

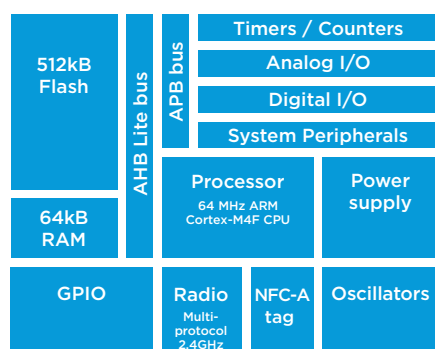


nRF52832

Multiprotocol Bluetooth Smart, ANT/ANT+ and 2.4GHz proprietary System-on-Chip

ULP wireless System-on-Chip

The nRF52832 is a powerful multiprotocol single chip solutions for ULP wireless applications. It incorporates Nordic's latest best-in-class performance radio transceiver, an ARM® Cortex™ M4F CPU and 512kB flash and 64kB RAM memory. The nRF52832 supports Bluetooth® Smart (formerly known as Bluetooth low energy), ANT and 2.4GHz proprietary protocol stacks. The device also has a NFC-A tag interface for OOB pairing.



Lower power and higher performance

The nRF52832 uses the 32-bit ARM Cortex M4F MCU, together with extensive flash availability, 512kB in total with 400kB available for application development. Code density and execution speed are considerably greater than for 8/16-bit platforms. Having HW support for DSP instructions as well as for Floating point operations positions the Cortex M4F above Cortex M0/M0+/M3 and M4 performance wise. The Programmable Peripheral Interconnect (PPI) system provides a 20-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 nRF52832 performance. The radio supports Bluetooth Smart and ANT and is on air compatible with nRF24AP, nRF24L and nRF51 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 -89dBm, with -96dBm for Bluetooth Smart, and -92.5dBm for ANT.

KEY FEATURES

- Multi-protocol 2.4GHz radio
- 32-bit ARM Cortex M4F processor
- 512kB flash + 64kB RAM
- Software stacks available as downloads
- Application development independent from protocol stack
- On-air compatible with nRF51, nRF24AP and 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 32 pin GPIO
- Programmable Peripheral Interface – PPI
- Simple ON/OFF global power modes
- Full set of digital interfaces including: SPI/2-wire/UART/PDM/I2S, all with EasyDMA
- 12-bit/200KSPS ADC
- 128-bit AES ECB/CCM/AAR co-processor
- Quadrature demodulator
- Low cost external crystal 32MHz ± 40ppm for Bluetooth, ± 50ppm for ANT
- Low power 32MHz crystal and RC oscillators
- Ultra low-power 32kHz crystal and RC oscillators
- Wide supply voltage range (1.7 V to 3.6 V)
- On-chip DC/DC buck converter
- Individual power management for all peripherals
- Package options: 48-pin 6x6 QFN/WL-CSP

APPLICATIONS

- **IoT**
 - Home automation
 - Sensor networks
 - Building automation
- **Personal Area Networks**
 - Health/fitness sensor and monitor devices
 - Medical devices
 - Key-fobs + wrist watches
- **Interactive entertainment devices**
 - Remote control
 - Gaming controller
- **Beacons**
- **A4WP wireless chargers and devices**
- **Remote control toys**
- **Computer peripherals and I/O devices**
 - Mouse
 - Keyboard
 - Multi-touch trackpad

The NFC module supports NFC-A tags with proximity detection and Wake-on-field from low power mode. The NFC enables Out-Of-Band Bluetooth pairing of devices and thus greatly simplifying deployment.

Easy, fast and safe code development

The nRF52832 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 Smart and ANT 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 nRF52832 is supported by an Over-The-Air Device Firmware Upgrade (OTA DFU) feature. This allows for in the field updates of application software and SoftDevice.

Maximum re-use and easy migration

The nRF52832 have binary compatible peripherals with the nRF51 Series for most functions enabling easy migration between older parts and the new nRF52 Series. The backwards compatibility of most interfaces and the common SW architecture of the nRF51 Series S130 and the nRF52 Series S132 SoftDevices ensures that existing codebase for the nRF51 Series can in very large parts be re-used effortlessly on the nRF52 Series.

SoftDevices

The Nordic protocol stacks are known as SoftDevices and complement the nRF52 Series SoCs. All nRF52 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 nRF52 Series SoC.

Development tools

Nordic Semiconductor provides a complete range of hardware and software development tools for the nRF52 Series devices.

nRF52832 compatible SoftDevices

| | |
|------|---|
| S132 | Bluetooth Smart concurrent central/peripheral/observer/broadcaster stack |
| S212 | ANT 8-link |
| S332 | Bluetooth Smart concurrent central/peripheral/observer/broadcaster /ANT 8-link (concurrent) |

SPECIFICATIONS

| | |
|--|---|
| Frequency band | 2.4GHz ISM (2.36000 – 2.48356GHz) |
| On-air data rate | 1 Mbps or 2 Mbps |
| Modulation | GFSK |
| Output power | Programmable: +4 to -20dBm in 4dB steps |
| Sensitivity | -96dBm Bluetooth, -92.5dBm at 1Mbps ANT, -89dBm at 2Mbps, -30dBm whisper mode |
| Radio current con-sumption LDO at 1.8V | 15.2mA – TX at +4dBm output power, 10mA – TX at 0dBm output power, 10.4mA – RX at 1Mbps |
| Radio current consumption DC-DC at 3V | 7.7mA – TX at +4dBm output power, 5.5mA – TX at 0dBm output power, 5.5mA – RX at 1Mbps |
| Microcontroller | 32-bit ARM Cortex M4F |
| Program Memory | 512kB Flash |
| RAM | 64kB |
| Oscillators | 32MHz crystal oscillator, 64MHz RC oscillator, 32kHz crystal oscillator, 32kHz RC oscillator (±250 ppm) |
| System current consumption | 0.4µA – No RAM retention, 1.2µA – All peripherals in IDLE mode, 1.6µA – All peripherals in IDLE mode and 32KHz XO and RTC running, 40nA per 4KB – RAM retention |
| Hardware Security | 128-bit AES ECB/CCM/AAR co-processor |
| GPIO | 32 configurable |
| Digital I/O | 3 x Hardware SPI master, 3 x Hardware SPI slave, 2 x 2-wire master, 2 x 2-wire slave, UART, Quadrature demodulator |
| Peripherals | 12-bit/200KSPS ADC, RNG, Temperature sensor |
| PPI | 20-channel |
| Voltage regulator | LDO (1.7 to 3.6V), Buck DC/DC (1.7 to 3.6V) |
| Timers/counters | 5 x 32bit, 3 x 24bit RTC |
| Package options | RoHS compliant 48-pin 6x6 QFN / 3.0x3.2 Ultra-compact Wafer Level Chip Scale Package (WLCSPP) |

RELATED PRODUCTS

| | |
|------------------|--|
| nRF52 Preview DK | Development kit for Bluetooth Smart, ANT and 2.4GHz applications |
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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 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.

