

ANNA-B50 series

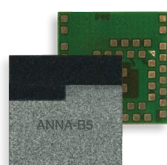
Stand-alone Bluetooth® LE module

Bluetooth LE module for size-constrained applications

- Ultra-compact SiP (6.5 x 6.5mm) with fully integrated antenna
- High performance Arm® Cortex®-M33 for demanding applications
- Qualified against Bluetooth Core 6.0, with Channel Sounding
- Thread, Zigbee®, NFC™, and Matter applications
- Advanced protection against security threats
- Global certification



6.5 × 6.5 × 1.2 mm



Product description

The ANNA-B50 module series is an ultra-compact, high-performance, stand-alone Bluetooth LE wireless MCU module. The System-in-Package (SiP) module measures only 6.5 × 6.5 mm including a fully integrated antenna. The small size allows Bluetooth to be integrated into devices with size constraints.

The module is built on the Nordic Semiconductor nRF54L15 wireless System-on-Chip. It features an embedded Arm® Cortex®-M33 microcontroller, and state-of-the-art power performance. With 1.5 MB non-volatile memory and 256 kB RAM, it offers necessary capacity for advanced applications developed with the open CPU architecture and the Nordic nRF Connect SDK. Compared to the previous nRF52 series, it doubles the processing power and triples the processing efficiency.

With the Bluetooth LE radio, supporting Channel Sounding, the ANNA-B50 module series can be used for secure and accurate distance measurement between devices. It also comes with features such as higher throughput with LE 2M, longer range with LE Coded as well as Mesh Networking. In addition to Bluetooth, Thread, Zigbee and Matter protocols are supported, as well as NFC.

ANNA-B505 comes with an internal antenna for ease of integration in the end-product while ANNA-B501 has an antenna pin for use with an external antenna of choice. The ANNA-B50 series is globally certified — reducing time, cost, and effort for customers integrating Bluetooth technology in their designs. To ensure operation in harsh professional environments, the module is qualified according to u-blox professional grade requirements.

Key markets include industrial automation, medical and healthcare, smart home and buildings, and telematics.

	ANNA-B501	ANNA-B505
Grade		
Automotive		
Professional	•	•
Standard		
Radio		
Chip inside	nRF54L15	nRF54L15
Qualified against Bluetooth® Core	6.0	6.0
Bluetooth low energy	•	•
Thread / Zigbee	•	•
Bluetooth output power [dBm]	7	7
Max range [meters]	TBD	TBD
NFC	•	•
Antenna type (see footnotes)	pin	chip
Application software		
Open CPU for embedded applications	•	•
Interfaces		
UART	•	•
SPI	•	•
I2C	•	•
I2S	•	•
QDEC	•	•
PDM and PWM	•	•
GPIO pins	32	32
AD converters [number of bits]	14	14
Features		
MCU	Arm Cortex-M33	Arm Cortex-M33
RAM [kB]	256	256
Flash [kB]	1524	1524
Matter	•	•
Channel Sounding	•	•
Simultaneous GATT server and client	•	•
LE 2M (2 Mbit/s)	•	•
LE Coded PHY	•	•
Arm TrustZone®	•	•
Secure boot	•	•
Secure FOTA	•	•

pin = Antenna pin
chip = Internal chip antenna

Radio features

Bluetooth	Qualified against Bluetooth® Core 6.0
Bluetooth PHY rates	2 Mbps, 1 Mbps, 500 kbps, 125 kbps
802.15.4	Thread, Zigbee, Matter
Other radios	Nordic proprietary protocol, up to 4 Mbps
Max output power, conducted	7 dBm
Receiver sensitivity, conducted	Bluetooth LE, 125 kbit/s: -103 dBm Bluetooth LE, 1 Mbit/s: -95 dBm 802.15.4, 250 kbit/s: -101 dBm
Antennas	ANNA-B501: External antenna (pin) ANNA-B505: Internal chip antenna

Open CPU for customer application

Customers develop and embed their own applications on ANNA-B50 modules using the Nordic nRF Connect SDK (open CPU concept). This section describes the hardware features that the ANNA-B50 modules enable.

Development environment	Nordic Semiconductor nRF Connect SDK
MCU system	Arm® Cortex® -M33 application processor at 128 MHz. RISC-V co-processor at 128 MHz. 1.5 MB non-volatile memory and 256 kB RAM.
HW interfaces *	5 x UART 5 x SPI 5 x I2C 2 x I2S 3 x PWM 2 x QDEC 32 x GPIO pins 14-bit ADC NFC tag Global Real-Time Counter (GRTC)
Security	Arm® TrustZone® technology Secure key management Memory protection Immutable boot loader partition Hardware crypto-accelerator Debug access port protection Physical tamper detection

* Not all simultaneously

Electrical data

Power supply	1.7 to 3.6 VDC
Power consumption	Bluetooth LE TX, 1 Mbps, 0 dBm: 4.8 mA Bluetooth LE RX, 1 Mbps: 3.4 mA Idle mode, full RAM retention: 2.7 µA System off: 0.7 µA

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.

Package

Dimensions	6.5 x 6.5 x 1.2 mm
Weight	< 0.1 g
Mounting	Machine mountable Solder pins, 52-pin LGA

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

Certifications and approvals*

Type approvals	Europe (ETSI RED), Great Britain (UKCA), US (FCC), Canada (IC RSS), Japan (MIC), Taiwan (NCC), South Korea (KCC), Australia / New Zealand (ACMA)
Health and safety	EN 62479, EN 62368-1
Medical Electrical Equipment	IEC 60601-1-2
Bluetooth qualification	Qualified against Bluetooth Core 6.0

* Certifications pending

Support products

EVK-ANNA-B505	Evaluation kit for ANNA-B50x with open CPU
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Product variants

ANNA-B501	Bluetooth LE module with open CPU and antenna pin for external antenna connection
ANNA-B505	Bluetooth LE module with open CPU and internal antenna

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