HIGH GAIN, LOW NOISE & CURRENT

Monolithic Amplifier

PSA-39+

50Ω DC to 6 GHz

THE BIG DEAL

- Wideband, DC to 6 GHz
- High Gain, 23 dB Typ. at 0.1 GHz
- Low NF, 2.2 dB Typ. at 0.1 GHz
- Low Current, 32 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 website for RoHS Compliance methodologies and qualifications

APPLICATIONS

- Cellular
- PCS
- Communication Receivers & Transmitters
- Satellite Communication
- Military

PRODUCT OVERVIEW

The PSA-39+ is a HBT based wideband low noise MMIC Amplifier with high gain and low current. This design operates on a single +5 V supply, is well matched for 50Ω and comes in a SOT-363 package, accommodating dense circuit board layouts.

KEY FEATURES

Feature	Advantages
High Gain, 23 dB Typ. at 0.1 GHz	Enables signal amplification without the need for multiple gain stages.
Low Noise, 2.2 dB Typ. at 0.1 GHz	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.

Monolithic Amplifier PSA-39+

50Ω DC to 6 GHz

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

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range[2]		DC		6.0	GHz
Gain	0.1	19.7	23.0	26.7	dB
	1.0	18.3	21.3	24.7	
	3.0	13.5	15.7	18.2	
	5.0	10.4	11.4	14.1	
	6.0		10.2		
Input Return Loss	0.1		38		dB
	1.0		18		
	3.0		13		
	5.0		11		
	6.0		15		
Output Return Loss	0.1		21		dB
	1.0		30		
	3.0		10		
	5.0		7		
	6.0		10		
P1dB	0.1		+10.7		dBm
	1.0		+10		
	3.0		+10		
	5.0		+9		
	6.0		+7		
OIP3 (P_{OUT} = -5 dBm/Tone)	0.1		+23.3		dBm
	1.0		+22.5		
	3.0		+22.7		
	5.0		+20.1		
	6.0		+17.6		
Noise Figure	0.1		2.2		dB
	1.0		2.2		
	3.0		2.5		
	5.0		3.0		
	6.0		3.3		
Supply Voltage (V_S)	DC	+4.75	+5	+5.25	V
Device Operating Current (I_S)	DC		32	38	mA
Device Current Variation vs. Voltage[3]			0.022		mA/mV
Device Current Variation vs. Temperature[4]			42		µA/°C
Thermal Resistance, Junction-to-Ground Lead			127		°C/W

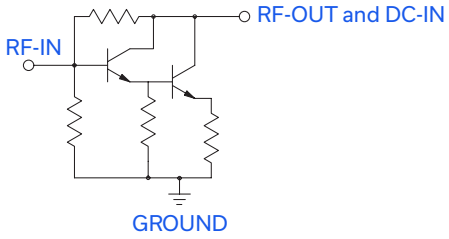
1. Measured on Mini-Circuits Characterization Test Board TB-PSA-39+. See Characterization Test Circuit (Fig. 1).
2. Guaranteed specifications DC to 6 GHz. Low frequency cut-off determined by external coupling capacitor.
3. Device Current Variation vs. Voltage = (Current at +5.25 V - Current at +4.75 V) / (+5.25 V - +4.75 V) * 1000)
4. Device Current Variation vs. Temperature = (Current at +85°C - Current at -45°C)/130

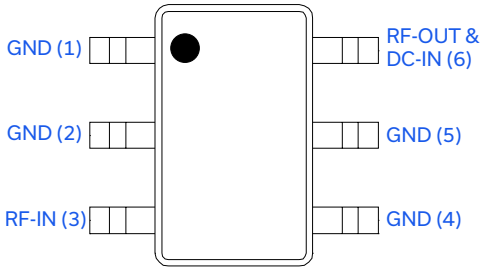
ABSOLUTE MAXIMUM RATINGS[5]

Parameter	Ratings
Operating Temperature	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Input Power (CW)	+13 dBm
Operating Current on Pin 6	55 mA

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

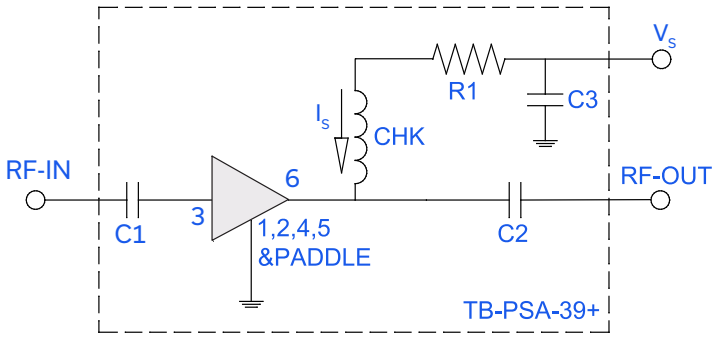
SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION





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 V_{DD} via RF Choke L1 & Resistor R1)
GND	1,2,4,5	Connections to ground

CHARACTERIZATION TEST / APPLICATION CIRCUIT

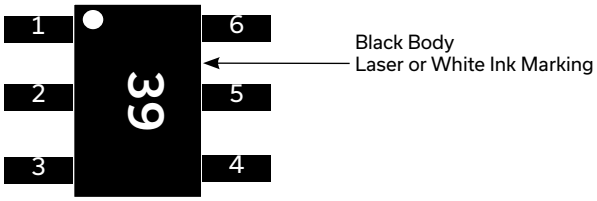


Component	Size	Value	Part Number	Manufacturer
DUT	SOT-363		PSA-39+	MCL
C1,C2	0402	2400 pF	GRM155R71H-242JA01D	Murata
C3	0603	0.1 uF	GCJ188R71H-104KA12D	Murata
R1	0805	43.2Ω	ERJ-6ENF43R2V	Panasonic
CHK	0.15x0.15		TCCH-80+	MCL

Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization Test Board TB-PSA-39+) Gain, Return Loss, Output Power at 1 dB Compression (P1dB), Output IP3 (OIP3) and Noise Figure measured using Agilent's N5242A PNA-X microwave network analyzer.

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

PRODUCT MARKING



Marking may contain other features or characters for internal lot control.

Monolithic Amplifier PSA-39+

50Ω DC to 6 GHz

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. 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 Finish: Matte Tin
Tape & Reel **Standard Quantities Available on Reel**	F101 7" Reels with 20, 50, 100, 200, 500, 1000, or 2000 devices
Suggested Layout for PCB Design	PL-645
Evaluation Board	TB-PSA-39+
Environmental Ratings	ENV08T2

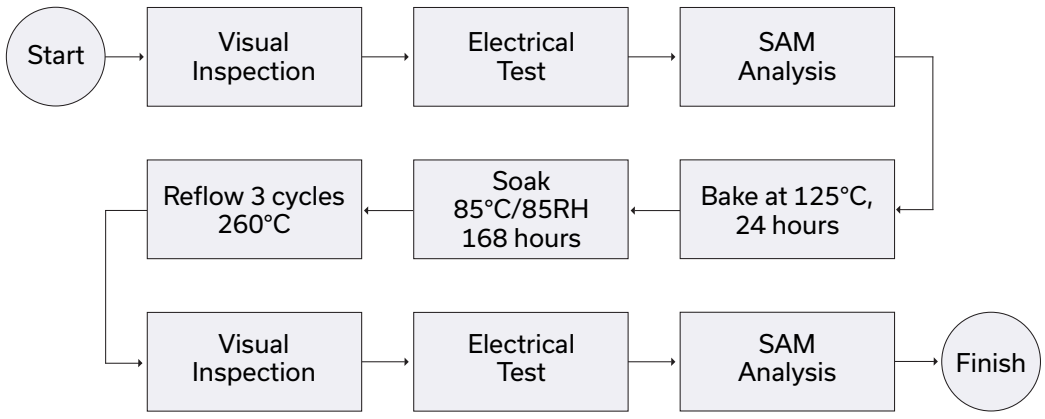
ESD RATING

Human Body Model (HBM): Class 1A (250 to <500 V) 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



