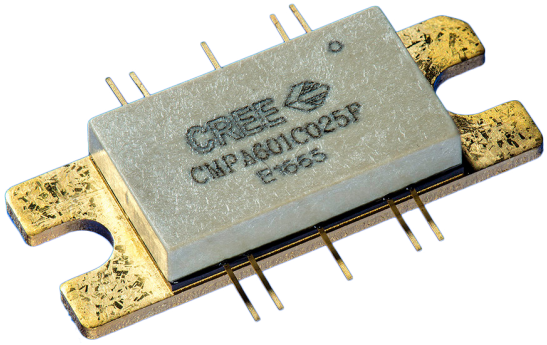
CMPA601C025F

25 W, 6.0 - 12.0 GHz, GaN MMIC, Power Amplifier

Description

The CMPA601C025F is a gallium nitride (GaN) High Electron Mobility Transistor (HEMT) based monolithic microwave integrated circuit (MMIC) on a silicon carbide (SiC) substrate, using a 0.25 µm gate length fabrication process. The semiconductor offers 25 Watts of power from 6 to 12 GHz of instantaneous bandwidth. The GaN HEMT MMIC is housed in a thermally-enhanced, 10-lead 25 mm x 9.9 mm metal/ceramic flanged package. It offers high gain and superior efficiency in a small footprint package at 50 ohms.



PN: CMPA601C025F
Package Type: 440213

Typical Performance Over 6.0-12.0 GHz (T_c = 25˚C)

Parameter	6.0 GHz	7.5 GHz	9.0 GHz	10.5 GHz	12.0 GHz	Units
Small Signal Gain	35	34	34	37	31	dB
P_{OUT} @ P_{IN} = 22 dBm	34	51	49	45.9	36.5	W
Power Gain @ P_{IN} = 22 dBm	23	25	25	25	23.5	dB
PAE @ P_{IN} = 22 dBm	21	36	35	33	27	%

Note: All data CW

Features

- 34 dB Small Signal Gain
- 40 W Typical P_{SAT}
- Operation up to 28 V
- High Breakdown Voltage
- High Temperature Operation
- Size 0.172 x 0.239 x 0.004 inches

Applications

- Jamming Amplifiers
- Test Equipment Amplifiers
- Broadband Amplifiers

RoHS COMPLIANT

Absolute Maximum Ratings (not simultaneous) at 25˚C

Parameter	Symbol	Rating	Units	Conditions
Drain-source Voltage	V_{DS}	84	V_{DC}	25˚C
Gate-source Voltage	V_{GS}	-10, +2	V_{DC}	25˚C
Storage Temperature	T_{STG}	-40, +150	˚C	
Operating Junction Temperature	T_J	225	˚C	
Maximum Forward Gate Current	I_{GMAX}	23	mA	25˚C
Soldering Temperature[1]	T_{STG}	245	˚C	
Screw Torque	T	40	in-oz	
Thermal Resistance, Junction to Case[2]	$R_{\theta JC}$	0.85	˚C/W	85˚C @ P_{DISS} = 116 W
Case Operating Temperature[2]	T_C	-40, +150	˚C	

Notes:
[1] Refer to the Application Note on soldering at wolfspeed.com/rf/document-library
[2] See also, the Power Dissipation De-rating Curve on page 4

Electrical Characteristics (Frequency = 6.0 GHz to 12.0 GHz unless otherwise stated; T_C = 25˚C)

