

Qorvo Expands Spatium Line with Ka-Band SSPAs

By Barry Manz

[Qorvo](#) has released four wideband solid-state power amplifiers built on the company's patented Spatium spatial combining architecture. The new products – the QPR3238, QPB3238J, QPB0618J, and QPB1840N – target radar, SATCOM, electronic warfare, and test and measurement applications.

Spatium technology has had a twisty path since its inception. It originated at CAP Wireless, founded in 1996, the result of an SBIR grant from the Air Force, and first used GaAs MMICs. When TriQuint Semiconductor acquired CAP Wireless in 2013, its focus was on leveraging Spatium's advantages and pairing them with TriQuint's GaN device technology. TriQuint then merged with RF Micro Devices (RFMD) in 2015 to form Qorvo. Spatium is now Qorvo's primary millimeter-wave technology for high-power combining.

Spatium is designed to serve applications that require tens to hundreds of watts of broadband power from a single feed point, making it extremely useful for EW applications, as well as satellite communications ground terminals. It achieves its performance in part by departing from conventional planar combining techniques, which merge transistor outputs via transmission-line networks that introduce losses and constrain usable bandwidth.

Instead, Spatium distributes RF energy via a three-dimensional waveguide network, where multiple GaN-on-SiC MMIC amplifiers operate as phase-coherent elements. Their outputs are combined within a shared cavity, which produces a single coherent output, and the result is significantly lower combining loss than planar approaches. The result is an amplifier that can

sustain high CW output power across bandwidths that would be impractical with traditional solid-state combining methods. The spatial combining architecture also provides inherent graceful degradation, so if an individual MMIC element fails, the combined output decreases proportionally rather than catastrophically.

The QPR3238 operates from 32 to 38 GHz and delivers up to 141 W CW and 158 W pulsed with a power-added efficiency of 15% and 51.5 dB of large-signal gain. The QPR3238 includes an integrated driver stage and DC enable control for RF pulsing and modulation; when disabled, current draw drops to near zero. Input and output use WR-28 waveguide interfaces.

The companion QPB1840N extends the operating range to 18 to 40 GHz, delivering 44 dBm of output power. The QPB3238J and QPB0618J are suited for service as driver amplifiers, providing 37 to 50 dB of gain with saturated output up to 45 dBm. All four products operate from standard 18 to 24 VDC supply rails and the platform is ruggedized to MIL-STD-810 for shock, acceleration, and vibration, and operate over a temperature range of -40° C to +71° C.