

# Osmium MIMU4X4C & BMBT4444 Specifications

---

## Revision 1.1

**R&D Centre:**

**GT Silicon Pvt Ltd**

D210, Type 1, SIIC Extension,

IIT Kanpur

Kanpur (UP), India, PIN – 208016

Tel: +91 512 259 5333

Fax: +91 512 259 6177

Email: [info@gt-silicon.com](mailto:info@gt-silicon.com)

URL: [www.gt-silicon.com](http://www.gt-silicon.com)

© 2015, GT Silicon Pvt Ltd, Kanpur, India



## Revision History

Revision	Revision Date	Updates
1.0	05 Dec 2014	Initial version
1.1	10 Sep 2015	Updated MIMU4X4C's description.



## Purpose & Scope

This document describes the data processing flow in Osmium MIMU22BT and Osmium MIMU4444. It also describes communication protocol using which one can access and control the data and the processing at various stages, through an external application platform.

Please refer Openshoe embedded code and Matlab interfacing codes for better understanding.

Please refer for architecture, design and algorithm details: **John-Olof Nilsson, Amit K Gupta, Peter Handel, "Foot mounted inertial navigation made easy", In Proc Indoor Positioning & Indoor Navigation (IPIN), Busan, Korea, 2014.**

Please refer following documents also for specific details:

1. [MPU-9150 Register Map and Descriptions Revision 4.2](#)
2. [MPU-9150 Product Specification Revision 4.3](#)
3. [32-bit AVR Microcontorller Specification](#)

## MIMU4X4C

*MIMU4X4C = MIMU4444 + 10 pin Connector*

The **Osmium MIMU4X4C** is a variant of massive inertial sensory array module MIMU4444, with a 10-pins connector. The connector allows access to one set each of UART and SPI IOs of the micro-controller. The connector also allows access to power IOs. This arrangement allows integration of hardware accessories like Bluetooth, Memory card etc. in form of extension board (or shield) with the sensor array module. Access to power IOs enables integration of battery power management with MIMU4X4C. MIMU4X4C, like MIMU4444, is supported by an open source embedded code written in C, which is easily configurable to run any user implemented algorithm. The software is configurable to work as a standalone ZUPT-aided inertial navigation system and as a displacement & heading change sensor. MATLAB code is also available for communication.

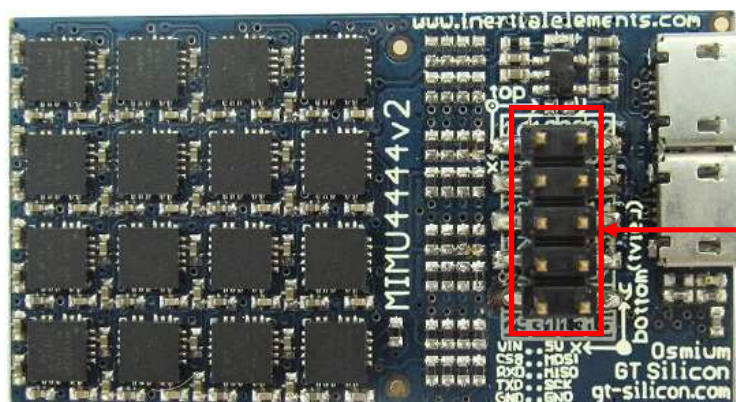
MIMU4X4C, when used with BMBT4444, is capable of storing data in micro SD card, operating on battery power and, most importantly, wireless communication with the application platform. Mating of MIMU4X4C and BMBT4444 results in an easy-to-use integrated device which is capable of communicating with the application platform wirelessly. These features are in addition to all the features of MIMU4444. These features and capabilities make MIMU4X4C a great platform for carrying out research in motion sensing by using Sensor Fusion and Array Signal Processing methods. MIMU4X4C, like MIMU4444, is an easy to use and highly configurable hardware platform, serves the needs for niche applications, such as gait analysis, autonomous robotics, 3D motion capture, indoor positioning, Structure from Motion (SfM) etc.

10-pins connector description:

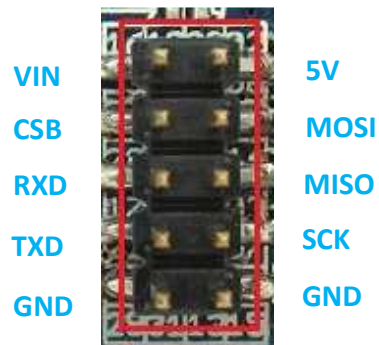
UART: RX and TX

SPI: MOSI, MISO, SCK, GND

Power pins: VDD (5V out), GND, VIN (For enabling battery operability)



10-pins  
Connector



Please go through the technical specifications of MIMU4444 for details.