Characteristics	Symbol	Min.	Typ.	Max.	Units	Conditions
DC Characteristics[1,2]						
Gate Threshold	V_{TH}	-3.8	-2.8	-2.3	V	V_{DS} = 10 V, I_D = 23 mA
Saturated Drain Current	I_{DS}	10.6	13.0	–	A	V_{DS} = 6 V, V_{GS} = 2 V
Drain-Source Breakdown Voltage	V_{BD}	84	100	–	V	V_{GS} = -8 V, I_{DS} = 23 mA
RF Characteristics[3]						
Small Signal Gain	S21	28	31	–	dB	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = -30 dBm, Frequency = 6.0 - 10.5 GHz
Small Signal Gain	S21	25	28	–	dB	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = -30 dBm, Frequency = 10.5 - 12 GHz
Output Power[3,4]	P_{OUT1}	45.5	47.2	–	dBm	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = 22 dBm, Freq = 6 GHz
Output Power[3,4]	P_{OUT2}	45.5	47.1	–	dBm	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = 22 dBm, Freq = 9.5 GHz
Output Power[3,4]	P_{OUT3}	43.0	44.8	–	dBm	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = 22 dBm, Freq = 12 GHz
Power Added Efficiency[3,4]	PAE_1	23	33.2	–	%	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = 22 dBm, Freq = 6 GHz
