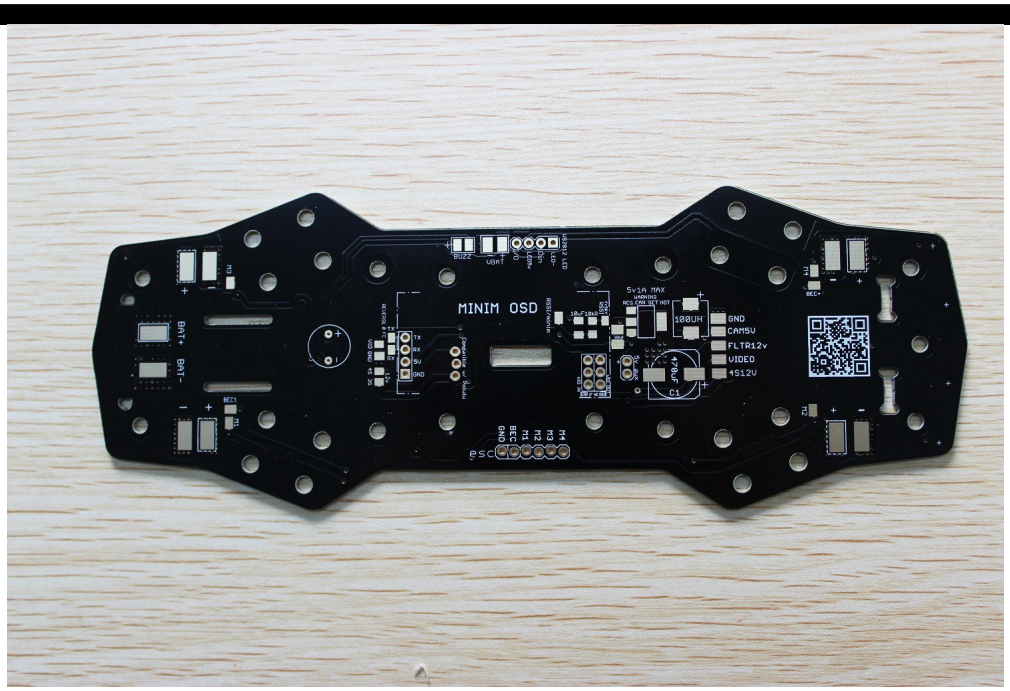
nucleus pdb

By WADZoQUADZ

Instruction Manual



WARNING

Read the ENTIRE instruction manual to become familiar with the features of the product before operating. Failure to operate the product correctly can result in damage to the product, personal property and cause serious injury.

This is a sophisticated hobby product. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this product in a safe and responsible manner could result in injury or damage to the product or other property. This product is not intended for use by children without direct adult supervision. Do not alter this product in any way outside of those outlined in the following instructions.

This manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid any damage or injury.

Disclaimer: WadzofQuadz is not liable to any damage to equipment or personal injury when using this product. This PDB is rated for a MAX of 80A @ 4S operation. Operating this PDB beyond this rating is not recommended and WadzofQuadz is not liable for anything that happens from doing so. On-board regulator may get hot. Please be careful and do not touch it when in operation. Do not connect any conductive part or material from top to bottom of board as this may cause a direct short circuit.

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Feature List

- 1.6mm thick 2oz copper gold (ENIG) plated pads.
- Fits ZMR250 quadcopter frames.
- 4 sets of ESC power pads for each arm. ESC and motor signal pads top and bottom.
- Main battery pads on top and bottom of the board. Bottom to keep battery leads out of the way and protected. Zip tie holes allow for secondary securing of the battery leads to hold up in hard crashes. 3S and 4S capable.
- Wide uninterrupted power and ground plane to give the highest current handling possible. The more copper on the plane with no traces restricting it means the more power can be run without it starving motors/ESCs and heating up.
- On-board motor/ESC connection to FC. No need to run any wires from the ESC to the flight controller. A signal pad is located next to each ESC power pad. Motor 1 also has ESC BEC 5v power pad to power the flight controller. There is an additional AUX BEC pad off motor 4.
- Built in LC filter for FPV which filters 3S battery, 5v regulator and optional 4S regulator.
- On-board (clean) filtered 5v 1A LM2940 regulator to power 5v FPV hardware with pads at each FPV component location.
- Filtered 3S (12v) pads at front for camera, one for StpDWN reg and rear for VTx front (camera), mid (Pololu), and rear (VTx video pads).
- (Compatible with Pololu regulator boards) Optional direct solder-in pads/pin header to connect a Pololu step-down or/and step up for 4S safe FPV operation. 4S pads for camera and rear for VTx.
- Clean 5v powered direct solder/plug in compatible with MinimOSD with all connections on board. Minim setup for smooth operation with no text overlay issues. Pads on PDB are as follows: digital side – 5v/gnd/Rx/Tx with additional Rx and Tx pads on board. Analog side – video in/video out/gnd.
- Additional filtered AUX 5v output pins.
- RSSI components built in (resistor, capacitor) to run RSSI from FRsky D4RII receivers into the MinimOSD. Pads for D4rII RSSI and Minim RSSI on board.

- On-board pads/pin header to run optional WS2812b programmable RGB LED strips. Can be programmed by Cleanflight to display multiple features like orientation, warnings/alerts, flight modes, stick input direction, lost model beacon, armed status, etc. Four pads total. One data in to connect lead to Naze32 (Rx pin 5) and three pads to direct plug in three wire lead LED strip (pwr, gnd, data).
- On-board front and back LEDs attached to bottom of PDB. White front, red rear. Can be turned on and off by soldering jump pads. Comes in the off state, jump to light. Plcc2 or 1206 SMD LEDs can be used.
- On-board piezo buzzer – pretty loud. Not factory installed, up to user to solder on board. Buzzer can be mounted on top or bottom of PDB. Easy to solder pads that line up with Naze32 and Flip32/Dragonfly32.
- Slots for battery straps.
- All pads to FC are strategically located to line up with Naze32 in 90° right orientation. Flip32/Dragonfly32 lined up as well in its standard orientation, all that is needed is 90° motor pin headers soldered under board facing in.
- On-board Vbat pads for FC directly in line with Naze32, Dragonfly32, Flip32.
- 6.3mm isolation around all screw/standoff holes as well as no copper around arm mounting area to prevent any possible short circuits.
- Camera pads and front ESC pads moved as far away as needed from camera mounting area so they don't come in contact with camera.
- QR code printed on board (smartphone scannable) bringing instant access this page with links to all info.

Installation

1. Soldering buzzer (optional) – Buzzer can be soldered on the top or bottom of PDB. To solder on bottom requires use of a spacer kit (For example the 7mm spacers sold by RCG member Moray) for clearance. Make sure to install in correct polarity orientation. Follow + and – symbols on PDB and line up + to +. The + pin is also longer then the – pin. Solder pins on opposite side of board that buzzer is mounted on.
2. Installing main battery leads – Use battery leads of proper gauge for the amount of current you plan on running. Leads can be soldered on top or bottom of PDB. Follow correct polarity marked on board and solder wires to pads. After soldering, a zip tie can be placed through the half circle holes for extra securing of leads in case of crash.
3. LEDs on the bottom of PDB can be turned on and off. PDB will arrive in the LED off state. To turn on LEDs, there are sets of pads next to LEDs on front and back labeled “Solder Jumper.” Bridge solder across the two solder jumper pads to turn on LEDs. You have the option of turning on the front independently from the rear or vice versa.
4. Solder all connections that would need to be made on bottom of PDB. This includes the pin headers you will be using for motor to FC connections, programmable LED header, AUX 5v and OSD pins.
5. Install 3mm nylon screws and standoffs on PDB for mounting your flight controller. Make sure they are long enough for the setup you are using. If using a MinimOSD you will want the FC to mount higher up to clear the OSD.
6. Install all ZMR250 aluminum standoffs to original locations before mounting PDB.

Mounting PDB to frame:

Decide whether you would like to install ESCs between frame plates (when using spacers). If you are, wire ESCs before mounting PDB to quadcopter. (skip to ESC connections and wiring).

If installing ESCs on the arms go ahead and mount PDB to quadcopter. The PDB replaces the center plate of the ZMR frame. Discard (but don't throw away) ZMR center plate as it will no longer be used. Install PDB same as you would the original center frame plate. Connect arms, spacers etc., then bottom plate.

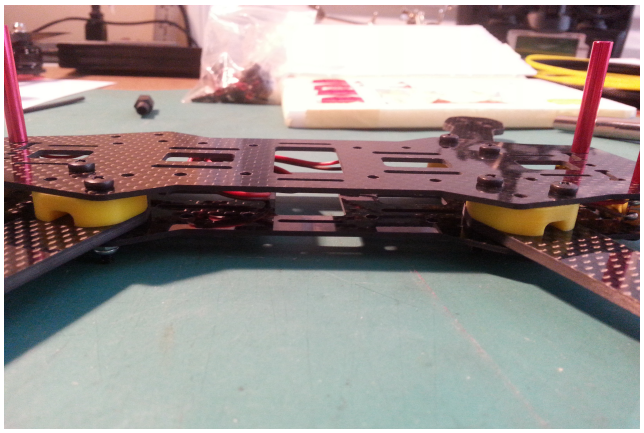


Image from google images -Ex.Spacer Kit

ESC Connection and Wiring

You no longer need to run long servo leads all the way to your flight controller and have that ugly rat's nest of wires. You can now cut most of that off, leaving a clean setup and shave off some extra weight.

