

Surface Mount

# Monolithic Amplifier

DC-2 GHz

## Product Features

- Wideband, DC to 2 GHz
- Cascadable ceramic package
- Internally Matched to 50 Ohms
- Low noise figure, 1.9 dB typ.
- Excellent repeatability
- Aqueous washable

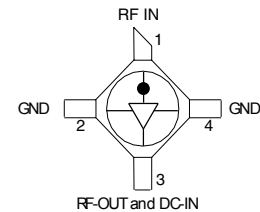
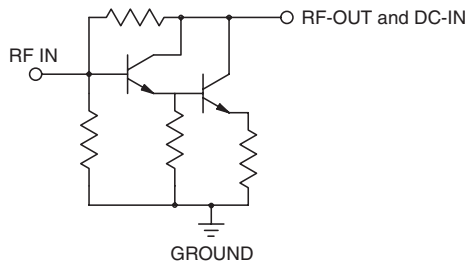
## Typical Applications

- Cellular
- UHF/VHF
- Communication system
- Transmission receivers

## General Description

RAM-6A+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in a ceramic surface-mount package. RAM-6A+ uses Darlington configuration and is fabricated using GaAs technology.

### simplified schematic and pin description



Function	Pin Number	Description
RF IN	1	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
RF-OUT and DC-IN	3	RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit".
GND	2,4	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

- a. The RAM-6A+ part number is a potential replacement for the MSA-0636 part number based on a comparison of data and characterization information available for the MSA-0636 versus similar data and the measured performance of RAM-6A+; the final determination of whether this RAM-6A+ part number is suitable for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components, and environmental conditions and stresses.
- b. The MSA-0636 part number is used for identification and comparison purposes only.
- c. Avago Technologies is a registered trademark of Avago Technologies and is in no way affiliated with Mini-Circuits.
- d. Data in Table for the MSA-0636 was taken from Avago Technologies published datasheet April 12, 2007 and is used solely for informational purposes to identify MSA-0636

### 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/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



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Generic photo used for illustration purposes only

## RAM-6A+

CASE STYLE: AF190

+RoHS Compliant

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

Electrical Specifications at 25°C and 16mA, unless noted

Parameter	Min.	Typ.	Max.	Units
Frequency Range*	DC		2	GHz
Gain	f=0.1 GHz	—	21.3	dB
	f=1 GHz	—	19.7	
	f=2 GHz	15.4 <sup>2</sup>	17.1	
Input Return Loss <sup>3</sup>	f=DC to 2 GHz		20	dB
Output Return Loss <sup>3</sup>	f=DC to 2 GHz		20	dB
Output Power @ 1 dB compression	f=0.5 GHz		+3.2	dBm
Output IP3	f=0.5 GHz		+17.3	dBm
Noise Figure	f=0.5 GHz		2.3	dB
Recommended Device Operating Current		16		mA
Device Operating Voltage		3.5		V
Device Voltage Variation vs. Temperature at 16 mA		-2.8		mV/°C
Device Voltage Variation vs. Current at 25°C		4.4		mV/mA
Thermal Resistance, junction-to-case <sup>1</sup>		100		°C/W

\*Guaranteed specification DC-2 GHz. Low frequency cut off determined by external coupling capacitors.

Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature	-54°C to 100°C
Storage Temperature	-65°C to 150°C
Operating Current	50mA
Power Dissipation	200mW
Input Power	13dBm

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

These ratings are not intended for continuous normal operation.

<sup>1</sup>Case is defined as ground leads.

<sup>2</sup>Full temperature range.

<sup>3</sup>RAM-6A+ conditionally stable, source and load VSWR<5:1 required.

Potentially unstable with very high VSWR terminations.

Notes

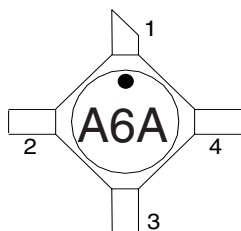
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C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



Product Marking



Markings in addition to model number designation may appear for internal quality control purposes.

Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Performance data, graphs, s-parameter data set (.zip file)

Case Style: AF190

Ceramic surface-mount, .083 body diameter

Tape & Reel: F14

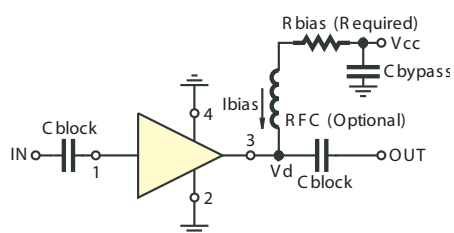
7" inch reels with 20, 50, 100, 200, 500, 1000 devices.

Suggested Layout for PCB Design: PL-254

Evaluation Board: TB-414-6A+

Environmental Ratings: ENV08T6

Recommended Application Circuit



Test Board includes case, connectors, and components (in bold) soldered to PCB

R BIAS	
Vcc	"1%" Res. Values (ohms) for Optimum Biasing
6	154
7	215
8	280
9	340
10	402
11	464
12	536
13	590
14	665

ESD Rating

Human Body Model (HBM): Class 1C (1000 to <2000V) in accordance with ANSI/ESD STM 5.1 - 2001  
 Machine Model (MM): Class M2 (100V to <200V) in accordance with ANSI/ESD STM 5.2 - 1999

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## 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: Vd = 3.53V, Id = 16.00mA @ 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)			(dBm)	(dBm)	(dB)
20.0	21.29	23.44	31.90	33.97	1.03	0.39	18.71	3.56	2.45
30.0	21.26	23.41	33.09	34.48	1.03	0.39	17.74	3.26	2.33
40.0	21.29	23.41	33.91	35.94	1.03	0.39	19.25	2.69	2.31
50.0	21.25	23.38	34.79	37.36	1.03	0.39	19.19	3.34	2.32
60.0	21.25	23.42	35.20	38.11	1.03	0.39	19.73	3.59	1.99
70.0	21.25	23.41	35.49	38.02	1.03	0.39	16.93	3.33	2.21
80.0	21.23	23.41	35.57	37.34	1.03	0.39	16.70	3.34	2.22
90.0	21.23	23.41	35.40	39.07	1.03	0.40	18.05	3.24	2.29
100.0	21.22	23.41	34.95	39.80	1.03	0.40	17.40	2.81	2.20
200.0	21.14	23.44	34.60	38.08	1.03	0.41	17.66	2.94	2.24
300.0	21.04	23.43	34.00	36.39	1.04	0.42	17.71	2.83	2.24
400.0	20.93	23.43	33.38	34.83	1.04	0.44	18.43	3.28	2.16
500.0	20.78	23.40	32.90	32.69	1.04	0.45	17.48	3.06	2.19
600.0	20.61	23.38	32.38	31.06	1.05	0.47	16.80	2.65	2.33
700.0	20.42	23.36	31.52	30.15	1.06	0.49	16.78	2.62	2.28
800.0	20.22	23.31	30.72	29.27	1.06	0.51	16.63	2.86	2.26
900.0	20.02	23.26	30.20	28.27	1.07	0.53	16.81	2.92	2.31
1000.0	19.79	23.22	29.47	26.85	1.08	0.55	16.25	2.90	2.33
1100.0	19.56	23.17	28.54	26.12	1.08	0.57	16.35	2.50	2.39
1200.0	19.32	23.11	27.99	25.59	1.09	0.58	16.69	2.61	2.35
1300.0	19.07	23.07	27.38	25.04	1.10	0.60	16.66	2.52	2.43
1400.0	18.84	22.99	26.37	24.44	1.11	0.62	16.66	2.44	2.43
1500.0	18.59	22.93	25.42	23.89	1.12	0.63	16.67	2.57	2.45
1600.0	18.34	22.85	24.51	23.44	1.13	0.65	17.69	3.02	2.39
1700.0	18.09	22.77	23.75	22.98	1.14	0.66	16.95	2.24	2.43
1800.0	17.85	22.70	22.92	22.62	1.15	0.68	17.54	2.64	2.49
1900.0	17.58	22.63	22.16	22.32	1.16	0.69	17.97	2.57	2.44
2000.0	17.36	22.53	21.39	22.05	1.16	0.70	18.08	2.81	2.41
2100.0	17.11	22.46	20.60	21.83	1.17	0.72	18.29	3.34	2.48
2200.0	16.88	22.38	19.86	21.56	1.18	0.73	16.93	2.62	2.46
2300.0	16.65	22.27	19.22	21.38	1.19	0.74	17.71	3.17	2.47
2500.0	16.19	22.14	18.04	21.06	1.21	0.76	17.85	3.40	2.47
3000.0	15.09	21.77	15.81	20.78	1.26	0.81	18.41	3.97	2.62
3500.0	14.16	21.26	14.05	20.11	1.28	0.85	18.08	3.80	2.55
4000.0	13.26	21.09	12.76	19.82	1.34	0.89	17.86	3.75	2.71
4500.0	12.60	20.62	11.76	19.19	1.34	0.91	17.83	3.69	2.79
5000.0	11.94	20.10	11.13	18.86	1.35	0.92	17.31	3.81	2.80
5500.0	11.55	19.67	10.34	17.63	1.31	0.94	16.92	3.69	2.93
6000.0	11.15	19.01	9.93	17.02	1.27	0.93	16.12	3.20	2.98

