



MMIC SURFACE MOUNT

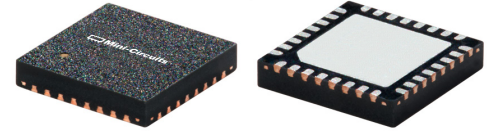
# Power Amplifier

## PMA5-83-2W+

50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

### THE BIG DEAL

- P1dB, Typ. +31 dBm
- P<sub>SAT</sub>, Typ. +33 dBm
- Low Noise Figure, Typ. 3.5 dB
- High OIP3, Typ. +43.5 dBm
- Supply Voltage +12 V, 400 mA
- 5x5 mm 32-Lead QFN-Style Package

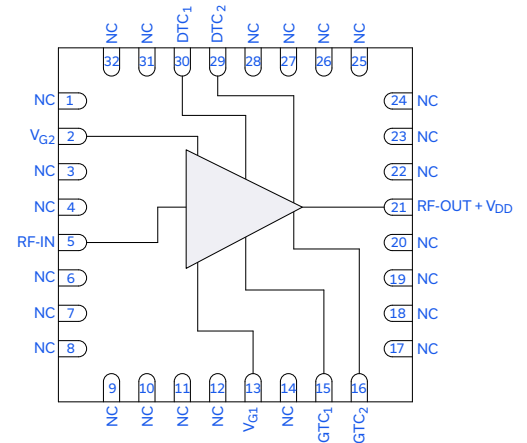


Generic photo used for illustration purposes only

### APPLICATIONS

- Test and Measurement Equipment
- Radar, EW, and ECM Defense Systems
- 5G Sub6, MIMO Wireless Infrastructure Systems
- Microwave Radio & VSAT

### FUNCTIONAL DIAGRAM



### PRODUCT OVERVIEW

The PMA5-83-2W+ is a GaAs MMIC Distributed Power Amplifier operating from 0.01 to 10 GHz. The amplifier provides 12 dB of gain, +33 dBm saturated output power, and achieves +43.5 dBm output IP3, while operating from a +12 V power supply and consuming 400 mA of current. In addition, it is internally matched to 50 Ohms and comes in a 5x5 mm 32-Lead QFN-Style package. These characteristics make it ideally suited for wideband test instrumentation and defense systems that require high operating output power, while maintaining very low distortion characteristics.

### KEY FEATURES

Feature	Advantages
High P1dB Typ. +31 dBm	Flat gain and output power make this device excellent for wideband systems from 0.01 to 10 GHz that require at least 1W of operating output power over the full band.
Low Noise Figure Typ. 3.5 dB	High operating output power accompanied with low noise figure enables a significant signal to noise ratio advantage for systems requiring high dynamic range.
High OIP3 Typ. +43.5 dBm	High operating OIP3 and low 2nd and 3rd harmonic response provides for very low in-band distortion products, which is typically needed for high fidelity measurement systems.
5x5 mm 32-Lead QFN-Style Package	Small footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB. Industry standard packaging allows for ease of assembly in high volume manufacturing processes.





MMIC SURFACE MOUNT

# Power Amplifier

## PMA5-83-2W+

Mini-Circuits

50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

### ELECTRICAL SPECIFICATIONS<sup>1</sup> AT 25°C, V<sub>DD</sub>= +12 V, UNLESS NOTED OTHERWISE

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		0.01		10	GHz
Gain	0.01		17.9		dB
	2		12.3		
	4		12.0		
	6		11.9		
	8		11.3		
	10		10.3		
Output Power at 1 dB Compression (P <sub>1dB</sub> )	0.01		+30.6		dBm
	2		+31.0		
	4		+31.3		
	6		+31.5		
	8		+31.1		
	10		+31.0		
Output Power at Saturation (P <sub>SAT</sub> ) <sup>2</sup>	0.01		+35.6		dBm
	2		+32.9		
	4		+33.0		
	6		+33.5		
	8		+33.3		
	10		+32.2		
Output Third-Order Intercept (P <sub>OUT</sub> = +20 dBm/Tone)	0.01		+36.8		dBm
	2		+44.1		
	4		+43.3		
	6		+42.2		
	8		+40.6		
	10		+38.5		
Output Second-Order Intercept (P <sub>OUT</sub> = +20 dBm/Tone)	0.01		+63.1		dBm
	2		+44.5		
	4		+42.3		
	6		+42.1		
	8		+46.1		
	10		+53.4		
2nd Harmonics <sup>3</sup> (P <sub>OUT</sub> = +10 dBm/Tone)	0.01		-61.0		dBc
	2		-42.5		
	4		-40.4		
	6		-39.9		
	8		-44.2		
	10		-50.6		
Input Return Loss	0.01		23		dB
	2		12		
	4		17		
	6		24		
	8		23		
	10		33		





MMIC SURFACE MOUNT

# Power Amplifier

## PMA5-83-2W+

50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

### ELECTRICAL SPECIFICATIONS<sup>1</sup> AT 25°C, V<sub>DD</sub>= +12 V, UNLESS NOTED OTHERWISE (CONTINUED)

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Output Return Loss	0.01		24		dB
	2		12		
	4		10		
	6		14		
	8		12		
	10		12		
Isolation	0.01		50		dB
	2		47		
	4		42		
	6		38		
	8		36		
	10		34		
Noise Figure	0.5		6.8		dB
	2		3.7		
	4		2.8		
	6		2.9		
	8		3.3		
	10		4.1		
Device Operating Voltage (V <sub>DD</sub> )			+12	+16	V
Device Operating Current (I <sub>DD</sub> ) <sup>4</sup>			400		mA
Gate Voltage (V <sub>G1</sub> )			-0.8		V
Gate Current (I <sub>G1</sub> )			15	4,000	μA
Gate Voltage (V <sub>G2</sub> )			+5		V
Gate Current (I <sub>G2</sub> )			15	4,000	μA
DC Current Variation vs. Temperature <sup>5</sup>			11		μA/°C

1. Tested on Mini-Circuits Characterization Test Board. See Figure 2. Board loss de-embedded.
2. P<sub>SAT</sub> defined as when the Output Power changes 0.1 dB per 1 dB change in Input Power.
3. 2nd harmonic measured at 2x the input frequency shown.
4. Current at P<sub>IN</sub> = -25 dBm. Increases to ~650 mA at P1dB.
5. (Current at +85°C - Current at -45°C)/(130°C). V<sub>GS</sub> held constant over temperature.



MMIC SURFACE MOUNT

# Power Amplifier

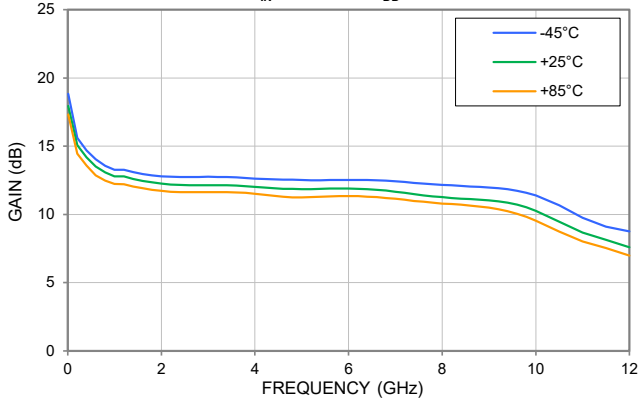
## PMA5-83-2W+

Mini-Circuits

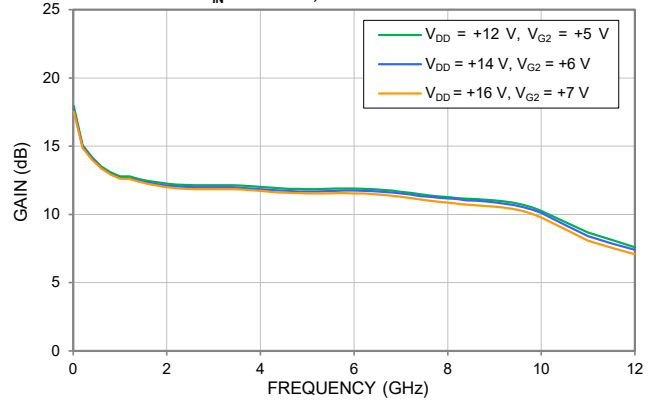
50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

### TYPICAL PERFORMANCE GRAPHS

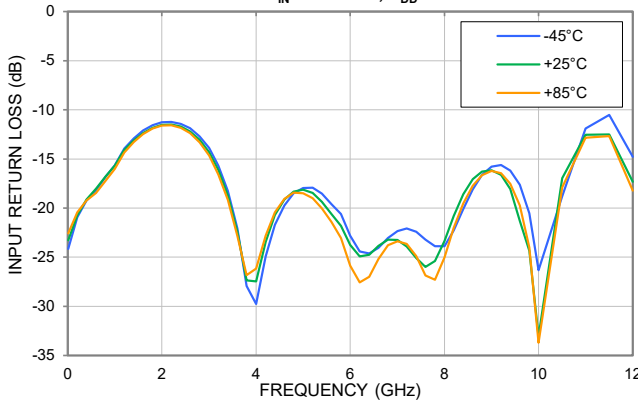
**GAIN vs. TEMPERATURE,**  
P<sub>IN</sub> = -25 dBm, V<sub>DD</sub> = +12 V



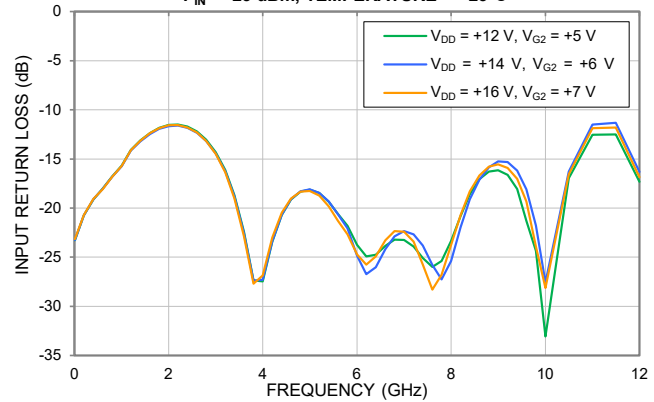
**GAIN vs. DEVICE VOLTAGE,**  
P<sub>IN</sub> = -25 dBm, TEMPERATURE = +25°C



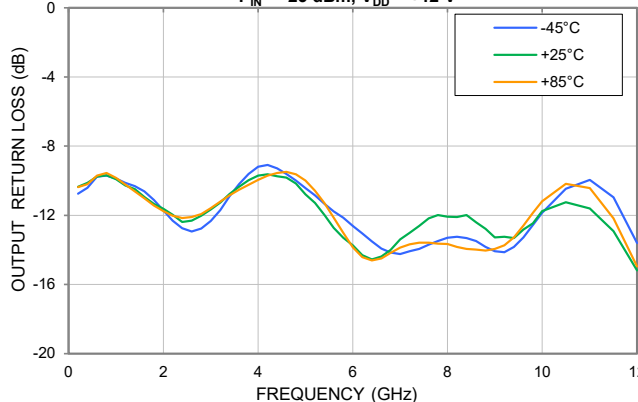
**INPUT RETURN LOSS vs. TEMPERATURE,**  
P<sub>IN</sub> = -25 dBm, V<sub>DD</sub> = +12 V



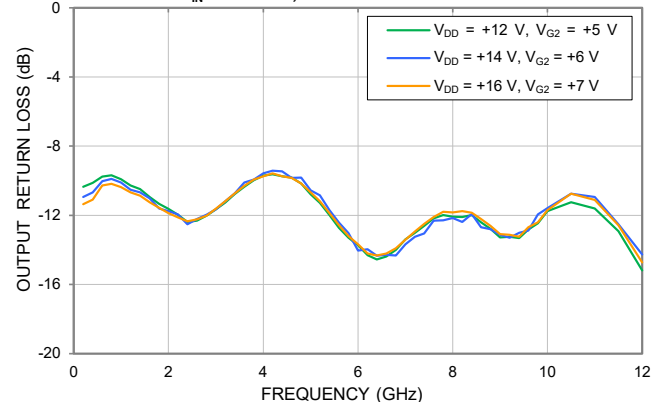
**INPUT RETURN LOSS vs. DEVICE VOLTAGE,**  
P<sub>IN</sub> = -25 dBm, TEMPERATURE = +25°C



**OUTPUT RETURN LOSS vs. TEMPERATURE,**  
P<sub>IN</sub> = -25 dBm, V<sub>DD</sub> = +12 V



**OUTPUT RETURN LOSS vs. DEVICE VOLTAGE,**  
P<sub>IN</sub> = -25 dBm, TEMPERATURE = +25°C





MMIC SURFACE MOUNT

# Power Amplifier

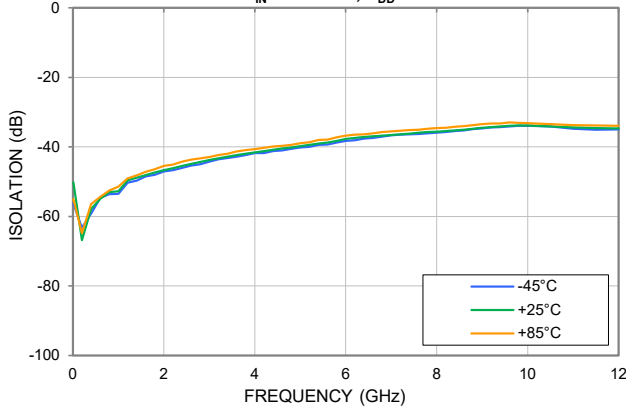
## PMA5-83-2W+

Mini-Circuits

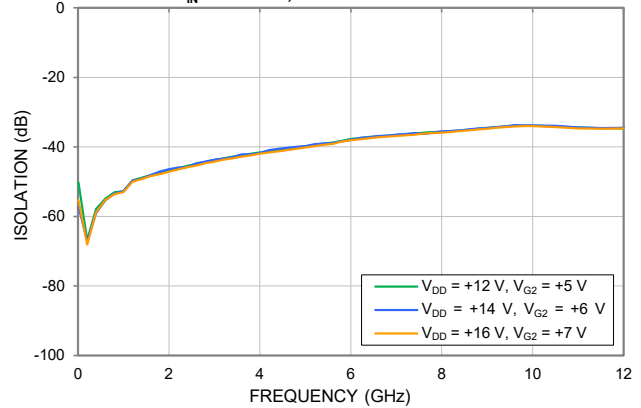
50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

### TYPICAL PERFORMANCE GRAPHS

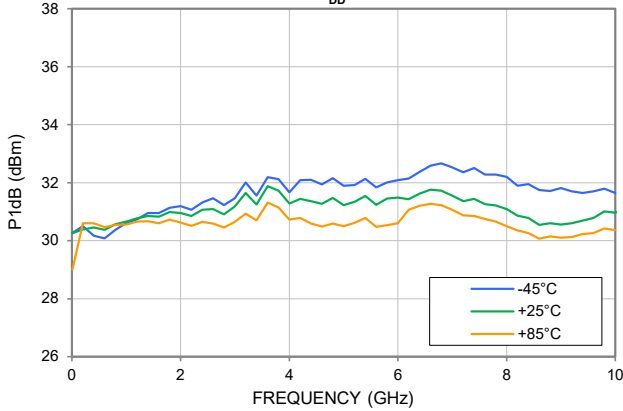
**ISOLATION vs. TEMPERATURE,**  
P<sub>IN</sub> = -25 dBm, V<sub>DD</sub> = +12 V



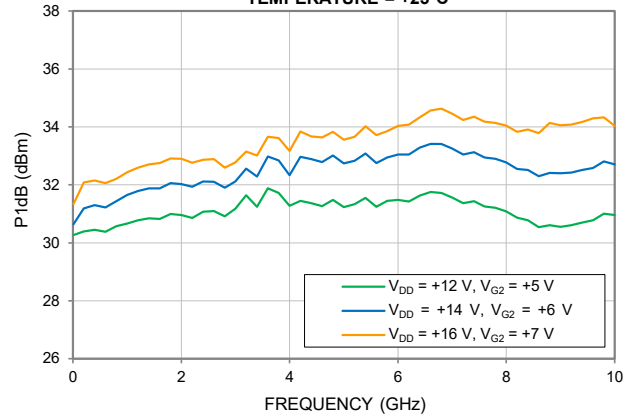
**ISOLATION vs. DEVICE VOLTAGE,**  
P<sub>IN</sub> = -25 dBm, TEMPERATURE = +25°C



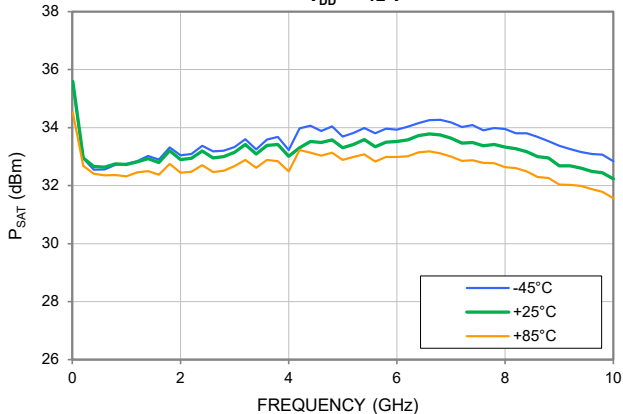
**P<sub>1dB</sub> vs. TEMPERATURE,**  
V<sub>DD</sub> = +12 V



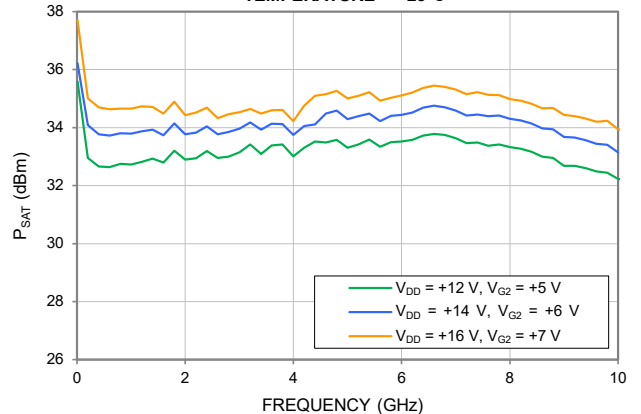
**P<sub>1dB</sub> vs. DEVICE VOLTAGE,**  
TEMPERATURE = +25°C



**P<sub>SAT</sub> vs. TEMPERATURE,**  
V<sub>DD</sub> = +12 V



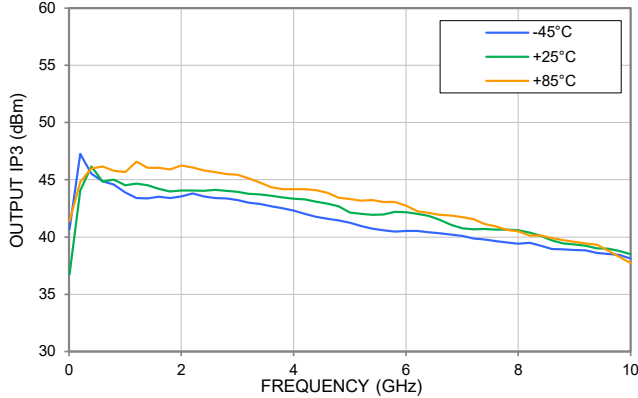
**P<sub>SAT</sub> vs. DEVICE VOLTAGE,**  
TEMPERATURE = +25°C



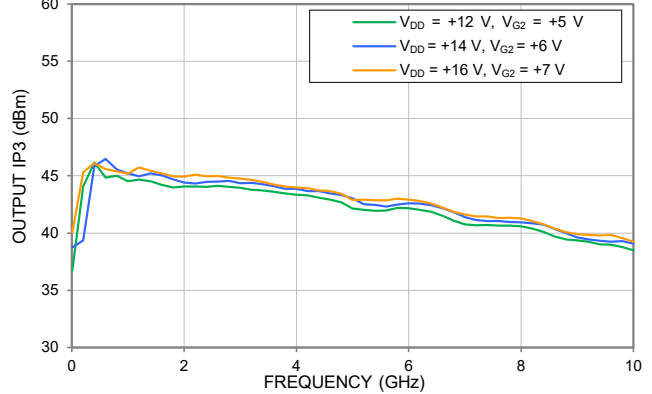


### TYPICAL PERFORMANCE GRAPHS

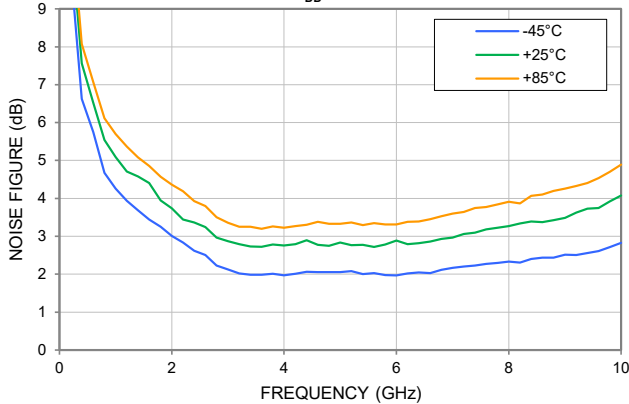
**OUTPUT IP3 vs. TEMPERATURE,**  
P<sub>OUT</sub> = +20 dBm/TONE, V<sub>DD</sub> = +12 V



