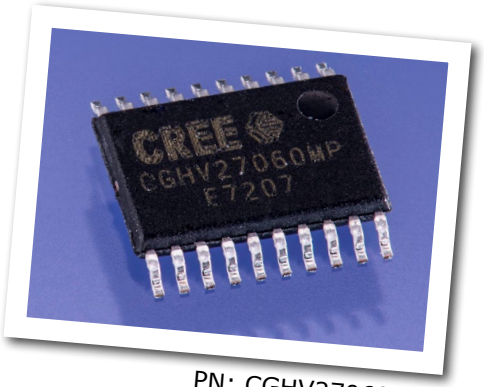
CGHV27060MP

60 W, DC - 2700 MHz, 50 V, GaN HEMT for LTE and Pulse Radar Applications



PN: CGHV27060MP

Cree's CGHV27060MP is a 60W gallium nitride (GaN) high electron mobility transistor (HEMT) housed in a small plastic SMT package 4.4mm x 6.5mm. The transistor is a broadband device with no internal input or output match which allows for the agility to apply to a wide range of frequencies from UHF thru 2.7GHz. The CGHV27060MP makes for an excellent transistor for pulsed applications at UHF, L Band or low S Band (<2.7GHz). Additionally, the transistor is well suited for LTE micro basestation amplifiers in the power class of 10 to 15W average power in high efficiency topologies such as Class A/B, F or Doherty amplifiers. The CGHV27060MP typical performance described in the datasheet is derived from a Class A/B reference design from 2.5-2.7GHz.

Typical Performance Over 2.5 - 2.7 GHz (T_C = 25°C) of Demonstration Amplifier

Parameter	2.5 GHz	2.6 GHz	2.7 GHz	Units
Gain @ 41.5 dBm Avg P_{OUT}	18.25	18.5	18.25	dB
ACLR @ 41.5 dBm Avg P_{OUT}	-34	-37	-38	dBc
Drain Efficiency @ 41.5 dBm Avg P_{OUT}	33	35	33	%

Note:
Measured in the CGHV27060MP-TB amplifier circuit, under WCDMA 3GPP test model 1, 64 DPCH, 45% clipping, PAR = 7.5 dB @ 0.01% Probability on CCDF, V_{DD} = 50 V, I_{DS} = 125 mA.

Typical Performance Over 2.5 - 2.7 GHz (T_C = 25°C) of Demonstration Amplifier

Parameter	2.5 GHz	2.6 GHz	2.7 GHz	Units
Gain	16.5	16.3	16.2	dB
Output Power	84	82	79	dBc
Drain Efficiency	71	69	65	%

Note:
Measured in the CGHV27060MP-TB amplifier circuit, under pulse width 100 µs, 10% duty cycle, P_{IN} = 33 dBm

Features - WCDMA

- 2.5 - 2.7 GHz Reference Design Amplifier
- 18.5 dB Gain at 14 W P_{AVE}
- -35 dBc ACLR at 14 W P_{AVE}
- 35% Efficiency at 14 W P_{AVE}
- High Degree of DPD Correction Can be Applied

Features - Pulsed

- 16.5 dB Gain at Pulsed P_{SAT}
- 70% Efficiency at Pulsed P_{SAT}
- 80W at Pulsed P_{SAT}

RoHS COMPLIANT

Rev 0 – April 2015

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

Parameter	Symbol	Rating	Units	Conditions
Drain-Source Voltage	V_{DSS}	150	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}	10.4	mA	25°C
Maximum Drain Current[1]	I_{DMAX}	6.3	A	25°C
Soldering Temperature[2]	T_S	245	°C	
Thermal Resistance, Junction to Case[3]	$R_{\theta JC}$	2.6	°C/W	85°C, P_{DISS} = 52 W
Thermal Resistance Pulsed 10%, 100 µs, Junction to Case	$R_{\theta JC}$	1.95	°C/W	85°C, P_{DISS} = 62W, 100 µs/10%
Case Operating Temperature[4]	T_C	-40, +90	°C	

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 CGHV27060MP
[4] See also, the Power Dissipation De-rating Curve on Page 4.