## 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 = 3.51V, Id = 12.00mA @ 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)
20.0	19.11	21.85	13.90	14.06	1.04	0.41	17.62	-1.36	2.54
30.0	19.06	21.84	14.02	14.37	1.04	0.42	20.41	-1.62	2.44
40.0	19.09	21.84	14.14	14.63	1.04	0.42	18.88	-2.05	2.38
50.0	19.11	21.90	14.28	14.90	1.04	0.43	21.79	-1.56	2.83
60.0	19.08	21.87	14.26	14.88	1.04	0.43	25.13	-1.37	2.12
70.0	19.06	21.84	14.27	14.88	1.04	0.43	16.59	-1.53	2.28
80.0	19.05	21.84	14.29	14.90	1.04	0.43	19.00	-1.56	2.33
90.0	19.04	21.83	14.13	14.73	1.04	0.43	18.19	-1.62	2.43
100.0	19.03	21.84	14.15	14.68	1.04	0.43	16.87	-2.00	2.31
200.0	18.98	21.86	14.24	14.81	1.04	0.44	16.55	-1.93	2.41
300.0	18.91	21.86	14.29	14.92	1.04	0.45	16.45	-1.89	2.33
400.0	18.83	21.86	14.36	15.04	1.05	0.46	16.73	-1.61	2.19
500.0	18.74	21.84	14.46	15.20	1.05	0.47	15.69	-1.79	2.25
600.0	18.61	21.83	14.53	15.35	1.05	0.49	15.32	-2.19	2.41
700.0	18.47	21.81	14.58	15.45	1.05	0.51	15.08	-2.20	2.41
800.0	18.33	21.79	14.60	15.58	1.06	0.52	14.92	-2.02	2.33
900.0	18.18	21.76	14.65	15.74	1.06	0.54	14.82	-2.02	2.38
1000.0	18.02	21.73	14.70	15.90	1.07	0.56	13.76	-2.05	2.45
1100.0	17.84	21.72	14.65	15.98	1.07	0.58	14.40	-2.35	2.50
1200.0	17.66	21.68	14.66	16.05	1.08	0.60	14.58	-2.35	2.44
1300.0	17.46	21.67	14.68	16.14	1.08	0.62	14.27	-2.42	2.52
1400.0	17.28	21.62	14.59	16.18	1.09	0.63	14.56	-2.48	2.52
1500.0	17.08	21.60	14.48	16.20	1.09	0.65	14.40	-2.40	2.55
1600.0	16.87	21.56	14.37	16.19	1.10	0.67	14.90	-1.95	2.53
1700.0	16.67	21.53	14.24	16.17	1.11	0.68	14.73	-2.67	2.54
1800.0	16.47	21.51	14.08	16.17	1.12	0.70	15.03	-2.29	2.58
1900.0	16.25	21.50	13.92	16.10	1.13	0.72	15.39	-2.34	2.52
2000.0	16.06	21.43	13.73	16.03	1.13	0.73	15.32	-2.15	2.50
2100.0	15.85	21.42	13.52	15.92	1.14	0.75	15.62	-1.63	2.55
2200.0	15.65	21.39	13.31	15.81	1.15	0.76	14.81	-2.24	2.55
2300.0	15.45	21.35	13.08	15.72	1.16	0.77	15.23	-1.72	2.55
2500.0	15.04	21.32	12.69	15.55	1.18	0.80	15.94	-1.45	2.56
3000.0	14.05	21.27	11.82	15.18	1.24	0.86	16.43	-0.82	2.70
3500.0	13.20	21.04	10.99	14.69	1.28	0.90	16.83	-0.71	2.60
4000.0	12.37	21.19	10.33	14.52	1.37	0.94	17.57	-0.63	2.87
4500.0	11.78	20.98	9.77	14.35	1.39	0.96	18.57	-0.46	2.91
5000.0	11.18	20.63	9.45	14.40	1.41	0.98	17.60	0.05	2.88
5500.0	10.82	20.45	8.95	13.88	1.40	1.00	16.18	0.33	3.03
6000.0	10.45	19.95	8.81	13.64	1.37	0.99	14.82	0.15	3.08

## 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 = 3.54V, Id = 20.00mA @ 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)
20.0	22.37	24.56	20.55	19.01	1.03	0.38	20.83	6.85	2.37
30.0	22.36	24.49	20.69	18.50	1.03	0.36	19.59	6.53	2.32
40.0	22.39	24.51	20.82	18.07	1.03	0.36	20.81	5.93	2.29
50.0	22.31	24.59	20.95	17.64	1.03	0.38	21.85	6.70	2.00
60.0	22.33	24.48	20.96	17.68	1.03	0.36	21.85	6.92	1.97
70.0	22.34	24.51	20.96	17.67	1.03	0.37	19.01	6.65	2.20
80.0	22.32	24.52	20.98	17.64	1.03	0.37	18.82	6.64	2.22
90.0	22.32	24.51	21.05	17.88	1.03	0.37	20.25	6.54	2.25
100.0	22.30	24.52	21.05	17.97	1.03	0.37	20.08	6.05	2.17
200.0	22.22	24.53	21.11	17.99	1.03	0.39	20.37	6.20	2.16
300.0	22.09	24.52	21.28	18.04	1.03	0.40	20.31	6.07	2.10
400.0	21.96	24.49	21.49	18.09	1.04	0.42	21.15	6.60	2.16
500.0	21.78	24.44	21.67	18.09	1.04	0.44	20.29	6.39	2.18
600.0	21.59	24.39	21.96	18.14	1.05	0.46	19.42	5.90	2.27
700.0	21.36	24.33	22.37	18.30	1.05	0.48	19.50	5.86	2.22
800.0	21.13	24.25	23.01	18.45	1.06	0.50	19.38	6.16	2.25
900.0	20.89	24.17	23.61	18.50	1.06	0.51	19.63	6.21	2.28
1000.0	20.63	24.08	24.38	18.51	1.07	0.53	19.20	6.20	2.32
1100.0	20.37	24.00	25.23	18.61	1.08	0.55	19.12	5.73	2.31
1200.0	20.10	23.90	26.17	18.75	1.09	0.57	19.52	5.88	2.33
1300.0	19.82	23.82	27.21	18.87	1.10	0.59	19.63	5.77	2.39
1400.0	19.56	23.70	28.83	18.96	1.11	0.60	19.58	5.67	2.41
1500.0	19.28	23.59	30.49	19.06	1.12	0.62	19.67	5.81	2.42
1600.0	19.01	23.48	32.43	19.19	1.12	0.63	20.63	6.24	2.41
1700.0	18.74	23.36	33.79	19.27	1.13	0.64	19.88	5.42	2.45
1800.0	18.48	23.24	33.91	19.33	1.14	0.66	20.43	5.83	2.48
1900.0	18.19	23.14	32.62	19.49	1.15	0.67	20.83	5.74	2.38
2000.0	17.95	23.00	30.49	19.66	1.16	0.68	21.04	5.98	2.39
2100.0	17.69	22.88	28.40	19.83	1.17	0.69	21.08	6.48	2.45
2200.0	17.44	22.77	26.58	19.97	1.18	0.70	19.93	5.75	2.41
2300.0	17.19	22.63	25.12	20.14	1.18	0.71	20.55	6.26	2.43
2500.0	16.71	22.43	22.72	20.47	1.20	0.74	20.50	6.44	2.49
3000.0	15.56	21.90	18.64	21.79	1.25	0.78	20.44	6.86	2.57
3500.0	14.61	21.24	16.00	22.55	1.26	0.81	19.65	6.36	2.57
4000.0	13.67	20.93	14.19	23.26	1.31	0.85	19.04	6.06	2.72
4500.0	12.99	20.36	12.86	22.61	1.30	0.87	18.81	5.92	2.77
5000.0	12.31	19.78	12.01	21.99	1.30	0.89	17.99	5.61	2.74
5500.0	11.90	19.27	11.04	20.05	1.26	0.90	17.63	5.25	2.97
6000.0	11.49	18.58	10.50	19.13	1.22	0.89	16.89	4.75	2.89

