MMIC SURFACE MOUNT

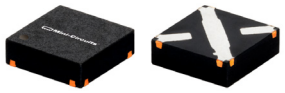
Monolithic Amplifier

LEE-29+

50Ω DC to 8 GHz

FEATURES

- Frequency Range, DC to 8 GHz
- Internally Matched to 50Ω
- Output Power, +10.6 dBm Typ.
- Excellent Package for Heat Dissipation, Exposed Metal Bottom
- Flat Output Power to 10 GHz
- Aqueous Washable
- Protected By US Patent 6,943,629



Generic photo used for illustration purposes only

CASE STYLE: FG873

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

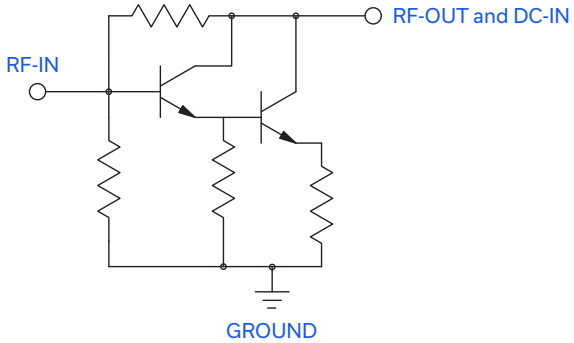
APPLICATIONS

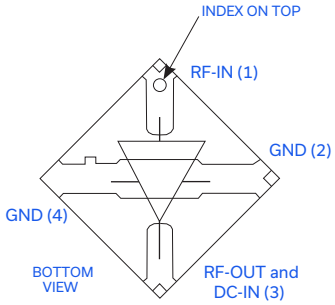
- Cellular
- PCS
- Communication Receivers & Transmitters
- Satellite Communication, Military

PRODUCT OVERVIEW

LEE-29+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in a 3 x 3 mm MCLP molded plastic package. Expected MTBF is 2,000 years at +85°C case temperature.

SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION





Function	Pin Number	Description
RF-IN	1	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
RF-OUT and DC-IN	3	RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit".
GND	2,4	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

REV. L
ECO-024941
LEE-29+
MCL NY
250320

Monolithic Amplifier

LEE-29+

50Ω DC to 8 GHz

ELECTRICAL SPECIFICATIONS AT +25°C AND 40 mA UNLESS NOTED OTHERWISE

Parameter	Conditions (GHz)	Min.	Typ.	Max.	Units
Frequency Range[1]		DC		8	GHz
Gain	0.1	13.3	15.5		dB
	1		15.4		
	2		15.4		
	4		14.9		
	5		14.1		
	8		12.5		
	10		10.6		
Input Return Loss	DC - 3		15.5		dB
	3 - 8		17.5		
Output Return Loss	DC - 3		17.5		dB
	3 - 8		12.5		
Output Power @ 1 dB Compression	2	+10.6	+11.9		dBm
	8	+10.0	+11.5		
Output IP3			+25.5		dBm
Noise Figure			5.5		dB
Recommended Device Operating Current			40		mA
Device Operating Voltage		+3.2	+3.6	+4.0	V
Device Voltage Variation vs. Temperature at 40 mA			-1.9		mV/°C
Device Voltage Variation vs. Current at +25°C			8.6		mV/mA
Thermal Resistance, Junction-to-Case[2]			120		°C/W

1. Guaranteed specification DC-8 GHz. Low frequency cut off determined by external coupling capacitors.
2. Case is defined as ground leads.

ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature[3]	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Operating Current	55 mA
Input Power	+15 dBm

3. Based on typical case temperature rise +5°C above ambient.

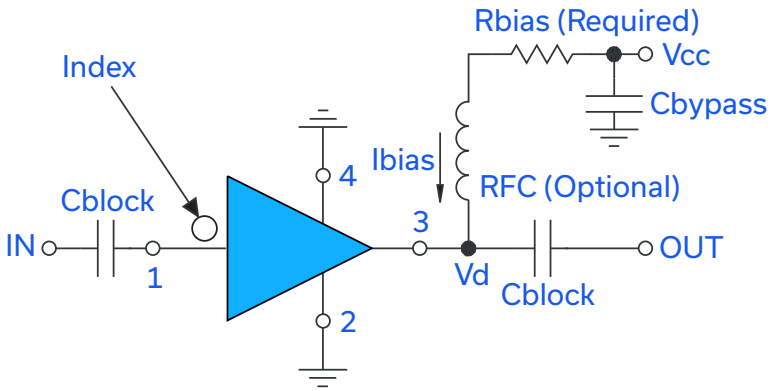
Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.

Monolithic Amplifier

LEE-29+

50Ω DC to 8 GHz

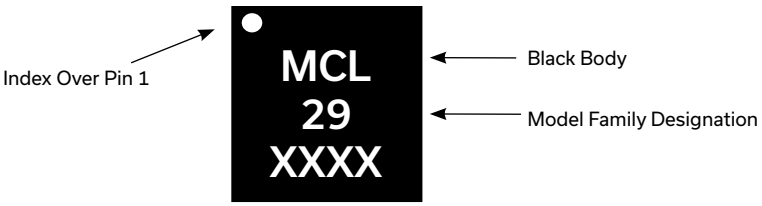
RECOMMENDED APPLICATION CIRCUIT



Test Board includes case, connectors, and components (in bold) soldered to PCB

R BIAS	
Vcc	"1%" Res. Values (Ohms) for Optimum Biasing
7	88.7
8	113
9	137
10	162
11	187
12	215
13	237
14	261
15	287
16	316
17	340
18	365
19	392
20	412

PRODUCT MARKING



Markings in addition to model number designation may appear for internal quality control purposes.

Monolithic Amplifier

LEE-29+

50Ω DC to 8 GHz

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Performance Data & Graphs	Data Table Swept Graphs S-Parameter Data Set (.zip file)
Case Style	FG873 Plastic package, exposed paddle, Lead finish: Tin-Silver over Nickel
Tape & Reel **Standard Quantities Available on Reel**	F68 7" Reels with 20, 50, 100, 200, 500 or 1K devices 13" Reels with 2K, 3K, 4K devices
Suggested Layout for PCB Design	PL-252
Evaluation Board	TB-413-29+
Environmental Ratings	ENV08T2

ESD RATING

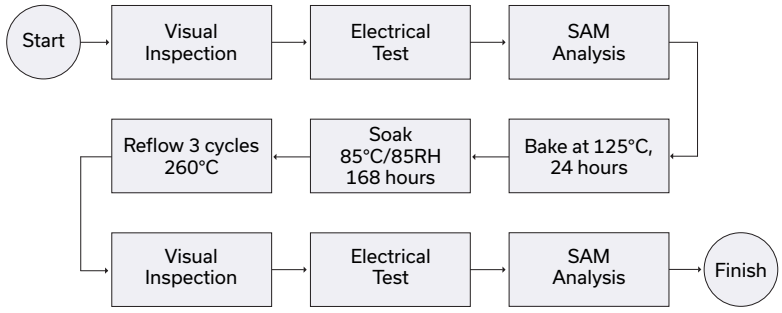
Human Body Model (HBM): Class 1A (250 V to < 500 V) in accordance with ANSI/ESD STM 5.1 - 2001
Machine Model (MM): Class M1 (< 100 V) in accordance with ESD STM 5.2 - 1999

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDECJ-STD-020C

No.	Test Required	Condition	Standard	Quantity
1	Visual Inspection	Low Power Microscope Magnification 40x	MIP-IN-0003 (MCT spec)	45 units
2	Electrical Test	Room Temperature	SCD (MCL spec)	45 units
3	SAM Analysis	Less than 10% growth in term of delamination	J-Std-020C (Jedec Standard)	45 units
4	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-020C (Jedec Standard)	45 units

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-Circuits' 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

MMIC Amplifier LEE-29+

Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions or to view GRAPHS.

