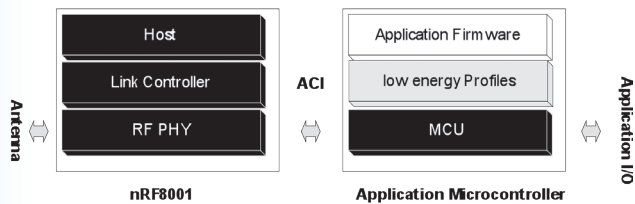


## Complete *Bluetooth* low energy solution

### The nRF8001 connectivity-on-chip solution

The nRF8001 is the first member of Nordic Semiconductor's  $\mu$ Blue family of *Bluetooth* low energy solutions. It is designed to be used in conjunction with an external microcontroller running the application. The nRF8001 integrates a complete PHY, Link Controller and Host single mode *Bluetooth* low energy subsystem and features a simple SPI based interface to the application microcontroller. Qualified profiles, APIs and example application are provided as part of the  $\mu$ Blue SDK which is easily portable to a range of different application microcontrollers. This system segmentation allows the nRF8001 to be used with the best-fit microcontroller for a specific application as well as ease integration and end product qualification as application and protocol stack does not share the same microcontroller.

### nRF8001 application block diagram

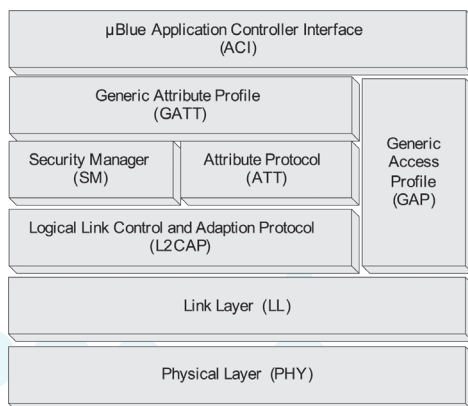


## Optimized single mode slave solution

### *Bluetooth* low energy features

The nRF8001 is a cost and power optimized solution for single mode slave applications such as sports, healthcare and automation sensors, watches, remote controls, proximity tags and mobile phone peripherals. The on-chip protocol stack provides a full slave role support, encryption, client and server protocols, just works security, all mandatory client and server profile features as well as direct test mode for PHY qualification.

### nRF8001 protocol stack



## Designed for coin cell battery operation

### Sub 14mA peak, micro ampere range average currents

The nRF8001 has been designed from scratch to meet the stringent peak current requirements of standard coin cell batteries like CR2032 where total peak current is advised to be below 20mA at any time. Using the on-chip linear regulator the nRF8001 has a peak current below 14mA, thus providing a valuable headroom for the application microcontroller. Depending on the application and profile nRF8001 can support average currents below 10 $\mu$ A, enabling years of battery lifetime on standard coin cell batteries.



RF Silicon

Software

Reference Design

Development Tools

## PRODUCT BRIEF



# nRF8001

## Single mode *Bluetooth* low energy slave connectivity-on-chip solution

### KEY FEATURES

- *Bluetooth* Specification v4.0 compliant single mode low energy solution
- Complete PHY, Link Controller and Host subsystem
- Profiles and example applications provided in  $\mu$ Blue SDK
- Cost and power optimized for slave operation
- Simple SPI based Application Controller Interface (ACI)
- Full Link Controller and Host security
- 1.9 to 3.6V operation
- Linear voltage regulator
- Step-down DC/DC voltage regulator providing up to 20% peak current reduction
- Sub 14mA peak current with linear voltage regulator
- Supports sub 10 $\mu$ A average current operation
- 16MHz crystal oscillators
- Supports low cost external 16MHz crystals
- Ultra low power 32kHz crystal and RC oscillators
- Support operation without external 32kHz crystal
- Battery voltage monitor
- Temperature sensor
- RoHS compliant 5x5mm 32-pin QFN package

### APPLICATIONS

- Sports and fitness sensors
- Healthcare and medical sensors
- Continua™ Version Two certified products
- Remote controls
- Watches
- Mobile phone peripherals
- Automation sensors
- Proximity tags

## On-chip peripherals

### ±250 ppm 32kHz RC oscillator

The 32kHz RC oscillator enables the nRF8001 to be used in application without an external 32 kHz crystal saving both cost and board space.

