

# 18–50 GHz GaAs MMIC Voltage Variable Attenuator



AV850M1-00

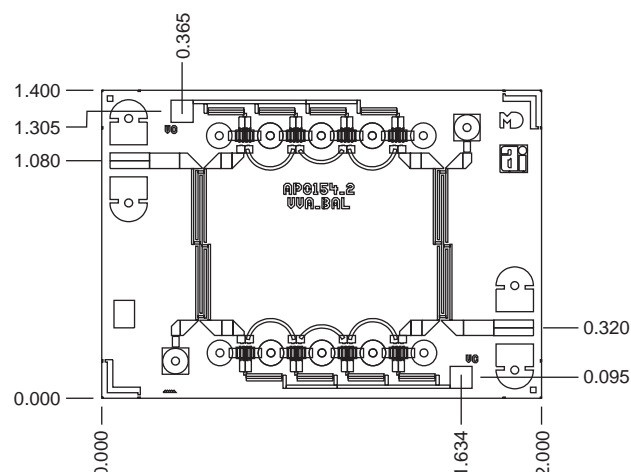
## Features

- Single Voltage Control
- 40 dB Attenuation Range
- Balanced 0.25  $\mu\text{m}$  MESFET  
Non-Reflective Design
- 100% On-Wafer RF and DC Testing
- 100% Visual Inspection to MIL-STD-883  
MT 2010

## Description

Alpha's AV850M1-00 MMIC voltage variable attenuator is a balanced configuration incorporating Lange couplers at input and output. The attenuator has a typical insertion loss of 2.5 dB over the 18–40 GHz band with a worst-case insertion loss of 3.5 dB across the full 18–50 GHz band. The attenuation range is 35 dB over the full 18–50 GHz band while typical I/P and O/P return loss is better than 13 dB for all attenuation states. The chip uses Alpha's proven 0.25  $\mu\text{m}$  MESFET technology and is based upon MBE layers and electron beam lithography for the highest uniformity and repeatability. The MMICs employ surface passivation to ensure a rugged, reliable part with through-substrate via holes and gold-based backside metallization to facilitate a conductive epoxy die attach process. All chips are screened for insertion loss, full attenuation and I/P and O/P match over the 18–50 GHz band for guaranteed performance.

## Chip Outline



Dimensions indicated in mm.

All DC (V) pads are 0.1 x 0.1 mm and RF In, Out pads are 0.07 mm wide.  
Chip thickness = 0.1 mm.

## Absolute Maximum Ratings

Characteristic	Value
Operating Temperature ( $T_C$ )	-55°C to +90°C
Storage Temperature ( $T_{ST}$ )	-65°C to +150°C
Control Voltage ( $V_C$ )	-7 $V_{DC}$
Power In ( $P_{IN}$ )	30 dBm
Junction Temperature ( $T_J$ )	175°C

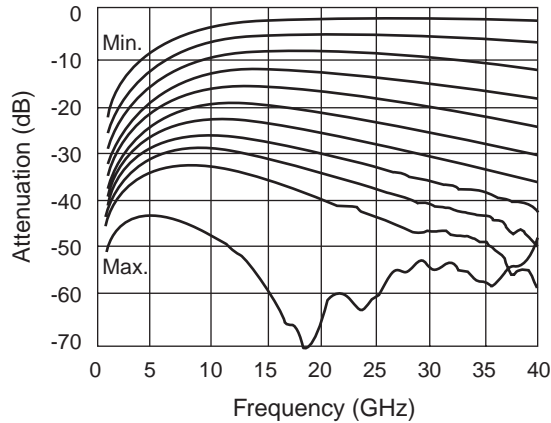
## Electrical Specifications at 25°C (Frequency = 18, 24, 31, 38, 43, 50 GHz)

Parameter	Condition	Symbol	Min.	Typ. <sup>2</sup>	Max.	Unit
Maximum Attenuation	$V_C = 0$ V	ISO	35	45		dB
Minimum Attenuation	$V_C = -5$ V	$I_L$		2.5	3.5	dB
Input Return Loss	At Min. and Max. Attenuation	$RL_I$		-20	-12.5	dB
Output Return Loss	At Min. and Max. Attenuation	$RL_O$		-20	-12.5	dB
Input Power at 1 dB Gain Compression (For All Attenuation Levels) <sup>1</sup>		$P_1$ dB		0		dBm

