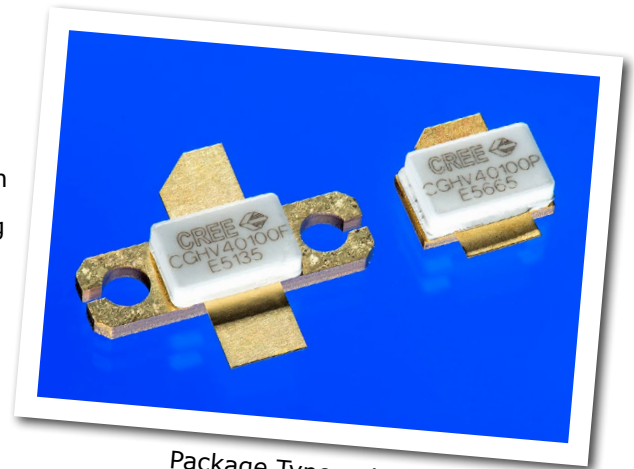


CGHV40100

100 W, DC - 4.0 GHz, 50 V, GaN HEMT

Cree's CGHV40100 is an unmatched, gallium nitride (GaN) high electron mobility transistor (HEMT). The CGHV40100, operating from a 50 volt rail, offers a general purpose, broadband solution to a variety of RF and microwave applications. GaN HEMTs offer high efficiency, high gain and wide bandwidth capabilities making the CGHV40100 ideal for linear and compressed amplifier circuits. The transistor is available in a 2-lead flange and pill package.



Package Types: 440193 & 440206
PN: CGHV40100F & CGHV40100P

Typical Performance Over 500 MHz - 2.5 GHz ($\tau_c = 25^\circ\text{C}$), 50 V

Parameter	500 MHz	1.0 GHz	1.5 GHz	2.0 GHz	2.5 GHz	Units
Small Signal Gain	17.6	16.9	17.7	17.5	14.8	dB
Saturated Output Power	147	100	141	116	112	W
Drain Efficiency @ P_{SAT}	68	56	58	54	54	%
Input Return Loss	6	5.1	10.5	5.5	8.8	dB

Note:
Measured CW in the CGHV40100F-TB application circuit.

Features

- Up to 4 GHz Operation
- 100 W Typical Output Power
- 17.5 dB Small Signal Gain at 2.0 GHz
- Application Circuit for 0.5 - 2.5 GHz
- 55 % Efficiency at P_{SAT}
- 50 V Operation



Large Signal Models Available for SiC & GaN



Absolute Maximum Ratings (not simultaneous) at 25 °C Case Temperature

Parameter	Symbol	Rating	Units	Conditions
Drain-Source Voltage	V_{DSS}	125	Volts	25 °C
Gate-to-Source Voltage	V_{GS}	-10, +2	Volts	25 °C
Storage Temperature	T_{STG}	-65, +150	°C	
Operating Junction Temperature	T_J	225	°C	
Maximum Forward Gate Current	I_{GMAX}	20.8	mA	25 °C
Maximum Drain Current ¹	I_{DMAX}	8.7	A	25 °C
Soldering Temperature ²	T_S	245	°C	
Screw Torque	τ	40	in-oz	
Thermal Resistance, Junction to Case ³	$R_{\theta JC}$	1.62	°C/W	85 °C
Thermal Resistance, Junction to Case ⁴	$R_{\theta JC}$	1.72	°C/W	85 °C
Case Operating Temperature ⁵	T_C	-40, +150	°C	30 seconds

Note:

¹ Current limit for long term, reliable operation

² Refer to the Application Note on soldering at www.cree.com/products/wireless_appnotes.asp

³ Measured for the CGHV40100P at $P_{DISS} = 83$ W.

⁴ Measured for the CGHV40100F at $P_{DISS} = 83$ W.

⁵ See also, Power Derating Curve on Page 7

Electrical Characteristics ($T_C = 25$ °C)

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
DC Characteristics¹						
Gate Threshold Voltage	$V_{GS(th)}$	-3.8	-3.0	-2.3	V_{DC}	$V_{DS} = 10$ V, $I_D = 20.8$ mA
Gate Quiescent Voltage	$V_{GS(Q)}$	-	-2.7	-	V_{DC}	$V_{DS} = 50$ V, $I_D = 0.6$ A
Saturated Drain Current ²	I_{DS}	15.6	18.7	-	A	$V_{DS} = 6.0$ V, $V_{GS} = 2.0$ V
Drain-Source Breakdown Voltage	V_{BR}	150	-	-	V_{DC}	$V_{GS} = -8$ V, $I_D = 20.8$ mA
RF Characteristics³ ($T_C = 25$ °C, $F_0 = 2.0$ GHz unless otherwise noted)						
Small Signal Gain	G_{SS}	-	17.5	-	dB	$V_{DD} = 50$ V, $I_{DQ} = 0.6$ A
Power Gain	G_P	-	11.0	-	dB	$V_{DD} = 50$ V, $I_{DQ} = 0.6$ A, $P_{OUT} = P_{SAT}$
Power Output at Saturation ⁴	P_{SAT}	-	116	-	W	$V_{DD} = 50$ V, $I_{DQ} = 0.6$ A
Drain Efficiency	η	-	54	-	%	$V_{DD} = 50$ V, $I_{DQ} = 0.6$ A, $P_{OUT} = P_{SAT}$
Output Mismatch Stress	VSWR	-	-	10 : 1	Ψ	No damage at all phase angles, $V_{DD} = 50$ V, $I_{DQ} = 0.6$ A, $P_{OUT} = 100$ W CW
Dynamic Characteristics⁵						
Input Capacitance	C_{GS}	-	29.3	-	pF	$V_{DS} = 50$ V, $V_{GS} = -8$ V, $f = 1$ MHz
Output Capacitance	C_{DS}	-	7.3	-	pF	$V_{DS} = 50$ V, $V_{GS} = -8$ V, $f = 1$ MHz
Feedback Capacitance	C_{GD}	-	0.61	-	pF	$V_{DS} = 50$ V, $V_{GS} = -8$ V, $f = 1$ MHz