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

TEST CONDITIONS: Icc = 40mA, Vd = 3.59V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	16.09	19.83	35.72	27.62	1.09	0.65	50	27.59	12.97	3.31
100	16.08	19.81	34.61	27.47	1.09	0.65	100	27.57	12.73	3.36
200	16.02	19.82	35.61	27.09	1.09	0.65	200	27.94	13.04	3.34
400	15.95	19.82	36.05	26.05	1.10	0.64	400	27.43	12.97	3.38
600	15.85	19.74	37.85	24.90	1.10	0.64	600	26.91	12.80	3.35
800	15.74	19.71	41.63	23.66	1.10	0.63	800	27.14	12.30	3.38
1000	15.62	19.66	47.05	22.73	1.11	0.63	1000	26.96	12.42	3.40
1200	15.52	19.61	51.71	21.86	1.11	0.62	1200	26.88	12.58	3.46
1400	15.40	19.55	58.14	21.21	1.11	0.62	1400	26.80	12.55	3.47
1600	15.29	19.49	56.56	20.77	1.11	0.62	1600	27.60	12.57	3.45
1800	15.16	19.43	50.83	20.36	1.12	0.61	1800	27.81	12.53	3.49
2000	15.04	19.37	52.53	20.05	1.12	0.61	2000	27.16	12.15	3.46
2200	14.92	19.31	53.29	19.96	1.12	0.60	2200	27.23	11.75	3.47
2400	14.79	19.22	44.35	19.86	1.12	0.60	2400	27.24	11.82	3.49
2600	14.66	19.15	39.37	19.85	1.13	0.60	2600	27.28	12.31	3.47
2800	14.52	19.06	36.28	19.88	1.13	0.59	2800	27.50	12.37	3.48
3000	14.38	18.97	33.41	19.92	1.13	0.59	3000	27.79	12.48	3.49
3500	14.02	18.76	28.38	20.50	1.14	0.58	3200	27.61	12.40	3.46
4000	13.63	18.51	26.21	20.87	1.15	0.57	3400	27.39	12.38	3.40
4500	13.25	18.24	25.54	20.74	1.15	0.56	3600	27.15	12.49	3.44
5000	12.85	17.97	26.64	20.06	1.16	0.55	3800	26.96	12.50	3.45
5500	12.45	17.72	29.53	18.88	1.17	0.54	4000	27.12	12.86	3.50
6000	12.05	17.45	32.25	17.45	1.18	0.54	4200	27.05	12.97	3.50
6500	11.71	17.17	28.70	16.34	1.18	0.54	4400	26.95	13.00	3.46
7000	11.40	16.91	25.15	15.45	1.18	0.54	4600	26.62	13.24	3.53
7500	11.12	16.64	21.56	14.58	1.18	0.54	4800	26.33	13.24	3.62
8000	10.85	16.40	18.80	13.72	1.18	0.55	5000	26.18	13.01	3.61
8500	10.50	16.18	15.74	12.55	1.18	0.55	5200	26.26	12.63	3.58
9000	10.09	15.99	13.21	11.12	1.17	0.56	5400	26.31	12.81	3.54
10000	8.94	15.71	9.93	8.93	1.19	0.57	5600	25.89	13.05	3.59
11000	7.41	15.56	7.70	7.35	1.22	0.56	5800	25.36	13.10	3.58
12000	5.60	15.58	5.72	5.90	1.25	0.56	6000	25.22	12.96	3.55
13000	3.89	15.79	4.42	4.80	1.24	0.57	6200	25.27	12.80	3.67
14000	2.23	16.19	3.72	4.03	1.23	0.56	6400	25.19	12.79	3.74
15000	1.01	16.53	3.44	3.88	1.22	0.52	6600	25.11	12.82	3.74
16000	0.88	16.34	3.90	4.48	1.23	0.42	6800	24.79	12.75	3.77
17000	1.31	15.16	5.26	6.08	1.31	0.28	7000	24.24	12.70	3.80
18000	1.86	13.84	6.67	8.23	1.35	0.21	7200	23.91	12.43	3.85
19000	2.23	13.48	6.64	8.68	1.30	0.26	7600	23.49	12.37	3.97
20000	1.82	15.77	5.37	7.31	1.50	0.28	8000	22.65	11.46	3.99

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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: Icc = 32mA, Vd = 3.53V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	15.72	19.53	26.79	40.05	1.10	0.64	50	23.35	9.75	3.28
100	15.71	19.50	26.37	39.67	1.09	0.65	100	23.34	9.38	3.33
200	15.66	19.51	26.91	37.48	1.10	0.64	200	23.62	9.90	3.34
400	15.58	19.49	27.11	33.92	1.10	0.64	400	23.24	9.77	3.37
600	15.49	19.46	27.70	30.95	1.10	0.63	600	22.77	9.55	3.33
800	15.38	19.42	28.61	28.33	1.11	0.63	800	22.97	8.92	3.40
1000	15.29	19.36	29.74	26.87	1.11	0.62	1000	22.79	9.23	3.38
1200	15.19	19.32	30.54	25.57	1.11	0.62	1200	22.73	9.51	3.41
1400	15.08	19.26	31.59	24.36	1.11	0.62	1400	22.68	9.49	3.44
1600	14.97	19.21	31.79	23.68	1.12	0.61	1600	23.32	9.51	3.44
1800	14.87	19.15	32.24	22.91	1.12	0.61	1800	23.62	9.44	3.47
2000	14.74	19.09	32.01	22.42	1.12	0.60	2000	22.72	8.92	3.39
2200	14.62	19.02	30.91	22.10	1.12	0.60	2200	22.80	8.52	3.42
2400	14.51	18.96	29.88	21.85	1.13	0.60	2400	23.00	8.60	3.41
2600	14.39	18.89	28.74	21.79	1.13	0.59	2600	23.27	9.24	3.45
2800	14.26	18.81	27.66	21.59	1.13	0.59	2800	23.64	9.46	3.46
3000	14.12	18.72	26.53	21.51	1.13	0.59	3000	23.84	9.48	3.45
3500	13.78	18.52	23.88	21.93	1.14	0.57	3200	23.62	9.42	3.45
4000	13.41	18.29	22.55	22.27	1.15	0.56	3400	23.53	9.43	3.40
4500	13.05	18.03	22.22	22.07	1.15	0.56	3600	23.73	9.53	3.39
5000	12.68	17.77	23.06	21.30	1.16	0.55	3800	23.90	9.60	3.40
5500	12.29	17.53	24.90	19.94	1.17	0.54	4000	24.33	10.15	3.44
6000	11.89	17.28	26.76	18.34	1.18	0.53	4200	24.30	10.33	3.48
6500	11.56	17.02	25.50	17.06	1.18	0.53	4400	24.36	10.29	3.42
7000	11.25	16.77	23.42	16.09	1.18	0.53	4600	24.35	10.72	3.46
7500	10.97	16.53	20.50	15.18	1.18	0.54	4800	24.47	10.69	3.51
8000	10.70	16.32	18.10	14.27	1.18	0.54	5000	24.47	10.44	3.56
8500	10.35	16.12	15.23	13.03	1.18	0.55	5200	24.31	9.97	3.52
9000	9.93	15.97	12.83	11.55	1.18	0.55	5400	24.05	10.26	3.49
10000	8.77	15.75	9.69	9.33	1.21	0.55	5600	23.97	11.12	3.52
11000	7.23	15.62	7.56	7.73	1.25	0.54	5800	23.94	11.46	3.51
12000	5.43	15.67	5.64	6.26	1.27	0.54	6000	24.28	11.11	3.52
13000	3.72	15.87	4.37	5.12	1.26	0.54	6200	24.79	10.91	3.61
14000	2.06	16.28	3.70	4.33	1.26	0.54	6400	24.69	11.17	3.63
15000	0.83	16.59	3.43	4.16	1.24	0.49	6600	24.43	11.50	3.72
16000	0.59	16.45	3.87	4.73	1.27	0.39	6800	24.08	11.48	3.74
17000	0.93	15.36	5.12	6.19	1.36	0.25	7000	23.75	11.57	3.73
18000	1.50	14.08	6.44	8.17	1.39	0.18	7200	23.57	11.50	3.77
19000	1.87	13.69	6.44	8.67	1.34	0.23	7600	23.35	11.41	3.85
20000	1.46	15.93	5.25	7.47	1.56	0.26	8000	22.37	10.48	3.90

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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: Icc = 48mA, Vd = 3.64V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	16.28	19.95	49.23	24.45	1.09	0.66	50	30.75	14.56	3.35
100	16.27	20.00	49.00	24.39	1.09	0.65	100	30.82	14.60	3.40
200	16.22	19.98	58.61	24.17	1.09	0.65	200	31.22	14.70	3.37
400	16.13	19.95	62.27	23.41	1.09	0.64	400	30.46	14.72	3.43
600	16.03	19.91	50.49	22.62	1.10	0.64	600	29.80	14.68	3.39
800	15.92	19.87	43.37	21.68	1.10	0.63	800	29.99	14.42	3.45
1000	15.80	19.82	39.10	20.98	1.10	0.63	1000	29.74	14.33	3.44
1200	15.69	19.77	37.63	20.34	1.11	0.63	1200	29.63	14.36	3.49
1400	15.57	19.72	35.66	19.82	1.11	0.62	1400	29.53	14.34	3.51
1600	15.45	19.66	35.39	19.47	1.11	0.62	1600	30.33	14.30	3.48
1800	15.33	19.59	34.96	19.17	1.11	0.61	1800	29.93	14.33	3.52
2000	15.20	19.52	35.61	18.94	1.12	0.61	2000	29.66	14.20	3.50
2200	15.07	19.47	37.14	18.87	1.12	0.60	2200	29.58	13.96	3.51
2400	14.94	19.38	39.32	18.84	1.12	0.60	2400	29.30	13.89	3.51
2600	14.80	19.30	45.23	18.91	1.13	0.60	2600	28.89	14.09	3.51
2800	14.66	19.22	50.05	18.98	1.13	0.59	2800	28.79	14.13	3.50
3000	14.52	19.12	43.11	19.07	1.13	0.59	3000	28.82	14.20	3.53
3500	14.15	18.89	32.70	19.67	1.14	0.58	3200	28.58	14.20	3.50
4000	13.75	18.65	29.33	20.06	1.15	0.57	3400	28.32	14.12	3.46
4500	13.36	18.36	28.32	19.98	1.16	0.56	3600	27.79	14.21	3.49
5000	12.95	18.09	29.67	19.43	1.17	0.55	3800	27.41	14.22	3.51
5500	12.54	17.82	34.59	18.33	1.17	0.54	4000	27.40	14.40	3.53
6000	12.13	17.56	37.40	16.99	1.18	0.54	4200	27.23	14.40	3.58
6500	11.80	17.25	29.93	15.94	1.18	0.54	4400	27.16	14.42	3.51
7000	11.48	16.98	25.67	15.10	1.18	0.54	4600	26.69	14.56	3.58
7500	11.20	16.70	21.96	14.27	1.18	0.54	4800	26.38	14.41	3.66
8000	10.94	16.45	19.12	13.42	1.17	0.55	5000	26.17	14.28	3.68
8500	10.59	16.20	16.01	12.28	1.17	0.56	5200	26.21	14.14	3.62
9000	10.19	16.01	13.44	10.88	1.17	0.57	5400	26.20	14.14	3.61
10000	9.06	15.69	10.09	8.69	1.18	0.58	5600	25.86	13.95	3.62
11000	7.53	15.51	7.80	7.11	1.21	0.57	5800	25.30	13.88	3.61
12000	5.71	15.53	5.78	5.67	1.23	0.57	6000	24.93	13.80	3.62
13000	3.99	15.73	4.45	4.58	1.22	0.58	6200	24.82	13.67	3.74
14000	2.33	16.14	3.74	3.83	1.22	0.58	6400	24.68	13.49	3.81
15000	1.14	16.47	3.46	3.67	1.19	0.54	6600	24.73	13.48	3.83
16000	1.06	16.26	3.93	4.27	1.20	0.44	6800	24.55	13.40	3.84
17000	1.56	15.04	5.36	5.92	1.28	0.30	7000	23.98	13.28	3.90
18000	2.13	13.68	6.85	8.16	1.31	0.23	7200	23.60	12.93	3.91
19000	2.46	13.34	6.81	8.55	1.28	0.28	7600	23.29	12.85	4.02
20000	2.07	15.62	5.46	7.08	1.45	0.30	8000	22.49	12.04	4.08

