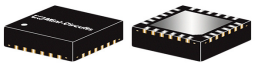
Dual Matched High Dynamic Range

Monolithic Amplifier MPGA-122-75+

75Ω 40 to 1250 MHz

The Big Deal

- High IP3
- Positive Gain Slope
- 1W Output Power



4x4mm 24-lead, MCLP package

Product Overview

MPGA-122-75+ (RoHS compliant) is an advanced wideband dual amplifier fabricated using E-PHEMT* technology and offers extremely high dynamic range over a broad frequency range and with low noise figure and flat gain. In addition, the MPGA-122-75+ has excellent input and output return loss when used per suggested application circuit over a broad frequency range. It is enclosed in a 4x4mm, 24 lead MCLP package for very good thermal performance.

Key Features

Feature	Advantages
Broad Band: 0.04 to 1.25 GHz Usable to 1.5 GHz	Covers primary CATV applications such as DOCSIS 3.1
Positive Gain Slope, 0.3 dB	Compensates for increasing loss versus frequency of cables
High IP3 Versus DC power Consumption: 51 dBm typical at 0.5 GHz	The MPGA-122-75+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and E-PHEMPT structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being typically 14-19 dB above the P 1dB point. This feature makes this amplifier ideal for use in CATV applications.
High IP2, 68 dBm at 0.5 GHz	Suppresses second order product on wideband applications such as CATV
Low Noise Figure, 2.8 dB at 0.5 GHz	Low noise figure performance in combination with the high output IP3 results in high dynamic range.
Excellent CSO/CTB* CSO, -80 dBc CTB, -83 dBc Measured at channel 17	Competitive performance at lower current and supply voltage.

*108 channels flat, 40 dBmv/channel at output, 6 MHz channel spacing.

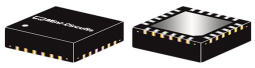
Dual Matched High Dynamic Range

Monolithic Amplifier

40-1250 MHz

Product Features

- High IP3, 50 dBm typ. at 0.5 GHz
- Gain, 15.1 dB typ. at 0.5 GHz
- High Pout, P1dB 80 dBmV typ. at 0.5 GHz
- Low Noise Figure, 2.9 dB at 0.5 GHz
- Usable over 40-1800 MHz



MPGA-122-75+

CASE STYLE: DG1847

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

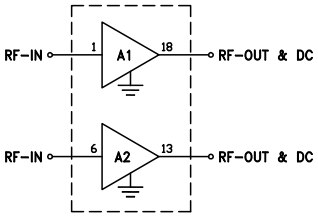
Typical Applications

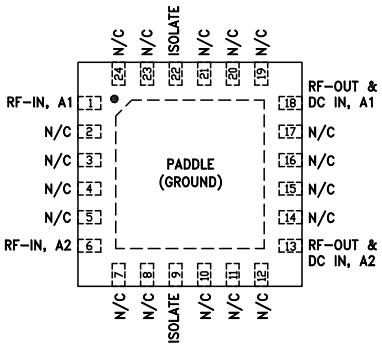
- CATV, DOCSIS 3.1
- GPON
- MOCA
- DBS

General Description

MPGA-122-75+ (RoHS compliant) is an advanced wideband dual amplifier fabricated using E-PHEMT* technology and offers extremely high dynamic range over a broad frequency range and with low noise figure and flat gain. In addition, the MPGA-122-75+ has excellent input and output return loss when used per suggested application circuit over a broad frequency range. It is enclosed in a 4x4mm, 24 lead MCLP package for very good thermal performance.

simplified schematic and pad description





Function	Pad Number	Description (Refer to Figure 1)
RF IN, A1	1	RF input pad. This pad requires the use of an external DC blocking capacitor
RF IN, A2	6	RF input pad. This pad requires the use of an external DC blocking capacitor
RF-OUT and DC-IN, A1	18	RF output and bias pad. DC voltage is present on this pad; 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. 1
RF-OUT and DC-IN, A2	13	RF output and bias pad. DC voltage is present on this pad; 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. 1
GND	Paddle	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.
N/C	2-5, 7,8 10-12,14-17, 19-21 23-24	No connection. Ground externally
Do not use	9,22	Isolate on PCB trace

*Enhanced mode pseudomorhic High Electron Mobility Transistor.

Electrical Specifications[1] at 25°C, 75Ω unless noted

Parameter	Condition (GHz)	V_{DD}=9V (Note 1)			V_{DD}=8V (Note 1)			V_{DD}=9V (Note 1A)	Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	Typ.	
Frequency range		0.04		1.25	0.04		1.25	0.04-1.25	GHz
Gain	0.04		15			14.9		15.0	dB
	0.5		15.1			15.1		15.1	
	0.86	13.8	15.3	16.9		15.3		15.3	
	1.25		15.3			15.3		15.0	
	1.5		15.1			15.0		14.5	
Input return loss	0.04		13.6			13.7		13.4	dB
	0.5		16.4			16.3		15.3	
	0.86		20.5			20.1		20.6	
	1.25		19.1			18.7		20.3	
	1.5		15.1			14.6		15.7	
Output return loss	0.04		16.8			16.7		16.7	dB
	0.5		13.7			13.6		13.4	
	0.86		16.4			16.3		17.1	
	1.25		17.5			17.0		15.3	
	1.5		12.6			12.2		9.7	
Reverse isolation	1.0		21.5			21.5		21.7	dB
Output power @1dB compression	0.04		30.1 (78.8)			29.1 (77.8)		30.2 (78.9)	dBm (dBmV)
	0.5		30.9 (79.6)			29.9 (78.7)		30.9 (79.7)	
	0.86		30.6 (79.4)			29.6 (78.3)		30.5 (79.2)	
	1.25		28.6 (77.4)			27.4 (76.2)		28.0 (76.7)	
	1.5		28.2 (76.4)			27.1 (75.9)		27.3 (76.0)	
Output IP3	0.04		45.9			45.4		44.4	dBm
	0.5		49.7			48.9		50.6	
	0.86		48.8			46.5		47.0	
	1.25		48.4			48.6		46.3	
	1.5		42.8			43.0		40.7	
Output IP2[2]	0.04		75.7			73.7		76.2	dBm
	0.5		68.9			69.4		69.2	
	0.86		68.8			66.8		67.1	
	1.25		72.5			70.6		66.2	
	1.5		55.3			53.1		50.1	
Noise figure	0.04		2.9			2.8		2.8	dB
	0.5		2.9			2.8		2.9	
	0.86		3.2			3.2		3.2	
	1.25		3.6			3.5		3.6	
	1.5		3.9			3.9		4.1	
Supply operating voltage			9.0			8.0		9.0	V
Supply operating current (Total)		—	391	487		343		392	mA
Device current variation vs temperature[3]			9.4			29.4		—	µA°/C
Device current variation vs voltage			0.0506			0.0507		—	mA/mV
Thermal resistance, junction-to-ground lead			8.6			8.6		8.6	°C/W

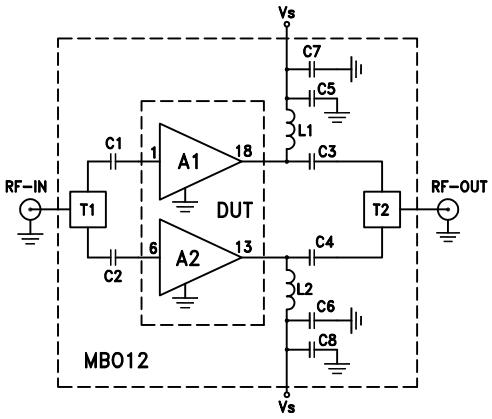
1. Measured on Mini-Circuits Characterization Test board MB012. PCB material Rogers 4350B. See Characterization Test Circuit (Fig. 1).
1A. Measured on Mini-Circuit Evaluation Board TB-937+ (PCB Material FR4) VDD=12V is applied to get 9V at DUT (Fig. 2)
2. Output IP2 measured at sum frequency of the two tones (f means= f1+f2).
3. (Current at 85°C - Current at -45°C)/130

Absolute Maximum Ratings[6]

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Operating Current at 9.0V	464 mA
Power Dissipation	8.5 W
Input Power (CW) at 9V	+28 dBm (5 minutes) +25 dBm (continuous)
DC Voltage on Pad 13 & 18	12V

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

Characterization and ApplicationTest Circuit

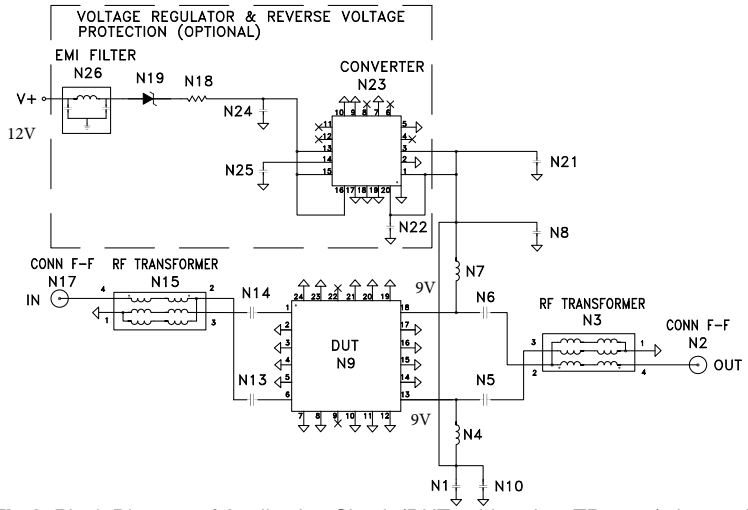


Component	Size	Value	Manufacturers P/N	Manufacturer
DUT	--	---	MPGA-122-75+	Mini-Circuits
C1 & C2	0402	220 pF	GRM1555C1H221JA01D	Murata
C3 & C4	0402	220 pF	GRM1555C1H221JA01D	Murata
C5 & C6	0402	0.01 µF	GRM155R71E103KA01D	Murata
C7 & C8	1210	10 µF	GRM32ER71H106MA2L	Murata
L1, L2	0805	390 nH	0805CS-391XGLC	Coilcraft
T1 & T2	--	--	TRS1-182-75+	Mini-Circuits

Fig 1. Block Diagram of Test Circuit used for characterization. (DUT tested on Mini-Circuits Characterization test board MB012) Gain, Return loss, Output power at 1dB compression (P1 dB) , output IP3 (OIP3), output IP2 (OIP2) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return loss: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 5 dBm/tone at output.
3. Output IP2 (OIP2): Two tones, spaced 1 MHz apart, 5 dBm/tone at output.

