MEDIUM POWER, 0.3W

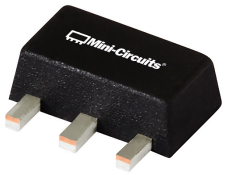
Monolithic Amplifier

GVA-92+

50Ω 869 to 2170 MHz

THE BIG DEAL

- Medium power, +24.1 dBm typ. at 920 MHz at P3dB
- High gain, 21.2 dB typ.
- High power added efficiency, up to 50%
- Usable over 10 to 3600 MHz in balanced amplifiers



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
- LTE
- WCDMA

PRODUCT OVERVIEW

Mini-Circuits' GVA-92+ is an advanced wideband amplifier fabricated using GaAs HBT technology. It offers high gain and excellent output power with high Power Added Efficiency (PAE) in application bands. Application circuits may also be developed to achieve outstanding performance significantly beyond the specified operating frequency range (see application note AN-60-066). Housed in an SOT-89 package, it has repeatable performance from lot to lot and very good thermal performance.

KEY FEATURES

Feature	Advantages
Optimized over 869 – 960 MHz and 2110 – 2170 MHz	Matched for best Power Added Efficiency in primary wireless communication bands: cellular and LTE. Application circuit with component values provided to minimize design effort on customer end.
Medium power output at P1dB: • +23.3 dBm over 869 – 960 MHz • +23.8 dBm over 2110 - 2170	With a power added efficiency of 45 – 54%, GVA-92+ delivers high power with low DC power consumption.
High gain: • 21.2 dB typ. at 920 MHz • 15.5 dB typ. at 2140 MHz	High gain results in fewer amplifier stages and lower system design cost.
Excellent ESD: • HBM: class 1C (1000 to <2000V) • MM: class M1 (50 to <100V)	Built-in ESD protection makes this amplifier a robust product.
Usable gain unmatched 10 – 29 dB over 10 to 3600 MHz	Usable over octave bandwidths in balanced amplifiers. Refer to application note AN-60-066.

Monolithic Amplifier GVA-92+

50Ω 869 to 2170 MHz

ELECTRICAL SPECIFICATIONS[1] AT +25°C AND VCC=+5 V, UNLESS NOTED

Parameter	Condition (MHz)	900 MHz Match			Condition (MHz)	2100 MHz Match			Units
		Min.	Typ.	Max.		Min.	Typ.	Max.	
Frequency Range		869		960		2110		2170	MHz
Gain	869		21.6		2110		15.4		dB
	920	19.1	21.2	23.3	2140	14.0	15.5	17.1	
	960		20.7		2170		15.5		
Input Return Loss	869		10.8		2110		12.6		dB
	920		10.6		2140		14.6		
	960		9.9		2170		16.8		
Output Return Loss	869		10.7		2110		10.8		dB
	920		9.7		2140		10.6		
	960		9.2		2170		10.4		
Reverse Isolation	869 - 920		33.6		2110 - 2170		29.8		dB
Output Power at 1dB Compression[2]	869		+23.2		2110		+23.7		dBm
	920		+23.3		2140		+23.8		
	960		+23.3		2170		+23.8		
Output Power at 3dB Compression	869		+24.1		2110		+24.8		dBm
	920		+24.1		2140		+24.9		
	960		+24.1		2170		+24.9		
Output IP3	869		+40.9		2110		+41.3		dBm
	920		+42.0		2140		+41.1		
	960		+43.6		2170		+41.6		
Efficiency Power Added at P1dB (PAE)	869 - 920		45.4		2110 - 2170		50		%
Noise Figure	869		6.0		2110		5.5		dB
	920		6.0		2140		5.6		
	960		6.0		2170		5.3		
Device Operating Voltage (Vcc)		+4.8	+5.0	+5.2		+4.8	+5.0	+5.2	V
Device Operating Current[2]			99.1	119			99.1	119	mA
Device Current Variation vs. Temperature[3]			41				66		µA/°C
Device Current Variation vs. Voltage			0.040				0.043		mA/mW
Thermal Resistance, junction-to-ground lead			94.8				94.8		°C/W

1. Measured on Mini-Circuits Characterization test board TB-820+ (900 MHz match) and TB-821+ (2100 MHz match). See Characterization Test Circuit (Fig. 1).
2. Current with no RF or small signal, decreases by 10% typ with 900 MHz and increases by 10% typ with 2100 MHz match.
3. Current at 85°C — Current at -45°C)/130

Monolithic Amplifier GVA-92+

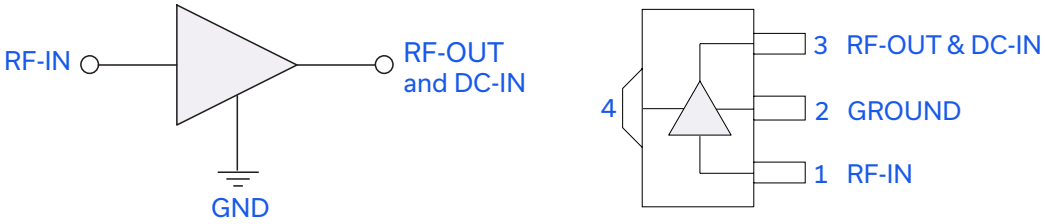
50Ω 869 to 2170 MHz

MAXIMUM RATINGS[4]

Parameter	Ratings		
Operating Temperature (ground lead)	-40°C to 85°C		
Storage Temperature	-65°C to 150°C		
Power Dissipation	0.68 W		
Input Power (CW)[(1)]		Continuous	5 Minutes Max.
	900 MHz	+14 dBm	+30 dBm
	2100 MHz	+21 dBm	+30 dBm
DC Voltage on Pin 3	+6 V		

(4) Permanent damage may occur if any of these limits are exceeded.
Electrical maximum ratings are not intended for continuous normal operation unless specified.

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.

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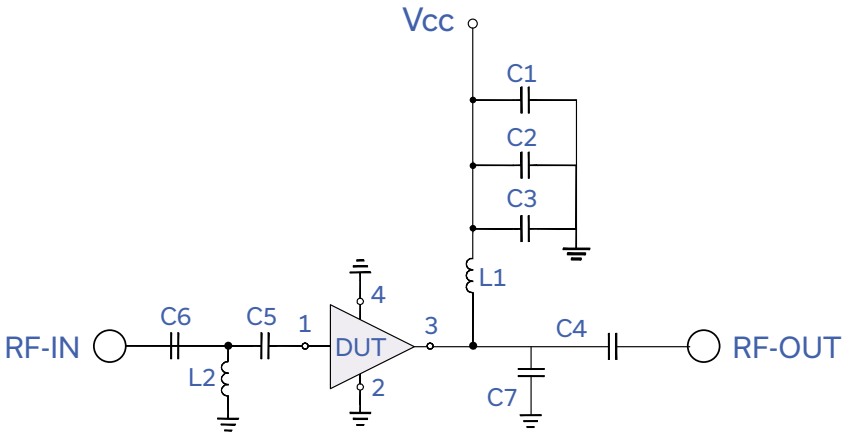
CHARACTERIZATION TEST AND APPLICATION CIRCUIT



	TB-820+ 896-920 MHz		TB-821+ 2110-2170 MHz	
Component	Value	Size	Value	Size
C1	10.0µF	1206	10.0µF	1206
C2	0.1 µF	0603	0.1 µF	0603
C3	10 pF	0402	8.2 pF	0402
C4	100 pF	0402	47 pF	0402
C5	5.6 pF	0402	1.3 pF	0402
C6	100 pF	0402	47 pF	0402
C7	Not Used		0.5 pF	0402
L1	18 nH	0603	9.5 nH	0603
L2	7.5 nH	0402	2.2 nH	0402

Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-820+(869-960 MHz) and TB-821+(2110-2170 MHz)

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.

PRODUCT MARKING

Marking may contain other features or characters for internal lot control

Monolithic Amplifier GVA-92+

50Ω 869 to 2170 MHz

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS 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-370
Evaluation Board	TB-820+ (869-960 MHz) TB-821+ (2110-2140 MHz)
Environmental Ratings	ENV08T1

ESD RATING

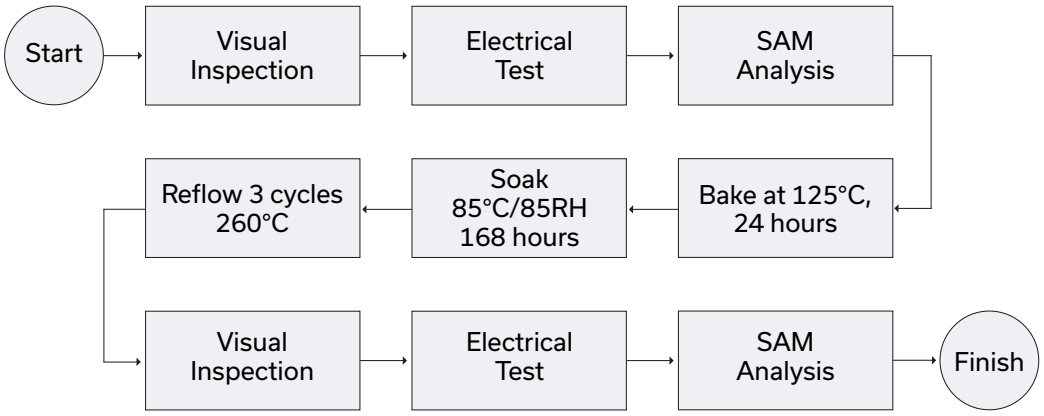
Human Body Model (HBM): Class 1C (1000 to <2000V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (Pass 75V) in accordance with ANSI/ESD STM5.2-2009

MSL RATING

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

MSL TEST FLOW CHART



NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-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)

