

Broad Band Voltage Variable Attenuator

NON-CATALOG

RVA-3000+

50Ω 20 to 3000 MHz

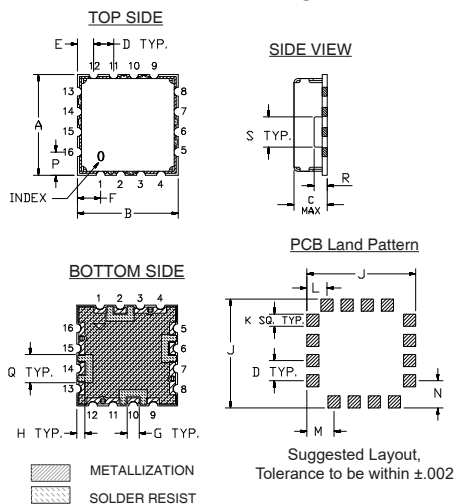
Maximum Ratings

Operating Temperature	-55°C to 85°C
Storage Temperature	-55°C to 85°C
Absolute Max. Supply Voltage(V+)	12V
Absolute Max. Control Voltage(Vctrl)	20V
Absolute Max. RF Input Level	+26 dBm
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

RF IN	2
RF OUT	10
V CONTROL	6
V+	14
GROUND	1,3,4,5,7,8,9,11,12,13,15,16

Outline Drawing

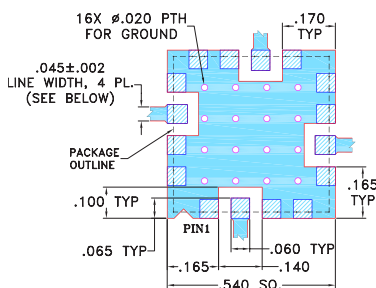


Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H	J
.500	.500	.195	.100	.080	.115	.060	.040	.540
12.70	12.70	4.95	2.54	2.03	2.92	1.52	1.02	13.72
K	L	M	N	P	Q	R	S	wt.
.060	.100	.135	.135	.115	.140	.070	.150	grams
1.52	2.54	3.43	3.43	2.92	3.56	1.78	3.81	1.0

Demo Board MCL P/N: TB-163

Suggested PCB Layout (PL-040)



- NOTE:
1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS 0.025" ± 0.0025"; 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

Features

- Broadband, 20-3000 MHz, could be used up to 4000MHz
- IP3, +55 dBm typ.
- Good VSWR at IN/OUT ports over attenuation range
- Fast Rise/Fall Time, 5μSec/4μSec Typ.
- Minimal phase deviation over attenuation range
- No external bias and RF matching network required
- Shielded case
- Aqueous washable

Applications

- Power level control
- Feed forward amplifiers



Generic photo used for illustration purposes only

CASE STYLE: DV874

+RoHS Compliant

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

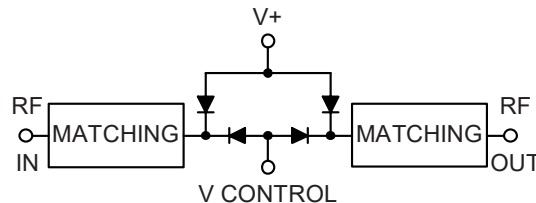
Electrical Specifications (T_{AMB} = 25°C)

FREQ. (MHz)		MIN. INSERTION LOSS, dB (+17V)		MAX. ATTENUATION dB (0V)		INPUT POWER (dBm)	CONTROL Voltage Current (V) (mA)		IP3 (dBm)	RETURN LOSS (dB)	POWER SUPPLY Voltage Current (V) (mA)	
Min.	Max.	Typ.	Max.	Typ.	Min.	Max.			Typ.	Typ.		Max.
20 - 500		2.8	3.5	56	39	+26	0 - 17	30	48	23	+5	10
500 - 1500		3.0	4.0	40	28	+26	0 - 17	30	56	26	+5	10
1500 - 3000		3.6	5.0	29	22	+26	0 - 17	30	57	21	+5	10

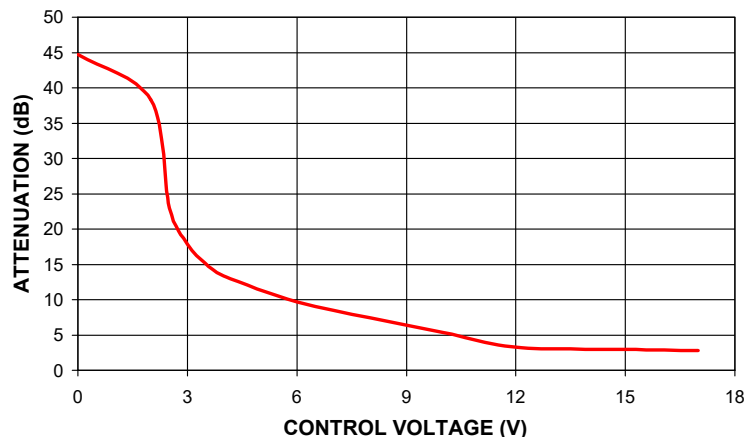
Notes:

- Rise/Fall time: 5μSec/4μSec Typ.
- Switching Time, turn on/off: 6μSec. Typ.

