Abstracts

Negative Photoresponse in Modulation Doped Field Effect Transistors (MODFET's): Theory and Experiment

M.A. Romero and P.R. Herczfeld. "Negative Photoresponse in Modulation Doped Field Effect Transistors (MODFET's): Theory and Experiment." 1995 Transactions on Microwave Theory and Techniques 43.3 (Mar. 1995 [T-MTT]): 511-517.

A model for the mechanism of negative photoresponse, namely, the decrease of drain current under illumination, in AIGaAs/GaAs MODFET's is presented. Also, a comprehensive experimental study discussing the dependence of this phenomena on gate and drain to source bias voltages and optical power, as well as a comparison with devices that show the usual positive photoresponse, are reported. The negative photoresponse is attributed to trapping of photogenerated carriers in the GaAs buffer layer, causing a change in the potential profile and consequent reduction in the number of carriers in the 2-DEG channel. The above theory is supported by numerical solution of Poisson's and electron continuity equation, using the finite-elements method. Finally, the implications of the negative photoresponse on the high-speed photodetection properties of MODFET's devices are discussed.

❑ Return to main document.