

# Cassiopeia LTE-Advanced Platform

## Chipset Solution for High Performance LTE-A Devices

Sequans' Cassiopeia is a family of Cat 4 and Cat 6 LTE-Advanced Platforms that comprises SQN3220 Cat 6 baseband SoC and SQN3220SC Cat 4 baseband SoC with integrated high-performance network and application CPU, Sequans' SQN3242 and SQN3244 LTE-optimized transceivers, a carrier-proven and mature single and dual carrier aggregation LTE protocol stack, a comprehensive software package, and reference designs. Designed for the highest performance and efficiency as a standalone singlemode 4G LTE-A solution, Cassiopeia is a powerful, compact, and cost-effective LTE-A connectivity solution for feature-rich, high performance mobile devices. Cassiopeia supports single and dual carrier aggregation of up to 40 MHz total bandwidth and delivers category 1, 4 and 6 throughput.

### Highlights

- 3GPP Release 10 and software-upgradable to Release 11
- Category 1, 4 and 6 throughputs
- FDD and TDD
- Versatile RF covering 170 MHz to 3.8 GHz
- Supports both single and dual carrier aggregation in any standard combination up to 20+20 MHz
- Supports VoLTE and eMBMS
- Includes Sequans AIR™ interference cancellation technology
- Enhanced network and application CPU
- Royalty-free OMA-DM and IMS/SMS clients
- Host environments: Android, ChromeOS, Linux, Windows, MAC OS

### Applications

Cassiopeia is designed for feature-rich, high performance LTE mobile devices such as CPE, residential gateways, Integrated Access Devices, mobile routers, IoT gateways and add-on datacards such as USB dongles, M.2 cards and PCI-express minicards.

## Key benefits of Cassiopeia LTE-Advanced Platform

### High integration

Cassiopeia's LTE-A baseband processors SQN3220 (Cat 6, dual carrier) and SQN3220SC (Cat 4, single carrier) include an integrated network/application CPU and LP-DDR SDRAM in a small 11x11mm BGA package, optimizing both the footprint and the cost of LTE-A devices.

### High throughput

Cassiopeia delivers up to category 6 throughput. The enhanced, high performance network and application CPU provides plenty of headroom for running customer applications.

### Ultra low power consumption

Leveraging the low power consumption achievements of Sequans' earlier generation 4G platforms, Cassiopeia features ultra low power consumption in both idle and active modes, delivering best-in-class power consumption.

### Comprehensive software suite

Cassiopeia's software suite is based on more than a decade of proven field experience. It is running in major 4G deployments around the world and is one of the most mature solutions in the global 4G ecosystem. It includes the entire FDD/TDD LTE software stack along with all drivers and host applications required for a complete 4G system,

as well as the test tool suite. Host software includes a turnkey package for all major operating systems (including Android, Linux, Windows, Chrome and MAC OSx), Sequans' connection manager, and standards-compliant, royalty-free OMA-DM and IMS/SMS clients, eliminating the cost and complexity of integrating third party software. Also included are a standard RIL for easy integration with any vendor's AP, a field diagnostic tool, and a manufacturing software tool. Sequans' software suite also provides a fully customizable verification environment.

### Supports numerous interfaces

Cassiopeia supports a wide variety of interfaces, including USB 2.0 OTG host or device with integrated transceiver, SDIO host, RGMII, USIM and I2S/PCM-TDM (audio).

### Supports advanced features

Cassiopeia provides support for advanced release 10 and 11 features, including Carrier Aggregation, HetNet support, TM9, VoLTE, IMS, OMA-DM on modem, and eMBMS.

### Sequans AIR - Active Interference Rejection

Sequans AIR™ is an innovative and powerful interference mitigation algorithm implemented on Sequans platforms. Sequans AIR has been fully tested and proven at both the system and link levels and has been shown to increase network capacity up to 2 times when all user terminals are equipped with Sequans AIR (see Sequans' white paper: Mitigating Interference in LTE Networks with Sequans AIR).

