1 Features

- ESP32-C3 microcontroller with integrated 2.4 GHz Wi-Fi and Bluetooth Low Energy (BLE) for wireless configuration and real-time monitoring.
- Preloaded with VESC Express firmware for seamless integration with VESC controllers, supporting telemetry, diagnostics, and wireless firmware updates.
- 4 GB onboard flash memory for high-capacity data logging, enabling extended ride telemetry and performance analysis without external storage.
- CAN-bus interface for reliable, high-speed communication between multiple devices such as motor controllers, BMS units, and other CAN-enabled peripherals.
- Wide input voltage range from 3 V to 15 V for compatibility with various power sources including batteries and regulated supplies.
- GNSS interface compatible with GPS/GNSS modules for location tracking, also usable as a general-purpose UART port for custom peripherals or debugging.
- Can be powered directly from USB for convenience during configuration, development, and bench testing.
- Compact form factor measuring only 23 mm × 25 mm and lightweight at just 4.3 g, ideal for applications where space and weight are critical.

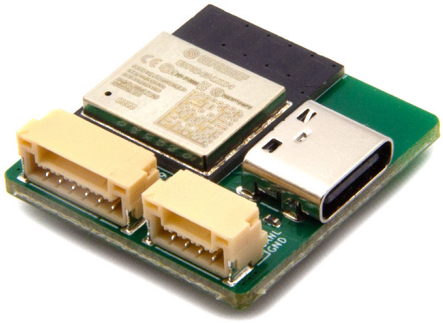

Figure 1: VESC Nanolog

2 Description

The VESC Nanolog features a 4GB built-in memory chip for reliable data logging when connected via CAN bus. Powered by an ESP32-C3 microcontroller, it offers Bluetooth and Wi-Fi connectivity for wireless data transfer and monitoring.

For enhanced functionality, you can add GPS/GNSS through the UART port for accurate location tracking. The Nanolog supports power input via USB-C or 3–15V, providing flexible options for integration.

All of this is packed into a compact 23 × 25 mm footprint and weighs just 4.3 grams, making it an incredibly lightweight and versatile solution.

3 Specifications

3.1 Typical Operating Characteristics

Parameter	Min	Max	Unit
Input Voltage	3.0	15.0	V
Memory		4	GB

3.2 Recommended Operating Conditions

Parameter	Min	Max	Unit
Operating Temperature	-40	85	°C
Humidity		Non-condensing	-

3.3 Physical Properties

Parameter	Value	Unit
Length	24.5	mm
Width	23	mm
Height	7.2	mm
Mass	4.3	g

4 Pinout and Wiring

4.1 Pin Descriptions

Pin Name	Description
UART (JST-GH 6 Pin)	
IO4	GPIO / ADC
3v3	3.3V
TX	Transmit
RX	Receive
GND	Ground Reference Pin
IO9	Bootloader / GPIO
Power & CAN (JST-GH 4 Pin)	
3V-15V	3V-15V input
CAN H	CAN High
CAN L	CAN Low
GND	Ground Reference Pin

