MMIC SURFACE MOUNT

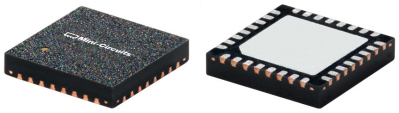
Power Amplifier

PMA5-63-2W+

50Ω 10 to 6000 MHz 2 W P_{SAT}

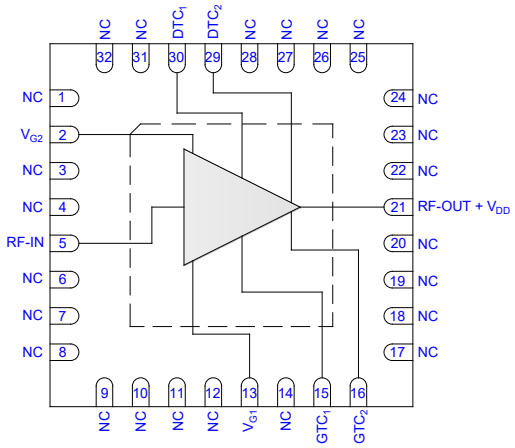
THE BIG DEAL

- P1dB, Typ. +31.2 dBm
- $P_{SAT,}$ Typ. +33.8 dBm
- Low Noise Figure, Typ. 2.7 dB
- High OIP3, Typ. +44.5 dBm
- Supply Voltage +12 V, 400 mA
- 5x5 mm 32-Lead QFN-Style Package



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM



APPLICATIONS

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

PRODUCT OVERVIEW

The PMA5-63-2W+ is a GaAs MMIC Distributed Power Amplifier operating from 10 to 6000 MHz. The amplifier provides 12 dB of gain, +33.8 dBm saturated output power, and achieves +44.5 dBm output IP3, while operating from a +12 V power supply and consuming 400 mA of quiescent 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

Features	Advantages
High P1dB (Typ. +31.2 dBm) and P_{SAT} (Typ. +33.8 dBm)	Flat, broadband gain and high output power without high frequency roll-off make this device excellent for wideband systems from 10 to 6000 MHz that require at least 1 W of linear operating output power over the full band.
Low Noise Figure Typ. 2.7 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. +44.5 dBm	High operating OIP3 and low 2nd and 3rd harmonic response provides for very low in-band distortion products, enabling minimal signal degradation in high fidelity measurement systems and demanding communication 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.

REV. OR
ECO-023168
PMA5-63-2W+
MCL NY
240926

Power Amplifier

PMA5-63-2W+

50Ω 10 to 6000 MHz 2 W P_{SAT}

ELECTRICAL SPECIFICATIONS[1] AT +25°C, V_{DD} = +12 V, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		10		6000	MHz
Gain	10		17.9		dB
	2000	11.0	12.2		
	4000	10.8	12.0		
	6000	10.0	11.9		
Output Power at 1 dB Compression (P1dB)	10		+28.2		dBm
	2000		+30.6		
	4000		+31.2		
	6000		+30.9		
Output Power at Saturation (P_{SAT})[2]	10		+32.9		dBm
	2000		+33.0		
	4000		+33.8		
	6000		+33.6		
Output Third-Order Intercept (P_{OUT} = +20 dBm/Tone)	10		+42.5		dBm
	2000		+45.0		
	4000		+44.5		
	6000		+42.3		
Output Second-Order Intercept (P_{OUT} = +20 dBm/Tone)	10		+63.1		dBm
	2000		+44.5		
	4000		+42.3		
	6000		+42.1		
2nd Harmonic[3] (P_{OUT} = +10 dBm/Tone)	10		-61.0		dBc
	2000		-42.6		
	4000		-40.6		
	6000		-40.0		
Input Return Loss	10		23		dB
	2000		12		
	4000		28		
	6000		25		
Output Return Loss	10		24		dB
	2000		12		
	4000		10		
	6000		13		
Isolation	10		50		dB
	2000		46		
	4000		41		
	6000		37		
Noise Figure	500		6.8		dB
	2000		3.8		
	4000		2.7		
	6000		2.7		
Device Operating Voltage (V_{DD})			+12	+16	V
Device Operating Current (I_{DD})[4]			400		mA
Gate Voltage (V_{G1})[5]		-2.0	-0.8	-0.2	V
Gate Current (I_{G1})			15	4,000	µA
Gate Voltage (V_{G2})		+2	+5	+7.5	V
Gate Current (I_{G2})			15	4,000	µA
DC Current Variation vs. Temperature[6]			11		µA/°C

1. Tested on Mini-Circuits Characterization Test Board. See Figure 2. Board loss de-embedded.
2. P_{SAT} 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_{IN} = -25 dBm. Increases to 650 mA at P1dB.
5. Adjust V_{G1} between -2.0 V and -0.5 V to achieve I_{DD} = 400 mA.
6. (Current at +85°C - Current at -45°C)/(+130°C). V_{G1} held constant over temperature.

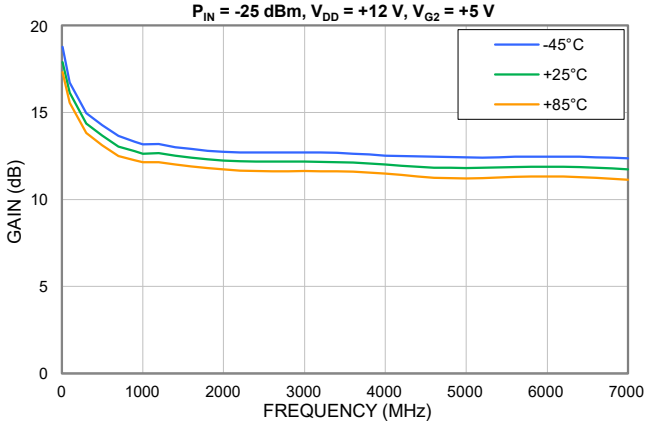
Power Amplifier

PMA5-63-2W+

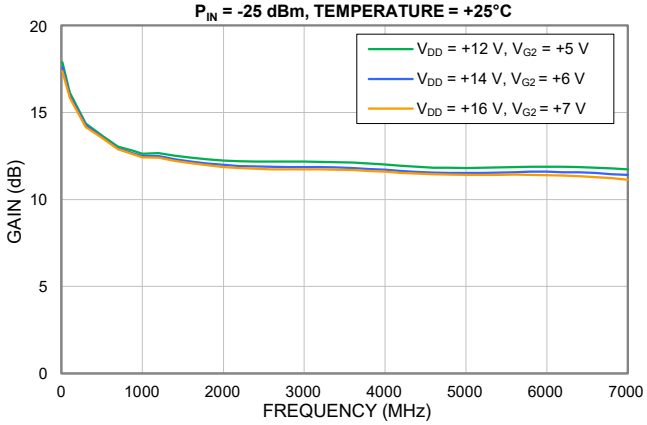
50Ω 10 to 6000 MHz 2 W P_{SAT}

TYPICAL PERFORMANCE GRAPHS

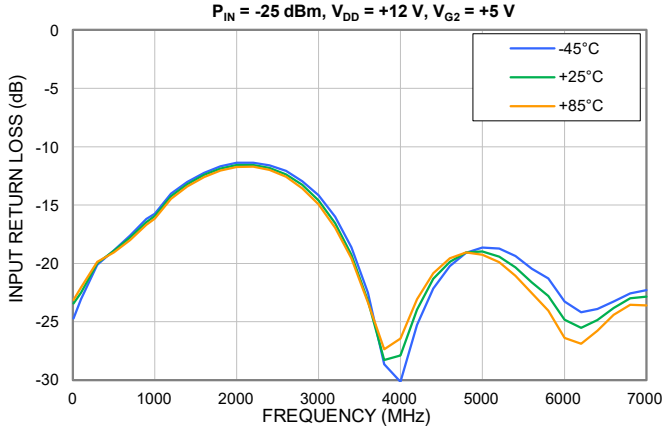
GAIN vs. TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



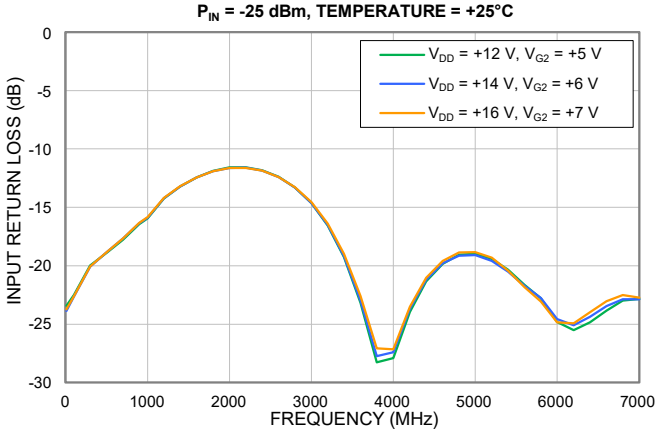
GAIN vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



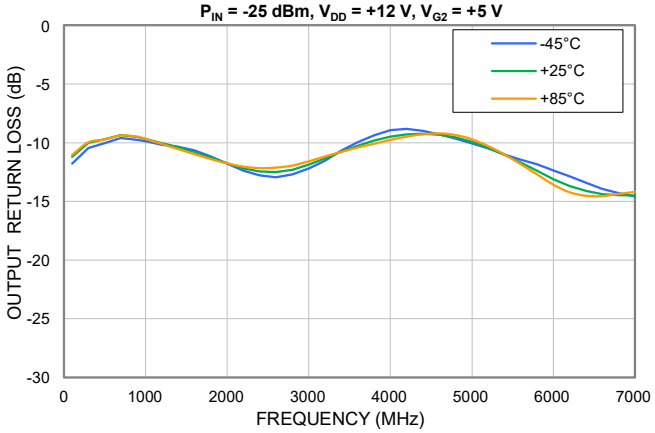
INPUT RETURN LOSS vs.TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



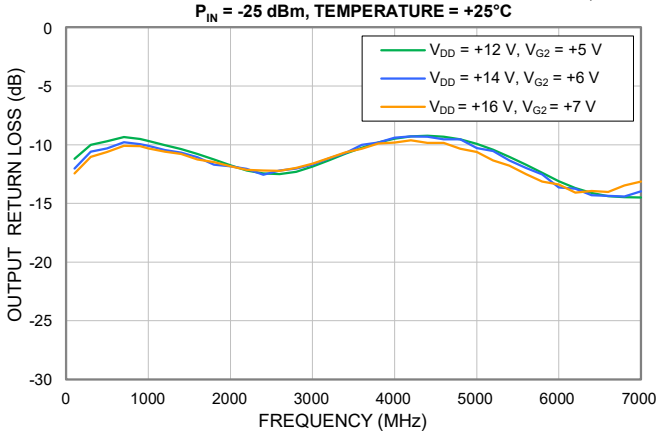
INPUT RETURN LOSS vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



OUTPUT RETURN LOSS vs. TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



OUTPUT RETURN LOSS vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



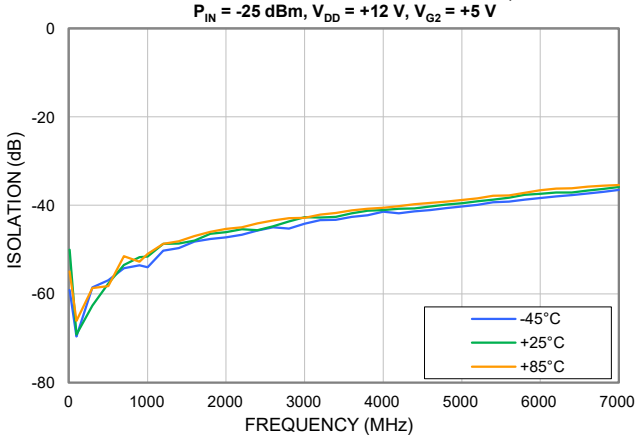
Power Amplifier

PMA5-63-2W+

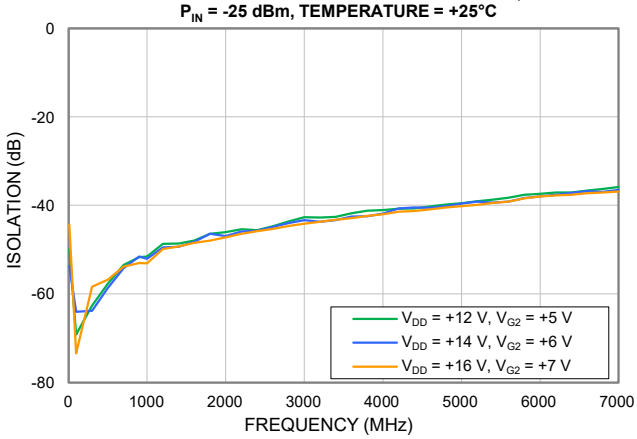
50Ω 10 to 6000 MHz 2 W P_{SAT}

TYPICAL PERFORMANCE GRAPHS

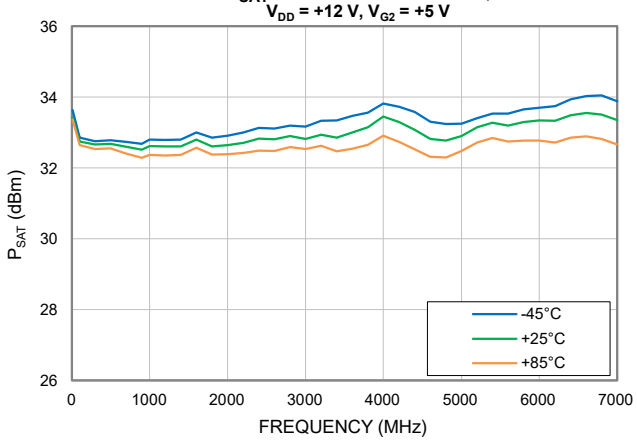
ISOLATION vs.TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



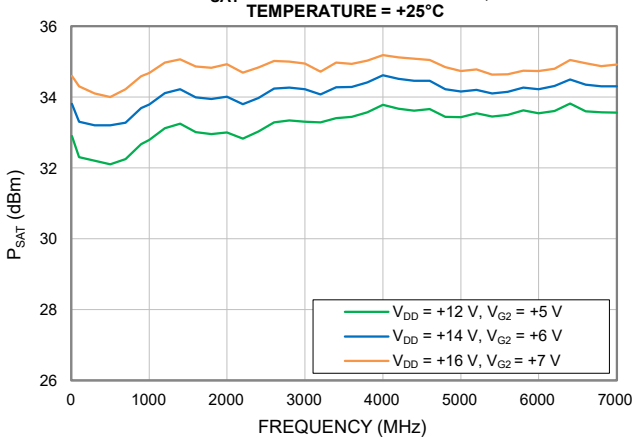
ISOLATION vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



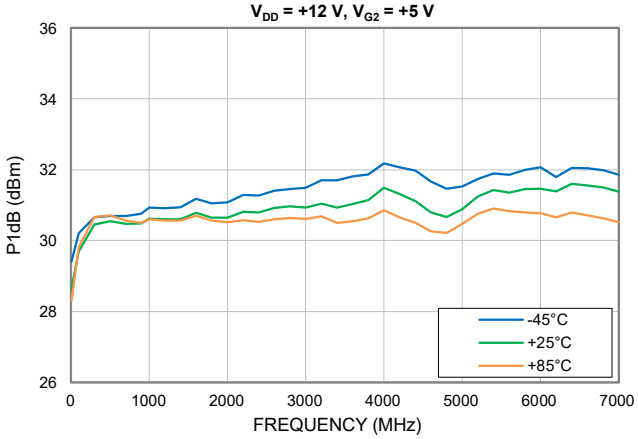
P_{SAT} vs. TEMPERATURE,
V_{DD} = +12 V, V_{G2} = +5 V



