

Ultrawideband LNA offers very low NF and flat gain response

By Ashok Bindra

Combining four stages of class A amplification using gallium arsenide (GaAs) high electron mobility transistors (HEMTs) with low-pass network topology and lumped element transmission lines, nascent **B&Z Technologies** has readied an ultrawideband low-noise amplifier (LNA) with unprecedented noise figure (NF) and gain performance. As a result, the 0.1 GHz to 40 GHz LNA, BZP140 HP, boasts a noise figure of 3.2 dB (typical) over the specified frequency range, and a typical gain flatness of ± 1.5 dB across the band. Minimum gain for the LNA is given as 25 dB. While the maximum NF across the band is rated at 3.5 dB. While these specs were measured at room temperature, the developer said that the unit can also be cooled to a cryogenic temperature for achieving a NF performance of <1.5 dB.

“To minimize dispersion vs. frequency, which is common in traditional stripline and microstripline designs, the broadband amplifier uses a 0.7 mil wire as a high impedance transmission line,” stated B&Z’s president and founder Javed Siddiqui. Furthermore, he added, to obtain a reasonable gain variation over the ultrawide frequency range, the amplifier uses resistive feedback in the two interstages (Figure 1).

“To simultaneously obtain an acceptable noise source impedance and reasonable input match over an ultrawide frequency at the input, the design incorporates 0.1 micron gate super HEMTs in a distributed network, with loss-less inductive feedback in the sources,” noted Siddiqui. The output stage consists of two devices in a distributed network with restive feedback. According to the manufacturer, the distributed techniques allow the input capacitance of the devices to be incorporated in traveling wave concepts, which increases the transconductance at low frequency for an effective use of negative feedback with lumped resistors. Thus, resulting in a flat gain response over the specified frequency range.

Besides very low NF and a flat gain response, the ultrawideband LNA also offers low input and output VSWR, which is specified as 2.5:1 (maximum). Other key features of the amplifier include 50 Ω matched input and output, unconditional stability at all temperatures, field-replaceable SMA connectors and excellent group delay and phase linearity. While the group delay over the frequency range is rated at ± 25 ps, the third-order intercept is given at 19 dBm. In addition, the minimum output power at P1dB is 8 dBm.

Housed in a small package with drop-in configuration, the unit occupies <0.02 cubic inch in volume (Figure 2), and requires a single +12 V supply. The dc voltage is internally regulated, and the maximum current consumption is 190 mA. Operating temperature range for the amplifier is -55 $^{\circ}$ C to 85 $^{\circ}$ C. In quantities more than 25, the BZP140HP is priced at \$ 1950 for the U.S. domestic market.

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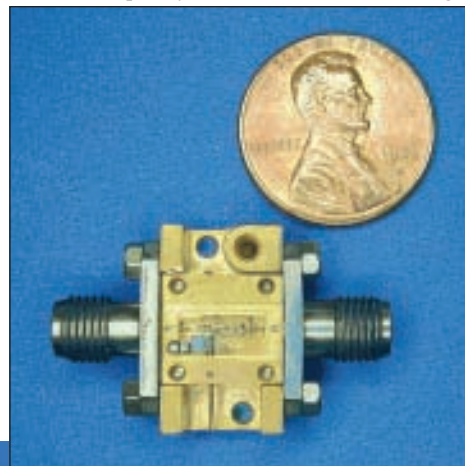


Figure 1. This four-stage low-noise amplifier offers a maximum noise figure (NF) of 3.5 dB across a band of 0.1 GHz to 40 GHz.

Figure 2. The ultrawideband LNA is housed in a very small package with a drop-in configuration.

