Product summary

NINA-B50 series

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Stand-alone Bluetooth 5.3 low energy modules

Standard

Professional

Automotive

Versatile Bluetooth LE 5.3 modules with CAN FD

- Bluetooth low energy, Thread, Zigbee, and Matter
- CAN FD controller
- Powerful Cortex-M33 with open CPU architecture for customized applications
- Full set of enhanced security features with NXP EdgeLock
- Extended temperature range up to 85 °C
- Global certification

10.0 × 11.6 × 2.4 mm

10.0 × 15.0 × 2.4 mm

Product description

NINA-B50 series are small Bluetooth Low Energy 5.3 triple-core wireless MCU modules, qualified in professional grade. The main core is a powerful Arm Cortex-M33 processor for implementation of advanced applications with the MCUXpresso SDK. A wide range of interfaces (including 16-bit ADC) offer flexibility.

NINA-B50 modules support CAN and CAN FD, for seamless integration in automotive or industrial bus networks, for a lightweight alternative to traditional cables.

The dedicated radio core, with its own flash and RAM, frees up resources for the main application and provides optimized current consumption. This can be used to improve system level power consumption, letting other systems sleep when not in use, such as cellular or full systems in keyless entry systems. In addition to upgradeable Bluetooth low energy 5.3, the NINA-B50 modules also support Matter, Thread, and Zigbee. This allows interoperability in the growing Matter ecosystem, and the dual-PAN feature allows bridging use cases for Thread and Zigbee with fast and reliable time-slicing.

The third core is the isolated EdgeLock secure enclave, with advanced security features including secure boot, debug, over-the-air updates, root-of-trust, hardware cryptography, on-the-go flash encryption, and Arm TrustZone secure execution environment. NINA-B50 also supports the NXP EdgeLock2GO service for installing keys and certificates into the end device; it is authorized for Matter device attestation certificates, making it easier to deploy Matter devices.

NINA-B506 comes with an internal PCB antenna providing high performance and an extensive range, while NINA-B501 has a module pin for an external antenna. NINA-B50 is globally certified, reducing time, cost, and effort for customers. Example applications include smart buildings and homes, industrial automation, e-bikes, and EV charging.

	NINA-B501	NINA-B506
Grade		
Automotive		
Professional	•	•
Standard		
Radio		
Chip inside	MCX W71	
Bluetooth qualification	v5.3	v5.3
Bluetooth low energy	•	•
802.15.4 / Thread / Zigbee / Matter	•	•
Bluetooth output power EIRP [dBm]	13	13
Max range [meters]	1400	1400
Antenna type (see footnotes)	pin	pcb
Application software		
Open CPU for embedded applications	•	•
Interfaces		
CAN / CAN FD controller	♦	♦
UART	♦	♦
SPI	♦	♦
I2C and I3C	♦	♦
Timer / PWM	♦	♦
GPIO pins	29	29
AD converters [number of bits]	16	16
DA converters [number of bits]	8	8
Coexistence interface	♦	♦
Features		
MCU	Arm Cortex-M33 and M3 and M0+	
RAM [kB]	128 + 88	
Flash [kB]	1024 + 256	
Simultaneous GATT server and client	♦	♦
Maximum Bluetooth connections	24	24
Bluetooth LE long range (coded PHY)	♦	♦
Matter	♦	♦
Secure boot	♦	♦
HW root-of-trust	♦	♦
Arm TrustZone-M	♦	♦
On-the-fly flash encryption	♦	♦
Secure FOTA	♦	♦
Dual-PAN HW support	♦	♦

pin = Antenna pin
pcb = Internal PCB antenna

♦ = Enabled by HW; depends on open CPU SW

NINA-B50 series

S

Features

Chip inside	NXP MCX W71
Bluetooth	v5.3 (Bluetooth low energy) 24 simultaneous connections
Bluetooth PHY rate	125 kbit/s, 500 kbit/s, 1 Mbit/s, 2 Mbit/s
802.15.4	Thread Zigbee Matter Dual-PAN
Max. conducted output power	10 dBm
Output power, radiated (EIRP)	13 dBm with approved antennas
Receiver sensitivity, conducted	Bluetooth LE, 125 kbit/s: -105 dBm Bluetooth LE, 500 kbit/s: -101 dBm Bluetooth LE, 1 Mbit/s: -97 dBm Bluetooth LE, 2 Mbit/s: -94 dBm 802.15.4, 250 kbit/s: -103 dBm
Antenna	NINA-B501: Antenna pin for connecting to an external antenna NINA-B506: Internal PCB antenna
Range	1400 m

