

Wideband, Microwave

Monolithic Amplifier

AVA-183+

50Ω

6 to 18 GHz



CASE STYLE: DQ849

The Big Deal

- Surface Mount Amplifier up to 18 GHz
- Integrated matching, DC Blocks and bias circuits
- High Reverse Isolation

Product Overview

The Mini-Circuits AVA-183+ is a surface mount, microwave amplifier fabricated using InGaAs PHEMT technology and fully integrated gain block up to 18 GHz. It is packaged in Mini-Circuits' industry standard 3x3 mm MCLP (QFN) package, which provides excellent RF and thermal performance. The AVA-183+ integrates the entire matching network with the majority of the bias circuit inside the package, reducing the need for complicated external circuits. This approach makes the AVA-183+ extremely flexible and enables simple, straightforward use.

NON-CATALOG

Key Features

Feature	Advantages
Wideband, 6 to 18 GHz	Broad frequency range supports a wide array of applications from microwave radio and radar , to military communications and countermeasures.
Excellent Gain Flatness	Typical ± 0.6 dB gain flatness across the entire frequency range minimizes the need for external equalizer networks making it a great fit for instrumentation and EW applications.
High Isolation	With reverse isolation of 38 dB (25 dB directivity), the AVA-183+ is an excellent choice for buffering broadband circuits. It is an ideal LO driver amplifier and provides designers system flexibility and margin when integrating cascaded RF components.
Manufacturability	MSL1 and ESD Class1A (HBM) ratings minimize special handling on production lines.

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



Monolithic Amplifier

6-18 GHz

Product Features

- Gain, 12.3 dB typ. & Flatness, ± 0.6 dB
- Output Power, up to +18.4 dBm typ.
- Excellent isolation, 38 dB typ.
- Single Positive Supply Voltage, 5V
- Integrated DC blocks, Bias-Tee & Microwave bypass capacitor
- Unconditionally Stable
- Aqueous washable; 3mm x 3mm SMT package



AVA-183+

CASE STYLE: DQ849

PRICE: Contact Sales Dept.

+RoHS Compliant

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

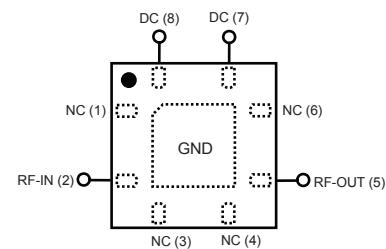
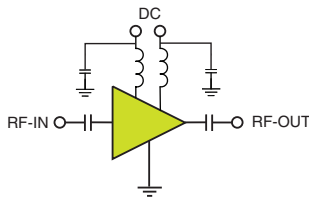
Typical Applications

- Military EW and Radar
- DBS
- Wideband Isolation amplifier
- Microwave point-to-point radios
- Satellite systems

General Description

AVA-183+ is a wideband medium power monolithic amplifier fabricated using InGaAs PHEMT technology with outstanding gain flatness up to 18 GHz. It is manufactured using PHEMT* technology and is unconditionally stable. Its outstanding isolation enables it to be used as a wideband isolation amplifier or buffer amplifier in a variety of microwave systems.

simplified schematic and pad description



Function	Pad Number	Description (See Application Circuit, Fig. 2)
RF-IN	2	RF input pad
RF-OUT	5	RF output pad
DC	8(V_{D1}), 7(V_{D2})	DC power supply
GND	paddle in center of bottom	Connected to ground
NOT USED	1,3,4,6	No internal connection; recommended use: per PCB Layout PL-328

*Pseudomorphic High Electron Mobility Transistor.

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Electrical Specifications⁽¹⁾ at 25°C, $Z_0=50\Omega$, (refer to characterization circuit, Fig.1)

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		6.0		18.0	GHz
DC Voltage (V_{D1} , V_{D2})			5.0		V
DC Current ($I_{D1}+I_{D2}$)			134	145	mA
Gain	6.0		12.5		dB
	8.0	10.0	12.7		
	10.0	10.0	12.4		
	12.0		12.0		
	14.0		11.7		
	16.0		12.6		
	18.0	10.0	12.6		
Input Return Loss	6.0		15.6		dB
	8.0		25.7		
	10.0		17.9		
	12.0		12.4		
	14.0		11.3		
	16.0		15.8		
	18.0		11.7		
Output Return Loss	6.0		21.0		dB
	8.0		25.0		
	10.0		18.6		
	12.0		14.3		
	14.0		13.6		
	16.0		20.3		
	18.0		19.0		
Output IP3	6.0		27.1		dBm
	8.0		26.3		
	10.0		26.5		
	12.0		26.3		
	14.0		26.0		
	16.0		25.4		
	18.0		24.5		
Output Power @ 1 dB compression	6.0		18.9		dBm
	8.0		18.7		
	10.0	16.0	18.6		
	12.0		18.7		
	14.0		18.5		
	16.0		18.0		
	18.0		17.4		
Noise Figure	6.0		7.0		dB
	8.0		6.3		
	10.0		5.6		
	12.0		6.5		
	14.0		6.5		
	16.0		6.1		
	18.0		6.1		
Directivity (Isolation-Gain)			25.0		dB
DC Current Variation vs. Temperature ⁽²⁾			-0.087		mA/°C
Thermal Resistance			47		°C/W

Absolute Maximum Ratings⁽³⁾

Parameter	Ratings
Operating Temperature ⁽⁴⁾	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Channel Temperature	160°C
DC Voltage (Pad 7,8)	5.5V
Voltage (Pads 2, 5)	10V
Power Dissipation	860 mW
DC Current (Pad 7+8)	160mA
Input Power	20 dBm

⁽¹⁾ Measured on Mini-Circuits Characterization test fixture TB-547+ See Characterization Test Circuit (Fig. 1)

⁽²⁾ (Current at 85°C - Current at -45°C)/130

⁽³⁾ Permanent damage may occur if any of these limits are exceeded.

These maximum ratings are not intended for continuous normal operation.

⁽⁴⁾ Defined with reference to ground pad temperature.

Notes

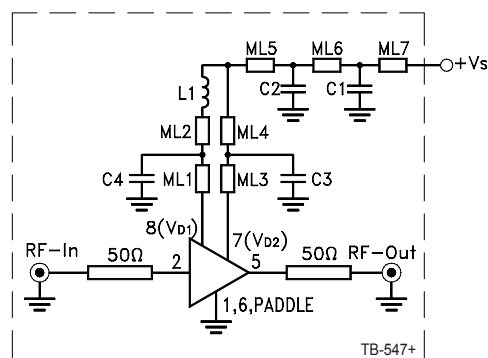
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Characterization Test Circuit



C1=5.6pF, 0402 (NPO) ML1-ML7 are short microstrip lines
 C2=18pF, 0402 (NPO) Refer to 98-PL-328
 C3=0.001μF, 0402 (NPO)
 C4=0.1 μF, 0402 (X7R)
 L1=3.3nH, 0805 (wire wound)

Recommended Application Circuit

(refer to evaluation board for PCB Layout and component values)

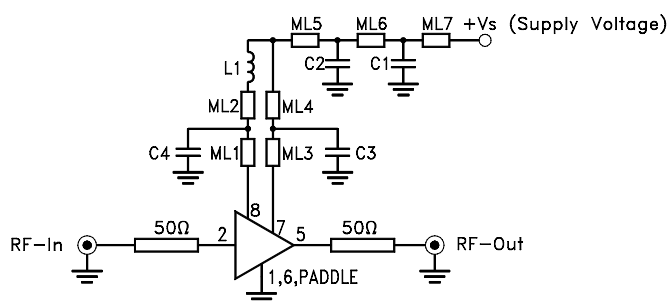


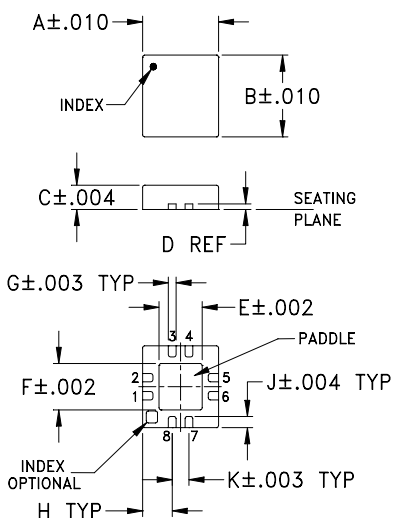
Fig 2. Recommended Application Circuit

Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization Test Board TB-547+) Gain, Output power at 1dB compression (P1dB), Noise Figure, Output IP3 (OIP3) are measured using Agilent's N5242A PNA-X microwave network analyzer.

