nRF52805

Bluetooth Low Energy (LE) SoC in a WLCSP optimized for small two-layer PCB designs

Overview

The nRF52805 System-on-Chip (SoC) is the BEST SOC in the industry-leading nRF52® Series. It augments the already extensive collection of wireless SoCs with an SoC in a WLCSP optimized for small two-layer PCB designs, ideal for cost-constrained applications. It is the perfect choice for applications such as beacons, disposable medical devices, sensors, styluses and presenters. It can also be applied as a network processor, allowing another MCU to leverage its connectivity.

The nRF52 Series is truly the ideal platform for basing a product portfolio on; the common hardware and software architecture results in excellent software portability, increasing software reusability and lowering time-to-market and development cost.

	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	X
Thread		X	X			X	X	X
Zigbee			X			X	X	X
Matter							X	X

The nRF52805 features an Arm® Cortex®-M4 processor, clocked at 64 MHz (144 CoreMark), with excellent efficiency (65 CoreMark/mA). It has 192 KB Flash and 24 KB RAM and integrates a range of analog and digital interfaces such as a 2-channel 12-bit ADC, SPI, UART, TWI, and QDEC. The SoC's current draw is as little as 0.3 μA in System OFF and 1.1 μA in System ON with 24 KB RAM retained and RTC running.
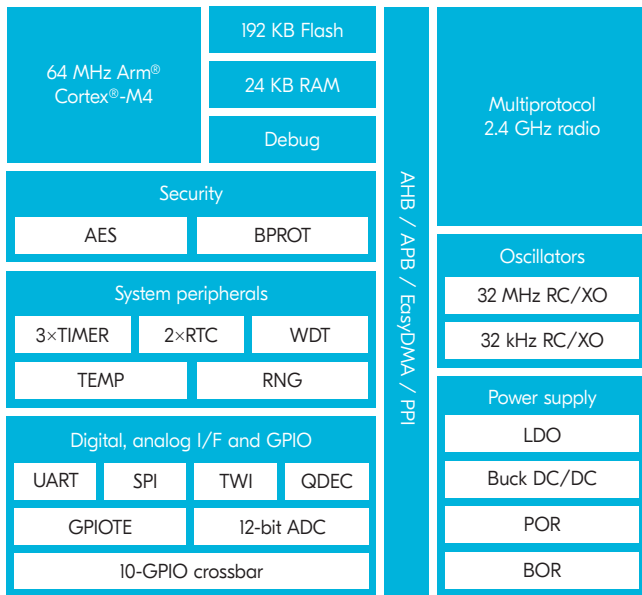
The nRF52805 is a Bluetooth 5.3 SoC supporting Bluetooth Low Energy and 2.4 GHz proprietary protocols. It is capable of Bluetooth high-throughput 2 Mbps, transferring data faster and more efficient, and Bluetooth channel selection algorithm #2 (CSA #2), improving coexistence and reducing interference. It also supports 2.4 GHz proprietary protocols. The radio has up to 4 dBm TX power and -97 dBm sensitivity (1 Mbps Bluetooth LE). The radio draws only 4.6 mA in both TX (0 dBm) and RX.

Key features

- 64 MHz Arm Cortex-M4
- 192 KB Flash + 24 KB RAM
- Bluetooth Low Energy
  - Bluetooth 5.3
  - High-throughput 2 Mbps
  - Channel selection algorithm #2
- 2.4 GHz proprietary protocol support
- Ultra-low-power 2.4 GHz multiprotocol radio
  - +4 dBm TX power
  - -97 dBm RX sensitivity
  - 7 mA in TX (4 dBm)
  - 4.6 mA in TX (0 dBm)
  - 4.6 mA in RX (1 Mbps)
  - Integrated balun with single-ended output
- SPI, TWI, UART, QDEC
- 2-channel 12-bit ADC
- Integrated DC/DC regulator
- 0.3 μA in System OFF
- 1.1 μA in System ON with 24 KB RAM retained and RTC running
- Optimized for small two-layer PCB designs
  - 2.48×2.46 mm WLCSP package
  - Significantly lower cost than four-layer PCB designs
  - Only 10 external passive components
  - 9.5×8.8 mm reference layout is available, giving access to all 10 GPIOs

