

Voltage Variable Attenuator, 824 - 960 MHz

**AT65-0009
V2**

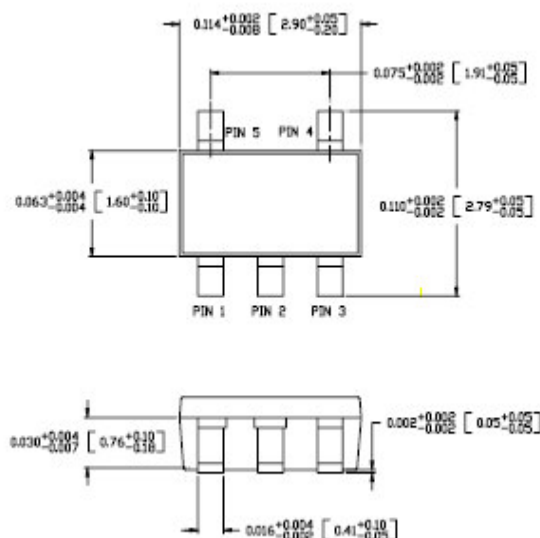
Features

- 25 dB Attenuation Range
- High IP3
- Excellent Linearity Performance
- Surface Mount SOT-25 Package
- Low Cost/High Performance
- 50 Ohm Nominal Impedance

Description

M/A-COM's AT65-0009 is an integrated voltage variable attenuator containing two PIN diodes and a passive glass quadrature hybrid. This device is packaged in a 5 leaded SOT plastic surface mount package. Maximum attenuation is typically achieved at 3.5 V bias using the suggested bias circuit. The AT65-0009 is ideally suited for GSM communication applications requiring variable attenuation in the 824 to 960 MHz bandwidth.

SOT-25



Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_0 = 50\ \Omega$, $F = 824\text{-}960\ \text{MHz}$

Parameter	Test Conditions ¹	Units	Min.	Typ.	Max.
Insertion Loss	$V_B = 0\ \text{V}$	dB	—	1.7	2.1
VSWR		Ratio	—	1.7	2.2
Attenuation Flatness Vs Frequency	0- 10 dB	dB	—	1.3	—
	0- 20 dB	dB	—	1.3	—
	0- 630 dB	dB	—	2.5	—
Switching Speed	50% Control to 90%/10% RF	μSec	—	7.0	—
Input IP3	Two-tone 900 MHz, 905 MHz, +5 dBm $V_B = 0\ \text{V}$	dBm	—	40	—
Input IP2	Two-tone 900 MHz, 905 MHz, +5 dBm $V_B = 0\ \text{V}$	dBm	—	34	—
Attenuation	$I_B = 0.30\ \text{to}\ 0.45\ \text{mA}$	dB	25	28	—

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Pin Configuration

Pin No.	Function
1	RFIN, V_g
2	GND
3	RFOUT, V_g
4	GND
5	GND

External Circuitry Parts ¹

Part	Value	Purpose
C1	390 pF	DC Block
C2	390 pF	DC Block
C3	390 pF	By-pass
C4	390 pF	By-pass
L1	180 nH	RF Choke
L2	180 nH	RF Choke
R1	10 KOhm	Current Limiting
C5 ²	1.5 pF	RF Tune
C6 ²	1.5 pF	RF Tune

1. All external circuitry parts are readily available, low cost surface mount components (.060 in. x .030 in. or .080 in. x .050 in.).

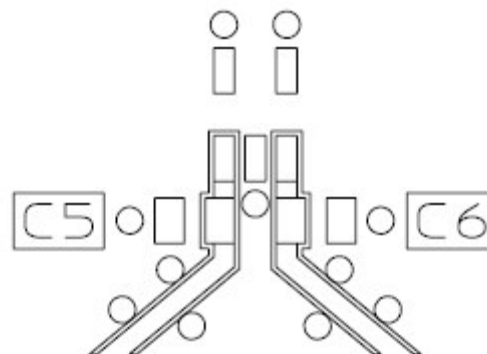
2. See Application Note MA-C-05010008A for external tuning capacitor values to suit specific Communication Bandwidths. Insertion Loss will vary depending on tuning capacitor value chosen.

Absolute Maximum Ratings ³

Parameter	Absolute Maximum
Max Input Power	+27 dBm
Operating Voltage	+ 5 Volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +125°C

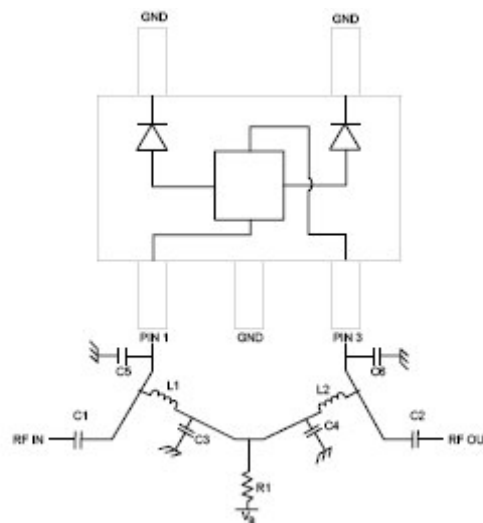
3. Exceeding any one or combination of these limits may cause permanent damage to this device.