Notes:

¹ Measured on wafer prior to packaging.

² Scaled from PCM data.

³ Measured in CGHV40100-TB.

⁴ P_{SAT} is defined as I_G

⁵ Includes package

CGHV40100 Typical Performance

Figure 1. - Small Signal Gain and Return Losses versus Frequency of the CGHV40100 in the application circuit CGHV40100-TB
 $V_{DD} = 50\text{ V}$, $I_{DQ} = 600\text{ mA}$, $T_{case} = 25^\circ\text{C}$

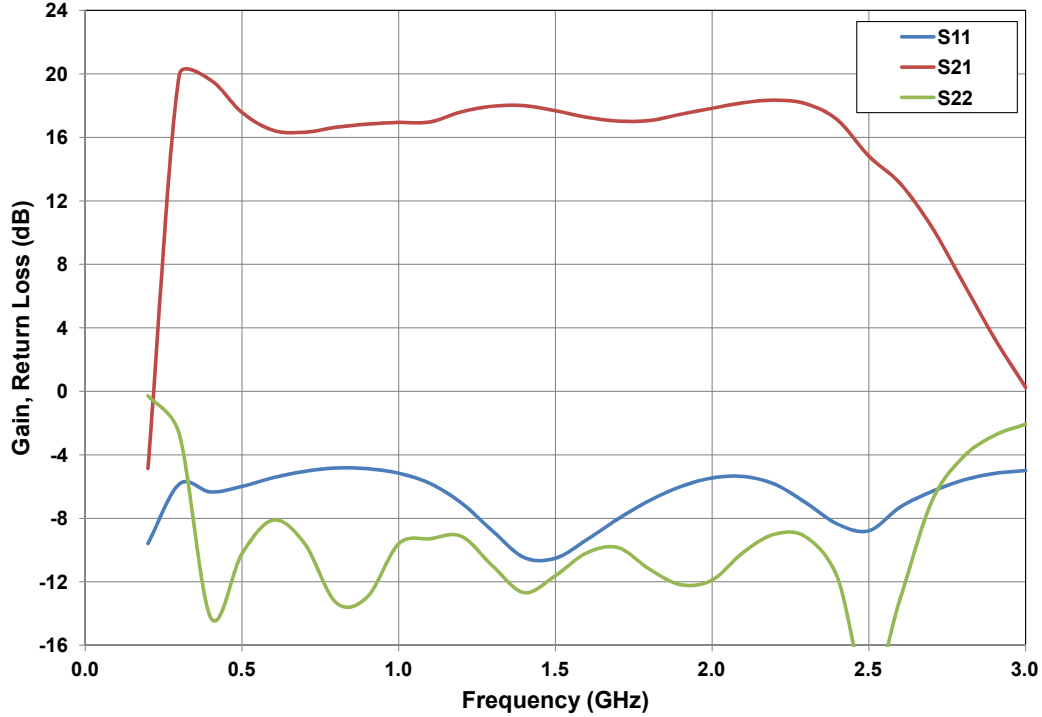
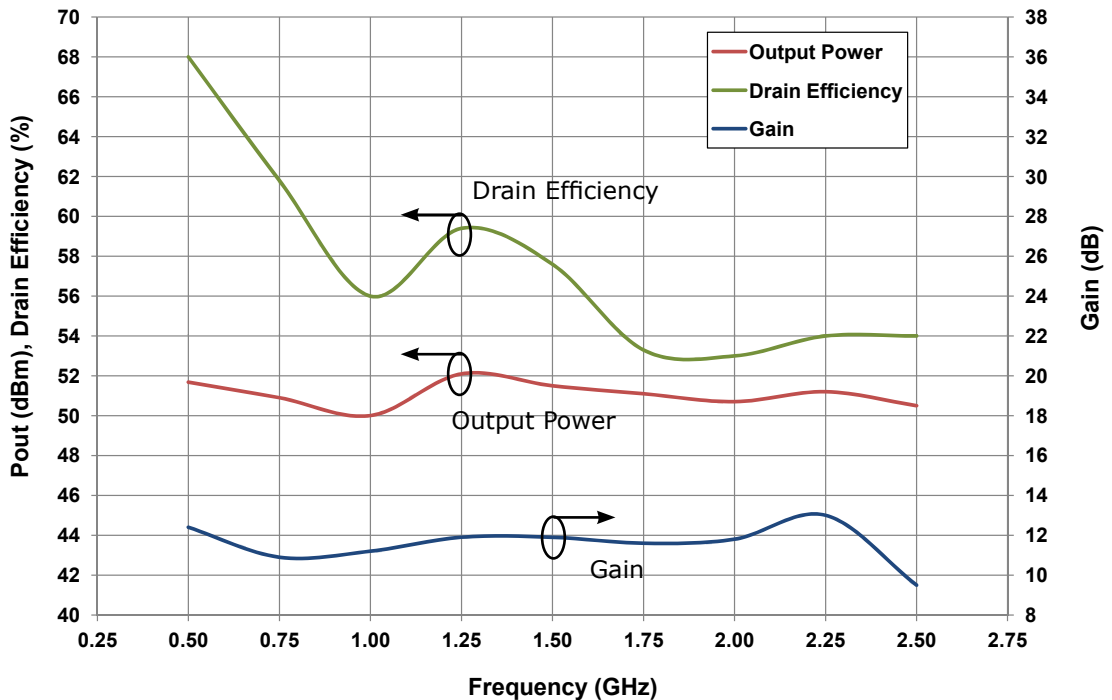


