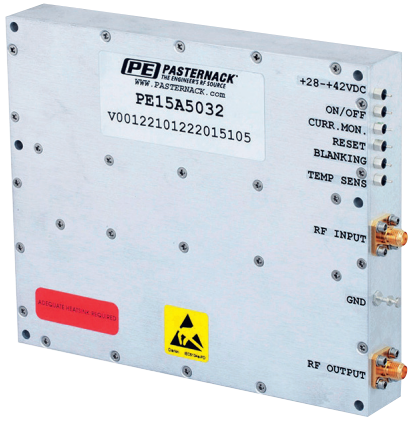
JACK BROWNE | Technical Contributor

GaN Amplifiers Power 30 MHz to 7.5 GHz

This GaN power-amplifier family serves applications ranging from radar to video data links, with broad operating bandwidths as wide as 100 MHz to 6 GHz.

GALLIUM NITRIDE (GaN) has become the semiconductor material of choice for high-frequency discrete and integrated-circuit (IC) power devices. In fact, its transition from the laboratory to commercial products has been quicker than the push toward gallium arsenide (GaAs) in the 1980s. Fueled by funding to private industry by the U.S. Defense Advanced Research Projects Administration (DARPA), GaN devices made their first large-scale appearance during the mid-2000s in IED jammers. Less than a decade later, GaN devices can be found in commercial, industrial, military, and even medical electronic applications.

Many suppliers now offer GaN devices, but few provide short delivery times. One exception is Pasternack Enterprises, with its line of GaN high-electron-mobility-transistor (HEMT) power amplifiers (PAs) that cover frequencies ranging from 30 MHz to 7.5 GHz. All are available from stock, and they meet MIL-STD-810 environmental test conditions.



Model PE15A5032 delivers 10 W (+40 dBm) at 3-dB compression from 0.5 to 7.0 GHz, with 60-dB small-signal gain and –70-dBc spurious suppression.

The PA line targets multiple applications from commercial and military communications to satellite communications (satcom), L-band radar, data links, air traffic control (ATC), and medical systems. The most broadband models cover 0.1 to 6.0 GHz. Output power at 3-dB compression (P3dB) ranges from 10 to 100 W. All amplifiers are designed to meet military requirements for shock and vibration under high humidity and wide operating-temperature ranges. Units come with hermetic seals and can be used at altitudes to 30,000 ft.

Small-signal gain ranges from 43 to 60 dB, with power-added efficiency (PAE) from 20% to 35%. Active GaN devices are mounted on silicon-carbide substrates for effective thermal management. The amplifiers, which operate with supplies from +28 to +36 V dc, feature integral voltage regulation, bias sequencing, and over-current/over-temperature monitoring and protection. They come in rugged coaxial packages with female SMA input and output connectors *(a listing of these devices can be seen in the online version of this article at www.mwrf.com)*.

One PA from the Pasternack line, model PE15A5032 *(see figure)*, delivers 10-W (+40 dBm) P3dB output power from 0.5 to 7.0 GHz. It exhibits 60-dB small-signal gain with ±1.25-dB gain flatness. PAE is 20% and the noise figure measures 10 dB. Spurious suppression is –70 dBc at the rated output-power level. The GaN amplifier runs on 2.2 A at +28 V dc complete with voltage regulation, bias sequencing, and transistor-transistor-logic (TTL) control. The MIL-STD-202 amplifier handles operating temperatures from –40 to +85°C.

Another PA from the line, model PE15A5019, is a narrowband GaN amplifier for use from 7.2 to 7.5 GHz, such as in coded orthogonal frequency-division-multiplexing (COFDM) video and unmanned aerial and ground (UAV/UGV) data links. It provides 20-W output power with P3dB of 15 W (+41.75 dBm) and 5 W (+37 dBm) typical linear COFDM output power. Typical small-signal gain is 58 dB, flat within ±2 dB. The amplifier incorporates protection for VSWR mismatch, thermal overload, over- and under-voltage conditions, and reverse bias. MW

PASTERNACK ENTERPRISES INC., 17802 Fitch, Irvine, CA 92614, (866) 727-8376, (949) 261-1920, fax: (949) 261-7451, e-mail: sales@pasternack.com, *www.pasternack.com*.