4.2 Wiring Diagram

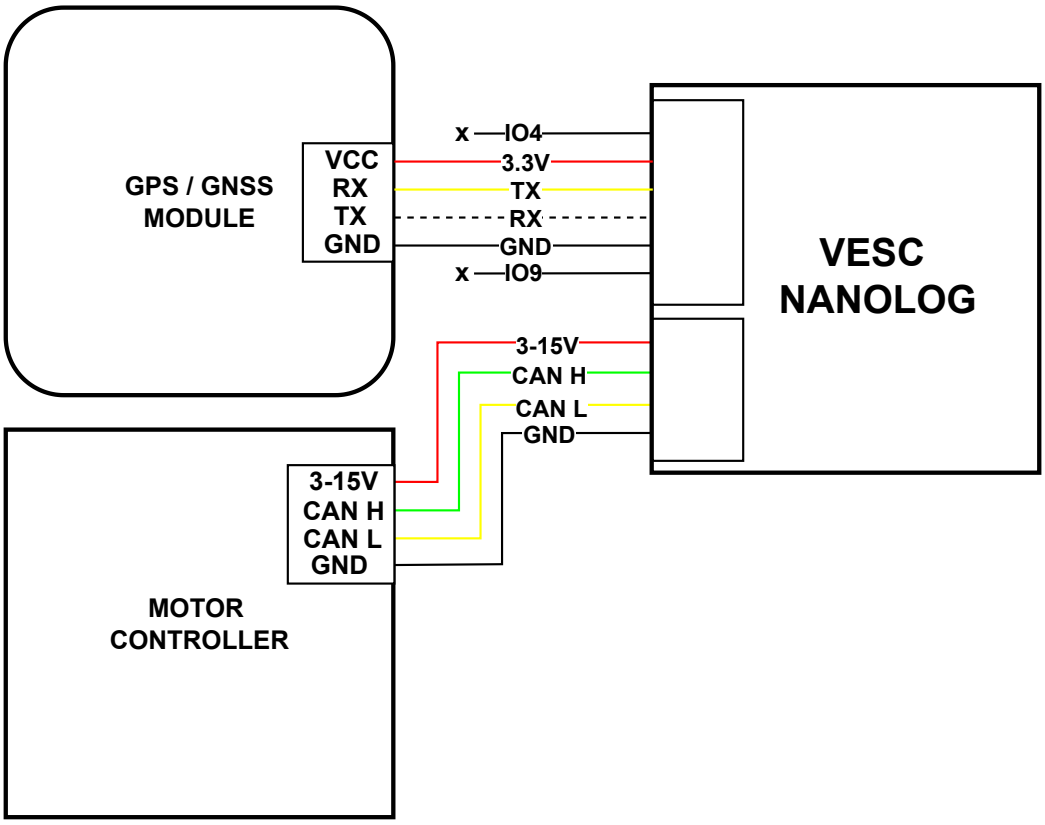

Figure 2: Composite image of the VESC Nanolog wired to GPS/GNSS module and motor controller

5 Device Installation

5.1 Installation Warnings

- **Installation must be performed by qualified personnel** with experience in high-voltage battery systems and VESC-based motor controllers.
- **Read and fully understand all instructions, datasheets, and safety warnings** before beginning installation.
- **Gather all necessary tools and materials** including the device, wiring harnesses, connectors, insulation materials, and personal protective equipment.
- **Ensure the motor controller and motor system are prepared and properly arranged** with correct wiring paths and secure mounting.
- **Securely mount the device using threadlock** in a location protected from vibration, moisture, dust, and direct heat sources.
- **Do not install the device in locations exposed to water, condensation, or flammable materials.**
- **Install motor temperature sensors as required,** in order for the motor protection to ramp down the current smoothly when the motor is about to overheat.
- **Only use manufacturer-specified connectors and cables** to ensure safe and reliable connections.
- **Verify correct polarity for all connections.** Incorrect wiring can cause irreversible damage to the device, battery pack, or connected equipment. **Double-check the wiring diagram before proceeding.**
- **Insulate all exposed terminals and wiring** to prevent accidental short circuits or electric shock.
- **Keep metal objects and tools away from the device and power terminals during installation** to avoid accidental bridging of electrical contacts.
- **Tidy up and secure all cables** with cable ties or routing guides to prevent movement and wear.
- **Do not drill, cut, or modify the device enclosure or circuit board.** Unauthorized modifications may void the warranty and compromise safety or functionality.
- **Double-check all connections and wiring against the provided diagrams** before applying power to the system.
- **When powering up the system for the first time, do so in a controlled environment with appropriate protective equipment.** Be prepared to disconnect power immediately if any abnormal behaviour is observed.