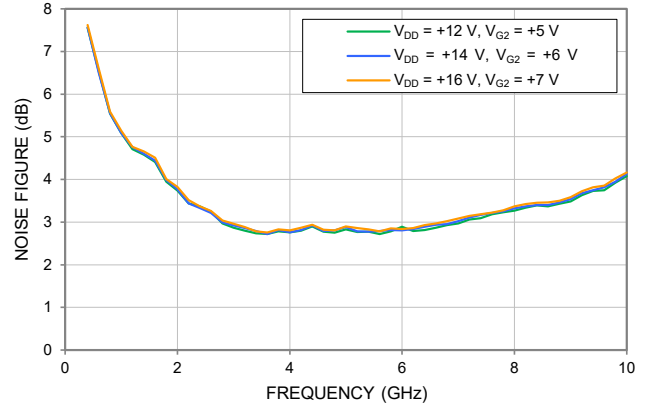
**OUTPUT IP3 vs. DEVICE VOLTAGE,**  
P<sub>OUT</sub> = +20 dBm/TONE, TEMPERATURE = +25°C



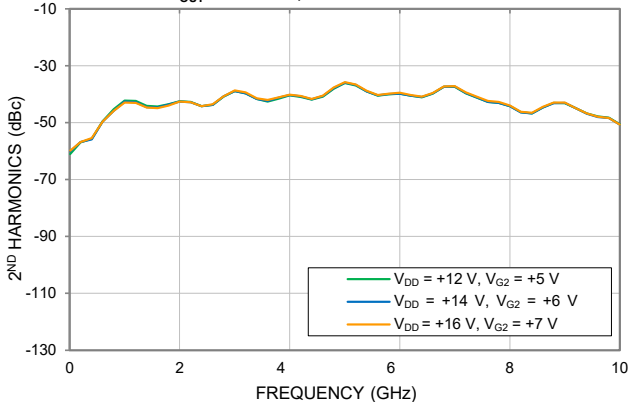
**NOISE FIGURE vs. TEMPERATURE,**  
V<sub>DD</sub> = +12 V



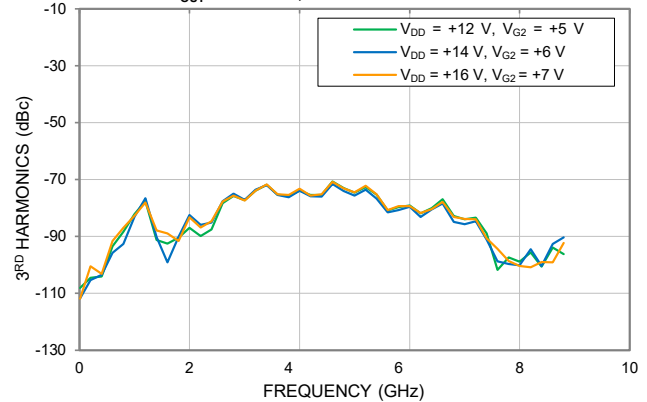
**NOISE FIGURE vs. DEVICE VOLTAGE,**  
TEMPERATURE = +25°C



**2<sup>ND</sup> HARMONICS vs. DEVICE VOLTAGE,**  
P<sub>OUT</sub> = +10 dBm, TEMPERATURE = +25°C



**3<sup>RD</sup> HARMONICS vs. DEVICE VOLTAGE,**  
P<sub>OUT</sub> = +10 dBm, TEMPERATURE = +25°C





MMIC SURFACE MOUNT

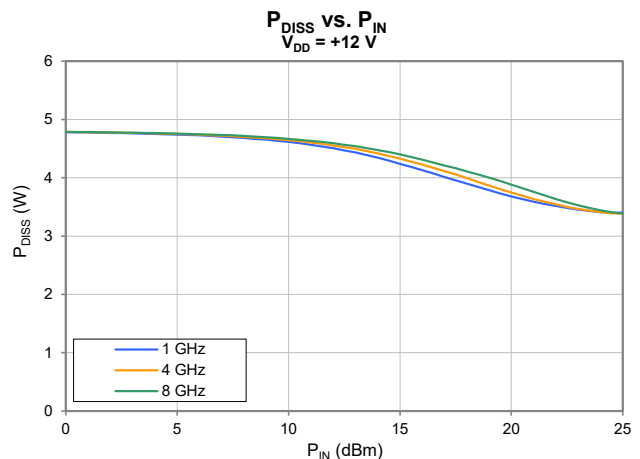
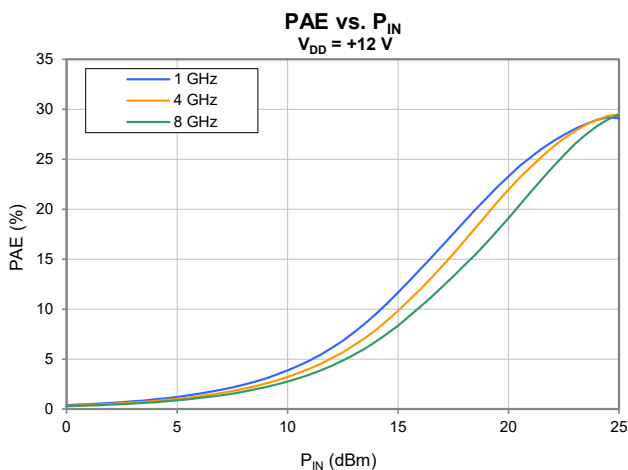
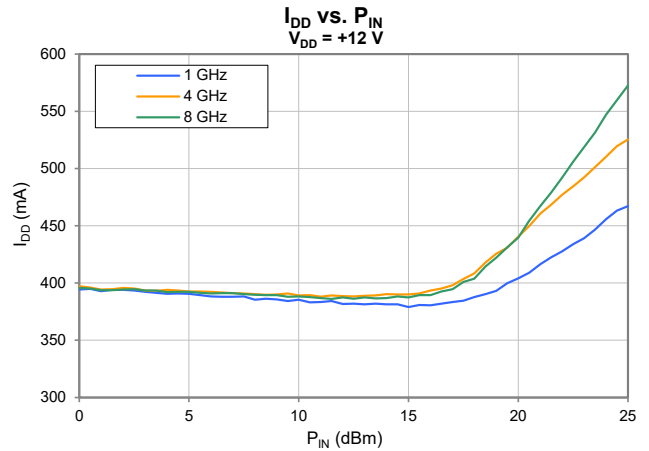
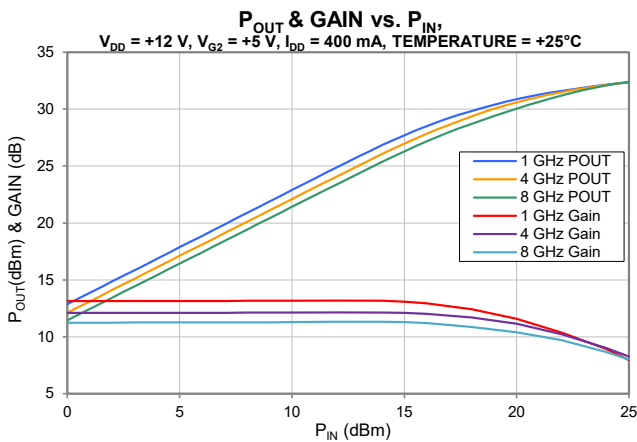
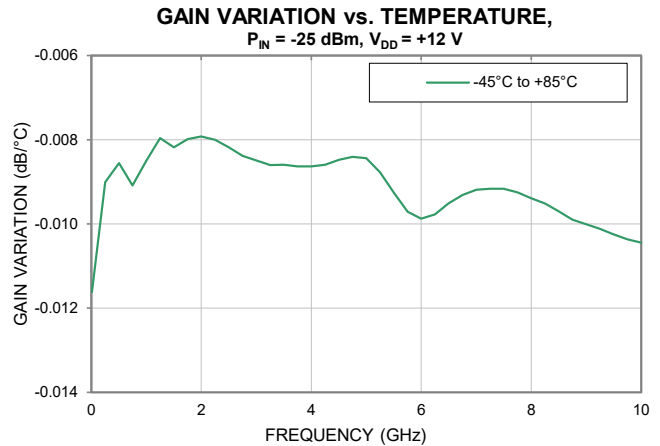
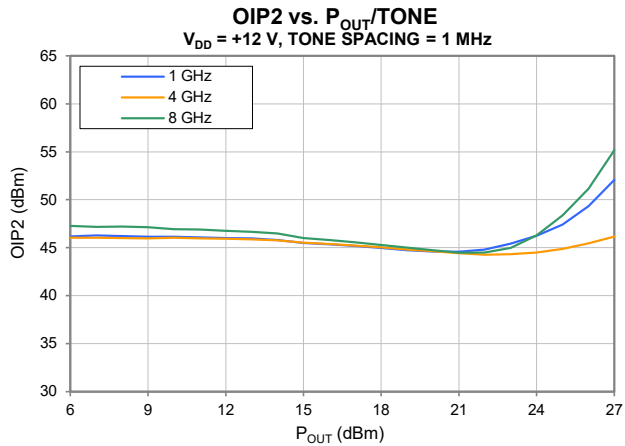
# Power Amplifier

## PMA5-83-2W+

Mini-Circuits

50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

### TYPICAL PERFORMANCE GRAPHS





MMIC SURFACE MOUNT

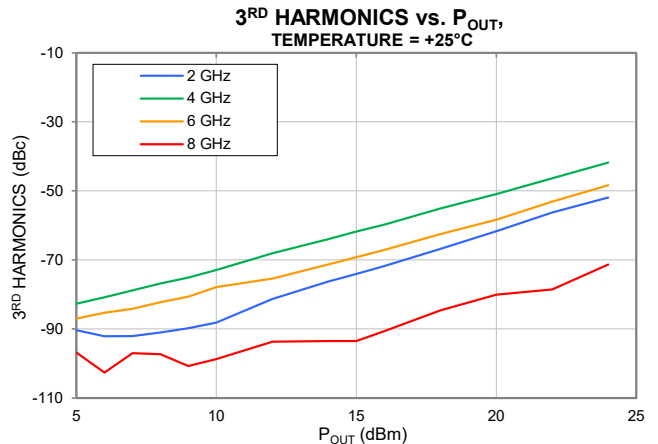
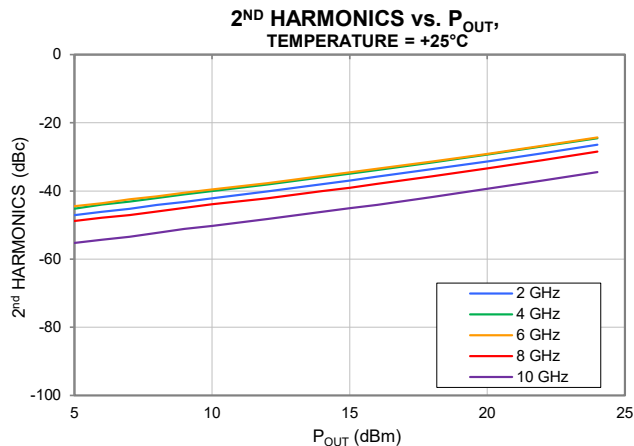
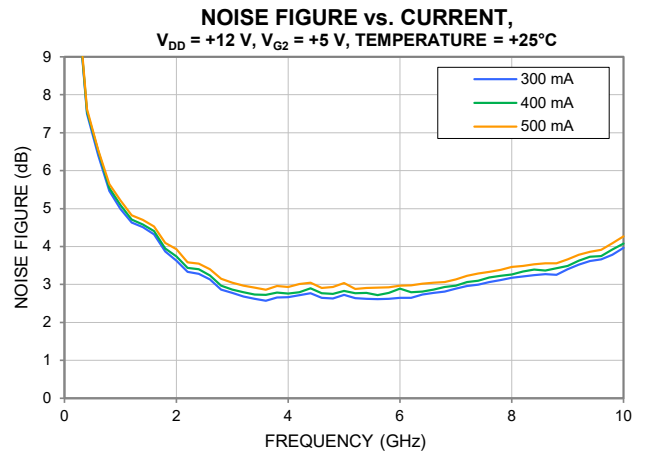
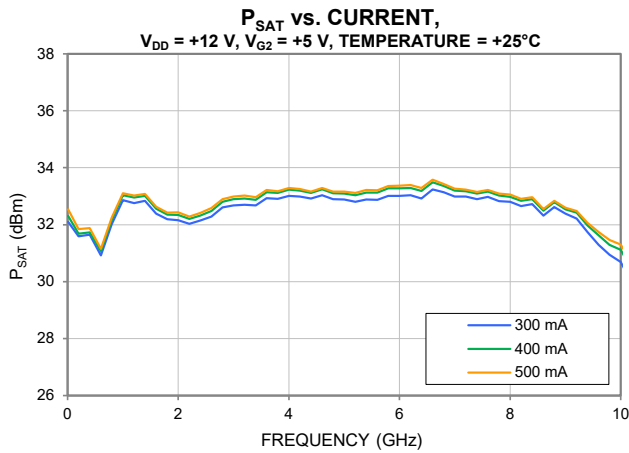
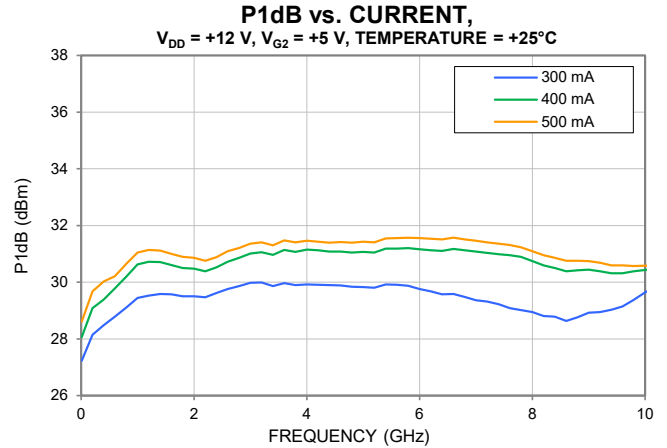
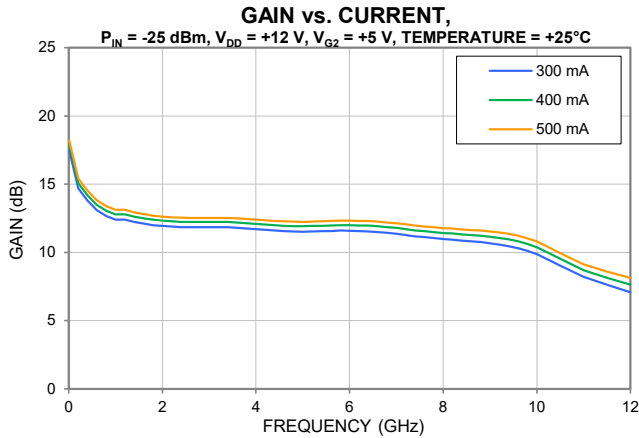
# Power Amplifier

## PMA5-83-2W+

Mini-Circuits

50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

### TYPICAL PERFORMANCE GRAPHS







MMIC SURFACE MOUNT

# Power Amplifier

## PMA5-83-2W+

50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

### ABSOLUTE MAXIMUM RATINGS<sup>6</sup>

Parameter	Ratings
Operating Temperature (ground lead)	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Junction Temperature <sup>7</sup>	+175°C
Total Power Dissipation	10 W
Input Power (CW), V <sub>DD</sub> = +12 V	+31 dBm
DC Voltage at RF-OUT + V <sub>DD</sub>	+16.5 V
DC Gate Voltage at V <sub>G1</sub>	-0.2 V
DC Gate Voltage at V <sub>G2</sub>	+7.5 V
DC Gate Current at V <sub>G1</sub> (I <sub>G1</sub> )	4.5 mA
DC Gate Current at V <sub>G2</sub> (I <sub>G2</sub> )	4.5 mA

6. Permanent damage may occur if any of these limits are exceeded. Maximum ratings are not intended for continuous normal operation.

7. Peak temperature on top of Die.

### THERMAL RESISTANCE

Parameter	Ratings
Thermal Resistance (Θ <sub>JC</sub> ) <sup>8</sup>	6°C/W

8. Θ<sub>JC</sub> = (Hot Spot Temperature on Die - Temperature at Ground Lead)/Dissipated Power

### ESD RATING

	Class	Voltage Range	Reference Standard
HBM	1A	250 V to <500 V	ANSI/ESDA/JEDEC JS-001-2017
CDM	C2	500 V to <1,000 V	JESD22-C101F



ESD HANDLING PRECAUTION: This device is designed to be Class 1A for HBM. Static charges may easily produce potentials higher than this with improper handling and can discharge into DUT and damage it. As a preventive measure Industry standard ESD handling precautions should be used at all times to protect the device from ESD damage.

### MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020E/JEDEC J-STD-033C





MMIC SURFACE MOUNT

# Power Amplifier

**PMA5-83-2W+**

Mini-Circuits

50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

## FUNCTIONAL DIAGRAM

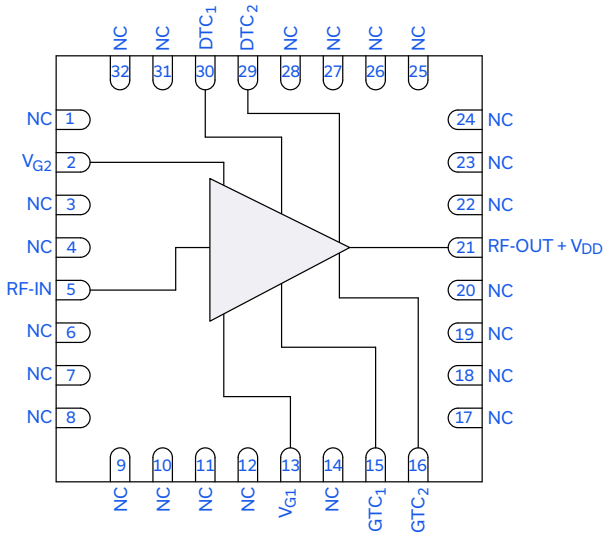


Figure 1. PMA5-83-2W+ Functional Diagram

## PAD DESCRIPTION

Function	Pad Number	Description (Refer to Figure 1)
RF-IN	5	RF-IN Pad connects to RF Input port.
RF-OUT + V <sub>DD</sub>	21	RF-OUT Pad connects to RF Output port. V <sub>DD</sub> is applied via external bias tee.
V <sub>G1</sub>	13	Gate 1 control voltage.
V <sub>G2</sub>	2	Gate 2 control voltage.
DTC <sub>1</sub>	30	Drain Low Frequency Termination Capacitor (AC GND)
DTC <sub>2</sub>	29	Drain Low Frequency Termination Capacitor (AC GND)
GTC <sub>1</sub>	15	Gate Low Frequency Termination Capacitor (AC GND)
GTC <sub>2</sub>	16	Gate Low Frequency Termination Capacitor (AC GND)
NC	1, 3, 4, 6-12, 14, 17-20, 22-28, 31, 32	Not used internally. Connected to ground on test board.
GND	Paddle	Connects to ground.

## CHARACTERIZATION TEST BOARD

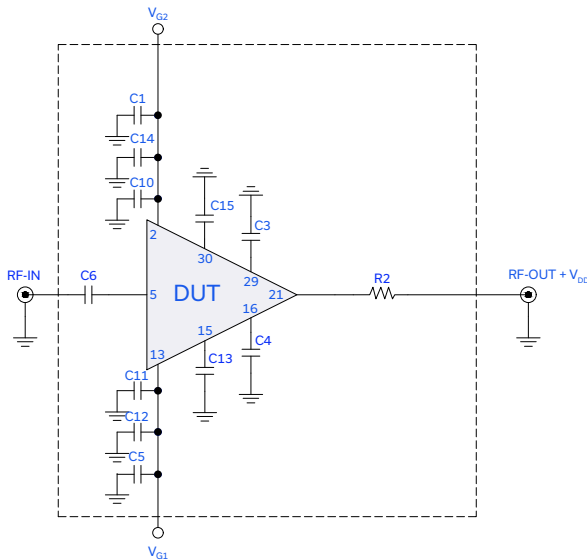


Figure 2. DUT soldered on Mini-Circuits Characterization Test Board

### Electrical Parameters and Conditions

Gain, Return Loss, Output Power at 1 dB Compression (P1dB), Output IP3 (OIP3), and Noise Figure measured using N5242B PNA-X Microwave Network Analyzer. Device bias voltage V<sub>DD</sub> supplied by external Bias-Tee.

#### Conditions:

1. Gain and Return Loss: P<sub>IN</sub> = -25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1MHz apart, +20 dBm/Tone at output.

#### Power ON/ Power OFF Sequence

Caution: Permanent damage to the device will occur if the Power ON/ Power OFF sequences are not followed.

#### Power ON:

1. Set V<sub>G1</sub> = -2 V and Turn ON.
2. Set V<sub>G2</sub> = +5 V and Turn ON.
3. Set V<sub>DD</sub> = +12 V and Turn ON.
4. Increase V<sub>G1</sub> to desired I<sub>DD</sub>.
5. Turn ON RF signal.