## 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 = 3.74V, Id = 16.00mA @ Temperature = -55°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)
20.0	22.13	24.21	24.94	23.78	1.03	0.37	17.23	3.50	1.88
30.0	22.10	24.16	25.23	22.79	1.03	0.37	16.36	3.13	1.82
40.0	22.14	24.15	25.58	21.94	1.03	0.36	17.63	2.57	1.79
50.0	22.06	24.30	25.91	21.10	1.03	0.39	18.18	3.24	1.80
60.0	22.08	24.23	26.26	21.26	1.03	0.38	18.34	3.48	1.50
70.0	22.08	24.16	26.39	21.33	1.03	0.37	15.85	3.25	1.65
80.0	22.07	24.15	26.58	21.36	1.03	0.37	15.70	3.25	1.69
90.0	22.07	24.16	26.72	21.80	1.03	0.37	17.10	3.13	1.74
100.0	22.06	24.16	26.90	22.00	1.03	0.37	16.72	2.68	1.67
200.0	21.99	24.15	27.03	22.02	1.03	0.38	16.95	2.83	1.70
300.0	21.89	24.13	26.26	21.42	1.03	0.39	16.96	2.76	1.66
400.0	21.78	24.11	26.56	21.47	1.03	0.40	17.65	3.20	1.57
500.0	21.63	24.07	26.77	21.45	1.04	0.42	16.89	3.07	1.64
600.0	21.46	24.03	26.79	21.17	1.04	0.44	16.15	2.59	1.70
700.0	21.26	23.97	27.00	21.22	1.05	0.45	16.14	2.57	1.70
800.0	21.06	23.90	27.50	21.20	1.05	0.47	16.01	2.89	1.66
900.0	20.85	23.83	28.09	21.04	1.06	0.49	16.23	2.91	1.69
1000.0	20.62	23.75	29.01	20.88	1.06	0.50	15.94	2.95	1.72
1100.0	20.38	23.67	29.58	20.68	1.07	0.52	15.81	2.50	1.74
1200.0	20.13	23.59	30.19	20.52	1.08	0.54	16.19	2.70	1.70
1300.0	19.88	23.51	31.65	20.54	1.08	0.56	16.21	2.53	1.77
1400.0	19.64	23.40	33.81	20.48	1.09	0.57	16.18	2.50	1.78
1500.0	19.39	23.31	36.32	20.33	1.10	0.58	16.26	2.60	1.80
1600.0	19.15	23.19	41.55	20.27	1.10	0.60	17.34	3.05	1.73
1700.0	18.89	23.10	50.80	20.25	1.11	0.61	16.54	2.25	1.77
1800.0	18.65	22.99	49.79	20.21	1.12	0.62	17.11	2.70	1.81
1900.0	18.39	22.87	39.80	20.29	1.13	0.64	17.60	2.60	1.75
2000.0	18.16	22.75	34.34	20.35	1.13	0.65	17.78	2.88	1.72
2100.0	17.92	22.65	31.12	20.40	1.14	0.66	18.01	3.44	1.78
2200.0	17.68	22.54	28.85	20.34	1.15	0.67	16.48	2.63	1.73
2300.0	17.45	22.40	27.24	20.31	1.15	0.68	17.36	3.20	1.77
2500.0	17.00	22.20	24.35	20.79	1.17	0.70	17.47	3.40	1.77
3000.0	15.93	21.67	19.80	22.23	1.20	0.75	18.34	4.14	1.87
3500.0	15.04	21.02	17.10	23.20	1.21	0.77	18.21	3.92	1.78
4000.0	14.22	20.51	15.34	23.79	1.23	0.80	18.21	4.12	1.93
4500.0	13.47	20.04	13.93	23.16	1.24	0.82	18.11	4.04	1.97
5000.0	12.90	19.53	13.35	22.01	1.24	0.83	18.02	4.32	1.93
5500.0	12.53	18.94	12.53	20.35	1.20	0.83	18.12	4.43	2.10
6000.0	12.07	18.35	11.98	20.03	1.19	0.83	17.64	4.12	2.03

## 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 = 3.72V, Id = 12.00mA @ Temperature = -55°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)			(dBm)	(dBm)	(dB)
20.0	20.15	22.49	18.17	18.22	1.03	0.39	16.10	-1.68	1.98
30.0	20.10	22.47	18.05	18.69	1.03	0.40	17.17	-2.01	1.83
40.0	20.13	22.47	17.91	19.07	1.03	0.40	18.91	-2.46	1.81
50.0	20.13	22.51	17.79	19.44	1.03	0.41	16.88	-1.94	2.33
60.0	20.11	22.45	17.69	19.36	1.03	0.40	18.92	-1.77	1.61
70.0	20.09	22.48	17.69	19.30	1.03	0.41	14.53	-1.96	1.69
80.0	20.08	22.47	17.65	19.28	1.03	0.41	14.94	-1.96	1.72
90.0	20.07	22.47	17.54	18.91	1.03	0.41	15.90	-2.05	1.86
100.0	20.07	22.47	17.50	18.77	1.03	0.41	14.62	-2.40	1.73
200.0	20.02	22.48	17.57	18.88	1.03	0.41	14.62	-2.30	1.86
300.0	19.96	22.47	17.95	19.42	1.04	0.42	14.88	-2.30	1.73
400.0	19.88	22.45	17.99	19.51	1.04	0.43	15.24	-2.02	1.54
500.0	19.78	22.43	18.05	19.64	1.04	0.44	14.18	-2.19	1.62
600.0	19.66	22.41	18.26	20.00	1.04	0.46	13.85	-2.52	1.81
700.0	19.51	22.38	18.33	20.06	1.05	0.48	13.62	-2.54	1.79
800.0	19.37	22.34	18.43	20.22	1.05	0.49	13.32	-2.38	1.71
900.0	19.21	22.30	18.55	20.50	1.05	0.50	13.39	-2.33	1.73
1000.0	19.04	22.26	18.57	20.62	1.06	0.52	12.50	-2.38	1.77
1100.0	18.86	22.23	18.64	20.72	1.06	0.54	12.95	-2.70	1.84
1200.0	18.67	22.17	18.79	20.83	1.07	0.56	13.17	-2.57	1.80
1300.0	18.47	22.15	18.75	20.84	1.08	0.58	12.93	-2.69	1.83
1400.0	18.28	22.09	18.61	20.75	1.08	0.59	13.13	-2.75	1.82
1500.0	18.08	22.05	18.53	20.65	1.09	0.61	13.00	-2.63	1.89
1600.0	17.87	22.00	18.31	20.53	1.09	0.62	13.55	-2.19	1.85
1700.0	17.66	21.95	18.07	20.33	1.10	0.64	13.31	-2.91	1.84
1800.0	17.45	21.90	17.86	20.15	1.11	0.65	13.51	-2.55	1.85
1900.0	17.23	21.85	17.61	19.93	1.11	0.67	13.89	-2.62	1.82
2000.0	17.03	21.78	17.27	19.77	1.12	0.68	13.84	-2.40	1.80
2100.0	16.82	21.73	16.93	19.58	1.13	0.70	14.11	-1.86	1.84
2200.0	16.62	21.70	16.62	19.33	1.14	0.71	13.22	-2.50	1.81
2300.0	16.41	21.62	16.33	19.06	1.14	0.72	13.64	-2.00	1.86
2500.0	16.00	21.55	15.64	18.53	1.16	0.75	14.12	-1.71	1.78
3000.0	15.03	21.33	14.19	18.04	1.20	0.80	14.71	-1.04	1.92
3500.0	14.20	20.96	13.08	17.32	1.23	0.84	15.05	-1.02	1.79
4000.0	13.45	20.69	12.27	17.15	1.26	0.87	15.65	-0.75	2.06
4500.0	12.76	20.42	11.51	16.83	1.29	0.89	16.50	-0.60	2.02
5000.0	12.23	20.10	11.30	16.64	1.30	0.91	17.21	0.00	1.97
5500.0	11.89	19.66	10.80	15.98	1.27	0.91	17.82	0.60	2.16
6000.0	11.44	19.18	10.57	15.84	1.26	0.91	17.44	0.47	2.12



