MAAV-008988-PKG003

Tyco Electronics

Attenuator, Voltage Variable
35 dB, 2.0—15.5 GHz

M/A-COM Products
Preliminary: Rev. B

Features

- **45 dBm Input IP3**
- **4 dB insertion Loss at 10 GHz**
- **35 dB Attenuation Range at 10 GHz**
- **10 dB Return Losses**
- **3 mm, 16 Lead QFN Package**
- **RoHS Compliant**

Description

The MAAV-008988-PKG003 is a broadband Voltage Variable Attenuator for applications requiring high dynamic range and linearity. This VVA is unidirectional. The designated input must be used to achieve the P1dB and IP3 performance over the attenuation range.

The RoHS compliant QFN package is compatible with 260°C reflow temperatures and has an MSL 1 rating. The MTTF is >1,000,000 hours over the full operating temperature range of –40 to +85°C.

Electrical Specifications: T_c=25°C[1], Z_0 = 50Ω

Parameter	Units	Typical
Bandwidth	GHz	2.0-15.5
Insertion Loss @ 10 GHz	dB	4
Insertion Loss @15.5 GHz	dB	5
Attenuation Range @ 10 GHz	dB	35
Attenuation Range @15.5 GHz	dB	27
Input Return Loss	dB	10
Output Return Loss	dB	10
Input IP3 (Min Atten)	dBm	45
Input P1dB (Min Atten)	dBm	27.5
Control Voltages	V	0 to –3

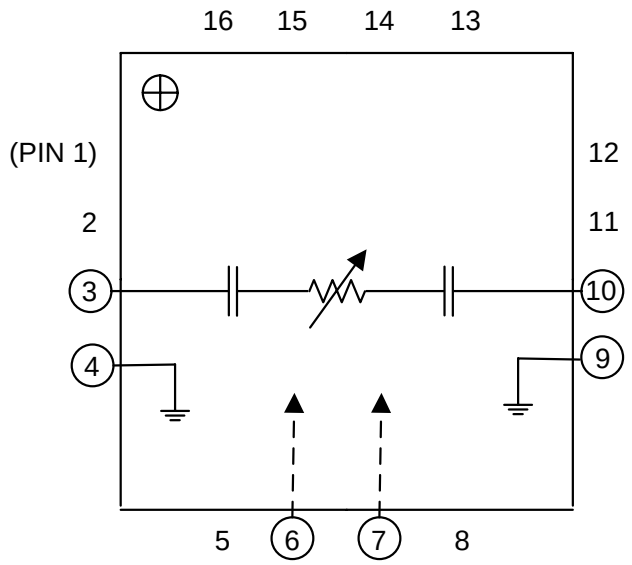
1. T_c = Case Temperature.

Minimum attenuation at V1=0V and V2=-3V
Maximum attenuation at V1=-3V and V2=0V

Ordering Information

Part Number	Package
MAAV-008988-PKG003	3 mm, 16 Lead QFN
MAAV-008988-SMB003	Evaluation Sample Board
MAAV-008988-DIE000	Bare Die

Product Drawing



Absolute Maximum[2] Ratings

Parameter	Absolute Maximum
Storage Temperature	-55ºC to +150ºC
Case Temperature	-40ºC to +85ºC
Junction Temperature	170ºC
Input Power	+32 dBm
Control Voltages	0 to –6V
ESD Level (HBM)	250V

2. Operation beyond these limits may result in permanent damage to the part. Exceeding any one or combination of these limits may cause permanent damage to this device.

