

Low Noise, Wideband, High IP3

Monolithic Amplifier

PMA2-123LN+

50Ω 0.5 to 12 GHz

The Big Deal

- Ultra wideband, 0.5 to 12 GHz
- Flat gain over wideband, 17.6 dB with ± 2.0 dB
- Low noise figure, 2.6 dB at 8 GHz
- High IP3, up to +28 dBm



2mm x 2mm

Product Overview

The PMA2-123LN+ is a PHEMT based wideband, low noise MMIC amplifier with a unique combination of low noise, high IP3, and flat gain over wideband making it ideal for sensitive, high-dynamic-range receiver applications. This design operates on a single 5V or 6V supply, is well matched for 50Ω and comes in a tiny, low profile package (2 x 2 mm, 8 lead MCLP), accommodating dense circuit board layouts.

Key Features

Feature	Advantages
Low noise <ul style="list-style-type: none">• 2.2 dB at 2 GHz• 2.6 dB at 8 GHz	Enables lower system noise figure performance.
High IP3 <ul style="list-style-type: none">• +28 dBm at 2 GHz• +27 dBm at 8 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.
Low operating voltage, 5V/6V.	Achieves high IP3 using low voltage.
2 x 2mm 8-lead MCLP package	Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.
Wide bandwidth with flat gain <ul style="list-style-type: none">• ± 0.3 dB over 0.5 to 2 GHz• ± 0.7 dB over 0.5 to 6 GHz• ± 1.2 dB over 0.5 to 8 GHz• ± 2.0 dB over 0.5 to 12 GHz	Enables usage in wideband applications flattening networks.



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Product Features

- Low Noise figure, 2.6 dB at 8 GHz
- High IP3, 27 dBm typ. at 8 GHz
- Excellent Gain flatness, ± 2.0 dB over 0.5 to 12 GHz at 6V

Typical Applications

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



Generic photo used for illustration purposes only

CASE STYLE: MC1631-1

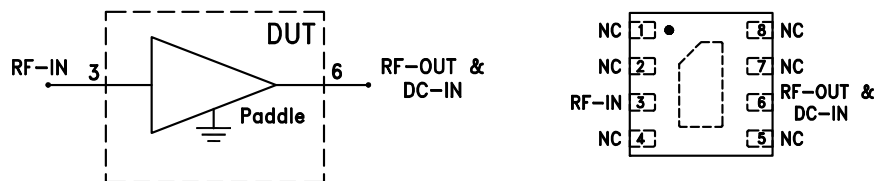
+RoHS Compliant

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

General Description

The PMA2-123LN+ is a PHEMT based wideband, low noise MMIC amplifier with a unique combination of low noise, high IP3, and flat gain over wideband making it ideal for sensitive, high-dynamic-range receiver applications. This design operates on a single 5V or 6V supply, is well matched for 50Ω and comes in a tiny, low profile package (2 x 2 mm, 8 lead MCLP), accommodating dense circuit board layouts.

simplified schematic & pad description



Function	Pad Number	Description (See Figure 2)
RF-IN	3	Connects to RF input via C1
RF-OUT & DC-IN	6	Connects to RF out and V_{DD} via Bias-Tee
Ground	Paddle	Connects to ground
No Connection	1,2,4,5,7,8	Not used internally. Connected to ground on Test Board

Electrical Specifications¹ at 25°C, unless noted

Parameter	Condition (GHz)	V _{DD} =6.0			V _{DD} =5.0			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range		0.5		12.0	0.5		12.0	GHz
Noise Figure	0.5		2.5			2.5		dB
	2.0		2.2			2.1		
	8.0		2.6			2.5		
	10.0		3.0			2.9		
	12.0		3.1			3.0		
Gain	0.5		18.6			17.7		dB
	2.0		19.2			18.3		
	8.0	15.2	16.8	18.5	14.5	16.1	17.8	
	10.0		16.1			15.4		
	12.0		15.3			14.7		
Input Return Loss	0.5		7.0			6.2		dB
	2.0		12.0			10.5		
	8.0		9.8			9.1		
	10.0		9.7			9.1		
	12.0		9.8			9.6		
Output Return Loss	0.5		11.4			9.6		dB
	2.0		14.5			12.4		
	8.0		22.0			19.4		
	10.0		16.5			15.9		
	12.0		9.6			8.9		
Output Power at 1dB Compression ²	0.5		15.2			13.9		dBm
	2.0		15.3			13.9		
	8.0		14.9			13.3		
	10.0		14.9			13.3		
	12.0		14.0			12.5		
Output IP3	0.5		27.4			24.9		dBm
	2.0		28.0			25.1		
	8.0		27.0			24.6		
	10.0		26.8			24.8		
	12.0		26.3			24.8		
Device Operating Voltage (V _{DD})			6.0			5.0		V
Device Operating Current (I _{DD})			68	82		51		mA
Device Current Variation vs. Temperature ³			-11.7			9.3		µA/°C
Device Current Variation vs. Voltage			0.0187			0.0184		mA/mV
Thermal Resistance, junction-to-ground lead			107			107		°C/W

1. Measured on Mini-Circuits Characterization Test Board TB-MB014. See Characterization Test Circuit (Fig. 1)

2. Current increases at P1dB up to 10mA typ. at 5Volts V_{DD}

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

Absolute Maximum Ratings⁴

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Junction Temperature	160
Total Power Dissipation	0.7W
Input Power (CW), V _d =5,6V ⁵	+20 dBm (0.7 - 7.75 GHz) 5 minutes max. +22 dBm (7.75 - 15 GHz) 5 minutes max. +8 dBm (continuous)
DC Voltage	7V

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

Electrical maximum ratings are not intended for continuous normal operation.

5. Measured on Mini-Circuits Test Board, TB-MB014



Characterization Test Circuit

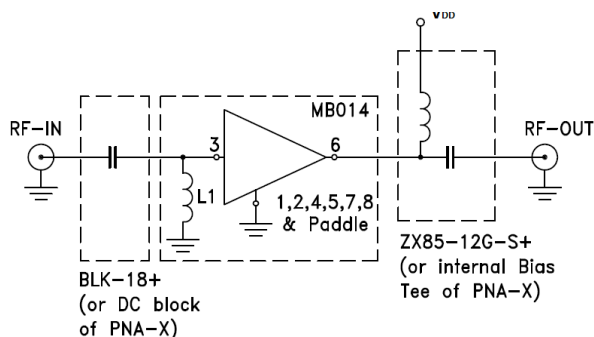


Fig 1. Application and Characterization Circuit
 Note: This block diagram is used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-MB014+) Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

- Conditions:
1. Gain and Return loss: Pin= -25dBm
 2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.

Recommended Application Circuit

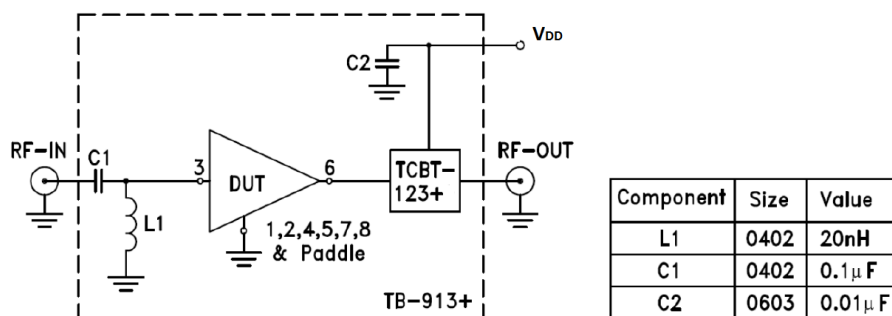


Fig 2. Test board (TB-913+) includes case, connectors and components soldered to PCB. (TB-913+ is a 3-layer PCB. See TB-913+ drawing.)

Product Marking



Marking may contain other features or characters for internal lot control

Additional Detailed Technical Information	
<i>additional information is available on our dash board. To access this information click here</i>	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	MC1631-1 <i>Plastic package, exposed paddle, lead finish: tin silver over nickel</i>
Tape & Reel Standard quantities available on reel	F66 <i>7" reels with 20, 50, 100, 200, 500, 1K or 2K devices</i>
Suggested Layout for PCB Design	PL-490
Evaluation Board	TB-913+
Environmental Ratings	ENV08T1

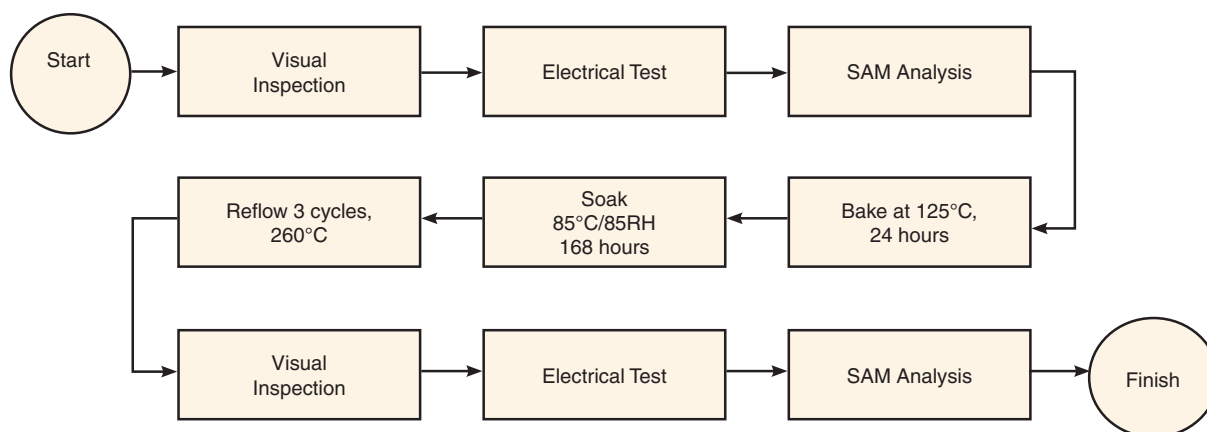
ESD Rating

Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

MSL Test Flow Chart



Additional 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

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 = 5V, Id = 52.96 mA @ Temperature = +25degC