900 MHz Match

TEST CONDITIONS: Vd = 5V, Id = 108.61 mA @ Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dB)
800	22.05	34.30	9.81	13.15	1.82	1.01	38.86	23.20	23.81	6.45
820	21.94	34.11	10.52	12.43	1.83	0.98	39.40	23.30	23.87	6.45
840	21.82	34.08	11.01	11.81	1.86	0.96	39.64	23.33	23.88	6.37
860	21.67	33.85	11.32	11.26	1.84	0.95	40.30	23.38	23.93	6.36
869	21.59	33.83	11.36	11.04	1.85	0.94	40.24	23.44	24.13	6.35
880	21.50	33.80	11.39	10.78	1.85	0.93	40.44	23.53	24.29	6.33
900	21.31	33.73	11.30	10.39	1.86	0.92	40.69	23.54	24.13	6.30
910	21.22	33.72	11.17	10.21	1.87	0.92	41.00	23.43	24.30	6.30
920	21.13	33.57	11.04	10.03	1.85	0.92	40.97	23.38	24.24	6.27
930	21.03	33.72	10.87	9.89	1.89	0.92	41.14	23.57	24.36	6.27
950	20.83	33.67	10.50	9.60	1.90	0.91	41.27	23.69	24.44	6.33
960	20.72	33.65	10.30	9.47	1.90	0.91	42.08	23.59	24.29	6.30
970	20.62	33.66	10.10	9.35	1.91	0.91	41.30	23.69	24.23	6.30
980	20.52	33.69	9.89	9.23	1.93	0.92	41.15	23.59	24.40	6.29
990	20.41	33.64	9.68	9.13	1.92	0.92	41.24	23.71	24.44	6.26
1000	20.31	33.75	9.47	9.04	1.95	0.92	40.74	23.76	24.19	6.28

2100 MHz Match

TEST CONDITIONS: Vd = 5V, Id = 106.16 mA @ Temperature = +25degC

2000	15.16	31.22	8.28	11.79	2.51	1.08	41.60	23.86	24.85	6.11
2020	15.28	30.88	9.06	11.75	2.45	1.05	39.17	23.97	25.23	5.97
2040	15.36	30.53	9.94	11.63	2.40	1.02	41.26	24.02	24.99	5.87
2060	15.46	30.39	10.82	11.63	2.39	1.00	41.11	23.72	25.03	5.78
2080	15.52	30.26	11.71	11.52	2.39	0.98	41.73	23.87	25.07	5.72
2100	15.57	30.04	12.76	11.45	2.36	0.97	42.19	23.86	25.07	5.67
2110	15.58	29.99	13.25	11.37	2.36	0.96	43.21	24.20	25.09	5.57
2140	15.58	29.79	14.82	11.17	2.34	0.94	40.81	24.08	25.21	5.55
2170	15.58	29.77	16.21	11.11	2.36	0.92	40.18	24.15	25.26	5.55
2180	15.57	29.60	16.60	11.08	2.33	0.92	40.40	24.15	25.13	5.44
2200	15.55	29.58	17.12	11.03	2.34	0.91	42.31	24.13	25.53	5.39

Typical Performance Data

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

900 MHz Match										
TEST CONDITIONS: Vd = 4.75V, Id =98.15 mA @ Temperature = +25degC										
FREQ	**Gain**	**Isolation**	**Input Return Loss**	**Output Return Loss**	**Stability**		**IP-3 Output**	**1dB Comp. Output**	**3dB Comp. Output**	**Noise Figure**
(MHz)	**(dB)**	**(dB)**	**(dB)**	**(dB)**	**K**	**Measure**	**(dBm)**	**(dBm)**	**(dBm)**	**(dB)**
800	21.99	33.98	9.66	12.69	1.76	1.01	38.35	22.51	23.20	6.18
820	21.89	33.84	10.35	12.01	1.77	0.98	39.14	22.64	23.26	6.17
840	21.76	33.69	10.86	11.41	1.77	0.96	39.32	22.68	23.28	6.08
860	21.61	33.67	11.18	10.88	1.80	0.94	40.12	22.77	23.34	6.08
869	21.53	33.59	11.23	10.67	1.79	0.93	40.34	22.85	23.54	6.05
880	21.44	33.54	11.29	10.43	1.80	0.93	40.38	22.91	23.69	6.02
900	21.25	33.49	11.22	10.04	1.81	0.92	40.67	22.93	23.54	5.99
910	21.16	33.52	11.10	9.87	1.83	0.91	41.19	22.84	23.71	6.00
920	21.07	33.45	10.97	9.69	1.82	0.91	41.19	22.80	23.66	5.96
930	20.97	33.44	10.81	9.56	1.83	0.91	41.36	22.99	23.77	5.98
950	20.77	33.43	10.46	9.29	1.85	0.91	41.71	23.12	23.86	6.05
960	20.66	33.38	10.26	9.15	1.84	0.90	42.50	23.01	23.71	5.98
970	20.56	33.45	10.06	9.04	1.87	0.90	42.08	23.14	23.64	5.99
980	20.46	33.44	9.86	8.93	1.87	0.90	41.82	23.02	23.82	5.99
990	20.35	33.45	9.67	8.83	1.88	0.91	41.71	23.14	23.85	5.99
1000	20.24	33.50	9.47	8.74	1.90	0.91	41.47	23.19	23.61	5.99

2100 MHz Match										
TEST CONDITIONS: Vd = 4.75V, Id =94.64 mA @ Temperature = +25degC										
2000	14.97	31.05	8.20	11.57	2.49	1.08	40.28	23.08	23.72	5.83
2020	15.09	30.75	8.98	11.51	2.45	1.05	39.96	23.26	24.09	5.72
2040	15.19	30.46	9.83	11.47	2.41	1.03	40.21	23.27	23.84	5.62
2060	15.30	30.22	10.71	11.45	2.38	1.00	39.45	22.92	23.77	5.53
2080	15.38	30.01	11.64	11.39	2.35	0.98	39.80	23.10	23.73	5.46
2100	15.42	29.91	12.61	11.30	2.35	0.97	40.40	23.10	23.73	5.42
2110	15.43	29.81	13.12	11.27	2.34	0.96	41.83	23.46	23.78	5.30
2140	15.42	29.65	14.58	11.04	2.33	0.94	41.25	23.34	23.83	5.29
2170	15.43	29.52	15.97	10.97	2.33	0.92	40.77	23.37	23.81	5.26
2180	15.43	29.52	16.32	10.97	2.34	0.92	41.81	23.42	23.70	5.17
2200	15.41	29.37	16.88	10.92	2.31	0.91	41.29	23.39	24.07	5.10

Typical Performance Data

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

900 MHz Match

TEST CONDITIONS: Vd = 5.25V, Id = 117.83 mA @ Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dB)
800	22.07	34.57	9.94	13.71	1.89	1.02	37.86	23.80	24.40	6.74
820	21.96	34.39	10.65	12.96	1.90	0.99	38.09	23.91	24.47	6.73
840	21.84	34.20	11.13	12.30	1.89	0.97	38.34	23.94	24.46	6.64
860	21.69	34.20	11.44	11.73	1.92	0.96	38.74	23.94	24.51	6.65
869	21.61	34.01	11.48	11.49	1.90	0.95	38.71	24.02	24.70	6.62
880	21.52	34.01	11.49	11.23	1.91	0.94	38.73	24.09	24.86	6.60
900	21.34	34.01	11.38	10.81	1.94	0.93	38.88	24.14	24.71	6.59
910	21.24	33.97	11.26	10.62	1.94	0.93	38.99	24.02	24.87	6.59
920	21.15	34.09	11.11	10.43	1.97	0.93	38.90	23.97	24.80	6.56
930	21.05	34.01	10.94	10.28	1.97	0.93	38.97	24.14	24.93	6.58
950	20.85	33.84	10.55	9.99	1.95	0.93	39.10	24.25	25.01	6.64
960	20.75	33.92	10.34	9.85	1.97	0.93	39.52	24.18	24.86	6.60
970	20.65	33.84	10.13	9.71	1.97	0.93	39.10	24.25	24.79	6.59
980	20.54	33.86	9.92	9.60	1.98	0.93	39.04	24.16	24.97	6.61
990	20.44	33.91	9.70	9.48	2.00	0.93	39.14	24.28	25.01	6.57
1000	20.33	33.92	9.50	9.38	2.01	0.93	38.72	24.32	24.76	6.63

2100 MHz Match

TEST CONDITIONS: Vd = 5.25V, Id = 115.77 mA @ Temperature = +25degC

2000	15.19	31.19	8.35	12.00	2.51	1.08	37.12	24.51	25.47	6.31
2020	15.32	31.08	9.14	11.94	2.52	1.05	37.68	24.66	25.86	6.19
2040	15.40	30.74	10.04	11.81	2.47	1.03	37.79	24.65	25.58	6.09
2060	15.51	30.51	10.94	11.77	2.43	1.00	37.92	24.37	25.65	6.00
2080	15.56	30.38	11.84	11.67	2.42	0.98	38.38	24.60	25.66	5.96
2100	15.61	30.34	12.88	11.59	2.44	0.97	38.43	24.58	25.70	5.90
2110	15.61	30.15	13.39	11.51	2.40	0.96	38.38	24.85	25.69	5.79
2140	15.61	29.98	14.98	11.34	2.39	0.94	38.65	24.77	25.82	5.78
2170	15.62	29.98	16.38	11.27	2.42	0.92	39.41	24.82	25.87	5.77
2180	15.60	29.85	16.79	11.24	2.40	0.92	39.45	24.81	25.72	5.67
2200	15.58	29.68	17.29	11.17	2.36	0.91	39.71	24.78	26.11	5.63

