HIGH GAIN, LOW CURRENT

Monolithic Amplifier

PSA-8A+

50Ω DC to 4 GHz

THE BIG DEAL

- Wideband, DC to 4 GHz
- High Gain, 31 dB typ. at 0.1GHz
- Low NF 3.0 dB typ. at 0.1GHz
- Low Current, 36 mA typ.
- Protected by US Patent 6,943,629

Generic photo used for illustration purposes only

CASE STYLE: CA1389

+RoHS Compliant

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

APPLICATIONS

- Cellular
- PCS
- Communication receivers & Transmitters
- Satellite communication
- Military

PRODUCT OVERVIEW

The PSA-8A+ is a HBT based wideband low noise MMIC Amplifier with high gain and low current. This design operates on a single 5V supply, is well matched for 50 Ohms and comes in a SOT-363 package, accommodating dense circuit board layouts.

KEY FEATURES

Feature	Advantages
High Gain, 31 dB typ. at 0.1GHz	Enables signal amplification without the need for multiple gain stages.
Low Noise, 3.0 dB typ. at 0.1GHz	Enables lower system noise figure performance. Low NF and High Gain results in lower NF systems
SOT-363 Package	Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.

REV. A
ECO-011279
PSA-8A+
MCL NY
220105

ELECTRICAL SPECIFICATIONS[1] AT 25°C, ZO=50Ω

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range[4]		DC		4.0	GHz
Gain	0.01	26.7	30.8	36.2	dB
	0.1	26.9	31	36.4	
	1.0	22.1	25.4	29.9	
	2.0	17.5	20.1	23.6	
	3.0	—	15.6	—	
	4.0	—	11.2	—	
Input Return Loss	0.01		11		dB
	0.1		12		
	1.0		18		
	2.0		18		
	3.0		12		
	4.0		8		
Output Return Loss	0.01		20		dB
	0.1		19		
	1.0		7		
	2.0		9		
	3.0		16		
	4.0		9		
P1dB	0.01		12.1		dBm
	0.1		12.8		
	1.0		11.9		
	2.0		9.6		
	3.0		6.5		
	4.0		3.1		
OIP3 (Pout = -5dBm/Tone)	0.01		26.1		dBm
	0.1		25.8		
	1.0		23.2		
	2.0		20		
	3.0		16.2		
	4.0		11.3		
Noise Figure	0.01		3.1		dB
	0.1		3		
	1.0		3.7		
	2.0		4		
	3.0		4.4		
	4.0		4.8		
Supply Voltage (Vs)	DC	4.75	5	5.25	V
Device Operating Current (Is)	DC		36	39	mA
Device Current Variation vs. Voltage[2]			0.024		mA/mV
Device Current Variation vs. Temperature[3]			7.7		µA/°C
Thermal Resistance, Junction to ground lead			140		°C/W

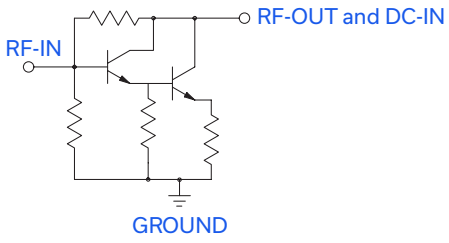
1. Measured on Mini-Circuits Characterization Test Board TB-PSA-8A+. See Characterization Test Circuit (Fig. 1)
2. Device Current Variation vs. Voltage = (Current at 5.25V - Current at 4.75V)/(5.25V-4.75V)*1000)
3. Device Current Variation vs. Temperature = (Current at 85°C - Current at -45°C)/130
4. Guaranteed specifications DC to 4 GHz. Low frequency cut-off determined by external coupling capacitor.

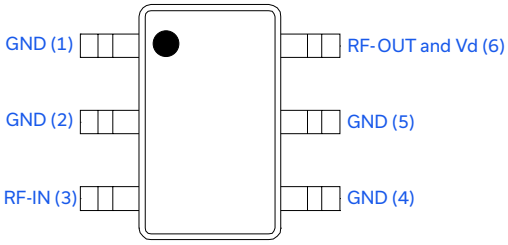
MAXIMUM RATINGS[5]

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Input Power (CW)	13 dBm
Operating Current on Pin 6	65mA

5.Permanent damage may occur if any of these limits are exceeded. Electrical Maximum rating are not intended for continuous normal operation.

SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION





Function	Pin Number	Description (See Application Circuit, Fig. 1)
RF-IN	3	RF input pin (connect to RF-IN via C1)
RF-OUT & DC-IN	6	RF output pin (connected to RF-OUT via blocking cap C2 and supply voltage VDD via RF Choke (CHK) & Resistor R1)
GND	1,2,4,5	Connections to ground

CHARACTERIZATION TEST / APPLICATION CIRCUIT

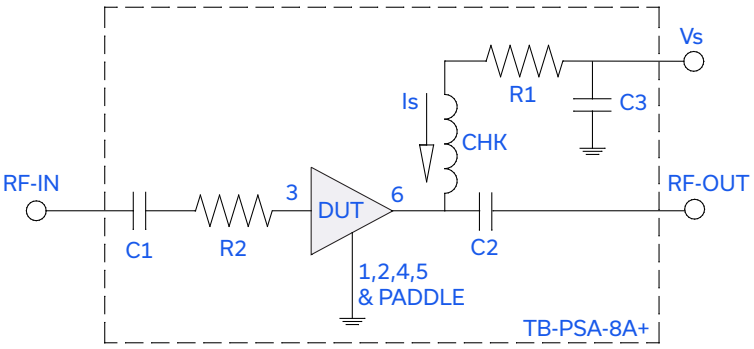
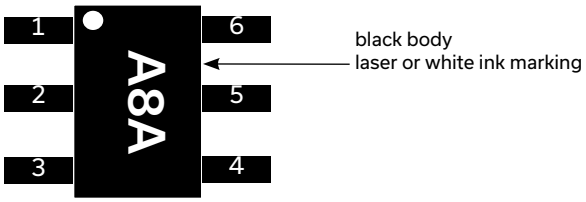


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization Test Board TB-PSA-8A+) Gain, Return loss, Output power at 1dB compression (P1 dB), Output IP3 (OIP3) and Noise Figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -5 dBm/tone at output.

Component	Size	Value	Part Number	Manufacturer
DUT	SOT-363	--	PSA-8A+	MCL
C1,C2	0402	2400pF	GRM155R71H-242JA01D	Murata
C3	0603	0.1uF	GCJ188R71H-104KA12D	Murata
R1	0805	36.5Ohms	RK73H2ATTD36R5F	KOA
CHK	0.15x0.15	--	TCCH-80+	MCL
R2	402	10Ohms	RK73H1ETTP10R0F	KOA

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

Monolithic Amplifier PSA-8A+

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS CLICK HERE

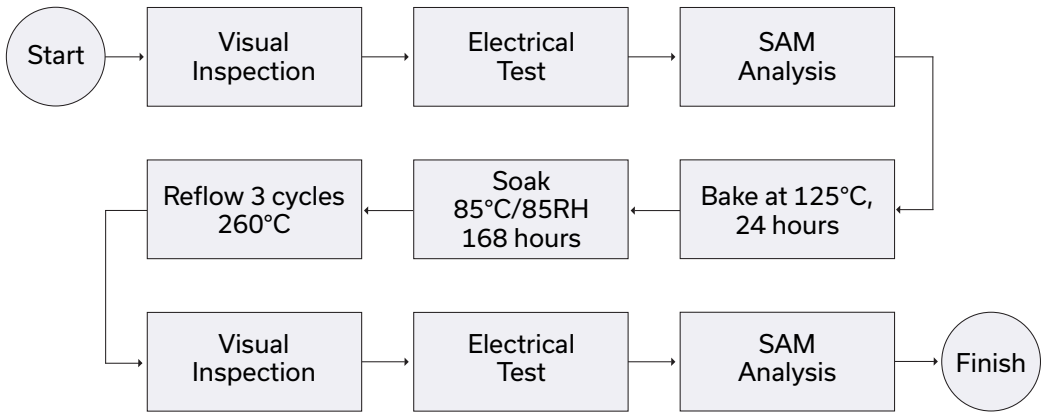
Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	CA1389 Plastic molded SOT-363 package, lead finishi: Matte-Tin
Tape & Reel **Standard quantities available on reel**	F101 7" reels with 20, 50, 100, 200, 500, 1K, or 2K devices
Suggested Layout for PCB Design	PL-643
Evaluation Board	TB-PSA-8A+
Environmental Ratings	ENV08T2

ESD RATING

Human Body Model (HBM): Class 1B (500 v to < 1,000 v) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (< 100 v) in accordance with ANSI/ESD STM 5.2 - 1999

