CMPA601J025F

6 – 18 GHz, 25 W GaN HPA

Description

Wolfspeed's CMPA601J025F is a 25 W, MMIC HPA utilizing Wolfspeed's high performance, 0.15um GaN on SiC production process. The CMPA601J025F operates from 6 – 18 GHz and supports a variety of end applications such as electronic warfare, test instrumentation, radar and general amplification. The CMPA601J025F achieves 25 W of saturated output power with 20 dB of large signal gain and 20% power-added efficiency under CW operation.

Packaged in a 15x15 mm bolt-down, flange package, the CMPA601J025F provides superior broadband, RF performance and thermal management allowing customers to improve SWaP-C benchmarks in their next-generation systems.

Figure 1. CMPA601J025F

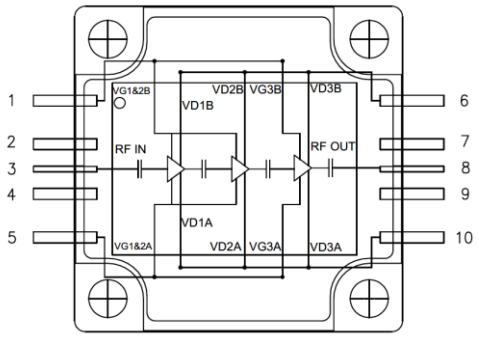


Figure 2. Functional Block Diagram

Features

- Psat: 25 W
- PAE: 20 %
- LSG: 20 dB
- S21: 30 dB
- S11: -10 dB
- S22: -8 dB
- CW operation

Note: Features are typical performance across frequency under 25°C operation. Please reference performance charts for additional information.

Applications

- Electronic Warfare
- Test Instrumentation
- Radar
- Broadband Amplifiers

RoHS COMPLIANT

Absolute Maximum Ratings

Parameter	Symbol	Units	Value	Conditions
Drain to Source Voltage	V_{DSS}	V	84	
Drain Voltage	V_D	V	22	
Gate Voltage	V_G	V	-10, +2	
Drain Current	I_D	A	5.9	
Gate Current	I_G	mA	11	
Input Power	P_{in}	dBm	24	CW operation
Dissipated Power	P_{diss}	W	130	
Storage Temperature	T_{stg}	°C	-55, +150	
Mounting Temperature	T_J	°C	320	30 seconds
Junction Temperature	T_J	°C	225	MTTF > 1E6
Output Mismatch Stress	VSWR	Ψ	3:1	

Recommended Operating Conditions

Parameter	Symbol	Units	Typical Value	Conditions
Drain Voltage	Vd	V	22	
Gate Voltage	Vg	V	-1.9	
Drain Current	Idq	mA	>1.2	
Input Power	Pin	dBm	24	CW operation only
Case Temperature	Tcase	°C	-40 to 60	

RF Specifications

Test conditions unless otherwise noted: Vd=22V, Idq= 1200mA, CW, Pin = 24dBm, T_{base}=25 °C, Frequency: 12GHz

Parameter	Units	Frequency	Min	Typical	Max	Conditions
Frequency	GHz		6		18	
Output Power	dBm	6		43.5		
		12		45.0		
		18		43.0		
Power-added Efficiency	%	6		33		
		12		27		
		18		19		
LSG	dB	6		19.5		
		12		21.0		
		18		19		
Small-Signal Gain	dB	6		31		Pin = -25 dBm
		12		30		
		18		26		
Input Return Loss	dB			-10		Pin = -25 dBm
Output Return Loss	dB			-8		Pin = -25 dBm

Test conditions unless otherwise noted: Vd=22V, Idq= 1200mA, CW, Pin = 24dBm, T_{base}=25 °C, Frequency: 12GHz

