

# NHD-4.3RTP-SHIELD-L

## Color TFT Liquid Crystal Display Module + Arduino Shield

|         |                                                                        |
|---------|------------------------------------------------------------------------|
| NHD-    | Newhaven Display                                                       |
| 4.3-    | 4.3" Diagonal                                                          |
| RTP-    | 4-wire Resistive Touch Panel with Controller                           |
| SHIELD- | Arduino Shield                                                         |
| L-      | Display: NHD-4.3-480272EF-ATXL#-T, 6:00 Optimal View, Wide Temperature |

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## Document Revision History

| Revision | Date     | Description     | Changed by |
|----------|----------|-----------------|------------|
| 0        | 08/17/16 | Initial Release | PB         |

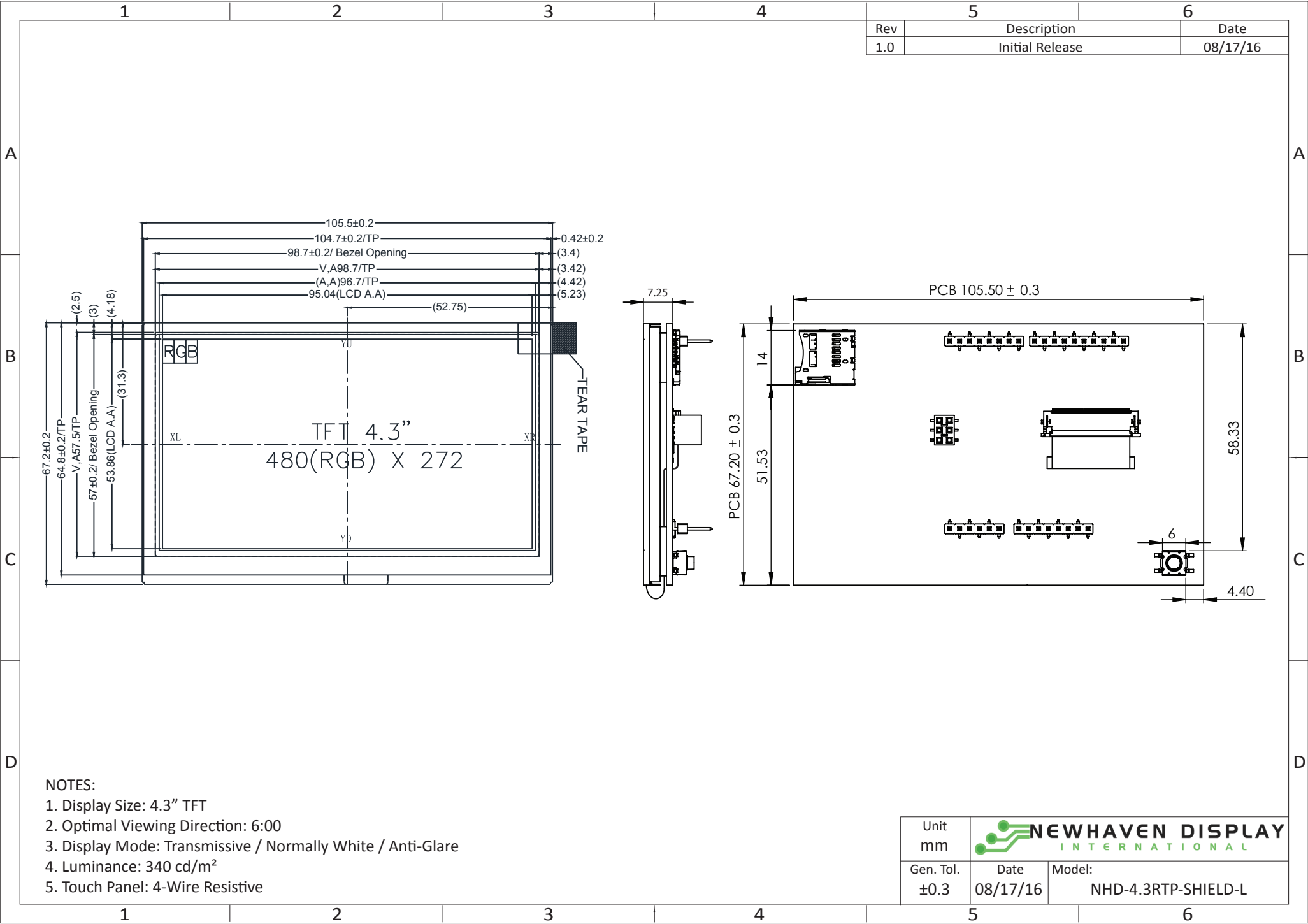
## Functions and Features

- 480xRGBx272 resolution, up to 262K colors
- Utilizes the FTDI FT800 Embedded Video Engine
- PWM backlight control
- Onboard audio power amplifier
- microSD card reader (microSD card not included)
- Built-in logic level shifting
- Assembled with NHD-4.3-480272EF-ATXL#-T
- 4-wire resistive Touch Panel

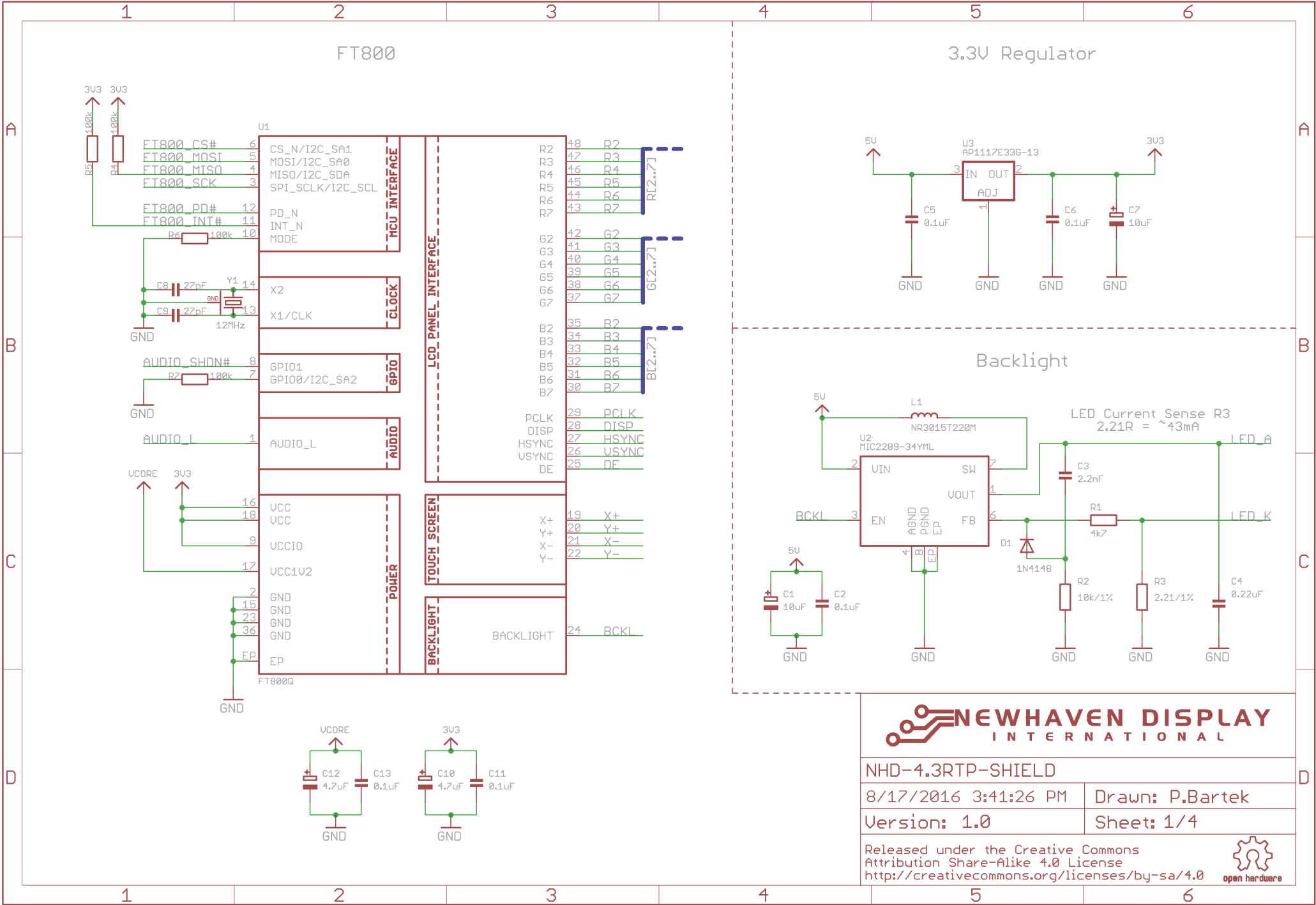
## User Guide:

Please download User Guide at [http://www.newhavendisplay.com/userguides/NHD-4.3RTP-SHIELD\\_User\\_Guide.pdf](http://www.newhavendisplay.com/userguides/NHD-4.3RTP-SHIELD_User_Guide.pdf)

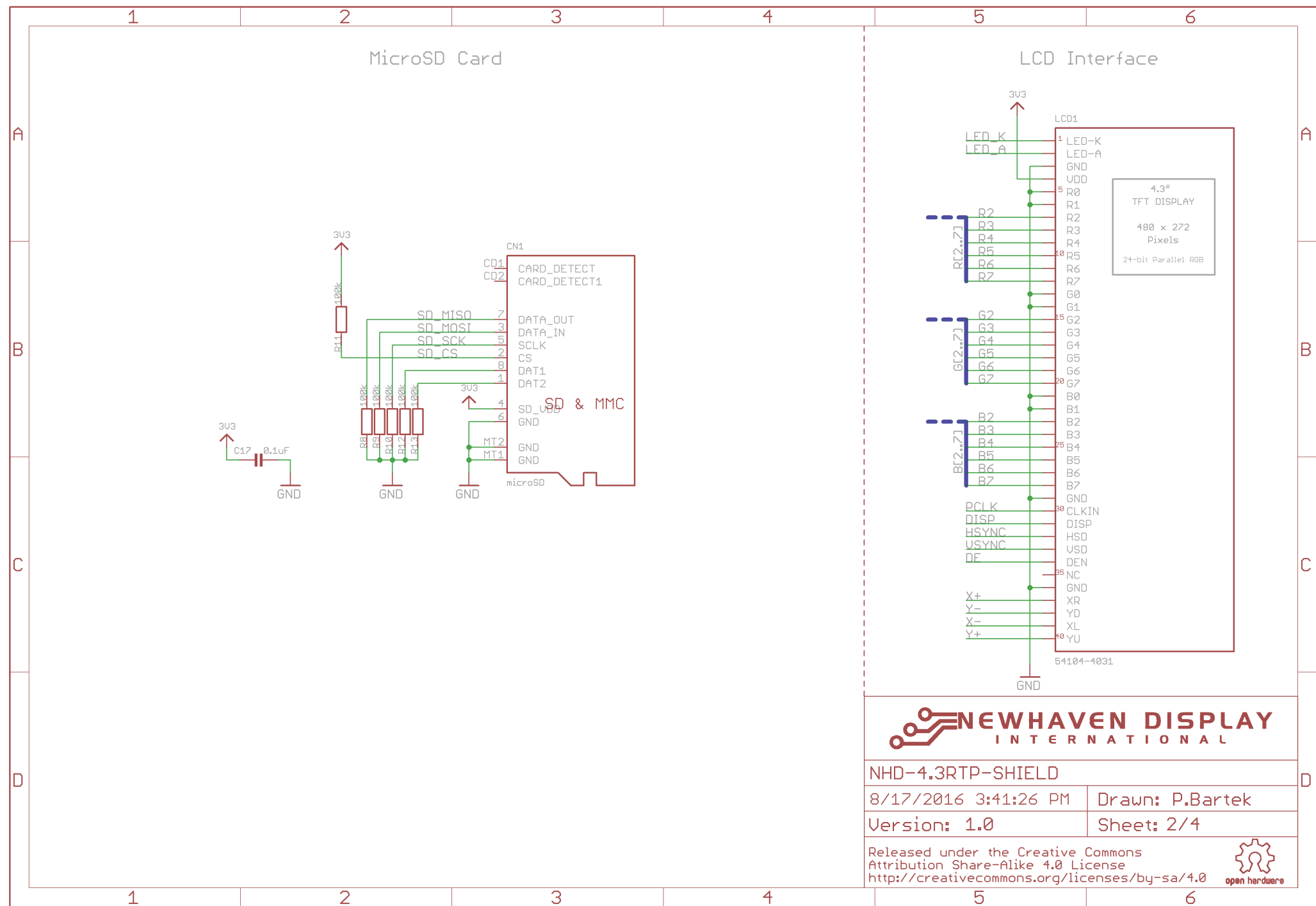
Mechanical Drawing



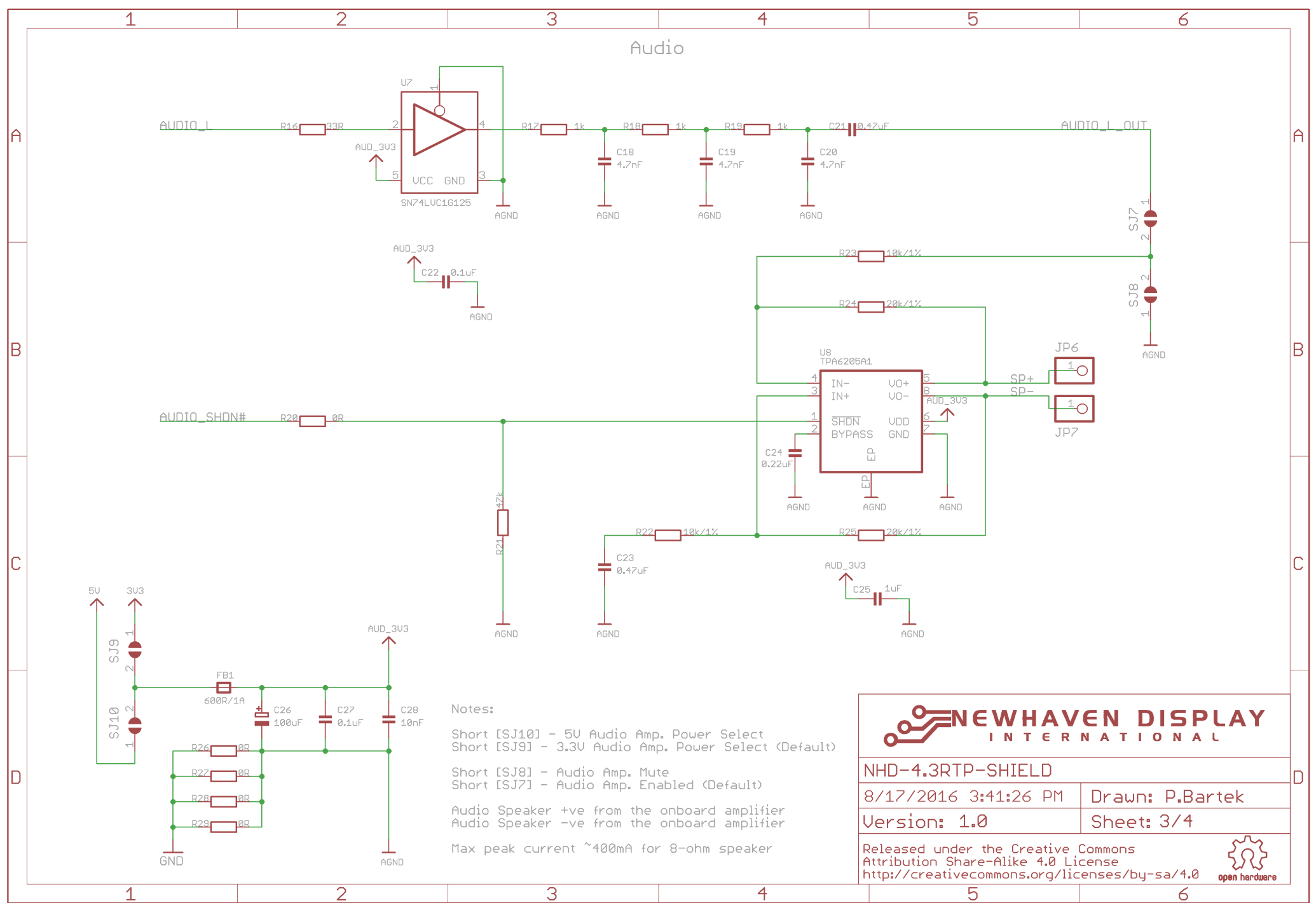
