

Series 1580/1585 RC Control Board User Manual

Features List

- **Type of the signal output**
 - **DShot150/300/600**
 - **OneShot42/125**
 - **MultiShot**
 - **Standard PWM (1000us~2000us)**
 - **Multiple frequency of Standard PWM**
- **Output**
- **4 signal output to the ESC**
- **Dedicated hardware timers guarantee precise and jitter-free signals**
- **Compatible with the Series 1580/1585 Dynamometer**
- **Controlled by using the RCbenchmark GUI**
- **Support automatic control function in the RCbenchmark GUI**



Introduction

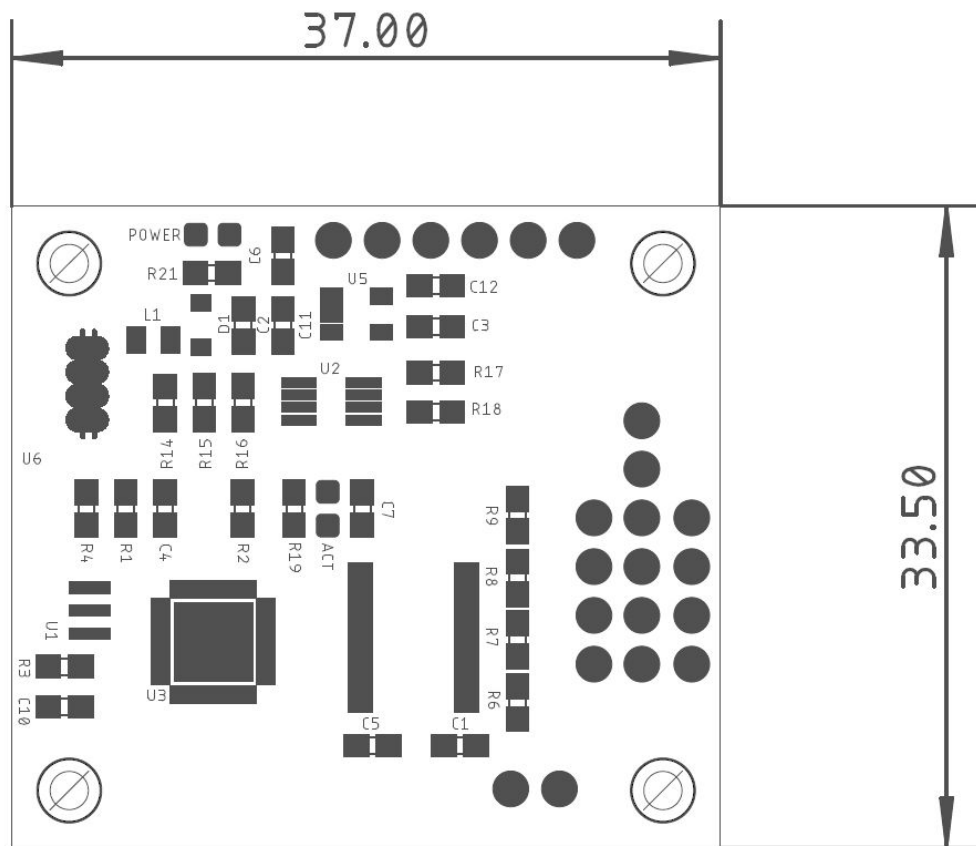
This product is an accessory of the Series 1580/1585, which is able to output multiple types of ESC protocol to control the ESC, including DShot150/300/600, OneShot42/125, MultiShot, and Multiple frequencies of Standard PWM (1000us~2000us). Standard PWM can be selected with refresh frequencies of 50Hz, 100Hz, 200Hz, 300Hz, 400Hz and 500Hz. Use the RCbenchmark software to configure the output protocol. Before purchasing the product, please make sure that the ESC you are going to test on our dynamometer is able to support the ESC protocol being mentioned above. Please note that some ESCs need to do the initialization before functioning. Check the ESC's manufacturer documentation for more details.

Please do not try to power or control the RC Control Board by using other unauthorized equipment other than the Series 1580/1585 Dynamometer from RCbenchmark.

