CGH35240F

240 W, 3100-3500 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 3.1-3.5GHz S-Band radar amplifier applications. The transistor is supplied in a ceramic/metal flange package.

Package Type: 440201
PN: CGH35240F

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

Parameter	3.1 GHz	3.2 GHz	3.3 GHz	3.4 GHz	3.5 GHz	Units
Output Power	250	240	225	225	220	W
Gain	12.1	11.9	11.6	11.5	11.4	dB
Power Added Efficiency	60	59	57	52	48	%

Note:
Measured in the CGH35240F-AMP amplifier circuit, under 300 µs pulse width, 20% duty cycle, P_{IN} = 42 dBm.

Features

- 3.1 - 3.5 GHz Operation
- 240 W Typical Output Power
- 11.6 dB Power Gain at P_{IN} = 42.0 dBm
- 57 % Typical Power Added Efficiency
- 50 Ohm Internally Matched
- <0.2 dB Pulsed Amplitude Droop

Large Signal Models Available for ADS and MWO

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

Parameter	Symbol	Rating	Units	Conditions
Pulse Width	PW	1	ms	
Duty Cycle	DC	50	%	
Drain-Source Voltage	V_{DSS}	120	Volts	25˚C
Gate-to-Source Voltage	V_{GS}	-10, +2	Volts	25˚C
Power Dissipation	P_{DISS}	345	Watts	
Storage Temperature	T_{STG}	-65, +150	˚C	
Operating Junction Temperature	T_J	225	˚C	
Maximum Forward Gate Current	I_{GMAX}	60	mA	25˚C
Maximum Drain Current[1]	I_{DMAX}	24	A	25˚C
Soldering Temperature[2]	T_S	245	˚C	
Screw Torque	τ	40	in-oz	
Pulsed Thermal Resistance, Junction to Case[3]	$R_{\theta JC}$	0.5	˚C/W	85˚C
Case Operating Temperature[3]	T_C	-40, +150	˚C	

Note:
[1] Current limit for long term, reliable operation
[2] Refer to the Application Note on soldering at www.cree.com/RF/Document-Library
[3] Measured for the CGH35240F at P_{DISS} = 280 W. Pulse Width = 300 µS, Duty Cycle = 20%.

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 = 57.6 mA
Gate Quiescent Voltage	$V_{GS(Q)}$	–	-2.7	–	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] (T_C = 25˚C, F_0 = 3.1-3.5 GHz unless otherwise noted)						
Output $Power_1$ at 3.1 GHz	P_{OUT}	210	250	–	W	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = 42 dBm
Output $Power_2$ at 3.3 GHz	P_{OUT}	200	225	–	W	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = 42 dBm
Output $Power_3$ at 3.5 GHz	P_{OUT}	180	220	–	W	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = 42 dBm
Power Added $Efficiency_1$ at 3.1 GHz	PAE	48	60	–	%	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = 42 dBm
Power Added $Efficiency_2$ at 3.3 GHz	PAE	48	57	–	%	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = 42 dBm
Power Added $Efficiency_3$ at 3.5 GHz	PAE	40	48	–	%	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = 42 dBm
Power $Gain_1$ at 3.1 GHz	G_P	11.0	12.0	–	dB	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = 42 dBm
Power $Gain_2$ at 3.3 GHz	G_P	10.8	11.5	–	dB	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = 42 dBm
Power $Gain_3$ at 3.5 GHz	G_P	10.5	11.5	–	dB	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = 42 dBm
Small Signal Gain	S21	11.4	14	–	dB	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = -10 dBm
Input Return Loss	S11	–	-9	-4.5	dB	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = -10 dBm
Output Return Loss	S22	–	-10	-4.5	dB	V_{DD} = 28 V, I_{DQ} = 1.0 A, P_{IN} = -10 dBm
Pulsed Amplitude Droop	D	–	0.1	–	dB	V_{DD} = 28 V, I_{DQ} = 1.0 A

Notes:
[1] Measured on wafer prior to packaging.
[2] Scaled from PCM data.
[3] Measured in CGH35240F-AMP. Pulse Width = 300 µS, Duty Cycle = 20%.

