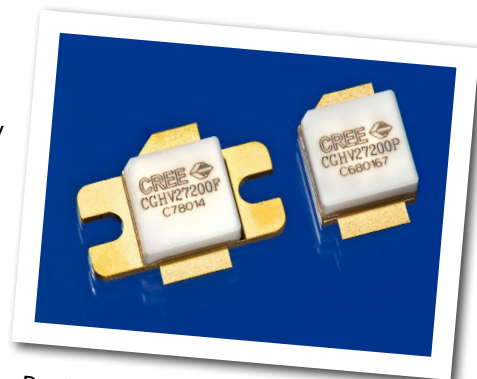


CGHV27200

200 W, 2500-2700 MHz, GaN HEMT for LTE

Cree's CGHV27200 is a gallium nitride (GaN) high electron mobility transistor (HEMT) designed specifically for high efficiency, high gain and wide bandwidth capabilities, which makes the CGHV27200 ideal for 2.5-2.7 GHz LTE and BWA amplifier applications. The transistor is supplied in a ceramic/metal flange package.



Package Type: 440162 and 440161
PN: CGHV27200F and CGHV27200P

Typical Performance Over 2.5 - 2.7 GHz ($T_c = 25^\circ\text{C}$) of Demonstration Amplifier

Parameter	2.5 GHz	2.6 GHz	2.7 GHz	Units
Gain @ 47 dBm	15.0	16.0	16.0	dB
ACLR @ 47 dBm	-36.5	-37.5	-37.0	dBc
Drain Efficiency @ 47 dBm	29.0	28.5	29.0	%

Note:

Measured in the CGHV27200-TB amplifier circuit, under WCDMA 3GPP test model 1, 64 DPCH, 45% clipping, PAR = 7.5 dB @ 0.01% Probability on CCDF.

Features

- 2.5 - 2.7 GHz Operation
- 16 dB Gain
- -37 dBc ACLR at 50 W P_{AVE}
- 29 % Efficiency at 50 W P_{AVE}
- High Degree of DPD Correction Can be Applied





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

Parameter	Symbol	Rating	Units	Units
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}	32	mA	25 °C
Maximum Drain Current ¹	I_{DMAX}	12	A	25 °C
Soldering Temperature ²	T_S	245	°C	
Screw Torque	τ	80	in-oz	
Thermal Resistance, Junction to Case ³	$R_{\theta JC}$	1.22	°C/W	85 °C, $P_{DISS} = 96$ W
Thermal Resistance, Junction to Case ⁴	$R_{\theta JC}$	1.54	°C/W	85 °C, $P_{DISS} = 96$ W
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 <http://www.cree.com/rf/document-library>

³ Measured for the CGHV27200P

⁴ Measured for the CGHV27200F

⁵ See also, the Power Dissipation De-rating Curve on Page 6

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, $I_D = 32$ mA
Gate Quiescent Voltage	$V_{GS(Q)}$	-	-2.7	-	V_{DC}	$V_{DS} = 50$ V, $I_D = 1.0$ A
Saturated Drain Current ²	I_{DS}	24	28.8	-	A	$V_{DS} = 6.0$ V, $V_{GS} = 2.0$ V
Drain-Source Breakdown Voltage	V_{BR}	125	-	-	V_{DC}	$V_{GS} = -8$ V, $I_D = 32$ mA
RF Characteristics⁵ ($T_C = 25$ °C, $F_0 = 2.7$ GHz unless otherwise noted)						
Saturated Output Power ^{3,4}	P_{SAT}	-	300	-	W	$V_{DD} = 50$ V, $I_{DQ} = 1.0$ A
Pulsed Drain Efficiency ³	η	-	62	-	%	$V_{DD} = 50$ V, $I_{DQ} = 1.0$ A, $P_{OUT} = P_{SAT}$
Gain ⁶	G	-	15.25	-	dB	$V_{DD} = 50$ V, $I_{DQ} = 1.0$ A, $P_{OUT} = 47$ dBm
WCDMA Linearity ⁶	ACLR	-	-37	-	dBc	$V_{DD} = 50$ V, $I_{DQ} = 1.0$ A, $P_{OUT} = 47$ dBm
Drain Efficiency ⁶	η	-	30.5	-	%	$V_{DD} = 50$ V, $I_{DQ} = 1.0$ A, $P_{OUT} = 47$ dBm
Output Mismatch Stress ³	VSWR	-	-	10 : 1	Ψ	No damage at all phase angles, $V_{DD} = 50$ V, $I_{DQ} = 1.0$ A, $P_{OUT} = 200$ W Pulsed
Dynamic Characteristics						
Input Capacitance ⁷	C_{GS}	-	97	-	pF	$V_{DS} = 50$ V, $V_{GS} = -8$ V, $f = 1$ MHz
Output Capacitance ⁷	C_{DS}	-	13.4	-	pF	$V_{DS} = 50$ V, $V_{GS} = -8$ V, $f = 1$ MHz
Feedback Capacitance	C_{GD}	-	0.94	-	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 Pulse Width = 100 μ S, Duty Cycle = 10%

⁴ P_{SAT} is defined as $I_G = 3$ mA peak.

