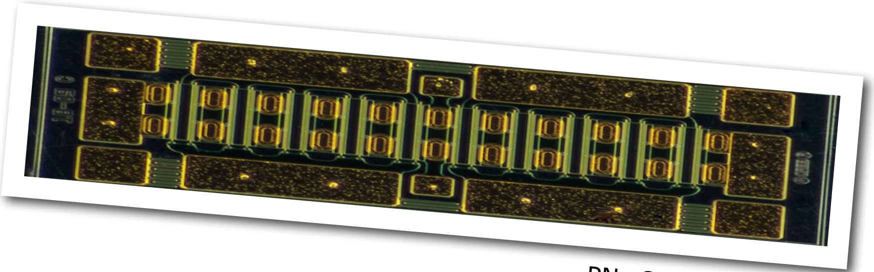
CGHV60040D

40 W, 6.0 GHz, GaN HEMT Die


PN: CGHV60040D

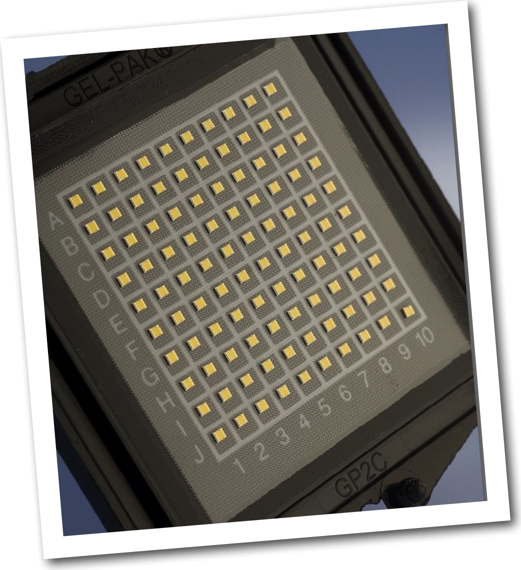
Cree's CGHV60040D is a gallium nitride (GaN) High Electron Mobility Transistor (HEMT). GaN has superior properties compared to silicon or gallium arsenide, including higher breakdown voltage, higher saturated electron drift velocity, and higher thermal conductivity. GaN HEMTs offer greater power density and wider bandwidths compared to Si and GaAs transistors.

FEATURES

- 18 dB Typical Small Signal Gain at 4 GHz
- 17 dB Typical Small Signal Gain at 6 GHz
- 65% Typical Power Added Efficiency
- 40 W Typical P_{SAT}
- 50 V Operation
- High Breakdown Voltage
- Up to 6 GHz Operation

APPLICATIONS

- Cellular Infrastructure
- Class AB, Linear amplifiers suitable for OFDM, W-CDMA, LTE, EDGE, CDMA waveforms



Packaging Information

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

PRELIMINARY
Rev 0.0 – September 2014

Absolute Maximum Ratings (not simultaneous)

Parameter	Symbol	Rating	Units	Conditions
Drain-source Voltage	V_{DSS}	150	V_{DC}	25˚C
Gate-source Voltage	V_{GS}	-10, +2	V_{DC}	25˚C
Storage Temperature	T_{STG}	-65, +150	˚C	
Operating Junction Temperature	T_J	225	˚C	
Maximum Drain Current[1]	I_{MAX}	3.2	A	25˚C
Maximum Forward Gate Current	I_{GMAX}	5.2	mA	25˚C
Mounting Temperature	T_S	320	˚C	30 seconds

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

Electrical Characteristics (Frequency = 6 GHz unless otherwise stated; T_C = 25˚C)

