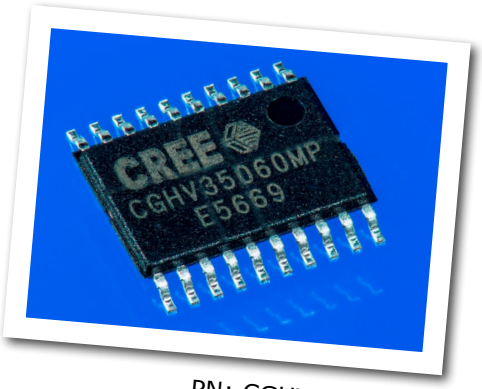
CGHV35060MP

60W, 2700-3500 MHz, 50V, GaN HEMT for S Band Radar and LTE base stations

Cree's CGHV35060MP is a 60W input matched, gallium nitride (GaN) high electron mobility transistor (HEMT) optimized for S Band performance. The CGHV35060MP is suitable for typical bands of 2.7-3.1GHz and 3.1-3.5GHz while the input matched transistor provides optimal gain, power and efficiency in a small 6.5mm x 4.4mm plastic surface mount (SMT) package. The typical performance plots in the datasheet are derived with CGHV35060MP matched into a 3.1-3.5GHz high power amplifier.



PN: CGHV35060MP

Typical Performance Over 3.1 - 3.5 GHz (T_C = 25°C) of Demonstration Amplifier

Parameter	3.1 GHz	3.3 GHz	3.5 GHz	Units
Gain	14.5	14.3	13.8	dB
Output Power	88	88	75	W
Drain Efficiency	61	67	64	%

Note:
Measured in the CGHV35060MP-TB amplifier circuit, under 100 µs pulse width, 10% duty cycle, P_{IN} = 35 dBm.

Features

- Reference design amplifier 3.1 - 3.5 GHz
- 75W Typical output power
- 14.5 dB power gain
- 67% Drain efficiency
- Internally pre-matched on input, unmatched output

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	
CW Thermal Resistance, Junction to Case[3]	$R_{\theta JC}$	2.6	˚C/W	85˚C, P_{DISS} = 52 W
Pulsed Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.95	˚C/W	85˚C, P_{DISS} = 62 W, 100 µsec 10%
Case Operating Temperature[4]	T_C	-40, +107	˚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 CGHV35060MP
[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[4] (T_C = 25˚C, F_0 = 3.3 GHz unless otherwise noted)						
Saturated Output Power[3]	P_{SAT}	–	75	–	W	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{IN} = 35 dBm
Pulsed Drain Efficiency[3]	η	–	67	–	%	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{IN} = 35 dBm
Gain[3]	G	–	14.5	–	dB	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{IN} = 35 dBm
Gain[5]	G	–	17	–	dB	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{OUT} = 41.5 dBm
WCDMA Linearity[5]	ACLR	–	-35	–	dBc	V_{DD} = 50 V, I_{DQ} = 125 mA, P_{OUT} = 41.5 dBm
Drain Efficiency[5]	η	–	35	–	%	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[6]	C_{GS}	–	32.16	–	pF	V_{DS} = 50 V, V_{gs} = -8 V, f = 1 MHz
Output Capacitance[6]	C_{DS}	–	4.4	–	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] Measured in CGHV35060MP-TB.
[5] Single Carrier WCDMA, 3GPP Test Model 1, 64 DPCH, 45% Clipping, PAR = 7.5 dB @ 0.01% Probability on CCDF, V_{DD} = 50 V.
[6] Includes package.

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Typical Performance

Figure 1. - Small Signal Gain and Return Losses of the CGHV35060MP Measured in Demonstration Amplifier Circuit CGHV35060MP-TB