Schematic



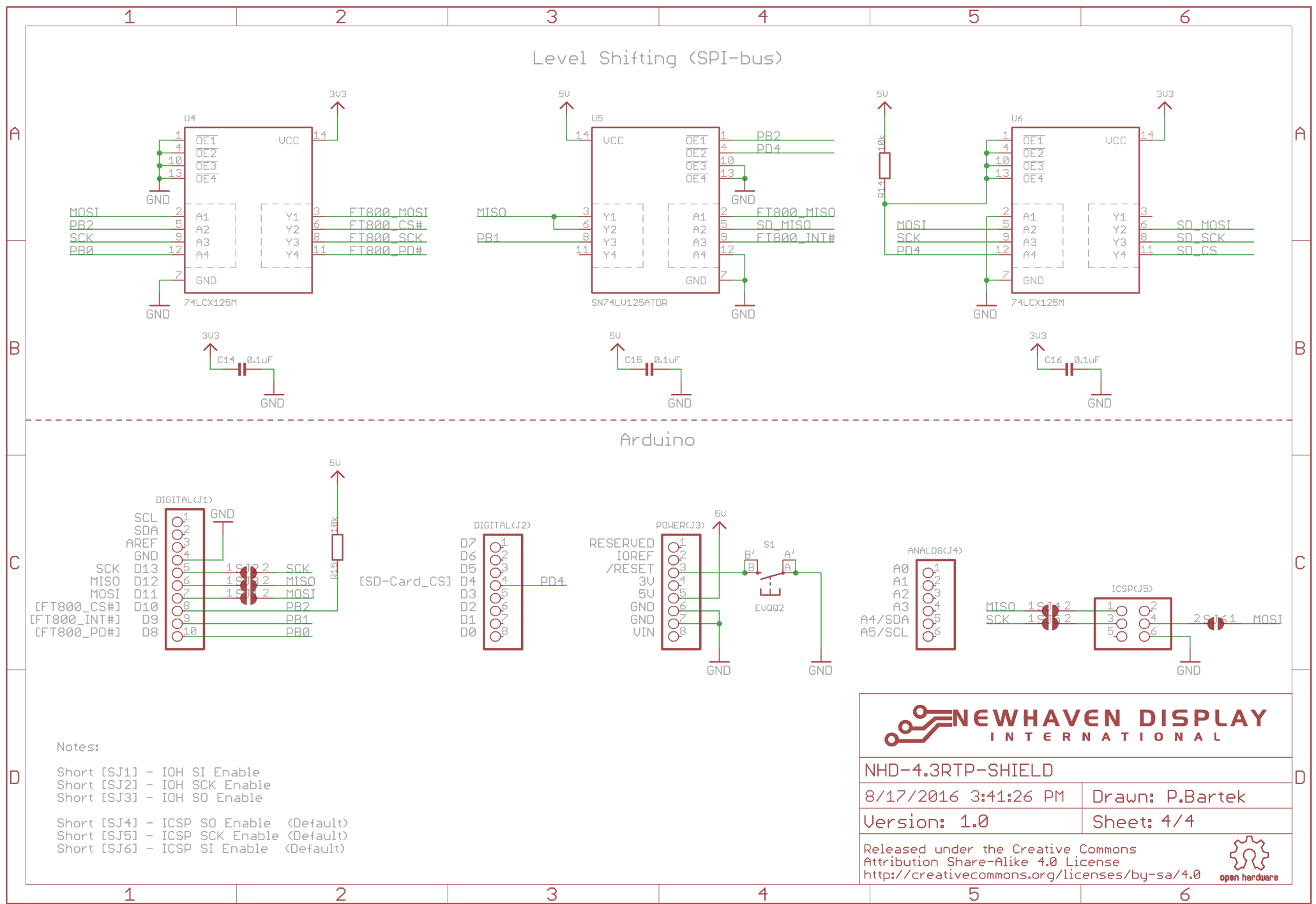
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## Pin Description

