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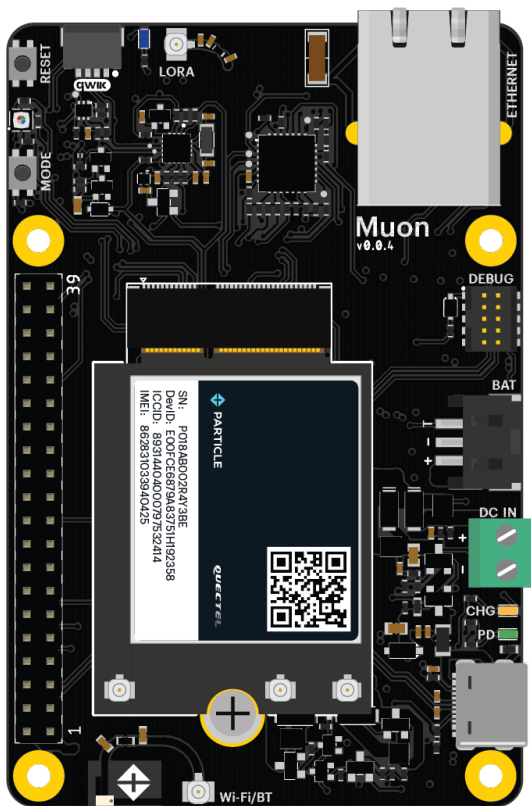
# Muon datasheet

This is a preliminary overview of the Muon. A full datasheet will be released at a later date.

# Overview

The Muon is a developer kit based on the M-SoM with additional peripherals for easy prototyping.

- LoRaWAN module (Quectel KG200Z, 862 – 928 MHz)
- Expansion connector
- Temperature sensor (TMP112A)
- Real-time clock and watchdog chip (AM1805)
- Ethernet (WIZnet W5500)
- Reset and mode buttons
- RGB status LED
- Power input options
  - USB-C
  - VIN (6-12 VDC)
  - LiPo battery with temperature sensor (3-pin JST-PH)



## M-SOM

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The Muon contains a Particle M-SoM that the following functional units:

- M.2 SoM form-factor, like the B-Series SoM
- Can use cellular or Wi-Fi (2.4 GHz or 5 GHz) for the cloud connection
- Realtek RTL8722DM MCU (BLE and Wi-Fi)
- Cellular modem
  - M404: Quectel BG95-M5 LTE Cat M1/2G (Global)
  - M524: Quectel EG91-EX LTE Cat 1 with 2G/3G fallback (EMEA)
  - M635: Quectel BG95-S5 LTE Cat M1/2G (Global with satellite)

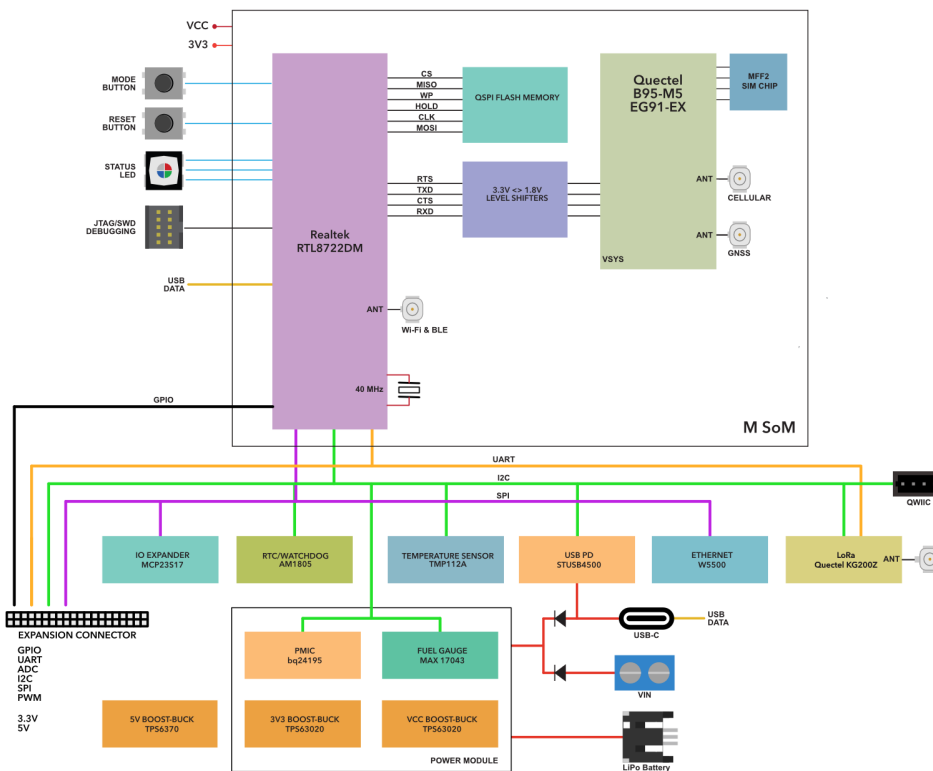
The M404 is fully supported in the United States, Canada, and Mexico. It is in beta testing in other locations. See the [carrier list](#) for country compatibility information.