P_{SAT} vs. DEVICE VOLTAGE,
TEMPERATURE = +25°C



P1dB vs. TEMPERATURE,
V_{DD} = +12 V, V_{G2} = +5 V



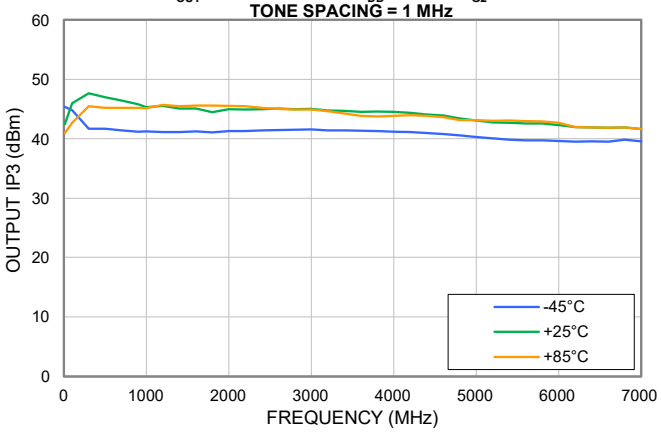
Power Amplifier

PMA5-63-2W+

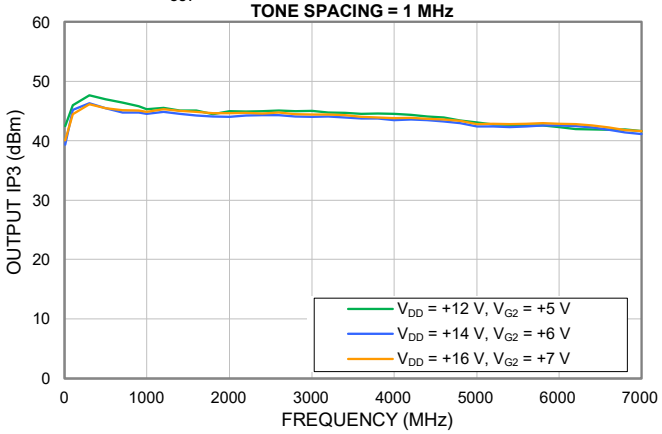
50Ω 10 to 6000 MHz 2 W P_{SAT}

TYPICAL PERFORMANCE GRAPHS

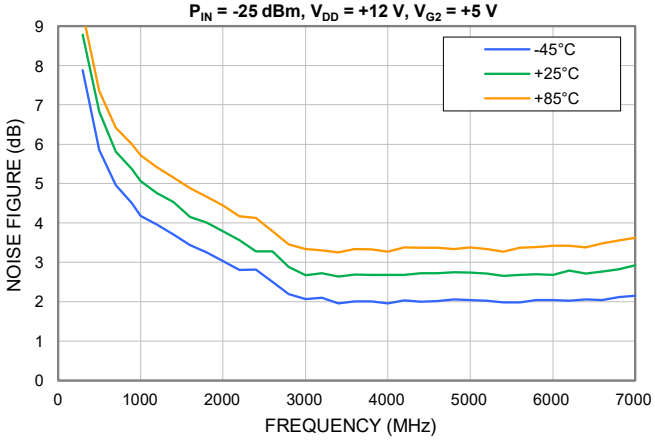
OUTPUT IP3 vs. TEMPERATURE,
P_{OUT} = +20 dBm/TONE, V_{DD} = +12 V, V_{G2} = +5 V
TONE SPACING = 1 MHz



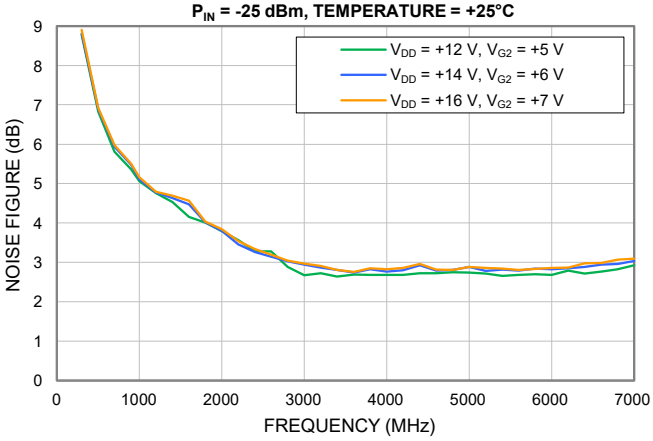
OUTPUT IP3 vs. DEVICE VOLTAGE,
P_{OUT} = +20 dBm/TONE, TEMPERATURE = +25°C
TONE SPACING = 1 MHz



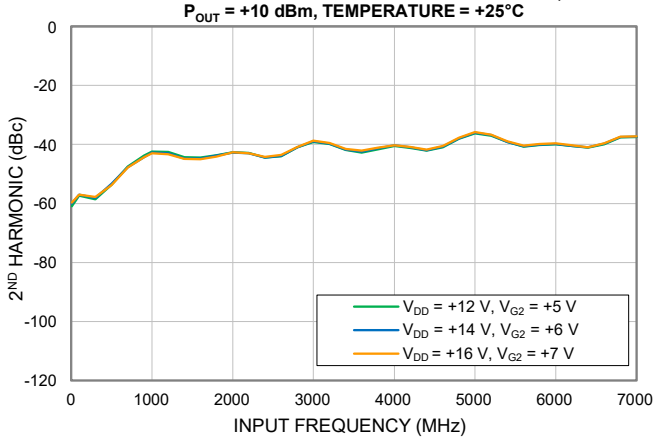
NOISE FIGURE vs. TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



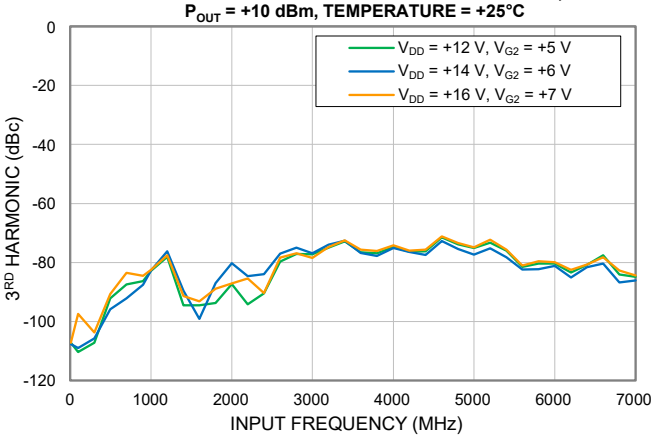
NOISE FIGURE vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