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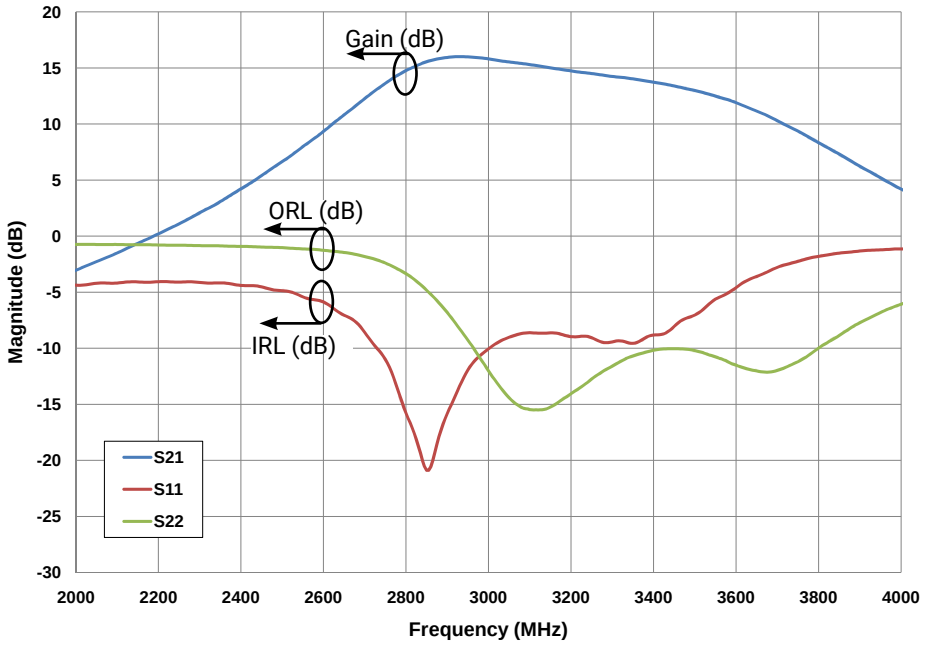
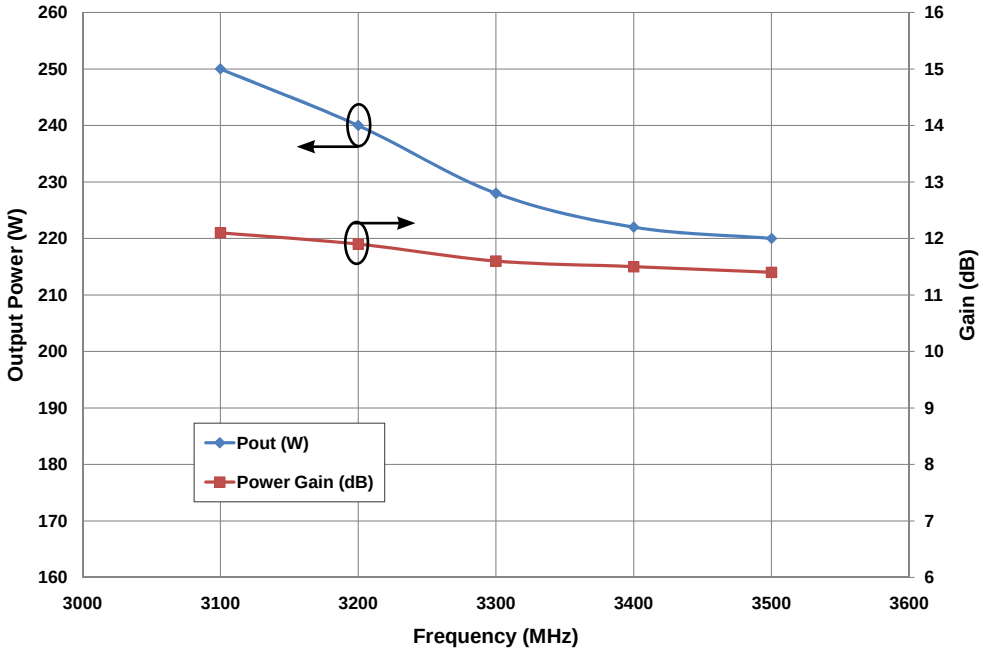
Typical Performance

Gain and Return Losses vs Frequency
Measured in CGH35240-AMP Amplifier Circuit.
V_{DS} = 28 V, I_{DS} = 1 A



Typical Pulsed Output Power and Power Gain vs Frequency
Measured in CGH35240-AMP Amplifier Circuit.
V_{DS} = 28 V, I_{DS} = 1 A, P_{IN} = 42 dBm, Pulse Width = 300 µS, Duty Cycle = 20%



