COAXIAL

Low Noise Amplifier ZX60-P103LN+

50Ω 50 to 3000 MHz SMA Female

THE BIG DEAL

- Ultra Low Noise Figure, 0.5 dB typ.
- High Dynamic Range
- Protected by US patent 6,790,049

Generic photo used for illustration purposes only

APPLICATIONS

- Front-end amplifier
- Cellular
- GPS
- Bluetooth
- Lab
- Instrumentation
- Test equipment

Model No.	ZX60-P103LN+
Case Style	GC957
Connectors	SMA Female

+RoHS Compliant
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

PRODUCT OVERVIEW

The ZX60-P103LN+ (RoHS compliant) uses Mini-Circuits' E-pHEMT technology to offer ultra low noise figure over a broad frequency range and high IP3. Housed in a rugged, cost effective unibody chassis, this amplifier supports a wide variety of applications requiring moderate power output, low distortion and 50 ohm matched input/output ports.

KEY FEATURES

Feature	Advantages
Ultra Low Noise Figure, 0.5 dB at 1GHz	Outstanding world class noise figure performance.
High IP3 vs. DC power consumption 39.4 dBm typical at 1 GHz	Combining Low Noise and High IP3 makes this model ideal for use in Low Noise Receiver Front End (RFE)
Max. Input Power, +25 dBm	Ruggedized design operates to high input powers often seen at receiver inputs.
Very Small Size, 0.75" x 0.75"	The unique unibody size and construction enable the ZX60-P103LN+ to be used in extremely compact connectorized applications.

Low Noise Amplifier ZX60-P103LN+

50Ω 50 to 3000 MHz SMA Female

ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		50		3000	MHz
Noise Figure	50		1.2		dB
	500		0.4		
	1000		0.5		
	2000		0.6		
	3000		1.0		
Gain	50	23.0	25.2		dB
	500	18.0	20.3		
	1000	13.5	15.6		
	2000	8.0	10.0		
	3000	4.5	6.9		
Output Power at 1dB Compression	50		19.8		dBm
	500		22.3		
	1000		22.4		
	2000		23.2		
	3000		23.8		
Output IP3	50		36.9		dBm
	500		39.7		
	1000		39.4		
	2000		42.6		
	3000		44.3		
Input VSWR	50		2.15		:1
	500		1.91		
	1000		1.65		
	2000		1.48		
	3000		1.27		
Output VSWR	50		1.27		:1
	500		1.10		
	1000		1.47		
	2000		2.36		
	3000		1.80		
Active Directivity (Isolation-Gain)	50		6.46		dB
	500		5.82		
	1000		6.27		
	2000		6.99		
	3000		7.01		
DC Supply Voltage		—	5.0	—	V
Supply Current		—	95	120	mA

Low Noise Amplifier ZX60-P103LN+

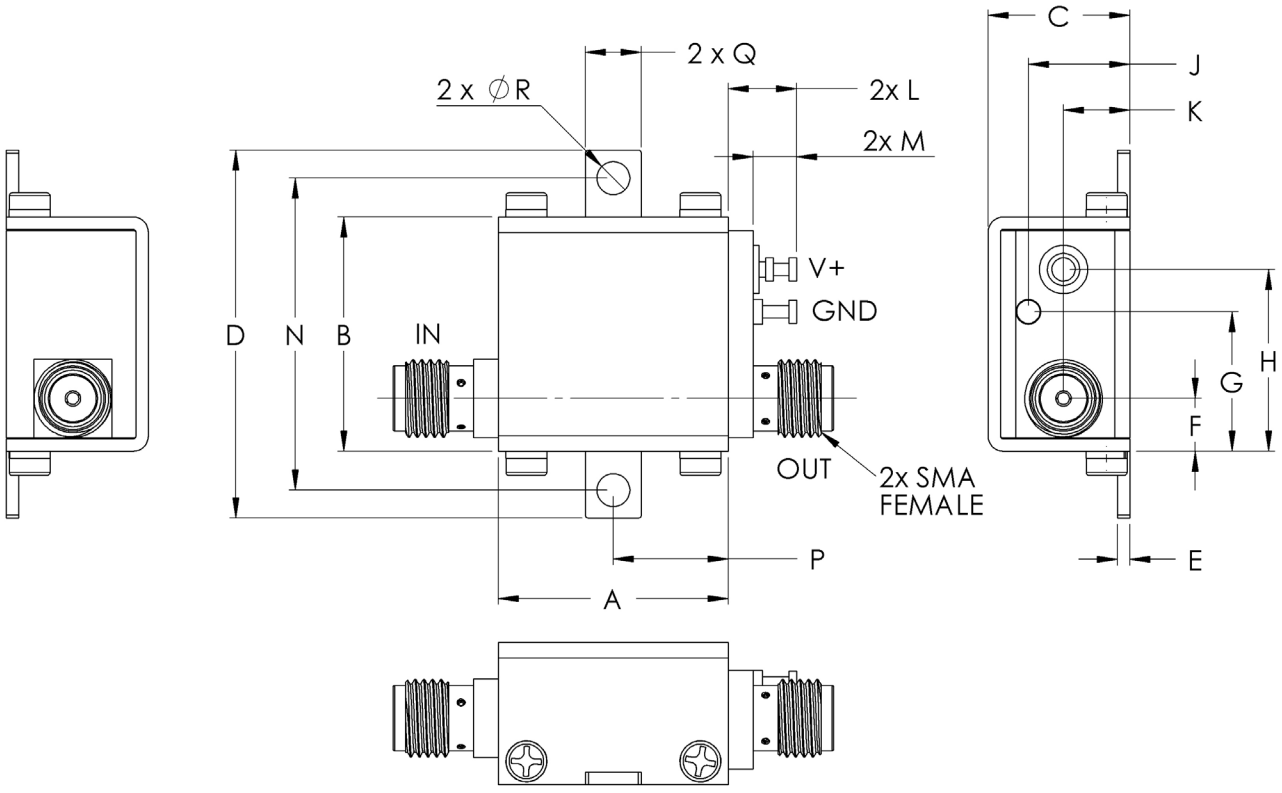
50Ω 50 to 3000 MHz SMA Female

ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C Case
Storage Temperature	-55°C to 100°C
DC Voltage	+5.5V
Input RF Power (no damage)	+21 dBm
Power Consumption	0.66W

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

OUTLINE DRAWING



⚠ NOTE: When soldering the DC connections, caution must be used to avoid overheating the DC terminal. See Application Note. AN-40-010.

OUTLINE DIMENSIONS (Inches / mm)

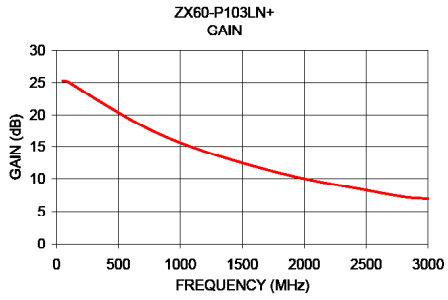
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	wt
.74	.75	.46	1.18	.04	.17	.45	.59	.33	.21	.22	.14	1.00	.37	.18	.106	grams
18.80	19.1	11.68	30.0	1.02	4.32	11.4	14.99	8.38	5.33	5.59	3.56	25.40	9.40	4.57	2.69	23.0

