

Low Noise, High Gain

# Monolithic Amplifier Die

## PMA3-63GLN-D+

50Ω 1.8 to 6.0 GHz

### The Big Deal

- Flat gain over wideband
- Low noise figure, 0.6 dB typ.
- High Gain, up to 29.7 dB typ.



### Product Overview

The PMA3-63GLN-D+ is a PHEMT based wideband, low noise MMIC amplifier die with a unique combination of low noise, high gain and IP3 over wideband making it ideal for sensitive, high-dynamic-range S-band receiver applications. This design operates on a single 5V supply, is well matched for 50Ω.

### Key Features

Feature	Advantages
Low noise, 0.6 dB at 2.5 GHz	Enables lower system noise figure performance.
Wide bandwidth with flat gain • ±1.6 dB over 2.5 to 5 GHz	Enables a single amplifier to be used in many wideband applications including defense, instrumentation and more.
High Gain, 29.7 dB at 2.5 GHz	Enables signal amplification without the need for multiple gain stage. Thus minimize effect of subsequent stages on noise figure.
High IP3 • +28.6 dBm at 2.5 GHz • +14.8 dBm at 2.5 GHz	Combination of low noise and high IP3 makes this MMIC amplifier ideal for use in low noise receiver front end (RFE) as it gives the user advantages of sensitivity and two-tone IM performance at both ends of the dynamic range.
Unpackaged die	Enables user to integrate it directly into hybrids.



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## PMA3-63GLN-D+

50Ω 1.8 to 6.0 GHz

### Product Features

- Low Noise figure, 0.6 dB typ.
- High IP3, 28.6 dBm typ.
- Excellent Gain flatness, ±1.6 dB over 2.5 to 5 GHz
- High Gain, 29.7 dB typ.

### Typical Applications

- 5G
- WiFi
- WLAN
- UMTS
- LTE
- WiMAX
- S-band Radar
- C-band Satcom

### General Description

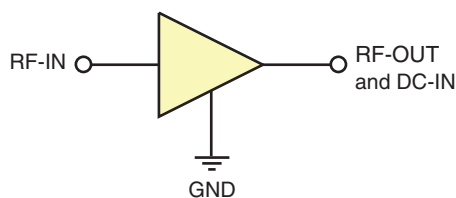
The PMA3-63GLN-D+ is a PHEMT based wideband, low noise MMIC amplifier die with a unique combination of low noise, high gain & IP3 over wideband making it ideal for sensitive, high-dynamic-range S-band receiver applications. This design operates on a single 5V supply, is well matched for 50Ω.



**+RoHS Compliant**  
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

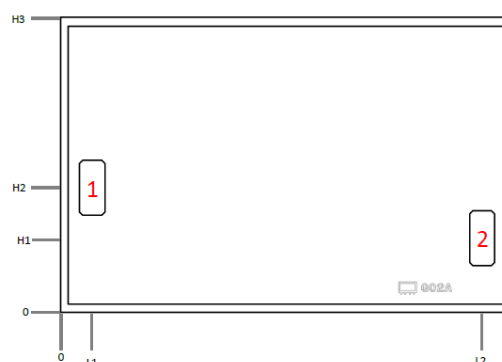
Ordering Information: Refer to Last Page

### Simplified Schematic and Pad description



Pad#	Function
1	RF-IN
2	RF-OUT and DC-IN
Bottom of Die	GND

### Bonding Pad Position



Dimensions in μm, Typical

L1	L2	L3	H1	H2	H3
81.5	1074	1150	187	315.5	750
Bond pad size		Thickness		Die size	
65.0 x 140.0		100		1150.0 X 750.0	

