

NHD-C12832A1Z-NSW-BBW-3V3

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

NHD-	Newhaven Display
C12832-	128 x 32 Pixels
A1Z-	Model
N-	Transmissive
SW-	Side White LED Backlight
B-	STN Negative, Blue
B-	6:00 Optimal View
W-	Wide Temp
3V3-	3V _{DD} , 3V Backlight
	RoHS Compliant

Newhaven Display International, Inc.

2661 Galvin Ct.

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	11/12/08	Initial Release	-
1	5/18/09	User guide reformat	BE
2	10/12/09	Updated Electrical Characteristic	MC
3	5/6/13	Electrical and Optical characteristics updated. Pin description, wiring diagram, mechanical drawing page and example initialization program updated.	JN
4	1/26/17	Mechanical Drawing, Electrical & Optical Char. Updated	SB
5	7/5/19	Added PCB Footprint Drawing	AS
6	9/19/19	Alternative Glass Supplier, Backlight Supply Current Updated	SB
7	6/17/20	Updated 2D Mechanical Drawing & Quality Information	AS

Functions and Features

- 128 x 32 pixels
- 4-line SPI MPU interfaces
- Built-in ST7565R controller
- 3V power supply
- 1/33 duty cycle; 1/6 bias
- RoHS Compliant

A

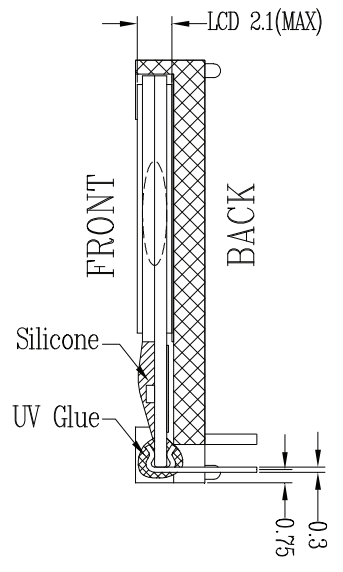
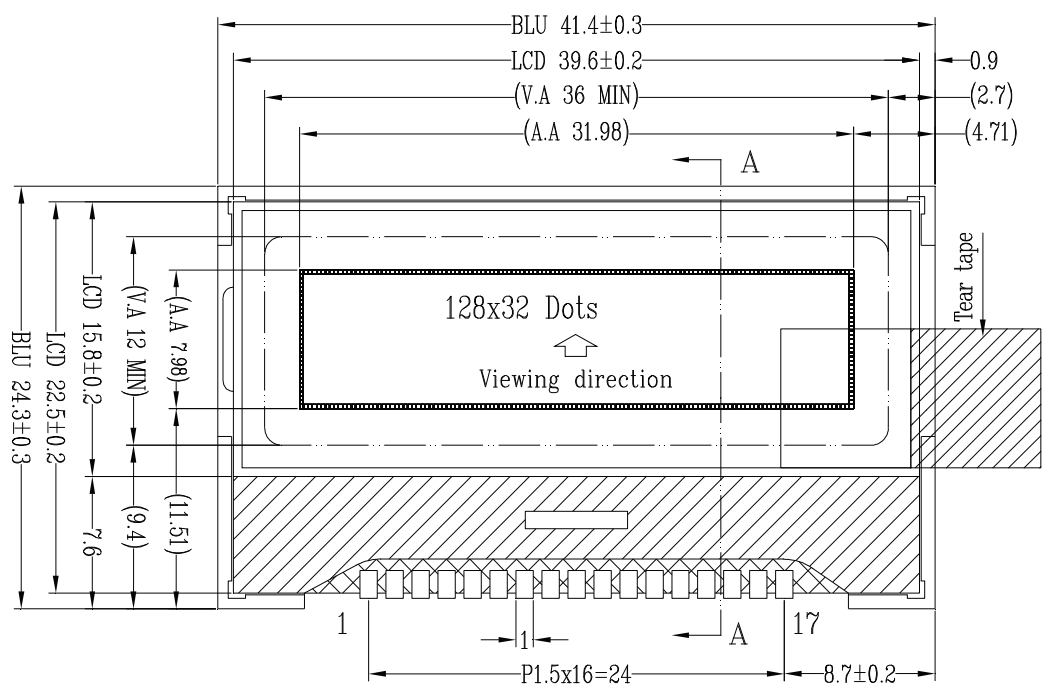
B