Equivalent Schematic



RVA-3000+ TYPICAL ATTENUATION AT 500 MHz



Notes

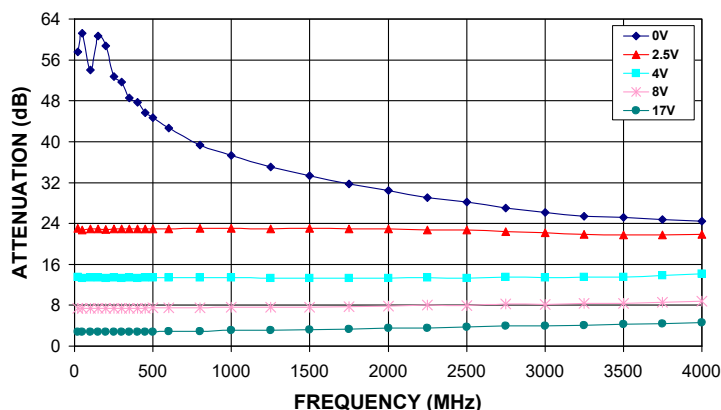
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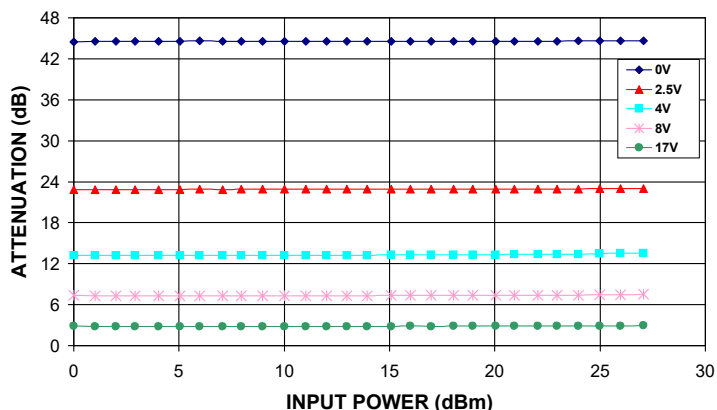
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RVA-3000+
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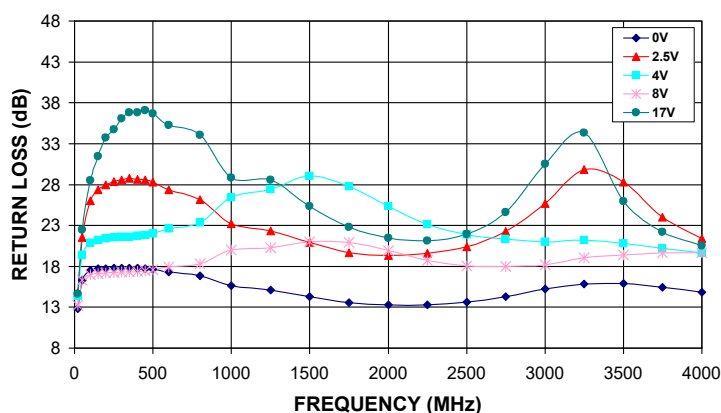
RVA-3000+
ATTENUATION Vs. FREQUENCY
OVER CONTROL VOLTAGES



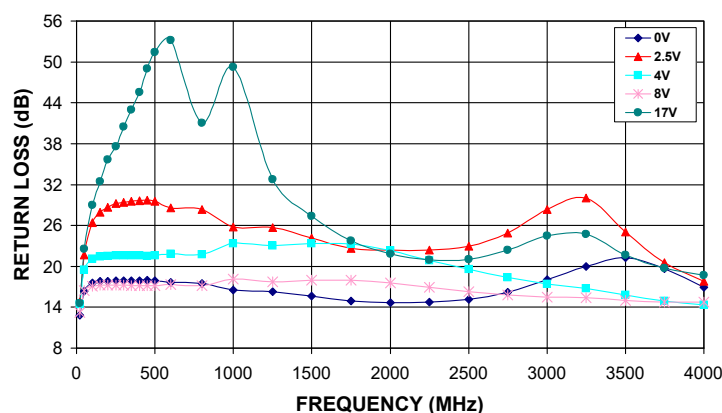
RVA-3000+
ATTENUATION Vs. INPUT POWER
OVER CONTROL VOLTAGES AT 500MHz



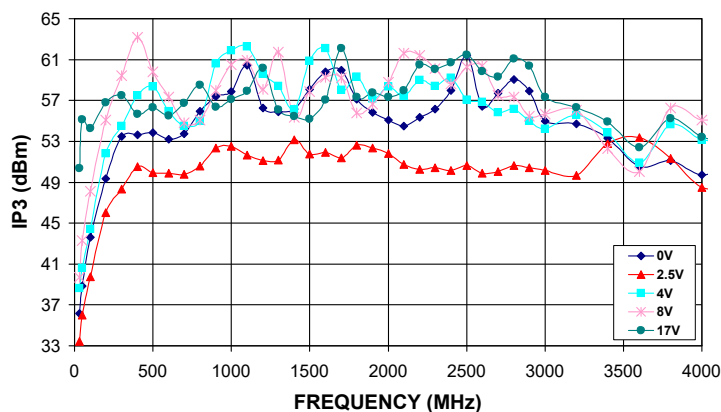
RVA-3000+
INPUT RETURN LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES



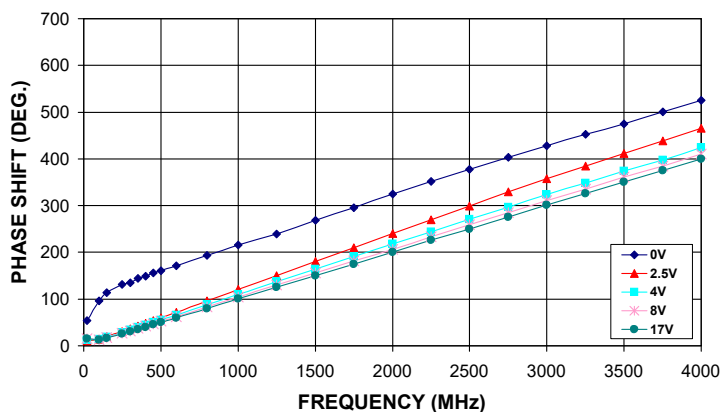
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OUTPUT RETURN LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES



RVA-3000+
IP3 Vs. FREQUENCY
OVER CONTROL VOLTAGES



RVA-3000+
PHASE SHIFT Vs. FREQUENCY
OVER CONTROL VOLTAGES



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Voltage Variable Attenuator

RVA-3000+

Typical Performance Data

V CONTROL (V)	ATTENUATION @ 500 MHz (dB) @V+=5V
0.0	44.71
2.0	38.31
2.5	22.98
3.0	17.84
3.5	15.13
4.0	13.38
6.0	9.65
8.0	7.47
10.0	5.34
12.0	3.26
15.0	2.96
17.0	2.82

FREQ. (MHz)	ATTENUATION Vs. V CONTROL @ V+=5V				
	(dB)				
	@V Control=0V	@V Control=2.5V	@V Control=4V	@V Control=8V	@V Control=17V
20	57.57	23.09	13.46	7.44	2.84
50	61.24	22.75	13.31	7.37	2.74
100	54.00	22.98	13.37	7.40	2.74
150	60.70	22.98	13.38	7.41	2.75
200	58.76	22.84	13.31	7.37	2.74
250	52.74	22.97	13.38	7.43	2.77
300	51.65	22.90	13.30	7.37	2.76
350	48.53	22.94	13.35	7.42	2.77
400	47.66	22.95	13.34	7.41	2.79
450	45.62	22.97	13.37	7.45	2.81
500	44.71	22.98	13.38	7.47	2.82
600	42.69	22.99	13.39	7.51	2.87
800	39.36	23.02	13.36	7.51	2.91
1000	37.26	23.09	13.41	7.63	3.08
1250	35.08	22.92	13.28	7.58	3.06
1500	33.36	23.00	13.28	7.63	3.20
1750	31.75	22.97	13.29	7.75	3.34
2000	30.47	22.90	13.30	7.85	3.49
2250	29.05	22.74	13.37	8.04	3.57
2500	28.18	22.68	13.29	7.96	3.70
2750	27.02	22.45	13.47	8.28	3.92
3000	26.13	22.14	13.41	8.18	3.94
3250	25.42	21.92	13.48	8.33	4.08
3500	25.18	21.79	13.56	8.34	4.25
3750	24.78	21.79	13.83	8.57	4.43
4000	24.39	21.83	14.18	8.83	4.66

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Voltage Variable Attenuator

RVA-3000+

Typical Performance Data

FREQ. (MHz)	INPUT RETURN LOSS Vs. V CONTROL @ V+=5V				
	(dB)				
	@V Control=0V	@V Control=2.5V	@V Control=4V	@V Control=8V	@V Control=17V
20	12.82	14.75	14.37	13.21	14.60
50	16.31	21.53	19.36	16.32	22.47
100	17.53	26.00	20.85	16.96	28.49
150	17.71	27.36	21.23	17.13	31.48
200	17.72	27.97	21.42	17.20	33.74
250	17.80	28.38	21.52	17.27	34.75
300	17.77	28.59	21.60	17.29	36.09
350	17.81	28.80	21.59	17.29	36.84
400	17.75	28.65	21.74	17.39	36.78
450	17.74	28.60	21.82	17.45	37.07
500	17.63	28.28	21.99	17.57	36.70
600	17.30	27.39	22.58	17.93	35.30
800	16.82	26.17	23.33	18.33	34.04
1000	15.63	23.19	26.42	19.97	28.85
1250	15.07	22.37	27.42	20.28	28.54
1500	14.28	20.95	29.03	21.01	25.33
1750	13.54	19.65	27.77	20.93	22.78
2000	13.26	19.34	25.38	19.94	21.49
2250	13.30	19.57	23.13	18.75	21.15
2500	13.66	20.42	21.84	18.07	21.94
2750	14.31	22.26	21.31	17.96	24.64
3000	15.24	25.71	21.02	18.19	30.48
3250	15.84	29.86	21.21	19.03	34.32
3500	15.91	28.30	20.77	19.36	25.98
3750	15.46	24.00	20.19	19.63	22.19
4000	14.82	21.37	19.69	19.68	20.51

