Abstracts

Source-Pull Measurements Using Reverse Six-Port Reflectometers with Application to MESFET Mixer Design

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A new experimental technique using six-port reflectometers, operated in reverse configuration, suitable for source-pull device characterization is reported. Analytical analysis and experimental verification show that using the six-port in reverse configuration allows the impedance of the test port of the six-port junction to be measured. This measurement technique is suitable for the design of low noise amplifiers and of active nonlinear circuits such as FET mixers and power amplifiers. This measurement technique has been used for the first time to study: 1) The effect of the LO and RF impedances of the input matching circuit of a MESFET gate mixer on the IF output power and conversion gain. 2) The effect of the phase of a LO offset short circuit presented to the MESFET output on the DC power efficiency and the conversion gain of the gate mixer. Experimental results of a NE-72084 GaAs MESFET gate mixer demonstrate that by presenting to the MESFET the optimum input RF and LO impedances and the right phase for the LO offset short-circuit at the output, 2.5 dB conversion gain can be achieved with a 2.5 times reduction of DC power consumption as compared to conventional design approaches.

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