## 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 = 3.75V, Id = 20.00mA @ Temperature = -55°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)
20.0	23.06	25.35	16.43	15.09	1.03	0.36	20.22	6.90	1.79
30.0	23.04	25.24	16.42	14.74	1.02	0.34	18.88	6.59	1.78
40.0	23.07	25.25	16.45	14.44	1.02	0.33	20.43	5.96	1.78
50.0	22.98	25.48	16.49	14.16	1.03	0.38	21.56	6.72	1.45
60.0	23.01	25.27	16.56	14.22	1.02	0.35	21.27	6.99	1.52
70.0	23.02	25.25	16.57	14.25	1.02	0.34	18.73	6.66	1.66
80.0	23.01	25.25	16.62	14.26	1.02	0.34	18.56	6.67	1.68
90.0	23.01	25.25	16.73	14.45	1.02	0.35	19.97	6.56	1.70
100.0	23.00	25.24	16.83	14.54	1.02	0.35	20.07	6.05	1.67
200.0	22.92	25.24	16.98	14.62	1.03	0.36	20.31	6.23	1.62
300.0	22.79	25.21	16.81	14.44	1.03	0.37	20.20	6.10	1.61
400.0	22.66	25.15	17.03	14.56	1.03	0.38	21.04	6.63	1.59
500.0	22.49	25.08	17.25	14.67	1.03	0.40	20.28	6.50	1.63
600.0	22.28	25.00	17.39	14.68	1.03	0.42	19.36	5.95	1.70
700.0	22.05	24.90	17.66	14.87	1.04	0.44	19.56	5.98	1.66
800.0	21.82	24.78	18.00	15.03	1.04	0.46	19.44	6.27	1.65
900.0	21.58	24.67	18.36	15.11	1.05	0.47	19.75	6.32	1.68
1000.0	21.32	24.55	18.87	15.26	1.05	0.49	19.42	6.35	1.70
1100.0	21.05	24.43	19.24	15.34	1.06	0.51	19.25	5.81	1.72
1200.0	20.78	24.29	19.64	15.44	1.06	0.52	19.64	6.03	1.71
1300.0	20.51	24.17	20.28	15.63	1.07	0.54	19.81	5.88	1.76
1400.0	20.24	24.01	21.03	15.80	1.08	0.55	19.74	5.82	1.77
1500.0	19.97	23.88	21.77	15.92	1.09	0.57	19.84	5.92	1.76
1600.0	19.71	23.73	22.77	16.08	1.09	0.58	20.91	6.35	1.72
1700.0	19.42	23.57	23.82	16.27	1.10	0.59	20.16	5.52	1.78
1800.0	19.17	23.44	24.89	16.44	1.11	0.60	20.76	5.99	1.81
1900.0	18.89	23.28	26.44	16.69	1.11	0.61	21.18	5.86	1.72
2000.0	18.65	23.11	28.55	16.90	1.12	0.62	21.44	6.13	1.75
2100.0	18.39	22.98	31.41	17.11	1.13	0.63	21.57	6.67	1.78
2200.0	18.15	22.84	35.15	17.27	1.13	0.64	20.19	5.84	1.71
2300.0	17.91	22.66	41.63	17.45	1.14	0.65	21.04	6.43	1.72
2500.0	17.43	22.40	40.07	18.26	1.15	0.67	20.98	6.59	1.76
3000.0	16.33	21.72	24.39	20.44	1.18	0.71	21.24	7.25	1.88
3500.0	15.41	20.96	19.75	23.24	1.19	0.73	20.72	6.83	1.77
4000.0	14.56	20.36	17.13	26.07	1.20	0.76	20.22	6.75	1.83
4500.0	13.79	19.82	15.18	27.12	1.21	0.79	19.85	6.59	1.97
5000.0	13.19	19.24	14.44	25.18	1.20	0.79	19.22	6.53	1.93
5500.0	12.81	18.61	13.41	22.78	1.17	0.79	19.01	6.33	2.03
6000.0	12.34	17.99	12.68	22.53	1.15	0.79	18.51	5.88	2.05

## 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 = 3.32V, Id = 16.00mA @ Temperature = +100°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)
20.0	20.50	22.80	23.73	24.09	1.03	0.41	20.59	3.76	3.00
30.0	20.47	22.79	23.44	24.56	1.03	0.41	19.25	3.41	2.94
40.0	20.48	22.80	23.10	24.93	1.03	0.41	21.20	2.94	2.91
50.0	20.51	22.78	22.80	25.34	1.03	0.40	20.30	3.53	2.90
60.0	20.45	22.86	22.90	25.66	1.04	0.42	21.26	3.73	2.54
70.0	20.45	22.79	23.07	25.85	1.04	0.41	18.02	3.50	2.80
80.0	20.44	22.79	23.19	26.03	1.04	0.42	17.74	3.52	2.83
90.0	20.43	22.79	23.18	25.93	1.04	0.42	18.97	3.42	2.88
100.0	20.43	22.80	23.17	25.99	1.04	0.42	18.08	3.02	2.80
200.0	20.34	22.83	23.43	26.65	1.04	0.43	18.46	3.16	2.79
300.0	20.24	22.84	22.73	25.86	1.04	0.45	18.56	3.06	2.82
400.0	20.12	22.85	22.42	25.66	1.05	0.46	19.27	3.42	2.74
500.0	19.97	22.83	22.56	25.92	1.05	0.48	18.21	3.24	2.78
600.0	19.82	22.84	22.39	25.58	1.06	0.50	17.55	2.81	2.90
700.0	19.62	22.82	21.95	25.03	1.06	0.52	17.40	2.74	2.91
800.0	19.42	22.80	21.44	24.68	1.07	0.54	17.30	2.99	2.86
900.0	19.21	22.77	21.09	24.37	1.08	0.56	17.43	3.01	2.91
1000.0	18.99	22.74	20.91	23.66	1.09	0.58	16.67	2.94	2.96
1100.0	18.76	22.72	20.61	23.20	1.10	0.60	16.97	2.60	3.01
1200.0	18.52	22.68	20.08	22.87	1.10	0.62	17.33	2.67	2.98
1300.0	18.27	22.65	19.64	22.47	1.12	0.64	17.12	2.61	3.06
1400.0	18.03	22.60	19.30	22.05	1.13	0.66	17.20	2.47	3.07
1500.0	17.78	22.55	18.93	21.57	1.14	0.67	17.22	2.61	3.11
1600.0	17.55	22.51	18.51	21.22	1.15	0.69	18.13	3.08	3.07
1700.0	17.29	22.46	18.01	20.94	1.16	0.71	17.50	2.31	3.12
1800.0	17.02	22.41	17.61	20.61	1.17	0.73	18.00	2.67	3.17
1900.0	16.78	22.37	17.16	20.40	1.18	0.74	18.40	2.64	3.12
2000.0	16.53	22.30	16.68	20.23	1.19	0.75	18.47	2.84	3.13
2100.0	16.29	22.23	16.21	20.01	1.20	0.77	18.63	3.34	3.15
2200.0	16.05	22.18	15.77	19.71	1.21	0.78	17.55	2.72	3.16
2300.0	15.81	22.12	15.34	19.49	1.22	0.79	18.08	3.21	3.21
2500.0	15.34	21.99	14.65	19.25	1.25	0.82	18.26	3.42	3.25
3000.0	14.21	21.74	13.13	18.56	1.31	0.87	18.34	3.94	3.39
3500.0	13.25	21.40	11.96	17.82	1.35	0.91	17.73	3.67	3.37
4000.0	12.29	21.50	11.06	17.56	1.46	0.95	17.32	3.39	3.56
4500.0	11.56	20.70	10.15	16.70	1.42	0.97	17.13	3.29	3.69
5000.0	10.95	20.60	9.51	16.34	1.46	0.99	16.13	3.07	3.67
5500.0	10.43	20.10	9.02	15.69	1.43	1.01	15.48	2.67	3.89
6000.0	10.11	19.61	8.71	15.06	1.39	1.01	14.46	2.17	3.93

