

# Voltage Variable Attenuator

## EVA-1500+

50Ω 100 to 1500 MHz



CASE STYLE: HE1354

### The Big Deal

- Broad band, 100 to 1500 MHz
- IP2 +85 dBm typ., IP3 +49 dBm typ.
- Well matched in/out ports, return loss 18.5 dB typ.
- Minimal phase deviation over attenuation range
- Drop-in, no external matching circuits required

### Product Overview

The EVA-1500+ is a Voltage Variable 50Ω matched Attenuator built into a shielded (0.394" x 0.394" x 0.15") case. The model utilizes well matched PIN diodes, carefully biased in order to enable very low insertion loss with very low supply and control current consumption.

### Key Features

| Feature                                                                                                                                                                                                 | Advantages                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Insertion loss of 1.5 dB up to 500MHz                                                                                                                                                                   | Low insertion loss means very less power dissipation, so SNR will be maintained without much degradation.                           |
| Low power consumption: <ul style="list-style-type: none"><li>• Supply voltage +3 V</li><li>• Supply current 0.5 mA max.</li><li>• Control voltage 0 - 5 V</li><li>• Control current 7 mA max.</li></ul> | Needs very little current for adjusting the attenuation range so that a wide range of drivers can be chosen to control attenuation. |
| IP3 +49 dBm typ.<br>IP2 +85 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](http://www.minicircuits.com/MCLStore/terms.jsp)



# Surface Mount Voltage Variable Attenuator

## EVA-1500+

50Ω 100 to 1500 MHz

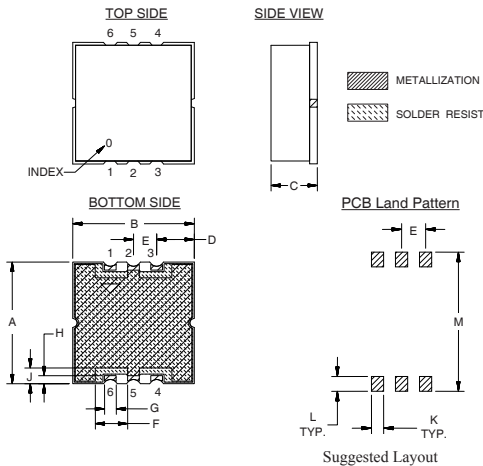
### Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -45°C to 85°C  |
| Storage Temperature                                             | -55°C to 100°C |
| Absolute Max. Supply Voltage(V <sub>+</sub> )                   | 6V             |
| Absolute Max. Control Voltage(V <sub>ctrl</sub> )               | 10V            |
| Absolute Max. RF Input Level                                    | +20dBm         |
| Permanent damage may occur if any of these limits are exceeded. |                |

### Pin Connections

|           |     |
|-----------|-----|
| RF IN     | 1   |
| RF OUT    | 6   |
| V CONTROL | 3   |
| V+        | 4   |
| GROUND    | 2,5 |

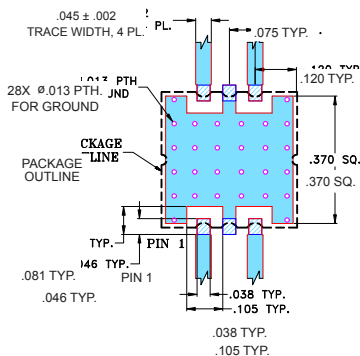
### Outline Drawing



### Outline Dimensions (inch/mm)

| A     | B     | C    | D    | E    | F     |           |
|-------|-------|------|------|------|-------|-----------|
| .394  | .394  | .150 | .122 | .075 | .098  |           |
| 10.01 | 10.01 | 3.81 | 3.10 | 1.90 | 2.49  |           |
| G     | H     | J    | K    | L    | M     | wt. grams |
| .038  | .026  | .051 | .038 | .046 | .434  | 0.7       |
| 0.97  | 0.66  | 1.29 | 0.97 | 1.17 | 11.02 |           |

### Demo Board MCL P/N: TB-474+ Suggested PCB Layout (PL-285)



- NOTES:
1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025" ± .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 SOLDER MASK

### 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-Circuits' 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](http://www.minicircuits.com/MCLStore/terms.jsp)

### Features

- Frequency range, 100-1500 MHz
- Low current consumption
- Low insertion loss
- IP2 +85 dBm typ.
- IP3 +49 dBm 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 amplifier
- Test equipment
- VHF



CASE STYLE: HE1354

### +RoHS Compliant

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

### Electrical Specifications (T<sub>AMB</sub> = 25°C)

| FREQ.<br>(MHz) |      | MIN. INSERTION<br>LOSS, dB (+5V) |      | MAX. ATTEN.<br>dB (0V) |      | INPUT<br>POWER<br>(dBm) | CONTROL<br>Voltage Current<br>(V) (mA) |      | IP3*<br>(dBm) | IP2*<br>(dBm) | RETURN<br>LOSS<br>(dB) | POWER SUPPLY<br>Voltage Current<br>(V) (mA) |      |
|----------------|------|----------------------------------|------|------------------------|------|-------------------------|----------------------------------------|------|---------------|---------------|------------------------|---------------------------------------------|------|
| Min.           | Max. | Typ.                             | Max. | Typ.                   | Min. | Max.                    |                                        | Max. | Typ.          | Typ.          | Typ.                   |                                             | Max. |
| 100 - 500      |      | 1.5                              | 2.5  | 35                     | 25   | +20                     | 0 - 5                                  | 7    | 47            | 80            | 17                     | +3                                          | 0.5  |
| 500 - 1000     |      | 1.7                              | 3.0  | 30                     | 20   | +20                     | 0 - 5                                  | 7    | 50            | 85            | 20                     | +3                                          | 0.5  |
| 1000 - 1500    |      | 2.0                              | 3.5  | 25                     | 17   | +20                     | 0 - 5                                  | 7    | 50            | 85            | 20                     | +3                                          | 0.5  |

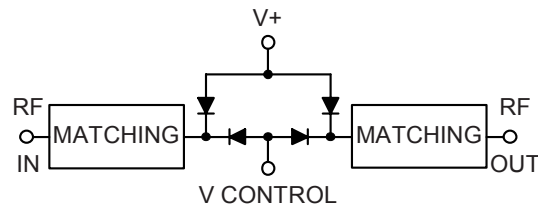
### Notes:

Rise/Fall time: 13 μSec / 15 μSec Typ.

