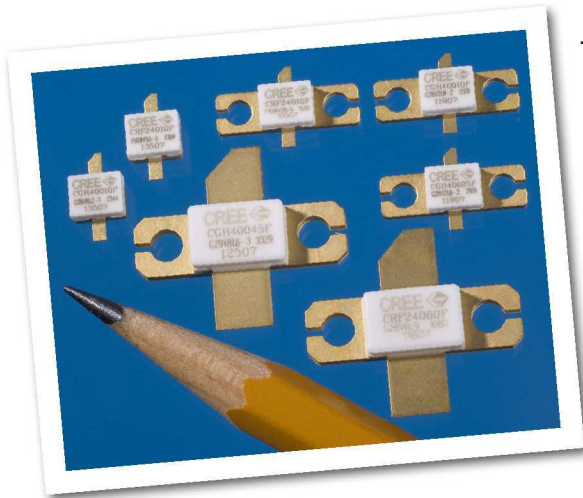


General Purpose Wide Bandgap Transistors

Gallium Nitride (GaN) HEMTs for Broadband Applications

Broadband performance - Enables high power, multi-octave bandwidth amplifiers



This “general purpose” discrete device series features Cree’s GaN HEMTs. These unmatched packaged transistors allow wideband amplifier operation using appropriate external input or output matching circuit topologies. The value of these wide bandgap devices, when compared to other transistor technologies, is more power bandwidth within a smaller amplifier footprint.

Applications

- 2-Way Private Radio
- Test Instrumentation
- Broadband Amplifiers
- Class A, AB, Linear amplifiers suitable with OFDM, QPSK, QAM, FM waveforms

GaN HEMT Features

High Gain, 16 dB at 4 GHz

High Efficiency, 65% drain efficiency at P_{SAT} at 4 GHz

Excellent Linearity, -30 dBc IM3 typical

Operational Frequencies up to 6 GHz

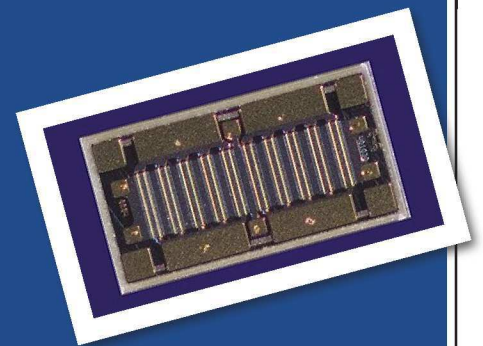
High Breakdown, 84V $V_{DS\ min}$

Low Intrinsic Device Capacitances

High Breakdown (100V – typical)

High Temperature Operation ($T_{CH} - 225^{\circ}C$)

High Reliability (1E6 MTF Hours @ 225°C)



General Purpose GaN HEMT Product Family



PACKAGED GAN HEMTS

Part Number	Frequency Band	Operating Voltage	P _{SAT}	Small Signal Gain at 4 GHz	Drain Efficiency at P3dB	Package
CGH40010F	Up to 6.0 GHz	28 V	10 W	15 dB	65 %	440166
CGH40010P	Up to 6.0 GHz	28 V	10 W	15 dB	65 %	440196
CGH40025F	Up to 6.0 GHz	28 V	25 W	15 dB	65 %	440166
CGH40025P	Up to 6.0 GHz	28 V	25 W	15 dB	65 %	440196
CGH40035F	Up to 4.0 GHz	28 V	35 W	15 dB	65 %	440193
CGH40045F	Up to 4.0 GHz	28 V	45 W	15 dB	65 %	440193
CGH40090PP	Up to 4.0 GHz	28 V	90 W	15 dB	65 %	440199
CGH40120F	Up to 4.0 GHz	28 V	120 W	10 dB	65 %	440193
CGH40180PP	Up to 4.0 GHz	28 V	180 W	10 dB	65 %	440199

Package Types 440166, 440193, 440196, 440199



Package Type: 440166
Overall Size 0.330" x 0.555"



Package Type: 440193
Overall Size 0.805" x 0.730"



Package Type: 440196
Overall Size 0.205" x 0.325"



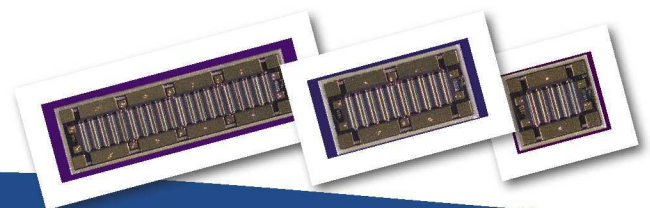
Package Type: 440199
Overall Size 0.230" x 1.140"

Transistor Die

Cree is the **leading** supplier of silicon carbide (SiC) and gallium nitride (GaN) wafers and devices for wireless communications. Cree is the world's largest supplier of GaN-on-SiC devices.

GAN HEMT BARE DIE

Die Part Number	Frequency Band	Operating Voltage	P3dB	Small Signal Gain at 6 GHz	Drain Efficiency at P3dB
CGH60015D	Up to 6.0 GHz	28 V	15 W	15 dB	65 %
CGH60030D	Up to 6.0 GHz	28 V	30 W	15 dB	65 %
CGH60060D	Up to 6.0 GHz	28 V	60 W	13 dB	65 %
CGH60120D	Up to 6.0 GHz	28 V	120 W	13 dB	65 %

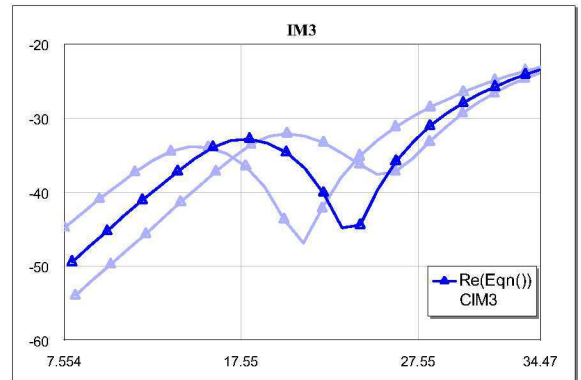


Large Signal Models

Cree offers large signal GaN HEMT & SiC MESFET models. Cree's GaN models are available for both die and packaged products.