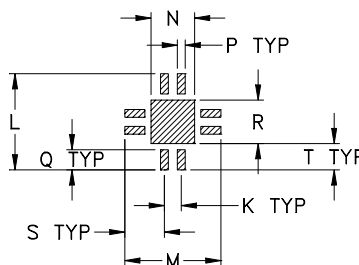
Conditions:

1. Gain: Pin=-25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -10 dBm/line at output.
3. Vs adjusted for 5V at device (V_{D1} and V_{D2}), compensating loss of bias lines.

Outline Drawing



PCB Land Pattern



Suggested Layout,
Tolerance to be within ± 0.002

Outline Dimensions (inch mm)

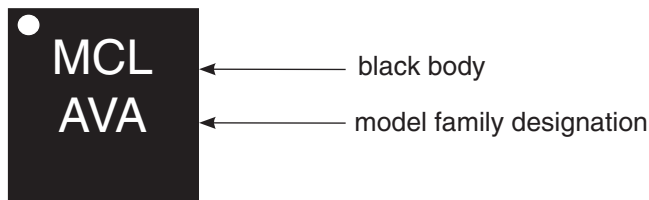
A	B	C	D	E	F	G	H	J
.118	.118	.035	.008	.067	.067	.012	.046	.016
3.00	3.00	0.89	0.20	1.70	1.70	0.30	1.17	0.41
K	L	M	N	P	Q	R	S	T
.026	.148	.148	.067	.012	.031	.067	.061	.041
0.66	3.76	3.76	1.70	0.30	0.79	1.70	1.55	1.04
								grams
								0.02

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Product Marking



Additional Detailed Technical Information

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

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

Case Style: DQ849

Plastic package, exposed paddle, lead finish: tin silver nickel

Tape & Reel: F104

Standard quantities available on reel: 7" reels with 10, 20, 50, 100, 200, 500, 1K, 2K

Suggested Layout for PCB Design: PL-328

Evaluation Board: TB-547+

Environmental Ratings: ENV08T1

ESD Rating

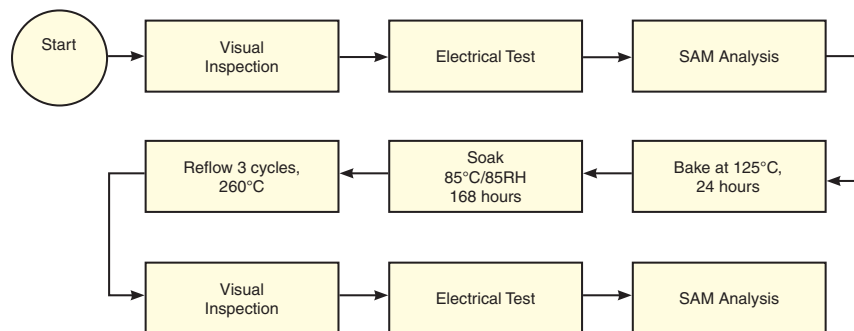
Human Body Model (HBM): 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): M1 (<100V) in accordance with ANSI/ESD STM5.2-1999; passes 25V

MSL Rating

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

MSL Test Flow Chart



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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 = 5.00V, Id=118.92mA @ Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
6000.0	13.39	38.15	18.30	27.14	8.61	1.01	27.96	18.85	6.35
6500.0	13.40	37.85	20.89	28.01	8.44	1.00	28.08	18.68	6.18
7000.0	13.44	37.39	24.39	31.49	8.16	1.00	27.98	18.75	6.03
7500.0	13.46	37.53	33.61	32.08	8.19	1.00	27.24	18.95	5.89
8000.0	13.47	37.26	30.05	25.42	8.15	0.99	28.38	18.65	5.84
8500.0	13.29	36.56	23.78	22.05	7.70	0.99	27.58	18.57	5.87
9000.0	13.23	37.24	18.98	19.10	8.41	1.00	27.52	18.92	5.91
9500.0	13.10	37.55	17.49	17.47	8.41	0.99	27.68	18.72	5.54
10000.0	12.96	37.40	15.69	16.35	8.43	1.00	27.78	18.72	5.16
10500.0	12.79	37.80	14.06	15.99	8.54	1.00	28.16	18.65	5.61
11500.0	12.57	37.99	12.81	15.13	9.73	1.01	26.71	18.62	6.08
12000.0	12.47	38.14	12.77	14.62	9.64	1.01	28.44	18.85	6.08
12500.0	12.30	38.64	11.13	13.90	9.60	1.02	26.69	18.58	6.02
13000.0	12.23	38.70	10.74	13.71	9.85	1.03	26.85	18.76	6.06
13500.0	12.22	38.45	11.00	13.43	9.30	1.02	26.74	18.66	6.00
14000.0	12.15	38.39	11.25	15.32	9.59	1.03	27.14	18.70	6.00
14500.0	12.48	37.06	11.66	15.42	7.89	1.03	26.47	18.60	5.99
15000.0	12.65	38.03	14.03	16.52	9.12	1.01	27.49	18.77	5.92
15500.0	12.77	38.05	13.65	19.59	8.88	1.03	26.80	18.79	5.91
16000.0	12.90	37.44	14.35	22.84	8.43	1.03	26.95	18.40	5.89
16500.0	12.94	36.73	14.77	29.04	8.36	1.03	26.55	18.12	6.55
17000.0	12.91	36.53	12.95	35.59	7.66	1.04	25.27	17.87	6.92
17500.0	12.92	35.73	13.58	29.50	6.88	1.03	25.21	17.72	6.20
18000.0	12.93	34.18	14.10	27.93	6.01	1.03	25.39	17.97	5.77