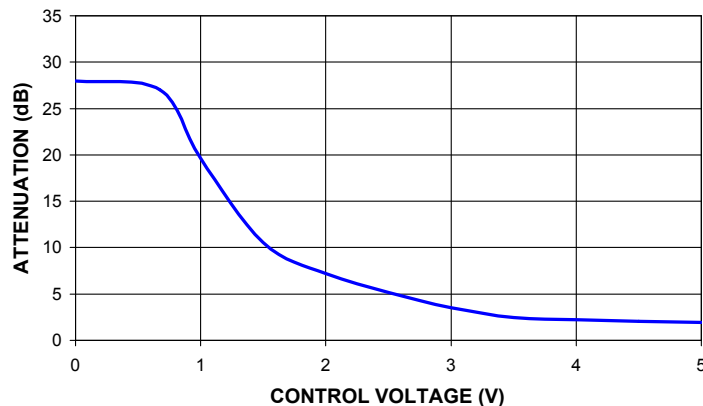
Switching Time, turn on/off: 15 μSec / 25 μSec Typ.

\* Typical IP2 & IP3 at V<sub>c</sub>=5V

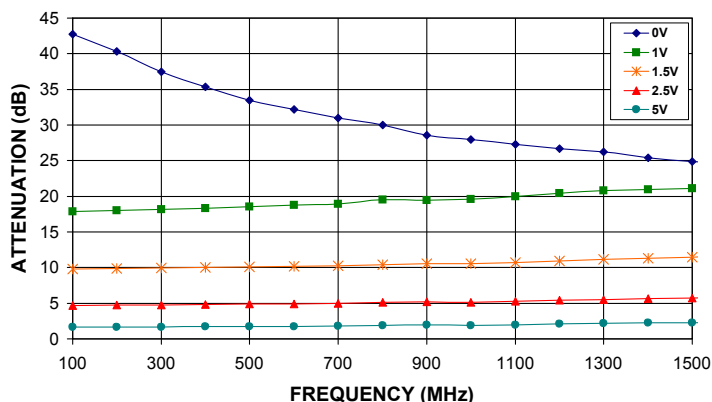
### Equivalent Schematic



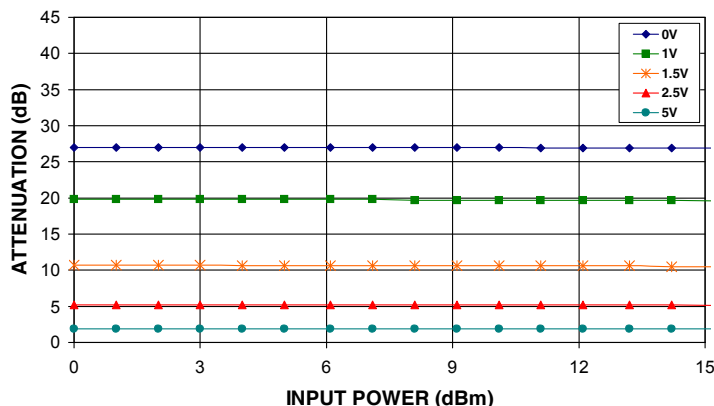
### EVA-1500+ TYPICAL ATTENUATION AT 1000 MHz



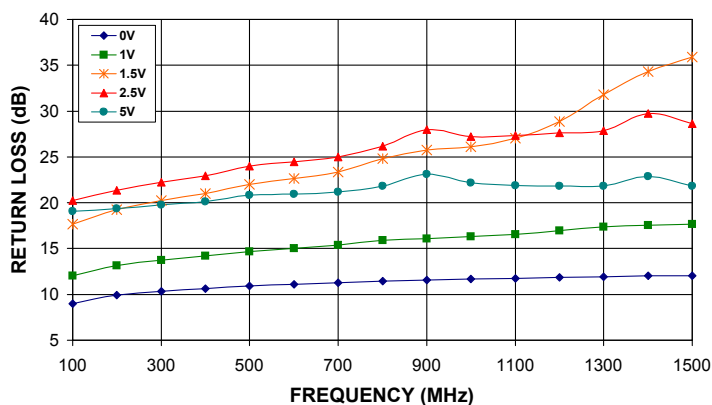
**EVA-1500+**  
**ATTENUATION Vs. FREQUENCY**  
**OVER CONTROL VOLTAGES**



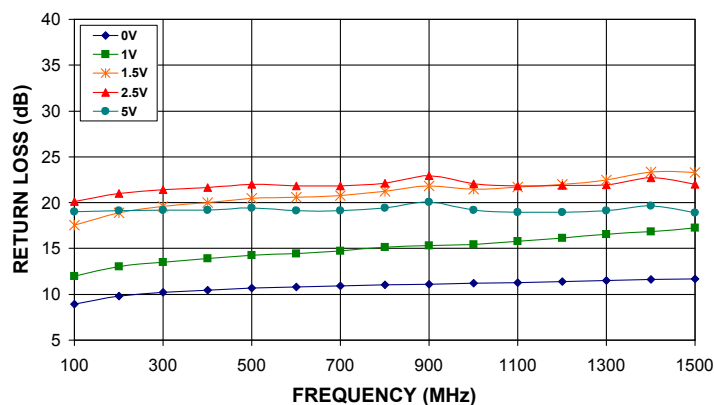
**EVA-1500+**  
**ATTENUATION Vs. INPUT POWER**  
**OVER CONTROL VOLTAGES AT 1000 MHz**



