

Surface Mount

# Monolithic Amplifier

DC-8 GHz

## Product Features

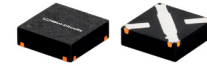
- DC-8 GHz
- Output power, 10.2 dBm typ.
- Internally Matched to 50 Ohms
- Excellent package for heat dissipation, exposed metal bottom
- Flat output power to 10 GHz
- Aqueous washable
- Protected by US Patent 6,943,629

## Typical Applications

- Cellular
- PCS
- Communication receivers & transmitters
- Satellite communication, military

## General Description

LEE-19+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in a 3X3mm MCLP molded plastic package. Expected MTBF is 3,000 years at 85°C case temperature.



Generic photo used for illustration purposes only

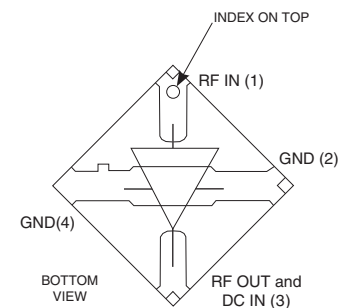
## LEE-19+

CASE STYLE: FG873

**+RoHS Compliant**

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

## 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.

### Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



## Electrical Specifications at 25°C and 40mA, unless noted

Parameter		Min.	Typ.	Max.	Units
Frequency Range*		DC		8	GHz
Gain	f=0.1 GHz	—	12.1	—	dB
	f=1 GHz	—	12.0	—	
	f=2 GHz	9.6	12.1	—	
	f=4 GHz	—	12.0	—	
	f=5 GHz	—	11.6	—	
	f=8 GHz	—	10.6	—	
	f=10 GHz	—	9.0	—	
Input Return Loss	f= DC to 3 GHz		14		dB
	f= 3 to 8 GHz		21		
Output Return Loss	f= DC to 3 GHz		15.5		dB
	f= 3 to 8 GHz		11		
Output Power @ 1 dB compression	f= 2 GHz	10.2	12.0	—	dBm
	f= 8 GHz	11.3	12.6	—	
Output IP3			24.5		dBm
Noise Figure			6.5		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			-2.5		mV/°C
Device Voltage Variation vs. Current at 25°C			10.0		mV/mA
Thermal Resistance, junction-to-case <sup>1</sup>			122		°C/W

\*Guaranteed specification DC-8 GHz. Low frequency cut off determined by external coupling capacitors.

## Absolute Maximum Ratings

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

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

These ratings are not intended for continuous normal operation.

<sup>1</sup>Case is defined as ground leads.

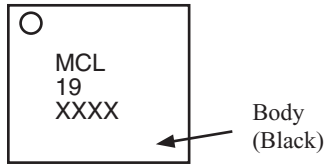
\*Based on typical case temperature rise 5°C above ambient.

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Product Marking



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

Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Performance data, graphs, s-parameter data set (.zip file)

Case Style: FG873

Plastic package, exposed paddle, lead finish: matte-tin

Tape & Reel: F68

7" Reels with 20, 50, 100, 200, 500, 1K devices

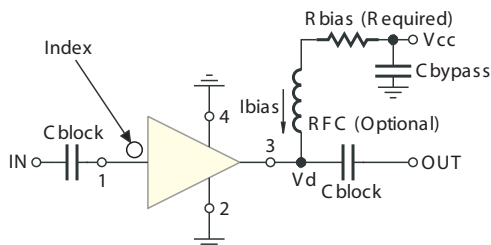
13" Reels with 2K, 3K, 4K devices

Suggested Layout for PCB Design: PL-252

Evaluation Board: TB-413-19+

Environmental Ratings: ENV08T2

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	309
17	332
18	357
19	383
20	412

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**ESD Rating**

Human Body Model (HBM): Class 1A (250v to < 500v) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (< 100v) in accordance with ANSI/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**



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## 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 = 3.64V @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	12.55	17.21	27.42	42.62	1.15	0.58	50	27.48	12.15	4.06
100	12.55	17.24	27.60	41.22	1.15	0.58	100	27.69	11.80	4.10
200	12.52	17.24	27.55	40.05	1.15	0.58	200	27.99	12.31	4.10
400	12.46	17.23	27.42	36.13	1.15	0.58	400	27.33	12.12	4.16
600	12.42	17.21	27.66	32.89	1.15	0.58	600	26.73	11.98	4.10
800	12.35	17.20	28.20	31.02	1.16	0.57	800	26.95	11.76	4.16
1000	12.29	17.19	28.71	29.50	1.16	0.57	1000	26.78	11.60	4.16
1200	12.24	17.18	28.87	28.00	1.16	0.57	1200	26.69	11.78	4.18
1400	12.17	17.16	29.24	27.47	1.17	0.56	1400	26.62	11.97	4.20
1600	12.11	17.14	29.51	26.42	1.17	0.56	1600	27.68	11.90	4.15
1800	12.04	17.11	29.44	25.81	1.17	0.56	1800	27.85	11.93	4.20
2000	11.99	17.08	29.54	25.52	1.17	0.56	2000	27.55	11.98	4.18
2200	11.92	17.06	29.11	25.22	1.18	0.55	2200	27.53	11.67	4.14
2400	11.86	17.02	28.43	25.18	1.18	0.55	2400	27.55	11.15	4.18
2600	11.80	17.01	27.88	25.15	1.18	0.55	2600	27.71	11.16	4.20
2800	11.72	16.96	27.22	25.15	1.18	0.55	2800	27.88	11.34	4.17
3000	11.65	16.92	26.24	25.53	1.18	0.54	3000	28.23	11.58	4.20
3500	11.47	16.82	24.07	26.79	1.19	0.54	3200	27.88	11.53	4.19
4000	11.27	16.69	22.75	29.35	1.19	0.53	3400	27.95	11.59	4.14
4500	11.07	16.54	22.35	32.32	1.20	0.53	3600	27.82	11.65	4.15
5000	10.85	16.40	22.95	30.56	1.20	0.53	3800	27.59	11.57	4.17
5500	10.62	16.23	24.70	24.95	1.21	0.52	4000	27.73	11.48	4.19
6000	10.37	16.05	26.03	21.16	1.21	0.52	4200	27.82	11.44	4.22
6500	10.13	15.93	25.07	18.74	1.22	0.51	4400	27.67	11.58	4.19
7000	9.89	15.77	23.63	16.59	1.22	0.51	4600	27.44	11.90	4.21
7500	9.71	15.61	22.08	15.03	1.21	0.52	4800	27.05	12.42	4.28
8000	9.52	15.47	20.07	13.52	1.21	0.52	5000	27.03	12.52	4.31
8500	9.29	15.37	17.60	11.85	1.20	0.53	5200	27.05	12.66	4.22
9000	8.99	15.27	15.15	10.28	1.20	0.54	5400	26.98	12.73	4.23
10000	8.10	15.27	11.29	7.73	1.20	0.55	5600	26.52	12.41	4.17
11000	6.86	15.30	8.76	6.21	1.23	0.55	5800	26.04	12.69	4.22
12000	5.44	15.32	6.91	5.34	1.26	0.55	6000	25.72	12.79	4.29
13000	4.08	15.29	5.70	4.74	1.27	0.55	6200	25.66	12.95	4.31
14000	2.66	15.56	4.73	4.12	1.25	0.54	6400	25.60	12.96	4.32
15000	1.58	15.94	4.18	4.07	1.24	0.50	6600	25.43	13.17	4.36
16000	1.37	15.68	4.40	4.77	1.23	0.41	6800	24.95	13.22	4.43
17000	1.64	14.93	5.18	6.75	1.32	0.29	7000	24.52	13.17	4.41
18000	1.96	14.00	5.96	9.46	1.38	0.24	7200	24.06	12.89	4.38
19000	1.90	13.63	5.62	9.29	1.33	0.29	7600	23.70	12.64	4.50
20000	1.44	14.77	4.72	7.47	1.34	0.30	8000	22.79	12.48	4.51