Typical Performance Data

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

900 MHz Match

TEST CONDITIONS: Vd = 5V, Id =96.69 mA @ Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dB)
800	22.55	34.30	9.56	11.55	1.69	0.99	42.24	23.40	24.06	5.51
820	22.44	34.13	10.23	10.99	1.69	0.96	44.44	23.53	24.13	5.51
840	22.30	33.97	10.67	10.46	1.70	0.94	43.33	23.58	24.15	5.42
860	22.14	33.90	10.94	10.01	1.71	0.92	43.04	23.67	24.20	5.45
869	22.06	33.96	10.97	9.82	1.73	0.91	43.72	23.75	24.40	5.40
880	21.96	33.99	11.00	9.60	1.75	0.91	44.08	23.81	24.57	5.38
900	21.77	33.84	10.88	9.28	1.75	0.89	42.30	23.84	24.41	5.40
910	21.67	33.75	10.76	9.11	1.74	0.89	42.04	23.75	24.58	5.39
920	21.58	33.79	10.61	8.97	1.75	0.89	42.98	23.70	24.51	5.35
930	21.47	33.80	10.45	8.84	1.77	0.88	42.94	23.89	24.64	5.37
950	21.27	33.63	10.09	8.59	1.75	0.88	41.79	24.01	24.73	5.48
960	21.16	33.75	9.90	8.47	1.78	0.88	41.18	23.94	24.58	5.44
970	21.05	33.79	9.70	8.36	1.79	0.88	41.84	24.05	24.50	5.41
980	20.95	33.73	9.51	8.26	1.79	0.88	42.10	23.93	24.69	5.42
990	20.84	33.78	9.31	8.16	1.81	0.88	42.10	24.05	24.71	5.41
1000	20.73	33.72	9.12	8.07	1.80	0.88	42.07	24.09	24.46	5.39

2100 MHz Match

TEST CONDITIONS: Vd = 5V, Id =96.77 mA @ Temperature = -45degC

2000	15.61	31.08	8.11	11.56	2.31	1.08	39.86	23.53	23.82	5.18
2020	15.69	30.89	8.84	11.35	2.31	1.05	41.15	23.70	24.18	5.05
2040	15.78	30.46	9.73	11.22	2.25	1.02	39.15	23.67	23.95	4.98
2060	15.90	30.25	10.64	11.20	2.22	1.00	41.30	23.37	23.87	4.88
2080	15.99	30.15	11.61	11.19	2.22	0.98	39.66	23.50	23.83	4.82
2100	16.04	29.88	12.62	11.10	2.18	0.96	39.76	23.49	23.84	4.78
2110	16.05	29.73	13.17	11.06	2.16	0.95	39.30	23.73	23.89	4.70
2140	16.03	29.75	14.64	10.79	2.20	0.93	38.32	23.65	23.92	4.68
2170	16.05	29.59	16.04	10.70	2.19	0.91	38.35	23.64	23.94	4.68
2180	16.04	29.54	16.39	10.67	2.18	0.91	38.10	23.67	23.83	4.56
2200	16.02	29.35	16.83	10.59	2.15	0.90	39.32	23.62	24.19	4.53

Typical Performance Data

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

900 MHz Match										
TEST CONDITIONS: Vd = 4.75V, Id =87.05 mA @ Temperature = -45degC										
FREQ	**Gain**	**Isolation**	**Input Return Loss**	**Output Return Loss**	**Stability**		**IP-3 Output**	**1dB Comp. Output**	**3dB Comp. Output**	**Noise Figure**
(MHz)	**(dB)**	**(dB)**	**(dB)**	**(dB)**	**K**	**Measure**	**(dBm)**	**(dBm)**	**(dBm)**	**(dB)**
800	22.46	34.04	9.43	11.30	1.64	0.99	40.18	22.66	23.39	5.25
820	22.34	33.83	10.09	10.74	1.64	0.96	42.02	22.81	23.47	5.26
840	22.20	33.75	10.55	10.23	1.66	0.93	42.22	22.89	23.50	5.16
860	22.05	33.59	10.84	9.79	1.66	0.91	43.16	23.01	23.57	5.17
869	21.97	33.69	10.88	9.60	1.68	0.91	45.47	23.10	23.78	5.14
880	21.87	33.56	10.92	9.39	1.68	0.90	46.13	23.16	23.94	5.14
900	21.68	33.53	10.82	9.06	1.69	0.89	43.61	23.16	23.78	5.11
910	21.58	33.48	10.70	8.90	1.69	0.88	43.99	23.12	23.96	5.12
920	21.49	33.42	10.57	8.76	1.69	0.88	46.04	23.08	23.89	5.08
930	21.38	33.48	10.42	8.64	1.71	0.88	48.39	23.29	24.03	5.11
950	21.17	33.45	10.06	8.40	1.72	0.87	44.04	23.39	24.12	5.21
960	21.07	33.54	9.88	8.27	1.74	0.87	43.39	23.33	23.97	5.12
970	20.96	33.42	9.69	8.17	1.73	0.87	45.02	23.44	23.89	5.12
980	20.85	33.44	9.51	8.07	1.74	0.87	45.74	23.33	24.08	5.12
990	20.75	33.48	9.30	7.98	1.75	0.87	45.23	23.45	24.10	5.13
1000	20.64	33.38	9.11	7.89	1.74	0.87	44.94	23.49	23.85	5.12

2100 MHz Match										
TEST CONDITIONS: Vd = 4.75V, Id =87.11 mA @ Temperature = -45degC										
2000	15.51	30.97	8.02	11.37	2.29	1.08	44.91	23.54	23.80	5.00
2020	15.58	30.65	8.75	11.14	2.25	1.05	43.69	23.72	24.19	4.87
2040	15.67	30.38	9.63	11.03	2.23	1.02	44.16	23.71	23.96	4.78
2060	15.80	30.12	10.53	11.01	2.20	1.00	42.36	23.40	23.87	4.71
2080	15.89	29.97	11.49	11.01	2.19	0.98	41.51	23.55	23.84	4.63
2100	15.94	29.78	12.48	10.91	2.17	0.96	41.15	23.52	23.85	4.61
2110	15.96	29.71	13.01	10.88	2.17	0.95	40.08	23.79	23.89	4.52
2140	15.94	29.60	14.47	10.61	2.17	0.92	39.33	23.68	23.93	4.49
2170	15.95	29.44	15.86	10.51	2.16	0.91	40.07	23.68	23.95	4.52
2180	15.95	29.40	16.21	10.50	2.16	0.90	39.92	23.69	23.83	4.36
2200	15.92	29.25	16.67	10.40	2.14	0.89	39.94	23.65	24.19	4.34

Typical Performance Data

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

900 MHz Match										
TEST CONDITIONS: Vd = 5.25V, Id = 108.86 mA @ Temperature = -45degC										
FREQ	**Gain**	**Isolation**	**Input Return Loss**	**Output Return Loss**	**Stability**		**IP-3 Output**	**1dB Comp. Output**	**3dB Comp. Output**	**Noise Figure**
(MHz)	**(dB)**	**(dB)**	**(dB)**	**(dB)**	**K**	**Measure**	**(dBm)**	**(dBm)**	**(dBm)**	**(dB)**
800	22.68	34.54	9.69	11.82	1.72	0.99	43.79	24.00	24.66	5.80
820	22.56	34.35	10.34	11.24	1.73	0.96	44.93	24.13	24.71	5.83
840	22.42	34.27	10.79	10.70	1.74	0.94	43.48	24.19	24.72	5.74
860	22.26	34.09	11.04	10.24	1.74	0.92	42.71	24.21	24.76	5.75
869	22.18	34.13	11.06	10.06	1.76	0.92	43.53	24.30	24.96	5.74
880	22.08	34.06	11.07	9.85	1.76	0.91	43.44	24.38	25.13	5.71
900	21.89	33.99	10.92	9.51	1.77	0.90	42.35	24.38	24.98	5.70
910	21.79	33.87	10.79	9.35	1.75	0.89	42.18	24.29	25.14	5.70
920	21.70	33.95	10.64	9.20	1.78	0.89	42.83	24.25	25.07	5.68
930	21.59	34.02	10.47	9.07	1.80	0.89	42.72	24.47	25.20	5.69
950	21.39	33.98	10.09	8.81	1.81	0.89	41.67	24.54	25.28	5.78
960	21.28	34.00	9.90	8.69	1.82	0.89	41.37	24.47	25.14	5.72
970	21.17	34.03	9.70	8.58	1.83	0.89	41.68	24.57	25.06	5.73
980	21.07	33.94	9.50	8.47	1.82	0.89	42.10	24.48	25.24	5.74
990	20.96	34.00	9.30	8.38	1.84	0.89	42.19	24.60	25.27	5.74
1000	20.85	34.10	9.11	8.29	1.87	0.89	42.32	24.64	25.02	5.74

2100 MHz Match										
TEST CONDITIONS: Vd = 5.25V, Id = 109.39 mA @ Temperature = -45degC										
2000	15.73	31.18	8.19	11.77	2.33	1.08	40.09	25.05	25.88	5.41
2020	15.81	30.95	8.92	11.55	2.31	1.05	40.99	25.24	26.41	5.28
2040	15.90	30.62	9.84	11.43	2.27	1.02	40.56	25.23	26.04	5.21
2060	16.02	30.35	10.75	11.42	2.23	1.00	39.31	24.99	26.32	5.13
2080	16.11	30.29	11.76	11.42	2.24	0.98	40.25	25.16	26.15	5.08
2100	16.16	30.05	12.78	11.31	2.21	0.96	40.42	25.18	26.33	5.01
2110	16.17	29.90	13.32	11.27	2.19	0.95	39.61	25.39	26.30	4.97
2140	16.15	29.86	14.82	11.00	2.21	0.93	38.73	25.36	26.47	4.94
2170	16.16	29.75	16.23	10.90	2.21	0.91	38.69	25.39	26.45	4.96
2180	16.16	29.71	16.57	10.88	2.21	0.91	38.06	25.40	26.38	4.82
2200	16.13	29.52	16.99	10.79	2.18	0.90	39.18	25.35	26.68	4.79