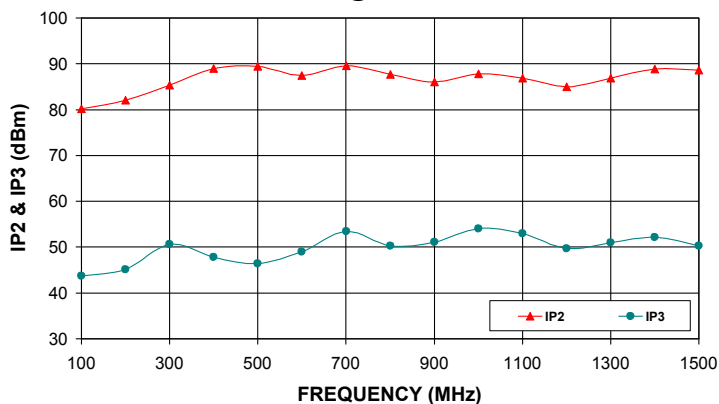
**EVA-1500+**  
**INPUT RETURN LOSS Vs. FREQUENCY**  
**OVER CONTROL VOLTAGES**



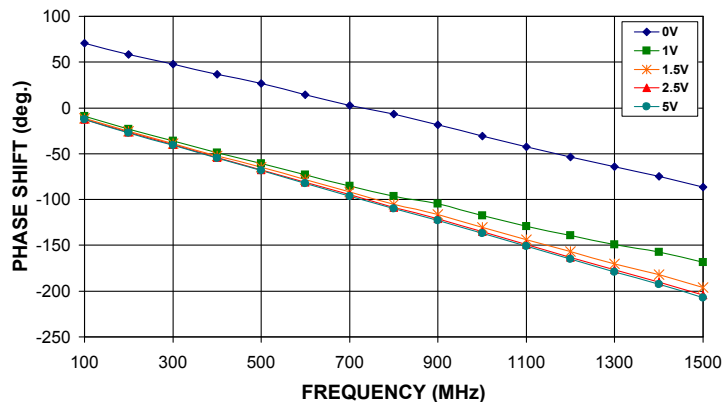
**EVA-1500+**  
**OUTPUT RETURN LOSS Vs. FREQUENCY**  
**OVER CONTROL VOLTAGES**



**EVA-1500+**  
**IP2 & IP3 Vs. FREQUENCY**  
**@ Vc=5V**



**EVA-1500+**  
**PHASE SHIFT Vs. FREQUENCY**  
**OVER CONTROL VOLTAGES**



## Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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](http://www.minicircuits.com/MCLStore/terms.jsp)



# Voltage Variable Attenuator

EVA-1500+

## Typical Performance Data

| V<br>CONTROL<br>(V) | ATTENUATION<br>@ 1000 MHz<br>(dB)<br>@V+=3V |
|---------------------|---------------------------------------------|
| 0.0                 | 27.98                                       |
| 0.7                 | 27.05                                       |
| 1.0                 | 19.62                                       |
| 1.5                 | 10.53                                       |
| 2.0                 | 7.23                                        |
| 2.5                 | 5.15                                        |
| 3.0                 | 3.51                                        |
| 3.5                 | 2.48                                        |
| 4.0                 | 2.23                                        |
| 4.5                 | 2.04                                        |
| 5.0                 | 1.91                                        |

| FREQ.<br>(MHz) | ATTENUATION Vs. V CONTROL @ V+=3V |               |                 |                 |               |
|----------------|-----------------------------------|---------------|-----------------|-----------------|---------------|
|                | (dB)                              |               |                 |                 |               |
|                | @V Control=0V                     | @V Control=1V | @V Control=1.5V | @V Control=2.5V | @V Control=5V |
| 100            | 42.71                             | 17.88         | 9.80            | 4.69            | 1.63          |
| 200            | 40.33                             | 18.01         | 9.87            | 4.74            | 1.65          |
| 300            | 37.44                             | 18.17         | 9.94            | 4.78            | 1.68          |
| 400            | 35.34                             | 18.31         | 9.99            | 4.82            | 1.70          |
| 500            | 33.48                             | 18.53         | 10.09           | 4.89            | 1.75          |
| 600            | 32.22                             | 18.74         | 10.16           | 4.93            | 1.77          |
| 700            | 30.95                             | 18.94         | 10.23           | 4.96            | 1.79          |
| 800            | 29.99                             | 19.49         | 10.43           | 5.11            | 1.91          |
| 900            | 28.60                             | 19.44         | 10.52           | 5.18            | 1.97          |
| 1000           | 27.98                             | 19.62         | 10.53           | 5.14            | 1.91          |
| 1100           | 27.29                             | 20.01         | 10.70           | 5.25            | 1.98          |
| 1200           | 26.70                             | 20.41         | 10.91           | 5.39            | 2.09          |
| 1300           | 26.20                             | 20.83         | 11.16           | 5.54            | 2.19          |
| 1400           | 25.43                             | 20.93         | 11.33           | 5.66            | 2.25          |
| 1500           | 24.91                             | 21.13         | 11.46           | 5.70            | 2.24          |

REV. X1  
EVA-1500+  
090910  
Page 1 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



