MMIC SURFACE MOUNT

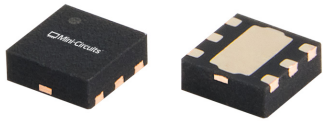
Monolithic Amplifier

LEE1-39+

50Ω DC to 7000 MHz

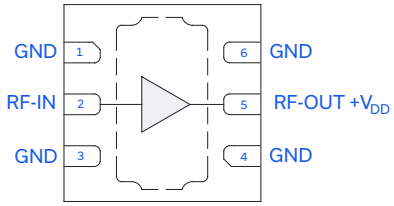
THE BIG DEAL

- Low Noise Figure, Typ. 2.3 dB
- High Gain, Typ. 18.4 dB
- High OIP3, Typ. +22.3 dBm
- High P1dB, Typ. +11.9 dBm
- Low Operating Current, 35 mA at +3.6 V
- 1.5x1.5 mm 6-Lead QFN-Style Package



Generic photo used for illustration purposes only

FUNCTIONAL DIAGRAM (TOP VIEW)



APPLICATIONS

- Satellite Communications
- 5G MIMO and Backhaul MW Radio Systems
- Radar, EW and ECM Defense Systems

PRODUCT OVERVIEW

The LEE1-39+ is high-linearity gain block amplifier in a low-cost surface mount package, fabricated using an InGaP/GaAs HBT semiconductor process. Operating from DC to 7000 MHz, this amplifier features high dynamic range with typical 2.3 dB noise figure, 18.4 dB gain, +11.9 dBm P1dB, and +22.3 dBm OIP3 at 4 GHz. This combination of performance makes it ideal for sensitive, high dynamic range receiver applications. The LEE1-39+ is a current driven device consuming only 35 mA at +3.6 V supply, is well matched to 50Ω, and comes in a small, low-profile 1.5x1.5 mm QFN-style package for ease of integration into dense circuit board layouts.

KEY FEATURES

Features	Advantages
Low Power Consumption, Typ. 35 mA at +3.6 V	At only 35 mA, this amplifier is ideal for applications with limited available power or densely packed applications where thermal and power management is critical.
High Dynamic Range • Noise Figure, Typ. 2.3 dB • OIP3, Typ. +22.3 dBm • P1dB, Typ. +11.9 dBm	The LEE1-39+ offers low noise figure and good linearity making this gain block amplifier ideal for use as a secondary stage amplifier in ultra-high dynamic range receivers.
1.5x1.5 mm 6-Lead QFN-Style Package	Very small footprint saves space in dense PCB layouts while providing low inductance, repeatable transitions, and excellent thermal contact with the PCB. Industry standard packaging allows for ease of assembly in high volume manufacturing processes.
No External Matching Components Required	The LEE1-39+ has good input and output return loss up to 6 GHz, eliminating the need for any external matching components while demonstrating excellent reliability.

Monolithic Amplifier

LEE1-39+

50Ω DC to 7000 MHz

ELECTRICAL SPECIFICATIONS[1] AT +25°C, I_{DD} = 35 mA, UNLESS NOTED OTHERWISE

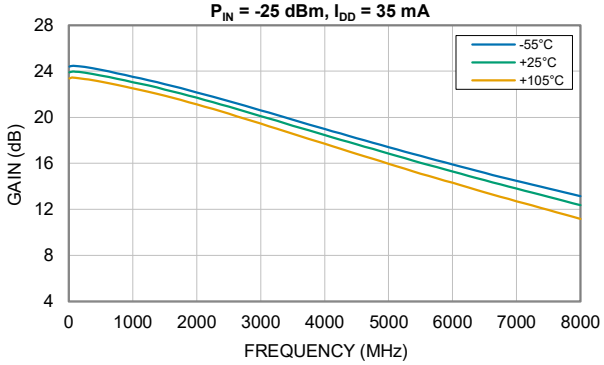
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		DC[6]		7000	MHz
Gain	10	22.5	23.9		dB
	1000	21.6	23.0		
	2000	20.3	21.7		
	4000	17.2	18.4		
	6000	13.5	15.2		
	7000	11.3	13.7		
Input Return Loss	10		25		dB
	1000		19		
	2000		15		
	4000		12		
	6000		9		
	7000		8		
Output Return Loss	10		21		dB
	1000		17		
	2000		14		
	4000		11		
	6000		11		
	7000		10		
Isolation	10 - 7000		22		dB
Output Power at 1 dB Compression (P1dB)	10		+12.8		dBm
	1000		+11.5		
	2000		+11.5		
	4000		+11.9		
	6000		+10.6		
	7000		+9.8		
Output Power at 3 dB Compression (P3dB)	10		+14.2		dBm
	1000		+13.1		
	2000		+12.8		
	4000		+13.3		
	6000		+12.3		
	7000		+11.7		
Output Third-Order Intercept Point (P_{OUT} = 0 dBm/Tone)	10		+24.3		dBm
	1000		+24.0		
	2000		+23.2		
	4000		+22.3		
	6000		+22.0		
	7000		+21.7		
Noise Figure	10		2.0		dB
	1000		2.1		
	2000		2.1		
	4000		2.3		
	6000		2.8		
	7000		3.1		
Device Operating Voltage (V_{DD})[2]		+3.1	+3.6	+3.9	V
Device Operating Current (I_{DD})[3]			35		mA
Device Voltage Variation vs. Temperature[4]			-2.5		mV/°C
Device Voltage Variation vs. Current[5]			3.571		mV/mA

1. Tested on Mini-Circuits Characterization Test Board MB-225-39C+. See Figure 2. Board loss de-embedded to the device.
2. Operating Voltage applied to device LEE1-39+.
3. Current at P_{IN} = -25 dBm.
4. (Voltage at +105°C - Voltage at -55°C) / (+105°C - -55°C)
5. (Voltage at 42 mA - Voltage at 28 mA) / (42 mA- 28 mA)
6. Low frequency cut off determined by external coupling capacitors.

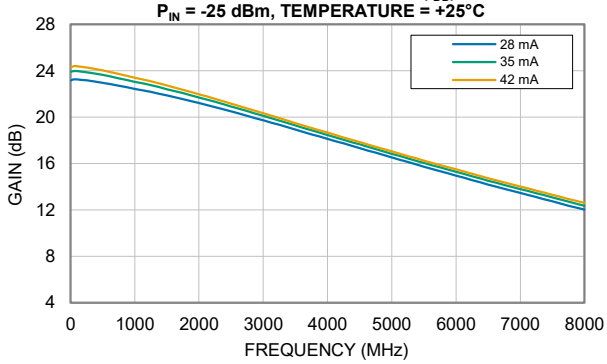
TYPICAL PERFORMANCE GRAPHS

Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2).

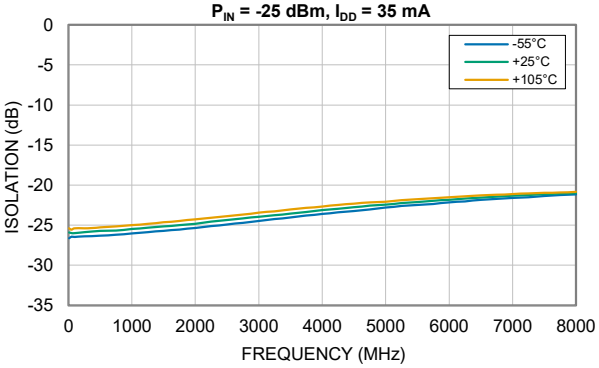
GAIN vs. TEMPERATURE
P_{IN} = -25 dBm, I_{DD} = 35 mA



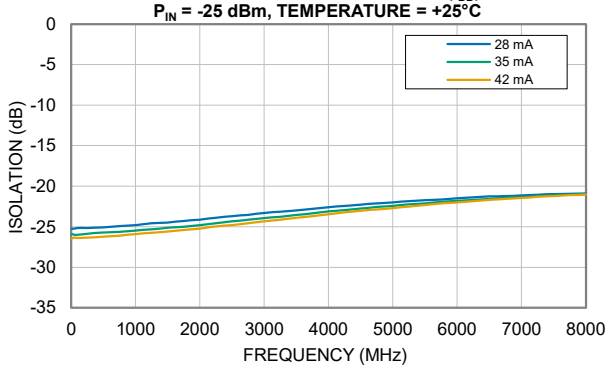
GAIN vs. DEVICE CURRENT (I_{DD})
P_{IN} = -25 dBm, TEMPERATURE = +25°C



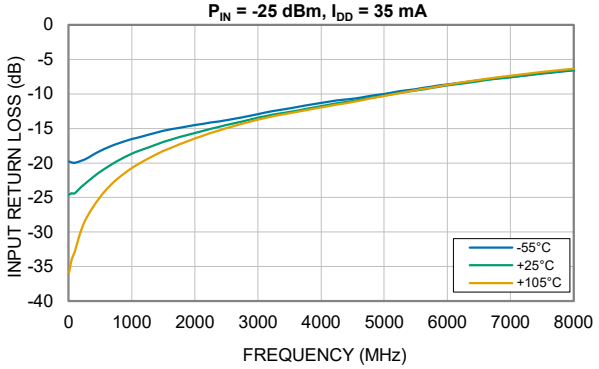
ISOLATION vs. TEMPERATURE
P_{IN} = -25 dBm, I_{DD} = 35 mA



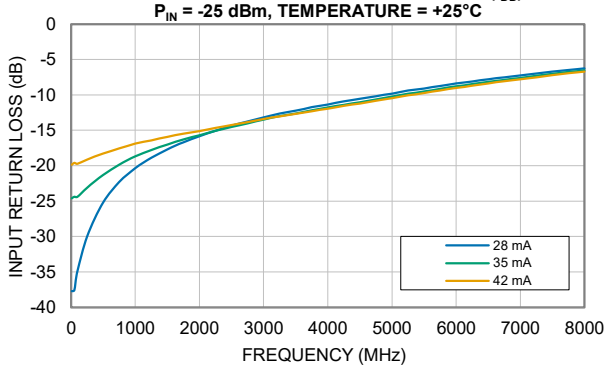
ISOLATION vs. DEVICE CURRENT (I_{DD})
P_{IN} = -25 dBm, TEMPERATURE = +25°C



INPUT RETURN LOSS vs. TEMPERATURE
P_{IN} = -25 dBm, I_{DD} = 35 mA



INPUT RETURN LOSS vs. DEVICE CURRENT (I_{DD})
P_{IN} = -25 dBm, TEMPERATURE = +25°C



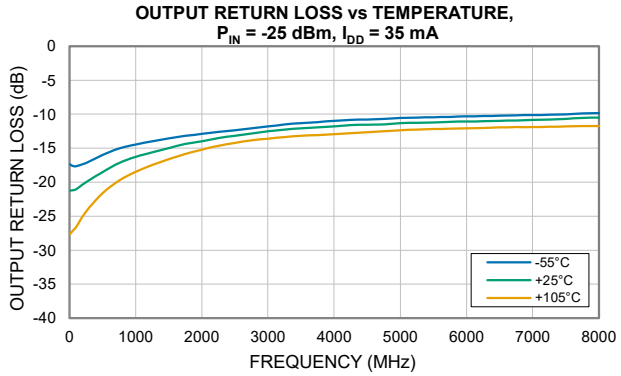
Monolithic Amplifier

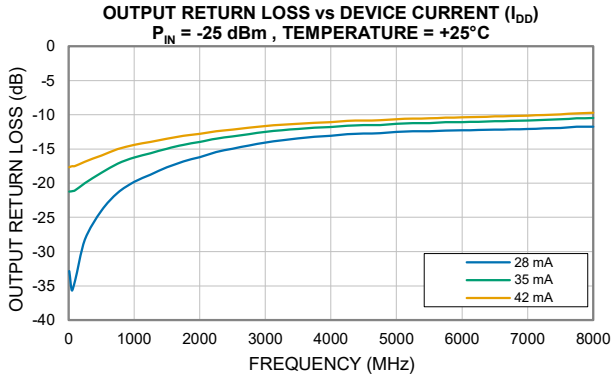
LEE1-39+

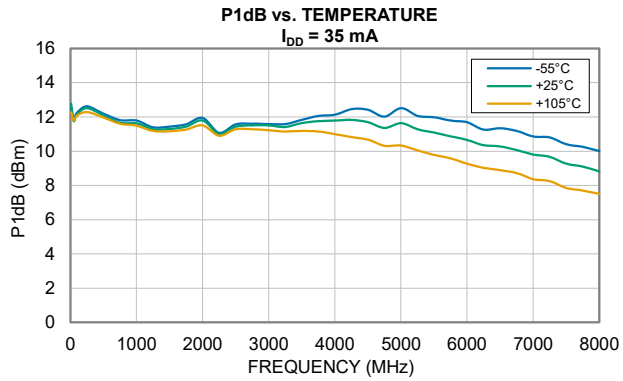
50Ω DC to 7000 MHz

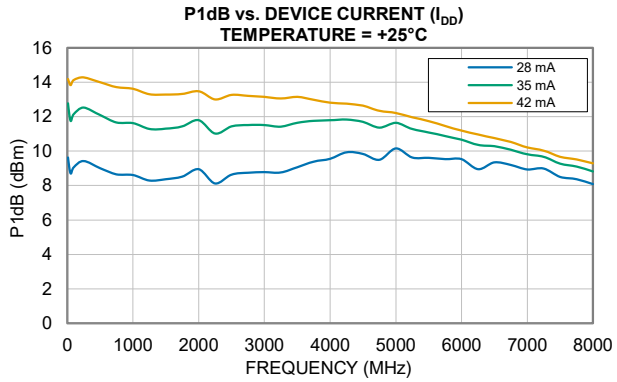
TYPICAL PERFORMANCE GRAPHS

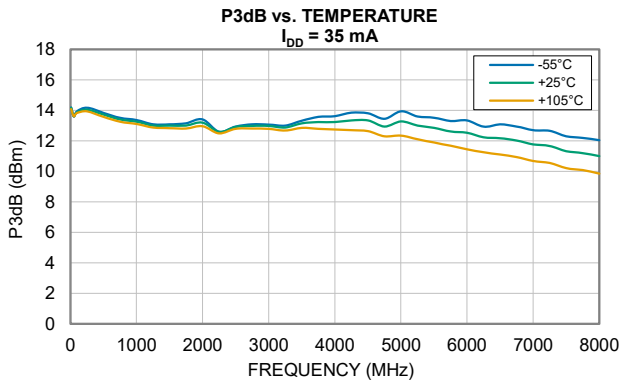
Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2).