Application Circuit



COMPONENT	VALUE	SIZE
N9 (DUT)	Mini-Circuits MPGA-122-75+	4X4 mm
N1,N21,N24	Capacitor 10 uF	1206
N3,N15	Mini-Circuits TRS1-182-75+	7.11X6.35 mm
N4,N7	Inductor 390 nH	0805
N5,N6,N13,N14	Capacitor 220 pF	0402
N8,N10	Capacitor .01 uF	
N18	Resistor 4.32 Ohms,1W	2512
N19	Diod Schottky SMA 40V MSL1	5.21X2.60 mm
N22	Capacitor 22 uF	1210
N23	Voltage Regulator QFN20 ADJ MSL2	5X5 mm
N25	Capacitor 1 uF	0603
N26	EMI Filter	–

Fig 2. Block Diagram of Application Circuit (DUT soldered on TB-937+) due to 3V drop at the voltage regulator and reversed voltage protection circuit, V_{DD}=12V is needed to get 9V at DUT.

Product Marking

Marking may contain other features or characters for internal lot control

Additional Detailed Technical Information *additional information is available on our dash board. To access this information click here*	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DG1847 *Plastic package, exposed paddle* *lead finish: matt-tin*
Tape & Reel **Standard quantities available on reel**	F68 *7" reels with 20, 50, 100, 200, 500 or 1K devices*
Suggested Layout for PCB Design	PL-500
Evaluation Board	TB-937+
Environmental Ratings	ENV08T1

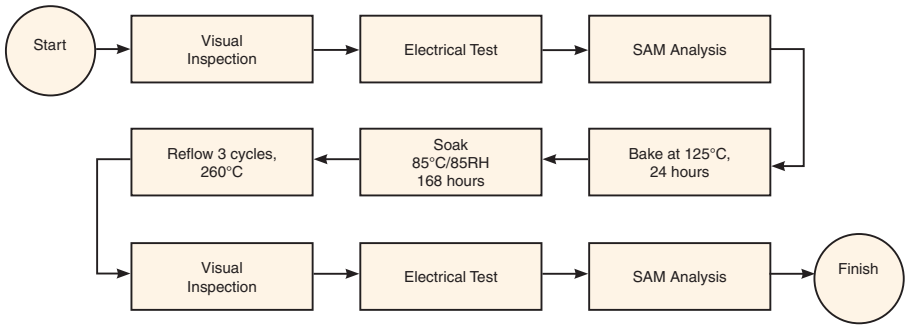
ESD Rating

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

MSL Rating

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

MSL Test Flow Chart



Additional 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/MCLStore/terms.jsp

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 = 9.00V, Id = 391.97mA @ Temperature = +25°C

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)
20	14.56	21.59	6.50	10.68	1.16	0.80	39.90	30.21	2.87
30	15.02	21.10	10.81	15.68	1.19	0.76	42.17	30.32	2.71
40	15.00	21.01	13.72	17.35	1.22	0.75	43.94	30.09	2.62
50	14.99	21.10	15.39	17.54	1.23	0.75	47.36	30.27	2.56
60	15.02	21.03	16.34	17.57	1.23	0.74	49.66	30.41	2.65
70	15.03	20.93	16.90	17.56	1.22	0.73	49.26	30.45	2.63
80	15.06	20.92	17.35	17.42	1.22	0.73	50.39	30.55	2.54
90	15.07	20.98	17.50	17.41	1.22	0.73	50.55	30.54	2.49
100	15.09	20.89	17.72	17.34	1.21	0.72	50.56	30.53	2.44
150	15.14	20.83	18.12	16.82	1.20	0.71	50.52	30.61	2.45
200	15.17	20.84	18.13	16.30	1.20	0.70	49.30	30.73	2.42
250	15.18	20.81	18.07	15.83	1.19	0.70	48.63	30.84	2.51
300	15.18	20.82	17.91	15.41	1.19	0.70	49.48	31.05	2.50
350	15.19	20.92	17.68	14.97	1.20	0.70	49.33	30.93	2.54
400	15.19	20.81	17.39	14.72	1.19	0.69	50.38	30.92	2.56
450	15.18	20.98	17.39	14.46	1.20	0.70	51.82	30.97	2.57
500	15.19	21.01	17.30	14.35	1.20	0.70	50.76	31.03	2.71
550	15.20	21.10	17.50	14.36	1.21	0.70	50.61	30.94	2.69
600	15.21	21.12	17.62	14.46	1.21	0.70	53.03	30.93	2.69
650	15.23	21.13	18.00	14.70	1.21	0.70	52.95	31.04	2.75
700	15.24	21.15	18.39	15.01	1.21	0.71	51.57	30.93	2.73
750	15.28	21.16	19.18	15.56	1.21	0.71	50.67	30.97	2.81
800	15.31	21.21	20.05	16.13	1.22	0.71	49.05	30.87	2.93
850	15.36	21.25	21.24	16.99	1.22	0.72	47.49	30.79	3.00
900	15.39	21.30	22.29	17.95	1.23	0.73	46.63	30.51	3.03
950	15.41	21.39	23.09	19.19	1.23	0.74	47.27	30.49	3.06
1000	15.42	21.44	23.35	20.36	1.24	0.74	46.29	30.21	3.02
1100	15.42	21.69	22.53	21.80	1.26	0.77	48.29	29.34	3.08
1200	15.38	21.90	20.72	20.60	1.27	0.78	49.98	28.57	3.21
1300	15.32	22.18	19.06	17.96	1.29	0.80	46.39	28.36	3.41
1400	15.20	22.52	17.51	15.31	1.31	0.81	43.58	27.90	3.46
1500	15.09	22.98	15.91	13.07	1.34	0.82	41.79	28.14	3.47
1600	14.90	23.41	14.24	11.20	1.38	0.81	40.03	28.11	3.69
1700	14.66	23.86	13.05	9.79	1.42	0.80	39.47	27.51	3.88
1800	14.37	24.55	12.23	8.83	1.51	0.80	38.54	26.87	3.98
1900	14.01	25.12	11.69	8.13	1.61	0.80	37.43	26.06	4.23
2000	13.44	25.99	11.14	7.63	1.78	0.81	36.90	25.01	4.51
2100	13.04	26.88	10.56	7.52	1.98	0.84	36.01	24.58	4.80
2200	12.25	27.95	8.75	6.93	2.22	0.86	35.97	24.48	5.25
2300	11.04	29.65	6.91	6.09	2.66	0.88	36.11	23.90	5.64
2400	9.36	31.94	5.40	5.19	3.45	0.88	35.76	23.23	5.77
2500	7.35	34.22	4.32	4.37	4.51	0.86	38.24	22.00	6.75

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 = 8.00V, Id = 344.62mA @ Temperature = +25°C

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)
20	14.53	21.53	6.49	10.59	1.16	0.79	40.35	29.19	2.84
30	14.99	21.14	10.79	15.66	1.20	0.77	42.80	29.33	2.71
40	14.97	21.03	13.67	17.39	1.22	0.75	44.48	29.09	2.55
50	14.96	20.87	15.26	17.44	1.21	0.73	47.69	29.29	2.56
60	14.99	20.87	16.20	17.39	1.21	0.73	49.67	29.43	2.58
70	15.00	21.00	16.72	17.41	1.23	0.73	48.56	29.48	2.57
80	15.02	20.98	17.22	17.30	1.22	0.73	50.82	29.58	2.52
90	15.04	20.87	17.40	17.27	1.21	0.72	50.45	29.58	2.48
100	15.06	20.92	17.59	17.19	1.22	0.72	49.00	29.57	2.45
150	15.11	20.87	17.96	16.62	1.21	0.71	49.07	29.67	2.41
200	15.14	20.82	18.03	16.22	1.20	0.71	49.21	29.79	2.41
250	15.15	20.80	17.94	15.75	1.19	0.70	48.56	29.92	2.44
300	15.15	20.87	17.73	15.30	1.20	0.70	49.35	30.13	2.46
350	15.16	20.95	17.50	14.86	1.20	0.70	48.85	29.99	2.51
400	15.16	20.92	17.24	14.62	1.20	0.70	48.55	29.98	2.56
450	15.15	21.01	17.28	14.38	1.20	0.70	48.67	30.01	2.55
500	15.16	20.97	17.13	14.21	1.20	0.69	48.06	30.04	2.62
550	15.17	21.04	17.33	14.28	1.21	0.70	48.58	29.94	2.64
600	15.18	21.02	17.47	14.35	1.20	0.70	49.12	29.91	2.66
650	15.20	21.14	17.81	14.58	1.21	0.71	49.08	30.00	2.75
700	15.21	21.15	18.19	14.91	1.22	0.71	48.68	29.89	2.78
750	15.25	21.15	18.98	15.47	1.22	0.71	49.32	29.94	2.82
800	15.28	21.18	19.79	15.96	1.22	0.71	46.74	29.84	2.84
850	15.33	21.26	20.98	16.81	1.22	0.72	45.67	29.73	2.97
900	15.36	21.26	21.86	17.69	1.22	0.73	45.48	29.42	3.01
950	15.37	21.41	22.69	18.91	1.24	0.74	45.35	29.37	3.06
1000	15.38	21.52	22.78	19.95	1.25	0.75	44.97	29.03	3.04
1100	15.38	21.65	21.97	21.09	1.25	0.77	47.06	28.02	3.07
1200	15.34	21.84	20.35	19.89	1.27	0.78	52.39	27.31	3.18
1300	15.26	22.27	18.60	17.36	1.30	0.81	46.84	27.10	3.33
1400	15.14	22.49	17.07	14.80	1.31	0.81	43.76	26.59	3.45
1500	15.02	23.04	15.38	12.63	1.35	0.82	41.80	27.02	3.50
1600	14.80	23.48	13.81	10.82	1.38	0.82	39.90	26.94	3.68
1700	14.55	23.94	12.60	9.47	1.43	0.80	39.42	26.32	3.87
1800	14.24	24.69	11.84	8.53	1.53	0.80	38.58	25.65	3.99
1900	13.87	25.37	11.30	7.89	1.64	0.80	37.66	24.79	4.17
2000	13.29	26.29	10.81	7.41	1.83	0.82	37.12	23.73	4.43
2100	12.86	27.05	10.25	7.29	2.02	0.84	35.95	23.32	4.76
2200	12.04	28.10	8.51	6.76	2.27	0.86	35.42	23.26	5.26
2300	10.81	29.83	6.77	5.95	2.74	0.88	35.70	22.65	5.70
2400	9.10	32.07	5.29	5.11	3.52	0.88	35.65	21.97	5.74
2500	7.09	34.28	4.26	4.31	4.58	0.86	37.81	21.16	6.80