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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: Icc = 40mA, Vd = 3.76V @Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	16.23	19.92	37.24	26.58	1.09	0.65	50	28.16	12.88	2.77
100	16.22	19.87	35.11	26.69	1.09	0.66	100	28.15	12.53	2.79
200	16.19	19.91	35.54	26.86	1.09	0.65	200	28.46	12.82	2.83
400	16.11	19.85	37.79	25.28	1.09	0.65	400	28.01	12.78	2.84
600	16.01	19.80	39.88	24.25	1.09	0.65	600	27.51	12.63	2.82
800	15.92	19.76	46.47	23.02	1.10	0.64	800	27.78	12.13	2.87
1000	15.80	19.70	65.18	22.09	1.10	0.64	1000	27.61	12.28	2.87
1200	15.70	19.65	49.48	21.28	1.10	0.64	1200	27.57	12.51	2.89
1400	15.60	19.59	41.23	20.54	1.10	0.63	1400	27.51	12.41	2.89
1600	15.48	19.53	39.91	20.00	1.10	0.63	1600	28.31	12.45	2.88
1800	15.37	19.47	38.21	19.67	1.11	0.63	1800	28.53	12.42	2.93
2000	15.26	19.39	38.87	19.50	1.11	0.62	2000	27.90	11.99	2.89
2200	15.13	19.32	40.93	19.41	1.11	0.62	2200	28.01	11.64	2.89
2400	15.01	19.24	43.69	19.29	1.11	0.62	2400	28.05	11.63	2.89
2600	14.88	19.17	50.72	19.47	1.11	0.61	2600	28.14	12.16	2.91
2800	14.75	19.08	43.47	19.49	1.12	0.61	2800	28.44	12.31	2.89
3000	14.63	18.97	37.09	19.75	1.12	0.61	3000	28.75	12.36	2.87
3500	14.28	18.74	30.83	20.14	1.12	0.60	3200	28.54	12.34	2.88
4000	13.90	18.51	28.60	20.54	1.13	0.58	3400	28.36	12.30	2.84
4500	13.53	18.21	28.97	19.98	1.14	0.58	3600	28.23	12.44	2.87
5000	13.19	17.94	30.02	19.56	1.14	0.58	3800	28.13	12.41	2.88
5500	12.76	17.64	33.97	18.34	1.15	0.57	4000	28.42	12.83	2.90
6000	12.38	17.38	34.42	17.39	1.15	0.56	4200	28.29	12.97	2.91
6500	12.10	17.14	33.08	16.91	1.16	0.56	4400	28.24	13.00	2.85
7000	11.77	16.81	29.85	15.80	1.15	0.56	4600	27.85	13.36	2.92
7500	11.52	16.54	24.14	14.66	1.15	0.57	4800	27.63	13.35	2.99
8000	11.26	16.29	19.36	13.37	1.14	0.58	5000	27.56	13.22	3.04
8500	10.92	16.09	15.55	12.01	1.14	0.59	5200	27.68	12.73	3.00
9000	10.58	15.87	13.16	10.78	1.13	0.60	5400	27.66	12.85	2.95
10000	9.60	15.43	10.65	9.22	1.14	0.61	5600	27.31	13.46	2.97
11000	8.24	15.14	8.41	7.51	1.16	0.61	5800	26.84	13.65	2.95
12000	6.31	15.20	5.67	5.54	1.17	0.62	6000	26.61	13.51	2.94
13000	4.44	15.65	4.03	4.34	1.15	0.63	6200	26.75	13.35	3.08
14000	2.98	16.17	3.49	3.65	1.14	0.62	6400	26.78	13.41	3.13
15000	1.92	16.02	3.25	3.47	1.06	0.58	6600	26.79	13.45	3.22
16000	1.67	16.26	3.39	3.79	1.03	0.51	6800	26.42	13.44	3.21
17000	2.08	15.10	4.41	5.48	1.08	0.35	7000	25.76	13.45	3.28
18000	2.86	13.45	6.39	7.99	1.13	0.24	7200	25.44	13.22	3.24
19000	3.50	12.69	7.20	8.34	1.11	0.32	7600	25.03	13.22	3.39
20000	2.76	15.26	4.43	6.46	1.15	0.36	8000	24.21	12.40	3.44

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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: Icc = 32mA, Vd = 3.71V @Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	15.91	19.63	27.94	35.09	1.09	0.65	50	23.57	9.51	2.75
100	15.90	19.63	27.33	35.74	1.09	0.65	100	23.55	9.18	2.80
200	15.85	19.60	27.13	35.03	1.09	0.65	200	23.79	9.58	2.82
400	15.78	19.58	28.08	31.67	1.09	0.64	400	23.49	9.48	2.82
600	15.69	19.55	28.87	29.61	1.10	0.64	600	23.05	9.30	2.79
800	15.60	19.49	30.05	27.11	1.10	0.64	800	23.29	8.76	2.86
1000	15.50	19.43	31.96	25.73	1.10	0.64	1000	23.08	8.95	2.86
1200	15.40	19.38	33.06	24.47	1.10	0.63	1200	23.05	9.27	2.88
1400	15.30	19.32	35.12	23.29	1.10	0.63	1400	23.04	9.23	2.88
1600	15.19	19.28	36.52	22.59	1.11	0.62	1600	23.64	9.24	2.86
1800	15.09	19.20	37.58	21.93	1.11	0.62	1800	23.92	9.21	2.92
2000	14.98	19.13	36.55	21.58	1.11	0.62	2000	23.05	8.72	2.89
2200	14.87	19.06	34.90	21.41	1.11	0.62	2200	23.17	8.32	2.88
2400	14.76	19.00	33.78	21.14	1.11	0.61	2400	23.36	8.36	2.89
2600	14.63	18.93	31.84	21.31	1.12	0.61	2600	23.63	9.01	2.89
2800	14.51	18.83	30.31	21.14	1.12	0.61	2800	24.04	9.21	2.87
3000	14.39	18.73	28.28	21.31	1.12	0.60	3000	24.26	9.24	2.86
3500	14.07	18.52	25.57	21.51	1.12	0.59	3200	24.03	9.23	2.86
4000	13.71	18.31	24.44	21.89	1.13	0.58	3400	23.93	9.21	2.83
4500	13.36	18.00	24.80	21.18	1.13	0.58	3600	24.20	9.34	2.84
5000	13.02	17.77	25.37	20.66	1.14	0.57	3800	24.43	9.30	2.88
5500	12.62	17.47	27.50	19.28	1.15	0.57	4000	24.89	9.85	2.89
6000	12.24	17.24	28.28	18.22	1.15	0.56	4200	24.89	10.08	2.91
6500	11.97	17.00	27.71	17.63	1.15	0.56	4400	24.97	10.04	2.84
7000	11.65	16.70	27.79	16.40	1.15	0.56	4600	24.98	10.55	2.91
7500	11.41	16.45	23.60	15.17	1.15	0.57	4800	25.15	10.60	2.96
8000	11.15	16.22	19.11	13.81	1.15	0.58	5000	25.19	10.37	2.97
8500	10.81	16.04	15.24	12.39	1.15	0.58	5200	25.03	9.77	2.97
9000	10.45	15.85	12.84	11.14	1.14	0.60	5400	24.74	9.99	2.88
10000	9.45	15.45	10.37	9.57	1.15	0.59	5600	24.69	11.09	2.89
11000	8.09	15.20	8.26	7.83	1.17	0.59	5800	24.73	11.67	2.89
12000	6.16	15.28	5.60	5.84	1.18	0.60	6000	25.20	11.28	2.88
13000	4.31	15.75	3.97	4.63	1.16	0.61	6200	25.78	11.02	3.04
14000	2.85	16.25	3.47	3.92	1.16	0.59	6400	25.83	11.39	3.03
15000	1.77	16.07	3.23	3.73	1.07	0.56	6600	25.54	11.92	3.17
16000	1.43	16.35	3.36	4.05	1.05	0.48	6800	25.22	11.87	3.19
17000	1.73	15.27	4.30	5.68	1.10	0.32	7000	24.85	12.01	3.18
18000	2.51	13.68	6.14	7.99	1.16	0.20	7200	24.78	11.96	3.20
19000	3.21	12.89	6.94	8.41	1.12	0.29	7600	24.59	12.07	3.24
20000	2.44	15.42	4.31	6.72	1.18	0.34	8000	23.63	11.15	3.40