Mounting ESC:

Option 1 – Mount ESCs on arms. Run power and ground wires to (top of PDB) ESC power pads labeled + and -. Next to ESC power pads are signal pads. Rear right (motor 1) also has a BEC + pad connection which will power your flight controller. Front left (motor 4) also has a BEC + pad connection. This pad is used when running programmable LEDs. Cut servo lead wire on your ESCs to reach these pads. Connect red ESC(servo lead)5v + wire to BEC pad and white ESC signal wire to each of the corresponding signal pads labeled M1-M4. (refer to Figure 1)

Option 2 – Mounting ESCs between plates (when using spacers). Fit ESCs on the bottom of PDB aligning them as best as possible so that your motor wires run to the motors and you have a short run of power and signal wires. The Nucleus PDB has ESC power and signal pads on the bottom specifically for this setup so there is no need to run wires up to the top of the PDB. Refer to option 1 above on how to connect wires to corresponding pads. The ESC pads on the bottom of PDB are set up the same way they are on top of the PDB. Install and solder ESC wires before assembling frame. (refer to Figure 2)

Figure 1

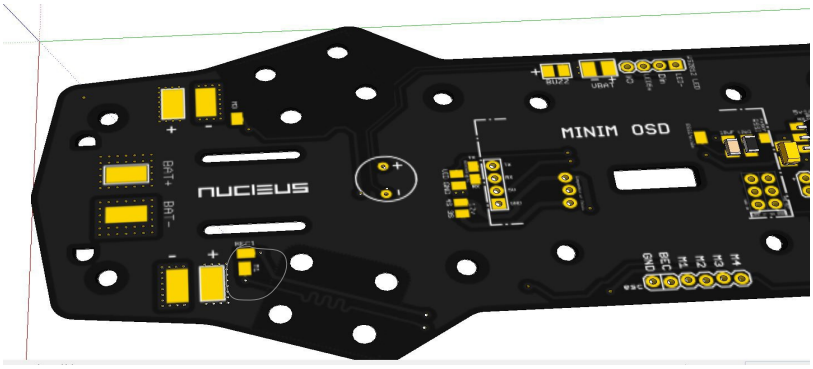
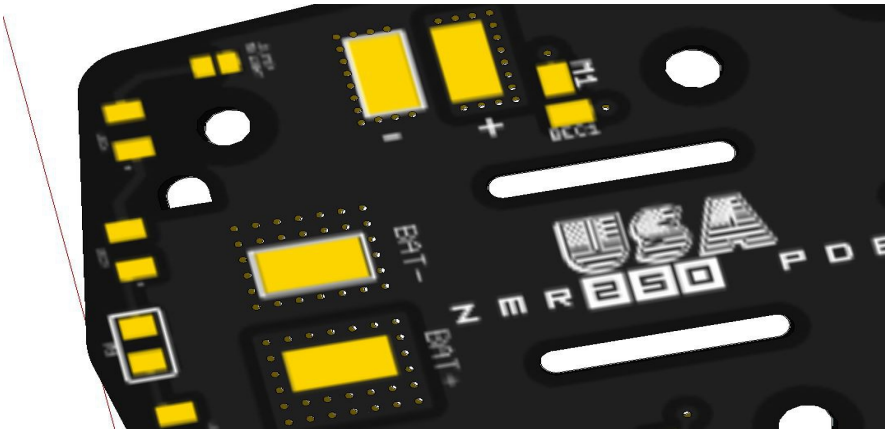


Figure 2



On-board 5v Regulator

The Nucleus PDB has an on-board LC filtered 5v BEC/regulator with a MAX Amperage of 1Amp. It can be used to power things like a:

- Flight Controller
- 5v Camera
- MinimOSD or others like E-OSD
- Rx
- GPS
- Sonar
- Programmable LEDs

Note: Linear Regulators may got hot at times. Don't touch when in operation.

Note: Check the total Amp draw for each part you are powering from the on-board regulator and make sure the sum isn't more then 1A or you will overload the regulator.

The 5v connection for the MinimOSD is already built into the PDB. There is also a pad in the front of the PDB labeled "CAM5V."

The flight controller is usually powered from BEC+ on your motor 1 ESC and doesn't need additional power from the on-board regulator. If you are using ESCs without built in BECs, you can power the regulator from the on-board filtered 5v AUX port located next to the front of the FC mounting area.

All additional hardware that needs 5v may also be powered off the 5v AUX port.

3S and Optional 4S Operation

ESC power pads as well as Vbat pads are unfiltered main battery voltage connections. Pads labeled “FILTERED12V” are 3S pads that are filtered through the on-board LC filter. They will output 4S voltages (16.8v) when a 4S battery is connected.

To receive 12v when running a 4S battery you must connect an optional step-down regulator to the provided pins on board. Once a step-down regulator is connected, you will need to use pads labeled “4S12V”. **ALL 3S pads will continue to output 16.8v.**

See chapter: FPV Setup Part 1 (3S & 4S Wiring/Connections) for more on 3S and 4S operation

FPV Setup Part 1 (3S & 4S Wiring/Connections)

This section will talk about 3S and 4S regulator power connections to your VTx and camera using optional 4S step-down regulators. All pads for connecting power to the equipment above are filtered through an on-board LC filter for optimum signal clarity.

Optional 4S step-down regulator hookup (direct compatible with Pololu step-down regulators)

When choosing a regulator you must determine how much current your board camera and VTx will need. Certain step-down regulators may not have a high enough amp rating to power your equipment so check specs before purchasing.

Pololu Regulator Part numbers that are direct compatible with pins on PDB:

-Pololu 12V, 1A Step-Down Voltage Regulator D24V10F12

-Pololu 12V, 500mA Step-Down Voltage Regulator D24V5F12

To connect these regulators, you may mount them on the top or bottom of PDB. The pins on board are labeled “INPUT,” “GND,” and “4S12V OUT.” Line up pins on the Pololu to those three corresponding pins. Any extra pins on the Pololu are not needed. You may install female pin headers on the PDB to quick disconnect regulator at any time, or solder regulator directly to PDB. You will install a male 3pin header on the Pololu for both ways of connecting.

Connecting Board Cam and VTX when running 4s

There are pads in front and rear of PDB for camera and VTx. Pads labeled “3S” and “FLTR12v” are for 3S operation only. These pads are not to be used when running 4S as they output full battery voltage. Next to these pads are additional pads labeled “4S12V.” You will connect your camera and VTx power wire to these pads to access a safe 12v source when running 4S.

To summarize:

-If running 3S connect camera/VTx power wires to FLTR12v/3S pads

-If running 4S connect camera/VTx power wires to 4S12V pads

Additional options for changing back from 4S to 3S

1. If you are running Pololu at 4S and want to switch to a 3S battery you can leave the Pololu on the PDB, or unplug it from the PDB and just switch the camera/VTx power wires back to the 3S pads. It's only two wires to change which can be de-soldered and re-soldered in seconds. If you want, you can use a cheap portable soldering iron to do it in the field as they are not heavy duty pads.

2. If you are using the Pololu regulator with a female header on PDB. You can unplug the Pololu from the PDB and use a male pin or make a jumper link to jump the input and 4S output pins together. Then you can leave your camera/VTx power wires on the 4S12V pads and run 3S. There is no soldering or changing wires needed.

3. **USING A STEP-UP/STEP-DOWN REGULATOR (Not direct connection)** Another option is wiring a Pololu 12v step-up/step-down regulator to the 4S regulator pads. You won't need to change any wires, since the step-up/step-down can run with an input voltage above and below 12v and keep a 12v output. You would leave the camera/VTx power wires on the 4S12V pads with this option

   Note: A step-up/step-down regulator won't be direct plug and play on the PDB so you will need to run leads from the regulator to the corresponding pins on the PDB

   Here are some step-up/step-down regulators you may choose to use:

   Pololu 12V Step-Up/Step-Down Voltage Regulator S18V20F12

   Pololu Adjustable 4-12V Step-Up/Step-Down Voltage Regulator S18V20ALV

Non-direct connect regulator options.

There are regulators you can choose to use that will have to be wired up and don't fit the PDB pin configuration for direct plug and play. You may wire the 12v BEC to the INPUT, GND, and OUTPUT pins on the PDB. You would still connect camera/VTx power leads to the 4S12V pads.

