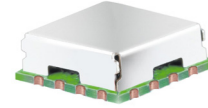


Voltage Variable Attenuator

RVA-6000+

50Ω 2000 to 6000 MHz



CASE STYLE: DV874

The Big Deal

- Broad band, 2000 to 6000 MHz
- IP3 +43 dBm typ.
- Well matched in/out ports, return loss 20 dB typ.
- Minimal phase deviation over attenuation range
- Drop-in, no external matching circuits required

Product Overview

The RVA-6000+ is a Voltage Variable 50Ω matched Attenuator built into a shielded (0.5" x 0.5" x 0.195") case. The model utilizes well matched PIN diodes, carefully biased in order to enable over 30 dB attenuation range control while maintaining very good input & output port matching.

Key Features

| Feature | Advantages |
|--|--|
| IP3 +40 dBm typ. | Low distortion enabling improved system performance. |
| Minimal phase deviation over attenuation range | Can provide low signal distortion over attenuation range |

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



Surface Mount Voltage Variable Attenuator

RVA-6000+

50Ω 2000 to 6000 MHz

Maximum Ratings

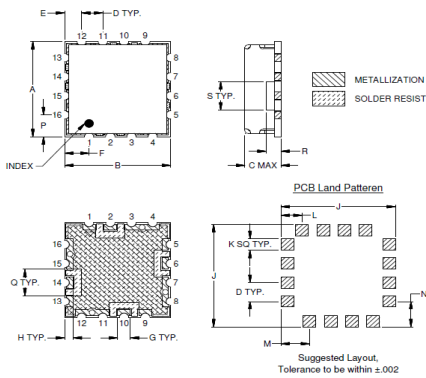
| | |
|--------------------------------------|---------------|
| Operating Temperature | -55°C to 85°C |
| Storage Temperature | -55°C to 85°C |
| Absolute Max. Supply Voltage(V+) | 6V |
| Absolute Max. Control Voltage(Vctrl) | 14V |
| Absolute Max. RF Input Level | +20dBm |

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 |

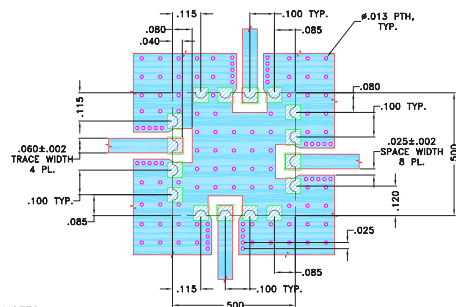
Outline Drawing



Outline Dimensions (inch/mm)

| A | B | C | D | E | F | G | H | J | K |
|------|------|------|------|------|------|------|-------|-------|------|
| .500 | .500 | .195 | .100 | .080 | .115 | .060 | .040 | .540 | .060 |
| 12.7 | 12.7 | 4.95 | 2.54 | 2.03 | 2.92 | 1.52 | 1.02 | 13.72 | 1.52 |
| L | M | N | P | Q | R | S | Wt. | | |
| .100 | .135 | .135 | .115 | .140 | .070 | .150 | grams | | |
| 2.54 | 3.43 | 3.43 | 2.92 | 3.56 | 1.78 | 3.81 | 1.0 | | |

Demo Board MCL P/N: TB-686 Suggested PCB Layout (PL-374)

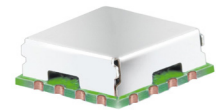


NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .030 ±.002" COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
 - 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 SOLDERMASK

Features

- Broadband, 2000-6000 MHz
- Good VSWR at IN/OUT ports over attenuation range
- Fast Rasing/Fall Time, 6.8μSec/3.5μSec Typ.
- Minimal phase deviation over attenuation range
- No external bias and RF matching network required
- Shielded case
- Aqueous washable



CASE STYLE: DV874

+RoHS Compliant

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

Applications

- Power level control
- Feed forward amplifier

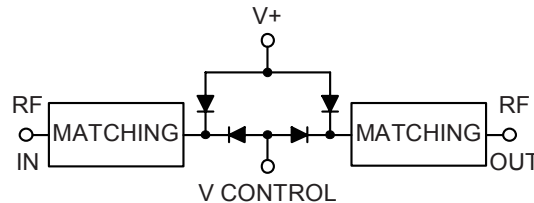
Electrical Specifications (T_{AMB} = 25°C)

| FREQ. (MHz) | MIN. INSERTION LOSS, dB (+12V) | | MAX. ATTEN. 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. | Max. | | | Typ. | Max. |
| 2000- 4000 | 3.3 | 4.0 | 37.7 | 30 | +20 | 0 - 12 | 10 | 41 | 20 | +5 | 5 |
| 4000- 6000 | 3.5 | 4.5 | 32.7 | 25 | +20 | 0 - 12 | 10 | 43 | 20 | +5 | 5 |

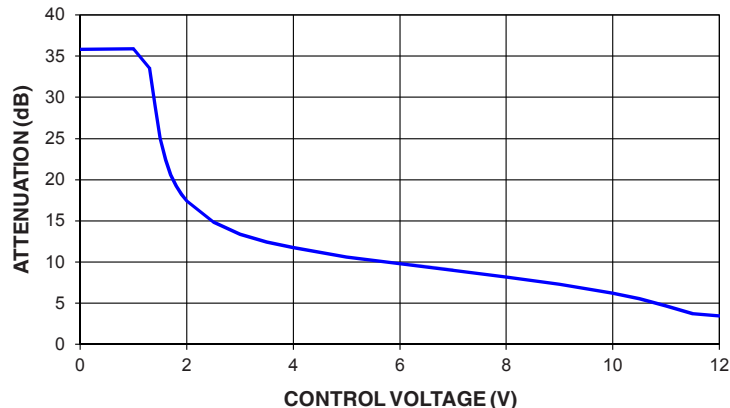
Notes:

- Rise/Fall time: 6.8 / 3.8 μSec Typ.
- Switching Time & turn on/off time: 8.8 / 3.8 μSec. Typ.
- * Typical IP3 @ Vc = 5V

Equivalent Schematic



RVA-6000+ TYPICAL ATTENUATION AT 4000 MHz



Notes

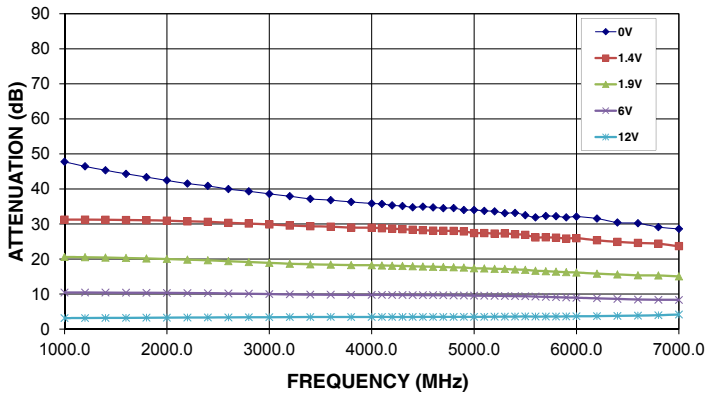
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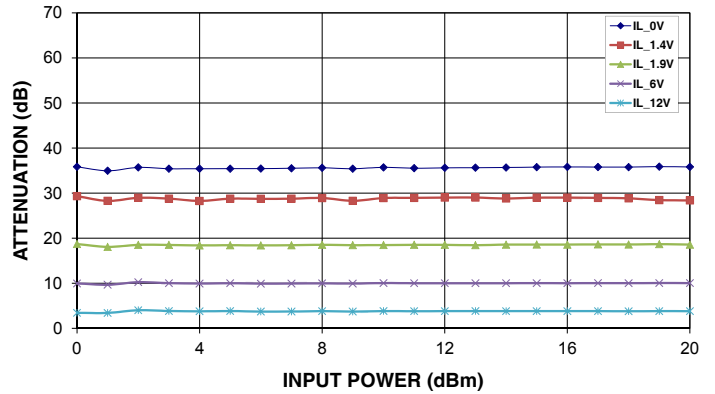
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REV. OR
M153512
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RVA-6000+
URJ
160727
Page 2 of 3

