

NHD-C12864A1Z-FSB-FBW-HTT

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

| | |
|---------|-------------------------|
| NHD- | Newhaven Display |
| C12864- | 128 x 64 Pixels |
| A1Z- | Model |
| F- | Transflective |
| SB- | Side Blue LED Backlight |
| F- | FSTN Positive |
| B- | 6:00 Optimal View |
| W- | Wide Temp |
| HTT- | With 12V Heater |
| | 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

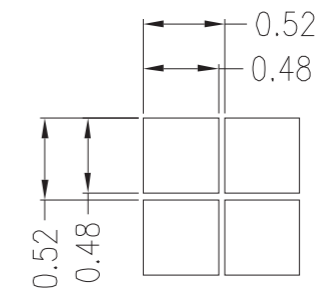
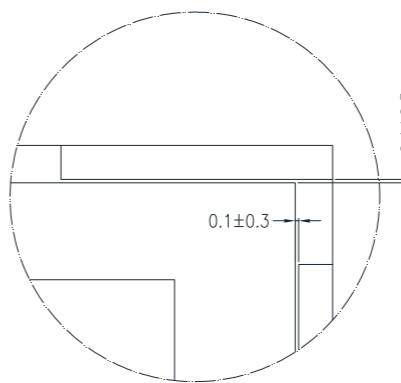
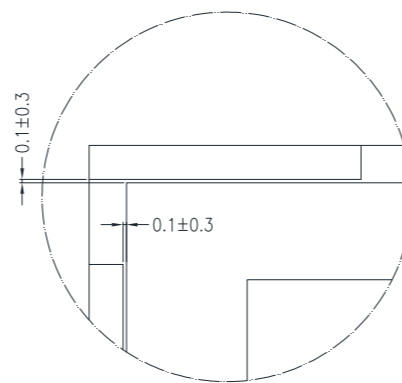
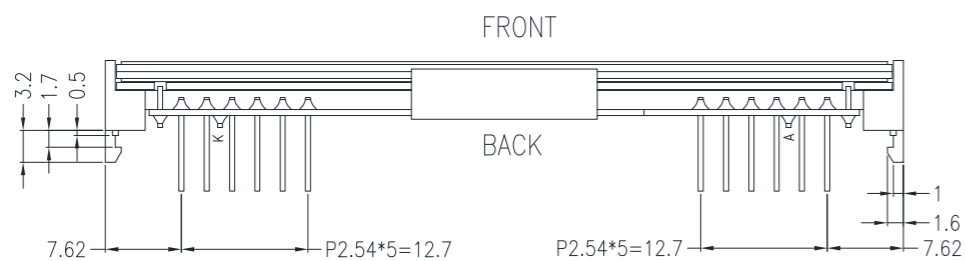
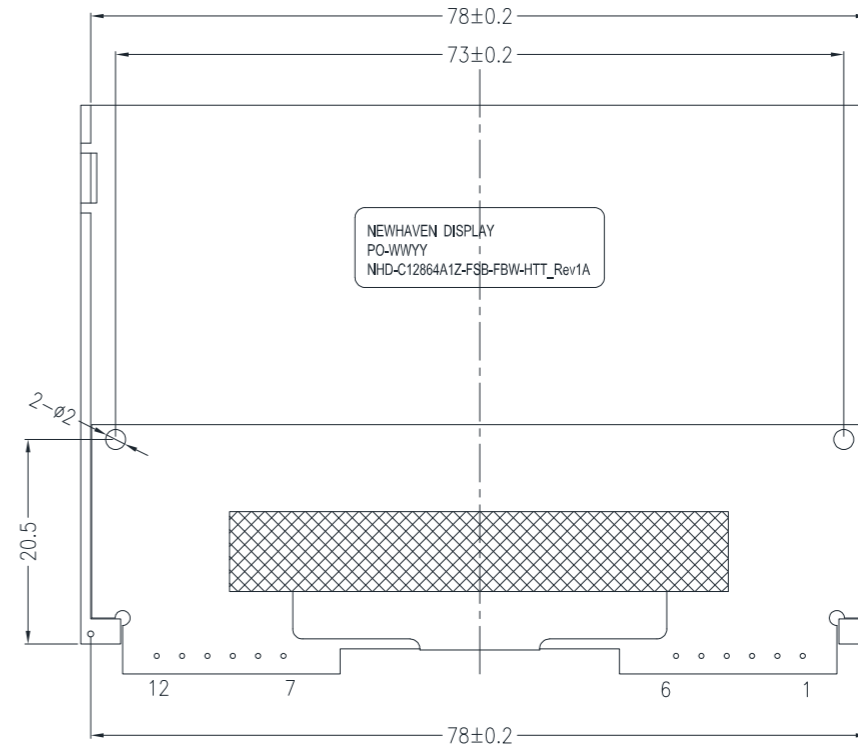
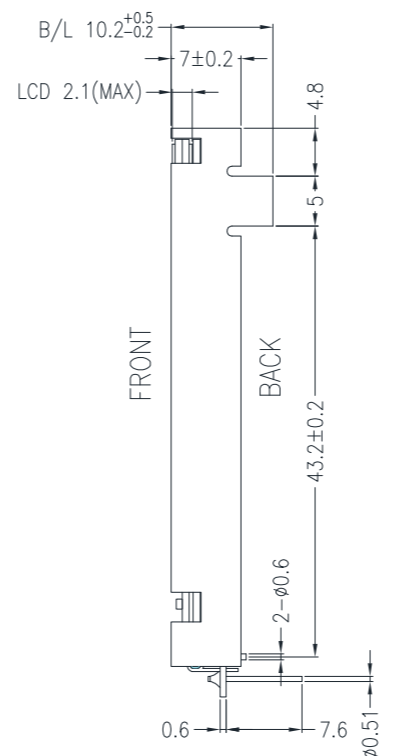
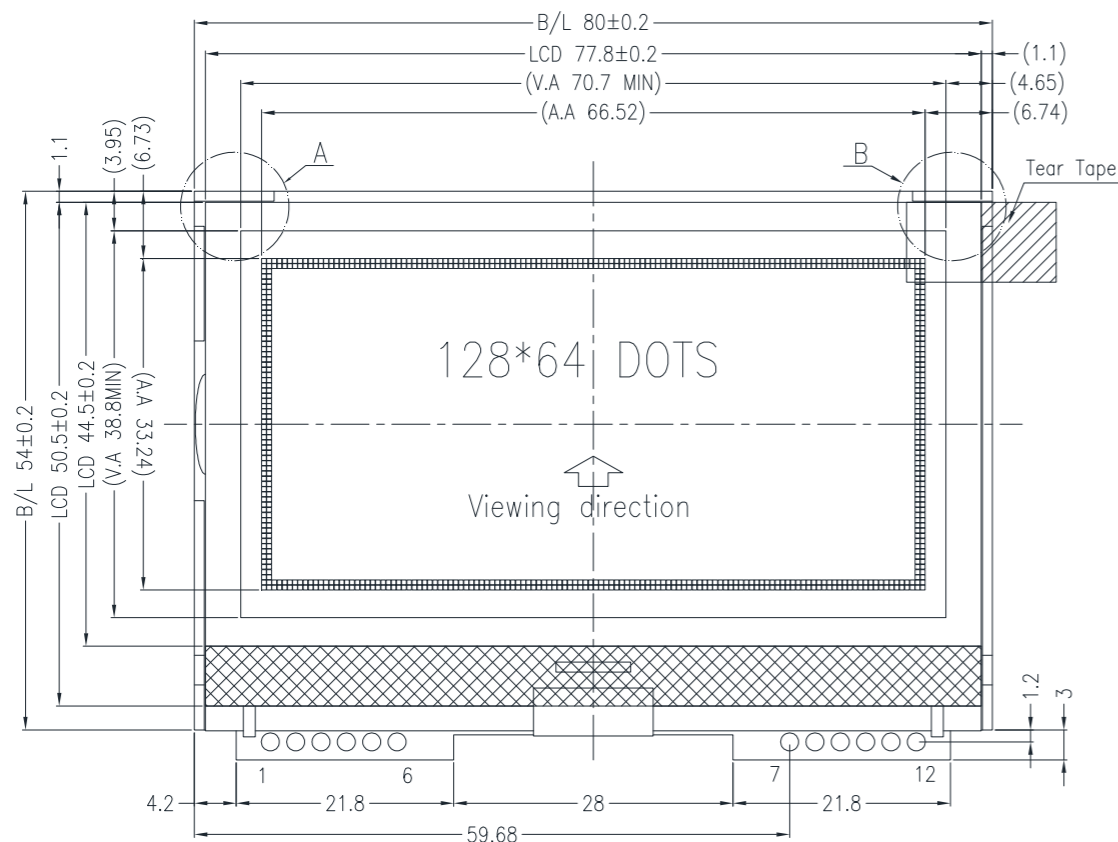
Document Revision History

