monarch 2 SiP

Monarch2 SiP
LTE-M/NB-IoT

SEQUANS
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All-in-One 5G Massive IoT System-in-Package

Monarch 2 SiP, SKY66431, is a multi-band, multi-chip system-in-package (SiP), supporting 5G massive IoT (LTE-M/NB-IoT) platforms, co-developed by Sequans and Skyworks. It integrates the entire RF front end, transceiver, power management, RAM memory, crystals, and baseband modem for an LTE multi-band radio operating in the 699 to 2200 MHz frequency range. Monarch 2 SiP complies with the ultra-low power and reduced complexity feature requirements of the 3GPP release 14 LTE-Advanced Pro standard that defines narrowband, low data rate LTE technology for machine-type-communications (MTC), and is upgradable to 3GPP release 15 and 16. Monarch 2 SiP's very high level of integration results in an 8.8 x 11.3 x 1.585 mm (max) BGA package for an industry-leading compact size. Monarch 2 SiP also embeds a low power GNSS functionality.

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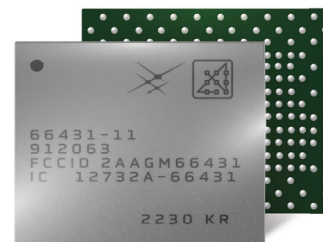
Highlights

- Compact LTE modem and RF front-end in a single package: Integrated baseband, transceiver, RF front end, RAM memory, crystals and power management

- 8.8 x 11.3 x 1.585 mm (max) BGA package, 0.5 and 1 mm pitch

- 3GPP release 14 Cat M1 and NB1/NB2, upgradable to 3GPP release 15 and 16

- Optimized for half-duplex operation (HD-FDD) for LTE-M/NB-IoT

- Certified with FCC, ISED/IC, RED, UKCA, ACMA, GCF/PTCRB and major MNOs

- Programmable RF filtering for global band support in a Single-SKU design (699 MHz to 2.2 GHz)

- Adaptive output power supporting +23dBm, +20dBm and +14dBm providing the most efficient solution for deep indoor penetration

- Fully tested and calibrated for easy integration into product hardware

- Embedded LwM2M client, TCP/IP stack

- Embedded low power GNSS solution eliminating need for an external GNSS chipset for intermittent tracking

- Open SDK for customer applications

- Best-in-class deep sleep power consumption of 1 uA that enables operability for 20 years

- Silver (Ag) free conformal shielding, Halogen free, GaAs free

Monarch 2 SiP

Monarch 2 SiP is a ready-to-go optimized solution for ultra compact IoT devices. It uses the carrier-certified LTE protocol stack of Monarch 2 and therefore leverages Monarch's high level of maturity, gained from years of proven field experience.

Applications

Monarch 2 SiP is ideal for adding LTE-M and/or NB-IoT connectivity to IoT devices which require intermittent tracking, operate in harsh environments, are size-constrained, or run on batteries. As such, its ultra-low power consumption, support of private LTE networks, optional integrated SIM, and Ag-free high-reliability composition makes it ideally suited for applications such as smart meters, industrial asset trackers, or home or industrial monitoring devices. Its industry-leading compact size, integrated GNSS, open SDK, and ultra-low power consumption makes it the ideal connectivity solution for space-constrained devices, including personal/pet/bike trackers or wearable medical devices.

Key Benefits of Monarch 2 SiP

Ultra small and thin

Monarch 2 SiP, SKY66431, integrates baseband, transceiver, RF front-end, RAM memory, crystals, and power management in a single solution. Monarch 2 SiP's ultra small footprint is due to advanced packaging techniques, resulting in a very small 8.8 x 11.3 x 1.585 mm (max) BGA package, 0.5 and 1 mm pitch.

