Raspberry Pi Zero Battery

This board was designed and built by Geppetto
Free automated documentation anytime.
Design for free @ https://geppetto.gumstix.com/

No Minimum Order       Automated Supply Chain       Reduce Cost and Errors
Gumstix, Inc. shall have no liability of any kind, express or implied, arising out of the use of the Information in this document, including direct, indirect, special or consequential damages.

Gumstix, Inc. may have patents, patent applications, trademarks, copyrights, trade secrets or other intellectual property rights pertaining to Gumstix products described in this document (collectively “Gumstix Intellectual Property”).

Except as expressly provided in any written license or agreement from Gumstix, Inc., this document and the information contained therein does not create any license to Gumstix’s Intellectual Property.

The Information contained herein is subject to change without notice. Revisions may be issued regarding changes and/or additions.

Copyright © 2020, Gumstix, Inc. All rights reserved.
Board Description

Uses Raspberry Pi Zero HAT Connector as its COM/processor.

Functional modules include:
Bosch BMI160 IMU

Powered by a Battery - Pigtail.

Board Dimensions

6.5cm x 6.25cm
## Contents

1 Modules on Board                                           1

1.1 Power                                                1

1.1.1 LTC4060 NiMH Battery Charger (v1) (1)                1

1.1.2 5.0V Boost Converter (v4) (2)                      2

1.1.3 3.3V/1.5A Regulator (v20) (3)                       2

1.2 COM Connectors                                        2

1.2.1 Raspberry Pi Zero HAT Connector (v1) (4)            2

1.3 Sensors                                              3

1.3.1 Bosch BMI160 IMU (v1) (5)                          3

1.4 Lights and Switches                                  3

1.4.1 JS102011 SPDT RA Slide Switch (v1) (6)              3

2 Module Connections Graph                                 4

3 Module Power Graph                                      5
1 Modules on Board

1.1 Power

1.1.1 LTC4060 NiMH Battery Charger (v1) (1)

The LTC4060 is a complete fast charging system for NiMH batteries. The module supports charging a 2-cell NiMH battery at 1A with power path control.

The datasheet for the LTC5060 is available at: https://www.analog.com/media/en/technical-documentation/data-sheets/4060f.pdf

The LTC5060 module receives:
• 5.0V from THROW2 5V on JS102011 SPDT RA Slide Switch (6)
• VBAT from VBAT on AA Battery Holder ()

1.1.2 5.0V Boost Converter (v4) (2)

This DC to DC buck-boost converter provides a 5.0V DC output at 2A needed by certain components on this board. It is capable of accepting an input voltage between 1.5V to 5V DC and output is controlled by the Linear Technology LTC3533 buck-boost regulator.

It receives INPUT from AA Battery Holder ().

The datasheet for the LTC3533 converter is available at:
This converter provides 5.0V to:
• JS102011 SPDT RA Slide Switch (6)

1.1.3 3.3V/1.5A Regulator (v20) (3)

This DC to DC step down regulator provides a 3.3V DC output at 1.5A needed by certain components on this board. It is capable of accepting an input voltage between 3.1 to 16V DC and output is controlled by the TI TPS6211 buck regulator.
It receives VIN from Raspberry Pi Zero HAT Connector (4).

The datasheet for the TPS6211 regulator is available at:
This regulator provides 3.3V to:
• Raspberry Pi Zero HAT Connector (4)
• Bosch BMI160 IMU (5)

1.2 COM Connectors

1.2.1 Raspberry Pi Zero HAT Connector (v1) (4)

The Raspberry Pi Hardware Attached on Top (HAT) Zero Module provides many GPIO, serial and special purpose signals from the Raspberry Pi Zero to custom Geppetto expansion boards.
Specifications, mechanical drawings and design guidelines for HAT expansion boards are available from:
https://github.com/raspberrypi/hats

Requires:
• 3.3V from 3.3V/1.5A Regulator (3)
The Raspberry Pi HAT connector provides the following outputs:

- 5.0V to:
  - 3.3V/1.5A Regulator (3)
  - JS102011 SPDT RA Slide Switch (6)
- I2C to Bosch BMI160 IMU (5)
- GPIO20 to Bosch BMI160 IMU (5)
- GPIO21 to Bosch BMI160 IMU (5)

### 1.3 Sensors

#### 1.3.1 Bosch BMI160 IMU (v1) (5)

The BMI160 is a highly integrated, low power inertial measurement unit (IMU) that provides precise acceleration and angular rate (gyroscopic) measurement. The BMI160 integrates 16 bit digital, triaxial accelerometer and 16 bit digital, triaxial gyroscope. The module supports I2C or SPI interface. The supply voltage of the module is 3.3V. The module supports IO voltage levels of either 1.8V or 3.3V based on the user selection.

The datasheet for BMI160 is available at: [https://ae-bst.resource.bosch.com/media/_tech/media/datasheets/BST-BMI160-DS000.pdf](https://ae-bst.resource.bosch.com/media/_tech/media/datasheets/BST-BMI160-DS000.pdf)

The BMI160 receives:

- 3.3V from 3.3V on 3.3V/1.5A Regulator (3)
- I2C from I2C on Raspberry Pi Zero HAT Connector (4)
- VLOGIC from VLOGIC on Raspberry Pi Zero HAT Connector (4)
- INT1 from GPIO20 on Raspberry Pi Zero HAT Connector (4)
- INT2 from GPIO21 on Raspberry Pi Zero HAT Connector (4)

### 1.4 Lights and Switches

#### 1.4.1 JS102011 SPDT RA Slide Switch (v1) (6)

It's a SPDT Right Angle Slide Switch.

The datasheet for the switch is available at: [https://dznh3ojzb2azq.cloudfront.net/products/Slide/JS/documents/datasheet.pdf](https://dznh3ojzb2azq.cloudfront.net/products/Slide/JS/documents/datasheet.pdf)

The SPDT RA Slide Switch module receives:

- THROW1 from 5.0V on 5.0V Boost Converter (2)
- POLE from 5.0V on Raspberry Pi Zero HAT Connector (4)

The LTC5060 module provides the following outputs:

- THROW2 5V to 5.0V on LTC4060 NiMH Battery Charger (1)
2 Module Connections Graph

Raspberry Pi Zero HAT Connector

I2C
GPIO20
GPIO21

Bosch BMI160 IMU

Figure 1: excludes power modules
3 Module Power Graph

- AA Battery Holder: VBAT: 110mW
- 5.0V Boost Converter: VBAT: 1mW, 5.0V: 100mW
- JS102011 SPDT RA Slide Switch: THROW2 5V: 5000mW
- LTC4060 NiMH Battery Charger
- Raspberry Pi Zero HAT Connector: VBAT: 5mW, 5.0V: 574mW, 3.3V: 500mW
- 3.3V/1.5A Regulator: 3.3V: 5mW
- Bosch BMI160 IMU