Monarch SiP

All-in-One System-in-Package for Ultra Compact LTE-M and NB-IoT Devices

Monarch SiP, SON66430, is a system-in-package (SiP) LTE-M/NB-IoT solution from Skyworks Solutions Inc. and Sequans for the design of wearables and other space-constrained LTE device types. It combines Skyworks’ LTE universal, multi-band RF front-end module, SKY68020, with Sequans’ Monarch LTE-M/NB-IoT Platform, SON3330, in a new, ultra compact SiP that enables worldwide deployment and roaming capability in a Single-SKU™ based on Sequans’ SAW-less radio design architecture. It complies with the ultra-low-power and reduced complexity feature requirements of the 3GPP release 13 and 14 LTE-Advanced Pro standard that defines narrowband, low data rate LTE technology for machine-type-communications (MTC). Monarch SiP achieves a very high level of integration whereby baseband, RF transceiver, power management, RF front-end, RAM memory, and most of the required passives, are integrated into a 8.8 x 10.8 x 0.95 mm package for an industry-leading compact size. Monarch SiP runs Sequans’ carrier-proven LTE protocol stack, an OMA lightweight M2M (LWM2M) client for over-the-air device package for an industry-leading compact size. Monarch SiP achieves a very high level of integration whereby baseband, RF transceiver, power management, RF front-end, RAM memory, and most of the required passives, are integrated into a 8.8 x 10.8 x 0.95 mm package for an industry-leading compact size. Monarch SiP runs Sequans’ carrier-proven LTE protocol stack, an OMA lightweight M2M (LWM2M) client for over-the-air device management, Sequans’ Cloud Connector™ and a rich set of AT commands.

Monarch SiP

Monarch SiP is a ready-to-go optimized solution for ultra compact IoT devices. It uses the carrier-certified LTE protocol stack of Monarch SON3330 and therefore leverages Monarch’s high level of maturity, gained from years of proven field experience.

Applications
Monarch SiP is ideal for adding LTE-M and/or NB-IoT connectivity to low data rate consumer and IoT devices, including health, safety, and fitness wearables, smart watches, and trackers of all types.

Highlights
- Certified by KDDI, NTT Docomo, SoftBank, Sprint, Verizon Wireless
- Certified by regulatory agencies: GCF, PTCRB, FCC, IC, JATE, TELECOM
- 3GPP Release 13 LTE-Advanced Pro, upgradable to Release 14
- Supports narrowband LTE UE categories M1 and NB1/NB2
  - M1: 300 kbps DL / 375 kbps UL
  - NB1: 27 kbps DL / 63 kbps UL
  - NB2: 120 kbps DL / 170 kbps UL
- Extended DRX and PSM features for long sleep and active state power consumption based on use cases.
- Proprietary Dynamic Power Management (DPM) technology for 10 years operation
- Coverage enhancement methods
- Programmable RF filtering for global band support in a Single SKU™
- Supports VoLTE
- Single chip 8.8 x 10.8 x 0.95 mm package
- Extremely reduced BOM
- Optimized for half-duplex FDD (HD-FDD) operation
- 23dBm power class, with reduced power class option
- Low power serial interfaces

Reduced BOM
Monarch SiP is a comprehensive solution and includes almost every component needed for a complete LTE-M/NB-IoT modem system. Device designers may need to add only Flash memory, crystals, and a few passives.

Simple integration
Host IoT devices can access the LTE network through a simple low power serial interface connected to the Monarch SiP. The tiny size of Monarch SiP facilitates placement and routing of LTE functions into space-constrained devices. Only a single power supply is required, and both active and sleep mode power consumption is optimized to enable long battery life using very small batteries.

Programmable on-chip RF filtering
Monarch SiP’s versatile RF architecture, based on SAW-less radio design, supports programmable, intelligent RF filtering that greatly simplifies logistics and deployments and enables a Single-SKU™ to support LTE bands worldwide.

Extended coverage
Monarch SiP implements the most advanced coverage enhancement techniques to provide superior network coverage and performance. Compared to legacy LTE systems, Monarch adds up to 20dB of link budget, thus enabling operation even in challenging environments such as in-building.

Simple software integration into IoT devices
Monarch’s comprehensive software suite is based on more than a dozen years of proven field experience. With certifications and deployments in major LTE networks around the world, it is one of the most mature software solutions in the global 4G ecosystem. It includes the entire LTE Release 13/14 software stack and other drivers and applications required for a complete LTE system. Integration into all major operating systems (including Android, Android Wear, Linux, Windows and various Real Time operating systems) is simplified thanks to a complete set of AT commands for M2M applications. The standard-compliant OMA LWM2M client enables remote management of device over-the-air. And Sequans’ Cloud Connector™ allows off-the-shelf connection to a number of cloud solutions. A field diagnostic tool and an RF calibration software tool are also provided for faster time-to-market.

Monarch SiP

Monarch SiP is a comprehensive solution and includes almost every component needed for a complete LTE-M/NB-IoT modem system. Device designers may need to add only Flash memory, crystals, and a few passives.

Simple integration
Host IoT devices can access the LTE network through a simple low power serial interface connected to the Monarch SiP. The tiny size of Monarch SiP facilitates placement and routing of LTE functions into space-constrained devices. Only a single power supply is required, and both active and sleep mode power consumption is optimized to enable long battery life using very small batteries.

Programmable on-chip RF filtering
Monarch SiP’s versatile RF architecture, based on SAW-less radio design, supports programmable, intelligent RF filtering that greatly simplifies logistics and deployments and enables a Single-SKU™ to support LTE bands worldwide.

Extended coverage
Monarch SiP implements the most advanced coverage enhancement techniques to provide superior network coverage and performance. Compared to legacy LTE systems, Monarch adds up to 20dB of link budget, thus enabling operation even in challenging environments such as in-building.