MSL TEST FLOW CHART



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, Icc = 36mA @ 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)
10	30.89	36.71	10.14	19.19	1.15	0.80	26.04	12.11	3.13
20	31.14	36.48	10.62	21.20	1.13	0.76	25.23	12.58	2.85
30	31.23	36.47	10.83	21.60	1.13	0.75	26.59	12.51	2.88
40	31.27	36.18	10.97	21.16	1.11	0.72	25.65	12.74	2.97
50	31.29	36.11	11.05	21.11	1.11	0.71	26.19	12.80	2.93
60	31.29	36.21	11.17	20.58	1.11	0.72	25.13	12.61	2.91
70	31.29	36.15	11.22	20.06	1.11	0.71	26.12	12.76	2.90
80	31.29	36.21	11.21	19.47	1.11	0.71	25.18	12.86	2.96
90	31.27	36.12	11.36	19.01	1.11	0.71	25.13	12.76	2.95
100	31.26	36.19	11.34	18.60	1.11	0.71	25.59	12.75	2.96
200	30.89	36.01	11.93	14.56	1.10	0.71	24.72	12.77	3.16
250	30.63	35.88	12.27	12.98	1.10	0.70	23.96	12.69	3.24
300	30.34	35.80	12.63	11.75	1.09	0.70	23.96	12.55	3.35
350	30.05	35.60	12.86	10.80	1.08	0.70	24.11	12.65	3.39
400	29.72	35.54	13.24	9.91	1.07	0.70	24.13	12.50	3.44
450	29.39	35.29	13.61	9.23	1.06	0.69	24.15	12.39	3.47
500	29.07	35.00	13.93	8.56	1.04	0.67	23.82	12.62	3.53
550	28.73	34.78	14.29	8.15	1.03	0.66	24.02	12.49	3.59
600	28.39	34.59	14.56	7.71	1.03	0.66	23.79	12.46	3.67
650	28.06	34.35	14.89	7.39	1.02	0.65	23.47	12.23	3.66
700	27.73	34.16	15.11	7.07	1.01	0.64	23.65	12.34	3.69
750	27.41	33.90	15.38	6.88	1.00	0.64	23.32	12.20	3.69
800	27.05	33.61	15.84	6.74	1.00	0.63	23.53	12.44	3.65
850	26.73	33.36	16.06	6.54	1.00	0.63	23.40	12.24	3.67
900	26.41	33.09	16.33	6.46	1.00	0.63	23.26	12.37	3.67
950	26.10	32.98	16.60	6.40	1.01	0.63	23.22	11.97	3.73
1000	25.78	32.71	16.89	6.35	1.01	0.63	23.24	11.95	3.67
1050	25.46	32.52	17.32	6.33	1.02	0.63	23.01	11.92	3.69
1100	25.15	32.31	17.53	6.35	1.03	0.64	22.82	12.03	3.76
1150	24.85	32.12	17.89	6.37	1.04	0.64	22.65	12.05	3.75
1200	24.56	31.79	18.09	6.43	1.04	0.64	22.69	11.72	3.75
1250	24.26	31.69	18.35	6.49	1.06	0.65	22.45	11.72	3.80
1300	23.97	31.44	18.62	6.55	1.07	0.65	22.44	11.74	3.83
1350	23.69	31.17	18.71	6.69	1.08	0.66	22.44	11.72	3.82
1400	23.41	31.02	18.97	6.77	1.10	0.67	22.09	11.27	3.82
1450	23.13	30.75	19.25	6.88	1.10	0.67	21.76	11.31	3.84
1500	22.86	30.59	19.33	7.04	1.12	0.68	21.86	11.12	3.83
1550	22.61	30.45	19.33	7.19	1.14	0.69	21.80	11.02	3.87
1600	22.33	30.21	19.46	7.34	1.15	0.70	21.54	10.84	3.91
1650	22.08	30.06	19.48	7.50	1.17	0.71	21.22	10.58	3.91
1700	21.83	29.92	19.42	7.67	1.19	0.72	21.11	10.37	3.93
1750	21.58	29.72	19.27	7.89	1.21	0.73	20.67	10.34	3.99
1800	21.33	29.52	19.18	8.06	1.22	0.73	20.67	9.97	3.95
1850	21.09	29.36	19.02	8.25	1.24	0.74	20.58	9.93	4.03
1900	20.86	29.28	18.73	8.49	1.27	0.76	20.36	9.77	3.99
1950	20.62	29.05	18.48	8.72	1.28	0.76	20.37	9.56	3.97
2000	20.39	28.93	18.23	8.96	1.30	0.78	19.87	9.37	4.00
2200	19.49	28.31	16.97	10.02	1.37	0.81	19.19	8.86	4.12
2400	18.63	27.86	15.47	11.25	1.45	0.85	18.36	8.09	4.31
2600	17.76	27.49	14.03	12.54	1.53	0.89	18.16	7.57	4.31
2800	16.90	27.13	12.70	13.91	1.62	0.92	17.04	6.97	4.55
3000	16.02	26.90	11.61	14.91	1.72	0.95	16.03	6.28	4.52
3200	15.16	26.71	10.60	15.17	1.82	0.97	15.71	5.90	4.47
3400	14.28	26.63	9.74	14.47	1.95	0.99	14.62	5.13	4.59
3600	13.40	26.55	9.07	13.19	2.07	0.99	13.21	4.54	4.64
3800	12.48	26.52	8.55	11.81	2.21	0.99	12.45	3.61	4.69
4000	11.62	26.53	8.16	10.41	2.34	0.98	11.00	3.11	4.83

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, Icc = 30mA @ 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)
10	29.99	36.44	9.35	17.44	1.19	0.83	24.82	11.16	3.09
20	30.23	36.14	9.70	16.66	1.16	0.78	24.72	11.64	2.83
30	30.31	35.93	9.81	16.18	1.15	0.75	24.93	11.59	2.86
40	30.35	35.95	10.02	16.03	1.15	0.74	24.54	11.72	2.91
50	30.38	35.93	10.02	15.68	1.14	0.74	24.93	11.71	2.90
60	30.39	35.81	10.21	15.55	1.14	0.72	23.94	11.64	2.87
70	30.39	35.88	10.19	15.49	1.14	0.73	24.46	11.80	2.88
80	30.39	35.75	10.19	15.24	1.13	0.72	24.16	11.82	2.92
90	30.37	35.74	10.31	15.14	1.13	0.72	23.94	11.83	2.89
100	30.35	35.83	10.36	14.92	1.14	0.72	24.25	11.82	2.93
200	30.02	35.65	10.88	13.27	1.13	0.72	23.41	11.60	3.13
250	29.78	35.57	11.20	12.44	1.13	0.73	23.21	11.52	3.22
300	29.51	35.28	11.49	11.59	1.11	0.72	22.98	11.38	3.33
350	29.23	35.23	11.77	10.92	1.11	0.72	22.75	11.54	3.38
400	28.92	35.18	12.14	10.27	1.11	0.73	22.74	11.28	3.42
450	28.61	34.91	12.45	9.63	1.10	0.72	22.58	10.95	3.45
500	28.30	34.66	12.81	9.17	1.09	0.71	22.42	11.19	3.48
550	27.99	34.54	13.13	8.76	1.09	0.71	22.61	11.23	3.55
600	27.68	34.24	13.35	8.34	1.07	0.70	22.42	11.19	3.61
650	27.36	33.90	13.72	8.04	1.06	0.69	22.17	10.97	3.62
700	27.04	33.68	13.95	7.73	1.05	0.69	22.35	10.99	3.64
750	26.72	33.61	14.19	7.53	1.06	0.69	22.07	10.99	3.65
800	26.41	33.28	14.49	7.31	1.04	0.68	22.18	11.18	3.63
850	26.10	33.02	14.74	7.11	1.04	0.67	22.11	10.84	3.62
900	25.79	32.87	15.02	6.98	1.04	0.67	22.17	11.25	3.64
950	25.49	32.68	15.26	6.84	1.04	0.67	21.96	10.72	3.74
1000	25.18	32.42	15.60	6.74	1.04	0.67	22.12	10.73	3.65
1050	24.89	32.20	15.85	6.71	1.05	0.67	21.88	10.82	3.65
1100	24.61	31.93	16.01	6.63	1.04	0.67	21.87	10.83	3.71
1150	24.32	31.72	16.36	6.62	1.05	0.67	21.83	10.99	3.73
1200	24.05	31.46	16.52	6.62	1.05	0.67	21.71	10.67	3.68
1250	23.77	31.29	16.69	6.61	1.06	0.67	21.52	10.70	3.74
1300	23.49	31.09	16.89	6.64	1.07	0.67	21.52	10.77	3.76
1350	23.23	30.92	17.05	6.68	1.08	0.68	21.62	10.77	3.76
1400	22.96	30.71	17.20	6.74	1.09	0.68	21.20	10.43	3.78
1450	22.71	30.50	17.30	6.82	1.10	0.69	21.01	10.51	3.78
1500	22.45	30.28	17.39	6.89	1.11	0.69	20.99	10.31	3.77
1550	22.20	30.16	17.47	6.99	1.12	0.70	21.00	10.35	3.82
1600	21.95	29.96	17.54	7.13	1.14	0.71	20.79	9.93	3.86
1650	21.71	29.79	17.52	7.24	1.15	0.72	20.49	9.92	3.85
1700	21.47	29.56	17.48	7.40	1.16	0.72	20.35	9.71	3.86
1750	21.23	29.34	17.34	7.59	1.17	0.73	19.90	9.59	3.89
1800	20.99	29.26	17.25	7.78	1.20	0.74	19.98	9.20	3.89
1850	20.75	29.05	17.10	7.97	1.21	0.75	19.88	9.17	3.94
1900	20.53	28.88	16.85	8.16	1.22	0.76	19.67	9.24	3.92
1950	20.30	28.78	16.75	8.43	1.25	0.77	19.60	8.93	3.97
2000	20.07	28.68	16.54	8.68	1.27	0.79	19.20	8.86	3.94
2200	19.17	28.10	15.43	9.92	1.35	0.83	18.48	8.36	4.04
2400	18.27	27.65	14.23	11.52	1.44	0.88	17.73	7.49	4.07
2600	17.37	27.36	13.04	13.61	1.56	0.92	17.48	7.08	4.25
2800	16.48	27.09	11.93	15.99	1.68	0.96	16.36	6.40	4.35
3000	15.59	26.92	11.03	17.99	1.80	0.99	15.43	5.83	4.37
3200	14.71	26.75	10.17	17.88	1.92	1.01	15.11	5.45	4.39
3400	13.83	26.71	9.51	15.81	2.06	1.01	14.08	4.80	4.45
3600	12.96	26.61	8.95	13.60	2.18	1.01	12.79	4.12	4.53
3800	12.08	26.63	8.52	11.75	2.32	1.00	12.05	3.30	4.58
4000	11.26	26.56	8.14	10.27	2.43	0.98	10.59	2.82	4.69

