

# NHD-1.5-Breakout

## Breakout Board for 1.5" Color OLED Glass

NHD- Newhaven Display  
1.5- 1.5" Diagonal Size  
Breakout- Breakout Board

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## Document Revision History

| Revision | Date     | Description     | Changed by |
|----------|----------|-----------------|------------|
| -        | 09/18/19 | Initial Release | PB         |

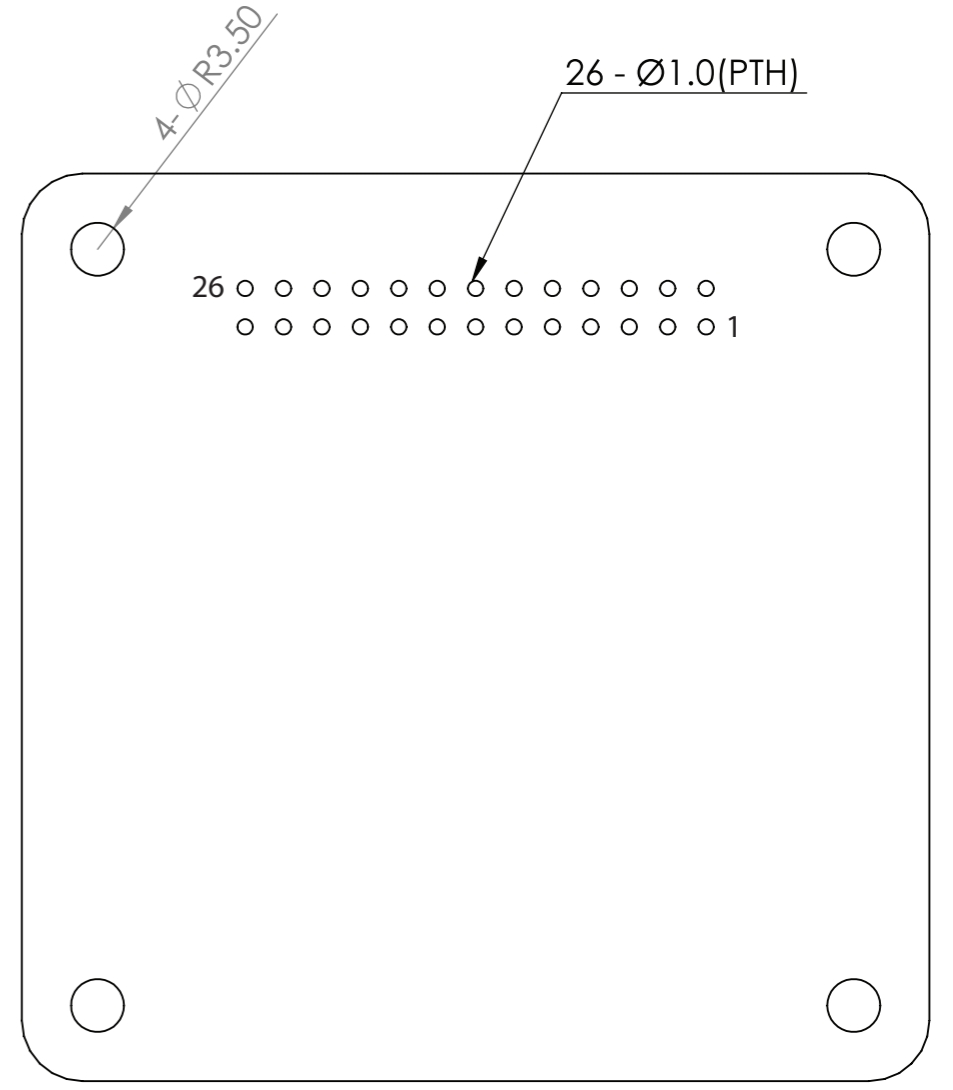
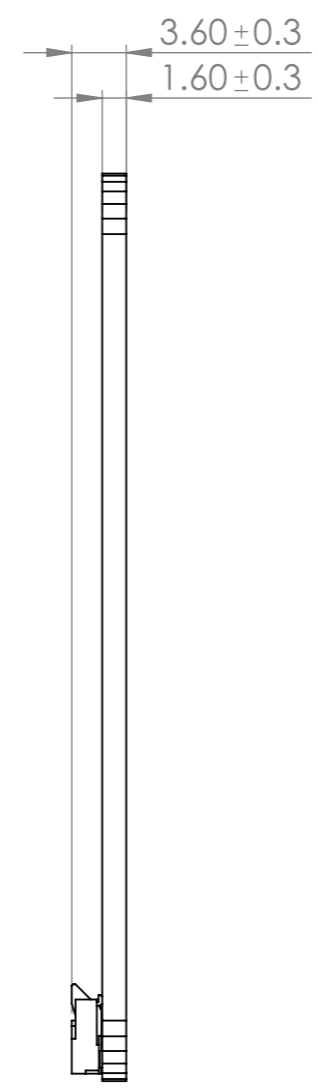
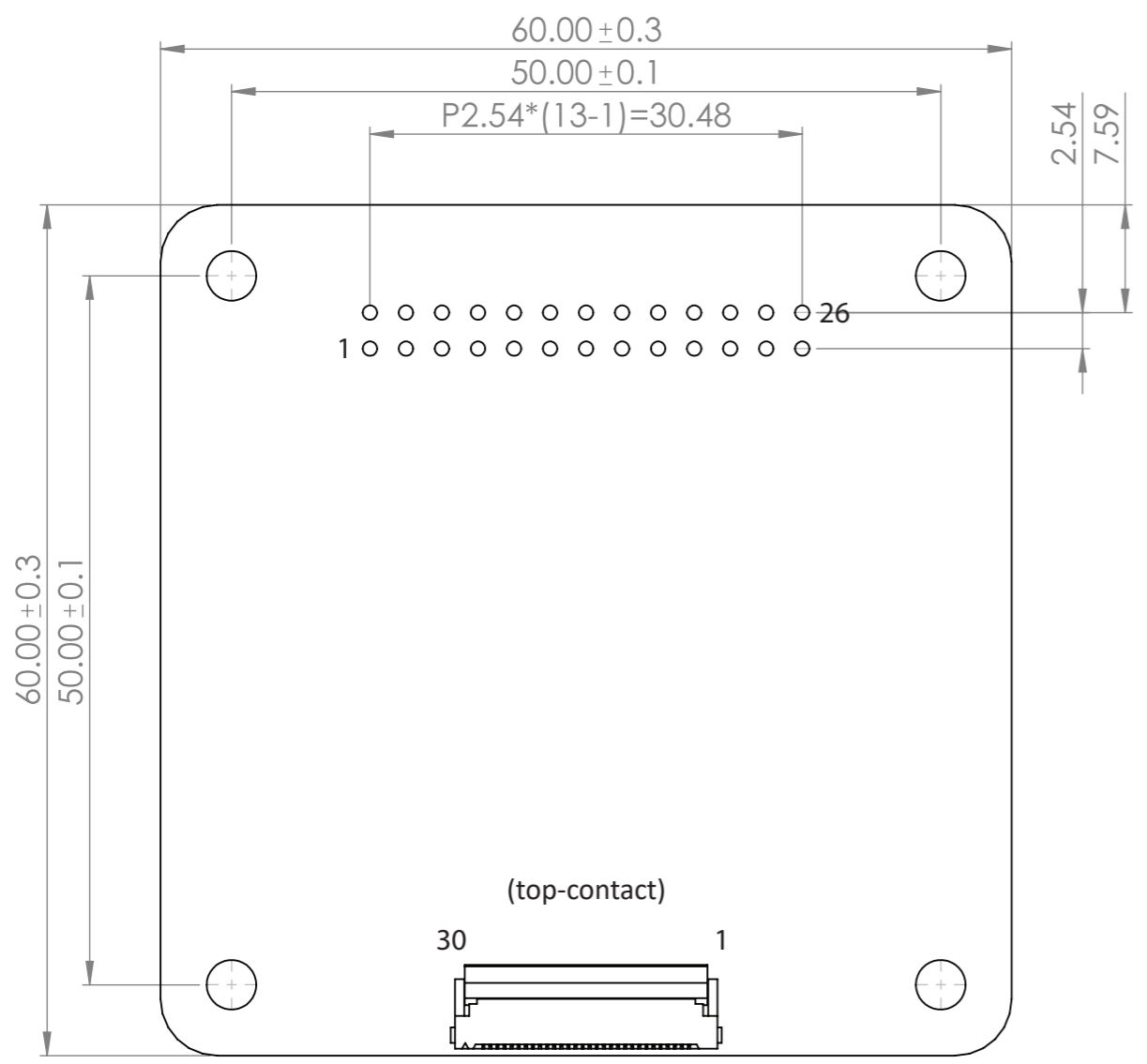
## Functions and Features

