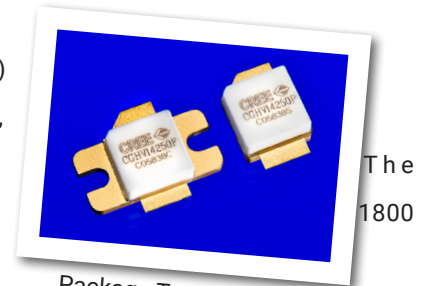


CGHV14250

250 W, 1200 - 1400 MHz, GaN HEMT for L-Band Radar Systems

Cree's CGHV14250 is a gallium nitride (GaN) high electron mobility transistor (HEMT) designed specifically with high efficiency, high gain and wide bandwidth capabilities, which makes the CGHV14250 ideal for 1.2 - 1.4 GHz L-Band radar amplifier applications. This transistor could be utilized for band specific applications ranging from UHF through 1800 MHz. The package options are ceramic/metal flange and pill package.



Package Type: 440162, 440161
PN: CGHV14250

Typical Performance Over 1.2-1.4 GHz ($T_c = 25^\circ\text{C}$) of Demonstration Amplifier

| Parameter | 1.2 GHz | 1.25 GHz | 1.3 GHz | 1.35 GHz | 1.4 GHz | Units |
|------------------|---------|----------|---------|----------|---------|-------|
| Output Power | 365 | 365 | 350 | 310 | 330 | W |
| Gain | 18.6 | 18.6 | 18.4 | 17.9 | 18.2 | dB |
| Drain Efficiency | 80 | 80 | 77 | 74 | 76 | % |

Note:

Measured in the CGHV14250-AMP1 amplifier circuit, under 500 μs pulse width, 10% duty cycle, $P_{IN} = 37 \text{ dBm}$.

Features

- Reference design amplifier 1.2 - 1.4 GHz Operation
- FET Tuning range UHF through 1800 MHz
- 330 W Typical Output Power
- 18 dB Power Gain
- 77% Typical Drain Efficiency
- <0.3 dB Pulsed Amplitude Droop
- Internally pre-matched on input, unmatched output

Large Signal Models Available for ADS and MWO

Absolute Maximum Ratings (not simultaneous)

| Parameter | Symbol | Rating | Units | Conditions |
|--|------------------|-----------|-------|---|
| 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} | 42 | mA | 25°C |
| Maximum Drain Current ¹ | I_{DMAX} | 18 | A | 25°C |
| Soldering Temperature ² | T_S | 245 | °C | |
| Screw Torque | τ | 40 | in-oz | |
| CW Thermal Resistance, Junction to Case ³ | $R_{\theta JC}$ | 0.95 | °C/W | $P_{DISS} = 167\text{ W}, 65^\circ\text{C}$ |
| Pulsed Thermal Resistance, Junction to Case ³ | $R_{\theta JCS}$ | 0.57 | °C/W | $P_{DISS} = 167\text{ W}, 500\ \mu\text{sec}, 10\%, 85^\circ\text{C}$ |
| Pulsed Thermal Resistance, Junction to Case ⁴ | $R_{\theta JC}$ | 0.63 | °C/W | $P_{DISS} = 167\text{ W}, 500\ \mu\text{sec}, 10\%, 85^\circ\text{C}$ |
| Case Operating Temperature ⁵ | T_C | -40, +130 | °C | $P_{DISS} = 167\text{ W}, 500\ \mu\text{sec}, 10\%$ |