⁵ Measured in CGHV27200-TB.

⁶ Single Carrier WCDMA, 3GPP Test Model 1, 64 DPCH, 45% Clipping, PAR = 7.5 dB @ 0.01% Probability on CCDF.

⁷ Includes package and internal matching components.

Typical Performance

Figure 1. - Small Signal Gain and Return Losses vs Frequency for the CGHV27200 measured in CGHV27200-TB Amplifier Circuit
 $V_{DD} = 50\text{ V}, I_{DQ} = 1.0\text{ A}$

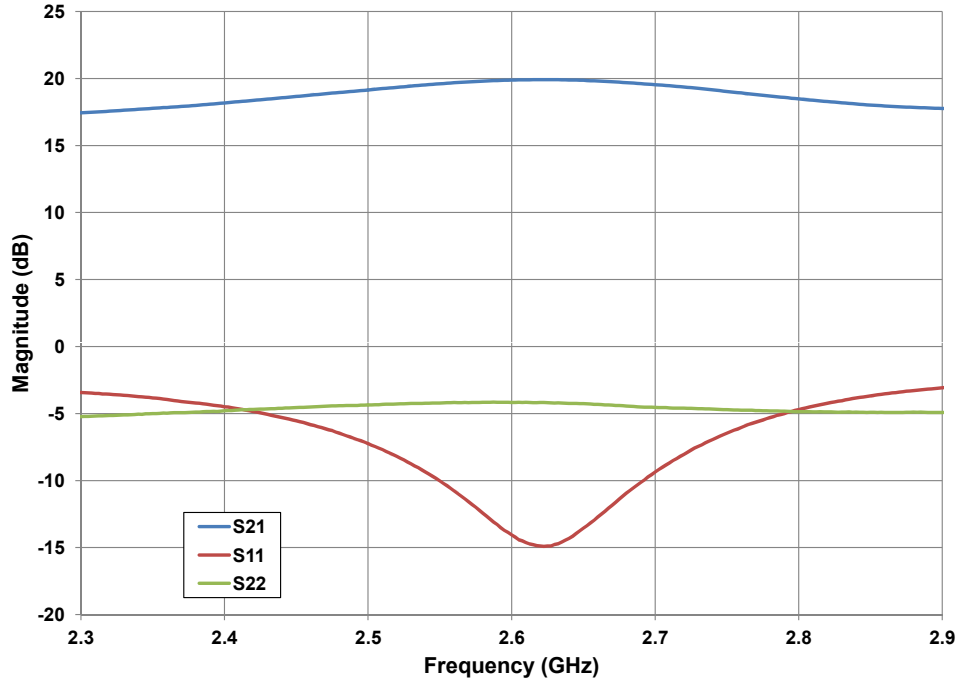
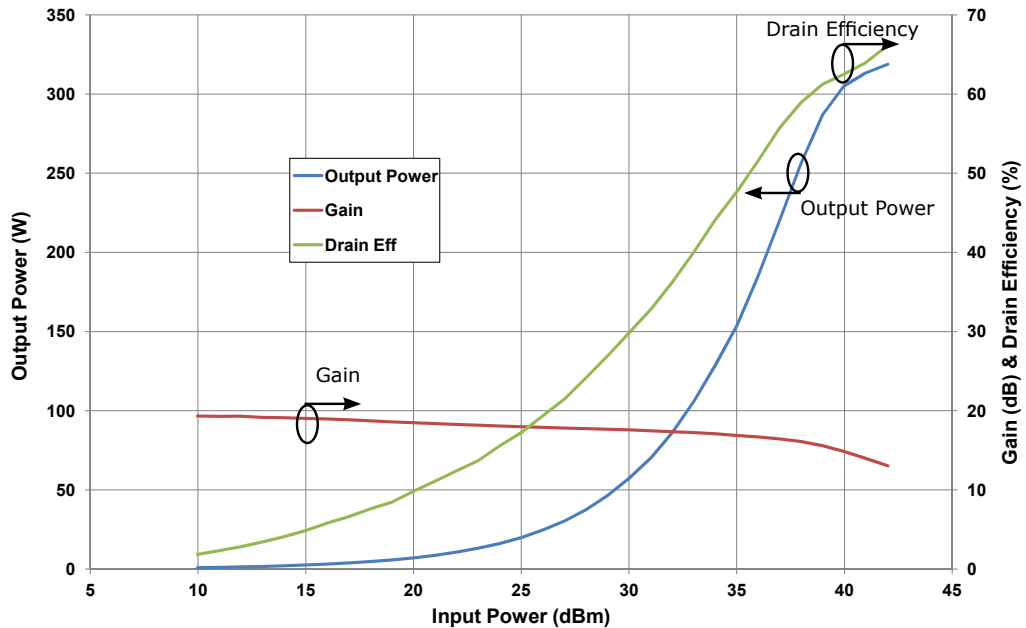


