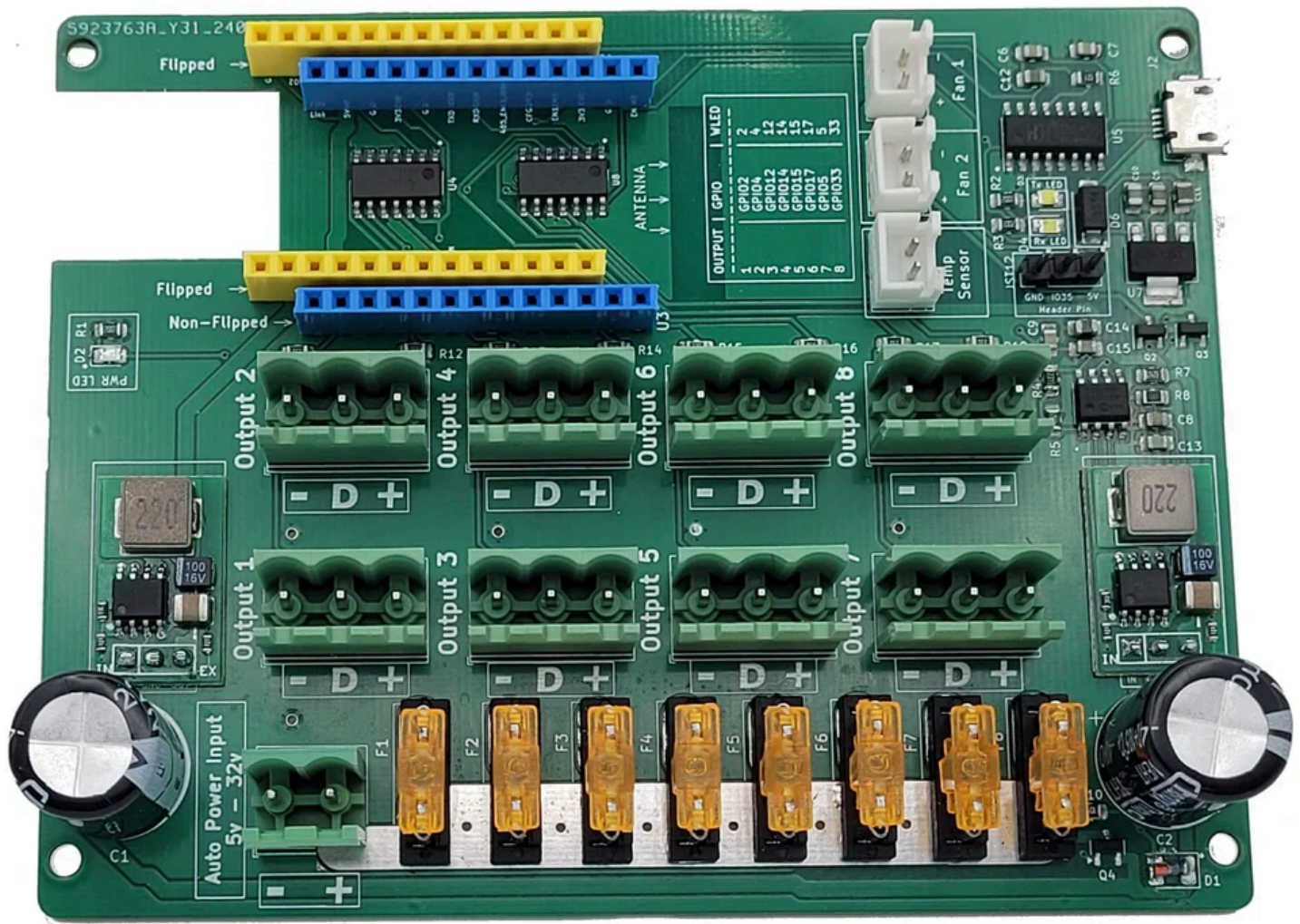# 8-Output WT32-ETH01 Distribution Board

By creativexlights in CircuitsMicrocontrollers
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Introduction: 8-Output WT32-ETH01 Distribution Board

This is an 8-Output driver board for WS2811/WS2812 LED series. The board uses WT32-ETH01 microcontroller with ethernet to control LED strings.

There are two forms of WT32-ETH01 microcontroller boards available due to the way the header pins are soldered to the main microcontroller. This board accepts either form factors (Non-Flipped and Flipped), there are two sets of female header connectors that accepts flipped or non flipped WT32-ETH01.

Step 1:

Power Supply

Board can be powered using voltage that ranges between 5v to 32v, there is an onboard converter that powers the microcontroller and level shifters with stable 5v and user is free to use LED that are 5v, 12v and 24v without the need to set any jumper pins. Board is also protected against reverse polarity, meaning if the power input is connected the wrong way, the board will simply not turn on. However, the connected LEDs are not protected (although LEDs typically will not allow current to flow the wrong way, but efforts should be made to not run LEDs with polarity reversed, or they may be damaged). All the 8-outputs are individually fused with 5A blade fuses that can be easily replaced.

