

## NLED 4 Channel DMX Wash Controller

This DMX connected LED controller from Northern Lights Electronic Design, is designed for DIY LED wash/flood light construction. With numerous features including 8-bit and 16-bit DMX reception modes, serial reception mode, stand-alone sequences, and an external 3-digit LED display for adjusting the configurations and options. No more reading and setting DIP switches, the configurations such as DMX address and reception modes can be adjusted easily. Serial reception allows many other TTL serial devices, such as Arduino, FTDI adapters, and wireless XBees to control the device. And for when a data signal is not available or required, there are several stand-alone sequences that the device can run, with the option to upload customized sequences through specialized software. With four, high current sinking outputs, many different LED configurations can be utilized, such as LED strip, high wattage LEDs, or LED arrays. RGB+W or RGB+U.V. or any combination of single color LEDs can be utilized.

### Features:

- Small Size 2.1" x 1.75" x 0.5"(tall)
- 4 Output Channels, Current Sinking, for RGB+W or RGB+U.V. or single color setups.
- High Current Sink Outputs(LED Configuration as Common Anode, see pg. 4)
- Versatile LED Configurations, most any (common anode type) configuration of LEDs is compatible.
- DMX-512 connectivity, 40FPS at full packets, faster with partial packets.
- Multiple User Selected DMX Reception Modes(8-bit and 16-Bit Mode, with additional features)
- Serial Reception Mode at user selected baud rate. With RS-485 or TTL reception option.
- User Selectable PWM Rate, 960Hz, 2KHz, 15kHz, or 31KHz at 10-bit(1024 levels) PWM resolution
- Automatically saves user configurations, options and DMX address, and loads them at startup.
- External 3 Digit LED Display with 2 buttons for adjusting the configurations and options, such as the DMX reception address.(no DIP switches used, easy to read, and easy to configure)
- Stand-Alone Sequences, for when no data signal is available, 32 stock sequences to choose or customize.
- NLED Control Software Compatibility, connection via the 3-pin header.

Create and upload(save) custom stand-alone color sequences to the controller from a computer.

- Serviceable Design, in case of any damage caused by accident, including a Full Warranty and Guarantee

### Specification:

|  |                                      |
|--|--------------------------------------|
| <b>Input Voltage</b>                   | <b>5v* - 24v</b>                     |
| <b>Logic Current Draw</b>              | <b>&lt; 100mA</b>                    |
| <b>Output</b>                          | <b>4 Channels, Sink</b>              |
| <b>Max Current Per Output</b>          | <b>5 Amp**</b>                       |
| <b>Max Current Total(all channels)</b> | <b>15 Amp</b>                        |
| <b>PWM Frequency</b>                   | <b>488Hz to 31kHz****</b>            |
| <b>PWM Resolution</b>                  | <b>8-bit or 10-bit(DMX only)</b>     |
| <b>Connectors</b>                      | <b>Screw Terminals, 0.2"(5.08mm)</b> |
| <b>Connector Spacing</b>               | <b>0.1"(Headers) 0.2"(Terminal)</b>  |
| <b>Main PCB Dimension</b>              | <b>2.1" x 1.75" x ~0.5"</b>          |

\*5 Volt Input operation requires V-JUMP to be soldered.

\*\*Equivalent to 16 meters of 7.2w/meter(600mA/M) LED strip

\*\*\*\*Selectable through the Options Menu

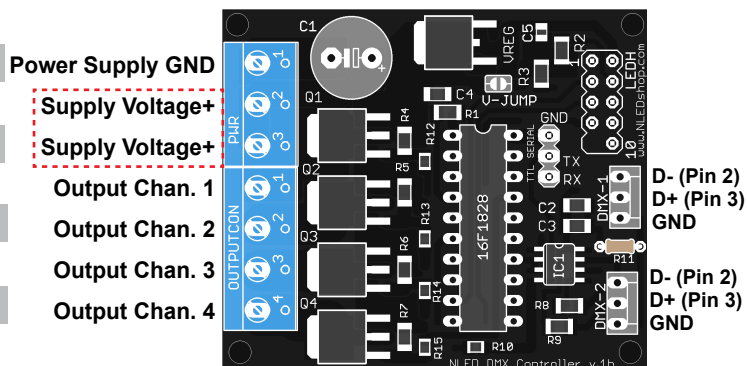


Fig. 1a

**Full Pinout Information On Page 11**

## External 3-Digit LED Display

The 3-digit LED display is used to adjust the configurations, such as the DMX address. And to display device messages. The display are not mandatory for operation, the controller works without it, and a single display can be swapped among multiple controllers(while powered on) without an issue or danger. All the configurations and options can also be adjusted over Aurora commands and software, or through a terminal program. The plug for the LED display may affect device dimensions and usage.

The datasheet and other information for the 3-Digit LED Display is available on the website.  
[www.NLEDshop.com/extdisplay](http://www.NLEDshop.com/extdisplay)

**Default Messages:** If the display is set to be always on(page 3), it will display a default message depending on its current state.

DMX Reception: Displays DMX Address in 3 digit format(001, 089, etc)

Serial Reception: Cycles displaying S-L and current baud rate ID such as

Stand-Alone Sequence/Mode: Shows S-x to indicate what stand-alone ID is running.

Upload Mode: Displays uPL

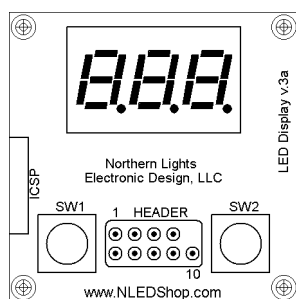
Stand-Alone Hold: Displays Hold

Stand-Alone Blank: Displays bLR

The controller offers 4 modes to configure how the LED display will act.

- ALL** Always On at full brightness, displays default message based on program mode.(NOT RECOMMENDED)
- Con** Blanks the display after short countdown after previous displayed message.
- d in** Always on(as above) and dimmed
- dn2** Display dimmed, and after a short count down it will go blank(as above)

NOTE: AVOID TOUCHING THE LED DISPLAY HEADER PINS WHENEVER POSSIBLE



Full Size Version 3a  
External LED Display

Print without scaling to  
use as a template  
or  
Check Website for  
vector cutout files for  
CNC/Laser cutting.

## Button Use and Options Menu Navigation

Pressing and holding both buttons will open the device menu, where the device configurations and features can be adjusted. When both buttons are pressed and held, the display will indicate by animating "...". Once the menu is open( E n u ) use SW1(left) to cycle through the options and SW2(right) to select an option. For quicker adjustment of the DMX address, both buttons are pressed simultaneously, and released before the menu opens. Adjust the address using the buttons and repeat a quick press of both buttons simultaneously to apply the changes. The configurations are loaded at device startup and saved after a short delay after adjusting them. Configurations can also be altered through software.