2ND HARMONIC vs. DEVICE VOLTAGE,
P_{OUT} = +10 dBm, TEMPERATURE = +25°C



3RD HARMONIC vs. DEVICE VOLTAGE,
P_{OUT} = +10 dBm, TEMPERATURE = +25°C



Power Amplifier

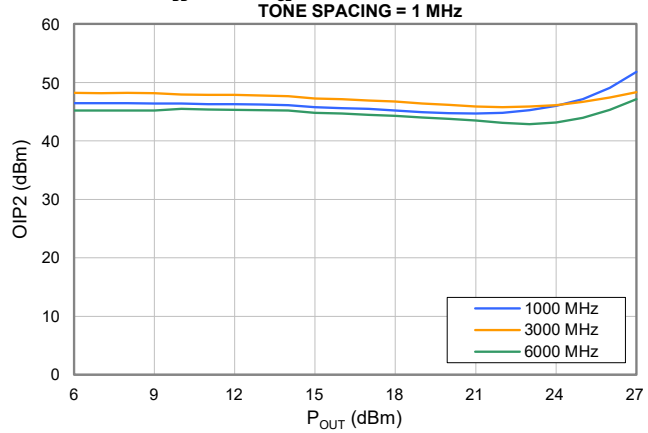
PMA5-63-2W+

50Ω 10 to 6000 MHz 2 W P_{SAT}

TYPICAL PERFORMANCE GRAPHS

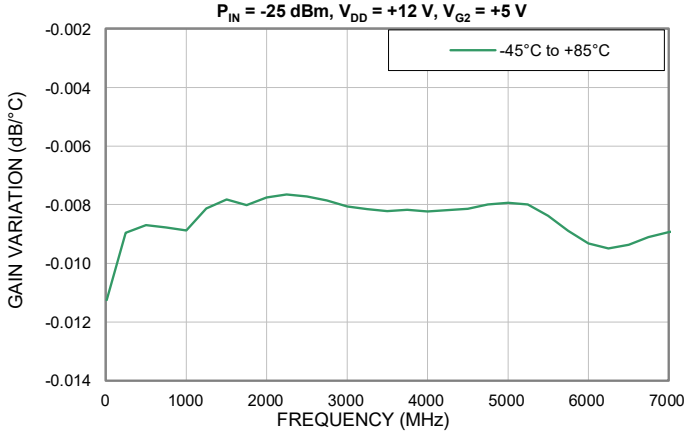
OUTPUT IP2 vs. P_{OUT}/TONE

V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C, TONE SPACING = 1 MHz



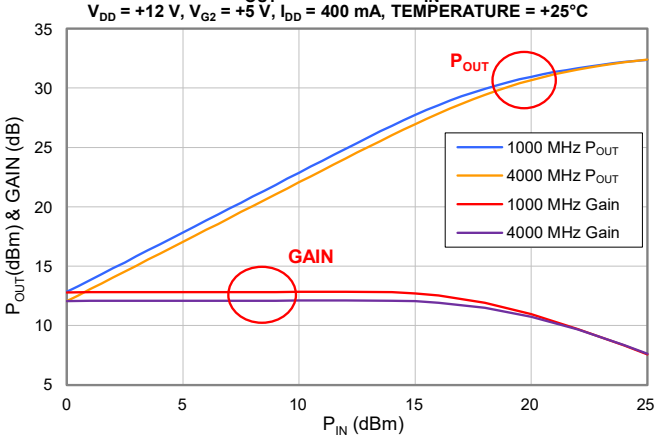
GAIN VARIATION vs. TEMPERATURE,

P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



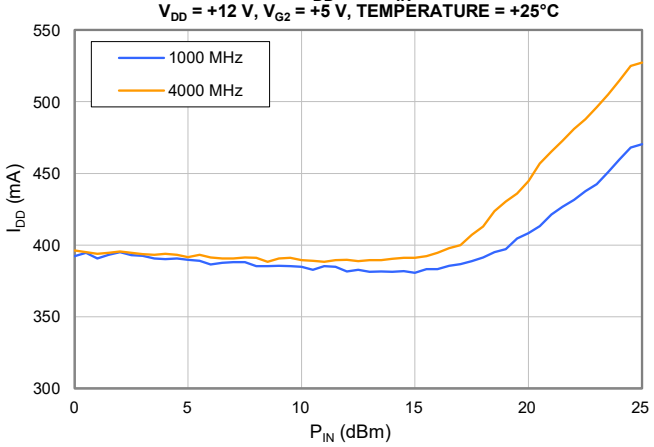
P_{OUT} & GAIN vs. P_{IN},

V_{DD} = +12 V, V_{G2} = +5 V, I_{DD} = 400 mA, TEMPERATURE = +25°C



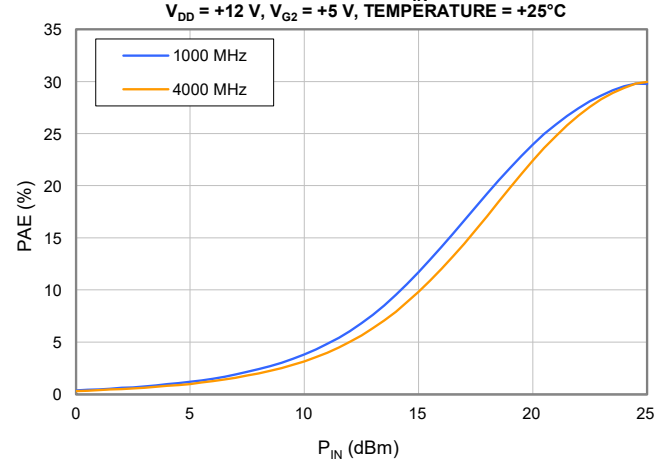
I_{DD} vs. P_{IN}

V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



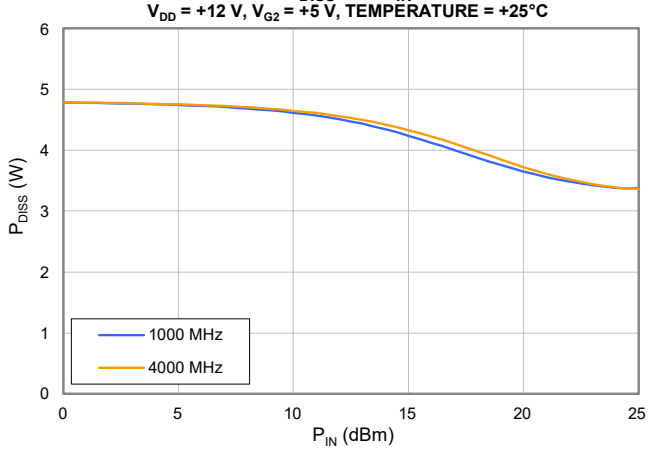
PAE vs. P_{IN}

V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



P_{DISS} vs. P_{IN}

V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



Power Amplifier

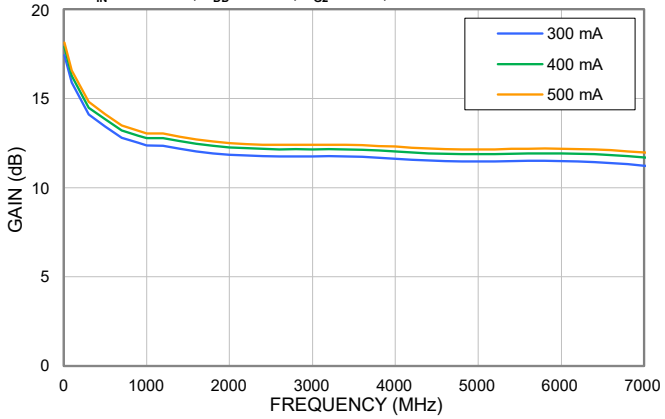
PMA5-63-2W+

50Ω 10 to 6000 MHz 2 W P_{SAT}

TYPICAL PERFORMANCE GRAPHS

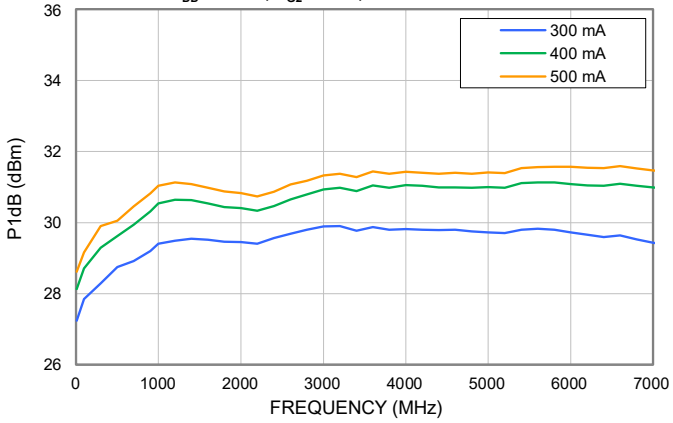
GAIN vs. CURRENT,

P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



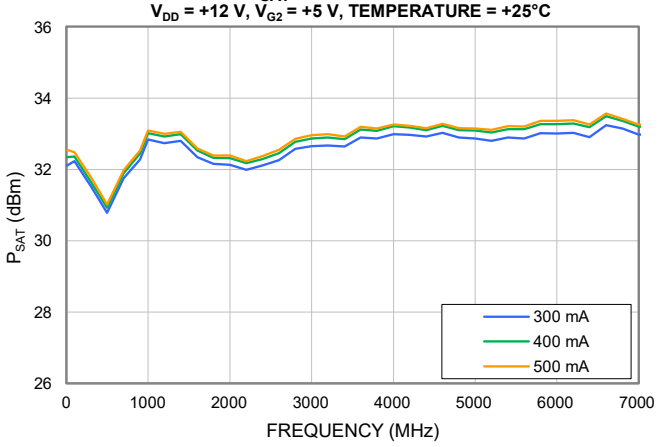
P1dB vs. CURRENT,

V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



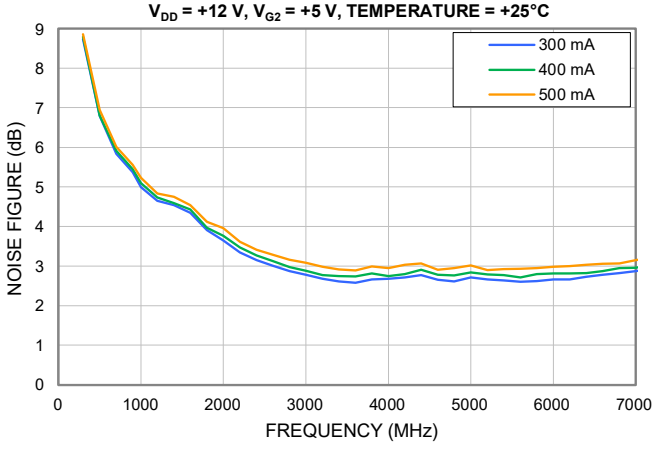
P_{SAT} vs. CURRENT,

V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



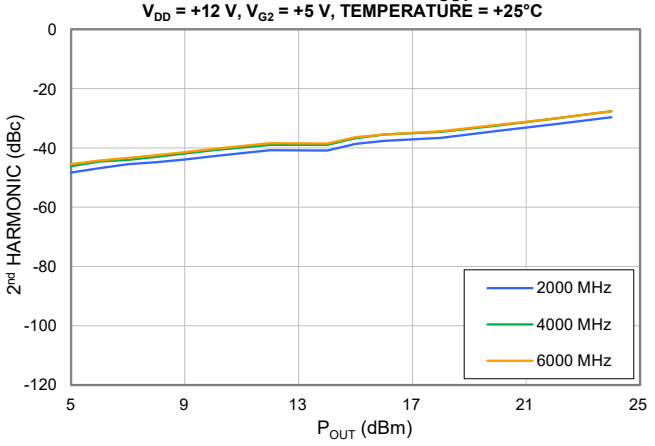
NOISE FIGURE vs. CURRENT,

V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



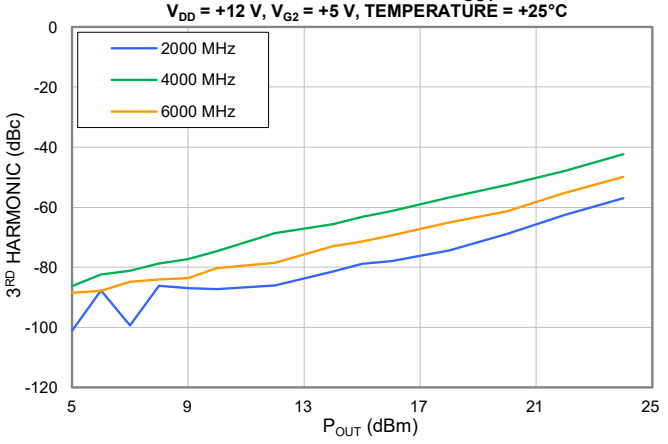
2ND HARMONIC vs. P_{OUT},

V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



3RD HARMONIC vs. P_{OUT},

V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



ABSOLUTE MAXIMUM RATINGS[7]

Parameter	Ratings
Operating Temperature (ground lead)	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Junction Temperature[8]	+175°C
Total Power Dissipation	10 W
Input Power (CW), V_{DD} = +12 V	+31 dBm
DC Voltage at RF-OUT + V_{DD}	+16.5 V
DC Gate Voltage at V_{G1}	-0.2 V
DC Gate Voltage at V_{G2}	+7.5 V
DC Gate Current at V_{G1} (I_{G1})	4.5 mA
DC Gate Current at V_{G2} (I_{G2})	4.5 mA

7. Permanent damage may occur if any of these limits are exceeded. Maximum ratings are not intended for continuous normal operation.
8. Peak temperature on top of Die.

THERMAL RESISTANCE

Parameter	Ratings
Thermal Resistance (Θ_{JC})[9]	6°C/W

9. Θ_{JC}= (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-001-2023
CDM	C2	500 V to < 1,000 V	ANSI/ESDA/JEDEC JS-002-2022

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

Power Amplifier

PMA5-63-2W+

50Ω 10 to 6000 MHz 2 W P_{SAT}

FUNCTIONAL DIAGRAM

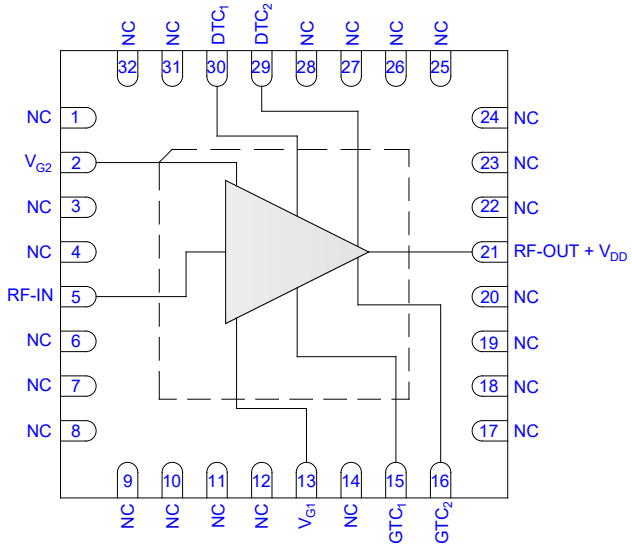
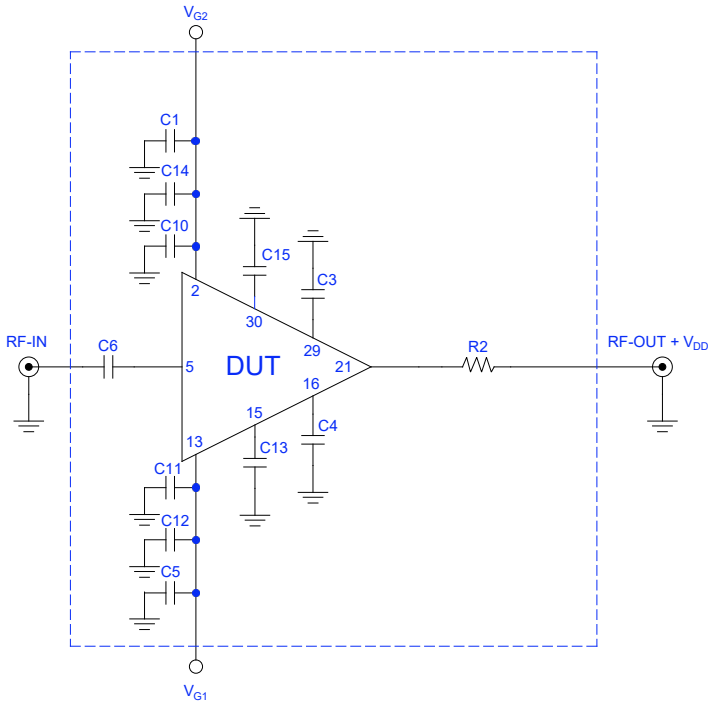


Figure 1. PMA5-63-2W+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description (Refer to Figure 1)
RF-IN	5	RF-IN Pad connects to RF Input port.
RF-OUT + V_{DD}	21	RF-OUT Pad connects to RF Output port. V_{DD} is applied via external bias tee.
V_{G1}	13	Gate 1 control voltage.
V_{G2}	2	Gate 2 control voltage.
DTC_1	30	Drain Low Frequency Termination Capacitor (AC GND)
DTC_2	29	Drain Low Frequency Termination Capacitor (AC GND)
GTC_1	15	Gate Low Frequency Termination Capacitor (AC GND)
GTC_2	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



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_{DD} supplied by external Bias-Tee.

Conditions:
1. Gain and Return Loss: P_{IN} = -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.

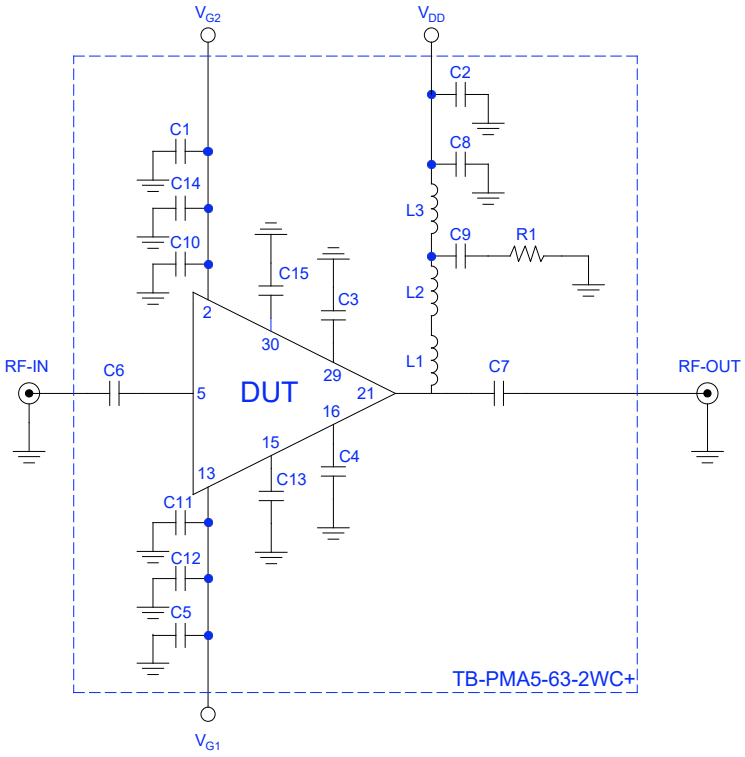
Power ON:
1. Set V_{G1} = -2 V and Turn ON.
2. Set V_{G2} = +5 V and Turn ON.
3. Set V_{DD} = +12 V and Turn ON.
4. Increase V_{G1} to desired I_{DD}.
5. Turn ON RF signal.

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 2. PMA5-63-2W+ Characterization Test Board

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. PMA5-63-2W+ Evaluation Board

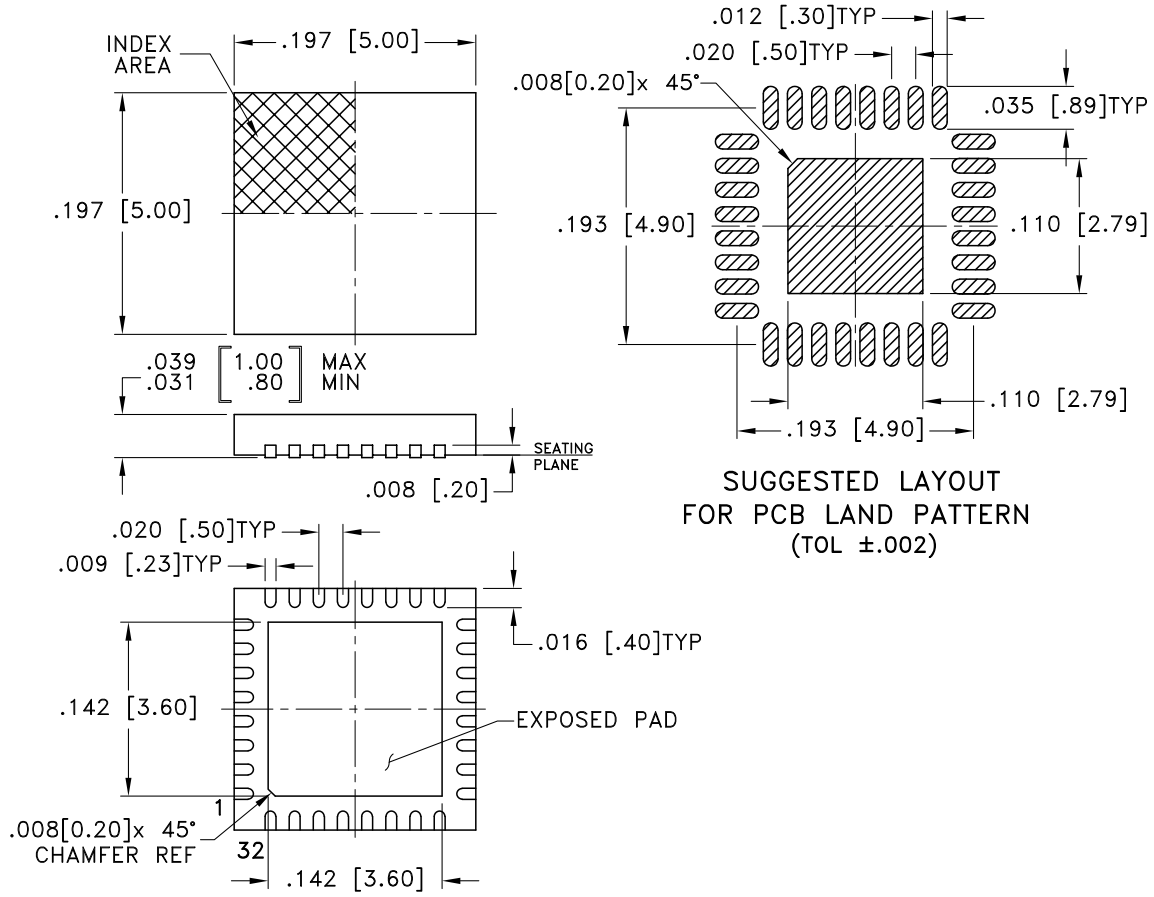
Component	Value	Size	Part Number	Manufacturer
R1	301Ω	0402	RK73H1ETTP3010F	KOA SPEER ELECTRONICS
C1, C2, C3, C4, C5	4.7 µF	1206	12063C475KAT2A	AVX CORPORATION
C6, C7, C8	0.1 µF	0402	GRM155R71E104KE14D	MURATA
C9, C10, C11	100 pF	0402	GRM1555C1H101JA01D	MURATA
C12, C13, C14, C15	1 nF	0402	GRM1555C1H102JA01D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

Power Amplifier

PMA5-63-2W+

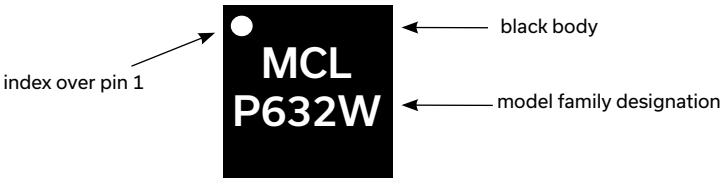
50Ω 10 to 6000 MHz 2 W P_{SAT}

CASE STYLE DRAWING



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

Power Amplifier

PMA5-63-2W+

50Ω 10 to 6000 MHz 2 W P_{SAT}

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 **Standard quantities available on reel**	F68-1 7" reels with 10, 50, 100, 200, 500, 1K, or 2K devices
Suggested Layout for PCB Design	PL-789
Evaluation Board	TB-PMA5-63-2WC+ 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