Typical Performance Data

Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.75V, Id=117.48mA @ Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
6000.0	13.43	38.16	18.13	29.66	8.68	1.01	28.58	18.49	6.17
6500.0	13.44	37.77	20.63	31.02	8.49	1.00	27.17	18.27	6.00
7000.0	13.48	37.58	24.02	36.18	8.40	1.00	27.77	18.36	5.83
7500.0	13.50	37.39	32.47	32.31	8.18	1.00	27.96	18.59	5.70
8000.0	13.51	36.98	30.96	25.23	7.86	0.99	27.65	18.23	5.65
8500.0	13.34	36.40	24.10	22.10	7.35	0.99	27.98	18.16	5.66
9000.0	13.28	37.41	19.21	19.21	8.40	1.00	27.43	18.60	5.73
9500.0	13.16	37.83	17.63	17.62	8.38	0.99	26.80	18.36	5.34
10000.0	13.02	37.31	15.88	16.51	8.41	1.00	25.67	18.39	4.98
10500.0	12.87	37.81	14.27	16.29	8.63	1.00	26.01	18.30	5.45
11500.0	12.65	38.14	12.94	15.29	9.02	1.01	27.39	18.26	5.85
12000.0	12.55	38.30	12.84	14.78	8.82	1.01	26.74	18.61	5.86
12500.0	12.39	38.27	11.20	14.02	9.43	1.02	26.97	18.25	5.82
13000.0	12.32	38.38	10.75	13.79	9.73	1.03	27.64	18.56	5.87
13500.0	12.30	38.12	10.97	13.71	9.53	1.02	28.87	18.44	5.77
14000.0	12.25	37.92	11.24	15.56	9.45	1.03	27.88	18.52	5.82
14500.0	12.59	37.09	11.50	15.78	7.89	1.03	26.39	18.42	5.77
15000.0	12.76	37.35	13.86	17.09	8.79	1.02	26.64	18.49	5.69
15500.0	12.88	37.73	13.61	20.36	9.16	1.03	26.29	18.48	5.70
16000.0	13.03	36.95	14.30	23.77	8.02	1.03	25.82	18.00	5.69
16500.0	13.07	36.74	14.78	29.71	8.05	1.03	26.98	17.74	6.31
17000.0	13.04	36.34	12.91	33.40	7.25	1.04	24.67	17.46	6.69
17500.0	13.04	35.33	13.30	28.05	6.62	1.03	25.54	17.30	5.97
18000.0	13.06	34.16	13.83	27.71	5.83	1.03	25.19	17.59	5.62

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 = 5.25V, Id=120.41mA @ Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
6000.0	13.38	38.11	18.49	25.60	8.95	1.01	28.92	19.20	6.46
6500.0	13.39	37.71	21.15	26.19	8.34	1.00	28.91	19.05	6.29
7000.0	13.42	37.51	24.80	28.90	8.31	1.00	28.72	19.10	6.10
7500.0	13.44	37.48	34.45	30.65	7.99	1.00	27.13	19.27	6.01
8000.0	13.45	37.23	28.96	25.20	8.07	0.99	28.03	19.00	5.92
8500.0	13.26	36.38	23.31	21.83	7.46	0.99	28.55	18.96	5.95
9000.0	13.20	37.61	18.74	18.96	8.45	1.00	27.78	19.21	5.98
9500.0	13.07	37.64	17.29	17.27	8.63	0.99	28.86	19.06	5.62
10000.0	12.92	37.64	15.53	16.19	8.52	1.00	28.08	19.05	5.23
10500.0	12.76	37.74	13.99	15.85	8.64	1.00	29.99	19.01	5.73
11500.0	12.52	38.36	12.78	15.05	9.51	1.01	27.52	18.95	6.18
12000.0	12.41	38.50	12.67	14.53	9.85	1.01	26.35	19.09	6.15
12500.0	12.24	38.60	11.09	13.79	9.85	1.02	28.27	18.90	6.06
13000.0	12.17	38.40	10.70	13.59	9.88	1.03	27.48	18.96	6.15
13500.0	12.15	38.98	10.98	13.20	9.78	1.02	28.81	18.87	6.09
14000.0	12.08	38.37	11.23	15.01	10.09	1.03	27.93	18.91	6.11
14500.0	12.41	36.81	11.67	15.06	7.98	1.03	27.54	18.80	6.04
15000.0	12.58	37.94	14.08	16.00	9.46	1.01	28.13	19.01	5.97
15500.0	12.69	38.04	13.70	18.85	9.58	1.02	27.91	19.08	5.96
16000.0	12.83	37.46	14.44	22.02	8.56	1.03	27.40	18.78	5.95
16500.0	12.86	37.04	14.84	27.60	8.60	1.03	27.99	18.49	6.63
17000.0	12.82	36.27	13.04	36.29	7.73	1.04	26.31	18.26	7.01
17500.0	12.84	35.59	13.68	29.85	7.01	1.03	26.90	18.12	6.31
18000.0	12.82	34.24	14.06	27.92	6.08	1.03	26.79	18.36	5.86

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 = 5.00V, Id=121.73mA @ Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
6000.0	14.96	38.05	19.70	37.44	7.41	1.01	28.85	19.39	4.94
6500.0	14.94	37.93	22.44	35.76	7.34	1.00	28.22	19.14	4.78
7000.0	14.95	37.73	25.31	29.94	7.04	1.00	31.36	19.26	4.59
7500.0	14.97	37.39	30.12	25.16	6.90	0.99	28.03	19.54	4.50
8000.0	14.99	37.22	28.29	22.57	6.86	0.99	26.74	19.13	4.42
8500.0	14.81	36.43	22.01	21.51	6.15	0.99	27.95	19.17	4.42
9000.0	14.80	37.55	19.94	19.24	7.00	0.99	28.27	19.60	4.47
9500.0	14.70	37.62	18.10	17.82	6.89	0.99	28.40	19.42	4.06
10000.0	14.57	37.34	15.65	17.44	7.12	1.00	26.15	19.59	3.68
10500.0	14.46	37.39	14.50	16.76	7.05	1.01	28.38	19.48	4.12
11500.0	14.30	37.86	13.75	15.50	7.27	1.01	26.70	19.48	4.52
12000.0	14.16	37.83	12.06	15.04	6.96	1.02	27.63	19.71	4.54
12500.0	13.99	37.78	10.54	14.12	7.30	1.03	29.44	19.28	4.47
13000.0	13.96	38.14	10.54	13.96	7.54	1.03	29.19	19.59	4.49
13500.0	13.96	37.79	10.44	14.74	7.14	1.04	26.71	19.51	4.42
14000.0	13.89	37.86	11.00	16.51	7.79	1.04	27.95	19.55	4.46
14500.0	14.29	36.00	11.97	16.96	6.10	1.03	27.26	19.47	4.37
15000.0	14.46	37.46	13.92	20.00	7.25	1.02	28.82	19.55	4.34
15500.0	14.52	37.18	13.08	23.59	6.85	1.04	26.93	19.43	4.33
16000.0	14.72	36.55	14.69	25.08	6.36	1.02	27.31	18.84	4.29
16500.0	14.74	36.35	13.34	25.85	6.09	1.03	28.03	18.74	4.92
17000.0	14.73	35.51	12.44	25.19	5.59	1.04	26.95	18.37	5.38
17500.0	14.78	34.63	12.19	26.86	5.00	1.04	25.85	18.28	4.61
18000.0	14.84	33.34	12.35	30.83	4.37	1.04	26.14	18.67	4.17

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 = 4.75V, Id=120.13mA @ Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
6000.0	14.93	38.03	19.42	31.60	7.59	1.01	29.02	18.95	4.87
6500.0	14.91	38.01	22.07	30.08	7.36	1.00	27.56	18.68	4.71
7000.0	14.93	37.79	24.85	26.57	7.02	1.00	28.06	18.80	4.58
7500.0	14.95	37.53	29.80	23.12	7.02	0.99	28.03	19.09	4.42
8000.0	14.97	37.23	29.28	21.30	6.56	0.99	28.20	18.67	4.36
8500.0	14.80	36.47	22.40	20.57	6.28	0.99	26.99	18.71	4.35
9000.0	14.78	37.40	20.25	18.78	7.00	0.99	27.03	19.16	4.38
9500.0	14.69	37.57	18.28	17.60	7.04	0.99	26.67	18.98	4.02
10000.0	14.57	37.67	15.78	17.30	7.08	1.00	27.12	19.16	3.60
10500.0	14.47	37.29	14.61	16.65	6.89	1.00	27.41	19.03	4.04
11500.0	14.32	37.72	13.82	15.46	7.22	1.00	27.13	19.05	4.45
12000.0	14.19	37.80	12.13	15.02	7.35	1.02	27.30	19.34	4.48
12500.0	14.02	37.68	10.56	14.16	7.11	1.03	27.31	18.86	4.39
13000.0	14.00	37.74	10.57	14.07	7.47	1.03	27.16	19.27	4.42
13500.0	14.00	37.64	10.45	14.98	7.24	1.04	26.52	19.15	4.34
14000.0	13.93	37.98	10.95	16.84	7.74	1.05	27.33	19.23	4.38
14500.0	14.33	35.98	11.91	17.62	5.94	1.04	27.03	19.12	4.31
15000.0	14.50	37.13	13.89	21.24	6.90	1.03	26.69	19.16	4.24
15500.0	14.56	37.03	13.02	25.36	6.83	1.04	26.11	19.01	4.24
16000.0	14.78	36.12	14.60	25.42	6.19	1.02	26.17	18.40	4.21
16500.0	14.79	36.03	13.41	24.75	6.10	1.03	25.66	18.31	4.87
17000.0	14.79	35.42	12.36	23.42	5.52	1.04	25.44	17.94	5.29
17500.0	14.85	34.55	12.05	25.30	4.97	1.04	25.99	17.84	4.55
18000.0	14.92	33.42	12.28	29.00	4.15	1.04	26.33	18.23	4.11