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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: Icc = 48mA, Vd = 3.82V @Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	16.41	20.01	52.88	23.90	1.08	0.66	50	31.44	14.80	2.82
100	16.40	20.05	50.18	24.08	1.09	0.66	100	31.47	14.81	2.85
200	16.36	20.03	51.41	24.20	1.09	0.66	200	31.83	14.95	2.85
400	16.28	19.99	56.88	23.06	1.09	0.65	400	31.19	14.95	2.88
600	16.19	19.95	47.37	22.29	1.09	0.65	600	30.63	14.80	2.84
800	16.08	19.91	40.31	21.30	1.09	0.64	800	30.89	14.48	2.88
1000	15.97	19.85	36.72	20.57	1.10	0.64	1000	30.64	14.51	2.91
1200	15.86	19.79	35.37	19.96	1.10	0.64	1200	30.60	14.56	2.95
1400	15.75	19.73	32.97	19.33	1.10	0.63	1400	30.54	14.55	2.92
1600	15.63	19.67	32.33	18.89	1.10	0.63	1600	31.44	14.50	2.91
1800	15.51	19.61	31.70	18.63	1.11	0.63	1800	31.24	14.55	2.93
2000	15.39	19.54	32.02	18.52	1.11	0.62	2000	30.89	14.33	2.92
2200	15.27	19.46	32.96	18.42	1.11	0.62	2200	30.86	14.02	2.92
2400	15.15	19.39	34.38	18.40	1.11	0.62	2400	30.60	13.96	2.93
2600	15.01	19.30	37.90	18.59	1.11	0.61	2600	30.31	14.30	2.93
2800	14.87	19.20	40.42	18.65	1.12	0.61	2800	30.26	14.37	2.90
3000	14.75	19.10	46.81	18.93	1.12	0.61	3000	30.37	14.43	2.93
3500	14.40	18.87	36.37	19.39	1.12	0.60	3200	30.26	14.43	2.91
4000	14.01	18.64	32.28	19.81	1.13	0.58	3400	29.98	14.38	2.87
4500	13.63	18.32	32.77	19.35	1.14	0.58	3600	29.50	14.46	2.88
5000	13.27	18.05	34.38	18.98	1.14	0.57	3800	29.17	14.46	2.92
5500	12.84	17.74	43.57	17.87	1.15	0.57	4000	29.17	14.70	2.94
6000	12.46	17.47	38.02	16.98	1.15	0.56	4200	29.04	14.79	2.97
6500	12.17	17.22	36.05	16.51	1.16	0.56	4400	28.91	14.84	2.87
7000	11.84	16.88	29.37	15.48	1.15	0.57	4600	28.54	15.00	2.94
7500	11.59	16.61	23.97	14.38	1.15	0.57	4800	28.07	14.97	3.05
8000	11.34	16.34	19.32	13.10	1.14	0.59	5000	27.91	14.81	3.07
8500	11.00	16.12	15.68	11.79	1.14	0.60	5200	27.99	14.58	3.04
9000	10.67	15.88	13.36	10.57	1.13	0.61	5400	28.23	14.63	2.99
10000	9.70	15.40	10.85	9.01	1.13	0.62	5600	27.77	14.69	2.98
11000	8.35	15.09	8.53	7.30	1.15	0.62	5800	27.17	14.66	3.00
12000	6.41	15.15	5.74	5.35	1.15	0.63	6000	26.72	14.63	3.05
13000	4.53	15.59	4.07	4.15	1.14	0.64	6200	26.67	14.52	3.15
14000	3.06	16.11	3.52	3.44	1.13	0.63	6400	26.53	14.37	3.23
15000	2.01	15.98	3.26	3.27	1.05	0.60	6600	26.75	14.35	3.24
16000	1.83	16.20	3.41	3.56	1.02	0.53	6800	26.46	14.32	3.26
17000	2.31	14.98	4.50	5.27	1.06	0.38	7000	25.80	14.21	3.29
18000	3.11	13.30	6.59	7.89	1.11	0.27	7200	25.37	13.85	3.29
19000	3.74	12.54	7.43	8.18	1.09	0.35	7600	25.02	13.84	3.42
20000	2.99	15.13	4.53	6.21	1.13	0.39	8000	24.37	13.05	3.53

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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: Icc = 40mA, Vd = 3.44V @Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	15.95	19.71	32.87	29.17	1.09	0.65	50	27.37	12.95	3.77
100	15.93	19.68	33.01	28.63	1.09	0.65	100	27.43	12.85	3.79
200	15.88	19.72	35.16	27.74	1.10	0.64	200	27.81	13.11	3.81
400	15.78	19.71	34.12	26.82	1.10	0.64	400	27.21	13.02	3.83
600	15.68	19.66	34.67	25.94	1.10	0.63	600	26.65	12.87	3.80
800	15.57	19.63	36.13	24.49	1.11	0.63	800	26.86	12.43	3.86
1000	15.45	19.57	37.77	23.71	1.11	0.62	1000	26.65	12.50	3.85
1200	15.34	19.52	38.02	22.96	1.11	0.62	1200	26.57	12.63	3.94
1400	15.23	19.48	39.19	22.35	1.12	0.61	1400	26.48	12.59	3.93
1600	15.11	19.42	38.06	22.03	1.12	0.61	1600	27.32	12.58	3.95
1800	14.99	19.37	38.97	21.42	1.12	0.60	1800	27.35	12.54	3.98
2000	14.85	19.29	37.13	21.13	1.13	0.60	2000	26.79	12.23	3.96
2200	14.72	19.22	35.73	20.88	1.13	0.59	2200	26.85	11.91	3.94
2400	14.60	19.14	34.08	20.69	1.13	0.59	2400	26.79	11.90	3.93
2600	14.45	19.09	32.00	20.75	1.14	0.58	2600	26.70	12.33	3.96
2800	14.31	19.01	30.85	20.52	1.14	0.58	2800	26.78	12.43	3.94
3000	14.17	18.91	29.16	20.46	1.14	0.58	3000	26.97	12.49	3.99
3500	13.80	18.68	25.60	21.16	1.15	0.56	3200	26.83	12.46	3.98
4000	13.39	18.46	23.50	21.85	1.16	0.55	3400	26.49	12.40	3.92
4500	12.98	18.19	23.06	21.79	1.17	0.54	3600	26.16	12.50	3.92
5000	12.58	17.93	23.77	20.96	1.18	0.53	3800	25.87	12.52	3.97
5500	12.13	17.70	27.25	18.96	1.20	0.52	4000	25.94	12.81	4.01
6000	11.72	17.44	28.56	17.10	1.20	0.52	4200	25.74	12.86	4.01
6500	11.37	17.19	24.32	15.72	1.21	0.52	4400	25.69	12.88	3.99
7000	11.00	16.93	20.95	14.75	1.21	0.51	4600	25.20	12.99	4.08
7500	10.69	16.68	18.69	14.36	1.21	0.51	4800	24.88	12.88	4.11
8000	10.41	16.47	17.37	13.96	1.21	0.52	5000	24.70	12.71	4.16
8500	10.01	16.24	15.00	12.79	1.22	0.52	5200	24.75	12.43	4.08
9000	9.52	16.12	12.75	11.35	1.23	0.52	5400	24.72	12.51	4.07
10000	8.14	15.98	9.12	8.65	1.26	0.53	5600	24.26	12.48	4.08
11000	6.45	15.95	6.99	7.19	1.31	0.52	5800	23.75	12.49	4.14
12000	4.76	15.76	5.73	6.31	1.34	0.51	6000	23.39	12.27	4.06
13000	3.30	15.79	4.76	5.48	1.34	0.50	6200	23.35	12.17	4.19
14000	1.64	16.08	3.99	4.60	1.33	0.50	6400	23.24	12.04	4.25
15000	0.25	16.48	3.69	4.44	1.38	0.46	6600	23.18	12.08	4.33
16000	-0.03	16.27	4.44	5.07	1.49	0.36	6800	22.85	12.05	4.34
17000	0.40	15.20	6.12	6.60	1.61	0.22	7000	22.31	11.95	4.32
18000	0.95	13.97	6.79	9.02	1.57	0.19	7200	21.92	11.65	4.38
19000	0.97	14.04	6.03	8.76	1.52	0.24	7600	21.59	11.55	4.38
20000	0.41	16.79	5.67	7.23	1.96	0.23	8000	20.76	10.57	4.50

