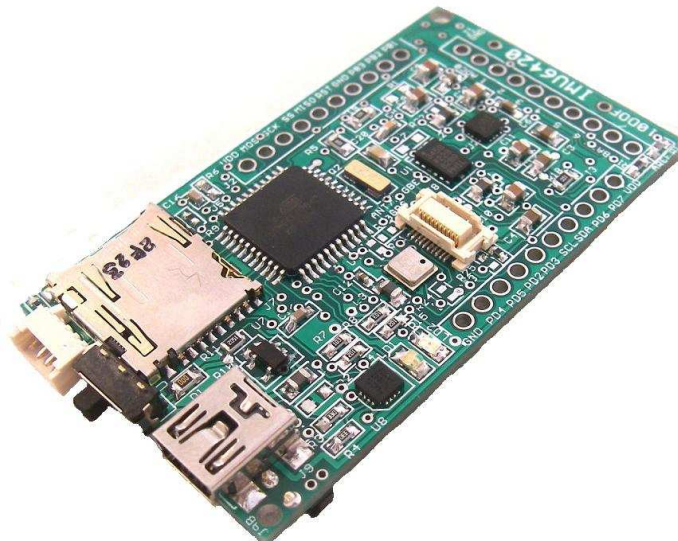# IMU6420   9/10 Degree of Freedom Processing Platform

+-16G, +-2000 dps, +-8Gauss, 350-700hPa

IMU6420-9
IMU6420-10

Technical Reference Manual
Preliminary
PCB Rev 1.0

www.soc-robotics.com

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- 3-Axis Magnetometer eight ranges from 0.88 – 8.1 gauss
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- MS5611 Barometer with 10cm resolution (optional)
- All digital sensors – no analog interface required
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- 128K Internal Program Flash
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- Data logging application source code for AVR Studio 4.19
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- Small form factor (1.34x2.34in) - 0.34in height with battery
- 9 DOF version available
- Turnkey IMU Data Logger Application V0.98 (AVR Studio 6.0 – source code included)
- IMULINK Wireless Communications Application (Java based)
- Desktop Integration with SOC Hexapod Simulator
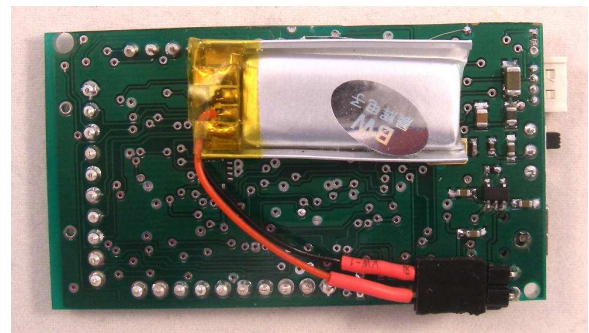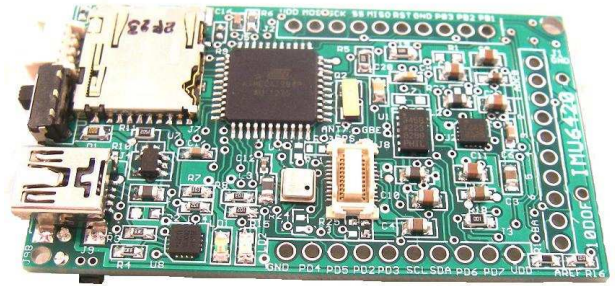
Hardware

The IMU6420 is an extremely compact embedded processor with 10DOF MEMs sensors for mobile data acquisition, control and remote monitoring applications. The IMU6420 uses an ATmega61284P processor. The ATmega61284P has the added benefit of being able to generate an interrupt on any pin transition (low to high or high to low). The processor has internal Flash, SRAM, EEPROM, SPI, TWI (I2C), UART, 8 channel 10bit A/D and general purpose IO. The IMU6420 has an internal 8MHz oscillator but is shipped with an external 11.0592MHz crystal. An external 32.756KHz clock crystal is also on the board to provide an accurate real time clock active during power down modes.

The IMU6420 consumes about 25ma in the active state (not including losses through the USB voltage regulator - not present with battery operation) and about 1.5ma in standby. By changing the internal clock and reducing power to certain peripherals it is possible for the IMU6420 to operate with very low power consumption. The IMU6420 is programming using an ISP Programming Adapter such as the ISP10 or via the Arduino Development Environment using the on chip stk500v2 bootloader.

The Rev 1.0 PCB has connectors J1, J2 and J3 on 0.1" pin spacing so prototype daughter cards can easily be attached to the top or bottom of the board making custom circuit design possible without the need for a custom PCB. An Eagle CAD layout template of the connectors to facilitate the development of custom circuits can be downloaded from the SOC Robotics web site.

The IMU6420 can be power via the USB port, 3.7V Lithium Polymer battery or by two double AA batteries (with the optional battery holder installed) with power source selected by a slide switch.

Software

The IMU6420 can be programmed with Atmel's AVR Studio 4.19 (or V6) IDE or the Arduino Development Environment. The on chip stk500v2 bootloader is preloaded into the ATmega1284P's internal Flash and is compatible with both Atmel IDE programming tools and Arduino programming tools. On power up the stk500v2 bootloader starts and runs for the first five seconds waiting for programming commands. If no commands are received the data logging application also loaded into flash starts automatically. Complete source code for the IMU Data Logging Application and bootloader are provided. Currently the application program is written in C using the AVR Studio 4.19 development environment. An Arduino version of the data logging application is underdevelopment and will be provided shortly.

Configurations

The IMU6420 is available in two different configurations – a 9DOF or 10DOF. The difference between the two is the installation of a barometric pressure sensor.

MEMs Configuration	Model Designation
9 DOF	IMU6420-9
10 DOF	IMU6420-10

Options

The following options are available for the IMU6420:

High performance barometer MS5611
Lithium Polymer Battery   145mah, 230mah and 240mah
AA Battery Holder

New Data Logger Version 1.00 Features

The IMU6420 comes pre-loaded with a comprehensive IMU Data Logger. The current version is V0.98.

The next release of the IMU Data Logger will provide extensive support for both ANT and ZigBee wireless operation.   The V1.00 release will come with a new Java desktop application IMULINK for real time data logging, data retrieval and control. V1.00 is scheduled for mid February 2013 release.

IMU6420 Wireless Options

The IMU6420 has an ANT compatible connector that accepts ANT wireless modules or SOC ZB1 ZigBee wireless modules. The ANT connector also accepts our new ZB1 ZigBee wireless module communicating at 38,400 baud. Both wireless modules are interchangeable.

ZB1 Wireless Module

The ZB1 module is a new SOC Robotics ZigBee compatible adapter with an Atmel ZigBit ATZB-24-2A ZigBee module attached to it. The Molex connector on the bottom ZB1 is compatible with the ANT wireless base connector on the IMU6420. The ZigBit comes preloaded with SerialNet and is ready to join a ZigBee network as a slave device. Software on the IMU8420 configures the ZigBee node for correct network operation. SerialNet supports an extensive AT command set.