#### Power OFF:

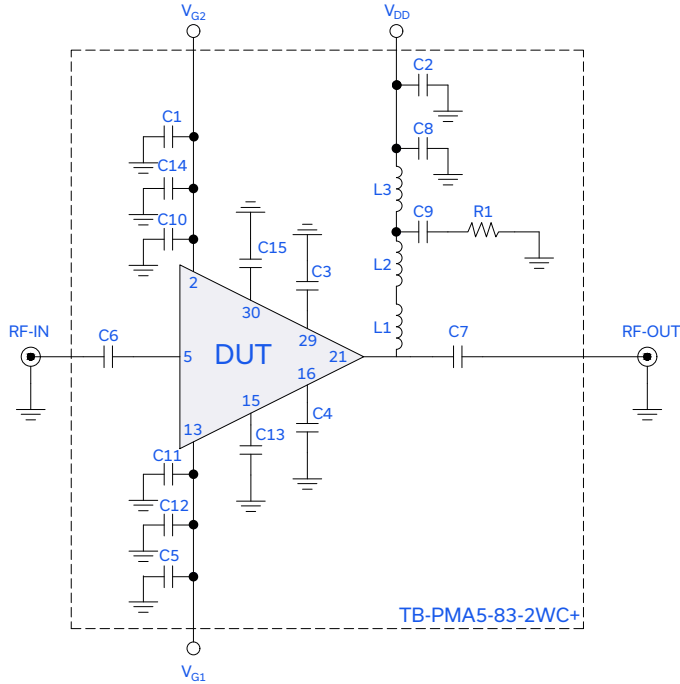
1. Turn OFF RF signal.
2. Decrease V<sub>G1</sub> to -2 V.
3. Turn OFF V<sub>DD</sub>.
4. Turn OFF V<sub>G2</sub>.
5. Turn OFF V<sub>G1</sub>.

Component	Value	Size	Part Number	Manufacturer
R2	0Ω	0402	RK73Z1ETTP	KOA SPEER ELECTRONICS
C1, C3, C4, C5	4.7 μF	1206	12063C475KAT2A	AVX CORPORATION
C6	0.1 μF	0402	GRM155R71E104KE14D	MURATA
C10, C11	100 pF	0402	GRM1555C1H101JA01D	MURATA
C12, C13, C14, C15	1 nF	0402	GRM1555C1H102JA01D	MURATA





### EVALUATION BOARD



#### Power ON/ Power OFF Sequence

Caution: Permanent damage to the device will occur if the Power ON/ Power OFF sequences are not followed.

#### Power ON:

1. Set  $V_{G1} = -2$  V and Turn ON.
2. Set  $V_{G2} = +5$  V and Turn ON.
3. Set  $V_{DD} = +12$  V and Turn ON.
4. Increase  $V_{G1}$  to desired  $I_{DD}$ .
5. Turn ON RF signal.

#### Power OFF:

1. Turn OFF RF signal.
2. Decrease  $V_{G1}$  to  $-2$  V.
3. Turn OFF  $V_{DD}$ .
4. Turn OFF  $V_{G2}$ .
5. Turn OFF  $V_{G1}$ .

Figure 3. DUT soldered on Mini-Circuits Evaluation Board TB-PMA5-83-2WC+

Component	Value	Size	Part Number	Manufacturer
R1	301Ω	0402	RK73H1ETTP3010F	KOA SPEER ELECTRONICS
C1, C2, C3, C4, C5	4.7 μF	1206	12063C475KAT2A	AVX CORPORATION
C6, C7, C8	0.1 μF	0402	GRM155R71E104KE14D	MURATA
C9, C10, C11	100 pF	0402	GRM1555C1H101JA01D	MURATA
C12, C13, C14, C15	1 nF	0402	GRM1555C1H102JA01D	MURATA
L1, L2	36 nH	0402	0402AF-360XJLW	COILCRAFT
L3	1.1 μH	1008	1008AF-112XKRC	COILCRAFT



MMIC SURFACE MOUNT

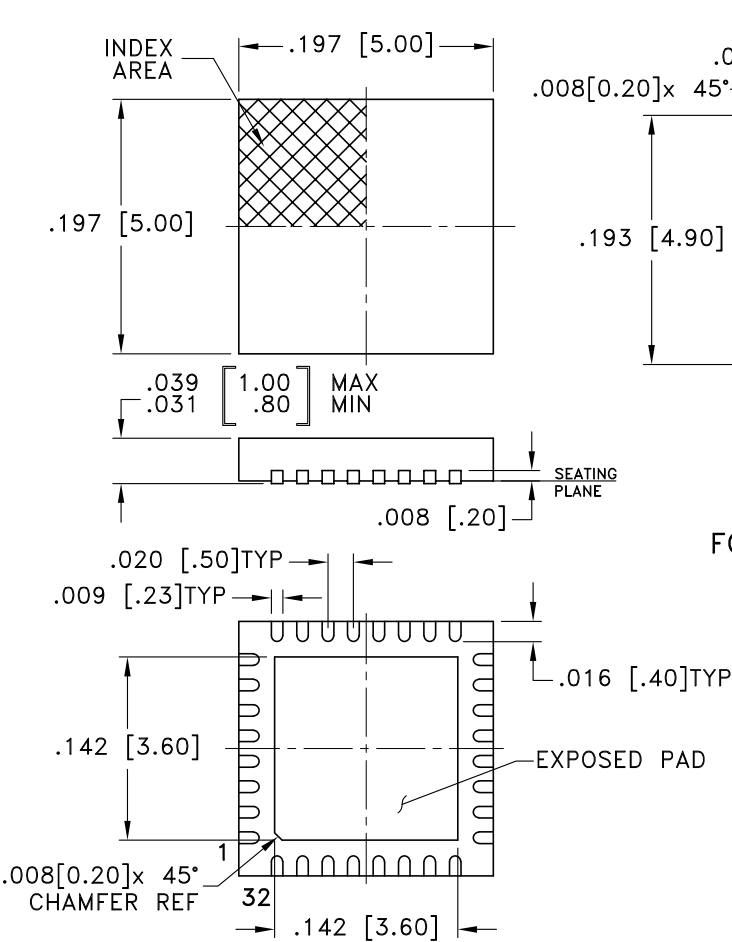
# Power Amplifier

## PMA5-83-2W+

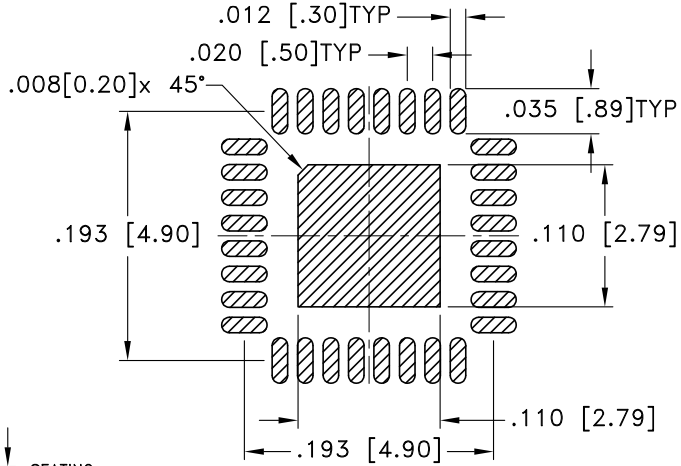
Mini-Circuits

50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

### CASE STYLE DRAWING



### PCB Land Pattern

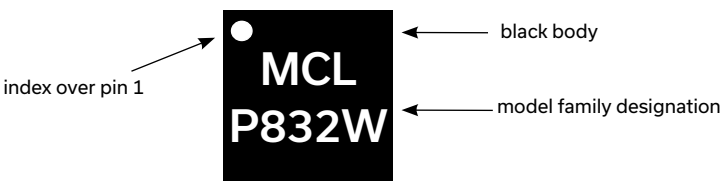


SUGGESTED LAYOUT FOR PCB LAND PATTERN (TOL ±.002)

Weight: .05 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl.±.01; 3Pl.±.005 Inch

### PRODUCT MARKING



Marking may contain other features or characters for internal lot control



MMIC SURFACE MOUNT

# Power Amplifier

## PMA5-83-2W+

50 Ω 0.01 to 10 GHz 2 W P<sub>SAT</sub>

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD [CLICK HERE](#)

Performance Data & Graphs	Data
	Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DG1677-10 Plastic package, exposed paddle, Lead Finish: Matte-Tin
RoHS Status	Compliant
Tape & Reel	F68-1
Standard quantities available on reel	7" reels with 10, 50, 100, 200, 500, 1K, or 2K devices
Suggested Layout for PCB Design	PL-771
Evaluation Board	TB-PMA5-83-2WC+
	Gerber File
Environmental Ratings	ENV08T1

### NOTES

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = S12 (dB)

Output Return Loss = S22 (dB)

TEST CONDITIONS:  $V_{DD} = +12\text{ V}$ ,  $I_{DD} = 400\text{ mA}$  @ Temperature =  $+25^{\circ}\text{C}$

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Psat Output	Noise Figure	2nd Harmonics	3rd Harmonics
					K	Measure							
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)
0.01	17.9	-50.22	-23.27	-23.65	21.01	1.00	36.75	30.27	32.57	35.59	28.68	-61.02	-108.08
0.2	15.1	-66.83	-20.75	-10.35	178.66	0.92	44.06	30.39	32.02	32.96	11.04	-56.91	-104.58
0.4	14.2	-57.84	-19.13	-10.11	68.16	0.91	46.17	30.45	31.91	32.66	7.56	-55.63	-104.10
0.6	13.5	-54.95	-18.01	-9.76	51.97	0.91	44.86	30.38	31.91	32.64	6.52	-49.53	-93.41
0.8	13.1	-53.02	-16.78	-9.68	43.42	0.91	45.02	30.57	32.10	32.75	5.54	-45.26	-88.36
1.0	12.8	-52.79	-15.68	-9.91	43.70	0.92	44.52	30.66	32.13	32.73	5.09	-42.25	-82.13
1.2	12.8	-49.62	-14.07	-10.27	30.27	0.94	44.67	30.78	32.25	32.82	4.71	-42.35	-77.62
1.4	12.6	-48.90	-13.12	-10.48	28.32	0.95	44.54	30.85	32.37	32.94	4.58	-44.09	-91.22
1.6	12.5	-48.08	-12.36	-10.94	26.21	0.97	44.22	30.83	32.32	32.80	4.41	-44.33	-92.45
1.8	12.3	-47.40	-11.83	-11.35	24.55	0.99	43.97	30.99	32.58	33.21	3.95	-43.53	-90.40
2.0	12.3	-46.71	-11.54	-11.63	22.91	1.00	44.07	30.96	32.52	32.90	3.74	-42.47	-86.91
2.2	12.2	-46.11	-11.50	-11.97	21.61	1.00	44.08	30.86	32.41	32.94	3.44	-42.71	-89.88
2.4	12.2	-45.48	-11.71	-12.39	20.38	1.01	44.03	31.07	32.68	33.19	3.37	-44.21	-87.51
2.6	12.1	-44.93	-12.21	-12.30	19.27	1.00	44.11	31.09	32.77	32.96	3.24	-43.80	-78.31
2.8	12.1	-44.32	-13.05	-12.03	18.07	0.99	44.04	30.91	32.50	33.01	2.97	-40.87	-75.72
3.0	12.1	-43.80	-14.31	-11.67	17.13	0.97	43.94	31.18	32.83	33.15	2.87	-38.91	-77.29
3.2	12.1	-43.33	-16.12	-11.27	16.32	0.95	43.77	31.64	33.34	33.42	2.80	-39.71	-73.96
3.4	12.1	-42.83	-18.69	-10.76	15.46	0.93	43.73	31.25	32.81	33.09	2.74	-41.72	-71.86
3.6	12.1	-42.34	-22.43	-10.35	14.66	0.91	43.59	31.88	33.36	33.39	2.72	-42.63	-75.34
3.8	12.1	-41.97	-27.36	-9.97	14.05	0.90	43.46	31.72	33.35	33.42	2.78	-41.54	-75.77
4.0	12.0	-41.58	-27.46	-9.70	13.41	0.89	43.35	31.28	32.88	33.01	2.76	-40.43	-73.85
4.2	12.0	-41.20	-23.45	-9.63	12.87	0.89	43.28	31.44	33.10	33.31	2.80	-40.93	-75.43
4.4	11.9	-40.86	-20.70	-9.74	12.43	0.90	43.10	31.37	33.15	33.52	2.90	-41.85	-75.39
4.6	11.9	-40.51	-19.14	-9.82	11.97	0.90	42.92	31.27	33.01	33.48	2.77	-40.85	-70.67
4.8	11.9	-40.18	-18.34	-10.15	11.62	0.91	42.68	31.48	33.29	33.57	2.75	-38.04	-72.97
5.0	11.9	-39.79	-18.13	-10.80	11.27	0.93	42.15	31.23	32.94	33.31	2.83	-36.07	-74.57
5.2	11.9	-39.43	-18.45	-11.28	10.91	0.94	42.02	31.33	33.04	33.42	2.77	-36.90	-72.64
5.4	11.9	-39.06	-19.35	-11.98	10.60	0.95	41.95	31.55	33.26	33.59	2.77	-39.03	-75.26
5.6	11.9	-38.72	-20.62	-12.73	10.32	0.95	41.98	31.24	32.95	33.34	2.72	-40.51	-80.86
5.8	11.9	-38.25	-21.79	-13.29	9.85	0.96	42.19	31.45	33.19	33.50	2.78	-39.99	-79.64
6.0	11.9	-37.72	-23.73	-13.73	9.35	0.96	42.18	31.48	33.26	33.52	2.89	-39.86	-79.13
6.2	11.9	-37.43	-24.92	-14.31	9.12	0.96	42.03	31.43	33.29	33.58	2.79	-40.49	-81.91
6.4	11.9	-37.19	-24.77	-14.56	8.91	0.97	41.85	31.63	33.52	33.72	2.82	-41.06	-80.03
6.6	11.8	-36.95	-23.86	-14.39	8.70	0.96	41.51	31.76	33.61	33.79	2.87	-39.80	-76.91
6.8	11.7	-36.74	-23.20	-14.00	8.51	0.96	41.09	31.72	33.61	33.75	2.93	-37.43	-82.85
7.0	11.7	-36.54	-23.23	-13.39	8.34	0.96	40.75	31.56	33.46	33.64	2.97	-37.38	-84.00
7.2	11.6	-36.35	-23.93	-13.01	8.21	0.95	40.68	31.37	33.29	33.47	3.06	-39.65	-83.34
7.4	11.5	-36.18	-25.09	-12.61	8.10	0.94	40.69	31.44	33.37	33.49	3.09	-41.15	-88.95
7.6	11.4	-35.96	-25.98	-12.17	7.95	0.94	40.64	31.26	33.20	33.37	3.19	-42.69	-101.73
7.8	11.3	-35.77	-25.38	-11.98	7.81	0.94	40.65	31.21	33.25	33.42	3.23	-43.01	-97.37
8.0	11.3	-35.63	-23.34	-12.09	7.75	0.94	40.59	31.08	33.11	33.33	3.27	-44.21	-98.91
8.2	11.2	-35.45	-20.80	-12.09	7.62	0.94	40.39	30.87	32.95	33.27	3.34	-46.33	-95.67
8.4	11.2	-35.25	-18.61	-11.98	7.44	0.94	40.11	30.78	32.88	33.17	3.39	-46.71	-100.62
8.6	11.1	-35.03	-17.07	-12.40	7.29	0.96	39.69	30.54	32.66	32.99	3.37	-44.73	-93.85
8.8	11.1	-34.79	-16.28	-12.79	7.13	0.96	39.45	30.60	32.67	32.95	3.43	-43.10	-96.23
9.0	11.0	-34.55	-16.14	-13.29	7.00	0.97	39.36	30.56	32.40	32.69	3.49	-43.14	-
9.2	11.0	-34.32	-16.63	-13.24	6.87	0.97	39.23	30.60	32.38	32.68	3.63	-44.85	-
9.4	10.9	-34.09	-18.05	-13.32	6.81	0.97	39.00	30.70	32.40	32.60	3.73	-46.78	-
9.6	10.7	-33.96	-21.29	-12.82	6.82	0.96	38.98	30.78	32.46	32.49	3.75	-47.78	-
9.8	10.5	-33.87	-24.36	-12.46	6.92	0.94	38.78	31.01	32.48	32.44	3.92	-48.29	-
10.0	10.3	-33.85	-33.06	-11.75	7.07	0.93	38.49	30.96	32.27	32.23	4.08	-50.60	-
10.5	9.5	-34.12	-16.95	-11.25	7.79	0.94	-	31.35	32.23	32.18	-	-	-
11.0	8.7	-34.44	-12.55	-11.61	8.56	0.98	-	30.74	31.62	31.56	-	-	-
11.5	8.1	-34.59	-12.51	-12.92	9.38	1.00	-	29.67	30.95	30.89	-	-	-
12.0	7.6	-34.68	-17.32	-15.19	10.75	0.99	-	28.83	30.28	30.23	-	-	-

## Typical Performance Data

### Definitions:

Input Return Loss = S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = S12 (dB)

Output Return Loss = S22 (dB)

TEST CONDITIONS:  $V_{DD} = +14\text{ V}$ ,  $I_{DD} = 400\text{ mA}$  @ Temperature =  $+25^{\circ}\text{C}$

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Psat Output	Noise Figure	2nd Harmonics	3rd Harmonics
					K	Measure							
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)
0.01	17.72	-57.14	-23.23	-24.17	51.55	1.00	38.74	30.64	35.34	36.22	28.75	-60.14	-111.77
0.2	14.97	-67.15	-20.72	-10.93	187.14	0.93	39.36	31.19	33.22	34.09	11.10	-56.80	-105.35
0.4	14.10	-59.10	-19.09	-10.68	84.31	0.93	45.85	31.30	33.13	33.77	7.57	-55.89	-103.46
0.6	13.40	-55.36	-18.05	-10.03	56.41	0.91	46.47	31.23	33.15	33.73	6.49	-49.68	-95.69
0.8	12.95	-53.46	-16.83	-9.90	46.77	0.92	45.56	31.44	33.35	33.80	5.55	-45.79	-92.58
1.0	12.67	-52.72	-15.75	-10.11	44.27	0.93	45.21	31.65	33.40	33.79	5.09	-42.62	-83.05
1.2	12.65	-49.75	-14.16	-10.51	31.42	0.94	44.96	31.78	33.52	33.88	4.75	-42.79	-76.54
1.4	12.47	-49.12	-13.21	-10.67	29.68	0.96	45.21	31.88	33.64	33.93	4.60	-44.54	-90.21
1.6	12.32	-48.16	-12.47	-11.01	26.96	0.97	45.04	31.88	33.60	33.74	4.44	-44.64	-99.07
1.8	12.20	-47.07	-11.95	-11.60	24.24	0.99	44.70	32.06	33.90	34.15	3.99	-43.66	-90.10
2.0	12.12	-46.42	-11.67	-11.75	22.63	1.00	44.40	32.03	33.84	33.77	3.77	-42.65	-82.46
2.2	12.06	-45.94	-11.62	-11.95	21.59	1.00	44.32	31.94	33.72	33.83	3.44	-42.82	-85.90
2.4	12.01	-45.84	-11.83	-12.51	21.69	1.01	44.47	32.11	33.96	34.04	3.33	-44.26	-85.17
2.6	11.99	-44.70	-12.34	-12.22	19.10	1.00	44.49	32.11	33.84	33.77	3.22	-43.72	-77.58
2.8	11.99	-44.28	-13.19	-11.97	18.33	0.98	44.55	31.90	33.78	33.85	2.99	-40.73	-74.99
3.0	11.98	-43.63	-14.45	-11.65	17.14	0.97	44.36	32.12	34.01	33.97	2.92	-38.84	-77.12
3.2	11.99	-43.39	-16.25	-11.18	16.74	0.95	44.38	32.56	34.29	34.18	2.86	-39.67	-73.51
3.4	11.98	-43.00	-18.83	-10.74	16.06	0.93	44.27	32.29	34.03	33.93	2.79	-41.64	-71.98
3.6	11.95	-42.16	-22.58	-10.09	14.54	0.91	44.08	32.98	34.24	34.14	2.72	-42.34	-75.43
3.8	11.91	-42.12	-27.40	-9.94	14.57	0.90	43.87	32.84	34.23	34.13	2.82	-41.26	-76.20
4.0	11.85	-41.83	-27.31	-9.58	14.03	0.89	43.85	32.33	33.84	33.74	2.76	-40.26	-73.92
4.2	11.80	-40.92	-23.38	-9.42	12.64	0.89	43.66	32.97	34.52	34.05	2.81	-40.78	-75.86
4.4	11.75	-40.55	-20.68	-9.45	12.13	0.89	43.66	32.89	34.47	34.11	2.92	-41.84	-75.93
4.6	11.72	-40.31	-19.09	-9.83	11.93	0.90	43.48	32.79	34.36	34.48	2.79	-40.68	-71.55
4.8	11.69	-39.94	-18.30	-9.82	11.44	0.91	43.33	33.01	34.56	34.59	2.81	-37.87	-74.06
5.0	11.67	-39.80	-18.10	-10.56	11.45	0.92	43.03	32.7	34.2	34.3	2.88	-35.94	-75.61
5.2	11.69	-39.25	-18.48	-10.84	10.81	0.93	42.51	32.8	34.37	34.40	2.78	-36.73	-73.59
5.4	11.71	-39.05	-19.34	-11.70	10.74	0.94	42.45	33.1	34.57	34.49	2.78	-38.97	-76.70
5.6	11.73	-38.94	-20.62	-12.42	10.74	0.95	42.32	32.7	34.27	34.23	2.79	-40.45	-81.49
5.8	11.76	-38.41	-22.08	-13.03	10.17	0.95	42.49	32.9	34.45	34.41	2.81	-39.91	-80.69
6.0	11.75	-38.00	-24.86	-14.04	9.85	0.96	42.59	33.1	34.5	34.4	2.81	-39.79	-79.58
6.2	11.72	-37.42	-26.72	-13.96	9.25	0.96	42.58	33.0	34.60	34.52	2.84	-40.47	-83.11
6.4	11.71	-37.23	-26.03	-14.33	9.09	0.96	42.43	33.3	34.76	34.68	2.89	-40.99	-80.52
6.6	11.66	-36.88	-24.18	-14.28	8.77	0.96	42.16	33.4	34.82	34.76	2.94	-39.71	-78.43
6.8	11.60	-36.78	-22.86	-14.31	8.72	0.96	41.84	33.4	34.77	34.70	2.95	-37.36	-84.89
7.0	11.54	-36.47	-22.36	-13.68	8.41	0.96	41.41	33.2	34.7	34.6	3.03	-37.31	-85.65
7.2	11.45	-36.35	-22.67	-13.24	8.34	0.95	41.14	33.0	34.48	34.41	3.11	-39.60	-84.70
7.4	11.35	-36.05	-23.80	-13.06	8.15	0.95	41.05	33.1	34.50	34.45	3.16	-41.05	-91.10
7.6	11.30	-36.34	-25.80	-12.30	8.40	0.94	41.04	32.9	34.44	34.39	3.22	-42.70	-98.70
7.8	11.23	-35.92	-27.25	-12.30	8.09	0.94	40.96	32.9	34.48	34.42	3.25	-43.03	-99.68
8.0	11.16	-35.53	-25.38	-12.15	7.77	0.94	40.94	32.8	34.3	34.3	3.32	-44.23	-100.11
8.2	11.12	-35.43	-21.94	-12.39	7.72	0.94	40.85	32.6	34.29	34.24	3.37	-46.36	-94.43
8.4	11.04	-35.28	-19.09	-11.93	7.57	0.94	40.73	32.5	34.19	34.14	3.40	-46.74	-100.37
8.6	11.00	-34.98	-17.12	-12.68	7.38	0.96	40.36	32.3	34.00	33.97	3.40	-44.63	-92.64
8.8	10.95	-34.67	-15.85	-12.80	7.12	0.97	39.99	32.4	33.98	33.95	3.46	-43.15	-90.30
9.0	10.88	-34.58	-15.23	-13.13	7.09	0.98	39.61	32.4	33.7	33.7	3.54	-43.11	-
9.2	10.80	-34.36	-15.32	-13.30	6.99	0.98	39.44	32.4	33.69	33.66	3.68	-44.89	-
9.4	10.70	-34.15	-16.20	-13.02	6.91	0.97	39.32	32.5	33.60	33.56	3.75	-46.88	-
9.6	10.55	-33.74	-18.08	-12.88	6.75	0.96	39.24	32.6	33.49	33.44	3.82	-48.08	-
9.8	10.37	-33.87	-21.77	-11.96	6.98	0.94	39.29	32.8	33.45	33.41	3.95	-48.42	-
10.0	10.13	-33.80	-27.57	-11.59	7.12	0.93	39.06	32.7	33.2	33.1	4.13	-50.65	-
10.5	9.25	-33.94	-16.30	-10.75	7.74	0.93	38.74	33.15	33.16	33.11	-	-	-
11.0	8.41	-34.44	-11.52	-10.93	8.59	0.98	-	32.45	32.46	32.39	-	-	-
11.5	7.88	-34.63	-11.32	-12.52	9.48	1.01	-	31.81	31.87	31.80	-	-	-
12.0	7.41	-34.51	-16.33	-14.26	10.62	0.98	-	31.01	31.19	31.14	-	-	-