Open CPU for customer application

Customers develop and embed their own apps on NINA-B50 modules with the NXP MCUXpresso SDK (open CPU concept). This section describes the hardware features that NINA-B50 modules can enable.

MCU system	Application: 96 MHz Arm Cortex-M33, 1 MB flash, 128 kB RAM, 8 kB code cache Radio: Arm Cortex-M3, 256 kB flash, 88 kB RAM Security: Arm Cortex-M0+, dedicated ROM/RAM
Hardware interfaces*	CAN / CAN FD controller 2 x LPUART 2 x LPSPI 2 x LPI2C 1 x I3C Timers / PWM 29 x GPIO 1 x FlexIO 1 x 16-bit SAR ADC, up to 2 MS/s (2x single end 16-bit ADC) 2 x CMP (6-bit high speed with 8-bit DAC) Wi-Fi PTA coexistence interface
Security	Arm TrustZone-M Hardware cryptographic accelerator Secure bootloader Isolated ROM and RAM Secure storage On-the-fly flash encryption Secure debug Random Number Generator (PRNG, TRNG) Digital tamper pins Support for NXP EdgeLock 2GO security service
Development environment	NXP MCUXpresso SDK (Zephyr / FreeRTOS)

* = Not all simultaneously

Package

Dimensions	10.0 x 11.6 x 2.4 mm (NINA-B501) 10.0 x 15.0 x 2.4 mm (NINA-B506)
Weight	< 1.0 g
Mounting	Machine mountable; solder pins

Environmental data, quality and reliability

Operating temperature	–40 °C to +85 °C
Storage temperature	–40 °C to +85 °C
Humidity	RH 5 – 90% non-condensing
RoHS directive	RoHS 2 and RoHS 3

Electrical data

Power supply	1.71 to 3.60 V
Power consumption	Active TX @ 0 dBm: 4.6 mA Active TX @ 10 dBm: 18.7 mA RX only: 4.7 mA Deep sleep: 2.5 µA Deep power down: 0.4 µA LE advertising without MCU intervention Auto switch between RUN and deep sleep modes

Certifications and approvals

Type approvals	Europe (RED), Great Britain (UKCA), US (FCC), Canada (ISED), Japan (MIC), South Korea (KCC), Taiwan (NCC), Australia (ACMA), New Zealand
Health and safety	EN 62479, EN 62368-1
Medical Electrical Equipment	IEC 60601-1-2
Bluetooth qualif.	Bluetooth Low Energy 5.3

Support products

EVK-NINA-B501-10	Evaluation kit for NINA-B501-10B with CAN controller, open CPU and external antenna
EVK-NINA-B506-10	Evaluation kit for NINA-B506-10B with CAN controller, open CPU and internal PCB antenna
EVK-NINA-B501-00	Evaluation kit for NINA-B501-00B with open CPU and external antenna
EVK-NINA-B506-00	Evaluation kit for NINA-B506-00B with open CPU and internal PCB antenna

Product variants

NINA-B501-10B	Bluetooth low energy module with open CPU and pin for external antenna, with CAN
NINA-B506-10B	Bluetooth low energy module with open CPU and internal PCB antenna, with CAN
NINA-B501-00B	Bluetooth low energy module with open CPU and pin for external antenna, without CAN, based on NXP K32W148
NINA-B506-00B	Bluetooth low energy module with open CPU and internal PCB antenna, without CAN, based on NXP K32W148

Further information

For contact information, see **www.u-blox.com/contact-u-blox**.

For more product details and ordering information, see the product data sheet.

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EVK-NINA-B501 EVK-NINA-B506