Abstracts

40-W CW broad-band spatial power combiner using dense finline arrays

Nai-Shuo Cheng, A. Alexanian, M.G. Case, D.B. Rensch and R.A. York. "40-W CW broad-band spatial power combiner using dense finline arrays." 1999 Transactions on Microwave Theory and Techniques 47.7 (Jul. 1999, Part I [T-MTT]): 1070-1076.

This paper presents a broad-band spatial power-combining system based on tapered-slot antenna arrays integrated in a standard WR-90 waveguide environment. The system is designed using a modular tray architecture, providing full waveguide-band frequency coverage and an excellent thermal environment for a set of monolithic-microwave integrated-circuit (MMIC) amplifiers. The shape of the tapered-slot or finline structures was optimized to minimize return loss and provide a broad-band impedance transformation from the waveguide mode to the MMIC amplifiers. A prototype eight-element array using commercial GaAs MMIC power amplifiers yielded a maximum of 41 W output power (continuous wave) with a gain variation less than /spl plusmn/1.2 dB within the entire band of interest. The average combining efficiency over the operating band was estimated at 73%. The results suggest the efficacy of the design and a strong potential for higher powers by moving toward a greater number of MMIC's per tray and a larger number of trays. Should the 100 W system be realized in the near future, our combiner system will become a promising candidate to challenge the dominant position currently claimed by the traveling-wave tube amplifiers.

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