## Typical Performance Data

### Definitions:

Input Return Loss = S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = S12 (dB)

Output Return Loss = S22 (dB)

TEST CONDITIONS:  $V_{DD} = +16\text{ V}$ ,  $I_{DD} = 400\text{ mA}$  @ Temperature =  $+25^\circ\text{C}$

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Psat Output	Noise Figure	2nd Harmonics	3rd Harmonics
					K	Measure							
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)
0.01	17.53	-55.26	-23.14	-24.22	51.94	1.00	40.03	31.33	33.39	37.70	28.79	-59.85	-111.87
0.2	14.86	-68.10	-20.71	-11.37	271.45	0.93	45.31	32.09	35.11	35.01	11.16	-56.81	-100.48
0.4	14.00	-58.76	-19.07	-11.09	81.96	0.93	46.11	32.15	34.27	34.70	7.62	-55.46	-103.15
0.6	13.37	-55.33	-18.08	-10.27	55.94	0.92	45.58	32.06	34.29	34.63	6.58	-49.67	-91.59
0.8	12.91	-53.63	-16.84	-10.18	48.14	0.92	45.37	32.21	34.51	34.65	5.59	-45.82	-86.98
1.0	12.61	-53.02	-15.72	-10.37	46.41	0.93	45.20	32.43	34.59	34.65	5.14	-42.88	-82.65
1.2	12.59	-49.98	-14.10	-10.67	32.60	0.95	45.74	32.59	34.67	34.73	4.76	-43.02	-78.11
1.4	12.39	-49.27	-13.14	-10.86	30.56	0.96	45.43	32.71	34.79	34.72	4.65	-44.67	-87.87
1.6	12.23	-48.41	-12.38	-11.25	28.11	0.98	45.23	32.75	34.55	34.49	4.51	-44.85	-88.87
1.8	12.11	-47.87	-11.86	-11.57	26.74	0.99	44.97	32.91	34.97	34.90	4.01	-43.95	-91.53
2.0	12.00	-47.19	-11.58	-11.87	25.03	1.00	44.94	32.90	34.50	34.43	3.83	-42.62	-83.29
2.2	11.93	-46.50	-11.55	-12.12	23.36	1.00	45.11	32.76	34.57	34.52	3.52	-42.85	-86.84
2.4	11.88	-45.88	-11.79	-12.35	22.02	1.00	44.96	32.86	34.75	34.69	3.37	-44.18	-84.66
2.6	11.86	-45.34	-12.31	-12.22	20.85	1.00	44.99	32.89	34.39	34.32	3.26	-43.51	-77.71
2.8	11.86	-44.74	-13.17	-12.02	19.62	0.98	44.85	32.60	34.52	34.47	3.04	-40.69	-75.63
3.0	11.85	-44.23	-14.47	-11.63	18.63	0.97	44.76	32.78	34.59	34.53	2.96	-38.68	-77.42
3.2	11.85	-43.71	-16.35	-11.19	17.64	0.95	44.64	33.15	34.75	34.65	2.88	-39.41	-73.96
3.4	11.84	-43.26	-19.02	-10.73	16.81	0.93	44.46	33.02	34.59	34.48	2.79	-41.42	-71.67
3.6	11.81	-42.85	-22.88	-10.29	16.07	0.91	44.25	33.66	34.70	34.60	2.76	-42.07	-75.13
3.8	11.77	-42.43	-27.71	-9.92	15.32	0.90	44.06	33.61	34.71	34.61	2.83	-41.11	-75.43
4.0	11.72	-41.97	-26.87	-9.74	14.54	0.89	43.99	33.17	34.33	34.23	2.81	-40.13	-73.18
4.2	11.67	-41.61	-23.00	-9.57	13.94	0.89	43.93	33.84	35.47	34.75	2.87	-40.62	-75.60
4.4	11.61	-41.29	-20.46	-9.74	13.53	0.90	43.73	33.67	35.35	35.09	2.94	-41.66	-75.21
4.6	11.57	-40.90	-19.03	-9.83	12.98	0.91	43.66	33.64	35.23	35.16	2.82	-40.47	-70.80
4.8	11.55	-40.52	-18.33	-10.16	12.54	0.92	43.43	33.83	35.35	35.27	2.80	-37.61	-73.13
5.0	11.53	-40.19	-18.26	-10.67	12.22	0.93	42.89	33.55	35.05	35.01	2.90	-35.75	-74.53
5.2	11.53	-39.82	-18.72	-11.19	11.84	0.94	42.91	33.66	35.13	35.10	2.86	-36.56	-72.16
5.4	11.54	-39.45	-19.82	-11.86	11.51	0.94	42.86	34.03	35.28	35.23	2.83	-38.77	-75.21
5.6	11.55	-39.13	-21.31	-12.58	11.23	0.95	42.87	33.71	34.96	34.93	2.79	-40.28	-80.67
5.8	11.55	-38.51	-22.66	-13.20	10.57	0.96	43.01	33.85	35.04	35.03	2.85	-39.77	-79.35
6.0	11.54	-38.07	-24.72	-13.68	10.14	0.96	42.91	34.03	35.12	35.11	2.84	-39.52	-79.29
6.2	11.52	-37.79	-25.76	-14.21	9.88	0.96	42.79	34.08	35.27	35.21	2.86	-40.27	-81.78
6.4	11.49	-37.55	-24.92	-14.33	9.66	0.96	42.57	34.33	35.43	35.36	2.93	-40.84	-80.37
6.6	11.43	-37.27	-23.27	-14.20	9.40	0.96	42.23	34.56	35.52	35.45	2.96	-39.53	-77.79
6.8	11.37	-37.04	-22.33	-13.90	9.18	0.96	41.85	34.63	35.49	35.40	3.02	-37.24	-83.20
7.0	11.29	-36.86	-22.40	-13.40	9.03	0.96	41.62	34.46	35.39	35.31	3.08	-37.11	-83.81
7.2	11.21	-36.69	-23.42	-12.93	8.90	0.95	41.44	34.24	35.23	35.15	3.14	-39.40	-83.94
7.4	11.11	-36.45	-25.76	-12.50	8.72	0.94	41.46	34.35	35.24	35.22	3.18	-40.88	-90.61
7.6	11.01	-36.22	-28.30	-12.09	8.56	0.94	41.31	34.19	35.19	35.13	3.23	-42.39	-94.32
7.8	10.93	-36.02	-26.80	-11.80	8.41	0.93	41.33	34.14	35.19	35.12	3.28	-42.74	-98.65
8.0	10.86	-35.88	-23.73	-11.83	8.33	0.93	41.27	34.04	35.03	34.98	3.37	-43.98	-100.38
8.2	10.79	-35.72	-20.69	-11.75	8.20	0.94	41.04	33.83	34.97	34.92	3.43	-46.20	-100.79
8.4	10.73	-35.47	-18.30	-11.85	7.99	0.94	40.77	33.91	34.88	34.82	3.45	-46.57	-98.92
8.6	10.68	-35.27	-16.68	-12.21	7.85	0.95	40.38	33.78	34.72	34.67	3.46	-44.43	-99.10
8.8	10.63	-35.02	-15.80	-12.61	7.66	0.97	40.08	34.13	34.73	34.67	3.50	-42.93	-92.27
9.0	10.57	-34.77	-15.56	-13.08	7.53	0.97	39.91	34.06	34.51	34.44	3.58	-42.90	-
9.2	10.50	-34.53	-15.93	-13.12	7.38	0.97	39.84	34.08	34.44	34.39	3.72	-44.87	-
9.4	10.39	-34.30	-17.04	-13.24	7.33	0.97	39.79	34.17	34.37	34.31	3.82	-46.75	-
9.6	10.25	-34.13	-19.33	-12.69	7.32	0.96	39.84	34.29	34.28	34.21	3.85	-47.94	-
9.8	10.04	-34.03	-23.91	-12.40	7.44	0.94	39.56	34.33	34.30	34.23	4.02	-48.37	-
10.0	9.78	-34.02	-28.12	-11.70	7.62	0.93	39.24	34.03	34.00	33.94	4.17	-50.68	-
10.5	8.93	-34.32	-16.56	-10.76	8.38	0.93	-	33.88	33.86	33.80	-	-	-
11.0	8.07	-34.72	-11.87	-11.12	9.31	0.98	-	33.03	33.01	32.94	-	-	-
11.5	7.55	-34.77	-11.80	-12.57	10.12	1.01	-	32.55	32.53	32.47	-	-	-
12.0	7.08	-34.74	-16.84	-14.72	11.40	0.99	-	31.89	31.87	31.82	-	-	-



## Typical Performance Data

**Definitions:**

Input Return Loss = S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = S12 (dB)

Output Return Loss = S22 (dB)

TEST CONDITIONS:  $V_{DD} = +12\text{ V}$ ,  $I_{DD} = 400\text{ mA}$  @ Temperature =  $-45^{\circ}\text{C}$

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Psat Output	Noise Figure
					K	Measure					
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
0.0	18.83	-56.36	-24.14	-24.85	39.31	1.00	40.72	30.27	31.35	35.50	26.12
0.2	15.61	-63.26	-20.94	-10.75	109.80	0.92	47.26	30.50	31.93	32.94	10.13
0.4	14.70	-59.16	-19.24	-10.40	75.70	0.92	45.54	30.17	31.62	32.55	6.63
0.6	14.05	-54.62	-18.19	-9.76	47.09	0.91	44.88	30.08	31.60	32.55	5.75
0.8	13.57	-53.64	-16.81	-9.70	44.26	0.91	44.58	30.38	31.89	32.72	4.67
1.0	13.26	-53.49	-15.64	-9.88	44.98	0.92	43.90	30.61	32.02	32.75	4.26
1.2	13.28	-50.29	-13.94	-10.13	30.79	0.94	43.42	30.74	32.14	32.84	3.94
1.4	13.09	-49.69	-12.89	-10.31	29.16	0.95	43.38	30.95	32.34	33.02	3.68
1.6	12.96	-48.52	-12.10	-10.62	25.78	0.97	43.51	30.96	32.31	32.90	3.45
1.8	12.85	-48.02	-11.57	-11.10	24.66	0.98	43.40	31.14	32.58	33.32	3.25
2.0	12.79	-47.12	-11.28	-11.71	22.50	1.00	43.56	31.19	32.60	33.04	3.01
2.2	12.75	-46.66	-11.25	-12.32	21.60	1.01	43.81	31.07	32.48	33.09	2.84
2.4	12.74	-46.06	-11.44	-12.75	20.38	1.01	43.55	31.32	32.77	33.37	2.62
2.6	12.74	-45.36	-11.85	-12.94	18.96	1.01	43.41	31.46	32.92	33.18	2.51
2.8	12.74	-44.99	-12.70	-12.77	18.35	1.00	43.39	31.23	32.61	33.21	2.23
3.0	12.75	-44.25	-13.87	-12.32	16.92	0.98	43.22	31.47	32.91	33.32	2.12
3.2	12.75	-43.63	-15.67	-11.70	15.84	0.96	43.01	32.01	33.44	33.60	2.02
3.4	12.75	-43.21	-18.27	-10.91	15.07	0.93	42.88	31.55	32.90	33.25	1.99
3.6	12.71	-42.80	-22.09	-10.20	14.36	0.91	42.69	32.18	33.46	33.59	1.99
3.8	12.67	-42.35	-27.92	-9.62	13.57	0.89	42.53	32.13	33.51	33.68	2.01
4.0	12.62	-41.77	-29.76	-9.20	12.63	0.88	42.31	31.67	33.01	33.23	1.97
4.2	12.59	-41.77	-24.91	-9.09	12.60	0.88	42.04	32.08	33.41	33.98	2.01
4.4	12.57	-41.22	-21.71	-9.28	11.90	0.88	41.77	32.10	33.52	34.07	2.06
4.6	12.55	-41.03	-19.73	-9.61	11.72	0.90	41.59	31.94	33.32	33.89	2.06
4.8	12.54	-40.55	-18.51	-9.99	11.18	0.91	41.45	32.16	33.65	34.04	2.06
5.0	12.52	-40.19	-17.94	-10.43	10.85	0.92	41.25	31.90	33.29	33.70	2.06
5.2	12.50	-40.00	-17.92	-10.85	10.72	0.93	40.95	31.92	33.33	33.82	2.08
5.4	12.51	-39.40	-18.52	-11.34	10.11	0.94	40.75	32.13	33.62	33.99	2.00
5.6	12.52	-39.30	-19.59	-11.78	10.08	0.94	40.58	31.84	33.34	33.81	2.03
5.8	12.53	-38.78	-20.59	-12.15	9.57	0.95	40.49	32.01	33.54	33.96	1.98
6.0	12.53	-38.28	-22.82	-12.61	9.13	0.95	40.53	32.09	33.64	33.94	1.97
6.2	12.53	-38.12	-24.43	-13.06	9.03	0.95	40.55	32.14	33.71	34.03	2.02
6.4	12.52	-37.62	-24.63	-13.51	8.58	0.96	40.43	32.37	33.93	34.16	2.05
6.6	12.50	-37.39	-24.04	-13.92	8.42	0.96	40.33	32.59	34.09	34.26	2.03
6.8	12.47	-37.09	-23.04	-14.15	8.17	0.96	40.23	32.67	34.16	34.27	2.12
7.0	12.43	-36.66	-22.34	-14.24	7.81	0.96	40.10	32.53	34.02	34.18	2.16
7.2	12.37	-36.45	-22.07	-14.08	7.67	0.96	39.88	32.36	33.82	34.02	2.20
7.4	12.30	-36.43	-22.40	-13.94	7.69	0.96	39.78	32.51	33.91	34.09	2.23
7.6	12.25	-36.29	-23.21	-13.70	7.60	0.96	39.63	32.28	33.65	33.91	2.27
7.8	12.21	-36.12	-23.87	-13.48	7.49	0.95	39.53	32.28	33.72	33.99	2.30
8.0	12.16	-35.96	-23.87	-13.29	7.38	0.95	39.41	32.20	33.68	33.95	2.34
8.2	12.13	-35.78	-22.29	-13.23	7.25	0.95	39.51	31.90	33.42	33.81	2.31
8.4	12.09	-35.43	-20.10	-13.31	6.98	0.96	39.25	31.95	33.45	33.81	2.41
8.6	12.04	-35.29	-18.09	-13.49	6.88	0.96	38.96	31.75	33.27	33.68	2.44
8.8	12.02	-34.88	-16.63	-13.83	6.57	0.97	38.91	31.72	33.18	33.53	2.44
9.0	11.97	-34.74	-15.79	-14.07	6.48	0.98	38.86	31.81	33.04	33.37	2.51
9.2	11.92	-34.40	-15.62	-14.13	6.26	0.98	38.83	31.70	32.91	33.26	2.51
9.4	11.84	-34.28	-16.17	-13.83	6.23	0.98	38.60	31.64	32.85	33.16	2.56
9.6	11.72	-34.12	-17.63	-13.27	6.19	0.97	38.51	31.70	32.91	33.09	2.61
9.8	11.59	-33.94	-20.55	-12.56	6.16	0.95	38.44	31.79	32.97	33.07	2.71
10.0	11.39	-33.94	-26.31	-11.85	6.27	0.93	38.12	31.65	32.81	32.84	2.82
10.5	10.66	-34.14	-18.80	-10.46	6.75	0.91	-	32.03	32.88	32.84	-
11.0	9.75	-34.77	-11.89	-9.95	7.55	0.95	-	31.75	32.39	32.35	-
11.5	9.09	-35.09	-10.52	-10.97	8.37	1.00	-	30.79	31.73	31.68	-
12.0	8.76	-35.00	-14.80	-13.60	9.46	0.99	-	29.59	30.82	30.87	-

## Typical Performance Data

**Definitions:**

Input Return Loss = S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = S12 (dB)

Output Return Loss = S22 (dB)

TEST CONDITIONS:  $V_{DD} = +12\text{ V}$ ,  $I_{DD} = 400\text{ mA}$  @ Temperature =  $+85^{\circ}\text{C}$