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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 = 3.56V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
					K	Delta				
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	12.25	17.03	23.86	34.79	1.15	0.58	50	23.00	8.63	4.07
100	12.24	16.98	24.08	36.85	1.15	0.58	100	23.04	8.23	4.08
200	12.22	17.01	24.08	36.33	1.15	0.58	200	23.33	8.81	4.11
400	12.17	17.03	24.00	35.68	1.16	0.57	400	22.86	8.55	4.12
600	12.11	17.01	24.20	34.05	1.16	0.57	600	22.36	8.39	4.11
800	12.06	17.00	24.61	32.75	1.16	0.57	800	22.53	8.03	4.13
1000	11.99	16.98	24.98	31.84	1.17	0.56	1000	22.36	7.97	4.16
1200	11.94	16.98	25.21	29.96	1.17	0.56	1200	22.24	8.20	4.18
1400	11.88	16.94	25.43	29.38	1.17	0.56	1400	22.16	8.60	4.20
1600	11.83	16.93	25.66	28.30	1.17	0.56	1600	22.87	8.49	4.16
1800	11.76	16.90	25.71	27.21	1.18	0.55	1800	23.18	8.47	4.19
2000	11.72	16.87	25.62	26.82	1.18	0.55	2000	22.88	8.58	4.17
2200	11.66	16.84	25.29	26.25	1.18	0.55	2200	22.87	8.10	4.13
2400	11.60	16.82	24.83	25.89	1.18	0.55	2400	22.97	7.53	4.18
2600	11.53	16.79	24.42	25.67	1.18	0.55	2600	23.22	7.55	4.19
2800	11.47	16.75	23.97	25.44	1.18	0.54	2800	23.48	7.93	4.15
3000	11.41	16.71	23.19	25.57	1.18	0.54	3000	23.57	8.13	4.20
3500	11.23	16.62	21.62	26.38	1.19	0.54	3200	23.31	8.16	4.16
4000	11.05	16.49	20.63	28.55	1.19	0.53	3400	23.29	8.28	4.12
4500	10.87	16.34	20.29	32.91	1.19	0.53	3600	23.44	8.35	4.08
5000	10.66	16.20	20.78	35.50	1.20	0.53	3800	23.68	8.19	4.17
5500	10.45	16.04	22.06	27.35	1.20	0.52	4000	24.01	8.10	4.18
6000	10.21	15.87	23.14	22.49	1.21	0.52	4200	24.01	8.11	4.18
6500	10.00	15.74	22.68	19.64	1.21	0.52	4400	24.12	8.22	4.16
7000	9.77	15.58	21.92	17.24	1.21	0.51	4600	24.14	8.63	4.15
7500	9.59	15.44	20.85	15.54	1.21	0.52	4800	24.37	9.27	4.19
8000	9.41	15.32	19.36	13.89	1.20	0.52	5000	24.38	9.31	4.22
8500	9.19	15.23	17.24	12.15	1.20	0.53	5200	24.17	9.49	4.19
9000	8.88	15.16	14.99	10.53	1.20	0.53	5400	23.87	9.58	4.20
10000	7.98	15.19	11.25	7.95	1.21	0.54	5600	23.97	9.10	4.15
11000	6.74	15.25	8.77	6.45	1.24	0.54	5800	24.13	9.69	4.16
12000	5.33	15.32	6.92	5.60	1.28	0.54	6000	24.64	9.91	4.17
13000	3.97	15.31	5.70	5.02	1.29	0.53	6200	25.20	10.38	4.22
14000	2.55	15.59	4.74	4.40	1.27	0.52	6400	25.13	10.61	4.26
15000	1.43	15.98	4.19	4.39	1.27	0.47	6600	24.77	11.30	4.31
16000	1.14	15.76	4.38	5.11	1.26	0.38	6800	24.41	11.49	4.37
17000	1.28	15.08	5.06	7.07	1.36	0.25	7000	24.29	11.43	4.35
18000	1.56	14.22	5.76	9.71	1.43	0.20	7200	24.02	11.01	4.32
19000	1.54	13.84	5.44	9.56	1.37	0.25	7600	23.72	11.13	4.40
20000	1.08	14.96	4.60	7.72	1.38	0.27	8000	22.63	11.31	4.48

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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 = 3.72V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
					K	Delta				
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	12.71	17.32	30.06	33.89	1.14	0.59	50	30.86	14.30	4.11
100	12.70	17.32	29.91	33.11	1.14	0.59	100	31.02	14.15	4.16
200	12.68	17.35	30.14	33.04	1.15	0.58	200	31.38	14.28	4.13
400	12.62	17.34	30.00	31.74	1.15	0.58	400	30.57	14.26	4.18
600	12.57	17.33	30.14	29.88	1.15	0.58	600	29.80	14.21	4.13
800	12.50	17.33	30.84	28.59	1.16	0.57	800	30.03	14.07	4.22
1000	12.44	17.31	31.38	27.43	1.16	0.57	1000	29.80	13.87	4.22
1200	12.38	17.29	31.43	26.34	1.16	0.57	1200	29.81	13.92	4.22
1400	12.31	17.27	31.93	25.90	1.16	0.56	1400	29.71	14.05	4.23
1600	12.25	17.25	32.10	25.07	1.17	0.56	1600	31.34	13.94	4.21
1800	12.19	17.22	31.92	24.67	1.17	0.56	1800	30.72	13.98	4.22
2000	12.13	17.19	32.20	24.47	1.17	0.56	2000	30.48	14.06	4.22
2200	12.05	17.17	31.81	24.29	1.17	0.55	2200	30.37	13.90	4.18
2400	11.99	17.14	30.98	24.40	1.18	0.55	2400	30.31	13.56	4.21
2600	11.92	17.11	30.38	24.44	1.18	0.55	2600	30.13	13.45	4.23
2800	11.85	17.07	29.56	24.55	1.18	0.55	2800	30.26	13.52	4.22
3000	11.78	17.02	28.39	25.00	1.18	0.55	3000	30.57	13.65	4.22
3500	11.58	16.92	25.72	26.51	1.19	0.54	3200	29.99	13.65	4.21
4000	11.38	16.80	24.12	29.05	1.19	0.53	3400	30.15	13.63	4.21
4500	11.17	16.65	23.60	31.10	1.20	0.53	3600	29.47	13.66	4.21
5000	10.94	16.50	24.35	28.86	1.21	0.53	3800	29.06	13.65	4.25
5500	10.70	16.34	26.51	24.05	1.21	0.52	4000	29.05	13.65	4.27
6000	10.44	16.16	28.06	20.60	1.21	0.52	4200	28.89	13.68	4.27
6500	10.20	16.03	26.54	18.31	1.22	0.51	4400	28.90	13.71	4.23
7000	9.96	15.86	24.52	16.29	1.22	0.51	4600	28.30	13.99	4.26
7500	9.77	15.70	22.62	14.82	1.21	0.52	4800	27.85	14.34	4.34
8000	9.58	15.55	20.34	13.36	1.21	0.52	5000	27.58	14.38	4.34
8500	9.35	15.44	17.73	11.74	1.20	0.53	5200	27.64	14.37	4.29
9000	9.04	15.35	15.20	10.19	1.20	0.54	5400	27.49	14.30	4.28
10000	8.16	15.32	11.31	7.66	1.20	0.55	5600	27.10	14.20	4.24
11000	6.92	15.33	8.76	6.11	1.23	0.56	5800	26.58	14.27	4.27
12000	5.50	15.33	6.91	5.21	1.25	0.56	6000	25.99	14.26	4.32
13000	4.14	15.27	5.70	4.61	1.26	0.56	6200	25.42	14.19	4.36
14000	2.73	15.54	4.72	3.98	1.24	0.55	6400	25.35	14.06	4.43
15000	1.65	15.93	4.17	3.90	1.23	0.52	6600	25.37	14.16	4.45
16000	1.49	15.65	4.41	4.55	1.21	0.43	6800	25.14	14.10	4.47
17000	1.82	14.85	5.24	6.49	1.29	0.32	7000	24.49	13.98	4.48
18000	2.18	13.87	6.07	9.19	1.35	0.26	7200	23.89	13.71	4.43
19000	2.09	13.51	5.72	9.06	1.31	0.31	7600	23.60	13.32	4.57
20000	1.62	14.66	4.81	7.28	1.31	0.32	8000	22.78	13.03	4.59