**Electrical Specifications<sup>1</sup> at 25°C and 5V, unless noted otherwise**

Parameter	Condition (GHz)	$V_{DD}=5.0V$			Units
		Min.	Typ.	Max.	
Frequency Range		1.8		6.0	GHz
Noise Figure	1.8		0.8		dB
	2.5		0.6		
	3.5		0.7		
	5		0.9		
	6		1.1		
Gain	1.8		31.7		dB
	2.5		29.7		
	3.5		27.9		
	5		26.5		
	6		24.9		
Input Return Loss	1.8		7		dB
	2.5		10		
	3.5		11		
	5		10		
	6		12		
Output Return Loss	1.8		10		dB
	2.5		10		
	3.5		10		
	5		16		
	6		22		
Output Power at 1dB Compression	1.8		15.2		dBm
	2.5		14.8		
	3.5		14.1		
	5		11.5		
	6		10.7		
Output IP3 <sup>3</sup>	1.8		28.8		dBm
	2.5		28.6		
	3.5		26.6		
	5		23.4		
	6		22.3		
Device Operating Voltage ( $V_{DD}$ )			5.0		V
Device Operating Current ( $I_{DD}$ )		—	69	80	mA
Device Current Variation vs. Temperature <sup>2</sup>			-26.9		$\mu A/^{\circ}C$
Device Current Variation vs. Voltage			0.006		mA/mV
Thermal Resistance, junction-to-ground lead			57.3		$^{\circ}C/W$

1. Measured on Mini-Circuits Characterization test board with tested board loss being deducted. Die is packaged in 3x3 mm, 12-lead MCL package and soldered on TB-PMA3-63GLN+. See Characterization Test Circuit (Fig. 1)

2. (Current at 85°C - Current at -45°C)/130

3. Tested at Pout=0 dBm/tone

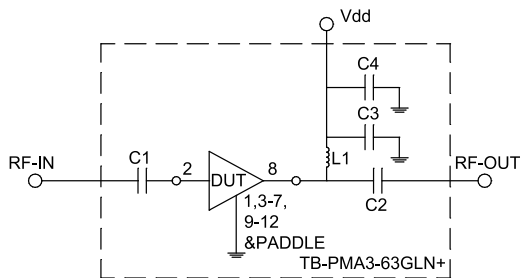
**Absolute Maximum Ratings<sup>4</sup>**

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Junction Temperature	150°C
Total Power Dissipation	1.0W
Input Power (CW), $V_d=5V$	+29 dBm (5 minutes max.) +10 dBm (continuous)
DC Voltage	8.5V

4. Permanent damage may occur if any of these limits are exceeded.

Electrical maximum ratings are not intended for continuous normal operation.

Characterization Test Circuit



Component	Size	Value	P/N	Manufacturer
C1	0402	22pF	GRM1555C1H220JA01	Murata
C2	0402	22pF	GRM1555C1H220JA01	Murata
C3	0402	100pF	GRM1555C1H101JA01	Murata
C4	1206	22uF	GRM31CR61H106KA12	Murata
L1	0402	10nH	LQG15HSIONJD2	Murata

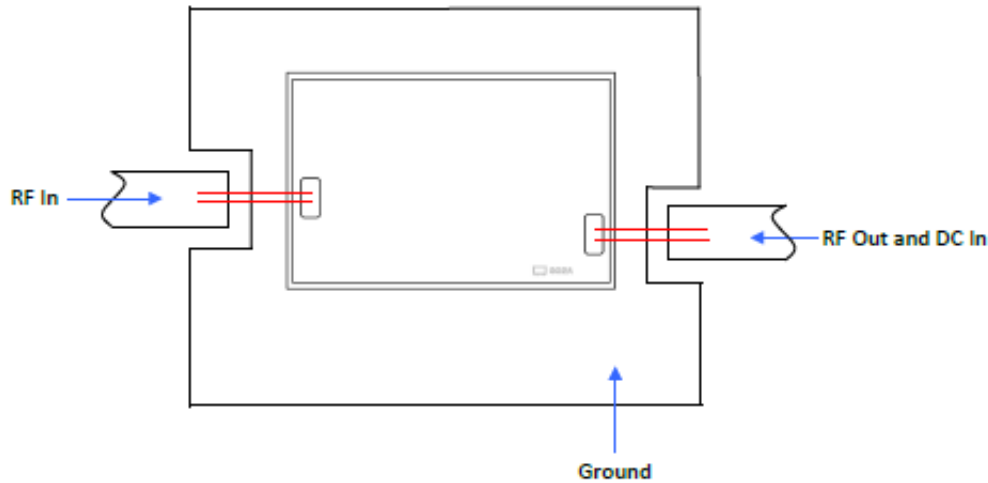
Fig 1. Application and Characterization Circuit

