Abstracts

1.6- and 3.3-W power-amplifier modules at 24 GHz using waveguide-based power-combining structures

Jinho Jeon, Youngwoo Kwon, Sunyoung Lee, Changyul Cheon and E.A. Sovero. "1.6- and 3.3-W power-amplifier modules at 24 GHz using waveguide-based power-combining structures." 2000 Transactions on Microwave Theory and Techniques 48.12 (Dec. 2000 [T-MTT] (Special Issue on 2000 International Microwave Symposium)): 2700-2708.

Both 1.6- and 3.3-W power-amplifier (PA) modules were developed at 24 GHz using a waveguide-based power combiner. The combiner is based on a double antipodal finline-to-microstrip transition structure, which also serves as a two-way power combiner. The proposed 1/spl times/2 combining structure was analyzed and optimized by finite-element-method (FEM)-simulations and experiments. An optimized 1/spl times/2 power combiner showed a very low back-to-back insertion loss of 0.6 dB and return losses better than 17 dB over most of Ka-band. The resonant behavior of the combiner was also identified and analyzed using an FEM simulator. The two-way power-combining approach was extended to four-way (2/spl times/2) power combining by vertical stacking inside the waveguide. No degradation in the combining efficiency was observed during this process, demonstrating the scalability of the proposed approach. The implemented 1/spl times/2 power module that combines two 1-W monolithic-microwave integrated-circuit (MMIC) PAs showed an output power of 1.6 W and a combining efficiency of 83% around 24 GHz. The 2/spl times/2 PA module combining the four 1-W MMICs showed an output power of 3.3 W together with an almost identical combining efficiency. This paper demonstrates the potential of the proposed power combiner for high-power amplification at millimeter-wave frequencies.

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