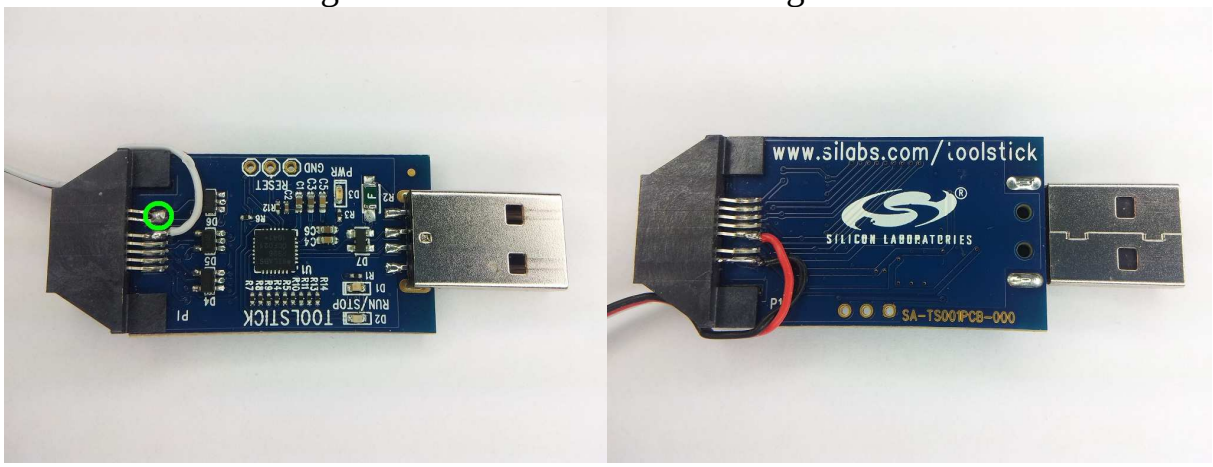
ESCs supported by BLHeli SiLabs

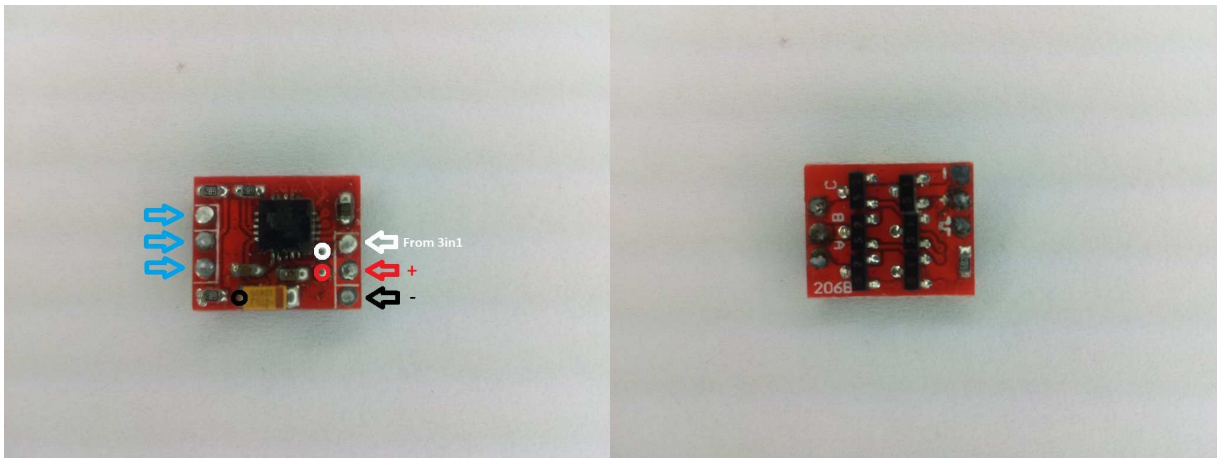
Toolstick connection:

The ESCs shown in this document can be flashed with BLHeli firmware.
The black, red and white circles in the ESC images are the Toolstick programmer connections according to the wire colours in the images below:



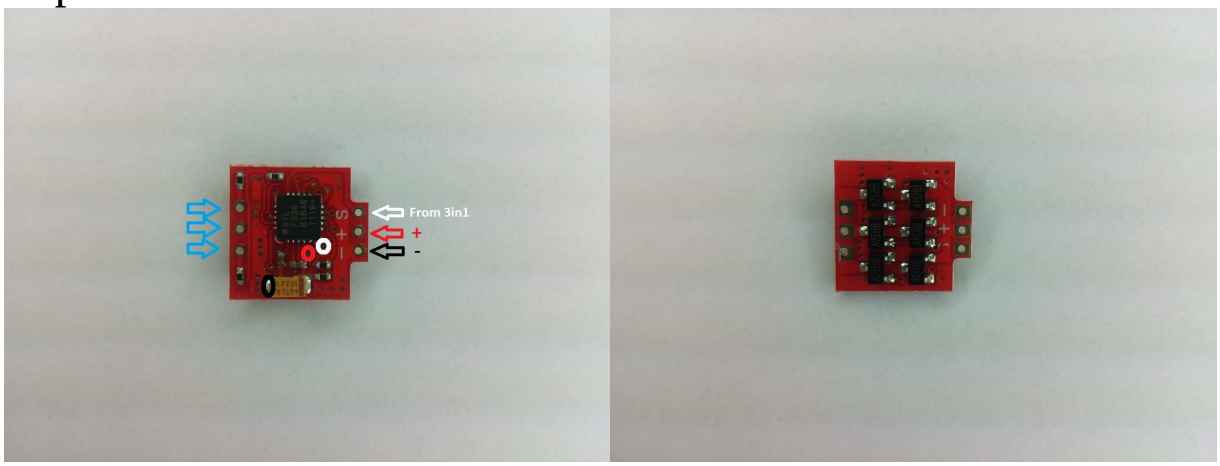
The green circle in the above image indicates where two pins on the connector shall be shorted.