| Arduino UNO<br>Pin Symbol | Function Description                       |
|---------------------------|--------------------------------------------|
| <b>J1 Interface</b>       |                                            |
| SCL                       | No Connect                                 |
| SDA                       | No Connect                                 |
| AREF                      | No Connect                                 |
| GND                       | Ground                                     |
| 13                        | No Connect (Short SJ2 for SPI SCK signal)  |
| 12                        | No Connect (Short SJ3 for SPI MISO signal) |
| 11                        | No Connect (Short SJ1 for SPI MOSI signal) |
| 10                        | FT801 Active LOW Chip Select signal        |
| 9                         | FT801 Active LOW Host Interrupt signal     |
| 8                         | FT801 Active LOW Power Down signal         |
| <b>J2 Interface</b>       |                                            |
| 7                         | No Connect                                 |
| 6                         | No Connect                                 |
| 5                         | No Connect                                 |
| 4                         | microSD Active LOW Chip Select signal      |
| 3                         | No Connect                                 |
| 2                         | No Connect                                 |
| 1                         | No Connect                                 |
| 0                         | No Connect                                 |
| <b>J3 Interface</b>       |                                            |
| RESERVED                  | No Connect                                 |
| IOREF                     | No Connect                                 |
| RESET                     | No Connect                                 |
| 3.3V                      | No Connect                                 |
| 5V                        | Supply Voltage for Module (+5V)            |
| GND                       | Ground                                     |
| GND                       | Ground                                     |
| Vin                       | No Connect                                 |
| <b>J4 Interface</b>       |                                            |
| A0                        | No Connect                                 |
| A1                        | No Connect                                 |
| A2                        | No Connect                                 |
| A3                        | No Connect                                 |
| A4                        | No Connect                                 |
| A5                        | No Connect                                 |
| <b>J5 Interface</b>       |                                            |
| MISO                      | SPI MISO signal (Default)                  |
| 5V                        | No Connect                                 |
| SCK                       | SPI SCK signal (Default)                   |
| MOSI                      | SPI MOSI signal (Default)                  |
| RESET                     | No Connect                                 |
| GND                       | Ground                                     |

## Electrical Characteristics

| Item                        | Symbol          | Condition            | Min. | Typ. | Max.            | Unit |
|-----------------------------|-----------------|----------------------|------|------|-----------------|------|
| Operating Temperature Range | T <sub>OP</sub> | Absolute Max         | -20  | -    | +70             | °C   |
| Storage Temperature Range   | T <sub>ST</sub> | Absolute Max         | -30  | -    | +80             | °C   |
| Supply Voltage              | V <sub>DD</sub> | -                    | 4.8  | 5.0  | 5.5             | V    |
| Supply Current              | I <sub>DD</sub> | V <sub>DD</sub> = 5V | -    | 250  | 340             | mA   |
| "H" level input             | V <sub>IH</sub> | -                    | 2.2  | -    | V <sub>DD</sub> | V    |
| "L" level input             | V <sub>IL</sub> | -                    | GND  | -    | 0.8             | V    |

## Optical Characteristics

| Item                   | Symbol | Condition                | Min. | Typ. | Max. | Unit              |
|------------------------|--------|--------------------------|------|------|------|-------------------|
| Optimal Viewing Angles | Top    | CR ≥ 10                  | -    | 50   | -    | °                 |
|                        | Bottom |                          | -    | 70   | -    | °                 |
|                        | Left   |                          | -    | 70   | -    | °                 |
|                        | Right  |                          | -    | 70   | -    | °                 |
| Contrast Ratio         | Cr     | -                        | 400  | 500  | -    | -                 |
| Luminance              | Lv     | I <sub>LED</sub> = 40 mA | -    | 340  | -    | cd/m <sup>2</sup> |
| Response Time          | Rise   | T <sub>OP</sub> = 25°C   | -    | 25   | 30   | ms                |
|                        | Fall   |                          | -    | 25   | 30   | ms                |

## Touch Panel Characteristics

| Item                        | Min.      | Typ. | Max. | Unit       |
|-----------------------------|-----------|------|------|------------|
| Linearity                   | -1.5      | -    | 1.5  | %          |
| Circuit Resistance – X-Axis | 350       | -    | 1050 | Ω          |
| Circuit Resistance – Y-Axis | 100       | -    | 450  | Ω          |
| Insulation Resistance       | 20        | -    | -    | MΩ         |
| Operating Voltage           | -         | -    | 10   | V          |
| Chattering                  | -         | -    | 15   | ms         |
| Transmittance               | 80        | -    | -    | %          |
| Activation Force            | 20        | -    | 80   | g          |
| Pen Writing Durability      | 100,000   | -    | -    | Characters |
| Pitting Durability          | 1,000,000 | -    | -    | Touches    |
| Surface Hardness            | 3         | -    | -    | H          |
| Haze                        | 4         | 7    | 10   | %          |

## Controller Information

### TFT Controller:

Built-in FTDI FT800 Embedded Video Engine.

