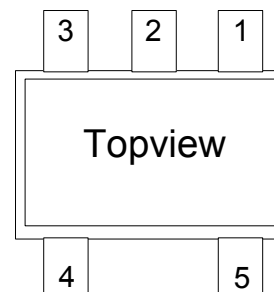


## PIN Diode $\pi$ Quad Attenuator

Rev. V4

### Features

- 4 PIN diodes in a SOT-25 Plastic Package
- Externally Selectable Bias and RF Matching Network
- 5 - 3000 MHz Useable Frequency Band
- 45 dBm IIP3 @ 1 GHz (50  $\Omega$ )
- 2.8 dB Loss @ 1 GHz (50  $\Omega$ )
- 36 dB Attenuation @ 1 GHz (50  $\Omega$ )
- Lead-Free
- RoHS\*



### Description and Applications

The MADP-007167-12250T is a wideband, moderate insertion loss, high IP3, PIN diode quad diode in a low-cost, surface mount SOT-25 package. Four PIN Diodes in one package reduce circuit parasitics and improve circuit density.

These PIN diode attenuators perform well where variable RF amplitude control is required in 50  $\Omega$  and 75  $\Omega$  circuit applications.

Wideband attenuation range, frequency flatness, and input IP3 make these devices suitable for better power level control in RF amplifiers.

### Pin Configuration<sup>2</sup>

Pin #	Function
1	RF Input
2	Series Bias
3	RF Output
4	Shunt 1 Bias
5	Shunt 2 Bias

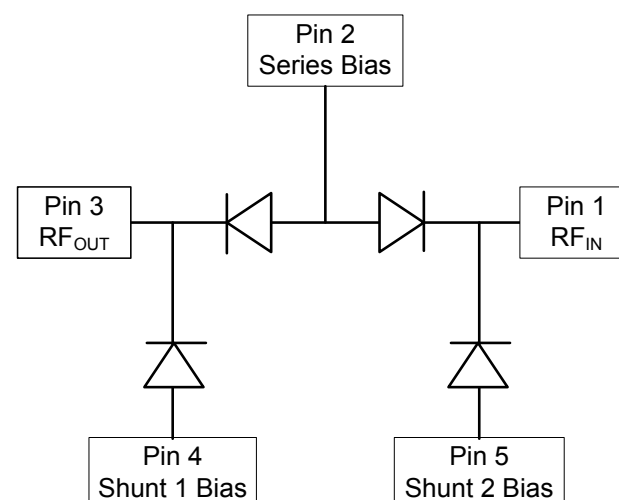
2. RF input and RF output are functionally symmetrical.

### Ordering Information<sup>1</sup>

Part Number	Package
MADP-007167-12250T	3000 piece reel

1. Reference Application Note M513 for reel size information.

### Functional Schematic



\* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

PIN Diode  $\pi$  Quad Attenuator

Rev. V4

## Electrical Specifications @ +25°C

Parameter	Condition	Unit	Typical	Max.
Reverse Current ( $I_R$ )	$V_R = 200\text{ V}$	mA	—	10
Capacitance ( $C_T$ )	$F = 1\text{ MHz}, V = 50\text{ V}$	pF	.20	.30
Resistance ( $R_S$ )	$F = 100\text{ MHz}, I = 1\text{ mA}$	$\Omega$	85	—
	$F = 100\text{ MHz}, I = 10\text{ mA}$		11	16
	$F = 100\text{ MHz}, I = 100\text{ mA}$		3	—
Minority Carrier Lifetime ( $T_L$ )	$I_F = 10\text{ mA}$	ms	2.7	—
I Region Width	—	mm	175	—

**Typical 50  $\Omega$  SOT-25 RF Performance: Freq. = 50 - 3000 MHz,  $T_A = +25^\circ\text{C}$  using Wide Band RF Circuit Design (Values Shown include Through Loss Calibrated Out of RF Test Circuit )**

Parameter	Test Conditions	Units	Typ.
Insertion Loss	13 mA / Series Diode and 3.7 V Shunt 1 and 2 Bias, $F = 1\text{ GHz}$	dB	-2.8
Return Loss	13 mA / Series Diode and 3.7 V Shunt 1 and 2 Bias, $F = 1\text{ GHz}$	dB	-15
Attenuation	0 mA / Series Diode and 3.7 V Shunt 1 and 2 Bias, $F = 1\text{ GHz}$	dB	-36
Input IP3	0 V / Series Diode and 3.7 V Shunt 1 and 2 Bias, $F_1 = 1010\text{ MHz}, F_2 = 1020\text{ MHz}$	dBm	45
Input IP3	+ 10 V / Series Diode and 3.7 V Shunt 1 and 2 Bias, $F_1 = 1010\text{ MHz}, F_2 = 1020\text{ MHz}$	dBm	43.5
Input IP3	0 V / Series Diode and 3.7 V Shunt 1 and 2 Bias, $F_1 = 110\text{ MHz}, F_2 = 120\text{ MHz}$	dBm	43.5
Input IP3	+ 10 V / Series Diode and 3.7 V Shunt 1 and 2 Bias, $F_1 = 110\text{ MHz}, F_2 = 120\text{ MHz}$	dBm	39
Settling Time	Within 1 dB of Final Attenuation Value, $F = 1\text{ GHz}$	$\mu\text{s}$	10
RF C.W. Incident Power	0 - 20 V Series Diode Bias and 3.7 V Shunt 1 and 2 Bias	dBm	+ 20