Note: This block diagram is used for characterization. (Die is packaged in 3x3mm, 12-lead MCLP package and soldered on Mini-Circuits Characterization test board TB-PMA3-63GLN+) Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:

1. Gain and Return loss: Pin= -35dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.

## Assembly Diagram



## Assembly and Handling Procedure

- 1. Storage**  
Dice should be stored in a dry nitrogen purged desiccators or equivalent.
- 2. ESD**  
MMIC PHEMT amplifier dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be opened in clean room conditions at an appropriately grounded anti-static workstation. Devices need careful handling using correctly designed collets, vacuum pickup tips or sharp antistatic tweezers to deter ESD damage to dice.
- 3. Die Attach**  
The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are DieMat DM6030HK-PT/H579 or Ablestik 84-1LMISR4. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total die periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. It is recommended to use antistatic die pick up tools only.
- 4. Wire Bonding**  
Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the dice gold bond pads. Thermosonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1 mil diameter. Bonds must be made from the bond pads on the die to the package or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.

<b>Additional Detailed Technical Information</b> <i>additional information is available on our dash board.</i>		
<b>Performance Data</b>	Data Table	
	Swept Graphs	
	S-Parameter (S2P Files) Data Set with and without port extension(.zip file)	
<b>Case Style</b>	Die	
<b>Die Ordering and packaging information</b>	Quantity, Package Small, Gel - Pak: 5,10,50,100 KGD* Medium†, Partial wafer: KGD*<1575 Large†, Full Wafer	Model No. PMA3-63GLN-DG+ PMA3-63GLN-DP+ PMA3-63GLN-DF+
	†Available upon request contact sales representative  Refer to <a href="#">AN-60-067</a>	
<b>Environmental Ratings</b>	ENV80	

\*Known Good Dice ("KGD") means that the dice in question have been subjected to Mini-Circuits DC test performance criteria and measurement instructions and that the parametric data of such dice fall within a predefined range. While DC testing is not definitive, it does help to provide a higher degree of confidence that dice are capable of meeting typical RF electrical parameters specified by Mini-Circuits.

## ESD Rating\*\*

Human Body Model (HBM): Class 1C (pass <2000V) in accordance with ANSI/ESD STM 5.1 - 2001

\*\* Tested in industry standard MCLP 3 x 3 mm, 12-lead package.