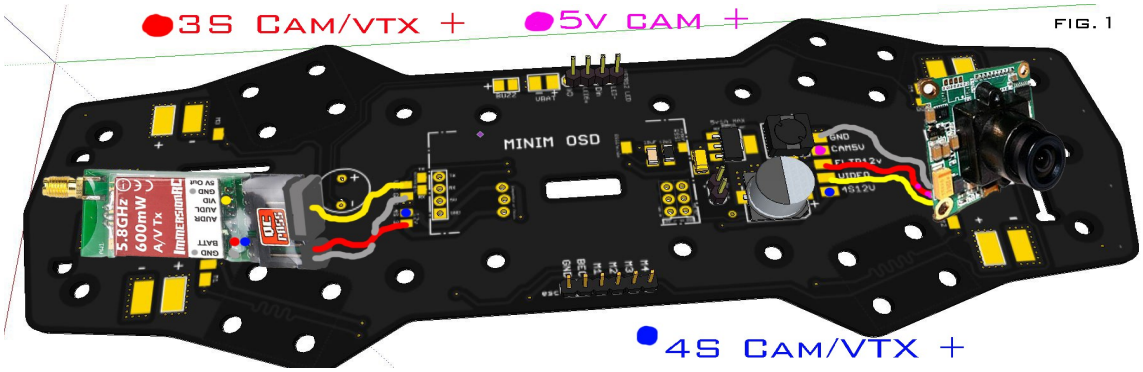
WARNING: With any option above make sure you are not connecting your camera or VTx to full 4S battery voltage. Connecting any equipment to the "FLTR12v 3S" pads will send 4S voltages of up to 16.8v into your equipment. If your equipment can only handle 12v, then it may fry them at higher voltages.

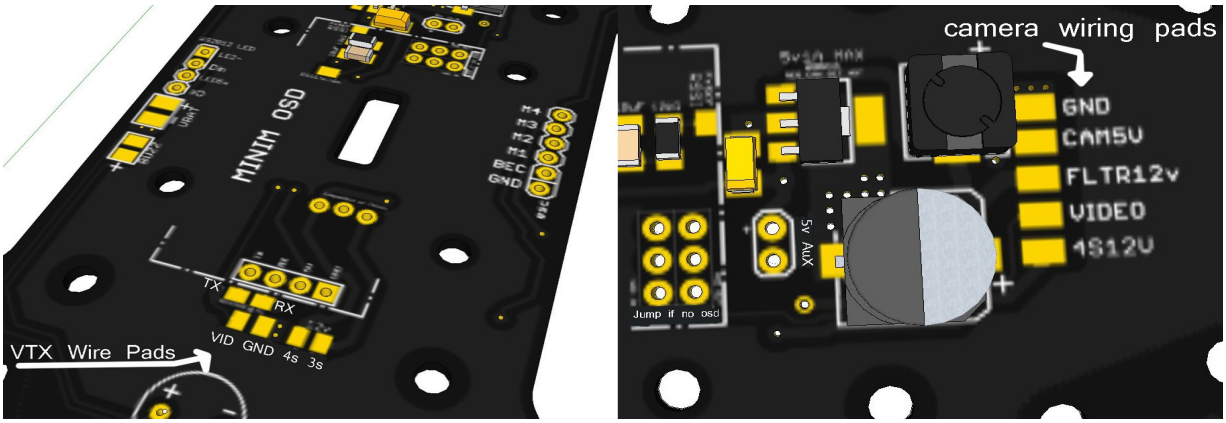
FPV SETUP PART 2 (Camera/VTx/OSD Connections)

Both board camera and VTx will have their own set of pads. Board camera pad row is located at the front of board, and VTx pads in rear of board just in front of rear arm location.

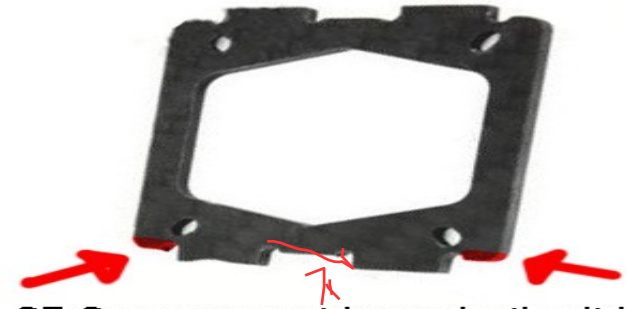
Board camera pads from left to right: GND / CAM5V / FLTR12v (3S) / VIDEO / 4S12V

VTx pads from left to right: VIDEO / GND / 4S12V / FLTR12v (3S)





When mounting cam to FPV plate, file down plate as shown below or use nylon hardware



CF Camera mount is conductive.It is recommended to use nylon hardware to mount cam and file edges of this plate down in area shown above so it doesnt contact the pdb which can eventually wear the coating on the pdb exposing copper

Board Camera / VTx Video in/out connections without MinimOSD

Very important! If not running a MinimOSD, the video in and video out pad on the Minim video pins must be shorted together with a jumper. Doing this depends on what type of header you are using on the Minim pin. With no header on the Minim pins, you may stick a piece of wire through both pin holes on board and solder it in place. If you have female pin header, you can make a jumper link with a piece of solid wire (for example, cut the lead off of a resistor). With a male header on the Minim pins, you may use a standard jumper cap similar to those used for Rx binding. Without shorting these two pins together, your video signal won't make it from your camera to the VTx.

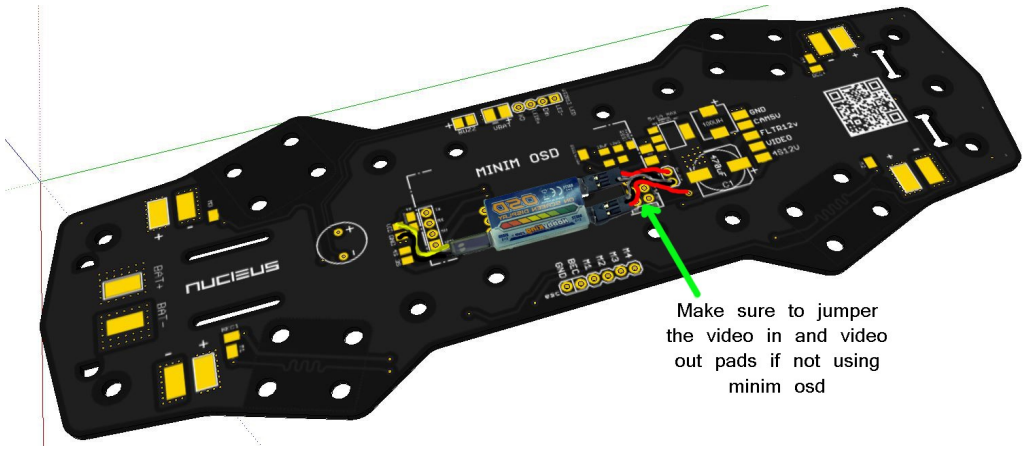
Non-Direct fit E-OSD Connection

The NUCLEUS PDB is setup to directly fit and run a Minim OSD. However, other OSD modules may be used by wiring to the supplied pads shown in the diagram below.

Batt1 – To any 3s pad (closest pad is located between capacitor and 5vAUX port)

Batt2 – 5v Aux pins

Video- connect to VTx video pad.



NOTE: To use non-Minim OSDs, you must follow the notice in red above about connecting video in and video out together.

Minim OSD connections

The Nucleus PDB is made to directly fit the Minim OSD/KV/MRMOSD. ALL needed pins are built into the board, no power or video connections need to be wired.

The following connections are built into the PDB:

-5v/GND/Rx/Tx – Analog side: GND/VidIN/VidOUT

-Also built in are extra Rx and Tx pads, this gives the MINIM full plug and play functionality.

You can purchase a MinimOSD here: http://multirotormania.com/osd/694-mrm-minimosd-black.html

Connecting the Minim to the PDB

Option 1: *Solder in supplied female pin headers to PDB. Make sure the Minim has male pin headers facing down to plug into the PDB. If using an MRM or KV version, you can use male pin headers facing up, as these extra pins do not direct connect to the PDB.*

Option 2: *Solder Minim directly to PDB. If you don't care about unplugging it from the PDB, this option is for you. Insert male header pins from the Minim into the pin holes in the PDB and solder the pins from the bottom of the PDB.*

Next, connect a two wire lead from the separate Rx/Tx pads to the Rx and Tx pin on your flight controller. If you have a lead with plugs on both sides, cut the plug off one side to solder the wires to the PDB Rx/Tx pads with the other end of the lead plugging into the FC. Remember to switch the wires opposite (**Tx on PDB goes to Rx of FC and Rx from PDB to Tx of FC**) This is noted on board by text "Reverse @ FC"

To disconnect the Minim OSD to use the NAZE/Clone32's USB you may simply unplug the RX/TX leads from the FC. Another option would be to just unplug the Minim from the PDB. Lastly if you aren't using a GPS or anything else on USART2, connect the minimOSD there. On a Naze32 that's pins 3 & 4 of the 10 pin connector. Then you don't have to worry about affecting the USB. Works with Cleanflight with the following settings:
set serial_port_1_scenario = 1
set serial_port_2_scenario = 8