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 = 415.87mA @ Temperature = +25°C

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)
20	14.57	21.97	6.48	10.61	1.18	0.82	39.85	30.67	2.86
30	15.03	21.18	10.84	15.74	1.20	0.77	42.28	30.75	2.74
40	15.01	21.02	13.74	17.34	1.21	0.75	46.05	30.53	2.65
50	15.00	21.04	15.41	17.53	1.22	0.74	47.94	30.71	2.60
60	15.03	20.98	16.27	17.51	1.22	0.73	49.29	30.84	2.65
70	15.05	20.88	16.90	17.62	1.21	0.73	49.92	30.89	2.65
80	15.07	20.96	17.34	17.52	1.22	0.73	50.23	30.98	2.59
90	15.09	20.88	17.57	17.43	1.21	0.72	51.64	30.98	2.48
100	15.11	20.87	17.80	17.36	1.21	0.72	51.59	30.96	2.45
150	15.15	20.85	18.15	16.84	1.20	0.71	50.64	31.03	2.46
200	15.19	20.80	18.24	16.42	1.20	0.70	52.09	31.14	2.41
250	15.20	20.86	18.14	15.84	1.20	0.70	48.81	31.24	2.49
300	15.19	20.88	17.91	15.43	1.20	0.70	50.64	31.44	2.49
350	15.20	20.85	17.78	15.05	1.19	0.69	50.34	31.33	2.52
400	15.20	20.96	17.48	14.78	1.20	0.70	50.19	31.33	2.55
450	15.19	20.90	17.44	14.50	1.19	0.69	51.83	31.39	2.62
500	15.21	21.00	17.36	14.34	1.20	0.69	49.78	31.46	2.63
550	15.21	20.97	17.51	14.41	1.20	0.69	52.54	31.38	2.72
600	15.22	21.06	17.71	14.47	1.21	0.70	52.53	31.37	2.71
650	15.24	21.10	18.11	14.74	1.21	0.70	51.27	31.48	2.78
700	15.25	21.11	18.45	15.06	1.21	0.70	51.19	31.39	2.77
750	15.29	21.15	19.33	15.61	1.21	0.71	51.09	31.42	2.80
800	15.33	21.14	20.16	16.14	1.21	0.71	49.11	31.32	2.90
850	15.37	21.32	21.43	17.05	1.23	0.72	47.43	31.25	2.95
900	15.40	21.31	22.37	18.01	1.23	0.73	46.81	30.98	3.04
950	15.42	21.39	23.31	19.29	1.23	0.74	46.67	30.97	3.10
1000	15.44	21.46	23.62	20.52	1.24	0.74	46.35	30.71	3.07
1100	15.44	21.66	22.62	22.13	1.25	0.76	48.12	29.91	3.13
1200	15.41	21.94	20.85	21.04	1.27	0.78	51.38	29.16	3.23
1300	15.34	22.19	19.22	18.22	1.29	0.80	48.23	28.90	3.44
1400	15.23	22.51	17.71	15.52	1.31	0.81	44.68	28.47	3.52
1500	15.13	22.90	16.11	13.23	1.33	0.82	42.41	28.60	3.55
1600	14.94	23.30	14.44	11.34	1.37	0.81	40.53	28.59	3.70
1700	14.70	23.80	13.19	9.88	1.41	0.80	39.98	28.01	3.94
1800	14.42	24.52	12.36	8.90	1.51	0.80	38.78	27.37	4.03
1900	14.06	25.16	11.83	8.23	1.61	0.80	37.68	26.60	4.25
2000	13.50	26.11	11.28	7.69	1.80	0.82	36.99	25.56	4.47
2100	13.11	26.78	10.66	7.58	1.96	0.84	36.08	25.12	4.83
2200	12.33	27.93	8.85	6.99	2.22	0.86	36.00	25.01	5.33
2300	11.13	29.57	6.97	6.13	2.63	0.88	36.20	24.44	5.68
2400	9.45	31.82	5.42	5.21	3.38	0.88	35.88	23.77	5.89
2500	7.45	34.19	4.32	4.37	4.45	0.86	38.53	22.26	6.70

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 = 388.05mA @ Temperature = -45°C

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)
20	14.22	22.28	7.16	9.97	1.26	0.81	37.98	30.12	2.47
30	14.78	21.24	11.77	14.76	1.23	0.76	40.14	30.41	2.28
40	14.87	21.17	14.24	16.59	1.24	0.75	42.01	30.23	2.17
50	14.91	21.10	15.49	16.94	1.24	0.75	44.65	30.43	2.13
60	14.98	21.03	16.30	16.94	1.23	0.74	47.36	30.57	2.11
70	15.02	21.00	16.69	17.00	1.22	0.73	48.92	30.64	2.08
80	15.06	21.06	17.02	16.81	1.23	0.73	50.39	30.75	2.02
90	15.09	20.86	17.08	16.73	1.21	0.72	49.64	30.76	1.96
100	15.12	20.86	17.18	16.60	1.20	0.71	49.52	30.74	1.91
150	15.18	20.92	17.37	15.86	1.20	0.71	48.54	30.85	1.90
200	15.23	20.85	17.67	15.66	1.19	0.70	49.18	30.96	1.89
250	15.27	20.74	17.92	15.57	1.18	0.69	47.99	31.10	1.97
300	15.29	20.79	18.06	15.58	1.18	0.69	48.60	31.34	1.94
350	15.31	20.73	18.11	15.32	1.18	0.68	49.32	31.21	1.94
400	15.32	20.85	17.66	15.05	1.18	0.69	50.26	31.18	1.99
450	15.31	20.85	17.55	14.58	1.18	0.68	52.29	31.22	2.02
500	15.33	20.82	17.21	14.25	1.18	0.67	49.52	31.28	2.07
550	15.33	20.90	17.12	14.17	1.18	0.68	51.07	31.18	2.08
600	15.34	20.92	17.24	14.19	1.18	0.68	51.27	31.16	2.08
650	15.36	20.97	17.61	14.38	1.19	0.68	50.87	31.30	2.10
700	15.38	21.06	17.96	14.69	1.20	0.69	50.34	31.19	2.15
750	15.42	21.00	18.91	15.29	1.19	0.69	49.83	31.21	2.19
800	15.46	21.04	19.84	15.82	1.19	0.69	48.47	31.16	2.26
850	15.51	21.05	21.08	16.77	1.19	0.70	48.13	31.07	2.34
900	15.54	21.11	22.13	17.66	1.20	0.70	48.02	30.77	2.38
950	15.57	21.19	23.01	18.90	1.20	0.71	47.17	30.76	2.43
1000	15.58	21.17	23.45	19.83	1.20	0.72	46.47	30.50	2.40
1100	15.59	21.42	22.82	20.83	1.22	0.74	48.43	29.69	2.44
1200	15.57	21.66	21.64	19.93	1.23	0.76	51.27	28.99	2.55
1300	15.51	21.91	20.31	17.72	1.25	0.77	45.97	28.72	2.69
1400	15.39	22.29	18.75	15.19	1.27	0.79	43.03	28.23	2.86
1500	15.31	22.60	16.92	13.09	1.29	0.79	41.24	27.99	2.82
1600	15.13	23.03	14.95	11.24	1.32	0.79	39.51	28.40	2.87
1700	14.92	23.48	13.52	9.88	1.36	0.78	38.89	27.87	3.10
1800	14.68	24.04	12.64	8.95	1.42	0.78	37.90	27.27	3.21
1900	14.39	24.60	12.08	8.33	1.50	0.78	36.78	26.60	3.44
2000	13.92	25.37	11.50	7.87	1.63	0.80	36.13	25.67	3.62
2100	13.50	26.12	11.16	7.79	1.79	0.83	35.17	25.05	3.84
2200	12.88	27.07	9.28	7.21	1.96	0.86	35.11	24.98	4.30
2300	11.80	28.67	7.24	6.27	2.27	0.88	34.92	24.54	4.67
2400	10.21	30.76	5.48	5.24	2.80	0.88	34.63	24.04	4.80
2500	8.20	33.20	4.25	4.27	3.59	0.85	36.61	23.41	5.69

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 = 8.00V, Id = 340.78mA @ Temperature = -45°C