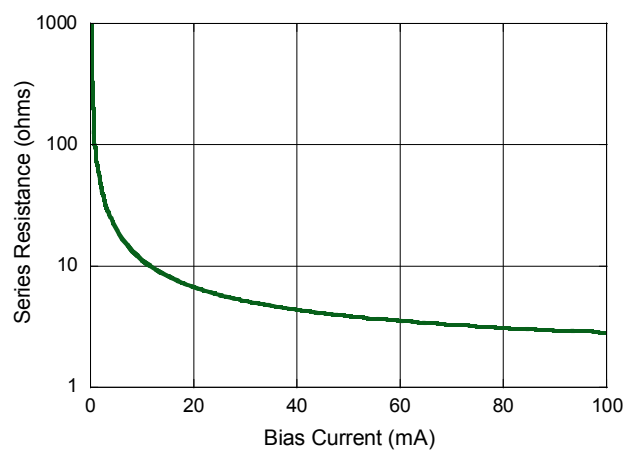
### Absolute Maximum Ratings @ +25°C<sup>3</sup>

Parameter	Absolute Maximum
Operating Temperature	-65°C to +125°C
Storage Temperature (0 mW Dissipated Power)	-65°C to +150°C
Junction Temperature	+175°C
DC Voltage @ Temperature Extremes	-200 V
DC Current per diode	200 mA
Mounting Temperature	+235°C for 10 seconds

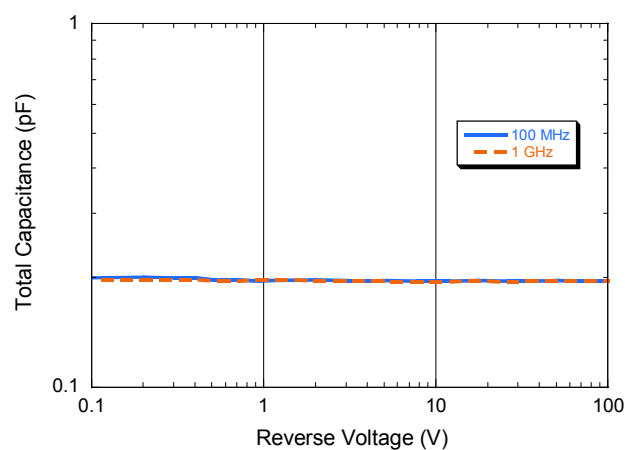
3. Exceeding these limits may cause permanent damage.