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)
100	6.43	37.91	0.54	6.97	2.19	1.48	28.41	14.23	12.92
200	13.85	30.41	2.00	7.63	1.43	1.23	26.34	13.95	5.26
300	16.33	27.81	3.80	8.94	1.32	1.04	25.78	13.97	3.52
400	17.38	26.62	5.42	10.17	1.27	0.93	26.66	13.98	2.85
500	17.90	26.02	6.75	11.17	1.25	0.87	26.20	14.02	2.57
1000	18.61	24.98	10.40	13.73	1.21	0.76	25.82	14.46	2.14
1500	18.66	24.84	11.49	14.27	1.21	0.74	26.60	14.40	2.06
2000	18.55	24.92	11.48	14.13	1.22	0.75	26.51	14.23	2.09
2500	18.42	25.06	11.28	14.03	1.24	0.76	26.28	14.18	2.05
3000	18.30	25.20	11.25	14.60	1.26	0.79	26.34	14.13	2.05
3500	18.22	25.27	11.43	15.94	1.28	0.81	26.42	14.28	2.11
4000	18.11	25.38	11.40	17.41	1.31	0.83	26.00	14.15	2.13
4500	17.98	25.48	11.43	19.09	1.33	0.86	26.01	14.18	2.13
5000	17.84	25.64	11.53	21.19	1.36	0.88	26.77	14.52	2.16
5500	17.67	25.73	11.80	24.25	1.39	0.89	25.92	14.22	2.20
6000	17.45	25.90	11.88	27.47	1.43	0.91	26.44	14.32	2.29
6500	17.17	26.09	11.59	30.71	1.48	0.94	25.81	14.18	2.33
7000	16.93	26.30	11.05	32.96	1.52	0.96	25.35	13.98	2.40
7500	16.68	26.52	10.57	31.24	1.57	0.99	24.91	13.80	2.43
8000	16.49	26.68	9.92	27.19	1.59	1.01	25.27	13.78	2.51
8500	16.34	26.74	9.36	23.98	1.59	1.03	25.26	13.78	2.60
9000	16.23	26.82	9.05	21.69	1.59	1.04	25.22	13.70	2.64
9500	16.15	26.89	9.23	19.60	1.61	1.04	25.48	13.75	2.69
10000	15.87	27.12	9.63	17.88	1.70	1.04	25.55	13.70	2.89
10500	15.89	27.10	10.06	15.46	1.68	1.02	25.69	13.74	2.75
11000	15.65	27.26	11.07	13.49	1.75	0.99	25.70	13.45	2.74
11500	15.35	27.52	11.46	11.80	1.82	0.97	25.47	13.32	2.83
12000	14.99	27.92	10.79	10.40	1.88	0.97	24.91	12.94	3.00
12500	14.53	28.34	9.32	9.35	1.91	0.99	24.47	12.46	3.23
13000	14.01	28.86	7.76	8.59	1.92	1.03	24.21	12.18	3.45
13500	13.51	29.26	6.52	8.09	1.91	1.07	23.92	11.78	3.68
14000	13.05	29.72	5.72	7.65	1.93	1.09	23.47	11.76	3.88
14500	12.63	30.05	5.34	7.39	2.00	1.10	23.22	11.51	4.04
15000	11.96	30.75	5.46	7.08	2.34	1.07	22.34	11.01	4.41
15500	10.57	31.93	6.82	6.82	3.51	0.98	21.17	10.45	5.11
16000	8.41	33.76	12.45	6.29	6.59	0.82	20.32	10.01	6.42

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 = 6V, Id = 71.67 mA @ Temperature = +25degC

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)
100	7.00	38.69	0.54	6.74	2.20	1.46	29.62	15.39	13.21
200	14.64	30.72	2.08	8.09	1.41	1.25	28.43	14.95	5.58
300	17.16	28.07	4.05	9.87	1.30	1.06	28.04	14.97	3.69
400	18.19	26.98	5.84	11.44	1.26	0.94	28.77	15.19	3.00
500	18.70	26.37	7.33	12.70	1.24	0.87	28.47	15.25	2.69
1000	19.38	25.42	11.58	15.95	1.20	0.75	28.32	15.74	2.21
1500	19.41	25.26	12.93	16.49	1.20	0.73	29.29	15.81	2.13
2000	19.31	25.33	12.91	16.07	1.21	0.74	29.40	15.77	2.16
2500	19.17	25.47	12.65	15.72	1.23	0.76	29.33	15.86	2.12
3000	19.04	25.59	12.57	16.14	1.25	0.77	29.45	15.93	2.11
3500	18.93	25.72	12.75	17.41	1.28	0.80	29.33	16.09	2.17
4000	18.80	25.79	12.66	18.66	1.29	0.82	28.98	15.98	2.16
4500	18.65	25.97	12.63	19.90	1.32	0.84	28.84	16.09	2.22
5000	18.49	26.11	12.70	20.91	1.35	0.86	29.34	16.44	2.22
5500	18.30	26.22	12.95	21.73	1.39	0.87	28.50	16.13	2.30
6000	18.08	26.44	12.97	22.14	1.43	0.89	28.76	16.29	2.36
6500	17.80	26.64	12.58	22.80	1.48	0.92	28.15	16.12	2.38
7000	17.56	26.84	11.93	23.86	1.53	0.94	27.70	15.95	2.43
7500	17.32	27.05	11.40	24.95	1.57	0.97	27.25	15.67	2.53
8000	17.13	27.24	10.65	26.15	1.60	0.99	27.45	15.60	2.59
8500	16.98	27.37	10.01	25.33	1.62	1.01	27.32	15.60	2.68
9000	16.87	27.39	9.65	23.55	1.62	1.03	27.14	15.53	2.73
9500	16.78	27.49	9.83	21.02	1.64	1.03	27.22	15.52	2.77
10000	16.49	27.80	10.22	18.95	1.74	1.03	27.35	15.38	2.97
10500	16.51	27.72	10.64	16.26	1.72	1.01	27.27	15.43	2.82
11000	16.28	27.94	11.67	14.10	1.80	0.98	27.29	15.11	2.84
11500	16.00	28.28	11.94	12.37	1.88	0.97	26.90	14.88	2.96
12000	15.66	28.71	11.11	10.96	1.95	0.97	26.24	14.41	3.13
12500	15.22	29.15	9.53	9.94	1.99	1.00	25.73	13.83	3.33
13000	14.73	29.61	7.90	9.21	2.00	1.04	25.32	13.41	3.60
13500	14.25	30.08	6.64	8.73	2.01	1.08	24.99	13.03	3.82
14000	13.80	30.46	5.82	8.28	2.02	1.11	24.40	12.92	4.07
14500	13.38	30.90	5.41	7.98	2.11	1.12	24.17	12.65	4.24
15000	12.72	31.65	5.50	7.61	2.47	1.10	23.37	11.99	4.57
15500	11.33	32.84	6.84	7.32	3.69	1.01	22.16	11.35	5.34
16000	9.21	34.84	12.59	6.75	7.04	0.84	21.45	10.77	6.62

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: Vd = 4.75V, Id =48.39 mA @ Temperature = +25degC

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)
100	6.20	37.66	0.54	7.05	2.18	1.49	27.07	13.70	12.82
200	13.53	30.21	1.96	7.42	1.42	1.22	25.09	13.45	5.17
300	16.00	27.68	3.70	8.57	1.32	1.03	24.47	13.45	3.47
400	17.05	26.51	5.26	9.70	1.28	0.93	25.26	13.45	2.81
500	17.58	25.87	6.53	10.62	1.25	0.86	24.88	13.43	2.58
1000	18.31	24.86	9.99	12.97	1.21	0.76	24.55	13.87	2.11
1500	18.37	24.73	11.01	13.51	1.21	0.74	25.19	13.78	2.03
2000	18.26	24.79	11.01	13.43	1.23	0.75	25.13	13.60	2.07
2500	18.13	24.95	10.85	13.40	1.25	0.77	24.84	13.49	2.00
3000	18.02	25.06	10.83	13.97	1.27	0.79	24.93	13.42	2.01
3500	17.94	25.16	11.01	15.28	1.29	0.81	25.05	13.52	2.08
4000	17.84	25.21	11.01	16.71	1.31	0.84	24.64	13.39	2.08
4500	17.73	25.34	11.04	18.39	1.33	0.86	24.70	13.40	2.13
5000	17.60	25.43	11.17	20.59	1.36	0.88	25.65	13.71	2.09
5500	17.43	25.53	11.46	24.23	1.39	0.90	24.74	13.49	2.17
6000	17.22	25.73	11.57	29.08	1.43	0.92	25.38	13.50	2.25
6500	16.95	25.88	11.32	36.64	1.48	0.94	24.77	13.42	2.29
7000	16.70	26.08	10.82	39.82	1.52	0.97	24.25	13.24	2.32
7500	16.45	26.31	10.37	31.24	1.56	0.99	23.77	13.06	2.41
8000	16.25	26.48	9.73	25.88	1.59	1.02	24.27	12.99	2.48
8500	16.11	26.57	9.18	22.78	1.59	1.04	24.31	13.06	2.55
9000	16.01	26.61	8.89	20.71	1.58	1.05	24.37	12.94	2.60
9500	15.94	26.65	9.07	19.00	1.59	1.05	24.71	13.05	2.65
10000	15.66	26.89	9.51	17.43	1.68	1.04	24.65	13.02	2.87
10500	15.69	26.75	9.94	15.12	1.64	1.02	24.95	13.05	2.67
11000	15.45	26.96	10.98	13.21	1.72	0.99	24.96	12.79	2.69
11500	15.14	27.21	11.40	11.56	1.79	0.97	24.75	12.69	2.82
12000	14.78	27.63	10.81	10.20	1.85	0.97	24.25	12.32	2.95
12500	14.32	27.99	9.38	9.15	1.87	0.98	23.68	11.87	3.18
13000	13.80	28.47	7.82	8.39	1.87	1.02	23.41	11.57	3.38
13500	13.31	28.94	6.58	7.88	1.87	1.06	23.16	11.23	3.64
14000	12.85	29.29	5.76	7.45	1.86	1.08	22.66	11.16	3.84
14500	12.44	29.76	5.38	7.19	1.96	1.09	22.36	11.00	3.99
15000	11.78	30.30	5.48	6.89	2.24	1.06	21.35	10.57	4.33
15500	10.39	31.56	6.82	6.68	3.40	0.98	20.18	10.02	5.00
16000	8.17	33.44	12.75	6.20	6.52	0.81	19.26	9.53	6.37

