# Abstracts

## Optical Control of GaAs MESFET's

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Theoretical and experimental work for the performance of GaAs MESFET's under illumination from light of photon energy greater than the bandgap of the semiconductor is described. A simple model to estimate the effects of light on the dc and RF properties of MESFET'S is presented. Photoconductive and photovoltaic effects in the active channel and substrate are considered to predict the change in the dc equivalent circuit parameters of the FET, and from these the new Y- and S-parameters under illumination are calculated. Comparisons with the measured S-parameter's without and under illumination show very close agreement. Optical techniques can he used to control the gain of an FET amplifier and the frequency of an FET oscillator. Experimental results are presented showing that the gain of amplifiers can be varied up to around 20 dB and that the frequency of oscillators can be varied (tuning) around 10 percent when the optical absorbed power in the active region of the FET is varied by a few microwatts. When the laser beam is amplitude-modulated to a frequency close to the free-running FET oscillation frequency, optical injection locking can occur. An analytical expression to estimate the locking range is presented. This shows a fair agreement with the experiments. Some suggestions to improve the optical locking range are presented.

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