Figure 2. - Output Power and Drain Efficiency vs Frequency
 $V_{DD} = 50\text{ V}$, $I_{DQ} = 600\text{ mA}$





CGHV40100 Typical Performance

Figure 3. - Third Order Intermodulation Distortion vs Average Output Power of CGHV40100 measured in Broadband Amplifier Circuit CGHV40100-TB
Spacing = 1 MHz, $V_{DD} = 50\text{ V}$, $I_{DQ} = 600\text{ mA}$, $T_{case} = 25^\circ\text{C}$

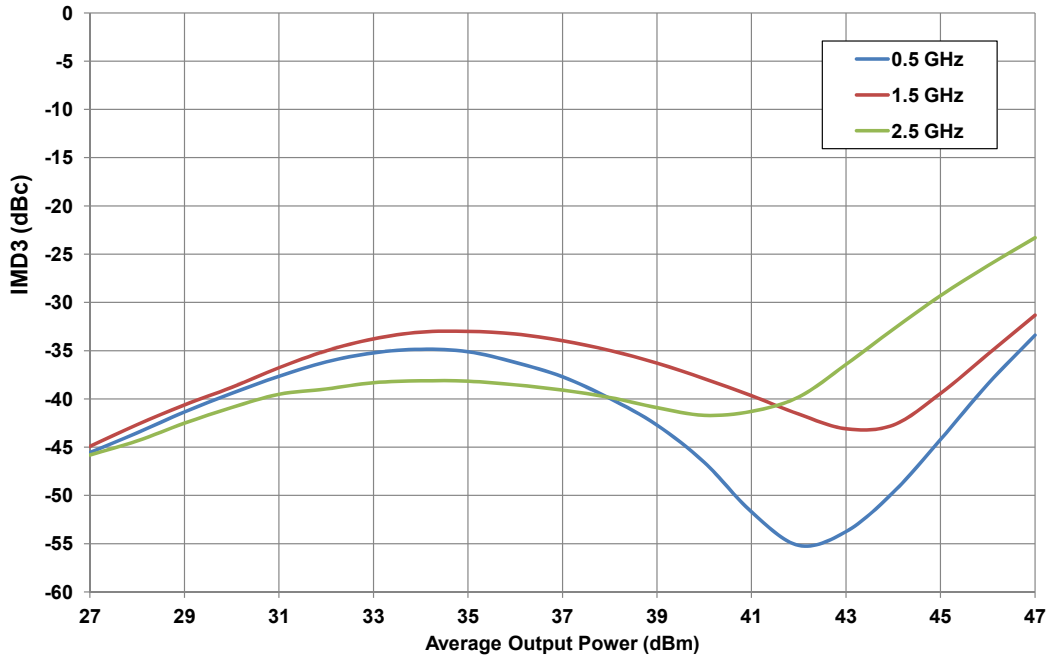
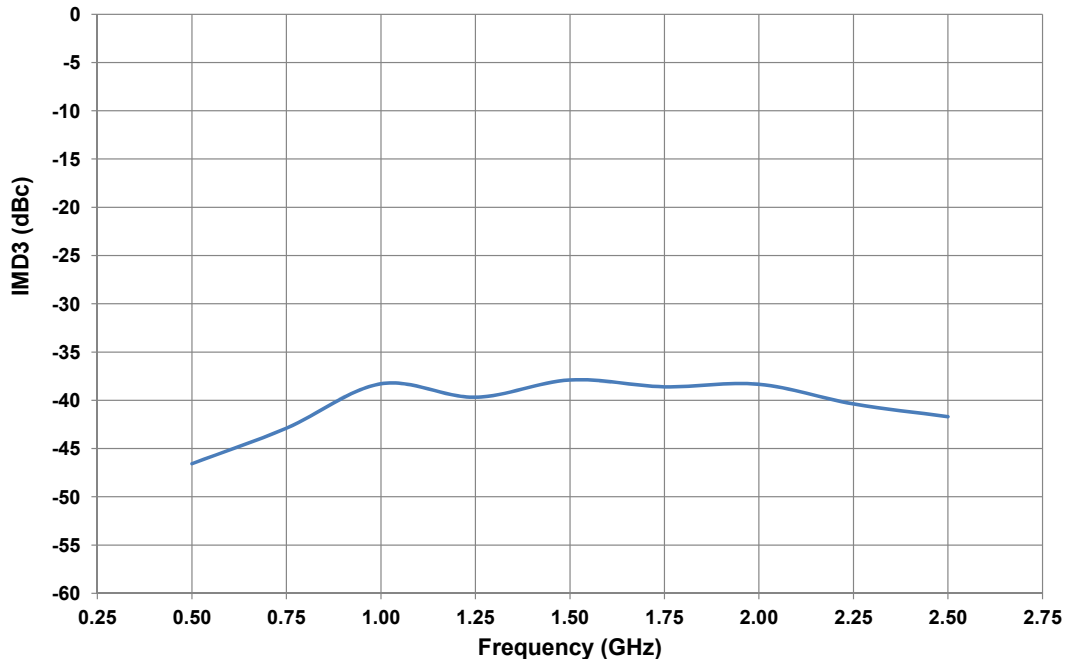