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 = 5.25, Icc = 42mA @ 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)
10	31.47	37.24	11.04	18.82	1.15	0.79	27.48	12.76	3.13
20	31.73	36.82	11.66	24.49	1.12	0.74	27.40	13.25	2.85
30	31.82	36.85	11.91	28.07	1.12	0.74	27.10	13.13	2.88
40	31.86	36.71	12.15	28.43	1.12	0.72	26.77	13.50	2.97
50	31.88	36.77	12.20	28.42	1.12	0.72	27.57	13.67	2.93
60	31.88	36.75	12.33	26.83	1.12	0.72	26.60	13.31	2.91
70	31.87	36.61	12.41	25.15	1.11	0.71	27.29	13.53	2.90
80	31.87	36.62	12.41	23.68	1.11	0.71	26.28	13.62	2.96
90	31.85	36.56	12.59	22.58	1.11	0.70	26.38	13.50	2.95
100	31.84	36.54	12.53	21.65	1.10	0.70	26.96	13.38	2.96
200	31.44	36.45	13.18	15.39	1.10	0.70	25.89	13.43	3.16
250	31.16	36.21	13.53	13.48	1.09	0.69	25.51	12.82	3.24
300	30.85	36.11	13.86	12.03	1.08	0.69	25.33	13.36	3.35
350	30.53	36.06	14.11	10.98	1.08	0.69	25.36	13.32	3.39
400	30.17	35.81	14.48	10.03	1.07	0.68	25.24	13.17	3.44
450	29.82	35.66	14.91	9.33	1.07	0.68	25.14	13.24	3.47
500	29.47	35.50	15.23	8.64	1.06	0.67	24.87	13.66	3.53
550	29.11	35.34	15.63	8.20	1.06	0.67	24.88	12.98	3.59
600	28.76	35.00	15.88	7.78	1.04	0.65	24.89	13.07	3.67
650	28.40	34.80	16.14	7.45	1.03	0.65	24.60	13.07	3.66
700	28.05	34.66	16.43	7.15	1.04	0.65	24.54	13.06	3.69
750	27.71	34.38	16.73	6.95	1.03	0.64	24.53	12.90	3.69
800	27.33	34.17	17.16	6.80	1.04	0.64	24.31	13.05	3.65
850	27.00	33.90	17.47	6.64	1.03	0.63	23.99	13.04	3.67
900	26.67	33.68	17.71	6.54	1.04	0.63	24.04	12.98	3.67
950	26.35	33.43	17.97	6.49	1.04	0.63	24.22	12.72	3.72
1000	26.02	33.13	18.26	6.43	1.04	0.63	24.05	12.68	3.67
1050	25.67	33.05	18.74	6.44	1.06	0.64	23.79	12.67	3.69
1100	25.36	32.74	19.04	6.42	1.06	0.64	23.53	12.77	3.76
1150	25.05	32.48	19.36	6.46	1.07	0.64	23.38	12.76	3.75
1200	24.75	32.17	19.50	6.52	1.07	0.64	23.40	12.42	3.75
1250	24.45	32.00	19.87	6.57	1.09	0.65	22.96	12.41	3.80
1300	24.15	31.87	20.15	6.65	1.11	0.66	23.12	12.30	3.83
1350	23.86	31.54	20.28	6.78	1.11	0.66	22.94	12.27	3.82
1400	23.57	31.47	20.58	6.85	1.14	0.67	22.62	11.93	3.82
1450	23.29	31.25	20.83	6.97	1.15	0.68	22.41	11.83	3.84
1500	23.02	31.01	20.87	7.12	1.16	0.69	22.44	11.54	3.83
1550	22.76	30.85	20.92	7.26	1.18	0.69	22.30	11.53	3.87
1600	22.48	30.67	20.92	7.41	1.20	0.70	22.20	11.27	3.91
1650	22.23	30.47	20.92	7.58	1.21	0.71	21.68	11.09	3.91
1700	21.98	30.26	20.84	7.72	1.23	0.72	21.76	10.87	3.93
1750	21.72	30.05	20.65	7.93	1.24	0.73	21.18	10.73	4.02
1800	21.47	29.86	20.44	8.09	1.25	0.73	21.16	10.58	3.95
1850	21.23	29.76	20.28	8.28	1.28	0.74	21.10	10.32	4.03
1900	21.00	29.55	19.94	8.50	1.29	0.75	20.91	10.26	3.99
1950	20.76	29.44	19.60	8.73	1.31	0.76	20.91	9.94	3.97
2000	20.53	29.30	19.26	8.94	1.33	0.77	20.41	9.86	4.00
2200	19.62	28.67	17.79	9.94	1.40	0.81	19.80	9.33	4.12
2400	18.76	28.10	16.09	11.10	1.47	0.84	18.93	8.57	4.31
2600	17.89	27.70	14.51	12.29	1.55	0.88	18.72	7.93	4.31
2800	17.03	27.33	13.11	13.49	1.63	0.91	17.53	7.42	4.55
3000	16.16	27.04	11.93	14.35	1.73	0.94	16.56	6.74	4.59
3200	15.29	26.87	10.82	14.54	1.83	0.96	16.13	6.25	4.47
3400	14.41	26.76	9.96	13.92	1.95	0.98	15.02	5.46	4.59
3600	13.52	26.68	9.21	12.78	2.07	0.98	13.57	4.77	4.64
3800	12.60	26.61	8.67	11.45	2.20	0.98	12.78	4.04	4.69
4000	11.74	26.58	8.24	10.16	2.32	0.97	11.26	3.31	4.83

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, Icc = 35mA @ Temperature = -45°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)
10	31.52	37.25	11.07	17.68	1.14	0.78	25.31	12.07	2.70
20	31.79	36.87	11.71	23.50	1.12	0.74	24.85	12.52	2.48
30	31.90	36.92	12.01	27.32	1.12	0.74	25.87	12.55	2.52
40	31.94	36.82	12.23	28.75	1.12	0.72	25.31	12.79	2.57
50	31.97	36.62	12.31	29.27	1.10	0.71	25.85	12.84	2.54
60	31.98	36.75	12.44	27.82	1.11	0.71	24.93	12.60	2.54
70	31.97	36.71	12.49	26.07	1.11	0.71	25.61	12.86	2.53
80	31.98	36.64	12.50	24.39	1.10	0.70	24.70	12.94	2.59
90	31.96	36.55	12.70	23.28	1.10	0.69	24.99	12.84	2.58
100	31.95	36.51	12.63	22.33	1.10	0.69	25.36	12.84	2.61
200	31.60	36.48	13.27	15.68	1.10	0.69	24.53	12.82	2.78
250	31.34	36.34	13.70	13.75	1.09	0.69	24.33	12.74	2.86
300	31.05	36.15	14.20	12.31	1.08	0.68	24.36	12.72	2.96
350	30.76	36.01	14.49	11.24	1.07	0.68	23.56	12.80	3.00
400	30.42	35.89	14.87	10.28	1.07	0.68	24.04	12.63	3.04
450	30.08	35.63	15.31	9.55	1.05	0.67	23.94	12.59	3.05
500	29.75	35.50	15.68	8.79	1.04	0.66	23.86	12.72	3.11
550	29.41	35.24	16.11	8.36	1.04	0.65	23.94	12.62	3.18
600	29.07	35.03	16.46	7.90	1.03	0.64	24.17	12.56	3.23
650	28.73	34.70	16.85	7.55	1.01	0.63	23.30	12.33	3.22
700	28.39	34.56	17.18	7.20	1.01	0.62	23.60	12.54	3.24
750	28.06	34.26	17.54	7.02	1.00	0.62	23.26	12.41	3.23
800	27.70	34.13	18.04	6.84	1.01	0.62	23.62	12.53	3.18
850	27.37	33.96	18.35	6.60	1.01	0.62	23.60	12.32	3.22
900	27.05	33.53	18.60	6.55	1.00	0.61	23.24	12.56	3.20
950	26.74	33.39	18.90	6.47	1.01	0.61	23.64	12.19	3.29
1000	26.42	33.29	19.24	6.37	1.02	0.61	23.33	12.16	3.22
1050	26.09	32.96	19.90	6.37	1.02	0.61	23.11	12.24	3.23
1100	25.78	32.73	20.11	6.35	1.03	0.61	23.15	12.15	3.28
1150	25.48	32.54	20.54	6.36	1.04	0.62	23.20	12.30	3.32
1200	25.19	32.21	20.78	6.43	1.04	0.62	23.12	12.09	3.30
1250	24.89	32.02	21.13	6.48	1.05	0.62	22.77	12.10	3.30
1300	24.61	31.86	21.25	6.52	1.07	0.63	23.13	12.13	3.34
1350	24.32	31.56	21.51	6.62	1.07	0.63	23.00	12.11	3.34
1400	24.04	31.39	21.91	6.70	1.09	0.64	22.48	11.79	3.37
1450	23.76	31.14	22.05	6.81	1.10	0.64	22.49	11.94	3.37
1500	23.49	30.95	21.91	6.93	1.11	0.65	22.33	11.77	3.37
1550	23.24	30.94	21.95	7.10	1.14	0.67	22.40	11.68	3.41
1600	22.97	30.69	21.83	7.24	1.15	0.68	22.32	11.30	3.43
1650	22.72	30.44	21.63	7.36	1.16	0.68	21.91	11.27	3.44
1700	22.47	30.24	21.45	7.53	1.17	0.69	21.76	11.03	3.46
1750	22.22	30.09	21.11	7.71	1.19	0.70	21.48	10.90	3.46
1800	21.98	29.90	20.75	7.86	1.20	0.71	21.34	10.63	3.49
1850	21.74	29.72	20.55	8.04	1.22	0.72	21.41	10.63	3.57
1900	21.51	29.61	20.04	8.27	1.24	0.73	21.23	10.56	3.52
1950	21.28	29.33	19.57	8.43	1.24	0.73	21.27	10.28	3.52
2000	21.04	29.26	19.19	8.64	1.26	0.74	20.72	10.18	3.53
2200	20.15	28.68	17.56	9.59	1.33	0.78	20.14	9.69	3.61
2400	19.30	28.25	15.76	10.66	1.41	0.82	19.41	8.84	3.66
2600	18.47	27.77	14.19	11.77	1.47	0.86	19.24	8.48	3.77
2800	17.65	27.32	12.75	12.98	1.53	0.89	18.12	7.79	3.92
3000	16.81	27.10	11.63	13.76	1.62	0.92	17.28	7.28	3.91
3200	15.97	26.82	10.39	13.97	1.69	0.95	16.95	6.78	3.96
3400	15.11	26.63	9.49	13.23	1.78	0.96	15.92	6.05	4.04
3600	14.24	26.64	8.78	12.13	1.89	0.97	14.48	5.49	4.10
3800	13.34	26.65	8.21	10.80	2.01	0.97	13.85	4.69	4.15
4000	12.48	26.51	7.77	9.55	2.09	0.95	12.25	4.09	4.25

