**nRF52805**

Bluetooth 5.2 SoC in a WLCSP optimized for small two-layer PCB designs

**Overview**

The nRF52805 System-on-Chip (SoC) is the 7th addition to 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.

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, and TWI. 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 5.2 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.

### Hardware feature comparison

<table>
<thead>
<tr>
<th>Feature</th>
<th>nRF52805</th>
<th>nRF52810</th>
<th>nRF52811</th>
<th>nRF52820</th>
<th>nRF52822</th>
<th>nRF52832</th>
<th>nRF52833</th>
<th>nRF52840</th>
<th>nRF52841</th>
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</thead>
<tbody>
<tr>
<td>Bluetooth 5.2</td>
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<td>X</td>
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<tr>
<td>Bluetooth Direction Finding</td>
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<td>Bluetooth Long Range</td>
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<td>802.15.4</td>
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<td>USB</td>
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<td>X</td>
<td>X</td>
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<td>Max supply voltage (V)</td>
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<td>3.6</td>
<td>5.5</td>
<td>3.6</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
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<tr>
<td>Max temperature (°C)</td>
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<td>+85</td>
<td>+85</td>
<td>+105</td>
<td>+85</td>
<td>+105</td>
<td>+85</td>
<td>+105</td>
<td>+105</td>
</tr>
</tbody>
</table>

**Applications**

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

**Key features**

- 64 MHz Arm Cortex-M4
- 192 KB Flash + 24 KB RAM
- Bluetooth Low Energy
  - Bluetooth 5.2
  - 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
- 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
- 2.4×2.46 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
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).

Get started today

The nRF52805 is supported by SoftDevice S112, and will be supported by SoftDevice S113, S112 and S113 are memory-optimized Peripheral-only Bluetooth Low Energy protocol stacks supporting up to 4 connections as a Peripheral concurrently with a Broadcaster. They are Bluetooth 5.1 qualified and support the high-throughput 2 Mbps and CSA #2 Bluetooth features.

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. A guide on how to use nRF52805 with nRF5 SDK is available.

nRF52805 SoC is in mass production now, in a 2.48×2.46 WLCSP28 package with 10 GPIOs.

For more information please visit: www.nordicsemi.com/nRF52805

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**SPECIFICATIONS**

**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/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
- +4 dBm TX power: 7 mA
- 0 dBm TX power: 4.6 mA

**RX sensitivity**
- Bluetooth LE: -97 dBm at 1 Mbps
- 2.4 GHz proprietary: -94 dBm at 1 Mbps

**Radio current consumption**
- 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

**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**
- 2.48x2.46 mm WLCSP28 with 10 GPIOs

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**RELATED PRODUCTS**

- **nRF52 DK**
  - Development kit for nRF52805, nRF52810 and nRF52832 SoCs

- **nRF5 SDK**
  - Software development kit for Bluetooth Low Energy, ANT and 802.15.4

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**WORLD WIDE OFFICE LOCATIONS**

[Map of worldwide office locations]

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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.