Power Added Efficiency[3,4]	PAE_2	26	32.3	–	%	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = 22 dBm, Freq = 9.5 GHz
Power Added Efficiency[3,4]	PAE_3	15.5	26.5	–	%	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = 22 dBm, Freq = 12 GHz
Input Return Loss	S11	–	-5	–	dB	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = -30 dBm
Output Return Loss	S22	–	-5	–	dB	V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = -30 dBm
Output Mismatch Stress	VSWR	–	5:1	VSWR	Ψ	No damage at all phase angles, V_{DD} = 28 V, I_{DQ} = 2 A, P_{IN} = 22 dBm

Notes:
[1] Measured on-wafer prior to packaging
[2] Scaled from PCM data
[3] Measured in CMPA601C025F-AMP with 12.4 GHz low pass filter
[4] Fixture loss de-embedded using the following offsets. The offset is subtracted from the input offset value and added to the output offset value.
a) 6.0 GHz - 0.13 dB
b) 9.50 GHz - 0.26 dB
c) 12.0 GHz - 0.35 dB

CMPA601C025F Typical Performance

Figure 1. Small Signal S-Parameters vs. Frequency
V_{DD} = 28 V, I_{DQ} = 2.0 A, P_{IN} = -30 dBm

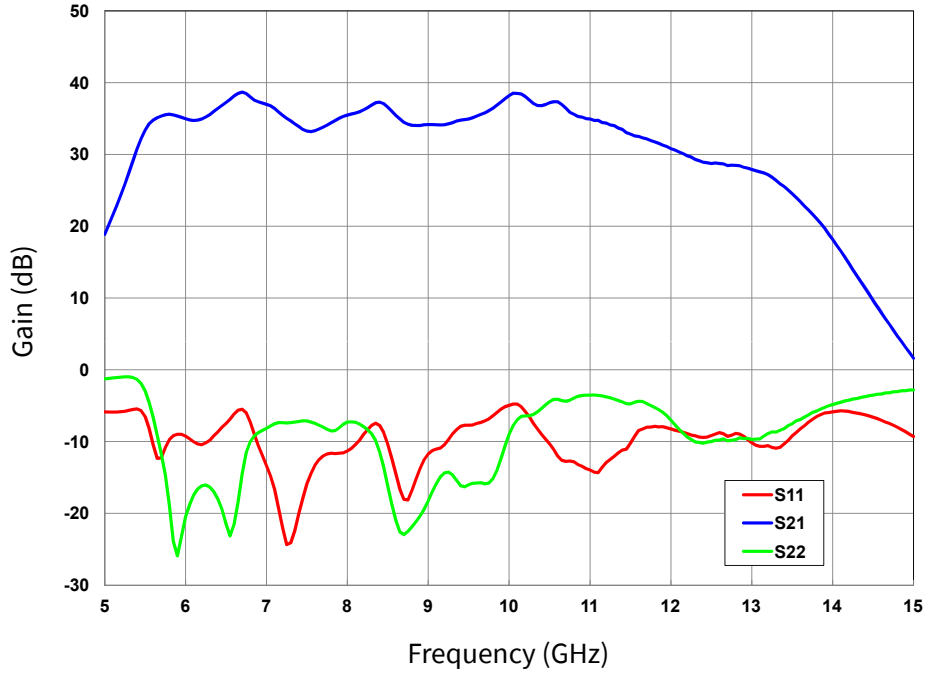
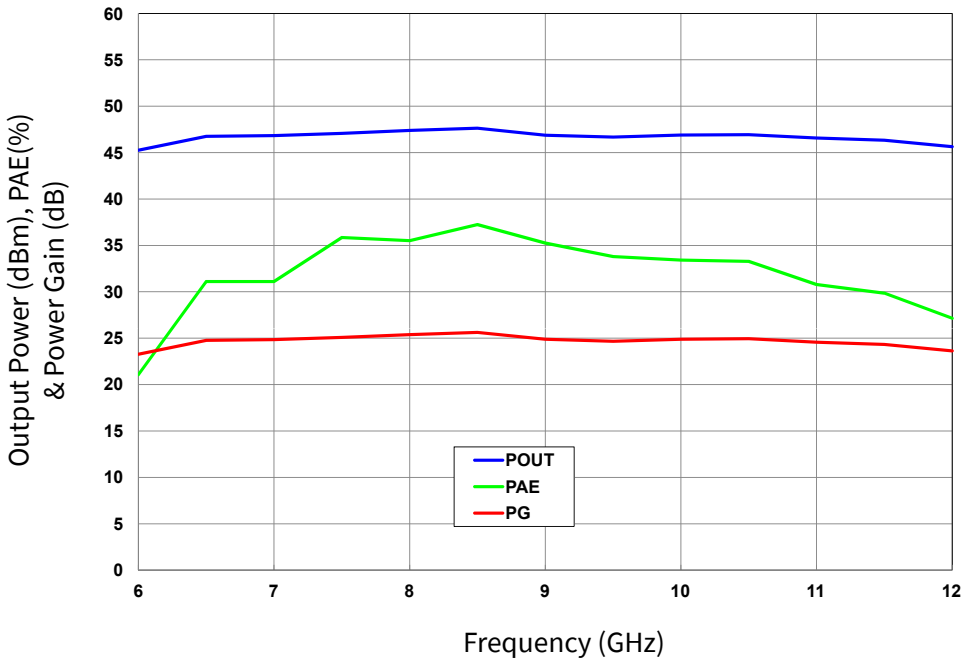