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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 = 4.03V @Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
					K	Delta				
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	12.66	17.23	27.43	40.98	1.14	0.59	50	27.99	12.06	3.49
100	12.67	17.26	27.35	40.71	1.14	0.59	100	28.12	11.62	3.46
200	12.64	17.25	26.90	41.23	1.14	0.59	200	28.47	12.16	3.53
400	12.60	17.25	27.44	35.39	1.14	0.58	400	27.88	11.99	3.52
600	12.56	17.23	27.59	32.58	1.15	0.58	600	27.33	11.87	3.50
800	12.50	17.22	28.41	30.53	1.15	0.58	800	27.65	11.65	3.51
1000	12.45	17.21	29.15	28.84	1.15	0.58	1000	27.48	11.55	3.52
1200	12.39	17.18	29.74	27.40	1.15	0.58	1200	27.42	11.59	3.59
1400	12.33	17.15	30.57	26.49	1.15	0.57	1400	27.35	11.94	3.58
1600	12.28	17.13	30.45	25.78	1.16	0.57	1600	28.40	11.79	3.55
1800	12.22	17.09	30.83	25.15	1.16	0.57	1800	28.58	11.86	3.55
2000	12.17	17.07	32.15	24.75	1.16	0.57	2000	28.34	11.94	3.51
2200	12.11	17.04	31.04	24.69	1.16	0.57	2200	28.23	11.61	3.53
2400	12.05	17.00	30.17	24.45	1.16	0.57	2400	28.28	11.12	3.59
2600	11.99	16.98	29.91	24.60	1.16	0.56	2600	28.54	11.02	3.58
2800	11.93	16.92	28.91	24.92	1.16	0.56	2800	28.77	11.25	3.53
3000	11.86	16.87	27.40	25.30	1.17	0.56	3000	28.99	11.50	3.52
3500	11.67	16.78	24.92	26.78	1.17	0.55	3200	28.78	11.48	3.50
4000	11.49	16.63	23.76	28.89	1.17	0.55	3400	28.79	11.50	3.49
4500	11.32	16.46	23.30	31.31	1.17	0.55	3600	28.78	11.62	3.49
5000	11.09	16.32	24.52	29.54	1.18	0.55	3800	28.79	11.51	3.54
5500	10.85	16.15	26.18	24.46	1.18	0.54	4000	29.08	11.41	3.54
6000	10.65	15.97	25.89	21.38	1.18	0.54	4200	29.04	11.41	3.53
6500	10.33	15.79	25.39	18.37	1.19	0.54	4400	29.00	11.45	3.51
7000	10.17	15.67	24.97	16.48	1.19	0.54	4600	28.97	11.83	3.49
7500	10.06	15.55	23.99	14.84	1.18	0.54	4800	28.97	12.35	3.61
8000	9.83	15.38	20.58	12.97	1.17	0.55	5000	28.85	12.43	3.65
8500	9.63	15.26	17.41	11.35	1.17	0.56	5200	28.78	12.59	3.58
9000	9.39	15.15	14.93	10.04	1.16	0.57	5400	28.60	12.72	3.57
10000	8.66	15.03	11.90	7.91	1.16	0.58	5600	28.53	12.43	3.49
11000	7.56	14.90	9.54	6.34	1.16	0.59	5800	28.24	12.86	3.53
12000	6.06	15.07	6.81	5.05	1.18	0.60	6000	28.27	12.95	3.54
13000	4.57	15.13	5.36	4.33	1.19	0.60	6200	28.47	13.17	3.61
14000	3.31	15.49	4.45	3.67	1.15	0.59	6400	28.57	13.28	3.67
15000	2.25	15.87	3.88	3.47	1.13	0.57	6600	28.60	13.62	3.70
16000	1.91	15.51	3.86	3.86	1.06	0.52	6800	27.93	13.73	3.78
17000	2.29	14.92	4.38	5.72	1.09	0.37	7000	27.18	13.76	3.78
18000	2.93	13.62	5.51	9.19	1.15	0.27	7200	26.96	13.45	3.75
19000	3.17	12.82	5.82	9.62	1.14	0.35	7600	26.63	13.32	3.86
20000	2.54	14.04	4.26	6.96	1.09	0.39	8000	25.62	13.34	3.91

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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 = 3.93V @Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
					K	Delta				
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	12.39	17.13	24.37	38.43	1.15	0.58	50	23.10	8.23	3.44
100	12.40	17.06	24.22	38.00	1.15	0.59	100	23.16	7.87	3.43
200	12.37	17.08	23.98	36.93	1.15	0.58	200	23.40	8.44	3.49
400	12.33	17.07	24.33	37.44	1.15	0.58	400	23.00	8.21	3.51
600	12.29	17.05	24.49	34.71	1.15	0.58	600	22.54	8.10	3.48
800	12.23	17.04	25.11	33.46	1.15	0.58	800	22.71	7.91	3.51
1000	12.18	17.02	25.75	31.71	1.16	0.57	1000	22.55	7.72	3.52
1200	12.14	17.00	26.26	29.92	1.16	0.57	1200	22.45	7.83	3.57
1400	12.08	16.97	26.80	28.81	1.16	0.57	1400	22.38	8.29	3.52
1600	12.03	16.95	26.82	27.80	1.16	0.57	1600	23.07	8.06	3.50
1800	11.98	16.92	27.33	26.87	1.16	0.57	1800	23.35	8.21	3.53
2000	11.93	16.88	27.92	26.38	1.16	0.57	2000	23.08	8.27	3.47
2200	11.87	16.85	27.07	26.01	1.16	0.56	2200	23.08	7.92	3.53
2400	11.82	16.81	26.53	25.42	1.16	0.56	2400	23.05	7.40	3.57
2600	11.77	16.80	26.26	25.46	1.17	0.56	2600	23.34	7.33	3.56
2800	11.70	16.73	25.46	25.55	1.17	0.56	2800	23.61	7.65	3.49
3000	11.64	16.69	24.35	25.65	1.17	0.56	3000	23.71	7.88	3.51
3500	11.47	16.60	22.48	26.57	1.17	0.55	3200	23.46	7.96	3.49
4000	11.30	16.46	21.58	28.49	1.17	0.55	3400	23.39	7.97	3.47
4500	11.15	16.29	21.23	32.07	1.17	0.55	3600	23.65	8.06	3.49
5000	10.93	16.15	22.13	33.51	1.18	0.55	3800	23.85	7.96	3.51
5500	10.71	15.97	23.33	26.54	1.18	0.54	4000	24.17	7.88	3.48
6000	10.52	15.80	23.29	22.62	1.18	0.54	4200	24.17	7.78	3.52
6500	10.19	15.63	23.16	19.07	1.19	0.54	4400	24.20	7.93	3.43
7000	10.05	15.50	22.99	16.98	1.18	0.54	4600	24.37	8.31	3.46
7500	9.96	15.40	22.61	15.24	1.18	0.54	4800	24.67	8.93	3.56
8000	9.74	15.24	20.27	13.25	1.17	0.55	5000	24.70	9.06	3.63
8500	9.53	15.13	17.34	11.57	1.16	0.56	5200	24.32	9.15	3.55
9000	9.30	15.04	14.90	10.23	1.16	0.57	5400	23.89	9.26	3.53
10000	8.57	14.95	11.85	8.09	1.16	0.58	5600	24.14	8.94	3.45
11000	7.46	14.85	9.55	6.52	1.17	0.58	5800	24.49	9.39	3.47
12000	5.98	15.04	6.84	5.25	1.19	0.59	6000	25.19	9.48	3.49
13000	4.49	15.14	5.38	4.56	1.20	0.59	6200	25.83	10.15	3.58
14000	3.24	15.52	4.46	3.90	1.16	0.57	6400	25.69	10.40	3.62
15000	2.16	15.91	3.90	3.74	1.14	0.55	6600	25.25	11.17	3.67
16000	1.74	15.58	3.86	4.19	1.08	0.48	6800	25.31	11.43	3.67
17000	1.99	15.04	4.30	6.09	1.11	0.33	7000	25.31	11.63	3.72
18000	2.57	13.84	5.31	9.49	1.18	0.23	7200	25.49	11.07	3.68
19000	2.85	13.01	5.60	10.01	1.16	0.31	7600	25.44	11.25	3.79
20000	2.25	14.21	4.14	7.32	1.10	0.36	8000	24.40	11.79	3.81

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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 = 4.15V @Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
					K	Delta				
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	12.81	17.33	30.02	33.92	1.14	0.59	50	31.55	14.53	3.50
100	12.80	17.36	29.46	34.12	1.14	0.59	100	31.65	14.23	3.53
200	12.78	17.35	29.06	34.39	1.14	0.59	200	32.12	14.51	3.55
400	12.74	17.36	29.61	31.49	1.14	0.59	400	31.20	14.44	3.60
600	12.69	17.34	29.73	29.89	1.14	0.58	600	30.72	14.30	3.52
800	12.63	17.32	30.83	28.32	1.15	0.58	800	31.04	14.11	3.57
1000	12.57	17.31	31.54	27.04	1.15	0.58	1000	30.90	13.95	3.55
1200	12.52	17.28	31.97	25.89	1.15	0.58	1200	30.84	14.03	3.60
1400	12.46	17.26	32.97	25.11	1.15	0.58	1400	30.95	14.21	3.59
1600	12.40	17.23	32.57	24.57	1.15	0.57	1600	32.63	14.12	3.55
1800	12.34	17.20	32.81	24.09	1.16	0.57	1800	32.01	14.19	3.58
2000	12.29	17.18	34.69	23.77	1.16	0.57	2000	31.82	14.27	3.52
2200	12.22	17.14	33.82	23.79	1.16	0.57	2200	31.90	14.00	3.55
2400	12.16	17.10	32.59	23.70	1.16	0.57	2400	32.01	13.58	3.59
2600	12.10	17.08	32.47	23.91	1.16	0.56	2600	31.95	13.48	3.58
2800	12.04	17.03	31.60	24.28	1.16	0.56	2800	32.02	13.68	3.56
3000	11.97	16.97	29.79	24.75	1.17	0.56	3000	32.24	13.81	3.52
3500	11.77	16.88	26.62	26.41	1.17	0.55	3200	32.13	13.78	3.50
4000	11.59	16.73	25.26	28.40	1.18	0.55	3400	32.17	13.80	3.51
4500	11.40	16.56	24.76	30.11	1.18	0.55	3600	31.98	13.85	3.55
5000	11.17	16.44	26.29	28.05	1.18	0.54	3800	31.48	13.84	3.62
5500	10.92	16.25	28.42	23.69	1.19	0.54	4000	31.57	13.79	3.61
6000	10.71	16.07	27.79	20.91	1.19	0.54	4200	31.39	13.75	3.60
6500	10.38	15.88	26.86	18.06	1.19	0.53	4400	31.57	13.80	3.53
7000	10.21	15.76	26.19	16.27	1.19	0.53	4600	31.40	14.07	3.53
7500	10.10	15.64	24.62	14.71	1.18	0.54	4800	30.89	14.52	3.66
8000	9.87	15.46	20.62	12.88	1.18	0.55	5000	30.71	14.62	3.70
8500	9.66	15.34	17.40	11.27	1.17	0.56	5200	30.80	14.73	3.66
9000	9.43	15.22	14.95	9.96	1.16	0.57	5400	30.87	14.75	3.63
10000	8.70	15.09	11.93	7.84	1.16	0.58	5600	30.42	14.60	3.53
11000	7.60	14.93	9.53	6.25	1.16	0.59	5800	29.74	14.81	3.59
12000	6.10	15.09	6.81	4.94	1.18	0.61	6000	29.21	14.81	3.61
13000	4.61	15.14	5.38	4.19	1.18	0.61	6200	29.13	14.79	3.67
14000	3.33	15.51	4.45	3.52	1.15	0.61	6400	29.02	14.72	3.76
15000	2.29	15.87	3.87	3.29	1.12	0.59	6600	29.51	14.84	3.80
16000	1.99	15.51	3.87	3.64	1.06	0.54	6800	28.94	14.83	3.81
17000	2.47	14.87	4.45	5.40	1.08	0.40	7000	28.37	14.77	3.85
18000	3.15	13.47	5.66	8.83	1.13	0.31	7200	27.64	14.53	3.82
19000	3.35	12.70	5.95	9.24	1.12	0.37	7600	27.09	14.24	3.94
20000	2.72	13.94	4.38	6.67	1.08	0.42	8000	26.18	14.06	3.97

