CGH35240F

240 W, 2900-3500 MHz, 50-ohm Input/Output Matched, GaN HEMT for S-Band Radar Systems

Cree's CGH35240F is a gallium nitride (GaN) high electron mobility transistor (HEMT) designed specifically with high efficiency, high gain and wide bandwidth capabilities, which makes the CGH35240F ideal for 2.9-3.5GHz S-Band radar amplifier applications. The transistor is supplied in a ceramic/metal flange package.

Package Type: 440204
PN: CGH35240F

Typical Performance Over 2.9-3.5GHz (T_c = 25°C) of Demonstration Amplifier

Parameter	2.9 GHz	3.0 GHz	3.1 GHz	3.2 GHz	3.3 GHz	3.4 GHz	3.5 GHz	Units
Saturated Output Power	243	239	233	242	252	245	212	W
Gain @ P_{SAT}	13.8	13.1	12.2	11.6	11.4	12.3	11.6	dB
Power Added Efficiency	63	68	66	63	60	57	54	%

Note:
Measured in the CGH35240F-TB amplifier circuit, under 300 μs pulse width, 10% duty cycle, where I_G = 20 mA peak.

Features

- 2.9 - 3.5 GHz Operation
- 11.5 dB Gain at Saturated Output Power
- 60 % Power Added Efficiency at Saturated Output Power
- < 0.3 dB Pulsed Amplitude Droop at Saturated Output Power

Rev 0.1 – May 2010

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DSS}	84	Volts
Gate-to-Source Voltage	V_{GS}	-10, +2	Volts
Power Dissipation	P_{DISS}	115	Watts
Storage Temperature	T_{STG}	-65, +150	˚C
Operating Junction Temperature	T_J	225	˚C
Maximum Forward Gate Current	I_{GMAX}	60	mA
Soldering Temperature[1]	T_S	245	˚C
Screw Torque	τ	80	in-oz
Pulsed Thermal Resistance, Junction to Case[2,3]	$R_{\theta JC}$	0.45	˚C/W
Case Operating Temperature[2]	T_C	-40, +150	˚C

Note:

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

[2] Measured for the CGH35240F at P_{DISS} = 115 W

[3] Pulse Width = 300 µS, Duty Cycle = 10%.

Electrical Characteristics (T_C = 25˚C)

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
DC Characteristics[1]						
Gate Threshold Voltage	$V_{GS(th)}$	-3.8	-3.3	-2.3	V_{DC}	V_{DS} = 10 V, I_D = 57.6 mA
Gate Quiescent Voltage	$V_{GS(Q)}$	–	-3.0	–	V_{DC}	V_{DS} = 28 V, I_D = 1.0 A
Saturated Drain Current[2]	I_{DS}	46.4	56.0	–	A	V_{DS} = 6.0 V, V_{GS} = 2.0 V
Drain-Source Breakdown Voltage	V_{BR}	120	–	–	V_{DC}	V_{GS} = -8 V, I_D = 57.6 mA
RF Characteristics[3,5] (T_C = 25˚C, F_0 = 3.3 GHz unless otherwise noted)						
Saturated Output Power[4]	P_{SAT}	–	250	–	W	V_{DD} = 28 V, I_{DQ} = 1.0 A
Power Added Efficiency	PAE	–	60	–	%	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{OUT} = P_{SAT}
Gain	G	–	11.4	–	dB	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{OUT} = P_{SAT}
Pulsed Amplitude Droop	D	–	0.3	–	dB	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{OUT} = P_{SAT}
Dynamic Characteristics						
Input Capacitance[6]	C_{GS}	–	99	–	pF	V_{DS} = 28 V, V_{gs} = -8 V, f = 1 MHz
Output Capacitance[6]	C_{DS}	–	17	–	pF	V_{DS} = 28 V, V_{gs} = -8 V, f = 1 MHz
Feedback Capacitance	C_{GD}	–	4.8	–	pF	V_{DS} = 28 V, V_{gs} = -8 V, f = 1 MHz

Notes:

[1] Measured on wafer prior to packaging.

[2] Scaled from PCM data.

[3] Pulse Width = 300 µS, Duty Cycle = 10%.

[4] P_{SAT} is defined as I_G = 20 mA peak.

[5] Measured in CGH35240F-TB.

[6] Includes package and internal matching components.

