

NORA-W40 series



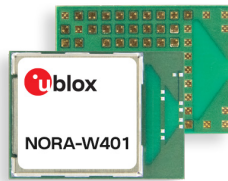
Stand-alone Wi-Fi™ 6 multiradio modules

Wireless MCU modules for cost-efficient designs

- Single-band Wi-Fi 6, Bluetooth® LE, Zigbee®, and Thread
- Supports Wi-Fi 6 Target Wake Time and other low power peripherals
- Full set of enhanced security features
- Small footprint, multiple antenna options, pin compatible with other NORA modules
- Matter over Wi-Fi or Thread
- Global certification



10.4 x 14.3 x 1.9 mm



Product description

NORA-W40 series are small, stand-alone, single-band Wi-Fi 6 and Bluetooth LE wireless microcontroller unit (MCU) modules based on Espressif's ESP32-C6 System-on-Chip. The modules are ideal for users looking to add advanced wireless connectivity to their end products.

The NORA-W40 Wi-Fi 6 features improve network efficiency, latency, range, and power consumption compared to earlier Wi-Fi generations. Qualified against Bluetooth Core 5.3, Zigbee, and the Thread mesh networking protocol, the NORA-W40 module is well suited to many different use cases. The Matter application protocol is supported over Thread and Wi-Fi, allowing interoperability in a growing ecosystem of various smart home products.

The open CPU configuration embeds a RISC-V MCU, clocked up to 160 MHz, with 512 kB SRAM and 4/8 MB flash. With many peripheral interfaces, NORA-W40 can operate completely stand-alone, hosting advanced software applications for a variety of use cases. NORA-W40 comes with a separate low-power (LP) RISC-V co-processor, LP I2C, and LP UART making it a perfect fit for low-power sensor applications.

The NORA-W40 series includes hardware security features like secure boot with a hardware root of trust, a trusted execution environment controller, cryptographic hardware accelerators, encrypted flash, and protection of the debug port. The wireless communication can be secured with WPA2/WPA3 authentication, Wi-Fi enterprise security, and TLS.

NORA-W406's internal PCB antenna provides a robust low-profile solution with high performance and an extensive range, while NORA-W401 has a module pin to connect to an external antenna of choice. The modules are globally certified for use with the internal antenna or a range of external antennas. This reduces time, cost and effort for customers integrating Wi-Fi, Bluetooth Low Energy, and Thread in their products.

The modules are ideally suited to wide range of applications, including low-power wireless sensors, industrial automation, smart buildings and homes, smart city, healthcare and medical devices, telematics, and point-of-sales.

	NORA-W401	NORA-W406
Grade		
Automotive		
Professional	•	•
Standard		
Radio		
Chip inside	ESP32-C6	ESP32-C6
Qualified against Bluetooth Core	5.3	5.3
Bluetooth LE	•	•
Bluetooth output power EIRP [dBm]	10	10
Wi-Fi bands [GHz]	2.4	2.4
Wi-Fi IEEE 802.11 standards	b/g/n/ax	b/g/n/ax
Wi-Fi output power EIRP [dBm]	20	20
Thread	•	•
Antenna type (see footnotes)	pin	pcb
Application software		
Open CPU for embedded applications	•	•
Interfaces		
UART	♦	♦
SPI	♦	♦
SDIO 2.0	♦	♦
TWAI® (CAN 2.0 compatible)	♦	♦
I2C	♦	♦
I2S	♦	♦
GPIO pins (user available)	22	22
AD converters [number of bits]	12	12
Low-power I2C	♦	♦
Low-power UART	♦	♦
Features		
MCU	RISC-V, 160 MHz	
RAM [kB]	512	512
Flash [MB]	4/8	4/8
FOTA	♦	♦
Trusted execution environment	♦	♦
Secure boot	♦	♦
WPA2/WPA3	♦	♦

pin = Antenna pin
pcb = Internal PCB antenna

♦ = Feature enabled by HW. Support depends on the open CPU app SW.

NORA-W40 series



Features

Wi-Fi standards	IEEE 802.11 b/g/n/ax
Wi-Fi channels	2.4 GHz channels 1-14 (depending on region)
Wi-Fi maximum transfer rates	IEEE 802.11b: 11 Mbits/s IEEE 802.11g: 54 Mbit/s IEEE 802.11n: 72 Mbit/s (HT20) 150 Mbits/s (HT40) IEEE 802.11ax: 114 Mbit/s
Bluetooth	Qualified against Bluetooth Core 5.3
Bluetooth PHY rate	125 kbps, 500 kbps, 1 Mbps, 2 Mbps
Output power (conducted)	Wi-Fi: 17 dBm Bluetooth: 7 dBm
Sensitivity (conducted)	Wi-Fi: -99 dBm Bluetooth: -98 dBm
Antenna	Internal PCB antenna or antenna pin for connecting to an external antenna

Electrical data

Power supply	3.3 V (+/-10%)
Power consumption	Wi-Fi TX 802.11ax MCS9 @ 16.5 dBm: 252 mA (100% duty cycle) Bluetooth LE TX @ 0 dBm: 130 mA (100% duty cycle) Wi-Fi RX: 78 mA Light sleep mode: 180 µA Deep Sleep mode: 7 µA

Open CPU for customer applications

Customers develop and embed their own applications on the NORA-W40 modules using the ESP-IDF (open CPU concept). This section describes the hardware features that can be enabled by the NORA-W40 modules.

MCU system	160 MHz RISC-V application processor, 20MHz RISC-V LP co-processor, 512 kB SRAM, 4/8MB Flash
Hardware interfaces	UART SPI SDIO TWAI® (CAN 2.0 compatible) I2C I2S JTAG over USB GPIO ADC Low-power I2C Low-power UART
Security	Trusted execution environment Hardware cryptographic accelerator Secure bootloader External memory encryption Flash encryption Random number generator (RNG) OTP, 4 kB Secure debug interface
Development environment	ESP-IDF SDK

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	10.4 x 14.3 x 1.9 mm
Mounting	Machine mountable solder pins

Environmental data, quality & reliability

Operating temperature	-40 °C to 85 °C
Storage temperature	-55 °C to +125 °C
Humidity	RH 5-90% non-condensing
RoHS directive	RoHS 2 and RoHS 3

Certifications and approvals¹

Type approvals	Europe (RED), Great Britain (UKCA), US (FCC), Canada (ISED), Japan (MIC), Taiwan (NCC), South Korea (KCC), Australia (ACMA), New Zealand
Health and safety	EN 62479, EN 62368-1, IEC 62311
Medical Electrical Equipment	IEC 60601-1-2
Bluetooth	Qualified against Bluetooth Core 5.3

¹ = Certifications are pending

Support products

EVK-NORA-W401	Evaluation kit for NORA-W401 module with antenna pin
EVK-NORA-W406	Evaluation kit for NORA-W406 module with internal PCB antenna

Product variants

NORA-W401	Multiradio wireless MCU module with antenna pin
NORA-W406	Multiradio wireless MCU module with internal PCB antenna

Legal Notice:

u-blox or third parties may hold intellectual property rights in the products, names, logos and designs included in this document. Copying, reproduction, or modification of this document or any part thereof is only permitted with the express written permission of u-blox. Disclosure to third parties is permitted for clearly public documents only.

The information contained herein is provided "as is". No warranty of any kind, either express or implied, is made in relation to the accuracy, reliability, fitness for a particular purpose, or content of this document. This document may be revised by u-blox at any time. For most recent documents and product statuses, please visit www.u-blox.com.