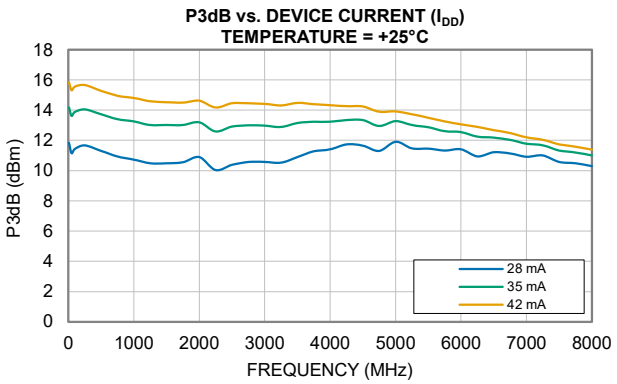






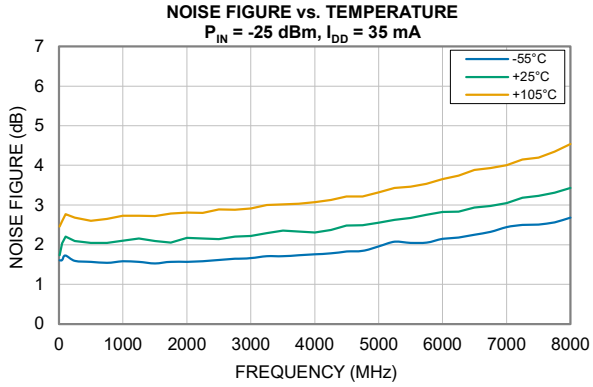


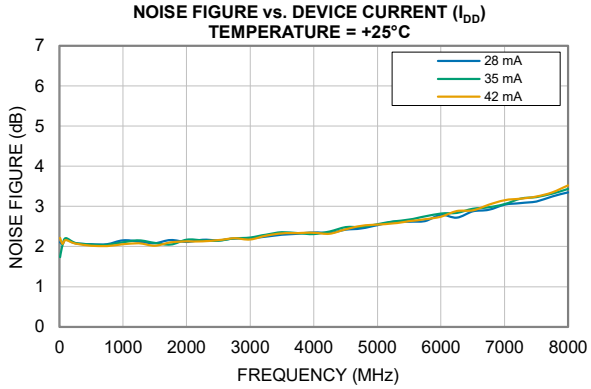


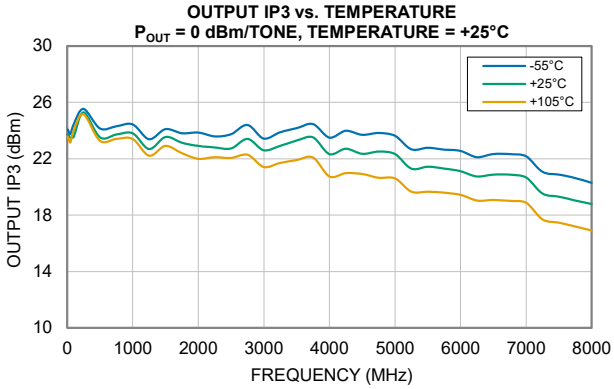


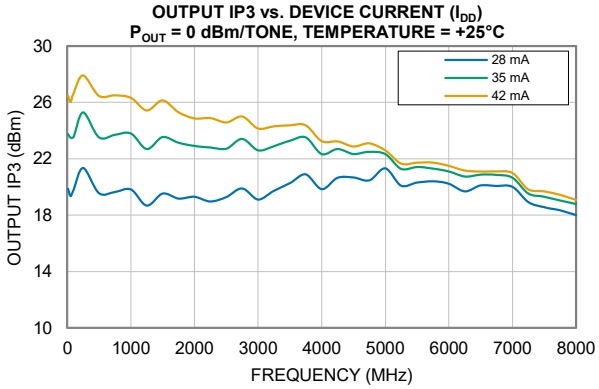
TYPICAL PERFORMANCE GRAPHS

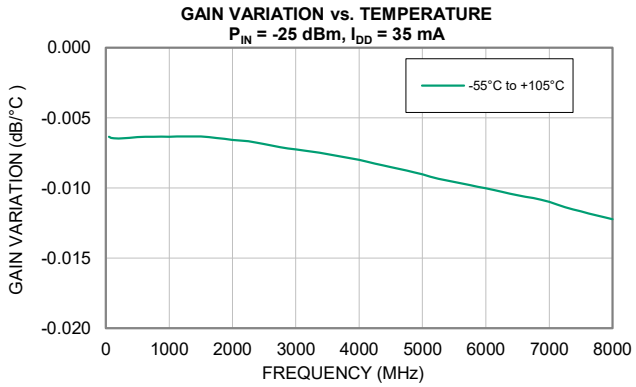
Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2).











ABSOLUTE MAXIMUM RATINGS[7]

Parameter	Ratings
Operating Temperature	-55°C to +105°C
Storage Temperature	-65°C to +150°C
Junction Temperature[8]	+150°C
Total Power Dissipation	0.43 W
Input Power (CW), I_{DD} = 35 mA	+13 dBm
DC Voltage at V_{DD}	+4 V
DC Current I_{DD}	60 mA

7. Permanent damage may occur if any of these limits are exceeded. Maximum ratings are not intended for continuous normal operation.
8. Peak temperature on top of Die.

THERMAL RESISTANCE

Parameter	Ratings
Thermal Resistance (Θ_{JC})[9]	104.3°C/W

9. Θ_{JC}= (Hot Spot Temperature on Die - Temperature at Ground Lead)/Dissipated Power

ESD RATING

	Class	Voltage Range	Reference Standard
HBM	1A	250 V to < 500 V	ANSI/ESDA/JEDEC JS-001-2023
CDM	C3	> 1000 V	ANSI/ESDA/JEDEC JS-002-2022

ESD HANDLING PRECAUTION: This device is designed to be Class 1A for HBM. Static charges may easily produce potentials higher than this with improper handling and can discharge into DUT and damage it. As a preventive measure industry standard ESD handling precautions should be used at all times to protect the device from ESD damage.

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020E /JEDEC J-STD-033C

Monolithic Amplifier

LEE1-39+

50Ω DC to 7000 MHz

FUNCTIONAL DIAGRAM (TOP VIEW)

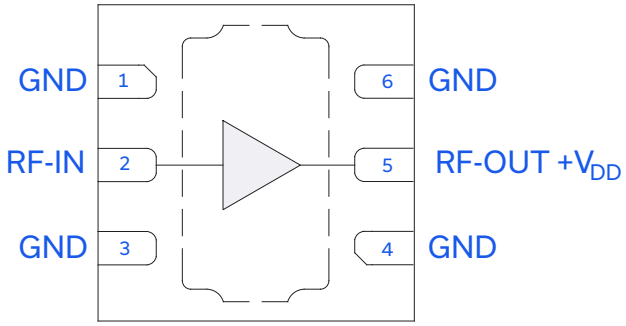


Figure 1. LEE1-39+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description (Refer to Fig 2)
RF-IN	2	RF-IN Pad connects to RF Input port.
RF-OUT+V_{DD}	5	RF-OUT Pad connects to RF Output port. V_{DD} is applied via external bias tee.
GND	1, 3, 4, 6 & Paddle	Connects to ground.

CHARACTERIZATION TEST BOARD

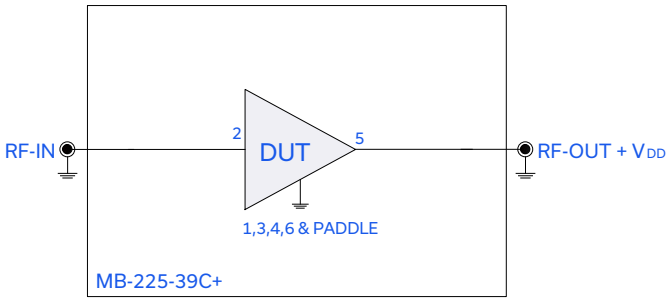


Figure 2. LEE1-39+ Characterization Circuit

Electrical Parameters and Conditions
Gain, Return Loss, Output Power at 1dB Compression (P1dB), Output IP3 (OIP3), and Noise Figure measured using N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return Loss: P_{IN} = -25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/Tone at output.
3. I_{DD} = 35 mA at V_{DD} = +3.6 V Typ.

Monolithic Amplifier

LEE1-39+

50Ω DC to 7000 MHz

EVALUATION BOARD

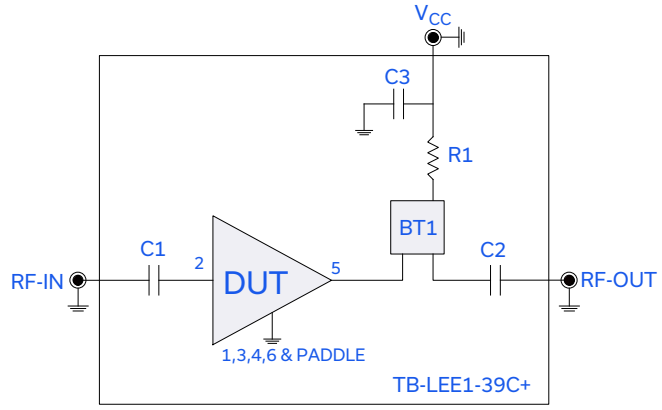


Figure 3. LEE1-39+ Evaluation Circuit

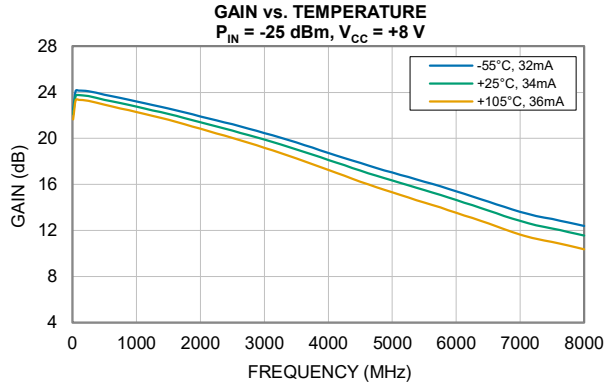
Electrical Parameters and Conditions
Gain, Return Loss, Output Power at 1dB Compression (P1dB), Output IP3 (OIP3), and Noise Figure measured using N5242A PNA-X microwave network analyzer.