## Additional Notes

- 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.
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## 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: Vd = 5.00V, Id = 68mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1000	28.96	52.36	3.95	17.77	4.35	1.38	24.83	13.28	1.87
1100	30.17	49.93	3.89	17.90	2.90	1.37	25.66	14.05	1.58
1200	31.06	50.25	3.97	15.68	2.72	1.35	26.81	14.41	1.40
1300	31.61	48.01	4.16	13.71	2.08	1.29	27.06	14.57	1.22
1400	31.91	45.64	4.51	12.28	1.61	1.22	27.77	14.88	1.11
1500	32.01	44.30	4.92	11.39	1.44	1.15	28.17	15.25	0.99
1600	31.99	45.26	5.39	10.76	1.64	1.12	28.44	15.44	0.90
1700	31.81	43.30	5.93	10.41	1.43	1.05	28.49	15.28	0.84
1800	31.62	43.07	6.47	10.21	1.45	1.03	28.73	15.17	0.78
1900	31.36	41.74	6.97	10.16	1.37	0.98	28.97	15.32	0.72
2000	31.11	43.55	7.44	10.07	1.68	1.00	29.10	15.39	0.68
2100	30.83	42.11	7.87	10.09	1.53	0.97	29.28	15.06	0.69
2200	30.55	40.72	8.40	10.15	1.41	0.93	29.09	15.15	0.61
2300	30.29	40.83	8.76	10.16	1.48	0.93	29.42	15.50	0.63
2400	30.02	40.80	9.14	10.25	1.53	0.93	28.97	15.30	0.62
2500	29.76	39.29	9.49	10.29	1.39	0.89	28.67	14.82	0.59
2600	29.52	39.60	9.75	10.35	1.46	0.90	28.17	14.76	0.63
2700	29.27	40.10	10.02	10.37	1.58	0.91	28.06	14.98	0.65
2800	29.07	39.90	10.23	10.38	1.59	0.90	27.77	14.79	0.64
2900	28.86	39.09	10.41	10.41	1.50	0.89	28.04	15.00	0.65
3000	28.68	39.60	10.65	10.47	1.62	0.90	27.72	14.82	0.71
3100	28.52	39.17	10.80	10.43	1.58	0.89	27.41	14.57	0.64
3200	28.37	39.19	10.95	10.51	1.61	0.90	27.13	14.12	0.69
3300	28.24	38.70	10.98	10.50	1.56	0.89	27.28	14.28	0.65
3400	28.14	39.21	10.98	10.54	1.65	0.90	26.89	14.27	0.68
3500	28.01	39.04	10.92	10.62	1.65	0.90	26.42	14.12	0.69
3600	27.89	38.83	10.90	10.66	1.63	0.90	26.42	13.75	0.73
3700	27.76	38.34	10.87	10.81	1.59	0.90	26.11	13.60	0.70
3800	27.66	39.69	10.75	10.88	1.82	0.93	25.68	13.19	0.71
3900	27.56	39.09	10.71	11.08	1.74	0.92	25.62	12.97	0.68
4000	27.47	38.47	10.63	11.28	1.66	0.92	25.60	13.25	0.73
4100	27.38	39.42	10.59	11.48	1.84	0.94	25.04	12.88	0.73
4200	27.30	38.73	10.45	11.68	1.73	0.93	24.80	12.64	0.75
4300	27.23	39.19	10.30	11.99	1.83	0.95	24.91	12.64	0.76
4400	27.13	38.61	10.27	12.38	1.75	0.95	24.32	12.30	0.78
4500	27.06	39.32	10.12	12.78	1.90	0.97	23.97	12.00	0.81
4600	26.96	38.69	10.11	13.26	1.81	0.97	23.95	12.04	0.82
4700	26.87	39.07	10.08	13.78	1.90	0.98	23.35	11.51	0.83
4800	26.77	38.87	10.09	14.39	1.90	0.99	23.77	11.58	0.83
4900	26.68	38.81	10.01	15.19	1.91	0.99	23.62	11.53	0.84
5000	26.54	38.49	9.99	16.13	1.89	1.00	23.36	11.52	0.88
5100	26.43	38.54	10.04	17.13	1.93	1.01	22.68	11.05	0.92
5200	26.29	38.60	10.09	18.57	1.98	1.01	23.28	11.53	0.94
5300	26.13	38.46	10.21	20.04	1.99	1.02	22.98	11.30	0.94
5400	25.96	39.01	10.37	21.54	2.16	1.03	22.39	10.99	0.97
5500	25.78	39.05	10.55	23.14	2.22	1.03	21.78	10.34	1.00
5600	25.62	38.94	10.70	25.36	2.24	1.03	22.53	10.89	1.04
5700	25.42	38.40	10.96	27.43	2.17	1.02	22.31	10.62	1.05
5800	25.21	38.89	11.29	26.02	2.34	1.03	22.20	10.63	1.11
5900	24.99	38.67	11.60	23.91	2.35	1.02	22.50	10.92	1.10
6000	24.75	39.74	12.01	21.44	2.71	1.02	22.08	10.67	1.16