5.2 Mechanical Dimensions

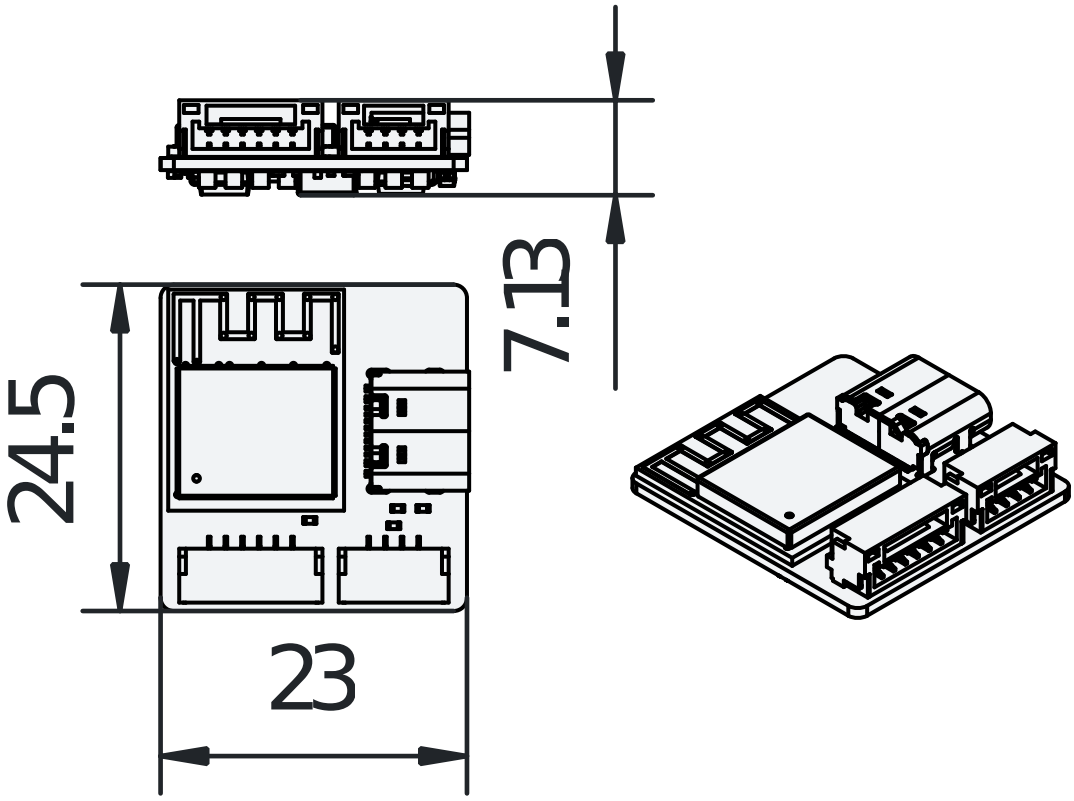

Figure 3: VESC Nanolog Dimensions shown in mm.

6 Configuring the Device

6.1 Configuration Warnings

- **Double-check all wiring connections** before powering on the device. Incorrect wiring can cause damage to the device, battery cells, any connected devices or pose a fire risk.
- **Always install the latest version of VESC Tool from the official website** to ensure compatibility with your hardware and access to the newest features, bug fixes, and safety updates. Download the installer from *vesc-project.com/vesc_tool* and follow the on-screen instructions. After installation, update your device firmware if prompted to ensure optimal performance.
- **Do not exceed the recommended voltage limits** for this device, your specific battery or motor system. Setting incorrect voltage thresholds can result in overvoltage errors or undervoltage cutoffs, potentially damaging the system.
- **Do not exceed the recommended current limits** for this device, your specific battery or motor system. Setting incorrect current thresholds can result in overheating or excessive stress on components, which may lead to failure or dangerous conditions.
- **Ensure the motor and any moving parts connected to it are free from obstruction and lifted off the ground before powering on the device.** This prevents unexpected movement that could cause injury, damage, or interference with calibration and configuration procedures
- **Avoid configuring the device in wet or humid environments.** Moisture can cause short circuits and damage sensitive electronic components.
- **If you are unsure about any configuration step, consult the datasheet or seek professional assistance.** Improper configuration can void warranties and lead to hazardous conditions.
- **Wear appropriate personal protective equipment (PPE),** such as safety glasses and gloves, when working with high-voltage systems.