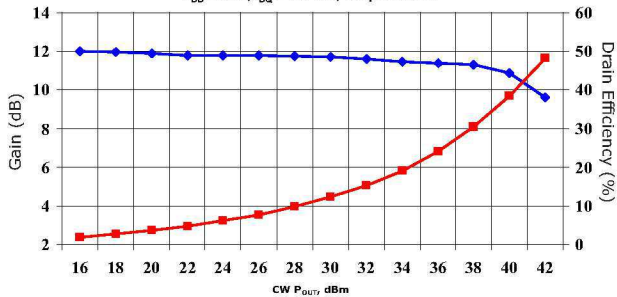
Enable accurate simulation of parameters, such as

- I-V Curves and Dynamic Load Lines
- S-Parameters
- Gain Compression
- Source and Load Pull Contours
- Drain Efficiency
- Two-tone IM3, IM5 and IM7
- Prediction of linearity "sweet spots"
- Channel temperatures automatically calculated and effects on DC and RF parameters taken into account

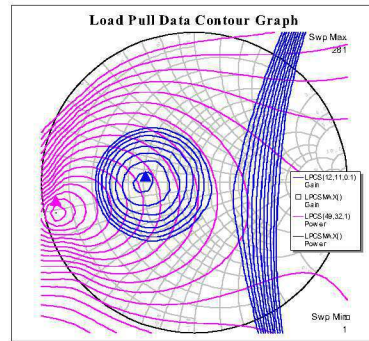


Example of Two-Tone IM3 as a function of average P_{out} and quiescent drain current in Class A/B mode

Simulated Single Tone CW Gain and Efficiency of CGH40010F vs. Output Power in Broadband Amplifier Circuit
 $V_{DD} = 28\text{ V}$, $I_{DQ} = 100\text{ mA}$, Freq = 3.6 GHz



Example of Gain Compression and Drain Efficiency



Example of Source and Load Pull Contours for CGH35120F at 3.6 GHz - Triangles are measured values

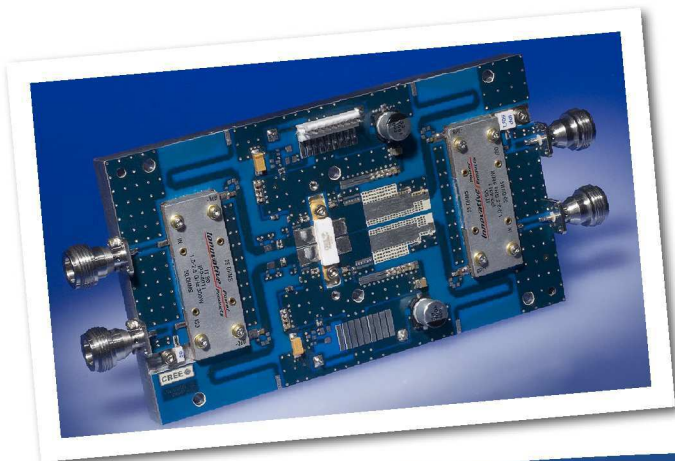
Available in Applied Wave Research's Microwave Office (MWO) format



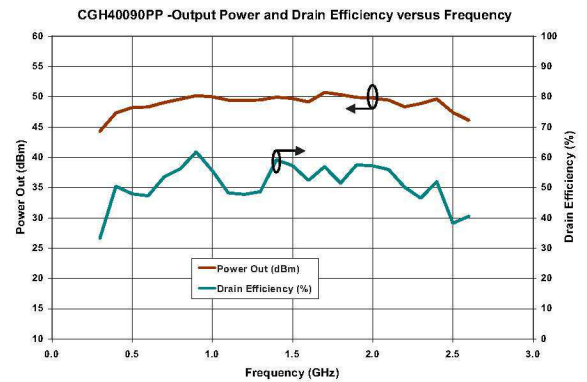
and Agilent Technologies' Advanced Design System (ADS) format.



GaN HEMT for Broadband Amplifiers (Example Reference Amplifier)



55% Average Efficiency from 0.5 - 2.5GHz at 90W!!



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About Cree Inc.

Cree is a market-leading innovator of semiconductor solutions for wireless and power applications, lighting-class LEDs, and LED lighting solutions. Cree's product families include power-switching devices and radio-frequency/wireless devices, blue and green LED chips, high-brightness LEDs, lighting-class power LEDs, and recessed LED down lights. Cree solutions are driving improvements in applications such as variable-speed motors, wireless communications, general illumination, backlighting and electronic signs and signals.



Durham, NC campus

Cree drives its increased performance technology into multiple applications, including exciting alternatives in brighter and more-tunable light for general illumination, backlighting for more-vivid displays, optimized power management for high-current, switch-mode power supplies and variable-speed motors, and more-effective wireless infrastructure for data and voice communications. Cree customers range from innovative lighting-fixture makers to defense-related federal agencies.

A publicly traded company founded in 1987, Cree now employs more than 1,500 people at its Durham, NC, headquarters and has additional offices in Santa Barbara, CA, and Asia. The Cree facility is ISO/TS 16949 certified.



Contact

For inquiries and sample requests, please contact the Cree Wireless team at: 919-313-5639 or RFsales@cree.com