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 V, I_{DD} = 400 mA @ Temperature = +25°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 Harmonic	3rd Harmonic
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)
10	17.9	-50.04	-23.43	-24.41	32.23	1.00	42.45	28.20	31.30	32.90	28.17	-60.95	-107.21
100	16.1	-69.16	-22.52	-11.18	164.23	0.93	45.96	28.90	31.20	32.30	18.50	-57.34	-110.29
300	14.4	-62.67	-19.98	-10.00	189.18	0.91	47.64	29.60	31.10	32.20	8.78	-58.61	-107.21
500	13.7	-57.59	-18.91	-9.70	67.51	0.91	46.94	29.60	31.10	32.10	6.82	-53.59	-92.21
700	13.0	-53.45	-17.78	-9.34	44.13	0.90	46.44	29.94	31.10	32.25	5.81	-47.48	-87.35
900	12.8	-51.67	-16.45	-9.51	38.89	0.91	45.77	30.26	31.40	32.67	5.36	-43.72	-86.20
1000	12.6	-51.59	-15.95	-9.67	39.42	0.92	45.31	30.45	31.50	32.79	5.06	-42.43	-82.90
1200	12.7	-48.68	-14.25	-10.03	28.86	0.93	45.55	30.65	31.60	33.12	4.76	-42.49	-78.16
1400	12.5	-48.63	-13.22	-10.38	27.25	0.95	45.07	30.80	31.70	33.25	4.54	-44.31	-94.49
1600	12.4	-47.94	-12.42	-10.80	25.46	0.97	45.05	30.69	31.50	33.01	4.16	-44.49	-94.53
1800	12.3	-46.43	-11.88	-11.27	22.52	0.98	44.47	30.62	31.50	32.96	4.01	-43.68	-93.69
2000	12.2	-46.10	-11.58	-11.75	21.44	1.00	44.96	30.64	31.98	32.99	3.79	-42.58	-87.28
2200	12.2	-45.38	-11.56	-12.19	20.47	1.01	44.89	30.56	31.85	32.83	3.56	-42.88	-94.15
2400	12.2	-45.61	-11.82	-12.44	19.69	1.01	44.98	30.74	32.06	33.03	3.27	-44.40	-90.42
2600	12.2	-44.73	-12.37	-12.48	18.74	1.00	45.05	30.90	32.26	33.28	3.28	-43.99	-79.69
2800	12.2	-43.59	-13.28	-12.30	17.32	0.99	44.99	30.90	32.30	33.34	2.88	-41.04	-77.10
3000	12.2	-42.70	-14.62	-11.86	15.75	0.97	45.04	30.90	32.30	33.30	2.67	-39.10	-77.20
3200	12.2	-42.73	-16.56	-11.36	15.58	0.95	44.74	30.90	32.30	33.28	2.73	-39.85	-74.94
3400	12.1	-42.55	-19.25	-10.77	15.06	0.93	44.69	31.01	32.44	33.41	2.64	-41.81	-72.89
3600	12.1	-41.85	-23.19	-10.26	13.88	0.91	44.51	30.99	32.45	33.45	2.69	-42.81	-76.56
3800	12.1	-41.22	-28.29	-9.82	13.14	0.90	44.56	31.11	32.56	33.57	2.68	-41.65	-76.85
4000	12.0	-41.07	-27.91	-9.48	13.10	0.89	44.52	31.24	32.77	33.78	2.68	-40.55	-74.71
4200	11.9	-40.76	-23.95	-9.28	12.29	0.89	44.35	31.16	32.71	33.67	2.68	-41.14	-76.22
4400	11.9	-40.71	-21.34	-9.24	12.21	0.89	44.09	31.09	32.67	33.61	2.72	-42.00	-76.17
4600	11.8	-40.20	-19.85	-9.33	11.68	0.90	43.89	31.08	32.71	33.66	2.72	-40.97	-71.46
4800	11.8	-39.78	-19.06	-9.54	11.06	0.91	43.39	30.96	32.51	33.45	2.74	-38.06	-73.85
5000	11.8	-39.45	-18.97	-9.92	10.84	0.92	43.07	30.95	32.40	33.43	2.74	-36.21	-75.04
5200	11.8	-39.04	-19.41	-10.43	10.52	0.93	42.73	31.06	32.46	33.54	2.71	-37.06	-73.22
5400	11.8	-38.75	-20.35	-11.04	10.12	0.94	42.70	31.00	32.33	33.45	2.65	-39.22	-76.02
5600	11.9	-38.24	-21.64	-11.69	9.77	0.94	42.55	31.02	32.32	33.50	2.68	-40.74	-81.45
5800	11.9	-37.64	-22.80	-12.40	9.29	0.95	42.60	31.10	32.40	33.62	2.70	-40.17	-80.29
6000	11.9	-37.41	-24.81	-13.12	9.05	0.96	42.32	30.93	32.28	33.55	2.69	-39.98	-80.28
6200	11.9	-37.10	-25.52	-13.70	8.73	0.96	41.97	30.93	32.32	33.61	2.79	-40.55	-83.45
6400	11.9	-37.08	-24.87	-14.10	8.70	0.96	41.86	31.02	32.46	33.82	2.72	-41.12	-80.81
6600	11.8	-36.64	-23.83	-14.38	8.43	0.96	41.83	30.88	32.35	33.59	2.77	-39.95	-77.61
6800	11.8	-36.30	-22.99	-14.46	8.12	0.96	41.90	30.79	32.37	33.56	2.83	-37.58	-84.07
7000	11.7	-35.87	-22.84	-14.49	7.89	0.96	41.62	30.81	32.34	33.56	2.93	-37.52	-84.81

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 V, I_{DD} = 400 mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dB)
10	18.77	-59.10	-24.73	-25.09	39.31	1.00	45.38	26.11
100	16.72	-69.60	-23.07	-11.76	283.96	0.94	44.80	18.89
300	14.96	-58.55	-20.11	-10.46	114.88	0.92	41.69	7.88
500	14.26	-56.92	-18.89	-10.05	60.67	0.91	41.69	5.85
700	13.64	-54.23	-17.61	-9.59	42.29	0.91	41.40	4.96
900	13.31	-53.53	-16.21	-9.77	42.03	0.92	41.17	4.50
1000	13.16	-53.95	-15.75	-9.88	44.98	0.92	41.21	4.18
1200	13.19	-50.22	-14.04	-10.15	30.79	0.94	41.11	3.96
1400	13.01	-49.62	-13.02	-10.34	29.16	0.95	41.10	3.71
1600	12.89	-48.19	-12.23	-10.65	25.78	0.97	41.24	3.44
1800	12.80	-47.53	-11.69	-11.16	24.66	0.98	41.04	3.26
2000	12.74	-47.18	-11.39	-11.79	22.50	1.00	41.25	3.03
2200	12.71	-46.62	-11.38	-12.40	21.60	1.01	41.29	2.80
2400	12.70	-45.73	-11.61	-12.80	20.38	1.01	41.38	2.82
2600	12.70	-44.96	-12.07	-12.93	18.96	1.01	41.44	2.51
2800	12.69	-45.18	-12.95	-12.70	18.35	1.00	41.51	2.20
3000	12.71	-44.19	-14.15	-12.22	16.92	0.98	41.53	2.07
3200	12.69	-43.36	-15.99	-11.54	15.84	0.96	41.42	2.11
3400	12.68	-43.22	-18.62	-10.69	15.07	0.93	41.40	1.96
3600	12.62	-42.61	-22.53	-9.96	14.36	0.91	41.32	2.00
3800	12.58	-42.24	-28.62	-9.37	13.57	0.89	41.28	2.00
4000	12.52	-41.48	-30.16	-8.93	12.63	0.88	41.20	1.96
4200	12.49	-41.79	-25.26	-8.82	12.60	0.88	41.07	2.04
4400	12.47	-41.33	-22.14	-8.99	11.90	0.88	40.97	2.00
4600	12.46	-41.08	-20.23	-9.29	11.72	0.90	40.77	2.02
4800	12.44	-40.58	-19.09	-9.65	11.18	0.91	40.55	2.06
5000	12.43	-40.23	-18.63	-10.08	10.85	0.92	40.31	2.04
5200	12.41	-39.90	-18.72	-10.48	10.72	0.93	40.04	2.03
5400	12.43	-39.30	-19.36	-11.00	10.11	0.94	39.83	1.98
5600	12.45	-39.20	-20.44	-11.44	10.08	0.94	39.72	1.99
5800	12.46	-38.66	-21.28	-11.85	9.57	0.95	39.71	2.04
6000	12.46	-38.33	-23.26	-12.35	9.13	0.95	39.64	2.04
6200	12.46	-37.99	-24.19	-12.86	9.03	0.95	39.51	2.03
6400	12.45	-37.66	-23.89	-13.41	8.58	0.96	39.54	2.06
6600	12.43	-37.31	-23.28	-13.92	8.42	0.96	39.47	2.04
6800	12.40	-36.93	-22.56	-14.31	8.17	0.96	39.84	2.12
7000	12.37	-36.54	-22.28	-14.57	7.81	0.96	39.53	2.16

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 V, I_{DD} = 400 mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dB)
10	17.31	-54.93	-23.13	-22.40	37.91	1.00	40.97	29.59
100	15.56	-66.07	-22.09	-11.04	227.57	0.93	42.70	18.58
300	13.83	-58.68	-19.88	-9.97	79.49	0.91	45.47	9.34
500	13.12	-58.23	-19.06	-9.72	64.24	0.91	45.14	7.35
700	12.49	-51.44	-18.01	-9.38	44.13	0.90	45.18	6.42
900	12.26	-52.75	-16.69	-9.47	44.15	0.91	45.17	6.00
1000	12.14	-50.93	-16.15	-9.69	39.95	0.92	45.12	5.71
1200	12.15	-48.65	-14.46	-10.11	30.29	0.94	45.70	5.42
1400	12.00	-48.11	-13.41	-10.53	28.00	0.95	45.50	5.15
1600	11.90	-46.93	-12.60	-10.98	25.23	0.97	45.59	4.88
1800	11.79	-45.94	-12.03	-11.40	23.49	0.99	45.58	4.66
2000	11.72	-45.32	-11.74	-11.75	21.06	1.00	45.55	4.45
2200	11.66	-44.94	-11.72	-12.03	20.43	1.00	45.43	4.17
2400	11.64	-44.03	-12.00	-12.17	18.69	1.00	45.16	4.13
2600	11.63	-43.44	-12.59	-12.13	17.74	0.99	45.03	3.79
2800	11.63	-42.87	-13.58	-11.95	17.01	0.98	44.92	3.46
3000	11.64	-42.82	-14.95	-11.58	16.46	0.96	44.86	3.34
3200	11.63	-42.09	-16.94	-11.18	15.47	0.95	44.61	3.31
3400	11.62	-41.70	-19.58	-10.77	14.84	0.93	44.22	3.25
3600	11.59	-41.14	-23.35	-10.41	13.82	0.92	43.85	3.33
3800	11.55	-40.78	-27.36	-10.09	13.32	0.91	43.72	3.33
4000	11.48	-40.51	-26.45	-9.76	12.86	0.90	43.86	3.27
4200	11.41	-40.15	-23.09	-9.48	12.30	0.89	43.94	3.37
4400	11.31	-39.73	-20.84	-9.29	11.82	0.89	43.83	3.37
4600	11.24	-39.39	-19.57	-9.21	11.64	0.90	43.60	3.37
4800	11.21	-39.15	-19.06	-9.34	11.23	0.90	43.16	3.34
5000	11.21	-38.78	-19.25	-9.70	10.79	0.91	43.10	3.37
5200	11.23	-38.42	-19.91	-10.29	10.53	0.92	43.01	3.34
5400	11.27	-37.80	-21.06	-11.00	9.88	0.93	43.06	3.27
5600	11.30	-37.72	-22.53	-11.82	9.95	0.94	42.97	3.37
5800	11.31	-37.16	-24.04	-12.70	9.35	0.95	42.91	3.38
6000	11.31	-36.57	-26.39	-13.58	9.01	0.96	42.67	3.42
6200	11.31	-36.22	-26.87	-14.22	8.75	0.96	41.97	3.42
6400	11.28	-36.17	-25.77	-14.52	8.66	0.96	41.86	3.38
6600	11.24	-35.81	-24.43	-14.55	8.40	0.96	41.83	3.48
6800	11.19	-35.50	-23.55	-14.36	8.05	0.96	41.90	3.55
7000	11.13	-35.37	-23.59	-14.20	7.95	0.96	41.62	3.62

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 V, I_{DD} = 400 mA

FREQ	1dB Comp. Output			3dB Comp. Output			P_{SAT} Output		
	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C	-45°C	+25°C	+85°C
(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
10	29.42	28.66	28.30	31.88	31.48	31.36	33.63	33.41	33.37
100	30.21	29.70	29.81	31.92	31.69	31.77	32.85	32.74	32.64
300	30.66	30.45	30.67	31.95	31.88	31.94	32.75	32.65	32.54
500	30.69	30.55	30.71	32.02	32.00	32.02	32.78	32.68	32.55
700	30.69	30.47	30.56	32.05	31.98	31.95	32.73	32.59	32.40
900	30.75	30.48	30.50	32.06	31.94	31.87	32.68	32.51	32.28
1000	30.93	30.62	30.60	32.23	32.10	32.00	32.80	32.61	32.36
1200	30.91	30.59	30.56	32.19	32.04	31.94	32.78	32.60	32.35
1400	30.94	30.60	30.56	32.20	32.07	31.97	32.79	32.61	32.36
1600	31.17	30.78	30.70	32.44	32.28	32.17	33.01	32.79	32.56
1800	31.05	30.65	30.56	32.33	32.13	32.02	32.85	32.60	32.38
2000	31.07	30.65	30.51	32.29	32.06	31.92	32.91	32.64	32.39
2200	31.28	30.81	30.57	32.55	32.30	32.08	33.00	32.71	32.41
2400	31.28	30.80	30.52	32.55	32.28	32.04	33.12	32.82	32.49
2600	31.40	30.92	30.60	32.66	32.42	32.16	33.11	32.81	32.48
2800	31.45	30.96	30.64	32.66	32.42	32.19	33.19	32.90	32.59
3000	31.49	30.92	30.61	32.70	32.40	32.18	33.17	32.82	32.53
3200	31.71	31.04	30.68	32.90	32.53	32.29	33.33	32.93	32.62
3400	31.70	30.93	30.50	32.91	32.46	32.14	33.34	32.86	32.46
3600	31.81	31.03	30.54	33.08	32.66	32.28	33.47	33.00	32.54
3800	31.87	31.15	30.62	33.22	32.88	32.46	33.56	33.15	32.65
4000	32.18	31.49	30.86	33.57	33.31	32.82	33.81	33.45	32.91
4200	32.07	31.32	30.66	33.53	33.19	32.66	33.72	33.30	32.73
4400	31.97	31.11	30.49	33.32	32.86	32.38	33.57	33.07	32.53
4600	31.67	30.79	30.26	32.99	32.55	32.12	33.30	32.82	32.31
4800	31.46	30.67	30.22	32.86	32.46	32.06	33.24	32.77	32.29
5000	31.53	30.89	30.47	32.92	32.66	32.33	33.25	32.90	32.48
5200	31.74	31.24	30.76	33.12	32.95	32.63	33.40	33.14	32.72
5400	31.89	31.43	30.90	33.26	33.10	32.78	33.54	33.27	32.84
5600	31.86	31.35	30.83	33.22	33.00	32.65	33.53	33.20	32.74
5800	31.99	31.45	30.79	33.39	33.13	32.69	33.65	33.30	32.77
6000	32.07	31.47	30.77	33.47	33.20	32.70	33.69	33.34	32.77
6200	31.79	31.39	30.66	33.48	33.16	32.61	33.75	33.33	32.71
6400	32.05	31.60	30.80	33.76	33.42	32.81	33.94	33.49	32.85
6600	32.05	31.55	30.71	33.89	33.51	32.86	34.02	33.55	32.89
6800	31.98	31.50	30.63	33.95	33.48	32.79	34.04	33.50	32.82
7000	31.86	31.38	30.52	33.78	33.32	32.63	33.88	33.35	32.66