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 = 6.25V, Id = 76.53 mA @ Temperature = +25degC

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)
100	6.98	38.80	0.54	6.78	2.23	1.47	28.73	15.35	13.43
200	14.61	30.72	2.08	8.13	1.41	1.25	27.93	14.91	5.78
300	17.13	28.14	4.05	9.90	1.31	1.06	27.47	14.96	3.90
400	18.18	27.00	5.86	11.49	1.27	0.94	28.22	15.17	3.13
500	18.69	26.44	7.37	12.76	1.25	0.87	28.00	15.27	2.80
1000	19.39	25.44	11.71	16.07	1.20	0.75	28.00	15.75	2.30
1500	19.43	25.31	13.10	16.62	1.20	0.74	28.61	15.85	2.19
2000	19.33	25.37	13.08	16.16	1.21	0.74	28.85	15.81	2.25
2500	19.19	25.49	12.82	15.78	1.23	0.75	28.86	15.93	2.18
3000	19.06	25.63	12.74	16.15	1.25	0.77	29.08	16.04	2.17
3500	18.94	25.74	12.90	17.36	1.28	0.80	28.95	16.20	2.22
4000	18.81	25.89	12.81	18.55	1.30	0.82	28.65	16.12	2.26
4500	18.66	26.00	12.77	19.69	1.33	0.84	28.51	16.24	2.27
5000	18.50	26.14	12.82	20.56	1.36	0.86	28.96	16.61	2.29
5500	18.31	26.26	13.07	21.29	1.39	0.87	28.21	16.31	2.32
6000	18.09	26.47	13.07	21.71	1.44	0.89	28.43	16.50	2.43
6500	17.82	26.67	12.66	22.46	1.49	0.91	27.88	16.33	2.45
7000	17.58	26.87	12.01	23.57	1.53	0.94	27.46	16.10	2.51
7500	17.34	27.16	11.45	24.84	1.59	0.97	27.03	15.83	2.60
8000	17.15	27.36	10.70	26.43	1.62	0.99	27.21	15.78	2.68
8500	17.00	27.45	10.06	25.97	1.63	1.01	27.01	15.77	2.73
9000	16.89	27.48	9.71	24.17	1.63	1.03	26.90	15.69	2.81
9500	16.79	27.57	9.88	21.48	1.66	1.03	26.91	15.66	2.84
10000	16.52	27.92	10.25	19.34	1.76	1.03	27.00	15.50	3.07
10500	16.53	27.87	10.68	16.59	1.74	1.01	26.92	15.56	2.91
11000	16.30	28.06	11.68	14.39	1.82	0.99	26.80	15.25	2.90
11500	16.02	28.36	11.94	12.61	1.90	0.97	26.37	15.01	3.04
12000	15.68	28.77	11.09	11.15	1.97	0.98	25.66	14.52	3.21
12500	15.25	29.32	9.48	10.10	2.03	1.00	25.16	13.91	3.43
13000	14.75	29.75	7.86	9.33	2.04	1.04	24.87	13.44	3.70
13500	14.27	30.27	6.60	8.84	2.05	1.09	24.43	13.03	3.93
14000	13.81	30.69	5.79	8.36	2.07	1.11	23.89	12.96	4.17
14500	13.39	31.15	5.39	8.06	2.18	1.12	23.64	12.61	4.35
15000	12.71	31.81	5.51	7.66	2.53	1.10	22.83	11.98	4.69
15500	11.31	33.17	6.89	7.33	3.87	1.01	21.65	11.19	5.49
16000	9.24	34.85	12.48	6.74	7.01	0.84	20.99	10.70	6.75

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 = 5V, Id =52.20 mA @ Temperature = -45degC

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)
100	6.91	38.47	0.50	6.77	2.05	1.47	28.06	14.44	11.51
200	14.45	30.74	1.96	7.73	1.39	1.24	25.95	13.98	4.18
300	16.97	28.06	3.83	9.31	1.29	1.05	25.34	13.90	2.65
400	18.03	26.86	5.53	10.71	1.24	0.93	26.21	13.91	2.19
500	18.55	26.34	6.94	11.84	1.23	0.86	25.83	13.87	1.94
1000	19.25	25.27	10.84	14.73	1.19	0.74	25.37	14.40	1.57
1500	19.32	25.10	12.11	15.49	1.19	0.72	25.98	14.27	1.51
2000	19.24	25.11	12.27	15.46	1.19	0.73	25.95	14.11	1.57
2500	19.12	25.23	12.13	15.39	1.21	0.74	25.79	14.00	1.45
3000	18.99	25.35	11.91	15.71	1.23	0.76	25.92	13.95	1.45
3500	18.90	25.47	12.06	17.02	1.25	0.79	26.08	14.09	1.51
4000	18.81	25.55	12.12	18.75	1.26	0.81	25.84	13.94	1.52
4500	18.69	25.62	12.20	20.59	1.28	0.83	25.95	14.04	1.53
5000	18.56	25.73	12.37	22.70	1.30	0.85	26.94	14.36	1.52
5500	18.40	25.83	12.88	24.17	1.33	0.86	26.02	14.11	1.55
6000	18.22	25.93	13.35	24.23	1.36	0.87	26.98	14.28	1.63
6500	17.97	26.11	13.30	22.34	1.40	0.89	26.43	14.20	1.62
7000	17.74	26.30	12.11	22.51	1.42	0.93	25.86	14.01	1.69
7500	17.47	26.55	10.90	24.12	1.46	0.97	25.46	13.88	1.76
8000	17.29	26.72	9.80	25.91	1.48	1.00	25.55	13.70	1.82
8500	17.16	26.73	9.34	26.08	1.48	1.01	25.58	13.81	1.85
9000	17.13	26.74	9.44	23.42	1.48	1.01	25.97	13.78	1.85
9500	17.11	26.79	10.21	18.52	1.49	1.00	26.15	13.82	1.84
10000	16.76	27.01	12.16	14.98	1.59	0.96	26.30	13.87	2.12
10500	16.68	27.12	11.82	13.41	1.58	0.96	26.81	13.85	1.93
11000	16.48	27.18	12.89	11.96	1.61	0.93	26.89	13.63	1.93
11500	16.28	27.44	13.10	10.64	1.65	0.91	26.61	13.56	2.01
12000	16.01	27.65	11.98	9.26	1.64	0.91	26.05	13.25	2.15
12500	15.64	28.08	10.01	8.15	1.61	0.92	25.76	12.76	2.35
13000	15.23	28.41	8.21	7.64	1.56	0.97	25.17	12.38	2.54
13500	14.94	28.66	7.01	7.62	1.53	1.03	24.94	12.12	2.68
14000	14.76	28.80	6.35	7.85	1.52	1.07	24.52	12.22	2.80
14500	14.58	28.93	6.06	8.03	1.55	1.09	24.15	12.11	2.86
15000	13.96	29.60	5.71	7.54	1.69	1.09	22.98	11.56	3.15
15500	12.69	30.91	5.33	6.63	2.06	1.06	21.82	10.76	3.61
16000	10.44	33.09	6.34	5.95	3.68	0.95	20.92	10.20	4.89

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 = 6V, Id = 72.49 mA @ Temperature = -45degC

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)
100	7.58	39.45	0.50	6.36	2.07	1.43	34.23	16.66	11.73
200	15.41	31.17	2.06	8.21	1.37	1.25	31.60	16.22	4.32
300	17.97	28.53	4.15	10.49	1.28	1.06	31.11	16.23	2.80
400	19.00	27.36	6.08	12.45	1.24	0.94	32.15	16.33	2.26
500	19.49	26.72	7.68	13.99	1.21	0.86	31.37	16.35	2.00
1000	20.14	25.72	12.31	17.97	1.17	0.73	30.67	16.87	1.62
1500	20.18	25.54	13.91	18.76	1.17	0.71	31.90	16.86	1.54
2000	20.09	25.60	14.08	18.24	1.18	0.72	31.87	16.77	1.61
2500	19.96	25.67	13.84	17.74	1.19	0.73	31.65	16.84	1.52
3000	19.81	25.82	13.51	17.77	1.21	0.75	31.81	16.83	1.54
3500	19.70	25.93	13.62	18.76	1.23	0.77	31.91	16.97	1.56
4000	19.57	26.05	13.62	20.02	1.25	0.79	31.58	16.87	1.58
4500	19.42	26.17	13.63	20.57	1.28	0.81	31.50	16.93	1.56
5000	19.26	26.29	13.77	20.77	1.30	0.82	32.14	17.21	1.57
5500	19.07	26.43	14.25	19.84	1.33	0.84	31.13	16.98	1.59
6000	18.87	26.56	14.62	18.95	1.36	0.85	31.49	17.08	1.68
6500	18.61	26.75	14.39	18.04	1.41	0.87	30.86	16.99	1.67
7000	18.39	26.94	12.97	18.79	1.43	0.90	30.33	16.86	1.74
7500	18.14	27.13	11.70	20.87	1.47	0.94	29.80	16.69	1.81
8000	17.98	27.36	10.54	24.72	1.50	0.98	29.80	16.46	1.86
8500	17.84	27.34	10.04	25.30	1.49	0.99	29.80	16.54	1.92
9000	17.78	27.35	10.14	21.98	1.50	0.99	29.64	16.46	1.92
9500	17.73	27.46	10.95	17.67	1.52	0.98	29.75	16.42	1.92
10000	17.35	27.76	13.06	14.53	1.64	0.94	30.07	16.40	2.19
10500	17.28	27.78	12.59	13.39	1.62	0.94	30.15	16.32	2.01
11000	17.10	27.92	13.64	12.07	1.66	0.92	30.21	16.04	1.99
11500	16.91	28.07	13.59	10.82	1.68	0.91	30.11	15.91	2.10
12000	16.65	28.44	12.12	9.49	1.70	0.90	29.79	15.52	2.23
12500	16.29	28.90	10.02	8.47	1.69	0.93	29.26	15.02	2.44
13000	15.90	29.21	8.25	8.05	1.64	0.98	28.79	14.61	2.65
13500	15.62	29.51	7.07	8.15	1.62	1.04	28.43	14.34	2.78
14000	15.45	29.62	6.43	8.47	1.61	1.08	27.75	14.38	2.88
14500	15.27	29.81	6.11	8.68	1.65	1.11	27.17	14.22	2.99
15000	14.65	30.43	5.70	8.10	1.78	1.11	26.58	13.59	3.25
15500	13.40	31.84	5.31	7.09	2.19	1.08	25.06	12.73	3.79
16000	11.17	33.70	6.31	6.36	3.75	0.98	24.15	12.12	5.03

