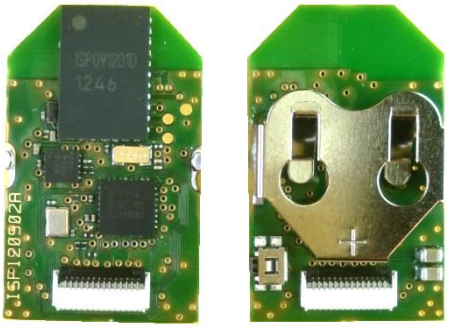
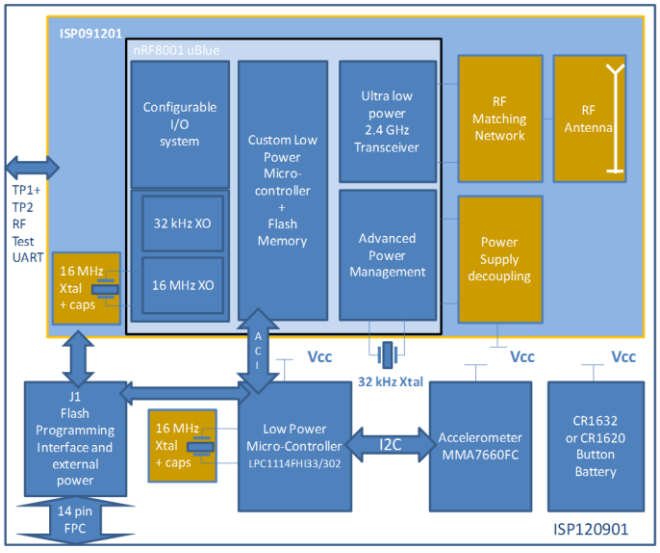
ISP120901
Bluetooth Low Energy Wireless Orientation/Motion Detection Sensor



Key Features

- Single Mode BLE v4.0 Slave Module
- Based on Nordic Semiconductor µBlue family
- Includes transceiver, baseband, software stack
- Fully integrated RF matching and Antenna
- Integrated 16 MHz Crystal Clock
- Ultra Low Power Consumption
  Coin cell battery CR1632 or CR1620
- Low Power 3-Axis Orientation/Motion Detection
- Ultra Low Power Application Processor
- 16 MHz Crystal Clock for Application Processor
- 32.768 kHz Crystal for BLE Protocol Sync.
- Overall Size 18 x 29 x 6 mm
- Temperature -40 to 85 °C



Applications

- Sport and fitness sensors
- Health care sensors
- Out of Range (OOR) sensors
- Gaming sensors : Motion detection and transmission

General Description

ISP120901 is an autonomous low-power device for wireless orientation/motion detection and transmission. The complete device makes use of Insight SiP ISP091201 BLE module together with low power host processor, 3-axis orientation/ motion sensor and small primary button cell battery CR1632 or lower capacity CR1620. Overall size of the device is 18x29x6 mm.

The host processor that handles the autonomous sensor application, the high level portion of the BLE protocol stack and communication with the 3-axis sensor is a low power 32-bit MCU (ARM Cortex-M0 based), the NXP LPC1114FHI33/302, integrating 56kB flash memory and 8kB SRAM.

The Freescale MMA7660FC, a 3-axis orientation/ motion detection sensor is used to detect acceleration and orientation transmitted via the I2C bus. The MMA7660FC has an auto-Wake/ Sleep feature for low power consumption. Data sampling rate is configurable from 1 to 120 samples/second. The MMA7660FC has orientation detection and gesture detection capabilities.

An interface board, ISP120907 is available from Insight SIP and allows for easy flash programming the LPC1114FHI33/302 application processor via the 14 pin FPC connector. During firmware modification and debug, the ISP120901 device may be supplied via the DC voltage from the ISP120907 interface board. An optional UART interface (TP1+TP2) with direct connection to the nRF8001 uBlue is available for Bluetooth Low Energy radio testing as specified by the Bluetooth standard.