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 V, I_{DD} = 400 mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	3dB Comp. Output	Psat Output	Noise Figure	2nd Harmonic	3rd Harmonic
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)
10	17.59	-53.65	-23.87	-24.03	31.54	1.00	39.35	31.70	33.80	28.82	-59.98	-107.65
100	15.98	-64.02	-22.63	-12.02	117.65	0.94	45.16	32.10	33.30	30.53	-57.04	-108.98
300	14.26	-63.82	-20.09	-10.58	135.92	0.92	46.30	32.40	33.20	8.81	-58.20	-105.78
500	13.57	-58.61	-18.84	-10.30	79.96	0.92	45.48	32.40	33.20	6.89	-53.32	-95.91
700	12.92	-54.22	-17.67	-9.79	51.15	0.91	44.75	32.40	33.27	5.93	-47.72	-92.16
900	12.62	-51.58	-16.36	-9.95	38.99	0.92	44.76	32.80	33.69	5.48	-44.26	-87.55
1000	12.49	-52.05	-15.87	-10.10	41.84	0.92	44.49	32.90	33.79	5.11	-42.77	-82.79
1200	12.48	-49.52	-14.22	-10.47	31.17	0.94	44.81	33.00	34.11	4.78	-42.98	-76.20
1400	12.31	-49.34	-13.22	-10.68	31.00	0.96	44.53	33.20	34.22	4.64	-44.77	-89.56
1600	12.17	-48.25	-12.45	-11.07	27.75	0.97	44.24	33.00	33.99	4.47	-44.80	-99.10
1800	12.06	-46.41	-11.92	-11.70	22.81	0.99	44.09	33.00	33.94	4.02	-43.73	-87.05
2000	11.98	-46.95	-11.63	-11.83	24.41	1.00	44.01	33.60	34.01	3.80	-42.78	-80.18
2200	11.92	-45.92	-11.60	-12.04	21.86	1.00	44.20	33.42	33.80	3.46	-42.96	-84.66
2400	11.89	-45.74	-11.84	-12.55	21.76	1.01	44.25	33.64	33.98	3.26	-44.36	-83.96
2600	11.87	-44.90	-12.40	-12.22	19.85	0.99	44.29	33.85	34.23	3.14	-43.87	-77.03
2800	11.87	-44.00	-13.30	-12.02	18.02	0.98	44.10	33.91	34.27	3.02	-40.91	-74.91
3000	11.86	-43.30	-14.61	-11.70	16.78	0.97	44.05	33.88	34.22	2.94	-38.92	-76.89
3200	11.86	-43.67	-16.49	-11.17	17.56	0.95	44.09	33.88	34.08	2.87	-39.78	-73.92
3400	11.84	-43.38	-19.16	-10.69	17.04	0.93	43.89	34.02	34.27	2.80	-41.74	-72.56
3600	11.80	-42.49	-23.00	-9.99	15.32	0.90	43.70	34.02	34.28	2.74	-42.45	-76.74
3800	11.75	-42.44	-27.74	-9.81	15.31	0.90	43.69	34.15	34.41	2.82	-41.24	-77.72
4000	11.70	-41.87	-27.43	-9.41	14.29	0.89	43.49	34.42	34.61	2.77	-40.36	-75.01
4200	11.64	-40.73	-23.70	-9.29	12.54	0.88	43.56	34.34	34.52	2.80	-40.89	-76.48
4400	11.58	-40.45	-21.21	-9.32	12.20	0.89	43.43	34.33	34.46	2.93	-41.95	-77.35
4600	11.55	-40.55	-19.80	-9.54	12.42	0.90	43.23	34.40	34.46	2.79	-40.72	-72.63
4800	11.53	-40.18	-19.15	-9.54	11.92	0.90	42.94	34.2	34.22	2.81	-37.87	-75.38
5000	11.52	-39.57	-19.09	-10.27	11.33	0.92	42.40	34.10	34.16	2.88	-36.00	-77.31
5200	11.53	-39.16	-19.57	-10.54	10.86	0.92	42.38	34.26	34.20	2.78	-36.89	-75.24
5400	11.55	-39.34	-20.52	-11.34	11.26	0.93	42.25	34.10	34.10	2.82	-39.13	-78.19
5600	11.57	-39.12	-21.72	-11.98	11.12	0.94	42.41	34.14	34.15	2.79	-40.60	-82.40
5800	11.59	-38.33	-22.75	-12.54	10.21	0.95	42.58	34.3	34.3	2.84	-40.01	-82.31
6000	11.59	-38.01	-24.58	-13.63	10.00	0.96	42.58	34.22	34.22	2.82	-39.86	-81.18
6200	11.57	-37.54	-25.09	-13.73	9.52	0.96	42.45	34.35	34.31	2.84	-40.53	-85.07
6400	11.55	-37.20	-24.38	-14.31	9.21	0.96	42.21	34.59	34.49	2.88	-41.04	-81.60
6600	11.51	-36.86	-23.47	-14.35	8.90	0.96	41.84	34.44	34.34	2.94	-39.80	-80.26
6800	11.46	-36.98	-22.87	-14.41	9.08	0.97	41.38	34.4	34.3	2.96	-37.49	-86.74
7000	11.41	-36.52	-22.87	-13.99	8.62	0.96	41.11	34.39	34.30	3.03	-37.44	-86.09

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 V, I_{DD} = 400 mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	3dB Comp. Output	Psat Output	Noise Figure	2nd Harmonic	3rd Harmonic
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)
10	17.37	-44.33	-23.75	-25.20	11.08	1.00	40.04	32.50	34.60	28.86	-59.67	-107.14
100	15.83	-73.40	-22.63	-12.45	354.52	0.95	44.44	33.00	34.30	30.71	-57.02	-97.40
300	14.16	-58.40	-20.08	-11.04	74.31	0.93	46.12	33.40	34.10	8.90	-57.73	-103.69
500	13.53	-56.72	-18.84	-10.63	65.06	0.92	45.51	33.50	34.00	6.91	-53.68	-90.64
700	12.88	-53.87	-17.67	-10.10	49.72	0.92	45.11	33.50	34.22	5.98	-47.79	-83.49
900	12.57	-52.99	-16.34	-10.13	46.35	0.92	45.06	34.00	34.58	5.50	-44.25	-84.58
1000	12.42	-53.09	-15.84	-10.31	47.74	0.93	44.82	34.10	34.68	5.16	-43.00	-82.49
1200	12.42	-49.82	-14.17	-10.57	32.60	0.95	45.32	34.10	34.97	4.79	-43.24	-77.59
1400	12.22	-49.31	-13.20	-10.79	31.26	0.96	45.03	34.20	35.06	4.69	-44.83	-91.31
1600	12.08	-48.50	-12.43	-11.25	28.93	0.98	44.82	34.10	34.86	4.56	-44.96	-93.13
1800	11.96	-47.91	-11.90	-11.46	27.28	0.99	44.63	34.00	34.83	4.03	-44.10	-88.87
2000	11.86	-47.27	-11.63	-11.84	25.67	1.00	44.61	34.48	34.93	3.84	-42.70	-87.13
2200	11.80	-46.46	-11.62	-12.15	23.65	1.00	44.71	34.28	34.69	3.54	-42.94	-85.40
2400	11.76	-45.85	-11.86	-12.20	22.23	1.00	44.55	34.41	34.84	3.34	-44.21	-90.27
2600	11.74	-45.24	-12.39	-12.24	20.96	1.00	44.72	34.53	35.02	3.19	-43.58	-78.33
2800	11.73	-44.68	-13.26	-11.97	19.78	0.98	44.48	34.58	35.00	3.04	-40.82	-76.83
3000	11.72	-44.18	-14.55	-11.61	18.80	0.97	44.42	34.51	34.95	2.96	-38.73	-78.46
3200	11.72	-43.64	-16.39	-11.15	17.76	0.95	44.42	34.40	34.71	2.91	-39.46	-74.75
3400	11.71	-43.23	-18.97	-10.66	16.98	0.93	44.26	34.55	34.97	2.81	-41.46	-72.51
3600	11.68	-42.84	-22.61	-10.36	16.32	0.91	44.03	34.47	34.94	2.75	-42.08	-75.56
3800	11.64	-42.41	-27.08	-9.92	15.50	0.90	43.88	34.57	35.03	2.85	-41.11	-76.05
4000	11.59	-42.01	-27.15	-9.80	14.85	0.90	43.79	34.83	35.18	2.83	-40.20	-74.15
4200	11.54	-41.48	-23.50	-9.62	13.96	0.89	43.84	34.70	35.12	2.86	-40.78	-76.01
4400	11.49	-41.28	-21.02	-9.84	13.75	0.90	43.65	34.67	35.09	2.96	-41.72	-75.57
4600	11.45	-40.90	-19.58	-9.85	13.19	0.90	43.57	34.68	35.04	2.82	-40.51	-71.14
4800	11.43	-40.46	-18.88	-10.34	12.70	0.92	43.34	34.47	34.85	2.80	-37.65	-73.47
5000	11.41	-40.14	-18.83	-10.60	12.33	0.92	42.77	34.40	34.74	2.88	-35.84	-74.87
5200	11.40	-39.84	-19.31	-11.33	12.11	0.94	42.80	34.55	34.78	2.85	-36.70	-72.32
5400	11.41	-39.45	-20.42	-11.77	11.68	0.94	42.76	34.43	34.64	2.84	-38.91	-75.72
5600	11.41	-39.15	-21.85	-12.52	11.44	0.95	42.82	34.37	34.64	2.81	-40.41	-80.96
5800	11.41	-38.46	-23.07	-13.15	10.68	0.95	42.95	34.43	34.74	2.83	-39.88	-79.58
6000	11.39	-38.01	-24.87	-13.40	10.21	0.96	42.89	34.40	34.73	2.85	-39.59	-79.94
6200	11.38	-37.78	-24.94	-14.08	10.04	0.96	42.79	34.48	34.80	2.87	-40.26	-82.50
6400	11.34	-37.54	-23.97	-13.95	9.79	0.96	42.58	34.76	35.05	2.97	-40.89	-80.70
6600	11.28	-37.28	-23.04	-14.03	9.56	0.96	42.22	34.72	34.95	2.98	-39.58	-78.21
6800	11.22	-37.05	-22.50	-13.46	9.32	0.96	41.79	34.63	34.87	3.06	-37.34	-82.70
7000	11.13	-36.86	-22.74	-13.15	9.18	0.95	41.59	34.65	34.91	3.10	-37.18	-84.41

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 V, I_{DD} = 400 mA @ Temperature = +25°C

Power	OIP2 (@1 GHz)	OIP2 (@3 GHz)	OIP2 (@6 GHz)
(dBm)	(dBm)	(dBm)	(dBm)
5	46.06	47.98	45.17
6	46.46	48.22	45.21
7	46.47	48.15	45.22
8	46.47	48.20	45.24
9	46.40	48.15	45.24
10	46.37	47.88	45.44
11	46.26	47.86	45.37
12	46.26	47.86	45.33
13	46.22	47.76	45.27
14	46.08	47.65	45.16
15	45.76	47.25	44.80
16	45.60	47.13	44.68
17	45.46	46.92	44.47
18	45.18	46.68	44.27
19	44.94	46.42	43.99
20	44.76	46.17	43.79
21	44.65	45.90	43.49
22	44.77	45.74	43.06
23	45.28	45.88	42.85
24	46.01	46.15	43.11
25	47.14	46.67	43.93
26	49.03	47.40	45.30
27	51.80	48.30	47.12

Typical Performance Data

TEST CONDITIONS: V_{DD} = +12 V, V_{G2} = +5 V, I_{DD} = 400 mA @ Temperature = +25°C

FREQ	P_{IN}	Gain
(MHz)	(dBm)	(dB)
1000	0.00	12.8
1000	1.00	12.8
1000	2.00	12.8
1000	3.00	12.8
1000	4.00	12.8
1000	5.00	12.8
1000	6.0	12.8
1000	7.0	12.8
1000	8.0	12.8
1000	9.0	12.8
1000	10.0	12.9
1000	12.0	12.9
1000	14.0	12.8
1000	15.0	12.7
1000	16.0	12.5
1000	18.0	11.9
1000	20.0	11.0
1000	22.0	9.7
1000	24.0	8.3
1000	25.0	7.6
4000	0.00	12.1
4000	1.00	12.1
4000	2.00	12.1
4000	3.00	12.1
4000	4.00	12.1
4000	5.00	12.1
4000	6.0	12.1
4000	7.0	12.1
4000	8.0	12.1
4000	9.0	12.1
4000	10.0	12.1
4000	12.0	12.1
4000	14.0	12.1
4000	15.0	12.1
4000	16.0	11.9
4000	18.0	11.5
4000	20.0	10.8
4000	22.0	9.7
4000	24.0	8.3
4000	25.0	7.6
8000	0.00	11.4
8000	1.00	11.4
8000	2.00	11.4
8000	3.00	11.4
8000	4.00	11.4
8000	5.00	11.4
8000	6.0	11.4
8000	7.0	11.4
8000	8.0	11.4
8000	9.0	11.4
8000	10.0	11.4
8000	12.0	11.4
8000	14.0	11.4
8000	15.0	11.4
8000	16.0	11.3
8000	18.0	10.9
8000	20.0	10.3
8000	22.0	9.5
8000	24.0	8.5
8000	25.0	7.9

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 V, I_{DD} = 400 mA @ Temperature = +25°C

Power	P_{OUT} (@1 GHz)	P_{OUT} (@4 GHz)	I_{DD} (@1 GHz)	I_{DD} (@4 GHz)	P_{DISS} (@1 GHz)	P_{DISS} (@4 GHz)	PAE (@1 GHz)	PAE (@4 GHz)
(dBm)	(dBm)	(dBm)	mA	mA	(dBm)	(dBm)	(%)	(%)
0.00	12.85	12.07	392.27	396.15	4.78	4.78	0.38	0.32
0.50	13.34	12.56	394.53	394.85	4.78	4.78	0.43	0.36
1.00	13.85	13.06	390.66	393.89	4.78	4.78	0.48	0.40
1.50	14.35	13.56	393.24	394.53	4.77	4.78	0.54	0.45
2.00	14.84	14.06	394.85	395.50	4.77	4.78	0.60	0.50
2.50	15.33	14.56	392.92	394.53	4.77	4.77	0.67	0.56
3.00	15.84	15.06	392.59	393.56	4.76	4.77	0.76	0.63
3.50	16.34	15.56	390.66	393.24	4.76	4.77	0.85	0.71
4.00	16.84	16.06	390.01	393.89	4.75	4.76	0.95	0.80
4.50	17.34	16.56	390.66	393.24	4.75	4.76	1.07	0.89
5.00	17.84	17.06	389.69	391.63	4.74	4.75	1.20	1.00
5.50	18.35	17.56	389.04	393.24	4.74	4.75	1.35	1.13
6.00	18.85	18.07	386.46	391.30	4.73	4.74	1.51	1.26
6.50	19.35	18.56	387.43	390.66	4.72	4.73	1.70	1.42
7.00	19.85	19.06	388.07	390.66	4.71	4.72	1.91	1.59
7.50	20.36	19.56	388.07	391.30	4.70	4.71	2.14	1.79
8.00	20.86	20.06	385.17	390.98	4.68	4.70	2.41	2.00
8.50	21.36	20.56	385.17	388.40	4.67	4.69	2.70	2.25
9.00	21.87	21.06	385.49	390.66	4.65	4.68	3.04	2.52
9.50	22.37	21.56	385.17	390.98	4.64	4.66	3.41	2.83
10.00	22.87	22.06	384.85	389.37	4.62	4.65	3.83	3.18
10.50	23.38	22.56	382.59	389.04	4.59	4.63	4.30	3.56
11.00	23.88	23.06	385.17	388.40	4.57	4.61	4.83	4.00
11.50	24.38	23.56	384.85	389.37	4.54	4.58	5.42	4.49
12.00	24.88	24.06	381.62	389.69	4.51	4.56	6.07	5.03
12.50	25.37	24.56	382.91	388.72	4.47	4.53	6.81	5.64
13.00	25.87	25.05	381.29	389.37	4.43	4.50	7.63	6.32
13.50	26.35	25.54	381.62	389.37	4.39	4.46	8.53	7.07
14.00	26.83	26.02	381.29	390.33	4.34	4.42	9.52	7.90
14.50	27.29	26.50	381.94	390.98	4.29	4.38	10.58	8.81
15.00	27.74	26.97	380.65	390.98	4.24	4.33	11.71	9.81
15.50	28.16	27.42	383.23	392.27	4.18	4.28	12.90	10.88
16.00	28.56	27.86	383.23	394.53	4.12	4.22	14.14	12.01
16.50	28.94	28.27	385.49	397.76	4.06	4.17	15.39	13.20
17.00	29.29	28.67	386.78	400.02	4.00	4.11	16.66	14.44
17.50	29.63	29.06	388.72	407.12	3.94	4.04	17.95	15.74
18.00	29.94	29.43	391.30	412.94	3.88	3.98	19.24	17.09
18.50	30.23	29.78	395.18	423.59	3.82	3.91	20.50	18.47
19.00	30.50	30.10	397.11	430.37	3.76	3.85	21.71	19.83
19.50	30.74	30.40	404.54	435.86	3.70	3.79	22.86	21.14
20.00	30.96	30.67	408.42	444.58	3.65	3.72	23.94	22.40
20.50	31.17	30.93	413.26	456.85	3.60	3.67	24.94	23.60
21.00	31.35	31.16	421.33	465.24	3.56	3.61	25.86	24.73
21.50	31.52	31.37	426.82	472.67	3.52	3.56	26.68	25.78
22.00	31.68	31.56	431.34	481.06	3.48	3.52	27.42	26.72
22.50	31.82	31.74	437.47	487.84	3.45	3.48	28.08	27.56
23.00	31.96	31.90	442.32	496.24	3.42	3.44	28.66	28.28
23.50	32.08	32.05	450.71	504.95	3.40	3.41	29.14	28.89
24.00	32.20	32.18	459.75	514.64	3.38	3.39	29.53	29.39
24.50	32.30	32.30	467.82	524.97	3.37	3.37	29.79	29.77
25.00	32.38	32.40	470.41	527.23	3.37	3.36	29.75	29.93

