nRF52833

Bluetooth 5.1 SoC supporting Bluetooth Low Energy, Bluetooth mesh, Thread and Zigbee, qualified up to 105°C ambient temperature.

Overview
The ultra-low power nRF52833 is a multiprotocol SoC with a Bluetooth 5.1 Direction Finding capable radio, qualified for operation at an extended temperature range of -40°C to 105°C. It supports Bluetooth 5.1, Bluetooth mesh, 802.15.4, Thread, Zigbee, and proprietary 2.4 GHz protocols.

The nRF52833 is the 5th addition to the industry leading nRF52 Series SoC family and is built around a 64 MHz Arm Cortex-M4 with FPU, and has 512 KB flash and 128 KB RAM memory available for higher value applications. The extended temperature range up to 105°C, a generous amount of memory, and dynamic multiprotocol support ensures the nRF52833 is an ideal device for a wide range of commercial and industrial applications, including professional lighting and asset tracking. A 1:4 RAM to Flash ratio and +8 dBm output power make the nRF52833 suitable for advanced wearables or smart home applications where robust coverage is important.

It includes a range of analog and digital interfaces such as NFC-A, ADC, Full-speed 12 Mbps USB 2.0, High-speed 32 MHz SPI, UART/SPI/TWI, PWM, I2S and PDM, and has a 1.7 V to 5.5 V supply voltage range, which enables powering the device from rechargeable batteries or over USB. The two-stage LDO regulator and a DC-DC converter, together with the automated power management system help deliver low power numbers even in more advanced applications.

Professional lighting
Saving electricity while ensuring properly lighted areas is a high priority concern for commercial building owners. In addition to leveraging the maturity of the tried and tested nRF52 series, the nRF52833 comes qualified for 105°C ambient temperature operation, and ample available memory allows for concurrent operation of multiple protocols in the 2.4 GHz frequency band, for instance Bluetooth Low Energy in conjunction with Bluetooth Mesh, Thread, or Zigbee. The nRF52833 is a high quality device targeting the performance, connectivity and stability that is required of such systems.

Feature comparison	nRF52810	nRF52811	nRF52832	***nRF52833***	nRF52840
Bluetooth 5 2 Mbps & CSA #2	X	X	X	***X***	X
Bluetooth 5 Advertising Extensions		X	X	***X***	X
Bluetooth 5 Long Range		X		***X***	X
Bluetooth 5.1 Direction Finding		X		***X***	
Input supply range (V)	1.7-3.6	1.7-3.6	1.7-3.6	***1.7-5.5***	1.7-5.5
Max temperature (°C)	+85	+85	+85	***+105***	+85

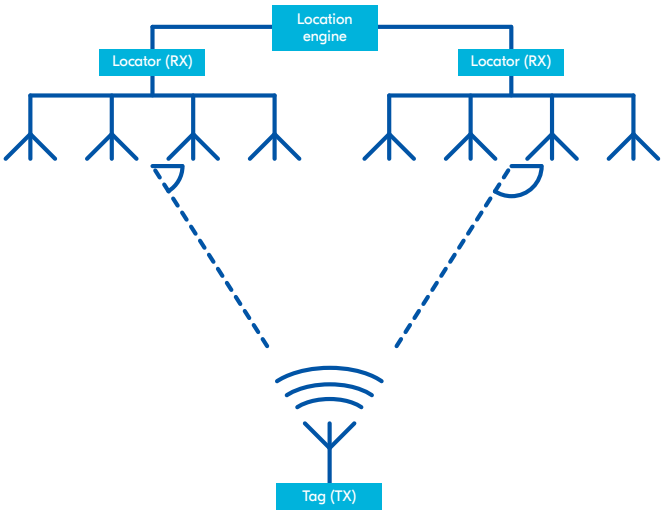
KEY FEATURES

- 64 MHz Arm® Cortex-M4 with FPU
- 512 KB Flash + 128 KB RAM
- Bluetooth 5.1 radio
  - Direction Finding
  - Long Range
  - Bluetooth mesh
  - +8 dBm TX power
  - -95 dBm sensitivity (1 Mbps)
  - 4.8 mA in TX (0 dBm)
  - 4.6 mA in RX (1 Mbps)
  - Integrated balun with single-ended output
- IEEE 802.15.4 radio support
  - Thread
  - Zigbee
- Extended temperature range: -40°C to 105°C
- 1.7-5.5 V supply voltage range
- Integrated DC-DC regulator
- Full-speed 12 Mbps USB
- NFC-A tag
- 128 bit AES/ECB/CCM/AAR accelerator
- 12-bit 200 ksps ADC
- High speed 32 MHz SPI
- Full range of digital interfaces with EasyDMA