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Typical Performance Data

FREQ. (MHz)	OUTPUT RETURN LOSS Vs. V CONTROL @ V+=5V				
	(dB)				
	@V Control=0V	@V Control=2.5V	@V Control=4V	@V Control=8V	@V Control=17V
20	12.83	14.78	14.41	13.25	14.62
50	16.35	21.64	19.50	16.41	22.57
100	17.59	26.39	21.07	17.07	28.95
150	17.79	27.95	21.43	17.21	32.44
200	17.80	28.64	21.54	17.22	35.66
250	17.91	29.22	21.57	17.24	37.61
300	17.87	29.37	21.57	17.21	40.47
350	17.90	29.54	21.56	17.20	42.95
400	17.92	29.60	21.56	17.20	45.52
450	17.94	29.69	21.51	17.17	49.04
500	17.90	29.52	21.55	17.18	51.39
600	17.62	28.55	21.79	17.33	53.18
800	17.46	28.34	21.71	17.20	41.04
1000	16.51	25.75	23.39	18.10	49.25
1250	16.27	25.69	23.00	17.75	32.78
1500	15.61	24.16	23.38	17.96	27.37
1750	14.93	22.63	23.28	18.00	23.76
2000	14.70	22.37	22.33	17.58	21.85
2250	14.73	22.43	20.90	16.91	20.91
2500	15.15	22.97	19.56	16.31	21.04
2750	16.22	24.90	18.37	15.80	22.38
3000	18.02	28.35	17.43	15.50	24.52
3250	19.98	30.04	16.79	15.43	24.72
3500	21.24	25.06	15.82	15.02	21.69
3750	19.65	20.56	14.95	14.76	19.75
4000	16.94	17.83	14.39	14.74	18.68

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Typical Performance Data

FREQ. (MHz)	INPUT IP3 Vs. V CONTROL @ V+=5V (dBm)				
	@V Control=0V	@V Control=2.5V	@V Control=4V	@V Control=8V	@V Control=17V
30	36.14	33.45	38.61	39.72	50.35
50	38.85	35.98	40.63	43.27	55.16
100	43.60	39.74	44.40	48.10	54.28
200	49.36	46.05	51.83	55.07	56.78
300	53.49	48.35	54.52	59.40	57.52
400	53.61	50.55	57.51	63.18	55.69
500	53.83	49.96	58.38	59.78	56.29
600	53.19	49.87	55.94	57.34	55.53
700	53.77	49.76	54.52	54.83	56.75
800	55.94	50.56	55.00	55.10	58.50
900	57.39	52.35	60.62	57.97	56.36
1000	57.86	52.49	61.90	60.51	57.14
1100	60.47	51.64	62.28	60.94	57.93
1200	56.25	51.14	59.58	58.06	60.16
1300	55.91	51.15	58.40	61.73	56.12
1400	56.15	53.16	56.10	55.34	55.44
1500	58.07	51.77	60.85	57.88	55.17
1600	59.81	51.93	62.11	59.28	57.06
1700	59.95	51.38	58.03	59.22	62.12
1800	57.10	52.62	59.30	55.79	57.32
1900	55.84	52.36	57.15	56.66	57.79
2000	55.11	51.84	58.36	58.76	57.31
2100	54.47	50.74	57.43	61.60	57.96
2200	55.37	50.26	59.01	61.39	60.49
2300	56.18	50.42	58.40	60.13	60.06
2400	57.99	50.13	59.23	58.60	60.73
2500	61.39	50.66	57.06	60.28	61.46
2600	56.44	49.89	56.85	60.41	59.87
2700	57.70	50.02	55.83	57.52	59.33
2800	59.03	50.63	56.13	57.36	61.10
2900	57.93	50.43	54.99	55.45	60.37
3000	55.00	50.16	54.20	55.66	57.35
3200	54.72	49.69	55.55	56.05	56.29
3400	53.33	52.80	53.85	52.30	54.92
3600	50.51	53.35	50.92	50.07	52.40
3800	51.14	51.35	54.63	56.27	55.24
4000	49.72	48.49	53.13	55.09	53.40

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Voltage Variable Attenuator

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Typical Performance Data

FREQ. (MHz)	PHASE SHIFT Vs. V CONTROL @ V+=5V				
	(deg)				
	@V Control=0V	@V Control=2.5V	@V Control=4V	@V Control=8V	@V Control=17V
20	54.09	10.62	13.03	15.69	15.46
100	96.53	14.59	13.74	13.27	12.62
150	113.22	19.38	18.30	17.49	16.67
250	131.47	30.92	28.71	27.14	25.87
300	135.20	36.25	33.78	31.99	30.60
350	144.50	42.54	39.31	37.09	35.44
400	149.18	48.25	44.70	42.18	40.32
450	155.66	54.43	50.27	47.45	45.20
500	160.85	60.24	55.57	52.36	50.14
600	171.61	71.72	66.11	62.35	59.73
800	193.51	96.00	88.07	83.06	79.69
1000	215.35	120.34	110.56	104.54	100.40
1250	239.19	149.71	137.44	130.34	124.98
1500	268.06	180.02	164.12	155.55	149.81
1750	295.42	209.89	191.17	181.73	175.02
2000	324.34	240.50	217.56	206.94	200.35
2250	351.76	270.25	244.41	233.46	225.91
2500	377.19	299.30	270.47	258.75	250.16
2750	403.86	329.07	296.68	284.45	276.07
3000	427.90	357.58	323.67	311.12	301.16
3250	452.39	384.82	347.90	335.07	325.53
3500	474.80	411.46	374.34	361.42	350.95
3750	500.84	438.25	397.94	384.52	374.83
4000	525.12	466.05	424.12	410.14	400.00