## MCU

The Realtek RTL8722DM is in the same family as the P2 and Photon 2 modules (RTL8721DM), but has additional GPIO.

- 802.11a/b/g/n Wi-Fi, 2.4 GHz and 5 GHz
  - U.FL connector for external antenna
- BLE 5 using same antenna as Wi-Fi
- Realtek RTL8722DM MCU
  - ARM Cortex M33 CPU, 200 MHz
- 2048 KB (2 MB) user application maximum size
- 3072 KB (3 MB) of RAM available to user applications
- 8 MB flash file system
- FCC (United States), ISED (Canada), and CE (European Union) certified

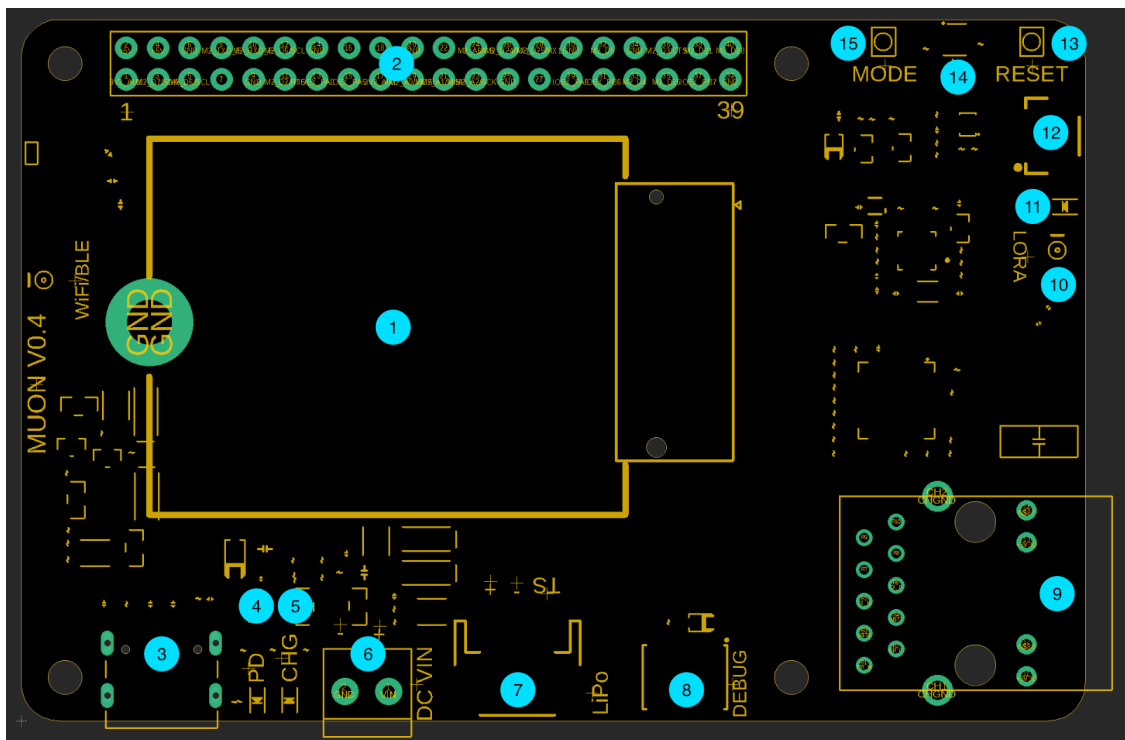
## BLOCK DIAGRAM



## DEVICE FAMILIES

	Cellular Only	Cellular & Wi-Fi	Wi-Fi Only
Developer devices	Boron	Muon	Photon 2
Production module	B-SoM	M-SoM	P2