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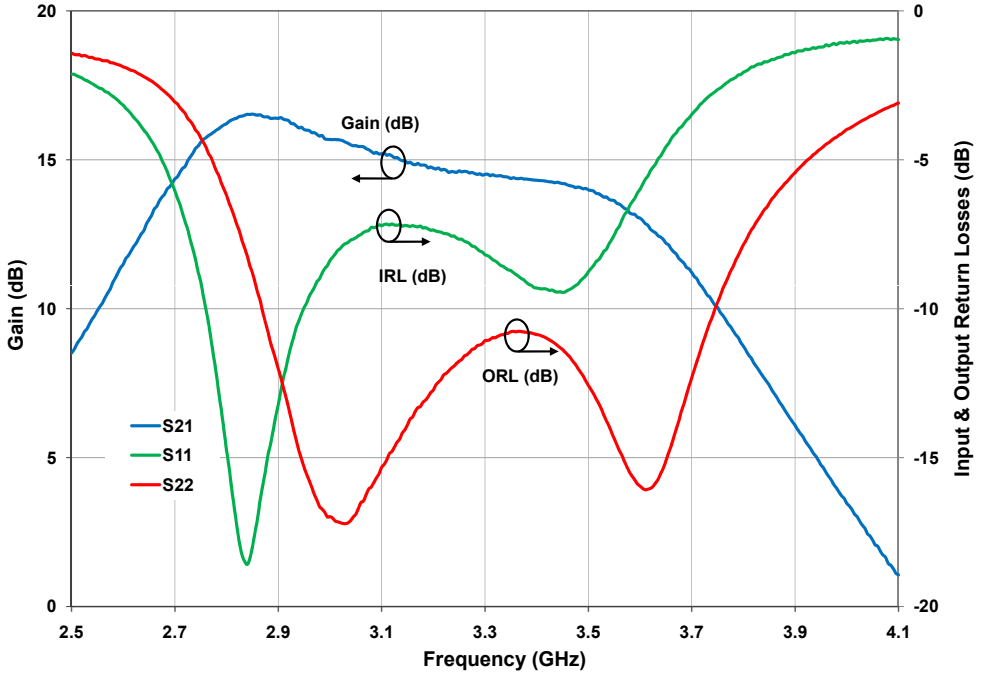
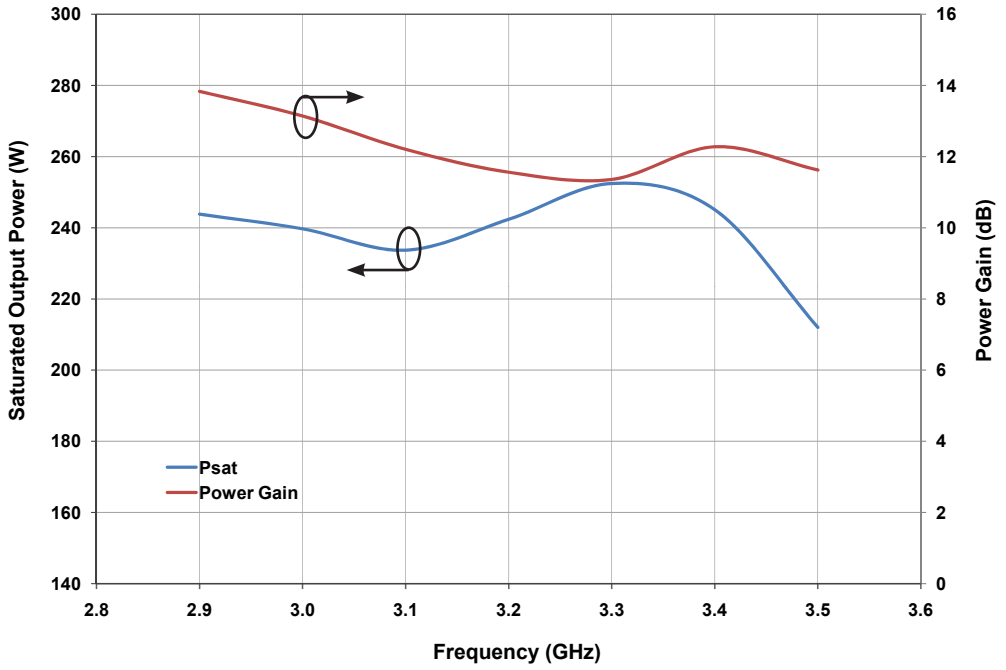
Typical Performance

Gain and Return Losses vs Frequency of the CGH35240F Measured in CGH35240-TB Amplifier Circuit.
V_{DS} = 28 V, I_{DS} = 1 A, Pulse Width = 300 μS, Duty Cycle = 10%



Typical Pulsed Saturated Output Power and Power Gain vs Frequency of the CGH35240F Measured in CGH35240-TB Amplifier Circuit.
V_{DS} = 28 V, I_{DS} = 1 A, I_{GS} (at P_{SAT}) = 20 mA Peak, Pulse Width = 300 μS, Duty Cycle = 10%