DP 3A:



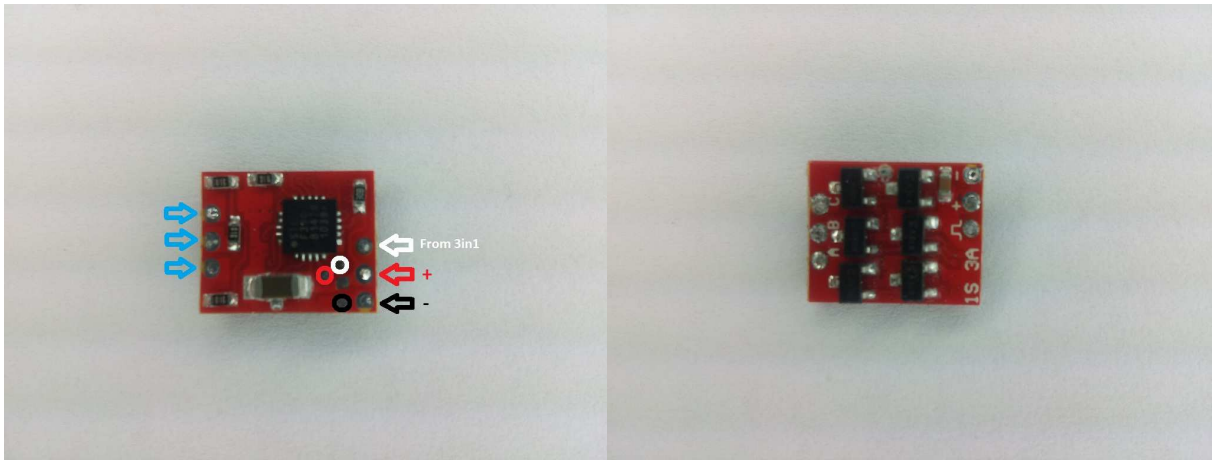
The ESC supports 1S operation only. It supports fully damped mode.
Switching speed is fast, <0.5us.
Fet resistances are approximately 40mohm for N and 90mohm for P.

Supermicro 3.5A:



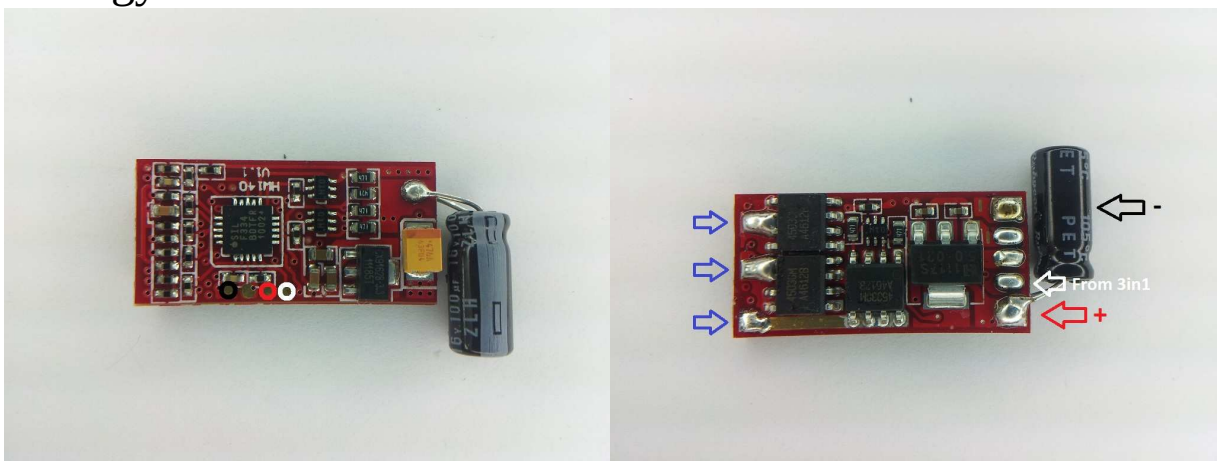
The ESC supports 1S operation only. It supports fully damped mode.
Switching speed is fast, <0.5us.

XP 3A:



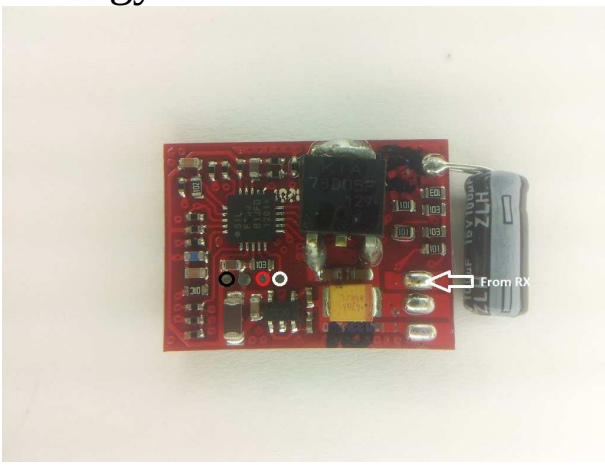
The ESC supports 1S operation only. It supports fully damped mode.
Switching speed is fast, <0.5us.
Fet resistances are approximately 30mohm for N and 60mohm for P.

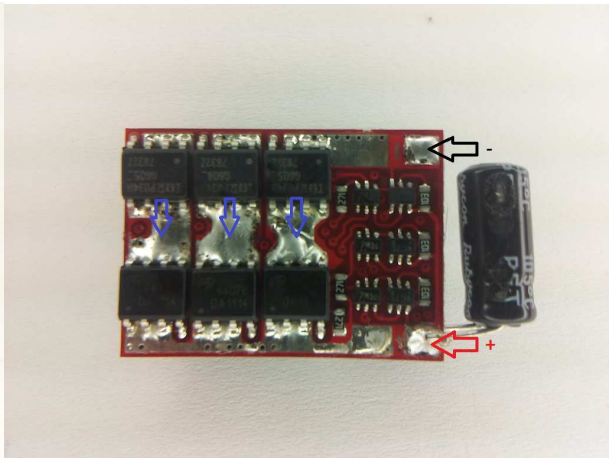
Turnigy Plush 6A:



The ESC supports 2S (to 3S) operation.
Switching speed is not fast, ~2.5us (on 2S) for pfet to go off.
Fet resistances are around 40mohm for N and 60mohm for P (max at 4.5V).
Also, there is a 2.5us delay in the fet driver that shifts throttle range up,
and causes a step in the response from almost full to full throttle.

