ULTRA HIGH DYNAMIC RANGE

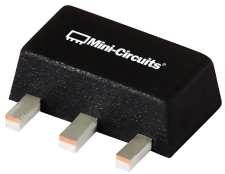
Monolithic Amplifier

PHA-101+

50Ω 0.05 to 1.5 GHz

THE BIG DEAL

- Ultra High IP3
- Broadband High Dynamic Range without External Matching Components
- May be used as a replacement to WJ AH101[a,b]



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

- Base station infrastructure
- CATV
- LTE

PRODUCT OVERVIEW

PHA-101+ (RoHS compliant) is an advanced wideband amplifier fabricated using E-PHEMT* technology and offers extremely high dynamic range over a broad frequency range and with low noise figure. In addition, the PHA-101+ has good input and output return loss over a broad frequency range without the need for external matching components and has demonstrated excellent reliability. It has repeatable performance from lot to lot and is enclosed in a SOT-89 package for very good thermal performance.

KEY FEATURES

Feature	Advantages
Broad Band: 0.05 to 1.5 GHz	Broadband covering primary wireless communications bands: Cellular, PCS, LTE
Extremely High IP3 Versus DC power Consumption +45 dBm typical at 0.9 GHz	The PHA-101+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and E-PHEMT Structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being typically 20 dB above the P 1dB point. This feature makes this amplifier ideal for use in: • Driver amplifiers for complex waveform up converter paths • Drivers in linearized transmit systems • Secondary amplifiers in ultra High Dynamic range receivers
No External Matching Components Required	Unlike competing products, Mini-Circuits PHA-101+ provides Input and Output Return Loss of 9.9-12.5 dB up to 1.5 GHz without the need for any external matching components

* Enhancement mode pseudomorphic High Electron Mobility Transistor.
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 AH1 part number is used for identification and comparison purposes only.

REV. B
ECO-010399
PHA-101+
MCL NY
240722

Monolithic Amplifier

PHA-101+

50Ω 0.05 to 1.5 GHz

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

Parameter	Condition (MHz)	Vd=+9V[1] Min.	Typ.	Max.	Units
Frequency range		0.05		1.5	GHz
Gain	50	—	15.3	—	dB
	450	—	15.5	—	
	900	13.8	15.2	16.9	
	1500	—	15.0	—	
Input Return Loss	50		10.7		dB
	450		11.4		
	900		10.7		
	1500		9.5		
Output Return Loss	50		13.2		dB
	450		10.7		
	900		10.2		
	1500		8.9		
Reverse Isolation			20.5		dB
Output Power @1dB Compression	50		+25.3		dBm
	450		+26.2		
	900		+25.8		
	1500		+25.4		
Output IP3[2]	50	—	+47.0	—	dBm
	450	—	+44.3	—	
	900	+40.0	+45.0	—	
	1500	—	+43.8	—	
Noise Figure	50		4.1		dB
	450		3.9		
	900		4.0		
	1500		4.2		
Device Operating Voltage			+9.0		V
Device Operating Current		—	182	220	mA
Device Current Variation vs. Temperature[3]			-4		µA/°C
Device Current Variation vs. Voltage			0.024		mA/mV
Thermal Resistance, junction-to-ground lead at +85°C stage temperature			20		°C/W

1. Measured on Mini-Circuits Characterization test board TB-869+. See Characterization Test Circuit (Fig. 1)
2. Tested at Pout=8dBm / tone.
3. (Current at 85°C — Current at -45°C)/130

Monolithic Amplifier PHA-101+

50Ω 0.05 to 1.5 GHz

ABSOLUTE MAXIMUM RATINGS[4]

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to +85°C
Storage Temperature	-65°C to +150°C
Operating Current at 9V	360 mA
Power Dissipation	3.25 W
Input Power (CW)	+24 dBm (5 minutes max.) +20 dBm (continuous)
DC Voltage on Pin 3	+11 V

4. 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. 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", Fig. 2
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.

CHARACTERIZATION TEST CIRCUIT

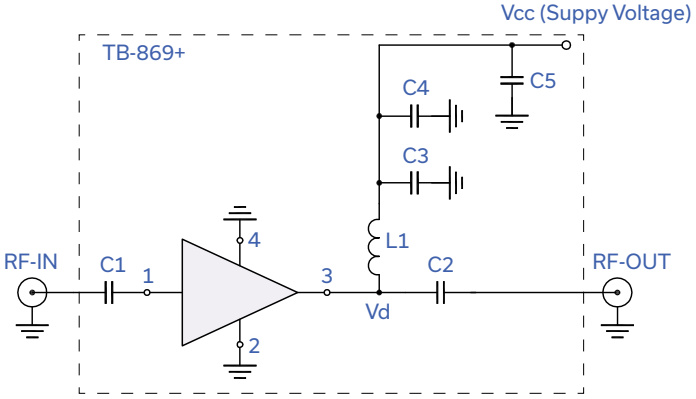


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-869+)

Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

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

RECOMMENDED APPLICATION CIRCUIT (TB-869A+)

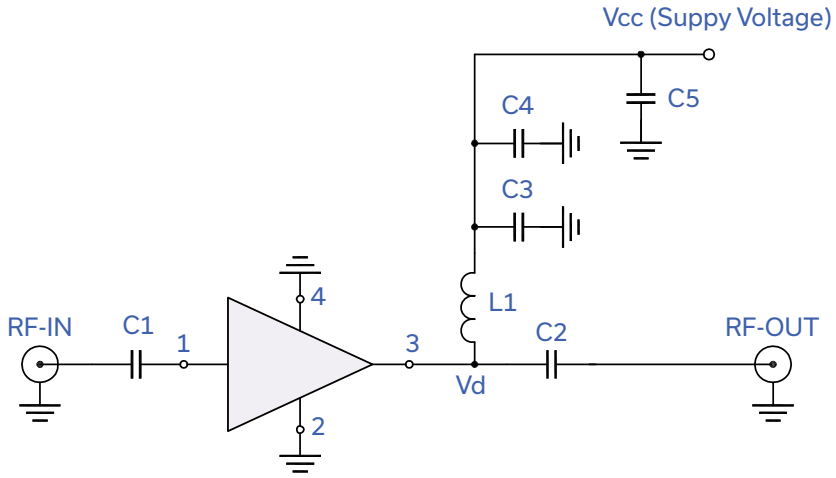
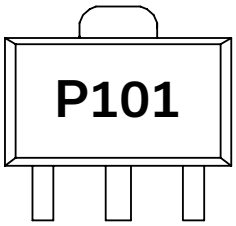


Fig 2. Test board (TB-869A+) includes case, connectors, and components soldered to PCB

Component	Value	Size	Part Number	Manufacturer
C1, C2, C3	150 pF	0603	GRM1885C1H151JA01D	Murata
C4	0.01 µF	0603	GRM188R71H103KA01D	Murata
C5	10 µF	1206	GRM31CR61H106KA12L	Murata
L1	390 nH	0505	0805CS-391XJEC	Coilcraft

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

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-486
Evaluation Board	TB-869A+
Environmental Ratings	ENV008T1