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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: Icc = 32mA, Vd = 3.39V @Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	15.55	19.41	25.49	66.31	1.10	0.64	50	23.33	10.01	3.73
100	15.53	19.38	25.48	50.37	1.10	0.64	100	23.34	9.69	3.77
200	15.48	19.39	26.44	41.76	1.10	0.64	200	23.67	10.23	3.79
400	15.40	19.38	26.10	35.67	1.10	0.63	400	23.23	10.07	3.82
600	15.30	19.34	26.23	32.95	1.11	0.63	600	22.74	9.84	3.79
800	15.19	19.31	27.04	29.93	1.11	0.62	800	22.94	9.25	3.85
1000	15.08	19.26	27.31	28.47	1.11	0.62	1000	22.75	9.52	3.86
1200	14.99	19.22	27.38	27.04	1.12	0.61	1200	22.68	9.78	3.89
1400	14.88	19.17	27.98	25.86	1.12	0.61	1400	22.60	9.74	3.91
1600	14.77	19.11	27.53	25.35	1.12	0.60	1600	23.25	9.79	3.92
1800	14.66	19.06	27.96	24.39	1.12	0.60	1800	23.55	9.68	3.97
2000	14.54	19.00	27.51	23.62	1.13	0.60	2000	22.70	9.19	3.93
2200	14.41	18.93	27.19	23.16	1.13	0.59	2200	22.82	8.77	3.92
2400	14.28	18.87	26.34	22.76	1.13	0.59	2400	23.00	8.97	3.91
2600	14.16	18.79	25.41	22.66	1.13	0.58	2600	23.23	9.58	3.95
2800	14.02	18.73	25.07	22.25	1.14	0.58	2800	23.60	9.77	3.91
3000	13.89	18.63	24.18	21.97	1.14	0.57	3000	23.81	9.78	3.97
3500	13.54	18.43	21.96	22.56	1.15	0.56	3200	23.61	9.74	3.96
4000	13.16	18.21	20.61	23.32	1.16	0.55	3400	23.50	9.75	3.90
4500	12.76	17.97	20.35	23.45	1.17	0.54	3600	23.65	9.84	3.91
5000	12.38	17.72	21.00	22.50	1.18	0.53	3800	23.77	9.89	3.92
5500	11.95	17.50	23.33	20.16	1.19	0.52	4000	24.10	10.45	3.97
6000	11.56	17.26	24.64	18.00	1.20	0.52	4200	24.06	10.63	3.99
6500	11.21	17.03	22.48	16.46	1.21	0.51	4400	24.08	10.63	3.94
7000	10.84	16.80	19.87	15.41	1.21	0.51	4600	23.94	10.93	4.02
7500	10.52	16.58	17.78	15.02	1.21	0.51	4800	23.91	10.81	4.08
8000	10.24	16.40	16.57	14.60	1.22	0.51	5000	23.89	10.58	4.06
8500	9.83	16.19	14.48	13.37	1.23	0.51	5200	23.85	10.20	4.01
9000	9.34	16.11	12.40	11.85	1.24	0.51	5400	23.68	10.49	4.01
10000	7.95	16.01	8.95	9.08	1.28	0.51	5600	23.46	11.02	4.07
11000	6.26	16.02	6.90	7.61	1.34	0.50	5800	23.20	11.22	4.05
12000	4.58	15.84	5.68	6.70	1.37	0.48	6000	23.19	10.85	4.03
13000	3.12	15.88	4.73	5.85	1.38	0.48	6200	23.48	10.75	4.11
14000	1.48	16.16	3.96	4.90	1.37	0.48	6400	23.41	10.84	4.24
15000	0.03	16.56	3.69	4.70	1.42	0.44	6600	23.21	11.04	4.23
16000	-0.33	16.38	4.39	5.26	1.54	0.33	6800	22.81	11.03	4.24
17000	0.03	15.40	5.98	6.61	1.67	0.20	7000	22.25	11.09	4.22
18000	0.59	14.21	6.60	8.93	1.63	0.17	7200	22.06	10.89	4.29
19000	0.63	14.23	5.89	8.76	1.57	0.21	7600	21.56	10.77	4.20
20000	0.07	16.95	5.58	7.29	2.04	0.22	8000	20.77	9.73	4.47

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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: Icc = 48mA, Vd = 3.50V @Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	16.16	19.87	44.60	25.33	1.09	0.65	50	30.42	14.20	3.78
100	16.14	19.88	44.76	25.00	1.09	0.65	100	30.58	14.30	3.80
200	16.09	19.90	55.57	24.32	1.10	0.64	200	30.99	14.32	3.82
400	16.00	19.88	51.15	23.88	1.10	0.64	400	30.12	14.38	3.84
600	15.89	19.84	53.81	23.30	1.10	0.63	600	29.40	14.46	3.83
800	15.77	19.81	54.89	22.26	1.11	0.63	800	29.51	14.27	3.90
1000	15.65	19.76	49.30	21.71	1.11	0.62	1000	29.19	14.12	3.87
1200	15.54	19.70	48.24	21.09	1.11	0.62	1200	29.03	14.10	3.97
1400	15.41	19.64	44.88	20.66	1.11	0.62	1400	28.91	14.13	3.97
1600	15.29	19.59	48.97	20.46	1.12	0.61	1600	29.62	14.03	3.96
1800	15.16	19.53	46.57	19.98	1.12	0.61	1800	28.97	14.11	4.00
2000	15.03	19.47	52.45	19.84	1.12	0.60	2000	28.71	14.00	4.02
2200	14.89	19.39	61.92	19.70	1.13	0.60	2200	28.50	13.86	4.00
2400	14.76	19.32	47.51	19.59	1.13	0.59	2400	28.11	13.71	3.98
2600	14.61	19.25	40.28	19.70	1.14	0.59	2600	27.65	13.80	3.99
2800	14.46	19.16	37.92	19.56	1.14	0.58	2800	27.41	13.82	4.03
3000	14.32	19.06	34.31	19.60	1.14	0.58	3000	27.36	13.90	4.01
3500	13.94	18.83	28.49	20.36	1.15	0.57	3200	27.11	13.93	4.02
4000	13.52	18.61	25.65	21.03	1.16	0.55	3400	26.72	13.79	3.95
4500	13.10	18.32	25.01	20.96	1.17	0.54	3600	26.28	13.83	3.97
5000	12.68	18.05	25.88	20.22	1.18	0.53	3800	25.88	13.83	4.03
5500	12.23	17.81	30.55	18.41	1.20	0.52	4000	25.76	13.95	4.05
6000	11.81	17.54	30.99	16.68	1.21	0.52	4200	25.51	13.92	4.08
6500	11.46	17.28	25.16	15.40	1.21	0.52	4400	25.42	13.90	4.03
7000	11.08	17.01	21.45	14.44	1.21	0.52	4600	24.99	13.95	4.14
7500	10.77	16.74	19.14	14.06	1.21	0.52	4800	24.66	13.73	4.15
8000	10.50	16.52	17.79	13.68	1.21	0.52	5000	24.36	13.60	4.19
8500	10.10	16.27	15.30	12.54	1.21	0.53	5200	24.30	13.52	4.18
9000	9.61	16.15	12.96	11.13	1.22	0.53	5400	24.35	13.47	4.13
10000	8.24	15.96	9.22	8.45	1.24	0.53	5600	23.92	13.10	4.19
11000	6.55	15.91	7.04	6.99	1.29	0.53	5800	23.44	13.02	4.15
12000	4.85	15.70	5.77	6.10	1.32	0.52	6000	22.98	12.89	4.11
13000	3.39	15.72	4.79	5.28	1.32	0.52	6200	22.77	12.78	4.27
14000	1.74	16.03	4.00	4.42	1.31	0.52	6400	22.66	12.55	4.37
15000	0.36	16.45	3.71	4.26	1.36	0.48	6600	22.67	12.58	4.41
16000	0.13	16.21	4.46	4.92	1.45	0.37	6800	22.45	12.50	4.44
17000	0.60	15.09	6.22	6.51	1.57	0.23	7000	21.89	12.34	4.41
18000	1.14	13.84	6.91	8.97	1.54	0.21	7200	21.53	12.00	4.47
19000	1.14	13.92	6.13	8.63	1.49	0.25	7600	21.20	11.93	4.63
20000	0.60	16.68	5.71	7.10	1.90	0.25	8000	20.52	10.95	4.65

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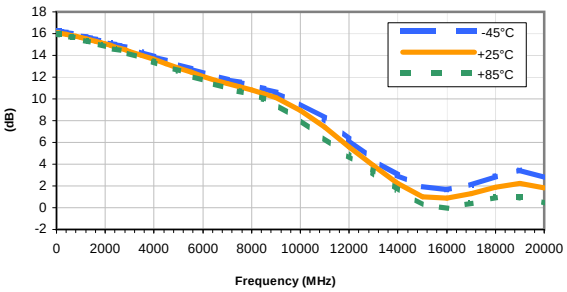
Typical Performance Curves

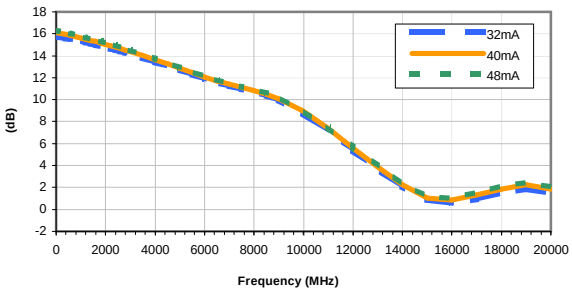
GAIN vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



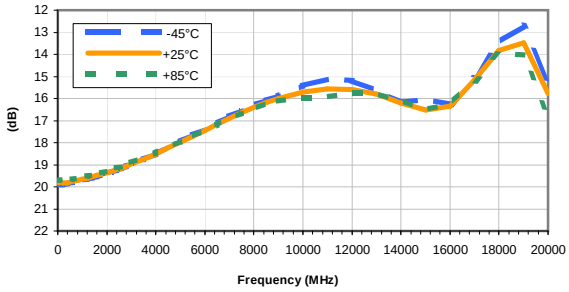
GAIN vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