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 = 4.75, Icc = 30mA @ Temperature = -45°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)
10	30.34	36.61	10.06	17.80	1.18	0.82	25.17	10.95	2.75
20	30.63	36.41	10.63	19.55	1.17	0.78	24.70	11.58	2.51
30	30.74	36.38	10.87	19.45	1.16	0.77	25.68	11.56	2.53
40	30.78	36.21	11.09	19.32	1.15	0.75	25.20	11.69	2.56
50	30.82	36.15	11.11	18.91	1.14	0.74	25.65	11.68	2.55
60	30.83	36.11	11.31	18.68	1.14	0.73	24.75	11.53	2.56
70	30.83	36.15	11.32	18.53	1.14	0.73	25.53	11.82	2.56
80	30.84	36.14	11.30	18.13	1.14	0.73	24.55	11.81	2.60
90	30.82	36.09	11.42	17.98	1.14	0.73	24.90	11.82	2.59
100	30.80	36.14	11.50	17.58	1.14	0.73	25.21	11.84	2.60
200	30.50	35.82	12.07	14.76	1.12	0.71	24.55	11.55	2.79
250	30.26	35.67	12.47	13.60	1.12	0.71	24.18	11.34	2.88
300	29.99	35.68	12.78	12.51	1.12	0.72	24.31	11.47	2.99
350	29.71	35.40	13.11	11.62	1.11	0.71	23.50	11.60	3.02
400	29.40	35.17	13.54	10.83	1.10	0.71	24.00	11.34	3.05
450	29.09	35.01	13.86	10.13	1.09	0.70	24.02	11.07	3.09
500	28.78	34.87	14.22	9.58	1.08	0.70	23.83	11.20	3.10
550	28.46	34.62	14.55	9.12	1.08	0.70	23.81	11.25	3.19
600	28.15	34.45	14.80	8.63	1.07	0.69	24.16	11.08	3.25
650	27.83	34.27	15.27	8.27	1.06	0.69	23.31	10.97	3.25
700	27.51	33.99	15.56	7.95	1.06	0.68	23.65	11.10	3.25
750	27.18	33.79	15.92	7.68	1.05	0.67	23.33	10.99	3.26
800	26.87	33.51	16.21	7.44	1.04	0.67	23.63	11.26	3.18
850	26.56	33.33	16.54	7.25	1.05	0.66	23.65	10.81	3.22
900	26.24	33.09	16.87	7.09	1.04	0.66	23.26	11.33	3.24
950	25.94	32.86	17.13	6.93	1.04	0.65	23.66	10.93	3.34
1000	25.64	32.69	17.52	6.81	1.05	0.65	23.40	10.82	3.25
1050	25.34	32.46	17.88	6.74	1.05	0.65	23.17	10.80	3.23
1100	25.06	32.22	18.04	6.67	1.05	0.65	23.14	10.82	3.29
1150	24.77	32.06	18.31	6.63	1.06	0.65	23.21	11.01	3.33
1200	24.49	31.80	18.53	6.61	1.06	0.65	23.11	10.81	3.29
1250	24.22	31.59	18.65	6.61	1.06	0.65	22.81	10.94	3.34
1300	23.94	31.39	18.87	6.60	1.07	0.66	23.12	11.02	3.39
1350	23.68	31.23	19.02	6.65	1.08	0.66	23.01	11.12	3.36
1400	23.41	30.86	19.18	6.71	1.08	0.66	22.50	10.70	3.36
1450	23.17	30.79	19.15	6.76	1.10	0.67	22.50	11.01	3.39
1500	22.91	30.58	19.20	6.81	1.10	0.67	22.34	10.72	3.35
1550	22.66	30.39	19.26	6.92	1.12	0.68	22.38	10.77	3.41
1600	22.42	30.19	19.24	7.04	1.13	0.68	22.31	10.36	3.45
1650	22.18	30.02	19.20	7.13	1.14	0.69	21.92	10.50	3.45
1700	21.93	29.83	19.08	7.27	1.15	0.70	21.76	10.36	3.48
1750	21.71	29.66	18.87	7.44	1.16	0.71	21.47	10.25	3.52
1800	21.47	29.49	18.70	7.62	1.18	0.72	21.36	9.73	3.48
1850	21.23	29.32	18.53	7.79	1.19	0.73	21.42	9.86	3.59
1900	21.02	29.20	18.15	7.97	1.21	0.74	21.23	9.81	3.51
1950	20.79	28.99	17.91	8.22	1.22	0.75	21.27	9.65	3.51
2000	20.55	28.91	17.69	8.47	1.25	0.76	20.71	9.55	3.51
2200	19.68	28.35	16.38	9.55	1.32	0.80	20.14	9.09	3.63
2400	18.80	27.91	14.96	10.94	1.41	0.85	19.41	8.34	3.67
2600	17.92	27.50	13.53	12.77	1.50	0.90	19.25	7.89	3.76
2800	17.06	27.32	12.28	14.78	1.62	0.94	18.12	7.34	3.94
3000	16.20	26.98	11.27	16.42	1.71	0.96	17.27	6.83	3.93
3200	15.33	26.86	10.26	16.32	1.83	0.99	16.95	6.35	3.94
3400	14.46	26.78	9.49	14.71	1.94	0.99	15.92	5.72	4.03
3600	13.58	26.71	8.81	12.61	2.05	0.99	14.48	5.07	4.08
3800	12.69	26.70	8.30	10.80	2.16	0.97	13.86	4.28	4.12
4000	11.84	26.75	7.92	9.40	2.28	0.95	12.25	3.59	4.28

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, Icc = 41mA @ Temperature = -45°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)
10	32.04	37.68	11.94	16.28	1.13	0.77	25.01	12.75	2.70
20	32.34	37.40	12.86	22.21	1.12	0.74	26.33	13.35	2.51
30	32.44	37.16	13.23	27.31	1.11	0.71	26.64	13.26	2.53
40	32.49	37.21	13.51	33.07	1.11	0.71	26.30	13.59	2.57
50	32.51	37.19	13.65	35.93	1.11	0.71	26.89	13.69	2.55
60	32.51	36.97	13.75	34.13	1.10	0.69	26.18	13.45	2.52
70	32.52	37.13	13.88	30.37	1.11	0.70	26.99	13.60	2.53
80	32.52	37.04	13.88	27.66	1.10	0.69	26.09	13.76	2.57
90	32.49	37.02	14.08	25.48	1.10	0.69	26.11	13.64	2.58
100	32.48	37.02	13.99	23.86	1.10	0.69	26.85	13.65	2.60
200	32.10	36.81	14.72	16.00	1.09	0.68	25.53	13.74	2.78
250	31.82	36.76	15.22	13.89	1.09	0.68	25.33	13.67	2.85
300	31.52	36.70	15.76	12.37	1.09	0.68	25.56	13.62	2.94
350	31.20	36.46	16.03	11.23	1.08	0.67	24.70	13.68	2.99
400	30.84	36.35	16.50	10.25	1.07	0.67	25.50	13.48	3.03
450	30.48	36.09	16.91	9.51	1.06	0.66	24.52	13.55	3.06
500	30.12	35.85	17.24	8.78	1.05	0.65	25.17	13.70	3.12
550	29.76	35.67	17.73	8.33	1.05	0.64	25.27	13.43	3.16
600	29.39	35.43	18.08	7.89	1.04	0.64	24.96	13.47	3.22
650	29.04	35.21	18.46	7.53	1.04	0.63	24.75	13.46	3.22
700	28.68	35.02	18.82	7.22	1.03	0.62	25.08	13.45	3.24
750	28.33	34.93	19.20	7.02	1.04	0.63	24.82	13.30	3.24
800	27.95	34.59	19.72	6.86	1.04	0.62	24.60	13.46	3.18
850	27.62	34.37	20.04	6.68	1.04	0.62	24.33	13.31	3.24
900	27.28	34.10	20.38	6.60	1.04	0.61	24.15	13.38	3.22
950	26.96	33.82	20.59	6.52	1.04	0.61	24.47	13.03	3.30
1000	26.63	33.56	21.06	6.44	1.04	0.61	24.61	13.09	3.23
1050	26.28	33.35	21.78	6.42	1.05	0.61	24.26	13.07	3.23
1100	25.97	32.99	21.97	6.40	1.05	0.61	24.05	13.08	3.27
1150	25.65	32.94	22.61	6.42	1.07	0.62	23.63	13.20	3.31
1200	25.36	32.57	22.87	6.47	1.07	0.62	23.93	12.98	3.32
1250	25.06	32.46	23.16	6.52	1.09	0.63	23.57	12.87	3.34
1300	24.77	32.18	23.27	6.59	1.09	0.63	23.66	12.86	3.35
1350	24.48	32.01	23.72	6.68	1.11	0.64	23.56	12.83	3.34
1400	24.19	31.80	24.07	6.75	1.12	0.64	23.34	12.52	3.33
1450	23.91	31.57	24.15	6.85	1.13	0.65	23.08	12.52	3.38
1500	23.64	31.34	24.07	6.97	1.15	0.66	23.17	12.26	3.34
1550	23.38	31.10	23.96	7.14	1.16	0.66	22.95	12.26	3.40
1600	23.11	30.96	23.69	7.26	1.18	0.67	22.99	12.00	3.43
1650	22.86	30.76	23.39	7.37	1.19	0.68	22.50	11.73	3.45
1700	22.60	30.59	23.17	7.56	1.20	0.69	22.47	11.60	3.45
1750	22.35	30.38	22.56	7.71	1.22	0.70	21.97	11.57	3.58
1800	22.11	30.24	22.14	7.85	1.23	0.71	22.00	11.20	3.49
1850	21.86	30.10	21.81	8.03	1.25	0.72	21.94	11.08	3.54
1900	21.64	29.85	21.20	8.22	1.26	0.72	21.68	11.01	3.52
1950	21.41	29.70	20.59	8.39	1.27	0.73	21.91	10.83	3.58
2000	21.17	29.53	20.15	8.61	1.29	0.74	21.39	10.73	3.50
2200	20.28	28.94	18.34	9.49	1.35	0.78	20.80	10.22	3.61
2400	19.43	28.34	16.32	10.49	1.41	0.81	19.90	9.37	3.66
2600	18.60	27.96	14.65	11.52	1.48	0.85	19.82	8.80	3.81
2800	17.78	27.55	13.10	12.59	1.55	0.89	18.64	8.20	3.87
3000	16.94	27.18	11.89	13.30	1.62	0.91	17.70	7.58	3.94
3200	16.10	26.98	10.60	13.42	1.70	0.94	17.34	7.19	3.94
3400	15.24	26.89	9.67	12.78	1.80	0.95	16.30	6.44	4.06
3600	14.37	26.73	8.93	11.72	1.89	0.96	14.88	5.67	4.08
3800	13.46	26.64	8.35	10.52	1.99	0.95	14.22	5.07	4.15
4000	12.59	26.65	7.86	9.29	2.09	0.94	12.55	4.35	4.26

