



ULTRA HIGH DYNAMIC RANGE

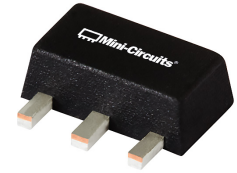
# Monolithic Amplifier

## PHA-102+

50Ω 50 MHz to 6 GHz

### THE BIG DEAL

- Ultra Wideband, 50 MHz to 6 GHz
- Excellent gain flatness  $14.3 \pm 0.3$  dB from 0.05-3 GHz
- High Linearity, +26.4 dBm P1dB & +50 dBm OIP3 at 0.9 GHz
- May be used as a replacement for AH102<sup>a,b</sup>



Generic photo used for illustration purposes only

CASE STYLE: DF782

### +RoHS Compliant

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

### APPLICATIONS

- WiFi
- WLAN
- LTE
- WiMAX
- S-band Radar

### PRODUCT OVERVIEW

The PHA-102+ (RoHS compliant) is an advanced wideband amplifier fabricated using PHEMT technology and offers extremely high dynamic range over a broad frequency range and with excellent gain flatness. In addition, the PHA-102+ has good input and output return loss over a broad frequency range. PHA-102+ is enclosed in a SOT-89 package and has very good thermal performance.

### KEY FEATURES

Feature	Advantages
Ultra Wideband: 50MHz to 6GHz	Broadband covering primary wireless communications bands
Extremely High IP3 +50 dBm typ. at 0.9 GHz +40.3 dBm typ. at 3 GHz	The PHA-102+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and PHEMT Structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being approximately 17 dB above the P1dB point. This feature makes this amplifier ideal for use in: <ul style="list-style-type: none"> <li>• Driver amplifiers for complex waveform up converter paths</li> <li>• Drivers in linearized transmit systems</li> <li>• Secondary amplifiers in ultra-High Dynamic range receivers</li> </ul>
Excellent Gain Flatness, 50 MHz-3GHz	Typical $\pm 0.3$ dB gain flatness across the entire frequency range minimizes the need for external equalizer networks making it a great fit for instrumentation and EW application.

a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.

b. The WJ AH102 part number is used for identification and comparison purposes only.

REV. B  
ECO-010399  
PHA-102+  
MCL NY  
240722





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## PHA-102+

50Ω 50 MHz to 6 GHz

### ELECTRICAL SPECIFICATIONS AT +25°C, 50Ω, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	V <sub>DD</sub> =+9V <sup>1</sup>			V <sub>S</sub> =+9V <sup>2</sup>	Units
		Min.	Typ.	Max.	Typ.	
Frequency Range		50		6000	50-6000	MHz
Gain	50	13.1	14.6	16.0	14.2	dB
	900	—	14.5	—	14.2	
	2000	12.7	14.1	15.5	13.8	
	2500	—	14.0	—	13.7	
	3000	12.5	14.0	15.3	13.8	
	6000	—	11.9	—	10.9	
Gain flatness (±)	50-3000		0.3		0.25	dB
Input Return Loss	50		14		12	dB
	900		14		13	
	2000		12		13	
	2500		12		14	
	3000		12		15	
	6000		4		4	
Output Return Loss	50		18		13	dB
	900		17		17	
	2000		15		15	
	2500		14		15	
	3000		14		15	
	6000		4		4	
Output Power @1dB compression	50		+26.1		+25.4	dBm
	900		+26.4		+26.0	
	2000		+26.5		+26.1	
	2500		+26.1		+25.6	
	3000		+25.6		+25.0	
	6000		+20.4		+19.8	
Output IP3 (P <sub>out</sub> = 0dBm/Tone)	50		+44.8		+41.6	dBm
	900		+50.0		+49.3	
	2000		+43.0		+42.5	
	2500		+41.4		+41.4	
	3000		+40.3		+40.4	
	6000		+37.3		+38.1	
Noise Figure	50		3.6		3.6	dB
	900		3.4		3.6	
	2000		3.7		3.8	
	2500		3.7		3.7	
	3000		4.0		4.0	
	6000		6.7		7.0	
Device Operating Voltage		+8.5	+9	+9.5	+9	V
Device Operating Current			192	211	191	mA
Device Current Variation vs. Temperature <sup>3</sup>			57.69		57.69	µA/°C
Device Current Variation vs. Voltage <sup>4</sup>			0.026		0.026	mA/mV
Thermal Resistance Junction-To-Ground Lead at 85°C stage temperature			20.4		20.4	°C/W

1. Measured on Mini-Circuits Characterization Test Board. See Characterization Test Circuit (Figure 1A, 1B & 1C).

2. Measured on Mini-Circuits Application Evaluation Board TB-PHA-102+. See Application Test Circuit (Figure 2).

3. Device Current Variation vs. Temperature= (Current at 85°C - Current at -45°C)/130°C

4. Device Current Variation vs. Voltage = (Current at 9.5V - Current at 8.5V) / ((9.5V-8.5V)\*1000 mV/V)





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## PHA-102+

50Ω 50 MHz to 6 GHz

### ABSOLUTE MAXIMUM RATINGS<sup>5</sup>

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to +85°C
Storage Temperature	-65°C to +150°C
Power Dissipation	3.18 W
Input Power (CW)	+22 dBm (continuous) +25 dBm (5 minutes max)
DC Voltage on Pin 3	+11 V

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

### SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION



Function	Pin Number	Description
RF-IN	1	RF Input pin.
RF-OUT and DC-IN	3	RF Output and DC Bias
GND	Paddle	Connections to ground.

### CHARACTERIZATION TEST CIRCUIT FOR S-PARAMETER & NOISE FIGURE MEASUREMENT

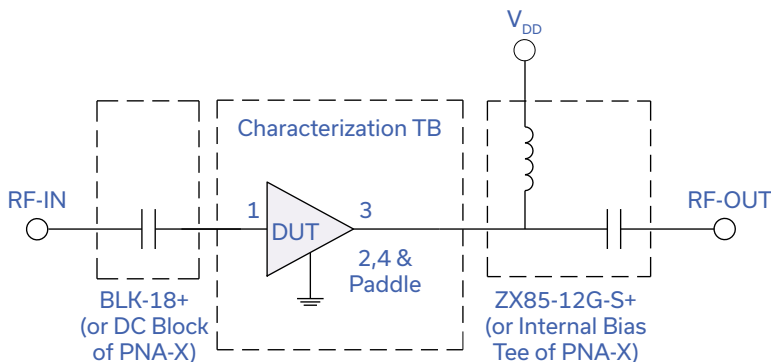


Fig 1A. Block Diagram of Test Circuit used for S-Parameter and Noise Figure Measurement. (DUT is soldered on Mini-Circuits Characterization test board.) Gain, Return loss and noise figure are measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:  
1. Gain and Return loss:  $P_{IN} = -25\text{dBm}$





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### CHARACTERIZATION TEST CIRCUIT FOR P1dB MEASUREMENT

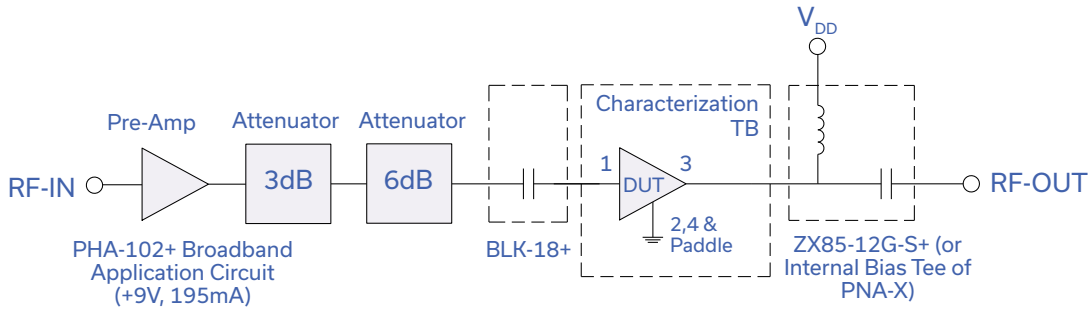


Fig 1B. Block Diagram of Test Circuit used for P1dB Measurement. (DUT is soldered on Mini-Circuits Characterization test board.) Output power at 1dB compression is measured using Agilent's N5242A PNA-X microwave network analyzer.