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)
20	14.20	22.26	7.12	10.00	1.25	0.81	38.04	29.04	2.42
30	14.75	21.38	11.75	14.77	1.25	0.77	39.74	29.36	2.24
40	14.84	21.23	14.23	16.52	1.25	0.76	41.76	29.18	2.12
50	14.88	21.20	15.53	16.84	1.25	0.75	44.57	29.40	2.06
60	14.95	21.05	16.24	16.94	1.23	0.74	47.23	29.56	2.03
70	14.99	21.06	16.59	16.89	1.23	0.74	47.98	29.63	2.11
80	15.03	20.92	16.89	16.68	1.22	0.72	50.16	29.75	1.97
90	15.06	20.94	16.97	16.55	1.22	0.72	48.77	29.76	1.94
100	15.08	20.87	17.10	16.45	1.21	0.71	50.48	29.75	1.91
150	15.15	20.71	17.21	15.79	1.19	0.69	49.07	29.87	1.88
200	15.20	20.81	17.50	15.55	1.19	0.69	49.34	29.98	1.86
250	15.24	20.75	17.79	15.49	1.18	0.69	48.27	30.14	1.87
300	15.26	20.78	17.93	15.45	1.18	0.69	50.30	30.34	1.91
350	15.28	20.82	17.88	15.16	1.18	0.69	49.50	30.19	1.93
400	15.29	20.78	17.61	14.92	1.18	0.68	50.24	30.16	1.98
450	15.28	20.78	17.39	14.48	1.18	0.68	51.40	30.19	2.00
500	15.29	20.85	17.06	14.17	1.18	0.68	50.91	30.24	2.07
550	15.30	20.87	17.04	14.06	1.18	0.68	51.53	30.12	2.09
600	15.31	20.95	17.10	14.08	1.19	0.68	54.05	30.09	2.02
650	15.34	20.90	17.41	14.29	1.18	0.68	51.88	30.21	2.15
700	15.35	20.95	17.73	14.52	1.19	0.68	51.58	30.10	2.07
750	15.39	21.02	18.66	15.09	1.19	0.69	50.65	30.14	2.18
800	15.43	21.07	19.54	15.71	1.20	0.70	48.70	30.08	2.25
850	15.48	21.11	20.75	16.61	1.20	0.70	48.72	29.98	2.30
900	15.51	21.02	21.75	17.44	1.19	0.70	48.50	29.66	2.31
950	15.53	21.20	22.55	18.60	1.21	0.72	48.72	29.64	2.39
1000	15.55	21.27	22.85	19.56	1.21	0.72	47.65	29.34	2.37
1100	15.55	21.40	22.46	20.52	1.22	0.74	52.16	28.46	2.39
1200	15.53	21.63	21.18	19.67	1.23	0.76	46.40	27.75	2.49
1300	15.47	21.97	19.81	17.49	1.25	0.78	43.22	27.50	2.65
1400	15.34	22.31	18.30	14.99	1.28	0.79	41.12	26.98	2.75
1500	15.25	22.64	16.49	12.89	1.29	0.79	40.05	26.83	2.76
1600	15.07	23.09	14.57	11.06	1.32	0.79	38.60	27.21	2.85
1700	14.84	23.57	13.17	9.69	1.36	0.79	37.99	26.67	3.04
1800	14.59	24.11	12.33	8.78	1.43	0.78	37.26	26.06	3.16
1900	14.29	24.71	11.81	8.18	1.51	0.78	36.36	25.34	3.34
2000	13.80	25.57	11.17	7.72	1.66	0.80	35.92	24.38	3.61
2100	13.37	26.38	10.87	7.61	1.84	0.83	35.19	23.77	3.83
2200	12.72	27.37	9.06	7.05	2.02	0.86	35.09	23.73	4.20
2300	11.61	28.96	7.07	6.15	2.36	0.88	34.83	23.26	4.60
2400	9.99	31.06	5.38	5.14	2.90	0.87	34.54	22.74	4.69
2500	7.96	33.23	4.18	4.20	3.64	0.84	36.37	22.05	5.64

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 = 413.23mA @ Temperature = -45°C

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)
20	14.24	22.10	7.11	10.11	1.24	0.80	37.87	30.59	2.51
30	14.81	21.36	11.73	14.74	1.24	0.77	40.60	30.85	2.33
40	14.89	21.14	14.28	16.66	1.24	0.75	42.85	30.69	2.18
50	14.93	21.20	15.63	16.97	1.24	0.75	44.79	30.89	2.12
60	15.00	20.93	16.33	17.11	1.22	0.73	45.79	31.02	2.15
70	15.04	20.98	16.73	17.05	1.22	0.73	47.10	31.08	2.07
80	15.08	20.98	17.06	16.88	1.22	0.72	49.79	31.20	2.01
90	15.11	20.93	17.10	16.74	1.21	0.72	49.63	31.20	2.00
100	15.13	20.94	17.23	16.60	1.21	0.72	50.29	31.18	1.90
150	15.20	20.85	17.43	16.00	1.20	0.70	51.49	31.29	1.96
200	15.25	20.85	17.67	15.71	1.19	0.70	49.64	31.40	1.92
250	15.28	20.79	17.97	15.62	1.18	0.69	47.55	31.53	1.95
300	15.31	20.80	18.21	15.58	1.18	0.69	48.09	31.78	1.97
350	15.33	20.75	18.16	15.40	1.18	0.68	49.19	31.66	1.96
400	15.34	20.83	17.80	15.08	1.18	0.68	50.13	31.64	2.01
450	15.33	20.85	17.62	14.60	1.18	0.68	51.08	31.69	2.02
500	15.34	20.87	17.25	14.30	1.18	0.68	49.37	31.75	2.08
550	15.35	20.86	17.19	14.25	1.18	0.67	52.05	31.66	2.11
600	15.36	20.87	17.31	14.25	1.18	0.67	52.57	31.64	2.07
650	15.38	20.97	17.66	14.44	1.19	0.68	50.39	31.78	2.19
700	15.40	21.08	18.04	14.71	1.20	0.69	50.66	31.68	2.13
750	15.44	20.98	18.94	15.28	1.19	0.68	50.62	31.69	2.20
800	15.48	21.07	19.90	15.90	1.19	0.69	48.40	31.64	2.29
850	15.52	21.03	21.23	16.81	1.19	0.69	47.97	31.55	2.37
900	15.56	21.13	22.27	17.73	1.20	0.70	47.17	31.26	2.43
950	15.59	21.19	23.19	18.96	1.20	0.71	47.50	31.26	2.46
1000	15.60	21.25	23.60	19.96	1.21	0.72	46.26	31.01	2.49
1100	15.61	21.50	23.05	21.05	1.22	0.74	46.87	30.25	2.46
1200	15.59	21.60	21.82	20.20	1.23	0.75	51.14	29.63	2.58
1300	15.54	21.95	20.46	17.80	1.25	0.77	49.01	29.26	2.71
1400	15.42	22.22	18.95	15.28	1.26	0.79	44.19	28.79	2.80
1500	15.34	22.62	17.16	13.20	1.29	0.79	42.41	28.51	2.81
1600	15.17	23.07	15.19	11.31	1.32	0.79	40.35	28.91	2.93
1700	14.96	23.53	13.70	9.95	1.36	0.78	39.51	28.39	3.14
1800	14.73	23.99	12.78	9.04	1.41	0.78	38.51	27.79	3.23
1900	14.44	24.46	12.23	8.44	1.48	0.78	37.24	27.15	3.40
2000	13.98	25.45	11.60	7.95	1.64	0.80	36.50	26.23	3.68
2100	13.57	26.05	11.30	7.89	1.78	0.83	35.47	25.61	3.88
2200	12.95	27.17	9.38	7.28	1.97	0.86	35.35	25.53	4.32
2300	11.88	28.80	7.32	6.32	2.30	0.88	35.23	25.09	4.73
2400	10.29	30.70	5.53	5.26	2.77	0.88	34.88	24.62	4.88
2500	8.29	33.17	4.27	4.27	3.56	0.85	36.97	23.78	5.67

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 = 394.13mA @ Temperature = +85°C

