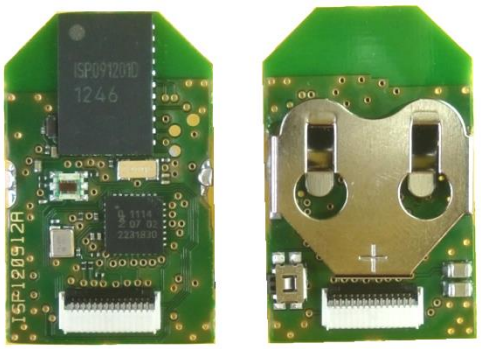
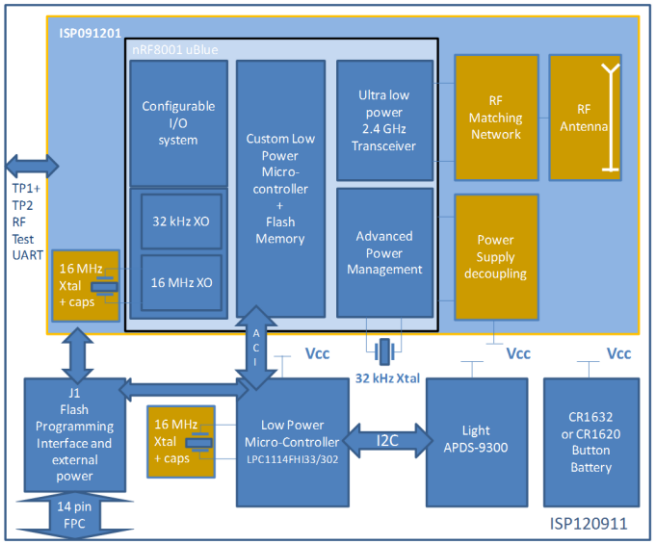
ISP120911
Bluetooth Low Energy Wireless Light Detection Sensor



Key Features

- Single Mode BLE v4.0 Slave Module
- Based on Nordic Semiconductor uBlue 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 Digital Light Sensor
- 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

- Home light monitoring sensors
- Small business light monitoring sensors
- Out of Range (OOR) sensors

General Description

ISP120911 is an autonomous low-power device for wireless light detection and transmission. The complete device makes use of Insight SiP ISP091201 BLE module together with low power host processor, digital temperature 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 light sensor is a low power 32-bit MCU (ARM Cortex-M0 based), the NXP LPC1114FHI33/302, integrating 56kB flash memory and 8kB SRAM.

The Avago APDS-9300, a digital light detection sensor is used to detect ambient light transmitted via the I2C bus. Each APDS-9300 consists of one broadband photodiode (visible plus infrared) and one infrared photodiode. Two integrated ADSs convert the photodiode currents to a digital output that represents the irradiance measured on each channel. This digital output is addressed to the NXP application processor where illuminance (ambient light level) in lux is derived using an empirical formula to approximate the human-eye response.

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 BLE radio testing as specified by the Bluetooth standard.

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1. Electrical Specifications

Current Consumption

The measured total average current consumption and autonomy of the ISP120911 light sensor node supplied by a CR1632 battery for several connection intervals is shown below.

Connection Interval (ms)	Average Current Consumption (µA)	Autonomy (year)
1000	67.8	0.24
2000	40.3	0.40
3000	31.1	0.51
4000	26.5	0.60

