A single-recess 0.15-µm gate length metamorphic HEMT (mHEMT) process on 100-mm GaAs substrates has been developed for ultra low-noise applications. These 0.15-µm Ti-Pt-Au gate mHEMTs exhibited typical $g_{m}$ of 850 mS/mm, pinch-off voltages of ~0.4 volts, and extrapolated peak $f_{T}$ of over 150 GHz. Wide-band low-noise amplifier (LNA) ICs have been designed and fabricated using this 0.15-µm mHEMT technology. Ultra low noise figure of 0.5 dB and high gain of greater than 31 dB from 7-11 GHz were measured on these X-band mHEMT Monolithic Microwave Integrated Circuits (MMICs) that consumed only 42 mW DC power.

We have also developed a dual-recess (DR) 0.15-µm T-shaped gate pseudomorphic HEMT (pHEMT) process for power amplification applications at frequency range of 30 to 50 GHz. 0.15-µm x 600-µm pHEMT unit cells produced output power density of greater than 740 mW/mm and power-added efficiency of 40% at 35 GHz. Furthermore, we have successfully advanced the state-of-the-art of Ka- and Q-band power MMIC performance using this DR 0.15-micron pHEMT technology. Under CW operation, 2.5 W output power from 32 to 38 GHz were measured on a compact pHEMT MMIC of 7.44 mm² in chip size when the circuit was biased at 6 volts. GaAs Q-band (41-46 GHz) power MMICs with record output power will be presented in the conference as well.