



# nRF52820

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

## Overview

The nRF52820 System-on-Chip (SoC) is the 6th addition to the industry-leading nRF52® Series. It augments the already extensive collection of wireless SoCs with a lower-end option with built-in USB and a fully-featured multiprotocol radio. The nRF52 Series is truly the ideal platform for basing a product portfolio upon. The common hardware and software architecture results in excellent software portability, increasing software reusability and lowering time-to-market and development cost.

The nRF52820 features an Arm® Cortex®-M4 processor, clocked at 64 MHz. It has 256 KB Flash and 32 KB RAM, and a range of analog and digital interfaces such as an analog comparator, SPI, UART, TWI, QDEC, and last but not least, USB. It can be supplied with a voltage from 1.7 to 5.5 V which enables powering the device from sources such as rechargeable batteries or via USB.

The nRF52820 supports Bluetooth 5.3, in addition to the Direction Finding, high-throughput 2 Mbps and Long Range features. It also capable of Bluetooth mesh, Thread and Zigbee mesh protocols.

For human interface device (HID) applications the built-in USB and +8 dBm TX power make the nRF52820 a great single-chip option, while asset tracking applications can leverage its Bluetooth Direction Finding capabilities. The extended temperature range of -40 to +105 °C makes it suitable for professional lighting applications.

The built-in USB, fully-featured multiprotocol radio and +8 dBm output power makes it the perfect network processor to be paired with an application MCU in gateways and other smart home, commercial and industrial applications requiring advanced wireless connectivity.

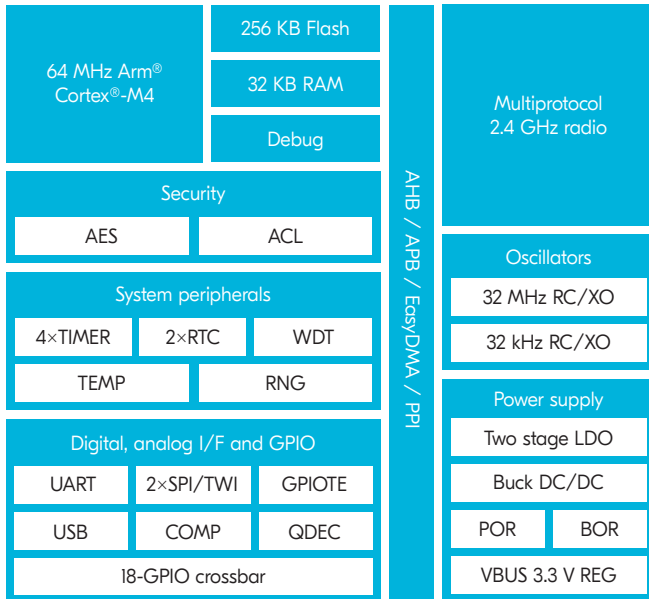
	nRF52805	nRF52810	nRF52811	nRF52820	nRF52832	nRF52833	nRF52840	nRF5340
Bluetooth 5.3	X	X	X	X	X	X	X	X
Bluetooth 2 Mbps	X	X	X	X	X	X	X	X
Bluetooth Long Range			X	X		X	X	X
Bluetooth Direction Finding			X	X		X		X
Bluetooth LE Audio								X
Bluetooth mesh				X	X	X	X	X
Thread			X	X		X	X	X
Zigbee				X		X	X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

## Key features

- Arm processor
  - 64 MHz Arm® Cortex-M4 with FPU
  - 256 KB Flash + 32 KB RAM
- 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
- Full range of digital interfaces with EasyDMA
  - Full-speed USB 2.0
  - 32 MHz high-speed SPI
- 128 bit AES/ECB/CCM/AAR accelerator
- 105 °C extended operating temperature
- 1.7-5.5 V supply voltage range

## Applications

- Professional lighting
- Industrial
- Human Interface device
- Wearables
- Gaming
- Smart home
- Gateways
- Asset tracking and RTLS



### Built-in USB for communication, DFU and power supply

The nRF52820's USB peripheral implements a Full Speed USB 2.0 device that offers a widely-used interface that enables low-latency and high-bandwidth communication with a range of hosts, such as PCs, tablets, smartphones, and gateways. It also adds the option of performing device firmware updates (DFU) over USB.

When connected to a USB host, the nRF52820 can be directly powered by the always-present 5 V VBUS signal. Nordic provides a reference layout for this configuration. In addition to the main supply regulators, the USB peripheral in the nRF52820 integrates a dedicated regulator for converting the 5 V VBUS signal to the 3.3 V needed for supplying the USB signaling interface, removing the cost and space for an external regulator.

### nRF Connect SDK

The [nRF Connect SDK](#) is our software development kit for the nRF52820 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.

Our 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 nRF52820 SoC. The nRF52833 has a superset of the nRF52820's features. The DK 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 nRF52820 SoC and the nRF52833 DK are available for purchase through our distribution network.

## Specification

<b>Microprocessor</b> CPU Memory Performance Efficiency	64 MHz Arm Cortex-M4 256 KB Flash + 32 KB RAM 144 CoreMark 39 CoreMark/mA
Hardware security	128-bit AES CCM, ECB, AAR
Wireless protocol support	Bluetooth Low Energy/Bluetooth mesh/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 kbps -95 dBm at 1 Mbps -89 dBm at 2 Mbps 802.15.4: -99 dBm at 250 kbps
Radio current consumption DC/DC at 3 V	+8 dBm TX power 14.40 mA +4 dBm TX power 9.40 mA 0 dBm TX power, 6 mA at RX at 1 Mbps 4.7 mA
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 1.1 µA in System OFF 2.6 µA in System ON, full RAM retention and RTC
Digital interfaces	USB 2.0 1× UART 2×SPI/TWI QDEC
Analog interfaces	General-purpose comparator
Other peripherals	4 × 32 bit timer/counter 2 × 24 bit real-time counter PPI GPIOTE Temperature sensor Watchdog timer Random Number generator
Temperature range	-40°C to 105°C
Supply voltage	1.7 to 5.5 V
Package options	5×5 mm QFN40 with 18 GPIOs 2.5×2.5 mm WLCSPP with 18 GPIOs



6×6 mm



2.5 mm x 2.5 mm

## Related Products

<a href="#">nRF52833 DK</a>	Development kit for the nRF52820 SoC
<a href="#">nRF Connect SDK</a>	Software development kit for the nRF52820



For more information please visit: [nordicsemi.com/nRF52820](http://nordicsemi.com/nRF52820)