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 CGHV14250P

⁴ Measured for the CGHV14250F

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

Electrical Characteristics

| Characteristics | Symbol | Min. | Typ. | Max. | Units | Conditions |
|--|--------------|------|-------|------|----------|---|
| DC Characteristics¹ ($T_C = 25^\circ\text{C}$) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | -3.8 | -3.0 | -2.3 | V_{DC} | $V_{DS} = 10\text{ V}, I_D = 41.8\text{ mA}$ |
| Gate Quiescent Voltage | $V_{GS(Q)}$ | - | -2.7 | - | V_{DC} | $V_{DS} = 50\text{ V}, I_D = 500\text{ mA}$ |
| Saturated Drain Current ² | I_{DS} | 31.4 | 37.6 | - | A | $V_{DS} = 6.0\text{ V}, V_{GS} = 2.0\text{ V}$ |
| Drain-Source Breakdown Voltage | V_{BR} | 150 | - | - | V_{DC} | $V_{GS} = -8\text{ V}, I_D = 41.8\text{ mA}$ |
| RF Characteristics³ ($T_C = 25^\circ\text{C}, F_0 = 1.3\text{ GHz}$ unless otherwise noted) | | | | | | |
| Output Power | P_{OUT} | 275 | 330 | - | W | $V_{DD} = 50\text{ V}, I_{DQ} = 500\text{ mA}, P_{IN} = 37\text{ dBm}$ |
| Drain Efficiency | D_E | 63 | 77 | - | % | $V_{DD} = 50\text{ V}, I_{DQ} = 500\text{ mA}, P_{IN} = 37\text{ dBm}$ |
| Power Gain | G_p | - | 18.2 | - | dB | $V_{DD} = 50\text{ V}, I_{DQ} = 500\text{ mA}, P_{IN} = 37\text{ dBm}$ |
| Pulsed Amplitude Droop | D | - | -0.3 | - | dB | $V_{DD} = 50\text{ V}, I_{DQ} = 500\text{ mA}$ |
| Output Mismatch Stress | VSWR | - | 5 : 1 | - | Ψ | No damage at all phase angles, $V_{DD} = 50\text{ V}, I_{DQ} = 500\text{ mA}, P_{IN} = 37\text{ dBm}$ Pulsed |

Notes:

¹ Measured on wafer prior to packaging.

² Scaled from PCM data.

³ Measured in CGHV14250-AMP1. Pulse Width = 500 μs , Duty Cycle = 10%.

Typical Performance

Figure 1. - CGHV14250 Typical Sparameters

$T_{case} = 25^{\circ}C$ $V_{DD} = 50 V$, $I_{DQ} = 500 mA$

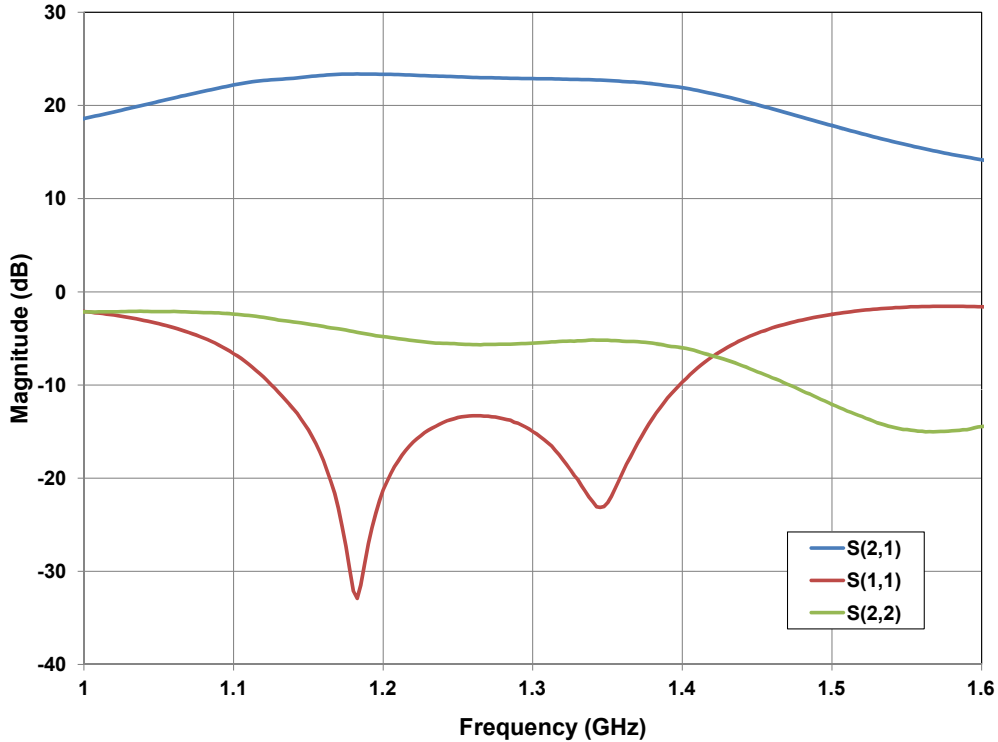
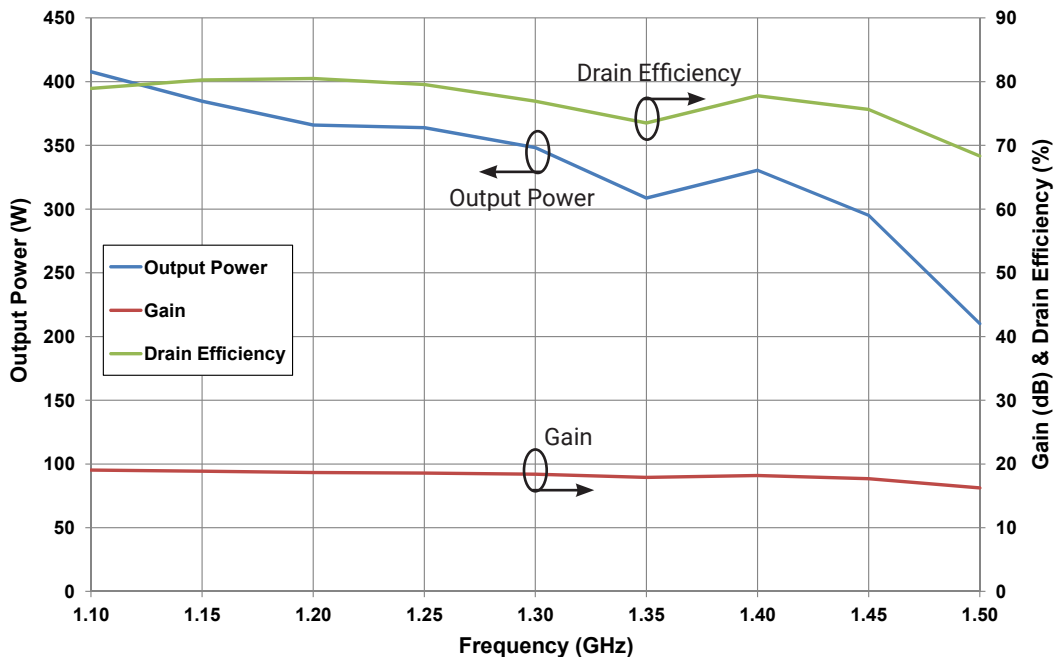


