

# NHD-0108HZ-FSW-GBW

## Character Liquid Crystal Display Module

NHD- Newhaven Display  
0108- 1 line x 8 characters  
HZ- Model  
F- Transflective  
SW- Side White LED Backlight  
G- STN- Gray  
B- 6:00 view  
W- Wide Temperature (-20°C~+70°C)  
**RoHS Compliant**

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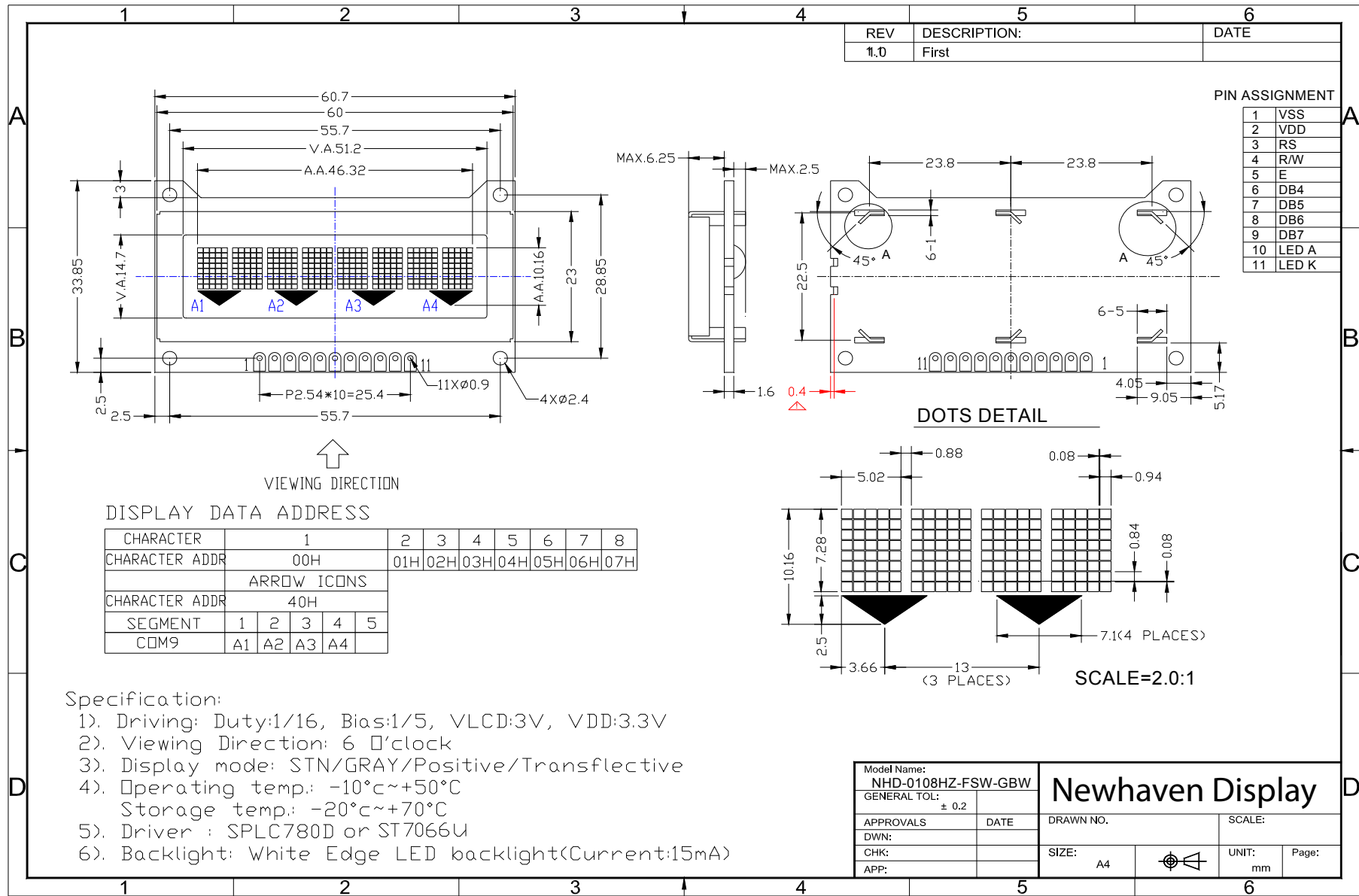
## Document Revision History

Revision	Date	Description	Changed by
0	5/10/2007	Initial Release	-
1	10/2/2009	User Guide Reformat	BE
2	10/16/2009	Block Diagram Revision	BE
3	10/19/2009	Mechanical Drawing Revision	BE
4	11/25/2009	Block Diagram Revision	BE
5	12/22/2009	Optical revised	BE
6	6/17/2010	Mechanical Drawing Correction ->11pin holes Updated backlight supply voltage from 3.3V to 3.0V	MC
7	1/5/2011	Alternate controller information updated	AK