Env

## Menu Tree and Navigation

Adr

Adjustment of the DMX Address. Use SW1 to increase the address and SW2 to decrease. Press and hold for faster alteration, quick press both buttons to close and apply changes.

d 5

External LED Display Modes

ALL

Always On, displays default message based on program mode. **(NOT RECOMMENDED)**

Con

Blanks the display after short countdown after last displayed message.

d in

Always on(as above) and dimmed

dn2

Display always dimmed, and counts down to blank(as above)

odE

DMX Reception Modes

Mode 1

Mode 2

Mode 3

Mode 4

Mode 5

DMX Reception Mode, 1 - 5

od 1

od 2

od 3

od 4

od 5

Please See Page 4 for Details

con

Connection and communication

S-S

DMX Master Transmission

non

No DMX transmission, Normal Reception, Slave Device.

Ful

Transmits Full DMX Packets when in stand-alone(see pg. 5)

PAR

Transmits Partial DMX Packets when in stand-alone(see pg. 5)

Aud

Enabled(**EnA**) will allow Device to automatically switch back and fourth from stand alone mode and DMX/Serial when signal is available. Disabled(**dSA**) will keep device waiting for signal and never run stand-alone sequences.

S-L

Enabled(**EnA**) will allow Serial control at the selected baud rate  
Disabled(**dSA**) will allow DMX-512 control

485

Enabled(**EnA**) will allow RS-485 Hardware to be used for Serial reception.  
Disabled(**dSA**) will allow RX-TX-GND header usage to function for Serial control.

baU

Selects Baud Rate for Serial reception usage.

b 1>b 2>b 3.. b 8

1=9600, 2=19200, 3=38400, 4=57600 | 5=115200 | 6=230400 | 7=250,000 | 8=460800 | 9=500,000 | 10=1,000,000

SdA

Stand-Alone and Switch Over

uPL

Enter device into Upload/Software Mode. Disables data reception modes other than Live Mode.

Hod

Hold Outputs at the last intensities if DMX signal is no available

blA

Blanks(sets to 0% intensity) the Outputs when DMX signal is not available

FAo

Fade outputs smoothly to 0%/blank/off when DMX signal is lost.

SEL

Select Sequence Mode, double press both buttons to save the selected sequence and exit selection.

ur 1

Automatically start User Sequence ID when DMX is not available.

...

Select ID Number, will only list sequences that are already loaded.

u32

PFr

Output PWM Frequency

P- 1

31KHz

P- 2

7.8KHz

P- 3

1.95KHz

P- 4

488Hz

## DMX Reception Modes

### #1: 4 Channel Mode: Standard RGBW Usage

| DMX Channel | Function | Value   | Description                            |
|-------------|----------|---------|--|
| Channel 1   | Red      | 0 - 255 | Red Value, 0 is Off, 255 is Maximum    |
| Channel 2   | Green    | 0 - 255 | Green Value, 0 is Off, 255 is Maximum  |
| Channel 3   | Blue     | 0 - 255 | Blue Value, 0 is Off, 255 is Maximum   |
| Channel 4   | White/UV | 0 - 255 | Fourth Value, 0 is Off, 255 is Maximum |

### #2: 5 Channel Mode: RGBW Control with Intensity - RGBWA

| DMX Channel | Function        | Value   | Description  |
|-------------|-----------------|---------|--|
| Channel 1   | Red             | 0 - 255 | Red Value, 0 is Off, 255 is Maximum                    |
| Channel 2   | Green           | 0 - 255 | Green Value, 0 is Off, 255 is Maximum                  |
| Channel 3   | Blue            | 0 - 255 | Blue Value, 0 is Off, 255 is Maximum                   |
| Channel 4   | White/UV        | 0 - 255 | Fourth Value, 0 is Off, 255 is Maximum                 |
| Channel 5   | Intensity/Alpha | 0 - 255 | Scales other channel's Intensity, 0 is 0%, 255 is 100% |

### #3: 8 Channel, 16-bit Mode: 16-Bit RGBW

| DMX Channel | Function     | Value   | Description                                    |
|-------------|--------------|---------|--|
| Channel 1   | Red MSB      | 0 - 255 | Most-Significant-Bits of the 16-bit 1st value  |
| Channel 2   | Red LSB      | 0 - 255 | Least-Significant-Bits of the 16-bit 1st value |
| Channel 3   | Green MSB    | 0 - 255 | Most-Significant-Bits of the 16-bit 2nd value  |
| Channel 4   | Green LSB    | 0 - 255 | Least-Significant-Bits of the 16-bit 2nd value |
| Channel 5   | Blue MSB     | 0 - 255 | Most-Significant-Bits of the 16-bit 3rd value  |
| Channel 6   | Blue LSB     | 0 - 255 | Least-Significant-Bits of the 16-bit 3rd value |
| Channel 7   | White/UV MSB | 0 - 255 | Most-Significant-Bits of the 16-bit 4th value  |
| Channel 8   | White/UV LSB | 0 - 255 | Least-Significant-Bits of the 16-bit 4th value |

Note: The maximum PWM resolution is 10-bits(1024 brightness levels), so the 6 LSBs are unused

### #4: 3 Channel Mode: Standard RGB Compatibility

| DMX Channel | Function | Value   | Description                     |
|-------------|----------|---------|---------------------------------|
| Channel 1   | Red      | 0 - 255 | Red, 0 is Off, 255 is Maximum   |
| Channel 2   | Green    | 0 - 255 | Green, 0 is Off, 255 is Maximum |
| Channel 3   | Blue     | 0 - 255 | Blue, 0 is Off, 255 is Maximum  |

### #5: 6 Channel Mode: RGBW Control with Intensity and Strobe

| DMX Channel | Function        | Value   | Description  |
|-------------|-----------------|---------|--|
| Channel 1   | Red             | 0 - 255 | Red Value, 0 is Off, 255 is Maximum                    |
| Channel 2   | Green           | 0 - 255 | Green Value, 0 is Off, 255 is Maximum                  |
| Channel 3   | Blue            | 0 - 255 | Blue Value, 0 is Off, 255 is Maximum                   |
| Channel 4   | White/UV        | 0 - 255 | Fourth Value, 0 is Off, 255 is Maximum                 |
| Channel 5   | Intensity/Alpha | 0 - 255 | Scales other channel's Intensity, 0 is 0%, 255 is 100% |
| Channel 6   | Strobe Vblue    | 0 - 255 | Strobe time value, multiply by 5 milliseconds, 0 = Off |

Need something different? Custom? Contact [Support@NLEDshop.com](mailto:Support@NLEDshop.com) for Help

## **Auto-Detection, DMX or Serial**

One of the configuration options allows the device to detect valid serial data or DMX signal and automatically switch from stand-alone sequences to the selected data signal type. For DMX it will take a few packets of good data for the device to validate the signal and then switch over. Serial auto detection is similar, it must detect several packets of serial data at the correct baud rate for it to validate the signal and switch over from stand-alone sequences. The configuration can be changed in NLED Aurora Control software or through NLED Aurora USB commands. DMX master transmission overrides auto-detect usage.