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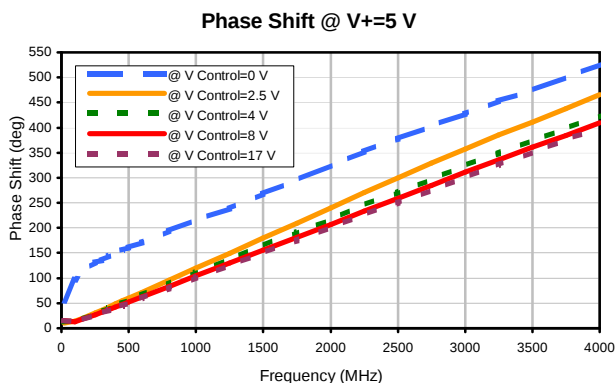
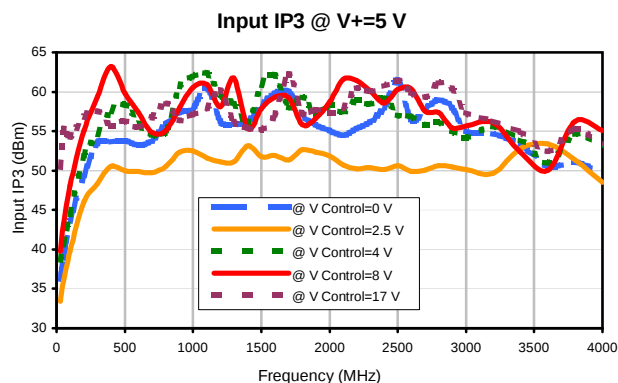
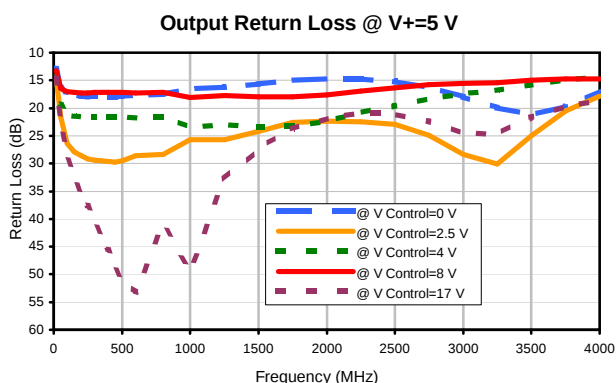
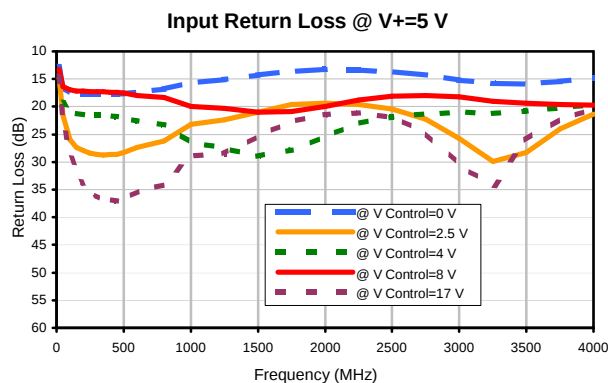