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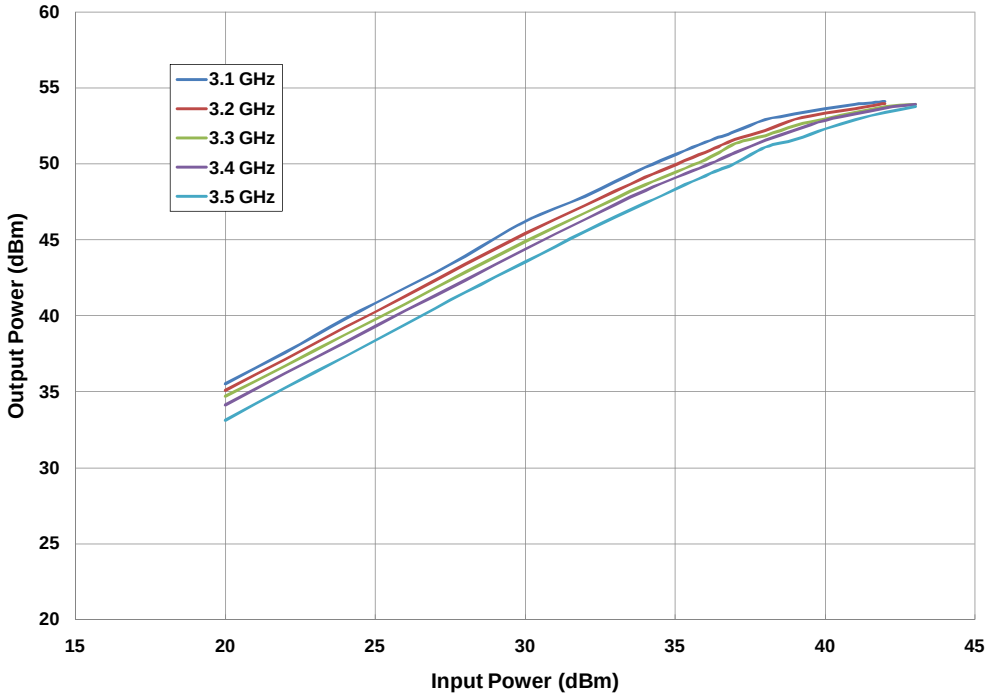
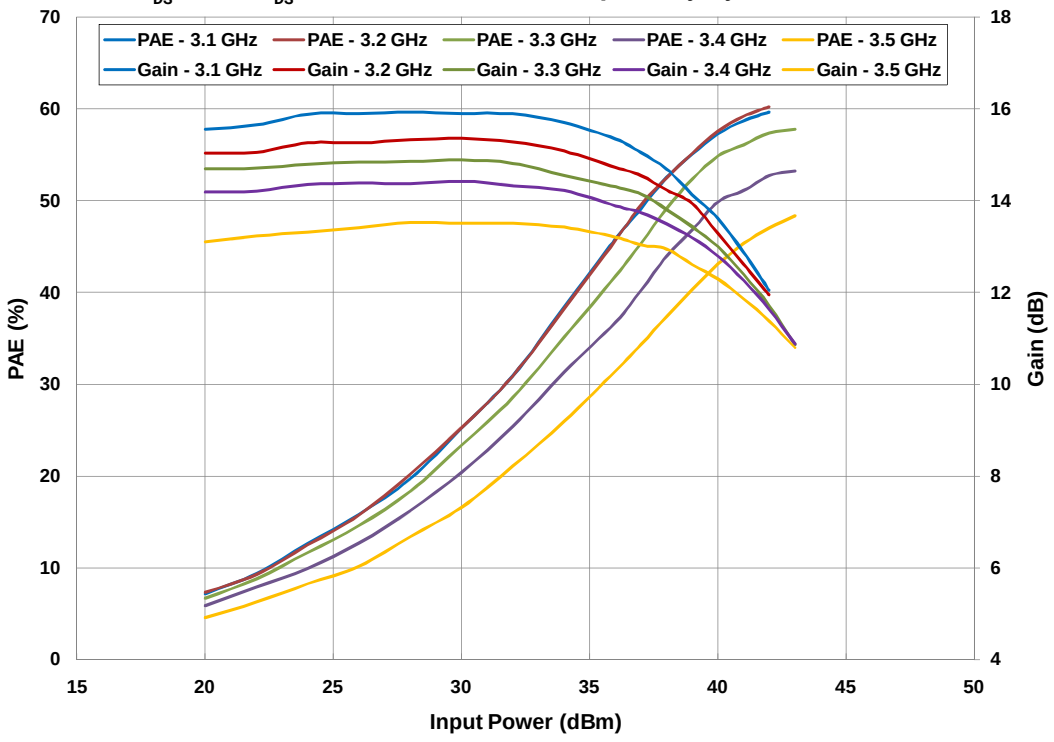
Typical Performance

CGH35240 Output Power vs Input Power
V_{DS} = 28 V, I_{DS} = 1 A, Pulse Width = 300 µS, Duty Cycle = 20 %



