

- Detector Diode MMIC
- W-Band 75-110 GHz
- Lowest 1/f Noise
- Zero Bias Detector

The V1A is a tunnel diode W-band square law detector fabricated using HRL's advanced InAs/GaAsSb growth and fabrication processes that are AS9100B certified. The zero bias diode produces a DC voltage proportional to input power with high sensitivity. Linearity is excellent up to the -30 dBm input power level. Noise equivalent power is less than 1 pW/Hz^{1/2}.

Electrical Specifications, $T_A = 25^\circ\text{C}$

Specification	Symbol	Units	Min	Typical	Max
Diode Resistance	R_d	Ω	900	1400	3000
Curvature Coefficient	γ	mA/mW	15	32	
Mean Sensitivity	β_{avg}	V/mW	7	15	
Center Frequency	f_0	GHz	85	95	105
Bandwidth	$\Delta\nu$	GHz	25	35	
Return Loss	RL	dB	5	7	

$R_d = dV/dI =$ slope of DC I(V) curve at zero bias, $V=0$.

$\gamma = (d^2I/dV^2)/(dI/dV)$ at $V=0$.

$RL = -10 \log_{10}(S_{11,ave})$

Other parameters are defined as:

$$f_0 = \frac{\int_0^{\infty} \beta(f) f df}{\int_0^{\infty} \beta(f) df}, S_{11,ave} = \frac{\int_0^{\infty} |S_{11}(f)|^2 \beta(f) df}{\int_0^{\infty} \beta(f) df}, \Delta\nu = \frac{\left(\int_0^{\infty} \beta(f) df \right)^2}{\int_0^{\infty} \beta^2(f) df}, \beta_{avg} = \frac{\int_0^{\infty} \beta^2(f) df}{\int_0^{\infty} \beta(f) df}$$

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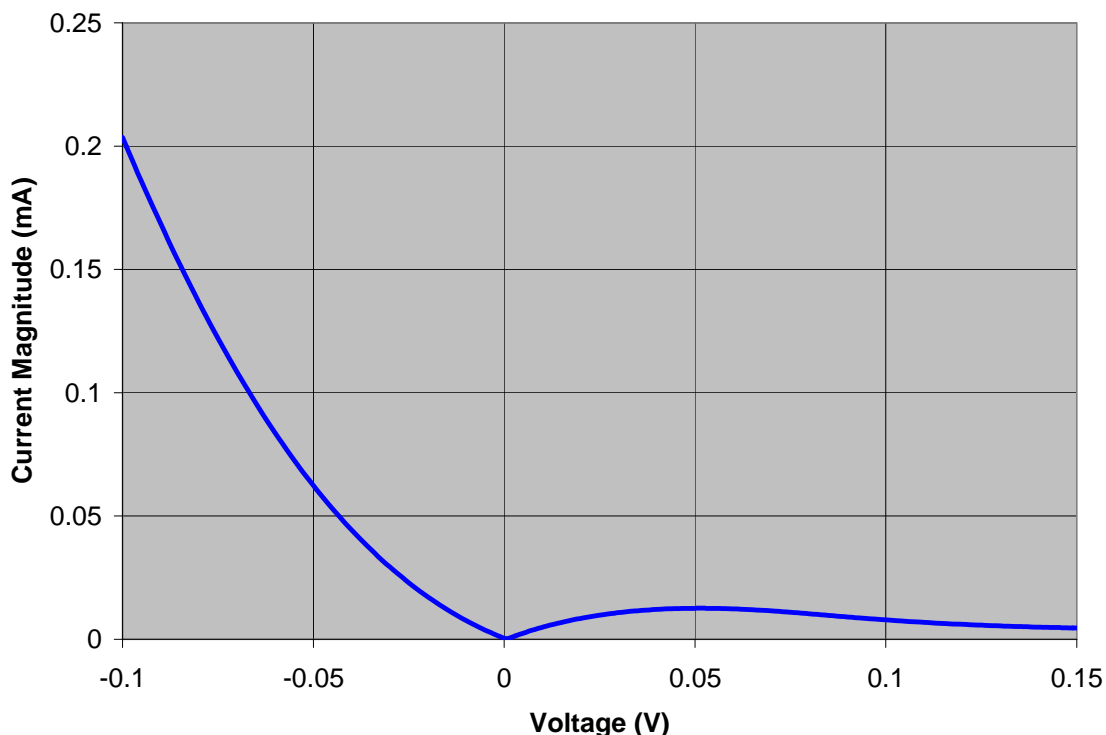
Table I Maximum Ratings

Symbol	Parameter	Value	Note
P_{IN}	Input Power	-10 dBm	
$ V_{MAX} $	DC Voltage Magnitude	0.2 V	
T_M	Mounting Temperature (30 seconds)	290	

ESD Sensitivity

Diodes are ESD sensitive. ESD preventive measures must be employed in all aspects of storage, handling, and assembly. Common causes of ESD include attaching and detaching high capacitance cables, electronic equipment that may produce power spikes, and DC voltage offsets in post-detection amplifiers.

