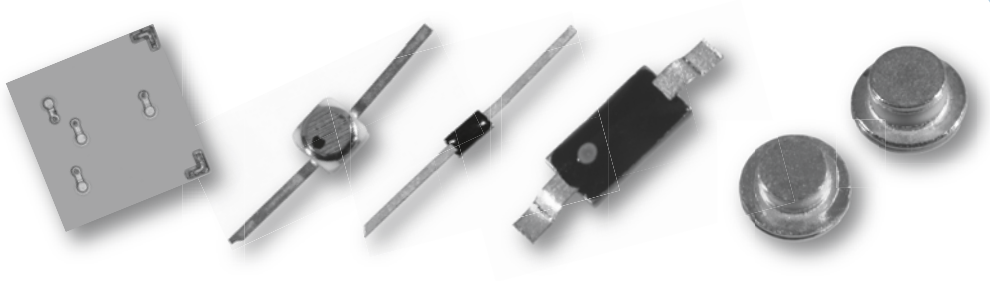
Planar Back (Tunnel) Diodes
MBD Series



Description

The MDB series of back (tunnel) diodes are fabricated on germanium substrates using passivated, planar construction and gold metallization for reliable operation up to +110 °C. Unlike the standard tunnel diode I_P is minimized for detector operation and offered in five nominal values with varying degrees of sensitivity and video impedance. The back detector is generally operated with zero bias and is known for its exellent temperature stability and fast video rise times.

Features

- Zero bias operation
- Exellent temperature stability
- Low Video Impedance
- Screening per MIL-PRF-19500 and MIL-PRF-35834 available.

Absolute Maximum Ratings

Parameters	Rating
Input Power	+14 dBm CW or Pulsed in a tuned detector
Operating Temperature	-65 °C to +110 °C
Storage Temperature	-65 °C to +125 °C
Soldering Temperature	
Chip	See chip assembly instructions on page 8
Packaged	+230 °C for 5 seconds (must be hand soldered)

Chip
Electrical Specifications, T_A = 25 °C

Model	I_P		C_J	γ	R_V	I_P / I_V	V_R	V_F	Package
	MIN µA	MAX µA	MAX pF	TYP mV / mW	TYP Ω	MIN	MIN mV	MAX mV	
MBD1057-C18	100	200	0.30	1,000	180	2.5	420	135	C18
MBD2057-C18	200	300	0.30	750	130	2.5	410	130	C18
MBD3057-C18	300	400	0.30	500	80	2.5	400	125	C18
MBD4057-C18	400	500	0.30	275	65	2.5	400	120	C18
MBD5057-C18	500	600	0.30	250	60	2.5	400	110	C18
Test Conditions			$V_R = V_V$ F = 100 MHz	P_{IN} = -20 dBm R_L = 10 KΩ F = 10 GHz			I_R = 500 µA	I_F = 3 mA	

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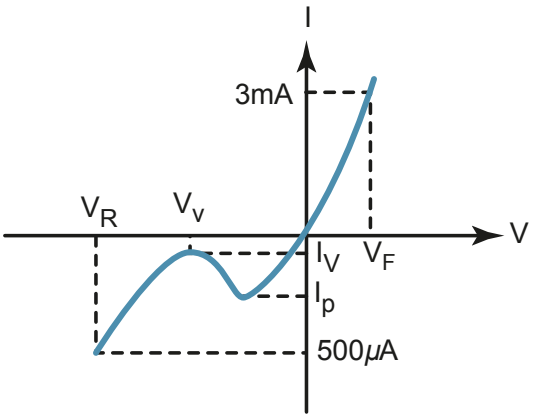
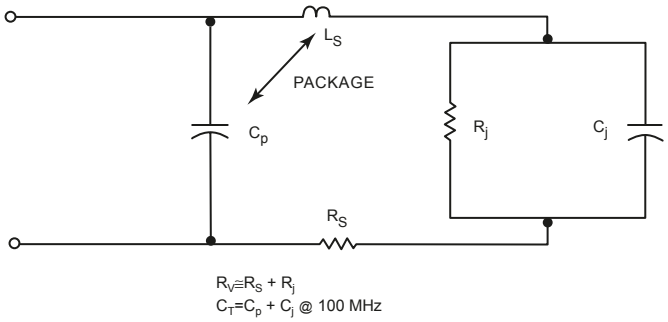
MBD Series