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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 = 3.72V @Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
					K	Delta				
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	12.44	17.15	26.89	46.64	1.15	0.58	50	27.18	12.25	4.59
100	12.44	17.17	27.33	42.47	1.15	0.58	100	27.30	12.02	4.62
200	12.40	17.16	28.05	39.60	1.15	0.58	200	27.70	12.52	4.61
400	12.34	17.18	27.38	36.92	1.16	0.57	400	26.89	12.32	4.66
600	12.29	17.17	27.59	33.65	1.16	0.57	600	26.31	12.16	4.60
800	12.22	17.16	27.99	31.47	1.16	0.57	800	26.49	11.92	4.69
1000	12.16	17.14	28.43	29.84	1.17	0.56	1000	26.33	11.74	4.65
1200	12.10	17.14	28.57	28.11	1.17	0.56	1200	26.23	11.95	4.71
1400	12.04	17.11	28.72	27.44	1.17	0.56	1400	26.15	12.15	4.75
1600	11.97	17.10	28.95	26.39	1.18	0.55	1600	27.38	12.02	4.71
1800	11.90	17.08	28.73	25.70	1.18	0.55	1800	27.31	12.09	4.76
2000	11.85	17.04	28.70	25.34	1.18	0.55	2000	27.07	12.15	4.70
2200	11.77	17.03	28.44	24.65	1.18	0.55	2200	26.96	11.85	4.73
2400	11.71	16.98	27.75	24.37	1.18	0.54	2400	27.06	11.36	4.74
2600	11.64	16.97	27.13	24.32	1.19	0.54	2600	27.11	11.30	4.77
2800	11.57	16.93	26.43	23.99	1.19	0.54	2800	27.22	11.52	4.73
3000	11.50	16.88	25.51	24.33	1.19	0.54	3000	27.35	11.73	4.76
3500	11.31	16.79	23.08	25.30	1.20	0.53	3200	27.20	11.72	4.71
4000	11.10	16.67	21.19	28.49	1.20	0.53	3400	27.09	11.73	4.69
4500	10.90	16.51	20.18	34.55	1.21	0.52	3600	26.78	11.85	4.69
5000	10.68	16.35	20.43	37.80	1.21	0.52	3800	26.51	11.76	4.75
5500	10.42	16.18	22.62	25.89	1.22	0.51	4000	26.55	11.63	4.75
6000	10.15	16.04	24.71	20.56	1.23	0.51	4200	26.49	11.60	4.80
6500	9.88	15.91	23.54	17.48	1.23	0.50	4400	26.24	11.69	4.74
7000	9.63	15.75	20.82	15.55	1.23	0.50	4600	25.88	12.07	4.77
7500	9.49	15.67	19.52	14.62	1.23	0.50	4800	25.52	12.53	4.82
8000	9.24	15.50	17.98	13.45	1.23	0.50	5000	25.24	12.65	4.83
8500	9.00	15.40	16.64	12.07	1.23	0.51	5200	25.22	12.70	4.79
9000	8.66	15.28	14.79	10.31	1.22	0.52	5400	25.11	12.61	4.78
10000	7.62	15.39	10.65	7.54	1.24	0.53	5600	24.57	12.33	4.81
11000	6.21	15.57	8.09	6.18	1.29	0.52	5800	24.11	12.55	4.79
12000	4.87	15.40	6.88	5.67	1.33	0.51	6000	23.55	12.57	4.82
13000	3.61	15.32	5.77	5.24	1.32	0.50	6200	23.38	12.58	4.89
14000	2.14	15.59	4.83	4.53	1.32	0.49	6400	23.28	12.57	4.96
15000	0.89	15.98	4.21	4.51	1.34	0.45	6600	23.12	12.73	4.95
16000	0.56	15.82	4.60	5.31	1.39	0.35	6800	22.77	12.73	4.99
17000	0.73	15.01	5.67	7.08	1.53	0.24	7000	22.24	12.65	4.98
18000	1.03	13.98	6.14	9.28	1.52	0.21	7200	21.79	12.29	5.01
19000	0.79	13.98	5.23	9.29	1.47	0.25	7600	21.40	12.00	5.03
20000	0.33	15.06	4.64	7.78	1.52	0.26	8000	20.68	11.73	5.10

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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 = 3.62V @Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
					K	Delta				
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	12.11	16.90	23.40	32.92	1.15	0.58	50	22.79	8.82	4.54
100	12.10	16.92	23.81	34.65	1.16	0.58	100	22.88	8.47	4.58
200	12.08	16.95	24.20	35.82	1.16	0.57	200	23.20	9.14	4.64
400	12.02	16.94	23.84	34.23	1.16	0.57	400	22.65	8.81	4.62
600	11.96	16.95	24.01	33.55	1.17	0.56	600	22.13	8.72	4.62
800	11.91	16.93	24.23	32.68	1.17	0.56	800	22.30	8.45	4.64
1000	11.84	16.92	24.60	31.78	1.17	0.56	1000	22.14	8.26	4.67
1200	11.78	16.91	24.81	29.79	1.18	0.55	1200	22.01	8.40	4.70
1400	11.73	16.89	24.90	28.96	1.18	0.55	1400	21.92	8.80	4.74
1600	11.67	16.88	25.10	27.92	1.18	0.55	1600	22.70	8.66	4.70
1800	11.60	16.86	24.94	26.74	1.18	0.55	1800	22.98	8.74	4.72
2000	11.56	16.83	24.90	26.35	1.18	0.55	2000	22.70	8.78	4.71
2200	11.49	16.80	24.68	25.44	1.19	0.54	2200	22.71	8.41	4.67
2400	11.43	16.78	24.24	24.80	1.19	0.54	2400	22.85	7.82	4.70
2600	11.36	16.76	23.82	24.57	1.19	0.54	2600	23.13	7.75	4.71
2800	11.29	16.72	23.27	23.99	1.19	0.53	2800	23.35	8.15	4.70
3000	11.24	16.67	22.56	24.09	1.19	0.53	3000	23.48	8.45	4.69
3500	11.05	16.58	20.78	24.41	1.20	0.53	3200	23.27	8.43	4.70
4000	10.86	16.46	19.28	26.50	1.20	0.53	3400	23.24	8.44	4.67
4500	10.68	16.31	18.46	30.31	1.20	0.52	3600	23.40	8.61	4.63
5000	10.48	16.15	18.66	49.41	1.21	0.52	3800	23.52	8.46	4.70
5500	10.24	15.98	20.41	28.81	1.21	0.51	4000	23.91	8.28	4.74
6000	9.98	15.85	22.21	21.89	1.22	0.51	4200	23.86	8.31	4.73
6500	9.73	15.71	21.78	18.34	1.23	0.50	4400	23.94	8.45	4.74
7000	9.48	15.55	19.76	16.18	1.23	0.50	4600	23.92	8.90	4.68
7500	9.36	15.51	18.58	15.12	1.23	0.50	4800	23.97	9.62	4.77
8000	9.11	15.34	17.30	13.88	1.22	0.50	5000	24.00	9.72	4.76
8500	8.86	15.26	16.15	12.42	1.22	0.50	5200	23.84	9.76	4.72
9000	8.53	15.15	14.58	10.59	1.22	0.51	5400	23.64	9.85	4.73
10000	7.49	15.31	10.62	7.78	1.25	0.52	5600	23.57	9.39	4.71
11000	6.08	15.52	8.11	6.44	1.30	0.51	5800	23.49	9.83	4.74
12000	4.75	15.39	6.89	5.97	1.35	0.50	6000	23.50	10.02	4.70
13000	3.48	15.35	5.76	5.54	1.35	0.48	6200	23.82	10.42	4.78
14000	2.02	15.62	4.84	4.80	1.35	0.47	6400	23.87	10.59	4.86
15000	0.73	16.01	4.22	4.79	1.37	0.43	6600	23.59	11.05	4.88
16000	0.31	15.90	4.56	5.58	1.43	0.32	6800	23.01	11.21	4.82
17000	0.40	15.15	5.55	7.27	1.58	0.21	7000	22.50	11.22	4.85
18000	0.66	14.18	5.97	9.38	1.58	0.18	7200	22.15	10.70	4.89
19000	0.46	14.19	5.10	9.45	1.52	0.22	7600	21.72	10.75	4.97
20000	0.00	15.24	4.55	7.92	1.58	0.24	8000	20.77	10.80	4.97