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

Machine Model (MM): Class M1 (>25V) in accordance with ANSI/ESD STM5.2-1999

MSL RATING
Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

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

Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions

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

TEST CONDITIONS: Vd = 9V, Id = 190.68 mA @ Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	15.27	20.39	11.33	14.18	1.13	0.67	48.57	25.93	4.12
100	15.49	20.63	12.58	12.60	1.14	0.63	45.82	26.49	4.04
150	15.51	20.74	12.56	12.06	1.14	0.63	45.50	26.41	3.98
200	15.52	20.77	12.55	11.88	1.14	0.62	45.27	26.63	3.89
250	15.51	20.81	12.52	11.78	1.14	0.62	44.99	26.48	4.01
300	15.50	20.85	12.47	11.71	1.15	0.63	44.46	26.66	4.04
350	15.48	20.82	12.45	11.63	1.14	0.62	43.54	26.67	4.10
400	15.46	20.84	12.39	11.58	1.15	0.63	43.35	26.45	4.08
450	15.44	20.84	12.33	11.52	1.15	0.63	42.92	26.55	4.08
500	15.42	20.87	12.26	11.43	1.15	0.63	42.77	26.47	4.12
550	15.40	20.91	12.17	11.36	1.15	0.63	42.68	26.58	4.09
600	15.38	20.89	12.16	11.31	1.15	0.63	42.55	26.39	4.10
650	15.36	20.89	12.04	11.25	1.15	0.63	42.78	26.40	4.09
700	15.33	20.93	12.00	11.22	1.16	0.63	43.22	26.53	4.10
750	15.32	20.92	11.90	11.12	1.16	0.63	43.07	26.57	4.05
800	15.30	20.97	11.81	11.02	1.16	0.64	43.31	26.55	4.03
850	15.28	20.99	11.74	10.96	1.16	0.64	43.68	26.64	4.02
1000	15.21	21.07	11.42	10.63	1.16	0.64	44.91	26.60	4.14
1050	15.20	21.10	11.27	10.49	1.17	0.64	44.91	26.52	4.12
1100	15.18	21.14	11.20	10.39	1.17	0.64	45.25	26.57	4.12
1150	15.15	21.17	11.08	10.26	1.17	0.64	45.14	26.71	4.18
1200	15.13	21.23	10.99	10.12	1.17	0.64	46.20	26.48	4.20
1250	15.11	21.28	10.87	10.01	1.18	0.65	46.47	26.54	4.15
1300	15.08	21.36	10.74	9.83	1.18	0.65	46.16	26.23	4.20
1350	15.04	21.42	10.68	9.70	1.18	0.65	47.37	26.34	4.20
1400	15.05	21.45	10.53	9.64	1.18	0.65	46.77	26.14	4.21
1450	15.04	21.53	10.38	9.50	1.19	0.65	46.13	26.14	4.23
1500	15.02	21.54	10.28	9.37	1.19	0.65	44.94	26.19	4.20
1550	14.99	21.66	10.15	9.24	1.19	0.65	43.39	26.07	4.26
1600	14.97	21.71	10.09	9.10	1.20	0.65	43.61	25.97	4.28
1650	14.94	21.78	9.93	8.94	1.20	0.65	44.29	25.99	4.29
1700	14.90	21.89	9.83	8.81	1.21	0.66	42.39	25.70	4.23
1750	14.87	22.02	9.75	8.70	1.22	0.66	41.46	25.76	4.36
1800	14.81	22.13	9.61	8.57	1.23	0.67	41.62	25.63	4.32
1850	14.76	22.21	9.56	8.42	1.23	0.67	41.39	25.52	4.52
1900	14.70	22.38	9.39	8.28	1.25	0.67	41.32	25.48	4.44
1950	14.62	22.53	9.30	8.13	1.26	0.68	41.07	25.42	4.47
2000	14.50	22.71	9.23	8.00	1.28	0.69	40.75	25.27	4.50

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 = 8.5V, Id =177.90 mA @ Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	15.25	20.62	11.33	14.22	1.15	0.69	48.81	25.41	4.02
100	15.47	20.66	12.53	12.62	1.14	0.63	45.09	25.95	3.98
150	15.49	20.75	12.53	12.07	1.14	0.63	45.04	25.86	3.89
200	15.50	20.77	12.50	11.87	1.14	0.63	44.50	26.09	3.84
250	15.49	20.83	12.47	11.77	1.15	0.63	43.32	25.94	3.95
300	15.47	20.81	12.41	11.68	1.14	0.63	43.46	26.14	3.96
350	15.46	20.85	12.40	11.62	1.15	0.63	41.84	26.13	4.03
400	15.43	20.86	12.32	11.57	1.15	0.63	41.74	25.91	4.04
450	15.42	20.88	12.29	11.53	1.15	0.63	41.61	26.01	4.04
500	15.40	20.88	12.22	11.44	1.15	0.63	41.10	25.95	4.04
550	15.38	20.87	12.12	11.37	1.15	0.63	41.94	26.06	4.03
600	15.36	20.90	12.11	11.33	1.15	0.63	41.82	25.85	4.03
650	15.33	20.91	12.01	11.28	1.16	0.63	42.24	25.85	4.02
700	15.31	20.91	11.97	11.22	1.16	0.63	42.61	26.02	4.03
750	15.30	20.92	11.87	11.14	1.16	0.64	42.80	26.05	4.00
800	15.27	20.95	11.76	11.05	1.16	0.64	43.31	26.04	3.94
850	15.26	20.96	11.71	10.97	1.16	0.64	44.23	26.13	3.97
1000	15.19	21.06	11.38	10.65	1.17	0.64	46.07	26.05	4.09
1050	15.17	21.10	11.24	10.51	1.17	0.64	46.35	26.00	4.11
1100	15.15	21.14	11.15	10.39	1.17	0.64	47.37	26.03	4.06
1150	15.13	21.19	11.05	10.27	1.17	0.65	45.95	26.17	4.10
1200	15.10	21.24	10.95	10.13	1.18	0.65	46.58	25.94	4.11
1250	15.08	21.31	10.83	10.01	1.18	0.65	45.71	26.03	4.10
1300	15.05	21.36	10.70	9.83	1.18	0.65	44.62	25.73	4.15
1350	15.01	21.42	10.64	9.70	1.19	0.65	44.92	25.84	4.17
1400	15.02	21.46	10.47	9.64	1.19	0.65	44.68	25.64	4.15
1450	15.01	21.50	10.34	9.50	1.19	0.65	44.13	25.66	4.14
1500	14.99	21.56	10.24	9.37	1.19	0.65	43.45	25.69	4.14
1550	14.95	21.66	10.11	9.24	1.20	0.66	41.94	25.60	4.21
1600	14.93	21.76	10.06	9.12	1.20	0.66	41.71	25.51	4.20
1650	14.90	21.83	9.89	8.95	1.21	0.66	42.36	25.52	4.22
1700	14.86	21.92	9.80	8.81	1.21	0.66	41.21	25.23	4.23
1750	14.83	22.04	9.72	8.71	1.22	0.67	40.45	25.30	4.31
1800	14.77	22.17	9.58	8.58	1.23	0.67	40.30	25.17	4.26
1850	14.72	22.27	9.53	8.44	1.24	0.67	40.19	25.06	4.44
1900	14.65	22.42	9.36	8.29	1.25	0.68	40.27	25.01	4.34
1950	14.57	22.58	9.28	8.15	1.27	0.68	39.87	24.96	4.40
2000	14.45	22.73	9.22	8.03	1.29	0.69	39.83	24.82	4.45

