

Qualcomm's CMOS PA throws market into flux GaAs suppliers will have to continue to innovate to maintain edge

Qualcomm's new RF360, a family of RF front-end cell-phone products including multi-band CMOS power amplifiers (PAs), marks the firm's entry into the \$5bn cellular RF front-end component market, notes the Strategy Analytics report 'PA Market in Flux: CMOS PAs and Envelope Tracking Emerge as Major Themes at MWC 2013', issued following GSMA Mobile World Congress 2013 in Barcelona, Spain in February. The report evaluates Qualcomm's RF360 in the context of new developments in power management and high-efficiency multi-band power amplifiers by established PA suppliers, other chipset suppliers and power management IC specialists.

"Qualcomm is the first to launch a CMOS PA alternative to GaAs-based multi-band, multi-mode PAs for mid- to high-tier 3G/4G smartphones, a phone seg-

ment formerly the exclusive domain of GaAs PAs," notes Christopher Taylor, director of the Strategy Analytics RF & Wireless Components market research service. "Envelope tracking (ET) power management enables this, and we expect adoption of CMOS PAs from Qualcomm and others to accelerate in mobile phones as a result," he adds.

"GaAs is not dead yet, but GaAs PA suppliers will have to continue to innovate to maintain an edge over CMOS, and they may also need to consider offering their own CMOS PAs for the most cost-sensitive phones, as Skyworks and RFMD now do," comments Eric Higham, director of the Strategy Analytics GaAs and Compound Semiconductor market research service.

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GaAs device revenue grew 2% to record \$5.3bn in 2012 Above-average 8–10% growth in 2013; CMOS PAs threaten long term

In a blog in March, Eric Higham of market research firm Strategy Analytics noted that gallium arsenide device revenue closed 2012 at a new record of just over \$5.3bn, albeit up by just under 2% on 2011. The small gain was driven by a strong fourth-quarter performance from the industry after a sub-par third quarter almost erased the gains for the entire year.

With the exception of 2009, when the global economy took a sharp dip and the GaAs market fought back to breakeven, the growth rate in 2012 was the lowest since the GaAs device market began a steady rise in 2004.

Handsets and smartphones, in particular, remain the driving force behind GaAs device revenue growth, says Higham. Due to their increasing GaAs device content, the growth of smartphones helped propel the handset segment to more than 50% of the entire GaAs device market. Unsurprisingly, the companies associated with handset devices remain the revenue leaders. Skyworks Solutions again saw its revenue grow faster than the market, and it remains the largest GaAs device maker, stretching its lead over TriQuint. Regarding pure-play foundry, Taiwan's WIN Semiconductors continues its impressive growth trajectory and has become the dominant firm in this segment.

Strategy Analytics expects a good uptick in cellular terminal shipments in 2013, along with smartphones continuing to capture market share. This will drive GaAs device revenue growth in 2013 to 8–10%, Higham says, adding that there are signs this growth is taking root.

However, even with above-average growth looking likely in 2013, all is not rosy for the GaAs device market long-term, reckons Higham.

The first threat to growth comes from within. The number of LTE bands, coupled with a desire for the 'world-phone' has led to the multi-mode, multi-band power amplifier (MMMB PA). This has some serious repercussions, because this market is so price sensitive that it will not tolerate bigger and more costly parts, says Higham. So, MMMB PAs must be smaller and cheaper than the PAs they replace otherwise it won't make sense to use them. We have already seen substantial design and design-in activity, so these devices are beginning to see commercial traction, notes Higham.

The other serious threat was unveiled at the 2013 Mobile World Congress (MWC) in Barcelona, Spain at the end of February. Qualcomm fired the first shot across the bow with the pre-conference announcement of its RF360 family of devices, described as a complete, all-encompassing CMOS RF front-end subsystem, consisting of an antenna tuning IC, an envelope tracking (ET) IC for Qualcomm's PA, and a MMMB CMOS PA fabricated using a silicon-on-insulator (SOI) substrate. This announcement sent GaAs PA makers' share prices plummeting. Then at MWC, a host of firms announced their ET development efforts aimed at CMOS-based PAs in LTE handset applications.

These events and particularly CMOS developments will influence growth for GaAs devices in the next several years, says Higham, who hosts the panel session 'The Death of GaAs (?)' on 6 June at the IEEE MTT-S International Microwave Symposium (IMS2013) in Seattle, and is presenting an overview of the 2012 GaAs market at CS MANTECH in New Orleans (13–16 May).

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