Simple software integration into IoT devices
Monarch’s comprehensive software suite is based on more than a dozen years of proven field experience. With certifications and deployments in major LTE networks around the world, it is one of the most mature software solutions in the global 4G ecosystem. It includes the entire LTE Release 13/14 software stack and other drivers and applications required for a complete LTE system. Integration into all major operating systems (including Android, Android Wear, Linux, Windows and various Real Time operating systems) is simplified thanks to a complete set of AT commands for M2M applications. The standard-compliant OMA LWM2M client enables remote management of device over-the-air. And Sequans’ Cloud Connector™ allows off-the-shelf connection to a number of cloud solutions. A field diagnostic tool and an RF calibration software tool are also provided for faster time-to-market.

Monarch SiP

Monarch SiP is a ready-to-go optimized solution for ultra compact IoT devices. It uses the carrier-certified LTE protocol stack of Monarch SON3330 and therefore leverages Monarch’s high level of maturity, gained from years of proven field experience.

Applications
Monarch SiP is ideal for adding LTE-M and/or NB-IoT connectivity to low data rate consumer and IoT devices, including health, safety, and fitness wearables, smart watches, and trackers of all types.

Key Benefits of Monarch SiP

Ultra small and thin
Monarch SiP integrates digital baseband, RF transceiver, 23 dBm RF front-end, RAM memory, and power management functions, and passives in a single solution. Monarch SiP’s ultra small footprint is due to advanced packaging techniques, resulting in a very small 8.8 x 10.8 x 0.95 mm package.

Proprietary Dynamic Power Management (DPM) low power technology
Monarch SiP leverages a dozen years of Sequans’ 4G chip design optimization experience. Its high-level of integration and highly-efficient architecture have resulted in ultra-low power consumption in PSM (power saving mode), extended DRX, and active mode. Additional low power capability is enabled by Sequans’ proprietary Dynamic Power Management (DPM) technology, which adapts chipset sleep and active state power consumption based on use case to minimize power consumption for all IoT device types, enabling 10-15 years of battery life for some IoT use cases.

sequans.com

Monarch SiP

Monarch SiP is a comprehensive solution and includes almost every component needed for a complete LTE-M/NB-IoT modem system. Device designers may need to add only Flash memory, crystals, and a few passives.

Simple integration
Host IoT devices can access the LTE network through a simple low power serial interface connected to the Monarch SiP. The tiny size of Monarch SiP facilitates placement and routing of LTE functions into space-constrained devices. Only a single power supply is required, and both active and sleep mode power consumption is optimized to enable long battery life using very small batteries.

Programmable on-chip RF filtering
Monarch SiP’s versatile RF architecture, based on SAW-less radio design, supports programmable, intelligent RF filtering that greatly simplifies logistics and deployments and enables a Single-SKU™ to support LTE bands worldwide.

Extended coverage
Monarch SiP implements the most advanced coverage enhancement techniques to provide superior network coverage and performance. Compared to legacy LTE systems, Monarch adds up to 20dB of link budget, thus enabling operation even in challenging environments such as in-building.

Simple software integration into IoT devices
Monarch’s comprehensive software suite is based on more than a dozen years of proven field experience. With certifications and deployments in major LTE networks around the world, it is one of the most mature software solutions in the global 4G ecosystem. It includes the entire LTE Release 13/14 software stack and other drivers and applications required for a complete LTE system. Integration into all major operating systems (including Android, Android Wear, Linux, Windows and various Real Time operating systems) is simplified thanks to a complete set of AT commands for M2M applications. The standard-compliant OMA LWM2M client enables remote management of device over-the-air. And Sequans’ Cloud Connector™ allows off-the-shelf connection to a number of cloud solutions. A field diagnostic tool and an RF calibration software tool are also provided for faster time-to-market.
Monarch SiP

Monarch SQN66430 LTE Cat M1 and NB1/NB2 Platform block diagram

Product characteristics

Baseband features SQN66430

Product features
- Single 8.8 x 10.8 x 0.95 mm package integrates baseband + RF transceiver + RF front-end + RAM + power management

LTE modem
- Certified by KDDI, NTT Docomo, SoftBank, Sprint, Verizon Wireless
- Certified by regulatory agencies: GCF, PTCRB, FCC, IC, JATE, TELEC
- Supports narrowband channel sizes defined in 3GPP Release 13/14 LTE Advanced Pro standard for machine type communications: 1.4 MHz and 200 kHz bandwidths
- Configurable support for LTE UE Cat M1 and NB1/NB2
- Optimized for single Rx and HD-FDD operation
- Coverage enhancement with frequency hopping and time repetition
- Improved scanning performance for deep indoor coverage
- Standard 3GPP security, integrity, ciphering algorithms
- Intra/inter-frequency mobility
- Supports PSM and extended DRX for long sleep duty cycles

Interfaces
- Serial interfaces: high-speed UART, I2C, SPI
- High speed, low power, serial flash interface
- USIM

RF
- Designed and optimized for half-duplex FDD
- Support for programmable RF filtering, enabling simple, Single SKU™ hardware designs supporting global LTE bands
- 699 MHz to 2.2 GHz
- Supports normal (+23 dBm) and reduced (+20 dBm) Tx power class option
- Two AUX ports for increased flexibility in supporting additional bands

System power management
- Single power supply powering embedded voltage converters to simplify device supply tree
- Real time clock and alarm
- Fast wake-up and power saving modes
- Dynamic Power Management technology optimizes energy efficiency based on traffic patterns and active/sleep duty cycles

IPv4/v6
- SMS MO and MT message support
- OMA LWM2M for device management