CGH35240 PAE & Gain vs Input Power
V_{DS} = 28 V, I_{DS} = 1 A, Pulse Width = 300 µS, Duty Cycle = 20 %



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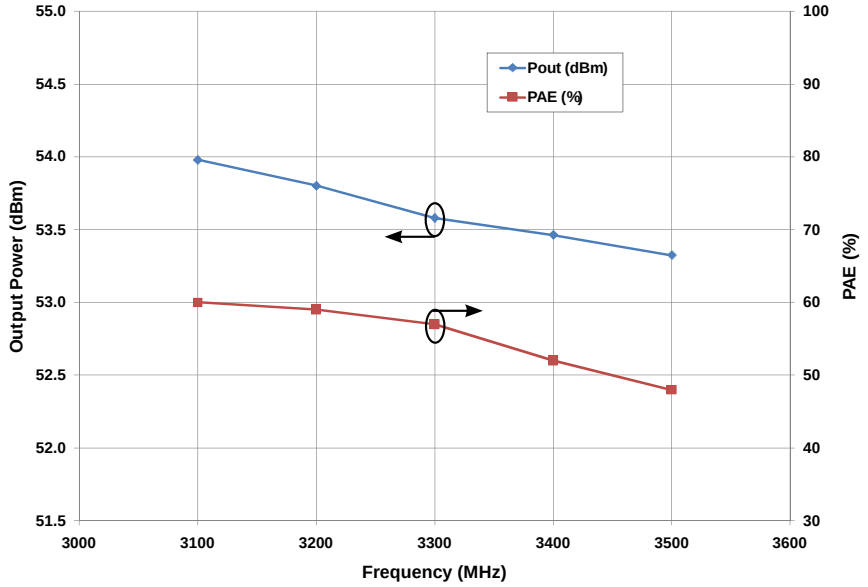
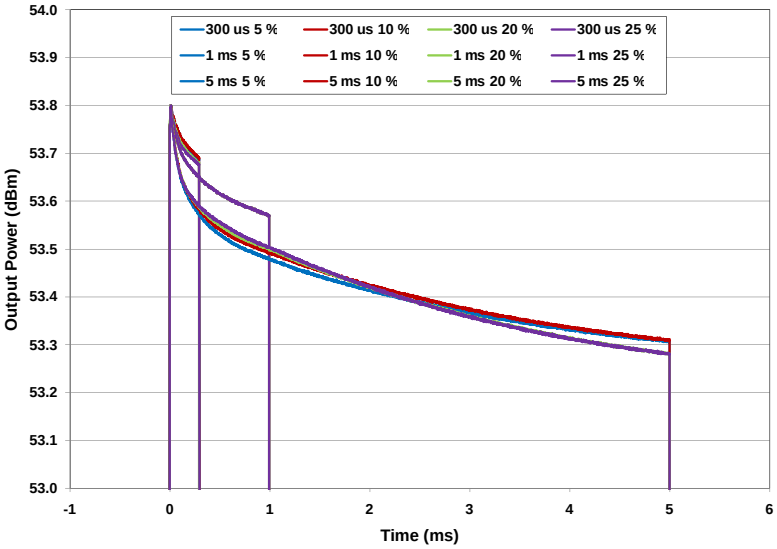
Typical Performance

Typical Pulsed Output Power and Power Added Efficiency vs Frequency Measured in CGH35240-AMP Amplifier Circuit.
V_{DS} = 28 V, I_{DS} = 1 A, P_{IN} = 42 dBm, Pulse Width = 300 µS, Duty Cycle = 20%



Typical Pulse Droop Performance



Pulse Width	Duty Cycle (%)	Droop (dB)
10 us	5-25	0.05
50 us	5-25	0.05
100 us	5-25	0.10
300 us	5-25	0.15
1 ms	5-25	0.30
5 ms	5-25	0.60

Electrostatic Discharge (ESD) Classifications

Parameter	Symbol	Class	Test Methodology
Human Body Model	HBM	1A (> 250 V)	JEDEC JESD22 A114-D
Charge Device Model	CDM	II (200 < 500 V)	JEDEC JESD22 C101-C