### CHARACTERIZATION TEST CIRCUIT FOR IP3 MEASUREMENT

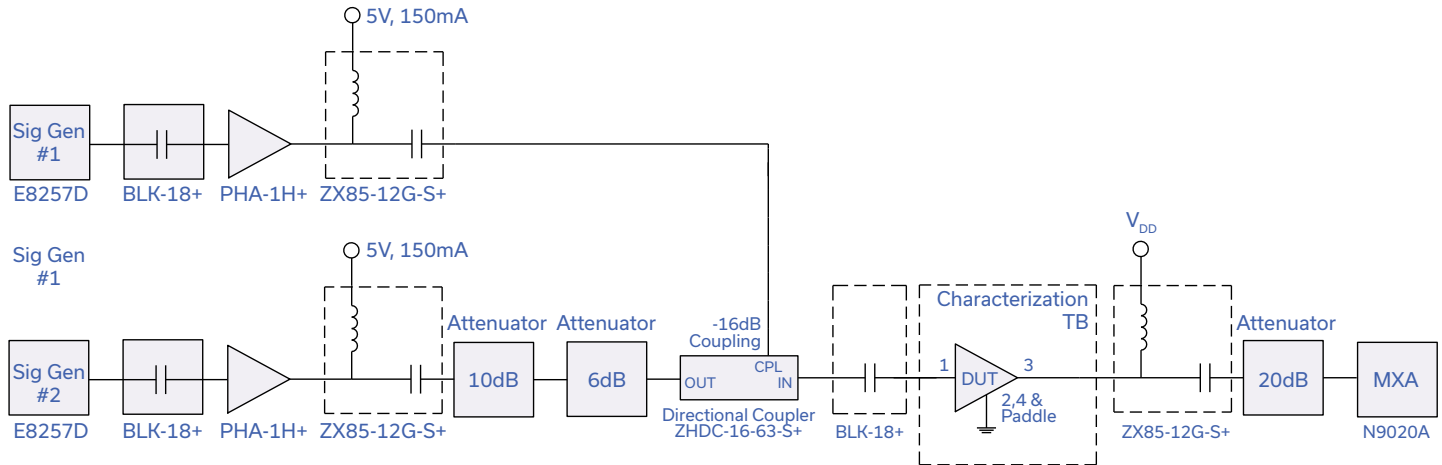


Fig 1C. Block Diagram of Test Circuit used for IP3 Measurement. (DUT is soldered on Mini-Circuits Characterization test board) P1dB is measured using two E8257D Signal Generators and one N9020A MXA Signal Analyzer.

Condition:

1. Output IP3 (OIP3): Two Tones spaced 1 MHz apart, 8 dBm/ tone at output.



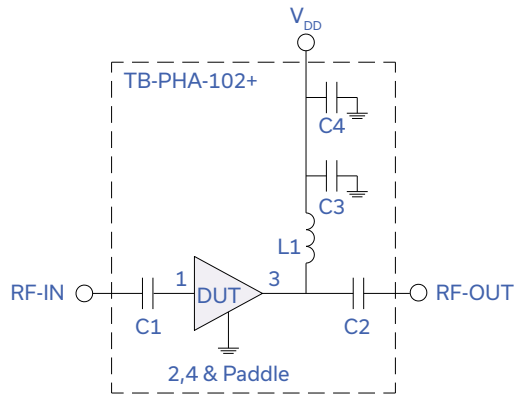
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## PHA-102+

50Ω 50 MHz to 6 GHz

### APPLICATION TEST CIRCUIT



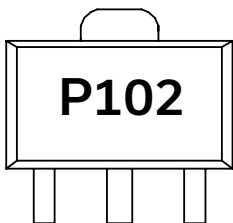
Component	Size	Value	Part Number	Manufacturer
C1	0402	1000pF	GRM1555C1H102JA01D	Murata
C2	0402	1000pF	GRM1555C1H102JA01D	Murata
C3	0402	100pF	GRM1555C1H101JA01D	Murata
C4	0402	10000pF	GRM155R71H103KA88D	Murata
L1	0603	390nH	LQW18CNR39J00D	Murata

Fig 2. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Application test board TB-PHA-102+) Gain, Return loss, Output power at 1dB compression (P1dB), output IP3 (OIP3) and noise figure are measured per Figure 1A, 1B & 1C, except DC block BLK-18+ and Bias-Tee ZX85-12G-S+(or Internal Bias-Tee of PNA-X) are not required.

Conditions:

1. Gain and Return loss:  $P_{IN} = -25\text{dBm}$
2. Output IP3 (OIP3): Two Tones spaced 1 MHz apart, 8 dBm/ tone at output.

### PRODUCT MARKING



Marking may contain other features or characters for internal lot control



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## PHA-102+

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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. [CLICK HERE](#)

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DF782 (SOT 89) Plastic package, exposed paddle lead finish: matte-tin
Tape & Reel Standard quantities available on reel	F55 7" reels with 20, 50, 100, 200, 500 or 1K devices
Suggested Layout for PCB Design	PL-670
Evaluation Board	TB-PHA-102+
Environmental Ratings	ENV008T1

### ESD RATING

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

- NOTES
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
  - B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
  - C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 9.00V, Id = 192mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.61	19.96	14.52	18.58	1.17	0.71	45.42	26.01	3.60
100	14.70	20.17	14.36	17.33	1.18	0.71	--	26.08	3.47
200	14.72	20.26	14.13	16.76	1.18	0.71	--	26.26	3.46
300	14.71	20.29	14.07	16.62	1.19	0.71	--	26.30	3.59
450	14.67	20.29	14.00	16.58	1.19	0.71	--	26.33	3.64
600	14.61	20.29	13.91	16.66	1.19	0.72	--	26.32	3.51
750	14.55	20.27	13.81	16.68	1.19	0.72	--	26.34	3.45
900	14.49	20.29	13.70	16.70	1.20	0.73	51.79	26.36	3.38
1050	14.44	20.28	13.56	16.60	1.20	0.73	--	26.36	3.48
1200	14.38	20.31	13.33	16.35	1.21	0.73	--	26.48	3.50
1350	14.33	20.33	13.13	16.13	1.21	0.74	--	26.41	3.51
1500	14.27	20.35	12.93	15.87	1.22	0.74	--	26.53	3.46
1650	14.23	20.37	12.76	15.65	1.22	0.74	--	26.37	3.55
1800	14.18	20.41	12.59	15.40	1.22	0.75	--	26.35	3.58
1900	14.15	20.44	12.48	15.17	1.23	0.75	42.37	26.42	3.58
1950	14.14	20.44	12.45	15.17	1.23	0.75	--	26.26	3.61
2100	14.10	20.48	12.30	14.88	1.23	0.75	--	26.40	3.65
2140	14.09	20.52	12.28	14.73	1.24	0.75	41.38	26.34	3.62
2250	14.06	20.51	12.19	14.58	1.24	0.75	--	26.17	3.71
2400	14.03	20.55	12.09	14.34	1.24	0.75	--	26.04	3.72
2550	14.01	20.61	12.02	14.16	1.25	0.76	--	25.94	3.80
2700	13.99	20.62	11.98	14.02	1.25	0.76	--	25.56	3.82
2850	13.99	20.68	11.97	13.90	1.25	0.76	--	25.53	3.88
3000	13.99	20.74	11.94	13.78	1.26	0.76	--	25.48	3.98
3150	13.99	20.76	11.93	13.64	1.26	0.76	--	25.29	4.00
3300	14.00	20.81	11.95	13.54	1.26	0.76	--	24.93	4.06
3450	14.01	20.88	11.95	13.42	1.27	0.76	--	24.62	4.13
3600	14.03	20.94	11.94	13.31	1.27	0.76	--	24.38	4.26
3750	14.06	21.01	11.86	13.18	1.27	0.76	--	24.49	4.33
3900	14.08	21.09	11.76	13.06	1.27	0.76	--	24.33	4.39
4000	14.10	21.15	11.65	12.91	1.28	0.76	38.15	23.97	4.47
4050	14.11	21.17	11.56	12.88	1.28	0.77	--	24.09	4.52
4200	14.12	21.28	11.29	12.66	1.28	0.77	--	23.67	4.57
4350	14.14	21.39	10.98	12.33	1.28	0.77	--	23.48	4.64
4500	14.14	21.55	10.57	11.93	1.29	0.78	--	23.41	4.82
4650	14.13	21.73	10.08	11.45	1.29	0.78	--	23.06	4.96
4800	14.09	21.94	9.51	10.92	1.30	0.79	--	23.13	5.04
4950	14.02	22.16	8.90	10.27	1.30	0.79	--	22.28	5.23
5100	13.91	22.44	8.26	9.50	1.31	0.80	--	22.13	5.39
5250	13.77	22.77	7.59	8.62	1.31	0.79	--	22.21	5.66
5400	13.56	23.21	6.90	7.68	1.32	0.79	--	21.14	5.78
5550	13.26	23.73	6.22	6.75	1.33	0.78	--	21.43	5.98
5700	12.86	24.26	5.57	5.86	1.34	0.76	--	20.76	6.30
5850	12.37	24.90	4.96	5.04	1.36	0.73	--	20.58	6.48
6000	11.78	25.56	4.40	4.29	1.36	0.70	37.32	20.34	6.71

