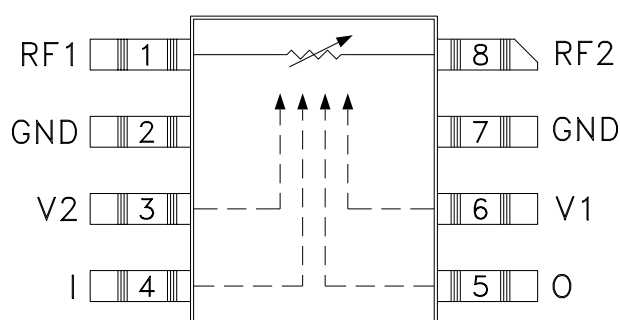


GaAs MMIC SMT VOLTAGE-VARIABLE ATTENUATOR, DC - 10 GHz

Typical Applications

- Base Station Infrastructure
- Portable Wireless CATV & DBS
- MMDS & Wireless LAN
- Wireless Local Loop
- Military, Space, & Test Equipment

Functional Diagram



Features

- Wide Bandwidth: DC - 10 GHz
- Low Phase Shift vs. Attenuation
- 25 dB Attenuation Range
- Simplified Voltage Control

General Description

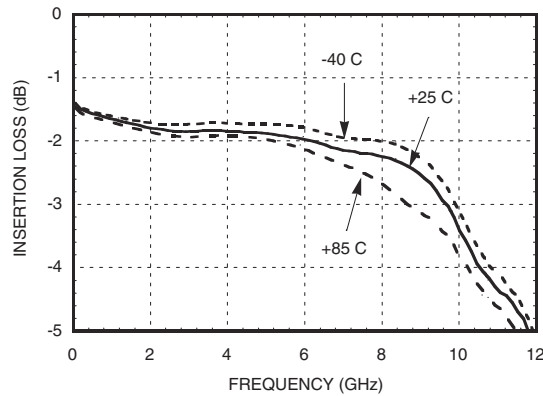
The HMC121C8 is an absorptive Voltage Variable Attenuator (VVA) in a non-hermetic surface-mount package covering DC - 10 GHz. It features an on-chip reference attenuator for use with an external op-amp to provide simple single voltage attenuation control, 0 to -3V. The device is ideal in designs where an analog DC control signal must control RF signal levels over a 25 dB amplitude range. Applications include AGC circuits and temperature compensation of multiple gain stages in microwave point-to-point and VSAT radios. See HMC121G8 for a hermetic SMT version of this device.

Electrical Specifications, $T_A = +25^\circ\text{C}$, 50 ohm system

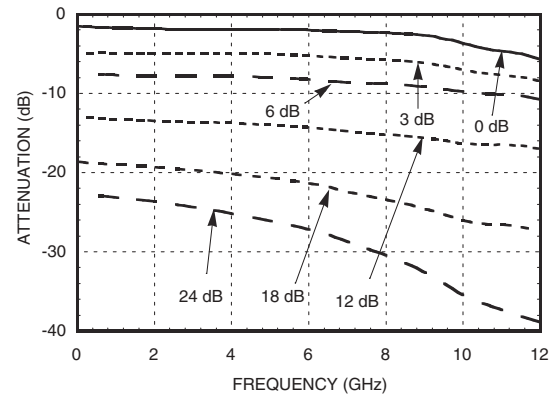
Parameter	Min.	Typical	Max.	Units
Insertion Loss				
DC - 6 GHz:		2.0	2.5	dB
DC - 8 GHz:		2.2	3.2	dB
DC - 10 GHz:		3.5	4.5	dB
Attenuation Range				
DC - 6 GHz:	20	25		dB
DC - 10 GHz:	25	30		dB
Return Loss				
DC - 8 GHz:	11	15		dB
DC - 10 GHz:	8	12		dB
Switching Characteristics				
tRISE, tFALL (10/90% RF)		3		ns
tON, tOFF (50% CTL to 10/90% RF)		6		ns
Input Power for 0.25 dB Compression (0.5 - 10 GHz)				
Min Atten:		+3		dBm
Atten >2 dB:		-3		dBm
Input Third Order Intercept (0.5 - 10 GHz) (Two-tone Input Power = -8 dBm Each Tone)				
Min Atten:		+18		dBm
Atten >2 dB:		+10		dBm