Recommended Operating Conditions[3]

Parameter	Symbol	Min	Typ	Max	Unit
Control Voltage	V_1, V_2	-3	-	0	V

3. Operation outside of these ranges may reduce product reliability.

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- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298
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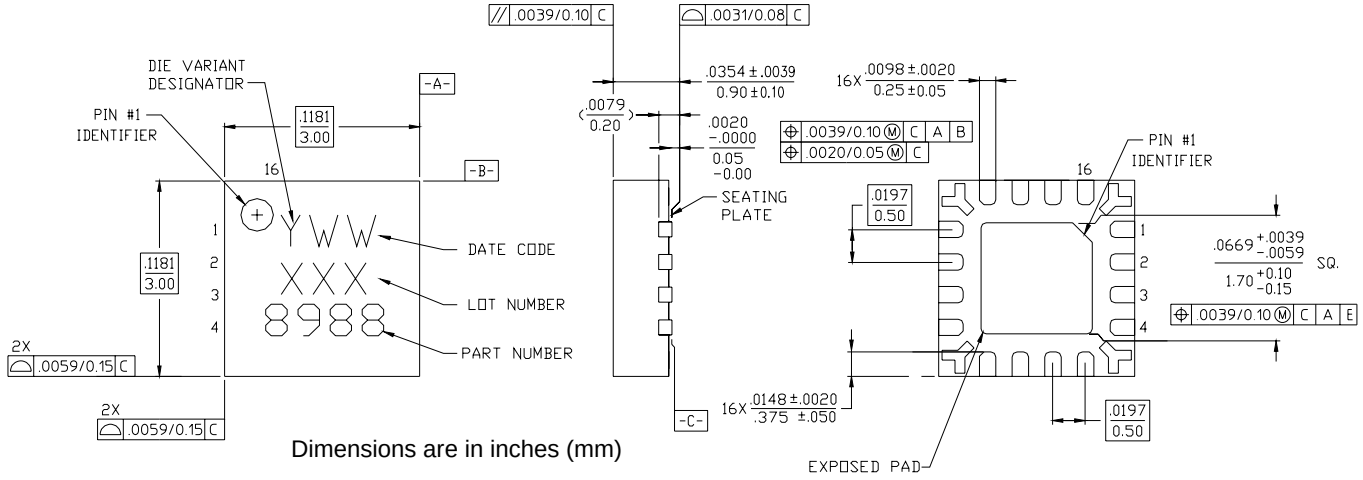
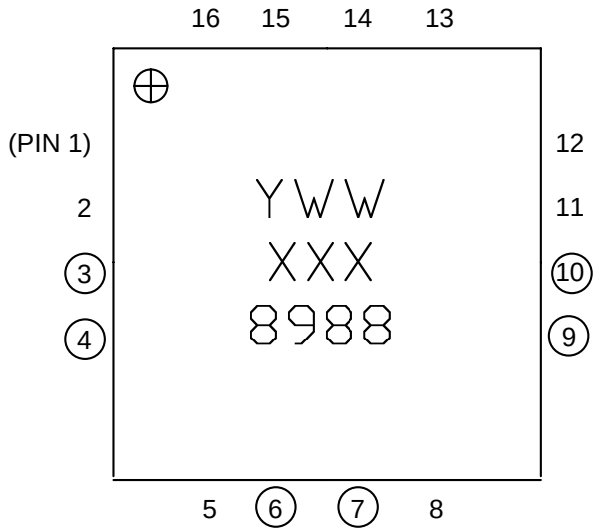
Outline Drawing



Dimensions are in inches (mm)

Pin Designations



Pin	Function	Pin	Function
1	NC	9	GND
2	NC	10	RF Out
3	RF In	11	NC
4	GND	12	NC
5	NC	13	NC
6	V1	14	NC
7	V2	15	NC
8	NC	16	NC

Exposed pad on bottom is ground

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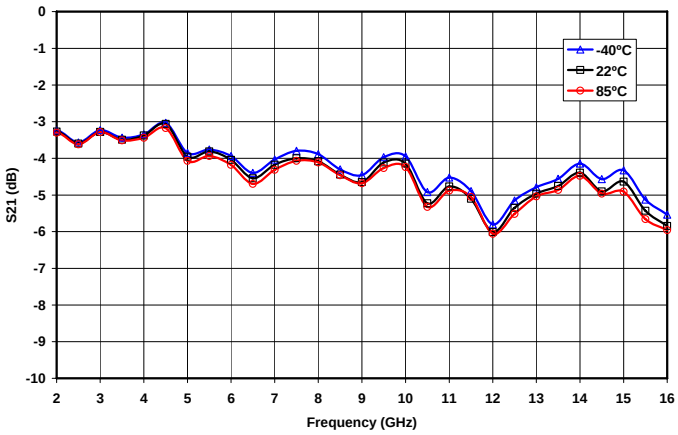