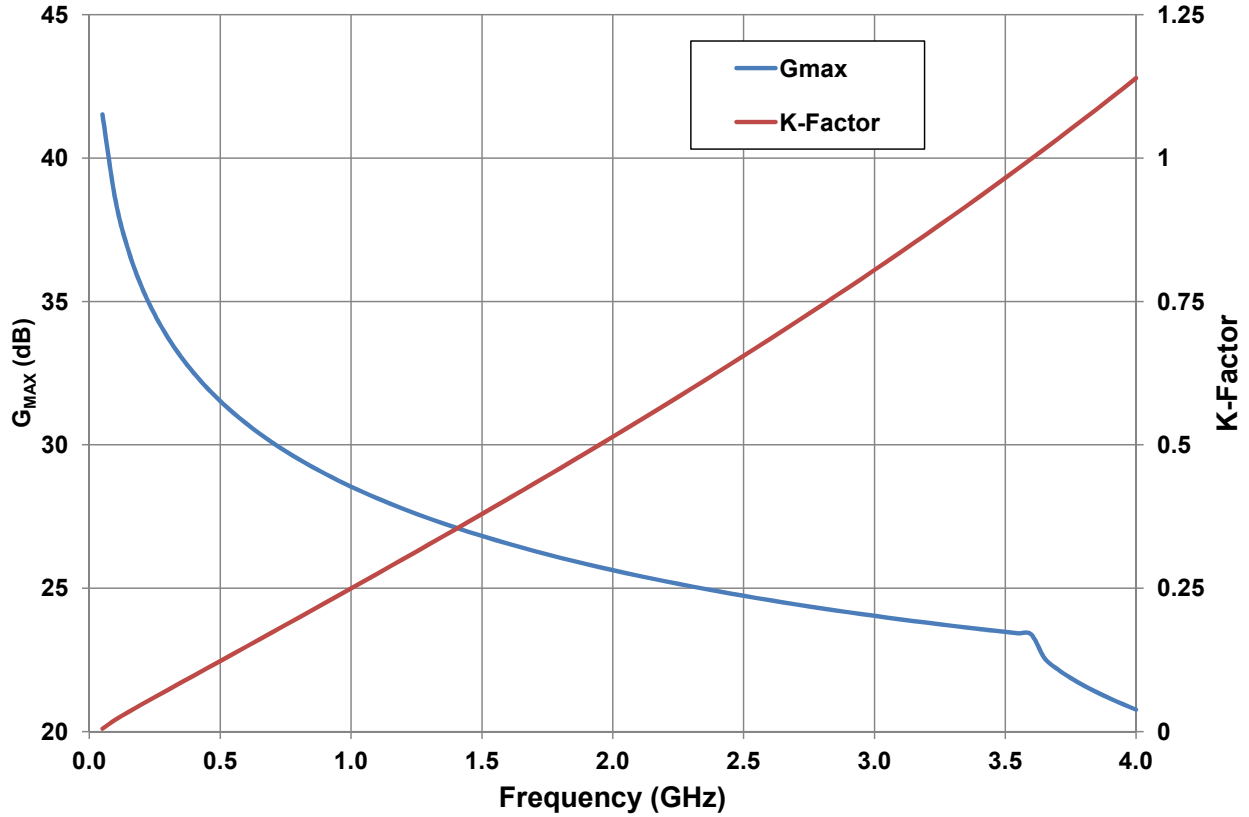
Figure 4. - Third Order Intermodulation Distortion vs Frequency of CGHV40100 measured in Broadband Amplifier Circuit CGHV40100-TB
Spacing = 1 MHz, $V_{DD} = 50\text{ V}$, $I_{DQ} = 600\text{ mA}$, $T_{case} = 25^\circ\text{C}$



