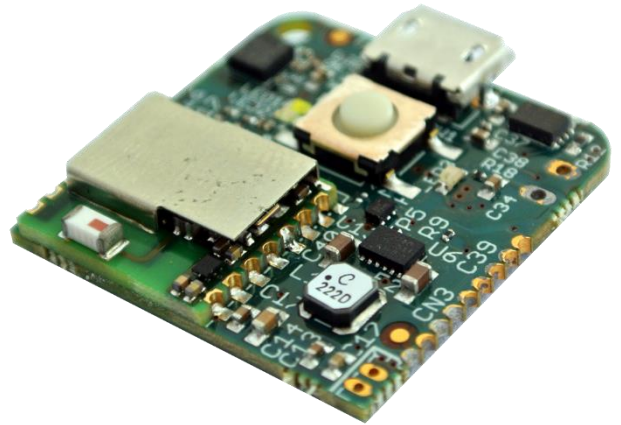


---

## APPLICATIONS

- Inertial Measurement Unit (IMU)
- Attitude and Heading Reference System (AHRS)
- Acceleration, angular rate and motion tracking
- Magnetic fields measurement surrounding the device
- Sports applications
- Vibration monitoring and compensation
- Drones, robotics, high-precision systems



---

## PRODUCT FEATURES

- Digital 3-axis Gyroscope (up to  $\pm 4000$  dps)
- Digital 3-axis Accelerometer (up to  $\pm 16g$ )
- Digital 3-axis Magnetometer (up to  $\pm 12G$ )
- Real-Time Clock (32768 kHz SMD low profile crystal, frequency tolerance 10 ppm)
- 32-bit Microprocessor ARM<sup>®</sup> Cortex<sup>®</sup>-M4-based
- On board NOR flash storage
- USB 2.0 micro, type B
- Bluetooth 3.0 qualified dual mode module
- Rechargeable battery
- Selectable device configurations, output formats and sample rates for data

---

## GENERAL DESCRIPTION

MUSE is a low-power, miniaturized, wireless Inertial Measurement Unit, incorporating state-of-the-art sensing technology. MUSE integrates complementary types of sensors to offer more compact, robust and easy-to-use and assemble solutions compared to discrete MEMS products.

MUSE module combine gyroscope, accelerometer and magnetometer into 6-axis or 9-axis solution. It integrates also an High-Dynamic Range acceleration sensor. With flash storage on board, wireless connectivity (i.e., Bluetooth 3.0), automated power on/off functions and regulated rechargeable power, MUSE is a versatile system for data acquisition in a multipurpose fashion.

MUSE runs a proprietary embedded sensor fusion algorithm capable to estimate the orientation of the device in 3D space. The integration of multiple sensor outputs bring motion sensing systems as well as the selectable IMU (6-DOFs) or AHRS (9-DOFs) solution to the level of accuracy required for the most demanding applications, such as enhanced gesture recognition, gaming and augmented reality.