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 = 4.75V, Id = 47.80 mA @ Temperature = -45degC

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)
100	6.61	38.26	0.49	6.91	2.07	1.48	26.18	13.78	11.48
200	14.05	30.55	1.91	7.50	1.39	1.23	24.32	13.15	4.16
300	16.54	27.83	3.70	8.84	1.29	1.04	23.72	13.04	2.68
400	17.62	26.77	5.33	10.08	1.26	0.93	24.59	12.97	2.17
500	18.14	26.09	6.67	11.09	1.23	0.86	24.12	12.98	1.91
1000	18.88	25.07	10.32	13.66	1.19	0.74	23.76	13.50	1.57
1500	18.95	24.89	11.49	14.38	1.19	0.73	24.21	13.38	1.50
2000	18.87	24.90	11.64	14.42	1.20	0.73	24.27	13.20	1.54
2500	18.75	25.04	11.54	14.43	1.22	0.75	24.05	13.03	1.48
3000	18.63	25.16	11.34	14.78	1.23	0.77	24.18	12.92	1.48
3500	18.56	25.24	11.50	16.05	1.25	0.79	24.37	13.10	1.51
4000	18.47	25.31	11.58	17.73	1.27	0.81	24.09	12.96	1.53
4500	18.37	25.41	11.68	19.59	1.29	0.83	24.21	13.00	1.55
5000	18.25	25.47	11.86	22.05	1.30	0.85	25.28	13.34	1.53
5500	18.10	25.57	12.35	25.24	1.33	0.87	24.32	13.11	1.54
6000	17.94	25.69	12.85	27.65	1.36	0.88	25.41	13.29	1.62
6500	17.69	25.89	12.85	25.14	1.40	0.90	24.89	13.22	1.63
7000	17.46	26.04	11.75	24.36	1.42	0.93	24.28	13.01	1.69
7500	17.18	26.28	10.58	24.91	1.45	0.97	23.89	12.85	1.75
8000	17.00	26.42	9.50	24.61	1.46	1.00	24.04	12.71	1.82
8500	16.88	26.56	9.05	24.67	1.48	1.02	24.07	12.86	1.84
9000	16.86	26.45	9.14	23.16	1.46	1.02	24.47	12.83	1.84
9500	16.85	26.55	9.88	18.83	1.48	1.01	24.78	12.93	1.85
10000	16.51	26.77	11.80	15.22	1.59	0.97	24.86	12.96	2.13
10500	16.43	26.81	11.48	13.44	1.56	0.97	25.48	12.97	1.96
11000	16.22	26.96	12.54	12.01	1.61	0.94	25.58	12.77	1.96
11500	16.02	27.17	12.85	10.61	1.64	0.92	25.31	12.74	2.01
12000	15.76	27.40	11.83	9.20	1.62	0.91	24.75	12.41	2.16
12500	15.38	27.74	9.96	8.06	1.58	0.92	24.35	11.92	2.36
13000	14.96	28.12	8.17	7.51	1.54	0.97	23.72	11.60	2.56
13500	14.66	28.45	6.94	7.45	1.51	1.02	23.55	11.28	2.67
14000	14.48	28.55	6.27	7.64	1.50	1.06	23.16	11.39	2.78
14500	14.30	28.63	6.01	7.81	1.52	1.08	22.71	11.23	2.86
15000	13.68	29.32	5.67	7.37	1.66	1.08	21.44	10.79	3.09
15500	12.40	30.62	5.32	6.48	2.03	1.05	20.27	10.03	3.61
16000	10.12	32.81	6.37	5.80	3.66	0.94	19.39	9.37	4.85

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 = 6.25V, Id = 77.79 mA @ Temperature = -45degC

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)
100	7.66	39.18	0.49	6.30	1.99	1.42	34.41	16.91	11.81
200	15.52	31.17	2.08	8.24	1.36	1.25	32.45	16.46	4.51
300	18.08	28.54	4.19	10.64	1.27	1.07	31.55	16.49	2.81
400	19.12	27.33	6.16	12.67	1.23	0.94	32.70	16.61	2.28
500	19.61	26.80	7.78	14.29	1.21	0.86	31.99	16.69	2.05
1000	20.24	25.80	12.52	18.44	1.17	0.73	31.34	17.21	1.64
1500	20.28	25.60	14.19	19.21	1.17	0.71	32.68	17.23	1.59
2000	20.19	25.65	14.35	18.55	1.18	0.72	32.83	17.17	1.62
2500	20.06	25.72	14.09	17.94	1.19	0.73	32.75	17.25	1.54
3000	19.91	25.87	13.75	17.91	1.21	0.75	32.81	17.27	1.56
3500	19.79	25.99	13.84	18.78	1.23	0.77	32.97	17.39	1.59
4000	19.66	26.09	13.82	19.85	1.25	0.79	32.39	17.31	1.57
4500	19.51	26.20	13.83	20.26	1.27	0.80	32.26	17.39	1.59
5000	19.35	26.35	13.94	20.26	1.30	0.82	32.83	17.68	1.59
5500	19.15	26.46	14.41	19.31	1.33	0.83	31.98	17.46	1.63
6000	18.96	26.60	14.74	18.49	1.36	0.84	32.39	17.54	1.71
6500	18.69	26.79	14.48	17.65	1.40	0.86	31.60	17.45	1.71
7000	18.48	26.97	13.06	18.47	1.43	0.90	30.95	17.32	1.77
7500	18.23	27.22	11.78	20.52	1.47	0.94	30.43	17.16	1.83
8000	18.06	27.40	10.63	24.48	1.49	0.97	30.51	16.92	1.89
8500	17.92	27.44	10.13	25.05	1.50	0.99	30.29	16.98	1.94
9000	17.85	27.41	10.27	21.80	1.50	0.99	30.27	16.92	1.94
9500	17.80	27.52	11.05	17.60	1.52	0.97	30.29	16.86	1.97
10000	17.42	27.86	13.14	14.52	1.64	0.94	30.57	16.82	2.21
10500	17.36	27.83	12.66	13.44	1.61	0.94	30.62	16.72	2.03
11000	17.18	27.97	13.65	12.15	1.66	0.92	30.73	16.47	2.03
11500	17.00	28.24	13.59	10.91	1.70	0.91	30.45	16.32	2.13
12000	16.74	28.61	12.07	9.60	1.71	0.91	29.95	15.90	2.26
12500	16.39	28.91	9.98	8.57	1.68	0.93	29.56	15.37	2.48
13000	16.00	29.31	8.20	8.16	1.65	0.98	28.85	14.95	2.69
13500	15.72	29.59	7.04	8.27	1.62	1.04	28.46	14.65	2.83
14000	15.55	29.75	6.40	8.60	1.63	1.09	27.72	14.69	2.95
14500	15.37	29.92	6.08	8.80	1.66	1.11	27.18	14.51	3.01
15000	14.74	30.61	5.66	8.20	1.80	1.12	26.54	13.86	3.35
15500	13.49	31.83	5.26	7.16	2.17	1.09	25.02	13.00	3.77
16000	11.25	33.95	6.29	6.42	3.84	0.98	24.16	12.33	5.15

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 = 5V, Id = 53.64 mA @ Temperature = +85degC

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)
100	6.09	37.91	0.56	7.10	2.32	1.49	27.26	13.43	13.78
200	13.43	30.21	1.99	7.57	1.45	1.23	25.68	13.09	5.96
300	15.92	27.59	3.77	8.81	1.33	1.04	25.23	13.07	4.03
400	16.98	26.45	5.39	9.94	1.29	0.93	25.93	13.17	3.34
500	17.50	25.84	6.68	10.82	1.26	0.87	25.66	13.22	3.01
1000	18.22	24.84	10.10	13.01	1.22	0.76	25.42	13.72	2.49
1500	18.27	24.71	11.10	13.52	1.22	0.75	26.15	13.70	2.43
2000	18.19	24.77	11.21	13.56	1.23	0.75	26.10	13.59	2.46
2500	18.06	24.91	11.03	13.49	1.25	0.77	25.85	13.55	2.41
3000	17.94	25.03	10.93	13.95	1.28	0.79	25.92	13.54	2.42
3500	17.85	25.13	11.09	15.14	1.30	0.82	25.95	13.70	2.45
4000	17.75	25.26	11.11	16.58	1.32	0.84	25.52	13.54	2.47
4500	17.63	25.37	11.18	18.28	1.35	0.86	25.53	13.62	2.52
5000	17.50	25.47	11.22	20.38	1.37	0.89	26.29	13.99	2.53
5500	17.31	25.59	11.36	23.55	1.41	0.91	25.50	13.69	2.61
6000	17.07	25.81	11.32	26.89	1.46	0.93	25.85	13.75	2.70
6500	16.80	25.98	10.92	30.66	1.50	0.95	25.25	13.60	2.73
7000	16.57	26.18	10.43	35.50	1.55	0.98	24.80	13.41	2.79
7500	16.32	26.42	10.26	43.92	1.60	1.00	24.33	13.17	2.83
8000	16.14	26.58	9.85	28.78	1.63	1.02	24.82	13.21	2.94
8500	15.97	26.68	9.41	23.21	1.64	1.04	24.76	13.20	3.03
9000	15.81	26.79	8.89	19.93	1.64	1.05	24.69	13.02	3.11
9500	15.70	26.95	8.65	18.74	1.66	1.06	24.88	13.10	3.15
10000	15.48	27.02	8.74	18.43	1.71	1.07	24.86	13.00	3.32
10500	15.53	27.00	9.09	16.77	1.69	1.05	24.89	13.05	3.19
11000	15.30	27.17	10.30	14.25	1.78	1.02	24.84	12.75	3.19
11500	14.96	27.45	10.88	12.11	1.86	0.99	24.51	12.59	3.31
12000	14.52	27.89	10.26	10.70	1.95	0.99	23.93	12.18	3.49
12500	14.02	28.45	8.85	9.87	2.03	1.02	23.35	11.56	3.72
13000	13.49	28.83	7.50	9.22	2.06	1.06	23.17	11.28	3.94
13500	12.94	29.41	6.36	8.48	2.09	1.09	22.81	10.89	4.21
14000	12.35	29.85	5.56	7.58	2.08	1.09	22.30	10.77	4.48
14500	11.75	30.33	5.05	6.80	2.13	1.08	22.02	10.35	4.73
15000	11.00	31.12	5.12	6.18	2.47	1.03	21.06	9.79	5.12
15500	9.80	32.10	6.57	6.02	3.64	0.94	19.83	9.18	5.70
16000	8.19	33.35	11.03	6.00	6.14	0.82	19.10	8.97	6.70