Figure 1. Insertion Loss vs. Frequency - Minimum Attenuation

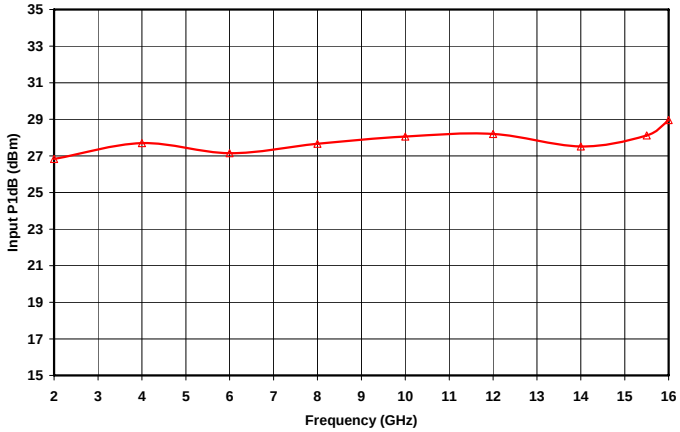

Figure 2. Input P1dB vs. Frequency - Minimum Attenutation State

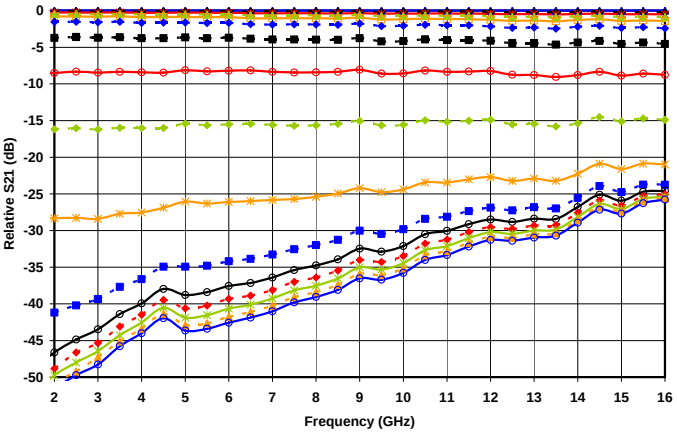

Figure 3. Relative Insertion Loss vs. Frequency and Control Voltage
(V1 = 0 to -3V, V2 = -3 to 0V, in 0.2V steps)

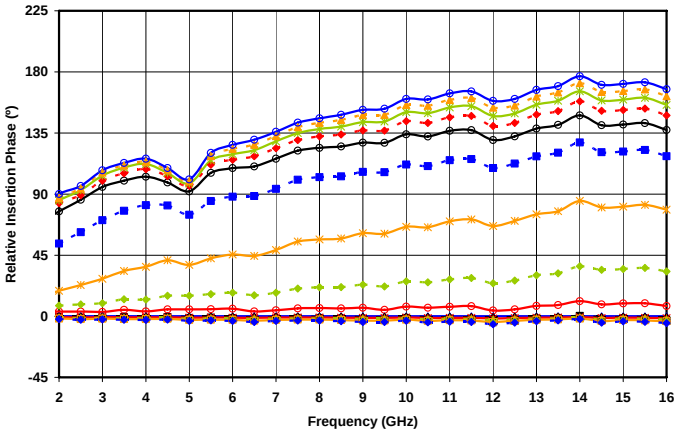

Figure 4. Relative Insertion Phase vs. Frequency and Control Voltage
(V1 = 0 to -3.0V, V2 = -3.0V to 0V, in 0.2V steps)