## 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 = 3.30V, Id = 12.00mA @ Temperature = +100°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)
20.0	18.22	21.37	12.46	12.30	1.04	0.43	17.11	-0.82	3.11
30.0	18.19	21.38	12.38	12.36	1.04	0.44	17.70	-1.20	3.08
40.0	18.21	21.40	12.32	12.40	1.04	0.44	17.20	-1.59	3.04
50.0	18.26	21.30	12.29	12.44	1.04	0.42	31.17	-1.00	3.41
60.0	18.19	21.36	12.32	12.51	1.04	0.44	20.16	-0.95	2.76
70.0	18.19	21.37	12.35	12.55	1.04	0.44	17.38	-1.04	2.91
80.0	18.19	21.37	12.38	12.58	1.05	0.44	25.15	-1.08	2.96
90.0	18.18	21.36	12.40	12.56	1.05	0.44	18.99	-1.18	3.01
100.0	18.17	21.37	12.44	12.58	1.05	0.44	18.62	-1.48	2.93
200.0	18.12	21.39	12.58	12.79	1.05	0.46	17.98	-1.44	3.00
300.0	18.04	21.41	12.45	12.72	1.05	0.47	17.19	-1.41	2.95
400.0	17.95	21.42	12.45	12.76	1.05	0.48	17.36	-1.17	2.81
500.0	17.85	21.40	12.58	12.97	1.06	0.50	16.67	-1.38	2.85
600.0	17.74	21.40	12.62	13.07	1.06	0.51	16.16	-1.71	3.07
700.0	17.58	21.40	12.59	13.09	1.06	0.53	15.90	-1.76	3.02
800.0	17.44	21.39	12.52	13.17	1.07	0.55	15.98	-1.66	2.99
900.0	17.29	21.37	12.52	13.30	1.07	0.57	15.73	-1.62	3.04
1000.0	17.12	21.34	12.59	13.40	1.07	0.59	14.68	-1.75	3.08
1100.0	16.95	21.34	12.57	13.46	1.08	0.61	15.38	-2.00	3.12
1200.0	16.77	21.31	12.47	13.52	1.08	0.63	15.50	-2.01	3.10
1300.0	16.57	21.30	12.42	13.58	1.09	0.65	15.16	-2.04	3.17
1400.0	16.38	21.27	12.39	13.63	1.10	0.66	15.52	-2.16	3.17
1500.0	16.18	21.25	12.33	13.67	1.10	0.68	15.40	-2.05	3.25
1600.0	16.01	21.25	12.22	13.72	1.11	0.70	15.89	-1.59	3.20
1700.0	15.78	21.22	12.10	13.76	1.12	0.72	15.71	-2.25	3.20
1800.0	15.56	21.21	12.00	13.76	1.13	0.74	16.10	-1.99	3.25
1900.0	15.36	21.19	11.84	13.78	1.14	0.75	16.41	-2.02	3.22
2000.0	15.15	21.17	11.66	13.79	1.14	0.77	16.38	-1.81	3.21
2100.0	14.95	21.14	11.48	13.80	1.15	0.79	16.67	-1.25	3.27
2200.0	14.75	21.13	11.31	13.74	1.16	0.80	16.00	-1.78	3.28
2300.0	14.54	21.11	11.15	13.69	1.17	0.81	16.42	-1.38	3.29
2500.0	14.12	21.09	10.86	13.68	1.20	0.84	17.16	-1.01	3.33
3000.0	13.12	21.08	10.16	13.54	1.26	0.90	17.29	-0.39	3.49
3500.0	12.25	21.06	9.58	13.25	1.33	0.94	17.06	-0.30	3.44
4000.0	11.36	21.50	9.10	13.23	1.47	0.99	17.26	-0.34	3.63
4500.0	10.69	20.91	8.52	12.87	1.44	1.01	16.76	-0.23	3.78
5000.0	10.13	21.13	8.15	12.81	1.53	1.03	15.40	0.03	3.76
5500.0	9.65	20.85	7.89	12.57	1.53	1.05	14.16	0.02	3.95
6000.0	9.37	20.56	7.77	12.29	1.51	1.05	12.92	-0.32	3.95