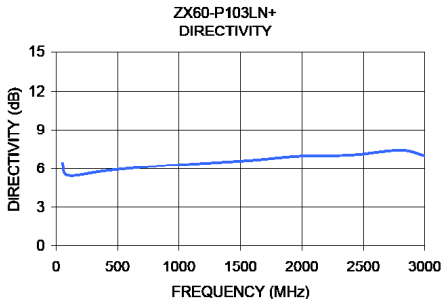
Low Noise Amplifier ZX60-P103LN+

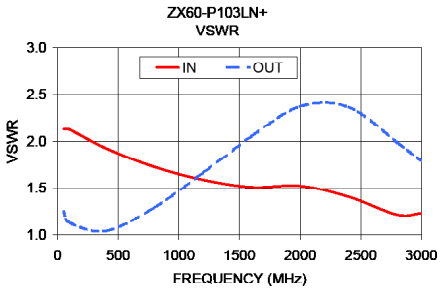
50Ω 50 to 3000 MHz SMA Female

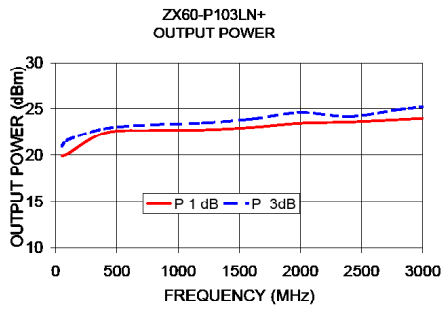
TYPICAL PERFORMANCE DATA/CURVES

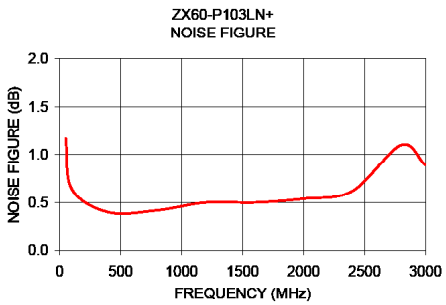
Frequency (MHz)	Gain (dB)	Directivity (dB)	VSVR (:1)		Power Out @1 dB COMPR. (dBm)	Noise Figure (dB)	Output IP3 (dBm)
			IN	OUT			
50.00	25.29	6.46	2.13	1.25	19.9	1.2	37.0
100.00	25.05	5.47	2.12	1.13	20.1	0.6	37.9
400.00	21.49	5.82	1.93	1.04	22.4	0.4	39.4
800.00	17.27	6.18	1.73	1.29	22.7	0.4	40.1
1200.00	14.22	6.42	1.59	1.67	22.7	0.5	40.6
1600.00	11.92	6.66	1.51	2.06	23.0	0.5	41.4
2000.00	10.03	6.99	1.53	2.37	23.5	0.5	42.6
2400.00	8.60	7.06	1.41	2.37	23.6	0.6	43.8
2800.00	7.25	7.43	1.21	1.99	23.8	1.1	45.7
3000.00	6.95	7.01	1.23	1.80	24.0	0.9	44.3

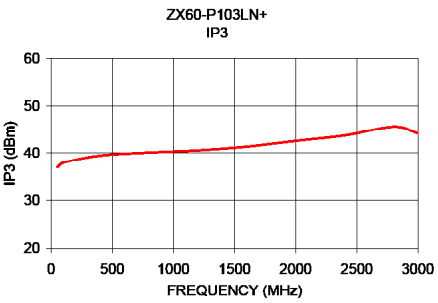












NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

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

Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions

Definitions:

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

TEST CONDITIONS: Vd = 5.00V, Id = 101.64mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20.0	25.50	35.16	7.24	12.05	1.35	0.98	35.54	19.86	2.68
60.0	25.22	31.34	8.92	20.28	1.11	0.88	37.84	19.59	1.18
100.0	25.04	30.49	8.94	24.19	1.07	0.85	37.96	20.20	0.82
200.0	24.04	29.41	9.22	30.63	1.08	0.84	39.10	21.55	0.57
300.0	22.75	28.36	9.63	39.30	1.11	0.84	39.48	22.11	0.81
400.0	21.47	27.31	10.04	33.58	1.14	0.84	40.23	22.41	0.60
500.0	20.26	26.26	10.42	27.13	1.16	0.84	40.22	22.58	0.67
600.0	19.16	25.26	10.80	22.99	1.17	0.83	40.13	22.62	0.66
700.0	18.15	24.33	11.14	20.04	1.17	0.83	40.31	22.64	0.71
800.0	17.21	23.47	11.43	17.75	1.18	0.82	40.67	22.70	0.79
900.0	16.36	22.69	12.27	15.85	1.19	0.80	40.81	22.73	0.97
1000.0	15.58	21.95	12.39	14.41	1.19	0.79	40.23	22.55	0.86
1100.0	14.85	21.29	12.62	13.09	1.19	0.77	40.98	22.74	0.91
1200.0	14.15	20.68	12.78	11.96	1.19	0.75	41.33	22.81	1.03
1300.0	13.48	20.14	12.81	10.96	1.19	0.73	40.75	22.83	1.07
1400.0	12.70	19.78	12.52	9.91	1.21	0.73	41.12	22.91	1.17
1500.0	12.33	19.12	13.87	9.75	1.20	0.69	40.88	23.02	1.31
1600.0	11.82	18.64	13.49	9.10	1.20	0.66	41.56	23.05	1.17
1700.0	11.30	18.22	13.31	8.58	1.20	0.64	42.40	23.24	1.22
1800.0	10.81	17.82	13.21	8.18	1.20	0.63	42.94	23.32	1.17
1900.0	10.35	17.45	13.20	7.87	1.20	0.61	42.54	23.33	1.31
2000.0	9.91	17.11	13.20	7.64	1.21	0.60	42.92	23.47	0.95
2100.0	9.42	16.84	13.41	7.49	1.22	0.61	44.05	23.65	1.36
2200.0	9.13	16.42	14.12	7.59	1.22	0.60	43.70	23.62	1.46
2300.0	8.81	16.07	14.42	7.62	1.22	0.60	44.20	23.49	1.18
2400.0	8.49	15.74	14.92	7.75	1.22	0.61	45.13	23.62	1.48
2500.0	8.18	15.43	15.58	7.98	1.22	0.62	45.72	23.76	1.30
2600.0	7.88	15.13	16.38	8.31	1.23	0.64	45.68	23.74	1.41
2700.0	7.55	14.88	17.32	8.77	1.24	0.67	48.55	23.78	1.47
2800.0	7.16	14.73	18.88	9.55	1.28	0.71	43.92	23.78	1.83
2900.0	7.01	14.37	20.40	10.27	1.26	0.73	44.59	24.01	1.90
3000.0	6.81	14.06	18.89	10.98	1.25	0.76	47.62	23.91	1.80
3100.0	6.56	13.83	17.03	11.93	1.25	0.79	47.53	23.82	2.03
3200.0	6.29	13.62	15.22	13.01	1.25	0.83	47.06	23.92	2.07
3300.0	6.01	13.45	13.58	14.17	1.25	0.86	46.60	24.01	2.15
3400.0	5.72	13.31	12.17	15.20	1.26	0.89	48.74	23.84	2.30
3600.0	5.07	13.11	9.84	16.06	1.28	0.94	48.13	23.61	2.87
3800.0	4.43	12.97	8.09	14.93	1.29	0.97	49.94	23.36	2.48
4000.0	3.74	12.90	7.00	13.26	1.32	0.98	47.20	22.98	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 = 4.75V, Id = 96.48mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20.0	25.44	35.14	7.31	12.10	1.36	0.98	35.94	19.42	2.67
60.0	25.17	31.33	8.87	20.09	1.11	0.89	37.48	19.12	1.15
100.0	24.99	30.48	8.88	23.97	1.07	0.86	37.62	19.77	0.79
200.0	24.00	29.38	9.14	30.24	1.07	0.84	38.85	21.20	0.55
300.0	22.72	28.33	9.56	37.71	1.11	0.84	39.04	21.81	0.72
400.0	21.44	27.28	9.98	33.33	1.13	0.84	39.90	22.09	0.61
500.0	20.23	26.24	10.36	27.19	1.15	0.84	39.64	22.28	0.69
600.0	19.13	25.24	10.72	23.07	1.17	0.84	39.61	22.32	0.64
700.0	18.12	24.31	11.08	20.13	1.17	0.83	39.91	22.37	0.69
800.0	17.18	23.45	11.37	17.83	1.18	0.82	40.24	22.42	0.75
900.0	16.34	22.66	12.20	15.92	1.19	0.80	40.44	22.46	0.97
1000.0	15.56	21.93	12.33	14.47	1.19	0.79	40.00	22.30	0.88
1100.0	14.83	21.26	12.57	13.14	1.19	0.77	40.47	22.50	0.88
1200.0	14.13	20.66	12.75	12.01	1.19	0.75	40.64	22.59	0.97
1300.0	13.46	20.11	12.80	10.99	1.19	0.73	40.28	22.67	1.06
1400.0	12.68	19.76	12.53	9.94	1.21	0.73	40.87	22.75	1.13
1500.0	12.32	19.09	13.87	9.78	1.20	0.69	40.73	22.89	1.27
1600.0	11.80	18.61	13.50	9.12	1.19	0.66	41.26	22.94	1.15
1700.0	11.29	18.19	13.33	8.60	1.20	0.64	41.92	23.07	1.20
1800.0	10.80	17.80	13.25	8.20	1.20	0.63	42.61	23.18	1.18
1900.0	10.35	17.42	13.23	7.89	1.20	0.61	42.93	23.23	1.31
2000.0	9.90	17.08	13.25	7.66	1.20	0.60	42.79	23.34	0.97
2100.0	9.41	16.81	13.46	7.51	1.22	0.61	43.53	23.46	1.34
2200.0	9.12	16.39	14.19	7.60	1.21	0.60	43.17	23.43	1.46
2300.0	8.80	16.04	14.48	7.63	1.21	0.60	43.10	23.30	1.24
2400.0	8.48	15.71	15.00	7.77	1.22	0.61	44.19	23.41	1.48
2500.0	8.17	15.40	15.66	8.00	1.22	0.62	44.79	23.54	1.29
2600.0	7.87	15.10	16.49	8.34	1.23	0.64	45.83	23.52	1.42
2700.0	7.55	14.86	17.43	8.80	1.24	0.67	46.54	23.56	1.45
2800.0	7.15	14.70	19.02	9.58	1.28	0.71	45.31	23.55	1.76
2900.0	7.01	14.34	20.48	10.31	1.26	0.73	44.16	23.76	2.02
3000.0	6.80	14.03	18.88	11.03	1.25	0.76	45.93	23.64	1.75
3100.0	6.55	13.80	17.00	11.99	1.25	0.79	47.02	23.55	1.94
3200.0	6.28	13.60	15.19	13.09	1.25	0.83	46.53	23.65	2.04
3300.0	6.00	13.42	13.54	14.27	1.25	0.86	47.07	23.70	2.03
3400.0	5.70	13.29	12.11	15.32	1.26	0.89	47.82	23.52	2.32
3600.0	5.05	13.09	9.80	16.18	1.28	0.94	49.55	23.27	2.76
3800.0	4.41	12.95	8.06	14.99	1.29	0.97	51.01	22.99	2.53
4000.0	3.72	12.90	6.97	13.29	1.32	0.99	47.62	22.59	2.94