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, Icc = 36mA @ 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)
10	30.30	36.40	9.43	19.20	1.16	0.83	26.57	12.09	3.46
20	30.54	36.02	9.79	18.97	1.13	0.77	26.96	12.56	3.15
30	30.63	36.10	9.95	18.69	1.14	0.76	26.01	12.47	3.16
40	30.68	35.86	10.08	18.15	1.12	0.74	25.91	12.75	3.23
50	30.70	35.96	10.13	18.04	1.12	0.74	26.06	12.79	3.23
60	30.70	35.84	10.20	17.65	1.12	0.73	25.20	12.59	3.15
70	30.69	35.83	10.24	17.36	1.12	0.73	26.04	12.74	3.19
80	30.68	35.88	10.22	16.87	1.12	0.73	25.42	12.84	3.23
90	30.66	35.93	10.34	16.61	1.12	0.73	25.72	12.74	3.22
100	30.65	35.82	10.29	16.46	1.11	0.73	25.36	12.71	3.25
200	30.28	35.80	10.76	13.64	1.12	0.73	24.50	12.64	3.42
250	30.03	35.52	11.13	12.46	1.10	0.72	24.90	12.56	3.51
300	29.75	35.44	11.55	11.45	1.10	0.72	24.28	12.50	3.64
350	29.48	35.22	11.79	10.62	1.08	0.71	24.20	12.50	3.69
400	29.15	35.08	12.14	9.80	1.07	0.71	23.90	12.35	3.73
450	28.83	34.97	12.47	9.15	1.07	0.70	23.55	12.26	3.76
500	28.52	34.73	12.73	8.49	1.05	0.69	23.56	12.50	3.83
550	28.18	34.49	13.07	8.09	1.04	0.68	23.72	12.23	3.87
600	27.85	34.41	13.34	7.68	1.04	0.68	23.80	12.33	3.97
650	27.53	34.05	13.58	7.37	1.02	0.67	23.16	12.21	3.95
700	27.20	33.97	13.83	7.06	1.02	0.67	23.31	12.20	3.98
750	26.87	33.66	14.06	6.88	1.01	0.66	23.32	12.06	3.99
800	26.52	33.40	14.39	6.70	1.01	0.66	23.40	12.18	3.94
850	26.20	33.16	14.58	6.54	1.01	0.65	22.91	12.00	3.98
900	25.88	32.95	14.86	6.47	1.01	0.65	22.81	12.11	3.97
950	25.57	32.56	15.03	6.42	1.00	0.65	23.03	11.72	4.02
1000	25.25	32.44	15.34	6.35	1.01	0.65	22.74	11.80	3.99
1050	24.93	32.25	15.72	6.35	1.03	0.65	22.65	11.79	3.99
1100	24.62	31.95	15.83	6.34	1.02	0.65	22.46	11.78	4.06
1150	24.31	31.80	16.17	6.37	1.04	0.66	22.26	11.78	4.11
1200	24.02	31.48	16.39	6.44	1.04	0.66	22.19	11.44	4.06
1250	23.72	31.30	16.57	6.53	1.06	0.67	21.98	11.43	4.12
1300	23.44	31.07	16.77	6.60	1.07	0.67	21.99	11.35	4.13
1350	23.16	30.97	16.93	6.74	1.10	0.69	21.62	11.32	4.13
1400	22.87	30.67	17.21	6.85	1.10	0.69	21.46	10.98	4.12
1450	22.60	30.47	17.44	6.97	1.12	0.70	21.18	10.89	4.14
1500	22.33	30.34	17.54	7.14	1.14	0.71	21.25	10.69	4.14
1550	22.07	30.13	17.66	7.32	1.16	0.72	21.04	10.58	4.19
1600	21.80	29.98	17.73	7.47	1.18	0.72	20.96	10.30	4.23
1650	21.54	29.78	17.82	7.62	1.19	0.73	20.46	10.02	4.25
1700	21.29	29.56	17.92	7.82	1.21	0.74	20.32	9.81	4.24
1750	21.04	29.48	17.86	8.06	1.24	0.75	19.97	9.78	4.30
1800	20.79	29.28	17.79	8.25	1.25	0.76	19.93	9.51	4.27
1850	20.55	29.08	17.75	8.47	1.26	0.77	19.88	9.35	4.39
1900	20.31	28.97	17.63	8.73	1.29	0.78	19.61	9.19	4.31
1950	20.08	28.77	17.37	8.94	1.30	0.79	19.59	8.97	4.29
2000	19.84	28.62	17.18	9.21	1.32	0.80	19.03	8.78	4.32
2200	18.93	28.08	16.32	10.42	1.41	0.84	18.38	8.37	4.44
2400	18.05	27.67	15.01	11.80	1.50	0.88	17.53	7.48	4.50
2600	17.17	27.24	13.75	13.32	1.59	0.91	17.23	7.03	4.60
2800	16.28	26.95	12.54	15.05	1.69	0.95	16.12	6.31	4.76
3000	15.37	26.74	11.60	16.39	1.82	0.97	15.11	5.60	4.82
3200	14.46	26.63	10.58	16.67	1.95	1.00	14.73	5.21	4.82
3400	13.54	26.54	9.83	15.72	2.09	1.01	13.63	4.51	4.89
3600	12.63	26.52	9.22	14.20	2.25	1.01	12.17	3.93	4.99
3800	11.71	26.57	8.78	12.62	2.44	1.01	11.36	2.98	5.06
4000	10.86	26.62	8.38	11.15	2.60	1.00	9.98	2.48	5.21

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, Icc = 30mA @ 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)
10	29.70	36.30	9.03	17.06	1.20	0.84	22.95	11.16	3.51
20	29.96	35.94	9.34	15.96	1.16	0.78	24.48	11.69	3.16
30	30.04	35.93	9.46	15.42	1.16	0.77	24.87	11.65	3.19
40	30.08	35.80	9.63	15.21	1.15	0.75	24.84	11.80	3.25
50	30.11	35.78	9.65	14.96	1.15	0.74	25.34	11.80	3.24
60	30.12	35.75	9.81	14.75	1.15	0.73	24.36	11.60	3.18
70	30.12	35.77	9.81	14.67	1.15	0.74	24.40	11.86	3.19
80	30.11	35.64	9.77	14.45	1.14	0.73	24.26	11.89	3.25
90	30.09	35.68	9.89	14.34	1.14	0.73	24.37	11.81	3.22
100	30.07	35.65	9.94	14.16	1.14	0.72	24.74	11.78	3.22
200	29.74	35.51	10.37	12.75	1.13	0.73	23.58	11.66	3.43
250	29.50	35.31	10.72	12.12	1.13	0.73	23.24	11.49	3.52
300	29.23	35.33	10.99	11.38	1.13	0.74	23.07	11.45	3.64
350	28.97	35.06	11.27	10.78	1.11	0.73	22.74	11.49	3.70
400	28.67	34.88	11.69	10.15	1.11	0.73	22.61	11.25	3.76
450	28.36	34.72	11.99	9.57	1.10	0.72	22.39	11.03	3.77
500	28.06	34.55	12.33	9.15	1.09	0.72	22.56	11.27	3.82
550	27.74	34.37	12.60	8.73	1.09	0.72	22.54	11.20	3.88
600	27.44	34.18	12.84	8.30	1.08	0.71	22.33	11.05	3.95
650	27.13	33.86	13.22	8.00	1.06	0.70	22.19	10.83	3.97
700	26.81	33.68	13.42	7.74	1.06	0.70	22.09	10.96	3.98
750	26.49	33.43	13.72	7.50	1.06	0.69	21.92	10.85	4.01
800	26.19	33.19	13.93	7.29	1.05	0.69	22.15	11.15	3.94
850	25.87	32.95	14.23	7.11	1.05	0.68	21.90	10.81	3.98
900	25.56	32.68	14.44	6.98	1.04	0.68	21.87	11.11	4.00
950	25.26	32.49	14.72	6.83	1.04	0.68	21.85	10.58	4.07
1000	24.96	32.30	15.01	6.74	1.05	0.68	21.88	10.59	4.00
1050	24.66	32.06	15.35	6.69	1.05	0.67	21.63	10.57	4.01
1100	24.38	31.74	15.45	6.61	1.04	0.67	21.58	10.69	4.06
1150	24.09	31.61	15.71	6.59	1.05	0.68	21.56	10.61	4.06
1200	23.81	31.38	15.94	6.56	1.06	0.67	21.45	10.39	4.08
1250	23.53	31.19	16.10	6.62	1.07	0.68	21.26	10.53	4.09
1300	23.26	30.95	16.25	6.62	1.07	0.68	21.16	10.47	4.14
1350	23.00	30.73	16.44	6.67	1.08	0.68	21.08	10.47	4.14
1400	22.73	30.53	16.65	6.75	1.09	0.69	20.70	10.12	4.12
1450	22.48	30.34	16.64	6.82	1.10	0.70	20.46	10.19	4.14
1500	22.22	30.20	16.81	6.90	1.11	0.70	20.44	9.87	4.16
1550	21.97	29.93	16.89	7.01	1.12	0.71	20.42	9.78	4.19
1600	21.73	29.81	16.93	7.15	1.14	0.72	20.14	9.59	4.22
1650	21.49	29.57	16.91	7.27	1.15	0.72	19.80	9.45	4.22
1700	21.24	29.44	16.89	7.43	1.17	0.73	19.69	9.14	4.24
1750	21.00	29.27	16.73	7.63	1.18	0.74	19.24	9.00	4.30
1800	20.76	29.09	16.69	7.82	1.20	0.75	19.30	8.73	4.28
1850	20.52	28.96	16.63	8.02	1.22	0.76	19.15	8.68	4.38
1900	20.30	28.79	16.35	8.24	1.23	0.77	18.98	8.65	4.28
1950	20.07	28.67	16.23	8.51	1.26	0.78	18.85	8.31	4.32
2000	19.83	28.49	16.01	8.78	1.27	0.80	18.35	8.14	4.31
2200	18.92	27.97	15.15	10.02	1.36	0.84	17.71	7.74	4.40
2400	18.02	27.57	14.05	11.67	1.46	0.89	16.93	6.84	4.46
2600	17.12	27.31	12.96	13.91	1.59	0.93	16.58	6.41	4.56
2800	16.23	27.03	11.87	16.67	1.71	0.97	15.47	5.82	4.74
3000	15.32	26.82	11.01	19.05	1.84	1.00	14.49	5.32	4.79
3200	14.42	26.70	10.20	18.62	1.97	1.01	14.12	4.84	4.79
3400	13.53	26.64	9.52	16.28	2.11	1.02	13.05	4.04	4.89
3600	12.64	26.60	8.98	13.86	2.25	1.01	11.78	3.35	4.96
3800	11.76	26.59	8.57	11.96	2.40	1.00	11.00	2.74	5.01
4000	10.95	26.58	8.24	10.52	2.53	0.99	9.70	2.15	5.16

