Product summary

**NINA-B41 series**

**Stand-alone Bluetooth 5.1 Low Energy modules**

**Bluetooth 5.1 module for harsh professional environments**
- Bluetooth 5.1 module with long range and direction finding support
- u-connect software for accelerated time to market
- Extended temperature range to 105 °C
- Superior security functionality
- Pin compatible with other NINA modules
- Global certification

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**Product description**

The NINA-B41 series is comprised of small, stand-alone Bluetooth Low Energy modules featuring full Bluetooth 5.1. The modules are delivered with u-connectXpress software that provides support for u-blox Bluetooth Low Energy Serial Port Service, GATT client and server, beacons, NFC™, and simultaneous peripheral and central roles. u-blox u-connectXpress software allows hosts to easily configure connectivity using AT commands over a UART interface.

NINA-B41 modules provide top grade security, thanks to secure boot, which ensures that the modules only boot up with authenticated u-connectXpress software. Leveraging Bluetooth 5 long range feature support, NINA-B41 modules also offer an extended communication range with reliable connections. NINA-B41 caters towards applications in smart buildings, smart cities, industrial automation systems, sensor networks, and asset tracking solutions.

For location applications, NINA-B41 supports Bluetooth 5.1 direction finding via angle-of-arrival. Connected to an array of antennas, the module can determine the direction from which a signal is transmitted, which allows for more accurate location methods. The algorithms required to calculate the angle-of-arrival are embedded in the u-connectLocate software that runs in the module MCU.

The NINA-B41 series is globally certified for use with the internal antenna or a range of external antennas. NINA-B416 comes with an internal PCB antenna while NINA-B410 and NINA-B411 are used with an external antenna, connected through a U.FL connector or module pin. The global pre-certification of u-blox modules means less compliance and verification testing, lower development costs, and an accelerated time to market for your application designs.

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### Product Data

**Grade**
- Automotive
- Professional
- Standard

**Radio**
- Chip inside: nRF52833
- Bluetooth qualification: v5.1
- Bluetooth Low Energy: v5.1
- Bluetooth output power EIRP [dBm]: 11
- Max range [meters]: 1400
- NFC: ✔

**Antenna type** (see footnotes): U.FL, pin, pcb

**Application software**
- u-connectLocate
- u-connectXpress

**Interfaces**
- UART: 2
- GPIO pins: 28

**Features**
- AT command interface
- Simultaneous GATT server and client: ✔
- Throughput [Mbit/s]: 0.8
- Maximum Bluetooth connections: 8
- Secure boot: ✔
- Low Energy Serial Port Service: ✔
- Bluetooth long range: ✔
- Direction finding (AoA/AoD): ✔

**Dimensions**
- NINA-B410: 10.0 × 15.0 × 2.2 mm
- NINA-B411: 10.0 × 11.6 × 2.2 mm
- NINA-B416: 10.0 × 15.0 × 2.2 mm

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**Footnotes**
- U.FL = U.FL connector for an external antenna
- pin = Antenna pin
- pcb = Internal PCB antenna
NINA-B41 series

Features

- Bluetooth v5.1 (Bluetooth Low Energy)
- NFC NFC-A tag for pairing and data
- Range 1400 m
- Max. conducted output power 8 dBm
- Conducted sensitivity –95 dBm (1 Mbit/s) –102 dBm (125 Kbit/s)

u-connectXpress software

NINA-B41 modules are pre-flashed with u-connectXpress and bootloader software that interfaces through an AT command interpreter to control customer application software running on host MCUs.

- Bluetooth u-blox Low Energy Serial Port Service (SPS) GATT server and client using AT commands Beacons 2 Mbit/s modulation 125 Kbit/s modulation long range functionality Advertising extensions
- Configuration over air Wireless transmission of AT commands to control the module
- Extended Data Mode™ For simultaneous AT commands and data, and multiple simultaneous data streams
- HW interfaces 2 x UART, GPIO
- Configuration AT commands
- Support tools s-center
- Operating modes Central role (7 simultaneous links) Peripheral role (6 simultaneous links) Simultaneous central and peripheral roles (8 in total, where max 4 as peripheral and max 7 as central) LE 1M PHY LE 2M PHY LE CODED PHY Advertising extensions LE data length extension
- Security Secure boot Secure Simple Pairing 128-bit AES encryption Bluetooth Low Energy secure connections

Electrical data

- Power supply 1.7 to 3.6 V
- Power consumption Active TX @ 0 dBm: 6.0 mA RX only: 6.0 mA Standby: 1.3 µA Sleep: 600 nA (with wake-up on external event)

Package

- Dimensions 10.0 x 11.6 x 2.2 mm (NINA-B411) 10.0 x 15.0 x 2.2 mm (NINA-B410, NINA-B416)
- Weight < 1.0 g
- Mounting Machine mountable Solder pins

Environmental data, quality, and reliability

- Operating temperature –40°C to +105°C
- Storage temperature –40°C to +105°C
- Humidity RH 5 – 90% non-condensing

Certifications and approvals

- Type approvals Europe (ETSI RED), US (FCC/CFR 47 part 15 unlicensed modular transmitter approval), Canada (IC RSS), Brazil (Anatel), Japan (MIC), Taiwan (NCC)1, Australia (ACMA), New Zealand, South Korea (KCC), South Africa (ICASA)1
- Health and safety EN 62479, EN 62368-1, IEC 62368-1
- Medical Electrical Equipment EN 60601-1-2:2015
- Bluetooth qualification v5.1 (Bluetooth Low Energy)

Support products

- EVK-NINA-B410 Evaluation kit for NINA-B410 and NINA-B411 with u-connectXpress software and U.FL connector for external antenna
- EVK-NINA-B416 Evaluation kit for NINA-B416 with u-connectXpress software and internal PCB antenna

Product variants

- NINA-B410 Bluetooth Low Energy module with u-connectXpress or u-connectLocate software and U.FL antenna connector
- NINA-B411 Bluetooth Low Energy module with u-connectXpress software and pin for external antenna
- NINA-B416 Bluetooth Low Energy module with u-connectXpress or u-connectLocate software and internal PCB antenna

Further information

For contact information, see www.u-blox.com/contact-us.
For more product details and ordering information, see the product data sheet.

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