GaAs MMIC SMT VOLTAGE-VARIABLE ATTENUATOR, DC - 10 GHz

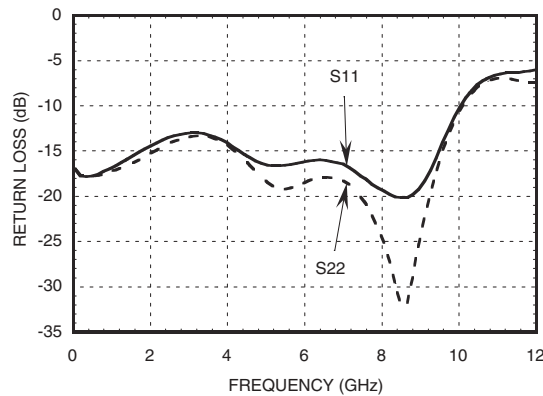
Insertion Loss



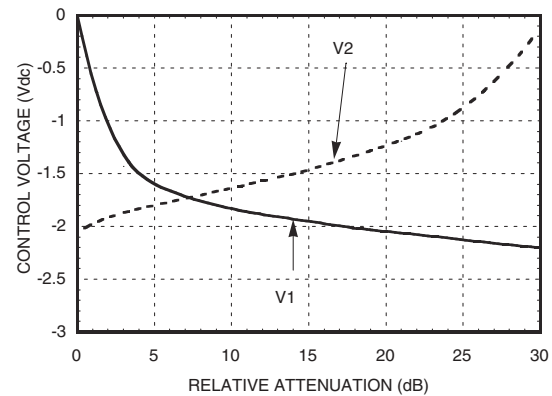
Relative Attenuation



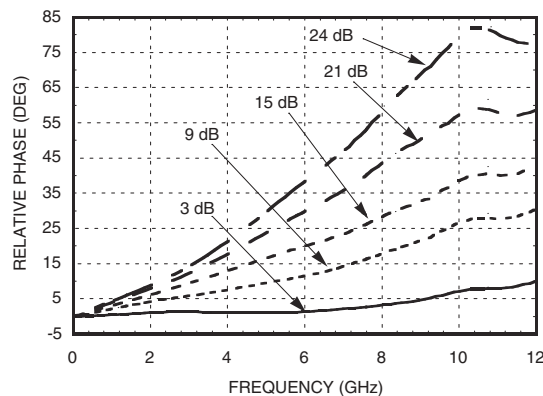
Return Loss



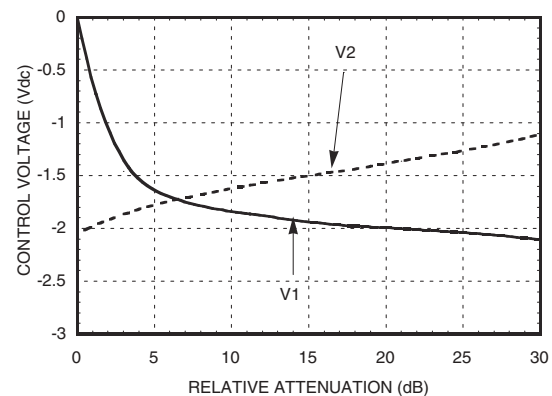
**Relative Attenuation vs.
Control Voltage @ 4.2 GHz**



Relative Phase

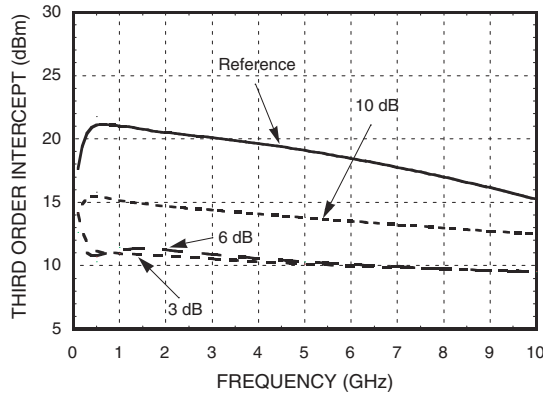


**Relative Attenuation vs.
Control Voltage @ 10 GHz**

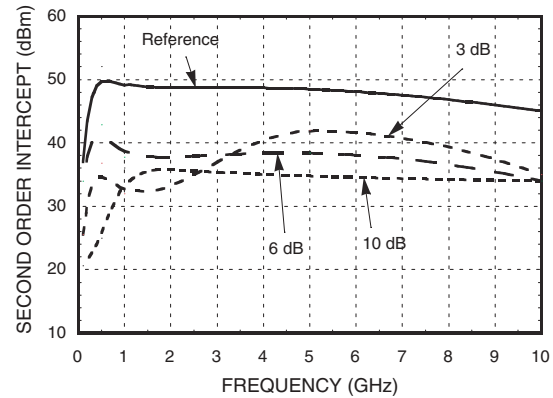


GaAs MMIC SMT VOLTAGE-VARIABLE ATTENUATOR, DC - 10 GHz

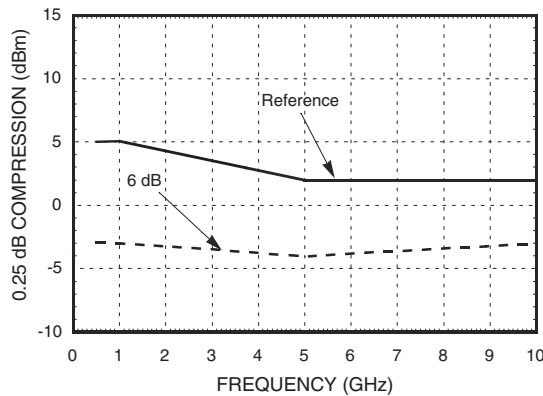
**Input Third Order
Intercept vs. Attenuation**