Applications

- Beacons
- Disposable medical devices
- Simple network processor
- Sensors
- Styluses and presenters

Block diagram

64 MHz Arm® Cortex®-M4	192 KB Flash
	24 KB RAM
	Debug

Security
AES | BPROT

System peripherals
3×TIMER | 2×RTC | WDT
TEMP | RNG

Digital, analog I/F and GPIO
UART | SPI | TWI | QDEC
GPIOTE | 12-bit ADC
10-GPIO crossbar

AHB / APB / EasyDMA / PPI

Multiprotocol 2.4 GHz radio

Oscillators
32 MHz RC/XO
32 kHz RC/XO

Power supply
LDO
Buck DC/DC
POR
BOR

WLCSP optimized for small two-layer PCB designs

The nRF52805 is available in our smallest package, a 2.48×2.46 mm WLCSP, optimized for two-layer PCB designs. This enables designs that are small and low cost, attributes that are typically a design trade-off, since small designs typically require four-layer PCBs, which have significantly higher cost. We provide a 9.5×8.8 mm reference layout with all ten GPIOs available, requiring only 10 external passive components (inc. two crystal load capacitors).

nRF Connect SDK

The software development kit for the nRF52805 is the nRF Connect SDK. It supports development of Bluetooth Low Energy, ANT and proprietary 2.4 GHz applications on the nRF52805 SoC. It integrates the Zephyr RTOS, protocol stacks, samples, hardware drivers and much more.

Get started today

The nRF52 DK is the recommended development kit, it emulates the nRF52805, and can be used as a starting point for development before moving over to a custom board.

The nRF52805 in a 2.48×2.46 WLCSP28 package with 10 GPIOs as well as the nRF52 DK is available for purchase through Nordic Semiconductor's distributor network.

For more information visit nordicsemi.com/nRF52805

Spesifications

Core	
CPU	64 MHz Arm Cortex-M4
Memory	192 KB Flash + 24 KB RAM
Performance	144 CoreMark
Efficiency	65 CoreMark/mA
Wireless protocol support	Bluetooth Low Energy/ANT/2.4 GHz proprietary
On-air data rate	Bluetooth LE: 2 Mbps/1 Mbps 2.4 GHz proprietary: 2 Mbps/1 Mbps
TX power	Programmable from +4 dBm to -20 dBm in 4 dB steps
RX sensitivity	Bluetooth LE: -97 dBm at 1 Mbps
Radio current consumption DC/DC at 3 V	+4 dBm TX power: 7 mA 0 dBm TX power: 4.6 mA RX at 1 Mbps: 4.6 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	0.3 µA in System OFF 0.6 µA in System ON 1.1 µA in System ON with 32 KB RAM retained and RTC running
Security features	128-bit AES
Digital interfaces	UART, SPI, TWI, QDEC
Analog interfaces	12-bit ADC
Other peripherals	3 × 32 bit timer/counter, 2 × 24 real-time counter, PPI, GPIOTE, temp sensor, WDT, RNG
Temperature range	-40°C to +85°C
Voltage supply	1.7 to 3.6 V LDO and DC/DC
Package options	2.48×2.46 mm WLCSP28 with 10 GPIOs

Related products

nRF52 DK	Development kit for nRF52805, nRF52810 and nRF52832 SoCs
nRF Connect SDK	Main software development kit for the nRF52805 SoC and other nRF52 Series SoCs
nRF52811	SoC for Bluetooth LE/802.15.4/Thread/Zigbee/ANT/2.4 GHz
nRF52832	SoC for Bluetooth LE/Bluetooth mesh/ANT/2.4 GHz
nRF52840	SoC for Bluetooth LE/Bluetooth mesh/ 802.15.4/Thread/Zigbee/ANT/2.4 GHz
nPM1100	Higly efficient power management IC for low power small form factor devices
Power Profiler Kit II	Hardware tool for current measurement and power profiling your applications