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

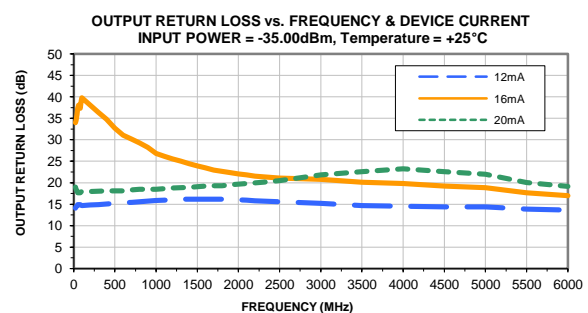
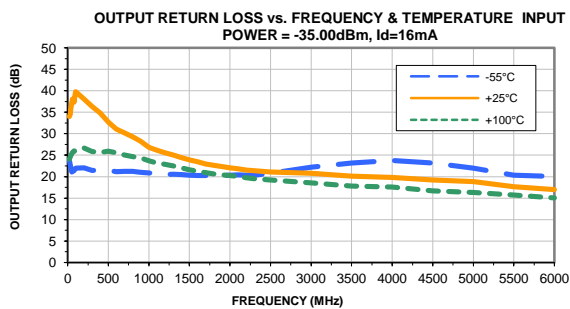
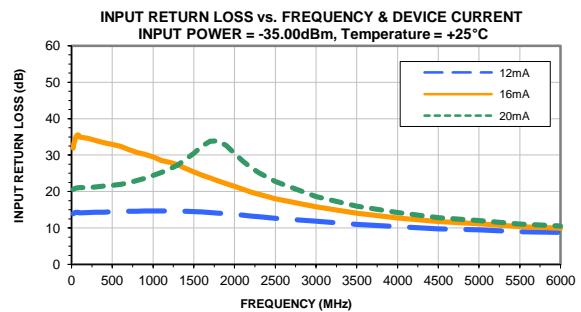
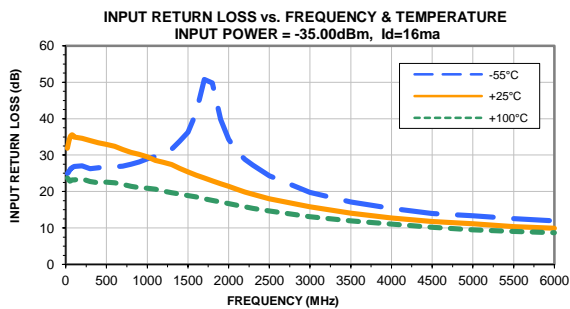
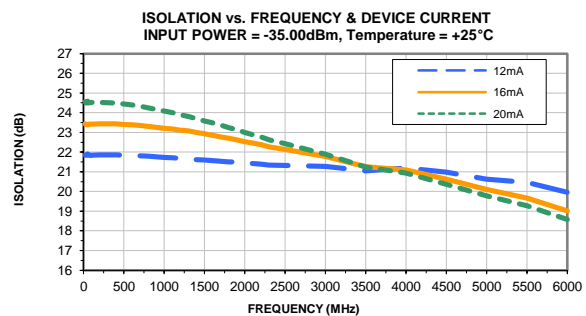
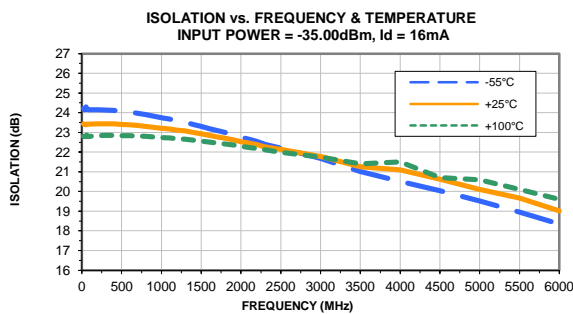
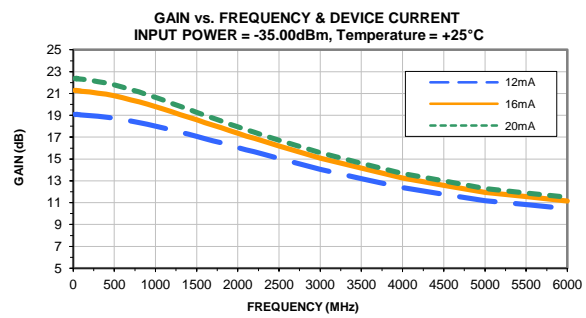
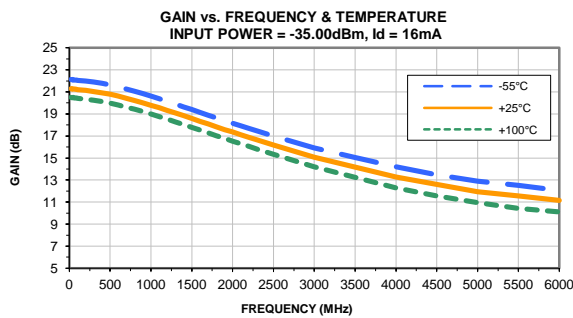
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

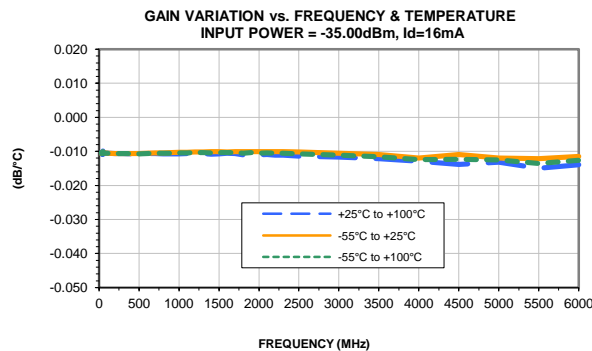
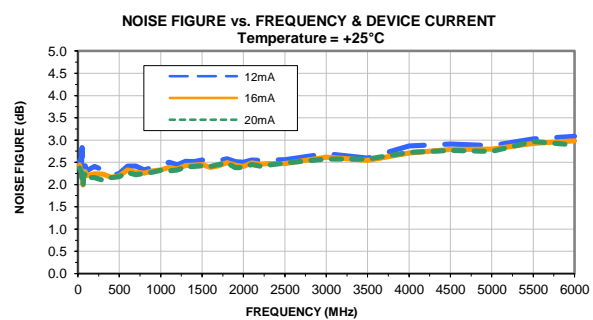
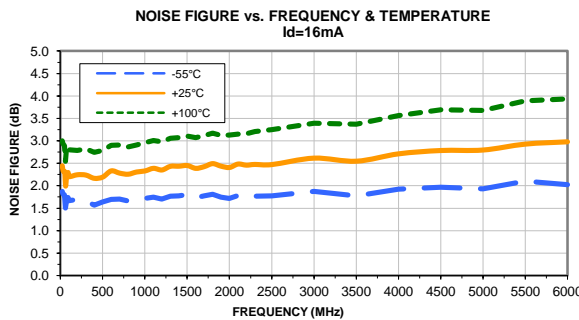
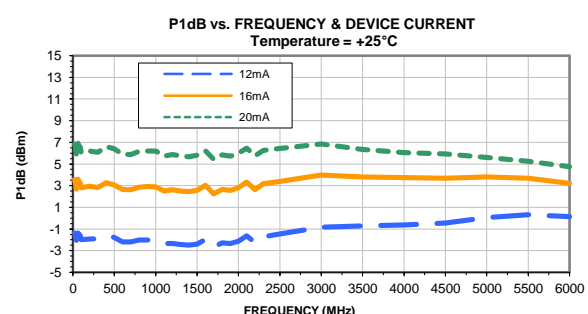
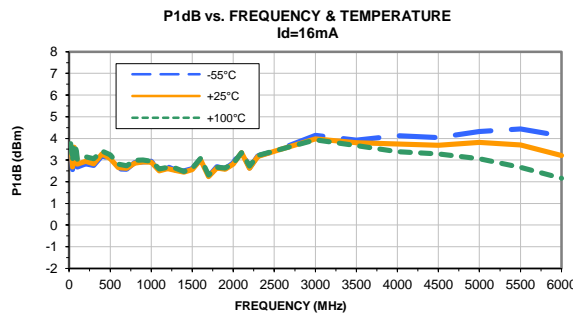
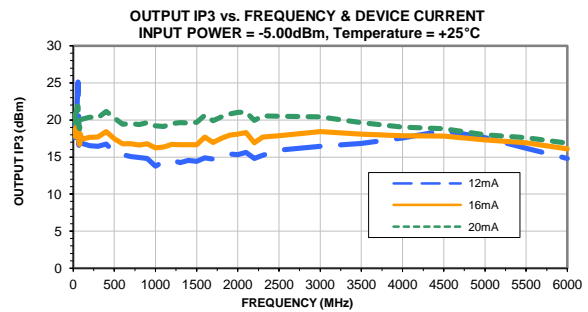
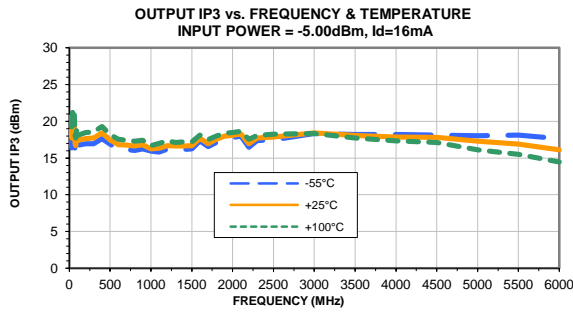
TEST CONDITIONS: Vd = 3.34V, Id = 20.00mA @ Temperature = +100°C