Typical Performance Data

TEST CONDITIONS: V_{DD} = +12 V, I_{DD} = 300 mA, 400 mA, 500 mA @ Temperature = +25°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
(MHz)	(dB)	(dB)	(dB)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)	(dB)	(dB)
10	17.4	17.9	18.1	27.24	28.13	28.62	32.11	32.35	32.55	28.64	28.71	28.90
100	15.9	16.3	16.6	27.85	28.71	29.15	32.24	32.36	32.48	30.81	30.77	30.42
300	14.1	14.5	14.8	28.29	29.29	29.90	31.52	31.65	31.78	8.73	8.79	8.85
500	13.4	13.8	14.1	28.74	29.62	30.05	30.78	30.92	31.02	6.79	6.81	6.95
700	12.8	13.2	13.5	28.92	29.94	30.45	31.75	31.90	31.98	5.84	5.91	6.02
900	12.5	12.9	13.2	29.20	30.31	30.81	32.28	32.45	32.53	5.37	5.44	5.55
1000	12.4	12.8	13.0	29.41	30.54	31.03	32.84	33.01	33.09	5.00	5.10	5.23
1200	12.4	12.8	13.0	29.48	30.63	31.12	32.74	32.92	33.00	4.65	4.73	4.84
1400	12.2	12.6	12.8	29.54	30.62	31.09	32.80	32.98	33.05	4.54	4.60	4.75
1600	12.0	12.5	12.7	29.52	30.53	30.98	32.35	32.53	32.59	4.34	4.43	4.54
1800	11.9	12.3	12.6	29.46	30.43	30.87	32.16	32.32	32.39	3.91	3.96	4.12
2000	11.8	12.3	12.5	29.44	30.41	30.83	32.13	32.31	32.39	3.65	3.76	3.95
2200	11.8	12.2	12.4	29.41	30.33	30.73	31.99	32.17	32.24	3.35	3.47	3.61
2400	11.8	12.2	12.4	29.56	30.46	30.86	32.11	32.29	32.37	3.15	3.27	3.41
2600	11.7	12.2	12.4	29.69	30.65	31.07	32.25	32.46	32.55	3.01	3.12	3.28
2800	11.8	12.2	12.4	29.80	30.79	31.18	32.58	32.77	32.86	2.88	2.97	3.16
3000	11.8	12.2	12.4	29.89	30.93	31.33	32.65	32.86	32.96	2.78	2.88	3.09
3200	11.8	12.2	12.4	29.90	30.97	31.37	32.67	32.89	32.99	2.68	2.78	2.98
3400	11.7	12.1	12.4	29.77	30.89	31.27	32.64	32.85	32.93	2.62	2.75	2.92
3600	11.7	12.1	12.4	29.87	31.04	31.44	32.89	33.12	33.19	2.58	2.74	2.89
3800	11.7	12.1	12.3	29.80	30.98	31.37	32.87	33.09	33.14	2.66	2.82	2.99
4000	11.6	12.0	12.3	29.82	31.06	31.43	32.98	33.20	33.26	2.68	2.75	2.95
4200	11.6	12.0	12.2	29.79	31.04	31.40	32.97	33.18	33.22	2.71	2.79	3.03
4400	11.5	11.9	12.2	29.79	30.99	31.37	32.92	33.10	33.15	2.78	2.91	3.06
4600	11.5	11.9	12.2	29.80	30.99	31.40	33.03	33.23	33.28	2.65	2.78	2.90
4800	11.5	11.9	12.1	29.75	30.97	31.37	32.90	33.10	33.15	2.62	2.76	2.95
5000	11.5	11.9	12.1	29.72	31.00	31.41	32.87	33.09	33.15	2.71	2.84	3.02
5200	11.5	11.9	12.1	29.70	30.98	31.39	32.80	33.03	33.10	2.66	2.79	2.90
5400	11.5	11.9	12.2	29.80	31.11	31.53	32.89	33.13	33.22	2.64	2.78	2.92
5600	11.5	11.9	12.2	29.83	31.13	31.56	32.87	33.13	33.20	2.60	2.71	2.93
5800	11.5	11.9	12.2	29.79	31.13	31.56	33.02	33.27	33.35	2.62	2.80	2.95
6000	11.5	11.9	12.2	29.72	31.08	31.56	33.00	33.27	33.36	2.67	2.81	2.98
6200	11.5	11.9	12.2	29.66	31.05	31.54	33.03	33.29	33.38	2.66	2.81	3.00
6400	11.4	11.9	12.1	29.59	31.03	31.53	32.90	33.18	33.27	2.73	2.82	3.03
6600	11.4	11.8	12.1	29.64	31.09	31.59	33.23	33.49	33.57	2.79	2.88	3.06
6800	11.3	11.8	12.0	29.52	31.04	31.52	33.14	33.36	33.42	2.83	2.96	3.07
7000	11.2	11.7	12.0	29.43	30.99	31.47	32.98	33.20	33.25	2.87	2.96	3.15
7200	11.2	11.6	11.9	29.35	30.94	31.42	32.97	33.17	33.22	2.96	3.06	3.22
7400	11.1	11.5	11.8	29.32	30.89	31.37	32.90	33.09	33.15	3.00	3.08	3.30
7600	11.0	11.4	11.7	29.18	30.86	31.33	32.99	33.17	33.23	3.04	3.18	3.32
7800	10.9	11.4	11.7	29.12	30.78	31.26	32.84	33.03	33.09	3.12	3.23	3.38
8000	10.8	11.3	11.6	29.04	30.64	31.13	32.81	32.99	33.05	3.17	3.27	3.46

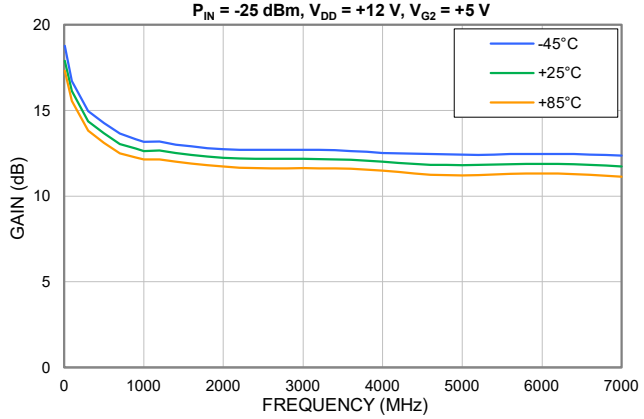
Typical Performance Data

TEST CONDITIONS: V_{DD} = +12 V, V_{G2} = +5 V, I_{DD} = 400 mA @ Temperature = +25°C

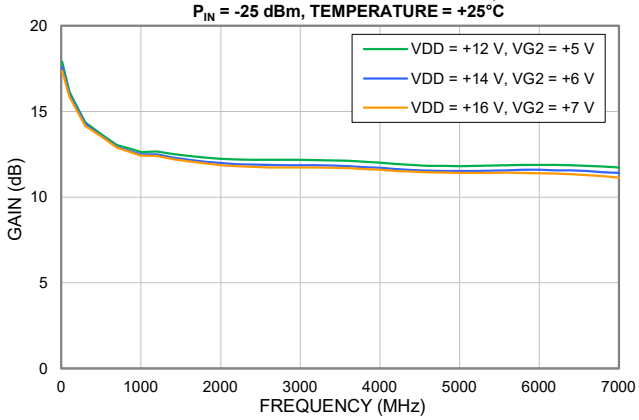
FREQ	P_{OUT}	2nd Harmonic	FREQ	P_{OUT}	3rd Harmonic
(MHz)	(dBm)	(dB)	(GHz)	(dBm)	(dB)
2000	5.0	-48.4	2.00	5.0	-101.2
2000	6.0	-46.9	2.00	6.0	-87.7
2000	7.0	-45.6	2.00	7.0	-99.4
2000	8.0	-44.9	2.00	8.0	-86.1
2000	9.0	-44.0	2.00	9.0	-87.0
2000	10.0	-42.9	2.00	10.0	-87.3
2000	12.0	-40.8	2.00	12.0	-86.1
2000	14.0	-41.0	2.00	14.0	-81.4
2000	15.0	-38.7	2.00	15.0	-78.9
2000	16.0	-37.7	2.00	16.0	-78.0
2000	18.0	-36.6	2.00	18.0	-74.4
2000	20.0	-34.4	2.00	20.0	-68.9
2000	22.0	-32.1	2.00	22.0	-62.5
2000	24.0	-29.6	2.00	24.0	-57.0
4000	5.00	-46.3	4.00	5.00	-86.3
4000	6.0	-44.6	4.00	6.0	-82.4
4000	7.0	-44.0	4.00	7.0	-81.2
4000	8.0	-43.0	4.00	8.0	-78.8
4000	9.0	-42.0	4.00	9.0	-77.3
4000	10.0	-40.9	4.00	10.0	-74.7
4000	12.0	-38.9	4.00	12.0	-68.6
4000	14.0	-39.1	4.00	14.0	-65.6
4000	15.0	-36.8	4.00	15.0	-63.2
4000	16.0	-35.6	4.00	16.0	-61.3
4000	18.0	-34.6	4.00	18.0	-56.8
4000	20.0	-32.5	4.00	20.0	-52.6
4000	22.0	-30.2	4.00	22.0	-47.9
4000	24.0	-27.7	4.00	24.0	-42.4
6000	5.0	-45.6	6.00	5.0	-88.4
6000	6.0	-44.4	6.00	6.0	-87.8
6000	7.0	-43.4	6.00	7.0	-84.8
6000	8.0	-42.4	6.00	8.0	-84.1
6000	9.0	-41.5	6.00	9.0	-83.6
6000	10.0	-40.4	6.00	10.0	-80.3
6000	12.0	-38.4	6.00	12.0	-78.5
6000	14.0	-38.6	6.00	14.0	-72.9
6000	15.0	-36.4	6.00	15.0	-71.4
6000	16.0	-35.5	6.00	16.0	-69.4
6000	18.0	-34.4	6.00	18.0	-65.1
6000	20.0	-32.3	6.00	20.0	-61.2
6000	22.0	-30.1	6.00	22.0	-55.2
6000	24.0	-27.7	6.00	24.0	-49.8

Typical Performance Curves

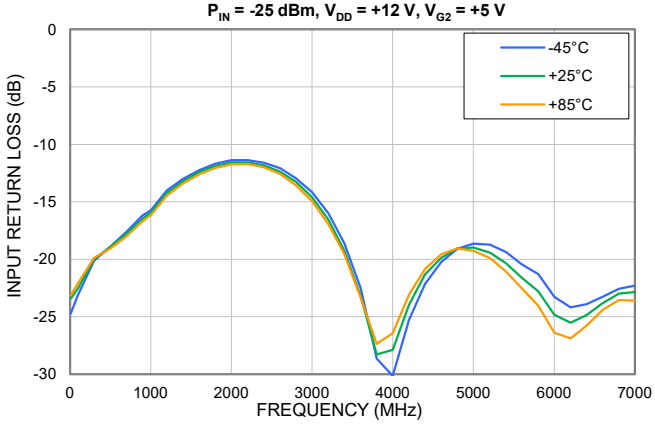
GAIN vs. TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



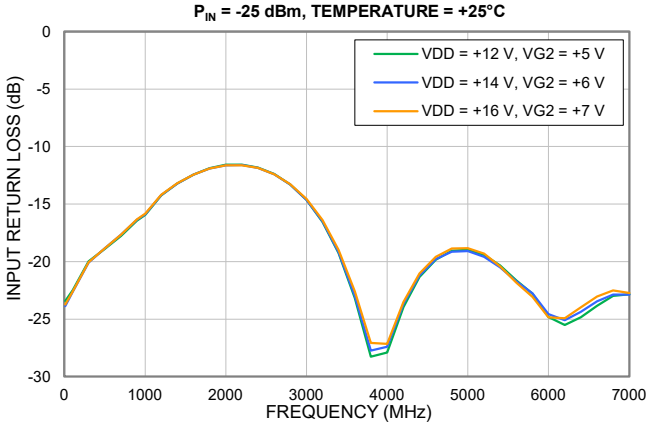
GAIN vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



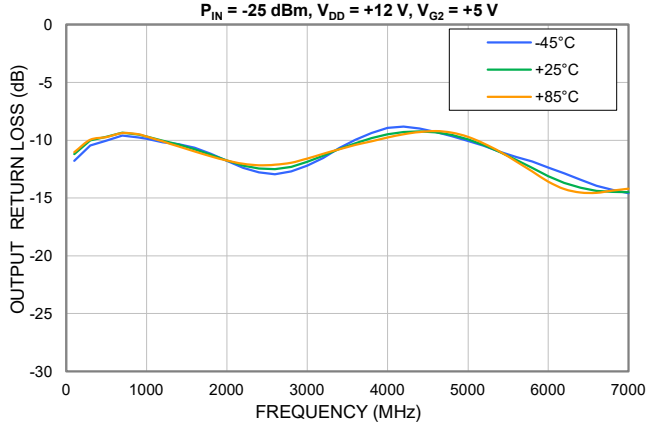
INPUT RETURN LOSS vs.TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



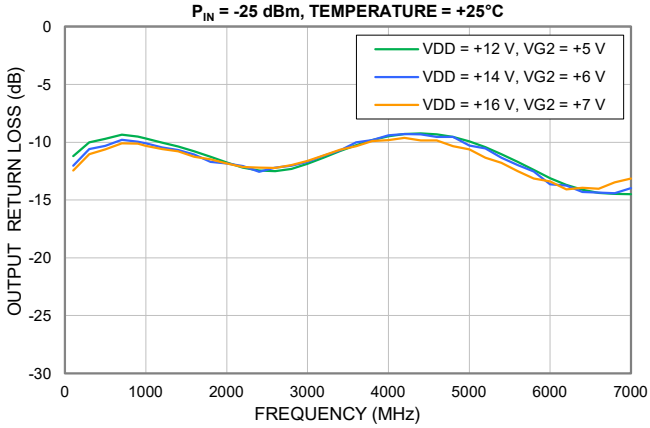
INPUT RETURN LOSS vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



OUTPUT RETURN LOSS vs. TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V

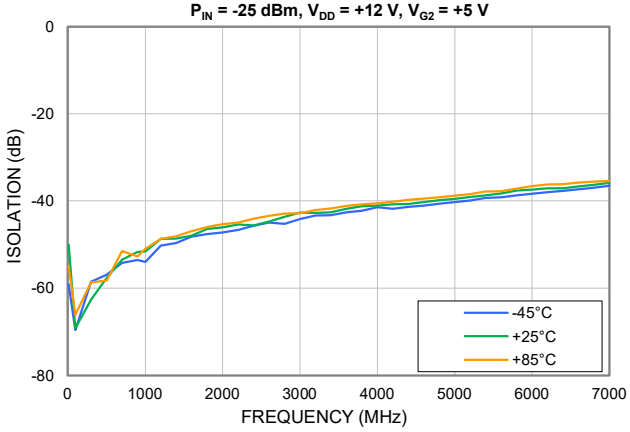


OUTPUT RETURN LOSS vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C

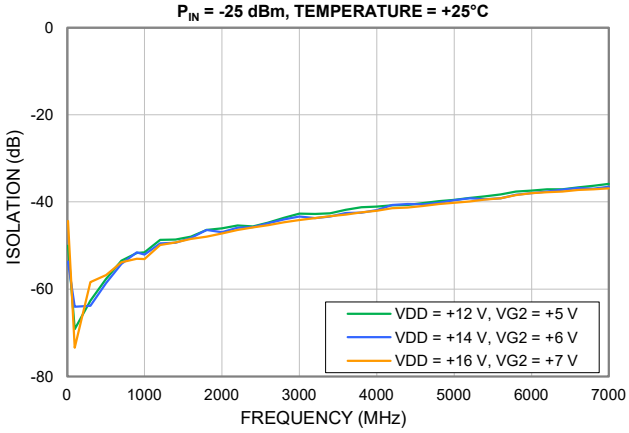


Typical Performance Curves

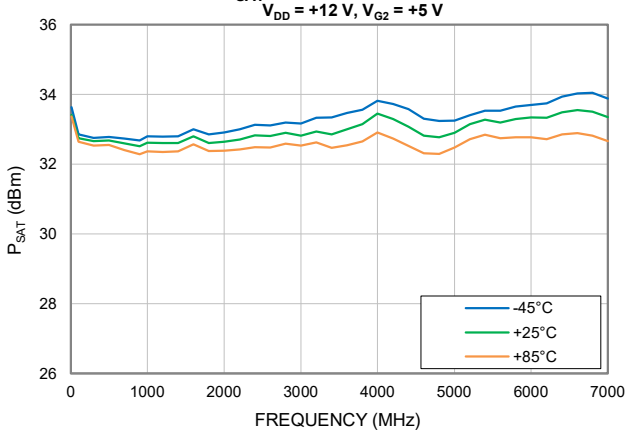
ISOLATION vs.TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