### Ultra low power 32kHz crystal oscillator

For connection oriented modes with long connection intervals the ultra low power 32kHz crystal oscillators with an external high precision crystal provides the lowest power solution.

### Step down DC/DC converter

The step down DC/DC converter is specifically designed to reduce peak current when operating from 3V nominal coin cell batteries. When used it provides up to 20% lower peak currents compared to using the linear voltage regulator at 3V input.

### Battery monitor

The battery monitor is using an on-chip ADC to measure the supply voltage and is accessible over the ACI.

### Temperature sensor

The temperature sensor provides 10-bit temperature reading through the ACI with a range from -40 to +80°C.

## µBlue Software Development Kit (SDK)

### Bluetooth low energy profiles

The µBlue SDK includes qualified Bluetooth low energy profiles, ACI transport layers and example applications. It is provided in c-source code and is easily portable to a range of different. The profiles in the µBlue SDK complements the on chip protocol stack in the nRF8001 to provide a easy to use complete qualified Bluetooth low energy solution.

## For more information

Please visit [www.nordicsemi.com](http://www.nordicsemi.com) for the complete product specification and more information about this or any other ULP wireless products.

## About Nordic Semiconductor ASA

### Ultra low power RF silicon solutions

Nordic Semiconductor is a fabless semiconductor company specializing in ULP short-range wireless communication. Nordic is a public company listed on the Norwegian stock exchange.

Nordic provides RF Silicon Solutions for ultra low power wireless connectivity including:

- Proprietary 2.4GHz and Sub 1 GHz ISM band solutions
- Single chip ANT™ solutions
- µBlue Bluetooth low energy solutions

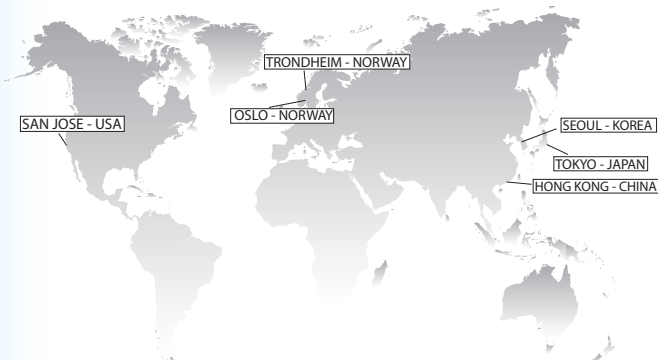
## Worldwide office locations

### Headquarter

Trondheim, Norway

Telephone: +47 72 89 89 00

[www.nordicsemi.com](http://www.nordicsemi.com)



## Specifications

Frequency band	2.4GHz ISM ( 2.40200 – 2.4800GHz)
On-air data rate	1 Mbps
Modulation	GFSK
RF channel resolution	2MHz
RF channels	40
Output power	Programmable: 0, -6, -12 or -18 dBm
RF Standard compliance	Bluetooth v4.0 single mode PHY
External crystal(s)	16MHz ±60ppm 32kHz ±250ppm or better (optional)
Supported protocols	Bluetooth low energy - Link Controller - Host (L2CAP, Security Manager, Attribute Protocol, Generic Access Profile, Generic Attribute Profile)
Protocol features	Bluetooth low energy - Link layer slave role - Link layer encryption - Attribute Protocol client - Attribute Protocol server - Generic Attribute Profile client - Generic Attribute Profile server - Direct Test Mode (DTM)
External Microcontroller interface	SPI Physical transport µBlue ACI Logical transport
Oscillators	16MHz crystal oscillator 32kHz crystal oscillator 32kHz ±250ppm RC oscillator
Digital I/O	SPI Slave 2-wire UART
Analog peripherals	Temperature sensor Battery monitor
Voltage regulator	Linear (1.9 to 3.6V operation) Step down DC/DC (2.1 to 3.6V operation)
Package options	RoHS compliant 32-pin 5x5mm QFN

Visit [www.nordicsemi.com](http://www.nordicsemi.com) for Nordic Semiconductor sales offices and distributors worldwide.