FRSKY D4RII RSSI CONNECTION

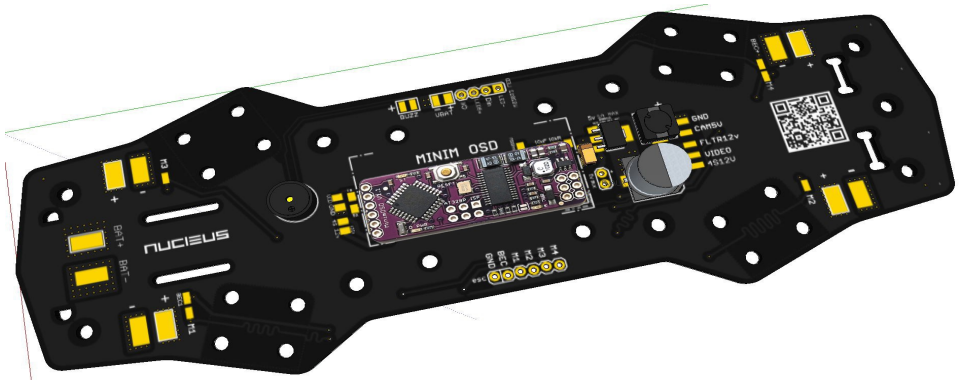
Built into the PDB is the needed RCfilter circuit to input FrSky RSSI to the Minim OSD RSSI pin.

Connect one lead from pin 2 of your D4R-II Rx (in CPPM) and solder other end to RSSI pad on PDB.

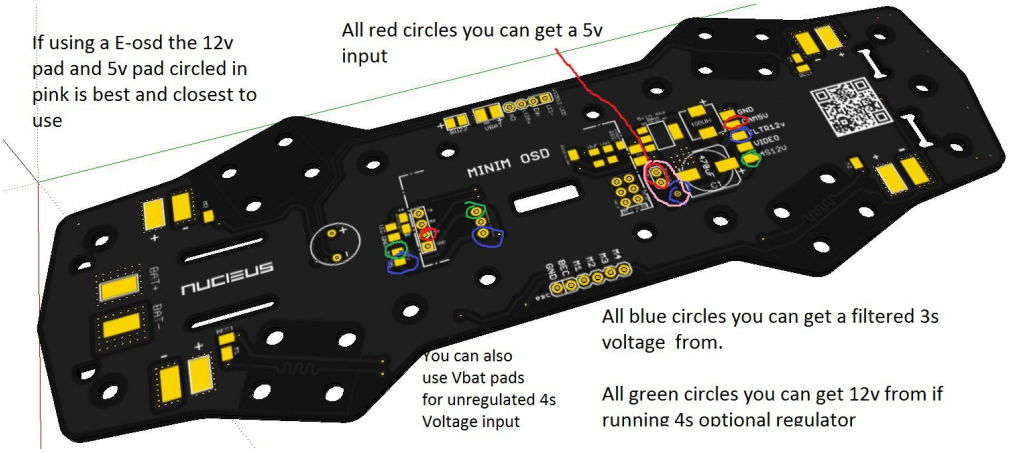
Connect another lead to the RSSI pin on the Minim and solder wire to Minim RSSI pad on the PDB.

Additional Minim OSD Diagrams

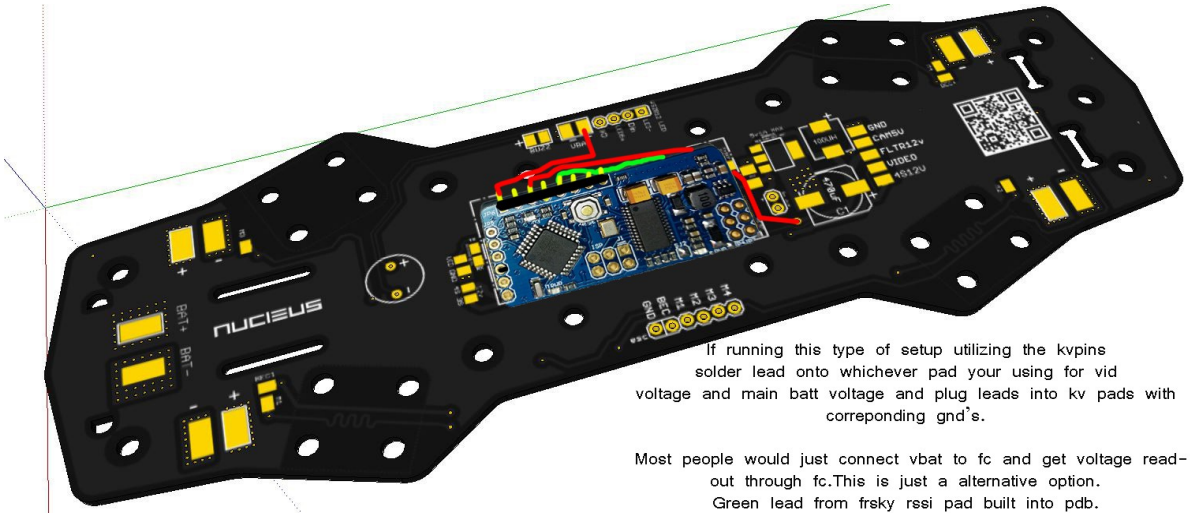
Connecting Minim OSD, Rx/Tx, FrSky RSSI and Additional KV Breakout Pins



Here is a diagram showing several places on the PDB where various voltage power pads can be used to tap off of when using the extra KV breakout pins.



This diagrams shows an example of what pads can be used to connect to the Minim KV battery breakout pads



Connecting Flight Controller

Supported Flight Controllers: NAZE32, DragonFly32, CC3D, Flip32

Other flight controllers may be used such as the KK2.1, KKmini, MultiWii, and APM but may require modification for mounting and following the proper motor layout of the FC, as motor numbers printed on PDB may not be the same.

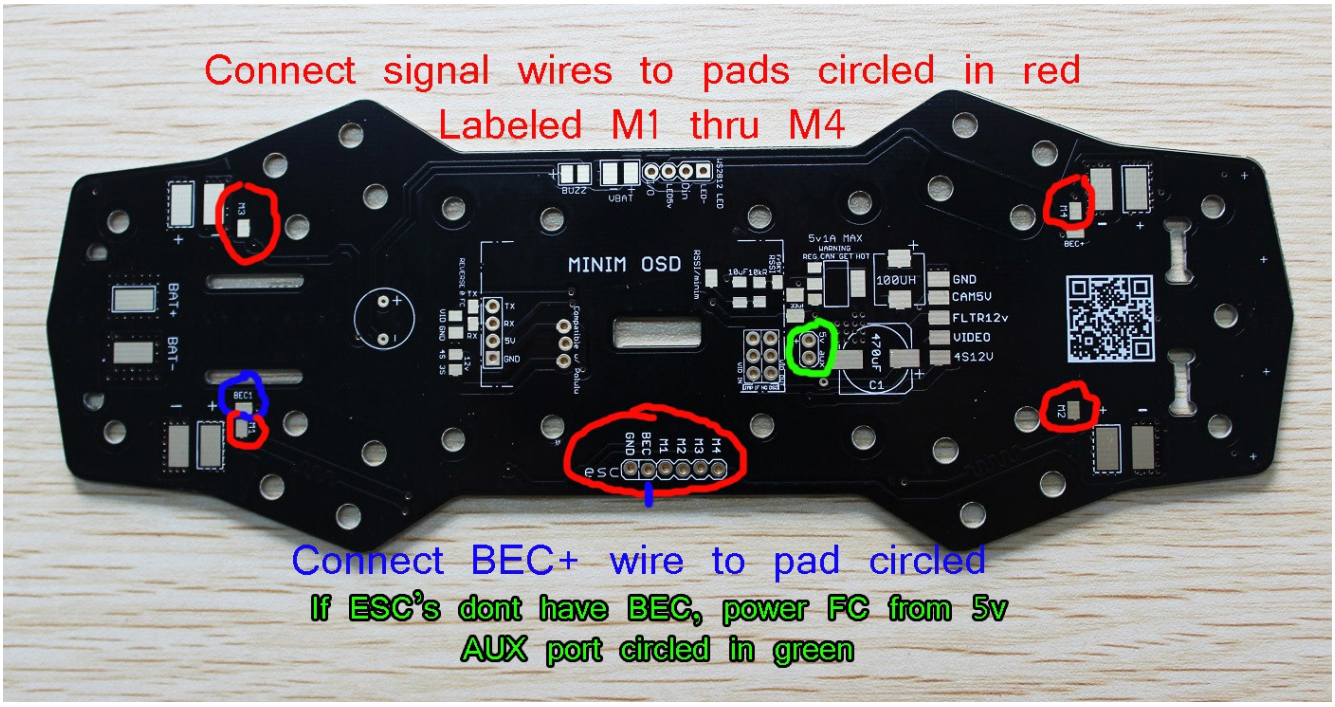
Before mounting the flight controller, follow the configuration below for the exact flight controller you are using. Note what type of pin header to solder to your FC and what the recommended orientation is. Mount FC to the PDB with nylon standoffs.