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 8.50V, Id = 179mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.59	20.01	14.45	18.35	1.18	0.71	44.55	25.60	3.53
100	14.68	20.18	14.30	17.30	1.18	0.71	--	25.61	3.48
200	14.71	20.26	14.07	16.72	1.18	0.71	--	25.73	3.44
300	14.69	20.29	14.01	16.60	1.19	0.71	--	25.78	3.56
450	14.65	20.28	13.94	16.57	1.19	0.71	--	25.80	3.59
600	14.59	20.28	13.86	16.65	1.19	0.72	--	25.80	3.49
750	14.53	20.28	13.76	16.68	1.20	0.72	--	25.82	3.45
900	14.47	20.28	13.64	16.69	1.20	0.73	52.46	25.84	3.37
1050	14.41	20.28	13.50	16.59	1.20	0.73	--	25.84	3.42
1200	14.36	20.30	13.27	16.33	1.21	0.74	--	25.97	3.45
1350	14.30	20.33	13.08	16.13	1.21	0.74	--	25.96	3.49
1500	14.24	20.36	12.88	15.86	1.22	0.74	--	26.03	3.45
1650	14.20	20.38	12.71	15.64	1.22	0.75	--	25.85	3.50
1800	14.15	20.42	12.55	15.41	1.23	0.75	--	25.89	3.51
1900	14.12	20.45	12.43	15.17	1.23	0.75	41.60	25.97	3.50
1950	14.10	20.45	12.41	15.17	1.23	0.75	--	25.74	3.52
2100	14.07	20.50	12.26	14.89	1.24	0.76	--	25.89	3.59
2140	14.05	20.50	12.23	14.75	1.24	0.76	40.65	25.83	3.63
2250	14.02	20.53	12.15	14.59	1.24	0.76	--	25.75	3.64
2400	13.99	20.57	12.06	14.37	1.25	0.76	--	25.59	3.65
2550	13.96	20.61	11.98	14.20	1.25	0.76	--	25.51	3.75
2700	13.94	20.65	11.94	14.07	1.25	0.76	--	25.04	3.79
2850	13.94	20.69	11.93	13.97	1.26	0.76	--	25.10	3.87
3000	13.93	20.74	11.90	13.86	1.26	0.77	--	24.97	3.89
3150	13.93	20.79	11.89	13.74	1.27	0.77	--	24.86	3.96
3300	13.93	20.84	11.91	13.64	1.27	0.77	--	24.50	3.99
3450	13.94	20.89	11.91	13.54	1.27	0.77	--	24.18	4.11
3600	13.96	20.95	11.90	13.46	1.28	0.77	--	23.94	4.20
3750	13.97	21.03	11.81	13.36	1.28	0.77	--	23.97	4.31
3900	13.99	21.12	11.69	13.23	1.28	0.77	--	23.89	4.34
4000	14.01	21.18	11.58	13.10	1.29	0.77	37.48	23.52	4.38
4050	14.01	21.21	11.49	13.09	1.29	0.78	--	23.64	4.45
4200	14.02	21.31	11.23	12.87	1.29	0.78	--	23.21	4.49
4350	14.03	21.42	10.91	12.55	1.29	0.78	--	23.01	4.60
4500	14.02	21.58	10.50	12.17	1.30	0.79	--	22.92	4.77
4650	13.99	21.78	10.00	11.69	1.31	0.80	--	22.47	4.90
4800	13.95	22.00	9.45	11.16	1.31	0.81	--	22.62	4.97
4950	13.87	22.23	8.84	10.51	1.32	0.81	--	21.75	5.17
5100	13.75	22.47	8.22	9.74	1.33	0.82	--	21.59	5.32
5250	13.59	22.81	7.56	8.84	1.33	0.82	--	21.67	5.60
5400	13.38	23.22	6.88	7.88	1.34	0.81	--	20.58	5.71
5550	13.06	23.75	6.21	6.95	1.36	0.80	--	20.88	5.93
5700	12.66	24.28	5.57	6.05	1.36	0.79	--	20.12	6.20
5850	12.17	24.88	4.98	5.22	1.38	0.76	--	20.01	6.37
6000	11.58	25.53	4.43	4.46	1.39	0.73	35.33	19.72	6.61



## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 9.50V, Id = 205mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.62	20.00	14.54	18.50	1.17	0.71	46.03	26.46	3.66
100	14.71	20.18	14.42	17.36	1.18	0.71	--	26.58	3.58
200	14.74	20.27	14.18	16.76	1.18	0.71	--	26.78	3.53
300	14.72	20.30	14.12	16.64	1.19	0.71	--	26.81	3.64
450	14.68	20.29	14.05	16.58	1.19	0.71	--	26.84	3.69
600	14.63	20.30	13.97	16.65	1.19	0.72	--	26.83	3.54
750	14.57	20.29	13.87	16.68	1.19	0.72	--	26.85	3.52
900	14.51	20.29	13.76	16.70	1.20	0.73	50.48	26.82	3.44
1050	14.46	20.28	13.60	16.60	1.20	0.73	--	26.86	3.50
1200	14.40	20.31	13.37	16.34	1.21	0.73	--	26.98	3.53
1350	14.35	20.33	13.18	16.14	1.21	0.74	--	26.90	3.54
1500	14.30	20.34	12.97	15.85	1.21	0.74	--	26.96	3.50
1650	14.25	20.38	12.80	15.63	1.22	0.74	--	26.89	3.66
1800	14.21	20.41	12.63	15.39	1.22	0.75	--	26.86	3.60
1900	14.18	20.43	12.51	15.14	1.22	0.75	43.00	26.92	3.59
1950	14.17	20.41	12.49	15.13	1.22	0.75	--	26.77	3.64
2100	14.14	20.47	12.33	14.84	1.23	0.75	--	26.83	3.69
2140	14.12	20.47	12.29	14.69	1.23	0.75	41.74	26.77	3.63
2250	14.10	20.49	12.22	14.54	1.23	0.75	--	26.66	3.80
2400	14.07	20.52	12.11	14.28	1.24	0.75	--	26.53	3.76
2550	14.05	20.59	12.04	14.09	1.24	0.75	--	26.43	3.92
2700	14.04	20.61	11.99	13.94	1.24	0.75	--	25.99	3.91
2850	14.04	20.65	11.98	13.80	1.25	0.75	--	26.01	3.96
3000	14.04	20.71	11.95	13.66	1.25	0.75	--	25.89	4.03
3150	14.05	20.74	11.94	13.51	1.25	0.75	--	25.70	4.10
3300	14.06	20.79	11.95	13.38	1.25	0.75	--	25.34	4.13
3450	14.08	20.84	11.96	13.25	1.26	0.75	--	25.04	4.24
3600	14.11	20.91	11.95	13.12	1.26	0.75	--	24.88	4.32
3750	14.14	20.97	11.88	12.96	1.26	0.75	--	24.91	4.38
3900	14.17	21.07	11.77	12.81	1.26	0.75	--	24.76	4.48
4000	14.19	21.13	11.67	12.66	1.26	0.75	38.48	24.48	4.54
4050	14.20	21.13	11.58	12.62	1.26	0.75	--	24.52	4.62
4200	14.22	21.25	11.32	12.37	1.27	0.76	--	24.12	4.63
4350	14.25	21.37	11.01	12.03	1.27	0.76	--	23.94	4.77
4500	14.26	21.52	10.60	11.62	1.27	0.76	--	23.95	4.90
4650	14.25	21.70	10.10	11.14	1.28	0.76	--	23.53	5.08
4800	14.23	21.90	9.53	10.60	1.28	0.77	--	23.70	5.11
4950	14.17	22.11	8.90	9.95	1.28	0.77	--	22.78	5.33
5100	14.07	22.39	8.26	9.19	1.29	0.77	--	22.71	5.47
5250	13.93	22.74	7.58	8.32	1.30	0.77	--	22.73	5.71
5400	13.73	23.18	6.87	7.39	1.30	0.76	--	21.67	5.88
5550	13.43	23.69	6.17	6.47	1.31	0.75	--	21.94	6.10
5700	13.04	24.26	5.52	5.60	1.32	0.72	--	21.29	6.28
5850	12.54	24.90	4.90	4.80	1.33	0.70	--	21.17	6.59
6000	11.94	25.62	4.34	4.07	1.34	0.66	36.23	20.83	6.84

