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High speed terahertz modulation from metamaterials with embedded high electron mobility transistors

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We have designed and demonstrated the performance of a novel terahertz (THz) device resulting from hybridization of metamaterials (MMs) with pseudomorphic high electron mobility transistors (HEMTs), fabricated in a commercial gallium arsenide

(GaAs) process. Monolithic integration of transistors into each unit cell permits modulation at the metamaterial resonant frequency of 0.46 THz. Characterization is performed using a THz time-domain spectrometer (THz-TDS) and we demonstrate modulation values over 30%, and THz modulation at frequencies up to 10 megahertz (MHz).

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