With Auto-Detect disabled, the controller will wait for DMX or serial data forever, with the outputs holding the last data that was received. When enabled, it will start one of the stand-alone methods. Including Hold, Blank, Fade Out, and Color Sequences. Page 3 has descriptions.

## **DMX Transmission Modes**

DMX master transmission allows a single controller to control multiple controllers(slaves) of the same type or ones with similar DMX profiles. A single controller becomes the master by selecting the appropriate mode through the menu or commands. The master controller will then output a DMX-512 signal to other DMX connected lights. The transmission only occurs when the controller is setup for master transmission and is running a loaded stand-alone sequence. While DMX master transmission is enabled, the controller will not auto-detect DMX or serial reception.

**NON** No Master DMX Transmission, device receives normally. As Slave.

**FUL** Transmits full DMX Universe when in Stand-Alone Mode, transmits the repeating values of the output channels to all DMX channels. 1-4, 5-8, 9-12 up to 512, would all be the same values.

**PAR** Transmits a partial DMX Universe(256 channels) when in Stand-Alone mode. Same as above but output channel values are repeated 1-4,5-8,9-12 etc up to channel 256.

Note: If a DMX Transmitter is attached to the device(s) it will load the line and Master transmission will not work until the other transmitter is removed from the circuit, and once a device is Master transmitting and DMX transmission is restored, all devices in the universe could act erratically for a few seconds.

When DMX Master Transmission is enabled, it will not detect DMX-512 or Serial reception.

## **(USB) Live Control & Aurora Commands**

Live control over USB/Serial is part of the Aurora command set, which allows the intensities of the outputs to be adjusted through commands.

NLED Aurora Control commands are compatible with all devices that are compatible with the software. The commands can be executed from any software or program that can connect to the device. Communication involves a simple byte exchange and acknowledge, then the command byte and 4 data bytes are sent to the device. See software documentation for command details and usages.

Note: The documentation may refer to it as USB Live Control or USB Commands, this controller is not a native USB device and requires an external third party USB to (TTL) Serial Adapter in order to interface. Other TTL serial devices will also work, WiFi or Bluetooth modules, Arduinos and many others.



## NLED Aurora Control Software

Most NLED controllers are compatible with the NLED Aurora Control software. The software is used to create a multitude of patterns and sequences on a computer, then upload them to the compatible controller for the device to run by itself, without a computer connection. The simple GUI makes it easy for anyone to create custom color sequences of any sort and upload them to the controller over the USB, WiFi, Bluetooth, or Serial connection. Great for any LED project that requires custom color sequences and control. In addition to standalone sequences, it also supports USB Live Control, send packets over USB to the device for direct control of the outputs. In addition it offers a command structure for interfacing and controlling with the device. It supports single color, RGB, or RGBW LED configurations. Entirely GUI based and easily to navigated.

This controller is fully compatible with up to 512 channels(170 RGB pixels) in stand alone mode and the communication methods.

**Color Sequence:** A color pattern, contains all the data to control the LEDs. Or dataset(how the color data is stored) that creates colors, patterns, and sequences. Can be single color, RGB or RGBW, all are still color sequences.

**Channels:** A channel represents a single output on a controller or a single color of a pixel.

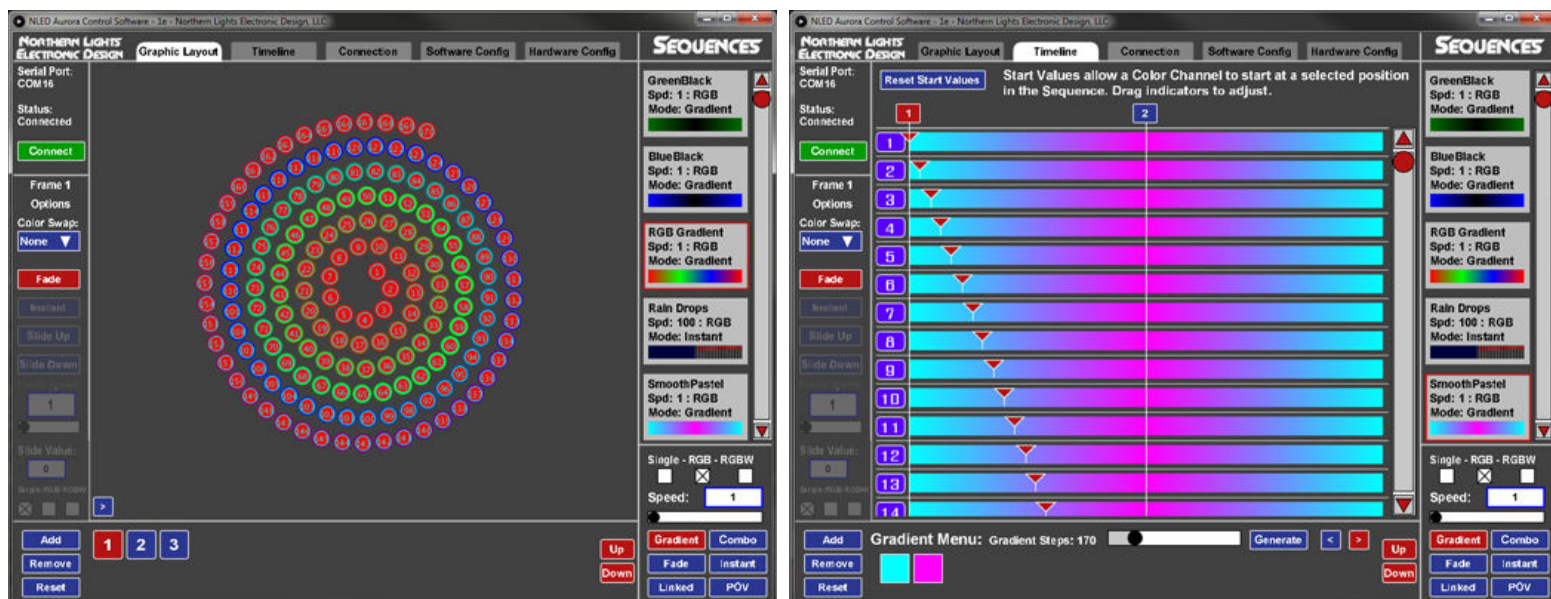
**Color Channel:** Represents a single LED or pixel. That could be either single color, RGB, or RGBW(or RGB+U.V.) A Color Channel is seen as 1 or more Channels. A sequence set to RGB Pixel Data Type will use 3 Channels Color Channel. A LED Icon(on the Graphic Layout tab) or a row on the Timeline tab represent a Color Channel.

**Frame:** The data stored in each Frame will be displayed on the outputs/pixels sequentially. A Frame can be thought of as a single frame of a video, it holds all the data to create those colors. See Manual for details.

**Index:** Contains a directory or order of the color sequences that will be uploaded to the controller.

**Pixel Data Type:** Tells the software and controller the LEDs that will be controlled are either a single color LED(like just blue), RGB, or RGBW(Any 4 colors)

PLEASE SEE THE AURORA MANUAL WITH THE SOFTWARE DOWNLOAD FOR EXTENDED DETAILS



Visit [www.NLEDshop.com/nledaurora](http://www.NLEDshop.com/nledaurora) to download and to find more information.