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 = 9.5V, Id = 202.27 mA @ Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	15.19	20.38	11.36	14.12	1.14	0.67	44.16	26.43	4.37
100	15.41	20.62	12.60	12.52	1.14	0.63	44.18	26.99	4.30
150	15.43	20.72	12.59	11.98	1.14	0.63	44.34	26.91	4.22
200	15.43	20.79	12.55	11.78	1.15	0.63	43.98	27.11	4.15
250	15.43	20.78	12.53	11.66	1.15	0.63	43.44	26.97	4.25
300	15.41	20.81	12.49	11.59	1.15	0.63	42.89	27.11	4.30
350	15.40	20.81	12.46	11.53	1.15	0.63	42.50	27.17	4.33
400	15.37	20.82	12.39	11.47	1.15	0.63	42.34	26.93	4.33
450	15.36	20.83	12.34	11.42	1.15	0.63	42.12	27.01	4.33
500	15.34	20.88	12.29	11.35	1.16	0.63	42.17	26.96	4.39
550	15.31	20.84	12.19	11.26	1.15	0.63	41.90	27.05	4.36
600	15.30	20.88	12.18	11.21	1.16	0.63	42.00	26.85	4.33
650	15.27	20.90	12.07	11.17	1.16	0.63	41.93	26.87	4.35
700	15.25	20.91	12.04	11.12	1.16	0.64	42.07	27.03	4.33
750	15.24	20.94	11.94	11.01	1.16	0.64	42.08	27.06	4.28
800	15.21	20.94	11.83	10.93	1.16	0.64	42.01	27.02	4.26
850	15.20	20.96	11.78	10.86	1.16	0.64	42.24	27.11	4.29
1000	15.13	21.05	11.43	10.53	1.17	0.64	42.94	27.07	4.37
1050	15.11	21.10	11.30	10.39	1.17	0.64	42.74	27.00	4.37
1100	15.09	21.10	11.23	10.28	1.17	0.64	42.94	27.04	4.38
1150	15.06	21.14	11.10	10.15	1.17	0.64	42.71	27.17	4.44
1200	15.04	21.23	11.00	10.01	1.18	0.65	43.03	26.96	4.42
1250	15.02	21.25	10.88	9.89	1.18	0.64	43.27	27.00	4.43
1300	14.99	21.32	10.75	9.72	1.18	0.65	43.24	26.69	4.47
1350	14.95	21.41	10.68	9.60	1.19	0.65	43.95	26.78	4.47
1400	14.96	21.45	10.52	9.53	1.19	0.65	44.00	26.57	4.46
1450	14.95	21.49	10.38	9.39	1.19	0.65	43.42	26.58	4.48
1500	14.93	21.54	10.27	9.26	1.19	0.65	43.18	26.61	4.46
1550	14.90	21.63	10.14	9.13	1.20	0.65	42.48	26.49	4.51
1600	14.87	21.68	10.08	8.99	1.20	0.65	43.05	26.41	4.50
1650	14.84	21.78	9.91	8.82	1.20	0.65	43.16	26.41	4.56
1700	14.81	21.88	9.81	8.69	1.21	0.66	41.62	26.11	4.51
1750	14.77	21.97	9.73	8.58	1.22	0.66	40.99	26.18	4.63
1800	14.71	22.12	9.59	8.45	1.23	0.67	41.35	26.04	4.61
1850	14.67	22.24	9.54	8.31	1.24	0.67	41.32	25.94	4.77
1900	14.60	22.39	9.36	8.17	1.25	0.67	40.98	25.90	4.68
1950	14.52	22.54	9.28	8.01	1.26	0.68	41.01	25.84	4.74
2000	14.41	22.70	9.23	7.90	1.29	0.69	40.53	25.66	4.77

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 = 9V, Id =191.59 mA @ Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	15.47	20.54	11.34	14.38	1.13	0.67	46.32	25.98	3.43
100	15.66	20.72	12.35	12.45	1.13	0.62	52.25	26.63	3.36
150	15.68	20.81	12.15	11.72	1.13	0.61	52.56	26.59	3.29
200	15.69	20.85	12.18	11.58	1.13	0.61	51.72	26.77	3.18
250	15.70	20.85	12.35	11.69	1.13	0.61	51.26	26.65	3.31
300	15.71	20.87	12.49	11.82	1.13	0.61	48.85	26.81	3.34
350	15.71	20.90	12.66	11.89	1.14	0.62	47.50	26.85	3.39
400	15.69	20.85	12.63	11.84	1.14	0.62	48.10	26.59	3.36
450	15.68	20.86	12.62	11.77	1.14	0.61	47.03	26.70	3.35
500	15.67	20.88	12.51	11.70	1.14	0.62	46.14	26.64	3.41
550	15.65	20.88	12.38	11.61	1.14	0.62	46.70	26.73	3.35
600	15.63	20.89	12.30	11.52	1.14	0.62	46.48	26.54	3.36
650	15.60	20.91	12.13	11.41	1.14	0.62	46.26	26.58	3.36
700	15.58	20.91	12.05	11.33	1.14	0.62	47.41	26.74	3.34
750	15.57	20.95	11.96	11.26	1.14	0.62	47.33	26.78	3.30
800	15.55	20.97	11.86	11.17	1.14	0.62	48.25	26.75	3.25
850	15.54	20.98	11.84	11.12	1.14	0.62	49.09	26.85	3.27
1000	15.49	21.03	11.66	10.92	1.15	0.62	55.49	26.79	3.39
1050	15.48	21.07	11.54	10.83	1.15	0.63	57.21	26.76	3.33
1100	15.46	21.10	11.49	10.76	1.15	0.63	50.47	26.79	3.37
1150	15.44	21.13	11.36	10.63	1.15	0.63	50.39	26.94	3.41
1200	15.43	21.18	11.30	10.50	1.16	0.63	47.84	26.75	3.40
1250	15.42	21.22	11.24	10.44	1.16	0.63	46.69	26.78	3.36
1300	15.39	21.26	11.14	10.31	1.16	0.63	45.42	26.53	3.42
1350	15.37	21.32	11.07	10.16	1.16	0.63	44.65	26.67	3.40
1400	15.34	21.37	10.99	10.10	1.17	0.64	44.62	26.44	3.40
1450	15.36	21.42	10.75	9.94	1.17	0.64	44.51	26.48	3.41
1500	15.35	21.46	10.60	9.77	1.17	0.63	44.15	26.53	3.37
1550	15.31	21.54	10.40	9.62	1.17	0.64	42.97	26.46	3.45
1600	15.29	21.63	10.31	9.46	1.18	0.64	42.10	26.37	3.44
1650	15.26	21.68	10.11	9.26	1.18	0.64	42.96	26.40	3.47
1700	15.23	21.77	10.00	9.10	1.18	0.64	42.42	26.11	3.41
1750	15.20	21.83	9.92	9.00	1.18	0.64	41.53	26.17	3.53
1800	15.15	21.98	9.79	8.86	1.20	0.65	41.04	26.07	3.51
1850	15.12	22.09	9.77	8.75	1.20	0.65	41.00	25.95	3.68
1900	15.06	22.20	9.62	8.63	1.21	0.66	41.19	25.93	3.58
1950	14.99	22.34	9.54	8.50	1.23	0.67	40.80	25.89	3.60
2000	14.89	22.48	9.48	8.37	1.24	0.67	40.85	25.74	3.65

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 = 8.5V, Id =178.39 mA @ Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	15.47	20.60	11.31	14.37	1.13	0.67	45.58	25.29	3.35
100	15.66	20.72	12.30	12.44	1.13	0.62	51.88	26.05	3.27
150	15.67	20.85	12.11	11.70	1.13	0.61	52.65	25.99	3.19
200	15.69	20.85	12.12	11.57	1.13	0.61	50.64	26.23	3.08
250	15.70	20.89	12.30	11.68	1.14	0.61	49.34	26.10	3.20
300	15.71	20.83	12.45	11.81	1.13	0.61	48.69	26.25	3.24
350	15.71	20.81	12.60	11.87	1.13	0.61	46.10	26.30	3.29
400	15.69	20.89	12.59	11.83	1.14	0.62	46.18	26.03	3.26
450	15.68	20.87	12.57	11.76	1.14	0.62	45.85	26.15	3.25
500	15.67	20.86	12.48	11.69	1.14	0.61	44.63	26.06	3.30
550	15.64	20.86	12.34	11.58	1.14	0.61	45.76	26.19	3.31
600	15.63	20.92	12.26	11.53	1.14	0.62	45.86	26.02	3.23
650	15.60	20.91	12.09	11.42	1.14	0.62	46.31	26.01	3.24
700	15.58	20.93	12.03	11.35	1.14	0.62	47.22	26.16	3.24
750	15.56	20.93	11.92	11.25	1.14	0.62	48.17	26.19	3.21
800	15.54	20.96	11.82	11.17	1.14	0.62	49.61	26.18	3.19
850	15.53	20.98	11.79	11.11	1.15	0.62	52.78	26.27	3.17
1000	15.48	21.03	11.62	10.93	1.15	0.63	48.05	26.23	3.25
1050	15.47	21.10	11.50	10.86	1.15	0.63	47.91	26.20	3.23
1100	15.46	21.10	11.46	10.77	1.15	0.63	46.62	26.25	3.25
1150	15.44	21.16	11.32	10.64	1.16	0.63	45.75	26.40	3.29
1200	15.42	21.20	11.26	10.52	1.16	0.63	44.20	26.19	3.28
1250	15.41	21.23	11.21	10.45	1.16	0.63	43.53	26.24	3.26
1300	15.39	21.31	11.10	10.32	1.16	0.64	42.75	25.98	3.32
1350	15.36	21.36	11.04	10.18	1.17	0.64	42.19	26.14	3.30
1400	15.33	21.40	10.96	10.10	1.17	0.64	42.29	25.91	3.31
1450	15.36	21.43	10.72	9.96	1.17	0.64	42.23	25.96	3.31
1500	15.34	21.48	10.58	9.80	1.17	0.64	41.70	26.00	3.27
1550	15.30	21.55	10.39	9.64	1.17	0.64	40.83	25.94	3.33
1600	15.29	21.61	10.30	9.49	1.17	0.64	40.31	25.86	3.31
1650	15.25	21.73	10.10	9.28	1.18	0.64	40.86	25.89	3.37
1700	15.22	21.80	9.99	9.12	1.18	0.64	40.59	25.61	3.32
1750	15.19	21.90	9.92	9.03	1.19	0.65	39.81	25.68	3.41
1800	15.14	21.99	9.79	8.91	1.20	0.65	39.44	25.56	3.39
1850	15.11	22.09	9.77	8.79	1.21	0.66	39.32	25.46	3.60
1900	15.05	22.19	9.62	8.69	1.21	0.66	39.57	25.43	3.45
1950	14.98	22.39	9.55	8.54	1.23	0.67	39.02	25.37	3.48
2000	14.87	22.52	9.48	8.43	1.25	0.68	39.26	25.24	3.53