## FEATURES

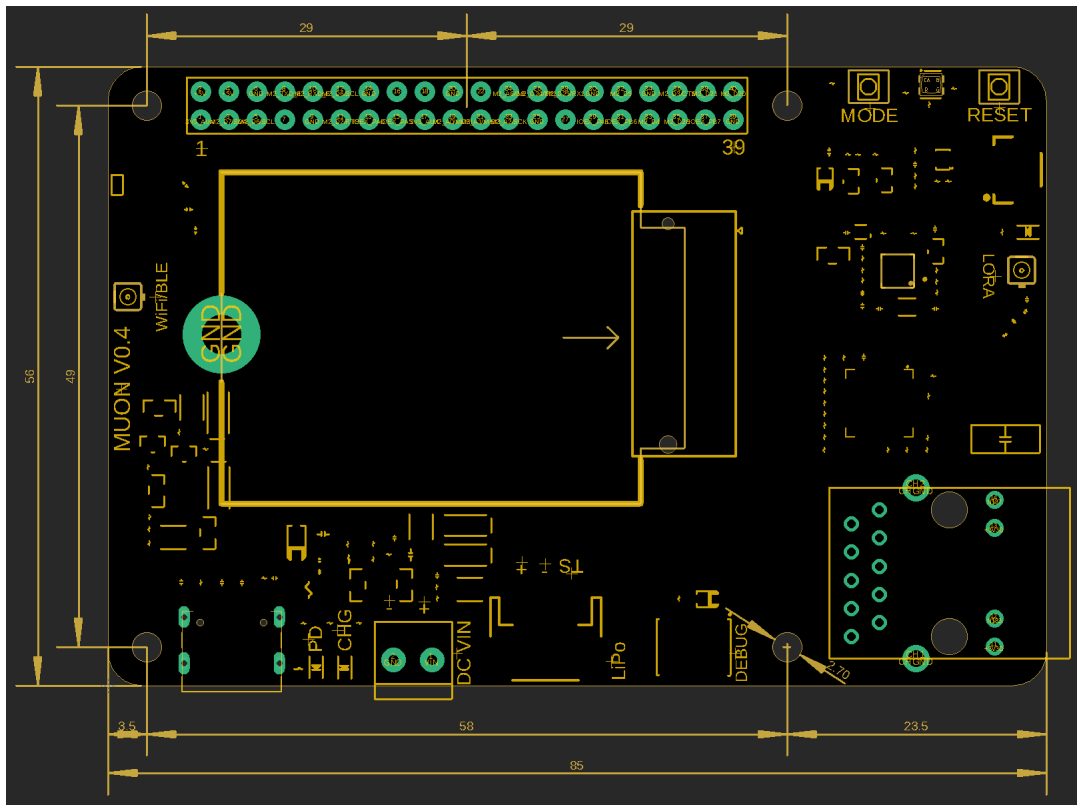


#### Label Feature

1	M SoM
2	Expansion connector
3	USB-C
4	USB Power LED ("PD")
5	Charge LED ("CHG")
6	VIN (6-12 VDC)
7	LiPo battery connector (3-pin)
8	SWD/JTAG debugging connector
9	Ethernet RJ-45 connector
10	LoRaWAN antenna
11	LoRaWAN status LED
12	QWIIC (3.3V I2C) connector
13	RESET button
14	RGB status LED
15	MODE button

#### DIMENSIONS

Overall dimensions are 56mm x 85mm (2.2" x 3.35").



Dimensions in millimeters (mm)

## EXPANSION CONNECTOR

The Muon has a 40-pin (2x20) male header pin expansion connector on the top of the board, allowing the use of many Raspberry Pi-compatible "hat" expansion cards that sit on top of the Muon.

