



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



NHD-C12864MZ-NSW-BTW

COG (Chip-On-Glass) Liquid Crystal Display Module

NHD-	Newhaven Display
C12864-	128 x 64 pixels
MZ-	Model
N-	Transmissive
SW-	Side White LED backlight
B-	STN- Blue (-)
T-	12:00 view
W-	Wide Temp (-20°C ~ +70°C)
	RoHS Compliant

Newhaven Display International, Inc.

2511 Technology Drive, Suite 101

Elgin IL, 60124

Ph: 847-844-8795

Fax: 847-844-8796

www.newhavendisplay.com

nhtech@newhavendisplay.com

nhsales@newhavendisplay.com

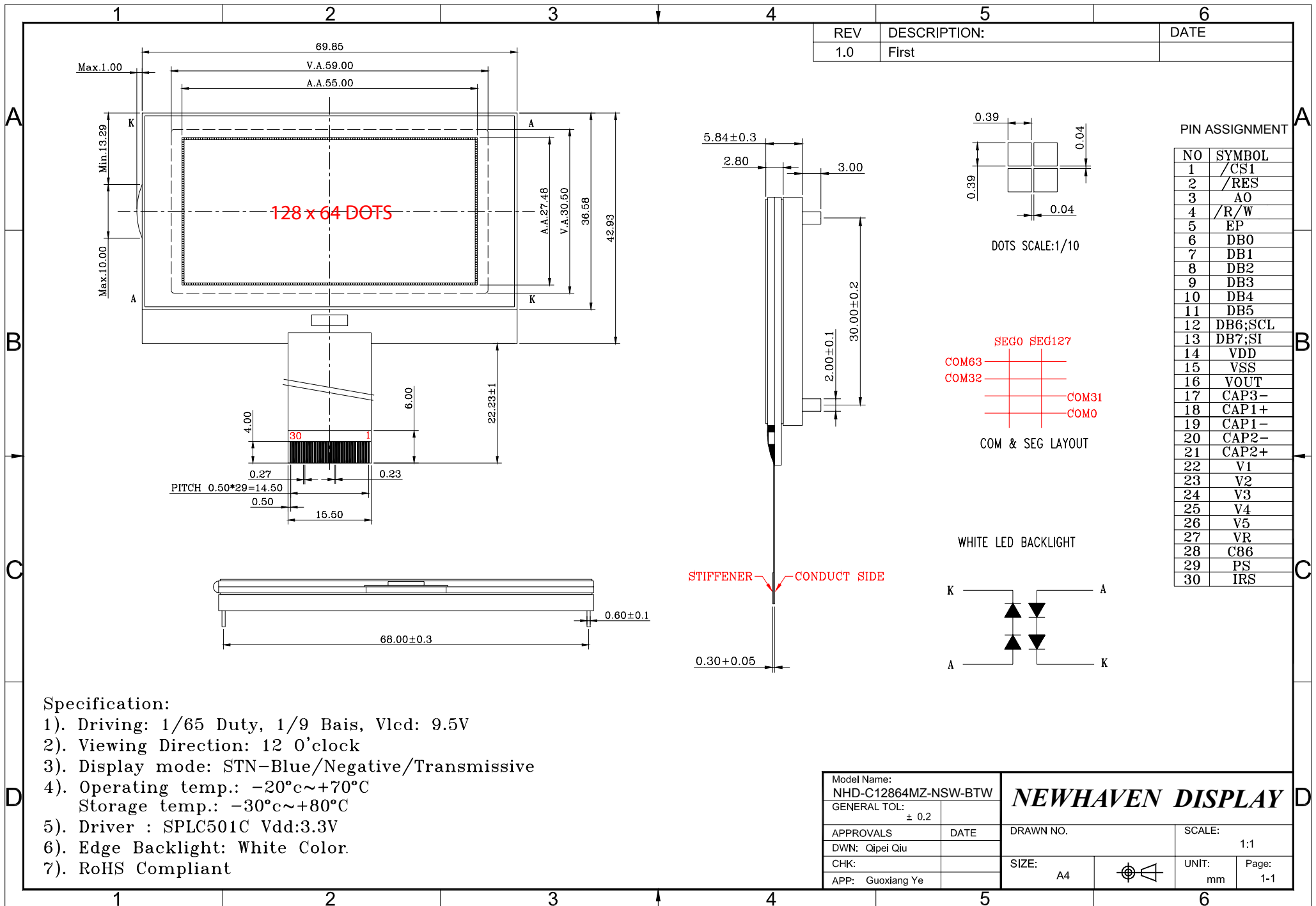
Document Revision History

Revision	Date	Description	Changed by
0	9/1/2008	Initial Release	-
1	9/28/2009	User guide reformat	BE
2	10/13/2009	Updated Pin Description and Electrical Characteristic	MC
3	11/20/2009	Updated backlight supply current	MC

Functions and Features

- 128 x 64 pixels
- Built-in SPLC501C controller