Fan & Temperature Sensor

There is on-board standalone fan controller that can be used to control at least two 5v fans when the controller is used in an enclosure. There is a sensor that controls the fan speed based on how hot the enclosure is

Board Programming

The WT32-ETH01 can be programmed using the provided micro-USB connector. Simply attach WT32-ETH01 and connect the board to a computer USB and flash the WT32-ETH01 with either WLED firmware to control LED strings. It is recommended to not connect this board to a computer USB at the same time connect power supply to the power input on the board to avoid damaging either the board or computer.

Header Pins

There is header pin for one standard input, a ground and 5v that can be used for audio reactive WLED and any other use as appropriate

Testing

The board is made to handle high current from connected LEDs due to wide traces and extra conductive materials added to the power traces. During testing, we were able to connect 300 LEDs on each output making a total of 2,400 LED without the need for power injection at 170 brightness level of white on WLED application thereby drawing close to 20A of current for over one hour.

Specification

Dimension: 88.14mm x 112.132mm (4.41" x 3.47")

Weight: 33g (1.2 oz) board only; 94g (3.3 oz) board and terminal blocks no WT32-ETH0

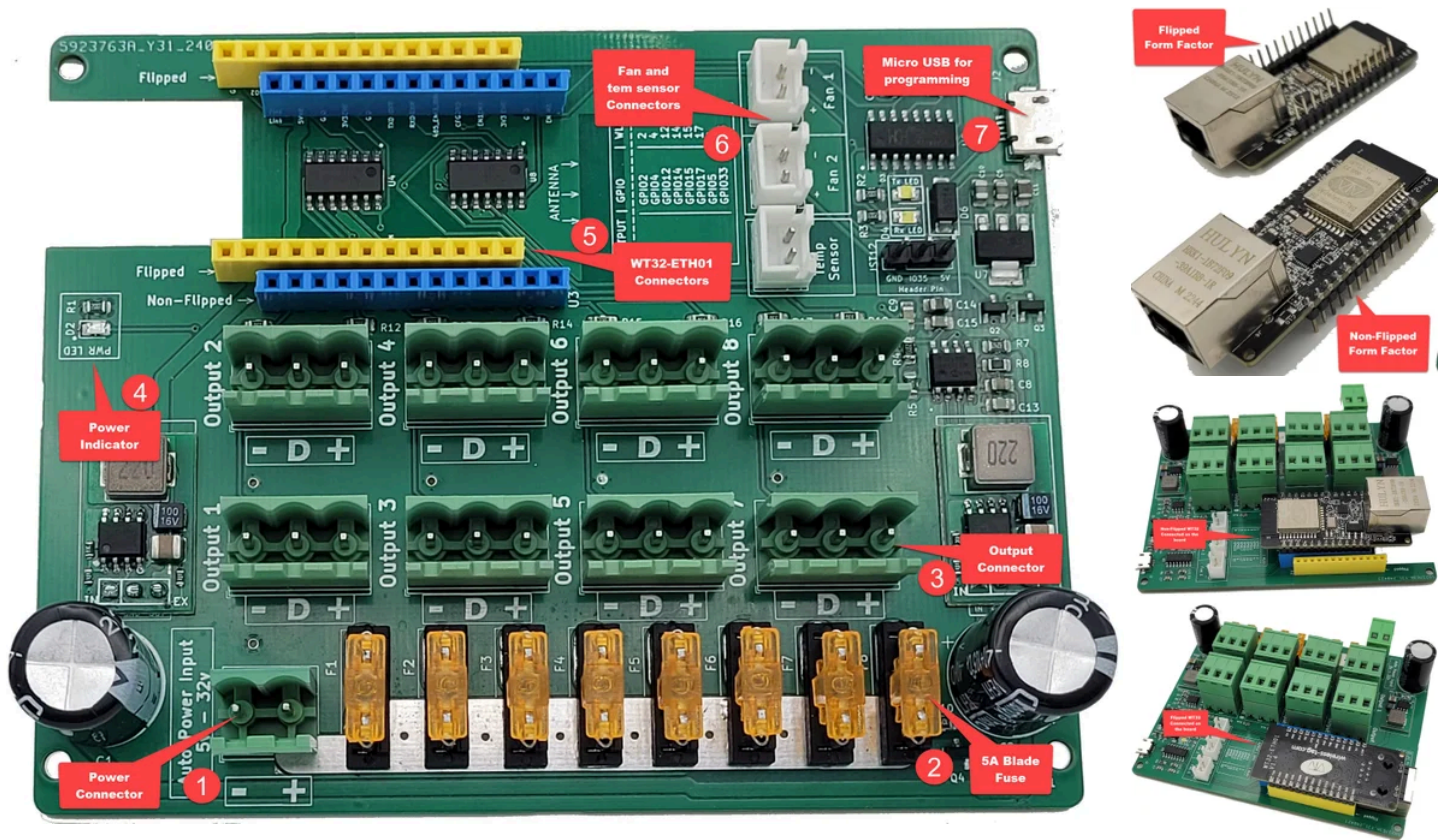*Connectors:*   Power Supply – 2Pin 5.08mm Pitch pluggable terminal block