Back Diode Perameters



Diode Equivalent Circuit



$R_V \cong R_S + R_j$
$C_T = C_p + C_j$ @ 100 MHz

Package
Electrical Specifications, T_A = 25 °C

Model	I_P		C_T	γ	R_V	I_P / I_V	V_R	V_F	Package
	MIN μA	MAX μA	MAX pF	TYP mV / mW	TYP Ω	MIN	MIN mV	MAX mV	
MBD1057-E28 / 28X	100	200	0.40	1,000	180	2.5	420	135	E28 / 28X
MBD1057-H20	100	200	0.50	1,000	180	2.5	420	135	H20
MBD1057-T54	100	200	0.55	1,000	180	2.5	420	135	T54
MBD1057-T80	100	200	0.65	1,000	180	2.5	420	135	T80
MBD2057-E28 / 28X	200	300	0.40	750	130	2.5	410	130	E28 / 28X
MBD2057-H20	200	300	0.50	750	130	2.5	410	130	H20
MBD2057-T54	200	300	0.55	750	130	2.5	410	130	T54
MBD2057-T80	200	300	0.65	750	130	2.5	410	130	T80
MBD3057-E28 / 28X	300	400	0.45	500	80	2.5	400	125	E28 / 28X
MBD3057-H20	300	400	0.55	500	80	2.5	400	125	H20
MBD3057-T54	300	400	0.60	500	80	2.5	400	125	T54
MBD3057-T80	300	400	0.70	500	80	2.5	400	125	T80
MBD4057-E28 / 28X	400	500	0.50	275	65	2.5	400	120	E28 / 28X
MBD4057-H20	400	500	0.60	275	65	2.5	400	120	H20
MBD4057-T54	400	500	0.65	275	65	2.5	400	120	T54
MBD4057-T80	400	500	0.75	275	65	2.5	400	120	T80
MBD5057-E28 / 28X	500	600	0.55	250	60	2.5	400	110	E28 / 28X
MBD5057- H20	500	600	0.65	250	60	2.5	400	110	H20
MBD5057- T54	500	600	0.70	250	60	2.5	400	110	T54
MBD5057- T80	500	600	0.80	250	60	2.5	400	110	T80
Test Conditions			$V_R = V_V$ F= 100 MHz	P_{IN} = -20 dBm R_L = 10 KΩ F =10 GHz			I_R = 500 μA	I_F = 3 mA	