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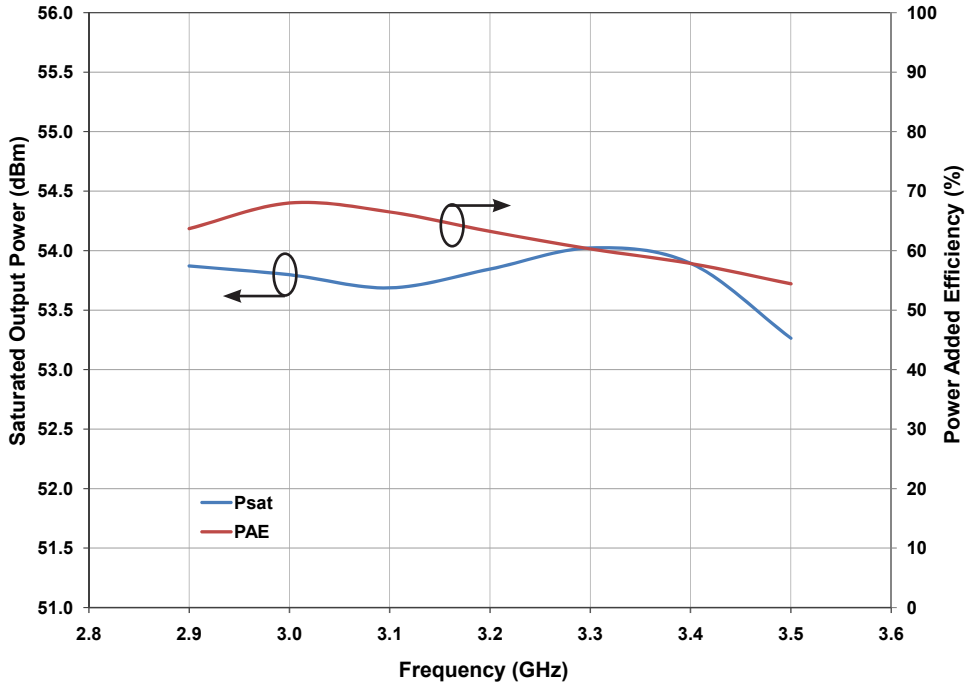
Typical Performance

Typical Pulsed Saturated Output Power and Power Added Efficiency vs Frequency of the CGH35240F Measured in CGH35240-TB Amplifier Circuit.
V_{DS} = 28 V, I_{DS} = 1 A, I_{GS} (at P_{SAT}) = 20 mA Peak, Pulse Width = 300 µS, Duty Cycle = 10%



Electrostatic Discharge (ESD) Classifications

Parameter	Symbol	Class	Test Methodology
Human Body Model	HBM	1A > 250 V	JEDEC JESD22 A114-D
Charge Device Model	CDM	1 < 200 V	JEDEC JESD22 C101-C

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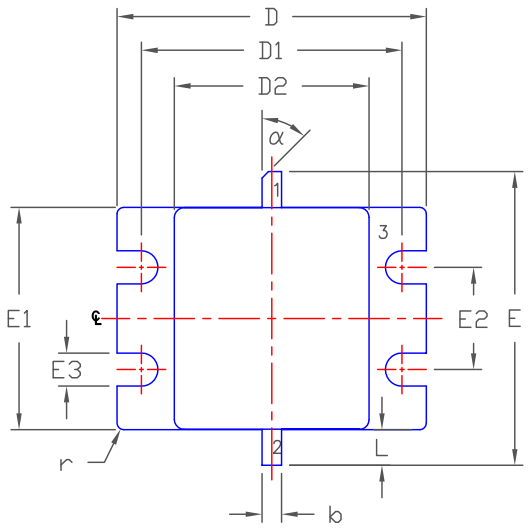
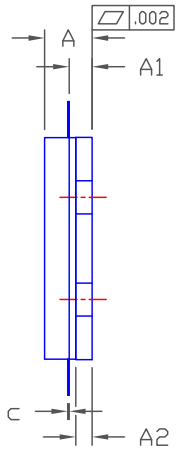
Product Dimensions CGH35240F (Package Type — 440201)





PIN 1. GATE
2. DRAIN
3. SOURCE

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.

	INCHES		MILLIMETERS		NOTES
DIM	MIN	MAX	MIN	MAX	
A	0.128	0.148	3.25	3.76	
A1	0.057	0.067	1.45	1.70	
A2	0.035	0.045	0.89	1.14	
b	0.055	0.065	1.40	1.65	2x
c	0.004	0.007	0.08	0.15	
D	0.948	0.958	24.08	24.33	
D1	0.798	0.808	20.27	20.52	
D2	0.595	0.605	15.11	15.37	
E	0.880	0.930	22.35	23.62	
E1	0.680	0.694	17.27	17.63	
E2	0.310	0.320	7.87	8.13	
E3	0.097	0.107	2.46	2.72	4x
L	0.095	0.125	2.41	3.18	2x
r	0.02 TYP		0.51 TYP		4x
α	45° REF		45° REF		

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