



Low Power LTE-M/NB-IoT Module with Low Power GNSS for Next-Generation 5G Massive IoT

Monarch 2 GM02SP is an LTE Cat M1/NB1/NB2 and GNSS capable module based on Sequans' second generation Monarch 2 chip platform. It is a pin-to-pin compatible variant of Monarch 2 GM02S, integrating a low-power GNSS best suited for Internet of Things tracking. The Monarch 2 GM02SP Module delivers significant advantages in performance and power consumption, and is based on the most mature and field-proven LTE-M/NB-IoT protocol stack. Monarch 2 GM02SP includes Sequans' Single-SKU™ RF front end, enabling deployment in any band worldwide, and an integrated Common Criteria EAL5+ secure enclave, enabling secure key storage and crypto applications and integrated SIM (iSIM). Added GNSS capability allows for tracking and positioning using various satellite constellations. An open SDK environment allows customers to develop their application into the module with low power consideration. Monarch 2 GM02SP utilizes a single rail power supply starting at 2.2 V, the lowest voltage supported by any LTE-M/NB-IoT module in the industry today, thereby unlocking battery and eBOM savings. Sequans designs and owns the chipsets and software used in all its modules, thus ensuring fast time to market and lowest total cost of ownership for device makers.



Highlights

- Dual-mode LTE-M / NB-IoT (NB1, NB2)
- 3GPP LTE Release 14 (upgradeable up to Release 17)
- New tiny LGA module form factor
- Single-rail power supply supporting 2.2-5.5V
- Industry lowest deep sleep mode at 1µA translating into best-in-class eDRX and PSM
- Programmable RF filtering for global band support in a Single-SKU design (617 MHz to 2.2 GHz) allowing for flexible support of public and private LTE bands
- Assisted and non-assisted integrated GNSS
- Adaptive output power supporting +23dBm, +20dBm and +14dBm providing the most efficient solution for deep indoor penetration
- Up to 2 external SIM/eSIM interfaces, and 1 integrated SIM/eSIM
- Embedded IP stack (TCP w/ TLS1.3, UDP w/ DTLS1.2, CoAP/MQTT, HTTP/FTP...), and LwM2M client
- Fully tested and calibrated for easy integration into product hardware
- Open SDK for customer applications
- Compatible set of AT commands with other Sequans modules including Monarch, Calliope, Calliope 2, enabling ease of customer code migration

Monarch 2 LTE Platform

At the heart of Monarch 2 GM02SP is the Monarch 2 chip, the second generation of Sequans' Monarch LTE Cat M1/NB1/NB2 platform. The new generation Monarch 2 technology improves on the size, cost and power consumption of first-generation Monarch and includes new, powerful features such as a Common Criteria EAL5+ secure enclave, usable as an iSIM, and an open SDK to run customer application. The Monarch 2 GM02SP module is 5G-ready and is designed for massive IoT.

Applications

The Monarch 2 GM02SP module is ideal for adding LTE-M and/or NB-IoT LTE connectivity to narrowband, low data rate M2M and IoT devices combined with GNSS use-cases requiring low-power consumption (battery operated). This includes all types of intermittent trackers for vehicles, personal assets, container and parcel logistics, fleet management, smart agriculture and smart city applications, emergency beacons, and rescue applications.

Key Features

Integrated SIM/eSIM

The secure enclave in Monarch 2 enables the integrated SIM/eSIM function to operate with no additional components, reducing complexity and total cost of ownership for customers. Sequans makes no compromise on security and certifies its chipsets and processes to Common Criteria EAL5+, the same standard as for traditional SIM cards.

Ultra-low power consumption

Monarch 2 GM02S leads the industry in optimizing power consumption, thanks to Sequans' proprietary Dynamic Power Management™ and eco-Paging™ technologies, which adapt sleep and active state power consumption according to use case, up to 15 years of battery life. The single rail power supply starting at 2.2 V allows lower voltage battery chemistries without the need of any additional components.

Low-power GNSS operation

Monarch 2 GM02SP offers an innovative GNSS functionality embedded into the module through the addition of an external SAW and LNA, and a dedicated GNSS antenna. A full set of AT commands provides a flexible application implementation, adapted to any low power IoT use case. No performance compromise was made compared to conventional GNSS solutions.

Next-level customer security

Monarch 2 GM02S SEQuire® suite provides customers with the necessary tools to securely boot and upgrade the firmware, ensuring authenticated firmware transfer, integrity verification, and protection against unauthorized modifications.