USB10Z Zigbee for PC
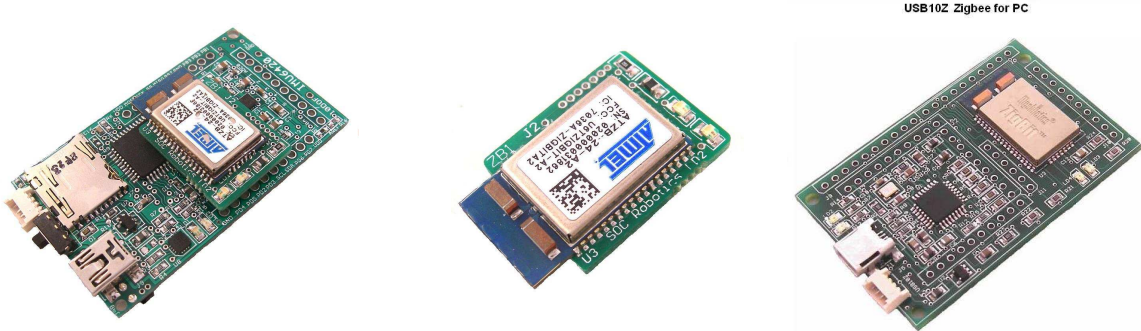
ANT Wireless Modules

ANT wireless modules are available from several distributors and is an off the shelf, component. Compatible ANT modules are the ANTAP281M5IB and ANTC782M5IB. ANT wireless devices support high speed over air operation with small packet data rates reaching 200Hz.

Ant

USB10Z

The USB10Z is a USB 2.0 to ZigBee communications device that attaches to a PC and is available directly from SOC Robotics, Inc. The ZB1 and USB10Z are available now.

2.0 Feature Summary

2.1 Introduction

The IMU6420 is a 10 degree of freedom (DOF) all digital sensor that brings a new level of integration and sensing. The IMU6420 has a 3-axis accelerometer, 3-axis rate gyro, 3-axis magnetometer and a barometric pressure sensor. The accelerometer is the Analog Devices ADXL345 with several acceleration range settings with a maximum of +-16G and a sensitivity of 4mG. The rate gyro is the STMicroelectronics L3GD20D with three range settings of 250, 500 and 2000 deg/sec. The magnetometer is a Honeywell HMC5883 with eight range settings from 0.88Gauss to 8.1Gauss. The barometer is a Bosch BMP180 with an absolute accuracy of 8M and a sensitivity of 80cm.
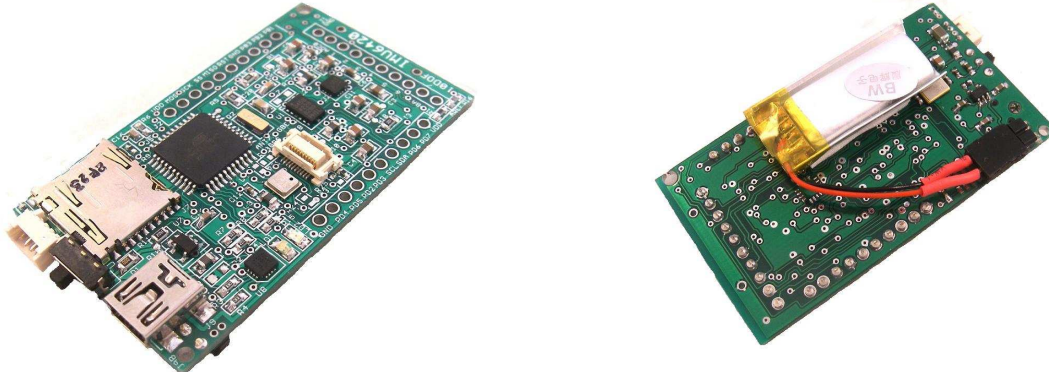
The picture below shows the IMU6420 pin assignment. The accelerometer and rate gyro use an SPI interface while the magnetometer and barometer are I2C devices. Software to program and configure each of the four sensors is provided.

IMU6420 Connector Pin Assignment
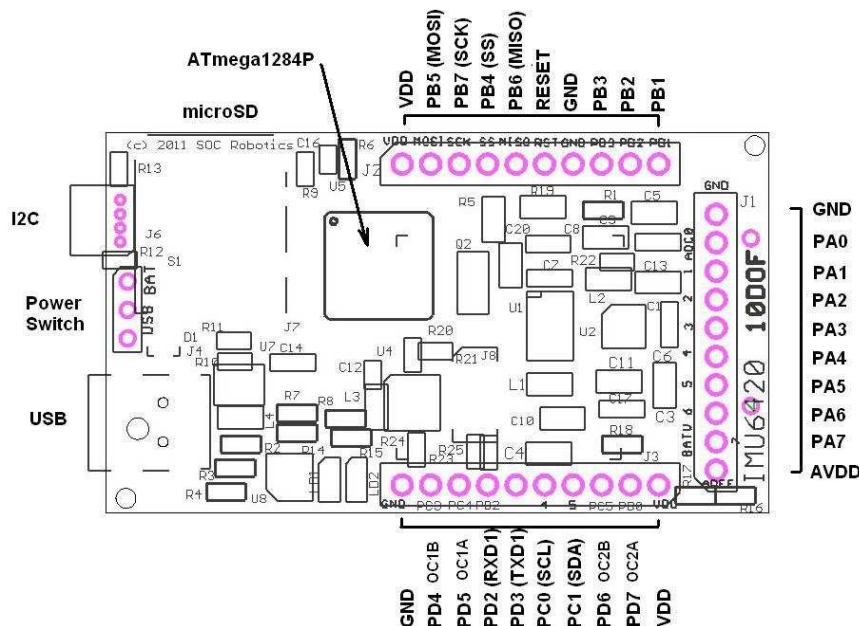
The IMU6420 has three expansion ports with a mix of digital IO and analog input.

2.2 Theory of Operation

Circuit Description
The IMU6420 uses sensors with digital interfaces so no A/D conversion interface logic is required. See the individual sensor datasheets for detailed operational and programming information.
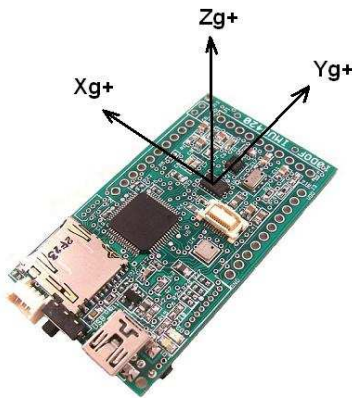
The Accelerometer and Rate Gyro have a high speed SPI interface. The Magnetometer and Barometric pressure sensor have an I2C interface. The IMU6420 is easily interfaced to other processors via the I2C and SPI interfaces.