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 = 106.09mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20.0	25.52	35.24	7.24	12.02	1.36	0.98	36.00	20.26	2.68
60.0	25.25	31.37	8.90	20.51	1.11	0.89	38.00	20.02	1.16
100.0	25.06	30.53	8.95	24.54	1.07	0.85	38.01	20.60	0.80
200.0	24.06	29.45	9.22	31.28	1.08	0.84	39.00	21.85	0.57
300.0	22.77	28.41	9.65	41.26	1.11	0.84	39.63	22.37	0.82
400.0	21.49	27.35	10.07	33.16	1.14	0.84	40.37	22.67	0.58
500.0	20.28	26.30	10.44	26.83	1.16	0.84	40.26	22.82	0.72
600.0	19.18	25.30	10.81	22.78	1.17	0.83	40.33	22.85	0.66
700.0	18.17	24.37	11.16	19.89	1.18	0.83	40.58	22.87	0.71
800.0	17.22	23.52	11.44	17.63	1.18	0.82	40.81	22.93	0.80
900.0	16.38	22.73	12.29	15.76	1.19	0.80	40.98	22.94	0.94
1000.0	15.60	21.99	12.41	14.32	1.19	0.79	40.71	22.75	0.85
1100.0	14.86	21.33	12.64	13.02	1.19	0.77	41.29	22.93	0.91
1200.0	14.17	20.72	12.79	11.90	1.19	0.75	41.40	22.97	1.04
1300.0	13.49	20.18	12.82	10.90	1.20	0.73	41.02	22.96	1.06
1400.0	12.71	19.82	12.55	9.86	1.21	0.72	41.52	23.02	1.17
1500.0	12.35	19.16	13.89	9.69	1.20	0.69	41.49	23.09	1.32
1600.0	11.83	18.68	13.49	9.04	1.20	0.66	41.95	23.12	1.15
1700.0	11.31	18.26	13.32	8.53	1.20	0.64	42.70	23.34	1.25
1800.0	10.83	17.86	13.22	8.13	1.20	0.63	42.67	23.40	1.17
1900.0	10.37	17.49	13.20	7.82	1.20	0.61	42.82	23.39	1.36
2000.0	9.92	17.15	13.21	7.60	1.21	0.60	43.07	23.55	0.99
2100.0	9.43	16.88	13.42	7.44	1.22	0.60	43.79	23.78	1.32
2200.0	9.14	16.46	14.14	7.54	1.22	0.60	44.16	23.75	1.46
2300.0	8.82	16.10	14.41	7.56	1.22	0.60	44.06	23.61	1.24
2400.0	8.50	15.78	14.91	7.70	1.22	0.61	45.16	23.77	1.52
2500.0	8.18	15.47	15.56	7.92	1.22	0.62	45.70	23.94	1.30
2600.0	7.89	15.17	16.34	8.25	1.23	0.64	46.80	23.92	1.47
2700.0	7.56	14.92	17.28	8.70	1.24	0.67	49.33	23.95	1.45
2800.0	7.17	14.77	18.88	9.47	1.28	0.71	45.03	23.96	1.82
2900.0	7.02	14.40	20.40	10.18	1.26	0.73	44.62	24.20	2.05
3000.0	6.82	14.10	18.90	10.88	1.25	0.76	47.18	24.14	1.80
3100.0	6.57	13.86	17.07	11.80	1.25	0.79	47.15	24.04	2.01
3200.0	6.30	13.66	15.29	12.87	1.25	0.82	46.37	24.14	2.12
3300.0	6.02	13.48	13.64	14.01	1.26	0.86	47.00	24.26	2.17
3400.0	5.73	13.34	12.21	15.03	1.26	0.89	46.64	24.10	2.35
3600.0	5.08	13.14	9.88	15.96	1.28	0.94	48.07	23.88	2.78
3800.0	4.44	13.00	8.11	14.92	1.29	0.97	50.42	23.68	2.49
4000.0	3.75	12.94	7.01	13.30	1.33	0.99	48.24	23.30	3.04

