Product summary

NINA-B40 series

S

Stand-alone Bluetooth 5.1 low energy modules

Standard

Professional

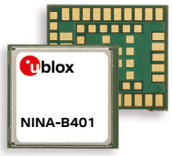
Automotive

Bluetooth 5.1 module for harsh professional environments

- Bluetooth 5.1, Bluetooth mesh, Thread, and Zigbee
- Direction finding support for indoor location
- Powerful MCU with open CPU architecture for customized applications
- Extended temperature range up to 105 °C
- Pin compatible with other NINA modules
- Global certification

10.0 × 15.0 × 2.2 mm

10.0 × 11.6 × 2.2 mm



10.0 × 15.0 × 2.2 mm

Product description

The NINA-B40 series are small, stand-alone Bluetooth low energy wireless microcontroller unit (MCU) modules that comply with the Bluetooth 5.1 specification.

The module is built on the Nordic nRF52833 chip and comes as an open CPU where customer applications run on the built-in Arm® Cortex®-M4 with FPU. NINA-B40 modules integrate flash and RAM memory, and the application runs on top of the embedded Bluetooth low energy stack. Bluetooth low energy services such as serial port communication, GATT, beacons, and mesh are also supported. For location applications, NINA-B40 supports the direction finding features such as Angle-of-Arrival and Angle-of-Departure from the Bluetooth 5.1 specification. These methods determine the direction from which a signal is transmitted. This improves location accuracy as compared to the received signal strength (RSSI). NINA-B40 can act both as a transmitter and receiver in a direction finding application. NINA-B40 provides an extended communication range or a more reliable connection using the Bluetooth 5 long range feature.

Additionally, the modules support NFC and IEEE 802.15.4 with Thread and Zigbee. A range of wired interfaces (UART, SPI, I2C, I2S, USB, QDEC, PDM, PWM, and ADC) are available.

Key market segments are smart cities and buildings, industrial automation, medical and healthcare, and telematics. Specific applications include smart lighting, asset tracking, indoor location, low power sensors, as well as wireless-connected and configurable equipment.

NINA-B406 comes with an internal PCB antenna while NINA-B400 and NINA-B401 are used with an external antenna, connected through a U.FL connector or module pin. The internal PCB antenna provides a robust low profile solution with high performance and an extensive range. The NINA-B40 series will be globally certified for use with the internal antenna or a range of external antennas. This greatly reduces time, cost and effort for customers integrating Bluetooth low energy in their designs.

	NINA-B400	NINA-B401	NINA-B406
Grade			
Automotive			
Professional	•	•	•
Standard			
Radio			
Chip inside	nRF52833		
Bluetooth qualification	v5.1	v5.1	v5.1
Bluetooth low energy	•	•	•
Thread / Zigbee	•	•	•
Bluetooth output power EIRP [dBm]	10	10	10
Max range [meters]	1400	1400	1400
NFC	•	•	•
Antenna type (see footnotes)	U.FL	pin	pcb
Application software			
Open CPU for embedded applications	•	•	•
Interfaces			
UART	♦	♦	♦
SPI	♦	♦	♦
I2C	♦	♦	♦
I2S	♦	♦	♦
USB	♦	♦	♦
PDM and PWM	♦	♦	♦
GPIO pins	40	40	40
AD converters [number of bits]	12	12	12
Features			
MCU (see footnotes)	M4F	M4F	M4F
RAM [kB]	128	128	128
Flash [kB]	512	512	512
Simultaneous GATT server and client	♦	♦	♦
Throughput [Mbit/s]	1.4	1.4	1.4
Maximum Bluetooth connections	20	20	20
Secure boot	♦	♦	♦
Bluetooth mesh	♦	♦	♦
Direction finding (AoA/AoD)	♦	♦	♦
FOTA	♦	♦	♦

U.FL = U.FL connector(s) for external antenna
pcb = Internal PCB antenna
pin = Antenna pin

♦ = Feature enabled by HW. The actual support depends on the open CPU application SW.
M4F = 64 MHz Arm® Cortex®-M4 with FPU

NINA-B40 series

S

Features

Bluetooth	v5.1 (Bluetooth low energy)
NFC	NFC-A tag support
Range	1400 m
Max. conducted output power	8 dBm
Conducted sensitivity	–95 dBm (1 Mbit/s) –102 dBm (125 Kbit/s)

Open CPU for customer application

Customers develop and embed their own application on top of the Bluetooth stack in the NINA-B40x modules (open CPU concept). This section describes the possible features enabled by the NINA-B40 hardware. Use Nordic Semiconductor's SDK environment to develop the connectivity and application software.

Development environment	Nordic SDK (including Bluetooth Mesh HomeKit, AirFuel, IoT, Thread, Zigbee)
HW interfaces *	2 x UART 3 x SPI 40 x GPIO pins 8 x ADC channels 1 x USB 2 x I2C 1 x I2S 4 x PWM 1 x QDEC
Security	Secure boot ready Secure Simple Pairing 128-bit AES encryption Bluetooth low energy secure connections

* Not all simultaneously

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-B401) 10.0 x 15.0 x 2.2 mm (NINA-B400, NINA-B406)
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); Japan (MIC); Taiwan (NCC); Australia (ACMA); New Zealand; Brazil (Anatel)[1]; 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)

1 = Pending approvals

Support products

EVK-NINA-B400	Evaluation kit for NINA-B400 and NINA-B401 with open CPU and U.FL connector for external antenna
EVK-NINA-B406	Evaluation kit for NINA-B406 with open CPU and internal PCB antenna

Product variants

NINA-B400	Bluetooth low energy module with open CPU and U.FL connector for external antenna
NINA-B401	Bluetooth low energy module with open CPU and pin for external antenna
NINA-B406	Bluetooth low energy module with open CPU 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.