Insight SiP – Green Side – 400 avenue Roumanille – BP 309 – 06906 Sophia-Antipolis Cedex – France – **www.insightsip.com**
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1. Electrical Specifications

Current Consumption

The measured total average current consumption and autonomy of the ISP120901 orientation/motion sensor node supplied by a CR1632 battery for several connection intervals is shown below.

Connection Interval (ms)	Average Current Consumption (µA)	Autonomy (year)
1000	63.6	0.25
2000	36.0	0.44
3000	26.9	0.60
4000	22.3	0.72

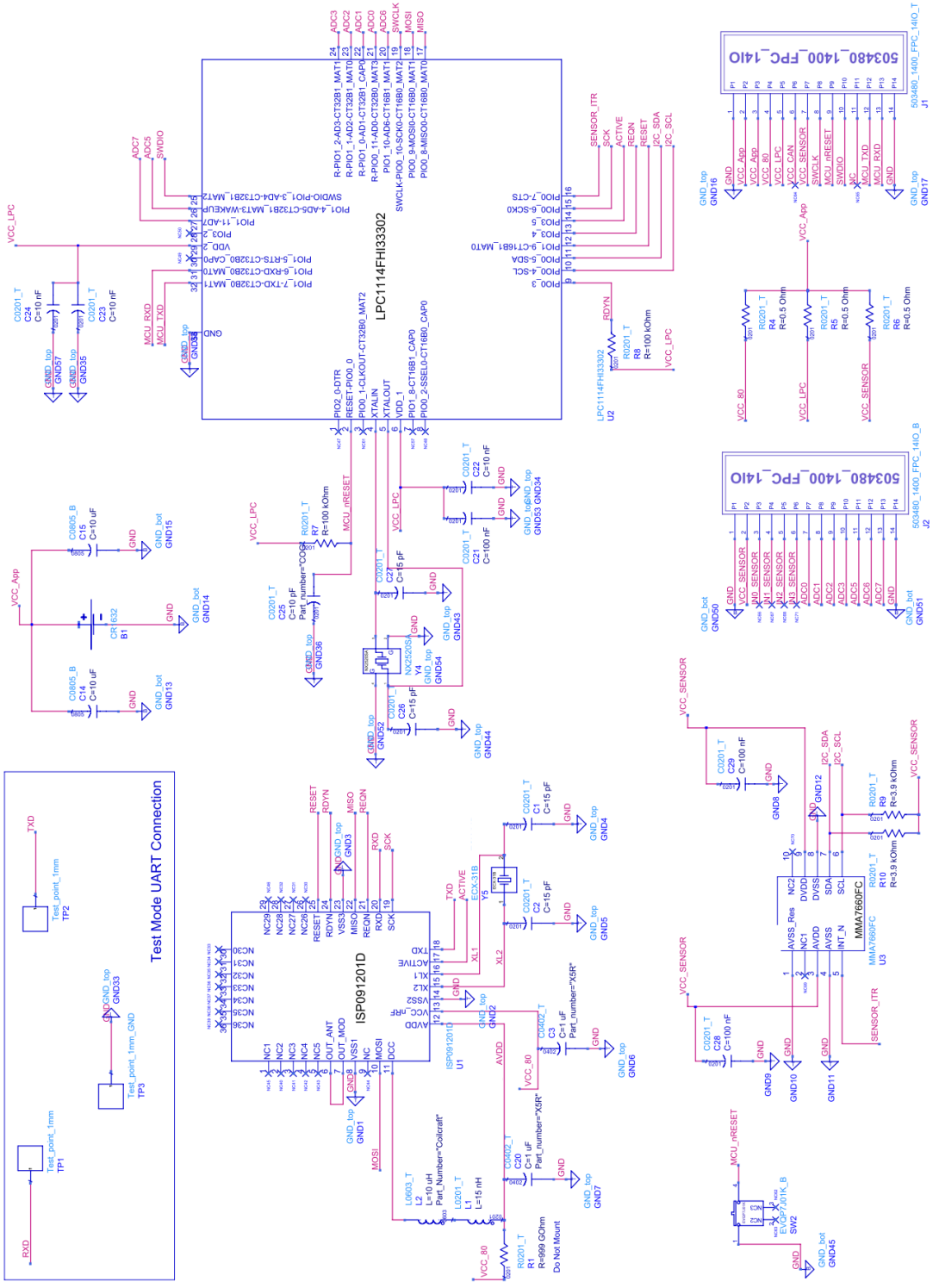
Sensor Performance

The performance of the motion sensor is that obtained by the Freescale MMA7660FC. Key characteristics are shown below.

Parameter	Value	Unit
Number of axes	3	
Acceleration range	+/- 1.5	g (9.81m/s²)
Number of bits for full range for each axis	6	bits