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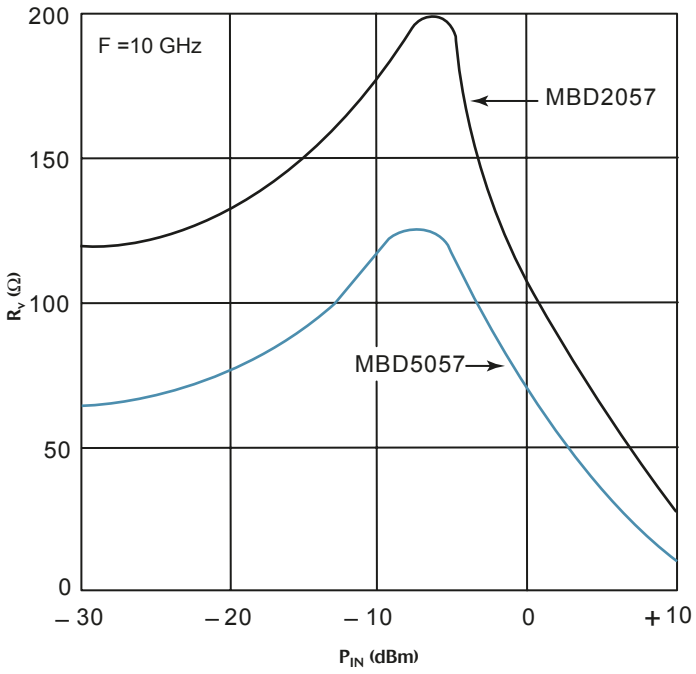
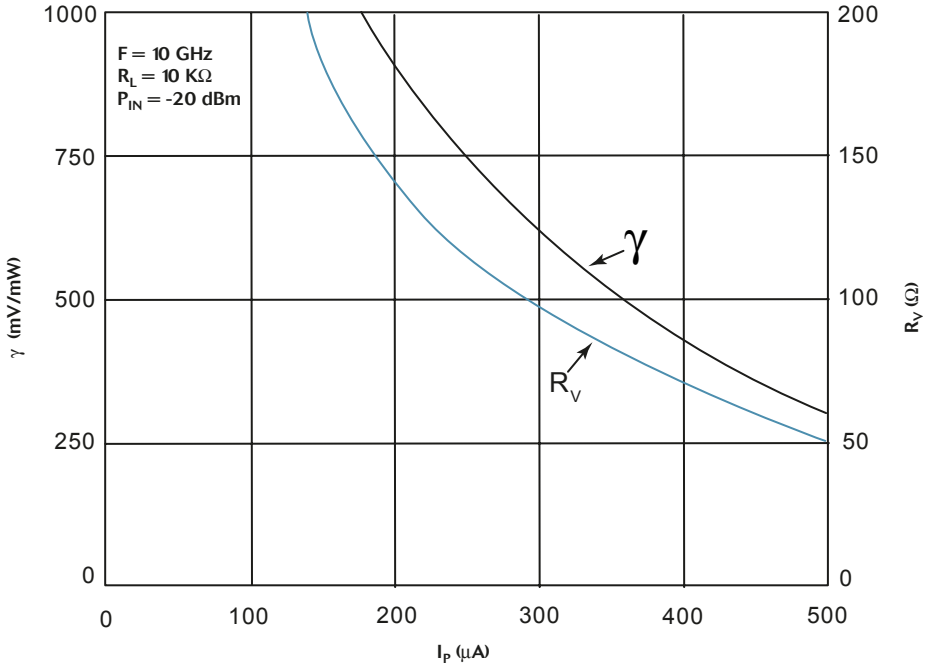
Typical Performance, $T_A = 25\ °C$