Typical Performance Data

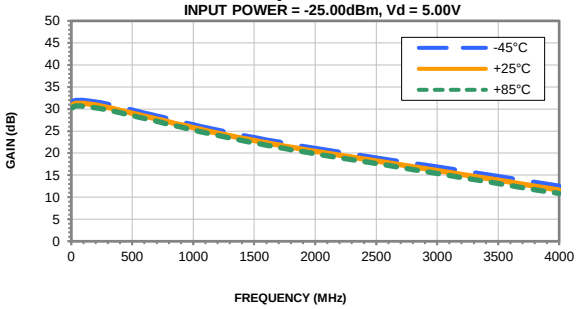
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.25V, Icc = 42mA @ Temperature = +85°C

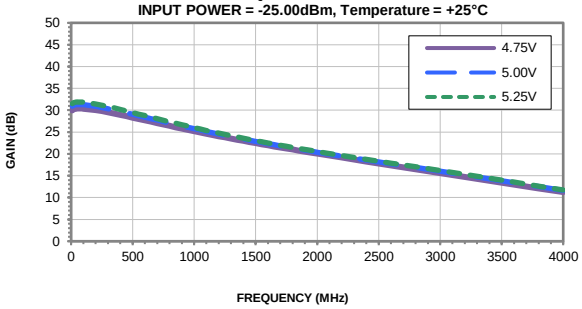
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	30.94	36.82	10.31	20.17	1.15	0.81	28.51	12.47	3.46
20	31.19	36.39	10.78	22.85	1.12	0.76	26.07	12.98	3.15
30	31.29	36.25	10.95	23.43	1.11	0.74	26.32	12.85	3.15
40	31.33	36.38	11.14	22.87	1.12	0.74	26.32	13.36	3.24
50	31.34	36.30	11.19	22.59	1.11	0.73	27.40	13.48	3.22
60	31.35	36.33	11.29	21.85	1.12	0.73	25.55	13.18	3.16
70	31.34	36.36	11.35	21.12	1.12	0.73	26.76	13.29	3.16
80	31.33	36.39	11.31	20.33	1.12	0.73	26.03	13.37	3.23
90	31.31	36.22	11.45	19.70	1.11	0.72	26.53	13.33	3.21
100	31.29	36.17	11.38	19.26	1.11	0.71	26.74	13.09	3.22
200	30.89	36.17	11.87	14.74	1.11	0.72	25.69	13.15	3.42
250	30.61	35.97	12.25	13.20	1.10	0.71	25.29	12.34	3.50
300	30.32	35.80	12.68	11.95	1.09	0.71	25.31	12.46	3.62
350	30.02	35.66	12.94	10.95	1.08	0.71	25.36	12.53	3.70
400	29.67	35.51	13.29	10.06	1.08	0.70	25.36	12.54	3.71
450	29.32	35.48	13.61	9.37	1.08	0.70	24.87	12.51	3.77
500	28.98	35.33	13.91	8.64	1.07	0.70	24.91	13.07	3.80
550	28.63	35.09	14.24	8.19	1.06	0.69	24.67	12.37	3.88
600	28.27	34.82	14.49	7.78	1.05	0.68	24.42	12.58	3.96
650	27.92	34.53	14.77	7.45	1.04	0.67	24.48	12.63	3.93
700	27.57	34.26	15.05	7.15	1.03	0.66	24.30	12.58	3.98
750	27.23	34.22	15.28	6.98	1.04	0.67	24.46	12.41	3.97
800	26.85	33.94	15.65	6.83	1.05	0.66	23.90	12.41	3.94
850	26.53	33.67	15.87	6.63	1.04	0.65	23.74	12.62	3.96
900	26.19	33.45	16.13	6.57	1.04	0.66	23.44	12.55	3.98
950	25.86	33.17	16.33	6.52	1.04	0.65	23.74	12.31	3.98
1000	25.53	33.01	16.65	6.45	1.05	0.66	23.77	12.19	3.96
1050	25.19	32.72	17.06	6.44	1.06	0.66	23.44	12.39	3.98
1100	24.88	32.55	17.22	6.43	1.07	0.66	23.03	12.39	4.07
1150	24.56	32.22	17.54	6.48	1.07	0.66	22.91	12.27	4.08
1200	24.26	32.05	17.77	6.55	1.09	0.67	22.84	12.02	4.08
1250	23.96	31.73	18.00	6.62	1.09	0.67	22.45	12.01	4.10
1300	23.66	31.53	18.21	6.68	1.11	0.67	22.40	11.89	4.13
1350	23.37	31.35	18.41	6.84	1.13	0.68	22.32	11.75	4.11
1400	23.08	31.12	18.75	6.94	1.14	0.69	22.14	11.51	4.11
1450	22.80	30.92	18.83	7.07	1.16	0.70	21.79	11.41	4.16
1500	22.53	30.71	18.92	7.21	1.17	0.71	21.89	11.21	4.12
1550	22.26	30.58	19.03	7.40	1.20	0.72	21.79	10.98	4.18
1600	21.99	30.40	19.08	7.56	1.22	0.73	21.50	10.71	4.23
1650	21.74	30.19	19.12	7.70	1.23	0.73	21.05	10.52	4.24
1700	21.48	30.00	19.18	7.89	1.25	0.74	20.91	10.32	4.24
1750	21.22	29.82	19.15	8.11	1.27	0.75	20.47	10.27	4.34
1800	20.97	29.65	18.97	8.28	1.28	0.76	20.56	10.01	4.28
1850	20.72	29.46	18.94	8.51	1.30	0.77	20.44	9.74	4.41
1900	20.49	29.35	18.73	8.76	1.33	0.78	20.10	9.69	4.30
1950	20.26	29.18	18.43	8.98	1.34	0.79	20.27	9.46	4.32
2000	20.02	29.02	18.17	9.22	1.36	0.80	19.60	9.38	4.32
2200	19.11	28.44	17.19	10.33	1.44	0.83	19.05	8.74	4.41
2400	18.23	27.95	15.64	11.64	1.52	0.87	18.09	7.85	4.49
2600	17.35	27.56	14.27	13.07	1.62	0.90	17.85	7.41	4.55
2800	16.47	27.18	12.94	14.65	1.71	0.94	16.68	6.67	4.74
3000	15.56	26.93	11.88	15.73	1.82	0.96	15.69	6.07	4.88
3200	14.64	26.80	10.76	15.89	1.95	0.99	15.24	5.46	4.86
3400	13.72	26.75	9.96	15.01	2.10	1.00	14.08	4.87	4.96
3600	12.81	26.70	9.33	13.59	2.25	1.00	12.62	4.05	5.01
3800	11.89	26.69	8.87	12.18	2.42	1.00	11.85	3.32	5.08
4000	11.02	26.72	8.47	10.81	2.58	0.99	10.45	2.70	5.23

Typical Performance Curves

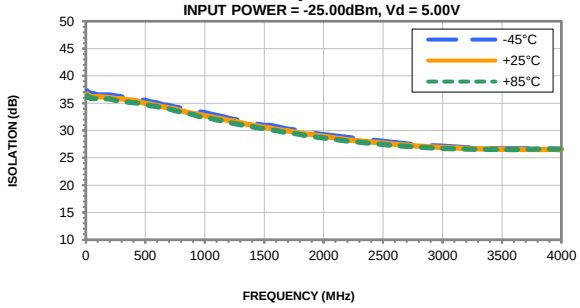
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



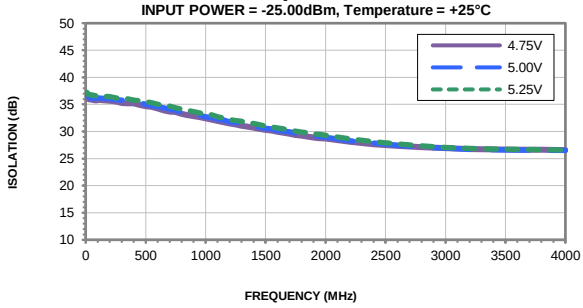
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