Figure 2. - Typical Pulsed Measurements vs Input Power of the CGHV27200 measured in CGHV27200-TB Amplifier Circuit.
 $V_{DS} = 50\text{ V}, I_{DQ} = 1.0\text{ A}, \text{Freq} = 2.6\text{ GHz}, \text{Pulse Width} = 100\text{ }\mu\text{s}, \text{Duty Cycle} = 10\%$



Typical Performance

Figure 3. - Typical Linearity vs Output Power for the CGHV27200 measured in CGHV27200-TB Amplifier Circuit
 $V_{DD} = 50\text{ V}$, $I_{DQ} = 1.0\text{ A}$, Freq = 2.6 GHz, 1c WCDMA 7.5 dB PAR

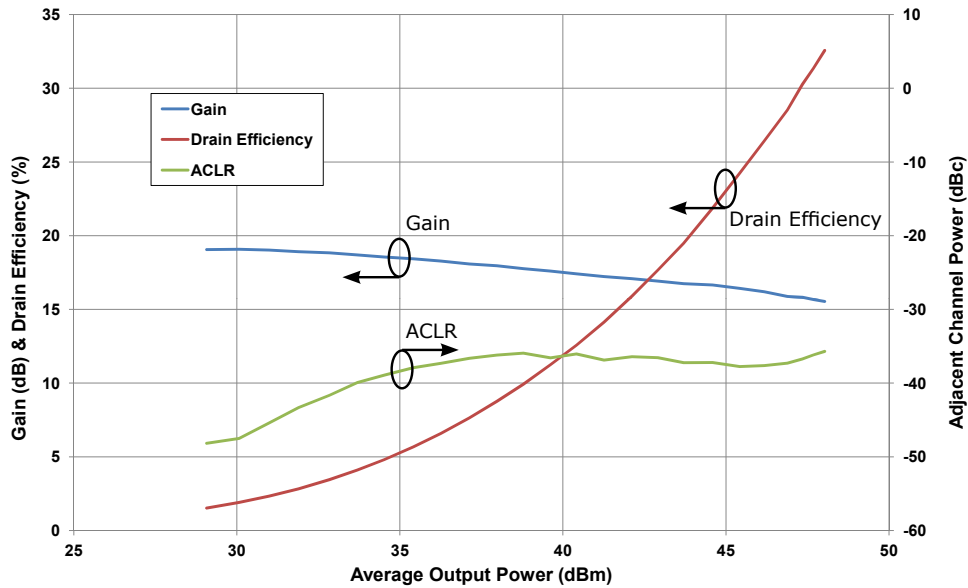
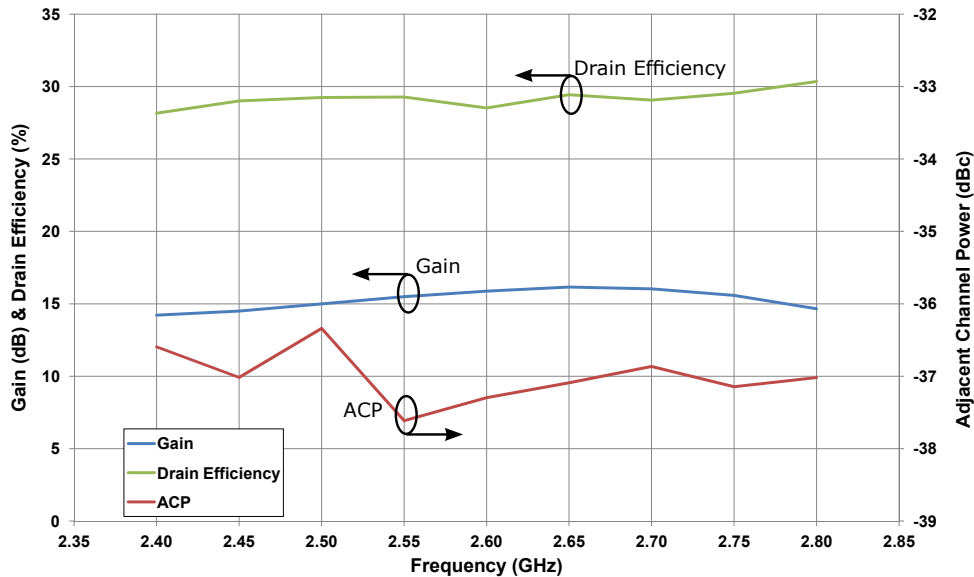


Figure 4. - Typical Linearity at $P_{AVE} = 47\text{ dBm}$ over Frequency of the CGHV27200 measured in CGHV27200-TB Amplifier Circuit.
 $V_{DD} = 50\text{ V}$, $I_{DQ} = 1.0\text{ A}$, 1c WCDMA 7.5 dB PAR