## Software Connection for Stand-Alone Usage

This device has the ability to run one of 32 stand-alone sequences, including linked sequences. The stand-alone sequences can be enabled by configuring the device for DMX reception and enabling Auto-Detect. Once those are set, the device will automatically start stand-alone mode after a small delay whenever no DMX signal is available or when it is lost. To select which sequence will run, the menu option lists the 32 sequence options along with select, hold, fade out, and blank. Select the option to manually change through the sequences using the buttons for up and down selection, sequence will run and the sequence number will be displayed. Double press both buttons to exit sequence select mode. To save a Sequence as the default, it must be selected through the menu options normally.

The device is compatible with the software NLED Aurora Control. The software is a Java based application that will run on Windows, Mac, and Linux. It requires a TTL serial adapter, such as an USB FTDI adapter, to be connected to the RX-TX-GND header.(as shown above) The software allows the user to create color sequences on a computer and upload(save) them to the device. The device stores them for use at any time, without the computer connection. Note this device runs a simplified version of the firmware and not all sequence modes are available, please see documentation.

Please see previous section on this datasheet and the webpage [www.NLEDshop.com/nledaurora](http://www.NLEDshop.com/nledaurora)

### Software/Command Usage:

1. Enter Device into Upload Mode, by selecting Upload(⬆️) menu option. Or by pressing and holding button SW1 during power up. It will then briefly display to indicate it is ready for software commands. Note it will start running stand alone functions if enabled, and will display the default characters on the display.

Or if a LED display is not connected. The device can be forced to enter Upload Mode by connecting SW1 button header to ground(both reds to blue on Fig. 7a). Then powering the device on. Once powered on, remove the jumpers tying the button header to ground. The device is then ready to accept commands.

2. Connect the RX-TX-GND Header as pictured in Fig. 8b if not already.

3. Once correctly wired to a serial adapter as Fig. 8b and placed in Upload Mode the device will accept and respond to NLED Control commands. See software webpage for command list and usage.

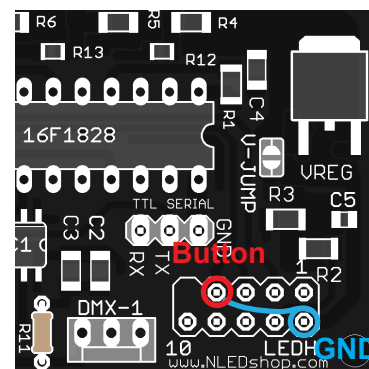


Fig. 7a

## Serial Communication

As briefly mentioned in the NLED Aurora Control section this controller offers Dual Command Mode configuration(see Pg. 6). This allows the user to select whether to run the controller normally using USB as the primary communication port for commands and uploads. Or allow commands to be communicated from TTL serial devices and modules.

**Disabled(Default):** Aurora commands, such as sequence uploading and sequence control, can only be issued over the USB interface. All other serial and DMX functions work as normal.

**Enabled:** The controller will disable serial reception, DMX reception, and DMX master transmission. This allows for external TTL serial devices such as FTDI adapters, WiFi modules(X-Bee, ESP8266), Bluetooth modules, or Arduino's to issue commands to the controller. The USB interface works concurrently with the external serial module and either can send and receive commands.

**NOTE:** This device expects a baud rate of 19200(Aurora default), double check software.ini file in the Aurora folder that it is set correctly, otherwise change it.

## Serial Control Reception Usage

Serial reception can directly control the device's outputs using a common serial transmission device. Such as a standard COM port with level translation, an FTDI adapter, Arduino, PIC UART, wireless XBee, or similar. The device receives data in packets, the size(in bytes) of the packet corresponds to how many channels will be controlled. Example: Sending a packet of 90 bytes will control 30 RGB pixels, sending 510 bytes would control 170 RGB pixels. There is a maximum of 5mS between bytes and a minimum of 5mS between packets(end-of-frame), to allow the data to latch. A delay between received data bytes of more than 5mS will reset the buffer pointer, framing the data. Partial packets will latch after the 5mS delay, or latching will occur immediately after receiving the last(512th) byte.

Serial Reception can be enabled through the NLED Aurora Control software by adding it to an index, or by configuring auto-detection. Each method requires the use of the software. In the software, on the Hardware Tab, select the Auto-Detect Serial option to automatically enter Serial Reception when valid data is received. The device can take several packets to detect and validate the data before starting reception. The stock baud rate is 19,200, but the user can set the utilized baud rate using the software through the hardware tab by selecting the desired baud rate from the drop down menu. The byte formatting is the standard 8-N-1(8-bits, no parity, 1 stop bit) The controller accepts the data in regular RGB order and will reformat it to the required output order(to GRB, BRG etc) as per the pixel configuration setting.

For Serial Reception to function the RS-485 hardware must be configured. RS-485 is a differential transmission method, that DMX-512 utilizes. The user can select through the software or external LED display to utilize the RS-485 hardware for Serial Reception(transmitting device must be RS-485 as well) on the DMXIN header or to disable usage and utilize the RX-TX-GND header for direct TTL (Low=0v, High=5v, 3.3v levels will work as well) control.

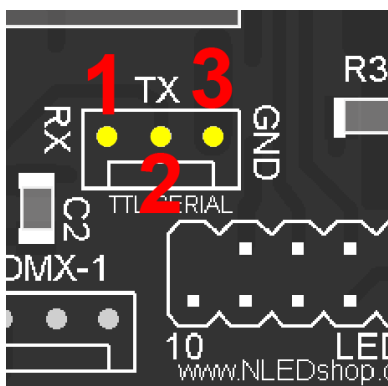


Fig. 8c

### RX-TX-GND Header Connection

Device:

1 RX ← TX  
2 TX → RX  
3 GND ↔ GND

Fig. 8b

| ID# | Actual Device Baud | Closest Common Baud Rate | Error % |
|-----|--------------------|--------------------------|---------|
| 0   | 9,615              | 9,600                    | 0.16%*  |
| 1   | 19,230             | 19,200                   | 0.16%*  |
| 2   | 38,461             | 38,400                   | 0.16%*  |
| 3   | 57,142             | 57,600                   | 0.64%*  |
| 4   | 117,647            | 115,200                  | -0.79%* |
| 5   | 222,222            | 230,400                  | 2.12%*  |
| 6   | 250,000            |                          |         |
| 7   | 444,444            | 460,800                  | -3.55%* |
| 8   | 500,000            |                          |         |
| 9   | 1,000,000          | 921,600                  | 8.51%   |

Fig. 8a

8-N-1

\*Note: Percentage of error is within usable limits. And won't affect usage.

"Actual Device Baud" is the exact rate the controller is expecting, match it for a 0% error value.

Controller supports both 3.3 volt and 5 volt logic levels.