Figure 2. - CGHV14250 Typical RF Results

$V_{DD} = 50 V$, $I_{DQ} = 500 mA$, $P_{IN} = 37 dBm$

$T_{case} = 25^{\circ}C$, Pulse Width = 500 μs , Duty Cycle = 10 %



Typical Performance

Figure 3. - CGHV14250 Typical RF Results

$V_{DD} = 50\text{ V}$, $I_{DQ} = 500\text{ mA}$, $P_{IN} = 37\text{ dBm}$
 $T_{case} = 85^\circ\text{C}$, Pulse Width = $500\ \mu\text{s}$, Duty Cycle = 10 %

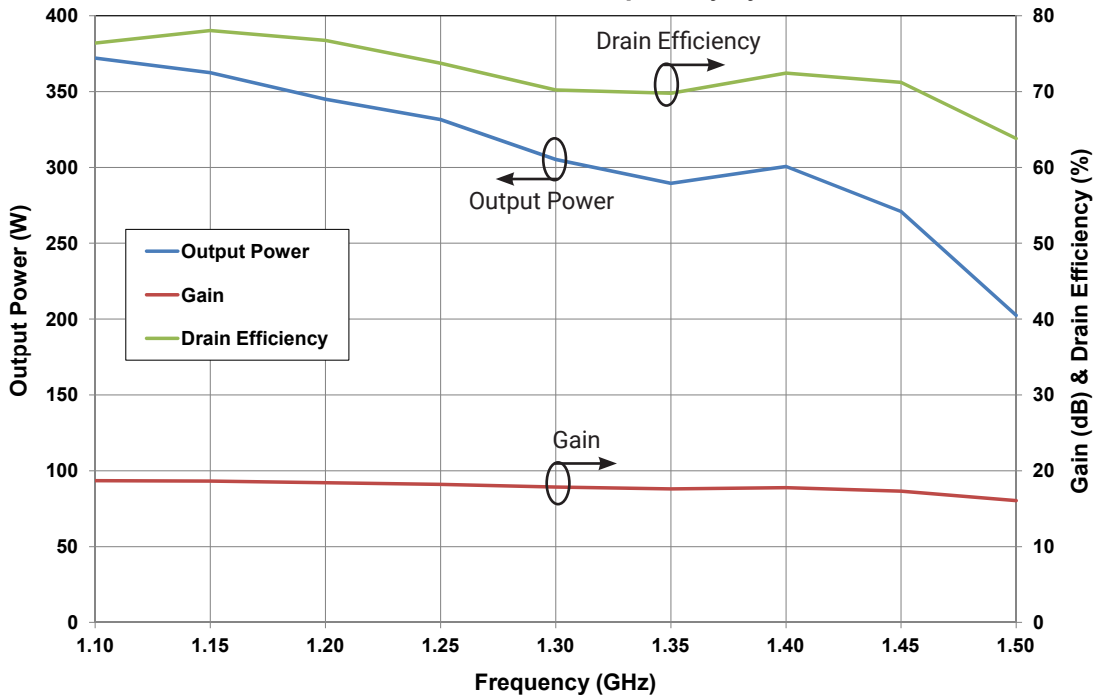
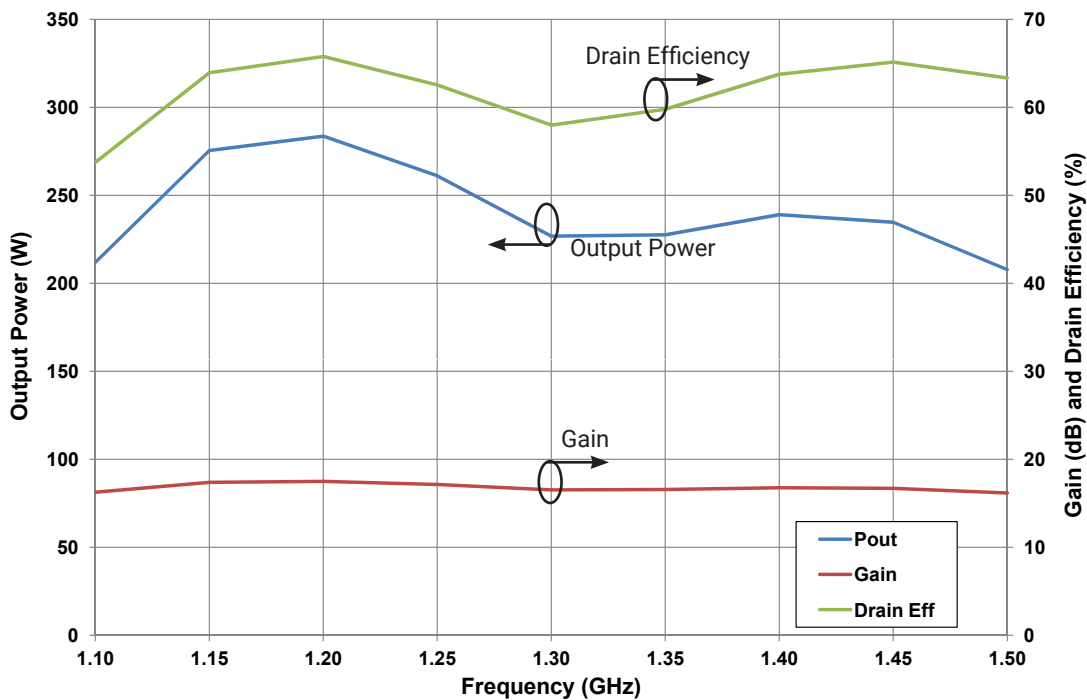
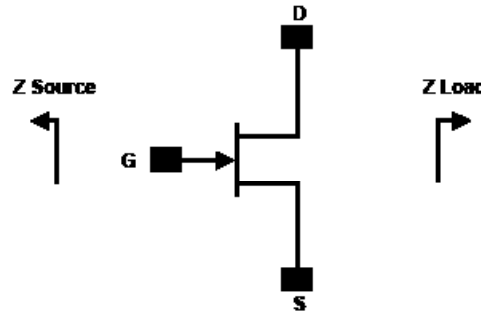


Figure 4. - CGHV14250 CW RF Results

$V_{DD} = 50\text{ V}$, $I_{DQ} = 500\text{ mA}$, $P_{IN} = 37\text{ dBm}$, $T_{case} = 65^\circ\text{C}$



Source and Load Impedances



| Frequency (MHz) | Z Source | Z Load |
|-----------------|------------|------------|
| 900 | 0.6 - j0.3 | 5.3 + j0.1 |
| 1000 | 0.7 - j0.8 | 4.3 + j0.8 |
| 1100 | 1.3 - j1.1 | 3.3 + j0.8 |
| 1200 | 1.8 - j1.1 | 3.0 + j0.4 |
| 1300 | 2.5 - j0.7 | 2.5 + j0.4 |
| 1400 | 3.4 - j0.7 | 2.3 + j0.1 |
| 1500 | 1.8 - j0.9 | 2.3 + j0 |

