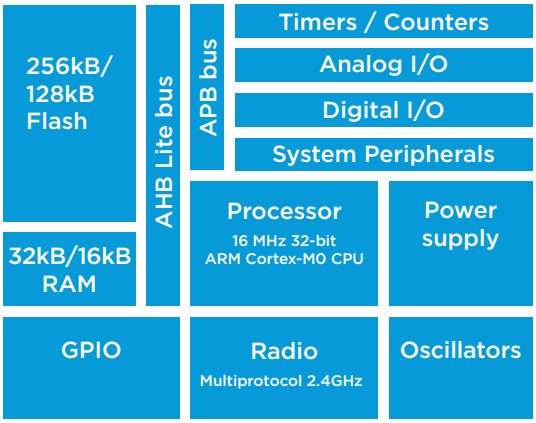
NORDIC SEMICONDUCTOR

nRF51822

Multiprotocol Bluetooth low energy and 2.4GHz proprietary System-on-Chip

ULP wireless System-on-Chip

The nRF51822 is a powerful multiprotocol 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/128kB flash and 32kB/16kB RAM memory. The nRF51822 supports *Bluetooth*® low energy (formerly known as Bluetooth Smart) 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/128kB in total with 40kB-180kB 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 -93dBm for Bluetooth low energy.

KEY FEATURES

- Multiprotocol 2.4GHz radio
- 32-bit ARM Cortex M0 processor
- 256kB/128kB flash and 32kB/16kB RAM
- Software stacks available as downloads
- Pin compatible with other nRF51 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/WLCSP, Thin-CSP

APPLICATIONS

- Bluetooth low energy applications
- Wearables
- Beacons
- Appcessories
- 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
- Intelligent domestic appliances

Easy, fast and safe code development

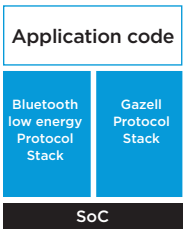
The nRF51822 offers developers a clean separation between application code development and embedded protocol stacks. This means compile, link and run-time dependencies with the embedded stack and associated de-bugging challenges are removed. The Bluetooth low energy stack is a pre-compiled binary available 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.

OTA DFU

The nRF51822 is supported by a Over The Air Device Firmware Upgrade (OTA-DFU) feature. This allows for in the field updates of application software and SoftDevices.

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.



SoftDevices

The Nordic protocol stacks are known as SoftDevices and complement the nRF51 Series SoCs. All nRF51 Series are programmable with software stacks available from Nordic Semiconductor. This brings maximum flexibility to application development and allows the latest stack version to be programmed into the nRF51 Series SoC.

nRF51822 compatible SoftDevices

S130	Bluetooth low energy concurrent central/ peripheral/observer/broadcaster stack

Development tools

Nordic Semiconductor provides a complete range of hardware and software development tools for the nRF51 Series devices.

RELATED PRODUCTS

nRF51 DK	Development kit for Bluetooth low energy, ANT and 2.4GHz applications
nRF51 Dongle	Bluetooth low energy/ANT/2.4GHz development dongle
nRF51422	ANT/Bluetooth low energy multiprotocol 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	-93dBm Bluetooth low energy -96dBm at 250kb -90dBm at 1Mbs -85dBm at 2Mbs
Radio current consumption LDO at 1.8V	16mA – TX at +4dBM output power 10.5mA – TX at 0dBm output power 13mA – RX at 1Mbs
Radio current consumption DC-DC at 3V	10.5mA – TX at +4dBm output power 8.06mA – TX at 0dBm output power 9.7mA – RX at 1Mbs
Microcontroller	32-bit ARM Cortex M0
Program Memory	256kB/128kB Flash
RAM	32kB/16kB
Oscillators	16MHz crystal oscillator 16MHz RC oscillator 32kHz crystal oscillator 32kHz RC oscillator (±250 ppm)
System current consumption	0.6µA – No RAM retention 1.2µA - 8k RAM retention 2.6µA – 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 2X 2-wire master UART Quadrature demodulator
Peripherals	10-bit ADC RNG Temperature sensor RTC
PPI	16-channel
Voltage regulator	LDO (1.8 to 3.6V), LDO bypass (1.75 to 1.95V) 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 / 3 Ultra-compact Wafer Level Chip Scale Package options (WLCSP), Thin-CSP

WORLD WIDE OFFICE LOCATIONS

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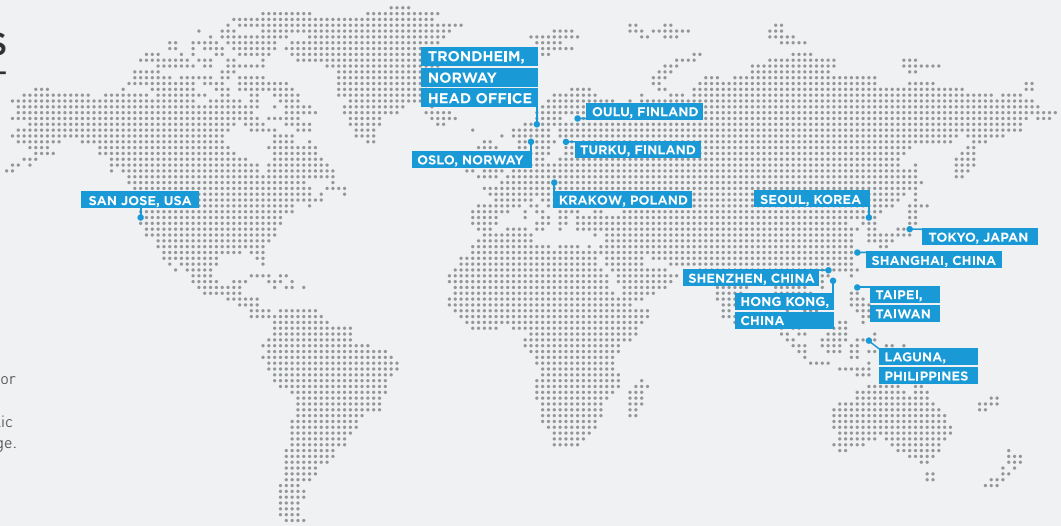

For more information
Visit **www.nordicsemi.com** for the complete product specification about this and any other wireless ultra-low power products.

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