*Constant Impedance*

# Voltage Variable Attenuator

# HVA-73+

50Ω 5500 to 7000 MHz

## The Big Deal

- Termination insensitive
- Low Insertion Loss: 1.6 dB
- Large attenuation range: 27 dB

CASE STYLE: CZ682

## Product Overview

The Mini-Circuits HVA series, surface mount, constant impedance voltage variable attenuators provide excellent attenuation and linearity performance while maintaining constant RF impedance across the attenuation range. Built using Mini-Circuits proven shielded module construction technology, these models integrate dual pin diodes along with internal 90 degree hybrids. This termination insensitive approach allows more flexibility so designers can locate the attenuators anywhere in their lineup, including cascading VVAs for true attenuation addition without VSWR interaction degrading the usable attenuation range.

## Key Features

| Feature | Advantages |
|---|---|
| Constant Impedance (Termination insensitive) | The HVA series VVA incorporates 90° hybrids to buffer internal circuits from source and load mismatch. This unique feature enables the HVA series to maintain performance independent of source and load impedance, and allows units to be cascaded with true additive attenuation. |
| Excellent flatness | Typical attenuation flatness less than 1 dB typ. across the full band from 0 to 25 dB attenuation is great for feed forward applications. |
| Return Loss | 17 dB typ return loss across frequency and control voltage ranges provides an excellent match under all operating conditions allowing straightforward cascading. |
| High IP3 | High +43 dBm IP3 typ. at min attenuation and +35 dBm typ. up to 1.0V allows flexibility to locate VVA in lineup where attenuation is required the most without degrading system linearity. |

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50Ω 5500 to 7000 MHz

CASE STYLE: CZ682
PRICE: $9.95 ea. QTY. (1-9)

*+ RoHS compliant in accordance with EU Directive (2002/95/EC)*

*The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.*

### Maximum Ratings

| | |
|---|---|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| Absolute Max. Control Current | 10 mA |
| Absolute Max. RF Input Level | +15 dBm |

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

### Pin Connections

| | |
|---|---|
| RF IN | 1 |
| V CONTROL 1 | 3 |
| V CONTROL 2 | 5 |
| RF OUT | 7 |
| GROUND | 2,4,6,8 |

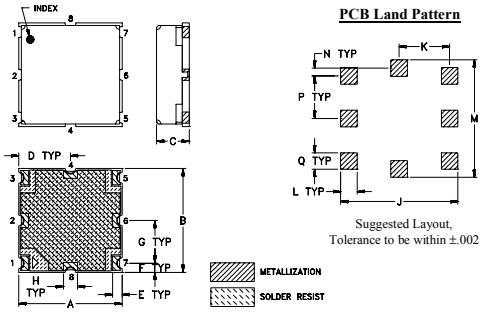
### Features

- low insertion loss, 1.6 dB typ.
- high attenuation, 27 dB typ.
- good return loss, 17 dB typ.

### Applications

- variable gain amplifier
- feed forward amps
- ALC circuits

### Outline Drawing




### Outline Dimensions (inch / mm)

| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| .375 | .375 | .131 | .188 | .035 | .033 | .154 | .050 |
| 9.52 | 9.52 | 3.33 | 4.77 | 0.89 | 0.84 | 3.91 | 1.27 |

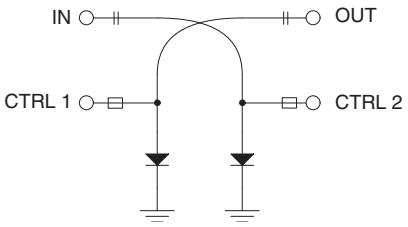
| J | K | L | M | N | P | Q | wt |
|---|---|---|---|---|---|---|---|
| .425 | .183 | .060 | .425 | .028 | .154 | .060 | grams |
| 10.80 | 4.65 | 1.52 | 10.80 | 0.71 | 3.91 | 1.52 | 0.60 |

### Electrical Specifications

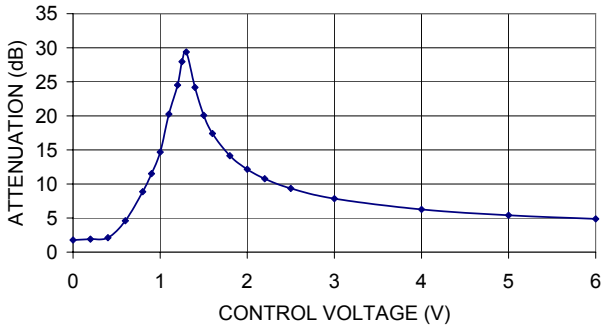
| Parameter | Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| **Frequency Range** | | 5500 | — | 7000 | MHz |
| **Insertion Loss** | at 0V Control Voltage | — | 1.6 | 2.3 | dB |
| **Attenuation** | | 22 | 27 | — | dB |
| **IP3**[1] | at 0V Control Voltage | 40 | 48 | — | dBm |
| **Input Return Loss** | | — | 17 | — | dB |
| **Output Return Loss** | | — | 17 | — | dB |
| **Control Voltage**[2] | | 0-6 | | | V |

1. Input IP3 tested with two tones separated by 0.1 MHz at 0 dBm each and 0V control voltage.
2. Using recommended control port biasing.