Typical Performance

Figure 5. - Typical Linearity under DPD vs Output Power
 $V_{DD} = 50\text{ V}$, $I_{DQ} = 1.0\text{ A}$, Freq = 2.6 GHz, 1c WCDMA 7.5 dB PAR

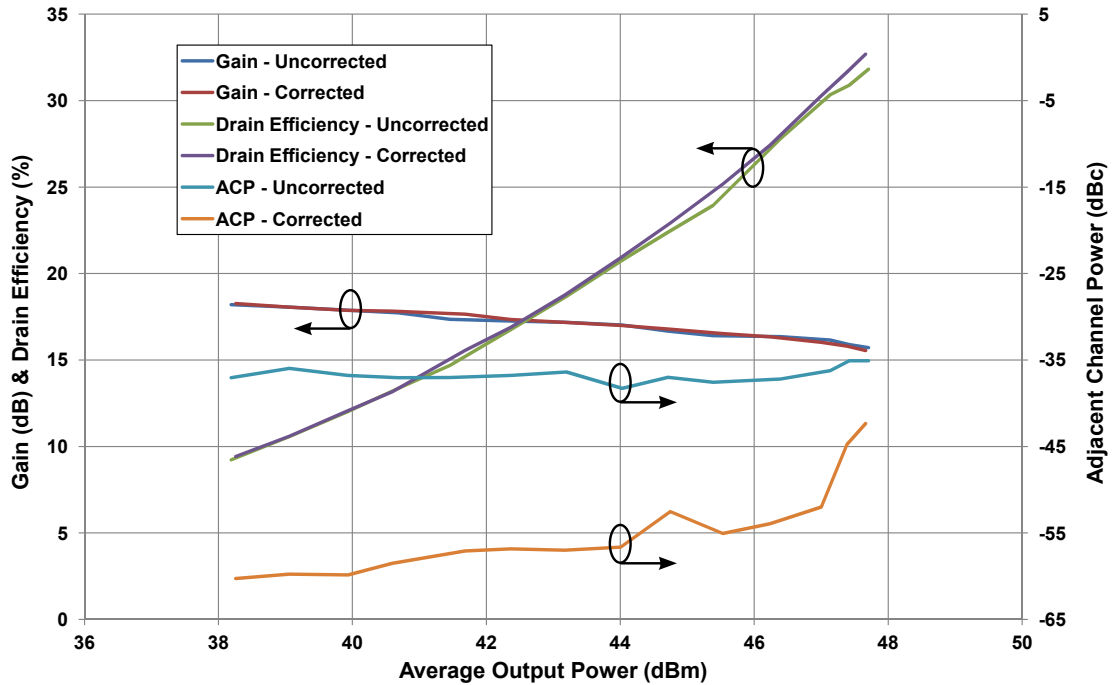
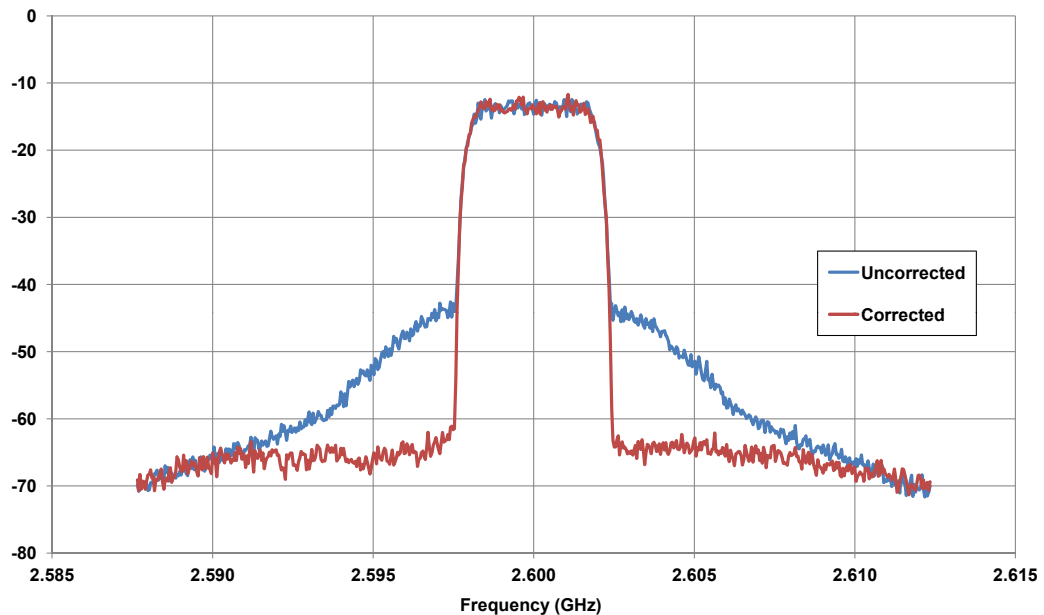


