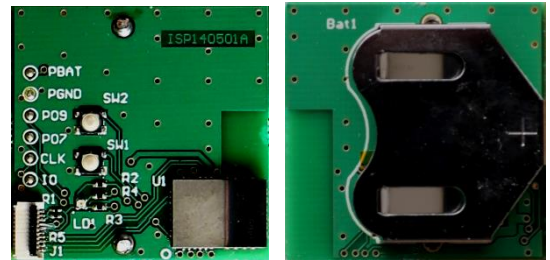


## ISP140501 Bluetooth Low Energy Wireless Beacon Detection



### Key Features

- ✦ Single Mode BLE v4.0 Slave
- ✦ Based on Nordic Semiconductor nRF51 family
- ✦ 2.4GHz low energy RF Transceiver
- ✦ 32bit ARM Cortex M0 CPU with 256kB Flash
- ✦ Fully integrated RF matching and Antenna
- ✦ Integrated 16 MHz and 32.768 kHz Clocks
- ✦ Ultra Low Power Consumption
- ✦ Coin cell battery CR2450
- ✦ Mini-RGB-LED
- ✦ 10 pins FPC connector for software loading
- ✦ Overall Size 33 x 33 x 8.7 mm
- ✦ Temperature -25 to 75 °C

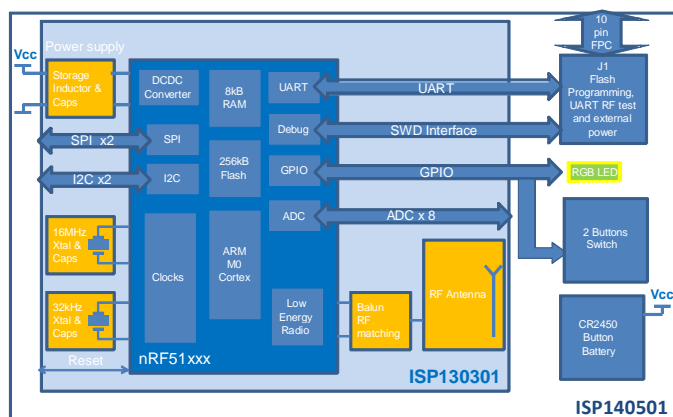
### Applications

- ✦ Location sensitive information
- ✦ Marketing or retail applications
- ✦ Beacon technologies in Healthcare
- ✦ Beacon technologies in Education

### General Description

ISP140501 is an autonomous low-power device for wireless detection and transmission. The complete device makes use of Insight SiP ISP130301 BLE module together with low power host processor and small primary button cell battery CR2450. Overall size of the device is 33 x 33 x 8.7 mm.

It has been developed to explore the full range of development possibilities for beacons using Bluetooth Smart technology. They allow indoor positioning, letting your phone know that you are in range of a beacon. As the "beacon" name suggests, they transmit packets of data in regular intervals, and this data can be then picked up by devices like smartphones.



Ultra low power consumption and advanced power management enables battery lifetimes up to several years on a coin cell battery.

Even though its very small size 8 x 11 x 1.2mm, the ISP130301 SiP module integrates decoupling capacitors, 16 MHz and 32 kHz crystals, load capacitors, DC-DC converter, RF matching circuit and antenna in addition to the wireless SoC. The host processor that handles the autonomous sensor application, the high level portion of the BLE protocol stack and communication with the RGB-LED is a low power 32-bit MCU (ARM Cortex-M0 based), integrating 256kB flash memory and 8kB SRAM.

The two buttons can be programmed to enable easy switching between modes and/or functionality. As well an RGB-LED can be configured to indicate different events.

An interface board, ISP130603 is available from Insight SiP development kit and allows for easy flash programming the application processor via the 10 pin FPC connector. During firmware modification and debug, the ISP140501 device may be supplied via the DC voltage from the ISP130603 interface board.



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## 1. Electrical Specifications

### Current Consumption

The measured total average current consumption and autonomy of the ISP140501 sensor node supplied by CR2450 or AAA battery for several connection intervals is shown below.

