frac{D+E \leq 0.25}{2}$ $\frac{F+G \leq 0.25}{2}$ </p> <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) $0.3 < \Phi \leq 0.45, N \geq 1, \Phi$: 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

		Packaging Specifications HTM12864C02			Approved	Checked	Designed
6.1 Packaging Material							
No	Item	Dimensions (mm)	IPCS Weight (KG)	Quantity	Total Weight		
1	LCM	40.6*32.2*11.0	0.015	400	6.0		
2	PE Bag	80*80	0.001	400	0.3		
3	Foam Rubber Cushion	310*170	0.0175	8	0.21		
4	Partition A1	310*170*100	0.30	4	1.8		
5	Product Box	330*180*120 (neutral packing)	0.45	4	2.7		
6	Carton	480*390*330 (neutral packing)	1.0	1	1.0		
7	Tape			AR			
8	Label Specifications			1			
9	Label Rohs			1			
10	Label ESD			1			
6.2. Total LCD Weight in carton: 12.0 KG±10%							
6.3. 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							
<p>1 此4隔不放产品 每隔断装4PCS产品 每小盒装100pcs产品</p> <p>2 每个PE袋装1pcs产品, 封口。 防静电PE袋</p> <p>3 刀片上下均放置一张珍珠棉</p> <p>4 一个外包装箱装4个内包装箱。</p> <p>5 一个外包装箱装4个内包装箱。 如果内箱与外箱间隙过大, 可以填充适当珍珠棉填充。</p>							