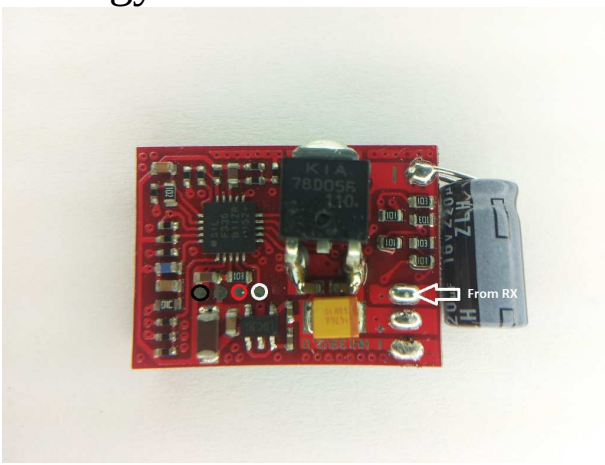
Turnigy Plush 10A:

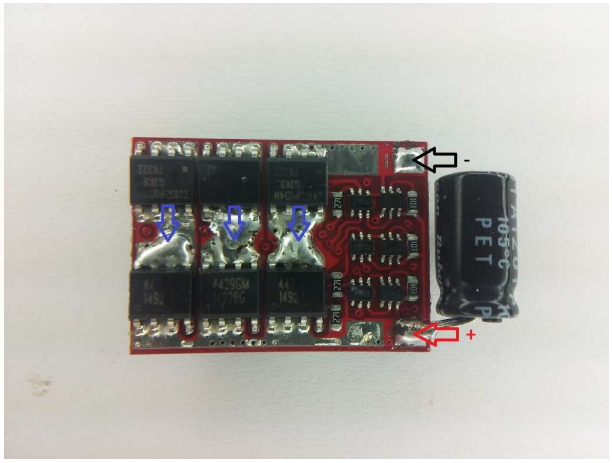




The ESC supports 2S to 4S operation.
Switching speed is not fast, ~4.5us (on 2S) for pfet to go off.
Fet resistances are around 4mohm for N and 19mohm for P (typ at 4.5V).
Also, there is a 2.5us delay in the fet driver that shifts throttle range up,
and causes a step in the response from almost full to full throttle.

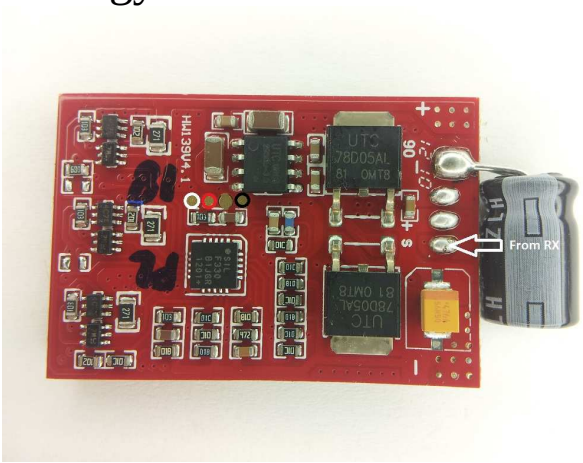
Turnigy Plush 12A:

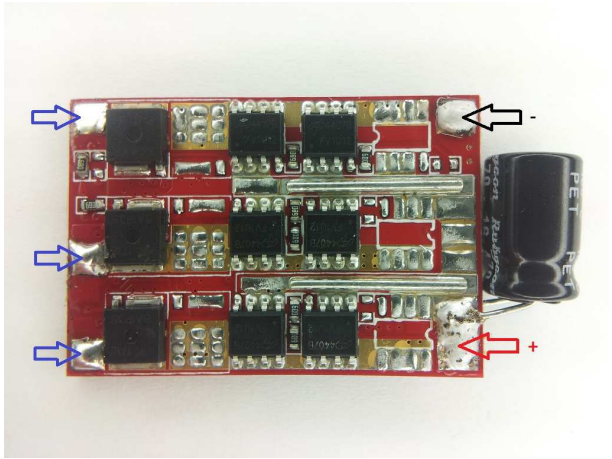




The ESC supports 2S to 4S operation.
Switching speed is not fast, ~4.5us (on 2S) for pfet to go off.
Fet resistances are around 4mohm for N and 15mohm for P (typ at 4.5V).
Also, there is a 2.5us delay in the fet driver that shifts throttle range up,
and causes a step in the response from almost full to full throttle.

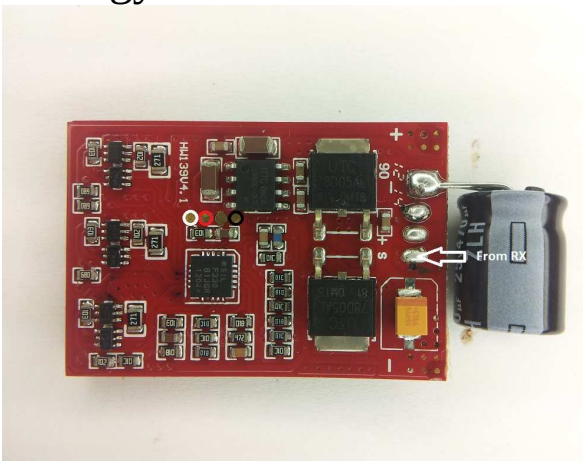
Turnigy Plush 18A:

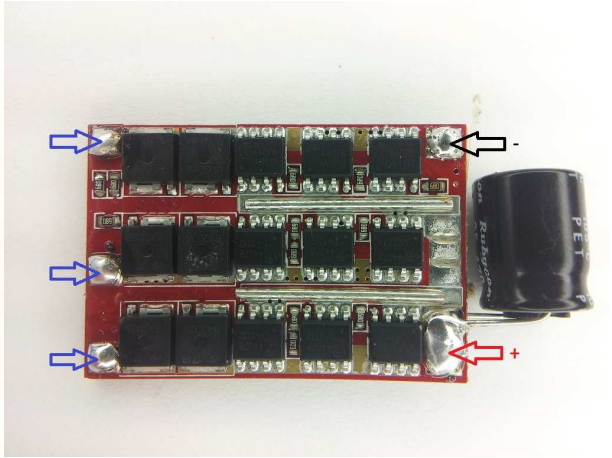




The ESC supports 2S to 4S operation.
Switching speed is not fast, ~4.1us (on 2S) for pfet to go off.
Fet resistances are around 4mohm for N and 10mohm for P (typ at 4.5V).
Also, there is a 2.5us delay in the fet driver that shifts throttle range up,
and causes a step in the response from almost full to full throttle.

