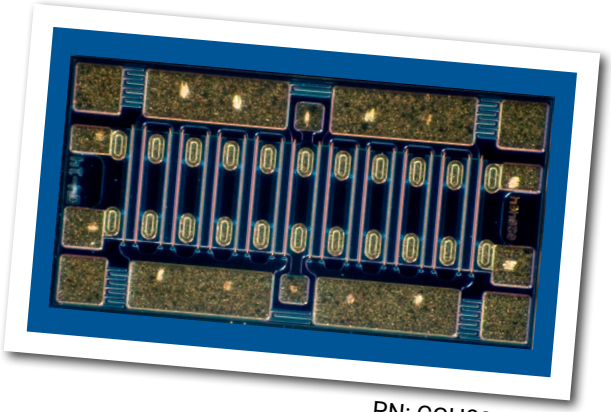
CGH80030D

30 W, 8.0 GHz, GaN HEMT Die

Cree's CGH80030D is a gallium nitride (GaN) High Electron Mobility Transistor (HEMT), based on Cree's 28V, 0.25um GaN-on-SiC process technology. GaN has superior properties compared to silicon or gallium arsenide, including higher breakdown voltage, higher saturated electron drift velocity, and higher thermal conductivity. GaN HEMTs offer greater power density and wider bandwidths compared to Si and GaAs transistors.



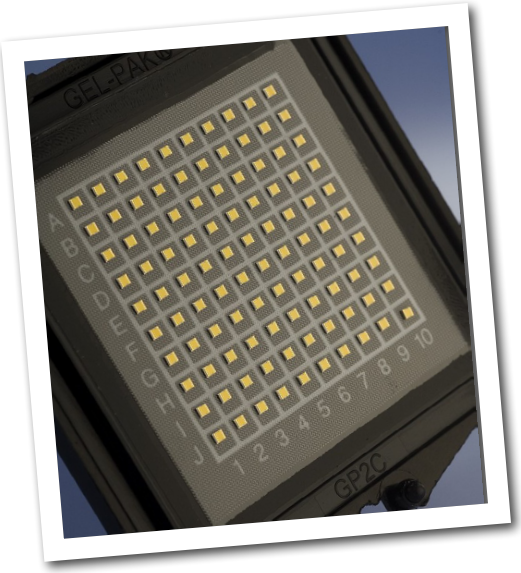
PN: CGH80030D

FEATURES

- 17 dB Typical Small Signal Gain at 4 GHz
- 12 dB Typical Small Signal Gain at 8 GHz
- 30 W Typical P_{SAT}
- 28 V Operation
- High Breakdown Voltage
- High Temperature Operation
- Up to 8 GHz Operation
- High Efficiency

APPLICATIONS

- 2-Way Private Radio
- Broadband Amplifiers
- Cellular Infrastructure
- Test Instrumentation
- Class A, AB, Linear amplifiers suitable for OFDM, W-CDMA, EDGE, CDMA waveforms



Packaging Information

RoHS COMPLIANT

- Bare die are shipped in Gel-Pak® containers.
- Non-adhesive tacky membrane immobilizes die during shipment.

Large Signal Models Available for ADS and MWO

Absolute Maximum Ratings (not simultaneous) at 25˚C

Parameter	Symbol	Rating	Units	Conditions
Drain-source Voltage	V_{DSS}	84	VDC	25˚C
Gate-source Voltage	V_{GS}	-10, +2	VDC	25˚C
Storage Temperature	T_{STG}	-65, +150	˚C	
Operating Junction Temperature	T_J	225	˚C	
Maximum Forward Gate Current	I_{GMAX}	7.0	mA	25˚C
Maximum Drain Current[1]	I_{DMAX}	3.0	A	25˚C
Thermal Resistance, Junction to Case (packaged)[2]	$R_{\theta JC}$	4.9	˚C/W	85°C, 28.8W Dissipation
Thermal Resistance, Junction to Case (die only)	$R_{\theta JC}$	2.74	˚C/W	85°C, 28.8W Dissipation
Mounting Temperature (30 seconds)	T_S	320	˚C	30 seconds

Note[1] Current limit for long term, reliable operation

Note[2] Eutectic die attach using 80/20 AuSn mounted to a 10 mil thick Cu15Mo85 carrier.