Figure 6. - Spectral Mask at $P_{AVE} = 47\text{ dBm}$ with and without DPD
 $V_{DD} = 50\text{ V}$, $I_{DQ} = 1.0\text{ A}$, 1c WCDMA 7.5 dB PAR



Typical Performance

Figure 7. - Intermodulation Distortion Products vs Output Power
 $V_{DD} = 50\text{ V}$, $I_{DQ} = 1.0\text{ A}$, Tone Spacing = 100 kHz

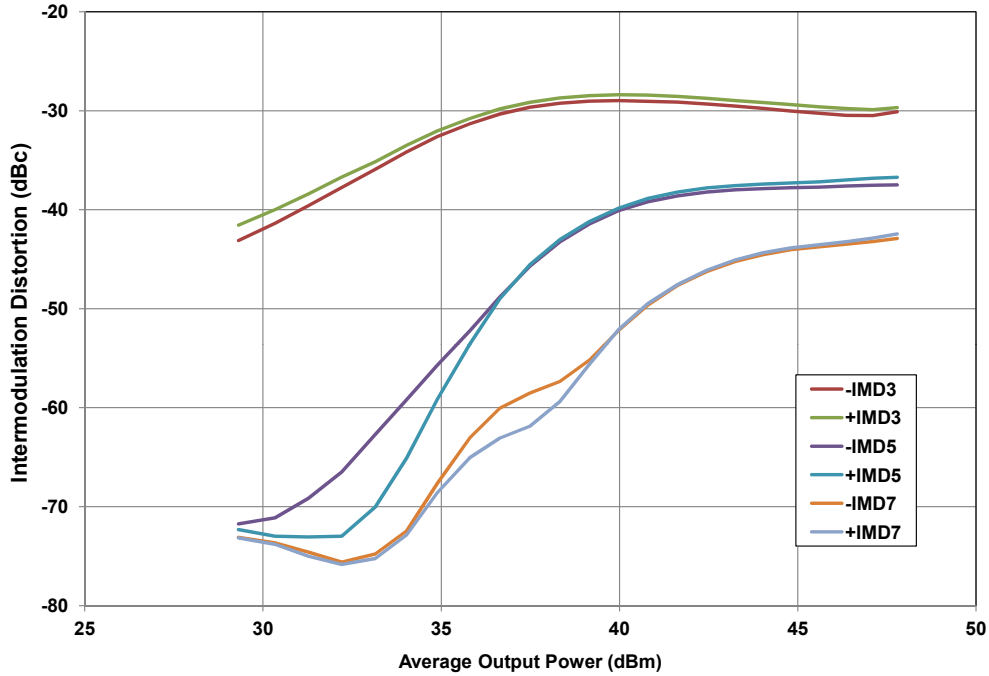
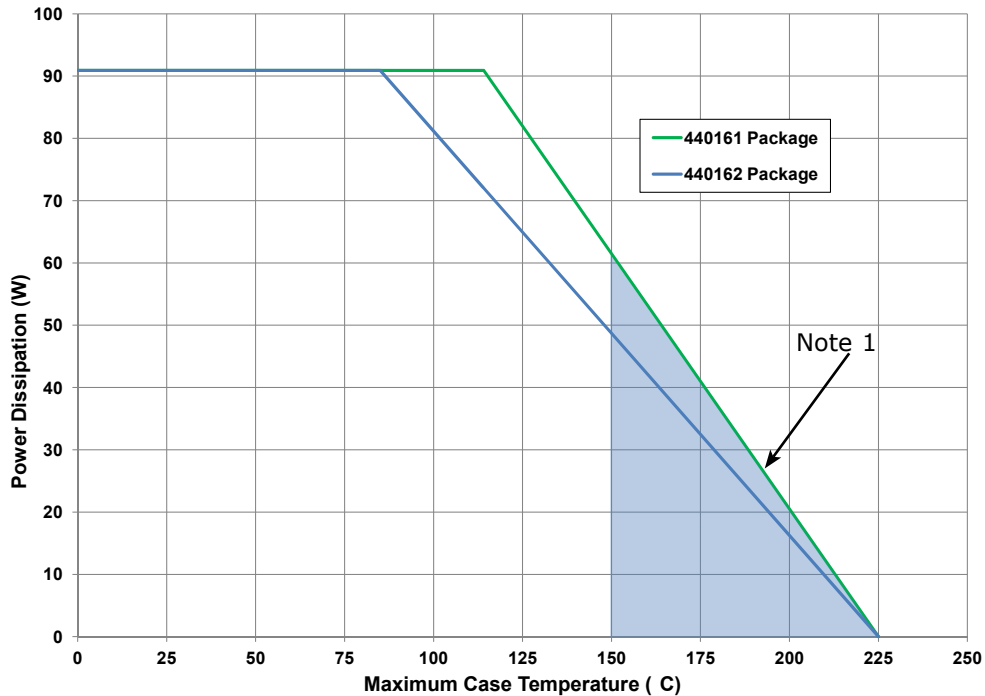
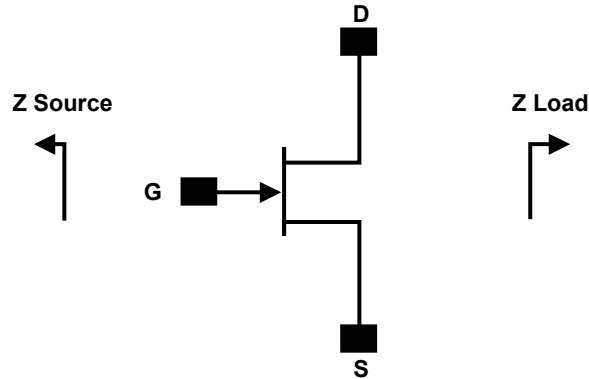