Note: Do not use metal standoffs on the 4 FC mounting holes

Powering the flight controller: To power the FC with 5 volts, you will connect the BEC+ wire of motor 1's ESC to the BEC pad next to motor 1. Use the ESC pads on top or bottom of PDB, depending on where you are mounting your ESCs. The ground connection is already built into the ESC header next to the FC.

If you are using ESCs without a built in BEC, you will connect to the 5v AUX port on the PDB located directly in front of the FC mounting area. You may use the ground on the 5v AUX port as well or connect ground from the ESC header.

Preparing ESC/motor signal wire: Solder the signal wire from you ESC to the M1-M4 signal pads located next to the ESC power pads. These pads are on both the top and bottom of the board. The bottom pads are used if mounting the ESCs inside the frame, whereas the top pads are if ESCs are mounted on the arms.



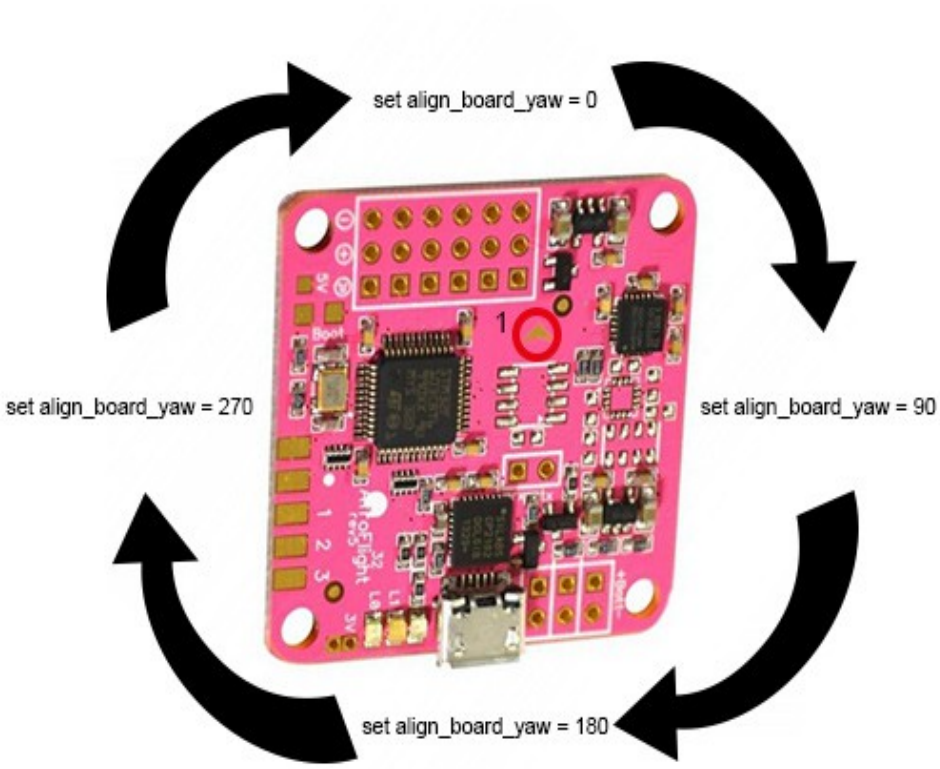
Naze32 FC Orientation, Configuration and Connections

Orientation recommended is 90° clockwise. This puts the Naze's pin in alignment with the corresponding pins on the PDB – USB should face to the left of the PDB towards the Vbatt and Buzzer pins. This also puts the motor pins on Naze and PDB in line with each other.

Remember to change the orientation in Baseflight or Cleanflight by entering the following command into Baseflight or Cleanflight's CLI:

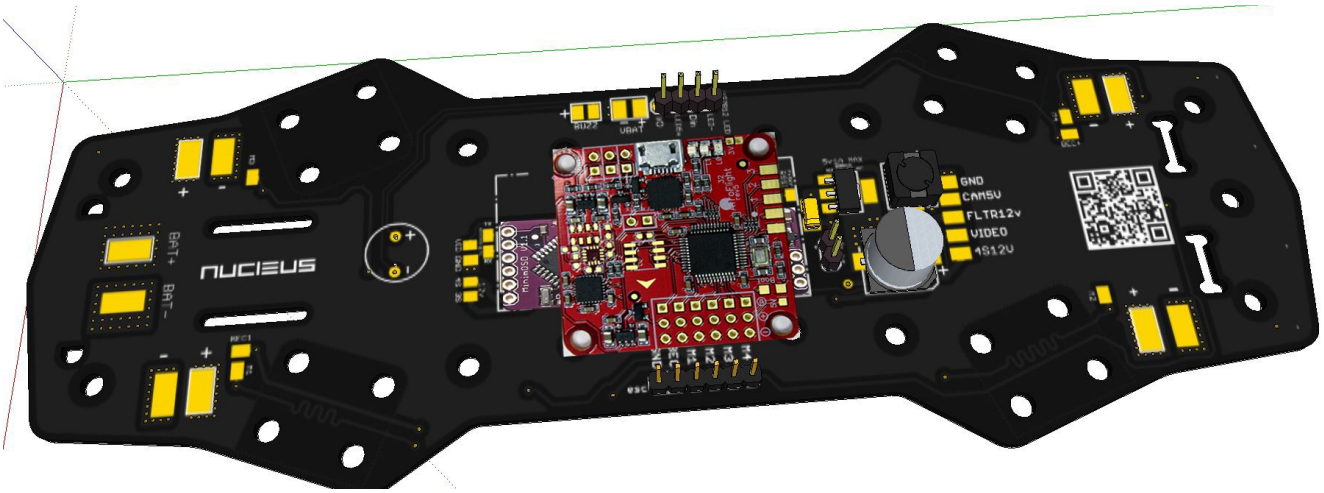
```
set align_board_yaw = 90
save
```

Don't forget to check that all the movements are right in the GUI! If you made a mistake and the movements are not right, your multicopter will crash!!