Electrical Characteristics (T_C = 25°C)

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
DC Characteristics[1]						
Gate Threshold Voltage	$V_{GS(th)}$	-3.8	-3.0	-2.3	V_{DC}	V_{DS} = 10 V, I_D = 10.4 mA
Gate Quiescent Voltage	$V_{GS(Q)}$	–	-2.7	–	V_{DC}	V_{DS} = 50 V, I_D = 125 mA
Saturated Drain Current[2]	I_{DS}	8.4	10.4	–	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 = 10.4 mA
RF Characteristics[5] (T_C = 25°C, F_0 = 2.7 GHz unless otherwise noted)						
Saturated Output Power[3,4]	P_{SAT}	–	80	–	W	V_{DD} = 50 V, I_{DQ} = 125 mA
Pulsed Drain Efficiency[3,4]	η	–	70	–	%	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{OUT} = P_{SAT}
Gain[3,4]	G	–	16.5	–	dB	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{OUT} = P_{SAT}
Gain[6]	G	–	18.5	–	dB	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{OUT} = 41.5 dBm
WCDMA Linearity[6]	ACLR	–	-35	–	dBc	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{OUT} = 41.5 dBm
Drain Efficiency[6]	η	–	34	–	%	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{OUT} = 41.5 dBm
Output Mismatch Stress[3]	VSWR	–	–	TBD	Ψ	No damage at all phase angles, V_{DD} = 50 V, I_{DQ} = 125 mA, P_{OUT} = 60 W Pulsed
Dynamic Characteristics						
Input Capacitance[7]	C_{GS}	–	15.3	–	pF	V_{DS} = 50 V, V_{gs} = -8 V, f = 1 MHz
Output Capacitance[7]	C_{DS}	–	4.7	–	pF	V_{DS} = 50 V, V_{gs} = -8 V, f = 1 MHz
Feedback Capacitance	C_{GD}	–	0.5	–	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 µs, Duty Cycle = 10%
[4] P_{SAT} is defined as I_{GS} = 1.0 mA peak
[5] Measured in CGHV27060MP-TB.
[6] Single Carrier WCDMA, 3GPP Test Model 1, 64 DPCH, 45% Clipping, PAR = 7.5 dB @ 0.01% Probability on CCDF, V_{DD} = 50 V.
[7] Includes package.

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Typical Performance

Figure 1. - Small Signal Gain and Return Losses of the CGHV27060MP Measured in Demonstration Amplifier Circuit CGHV27060MP-TB