# Voltage Variable Attenuator

# EVA-1500+

## Typical Performance Data

| FREQ.<br>(MHz) | INPUT RETURN LOSS Vs. V CONTROL @ V+=3V |               |                 |                 |               |
|----------------|-----------------------------------------|---------------|-----------------|-----------------|---------------|
|                | (dB)                                    |               |                 |                 |               |
|                | @V Control=0V                           | @V Control=1V | @V Control=1.5V | @V Control=2.5V | @V Control=5V |
| 100            | 8.97                                    | 12.03         | 17.68           | 20.25           | 19.05         |
| 200            | 9.90                                    | 13.12         | 19.23           | 21.36           | 19.34         |
| 300            | 10.34                                   | 13.74         | 20.22           | 22.24           | 19.76         |
| 400            | 10.65                                   | 14.20         | 21.03           | 22.94           | 20.12         |
| 500            | 10.92                                   | 14.66         | 22.01           | 24.01           | 20.85         |
| 600            | 11.11                                   | 15.03         | 22.66           | 24.48           | 20.97         |
| 700            | 11.25                                   | 15.35         | 23.35           | 24.99           | 21.20         |
| 800            | 11.44                                   | 15.89         | 24.80           | 26.15           | 21.83         |
| 900            | 11.57                                   | 16.08         | 25.74           | 28.00           | 23.12         |
| 1000           | 11.66                                   | 16.32         | 26.08           | 27.22           | 22.16         |
| 1100           | 11.72                                   | 16.56         | 27.07           | 27.31           | 21.88         |
| 1200           | 11.83                                   | 16.96         | 28.87           | 27.65           | 21.81         |
| 1300           | 11.94                                   | 17.36         | 31.82           | 27.86           | 21.85         |
| 1400           | 12.02                                   | 17.54         | 34.32           | 29.73           | 22.87         |
| 1500           | 12.04                                   | 17.69         | 35.90           | 28.63           | 21.85         |

REV. X1  
EVA-1500+  
090910  
Page 2 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



# Voltage Variable Attenuator

## EVA-1500+

### Typical Performance Data

| FREQ.<br>(MHz) | OUTPUT RETURN LOSS Vs. V CONTROL @ V+=3V |               |                 |                 |               |
|----------------|------------------------------------------|---------------|-----------------|-----------------|---------------|
|                | (dB)                                     |               |                 |                 |               |
|                | @V Control=0V                            | @V Control=1V | @V Control=1.5V | @V Control=2.5V | @V Control=5V |
| 100            | 8.95                                     | 11.99         | 17.55           | 20.15           | 19.00         |
| 200            | 9.83                                     | 13.01         | 18.91           | 21.01           | 19.12         |
| 300            | 10.23                                    | 13.53         | 19.59           | 21.43           | 19.18         |
| 400            | 10.48                                    | 13.90         | 20.00           | 21.66           | 19.21         |
| 500            | 10.67                                    | 14.24         | 20.48           | 22.03           | 19.42         |
| 600            | 10.80                                    | 14.46         | 20.57           | 21.83           | 19.13         |
| 700            | 10.90                                    | 14.74         | 20.77           | 21.83           | 19.14         |
| 800            | 11.02                                    | 15.16         | 21.26           | 22.14           | 19.45         |
| 900            | 11.12                                    | 15.30         | 21.84           | 22.94           | 20.07         |
| 1000           | 11.19                                    | 15.42         | 21.48           | 22.04           | 19.17         |
| 1100           | 11.29                                    | 15.79         | 21.68           | 21.85           | 18.94         |
| 1200           | 11.39                                    | 16.15         | 22.03           | 21.86           | 18.96         |
| 1300           | 11.49                                    | 16.55         | 22.49           | 21.93           | 19.10         |
| 1400           | 11.60                                    | 16.87         | 23.37           | 22.69           | 19.66         |
| 1500           | 11.71                                    | 17.23         | 23.31           | 21.99           | 18.87         |

REV. X1  
EVA-1500+  
090910  
Page 3 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



# Voltage Variable Attenuator

EVA-1500+

## Typical Performance Data

| FREQ.<br>(MHz) | INPUT IP2 Vs.<br>V CONTROL<br>@ V+=3V<br>(dBm) |
|----------------|------------------------------------------------|
|                | @V Control=5V                                  |
| 100            | 80.19                                          |
| 200            | 82.10                                          |
| 300            | 85.38                                          |
| 400            | 88.94                                          |
| 500            | 89.50                                          |
| 600            | 87.50                                          |
| 700            | 89.55                                          |
| 800            | 87.68                                          |
| 900            | 86.07                                          |
| 1000           | 87.79                                          |
| 1100           | 86.83                                          |
| 1200           | 85.03                                          |
| 1300           | 86.81                                          |
| 1400           | 88.86                                          |
| 1500           | 88.60                                          |

| FREQ.<br>(MHz) | INPUT IP3 Vs. V CONTROL @ V+=3V<br>(dBm) |               |                 |                 |               |
|----------------|------------------------------------------|---------------|-----------------|-----------------|---------------|
|                | @V Control=0V                            | @V Control=1V | @V Control=1.5V | @V Control=2.5V | @V Control=5V |
| 100            | 16.28                                    | 18.41         | 18.37           | 20.77           | 43.76         |
| 200            | 19.83                                    | 20.45         | 21.59           | 24.25           | 45.08         |
| 300            | 23.30                                    | 23.49         | 24.58           | 27.18           | 50.63         |
| 400            | 25.08                                    | 25.22         | 26.43           | 29.06           | 47.86         |
| 500            | 26.73                                    | 26.95         | 27.99           | 30.64           | 46.38         |
| 600            | 29.35                                    | 28.70         | 29.53           | 32.19           | 48.95         |
| 700            | 29.99                                    | 29.46         | 30.61           | 33.41           | 53.40         |
| 800            | 30.12                                    | 30.56         | 31.64           | 34.34           | 50.32         |
| 900            | 32.03                                    | 32.03         | 32.52           | 35.14           | 51.07         |
| 1000           | 34.35                                    | 32.17         | 33.34           | 36.02           | 54.08         |
| 1100           | 32.94                                    | 33.10         | 34.28           | 36.75           | 53.03         |
| 1200           | 34.24                                    | 34.01         | 34.69           | 36.68           | 49.65         |
| 1300           | 36.43                                    | 34.73         | 35.18           | 37.21           | 51.01         |
| 1400           | 35.15                                    | 34.80         | 35.85           | 37.83           | 52.13         |
| 1500           | 35.16                                    | 35.04         | 36.21           | 37.71           | 50.29         |