Recommended PCB Configuration ⁴



4. Circuit Material = FR-4, TETRA II, 0.031 inches thick. Line Width = 0.025 inches, Line Spacing = 0.0056 inches.

Functional Diagram and Bias Circuitry



Ordering Information

Part Number	Package
AT65-0009	Bulk Packaging
AT65-0009TR	Tape and Reel (1K Reel)
AT65-0009-TB	Unit Mounted on Test Board

Note: Reference Application Note M513 for reel size information.

• **North America** Tel: 800.366.2266 / Fax: 978.366.2266
 • **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
 • **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

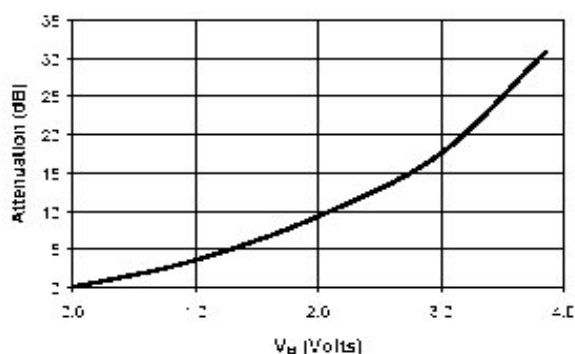
Visit www.macom.com for additional data sheets and product information.

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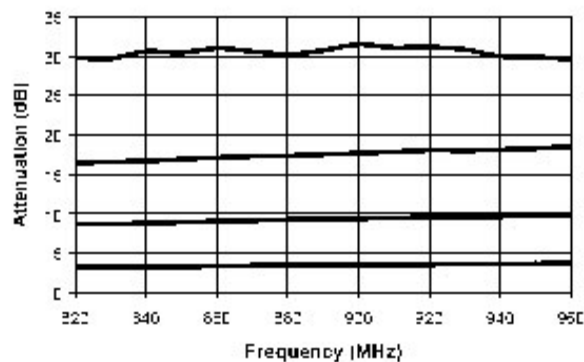
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Typical Performance Curves

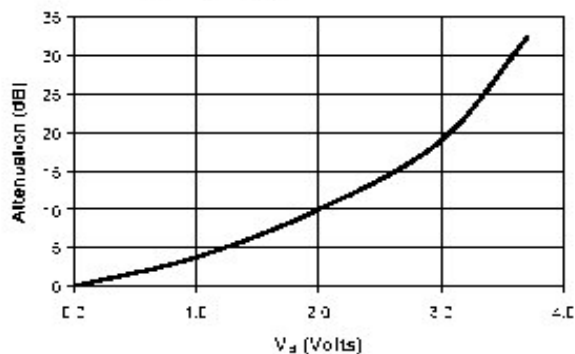
**Attenuation vs. Voltage with 1.5 pF
Tuning Cap @ +25°C**



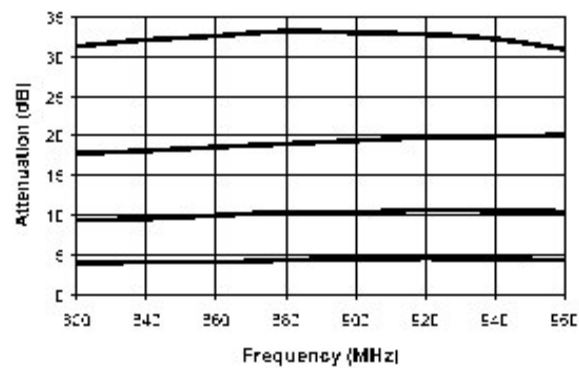
**Attenuation vs. Freq. With 1.5 pF
Tuning Cap @ +25°C**



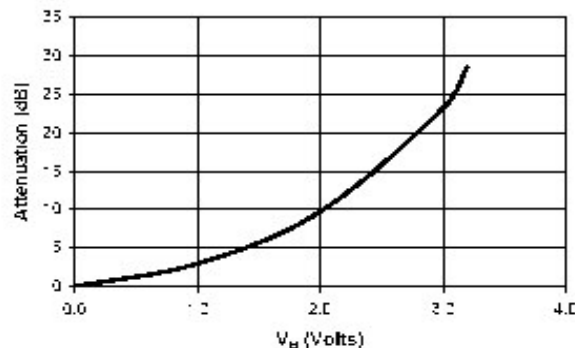
**Attenuation vs. Voltage with 1.5 pF
Tuning Cap @ +85°C**