Connection Interval (ms)	Peak Current (mA)	Average Current Consumption ( $\mu$ A)	CR2450 Autonomy (year)*	2 x AAA Autonomy (year)*
100	11.7	245	0.3	1.1
750	11.7	32.7	2.1	8.4**
1000	11.7	24.5	2.8	11.2**

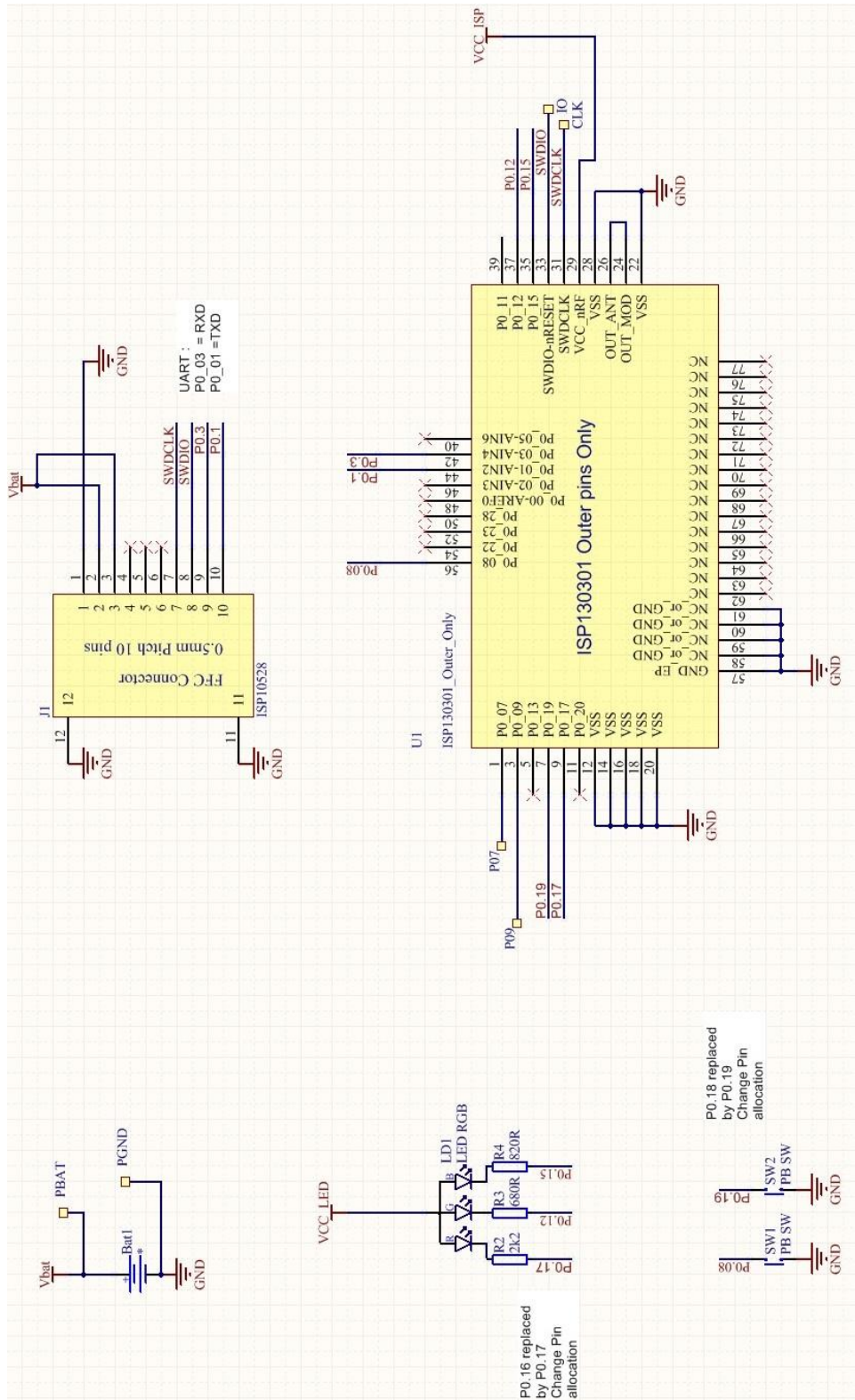
(\*) Example with:

- one battery CR2450 (600 mAh)
- two batteries type AAA 1.5V (2400 mAh for 2 batteries)

(\*\*) Limited by the battery lifetime



## Electrical Schematic



## 2. RF Performances

### RF Specifications according to standards

The performance of the Bluetooth Low Energy Radio link is that obtained by the ISP130301 module.  
Temperature range -25°C to +75°C.

Parameter	Value	BT V4 Std limit	Unit	Condition
Output Power	-20 to +4	-20 to 10	dBm	Channels 0 to 39
RF Frequency tolerance	Better than +/-20	+/- 50	Hz	Channels 0 to 39
Rx sensitivity	-93	-70	dBm	Level for BER <0,1% ideal Tx
Max range	> 200		m	Open field @1m height
EIRP	4.6		dBm	
Antenna Gain	0.6		dBi	
Rx sensitivity	51.4		dBμV/m	

## 3. Mechanical Outlines

### Dimensional drawing