REV. X1  
EVA-1500+  
090910  
Page 4 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



## Typical Performance Data

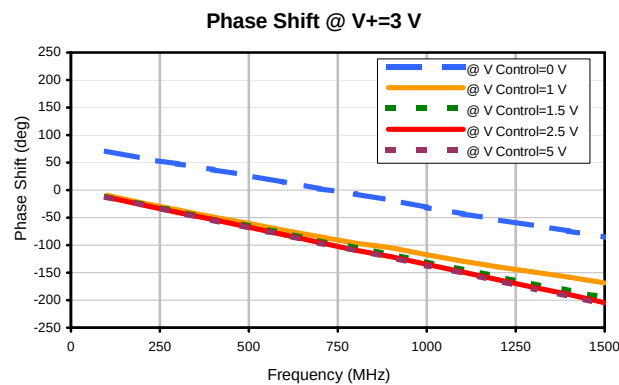
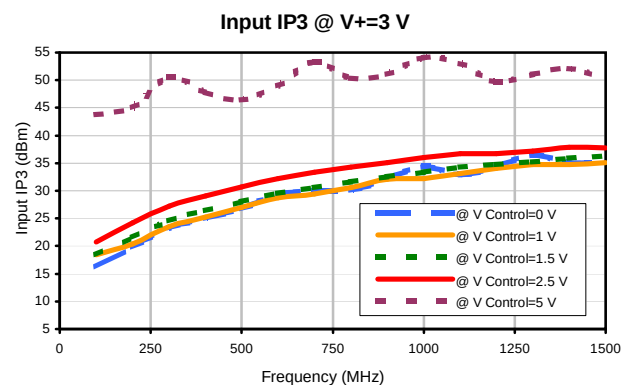
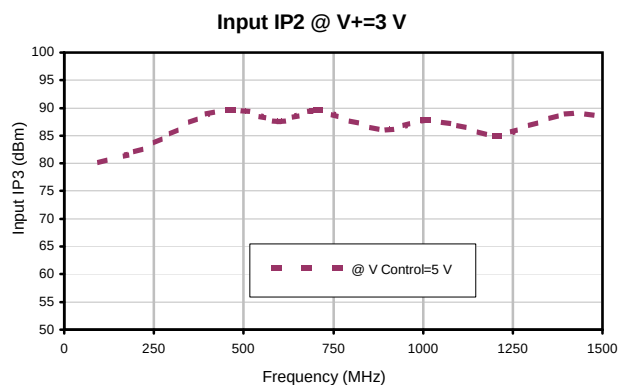
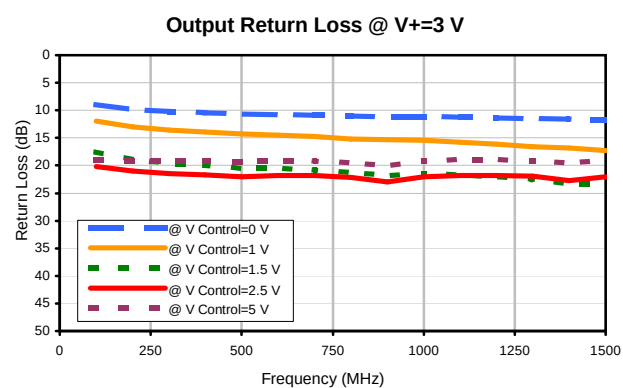
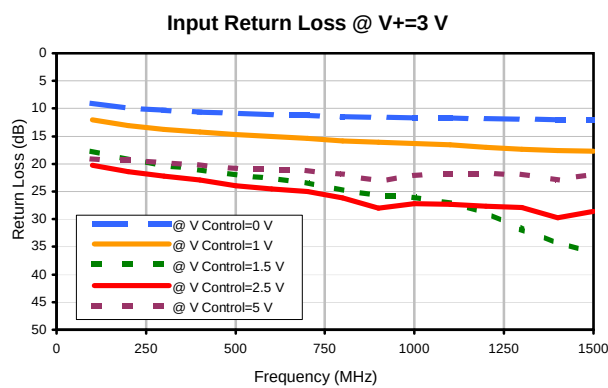
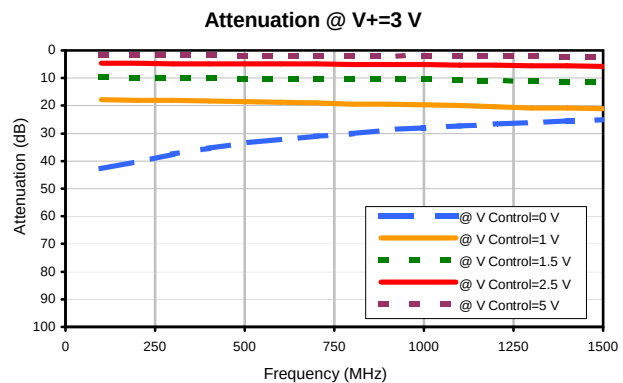
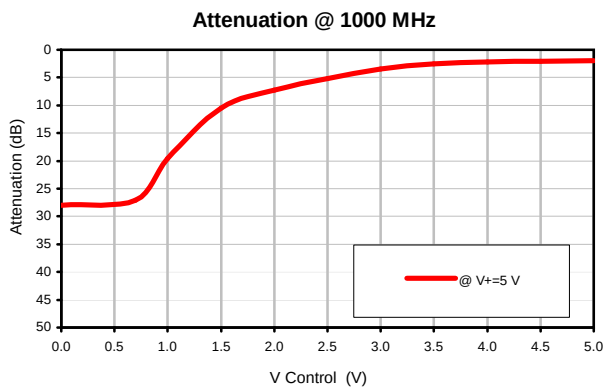
| FREQ.<br>(MHz) | PHASE SHIFT Vs. V CONTROL @ V+=3V |               |                 |                 |               |
|----------------|-----------------------------------|---------------|-----------------|-----------------|---------------|
|                | (deg)                             |               |                 |                 |               |
|                | @V Control=0V                     | @V Control=1V | @V Control=1.5V | @V Control=2.5V | @V Control=5V |
| 100            | 70.51                             | -8.98         | -11.64          | -12.46          | -12.57        |
| 200            | 58.34                             | -23.37        | -25.67          | -26.69          | -27.03        |
| 300            | 47.90                             | -36.16        | -38.90          | -40.34          | -40.84        |
| 400            | 36.85                             | -48.80        | -52.18          | -54.04          | -54.72        |
| 500            | 26.65                             | -60.46        | -65.02          | -67.44          | -68.27        |
| 600            | 14.53                             | -72.84        | -78.34          | -81.20          | -82.21        |
| 700            | 2.73                              | -85.09        | -91.72          | -94.91          | -96.15        |
| 800            | -6.83                             | -96.25        | -105.04         | -108.75         | -110.15       |
| 900            | -18.43                            | -104.78       | -116.42         | -121.10         | -122.64       |
| 1000           | -30.99                            | -117.64       | -130.20         | -135.20         | -136.89       |
| 1100           | -42.52                            | -129.08       | -143.74         | -149.22         | -151.14       |
| 1200           | -53.82                            | -139.17       | -156.81         | -162.96         | -165.12       |
| 1300           | -64.12                            | -149.17       | -170.15         | -176.95         | -179.21       |
| 1400           | -74.42                            | -157.56       | -182.15         | -189.97         | -192.54       |
| 1500           | -86.52                            | -168.67       | -195.78         | -204.30         | -207.04       |