Figure 8. - Power Dissipation Derating Curve



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

Source and Load Impedances

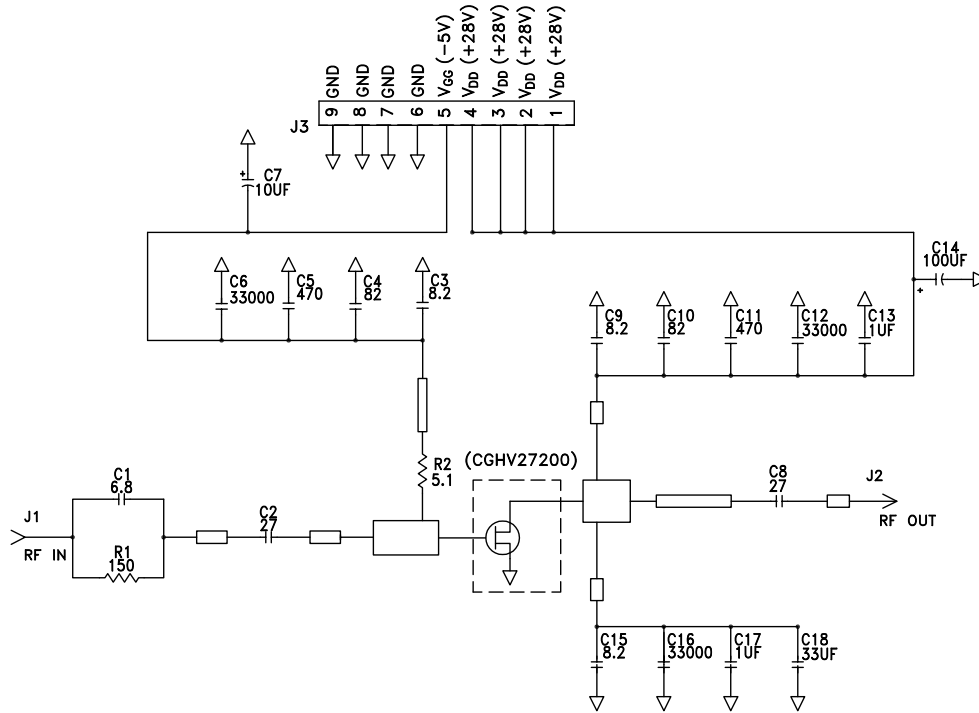


Frequency (MHz)	Z Source	Z Load
2500	7.12 - j10.19	2.23 - j0.03
2550	6.93 - j10.38	2.27 + j0.08
2600	6.61 - j10.59	2.32 + j0.18
2650	6.17 - j10.77	2.37 + j0.27
2700	5.61 - j10.87	2.41 + j0.33

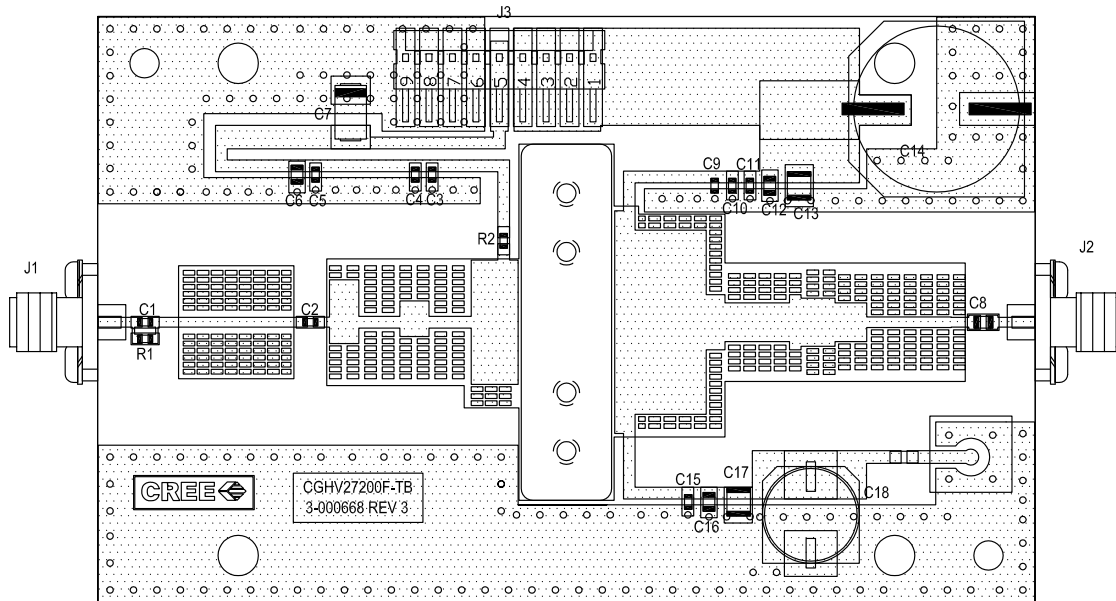
Note¹: $V_{DD} = 50\text{ V}$, $I_{DQ} = 1.0\text{ A}$. In the 440162 package.

