18–50 GHz GaAs MMIC Voltage Variable Attenuator

Alpha

AV850M1-00

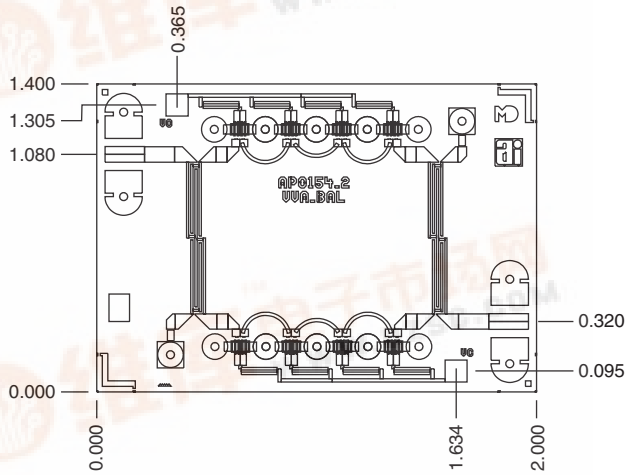
Features

- Single Voltage Control
- 40 dB Attenuation Range
- Balanced 0.25 µm 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 µm 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

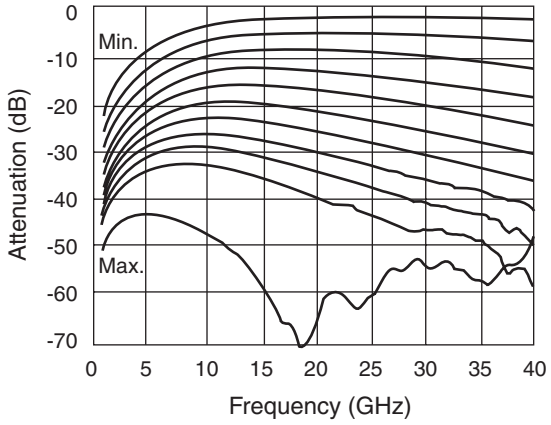
Characteristic	Value
Operating Temperature (T_C)	-55°C to +90°C
Storage Temperature (T_{ST})	-65°C to +150°C
Control Voltage (V_C)	-7 V_{DC}
Power In (P_{IN})	30 dBm
Junction Temperature (T_J)	175°C

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

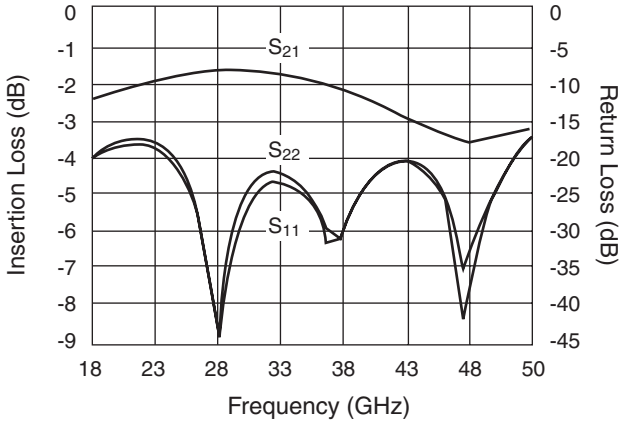
Parameter	Condition	Symbol	Min.	Typ.[2]	Max.	Unit
Maximum Attenuation	V_C = 0 V	ISO	35	45		dB
Minimum Attenuation	V_C = -5 V	I_L		2.5	3.5	dB
Input Return Loss	At Min. and Max. Attenuation	RL_I		-20	-12.5	dB
Output Return Loss	At Min. and Max. Attenuation	RL_O		-20	-12.5	dB
Input Power at 1 dB Gain Compression (For All Attenuation Levels)[1]		$P_{1\ dB}$		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.

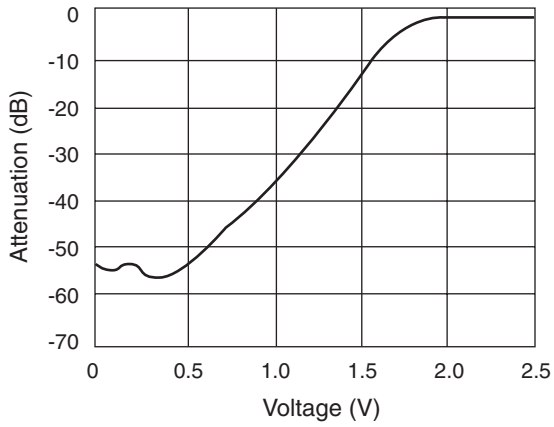
Typical Performance Data



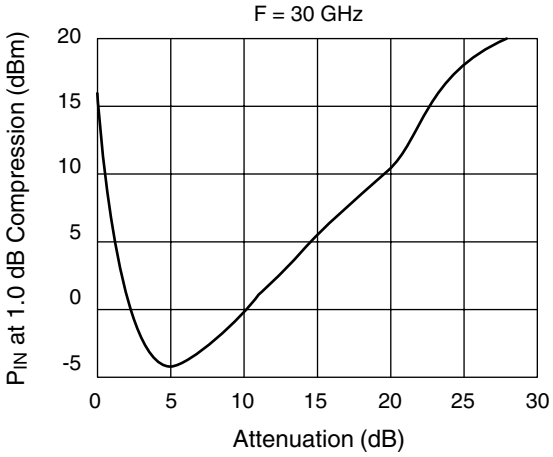
Attenuation vs. Frequency (By State)



Insertion Loss vs. Frequency

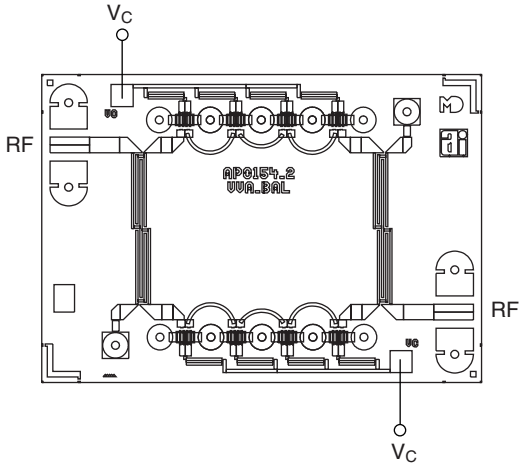


Attenuation vs. Control Voltage



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