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 = 32mA @ 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	22.37	26.57	19.17	15.14	1.09	0.60	22.05	10.96	2.32
20	22.64	25.81	24.03	17.45	1.05	0.50	22.82	10.61	2.16
30	22.72	25.87	26.65	18.46	1.06	0.50	22.79	10.87	2.13
40	22.76	25.80	28.88	19.04	1.05	0.49	22.03	10.52	2.15
50	22.78	26.42	32.47	19.12	1.08	0.56	20.78	10.00	2.12
60	22.81	25.85	32.47	19.80	1.05	0.49	22.15	10.44	2.11
70	22.83	25.79	34.08	19.96	1.05	0.49	22.42	10.66	2.10
80	22.83	25.74	36.38	20.18	1.05	0.48	22.27	10.47	2.13
90	22.84	25.78	38.63	20.23	1.05	0.48	22.48	10.64	2.16
100	22.84	25.71	40.97	20.38	1.05	0.47	22.82	10.90	2.11
200	22.77	25.65	36.61	20.84	1.05	0.48	22.62	10.75	2.20
250	22.71	25.59	33.06	20.94	1.05	0.48	22.36	10.42	2.23
300	22.64	25.58	30.37	21.14	1.05	0.48	22.24	10.65	2.26
350	22.56	25.50	28.37	21.16	1.05	0.49	22.74	10.77	2.29
400	22.47	25.54	27.00	21.38	1.06	0.50	22.56	10.54	2.33
450	22.38	25.46	25.65	21.61	1.06	0.50	22.49	10.34	2.32
500	22.29	25.44	24.55	21.74	1.06	0.51	22.15	10.35	2.31
550	22.19	25.39	23.66	22.11	1.06	0.52	22.94	11.01	2.30
600	22.09	25.31	22.76	22.53	1.06	0.52	22.60	10.52	2.33
650	21.98	25.28	22.05	22.99	1.06	0.53	22.46	10.51	2.29
700	21.88	25.21	21.34	23.63	1.06	0.54	22.46	10.52	2.28
750	21.77	25.13	20.78	24.30	1.07	0.55	22.14	10.29	2.26
800	21.66	25.09	20.24	25.09	1.07	0.55	22.38	10.30	2.19
850	21.55	25.03	19.75	25.96	1.07	0.56	22.41	10.34	2.17
900	21.44	24.98	19.27	27.13	1.07	0.57	22.45	10.70	2.16
950	21.31	24.90	18.88	28.43	1.07	0.58	21.54	9.71	2.17
1000	21.20	24.84	18.46	30.01	1.08	0.58	21.98	9.90	2.16
1050	21.08	24.76	18.16	32.17	1.08	0.59	21.80	9.81	2.19
1100	20.96	24.70	17.79	35.04	1.08	0.59	22.10	10.20	2.17
1150	20.83	24.63	17.50	40.08	1.08	0.60	22.53	10.21	2.18
1200	20.71	24.60	17.21	52.64	1.09	0.61	21.64	9.83	2.18
1250	20.59	24.49	17.01	43.84	1.09	0.61	22.29	9.99	2.21
1300	20.45	24.44	16.77	36.57	1.09	0.62	22.06	9.99	2.17
1350	20.33	24.36	16.57	32.38	1.09	0.62	22.07	10.07	2.18
1400	20.19	24.29	16.35	29.82	1.10	0.63	21.55	9.62	2.22
1450	20.05	24.25	16.22	27.74	1.10	0.64	21.75	9.72	2.19
1500	19.92	24.22	16.02	25.98	1.11	0.64	21.05	9.35	2.21
1550	19.78	24.09	15.87	24.54	1.11	0.64	21.92	9.65	2.28
1600	19.64	24.06	15.75	23.24	1.11	0.65	21.69	9.52	2.28
1650	19.50	24.00	15.58	22.16	1.12	0.66	21.73	9.68	2.26
1700	19.36	23.96	15.49	21.18	1.12	0.66	21.35	9.26	2.26
1750	19.22	23.92	15.37	20.25	1.13	0.67	21.38	9.44	2.23
1800	19.08	23.85	15.25	19.41	1.13	0.67	21.74	9.78	2.23
1850	18.93	23.78	15.15	18.67	1.14	0.67	22.06	9.61	2.29
1900	18.79	23.76	15.08	17.95	1.14	0.68	21.90	9.54	2.27
1950	18.64	23.69	15.00	17.30	1.15	0.68	21.38	9.24	2.30
2000	18.50	23.62	14.90	16.69	1.15	0.68	21.61	9.46	2.29
3000	15.58	22.74	13.09	9.76	1.26	0.68	22.09	9.85	2.50
3500	14.24	22.34	11.87	8.03	1.30	0.66	23.21	10.45	2.56
4000	13.05	21.84	11.01	7.07	1.32	0.64	22.81	10.62	2.67
4500	12.08	21.21	10.72	6.73	1.34	0.64	21.29	10.13	2.75
5000	11.32	20.51	11.18	6.96	1.36	0.65	19.10	9.00	2.87
5500	10.72	19.65	12.36	7.79	1.37	0.68	17.35	8.12	2.97
6000	10.11	18.89	13.64	9.11	1.41	0.73	16.67	7.44	3.23

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 = 4.75V, Id = 26mA @ 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	21.75	25.51	17.28	17.43	1.07	0.58	18.77	8.37	2.38
20	22.01	25.46	20.31	20.85	1.07	0.55	19.90	8.25	2.21
30	22.08	25.34	21.55	22.74	1.06	0.53	19.99	8.41	2.20
40	22.13	25.31	22.21	24.12	1.06	0.52	19.31	7.97	2.23
50	22.14	24.84	22.88	24.61	1.04	0.47	17.93	7.55	2.22
60	22.17	25.21	23.04	25.86	1.05	0.51	19.26	7.95	2.17
70	22.19	25.24	23.30	26.51	1.06	0.51	19.66	8.19	2.19
80	22.20	25.26	23.52	27.10	1.06	0.51	19.47	8.02	2.20
90	22.21	25.19	23.78	27.40	1.05	0.50	19.58	8.20	2.21
100	22.22	25.24	23.94	27.68	1.05	0.51	19.95	8.45	2.19
200	22.15	25.13	24.48	28.91	1.05	0.50	19.81	8.17	2.27
250	22.10	25.17	24.36	28.84	1.06	0.51	19.42	7.97	2.33
300	22.04	25.03	24.00	29.12	1.05	0.50	19.34	8.08	2.35
350	21.96	25.13	23.77	28.84	1.06	0.52	19.85	8.34	2.34
400	21.88	25.04	23.41	28.87	1.06	0.52	19.61	8.11	2.41
450	21.80	24.98	22.90	29.06	1.06	0.52	19.48	7.82	2.40
500	21.71	24.91	22.51	29.06	1.06	0.53	19.19	7.94	2.36
550	21.63	24.88	22.15	29.36	1.06	0.53	20.00	8.51	2.35
600	21.53	24.86	21.62	29.97	1.07	0.54	19.65	8.13	2.38
650	21.43	24.81	21.14	30.49	1.07	0.55	19.45	8.01	2.37
700	21.34	24.76	20.65	31.44	1.07	0.55	19.41	8.14	2.35
750	21.23	24.75	20.22	32.12	1.08	0.56	19.15	7.90	2.32
800	21.14	24.67	19.81	32.77	1.08	0.57	19.33	7.92	2.30
850	21.03	24.64	19.43	33.36	1.08	0.57	19.36	7.96	2.24
900	20.93	24.58	19.06	33.73	1.08	0.58	19.40	8.24	2.24
950	20.81	24.54	18.69	33.57	1.08	0.59	18.44	7.25	2.23
1000	20.71	24.47	18.33	32.82	1.09	0.59	18.77	7.47	2.22
1050	20.60	24.42	18.07	31.76	1.09	0.60	18.61	7.37	2.24
1100	20.48	24.37	17.71	30.55	1.09	0.60	18.98	7.87	2.25
1150	20.37	24.32	17.45	29.23	1.10	0.61	19.34	7.78	2.26
1200	20.25	24.25	17.18	27.89	1.10	0.61	18.39	7.39	2.27
1250	20.13	24.19	16.95	26.65	1.10	0.62	19.10	7.58	2.27
1300	20.01	24.17	16.72	25.51	1.10	0.63	18.76	7.56	2.24
1350	19.89	24.11	16.48	24.41	1.11	0.63	18.91	7.55	2.27
1400	19.76	24.05	16.28	23.43	1.11	0.63	18.24	7.20	2.25
1450	19.63	23.97	16.14	22.53	1.11	0.64	18.40	7.21	2.25
1500	19.50	23.99	15.90	21.71	1.12	0.65	17.66	6.94	2.27
1550	19.38	23.90	15.75	20.88	1.12	0.65	18.57	7.26	2.32
1600	19.24	23.90	15.60	20.15	1.13	0.66	18.18	7.04	2.34
1650	19.11	23.80	15.44	19.46	1.13	0.66	18.37	7.20	2.31
1700	18.97	23.78	15.31	18.81	1.14	0.66	17.82	6.88	2.32
1750	18.84	23.74	15.16	18.17	1.14	0.67	17.91	6.95	2.34
1800	18.70	23.66	15.03	17.57	1.15	0.67	18.36	7.31	2.31
1850	18.57	23.62	14.91	17.06	1.15	0.67	18.60	7.13	2.35
1900	18.43	23.56	14.81	16.49	1.16	0.67	18.39	7.07	2.32
1950	18.29	23.52	14.70	16.01	1.16	0.68	17.76	6.88	2.34
2000	18.15	23.48	14.57	15.54	1.17	0.68	18.04	7.00	2.33
3000	15.35	22.71	12.47	9.57	1.27	0.69	18.53	7.62	2.36
3500	14.04	22.33	11.28	7.95	1.31	0.67	20.18	8.42	2.63
4000	12.89	21.82	10.50	7.06	1.33	0.65	20.71	9.12	2.77
4500	11.94	21.25	10.23	6.75	1.36	0.65	20.42	9.36	2.80
5000	11.19	20.53	10.70	7.01	1.37	0.66	18.70	8.56	2.94
5500	10.62	19.71	11.87	7.89	1.39	0.70	17.04	7.85	3.09
6000	10.02	18.93	13.23	9.27	1.42	0.74	16.43	7.29	3.27