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 = 5.25V, Id=123.37mA @ Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
6000.0	14.99	38.30	19.95	42.58	7.27	1.01	29.89	19.78	4.97
6500.0	14.97	37.83	22.78	47.03	7.26	1.00	28.70	19.54	4.82
7000.0	14.98	37.58	25.69	34.07	7.11	1.00	29.49	19.67	4.65
7500.0	15.00	37.52	30.13	27.22	6.93	0.99	30.31	19.92	4.56
8000.0	15.02	37.12	27.71	23.71	6.77	0.99	29.35	19.55	4.49
8500.0	14.83	36.42	21.69	22.34	6.17	1.00	28.31	19.57	4.47
9000.0	14.81	37.69	19.62	19.53	6.96	0.99	28.53	19.95	4.50
9500.0	14.71	37.25	17.82	17.95	6.93	0.99	30.34	19.81	4.16
10000.0	14.57	37.53	15.42	17.44	7.18	1.00	27.34	19.95	3.74
10500.0	14.45	37.56	14.30	16.74	7.16	1.01	28.79	19.87	4.18
11500.0	14.29	37.84	13.58	15.49	7.43	1.00	28.74	19.86	4.59
12000.0	14.15	37.60	11.94	14.94	7.18	1.02	27.25	20.02	4.64
12500.0	13.97	38.01	10.43	14.06	7.54	1.03	27.20	19.65	4.56
13000.0	13.94	37.94	10.51	13.86	7.45	1.03	28.47	19.85	4.57
13500.0	13.93	37.68	10.43	14.54	7.34	1.04	27.60	19.80	4.52
14000.0	13.86	38.02	10.99	16.24	8.13	1.04	29.74	19.81	4.53
14500.0	14.26	36.29	12.01	16.45	5.89	1.03	28.70	19.73	4.45
15000.0	14.42	37.30	14.02	19.16	7.39	1.02	26.99	19.88	4.38
15500.0	14.48	37.08	13.14	22.48	6.95	1.04	28.09	19.80	4.39
16000.0	14.69	36.59	14.75	24.33	6.35	1.02	28.01	19.23	4.36
16500.0	14.68	36.44	13.30	26.71	6.15	1.04	27.68	19.13	4.98
17000.0	14.68	35.56	12.49	26.82	5.64	1.04	27.60	18.77	5.45
17500.0	14.70	34.77	12.24	28.08	5.21	1.04	28.47	18.65	4.71
18000.0	14.76	33.37	12.48	31.83	4.44	1.04	28.46	19.08	4.23

Typical Performance Data

Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.00V, Id=113.70mA @ Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
6000.0	11.28	37.80	16.76	21.01	10.42	1.01	28.60	18.12	8.02
6500.0	11.32	37.32	19.30	21.32	10.30	1.00	26.94	18.04	7.84
7000.0	11.36	37.21	23.28	22.19	10.05	1.00	26.41	18.01	7.66
7500.0	11.38	37.14	33.09	23.32	9.81	0.99	27.30	18.10	7.59
8000.0	11.36	36.99	26.20	21.51	10.14	0.99	26.20	17.95	7.52
8500.0	11.20	36.07	23.87	18.76	9.02	0.99	28.03	17.86	7.54
9000.0	11.09	37.30	17.61	16.88	10.10	0.99	27.49	17.86	7.64
9500.0	10.95	37.21	16.88	15.78	10.52	0.99	27.51	17.77	7.27
10000.0	10.79	37.66	15.86	14.85	10.78	0.99	27.98	17.73	6.91
10500.0	10.62	38.10	14.37	14.82	11.40	1.00	27.28	17.67	7.43
11500.0	10.27	38.66	12.34	14.49	12.56	1.02	27.60	17.56	7.92
12000.0	10.18	38.79	13.41	13.93	13.60	1.00	28.03	17.60	7.89
12500.0	10.00	38.91	11.55	13.48	13.03	1.01	27.97	17.46	7.88
13000.0	9.90	39.24	10.79	13.14	13.93	1.03	27.28	17.46	7.99
13500.0	9.90	39.13	11.56	12.19	14.32	1.00	27.43	17.24	7.90
14000.0	9.86	38.41	11.35	13.86	12.93	1.02	27.58	17.36	7.93
14500.0	10.13	36.98	11.29	14.40	10.77	1.03	27.37	17.23	7.88
15000.0	10.34	38.50	13.85	13.71	12.39	0.99	26.62	17.46	7.79
15500.0	10.51	38.55	14.45	16.79	12.62	1.01	27.07	17.66	7.74
16000.0	10.63	37.98	14.61	19.24	12.16	1.02	25.63	17.66	7.75
16500.0	10.68	37.79	17.25	23.72	11.88	1.01	27.69	17.46	8.37
17000.0	10.63	36.75	14.28	25.86	10.81	1.03	27.28	17.33	8.72
17500.0	10.64	35.83	15.31	28.33	9.70	1.02	27.05	17.14	8.04
18000.0	10.59	34.70	15.32	25.71	8.33	1.02	26.63	17.36	7.63

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 = 4.75V, Id=112.45mA @ Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
6000.0	11.24	37.65	16.59	21.79	10.92	1.01	26.82	17.76	7.98
6500.0	11.28	37.27	19.09	22.12	10.32	1.00	28.28	17.66	7.81
7000.0	11.32	37.08	22.85	23.12	10.00	1.00	28.03	17.65	7.64
7500.0	11.34	37.27	31.88	24.14	10.02	0.99	27.32	17.74	7.51
8000.0	11.33	37.10	26.60	22.09	10.17	0.99	27.74	17.57	7.48
8500.0	11.17	36.10	24.30	19.10	9.13	0.99	26.93	17.48	7.53
9000.0	11.06	37.15	17.78	17.20	10.19	0.99	26.45	17.58	7.60
9500.0	10.93	37.40	17.01	16.04	10.58	0.99	27.84	17.43	7.23
10000.0	10.77	37.30	16.02	15.04	11.06	0.99	27.49	17.38	6.88
10500.0	10.60	37.99	14.40	15.02	11.61	1.00	27.33	17.30	7.38
11500.0	10.26	38.48	12.37	14.64	12.38	1.02	27.23	17.22	7.87
12000.0	10.17	38.74	13.42	14.05	13.07	1.00	27.26	17.35	7.87
12500.0	9.99	38.76	11.59	13.59	12.93	1.01	26.49	17.17	7.84
13000.0	9.90	39.15	10.80	13.23	13.70	1.03	27.05	17.23	7.89
13500.0	9.89	39.27	11.61	12.31	13.64	1.00	26.03	17.02	7.82
14000.0	9.86	38.39	11.34	14.05	12.98	1.02	27.93	17.12	7.83
14500.0	10.13	37.09	11.26	14.64	10.69	1.03	27.60	17.03	7.80
15000.0	10.34	38.52	13.77	13.99	12.21	1.00	26.68	17.20	7.72
15500.0	10.52	38.14	14.37	17.19	12.51	1.01	26.20	17.37	7.64
16000.0	10.64	38.07	14.57	19.82	11.87	1.02	25.85	17.29	7.69
16500.0	10.70	37.55	17.12	24.50	11.43	1.01	25.90	17.03	8.30
17000.0	10.65	36.81	14.29	27.03	10.25	1.03	26.79	16.90	8.64
17500.0	10.67	35.80	15.36	27.47	9.44	1.02	25.98	16.69	7.96
18000.0	10.63	34.48	15.25	25.69	7.99	1.02	25.81	16.90	7.49