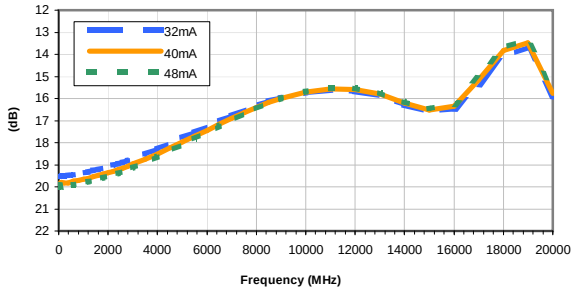
ISOLATION vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



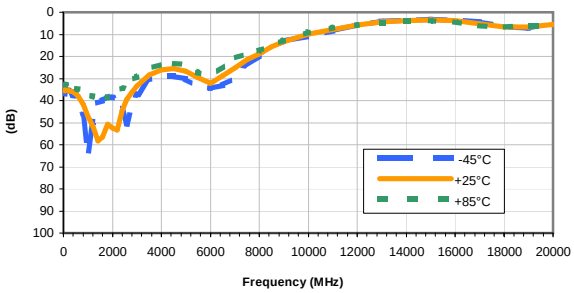
ISOLATION vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



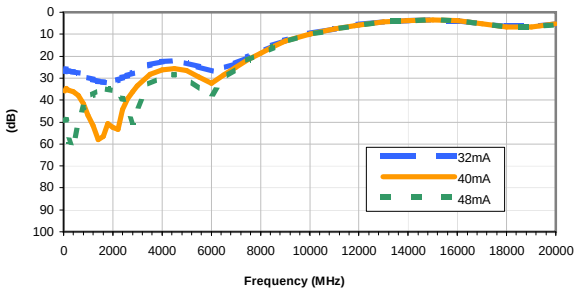
INPUT RETURN LOSS vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



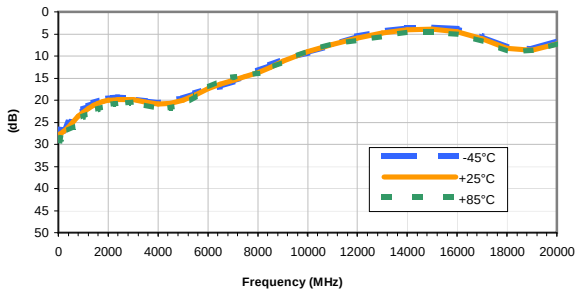
INPUT RETURN LOSS vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



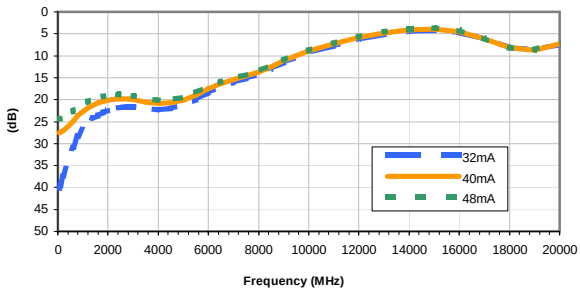
OUTPUT RETURN LOSS vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



OUTPUT RETURN LOSS vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



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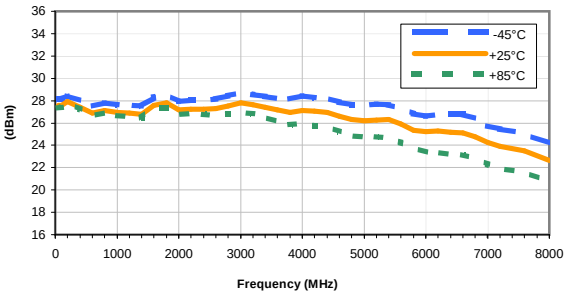
Typical Performance Curves

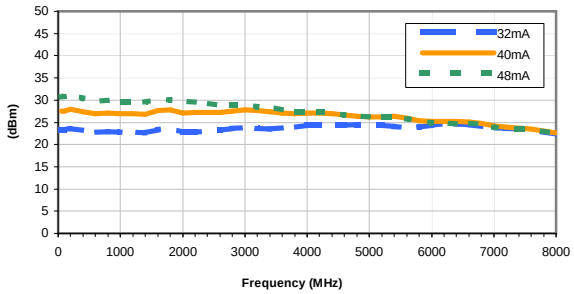
OUTPUT IP3 vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



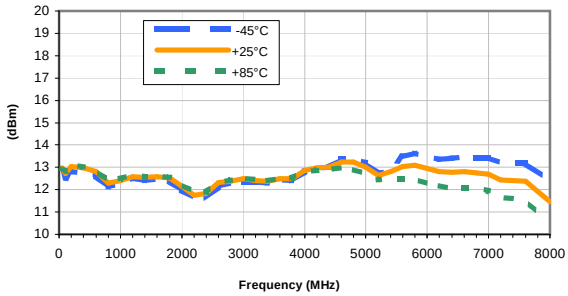
OUTPUT IP-3 vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



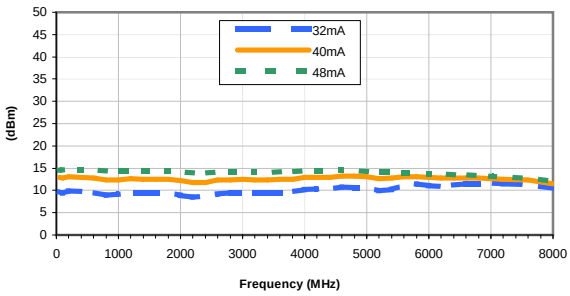
OUTPUT POWER at 1dB Compression vs. TEMPERATURE

CURRENT = 40mA



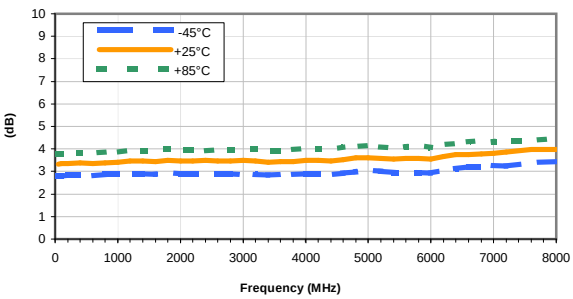
OUTPUT POWER at 1dB Compression vs. CURRENT

Temperature = +25°C



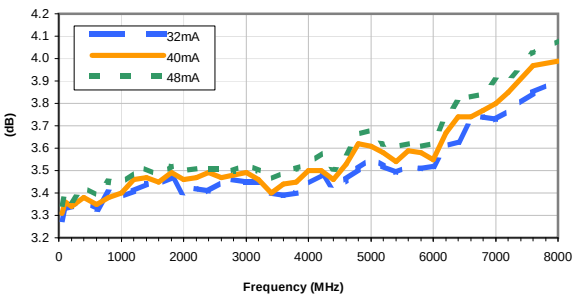
Noise Figure vs. TEMPERATURE

CURRENT = 40mA



Noise Figure vs. CURRENT

Temperature = +25°C



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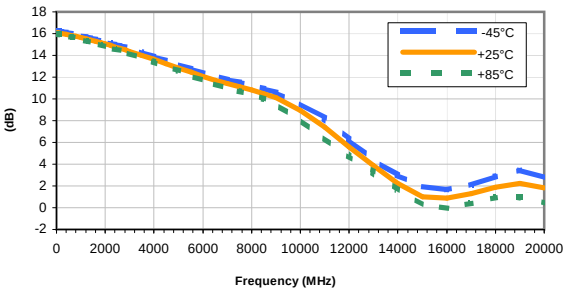
MMIC Amplifier LEE-29+

Typical Performance Curves

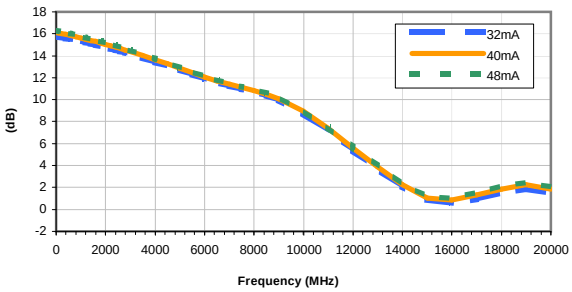
GAIN vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



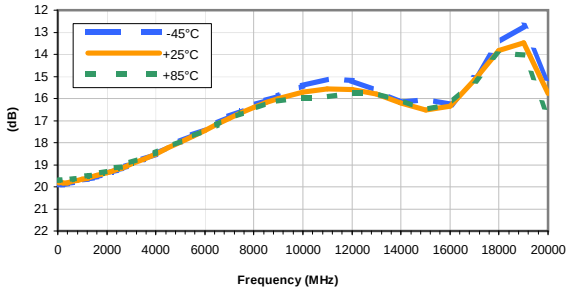
GAIN vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



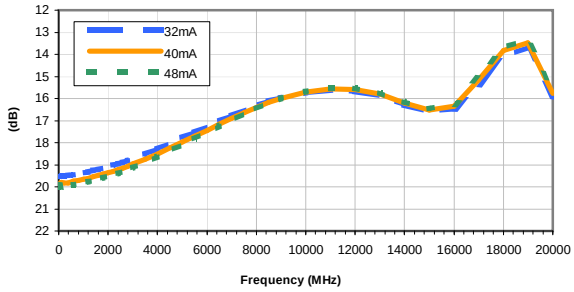
ISOLATION vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