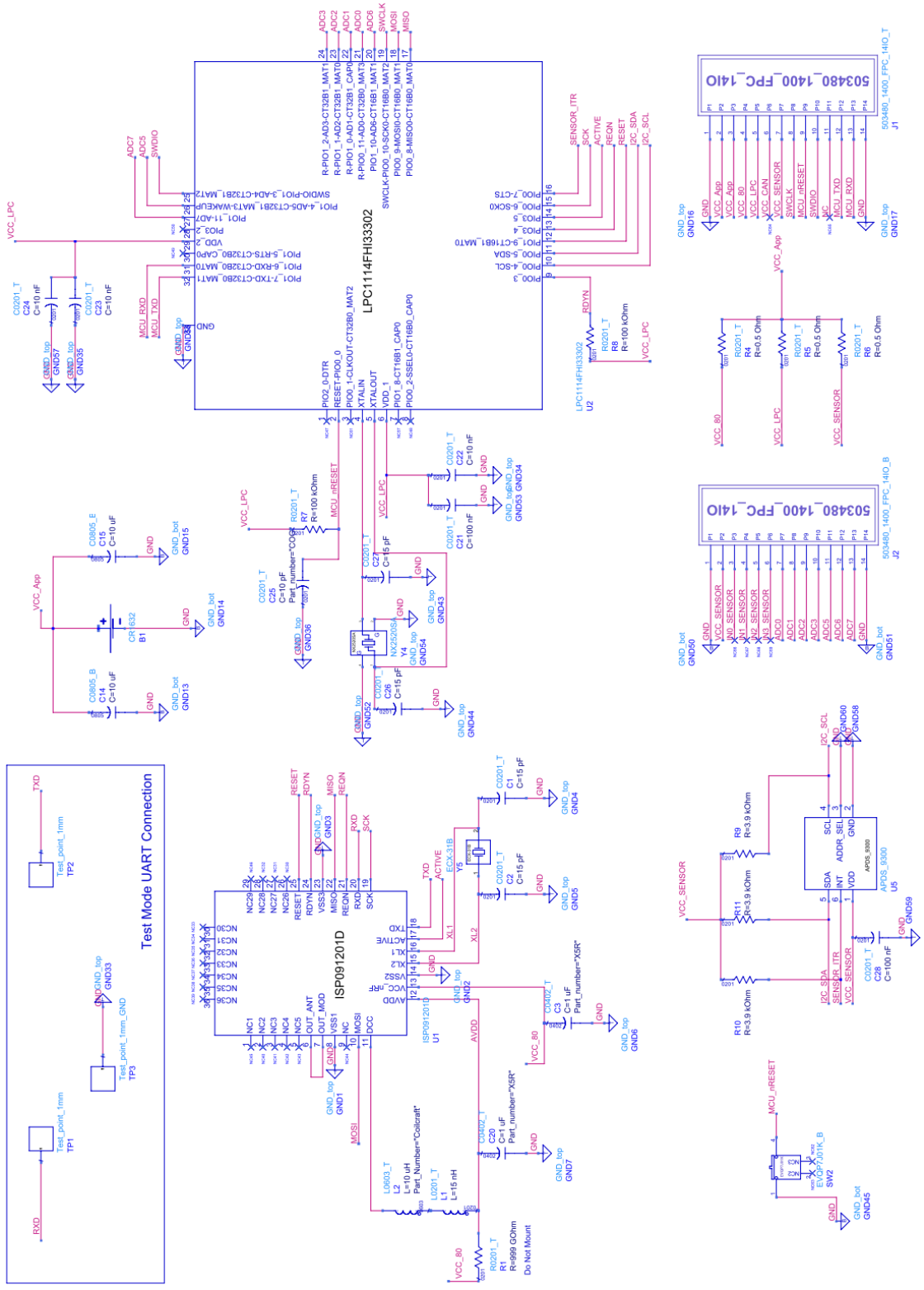
Sensor Performance

The performance of the light sensor is that obtained by the Avago APDS-9300. Key characteristics are shown below:

Parameter	Value	Unit
Light range	Dark to bright sun	
Resolution	16	bits

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Electrical Schematic



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2. RF Performances

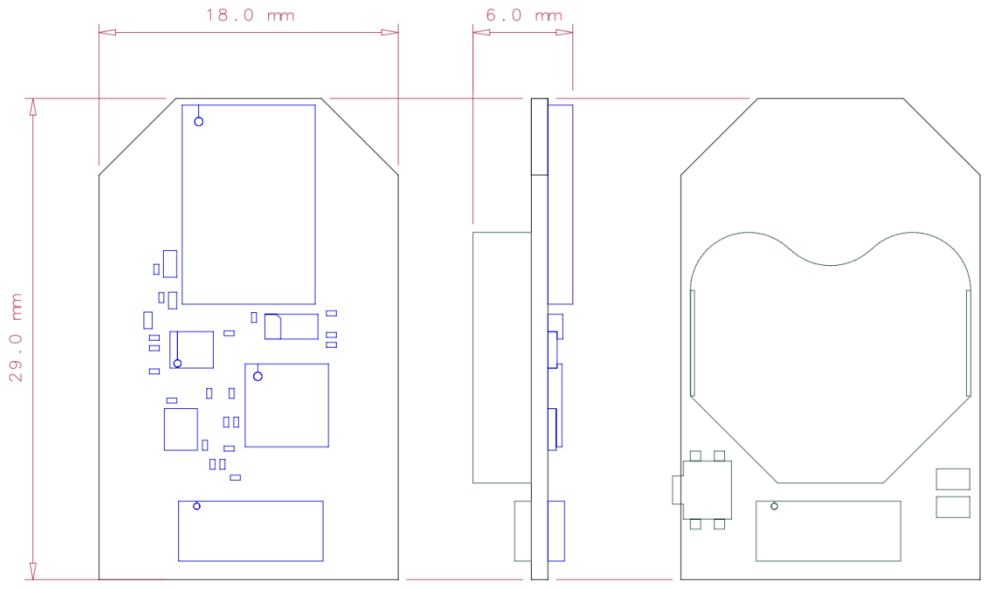
RF Specifications according to standards

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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