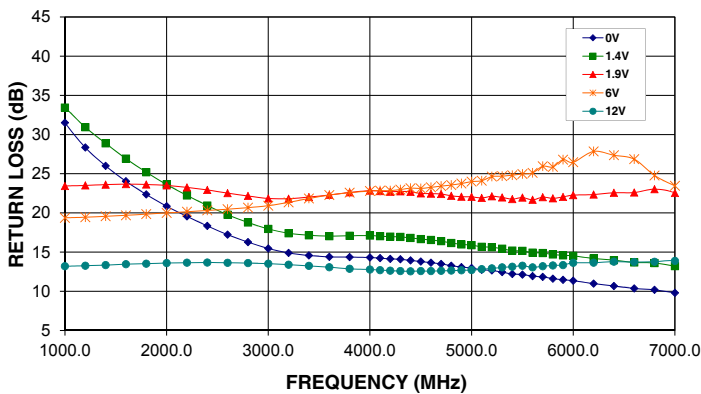
**RVA-6000+
ATTENUATION Vs. FREQUENCY
OVER CONTROL VOLTAGES**



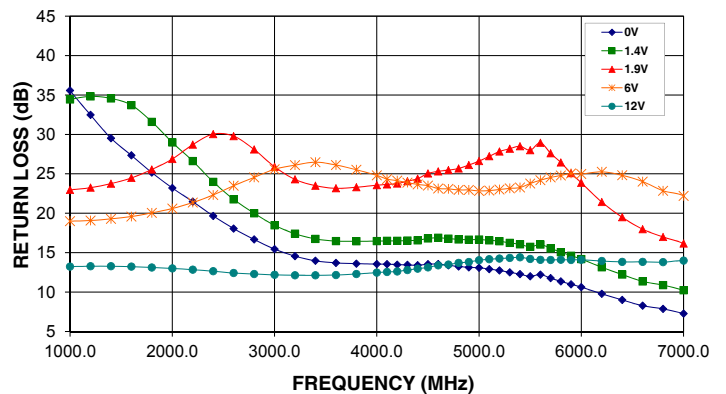
**RVA-6000+
ATTENUATION Vs. INPUT POWER
OVER CONTROL VOLTAGES AT 4000 MHz**



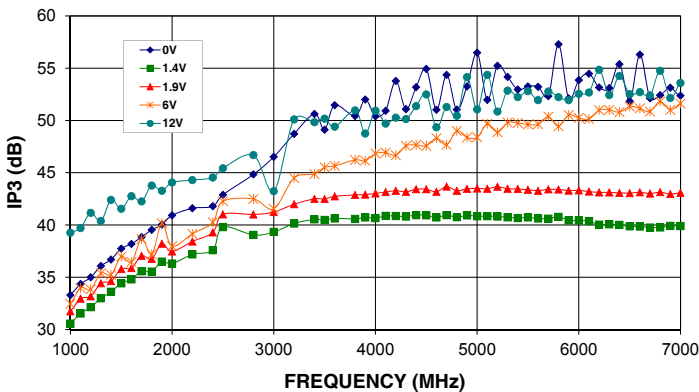
**RVA-6000+
INPUT RETURN LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES**



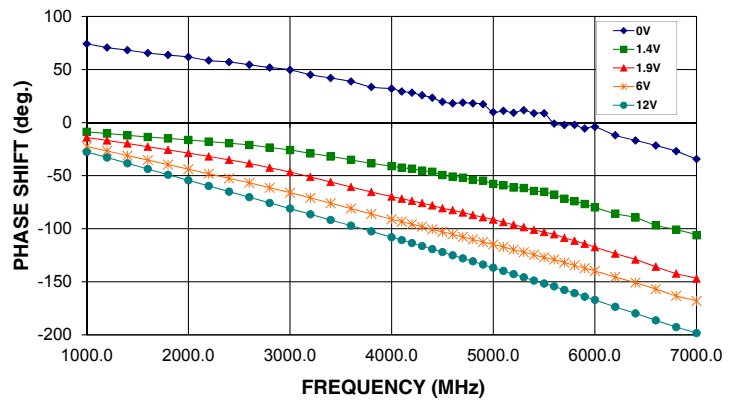
**RVA-6000+
OUTPUT RETURN LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES**



**RVA-6000+
IP3 Vs. FREQUENCY
OVER CONTROL VOLTAGES**



**RVA-6000+
PHASE SHIFT Vs. FREQUENCY
OVER CONTROL VOLTAGES**



Notes

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Typical Performance Data

| V CONTROL (V) | ATTENUATION @ 4000 MHz (dB) |
|---------------|-----------------------------|
| 0.0 | 35.86 |
| 1.0 | 35.88 |
| 1.3 | 33.54 |
| 1.4 | 28.95 |
| 1.5 | 25.04 |
| 1.6 | 22.41 |
| 1.7 | 20.60 |
| 1.8 | 19.26 |
| 1.9 | 18.23 |
| 2.0 | 17.40 |
| 2.5 | 14.82 |
| 3.0 | 13.40 |
| 3.5 | 12.44 |
| 4.0 | 11.72 |
| 5.0 | 10.64 |
| 6.0 | 9.78 |
| 7.0 | 9.00 |
| 8.0 | 8.21 |
| 9.0 | 7.33 |
| 10.0 | 6.23 |
| 10.5 | 5.54 |
| 11.0 | 4.67 |
| 11.5 | 3.71 |
| 12.0 | 3.48 |