Typical Performance Data

Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

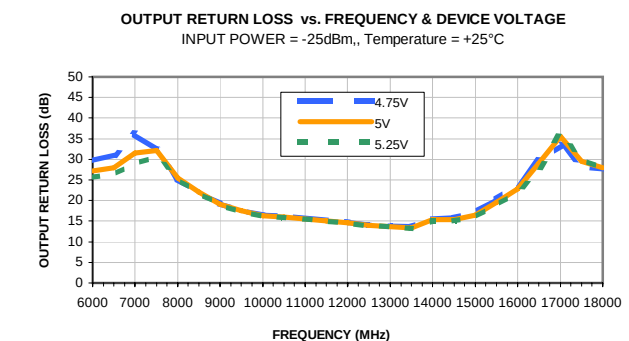
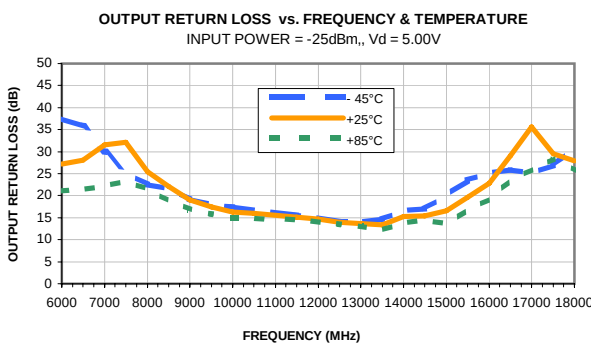
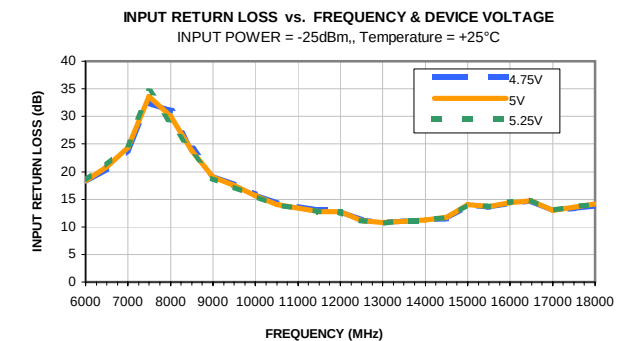
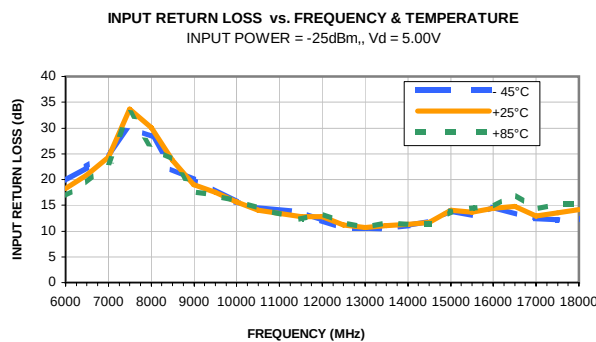
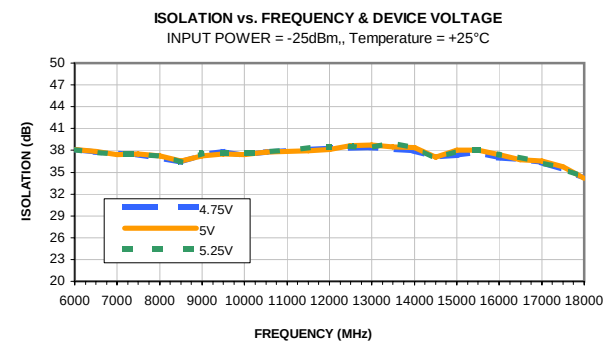
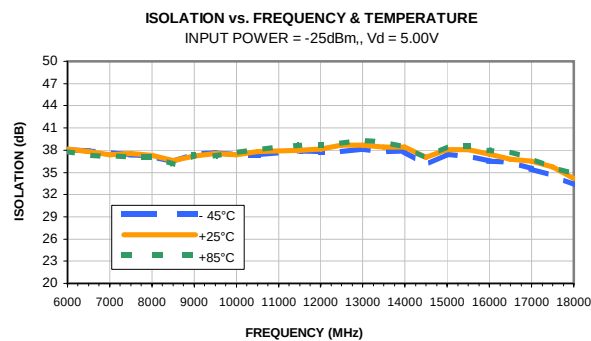
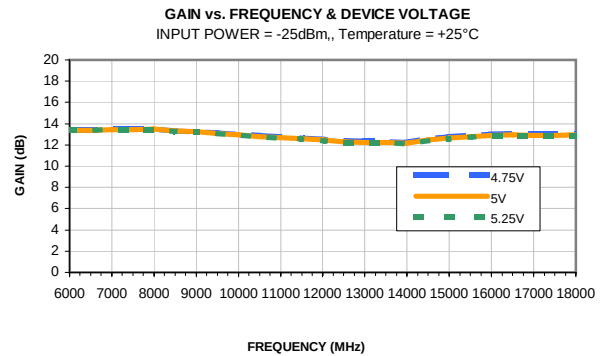
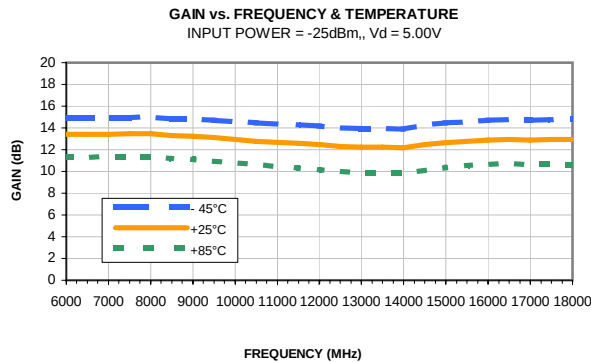
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