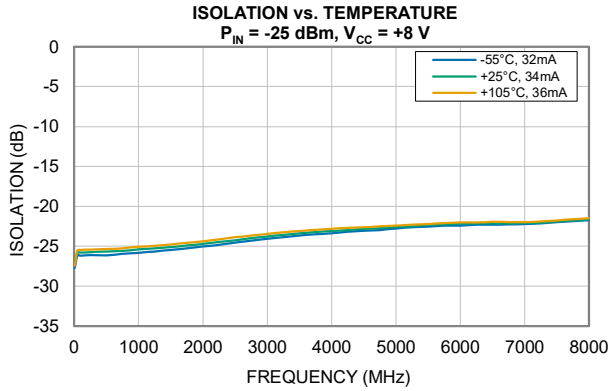
Conditions:
1. Gain and Return Loss: P_{IN} = -25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/Tone at output.
3. V_{CC} = +8 V

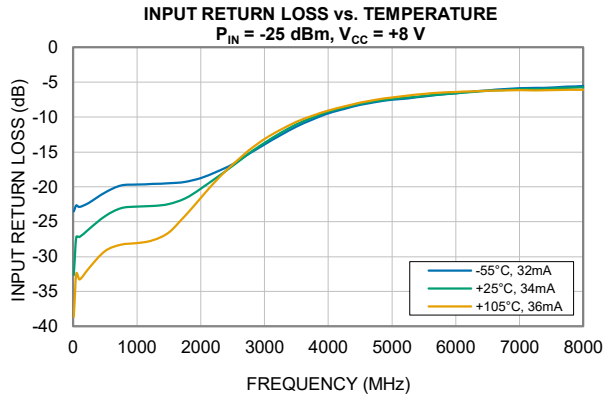
Component	Value	Size	Part Number	Manufacturer
C1, C2	2.4 nF	0402	GRM1557U1A242JA1D	Murata
C3	0.1 µF	0805	GCM21BR91H104KA37L	Murata
R1	130Ω, 0.5W	1210	RK73H2ETTD1300F	KOA Speer
BT1	-	3.8x3.8 mm	TCBT-123+	Mini-Circuits

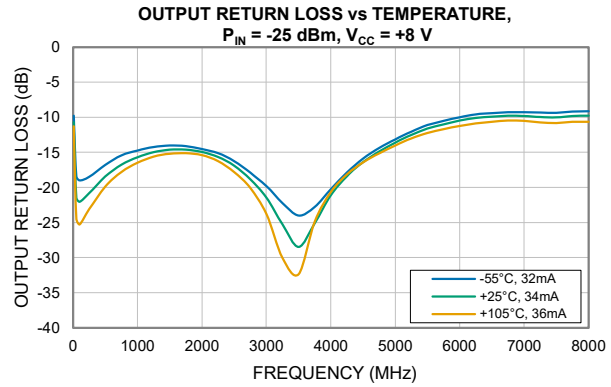
TYPICAL PERFORMANCE GRAPHS

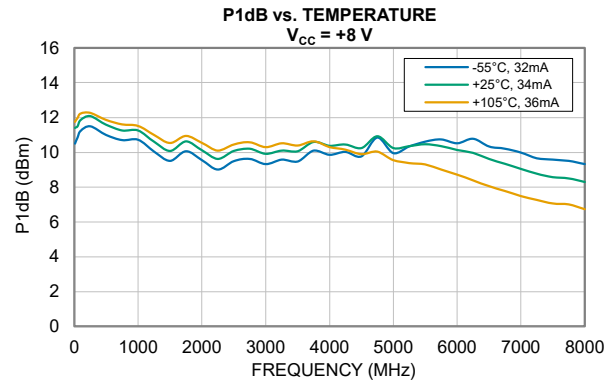
Note: The following data was taken on the Mini-Circuits Evaluation Board TB-LEE1-39C+ (Figure 3).

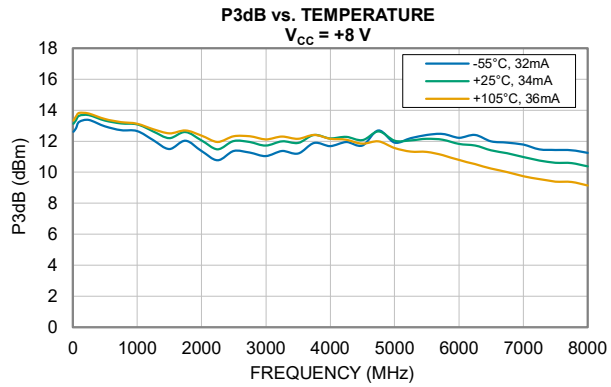






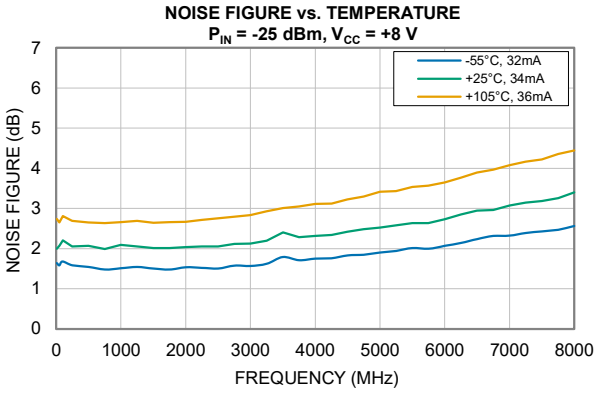


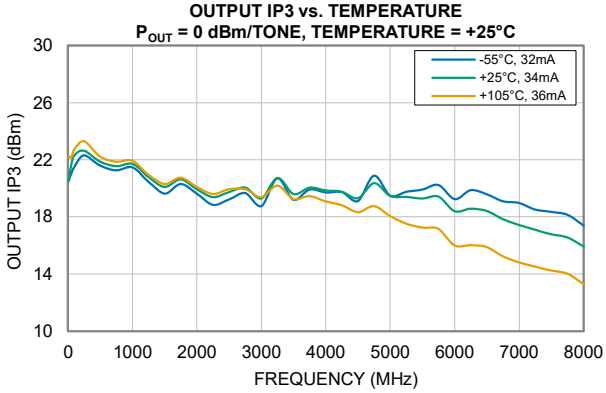


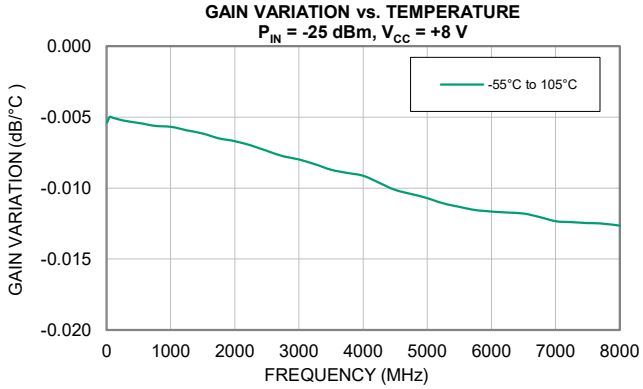


TYPICAL PERFORMANCE GRAPHS

Note: The following data was taken on the Mini-Circuits Evaluation Board TB-LEE1-39C+ (Figure 3).





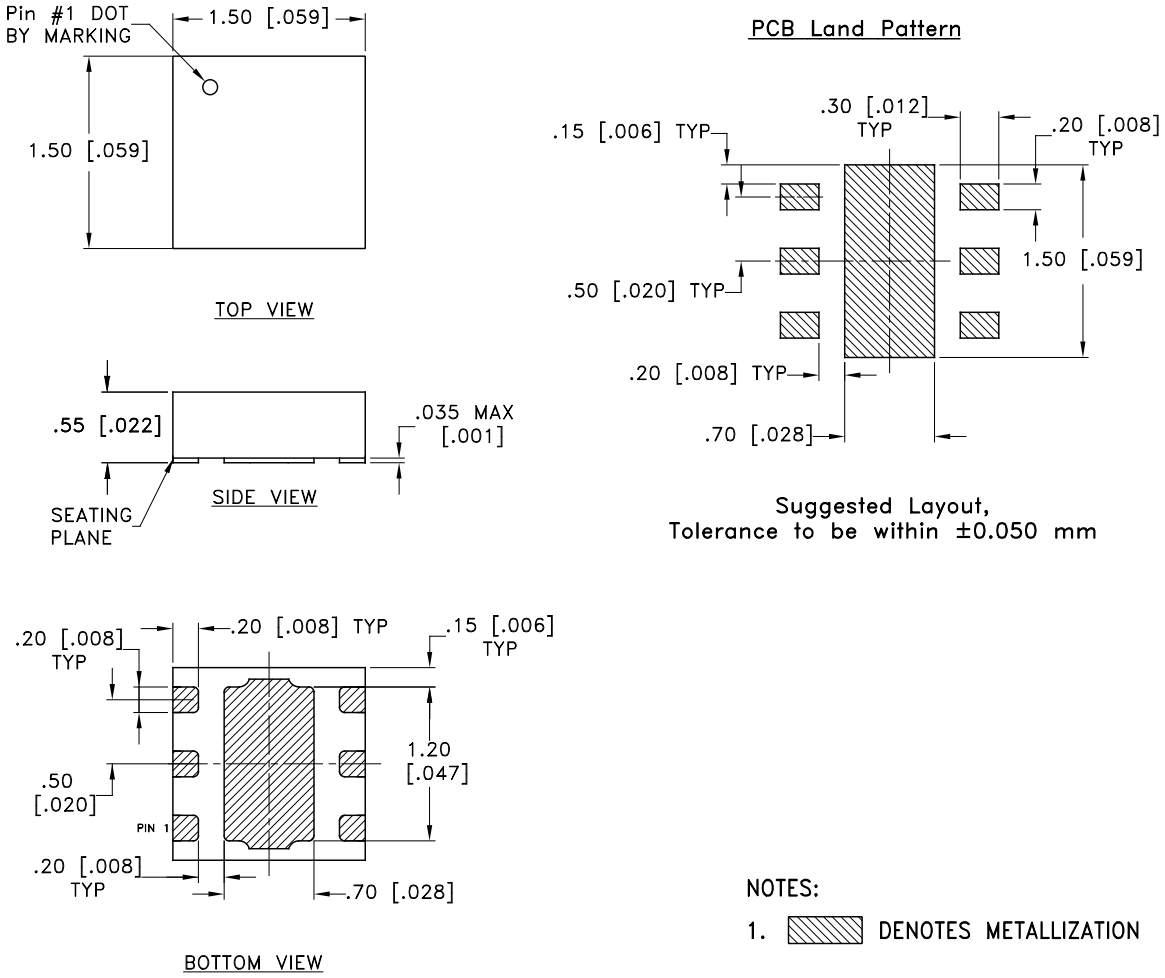


Monolithic Amplifier

LEE1-39+

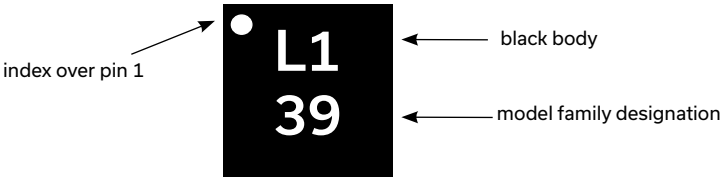
50Ω DC to 7000 MHz

CASE STYLE DRAWING



Weight: 0.0036 grams
Dimensions are in mm [inches]. Tolerances: 2Pl. ±0.05 mm [0.002 inches].

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

Monolithic Amplifier

LEE1-39+

50Ω DC to 7000 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD CLICK HERE

Performance Data & Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	KC3011 Plastic package, exposed paddle, Lead Finish: Nickel Palladium Gold
RoHS Status	Compliant
Tape & Reel **Standard quantities available on reel**	F66 7" reels with 20, 50, 100, 200, 500, 1000, 2000, or 3000 devices
Suggested Layout for PCB Design	PL-851
Evaluation Board	TB-LEE1-39C+ Gerber File
Environmental Ratings	ENV08T1

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: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2)

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

TEST CONDITIONS: I_{DD} = 28mA, V_{DD} = 3.61V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		1dB Comp. Output	3dB Comp. Output	Noise Figure	IP3 - Min
(MHz)	(dB)	(dB)	(dB)	(dB)	K	B1	(dBm)	(dBm)	(dB)	(dBm)
10	23.18	25.24	37.71	32.83	1.03	0.38	9.64	11.83	2.11	19.87
50	23.26	25.24	37.59	35.66	1.03	0.37	8.70	11.16	2.06	19.36
100	23.24	25.16	34.84	34.20	1.02	0.36	9.07	11.43	2.17	19.81
250	23.17	25.15	29.99	28.27	1.02	0.37	9.43	11.67	2.08	21.34
500	22.96	25.07	25.20	24.03	1.02	0.39	9.00	11.31	2.05	19.56
750	22.71	24.94	22.31	21.40	1.02	0.41	8.65	10.93	2.06	19.63
1000	22.44	24.80	20.36	19.83	1.02	0.42	8.61	10.73	2.15	19.83
1250	22.17	24.59	18.88	18.76	1.02	0.43	8.29	10.48	2.12	18.67
1500	21.87	24.48	17.71	17.70	1.02	0.46	8.36	10.48	2.08	19.53
1750	21.55	24.28	16.68	16.85	1.02	0.48	8.52	10.55	2.16	19.18
2000	21.21	24.12	15.85	16.19	1.02	0.50	8.95	10.89	2.11	19.30
2250	20.86	23.88	15.06	15.47	1.01	0.51	8.12	10.03	2.17	18.96
2500	20.49	23.70	14.36	14.96	1.02	0.53	8.63	10.38	2.15	19.29
2750	20.11	23.53	13.76	14.50	1.02	0.55	8.75	10.57	2.20	19.89
3000	19.72	23.29	13.16	14.05	1.02	0.57	8.78	10.58	2.20	19.11
3250	19.33	23.15	12.64	13.73	1.03	0.59	8.76	10.52	2.25	19.73
3500	18.92	22.98	12.23	13.45	1.03	0.62	9.07	10.89	2.29	20.26
3750	18.52	22.80	11.74	13.24	1.04	0.64	9.39	11.27	2.32	20.89
4000	18.13	22.59	11.34	13.08	1.04	0.65	9.55	11.4	2.35	19.84
4250	17.73	22.44	10.93	12.85	1.05	0.68	9.93	11.73	2.34	20.64
4500	17.32	22.27	10.57	12.76	1.06	0.70	9.83	11.65	2.42	20.67
4750	16.93	22.12	10.17	12.72	1.07	0.72	9.50	11.31	2.45	20.47
5000	16.53	21.99	9.81	12.52	1.08	0.74	10.16	11.91	2.53	21.31
5250	16.13	21.86	9.40	12.44	1.09	0.76	9.63	11.47	2.62	20.09
5500	15.73	21.74	9.09	12.41	1.10	0.78	9.61	11.46	2.62	20.31
5750	15.35	21.63	8.72	12.32	1.11	0.80	9.53	11.33	2.64	20.39
6000	14.97	21.49	8.39	12.28	1.12	0.82	9.53	11.4	2.79	20.23
6250	14.58	21.38	8.09	12.25	1.14	0.84	8.95	10.94	2.72	19.68
6500	14.19	21.27	7.79	12.18	1.15	0.86	9.34	11.21	2.87	20.10
6750	13.82	21.22	7.50	12.16	1.17	0.88	9.19	11.14	2.91	20.07
7000	13.46	21.14	7.26	12.09	1.18	0.90	8.94	10.91	3.04	20.01
7250	13.10	21.05	6.99	12.01	1.19	0.92	8.99	11	3.08	18.93
7500	12.74	20.98	6.72	11.92	1.20	0.94	8.50	10.57	3.12	18.56
7750	12.37	20.94	6.48	11.77	1.22	0.96	8.37	10.48	3.25	18.33
8000	12.02	20.89	6.26	11.73	1.23	0.98	8.09	10.29	3.35	18.00