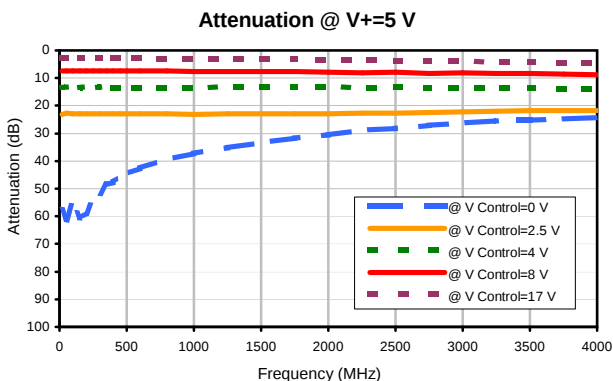
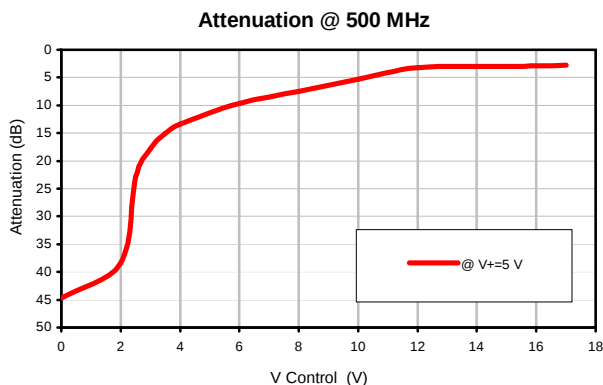
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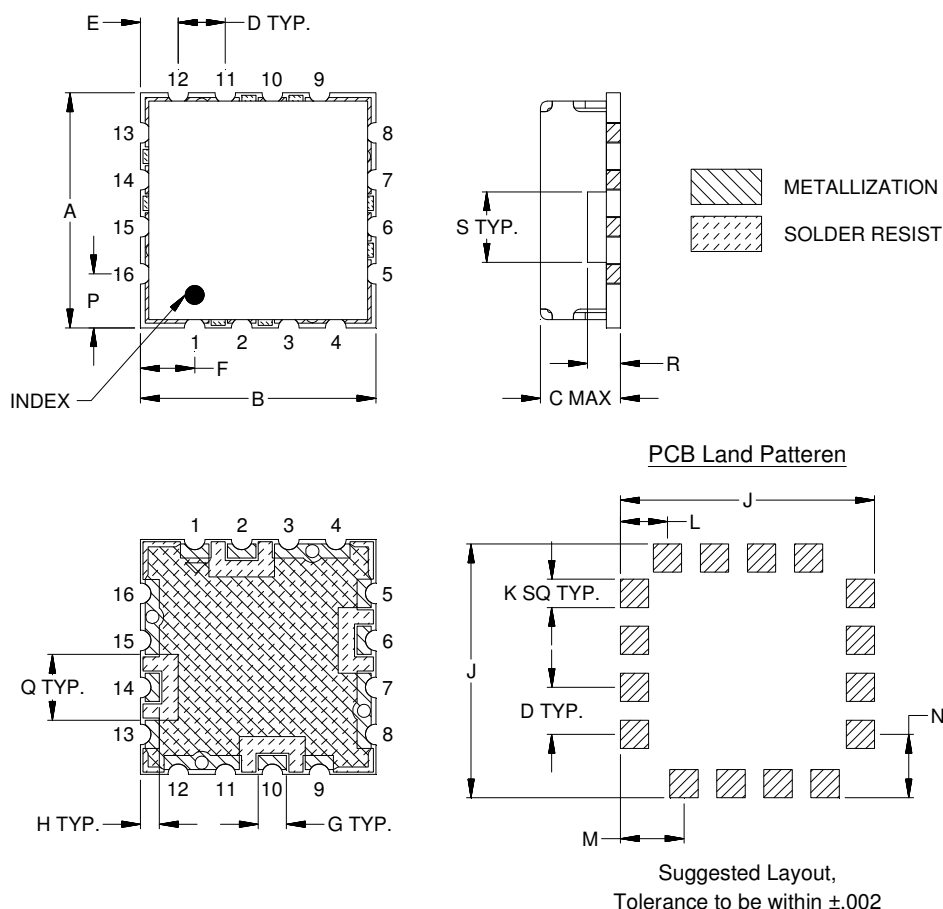
Typical Performance Curves