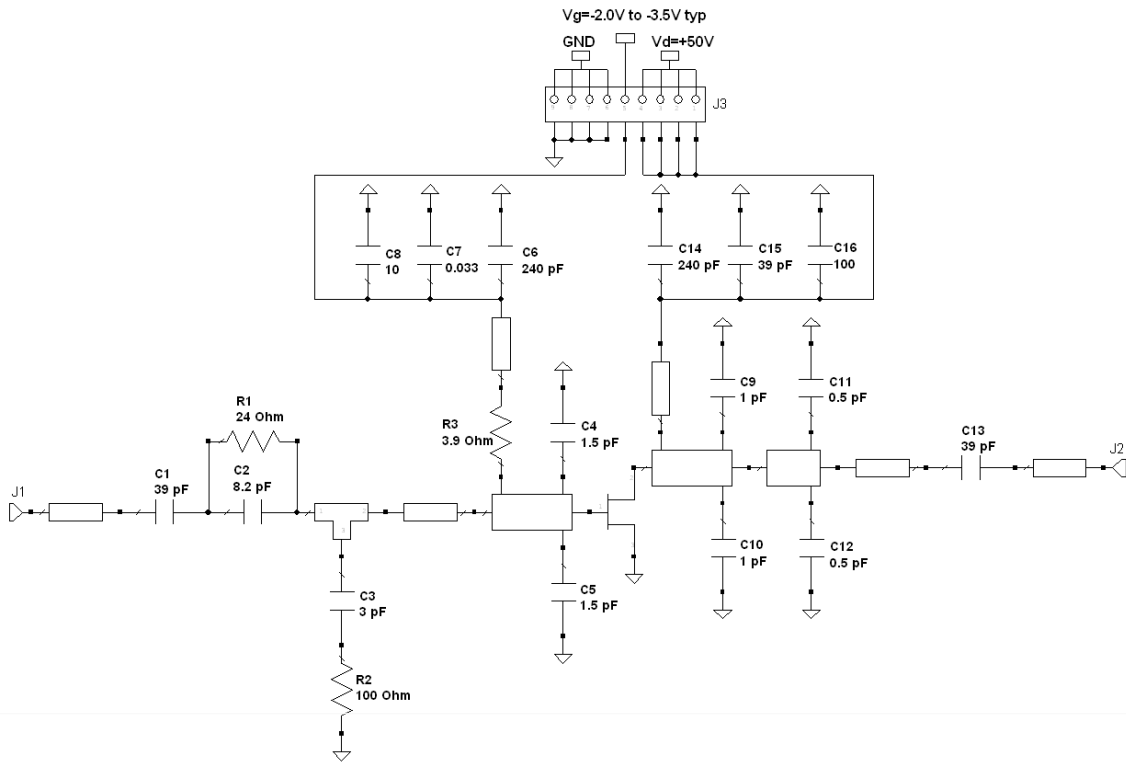


CGHV40100 Typical Performance

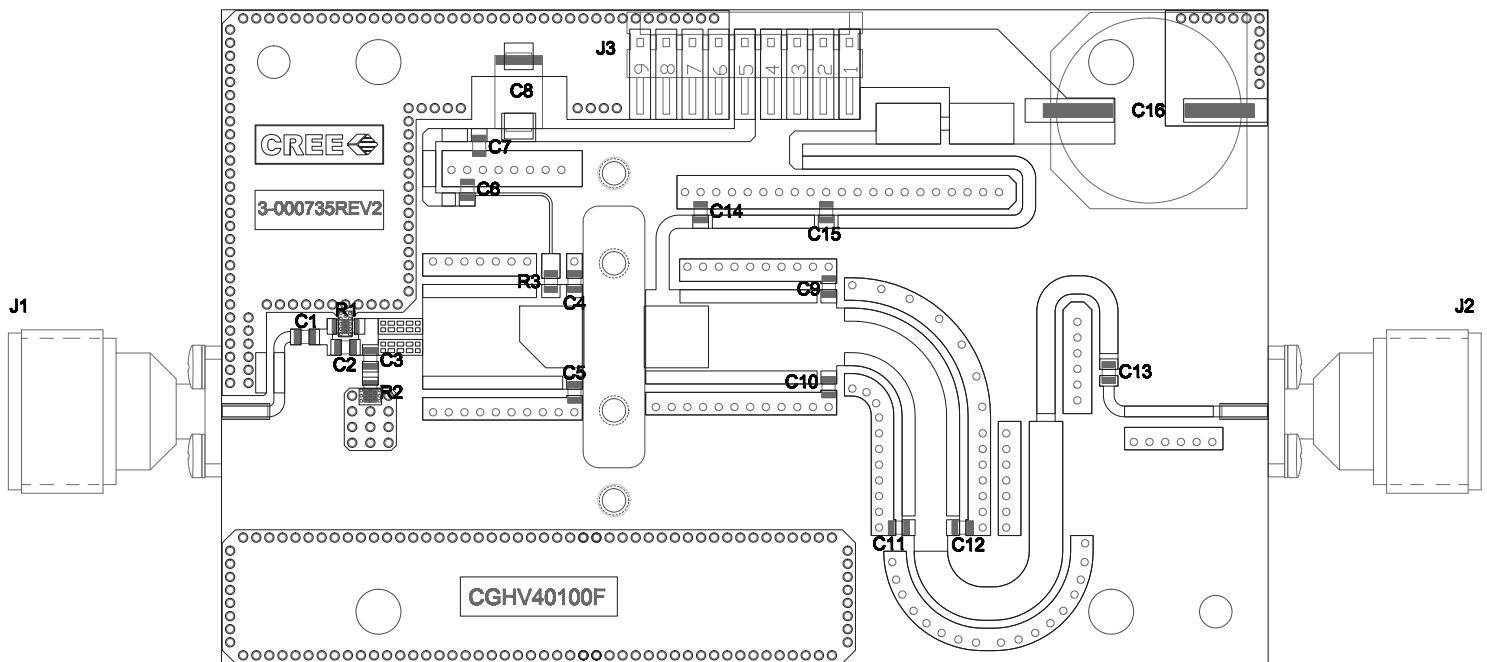
Figure 5. - G_{MAX} and K-Factor vs Frequency
 $V_{DD} = 50\text{ V}$, $I_{DQ} = 600\text{ mA}$, $T_{case} = 25^\circ\text{C}$