Figure 3: Pout v. Frequency v. Temperature

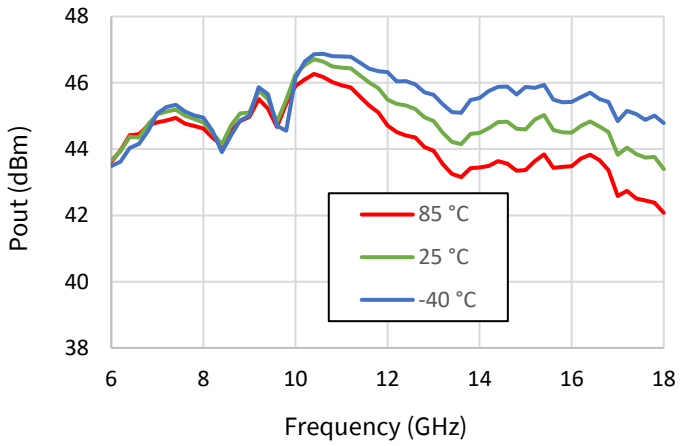


Figure 4: PAE v. Frequency v. Temperature

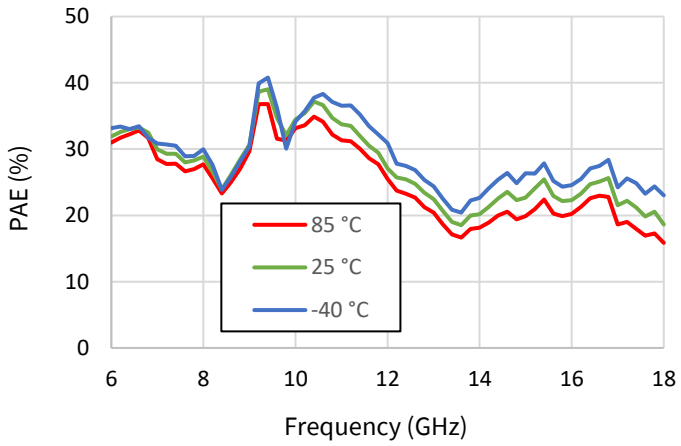


Figure 5: Id v. Frequency v. Temperature

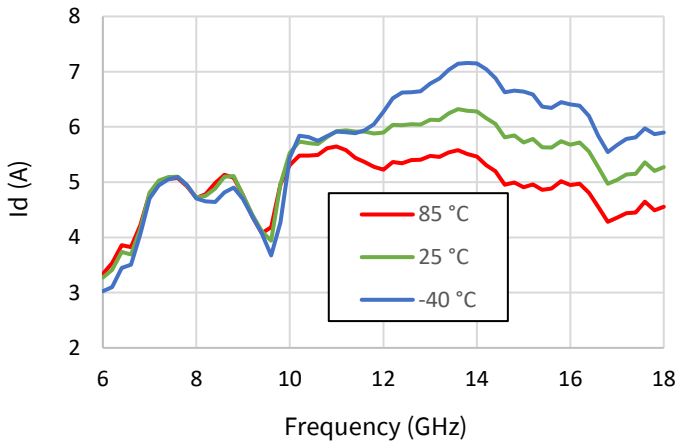


Figure 6: Ig v. Frequency v. Temperature

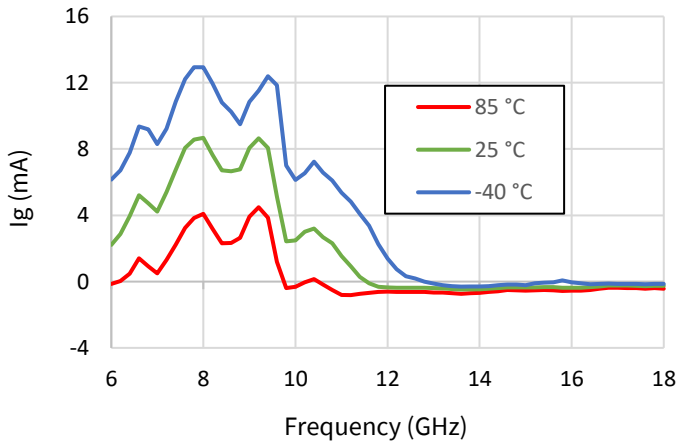
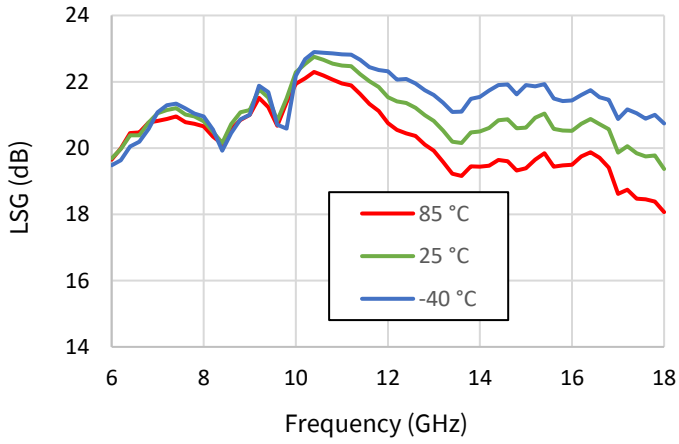


Figure 7: LSG v. Frequency v. Temperature



Test conditions unless otherwise noted: Vd=22V, Idq= 1200mA, CW, Pin = 24dBm, T_{base}=25 °C, Frequency: 12GHz

