

ANNA-B402 module

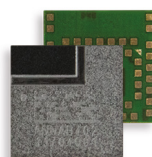
Stand-alone Bluetooth 5.1 low energy module

Ultra-compact module for harsh professional environments

- Ultra-compact SiP (6.5 x 6.5) with integrated antenna
- Bluetooth 5.1, Bluetooth mesh, long range, Zigbee and Thread
- Direction finding support for indoor location
- Powerful open CPU architecture for customized applications
- Extended temperature range up to 105 °C
- Global certification



6.5 × 6.5 × 1.2 mm



ANNA-B402

Product description

ANNA-B402 is an ultra-small, high-performing, standalone Bluetooth low energy module. The system in package (SiP) module measures only 6.5 x 6.5 mm including an integrated antenna. It features Bluetooth 5.1, an embedded Arm® Cortex®-M4 microcontroller with FPU, and state-of-the-art power performance.

The module is built on the Nordic Semiconductor nRF52833 chip. With 512 kB flash and 128 kB RAM, it offers the necessary capacity for advanced applications developed with open CPU architecture and the Nordic SDK. Wired interfaces like UART, USB, SPI, I2C, I2S, and GPIO are available for connections to peripheral devices.

For location applications, ANNA-B402 supports the Bluetooth direction finding features, Angle-of-Arrival (AoA) and Angle-of-Departure (AoD). This enables more accurate location compared to only using the received signal strength. ANNA-B402 provides an extended communication range or a more reliable connection using Bluetooth long range. Alternatively, the Wirepas Mesh stack can be used to form large-scale industrial mesh networks.

In addition to Bluetooth low energy, support for ZigBee and Thread protocols is provided, as well as NFC.

Key markets are industrial automation, smart cities and buildings, medical and healthcare, and telematics. Specific applications include smart lighting, asset tracking, indoor location, sensors, and wireless-connected and configurable equipment.

ANNA-B402 comes with an internal chip antenna for ease-of-integration in the end-product as well as an antenna pin for using an external antenna of choice. ANNA-B402 is globally certified for use with the internal or external antenna. This reduces time, cost and effort for customers integrating ANNA-B402 in their designs. To ensure operation in harsh professional environments, the module is industrial grade and qualified according to ISO 16750, supporting an extended temperature range of -40 °C to +105 °C.

Grade	
Automotive	
Professional	•
Standard	
Radio	
Chip inside	nRF52833
Bluetooth qualification	v5.1
Bluetooth low energy	•
Thread / Zigbee	•
Bluetooth output power EIRP [dBm] *	9 / 11
Max range [meters] *	600 / 700
NFC	•
Antenna type (see footnotes)	chip / pin
Application software	
Open CPU for embedded applications	•
Interfaces	
UART	♦
SPI	♦
I2C	♦
I2S	♦
USB	♦
PDM and PWM	♦
GPIO pins	33
AD converters [number of bits]	12
Features	
MCU (see footnotes)	M4F
RAM [kB]	128
Flash [kB]	512
Simultaneous GATT server and client	♦
Throughput [Mbit/s]	1.4
Maximum Bluetooth connections	20
Secure boot	♦
Bluetooth mesh	♦
Direction finding (AoA / AoD)	♦
FOTA	♦

pin = Antenna pin

chip = Internal chip antenna

* = The different values are for use with internal / external antennas

M4F = 64 MHz Arm® Cortex-M4 with FPU

♦ = Feature enabled by hardware; support depends on the open CPU application software

ANNA-B402 module



Features

Bluetooth	v5.1 (Bluetooth low energy)
NFC	NFC-A tag support
Range	Internal antenna: 600 m External antenna: 700 m
Max. output power	8 dBm
Conducted sensitivity	-94 dBm (1 Mbit/s) -103 dBm (125 Kbit/s)
Max radiated output power (EIRP)	Internal antenna: 9 dBm External antenna: 11 dBm

Open CPU for customer application

Customers can develop and embed their own application on top of the Bluetooth stack inside the ANNA-B402 module (open CPU concept). This section describes the possible features enabled by the ANNA-B402 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)
Bluetooth	GATT server and client Beacons 2 Mbit/s modulation 1 Mbit/s modulation 500 Kbit/s modulation long range functionality 125 Kbit/s modulation long range functionality Advertising extensions
HW interfaces *	2 x UART 4 x SPI 33 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 V to 3.6 VDC
Power consumption	Active TX @ 0 dBm: 6.0 mA Active TX @ +8 dBm: 15.5 mA RX only: 6.0 mA Standby: 1.3 µA Sleep: 600 nA (with wake-up on external event)

Package

Dimensions	6.5 x 6.5 x 1.2 mm
Weight	< 0.1 g
Mounting	Machine mountable Solder pins, 56-pin LGA

Environmental data, quality & reliability

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

Certifications and approvals¹

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

1 = Pending approvals

Support products

EVK-ANNA-B402C	Full-featured evaluation kit for ANNA-B402 module using the internal antenna
EVK-ANNA-B402U	Full-featured evaluation kit for ANNA-B402 module using the antenna pin, with an external antenna connected via a U.FL connector
USB-ANNA-B402	USB stick mini evaluation kit for ANNA-B402, using the internal antenna

Product variants

ANNA-B402	Bluetooth low energy module with open CPU, internal antenna, and antenna pin for external antenna connection
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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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