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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 = 3.83V @Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		FREQ	IP3 Output	1dB Comp. Output	Noise Figure
					K	Delta				
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(MHz)	(dBm)	(dBm)	(dB)
50	12.62	17.34	29.69	34.54	1.15	0.58	50	30.25	14.04	4.57
100	12.61	17.25	30.29	33.60	1.14	0.59	100	30.41	13.98	4.63
200	12.58	17.30	31.14	32.39	1.15	0.58	200	30.89	14.02	4.62
400	12.52	17.31	30.32	31.94	1.15	0.58	400	29.93	14.06	4.66
600	12.46	17.29	30.38	30.17	1.16	0.57	600	29.19	14.07	4.64
800	12.39	17.28	30.92	28.82	1.16	0.57	800	29.29	13.93	4.72
1000	12.32	17.27	31.31	27.71	1.16	0.57	1000	29.12	13.81	4.68
1200	12.26	17.26	31.20	26.40	1.17	0.56	1200	29.15	13.80	4.74
1400	12.20	17.24	31.36	25.89	1.17	0.56	1400	28.97	13.87	4.75
1600	12.13	17.22	31.48	25.08	1.17	0.56	1600	30.51	13.75	4.73
1800	12.06	17.20	31.11	24.65	1.18	0.55	1800	29.66	13.81	4.81
2000	12.00	17.16	31.16	24.42	1.18	0.55	2000	29.56	13.90	4.73
2200	11.93	17.15	30.91	23.92	1.18	0.55	2200	29.39	13.76	4.75
2400	11.86	17.10	30.00	23.85	1.18	0.55	2400	29.35	13.43	4.76
2600	11.79	17.09	29.29	23.89	1.19	0.54	2600	29.10	13.39	4.76
2800	11.72	17.04	28.50	23.74	1.19	0.54	2800	29.01	13.43	4.76
3000	11.64	17.00	27.39	24.22	1.19	0.54	3000	28.92	13.56	4.78
3500	11.44	16.89	24.49	25.61	1.20	0.53	3200	28.77	13.52	4.76
4000	11.22	16.77	22.28	29.52	1.20	0.53	3400	28.47	13.52	4.69
4500	11.01	16.60	21.14	36.61	1.21	0.52	3600	27.94	13.57	4.75
5000	10.79	16.46	21.42	33.23	1.21	0.52	3800	27.48	13.61	4.78
5500	10.52	16.28	23.90	24.62	1.22	0.51	4000	27.36	13.56	4.79
6000	10.23	16.14	26.17	19.92	1.23	0.51	4200	27.21	13.53	4.82
6500	9.95	16.00	24.39	17.11	1.23	0.50	4400	26.93	13.55	4.77
7000	9.69	15.83	21.26	15.29	1.23	0.50	4600	26.50	13.84	4.83
7500	9.55	15.76	19.89	14.41	1.23	0.50	4800	26.13	14.14	4.86
8000	9.29	15.58	18.26	13.30	1.23	0.50	5000	25.79	14.13	4.92
8500	9.04	15.47	16.84	11.97	1.23	0.51	5200	25.58	14.05	4.83
9000	8.70	15.34	14.87	10.24	1.22	0.52	5400	25.53	13.87	4.88
10000	7.66	15.44	10.65	7.50	1.24	0.53	5600	25.10	13.72	4.86
11000	6.25	15.60	8.08	6.14	1.29	0.53	5800	24.44	13.81	4.85
12000	4.91	15.39	6.87	5.61	1.32	0.52	6000	23.76	13.69	4.90
13000	3.65	15.32	5.77	5.17	1.32	0.51	6200	23.48	13.56	4.94
14000	2.17	15.58	4.83	4.44	1.32	0.50	6400	23.30	13.34	5.00
15000	0.94	15.95	4.20	4.40	1.33	0.46	6600	23.22	13.40	5.04
16000	0.62	15.82	4.61	5.19	1.39	0.36	6800	22.93	13.35	5.02
17000	0.84	14.94	5.72	6.96	1.51	0.25	7000	22.35	13.24	5.06
18000	1.13	13.90	6.22	9.15	1.50	0.23	7200	21.90	12.88	5.09
19000	0.89	13.90	5.30	9.16	1.45	0.26	7600	21.46	12.49	5.17
20000	0.43	14.98	4.70	7.65	1.51	0.27	8000	20.70	12.13	5.19

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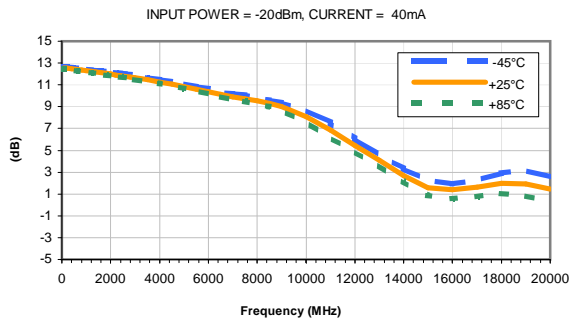


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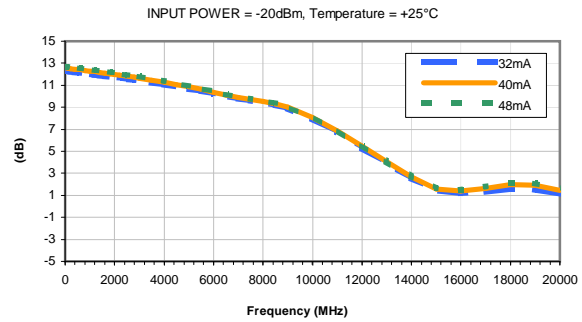