Figure 8: Pout v. Pin v. Frequency

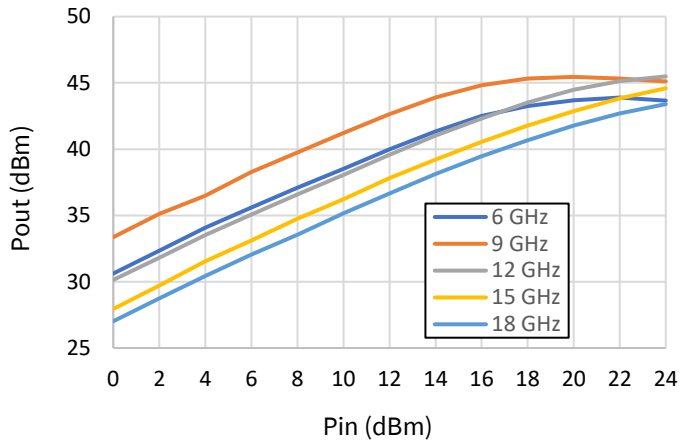


Figure 9: PAE v. Pin v. Frequency

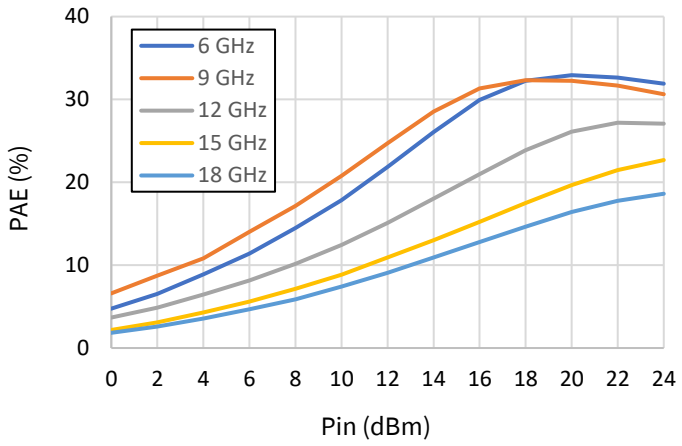


Figure 10: Id v. Pin v. Frequency

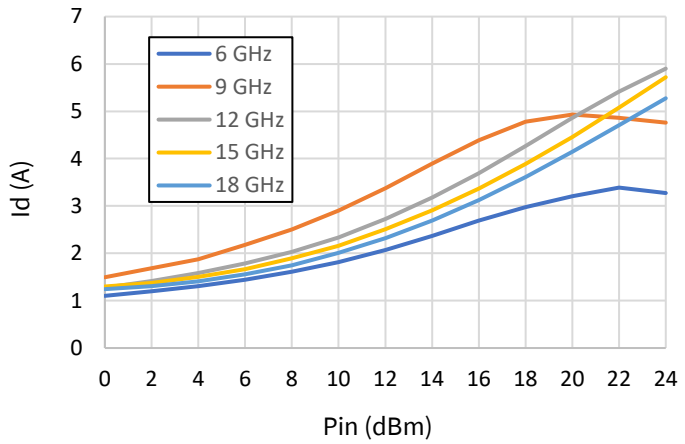


Figure 11: Ig v. Pin v. Frequency

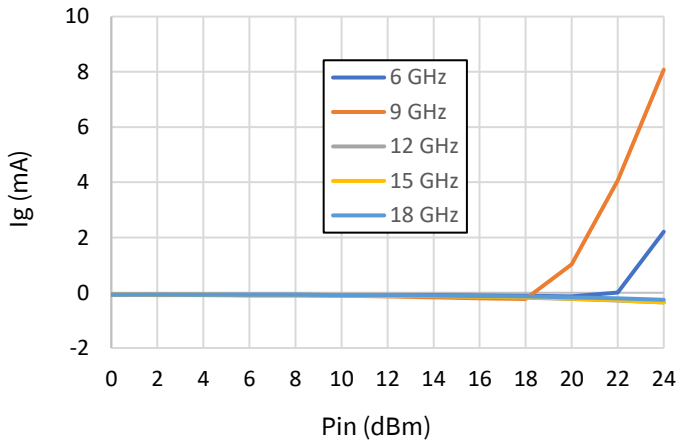
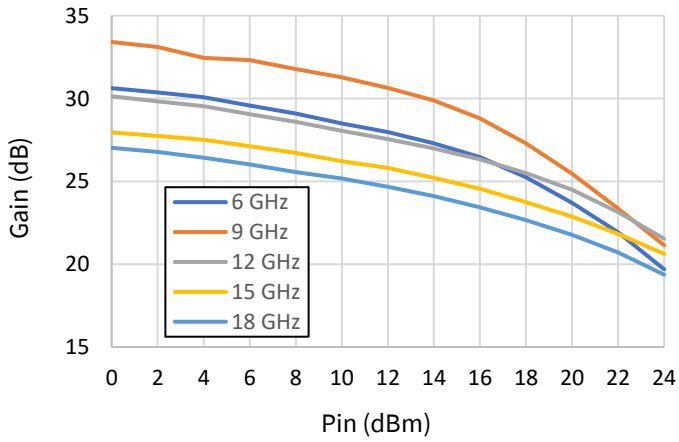


Figure 12: Gain v. Pin v. Frequency



Test conditions unless otherwise noted: Vd=22V, Idq= 1200mA, CW, Pin = 24dBm, T_{base}=25 °C, Frequency: 12GHz