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, Id = 37mA @ 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	22.77	26.68	19.90	13.52	1.07	0.54	24.14	12.39	2.31
20	23.04	26.29	24.06	15.53	1.05	0.49	25.01	12.49	2.17
30	23.12	26.27	25.97	16.17	1.05	0.49	25.23	12.61	2.14
40	23.17	26.24	27.21	16.63	1.05	0.48	24.36	12.38	2.19
50	23.18	26.62	30.30	16.63	1.07	0.52	23.15	11.92	2.17
60	23.21	26.20	28.78	17.09	1.05	0.47	24.55	12.36	2.12
70	23.23	26.16	28.92	17.23	1.05	0.47	24.62	12.56	2.13
80	23.24	26.04	29.00	17.37	1.04	0.45	24.60	12.37	2.15
90	23.24	26.14	29.14	17.38	1.05	0.46	24.89	12.50	2.17
100	23.25	26.12	29.17	17.45	1.05	0.46	25.24	12.75	2.14
200	23.16	26.05	27.77	17.80	1.05	0.46	24.92	12.54	2.21
250	23.10	25.94	26.80	17.89	1.05	0.46	24.69	12.42	2.25
300	23.03	25.93	26.03	18.09	1.05	0.47	24.48	12.54	2.30
350	22.94	25.93	25.01	18.14	1.05	0.48	25.06	12.63	2.31
400	22.85	25.85	24.21	18.33	1.05	0.48	24.81	12.40	2.37
450	22.75	25.82	23.40	18.55	1.05	0.49	24.90	12.19	2.35
500	22.65	25.77	22.58	18.74	1.05	0.50	24.47	12.31	2.31
550	22.55	25.70	21.93	19.01	1.05	0.51	25.19	12.70	2.33
600	22.44	25.63	21.26	19.37	1.06	0.51	24.99	12.36	2.35
650	22.33	25.57	20.70	19.78	1.06	0.52	24.73	12.35	2.33
700	22.22	25.51	20.16	20.23	1.06	0.53	24.71	12.35	2.30
750	22.11	25.47	19.68	20.74	1.06	0.54	24.36	12.13	2.29
800	21.99	25.36	19.24	21.36	1.06	0.55	24.73	12.23	2.23
850	21.87	25.29	18.85	21.98	1.06	0.55	24.70	12.26	2.18
900	21.76	25.22	18.45	22.78	1.06	0.56	24.72	12.49	2.19
950	21.63	25.17	18.13	23.60	1.07	0.57	23.96	11.54	2.19
1000	21.51	25.04	17.77	24.60	1.07	0.57	24.38	11.80	2.17
1050	21.39	25.01	17.51	25.74	1.07	0.58	24.12	11.72	2.21
1100	21.26	24.93	17.19	27.10	1.07	0.59	24.38	12.09	2.22
1150	21.13	24.86	16.96	28.87	1.07	0.60	24.75	12.10	2.19
1200	21.00	24.76	16.72	31.03	1.08	0.60	23.96	11.74	2.25
1250	20.87	24.68	16.55	33.83	1.08	0.61	24.52	11.88	2.23
1300	20.73	24.65	16.33	37.16	1.08	0.62	24.43	11.78	2.21
1350	20.60	24.55	16.17	38.08	1.08	0.62	24.61	11.86	2.22
1400	20.46	24.49	15.99	35.66	1.09	0.63	23.91	11.52	2.22
1450	20.32	24.43	15.88	32.47	1.09	0.64	24.31	11.51	2.23
1500	20.18	24.34	15.73	29.65	1.10	0.64	23.52	11.25	2.25
1550	20.04	24.29	15.59	27.46	1.10	0.65	24.37	11.53	2.29
1600	19.89	24.25	15.50	25.64	1.11	0.66	24.15	11.31	2.32
1650	19.75	24.14	15.39	24.14	1.11	0.66	24.17	11.46	2.28
1700	19.60	24.09	15.33	22.88	1.11	0.66	23.84	11.13	2.29
1750	19.46	24.04	15.22	21.68	1.12	0.67	23.94	11.32	2.29
1800	19.31	23.93	15.14	20.69	1.12	0.67	24.11	11.63	2.28
1850	19.16	23.89	15.07	19.80	1.13	0.67	24.48	11.47	2.39
1900	19.01	23.83	15.03	18.93	1.13	0.67	24.42	11.40	2.29
1950	18.87	23.73	14.99	18.16	1.13	0.67	23.91	11.10	2.33
2000	18.72	23.73	14.90	17.46	1.14	0.68	24.14	11.31	2.33
3000	15.74	22.77	13.47	9.88	1.25	0.68	24.27	11.52	2.45
3500	14.38	22.32	12.27	8.09	1.29	0.66	24.66	11.90	2.62
4000	13.17	21.84	11.39	7.10	1.32	0.64	23.48	11.40	2.76
4500	12.18	21.22	11.07	6.73	1.33	0.63	21.42	10.53	2.80
5000	11.40	20.45	11.55	6.94	1.35	0.65	19.20	9.14	2.91
5500	10.79	19.60	12.74	7.74	1.36	0.68	17.46	8.33	3.09
6000	10.17	18.83	13.92	9.03	1.39	0.72	16.80	7.63	3.28

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 = 5.00V, Id = 29mA @ 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	22.34	25.80	18.27	14.12	1.05	0.51	18.84	8.72	1.89
20	22.64	26.02	22.56	16.93	1.06	0.52	20.13	8.53	1.76
30	22.73	25.89	25.31	18.20	1.05	0.50	20.30	8.95	1.73
40	22.78	25.76	27.18	19.02	1.05	0.49	19.59	8.50	1.76
50	22.80	26.05	27.81	19.28	1.06	0.52	18.10	8.09	1.74
60	22.83	25.87	29.77	20.02	1.05	0.49	19.63	8.55	1.70
70	22.86	25.71	31.31	20.31	1.05	0.47	19.99	8.78	1.72
80	22.87	25.81	32.57	20.68	1.05	0.49	19.85	8.49	1.76
90	22.88	25.74	33.48	20.83	1.05	0.48	19.93	8.65	1.75
100	22.89	25.69	34.52	21.07	1.05	0.47	20.28	8.91	1.74
200	22.84	25.62	36.41	22.14	1.05	0.47	20.18	8.69	1.79
250	22.79	25.59	33.70	21.95	1.05	0.47	19.90	8.60	1.87
300	22.73	25.52	31.00	21.75	1.05	0.47	19.93	8.74	1.90
350	22.65	25.50	28.73	21.40	1.05	0.48	20.49	8.99	1.89
400	22.57	25.51	27.17	21.42	1.05	0.49	20.31	8.77	1.95
450	22.48	25.45	25.95	21.72	1.05	0.49	20.16	8.55	1.94
500	22.39	25.40	24.82	22.08	1.05	0.50	19.88	8.57	1.92
550	22.30	25.38	23.92	22.52	1.06	0.51	20.76	9.25	1.91
600	22.20	25.29	22.95	23.01	1.06	0.51	20.39	8.76	1.92
650	22.10	25.23	22.16	23.51	1.06	0.52	20.18	8.64	1.90
700	21.99	25.18	21.38	24.10	1.06	0.53	20.14	8.76	1.89
750	21.88	25.14	20.70	24.81	1.06	0.53	19.81	8.52	1.88
800	21.78	25.09	20.12	25.75	1.06	0.54	20.02	8.53	1.81
850	21.67	24.99	19.59	26.79	1.06	0.55	20.03	8.57	1.79
900	21.56	24.96	19.12	28.08	1.07	0.56	20.11	8.84	1.78
950	21.44	24.84	18.71	29.46	1.07	0.56	18.98	7.83	1.78
1000	21.33	24.80	18.34	31.17	1.07	0.57	19.47	8.03	1.78
1050	21.21	24.72	18.05	33.46	1.07	0.57	19.19	7.94	1.80
1100	21.10	24.67	17.73	36.91	1.07	0.58	19.64	8.44	1.80
1150	20.97	24.63	17.48	43.10	1.08	0.59	20.08	8.46	1.80
1200	20.85	24.56	17.19	51.59	1.08	0.59	18.31	7.97	1.81
1250	20.73	24.51	16.95	41.38	1.08	0.60	19.83	8.24	1.82
1300	20.60	24.43	16.70	36.29	1.08	0.61	18.84	8.14	1.78
1350	20.47	24.39	16.50	32.64	1.09	0.61	19.62	8.22	1.79
1400	20.34	24.28	16.32	30.17	1.09	0.62	18.88	7.76	1.79
1450	20.20	24.27	16.19	28.12	1.09	0.63	19.27	7.87	1.79
1500	20.07	24.18	16.02	26.29	1.10	0.63	18.37	7.49	1.82
1550	19.94	24.12	15.90	24.72	1.10	0.63	19.04	7.81	1.85
1600	19.80	24.05	15.79	23.45	1.10	0.64	18.70	7.58	1.89
1650	19.66	24.00	15.64	22.38	1.11	0.64	18.87	7.83	1.86
1700	19.52	23.95	15.55	21.39	1.11	0.65	18.28	7.40	1.84
1750	19.38	23.88	15.44	20.50	1.12	0.65	18.41	7.58	1.86
1800	19.24	23.85	15.32	19.62	1.12	0.66	18.89	7.94	1.85
1850	19.10	23.79	15.23	18.83	1.13	0.66	19.38	7.76	1.92
1900	18.95	23.73	15.18	18.07	1.13	0.66	19.19	7.69	1.85
1950	18.81	23.69	15.10	17.40	1.14	0.67	18.46	7.39	1.88
2000	18.67	23.60	15.03	16.84	1.14	0.67	18.82	7.51	1.88
3000	15.82	22.74	13.21	9.57	1.24	0.66	19.25	7.98	2.03
3500	14.52	22.28	11.96	7.83	1.26	0.64	20.98	8.89	2.11
4000	13.36	21.79	11.00	6.83	1.28	0.61	21.43	9.68	2.22
4500	12.41	21.16	10.71	6.44	1.29	0.60	21.96	10.35	2.23
5000	11.68	20.41	11.25	6.60	1.30	0.61	20.40	9.63	2.35
5500	11.12	19.57	12.41	7.37	1.31	0.64	18.76	8.81	2.48
6000	10.57	18.74	13.59	8.54	1.32	0.68	18.26	8.25	2.64