## Typical Performance Curves

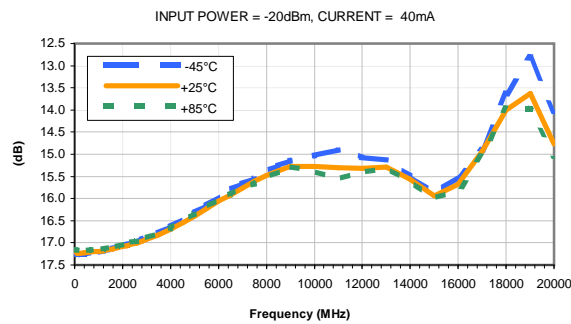
**GAIN vs. TEMPERATURE**



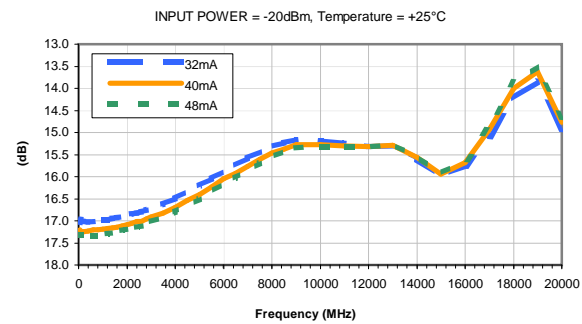
**GAIN vs. CURRENT**



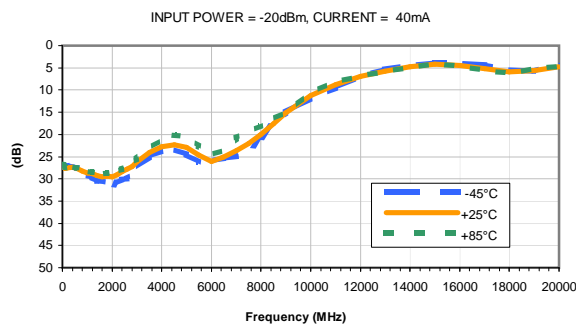
**ISOLATION vs. TEMPERATURE**



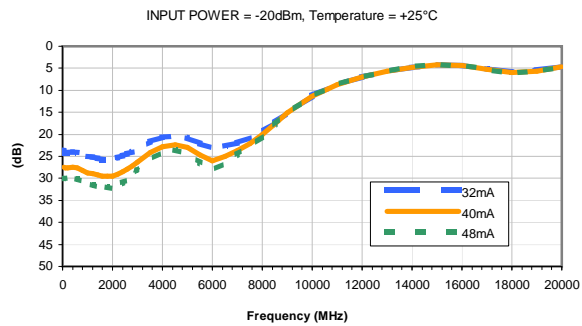
**ISOLATION vs. CURRENT**



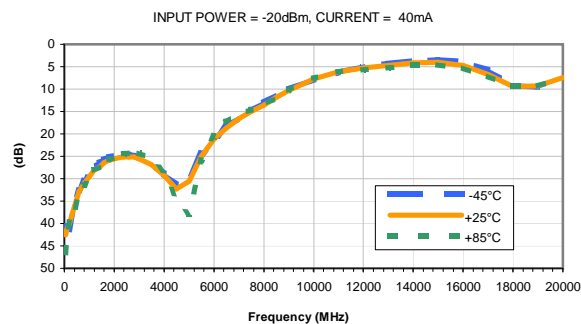
**INPUT RETURN LOSS vs. TEMPERATURE**



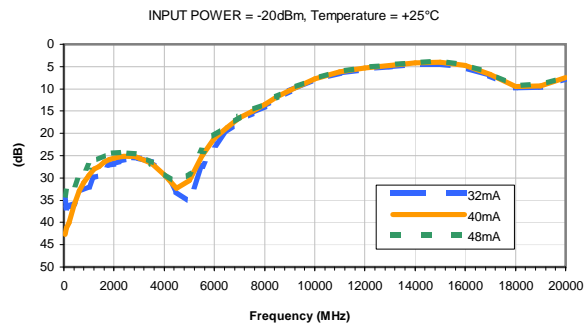
**INPUT RETURN LOSS vs. CURRENT**



**OUTPUT RETURN LOSS vs. TEMPERATURE**



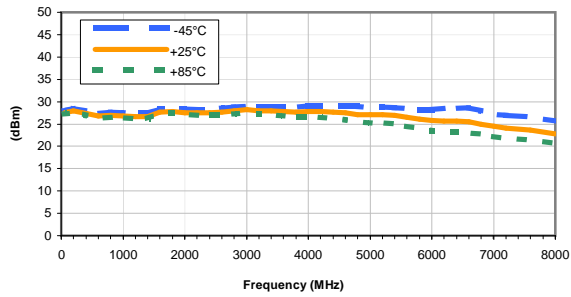
**OUTPUT RETURN LOSS vs. CURRENT**



## Typical Performance Curves

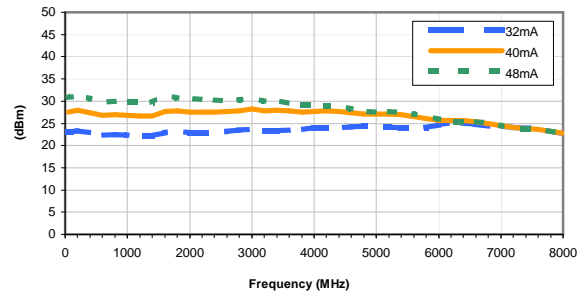
OUTPUT IP3 vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



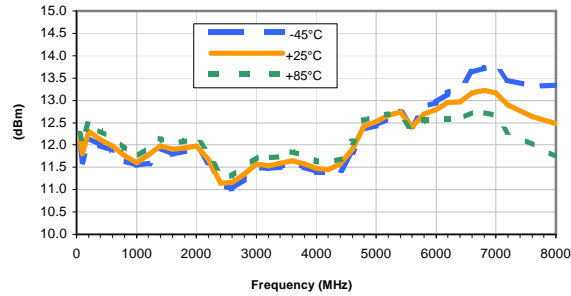
OUTPUT IP-3 vs. CURRENT

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



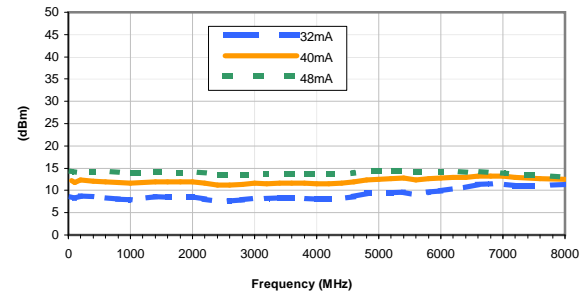
OUTPUT POWER at 1dB Compression vs. TEMPERATURE

CURRENT = 40mA



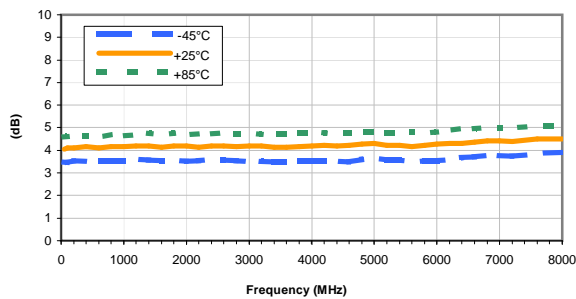
OUTPUT POWER at 1dB Compression vs. CURRENT