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 9.00V, Id = 187mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.63	19.97	14.34	18.11	1.17	0.70	43.79	25.96	3.00
100	14.72	20.18	14.21	17.02	1.18	0.70	--	26.07	2.92
200	14.75	20.28	13.99	16.46	1.18	0.70	--	26.27	2.94
300	14.74	20.29	13.94	16.33	1.18	0.71	--	26.33	3.03
450	14.71	20.30	13.85	16.27	1.18	0.71	--	26.36	3.14
600	14.66	20.29	13.78	16.34	1.19	0.71	--	26.37	2.96
750	14.61	20.27	13.70	16.41	1.19	0.72	--	26.40	2.98
900	14.55	20.28	13.61	16.45	1.19	0.72	45.87	26.43	2.85
1050	14.50	20.28	13.47	16.40	1.20	0.72	--	26.43	2.91
1200	14.46	20.29	13.27	16.21	1.20	0.73	--	26.56	2.95
1350	14.41	20.31	13.09	16.08	1.20	0.73	--	26.57	3.00
1500	14.36	20.33	12.92	15.87	1.21	0.73	--	26.63	2.90
1650	14.33	20.36	12.78	15.72	1.21	0.74	--	26.48	2.93
1800	14.29	20.39	12.63	15.54	1.21	0.74	--	26.55	2.97
1900	14.26	20.41	12.53	15.34	1.22	0.74	46.12	26.63	2.94
1950	14.25	20.42	12.52	15.36	1.22	0.74	--	26.47	2.98
2100	14.22	20.44	12.39	15.13	1.22	0.75	--	26.58	3.06
2140	14.21	20.46	12.38	14.99	1.22	0.75	45.39	26.51	3.11
2250	14.19	20.49	12.31	14.89	1.23	0.75	--	26.43	3.09
2400	14.17	20.52	12.24	14.71	1.23	0.75	--	26.29	3.12
2550	14.15	20.54	12.18	14.59	1.23	0.75	--	26.22	3.12
2700	14.14	20.59	12.17	14.50	1.24	0.75	--	25.86	3.22
2850	14.15	20.62	12.19	14.45	1.24	0.75	--	25.92	3.30
3000	14.15	20.65	12.20	14.39	1.24	0.75	--	25.80	3.24
3150	14.16	20.70	12.22	14.32	1.24	0.75	--	25.62	3.29
3300	14.18	20.74	12.27	14.29	1.25	0.75	--	25.27	3.35
3450	14.21	20.78	12.32	14.24	1.25	0.75	--	24.96	3.47
3600	14.24	20.84	12.35	14.22	1.25	0.76	--	24.80	3.59
3750	14.27	20.88	12.32	14.16	1.25	0.76	--	24.83	3.63
3900	14.31	20.95	12.26	14.12	1.25	0.76	--	24.67	3.76
4000	14.34	20.98	12.18	14.01	1.25	0.76	38.34	24.40	3.80
4050	14.35	21.03	12.11	14.03	1.25	0.76	--	24.45	3.78
4200	14.39	21.12	11.88	13.86	1.25	0.76	--	24.04	3.79
4350	14.42	21.21	11.60	13.58	1.25	0.76	--	23.86	3.97
4500	14.45	21.34	11.20	13.22	1.26	0.77	--	23.80	4.10
4650	14.47	21.46	10.70	12.75	1.26	0.77	--	23.40	4.24
4800	14.47	21.64	10.14	12.22	1.26	0.78	--	23.61	4.26
4950	14.44	21.85	9.51	11.56	1.26	0.78	--	22.78	4.44
5100	14.39	22.05	8.86	10.75	1.26	0.79	--	22.63	4.63
5250	14.31	22.34	8.15	9.77	1.26	0.79	--	22.71	4.76
5400	14.18	22.73	7.40	8.72	1.27	0.78	--	21.69	4.94
5550	13.96	23.17	6.66	7.68	1.28	0.78	--	22.11	5.11
5700	13.66	23.68	5.94	6.66	1.28	0.76	--	21.36	5.37
5850	13.27	24.23	5.25	5.71	1.28	0.74	--	21.20	5.52
6000	12.77	24.88	4.62	4.84	1.29	0.70	32.91	21.19	5.72

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 8.50V, Id = 174mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.61	19.96	14.31	18.18	1.17	0.70	43.75	25.53	2.96
100	14.70	20.17	14.16	16.97	1.18	0.70	--	25.55	2.91
200	14.73	20.28	13.95	16.43	1.18	0.71	--	25.73	2.88
300	14.72	20.29	13.89	16.30	1.18	0.71	--	25.80	2.98
450	14.68	20.28	13.81	16.26	1.18	0.71	--	25.84	3.01
600	14.64	20.28	13.74	16.33	1.19	0.71	--	25.84	2.93
750	14.58	20.28	13.66	16.39	1.19	0.72	--	25.87	2.93
900	14.53	20.27	13.55	16.42	1.19	0.72	44.72	25.91	2.83
1050	14.48	20.28	13.41	16.36	1.20	0.73	--	25.91	2.87
1200	14.43	20.29	13.20	16.17	1.20	0.73	--	26.05	2.87
1350	14.38	20.32	13.02	16.00	1.21	0.73	--	26.06	2.90
1500	14.33	20.33	12.84	15.80	1.21	0.74	--	26.13	2.82
1650	14.29	20.37	12.69	15.65	1.21	0.74	--	26.03	2.92
1800	14.25	20.39	12.55	15.47	1.22	0.74	--	26.02	2.91
1900	14.23	20.41	12.44	15.26	1.22	0.74	47.53	26.11	2.89
1950	14.21	20.43	12.43	15.28	1.22	0.75	--	25.96	2.93
2100	14.19	20.47	12.31	15.06	1.23	0.75	--	26.07	2.95
2140	14.17	20.46	12.28	14.92	1.23	0.75	46.48	26.07	3.05
2250	14.15	20.50	12.23	14.82	1.23	0.75	--	26.00	3.07
2400	14.13	20.52	12.16	14.66	1.23	0.75	--	25.79	3.00
2550	14.11	20.57	12.10	14.53	1.24	0.75	--	25.73	3.11
2700	14.10	20.61	12.09	14.45	1.24	0.76	--	25.34	3.14
2850	14.10	20.63	12.11	14.41	1.24	0.76	--	25.42	3.23
3000	14.10	20.67	12.11	14.36	1.24	0.76	--	25.30	3.28
3150	14.11	20.72	12.13	14.29	1.25	0.76	--	25.20	3.34
3300	14.13	20.75	12.17	14.26	1.25	0.76	--	24.85	3.28
3450	14.15	20.80	12.20	14.22	1.25	0.76	--	24.53	3.41
3600	14.17	20.86	12.23	14.19	1.26	0.76	--	24.29	3.51
3750	14.20	20.92	12.18	14.14	1.26	0.76	--	24.32	3.56
3900	14.24	21.01	12.10	14.09	1.26	0.77	--	24.17	3.62
4000	14.26	21.03	12.01	13.98	1.26	0.76	37.26	23.89	3.73
4050	14.27	21.08	11.93	13.99	1.26	0.77	--	23.94	3.77
4200	14.30	21.15	11.70	13.82	1.26	0.77	--	23.52	3.74
4350	14.33	21.28	11.41	13.54	1.27	0.77	--	23.34	3.82
4500	14.35	21.39	11.02	13.18	1.27	0.78	--	23.27	3.93
4650	14.35	21.55	10.52	12.70	1.27	0.78	--	22.94	4.13
4800	14.34	21.74	9.96	12.18	1.27	0.79	--	23.06	4.15
4950	14.31	21.92	9.34	11.52	1.28	0.80	--	22.21	4.28
5100	14.24	22.13	8.70	10.72	1.28	0.80	--	22.05	4.48
5250	14.15	22.44	8.01	9.76	1.28	0.80	--	22.13	4.68
5400	14.01	22.82	7.28	8.72	1.29	0.80	--	21.09	4.80
5550	13.77	23.27	6.56	7.69	1.29	0.79	--	21.54	4.98
5700	13.46	23.77	5.87	6.69	1.30	0.78	--	20.77	5.26
5850	13.05	24.34	5.20	5.75	1.31	0.76	--	20.68	5.42
6000	12.55	25.01	4.58	4.89	1.31	0.73	33.01	20.63	5.61

