

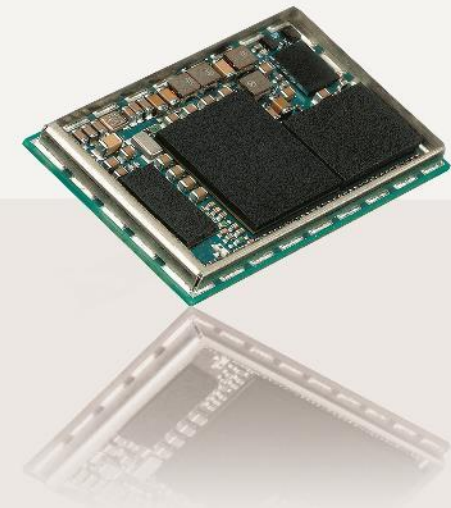
Avnet Silica Tech Day Breda

u-blox: Locate and Connect every thing

December 11, 2025

Nils Gautam, Senior Product Marketing Manager
Product Strategy, BU Short Range Radio

Markus Harder, Regional Sales Manager Germany and Benelux



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Agenda

- u-blox Introduction
- Introducing the New Bluetooth LE Module Series
 - Overview of NORA-B2, ALMA-B1, and ANNA-5
 - Technical highlights, features, and application scenarios
 - Accelerating Development with u-connectXpress
 - NORA-B2 Performance comparison
- Channel Sounding: Bluetooth Distance Measurement
- Cybersecurity & Compliance
 - How u-blox modules meet new security requirements
- Summary
- Q&A and Closing Remarks





We are u-blox

Company presentation | December 2025

> 123M

Revenues in H1 2025

850

Employees in
28 countries

+ 34%

Revenue growth YoY

#1

in Positioning
solutions

Helping you to locate and connect everything

Asset
tracking

Navigation

Mobile
robotics

Autonomous
driving

UAV
(Unmanned
Aerial Vehicles)

Connected
Factory

Healthcare

Wearables



Locate

GNSS chips and modules deliver unparalleled accuracy and reliability, ensuring critical applications in navigation and tracking operate flawlessly in any environment.

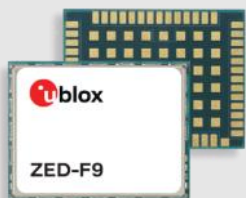
Services

Solve accuracy, availability and cost problems in order to reliably locate what matters, anywhere and anytime.

Connect

Achieve fast time-to-revenue with our short-range components and software - offering robustness, security, and flexibility, with powerful development tools and a global ecosystem of certification and technical support.

Locate products



Portfolio today

Automotive

- X20
- F9
- A9
- u-safe

Industrial Navigation & Robotics

- F9
- X20

Timing

- F9T
- F10T

Consumer & Industrial tracking

- M10
- F10
- M9

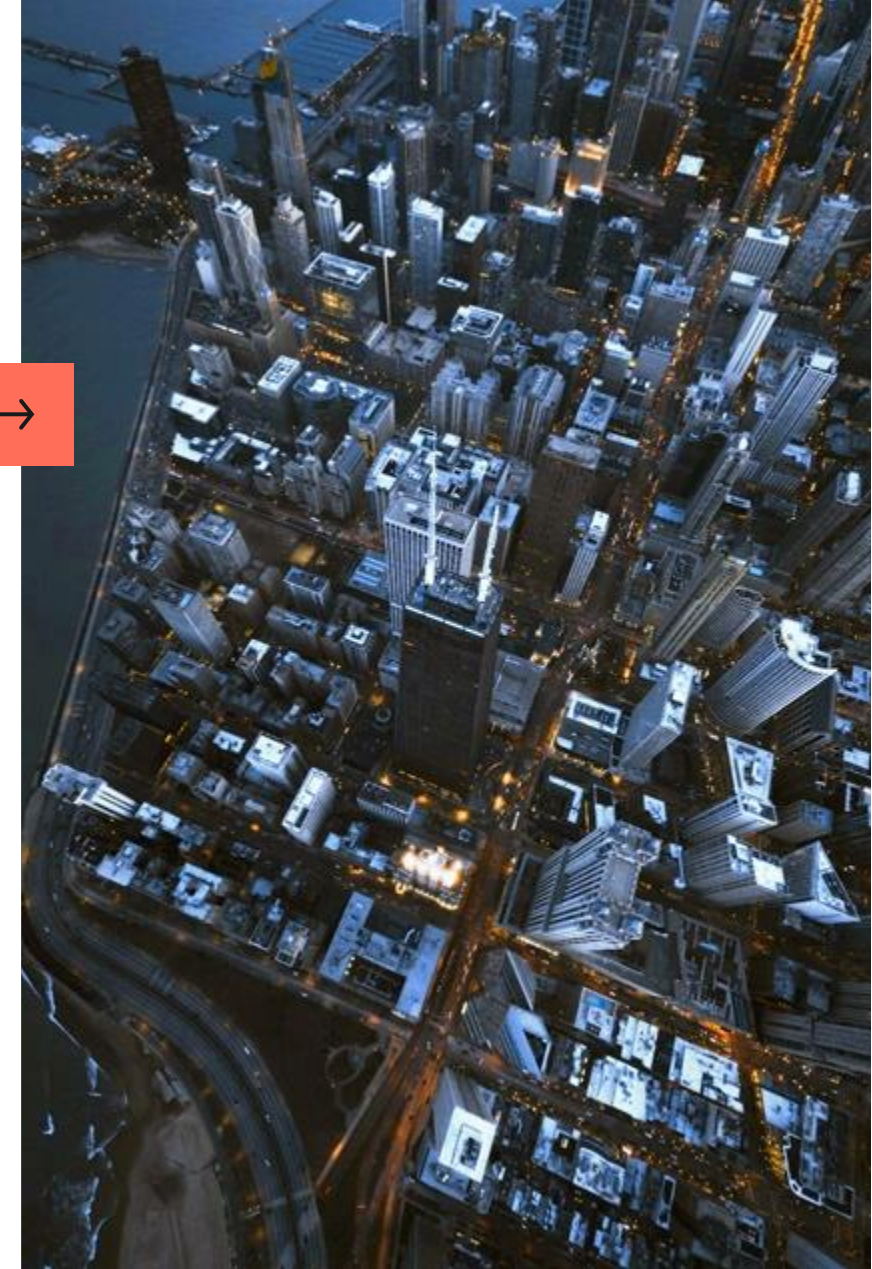
Success factors

- 20+ years track record in automotive GNSS
- All-band GNSS
- Automotive proven reliability and quality
- Functional safe solutions

- Leader in high precision technology
- Fully integrated multi and all-band GNSS

- Nanosecond-level
- Accuracy
- High security & reliability

- Affordability
- Reliability
- Accurate tracking



u-blox GNSS low-power platforms

	u-blox M8	u-blox M10	u-blox F10	u-blox 11
Target application	Wide range of standard precision in consumer, industrial, and automotive	Wide range of standard precision in consumer and industrial	Wide range of standard precision in consumer and industrial	Wide range of standard precision in consumer and industrial
Static accuracy (CEP)	2.5 m 2 m with SBAS	2 m 1.5 m with SBAS	1.5 m 1 m with SBAS	1.5 m 1 m with SBAS
Bands supported	Single-band (L1)	Single-band (L1)	Dual-band (L1, L5)	Dual-band (L1 or L1/L5)
Corrections	SBAS, SLAS, DGPS	SBAS, SLAS	SBAS, SLAS	SBAS, SLAS, DGNSS
Variants	Timing, Dead Reckoning	-	Timing, Dead Reckoning	-

u-blox GNSS high performance platforms

	u-blox M8	u-blox M9	u-blox F9	u-blox F20	u-blox X20
Target applications	Wide range of standard precision applications in consumer, industrial, and automotive markets	Wide range of standard precision applications in industrial and automotive markets	High precision applications in industrial automation, timing and infrastructure, automotive	High precision applications in industrial automation, timing and infrastructure, automotive	High precision applications in industrial automation, timing and infrastructure, automotive
Static accuracy (CEP)	Standalone: 2.5 m SBAS: 2.0 m RTK: 1cm + 1ppm	Standalone: 2.0 m SBAS: 1.5 m	Standalone: 1.5 m SBAS: 1.0 m RTK: 1cm + 1ppm PPP-RTK: 3-6cm	Standalone: 1.2 m SBAS: 0.6 m RTK: 0.6cm + 1ppm PPP-RTK: 3-6cm	Standalone: 1.2 m SBAS: 0.6 m RTK: 0.6cm + 1ppm PPP-RTK: 3-6cm PPP: <10cm
Bands supported	Single-band (L1)	Single-band (L1)	Multi-band (L1/L2, L1/L5)	Multi-band (L1, L2, L5)	All bands (L1, L2, L5, L6). Integrated L-band.
Product variants	Standard precision, High precision, Timing, Dead reckoning	Standard precision, Dead reckoning	High precision, Timing, Dead reckoning	High precision, Timing, Dead reckoning	High precision, Timing, Dead reckoning

