Abstracts

Millimeter-Wave, Cryogenically-Coolable Amplifiers Using AlInAs/GaInAs/InP HEMT's

M.W. Pospieszalski, W.J. Lakatosh, R. Lai, K.L. Tan, D.C. Streit, P.H. Liu, R.M. Dia and J. Velebir. "Millimeter-Wave, Cryogenically-Coolable Amplifiers Using AlInAs/GaInAs/InP HEMT's." 1993 MTT-S International Microwave Symposium Digest 93.2 (1993 Vol. II [MWSYM]): 515-518.

The cryogenic performance of AlInAs/GaInAs/InP.1 µm HEMT's is reported. Collapse free d.c. operation is observed down to the ambient temperature of 18 K. The application of these devices to Q- and E-band low-noise, cryogenically-coolable amplifiers is demonstrated. The measured record-breaking noise temperature of 15 K (noise figure of .2 dB) for a multi-stage 40-45 GHz amplifier with 33 dB of gain at the ambient of 18 K is in close agreement with the prediction of a simple noise model. A very low power consumption per stage of less than 1 mW is recorded. The noise temperature of the E-band cryogenic amplifier is less than 47 K at 70 GHz, demonstrating that the performance of HEMT receivers is now competitive with that of SIS receivers in the 3-mm wavelength atmospheric window.

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