| Revision | Date | Description | Changed by |
|----------|----------|--|------------|
| 0 | 10/20/10 | Initial Release | - |
| 1 | 10/26/10 | Pin Length Adjusted from 0.5" to 0.3" on Drawing | MC |
| 2 | 10/27/10 | Supply Current and block diagram updated | BE |
| 3 | 1/20/11 | Operating Temp updated | BE |
| 4 | 8/31/11 | Electrical characteristics updated | AK |
| 5 | 7/30/12 | Electrical characteristics updated | AK |
| 6 | 8/31/15 | Electrical characteristics, Mechanical drawing updated | SB |
| 7 | 8/24/18 | Supply Current & Voltage Updated | SB |
| 8 | 5/13/19 | Heater Resistance Updated | SB |
| 9 | 6/4/19 | Added PCB Footprint Drawing | AS |
| 10 | 1/31/20 | Glass Panel Updated | SB |
| 11 | 7/16/20 | Updated Serial Interface Timing Characteristics | AS |

Functions and Features

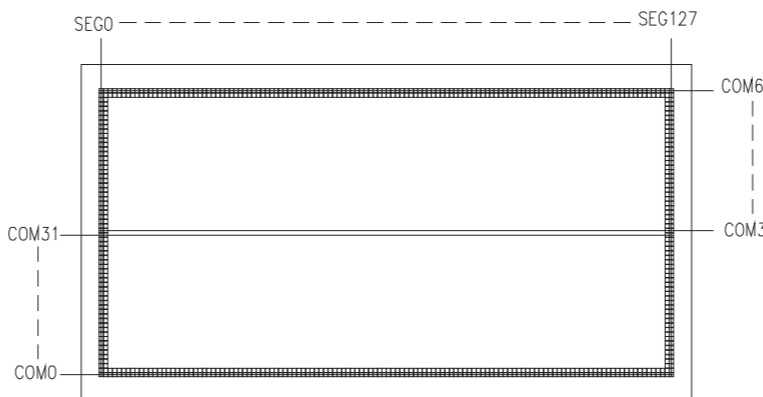
- 128 x 64 pixels
- Built-in ST7565P controller
- +3.3V power supply
- 1/65 duty cycle; 1/9 bias
- Built-in Heater
- RoHS Compliant

| SYMBOL | REVISION | DATE |
|--------|----------|------|
| | | |



| Pin assignment | |
|----------------|--------|
| NO. | Symbol |
| 1 | SCL |
| 2 | SI |
| 3 | VDD |
| 4 | AO |
| 5 | /RESET |
| 6 | /CS |
| 7 | VSS |
| 8 | H- |
| 9 | H+ |
| 10 | LED- |
| 11 | LED+ |
| 12 | NC |

1. Driver: 1/65 Duty, 1/9 Bias
2. Display Mode: FSTN Positive / Transflective
3. Optimal View: 6:00
4. Voltage: 3.0V VDD, 8.7V VLCD
5. Backlight: Blue LED
6. Driver IC: ST7565P