The output from each sensor is in binary format and is easily converted to engineering units. The pressure sensor, however, requires a more sophisticated conversion formula and the source code for this conversion is provided in the sample application IMU Data Logger V0.98 available for download from our web site.
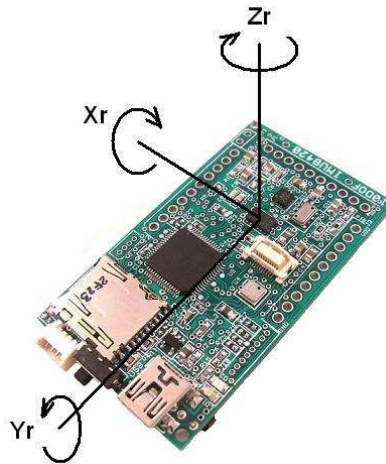
Polarity of Measurement
The IMU6420 outputs sensor data with 9 degrees of freedom. The pictures below show the output orientation of each sensor. The barometric pressure sensor is not affected by orientation.
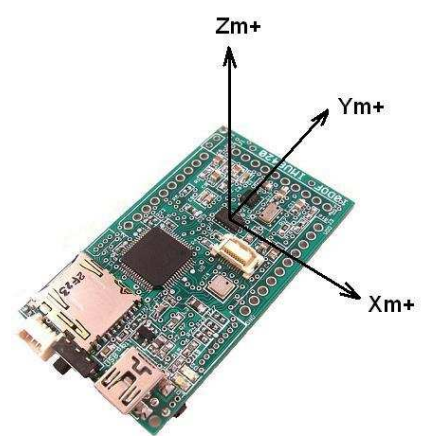
Calibration
Although each sensor has a digital interface sensor output may vary slightly due to sensor mounting skew – this should be taken into account before use.

2.3 Software Overview

A sample application IMU Data Logger V0.98 ATmega1284P processor (with full source code) configures each of the sensors on the IMU6420 and outputs the sensor data to the USB port. This application can be downloaded from the SOC Robotics web site.

The IMU Data Logger is a complete data logging application designed to simplify the setup and configuration of the sensors. The application was developed using Atmel's AVR Studio 4.19 IDE. Users can easily modify the source code to add additional functions such as AHRS or additional processing tasks. The IMU Data Logger application requires approximately half of the available program flash leaving plenty of room for custom enhancements.

A Java desktop GUI application IMULINK is in development and will be released in Q1 2013.

A desktop application using an Extender Kalman Filter sensor fusion algorithm post processing application is under development and will be release shortly. More information about this application is available upon request.

1.4 MEMs Specifications

The IMU6420 uses the STMicroelectronics L3GD20D digital 3-axis rate gyro, the Analog Devices ADXL345 3-axis accelerometer, Honeywell HMC5883 3-axis magnetometer and the Bosch BMP180 BMP180 or Measurement Specialties MS5611 barometric pressure sensor. Several of the sensors also include an on chip temperature sensor.

Accelerometer Specifications – ADXL345

Parameter	Value
Power Source	3.0V-+0.3VDC
Temperature Range	-20 to +80 deg C
Resolution	4mG
Gain	2,4,8,16g
Rate Range	-+100 deg/sec
Interface	SPI
Frequency Response	1600Hz
Power Consumption	140uA

Rate Gyro Specifications – L3GD20

Parameter	Value
Power Source	3.0V-+0.6VDC
Temperature Range	-20 to +80 deg C
Resolution	8.7/17/70mdps
Gain	3 settings
Rate Range	250/500/2000dps
Interface	SPI
Frequency Response	760Hz
Power Consumption	2.9ma

Magnetometer Specifications – HMC5883

Parameter	Value
Power Source	3.0V-+0.3VDC
Temperature Range	-20 to +80 deg C
Resolution	5mGauss
Gain	8 settings
Rate Range	0.88,1.3,8.1Gauss
Interface	I2C
Frequency Response	200Hz
Power Consumption	2.9ma

Barometer Specifications – BMP180

Parameter	Value
Power Source	3.0V-+0.3VDC
Temperature Range	-20 to +80 deg C
Resolution	0.034hPa (0.000145psi)
Gain	8 settings
Rate Range	350-1100hPa
Interface	I2C
Frequency Response	200Hz
Power Consumption	2.9ma

Barometer Specification - MS5611

| Parameter	Value
Power Source	1.8-3.6VDC
Temperature Range	-20 to +80 deg C
Resolution	0.012hPa (0.000145psi)
Gain	8 settings
Rate Range	450-1100hPa
Interface	I2C
Frequency Response	120Hz (0.012hPa)
Frequency Response	2000Hz (0.065hPa)
Power Consumption	2.9ma

Useful conversions: 1hPa = 1mBar = 0.01450377psi
Vertical lapse rate = 0.120mbar/m or 0.0365mbar/ft

3.0 IMU6420 Detailed Description

3.1 Introduction

The IMU6420 is an extremely compact 10 Degree of Freedom (10DOF) embedded processor for mobile data acquisition, control and monitoring applications. Programmed in C and powered by a Lithium Polymer battery the IMU6420 is an excellent embedded processor platform for small mobile applications.

IMU6420 10 Degree of Freedom Processing Platform
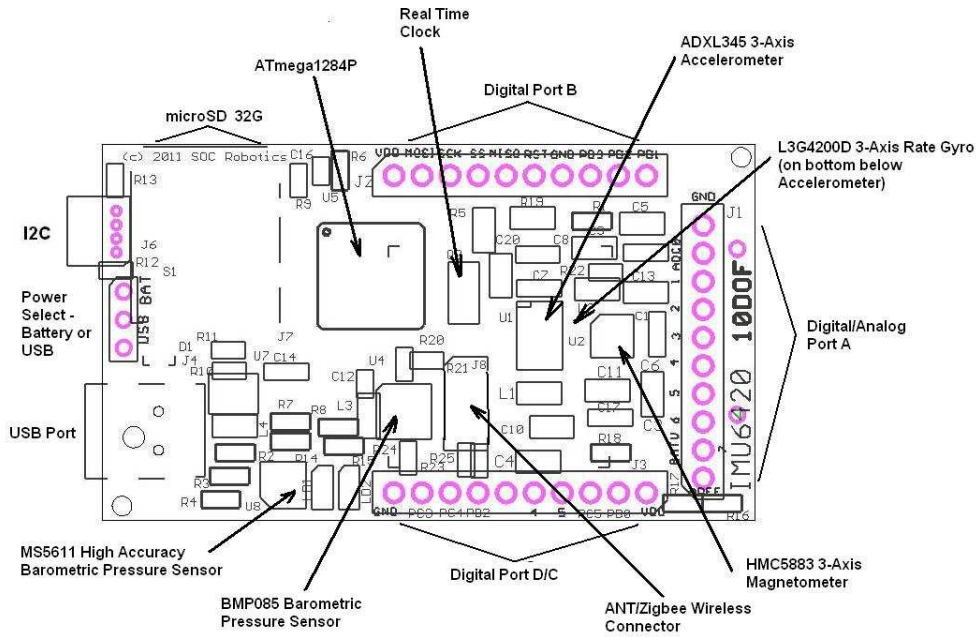
IMU6420 Connector Pin Assignment
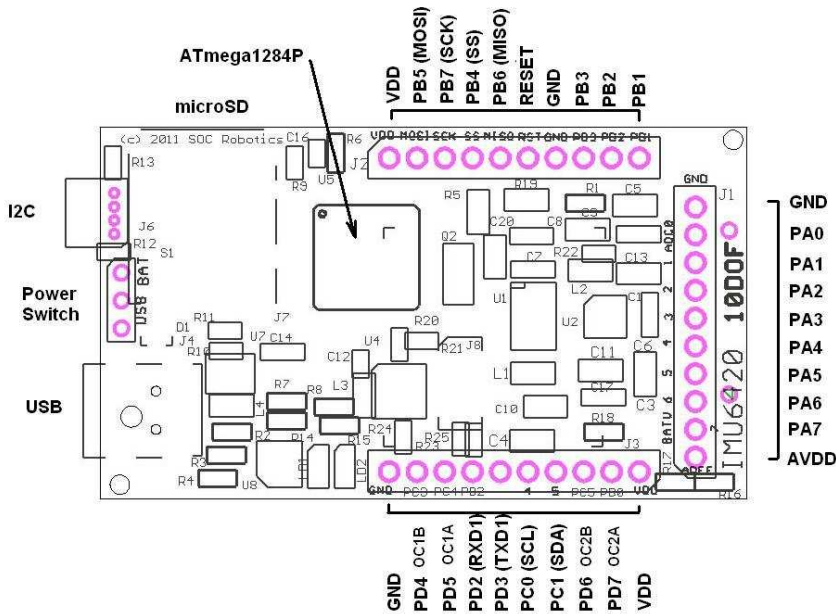
3.2 Processor