The expansion connector includes:

- GPIO
- I2C
- SPI
- UART serial
- PWM (pulse-width modulation)
- 3.3V power
- 5V power

All GPIO and ports are 3.3V only and are not 5V tolerant.

## POWER

Power can be supplied to Muon by:

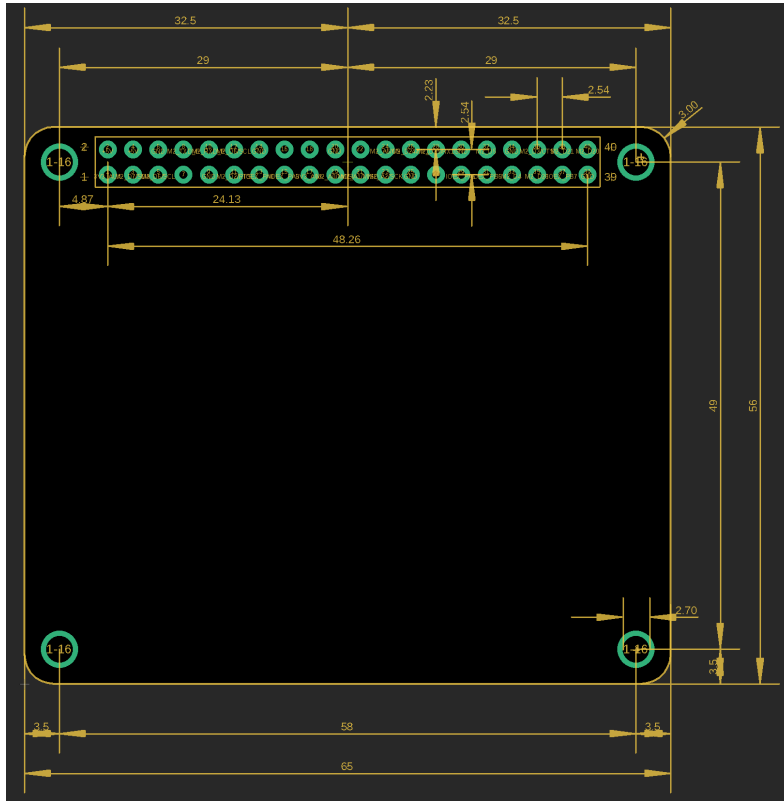
- USB-C
- VIN (6 - 12 VDC, via screw terminals)
- LiPo battery (via 3-pin JST battery connector)

## Expansion card

The Muon can be expanded in several ways:

- Qwiic or Stemma-QT I2C peripherals
- Dupont wires or ribbon cables to a solderless breadboard
- A custom expansion card that sits on top of the Muon

## CUSTOM EXPANSION CARDS



Dimensions in millimeters (mm)

The expansion card is intended to be 65mm x 56mm and connects to the Muon using a 40-pin female socket (0.1" pitch, 2x20). The expansion card has a female socket on the bottom that mates with the male header pins on the top of the Muon. It's a "hat" configuration.

The sample design uses a PTH (through-hole) female socket for strength and to make it easier to assemble with SMD components on the top of the expansion card, but you can use a SMD header reflowed to bottom instead if you prefer.

## Ordering information

SKU	Description	Region	Modem	EtherSIM	Lifecycle	Replacement
MUON404EA	Muon LTE-M/2G Kit (Global, EtherSIM), [x1]	Global	BG95-M5	✓	In development	
MUON404KIT	Muon LTE M1/2G Kit (Global, EtherSIM), [x1]	Global	BG95-M5	✓	In development	
MUON524EA	Muon LTE CAT1/3G/2G Kit (Europe, EtherSIM), [x1]	Global	EG91-EX	✓	In development	
MUON524KIT	Muon LTE CAT1/3G/2G Kit (Europe, EtherSIM), [x1]	Global	EG91-EX	✓	In development	
MUON635EA	Muon LTE M1/2G/Satellite Kit (Global, EtherSIM), [x1]	Global	BG95-S5	✓	In development	
MUON635KIT	Muon LTE M1/2G/Satellite Kit (Global, EtherSIM), [x1]	Global	BG95-S5	✓	In development	

- EMEAA: Selected countries in Europe, Middle East, Africa, and Asia, including Australia and New Zealand. See the [cellular carrier list](#) for more information.