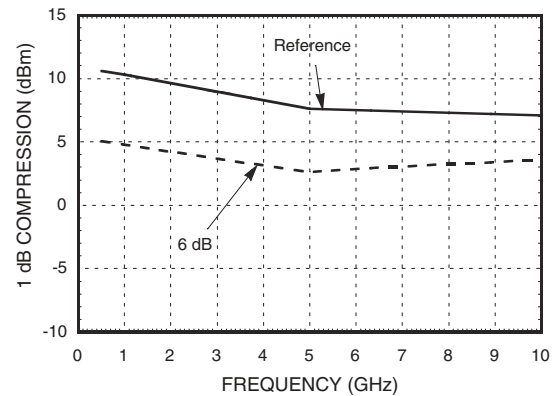
**Input Second Order
Intercept vs. Attenuation**



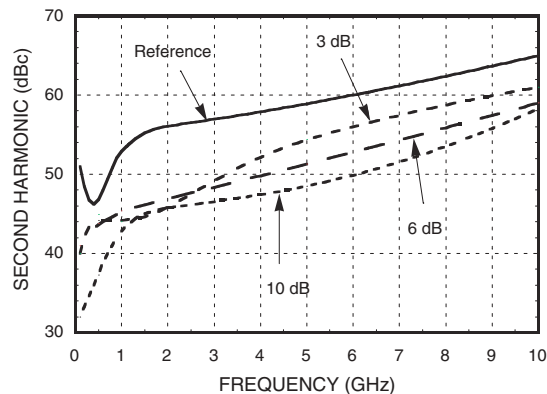
**0.25 dB Compression
vs. Attenuation**



**1 dB Compression
vs. Attenuation**



Second Harmonic vs. Attenuation

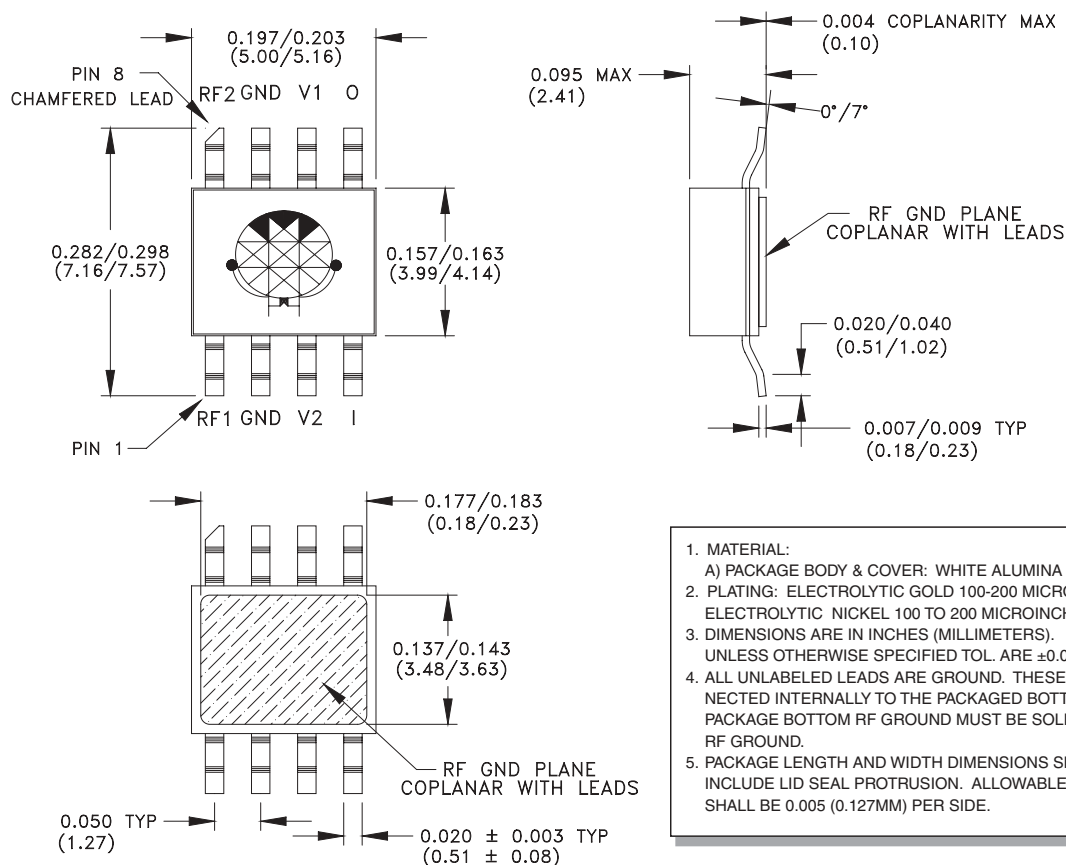


GaAs MMIC SMT VOLTAGE-VARIABLE ATTENUATOR, DC - 10 GHz

Absolute Maximum Ratings

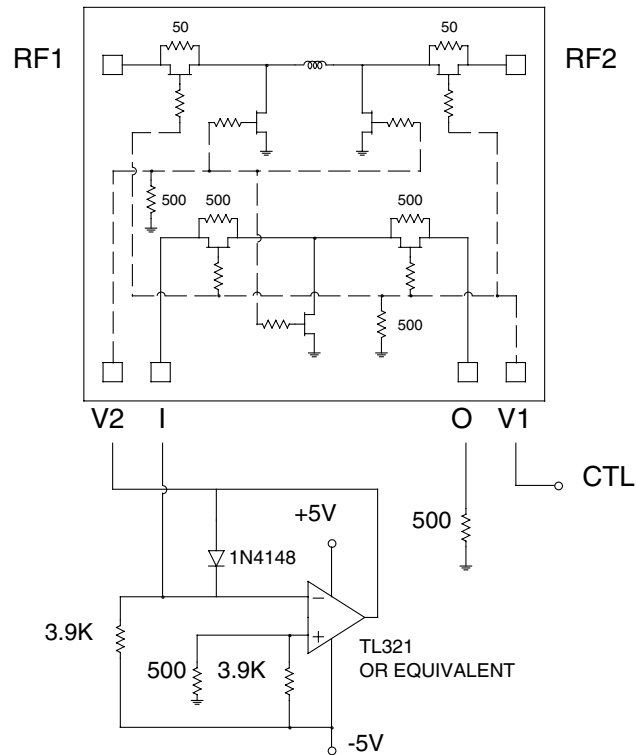
RF Input Power	+16 dBm
Control Voltage Range	+1.0 to -6.0 Vdc
Storage Temperature	-65 to +150 deg C
Operating Temperature	-55 to +125 deg C

Outline Drawing



GaAs MMIC SMT VOLTAGE-VARIABLE ATTENUATOR, DC - 10 GHz

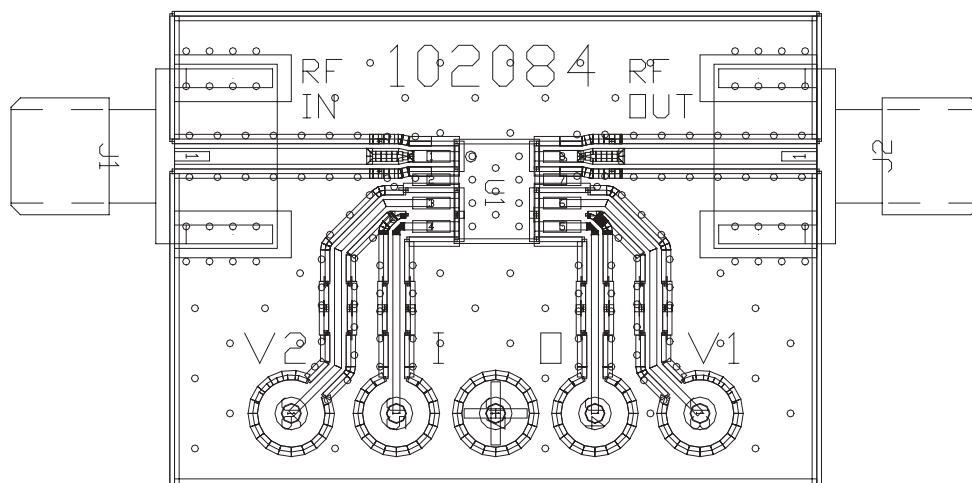
Single-Line Control Driver



External op-amp control circuit maintains impedance match while attenuation is varied. Input control ranges from 0 Volts (min. attenuation) to -2.5 Volts (max. attenuation).

GaAs MMIC SMT VOLTAGE-VARIABLE ATTENUATOR, DC - 10 GHz

Evaluation PCB for HMC121C8



The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines at the RF port should have 50 ohm impedance and the package ground leads and package bottom ground should be connected directly to the ground plane similar to that shown above. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.

List of Material

Item	Description
J1 - J2	PC Mount SMA RF Connector
J3 - J7	DC PIN
U1	HMC121C8 VVA
PCB*	102084 Eval Board
Circuit board Material: Rogers 4350	