Abstracts

Nonlinear analysis of GaN MESFETs with Volterra series using large-signal models including trapping effects

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Nonlinearities in GaN MESFETs are reported using a large-signal physics-based model. The model accounts for the observed current collapse to determine the frequency dispersion of output resistance and transconductance. Calculated f/sub T/ and f/sub max/ of a 0.8 /spl mu/m/spl times/150 /spl mu/m GaN MESFET are 6.5 and 13 GHz, respectively, which are in close agreement with their measured values of 6 and 14 GHz, respectively. A Volterra-series technique is used to calculate size and frequency-dependent nonlinearities. For a 1.5 /spl mu/m/spl times/150 /spl mu/m FET operating at 1 GHz, the 1 dB compression point and output-referred third-order intercept point are 16.3 and 22.2 dBm, respectively. At the same frequency, the corresponding quantities are 19.6 and 30.5 dBm for a. 0.6 /spl mu/m/spl times/150 /spl mu/m FET. Similar improvements in third-order intermodulation for shorter gatelength devices are observed.

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