RVA-3000+



Outline Dimensions

DV874



CASE#	A	B	C	D	E	F	G	H	J	K	L	M
DV874	.500 (12.70)	.500 (12.70)	.195 (4.95)	.100 (2.54)	.080 (2.03)	.115 (2.92)	.060 (1.52)	.040 (1.02)	.540 (13.72)	.060 (1.52)	.100 (2.54)	.135 (3.43)

CASE#	N	P	Q	R	S	WT.GRAM
DV874	.135 (3.43)	.115 (2.92)	.140 (3.56)	.070 (1.78)	.150 (3.81)	1.0

Dimensions are in inches (mm). Tolerances: 2Pl. $\pm .03$; 3Pl. $\pm .015$

Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:
 - For RoHS Case Styles: 3-5 μ inch (.08-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
 - For RoHS-5 Case Styles: Tin-Lead plate.

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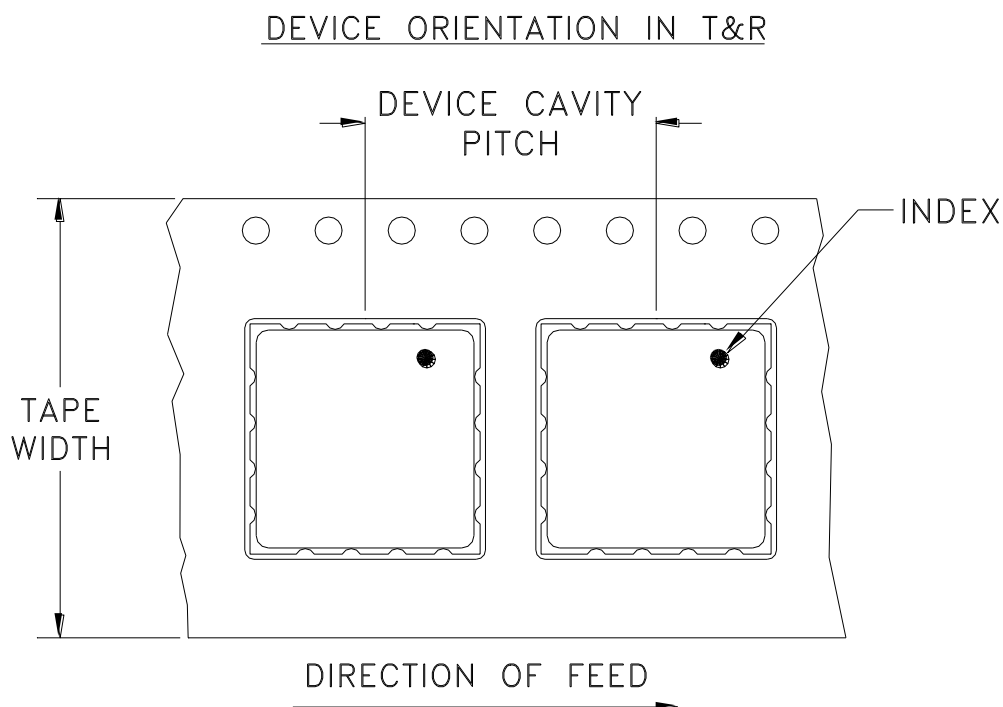
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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F37



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
24	16	7	Small quantity standards (see note)	10
				20
				50
				100
		13	Standard	200
				500

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



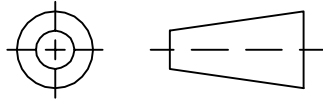
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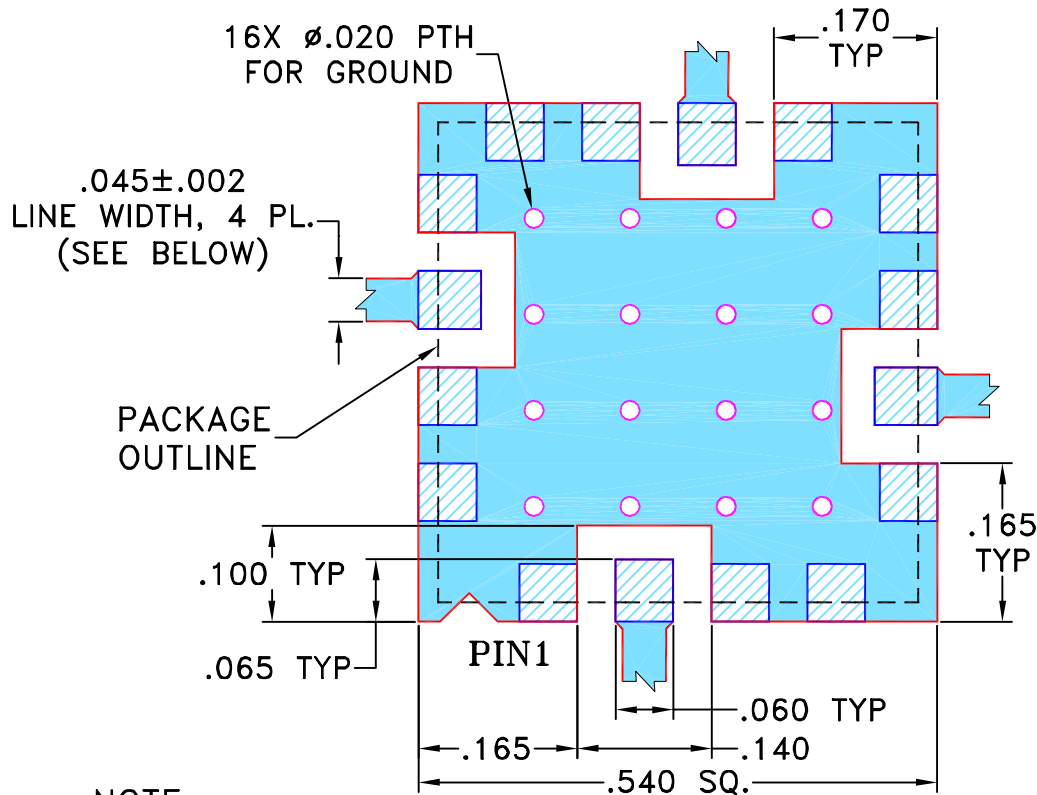
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M94233	CHANGE LINE WIDTH	09/04	RZ	HH
B	M101567	ADD CS: DV874	10/05	DK	HH
B	R82061	ADD CS: DV874	10/05	DK	HH
C	M102713	ADDED "...WITH SMOBC"	01/12/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION FOR DV894 & DV897 CASE STYLES, "np" PIN CONNECTION



NOTE:

1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS 0.025" $\pm$ 0.0025"; 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

TOLERANCES ON:

2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

DRAWN

DK (RAVON)

28 OCT 05

CHECKED

RZ (RAVON)

28 OCT 05

APPROVED

HH (RAVON)

