

Comparison of the Phase Noise Performance of HEMT and HBT Based Oscillators

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This paper presents a comparative study on the phase noise contribution of HBT and HEMT oscillators. For a quantitative comparison, HBT and HEMT oscillators were constructed at 5.6 GHz using the same circuit topology. Experimental results show that the low-frequency (LF) noise (i.e. $1/f$ noise) in HBT is relatively lower than that in HEMT; however, the lowest phase noise can be achieved in the HEMT oscillator due to its low LF noise up-conversion to the phase noise. A proposed theoretical model explains the difference in noise up-conversion performance of HEMT and HBT. The experimental investigation emphasizes the importance of LF noise level and its up-conversion factor in the design of microwave oscillators.

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