## Firmware Updates Using The Bootloader

This device includes a bootloader feature. It allows the firmware on the device to be upgraded with new features and bug fixes using a small computer program and an USB to serial adapter.

The software download links and instructions can be found at [www.NLEDshop.com/bootloader](http://www.NLEDshop.com/bootloader). This device uses the "Serial Bootloader" and requires an adapter. The "USB HID Bootloader" does not work with this device. Adapters such as FTDI, PL2303HX, and numerous others can work for this process.

Firmware updates are encrypted and protected with special code that prevents other devices from being programmed with the update firmware images. And prevents non-NLED firmwares from being programmed onto the devices. If a firmware image is loaded onto a microcontroller without the special protection code it will respond to commands and USB will work, but the outputs will be off. Contact Us for help restoring your device to original condition if your microcontroller was damaged, erased, 'bricked', or otherwise not working correctly.

The bootloader entry method is:

- With the device powered off, either make the jumper connections like in Fig. 9a or hold down both the buttons on the external LED display.
- Power up the device by connecting it to external power.
- Wait a second or two.
- The device's notification LED should be full on if it entered bootloader mode. Follow the instructions for the

Or the device can enter the bootloader mode via USB commands. Either from NLED Aurora Control, using the button on the upper right on the Hardware Tab.

The command is:

**140 0 0 0 0**

To Enter a command:

- Open the correct COM port
- Select any baud rate, doesn't matter
- Send as ASCII "NLED11"
- Device will respond with "a9"
- Send as ASCII "nled99"
- Device will respond with "f0"
- Send as Numbers "140 0 0 0 0"
- Device will then enter bootloader mode (Note not all devices and firmware versions are compatible)

Example shown is the third party software RealTerm.  
(NOT AFFILIATED)

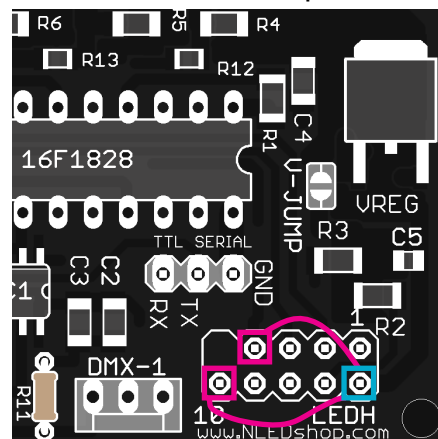


Fig. 9a

Fig. 9b

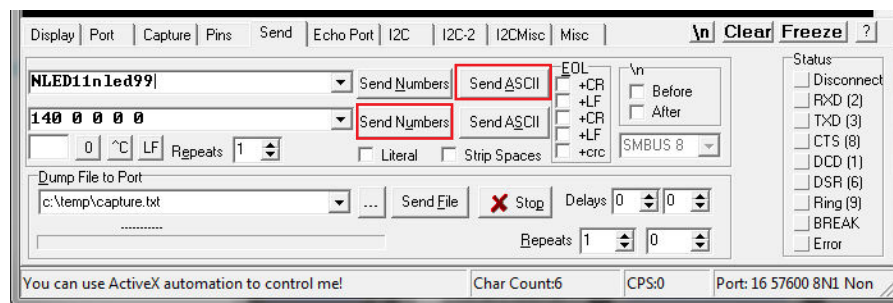
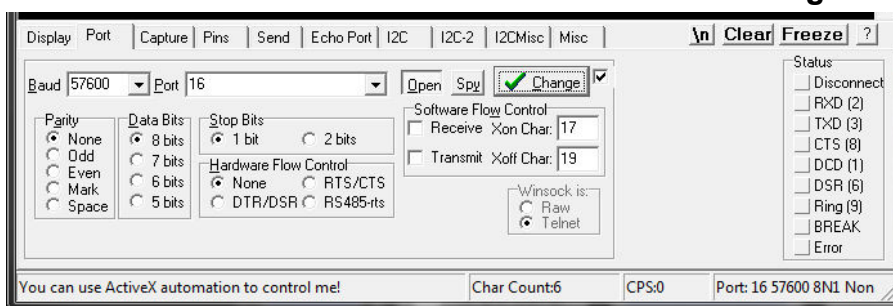


Fig. 9c

## **Device Configurations Settings**

The configurations affect how the controller functions and what features are utilized. These are configured to suit the project. They can be edited through the menu using the external LED display or they can be accessed via NLED Aurora software or through commands.

**Serial Baud Rate:** Sets the expected baud rate used for serial reception. The controllers baud must match the baud rate of the transmitting device.

**DMX Address:** The starting address for DMX reception.

**Auto-Detect Options:** Options allow the device to detect and automatically switch from stand-alone to the selected control method(DMX or Serial)

**DMX Reception Mode:** Configures how the received DMX data will be used to control the output channels. See DMX chart on page 4 for details.

**DMX Master Mode:** Configures DMX master transmission when the device is playing stand-alone sequences.

**External LED Display Mode:** Configures the display action of the LED display. See page 2.  
Note: Always On mode is not recommend for this controller.

**Serial RS-485:** For use with serial reception, DMX usage ignores. If enabled it will use the RS-485 transceiver and the data terminals D-, D+, & GND to collect standard 8-N-1 serial data at the user selected baud rate. If disabled the TTL(0v, 5v) serial header(RX,TX,GND) can be used for serial reception normally.

**Enable Serial Reception Over DMX:** If disabled the controller will expect to receive DMX data normally. If enabled the controller will expect serial 8-N-1 data at the user selected baud rate.

**PWM Frequency:** Sets PWM Frequency, faster is usually better for light quality.

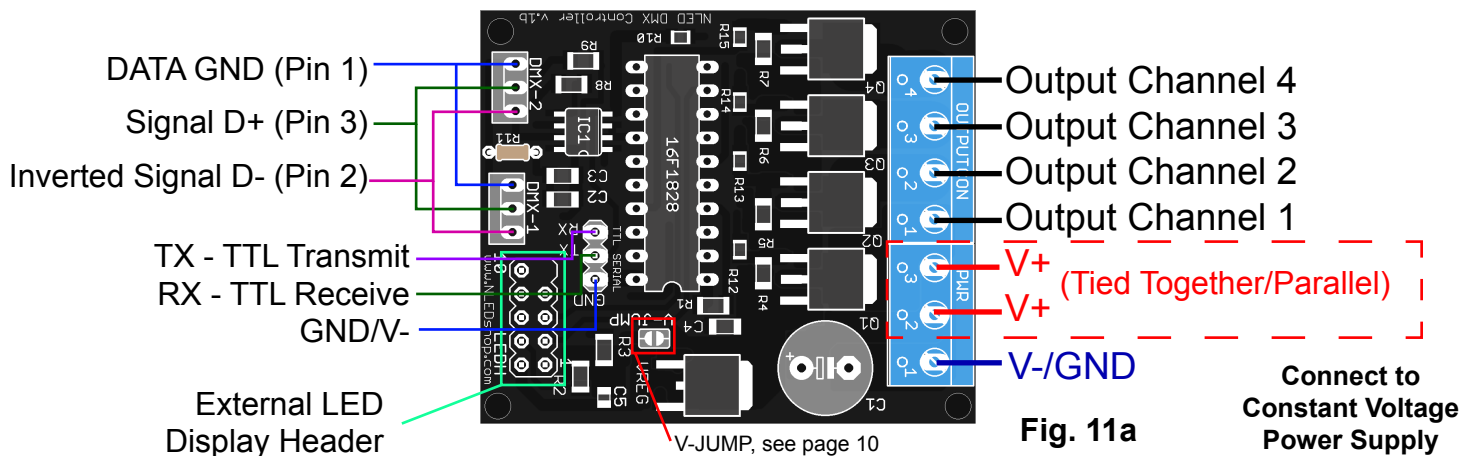
**Dual Communication Mode :** Allows a TTL serial device, such as a FTDI, X-Bee, Arduino, or ESP8266 to interface and command the controller over the RX/TX/GND serial connection. Serial control reception, DMX reception, and DMX transmission are disabled when Dual Communication Mode is enabled.