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Psat Output	Noise Figure
					K	Measure					
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
0.01	17.32	-55.02	-22.57	-22.38	37.91	1.00	41.39	29.01	32.27	34.52	29.55
0.2	14.44	-64.83	-20.44	-10.37	172.49	0.92	44.81	30.60	31.97	32.68	11.57
0.4	13.58	-56.48	-19.23	-10.20	62.88	0.91	46.00	30.60	31.88	32.41	8.07
0.6	12.87	-54.31	-18.45	-9.71	52.54	0.90	46.17	30.46	31.83	32.36	7.07
0.8	12.46	-52.55	-17.23	-9.55	44.32	0.90	45.80	30.54	31.94	32.36	6.11
1.0	12.23	-51.43	-16.02	-9.83	39.95	0.92	45.68	30.56	31.92	32.32	5.70
1.2	12.21	-49.03	-14.34	-10.21	30.29	0.94	46.59	30.66	32.05	32.45	5.36
1.4	12.05	-48.20	-13.29	-10.61	28.00	0.95	46.05	30.67	32.12	32.50	5.09
1.6	11.93	-47.19	-12.47	-11.02	25.23	0.97	46.04	30.60	32.05	32.37	4.86
1.8	11.81	-46.45	-11.91	-11.43	23.49	0.99	45.90	30.72	32.29	32.75	4.57
2.0	11.73	-45.43	-11.60	-11.76	21.06	1.00	46.26	30.62	32.21	32.44	4.36
2.2	11.66	-45.07	-11.57	-12.02	20.43	1.00	46.08	30.51	32.09	32.48	4.19
2.4	11.64	-44.23	-11.82	-12.15	18.69	1.00	45.82	30.65	32.33	32.70	3.93
2.6	11.62	-43.70	-12.38	-12.10	17.74	0.99	45.68	30.59	32.43	32.47	3.80
2.8	11.62	-43.25	-13.32	-11.93	17.01	0.98	45.50	30.46	32.14	32.52	3.51
3.0	11.63	-42.93	-14.66	-11.58	16.46	0.96	45.44	30.65	32.46	32.67	3.36
3.2	11.63	-42.33	-16.59	-11.21	15.47	0.95	45.12	30.93	32.92	32.88	3.25
3.4	11.63	-41.94	-19.16	-10.84	14.84	0.93	44.77	30.71	32.46	32.62	3.25
3.6	11.61	-41.28	-22.83	-10.52	13.82	0.92	44.34	31.31	32.99	32.89	3.20
3.8	11.58	-40.95	-26.83	-10.23	13.32	0.91	44.17	31.15	32.89	32.84	3.26
4.0	11.52	-40.65	-26.15	-9.96	12.86	0.90	44.19	30.72	32.49	32.49	3.23
4.2	11.45	-40.27	-22.80	-9.70	12.30	0.89	44.19	30.79	32.65	33.22	3.27
4.4	11.36	-39.91	-20.44	-9.54	11.82	0.89	44.08	30.59	32.52	33.14	3.30
4.6	11.29	-39.74	-19.07	-9.49	11.64	0.90	43.85	30.49	32.39	33.03	3.38
4.8	11.26	-39.39	-18.44	-9.63	11.23	0.90	43.42	30.59	32.56	33.13	3.33
5.0	11.25	-38.95	-18.48	-9.99	10.79	0.91	43.33	30.50	32.28	32.88	3.33
5.2	11.26	-38.63	-19.00	-10.58	10.53	0.92	43.18	30.62	32.34	32.99	3.36
5.4	11.30	-37.96	-20.04	-11.31	9.88	0.93	43.22	30.78	32.49	33.08	3.30
5.6	11.33	-37.91	-21.41	-12.14	9.95	0.94	43.07	30.48	32.14	32.83	3.35
5.8	11.34	-37.26	-23.03	-13.01	9.35	0.95	43.06	30.53	32.48	32.98	3.32
6.0	11.34	-36.82	-25.87	-13.85	9.01	0.96	42.75	30.60	32.24	32.99	3.32
6.2	11.33	-36.50	-27.57	-14.42	8.75	0.96	42.24	31.07	32.96	33.02	3.38
6.4	11.30	-36.36	-27.01	-14.61	8.66	0.96	42.10	31.21	33.14	33.15	3.39
6.6	11.26	-36.07	-25.19	-14.50	8.40	0.96	41.94	31.27	33.19	33.18	3.46
6.8	11.21	-35.69	-23.78	-14.17	8.05	0.96	41.87	31.23	33.14	33.12	3.53
7.0	11.14	-35.54	-23.39	-13.87	7.95	0.96	41.74	31.07	33.01	33.00	3.60
7.2	11.07	-35.32	-23.65	-13.67	7.80	0.96	41.56	30.87	32.86	32.85	3.65
7.4	10.99	-35.20	-24.88	-13.58	7.76	0.96	41.15	30.86	32.90	32.87	3.74
7.6	10.92	-35.04	-26.84	-13.58	7.69	0.95	40.94	30.75	32.80	32.78	3.77
7.8	10.86	-34.82	-27.31	-13.64	7.57	0.95	40.62	30.66	32.80	32.77	3.84
8.0	10.80	-34.57	-25.03	-13.65	7.40	0.95	40.51	30.50	32.66	32.64	3.91
8.2	10.76	-34.49	-22.00	-13.83	7.36	0.96	40.13	30.35	32.55	32.60	3.87
8.4	10.71	-34.19	-19.52	-13.94	7.13	0.96	40.12	30.26	32.45	32.49	4.07
8.6	10.64	-34.03	-17.73	-13.98	7.02	0.97	39.89	30.07	32.23	32.30	4.10
8.8	10.58	-33.76	-16.64	-14.03	6.82	0.98	39.72	30.15	32.26	32.27	4.20
9.0	10.50	-33.49	-16.23	-13.94	6.65	0.98	39.59	30.10	31.98	32.04	4.26
9.2	10.39	-33.30	-16.47	-13.73	6.57	0.98	39.43	30.13	31.98	32.03	4.33
9.4	10.24	-33.25	-17.54	-13.28	6.64	0.97	39.32	30.23	32.04	31.99	4.41
9.6	10.05	-32.97	-19.73	-12.60	6.56	0.95	38.81	30.26	31.98	31.88	4.53
9.8	9.82	-33.07	-24.02	-11.86	6.78	0.94	38.26	30.42	31.89	31.78	4.70
10.0	9.54	-33.18	-33.71	-11.19	7.04	0.92	37.73	30.37	31.67	31.56	4.89
10.5	8.73	-33.50	-17.91	-10.19	7.76	0.91	-	30.45	31.56	31.44	-
11.0	8.02	-33.78	-12.83	-10.42	8.40	0.95	-	29.64	30.83	30.70	-
11.5	7.55	-33.85	-12.66	-12.18	9.16	0.99	-	28.82	30.23	30.11	-
12.0	6.98	-33.98	-18.24	-14.96	10.65	0.98	-	28.29	29.69	29.60	-

## Typical Performance Data

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = +12\text{ V}$ ,  $I_{DD} = 400\text{ mA}$  @ Temperature =  $+25^{\circ}\text{C}$

Power	OIP2 (@1 GHz)	OIP2 (@4 GHz)	OIP2 (@8 GHz)
(dBm)	(dBm)	(dBm)	(dBm)
5.00	45.93	45.94	47.14
6.00	46.17	46.03	47.28
7.00	46.27	46.04	47.17
8.00	46.21	46.00	47.20
9.00	46.13	45.96	47.14
10.00	46.14	46.04	46.94
11.00	46.08	45.98	46.89
12.00	46.00	45.93	46.76
13.00	45.96	45.86	46.64
14.00	45.81	45.77	46.50
15.00	45.51	45.51	46.01
16.00	45.35	45.39	45.82
17.00	45.20	45.22	45.58
18.00	44.97	45.04	45.29
19.00	44.74	44.80	45.00
20.00	44.61	44.64	44.74
21.00	44.58	44.43	44.48
22.00	44.80	44.27	44.50
23.00	45.41	44.34	44.98
24.00	46.25	44.50	46.27
25.00	47.43	44.87	48.37
26.00	49.33	45.47	51.13
27.00	52.07	46.16	55.16

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)  
 Gain(Power Gain) = S21 (dB)  
 Reverse Isolation = -S12 (dB)  
 Output Return Loss = -S22 (dB)

TEST CONDITIONS:  $V_{DD} = +12\text{ V}$ ,  $I_{DD} = 400\text{ mA}$  @ Temperature =  $+25^{\circ}\text{C}$

Power	P <sub>OUT</sub> (@1 GHz)	P <sub>OUT</sub> (@4 GHz)	P <sub>OUT</sub> (@8 GHz)	I <sub>DD</sub> (@1 GHz)	I <sub>DD</sub> (@4 GHz)	I <sub>DD</sub> (@8 GHz)	P <sub>DISS</sub> (@1 GHz)	P <sub>DISS</sub> (@4 GHz)	P <sub>DISS</sub> (@8 GHz)	PAE (@1 GHz)	PAE (@4 GHz)	PAE (@8 GHz)
(dBm)	(dBm)	(dBm)	(dBm)	mA	mA	mA	(dBm)	(dBm)	(dBm)	(%)	(%)	(%)
0.00	12.87	12.12	11.45	394.37	397.28	395.82	4.78	4.78	4.79	0.38	0.32	0.28
0.50	13.37	12.61	11.95	395.02	396.15	395.18	4.78	4.78	4.79	0.43	0.36	0.31
1.00	13.87	13.11	12.44	392.92	394.21	393.72	4.78	4.78	4.78	0.48	0.40	0.35
1.50	14.37	13.61	12.94	394.05	394.69	393.89	4.77	4.78	4.78	0.54	0.45	0.39
2.00	14.86	14.11	13.44	394.05	395.66	394.37	4.77	4.78	4.78	0.61	0.51	0.44
2.50	15.36	14.61	13.94	393.40	395.18	394.53	4.77	4.77	4.78	0.68	0.57	0.49
3.00	15.87	15.11	14.44	392.27	393.56	393.40	4.76	4.77	4.77	0.76	0.64	0.55
3.50	16.36	15.61	14.94	391.46	393.08	393.56	4.76	4.77	4.77	0.86	0.72	0.62
4.00	16.86	16.11	15.43	390.50	394.05	392.11	4.75	4.76	4.77	0.96	0.81	0.69
4.50	17.36	16.61	15.93	390.82	393.56	392.43	4.75	4.76	4.76	1.08	0.90	0.78
5.00	17.87	17.11	16.43	390.50	392.59	392.43	4.74	4.75	4.76	1.21	1.01	0.87
5.50	18.37	17.61	16.93	389.53	392.59	391.46	4.73	4.75	4.75	1.36	1.14	0.98
6.00	18.87	18.11	17.43	388.40	392.43	390.98	4.73	4.74	4.75	1.53	1.28	1.09
6.50	19.38	18.61	17.93	388.07	391.79	391.14	4.72	4.73	4.74	1.71	1.43	1.23
7.00	19.88	19.11	18.42	388.07	391.30	391.30	4.71	4.72	4.73	1.92	1.61	1.38
7.50	20.38	19.61	18.92	388.40	390.98	390.33	4.70	4.71	4.73	2.16	1.80	1.54
8.00	20.89	20.11	19.42	385.49	390.33	389.69	4.68	4.70	4.72	2.43	2.02	1.73
8.50	21.39	20.61	19.92	386.30	389.85	389.53	4.67	4.69	4.71	2.72	2.27	1.94
9.00	21.89	21.11	20.42	385.81	390.17	389.37	4.65	4.68	4.70	3.06	2.55	2.18
9.50	22.39	21.61	20.92	384.36	390.98	388.07	4.64	4.66	4.68	3.44	2.86	2.45
10.00	22.90	22.11	21.42	385.33	389.04	388.40	4.61	4.65	4.67	3.86	3.20	2.75
10.50	23.40	22.61	21.92	383.07	389.37	387.75	4.59	4.63	4.65	4.33	3.59	3.08
11.00	23.90	23.10	22.41	383.55	388.07	386.94	4.57	4.61	4.63	4.86	4.03	3.45
11.50	24.40	23.60	22.91	384.20	389.20	386.14	4.54	4.58	4.61	5.45	4.52	3.86
12.00	24.89	24.10	23.40	381.78	388.56	387.43	4.51	4.56	4.59	6.11	5.07	4.33
12.50	25.38	24.59	23.89	382.10	388.24	386.30	4.47	4.53	4.57	6.84	5.68	4.84
13.00	25.87	25.08	24.39	381.46	388.88	387.43	4.43	4.49	4.54	7.65	6.36	5.42
13.50	26.35	25.57	24.87	381.94	389.20	386.46	4.39	4.46	4.51	8.52	7.10	6.05
14.00	26.82	26.04	25.36	381.29	390.33	386.78	4.34	4.42	4.48	9.51	7.93	6.75
14.50	27.28	26.51	25.83	381.29	390.01	388.24	4.29	4.38	4.44	10.55	8.83	7.52
15.00	27.71	26.97	26.30	379.03	390.17	387.43	4.24	4.33	4.40	11.65	9.81	8.36
15.50	28.13	27.42	26.75	380.81	390.98	389.53	4.19	4.28	4.36	12.80	10.87	9.26
16.00	28.52	27.84	27.18	380.49	393.56	389.37	4.13	4.23	4.31	13.97	11.97	10.22
16.50	28.88	28.25	27.60	381.94	395.34	392.59	4.07	4.17	4.26	15.16	13.11	11.21
17.00	29.22	28.63	27.99	383.55	398.08	394.53	4.02	4.11	4.21	16.35	14.29	12.24
17.50	29.55	29.01	28.36	384.68	403.57	400.83	3.96	4.06	4.16	17.55	15.52	13.28
18.00	29.85	29.36	28.71	387.75	408.42	403.90	3.90	3.99	4.11	18.75	16.79	14.35
18.50	30.14	29.71	29.05	390.33	417.78	414.39	3.84	3.93	4.06	19.95	18.11	15.46
19.00	30.40	30.03	29.39	393.24	425.69	422.30	3.79	3.87	4.00	21.11	19.44	16.63
19.50	30.65	30.33	29.72	399.86	430.85	431.18	3.73	3.81	3.94	22.23	20.72	17.85
20.00	30.87	30.60	30.04	404.22	440.70	439.73	3.68	3.75	3.88	23.30	21.95	19.11
20.50	31.08	30.85	30.36	409.06	449.90	454.26	3.63	3.69	3.82	24.29	23.12	20.39
21.00	31.27	31.08	30.66	416.33	460.72	467.34	3.59	3.64	3.76	25.20	24.22	21.69
21.50	31.44	31.30	30.94	422.62	468.31	478.96	3.55	3.59	3.70	26.03	25.25	22.97
22.00	31.60	31.50	31.21	427.79	477.03	491.88	3.51	3.54	3.64	26.78	26.19	24.22
22.50	31.75	31.68	31.46	433.92	484.61	505.92	3.48	3.50	3.58	27.44	27.05	25.40
23.00	31.89	31.84	31.69	439.09	492.36	518.84	3.45	3.47	3.53	28.03	27.80	26.49
23.50	32.02	31.99	31.89	446.68	501.24	531.27	3.43	3.44	3.48	28.53	28.43	27.46
24.00	32.14	32.13	32.08	455.72	510.28	547.25	3.41	3.41	3.44	28.93	28.95	28.31
24.50	32.25	32.26	32.25	463.14	519.64	559.84	3.40	3.39	3.41	29.19	29.34	28.99
25.00	32.33	32.37	32.40	467.18	525.46	572.59	3.40	3.38	3.39	29.11	29.50	29.46

*Typical Performance Data*

TEST CONDITIONS:  $V_{DD} = +12\text{ V}$ ,  $V_{G2} = +5\text{ V}$ ,  $I_{DD} = 400\text{ mA}$  @ Temperature =  $+25^{\circ}\text{C}$

FREQ	P <sub>IN</sub>	Gain
(GHz)	(dBm)	(dB)
1.00	0.00	13.1
1.00	1.00	13.1
1.00	2.00	13.1
1.00	3.00	13.1
1.00	4.00	13.1
1.00	5.00	13.1
1.00	6.0	13.2
1.00	7.0	13.2
1.00	8.0	13.2
1.00	9.0	13.2
1.00	10.0	13.2
1.00	12.0	13.2
1.00	14.0	13.2
1.00	15.0	13.1
1.00	16.0	13.0
1.00	18.0	12.4
1.00	20.0	11.6
1.00	22.0	10.4
1.00	24.0	8.9
1.00	25.0	8.0
4.00	0.00	12.1
4.00	1.00	12.1
4.00	2.00	12.1
4.00	3.00	12.1
4.00	4.00	12.1
4.00	5.00	12.1
4.00	6.0	12.1
4.00	7.0	12.1
4.00	8.0	12.1
4.00	9.0	12.1
4.00	10.0	12.1
4.00	12.0	12.1
4.00	14.0	12.1
4.00	15.0	12.1
4.00	16.0	12.0
4.00	18.0	11.7
4.00	20.0	11.1
4.00	22.0	10.2
4.00	24.0	9.0
4.00	25.0	8.3
8.00	0.00	11.2
8.00	1.00	11.2
8.00	2.00	11.2
8.00	3.00	11.2
8.00	4.00	11.3
8.00	5.00	11.3
8.00	6.0	11.3
8.00	7.0	11.3
8.00	8.0	11.3
8.00	9.0	11.3
8.00	10.0	11.3
8.00	12.0	11.3
8.00	14.0	11.3
8.00	15.0	11.3
8.00	16.0	11.2
8.00	18.0	10.9
8.00	20.0	10.4
8.00	22.0	9.7
8.00	24.0	8.7
8.00	25.0	8.0

## Typical Performance Data

TEST CONDITIONS:  $V_{DD} = +12\text{ V}$ ,  $I_{DD} = 300\text{ mA}$ ,  $400\text{ mA}$ ,  $500\text{ mA}$  @ Temperature =  $+25^\circ\text{C}$

FREQ	Gain @ 300 mA	Gain @ 400 mA	Gain @ 500 mA	1dB Comp. Output @ 300 mA	1dB Comp. Output @ 400 mA	1dB Comp. Output @ 500 mA	Psat Output @ 300 mA	Psat Output @ 400 mA	Psat Output @ 500 mA	Noise Figure @ 300 mA	Noise Figure @ 400 mA	Noise Figure @ 500 mA
(GHz)	(dB)	(dB)	(dB)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)	(dB)	(dB)
0.01	17.5	17.9	18.2	27.23	28.07	28.61	32.10	32.31	32.54	28.60	28.68	28.83
0.2	14.7	15.1	15.4	28.15	29.09	29.68	31.59	31.69	31.85	11.03	11.04	11.11
0.4	13.8	14.2	14.5	28.48	29.39	30.03	31.65	31.73	31.88	7.50	7.56	7.62
0.6	13.1	13.5	13.8	28.78	29.78	30.21	30.93	31.07	31.16	6.41	6.52	6.55
0.8	12.7	13.1	13.4	29.10	30.20	30.65	32.02	32.17	32.25	5.46	5.54	5.64
1.0	12.4	12.8	13.1	29.45	30.63	31.05	32.86	33.04	33.11	4.99	5.09	5.21
1.2	12.4	12.8	13.1	29.53	30.72	31.14	32.76	32.95	33.02	4.63	4.71	4.82
1.4	12.2	12.6	12.9	29.59	30.71	31.11	32.83	33.02	33.08	4.51	4.58	4.70
1.6	12.1	12.5	12.8	29.57	30.60	31.00	32.38	32.56	32.63	4.32	4.41	4.52
1.8	12.0	12.4	12.7	29.50	30.50	30.89	32.19	32.36	32.43	3.87	3.95	4.09
2.0	11.9	12.3	12.6	29.50	30.48	30.85	32.16	32.35	32.43	3.63	3.74	3.93
2.2	11.9	12.3	12.6	29.47	30.39	30.76	32.03	32.20	32.28	3.33	3.44	3.58
2.4	11.9	12.2	12.5	29.62	30.53	30.89	32.14	32.32	32.41	3.28	3.40	3.55
2.6	11.8	12.2	12.5	29.76	30.72	31.09	32.29	32.49	32.58	3.13	3.24	3.40
2.8	11.8	12.2	12.5	29.87	30.86	31.21	32.61	32.80	32.89	2.86	2.97	3.15
3.0	11.8	12.2	12.5	29.98	31.01	31.36	32.68	32.89	32.99	2.78	2.87	3.04
3.2	11.8	12.2	12.5	29.99	31.06	31.40	32.70	32.92	33.02	2.68	2.80	2.97
3.4	11.8	12.2	12.5	29.87	30.97	31.31	32.68	32.88	32.96	2.62	2.74	2.91
3.6	11.8	12.2	12.5	29.96	31.14	31.47	32.93	33.14	33.22	2.57	2.72	2.86
3.8	11.8	12.1	12.5	29.90	31.07	31.41	32.91	33.11	33.18	2.65	2.79	2.96
4.0	11.7	12.1	12.4	29.92	31.15	31.47	33.01	33.23	33.29	2.66	2.76	2.93
4.2	11.6	12.0	12.4	29.91	31.13	31.43	32.99	33.20	33.25	2.72	2.80	3.01
4.4	11.6	12.0	12.3	29.89	31.08	31.40	32.93	33.11	33.17	2.77	2.90	3.05
4.6	11.6	12.0	12.3	29.89	31.08	31.42	33.03	33.24	33.29	2.65	2.77	2.91
4.8	11.5	11.9	12.2	29.84	31.05	31.39	32.90	33.11	33.17	2.63	2.75	2.93
5.0	11.5	11.9	12.2	29.83	31.08	31.43	32.88	33.09	33.16	2.72	2.83	3.03
5.2	11.5	11.9	12.3	29.81	31.05	31.40	32.80	33.03	33.11	2.64	2.77	2.88
5.4	11.6	12.0	12.3	29.92	31.18	31.54	32.88	33.13	33.22	2.62	2.77	2.90
5.6	11.6	12.0	12.3	29.91	31.18	31.56	32.87	33.13	33.21	2.61	2.72	2.92
5.8	11.6	12.0	12.3	29.88	31.20	31.56	33.01	33.27	33.36	2.63	2.78	2.92
6.0	11.6	12.0	12.3	29.76	31.16	31.55	33.01	33.27	33.37	2.64	2.89	2.97
6.2	11.6	12.0	12.3	29.67	31.12	31.53	33.03	33.29	33.39	2.65	2.79	2.98
6.4	11.5	12.0	12.3	29.57	31.10	31.51	32.92	33.18	33.28	2.74	2.82	3.02
6.6	11.5	11.9	12.2	29.58	31.17	31.57	33.24	33.49	33.58	2.78	2.87	3.05
6.8	11.4	11.8	12.2	29.49	31.13	31.51	33.14	33.36	33.43	2.81	2.93	3.07
7.0	11.4	11.8	12.1	29.37	31.08	31.46	32.99	33.20	33.27	2.89	2.97	3.13
7.2	11.3	11.7	12.1	29.31	31.04	31.41	32.99	33.18	33.23	2.96	3.06	3.23
7.4	11.2	11.6	12.0	29.23	30.99	31.36	32.90	33.09	33.16	2.99	3.09	3.29
7.6	11.1	11.6	11.9	29.09	30.96	31.31	32.98	33.16	33.22	3.06	3.19	3.33
7.8	11.1	11.5	11.8	29.02	30.90	31.23	32.83	33.03	33.09	3.12	3.23	3.38
8.0	11.0	11.4	11.8	28.94	30.75	31.10	32.80	32.98	33.05	3.18	3.27	3.46
8.2	10.9	11.4	11.8	28.81	30.60	30.95	32.65	32.84	32.90	3.21	3.34	3.49
8.4	10.9	11.3	11.7	28.79	30.50	30.86	32.72	32.90	32.96	3.24	3.39	3.53
8.6	10.8	11.3	11.6	28.63	30.38	30.76	32.32	32.49	32.55	3.28	3.37	3.56
8.8	10.8	11.2	11.6	28.76	30.42	30.76	32.63	32.79	32.84	3.25	3.43	3.55
9.0	10.7	11.1	11.5	28.92	30.44	30.75	32.39	32.54	32.59	3.41	3.49	3.66
9.2	10.6	11.1	11.5	28.95	30.39	30.69	32.22	32.43	32.48	3.52	3.63	3.78
9.4	10.5	11.0	11.4	29.02	30.31	30.59	31.74	31.97	32.07	3.62	3.73	3.86
9.6	10.3	10.8	11.2	29.15	30.32	30.59	31.29	31.63	31.74	3.66	3.75	3.92
9.8	10.1	10.6	11.0	29.38	30.38	30.57	30.95	31.29	31.46	3.78	3.92	4.08
10.0	9.9	10.4	10.8	29.64	30.44	30.58	30.69	31.12	31.31	3.97	4.08	4.27
10.5	9.0	9.5	9.9	30.16	30.56	30.55	28.88	29.41	29.72	-	-	-
11.0	8.2	8.7	9.1	29.92	30.11	29.97	26.48	27.34	27.75	-	-	-
11.5	7.6	8.2	8.6	28.33	28.61	28.54	20.63	21.65	22.25	-	-	-
12.0	7.1	7.6	8.1	27.99	27.95	27.77	20.23	21.19	21.91	-	-	-