              LED Power and Data - 3Pin 5.08mm Pitch pluggable terminal block

Features:

·   Individually fused 8-Outputs for LED strings

- Board distributes both data and power to connected LED strings

- Auto input voltage 5v-32v, can be used for 5v, 12v and 24v LED strings

- Micro USB port can be used to program connected WT32-ETH01 microcontroller

- Pluggable terminal block for easy connection of power and LEDs

- Logic level shifter converts WT32-ETH01 3.3v to LED 5v

- A 33ohm resistor is placed on each output for impedance matching

- Board can run both WLED or ESPixelStick firmware to process E1.31 and DDP data from xLights, Vixen or Falcon Player

- An input pin, ground and 5v pin on a header terminal

Step 2:

Shown above is the picture of the 8-Port WT32-ETH01 board with main parts identified

1. **Power Connector**. This is the point where power supply unit (PSU) brings in power to the board. It is a 2-pin, 5.08mm pitch pluggable connector. It is important that polarity indicated on the board is reflected when connecting power from PSU. Connect ground to the negative side of the connector and power to the positive side of the connector. Board can automatically accept 5v through 35v. There are two on-board voltage converters that supply the board with 5v required by the WT32 microcontroller, level shifters and fan controller circuits. Reverse polarity protection circuit is provided to protect WT32 controllers and other sensitive components on the board, in the event that user mistakenly reverse power connector wires (positive to negative and negative to positive) those sensitive components will be protected, however, connected LEDs are not protected as such a prolonged reverse polarity connection can destroy the LEDs. Please be careful not to reverse the polarity on the power connector

2. **Blade Fuse**. All individual outputs are protected with a 5A blade fuse that will blow, if current above 5A is being pulled by connected LED. If a connected LED is not working correctly, first check that the fuse is not blown. If it is blown, try and figure out why it got blown and then replace with fuse of similar rating. This type of fuse is typically sold at most Auto Spare part shops or search for blade fuse on GOOGLE/AMAZON.

3. **Output Connectors**. There are eight 3-pin 5.08mm pitch pluggable connectors the board uses to distribute power and data to connected LEDs. Board supports 5v, 12v and 24v LEDs. Make sure that appropriate power supply is used with connected LEDs. When 5v LEDs are connected, then 5v power supply must be used and when 12v LEDs are connected, then 12v power supply must be used and so on. Each of the connectors are clearly labelled on the board as Output 1 through Output 8, connector polarities are also indicated on the board. Take extra precaution to connect LED cables correctly. Also noteworthy is the fact that the wires to all connectors should be tightened up well to avoid power loss through heat and subsequent failure of both connector and or LEDs

4. **Power LED**. Board is equipped with power indicator, the green LED will only come up if there is WT32-ETH01 microcontroller connected. The power LED is especially useful when flipped WT32 is connected. When a flipped WT32 is connected, the on-board power LED (red) will be facing downward where it cannot be seen, our board corrected this with this power LED (green) indicator. If non-flipped WT32 is connected both the red and green LED should come up

5. **WT32-ETH01 Connectors**. There are two set of 13-pin female header connectors that can be used to connect the WT32-ETH01. Our board accepts both form factors of WT32 available in the market and these are flipped and non-flipped. Shown above is the picture of flipped and non-flipped form factors and the way they appear when they are respectively connected to the board. When mounting controllers, pay special attention to the note on the board where either flipped or non flipped should be connected. Typically flipped has the ethernet jack in the open slot on the board, while non-flipped does not.

6. **Fan and Temp Sensor Connectors**. There are three 2-pin connectors for temperature sensor (which is supplied with the board) and two other connectors that can be attached to a 5v cooling fans (fan connectors are supplied with the board, but 5v cooling fans has to be purchased separately). Board ONLY accepts 5v cooling fan and we recommend 5v fan with current rating of 200 ma and speed of between 2500-3500 rpm and minimum diameter of 60mm anything smaller is not recommended. The supplied sensor is a 100K Negative Temperature Coefficient Thermistor, it senses temperature of enclosure the board is placed and adjust cooling fan speed accordingly. Our team is currently working on a custom waterproof enclosure using acrylic and should be on sale for interested customers, this enclosure will utilize the cooling fan to cool PSU and the controller.