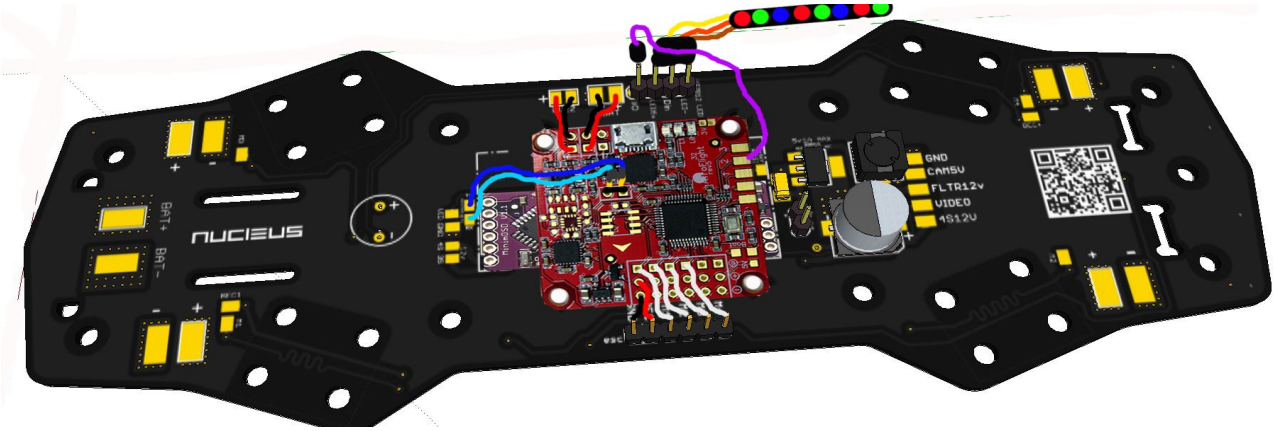


Naze32 Wiring Diagrams

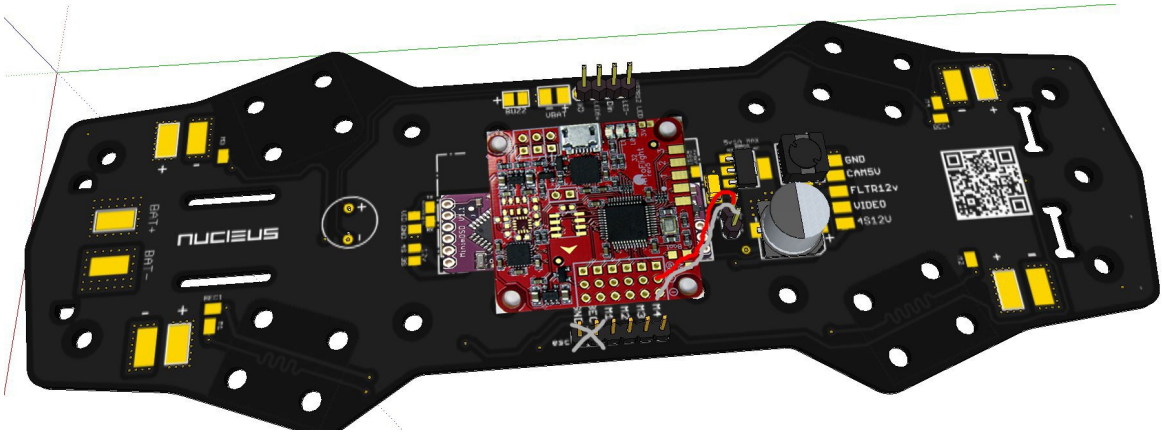
Orientation



Naze32 wiring with programmable LED setup



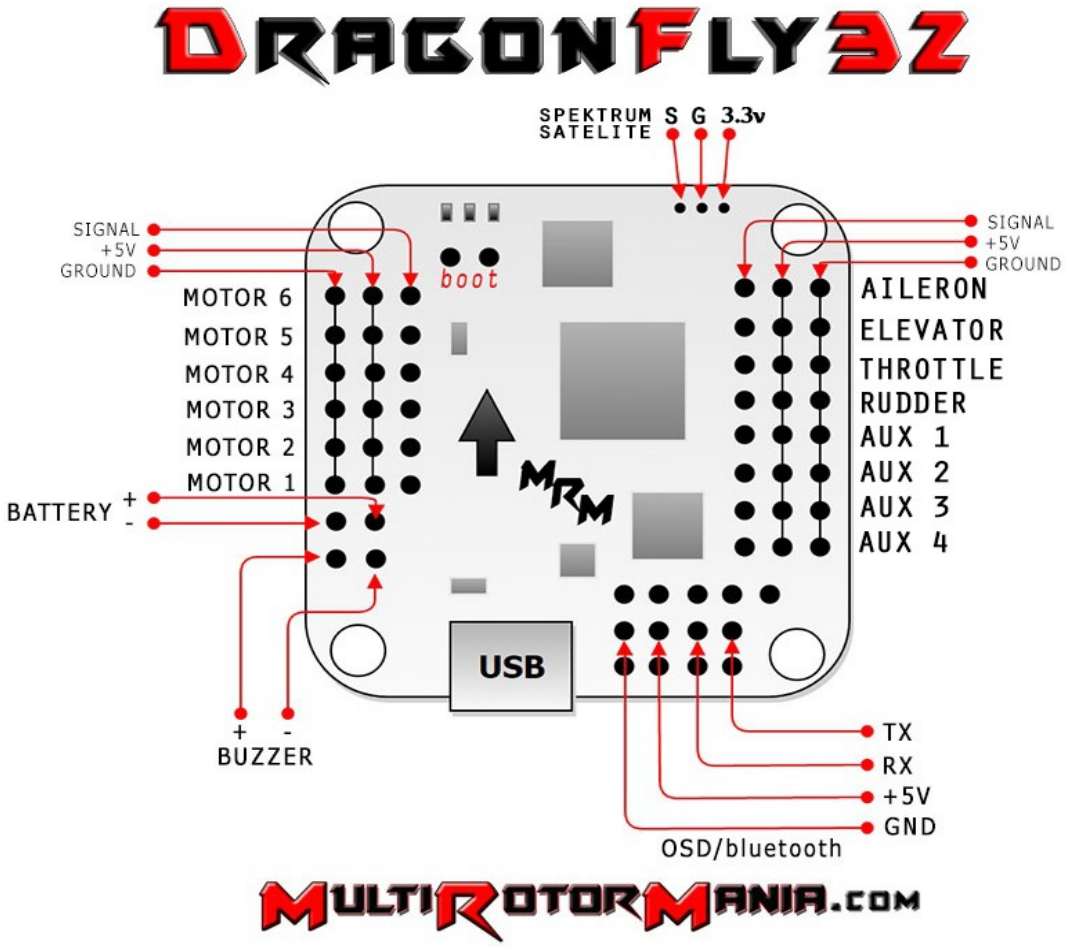
Use on-board 5v AUX port to power Naze32 when using ESCs without BEC (pictured below)



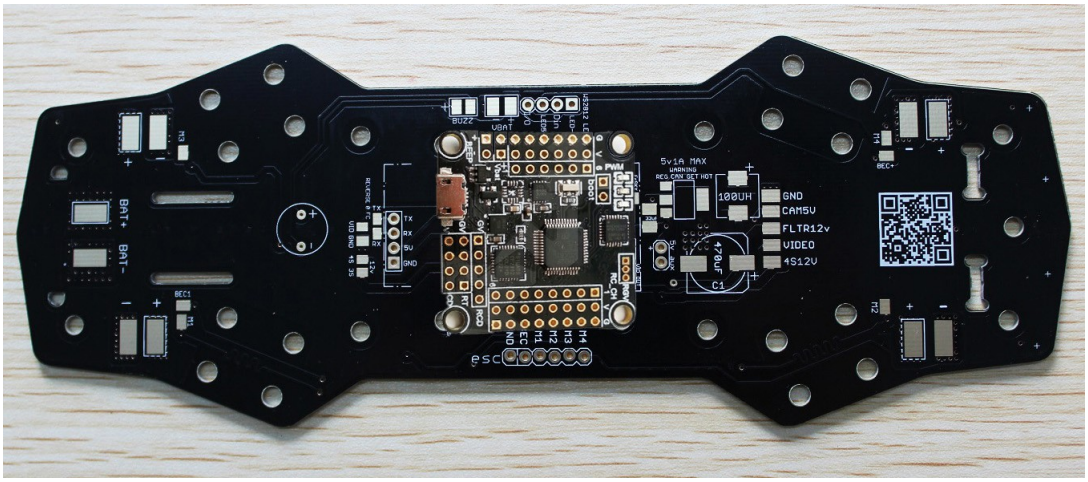
DragonFly32/flip32 FC

Orientation, Configuration & Connections

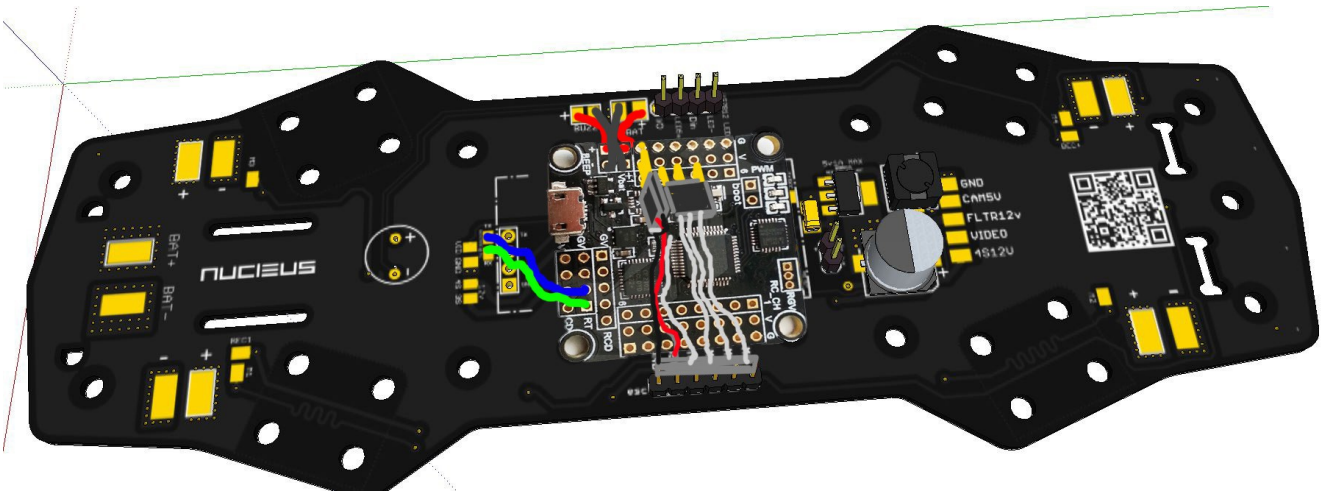
It is recommended to use the standard orientation with this FC. USB should face to the back of the PDB towards the buzzer. This puts the motor pins opposite of the motor pins on the PDB. For a clean set up, solder a right-angle header on the bottom of the FC facing towards the PDB motor pins. Solder a straight male header on the PDB if putting header on top of FC.



