High Power, High Conversion Gain Frequency Doublers Using SiC MESFETs and AlGaN/GaN HEMTs

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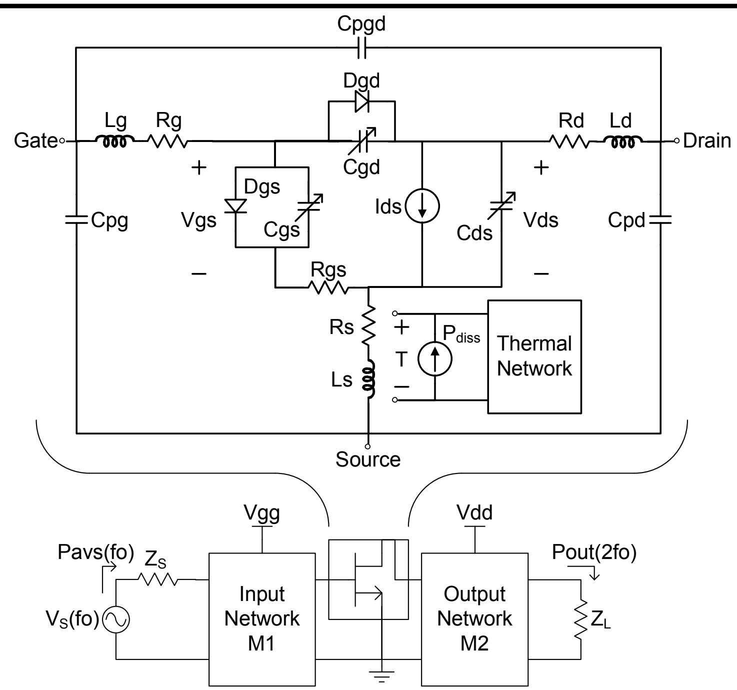
- **Development of high Pout, high CG frequency doublers**
  - Combine frequency multiplication with power amplification and gain
  - Use of high power, wide bandgap devices
- **Frequency doubler design using high-accuracy nonlinear models**
  - Harmonic impedance pull sims for determining optimum Zload/Zsource
  - Realization using simple, low-loss, microstrip stub networks



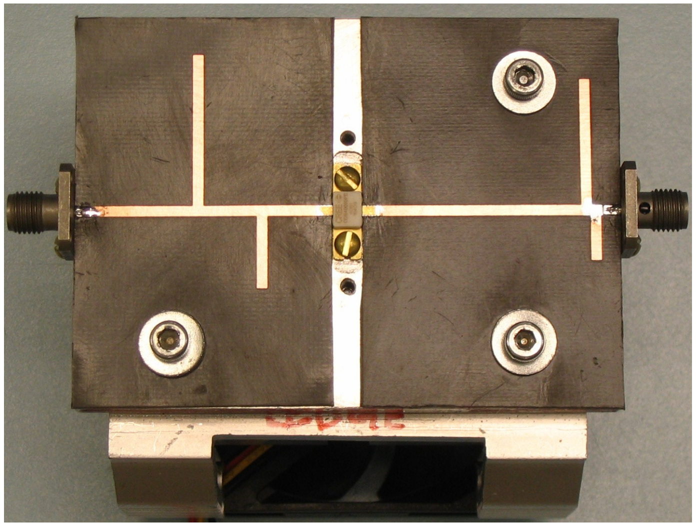


Photo of GaN HEMT-based frequency doubler.