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 9.50V, Id = 200mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.65	19.97	14.43	18.31	1.17	0.70	44.20	26.39	3.06
100	14.74	20.18	14.28	17.08	1.18	0.70	--	26.59	2.94
200	14.77	20.28	14.05	16.52	1.18	0.70	--	26.81	2.95
300	14.76	20.31	13.98	16.37	1.18	0.71	--	26.87	3.08
450	14.73	20.29	13.90	16.30	1.18	0.71	--	26.90	3.11
600	14.68	20.30	13.83	16.38	1.19	0.71	--	26.91	3.00
750	14.63	20.28	13.76	16.42	1.19	0.71	--	26.93	2.96
900	14.58	20.29	13.67	16.48	1.19	0.72	46.59	26.92	2.86
1050	14.53	20.28	13.53	16.44	1.19	0.72	--	26.97	2.90
1200	14.48	20.29	13.34	16.27	1.20	0.73	--	27.10	2.89
1350	14.43	20.31	13.16	16.13	1.20	0.73	--	27.05	2.94
1500	14.39	20.32	12.99	15.93	1.20	0.73	--	27.17	2.94
1650	14.35	20.36	12.85	15.79	1.21	0.74	--	27.04	3.00
1800	14.31	20.38	12.70	15.62	1.21	0.74	--	27.10	3.02
1900	14.29	20.38	12.59	15.40	1.21	0.74	45.83	27.11	2.97
1950	14.28	20.40	12.59	15.42	1.22	0.74	--	26.96	2.98
2100	14.26	20.45	12.46	15.18	1.22	0.74	--	27.12	3.03
2140	14.24	20.44	12.43	15.05	1.22	0.74	44.76	27.05	3.11
2250	14.22	20.47	12.37	14.94	1.22	0.74	--	26.95	3.11
2400	14.20	20.50	12.29	14.75	1.23	0.75	--	26.78	3.13
2550	14.19	20.54	12.23	14.62	1.23	0.75	--	26.75	3.21
2700	14.18	20.57	12.22	14.52	1.23	0.75	--	26.34	3.25
2850	14.19	20.59	12.24	14.46	1.23	0.75	--	26.39	3.28
3000	14.20	20.63	12.25	14.39	1.23	0.75	--	26.27	3.31
3150	14.21	20.66	12.27	14.32	1.24	0.75	--	26.17	3.36
3300	14.23	20.72	12.34	14.28	1.24	0.75	--	25.74	3.41
3450	14.26	20.75	12.39	14.23	1.24	0.75	--	25.53	3.49
3600	14.29	20.80	12.43	14.19	1.24	0.75	--	25.29	3.54
3750	14.33	20.84	12.42	14.13	1.24	0.75	--	25.31	3.65
3900	14.38	20.92	12.36	14.08	1.24	0.75	--	25.16	3.70
4000	14.41	20.95	12.29	13.97	1.24	0.75	38.56	24.90	3.76
4050	14.42	21.00	12.21	13.97	1.25	0.75	--	24.94	3.80
4200	14.46	21.07	11.99	13.80	1.25	0.75	--	24.54	3.83
4350	14.50	21.17	11.71	13.50	1.25	0.75	--	24.37	3.90
4500	14.54	21.28	11.33	13.15	1.25	0.76	--	24.31	4.04
4650	14.56	21.44	10.82	12.69	1.25	0.76	--	23.92	4.24
4800	14.57	21.58	10.25	12.14	1.25	0.76	--	24.15	4.26
4950	14.56	21.77	9.62	11.48	1.25	0.77	--	23.33	4.43
5100	14.51	21.98	8.96	10.67	1.25	0.77	--	23.18	4.57
5250	14.44	22.27	8.23	9.69	1.25	0.77	--	23.27	4.95
5400	14.32	22.65	7.47	8.64	1.25	0.76	--	22.18	4.89
5550	14.11	23.10	6.71	7.59	1.26	0.76	--	22.67	5.11
5700	13.82	23.57	5.98	6.58	1.26	0.74	--	21.87	5.42
5850	13.43	24.16	5.27	5.62	1.27	0.72	--	21.79	5.50
6000	12.94	24.83	4.63	4.75	1.27	0.68	32.74	21.70	5.74

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 9.00V, Id = 194mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.48	19.96	14.50	18.35	1.18	0.71	46.76	25.80	4.09
100	14.57	20.13	14.36	17.21	1.19	0.71	--	25.92	4.05
200	14.59	20.24	14.12	16.63	1.19	0.71	--	26.11	4.00
300	14.57	20.28	14.05	16.50	1.19	0.72	--	26.13	4.12
450	14.52	20.26	13.98	16.46	1.20	0.72	--	26.10	4.18
600	14.46	20.27	13.86	16.49	1.20	0.72	--	26.14	4.11
750	14.40	20.26	13.72	16.46	1.20	0.73	--	26.16	4.08
900	14.33	20.27	13.57	16.39	1.21	0.73	45.11	26.12	3.94
1050	14.27	20.29	13.37	16.21	1.21	0.74	--	26.15	4.04
1200	14.20	20.30	13.10	15.87	1.22	0.74	--	26.20	4.11
1350	14.14	20.32	12.87	15.59	1.22	0.74	--	26.15	4.13
1500	14.08	20.36	12.63	15.26	1.23	0.75	--	26.19	4.06
1650	14.03	20.39	12.44	14.97	1.23	0.75	--	26.14	4.11
1800	13.98	20.42	12.24	14.69	1.24	0.75	--	26.10	4.18
1900	13.95	20.43	12.11	14.41	1.24	0.75	40.90	26.07	4.17
1950	13.93	20.45	12.09	14.40	1.24	0.76	--	25.98	4.19
2100	13.89	20.50	11.93	14.07	1.25	0.76	--	25.95	4.27
2140	13.88	20.51	11.89	13.92	1.25	0.76	40.19	25.96	4.27
2250	13.84	20.53	11.81	13.75	1.25	0.76	--	25.75	4.39
2400	13.81	20.56	11.71	13.48	1.25	0.76	--	25.64	4.33
2550	13.78	20.65	11.64	13.27	1.26	0.76	--	25.51	4.42
2700	13.76	20.66	11.60	13.09	1.26	0.76	--	25.12	4.52
2850	13.75	20.74	11.60	12.93	1.27	0.76	--	25.06	4.63
3000	13.74	20.77	11.58	12.77	1.27	0.76	--	24.94	4.66
3150	13.74	20.82	11.56	12.58	1.28	0.76	--	24.73	4.67
3300	13.74	20.89	11.58	12.43	1.28	0.76	--	24.37	4.77
3450	13.74	20.96	11.58	12.26	1.29	0.76	--	24.15	4.87
3600	13.75	21.03	11.55	12.09	1.29	0.76	--	23.90	4.97
3750	13.76	21.13	11.45	11.92	1.30	0.76	--	23.94	5.06
3900	13.77	21.22	11.31	11.73	1.30	0.76	--	23.85	5.14
4000	13.78	21.29	11.18	11.55	1.30	0.76	36.44	23.48	5.22
4050	13.78	21.34	11.08	11.51	1.31	0.76	--	23.60	5.31
4200	13.77	21.47	10.78	11.24	1.31	0.77	--	23.17	5.37
4350	13.76	21.61	10.44	10.88	1.32	0.77	--	22.96	5.49
4500	13.73	21.80	10.00	10.48	1.33	0.77	--	22.95	5.62
4650	13.67	22.03	9.47	10.00	1.34	0.78	--	22.49	5.86
4800	13.59	22.29	8.89	9.48	1.35	0.78	--	22.58	5.91
4950	13.46	22.56	8.28	8.87	1.36	0.79	--	21.72	6.14
5100	13.29	22.88	7.65	8.17	1.37	0.79	--	21.64	6.34
5250	13.06	23.28	7.01	7.37	1.38	0.78	--	21.55	6.58
5400	12.76	23.79	6.36	6.55	1.40	0.77	--	20.54	6.76
5550	12.36	24.38	5.74	5.76	1.42	0.76	--	20.69	7.01
5700	11.87	24.93	5.16	5.00	1.43	0.73	--	20.12	7.31
5850	11.27	25.64	4.63	4.32	1.45	0.71	--	19.88	7.56
6000	10.59	26.33	4.16	3.71	1.47	0.67	34.87	19.36	7.77

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 8.50V, Id = 181mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.48	19.91	14.44	18.42	1.18	0.71	46.84	25.34	4.00
100	14.57	20.13	14.29	17.21	1.19	0.71	--	25.41	3.97
200	14.59	20.23	14.06	16.64	1.19	0.71	--	25.59	3.97
300	14.57	20.26	13.99	16.51	1.19	0.72	--	25.62	4.08
450	14.52	20.24	13.92	16.46	1.20	0.72	--	25.59	4.14
600	14.46	20.25	13.80	16.52	1.20	0.72	--	25.64	4.02
750	14.39	20.25	13.67	16.50	1.20	0.73	--	25.65	4.01
900	14.32	20.26	13.52	16.44	1.21	0.73	45.59	25.62	3.90
1050	14.26	20.27	13.33	16.26	1.21	0.74	--	25.65	4.00
1200	14.20	20.29	13.07	15.94	1.22	0.74	--	25.76	3.94
1350	14.13	20.33	12.84	15.66	1.22	0.75	--	25.67	4.03
1500	14.07	20.36	12.62	15.34	1.23	0.75	--	25.71	4.03
1650	14.02	20.39	12.43	15.05	1.23	0.75	--	25.64	4.05
1800	13.97	20.43	12.24	14.78	1.24	0.76	--	25.60	4.10
1900	13.93	20.44	12.11	14.53	1.24	0.76	40.30	25.64	4.08
1950	13.91	20.47	12.08	14.49	1.24	0.76	--	25.49	4.18
2100	13.87	20.49	11.93	14.18	1.25	0.76	--	25.54	4.19
2140	13.85	20.51	11.89	14.03	1.25	0.76	39.57	25.48	4.28
2250	13.82	20.55	11.81	13.85	1.25	0.76	--	25.35	4.30
2400	13.78	20.58	11.71	13.59	1.26	0.76	--	25.22	4.24
2550	13.76	20.63	11.63	13.39	1.26	0.76	--	25.11	4.35
2700	13.73	20.68	11.59	13.23	1.27	0.77	--	24.64	4.43
2850	13.72	20.72	11.58	13.07	1.27	0.77	--	24.59	4.55
3000	13.71	20.77	11.56	12.92	1.28	0.77	--	24.54	4.54
3150	13.69	20.84	11.54	12.75	1.28	0.77	--	24.33	4.63
3300	13.69	20.90	11.55	12.61	1.29	0.77	--	23.98	4.65
3450	13.69	20.97	11.55	12.46	1.29	0.77	--	23.74	4.77
3600	13.70	21.06	11.52	12.33	1.30	0.77	--	23.49	4.90
3750	13.70	21.15	11.43	12.16	1.31	0.77	--	23.53	5.03
3900	13.71	21.24	11.29	12.00	1.31	0.77	--	23.43	5.11
4000	13.71	21.34	11.16	11.84	1.32	0.78	36.33	23.05	5.15
4050	13.71	21.35	11.06	11.79	1.32	0.78	--	23.17	5.17
4200	13.69	21.50	10.77	11.54	1.32	0.78	--	22.73	5.25
4350	13.68	21.64	10.43	11.20	1.33	0.78	--	22.51	5.41
4500	13.64	21.81	9.99	10.80	1.34	0.79	--	22.50	5.54
4650	13.58	22.05	9.47	10.33	1.35	0.80	--	22.02	5.73
4800	13.49	22.29	8.90	9.81	1.36	0.80	--	22.11	5.83
4950	13.35	22.57	8.29	9.19	1.37	0.81	--	21.23	6.01
5100	13.17	22.86	7.67	8.47	1.38	0.81	--	21.15	6.20
5250	12.94	23.28	7.04	7.66	1.40	0.81	--	21.07	6.52
5400	12.65	23.77	6.40	6.82	1.41	0.80	--	20.04	6.65
5550	12.24	24.31	5.79	6.00	1.43	0.79	--	20.24	6.90
5700	11.75	24.90	5.21	5.24	1.45	0.76	--	19.65	7.19
5850	11.16	25.56	4.68	4.52	1.47	0.73	--	19.42	7.41
6000	10.49	26.20	4.20	3.90	1.49	0.70	35.08	19.03	7.69