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, Id = 24mA @ 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	21.52	26.18	15.54	16.63	1.11	0.66	15.09	5.47	1.93
20	21.84	25.35	18.41	20.50	1.07	0.56	16.33	5.50	1.79
30	21.93	25.28	19.55	22.85	1.06	0.54	16.60	5.83	1.78
40	21.98	25.19	20.10	24.82	1.06	0.53	15.94	5.42	1.78
50	21.99	25.17	20.32	25.49	1.06	0.53	14.54	4.99	1.74
60	22.03	25.12	20.60	27.62	1.06	0.52	15.89	5.40	1.74
70	22.05	25.15	20.79	28.83	1.06	0.52	16.29	5.74	1.75
80	22.07	25.05	20.97	29.98	1.05	0.51	16.12	5.48	1.76
90	22.08	25.10	21.03	30.97	1.05	0.51	16.23	5.68	1.77
100	22.09	25.10	21.14	31.70	1.05	0.51	16.50	5.91	1.79
200	22.06	25.01	21.55	39.89	1.05	0.50	16.39	5.66	1.85
250	22.02	24.93	22.10	38.52	1.05	0.50	16.14	5.49	1.89
300	21.97	24.93	22.39	36.33	1.05	0.50	16.03	5.75	1.92
350	21.91	24.92	22.64	33.63	1.06	0.51	16.53	5.92	1.93
400	21.83	24.87	22.60	32.78	1.06	0.51	16.33	5.69	1.97
450	21.75	24.86	22.19	32.66	1.06	0.52	16.15	5.40	1.95
500	21.67	24.80	21.88	32.88	1.06	0.52	15.89	5.53	1.92
550	21.59	24.75	21.54	32.92	1.06	0.52	16.76	6.10	1.92
600	21.50	24.70	21.04	33.44	1.06	0.53	16.30	5.72	1.92
650	21.40	24.67	20.63	33.50	1.07	0.54	16.04	5.60	1.91
700	21.31	24.65	20.18	33.79	1.07	0.54	16.02	5.62	1.89
750	21.21	24.58	19.78	33.50	1.07	0.55	15.78	5.38	1.89
800	21.12	24.58	19.35	32.90	1.07	0.56	15.81	5.40	1.80
850	21.02	24.52	18.98	32.33	1.08	0.56	15.85	5.45	1.80
900	20.92	24.47	18.64	31.50	1.08	0.57	15.86	5.74	1.79
950	20.81	24.43	18.32	30.75	1.08	0.58	14.85	4.73	1.80
1000	20.71	24.37	18.01	29.73	1.08	0.58	15.10	4.96	1.79
1050	20.60	24.32	17.80	28.80	1.08	0.58	14.96	4.87	1.82
1100	20.50	24.28	17.50	27.81	1.09	0.59	15.26	5.26	1.84
1150	20.39	24.22	17.27	26.80	1.09	0.60	15.60	5.29	1.78
1200	20.27	24.16	17.01	25.86	1.09	0.60	14.63	4.89	1.86
1250	20.16	24.13	16.80	25.05	1.10	0.61	15.29	5.09	1.83
1300	20.04	24.06	16.60	24.20	1.10	0.61	14.98	5.08	1.82
1350	19.93	24.03	16.43	23.34	1.10	0.62	15.11	5.07	1.82
1400	19.80	23.96	16.27	22.54	1.10	0.62	14.47	4.71	1.79
1450	19.67	23.92	16.14	21.74	1.11	0.63	14.56	4.73	1.80
1500	19.55	23.89	15.92	21.01	1.11	0.63	13.82	4.34	1.85
1550	19.43	23.84	15.78	20.32	1.12	0.64	14.66	4.69	1.86
1600	19.30	23.82	15.63	19.68	1.12	0.64	14.17	4.46	1.87
1650	19.18	23.76	15.49	19.06	1.13	0.65	14.38	4.62	1.88
1700	19.04	23.75	15.36	18.50	1.13	0.65	13.79	4.30	1.84
1750	18.91	23.69	15.24	17.90	1.14	0.66	13.82	4.46	1.90
1800	18.78	23.65	15.09	17.33	1.14	0.66	14.23	4.74	1.82
1850	18.64	23.56	14.99	16.80	1.14	0.66	14.55	4.65	1.92
1900	18.51	23.56	14.88	16.30	1.15	0.67	14.25	4.60	1.85
1950	18.37	23.52	14.77	15.81	1.16	0.67	13.64	4.31	1.91
2000	18.24	23.43	14.68	15.39	1.16	0.67	13.89	4.43	1.89
3000	15.53	22.64	12.45	9.34	1.25	0.67	14.15	5.04	2.02
3500	14.30	22.24	11.26	7.75	1.27	0.64	15.99	5.95	2.10
4000	13.17	21.79	10.39	6.83	1.29	0.63	16.89	7.09	2.21
4500	12.26	21.20	10.15	6.52	1.31	0.62	18.86	8.94	2.23
5000	11.56	20.46	10.68	6.68	1.31	0.63	19.12	8.78	2.34
5500	11.02	19.61	11.81	7.51	1.33	0.66	18.15	8.32	2.44
6000	10.48	18.80	13.07	8.69	1.34	0.70	17.87	7.94	2.58

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 = 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	22.78	26.96	18.12	13.07	1.08	0.57	21.97	11.13	1.87
20	23.10	26.31	23.04	15.01	1.05	0.48	23.17	11.01	1.78
30	23.19	26.28	24.97	15.84	1.05	0.48	23.39	11.30	1.74
40	23.25	26.29	26.28	16.31	1.05	0.47	22.68	10.83	1.78
50	23.26	25.97	27.76	16.36	1.04	0.43	21.30	10.46	1.77
60	23.30	26.22	28.00	16.89	1.05	0.46	22.79	10.91	1.73
70	23.32	26.24	28.34	17.11	1.05	0.46	22.98	11.14	1.73
80	23.33	26.23	28.69	17.27	1.05	0.46	22.88	10.93	1.76
90	23.34	26.18	28.81	17.37	1.05	0.46	23.09	11.09	1.78
100	23.35	26.19	28.94	17.48	1.05	0.46	23.57	11.37	1.77
200	23.29	26.08	27.99	18.07	1.04	0.45	23.28	11.15	1.82
250	23.23	25.94	26.63	18.04	1.04	0.44	22.98	11.04	1.88
300	23.16	26.00	25.25	18.00	1.05	0.46	23.12	11.19	1.91
350	23.08	25.93	24.03	17.85	1.05	0.46	23.63	11.41	1.91
400	22.99	25.90	23.22	17.93	1.05	0.47	23.51	11.19	1.97
450	22.90	25.83	22.70	18.17	1.05	0.48	23.46	10.95	1.96
500	22.80	25.79	22.22	18.48	1.05	0.48	23.05	10.98	1.94
550	22.70	25.71	21.80	18.98	1.05	0.49	23.99	11.64	1.95
600	22.60	25.68	21.27	19.49	1.05	0.50	23.56	11.15	1.96
650	22.49	25.55	20.65	19.96	1.05	0.50	23.37	11.03	1.94
700	22.38	25.50	19.98	20.38	1.05	0.51	23.30	11.15	1.90
750	22.26	25.48	19.39	20.83	1.05	0.53	23.10	10.80	1.90
800	22.15	25.43	18.86	21.40	1.06	0.54	23.29	10.91	1.84
850	22.03	25.36	18.44	21.91	1.06	0.55	23.30	10.95	1.81
900	21.91	25.22	18.10	22.66	1.06	0.55	23.41	11.20	1.80
950	21.79	25.19	17.81	23.40	1.06	0.56	22.45	10.20	1.81
1000	21.67	25.09	17.51	24.23	1.06	0.56	22.90	10.36	1.80
1050	21.55	25.03	17.27	25.21	1.06	0.57	22.63	10.38	1.84
1100	21.42	24.93	16.98	26.31	1.06	0.58	22.99	10.68	1.82
1150	21.29	24.85	16.75	27.83	1.06	0.58	23.39	10.79	1.83
1200	21.17	24.77	16.51	29.62	1.07	0.59	22.46	10.31	1.86
1250	21.04	24.71	16.34	31.88	1.07	0.60	23.21	10.56	1.82
1300	20.90	24.63	16.16	34.25	1.07	0.60	22.92	10.47	1.82
1350	20.77	24.54	16.01	35.61	1.07	0.61	23.32	10.54	1.84
1400	20.63	24.48	15.85	34.48	1.08	0.62	22.52	10.19	1.81
1450	20.49	24.44	15.73	32.43	1.08	0.62	22.86	10.19	1.81
1500	20.35	24.37	15.57	29.95	1.09	0.63	22.03	9.90	1.85
1550	20.21	24.27	15.43	27.92	1.09	0.63	23.01	10.21	1.89
1600	20.06	24.22	15.36	26.18	1.09	0.64	22.63	9.97	1.92
1650	19.92	24.17	15.27	24.61	1.10	0.65	22.78	10.13	1.89
1700	19.77	24.11	15.22	23.22	1.10	0.65	22.36	9.69	1.87
1750	19.63	23.99	15.16	22.03	1.10	0.65	22.41	9.88	1.90
1800	19.48	24.01	15.07	20.96	1.11	0.66	22.80	10.22	1.87
1850	19.34	23.88	15.05	20.06	1.11	0.66	22.93	10.15	1.90
1900	19.19	23.88	15.00	19.20	1.12	0.67	22.83	9.98	1.89
1950	19.04	23.77	14.96	18.43	1.12	0.67	22.27	9.76	1.91
2000	18.89	23.74	14.93	17.73	1.13	0.67	22.46	9.88	1.92
3000	15.97	22.78	13.68	9.80	1.23	0.67	23.10	10.27	2.02
3500	14.63	22.29	12.39	7.88	1.26	0.63	24.47	10.99	2.14
4000	13.44	21.80	11.40	6.84	1.28	0.61	24.14	11.35	2.26
4500	12.47	21.16	11.04	6.42	1.28	0.60	23.04	11.22	2.30
5000	11.71	20.43	11.52	6.56	1.30	0.61	20.84	10.10	2.39
5500	11.13	19.56	12.75	7.37	1.31	0.64	19.04	9.07	2.51
6000	10.59	18.70	13.98	8.50	1.32	0.68	18.46	8.49	2.73