C

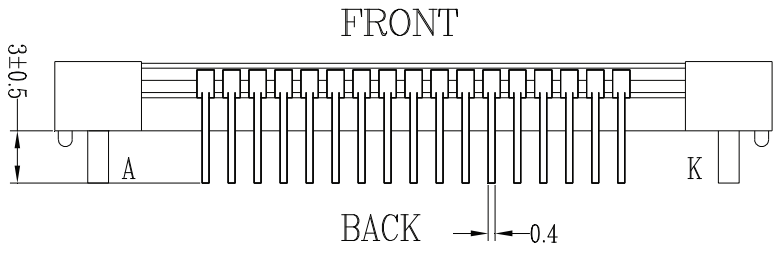
D

E

F



SECTION A-A



- Notes:**
- 1. Driver: 1/33 Duty, 1/6 Bias
 - 2. Voltage: 3.0V V_{DD}, 6V V_{LCD}
 - 3. Display Type: STN Negative / Blue / Transmissive
 - 4. Optimal View: 6:00
 - 5. Backlight: White LED
 - 6. Driver IC: ST7565R 4-Wire SPI

1

2

3

4

FRONT

COM

CO

CO

↑

A Recommended PCB Footprint

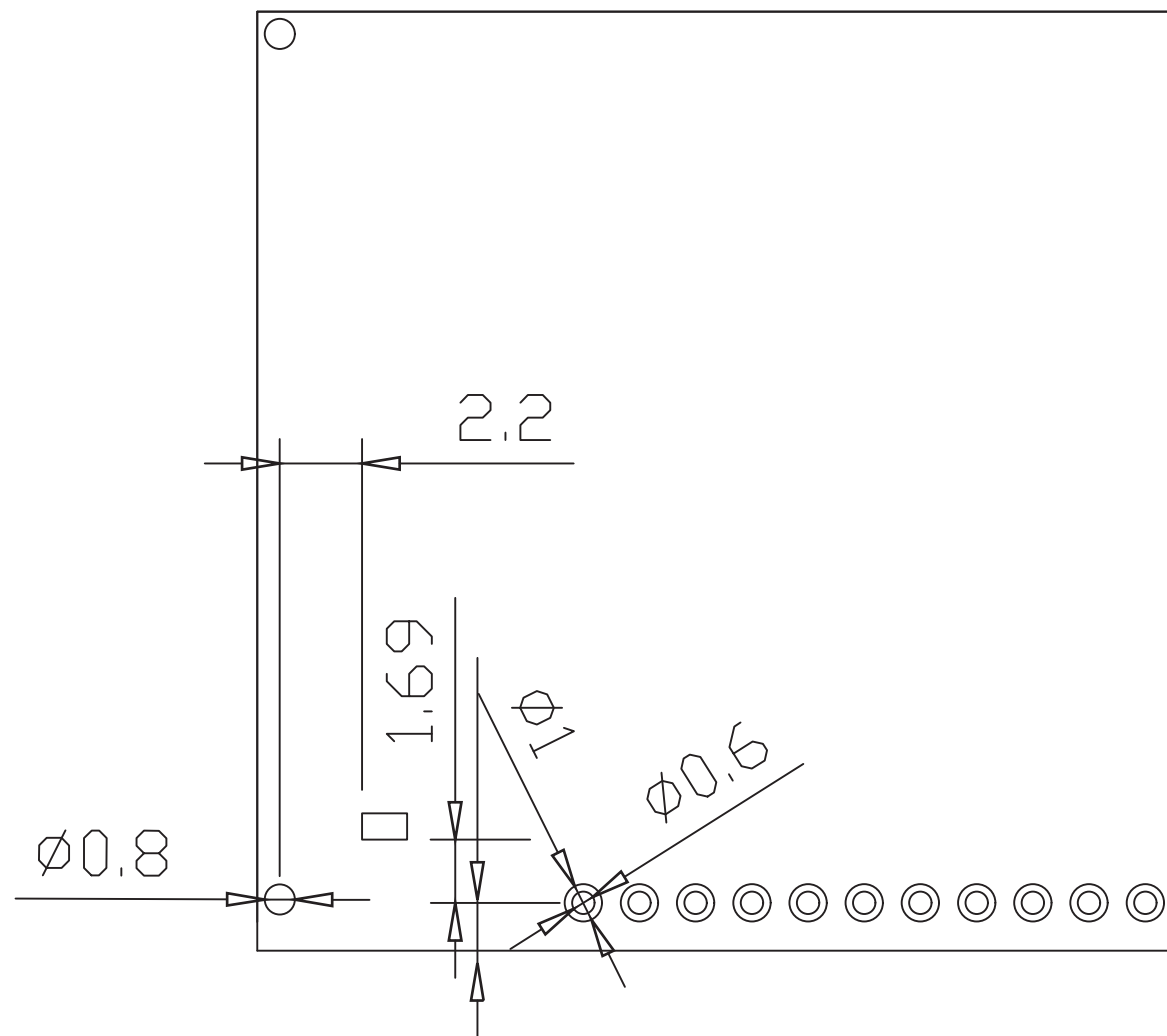
B

C

D

E

F



Applicable Displays:

- 1) NHD-C12832A1Z-FSW-FBW-3V3
- 2) NHD-C12832A1Z-NSW-BBW-3V3
- 3) NHD-C12832A1Z-FSR-FBW-3V3
- 4) NHD-C12832A1Z-FSB-FBW-3V3

1

2

3

4

↑

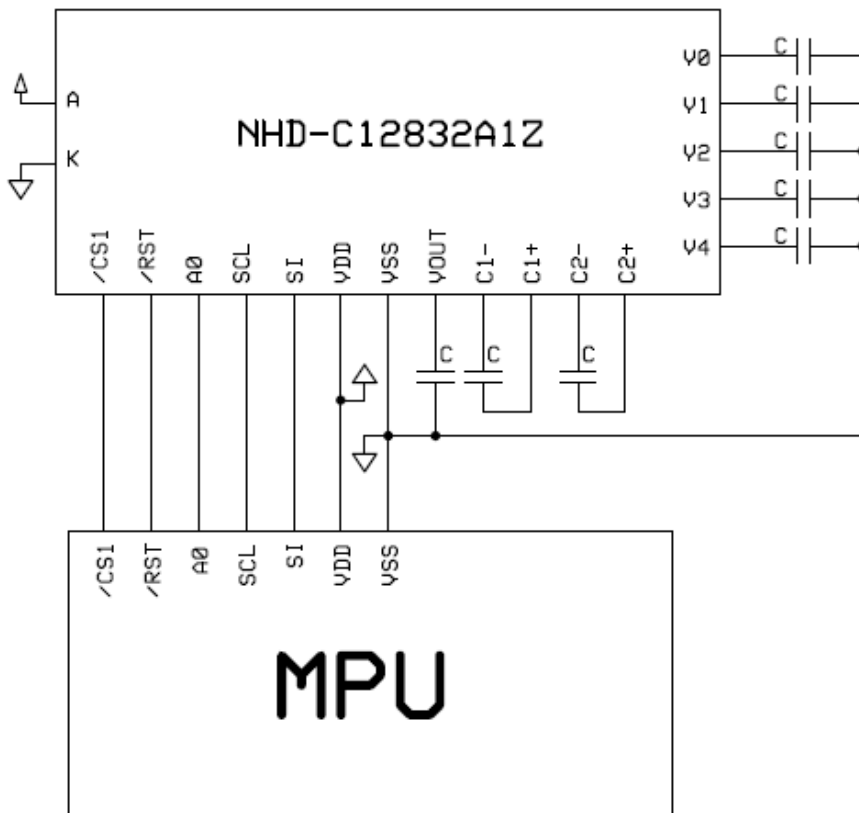
Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	V ₀	Power Supply	0.1μF – 1μF Capacitor to V _{SS}
2	V ₁	Power Supply	0.1μF – 1μF Capacitor to V _{SS}
3	V ₂	Power Supply	0.1μF – 1μF Capacitor to V _{SS}
4	V ₃	Power Supply	0.1μF – 1μF Capacitor to V _{SS}
5	V ₄	Power Supply	0.1μF – 1μF Capacitor to V _{SS}
6	C2-	Power Supply	Connect 1μF – 2.2μF Capacitor to C2+ (pin 7)
7	C2+	Power Supply	Connect 1μF – 2.2μF Capacitor to C2- (pin 6)
8	C1+	Power Supply	Connect 1μF – 2.2μF Capacitor to C1- (pin 9)
9	C1-	Power Supply	Connect 1μF – 2.2μF Capacitor to C1+ (pin 8)
10	V _{OUT}	Power Supply	Connect 1μF – 2.2μF Capacitor to V _{SS} (pin 11)
11	V _{SS}	Power Supply	Ground
12	V _{DD}	Power Supply	Supply Voltage for LCD and Logic (+3V)
13	SI	MPU	Serial Data
14	SCL	MPU	Serial Clock
15	A0	MPU	Register Select. A0=0: Instruction, A0=1: Data
16	/RST	MPU	Active LOW Reset signal
17	/CS1	MPU	Active LOW Chip Select signal
A	LED+	Power Supply	Backlight Anode(+3V)
K	LED-	Power Supply	Backlight Cathode (Ground)