**Stand-Alone Mode & Signal Loss Mode:** Sets what function will run after the controller does not detect a valid DMX or serial signal for the time out period of about 3 seconds. The options are covered on page 2, but include hold current values, blank, fade off current values, or start a stand-alone sequence.

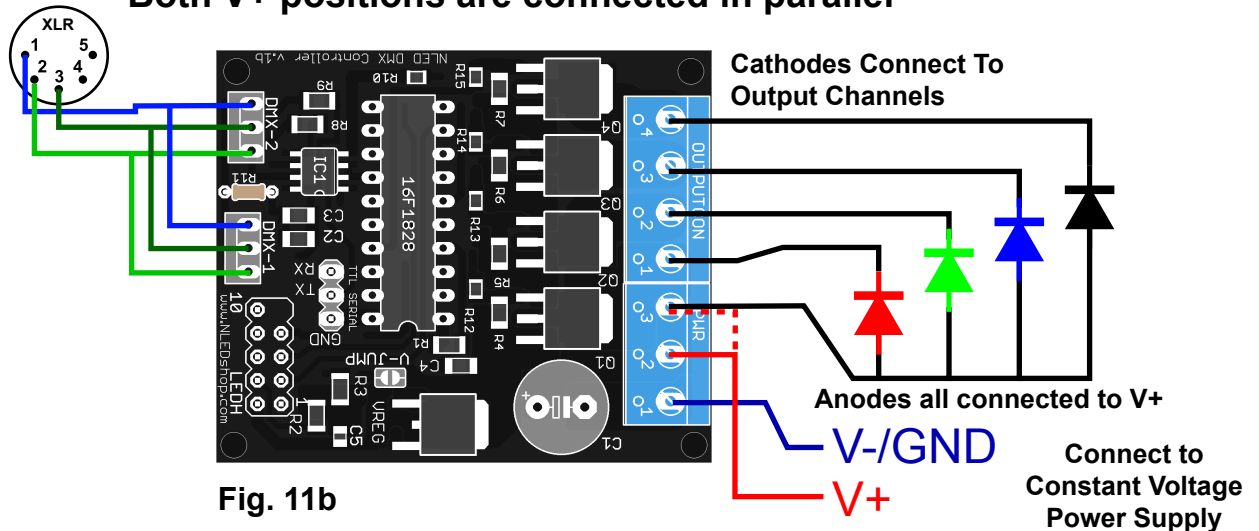
## **24 Volt Operation**

For 24 volt operation the LED Display option for Countdown or Dim, must be enabled. Powering the LED display constantly at full brightness could cause damage to the logic voltage regulator.

## Controller Pinout



**Both V+ positions are connected in parallel**



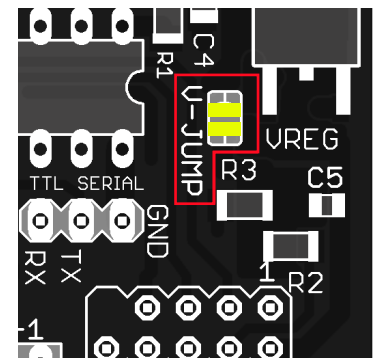
## Power Considerations

The controller accepts an input voltage of 5 volts(with V-JUMP jumped) to 16 volts. The controller regulates the input voltage to 5v to power the MCU, transceiver, and LED display. The controller does not affect the anode(LED positive) voltage of the LEDs or the voltage supplied to the LEDs.

**V-JUMP:** If the input voltage will be greater than 5 volts, this position will NOT be used for anything. If the input voltage(supplied to the V+ and V- positions) will be 5 volts or less, the V-JUMP jumper must be soldered closed. There are 2 SMD pads that need to be soldered together to enable the jumper and 5 volt operation.

On Fig. 11c shows the pads are highlighted in yellow. First carefully remove any protecting film or glue that may be covering the pads. With a clean soldering iron and a very small amount of solder heat up the pads and apply the solder. The solder should cover both pads, but should not be touching any adjacent parts. Clean up if needed.

Once V-JUMP is installed the maximum input voltage of the controller will be 5 volts, any higher will damage or destroy the controller. The jump can be undone by removing the solder from V-JUMP. Test after removal.



## LEDs Configuration Examples

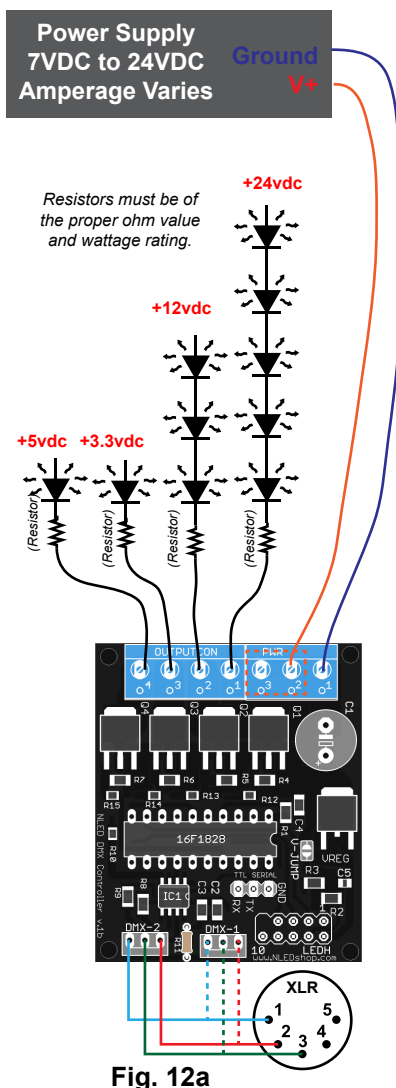
The controller outputs are current sinking, meaning the cathode of the LED(s), or LED string, is connected to the controller *Output Channels* and the LED anode(s) are connected directly to the positive supply voltage. The controller has a V+(Connects to PSU supply voltage) on both ends, one is for input power and the other is meant for the LED(anode) supply voltage, but either can be used as they are connected together. For higher amperage usage it is recommend to attach the LED anode(s) directly to the positive supply rather than through the controller.