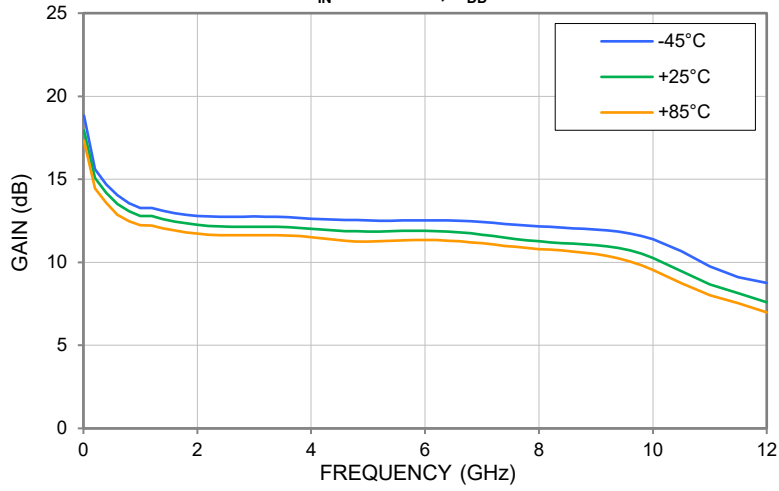
## Typical Performance Data

TEST CONDITIONS:  $V_{DD} = +12\text{ V}$ ,  $V_{G2} = +5\text{ V}$ ,  $I_{DD} = 400\text{ mA}$  @ Temperature =  $+25^\circ\text{C}$

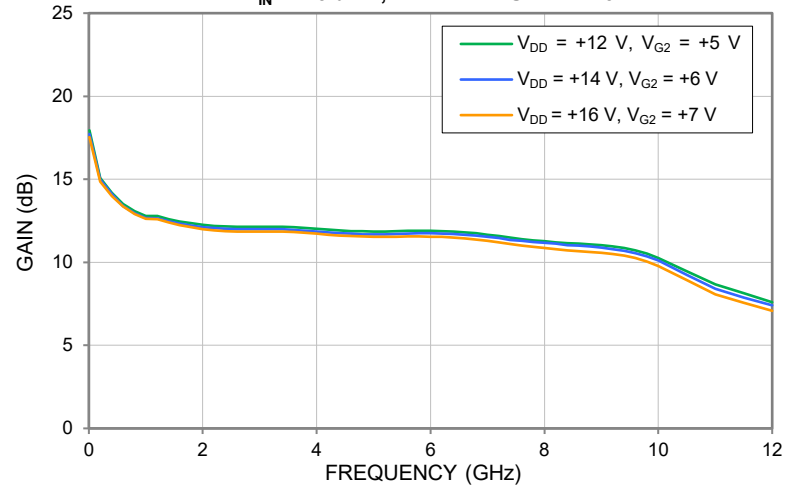
FREQ	P <sub>OUT</sub>	2nd Harmonics	FREQ	P <sub>OUT</sub>	3rd Harmonics
(GHz)	(dBm)	(dB)	(GHz)	(dBm)	(dB)
2.00	5.00	-47.1	2.00	5.00	-90.4
2.00	6.0	-46.2	2.00	6.0	-92.1
2.00	7.0	-45.2	2.00	7.0	-92.0
2.00	8.0	-44.1	2.00	8.0	-91.0
2.00	9.0	-43.2	2.00	9.0	-89.8
2.00	10.0	-42.2	2.00	10.0	-88.2
2.00	12.0	-40.2	2.00	12.0	-81.3
2.00	14.0	-38.0	2.00	14.0	-76.2
2.00	15.0	-36.9	2.00	15.0	-74.0
2.00	16.0	-35.8	2.00	16.0	-71.8
2.00	18.0	-33.6	2.00	18.0	-66.8
2.00	20.0	-31.3	2.00	20.0	-61.6
2.00	22.0	-28.9	2.00	22.0	-56.2
2.00	24.0	-26.4	2.00	24.0	-51.9
4.00	5.00	-45.2	4.00	5.00	-82.7
4.00	6.0	-44.0	4.00	6.0	-80.8
4.00	7.0	-43.2	4.00	7.0	-78.8
4.00	8.0	-42.1	4.00	8.0	-76.8
4.00	9.0	-41.1	4.00	9.0	-75.1
4.00	10.0	-40.0	4.00	10.0	-72.9
4.00	12.0	-38.1	4.00	12.0	-68.1
4.00	14.0	-36.0	4.00	14.0	-63.9
4.00	15.0	-34.9	4.00	15.0	-61.7
4.00	16.0	-33.9	4.00	16.0	-59.7
4.00	18.0	-31.7	4.00	18.0	-55.1
4.00	20.0	-29.4	4.00	20.0	-50.9
4.00	22.0	-26.9	4.00	22.0	-46.4
4.00	24.0	-24.5	4.00	24.0	-41.8
6.00	5.00	-44.5	6.00	5.00	-87.0
6.00	6.0	-43.6	6.00	6.0	-85.3
6.00	7.0	-42.5	6.00	7.0	-84.1
6.00	8.0	-41.6	6.00	8.0	-82.2
6.00	9.0	-40.5	6.00	9.0	-80.6
6.00	10.0	-39.5	6.00	10.0	-77.9
6.00	12.0	-37.7	6.00	12.0	-75.3
6.00	14.0	-35.6	6.00	14.0	-71.3
6.00	15.0	-34.6	6.00	15.0	-69.2
6.00	16.0	-33.5	6.00	16.0	-67.1
6.00	18.0	-31.3	6.00	18.0	-62.6
6.00	20.0	-29.1	6.00	20.0	-58.3
6.00	22.0	-26.8	6.00	22.0	-53.1
6.00	24.0	-24.3	6.00	24.0	-48.3
8.00	5.00	-48.8	8.00	5.00	-96.8
8.00	6.0	-47.9	8.00	6.0	-102.6
8.00	7.0	-47.1	8.00	7.0	-97.0
8.00	8.0	-46.0	8.00	8.0	-97.3
8.00	9.0	-45.0	8.00	9.0	-100.7
8.00	10.0	-43.9	8.00	10.0	-98.7
8.00	12.0	-42.2	8.00	12.0	-93.6
8.00	14.0	-40.1	8.00	14.0	-93.5
8.00	15.0	-39.1	8.00	15.0	-93.5
8.00	16.0	-37.9	8.00	16.0	-90.6
8.00	18.0	-35.7	8.00	18.0	-84.6
8.00	20.0	-33.4	8.00	20.0	-80.0
8.00	22.0	-31.0	8.00	22.0	-78.6
8.00	24.0	-28.5	8.00	24.0	-71.3
10.00	5.00	-55.3			
10.00	6.0	-54.3			
10.00	7.0	-53.5			
10.00	8.0	-52.3			
10.00	9.0	-51.1			
10.00	10.0	-50.3			
10.00	12.0	-48.2			
10.00	14.0	-46.1			
10.00	15.0	-45.1			
10.00	16.0	-44.1			
10.00	18.0	-41.8			
10.00	20.0	-39.4			
10.00	22.0	-37.0			
10.00	24.0	-34.5			

## Typical Performance Curves

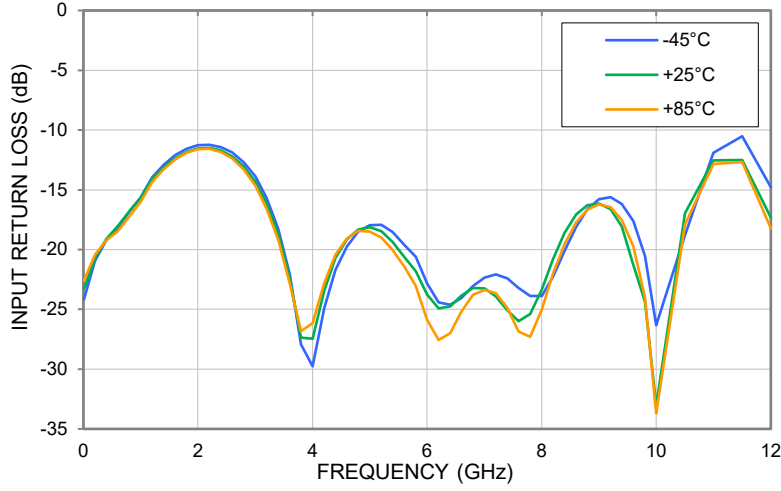
**GAIN vs. TEMPERATURE,**  
 $P_{IN} = -25 \text{ dBm}, V_{DD} = +12 \text{ V}$



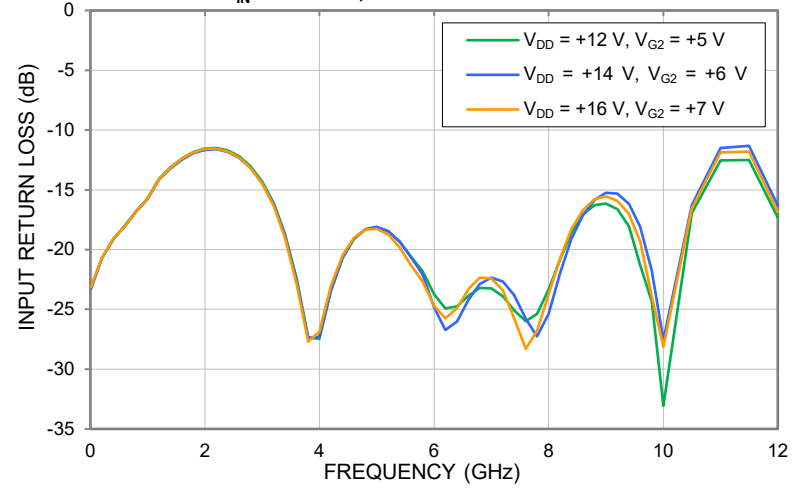
**GAIN vs. DEVICE VOLTAGE,**  
 $P_{IN} = -25 \text{ dBm}, \text{TEMPERATURE} = +25^\circ\text{C}$



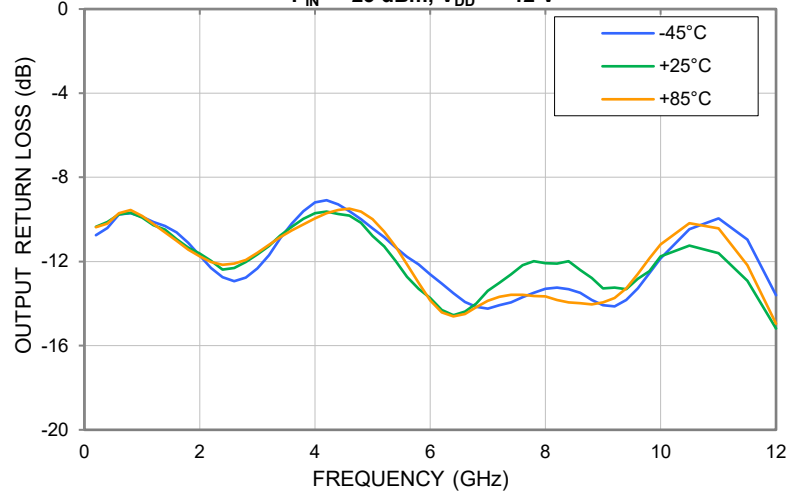
**INPUT RETURN LOSS vs. TEMPERATURE,**  
 $P_{IN} = -25 \text{ dBm}, V_{DD} = +12 \text{ V}$



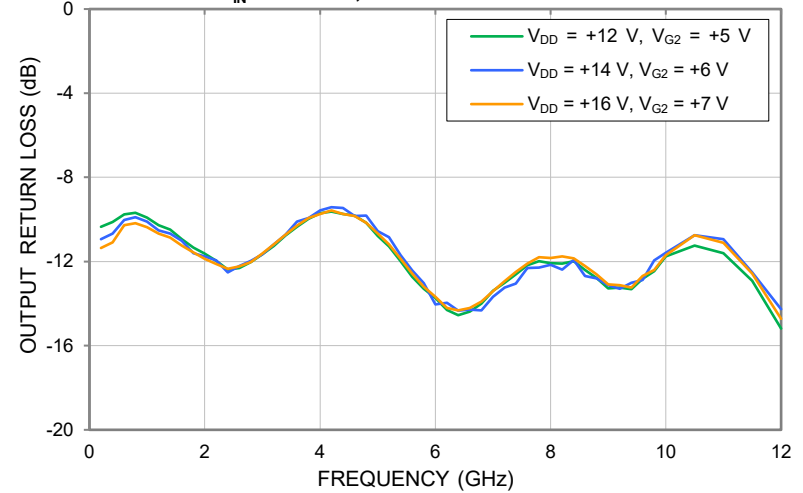
**INPUT RETURN LOSS vs. DEVICE VOLTAGE,**  
 $P_{IN} = -25 \text{ dBm}, \text{TEMPERATURE} = +25^\circ\text{C}$



**OUTPUT RETURN LOSS vs. TEMPERATURE,**  
 $P_{IN} = -25 \text{ dBm}, V_{DD} = +12 \text{ V}$

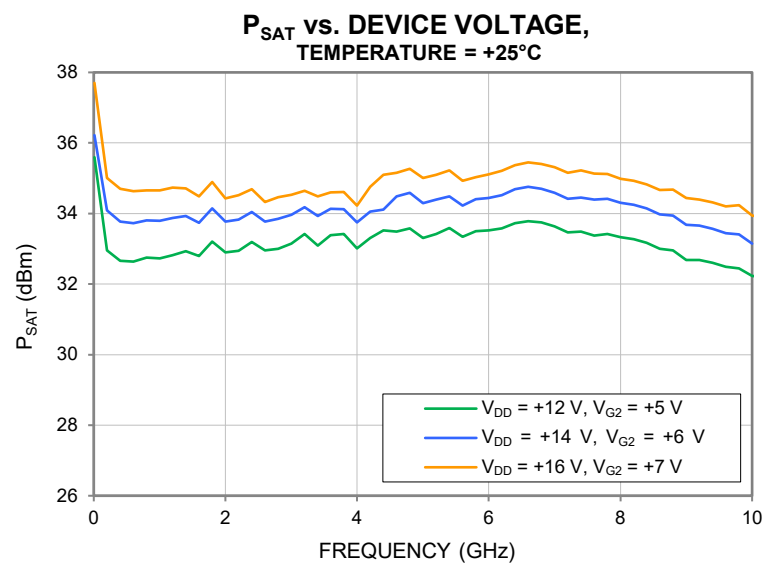
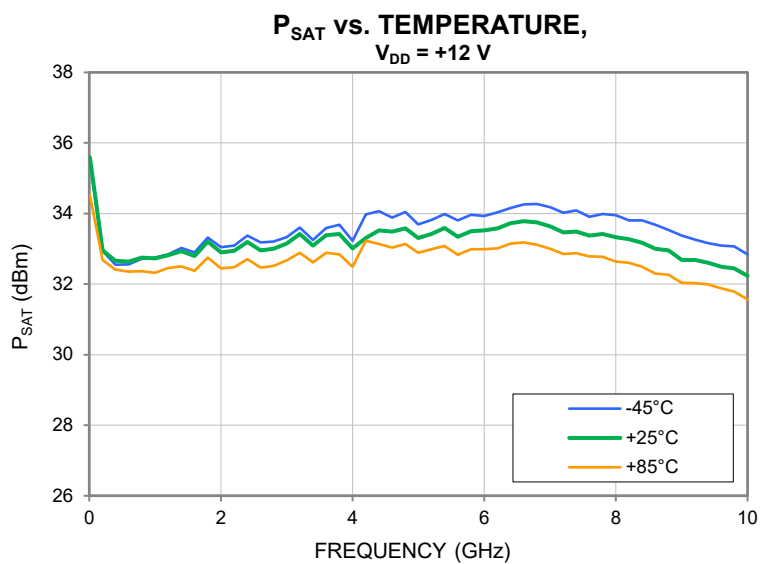
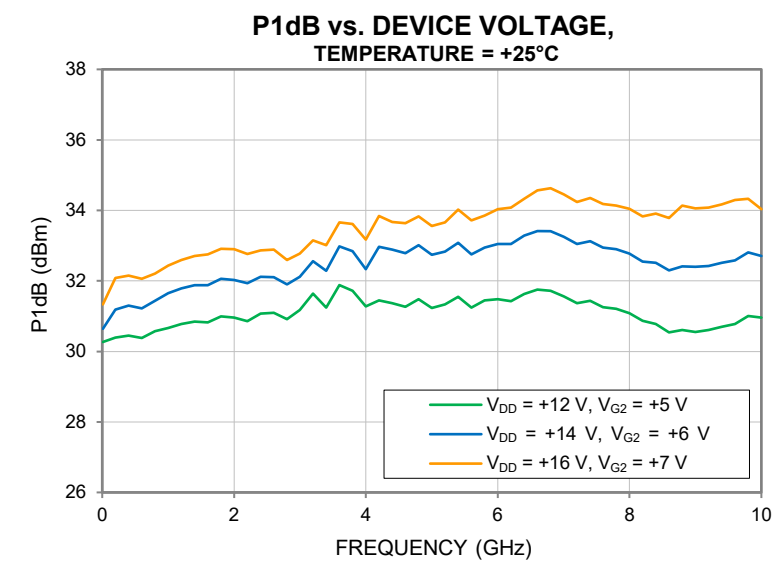
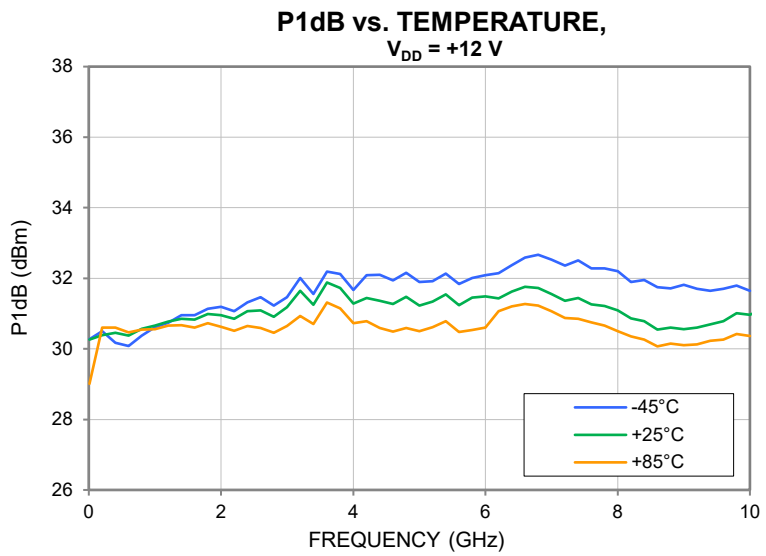
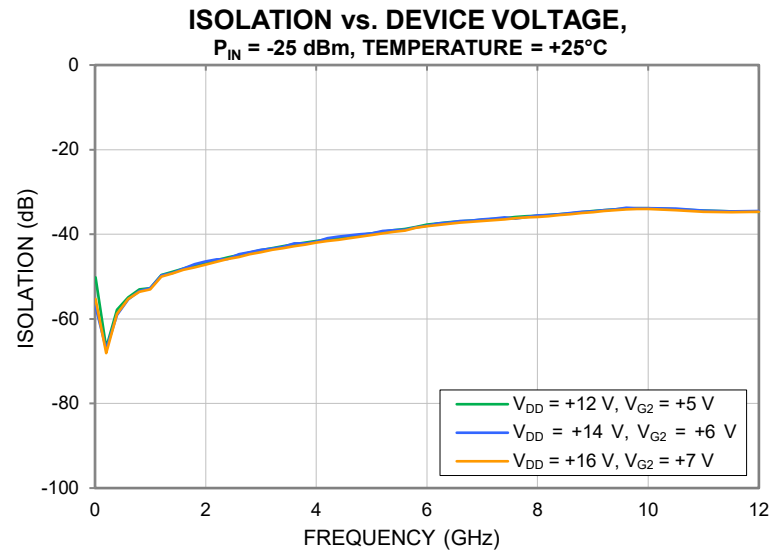
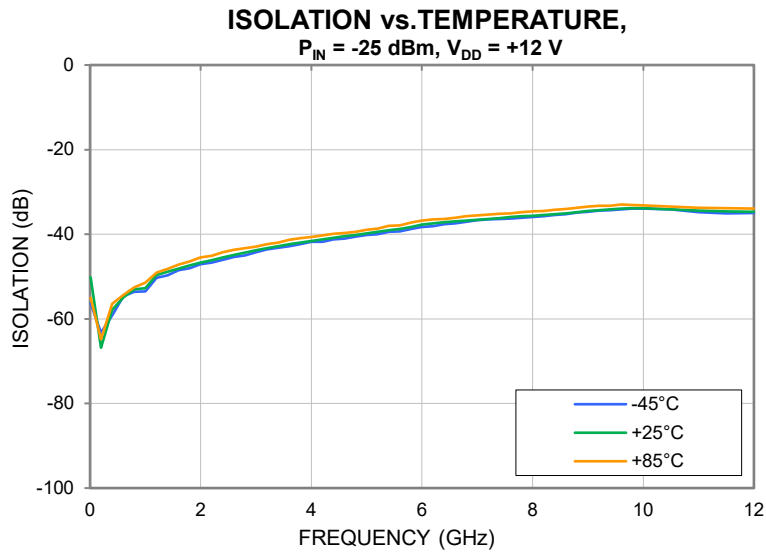