Recommended LCD connector: 1.5mm pitch pins, solder directly into PCB

Backlight connector: 1.2mm Wide pins, solder directly into PCB **Mates with:** ---

Recommended Breakout Board: [NHD-PCB12832A1Z](#)



Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T _{OP}	Absolute Max	-20	-	+70	°C
Storage Temperature Range	T _{ST}	Absolute Max	-30	-	+80	°C
Supply Voltage	V _{DD}	-	2.7	3.0	3.3	V
Supply Current	I _{DD}	V _{DD} =3.0V	0.1	0.4	1.0	mA
Supply for LCD (contrast)	V _{LCD}	T _{OP} = 25°C	5.8	6.0	6.2	V
"H" Level input	V _{IH}	-	0.8 * V _{DD}	-	V _{DD}	V
"L" Level input	V _{IL}	-	V _{SS}	-	0.2 * V _{DD}	V
"H" Level output	V _{OH}	-	0.8 * V _{DD}	-	V _{DD}	V
"L" Level output	V _{OL}	-	V _{SS}	-	0.2 * V _{DD}	V
Backlight supply voltage	V _{LED}	-	2.9	3.0	3.1	V
Backlight supply current	I _{LED}	V _{LED} =3.0V	10	30	36	mA

Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	CR ≥ 2	-	20	-	°
	Bottom		-	40	-	°
	Left		-	40	-	°
	Right		-	40	-	°
Contrast Ratio	CR	-	2	5	-	-
Response Time	Rise	T _{OP} = 25°C	-	200	250	ms
	Fall		-	250	320	ms