CGHV40100-TB Application Circuit Schematic



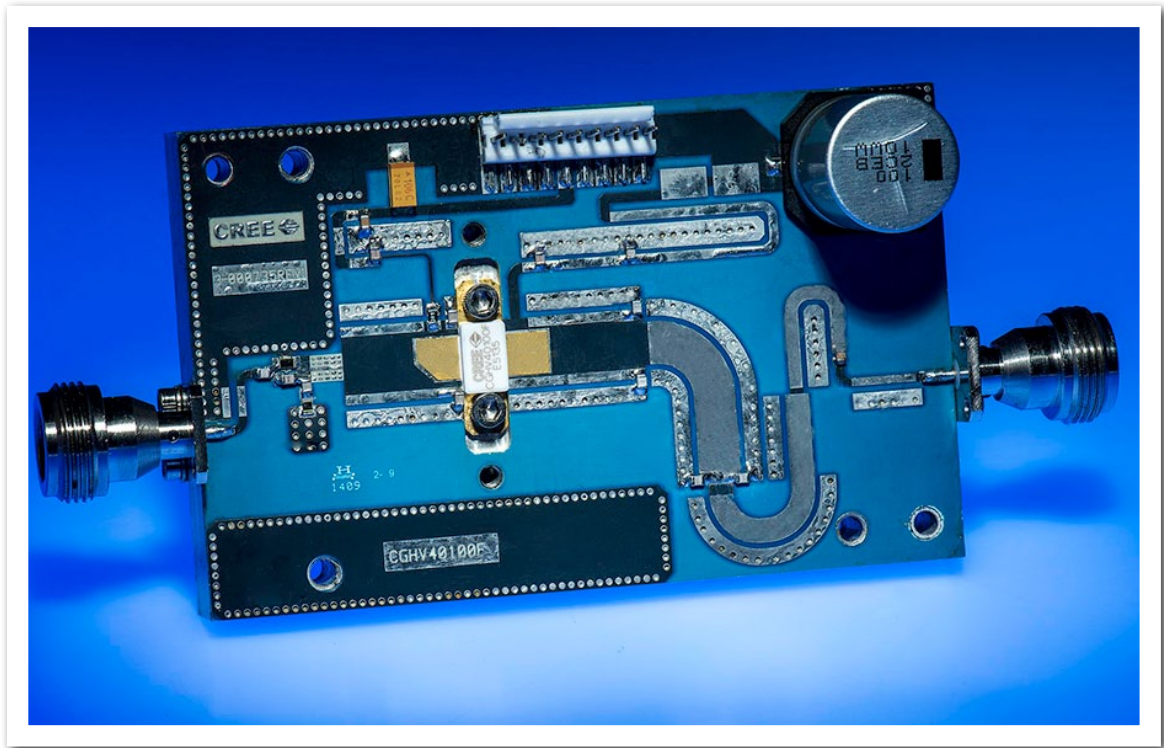
CGHV40100-TB Application Circuit



CGHV40100-TB Application Circuit Bill of Materials

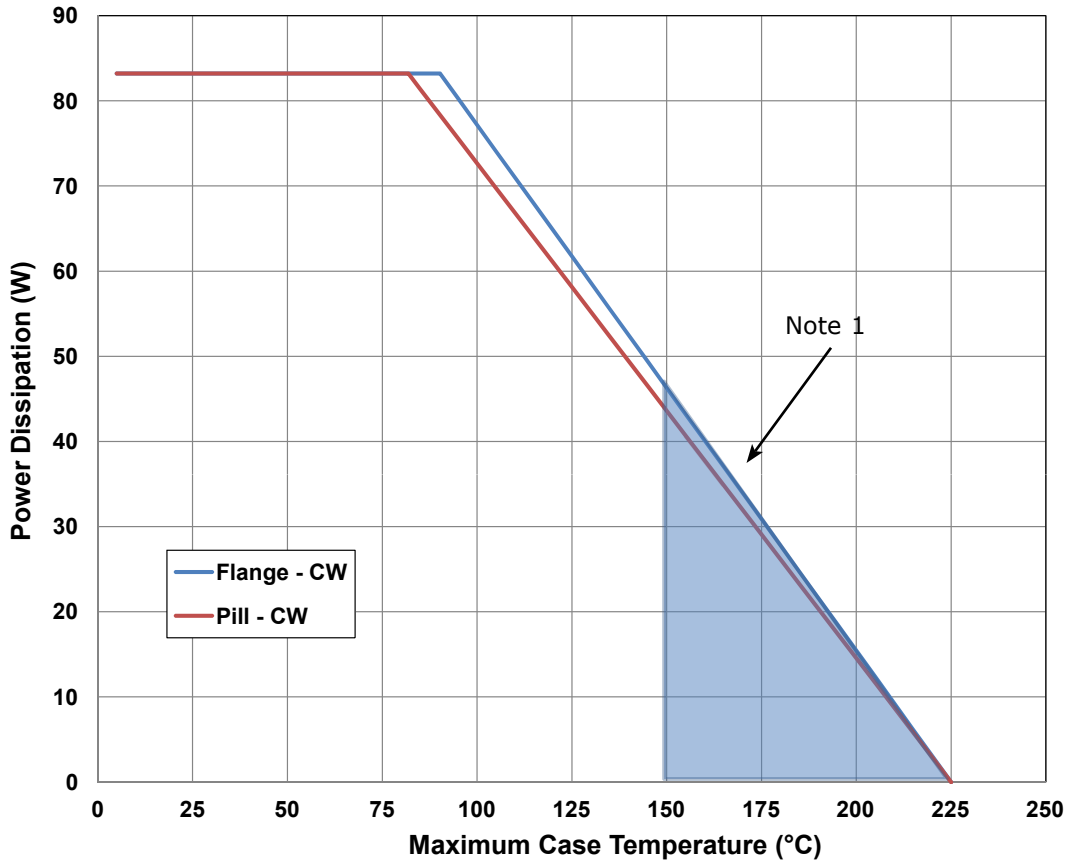
Designator	Description	Qty
C1, C13, C15	CAP, 39 pF, ± 0.1 pF, 250V, 0805, ATC600F	3
C2	CAP, 8.2 pF, ± 0.1 pF, 250 V, 0806, ATC600F	1
C3	CAP, 3 pF ± 0.1 pF, 250 V, 0805, ATC600F	1
C4, C5	CAP, 1.5 pF, ± 0.1 pF, 250 V, 0805, ATC600F	2
C7	CAP, 33000 pF, 0805 100V, X7R	1
C6, C14	CAP, 240 pF, ± 0.5 pF, 250 V, 0805, ATC600F	2
C8	CAP, 10 UF, 16V TANTALUM, 2312	1
C9, C10	CAP, 1 pF, ± 0.1 pF, 250 V, 0805, ATC600F	2
C11, C12	CAP, 0.5 pF, ± 0.1 pF, 250 V, 0805, ATC600F	2
C16	CAP, 100 UF, 20%, 160 V, ELEC	1
R1	RES, 24 OHMS, IMS ND3-1005CS24R0G	1
R2	RED, 100 OHMS, IMS ND3-0805EW1000G	1
R3	RES, 3.9 OHMS, 0805	1
J1, J2	CONN, N, FEM, W/.500 SMA FLNG	2
J3	HEADER RT>PLZ .1CEN LK 9POS	1
	BASEPLATE, CGH35120	1
	PCB, RO4350B, 2.5" X 4" X 0.020", CGHV40100F	1

