

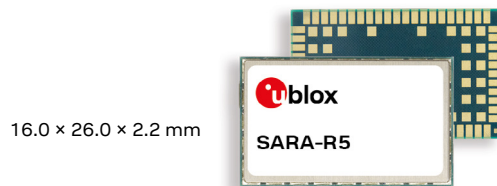
SARA-R5 series



LTE-M / NB-IoT modules based on u-blox chipset

Designed to last an IoT lifetime: 5G-ready with the u-blox UBX-R5 chipset

- Product longevity and best support guaranteed by u-blox LTE and GNSS chipsets
- Accurate and reliable positioning, always and everywhere, with u-blox M8 GNSS receiver and CloudLocate
- Optimized ultra-low power consumption
- Cost-effective, power efficient, end-to-end IoT communication with MQTT Anywhere and MQTT Flex



Product description

The SARA-R5 series is based on u-blox's UBX-R5 cellular chipset and the u-blox M8 GNSS receiver chip. By bringing all technology building blocks in house and having full hardware and software ownership, u-blox provides long-term device availability and lifetime support of the entire platform, down to the chipset level. The LTE-M and NB-IoT modules support a comprehensive set of 3GPP Rel. 14 features that are relevant for IoT applications, like improvements to power consumption, coverage, data rate, mobility, and positioning. They are 5G-ready, meaning customers will be able to (software) upgrade their deployed devices, once 5G LTE has been rolled out by mobile operators, thus greatly improving end-product scalability and lifetime.

The SARA-R5 series includes three hardware configurations that address the different needs of the IoT applications. SARA-R500S is a general purpose LTE module, intended for applications that favor the flexibility of an external GNSS receiver, or that do not need GNSS capabilities at all.

SARA-R510M8S is pre-integrated with the u-blox M8 GNSS receiver and separate GNSS antenna interface, which provides highly reliable, accurate positioning data in parallel to LTE communication.

SARA-R510S has been optimized for extremely low power consumption, using less than 1 μ A of current in PSM mode, and is ideal for battery-powered applications.

The SARA-R5 series delivers state-of-the-art security thanks to its secure boot, secure updates, and secure production implementations. All variants work seamlessly with the u-blox AssistNow A-GNSS service as well as with the CellLocate mobile network-based location service.

With u-blox's communication services – MQTT Anywhere or MQTT Flex – data overhead, time spent on-the-air, and energy consumption can be reduced, thus enabling users to extend device life cycles, lower costs, and improve ROI. SARA-R5 is AWS IoT Core qualified and Microsoft Azure certified.

| | SARA-R500S | SARA-R510S | SARA-R510M8S |
|--------------------------------------|--|------------|--------------|
| Grade | | | |
| Automotive | | | |
| Professional | • | • | • |
| Standard | | | |
| Regions | Multi-region | | |
| Access technology | | | |
| LTE bands | 1, 2, 3, 4, 5, 8, 12, 13, 18, 19, 20, 25, 26, 28, 66, 71, 85 | | |
| Data rate | M1/NB2 | M1/NB2 | M1/NB2 |
| LTE Power class | 23 dBm | 23 dBm | 23 dBm |
| Positioning | | | |
| Integrated GNSS receiver | | | • |
| Dedicated GNSS antenna interface | | | • |
| External GNSS control | • | • | |
| Compatible u-blox Services | | | |
| MQTT Anywhere, MQTT Flex | • | • | • |
| AssistNow™ | • | • | • |
| CellLocate® | • | • | • |
| CloudLocate | | | • |
| Interfaces | | | |
| UART | 2 | 2 | 2 |
| USB (for diagnostics) | 1 | 1 | 1 |
| DDC (I2C) | 1 | 1 | 1 |
| USIM | 1 | 1 | 1 |
| GPIO | 6 | 6 | 6 |
| Features | | | |
| Open CPU (uCPU) | • | • | • |
| Secure boot, updates, and production | • | • | • |
| MQTT, MQTT-SN | • | • | • |
| Antenna dynamic tuning | • | • | • |
| Ultra low PSM | | • | |
| HTTP, FTP | • | • | • |
| TCP/UDP | • | • | • |
| TLS/DTLS | • | • | • |
| FW update via serial (FOAT) | • | • | • |
| uFOTA | • | • | • |
| CoAP and LwM2M | • | • | • |
| Last gasp | • | • | • |
| Jamming detection | • | • | • |
| Antenna and SIM detection | • | • | • |
| CellTime | • | • | • |