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 = 34mA @ 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	22.31	26.02	19.81	15.34	1.07	0.55	23.02	11.77	2.80
20	22.58	26.15	24.29	17.45	1.07	0.55	23.45	11.57	2.62
30	22.66	25.88	26.94	18.43	1.06	0.51	23.92	11.79	2.61
40	22.70	25.80	29.38	19.04	1.05	0.50	22.99	11.48	2.65
50	22.72	25.21	31.20	19.14	1.03	0.43	21.66	11.10	2.64
60	22.74	25.75	32.97	19.64	1.05	0.49	23.10	11.42	2.61
70	22.76	25.76	34.82	19.86	1.05	0.49	23.39	11.61	2.59
80	22.76	25.79	37.12	19.98	1.05	0.49	23.16	11.43	2.63
90	22.76	25.65	39.47	20.02	1.05	0.48	23.33	11.58	2.63
100	22.77	25.73	41.49	20.10	1.05	0.49	23.82	11.81	2.60
200	22.68	25.65	35.79	20.19	1.05	0.49	23.53	11.57	2.65
250	22.61	25.75	32.50	20.22	1.06	0.51	23.18	11.46	2.71
300	22.55	25.64	30.26	20.53	1.06	0.50	23.16	11.56	2.74
350	22.46	25.56	28.34	20.71	1.06	0.50	23.62	11.67	2.76
400	22.38	25.56	26.96	20.99	1.06	0.51	23.25	11.45	2.81
450	22.29	25.45	25.74	21.35	1.06	0.51	23.36	11.25	2.81
500	22.19	25.44	24.64	21.54	1.06	0.52	23.01	11.25	2.78
550	22.09	25.40	23.73	21.82	1.06	0.53	23.77	11.75	2.78
600	21.99	25.31	22.85	22.23	1.06	0.54	23.39	11.42	2.81
650	21.88	25.33	22.18	22.69	1.07	0.55	23.20	11.41	2.79
700	21.78	25.22	21.51	23.24	1.07	0.55	23.19	11.41	2.77
750	21.66	25.13	20.88	23.90	1.07	0.56	22.98	11.18	2.74
800	21.56	25.06	20.38	24.78	1.07	0.56	23.20	11.29	2.68
850	21.44	25.04	19.84	25.76	1.08	0.57	23.17	11.23	2.66
900	21.33	24.96	19.36	27.02	1.08	0.58	23.25	11.46	2.69
950	21.21	24.89	18.99	28.42	1.08	0.58	22.36	10.62	2.69
1000	21.09	24.82	18.59	30.23	1.08	0.59	22.84	10.80	2.66
1050	20.97	24.77	18.28	32.40	1.08	0.60	22.58	10.82	2.68
1100	20.85	24.68	17.88	35.42	1.09	0.60	22.83	11.18	2.70
1150	20.72	24.61	17.59	41.03	1.09	0.61	23.26	11.19	2.68
1200	20.59	24.57	17.30	52.89	1.09	0.62	22.52	10.84	2.74
1250	20.47	24.52	17.07	42.83	1.10	0.62	23.04	10.99	2.71
1300	20.33	24.45	16.83	36.52	1.10	0.63	22.86	10.98	2.67
1350	20.21	24.37	16.62	32.38	1.10	0.63	23.03	10.97	2.73
1400	20.07	24.30	16.40	29.75	1.10	0.64	22.57	10.64	2.73
1450	19.93	24.26	16.25	27.70	1.11	0.65	22.72	10.63	2.69
1500	19.80	24.16	16.05	25.94	1.11	0.65	22.00	10.47	2.74
1550	19.66	24.18	15.87	24.44	1.12	0.66	22.84	10.66	2.74
1600	19.52	24.05	15.74	23.20	1.12	0.66	22.64	10.55	2.78
1650	19.38	24.01	15.56	22.09	1.13	0.67	22.62	10.69	2.75
1700	19.24	23.96	15.46	21.12	1.13	0.67	22.37	10.39	2.75
1750	19.09	23.88	15.35	20.22	1.14	0.67	22.32	10.47	2.76
1800	18.95	23.83	15.21	19.39	1.14	0.68	22.66	10.78	2.75
1850	18.81	23.80	15.12	18.63	1.15	0.68	22.90	10.61	2.79
1900	18.66	23.78	15.04	17.92	1.15	0.69	22.89	10.55	2.78
1950	18.52	23.66	14.96	17.29	1.16	0.68	22.42	10.36	2.79
2000	18.37	23.62	14.84	16.70	1.16	0.69	22.63	10.47	2.78
3000	15.41	22.77	12.92	9.82	1.28	0.70	22.82	10.77	2.97
3500	14.04	22.32	11.77	8.18	1.32	0.68	23.26	10.89	3.15
4000	12.84	21.86	11.01	7.30	1.36	0.67	22.18	10.31	3.27
4500	11.84	21.26	10.75	6.98	1.38	0.67	20.16	9.31	3.40
5000	11.03	20.56	11.13	7.18	1.40	0.68	17.98	7.99	3.56
5500	10.39	19.72	12.20	8.01	1.43	0.71	16.54	7.35	3.75
6000	9.74	18.97	13.35	9.34	1.46	0.76	16.00	6.72	3.97

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 = 29mA @ 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	21.75	25.74	17.79	17.09	1.08	0.60	20.21	9.92	2.82
20	22.02	25.52	20.70	20.52	1.07	0.56	21.50	9.53	2.62
30	22.10	25.39	22.04	22.20	1.06	0.54	21.71	9.80	2.62
40	22.14	25.42	22.87	23.40	1.06	0.53	21.38	9.35	2.66
50	22.16	24.91	23.85	23.61	1.04	0.47	19.68	8.81	2.63
60	22.19	25.26	23.75	24.87	1.06	0.51	21.08	9.34	2.58
70	22.20	25.31	24.00	25.36	1.06	0.52	20.88	9.56	2.59
80	22.21	25.24	24.35	25.75	1.05	0.51	20.77	9.39	2.59
90	22.21	25.25	24.52	25.98	1.05	0.51	20.86	9.56	2.60
100	22.22	25.30	24.68	26.10	1.06	0.51	21.19	9.80	2.62
200	22.14	25.17	25.17	26.46	1.06	0.51	21.07	9.52	2.65
250	22.08	25.21	25.21	26.29	1.06	0.52	20.74	9.32	2.69
300	22.02	25.18	24.70	26.52	1.06	0.52	20.64	9.42	2.76
350	21.94	25.18	24.34	26.51	1.06	0.53	21.06	9.56	2.77
400	21.86	25.05	23.81	26.90	1.06	0.52	20.86	9.42	2.80
450	21.78	25.06	23.14	27.33	1.07	0.54	20.67	9.14	2.79
500	21.69	24.98	22.76	27.50	1.07	0.54	20.38	9.14	2.78
550	21.60	24.94	22.33	27.72	1.07	0.54	21.22	9.81	2.78
600	21.50	24.89	21.81	28.14	1.07	0.55	20.86	9.33	2.80
650	21.40	24.85	21.42	28.50	1.07	0.55	20.65	9.33	2.80
700	21.30	24.78	20.96	29.26	1.07	0.56	20.68	9.33	2.77
750	21.20	24.80	20.50	30.18	1.08	0.57	20.39	9.09	2.75
800	21.10	24.74	20.03	31.13	1.08	0.58	20.58	9.12	2.71
850	20.99	24.66	19.59	32.12	1.08	0.58	20.58	9.26	2.64
900	20.89	24.62	19.14	33.11	1.08	0.59	20.65	9.52	2.67
950	20.77	24.58	18.78	33.75	1.09	0.59	19.78	8.55	2.69
1000	20.67	24.51	18.38	33.68	1.09	0.60	20.16	8.76	2.65
1050	20.55	24.43	18.14	32.88	1.09	0.60	19.95	8.78	2.68
1100	20.44	24.43	17.77	31.85	1.10	0.61	20.32	9.16	2.68
1150	20.32	24.35	17.52	30.33	1.10	0.62	20.64	9.07	2.67
1200	20.20	24.30	17.23	28.93	1.10	0.62	19.79	8.80	2.72
1250	20.08	24.24	17.00	27.54	1.10	0.63	20.47	8.87	2.69
1300	19.96	24.16	16.74	26.32	1.11	0.63	20.21	8.86	2.68
1350	19.84	24.14	16.53	25.00	1.11	0.64	20.39	8.95	2.71
1400	19.70	24.08	16.31	23.94	1.12	0.64	19.81	8.61	2.68
1450	19.57	24.06	16.14	23.00	1.12	0.65	20.01	8.61	2.69
1500	19.45	23.96	15.92	22.07	1.12	0.65	19.30	8.35	2.67
1550	19.32	23.93	15.74	21.19	1.13	0.66	20.15	8.55	2.73
1600	19.18	23.84	15.60	20.43	1.13	0.66	19.83	8.45	2.76
1650	19.05	23.84	15.41	19.68	1.14	0.67	20.01	8.60	2.74
1700	18.91	23.76	15.30	19.02	1.14	0.67	19.60	8.30	2.72
1750	18.77	23.70	15.16	18.38	1.15	0.67	19.65	8.36	2.74
1800	18.64	23.68	15.00	17.77	1.15	0.68	20.00	8.71	2.72
1850	18.50	23.62	14.89	17.19	1.16	0.68	20.34	8.53	2.81
1900	18.36	23.54	14.78	16.64	1.16	0.68	20.17	8.47	2.78
1950	18.22	23.58	14.66	16.13	1.17	0.69	19.54	8.28	2.76
2000	18.08	23.46	14.56	15.66	1.17	0.69	19.88	8.40	2.76
3000	15.21	22.71	12.36	9.63	1.29	0.70	20.31	8.93	3.00
3500	13.88	22.32	11.24	8.10	1.33	0.68	21.51	9.42	3.12
4000	12.71	21.85	10.55	7.27	1.36	0.67	21.27	9.54	3.25
4500	11.74	21.26	10.35	7.00	1.39	0.67	19.79	9.00	3.37
5000	10.95	20.55	10.76	7.23	1.41	0.69	17.72	7.86	3.52
5500	10.32	19.77	11.82	8.10	1.44	0.72	16.31	7.14	3.71
6000	9.68	19.04	12.99	9.45	1.48	0.76	15.80	6.53	3.95