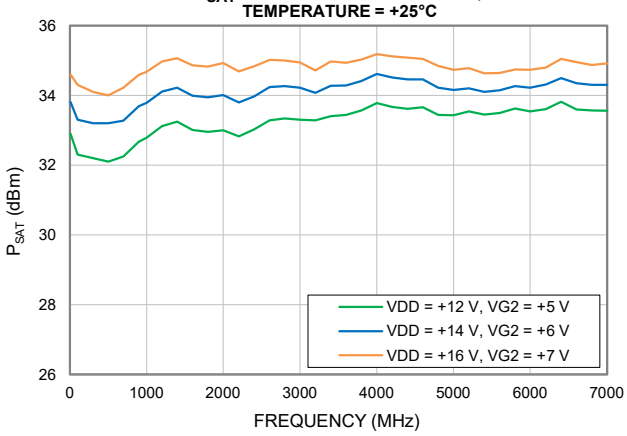
ISOLATION vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



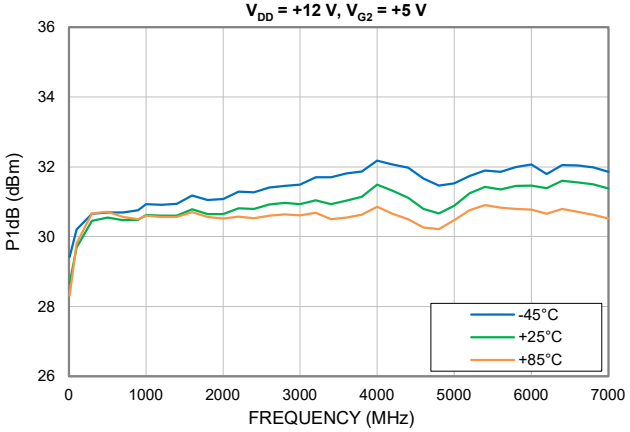
P_{SAT} vs. TEMPERATURE,
V_{DD} = +12 V, V_{G2} = +5 V



P_{SAT} vs. DEVICE VOLTAGE,
TEMPERATURE = +25°C

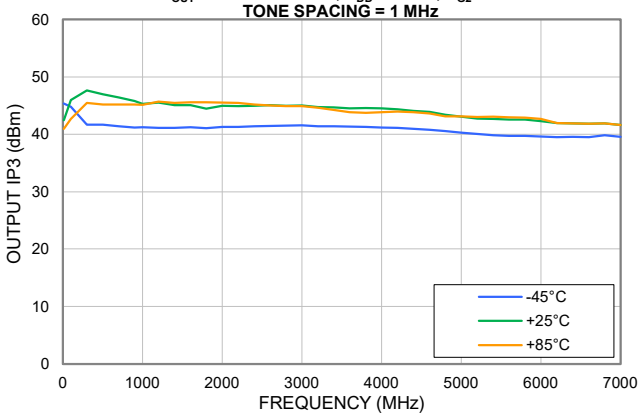


P1dB vs. TEMPERATURE,
V_{DD} = +12 V, V_{G2} = +5 V

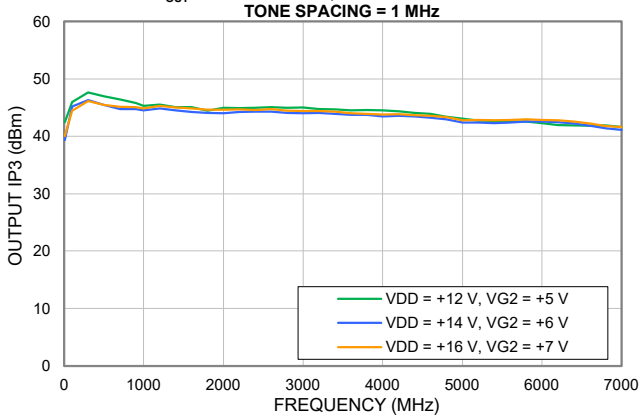


Typical Performance Curves

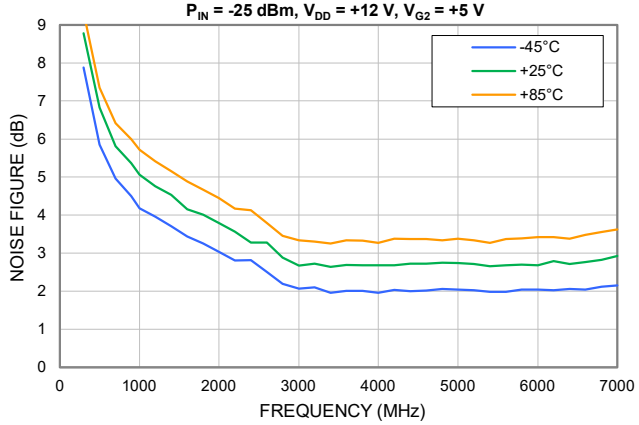
OUTPUT IP3 vs. TEMPERATURE,
P_{OUT} = +20 dBm/TONE, V_{DD} = +12 V, V_{G2} = +5 V
TONE SPACING = 1 MHz



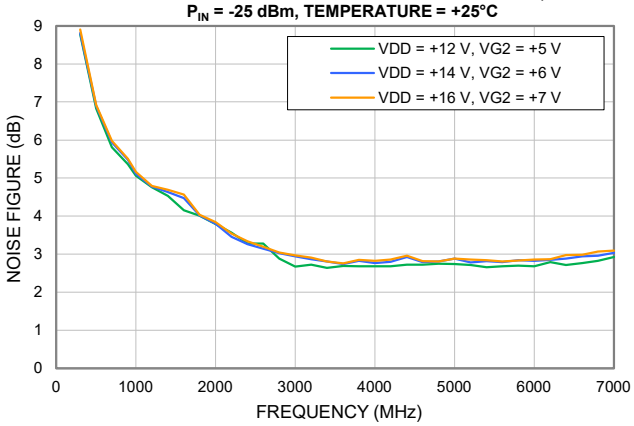
OUTPUT IP3 vs. DEVICE VOLTAGE,
P_{OUT} = +20 dBm/TONE, TEMPERATURE = +25°C
TONE SPACING = 1 MHz



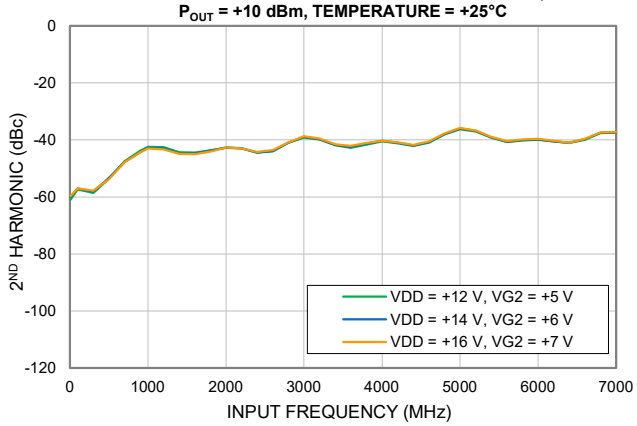
NOISE FIGURE vs. TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



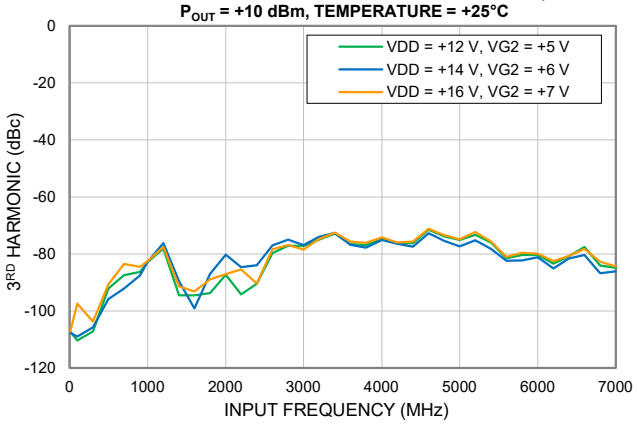
NOISE FIGURE vs. DEVICE VOLTAGE,
P_{IN} = -25 dBm, TEMPERATURE = +25°C



2ND HARMONIC vs. DEVICE VOLTAGE,
P_{OUT} = +10 dBm, TEMPERATURE = +25°C

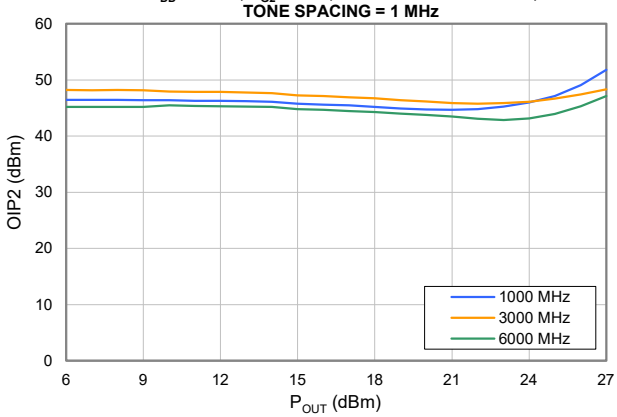


3RD HARMONIC vs. DEVICE VOLTAGE,
P_{OUT} = +10 dBm, TEMPERATURE = +25°C

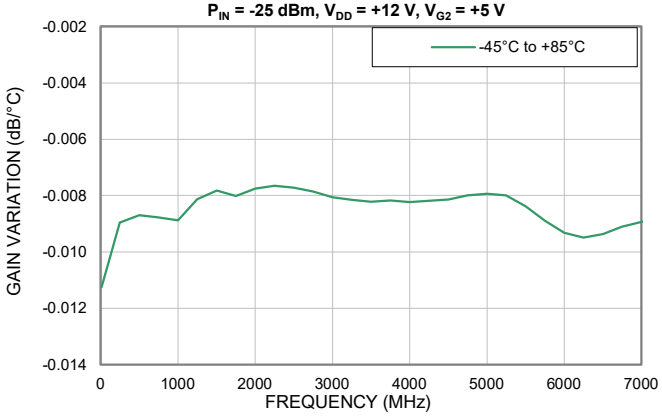


Typical Performance Curves

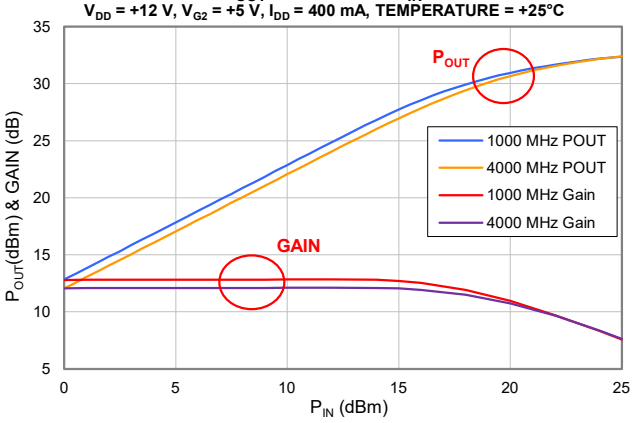
OUTPUT IP2 vs. P_{OUT}/TONE
V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C,
TONE SPACING = 1 MHz



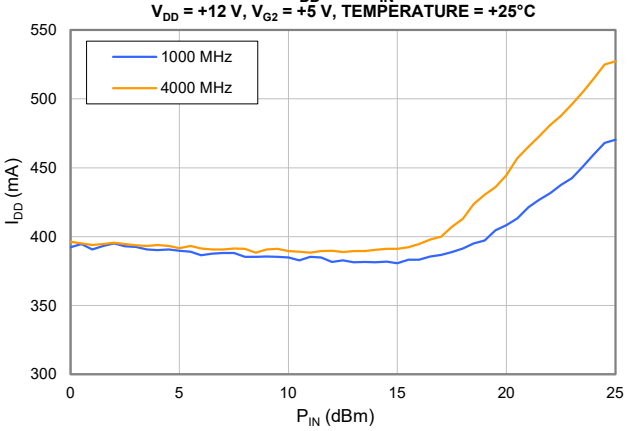
GAIN VARIATION vs. TEMPERATURE,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V



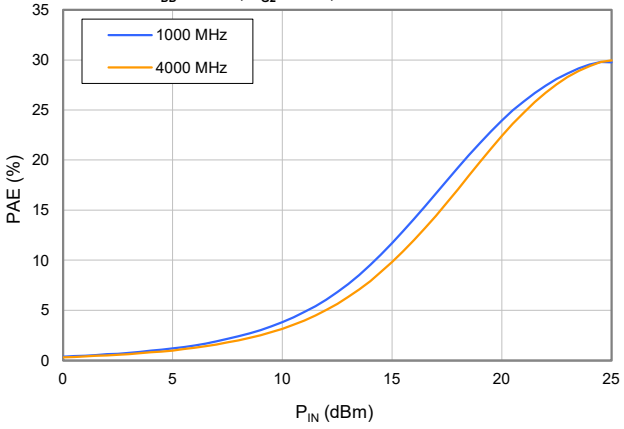
P_{OUT} & GAIN vs. P_{IN},
V_{DD} = +12 V, V_{G2} = +5 V, I_{DD} = 400 mA, TEMPERATURE = +25°C



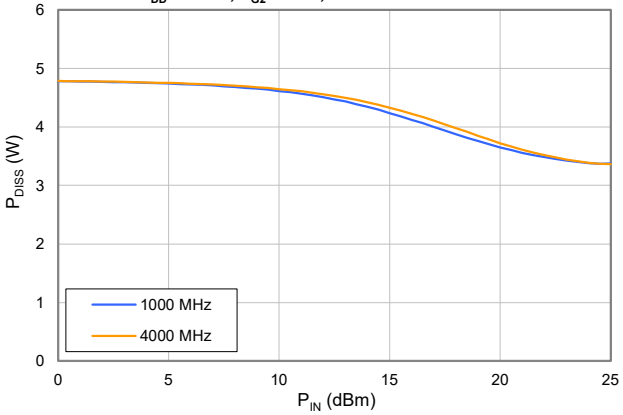
I_{DD} vs. P_{IN}
V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



PAE vs. P_{IN}
V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C

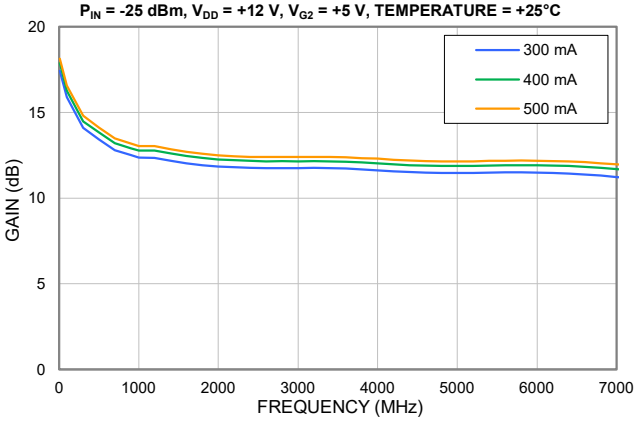


P_{DISS} vs. P_{IN}
V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C

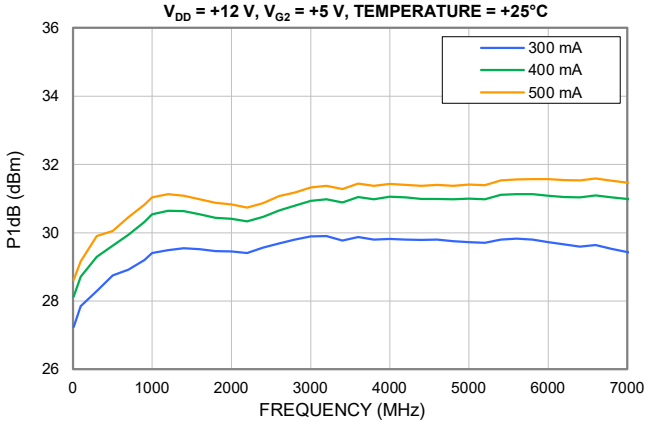


Typical Performance Curves

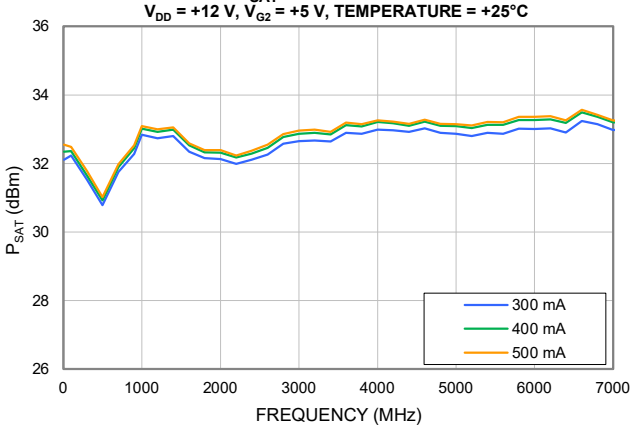
GAIN vs. CURRENT,
P_{IN} = -25 dBm, V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