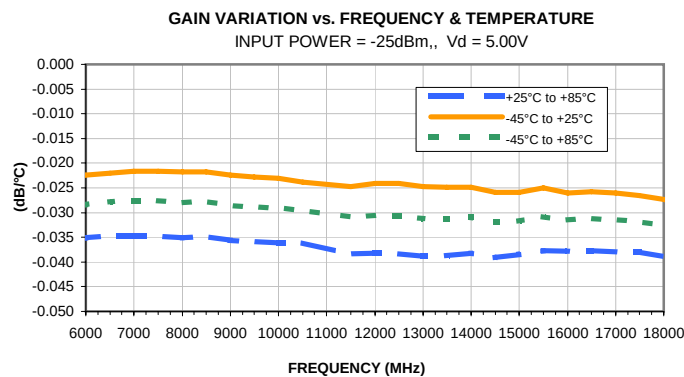
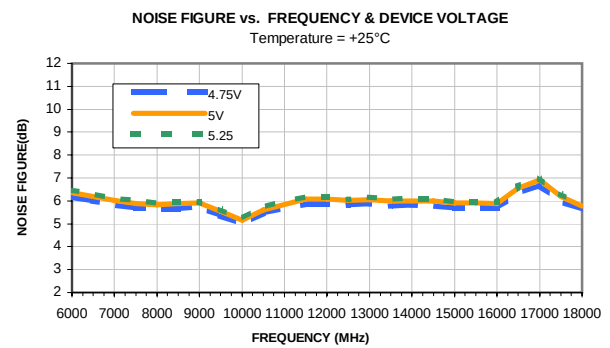
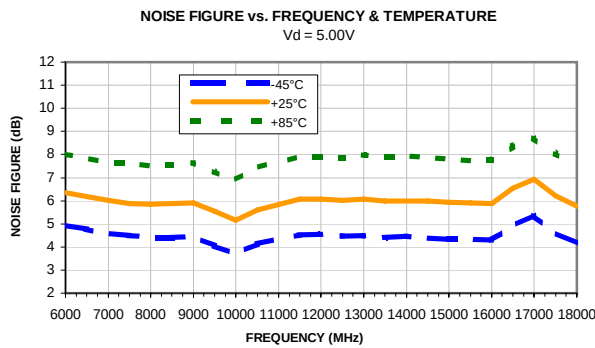
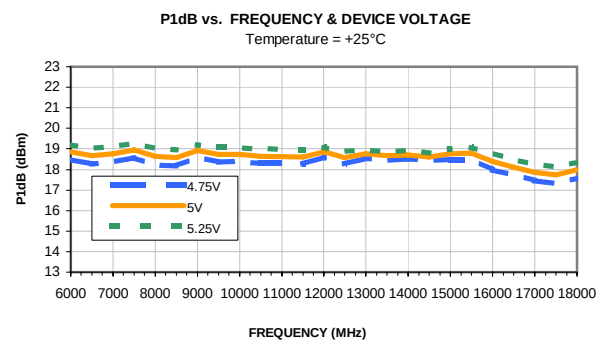
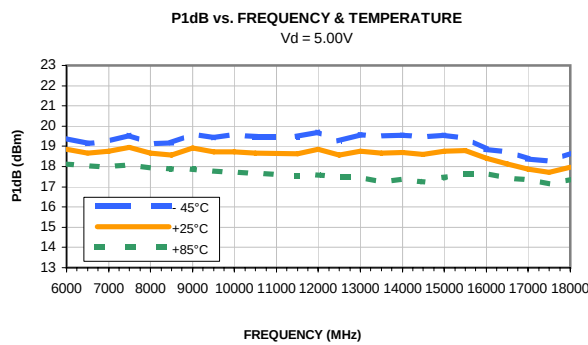
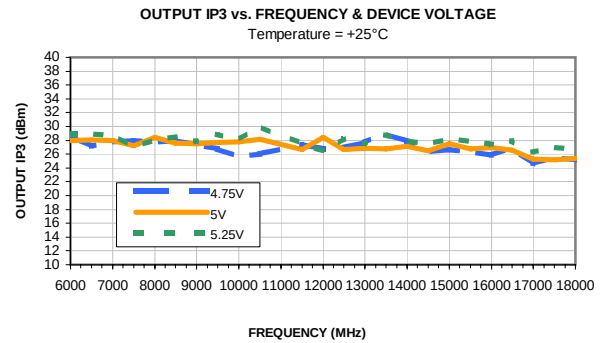
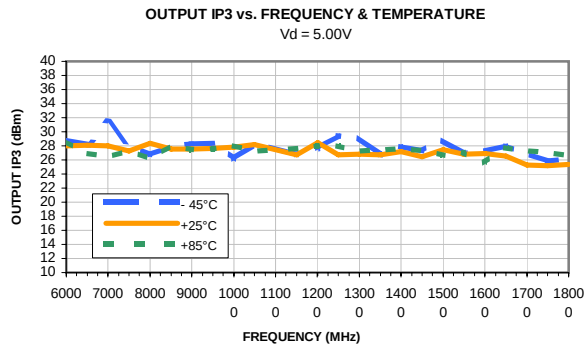
TEST CONDITIONS: Vd = 5.25V, Id=115.25mA @ Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
6000.0	11.34	37.59	17.00	20.49	10.71	1.01	27.66	18.41	8.04
6500.0	11.39	37.35	19.61	20.71	10.22	1.00	27.59	18.36	7.86
7000.0	11.43	37.15	23.74	21.56	10.11	0.99	26.77	18.27	7.69
7500.0	11.45	37.13	35.13	22.61	9.89	0.99	28.33	18.33	7.58
8000.0	11.42	37.13	25.94	21.11	9.67	0.99	27.23	18.24	7.53
8500.0	11.25	36.30	23.53	18.50	9.37	0.99	28.21	18.19	7.57
9000.0	11.14	37.51	17.52	16.68	10.28	0.99	26.88	18.09	7.67
9500.0	11.00	37.44	16.81	15.65	10.74	0.99	28.04	18.06	7.31
10000.0	10.83	37.68	15.80	14.70	10.81	0.99	27.10	18.03	6.96
10500.0	10.65	38.24	14.27	14.67	11.48	1.00	27.00	17.97	7.46
11500.0	10.29	38.70	12.33	14.39	13.12	1.01	29.15	17.87	7.94
12000.0	10.20	38.76	13.47	13.87	13.39	1.00	26.90	17.81	7.97
12500.0	10.01	39.31	11.58	13.38	13.28	1.01	27.61	17.70	7.97
13000.0	9.90	39.42	10.83	13.04	13.76	1.02	27.85	17.65	8.01
13500.0	9.89	39.15	11.63	12.10	14.14	1.00	29.51	17.43	7.92
14000.0	9.84	38.57	11.45	13.77	12.95	1.02	26.44	17.54	7.92
14500.0	10.10	37.35	11.47	14.15	10.72	1.03	26.94	17.44	7.90
15000.0	10.30	38.31	14.14	13.43	12.64	0.99	28.20	17.70	7.79
15500.0	10.47	38.60	14.79	16.56	13.09	1.01	28.36	17.87	7.76
16000.0	10.60	38.38	14.90	18.78	12.47	1.02	28.13	17.97	7.79
16500.0	10.65	38.11	17.58	22.91	12.38	1.01	28.99	17.81	8.42
17000.0	10.60	37.00	14.37	25.00	10.73	1.03	27.47	17.71	8.74
17500.0	10.60	35.95	15.43	28.82	9.67	1.02	27.58	17.54	8.08
18000.0	10.54	34.53	15.37	26.10	8.45	1.02	27.01	17.71	7.64