- +3.3V power supply
- 1/65 duty cycle; 1/9 bias
- RoHS Compliant

Mechanical Drawing



REV	DESCRIPTION:	DATE
1.0	First	

PIN ASSIGNMENT

NO	SYMBOL
1	/CS1
2	/RES
3	A0
4	/R/W
5	EP
6	DB0
7	DB1
8	DB2
9	DB3
10	DB4
11	DB5
12	DB6;SCL
13	DB7;SI
14	VDD
15	VSS
16	VOUT
17	CAP3-
18	CAP1+
19	CAP1-
20	CAP2-
21	CAP2+
22	V1
23	V2
24	V3
25	V4
26	V5
27	VR
28	C86
29	PS
30	IRS

Specification:

- 1). Driving: 1/65 Duty, 1/9 Bais, Vlcd: 9.5V
- 2). Viewing Direction: 12 O'clock
- 3). Display mode: STN-Blue/Negative/Transmissive
- 4). Operating temp.: -20°C~+70°C
Storage temp.: -30°C~+80°C
- 5). Driver : SPLC501C Vdd:3.3V
- 6). Edge Backlight: White Color.
- 7). RoHS Compliant

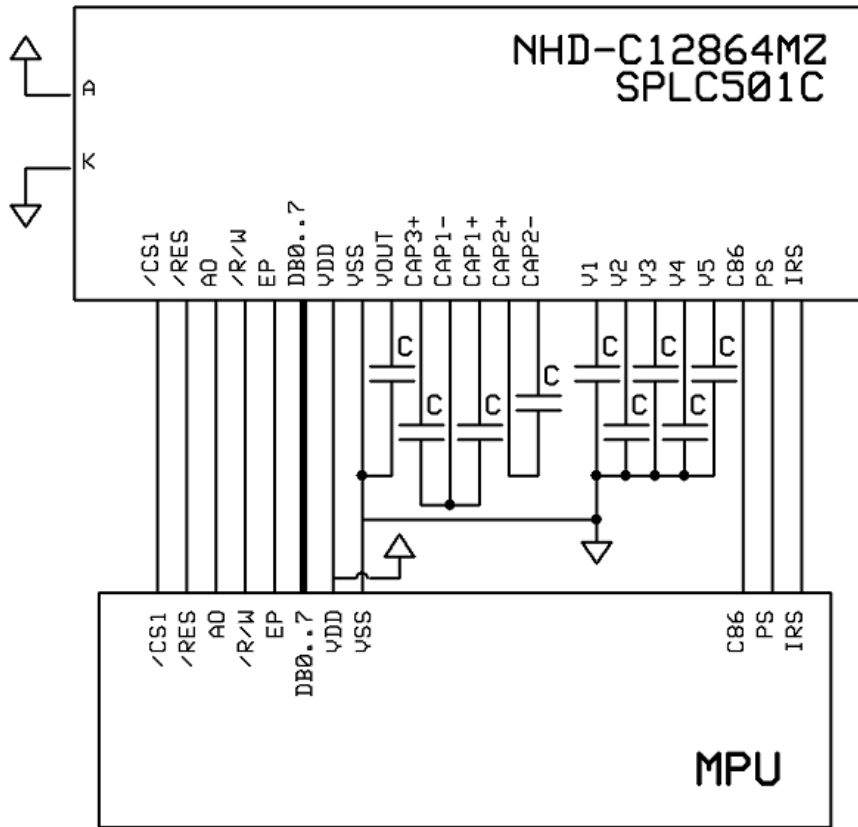
Model Name: NHD-C12864MZ-NSW-BTW		NEWHAVEN DISPLAY	
GENERAL TOL: ± 0.2		DRAWN NO.	
APPROVALS	DATE	SCALE: 1:1	
DWN: Qipei Qiu		SIZE: A4	UNIT: mm
CHK:			Page: 1-1
APP: Guoxiang Ye			

Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description	
1	/CS1	MPU	Active LOW chip select	
2	/RES	MPU	Active LOW Reset signal	
3	A0	MPU	Register select signal. 0: instruction; 1: data	
4	R/W	MPU	Read/write select signal. R/W=1: Read R/W=0: Write	
5	EP	MPU	Operation enable signal. Falling edge triggered.	
6	DB0	MPU	Parallel Interface DB0-DB7: Bi-directional 8-bit data bus Serial Interface: DB0-DB5: No connect in serial mode DB6= Serial clock (SCL) DB7= Serial data input (SI)	
7	DB1	MPU		
8	DB2	MPU		
9	DB3	MPU		
10	DB4	MPU		
11	DB5	MPU		
12	DB6	MPU		
13	DB7	MPU		
14	VDD	Power Supply		Power supply for LCD and logic (+3.3V)
15	VSS	Power Supply		Ground
16	VOUT	Power Supply		Connect to 1uF cap to VSS
17	CAP3-	Power Supply		Connect to 1uF cap to CAP1+ (PIN-18)
18	CAP1+	Power Supply		Connect to 1uF cap to CAP3-(PIN17) and CAP1-(PIN19)
19	CAP1-	Power Supply	Connect to 1uF cap to CAP1+ (PIN-18)	
20	CAP2-	Power Supply	Connect to 1uF cap to CAP2+ (PIN-21)	
21	CAP2+	Power Supply	Connect to 1uF cap to CAP2- (PIN-20)	
22	V1	Power Supply	1.0uF-2.2uF cap to VSS	
23	V2	Power Supply	1.0uF-2.2uF cap to VSS	
24	V3	Power Supply	1.0uF-2.2uF cap to VSS	
25	V4	Power Supply	1.0uF-2.2uF cap to VSS	
26	V5	Power Supply	1.0uF-2.2uF cap to VSS	
27	VR	-	No Connect	
28	C86	MPU	Select MPU interface pin. C86=H: 6800; C86=L: 8080	
29	PS	MPU	Parallel/Serial select. PS= H: Parallel; PS=L: Serial	
30	IRS	MPU	Internal resistor select (high to use internal resistors)	
A		Power Supply	Power supply for LED Backlight (+6.0V)	
K		Power Supply	Ground for Backlight	

Recommended LCD connector: 0.5mm Pitch, 30 pin FFC. Molex p/n: 52892-3095

Backlight connector: -- **Mates with:** --



Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	TOP	Absolute Max	-20	-	+70	°C
Storage Temperature Range	TST	Absolute Max	-30	-	+80	°C
Supply Voltage	VDD		3.0	3.3	3.5	V
Supply Current	IDD	Ta=25°C, VDD=3.3V	-	1.5	2.5	mA
Supply for LCD (contrast)	VDD-V0	Ta=25°C	-	9.5	-	V
"H" Level input	Vih		2.2	-	VDD	V
"L" Level input	Vil		0	-	0.6	V
"H" Level output	Voh		2.4	-	-	V
"L" Level output	Vol		-	-	0.4	V
LED Backlight voltage	VLED		-	6.0	-	V
LED Backlight current	ILED	VLED=6.0V	-	30	45	mA

