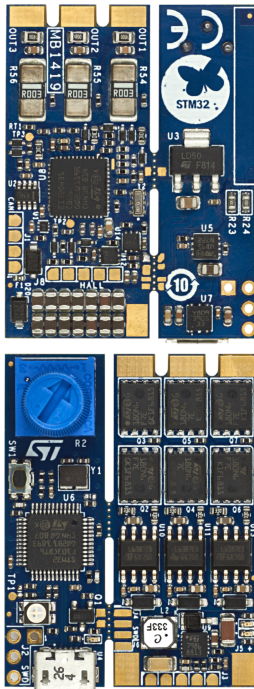


## Electronic speed controller Discovery kit for drones with STM32G431CB



Picture is not contractual.

Product status link

[B-G431B-ESC1](#)

### Features

- Full reference design for electronic speed controller capable of both sensorless FOC and 6-step algorithm
- Designed for drones with up to 6S LiPo battery pack or equivalent suitable DC supply
- 3-phase driver board for BLDC/PMSM motors with discrete N-channel 60 V, 120 A STripFET F7 power MOSFETs
- STM32G431CB Arm® Cortex®-M4 32-bit MCU, 213 DMIPS, 128 Kbytes of Flash memory, 32 Kbytes of SRAM, analog rich, math accelerator
- On-board ST-LINK/V2-1 debugger/programmer detachable from the main board
- Output peak motor current (maximum peak current tested with propeller to have an air-forced cooling): 40 A
- Designed with SMD ceramic capacitors with very low profile
- BEC available through the daughterboard (5 V for external board supply, for example a flight control board)
- Support for motor sensors (Hall or encoder)
- Supported by ST Motor Control Software Development Kit (SDK) with ST Motor profiler
- 3-shunt mode supported for motor current sensing
- L6387 High voltage high and low-side driver with integrated interlocking function
- Overcurrent and overvoltage protection feature (OCP/OVP)
- Thermal measuring and overheating protection with NTC on board
- ESC ready for communication with any standard flight control unit (FCU): PWM/CAN/UART
- Potentiometer and user button available on daughterboard
- Two user LEDs: one green LED for 3.3 V level, and one red LED configurable by the user
- Target applications: motor driving for R/C vehicles, UAV drone, electric car or boat
- PCB type and size:
  - FR-4 PCB material
  - 8-layer layout
  - Dimensions (including the daughterboard with ST-LINK part): 30 mm × 41 mm
  - Weight (including the daughterboard with ST-LINK part): 9.2 g
- RoHS compliant

### Description

The **B-G431B-ESC1** Discovery kit is based on the [STM32G431CB](#) microcontroller, the L6387 driver and STL180N6F7 power MOSFETs. It is composed of a main power board, and a daughterboard with embedded ST-LINK/V2-1. It is an electronic speed controller (ESC), designed to drive a single 3-phase brushless motor (BLDC/PMSM), performing both sensorless FOC algorithm and 6-step control with a speed regulation, and an active braking function algorithm. The ST sensorless FOC algorithm ensures longer flight times and an optimal dynamic performance. This unit accepts command signal from an external unit for driving and monitoring, for instance

a flight control board or equivalent. For this purpose, several communication bus interfaces (UART, CAN, PWM channel) are present. A potentiometer and a user button are available for user application. The daughterboard includes a 5 V battery eliminator circuit (BEC), and the main board embeds an overcurrent/overvoltage and thermal protection circuit. The form factor makes it suitable for small and very light R/C vehicles (FPV race drone) and the motor current capability fits the power requirement of big vehicles, for instance a prosumer drone.

# 1 Ordering information

To order the B-G431B-ESC1 Discovery kit, refer to [Table 1](#). For a detailed description of the board, refer to its user manual on the product web page. Additional information is available from the datasheet and reference manual of the target STM32.

**Table 1. List of available products**

Order code	Board reference	User manual	Target STM32
B-G431B-ESC1	MB1419	UM2516	STM32G431C8U6

## 1.1 Product marking

Evaluation tools marked as “ES” or “E” are not yet qualified and therefore not ready to be used as reference design or in production. Any consequences deriving from such usage will not be at ST charge. In no event, ST will be liable for any customer usage of these engineering sample tools as reference design or in production.

“E” or “ES” marking examples of location:

- On the targeted STM32 that is soldered on the board (for illustration of STM32 marking, refer to the STM32 datasheet “Package information” paragraph at the [www.st.com](http://www.st.com) website).
- Next to the evaluation tool ordering part number that is stuck or silk-screen printed on the board.

## 1.2 Codification

The meaning of the codification of the Discovery kit is explained in [Table 2](#).

**Table 2. Codification explanation**

B-XXYYZ-ESCN	Description	Example: B-G431B-ESC1
XX	MCU series in STM32 32-bit Arm Cortex MCUs	STM32G4 Series
YY	MCU product line in the series	STM32G431
Z	STM32 Flash memory size: • B for 128 Kbytes	128 Kbytes
ESCN	Electronic speed controller version number	ESC1

The order code is mentioned on a sticker placed on the top side of the board.

## 2 Development environment

The B-G431B-ESC1 runs with the STM32G431CB 32-bit microcontroller based on the Arm® Cortex®-M4 core.

*Note:* Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.



### 2.1 System requirements

- Windows® OS (7, 8 and 10), Linux® 64-bit, or macOS®
- USB Type-A to Micro-B cable

*Note:* macOS® is a trademark of Apple Inc. registered in the U.S. and other countries.

### 2.2 Development toolchains

- Keil® MDK-ARM (see [note](#))
- IAR™ EWARM (see [note](#))
- GCC-based IDEs

*Note:* On Windows® only.

## Revision history

**Table 3. Document revision history**

Date	Version	Changes
5-Apr-2019	1	Initial release.