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 = 9.5V, Id = 204.54 mA @ Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	15.46	20.47	11.39	14.34	1.13	0.66	48.29	26.41	3.52
100	15.66	20.69	12.39	12.45	1.13	0.62	50.02	27.13	3.46
150	15.67	20.83	12.19	11.71	1.13	0.61	51.85	27.07	3.37
200	15.68	20.86	12.20	11.58	1.13	0.61	51.54	27.30	3.29
250	15.70	20.84	12.37	11.68	1.13	0.61	50.23	27.19	3.41
300	15.71	20.87	12.52	11.83	1.14	0.62	49.39	27.32	3.45
350	15.70	20.80	12.68	11.87	1.13	0.61	47.31	27.37	3.50
400	15.69	20.85	12.66	11.84	1.14	0.62	46.90	27.08	3.45
450	15.68	20.85	12.62	11.77	1.14	0.61	46.78	27.23	3.47
500	15.66	20.88	12.56	11.68	1.14	0.62	45.98	27.14	3.49
550	15.64	20.89	12.40	11.59	1.14	0.62	45.58	27.24	3.49
600	15.62	20.87	12.34	11.51	1.14	0.61	45.71	27.06	3.48
650	15.60	20.91	12.15	11.40	1.14	0.62	45.62	27.11	3.45
700	15.58	20.90	12.09	11.32	1.14	0.62	46.12	27.24	3.46
750	15.56	20.94	11.98	11.23	1.14	0.62	46.29	27.29	3.44
800	15.54	20.94	11.89	11.14	1.14	0.62	46.29	27.33	3.39
850	15.53	20.97	11.87	11.08	1.14	0.62	46.22	27.38	3.39
1000	15.48	21.06	11.67	10.89	1.15	0.63	48.69	27.31	3.47
1050	15.48	21.06	11.56	10.81	1.15	0.63	48.34	27.25	3.47
1100	15.46	21.07	11.52	10.74	1.15	0.63	48.27	27.32	3.47
1150	15.44	21.11	11.39	10.61	1.15	0.63	50.53	27.45	3.51
1200	15.43	21.17	11.32	10.48	1.15	0.63	54.26	27.25	3.50
1250	15.41	21.21	11.26	10.41	1.16	0.63	55.06	27.31	3.48
1300	15.39	21.23	11.15	10.27	1.16	0.63	52.05	27.04	3.54
1350	15.37	21.32	11.09	10.13	1.16	0.63	49.88	27.18	3.52
1400	15.34	21.36	11.00	10.06	1.17	0.64	49.45	26.94	3.51
1450	15.36	21.40	10.76	9.91	1.16	0.63	50.59	26.97	3.52
1500	15.34	21.45	10.61	9.74	1.17	0.63	49.21	27.02	3.49
1550	15.31	21.53	10.41	9.57	1.17	0.64	46.46	26.93	3.55
1600	15.29	21.56	10.31	9.43	1.17	0.64	45.32	26.86	3.57
1650	15.26	21.66	10.11	9.22	1.17	0.64	46.89	26.87	3.61
1700	15.23	21.76	9.99	9.05	1.18	0.64	45.18	26.58	3.56
1750	15.20	21.85	9.91	8.95	1.18	0.64	43.72	26.65	3.65
1800	15.15	21.95	9.77	8.82	1.19	0.65	43.70	26.53	3.62
1850	15.12	22.04	9.76	8.70	1.20	0.65	43.55	26.43	3.77
1900	15.06	22.15	9.60	8.59	1.21	0.66	43.37	26.40	3.68
1950	14.99	22.35	9.53	8.43	1.22	0.66	43.10	26.33	3.72
2000	14.89	22.49	9.45	8.32	1.24	0.67	43.13	26.19	3.79

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 = 9V, Id = 186.26 mA @ Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.99	20.36	11.39	14.01	1.15	0.68	42.88	25.45	4.81
100	15.22	20.62	12.72	12.47	1.15	0.65	43.29	26.23	4.71
150	15.25	20.68	12.86	12.11	1.16	0.64	42.93	26.16	4.64
200	15.26	20.74	12.91	11.99	1.16	0.64	42.52	26.36	4.57
250	15.25	20.75	12.85	11.83	1.16	0.64	42.06	26.29	4.66
300	15.22	20.77	12.70	11.64	1.16	0.64	41.55	26.36	4.70
350	15.20	20.78	12.57	11.47	1.16	0.64	41.28	26.43	4.78
400	15.16	20.81	12.39	11.33	1.16	0.64	41.01	26.18	4.78
450	15.14	20.84	12.28	11.23	1.16	0.64	40.94	26.29	4.77
500	15.12	20.84	12.19	11.15	1.17	0.64	40.95	26.20	4.83
550	15.10	20.84	12.08	11.07	1.17	0.64	40.79	26.26	4.83
600	15.08	20.85	12.05	11.02	1.17	0.64	40.78	26.11	4.79
650	15.05	20.87	11.93	10.95	1.17	0.64	40.98	26.10	4.77
700	15.03	20.90	11.89	10.88	1.17	0.65	41.15	26.24	4.79
750	15.01	20.96	11.78	10.75	1.17	0.65	41.16	26.31	4.75
800	14.98	20.98	11.65	10.64	1.18	0.65	41.32	26.22	4.73
850	14.96	21.03	11.60	10.57	1.18	0.65	41.37	26.35	4.70
1000	14.89	21.11	11.23	10.23	1.18	0.65	42.06	26.25	4.84
1050	14.87	21.16	11.09	10.08	1.19	0.65	42.02	26.12	4.84
1100	14.85	21.19	11.02	9.97	1.19	0.65	42.05	26.17	4.83
1150	14.82	21.22	10.89	9.84	1.19	0.65	41.67	26.29	4.89
1200	14.80	21.29	10.81	9.71	1.19	0.65	42.19	26.07	4.92
1250	14.77	21.34	10.72	9.62	1.20	0.66	42.29	26.13	4.86
1300	14.74	21.38	10.60	9.45	1.20	0.66	41.90	25.77	4.94
1350	14.71	21.49	10.58	9.37	1.21	0.66	42.65	25.87	4.92
1400	14.71	21.51	10.41	9.29	1.21	0.66	42.57	25.64	4.93
1450	14.70	21.55	10.30	9.18	1.21	0.66	42.35	25.65	4.95
1500	14.68	21.60	10.22	9.07	1.21	0.66	42.03	25.69	4.90
1550	14.65	21.69	10.08	8.95	1.22	0.66	40.92	25.53	4.99
1600	14.63	21.77	10.05	8.83	1.22	0.66	41.40	25.45	4.98
1650	14.59	21.86	9.90	8.68	1.23	0.67	41.69	25.44	5.02
1700	14.56	21.95	9.82	8.55	1.23	0.67	40.32	25.15	4.98
1750	14.52	22.06	9.75	8.46	1.24	0.67	39.67	25.21	5.09
1800	14.46	22.16	9.62	8.34	1.25	0.68	39.95	25.07	5.06
1850	14.42	22.29	9.60	8.22	1.26	0.68	39.82	24.96	5.22
1900	14.35	22.45	9.41	8.09	1.28	0.69	39.77	24.92	5.15
1950	14.27	22.64	9.34	7.95	1.30	0.69	39.65	24.85	5.19
2000	14.16	22.78	9.29	7.86	1.32	0.70	39.43	24.67	5.23