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 = 6V, Id = 71.17 mA @ Temperature = +85degC

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)
100	6.35	37.81	0.56	7.14	2.24	1.49	26.87	14.30	14.35
200	13.79	30.37	2.03	7.96	1.45	1.25	26.44	13.90	6.57
300	16.33	27.72	3.91	9.42	1.33	1.06	26.10	13.89	4.43
400	17.40	26.72	5.64	10.71	1.30	0.94	26.57	14.08	3.66
500	17.93	26.10	7.06	11.71	1.27	0.87	26.35	14.16	3.28
1000	18.67	25.18	11.00	14.31	1.23	0.76	26.21	14.54	2.71
1500	18.74	25.05	12.22	14.84	1.23	0.75	26.57	14.62	2.60
2000	18.66	25.12	12.40	14.78	1.24	0.76	26.80	14.61	2.64
2500	18.54	25.23	12.18	14.59	1.26	0.77	26.84	14.73	2.53
3000	18.41	25.41	12.04	14.95	1.28	0.79	26.95	14.82	2.53
3500	18.31	25.52	12.19	16.09	1.31	0.81	26.87	15.01	2.60
4000	18.20	25.60	12.18	17.43	1.33	0.83	26.64	14.93	2.58
4500	18.06	25.82	12.20	18.88	1.37	0.86	26.53	15.08	2.65
5000	17.91	25.90	12.19	20.48	1.39	0.87	27.09	15.50	2.68
5500	17.72	26.01	12.27	22.48	1.42	0.89	26.43	15.13	2.73
6000	17.48	26.29	12.15	24.16	1.48	0.92	26.60	15.30	2.83
6500	17.21	26.43	11.67	26.17	1.53	0.94	26.03	15.12	2.85
7000	16.99	26.65	11.12	27.88	1.57	0.96	25.69	14.87	2.90
7500	16.74	26.86	10.94	28.56	1.63	0.98	25.28	14.56	3.01
8000	16.57	27.02	10.47	28.59	1.66	1.00	25.51	14.65	3.09
8500	16.40	27.21	9.95	25.18	1.68	1.02	25.36	14.63	3.18
9000	16.23	27.30	9.41	22.21	1.69	1.04	25.31	14.48	3.25
9500	16.12	27.46	9.10	21.09	1.71	1.06	25.31	14.47	3.33
10000	15.89	27.67	9.16	20.81	1.79	1.06	25.30	14.29	3.49
10500	15.93	27.65	9.53	18.42	1.78	1.05	25.21	14.43	3.33
11000	15.72	27.83	10.73	15.29	1.86	1.02	25.12	14.06	3.33
11500	15.40	28.21	11.20	12.93	1.97	1.00	24.69	13.83	3.49
12000	14.97	28.72	10.43	11.41	2.08	1.00	24.03	13.30	3.67
12500	14.49	29.10	8.96	10.57	2.13	1.03	23.45	12.55	3.94
13000	13.97	29.65	7.60	9.86	2.20	1.07	23.21	12.23	4.17
13500	13.43	30.20	6.44	9.07	2.24	1.10	22.80	11.73	4.43
14000	12.83	30.71	5.61	8.07	2.26	1.11	22.35	11.53	4.72
14500	12.21	31.26	5.07	7.18	2.31	1.10	22.07	11.10	4.98
15000	11.46	32.02	5.10	6.47	2.66	1.05	21.21	10.32	5.41
15500	10.28	32.91	6.51	6.26	3.84	0.96	19.89	9.78	5.98
16000	8.71	34.07	10.98	6.23	6.39	0.83	19.23	9.52	7.03

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 = 4.75V, Id = 49.51 mA @ Temperature = +85degC

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)
100	5.90	37.34	0.56	7.13	2.25	1.49	26.61	12.99	13.68
200	13.16	30.12	1.96	7.40	1.46	1.22	25.00	12.69	5.92
300	15.64	27.52	3.70	8.54	1.34	1.04	24.43	12.71	4.07
400	16.71	26.34	5.25	9.58	1.29	0.93	25.20	12.77	3.30
500	17.24	25.73	6.50	10.40	1.27	0.86	24.87	12.81	3.00
1000	17.96	24.72	9.77	12.47	1.22	0.76	24.65	13.25	2.49
1500	18.02	24.58	10.71	12.97	1.22	0.75	25.30	13.23	2.40
2000	17.94	24.67	10.83	13.03	1.24	0.76	25.24	13.11	2.47
2500	17.81	24.78	10.66	13.00	1.26	0.77	24.97	13.03	2.39
3000	17.69	24.91	10.56	13.46	1.28	0.79	24.99	13.00	2.40
3500	17.61	25.03	10.72	14.64	1.30	0.82	25.07	13.11	2.47
4000	17.52	25.09	10.75	16.05	1.32	0.84	24.64	12.96	2.48
4500	17.41	25.21	10.83	17.73	1.35	0.87	24.62	13.04	2.53
5000	17.28	25.31	10.89	19.82	1.37	0.89	25.53	13.35	2.51
5500	17.10	25.45	11.05	23.05	1.41	0.91	24.69	13.07	2.59
6000	16.86	25.63	11.05	26.72	1.46	0.93	25.17	13.09	2.68
6500	16.59	25.81	10.70	30.51	1.50	0.96	24.52	12.95	2.71
7000	16.36	26.00	10.22	34.34	1.54	0.98	24.05	12.76	2.75
7500	16.11	26.18	10.02	38.43	1.59	1.00	23.58	12.54	2.83
8000	15.93	26.39	9.62	27.52	1.62	1.02	24.13	12.53	2.92
8500	15.75	26.52	9.21	22.32	1.63	1.04	24.10	12.57	3.03
9000	15.61	26.63	8.74	19.39	1.63	1.06	24.08	12.46	3.08
9500	15.50	26.71	8.57	18.12	1.64	1.06	24.33	12.50	3.18
10000	15.29	26.74	8.63	17.67	1.68	1.07	24.31	12.42	3.29
10500	15.34	26.81	9.02	16.28	1.68	1.05	24.35	12.47	3.16
11000	15.09	26.97	10.19	13.94	1.77	1.02	24.34	12.23	3.15
11500	14.75	27.23	10.82	11.88	1.85	0.99	24.04	12.05	3.30
12000	14.31	27.67	10.21	10.48	1.93	0.99	23.43	11.66	3.47
12500	13.82	28.16	8.83	9.61	1.99	1.02	22.83	11.15	3.66
13000	13.27	28.65	7.46	8.91	2.03	1.05	22.67	10.85	3.89
13500	12.72	29.04	6.33	8.20	2.02	1.08	22.34	10.43	4.19
14000	12.14	29.58	5.56	7.37	2.04	1.08	21.86	10.39	4.45
14500	11.57	30.03	5.10	6.69	2.10	1.07	21.57	10.02	4.68
15000	10.81	30.79	5.23	6.14	2.45	1.02	20.53	9.41	5.04
15500	9.54	31.83	6.78	6.00	3.69	0.93	19.29	8.96	5.69
16000	7.96	33.11	11.15	5.89	6.10	0.81	18.55	8.67	6.70