Locate services

High Precision Positioning

GNSS correction services for cm-level precision that are robust, secure and scalable

Low Power Positioning and Communication

Cloud-based positioning, assisted GNSS and MQTT communication solutions to maximize IoT device performance

Portfolio today

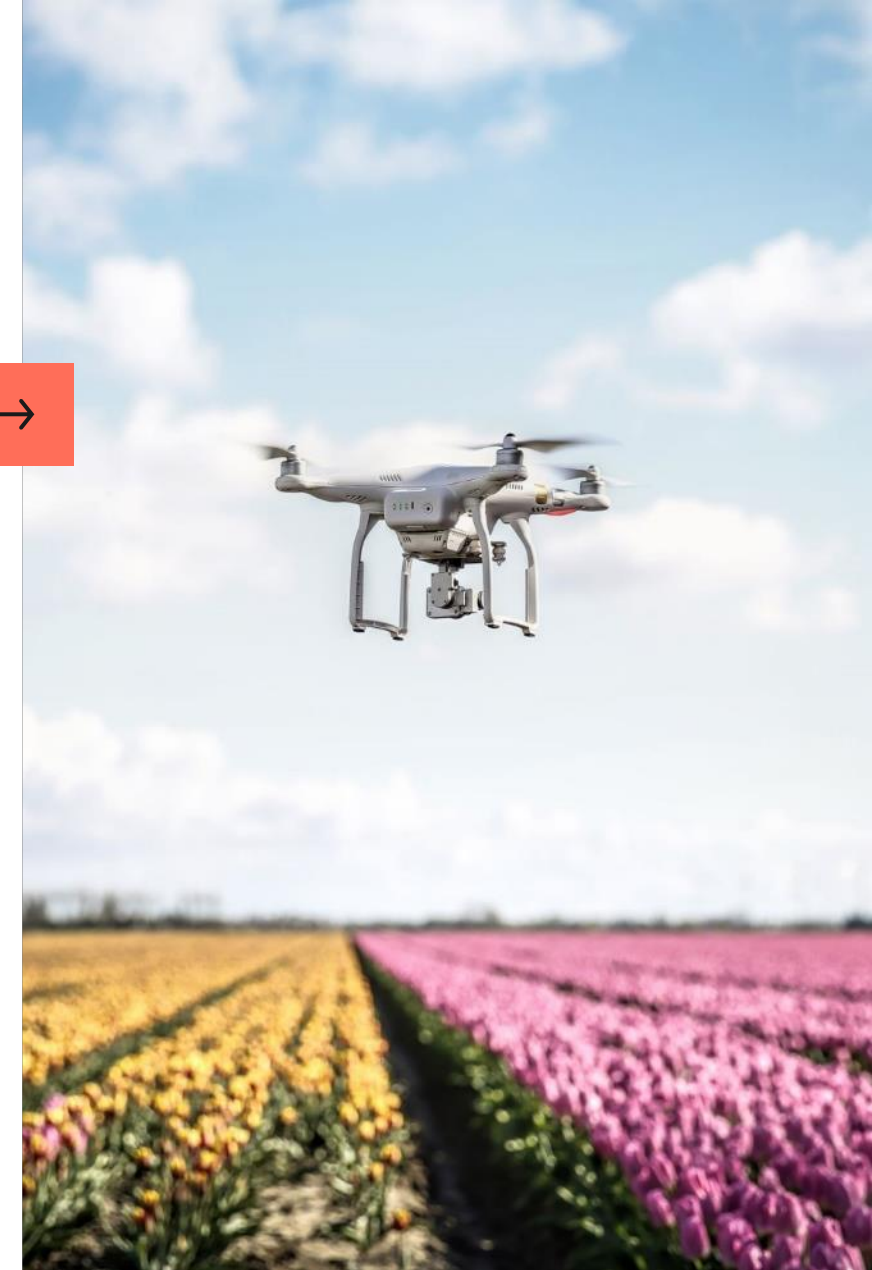
- PointPerfect Flex
- PointPerfect Live
- PointPerfect Global

- AssistNow
- CloudTrack
- CloudLocate
- MQTT Communication

Success factors

- Quick time to revenue
- Compatible with non u-blox RTK receivers
- Industry-leading uptime
- Flexible price plans

- Increased performance in constrained IoT environments
- Compatible with u-blox standard precision products
- Globally Available
- Flexible price plans



PointPerfect: An optimal solution for every application

	PointPerfect Live Superior performance for the most demanding applications	PointPerfect Flex Scalable and flexible solutions for wide-ranging use cases	PointPerfect Global* Seamless worldwide coverage for truly global solutions
Technology	network RTK OSR corrections format	PPP-RTK SSR and OSR correction formats	PPP-AR SSR corrections format
Error corrections	Satellite clock & orbits Code & phase biases Ionospheric & tropospheric delays	Satellite clock & orbits Code & phase biases Ionospheric & tropospheric delays	Satellite clock & orbits Code & phase biases
Accuracy**	1-2 cm	3-6 cm	<10 cm
Convergence time**	<10 sec	10-30 sec	1-2 min
Data format	RTCM	SPARTN & RTCM	SPARTN
Required bandwidth	~6 kbit/sec	SPARTN: ~0.5 kbit/sec RTCM: ~6 kbit/sec	~0.5 kbit/sec
Coverage	Key regions of Europe & USA	Europe & USA, Canada, Japan, Korea, South America, Australia ***	Global
Data delivery	Internet	Internet, customer cloud & Satellite broadcast in South America	Internet, customer cloud & Satellite broadcast ****

*Upcoming service to be launched during 2026, **Performance may vary depending on conditions,

Partial coverage in some countries, *L-band broadcast activation at later phase

Connect products

Portfolio today

Industrial and consumers

- Bluetooth
- Wi-Fi
- Matter
- Thread

Automotive and industrial

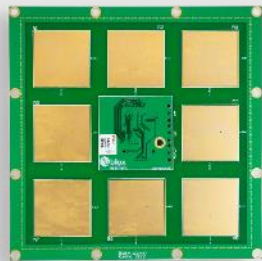
- Wi-Fi 7
- Wi-Fi 6/6E
- Bluetooth Classic / LE

Locate

- Direction finding
- Ranging

Success factors

- Diversified portfolio
- Leading chip suppliers
- Quality
- Form factor policy
- RF performance
- Compact design
- Global certification
- Fast time-to-market with u-connect software



Being close to our partners



Having close partnerships with our business partners
- for the best of our joint customers:

- Defining future roadmaps together
- Go to market together
- Solving problems together, if needed
- Some of our partners:



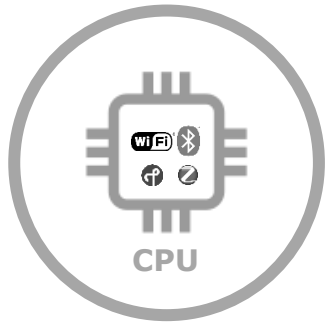
NORDIC[®]
SEMICONDUCTOR



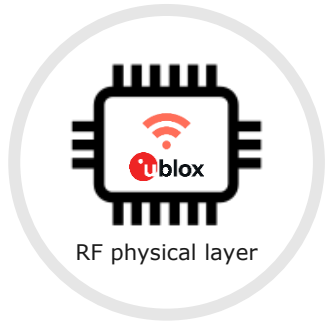
Key architectures

Addressing the common market needs

RF transceiver

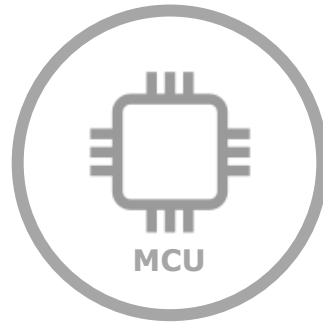


↕ SDIO, USB,
SPI, PCIe

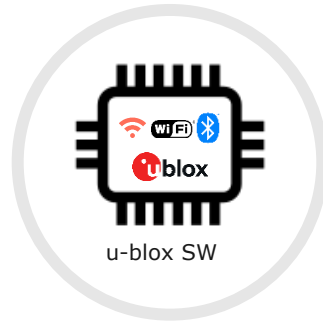


Host-based
RF transceiver module

Network processor

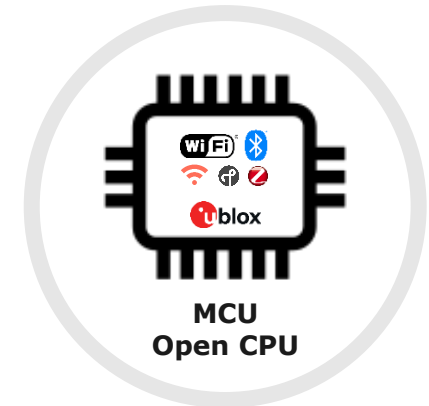


↕ Serial interface
AT commands



Stand-alone module
u-connectXpress/Locate and
AWS IoT ExpressLink software

Wireless MCU



Stand-alone module
open CPU

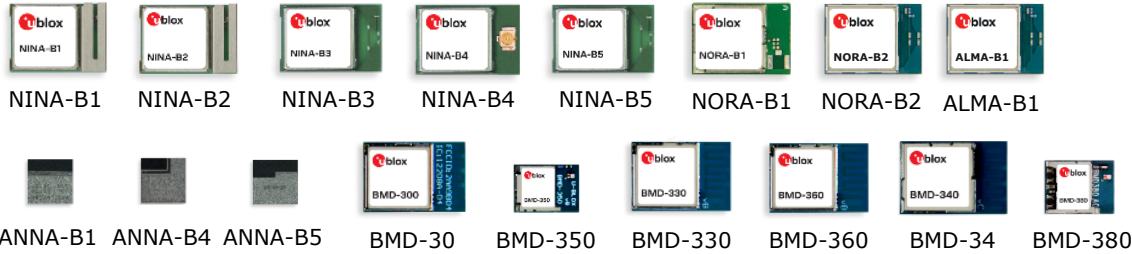
   = Protocol stacks **MCU/CPU** = Executes the device application

Short range radio portfolio

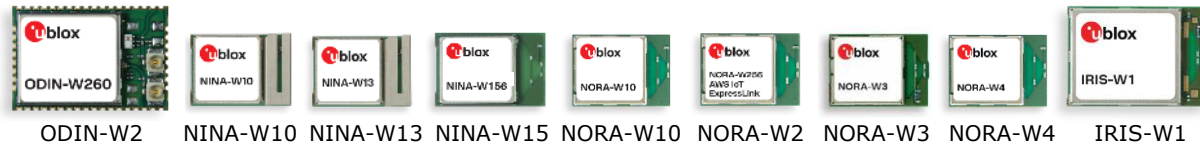
Module overview

Stand-alone modules

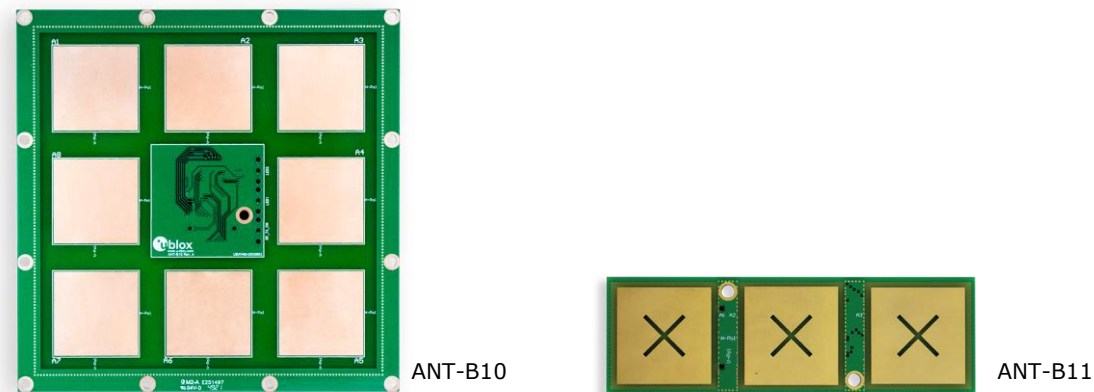
Wireless MCU and Network Processors - Bluetooth



Wireless MCU and Network Processors – Wi-Fi and Multiradio

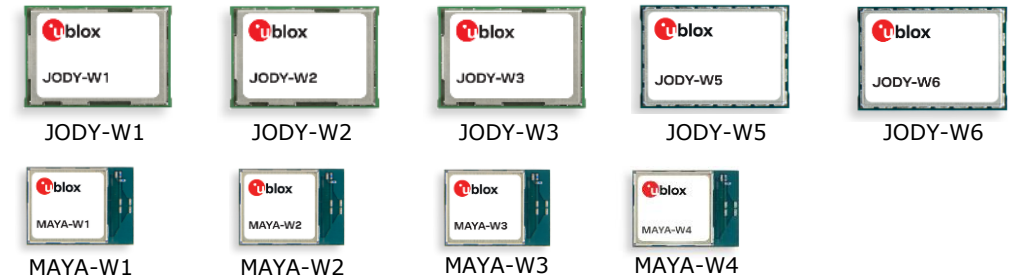


Antenna boards



Host-based modules

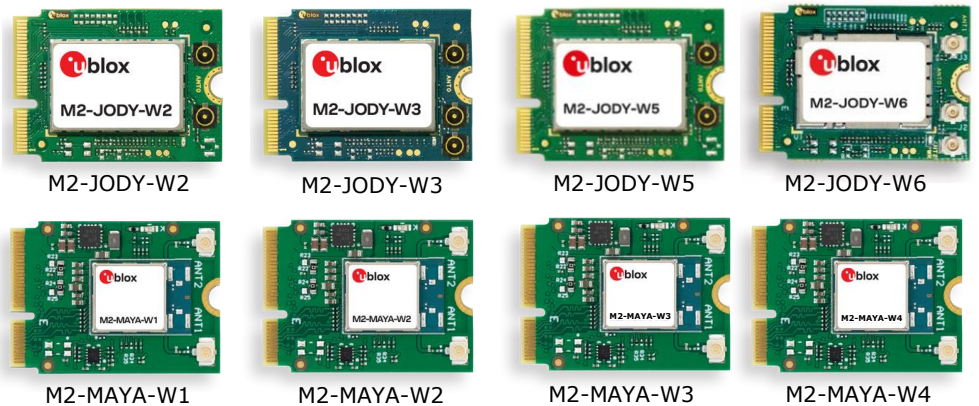
RF Transceivers - Multiradio






RF Transceivers - Wi-Fi



M.2 cards



Product grades: the right level of durability

Product grade	 Standard	 Professional	 Automotive	
Environmental conditions	Consumer environment	Industrial environment	Automotive environment	Safety critical environment
Temperature	-20 °C to +65 °C	-40 °C to +85 °C	-40 °C to +85 °C or extended (up to +105 °C)	-40 °C to +105 °C
Product qualification	JESD47 (ICs) Subset of AEC-Q104 (modules)	JESD47 (ICs) Subset of AEC-Q104 (modules)	AEC-Q100 (ICs) AEC-Q104 (modules)	AEC-Q100 (ICs) ASIL-B (ISO 26262)
Process levels for design, manufacturing, and testing	<ul style="list-style-type: none"> • 100% outgoing test • Product traceability • PCN process • Failure analysis 	Standard grade, plus: <ul style="list-style-type: none"> • 100% Automatic X-Ray and Optical Inspection on modules 	Professional grade, plus: <ul style="list-style-type: none"> • ISO/TS 16949 manufacturing • Automotive test flow • Long product life cycles • PPAP* • 8D failure reporting* • Component traceability* • 0-ppm program* • Automotive PCN process* 	Automotive grade, plus: <ul style="list-style-type: none"> • ISO 26262 certified component • Safety Element Out of Context (SEooC) • ISO 21434 • SOTIF