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)
20.0	21.70	23.84	28.75	23.47	1.03	0.38	21.98	6.97	2.89
30.0	21.66	23.84	29.07	23.58	1.03	0.39	20.39	6.62	2.89
40.0	21.67	23.84	29.21	23.76	1.03	0.39	21.75	6.05	2.88
50.0	21.68	23.85	29.27	23.92	1.03	0.39	22.21	6.75	2.56
60.0	21.63	23.89	29.34	23.65	1.03	0.40	22.32	6.98	2.56
70.0	21.63	23.84	28.96	23.48	1.03	0.39	19.57	6.72	2.79
80.0	21.62	23.85	28.71	23.33	1.03	0.39	19.35	6.70	2.80
90.0	21.61	23.85	28.48	23.42	1.03	0.40	20.65	6.60	2.82
100.0	21.60	23.86	28.24	23.38	1.03	0.40	20.28	6.14	2.78
200.0	21.50	23.88	27.87	23.00	1.04	0.41	20.67	6.30	2.74
300.0	21.38	23.87	29.17	23.59	1.04	0.43	20.66	6.15	2.80
400.0	21.25	23.86	29.81	23.80	1.04	0.45	21.42	6.63	2.73
500.0	21.06	23.83	29.31	23.31	1.05	0.47	20.50	6.43	2.74
600.0	20.88	23.82	29.53	23.18	1.06	0.49	19.68	5.91	2.89
700.0	20.65	23.78	30.06	23.47	1.06	0.51	19.75	5.91	2.83
800.0	20.42	23.73	30.74	23.58	1.07	0.53	19.62	6.17	2.91
900.0	20.17	23.68	30.53	23.37	1.08	0.55	19.82	6.16	2.90
1000.0	19.92	23.62	29.85	22.95	1.09	0.57	19.20	6.13	2.92
1100.0	19.66	23.56	29.52	22.82	1.10	0.59	19.35	5.69	2.96
1200.0	19.38	23.50	28.94	22.82	1.11	0.61	19.70	5.79	2.96
1300.0	19.10	23.44	27.93	22.73	1.12	0.63	19.64	5.72	3.03
1400.0	18.83	23.35	27.05	22.53	1.13	0.65	19.63	5.60	3.06
1500.0	18.55	23.26	26.11	22.22	1.14	0.66	19.67	5.73	3.07
1600.0	18.29	23.20	25.15	22.00	1.15	0.68	20.58	6.14	3.06
1700.0	18.01	23.10	24.08	21.89	1.16	0.69	19.96	5.34	3.11
1800.0	17.71	23.02	23.21	21.74	1.18	0.71	20.40	5.69	3.14
1900.0	17.45	22.93	22.17	21.71	1.19	0.72	20.74	5.60	3.08
2000.0	17.19	22.83	21.17	21.73	1.20	0.74	20.81	5.84	3.09
2100.0	16.93	22.73	20.28	21.60	1.21	0.75	20.76	6.28	3.15
2200.0	16.67	22.64	19.48	21.45	1.22	0.76	19.81	5.65	3.16
2300.0	16.42	22.54	18.73	21.42	1.23	0.77	20.20	6.13	3.16
2500.0	15.92	22.35	17.52	21.42	1.25	0.79	20.11	6.30	3.21
3000.0	14.74	21.92	15.16	21.11	1.30	0.84	19.55	6.44	3.37
3500.0	13.74	21.44	13.46	20.65	1.34	0.88	18.65	5.81	3.34
4000.0	12.75	21.37	12.24	20.51	1.42	0.93	17.97	5.33	3.54
4500.0	11.99	20.48	11.08	19.34	1.38	0.94	17.65	5.05	3.66
5000.0	11.37	20.23	10.27	18.72	1.40	0.96	16.63	4.48	3.70
5500.0	10.82	19.68	9.66	17.70	1.37	0.98	16.09	3.98	3.87
6000.0	10.49	19.13	9.21	16.81	1.32	0.98	15.19	3.39	3.88

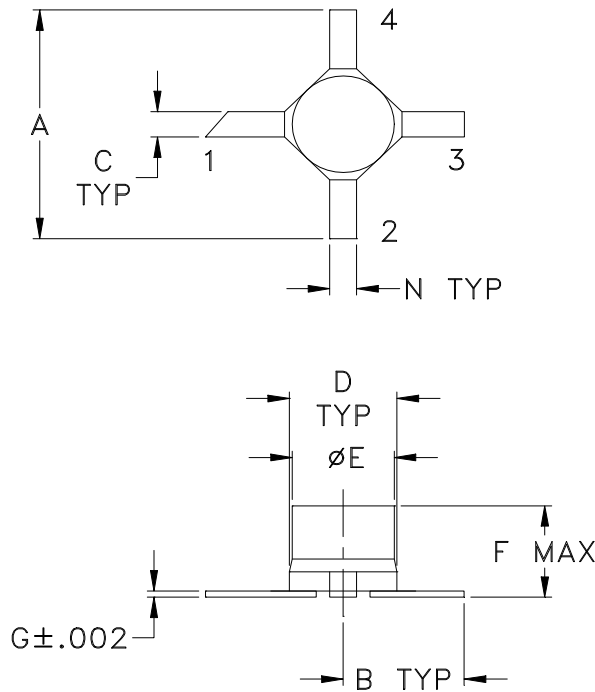
## Typical Performance Curves



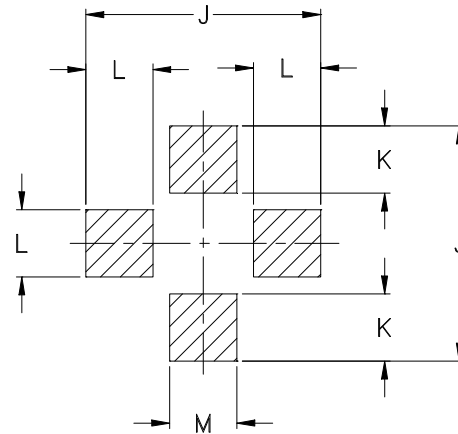
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N	WT. GRAM
AF190	.180 (4.57)	.090 (2.29)	.020 (0.51)	.100 (2.54)	.083 (2.11)	.072 (1.83)	.005 (0.13)	-	.210 (5.33)	.060 (1.52)	.060 (1.52)	.060 (1.52)	.020 (0.51)	.04

Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .03$ ; 3Pl.  $\pm .015$

#### Notes:

- Case material: Ceramic.
- Termination material:  
Nickel-Iron alloy 42.
- Termination finish:  
For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier.  
For RoHS-5 Case Styles: Tin-Lead plate.
- Termination (1):  
Identified by diagonally cut lead.
- Special Tolerances: Termination width  $\pm .005$  inch, termination thickness  $\pm .002$  inch, cap diameter  $\pm .005$  inch.