Typical Performance Data

Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

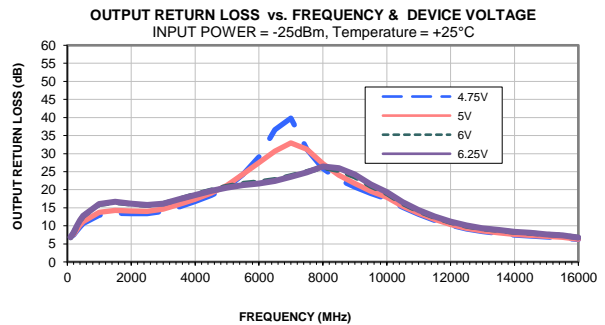
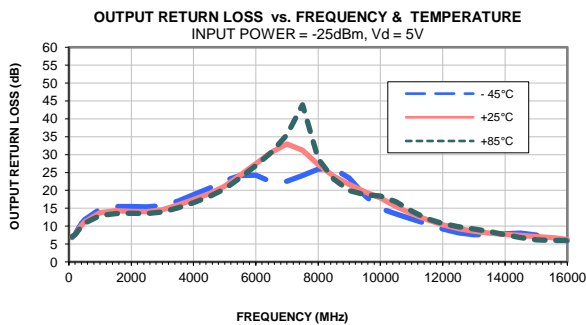
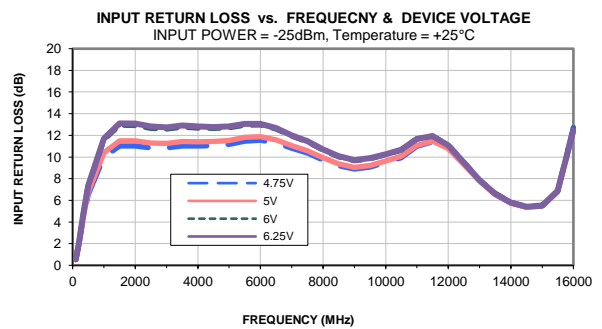
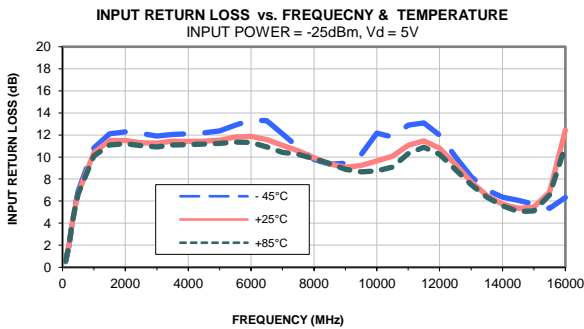
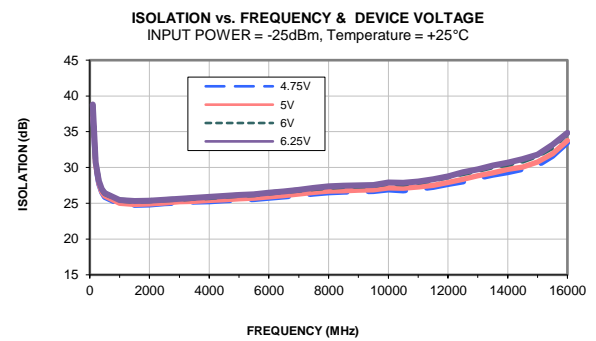
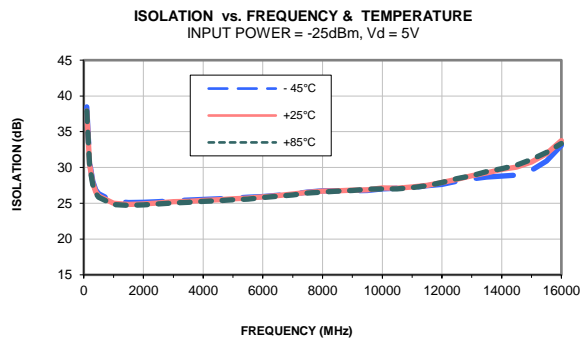
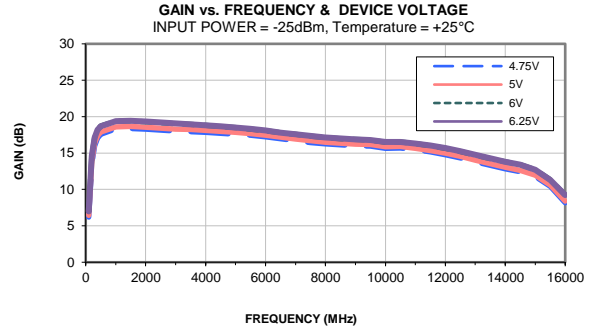
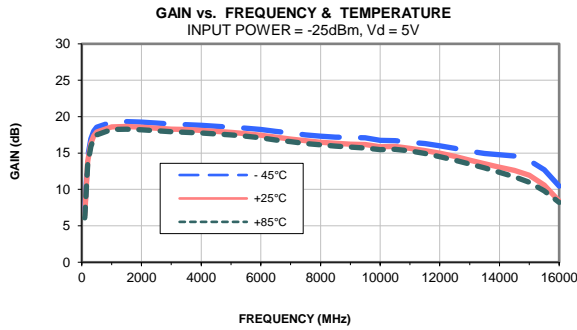
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

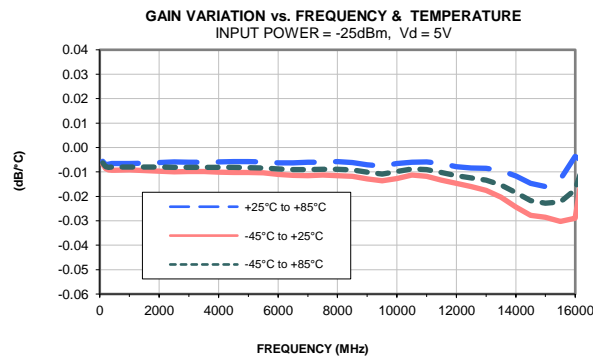
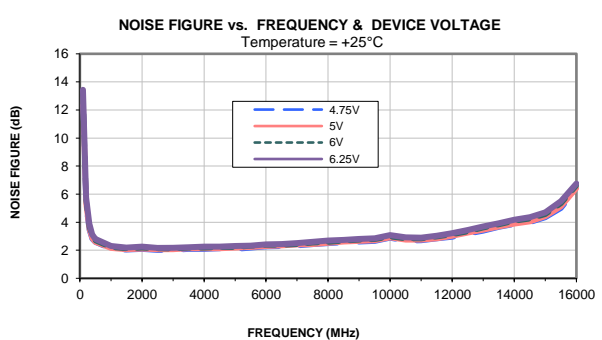
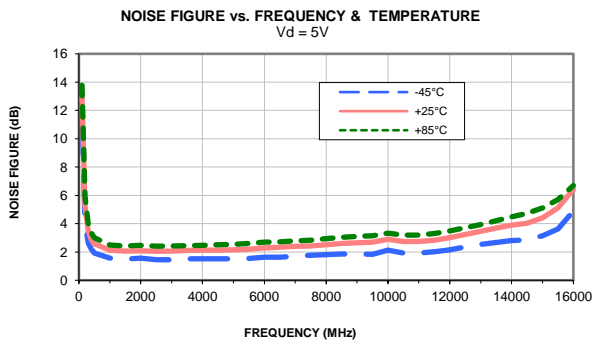
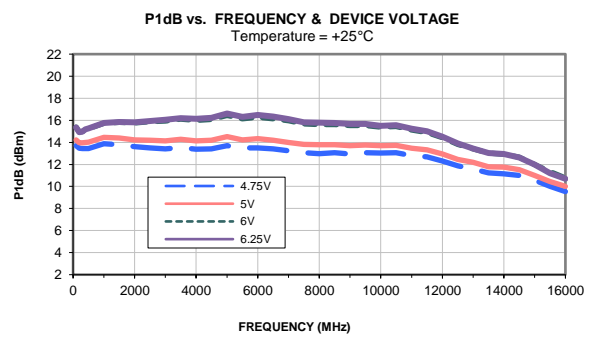
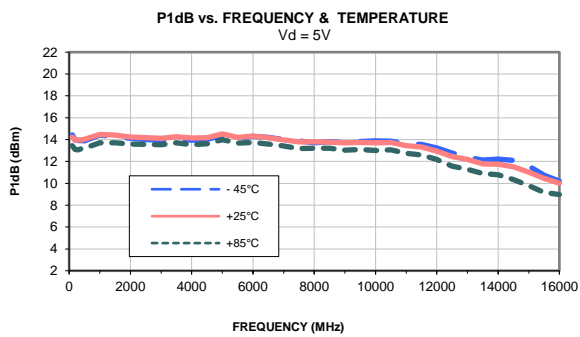
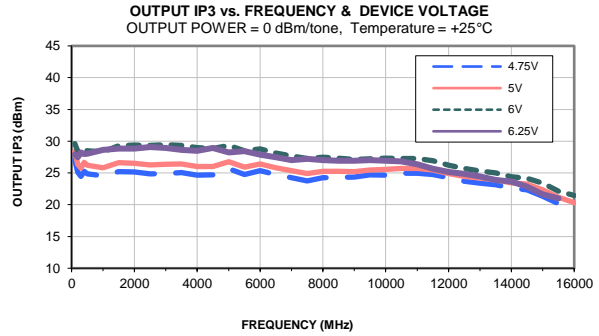
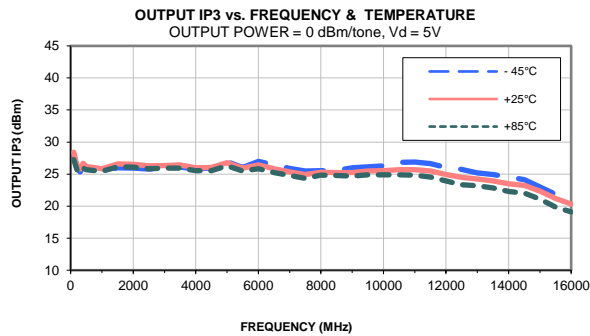
TEST CONDITIONS: Vd = 6.25V, Id = 75.48 mA @ Temperature = +85degC

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)
100	6.21	37.76	0.56	7.26	2.27	1.50	26.82	14.72	14.69
200	13.63	30.42	2.01	7.99	1.47	1.26	26.70	14.25	6.90
300	16.17	27.82	3.88	9.38	1.35	1.06	26.48	14.17	4.75
400	17.26	26.68	5.60	10.63	1.30	0.95	26.82	14.32	3.87
500	17.81	26.09	7.03	11.63	1.28	0.88	26.53	14.32	3.45
1000	18.59	25.21	11.09	14.25	1.24	0.77	26.21	14.63	2.82
1500	18.67	25.10	12.37	14.81	1.24	0.75	26.30	14.72	2.69
2000	18.60	25.15	12.57	14.79	1.25	0.76	26.45	14.70	2.71
2500	18.48	25.29	12.37	14.58	1.27	0.77	26.52	14.82	2.63
3000	18.36	25.43	12.22	14.92	1.29	0.79	26.68	14.98	2.66
3500	18.26	25.57	12.37	16.04	1.32	0.81	26.56	15.15	2.70
4000	18.14	25.67	12.35	17.32	1.34	0.83	26.36	15.05	2.71
4500	18.01	25.80	12.36	18.74	1.37	0.86	26.29	15.21	2.76
5000	17.87	25.97	12.35	20.27	1.40	0.88	26.76	15.68	2.77
5500	17.67	26.08	12.40	22.18	1.44	0.89	26.16	15.30	2.84
6000	17.44	26.32	12.27	23.88	1.49	0.92	26.36	15.49	2.93
6500	17.17	26.47	11.77	25.80	1.54	0.94	25.76	15.28	2.97
7000	16.94	26.67	11.23	27.40	1.58	0.96	25.42	15.03	3.00
7500	16.70	27.00	11.05	28.26	1.66	0.98	25.05	14.73	3.10
8000	16.53	27.13	10.59	28.97	1.68	1.00	25.26	14.82	3.18
8500	16.36	27.31	10.05	25.78	1.71	1.02	25.15	14.83	3.28
9000	16.19	27.40	9.50	22.66	1.72	1.04	25.02	14.68	3.35
9500	16.07	27.52	9.20	21.51	1.74	1.05	24.97	14.68	3.42
10000	15.86	27.76	9.23	21.23	1.82	1.06	24.96	14.48	3.57
10500	15.89	27.72	9.62	18.76	1.81	1.05	24.93	14.61	3.43
11000	15.69	27.96	10.82	15.57	1.90	1.02	24.80	14.27	3.44
11500	15.37	28.35	11.27	13.10	2.02	1.00	24.31	13.99	3.59
12000	14.93	28.81	10.47	11.57	2.12	1.00	23.57	13.48	3.79
12500	14.45	29.22	8.98	10.67	2.18	1.03	23.04	12.76	4.02
13000	13.93	29.79	7.63	9.93	2.26	1.07	22.85	12.32	4.28
13500	13.38	30.34	6.47	9.11	2.30	1.10	22.49	11.88	4.59
14000	12.78	31.01	5.63	8.09	2.36	1.11	21.99	11.65	4.89
14500	12.16	31.44	5.08	7.18	2.38	1.10	21.70	11.19	5.15
15000	11.39	32.17	5.11	6.45	2.73	1.05	20.67	10.38	5.48
15500	10.22	33.16	6.55	6.23	3.99	0.96	19.40	9.74	6.18
16000	8.68	34.34	10.99	6.20	6.61	0.83	18.82	9.56	7.17

