Abstracts

Submicron-Gate InP Power MISFET's with Improved Output Power Density at 18 and 20 GHz

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Presented here are the microwave characteristics at 18 and 20 GHz of submicron-gate iridium phosphide (InP) metal-insulator-semiconductor field-effect transistors (MISFET's) for high output power density applications. InP power MISFET's were fabricated with 0.7 µm gate lengths, 0.2 mm gate widths, and drain-source spacings of 2, 3, and 5 µm. The output power density was investigated as a function of drain-source spacing. The best output power density and gain were obtained for drain-source spacings of 3 µm. At 18 GHz output power densities of 1.59 W/mm with a gain of 3.47 dB and a power-added efficiency of 20% were obtained for a drain-source spacing of 3 µm. At 20 GHz output power densities of 1.20 W/mm with a gain of 3.17 dB and a power-added efficiency of 13.6% were obtained for a drain-source spacing of 3 µm. The output power density is 2.7 times greater than has previously been measured for InP MISFET's at 18 and 20 GHz, and the power-added efficiency has also been increased. The output power density is also 50% better than recently reported for comparable gate width pseudomorphic HEMT's at 20 GHz, The power gain was stable to within 3.0% over 12 h, and the drain current variation during the same time was less than 5%.

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