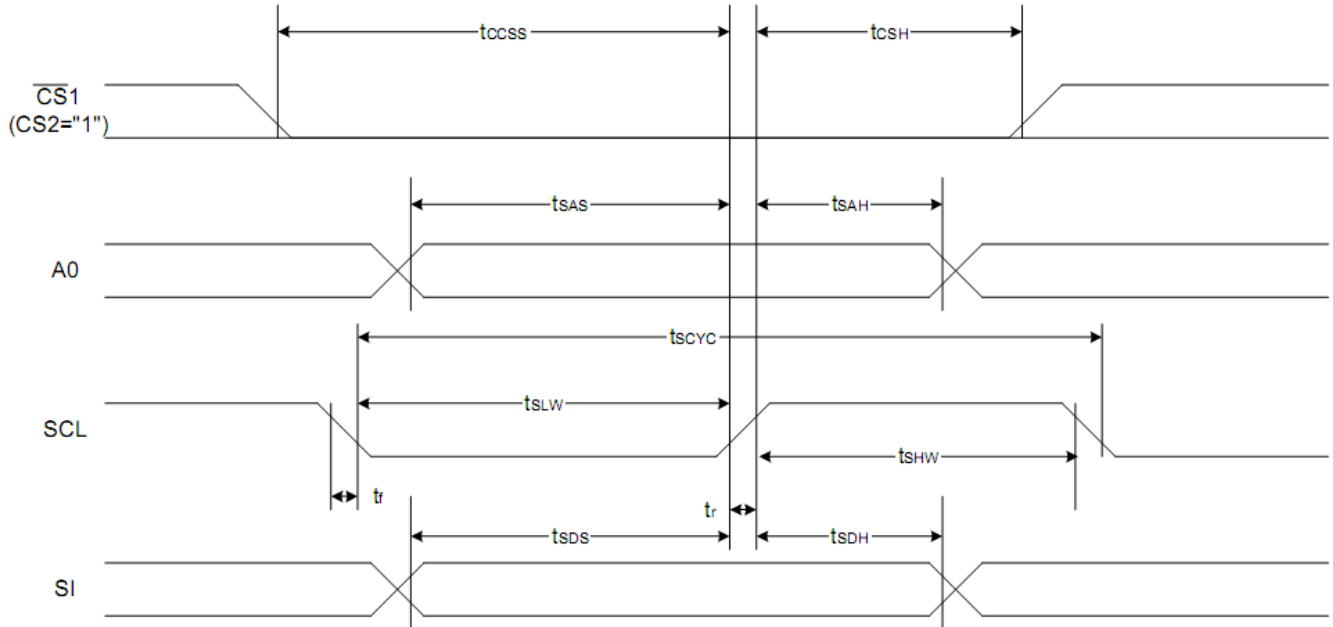
Controller Information

Built-in ST7565R controller.

Please download specification at http://www.newhavendisplay.com/app_notes/ST7565R.pdf

Timing Characteristics

The 4-line SPI Interface



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	—	

*1 The input signal rise and fall time (t_r , t_f) are specified at 15 ns or less.

*2 All timing is specified using 20% and 80% of V_{DD} as the standard.

Reset Timing

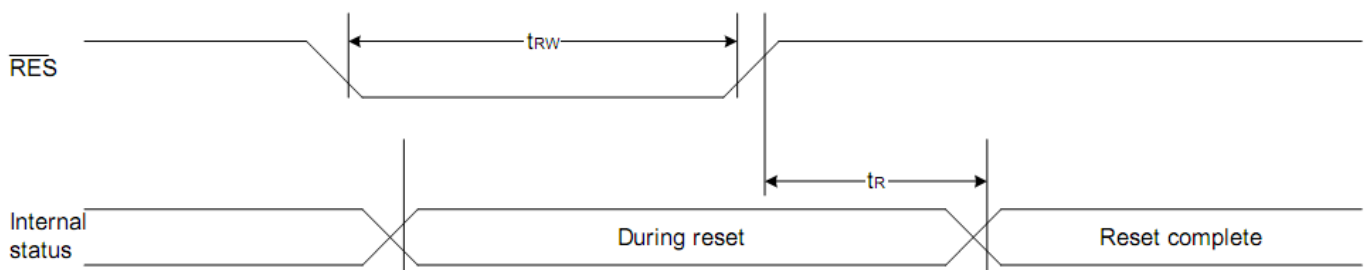


Table of Commands

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	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	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	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	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	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	0	1	Sets the LCD drive voltage bias ratio 0: 1/9 bias, 1: 1/7 bias (ST7565R)	
(12) Read-modify-write	0	1	0	1	1	1	0	0	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	0	0	1	Set the V ₀ output voltage electronic volume register	
Electronic volume register set				0	0	Electronic volume value									
(19) Sleep mode set	0	1	0	1	0	1	0	1	1	0	0	0	1	0: Sleep mode, 1: Normal mode	
(20) Booster ratio set	0	1	0	1	1	1	1	1	0	0	0	select booster ratio 00: 2x,3x,4x			
				0	0	0	0	0	0	0	step-up value	01: 5x 11: 6x			
(21) NOP	0	1	0	1	1	1	0	0	0	0	1	1	Command for non-operation		
(22) Test	0	1	0	1	1	1	1	*	*	*	*	*	*	Command for IC test. Do not use this command	