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

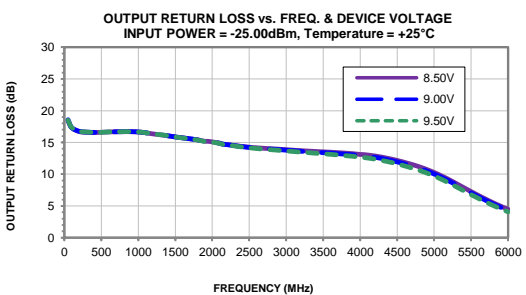
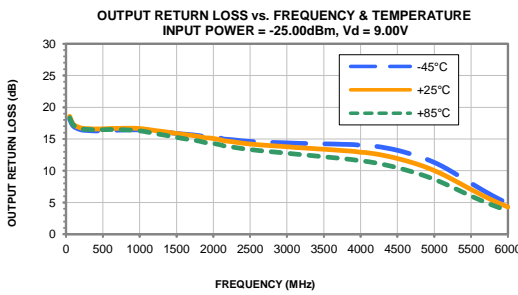
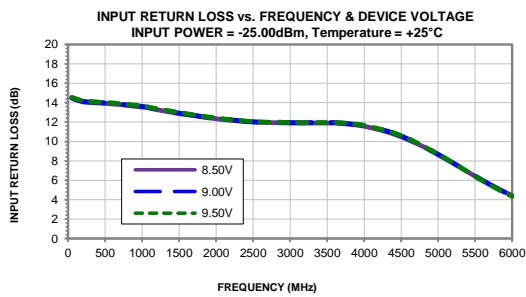
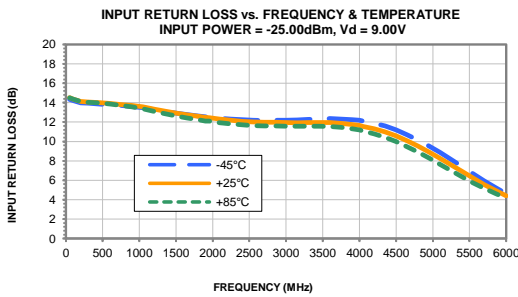
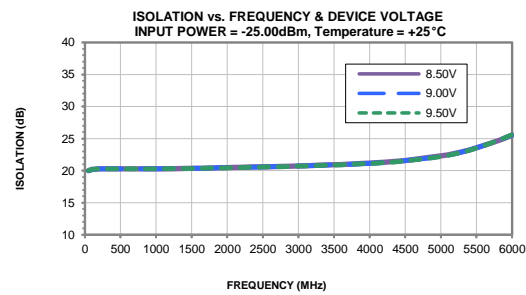
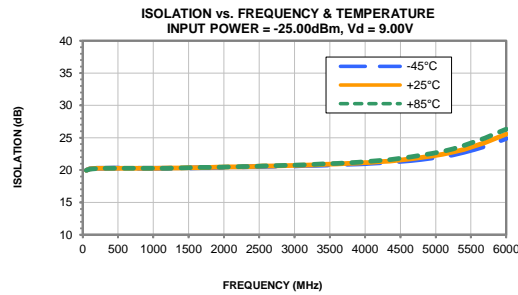
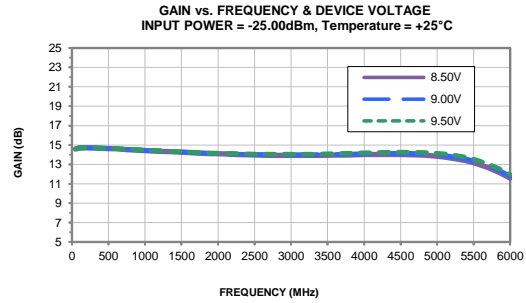
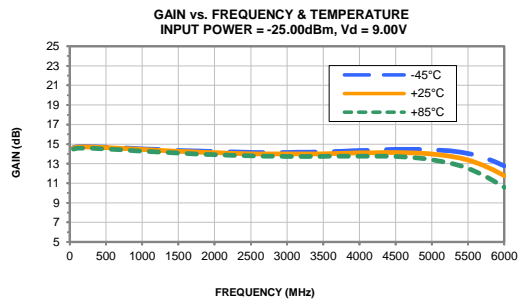
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 9.50V, Id = 207mA @ Temperature = +85°C

