Product summary
SARA-R4 series
LTE-M/NB-IoT/EGPRS modules with Secure Cloud

Built-in foundation and end-to-end security with Root of Trust
- Always and everywhere location, integrated u-blox M8 GNSS receiver and CellLocate®
- Software-based configurability within each hardware design
- Simultaneous LTE communication with GNSS positioning
- Guaranteed best coverage with 23dBm output power
- Future-proof solutions via LWM2M and uFOTA

Product description
The SARA-R4 series modules are ideal for mission-critical IoT solutions, as they include a unique and immutable root-of-trust. This provides the foundation for a trusted set of advanced security functionalities. The scalable, pre-shared key management system offers best-in-class data encryption and decryption, both on-device as well as from device-to-cloud. Utilizing the latest (D)TLS stack and cipher suites with hardware-based crypto acceleration provides robust, efficient and protected communication.

SARA-R422M8S is pre-integrated with the u-blox M8 GNSS receiver and separate GNSS antenna interface, which provides highly reliable, accurate positioning data simultaneously with LTE communication. In addition, the module offers unique hybrid positioning, in which the GNSS position is enhanced with u-blox CellLocate® data, providing location always and everywhere. Guaranteed best coverage is built in via 23dBm LTE output power, eliminating problems at cell edges and unwanted re-transmissions.

Customers can future-proof their solutions by means of the uFOTA client/server firmware updates, which utilizes LWM2M, a light and compact protocol ideal for IoT applications. The ultra-compact 16 x 26 mm LGA modules offer the ability to make software-based configuration decisions for LTE bands, radio interface and system selection preference, as well as Mobile Network Operator within each hardware variant.

With many interface options and an integrated IP stack, the SARA-R4 modules are targeted to a wide range of data-centric IoT applications, such as smart metering, smart lighting, telematics, asset tracking, remote monitoring, alarm panels, and connected health. The SARA-R4 modules target long life, low-maintenance, cost-sensitive, lower power consumption, extended battery life applications.

Thanks to the u-blox nested design principle SARA modules are compatible with other u-blox product families, enabling easy migration from 2G, 3G and 4G. This maximizes the investments of customers, simplifies logistics, and enables very short time-to-market.

UBX-19049143-R03 Objective Specification
## Features

### LTE
- **3GPP Release 13 LTE Cat M1 and NB1**
  - Cat M1 half-duplex, 300 kbit/s DL, 375 kbit/s UL
  - Cat NB1 half-duplex, 27.2 kbit/s DL, 62.5 kbit/s UL
- Coverage enhancement mode A
- Rel 12 LTE power save mode, PSM
- Rel 13 eDRX

### 3GPP Release 14 LTE Cat M1 and NB2
- **NB-IoT Release Assistant**
  - Cat M1 half-duplex, 375 kbit/s DL, 1200 kbit/s UL
  - Cat NB2 half-duplex, 125 kbit/s DL, 140 kbit/s UL

### GSM
- **3GPP Release 12 EGPRS MSC**
  - SMS
    - MT/MO PDU / text mode
    - SMS over SG/NAS

### Security
- **Foundation Security**
  - Root of Trust
  - Secure boot
  - Secure updates
  - Secure production
  - Anticloning Detection & Rejection
- **Design**
  - Local authenticated encryption/decryption
- **End-to-end**
  - Secure communication (D)TLS
  - Pre-shared keys (PSK) provisioning
  - E2E data protection

### Software features
- **Protocols**
  - Dual stack IPv4 and IPv6
  - Embedded TCP/IP, UDP/IP, FTP, HTTP
  - Embedded secure MQTT
  - Embedded HTTPS, FTPS, TLS, DTLS
- **Device Management**
  - OMA LWM2M
- **GNSS Interfaces**
  - Integrated u-blox M8 chip with concurrent GNSS (GPS, GLONASS, BeiDou, Galileo)
  - Dedicated GNSS antenna interface
  - Direct access to u-blox GNSS via module
  - AssistNow software for fastest GNSS TTFF
  - CellLocate & hybrid positioning
- **Firmware upgrade**
  - Via USB
  - Via UART
  - uFOTA client/server solution
  - (Firmware upgrade over the air)

### Electrical data
- **Power supply**
  - 3.8 V nominal, range 3.2 V to 4.2 V
  - 3.8 V nominal, range 3.2 V to 4.5 V
- **Power consumption**
  - **SARA-R41x**
    - Power save mode: 8 µA
    - Active idle mode: 2 mA
  - **SARA-R42x**
    - Power save mode: 3 µA
    - Active idle mode: TBD

### Package
- 96 pin LGA: 16.0 x 26.0 x 2.5 mm, < 3 g

### Environmental data, quality & reliability
- **Operating temperature**
  - ~40 °C to +85 °C
- **RoHS compliant (lead-free)**
- **Qualification according to ISO 16750**
- **Manufactured in ISO/TS 16949 certified production sites**

### Certifications and approvals – planned
- **SARA-R410M-63B**
  - GITEKI, Softbank, NTT DoCoMo
- **SARA-R410M-73B**
  - KC, SK Telecom
- **SARA-R410M-83B**
  - NCC, RCM, RED, Telstra
- **SARA-R422 series**
  - ANATEL, FCC, IFETEL, ISED, NCC, RCM, RED, GCF, PTCRB, AT&T, Deutsche Telekom, T-Mobile USA, Verizon, Vodafone

### Interfaces
- **Serial**
  - 1 UART
  - 1 USB 2.0 (high-speed, 480 Mbit/s)
  - 1 USB, for diagnostics
- **GPIO**
  - Up to 6 GPIOs, configurable
  - (U)SIM
  - Supports 1.8 V and 3.0 V, SIM toolkit

### Support products
- **EVK-R410M-6**
  - Evaluation kit for SARA-R410M-63B
- **EVK-R410M-7**
  - Evaluation kit for SARA-R410M-73B
- **EVK-R410M-8**
  - Evaluation kit for SARA-R410M-83B
- **EVK-R422**
  - Evaluation kit for SARA-R422
- **EVK-R422S**
  - Evaluation kit for SARA-R422S
- **EVK-R422M8S**
  - Evaluation kit for SARA-R422M8S

### Product variants
- **SARA-R410M-63B**
  - Secure Cloud LTE module for Japan.
  - Cat M1 bands: 1, 8, 19
- **SARA-R410M-73B**
  - Secure Cloud LTE module for Korea.
  - Cat M1 bands: 3, 5, 26
- **SARA-R410M-83B**
  - Secure Cloud LTE module for multi-regional use.
  - Cat M1, NB1 bands: 3, 5, 8, 20, 28
- **SARA-R422**
  - LTE-M, NB-IoT and EGPRS module for multi-regional use
- **SARA-R422S**
  - Secure Cloud LTE-M, NB-IoT and EGPRS module with integrated M8 GNSS receiver for multi-regional use
- **SARA-R422M8S**
  - Secure Cloud LTE-M, NB-IoT and EGPRS module with integrated M8 GNSS receiver for multi-regional use

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