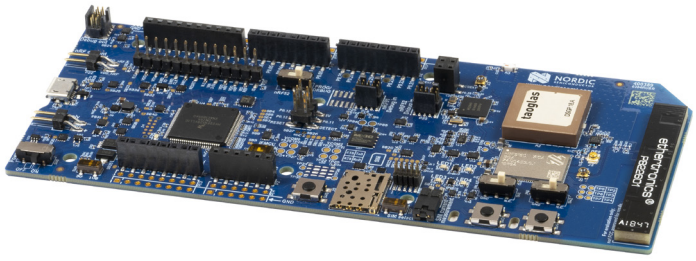
nRF9160 DK

Development kit for LTE-M/NB-IoT/GNSS/
Bluetooth Low Energy



Product overview

The nRF9160 DK is an affordable, pre-certifed single board development kit for evaluation and development on the nRF9160 System-in-Package (SiP) for LTE-M and NB-IoT. It also includes an nRF52840 board controller that for example can be used to build a Bluetooth® Low Energy (LE) gateway. It has a dedicated LTE-M and NB-IoT antenna that supports a wide range of bands, to operate globally. The nRF9160 DK has the same certification coverage as the nRF9160 SiP. LTE bands B1-B5, B8, B12-B14, B17-B20, B25-B26, B28 and B66 have been certified.

An integrated patch antenna for GNSS, and a 2.4 GHz chip antenna for use with Bluetooth LE are included on the PCB. SWF RF connectors are available for the LTE antenna and 2.4 GHz antenna for measuring performance of the respective RF signals. All three antenna connectors allow use of external antennas.

All GPIOs and interfaces are available via connectors. The kit is Arduino Uno Rev3 compatible, meaning it can easily interface with external device shields. User-programmable LEDs (4), buttons (2) and switches (2) are available for output and input.

The nRF9160 DK has both a nano/4FF SIM card slot and an MFF2 SIM footprint, to support both plug-in and soldered (e)SIMs. It is bundled with an eSIM card from iBasis with worldwide operation and preloaded with 10 MB.

Programming and debugging is enabled through the SEGGER J-Link OB, which also supports external targets.

The nRF9160 DK is supported by a full suite of development software and tools. All free to download and use commercially.

Key features

- Same certification coverage as nRF9160 SiP
- nRF52840 board controller
- LTE-M/NB-IoT, GNSS and 2.4 GHz antennas with respective SWF RF connectors
- SEGGER J-Link OB programmer/debugger
- Pins for measuring power consumption, e.g. with Nordic's Power Profiler Kit II
- User-programmable LEDs (4), buttons (2) and switches (2)
- 3.0-5.5 V supply from external or 5 V
- supply from USB

nRF9160 SiP

- Certified for global operation:
  - AT&T, Bell, China Telecom, Deutsche Telekom, KDDI, Telstra, Verizon, Vodafone, etc.
  - GCF, PTCRB
  - FCC (USA), CE (EUR), UKCA (UK), ISED (CAN), SRRC (CHN), ACMA RCM (AUS), NCC (TWN), MIC (JPN), MSIP (KOR), (IND) and more
  - More info: nordicsemi.com/9160cert
- Multimode LTE-M/NB-IoT modem
  - 700-2200 MHz LTE band support
  - +23 dBm output power
  - GNSS (GPS, QZSS)
  - eDRX and PSM power saving features
  - Coverage enhancement modes
  - Single pin 50 Ω antenna interface
  - UICC interface
- Dedicated application processor and memory
  - 64 MHz Arm® Cortex®-M33 CPU
  - Arm TrustZone® for trusted execution
  - Arm CryptoCell 310 for application layer security
  - 1 MB Flash & 256 KB RAM
  - 4 x SPI/UART/TWI, PDM, I2S, PWM, ADC

nRF52840 SoC

- Bluetooth Low Energy and NFC support
- 64 MHz Arm Cortex-M4 CPU with FPU
- 1 MB Flash & 256 KB RAM

Applications

- Logistics and asset tracking
- Smart city & smart agriculture
- Predictive maintenance & industrial
- Wearables & medical