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 = 106.20mA @ Temperature = -40°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20.0	26.16	34.62	6.96	10.47	1.18	0.93	36.54	19.86	2.61
60.0	25.44	30.69	9.48	18.80	1.05	0.82	42.00	19.37	0.95
100.0	25.12	29.88	9.92	23.54	1.04	0.78	41.30	20.02	0.60
200.0	24.09	28.87	10.55	27.71	1.07	0.77	42.57	21.96	0.41
300.0	22.85	27.90	11.00	32.25	1.10	0.77	41.86	22.88	0.58
400.0	21.61	26.91	11.36	42.12	1.13	0.78	41.78	23.11	0.48
500.0	20.43	25.92	11.59	32.11	1.14	0.78	43.23	23.32	0.51
600.0	19.36	24.97	11.87	25.40	1.15	0.78	43.58	23.42	0.50
700.0	18.37	24.06	12.12	21.63	1.16	0.78	43.33	23.48	0.60
800.0	17.45	23.22	12.27	18.55	1.16	0.78	43.85	23.52	0.53
900.0	16.61	22.47	13.37	16.17	1.17	0.76	44.60	23.60	0.64
1000.0	15.87	21.72	13.24	14.84	1.17	0.74	44.18	23.56	0.63
1100.0	15.14	21.06	13.40	13.48	1.17	0.73	45.32	23.72	0.68
1200.0	14.46	20.46	13.51	12.44	1.17	0.71	46.56	23.95	0.67
1300.0	13.80	19.92	13.43	11.43	1.17	0.70	44.94	24.23	0.78
1400.0	13.09	19.51	12.93	10.47	1.18	0.69	45.75	24.32	0.86
1500.0	12.63	18.96	14.50	10.29	1.18	0.67	45.35	24.59	1.26
1600.0	12.12	18.47	13.47	9.46	1.17	0.64	46.24	24.72	0.90
1700.0	11.60	18.07	13.04	8.85	1.17	0.62	45.59	24.60	0.85
1800.0	11.12	17.67	12.86	8.43	1.18	0.61	46.69	24.68	0.92
1900.0	10.67	17.29	12.92	8.15	1.18	0.60	44.62	24.87	0.85
2000.0	10.24	16.95	12.94	7.92	1.18	0.59	44.12	24.86	0.84
2100.0	9.78	16.64	12.88	7.73	1.19	0.59	46.03	24.77	1.00
2200.0	9.41	16.31	13.75	7.78	1.19	0.59	45.34	24.74	1.23
2300.0	9.12	15.93	13.61	7.66	1.18	0.58	45.17	24.73	1.02
2400.0	8.80	15.60	14.02	7.76	1.18	0.58	45.11	24.71	1.03
2500.0	8.53	15.25	14.68	8.04	1.18	0.60	46.35	24.72	0.86
2600.0	8.25	14.94	15.57	8.34	1.18	0.61	46.55	24.75	1.05
2700.0	7.97	14.64	16.75	8.84	1.19	0.64	43.86	24.88	1.51
2800.0	7.64	14.43	17.62	9.43	1.21	0.67	42.20	24.77	1.55
2900.0	7.31	14.24	21.30	10.42	1.24	0.71	45.31	24.92	1.73
3000.0	7.25	13.80	19.23	10.86	1.19	0.72	43.16	24.85	1.58
3100.0	7.03	13.53	17.02	11.84	1.18	0.75	44.81	24.73	1.37
3200.0	6.80	13.30	15.19	13.13	1.17	0.79	44.60	24.83	1.36
3300.0	6.52	13.12	13.56	14.17	1.18	0.82	44.08	24.82	1.50
3400.0	6.30	12.90	12.22	15.37	1.17	0.85	43.08	24.75	1.70
3600.0	5.69	12.68	10.09	16.00	1.19	0.89	42.03	24.44	1.86
3800.0	5.07	12.51	8.16	14.40	1.19	0.92	42.93	24.03	1.87
4000.0	4.40	12.43	6.80	12.24	1.20	0.93	41.80	23.60	2.08

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 = 4.75V, Id = 100.90mA @ Temperature = -40°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20.0	26.17	34.41	6.79	9.62	1.13	0.90	36.32	19.35	2.58
60.0	25.36	30.55	9.41	18.55	1.05	0.82	41.54	18.88	0.95
100.0	25.03	29.74	9.86	23.50	1.04	0.78	40.64	19.55	0.60
200.0	24.01	28.76	10.50	27.78	1.06	0.77	41.82	21.49	0.42
300.0	22.78	27.79	10.96	32.53	1.10	0.77	41.15	22.44	0.56
400.0	21.56	26.83	11.34	44.56	1.12	0.77	41.48	22.68	0.45
500.0	20.39	25.85	11.56	32.64	1.14	0.78	42.06	22.89	0.51
600.0	19.32	24.91	11.80	25.54	1.15	0.78	42.60	22.99	0.48
700.0	18.34	24.01	12.07	21.72	1.16	0.78	42.68	23.05	0.53
800.0	17.43	23.18	12.22	18.61	1.16	0.78	43.34	23.10	0.58
900.0	16.60	22.43	13.34	16.19	1.17	0.76	44.00	23.18	0.61
1000.0	15.85	21.69	13.19	14.88	1.17	0.74	43.53	23.15	0.62
1100.0	15.13	21.04	13.37	13.50	1.17	0.73	44.71	23.31	0.64
1200.0	14.46	20.44	13.49	12.47	1.17	0.71	45.67	23.55	0.73
1300.0	13.80	19.90	13.42	11.46	1.17	0.70	44.54	23.87	0.78
1400.0	13.09	19.49	12.92	10.50	1.18	0.69	44.57	23.95	0.82
1500.0	12.63	18.94	14.53	10.34	1.18	0.67	44.48	24.26	1.29
1600.0	12.12	18.45	13.47	9.49	1.17	0.64	44.90	24.41	0.82
1700.0	11.60	18.05	13.03	8.88	1.17	0.62	44.82	24.25	0.90
1800.0	11.12	17.66	12.87	8.45	1.17	0.61	44.76	24.35	0.83
1900.0	10.68	17.28	12.93	8.18	1.18	0.60	44.98	24.59	0.97
2000.0	10.25	16.93	12.95	7.94	1.18	0.59	43.94	24.56	0.63
2100.0	9.80	16.62	12.92	7.76	1.18	0.58	44.57	24.46	0.92
2200.0	9.42	16.30	13.80	7.79	1.19	0.59	44.30	24.44	1.13
2300.0	9.13	15.91	13.62	7.67	1.18	0.58	43.84	24.41	0.86
2400.0	8.81	15.58	14.02	7.76	1.18	0.58	44.42	24.41	1.07
2500.0	8.54	15.24	14.69	8.04	1.18	0.59	44.80	24.43	0.91
2600.0	8.26	14.92	15.57	8.34	1.18	0.61	45.77	24.45	0.95
2700.0	7.99	14.62	16.72	8.85	1.18	0.64	43.42	24.56	0.91
2800.0	7.66	14.41	17.56	9.43	1.20	0.67	41.85	24.46	1.18
2900.0	7.31	14.24	21.34	10.45	1.24	0.71	44.28	24.60	1.63
3000.0	7.27	13.78	19.24	10.88	1.18	0.72	42.45	24.50	1.18
3100.0	7.05	13.51	17.03	11.86	1.18	0.75	43.59	24.36	1.54
3200.0	6.82	13.28	15.16	13.16	1.17	0.79	43.88	24.46	1.55
3300.0	6.54	13.10	13.53	14.20	1.17	0.82	43.82	24.44	1.51
3400.0	6.33	12.88	12.21	15.43	1.17	0.84	42.40	24.33	1.70
3600.0	5.72	12.65	10.07	16.04	1.18	0.89	41.87	24.01	2.04
3800.0	5.10	12.48	8.14	14.36	1.18	0.92	41.49	23.57	1.75
4000.0	4.43	12.40	6.79	12.16	1.19	0.92	41.02	23.13	2.14