Typical Performance Data

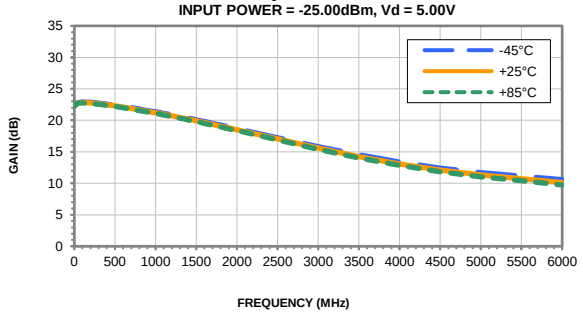
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.25V, Id = 40mA @ Temperature = +85°C

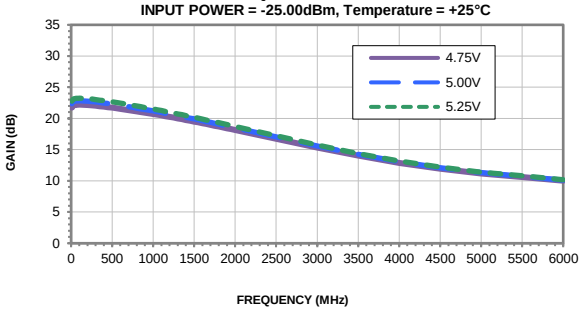
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	22.66	26.75	19.90	13.81	1.08	0.57	25.06	12.78	2.79
20	22.94	26.35	24.36	15.69	1.06	0.51	25.51	12.72	2.64
30	23.02	26.13	26.41	16.35	1.05	0.48	25.65	12.89	2.63
40	23.07	26.19	28.06	16.80	1.05	0.49	24.93	12.72	2.66
50	23.08	26.81	31.55	16.79	1.08	0.55	23.76	12.62	2.66
60	23.10	26.17	29.89	17.19	1.05	0.48	25.09	12.73	2.61
70	23.12	26.12	30.06	17.29	1.05	0.48	25.32	12.87	2.62
80	23.12	26.04	30.40	17.38	1.05	0.47	25.21	12.81	2.64
90	23.12	26.13	30.49	17.36	1.05	0.48	25.40	12.91	2.67
100	23.12	26.09	30.60	17.42	1.05	0.47	25.81	12.93	2.63
200	23.03	26.03	28.31	17.52	1.05	0.48	25.66	12.94	2.68
250	22.96	25.93	27.21	17.63	1.05	0.47	25.27	12.84	2.73
300	22.89	25.93	26.48	17.88	1.05	0.49	25.19	12.85	2.78
350	22.80	25.85	25.63	18.06	1.05	0.49	25.56	12.91	2.80
400	22.71	25.85	24.79	18.32	1.06	0.50	25.43	12.81	2.85
450	22.61	25.79	23.96	18.59	1.06	0.51	25.27	12.72	2.83
500	22.51	25.75	23.11	18.79	1.06	0.51	24.88	12.63	2.84
550	22.41	25.69	22.37	19.10	1.06	0.52	25.73	12.94	2.81
600	22.30	25.61	21.67	19.44	1.06	0.53	25.37	12.76	2.83
650	22.19	25.54	21.11	19.84	1.06	0.53	25.30	12.74	2.82
700	22.08	25.46	20.54	20.28	1.06	0.54	25.14	12.64	2.80
750	21.96	25.41	20.05	20.81	1.07	0.55	24.93	12.66	2.77
800	21.85	25.38	19.60	21.51	1.07	0.56	25.20	12.64	2.75
850	21.72	25.26	19.17	22.20	1.07	0.57	25.19	12.58	2.69
900	21.61	25.20	18.78	23.11	1.07	0.57	25.20	12.75	2.70
950	21.48	25.11	18.44	24.07	1.07	0.58	24.33	12.23	2.68
1000	21.36	25.06	18.05	25.15	1.07	0.59	24.77	12.37	2.68
1050	21.24	24.98	17.80	26.48	1.08	0.60	24.53	12.29	2.69
1100	21.11	24.90	17.44	27.98	1.08	0.60	24.71	12.50	2.72
1150	20.98	24.82	17.20	29.91	1.08	0.61	25.04	12.50	2.72
1200	20.85	24.74	16.95	32.24	1.08	0.61	24.39	12.30	2.73
1250	20.71	24.67	16.73	35.40	1.09	0.62	24.84	12.41	2.73
1300	20.58	24.61	16.52	38.69	1.09	0.63	24.76	12.44	2.74
1350	20.44	24.55	16.33	38.50	1.09	0.64	24.79	12.41	2.75
1400	20.30	24.45	16.14	35.09	1.10	0.64	24.41	12.21	2.73
1450	20.16	24.39	16.00	31.81	1.10	0.65	24.64	12.20	2.75
1500	20.02	24.32	15.82	29.14	1.10	0.65	23.94	12.05	2.74
1550	19.88	24.26	15.67	27.03	1.11	0.66	24.62	12.21	2.77
1600	19.73	24.16	15.56	25.30	1.11	0.66	24.51	12.10	2.79
1650	19.59	24.13	15.42	23.85	1.12	0.67	24.46	12.23	2.79
1700	19.44	24.04	15.36	22.61	1.12	0.67	24.19	11.96	2.76
1750	19.30	24.04	15.25	21.49	1.13	0.68	24.35	12.03	2.78
1800	19.15	23.95	15.15	20.50	1.13	0.68	24.44	12.22	2.77
1850	19.00	23.83	15.08	19.63	1.13	0.68	24.75	12.16	2.84
1900	18.85	23.84	15.02	18.80	1.14	0.69	24.76	12.10	2.79
1950	18.70	23.74	14.96	18.05	1.15	0.69	24.24	11.91	2.85
2000	18.55	23.69	14.89	17.38	1.15	0.69	24.47	12.02	2.81
3000	15.53	22.76	13.27	9.95	1.27	0.69	24.19	12.06	3.00
3500	14.14	22.36	12.11	8.24	1.32	0.68	24.00	11.70	3.19
4000	12.91	21.85	11.33	7.32	1.35	0.66	22.46	10.69	3.34
4500	11.90	21.25	11.03	6.97	1.38	0.66	20.41	9.52	3.46
5000	11.08	20.53	11.38	7.14	1.40	0.67	18.29	8.16	3.65
5500	10.43	19.71	12.43	7.97	1.42	0.71	16.79	7.41	3.79
6000	9.76	18.96	13.56	9.28	1.46	0.75	16.27	6.76	4.08

Typical Performance Curves

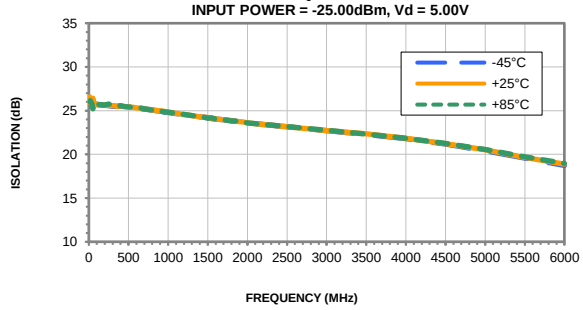
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



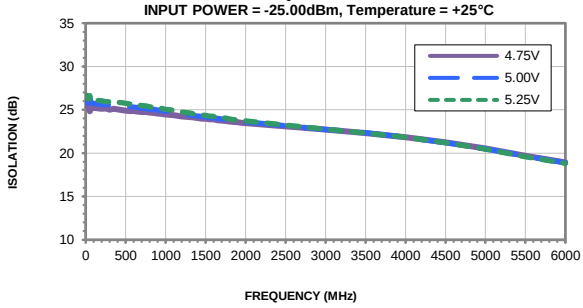
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