The IMU6420 has an 8bit RISC AVR ATmega1284P processor.   The processor has a UART, SPI port, TWI I2C, 8 Channel 10 bit A/D, digital IO ports, interrupts and timer/counter pins. A detailed device datasheet is available from the Atmel's web site providing detailed information on the internal peripherals.

The ATmega1284P has an external 11.0592MHz crystal and the board runs at 3.08V when powered by the USB port and 3.00 volts when powered by a battery pack.

Nominal power consumption of the board is 24ma. If internal peripherals are turned off and the processor placed in a sleep state power drops below 1ma.

3.3 Real Time Clock

A 32.756KHz clock crystal is connected to pins PC6/7 driving internal Timer 2. By setting up an interrupt routine on TIMER2 it is possible to create a time of day real time clock or to calibrate the internal 8MHz oscillator. The real time clock can be configured to wake the processor from a sleep state to reduce power consumption dramatically. The output of this clock is used to time stamp logged MEMs sensor data.

3.4 microSD Port

The IMU6420 has a microSD connector that supports microSD storage cards with FAT16/FAT32 file support. Up to 32G cards can be used.

3.5 USB 2.0 Port

The IMU6420 has a USB 2.0 port configured as a serial communication device. Baud rates up to 2Mbits/second are supported. The IMU6420 USB interface chip is the XR21V1410 chip.

3.6 TWI Port

The IMU6420 has a TWI I2C port for communicating with smart peripherals or other I2C peripherals. The TWI port uses a 4 pin Molex connector with power and ground so the IMU6420 can power other peripherals or be powered itself via this connector.

3.7 Expansion Ports

The IMU6420 has three expansion ports. PORTA, PORTB and PORTC - PORTA has analog inputs, digital IO, PORTB has SPI and PORTD has UART and TWI.

3.8 MEMs sensors

The IMU6420 uses the STMicroelectronics L3GD20D digital 3-axis rate gyro, the Analog Devices ADXL345 3-axis accelerometer, Honeywell HMC5883 3-axis magnetometer and the Bosch BMP180 barometric pressure sensor or Measurement Specialities MS5611. See the respective vendor datasheets for detail specifications and programming information.

3.9 Power Options

The IMU6420 can be powered either by the USB port, a Lithium Polymer battery or an optional AA battery holder. An onboard charging circuit powered by either the USB Port charges the Lithium Polymer battery. In addition, an optional battery holder can be installed on the bottom of the board that holds two AA batteries. A slide switch selects power from the USB Port or battery pack.

3.10 Programming

The ATmega1284P can be programmed using either the ISP programming port or via the USB interface using the on chip stk500v2 bootloader.

---

stk500v2 BootLoader

The ATmega1284P has an on chip stk500V2 compatible bootloader running at 115,200 baud. This bootloader is compatible with AVR Studio 4.19. Arduino development software can also be used to load new applications into the ATmega1284P. The IMU Data Logging Application pre-loaded into the Atmega1284P can start the bootloader by entering the "bl" command at the top level command menu. On power up the bootloader starts first and waits for programming commands for the first few seconds after which the data logging application is started. Bootloader starts at address 0x1F000 and can be reached from the application.

ISP Programming

The IMU6420 is programmed using an ISP10 Parallel Port programming adapter or any 10pin Atmel ISP compatible programming adapter. An optional CISP programming adapter is available that converts the IMU6420 7 pin ISP programming port into an Atmel compatible 10 pin ISP programming port. The CISP attaches to connector J2 located on the top edge of the board – attach as shown in the picture below.
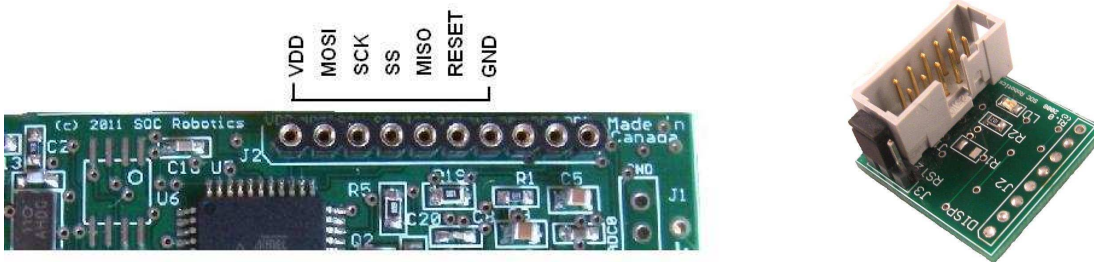

Figure 2-4. **CISP ISP Adapter and correct attachment to the IMU6420 .**

3.11 Molex Connector

The IMU6420 uses one small Molex picoBlade 4 pin connector with 1.25mm pin spacing (4 pin Molex Part No. 53048-0410 - Digikey Part No. WM1744-ND). The connectors mate with a female Molex 4 housing connector (4 pin housing Molex Part No. 51021-0400 - Digikey Part No. WM1722-ND).

The housing connector has two different crimp terminal types: 26-28AWG (Molex Part No. 50079-8000 - Digikey Part No. WM1722-ND – Crimp tool 63811-0300) and 28-32AWG (Molex Part No. 50058-8000 - Digikey Part No. WM1775-ND - Crimp tool 63811-0200).

3.12 Applications

The IMU6420 is a small, battery powered, low power, Inertial Measurement Unit with embedded processor with up to 8Mbytes of serial flash for storage of data measurement data, 8 10 bit analog input channels and up to 14 digital IO channels.

A sample data logging application is preloaded into the ATmega1284P processor and automatically configures all the MEMs sensors when activated. See the Data Logger V0.98 Application Note for more information.

IMU6420 Data Logger Overview V0.98

The IMU6420 Data Logger manages the acquisition and storage of 10 DOF MEMs sensor data to the microSD storage adapter and USB port.

The microSD subsystem supports both a FAT16 and FAT32 file system automatically. Files are stored by a user specified unique name or automatically using a default incremental naming convention starting with the three letters IMU followed by a file number - IMU00001.txt. The incremental naming system automatically creates the next name in sequence as below:

> IMU00001.txt
> IMU00002.txt
> .
> .
> .
> IMUnnnnn.txt

Logging configuration settings are selected using the "l" command at the top level command menu. As logging mode selections are entered they are automatically stored in Flash. The data logger checks if a microSD card is installed. By default, data from all four MEMs sensors is logged to the microSD card.