Typical Performance Data

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

900 MHz Match

TEST CONDITIONS: Vd = 5V, Id = 103.87 mA @ Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dB)
800	21.44	34.15	10.02	14.41	1.95	1.03	37.31	23.14	23.68	6.89
820	21.34	33.86	10.73	13.64	1.93	1.00	37.76	23.24	23.74	6.89
840	21.22	33.83	11.20	12.95	1.96	0.98	37.92	23.27	23.75	6.79
860	21.08	33.77	11.51	12.36	1.98	0.97	38.38	23.29	23.80	6.78
869	21.01	33.63	11.55	12.13	1.96	0.96	38.61	23.39	24.00	6.76
880	20.92	33.67	11.58	11.85	1.98	0.96	38.67	23.47	24.15	6.74
900	20.74	33.55	11.48	11.42	1.98	0.95	38.65	23.50	24.00	6.72
910	20.65	33.63	11.35	11.22	2.01	0.95	38.73	23.38	24.16	6.72
920	20.56	33.42	11.21	11.03	1.97	0.94	38.82	23.34	24.10	6.69
930	20.46	33.45	11.05	10.88	1.99	0.94	39.09	23.50	24.22	6.68
950	20.27	33.65	10.67	10.58	2.05	0.95	39.06	23.62	24.31	6.77
960	20.17	33.48	10.46	10.43	2.02	0.94	39.52	23.58	24.16	6.71
970	20.07	33.44	10.27	10.29	2.02	0.94	39.12	23.63	24.09	6.68
980	19.97	33.51	10.06	10.17	2.05	0.95	39.26	23.52	24.26	6.69
990	19.86	33.42	9.85	10.05	2.04	0.95	39.28	23.65	24.30	6.69
1000	19.76	33.56	9.65	9.95	2.07	0.95	38.90	23.68	24.07	6.71

2100 MHz Match

TEST CONDITIONS: Vd = 5V, Id = 105.45 mA @ Temperature = +85degC

2000	14.57	31.23	8.36	11.98	2.70	1.08	36.53	23.28	23.74	6.66
2020	14.70	30.91	9.11	11.97	2.65	1.05	36.88	23.48	24.07	6.50
2040	14.79	30.60	9.95	11.86	2.60	1.03	36.72	23.43	23.82	6.43
2060	14.87	30.47	10.81	11.77	2.59	1.01	37.14	23.09	23.72	6.32
2080	14.92	30.23	11.70	11.67	2.55	0.99	37.14	23.22	23.70	6.25
2100	14.97	30.14	12.71	11.58	2.55	0.97	36.52	23.23	23.73	6.21
2110	14.98	30.09	13.21	11.51	2.55	0.96	37.64	23.54	23.79	6.10
2140	14.98	29.96	14.79	11.37	2.55	0.94	38.04	23.45	23.82	6.07
2170	14.99	29.75	16.27	11.29	2.52	0.93	37.91	23.37	23.80	5.99
2180	14.98	29.63	16.66	11.28	2.50	0.93	37.03	23.40	23.67	5.96
2200	14.95	29.60	17.21	11.22	2.51	0.92	39.15	23.34	24.06	5.89

Typical Performance Data

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

900 MHz Match

TEST CONDITIONS: Vd = 4.75V, Id = 94.45 mA @ Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	3dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dBm)	(dB)
800	21.44	33.77	9.82	13.68	1.85	1.02	36.36	22.45	23.06	6.57
820	21.34	33.77	10.52	12.95	1.88	1.00	36.90	22.58	23.12	6.55
840	21.22	33.46	11.01	12.31	1.86	0.98	36.98	22.62	23.14	6.49
860	21.08	33.45	11.34	11.74	1.88	0.96	37.52	22.67	23.19	6.45
869	21.01	33.37	11.38	11.53	1.88	0.95	37.72	22.74	23.40	6.44
880	20.92	33.44	11.44	11.27	1.91	0.95	37.79	22.80	23.55	6.42
900	20.74	33.33	11.36	10.87	1.91	0.94	37.84	22.83	23.40	6.37
910	20.65	33.23	11.24	10.68	1.90	0.94	38.00	22.73	23.56	6.38
920	20.56	33.23	11.13	10.50	1.91	0.93	38.07	22.68	23.51	6.34
930	20.46	33.19	10.96	10.35	1.91	0.93	38.27	22.87	23.62	6.36
950	20.27	33.26	10.61	10.07	1.94	0.93	38.23	22.99	23.70	6.44
960	20.16	33.18	10.42	9.93	1.93	0.93	38.73	22.92	23.56	6.39
970	20.07	33.21	10.22	9.81	1.95	0.93	38.45	23.01	23.49	6.35
980	19.97	33.17	10.02	9.69	1.95	0.93	38.59	22.90	23.66	6.36
990	19.86	33.13	9.82	9.58	1.95	0.93	38.53	23.01	23.70	6.32
1000	19.76	33.15	9.62	9.48	1.96	0.93	38.18	23.05	23.46	6.34

2100 MHz Match

TEST CONDITIONS: Vd = 4.75V, Id = 94.49 mA @ Temperature = +85degC

2000	14.52	30.95	8.24	11.79	2.61	1.08	36.40	22.66	23.71	6.42
2020	14.66	30.61	9.00	11.78	2.55	1.05	36.53	22.80	24.07	6.27
2040	14.74	30.34	9.83	11.68	2.52	1.03	36.96	22.88	23.83	6.17
2060	14.82	30.22	10.67	11.58	2.51	1.01	37.38	22.53	23.72	6.07
2080	14.88	30.01	11.54	11.48	2.49	0.99	36.71	22.70	23.71	5.99
2100	14.93	29.86	12.54	11.40	2.47	0.97	37.11	22.68	23.72	5.94
2110	14.93	29.84	13.02	11.33	2.48	0.96	37.46	23.01	23.78	5.85
2140	14.95	29.69	14.59	11.19	2.48	0.94	37.26	22.91	23.81	5.81
2170	14.95	29.54	16.03	11.11	2.46	0.93	37.56	22.95	23.79	5.76
2180	14.94	29.47	16.43	11.09	2.45	0.92	37.75	22.96	23.67	5.69
2200	14.92	29.37	17.02	11.04	2.44	0.92	37.66	22.93	24.06	5.63

Typical Performance Data

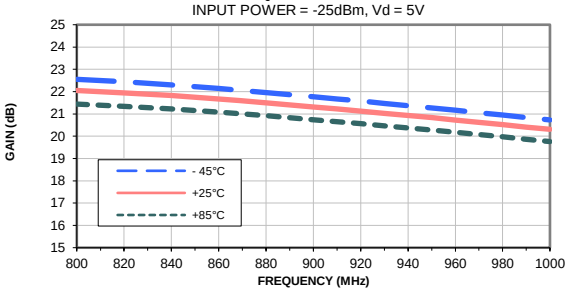
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

900 MHz Match										
TEST CONDITIONS: Vd = 5.25V, Id = 111.49 mA @ Temperature = +85degC										
FREQ	**Gain**	**Isolation**	**Input Return Loss**	**Output Return Loss**	**Stability**		**IP-3 Output**	**1dB Comp. Output**	**3dB Comp. Output**	**Noise Figure**
(MHz)	**(dB)**	**(dB)**	**(dB)**	**(dB)**	**K**	**Measure**	**(dBm)**	**(dBm)**	**(dBm)**	**(dB)**
800	21.40	34.44	10.18	15.16	2.04	1.03	37.57	23.78	24.25	7.12
820	21.30	34.24	10.88	14.34	2.04	1.01	37.93	23.89	24.32	7.15
840	21.17	33.97	11.36	13.60	2.02	0.99	38.06	23.89	24.31	7.06
860	21.03	33.94	11.65	12.96	2.04	0.98	38.54	23.93	24.36	7.04
869	20.96	33.92	11.68	12.71	2.05	0.97	38.68	23.99	24.56	7.02
880	20.87	33.80	11.71	12.42	2.04	0.96	38.76	24.05	24.71	6.99
900	20.69	33.78	11.57	11.97	2.06	0.96	38.74	24.10	24.57	6.99
910	20.60	33.74	11.44	11.76	2.06	0.96	38.97	23.99	24.73	6.99
920	20.52	33.74	11.28	11.56	2.07	0.96	38.86	23.94	24.66	6.95
930	20.42	33.81	11.11	11.40	2.10	0.96	39.07	24.10	24.78	6.96
950	20.22	33.67	10.72	11.07	2.09	0.96	39.02	24.22	24.86	7.03
960	20.12	33.65	10.51	10.91	2.09	0.96	39.31	24.14	24.71	6.97
970	20.02	33.63	10.31	10.77	2.10	0.96	39.14	24.19	24.64	6.98
980	19.92	33.72	10.09	10.65	2.13	0.96	39.28	24.13	24.81	6.99
990	19.82	33.67	9.88	10.52	2.12	0.96	39.26	24.23	24.86	6.96
1000	19.72	33.71	9.66	10.41	2.14	0.96	38.88	24.29	24.62	6.99