STANDARD TOLERANCE:
 (UNLESS OTHERWISE SPECIFIED)
 LINEAR: ±0.3mm

NEWHAVEN DISPLAY INTERNATIONAL
 DRAWING/PART NUMBER:
NHD-C12864A1Z-FSB-FBW-HTT

UNLESS OTHERWISE SPECIFIED:
 - DIMENSIONS ARE IN MILLIMETERS
 - THIRD ANGLE PROJECTION

DRAWN BY: S. Baxi
 DRAWN DATE: 1/31/20

APPROVED BY: S. Baxi
 APPROVED DATE: 1/31/20

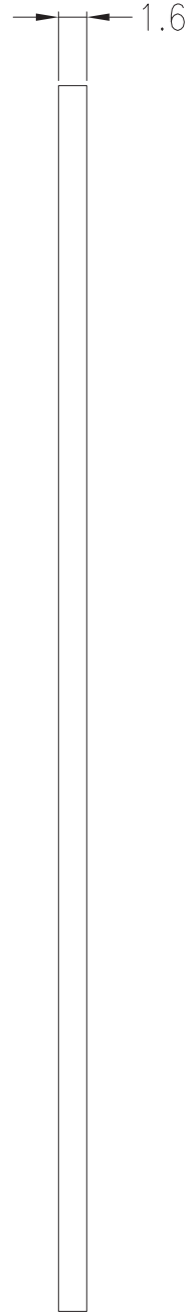
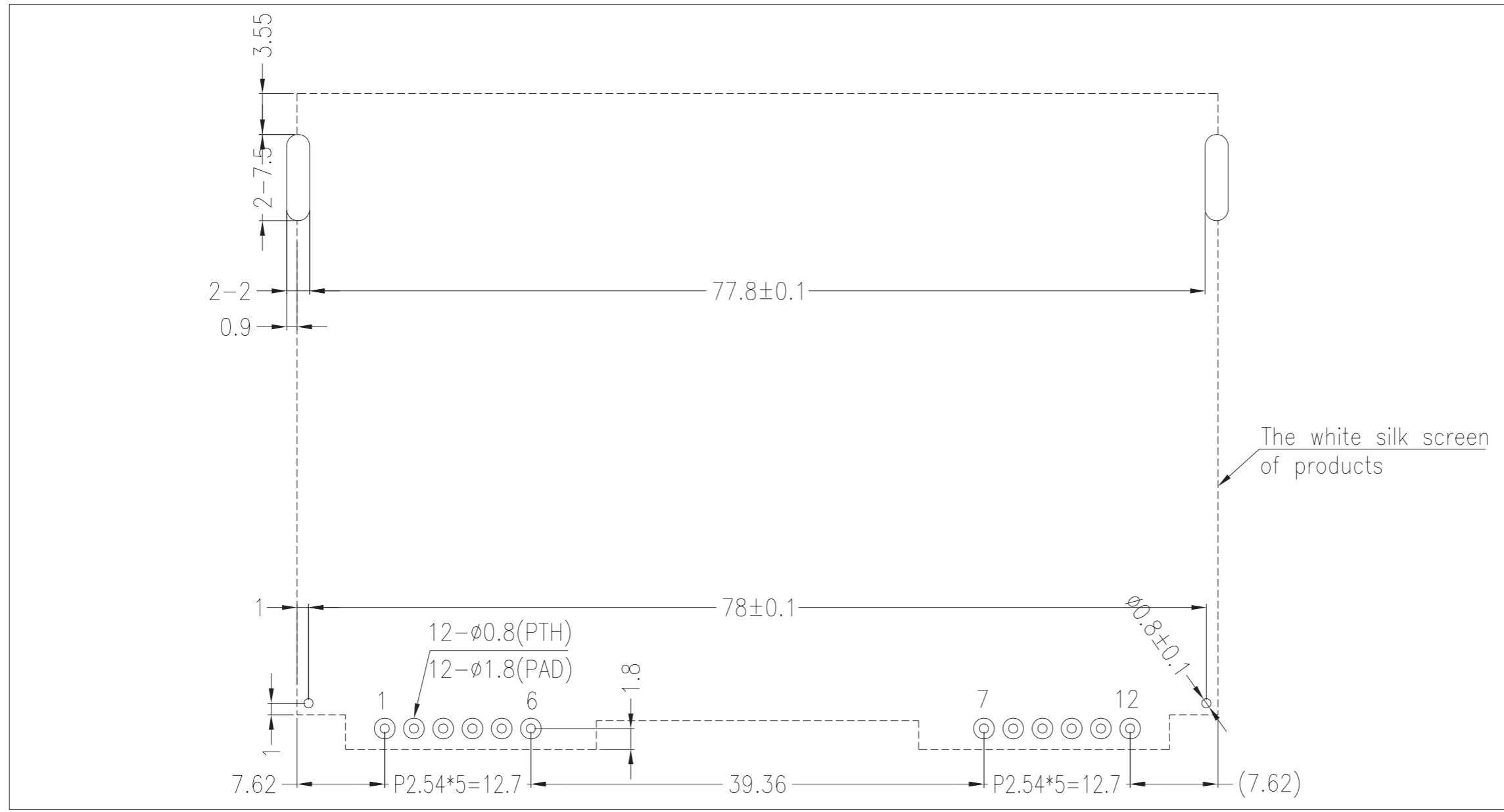
REVISION: 1A
 SIZE: A3
 SCALE: NS

