Abstracts

High-speed MSM/HEMT and p-i-n/HEMT monolithic photoreceivers

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The performance of monolithically integrated metal-semiconductor-metal/high electron-mobility transistor (MSM/HEMT) and p-i-n/HEMT photoreceivers is reported. p-i-n/HEMT photoreceivers have been designed and fabricated, resulting in measured transimpedances of 700 /spl Omega/, an 8.3-GHz bandwidth, and measured sensitivities of -17.7 dBm at 10 Gb/s and -15.8 dBm at 12 Gb/s for a 2/sup 31/ - 1 pattern length pseudorandom bit sequence at a bit error rate of 10/sup -9/. Low-noise MSM-based pbotoreceivers have also been designed and fabricated, and frequency response, noise, and sensitivity measurements have been performed. Sensitivities of -16.9, -13.1, and -10.7 dBm were obtained at 5, 8, and 10 Gb/s, respectively. A direct comparison of p-i-n- and MSM-based photoreceivers is undertaken on photoreceivers with matched responsivity and bandwidth. Measurement and theoretical analysis of circuit and device noise indicates an anomalous sensitivity penalty in MSM-based receivers that arises due to intersymbol interference.

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