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
DC Characteristics						
Gate Pinch-Off Voltage	V_P	-3.8	-3.0	–2.3	V	V_{DS} = 10 V, I_D = 5.2 mA
Drain Current[1]	I_{DSS}	4.2	5.2	–	A	V_{DS} = 6 V, V_{GS} = 2.0 V
Drain-Source Breakdown Voltage	V_{BD}	150	–	–	V	V_{GS} = -8 V, I_D = 5.2 mA
On Resistance	R_{ON}	–	0.56	–	Ω	V_{DS} = 0.1 V
Gate Forward Voltage	V_{G-ON}	–	1.9	–	V	I_{GS} = 5.2 mA
RF Characteristics						
Small Signal Gain	G_{SS}	–	17	–	dB	V_{DD} = 50 V, I_{DQ} = 65 mA
Saturated Power Output[2,3]	P_{SAT}	–	40	–	W	V_{DD} = 50 V, I_{DQ} = 65 mA
Drain Efficiency[4]	η	–	65	–	%	V_{DD} = 50 V, I_{DQ} = 65 mA, P_{SAT} = 40 W
Intermodulation Distortion	IM3	–	-30	–	dBc	V_{DD} = 50 V, I_{DQ} = 65 mA, P_{OUT} = 40 W PEP
Output Mismatch Stress	VSWR	–	–	10 : 1	Ψ	No damage at all phase angles, V_{DD} = 50 V, I_{DQ} = 65 mA P_{OUT} = 40 W Pulsed
Dynamic Characteristics						
Input Capacitance	C_{GS}	–	7.1	–	pF	V_{DS} = 50 V, V_{gs} = -8 V, f = 1 MHz
Output Capacitance	C_{DS}	–	1.6	–	pF	V_{DS} = 50 V, V_{gs} = -8 V, f = 1 MHz
Feedback Capacitance	C_{GD}	–	0.15	–	pF	V_{DS} = 50 V, V_{gs} = -8 V, f = 1 MHz

Notes:
[1] Scaled from PCM data
[2] P_{SAT} is defined as I_G = 0.52 mA.
[3] Pulsed 100 µsec, 10%
[4] Drain Efficiency = P_{OUT} / P_{DC}

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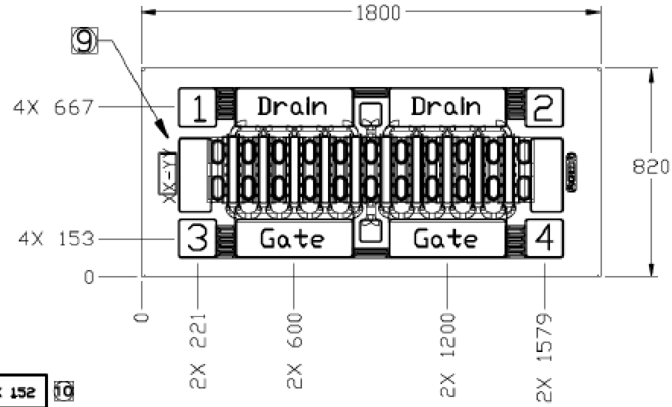
DIE Dimensions (units in microns)



BOND PAD 1, 2	DRAIN INTERCONNECT	156 X 152	10
BOND PAD 3, 4	GATE INTERCONNECT	156 X 152	10
2X DRAIN PAD		464 X 156	
2X GATE PAD		464 X 156	

Overall die size 820 x 1800 (+0/-50) microns, die thickness 100 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/wireless.
- 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, see arrow 9 in the drawing above.

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Typical Performance

Figure 1. - CGHV60040D Output Power, Gain and Efficiency vs. Input Power at Tcase = 25°C
V_{DD} = 50 V, I_{DQ} = 65 mA, Frequency = 2.7 GHz

