

An AlGaAs/InGaAs pseudomorphic HEMT modulator driver IC with low power dissipation for 10-Gb/s optical transmission systems

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An optical modulator driver integrated circuit (IC) has been developed for 10-Gb/s optical communication systems. To achieve both high-frequency (HF) operation and low power dissipation, 0.2- μm T-shaped gate AlGaAs/InGaAs pseudomorphic high electron-mobility transistors (HEMTs) have been employed for their large transconductance g_m of 610 mS/mm and high cutoff frequency f_T of 67.5 GHz. In addition, optimizing input logic swing, switching transistor size in the output driver, and using cascode-current mirror circuits with small output conductance enable power dissipation as low as 1 W to be achieved at a 10-Gb/s nonreturn-to-zero (NRZ) signal output with 3 V_{p-p}. This is the lowest value ever reported for power dissipation. As an additional function, the output-voltage swing can be controlled in the range from 2 to 3.3 V_{p-p} by the current mirror circuit for the purpose of adjusting the optical-output-signal duty factor through an optical modulator.

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