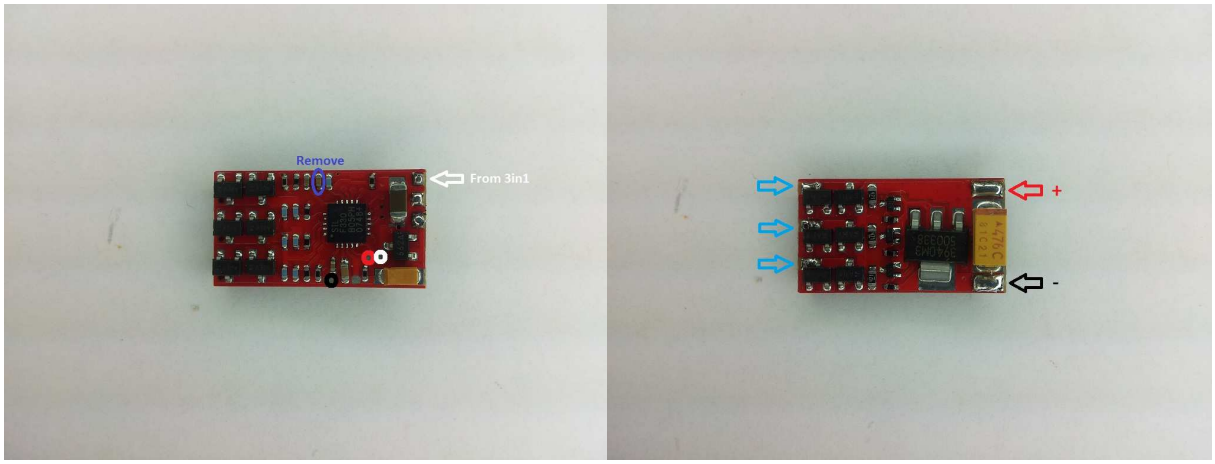
Turnigy Plush 25A and 30A:





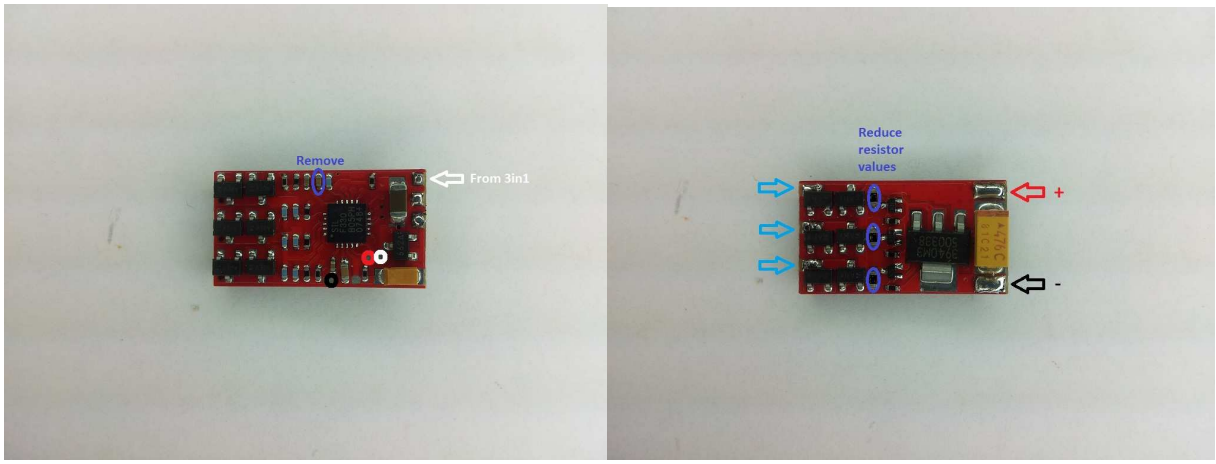
The ESC supports 2S to 4S operation.
Switching speed is not fast, ~4.1us (on 2S) for pfet to go off.
Fet resistances are around 2mohm for N and 6mohm for P (typ at 4.5V).
The only difference between the 25A and the 30A is an additional cooling plate
(not shown in the picture).
Also, there is a 2.5us delay in the fet driver that shifts throttle range up,
and causes a step in the response from almost full to full throttle.

XP 7A:



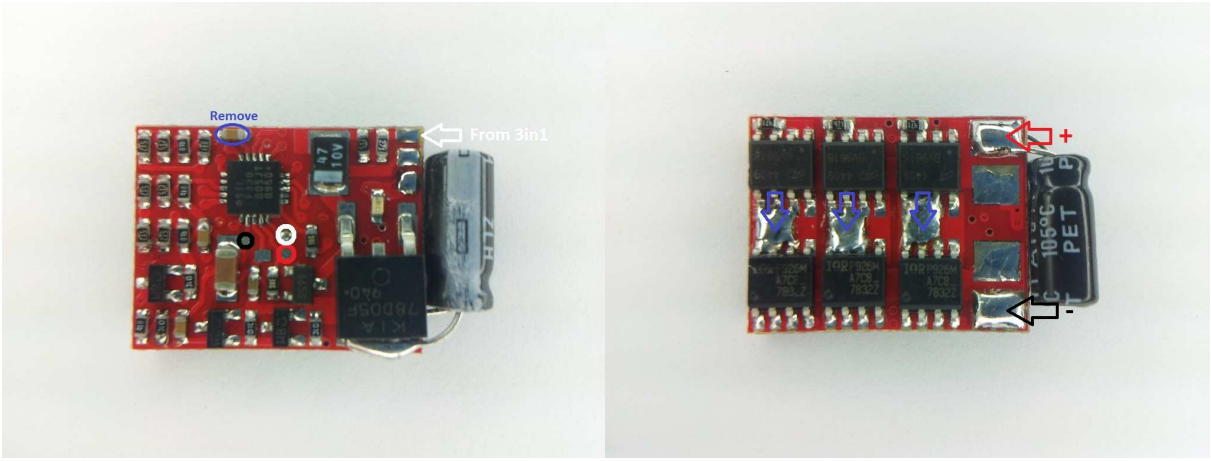
The ESC supports 1S to 2S operation.
Switching speed is not fast, ~5us (on 2S) for pfet to go off.
Fet resistances are around 12mohm for N and 30mohm for P (typ at 2.5V).
The circled capacitor in the image above should be removed for high frequency input signals (pwm > 1kHz, e.g. mCPX v1).

