Abstracts

Single-ended HEMT multiplier design using reflector networks

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Microwave and RF frequency multipliers are employed in a large number of communications, radar, civilian, and military systems. This paper presents the development of active doublers operating in S and C frequency bands. These devices are unique in that high electron-mobility transistors (Fujitsu FHX35LG) are employed in an unbalanced configuration utilizing "reflector" networks simultaneously on the input and output to reflect the second harmonic signal into the gate of the device and the fundamental signal into the drain simultaneously at appropriate phase angles to optimize performance. Measured and simulated results are presented on over 20 multiplier designs to verify the design philosophy. Conversion gains of approximately 7 dB are presented for narrow-band designs (5% bandwidth), 5 dB for medium-bandwidth designs (15%), and 4 dB for wide-bandwidth designs (35%). The fundamental and third harmonic rejection is approximately 40 dBc for the narrow-band designs and greater than 50 dBc for the medium and wide-band designs.

❑ Return to main document.