Several logging trigger conditions activate logging such as delayed start, keyboard start, threshold start or switch start. Delayed start allows logging to start at some time in the future. This allows the IMU8420 to be placed in a specific location, such as an instrument carriage, so the effects of sensor placement is not logged. Keyboard start is for immediate data logging start. Just enter the start logging command or the 9t, 10t commands. Threshold start depends on certain sensor values exceeding defined thresholds as a percentage plus or minus of full range at the current value. Switch start allows the press of a button to start and stop logging. The start of logging is indicated by a fast blinking Green LED.

There are also several logging stop modes. Halt logging is a keyboard command that immediately stops logging and closes the logging file. Timeout stop terminates logging after a specific time delay in seconds. Switch stop uses a switch to stop logging. Note that if switch stop and timeout are both selected then the one occurs first stops logging.

Delayed start and thresholding can be combined to allow time to place IMU6420 in position so that logging doesn't start prematurely. For example, say it takes 30 seconds to place the IMU6420 into a test jig after which movement on any axis exceeding a specific threshold is the trigger to start logging. This allows the IMU6420 to capture significant events defined by the user.

Thresholding start can be set on an individual sensor and sensor axis basis. So, for example, if the x axis acceleration exceeds +1G and the magnetometer axis falls below a specific value logging starts while changes to other sensor values does not start logging.

Automatic power up logging is also supported. This allows power cycling to start a logging event. This mode simplifies field-logging applications. By combining power on logging with delayed start, thresholding, timeout termination and incremental file naming it is possible to prepare an IMU8420 for field logging by simply cycling the power on and off.

Auto restart is a mode that closes files after a specific time period in seconds and then opens a new file to continue logging in combination with the file name increment function. The file system requires that a file be closed to save it. If power is lost and all the data is in a single file then that file is lost. By opening and closing smaller files data loss due to power failure is significantly reduced. Up to 32,000 files can be

created. The logging software also automatically snap shots logged data every 20 seconds. If power fails before the next 20 second snap shot that data is lost.

Logging command summary:

```
? - Logging parameters summary
p – Power up log start mode
a - Arm/disarm switch PB0
t - Terminate mode (b,t,h)
w - Start logging at future time
j - Threshold mode setup
y - Log restart mode setup
u - Store data in uSD or Serial Flash
x - Enter sensor range
s - Start data logging
h - Halt data logging
i - Enter Sensor ID1 or ID2 name
e - Erase chip
d - Select sensor(s) to log (a-accelerometer, g-gyro, m-mag, b-barometer)
r - Retrieve data
l - Log rate (msec)
f - Output format (raw, processed, minmax)
c - Display command summary
q - Quit data logging mode
```

Example of a logging event setup:

Enter the "u" command to select logging to the microSD and select incremental logging – this resets the file number to 1.

Enter the "t" command to set terminate mode to time out and enter a time out period in seconds. If 60 seconds is entered then after 60 seconds logging will stop and the file closed (saved).

Enter the "y" command to enable automatic restart and enter the number of restarts. If 20 restarts are selected and a time out period of 60 seconds is selected this will result in 20 files starting with the name IMU00001.txt and ending in IMU00020.txt to be created.

Enter the "w" command to set a future logging start time. If this time is set to 45 seconds then you have 45 seconds from power up to place the unit in position before logging to the microSD starts.

Enter the "p" command to enable automatically start logging on power up. Each time the IMU6420 is powered on it will start logging based on the other entered parameters rather than waiting for a keyboard "10t" or "9t" command.

Note that each time the unit is powered up a new file start number is used. So if 20 files are logged during the first power up then the next power up will start the file number at 21. If the u command is used again then the file numbering starts at 1 again.

Automatic restart is also designed to recover from power failures. If 20 restarts are selected and power is lost at file cycle 14 only file 14 is lost. On the next power up file 15 is stored and so on.

Thresholding is also supported as a start condition. By combining delayed start with thresholding it is possible to both place the unit in position and start logging based on a MEMs sensor event. Thresholding is based on a percentage sensor value change from the current resting state rather than a value entered as an absolute number. This allows the unit to be placed in variety of different configurations with a change in orientation or translation triggering a logging start condition.

4.0 IMU6420 Hardware Expansion Port Summary

4.1 Introduction

The IMU6420 has three I/O expansion ports, three power ports, USB port and I2C as shown in the connector layout diagram below.

IMU6420 Connector Pin Assignment
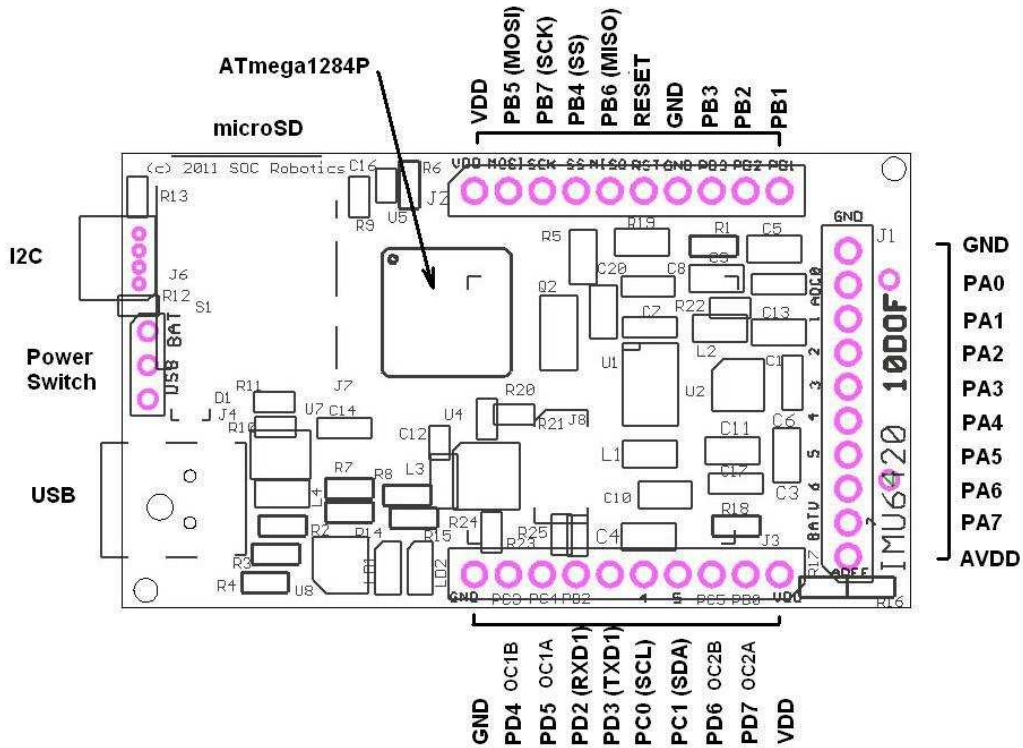
IMU6410 10 Degree of Freedom Processing Platform
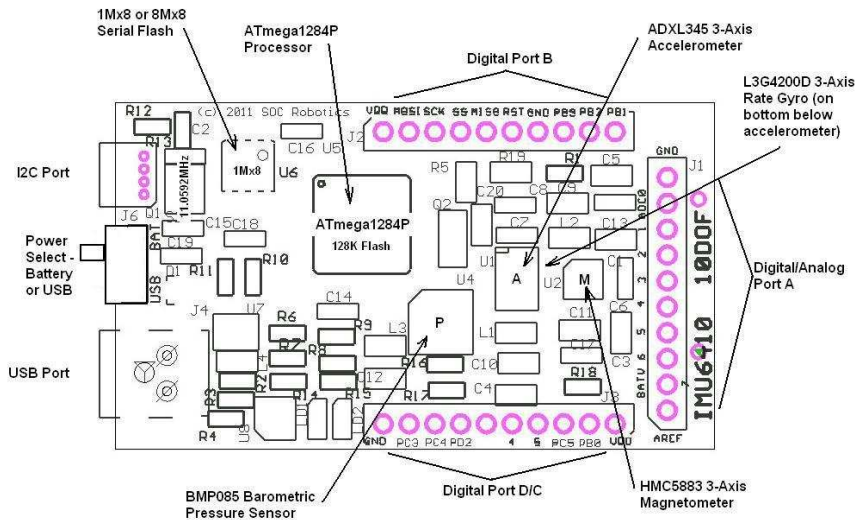
4.2 Expansion PORT A