Typical Performance Data

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

TEST CONDITIONS: Vd = 8.5V, Id = 175.82 mA @ Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	15.08	20.50	11.30	14.05	1.15	0.69	44.49	24.94	4.58
100	15.30	20.63	12.63	12.55	1.15	0.64	43.22	25.69	4.49
150	15.33	20.69	12.78	12.17	1.15	0.64	42.77	25.63	4.43
200	15.34	20.74	12.83	12.07	1.15	0.64	42.35	25.87	4.37
250	15.33	20.77	12.77	11.91	1.15	0.64	41.54	25.75	4.48
300	15.31	20.78	12.64	11.73	1.15	0.64	41.44	25.85	4.53
350	15.28	20.81	12.50	11.57	1.16	0.64	40.52	25.94	4.56
400	15.25	20.80	12.33	11.40	1.16	0.63	40.42	25.66	4.54
450	15.23	20.86	12.22	11.31	1.16	0.64	40.18	25.79	4.55
500	15.20	20.86	12.13	11.23	1.16	0.64	40.06	25.69	4.62
550	15.18	20.86	12.02	11.15	1.16	0.64	40.56	25.78	4.64
600	15.16	20.89	12.00	11.12	1.16	0.64	40.56	25.61	4.59
650	15.13	20.91	11.88	11.03	1.17	0.64	40.73	25.60	4.58
700	15.11	20.90	11.84	10.97	1.17	0.64	41.24	25.74	4.59
750	15.09	20.94	11.73	10.85	1.17	0.64	41.25	25.80	4.54
800	15.06	20.96	11.59	10.74	1.17	0.64	41.82	25.75	4.51
850	15.05	21.00	11.54	10.66	1.17	0.65	41.95	25.84	4.48
1000	14.97	21.09	11.18	10.32	1.18	0.65	42.77	25.76	4.62
1050	14.95	21.13	11.03	10.16	1.18	0.65	42.77	25.66	4.62
1100	14.93	21.18	10.97	10.05	1.18	0.65	43.24	25.67	4.62
1150	14.90	21.22	10.84	9.93	1.19	0.65	42.53	25.80	4.68
1200	14.88	21.28	10.76	9.80	1.19	0.65	43.17	25.62	4.70
1250	14.86	21.31	10.67	9.71	1.19	0.65	42.88	25.65	4.67
1300	14.83	21.40	10.55	9.53	1.20	0.66	42.31	25.30	4.74
1350	14.79	21.44	10.53	9.45	1.20	0.66	43.05	25.42	4.73
1400	14.80	21.49	10.36	9.37	1.20	0.66	42.71	25.20	4.72
1450	14.79	21.57	10.25	9.25	1.20	0.66	42.43	25.20	4.73
1500	14.77	21.62	10.17	9.15	1.21	0.66	42.02	25.24	4.70
1550	14.73	21.71	10.04	9.03	1.21	0.66	40.67	25.11	4.76
1600	14.71	21.76	10.02	8.91	1.22	0.66	40.84	25.02	4.76
1650	14.67	21.86	9.85	8.76	1.22	0.67	41.36	25.01	4.80
1700	14.64	21.98	9.79	8.63	1.23	0.67	40.08	24.72	4.78
1750	14.61	22.07	9.71	8.54	1.24	0.67	39.41	24.79	4.87
1800	14.55	22.21	9.57	8.43	1.25	0.68	39.47	24.64	4.82
1850	14.50	22.27	9.56	8.30	1.26	0.68	39.30	24.53	5.03
1900	14.43	22.49	9.37	8.17	1.27	0.69	39.27	24.50	4.92
1950	14.35	22.64	9.31	8.02	1.29	0.69	39.16	24.43	4.98
2000	14.24	22.81	9.27	7.94	1.31	0.70	39.03	24.26	5.01

Typical Performance Data

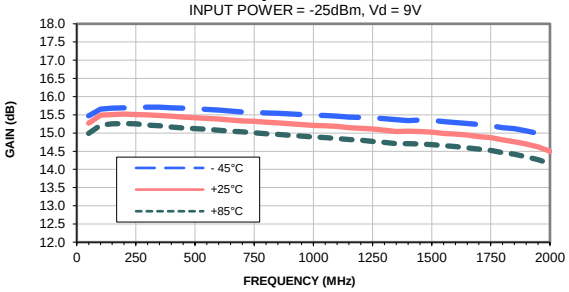
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 9.5V, Id = 196.61 mA @ Temperature = +85degC

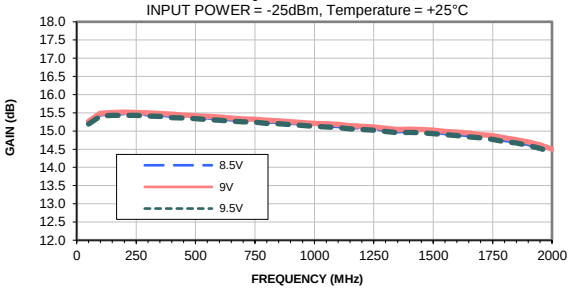
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	14.89	20.49	11.40	14.04	1.16	0.70	42.40	25.91	5.11
100	15.11	20.62	12.76	12.40	1.16	0.65	43.80	26.68	4.99
150	15.15	20.69	12.91	12.03	1.16	0.65	43.16	26.61	4.96
200	15.15	20.72	12.96	11.89	1.16	0.64	42.57	26.81	4.82
250	15.14	20.78	12.89	11.72	1.17	0.65	42.11	26.74	4.93
300	15.12	20.75	12.73	11.54	1.16	0.64	41.41	26.79	4.99
350	15.09	20.81	12.61	11.38	1.17	0.65	41.52	26.90	5.04
400	15.06	20.83	12.44	11.24	1.17	0.65	40.93	26.65	5.02
450	15.04	20.83	12.34	11.14	1.17	0.64	40.86	26.75	5.03
500	15.02	20.85	12.24	11.05	1.17	0.65	41.06	26.65	5.07
550	14.99	20.86	12.13	10.97	1.17	0.65	40.64	26.71	5.07
600	14.97	20.85	12.12	10.93	1.17	0.65	40.64	26.55	5.03
650	14.95	20.90	11.98	10.86	1.18	0.65	40.74	26.53	5.04
700	14.92	20.93	11.94	10.78	1.18	0.65	40.74	26.69	5.04
750	14.90	20.92	11.83	10.66	1.18	0.65	40.68	26.72	5.00
800	14.87	20.98	11.69	10.55	1.18	0.65	40.84	26.67	4.97
850	14.86	20.98	11.64	10.47	1.18	0.65	40.68	26.77	4.98
1000	14.78	21.11	11.28	10.13	1.19	0.66	41.37	26.69	5.09
1050	14.76	21.14	11.12	9.98	1.19	0.66	41.24	26.55	5.08
1100	14.74	21.16	11.07	9.88	1.19	0.65	41.14	26.60	5.09
1150	14.71	21.22	10.93	9.75	1.20	0.66	40.90	26.70	5.14
1200	14.69	21.28	10.85	9.62	1.20	0.66	41.20	26.50	5.13
1250	14.67	21.31	10.77	9.52	1.20	0.66	41.35	26.54	5.12
1300	14.63	21.40	10.64	9.36	1.21	0.66	41.19	26.17	5.16
1350	14.60	21.48	10.61	9.27	1.21	0.66	41.85	26.27	5.19
1400	14.61	21.47	10.44	9.20	1.21	0.66	41.82	26.02	5.18
1450	14.60	21.57	10.34	9.09	1.22	0.66	41.72	26.04	5.19
1500	14.58	21.61	10.26	8.98	1.22	0.66	41.56	26.06	5.17
1550	14.54	21.67	10.13	8.87	1.22	0.67	40.75	25.90	5.23
1600	14.52	21.80	10.10	8.74	1.23	0.67	41.41	25.83	5.24
1650	14.48	21.87	9.94	8.59	1.23	0.67	41.51	25.81	5.29
1700	14.45	21.97	9.86	8.46	1.24	0.67	40.31	25.52	5.26
1750	14.41	22.03	9.80	8.38	1.25	0.67	39.80	25.58	5.34
1800	14.35	22.16	9.65	8.25	1.26	0.68	40.14	25.44	5.32
1850	14.31	22.31	9.64	8.14	1.27	0.68	40.02	25.33	5.46
1900	14.24	22.44	9.45	8.01	1.28	0.69	39.86	25.28	5.40
1950	14.17	22.63	9.37	7.87	1.30	0.69	39.98	25.22	5.45
2000	14.05	22.78	9.34	7.78	1.32	0.70	39.60	25.03	5.51