Figure 13: Pout v. Pin v. Temperature

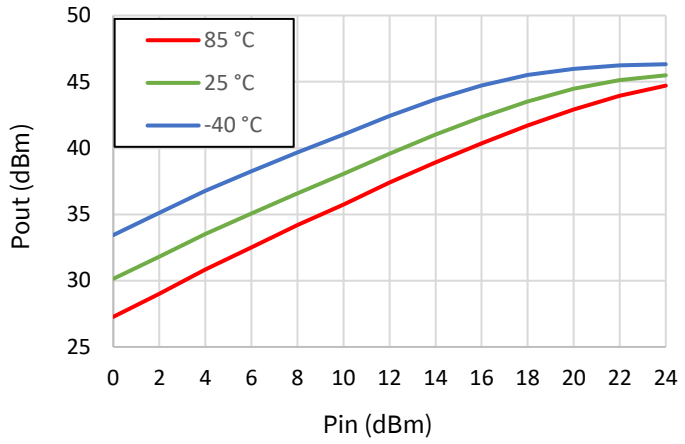


Figure 14: PAE v. Pin v. Temperature

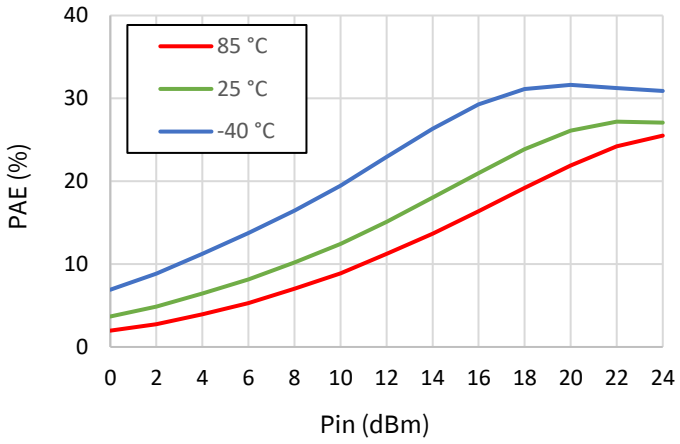


Figure 15: Id v. Pin v. Temperature

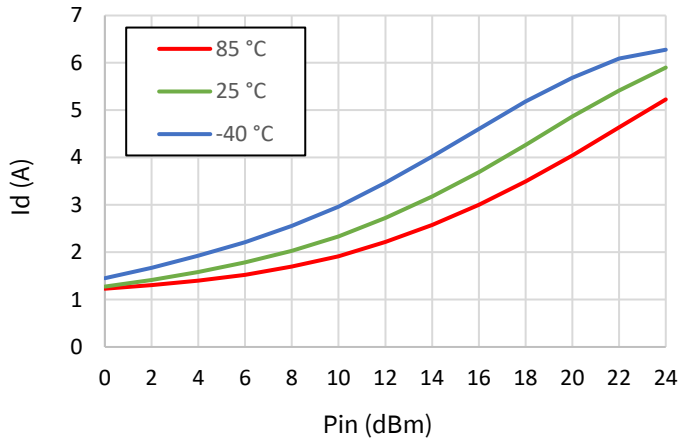


Figure 16: Ig v. Pin v. Temperature

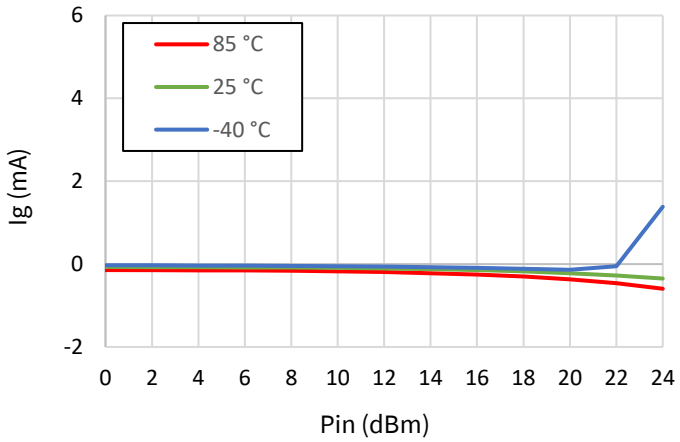
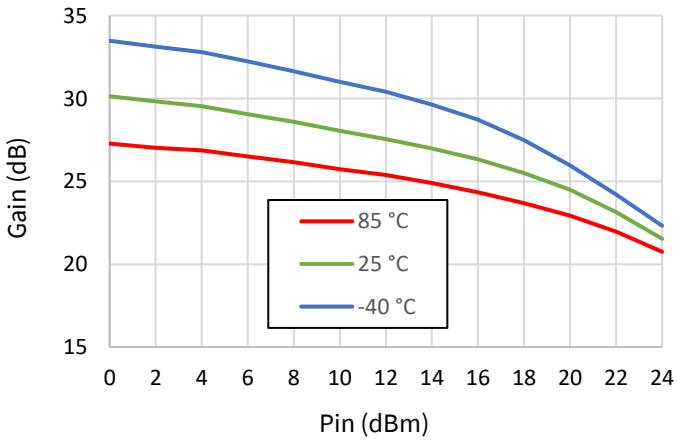


Figure 17: Gain v. Pin v. Temperature



Test conditions unless otherwise noted: Vd=22V, Idq= 1200mA, Pin = -25dBm, T_{base}=25 °C