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)
20	14.30	22.11	6.75	10.47	1.22	0.82	40.27	29.91	3.47
30	14.73	21.31	11.44	15.30	1.24	0.78	43.51	29.98	3.32
40	14.76	21.30	14.32	17.17	1.26	0.77	46.40	29.73	3.13
50	14.78	21.03	15.87	17.48	1.24	0.75	50.29	29.88	3.09
60	14.83	21.14	16.89	17.70	1.25	0.75	48.53	30.03	3.16
70	14.86	21.04	17.42	17.82	1.24	0.75	50.54	30.07	3.10
80	14.89	21.06	17.94	17.82	1.24	0.74	51.73	30.15	3.04
90	14.91	21.05	18.13	17.89	1.24	0.74	52.20	30.14	2.99
100	14.93	21.00	18.39	17.92	1.24	0.74	51.81	30.13	2.93
150	14.99	20.92	18.87	17.55	1.22	0.73	49.92	30.16	2.94
200	15.03	20.89	18.89	17.00	1.22	0.72	52.17	30.28	2.92
250	15.02	20.95	18.43	16.24	1.22	0.72	49.75	30.34	2.97
300	15.01	20.98	17.85	15.47	1.22	0.72	50.67	30.49	3.01
350	15.01	21.00	17.42	14.77	1.21	0.71	51.18	30.36	3.03
400	15.01	21.03	16.98	14.36	1.22	0.71	50.56	30.39	3.08
450	15.00	21.05	16.99	14.10	1.22	0.71	50.83	30.48	3.07
500	15.02	21.13	17.01	14.02	1.22	0.71	50.50	30.54	3.18
550	15.03	21.11	17.33	14.19	1.22	0.71	50.64	30.45	3.22
600	15.05	21.20	17.68	14.39	1.23	0.72	49.97	30.44	3.28
650	15.07	21.22	18.27	14.74	1.23	0.72	51.24	30.54	3.33
700	15.09	21.26	18.81	15.19	1.24	0.72	50.74	30.46	3.26
750	15.13	21.32	19.85	15.86	1.24	0.73	51.11	30.49	3.40
800	15.16	21.28	20.75	16.50	1.24	0.73	48.43	30.39	3.47
850	15.20	21.34	21.96	17.46	1.24	0.74	47.73	30.32	3.58
900	15.22	21.49	22.80	18.39	1.26	0.75	46.42	30.07	3.57
950	15.23	21.59	23.14	19.70	1.27	0.76	46.62	30.04	3.67
1000	15.24	21.61	22.86	20.81	1.27	0.77	46.89	29.76	3.69
1100	15.22	21.89	21.39	21.88	1.29	0.79	47.12	28.84	3.74
1200	15.18	22.17	19.55	20.67	1.31	0.81	49.98	28.13	3.92
1300	15.10	22.34	17.92	17.89	1.32	0.82	48.74	27.92	4.05
1400	14.99	22.76	16.50	15.30	1.35	0.83	45.33	27.52	4.15
1500	14.86	23.15	15.13	13.00	1.38	0.83	43.17	27.69	4.18
1600	14.64	23.68	13.78	11.09	1.43	0.83	41.37	27.55	4.38
1700	14.37	24.26	12.67	9.70	1.50	0.82	40.77	26.94	4.60
1800	14.03	24.90	11.89	8.64	1.60	0.81	39.43	26.27	4.76
1900	13.59	25.57	11.22	7.86	1.71	0.81	38.40	25.41	5.05
2000	12.95	26.54	10.71	7.33	1.94	0.82	37.62	24.34	5.26
2100	12.47	27.48	9.89	7.07	2.17	0.84	36.76	24.07	5.65
2200	11.55	28.64	8.39	6.56	2.51	0.86	36.55	23.91	6.14
2300	10.27	30.62	6.79	5.90	3.17	0.88	37.34	23.23	6.53
2400	8.57	32.64	5.47	5.21	4.10	0.88	37.00	22.51	6.77
2500	6.60	35.03	4.49	4.51	5.61	0.87	40.45	20.53	7.79

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 = 8.00V, Id = 346.71mA @ Temperature = +85°C

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)
20	14.27	22.02	6.79	10.48	1.22	0.82	39.74	28.90	3.38
30	14.68	21.29	11.47	15.26	1.24	0.78	42.50	29.00	3.24
40	14.72	21.22	14.34	17.16	1.26	0.77	45.96	28.76	3.08
50	14.74	21.11	15.93	17.41	1.26	0.76	47.79	28.94	3.07
60	14.79	21.15	16.75	17.53	1.26	0.76	48.50	29.09	3.07
70	14.81	21.09	17.34	17.76	1.25	0.75	48.80	29.13	3.06
80	14.85	21.06	17.84	17.72	1.25	0.75	50.72	29.22	2.98
90	14.87	20.96	18.08	17.78	1.24	0.74	51.56	29.21	2.92
100	14.89	20.96	18.32	17.85	1.24	0.74	50.92	29.20	2.88
150	14.95	20.94	18.68	17.56	1.23	0.73	50.61	29.26	2.91
200	14.98	20.87	18.65	16.93	1.22	0.72	50.57	29.39	2.82
250	14.98	20.91	18.20	16.13	1.22	0.72	49.77	29.47	2.90
300	14.97	20.94	17.70	15.31	1.22	0.72	50.99	29.64	2.94
350	14.97	20.91	17.15	14.64	1.21	0.71	48.73	29.52	2.94
400	14.97	20.98	16.80	14.26	1.21	0.71	49.24	29.53	3.02
450	14.96	21.12	16.82	13.95	1.22	0.71	48.47	29.58	3.03
500	14.98	21.15	16.85	13.92	1.23	0.71	48.15	29.62	3.14
550	14.99	21.10	17.10	14.05	1.22	0.71	48.71	29.53	3.15
600	15.01	21.12	17.46	14.29	1.23	0.71	49.31	29.51	3.17
650	15.03	21.26	18.05	14.65	1.24	0.72	49.51	29.59	3.21
700	15.05	21.26	18.54	15.04	1.24	0.72	49.90	29.48	3.22
750	15.09	21.29	19.50	15.72	1.24	0.73	48.77	29.52	3.30
800	15.12	21.32	20.35	16.28	1.24	0.73	46.85	29.40	3.39
850	15.16	21.36	21.51	17.25	1.25	0.74	46.02	29.31	3.47
900	15.18	21.45	22.19	18.24	1.26	0.75	45.41	29.02	3.58
950	15.19	21.50	22.56	19.42	1.26	0.76	45.64	28.96	3.55
1000	15.19	21.59	22.33	20.45	1.27	0.77	45.97	28.62	3.56
1100	15.17	21.86	20.90	21.48	1.29	0.79	48.06	27.57	3.62
1200	15.12	22.13	19.07	20.11	1.31	0.81	53.16	26.90	3.79
1300	15.03	22.42	17.46	17.41	1.33	0.82	47.54	26.69	4.03
1400	14.91	22.81	15.98	14.85	1.36	0.84	44.73	26.23	4.04
1500	14.77	23.27	14.60	12.64	1.40	0.84	42.71	26.65	4.15
1600	14.54	23.70	13.30	10.83	1.44	0.83	40.61	26.47	4.29
1700	14.25	24.30	12.24	9.45	1.51	0.82	39.93	25.82	4.55
1800	13.89	24.98	11.51	8.43	1.61	0.82	38.89	25.10	4.70
1900	13.42	25.75	10.91	7.65	1.75	0.81	38.02	24.17	4.90
2000	12.76	26.90	10.41	7.16	2.01	0.82	37.20	23.07	5.16
2100	12.25	27.70	9.62	6.90	2.23	0.84	36.06	22.83	5.56
2200	11.30	29.02	8.15	6.41	2.63	0.86	35.46	22.73	6.03
2300	9.99	30.75	6.66	5.81	3.26	0.88	36.44	22.07	6.47
2400	8.27	32.64	5.39	5.15	4.18	0.88	36.51	21.37	6.67
2500	6.29	35.37	4.46	4.48	5.96	0.87	39.33	20.04	7.65

Typical Performance Data

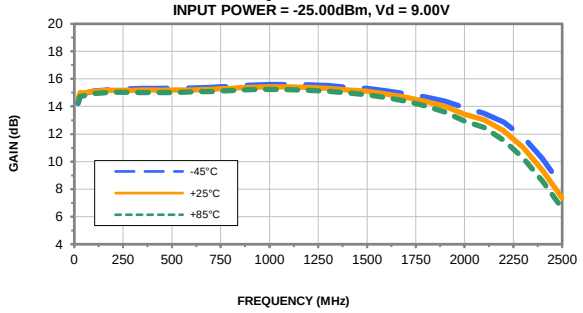
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 9.50V, Id = 417.35mA @ Temperature = +85°C

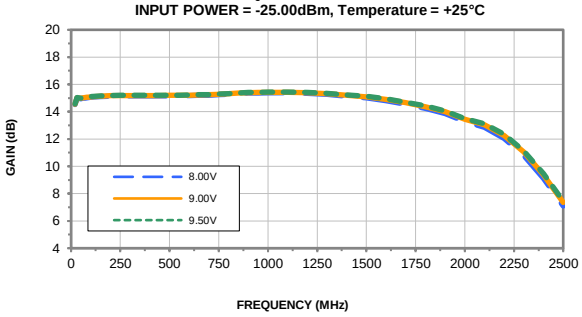
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	14.31	21.82	6.75	10.49	1.20	0.81	40.04	30.36	3.47
30	14.73	21.34	11.49	15.35	1.24	0.78	42.96	30.41	3.30
40	14.77	21.18	14.35	17.21	1.25	0.77	45.60	30.15	3.15
50	14.79	21.14	15.94	17.44	1.25	0.76	48.49	30.29	3.13
60	14.84	21.12	16.91	17.75	1.25	0.75	48.91	30.43	3.18
70	14.86	20.95	17.48	17.90	1.24	0.74	50.44	30.49	3.12
80	14.90	21.13	18.04	17.83	1.25	0.75	50.84	30.56	3.05
90	14.92	21.02	18.24	17.90	1.24	0.74	51.80	30.55	2.98
100	14.94	21.02	18.52	17.97	1.24	0.74	51.41	30.53	2.97
150	15.00	20.97	18.97	17.67	1.23	0.73	50.57	30.54	2.98
200	15.03	20.89	18.97	17.08	1.22	0.72	52.56	30.67	2.90
250	15.03	21.00	18.52	16.26	1.22	0.72	49.80	30.71	2.98
300	15.02	20.96	17.99	15.48	1.21	0.72	50.59	30.84	3.02
350	15.02	20.97	17.45	14.81	1.21	0.71	51.33	30.71	3.01
400	15.01	21.07	17.10	14.40	1.22	0.71	50.84	30.75	3.10
450	15.01	21.03	17.07	14.19	1.22	0.71	50.14	30.85	3.15
500	15.02	21.18	17.15	14.06	1.23	0.71	50.57	30.92	3.18
550	15.04	21.08	17.45	14.21	1.22	0.71	49.50	30.83	3.21
600	15.05	21.18	17.82	14.46	1.23	0.72	49.89	30.83	3.24
650	15.08	21.24	18.44	14.80	1.23	0.72	51.18	30.94	3.30
700	15.09	21.27	18.93	15.25	1.24	0.72	50.48	30.86	3.31
750	15.13	21.29	19.98	15.91	1.24	0.73	50.33	30.90	3.38
800	15.17	21.34	20.89	16.53	1.24	0.73	49.08	30.80	3.51
850	15.21	21.34	22.24	17.51	1.24	0.74	47.57	30.75	3.57
900	15.23	21.41	22.99	18.49	1.25	0.74	46.60	30.51	3.62
950	15.24	21.52	23.43	19.87	1.26	0.76	46.43	30.49	3.67
1000	15.25	21.59	23.13	20.91	1.27	0.76	46.75	30.24	3.68
1100	15.23	21.81	21.47	22.17	1.28	0.78	47.00	29.38	3.70
1200	15.19	22.12	19.64	20.95	1.31	0.80	48.73	28.65	3.87
1300	15.11	22.35	18.08	18.07	1.32	0.82	49.31	28.44	4.05
1400	15.00	22.82	16.66	15.43	1.36	0.84	46.17	28.07	4.17
1500	14.88	23.08	15.26	13.12	1.38	0.83	44.12	28.09	4.21
1600	14.67	23.63	13.92	11.22	1.43	0.83	42.11	27.99	4.38
1700	14.40	24.21	12.81	9.79	1.50	0.82	41.34	27.39	4.60
1800	14.07	24.86	12.01	8.72	1.59	0.81	39.98	26.75	4.78
1900	13.62	25.64	11.34	7.93	1.73	0.81	38.77	25.93	5.02
2000	12.99	26.60	10.86	7.39	1.95	0.82	37.98	24.87	5.31
2100	12.52	27.51	10.03	7.11	2.17	0.84	37.16	24.58	5.68
2200	11.61	28.84	8.47	6.61	2.56	0.86	37.12	24.38	6.14
2300	10.34	30.54	6.85	5.93	3.13	0.88	37.88	23.70	6.53
2400	8.65	32.54	5.51	5.23	4.04	0.88	37.43	22.99	6.76
2500	6.68	34.71	4.51	4.54	5.37	0.87	41.19	20.69	7.71