Typical Performance Curves

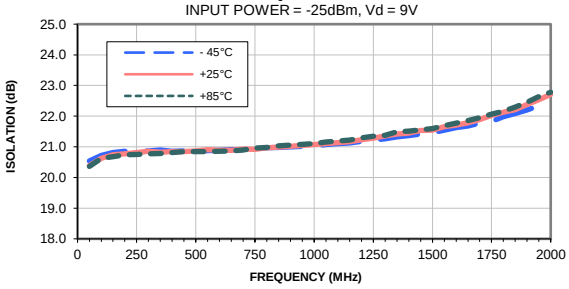
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 9V



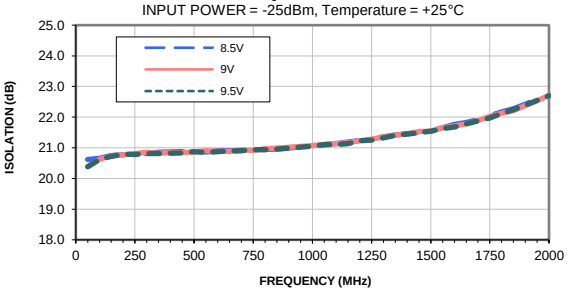
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C



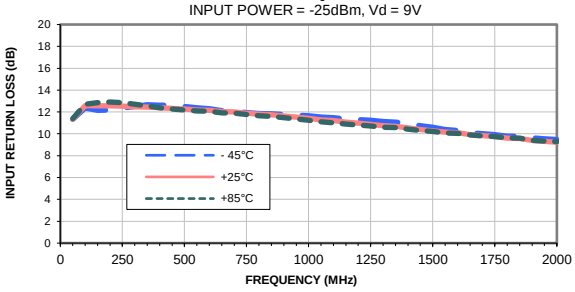
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 9V



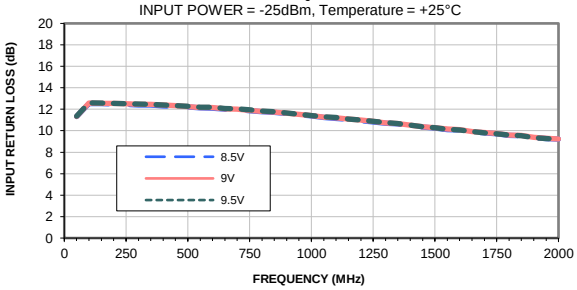
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C



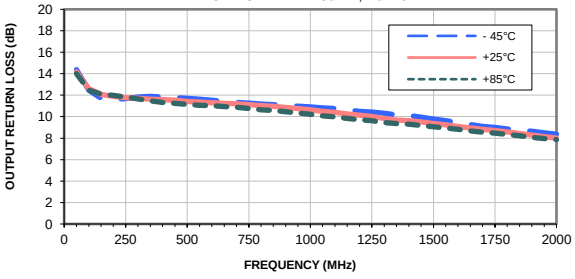
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 9V



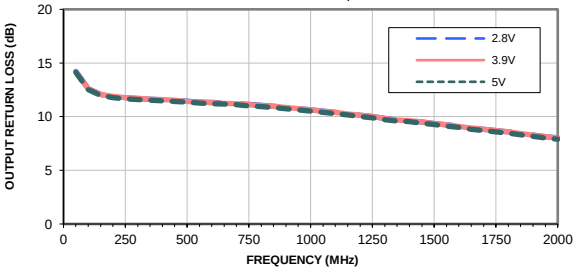
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C



OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 9V

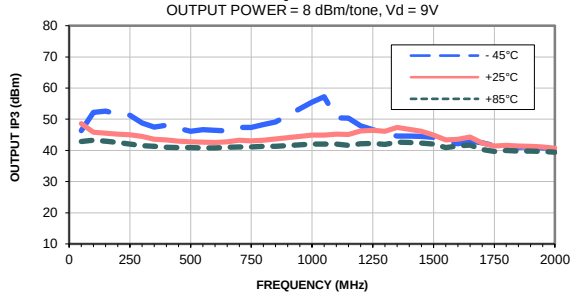


OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C

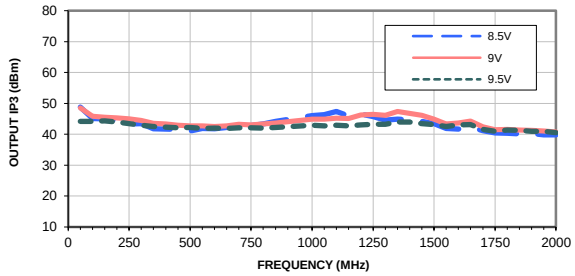


Typical Performance Curves

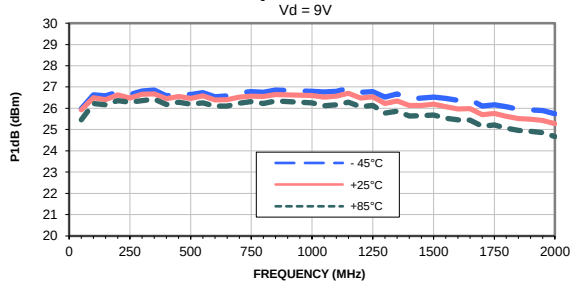
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTPUT POWER = 8 dBm/tone, Vd = 9V



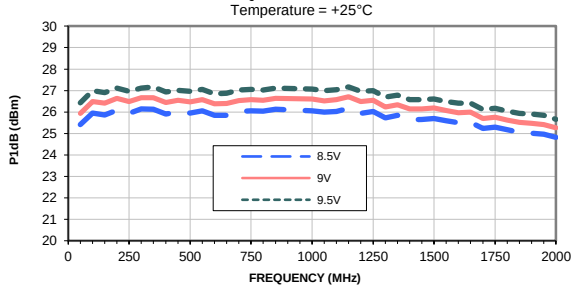
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
OUTPUT POWER = 8 dBm/tone



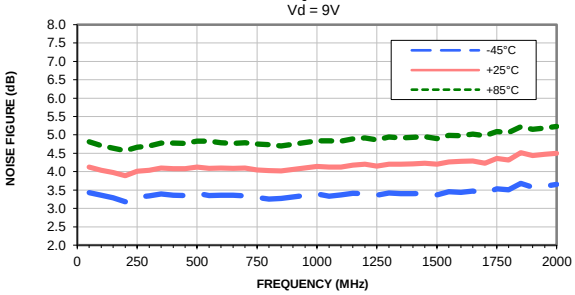
P1dB vs. FREQUENCY & TEMPERATURE
Vd = 9V