Figure 2. Output Power, Gain and Power Added Efficiency vs. Frequency
V_{DD} = 28 V, I_{DQ} = 2.0 A, P_{IN} = 22 dBm



CMPA601C025F Typical Performance

Figure 3. Power Added Efficiency vs. Input Power
V_{DD} = 28 V, I_{DQ} = 2.0 A

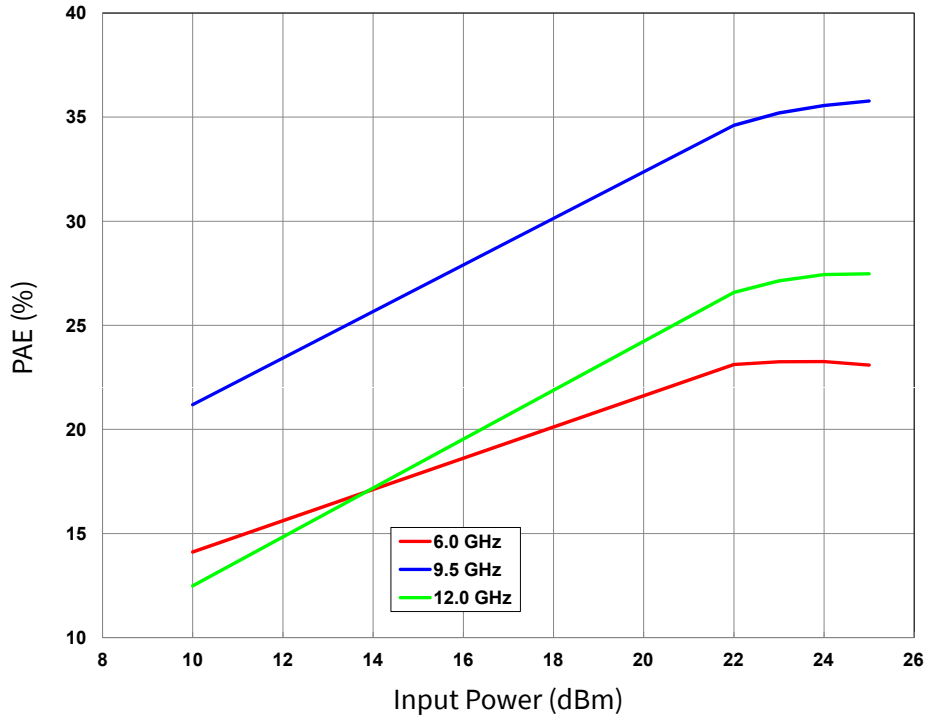
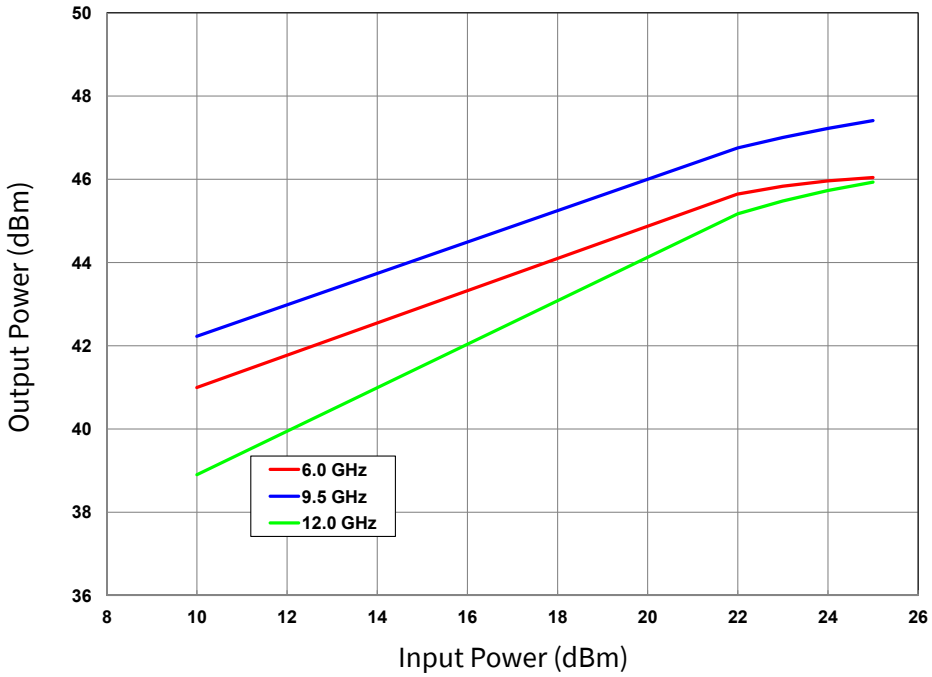