Optical Characteristics

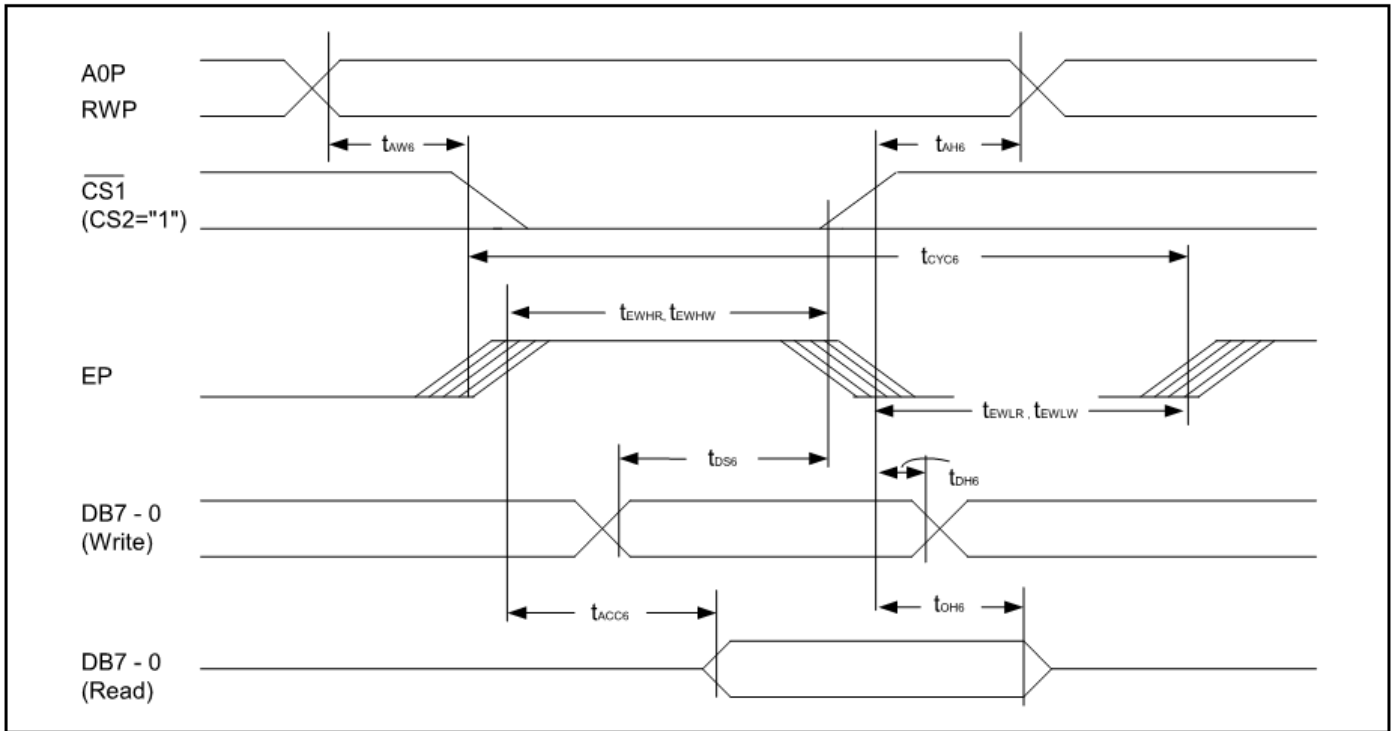
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle - Vertical	θ	CR \geq 2	-25	-	-	°
Viewing Angle - Horizontal	Φ	CR \geq 2	-30	-	+30	°
Contrast Ratio	CR		-	2	-	-
Response Time (rise)	Tr		-	120	150	ms
Response Time (fall)	Tf		-	120	150	ms

Controller Information

Built-in SPLC501C. Download specification at http://www.newhavendisplay.com/app_notes/SPLC501C.pdf