XP 7A Fast:



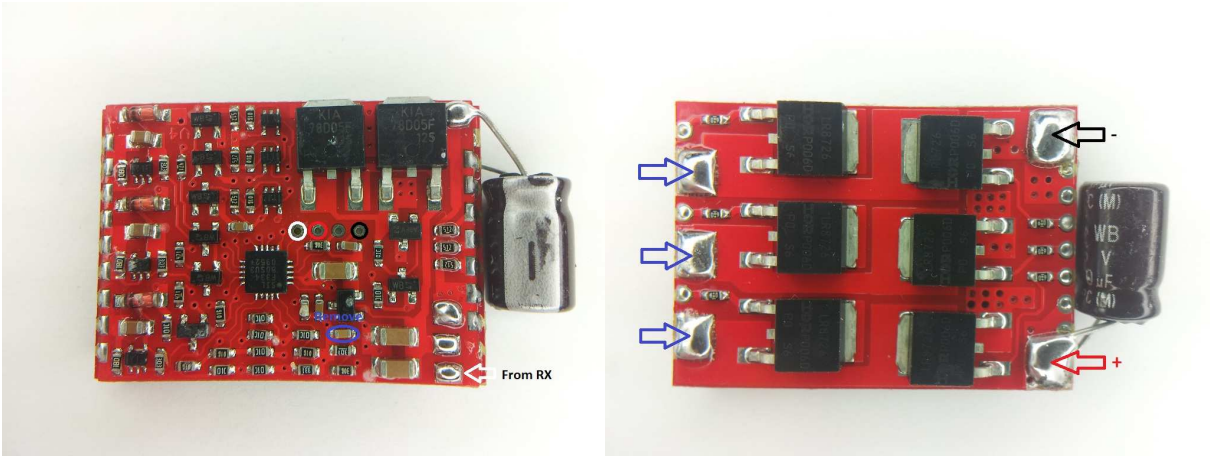
This is a modified version of an XP 7A esc, primarily targeting 2S tail operation.
The ESC supports 1S to 2S operation. It supports fully damped mode.
Switching speed is modified to be faster, ~1.6us (on 2S) for pfet to go off, thereby enabling fully damped mode operation.
The resistors marked in the picture above are originally 470ohm. They have to be modified to be between 150ohm and 180ohm. Paralleling the original 470ohm with 270ohm gives a final resistance of 170ohm, which is suitable.
The circled capacitor in the image above should be removed for high frequency input signals (pwm > 1kHz, e.g. mCPX v1).

XP 12A:



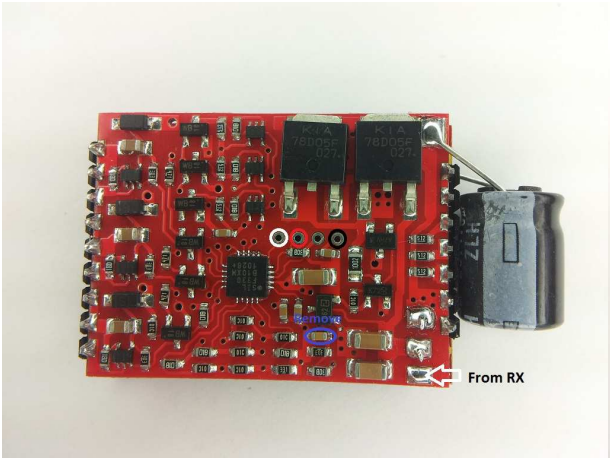
The ESC supports 1S to 3S operation.
Switching speed is not fast, up to ~9us (on 3S) for pfet to go off.
Fet resistances are around 4mohm for N and 10mohm for P (specified at 4.5V, fets are not specified for operation below 4.5V).
The circled capacitor in the image above should be removed for high frequency input signals (pwm > 1kHz, e.g. mCPX v1).

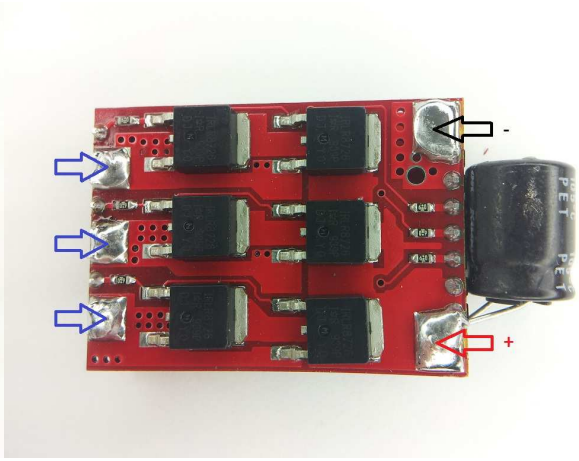
XP 18A:



The ESC supports 2S to 4S operation.
Switching speed is quite fast, <0.5us , except ~2us for high side to go on.
Pwm is applied to the high side.
Fet resistances are around 6mohm for low side and high side (typ at 4.5V).
Both low and high side fets are Nfets.