DO NOT SCALE DRAWING SHEET 1 OF 1

THIS DRAWING IS SOLELY THE PROPERTY OF NEWHAVEN DISPLAY INTERNATIONAL, INC. THE INFORMATION IT CONTAINS IS NOT TO BE DISCLOSED, REPRODUCED OR COPIED IN WHOLE OR PART WITHOUT WRITTEN APPROVAL FROM NEWHAVEN DISPLAY.

Recommended PCB Footprint

| SYMBOL | REVISION | DATE |
|--------|----------|------|
| | | |
| | | |



Applicable Displays:

- 1) NHD-C12864A1Z-FSW-FBW-HTT
- 2) NHD-C12864A1Z-FSR-FBW-HTT
- 3) NHD-C12864A1Z-FSB-FBW-HTT

| | | |
|---|-------------------------|---|
| STANDARD TOLERANCE: (UNLESS OTHERWISE SPECIFIED) | | |
| | LINEAR: ±0.3mm | DRAWING/PART NUMBER: NHD-C12864A1Z-Monochrome-Footprint |
| UNLESS OTHERWISE SPECIFIED: - DIMENSIONS ARE IN MILLIMETERS - THIRD ANGLE PROJECTION | DRAWN BY: A. Shah | REVISION: 1.0 SIZE: A3 SCALE: NS |
| | APPROVED BY: A. Khan | DRAWN DATE: 6/3/19 APPROVED DATE: 6/3/19 |
| DO NOT SCALE DRAWING | | SHEET 1 OF 1 |
| THIS DRAWING IS SOLELY THE PROPERTY OF NEWHAVEN DISPLAY INTERNATIONAL, INC. THE INFORMATION IT CONTAINS IS NOT TO BE DISCLOSED, REPRODUCED OR COPIED IN WHOLE OR PART WITHOUT WRITTEN APPROVAL FROM NEWHAVEN DISPLAY. | | |