# Voltage Variable Attenuator

## Typical Performance Curves

EVA-1500+



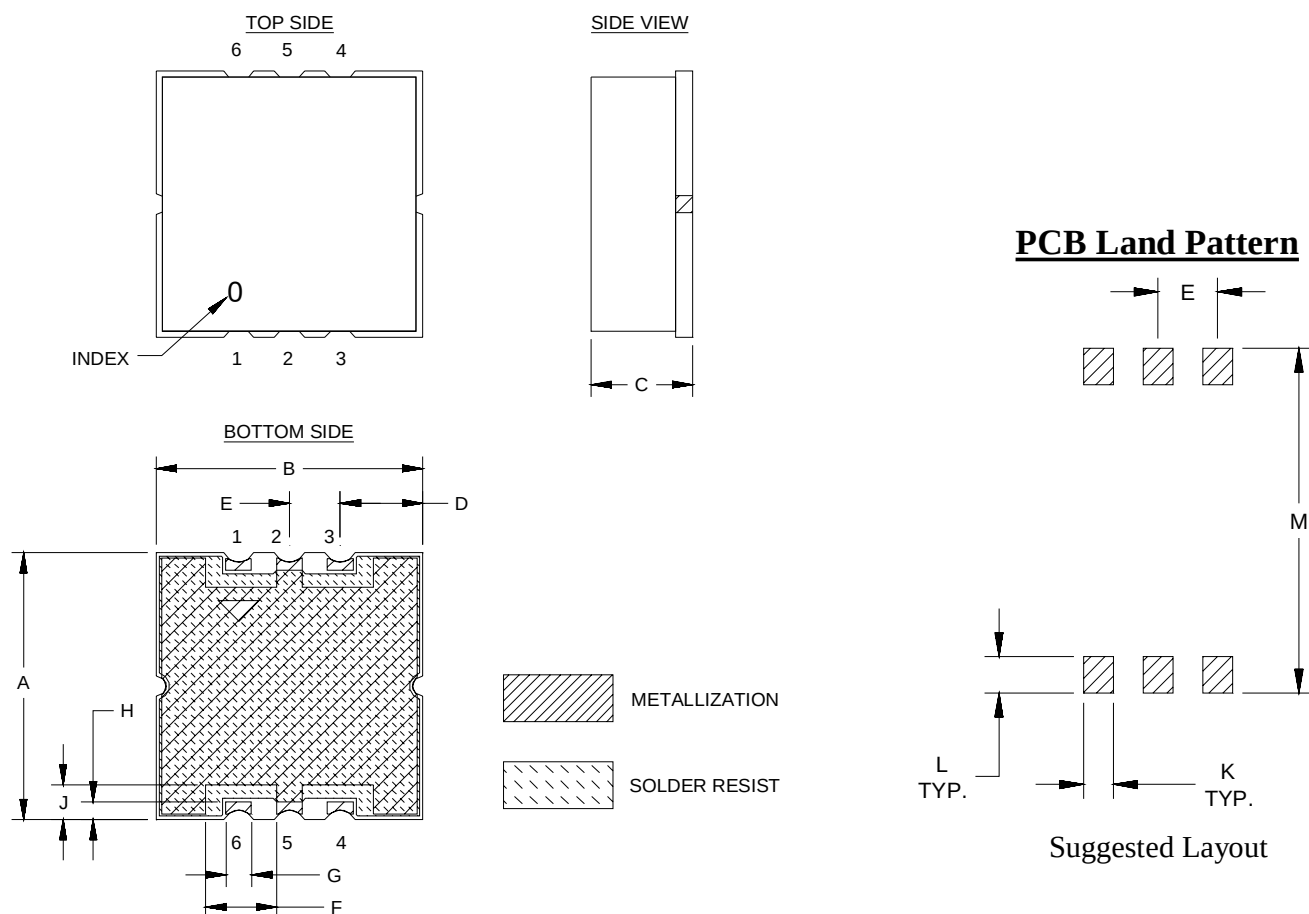
REV. X1  
EVA-1500+  
090910  
Page 1 of 1