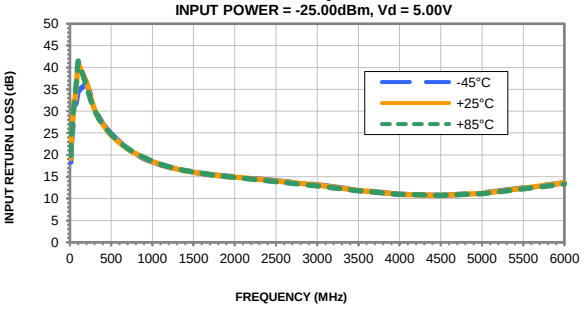
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



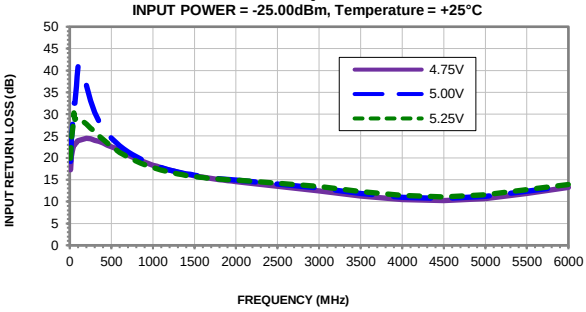
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



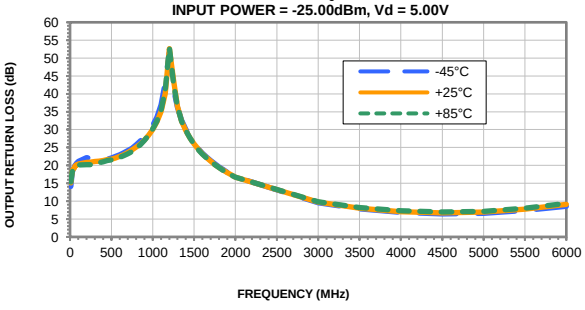
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



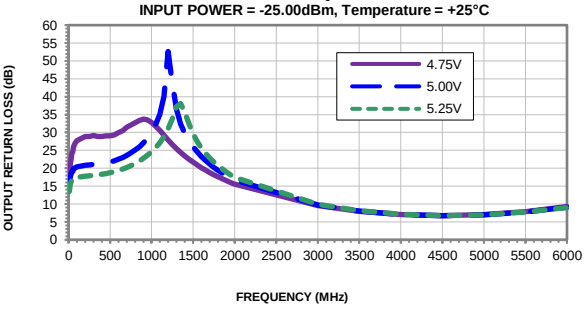
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



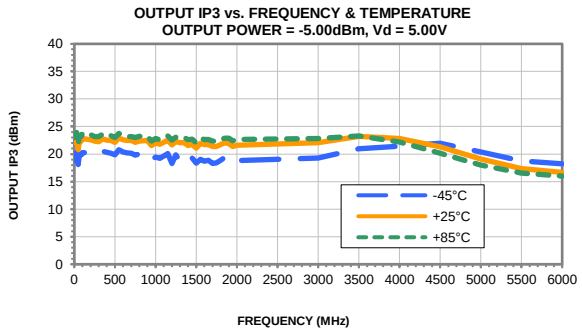
OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE.
INPUT POWER = -25.00dBm, Vd = 5.00V

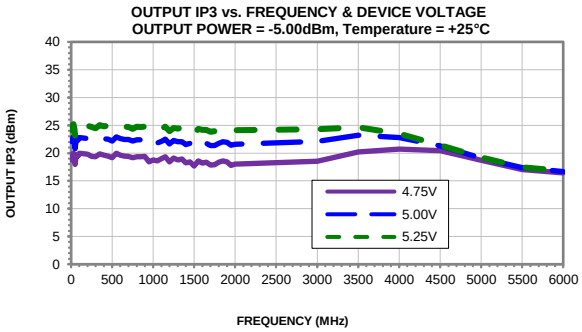


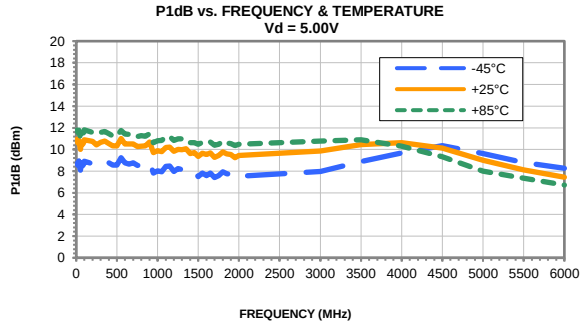
OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