7. **Micro USB For Programming**. WT32-ETH01 like any other ESP32 microcontroller series can be programmed to use WLED or ESPixel firmware to control LEDs. Attached micro USB connector is provided as the interface to make this happen. For example, current WLED firmware can be uploaded into the microcontroller by connecting on-board USB jack to a computer where the firmware has either been previously downloaded or compiled and ready to be uploaded. We will explain how this can be done later. There is no need to push any pin to ground, the board is intelligent enough to know when it should go into programming mode and when to be in boot mode. NOTE: Use USB connection for programming ONLY, do not use to power LED!

Step 3: Installing WLED Firmware on WT32-ETH01

There are two methods to install WLED firmware on WT32-ETH1, **web interface** method and **Micros oft Visual Studio Code/Platformio** method.

METHOD 1:

Installing WLED firmware on WT32-ETH01 board - Web Interface

1. Mount WT32-ETH01 to appropriate slot on the board

2. Connect USB cable to the USB jack and on to computer

3. Using this link, connect to WLED web interface installer https://install.wled.me/

4. Select Ethernet from the blue bar and click the dropdown and select current stable release (which as at the time of this documentation is 0.14.3)

5. Click on Install and a new pop up window will show up where active communication port can be s elected. Select communication port (This example showed as USB Serial COM3), click Connect

6. Communication should be established and device dashboard will show up. Click INSTALLL WLED

7. Select INSTALL from the new window

8. A window showing install status will come up

9. Click next when Installation complete window is up

10. Close the device Dashboard window

METHOD 2:

Installing WLED firmware on WT32-ETH01 board - Visual Studio/PlaformIO Method

To compile ethernet support for the wt32-eth01 requires the followings

1. Download the latest WLED source code from https://github.com/Aircoookie/WLED and unzip into a folder

2. Download and install Microsoft Visual Studio Code from https://code.visualstudio.com/

3. Install platformio extension on Visual Studio Code

- Open Visual Studio Code and click on the Extensions manager from the left panel icons
- Search for platformio ide and click on the install button to install it

4. After installation of platformio, open the WLED folder in Visual Studio Code by clicking on File=>Open Folder...

5. Navigate to the folder and open it

6. Open platformio.ini file in Visual Studio Code

Find the line **# Release binaries** and

remove the semicolon in front of the following line with **default_envs**

7. save the file

8. Compilation

- Click on Platformio icon on the left
- Then click on esp32_eth to expand it
- click on build

- Successfully build

9. Upload to the board

Connect your board to the USB port of your computer and click upload

10. Successful upload congrats!! All that is left is connecting it to WiFi and configure

WLED Configuration

This documentation will only discuss how to connect WT32-ETH01 to your network and configuring the output. There are a lot of YouTube videos that cann assist with details of how to use WLED. The configuration steps described below will be performed on Android phone. Steps are similar on iPhone or if done on a computer.

1. Once WLED firmware is successfully installed, use the steps below to configure WLED on the WT32-ETH01. While the board is still mounted on the board and connected to the computer USB port, open Android phone and go to settings -> Connections and tap on Wi-Fi, there should be WLED-AP in the available networks. Tap on WLED-AP

2. Phone should now be connected to WLED AP

3. Tap on WIFI SETTINGS

4. Configure your specific Wi-Fi in the new window

a. Tap on Scan to scan Wi-Fi network

b. Select your Wi-Fi from the list

c. Type Wi-Fi password in the box

d. Type static IP address

e. Type static gateway

f. If your network subnet mask is different from default, type it here

g. Scroll all the way down to Ethernet Type

h. Select WT32-ETH01 from the list

i. Tap Save & Connect to save the configuration

j.   Connect to the Wi-Fi that was configured above on the phone

k.   Open a browser and type in the IP address configured above

WLED Screen below should be shown

l.   From top icons, tap Config

m. Tap on LED Preferences

n.   From LED & Hardware Setup, uncheck the brightness to avoid issues with LED flikering when WL
D tries to limit current to LEDs. However, tis this setting is crucial to your use case, leave it checked

o.   Scroll down to LED Outputs to configure output ports. Output 1 is displayed

Select LED type. Default is WS281x

Select Color Order: RGB in this example

Type number of LED (Lenght) 300 in this example

GPIO: 2 in this example, taken from table below

Tap the plus sign to add next output until all 8 outputs have been configured

Note: There is a table on the board indicating what entries to use for each configured output in WLED

Below are screenshots of all 8 outputs as configured in WLED indicating all GPIO pin numbers

Outputs 1 & 2

Outputs 3 & 4

Outputs 5 & 6

Outputs 7 & 8

p. Tap the Save button

q. Tap the Back button to be in home page

Board can now be disconnected from computer as the WLED has been successfully loaded and configured.