**Mini-Circuits®**  
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant  
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661  
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



### Outline Dimensions



| CASE # | A               | B               | C              | D              | E              | F              | G              | H              | J              | K              | L              | M               | WT. GRAMS |
|--------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------|
| HE1354 | .394<br>(10.01) | .394<br>(10.01) | .150<br>(3.81) | .122<br>(3.10) | .075<br>(1.90) | .098<br>(2.49) | .038<br>(0.97) | .026<br>(0.66) | .051<br>(1.29) | .038<br>(0.97) | .046<br>(1.17) | .434<br>(11.02) | 0.7       |

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

#### Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:
  - For RoHS Case Styles: 3-5  $\mu$  inch (.08-.13 microns) Gold over 120-240  $\mu$  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

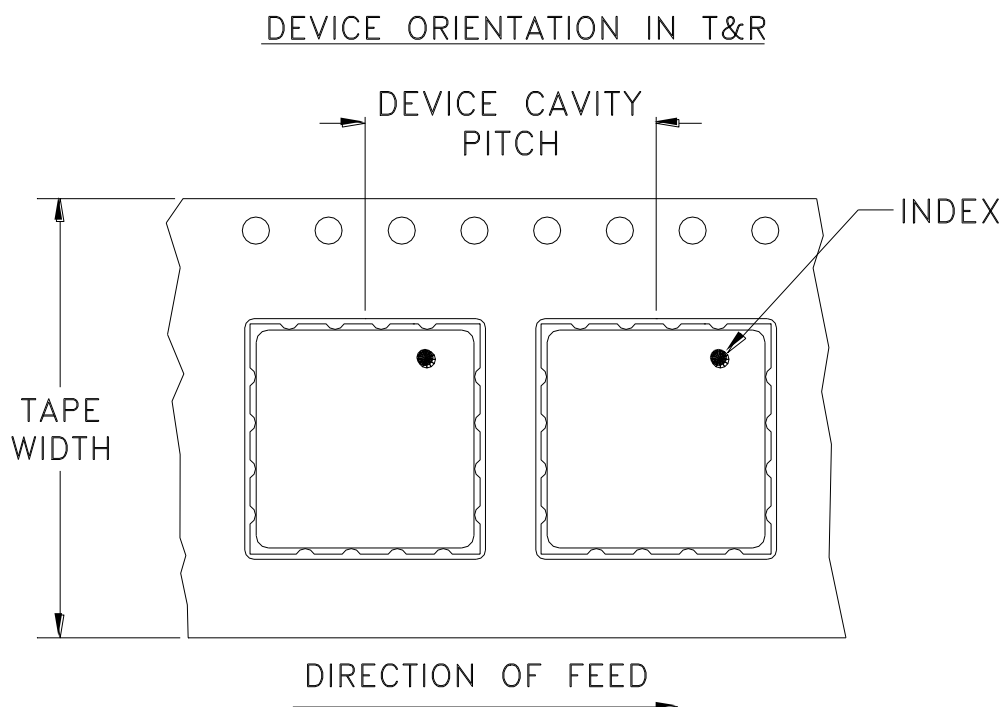


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS



# Tape & Reel Packaging TR-F37



| Tape Width,<br>mm | Device Cavity<br>Pitch, mm | Reel Size,<br>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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



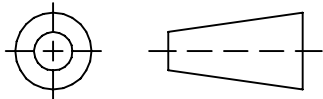
INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified

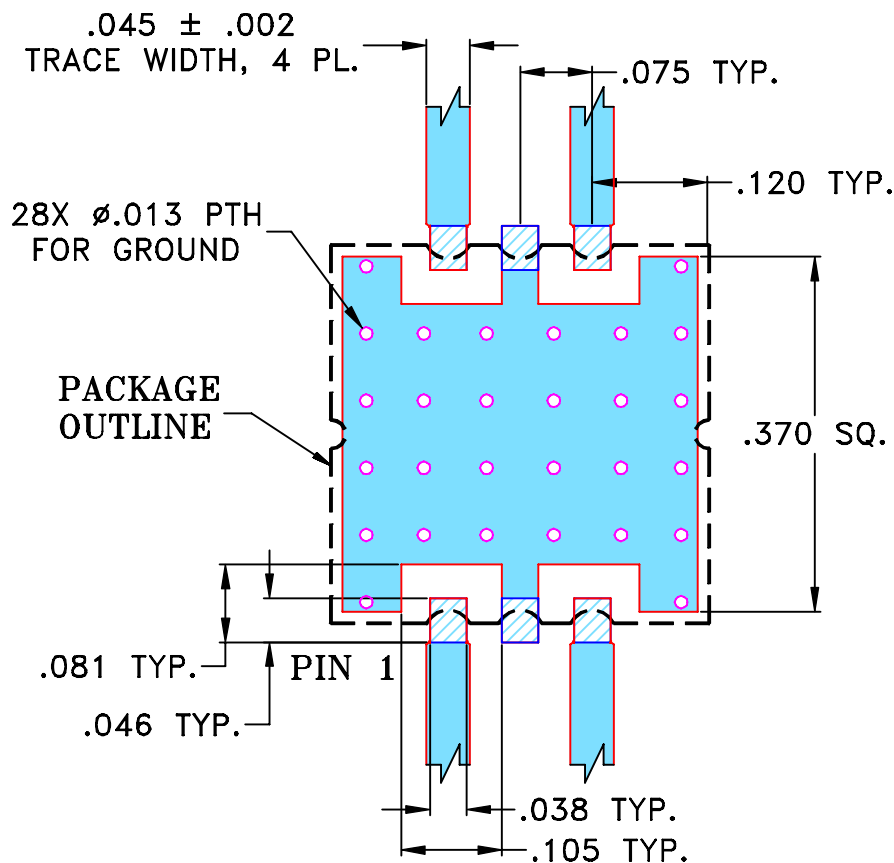
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION              | DATE  | DR | AUTH |
|-----|---------|--------------------------|-------|----|------|
| OR  | M116338 | NEW RELEASE (FROM RAVON) | 03/08 | DK | HH   |
| OR  | R72078  | NEW RELEASE (FROM RAVON) | 03/08 | DK | HH   |
|     |         |                          |       |    |      |
|     |         |                          |       |    |      |