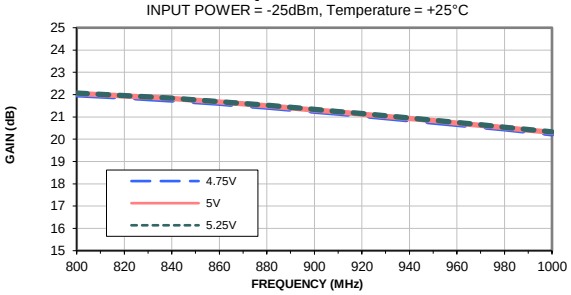
2100 MHz Match										
TEST CONDITIONS: Vd = 5.25V, Id = 113.22 mA @ Temperature = +85degC										
2000	14.57	31.32	8.42	12.10	2.75	1.08	36.25	24.14	25.14	6.87
2020	14.70	30.98	9.20	12.11	2.68	1.05	35.56	24.32	25.53	6.71
2040	14.78	30.71	10.05	12.00	2.64	1.03	36.23	24.30	25.29	6.63
2060	14.87	30.60	10.92	11.90	2.64	1.01	36.79	23.99	25.29	6.54
2080	14.91	30.53	11.81	11.80	2.65	0.99	36.47	24.20	25.37	6.47
2100	14.96	30.22	12.85	11.72	2.59	0.97	35.92	24.20	25.37	6.43
2110	14.97	30.19	13.35	11.63	2.59	0.96	36.25	24.47	25.37	6.31
2140	14.98	30.02	14.94	11.48	2.58	0.94	36.68	24.40	25.49	6.28
2170	14.98	29.86	16.40	11.42	2.57	0.93	36.80	24.36	25.56	6.23
2180	14.96	29.88	16.80	11.40	2.58	0.93	36.78	24.41	25.41	6.16
2200	14.94	29.73	17.33	11.34	2.55	0.92	37.27	24.41	25.79	6.13

Typical Performance Curves (900 MHz Match)

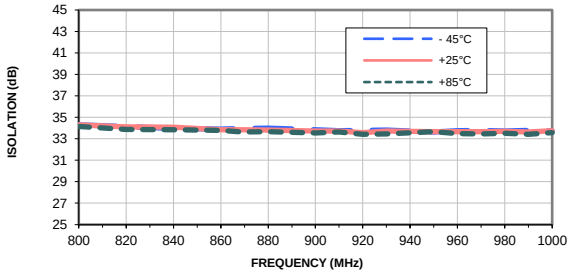
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V



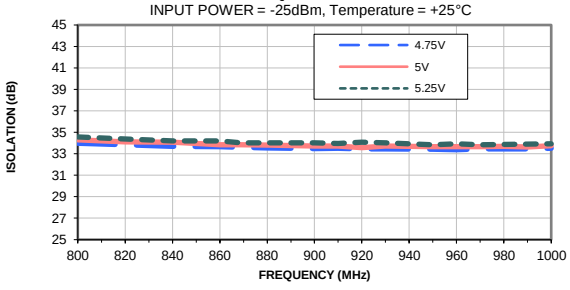
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C



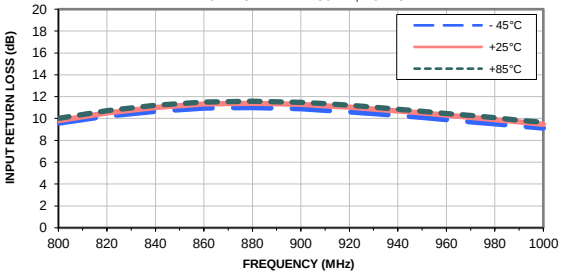
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V



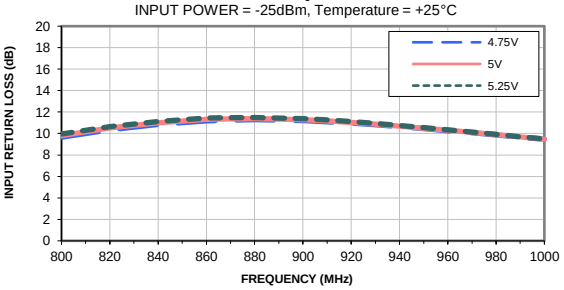
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C



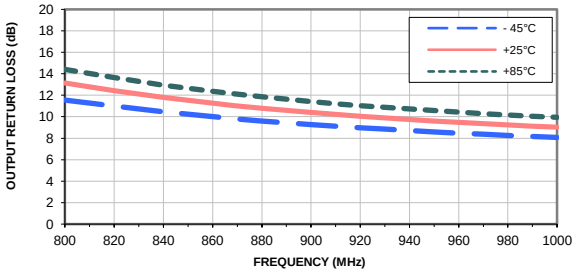
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V



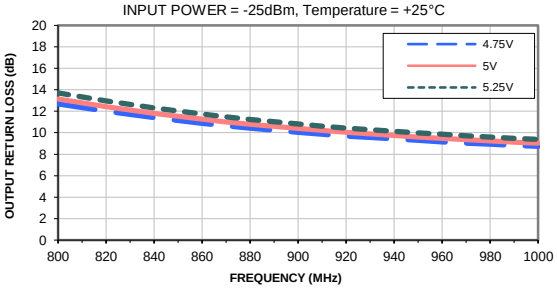
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V

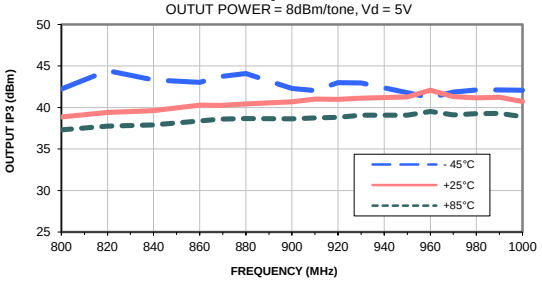


OUTPUT RETURN LOSS vs. DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C

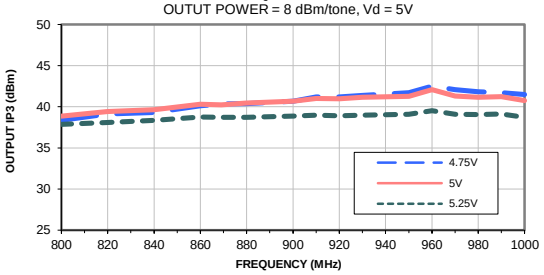


Typical Performance Curves (900 MHz Match)

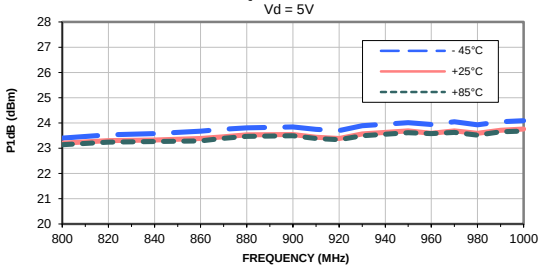
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTUT POWER = 8dBm/tone, Vd = 5V



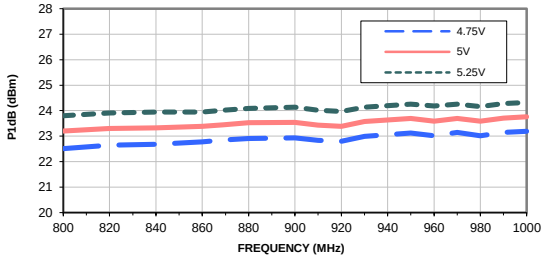
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
OUTUT POWER = 8 dBm/tone, Vd = 5V



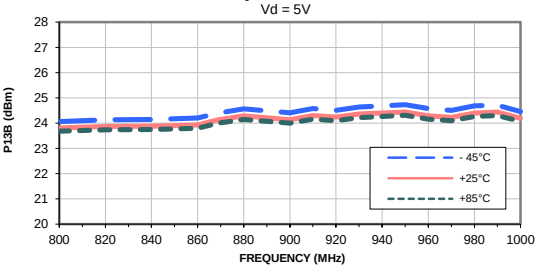
P1dB vs. FREQUENCY & TEMPERATURE
Vd = 5V



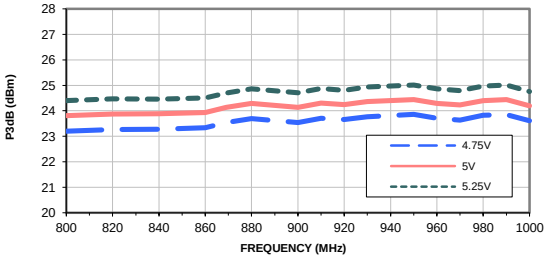
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



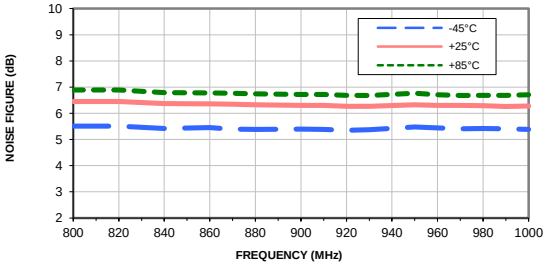
P3dB vs. FREQUENCY & TEMPERATURE
Vd = 5V



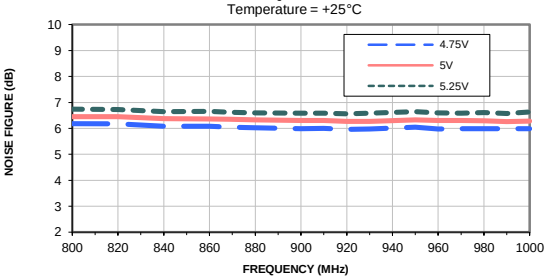
P3dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