Typical Performance Curves

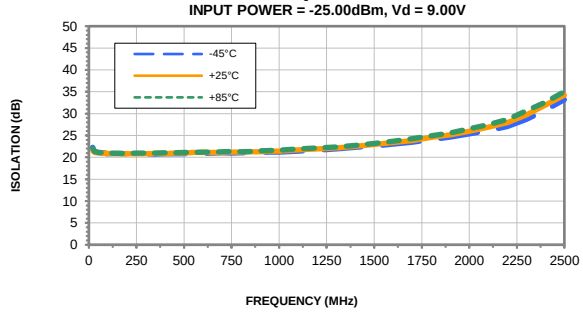
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 9.00V



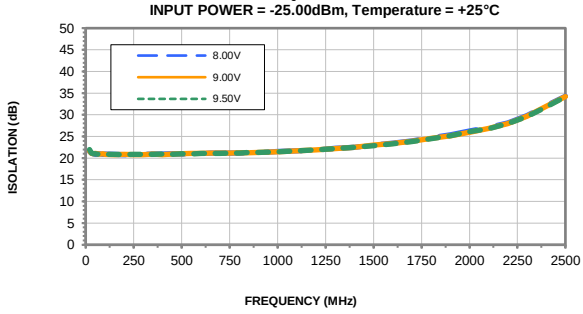
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



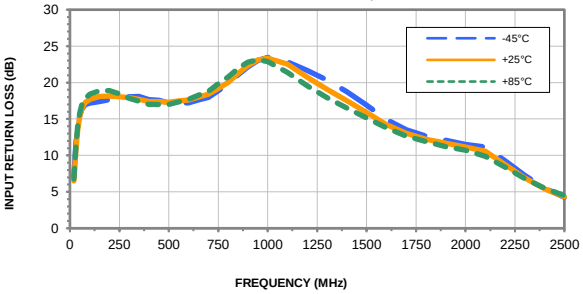
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 9.00V



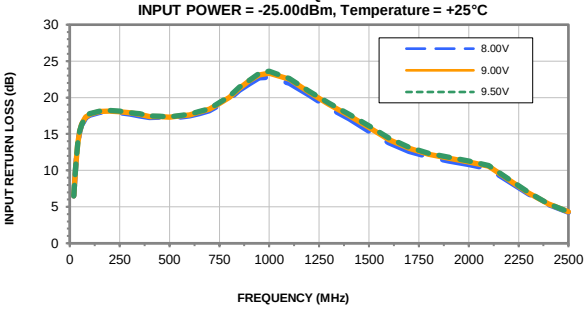
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



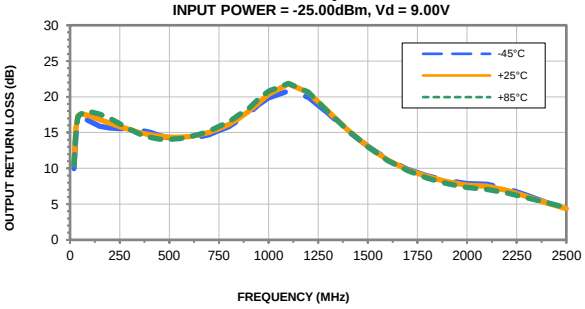
INPUT RETURN LOSS vs. FREQUENCY & TEMPERTURE
INPUT POWER = -25.00dBm, Vd = 9.00V



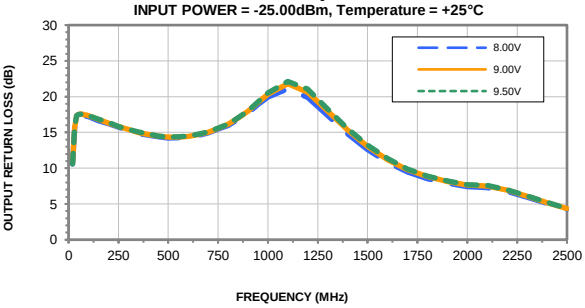
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 9.00V

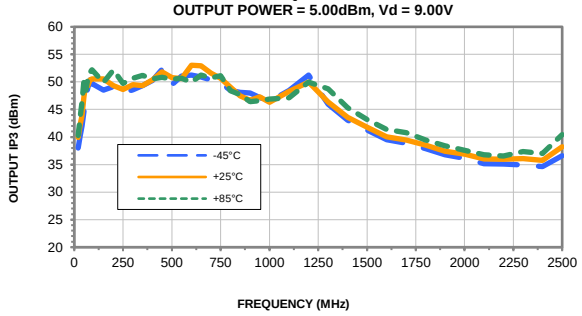


OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

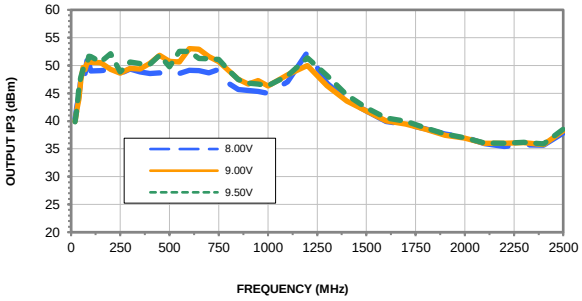


Typical Performance Curves

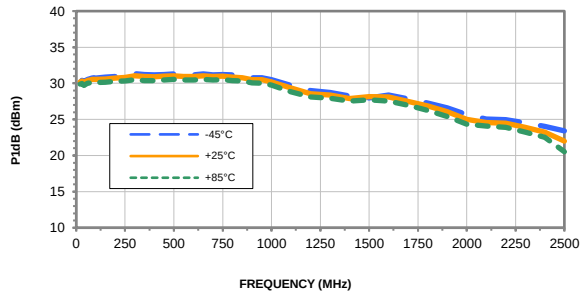
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTPUT POWER = 5.00dBm, Vd = 9.00V



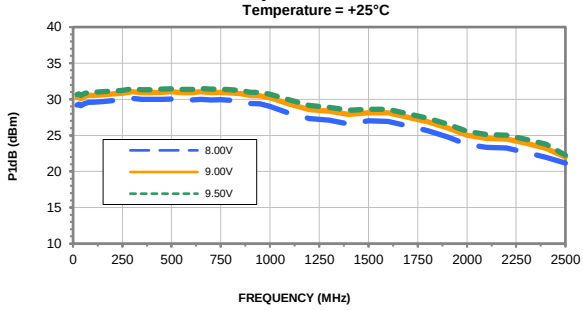
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
OUTPUT POWER = 5.00dBm, Temperature = +25°C



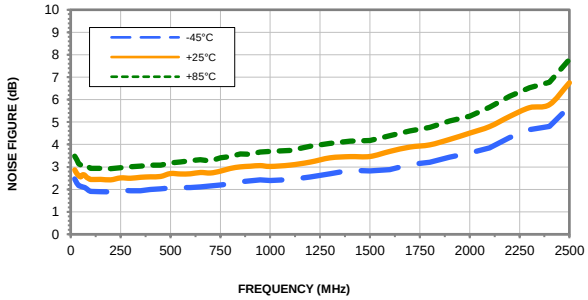
P1dB vs. FREQUENCY & TEMPERATURE
Vd = 9.00V



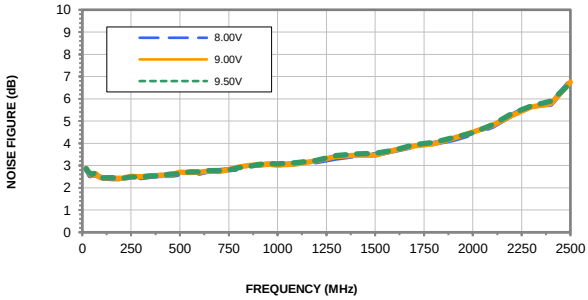
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