Typical Performance Data

| FREQ. (MHz) | ATTENUATION Vs. V CONTROL @ V+=5V | | | | | | |
|-------------|-----------------------------------|-----------------|-----------------|---------------|---------------|----------------|----------------|
| | @V Control=0V | @V Control=1.4V | @V Control=1.9V | @V Control=3V | @V Control=6V | @V Control=10V | @V Control=12V |
| 1000 | 47.76 | 31.25 | 20.60 | 15.34 | 10.44 | 5.89 | 3.14 |
| 1200 | 46.44 | 31.24 | 20.52 | 15.28 | 10.44 | 5.91 | 3.17 |
| 1400 | 45.33 | 31.20 | 20.42 | 15.21 | 10.42 | 5.93 | 3.19 |
| 1600 | 44.31 | 31.13 | 20.29 | 15.11 | 10.39 | 5.95 | 3.21 |
| 1800 | 43.37 | 31.07 | 20.16 | 15.01 | 10.37 | 5.98 | 3.25 |
| 2000 | 42.44 | 30.95 | 20.00 | 14.88 | 10.34 | 6.00 | 3.27 |
| 2200 | 41.54 | 30.76 | 19.82 | 14.74 | 10.30 | 6.03 | 3.30 |
| 2400 | 40.88 | 30.62 | 19.63 | 14.59 | 10.25 | 6.06 | 3.33 |
| 2600 | 39.96 | 30.33 | 19.38 | 14.39 | 10.17 | 6.08 | 3.34 |
| 2800 | 39.33 | 30.12 | 19.16 | 14.20 | 10.10 | 6.10 | 3.38 |
| 3000 | 38.60 | 29.88 | 18.91 | 13.99 | 10.01 | 6.13 | 3.40 |
| 3200 | 37.92 | 29.56 | 18.66 | 13.78 | 9.91 | 6.14 | 3.42 |
| 3400 | 37.17 | 29.36 | 18.50 | 13.62 | 9.84 | 6.16 | 3.45 |
| 3600 | 36.80 | 29.24 | 18.40 | 13.54 | 9.80 | 6.18 | 3.46 |
| 3800 | 36.29 | 28.99 | 18.27 | 13.44 | 9.77 | 6.19 | 3.46 |
| 4000 | 35.86 | 28.95 | 18.23 | 13.40 | 9.78 | 6.23 | 3.48 |
| 4100 | 35.73 | 28.79 | 18.17 | 13.36 | 9.78 | 6.25 | 3.48 |
| 4200 | 35.31 | 28.68 | 18.09 | 13.30 | 9.76 | 6.25 | 3.47 |
| 4300 | 35.14 | 28.53 | 18.01 | 13.24 | 9.74 | 6.26 | 3.47 |
| 4400 | 34.77 | 28.35 | 17.92 | 13.16 | 9.71 | 6.27 | 3.47 |
| 4500 | 34.95 | 28.23 | 17.86 | 13.12 | 9.70 | 6.29 | 3.48 |
| 4600 | 34.74 | 28.10 | 17.80 | 13.07 | 9.69 | 6.31 | 3.48 |
| 4700 | 34.53 | 28.08 | 17.73 | 13.00 | 9.67 | 6.33 | 3.48 |
| 4800 | 34.56 | 28.01 | 17.63 | 12.92 | 9.63 | 6.34 | 3.49 |
| 4900 | 33.99 | 27.87 | 17.56 | 12.85 | 9.61 | 6.37 | 3.50 |
| 5000 | 34.01 | 27.42 | 17.37 | 12.73 | 9.56 | 6.39 | 3.50 |
| 5100 | 33.74 | 27.41 | 17.30 | 12.65 | 9.52 | 6.41 | 3.51 |
| 5200 | 33.62 | 27.27 | 17.20 | 12.57 | 9.49 | 6.45 | 3.54 |
| 5300 | 33.08 | 27.30 | 17.15 | 12.51 | 9.47 | 6.48 | 3.56 |
| 5400 | 33.17 | 27.07 | 17.02 | 12.40 | 9.41 | 6.50 | 3.58 |
| 5500 | 32.51 | 26.90 | 16.93 | 12.34 | 9.39 | 6.56 | 3.63 |
| 5600 | 31.88 | 26.18 | 16.66 | 12.17 | 9.29 | 6.52 | 3.58 |
| 5700 | 32.28 | 26.19 | 16.53 | 12.03 | 9.21 | 6.52 | 3.59 |
| 5800 | 32.20 | 26.10 | 16.39 | 11.89 | 9.12 | 6.53 | 3.60 |
| 5900 | 31.90 | 25.84 | 16.24 | 11.77 | 9.03 | 6.55 | 3.63 |
| 6000 | 32.11 | 25.95 | 16.15 | 11.65 | 8.96 | 6.56 | 3.65 |
| 6200 | 31.56 | 25.36 | 15.83 | 11.39 | 8.78 | 6.59 | 3.71 |
| 6400 | 30.42 | 24.89 | 15.60 | 11.18 | 8.63 | 6.63 | 3.78 |
| 6600 | 30.21 | 24.59 | 15.34 | 10.94 | 8.44 | 6.64 | 3.85 |
| 6800 | 29.13 | 24.37 | 15.30 | 10.88 | 8.37 | 6.70 | 3.97 |
| 7000 | 28.61 | 23.69 | 15.04 | 10.76 | 8.33 | 6.86 | 4.16 |

Typical Performance Data

| FREQ. (MHz) | INPUT RETURN LOSS Vs. V CONTROL @ V+=5V | | | | | | |
|-------------|---|-----------------|-----------------|---------------|---------------|----------------|----------------|
| | @V Control=0V | @V Control=1.4V | @V Control=1.9V | @V Control=3V | @V Control=6V | @V Control=10V | @V Control=12V |
| 1000 | 31.51 | 33.43 | 23.43 | 19.25 | 19.37 | 26.87 | 13.19 |
| 1200 | 28.34 | 30.94 | 23.50 | 19.33 | 19.45 | 27.08 | 13.27 |
| 1400 | 26.00 | 28.88 | 23.61 | 19.46 | 19.57 | 27.15 | 13.34 |
| 1600 | 24.04 | 26.92 | 23.66 | 19.60 | 19.69 | 27.30 | 13.46 |
| 1800 | 22.35 | 25.20 | 23.63 | 19.74 | 19.85 | 27.28 | 13.53 |
| 2000 | 20.86 | 23.62 | 23.51 | 19.91 | 20.00 | 27.23 | 13.60 |
| 2200 | 19.56 | 22.24 | 23.26 | 20.04 | 20.15 | 27.05 | 13.65 |
| 2400 | 18.34 | 20.94 | 22.93 | 20.20 | 20.31 | 26.73 | 13.67 |
| 2600 | 17.23 | 19.77 | 22.52 | 20.38 | 20.48 | 26.16 | 13.64 |
| 2800 | 16.28 | 18.78 | 22.16 | 20.60 | 20.67 | 25.56 | 13.60 |
| 3000 | 15.47 | 17.96 | 21.85 | 20.90 | 20.92 | 24.87 | 13.53 |
| 3200 | 14.89 | 17.41 | 21.81 | 21.40 | 21.34 | 24.10 | 13.39 |
| 3400 | 14.57 | 17.15 | 22.02 | 22.01 | 21.84 | 23.47 | 13.24 |
| 3600 | 14.39 | 17.04 | 22.29 | 22.52 | 22.28 | 22.89 | 13.07 |
| 3800 | 14.36 | 17.08 | 22.61 | 22.83 | 22.58 | 22.40 | 12.87 |
| 4000 | 14.31 | 17.11 | 22.84 | 22.93 | 22.79 | 22.21 | 12.77 |
| 4100 | 14.23 | 17.03 | 22.78 | 22.90 | 22.84 | 22.09 | 12.70 |
| 4200 | 14.14 | 16.97 | 22.70 | 22.77 | 22.85 | 22.00 | 12.64 |
| 4300 | 14.09 | 16.95 | 22.75 | 22.79 | 22.98 | 21.92 | 12.58 |
| 4400 | 13.94 | 16.81 | 22.69 | 22.89 | 23.15 | 21.87 | 12.55 |
| 4500 | 13.79 | 16.67 | 22.50 | 22.75 | 23.13 | 22.00 | 12.59 |
| 4600 | 13.66 | 16.55 | 22.46 | 22.79 | 23.27 | 21.97 | 12.58 |
| 4700 | 13.50 | 16.40 | 22.42 | 22.89 | 23.42 | 22.01 | 12.61 |
| 4800 | 13.26 | 16.16 | 22.19 | 22.90 | 23.56 | 22.01 | 12.64 |
| 4900 | 13.09 | 15.99 | 22.07 | 22.96 | 23.75 | 22.02 | 12.68 |
| 5000 | 12.96 | 15.89 | 22.05 | 23.12 | 23.99 | 22.04 | 12.71 |
| 5100 | 12.75 | 15.68 | 21.91 | 23.16 | 24.11 | 22.20 | 12.82 |
| 5200 | 12.66 | 15.63 | 22.12 | 23.64 | 24.64 | 22.21 | 12.92 |
| 5300 | 12.45 | 15.43 | 21.98 | 23.65 | 24.69 | 22.37 | 13.05 |
| 5400 | 12.21 | 15.18 | 21.76 | 23.73 | 24.81 | 22.45 | 13.13 |
| 5500 | 12.14 | 15.15 | 21.96 | 24.06 | 24.97 | 22.63 | 13.26 |
| 5600 | 11.94 | 14.93 | 21.67 | 24.05 | 25.12 | 22.35 | 13.06 |
| 5700 | 11.83 | 14.89 | 22.01 | 25.02 | 25.95 | 22.19 | 13.20 |
| 5800 | 11.62 | 14.70 | 21.86 | 25.03 | 25.87 | 22.33 | 13.30 |
| 5900 | 11.47 | 14.59 | 22.04 | 26.11 | 26.79 | 21.99 | 13.35 |
| 6000 | 11.35 | 14.52 | 22.27 | 26.50 | 26.47 | 22.28 | 13.63 |
| 6200 | 10.98 | 14.19 | 22.34 | 28.98 | 27.84 | 21.48 | 13.65 |
| 6400 | 10.68 | 13.97 | 22.57 | 31.45 | 27.36 | 20.95 | 13.78 |
| 6600 | 10.37 | 13.69 | 22.60 | 37.05 | 26.85 | 20.11 | 13.73 |
| 6800 | 10.18 | 13.61 | 23.03 | 38.91 | 24.78 | 19.21 | 13.77 |
| 7000 | 9.80 | 13.21 | 22.54 | 34.61 | 23.47 | 18.66 | 13.88 |

