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GaAs PHEMT single-ended mixers for 28 GHz applications

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This paper presents the design and simulation result of two GaAs PHEMT mixers; the single-ended gate mixer and the single-ended drain mixer. These two mixers were designed by using the CAD Libra Eesoft Series IV and device model from Marconi Caswell Technology based on H40 Foundry. GaAs PHEMTs with 0.25 μm gate length were employed as mixing devices for these mixers. The mixers were designed for 28 GHz applications such as for LMDS system with RF frequency at 28 GHz, LO frequency at 27 GHz and IF frequency at 1 GHz. The single-ended gate mixer achieved a conversion loss of 2.0 dB with LO power at +10 dBm. Meanwhile the single-ended drain mixer gives a conversion gain of 3.4 dB with LO power at +15 dBm. Both the mixers achieved adequate LO to RF isolation and LO to IF isolation. The single-ended drain mixer has lower noise figure than the single-ended gate mixer. The layout size for single-ended gate mixer is 0.94 mm × 2.0 mm, whereas the layout size for single-ended drain mixer is 0.93 mm × 1.98 mm.