Electrical Characteristics (Frequency = 4 GHz unless otherwise stated; T_C = 25˚C)

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
DC Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	-3.6	-3.0	–2.4	V	V_{DS} = 10 V, I_D = 7.2 mA
Gate Quiescent Voltage	$V_{GS(Q)}$	–	-2.7	–	V_{DC}	V_{DD} = 28 V, I_{DQ} = 200 mA
Drain-Source Breakdown Voltage	V_{BD}	120	–	–	V	V_{GS} = -8 V, I_D = 7.2 mA
On Resistance	R_{ON}	0.26	0.33	0.41	Ω	V_{DS} = 0.1 V
RF Characteristics						
Small Signal Gain	G_{SS}	–	16.5	–	dB	V_{DD} = 28 V, I_{DQ} = 200 mA
Saturated Power Output[1]	P_{SAT}	–	30	–	W	V_{DD} = 28 V, I_{DQ} = 200 mA
Drain Efficiency[2]	η	–	65	–	%	V_{DD} = 28 V, I_{DQ} = 200 mA, P_{SAT} = 30 W
Output Mismatch Stress	VSWR	–	–	10 : 1	Y	No damage at all phase angles, V_{DD} = 28 V, I_{DQ} = 200 mA, P_{OUT} = 30 W CW
Dynamic Characteristics						
Input Capacitance	C_{GS}	–	7.3	–	pF	V_{DS} = 28 V, V_{gs} = -8 V, f = 1 MHz
Output Capacitance	C_{DS}	–	2.2	–	pF	V_{DS} = 28 V, V_{gs} = -8 V, f = 1 MHz
Feedback Capacitance	C_{GD}	–	0.37	–	pF	V_{DS} = 28 V, V_{gs} = -8 V, f = 1 MHz

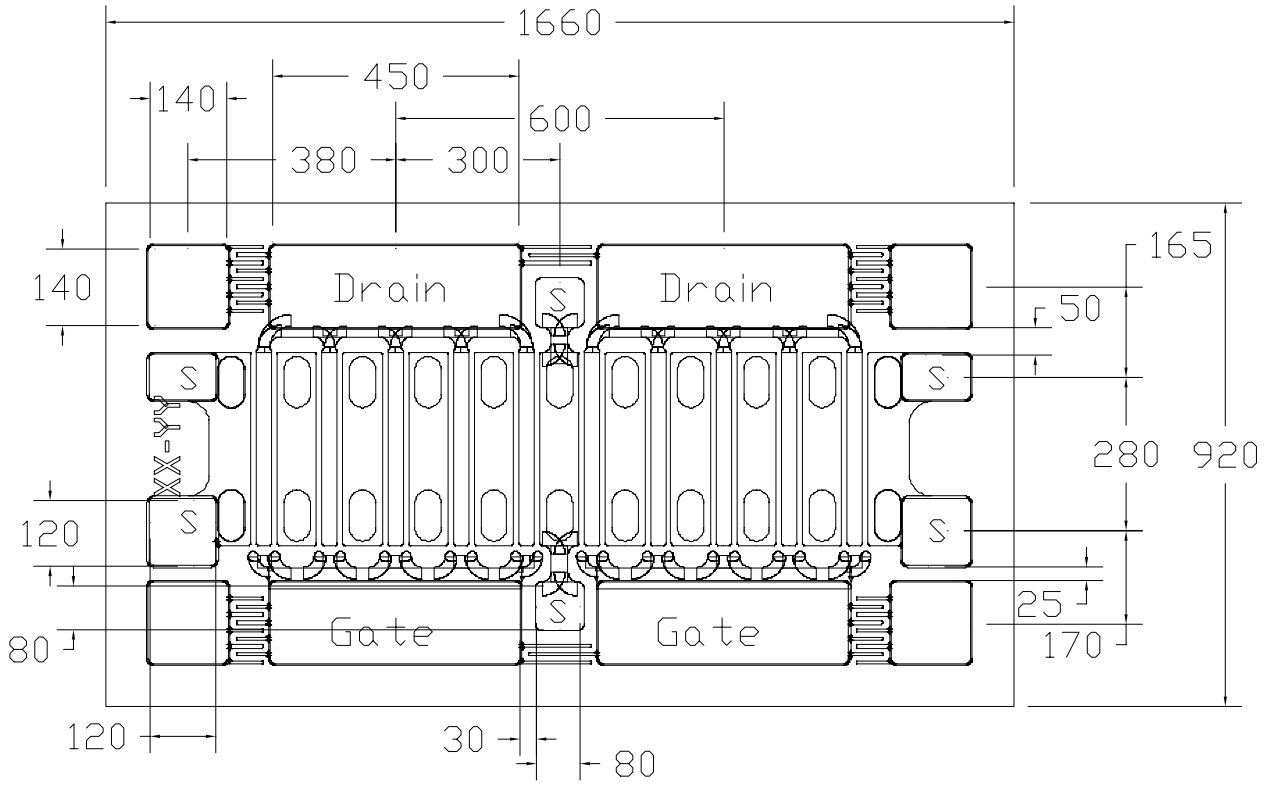
Notes:

[1] P_{SAT} is defined as I_G = 0.7 mA.

[2] Drain Efficiency = P_{OUT} / P_{DC}.

Cree, Inc.
4600 Silicon Drive
Durham, North Carolina, USA 27703
USA Tel: +1.919.313.5300
Fax: +1.919.869.2733
www.cree.com/RF

DIE Dimensions (units in microns)



Overall die size 1660 x 920 (+0/-50) microns, die thickness 100 (+/- 10) microns.
All Gate and Drain pads must be wire bonded for electrical connection.