Temperature = +25°C



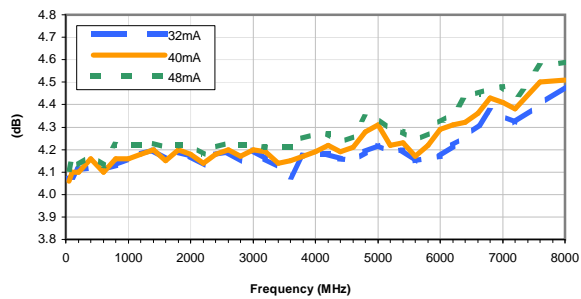
Noise Figure vs. TEMPERATURE

CURRENT = 40mA



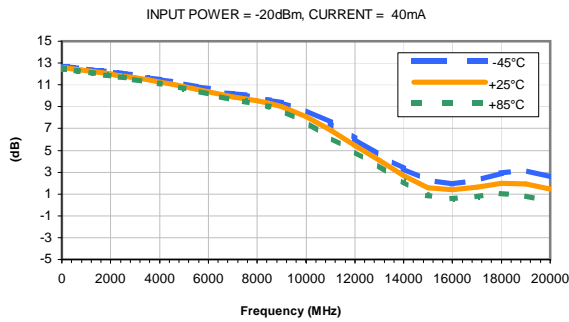
Noise Figure vs. CURRENT

Temperature = +25°C

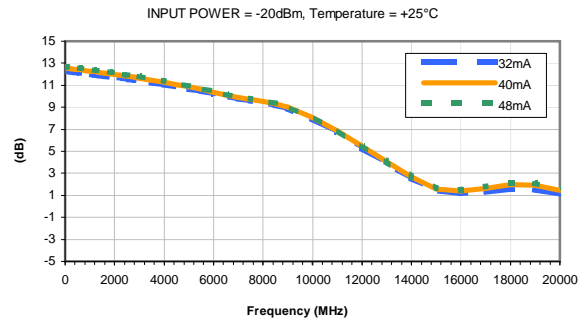


## Typical Performance Curves

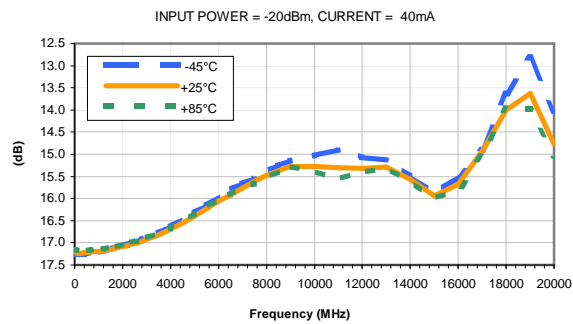
### GAIN vs. TEMPERATURE



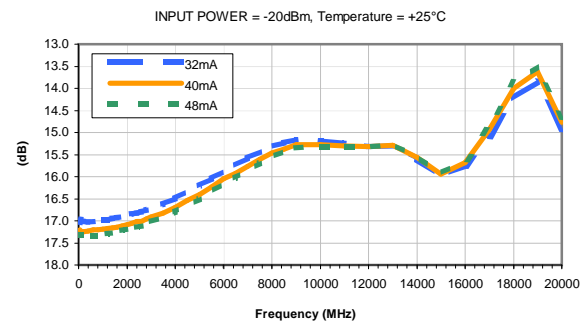
### GAIN vs. CURRENT



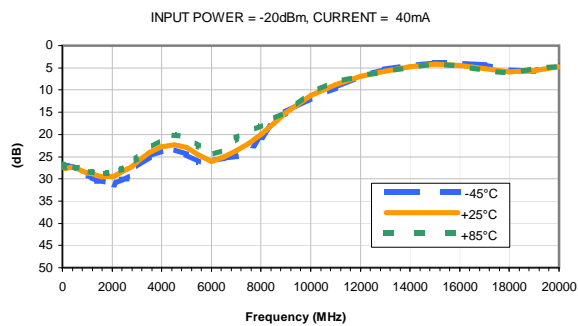
### ISOLATION vs. TEMPERATURE



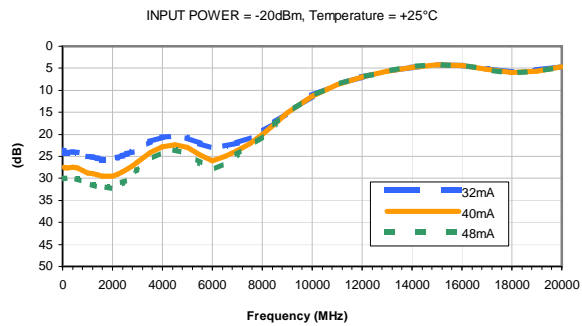
### ISOLATION vs. CURRENT



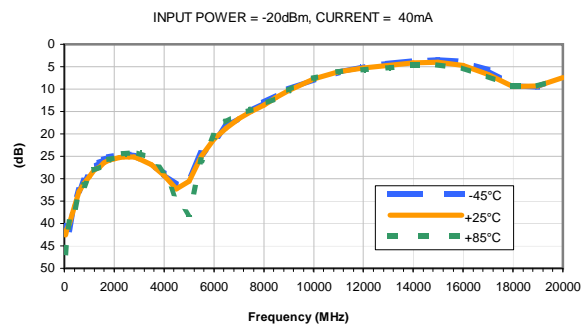
### INPUT RETURN LOSS vs. TEMPERATURE



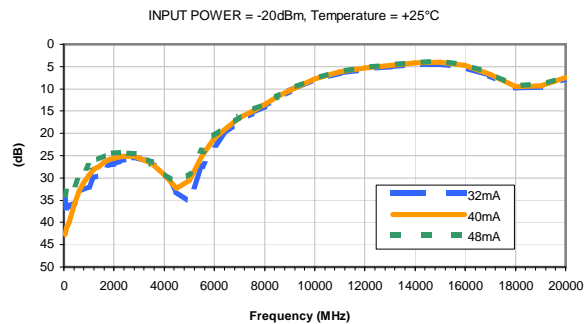
### INPUT RETURN LOSS vs. CURRENT



### OUTPUT RETURN LOSS vs. TEMPERATURE



### OUTPUT RETURN LOSS vs. CURRENT

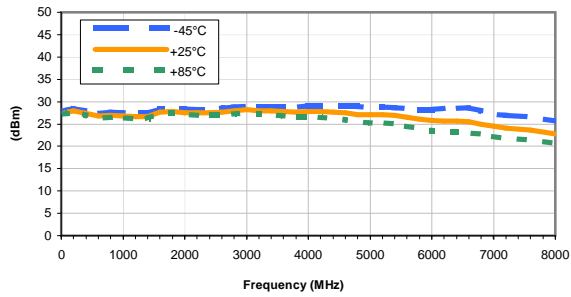




## Typical Performance Curves

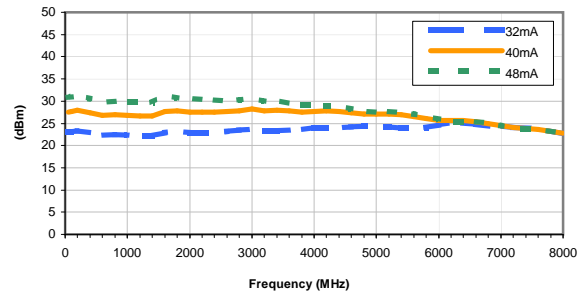
OUTPUT IP3 vs. TEMPERATURE

INPUT POWER = -20dBm, CURRENT = 40mA



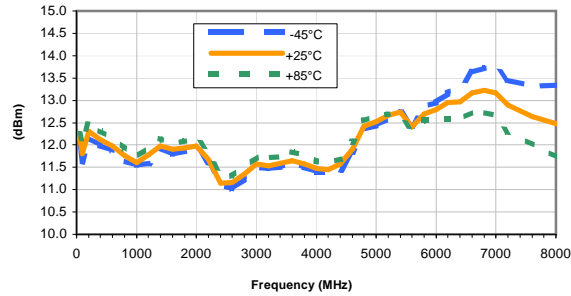
OUTPUT IP-3 vs. CURRENT

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



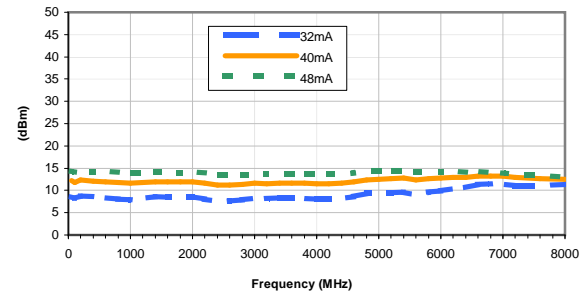
OUTPUT POWER at 1dB Compression vs. TEMPERATURE

CURRENT = 40mA



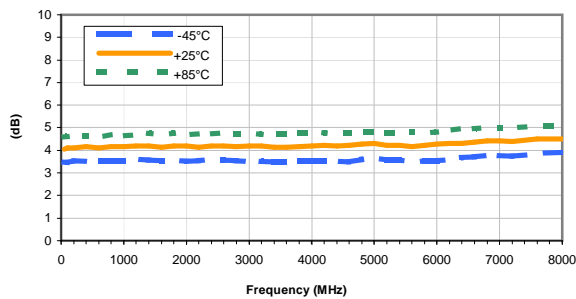
OUTPUT POWER at 1dB Compression vs. CURRENT

Temperature = +25°C



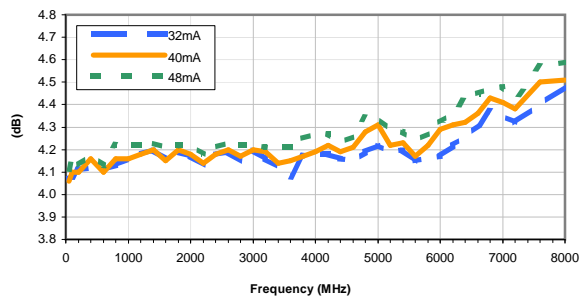
Noise Figure vs. TEMPERATURE

CURRENT = 40mA

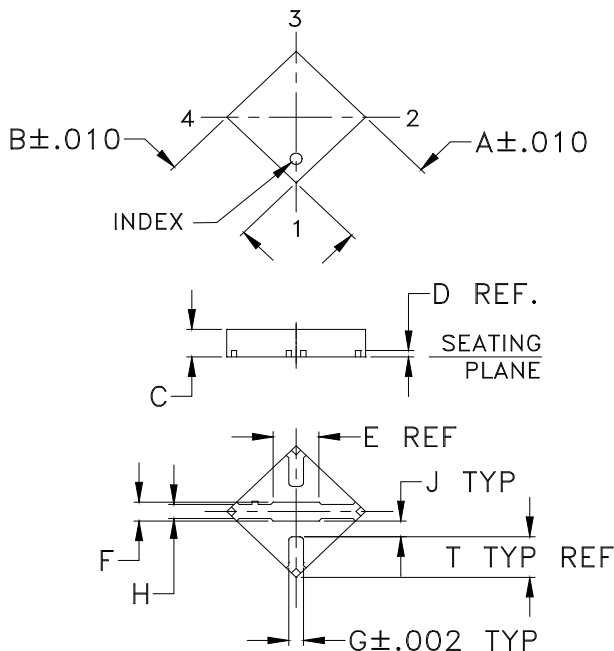


Noise Figure vs. CURRENT

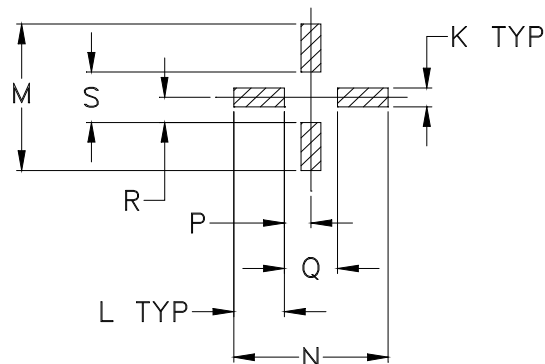
Temperature = +25°C



### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

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.  $\pm .01$ ; 3Pl.  $\pm .004$