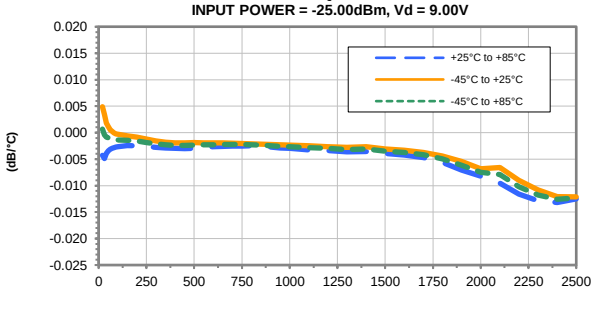
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vd = 9.00V



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



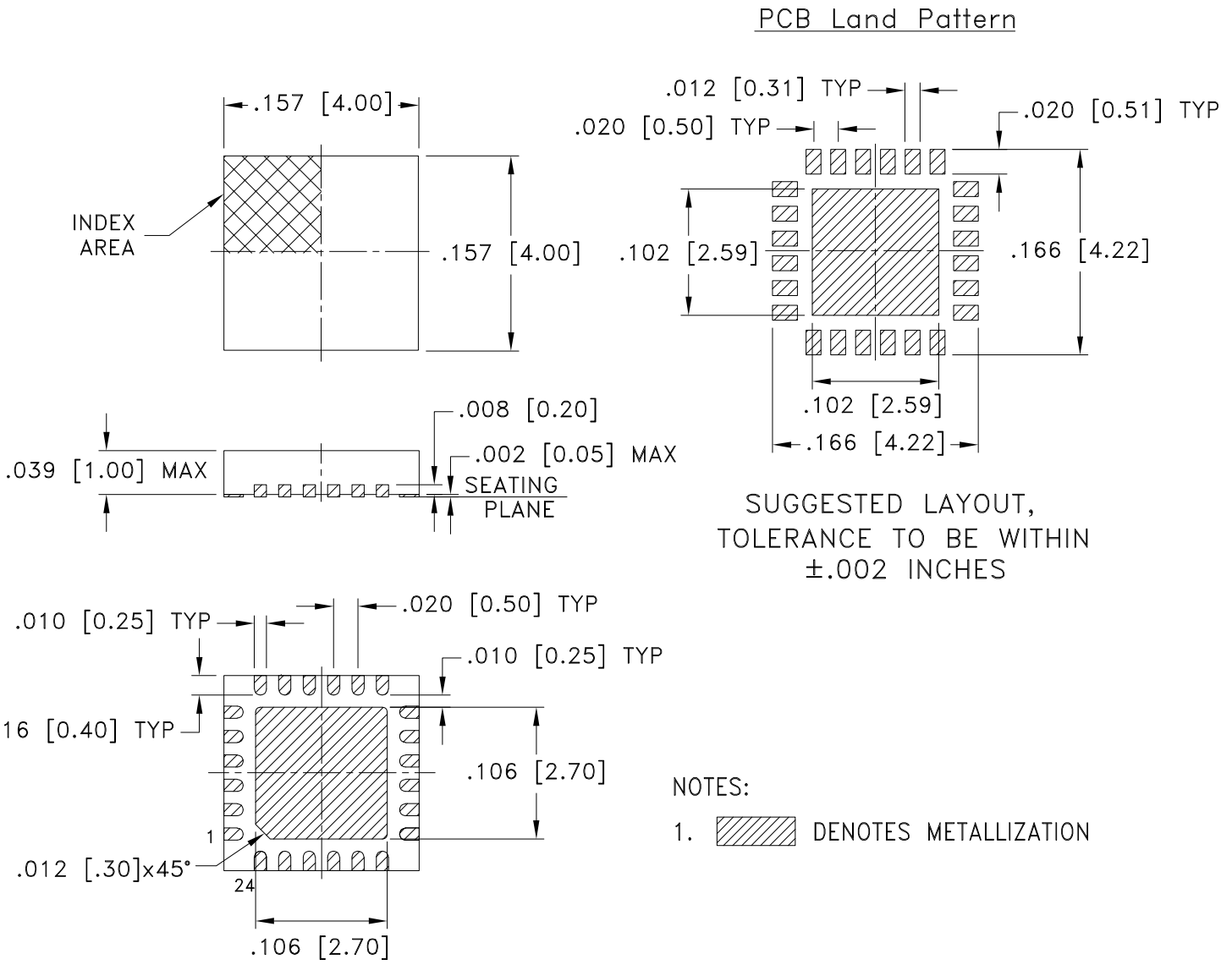
GAIN VARIATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 9.00V



Case Style DG

Outline Dimensions

DG1847



Weight: .04 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl.±.01; 3 Pl.±.005 Inches

Notes:

1. Case material: Plastic.
2. Termination finish:

For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin or NiPdAu All models, (+) suffix. See model Data sheet.

For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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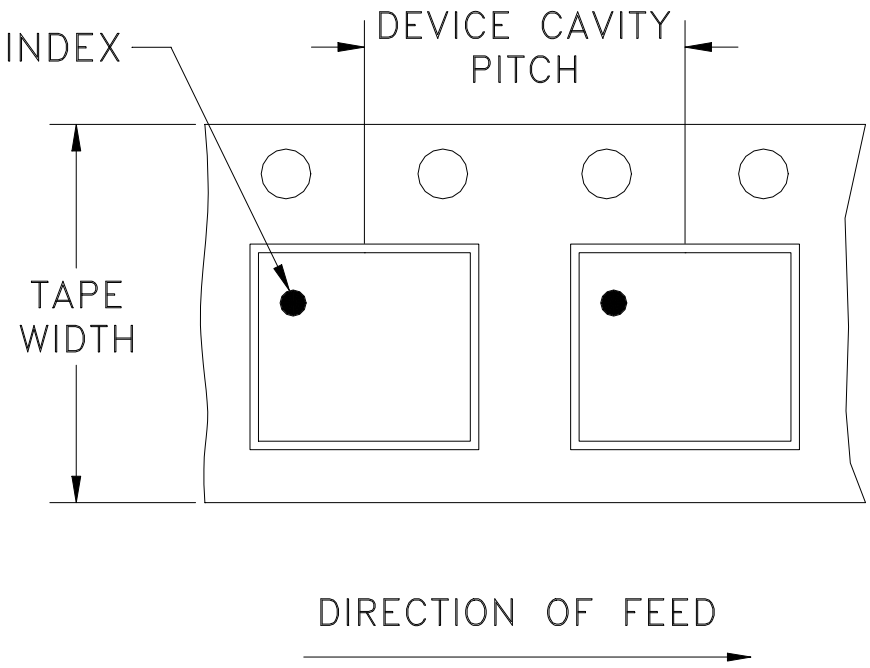
DEVICE ORIENTATION IN T&R



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.

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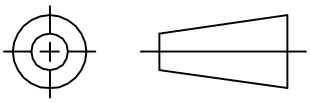
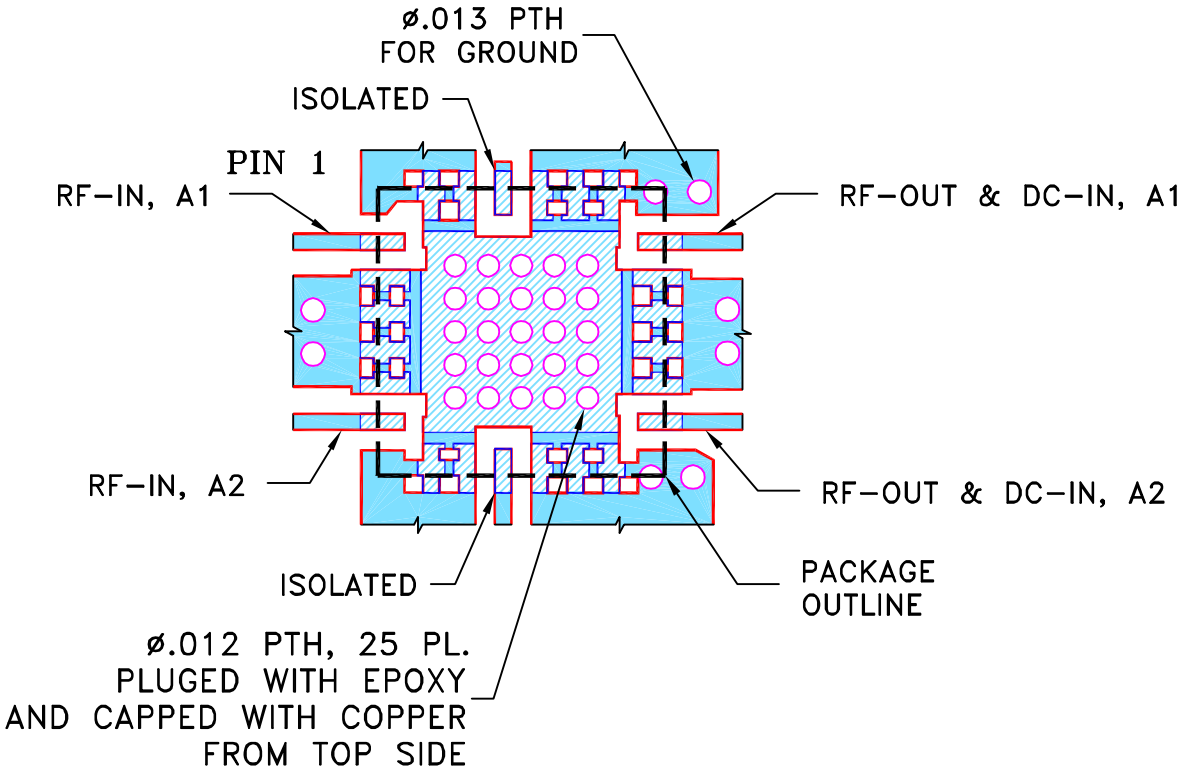
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M160689	NEW RELEASE	03/10/17	GF	RS

SUGGESTED MOUNTING CONFIGURATION FOR DG1847 CASE STYLE, "24AM02" PIN CONNECTION



NOTES: 1. MATERIAL: FR4 WITH DIELECTRIC THICKNESS 0.024" ± 0.002"; COPPER: 1/2 OZ. EACH SIDE.