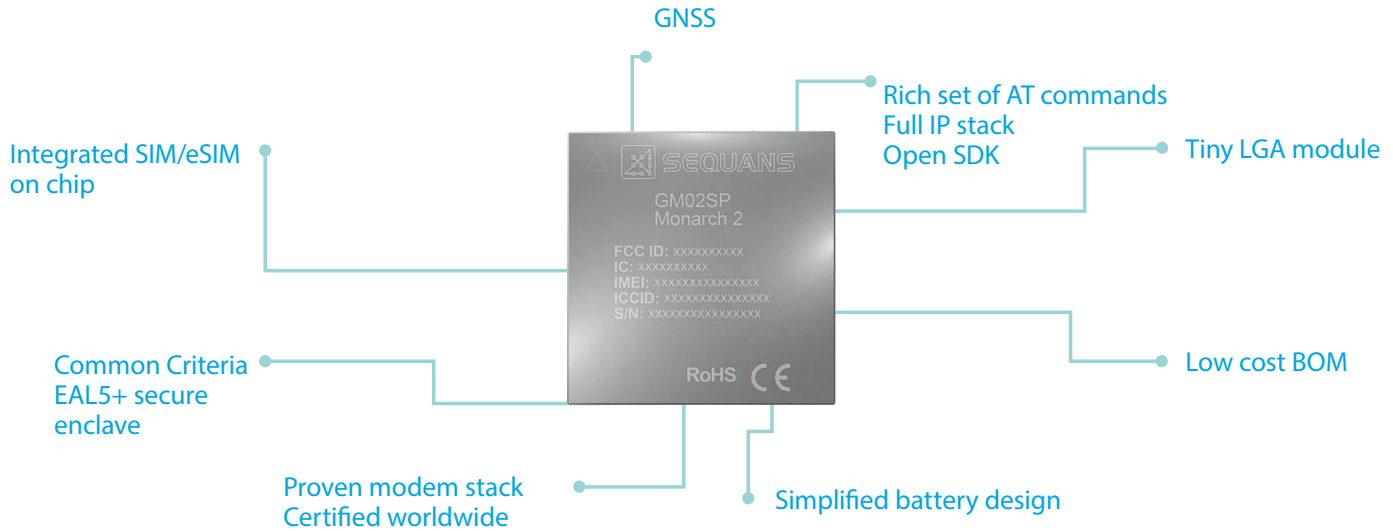
LTE-M / NB-IoT smart switch

IoT-Select® feature ensures instant switch between radio access technologies when supported by the operator



LTE-M/NB-IoT Module Enabling Next-generation 5G Massive IoT

Monarch 2 GM02SP in a nutshell



Product Characteristics

LTE Modem

- ❑ 16.3 x 17 x 2.2 (typ.) mm LGA module
- ❑ Single-SKU with support for LTE bands: 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 18, 19, 20, 25, 26, 28, 66, 70, 71, 85
- ❑ Cat M1: up to 590 kbps DL and 1.1 Mbps UL
- ❑ Cat NB1/NB2: up to 120.7 kbps DL and 160 kbps UL
- ❑ 3GPP Release 14/upgradeable up to Release 17
- ❑ SMS
- ❑ Max transmit power up to +23 dBm
- ❑ Single power supply: 2.2 - 5.5V

GNSS

- ❑ L1 band
- ❑ Very low-power consumption per fix (with configurable performance vs. power levels)

Interfaces

- ❑ JTAG
- ❑ I2C
- ❑ SPI
- ❑ ADC
- ❑ GPIO including multiple module wake inputs and high precision LTE-synchronized GPIOs
- ❑ UART x 4
- ❑ USIM x 2 (ISO7816)
- ❑ 50 ohm cellular antenna interface
- ❑ Dedicated GNSS RF input

Software

- ❑ Field proven LTE-M & NB-IoT LTE software stack
- ❑ Rich set of AT commands compatible with other Sequans platforms

- ❑ IP and non-IP data delivery
- ❑ AT Command driven GNSS navigation modes
- ❑ HTTPS, MQTTS, CoAP to connect to all cloud platforms

Environmental

- ❑ Operating temperature: -40° C to +85° C
- ❑ Storage: JEDEC MSL 3

Certifications

- ❑ Certified with all major MNOs, and FCC, ISED, RED, UKCA, JATE/TELEC, ACMA, NCC, GCF / PTCRB