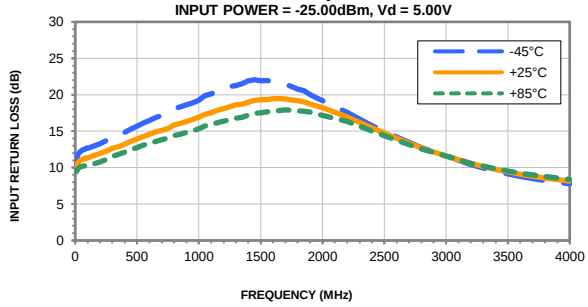
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



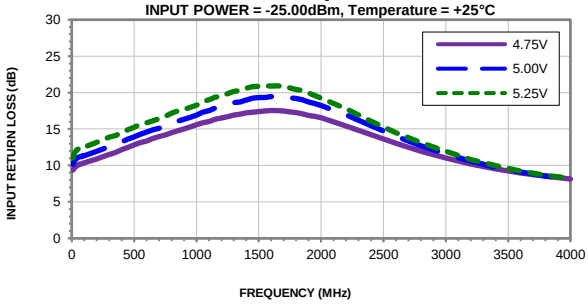
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



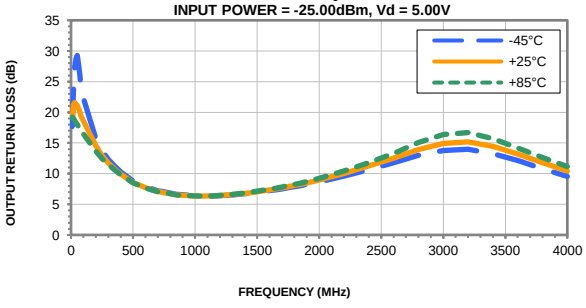
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



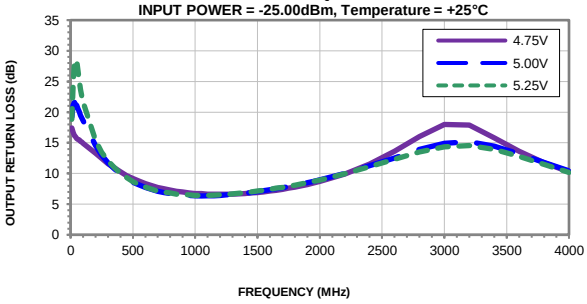
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



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

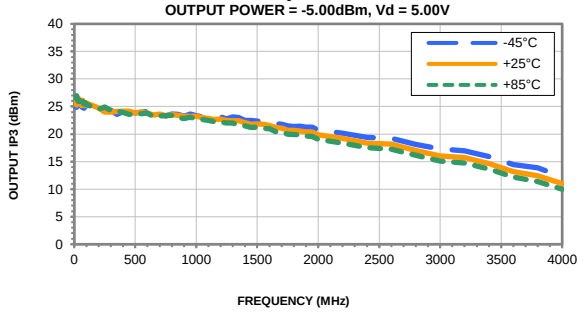


OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

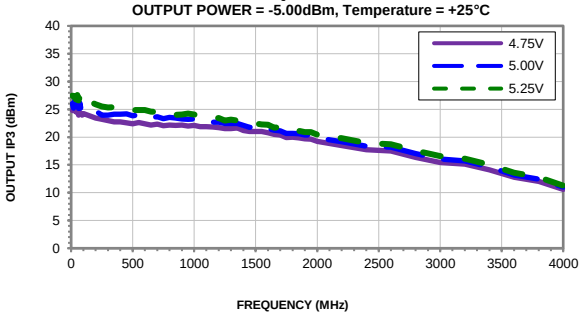


Typical Performance Curves

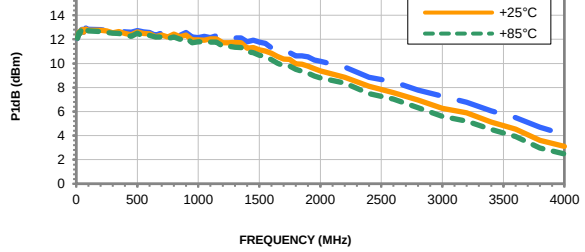
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTPUT POWER = -5.00dBm, Vd = 5.00V



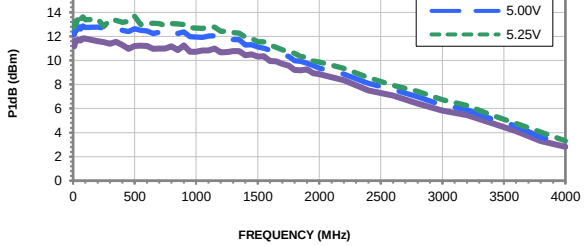
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
OUTPUT POWER = -5.00dBm, Temperature = +25°C



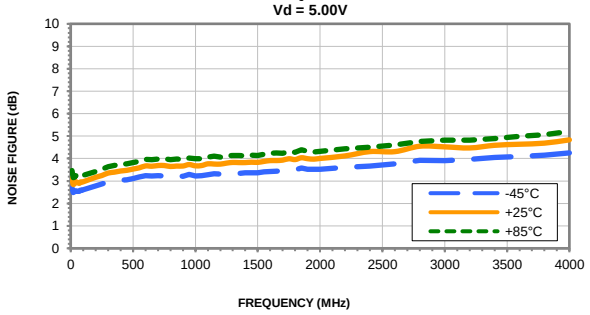
P1dB vs. FREQUENCY & TEMPERATURE
Vd = 5.00V



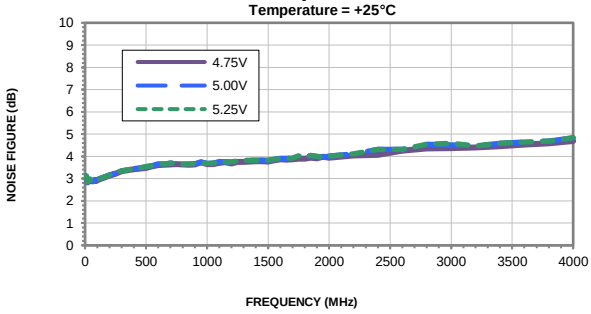
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



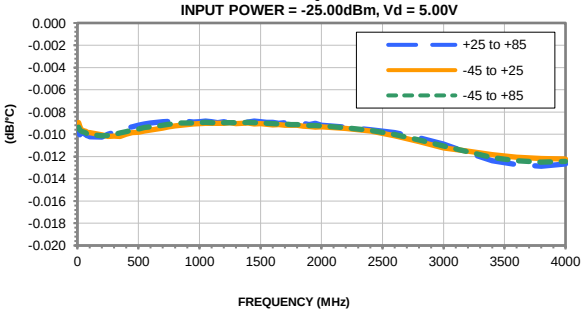
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vd = 5.00V



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



GAIN VARIANTS VS FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V

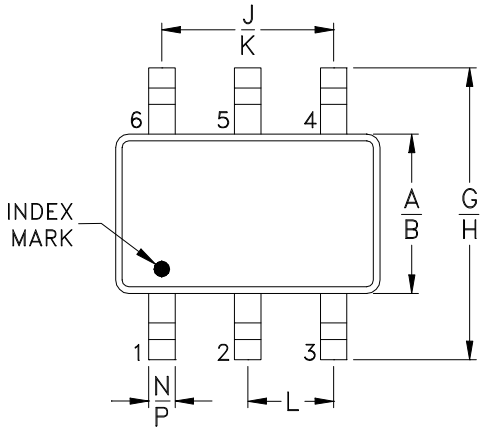


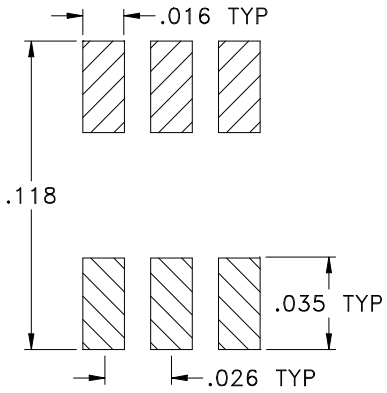
Case Style CA

CA1389

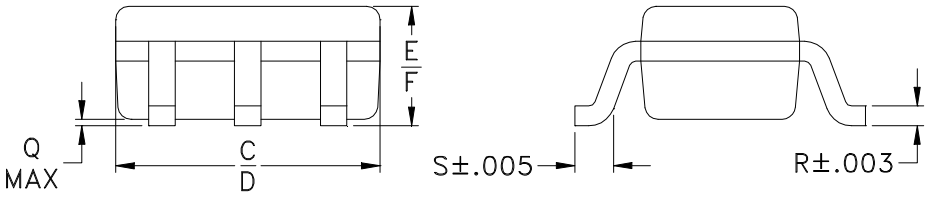
Outline Dimensions

PCB Land Pattern





Suggested Layout,
Tolerance to be within ±.002



CASE #	A	B	C	D	E	F	G	H	J	K
CA1389	.045 (1.15)	.053 (1.35)	.073 (1.85)	.089 (2.25)	.031 (0.80)	.039 (1.00)	.079 (2.00)	.091 (2.30)	.051 (1.30)	.051 (1.30)

CASE #	L	M	N	P	Q	R	S	T	WT. GRAM
CA1389	.026 (0.65)	- -	.006 (0.15)	.012 (0.30)	.004 (0.09)	.007 (0.165)	.012 (0.31)	- -	.010

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

Notes:

1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Matte Tin plate.
3. Primary dimensions are in millimeters.

