nRF52833

Bluetooth 5.3 SoC supporting Bluetooth Low Energy, Bluetooth mesh, NFC, Thread and Zigbee, qualified for up to 105°C.

Overview

The nRF52833 is an ultra-low-power multiprotocol SoC qualified for operation at an extended temperature range of -40° C to 105° C. Its feature set fulfills the requirements of professional lighting, advanced wearables, and higher value IoT applications. It supports Bluetooth LE, Bluetooth mesh, 802.15.4, Thread, Zigbee, and proprietary 2.4 GHz protocols.

The nRF52833 is built around a 64 MHz Arm Cortex-M4 with floating-point unit (FPU). It 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. The 1:4 RAM to Flash ratio and +8 dBm output power make the nRF52833 SoC 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. The 1.7 V to 5.5 V supply voltage range, enables powering the device from rechargeable batteries or over USB.

Wireless protocol support

The nRF52833 SoC supports an extensive range of wireless protocols. It supports Bluetooth Low Energy and is capable of all angle-of-arrival and angle-of-departure roles in Direction Finding, Long Range, high-throughput 2 Mbps and Advertising Extensions features. Mesh protocols like Bluetooth mesh, Thread and Zigbee can be run concurrently with Bluetooth LE, enabling smartphones to provision, commission, configure and control mesh nodes. NFC, ANT, 802.15.4 and 2.4 GHz proprietary protocols are also supported.

Key features

- Arm processor
  - 64 MHz Arm® Cortex-M4 with FPU
  - 512 KB Flash + 128 KB RAM
  - 8 KB cache
- Bluetooth 5.3 Radio
  - Direction Finding
  - Long Range
  - Bluetooth mesh
  - +8 dBm TX power
  - -95 dBm sensitivity (1 Mbps)
- IEEE 802.15.4 radio support
  - Thread
  - Zigbee
- NFC
- Full range of digital interfaces with EasyDMA
  - Full-speed USB
  - 32 MHz high-speed SPI
- 128 bit AES/ECB/CCM/AAR accelerator
- 12-bit 200 ksps ADC
- 105 °C extended operating temperature
- 1.7-5.5 V supply voltage range

Applications

- Professional lighting
- Industrial
- Advanced wearables
- Gaming
- Smart home
- Asset tracking and RTLS

	nRF52805	nRF52810	nRF52811	nRF52820	nRF52832	nRF52833	nRF52840	nRF5340
Bluetooth 5.3	X	X	X	X	X	X	X	X
Bluetooth 2 Mpbs	X	X	X	X	X	X	X	X
Bluetooth Long Range			X	X		X	X	X
Bluetooth Direction Finding			X	X		X		X
Bluetooth LE Audio								X
Bluetooth mesh				X	X	X	X	X
Thread			X	X		X	X	X
Zigbee				X		X	X	X
Matter							X	X

Bluetooth Direction Finding

The nRF52833 includes a radio capable of Bluetooth® 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.
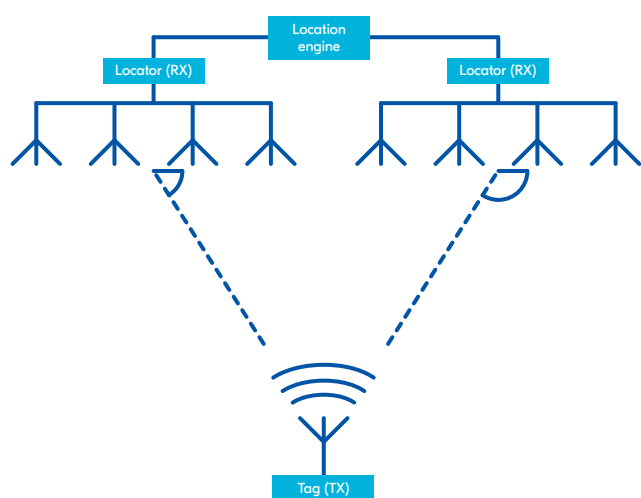
nRF Connect SDK

The nRF Connect SDK is our software development kit for the nRF52833 SoC. It supports development of Bluetooth Low Energy, Thread and Zigbee applications. It integrates the Zephyr RTOS, protocol stacks, samples, hardware drivers and much more. nRF Connect SDK also supports the nRF9160, our LTE-M/NB-IoT/GPS SiP, and the nRF53 Series. It is a common platform for both cellular IoT and short-range development.

nRF52833 DK

The nRF52833 DK is the affordable development kit for the nRF52833 SoC. It has everything needed for development on a single board. All features and GPIOs of the SoC are made available to the developer, and it comes with an on-board SEGGER J-Link debugger enabling both programming and debugging of the nRF52833. 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.

The nRF52833 SoC and the nRF52833 DK are available for purchase through our distribution network.

Specification

Microprocessor	
CPU	64 MHz Arm Cortex-M4
Memory	512 KB Flash + 128 KB RAM
Cache	8 KB cache
Performance	217 CoreMark
Efficiency	66 CoreMark/mA
Hardware security	128-bit AES CCM, ECB, AAR
Wireless protocol support	Bluetooth Low Energy/Bluetooth mesh/NFC/Thread/Zigbee/802.15.4/ANT/2.4 GHz proprietary
On-air data rate	Bluetooth LE: 2 Mbps/1 Mbps/125 kbps 802.15.4: 250 kbps
TX power	Programmable from +8 to -20 dBm in 4 dB steps
RX sensitivity	Bluetooth LE: -103 dBm at 125 Mbps -96 dBm at 1 Mbps -92 dBm at 2 Mbps 802.15.4: -100 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 mA at 0 dBm TX power, 6 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
Digital interfaces	12 Mbps full-speed USB 2.0 32 MHz high-speed SPI 2×TWI/SPI, SPI, 2×UART I²S, PDM 4×PWM QDEC
Analog interfaces	12-bit, 200 ksps ADC, low-power comparator, general-purpose comparator
Other peripherals	5 × 32 bit timer/counter, 3 × 24 bit real-time counter, DPPI, GPIOTE, Temp sensor, WDT, RNG
Temperature range	-40°C to 105°C
Supply voltage	1.7 to 5.5 V
Package options	7×7 mm aQFN™73 with 42 GPIOs 5×5 mm QFN40 with 18 GPIOs 3.2×3×2 mm WLCSP95 with 42 GPIOs

Related Products

nRF52833 DK	Development kit for the nRF52833 SoC
nRF Connect SDK	Software development kit for the nRF52833

For more information please visit: **nordicsemi.com/nRF52833**