Example Initialization Program

```
void data_out(unsigned char i) //Data Output Serial Interface
{
    unsigned int n;
    CS = 0;
    A0 = 1;
    for(n=0; n<8; n++){
        i <<=1;
        SCL = 0;
        P1 = i;
        delay(2);
        SCL = 1;
    }
    CS = 1;
}

void comm_out(unsigned char j) //Command Output Serial Interface
{
    unsigned int n;
    CS = 0;
    A0 = 0;
    for(n=0; n<8; n++){
        j <<=1;
        SCL = 0;
        P1 = j;
        delay(2);
        SCL = 1;
    }
    CS = 1;
}

/*****
*      Initialization For controller      *
*****/

void init_LCD()
{
    comm_out(0xA0);
    comm_out(0xAE);
    comm_out(0xC0);
    comm_out(0xA2);
    comm_out(0x2F);
    comm_out(0x21);
    comm_out(0x81);
    comm_out(0x3F);
}

/*****/
```

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, 96hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C, 96hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C, 96hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C, 96hrs	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, 96hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-20°C, 30min -> 70°C, 60min = 1 cycle For 20 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-50Hz, 5G amplitude. 30min in each of 3 directions X, Y, Z	3
Static electricity test	Endurance test applying electric static discharge.	Air: ±8kV 150pF/330Ω, 5 Times	
		Contact: ±4kV 150pF/330Ω, 5 Times	

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

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [LCD Graphic Display Modules & Accessories](#) category:

Click to view products by [Newhaven Display](#) manufacturer:

Other Similar products are found below :

[HDM64GS12L-Y11S](#) [MGLS-240128-Z05](#) [DEM 128064U FGH](#) [DEM 240064E FGH-PW](#) [11557](#) [18396](#) [15932](#) [HDM64GS24L-2-Y14S](#)
[RG12864C-YHW-V](#) [RG12864K-BIW-VBG](#) [DEM 128064A SBH-PW-N](#) [DEM 128064B SBH-PW-N](#) [DEM 128064G FGH-PW](#) [DEM](#)
[128064O FGH-PW](#) [DEM 128064O SBH-PW-N](#) [DEM 128064Q SBH-PW-N](#) [DEM 128128D FGH-PW](#) [DEM 240064B FGH-PW](#) [DEM](#)
[240064B SBH-PW-N](#) [DEM 320240B FGH-PW-N](#) [EA W240-7KHLW](#) [16239](#) [RX12864A1-BIW](#) [RX240128A-FHW](#) [RX240160A-FHW](#)
[18370](#) [19340](#) [RG24064A-TIW-V](#) [EA FL-14P](#) [GLK19264A-7T-1U-TCI](#) [GLK19264A-7T-1U-USB-FGW](#) [GLK19264A-7T-1U-USB-WB](#)
[DEM 320240I SBH-PW-N](#) [GLK24064R-25-1U-WB](#) [DEM 240160A FGH-PW](#) [RG12864B1-BIW-V](#) [RG240128B-BIW-V](#) [RG24064A-FHW-](#)
[V](#) [DEM 122032B SYH-LY](#) [DEM 128064A FGH-PW \(A-TOUCH\)](#) [DEM 128064A SBH-PW-N \(A-TOUCH\)](#) [DEM 128064B FGH-PW](#) [DEM](#)
[128064H SBH-PW-N](#) [DEM 128064J FGH-PW](#) [DEM 128064P FGH-PW](#) [DEM 320240C SBH-PW-N](#) [DEM 320240I FGH-PW](#) [DEM 128064F](#)
[SBH-PW-N](#) [DEM 128128B1 FGH-PW](#) [DEM 240064C1 FGH-PW](#)