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	03/09/17
TOLERANCES ON:	CHECKED	IL	03/10/17
2 PL DECIMALS ±	APPROVED	RS	03/10/17
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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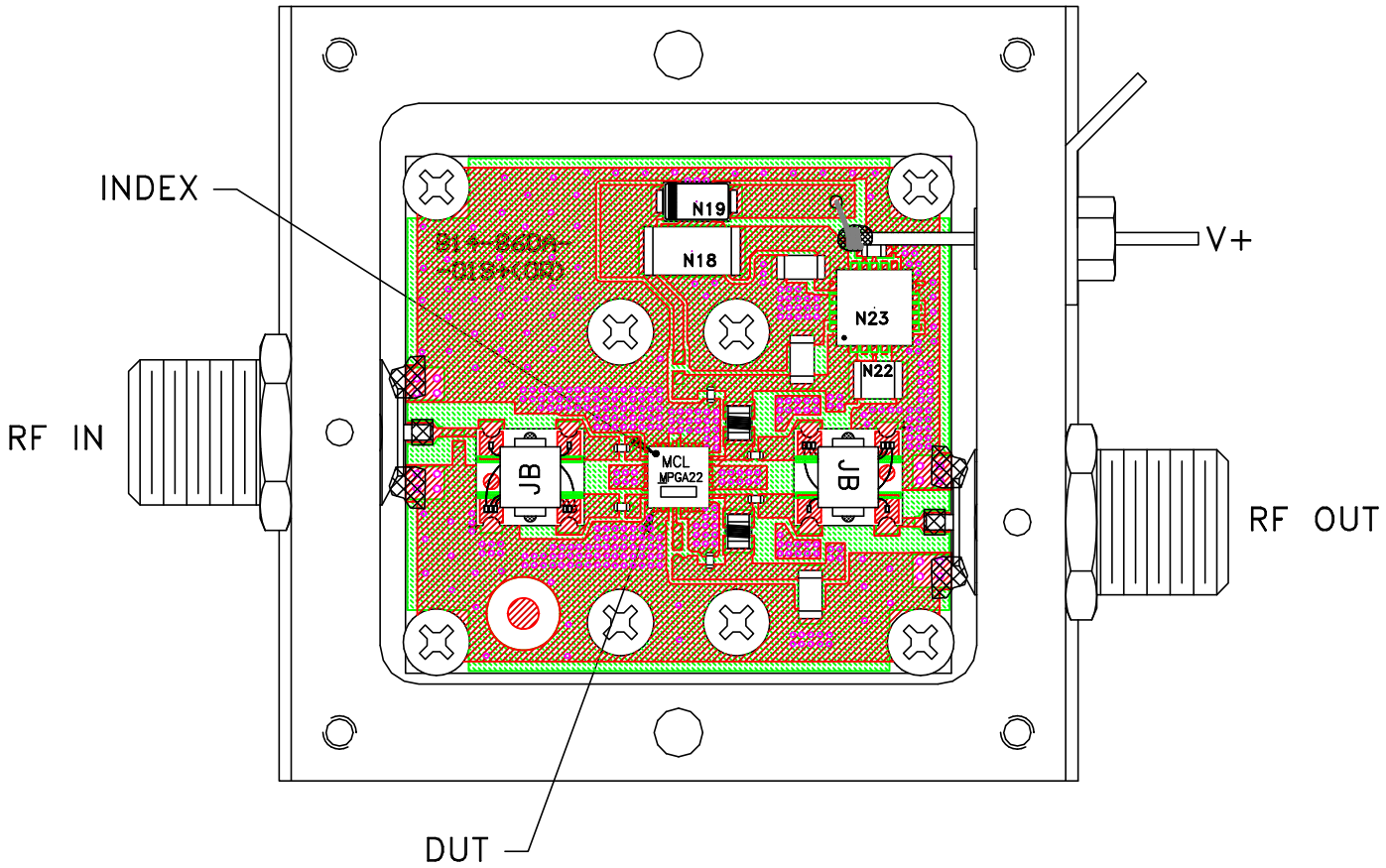
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 24AM02, DG1847, TB-937+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-500	OR
FILE: 98PL500	SCALE: 10:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-937+

STACK-UP DIAGRAM

Notes:

1. 75 Ohm F-Type Female connectors.
2. PCB Material: FR4 or equivalent, Dielectric Constant=4.5. Total Finished Thickness – .024".

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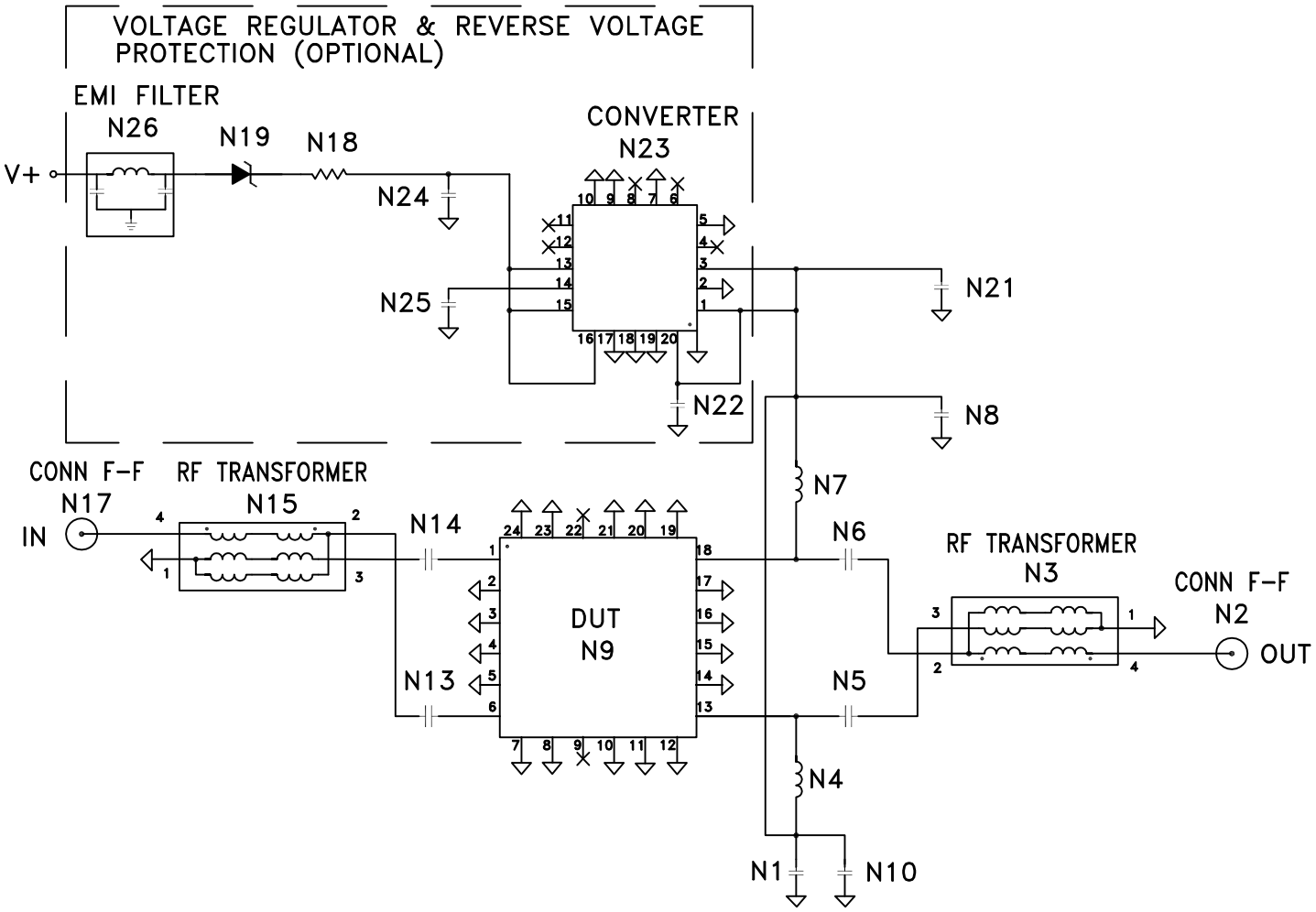
Evaluation Board and Circuit



COMPONENT	VALUE	SIZE
N9 (DUT)	Mini-Circuits MPGA-122-75+	4X4 mm
N1,N21,N24	Capacitor 10 uF	1206
N3,N15	Mini-Circuits TRS1-182-75+	7.11X6.35 mm
N4,N7	Inductor 390 nH	0805
N5,N6,N13,N14	Capacitor 220 pF	0402
N8,N10	Capacitor .01 uF	
N18	Resistor 4.32 Ohms,1W	2512
N19	Diod Schottky SMA 40V MSL1	5.21X2.60 mm
N22	Capacitor 22 uF	1210
N23	Voltage Regulator QFN20 ADJ MSL2	5X5 mm
N25	Capacitor 1 uF	0603
N26	EMI Filter	-

Schematic Diagram

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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 or -55° to 105° C or -40° to 105° C or -40° to 95° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° Ambient Environment	Individual Model Data Sheet
HTOL	1000 hours at 125°C	MIL-STD-883, Method 1005, Condition B
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Mechanical Shock	1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only	MIL-STD-883, Method 2002, Condition B, except Y1 direction only
Vibration (Variable Frequency)	50g peak	MIL-STD-883, Method 2007, Condition B
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102, Condition C
HAST	130°C, 85% RH, 96 hours	JESD22-A110
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak	J-STD-020

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

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

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