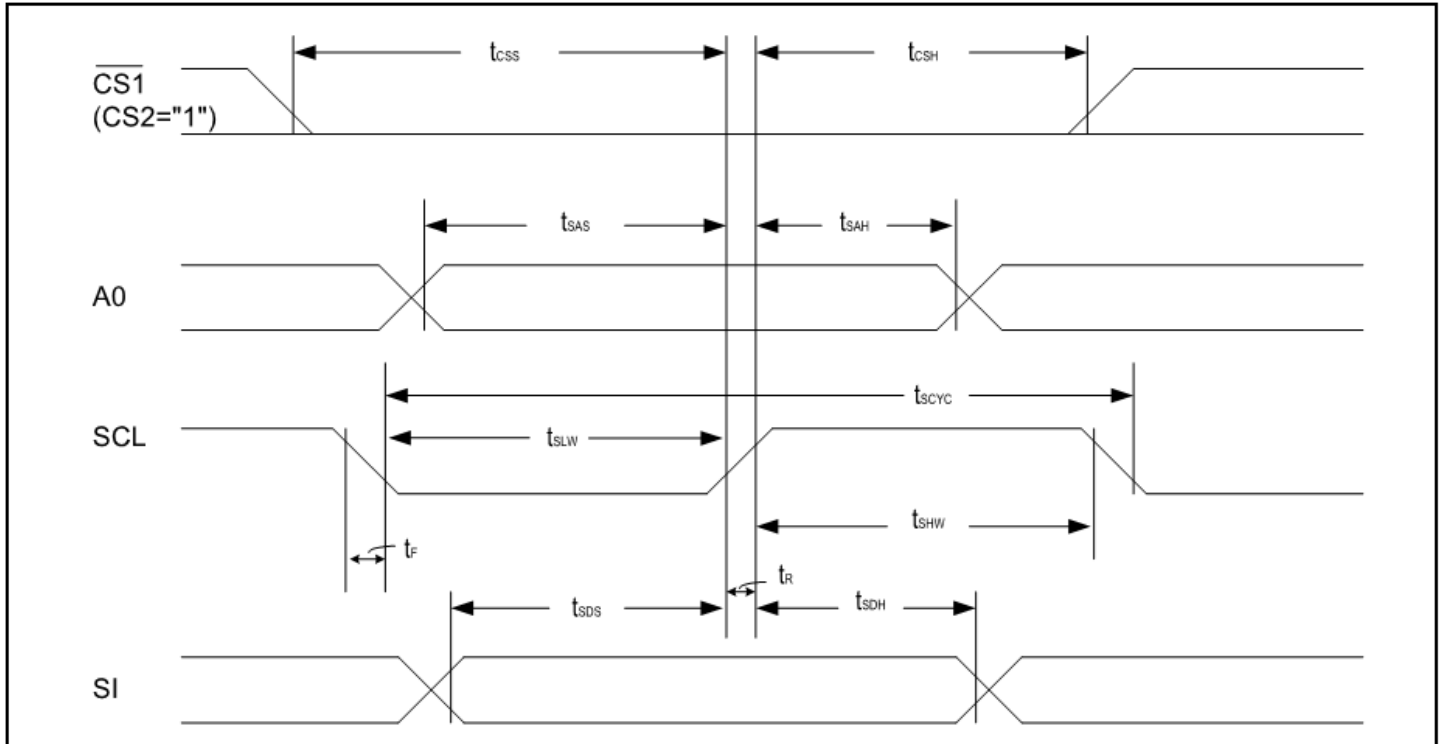
Timing Characteristics

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



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0P	t_{AH6}		0	-	ns
Address setup time	A0P	t_{AW6}		0	-	ns
System cycle time	A0P	t_{CYC6}		166	-	ns
Data setup time	DB7 - 0	t_{DS6}	$C_L = 100pF$	30	-	ns
Data hold time		t_{DH6}		10	-	ns
Access time		t_{ACC6}		-	70	ns
Output disable time		t_{OH6}		10	50	ns
Enable H pulse time	Read	EP		70	-	ns
	Write			t_{EWHW}	30	-
Enable L pulse time	Read	EP		30	-	ns
	Write			t_{EWLW}	30	-

The Serial Interface:



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period		t_{SCYC}	-	200	-	ns
SCL 'H' pulse width	SCL	t_{SHW}	-	75	-	ns
SCL 'L' pulse width		t_{SLW}	-	75	-	ns
Address setup time	A0P	t_{SAS}	-	50	-	ns
Address hold time		t_{SAH}	-	100	-	ns
Data setup time	SI	t_{SDS}	-	50	-	ns
Data hold time		t_{SDH}	-	50	-	ns
CS-SCL time	CS	t_{CSS}	-	100	-	ns
		t_{CSH}	-	100	-	ns

