Abstracts

On Theory and Performance of Solid-State Microwave Distributed Amplifiers

The performance characteristics of n-link distributed amplifiers employing GaAs MESFET'S are studied. At first, formulas of tie symmetrical amplifier using lumped circuit elements are developed for the case of an idealized FET model. The theoretical analysis is then extended to distributed line elements and later to an S-parameter derived transistor model. In efforts to optimize amplifier performance, the restriction of circuit symmetry is subsequently removed and the performance characteristics of two concepts, that of equal characteristic impedances and that of equal line lengths, are proposed and compared. Based on this analysis and practical considerations, several three-link hybrid amplifiers utilizing the equal line lengths approach have been assembled and test results are reported. A gain of G = 5.5±0.6 dB was measured over the bandwidth of 2-20 GHz. Across this frequency band a maximum VSWR of 2.2:1 for the input and 2.5:1 for the output terminaf have been reafized, while a minimum output power at the l-dB compression points of 19.3 dBm was achieved from 2-18 GHz. Agreement between measured and computed small-signal gain as well as reverse isolation is excellent.

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