Many configurations of LEDs can be controlled. Such as standard 12 volt LED strip or 12 volt RGB LED strip(common anode), series/parallel or single high wattage LEDs (1w, 3w, 5w, 10w, 20w, +more up to max specification) or series/parallel or single 10mm, 5mm LEDs with a current limiting resistors. And multi color LEDs with common anodes.

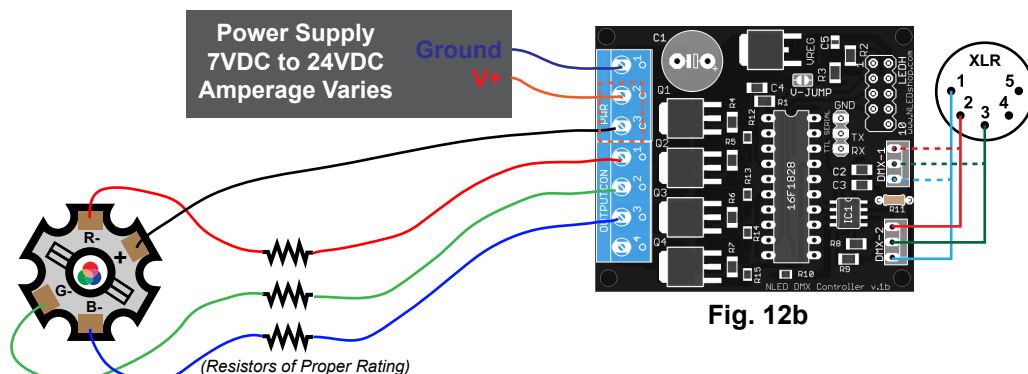
A few configuration examples are shown below. Note shown are 5-pin XLRs but 3-pin and 5-pin XLR for DMX connections use the same pin numbers.

Need Help or Have Questions? Contact [Support@NLEDshop.com](mailto:Support@NLEDshop.com) For Help

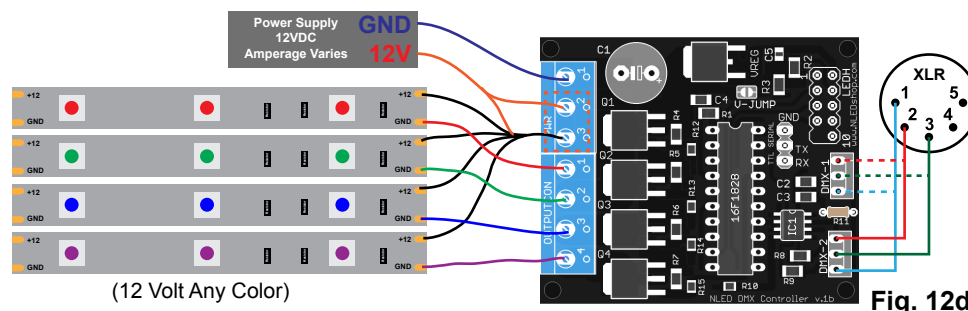
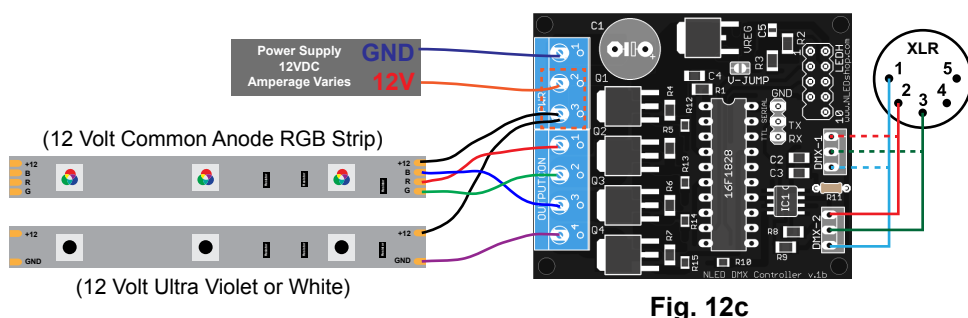
### Standard Loose LEDs



### Common Anode RGB



### Strip LEDs Configuration





## Dimensions and Mounting

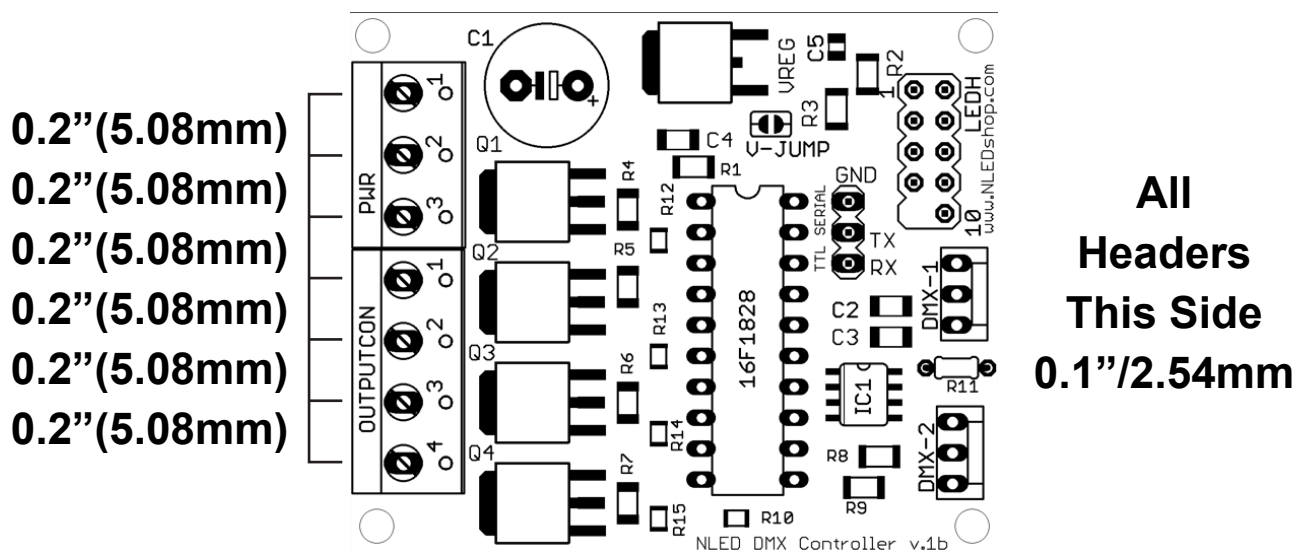
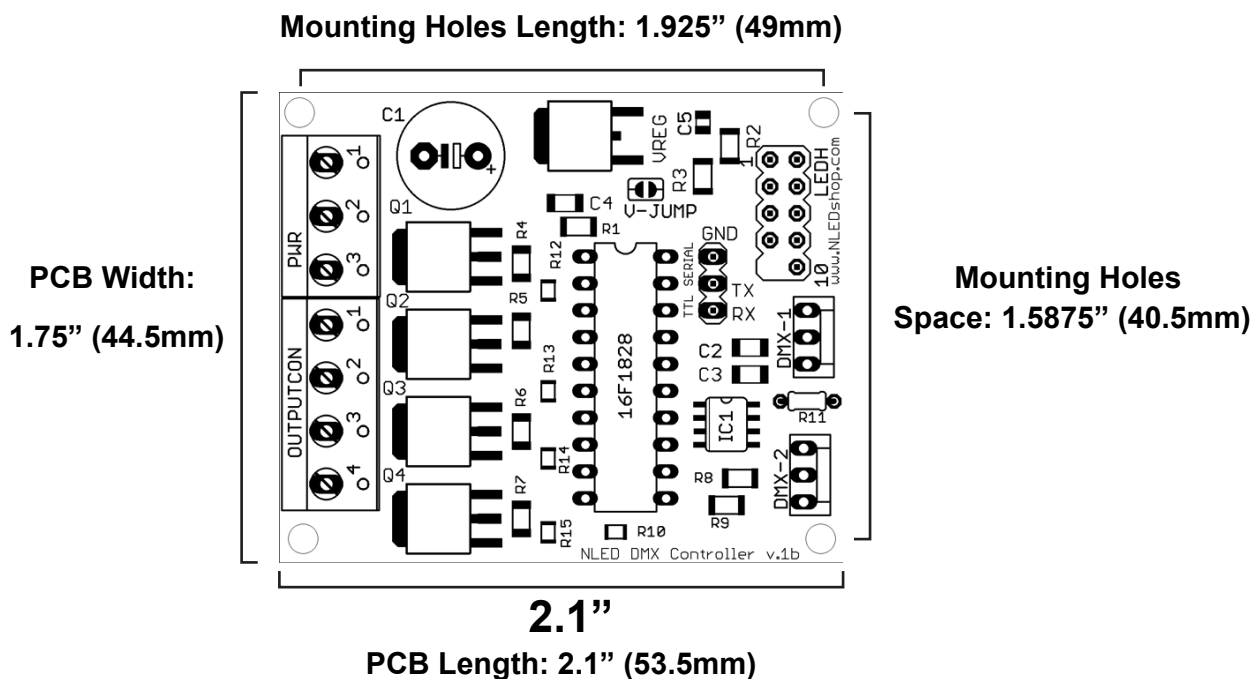