Typical Performance Data

Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2)

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

TEST CONDITIONS: I_{DD} = 35mA, V_{DD} = 3.64V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		1dB Comp. Output	3dB Comp. Output	Noise Figure	IP3 - Min
(MHz)	(dB)	(dB)	(dB)	(dB)	K	B1	(dBm)	(dBm)	(dB)	(dBm)
10	23.91	25.91	24.61	21.25	1.02	0.36	12.77	14.18	1.74	23.74
50	23.97	25.98	24.40	21.17	1.02	0.36	11.76	13.62	2.04	23.48
100	23.96	26.00	24.38	21.03	1.03	0.36	12.15	13.88	2.21	23.56
250	23.86	25.86	23.09	19.99	1.02	0.35	12.52	14.05	2.09	25.28
500	23.63	25.72	21.29	18.50	1.02	0.37	12.09	13.72	2.05	23.51
750	23.35	25.65	19.86	17.16	1.02	0.39	11.66	13.40	2.04	23.70
1000	23.05	25.47	18.67	16.26	1.02	0.41	11.63	13.25	2.10	23.79
1250	22.75	25.32	17.80	15.62	1.02	0.42	11.28	13.01	2.16	22.69
1500	22.41	25.14	16.99	14.97	1.02	0.44	11.30	13.01	2.09	23.54
1750	22.06	25.00	16.28	14.38	1.03	0.46	11.43	13.01	2.05	23.13
2000	21.69	24.81	15.69	13.99	1.03	0.48	11.80	13.20	2.17	22.90
2250	21.31	24.56	15.08	13.49	1.03	0.49	11.02	12.59	2.16	22.80
2500	20.92	24.34	14.52	13.17	1.03	0.51	11.43	12.91	2.15	22.72
2750	20.51	24.16	14.02	12.83	1.04	0.53	11.52	12.99	2.20	23.40
3000	20.10	23.93	13.48	12.51	1.04	0.55	11.51	12.98	2.22	22.60
3250	19.70	23.77	13.01	12.26	1.05	0.57	11.42	12.88	2.30	22.90
3500	19.27	23.56	12.64	12.08	1.05	0.59	11.65	13.15	2.35	23.28
3750	18.86	23.36	12.18	11.91	1.06	0.61	11.76	13.23	2.33	23.51
4000	18.46	23.13	11.79	11.80	1.06	0.63	11.79	13.23	2.31	22.33
4250	18.05	22.94	11.39	11.61	1.07	0.64	11.83	13.34	2.37	22.69
4500	17.64	22.76	11.03	11.54	1.08	0.66	11.69	13.34	2.48	22.33
4750	17.25	22.56	10.64	11.50	1.09	0.68	11.37	12.95	2.49	22.50
5000	16.84	22.43	10.25	11.33	1.10	0.70	11.64	13.27	2.56	22.32
5250	16.45	22.25	9.84	11.24	1.10	0.72	11.28	13.01	2.62	21.29
5500	16.05	22.11	9.52	11.22	1.12	0.74	11.09	12.86	2.67	21.42
5750	15.67	21.94	9.14	11.10	1.12	0.75	10.87	12.61	2.75	21.30
6000	15.29	21.82	8.79	11.08	1.14	0.77	10.66	12.54	2.82	21.10
6250	14.91	21.68	8.49	11.03	1.15	0.79	10.35	12.24	2.84	20.74
6500	14.53	21.57	8.15	10.97	1.16	0.81	10.29	12.18	2.94	20.87
6750	14.16	21.42	7.86	10.92	1.17	0.83	10.07	12.03	2.98	20.86
7000	13.80	21.33	7.60	10.84	1.18	0.84	9.81	11.78	3.05	20.65
7250	13.45	21.22	7.31	10.76	1.19	0.86	9.67	11.67	3.19	19.52
7500	13.09	21.13	7.02	10.68	1.20	0.88	9.28	11.33	3.23	19.30
7750	12.72	21.05	6.77	10.53	1.21	0.90	9.10	11.20	3.32	19.03
8000	12.37	20.99	6.54	10.48	1.22	0.91	8.82	11.01	3.43	18.79

Typical Performance Data

Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2)

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

TEST CONDITIONS: I_{DD} = 42mA, V_{DD} = 3.66V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		1dB Comp. Output	3dB Comp. Output	Noise Figure	IP3 - Min
(MHz)	(dB)	(dB)	(dB)	(dB)	K	B1	(dBm)		(dB)	(dBm)
10	24.30	26.46	19.88	17.69	1.03	0.37	14.19	15.83	2.22	26.46
50	24.39	26.34	19.61	17.52	1.02	0.33	13.83	15.31	2.07	26.03
100	24.38	26.38	19.71	17.49	1.02	0.34	14.13	15.55	2.16	26.67
250	24.27	26.36	19.12	16.86	1.02	0.35	14.28	15.65	2.07	27.91
500	24.02	26.23	18.30	15.96	1.02	0.36	13.99	15.28	2.02	26.46
750	23.72	26.09	17.57	15.03	1.02	0.38	13.72	14.95	2.01	26.51
1000	23.40	25.91	16.90	14.42	1.02	0.39	13.62	14.81	2.05	26.33
1250	23.08	25.75	16.41	13.98	1.03	0.41	13.30	14.58	2.08	25.43
1500	22.73	25.59	15.92	13.50	1.03	0.43	13.29	14.53	2.02	26.14
1750	22.35	25.40	15.49	13.09	1.03	0.45	13.31	14.49	2.10	25.30
2000	21.97	25.23	15.12	12.79	1.04	0.47	13.48	14.62	2.13	24.86
2250	21.58	24.95	14.65	12.41	1.04	0.48	13.00	14.17	2.13	24.88
2500	21.17	24.80	14.26	12.18	1.04	0.51	13.27	14.45	2.16	24.58
2750	20.75	24.56	13.85	11.90	1.05	0.52	13.21	14.45	2.20	24.99
3000	20.32	24.34	13.41	11.66	1.05	0.54	13.14	14.42	2.17	24.15
3250	19.91	24.12	13.03	11.46	1.06	0.56	13.06	14.31	2.27	24.29
3500	19.48	23.90	12.69	11.31	1.06	0.57	13.14	14.48	2.33	24.37
3750	19.07	23.69	12.29	11.17	1.07	0.59	12.98	14.39	2.34	24.37
4000	18.66	23.45	11.93	11.08	1.07	0.61	12.82	14.32	2.34	23.24
4250	18.25	23.25	11.54	10.90	1.08	0.62	12.75	14.26	2.32	23.24
4500	17.84	23.02	11.21	10.85	1.09	0.64	12.64	14.24	2.43	22.88
4750	17.45	22.87	10.83	10.80	1.10	0.66	12.34	13.89	2.52	23.08
5000	17.04	22.70	10.45	10.65	1.11	0.67	12.22	13.91	2.54	22.59
5250	16.65	22.50	10.07	10.57	1.11	0.69	11.97	13.73	2.57	21.66
5500	16.25	22.33	9.74	10.54	1.12	0.71	11.74	13.50	2.63	21.72
5750	15.87	22.12	9.36	10.44	1.13	0.72	11.46	13.25	2.68	21.72
6000	15.50	22.00	9.01	10.39	1.14	0.74	11.18	13.06	2.74	21.49
6250	15.12	21.84	8.70	10.33	1.15	0.76	10.97	12.88	2.88	21.17
6500	14.74	21.69	8.36	10.25	1.16	0.77	10.75	12.67	2.90	21.09
6750	14.37	21.56	8.07	10.21	1.17	0.79	10.53	12.48	3.04	21.11
7000	14.02	21.46	7.79	10.13	1.18	0.81	10.21	12.20	3.15	20.98
7250	13.67	21.31	7.51	10.03	1.18	0.82	10.03	12.04	3.19	19.83
7500	13.31	21.20	7.21	9.94	1.19	0.84	9.67	11.74	3.24	19.68
7750	12.95	21.11	6.94	9.79	1.20	0.85	9.51	11.58	3.35	19.43
8000	12.60	21.03	6.71	9.74	1.21	0.87	9.29	11.38	3.52	19.09

Typical Performance Data

Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2)

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

TEST CONDITIONS: I_{DD} = 35mA, V_{DD} = 3.43V @Temperature = +105degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		1dB Comp. Output	3dB Comp. Output	Noise Figure	IP3 - Min
(MHz)	(dB)	(dB)	(dB)	(dB)	K	B1	(dBm)	(dBm)	(dB)	(dBm)
10	23.36	25.40	35.89	27.63	1.03	0.37	12.27	14.10	2.46	23.55
50	23.45	25.57	33.97	27.13	1.03	0.38	11.79	13.61	2.59	23.16
100	23.43	25.38	32.80	26.62	1.02	0.36	12.08	13.83	2.77	24.03
250	23.33	25.39	28.57	24.33	1.03	0.38	12.29	13.93	2.68	25.16
500	23.10	25.29	24.93	21.60	1.03	0.39	11.97	13.57	2.61	23.25
750	22.81	25.14	22.51	19.76	1.02	0.41	11.60	13.26	2.65	23.40
1000	22.51	25.00	20.79	18.47	1.02	0.43	11.49	13.10	2.73	23.41
1250	22.21	24.84	19.44	17.48	1.02	0.45	11.18	12.88	2.73	22.21
1500	21.87	24.64	18.29	16.63	1.02	0.47	11.17	12.84	2.72	22.90
1750	21.50	24.47	17.35	15.86	1.03	0.49	11.26	12.82	2.79	22.39
2000	21.11	24.26	16.48	15.21	1.03	0.51	11.52	12.97	2.81	21.99
2250	20.72	24.09	15.68	14.64	1.03	0.53	10.91	12.49	2.80	22.11
2500	20.30	23.86	14.97	14.23	1.03	0.55	11.28	12.80	2.89	22.04
2750	19.87	23.69	14.34	13.83	1.04	0.58	11.29	12.81	2.88	22.27
3000	19.44	23.44	13.74	13.58	1.04	0.60	11.22	12.79	2.92	21.41
3250	19.01	23.25	13.24	13.35	1.05	0.62	11.15	12.68	3.01	21.71
3500	18.56	23.04	12.79	13.18	1.06	0.64	11.19	12.86	3.02	21.89
3750	18.13	22.85	12.38	13.05	1.07	0.66	11.16	12.80	3.03	22.08
4000	17.70	22.68	11.97	12.93	1.08	0.68	10.99	12.74	3.08	20.74
4250	17.26	22.46	11.57	12.76	1.09	0.70	10.82	12.70	3.13	20.97
4500	16.82	22.30	11.16	12.63	1.10	0.72	10.68	12.64	3.21	20.91
4750	16.40	22.14	10.74	12.50	1.11	0.74	10.32	12.30	3.21	20.64
5000	15.96	22.06	10.31	12.36	1.13	0.76	10.33	12.35	3.32	20.60
5250	15.53	21.88	9.87	12.24	1.14	0.78	10.05	12.10	3.43	19.66
5500	15.10	21.75	9.47	12.18	1.16	0.80	9.78	11.89	3.46	19.65
5750	14.70	21.62	9.08	12.13	1.17	0.82	9.58	11.68	3.53	19.59
6000	14.30	21.51	8.69	12.07	1.18	0.84	9.28	11.46	3.66	19.44
6250	13.89	21.39	8.33	12.01	1.20	0.86	9.04	11.25	3.74	19.03
6500	13.49	21.28	7.99	11.95	1.21	0.88	8.90	11.11	3.88	19.06
6750	13.10	21.21	7.67	11.90	1.23	0.91	8.73	10.94	3.94	19.00
7000	12.71	21.12	7.38	11.90	1.24	0.93	8.37	10.68	4.01	18.86
7250	12.33	21.02	7.11	11.86	1.26	0.94	8.26	10.55	4.15	17.68
7500	11.94	20.97	6.83	11.79	1.28	0.97	7.86	10.22	4.20	17.45
7750	11.55	20.93	6.59	11.75	1.30	0.99	7.71	10.08	4.34	17.18
8000	11.18	20.83	6.38	11.76	1.31	1.00	7.51	9.86	4.54	16.91

