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标题: Power Amplification at 0.65 THz Using InP HEMTs
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摘要: In this paper, progress toward developing solid-state power-amplifier modules at 0.65 THz is reported. This work is enabled by a >1 THz f(MAX) InP HEMT transistor with a 30-nm gate and an integrated circuit process specifically tailored for circuits operating at frequencies approaching 1 THz. The building block of the reported amplifier modules is an eight-stage terahertz monolithic integrated circuit (TMIC) amplifier. The first six stages of the TMIC use 20-m transistors, while the final two output stages rely on two power-combined 20-mu m transistors to increase the output power. For operation at 0.65 THz, the TMIC also relies on integrated electromagnetic transitions for direct coupling with the WR1.5 waveguide of the amplifier package. Two modules are reported, with the first module containing a single TMIC and demonstrating a peak saturated output power of 1.7 mW at 640 GHz with a measured small-signal gain >= 10 dB from 629 to 638 GHz. The second module features two power-combined TMICs to increase output power. This is done using a waveguide Y-junction as both the combiner and splitter. In test, this power-combined module reached a peak output power of 3 mW at 650 GHz and measured small-signal gain >= 10 dB from 625 to 640 GHz.
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