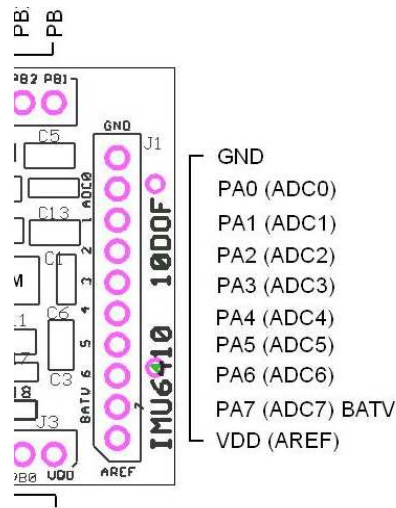AVR PORTA is routed to connector J1.

Figure 3-3. **PORTA Pin Assignment J1.**

Note that PA7 is connected to an on board resistive voltage divider network that can be used to measure battery voltage level by selecting either the 2.56 or 1.1 volt internal reference. The difference between the internal reference voltage and the measured voltage gives current battery voltage level.

Each PORTA pin can be configured either as an Analog input, digital output or digital input.

4.3 Expansion PORT B

AVR PORTB is routed to connector J2.
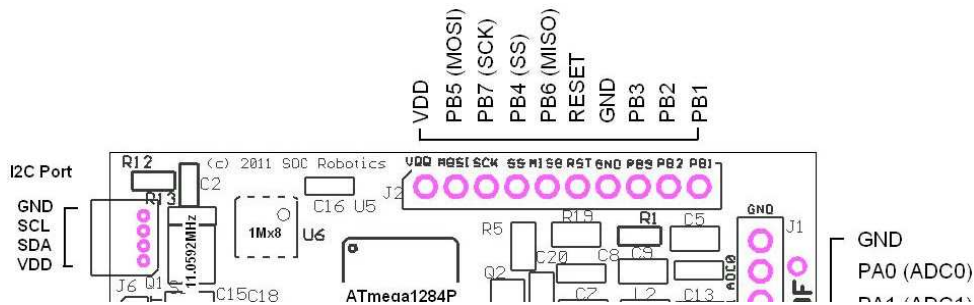
Figure 3-4. **PORTB Pin Assignment J2.**

Port B has an SPI port, general IO and is also the ISP programming port.

4.4 Expansion PORT B/C/D
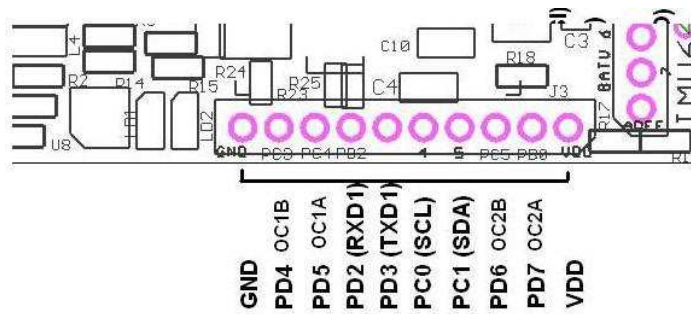Partial AVR PORTS C, D are routed to connector J3.

Figure 3-5. **PORTC/D/B Pin Assignment J3.**

Expansion Port J3 combines PORT pins from C and D. Note that PD2 and PD3 are USART1 RXD1 and TXD1 respectively. UART1 is also connected to the ANT Wireless connector. USART0 is connected to the on board USB interface chip and is not available. Port pins PD4, PD5, PD6 and PD7 can be controlled by the on chip hardware PWM subsystem.

4.5 TWI I2C Expansion Port
The TWI I2C lines are routed to connector J3 and a separate 4 pin Molex connector J5 (4 pin Molex picoBlade connector). J5 is compatible with the SOC Robotics Smart Peripheral family of motor controllers, LCD displays and data acquisition modules.
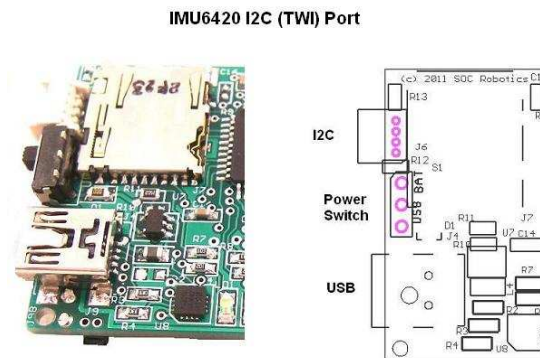

Figure 3-6. **TWI I2C Port with 4 Pin Molex picoBlade Connector.**

4.6 Board Power Options and Battery Holder

IMU6420 power may range from 3.0 to 3.3VDC. Power is supplied either by the USB port, lithium polymer battery or an optional AA battery pack. The USB port supplies 5V to the board that is regulated to 3.3V. The lithium polymer charging subsystem is attached to the same supply as the USB circuit and supplies power to the board when USB is not connected and is charged by the USB supply when USB is connected. Charging is automatic as is the switch over from USB to lithium battery.

A lithium battery is attached to a connector on the bottom of the board. The USB switch turns both USB or lithium battery power on.
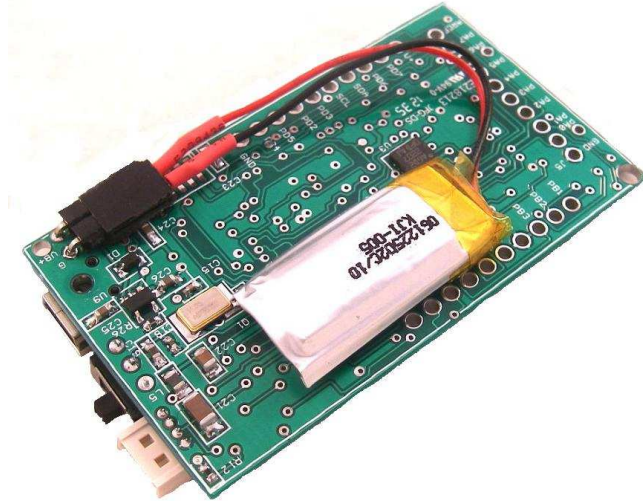
The optional battery pack holds two AA batteries that supply a nominal 3.00V to the board. A switch selects either the battery pack or USB/lithium battery port as the primary power source. A protection diode on the USB power subsystems protects the USB logic. Power from the USB port and battery pack cannot be applied at the same time.