Voltage Variable Attenuator

RVA-6000+

Typical Performance Data

| FREQ. (MHz) | OUTPUT RETURN LOSS Vs. V CONTROL @ V+=5V | | | | | | |
|-------------|--|-----------------|-----------------|---------------|---------------|----------------|----------------|
| | @V Control=0V | @V Control=1.4V | @V Control=1.9V | @V Control=3V | @V Control=6V | @V Control=10V | @V Control=12V |
| 1000 | 35.57 | 34.43 | 22.96 | 18.92 | 19.00 | 26.75 | 13.23 |
| 1200 | 32.47 | 34.83 | 23.25 | 19.04 | 19.08 | 26.55 | 13.27 |
| 1400 | 29.52 | 34.56 | 23.76 | 19.31 | 19.29 | 26.28 | 13.28 |
| 1600 | 27.34 | 33.72 | 24.48 | 19.67 | 19.58 | 25.75 | 13.23 |
| 1800 | 25.16 | 31.60 | 25.55 | 20.21 | 20.05 | 25.16 | 13.12 |
| 2000 | 23.21 | 28.98 | 26.88 | 20.88 | 20.60 | 24.54 | 13.00 |
| 2200 | 21.47 | 26.61 | 28.70 | 21.79 | 21.36 | 23.88 | 12.84 |
| 2400 | 19.67 | 23.98 | 30.04 | 22.90 | 22.32 | 23.18 | 12.65 |
| 2600 | 18.05 | 21.77 | 29.78 | 24.21 | 23.49 | 22.46 | 12.41 |
| 2800 | 16.67 | 20.00 | 28.09 | 25.43 | 24.55 | 21.98 | 12.30 |
| 3000 | 15.45 | 18.48 | 25.90 | 26.46 | 25.58 | 21.50 | 12.19 |
| 3200 | 14.56 | 17.40 | 24.30 | 26.84 | 26.10 | 21.17 | 12.14 |
| 3400 | 13.97 | 16.74 | 23.50 | 27.29 | 26.48 | 20.87 | 12.12 |
| 3600 | 13.70 | 16.47 | 23.16 | 26.98 | 26.12 | 20.75 | 12.17 |
| 3800 | 13.61 | 16.45 | 23.30 | 26.54 | 25.52 | 20.92 | 12.29 |
| 4000 | 13.55 | 16.47 | 23.55 | 25.91 | 24.80 | 21.27 | 12.47 |
| 4100 | 13.54 | 16.50 | 23.66 | 25.43 | 24.34 | 21.51 | 12.56 |
| 4200 | 13.48 | 16.49 | 23.77 | 25.22 | 24.14 | 21.70 | 12.61 |
| 4300 | 13.45 | 16.53 | 24.06 | 25.08 | 23.88 | 22.19 | 12.80 |
| 4400 | 13.41 | 16.57 | 24.39 | 24.96 | 23.66 | 22.64 | 12.96 |
| 4500 | 13.55 | 16.80 | 25.04 | 24.87 | 23.50 | 23.11 | 13.13 |
| 4600 | 13.56 | 16.89 | 25.31 | 24.46 | 23.14 | 23.81 | 13.39 |
| 4700 | 13.40 | 16.78 | 25.46 | 24.47 | 23.09 | 24.14 | 13.50 |
| 4800 | 13.25 | 16.69 | 25.68 | 24.48 | 22.96 | 24.67 | 13.69 |
| 4900 | 13.13 | 16.65 | 26.11 | 24.64 | 22.95 | 25.01 | 13.81 |
| 5000 | 13.08 | 16.67 | 26.61 | 24.65 | 22.84 | 25.51 | 14.04 |
| 5100 | 12.91 | 16.57 | 27.23 | 24.99 | 22.88 | 25.62 | 14.16 |
| 5200 | 12.74 | 16.46 | 27.83 | 25.47 | 23.01 | 25.55 | 14.26 |
| 5300 | 12.50 | 16.24 | 28.19 | 26.05 | 23.15 | 25.30 | 14.33 |
| 5400 | 12.28 | 16.06 | 28.49 | 26.62 | 23.26 | 24.99 | 14.42 |
| 5500 | 11.99 | 15.74 | 28.00 | 27.78 | 23.77 | 24.35 | 14.21 |
| 5600 | 12.22 | 16.04 | 28.93 | 28.49 | 24.20 | 23.25 | 14.09 |
| 5700 | 11.77 | 15.53 | 27.60 | 29.72 | 24.54 | 22.35 | 14.08 |
| 5800 | 11.36 | 15.07 | 26.43 | 30.88 | 24.80 | 21.86 | 14.10 |
| 5900 | 10.98 | 14.61 | 25.07 | 31.76 | 25.04 | 21.29 | 14.08 |
| 6000 | 10.63 | 14.18 | 23.86 | 31.20 | 24.98 | 20.65 | 14.10 |
| 6200 | 9.78 | 13.15 | 21.42 | 29.25 | 25.25 | 19.66 | 13.94 |
| 6400 | 9.01 | 12.22 | 19.49 | 26.14 | 24.82 | 18.83 | 13.83 |
| 6600 | 8.27 | 11.36 | 17.98 | 23.69 | 24.02 | 18.41 | 13.83 |
| 6800 | 7.87 | 10.88 | 16.99 | 21.86 | 22.85 | 17.91 | 13.80 |
| 7000 | 7.27 | 10.23 | 16.16 | 20.88 | 22.20 | 17.84 | 13.98 |



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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IF/RF MICROWAVE COMPONENTS

