

Voltage Variable Absorptive Attenuator 30 dB, 0.5 - 2.0 GHz

Rev. V5

Features

- Single Positive Voltage Control: 0 to +5 Volts
- 30 dB Voltage Variable Attenuation
- ± 2 dB Linearity from BSL
- Low DC Power Consumption
- Temperature Range: -40°C to $+85^{\circ}\text{C}$
- SOIC-8 Plastic Package
- Tape and Reel Packaging Available
- Fast Switching Speed

Description

M/A-COM's AT-110 is a GaAs MMIC voltage variable absorptive attenuator in a low-cost SOIC 8-lead surface mount plastic package. The AT-110 has a faster switching speed than the AT-108 or AT-109. The AT-110 is ideally suited for use where linear attenuation fine tuning and very low power consumption are required.

Typical applications include radio, cellular, GPS equipment and automatic gain/level control circuits.

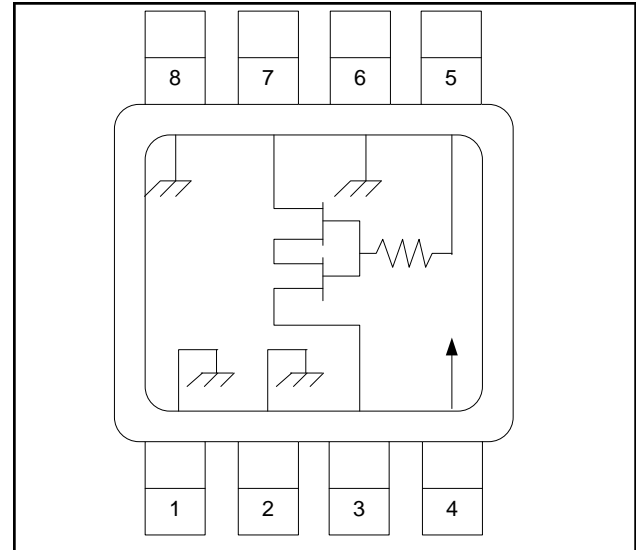
The AT-110 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

Ordering Information ^{1,2}

Part Number	Package
AT-110	Bulk Packaging
AT-110TR	Forward Tape and Reel
AT-110SMB	Sample Board

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

Functional Schematic ^{3,4,5}



3. $V_{CC} = +5 \text{ VDC} \pm 0.5 \text{ VDC}$ @ 300 μA maximum.
4. $V_C = 0 \text{ VDC}$ to $+5 \text{ VDC}$ @ 6 mA maximum.
5. External DC blocking capacitors are required on all RF ports.

Pin Configuration

Pin No.	Function	Pin No.	Function
1	Ground	5	V_C
2	Ground	6	Ground
3	RF Port	7	RF Port
4	V_{CC}	8	Ground

Absolute Maximum Ratings ⁶

Parameter	Absolute Maximum
Input Power	+21 dBm
Supply Voltage V_{CC}	$-1 \text{ V} \leq V_{CC} \leq +8 \text{ V}$
Control Voltage V_C	$-1 \text{ V} \leq V_C \leq V_{CC} + 0.5 \text{ V}$
Operating Temperature	-40°C to $+85^{\circ}\text{C}$
Storage Temperature	-65°C to $+150^{\circ}\text{C}$