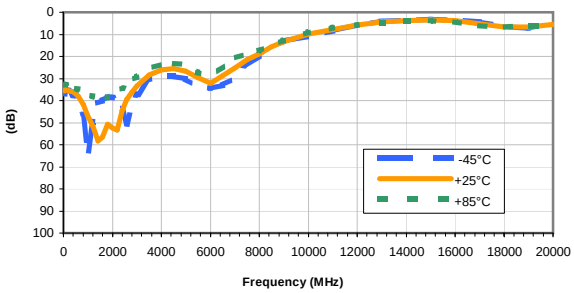
ISOLATION vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



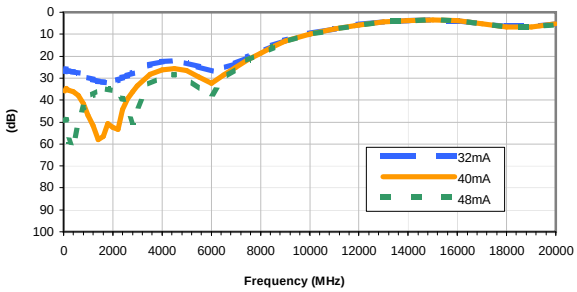
INPUT RETURN LOSS vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



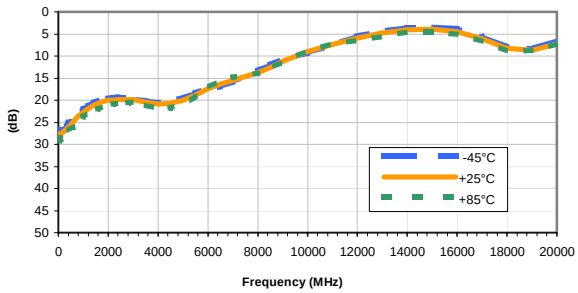
INPUT RETURN LOSS vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



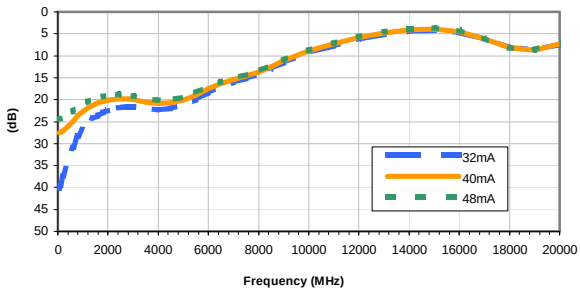
OUTPUT RETURN LOSS vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



OUTPUT RETURN LOSS vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



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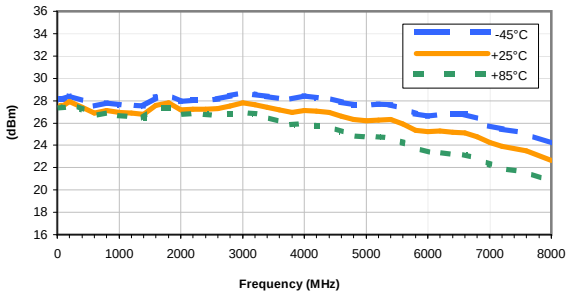
Typical Performance Curves

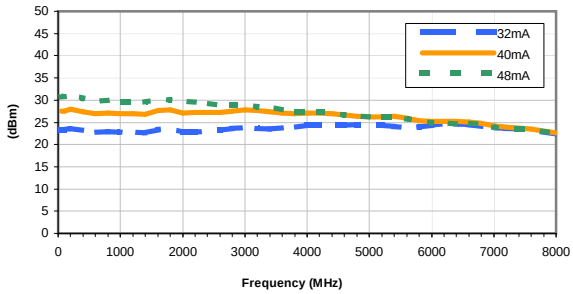
OUTPUT IP3 vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



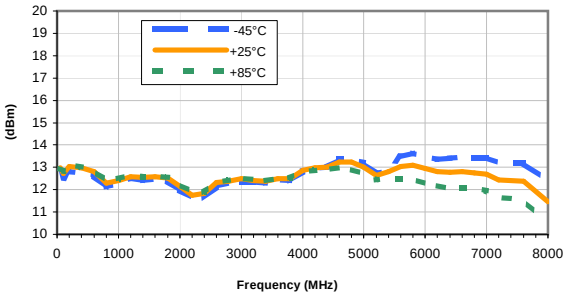
OUTPUT IP-3 vs. CURRENT

INPUT POWER = -20dBm, Temperature = +25°C



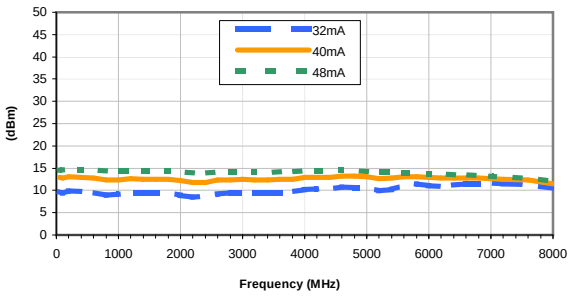
OUTPUT POWER at 1dB Compression vs. TEMPERATURE

CURRENT = 40mA



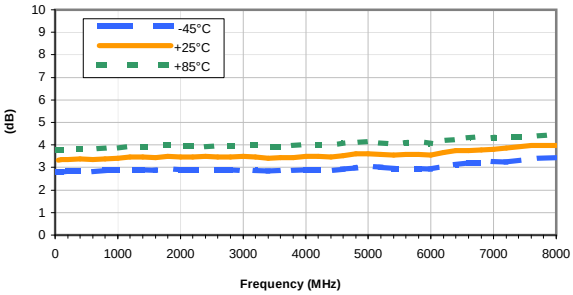
OUTPUT POWER at 1dB Compression vs. CURRENT

Temperature = +25°C



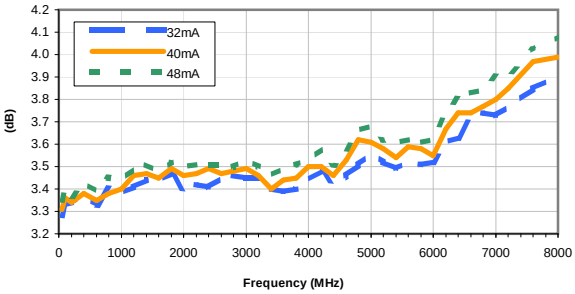
Noise Figure vs. TEMPERATURE

CURRENT = 40mA



Noise Figure vs. CURRENT

Temperature = +25°C



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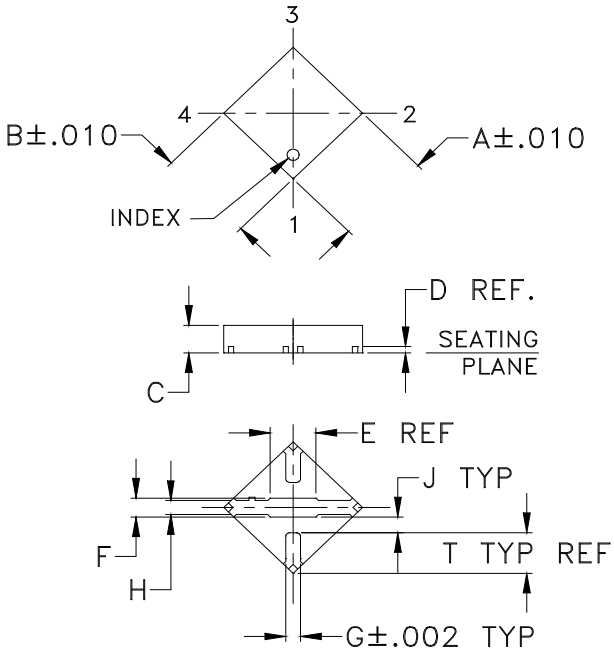
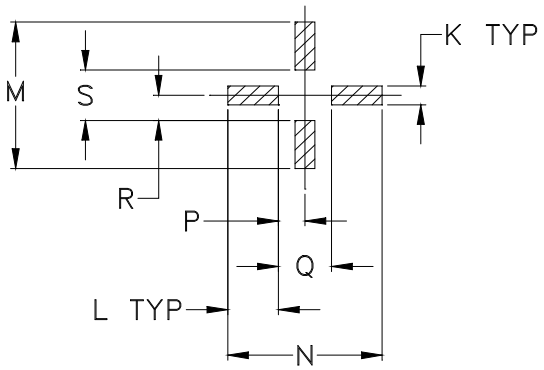
Case Style FG

FG873

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N	P
FG873	.118 (3.00)	.118 (3.00)	.035 (0.89)	.008 (0.20)	.07 (1.78)	.024 (0.60)	.017 (0.43)	.018 (0.46)	.021 (0.52)	.024 (0.61)	.061 (1.55)	.186 (4.72)	.186 (4.72)	.032 (0.81)

CASE #	Q	R	S	T	WT. GRAM
FG873	.064 (1.63)	.032 (0.81)	.064 (1.63)	.050 (1.27)	.02

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3Pl. ± .004

Notes:

1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin per Data Sheet. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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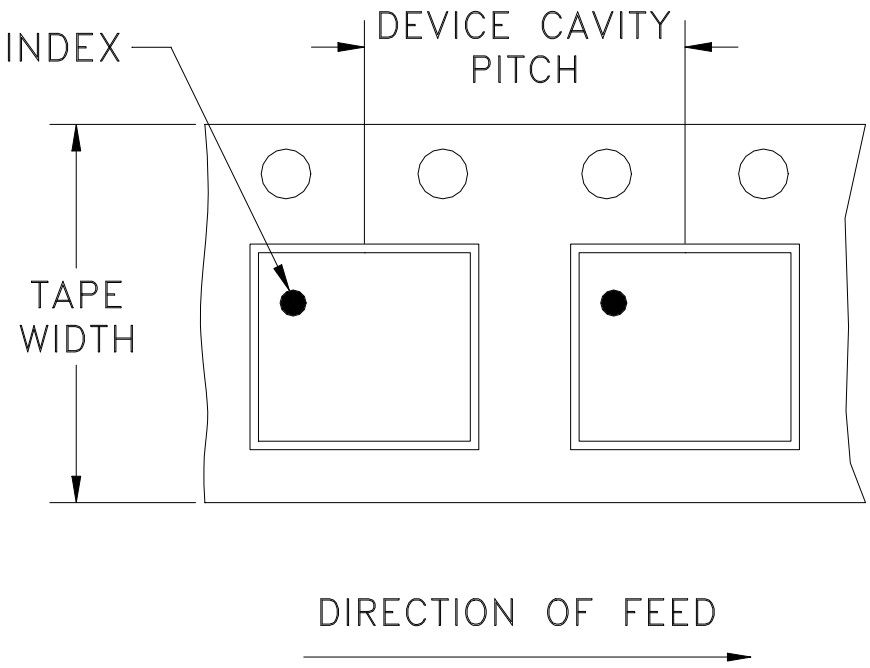
Tape & Reel Packaging TR-F68

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
12	8	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000
		13	Standard	2000
				3000
				4000

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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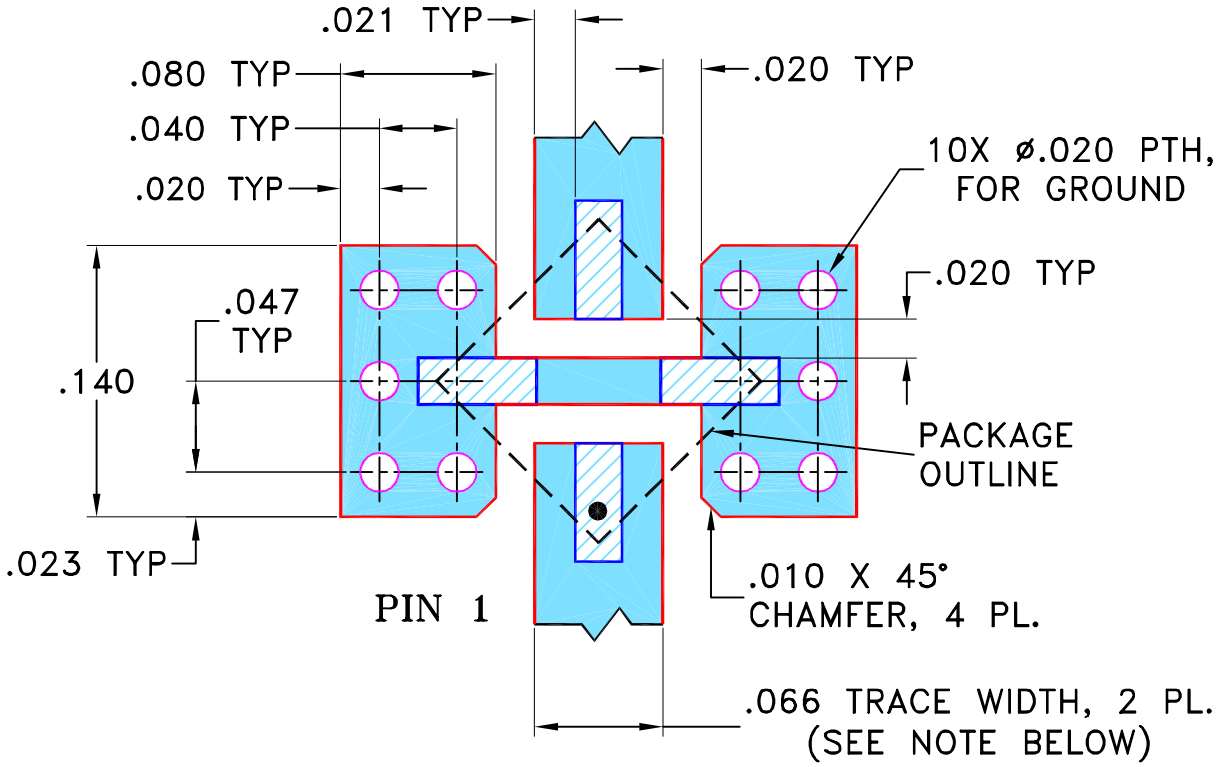
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M108436	NEW RELEASE	11/14/06	PW	IG

SUGGESTED MOUNTING CONFIGURATION FOR FG873 CASE STYLE, "cb" PIN CONNECTION



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	PW	11/11/06
TOLERANCES ON:	CHECKED	IL	11/14/06
2 PL DECIMALS ±	APPROVED	IG	11/14/06
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

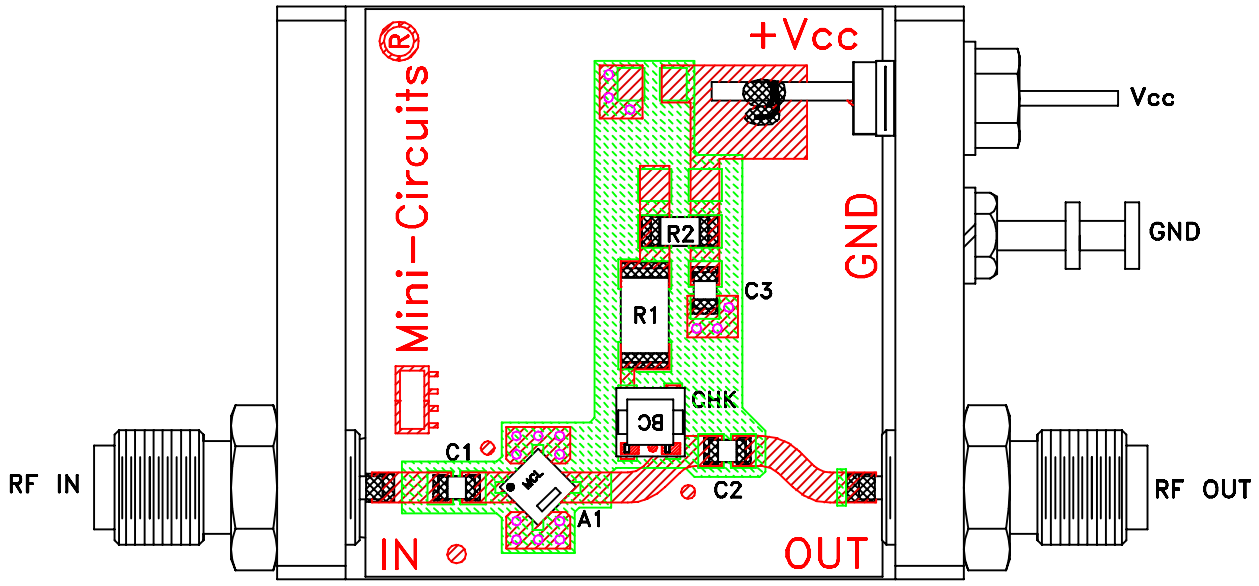
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, cb, FG873, LEE, TB-413-XX+

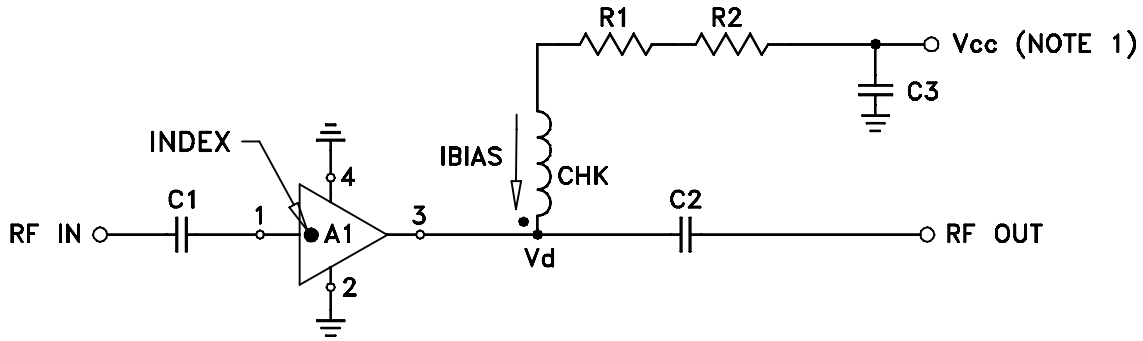
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-252	OR

FILE:	SCALE:	SHEET:
98PL252	10:1	1 OF 1

Evaluation Board and Circuit



TB-413-29+



COMPONENT	VALUE
A1	LEE-29(+)
C1 (NOTE 4)	2400 pF
C2 (NOTE 4)	2400 pF
C3 (bypass)	0.1 uF
R1	210 Ohms, 0.75W
R2	0 Ohm, 0.25W
CHK	Mini-Circuits TCCH-80+

Schematic Diagram

NOTES:

1. Vcc voltage: +12±0.2V.
2. SMA Female connectors.
3. PCB material: Rogers RO4350 or equivalent, dielectric constant=3.5, dielectric thickness=.030 inch.
4. Capacitors, C1 & C2 should be free of resonance up to the highest frequency specified.

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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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Specification	Test/Inspection Condition	Reference/Spec
	monoethanolamine at 63°C to 70°C	

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