

## A Multilayer Active Power Divider Using Pseudo Hybrid-Ring And Ground-Slot Coupling Technique

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A multilayer active power divider is presented for the Commission B under Guiding Structures and Circuits in URSI.

A broadband power divider in the form of five-ports hybrid-ring has been reported (G. F. Mikucki and A. K. Agrawal, "A broad-band printed circuit hybrid ring power divider," *IEEE Trans. Microwave Theory and Tech.*, vol. 37, no. 1, pp. 112-117, Jan. 1989). It is useful in sum mode operation and can divide the power for the realization of phase-array antenna systems. For the ground aperture technique, it is widely used in microstrip antenna design, and can also be applied to couple energy and/or to match impedance between microstrip lines. Here the proposed multilayer power divider uses a modified hybrid-ring structure and a ground-slot coupling technique to guide and couple signal between microstrip lines on the top and the bottom of printed circuit layers as shown in Fig. 1. With this coupling arrangement, two amplifying units can be placed on the bottom layer to boost up the coupled signal. The overall combination forms a multilayer structure which is broadband, compact and versatile.

The ground slots are carefully designed and optimized for a broadband performance while two Fujitsu HEMT (FHC40LG) transistors are used for the amplifying circuits. The power divider is designed and tested to operate in C-band with 35% 3dB-bandwidth, 9dB gain and 10dBm output P1dB. The output ports 2 and 3 have an identical response and a high isolation for a broadband frequency. In addition, their phase difference is less than 2 degrees which is mainly due to the transistors used being not identical. However, even with this slight phase difference, this design is still suitable for phase array antennas.

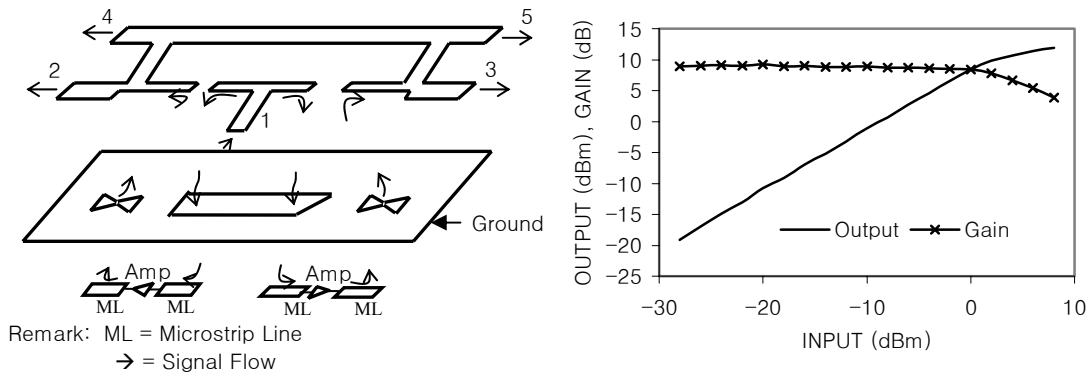


Fig. 1. Overall topology of the multilayer power divider, and output level and gain for different input level at 5.5GHz.