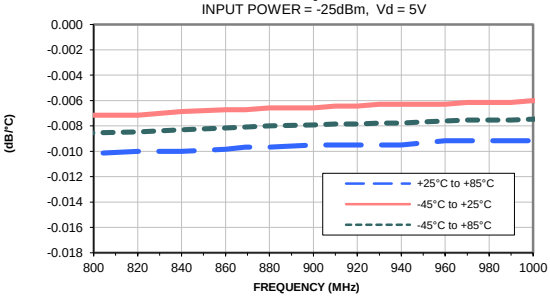
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vd = 5V



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

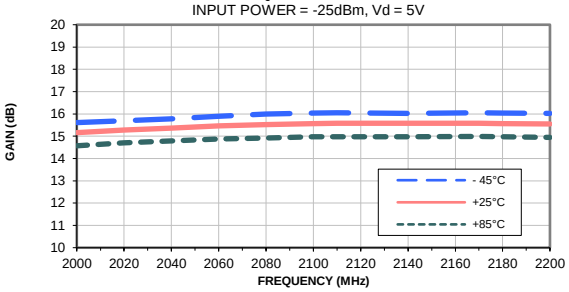


GAIN VARIATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V

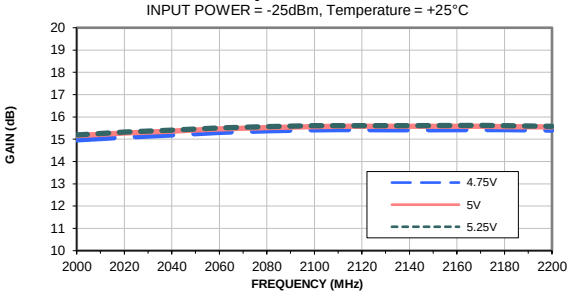


Typical Performance Curves (2100 MHz Match)

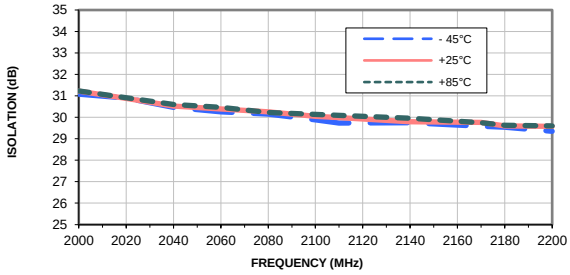
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V



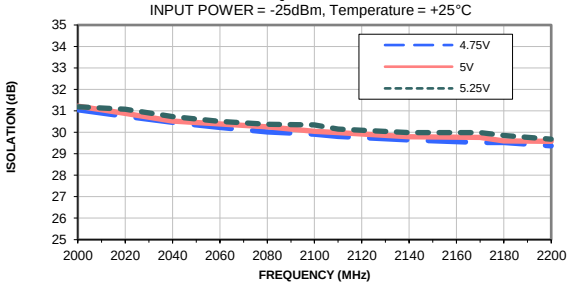
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C



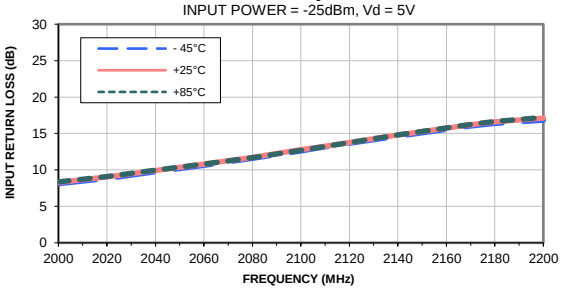
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V



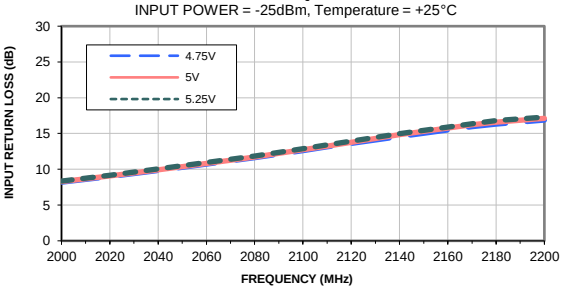
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C



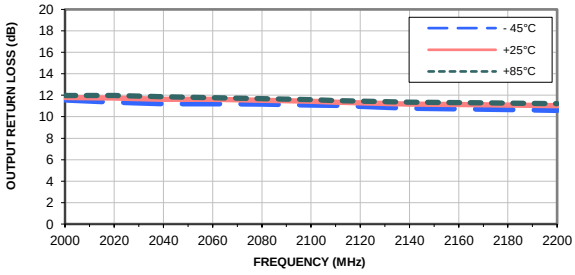
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V



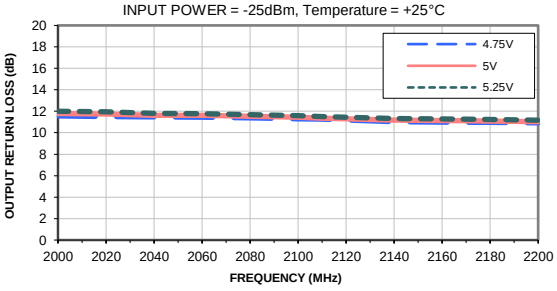
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V

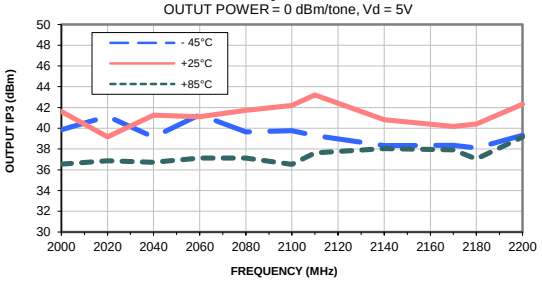


OUTPUT RETURN LOSS vs. DEVICE VOLTAGE
INPUT POWER = -25dBm, Temperature = +25°C

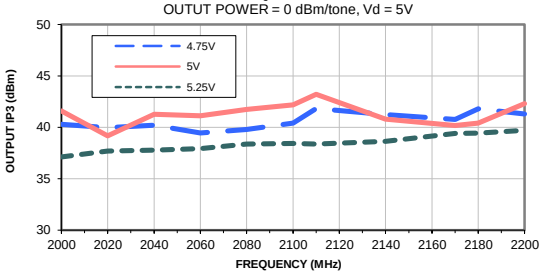


Typical Performance Curves (2100 MHz Match)

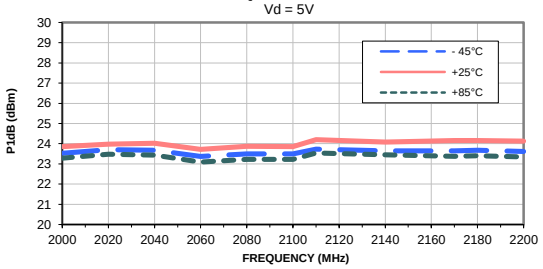
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTUT POWER = 0 dBm/tone, Vd = 5V



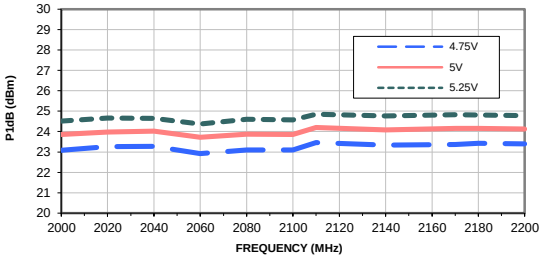
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
OUTUT POWER = 0 dBm/tone, Vd = 5V



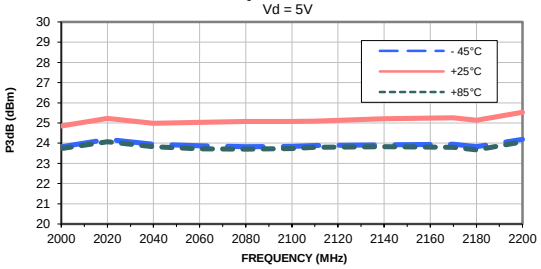
P1dB vs. FREQUENCY & TEMPERATURE
Vd = 5V



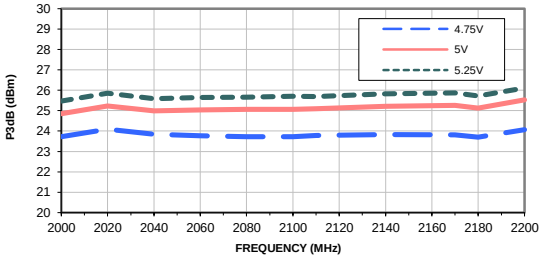
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



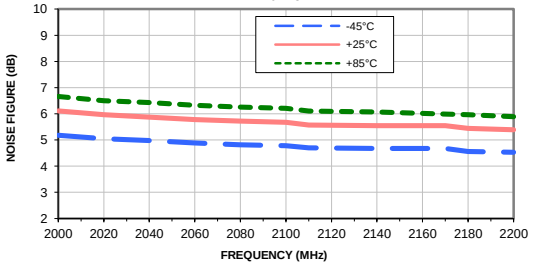
P3dB vs. FREQUENCY & TEMPERATURE
Vd = 5V



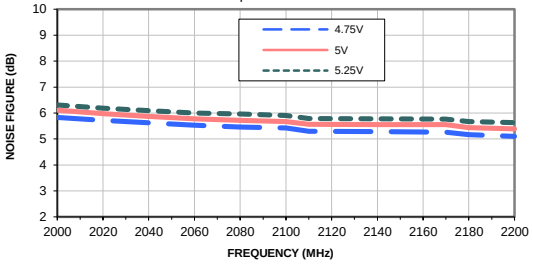
P3dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