**OUTPUT RETURN LOSS vs. DEVICE VOLTAGE,**  
 $P_{IN} = -25 \text{ dBm}, \text{TEMPERATURE} = +25^\circ\text{C}$



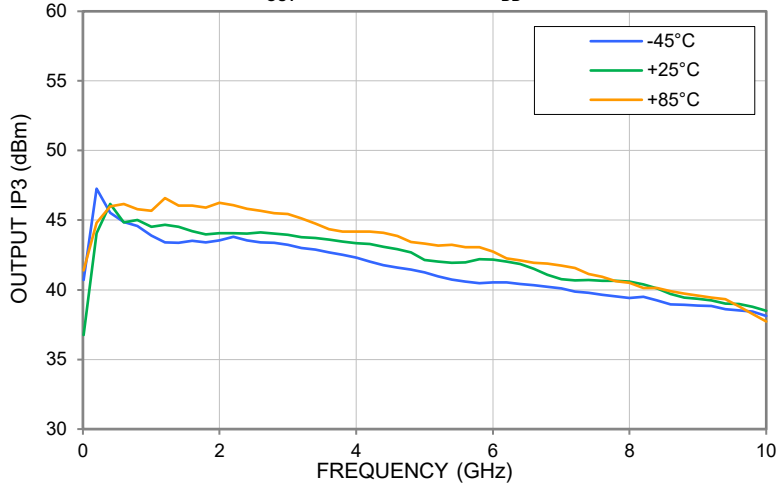


## Typical Performance Curves

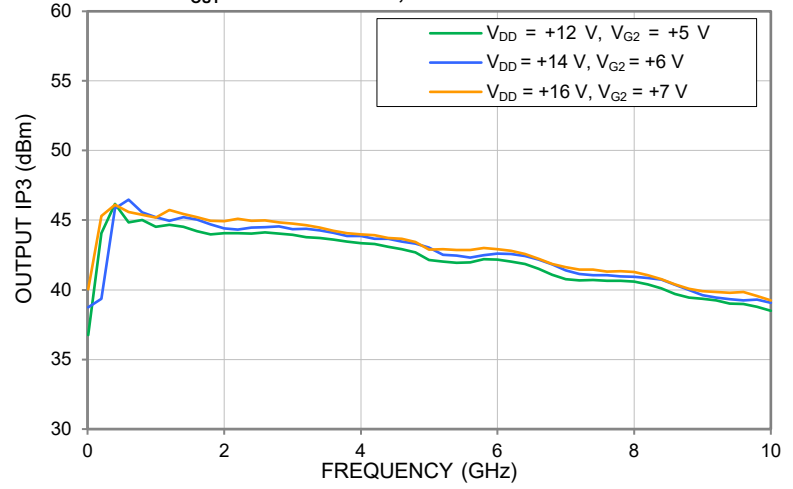


## Typical Performance Curves

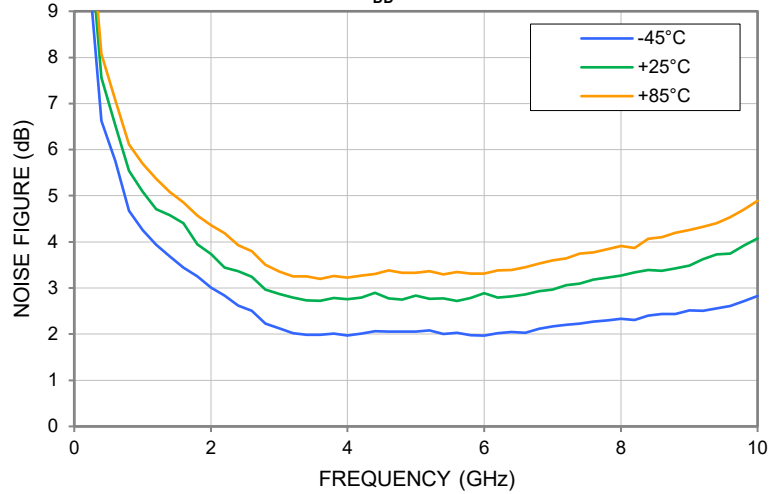
**OUTPUT IP3 vs. TEMPERATURE,**  
 $P_{OUT} = +20 \text{ dBm/TONE}$ ,  $V_{DD} = +12 \text{ V}$



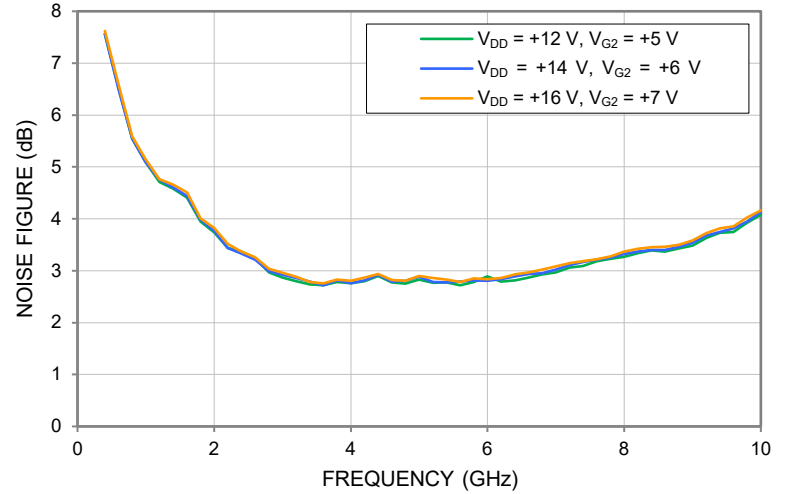
**OUTPUT IP3 vs. DEVICE VOLTAGE,**  
 $P_{OUT} = +20 \text{ dBm/TONE}$ , TEMPERATURE = +25°C



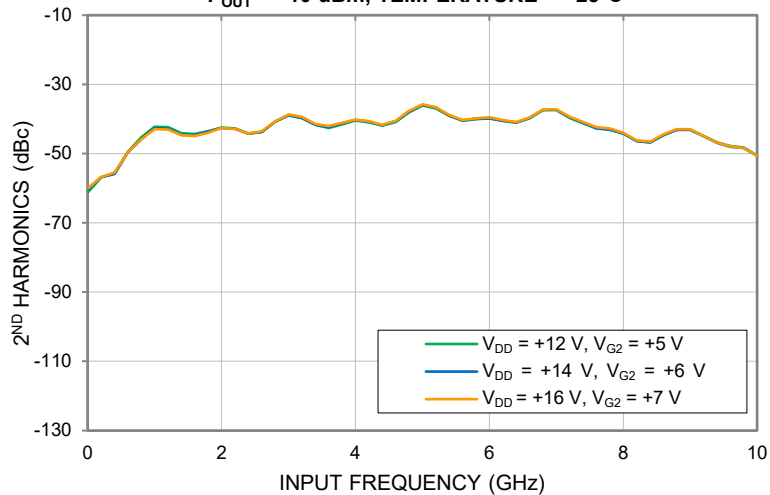
**NOISE FIGURE vs. TEMPERATURE,**  
 $V_{DD} = +12 \text{ V}$



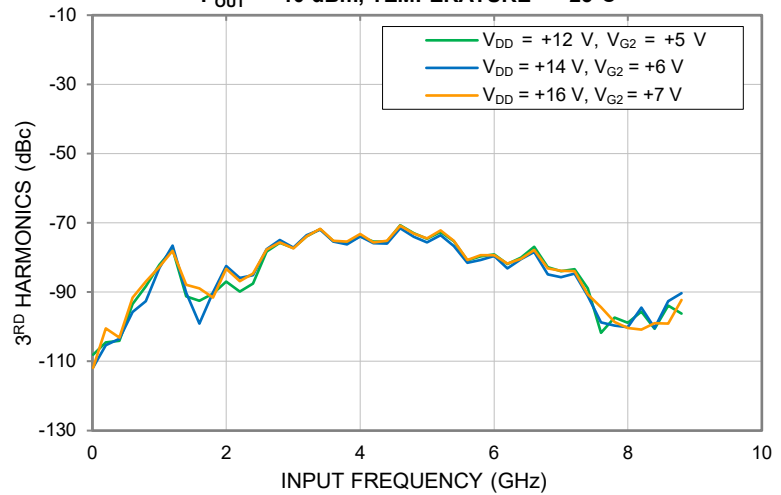
**NOISE FIGURE vs. DEVICE VOLTAGE,**  
 TEMPERATURE = +25°C



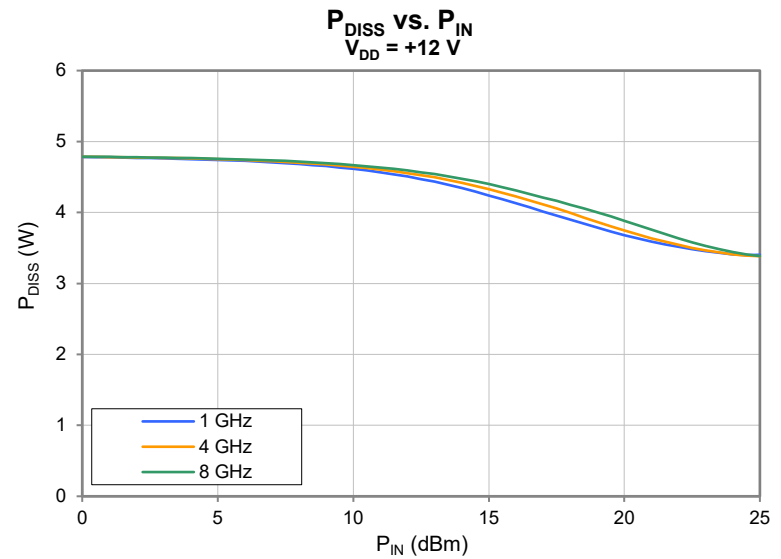
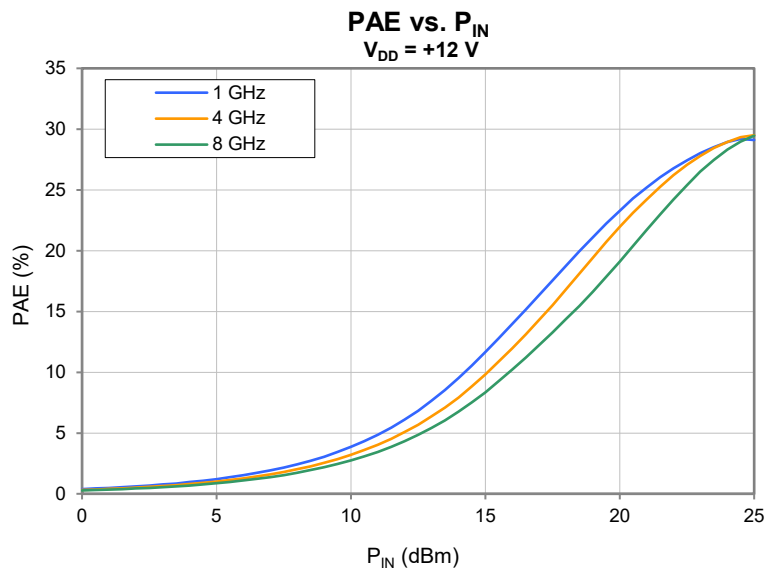
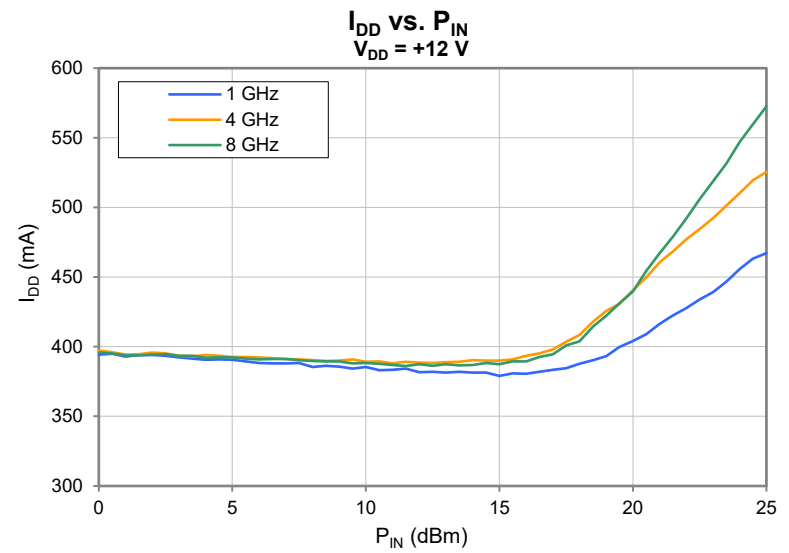
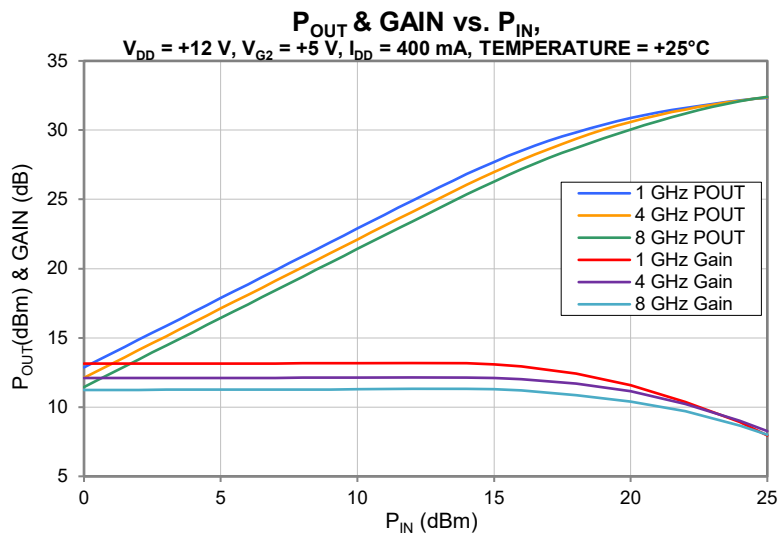
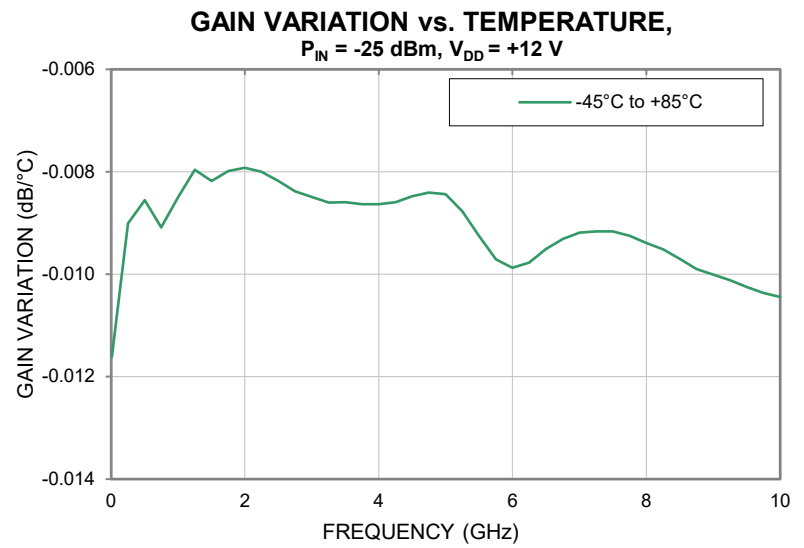
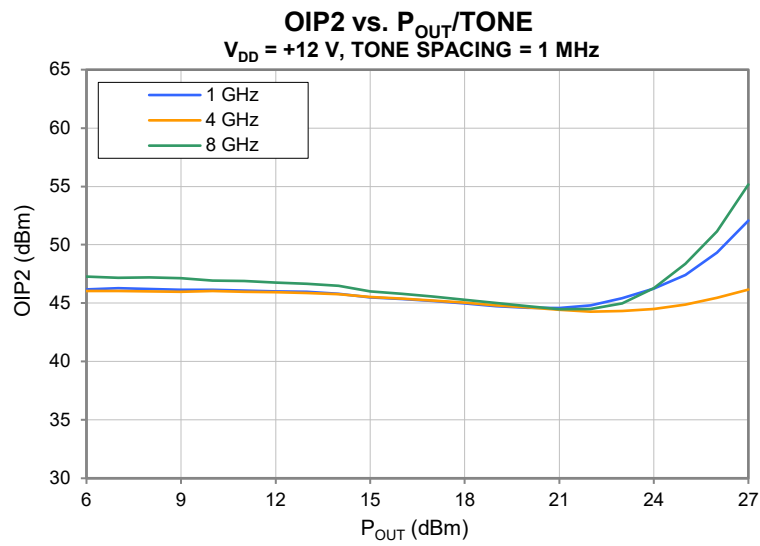
**2<sup>ND</sup> HARMONICS vs. DEVICE VOLTAGE,**  
 $P_{OUT} = +10 \text{ dBm}$ , TEMPERATURE = +25°C