* = Only offered to first-mount automotive customers

Production partners

Working with world leaders



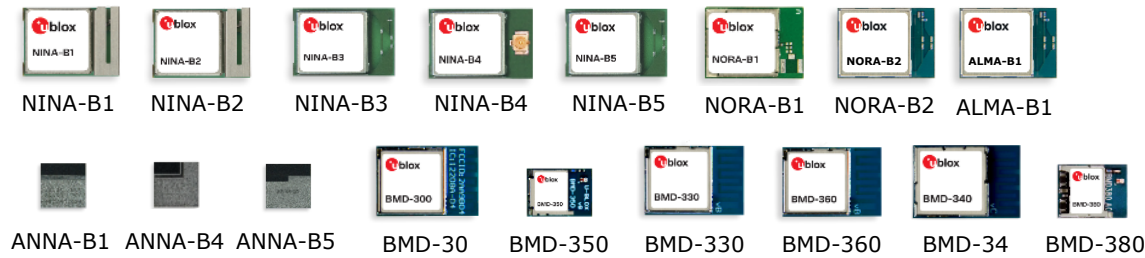
= global ranking per segment

Short range radio portfolio

Module overview

Stand-alone modules

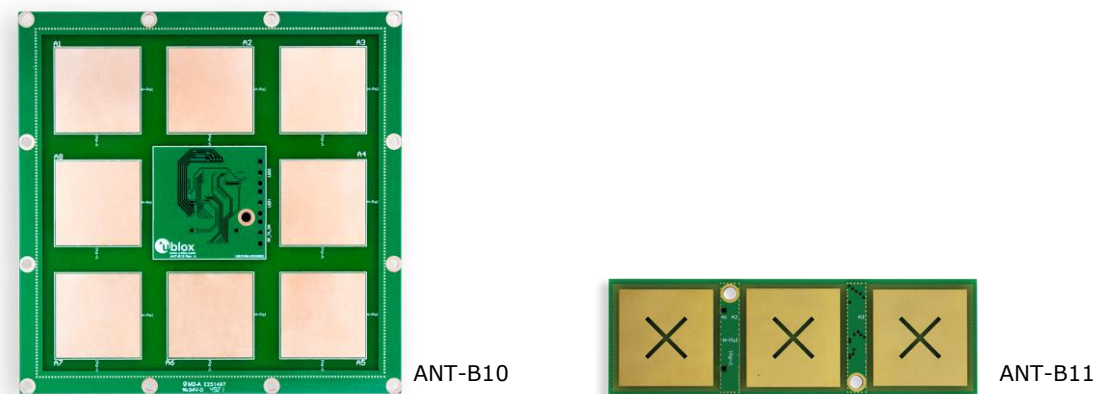
Wireless MCU and Network Processors - Bluetooth



Wireless MCU and Network Processors – Wi-Fi and Multiradio

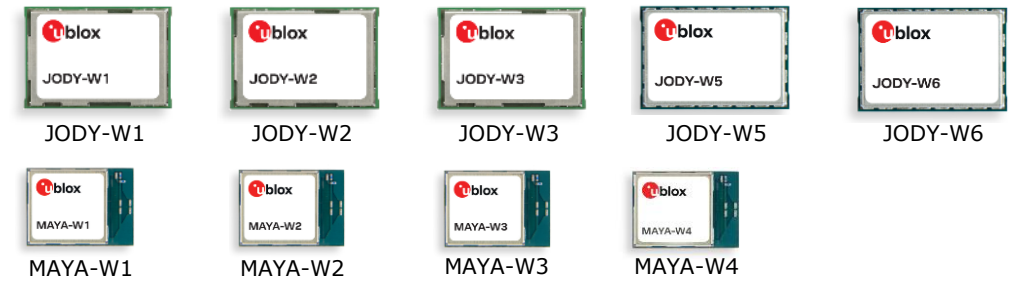


Antenna boards



Host-based modules

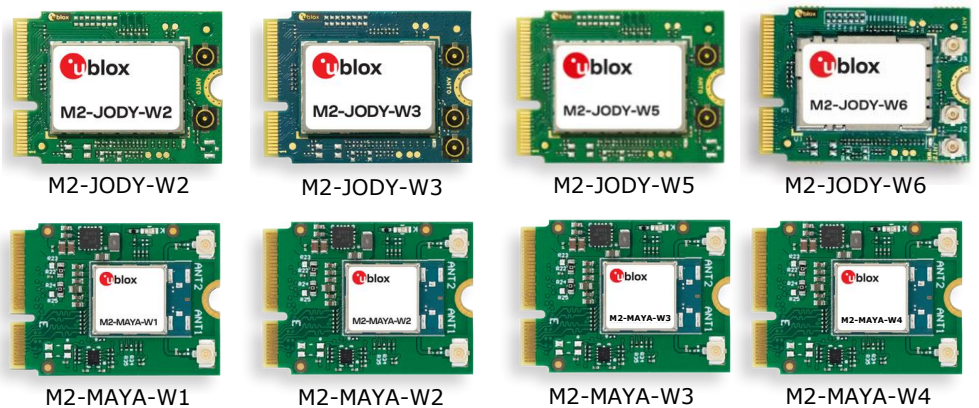
RF Transceivers - Multiradio



RF Transceivers - Wi-Fi



M.2 cards



Bluetooth Stand-Alone Portfolio



Why use u-blox modules?

Faster time to market

- Plug & play
- Fully qualified, tested and certified
- u-blox SW for accelerated time to market

Lower Investment

- Less production testing, certification covered, low production set-up effort
- Lower inventory costs and risks
- Less complex device circuit-boards

Future proof

- Form factor policy for easy migration to next generation
- High quality components for consistent performance
- No efforts for re-certification to standards