Video Resistance vs. Input Power

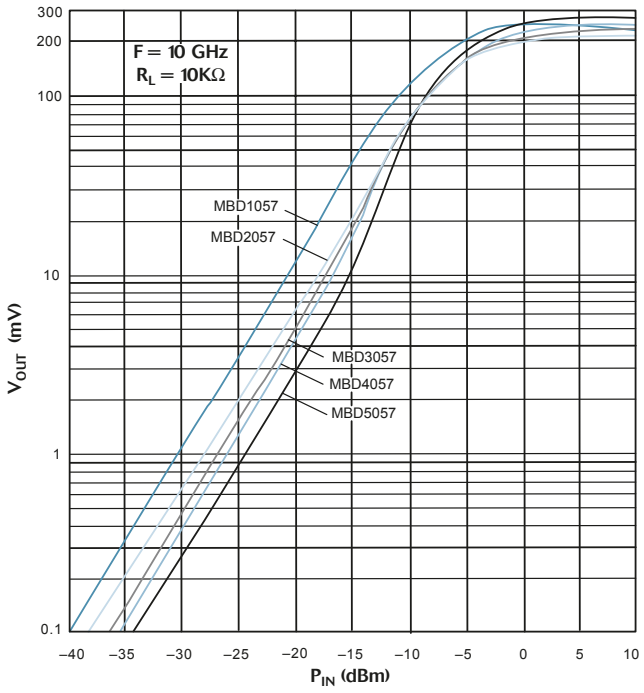


Video Impedance & Sensitivity vs. Peak Current

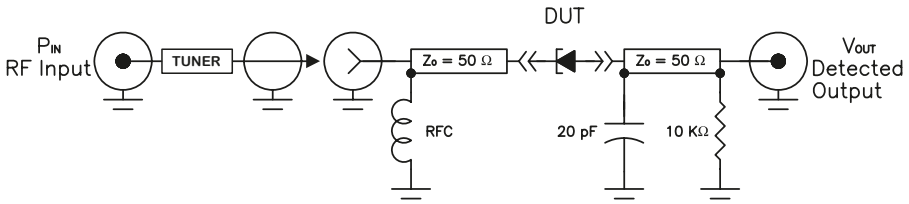


Typical Performance, $T_A = 25\ °C$,

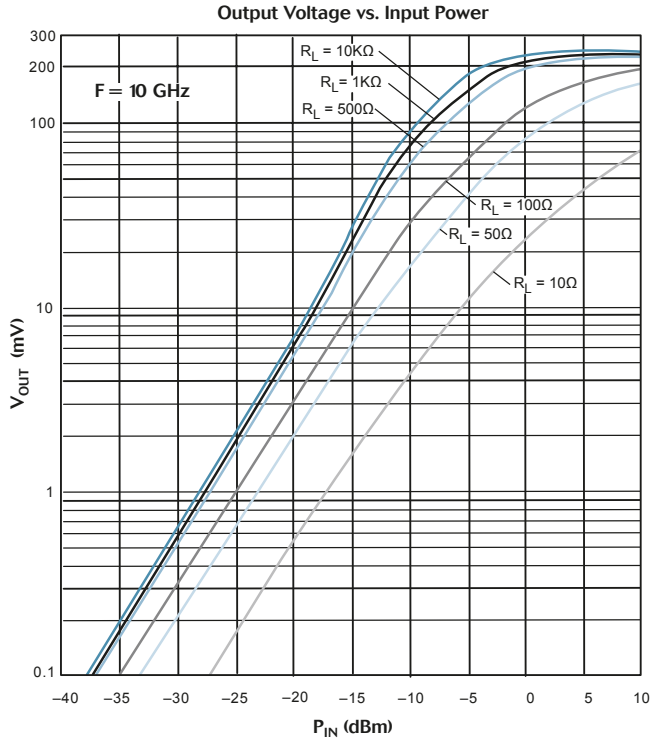
Output Voltage Vs. Input Power