Typical Performance Data

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

TEST CONDITIONS: Vd = 5.25V, Id = 113.02mA @ Temperature = -40°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20.0	26.33	34.51	6.78	9.81	1.13	0.91	36.37	20.38	2.70
60.0	25.50	30.64	9.61	18.96	1.05	0.81	41.16	19.86	0.98
100.0	25.16	29.87	10.00	23.78	1.04	0.78	41.31	20.51	0.64
200.0	24.12	28.88	10.65	27.64	1.07	0.76	42.95	22.37	0.41
300.0	22.88	27.90	11.13	31.58	1.10	0.76	42.82	23.26	0.85
400.0	21.63	26.91	11.48	39.41	1.13	0.77	43.21	23.49	0.48
500.0	20.46	25.92	11.71	31.92	1.14	0.78	43.28	23.70	0.53
600.0	19.39	24.96	11.96	25.40	1.15	0.78	43.79	23.78	0.51
700.0	18.40	24.06	12.20	21.63	1.16	0.78	43.67	23.83	0.55
800.0	17.48	23.22	12.37	18.54	1.16	0.77	44.32	23.88	0.56
900.0	16.65	22.47	13.49	16.15	1.17	0.75	44.73	23.94	0.63
1000.0	15.90	21.72	13.31	14.82	1.17	0.74	44.13	23.89	0.65
1100.0	15.18	21.07	13.47	13.46	1.17	0.73	44.54	24.04	0.70
1200.0	14.50	20.47	13.57	12.43	1.17	0.71	44.87	24.24	0.76
1300.0	13.83	19.93	13.49	11.42	1.17	0.70	44.39	24.46	0.78
1400.0	13.12	19.51	12.97	10.46	1.18	0.69	44.80	24.54	0.82
1500.0	12.66	18.96	14.56	10.29	1.18	0.67	45.25	24.78	1.27
1600.0	12.15	18.48	13.46	9.46	1.17	0.64	44.84	24.84	0.85
1700.0	11.63	18.07	13.00	8.84	1.17	0.62	45.53	24.80	0.90
1800.0	11.15	17.68	12.83	8.42	1.17	0.61	46.69	24.88	0.88
1900.0	10.70	17.30	12.88	8.14	1.18	0.59	45.83	25.00	0.95
2000.0	10.26	16.95	12.88	7.90	1.18	0.59	44.93	25.02	0.64
2100.0	9.82	16.65	12.84	7.72	1.18	0.58	46.66	25.04	0.97
2200.0	9.44	16.32	13.70	7.76	1.19	0.59	46.28	25.00	1.16
2300.0	9.15	15.94	13.53	7.64	1.18	0.57	46.20	24.98	0.87
2400.0	8.83	15.61	13.92	7.73	1.18	0.58	46.23	24.98	1.10
2500.0	8.56	15.26	14.58	8.01	1.18	0.59	51.61	24.99	0.94
2600.0	8.28	14.95	15.46	8.31	1.18	0.61	51.52	25.02	0.99
2700.0	8.00	14.65	16.61	8.81	1.19	0.63	45.28	25.15	1.01
2800.0	7.67	14.44	17.47	9.38	1.20	0.67	43.32	25.04	1.25
2900.0	7.33	14.26	21.22	10.38	1.23	0.71	47.08	25.20	1.61
3000.0	7.28	13.81	19.23	10.81	1.18	0.72	45.12	25.14	1.25
3100.0	7.07	13.54	17.06	11.79	1.18	0.75	48.51	25.03	1.56
3200.0	6.84	13.30	15.24	13.06	1.17	0.79	46.73	25.12	1.58
3300.0	6.56	13.12	13.62	14.10	1.17	0.82	46.53	25.12	1.58
3400.0	6.35	12.90	12.29	15.30	1.17	0.84	44.94	25.05	1.77
3600.0	5.73	12.67	10.14	15.93	1.18	0.88	44.93	24.75	2.08
3800.0	5.11	12.50	8.18	14.34	1.18	0.92	44.14	24.35	1.95
4000.0	4.44	12.42	6.82	12.19	1.20	0.92	42.99	23.96	2.23

Typical Performance Data

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

TEST CONDITIONS: Vd = 5.00V, Id = 93.98mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20.0	24.07	36.06	7.25	14.37	1.74	1.05	33.39	18.92	2.83
60.0	24.34	32.08	7.63	27.34	1.21	1.00	35.27	19.05	1.31
100.0	24.38	31.14	7.39	29.49	1.11	0.98	35.07	19.37	0.90
200.0	23.60	29.79	7.56	38.44	1.08	0.94	36.22	20.18	0.74
300.0	22.38	28.62	8.06	33.83	1.11	0.92	36.97	20.58	1.03
400.0	21.12	27.51	8.45	29.16	1.13	0.91	37.92	20.94	0.80
500.0	19.93	26.45	8.90	24.17	1.15	0.91	37.86	21.00	0.90
600.0	18.84	25.43	9.33	21.30	1.17	0.89	38.01	21.08	0.90
700.0	17.84	24.48	9.74	18.64	1.17	0.88	38.21	21.09	0.93
800.0	16.90	23.62	10.13	16.70	1.18	0.87	38.51	21.17	1.04
900.0	16.09	22.80	10.91	15.01	1.19	0.84	38.72	21.20	1.18
1000.0	15.32	22.05	11.23	13.68	1.19	0.82	38.47	21.09	1.14
1100.0	14.60	21.37	11.58	12.51	1.19	0.80	39.09	21.24	1.20
1200.0	13.92	20.75	11.87	11.46	1.19	0.77	39.22	21.22	1.35
1300.0	13.26	20.20	12.09	10.55	1.19	0.75	38.97	21.17	1.35
1400.0	12.48	19.85	12.31	9.63	1.21	0.74	39.37	21.28	1.54
1500.0	12.17	19.13	13.37	9.40	1.20	0.70	39.37	21.31	1.52
1600.0	11.66	18.64	13.38	8.83	1.19	0.67	40.09	21.32	1.44
1700.0	11.16	18.21	13.47	8.38	1.20	0.65	40.46	21.59	1.49
1800.0	10.68	17.80	13.53	8.01	1.20	0.63	40.77	21.64	1.44
1900.0	10.23	17.42	13.65	7.72	1.20	0.61	40.86	21.58	1.55
2000.0	9.78	17.08	13.74	7.50	1.21	0.60	41.59	21.79	1.31
2100.0	9.32	16.79	14.23	7.42	1.22	0.60	42.32	22.05	1.74
2200.0	9.02	16.38	14.66	7.42	1.21	0.60	42.14	22.03	1.81
2300.0	8.68	16.04	15.02	7.45	1.22	0.60	42.38	21.76	1.53
2400.0	8.34	15.73	15.57	7.59	1.22	0.61	43.29	22.05	1.87
2500.0	8.01	15.43	16.22	7.81	1.23	0.62	42.84	22.39	1.66
2600.0	7.69	15.16	17.00	8.14	1.24	0.64	42.43	22.32	1.82
2700.0	7.33	14.95	18.00	8.63	1.26	0.68	44.71	22.20	1.87
2800.0	7.01	14.73	19.90	9.34	1.28	0.71	45.22	22.31	2.38
2900.0	6.82	14.40	19.75	9.94	1.27	0.74	41.27	22.64	2.35
3000.0	6.57	14.14	18.36	10.70	1.27	0.77	43.93	22.65	2.21
3100.0	6.29	13.94	16.46	11.66	1.27	0.81	43.42	22.41	2.48
3200.0	5.99	13.77	14.65	12.73	1.28	0.85	43.76	22.49	2.47
3300.0	5.66	13.64	12.97	13.82	1.29	0.88	43.87	22.77	2.73
3400.0	5.32	13.56	11.54	14.82	1.31	0.92	43.48	22.61	2.85
3600.0	4.59	13.45	9.21	16.18	1.35	0.98	45.23	22.38	3.39
3800.0	3.80	13.45	7.60	15.77	1.39	1.03	44.51	22.33	3.23
4000.0	2.99	13.51	6.72	14.55	1.47	1.05	47.18	21.94	3.68