Note: Test data of Die packaged in industry standard, 3x3mm, 12-lead MCLP package

## 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: Vd = 4.75V, Id = 65mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1000	28.74	50.70	3.90	17.77	3.66	1.38	24.22	12.91	1.89
1100	29.97	50.83	3.85	17.93	3.25	1.38	25.04	13.57	1.58
1200	30.87	48.66	3.90	15.68	2.29	1.36	26.18	14.05	1.40
1300	31.44	48.74	4.09	13.70	2.22	1.31	26.35	14.20	1.24
1400	31.75	46.32	4.40	12.28	1.74	1.23	27.05	14.41	1.13
1500	31.86	46.05	4.83	11.37	1.71	1.19	27.58	14.79	1.00
1600	31.84	44.25	5.27	10.78	1.48	1.12	27.92	14.86	0.90
1700	31.67	43.61	5.82	10.43	1.45	1.08	27.87	14.82	0.84
1800	31.48	42.19	6.35	10.26	1.33	1.03	28.03	14.71	0.80
1900	31.23	41.45	6.82	10.19	1.35	0.98	28.40	14.86	0.72
2000	30.98	41.19	7.35	10.16	1.35	0.97	28.34	14.93	0.68
2100	30.70	40.73	7.76	10.16	1.36	0.95	28.70	14.60	0.68
2200	30.42	41.15	8.28	10.27	1.49	0.95	28.30	14.69	0.62
2300	30.16	39.75	8.58	10.26	1.35	0.92	28.46	14.92	0.63
2400	29.90	40.26	9.01	10.37	1.45	0.93	28.11	14.72	0.59
2500	29.63	39.64	9.39	10.41	1.45	0.91	27.65	14.36	0.61
2600	29.40	40.60	9.61	10.49	1.62	0.93	27.28	14.30	0.64
2700	29.14	40.11	9.92	10.53	1.60	0.92	27.63	14.51	0.65
2800	28.93	39.52	10.13	10.50	1.55	0.91	26.60	14.21	0.66
2900	28.72	39.05	10.34	10.55	1.53	0.89	27.40	14.42	0.66
3000	28.55	39.44	10.54	10.65	1.62	0.90	27.16	14.35	0.71
3100	28.39	39.00	10.71	10.62	1.58	0.90	26.71	13.98	0.65
3200	28.23	39.31	10.87	10.66	1.65	0.91	26.44	13.65	0.71
3300	28.10	39.28	10.90	10.66	1.67	0.91	26.66	13.81	0.65
3400	27.99	38.84	10.90	10.71	1.62	0.90	26.11	13.79	0.70
3500	27.87	38.81	10.93	10.82	1.65	0.90	25.79	13.52	0.71
3600	27.74	39.14	10.83	10.83	1.71	0.91	25.71	13.15	0.73
3700	27.61	39.29	10.82	10.98	1.77	0.92	25.43	13.00	0.70
3800	27.51	38.78	10.72	11.13	1.70	0.92	24.96	12.82	0.71
3900	27.40	38.95	10.68	11.32	1.75	0.92	24.71	12.48	0.70
4000	27.32	39.49	10.62	11.48	1.86	0.94	24.81	12.75	0.72
4100	27.22	38.48	10.57	11.71	1.71	0.93	24.44	12.39	0.75
4200	27.14	38.71	10.44	11.91	1.76	0.94	24.18	12.14	0.76
4300	27.06	39.16	10.31	12.21	1.86	0.96	24.22	12.03	0.77
4400	26.95	38.55	10.30	12.58	1.79	0.95	23.72	11.69	0.80
4500	26.88	38.93	10.18	12.98	1.87	0.96	23.27	11.50	0.79
4600	26.78	38.76	10.14	13.51	1.87	0.97	23.35	11.53	0.81
4700	26.69	39.02	10.14	14.02	1.94	0.98	22.78	11.11	0.83
4800	26.58	38.37	10.10	14.67	1.85	0.98	23.20	11.08	0.83
4900	26.48	38.66	10.08	15.47	1.93	0.99	23.04	11.02	0.87
5000	26.34	39.25	10.09	16.30	2.09	1.01	22.80	11.01	0.89
5100	26.22	38.77	10.16	17.41	2.02	1.01	22.13	10.42	0.91
5200	26.07	38.79	10.22	18.66	2.07	1.02	22.72	11.00	0.98
5300	25.91	38.84	10.34	20.09	2.13	1.02	22.45	10.88	0.98
5400	25.74	39.05	10.52	21.46	2.22	1.03	21.88	10.47	0.98
5500	25.56	38.33	10.74	22.82	2.12	1.02	21.39	9.81	1.01
5600	25.39	38.99	10.91	24.15	2.31	1.03	22.08	10.48	1.02
5700	25.19	38.67	11.10	25.43	2.29	1.02	21.80	10.31	1.06
5800	24.98	39.03	11.44	24.24	2.44	1.02	21.68	10.10	1.12
5900	24.76	39.06	11.83	22.45	2.51	1.02	22.00	10.61	1.12
6000	24.52	39.01	12.24	20.62	2.57	1.01	21.69	10.24	1.17