REV. OR
RVA-6000+
162707
Page 4 of 6

Typical Performance Data

| FREQ. (MHz) | OIP3 Vs. V CONTROL @ V+=5V | | | | | | |
|-------------|----------------------------|-----------------|-----------------|---------------|---------------|----------------|----------------|
| | @V Control=0V | @V Control=1.4V | @V Control=1.9V | @V Control=3V | @V Control=6V | @V Control=10V | @V Control=12V |
| 1000 | 33.29 | 30.56 | 32.06 | 33.85 | 33.76 | 31.03 | 39.26 |
| 1200 | 35.00 | 32.14 | 33.56 | 35.33 | 35.22 | 32.49 | 41.16 |
| 1400 | 36.70 | 33.61 | 35.07 | 36.89 | 36.70 | 33.83 | 42.40 |
| 1500 | 37.74 | 34.43 | 36.27 | 38.78 | 38.46 | 34.30 | 41.55 |
| 1700 | 38.85 | 35.58 | 37.43 | 40.11 | 39.66 | 35.24 | 42.26 |
| 1800 | 39.54 | 35.54 | 36.98 | 38.73 | 38.69 | 35.85 | 43.77 |
| 2000 | 40.92 | 36.31 | 37.81 | 39.61 | 39.62 | 36.97 | 44.06 |
| 2200 | 41.60 | 37.19 | 38.78 | 40.57 | 40.50 | 37.86 | 44.30 |
| 2400 | 41.79 | 37.79 | 39.46 | 41.28 | 41.11 | 38.45 | 44.54 |
| 2600 | 42.46 | 38.25 | 39.92 | 42.02 | 41.99 | 39.12 | 44.86 |
| 2800 | 44.84 | 39.35 | 41.01 | 43.40 | 43.61 | 40.38 | 47.16 |
| 3000 | 46.52 | 39.34 | 41.24 | 43.11 | 42.79 | 40.95 | 43.24 |
| 3200 | 48.72 | 40.43 | 42.56 | 46.56 | 46.80 | 41.48 | 50.10 |
| 3300 | 48.65 | 40.61 | 42.92 | 47.30 | 47.67 | 41.57 | 48.94 |
| 3400 | 50.62 | 40.85 | 43.05 | 47.41 | 47.97 | 41.71 | 49.83 |
| 3500 | 49.12 | 40.82 | 43.02 | 47.42 | 47.94 | 42.04 | 50.17 |
| 3700 | 51.17 | 41.02 | 43.43 | 48.83 | 49.48 | 42.37 | 50.07 |
| 3800 | 50.43 | 41.17 | 43.53 | 48.59 | 49.74 | 42.81 | 53.39 |
| 4000 | 50.40 | 41.36 | 43.78 | 49.31 | 50.46 | 43.04 | 51.60 |
| 4200 | 53.78 | 41.31 | 43.96 | 50.44 | 50.86 | 43.33 | 52.46 |
| 4400 | 53.18 | 41.42 | 44.17 | 50.99 | 52.98 | 43.80 | 51.37 |
| 4600 | 51.02 | 41.41 | 44.01 | 52.78 | 52.26 | 44.47 | 49.34 |
| 4800 | 51.04 | 41.27 | 43.97 | 52.77 | 52.69 | 45.32 | 50.45 |
| 5000 | 56.48 | 41.46 | 44.19 | 52.76 | 52.83 | 45.81 | 51.06 |
| 5100 | 51.97 | 41.45 | 44.04 | 51.28 | 59.61 | 45.84 | 54.36 |
| 5200 | 55.23 | 41.36 | 44.18 | 55.03 | 52.88 | 45.96 | 50.85 |
| 5300 | 54.17 | 41.29 | 43.77 | 51.19 | 54.74 | 46.52 | 55.86 |
| 5400 | 52.96 | 41.41 | 44.04 | 51.65 | 54.72 | 46.44 | 52.24 |
| 5500 | 53.25 | 41.16 | 43.83 | 52.05 | 53.06 | 47.24 | 52.81 |
| 5600 | 53.22 | 41.26 | 43.71 | 50.38 | 54.45 | 47.01 | 51.94 |
| 5700 | 52.33 | 40.91 | 43.95 | 53.70 | 51.97 | 47.88 | 52.77 |
| 5800 | 57.29 | 41.34 | 43.85 | 50.17 | 54.62 | 47.34 | 52.23 |
| 5900 | 52.12 | 40.79 | 43.66 | 51.75 | 51.85 | 48.38 | 51.95 |
| 6000 | 53.86 | 40.83 | 43.61 | 50.55 | 54.39 | 47.66 | 52.55 |
| 6100 | 54.47 | 40.54 | 43.35 | 50.86 | 51.95 | 48.61 | 52.67 |
| 6200 | 53.16 | 40.35 | 43.20 | 50.86 | 53.10 | 48.38 | 54.85 |
| 6300 | 53.10 | 40.38 | 43.27 | 50.92 | 52.95 | 48.73 | 52.43 |
| 6400 | 55.38 | 40.36 | 43.27 | 51.03 | 53.19 | 49.92 | 55.10 |
| 6500 | 51.85 | 40.19 | 43.26 | 50.82 | 53.77 | 48.64 | 52.52 |
| 6600 | 56.30 | 40.11 | 43.22 | 49.94 | 51.92 | 50.86 | 53.49 |
| 6700 | 52.13 | 40.12 | 43.25 | 51.05 | 54.47 | 49.10 | 52.39 |
| 6800 | 52.42 | 39.98 | 43.14 | 50.21 | 51.81 | 51.35 | 54.78 |
| 6900 | 53.13 | 40.33 | 43.25 | 50.66 | 55.21 | 49.69 | 52.15 |
| 7000 | 52.37 | 40.12 | 43.17 | 49.77 | 51.62 | 51.95 | 53.58 |

Typical Performance Data

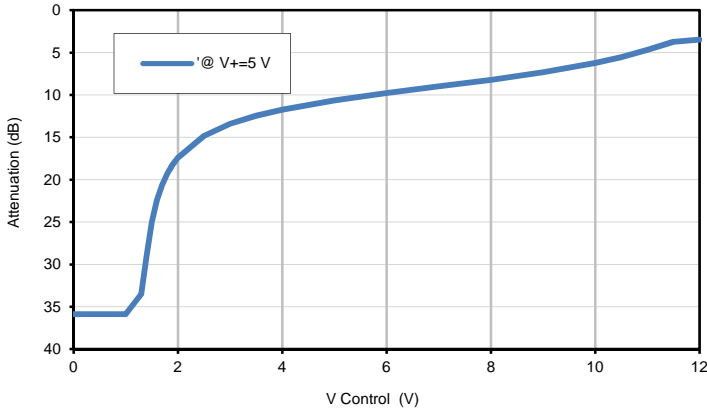
| FREQ. (MHz) | PHASE SHIFT Vs. V CONTROL @ V+=5V | | | | | | |
|-------------|-----------------------------------|-----------------|-----------------|---------------|---------------|----------------|----------------|
| | @V Control=0V | @V Control=1.4V | @V Control=1.9V | @V Control=3V | @V Control=6V | @V Control=10V | @V Control=12V |
| 1000 | 74.17 | -8.66 | -14.07 | -17.58 | -22.60 | -26.71 | -27.66 |
| 1200 | 70.69 | -10.28 | -16.84 | -20.85 | -26.75 | -31.73 | -32.92 |
| 1400 | 68.28 | -12.01 | -19.74 | -24.30 | -31.05 | -36.88 | -38.32 |
| 1600 | 65.57 | -13.57 | -22.73 | -27.79 | -35.35 | -42.03 | -43.69 |
| 1800 | 63.67 | -14.91 | -25.65 | -31.29 | -39.62 | -47.17 | -49.06 |
| 2000 | 61.82 | -16.37 | -28.69 | -34.80 | -43.89 | -52.28 | -54.35 |
| 2200 | 58.52 | -17.92 | -31.94 | -38.47 | -48.22 | -57.41 | -59.70 |
| 2400 | 57.07 | -19.43 | -35.14 | -42.16 | -52.53 | -62.50 | -65.03 |
| 2600 | 54.47 | -21.09 | -38.49 | -45.95 | -56.84 | -67.58 | -70.26 |
| 2800 | 51.95 | -23.50 | -42.46 | -50.19 | -61.41 | -72.75 | -75.67 |
| 3000 | 49.73 | -25.76 | -46.58 | -54.61 | -66.04 | -77.88 | -81.01 |
| 3200 | 45.11 | -28.99 | -51.18 | -59.40 | -70.91 | -83.02 | -86.39 |
| 3400 | 41.98 | -31.91 | -55.99 | -64.46 | -75.97 | -88.25 | -91.79 |
| 3600 | 38.67 | -35.15 | -60.73 | -69.45 | -81.04 | -93.48 | -97.13 |
| 3800 | 33.49 | -38.44 | -65.36 | -74.35 | -86.07 | -98.78 | -102.53 |
| 4000 | 31.87 | -40.99 | -69.69 | -79.03 | -91.02 | -104.15 | -108.04 |
| 4100 | 29.31 | -42.50 | -71.74 | -81.29 | -93.38 | -106.78 | -110.74 |
| 4200 | 28.23 | -43.52 | -73.75 | -83.47 | -95.71 | -109.43 | -113.53 |
| 4300 | 25.66 | -45.27 | -75.94 | -85.74 | -98.09 | -112.12 | -116.32 |
| 4400 | 23.42 | -46.44 | -78.13 | -88.11 | -100.51 | -114.83 | -119.22 |
| 4500 | 19.64 | -49.41 | -80.65 | -90.59 | -103.01 | -117.52 | -122.03 |
| 4600 | 18.14 | -50.80 | -82.62 | -92.80 | -105.34 | -120.29 | -124.98 |
| 4700 | 18.83 | -51.90 | -84.75 | -95.05 | -107.71 | -122.98 | -127.91 |
| 4800 | 18.15 | -54.03 | -87.10 | -97.42 | -110.09 | -125.73 | -130.82 |
| 4900 | 17.25 | -54.74 | -89.20 | -99.75 | -112.48 | -128.47 | -133.84 |
| 5000 | 9.85 | -57.83 | -91.42 | -101.99 | -114.75 | -131.07 | -136.70 |
| 5100 | 11.06 | -59.05 | -93.81 | -104.51 | -117.21 | -133.84 | -139.75 |
| 5200 | 9.29 | -61.17 | -96.30 | -107.04 | -119.71 | -136.65 | -142.83 |
| 5300 | 11.67 | -61.73 | -98.60 | -109.50 | -122.15 | -139.37 | -145.80 |
| 5400 | 8.70 | -64.46 | -101.13 | -112.11 | -124.64 | -142.08 | -148.79 |
| 5500 | 8.74 | -65.25 | -103.22 | -114.44 | -126.97 | -144.64 | -151.61 |
| 5600 | -0.90 | -67.94 | -105.32 | -116.60 | -129.12 | -146.97 | -154.25 |
| 5700 | -2.27 | -71.70 | -108.57 | -119.62 | -131.94 | -150.11 | -157.73 |
| 5800 | -2.21 | -74.10 | -111.31 | -122.32 | -134.47 | -152.78 | -160.73 |
| 5900 | -5.60 | -76.68 | -114.17 | -125.18 | -137.16 | -155.63 | -164.02 |
| 6000 | -4.01 | -79.94 | -117.45 | -128.26 | -139.83 | -158.35 | -167.09 |
| 6200 | -11.88 | -85.76 | -123.43 | -134.28 | -145.46 | -164.05 | -173.58 |
| 6400 | -16.78 | -89.49 | -129.01 | -140.10 | -150.84 | -169.41 | -179.83 |
| 6600 | -21.62 | -96.66 | -135.89 | -146.83 | -156.92 | -175.05 | -186.29 |
| 6800 | -26.87 | -100.86 | -142.32 | -153.57 | -163.26 | -180.86 | -192.66 |
| 7000 | -34.34 | -106.07 | -146.96 | -158.55 | -168.05 | -185.51 | -198.43 |