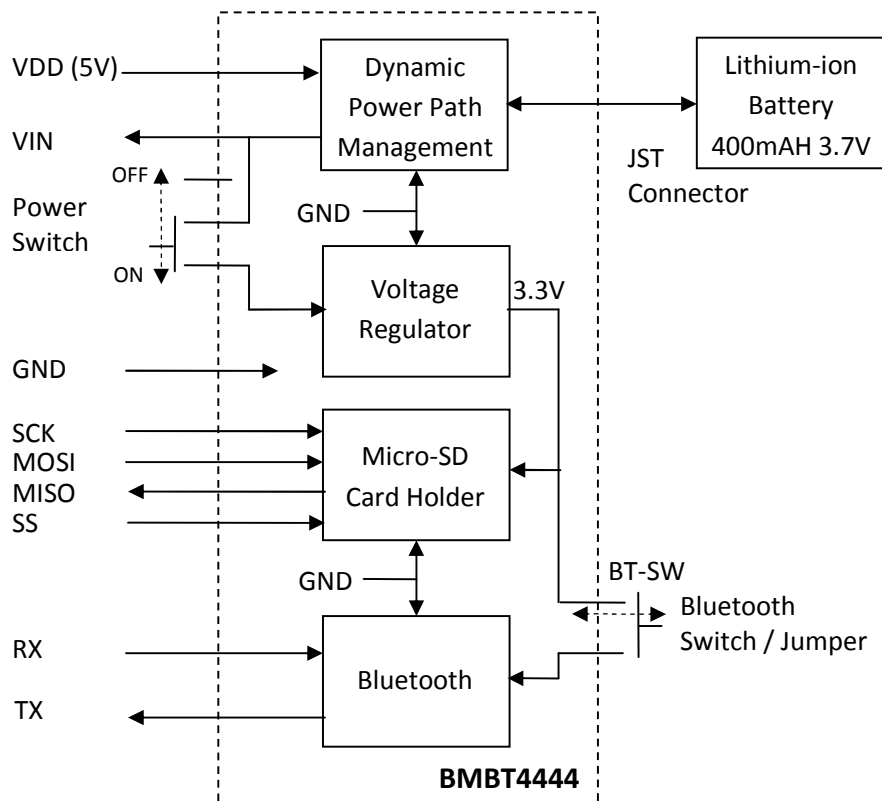
## BMBT4444

The **BMBT4444** serves the purpose of extension board for MIMU4444. When used with MIMU4444, it adds wireless communication interface (Bluetooth), data storage (Micro SD Card) and battery (Li-ion rechargeable) as another powering option to the inertial sensor array module.

Feature summary:

- Bluetooth version v3.0
- Micro SD Card Holder\*
- Powering option - Li-ion battery, USB
- On-board USB battery charging (with charging current of 200 mA)
- LED indicators for power, battery charging, Bluetooth pairing and communication status
- Power ON-OFF Switch
- JST Connector for Battery
- Jumper to disconnect Bluetooth
- 10-pins female connector (2.54 mm pitch) with UART, SPI and power IOs
- Dimensions: 26.6 mm x 16.7 mm

\*As of now, software support for Micro SD Card is not available.



## MIMU4X4C + BMBT4444

Mating of MIMU4X4C and BMBT4444 results in an integrated device which is capable of communicating with the application platform without any wire. Data can be transmitted over Bluetooth interface. The integrated device can run on battery and does not require USB power. Depending upon application, Bluetooth module can be selectively disconnected and the data can be store in the onboard micro SD card. Disconnecting Bluetooth module results in power saving.

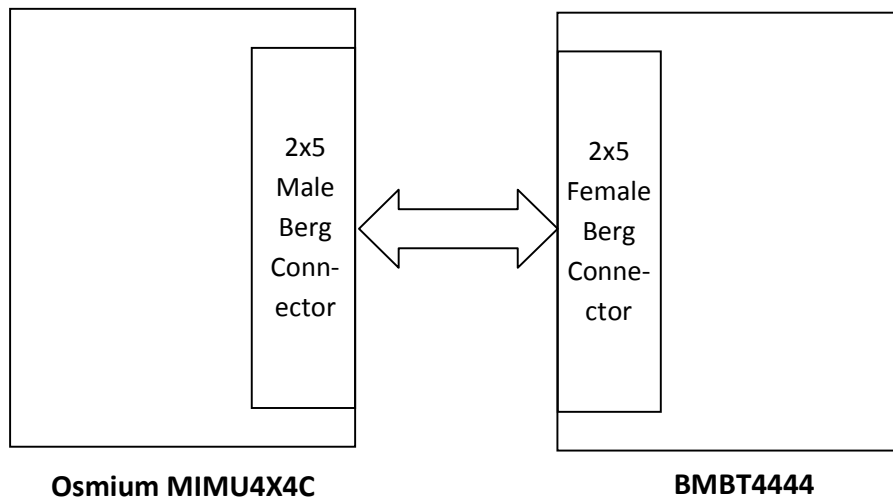


Figure 2 Block Diagram of Integrated Device