---

221e srl

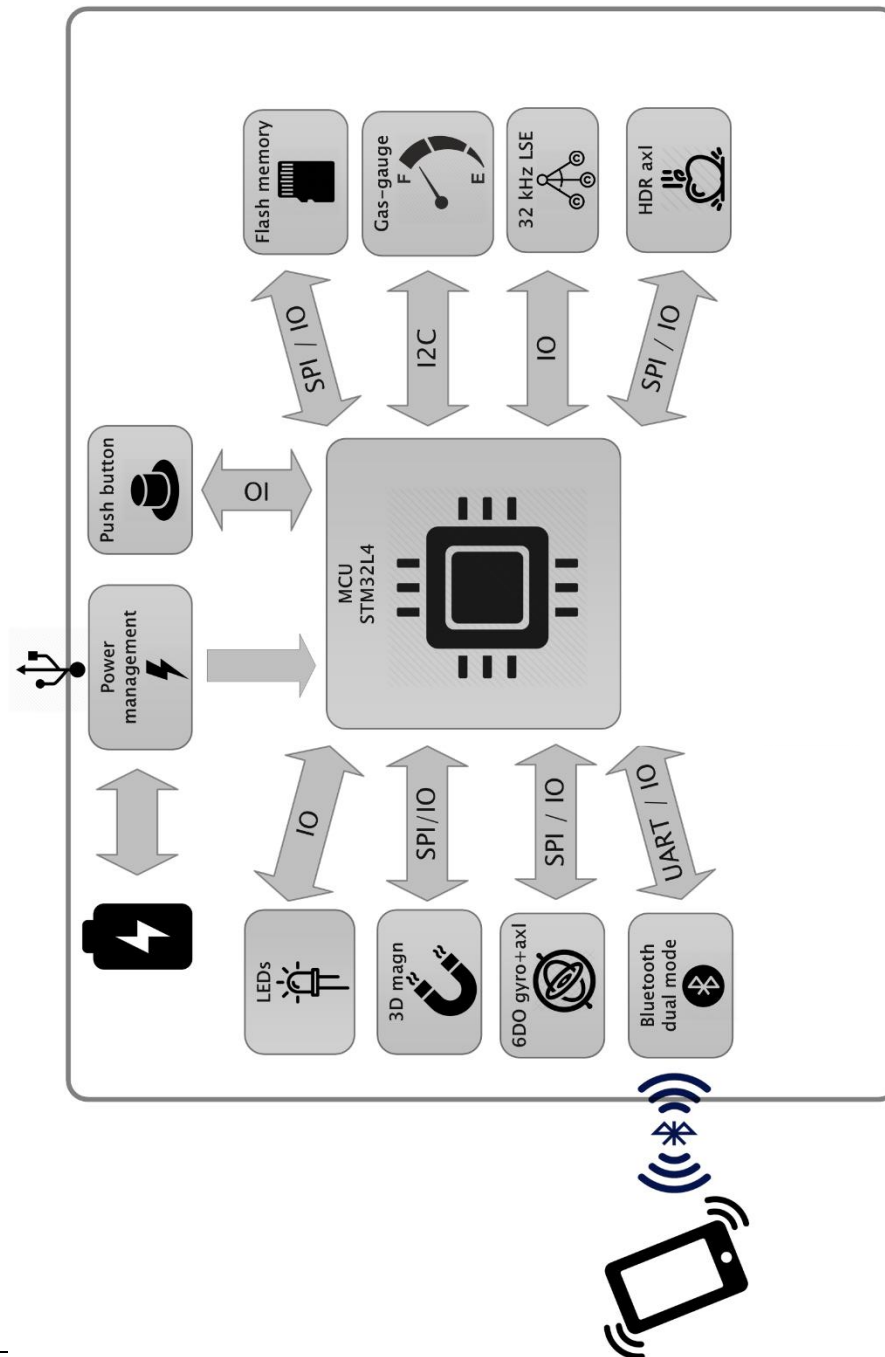
Via C. Battisti 43  
35020 Albignasego (PD) - ITALY

VAT IT 04694180284

221e.com - info@221e.com



## FUNCTIONAL BLOCK DIAGRAM<sup>1</sup>



<sup>1</sup> It is possible to ask for a Bluetooth Classic 3.0 version as well as a Bluetooth Low Energy 4.0 of the same device.

---

## SPECIFICATIONS

### Recommended Operating Conditions

Operating Temperature<sup>2</sup> -20 °C / +60 °C

### Electrical Specifications

Power supply type Rechargeable Lithium Polymer Battery

Model LP382024

Rated Voltage 3.7 V

Rated Capacity 165 mAh

Operating Temperature Charge: 0°C / 45°C

Discharge: -20 °C / +60 °C

### Connectivity Information

Embedded Bluetooth 3.0 qualified module (CE, FCC, IC, KCC, MIC and Anatel certified). Internal ceramic antenna. Master and slave mode support. Operating Temperature: -40 °C / +85 °C.

Micro USB 2.0, type B. The USB connector on the board is used to supply power (i.e., battery charging).