Voltage Variable Attenuator

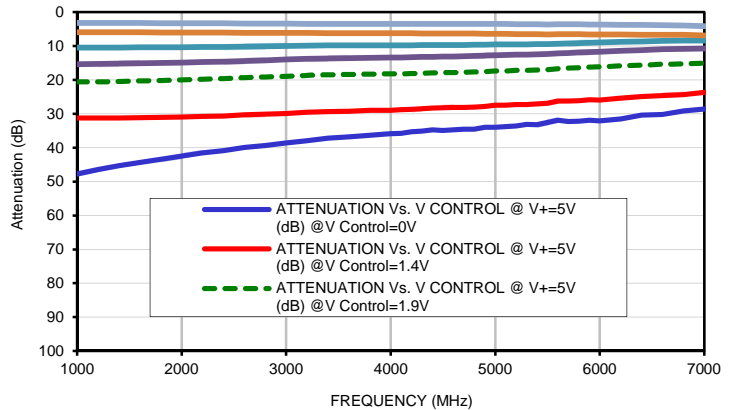
RVA-6000+

Typical Performance Curves

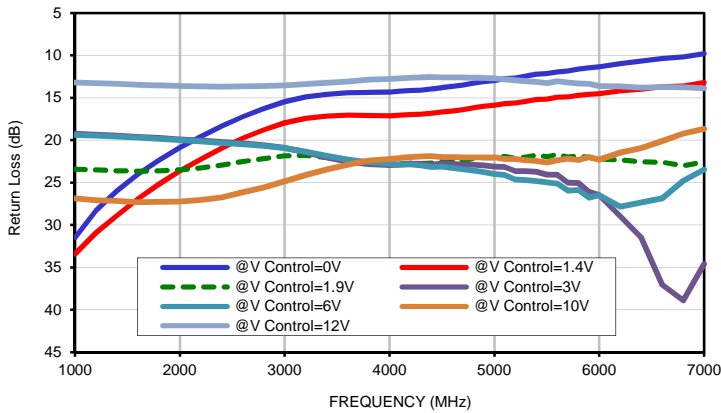
Attenuation @ 4000 MHz



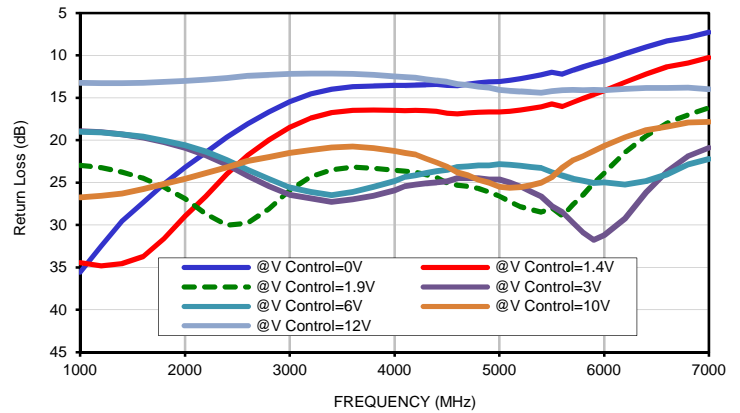
Attenuation @ V+=5 V



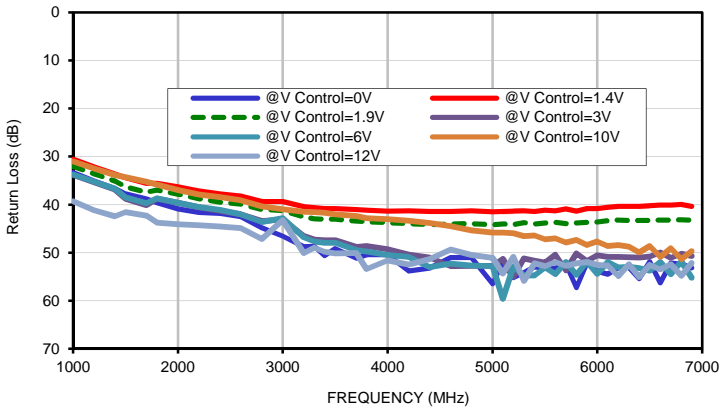
Input Return Loss @ V+=5 V



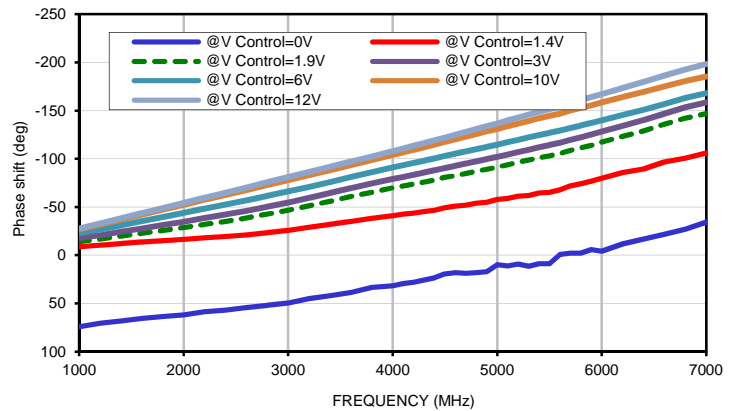
Output Return Loss @ V+=5 V



IP3 @ V+=5 V



Phase Shift @ V+=5 V



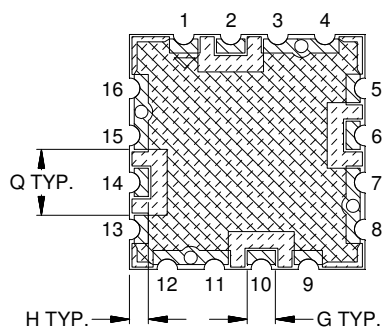
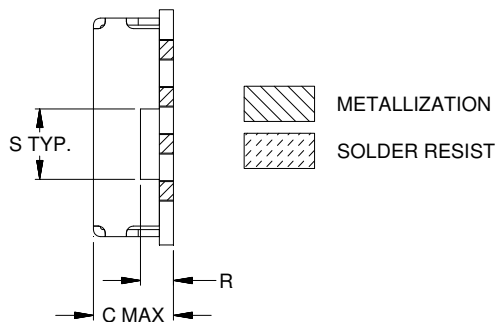
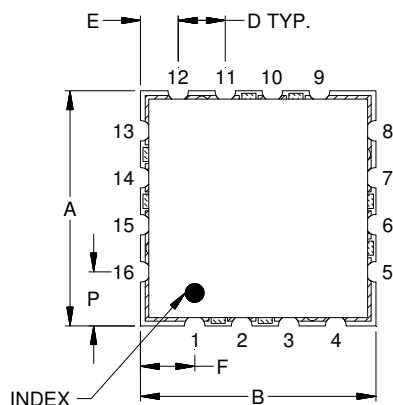
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site
