

RAK8212 Datasheet V1.0

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1. General Description

iTracker Pro RAK8212 is versatile developer board aimed at aiding in quick prototypes using NB-IOT. The board includes a vast array of connectivity options (NB-IoT, BLE 5.0 and GPS) and sensors like an accelerometer, a light sensor and a barometric sensor. At the heart of the module is the venerable Nordic NRF52832 BLE processor. The NB-IoT connectivity is provided by the Quectel BG96 module. The RAK8212 module is Arduino friendly and can be programmed using the IDE. The board also provides SWD interface for programming the NRF52832 core. The combination of BLE and NB-IoT provides flexible low power consumption development along with myriad of application option ranging from telemetry to live tracking and environment sensing. With RAK8212 tracker board the sky is the limit for your ideas !!



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2. Features & Applications

2.1 Features

- Arduino Compatible – Host controller NRF52832 has been widely used in Arduino environment
- Integrated Quectel BG96 NB-IoT wireless communication Module, with GPS built-in.
- Integrated LIS3DH ultra low-power, high performance 3-axes “nano” accelerometer
- Integrated LIS2MDL ultra-low-power, high-performance 3-axis digital magnetic sensor.
- Integrated BME280 ultra low-power, high linearity, high accuracy sensors for pressure, humidity and temperature
- Integrated OPT3001 that measures the intensity of visible light
- Size 43mm x 38mm x 18mm
- Operation temperature -40 °C to +85 °C
- Power supply 3.3V to 5V (power at solar panel connector P2).

2.2 BLE Features

- Bluetooth 5.0
- Single chip, highly flexible, 2.4GHz multi-protocol
- 32-bit ARM Cortex-M4F Processor
- 512kB flash + 64kB RAM
- Supports concurrent Bluetooth low energy/ANT protocol operation
- Up to +4dBm output power
- -96dBm sensitivity, Bluetooth low energy
- 2 data rates (2Mbps/1Mbps)
- PPI-maximum flexibility for power-efficient applications and code simplification
- Automated power management system with automatic power management of each peripheral
- Configurable I/O mapping for analog and digital I/O
- 3 x Master/Slave SPI
- 2 x Two-wire interface (I²C)
- UART (RTS/CTS)
- 3 x PWM
- AES HW encryption
- 12-bit ADC
- Real Time Counter (RTC)
- Digital microphone interface (PDM)
- On-chip balun
- Over-the-Air(OTA) firmware update

2.3 Applications

- Vehicle location / fleet transportation management
- Safety monitoring of old / young children
- Animal protection and animal husbandry management
- Loss of assets / personnel positioning
- Other remote, battery powered applications

