



# nRF51822

*Multi-protocol Bluetooth Low Energy and 2.4GHz proprietary system-on-chip*

## ULP wireless system-on-chip

The nRF51822 is a powerful multi-protocol single chip solution for ULP wireless applications. It incorporates Nordic's latest best-in-class performance radio transceiver, an ARM Cortex M0 CPU and 256kB flash + 16kB RAM memory. The nRF51822 supports *Bluetooth*® low energy and 2.4 GHz protocol stacks.



## Lower power and higher performance

The nRF51822 uses the 32-bit ARM Cortex M0 MCU, together with extensive flash availability, 256kB in total, with 128kB available for application development. Code density and execution speed are considerably greater than for 8/16-bit platforms. The Programmable Peripheral Interconnect (PPI) system provides a 16-channel bus for direct and autonomous system peripheral communication without CPU intervention. This brings predictable latency times for peripheral to peripheral interaction and power saving benefits associated with leaving the CPU idle. The device has 2 global power modes ON/OFF, but all system blocks and peripherals have individual power management control which allows for an automatic switching RUN/IDLE for system blocks based only on those required/not required to achieve particular tasks.

The new radio forms the basis of the nRF51822's performance. The radio supports *Bluetooth* Low Energy and is on air compatible with the nRF24L-series products from Nordic Semiconductor. Output power is now scalable from a maximum of +4dBm down to -20dBm in 4dB steps. Sensitivity is increased at every level and offers sensitivity ranges (dependent on data rate) from -96 to -85dBm, with -92.5dBm for *Bluetooth* low energy.

## KEY FEATURES

- Multi-protocol 2.4GHz radio
- 32-bit ARM Cortex M0 processor
- 256kB flash/16kB RAM
- Software stacks available as downloads
- Pin compatible with other nRF51xxx series devices
- Application development independent from protocol stack
- Fully on-air compatible with nRF24L-series
- Programmable output power from +4dBm to -20dBm
- RSSI
- RAM mapped FIFOs using EasyDMA
- Dynamic on air payload length up to 256 Bytes
- Flexible and configurable 31 pin GPIO
- Programmable Peripheral Interface – PPI
- Simple ON/OFF global power modes
- Full set of digital interfaces including: SPI/2-wire/UART
- 10-bit ADC
- 128-bit AES ECB/CCM/AAR co-processor
- Quadrature demodulator
- Low cost external crystal 16MHz ± 40ppm
- Low power 16MHz crystal and RC oscillators
- Ultra low-power 32kHz crystal and RC oscillators
- Wide supply voltage range (1.8 V to 3.6 V)
- On-chip DC/DC buck converter
- Individual power management for all peripherals
- Package options: 48-pin 6x6 QFN

## APPLICATIONS

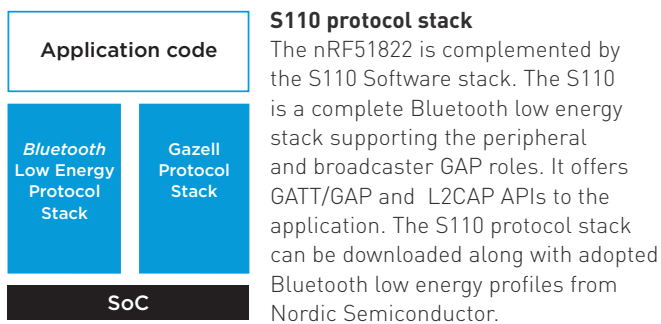
- Bluetooth Smart applications
- Mobile phone accessories
- Computer peripherals
- CE remote controls for TV, STB and media systems
- Proximity and security alert tags
- Sports- and fitness sensors
- Healthcare and lifestyle sensors
- Game controllers for computers
- Toys and Electronic games
- Domestic/Industrial control and data-acquisition
- Smart RF tags for tracking and social interaction
- Audience response system
- Intelligent domestic appliances

## Easy, fast and safe code development

The nRF51822 offers developers a clean separation between application code development and embedded protocol stacks. This means compile, link and run-time dependencies with the embedded stack and associated de-bugging challenges are removed. The Bluetooth low energy stack is a pre-compiled binary available from Nordic Semiconductor, leaving application code to be compiled stand-alone. The embedded stack interface uses an asynchronous and event-driven model removing the need for RTOS frameworks. Developers can concentrate with confidence on what they do best - developing applications.

## Maximum re-use and easy migration

The devices in the nRF51 series are pin compatible enabling migration between technologies such as Bluetooth low energy and ANT with no layout changes. The common HW architecture ensures that one codebase can be re-used effortlessly between nRF51 series devices. Variants in the nRF51 series enable simple choices tailoring device selection to desired wireless protocol and feature requirements with little or no changes.



## Development tools

Nordic Semiconductor provides a complete range of hardware and software development tools for the nRF51 series devices. For more information contact us.

## RELATED PRODUCTS

|             |                        |
|-------------|------------------------|
| nRF6700     | nRFgo Starter Kit      |
| nRF51822-DK | nRF51822 Develop Kit   |
| nRF51422    | ANT multi-protocol SoC |

## SPECIFICATIONS

|                                       |   |
|---------------------------------------|---|
| Frequency band                        | 2.4GHz ISM ( 2.40000 – 2.4835GHz)   |
| On-air data rate                      | 250 kbps, 1 Mbps or 2 Mbps  |
| Modulation                            | GFSK  |
| Output power                          | Programmable: +4 to -20dBm in 4dB steps   |
| Sensitivity                           | -92.5dBm <i>Bluetooth</i> low energy<br>-96dBm at 250kb<br>-90dBm at 1Mbs<br>-85dBm at 2Mbs                   |
| Radio current consumption LDO at 1.8V | 16mA – TX at +4dBm output power<br>10.5mA – TX at 0dBm output power<br>13mA – RX at 1Mbs                      |
| Radio current consumption DC-DC at 3V | 10.5mA – TX at +4dBm output power<br>8.1mA – TX at 0dBm output power<br>9.5mA – RX at 1Mbs                    |
| Microcontroller                       | 32-bit ARM Cortex M0  |
| Program Memory                        | 256kB Flash   |
| RAM                                   | 16kB  |
| Oscillators                           | 16MHz crystal oscillator<br>16MHz RC oscillator<br>32kHz crystal oscillator<br>32kHz RC oscillator (±250 ppm) |
| System current consumption            | 420nA – No RAM retention<br>530nA – 8k RAM retention<br>2µA – All peripherals in IDLE mode                    |
| Hardware Security                     | 128-bit AES ECB/CCM/AAR co-processor  |
| GPIO                                  | 31 configurable   |
| Digital I/O                           | X2 Hardware SPI master<br>2X 2-wire master<br>UART<br>Quadrature demodulator                                  |
| Peripherals                           | 10-bit ADC<br>RNG<br>Temperature sensor<br>RTC  |
| PPI                                   | 16-channel  |
| Voltage regulator                     | LDO (1.8 to 3.6V),<br>LDO bypass (1.75 to 1.95V)<br>Buck DC/DC (2.1 to 3.6V)                                  |
| Timers/counters                       | 2 x 16 bit, 1 x 24bit, 2 x 24bit, RTC   |
| Package options                       | RoHS compliant 48-pin 6x6 QFN   |

## WORLD WIDE OFFICE LOCATIONS

### Headquarters:

Trondheim, Norway  
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### For more information

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

### About Nordic Semiconductor

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.

## Данный компонент на территории Российской Федерации

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В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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