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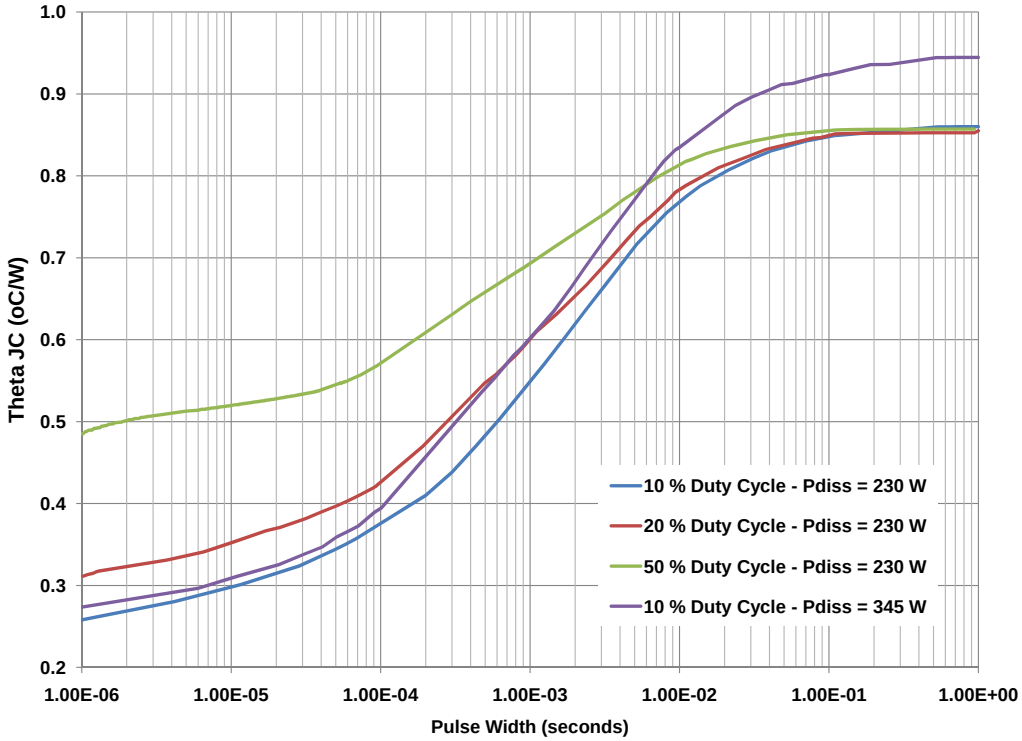
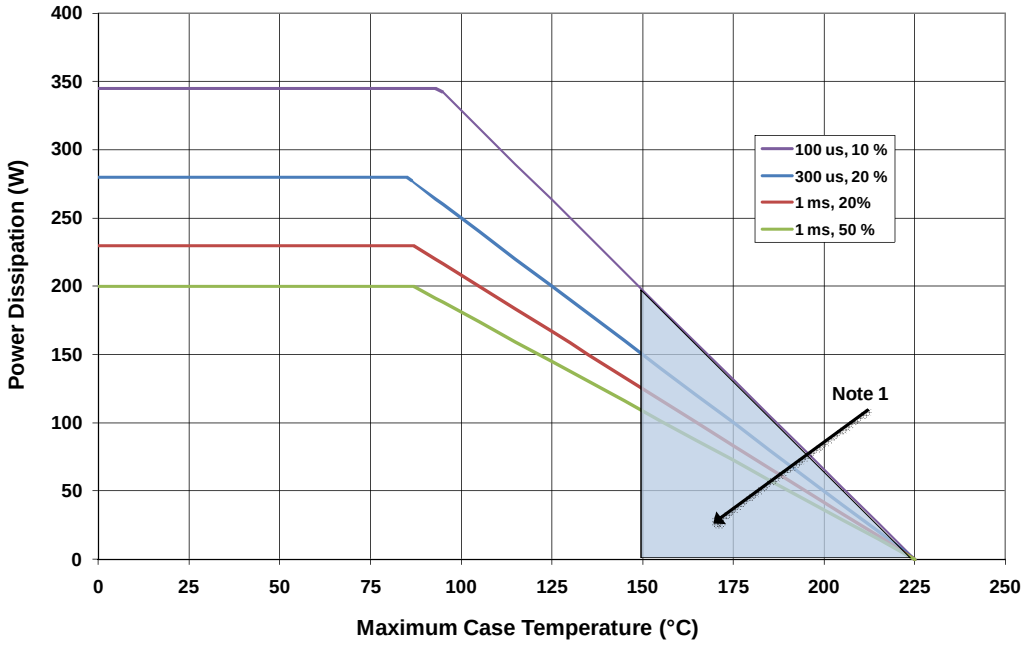
CGH35240F Transient Thermal Curve