Figure 18: S21 v. Frequency v. Temperature

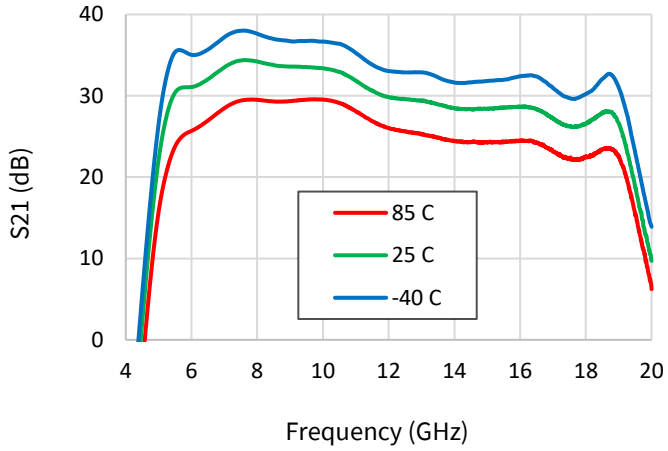


Figure 19: S11 v. Frequency v. Temperature

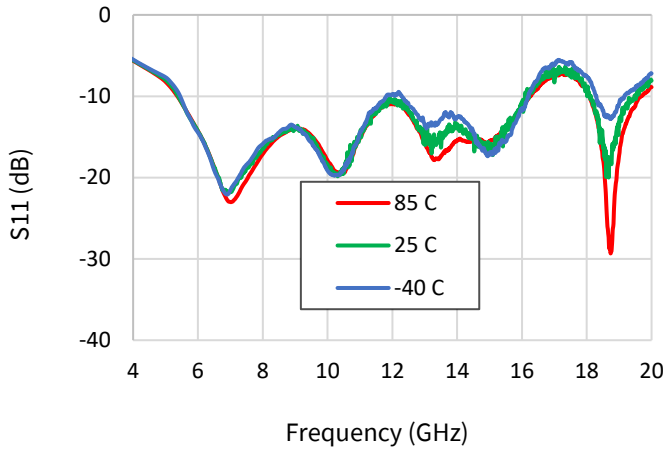
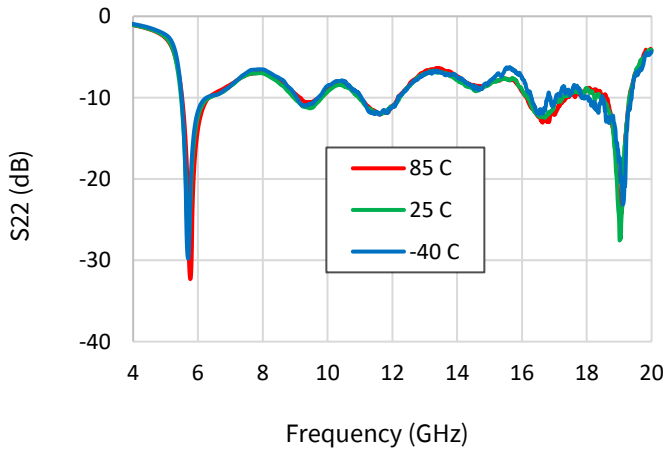


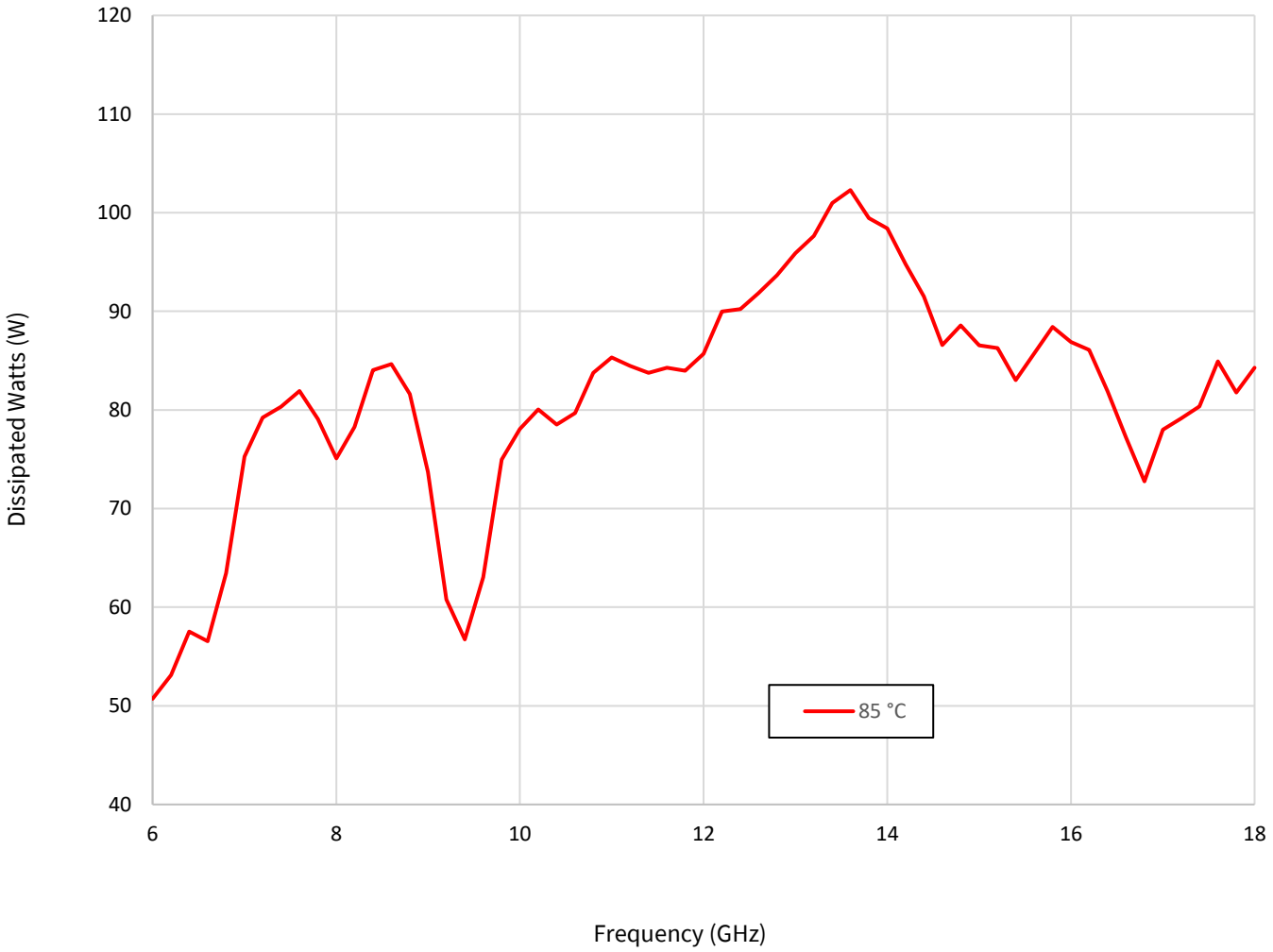
Figure 20: S22 v. Frequency v. Temperature