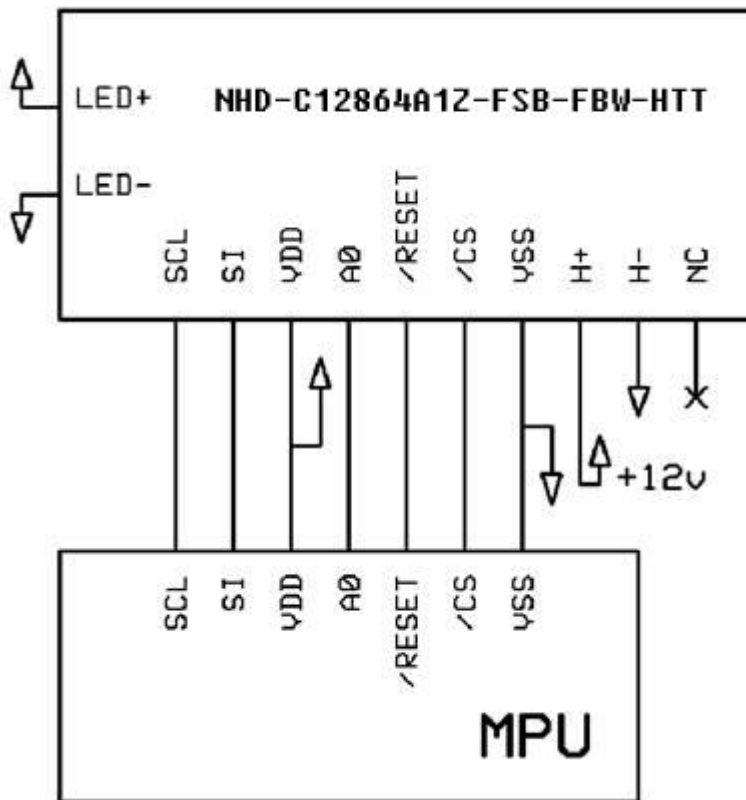
Pin Description and Wiring Diagram

| Pin No. | Symbol | External Connection | Function Description |
|---------|-----------------|---------------------|--|
| 1 | SCL | MPU | Serial Clock input |
| 2 | SI | MPU | Serial Data input |
| 3 | V _{DD} | Power Supply | Supply Voltage for LCD and logic (+3.3V) |
| 4 | A0 | MPU | Register Select. 0: instruction; 1: data |
| 5 | /RESET | MPU | Operation Active LOW Reset signal |
| 6 | /CS | MPU | Active LOW Chip Select Signal |
| 7 | V _{SS} | Power Supply | Ground |
| 8 | H- | Power Supply | Ground for Heater |
| 9 | H+ | Power Supply | Power for Heater (+12V) |
| 10 | LED- | Power Supply | Backlight Cathode (Ground) |
| 11 | LED+ | Power Supply | Backlight Anode (+3.3V) |
| 12 | NC | - | No Connect |

Recommended LCD connector: 2.54mm pitch thru-hole connection on PCB

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

Recommended Breakout Board: [NHD-PCB40](#)



Electrical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------------|--------------------|-------------------------|-----------------------|------|-----------------------|------|
| Operating Temperature Range | T _{OP} | Absolute Max | -40 | - | +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} | T _{OP} =25°C | 0.1 | 0.5 | 1.0 | mA |
| Supply for LCD (contrast) | V _{DD-V0} | V _{DD} =3.3V | 8.5 | 8.7 | 8.9 | V |
| "H" Level input | V _{IH} | - | 0.8 * V _{DD} | - | V _{DD} | V |
| "L" Level input | V _{IH} | - | 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} | - | 3.2 | 3.3 | 3.4 | V |
| Backlight Supply Current | I _{LED} | V _{LED} = 3.3V | 25 | 50 | 60 | mA |
| Heater panel resistance | R _{H+/-} | - | 10 | 20 | 30 | Ω |
| Heater Voltage Supply | V _H | - | - | 12V | 15 | V |
| Heater Current | I _H | V _H = 12.0V | 0.40 | 0.6 | 1.2 | A |
| Heater Power | W _H | - | 4.8 | 7.2 | 14.4 | W |

Optical Characteristics

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------|--------|------------------------|------|------|------|------|
| Optimal Viewing Angles | Top | CR ≥ 3 | - | 20 | - | ° |
| | Bottom | | - | 40 | - | ° |
| | Left | | - | 45 | - | ° |
| | Right | | - | 45 | - | ° |
| Contrast Ratio | CR | - | 2 | 5 | - | - |
| Response Time | Rise | T _{OP} = 25°C | - | 150 | 250 | ms |
| | Fall | | - | 200 | 300 | ms |