Monarch 2 SiP Platform

At the heart of SKY66431 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 integration, cost, and power consumption of first generation Monarch, includes an open SDK for running customer applications, integrates an optional UICC (iUICC) allowing a versatile choice of connectivity, and embeds a low-power GNSS ideal for intermittent tracking.
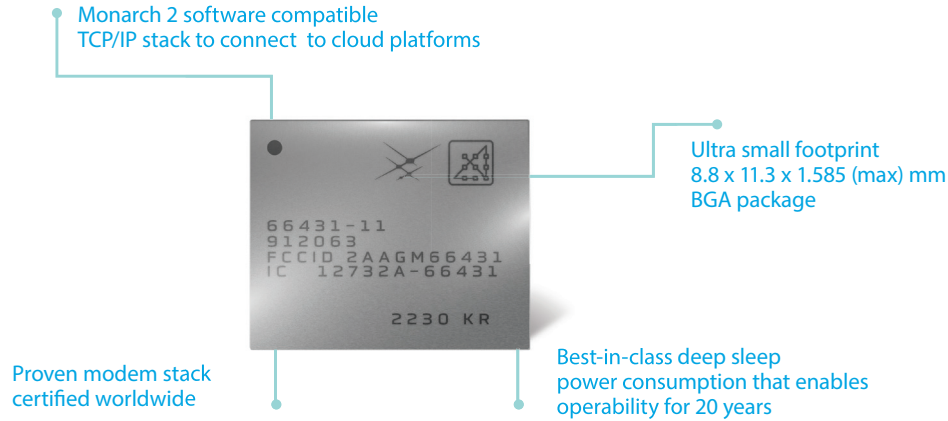
Reduced BOM

Monarch 2 SiP is a comprehensive System-in-Package designed to optimize device size and thickness. It includes almost every component needed for a complete LTE-M/NB-IoT modem system. Device designers need to add NOR flash, SIM card, and a few passives external to the SiP.

Ultra-low power consumption

Monarch 2 SiP delivers up to a 60 percent improvement in 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, thus enabling up to 20 years of battery life in some cases. The single rail power supply starting at 2.8 V allows lower voltage battery chemistries without the need of additional components, and higher overall efficiency further optimizes the power consumption.

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All-in-One 5G Massive IoT System-in-Package

Monarch 2 SiP, SKY66431, LTE Cat M1 and NB1/NB2 Platform

Monarch 2 software compatible
TCP/IP stack to connect to cloud platforms

Ultra small footprint
8.8 x 11.3 x 1.585 (max) mm
BGA package

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Proven modem stack
certified worldwide

Best-in-class deep sleep
power consumption that enables
operability for 20 years

Product Characteristics

LTE Modem

- 8.8 x 11.3 x 1.585 mm (max) BGA package, 0.5 and 1 mm pitch

- System-in-Package integrates baseband, transceiver, RF front end, RAM memory, crystals and power management

- Single-SKU with support for LTE bands:
  - Low-band: B5, B8, B12, B13, B14, B17, B18, B19, B20,B26, B28, B85
  - Mid-band: B1, B2, B3, B4, B25, B66
  - Various private LTE networks are also supported (list available on demand)

- Throughput:
  - LTE-M (1.4 MHz bandwidth) up to 300 kbps DL, 1.1 Mbps UL
  - NB-IoT (200 kHz bandwidth) NB2 up to 120.7 kbps DL, 160 kbps UL

- Max transmit power up to +23dBm

- Compliant to 3GPP release 14, upgradable to 3GPP release 15 and 16

- SMS

- Power supply: 2.8-5.5V

Interfaces

- JTAG
- I2C
- SPI
- ADC
- UART x3
- GPIO including multiple module wake inputs and high precision LTE-synchronized GPIOs
- Quad-IO SPI interface (QSPI) for Flash access
- USIM x1 (ISO7816)
- 50 ohm LTE antenna interface
- Dedicated GNSS RF input

Software

- Field proven LTE-M & NB-IoT LTE software stack
- Rich set of AT commands compatible with previous generation
- IP and non-IP data delivery

- Certified LwM2M stack (FOTA)
- TCP/IP stack enabling HTTP(S), MQTT(S), CoAP to connect to cloud platforms
- AT Command driven GNSS navigation modes

Environmental

- Operating temperature range: -40 C to +85 C
- Silver (Ag) free conformal shielding, Halogen free, GaAs free
- Storage: JEDEC MSL 3

Certifications

- GCF, PTCRB and major MNOs
- FCC, ISED/IC, RED, UKCA, ACMA

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