Note²: Impedances are extracted from CGHV27200-TB demonstration circuit and are not source and load pull data derived from transistor.

CGHV27200-TB Demonstration Amplifier Circuit Schematic



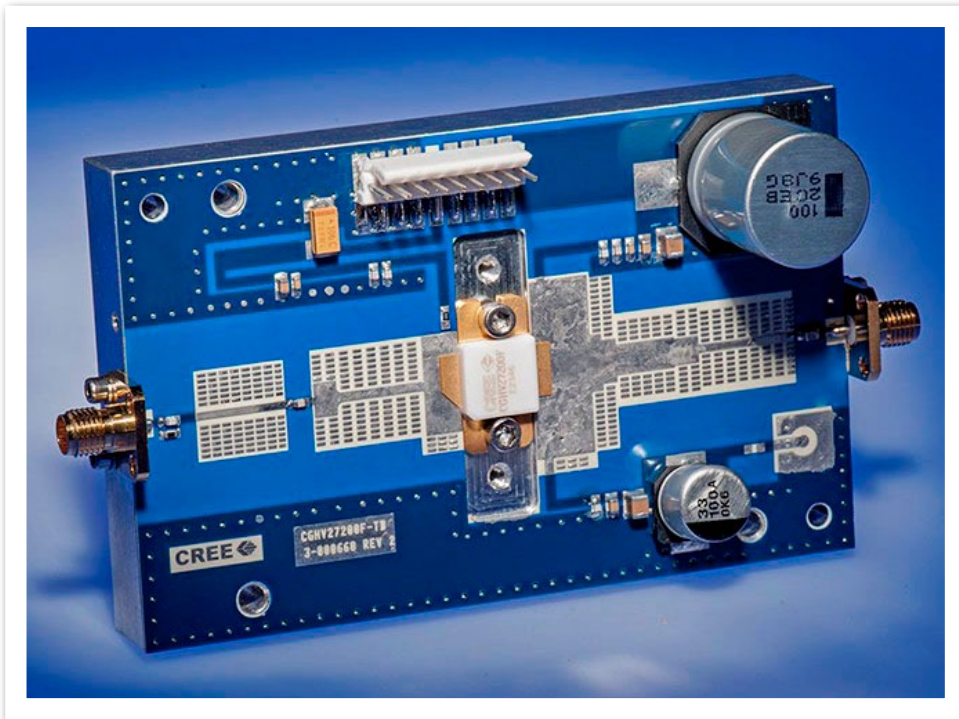
CGHV27200-TB Demonstration Amplifier Circuit Outline



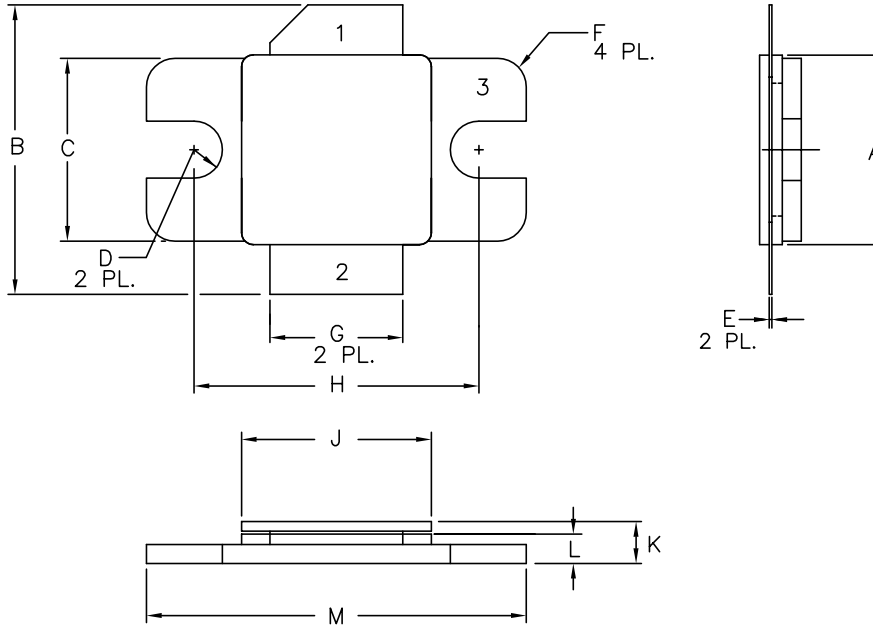
CGHV27200-TB Demonstration Amplifier Circuit Bill of Materials