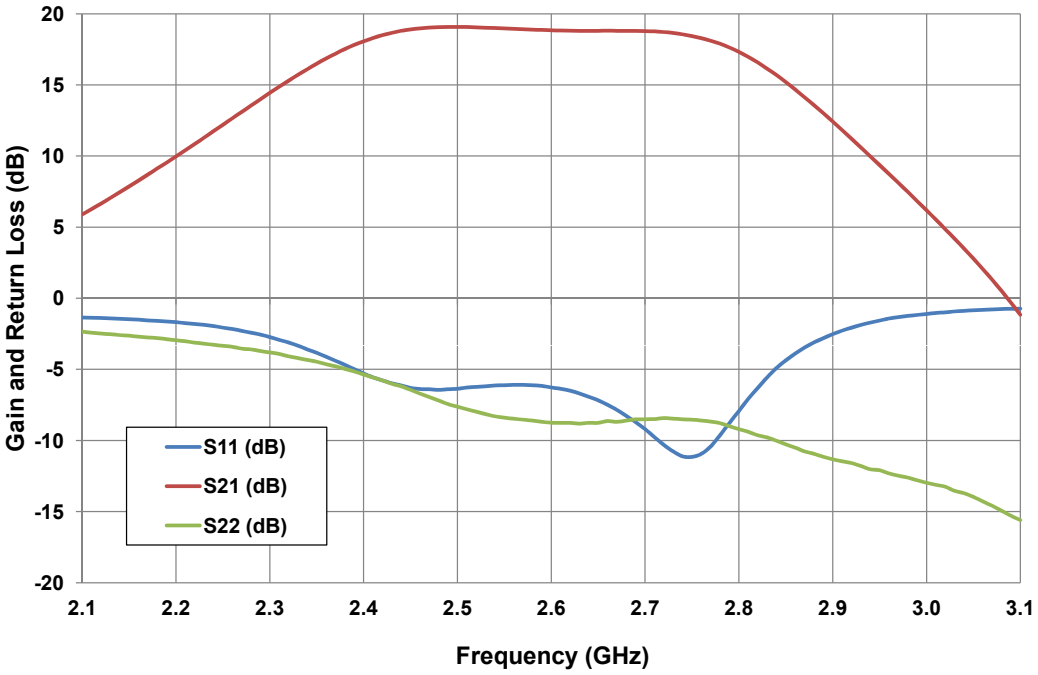
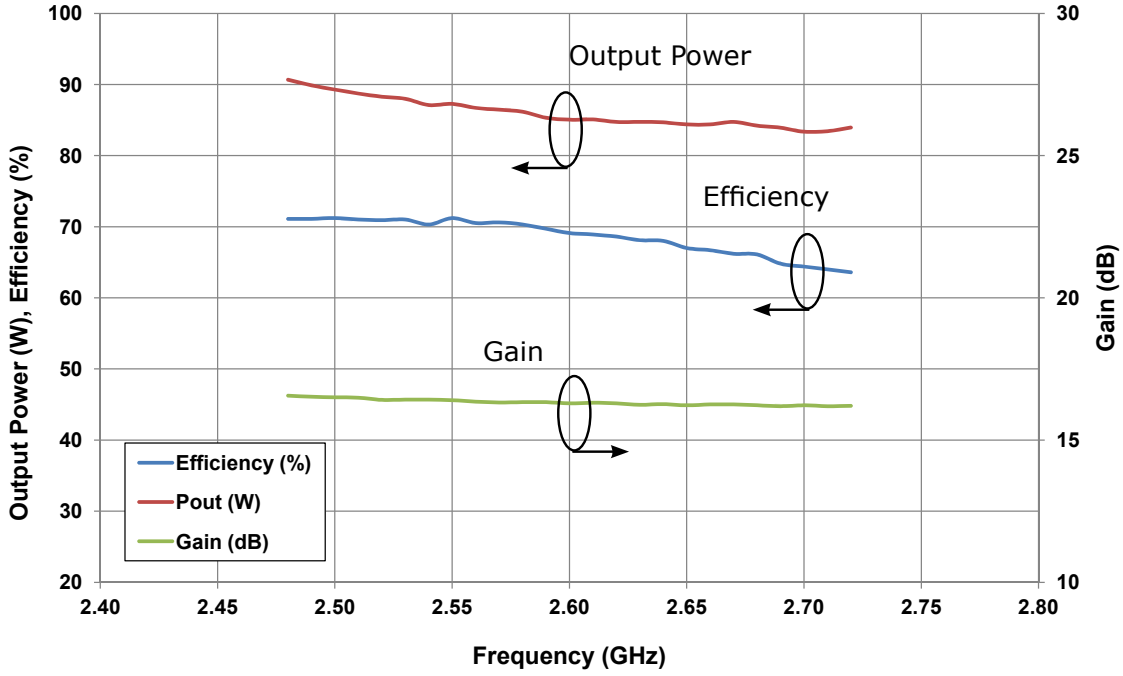


Figure 2. - Gain, Power Added Efficiency & Average Power Output at 10% Duty Cycle for the CGHV27060MP Measured in Demonstration Amplifier Circuit CGHV27060MP-TB