## Functions and Features

- 1 line x 8 characters
- Built-in controller (SPLC780D or ST7066U)
- 3.3V power supply
- 1/16 duty, 1/5 bias
- RoHS compliant

# Mechanical Drawing



REV	DESCRIPTION:	DATE
1.0	First	

**PIN ASSIGNMENT**

1	VSS
2	VDD
3	RS
4	R/W
5	E
6	DB4
7	DB5
8	DB6
9	DB7
10	LED A
11	LED K

**DISPLAY DATA ADDRESS**

CHARACTER	1	2	3	4	5	6	7	8
CHARACTER ADDR	00H	01H	02H	03H	04H	05H	06H	07H
	ARROW ICONS							
CHARACTER ADDR	40H							
SEGMENT	1	2	3	4	5			
COM9	A1	A2	A3	A4				

**Specification:**

- 1). Driving: Duty:1/16, Bias:1/5, VLCD:3V, VDD:3.3V
- 2). Viewing Direction: 6 o'clock
- 3). Display mode: STN/GRAY/Positive/Transflective
- 4). Operating temp: -10°C~+50°C  
Storage temp: -20°C~+70°C
- 5). Driver : SPLC780D or ST7066U
- 6). Backlight: White Edge LED backlight(Current:15mA)

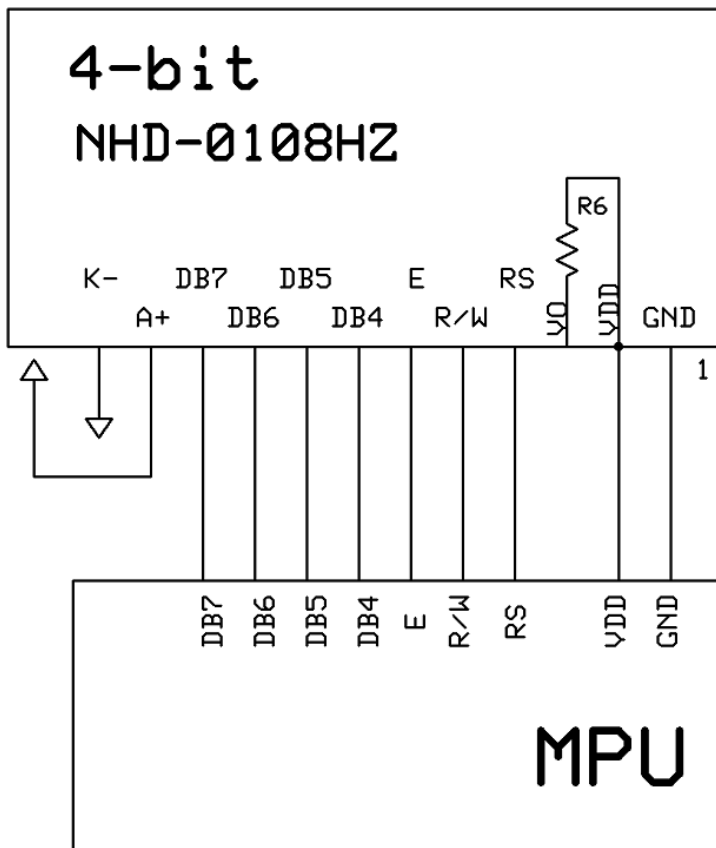
Model Name: NHD-0108HZ-FSW-GBW		<b>Newhaven Display</b>	
GENERAL TOL: ± 0.2			
APPROVALS	DATE	DRAWN NO.	SCALE:
DWN:			
CHK:		SIZE: A4	UNIT: mm
APP:			Page:

## Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	VSS	Power Supply	Ground
2	VDD	Power Supply	Supply Voltage for logic (+3.3V)
3	RS	MPU	Register select signal. RS=0: Command, RS=1: Data
4	R/W	MPU	Read/Write select signal, R/W=1: Read R/W: =0: Write
5	E	MPU	Operation enable signal. Falling edge triggered.
6-9	DB4-DB7	MPU	Four high order bi-directional three-state data bus lines.
10	LED+	Power Supply	Power supply for LED Backlight (+3.0V)
11	LED-	Power Supply	Ground for Backlight

**Recommended LCD connector:** 2.54mm pitch pins

**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		3.1	3.3	3.5	V
Supply Current	IDD	Ta=25°C, VDD=3.3V	-	1.0	1.5	mA
Supply for LCD (contrast)	VDD-V0	Ta=25°C	-	3.0	-	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
Backlight Supply Voltage	Vled	-	-	3.0	-	V
Backlight Supply Current	Iled	Vled=3.0V	-	15	-	mA

## Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle - Vertical (top)	AV	Cr ≥ 2	-	25	-	°
Viewing Angle – Vertical (bottom)	AV	Cr ≥ 2	-	70	-	°
Viewing Angle – Horizontal (left)	AH	Cr ≥ 2	-	30	-	°
Viewing Angle – Horizontal (right)	AH	Cr ≥ 2	-	30	-	°
Contrast Ratio	Cr		-	2	-	-
Response Time (rise)	Tr	-	-	120	150	ms
Response Time (fall)	Tf	-	-	120	150	ms

## Controller Information

Built-in SPLC780D. Download specification at [http://www.newhavendisplay.com/app\\_notes/SPLC780D.pdf](http://www.newhavendisplay.com/app_notes/SPLC780D.pdf)

Built-in ST7066U. Download specification at [http://www.newhavendisplay.com/app\\_notes/ST7066U.pdf](http://www.newhavendisplay.com/app_notes/ST7066U.pdf)

Display Position	1	2	3	4	5	6	7	8
DDRAM address	00H	01H	02H	03H	04H	05H	06H	07H

Segment	1	2	3	4
DDRAM address	40H-A1	40H-A2	40H-A3	40H-A4

## Built-in Font Table

Upper 4 Bits Lower 4 Bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxxx0000	CG RAM (1)			0	a	P	`	P				-	夕	ミ	&	P
xxxx0001	(2)		!	1	A	Q	a	q			。	ア	チ	厶	ö	q
xxxx0010	(3)		"	2	B	R	b	r			「	イ	ツ	×	ß	θ
xxxx0011	(4)		#	3	C	S	c	s			」	ウ	テ	モ	ε	∞
xxxx0100	(5)		\$	4	D	T	d	t			、	エ	ト	ト	μ	Ω
xxxx0101	(6)		%	5	E	U	e	u			・	オ	ナ	1	ε	ü
xxxx0110	(7)		&	6	F	V	f	v			ヲ	カ	ニ	ヨ	ρ	Σ
xxxx0111	(8)		'	7	G	W	g	w			フ	キ	ヌ	ラ	g	π
xxxx1000	(1)		(	8	H	X	h	x			イ	ク	ネ	リ	√	×
xxxx1001	(2)		)	9	I	Y	i	y			ウ	ケ	ル	ル	´	y
xxxx1010	(3)		*	:	J	Z	j	z			エ	コ	ハ	レ	j	≠
xxxx1011	(4)		+	;	K	[	k	<			オ	サ	ヒ	ロ	*	≠
xxxx1100	(5)		,	<	L	¥	l	l			カ	シ	フ	ワ	φ	≠
xxxx1101	(6)		-	=	M	]	m	>			ユ	ス	ハ	ン	も	÷
xxxx1110	(7)		.	>	N	^	n	→			ヨ	セ	ホ	°	ñ	
xxxx1111	(8)		/	?	O	_	o	←			ッ	ソ	マ	°	ö	■

## Example Initialization Program

```
4-bit Initialization:
/*****/
void command(char i)
{
    P1 = i;                //put data on output Port
    D_I =0;                //D/I=LOW : send instruction
    R_W =0;                //R/W=LOW : Write
    Nybble();              //Send lower 4 bits
    i = i<<4;              //Shift over by 4 bits
    P1 = i;                //put data on output Port
    Nybble();              //Send upper 4 bits
}
/*****/
void write(char i)
{
    P1 = i;                //put data on output Port
    D_I =1;                //D/I=HIGH : send data
    R_W =0;                //R/W=LOW : Write
    Nybble();              //Clock lower 4 bits
    i = i<<4;              //Shift over by 4 bits
    P1 = i;                //put data on output Port
    Nybble();              //Clock upper 4 bits
}
/*****/
void Nybble()
{
    E = 1;
    Delay(1);              //enable pulse width >= 300ns
    E = 0;                 //Clock enable: falling edge
}
/*****/
void init()
{
    P1 = 0;
    P3 = 0;
    Delay(100);            //Wait >15 msec after power is applied
    P1 = 0x30;             //put 0x30 on the output port
    Delay(30);             //must wait 5ms, busy flag not available
    Nybble();              //command 0x30 = Wake up
    Delay(10);             //must wait 160us, busy flag not available
    Nybble();              //command 0x30 = Wake up #2
    Delay(10);             //must wait 160us, busy flag not available
    Nybble();              //command 0x30 = Wake up #3
    Delay(10);             //can check busy flag now instead of delay
    P1= 0x20;              //put 0x20 on the output port
    Nybble();              //Function set: 4-bit interface
    command(0x28);         //Function set: 4-bit/2-line
    command(0x10);         //Set cursor
    command(0x0F);         //Display ON; Blinking cursor
    command(0x06);         //Entry Mode set
}
/*****/
```

## 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](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information and Terms & Conditions

[http://www.newhavendisplay.com/index.php?main\\_page=terms](http://www.newhavendisplay.com/index.php?main_page=terms)





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#### Как с нами связаться

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