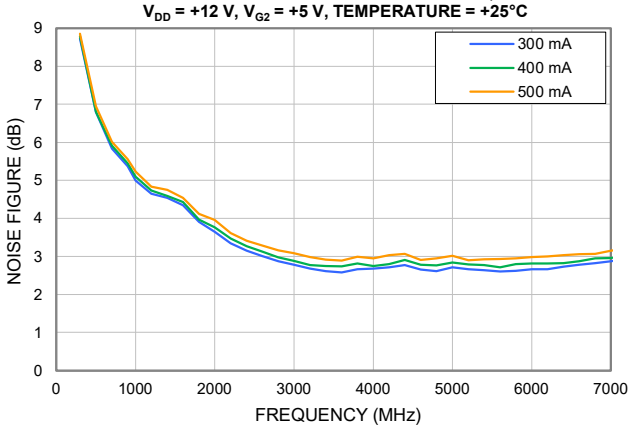
P1dB vs. CURRENT,
V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



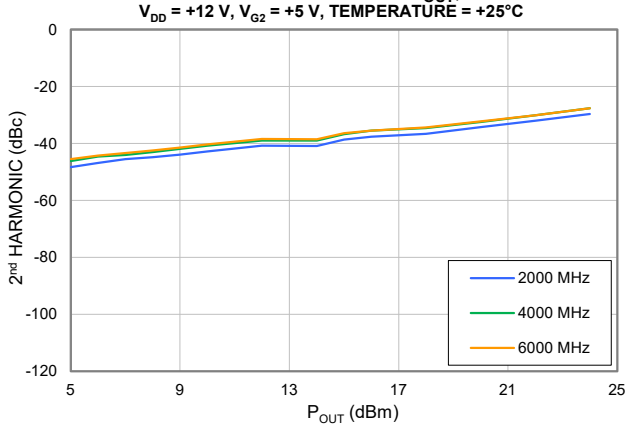
P_{SAT} vs. CURRENT,
V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



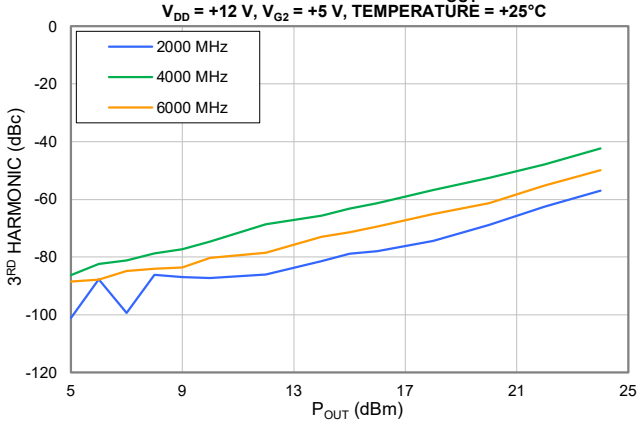
NOISE FIGURE vs. CURRENT,
V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



2ND HARMONIC vs. P_{OUT},
V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



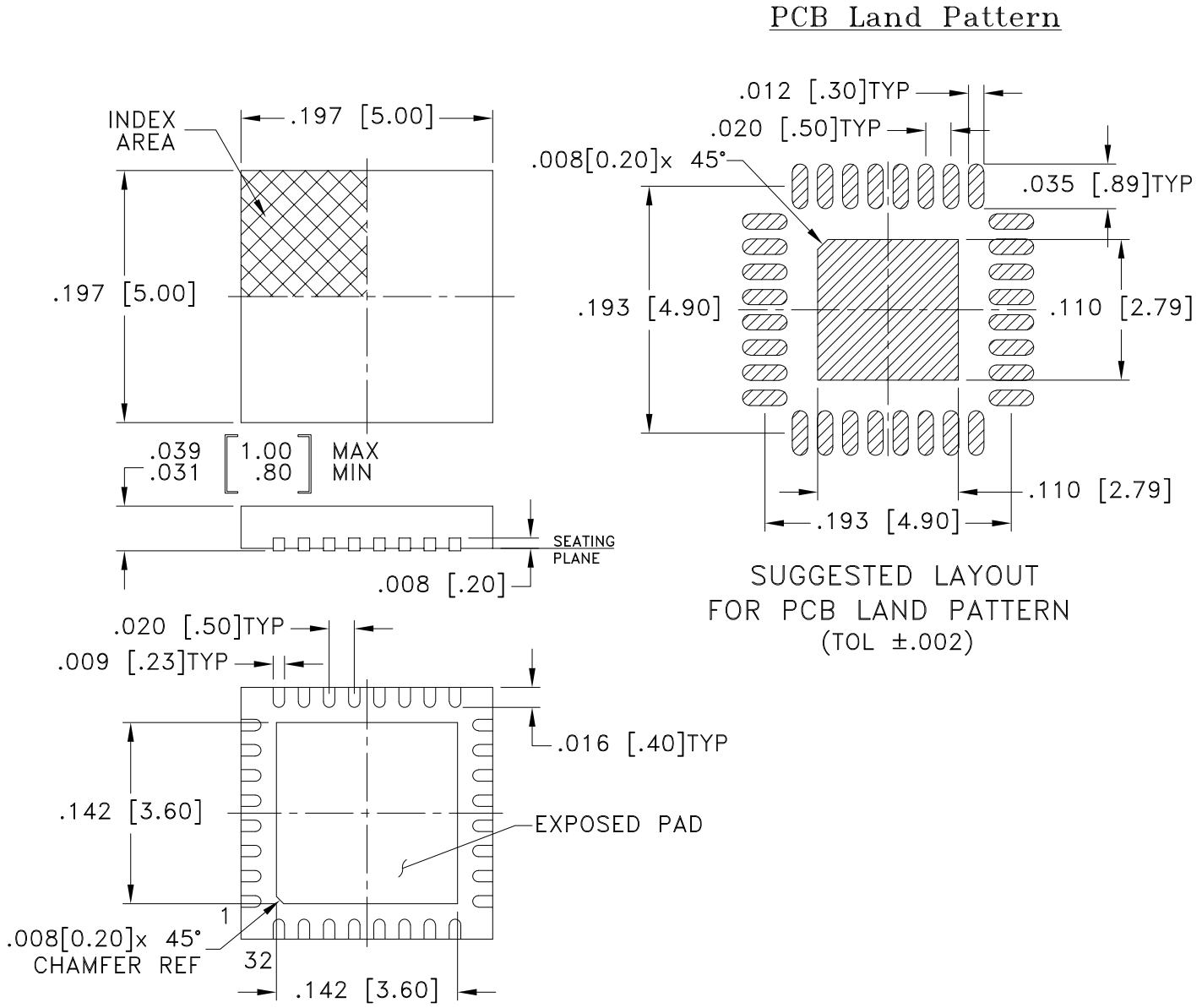
3RD HARMONIC vs. P_{OUT},
V_{DD} = +12 V, V_{G2} = +5 V, TEMPERATURE = +25°C



Case Style DG

Outline Dimensions

DG1677-10



Weight: .05 grams

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

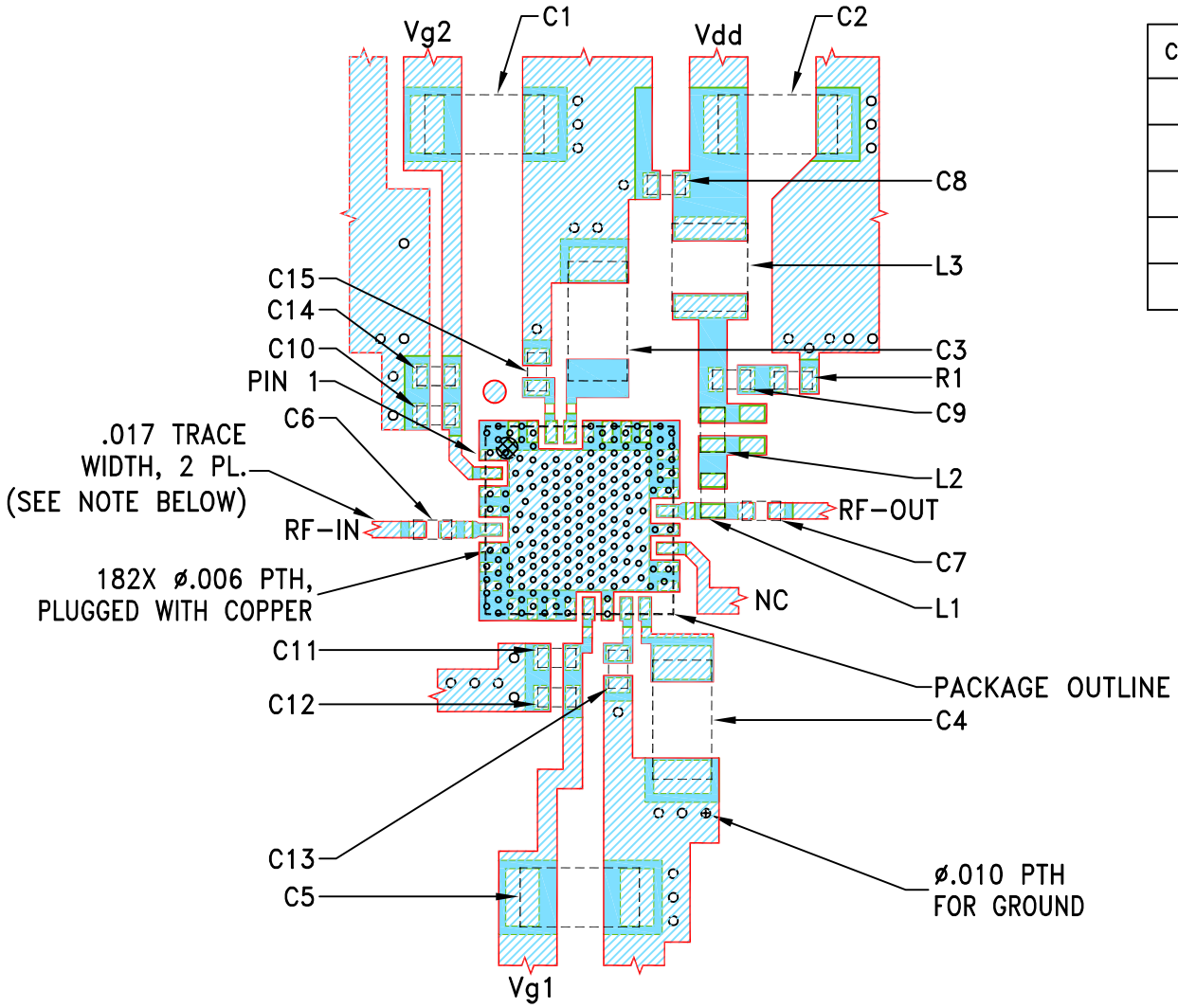
Notes:

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.

THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-022462	NEW RELEASE	07/23/24	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR DG1677-10 CASE STYLE



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

NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4003C 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.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE, FOR COMPONENT VALUES REFER TO TB-PMA5-63-2WC+.
3. 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	DRAWN	ITG	07/23/24
TOLERANCES ON:	CHECKED	GF	07/23/24
2 PL DECIMALS ±	APPROVED	IL	07/23/24
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

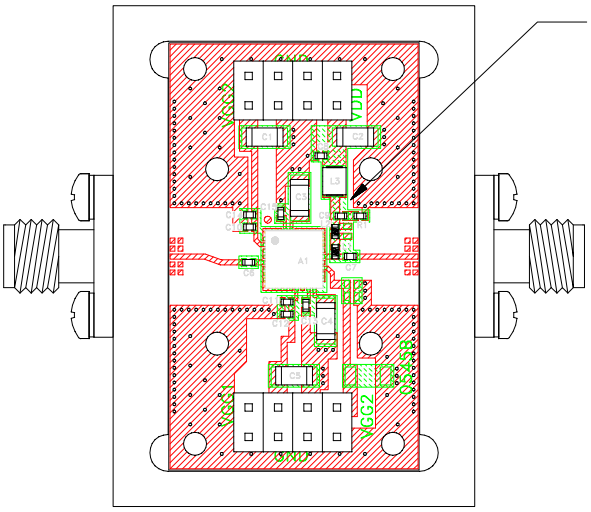
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

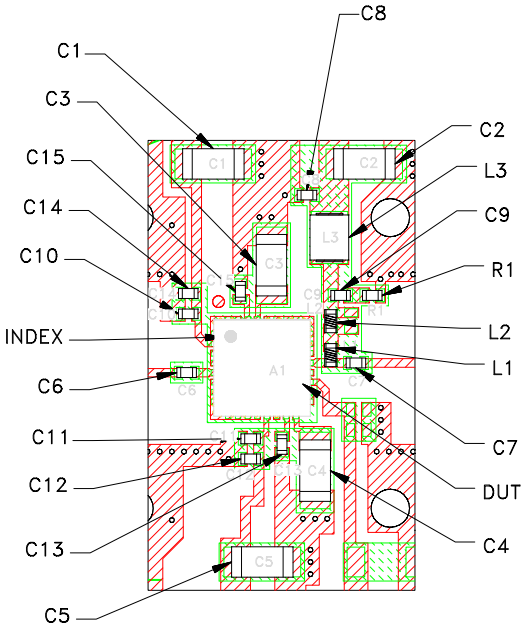
PL, DG1677-10, TB-PMA5-63-2WC+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-789	OR

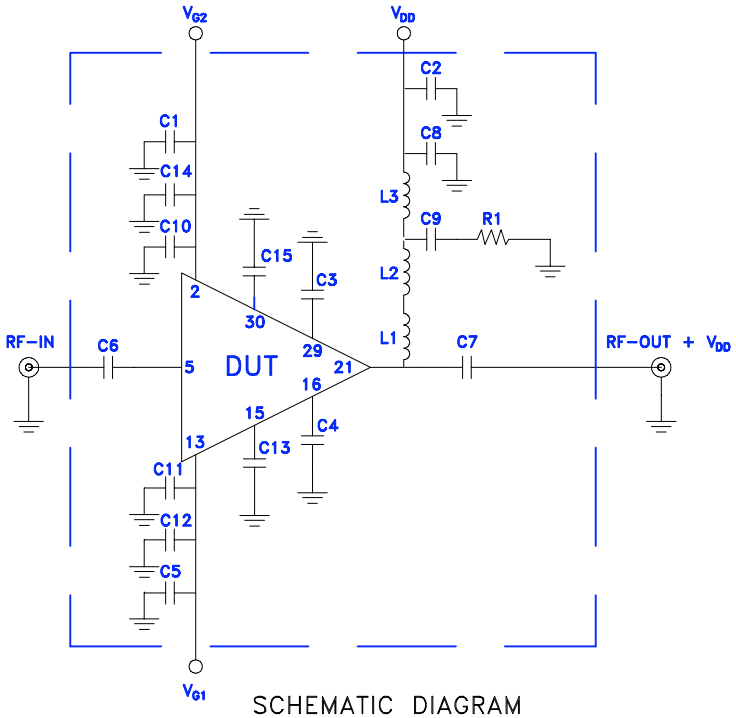
FILE:	SCALE:	SHEET:
98PL789	5:1	1 OF 1

Evaluation Board and Circuit





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



SCHEMATIC DIAGRAM

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:

1. 2.92mm Female Connectors.
2. PCB Material: Roger RO4003C or equivalent, Dielectric constant=3.38, Thickness=0.0087±.001 inch

Mini-Circuits®

Mini-Circuits

Environmental Specifications **ENV08T1**

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 or -55° to 105° C or -40° to 105° C or -40° to 95° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° Ambient Environment	Individual Model Data Sheet
HTOL	1000 hours at 125°C	MIL-STD-883, Method 1005, Condition B
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

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
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215