3. System Block Diagram

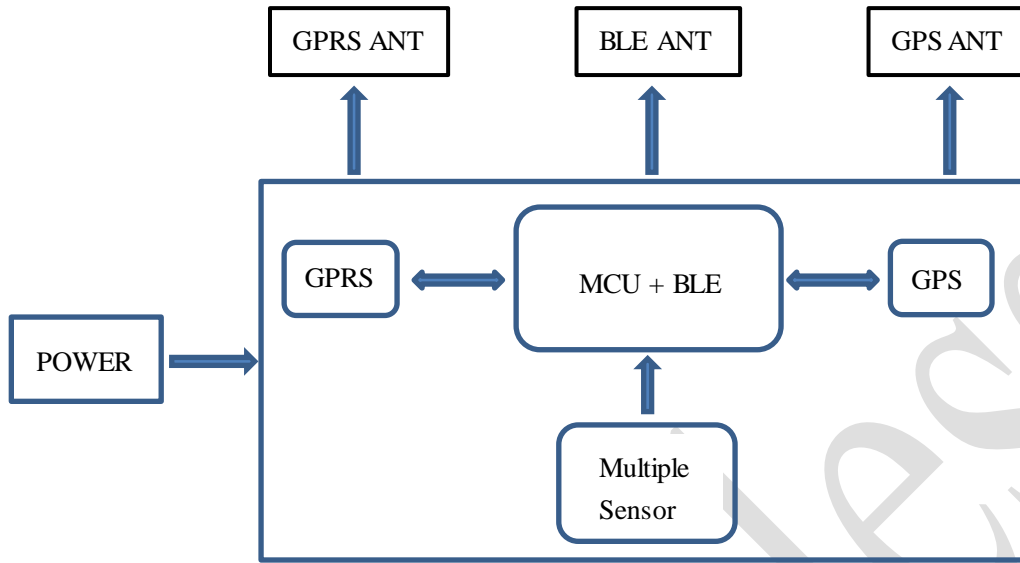


Figure 3-1 System Block Diagram

4. Product Details

4.1 Product Picture

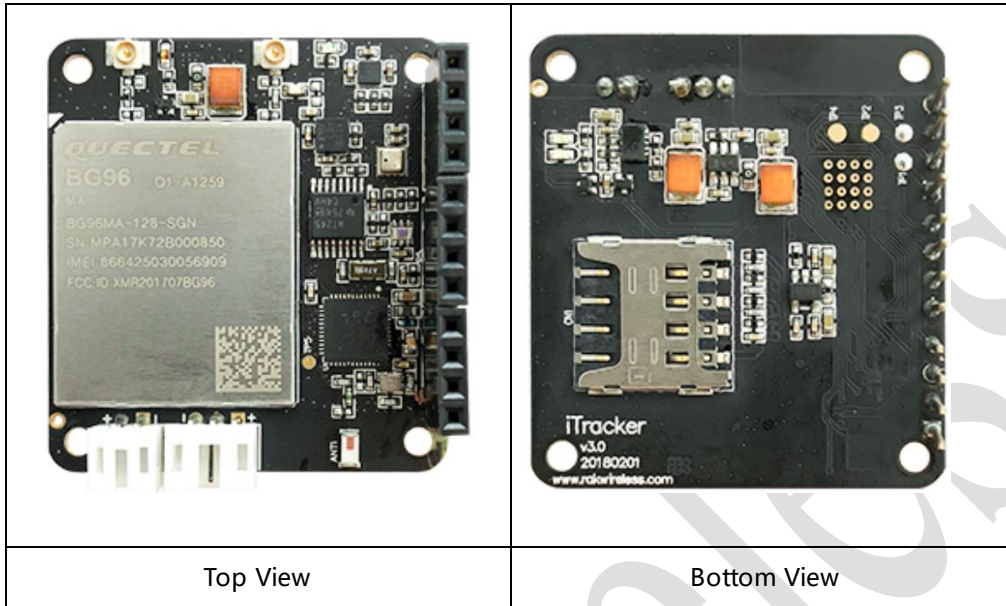


Figure 4-1 Product Picture

4.2 Interface Definition

| NO | Name | Type | Description |
|----|--------------|----------|---|
| P1 | VDD_nRF | P | VCC33 |
| | SWDIO | DI/DO | Debug |
| | SWDCLK | DI | Debug |
| | GND | — | Ground |
| P2 | VBUS | P | Charging interface/Connect to Solar panel |
| | GND | — | Ground |
| P3 | BAT | P | Power Supply |
| | TEMP | O | Charge indicator |
| | GND | — | Ground |
| P4 | RESET | Reset | Reset |
| | VCC33 | P | VCC33 |
| | GND | — | Ground |
| | TILT_DOUT | DI/DO,AI | Extended interface |
| P5 | SENSOR_DOUT1 | DI/DO,AI | Extended interface |
| | SENSOR_DOUT2 | DI/DO,AI | Extended interface |
| | VCC33 | P | VCC33 |
| | GND | — | Ground |

5. General Specification

5.1 Overall Specification

| | |
|-----------------------|---|
| Model Name | RAK8212 |
| Dimension | L x W x H: 43 x 38 x 18 mm |
| Interface | Digital I/O, Analog input |
| Frequency Band | Cat.M1/Cat.NB1: LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28 LTE TDD: B39 (for Cat.M1 only) EGPRS: 850/900/1800/1900MHz |
| Antenna Type | External antenna |
| Operating temperature | -40°C to +85°C |
| Storage temperature | -40°C to +85°C |
| Power Supply | 3.5V~18V |

5.2 GPS Specification

| Feature | Description |
|----------------------|--|
| navigation satellite | GPS, GLONASS, BeiDou/Compass, Galileo and QZSS |
| Protocols | NMEA 0183 |

5.3 GPRS Specification

| Feature | Description |
|--------------------|---|
| Frequency Band | Cat.M1/Cat.NB1: LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28 LTE TDD: B39 (for Cat.M1 only) EGPRS: 850/900/1800/1900MHz |
| Data rate | Cat.M1: Max. 375Kbps (DL), Max. 375Kbps (UL) Cat.NB1: Max. 32Kbps (DL), Max. 70Kbps (UL) GPRS: Max. 85.6Kbps (DL), Max. 85.6Kbps (UL) EDGE: Max. 236.8Kbps (DL), Max. 236.8Kbps (UL) |
| Message | Send and receive point to point SMS |
| | Text and PDU mode |
| Transmitting Power | Class 3 (23dBm±2.7dB) for LTE-FDD bands Class 3 (23dBm±2.7dB) for LTE-TDD bands Class 4 (33dBm±2dB) for GSM850 Class 4 (33dBm±2dB) for GSM900 Class 1 (30dBm±2dB) for DCS1800 Class 1 (30dBm±2dB) for PCS1900 Class E2 (27dBm±3dB) for GSM850 8-PSK Class E2 (27dBm±3dB) for GSM900 8-PSK Class E2 (26dBm±3dB) for DCS1800 8-PSK Class E2 (26dBm±3dB) for PCS1900 8-PSK |
| Sensitivity | -103dBm @ LTE-TDD B39 3GPP |
| Power | Power Consumption under LTE Cat.M1 Network: OFF State Power down Leakage Current 8 μA Power Saving Mode PSM @Real Network 10.4 μA Standby State DRX=1.28s @Real Network 1.99 mA Active State 23dBm @Instrument 190 mA 18dBm @Instrument 155 mA 12dBm @Instrument 136 mA 0dBm @Instrument 124 mA Data Transfer @Real Network 99 mA Voice @Real Network 108 mA |
| Protocol | TCP/UDP/PPP |

6. Contact information

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7. Change Note

| Version | Data | Change |
|---------|----------|------------------|
| V1.0 | 2018-4-2 | Creator Document |

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