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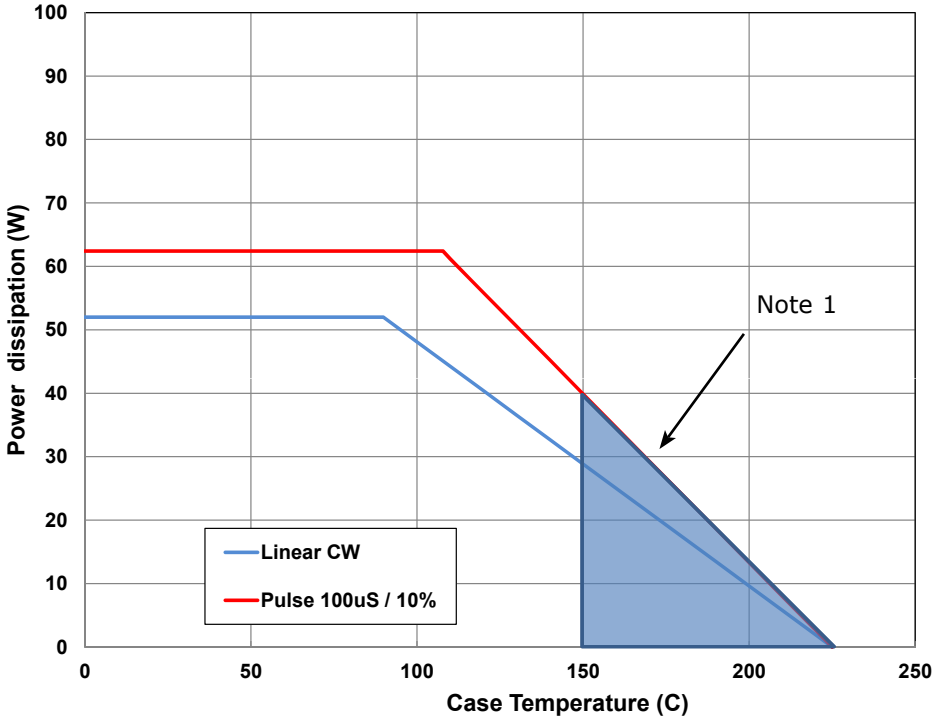
CGHV27060MP Power Dissipation De-rating Curve



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

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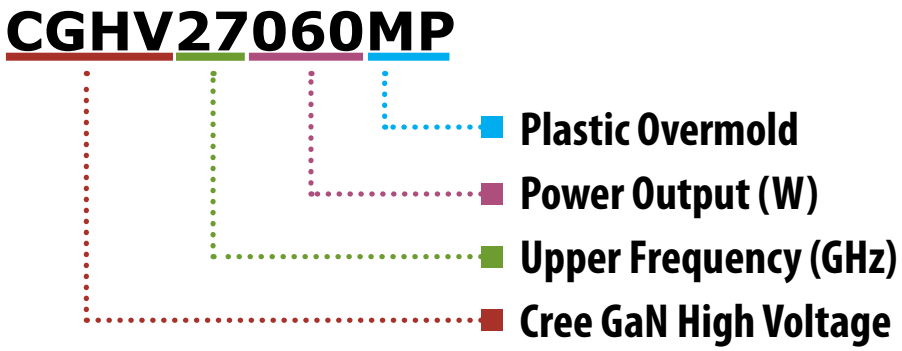
Part Number System



Parameter	Value	Units
Upper Frequency[1]	2.7	GHz
Power Output	60	W
Package	MP	-

Table 1.

Note[1]: Alpha characters used in frequency code indicate a value greater than 9.9 GHz. See Table 2 for value.

Character Code	Code Value
A	0
B	1
C	2
D	3
E	4
F	5
G	6
H	7
J	8
K	9
Examples:	1A = 10.0 GHz 2H = 27.0 GHz

Table 2.

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