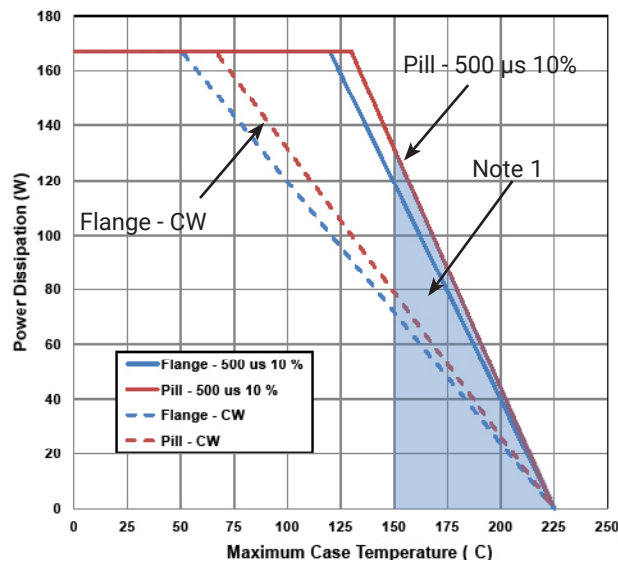
Note 1. $V_{DD} = 50\text{ V}$, $I_{DQ} = 500\text{ mA}$ in the 440162 package

Note 2. Optimized for power gain, P_{SAT} and Drain Efficiency

Note 3. When using this device at low frequency, series resistors should be used to maintain amplifier stability

CGHV14250F Power Dissipation De-rating Curve

Figure 4. - CGHV14250 Transient Power Dissipation De-Rating Curve

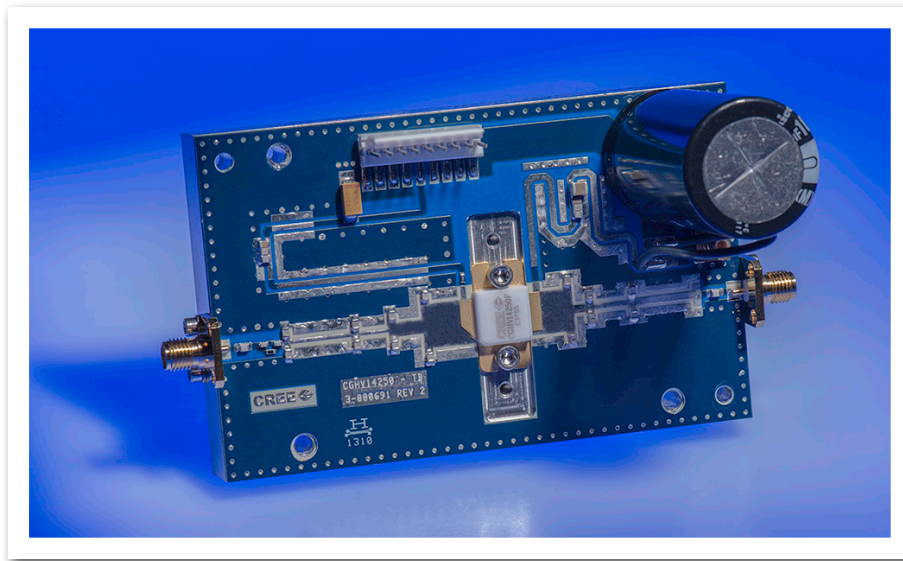


Note 1. Area exceeds Maximum Case Temperature (See Page 2).