Material List:

- RC control board circuit board (1)
- M3 8mm nylon female-male standoff (4)
- M3 hex nut (4)
- I2C extension cable 250mm (1)

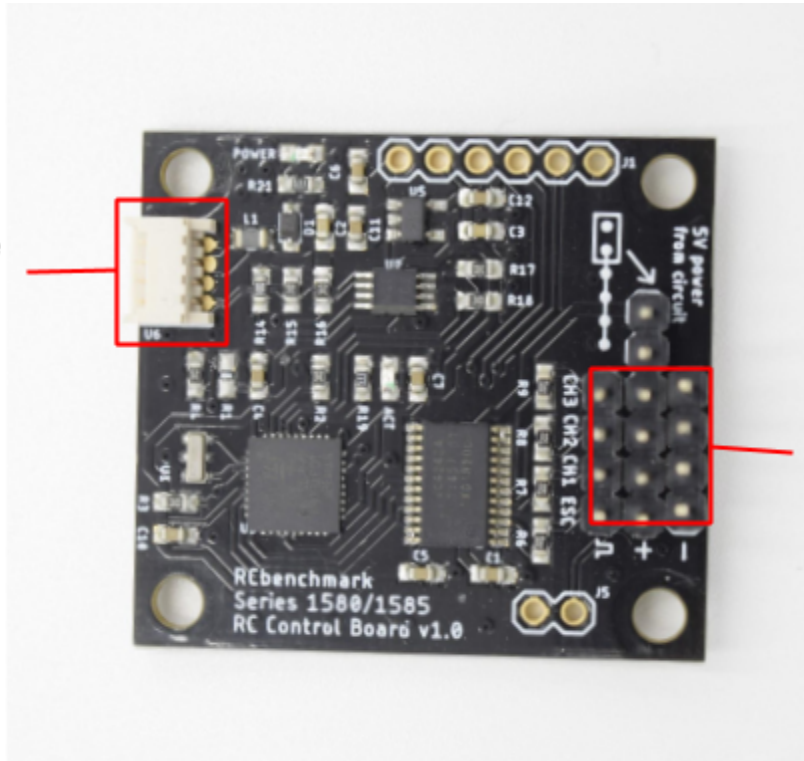
Circuit Dimension



*Diameter of the 4 holes on the conner of the circuit is 3mm

Figure 1. Dimensions of the RC Control Board

Connector to the
1580/1585 PCB



Signal output
connectors

Figure 2. RC Control Board circuit board

Operating Instructions

Please follow the steps below to setup the RC Control Board on the Series 1580/1585 Dynamometer:

1. Connect the RC Control Board and the S1580/1585 circuit board by using the I2C extension cable included with package. Please plug the cable to one of the Addons ports on the Series 1580/1585 circuit board.
2. Plug the ESC signal cable to the ESC connector on the RC Control Board. If you need to power your ESC by using the control board, please put the jumper on the connector being shown on the circuit. Please note that the current output limit and the voltage on the RC Control Board are 150mA and 5V respectively.
3. Download the latest version of the RCbenchmark GUI from the link below:
<https://docs.rcbenchmark.com/en/dynamometer/software/dynamometer-software-download.html>
Important: you need software **version 1.1.7 or above** to use the control board.
4. If needed, flash the new firmware to the Series 1580/1585 circuit board by following the instructions on the software.
5. Click “**Connect**” on the RCbenchmark GUI. If you see the **yellow LED** on the RC Control Board is flashing after the connection, it means the Series 1580/1585 circuit board is able to detect the RC Control Board successfully. Otherwise, please try to disconnect and connect the system again.
6. Go the “Utilities” tab on the RCbenchmark GUI to set up of the RC Control Board and control the ESC in the “Manual Control” tab. Please note that when the control board functionality is activated, the ESC control function on the Series 1580/1585 circuit board will be **disabled**. If the Automatic control is needed for your test by using the RC Control Board, please find the new RCbenchmark script API here: <https://api.rcbenchmark.com/rcbgui/v11>
7. If you encounter any issues when using the control board or have any questions regarding our products, please contact us by sending an email to info@rcbenchmark.com.

Description of the ESC Protocol

DShot

DShot is a communication protocol between the ESC and the FC (flight control). Compared to the standard PWM (1000us ~ 2000us), the DShot protocol is faster, safer, and more accurate.

DShot is a digital signal base ESC protocol, which uses different duty cycle in a PWM cycle to represent logic '0' and logic '1'. The data is transferred by package while each data package contains 16 bits data. The first 11 bits data are presenting the value to the ESC (from 0 to 2047, 2048 steps in total). The 12th bit data is the telemetry request to the ESC and the last 4 bits are the CRC checksum. For the initial signal to the ESC, the output value of the DShot must be 0. Please note that the ESC telemetry reading is not available on the RC Control Board, therefore, the 12th bit will be set to 0.

