Large-signal modeling of multi-finger InP DHBT devices at millimeter-wave frequencies

A large-signal modeling approach has been developed for multi-finger devices fabricated in an Indium Phosphide (InP) Double Heterojunction Bipolar Transistor (DHBT) process. The approach utilizes unit-finger device models embedded in a multi-port parasitic network. The unit-finger model is based on an improved UCSD HBT model formulation avoiding an erroneous RciCbci transit-time contribution from the intrinsic collector region as found in other III-V based HBT models. The mutual heating between fingers is modeled by a thermal coupling network with parameters extracted from electro-thermal simulations. The multi-finger modeling approach is verified against measurements on an 84 GHz power amplifier utilizing four finger InP DHBTs in a stacked configuration.

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