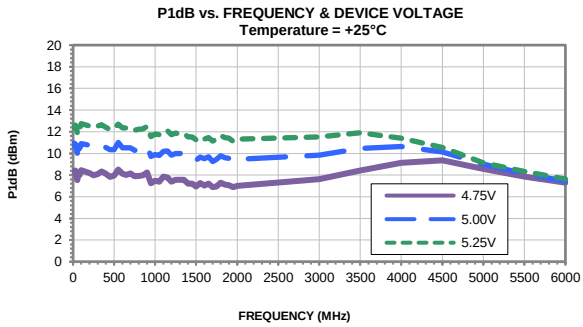


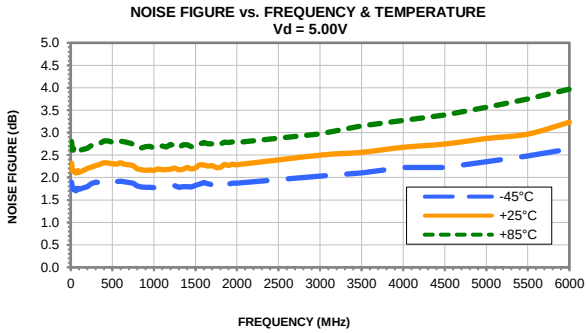
Typical Performance Curves

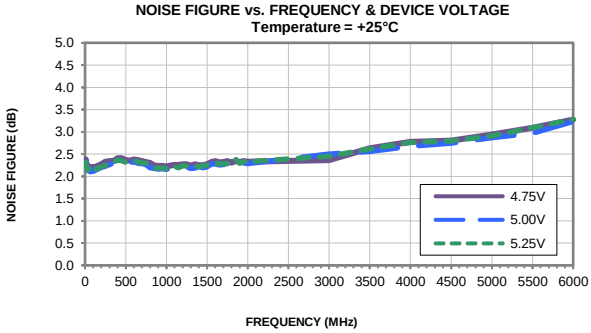


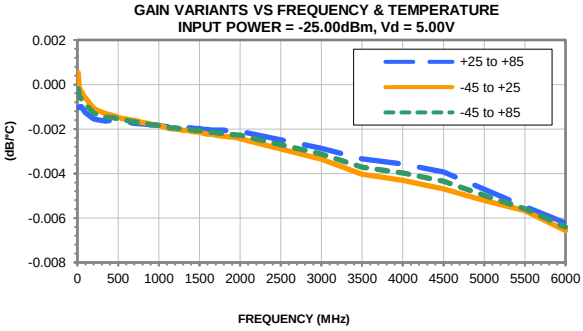








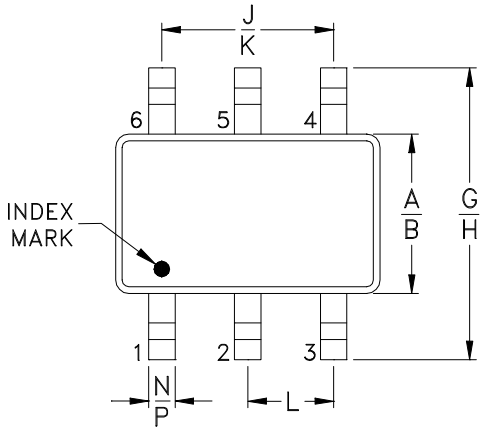




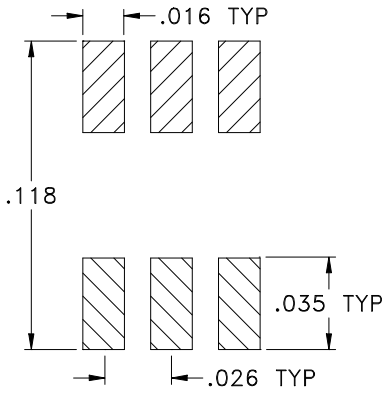
Case Style CA

CA1389

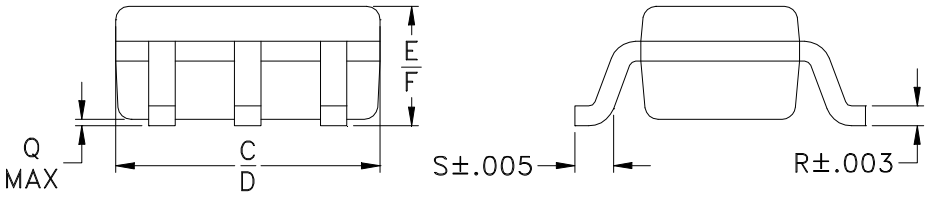
Outline Dimensions



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

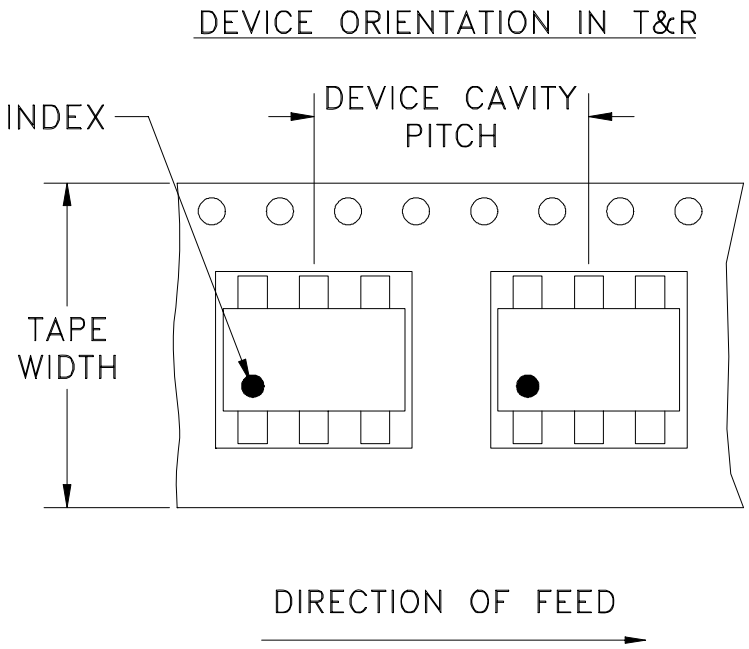
Dimensions are in inches (mm). Tolerances: 2Pl. ± .01; 3Pl. ± .005

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

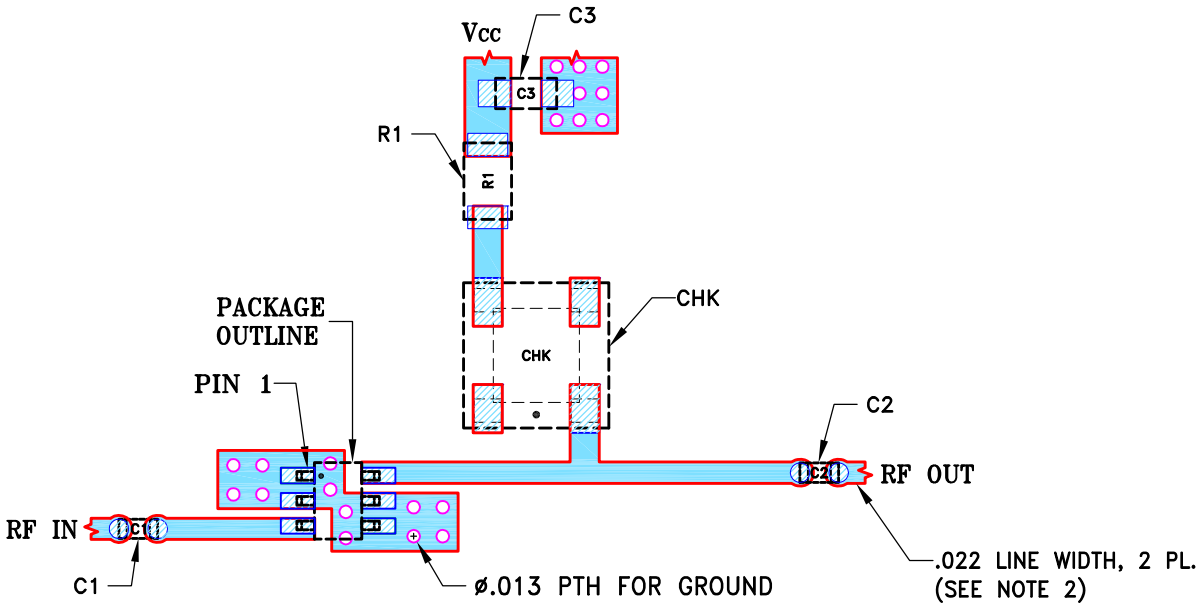
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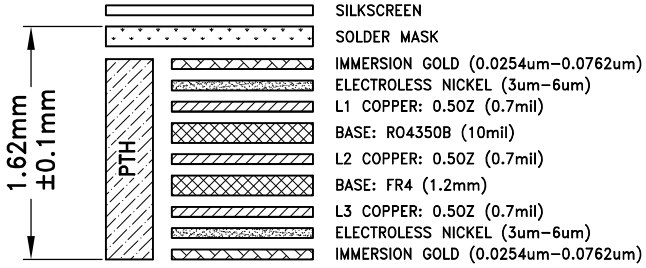
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M175903	NEW RELEASE	08/26/19	ITG	RS

SUGGESTED MOUNTING CONFIGURATION FOR CA1389 CASE STYLE



STACK-UP DIAGRAM



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

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-39+.
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//26/19
2 PL DECIMALS ±	APPROVED	RS	08/26/19
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

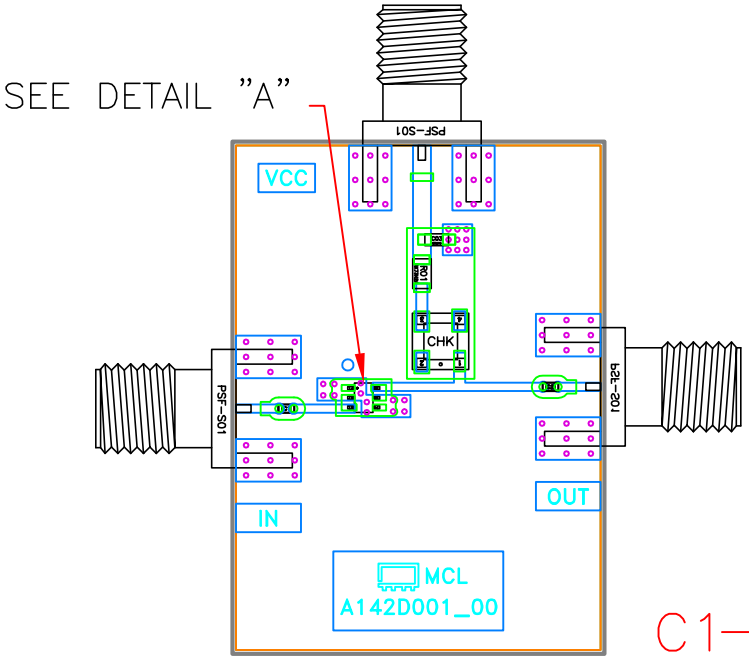
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

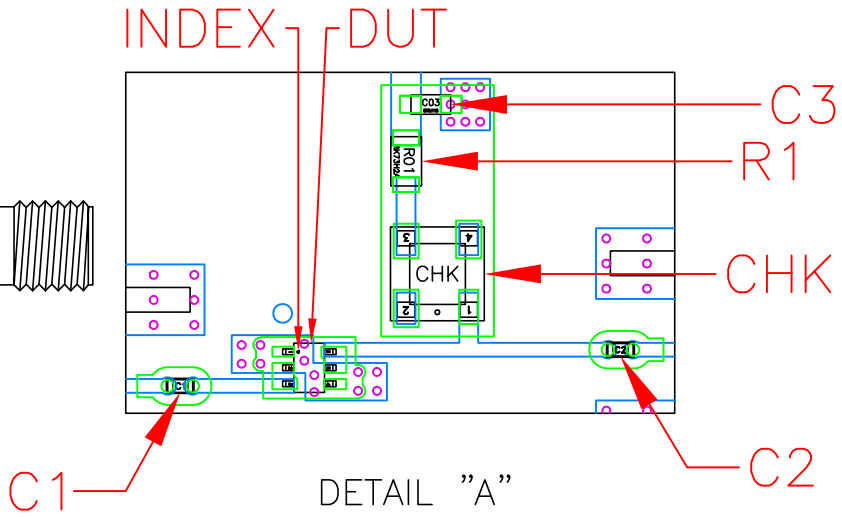
PL, CA1389, TB-PSA-39+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-645	OR

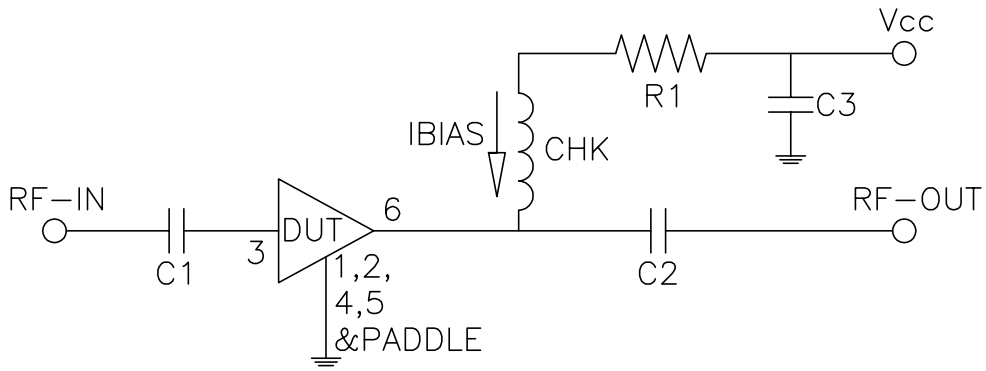
FILE:	SCALE:	SHEET:
98PL645	5:1	1 OF 1

Evaluation Board and Circuit





DETAIL "A"
LOCATION OF COMPONENTS
ON THE PCB
(SCALE 2:1)



SCHEMATIC DIAGRAM

Component	Size	Description
C1,C2	0402	2400pF
C3	0603	0.1uF
R1	0805	43.2ohm
CHK		TCCH-80+

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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