Short range radio portfolio

Module overview

Stand-alone modules

Wireless MCU and Network Processors - Bluetooth



Wireless MCU and Network Processors - Wi-Fi and Multiradio



Antenna boards



Host-based modules

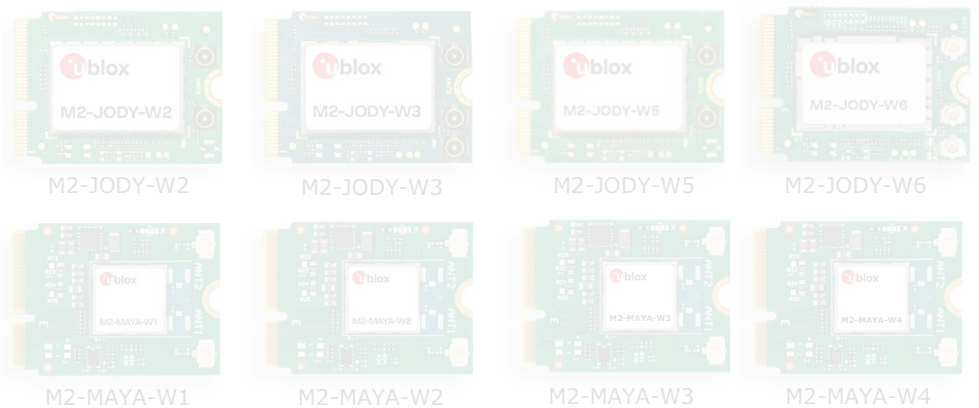
RF Transceivers - Multiradio



RF Transceivers - Wi-Fi



M.2 cards

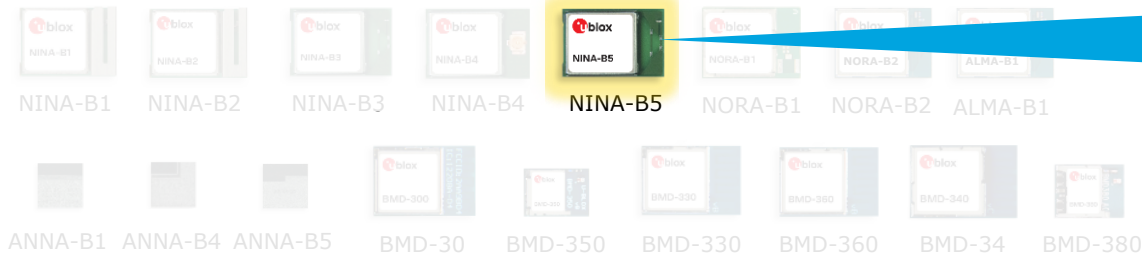


Short range radio portfolio

Module overview

Stand-alone modules

Wireless MCU and Network Processors - Bluetooth



Host-based modules

RF Transceivers - Multiradio

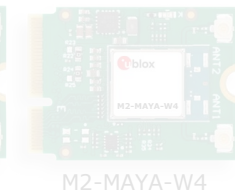
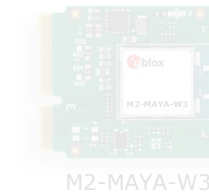
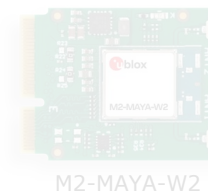
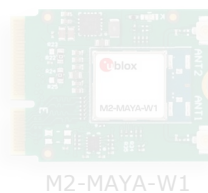
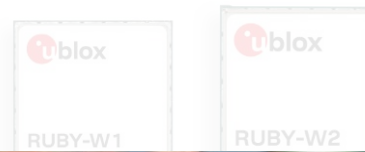
NINA-B5 updated with the NXP MCX W71 chipset
Adding CAN FD interface



Wireless MCU and Network Processors - Wi-Fi and Multiradio



RF Transceivers - Wi-Fi



Short range radio portfolio

Module overview

Stand-alone modules

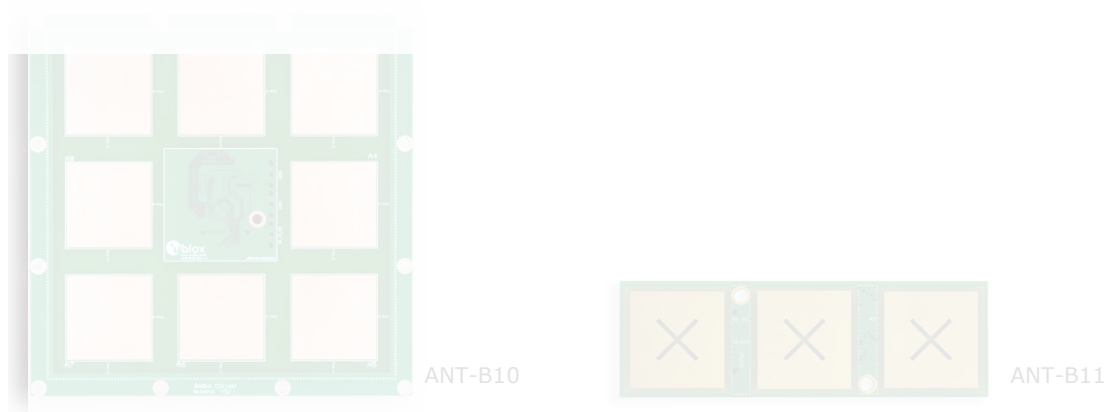
Wireless MCU and Network Processors - Bluetooth



Wireless MCU and Network Processors - Wi-Fi and Multiradio



Antenna boards



Host-based modules

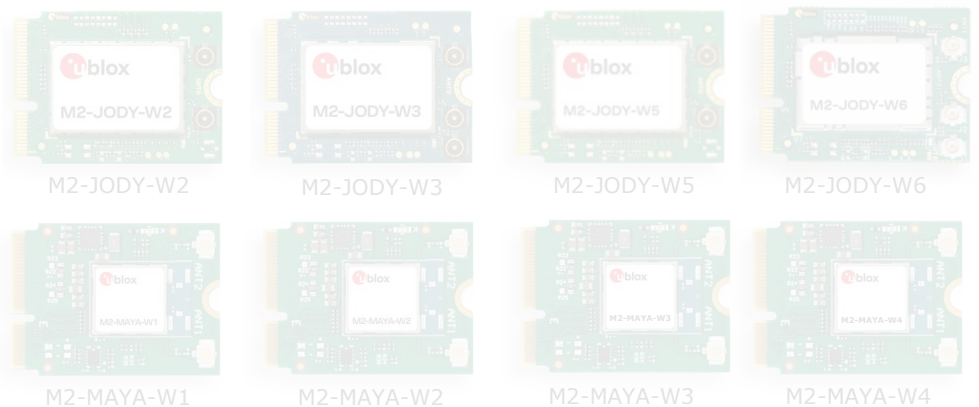
RF Transceivers - Multiradio



RF Transceivers - Wi-Fi

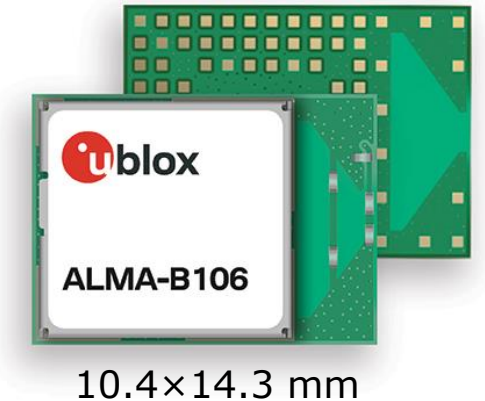


M.2 cards



ALMA-B1: Highest-end Bluetooth LE stand-alone module

- Product features
 - Dual Arm Cortex-M33 and dual RISC-V up to 320 MHz
 - 2 MB non-volatile memory, 1 MB RAM
 - Bluetooth 6.0, with Channel Sounding
 - Thread and Matter
 - Small module with integrated antenna or antenna pin
 - Global certification
- Nordic nRF54H20 chipset not yet mature for general availability
 - Nordic nRF54H20 public launch expected in 2026
- ALMA-B1 modules and EVKs in Prototype stage
- Documentation available under NDA
 - Data sheet
 - System integration manual
 - Evaluation kit user guide

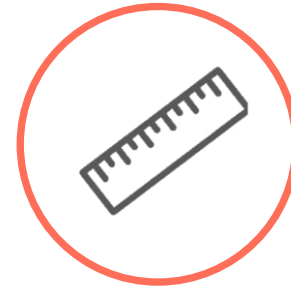


Nordic nRF54L15 System-on-Chip

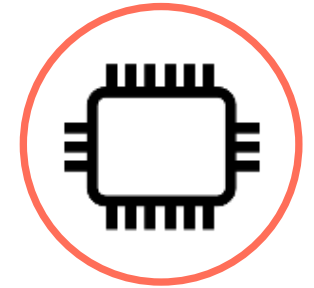
Significant improvements over the nRF52 series



**More powerful MCU
(2× nRF52840)**



**Ranging with
Channel Sounding**



More memory



**Higher security
level**



**Reduced current
consumption**



**Secured supply
chain**

NORA-B2 Highlights

- Standalone Bluetooth LE module
 - Bluetooth LE 6.0
 - 802.15.4 with Thread and Zigbee
 - Matter application protocol
- Based on **Nordic Semiconductor's nrf54L series** of chipsets
- High performance Arm Cortex-M33 processor @ 128 MHz
- Ultra-low power consumption
- Open CPU or u-connectXpress variants
- Enhanced security features for all upcoming regulations and beyond
- Internal antenna or pin for external antenna of choice
- Global Certification



