Design and Implementation of a Ka Band Balanced Amplifier with Six Port Power Divider

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Abstract
In this paper for designing a Ka band balanced amplifier, a novel structure using a six-port power divider is proposed. If we use this six-port power divider as a 3dB power divider and combiner, it will have broadband properties and completely symmetric structure that causes to really zero phase and gain unbalance between output equal power split ports. Zero phase and gain unbalance of the couplers together with the 90 degrees phase shifters, causes to nearly unity input and output VSWR in balanced amplifier which can not be achieved in balanced amplifiers with conventional 3dB couplers.
If single amplifiers are broadband than the six-port power divider, There will be a critical problem with stability of the balanced amplifier using six-port power divider. The problem is solved with using band pass filters in the six-port structure. So the six-port power divider together with the in-structure filters forms a novel balanced amplifier structure which is proposed in this paper. The simulated and measured results of balanced amplifier are reported. Measured results are in good agreement with simulated results.
The Fabricated power stage and bias circuit have been shown in Fig.1 and Fig.2 respectively.

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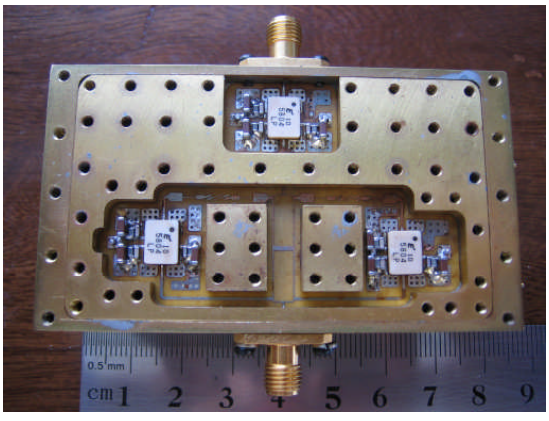

Fig. 1. Fabricated power stage for transmitter

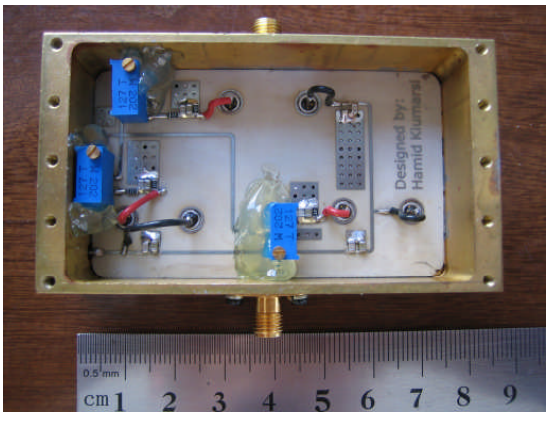

Fig. 2. The Bias circuit of power stage which is at the bottom of microwave circuit