### Typical Diode Performance Curves

**Series Resistance**



**Total Capacitance**

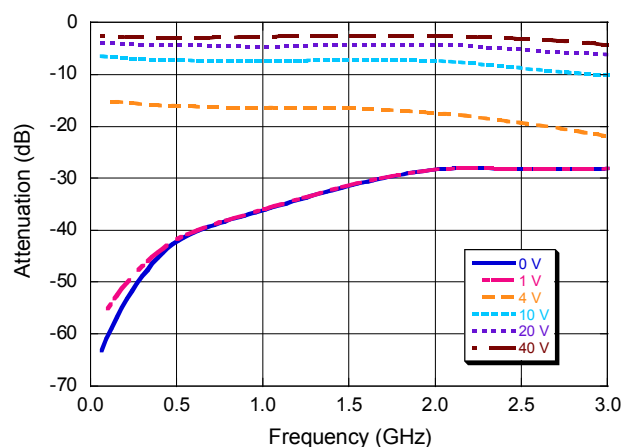


## PIN Diode $\pi$ Quad Attenuator

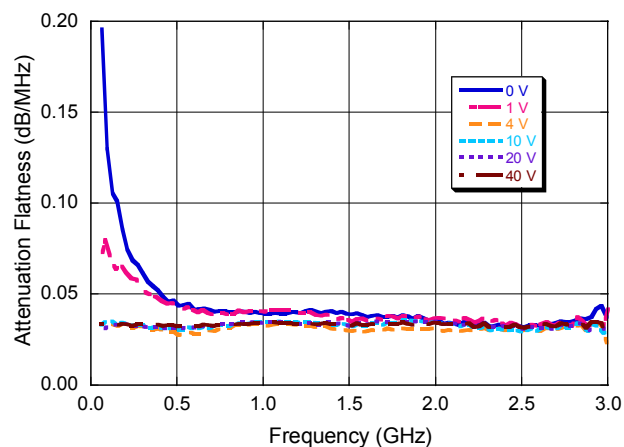
Rev. V4

### Typical Attenuator Performance

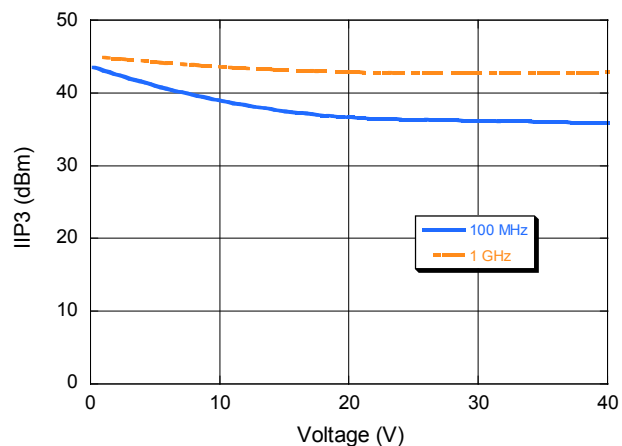
**Attenuation**



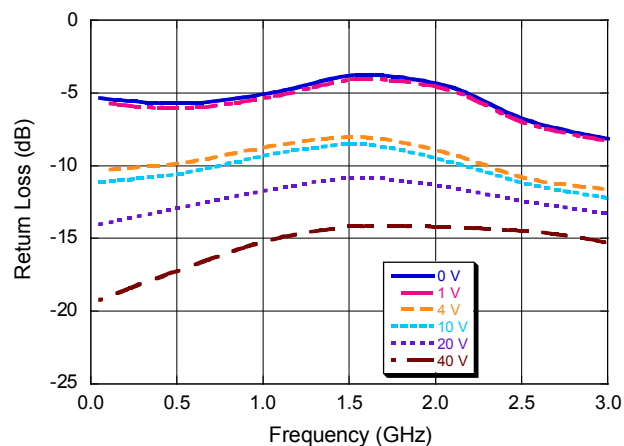
**Attenuation Flatness**



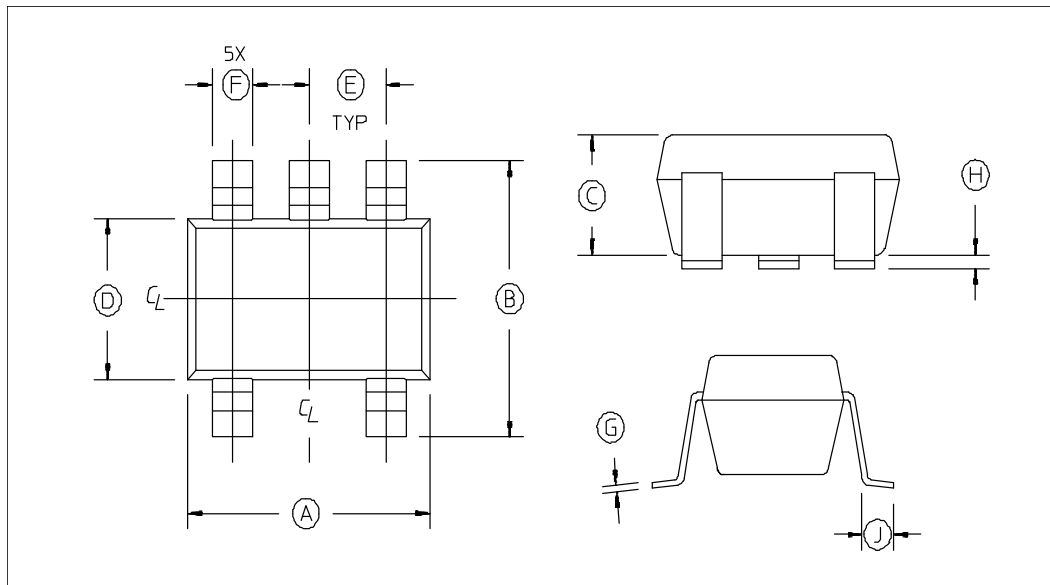
**Input IP3**



**Return Loss**



### SOT-25 (Case Style 1225)



Dim	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	.1103	.1181	2.80	3.10
B	.1023	.1181	2.6	3.00
C	0.0355	.0512	0.9	1.30
D	0.0591	.0669	1.5	1.70
E	.0374 REF.		0.95 REF.	
F	.0138	.0197	.35	.50
G	.0031	0.0079	.08	0.2
H	.0002	.0059	.05	.15
J	.0138	.0216	.35	.55

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