 The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

IF/RF MICROWAVE COMPONENTS

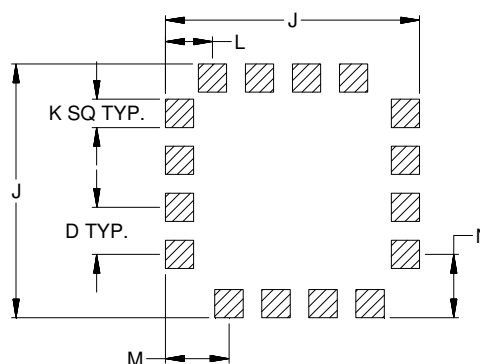
REV. OR
 RVA-6000+
 162707
 Page 1 of 1

Outline Dimensions

DV874



PCB Land Pattern



Suggested Layout,
Tolerance to be within ± 0.02

| 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.



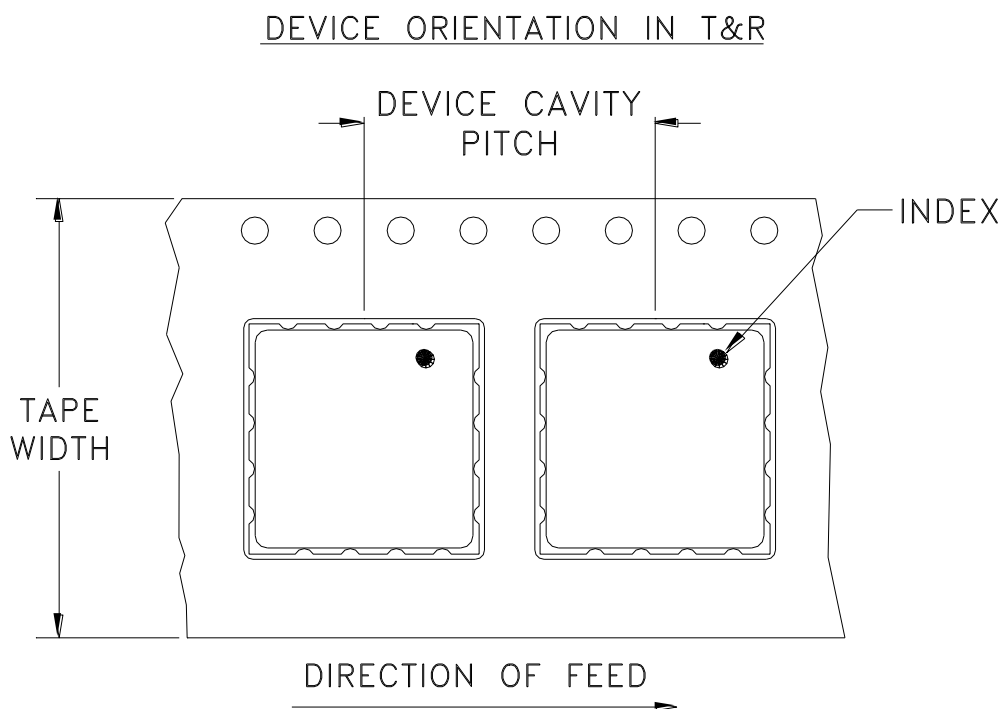
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

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



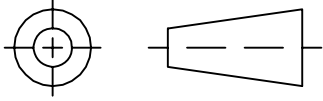
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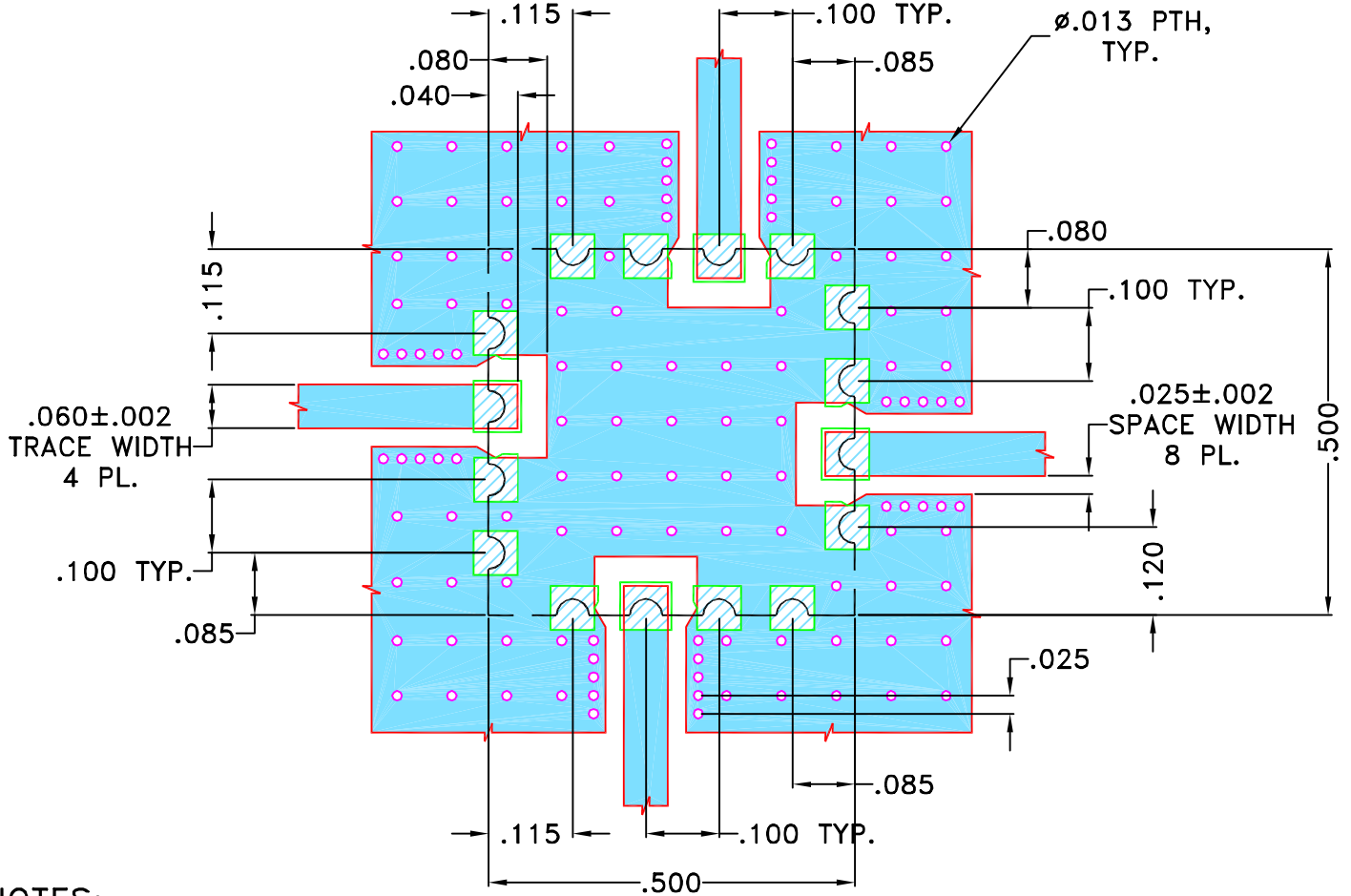
THIRD ANGLE PROJECTION