Controller Information

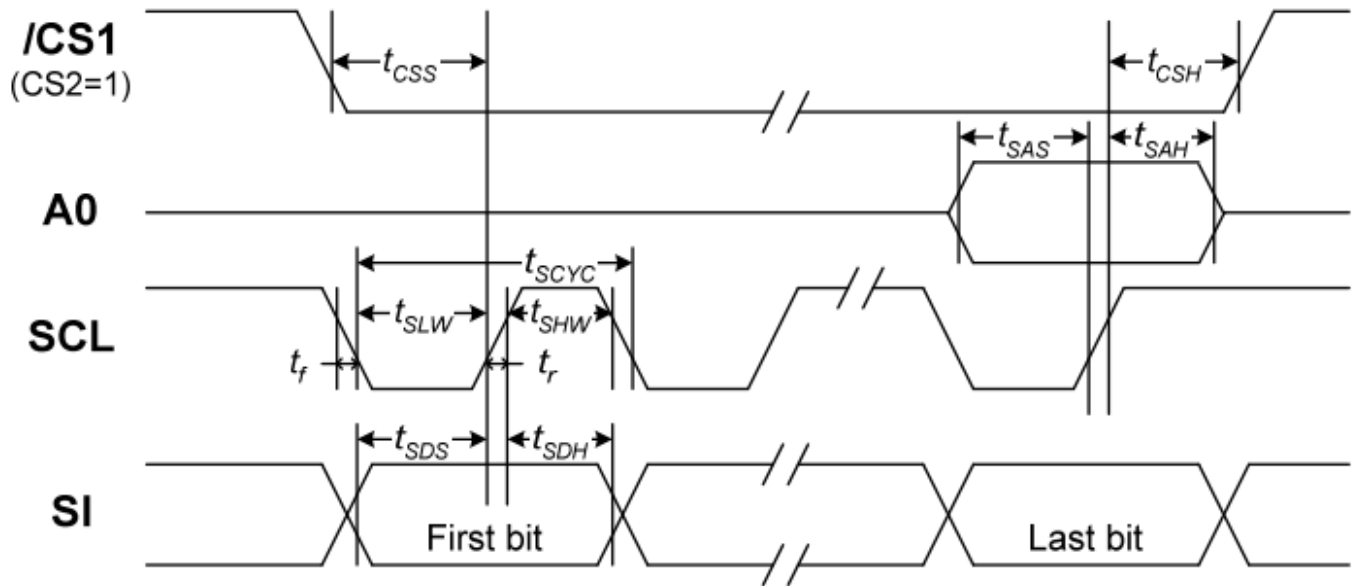
Built-in ST7565P controller.

Please download specification at

https://www.newhavendisplay.com/resources_dataFiles/datasheets/LCDs/ST7565P.pdf

Timing Characteristics

The Serial Interface



| Item | Signal | Symbol | Condition | Rating | | Units |
|---------------------|--------|------------|-----------|--------|------|-------|
| | | | | Min. | Max. | |
| Serial 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 | — | |