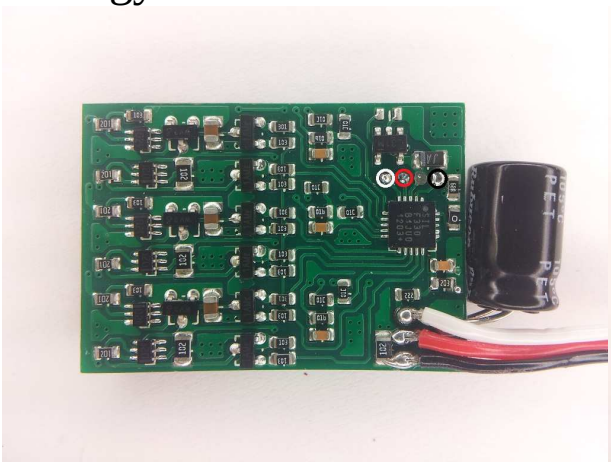
XP 25A:

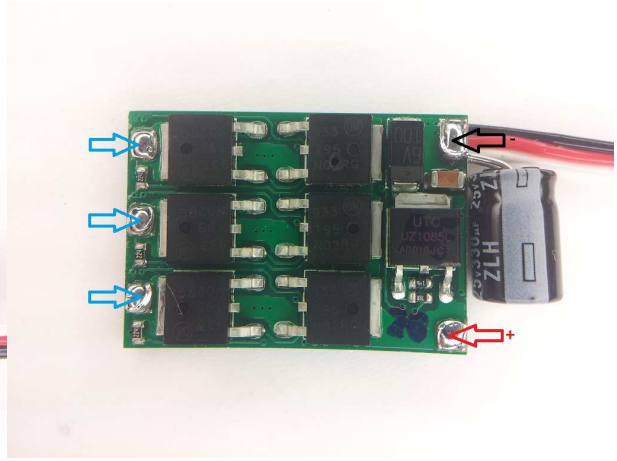




The ESC supports 2S to 4S operation.
Switching speed is quite fast, <0.5us , except ~2us for high side to go on.
Pwm is applied to the high side.
Fet resistances are around 3mohm for low side and high side (typ at 4.5V).
Both low and high side fets are Nfets.

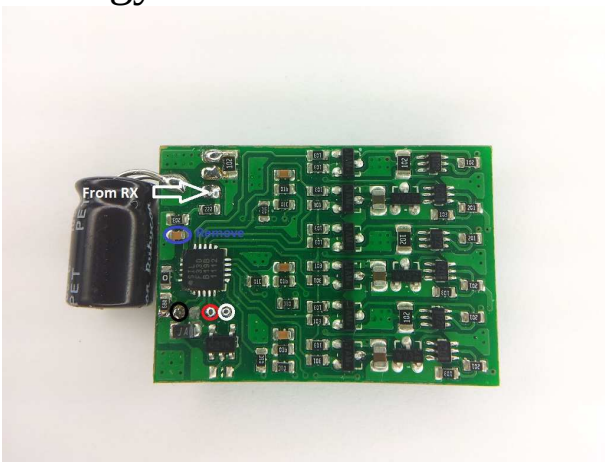
Turnigy AE 20A:

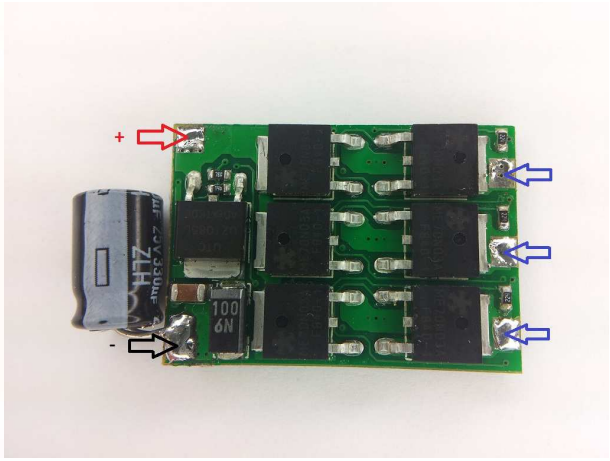




The ESC supports 2S to 4S operation.
Switching speed is quite fast, <1us.
Fet resistances are around 5mohm for low side and high side (typ at 10V).
Both low and high side fets are Nfets.

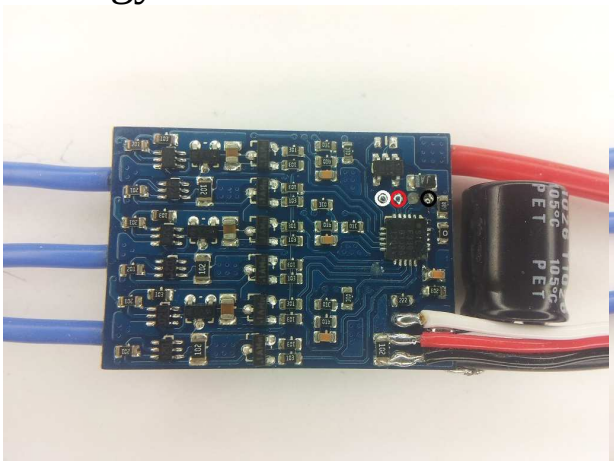
Turnigy AE 25A:

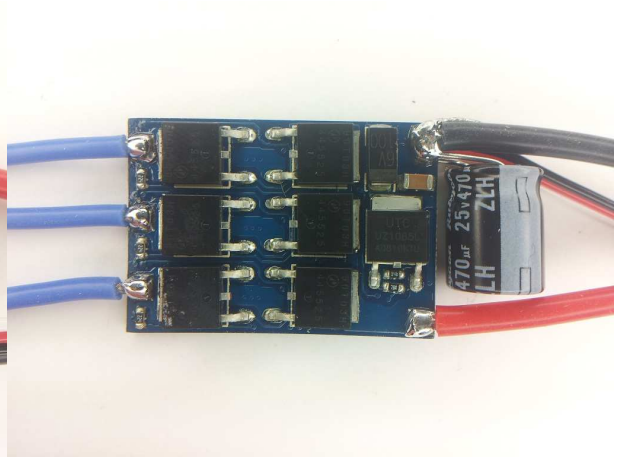




The ESC supports 2S to 4S operation.
Switching speed is quite fast, <1us.
Fet resistances are around 5mohm for low side and high side (typ at 10V).
Both low and high side fets are Nfets.