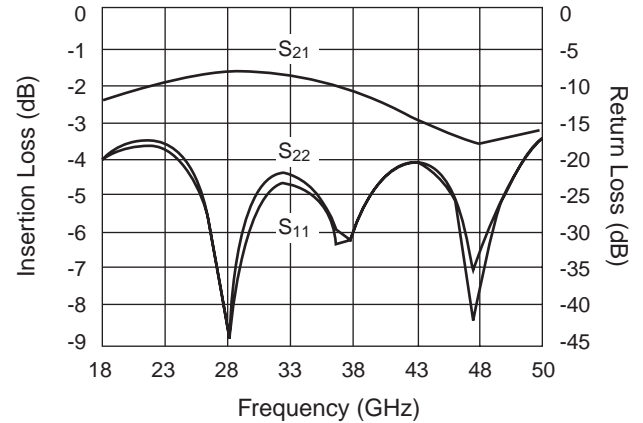
1. Not measured on a 100% basis.

2. Typical represents the median parameter value across the specified frequency range for the median chip.

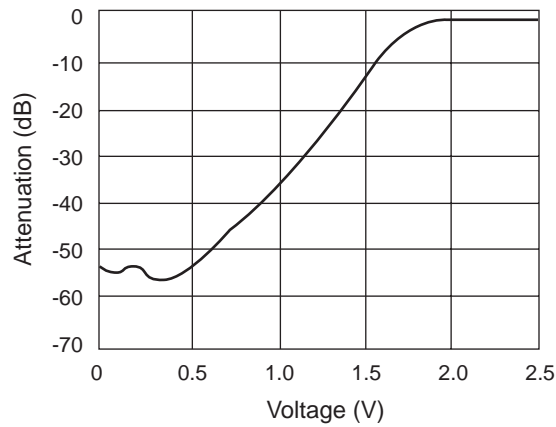
## Typical Performance Data



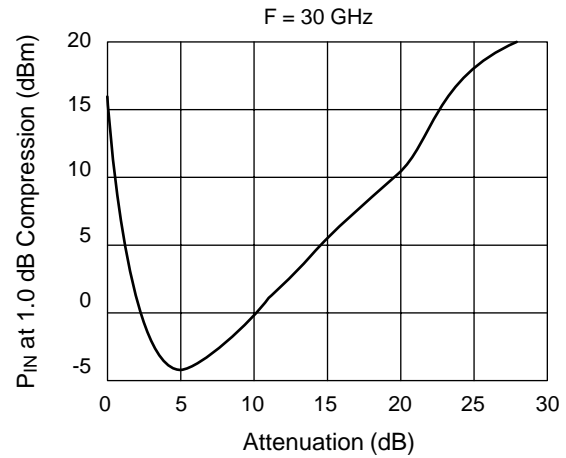
Attenuation vs. Frequency (By State)



Insertion Loss vs. Frequency

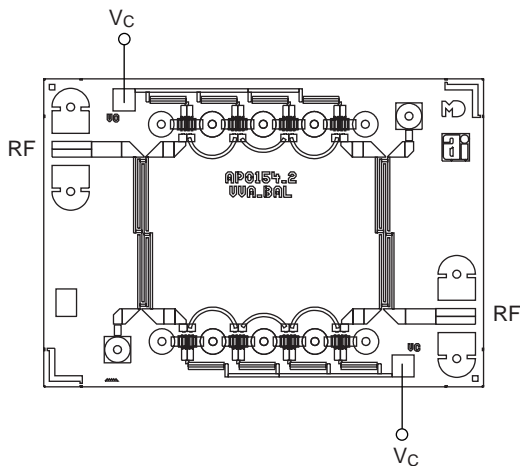


Attenuation vs. Control Voltage



Attenuation vs. 1.0 dB Compression Point

## Bias Arrangement



Bias must be applied to both  $V_C$ . Voltage range is  $V_{Low} = 0$  V to  $V_{High} = -5$  V.  $V_{Low}$  corresponds to high attenuation state.

## Circuit Schematic