CGH35240 Transient Power Dissipation De-rating Curve



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

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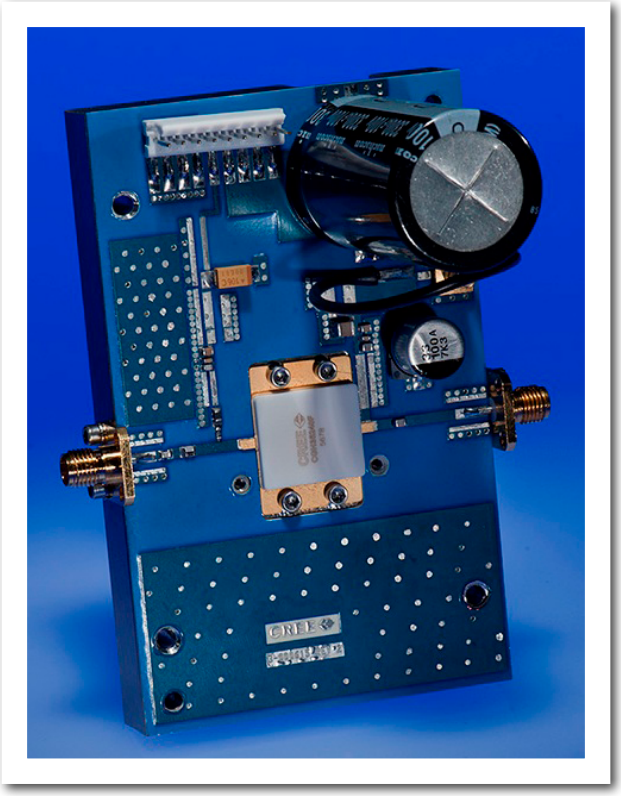
CGH35240F-AMP Demonstration Amplifier Circuit Bill of Materials

Designator	Description	Qty
R1	RES, 511 OHM, +/- 1%, 1/16W,0603	1
R2	RES, 5.1,OHM, +/- 1%, 1/16W,0603	1
C1,C3	CAP, 10.0pF, +/-5%,250V, 0603,	2
C2	CAP, 6.8pF, +/- 0.25 pF,250V, 0603	1
C4,C11	CAP, 470PF, +/-5%, 100V, 0603, X	2
C15	CAP, 33 UF, 20%, G CASE	1
C5,C12	CAP,33000PF, 0805,100V, X7R	2
C13	CAP, 1.0UF, 100V, 10%, X7R, 1210	1
C6	CAP 10UF 16V TANTALUM	1
C9,C10	CAP, 10pF, +/- 1%, 250V, 0805	2
C16	CAP, 3300 UF, +/-20%, 100V, ELECTROLYTIC	1
J1,J2	CONN, SMA, PANEL MOUNT JACK, FL	2
J3	HEADER RT>PLZ .1CEN LK 9POS	1
J4	CONNECTOR ; SMB, Straight, JACK,SMD	1
W1	CABLE ,18 AWG, 4.2	1
L1	FERRITE, 22 OHM, 0805, BLM21PG220SN1	1
-	PCB, RO4350, 2.5 X 4.0 X 0.030	1
Q1	CGH35240F	1