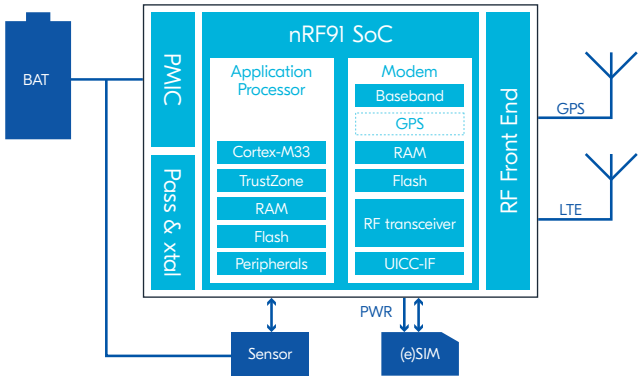
nRF9160 SiP
The nRF9160 is a low power SiP integrating a dedicated application processor and a multimode LTE-M and NB-IoT modem with support for GNSS. It is the most compact cellular IoT solution on the market, measuring just 10×16×1.04 mm.

The application processor includes a 64 MHz Arm Cortex-M33 CPU with 1 MB of flash and 256 KB of RAM dedicated for the application. It has Arm TrustZone for trusted execution and Arm CryptoCell for application layer security. It has a wide range of interfaces to communicate with sensors and actuators.

The multimode modem supports the eDRX and PSM power saving features and the coverage enhancement features of LTE-M and NB-IoT, and has built-in GNSS. The global RF front end supports LTE bands from 700 MHz to 2.2 GHz, has +23 dBm output power and offers a single pin 50 Ω antenna

Interface
The physical layer, LTE stack layers L1-L3, IPv4/IPv6, TCP/UDP, TLS/DTLS are all part of the modem firmware. The application processor communicates with the LTE modem through BSD secure sockets APIs and contains the application layer protocol, for example CoAP, MQTT, HTTP(S) or LWM2M, and the user application itself.

The nRF9160 LTE modem supports both SIM and eSIM, plug in or soldered. It provides power to the SIM and handles all communication automatically.



Security
The integrated cryptographic and security features enable the nRF9160 SiP to meet the latest requirements on internet security and authentication. By including a trusted execution capability on the application processor, it takes security a step further by securing the most critical processes and peripherals in the application.

The LTE modem is its own security island and runs only encrypted and signed firmware images from Nordic.

Designed for true low power cellular IoT
The nRF9160 SiP is specifically designed to take full advantage of the energy efficiency possibilities associated with the LTE-M and NB-IoT standards. Nordic designs all hardware and software, and as such offers an unparalleled, highly efficient and optimized low power cellular IoT solution.

It supports both the PSM and eDRX power saving features, with a PSM floor current of 2.7 uA. Average eDRX currents with a 655 s eDRX interval and 2.56 s paging cycle for LTE-M/NB-IoT are 6 uA and 9 uA respectively. Continuous GPS tracking with power saving mode typically consumes 9.6 mA of current. This can be reduced by using the assisted GPS or predictive GPS functionality located in Nordic's nRF Cloud Location Services.

Software and tools
The nRF Connect SDK is the software development kit for the nRF9160 DK, including everything needed to get started, and much more. It integrates the Zephyr RTOS, application layer protocols such as CoAP, MQTT, HTTP(S) and LWM2M, and application examples covering a wide range of use cases. It also includes software for secure boot, and secure firmware over-the-air (FOTA) for both application and modem firmware. The LTE modem firmware is offered as pre-certified and precompiled downloads.

The nRF Connect SDK is publicly hosted on GitHub and offers version control management with Git. It supports both nRF Connect for VS Code and SEGGER Embedded Studio IDEs free of charge.

The nRF9160 DK easily connects out of the box to our cloud solution, nRF Cloud, to display sensor data and get started with our Cloud services.

Related products

nRF9160 SiP	LTE-M/NB-IoT/GNSS SiP
Nordic Thingy:91	cellular IoT protoyping platform
nRF52840 SoC	Multiprotocol Bluetooth 5.3/Bluetooth mesh/Thread/Zigbee/ANT/2.4 GHz SoC
nRF Connect SDK	Software Development Kit for cellular IoT/Bluetooth LE/Bluetooth mesh/Wi-Fi/Thread/Zigbee/Matter development
nRF Cloud	IoT cloud optimized for ultra-low power Nordic devices
LTE Link Monitor	Development tool providing an AT command user interface to test cellular link and get network info
Trace Collector v2	Decrypt modem traces live and view them in Wireshark
Programmer	Programming user interface application

Order information

nRF9160-DK	Development kit for nRF9160 SiP