The Series 1580/1585 RC Control Board is able to support outputting the DShot150/300/600, and the speed of them is 150k bits/sec, 300k bits/sec, and 600k bits/sec respectively. **The data packet interval is 0.5ms.**

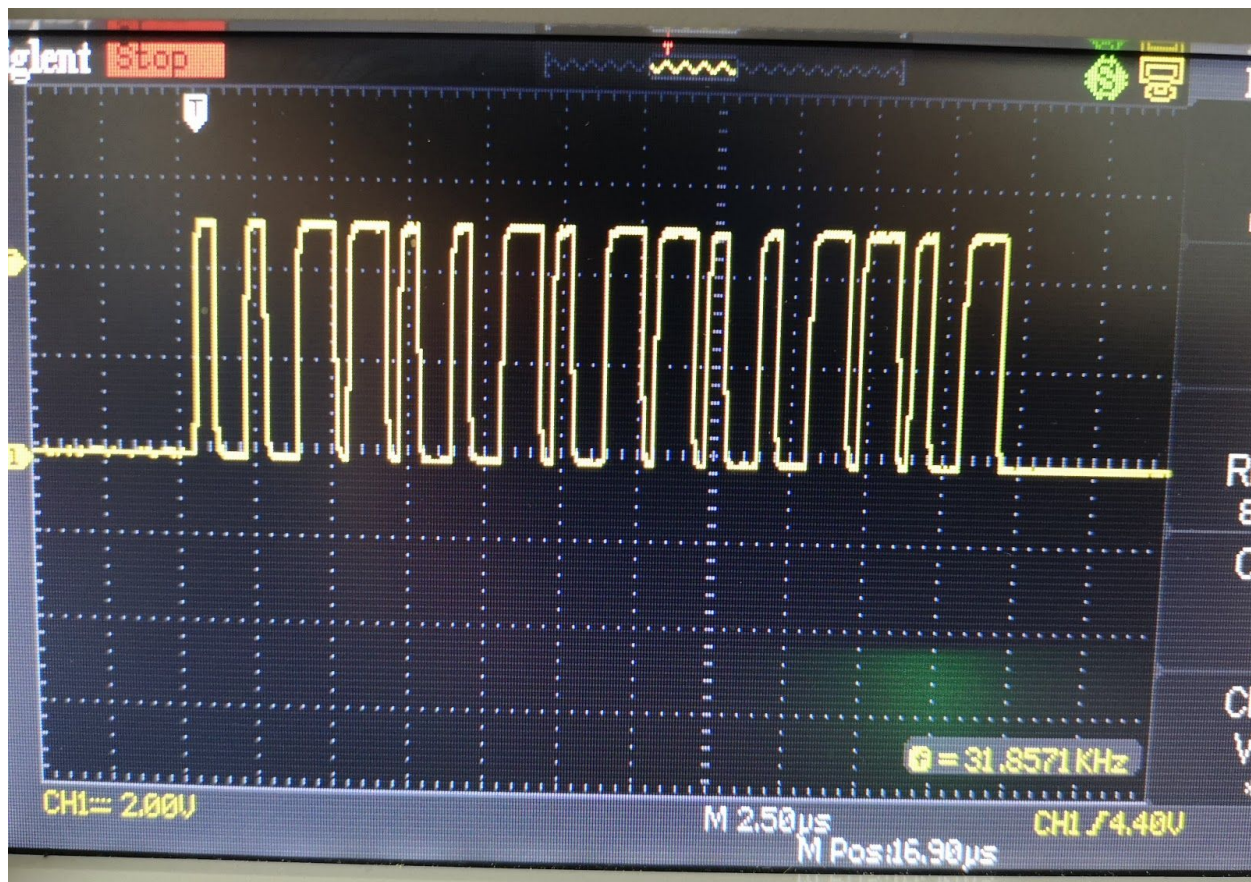


Figure 3. Waveform of the DShot

OneShot

OneShot is a fast ESC protocol. On the real application of the drone, the Oneshot signal will be generated after every PID loop on the FC (Flight Control). On the RC control board, it will send the signal out every 100us. OneShot is using the PWM value to present the ESC step value. The number on the name of Oneshot represents the minimum value of the throttle. For the OneShot42, the minimum throttle is 42us while the maximum one is 84us. For the other one, Oneshot125, minimum throttle is 125us and the maximum one is 250us. There are 1000 steps in total and the value of each step is 0.042us and 0.125us respectively.

MultiShot

Multishot is the fastest protocol in all the ESC protocol we can support on the RC control board. In comparison, Oneshot125 (125us ~ 250us) is 8 times faster than the standard PWM protocol and the Multishot is 10 times faster than Oneshot125. The value of the Multishot is from 5us to 25us, 240 steps in total.