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 = 89.71mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20.0	24.13	35.96	7.25	14.38	1.71	1.05	33.62	18.52	2.81
60.0	24.36	32.06	7.63	25.77	1.21	1.00	34.82	18.61	1.30
100.0	24.38	31.08	7.43	28.04	1.11	0.97	34.80	18.97	0.91
200.0	23.59	29.74	7.59	35.58	1.08	0.94	36.04	19.83	0.74
300.0	22.36	28.58	8.08	32.98	1.10	0.92	36.64	20.25	0.96
400.0	21.11	27.47	8.48	29.16	1.13	0.91	37.48	20.62	0.78
500.0	19.91	26.40	8.92	24.30	1.15	0.90	37.46	20.69	0.90
600.0	18.82	25.39	9.35	21.44	1.16	0.89	37.79	20.79	0.87
700.0	17.82	24.45	9.76	18.79	1.17	0.88	37.92	20.80	0.95
800.0	16.89	23.58	10.15	16.83	1.18	0.87	38.33	20.88	1.03
900.0	16.08	22.77	10.93	15.11	1.19	0.84	38.51	20.93	1.19
1000.0	15.31	22.02	11.24	13.77	1.19	0.82	38.00	20.82	1.15
1100.0	14.59	21.34	11.59	12.60	1.19	0.80	38.79	20.98	1.17
1200.0	13.91	20.73	11.89	11.54	1.19	0.77	38.88	20.98	1.26
1300.0	13.25	20.17	12.10	10.62	1.19	0.75	38.72	20.93	1.35
1400.0	12.46	19.82	12.30	9.68	1.21	0.74	39.07	21.04	1.52
1500.0	12.15	19.10	13.40	9.46	1.20	0.70	39.08	21.10	1.52
1600.0	11.65	18.62	13.41	8.89	1.19	0.67	39.59	21.13	1.43
1700.0	11.15	18.18	13.49	8.43	1.20	0.65	40.16	21.40	1.50
1800.0	10.67	17.77	13.58	8.06	1.20	0.63	40.71	21.43	1.50
1900.0	10.22	17.39	13.69	7.77	1.20	0.61	40.60	21.42	1.70
2000.0	9.77	17.06	13.78	7.54	1.21	0.60	41.39	21.61	1.30
2100.0	9.31	16.76	14.26	7.45	1.22	0.61	42.02	21.97	1.70
2200.0	9.01	16.35	14.72	7.47	1.21	0.60	41.38	21.94	1.79
2300.0	8.67	16.01	15.09	7.50	1.22	0.60	42.34	21.66	1.58
2400.0	8.33	15.70	15.66	7.64	1.22	0.61	42.65	21.96	1.80
2500.0	8.00	15.40	16.29	7.87	1.23	0.62	42.64	22.27	1.69
2600.0	7.68	15.13	17.12	8.20	1.24	0.65	42.37	22.20	1.86
2700.0	7.32	14.92	18.13	8.69	1.26	0.68	44.25	22.08	1.84
2800.0	7.00	14.71	20.09	9.42	1.29	0.71	44.92	22.19	2.39
2900.0	6.81	14.37	20.02	10.04	1.27	0.74	41.39	22.48	2.38
3000.0	6.56	14.12	18.53	10.80	1.27	0.77	43.01	22.46	2.29
3100.0	6.28	13.91	16.60	11.77	1.27	0.81	43.17	22.25	2.47
3200.0	5.99	13.74	14.76	12.85	1.28	0.85	43.64	22.38	2.50
3300.0	5.66	13.61	13.05	13.94	1.30	0.88	43.46	22.56	2.68
3400.0	5.32	13.52	11.64	14.94	1.31	0.92	43.22	22.38	2.90
3600.0	4.60	13.40	9.31	16.24	1.35	0.98	44.59	22.11	3.33
3800.0	3.82	13.39	7.68	15.77	1.39	1.02	43.24	22.03	3.18
4000.0	3.03	13.44	6.80	14.55	1.46	1.05	44.82	21.61	3.66

Typical Performance Data

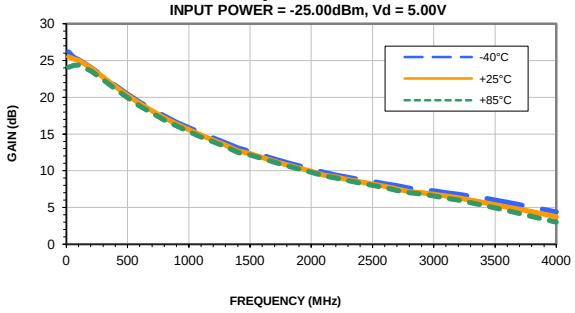
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.25V, Id = 97.14mA @ Temperature = +85°C

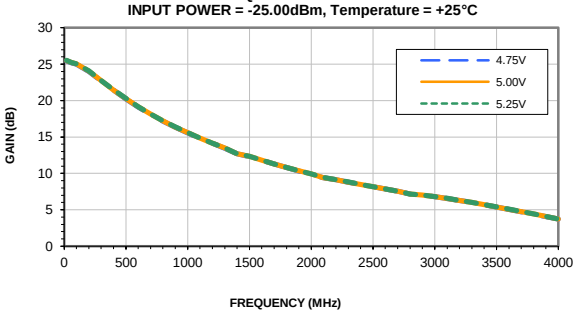
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20.0	24.03	36.09	7.21	14.30	1.75	1.05	33.52	19.00	2.84
60.0	24.32	32.18	7.59	28.37	1.22	1.01	35.01	19.21	1.34
100.0	24.37	31.18	7.36	30.82	1.11	0.98	34.98	19.45	0.92
200.0	23.60	29.83	7.54	41.72	1.09	0.94	36.13	20.17	0.77
300.0	22.39	28.67	8.04	34.10	1.11	0.92	36.78	20.56	0.96
400.0	21.13	27.57	8.46	28.73	1.14	0.91	37.77	20.92	0.81
500.0	19.94	26.50	8.91	23.88	1.16	0.91	37.75	20.97	0.91
600.0	18.84	25.49	9.34	21.07	1.17	0.90	38.00	21.05	0.88
700.0	17.85	24.54	9.76	18.45	1.18	0.88	38.28	21.05	0.96
800.0	16.91	23.68	10.17	16.54	1.19	0.87	38.63	21.14	1.02
900.0	16.10	22.86	10.94	14.87	1.19	0.84	39.03	21.14	1.21
1000.0	15.33	22.12	11.28	13.56	1.19	0.82	38.54	21.05	1.12
1100.0	14.61	21.44	11.63	12.40	1.19	0.80	39.16	21.19	1.19
1200.0	13.93	20.82	11.95	11.35	1.20	0.77	39.46	21.16	1.32
1300.0	13.27	20.27	12.18	10.45	1.20	0.75	39.15	21.08	1.37
1400.0	12.48	19.92	12.39	9.54	1.22	0.74	39.50	21.18	1.56
1500.0	12.17	19.20	13.49	9.30	1.20	0.70	39.44	21.22	1.56
1600.0	11.66	18.72	13.52	8.74	1.20	0.67	40.01	21.21	1.45
1700.0	11.15	18.28	13.60	8.29	1.20	0.65	40.69	21.49	1.53
1800.0	10.68	17.87	13.69	7.94	1.20	0.63	40.96	21.51	1.51
1900.0	10.23	17.50	13.80	7.65	1.21	0.61	41.37	21.46	1.65
2000.0	9.78	17.16	13.90	7.44	1.21	0.60	41.61	21.64	1.32
2100.0	9.32	16.86	14.40	7.36	1.22	0.61	41.91	22.06	1.69
2200.0	9.01	16.45	14.84	7.37	1.22	0.60	41.10	22.05	1.82
2300.0	8.67	16.12	15.22	7.41	1.22	0.60	42.21	21.76	1.62
2400.0	8.33	15.81	15.79	7.55	1.23	0.61	42.74	22.09	1.88
2500.0	8.01	15.51	16.44	7.77	1.23	0.63	42.32	22.44	1.69
2600.0	7.68	15.24	17.26	8.10	1.25	0.65	42.68	22.36	1.92
2700.0	7.32	15.02	18.31	8.58	1.27	0.68	44.11	22.23	1.93
2800.0	7.00	14.80	20.31	9.28	1.29	0.71	44.12	22.35	2.33
2900.0	6.82	14.47	20.28	9.86	1.27	0.74	41.43	22.71	2.32
3000.0	6.56	14.21	18.84	10.57	1.27	0.77	43.83	22.74	2.29
3100.0	6.29	14.01	16.89	11.47	1.28	0.81	43.29	22.49	2.50
3200.0	5.99	13.83	15.01	12.48	1.29	0.84	43.94	22.59	2.59
3300.0	5.66	13.70	13.28	13.48	1.30	0.88	43.87	22.87	2.70
3400.0	5.33	13.61	11.83	14.41	1.32	0.91	43.85	22.76	2.97
3600.0	4.61	13.49	9.45	15.78	1.35	0.97	45.17	22.56	3.35
3800.0	3.84	13.47	7.78	15.65	1.40	1.02	44.54	22.59	3.24
4000.0	3.04	13.52	6.87	14.67	1.47	1.05	47.00	22.23	3.78