28 OCT 05

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



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Brooklyn NY 11235

PL, np, DV894/897, RVA, TB-163

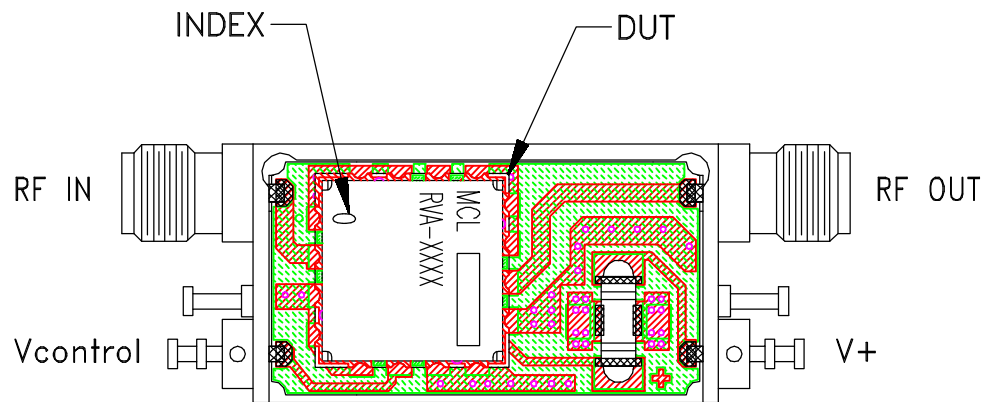
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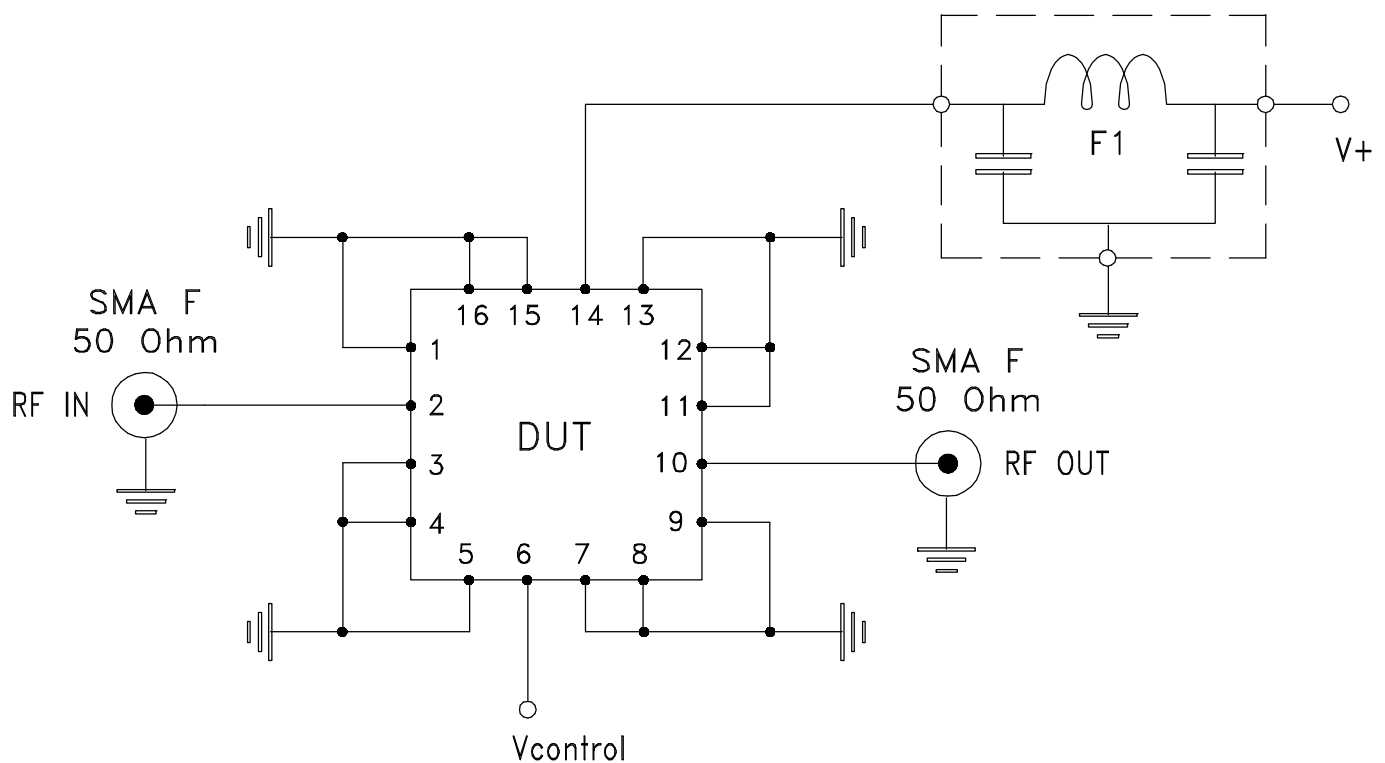
SCALE: 5:1

SHEET: 1 OF 1

Evaluation Board and Circuit



TB-163



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: ROGERS R04350B or equivalent, Dielectric Constant=4.5, Thickness=.020 inch.

 **Mini-Circuits®**



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

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 85° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutectic Process: 225°C peak Pb-Free Process, 245°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Vibration (High Frequency)	20g peak, 20-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-883, Method 2007.3, Condition A
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
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