Please download specification at [http://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS\\_FT800.pdf](http://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS_FT800.pdf)

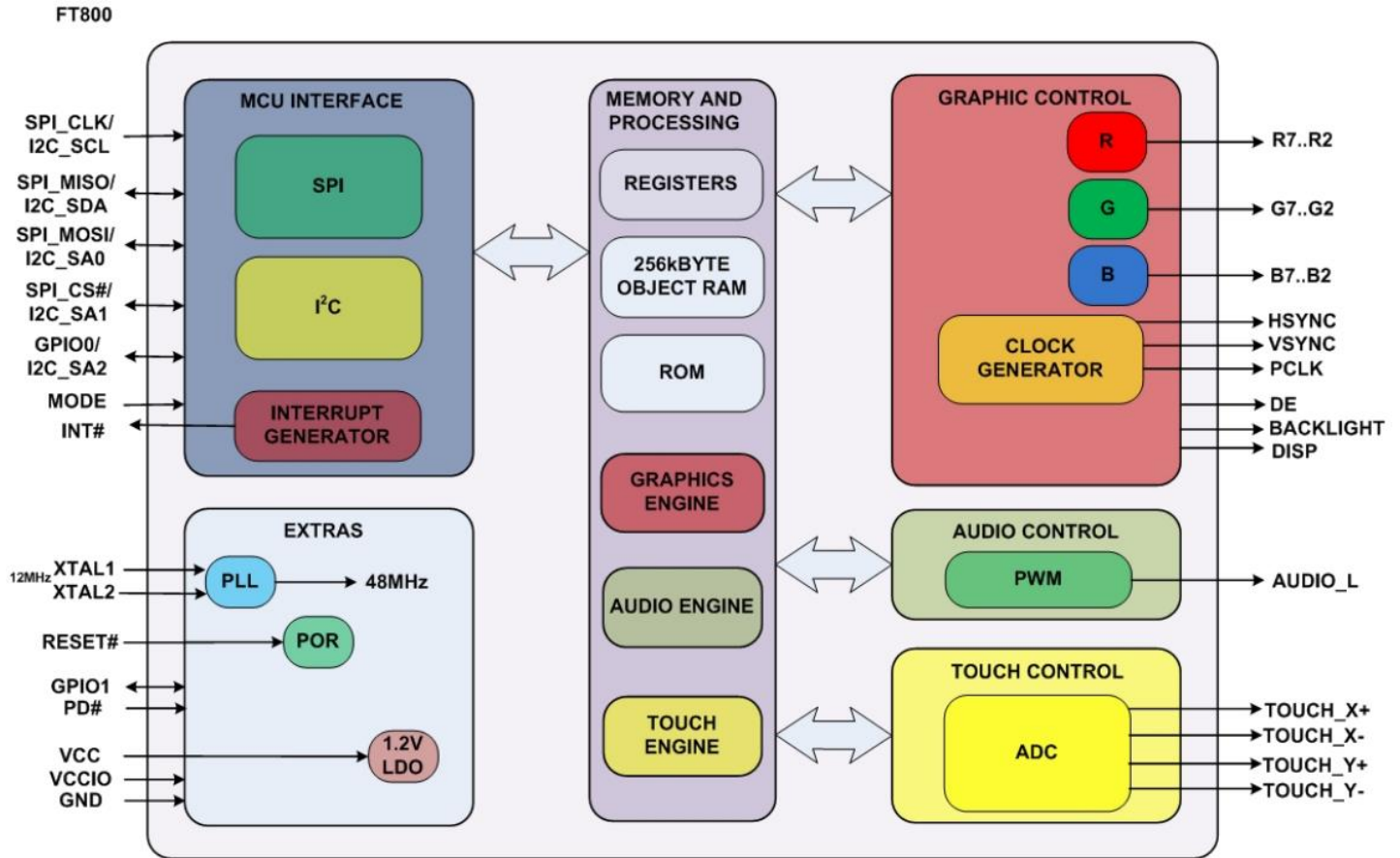
## Display Information

### TFT:

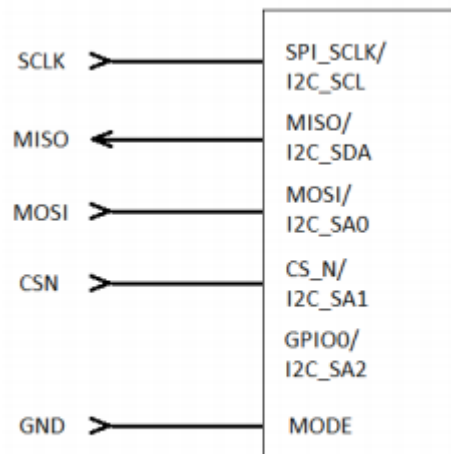
NHD-4.3-480272EF-ATXL#-T – Standard 4.3" TFT, 480x272 Pixels, 24-bit Parallel RGB Interface, w/ 4-wire Resistive Touch Panel.