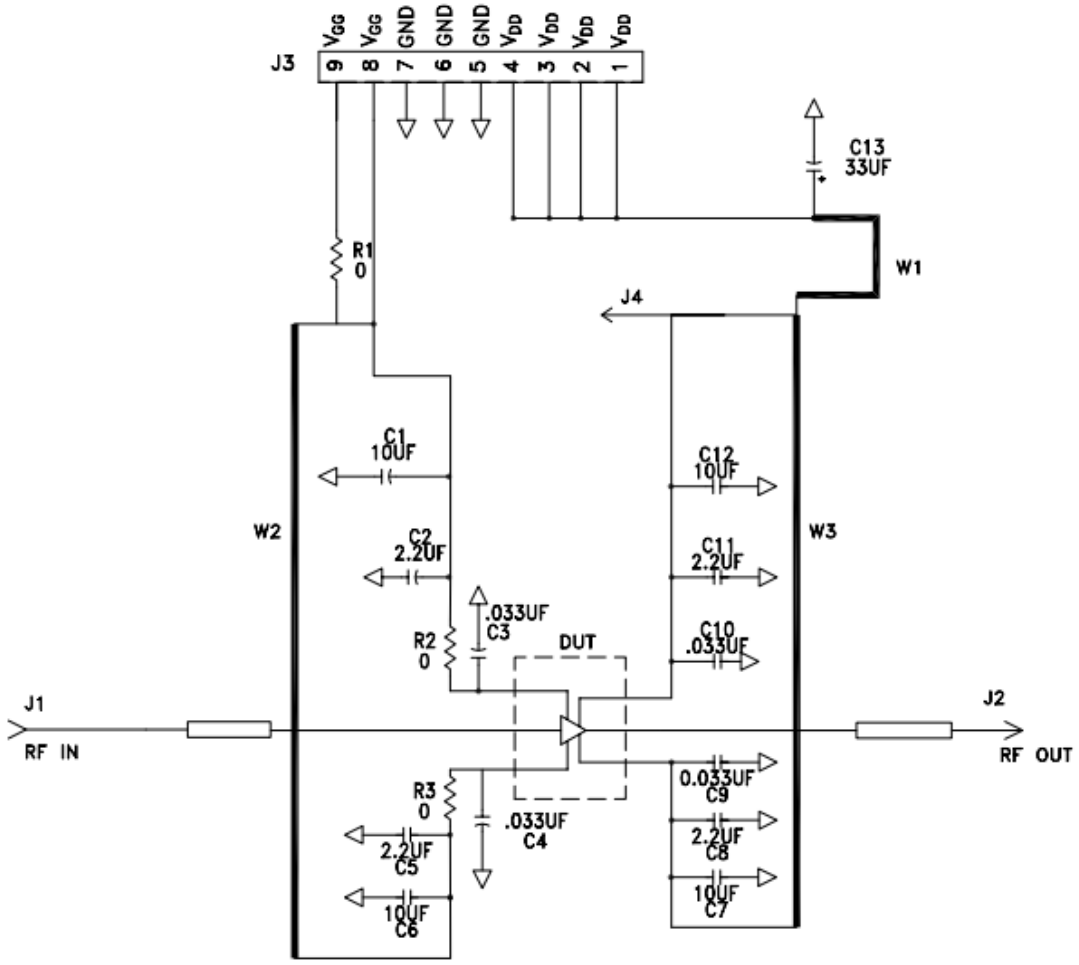
Thermal Characteristics

Parameter	Symbol	Value	Operating Conditions
Operating Junction Temperature	T_J	231°C	Freq = 13.6 GHz, V_d = 22 V, I_{dq} = 1.2 A, I_{drive} = 5.6 A, P_{in} = 24 dBm, P_{out} = 43.2 dBm, P_{diss} = 102 W, T_{case} = 60°C, CW
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.68°C/W	