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

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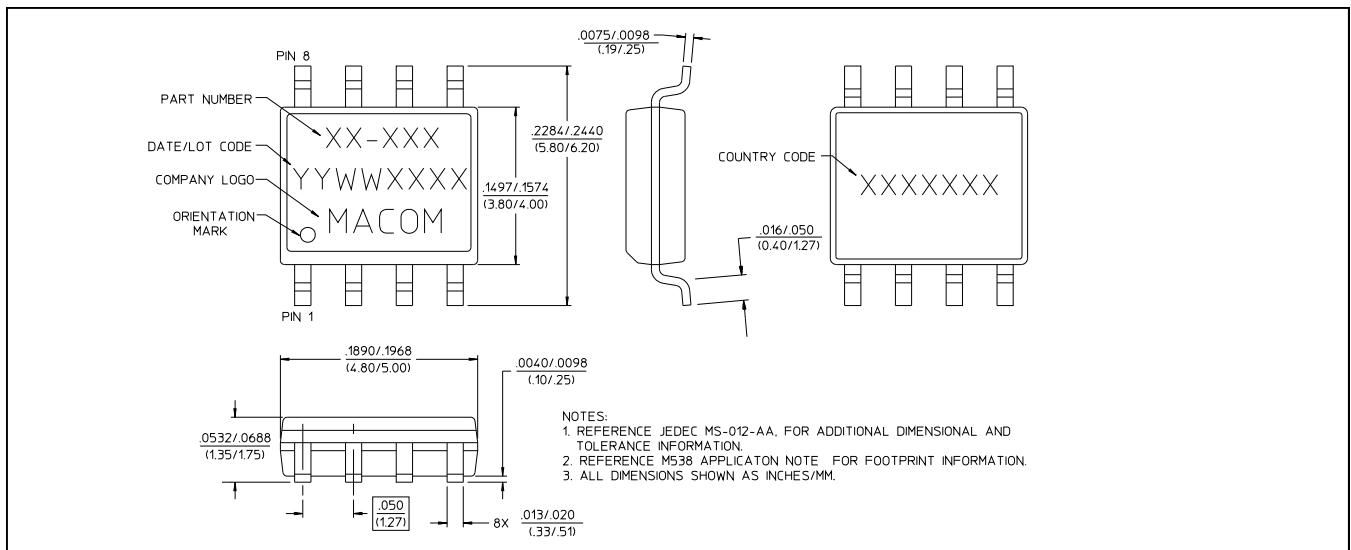
Rev. V5

Electrical Specifications ⁷: $T_A = 25^\circ\text{C}$, $Z_0 = 50 \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	0.5 - 1.0 GHz	dB	—	2.8	3.0
	1.0 - 2.0 GHz	dB	—	3.3	3.6
Attenuation	0.5 - 1.0 GHz	dB	30	—	—
	1.0 - 2.0 GHz	dB	25	—	—
Flatness (Peak to Peak)	0.5 - 1.0 GHz	dB	—	± 0.5	± 0.8
	1.0 - 2.0 GHz	dB	—	± 1.2	± 1.5
VSWR	—	Ratio	—	2:1	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	μS	—	0.2	—
Ton, Toff	50% Control to 90% RF, 50% Control to 10% RF	μS	—	0.2	—
Transients	In-band	mV	—	70	—

7. The RF ports must be blocked outside of the package from ground or any other voltage.

SOIC-8[†]



[†] Meets JEDEC moisture sensitivity level 1 requirements.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

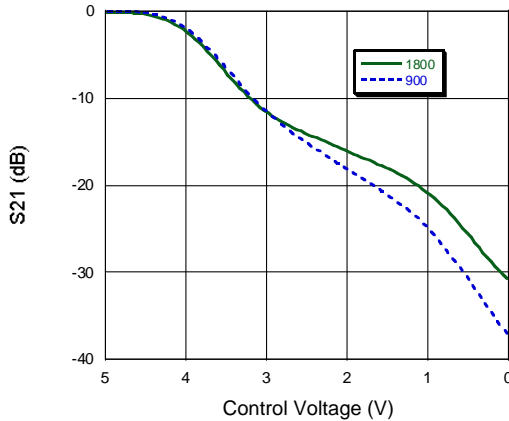
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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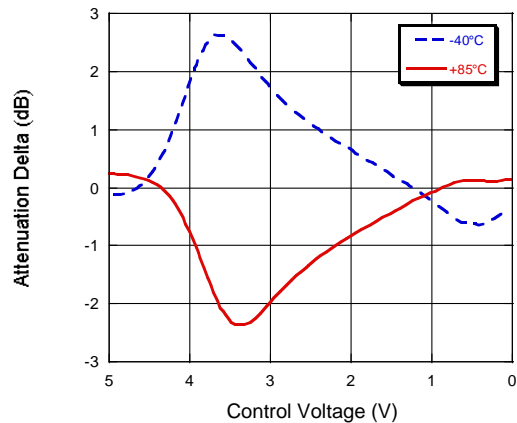
Rev. V5