Please download specification at <http://www.newhavendisplay.com/specs/NHD-4.3-480272EF-ATXL-T.pdf>

## Block Diagram



## Host Interface

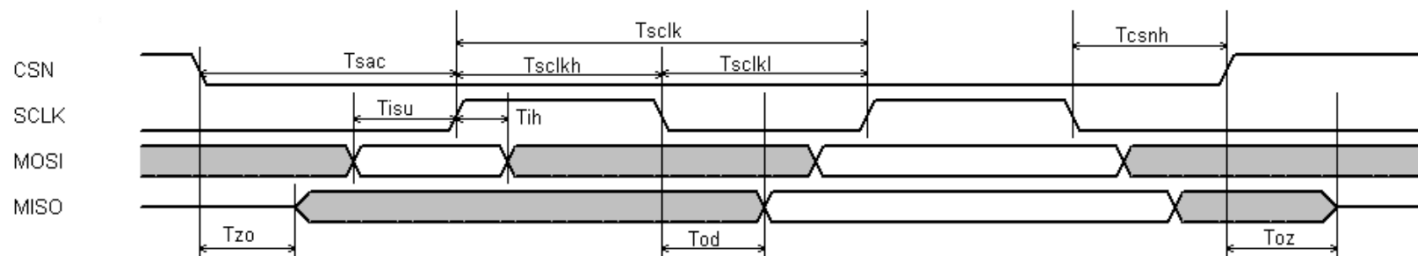


SPI Interface Connection

**SPI Interface** – The SPI slave interface operates up to 30MHz. Only SPI mode 0 is supported. The SPI interface is selected by default (MODE pin is internally pulled low by a 100k resistor).

## Timing Characteristics

### SPI Interface:



| Parameter | Description             | VCC(I/O)=1.8V |     | VCC(I/O)=2.5V |     | VCC(I/O)=3.3V |     | Units |
|-----------|-------------------------|---------------|-----|---------------|-----|---------------|-----|-------|
|           |                         | Min           | Max | Min           | Max | Min           | Max |       |
| Tsclk     | SPI clock period        | 60            | -   | 40            | -   | 33            | -   | ns    |
| Tsclkl    | SPI clock low duration  | 25            | -   | 16            | -   | 13            | -   | ns    |
| Tsclkh    | SPI clock high duration | 25            | -   | 16            | -   | 13            | -   | ns    |
| Tsac      | SPI access time         | 16            | -   | 16            | -   | 16            | -   | ns    |
| Tisu      | Input Setup             | 12            | -   | 11            | -   | 11            | -   | ns    |
| Tih       | Input Hold              | 3             | -   | 3             | -   | 3             | -   | ns    |
| Tzo       | Output enable delay     | 0             | 30  | 0             | 20  | 0             | 16  | ns    |
| Toz       | Output disable delay    | 0             | 30  | 0             | 20  | 0             | 16  | ns    |
| Tod       | Output data delay       | 0             | 24  | 0             | 15  | 0             | 12  | ns    |
| Tcsnh     | CSN hold time           | 0             | -   | 0             | -   | 0             | -   | ns    |

For more information about FT801 controller please go to official FT800 Datasheet.

[http://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS\\_FT800.pdf](http://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS_FT800.pdf)

## 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. | +60°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 -> 25°C,5min -> 70°C,30min = 1 cycle<br>10 cycles                       |      |
| Vibration test                        | Endurance test applying vibration to simulate transportation and use.                                                           | 10-55Hz , 15mm amplitude.<br>60 sec in each of 3 directions X,Y,Z<br>For 15 minutes | 3    |
| Static electricity test               | Endurance test applying electric static discharge.                                                                              | VS=800V, RS=1.5kΩ, CS=100pF<br>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

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

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