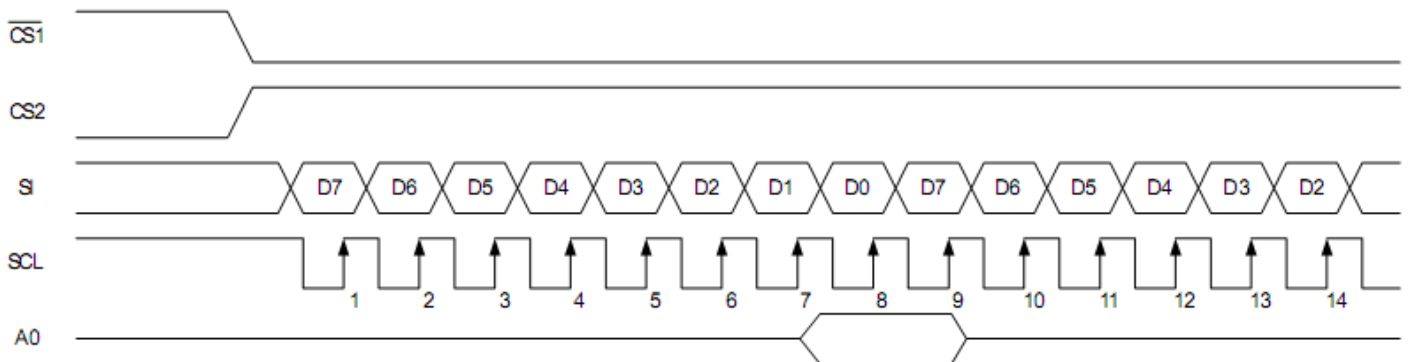


Table of Commands

| 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 |
| (2) Display start line set | 0 | 1 | 0 | 0 | 1 | Display start address | | | | | | 0 |
| (3) Page address set | 0 | 1 | 0 | 1 | 0 | 1 | 1 | Page address | | | | 0 |
| (4) Column address set upper bit | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Most significant column address | | | | 0 |
| Column address set lower bit | 0 | 1 | 0 | 0 | 0 | 0 | 0 | Least significant column address | | | | 0 |
| (5) Status read | 0 | 0 | 1 | Status | | | | 0 | 0 | 0 | 0 | 0 |
| (6) Display data write | 1 | 1 | 0 | Write data | | | | | | | | 0 |
| (7) Display data read | 1 | 0 | 1 | Read data | | | | | | | | 0 |
| (8) ADC select | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| (9) Display normal/reverse | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| (10) Display all points ON/OFF | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| (11) LCD bias set | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| (12) Read/modify/write | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| (13) End | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| (14) Reset | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| (15) Common output mode select | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | * | * | * |
| (16) Power control set | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Operating mode | | | 0 |
| (17) Vs voltage regulator internal resistor ratio set | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Resistor ratio | | | 0 |
| (18) Electronic volume mode set | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Electronic volume register set | 0 | 1 | 0 | 0 | 0 | Electronic volume value | | | | | | 0 |
| (19) Static indicator ON/OFF | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| Static indicator register set | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| (20) Power saver | | | | | | | | | | | | 1 |
| (21) NOP | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| (22) Test | 0 | 1 | 0 | 1 | 1 | 1 | 1 | * | * | * | * | * |

Example Initialization Program

```
.....  
Sub Command  
Reset P3.7  
Reset P3.4  
For Writecount = 1 To 8  
Rotate A , Left , 1  
Reset P3.1  
P1 = A  
Set P3.1  
Next Writecount  
Set P3.7  
End Sub  
.....
```

```
Sub Write  
Reset P3.7  
Set P3.4  
For Writecount = 1 To 8  
Rotate A , Left , 1  
Reset P3.1  
P1 = A  
Set P3.1  
Next Writecount  
Set P3.7  
End Sub  
.....
```

```
Sub Init  
Waitms 100  
A = &HA0  
Call Command  
A = &HAE  
Call Command  
A = &HC0  
Call Command  
A = &HA2  
Call Command  
A = &H2F  
Call Command  
A = &H26  
Call Command  
A = &H81  
Call Command  
A = &H11  
Call Command  
A = &HAF  
Call Command  
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 , 96hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -40°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. | -40°C /-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. | +50°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. | -40°C /-20°C , 60min --> 70°C , 60min = 1 cycle For 10 cycles | |
| Vibration test | Endurance test applying vibration to simulate transportation and use. | 10-50Hz , Acceleration of Gravity:5G 30 min in each of 3 directions X,Y,Z For 15 minutes | 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

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Newhaven Display:](#)

[NHD-C12864A1Z-FSB-FBW-HTT](#)