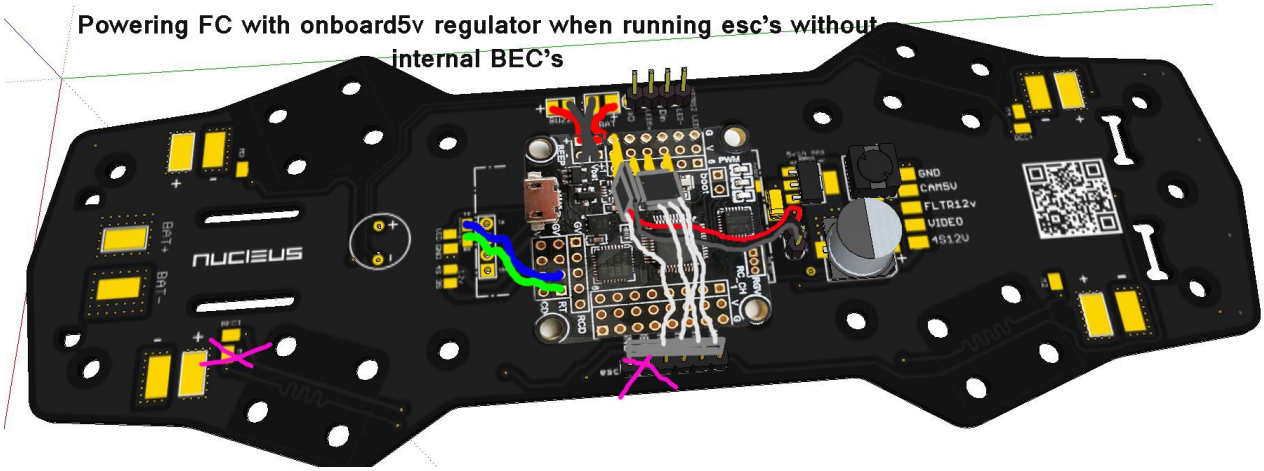
Dragonfly32 wiring diagrams



Using ESCs with BECs



Using ESC's without internal BEC's. Use 5v AUX Port to Power FC



Programmable LED Setup

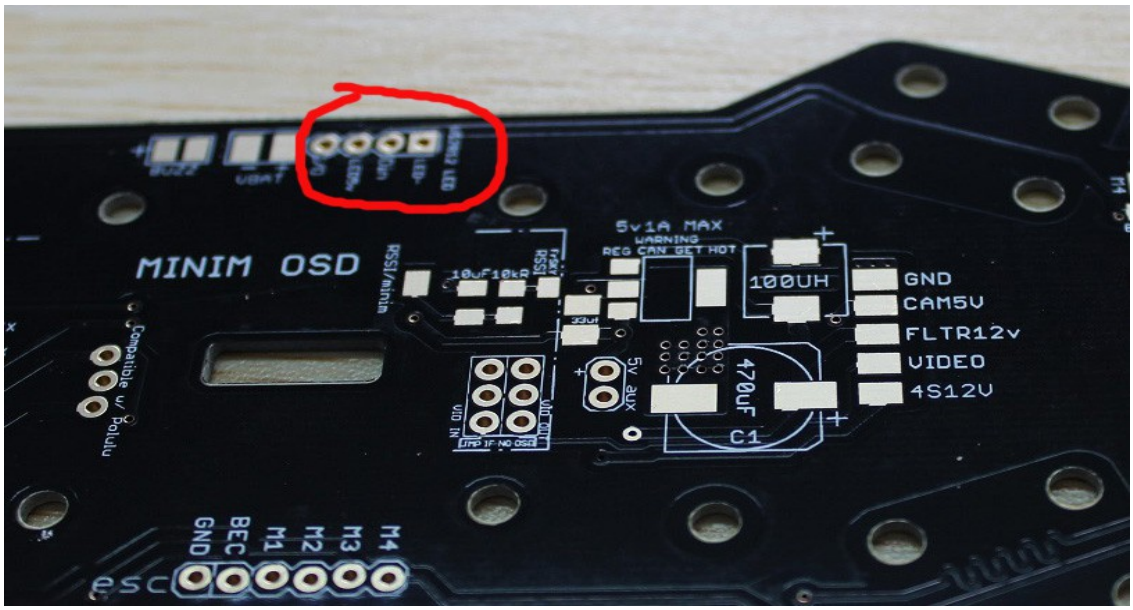
The Nucleus PDB has a programmable LED strip port built into it. It is a four pin port labeled “WS2812 LED.” Solder a male pin header to the top or bottom of the PDB. If installing pin header on the bottom, you will want to use a 90° header.

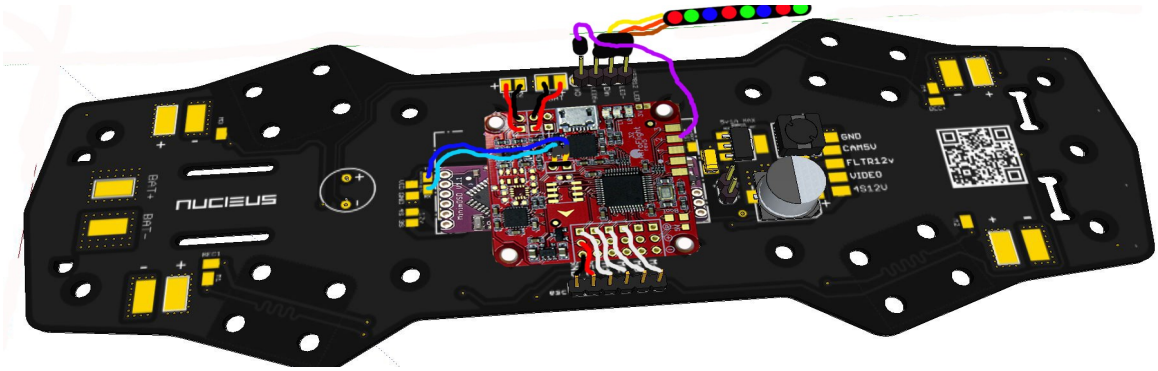
Pin Order:

1. I/O
2. 5v LED +
3. DIN
4. LED -

Pin 1 “I/O” is the data pin to the FC. Run a lead from this pin to Rx pin 5 (soft serial) on the Naze32, Dragonfly32, CC3D and other clones.

To connect a LED strip, put a three pin servo lead on your LED strip following the corresponding pins to the PDB port numbers 2/3/4. Plug the strip into the PDB. If you are running many strips, you may want to purchase a servo lead splitter cable so you can plug in multiple strips cleanly. If not, you will want to solder all the strips into the servo lead wires that plug into the PDB.





Article written by Oscar Liang modified by WadzoQuadz

CleanFlight supports RGB LED strip, which is really great. In this article I will show you how I setup and configure LEDs in Naze32 Cleanflight. Same should work for CC3D too.

RGB LED does not only help you identify your quadcopter easier, it can also indicate many flight data using different colors, Each single LED can be independently activated with any color.

Here are the documents and coding for Cleanflight:

https://github.com/cleanflight/cleanflight/blob/master/docs/LedStrip.md

Here are some features that can be controlled by programmable LED:

- **battery level warning (voltage alarm)**
- **flight mode indicator**
- **orientation lights**
- **RSSI SIGNAL**
- **GPS SIGNAL**
- **Throttle, aileron, rudder, elevator stick input or percentage**
- **Thrust levels**
- **Lost model**
- **Telemetry**
- **Arm/Disarm**
- **Plus More!**

To learn how to flash CleanFlight Firmware on your Naze32 or CC3D.

To learn other ways of turning LEDs on and off using Radio transmitter.

FULL HOW TO ARTICLE CAN BE FOUND HERE

http://blog.oscarliang.net/setup-rgb-led-cleanflight/

Recommended LED Strip for Cleanflight

This LED feature of Cleanflight are primarily designed for addressable LED strips. The recommended type of LEDs are called WS2812. These LEDs come all connected as a strip, you can cut it to whatever length or number of LEDs you like. They only need 1 data input, and take 5V power supply. This is all built into the Nucleus PDB LED port.

I am using WS2811, they look identical to the WS2812, which also seem to work fine. they are super bright and the colors are great. This feature can support up to 32 LEDs, that means Cleanflight can change the color of the LEDs independently at the same time.

The LED strips can be found here:

http://www.ebay.com/itm/4M-30Pixel-M...item566f003803

http://www.ebay.com/itm/NEW-50PCS-Mi...item20f3e4cab5

https://www.sparkfun.com/products/12661

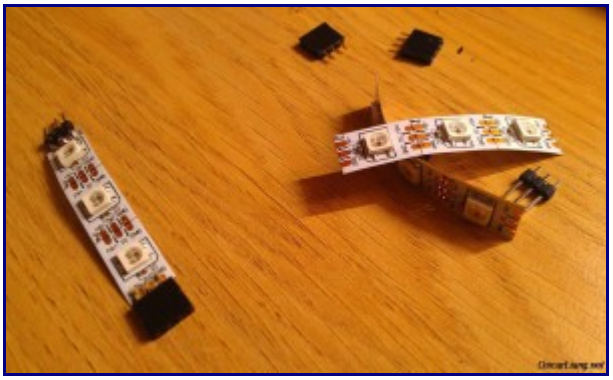
https://www.sparkfun.com/products/12664

You can even wire up your own standalone LEDs . Programming chips are actually built into the LED themselves.
http://www.ebay.com/itm/New-100PCS-W...item51c9aa3065

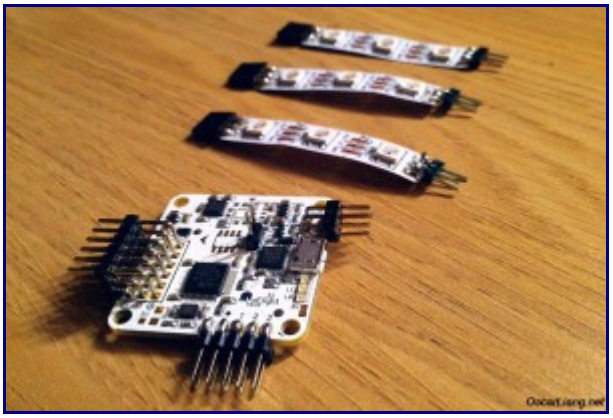
Soldering the Connectors to the LED strip

I decided to only use 9 LEDs, and divided them into three strips so I can place them at different places of the quad. You can use up to 32 LEDs.