Typical Performance Data

Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2)

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

TEST CONDITIONS: I_{DD} = 35mA, V_{DD} = 3.83V @Temperature = -55degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		1dB Comp. Output	3dB Comp. Output	Noise Figure	IP3 - Min
(MHz)	(dB)	(dB)	(dB)	(dB)	K	B1	(dBm)	(dBm)	(dB)	(dBm)
10	24.41	26.63	19.79	17.38	1.03	0.37	12.49	14.19234	1.61	24.07
50	24.47	26.43	19.93	17.59	1.02	0.34	11.86	13.6	1.61	23.74
100	24.46	26.45	19.98	17.65	1.02	0.34	12.25	13.94	1.73	24.45
250	24.36	26.40	19.52	17.16	1.02	0.35	12.62	14.18	1.59	25.52
500	24.12	26.31	18.27	15.99	1.02	0.36	12.20	13.84	1.56	24.15
750	23.83	26.20	17.30	15.03	1.02	0.38	11.82	13.51	1.54	24.28
1000	23.52	26.04	16.57	14.44	1.02	0.39	11.79	13.37	1.58	24.43
1250	23.22	25.85	15.96	13.97	1.02	0.41	11.40	13.09	1.57	23.38
1500	22.88	25.69	15.35	13.56	1.03	0.43	11.44	13.08	1.53	24.09
1750	22.53	25.53	14.94	13.18	1.03	0.45	11.57	13.16	1.57	23.80
2000	22.16	25.33	14.53	12.91	1.03	0.46	11.95	13.41	1.57	23.85
2250	21.79	25.12	14.16	12.58	1.04	0.48	11.08	12.6	1.59	23.58
2500	21.40	24.91	13.82	12.35	1.04	0.50	11.57	12.95	1.62	23.73
2750	21.01	24.69	13.42	12.07	1.04	0.51	11.61	13.08	1.64	24.40
3000	20.60	24.46	12.93	11.81	1.05	0.53	11.59	13.07	1.66	23.43
3250	20.20	24.25	12.49	11.51	1.05	0.54	11.59	13.01	1.71	23.88
3500	19.78	24.04	12.12	11.30	1.06	0.56	11.83	13.33	1.71	24.16
3750	19.37	23.81	11.70	11.14	1.06	0.57	12.07	13.57	1.73	24.46
4000	18.98	23.61	11.33	10.98	1.07	0.59	12.13	13.63	1.75	23.49
4250	18.58	23.41	10.96	10.82	1.07	0.61	12.46	13.85	1.78	23.97
4500	18.18	23.22	10.71	10.77	1.08	0.62	12.43	13.82	1.83	23.69
4750	17.80	23.03	10.35	10.69	1.09	0.64	12.02	13.46	1.84	23.81
5000	17.41	22.81	10.01	10.56	1.09	0.65	12.52	13.95	1.96	23.61
5250	17.02	22.61	9.62	10.47	1.10	0.67	12.07	13.6	2.07	22.66
5500	16.63	22.47	9.31	10.43	1.11	0.69	11.98	13.52	2.05	22.76
5750	16.27	22.34	8.96	10.38	1.11	0.71	11.79	13.31	2.05	22.65
6000	15.90	22.15	8.63	10.31	1.12	0.72	11.69	13.35	2.14	22.54
6250	15.53	22.02	8.34	10.27	1.13	0.74	11.27	12.93	2.18	22.11
6500	15.17	21.84	8.05	10.22	1.13	0.76	11.35	13.08	2.25	22.32
6750	14.81	21.71	7.79	10.15	1.14	0.77	11.19	12.95	2.32	22.31
7000	14.47	21.60	7.56	10.12	1.15	0.79	10.86	12.7	2.44	22.16
7250	14.15	21.51	7.33	10.09	1.16	0.81	10.82	12.66	2.50	21.06
7500	13.81	21.37	7.07	10.00	1.17	0.82	10.41	12.31	2.51	20.86
7750	13.47	21.24	6.83	9.88	1.18	0.83	10.26	12.2	2.56	20.62
8000	13.14	21.16	6.61	9.82	1.18	0.85	10.02	12.05	2.68	20.29

Typical Performance Data

Note: The following data was taken on the Mini-Circuits Evaluation Board TB-LEE1-39C+ (Figure 3).

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

TEST CONDITIONS: I_{CC} = 34mA, V_{CC} = 3.64V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		1dB Comp. Output	3dB Comp. Output	Noise Figure	IP3 - Min
(MHz)	(dB)	(dB)	(dB)	(dB)	K	B1	(dBm)	(dBm)	(dB)	(dBm)
10	22.1	27.2	32.7	10.7	1.1	0.6	11.4	13.1	2.0	20.5
50	23.7	25.8	27.2	21.4	1.0	0.4	11.5	13.4	2.1	21.7
100	23.7	25.8	27.2	22.1	1.0	0.4	11.9	13.6	2.2	22.3
250	23.7	25.7	26.0	20.8	1.0	0.4	12.1	13.7	2.1	22.6
500	23.4	25.7	24.2	18.5	1.0	0.4	11.6	13.3	2.1	21.9
750	23.1	25.6	23.0	16.7	1.0	0.4	11.3	13.2	2.0	21.5
1000	22.8	25.4	22.8	15.7	1.0	0.4	11.3	13.1	2.1	21.7
1250	22.4	25.3	22.7	15.0	1.0	0.4	10.6	12.6	2.1	20.8
1500	22.1	25.1	22.4	14.6	1.0	0.5	10.1	12.2	2.0	20.1
1750	21.8	24.9	21.7	14.6	1.0	0.5	10.6	12.6	2.0	20.6
2000	21.4	24.7	20.3	14.9	1.0	0.5	10.1	12.0	2.0	19.9
2250	21.0	24.5	18.6	15.6	1.0	0.5	9.6	11.5	2.0	19.4
2500	20.7	24.3	17.0	16.9	1.0	0.6	10.1	12.0	2.1	19.7
2750	20.3	24.0	15.2	18.8	1.0	0.6	10.2	11.9	2.1	20.1
3000	19.9	23.8	13.7	21.4	1.1	0.6	9.9	11.7	2.1	19.3
3250	19.5	23.6	12.3	25.3	1.1	0.7	10.1	12.0	2.2	20.7
3500	19.0	23.4	11.0	28.5	1.1	0.7	10.1	11.9	2.4	19.6
3750	18.6	23.2	10.1	25.1	1.1	0.7	10.6	12.4	2.3	20.0
4000	18.1	23.1	9.3	21.1	1.1	0.8	10.4	12.2	2.3	19.9
4250	17.7	23.0	8.6	18.4	1.1	0.8	10.5	12.3	2.3	19.8
4500	17.2	22.8	8.1	16.4	1.1	0.8	10.2	12.1	2.4	19.3
4750	16.8	22.7	7.7	14.9	1.1	0.8	10.9	12.6	2.5	20.4
5000	16.3	22.6	7.4	13.6	1.1	0.8	10.2	12.0	2.5	19.5
5250	15.9	22.5	7.2	12.5	1.1	0.8	10.4	12.1	2.6	19.4
5500	15.5	22.3	7.0	11.6	1.2	0.8	10.5	12.2	2.6	19.3
5750	15.1	22.3	6.8	11.0	1.2	0.8	10.4	12.1	2.6	19.4
6000	14.6	22.2	6.6	10.5	1.2	0.8	10.1	11.8	2.7	18.4
6250	14.2	22.1	6.4	10.1	1.2	0.8	10.0	11.7	2.9	18.6
6500	13.7	22.1	6.2	9.9	1.2	0.9	9.6	11.4	3.0	18.4
6750	13.3	22.1	6.1	9.8	1.3	0.9	9.3	11.2	3.0	17.8
7000	12.8	22.1	6.0	9.8	1.3	0.9	9.1	11.0	3.1	17.4
7250	12.4	22.1	6.0	10.0	1.3	0.9	8.8	10.8	3.1	17.1
7500	12.2	21.9	5.9	10.0	1.3	0.9	8.6	10.6	3.2	16.8
7750	11.9	21.8	5.8	9.8	1.3	0.9	8.5	10.6	3.3	16.6
8000	11.6	21.6	5.7	9.8	1.3	1.0	8.3	10.4	3.4	15.9

Typical Performance Data

Note: The following data was taken on the Mini-Circuits Evaluation Board TB-LEE1-39C+ (Figure 3).

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

TEST CONDITIONS: I_{CC} = 32mA, V_{CC} = 3.83V @Temperature = -55degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		1dB Comp. Output	3dB Comp. Output	Noise Figure	IP3 - Min
(MHz)	(dB)	(dB)	(dB)	(dB)	K	B1	(dBm)	(dBm)	(dB)	(dBm)
10	22.5	27.7	23.5	9.8	1.1	0.6	10.5	12.6	1.6	20.5
50	24.1	26.2	22.7	18.4	1.0	0.4	10.9	12.8	1.6	21.0
100	24.2	26.2	22.9	19.0	1.0	0.4	11.2	13.2	1.7	21.5
250	24.1	26.1	22.3	18.5	1.0	0.3	11.5	13.4	1.6	22.3
500	23.8	26.1	20.8	16.8	1.0	0.4	11.0	13.0	1.5	21.6
750	23.5	26.0	19.8	15.4	1.0	0.4	10.7	12.7	1.5	21.3
1000	23.2	25.8	19.7	14.7	1.0	0.4	10.7	12.7	1.5	21.5
1250	22.9	25.7	19.6	14.2	1.0	0.4	10.1	12.1	1.5	20.5
1500	22.6	25.5	19.5	14.0	1.0	0.4	9.5	11.5	1.5	19.6
1750	22.3	25.3	19.3	14.1	1.0	0.5	10.1	12.0	1.5	20.3
2000	21.9	25.0	18.7	14.5	1.0	0.5	9.6	11.4	1.5	19.6
2250	21.6	24.8	17.8	15.1	1.0	0.5	9.0	10.8	1.5	18.8
2500	21.2	24.6	16.8	16.2	1.0	0.5	9.5	11.4	1.5	19.2
2750	20.8	24.3	15.3	17.9	1.0	0.6	9.6	11.3	1.6	19.7
3000	20.5	24.1	13.9	19.8	1.0	0.6	9.3	11.0	1.6	18.8
3250	20.1	23.9	12.6	22.2	1.0	0.6	9.6	11.4	1.6	20.7
3500	19.6	23.6	11.4	24.0	1.1	0.7	9.5	11.2	1.8	19.2
3750	19.2	23.5	10.3	22.8	1.1	0.7	10.1	11.9	1.7	19.9
4000	18.7	23.4	9.5	20.2	1.1	0.7	9.9	11.7	1.8	19.7
4250	18.3	23.2	8.8	17.9	1.1	0.7	10.0	11.9	1.8	19.7
4500	17.9	23.1	8.2	15.9	1.1	0.8	9.8	11.7	1.8	19.1
4750	17.4	23.0	7.8	14.4	1.1	0.8	10.8	12.7	1.8	20.9
5000	17.0	22.8	7.5	13.1	1.1	0.8	10.0	11.9	1.9	19.5
5250	16.6	22.6	7.3	12.0	1.1	0.8	10.3	12.2	1.9	19.8
5500	16.2	22.5	7.0	11.1	1.1	0.8	10.6	12.4	2.0	19.9
5750	15.8	22.4	6.8	10.5	1.1	0.8	10.7	12.5	2.0	20.2
6000	15.4	22.4	6.6	10.0	1.1	0.8	10.5	12.2	2.1	19.2
6250	15.0	22.3	6.3	9.6	1.2	0.8	10.8	12.4	2.1	19.9
6500	14.5	22.3	6.2	9.4	1.2	0.8	10.3	12.0	2.2	19.6
6750	14.0	22.3	6.0	9.3	1.2	0.8	10.2	11.9	2.3	19.1
7000	13.6	22.2	5.9	9.3	1.2	0.9	10.0	11.8	2.3	19.0
7250	13.3	22.1	5.8	9.3	1.2	0.9	9.7	11.5	2.4	18.5
7500	13.0	22.0	5.8	9.4	1.2	0.9	9.6	11.4	2.4	18.4
7750	12.7	21.9	5.6	9.2	1.2	0.9	9.5	11.4	2.5	18.1
8000	12.4	21.7	5.5	9.2	1.3	0.9	9.3	11.2	2.6	17.4

Typical Performance Data

Note: The following data was taken on the Mini-Circuits Evaluation Board TB-LEE1-39C+ (Figure 3).

