

CMOS-based front-end targets single, global 4G LTE design for mobile devices

In February, Qualcomm Technologies Inc (a subsidiary of fabless chip manufacturer Qualcomm Inc of San Diego, CA, USA) introduced the RF360 front-end solution, a system-level solution addressing cellular radio-frequency band fragmentation and enabling for the first time, it is claimed, a single, global 4G LTE design for mobile devices.

With 40 cellular radio bands worldwide, band fragmentation is the biggest obstacle to designing global LTE devices, says Qualcomm. The RF front-end solution comprises a family of chips designed to mitigate this problem while improving RF performance and helping OEMs more easily develop multi-band, multi-mode mobile devices supporting all seven cellular modes, including LTE-FDD, LTE-TDD, WCDMA, EV-DO, CDMA 1x, TD-SCDMA and GSM/EDGE.

The front-end includes what is claimed to be the first envelope power tracker for 3G/4G LTE mobile devices, a dynamic antenna matching tuner, an integrated power amplifier-antenna switch, and a 3D-RF packaging solution incorporating key front-end components.

The RF360 is designed to work seamlessly, reduce power consumption and improve radio performance while reducing the RF front-end footprint inside a smartphone by up to 50% compared to current-generation devices, says Qualcomm. It also aims to reduce design complexity and development costs, allowing OEMs to develop multi-band, multi-mode LTE products faster and more efficiently. By combining the new RF front-end chipsets with Qualcomm Snapdragon all-in-one mobile processors and Gobi LTE modems, Qualcomm Technologies says that it can supply OEMs with a comprehensive, optimized, system-level LTE solution that is truly global.

As mobile broadband technologies evolve, OEMs need to support 2G, 3G, 4G LTE and LTE Advanced technologies in the same device in order to provide the best data and voice service to consumers regardless of where they are, says Qualcomm.

"The wide range of radio frequencies used to implement 2G, 3G and 4G LTE networks globally presents an ongoing challenge for mobile device designers," says Alex Katouzian, Qualcomm Technologies' senior VP of product management. "Where 2G and 3G technologies each have been implemented on four to five different RF bands globally, the inclusion of LTE brings the total

number of cellular bands to approximately 40," he adds. "Our new RF devices are tightly integrated and will allow us the flexibility and scalability to supply OEMs of all types, from those requiring only a region-specific LTE solution, to those needing LTE global roaming support."

The RF360 front-end solution represents an advance in overall radio performance and design, claims Qualcomm, and includes the following components:

- Integrated power amplifier/antenna switch (QFE23xx) — claimed to be the first chip featuring an integrated CMOS power amplifier (PA) and antenna switch with multi-band support across 2G, 3G and 4G LTE cellular modes. This provides what is reckoned to be unprecedented functionality in a single component, with smaller PCB area, simplified routing and one of the smallest PA/antenna switch footprints in the industry, it is claimed.
- Dynamic antenna matching tuner (QFE15xx) — The first modem-assisted and configurable antenna-matching technology extends antenna range to operate over 2G/3G/4G LTE frequency bands, from 700MHz to 2700MHz. In conjunction with modem control and sensor input, this dynamically improves the antenna's performance and connection reliability in the presence of physical signal impediments, like the user's hand.
- Envelope power tracker (QFE11xx) — The first modem-assisted envelope tracking technology designed for 3G/4G LTE mobile devices, this chip is designed to reduce overall thermal footprint and RF power consumption by up to 30%, depending on the mode of operation. By reducing power and heat dissipation, it enables OEMs to design thinner smartphones with longer battery life.
- RF POP (QFE27xx) — The first 3D RF packaging solution, integrates the QFE23xx multi-mode, multi-band power amplifier/antenna switch with all the associated SAW filters and duplexers in a single package. Designed to be easily interchangeable, the QFE27xx allows OEMs to change the substrate configuration to support global and/or region-specific frequency-band combinations. The QFE27xx RF POP enables a highly integrated multi-band, multi-mode, single-package RF front-end solution that is truly global, claims Qualcomm.

OEM products featuring the complete RF360 solution are due to be launched in second-half 2013.

www.qualcomm.com