Table of Commands

Command	Command Code											Function	
	A0P	RD	WR	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
1). Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0	LCD display ON/OFF 0: OFF, 1: ON	
2). Display start line set	0	1	0	0	1	Display start address					1	Sets the display RAM display start line address	
3). Page address set	0	1	0	1	0	1	1	Page address				1	Sets the display RAM page address
4). Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				1	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				1	Set the least significant 4 bits of the display RAM column address.
5). Status read	0	0	1	Status				0	0	0	0	1	Reads the status data
6). Display data write	1	1	0	Write data								1	Writes to the display RAM
7). Display data read	1	0	1	Read data								1	Reads from the display RAM
8). ADC select	0	1	0	1	0	1	0	0	0	0	0	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	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	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	Sets the LCD driver voltage bias ratio SPLC501C.....0:1/9, 1:1/7	
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 _S 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 _S output voltage electronic volume register	
Electronic volume register set	0	1	0	*	*	Electronic volume value							

Command	Command Code											Function
	A0P	\overline{RD}	\overline{WR}	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	
19). Static indicator ON/OFF Static indicator Register set				1	0	1	0	1	1	0	0	0: OFF, 1: ON 1 Set the flashing mode
20). Page Blink Page selection	0	1	0	1	1	0	1	0	1	0	1	P7 - 0: 1 - blinking page 0 - no blinking, normal display
21). Driving Mode Set Mode selection	0	1	0	1	1	0	1	0	0	1	0	Set the driving mode register Driving capability (D1, D0): (1,1)>(0,0)>(0,1)>(1,0)
22). Power saver												Display OFF and display all points ON compound command
23). NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation
24). Test	0	1	0	1	1	1	1	*	*	*	*	Command for IC test. Do not use this command

Example Initialization Program

```
'-----  
Sub Init  
Reset P3.7          'set Read/write to '0' for write  
Reset P3.0          'RS  
Set P3.1            'reset  
Reset P3.4 'E  
'Set P3.3  
'Reset P3.3  
Waitms 2  
'Set P3.3  
Waitms 20  
A = &HA2            '1/9 BIAS  
Call Writecom  
A = &HA0            'ADC SELECT , NORMAL  
Call Writecom  
A = &HC8            'COM OUTPUT REVERSE  
Call Writecom  
A = &HA4            'DISPLAY ALL POINTS NORMAL  
Call Writecom  
A = &H40            'DISPLAY START LINE SET  
Call Writecom  
A = &H25            'INTERNAL RESISTOR RATIO  
Call Writecom  
A = &H81            'ELECTRONIC VOLUME MODE SET  
Call Writecom  
A = &H10            'ELECTRONIC VOLUME  
Call Writecom  
A = &H2F            'POWER CONTROLLER SET  
Call Writecom  
A = &HAF            'DISPLAY ON  
Call Writecom  
End Sub
```

```
'-----  
Sub Writecom  
Reset P3.0          'A0 low  
Reset P3.7          'R/W low  
Set P3.6            'CS1  
Set P3.4            'E  
P1 = A  
Reset P3.4  
Reset P3.6  
Reset P3.7  
End Sub
```

```
Sub Writedata  
Set P3.0            'A0 high  
Reset P3.7          'R/W low  
Set P3.6            'CS1  
Set P3.4            'E  
P1 = A  
Reset P3.4  
Reset P3.6  
Reset P3.7  
End Sub  
'-----
```

Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+80°C , 48hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C , 48hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C 48hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 48hrs	1,2
High Temperature / Humidity Operation	Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time.	+40°C , 90% RH , 48hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-0°C,30min -> 25°C,5min -> 50°C,30min = 1 cycle 10 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-55Hz , 15mm amplitude. 60 sec in each of 3 directions X,Y,Z For 15 minutes	3
Static electricity test	Endurance test applying electric static discharge.	VS=800V, RS=1.5kΩ, CS=100pF One time	

Note 1: No condensation to be observed.

Note 2: Conducted after 4 hours of storage at 25°C, 0%RH.

Note 3: Test performed on product itself, not inside a container.

Precautions for using LCDs/LCMs

See Precautions at www.newhavendisplay.com/specs/precautions.pdf

Warranty Information and Terms & Conditions

http://www.newhavendisplay.com/index.php?main_page=terms