Figure 4. Output Power vs. Input Power
V_{DD} = 28 V, I_{DQ} = 2.0 A



CMPA601C025F Typical Performance

Figure 5. Gain vs Input Power
V_{DD} = 28 V, I_{DQ} = 2.0 A

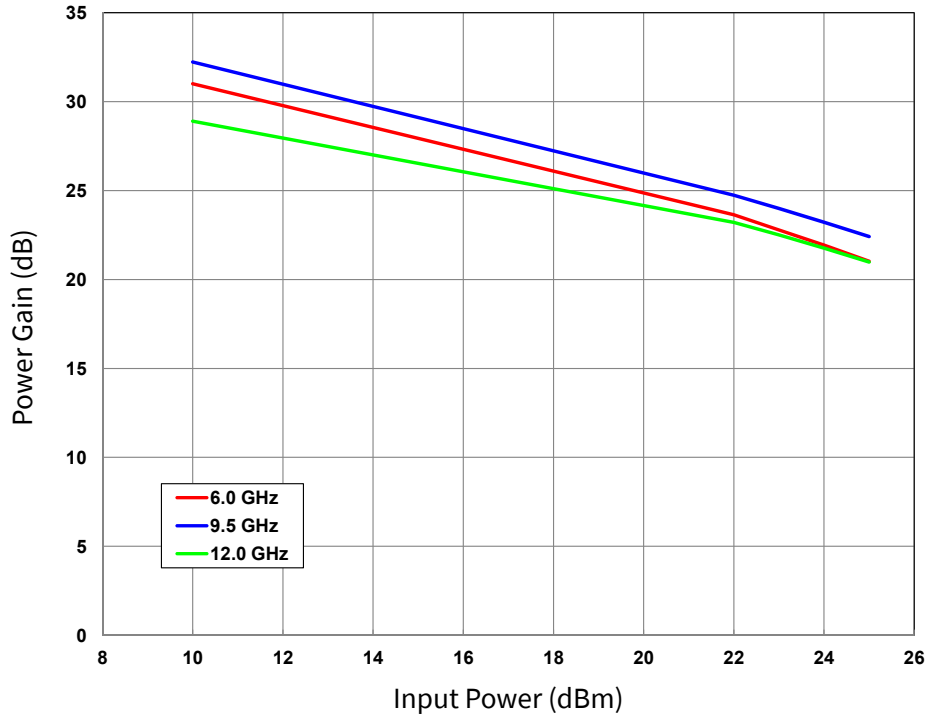
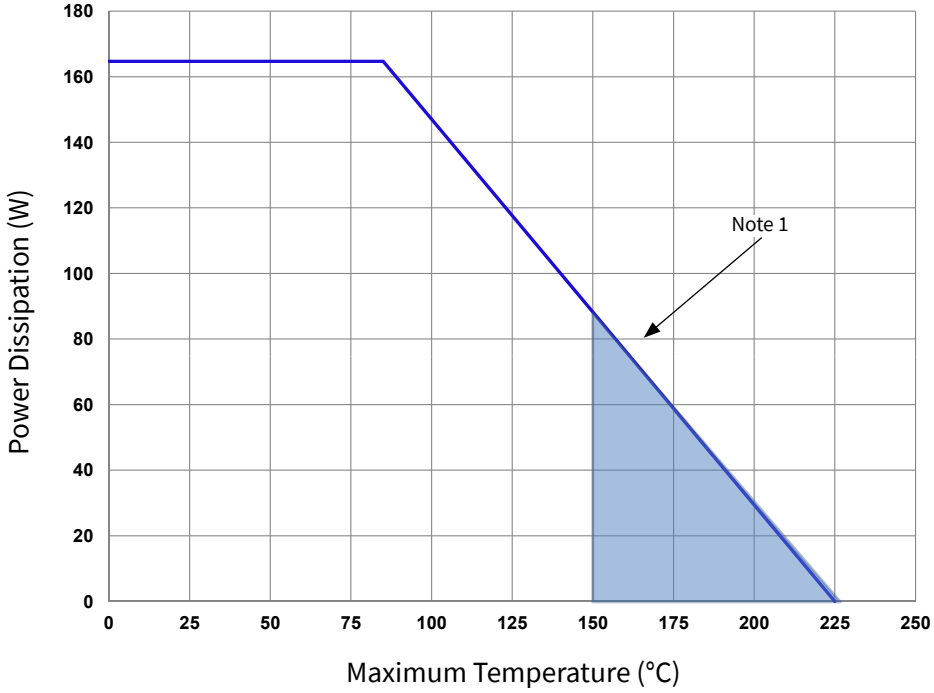


Figure 6. Power Dissipation Derating Curve

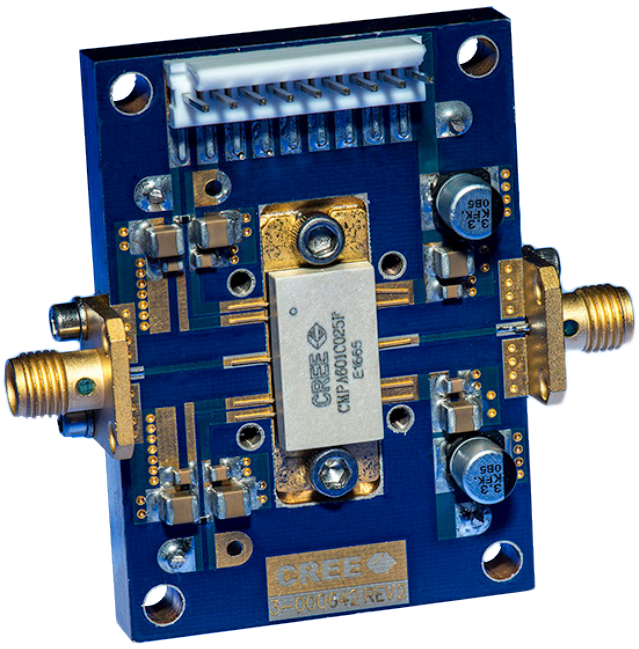


Note 1. Area exceeds Maximum Case Operating Temperature (See Page 2)