Typical Performance Curves @ 25°C

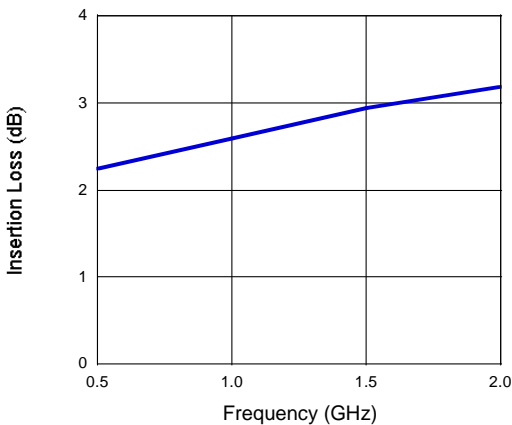
Attenuation vs. Control Voltage
F = 900, 1800 MHz



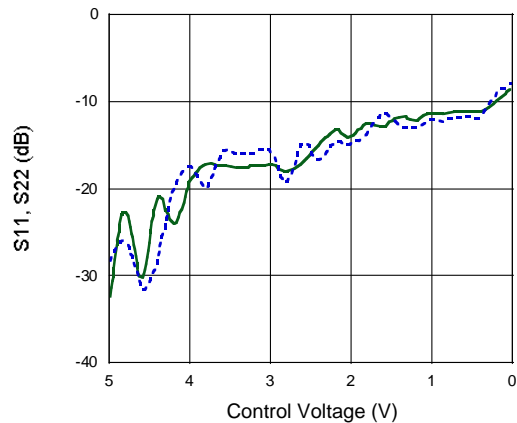
Attenuation vs. Temperature
Normalized to +25°C, F = 900 MHz



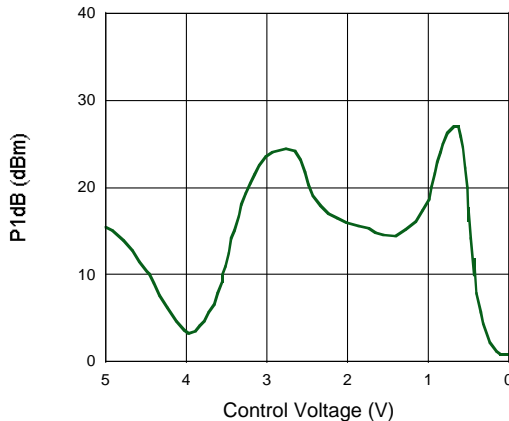
Insertion Loss vs. Frequency



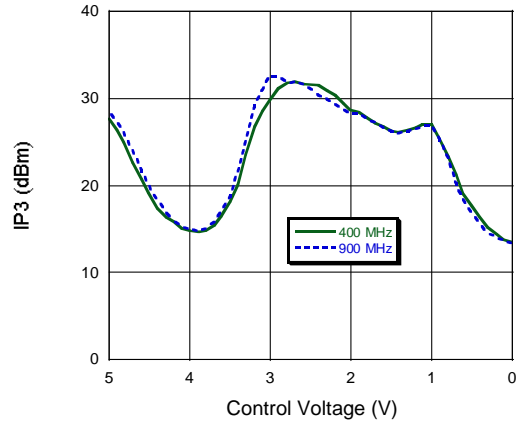
Return Loss vs. Control Voltage, F = 900 MHz



1 dB Compression vs. Control Voltage, F = 900 MHz



IP3 vs. Control Voltage



3

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