Typical Performance Curves

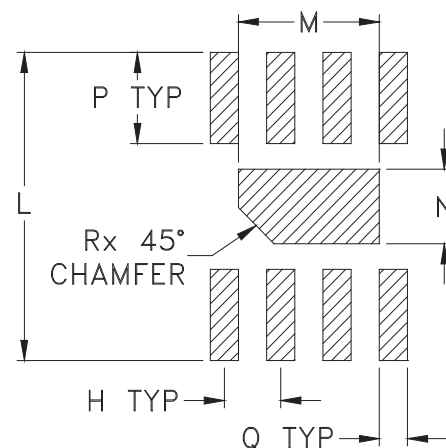
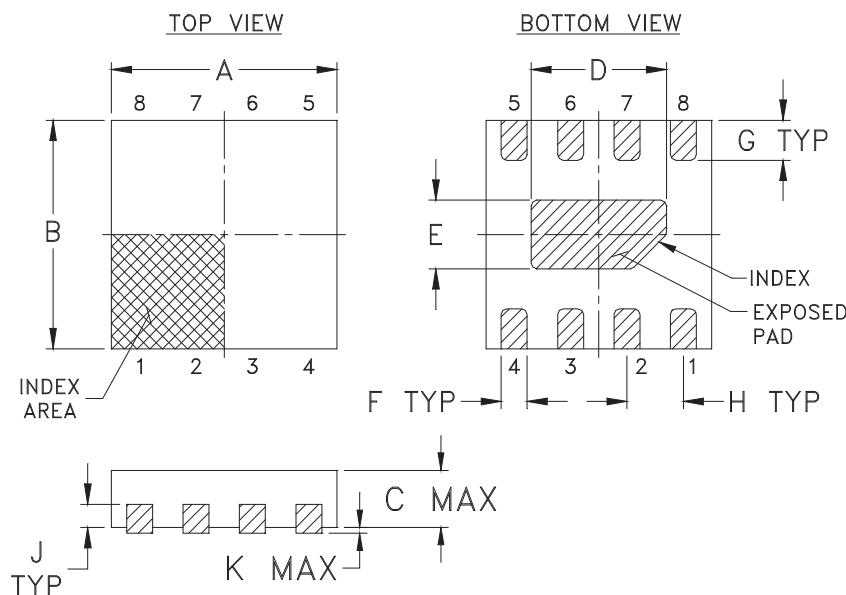


Typical Performance Curves



Outline Dimensions

PCB Land Pattern



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

SE #.	A	B	C	D	E	F	G	H	J	K	L	M	N	P
MC1631-1	.079 (2.00)	.079 (2.00)	.039 (1.00)	.047 (1.20)	.024 (.60)	.009 (.23)	.014 (.35)	.020 (.50)	.008 (.20)	.002 (.05)	.106 (2.70)	.049 (1.25)	.026 (.65)	.031 (.80)

CASE #.	Q	R	WT, GRAM
MC1631-1	.010 (.25)	.012 (.30)	.006

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .01$; 3 Pl. $\pm .005$

Notes:

- Case material: Plastic.
- Termination finish:
For RoHS Case Styles: Tin-Silver over Nickel plated or Matte-Tin Plated (See Data sheet).
All models, (+) suffix.
- Lead #1 identifier shall be located in the cross-hatched area shown.
Identifier may be either a molded or marked feature.



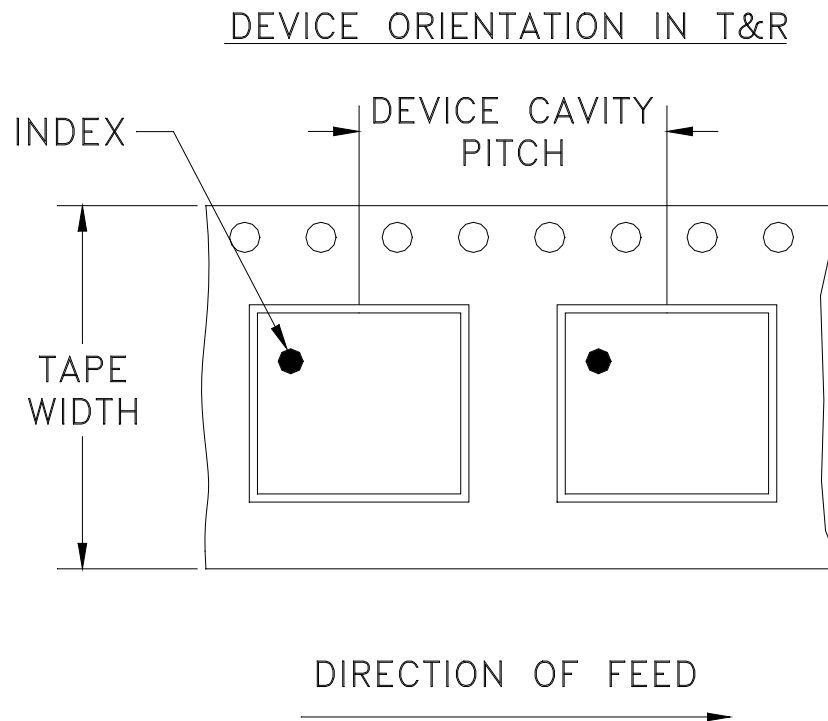
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F66



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
8	4	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000, 2000, 3000

Note: Please consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

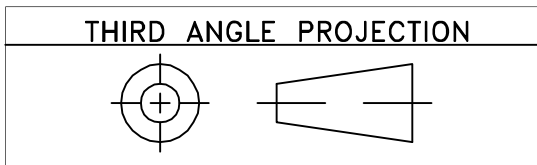
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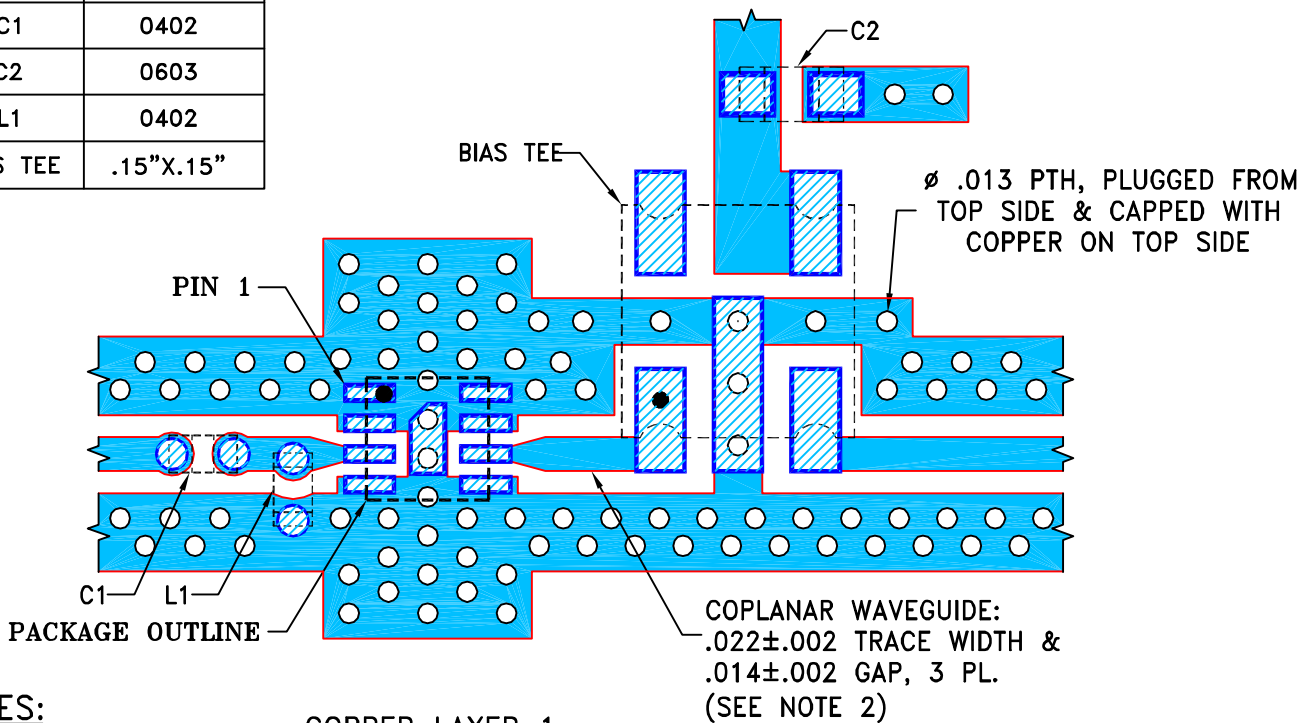
Mini-Circuits ISO 9001 & ISO 14001 Certified



REVISIONS					
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M158705	NEW RELEASE	01/05/17	GF	RS

SUGGESTED MOUNTING CONFIGURATION FOR
MC1631-1 CASE STYLE, "08AM14" PIN CODE

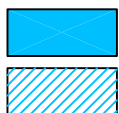
COMPONENT	SIZE
DUT	2X2mm 8 LEAD MCLP
C1	0402
C2	0603
L1	0402
BIAS TEE	.15"X.15"



NOTES:

COPPER LAYER 1

1. PCB IS MULTILAYER PCB, SEE STASK-UP DIAGRAM.
2. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001"; COPPER: 1/2 OZ. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
3. CHIP COMPONENT FOOTPRINTS ARE SHOWN FOR REFERENCE.
4. COPPER LAYER 3 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 GF	12/19/16
TOLERANCES ON:	CHECKED IL	01/05/17
2 PL DECIMALS ±	APPROVED RS	01/05/17
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		



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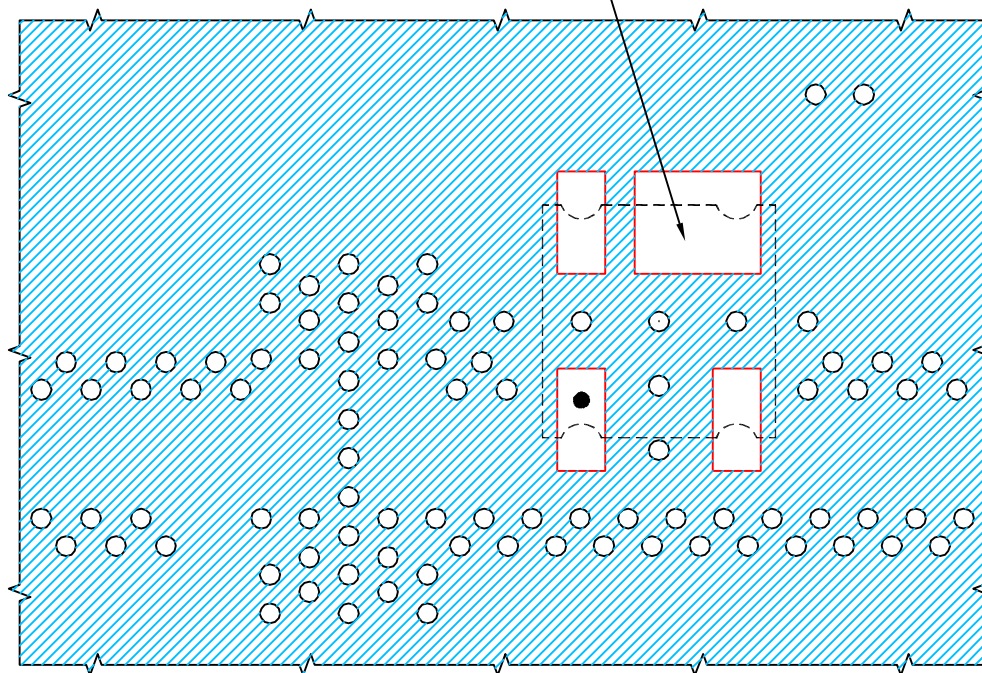
PL, 08AM14, MC1631-1, TB-913+

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

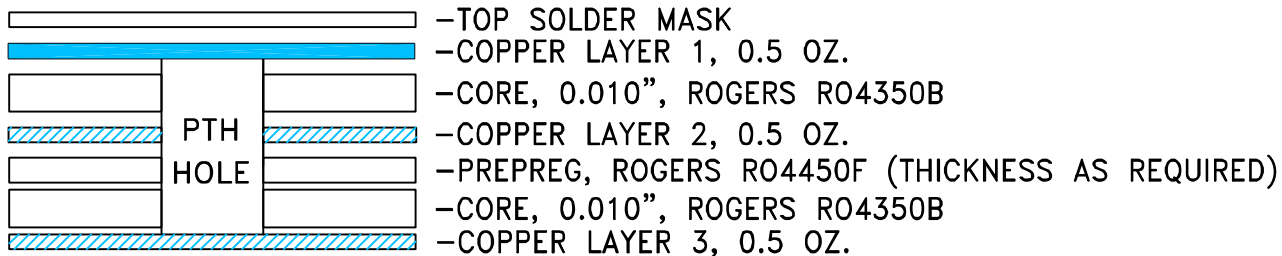
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-490	OR
FILE:	98PL490	SCALE: 8:1	SHEET: 1 OF 2

SCRATCH IN COPPER
LAYER 2 UNDER
BIAS TEE PADS, 4 PL.



COPPER LAYER 2

STACK-UP DIAGRAM



1. TOTAL FINISHED THICKNESS 0.032" ± 10%.
2. PTH HOLES PRESENT FROM COPPER LAYER 1 TO 3.

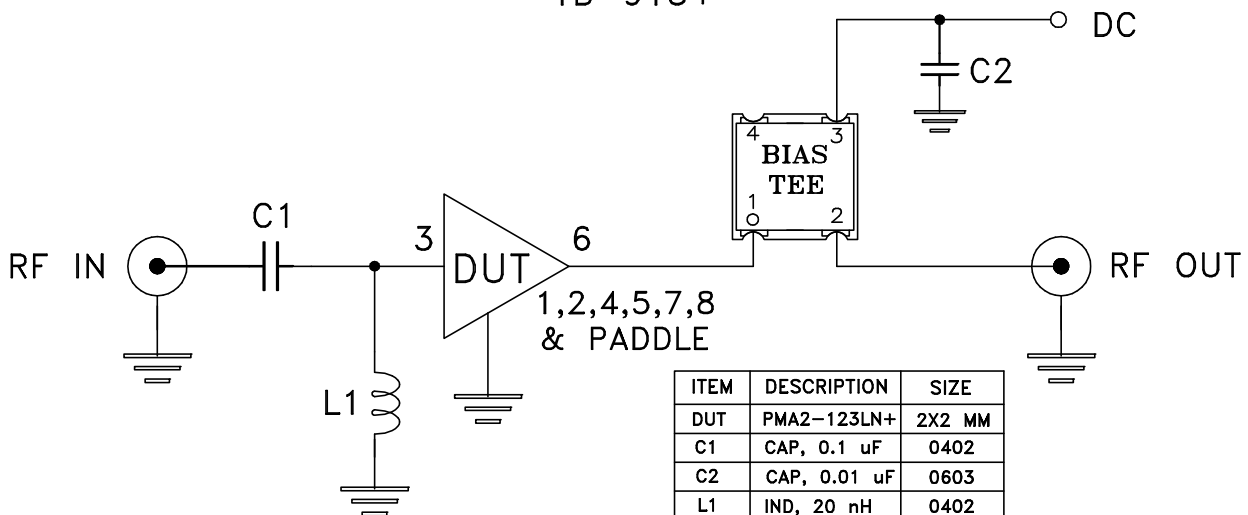
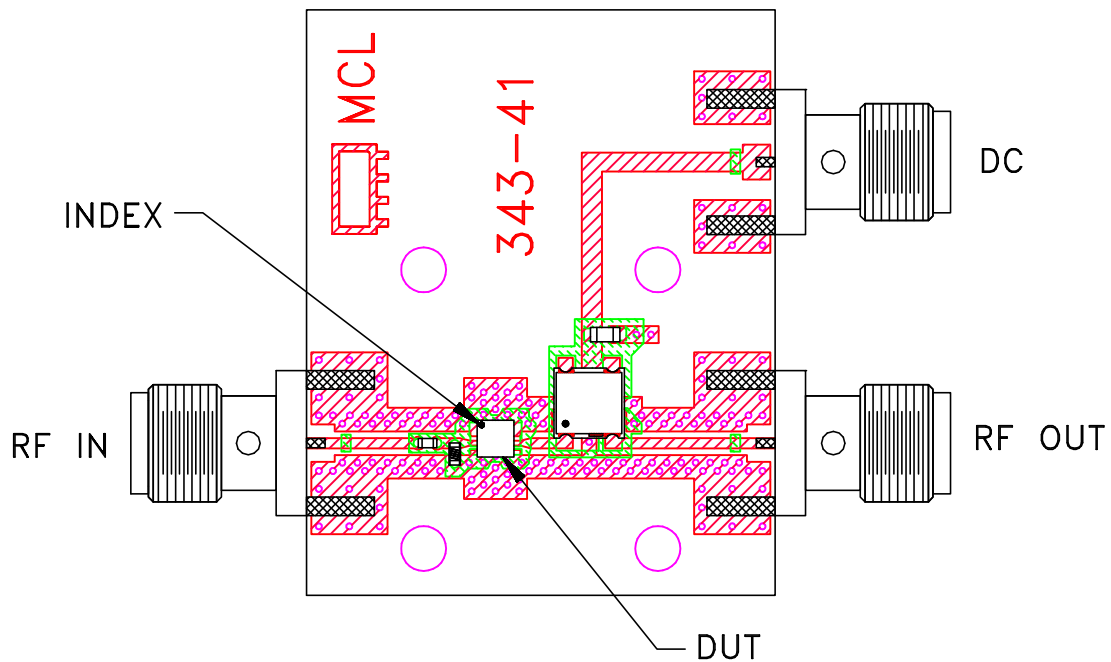
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ALL DIMENSIONS ARE IN INCHES EXCEPT OTHERWISE SPECIFIED

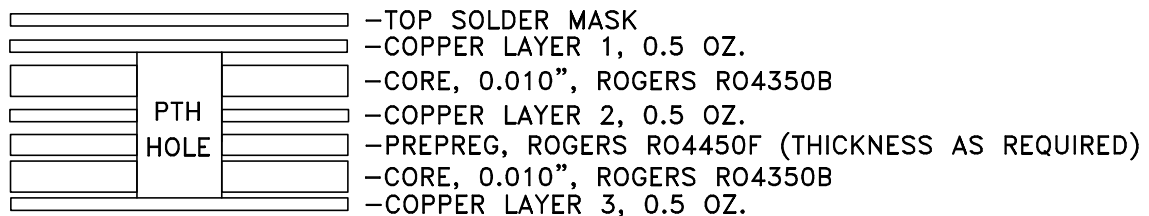
SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-490	REV: OR
FILE: 98PL490	SCALE: 8:1	SHEET: 2 OF 2	

Evaluation Board and Circuit



Schematic Diagram


ITEM	DESCRIPTION	SIZE
DUT	PMA2-123LN+	2X2 MM
C1	CAP, 0.1 uF	0402
C2	CAP, 0.01 uF	0603
L1	IND, 20 nH	0402
BIAS	TCBT-123+	.15"X.15"



Stack-up Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent, Dielectric Constant=3.5, Thickness=.032 inch.

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



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Specification	Test/Inspection Condition	Reference/Spec
---------------	---------------------------	----------------

monoethanolamine at 63°C to 70°C