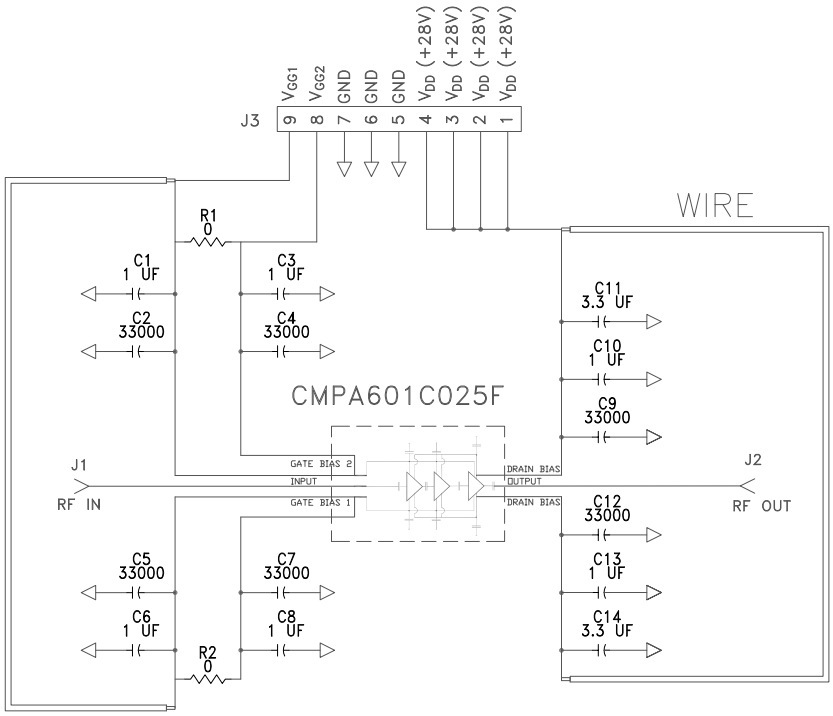
CMPA601C025F-AMP Demonstration Amplifier Circuit Bill of Materials

Designator	Description	Qty
C2,C4,C5,C7,C9,C12	CAP,33000PF, 0805,100V, X7R	6
C1,C3,C6,C8,C10,C13	CAP, 1.0UF, 100V, 10%, X7R, 1210	6
C11,C14	CAP ELECT 3.3UF 80V FK SMD	2
R1,R2	RES 0.0 OHM 1/16W 0402 SMD	2
J1,J2	CONN, SMA, PANEL MOUNT JACK, FLANGE, 4-HOLE, BLUNT POST, 20MIL	2
J3	HEADER RT>PLZ .1CEN LK 9POS	1
W1	WIRE, BLACK, 22 AWG ~ 1.50”	1
W2	WIRE, BLACK, 22 AWG ~ 1.75”	1
Q1	CMPA601C025F	1