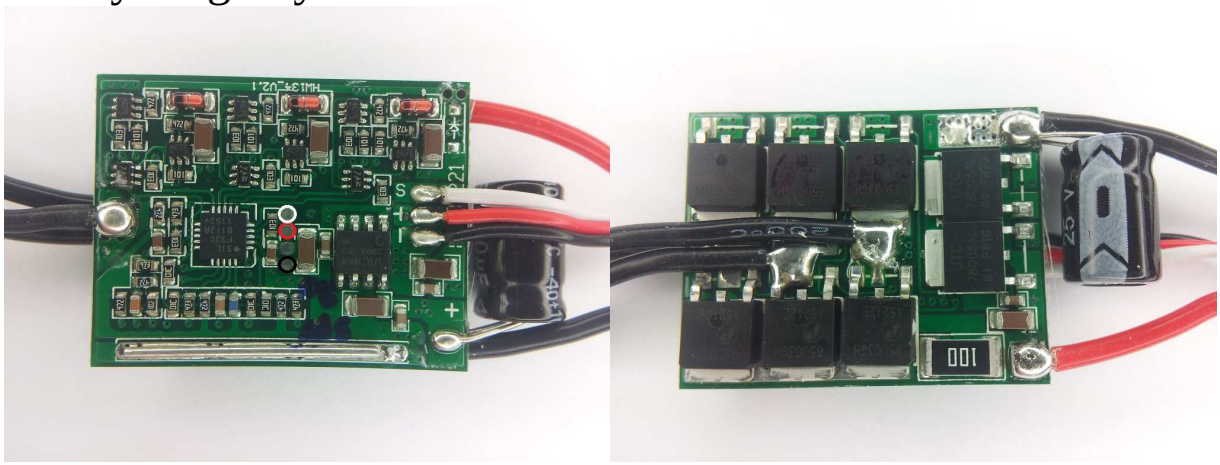
Turnigy AE 30A:





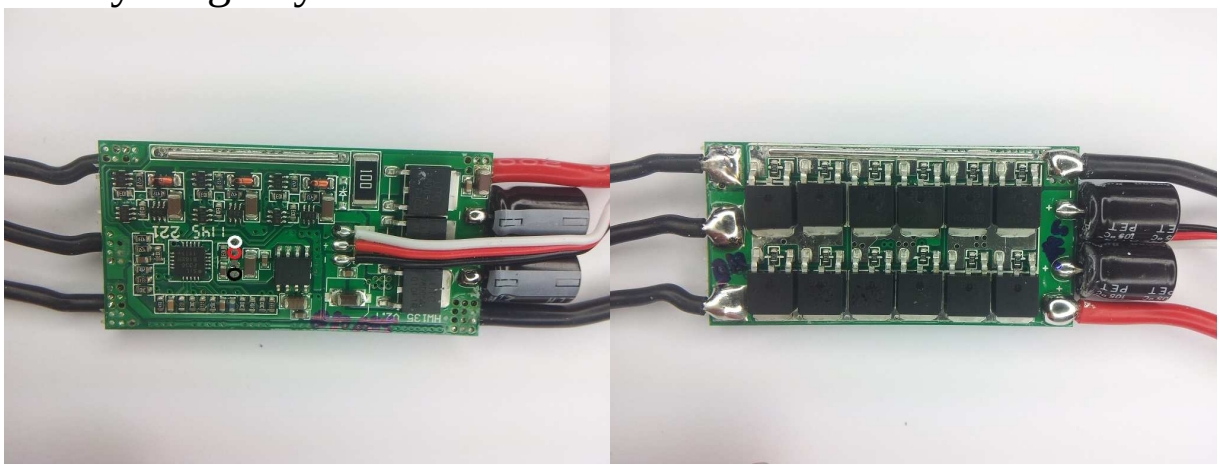
The ESC supports 2S to 4S operation.
Switching speed is quite fast, <1us.
Fet resistances are around 4mohm for low side and high side (max at 10V).
Both low and high side fets are Nfets.

Hobbywing Skywalker 20A:



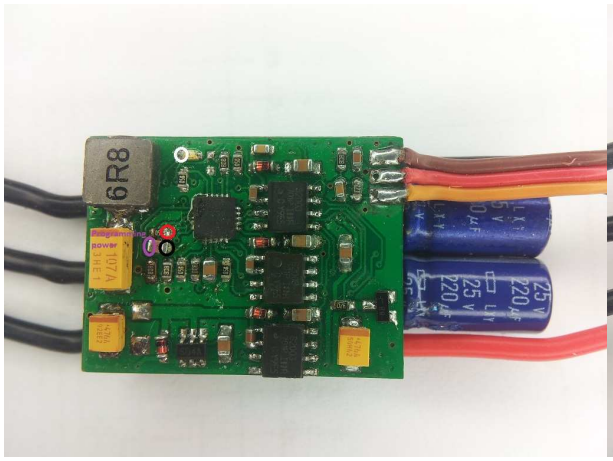
The ESC supports 2S to 3S operation.
Switching speed is quite fast.
Fet resistances are around 6mohm for low side and high side (max at 10V).
Both low and high side fets are Nfets.

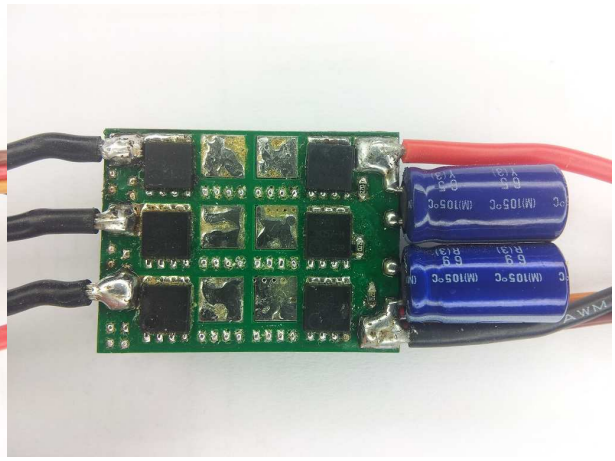
Hobbywing Skywalker 40A:



The ESC supports 2S to 3S operation.
Switching speed is quite fast.
Fet resistances are around 3mohm for low side and high side (max at 10V).
Both low and high side fets are Nfets.