Two standard AA batteries can power the IMU6420 at full speed for up to 8 hours. The pictures below show an IMU6410 configuration but are the same for the IMU6420.
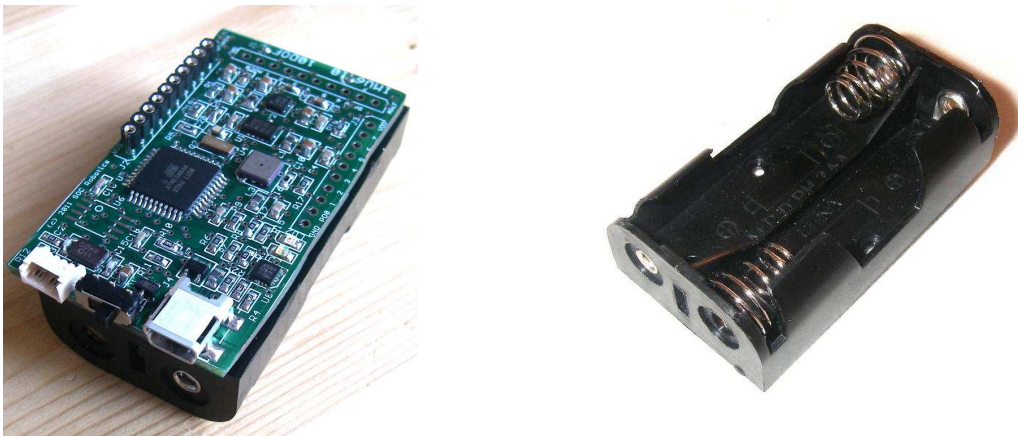

Figure 3-7. **IMU6410 attached to two AA battery cell holder shown on left.**

4.7 ISP Programming Port

The ISP Programming port is on connector J2. See the Atmel ISP programming specification for detailed ATmega1284Pprogramming procedures. The CISP converts the 7 pin ISP signals to a standard 10 pin Atmel ISP header. The ISP10 parallel port ISP programmer (Figure 3-9) is used to program the IMU6420 using anyone of the following software utilities - ISProg.exe (SOC Robotics, Inc utility), AVRDude, ICCAVR IDE or PonyProg. The USB10 can also be used to program the IMU6420.
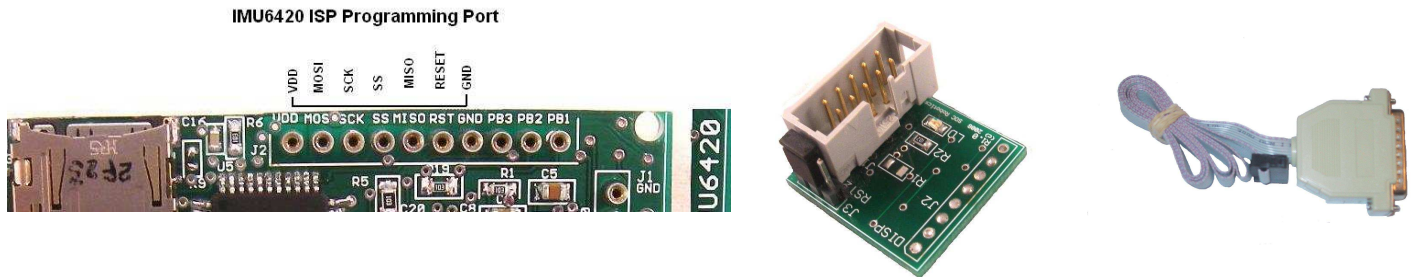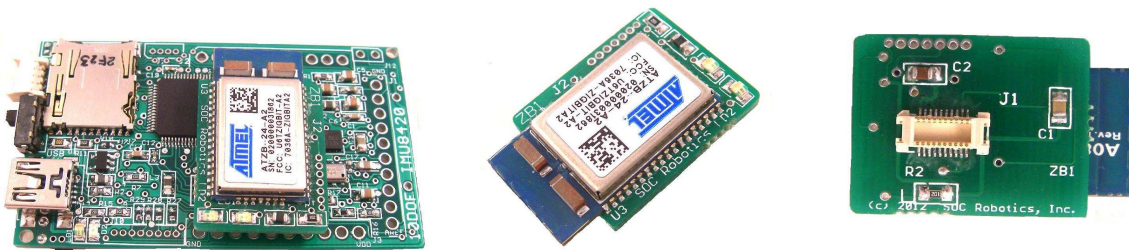

Figure 3-8. **ISP Programming Port and CISP Adapter Connection.**

4.8 ANT ZigBee Wireless Communications Port

The wireless interface connector on the IMU6420 supports two industry standard wireless technologies: ANT and ZigBee. The wireless connector is compatible with the connector found on ANT modules manufactured by ANT Wireless (subsidiary of Garmin, Inc.) available from many stocking distributors. SOC Robotics designed a compatible ZigBee module called the ZB1 using the same mating Molex connector using an Atmel ZigBit module. This allows either a standard off the shelf ANT module or industry standard ZigBee module to be attached to the IMU6420. SOC Robotics also supplies a PC compatible ZigBee module called the USB10Z that provides a communication link from the desktop to the IMU8420. ANT PC dongles are also available.

ZB1 Wireless Module

The ZB1 module is a new SOC Robotics ZigBee compatible adapter with an Atmel ZigBit ATZB-24-2A ZigBee module attached to it. The Molex connector on the bottom ZB1 is compatible with the ANT wireless base connector on the IMU6420. The ZigBit comes preloaded with SerialNet and is ready to join a ZigBee network as a slave device. Software on the IMU8420 configures the ZigBee node for correct network operation. SerialNet supports an extensive AT command set.

ANT Wireless Modules

An ANT wireless module are available from several distributors and is an off the shelf component. Compatible ANT modules are the ANTAP281M5IB and ANTC782M5IB. ANT wireless devices support high speed over air operation with small 8 byte packet data rates reaching 200Hz.

Ant

IMULINK Java Desktop Application

IMULINK is a Windows desktop application written in Java that manages the communication between IMU8420's and the desktop wirelessly. IMULINK coupled with the next version of the IMU Data Logger software (V1.00 in beta test) allows a user to communicate and control multiple IMU8420's from the desktop wirelessly. IMULINK synchronizes all IMU clocks, sets log file names on each IMU, starts and stops logging, retrieves min/max readings and retrieves data.