APPLICATIONS

- Professional lighting
- Asset tracking
- Wayfinding
- Multiprotocol devices
- Mesh networks
- Advanced wearables
- Smart home
- HID/Gaming/VR
- Toys
- Sports and fitness

Bluetooth 5.1 Direction Finding
The nRF52833 includes a radio capable of Bluetooth® 5.1 Direction Finding. Direction Finding enables positioning solutions to not only rely on received signal strength indicator (RSSI), but also the actual direction of a signal. This improves accuracy and opens new possibilities for applications in this segment. There are two types of methods for determining direction, angle of arrival (AoA), where the direction of the received signal is calculated, and angle of departure (AoD), where the direction of the transmitted signal is calculated. In addition to act as a simple transmitter in either scheme, the generous available memory and processing power on the nRF52833 also allows for calculating the angles when being a receiver in either AoA or AoD mode. Illustrated below is an example of a real time location system (RTLS) where the principle of AoA is used to deremine the location of a tag.



Get started today
The nRF52833 is supported by the nRF5 SDK, nRF5 SDK for Mesh and nRF5 SDK for Thread & Zigbee. The SDKs provide all necessary examples, libraries and drivers to get started with Bluetooth Low Energy, Bluetooth mesh, Thread or Zigbee development. The nRF52833 has Bluetooth 5.1 qualified protocol stack support using either the S113 or S140 SoftDevices from Nordic Semiconductor. S140 is a feature complete Bluetooth 5 protocol stack and includes support for high throughput with 2 Mbps transfer, Bluetooth Long Range, and improved coexistence with Channel Selection Algorithm #2.

The nRF52833 DK is an affordable single-board development kit for *Bluetooth*® 5.1, Bluetooth mesh, Thread, Zigbee, 802.15.4 and 2.4 GHz proprietary applications using the nRF52833 multi-protocol SoC. The kit is compatible with the Arduino Uno Rev3 standard, has access to all I/Os (42) and interfaces via connectors, and there is an integrated PCB trace antenna and an RF connector for direct RF test measurements.

SPECIFICATIONS

Protocol support	Bluetooth 5.1/802.15.4/2.4 GHz proprietary
Microprocessor	64 MHz 32-bit Arm Cortex-M4 with FPU
Memory	512 KB Flash + 128 KB RAM
On-air data rate	Bluetooth 5.1: 2 Mbps/1 Mbps/500 kbps/125 kbps 802.15.4: 250 kbps 2.4 GHz proprietary: 2 Mbps / 1 Mbps
TX power	Programmable from +8 dBm to -20 dBm in 4 dB steps
Sensitivity	Bluetooth 5: -103 dBm at 125 kbps -95 dBm at 1 Mbps 802.15.4: -99 dBm at 250 kbps 2.4 GHz: -93 dBm at 1 Mbps -89 dBm at 2 Mbps
Radio current consumption DC/DC at 3 V	15.50 mA at +8 dBm TX power, 6.0 mA at 0 dBm TX power, 6.0 mA in RX at 1 Mbps
Oscillators	64 MHz from 32 MHz external crystal or internal 32 kHz from crystal, RC or synthesized
System current consumption DC/DC at 3 V	0.6 µA in System OFF, no RAM retention 1.3 µA in System OFF, full RAM retention 1.1 µA in System ON, no RAM retention 1.8 µA in System ON, full RAM retention 2.6 µA in System ON, full RAM retention and RTC
Hardware security	128-bit AES CCM, ECB, AAR
Digital interfaces	USB 2.0, High speed SPI master, 3 × SPI master/slave, 2 × TWI master/slave, 2 × UART, 4 × PWM I²S, PDM, QDEC
Analog interfaces	12-bit 200 ksps ADC, GP and LP comparators
Peripherals	5 × 32 bit timer/counter, 3 × 24 real-time counter, 20 × PPI channels, 4 × GPIOTE channels, temperature sensor, watchdog timer, RNG
NFC	NFC-A tag
Temperature range	-40°C to 105°C
Voltage supply	1.7 to 5.5 V LDO and DC/DC
Package options	7×7 mm aQFN™73 with 42 GPIOs 5×5 mm QFN40 with 18 GPIOs 3.2×3.2 mm WLCSP with 42 GPIOs

RELATED PRODUCTS

nRF52833 DK	Development kit for nRF52833 SoC
nRF5 SDK	Main software development kit for Bluetooth 5.1, ANT and 802.15.4
nRF5 SDK for Thread and Zigbee	Software development kit for Thread and Zigbee
nRF5 SDK for mesh	Software development kit for Bluetooth mesh applications

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For more information
Visit **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.