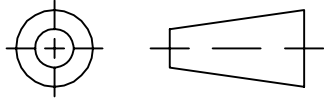
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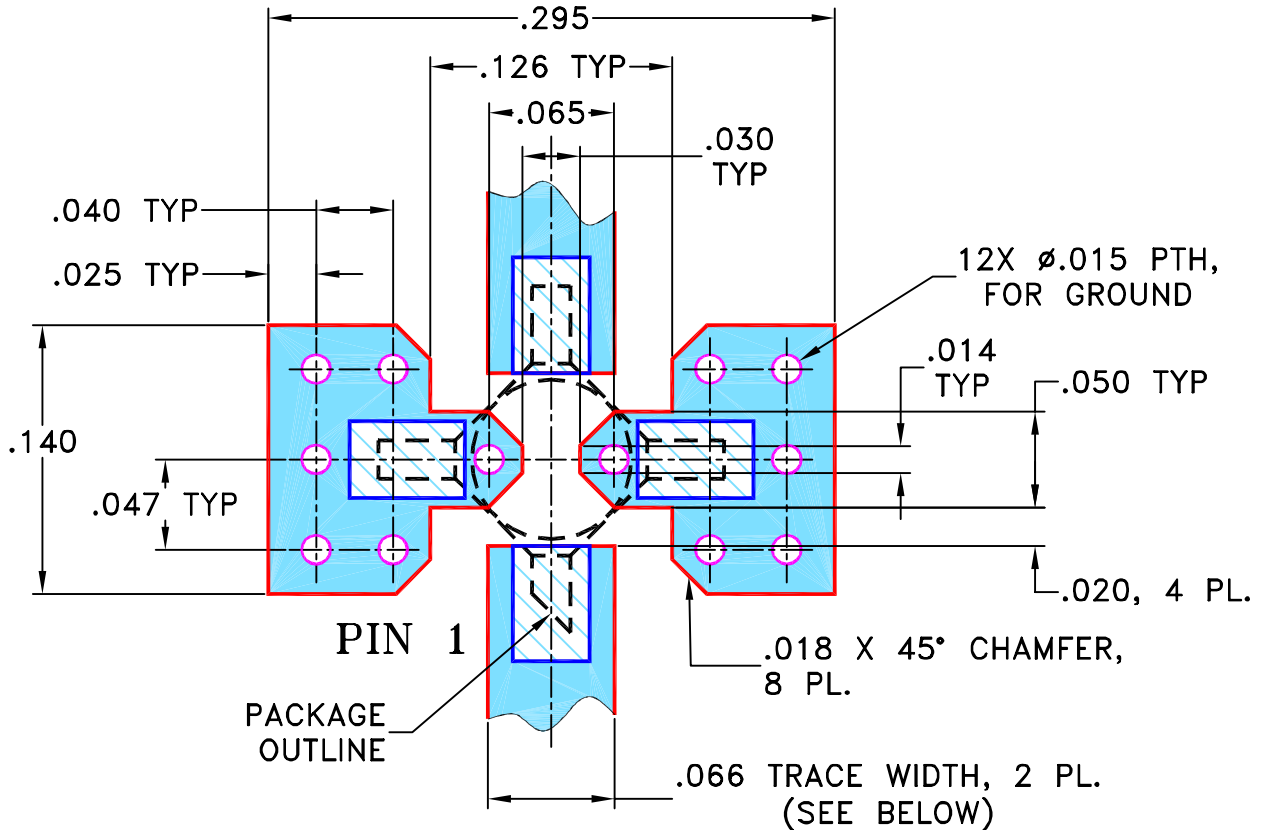
THIRD ANGLE PROJECTION



REVISIONS



REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M108436	NEW RELEASE	11/14/06	PW	IG
A	M108585	UPDATED DRAWING PER TB-414+	11/24/06	PW	MM

SUGGESTED MOUNTING CONFIGURATION FOR AF190 CASE STYLE, "cb" PIN CONNECTION



NOTES:

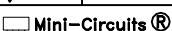
1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
3. IF PCB DESIGN RULES ALLOW, PLACE GROUND VIAS UNDER THE LAND PATTERN FOR BETTER RF PERFORMANCE. OTHERWISE PLACE GROUND VIAS AS CLOSE TO LAND PATTERN AS POSSIBLE.

-  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 PW	11/11/06
TOLERANCES ON:	CHECKED IL	11/14/06
2 PL DECIMALS ±	APPROVED IG	11/14/06
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

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

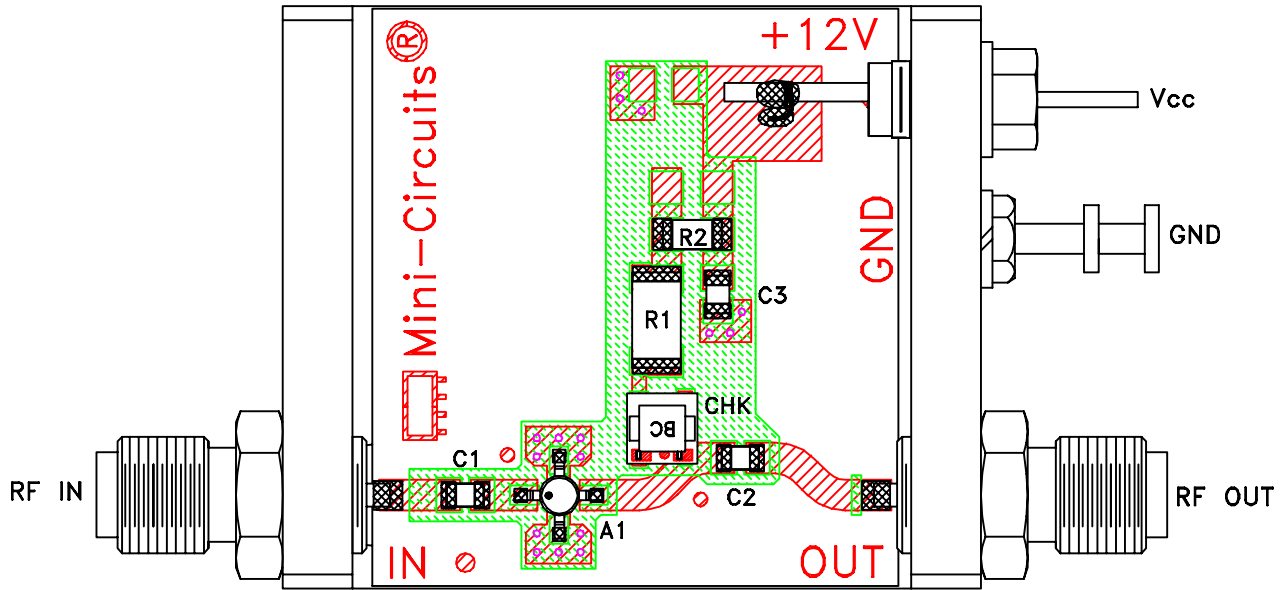
PL, cb, AF190, RAM, TB-414-X+

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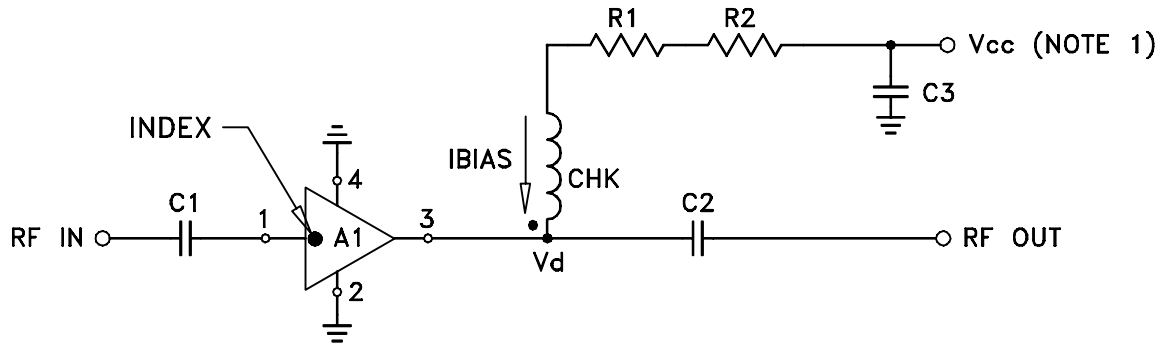
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-254	A
FILE:	98PL254	SCALE: 10:1	SHEET: 1 OF 1



# Evaluation Board and Circuit



TB-414-6A+




COMPONENT	VALUE
A1	RAM-6A(+)
C1 (NOTE 4)	2400 pF
C2 (NOTE 4)	2400 pF
C3 (bypass)	0.1 uF
R1	523 Ohms, 0.75W
R2	8.25 Ohms, 0.25W
CHK	Mini-Circuits TCCH-80+

Schematic Diagram

**NOTE:**

1. Vcc voltage: +12±0.2V.
2. SMA Female connectors.
3. PCB material: Rogers R04350 or equivalent, dielectric constant=3.5, dielectric thickness=.030 inch.
4. Capacitors, C1 & C2 should be free of resonance up to the highest frequency specified.

 **Mini-Circuits®**

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	-54° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-65° to 150° C 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	1500g, 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, 20-2000 Hz, 4 times in each of three perpendicular directions (total 12)	MIL-STD-883, Method 2007, Condition B
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JEDEC-STD-22-B, Method A102
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 Eutectic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020C, 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-020C
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;	MIL-STD-202, Method 215



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Specification	Test/Inspection Condition	Reference/Spec
	distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	