- Breakout board for 1.5" Color OLED Glass (NHD-1.5-128128G)
- On-board booster circuit (FAN5331SX)
- Jumper option to bypass booster circuit and provide  $V_{CC}$  directly
- Open source hardware

1 2 3 4 5 6 7 8

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

A A



B B  
C C  
D D  
E E

[read caution below]

OLED Panel must be connected with gold fingers **facing upward** (top-contact), for the display to operate and not be damaged.

|   |   |                            |
|---|---|----------------------------|
| STANDARD TOLERANCE:<br>(UNLESS OTHERWISE SPECIFIED)   |   |                            |
| LINEAR: ±0.3mm  | DRAWING/PART NUMBER:<br><b>NHD-1.5-Breakout</b> | REVISION:<br>-             |
| UNLESS OTHERWISE SPECIFIED:<br>- DIMENSIONS ARE IN MILLIMETERS<br>- THIRD ANGLE PROJECTION  | DRAWN BY:<br>P. Bartek                          | APPROVED BY:<br>P. Bartek  |
|   | DRAWN DATE:<br>09/17/19                         | APPROVED DATE:<br>09/17/19 |
|   | 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. |   |                            |

F F

1 2 3 4 5 6 7 8



## Pin Description

| Pin No. | Symbol   | External Connection | Function Description  |
|---------|----------|---------------------|---|
| 1       | GND      | Power Supply        | Ground  |
| 2       | 3V3      | Power Supply        | Supply Voltage for OLED Logic (+3.3V)   |
| 3       | DRV_VDD  | Power Supply        | Supply Voltage for boost converter (+5V) to drive OLED panel voltage (VCC).<br>(Should be no connect if using pin 4 to apply external VCC)                            |
| 4       | N.C./VCC | -                   | No Connect by default. Can be configured for external VCC (+13V).<br>(refer to On-Board Jumper Options table below)   |
| 5       | SHDN#    | MPU                 | Active LOW Shutdown control pin for boost converter<br>(pulled HIGH via on-board 10kΩ resistor)   |
| 6       | GPIO0    | MPU                 | See command 0xB5 (can be treated as a no connect)   |
| 7       | GPIO1    | MPU                 | See command 0xB5 (can be treated as a no connect)   |
| 8       | RES#     | MPU                 | Active LOW Reset signal   |
| 9       | D/C#     | MPU                 | Register Select signal. LOW: Command. HIGH: Data  |
| 10      | CS#      | MPU                 | Active LOW Chip Select signal   |
| 11      | BS1      | MPU                 | MPU interface select signal   |
| 12      | BS0      | MPU                 | MPU interface select signal   |
| 13      | R/W#     | MPU                 | <b>6800 mode:</b> Read/Write signal. LOW: Write. HIGH: Read<br><b>8080 mode:</b> Active LOW Write signal  |
| 14      | E/RD#    | MPU                 | <b>6800 mode:</b> Enable signal. Falling edge triggered<br><b>8080 mode:</b> Active LOW Read signal   |
| 15      | D0/SCK   | MPU                 | <b>Parallel interface:</b><br>8-bit bi-directional data bus<br><br><b>Serial interface:</b><br>D0 = Serial Clock signal (SCK)<br>D1 = Serial Data Input signal (SDIN) |
| 16      | D1/SDIN  | MPU                 |   |
| 17      | D2       | MPU                 |   |
| 18      | D3       | MPU                 |   |
| 19      | D4       | MPU                 |   |
| 20      | D5       | MPU                 |   |
| 21      | D6       | MPU                 |   |
| 22      | D7       | MPU                 |   |
| 23-26   | GND      | Power Supply        | Ground  |