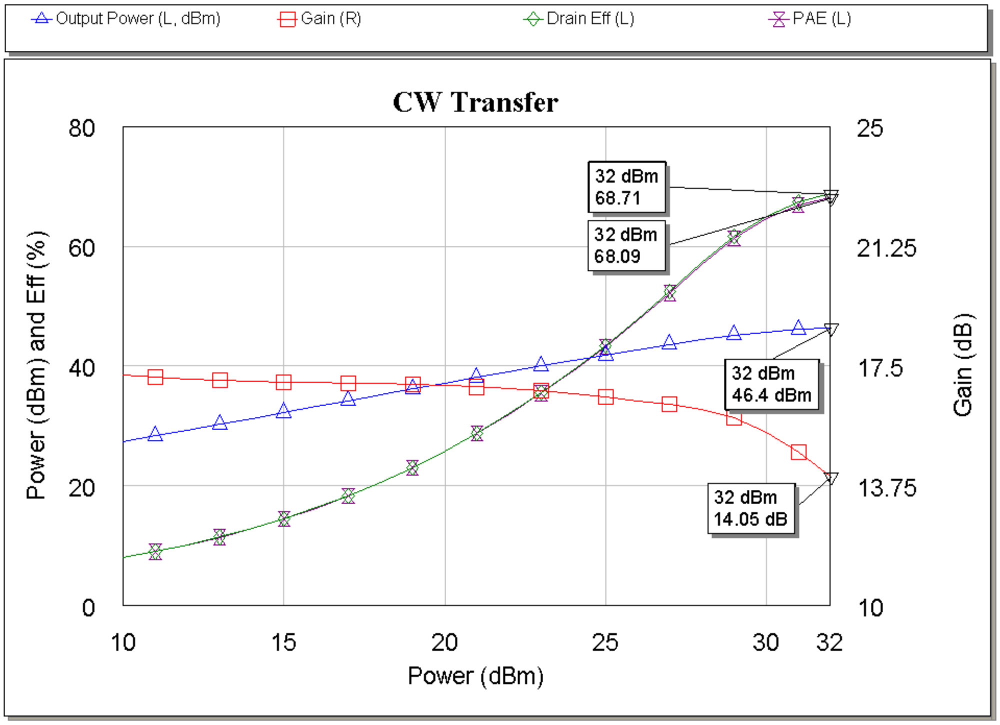
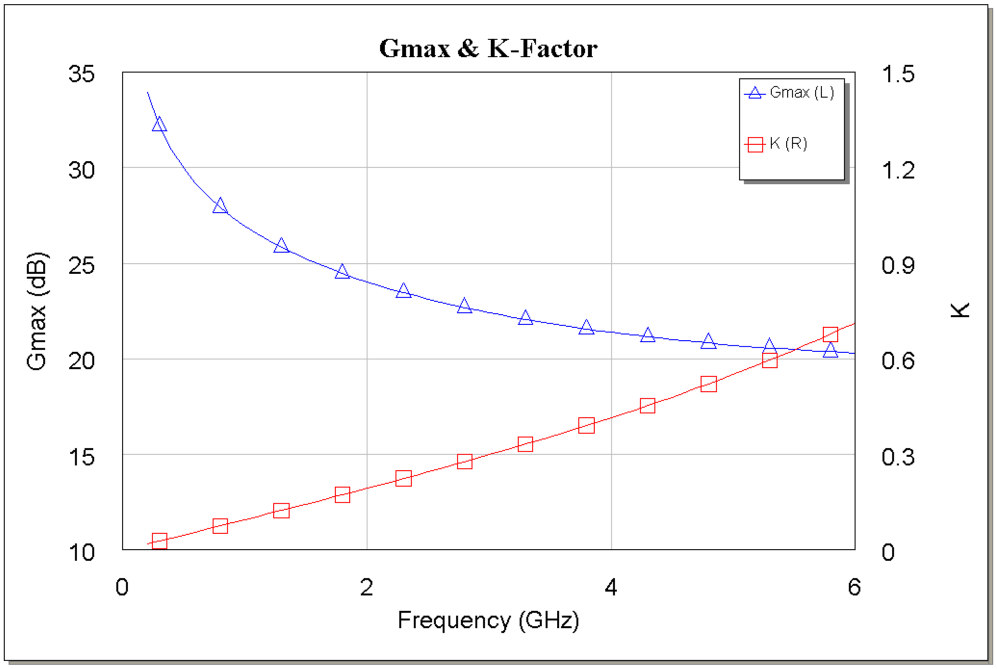


Figure 2. - CGHV60040D G_{MAX} and K Factor vs. Frequency at Tcase = 25°C
V_{DD} = 50 V, I_{DQ} = 65 mA



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