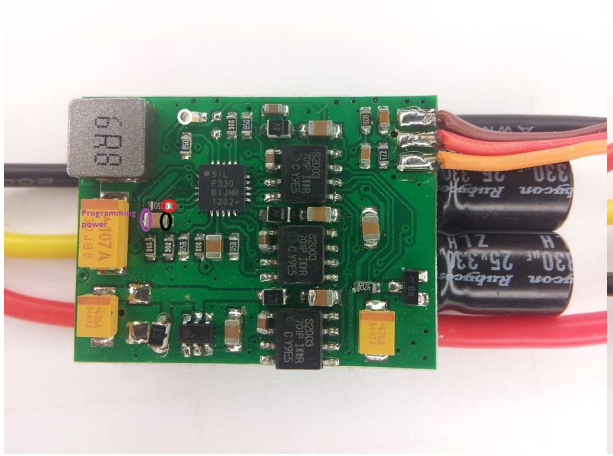
HiModel Cool 22A:

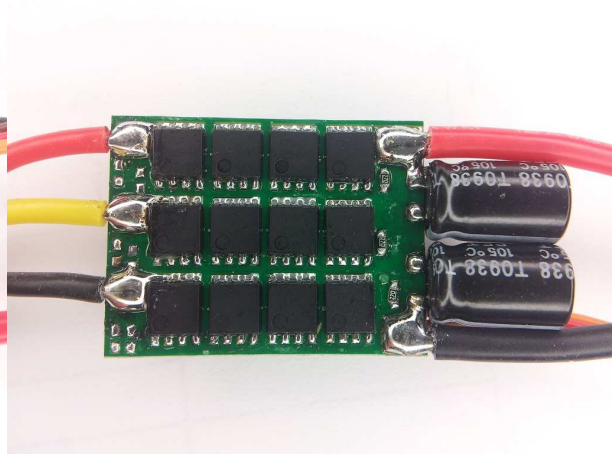




The ESC supports 2S to 4S operation.
Switching speed in stock form is very slow.
Fet resistances are low. Around 2mohm for low side and high side (typ at 10V).
Both low and high side fets are Nfets.
It has a 5V/4A switch mode BEC.
If programming an unmodified ESC, the ESC must not be powered. A 1S battery below 3.8V or similar shall be applied to the purple circle. The LED at the white circle may also have to be removed.

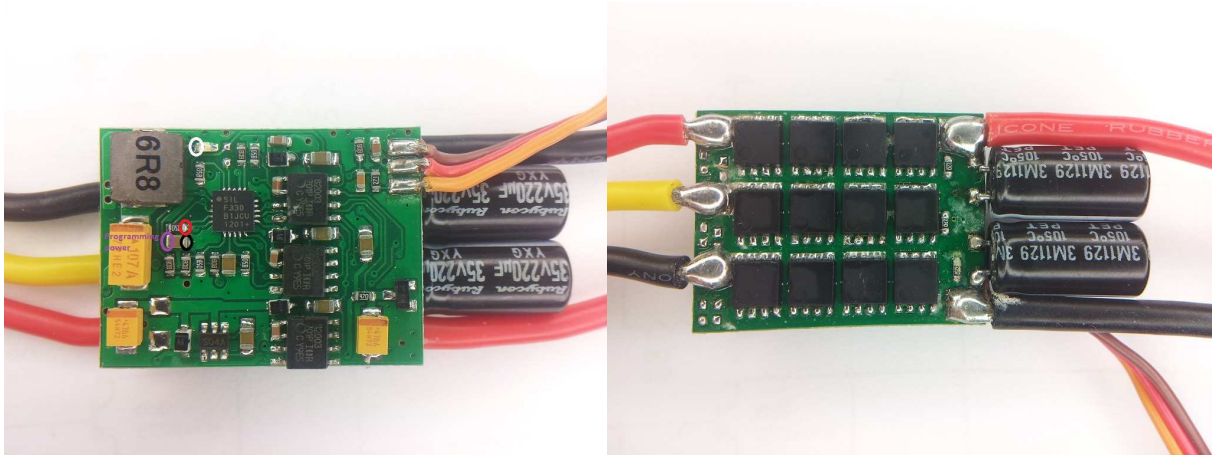
HiModel Cool 33A:





The ESC supports 2S to 4S operation.
Switching speed in stock form is very slow.
Fet resistances are low. Around 1.5mohm for low side and high side (typ at 10V).
Both low and high side fets are Nfets.
It has a 5V/4A switch mode BEC.
If programming an unmodified ESC, the ESC must not be powered. A 1S battery below 3.8V or similar shall be applied to the purple circle. The LED at the white circle may also have to be removed.

HiModel Cool 41A:



The ESC supports 2S to 4S operation.
Switching speed in stock form is very slow.
Fet resistances are low. Around 1mohm for low side and high side (typ at 10V).
Both low and high side fets are Nfets.
It has a 5V/4A switch mode BEC.
If programming an unmodified ESC, the ESC must not be powered. A 1S battery below 3.8V or similar shall be applied to the purple circle. The LED at the white circle may also have to be removed.

Recommended HiModel Cool 22A/33A/41A modification:

The left picture above shows the back side of the control board unmodified.
The three capacitors circled in red are on the MCU outputs to the Nfet drivers. These capacitors slow nfet switching. Also, the Nfet output lines should have pulldown resistors in order to ensure that the fets are off when the MCU is reset (as it is during programming).

Therefore these capacitors should be replaced by 10kohm pulldown resistors, as shown and circled in blue on the right picture.

With this modification, the ESC can safely be programmed and parameters changed (with configuration software like BLHeliSetup, BLHeliTool) with battery connected.