## MPU Interface Pin Assignment Summary

| Bus Interface | D7     | D6 | D5 | D4 | D3 | D2 | D1   | D0  | E   | R/W | BS0 | BS1 | CS# | D/C# | RES# | GPIO1 | GPIO0 |
|---------------|--------|----|----|----|----|----|------|-----|-----|-----|-----|-----|-----|------|------|-------|-------|
| 8-bit 6800    | D[7:0] |    |    |    |    |    |      |     | E   | R/W | 1   | 1   | CS# | D/C# | RES# | NC    | NC    |
| 8-bit 8080    | D[7:0] |    |    |    |    |    |      |     | RD# | WR# | 0   | 1   | CS# | D/C# | RES# | NC    | NC    |
| 4-wire SPI    | 0      |    |    |    |    | NC | SDIN | SCK | 0   | 0   | 0   | 0   | CS# | D/C# | RES# | NC    | NC    |
| 3-wire SPI    | 0      |    |    |    |    | NC | SDIN | SCK | 0   | 0   | 1   | 0   | CS# | 0    | RES# | NC    | NC    |

"X" : Don't care

"NC" : No Connect

"1" : VDD

"0" : VSS

## On-Board Jumper Options

### Default Jumper Setting

| R10  | R11   | Description   |
|------|-------|---|
| Open | Close | <b>(default)</b> Boost converter circuit (+5V on pin 3) is used to provide VCC to OLED Glass. |

### Jumper Option #1 – External Supply Voltage for OLED Panel (VCC)

| R10   | R11  | Description   |
|-------|------|---|
| Close | Open | Boost converter circuit (pin 3) is not used.<br>User must apply VCC (+13V) externally to (pin 4).<br>OLED logic is still powered from 3V3 (pin 2).<br>This method allows for minimum current drain. |

**Default Jumper Setting**



**Jumper Option #1**



## Electrical Characteristics

| Item                             | Symbol          | Condition    | Min. | Typ. | Max. | Unit |
|----------------------------------|-----------------|--------------|------|------|------|------|
| Operating Temperature Range      | T <sub>OP</sub> | Absolute Max | -40  | -    | +70  | °C   |
| Storage Temperature Range        | T <sub>ST</sub> | Absolute Max | -40  | -    | +85  | °C   |
| Supply Voltage for OLED Logic    | 3V3             | -            | 2.8  | 3.0  | 3.5  | V    |
| Supply Voltage for Boost Circuit | DRV_VDD         | -            | -    | 5.0  | 5.5  | V    |
| Supply Voltage for OLED Panel    | V <sub>CC</sub> | -            | 12.5 | 13.0 | 13.5 | V    |

**NOTICE:** It is not recommended to apply power to the board without a display connected. Doing so may result in a damaged booster circuit. Newhaven Display does not assume responsibility for PCB failures due to this damage.

## Compatible OLED Glass

This board is designed to drive and breakout the signals of the NHD-1.5-128128G.

Please download specification at <http://www.newhavendisplay.com/specs/NHD-1.5-128128G.pdf>

## Quality Information

| Test Item                             | Content of Test   | Test Condition          | Note |
|---------------------------------------|---|-------------------------|------|
| High Temperature storage              | Test the endurance of the display at high storage temperature.  | +85°C, 240 Hrs.         | 2    |
| Low Temperature storage               | Test the endurance of the display at low storage temperature.   | -40°C, 240 Hrs.         | 1,2  |
| High Temperature Operation            | Test the endurance of the display by applying electric stress (voltage & current) at high temperature.                    | +70°C, 240 Hrs.         | 2    |
| Low Temperature Operation             | Test the endurance of the display by applying electric stress (voltage & current) at low temperature.                     | -40°C, 240 Hrs.         | 1,2  |
| High Temperature / Humidity Operation | Test the endurance of the display by applying electric stress (voltage & current) at high temperature with high humidity. | +60°C, 90% RH, 120 Hrs. | 1,2  |

**Note 1:** No condensation to be observed.

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

## Precautions for using OLEDs/LCDs/LCMs

See Precautions at [www.newhavendisplay.com/specs/precautions.pdf](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information

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