NORA-B2 variants based on nRF54L series

Wireless MCU

Network processor

nRF54L15
Nordic Connect SDK
1.5MB NVM; 256 KB RAM



nRF54L10
Nordic Connect SDK
1.0 MB NVM; 192 KB RAM



nRF54L05
Nordic Connect SDK
0.5MB NVM; 96 KB RAM



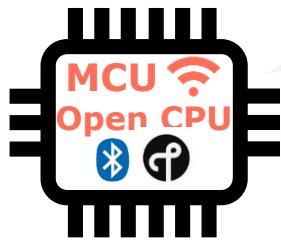
nRF54L10
u-connectXpress SW



nRF54L05
u-connectXpress SW

Two different operation modes

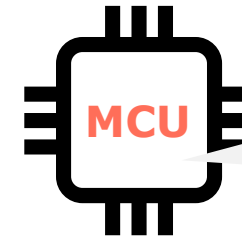
Wireless MCU (NORA-B20/B21/B22)



Hosting customer application software and communication protocols

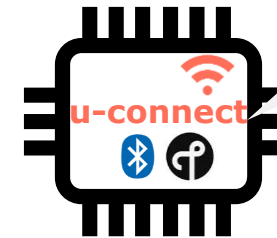
Stand-alone module
Open CPU

Network processor (NORA-B26/B27)



Executes customer application SW, AT commands controlling the wireless module

Serial interface
AT commands



Network processor with Bluetooth stack, GATT profiles, SPS protocol, etc.,

Stand-alone module
u-connectXpress

  = Protocol stacks

MCU = Executes the device application

NORA-B2 Wireless MCU (u-connectXpres) variants

- **NORA-B26x based on nRF54L10**

- Multiple antenna options
- More memory; More features
- Full feature set u-connectXpress (userguide: [link](#))
- **Use-cases:** BLE scanning, Initiate and receive connections, BLE sensor client and server, Multiple simultaneous connections, BLE beacon, Co-existence with Wi-Fi radio, serial data communication and wireless multidrop, communication with mobile phones, tablets and BLE dongles.
- **Examples:** Gateway devices, complex edge devices/controllers, beacons, wireless sensors, cable replacement devices



- **NORA-B276 based on nRF54L05**

- Only PCB antenna variant
- Less memory; reduced feature set
- Only peripheral mode & 1 simultaneous connection
- **Use-cases:** Receive incoming connection requests, Bluetooth sensor server, Bluetooth beacon, serial data communication, communication with mobile phones, tablets and BLE dongles.
- **Examples:** beacons, wireless sensors, cable replacement devices



Where we win with NORA-B2, examples



Power tools

- Ultra-low power consumption
- High performance MCU
- Product Longevity
- Good performance of integrated PCB antenna
- u-connectXpress

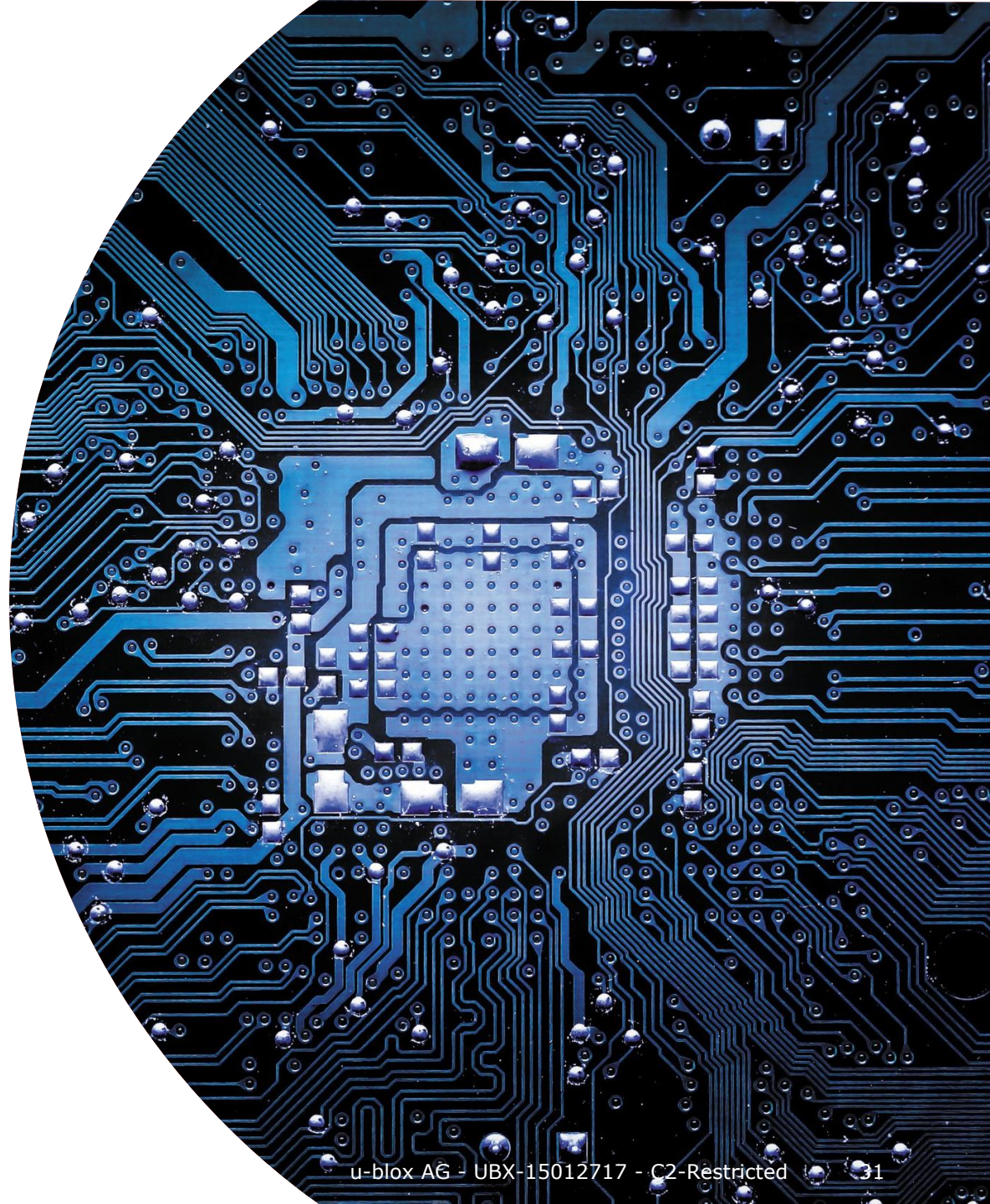


Smart Building

- MCU performance and security
- Reduced power consumption allowing for longer battery time

Competitor comparison

**NORA-B2 vs
Competitor module**

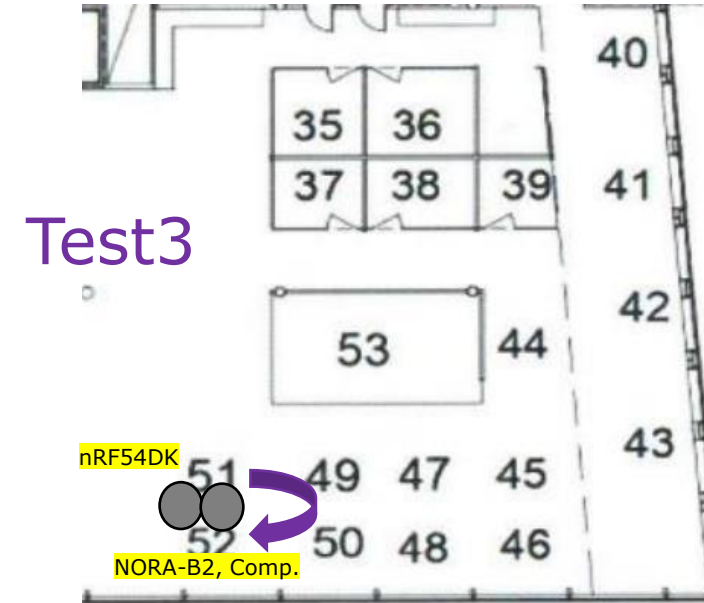


Throughput Measurement comparison: LoS

- NORA-B2 and Competitor are central; nRF54L15-DK is peripheral
- Bluetooth LE throughput example using SDK 3.0 (using 2M PHY)