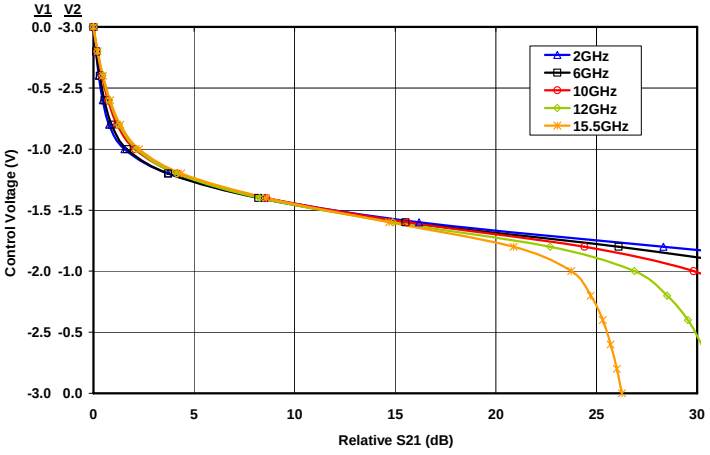

Figure 5. Control Voltage vs. Relative Insertion Loss and Frequency

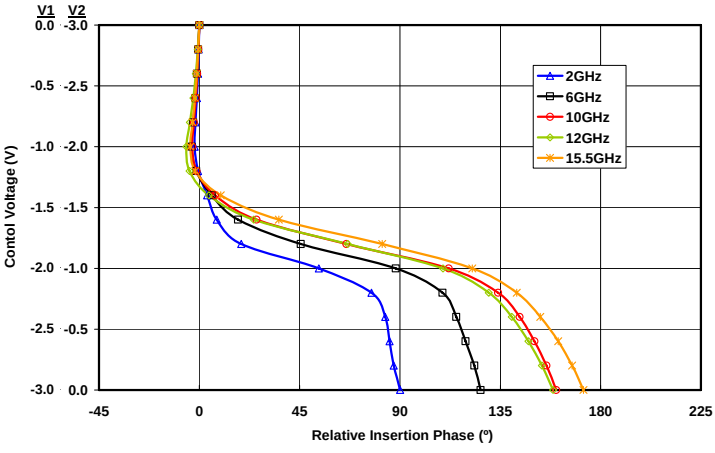

Figure 6. Control Voltage vs. Relative Insertion Phase and Frequency

ADVANCED: Data Sheets contain information regarding a product M/A-COM is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
PRELIMINARY: Data Sheets contain information regarding a product M/A-COM has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

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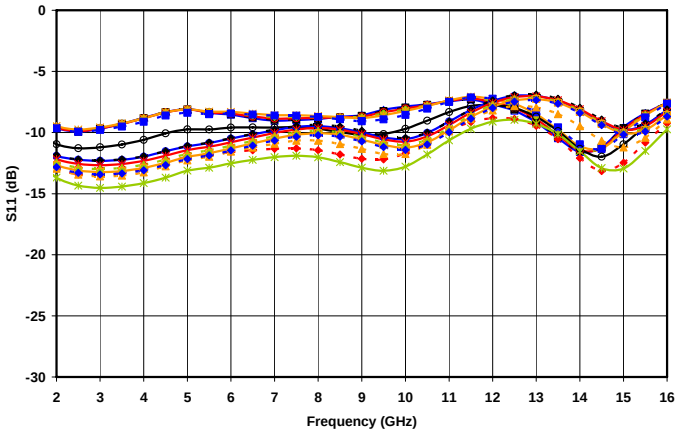

Figure 7. Input Return Loss vs. Frequency and Control Voltage (V1 = 0 to -3V, V2 = -3 to 0V, in 0.2V steps)