Data sampling rate (each sample is 3 axis acceleration data)	1 to 120	samples/s

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Electrical Schematic



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2. RF Performances

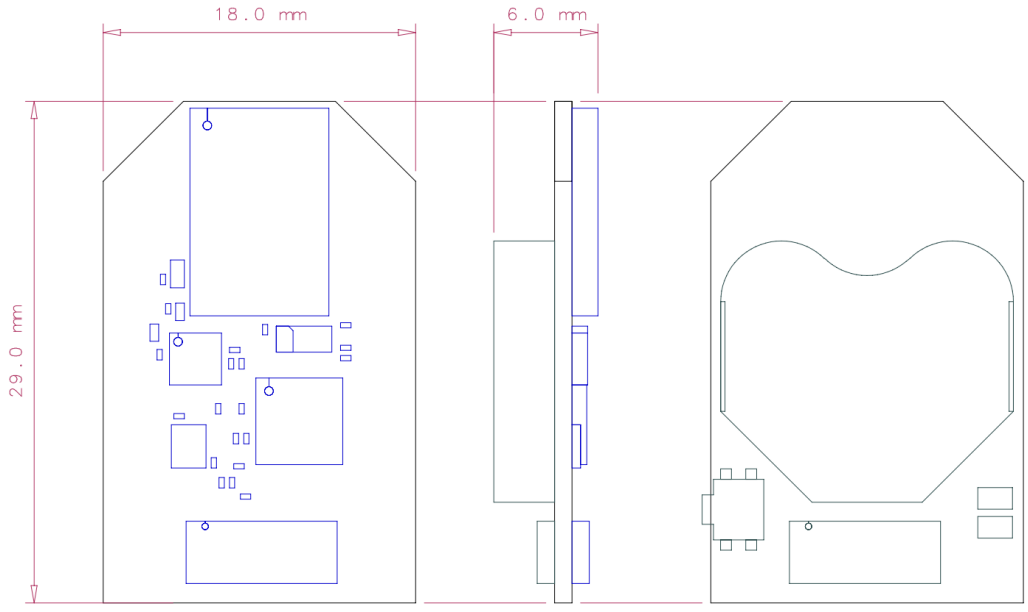
RF Specifications according to standards

The performance of the Bluetooth Low Energy Radio link is that obtained by the ISP091201 module.
Temperature range -40°C to +85°C.

Parameter	Value	BT V4 Std limit	Unit	Condition
Output Power	-0.9	-20 to 10	dBm	Channels 0 to 39
RF Frequency tolerance	Better than +/-20	+/- 50	Hz	Channel 0 to 39
Rx sensitivity	-87	-70	dBm	Level for BER <0,1% ideal Tx
Max range	> 20		m	Open field at 1m height
EIRP	0.3		dBm	
Antenna Gain	1.2		dBi	
Rx sensitivity	56.8		dBµV/m	

3. Mechanical Outlines

Dimensional drawing



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