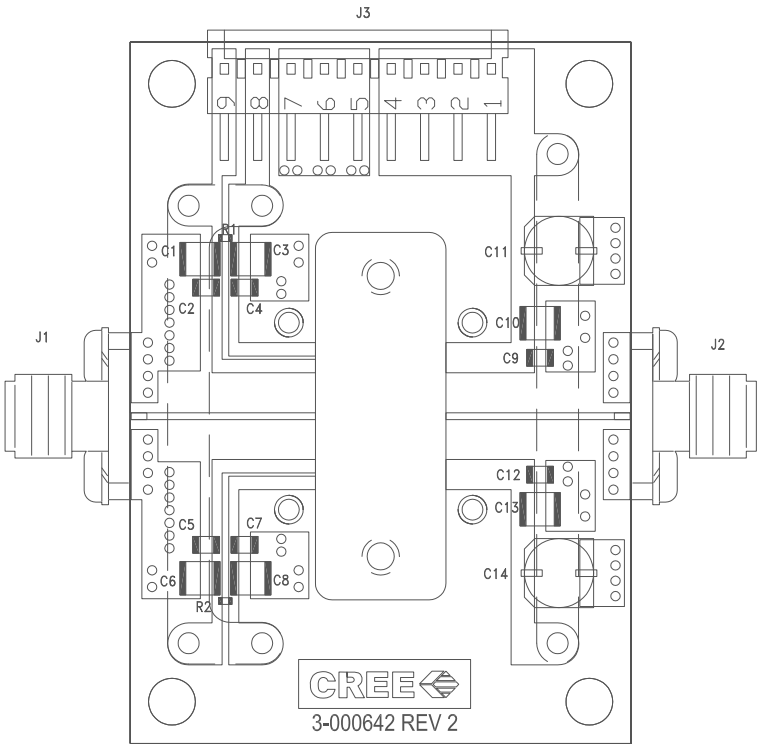
CMPA601C025F-AMP Demonstration Amplifier Circuit



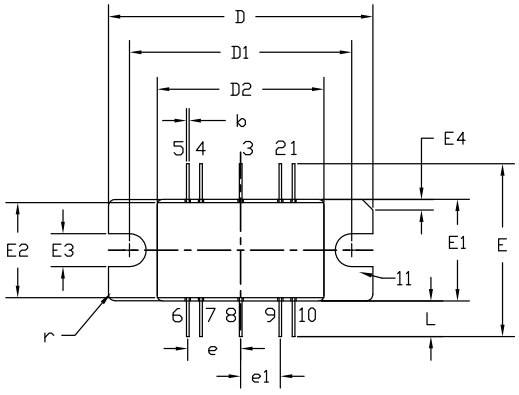
CMP601C025F-AMP Demonstration Amplifier Circuit Schematic

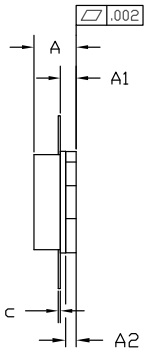


CMPA601C025F-AMP Demonstration Amplifier Circuit Outline



Product Dimensions CMPA601C025F





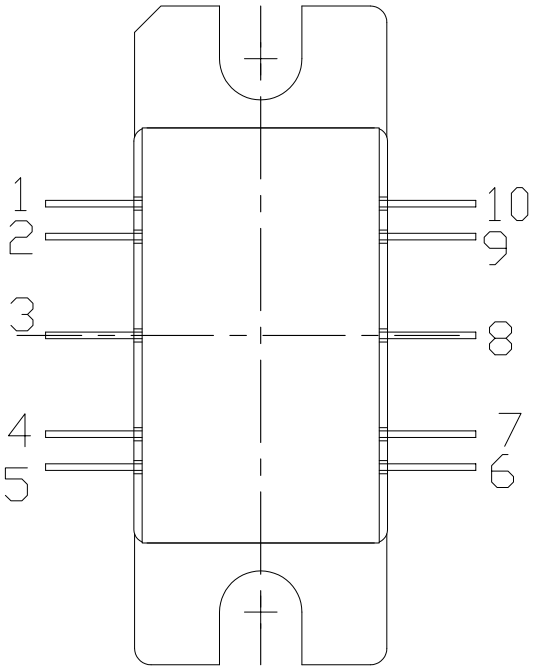
PIN 1: GATE BIAS 6: DRAIN BIAS
2: GATE BIAS 7: DRAIN BIAS
3: RF IN 8: RF OUT
4: GATE BIAS 9: DRAIN BIAS
5: GATE BIAS 10: DRAIN BIAS
11: SOURCE

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	0.155	0.175	3.94	4.45	
A1	0.055	0.065	1.40	1.65	
A2	0.035	0.045	0.89	1.14	
b	0.01 TYP		0.254 TYP		10x
c	0.007	0.009	0.18	0.23	
D	0.995	1.005	25.27	25.53	
D1	0.835	0.845	21.21	21.46	
D2	0.623	0.637	15.82	16.18	
E	0.653 TYP		16.59 TYP		
E1	0.380	0.390	9.65	9.91	
E2	0.355	0.365	9.02	9.27	
E3	0.120	0.130	3.05	3.30	
E4	0.035	0.045	0.89	1.14	45° CHAMFER
e	0.200 TYP		5.08 TYP		4x
e1	0.150 TYP		3.81 TYP		4x
L	0.115	0.155	2.92	3.94	10x
r	0.025 TYP		.635 TYP		3x