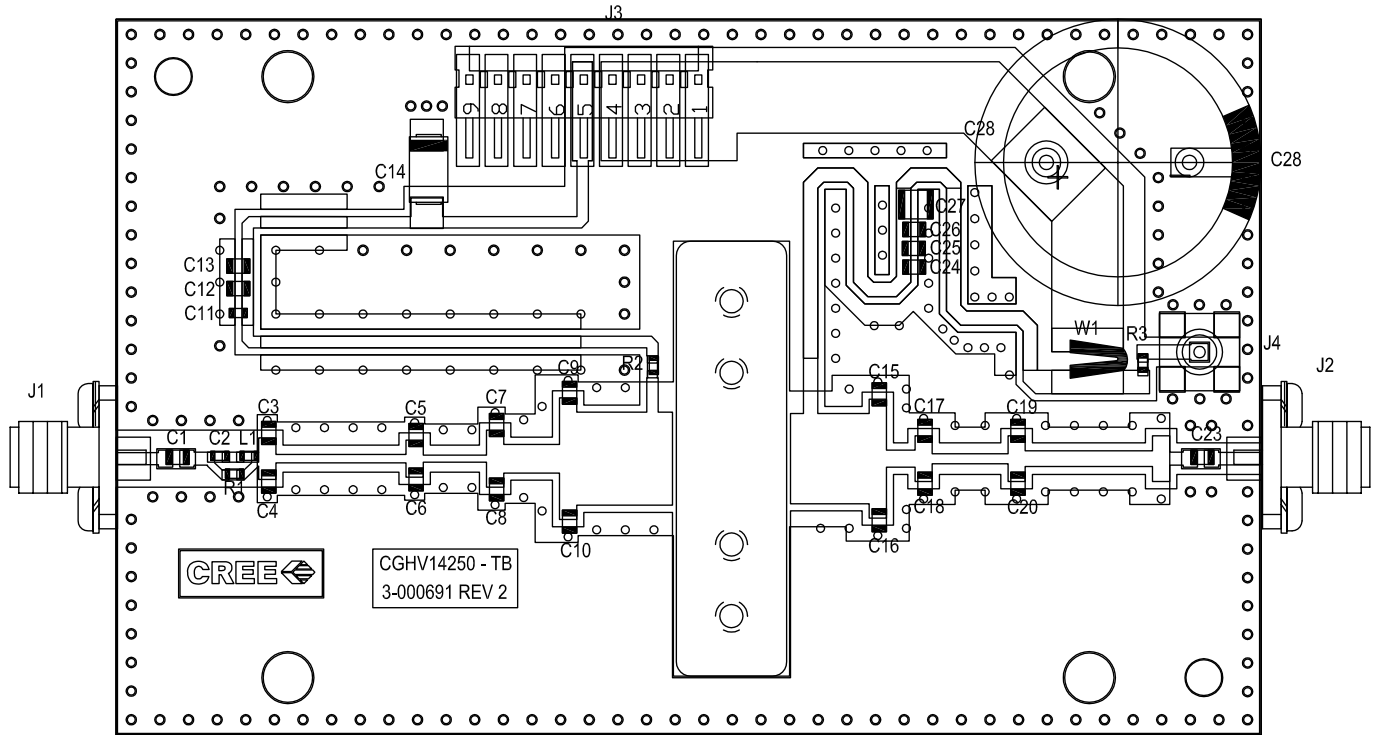
CGHV14250-AMP1 Demonstration Amplifier Circuit Bill of Materials

| Designator | Description | Qty |
|-----------------|---|-----|
| R1 | RES, 1/16W, 0603, 1%, 562 OHMS | 1 |
| R2 | RES, 5.1 OHM, +/-1%, 1/16W, 0603 | 1 |
| R3 | RES, 1/16W, 0603, 1%, 4700 OHMS | 1 |
| L1 | INDUCTOR, CHIP, 6.8 nH, 0603 SMT | 1 |
| C1, C23 | CAP, 27pF, +/- 5%, 250V, 0805, ATC 600F | 2 |
| C2 | CAP, 2.0pF, +/- 0.1pF, 0603, ATC | 1 |
| C3, C4 | CAP, 0.5pF, +/-0.05pF, 0805, ATC 600F | 2 |
| C5,C6 | CAP, 1.0pF, +/-0.05 pF, 0805, ATC 600F | 2 |
| C7,C8,C9,C10 | CAP, 3.0pF, +/-0.1pF, 250V, 0805, ATC 600F | 4 |
| C11,C24 | CAP, 47pF,+/-5%, 250V, 0805, ATC 600F | 2 |
| C12,C25 | CAP, 100pF, +/-5%, 250V, 0805, ATC 600F | 2 |
| C13,C26 | CAP, 33000PF, 0805,100V, X7R | 2 |
| C14 | CAP 10uF 16V TANTALUM | 1 |
| C15,C16,C17,C18 | CAP, 3.9pF, +/-0.1pF, 250V, 0805, ATC 600F | 4 |
| C19,C20 | CAP, 1.2pF, +/-0.05pF, 0805, ATC 600F | 2 |
| C27 | CAP, 1.0UF, 100V, 10%, X7R, 1210 | 1 |
| C28 | 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 |
| | PCB, RO4350, 0.020 MIL THK, CGHV14250, 1.2-1.4GHZ | 1 |
| Q1 | CGHV14250 | 1 |