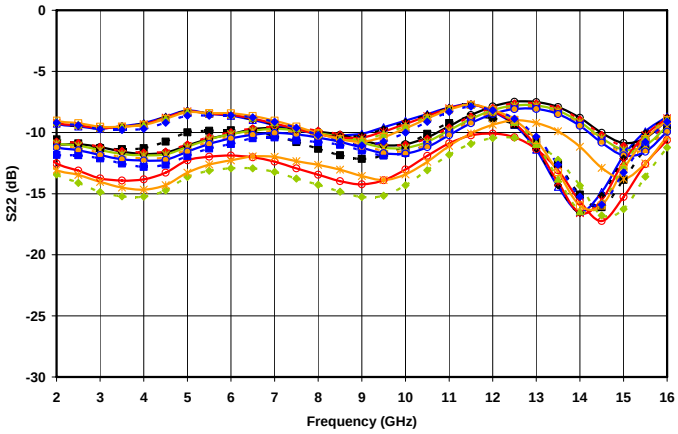

Figure 8. Output Return Loss vs. Frequency and Control Voltage (V1 = 0 to -3V, V2 = -3 to 0V, in 0.2V steps)

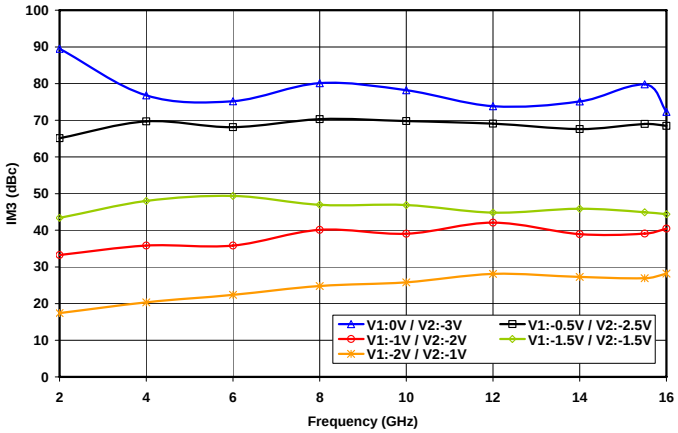

Figure 9. Third Order Intermodulation vs. Frequency and Control Voltage

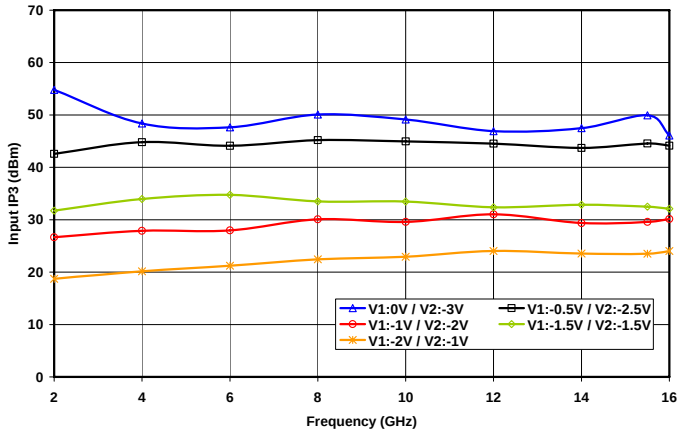

Figure 10. Input Third Order Intercept vs. Frequency and Control Voltage

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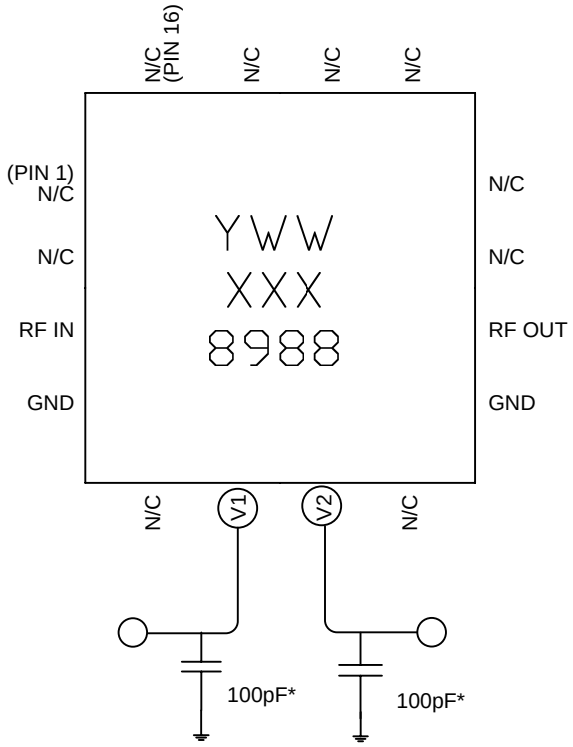
RF ports are internally dc blocked



