nRF9160 DK

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

LTE-M   **NB-IoT**
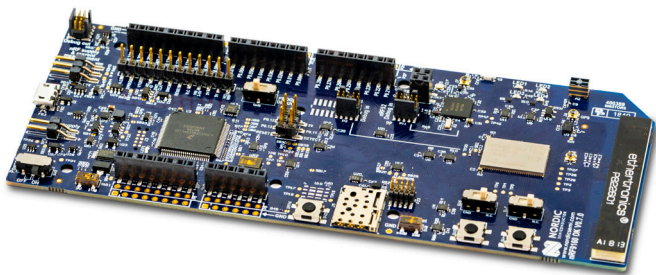
Product overview

The nRF9160 DK is an affordable, pre-certifed single board development kit for evaluation and development on the nRF9160 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 gateway.

It has a dedicated LTE-M and NB-IoT antenna that supports a wide range of bands, to operate globally. LTE bands B1, B2, B3, B4, B5, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28 and B66 have been certified so far, with many more planned: *nordicsemi. com/9160cert*

Included is also a dedicated antenna for GPS, and a 2.4 GHz antenna to be used with Bluetooth LE. SWF RF connectors are available for all antennas.

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

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 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.

nRF9160 SiP

The nRF9160 is a low power SiP integrating a dedicated application processor and a multimode LTE-M and NB-IoT modem. It is the most compact cellular IoT (cIoT) solution on the market, measuring just 10×16×1 mm.

KEY FEATURES

- Single board development kit for the nRF9160 SiP
- 700-960 MHz + 1710-2200 MHz LTE band support
- Certifications: CE, FCC, ISED, SRRC RTA, ACMA RCM, Taiwan, IMDA, Japan, South Korea
- nRF52840 board controller
- Arduino Uno Rev3 compatible
- LTE-M/NB-IoT, GPS and 2.4 GHz antennas
- SWF RF connectors for all antennas
- Nano/4FF SIM card slot and MFF2 SIM footprint
- SEGGER J-Link OB programmer/debugger
- Pins for measuring power consumption
- User-programmable LEDs(4), buttons(2) and switches(2)
- 3.3-5.5 V supply from USB or external

nRF9160 SiP

- Multimode LTE-M/NB-IoT modem
  - GCF and PTCRB certified for global operation
  - 700-2200 MHz LTE band support
  - 23 dBm output power
  - GPS
  - eDRX and PSM power saving modes
  - Coverage enhancement modes
  - Single pin 50 Ω antenna interface
  - UICC interface
- Application processor
  - 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

- Board controller
- Bluetooth LE and NFC support
- 64 MHz Arm Cortex-M4F CPU
- 1 MB Flash & 256 KB RAM
- USB

APPLICATIONS

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

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 modes and the coverage enhancement features of LTE-M and NB-IoT, and has built-in GPS. 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 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 a BSD secure sockets API and contains the application layer protocol, for example CoAP, MQTT or LWM2M, and the application itself.

The nRF9160 LTE modem supports both SIM and eSIM, plug-in or soldered. It provides power and handles all communication automatically.
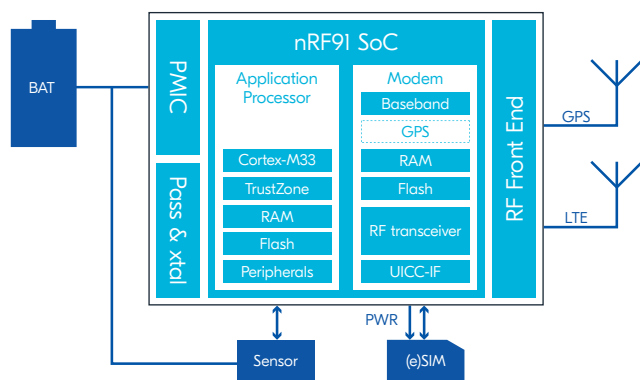
Security
The integrated cryptographic and security features enables the nRF9160 SiP to meet the latest requirements on internet security and authentication. By including trusted execution capability on the application processor, it takes security a step further by securing the most critical processes 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 cIoT
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, high efficient and optimized low power cIoT solution.

It supports both the PSM and eDRX power saving modes, with floor currents as low as 3 uA and 7 uA, respectively. In PSM mode, uploading 1 KB every 12 hours, the average current is as low as 5.5 uA. And it is 0.75 mA if GPS coordinates are uploaded every 2.7 minute.

Software and tools
The nRF Connect SDK is the software development kit for the nRF9160 DK, including everything needed to get started, and more. It includes application layer protocols such as CoAP, MQTT 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 necessary firmware for the LTE modem 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 the SEGGER Embedded Studio IDE free of charge.

The nRF9160 DK can easily be connected to our cloud solution, nRF Connect for Cloud, to display sensor data. To test the cellular link and extract information about the network, use the AT hcommand interface provided by the LTE Link Monitor tool.

RELATED PRODUCTS

nRF9160 SiP	LTE-M/NB-IoT/GPS SiP
nRF52840	Bluetooth 5/Bluetooth mesh/802.15.4/Thread/Zigbee/ANT/2.4 GHz SoC
nRF Connect SDK	Software Development Kit for the nRF9160 DK
nRF Connect for Cloud	Cloud solution for LTE-M and NB-IoT
LTE Link Monitor	Development tool providing an AT command user interface
Programmer	Programming user interface

ORDER INFORMATION

nRF9160-DK	Development kit for nRF9160 SiP

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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.