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

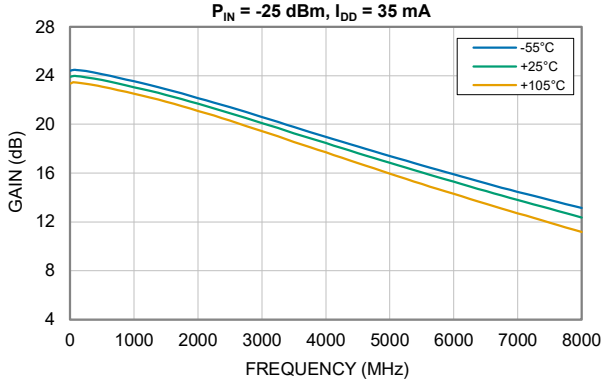
TEST CONDITIONS: I_{CC} = 36mA, V_{CC} = 3.43V @Temperature = +105degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		1dB Comp. Output	3dB Comp. Output	Noise Figure	IP3 - Min
(MHz)	(dB)	(dB)	(dB)	(dB)	K	B1	(dBm)	(dBm)	(dB)	(dBm)
10	21.7	27.4	38.7	11.3	1.2	0.6	11.7	13.3	2.7	22.3
50	23.3	25.6	32.4	24.4	1.0	0.4	12.0	13.6	2.7	22.2
100	23.4	25.5	33.3	25.3	1.0	0.4	12.2	13.8	2.8	22.7
250	23.3	25.4	31.6	23.1	1.0	0.4	12.3	13.8	2.7	23.3
500	22.9	25.4	29.2	19.9	1.0	0.4	11.9	13.4	2.7	22.2
750	22.6	25.2	28.3	17.8	1.0	0.4	11.6	13.2	2.6	21.9
1000	22.3	25.1	28.1	16.5	1.0	0.5	11.5	13.1	2.7	21.9
1250	22.0	25.0	27.7	15.6	1.0	0.5	11.0	12.8	2.7	20.9
1500	21.6	24.8	26.5	15.2	1.0	0.5	10.5	12.5	2.6	20.3
1750	21.2	24.6	24.2	15.1	1.0	0.5	10.9	12.7	2.7	20.7
2000	20.8	24.4	21.6	15.4	1.0	0.5	10.5	12.4	2.7	20.1
2250	20.4	24.1	19.0	16.2	1.1	0.6	10.1	12.0	2.7	19.6
2500	20.0	23.9	16.8	17.8	1.1	0.6	10.5	12.3	2.8	19.9
2750	19.6	23.7	14.8	20.1	1.1	0.7	10.6	12.3	2.8	19.9
3000	19.2	23.4	13.2	23.8	1.1	0.7	10.3	12.1	2.8	19.4
3250	18.7	23.3	11.8	30.0	1.1	0.7	10.5	12.3	2.9	20.2
3500	18.2	23.1	10.7	32.3	1.1	0.8	10.4	12.1	3.0	19.3
3750	17.8	22.9	9.8	24.9	1.1	0.8	10.6	12.4	3.0	19.5
4000	17.3	22.8	9.1	20.7	1.1	0.8	10.3	12.2	3.1	19.1
4250	16.8	22.7	8.5	18.1	1.1	0.8	10.2	12.1	3.1	18.8
4500	16.2	22.6	7.9	16.4	1.2	0.8	9.9	11.8	3.2	18.3
4750	15.8	22.5	7.5	15.1	1.2	0.9	10.0	12.0	3.3	18.8
5000	15.3	22.4	7.2	14.0	1.2	0.9	9.6	11.6	3.4	18.1
5250	14.9	22.3	6.9	13.0	1.2	0.9	9.4	11.3	3.4	17.5
5500	14.4	22.2	6.7	12.3	1.2	0.9	9.3	11.3	3.5	17.3
5750	14.0	22.1	6.5	11.7	1.2	0.9	9.0	11.1	3.6	17.2
6000	13.5	22.0	6.4	11.2	1.3	0.9	8.7	10.8	3.6	16.0
6250	13.1	22.0	6.3	10.9	1.3	0.9	8.4	10.5	3.8	16.0
6500	12.6	22.0	6.2	10.6	1.3	0.9	8.0	10.2	3.9	15.9
6750	12.1	22.0	6.2	10.5	1.4	0.9	7.8	10.0	4.0	15.2
7000	11.7	22.0	6.1	10.5	1.4	1.0	7.5	9.7	4.1	14.8
7250	11.3	21.9	6.2	10.7	1.4	1.0	7.3	9.6	4.2	14.5
7500	11.0	21.8	6.1	10.8	1.5	1.0	7.1	9.4	4.2	14.2
7750	10.7	21.6	6.1	10.6	1.5	1.0	7.0	9.4	4.4	14.0
8000	10.4	21.5	6.1	10.6	1.5	1.0	6.7	9.1	4.4	13.3

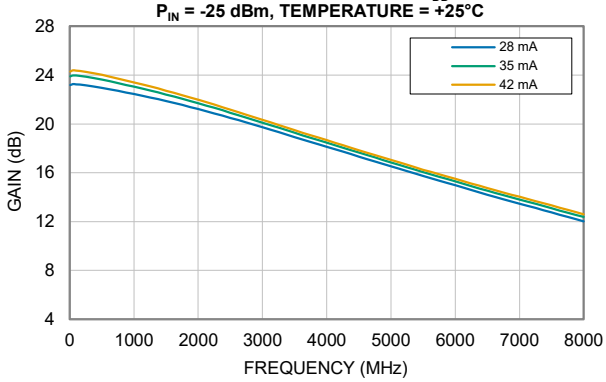
Typical Performance Curves

Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2).

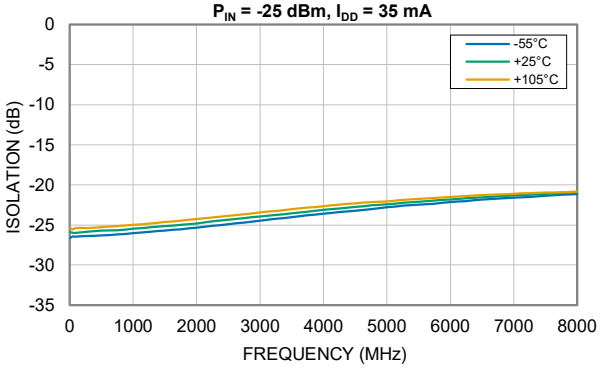
GAIN vs. TEMPERATURE
P_{IN} = -25 dBm, I_{DD} = 35 mA



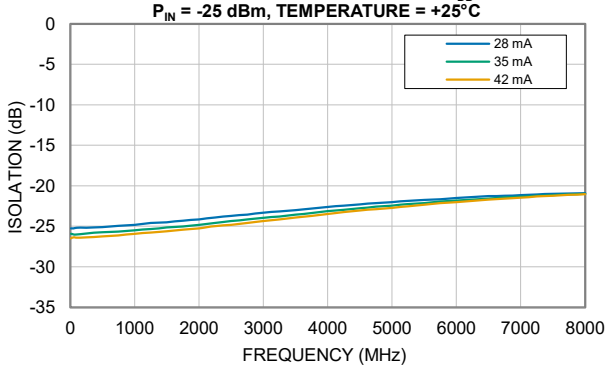
GAIN vs. DEVICE CURRENT (I_{DD})
P_{IN} = -25 dBm, TEMPERATURE = +25°C



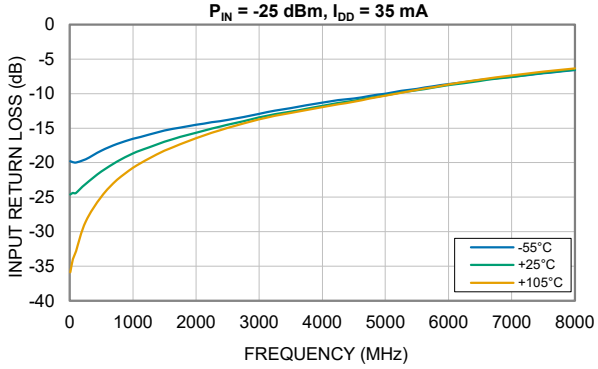
ISOLATION vs. TEMPERATURE
P_{IN} = -25 dBm, I_{DD} = 35 mA



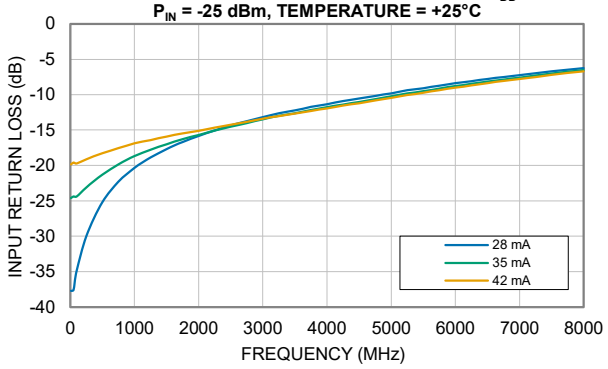
ISOLATION vs. DEVICE CURRENT (I_{DD})
P_{IN} = -25 dBm, TEMPERATURE = +25°C



INPUT RETURN LOSS vs. TEMPERATURE
P_{IN} = -25 dBm, I_{DD} = 35 mA

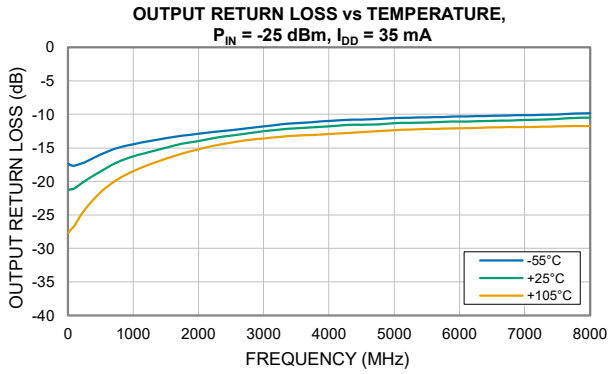


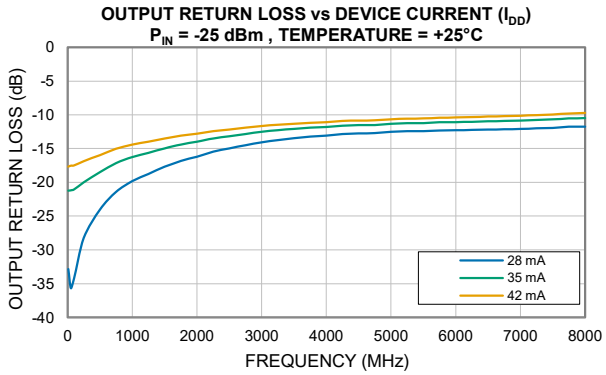
INPUT RETURN LOSS vs. DEVICE CURRENT (I_{DD})
P_{IN} = -25 dBm, TEMPERATURE = +25°C

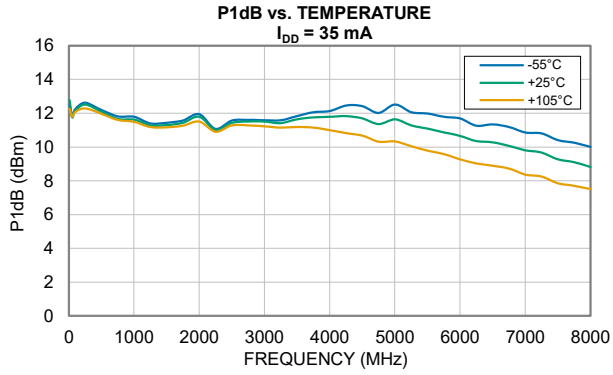


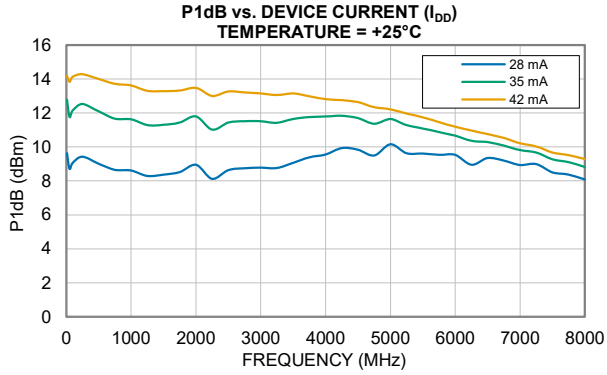
Typical Performance Curves

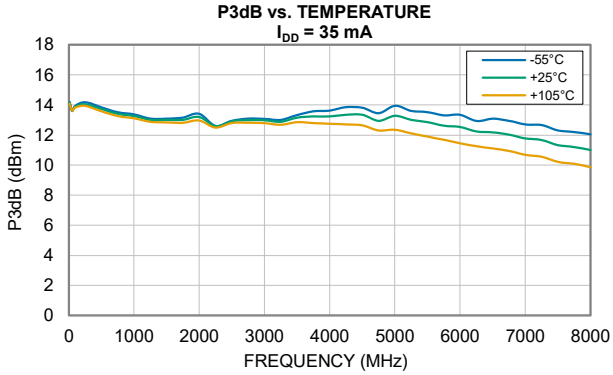
Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2).