* Place 100pF capacitors as close to the package as possible.

Figure 11. Recommended Bias Configuration.

Note: The exposed pad centered on the package bottom must be connected to RF and dc ground for proper electrical and thermal operation.

Reference M/A-COM application note S2083 for information regarding solder profiles.

*Application Notes can be found by going to http://www.macom.com/Application%20Notes/default.asp and searching for the required Application Note.

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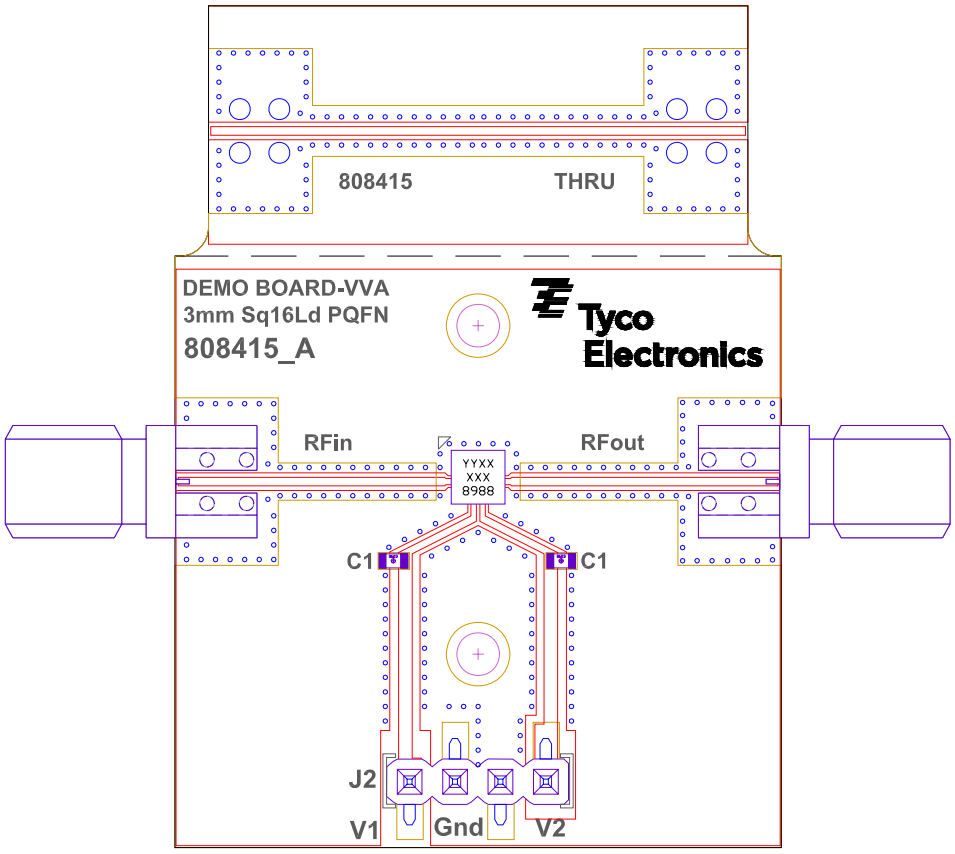

Figure 12. Demonstration Board PN MAAV-008988-SMB003 (available upon request).