Assembly Notes:

- Recommended solder is AuSn (80/20) solder. Refer to Cree's website for the Eutectic Die Bond Procedure application note at www.cree.com/RF/Document-Library
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge bonding are the preferred connection methods.
- Gold wire must be used for connections.
- Use the die label (XX-YY) for correct orientation.

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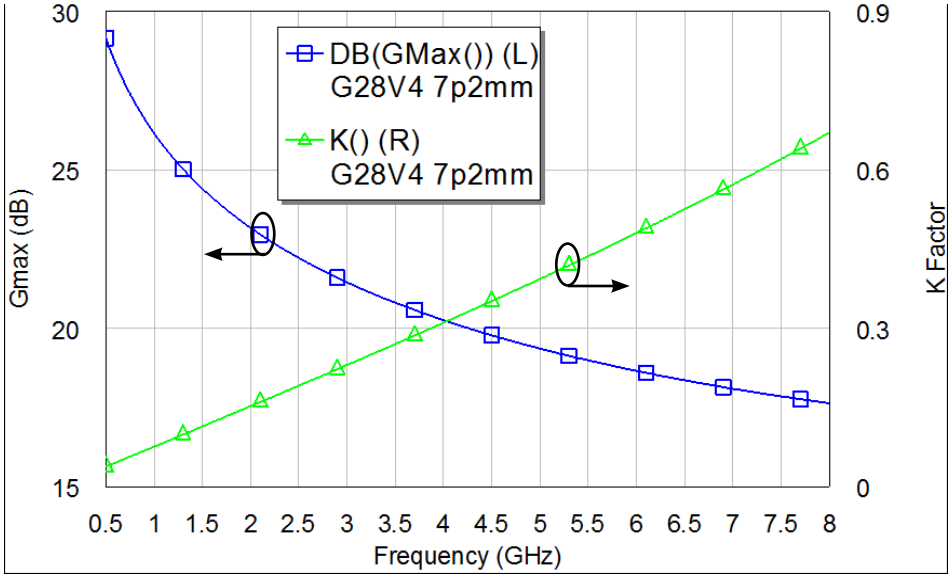
Typical Performance

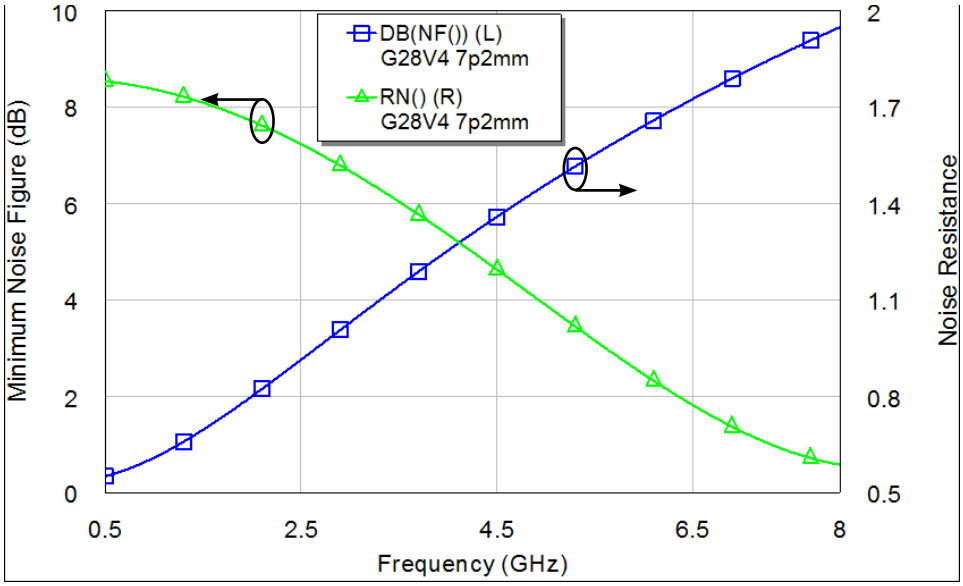
Simulated Maximum Available Gain and K Factor of the CGH80030D
V_{DD} = 28 V, I_{DQ} = 200 mA



Intrinsic die parameters - reference planes at centers of gate and drain bonding pads. No wire bonds assumed.

Typical Noise Performance

Simulated Minimum Noise Figure and Noise Resistance vs Frequency of the CGH80030D
V_{DD} = 28 V, I_{DQ} = 200 mA



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For more information, please contact:

Cree, Inc.
4600 Silicon Drive
Durham, North Carolina, USA 27703
www.cree.com/RF

Sarah Miller
Marketing
Cree, RF Components
1.919.407.5302

Ryan Baker
Marketing & Sales
Cree, RF Components
1.919.407.7816

Tom Dekker
Marketing & Sales Director
Cree, RF Components
1.919.407.5639

Cree, Inc.
4600 Silicon Drive
Durham, North Carolina, USA 27703
USA Tel: +1.919.313.5300
Fax: +1.919.869.2733
www.cree.com/RF

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