Abstracts

Active Inverted Stripline Circular Patch Antennas for Spatial Power Combining

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A new active antenna configuration is proposed for spatial power combining applications. The active patch antenna uses an inverted stripline topology to take advantage of several features. These features include avoiding drilling through the circuit substrate to insert the diode and the use of air within the resonant cavity for reducing loss. The inverted substrate can serves as a radome for hermetic sealing. The active antenna and housing can be fabricated in modular form for reduced cost and easy replaceability of devices. The active inverted stripline patch antenna exhibits a much cleaner spectrum and greater stability than previously reported active antennas. The fixture serves as a ground plane, heat sink and support in an active planar array or as a mirror in a quasi-optical power combining resonator. A single active antenna operating at 9.23 GHz exhibited a 16 MHz locking bandwidth at 30 dB locking gain. Power combining efficiencies of over 89% have been demonstrated for a four element square array. The square array maintained injection-locking and power combining over a 60 MHz bias tuned bandwidth. Similarly, a four element diamond array showed over 86% combining efficiency and 50 MHz bias tuned bandwidth. Beam Steering was demonstrated by varying bias voltage to the individual antenna elements of the square array.

❑ Return to main document.