Note: Test data of Die packaged in industry standard, 3x3mm, 12-lead MCLP package





## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

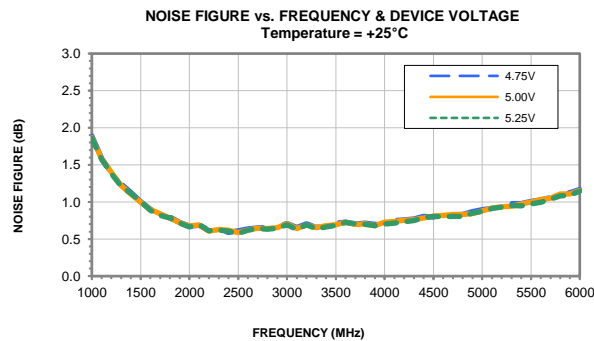
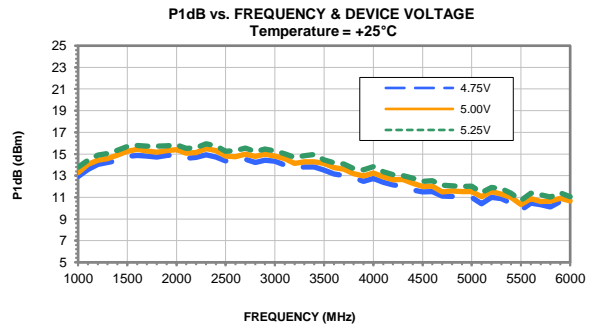
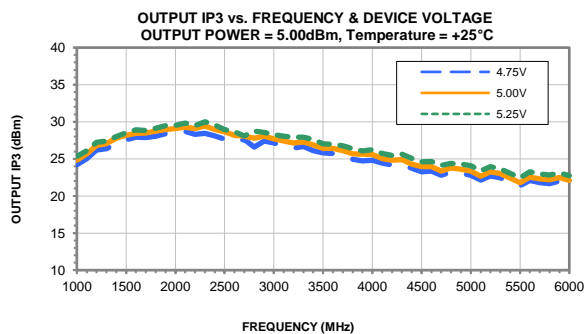
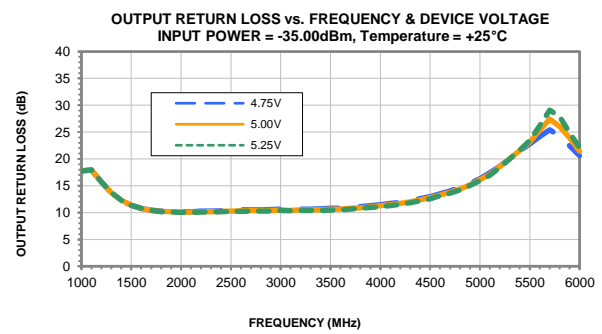
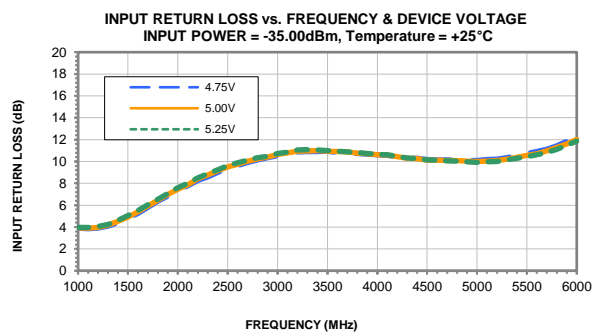
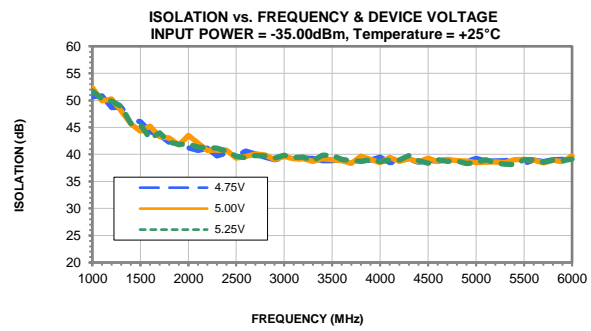
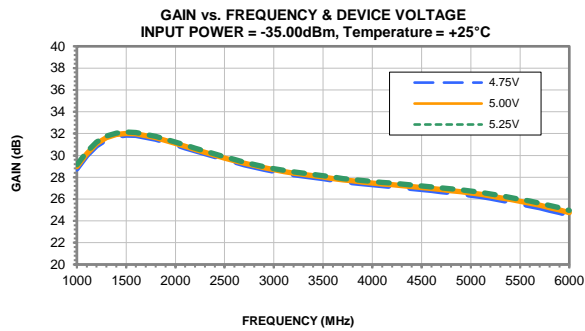
TEST CONDITIONS: Vd = 5.25V, Id = 70mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1000	29.14	51.73	3.97	17.70	4.00	1.37	25.35	13.77	1.86
1100	30.35	50.27	3.96	17.95	2.97	1.37	26.11	14.43	1.57
1200	31.22	49.83	4.05	15.71	2.59	1.34	27.22	14.89	1.38
1300	31.77	48.89	4.24	13.74	2.25	1.29	27.42	15.03	1.21
1400	32.05	45.72	4.60	12.29	1.60	1.22	28.01	15.34	1.11
1500	32.14	45.44	5.04	11.36	1.60	1.16	28.52	15.71	1.00
1600	32.11	42.90	5.51	10.82	1.31	1.08	28.91	15.78	0.89
1700	31.93	43.98	6.05	10.42	1.50	1.07	28.82	15.73	0.82
1800	31.73	42.29	6.56	10.17	1.36	1.00	29.13	15.72	0.78
1900	31.47	41.88	7.08	10.08	1.36	0.98	29.46	15.77	0.72
2000	31.22	41.92	7.59	10.03	1.44	0.96	29.52	15.83	0.66
2100	30.94	41.32	8.01	10.02	1.42	0.94	29.82	15.50	0.69
2200	30.66	41.24	8.51	10.11	1.46	0.94	29.47	15.59	0.61
2300	30.39	41.15	8.89	10.10	1.52	0.93	30.01	15.94	0.62
