

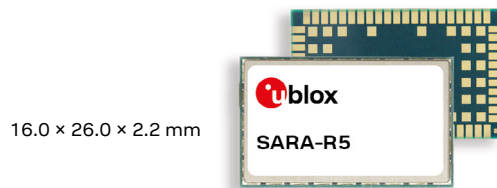
SARA-R5 series



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

Designed with the u-blox UBX-R5 chipset to last an IoT lifetime

- 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.

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 µA 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	Global		
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 global use
SARA-R510S	Secure cloud LTE-M and NB-IoT module for global use with ultra low PSM
SARA-R510M8S	Secure cloud LTE-M and NB-IoT module with integrated u-blox M8 GNSS receiver for global use

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