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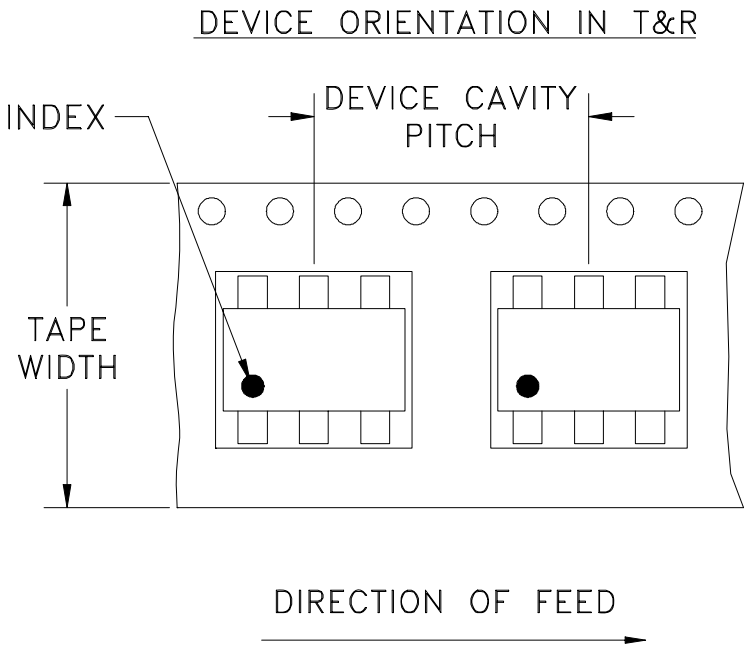
Tape & Reel Packaging TR-F101



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

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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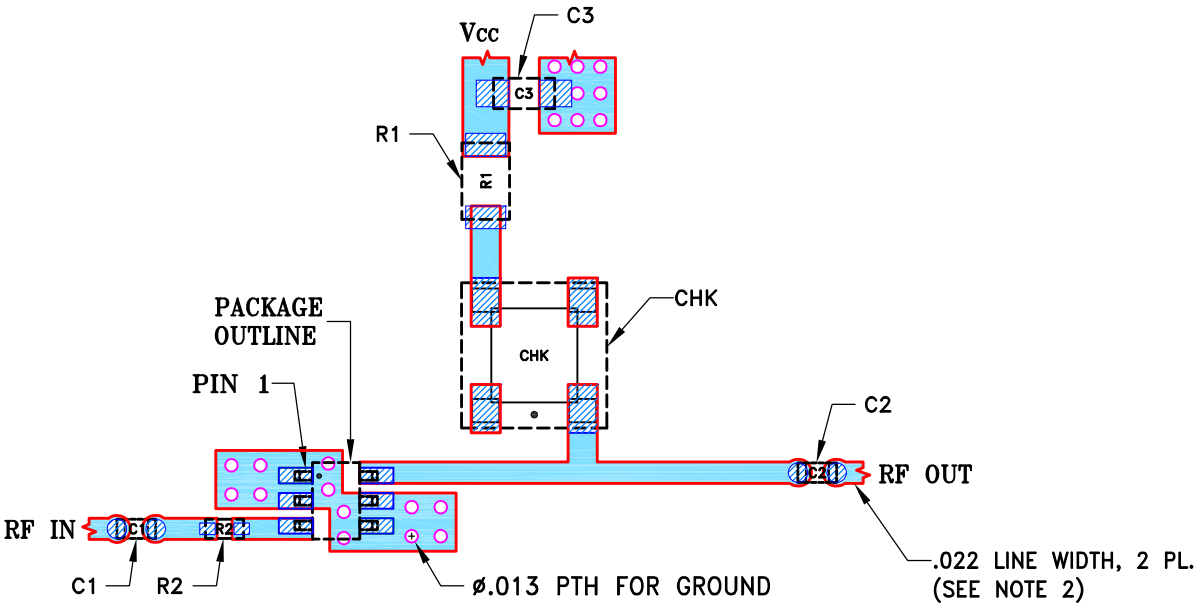
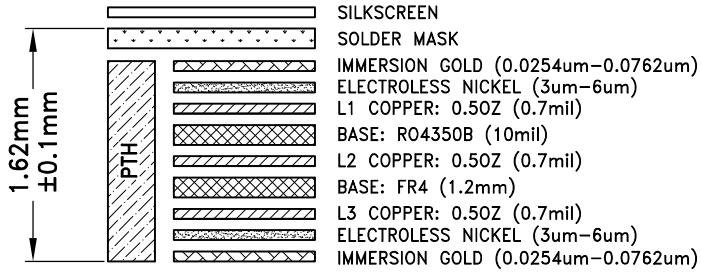
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M175905	NEW RELEASE	08/19/19	ITG	GH

SUGGESTED MOUNTING CONFIGURATION FOR CA1389 CASE STYLE



STACK-UP DIAGRAM



COMPONENT	SIZE
C1,C2	0402
C3	0603
R1	0805
CHK	.150 SQ.
R2	0402

1. TOTAL FINISHED THICKNESS 0.064" ± 10%.
2. PTH HOLES PRESENT FROM COPPER LAYER 1 TO 3.

NOTES:

1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. LINE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001"; COPPER: 1/2 OZ. FOR OTHER MATERIALS LINE WIDTH MAY NEED TO BE MODIFIED.
3. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-PSA-8A+.
4. COPPER LAYERS L2 & L3 OF THE PCB ARE CONTINUOUS GROUND PLANES.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	ITG	08/15/19
TOLERANCES ON:	CHECKED	GF	08/16/19
2 PL DECIMALS ±	APPROVED	GH	08/19/19
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

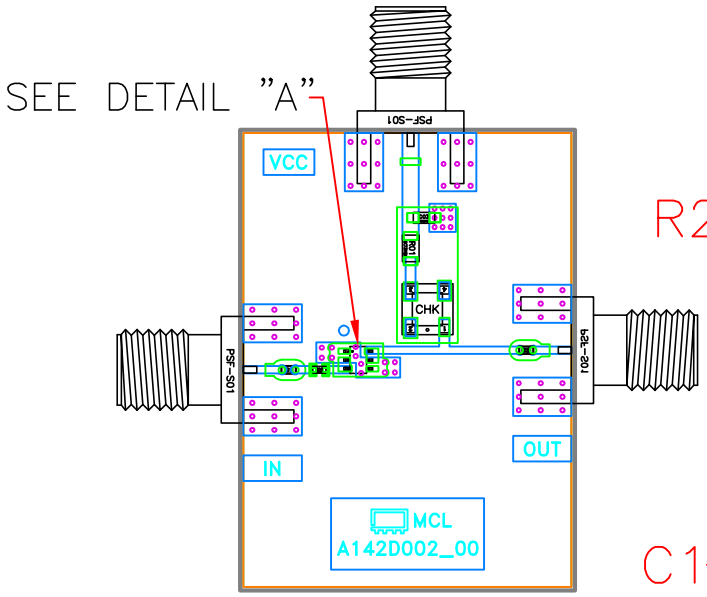
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

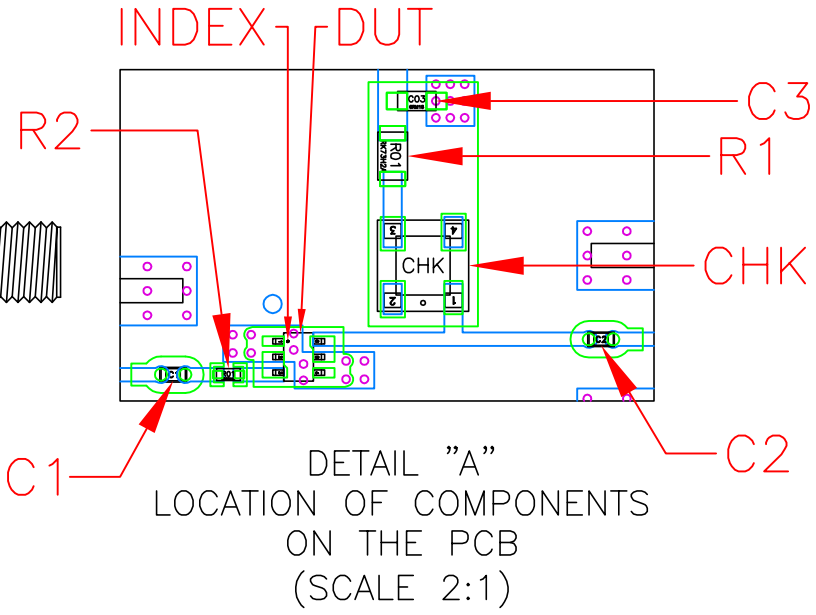
PL, CA1389, TB-PSA-8A+

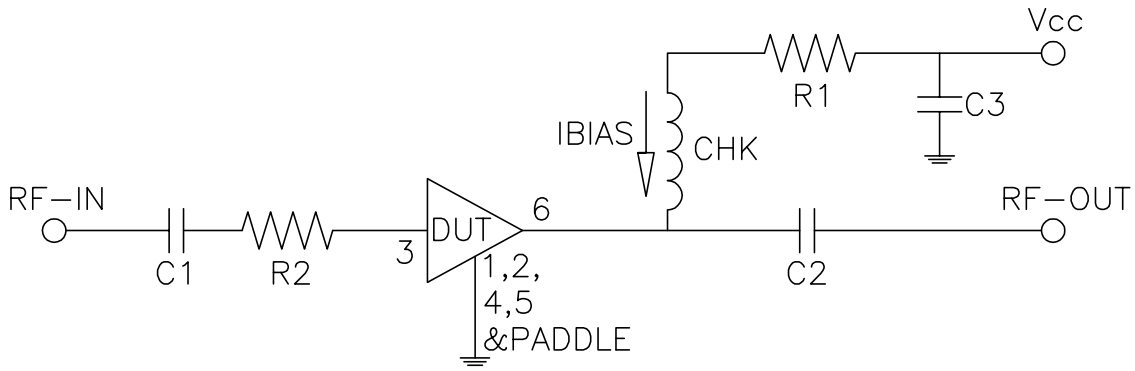
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-643	OR

FILE:	SCALE:	SHEET:
98PL643	5:1	1 OF 1

Evaluation Board and Circuit







SCHEMATIC DIAGRAM

Component	Size	Description
C1,C2	0402	2400pF
C3	0603	0.1uF
R1	0805	36.5ohm
CHK		TCCH-80+
R2	0402	10ohm

Notes:

1. 50 Ohm SMA Female Connectors.
2. PCB Material: Roger RO4350B or equivalent, Dielectric constant=3.5, Thickness=0.010 inch

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Environmental Specifications **ENV08T2**

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	-45° to 85°C or -40° to 85°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	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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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
	monoethanolamine at 63°C to 70°C	

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