USB10Z PC ZigBee

The USB10Z is a USB 2.0 to ZigBee communications device that attaches to a PC and is available directly from SOC Robotics, Inc. The USB10Z is based on the USB10 device and runs a small application called the Ferret. The Ferret application creates a serial link between the AT90USB162 processor on the board and the ZigBit module. ZigBit default baud rate is 38,400. A complete summary of the commands supported by the Ferret application is in the USB10 Technical Reference Manual.
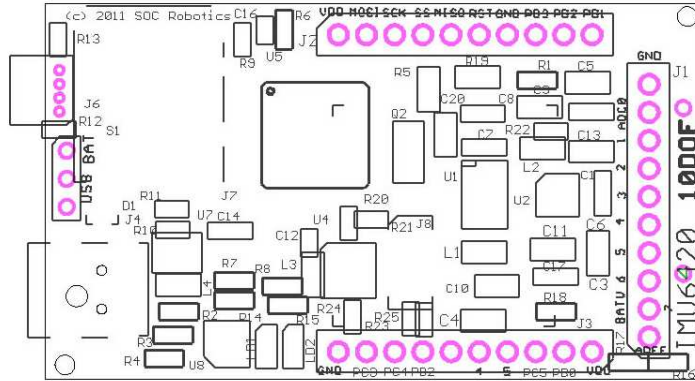
USB10Z Zigbee for PC
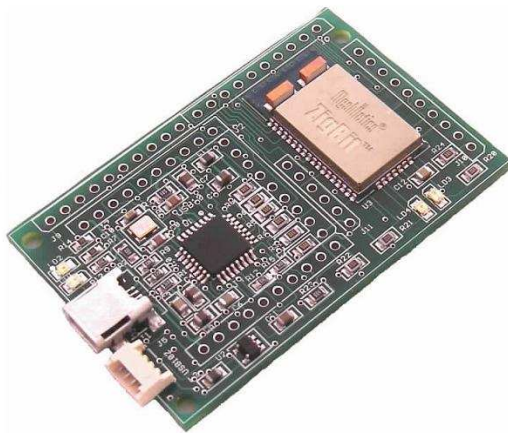
5.0 Electrical and Mechanical Description

5.1 Component Layout

Components are mounted on both sides of the board. Not all components may be mounted. See the section on optional components for more information.

## 5.2 Electrical Specifications

Electrical

Input power: 5.0V USB or 3.7V lithium polymer or 3.00V AA battery @ 25ma
Sleep Mode: 1.5ma

Mechanical

Dimensions: 1.34x2.34 in (one mounting hole)
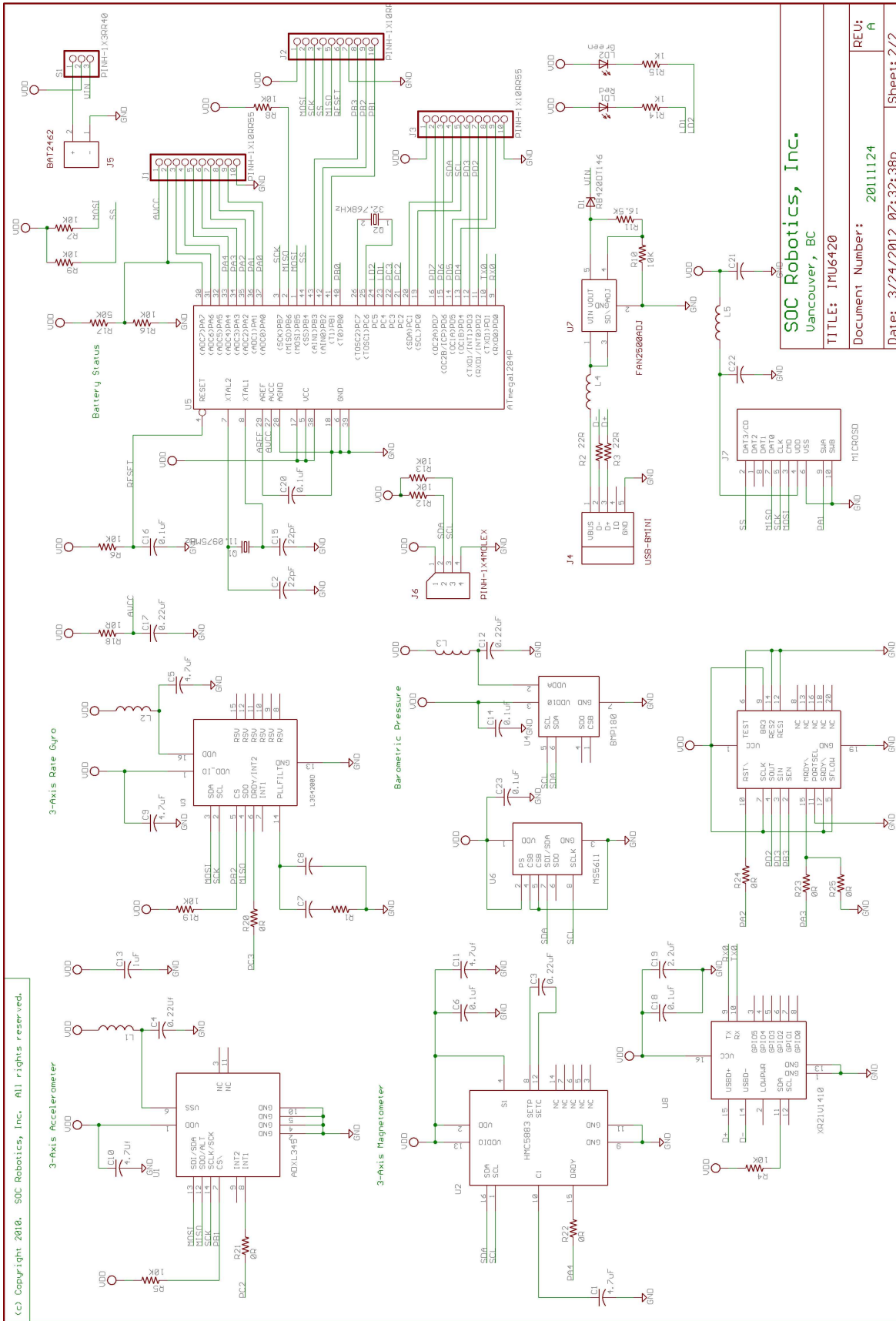Weight: 6 grams

5.3 Mechanical Dimensions

Board dimensions are stated in inches. Connectors J1, J2 and J3 are positioned on 0.1" pin spacing so the IMU6420 is easily mounted directly on any standard 0.1" prototyping board.
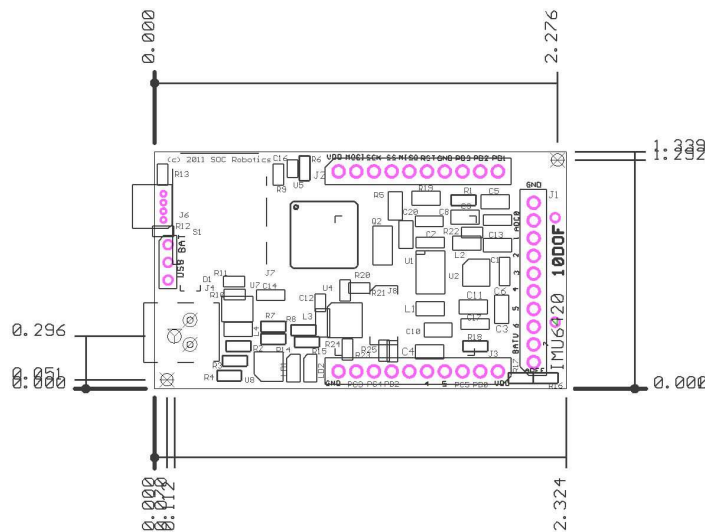
6.0   IMU6420 Rev 1.0 Schematics

IMU6420 10DOF Platform

ATmega1284P

PCB Rev. 1.0

SOC Robotics, Inc.
Vancouver, BC

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