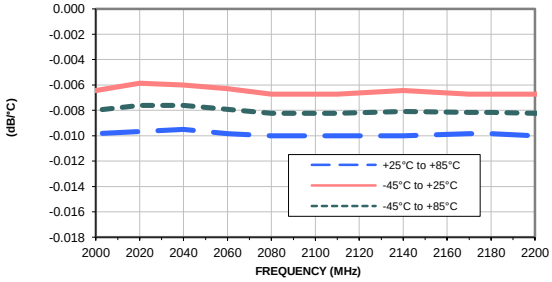
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vd = 5V



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



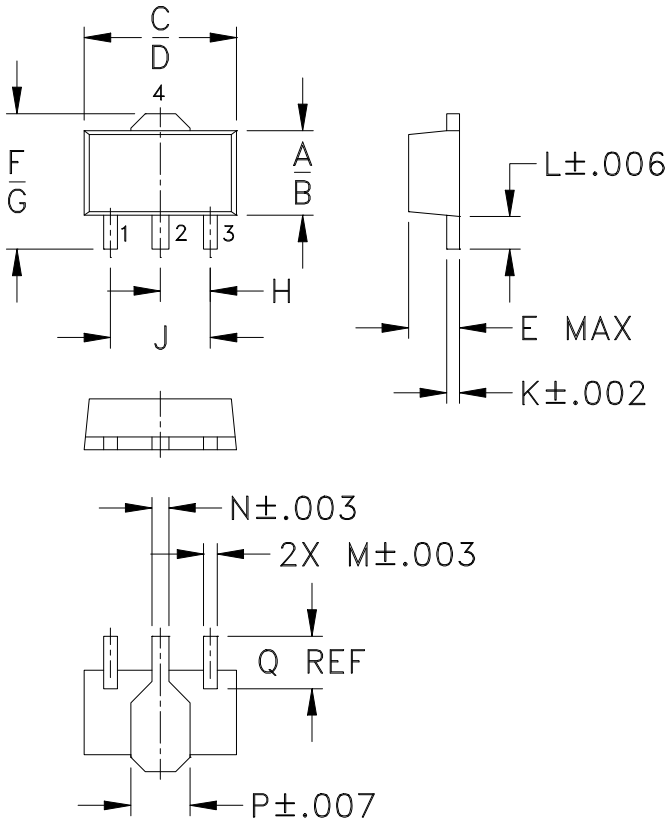
GAIN VARIATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V



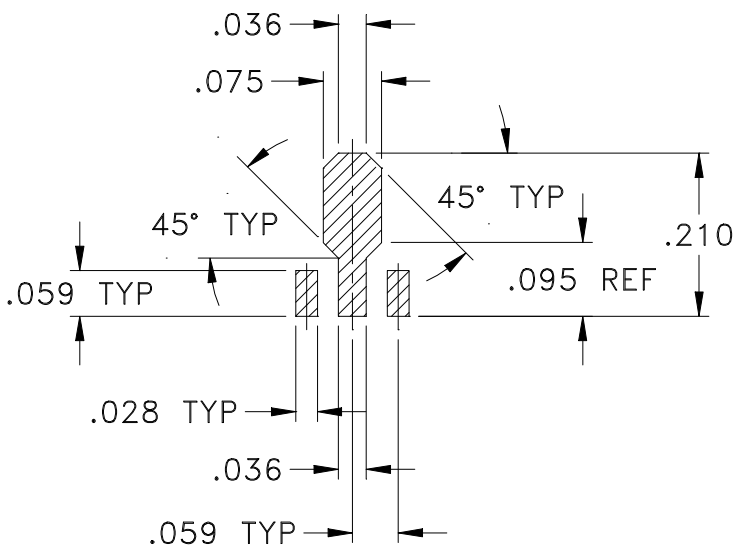
Case Style DF

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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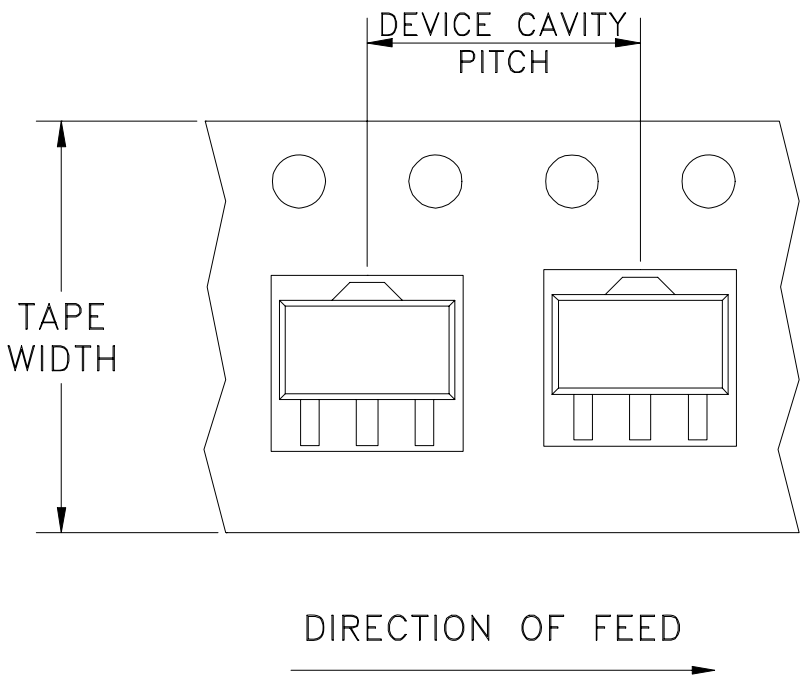
Mini-Circuits ISO 9001 & ISO 14001 Certified

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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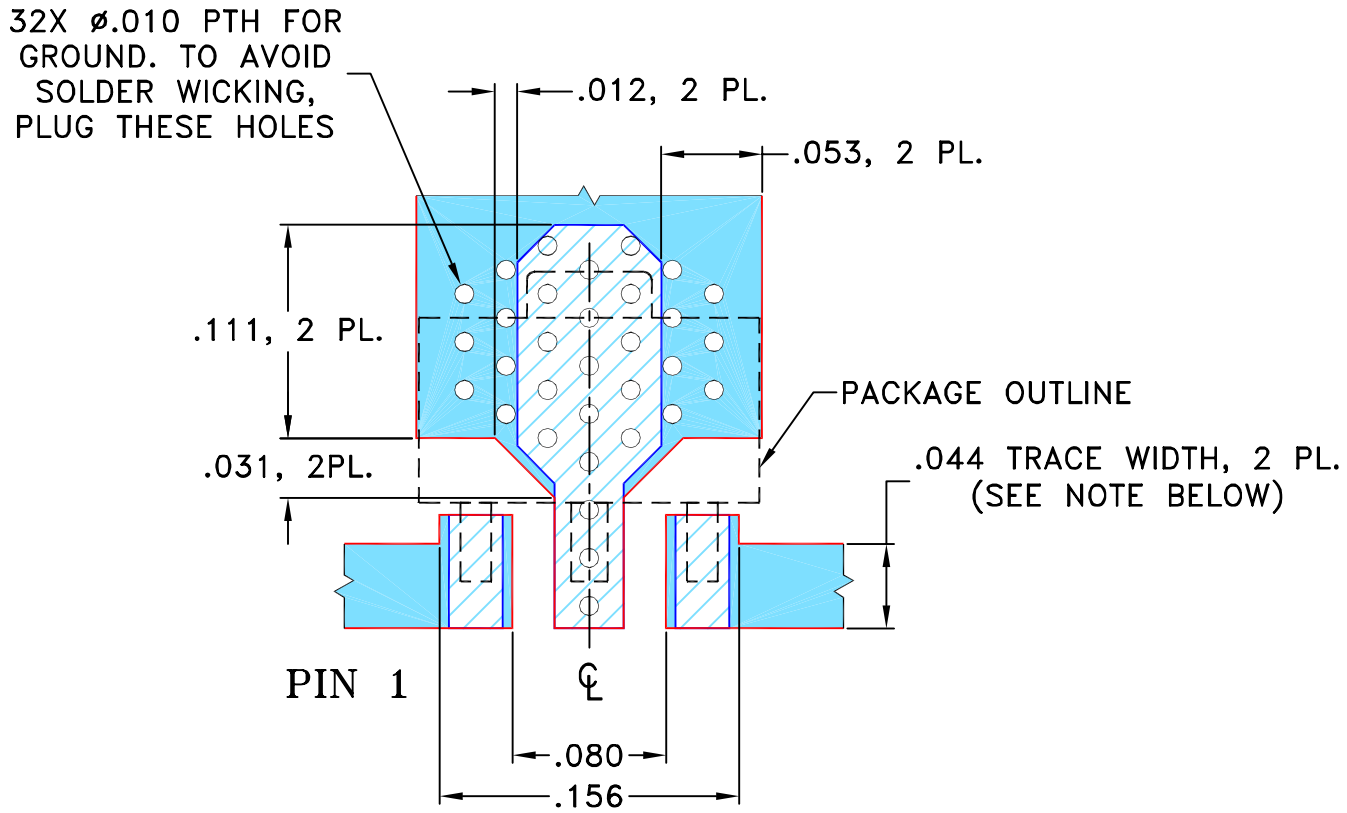
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M137326	NEW RELEASE	07/10/12	PW	DJ

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



NOTES:
1. TRACE WIDTH IS 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	PW	06/01/12
TOLERANCES ON:	CHECKED	IL	07/10/12
2 PL DECIMALS ±	APPROVED	DJ	07/10/12
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