Typical Performance Curves

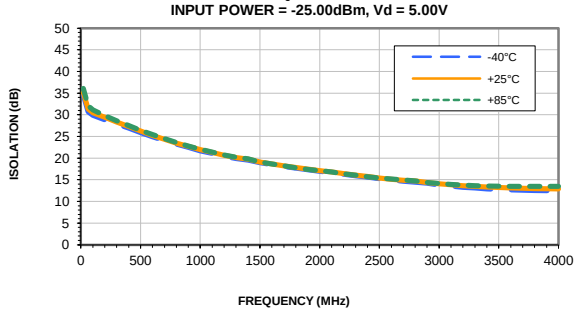
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



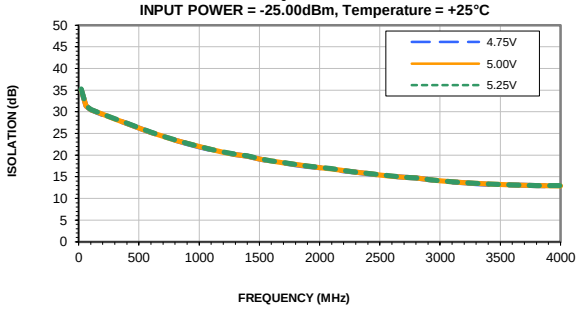
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



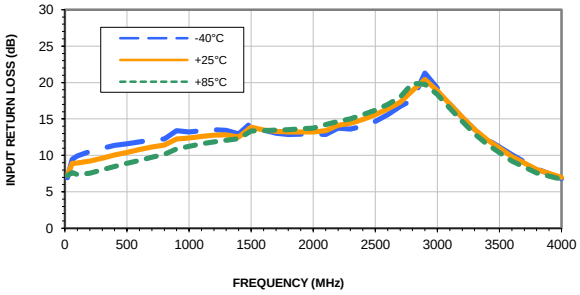
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



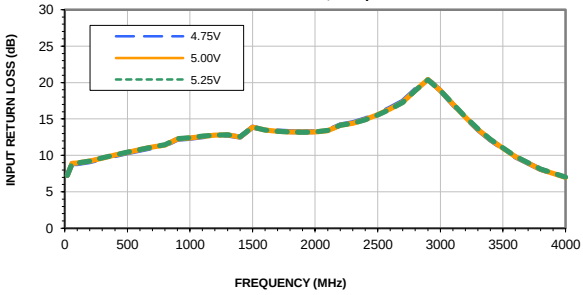
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



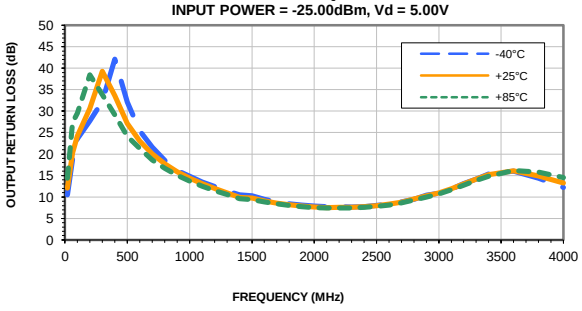
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



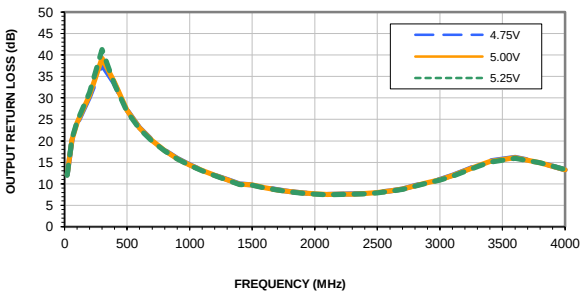
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V

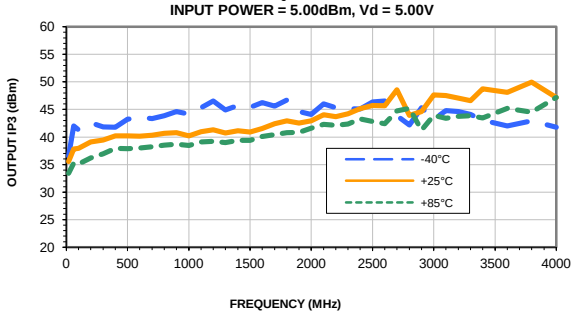


OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

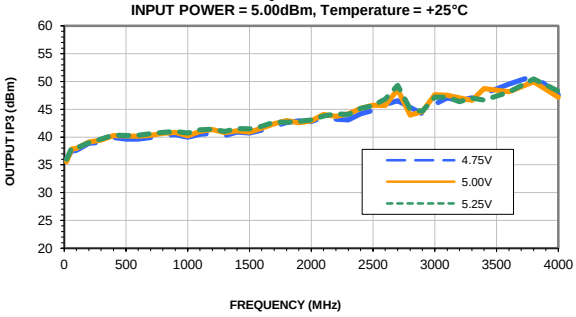


Typical Performance Curves

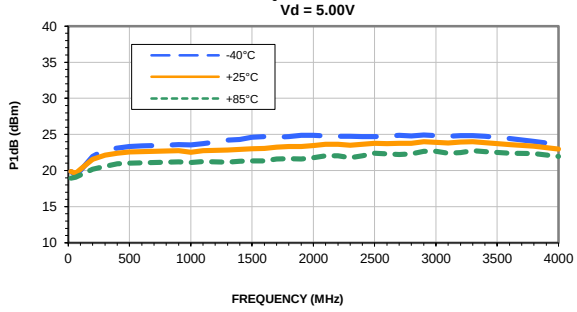
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
INPUT POWER = 5.00dBm, Vd = 5.00V