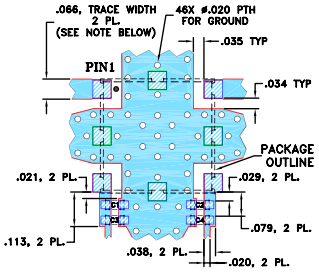
### Equivalent Schematic of DUT




HVA-73+
TYPICAL ATTENUATION at 6260 MHz




***Demo Board MCL P/N: TB-511+***
***Suggested PCB Layout (PL-323)***



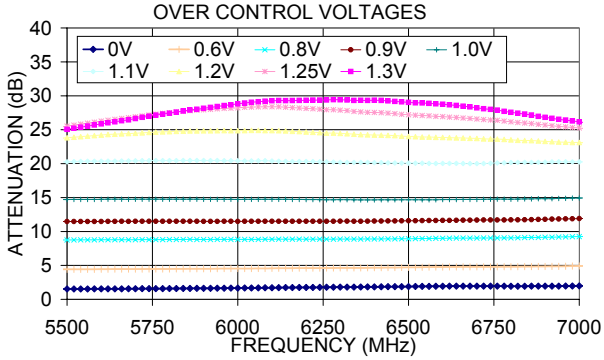

CAPACITORS C1, C2: 1000 pF, 0603 SIZE;
C3, C4: 68 pF, 0603 SIZE.

NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002"; 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.

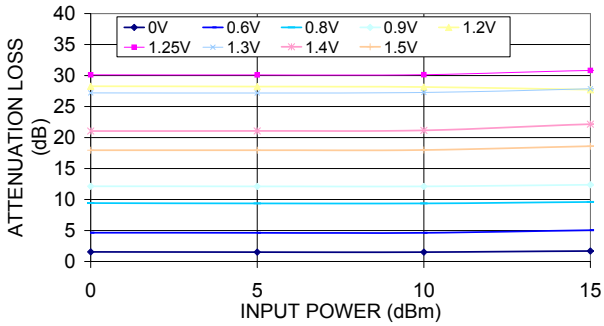
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

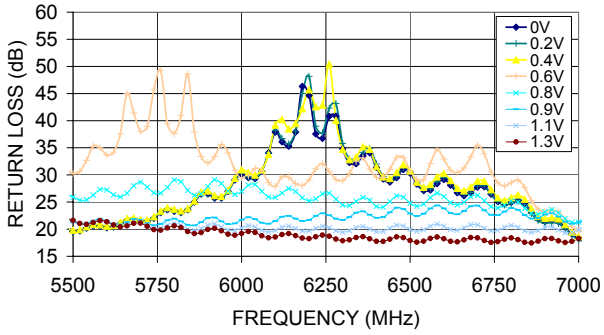
HVA-73+
ATTENUATION Vs. FREQUENCY
OVER CONTROL VOLTAGES



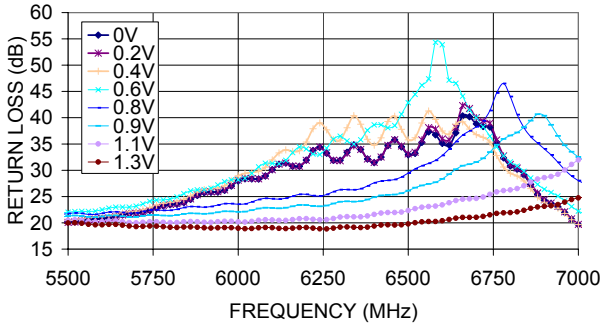

HVA-73+
ATTENUATION Vs. INPUT POWER
OVER CONTROL VOLTAGES AT 6000 MHz



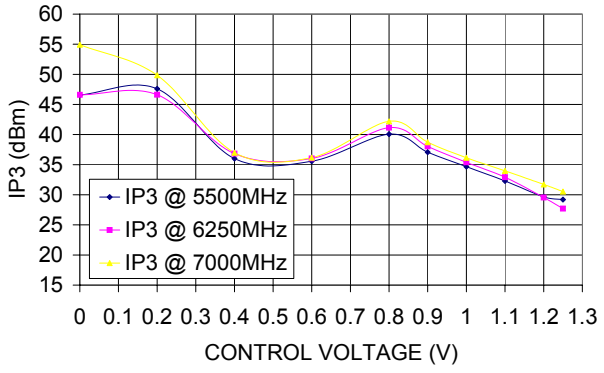

HVA-73+
INPUT RETURN LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES




HVA-73+
OUTPUT RETURN LOSS Vs. FREQUENCY
OVER CONTROL VOLTAGES




HVA-73+
IP3 Vs. CONTROL VOLTAGE Vs. FREQUENCY




HVA-73+
PHASE SHIFT Vs. FREQUENCY
OVER CONTROL VOLTAGES 5500~7000MHz
(WITH RELATION TO 0V CONTROL VOLTAGE)