REVISIONS



| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|-----|---------|-------------------------|----------|-----|------|
| OR | M137753 | NEW RELEASE | JUN 12 | DDR | KG |
| A | M142821 | ADDED PIN CODE "16FL01" | 08/07/13 | GF | IL |
| | | | | | |

SUGGESTED MOUNTING CONFIGURATION FOR DV874 CASE STYLE, 16AV01/16FL01 PIN CODES



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .030"±.002". 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.

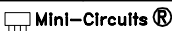
-  DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
-  DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

| UNLESS OTHERWISE SPECIFIED | INITIALS | | DATE |
|---|----------|-----|-----------|
| DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005" ANGLES ± FRACTIONS ± | DRAWN | DDR | 28 JUN 12 |
| | CHECKED | MD | 28 JUN 12 |
| | APPROVED | ASJ | 28 JUN 12 |

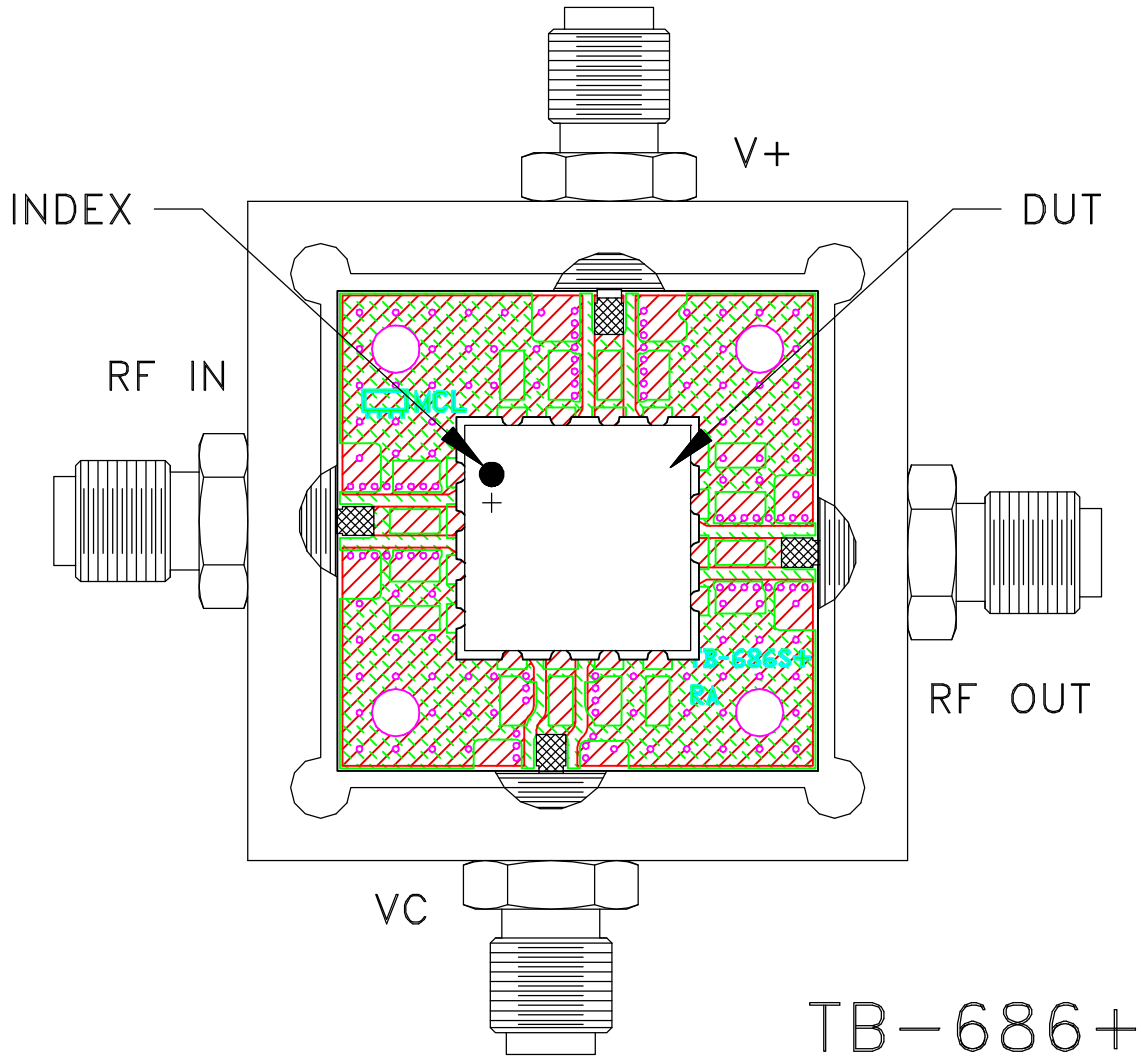
 **Mini-Circuits®** 13 Neptune Avenue
Brooklyn NY 11235

PL, 16AV01/16FL01, DV874,
TB-686+

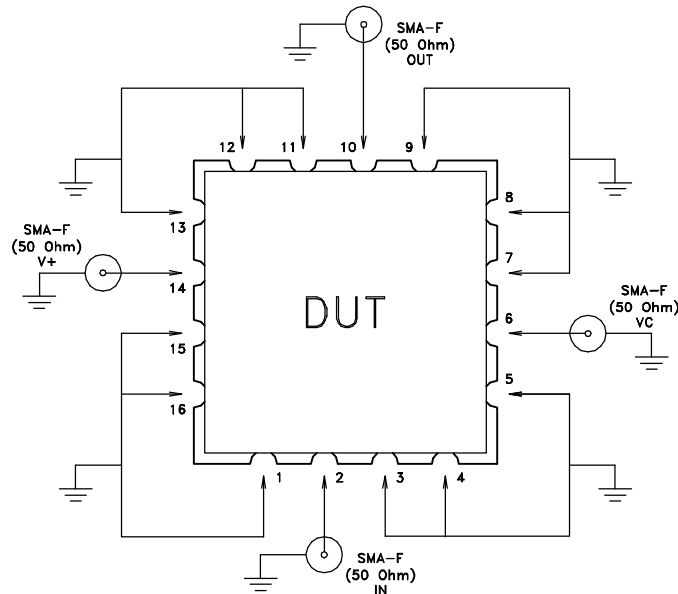
| | | | |
|------------------|---------------------|--------------------------|-----------|
| SIZE A | CODE IDENT 15542 | DRAWING NO: 98-PL-374 | REV: A |
| FILE: 98PL374 | SCALE: 4:1 | SHEET: 1 OF 1 | |

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Evaluation Board and Circuit



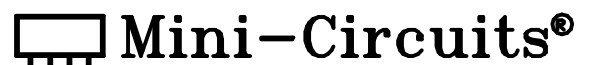
TB-686+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: ROGERS (R04350B) OR Equivalent
Dielectric Constant=3.48±.05, Thickness=.030 inch.



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 |