Test3: LoS 0.5m (2hours of datapump)

	NORA-B2	Comp.
Number of connection drops in 2h	0	0
Number of successful tests in 2h	306	305
Avg bytes received per test	3187978	3175522
Avg GATT writes per test	6440	6415
Throughput (bps) per test	1291697	1286097



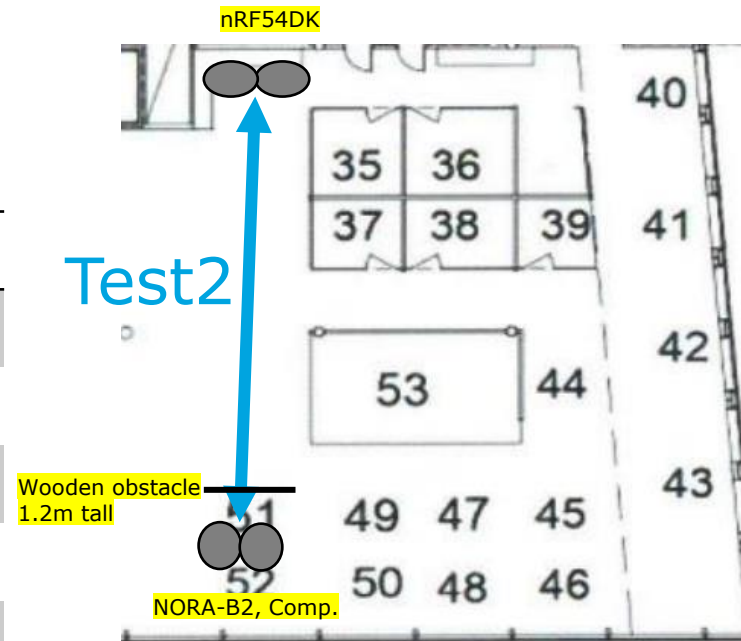
Similar performance in the best-case scenario

Throughput Measurement comparison: OLoS

- NORA-B2 and Competitor are central; nRF54L15-DK is peripheral
- BLE throughput example using SDK 3.0 (using 2M PHY)

Test2: Open Landscape office OLoS 15m (2hours of datapump)

	NORA-B2	Comp.
Number of connection drops in 2h	0	1
Number of successful tests in 2h	292	288
Avg bytes received per test	180494	113953
Avg GATT writes per test	364	230
Throughput (bps) per test	68691	42937



NORA-B2 is **58% better** at semi-LoS conditions

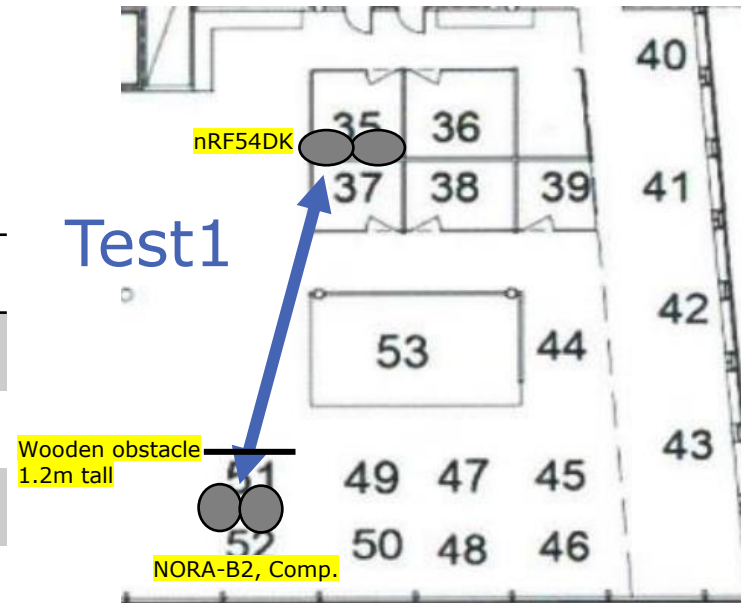
Throughput Measurement comparison: NLoS

- NORA-B2 and Competitor are central; nRF54L15-DK is peripheral
- BLE throughput example using SDK 3.0 (using 2M PHY)

Test1: Open Landscape office NLoS 12m (2hours of datapump)

- Through 1 glass and plaster wall

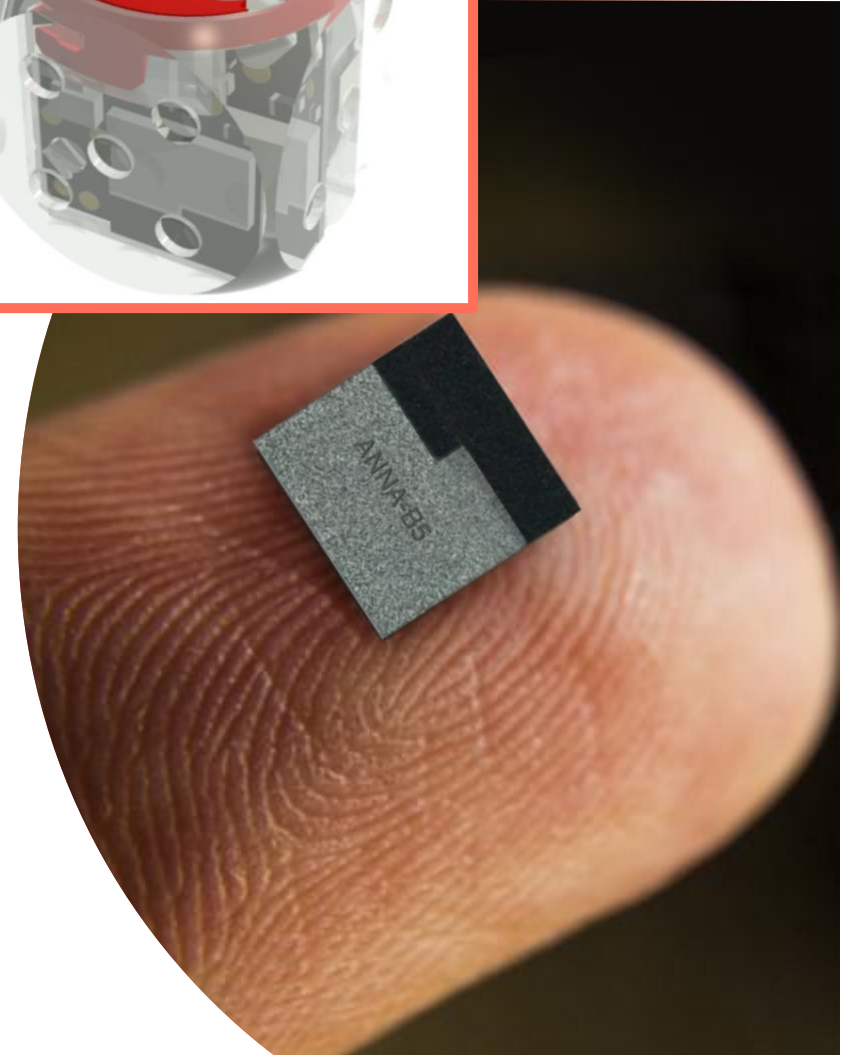
	NORA-B2	Comp.
Number of connection drops in 2h	1	13
Number of successful tests in 2h	248	214
Avg bytes received per test	105922	21584
Avg GATT writes per test	214	43.6
Throughput (bps) per test	39484	7896



NORA-B2 is **5x better** at NLoS conditions with much **lower dropped connections**

ANNA-B5

- **Small sized Bluetooth LE module**, 6.5×6.5 mm
 - Qualified against Bluetooth Core 6.0
 - 802.15.4 with Zigbee/Thread and **Matter** application protocol
- Built with Nordic Semiconductor's **nRF54L15** chipset
 - Arm® Cortex®-M33 MCU, 128 MHz
 - 256 kB RAM, 1.5 MB non-volatile memory
- Ultra-low power consumption
- **Wireless MCU** or with **u-connectXpress** AT commands
- Enhanced security features
- Internal antenna or pin for external antenna of choice
- Global Certification



Roll the dice, win a prize!