WEPB: Frequency Conversion and Control

See us in Room 204ABC at 3:00pm on Wednesday for details…

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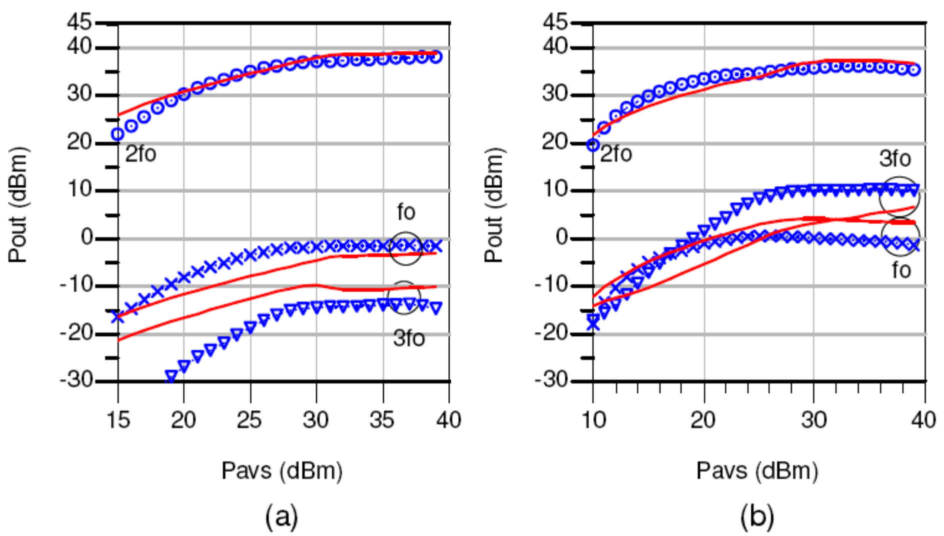
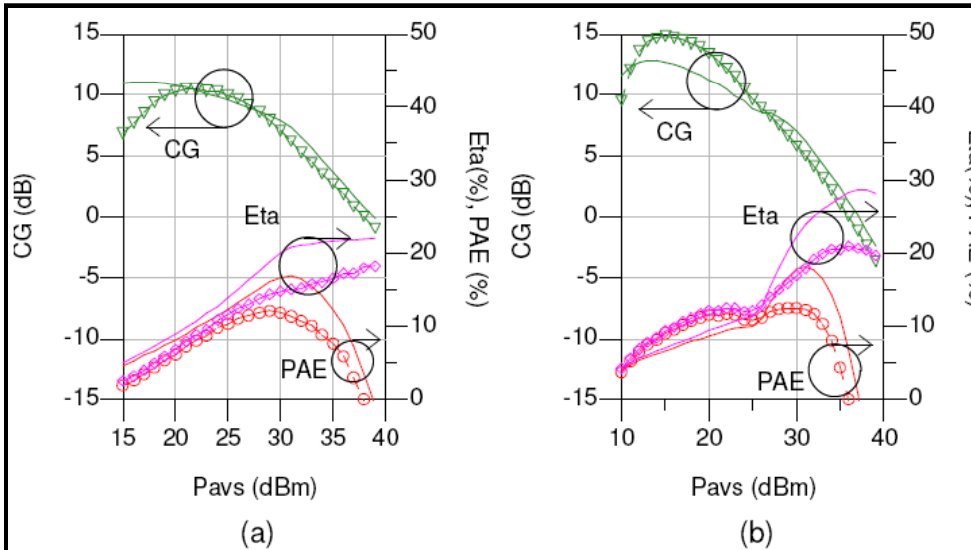
- **Highest power single-transistor frequency doublers to date**
  - **SiC MESFET-based doubler: CG_{max}=10.00dB, $Pout_{max}$=6.31W**
  - **AlGaN/GaN HEMT-based doubler: CG_{max}=14.80dB, $Pout_{max}$=4.14W**
  - **High suppression of unwanted first and third harmonics**
  - **Supports the use and development of high-accuracy nonlinear models**
  - **Cost-effective harmonic impedance pull simulations**



Measured (symbols) and simulated (solid lines) output for the (a) SiC MESFET and (b) GaN HEMT doublers.



Measured (symbols) and simulated (solid lines) CG, η and PAE for the (a) SiC MESFET and (b) GaN HEMT doublers.

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