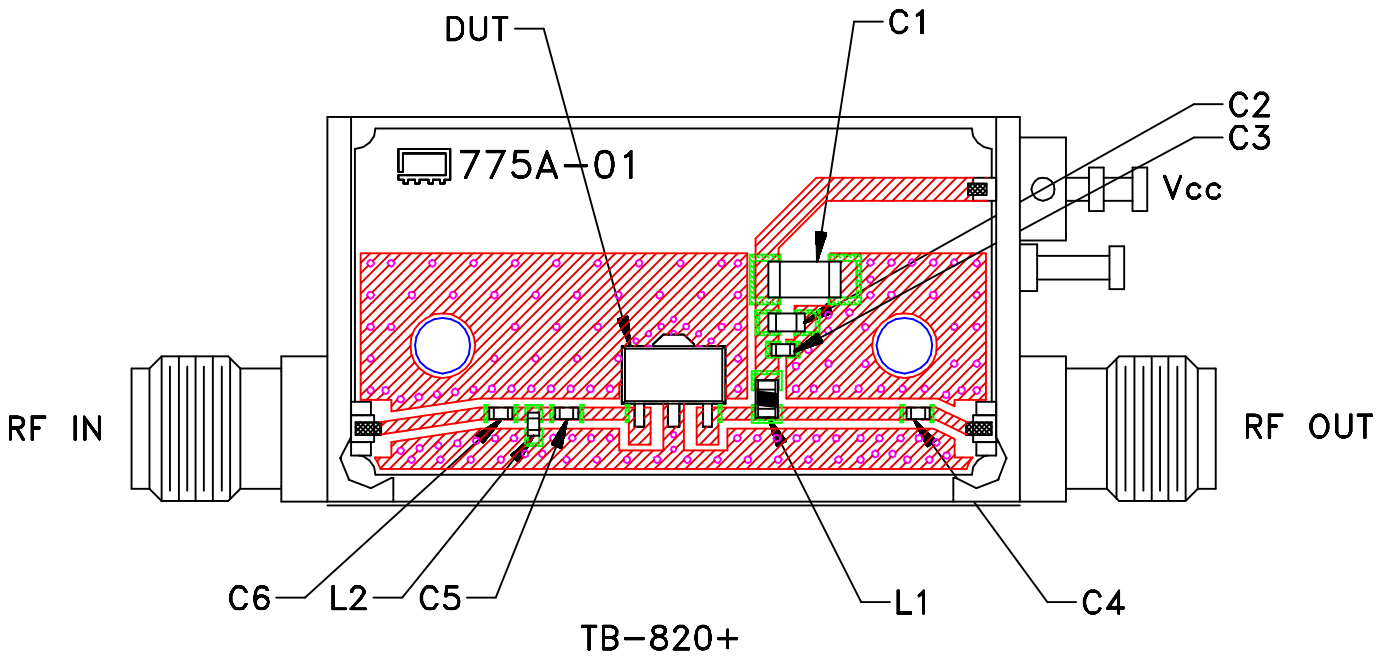
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 04AM03, DF782, TB-678-105+

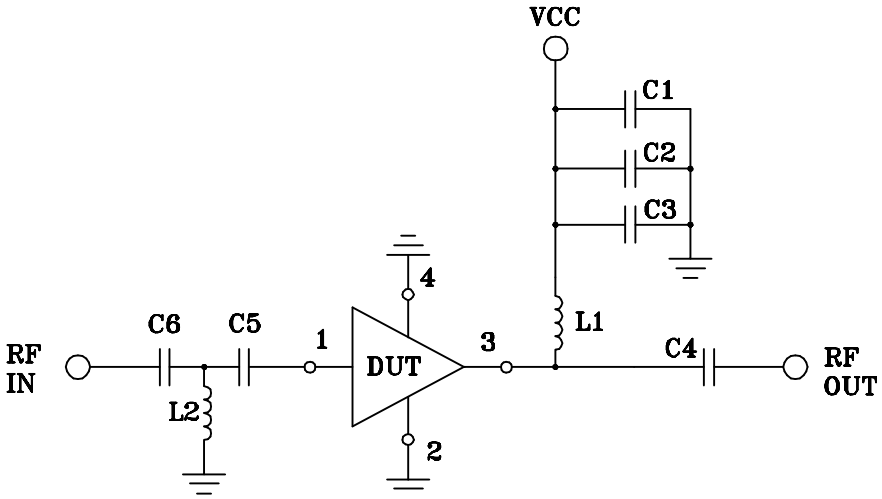
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-370	OR

FILE:	SCALE:	SHEET:
98PL370	10:1	1 OF 1

Evaluation Board and Circuit



TB-820+



COMPONENT	SIZE	VALUE	UNITS
C1	1206	10.0	uF
C2	0603	0.1	uF
C3	0402	10.0	pF
C4,C6	0402	100.0	pF
C5	0402	5.6	pF
L1	0603	18.0	nH
L2	0402	7.5	nH

Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.010 inch.

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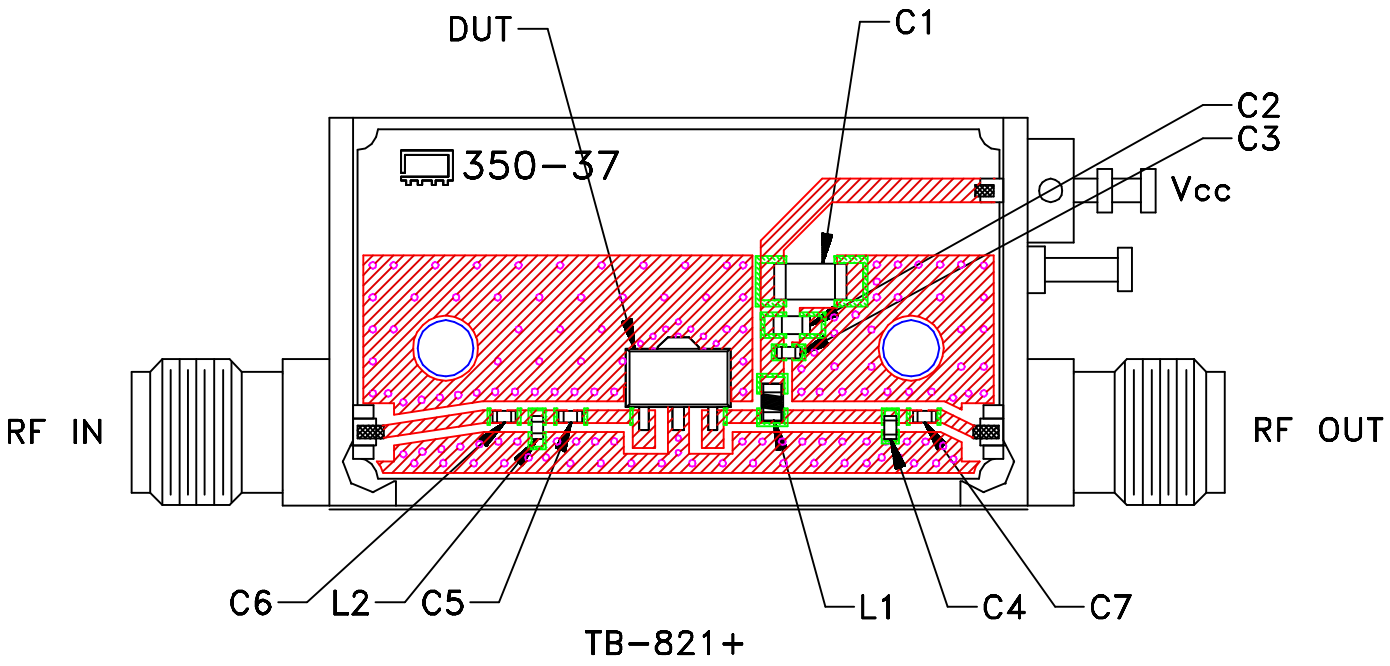
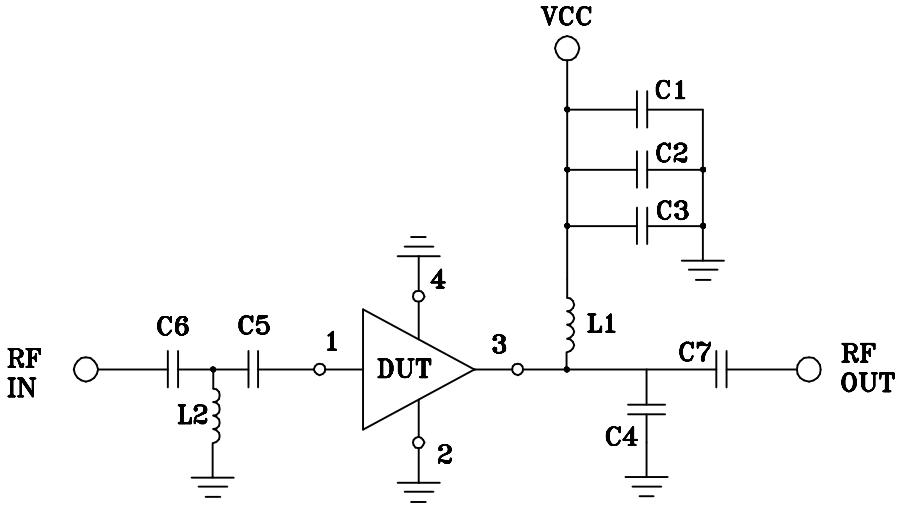
Evaluation Board and Circuit



TB-821+



COMPONENT	SIZE	VALUE	UNITS
C1	1206	10.0	uF
C2	0603	0.1	uF
C3	0402	8.2	pF
C4	0402	0.5	pF
C5	0402	1.3	pF
C6,C7	0402	47.0	pF
L1	0603	9.5	nH
L2	0402	2.2	nH

Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.010 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 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

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