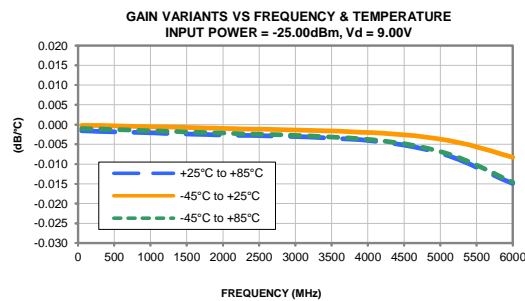
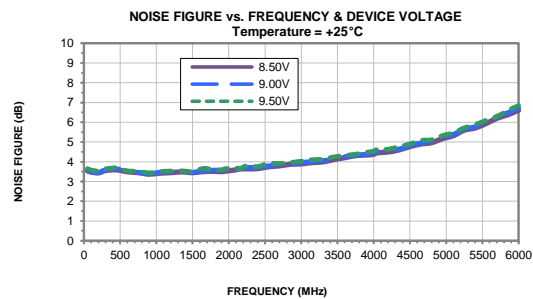
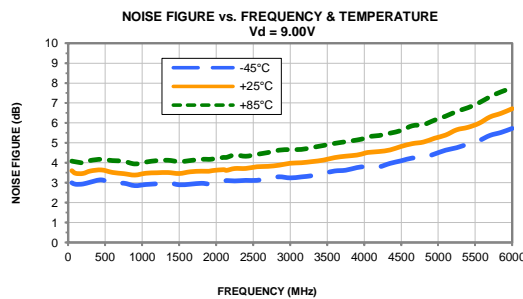
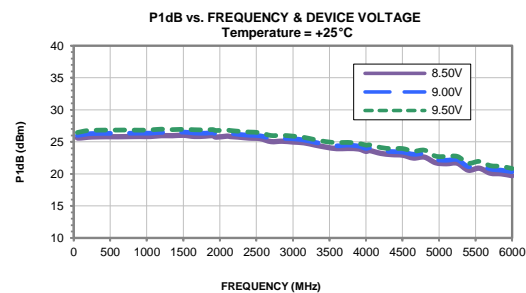
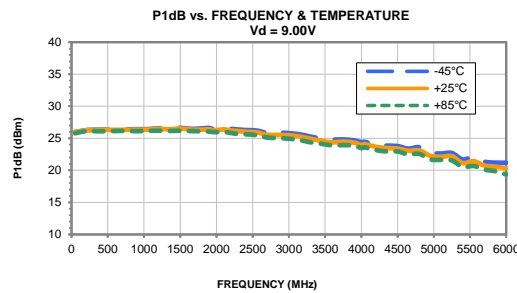
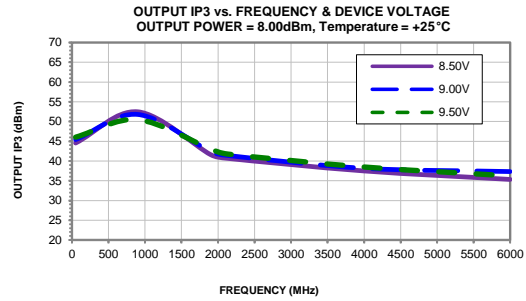
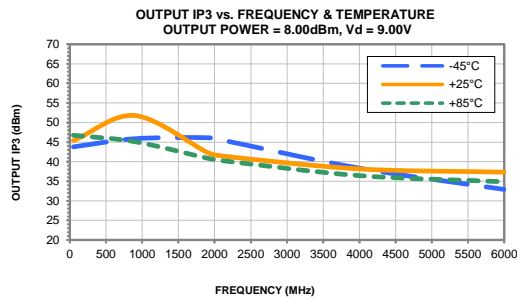
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.48	19.95	14.54	18.31	1.18	0.71	45.56	26.20	4.16
100	14.57	20.13	14.41	17.20	1.19	0.71	--	26.41	4.08
200	14.59	20.24	14.17	16.61	1.19	0.71	--	26.62	4.09
300	14.57	20.26	14.10	16.49	1.19	0.71	--	26.57	4.22
450	14.52	20.26	14.02	16.44	1.20	0.72	--	26.60	4.27
600	14.47	20.27	13.90	16.47	1.20	0.72	--	26.59	4.16
750	14.40	20.25	13.77	16.43	1.20	0.73	--	26.60	4.12
900	14.33	20.27	13.62	16.35	1.21	0.73	44.10	26.61	4.01
1050	14.27	20.28	13.41	16.15	1.21	0.74	--	26.64	4.13
1200	14.21	20.30	13.13	15.82	1.22	0.74	--	26.68	4.14
1350	14.15	20.33	12.90	15.53	1.22	0.74	--	26.57	4.21
1500	14.09	20.35	12.66	15.20	1.23	0.75	--	26.59	4.13
1650	14.04	20.39	12.45	14.92	1.23	0.75	--	26.56	4.23
1800	13.99	20.40	12.27	14.62	1.23	0.75	--	26.52	4.22
1900	13.96	20.43	12.13	14.36	1.24	0.75	41.19	26.54	4.24
1950	13.95	20.45	12.11	14.34	1.24	0.75	--	26.40	4.33
2100	13.91	20.48	11.94	14.00	1.24	0.75	--	26.42	4.29
2140	13.90	20.50	11.91	13.85	1.24	0.75	40.54	26.36	4.24
2250	13.87	20.53	11.82	13.66	1.25	0.75	--	26.14	4.39
2400	13.84	20.56	11.73	13.39	1.25	0.75	--	26.03	4.47
2550	13.81	20.61	11.64	13.18	1.26	0.76	--	25.89	4.56
2700	13.80	20.64	11.61	12.98	1.26	0.76	--	25.51	4.60
2850	13.79	20.71	11.61	12.81	1.26	0.76	--	25.43	4.67
3000	13.78	20.74	11.59	12.62	1.27	0.75	--	25.32	4.70
3150	13.78	20.81	11.58	12.44	1.27	0.75	--	25.12	4.77
3300	13.79	20.87	11.59	12.25	1.27	0.75	--	24.75	4.84
3450	13.79	20.93	11.57	12.07	1.28	0.75	--	24.54	4.95
3600	13.81	21.02	11.55	11.89	1.28	0.75	--	24.29	5.11
3750	13.82	21.11	11.45	11.68	1.29	0.75	--	24.33	5.15
3900	13.84	21.20	11.30	11.48	1.29	0.75	--	24.16	5.25
4000	13.85	21.28	11.17	11.29	1.29	0.75	36.32	23.88	5.34
4050	13.85	21.32	11.07	11.23	1.30	0.75	--	24.00	5.39
4200	13.85	21.45	10.78	10.94	1.30	0.75	--	23.58	5.41
4350	13.84	21.61	10.43	10.57	1.31	0.76	--	23.38	5.60
4500	13.82	21.80	9.98	10.15	1.31	0.76	--	23.37	5.72
4650	13.76	22.01	9.45	9.67	1.32	0.76	--	22.92	5.99
4800	13.69	22.28	8.85	9.14	1.33	0.77	--	23.02	6.03
4950	13.57	22.54	8.23	8.54	1.34	0.77	--	22.18	6.25
5100	13.40	22.88	7.61	7.85	1.35	0.77	--	22.09	6.46
5250	13.17	23.30	6.95	7.07	1.36	0.76	--	22.09	6.72
5400	12.88	23.85	6.30	6.26	1.38	0.75	--	21.09	6.89
5550	12.47	24.41	5.67	5.49	1.40	0.73	--	21.13	7.14
5700	11.96	25.04	5.09	4.76	1.41	0.70	--	20.58	7.46
5850	11.36	25.71	4.56	4.10	1.43	0.67	--	20.31	7.69
6000	10.67	26.44	4.09	3.51	1.45	0.64	33.81	19.71	7.95

## Typical Performance Curves

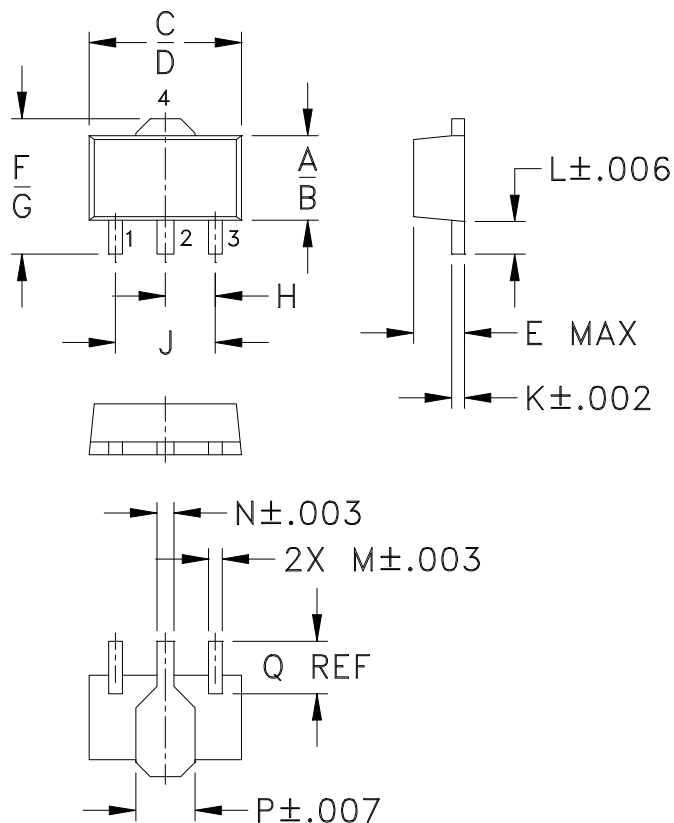




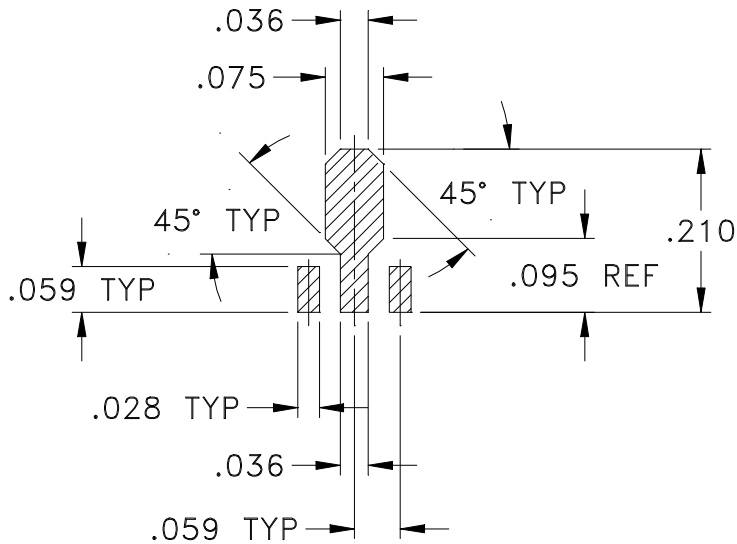
## Typical Performance Curves



### 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
DF782	.102 (2.59)	.090 (2.29)	.181 (4.60)	.173 (4.39)	.063 (1.60)	.167 (4.24)	.155 (3.94)	.059 (1.50)	.118 (3.00)	.015 (0.38)	.041 (1.04)	.016 (0.41)

