Abstracts

Single- and dual-polarized slot-ring subharmonic receivers

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Single- and dual-polarized subharmonic receivers have been developed for operation at W-band frequencies. The receivers are based on dielectric lens-supported, coplanar waveguide-fed slot-ring antennas integrated with uniplanar subharmonic mixers. The slot-ring antenna is capable of supporting two orthogonal modes offering the possibility of dual/multiple receive polarizations. The measured two-port isolation of the dual-polarized slot-ring antenna is better than -25 dB from 86-92 GHz. The measured DSB receiver noise temperature is 4300 K at an LO frequency of 45.0 GHz and an IF of 1.4 GHz. The corresponding DSB conversion loss is 12.2 dB. This includes lens reflection and absorption losses, backside radiation, RF feedline loss, and RF mismatch. When these losses are deembedded the results are in good agreement with the measured performance of the uniplanar subharmonic mixer alone. A matching cap layer on the lens and improved RF matching are expected to result in a DSB noise temperature of 1700-1900 K and conversion loss of 8-9 dB. Potential applications are compact, low-cost millimeter-wave receivers with fixed or variable polarization capabilities.

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