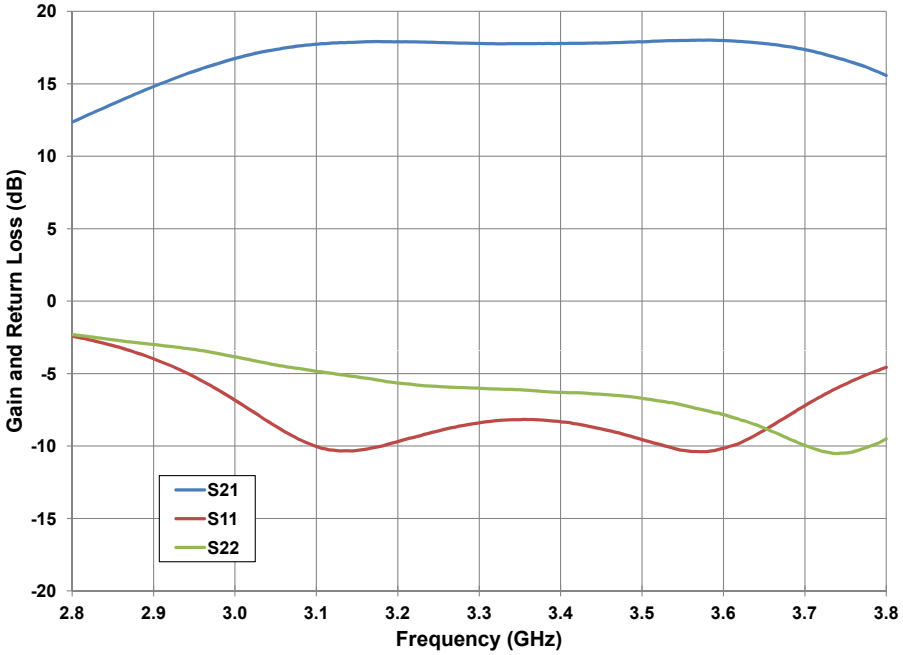
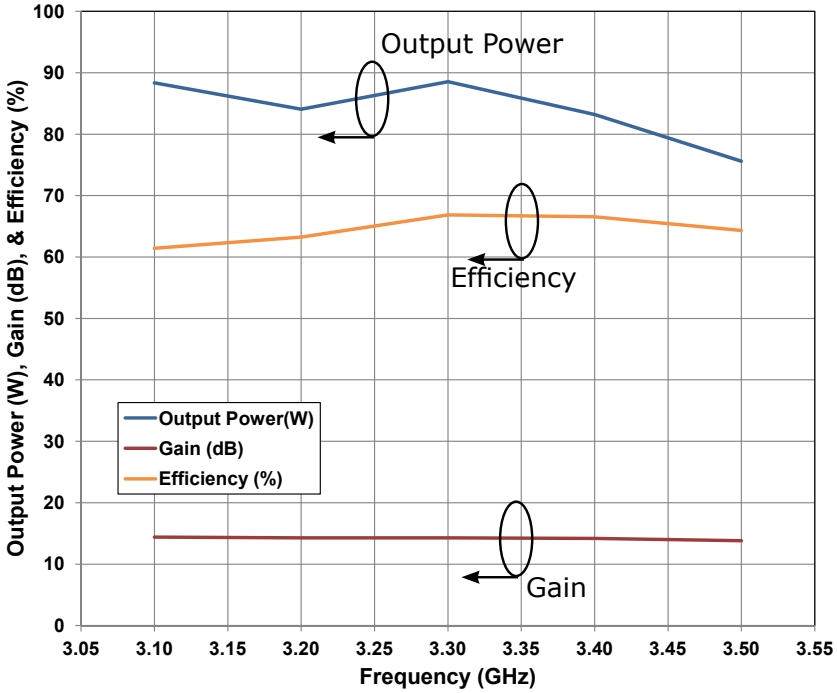


Figure 2. - Gain, Efficiency & Output Power for the CGHV35060MP at P_{IN} = 35 dBm with 100 µs/10% as Measured in Demonstration Amplifier Circuit CGHV35060MP



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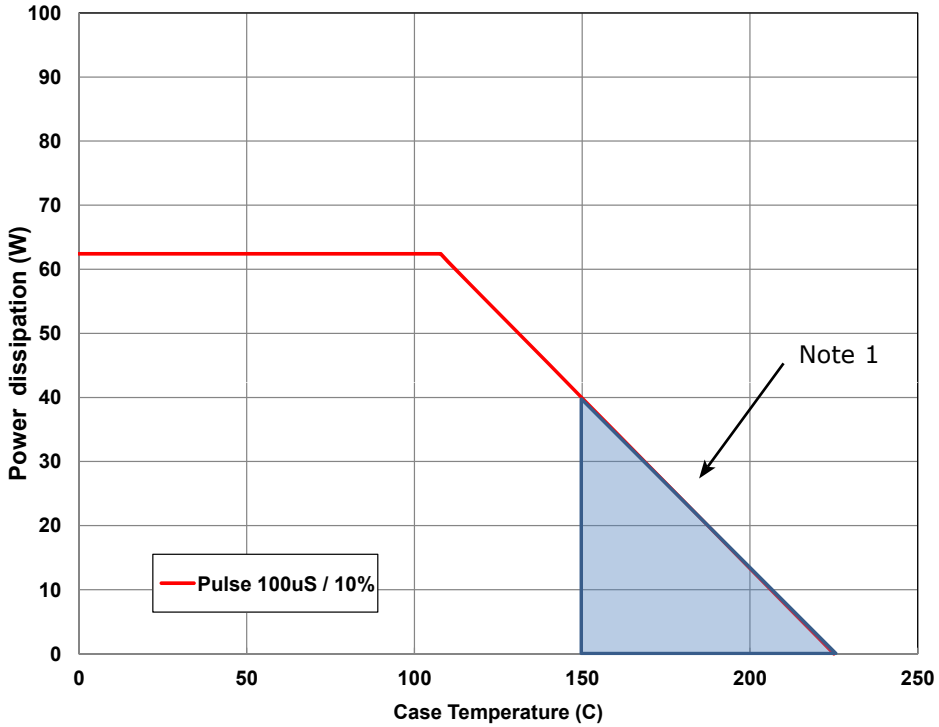
CGHV35060MP Power Dissipation De-rating Curve



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

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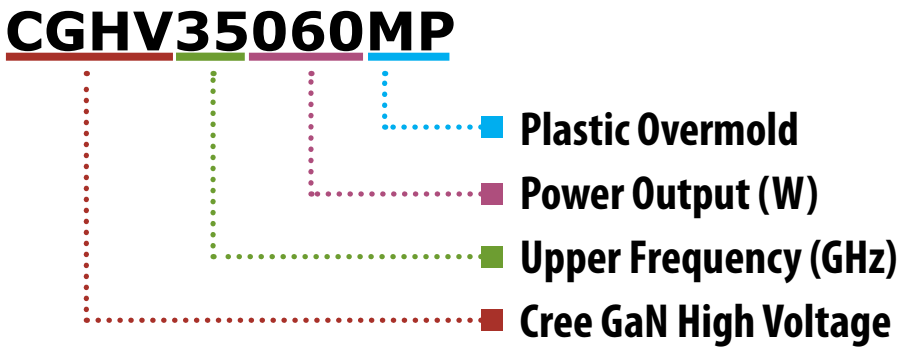
Part Number System



Parameter	Value	Units
Upper Frequency[1]	3.5	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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