6.2 Connecting the VESC Nanolog to VESC Tool

Once the VESC Nanolog has been wired to the controller, it can be connected to VESC Tool via USB, Wi-Fi, Bluetooth, or CAN. For instructions on how to connect with and navigate VESC Tool please visit: `https://www.vesclabs.com/category/getting-started/`

1. Connect the **"VESC Nanolog"** to VESC Tool using one of the mentioned methods.

6.3 Installing the LogUI Package on your Controller

1. Ensure the **controller** which you want to install the logging package on has been selected from the list of CAN devices.
2. Navigate to the **"VESC Packages"** section from the menu on the left of the screen on desktop, or by swiping across the screen on a mobile device.
3. Press the **"Update Archive"** button see an updated list of applications.
4. Select the **"LogUI"** package from the list of applications.
5. Press the **"Install"** button to install the package onto the controller.
6. Once installed you should see a pop up window confirming the package has been installed.

6.4 Configuring Logging

1. Navigate to the **"Welcome & Wizards"** section from the menu on the left of the screen on desktop, or by swiping across the screen on a mobile device.
2. A window should appear asking **"Do you want to load this custom user interface?"**, then select **"YES"**.
3. After the UI has loaded, **check the box(s) of the values you wish to log**, then press **"START"** to enable logging.

Please note that logging upon system start, incorporating GPS/GNSS position data will only start once a sufficient number of satellites are found.
For further information regarding the LogUI package, navigate back to VESC Packages and select LogUI.

6.5 Viewing the Logs

Please note that logs can currently only be opened on the desktop version of VESC Tool (Windows/Linux/macOS)

1. Select **"VESC Nanolog"** from the list of CAN Devices.
2. Navigate to the **"Log Analysis"** section from the menu on the left of the screen.
3. Select the **"Source"** and **"Connected Devices"** tabs from the top of the screen.
4. Press the **"Refresh"** button and a folder called **"log_can"** should appear.
5. Select the file which you want to open from the list.
   If you have recorded GPS/GNSS data plot points will show on the map where the data was recorded.
6. Once the files have loaded click on the **"Data"** tab to view.
7. Click on the value(s) for it to be viewed.
8. Click on the graph to move a slider and accurately read the data at each plot point.
9. If GPS/GNSS data was recorded the plot points will move with this slider to show you exactly where the piece of data you are viewing was recorded.

6.6 Configuring Wi-Fi

The Wi-Fi on the VESC Nanolog has 2 modes, **"Station Mode"** and **"Access Point"**.

1. Navigate to the **"VESC Express"** section from the menu on the left of the screen on desktop, or by swiping across the screen on a mobile device.
2. Select the **"WiFi"** tab at the top screen.

Station Mode will connect to your router at home so you access through any device with the VESC-Tool connected to the same WLAN/LAN.

1. Change the **"WiFi Mode"** to **"Station Mode"**
2. Enter your **"Router SSID"** and **"Wi-Fi password"**, these are usually found on a sticker on the router.
3. Press the **"Write"** button to save the settings.

Access Point will generate a Wi-Fi Hotspot you can connect to.

1. Change the **"WiFi Mode"** to **"Access Point"**
2. Enter a **"SSID"** and a **"Password"** of your choice.
3. Press the **"Write"** button to save the settings.

7 Product Warranty

7.1 Warranty Coverage

Please find the warranty information regarding VESC Labs products using the following link:
`https://www.vesclabs.com/warranty-and-returns-policy/`

8 Compliance & Regulatory Information

8.1 CE Marking

This product meets the requirements of all applicable EU directives and regulations and complies with the essential health, safety, and environmental protection requirements as set out in relevant legislation. It is CE marked in accordance with:

- **Directive 2014/30/EU** – Electromagnetic Compatibility (EMC)
- **Directive 2014/35/EU** – Low Voltage Directive (LVD)
- **Directive 2011/65/EU** – Restriction of Hazardous Substances (RoHS)

8.2 UKCA Marking

This product is compliant with UK regulations and bears the UKCA marking, confirming its conformity with the applicable statutory requirements in Great Britain. It meets the relevant provisions of:

- Electrical Equipment (Safety) Regulations 2016
- Electromagnetic Compatibility Regulations 2016
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

8.3 WEEE Directive (2012/19/EU)

This product is compliant with the Waste Electrical and Electronic Equipment (WEEE) Directive. It should not be disposed of with unsorted municipal waste and must be collected separately for proper treatment and recycling. Please contact your local distributor or relevant waste authority for information on recycling options and collection facilities.