CGH35240F-AMP Demonstration Amplifier Circuit



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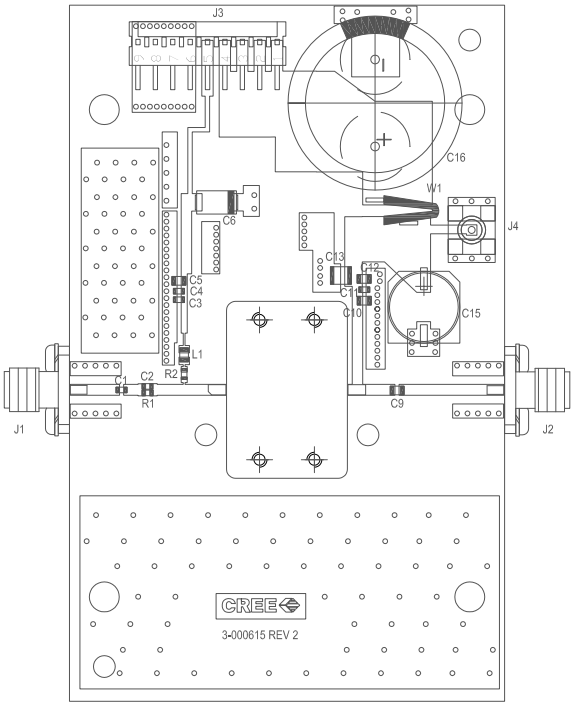
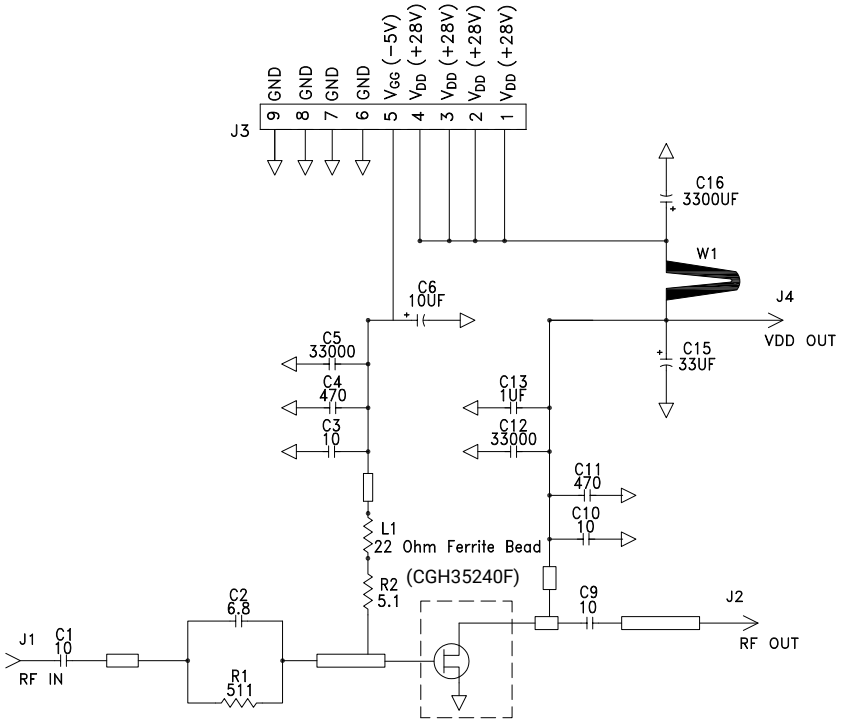
CGH35240F-AMP Demonstration Amplifier Circuit Outline



CGH35240F-AMP Demonstration Amplifier Circuit Schematic



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Typical Package S-Parameters for CGH35240F
(Small Signal, V_{DS} = 28 V, I_{DQ} = 1000 mA, angle in degrees)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
500 MHz	0.909	-110.39	0.67	85.30	0.001	7.79	0.931	-175.71
600 MHz	0.887	-133.63	0.68	52.25	0.001	-22.14	0.926	161.61
700 MHz	0.861	-157.29	0.67	21.72	0.002	-50.42	0.925	140.70
800 MHz	0.831	178.80	0.65	-6.95	0.002	-74.38	0.924	120.94
900 MHz	0.800	154.60	0.64	-34.16	0.002	-110.45	0.924	101.95
1.0 GHz	0.770	130.18	0.63	-60.27	0.002	-135.64	0.924	83.44
1.2 GHz	0.723	80.74	0.64	-110.13	0.002	166.59	0.919	46.75
1.4 GHz	0.698	29.48	0.69	-160.34	0.002	127.53	0.896	9.09
1.6 GHz	0.618	-28.54	0.76	137.30	0.004	116.81	0.766	-28.92
1.8 GHz	0.443	-48.39	0.45	107.33	0.003	53.00	0.861	-47.01
2.0 GHz	0.569	-89.52	0.69	73.39	0.003	-0.59	0.915	-88.98
2.1 GHz	0.594	-111.61	0.83	51.20	0.004	-23.48	0.913	-108.69
2.2 GHz	0.606	-133.58	1.01	28.33	0.005	-45.69	0.908	-128.26
2.3 GHz	0.607	-155.92	1.25	4.25	0.007	-71.50	0.902	-148.11
2.4 GHz	0.595	-179.54	1.59	-21.28	0.009	-99.04	0.895	-168.80
2.5 GHz	0.561	154.35	2.11	-49.48	0.013	-129.12	0.883	169.09
2.6 GHz	0.499	124.82	2.87	-80.80	0.018	-161.39	0.861	144.62
2.7 GHz	0.376	85.52	4.03	-118.36	0.027	161.11	0.813	115.40
2.8 GHz	0.177	20.59	5.38	-164.13	0.039	115.01	0.690	79.55
2.9 GHz	0.165	-127.79	6.17	144.62	0.049	64.36	0.480	37.79
3.0 GHz	0.309	163.81	6.11	96.28	0.052	15.24	0.288	-7.26
3.1 GHz	0.354	118.49	5.80	52.70	0.052	-28.98	0.208	-64.36
3.2 GHz	0.329	74.79	5.47	11.41	0.052	-70.29	0.236	-120.98
3.3 GHz	0.286	23.15	5.19	-29.09	0.052	-110.99	0.302	-160.98
3.4 GHz	0.300	-38.01	4.94	-70.05	0.052	-151.88	0.354	167.78
3.5 GHz	0.406	-96.34	4.55	-112.29	0.050	165.57	0.350	142.39
3.6 GHz	0.565	-143.08	4.00	-154.80	0.046	122.85	0.300	127.36
3.7 GHz	0.708	177.87	3.32	163.85	0.040	81.34	0.271	127.66
3.8 GHz	0.799	143.73	2.64	125.19	0.033	42.95	0.321	129.68
3.9 GHz	0.847	113.69	2.09	89.39	0.027	7.05	0.410	122.23
4.0 GHz	0.868	85.65	1.65	56.14	0.022	-25.45	0.497	108.92
4.2 GHz	0.853	30.51	1.10	-6.76	0.016	-84.72	0.622	78.62
4.4 GHz	0.803	-32.21	0.75	-69.35	0.012	-148.46	0.700	47.77
4.6 GHz	0.765	-101.68	0.51	-131.73	0.008	147.89	0.743	16.36
4.8 GHz	0.770	-166.93	0.32	167.88	0.005	101.70	0.762	-17.52
5.0 GHz	0.785	141.18	0.20	113.11	0.004	59.25	0.747	-56.70
5.2 GHz	0.786	100.39	0.13	60.03	0.005	5.11	0.676	-106.08
5.4 GHz	0.761	65.91	0.08	-1.66	0.007	-83.46	0.447	-179.99
5.6 GHz	0.691	35.57	0.03	-48.77	0.005	159.03	0.055	2 122.03
5.8 GHz	0.608	11.51	0.02	-59.15	0.004	57.07	0.310	23.86
6.0 GHz	0.604	-18.74	0.01	-102.12	0.003	-9.32	0.594	-75.04