Pin Number	Qty
1	Gate Bias for Stage 1, 2 & 3
2	Gate Bias for Stage 1, 2 & 3
3	RF IN
4	Gate Bias for Stage 1, 2 & 3
5	Gate Bias for Stage 1, 2 & 3
6	Drain Bias
7	Drain Bias
8	RF OUT
9	Drain Bias
10	Drain Bias



Part Number System

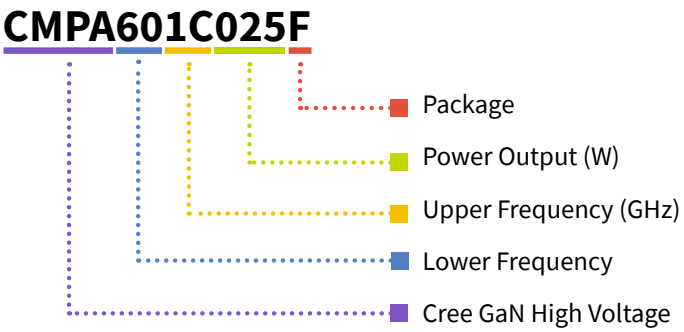


Table 1.

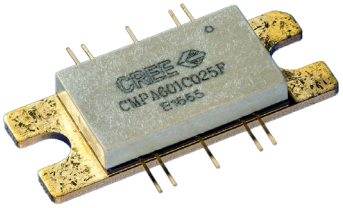
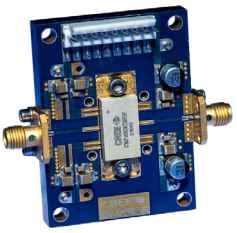
Parameter	Value	Units
Lower Frequency	6.0	GHz
Upper Frequency[1]	12.0	GHz
Power Output	25	W
Package	Flanged	-

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

Table 2.

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

Product Ordering Information

Order Number	Description	Unit of Measure	Image
CMPA601C025F	GaN HEMT	Each	
CMPA601C025F-AMP	Test board with GaN HEMT installed	Each	

For more information, please contact:

4600 Silicon Drive
Durham, North Carolina, USA 27703
www.wolfspeed.com/RF

Sales Contact
RFSales@wolfspeed.com

RF Product Marketing Contact
RFMarketing@wolfspeed.com

Notes

Disclaimer

Specifications are subject to change without notice. “Typical” parameters are the average values expected by Cree in large quantities and are provided for information purposes only. Cree products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death. No responsibility is assumed by Cree for any infringement of patents or other rights of third parties which may result from use of the information contained herein. No license is granted by implication or otherwise under any patent or patent rights of Cree.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for RF Amplifier ***category:***

Click to view products by Wolfspeed ***manufacturer:***

Other Similar products are found below :

A82-1 BGA622H6820XTSA1 BGA 728L7 E6327 BGB719N7ESDE6327XTMA1 HMC397-SX HMC405 HMC561-SX HMC8120-SX HMC8121-SX HMC-ALH382-SX HMC-ALH476-SX SE2433T-R SMA3101-TL-E SMA39 A66-1 A66-3 A67-1 A81-2 LX5535LQ LX5540LL MAAM02350 HMC3653LP3BETR HMC549MS8GETR HMC576-SX HMC-ALH435-SX SMA101 SMA32 SMA411 SMA531 SST12LP19E-QX6E WPM0510A HMC5879LS7TR HMC1087F10 HMC1086 HMC1016 SMA1212 MAX2689EWS+T MAAMSS0041TR MAAM37000-A1G LTC6430AIUF-15#PBF SMA70-2 SMA4011 A231 HMC-AUH232 LX5511LQ LX5511LQ-TR HMC7441-SX HMC-ALH310 XD1001-BD-000V A4011