

## Amalfi claims smallest, highest-performing CMOS transmit module for cellular handsets

August 27, 2009

Fabless design firm **Amalfi Semiconductor of Los Gatos, CA**, USA, a developer of CMOS-based RF and mixed-signal semiconductors for cellular mobile handsets, has made available samples of what it claims is the world's smallest, highest-performing CMOS-based transmit module for cellular handsets.

The AM7802 is part of the Amalfi Stratos power amplifier family, which uses a standard complementary metal oxide semiconductor (CMOS) process and proprietary architecture that has proven to outperform competing technology in performance, integration and cost, the firm claims. Integrating this CMOS architecture into a transmit module offers handset makers a much smaller (5mm x 6mm), simpler, lower-cost cellular handset front-end solution with up to 40% more battery life or talk time than existing modules from leading suppliers, it adds.

The AM7802 is a dual-band GSM/GPRS transmit module targeted primarily at the entry-level and ultra-low-cost (ULC) market segments in emerging markets. The ULC segment is targeted by all OEMs, including the traditional tier-one handset makers, and is one of the few segments that sustained market growth during the recent world economic downturn, says Amalfi.

“The emerging market handset (EMH) market segment is expected to grow at a compound annual growth rate of 9% between 2008 and 2012,” says Brian Modoff, senior wireless equipment analyst at Deutsche Bank. “The availability of a proven CMOS technology that enables handset manufacturers to deliver superior performance and lower-cost handset solutions with more efficient battery usage could drive CMOS to become the dominant technology in this market,” he adds.

Mobile phone power amplifiers typically use between one-third and 3.5W of power during cellular transmission, which represents 30-70% of the current used by the phone when the user is talking. The lower current consumption resulting from the Stratos AM7802 transmit module enables the cell phone to support up to 40% greater talk time compared to existing solutions and allows cellular manufacturers to use smaller, less expensive batteries, reducing the size and bill-of-material (BOM) cost of the phone, the firm claims. A 40% longer battery life also could have a significant impact on energy savings.

“Cellular handset manufacturers worldwide want CMOS to win because of its historic cost, integration and performance advantages, and they have shown us that it is an easy design transition from GaAs to CMOS,” claims co-founder & CEO Jim Finch. “Our CMOS transmit module has proven to significantly outperform all competitive solutions in power efficiency, size, and cost, which gives manufacturers the confidence they need to transition from GaAs to CMOS.”

The AM7802 integrates the power amplifier, controller, transmit/receive switch, filtering and all matching components into a 30mm<sup>2</sup> package, yielding the industry's smallest, most integrated transmit module, it is claimed. The small size saves PCB space and cost and provides for more flexible design layout, allowing smaller phones or phones with additional features.

The transmit module uses Amalfi's proprietary AdaptiveRF CMOS architecture, which was designed for the development of CMOS power amplifiers and has proven to achieve competitive peak performance and much

better power added efficiency (PAE) of 48% in the typical operation ranges relative to leading GaAs power amplifiers, the firm claims. A typical GaAs transmit module would need an improvement of more than 10% in PAE at maximum output power compared to current performance to match Amalfi's performance in the most common mid-range operating power levels applicable to GSM and EDGE cellular mobile handsets, it adds.

The AM7802 is capable of 1.5kV ESD on all pins, including RF pins, making the device less susceptible to electrostatic discharge damage during manufacturing, resulting in better yields and overall lower cost. It is also capable of withstanding 8kV ESD on the antenna port, further lowering BOM cost as no additional ESD protection is required on the phone to meet industry standards.

The transmit module is capable of operation down to 2.7V, enabling handsets to operate longer and extract up to 10% additional talk time from existing lithium ion battery technology, it is claimed. This will also enable the use of next-generation, lower-voltage batteries when they are available, further reducing BOM costs.

In conjunction with the AM7802, from mid-September Amalfi will also be sampling the 4mm x 5mm Stratos AM8802 and AM8802D quad-band CMOS power amplifier (PA) modules, which use the same core power amplifier with AdaptiveRF architecture and are capable of withstanding 2kV ESD as well as PAE of 58% and 59%, respectively. Using a standard bulk CMOS technology, they are manufactured by foundry partners and supported by leading packaging, assembly and test firms, it is claimed.

All of the products will be available in production quantity in Q4/2009.