M1 = LTE Cat M1 (375 kb/s DL, 1200 kb/s UL)
NB2 = Cat NB2 (125 kb/s DL, 140 kb/s UL)

□ = Available in future FW version



Features

| | |
|-----|---|
| LTE | 3GPP Release 13 LTE Cat M1 and NB1 3GPP Release 14 LTE Cat M1: Coverage enhancement mode B, Uplink TBS of 2984b, Clot optimizations, and Release Assistance Indication (RAI) 3GPP Release 14 LTE Cat NB2: Higher data rate (TBS of 2536b), mobility enhancement (RRC connection re-establishment), E-Cell ID, lower power class PC6 (14 dBm), two HARQ processes, release assistant, random access on non-anchor carrier Cat M1 Half-duplex, 375 kb/s DL, 1200 kb/s UL Cat NB2 Half-duplex, 125 kb/s DL, 140 kb/s UL |
| SMS | MT/MO PDU / text mode SMS over SG/NAS |

Compatible u-blox services

| | |
|---------------|---|
| Communication | MQTT Anywhere MQTT Flex |
| Location | AssistNow CellLocate CloudLocate ¹ |

Software features

| | |
|------------------|--|
| Protocols | Dual stack IPv4 and IPv6 PPP over IPv4 and IPv6 Embedded TCP/IP, UDP/IP, FTP, HTTP, DNS Embedded MQTT and MQTT-SN Embedded CoAP and LwM2M Embedded TLS/DTLS SIM provisioning (BIP) |
| Positioning | Integrated u-blox M8 chip with concurrent GNSS ¹ (GPS, GLONASS, BeiDou, Galileo) Dedicated GNSS antenna interface ¹ Direct access to u-blox GNSS via module ² |
| Functionalities | Antenna dynamic tuning CellTime for robust and accurate timing reference Last gasp Jamming detection Antenna and SIM detection |
| Firmware upgrade | Via UART uFOTA client/server solution (firmware upgrade over the air) |

1 = On SARA-R510M8S

2 = On SARA-R500S and SARA-R510S

Interfaces

| | |
|--------|--|
| Serial | 8-wire UART, configurable as 2x 4-wire UART with ring indication DDC (I2C) USB for diagnostics |
| GPIO | Up to 6 GPIOs, configurable |
| (U)SIM | Supports 1.8 V and 3.0 V |

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

96 pin LGA: 16.0 x 26.0 x 2.2 mm, < 3 g

Environmental data, quality & reliability

| | |
|---|------------------|
| Operating temperature | -40 °C to +85 °C |
| RoHS compliant (lead-free) | |
| Qualification according to AEC-Q104 | |
| Manufactured in ISO/TS 16949 certified production sites | |

Certifications and approvals

| | |
|----------------|---|
| SARA-R5 series | FCC, ISED, GCF, PTCRB, Verizon, AT&T, US Cell, T-Mobile, Telus, Rogers ³ , RED, Vodafone ³ , Deutsche Telekom ³ , KCC ³ , SKT ³ , Giteki, Softbank ³ , KDDI ³ , RCM, Telstra, ICASA ³ , NCC |
| SARA-R5 series | AWS IoT Core qualified Microsoft Azure certified |

3 = Planned certifications

Electrical data

| | |
|--|---|
| Power supply | 3.8 V nominal, range 3.0 V to 4.5 V |
| PSM current consumption | 0.5 µA SARA-R510S 62 µA SARA-R500S, SARA-R510M8S |
| eDRX current consumption | 180 µA |
| LTE Cat M1 Connected mode current consumption | 195 mA (at 23 dBm) |
| LTE Cat NB2 Connected mode current consumption | 135 mA (at 23 dBm) |

Support products

| | |
|-------------|---------------------------------|
| EVK-R500S | Evaluation kit for SARA-R500S |
| EVK-R510S | Evaluation kit for SARA-R510S |
| EVK-R510M8S | Evaluation kit for SARA-R510M8S |

Product variants

| | |
|--------------|---|
| SARA-R500S | Secure cloud LTE-M and NB-IoT module for multi-regional use |
| SARA-R510S | Secure cloud LTE-M and NB-IoT module for multi-regional use with ultra low PSM |
| SARA-R510M8S | Secure cloud LTE-M and NB-IoT module with integrated u-blox M8 GNSS receiver for multi-regional use |

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, please visit www.u-blox.com.