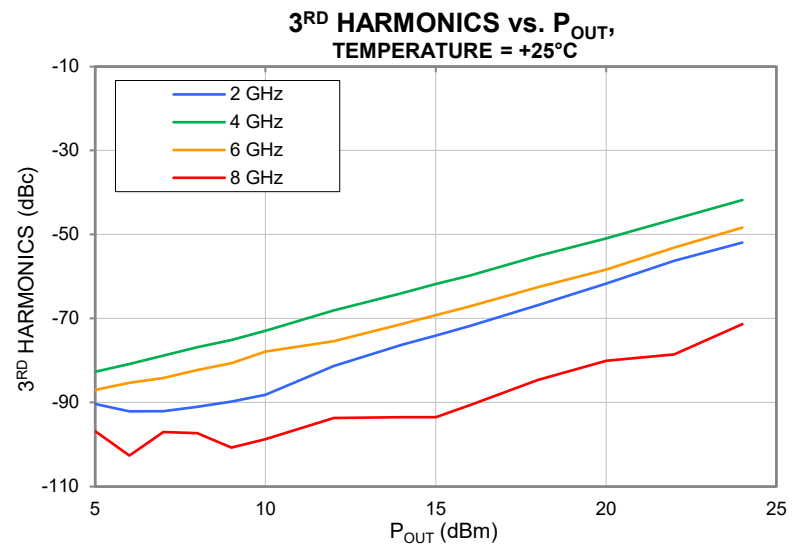
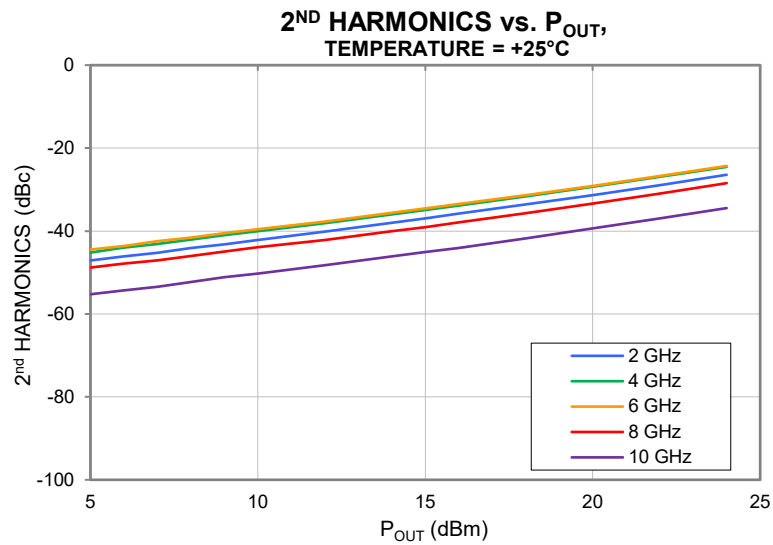
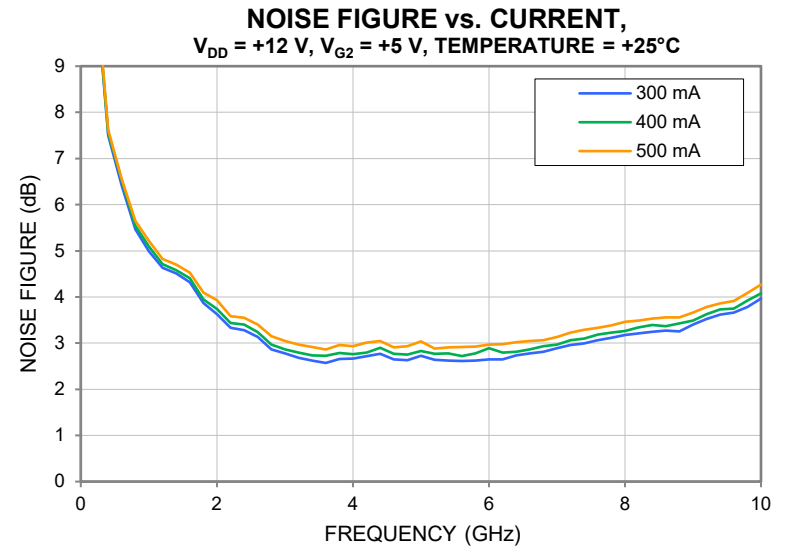
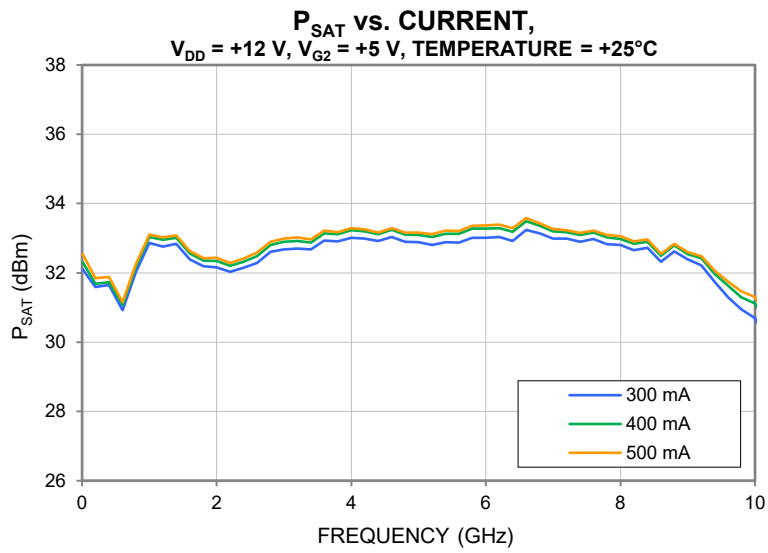
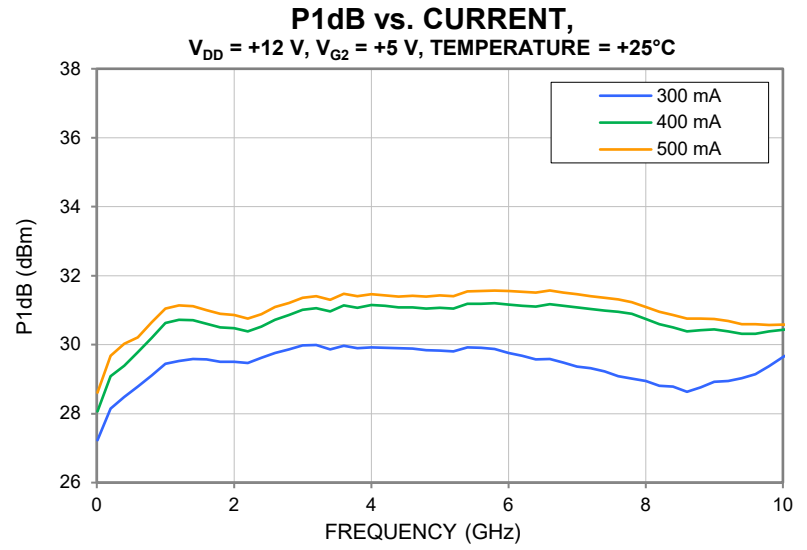
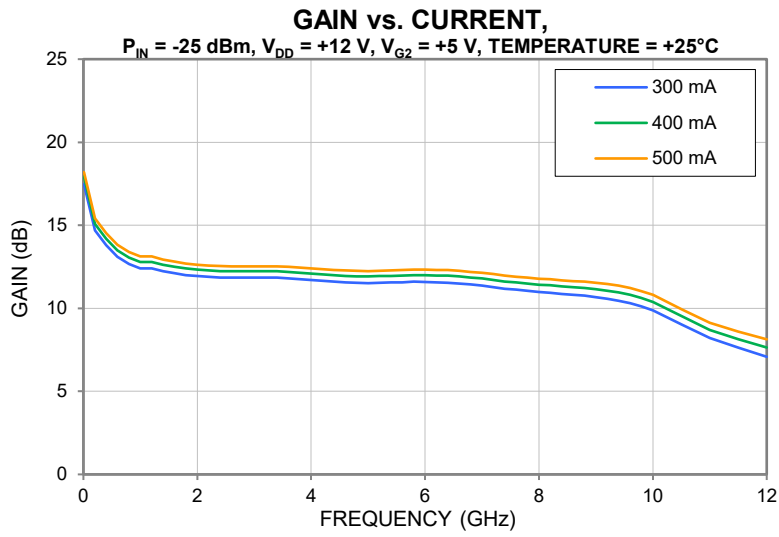
**3<sup>RD</sup> HARMONICS vs. DEVICE VOLTAGE,**  
 $P_{OUT} = +10 \text{ dBm}$ , TEMPERATURE = +25°C

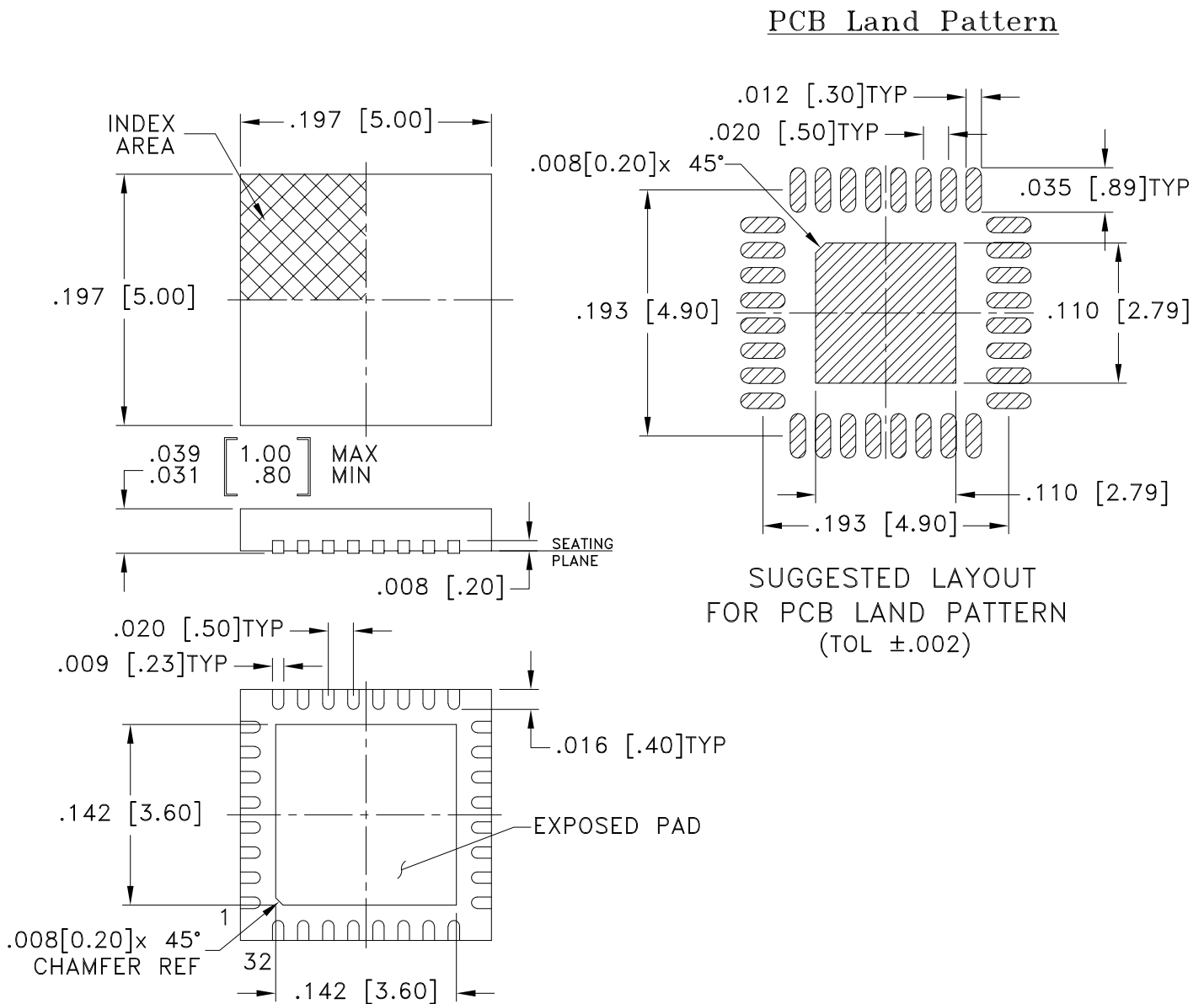


## Typical Performance Curves



## Typical Performance Curves





Weight: .05 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.01; 3 Pl. ±.005 Inch

### Notes:

1. Case material: Plastic.
2. Termination finish: For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier transitioning to Matte-Tin. All models, (+) suffix. See Data sheet.  
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

**Mini-Circuits®**  
ISO 9001 ISO 14001 CERTIFIED

ALL NEW  
minicircuits.com

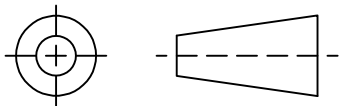
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

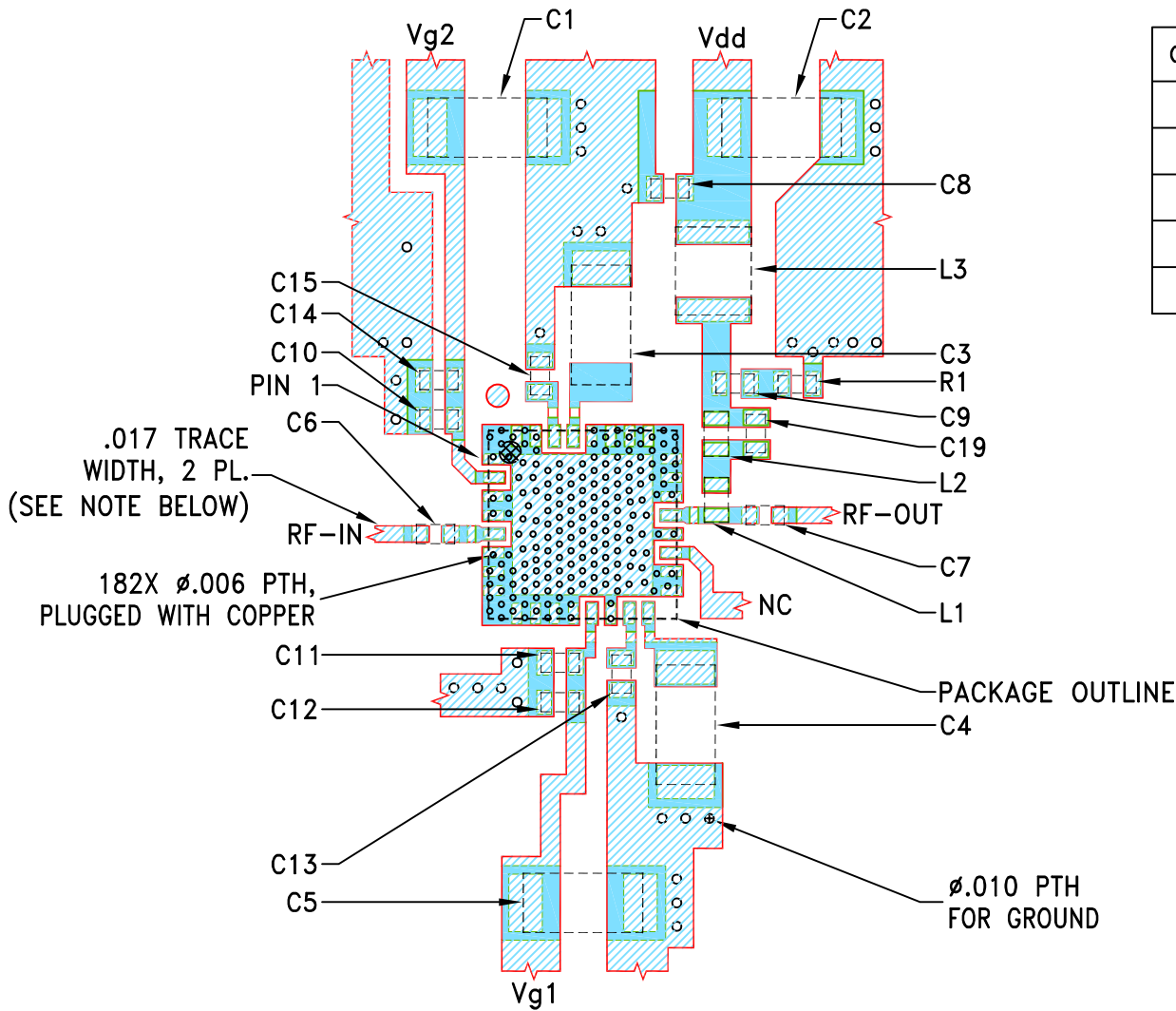
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-020020	NEW RELEASE	11/27/23	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR DG1677-2 CASE STYLE



COMPONENT	SIZE
R1	0402
C1-C5	1206
C6-C15	0402
L1-L2	0402
L3	1008

NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS R04003C LoPro FOIL WITH DIELECTRIC THICKNESS .0087".  
COPPER: 1 OZ. EACH SIDE. FINAL COPPER THICKNESS SHALL BE 2 OZ.  
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE, FOR COMPONENT VALUES REFER TO TB-PMA5-83-2WC+.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	ITG	11/27/23
TOLERANCES ON:	GF	11/27/23
2 PL DECIMALS ±	IL	11/27/23
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

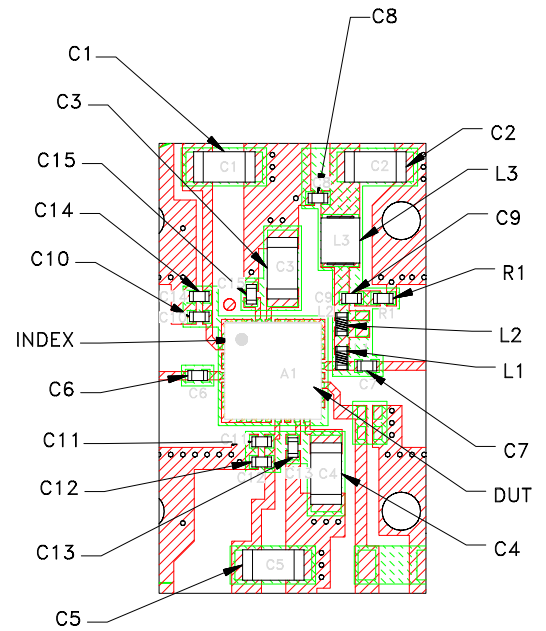
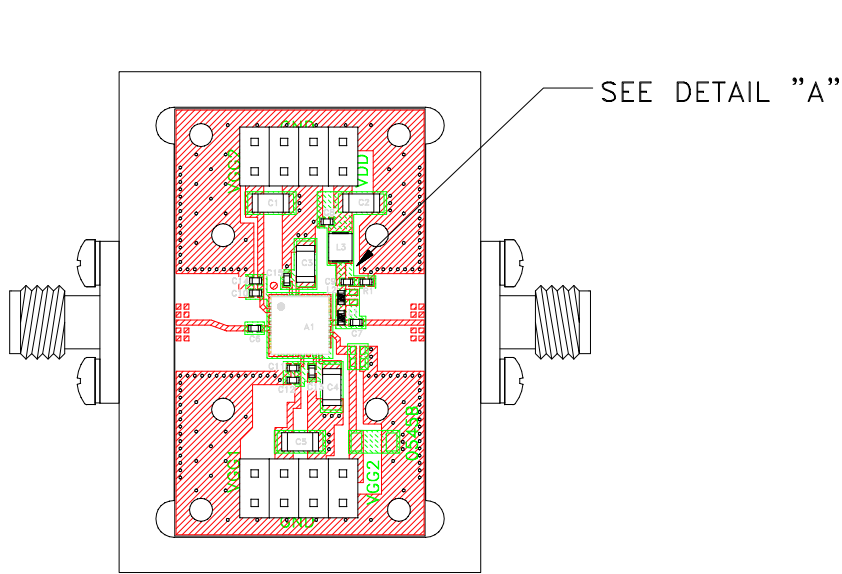
**Mini-Circuits®** 13 Neptune Avenue  
Brooklyn NY 11235

PL, DG1677-2, TB-PMA5-83-2WC+

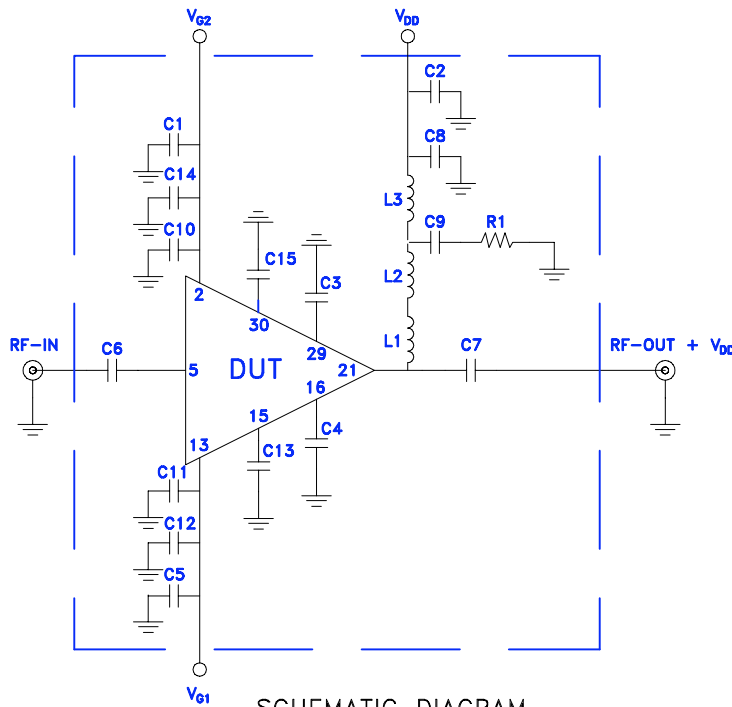
SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-771	REV: OR
FILE: 98PL771	SCALE: 5:1	SHEET: 1 OF 1	

Mini-Circuits®  
THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS.  
EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE  
AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY  
DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO.  
THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE  
PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

# Evaluation Board and Circuit



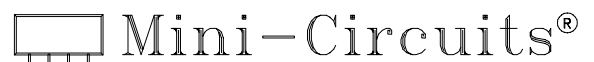
**DETAIL "A"**  
LOCATION OF INTERCONNECTOR  
AND UNITS COMPONENTS  
(SCALE 2:1)



Component	Size	Value	PartNumber	Manufacturer
R1	0402	301Ω	RK73H1ETTP3010F	KOA SPEER ELECTRONICS
C1,C2,C3,C4,C5	1206	4.7μF	12063C475KAT2A	AVX CORPORATION
C6,C7,C8	0402	0.1μF	GRM155R71E104KE14D	MURATA
C9,C10,C11	0402	100pF	GRM1555C1H101JA01D	MURATA
C12,C13,C14,C15	0402	1nF	GRM1555C1H102JA01D	MURATA
L1,L2	0402	36nH	0402AF-360XJLW	COILCRAFT
L3	1008	1.1μH	1008AF-112XKRC	COILCRAFT

**Notes:**

- 2.92mm Female Connectors.
- PCB Material: Roger RO4003C or equivalent,  
Dielectric constant=3.38, Thickness=0.0087±.001 inch



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C or -45° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Mechanical Shock	1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only	MIL-STD-883, Method 2002, Condition B, except Y1 direction only
Vibration (Variable Frequency)	50g peak	MIL-STD-883, Method 2007, Condition B
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102, Condition C
HAST	130°C, 85% RH, 96 hours	JESD22-A110
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak	J-STD-020
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether +	MIL-STD-202, Method 215





All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

<b>Specification</b>	<b>Test/Inspection Condition</b>	<b>Reference/Spec</b>
	monoethanolamine at 63°C to 70°C	