2400	30.13	40.60	9.23	10.17	1.48	0.92	29.57	15.74	0.61
2500	29.87	39.70	9.62	10.23	1.42	0.89	28.94	15.26	0.57
2600	29.64	39.40	9.90	10.24	1.43	0.88	28.64	15.31	0.62
2700	29.38	39.80	10.13	10.27	1.52	0.90	28.07	15.54	0.64
2800	29.18	39.72	10.34	10.28	1.54	0.90	28.75	15.23	0.63
2900	28.97	39.30	10.48	10.30	1.52	0.89	28.57	15.45	0.64
3000	28.80	39.83	10.72	10.38	1.63	0.90	28.28	15.27	0.69
3100	28.64	39.42	10.85	10.33	1.59	0.89	28.07	15.01	0.63
3200	28.48	39.47	11.04	10.37	1.63	0.90	27.92	14.69	0.69
3300	28.36	38.86	11.07	10.38	1.57	0.88	27.94	14.85	0.64
3400	28.26	39.87	11.05	10.42	1.74	0.90	27.62	14.96	0.66
3500	28.13	39.88	11.01	10.48	1.76	0.91	27.01	14.46	0.68
3600	28.01	39.08	10.93	10.52	1.65	0.90	26.96	14.20	0.72
3700	27.89	38.86	10.88	10.65	1.64	0.90	26.75	14.06	0.71
3800	27.79	38.73	10.81	10.82	1.64	0.90	26.38	13.65	0.70
3900	27.69	39.03	10.74	10.94	1.70	0.92	26.08	13.55	0.68
4000	27.61	38.69	10.65	11.10	1.67	0.91	26.24	13.83	0.70
4100	27.52	38.96	10.60	11.32	1.74	0.92	25.71	13.35	0.72
4200	27.45	38.96	10.47	11.53	1.74	0.93	25.47	13.11	0.73
4300	27.38	39.78	10.31	11.84	1.90	0.96	25.62	13.01	0.75
4400	27.28	38.85	10.25	12.18	1.76	0.95	25.07	12.78	0.79
4500	27.21	38.37	10.16	12.57	1.70	0.95	24.60	12.48	0.81
4600	27.11	39.03	10.11	13.12	1.84	0.97	24.65	12.52	0.80
