



APPLICATION

- Inertial Measurement Unit (IMU)
- Attitude Heading Reference System (AHRS)
- Motion Tracking and Analysis
- Quantitative Assessment of Motion

PRODUCT FEATURES

- Digital 3-axis Accelerometer
- Digital 3-axis Gyroscope
- Digital 3-axis Magnetometer
- High Resolution Barometric Pressure Sensor
- Temperature Sensor
- Real-Time Clock
- 32-bit Microprocessor ARM® Cortex®-M4-based
- On Board Flash Storage
- USB 2.0 micro, Type B
- Bluetooth Classic and Low Energy
- Rechargeable Battery
- Qi Wireless Charging

GENERAL DESCRIPTION

MuSe is a low-power, miniaturized, wireless IMU, incorporating state-of-the-art sensing technology. With Flash storage on board, wireless connectivity (Bluetooth), automated power on/off functions and regulated rechargeable power, MuSe is a versatile system for data acquisition in a multipurpose fashion. MuSe runs an embedded Extended Kalman Filter based sensor fusion algorithm capable to estimate the attitude and heading of the device in 3D space. The AHRS algorithm is based on the input streamed by the accelerometer, the gyroscope and the magnetometer, for a 9 Degrees Of Freedom (DOFs) measurement (i.e., yaw, pitch and roll).

TECHNICAL SPECIFICATIONS

MICROPROCESSOR

Architecture	ARM® 32-bit Cortex®-M4 CPU with FPU and DSP instructions
Max Frequency	100 MHz
Memory Size	512 Kbytes
RAM	128 Kbytes

SENSORS

ACCELEROMETER	
Measurement range	±2/±4/±6/±8/±16 g dynamically selectable full scale
Temperature range	-40 to +85 °C
Zero-g Offset	±90 mg

HIGH-G ACCELEROMETER	
Measurement range	±100/±200/±400 g dynamically selectable full scale
Temperature range	-40 to +85 °C
Zero-g Offset	±1 g

GYROSCOPE	
Measurement range	±500/±1000/±2000/±4000 dps dynamically selectable full scale
Temperature range	-40 to +85 °C
Zero-rate Offset	±30 dps

MAGNETOMETER	
Measurement range	±4/±8/±12 G dynamically selectable full scale
Temperature range	-40 to +85 °C
Zero-Gauss Offset	±1 G

BAROMETER	
Measurement range	from 260 to 1260 hPa
Temperature range	-30 to +105 °C
Pressure noise	0.01 – 0.03 hPa RMS

THERMOMETER	
Accuracy	±2 °C (T = 0 ~ +65 °C)

CONNECTIVITY

USB (for battery charging purposes only)	
Standard	USB 2.0
Connector	Micro USB, Type B

BLUETOOTH DUAL MODE	
Standard	Classic Bluetooth V3.0 or Bluetooth 4.1 Low Energy
Transmission rate	Up to 1.5 Mbps
Temperature range	-40 to +85 °C
Multipoint	Implementation dependent
Compliance	CE qualified – FCC, IC modular approval certified – BQE qualified

POWER

POWER SUPPLY	
Type	Li-Poly rechargeable
Capacity	165 mAh

POWER CONSUMPTION	
Idle	6 mAh
Streaming @ 100 Hz	35 mAh
Logging @ 100 Hz	10 mAh

BOARD FORM FACTOR

- Electronics Physical dimensions: 25L x 25W x 4H mm
- Electronics Weight: 3.3 gr

CASING FORM FACTOR

A viable casing is available providing housing for the PCB and the 165mAh battery, and featuring two lateral mounting brackets (as depicted in the figure below).

- Dimensions with battery and casing: 42L x 28W x 11.5 mm
- Weight with battery and casing: 15 gr



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WARNING

- Magnetic distortions or interference (e.g., proximity to metal objects or electromagnetic fields) can affect the accuracy of the heading estimation. Therefore, it is recommended to perform a preliminary calibration in order to adapt the algorithm coefficients to the environmental conditions of use.
- 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.

PRODUCT COMPLIANCE INFORMATION

- MuSe system uses a Right-Handed Coordinate System. Each rotation is clockwise positive with respect to the relative outgoing axis. The axes direction with respect to the system are indicated on the device.
- MuSe is calibrated at the 221e srl facility in order to compensate MEMS inertial sensors non-idealities such as bias, scale factor, and axes misalignments. The calibration parameters can be modified by the user via the supplied UI.

CONTACT INFORMATION

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