CASE #	N	P	Q	WT. GRAM
DF782	.019 (0.48)	.065 (1.65)	.062 (1.57)	.2

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

#### Notes:

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



INTERNET <http://www.minicircuits.com>

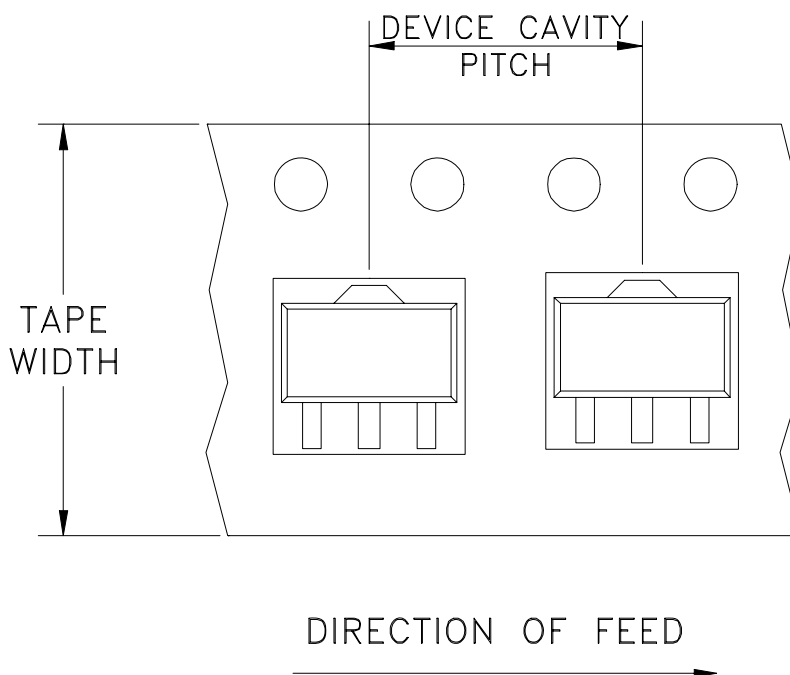
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

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Mini-Circuits ISO 9001 & ISO 14001 Certified

# Tape & Reel Packaging TR-F55

## DEVICE ORIENTATION IN T&R



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

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

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

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



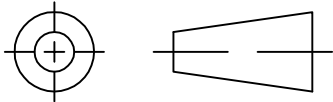
INTERNET <http://www.minicircuits.com>

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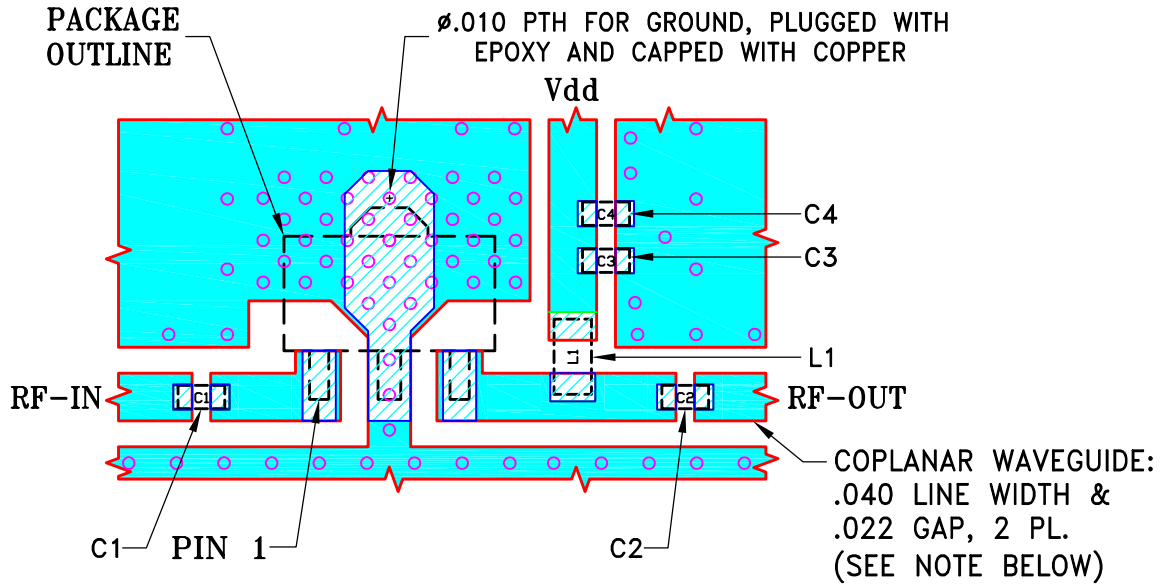
THIRD ANGLE PROJECTION



REVISIONS

REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	ECO-002234	NEW RELEASE	03/25/20	ITG	CC


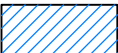
SUGGESTED MOUNTING CONFIGURATION FOR DF782 CASE STYLE




COMPONENT	SIZE
C1...C4	0402
L1	0603

NOTES:

1. LINE WIDTH & GAP ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.020 \pm .0015$ "; COPPER: 1 OZ. FOR OTHER MATERIALS LINE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-PHA-102+.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

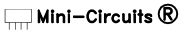
 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).  
 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

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	ITG	03/24/20
	CHECKED	GF	03/24/20
	APPROVED	CC	03/25/20

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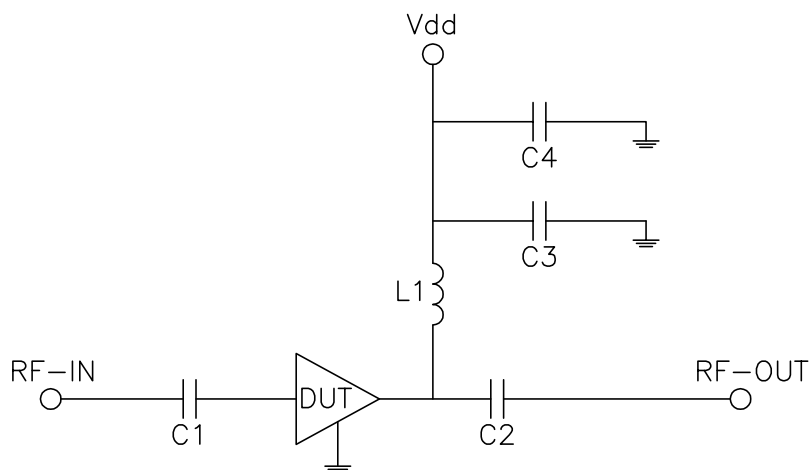
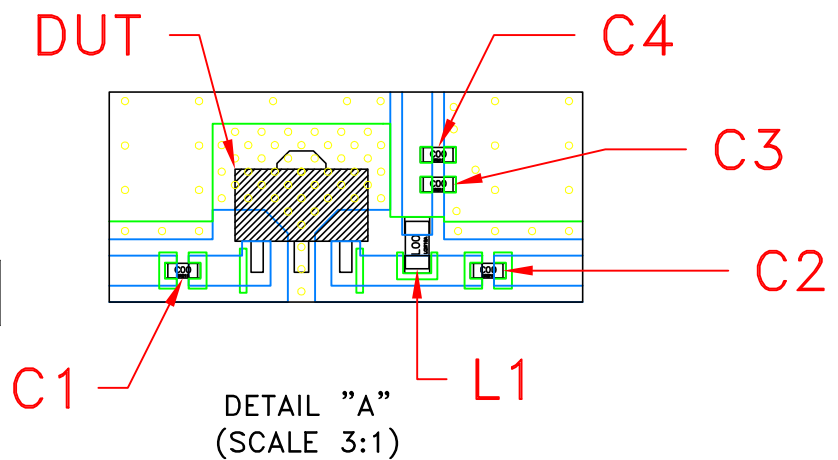
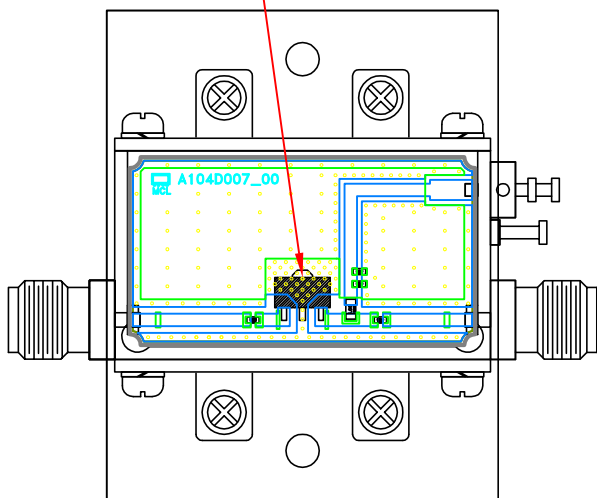
PL, DF782, TB-PHA-102+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-670	OR
FILE:	98PL670	SCALE: 6:1	SHEET: 1 OF 1

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# Evaluation Board and Circuit

SEE DETAIL "A"




SCHEMATIC DIAGRAM

Component	Size	Value	Part Number	Manufacturer
C1	0402	1000pF	GRM1555C1H102JA01D	Murata
C2	0402	1000pF	GRM1555C1H102JA01D	Murata
C3	0402	100pF	GRM1555C1H101JA01D	Murata
C4	0402	10000pF	GRM155R71H103KA88D	Murata
L1	0603	390nH	LQW18CNR39J00D	Murata

## Notes:

1. 50 Ohm SMA Female Connectors.
2. PCB Material: Roger R04350B or equivalent,  
Dielectric constant=3.5, Thickness=0.020 inch

 **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	-40° to 85°C or -45° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° 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	