nRF5340 Product Specification

NORDIC®
SEMICONDUCTOR

Contents

1. nRF5340 Product Specification

This Product Specification contains functional descriptions, register tables, and electrical specifications, and is organized into chapters based on the modules and peripherals that are available in this IC.

- nRF5340 Product Specification v1.5
- nRF5340 Product Specification v1.4
- nRF5340 Product Specification v1.3.1
- nRF5340 Product Specification v1.3
- nRF5340 Product Specification v1.2
- nRF5340 Product Specification v1.1
- nRF5340 Product Specification v1.0

Note: The HTML rendition of the Product Specification corresponds to the latest version only. All versions are available as PDF files.

Features:	

• 1.7 V to 5.5 V supply voltage range
• Package variants
  • aQFN94™ package, 7x7 mm
  • WLCSP95 package, 4.4x4.0 mm
	• Single 32 MHz crystal operation
	• 1.8 V to 3.3 V regulated supply for external components
	• Operating temperature from -40°C to 105°C
	• 48 general purpose I/O pins

Application core
• Arm® Cortex®-M33 with TrustZone® technology
  • 128 MHz or 64 MHz operation
  • 514 EEMBC CoreMark score running from flash, 4.0 CoreMark per MHz
  • Single-precision floating-point unit (FPU)
  • Digital signal processing (DSP) instructions
  • Data watchpoint and trace (DWT), embedded trace macrocell (ETM), instrumentation trace macrocell (ITM), and cross trigger interface (CTI)
  • Serial wire debug (SWD)
  • Trace port interface unit (TPIU)
  • 4-bit parallel trace of ITM and ETM trace data
  • Serial wire output (SWO) trace of ITM data
• 1 MB flash and 512 kB low leakage RAM
• Arm TrustZone CryptoCell™-312 security subsystem
	Network core
	• Arm Cortex-M33
	  • 64 MHz operation
	  • 244 EEMBC CoreMark score running from flash memory, 101 CoreMark per mA
	  • Cross trigger interface (CTI)
	  • Serial wire debug (SWD)
	  • SWO trace port
	• 256 kB flash and 64 kB low leakage RAM
	• Bluetooth® 5.2, IEEE 802.15.4-2006, 2.4 GHz enabled transceiver
	  • -98 dBm sensitivity in 1 Mbps Bluetooth Low Energy mode
	  • -104 dBm sensitivity in 125 kbps Bluetooth Low Energy mode (long range)
	  • -101 dBm sensitivity in IEEE 802.15.4

Features:

- NIST 800-90B, AIS-31, and FIPS 140-2 compliant random number generator
- AES-128 and 256: ECB, CBC, CMAC/CBC-MAC, CTR, CCM/CCM*, GCM
- SHA-1, SHA-2 up to 256 bits
- Keyed-hash message authentication code (HMAC)
- RSA public key cryptography with max key size 3072 bits
- ECC support for most used curves
- Application key management using derived key model
- Two-way set associative cache towards flash and QSPI XIP code regions
- QSPI peripheral for communicating with an external flash memory device
  - Execute in place with optional on-the-fly encryption and decryption
- Near field communication (NFC-A) tag with wake-on field and touch-to-pair
- Up to 5x SPI master/slave with EasyDMA
- Up to 4x I^2C compatible two-wire master/slave with EasyDMA
- Up to 4x UART (CTS/RTS) with EasyDMA
- Audio peripherals - I^2S compatible, digital microphone interface (PDM)
- Four pulse width modulator (PWM) units with EasyDMA
- 12-bit, 200 ksps ADC with EasyDMA - eight configurable channels with programmable gain
- Three 32-bit timers with counter mode
- Two 24-bit real-time counters (RTC)
- Two Quadrature decoders (QDEC)
- Distributed programmable peripheral interconnect (DPPI)
- Inter-processor communication (IPC)
- Mutually exclusive peripheral (MUTEX)
- USB 2.0 full speed (12 Mbps) controller

- -40 dBm to +3 dBm configurable TX power
- On-air compatible with nRF52, nRF51, nRF24L, and nRF24AP series devices
- Supported data rates:
  - *Bluetooth* 5.2 - 2 Mbps, 1 Mbps, 500 kbps, and 125 kbps
  - IEEE 802.15.4-2006 - 250 kbps
  - Proprietary 2.4 GHz - 2 Mbps, 1 Mbps
- Angle of Arrival (AoA) and Angle of Departure (AoD) direction finding using *Bluetooth* Low Energy
- Single-ended antenna output (on-chip balun)
- 128-bit AES/ECB/CCM/AAR co-processor (on-the-fly packet encryption)
- 3.2 mA run current in TX (0 dBm)
- 2.6 mA run current in RX
- RSSI (1 dB resolution)
- SPI master/slave with EasyDMA
- I^2C compatible two-wire master/slave with EasyDMA
- UART (CTS/RTS) with EasyDMA
- Three 32-bit timers with counter mode
- Two real-time counters (RTC)
- Temperature sensor
- Distributed programmable peripheral interconnect (DPPI)
- Inter-processor communication (IPC)
- Mutually exclusive peripheral (MUTEX)

Applications:

- Advanced computer peripherals and I/O devices
  - Multi-touch trackpad
- Advanced wearables
  - Health/fitness sensor and monitor devices
  - Wireless payment enabled devices
- Internet of things (IoT)
  - Smart home sensors and controllers
  - Industrial IoT sensors and controllers
- Interactive entertainment devices
  - Remote controls

Applications:	

• Wireless audio devices
  • Bluetooth Low Energy Audio
  • True wireless earbuds
  • Headphones, microphones, and speakers
	• Gaming controllers
	• Professional lighting
	  • Wireless connected luminaire

Revision history

About this document This document is organized into chapters that are based on the modules and peripherals available in the IC.

Product overviewnRF5340 is a wireless, ultra-low power multicore System on Chip (SoC), integrating two fully programmable Arm Cortex-M33 processors, advanced security features, a range of peripherals, and a multiprotocol 2.4 GHz transceiver. The transceiver supports Bluetooth Low Energy, ANT™, and IEEE 802.15.4 for Thread and Zigbee protocols. It also allows the implementation of proprietary 2.4 GHz protocols.

Power and clock management The power and clock management system in nRF5340 is optimized for ultra-low power applications to ensure maximum power efficiency.

Application core The application core contains a low-power microcontroller with embedded flash memory and a full featured Arm Cortex-M33 processor.

Network core The network core contains a low-power microcontroller with embedded flash memory and an Arm Cortex-M33 processor.

PeripheralsnRF5340 is made up of two cores, each with their own peripherals.

Debug and trace The debug and trace system offers a flexible and powerful mechanism for non-intrusive debugging.

Recommended operating conditions The operating conditions are the physical parameters that the chip can operate within.

Absolute maximum ratings Maximum ratings are the extreme limits to which the chip can be exposed for a limited amount of time without permanently damaging it. Exposure to absolute maximum ratings for prolonged periods of time may affect the reliability of the device.

Ordering information This chapter contains information on device marking, ordering codes, and container sizes.

Legal notices By using this documentation you agree to our terms and conditions of use. Nordic Semiconductor may change these terms and conditions at any time without notice.