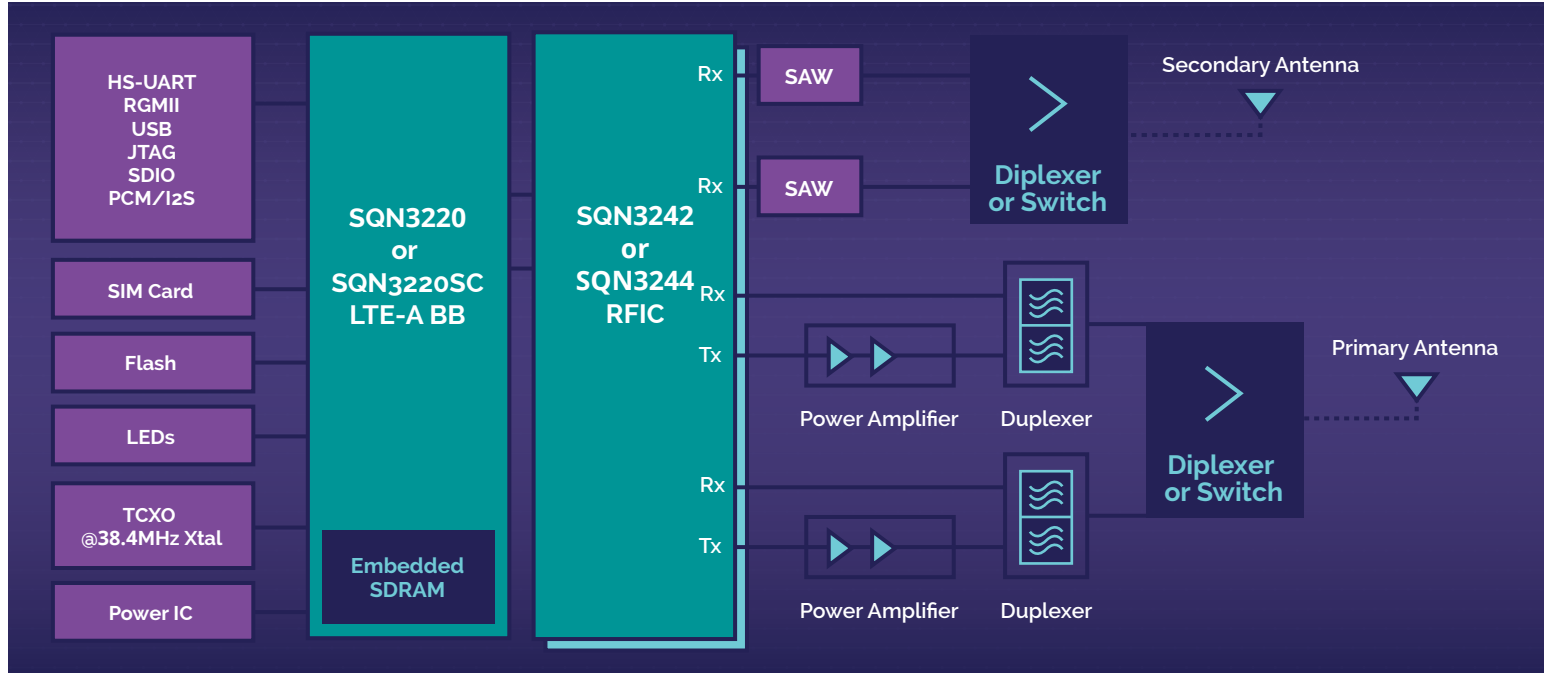
### RF versatility

Cassiopeia supports both FDD or TDD duplexing methods single, and dual carrier aggregation (using two RFICs). The baseband processor interconnects seamlessly with Sequans' LTE optimized transceivers, SQN3242 or SQN3244 for FDD or TDD carrier aggregation enabled LTE-A networks. All LTE frequencies from 170 MHz to 3.8 GHz are supported, including CBRS bands.

### Full-featured MAC layer

Cassiopeia's SQN3220 and SQN3220SC basebands feature an extremely efficient MAC implementation that is strategically partitioned between hardware and software to maximize available throughput and reduce power consumption. The software runs on a MIPS processor, providing flexibility and power efficiency, while the MAC hardware acceleration greatly enhances system performance and throughput. Complete support for mobility is provided, including inter/intra frequency handover and idle mode.

## Cassiopeia LTE-A Platform block diagram for FDD carrier aggregation networks using Sequans' SQN3220 or SQN3220SC + SQN3242 or SQN3244 RFIC



## Product characteristics

### Throughput

- ❖ LTE category 6 (SQN3220), 4 or 1 (SQN3220SC)

### LTE PHY

- ❖ 40 nm CMOS
- ❖ FDD and TDD
- ❖ From 1.4 to 20 MHz bandwidth
- ❖ Cat 6, 4 or 1 throughput
- ❖ Flexible dual-carrier aggregation: any combination of up to 20 + 20MHz, (SQN3220 only)
- ❖ 64 QAM UL
- ❖ All transmission modes (up to TM9, MIMO beamforming)
- ❖ All DL/UL and special sub-frames configurations
- ❖ Supports 2 or 4 Rx antennas, 1 Tx antenna (SQN3220 only for 4 antennas)
- ❖ Tx diversity
- ❖ HARQ Chase combining and incremental redundancy
- ❖ Fast scanning

### LTE MAC

- ❖ Standard 3GPP security, integrity, ciphering algorithms
- ❖ Intra/inter-frequency handover
- ❖ Discontinuous reception (cDRX – short and long cycles)

- ❖ Semi-persistent scheduling
- ❖ Advanced QoS features
- ❖ Voice support: VoLTE
- ❖ eMBMS
- ❖ IPv4/v6
- ❖ SMS MO and MT
- ❖ RoHC

### Interfaces

- ❖ Low power mode for devices running on batteries
- ❖ SDIO host
- ❖ Dual USB 2.0/OTG host/device with integrated transceiver
- ❖ RGMII
- ❖ Dual High-speed UART
- ❖ Dual USIM
- ❖ PCM-TDM and I2S (audio)

### Packaging SQN3220 and SQN3220SC

- ❖ 11x11mm BGA package
- ❖ LP-DDR SDRAM embedded

### RF Transceiver Features SQN3242 and SQN3244

- ❖ 7x7 mm package
- ❖ 170 MHz to 3.8 GHz
- ❖ FDD and TD-LTE operation
- ❖ Optimized for multiband designs
- ❖ Support for carrier aggregation: 1 Tx, 4 Rx (SQN3220 only)