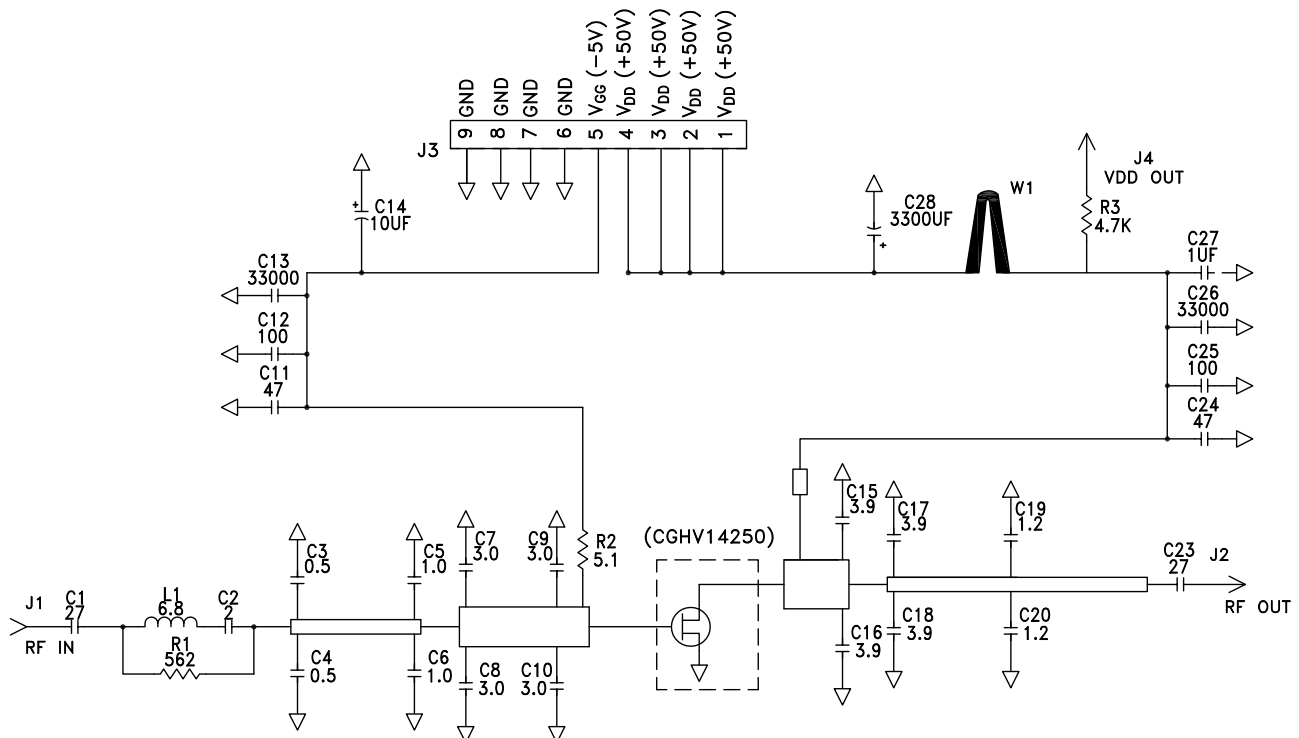
CGHV14250-AMP1 Demonstration Amplifier Circuit



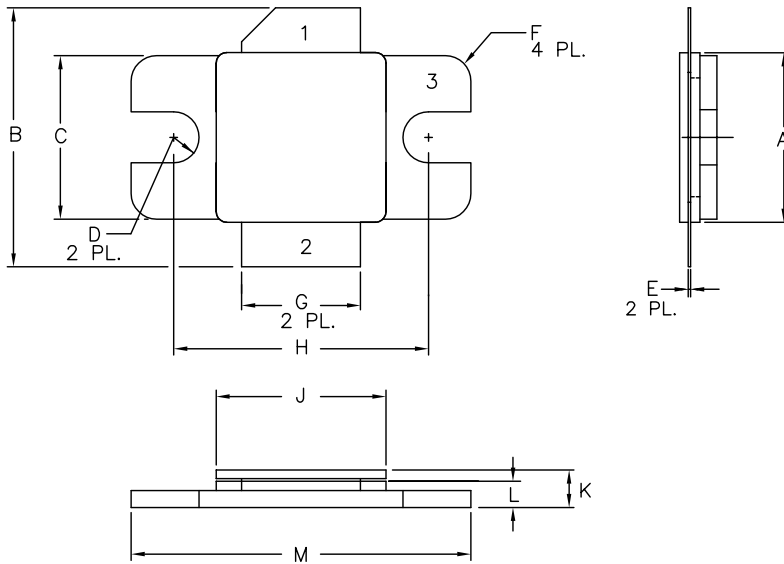
CGHV14250-AMP1 Demonstration Amplifier Circuit Outline



CGHV14250-AMP1 Demonstration Amplifier Circuit Schematic



Product Dimensions CGHV14250F (Package Type – 440162)