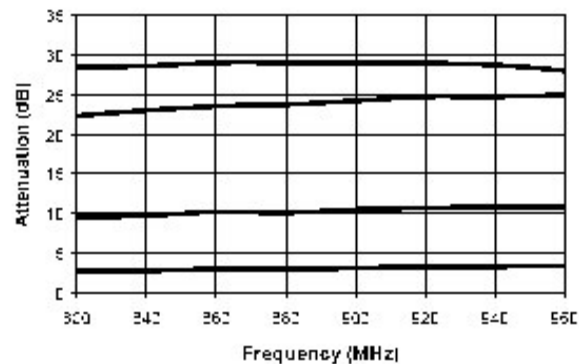
**Attenuation vs. Freq. With 1.5 pF
Tuning Cap @ +85°C**



**Attenuation vs. Voltage with 1.5 pF
Tuning Cap @ -40°C**



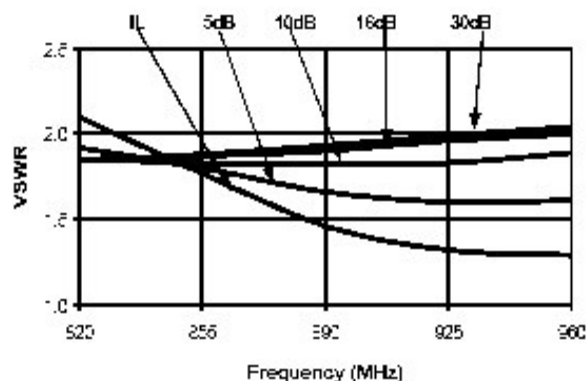
**Attenuation vs. Freq. With 1.5 pF
Tuning Cap @ -40°C**



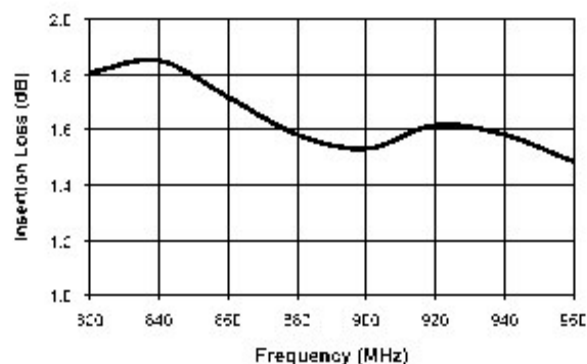
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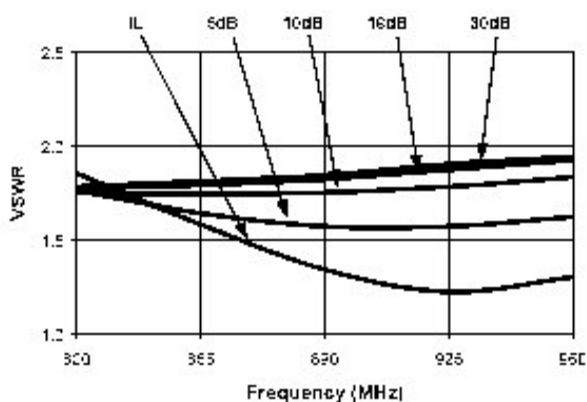
**VSWR vs. Freq. With 1.5 pF Tuning
Cap @ +25°C**



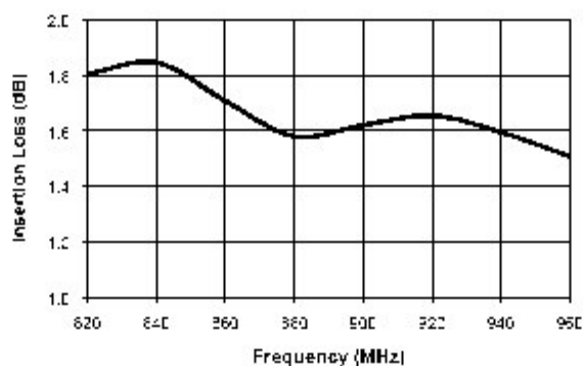
**Loss vs. Frequency @ +25°C
No Tuning Cap (See Note 2)**



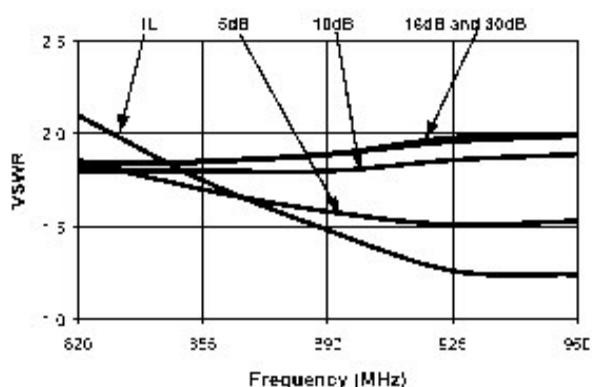
**VSWR vs. Freq. With 1.5 pF Tuning
Cap @ +85°C**



**Loss vs. Frequency @ +85°C
No Tuning Cap (See Note 2)**



**VSWR vs. Freq. With 1.5 pF Tuning
Cap @ -40°C**



**Loss vs. Frequency @ -40°C
No Tuning Cap (See Note 2)**