SUGGESTED MOUNTING CONFIGURATION FOR  
HE1354 CASE STYLE, "qg" PIN CONNECTION, 50 Ω

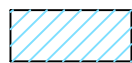


## NOTE:

1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS  $.025" \pm .002"$ .  
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 SOLDER MASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS ±

3 PL DECIMALS ± .005

ANGLES ±

FRACTIONS ±

DRAWN

DK (RAVON)

16 MAR 08

CHECKED

RZ (RAVON)

16 MAR 08

APPROVED

HH (RAVON)

16 MAR 08

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS.  
EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE  
AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY  
DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO.  
THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE  
PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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



Mini-Circuits®

13 Neptune Avenue  
Brooklyn NY 11235

PL, qg, HE1354, TB-474+

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-285

REV:

OR

FILE:

98PL285

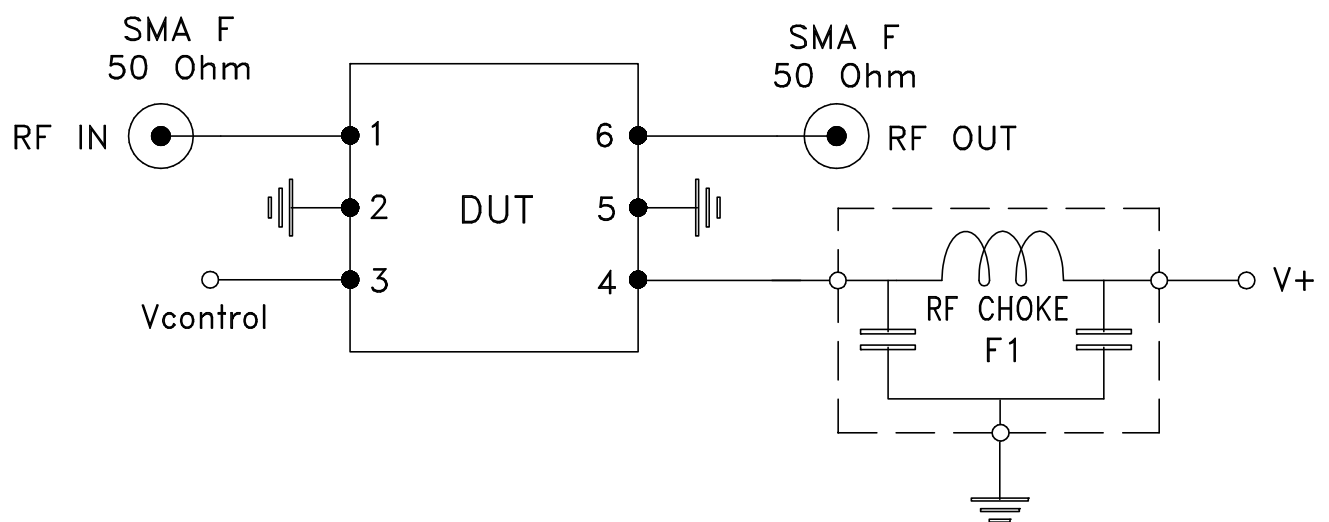
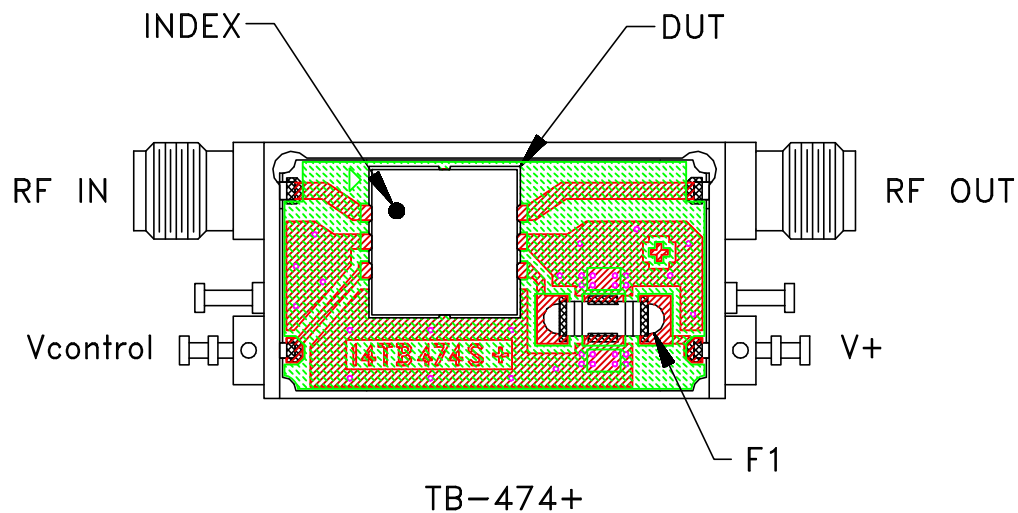
SCALE:

5:1

SHEET:

1 OF 1

# Evaluation Board and Circuit



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: FR4 GRADE IT-180TC (ITEQ CORPORATION)  
Dielectric Constant=4.5, Thickness=.025 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          | -45° to 85°C<br>Ambient Environment                                                                                                                             | Individual Model Data Sheet                                                                          |
| Storage Temperature            | -55° to 100° C<br>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<br>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;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215                                                                              |