Power Dissipation v. Frequency (Tcase = 60°C)



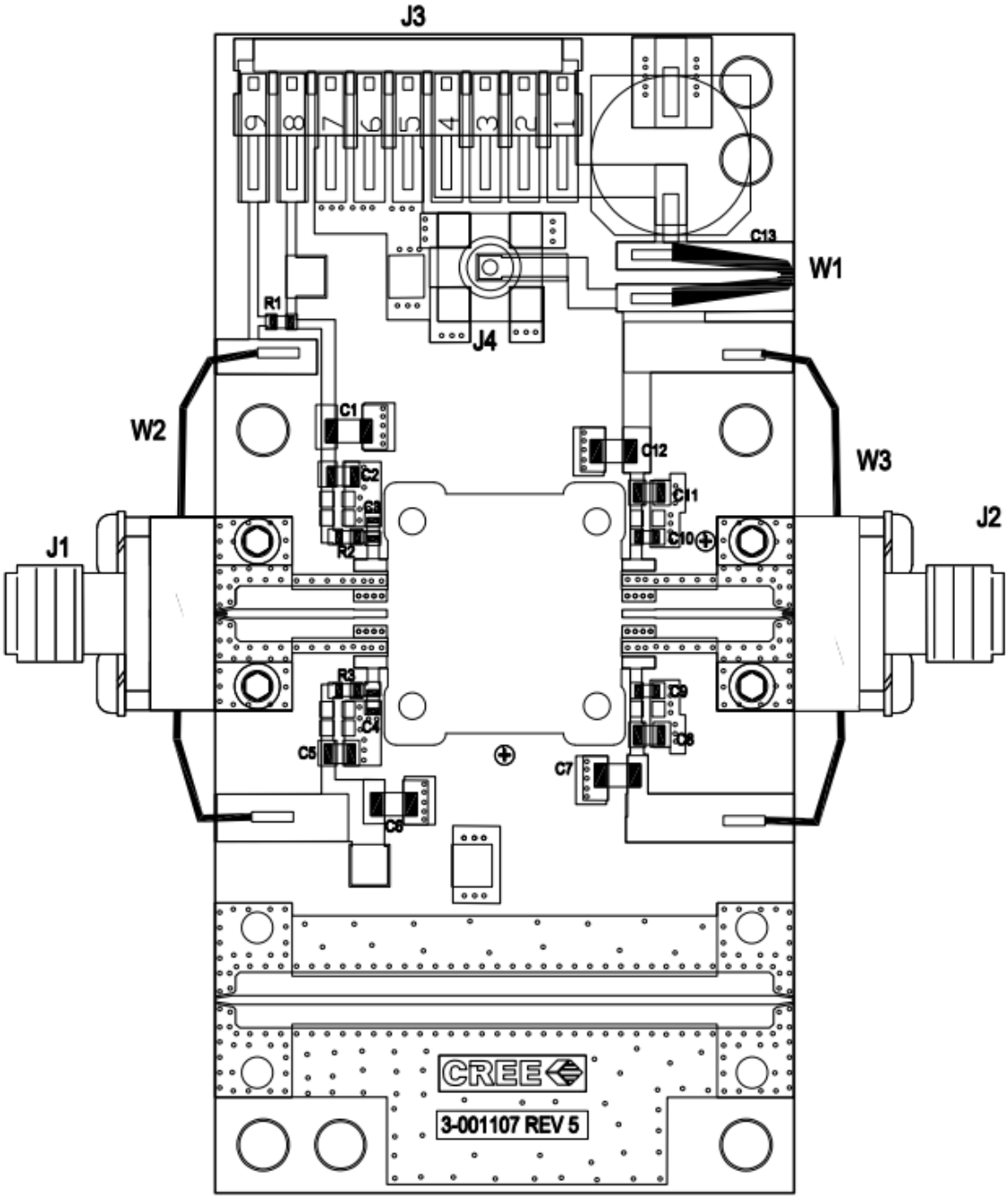
CMPA601J025F-AMP Evaluation Board Schematic Drawing



CMPA601J025F-AMP Evaluation Board Bill of Materials

Reference Designator	Description	Qty
R1,R2,R3	RES 0.0 OHM 1/10W 0603 SMD	3
C1,C6,C7,C12	CAP, 10uF, +/-10%, 50V, 1206	4
C2,C5,C8,C11	CAP, 2.2uF, +/-10%, 50V, 0805	4
C13	CAP, 33 uF, 20%, 100V, ELECTROLYTIC	1
C3,C4,C9,C10	CAP, .033uF, 50V,0603	4
-	PCB, RO3003, .010 THK, HPHF Package	1
-	BASEPLATE 3.0x1.5x0.25Cu	1
J1,J2	CONN, SMA JACK (FEMALE) END LAUNCH CONNECTOR	2
J4	CONN, SMB, STRAIGHT JACK RECEPTACLE, SMT, 50 OHM, Au PLATED	2
J3	HEADER RT>PLZ .1CEN LK 9POS	1
W1	WIRE, BLACK, 30 AWG	1
W2,W3	WIRE, BLACK, 22 AWG	2
U1	CMPA601J025F	1