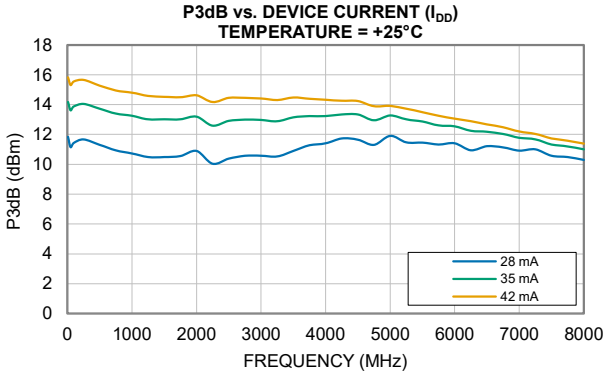








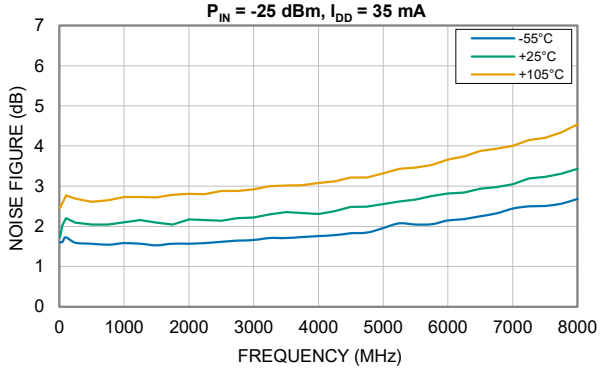




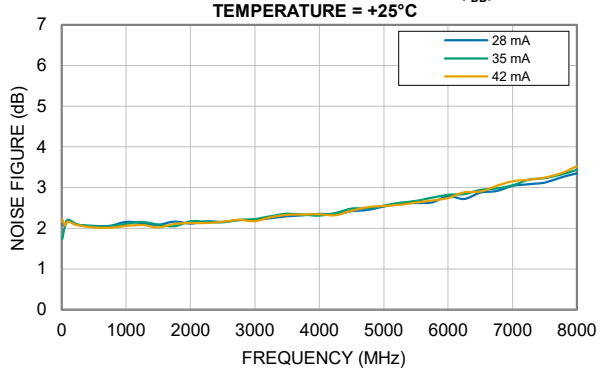
Typical Performance Curves

Note: The following data was taken on the Mini-Circuits Characterization Test Board MB-225-39C+ (Figure 2).

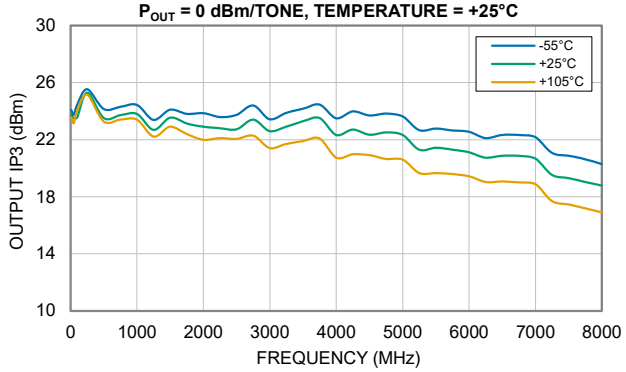
NOISE FIGURE vs. TEMPERATURE
P_{IN} = -25 dBm, I_{DD} = 35 mA



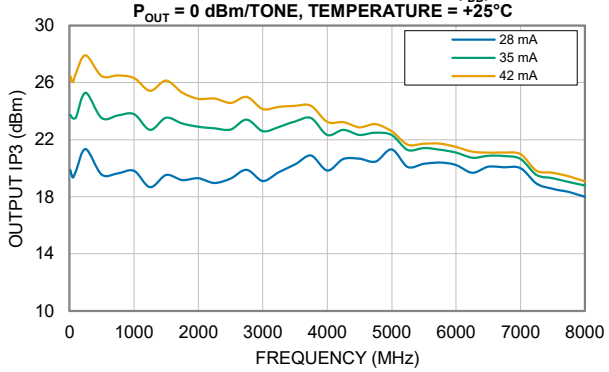
NOISE FIGURE vs. DEVICE CURRENT (I_{DD})
TEMPERATURE = +25°C



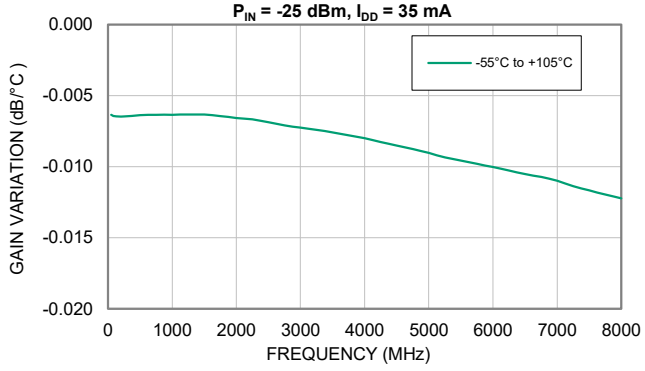
OUTPUT IP3 vs. TEMPERATURE
P_{OUT} = 0 dBm/TONE, TEMPERATURE = +25°C



OUTPUT IP3 vs. DEVICE CURRENT (I_{DD})
P_{OUT} = 0 dBm/TONE, TEMPERATURE = +25°C



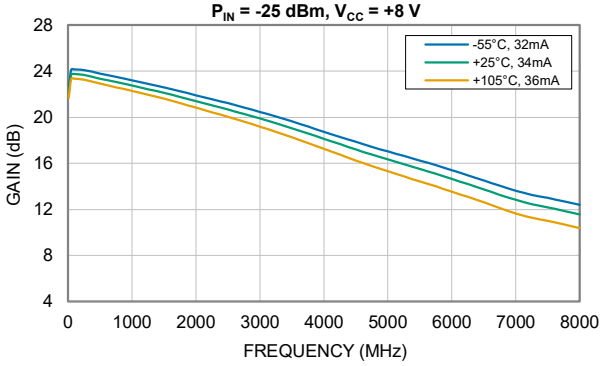
GAIN VARIATION vs. TEMPERATURE
P_{IN} = -25 dBm, I_{DD} = 35 mA



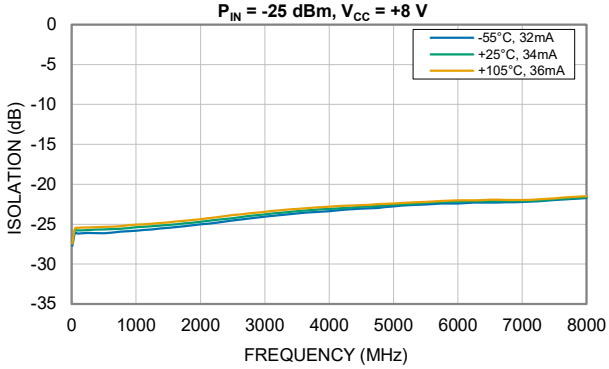
Typical Performance Curves

Note: The following data was taken on the Mini-Circuits Evaluation Board TB-LEE1-39C+ (Figure 3).

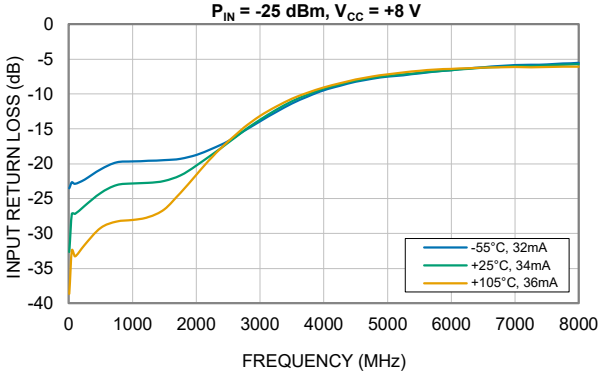
GAIN vs. TEMPERATURE
P_{IN} = -25 dBm, V_{CC} = +8 V



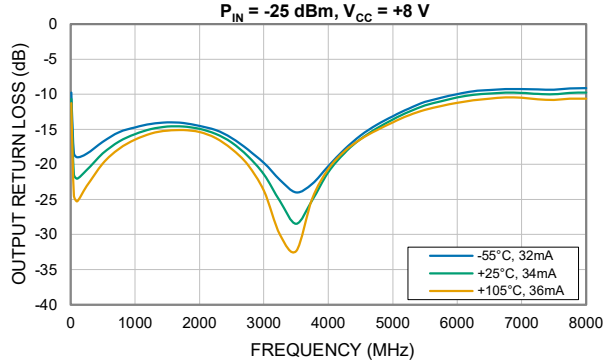
ISOLATION vs. TEMPERATURE
P_{IN} = -25 dBm, V_{CC} = +8 V



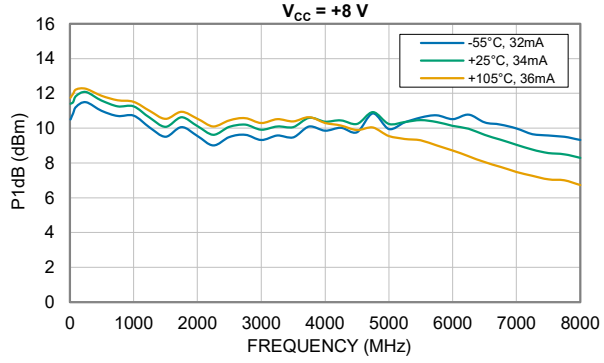
INPUT RETURN LOSS vs. TEMPERATURE
P_{IN} = -25 dBm, V_{CC} = +8 V



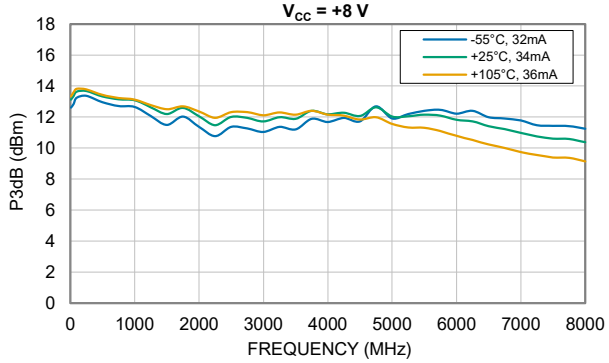
OUTPUT RETURN LOSS vs TEMPERATURE,
P_{IN} = -25 dBm, V_{CC} = +8 V



P1dB vs. TEMPERATURE
V_{CC} = +8 V

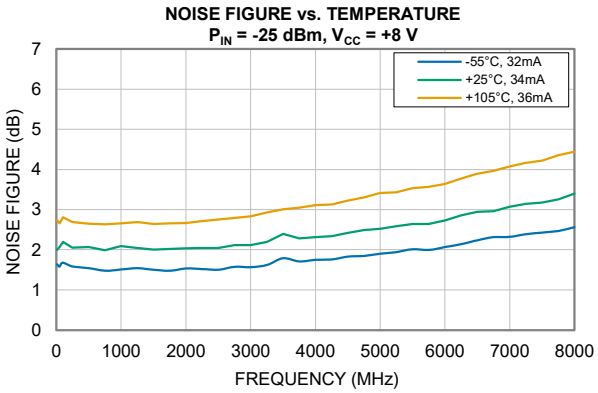


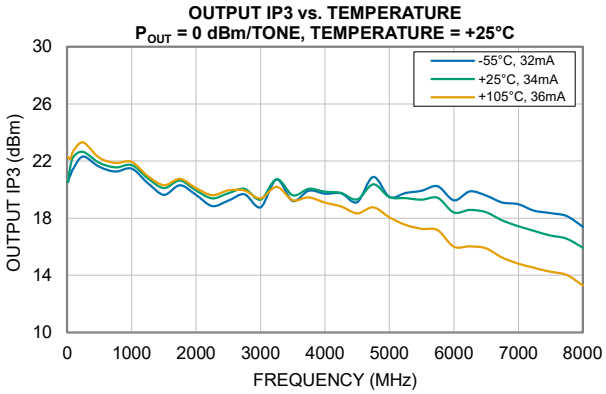
P3dB vs. TEMPERATURE
V_{CC} = +8 V

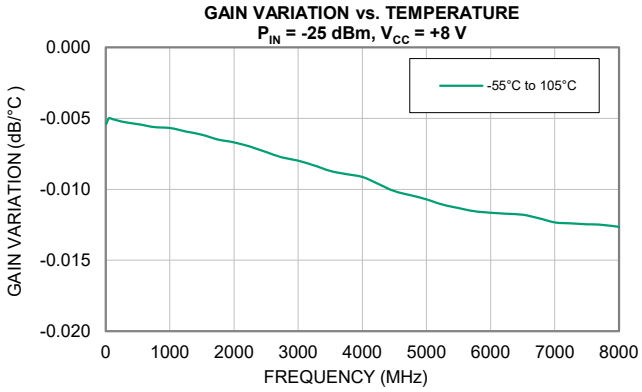


Typical Performance Curves

Note: The following data was taken on the Mini-Circuits Evaluation Board TB-LEE1-39C+ (Figure 3).