#### Notes:

- Case material: Plastic.
- 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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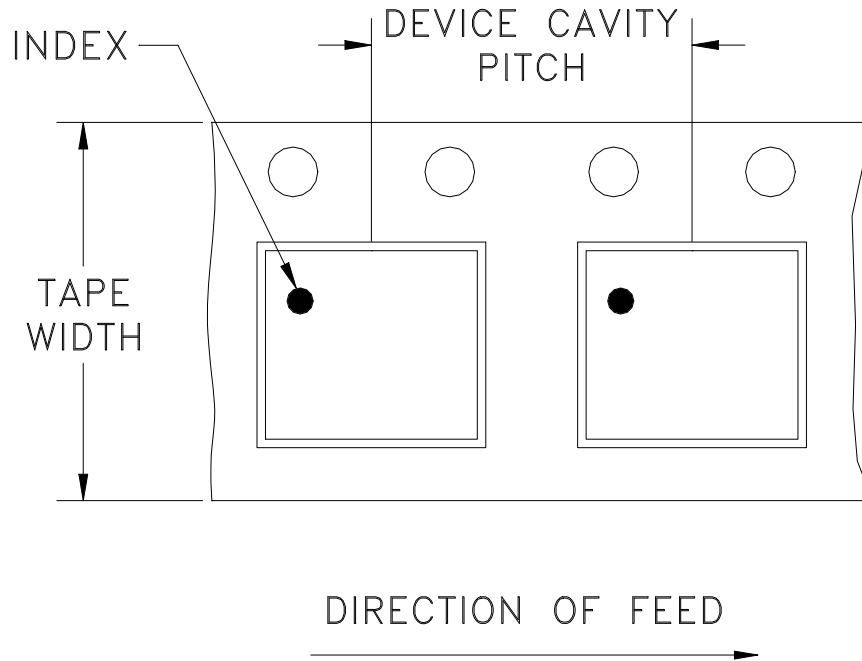


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

# 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](http://www.minicircuits.com/pages/pdfs/tape.pdf)

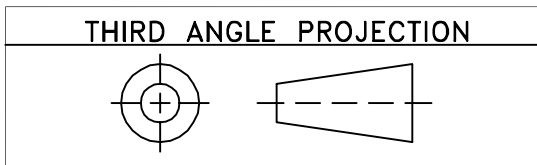


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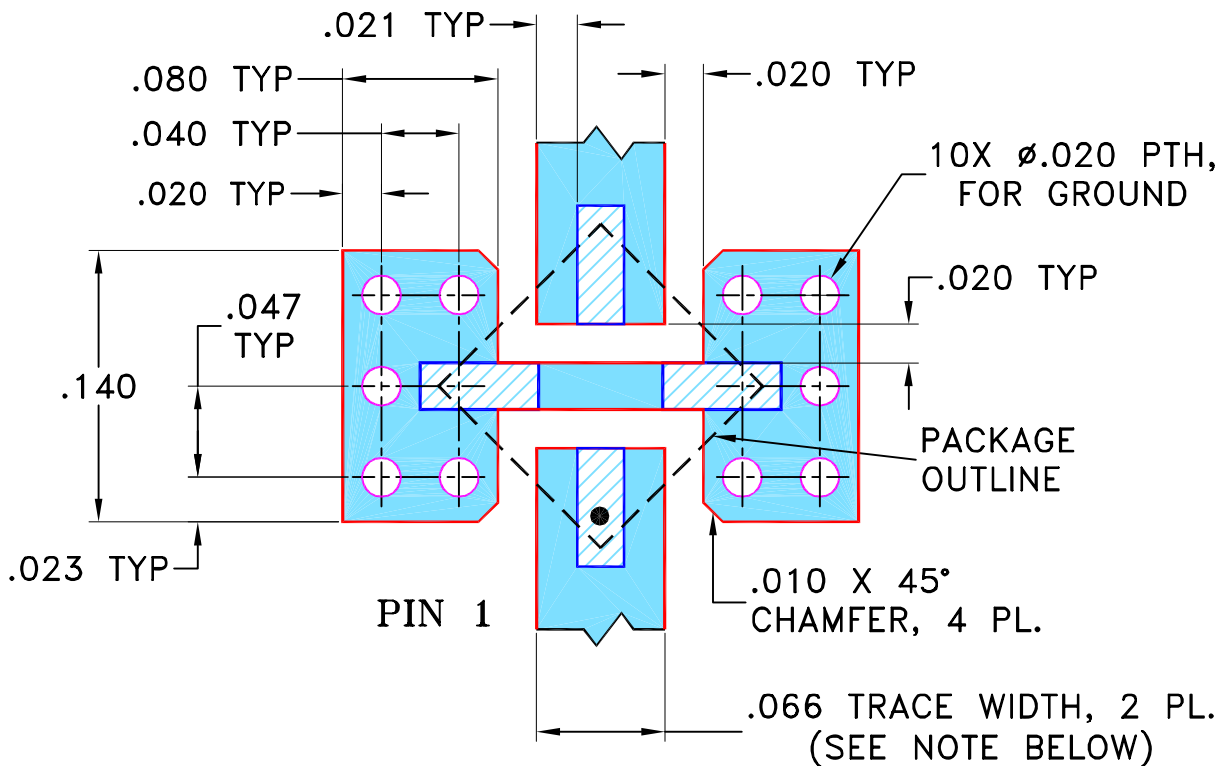
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REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M108436	NEW RELEASE	11/14/06	PW	IG

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

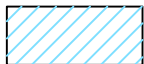


**NOTES:**

- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.030" \pm .002"$ ; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- 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 TOLERANCES ON: 2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$ .005 ANGLES $\pm$ FRACTIONS $\pm$	DRAWN	PW	11/11/06
	CHECKED	IL	11/14/06
	APPROVED	IG	11/14/06



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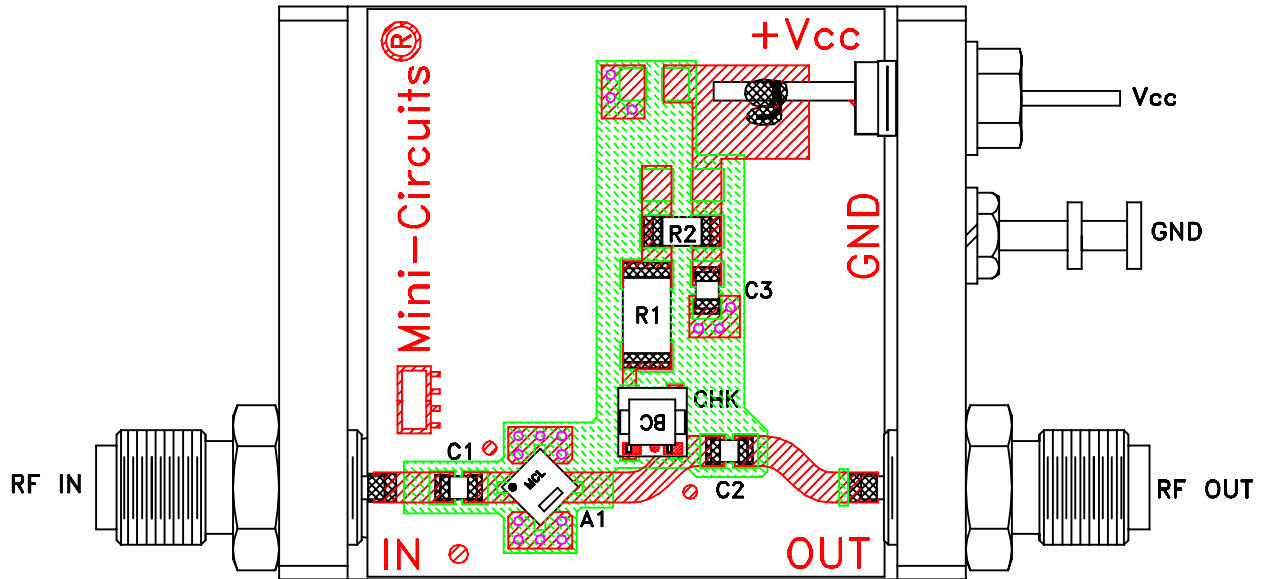
13 Neptune Avenue  
Brooklyn NY 11235

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

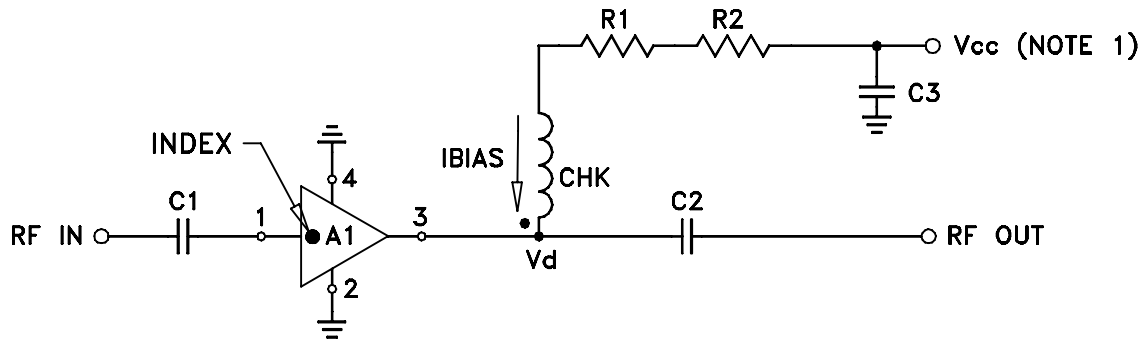
SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-252	REV: OR
FILE: 98PL252	SCALE: 10:1	SHEET: 1 OF 1	

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# Evaluation Board and Circuit



TB-413-19+



COMPONENT	VALUE
A1	LEE-19(+)
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 R04350 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.

Mini-Circuits®

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