- Come to the u-blox table and try our dice demo
- Get the same number on 3 dice
- Win an ANNA-B5 Evaluation kit!



Bluetooth Channel Sounding



Channel Sounding – Ranging with Bluetooth

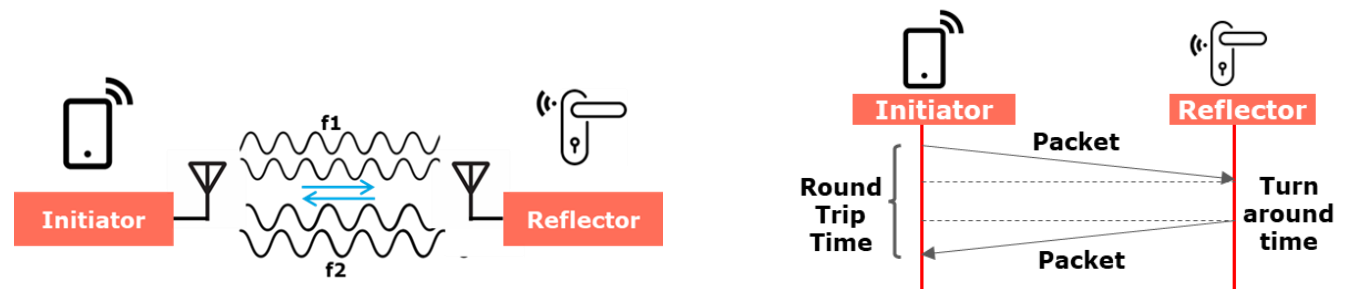


- Bluetooth SIG has released v6.0 of the core specification
- The hallmark feature is **Channel Sounding** for highly accurate distance measurements
- Channel Sounding brings true distance awareness to Bluetooth devices
- Possible applications include
 - Improved 'Find My' solutions
 - Digital keys
 - Safer HMI installations
 - Smart controllers

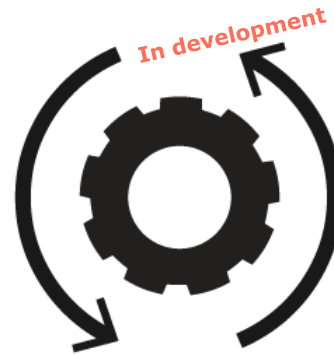
Channel Sounding – Ranging with Bluetooth



- Channel Sounding enables secure and accurate ranging between two connected Bluetooth devices
 - Sub-meter accuracy possible
- SIG specification supports up to four antennas
- Application and algorithms not in spec only framework
- Two methods available, providing flexibility in accuracy, security, range, latency and complexity
 - Phase-Based Ranging (PBR)
 - Round-Trip Timing (RTT)



How to explore Channel Sounding



Modules and EVKs

- ❑ NORA-B2,
- ❑ ALMA-B1,
- ❑ ANNA-B5
- ❑ Based on Nordic nRF54 Series

Software

- ❑ Algorithms for calculating the distance
- ❑ Running on top of Nordic SDK
- ❑ Coming as part of the u-connectXpress SW

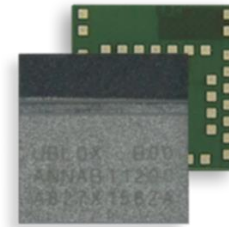
Antenna board

- ❑ Dual-antenna, improving stability and performance
- ❑ Click-board, easy to plug on to the EVKs

Products with coming Channel Sounding support



NORA-B2
Nordic nRF54L



ANNA-B5
Nordic nRF54L15

Security



CyberSecurity Compliance - SHO

- New regulations and cybersecurity initiatives coming into effect globally
 - **Radio Equipment Directive – Delegated Act** introduced cybersecurity requirements on internet connected products in August 2025
 - **Cyber Resilience Act** introduces more requirements on development processes for all components in the supply chain from Dec 2027
 - **Cyber Trust Mark** is a cybersecurity label for consumer IoT devices in the US (expected from H2 2026).
- u-blox SHO team constantly working to simplify cybersecurity compliance for our customers

Radio Equipment Directive – Delegated Act

- RED-DA part of our u-blox module portfolio affected by the regulation.
- Proved our security posture for some of our products at a Notified body
- Created extensive documentation to help customers
 - [Understanding Europe’s RED Cybersecurity regulations – u-blox guide](#)
 - [RED Delegated Act regarding u-blox short-range radio modules](#)
 - [RED Delegated Act regarding u-blox GNSS chips and modules](#)
 - [REDCYBER Guidance Application Note for module integrators](#)



Upcoming Regulations: CRA, CTM

- Neither CRA or CTM is fully complete and harmonized standards are still being worked upon
- u-blox actively working with our chipset partners
 - to make sure u-blox Short Range module comply with the regulation
 - assist customers to make their compliance journey easier

**More info
coming soon**



A first ever EU wide legislation of its kind: the **Cyber Resilience Act** introduces **mandatory cybersecurity requirements for hardware and software products**, throughout their whole lifecycle.



U.S. CYBER TRUST MARK

Summary



Summary - Why we win

Short range radio portfolio

Module overview

Stand-alone modules

Wireless MCU and Network Processors - Bluetooth

Wireless MCU and Network Processors - Wi-Fi and Multiradio

Indoor positioning (antenna boards)

Host-based modules

RF Transceivers - Multiradio

RF Transceivers - Wi-Fi

M.2 cards

Broad portfolio

Global certification

Radio type of approvals maintained during lifetime

Global certification

Host-based modules – professional grade

Multiradio

MAYA-W1
Compact, most cost-efficient, dual-band Wi-Fi 4 and Bluetooth 5.2

- Very small footprint
- Wi-Fi 4 dual-band
- Dual mode Bluetooth 5.2 (Classic/Bluetooth LE)
- WPA3 security
- Variants with PCB-antenna, U.FL connectors, and antenna pins

MAYA-W2
Compact, high-performance, dual-band Wi-Fi 6, Bluetooth 5.4 and IEEE 802.15.4

- Very small footprint
- Wi-Fi 6 dual-band
- Dual mode Bluetooth 5.4 (Classic/Bluetooth LE)
- 802.15.4 radio for Thread / Matter or Zigbee applications
- WPA3 security
- Variants with PCB-antenna, U.FL connectors, and antenna pins

MAYA-W3
Compact, cost-efficient, triple-band Wi-Fi 6E, Bluetooth 5.4 and IEEE 802.15.4

- Single- and dual-band Wi-Fi 6 (1x1, 20 MHz channels)
- Dual mode Bluetooth Classic and Low Energy 5.4
- Bluetooth LE Audio
- Efficient coexistence management between internal and external radios
- Variants with PCB-antenna, U.FL connectors, and antenna pins
- Secure boot and secure OTP

MAYA-W4
Compact, cost-efficient, dual-band Wi-Fi 6, Bluetooth 5.4 and IEEE 802.15.4

- Single- and dual-band Wi-Fi 6 (1x1, 20 MHz channels)
- Bluetooth Low Energy 5.4
- 802.15.4 radio supporting Thread / Matter over Wi-Fi and Thread
- Variants with PCB-antenna, U.FL connectors(s), and antenna pin(s)
- Secure boot, firmware, OTP memory, NXP EdgeLock

Form factor policy

Module size

NORA vs Espressif ESP32-WROVER-E

NORA-W106
74% smaller

ESP32-WROVER-E	31.4x18 mm	565 mm ²
NORA-W106	14.3x10.4 mm	149 mm ²

Compact

Being close to our partners

Having close partnerships with our business partners - for the best of our joint customers:

- Defining future roadmaps together
- Go to market together
- Solving problems together, if needed
- Some of our partners:

Chipset partnerships

u-connectXpress

Ease of integration

- No need to develop complex embedded real-time wireless software
- Avoid major re-designs of legacy systems
- Extensive and easy to use command API
- Application on host MCU configures connectivity, step by step

SW offering



Locate and connect every thing.