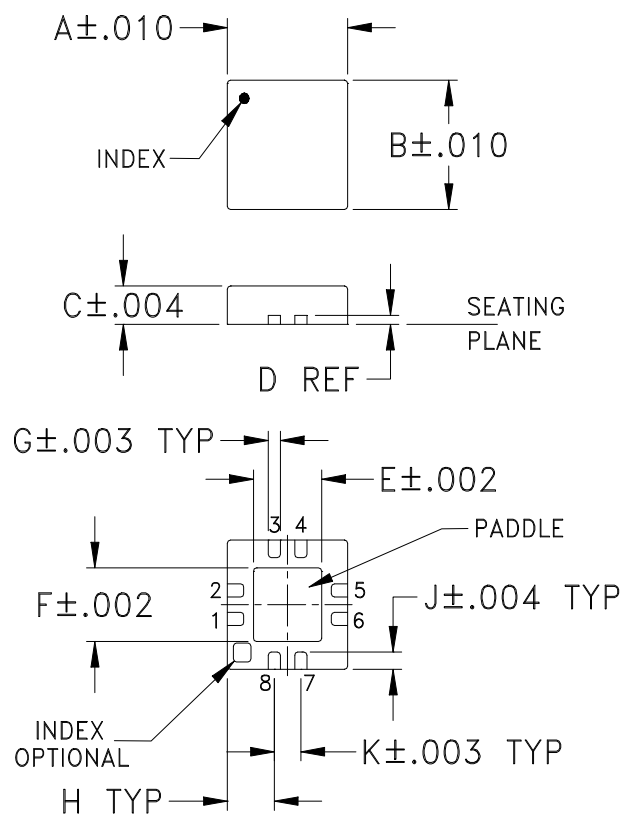
Typical Performance Curves



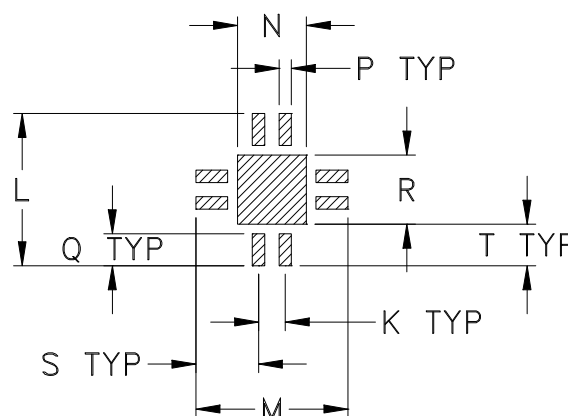
Typical Performance Curves



Outline Dimensions



PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N
DQ849	.118 (3.00)	.118 (3.00)	.035 (0.89)	.008 (0.20)	.067 (1.70)	.067 (1.70)	.012 (0.30)	.046 (1.17)	.016 (0.41)	.026 (0.66)	.148 (3.76)	.148 (3.76)	.067 (1.70)

CASE #	P	Q	R	S	T	WT. GRAM
DQ849	.012 (0.30)	.031 (0.79)	.067 (1.70)	.061 (1.55)	.041 (1.04)	.02

Dimensions are in inches (mm). Tolerances: 2Pl. $\pm.01$; 3 Pl. $\pm.004$

Notes:

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



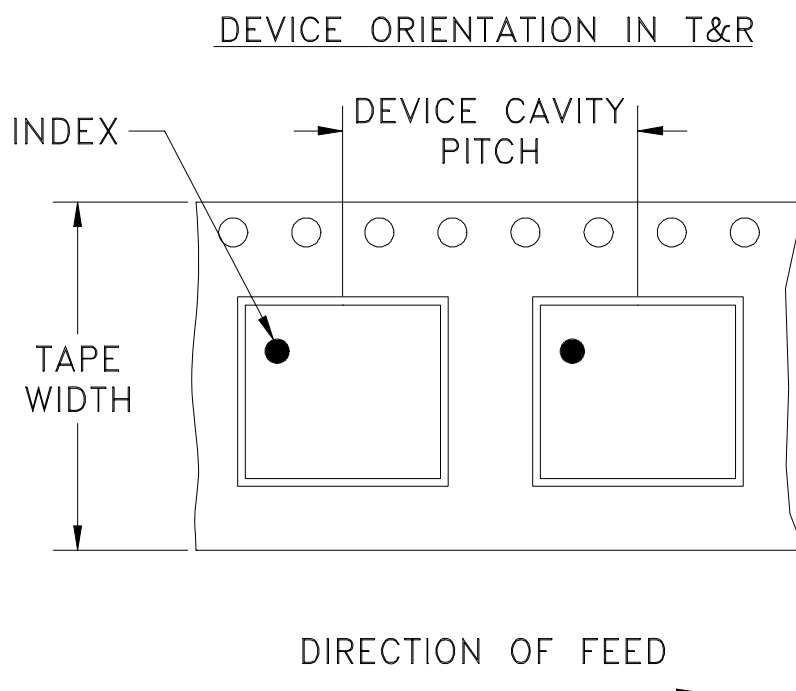
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Tape & Reel Packaging TR-F104



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
		7	Standard	2000

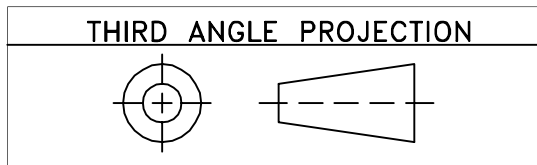
Note: Please Consult individual model data sheet to determine device per reel availability.

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

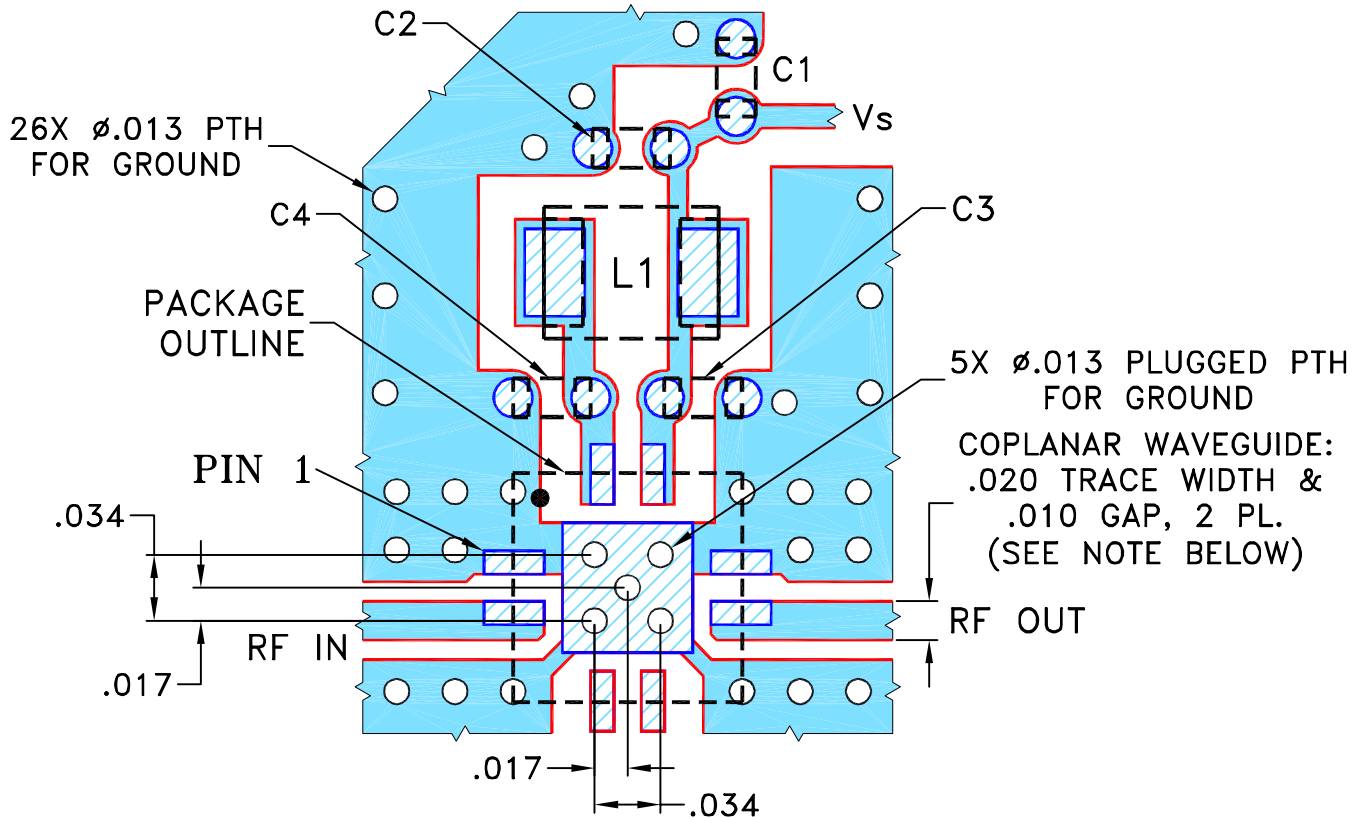


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REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M125952	NEW RELEASE	01/08/10	MMG	RD
A	M132664	UPDATED PATTERN & COMPONENTS	12/16/11	PW	DJ
B	M135298	UPDATED DESCRIPTION & NOTE 2	01/11/12	AV	DJ