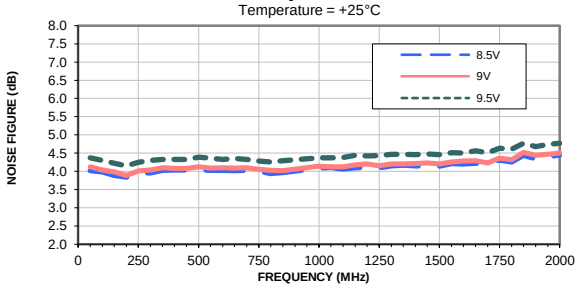
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



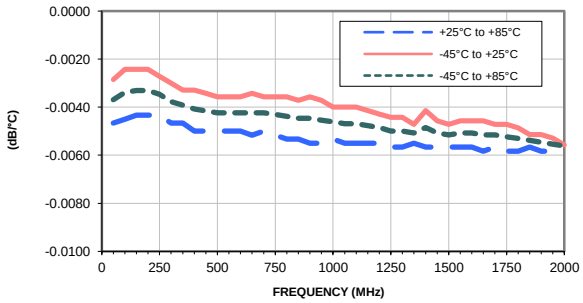
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vd = 9V



NOISE FIGURE vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



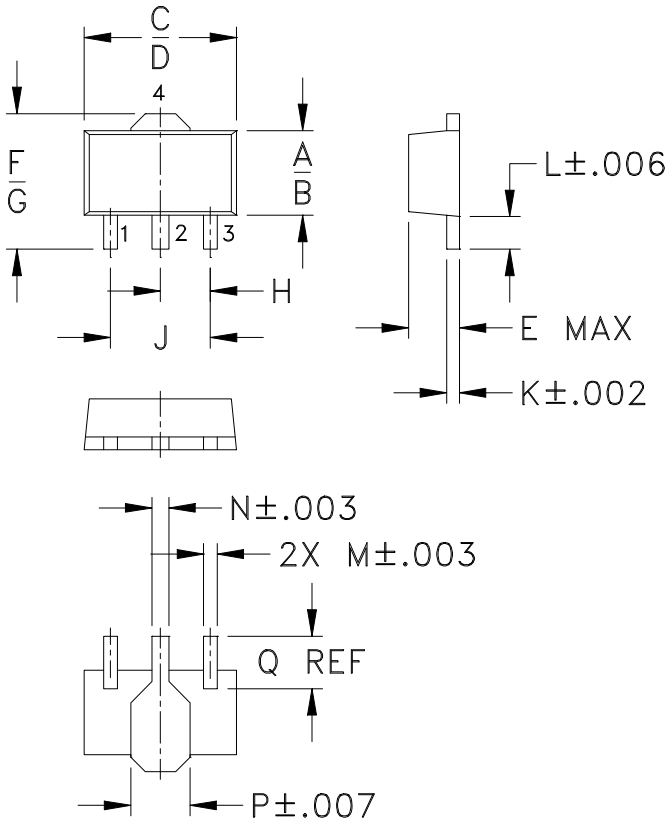
GAIN VARIATION Vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 9V



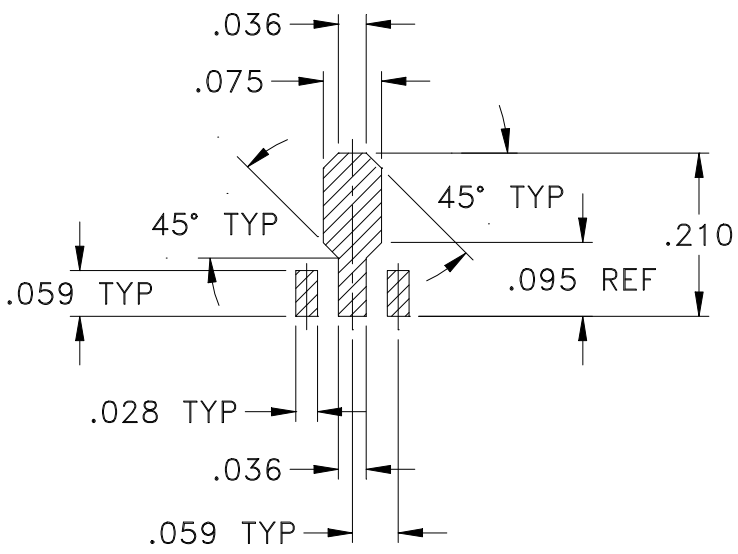
Case Style DF

DF782

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M
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. ± .01; 3Pl. ± .005

Notes:

1. Case material: Plastic.
2. 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.

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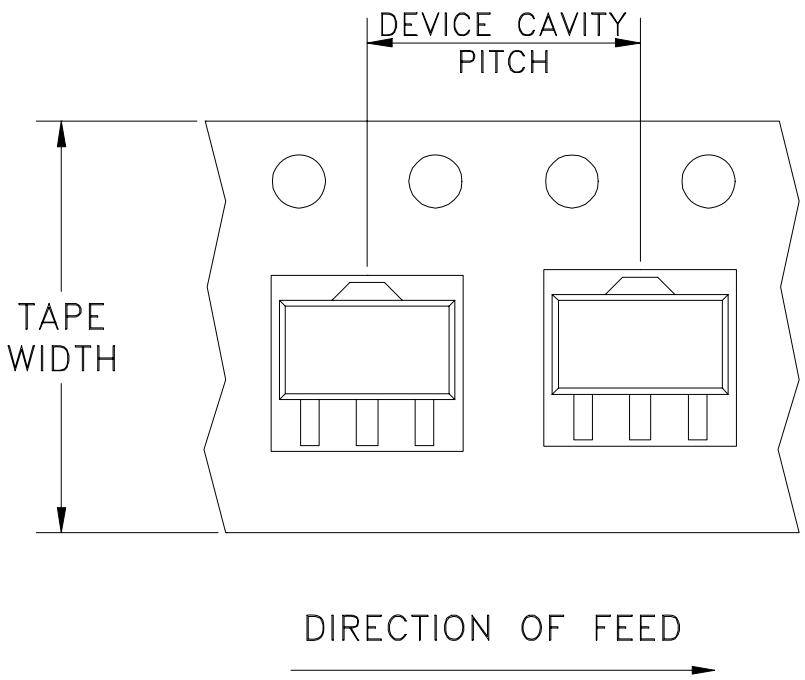
Mini-Circuits ISO 9001 & ISO 14001 Certified