CMPA601J025F-AMP Evaluation Board Assembly Drawing



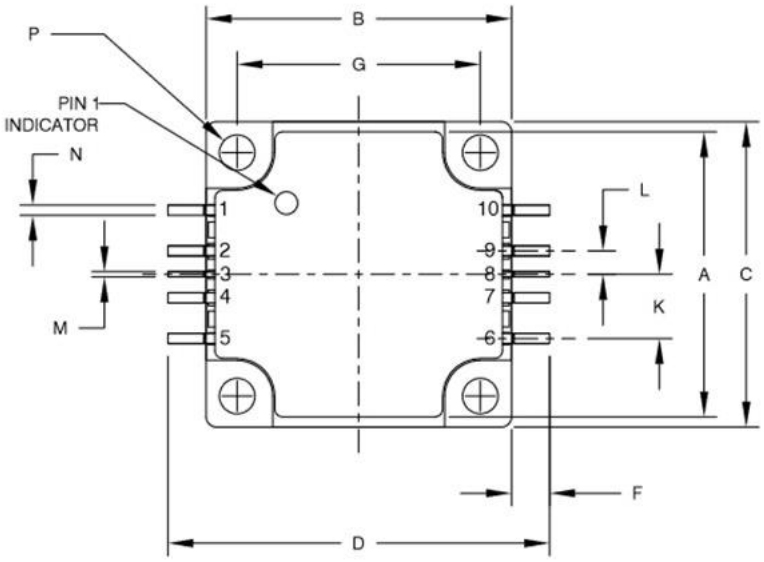
Bias On Sequence

1. Ensure RF is turned-off
2. Apply pinch-off voltage of -5 V to the gate (Vg)
3. Apply nominal drain voltage (Vd)
4. Adjust Vg to obtain desired quiescent drain current (Idq)
5. Apply RF

Bias Off Sequence

1. Turn RF off
2. Apply pinch-off to the gate (Vg=-5V)
3. Turn off drain voltage (Vd)
4. Turn off gate voltage (Vg)

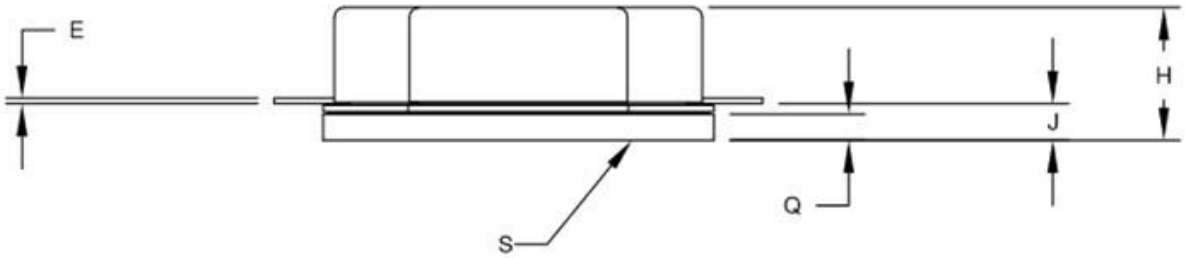
Product Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

1. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994.

DIM	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	.555	.560	.565	14.10	14.22	14.35
B	.595	.600	.605	15.11	15.24	15.37
C	.595	.600	.605	15.11	15.24	15.37
D	-	(.750)	-	-	(19.05)	-
E	.006	.008	.010	0.15	0.20	0.25
F	.065	.075	.085	1.66	1.91	2.16
G	.473	.478	.483	12.01	12.14	12.27
H	.191	.203	.215	4.86	5.16	5.46
J	.049	.056	.063	1.24	1.42	1.60
K	.121	.126	.131	3.07	3.20	3.33
L	.041	.046	.051	1.04	1.17	1.30
M	.005	.010	.015	0.13	.25	0.38
N	.015	.020	.025	0.38	.51	0.63
P	.065	.070	.075	1.65	1.78	1.90
Q	.038	.040	.042	0.97	1.02	1.07



PIN	DESC.	PIN	DESC
1	VG	6	VD
2	GND	7	GND
3	RF IN	8	RF OUT
4	GND	9	GND
5	VG	10	VD

Electrostatic Discharge (ESD) Classification

Parameter	Symbol	Class	Classification Level	Test Methodology
Human body Model	HBM	TBD	ANSI/ESDA/JEDEC JS-001 Table 3	JEDEC JESD22 A114-D
Charge Device Model	CDM	TBD	ANSI/ESDA/JEDEC JS-002 Table 3	JEDEC JESD22 C101-C

Product Ordering Information

Part Number	Description	MOQ Increment	Image
CMPA601J025F	6 – 18 GHz, 25W GaN MMIC		
CMPA601J025F-AMP	Evaluation Board w/ PA	1 Each	

For more information, please contact:

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RF Product Marketing Contact

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