4700	27.03	38.73	10.06	13.62	1.81	0.97	24.13	12.12	0.81
4800	26.93	38.78	10.02	14.22	1.84	0.98	24.39	12.06	0.81
4900	26.84	38.32	9.96	15.04	1.79	0.98	24.31	12.02	0.85
5000	26.72	38.48	9.92	15.97	1.84	1.00	24.07	12.02	0.87
5100	26.61	39.04	9.98	16.95	1.98	1.01	23.38	11.44	0.91
5200	26.47	38.42	10.00	18.38	1.90	1.01	23.95	11.92	0.93
5300	26.31	38.17	10.14	19.97	1.90	1.01	23.67	11.80	0.95
5400	26.14	38.13	10.28	21.62	1.93	1.01	23.04	11.38	0.95
5500	25.97	39.01	10.45	23.49	2.16	1.03	22.44	10.71	0.97
5600	25.81	39.03	10.61	26.19	2.21	1.03	23.25	11.38	1.00
5700	25.62	38.53	10.83	29.09	2.15	1.03	22.98	11.24	1.04
5800	25.41	38.97	11.11	27.87	2.31	1.03	22.83	11.02	1.08
5900	25.19	38.86	11.50	24.91	2.34	1.02	23.10	11.42	1.09
6000	24.95	39.16	11.86	22.09	2.48	1.02	22.73	11.05	1.15

Note: Test data of Die packaged in industry standard, 3x3mm, 12-lead MCLP package



## Typical Performance Curves



Note: Test data of Die packaged in industry standard, 3x3mm, 12-lead MCLP package



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 -40° to 105° C or -55° to 105° C or -45° to 105° C Ambient Environment	Refer to Individual Model Data Sheet
Storage Environment (Die)	-65° to 150°C	Individual Model Data Sheet
Storage Environment(Packaging)	-40° to 70°C and 40 to 60% humidity (In Factory Shipped Package)	