Fig. 13a

### Mounting Notes:

- Do not allow the PCB to touch anything conductive.
- Do not allow foreign material to fall onto or accumulate on the device.
- The device should be kept dry and clean. If the device becomes wet or dirty, do not use until it is cleaned and dried. Contact Us for assistance.

## Usage Tips

### **DMX-512 Reception**

Set DMX Reception Mode(Pg. 4)  
Any Mode 1 - 5

Set Auto-Detect If Needed

If Auto-Detect was Enabled,  
Setup the required  
Stand-Alone method,  
either hold, blank, fade out  
or start Color Sequence.

Set the DMX Address

Connect to DMX network  
using D-, D+, and GND  
terminal positions.

### **Serial Reception**

Set the Baud Rate To Match  
The Transmitters Baud Rate

Set Auto-Detect If Needed

If Auto-Detect was Enabled,  
Setup the required  
Stand-Alone method,  
either hold, blank, fade out  
or start Color Sequence.

Set RS485 Usage If Required  
(Better for long distances)

Set Serial Control to Enabled.

Connect to transmitter using  
TX-RX-GND as Fig. 8b, Pg. 8

Send Data in Packets  
Of 4 bytes, with a minimum  
of 5mS between packets.  
Ensure Baud Rates Match.

### **Color Sequence Stand-Alone Usage**

Ensure Sequences are Loaded  
Using the Software  
(stock firmware includes  
32 Sequences)

Select the Sequence ID number  
From the Stand-Alone Menu

Set Auto-Detect to Enabled

### **Color Sequence Stand-Alone Usage With DMX Master Transmission**

Follow Above Stand-Alone Setup

Open the DMX master menu(5-5)

Select either the Full Packet Option  
or the Partial Packet Option

The controller should then start  
transmitting a DMX universe,  
if it does not power cycle  
the controller.

Note: Some configurations may interfere with others, especially DMX master transmission and certain combinations of stand-alone. If you are having issues, disable all features and configurations you are not using. If you still have issues, please contact Support and we can figure it out for you.

## **Software Usage Instructions**

**Setup:** It is recommended you also read the NLED Aurora Manual found in the download folder.

1. Connect the controller to a computer using a serial adapter(FTDI or similar)
2. The controller requires external power, power up the controller now. If using header jumper method to enter Upload mode, make jump first. Otherwise select Upload from menu once its powered up.
3. Double check software.ini in the Aurora folder and see that 19200 is listed as baud rate. Otherwise change it.
4. Start the software, navigate to the hardware tab, on the left side select the controller's COM port.
5. The device should identify itself, and the Connect button should turn from red to green. The hardware configuration setting controls will also be displayed.
6. Adjust the configuration setting controls on the Hardware Tab to suit your project see page 10 for details.
7. Once the configuration settings are adjusted, navigate to the Connection Tab, and click the "Upload Configurations" button, you will be notified of a successful upload.
8. Connect your LED pixels of choice as described on page 12.
9. Apply suitable power to the controller and pixels, see page 11. The controller and pixels should start running a stand-alone color sequence, if not press the button or load new sequences.

## **Common Issues and Troubleshooting**

Please Contact [Support@NLEDshop.com](mailto:Support@NLEDshop.com) with any Questions, Comments, or Bug Reports.

Most issues can be resolved by power off the device, waiting a few seconds, and powering it back up.

**Problem:** Device with connected LEDs does not produce any light.

First ensure the LEDs are properly powered and wired to the controller and power source. Try to cycle through the Sequences or modes using the button. Or connect to DMX and try.

**Problem:** Device appears to be "bricked", unresponsive to user inputs and/or communication(USB etc) Attempt to upload a new firmware image via the Bootloader, see page 9 for details.

**Problem:** Software/Upload connection is not being established.

Check to make sure all cables are secure, ensure that you have properly hooked up RX to TX and TX to RX, and GND to GND. Select it through menu, power on method or set dual communication mode.

**Problem:** Operating systems indicates the driver can not be found.

The driver will be dependant on what serial adapter is used, check manufactures website.

## **Have Any Ideas for Future Updates**

Northern Lights Electronic Design, LLC is constantly looking to make our products better and improve upon our designs. If you have any ideas for future products, updates to current products, or features that you would find useful, please Contact Us at [Sales@NLEDshop.com](mailto:Sales@NLEDshop.com). There is a good chance your ideas could be utilized, you could also receive coupons or free items for your feedback.

NLED is available to create new designs and derivatives of current designs customized to the clients requirements, please Contact Us with your specifications.