SUGGESTED MOUNTING CONFIGURATION FOR
DQ849 CASE STYLE, "08AM03" PIN CODE



- NOTES: 1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010" $\pm$.001"; COPPER: 1/2 OZ. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. 0402 AND 0805 CHIP COMPONENTS FOOTPRINTS ARE SHOWN FOR REFERENCE. VALUE OF COMPONENTS AS PER TB-547-X+.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



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



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED	INITIALS		DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005 ANGLES $\pm$ FRACTIONS $\pm$	DRAWN	MMG	01/06/10
	CHECKED	IL	01/08/10
	APPROVED	RD	01/08/10



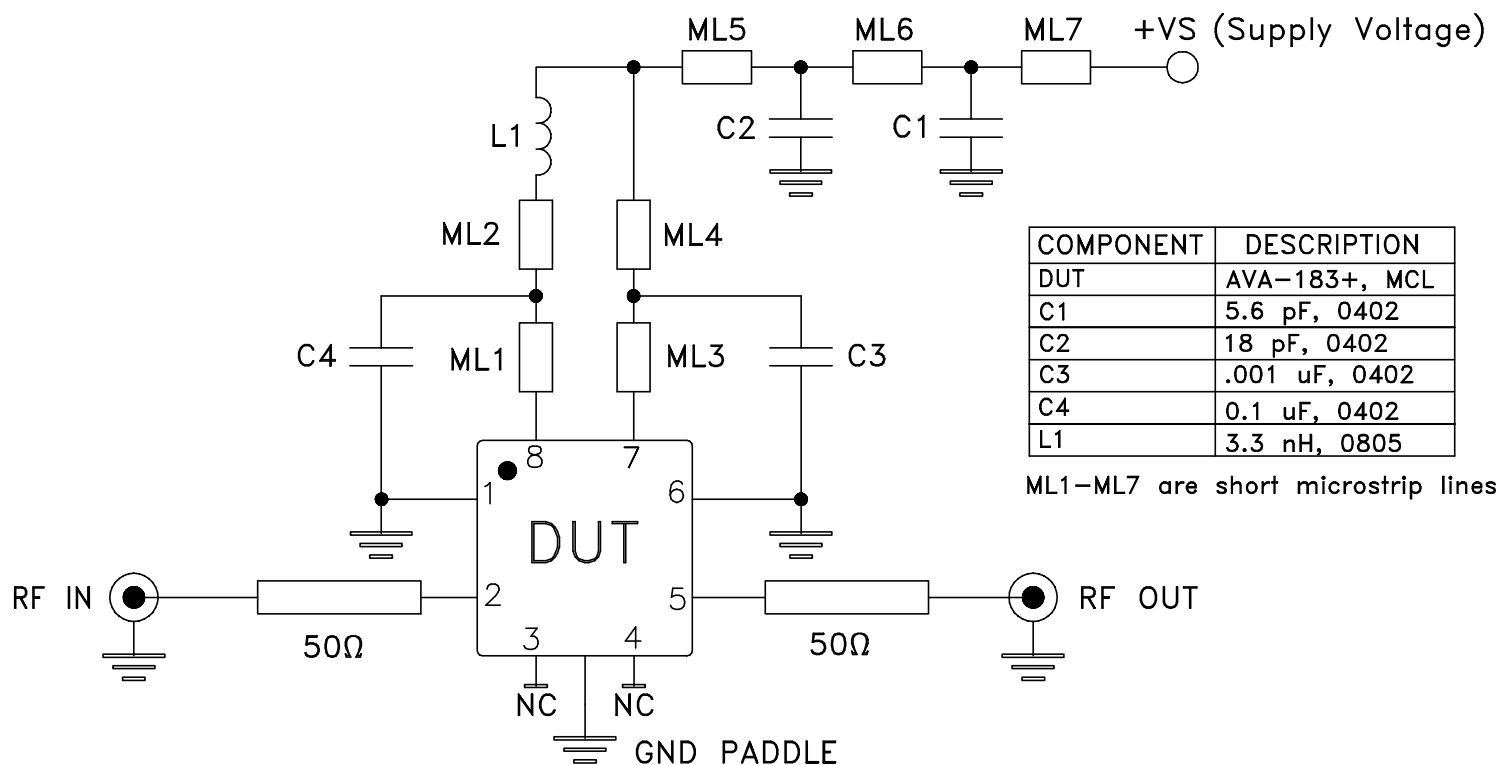
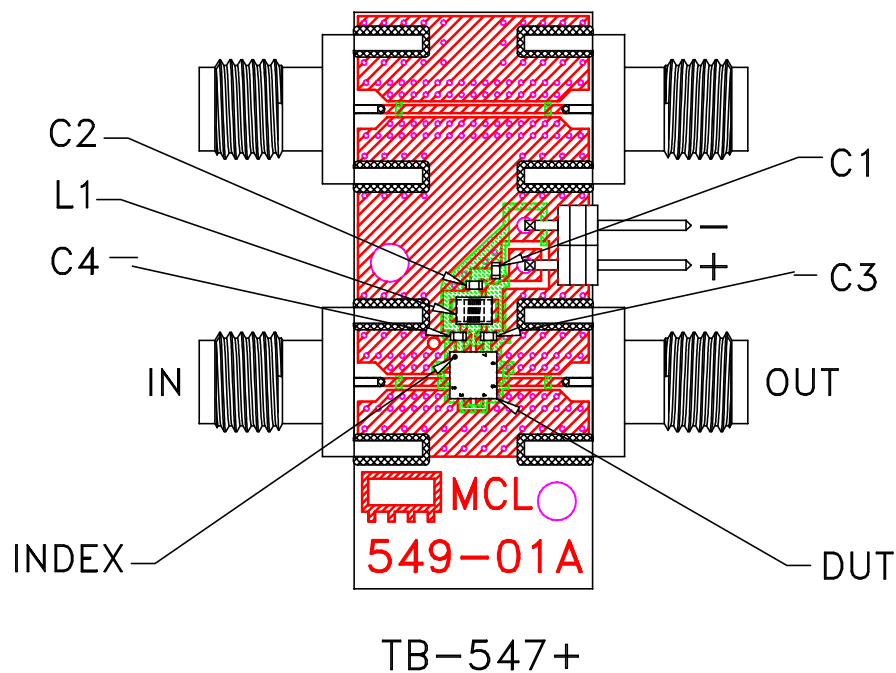
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PL, 08AM03, DQ849, TB-547-X+

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

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-328	B
FILE:	98PL328	SCALE:	10:1
		SHEET:	1 OF 1

Evaluation Board and Circuit



Schematic Diagram

NOTES:

1. SMA Female connectors.
2. PCB material: Rogers RO4350 or equivalent, dielectric constant=3.5, dielectric thickness=.010 inch.

 **Mini-Circuits®**



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

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