To download the s-parameters in s2p format, go to the CGH35240F Product Page and click on the documentation tab.

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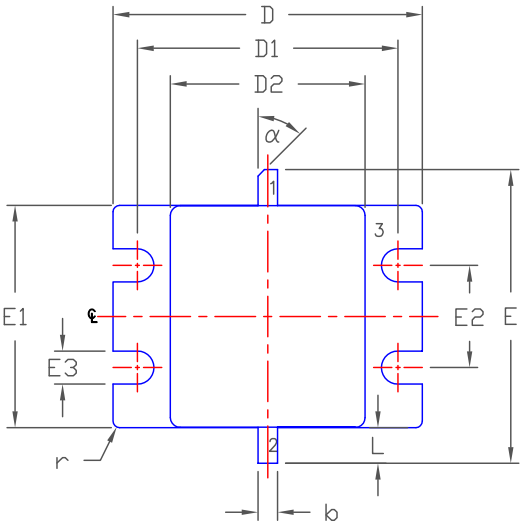
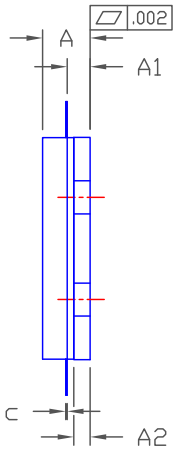
Product Dimensions CGH35240F (Package Type — 440201)





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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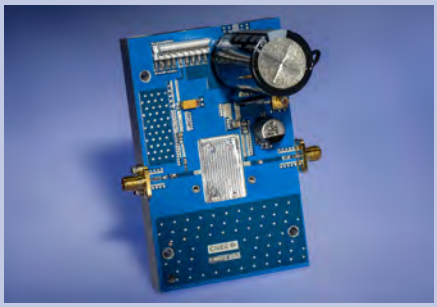
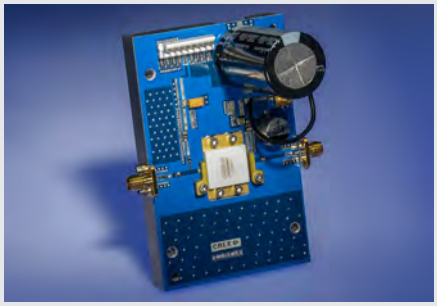
Product Ordering Information

Order Number	Description	Unit of Measure	Image
CGH35240F	GaN HEMT	Each	
CGH35240F-TB	Test board without GaN HEMT	Each	
CGH35240F-AMP	Test board with GaN HEMT installed	Each	

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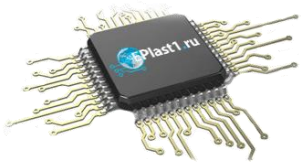
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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

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