Abstracts

A 10-GHz high-efficiency lens amplifier array

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The design of a 36-element quasi-optical amplifier for high-power and high-efficiency transmission at 10 GHz is presented. The following steps are taken in the design procedure: (1) design and characterization of a single high-efficiency CPW amplifier; (2) comparison to a saturated class-A amplifier; (3) design of a driver stage and testing of a two-stage CPW amplifier; (4) design of antennas and passive unit cell; (5) testing of active unit cell; (6) testing of passive lens array; and (7) construction and testing of active lens amplifier array. This systematic procedure enables us to ensure stability, calibrate properly, and measure power-combining efficiency as a function of the number of elements. A high-efficiency amplifier with 275 mW of output power, 48% power-added efficiency, and 6.4 dB saturated gain at 10.1 GHz gives 200 mW output power, 35% power-added efficiency, and 13 dB of saturated power gain in a two-stage amplifier. A single unit cell with second-resonant slot antennas gives the same performance and is the building block for a 36-element focal-point fed array.

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