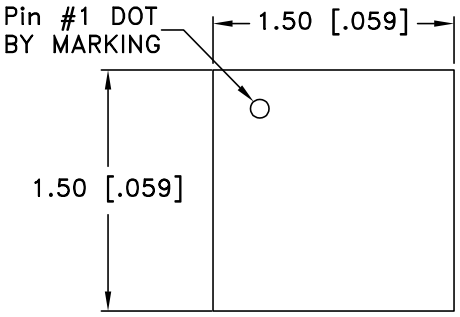




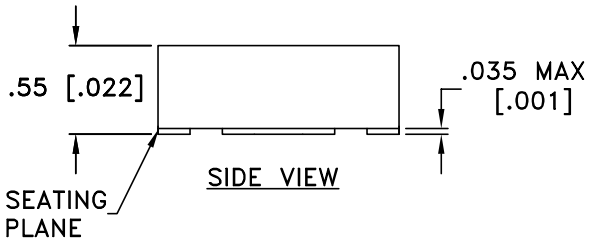


Case Style KC

Outline Dimensions KC3011

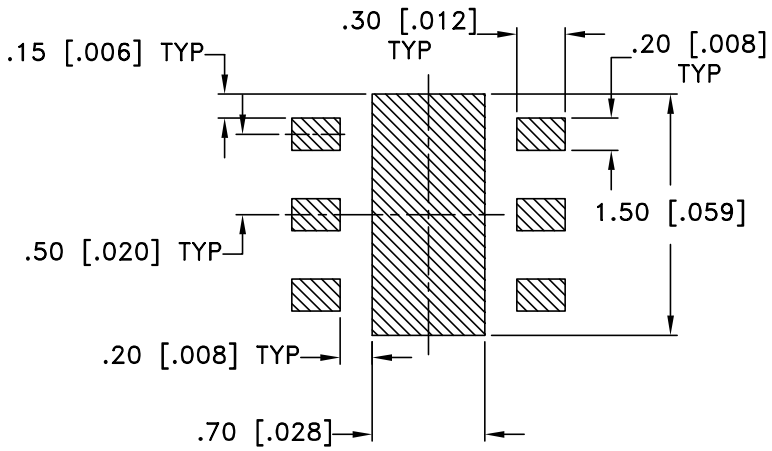


TOP VIEW

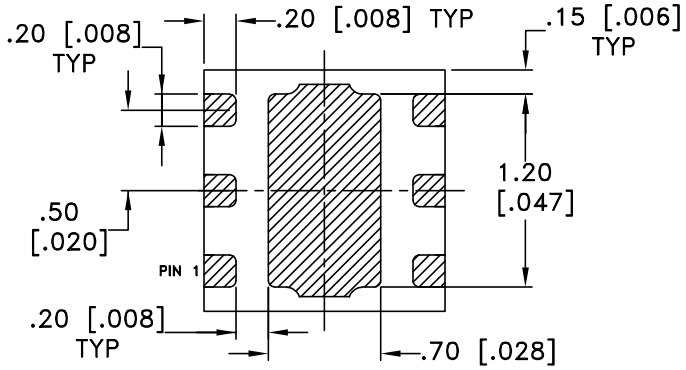


SIDE VIEW

PCB Land Pattern



Suggested Layout,
Tolerance to be within ±0.050 mm



BOTTOM VIEW

NOTES:

1. ▨ DENOTES METALLIZATION

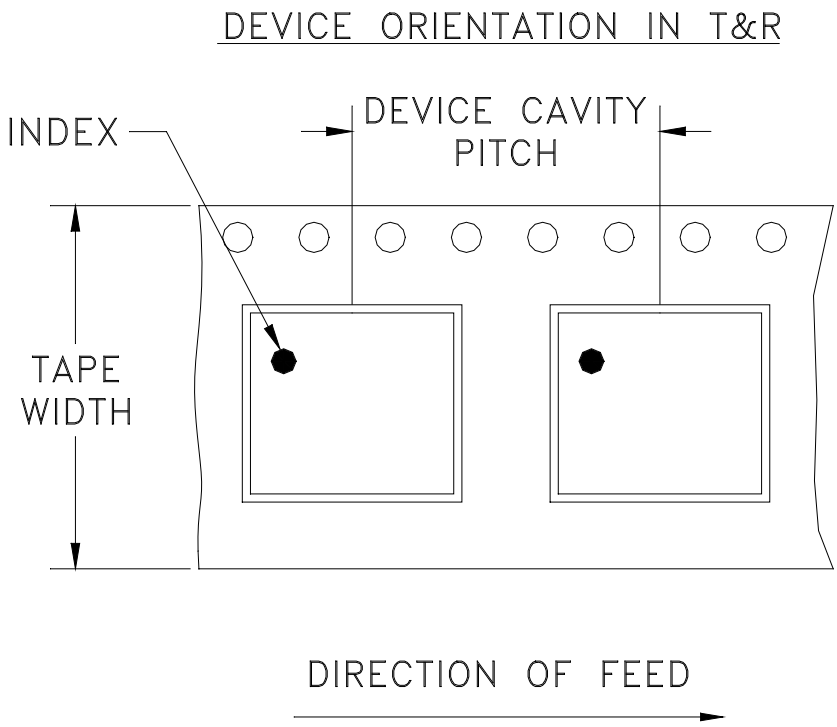
Weight: .0036 grams

Dimensions are in mm [inches]. Tolerances: 2 Pl.± 0.05 mm

Notes:

1. Case material: Plastic.
2. Termination finish: NiPdAu (3µm/0.080µm/0.080µm) .

Tape & Reel Packaging TR-F66



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

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

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

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

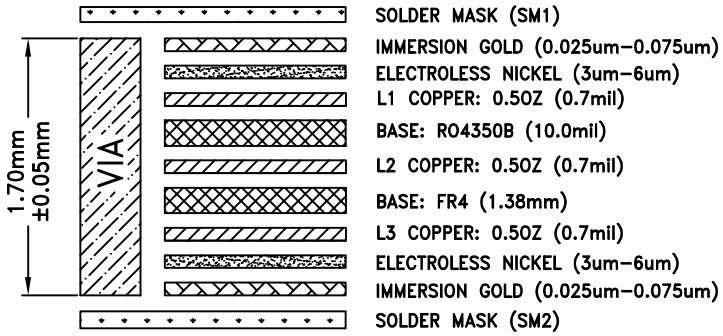
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-028458	NEW RELEASE	02/09/26	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR KC3011 CASE STYLE

3 LAYER STACKUP DETAIL



LAYERS L2 & L3 OF PCB ARE CONTINUOUS GROUND PLANES.

COMPONENT	SIZE
C1, C2	0402
C3	0805
R1	1210
BT1	N/A

NOTES:
1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH & GAP ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010", COPPER: .5 OZ. EACH LAYER. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
3. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-LEE1-XX+, WHERE XX=6, 39 & 63.

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	02/09/26
TOLERANCES ON:	CHECKED	NP	02/09/26
2 PL DECIMALS ±	APPROVED	IL	02/09/26
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

Mini-Circuits®

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

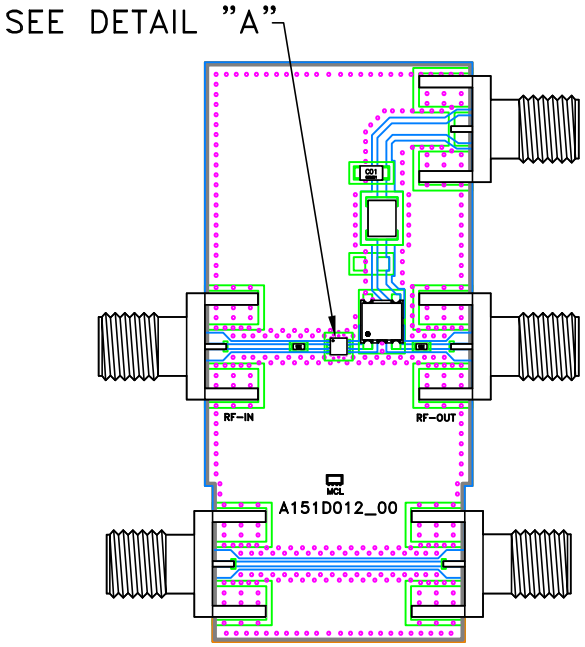
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

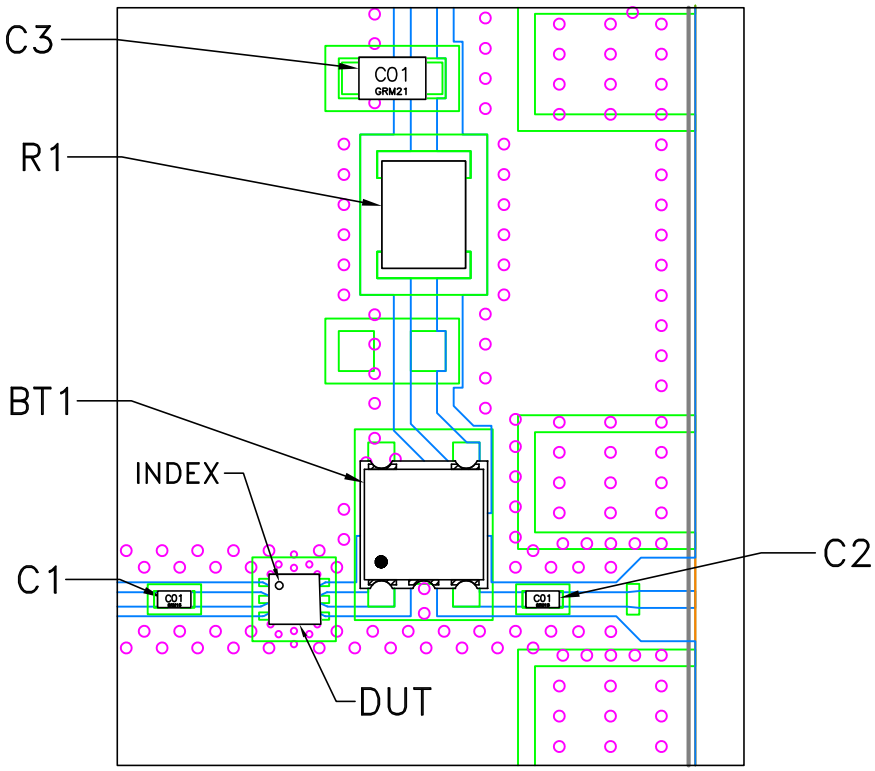
PL, KC3011, TB-LEE1-XXC+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-851	OR

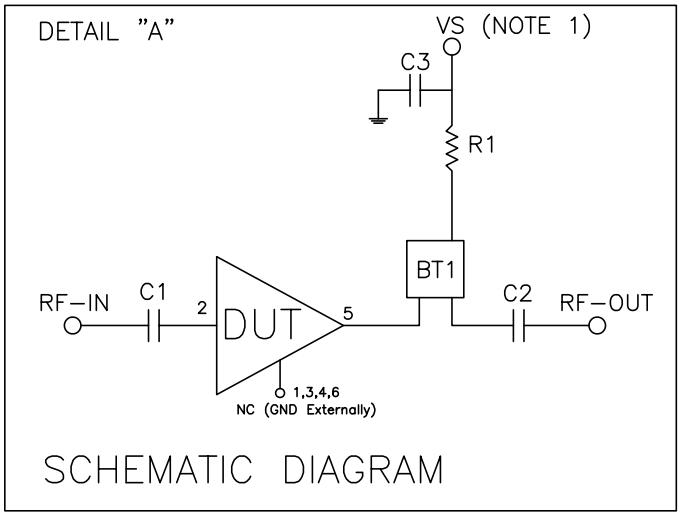
FILE:	SCALE:	SHEET:
98PL851	6:1	1 OF 1

Evaluation Board and Circuit





DETAIL "A"
LOCATION OF COMPONENTS
ON THE PCB
(SCALE 3:1)



Components	Size	Value	Part Numbers	Manufacturer
C1,C2	0402	2.4nF	GRM1557U1A242JA1D	Murata
C3	0805	0.1uF	GCM21BR91H104KA37L	Murata
R1	1210	130Ω	RK73H2ETTD1300F	KOA Speer
BT1	N/A	N/A	TCBT-123+	Mini Circuits

NOTES:

1. VS Voltage=+8V
2. 50 Ohm SMA Female Connectors.
3. PCB Material: Roger RO4350B or equivalent, Dielectric constant=3.5, Thickness=0.010 inch

Mini-Circuits®

Mini-Circuits

Environmental Specifications **ENV08T1**

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C or -45° to 85° C or -55° to 105° C or -40° to 105° C or -40° to 95° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° Ambient Environment	Individual Model Data Sheet
HTOL	1000 hours at 125°C	MIL-STD-883, Method 1005, Condition B
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

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
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215