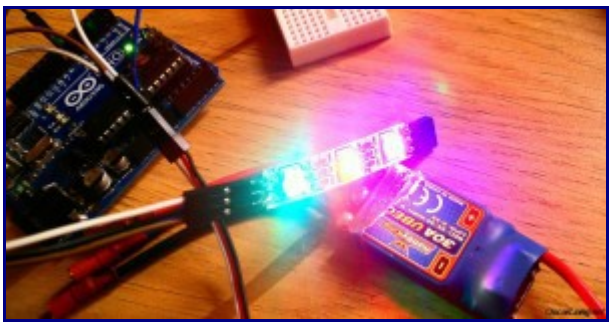
Solder pins on the pads of the LED strip or solder wires from the servo lead directly to the strip



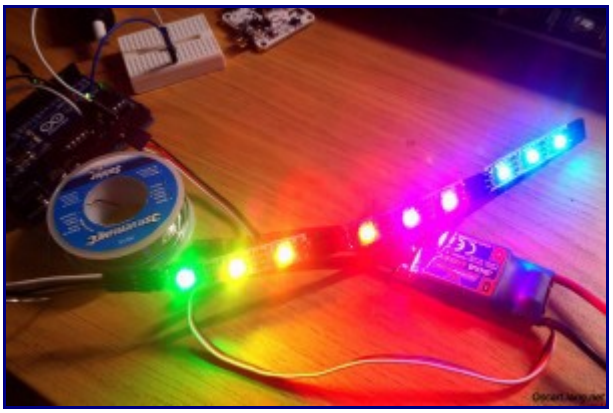
LED strips size comparison with the Naze32.



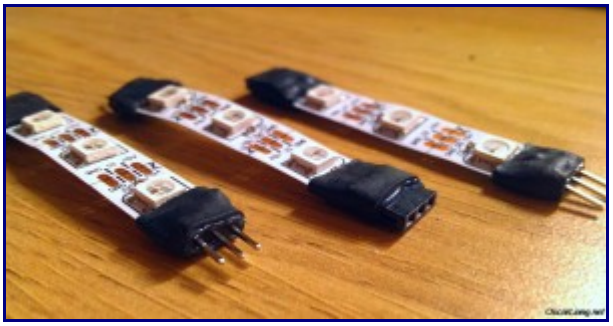
LEDs are super bright and require a small current.



With the male and female connectors I soldered, the strips can also be connected in series.



With some heat shrink to protect the connector soldering, just perfect



*** Warning**: The flexible LED strip pads are extremely susceptible to heat. Don't leave your soldering iron on the pads for long.

LED strip Current Draw

You might wonder, how much current do these little suckers draw? The answer is around 18mA per LED. (of course, current draw changes as color changes, blue actually uses more energy than red, This is the result for 3 LEDs.

Enabling LED_Strip Feature in CleanFlight

As you know the Naze32 has very limited pins on the board. To use the LED feature we can take advantage of some of the spare radio input pins. Be default pin1 to pin 8 are all have PWM signal input, in order to use them as outputs, we need to enable PPM feature. That allows you to use only pin1 as radio signal input (including channel1 to channel8) and the rest of the pins will be come spare. PPM feature is a great feature, it will make your wiring easier and tidier. I would recommend it even if you are not going to use LED_strip.

Enter the following commands in CLI to enable the LED_Strip feature.

```
# feature rx_ppm
Enabled RX_PPM

# feature led_strip
Enabled LED_STRIP
```

Connecting LED strip to the Naze32

Depends on how many LEDs you are planning to use, make sure your BEC is capable of supplying enough current. You will be getting power from spare ESC BEC (motor 4 BEC on the PDB), and not using the BEC that powers your radio and flight controller.

As mentioned, these LED only need 1 data input, and the pin used for the LED is Radio pin5 on the Naze32 32clones and CC3D.

```
Naze32 RC5
Dragonfly32 and other clones Rc5
CC3D   RCO5
ChebuzzF3/F3Discovery PB8
Sparky PWM5
```

Since RC5 is also used for SoftSerial and Parallel PWM on the Naze32, that means you cannot use LED_Strip with these features at the same time.

Configuring LED strip in CleanFlight

There are two ways of configuring LEDs in Cleanflight, 1 – LED Tab in GUI. 2 – CLI Commands.

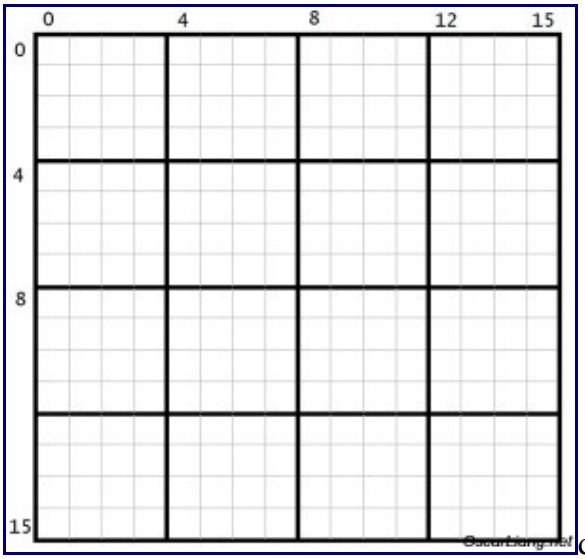
Configure LED in CLI Command

You can configure the LEDs using the **led** command. By entering “led” only in CLI it prints out your current configuration.

Each LED can be configure using this template “lednumber x,y:ddd:mmm”.

LED number is the sequential ordering of your LED in the LED strip. LED number should start at 0 (0 for first LED).

The LED system is a 16×16 grid. x and y are the grid coordinates. So if x,y=0,0, it's top left corner cell. If it's 15,15, you get the last cell in the bottom right.



ddd is direction: N – North, E – East, S – South, W – West, U – Up, D – Down. For instance, an LED that faces South-East at a 45° downwards angle could be configured as SED.

mmm is the LED mode. The currently available LED modes are:

- W – Warnings.
- F – Flight mode & Orientation
- I – Indicator.
- A – Armed state.
- T – Thrust state.

To erase or mark the end of the LED strip.

```
led 4 0,0::
```

So for example, if I were using only three LEDs, one on the left front arm, one on the right front arm, and one one the tail of the body.

```
      1              2
       \            /
        \          /
         \ FRONT  /
          |      |
         /        \
        /    3     \
       /            \
      /              \
```

I would define my LED strip in this way

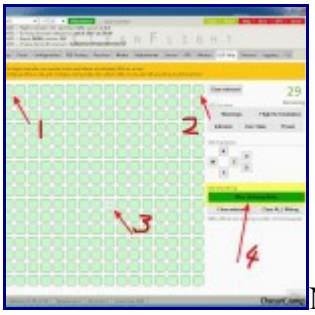
```
led 0 0,0:ND:IA
led 1 0,15:ND:WF
led 2 8,8:D:IA
led 3 0,0::
save
```

Configure LED in Configuration LED Tab

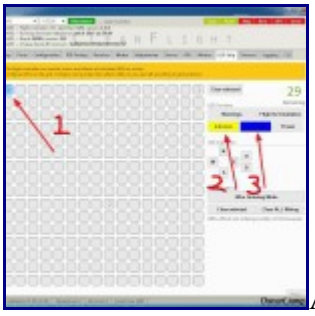
As I posted this page, a new version of Cleanflight GUI was released. Along with other updates, was the LED strip tab. It's probably the easiest way to configure your LED strip, in a graphic interface rather than command lines.

Get the latest version of Cleanflight Configurator. Go to the LED Strip tab. If you already have LEDs setup and don't want them, you can press "Clear All Wiring". To start adding LEDs, click "Wire Ordering Mode".

Now click on the grid to place your LEDs. I will place three LEDs, and Exit Wire Ordering mode.



Now click on each individual LED, and you should be able to assign them LED functions, and their orientation.



After you have assigned all of them, click save.

Here are some vids to show what can be done

http://youtu.be/cZTofVITR94

on zmr250

http://youtu.be/xH1izrKWRak

Additional images of Nucleus PDB