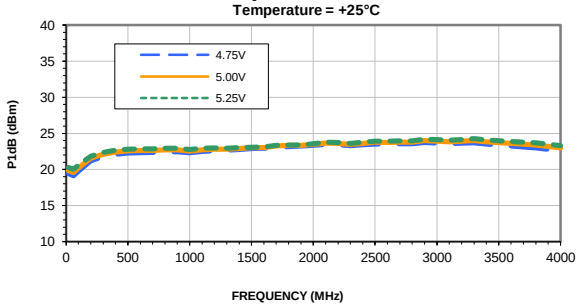
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = 5.00dBm, Temperature = +25°C



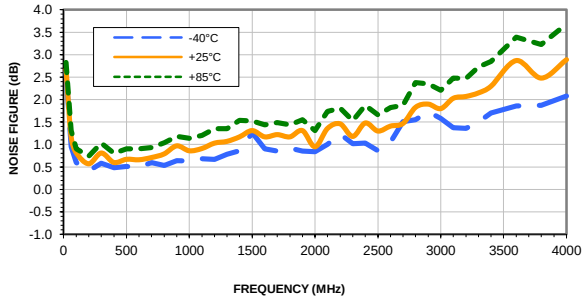
P1dB vs. FREQUENCY & TEMPERATURE
Vd = 5.00V



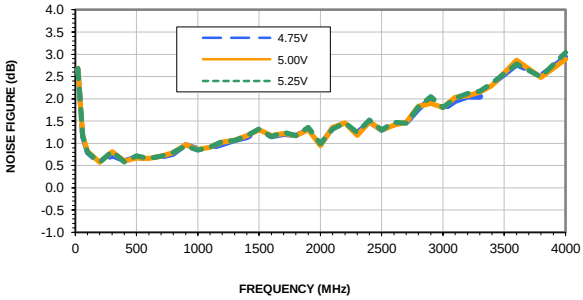
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



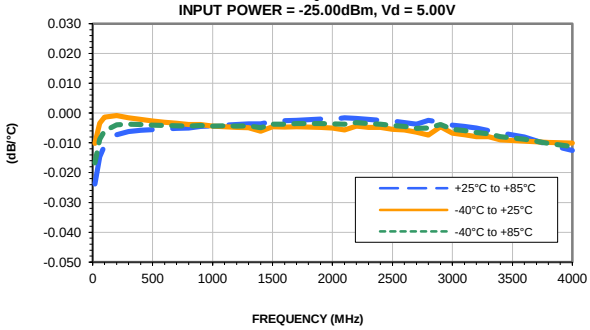
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vd = 5.00V



NOISE FIGURE vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



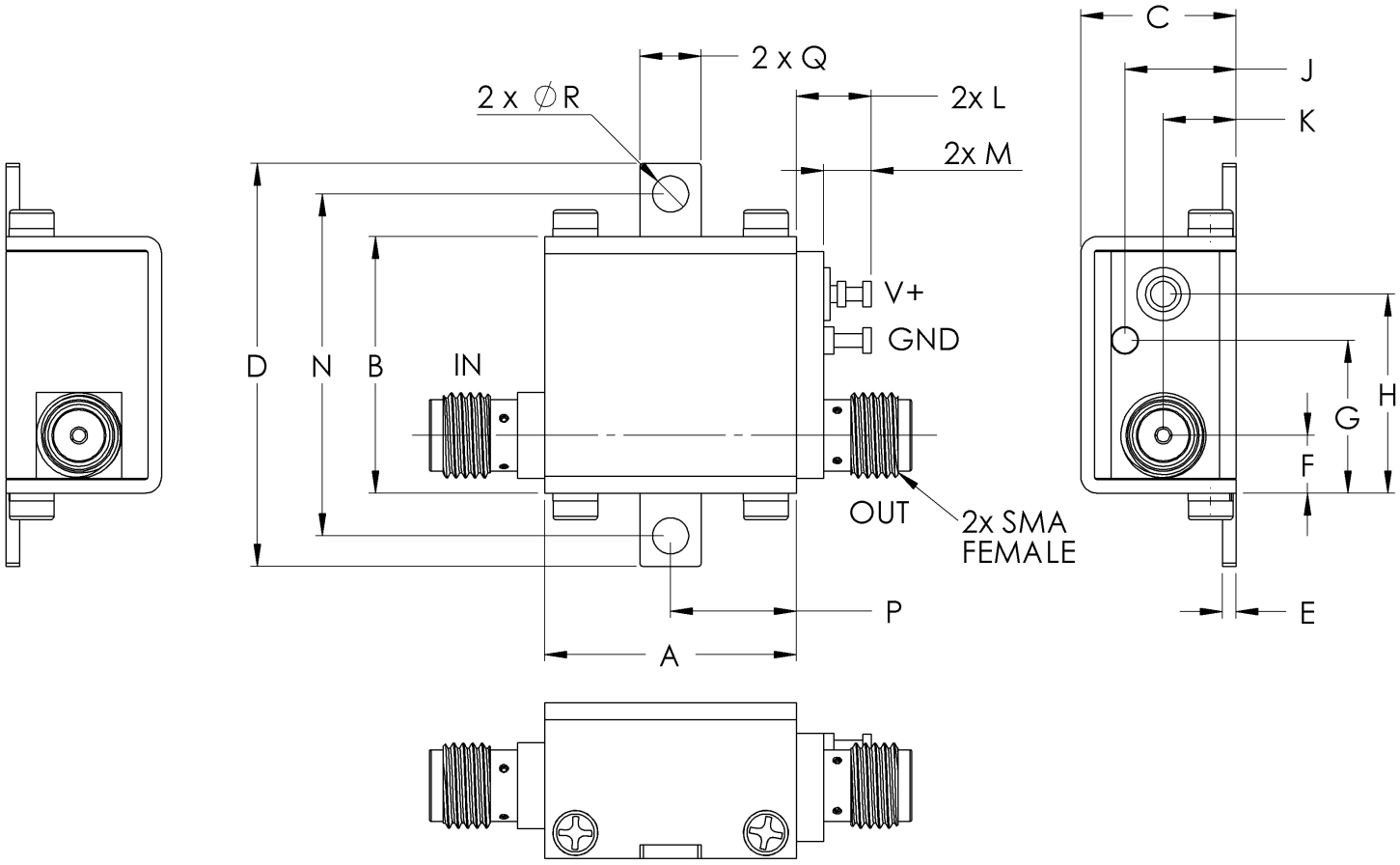
GAIN VARIATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



Case Style GC

Outline Dimensions

GC957



CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	N
GC957	.74 (18.80)	.75 (19.15)	.46 (11.61)	1.18 (30.07)	.04 (1.02)	.17 (4.32)	.45 (11.40)	.59 (14.86)	.33 (8.31)	.21 (5.44)	.22 (5.59)	.14 (3.56)	1.00 (25.4)

CASE #.	P	Q	R	WT GRAMS
GC957	.37 (9.40)	.18 (4.57)	.106 (2.69)	23.0

Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015
Tolerance on hole size and interaxes dimensions to be ± .005.

Note:

1. Case material: Brass
2. Case finish: Nickel plate

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
*Mini-Circuits **ISO 9001 & ISO 14001** Certified*

Mini-Circuits

Environmental Specifications ENV23T10

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 Case Temperature	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Stabilization Bake	(non-operating) 125°C, 24 hours	- - -
Burn-in at Elevated Temp.	(DC on) 160 hours at 85° C	MIL-STD-202, Method 108
Thermal Shock	-55° to 100°C, 5 cycles	MIL-STD-202, Method 107, Condition A, except 100°C