CGHV40100-TB Demonstration Amplifier Circuit



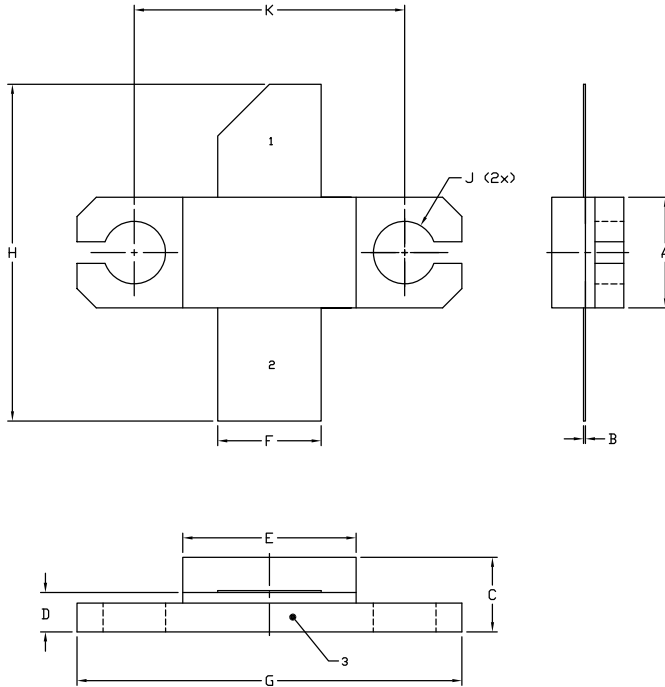
CGHV40100 Power Dissipation De-rating Curve

Figure 5. - Transient Power Dissipation De-Rating Curve



Note 1. Area exceeds Maximum Case Temperature (See Page 2).

Product Dimensions CGHV40100F (Package Type — 440193)

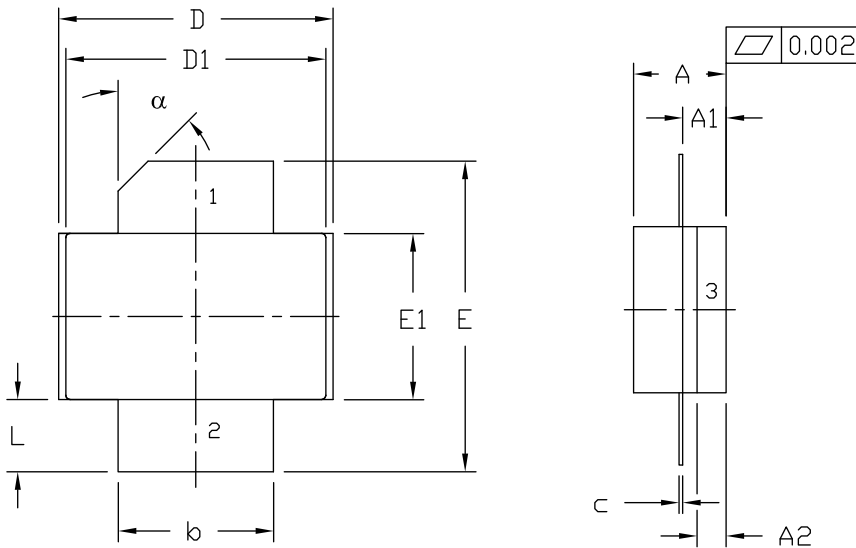


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. ADHESIVE FROM LID MAY EXTEND A MAXIMUM OF 0.020" BEYOND EDGE OF LID.
 4. LID MAY BE MISALIGNED TO THE BODY OF THE PACKAGE BY A MAXIMUM OF 0.008" IN ANY DIRECTION.
 5. ALL PLATED SURFACES ARE Ni/AU.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.225	0.235	5.72	5.97
B	0.004	0.006	0.10	0.15
C	0.145	0.165	3.68	4.19
D	0.077	0.087	1.96	2.21
E	0.355	0.365	9.02	9.27
F	0.210	0.220	5.33	5.59
G	0.795	0.805	20.19	20.45
H	0.670	0.730	17.02	18.54
J	∅ .130		3.30	
k	0.562		14.28	

- PIN 1. GATE
 PIN 2. DRAIN
 PIN 3. SOURCE

Product Dimensions CGHV40100P (Package Type — 440206)



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M - 1994.
 2. CONTROLLING DIMENSION: INCH.
 3. ADHESIVE FROM LID MAY EXTEND A MAXIMUM OF 0.020" BEYOND EDGE OF LID.
 4. LID MAY BE MISALIGNED TO THE BODY OF PACKAGE BY A MAXIMUM OF 0.008" IN ANY DIRECTION.

DIM	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.125	0.145	3.18	3.68	
A1	0.057	0.067	1.45	1.70	
A2	0.035	0.045	0.89	1.14	
b	0.210	0.220	5.33	5.59	2x
c	0.004	0.006	0.10	0.15	2x
D	0.375	0.385	9.53	9.78	
D1	0.355	0.365	9.02	9.27	
E	0.400	0.460	10.16	11.68	
E1	0.225	0.235	5.72	5.97	
L	0.085	0.115	2.16	2.92	2x
α	45° REF		45° REF		

- PIN 1. GATE
 PIN 2. DRAIN
 PIN 3. SOURCE



Disclaimer

Specifications are subject to change without notice. Cree, Inc. believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Cree for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Cree. Cree makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose. "Typical" parameters are the average values expected by Cree in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer's technical experts for each application. Cree products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Cree product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.

For more information, please contact:

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

Sarah Miller
Marketing & Export
Cree, RF Components
1.919.407.5302

Ryan Baker
Marketing
Cree, RF Components
1.919.407.7816

Tom Dekker
Sales Director
Cree, RF Components
1.919.407.5639



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.