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

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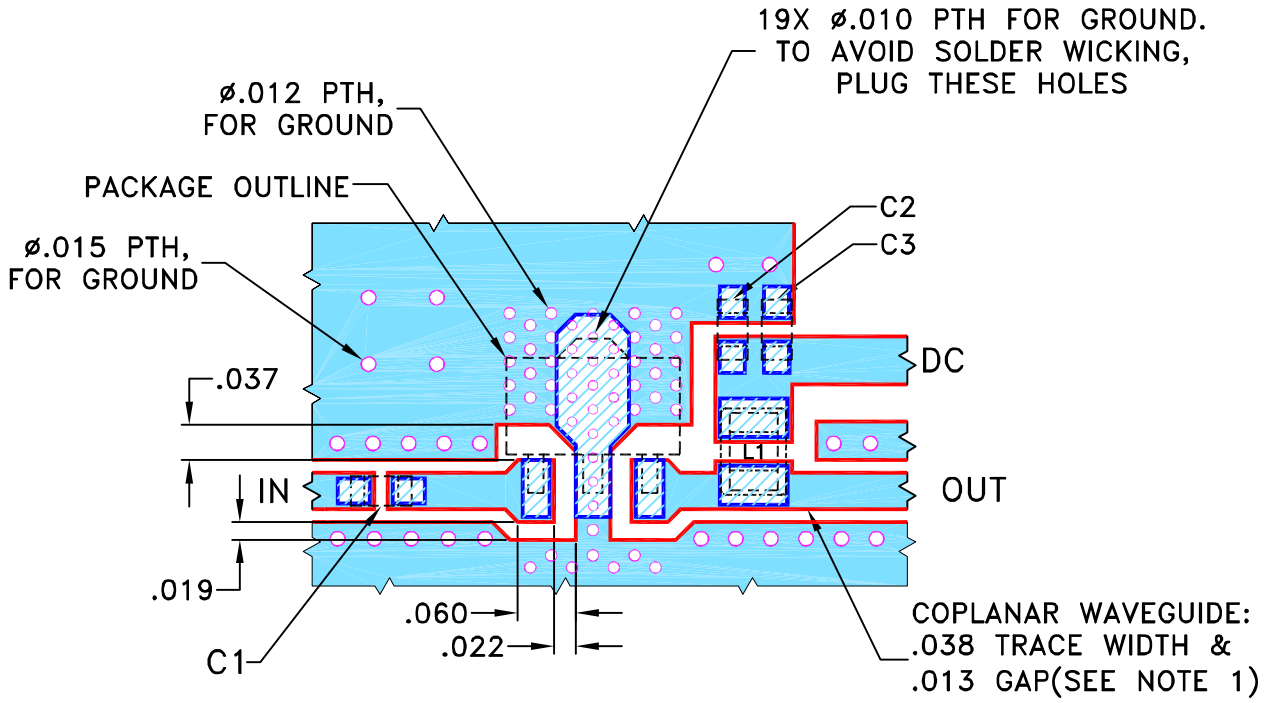
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M156313	NEW RELEASE	05/09/16	GF	RS

SUGGESTED MOUNTING CONFIGURATION FOR DF782 CASE STYLE, "04AM03" PIN CODE



COMPONENT	SIZE
C1–C3	0603
L1	0805

NOTES:

1. TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020"±.0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	GF	05/09/16
TOLERANCES ON:	CHECKED	IL	05/09/16
2 PL DECIMALS ±	APPROVED	RS	05/09/16
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

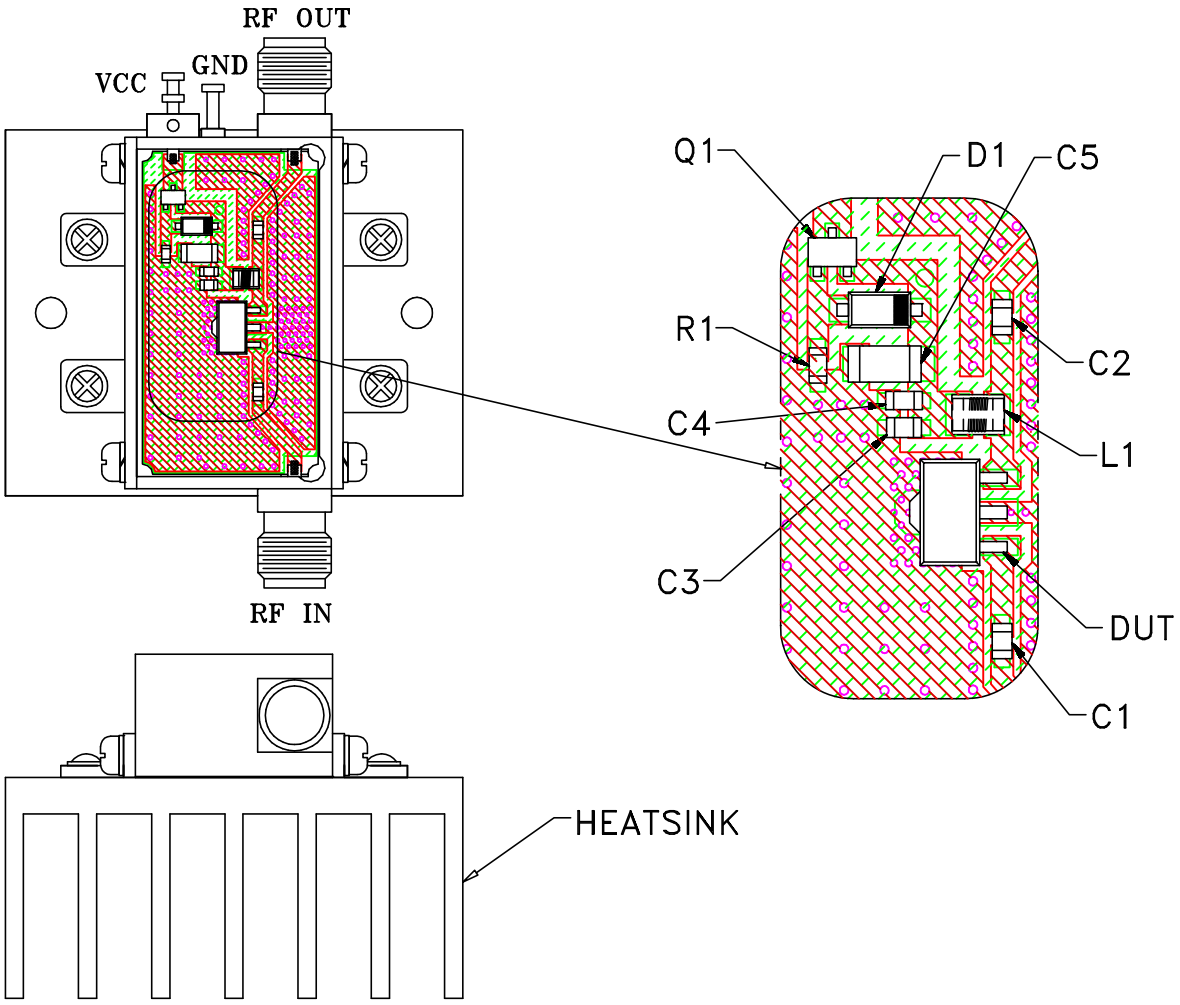
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 04AM03, DF782, TB-869A+

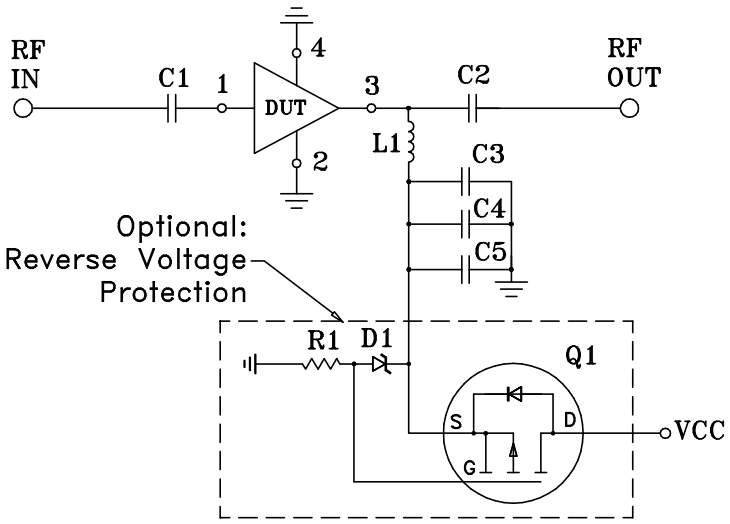
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-486	OR

FILE:	SCALE:	SHEET:
98PL486	5:1	1 OF 1

Evaluation Board and Circuit



TB-869A+



COMPONENT	VALUE	SIZE
DUT	PHA-101+	-
C1,C2,C3	150 pF, 50V	0603
C4	0.01uF,25V	
C5	10uF,35V	1206
L1	390 nH	0805
D1	Zener Diode 5.6V ONSEMI MMSZ4690T1G	SOD123
R1	1.5 kOhm	0603
Q1	Transistor ONSEMI FET NTS4101P	SOT323

Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent.
   Dielectric Constant=3.5, Thickness=.020 inch.

Mini-Circuits®

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Environmental Specifications ENV08T1

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

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C or -45° to 85°C 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

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

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