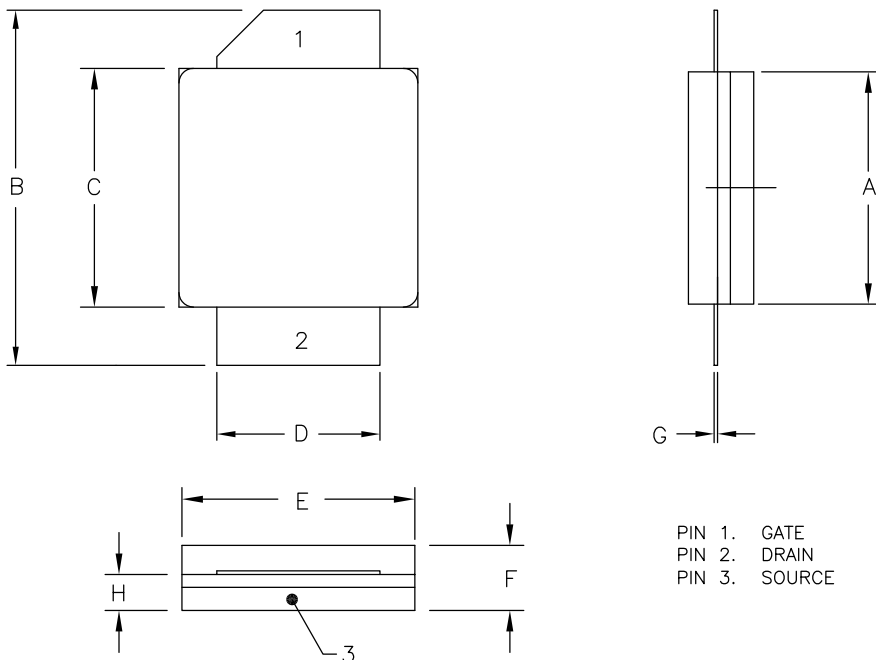
NOTES:

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 CGHV14250P (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

Part Number System

CGHV14250F



| Parameter | Value | Units |
|------------------------------|----------------------------|-------|
| Upper Frequency ¹ | 1.4 | GHz |
| Power Output | 250 | W |
| Type | F = Flanged P = Package | - |


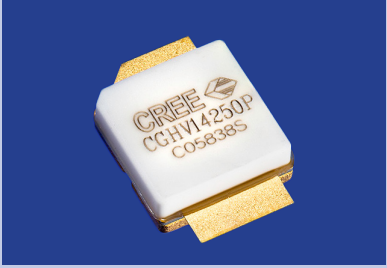
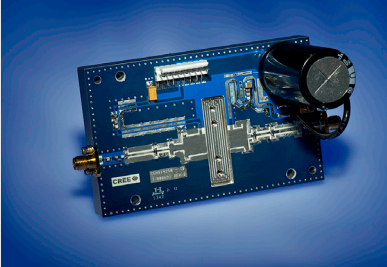
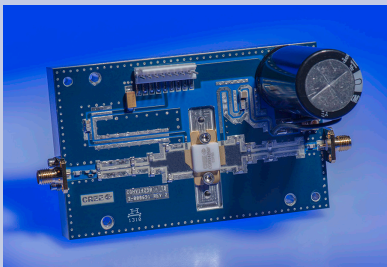
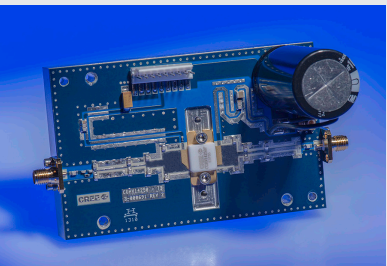
Table 1.

Note¹: 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.

Product Ordering Information

| Order Number | Description | Unit of Measure | Image |
|-----------------|------------------------------------|-----------------|---|
| CGHV14250F | GaN HEMT | Each |  |
| CGHV14250P | GaN HEMT | Each |  |
| CGHV14250-TB | Test board without GaN HEMT | Each |  |
| CGHV14250P-AMP1 | Test board with GaN HEMT installed | Each |  |
| CGHV14250F-AMP1 | Test board with GaN HEMT installed | Each |  |



Disclaimer

Specifications are subject to change without notice. Cree, Inc. believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Cree for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Cree. Cree makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose. "Typical" parameters are the average values expected by Cree in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer's technical experts for each application. Cree products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Cree product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.

For more information, please contact:

Cree, Inc.
4600 Silicon Drive
Durham, North Carolina, USA 27703
www.cree.com/rf

Sarah Miller
Marketing
Cree, RF Components
1.919.407.5302

Ryan Baker
Marketing & Sales
Cree, RF Components
1.919.407.7816

Tom Dekker
Sales Director
Cree, RF Components
1.919.407.5639



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

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.