

# PA modules push for efficiency

Like transceivers, transmit power amplifier modules are also constantly aiming for maximum functionality in minimum space, with the added requirement of minimising power added efficiency (PAE) to maximise battery life. While CMOS alternatives are now available, III-V compound semiconductors still appear to be marginally ahead where PAE is concerned.

Anadigics' latest PowerPlexer quad-band GSM/GPRS transmit module, the AWT6202, integrates an InGaP HBT PA, pHEMT antenna switch, harmonic filters, and CMOS power control circuitry into a module measuring 6mm square by 1mm high. The AWT6202 supports dual-, tri-, and quad-band applications in any combination of the GSM850, GSM900, DCS1800, and PCS1900 bands, and is GPRS Class 12 compliant. The module delivers 45% overall efficiency in the GSM900 band, equivalent to 57% PAE, and 40% efficiency in the DCS band, equivalent to 52% PAE. The integrated power control scheme of the AWT6202 interfaces directly with the baseband power control DAC, reducing the number of external components required for the power control function and easing production calibration. The module also offers electrostatic discharge (ESD)



**Figure 1: The Anadigics AWT6202 PowerPlexer module**

protection of 15kV at the antenna port.

Also new from Anadigics is a family of 4 x 4mm<sup>2</sup> "High-Efficiency-at-Low-Power" (HELP) W-CDMA PA modules. The AWT6270, AWT6271, AWT6274, and AWT6275 use Anadigics' proprietary mode switching techniques to enable high efficiency operation over a wide range of output power levels. AWT6275 has a power added efficiency of 43% at +27.5dBm and 21% at +16dBm over the range 1920 - 1980MHz. The new PAs are footprint compatible with the current generation of W-CDMA PAs.

TriQuint Semiconductor has announced the addition of a new GSM-EDGE power amplifier (PA) module to its handset product line. Efficiency of the TQM7M5001 in GSM mode is typically

50 - 52% across all four bands, and EDGE efficiency is 23%. GSM output power is +35dBm, while EDGE output power is greater than +28dBm in all modes. The amplifier operates from a +3.2 to +4.5V DC supply and is housed in a package measuring 7 x 7 x 1.1mm<sup>3</sup>.

The module has been optimised for EDGE efficiency and power class E2 operation while maintaining high GSM/GPRS efficiency. Two EDGE quiescent current states are provided to minimize power consumption during backed-off operation. In EDGE mode, the control voltage input is disabled, eliminating the need to apply a constant voltage for proper operation.

The module incorporates a InGaP power amplifier die with a CMOS controller, which implements a n integrated closed-loop power control within the module for GSM operation. This eliminates the need for any external couplers, power detectors and current sensing to assure output power level.

## Company Information

### Anadigics

[www.anadigics.com](http://www.anadigics.com)

### TriQuint Semiconductor

[www.triquint.com](http://www.triquint.com)

## Ultrawideband PAs take to field

In spite of all the high profile activity in wireless communications, there is still considerable work going on in developing higher frequency and broader bandwidth products for military and professional applications. TriQuint has recently introduced three low-cost ultrawideband medium power MMICs for DC - 45GHz optical comms applications. The TGA4850-EPU features a 1dB compression point of +11.5dBm with 13 dB of gain and a 3.2dB typical noise figure. It offers 20dB of AGC range, and typical input and output return losses are 15dB.

The TGA4832-EPU, for DC to 35 GHz, offers +18dBm output at P1dB, small signal gain of 12dB and a 3dB AGC range.

The TGA4036 is a low cost, compact medium power amplifier MMIC for wideband communications and instrumentation applications in the range 19 - 36GHz band. Performance includes

20dB small signal gain, saturated output power of +22dBm, and 8dB input/output return loss.

The CHA3023 is a new 1-18GHz driver from UMS, which is suitable for a variety of broadband electronic warfare and commercial applications. It uses a travelling wave amplifier design incorporating cascode FETs, which provides 14dB typical small signal gain and 3dB typical noise figure. It offers a typical output power at 1dB gain compression of +17dBm.

The device is manufactured in die form using a 0.25µm gate length pHEMT process with via holes through the substrate and air bridges. Bond pads and back side metallisation are gold plated.

### TriQuint Semiconductor

[www.triquint.com](http://www.triquint.com)

### UMS

[www.ums-gaas.com](http://www.ums-gaas.com)

## GaAs fab collaboration

Earlier this Filtronic and RF Micro Devices announced a supply agreement for the manufacture of high volume pHEMT GaAs products at Filtronic's 300mm (6") fab based in Newton Aycliffe, UK. RFMD will incorporate Filtronic's pHEMT GaAs products into its own modules aimed at mobile handset and WLAN applications. The two companies have been collaborating to develop and qualify a range of multi-throw GaAs pHEMT switches for band/mode switching in handsets, and these are now about to enter volume production. RFMD will now use Filtronic as its preferred supplier of pHEMT ICs for all its requirements.

### Filtronic

[www.filtronic.com](http://www.filtronic.com)

### RFMD

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