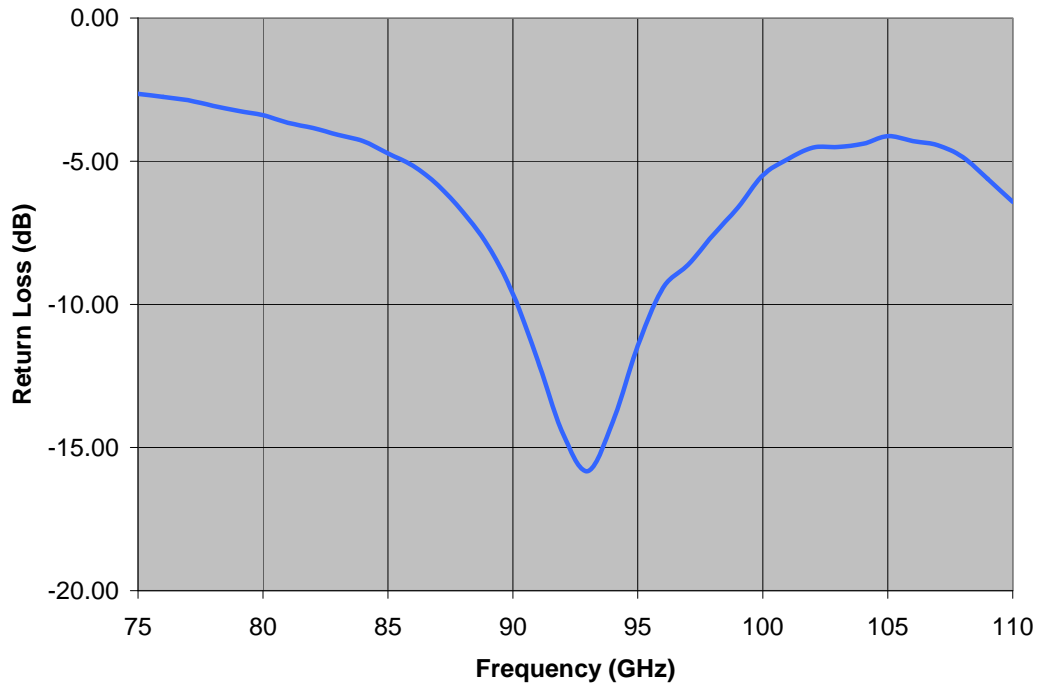
Typical DC Current Voltage Performance



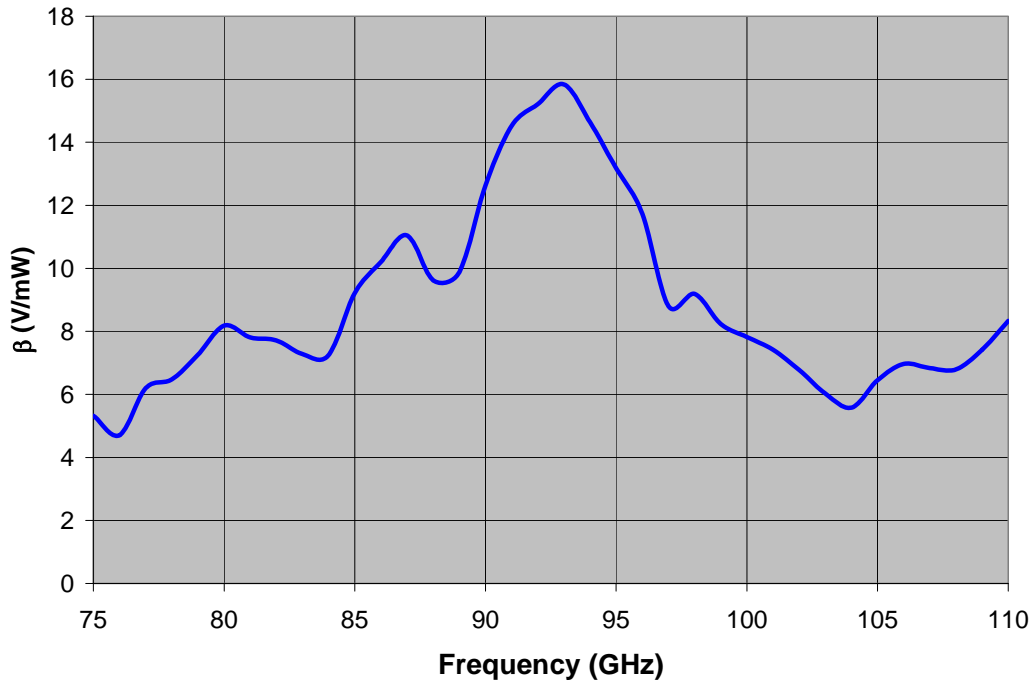
Typical Return Loss Performance

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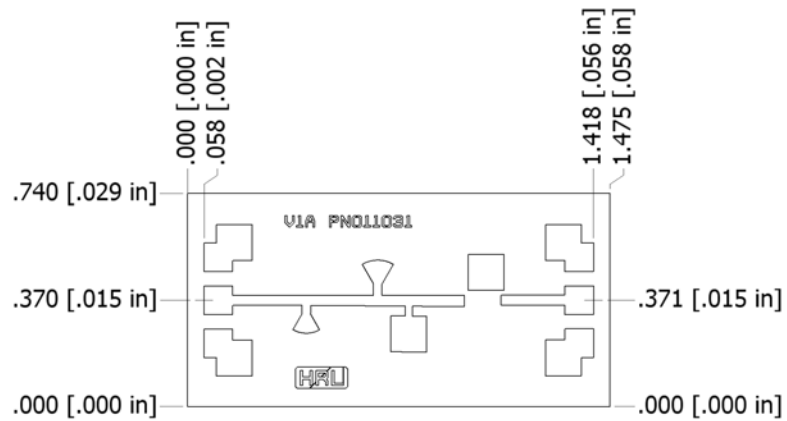
Typical Sensitivity Performance



Outline Drawing

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Bond pads are nominally 0.1mm square
 Bond pad locations shown from die edge to pad center
 Die thickness is nominally 50 um

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