Designator	Description	Qty
R1	RES, 1/16 W, 0603, 1%, 150 OHMS	1
R2	RES, 1/16 W, 0603, 1%, 5.1 OHMS	1
C1	CAP, 6.2 pF, +/-0.25 pF, 0603, ATC600S	1
C2	CAP, 27 pF, +/-5%, 0603, ATC600S	1
C3,C9,C15	CAP, 8.2 pF, +/-0.25 pF, 0603, ATC600S	3
C4,C10	CAP, 82.0 pF, +/-5%, 0603, ATC600S	2
C5,C11	CAP, 470 pF, 5%, 100 V, 0603, X7R	2
C6,C12,C16	CAP, 33000 pF, 0805, 100 V, X7R	3
C7	CAP, 10 UF, 16V, TANTALUM	1
C8	CAP, 27 pF, +/-5%, 250 V, 0603, ATC600S	1
C13,C17	CAP, 1.0 UF, 100 V, 10%, X7R, 1210	2
C14	CAP, 100 UF, +/-20%, 160V, ELECTROLYTIC	2
C18	CAP, 33 UF, 20%, G CASE	1
J1,J2	CONN, SMA, PANEL MOUNT JACK, FLANGE, 4-HOLE, BLUNT POST	2
J3	CONN, Header, RT> PLZ, 0.1 CEN, LK, 9 POS	1
	PCB, RO4350, 0.020" THK, CGHV27200	1
	2-56 SOC HD SCREW 1/4 SS	4
	#2 SPLIT LOCKWASHER SS	4
	CGHV27200	1

CGHV27200-TB Demonstration Amplifier Circuit



Product Dimensions CGHV27200F (Package Type — 440162)



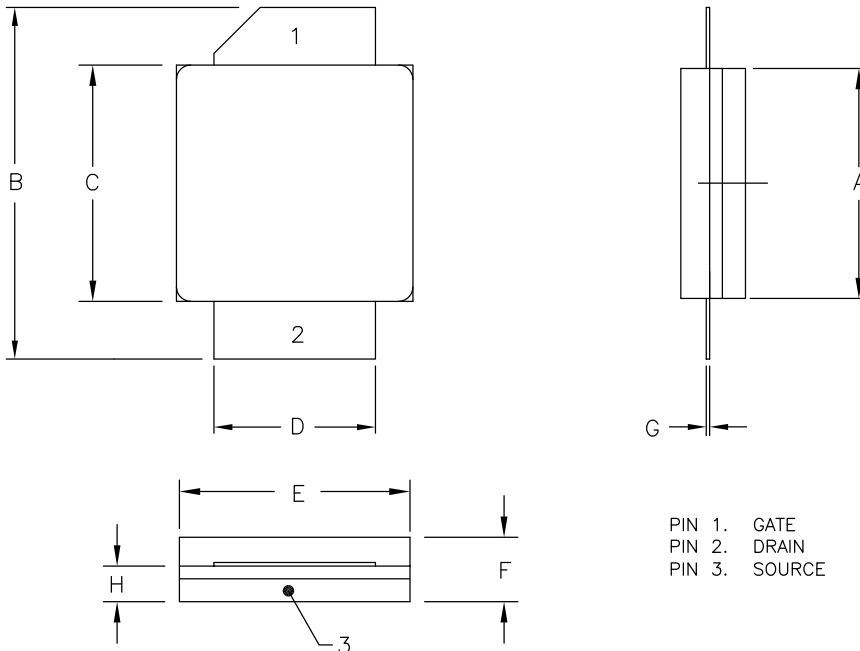
NOTES:

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.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.395	.405	10.03	10.29
B	.580	.620	14.73	15.75
C	.380	.390	9.65	9.91
D	.055	.065	1.40	1.65
E	.004	.006	0.10	0.15
F	.055	.065	1.40	1.65
G	.275	.285	6.99	7.24
H	.595	.605	15.11	15.37
J	.395	.405	10.03	10.29
K	.129	.149	3.28	3.78
L	.053	.067	1.35	1.70
M	.795	.805	20.19	20.45

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

Product Dimensions CGHV27200P (Package Type — 440161)



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 PACKAGE BY A MAXIMUM OF 0.008" IN ANY DIRECTION.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.395	.407	10.03	10.34
B	.594	.634	15.09	16.10
C	.395	.407	10.03	10.34
D	.275	.285	6.99	7.24
E	.395	.407	10.03	10.34
F	.129	.149	3.28	3.78
G	.004	.006	0.10	0.15
H	.057	.067	1.45	1.70

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



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