### Package Information and Dimensions

Electronic dimensions 25L x 25W x 4H mm

Electronic weight 3.3 gr

A viable casing (dimension 42L x 28W x 11.5H mm; weight 15 gr – including battery and case) is also available providing housing for the PCB and battery, featuring two lateral mounting brackets, as depicted in Figura 1.



---

<sup>2</sup> The operating temperature range is limited by the adopted rechargeable battery. The board components can correctly operate in the range -30°C / +85 °C.

## MICROPROCESSOR

<b>Architecture</b>	Arm® 32-bit Cortex®-M4 CPU with FPU 32-bit RISC processor, with adaptive real-time accelerator, MPU, 100 DMIPS and DSP instructions
<b>Frequency</b>	Up to 100 MHz
<b>Memories</b>	128 KB of system SRAM
<b>Temperature</b>	-40°C / +125°C

## GYROSCOPE

<b>Measurement Range</b>	±500 / ±1000 / ±2000 / ±4000 dps
<b>Temperature Range</b>	-40°C / +85°C
<b>Zero-rate Offset*</b>	±30 dps

\* within the operating temperature range

## ACCELEROMETER

<b>Measurement Range</b>	±2 / ±4 / ±6 / ±8 / ±16 g
<b>Temperature Range</b>	-40°C / +85°C
<b>Zero-rate Offset*</b>	±90 mg

\* within the operating temperature range

## HIGH-DYNAMIC RANGE (HDR) ACCELEROMETER

<b>Measurement Range</b>	±100 / ±200 / ±400 g
<b>Temperature Range</b>	-40°C / +85°C
<b>Zero-rate Offset*</b>	±1 g

\* within the operating temperature range. It can be eliminated by enabling the built-in high-pass filter.

## MAGNETOMETER

<b>Measurement Range</b>	±4 / ±8 / ±12 Gauss
<b>Temperature Range</b>	-40°C / +85°C
<b>Zero-rate Offset*</b>	±1 Gauss

\* within the operating temperature range



---

**WARNING**

DEVICE FOR PROFESSIONAL USE.

It is NOT a medical device.

The device must be used EXCLUSIVELY FOR EXTERNAL USE. THE MEMBRANE MUST NOT BE SWALLOWED.

Do NOT try to open or disassemble.

Do NOT place the device near thermal heat sources.

Do NOT expose the device to any type of flammable substance or substances which could cause a combustion or corrosion processes.

MUSE uses a rechargeable lithium-polymer battery and includes circuitry for both thermal and electrical protections against over-voltage and over-current conditions. As with any lithium-polymer battery-powered device, the following should be observed:

- Do not disassemble, crush, puncture, shred the battery;
- Do not let the battery to get in contact with water or other liquids;
- Do not short the battery contacts to metal objects;
- Do not place the battery near thermal heat sources.

Magnetic distortions or interference (e.g., proximity to metal objects or electromagnetic fields) can affect the accuracy of the heading estimation. It is recommended to perform a preliminary calibration of the device before application.

---

221e srl

Via C. Battisti 43  
35020 Albignasego (PD) - ITALY

VAT IT 04694180284

221e.com - [info@221e.com](mailto:info@221e.com)



---

### CONTACT INFORMATION

For the latest specifications, additional product information, worldwide sales and distribution locations, as well as information about 221e:

**Web:** [www.221e.com](http://www.221e.com)

**Email:** [info@221e.it](mailto:info@221e.it)

**Tel.** +39 049 501 3451

For technical questions and application information:

**Email:** [support@221e.com](mailto:support@221e.com)

---

### ORDERING INFORMATION

Serial Number	Description
221e-03b1Av2x-xxxxxx-xxxxxx	03b1Av2x – MultiSensor low power, wireless IMU

---

### IMPORTANT NOTICE

The information contained herein is believed to be reliable. 221e makes no warranties regarding the information contained herein. 221e assumes no responsibility or liability whatsoever for any of the information contained herein. 221e assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for 221e products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information. 221e products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

---

221e srl

Via C. Battisti 43  
35020 Albignasego (PD) - ITALY

VAT IT 04694180284

221e.com - [info@221e.com](mailto:info@221e.com)