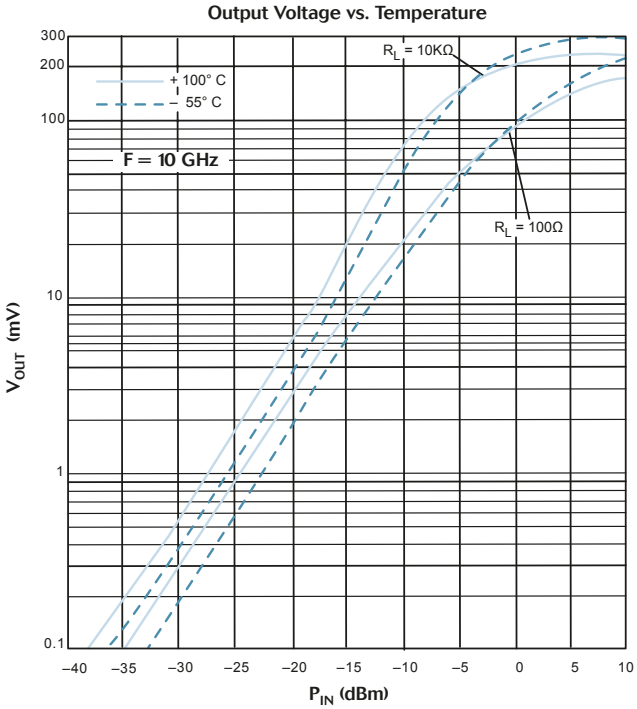


10 GHz RF Detector Test Circuit

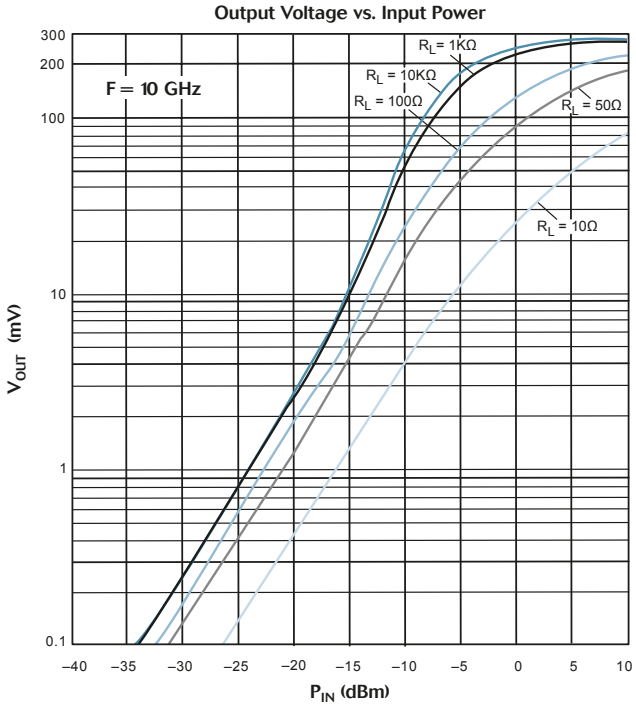


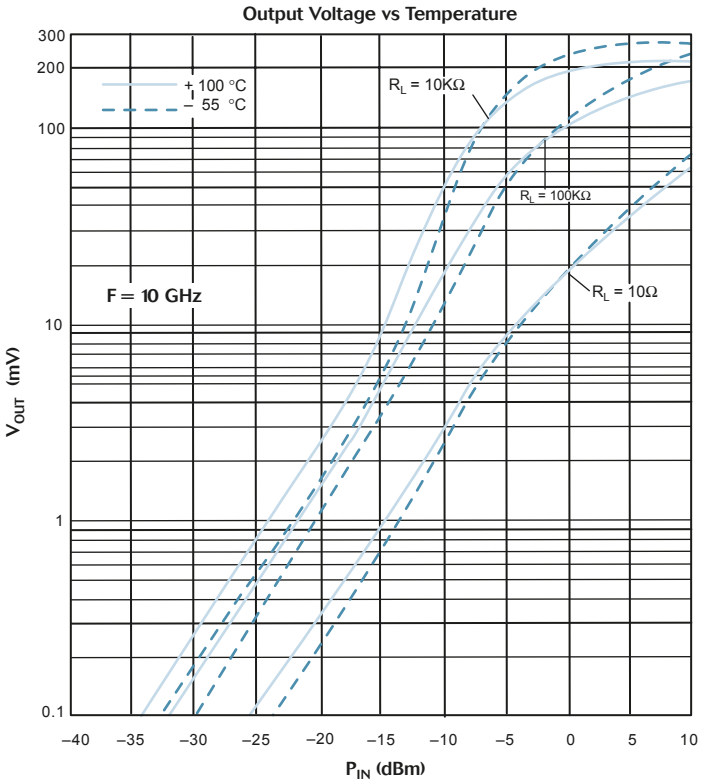
Typical Performance, T_A = 25 °C, MDB2057





Typical Performance, T_A = 25 °C, MDB5057

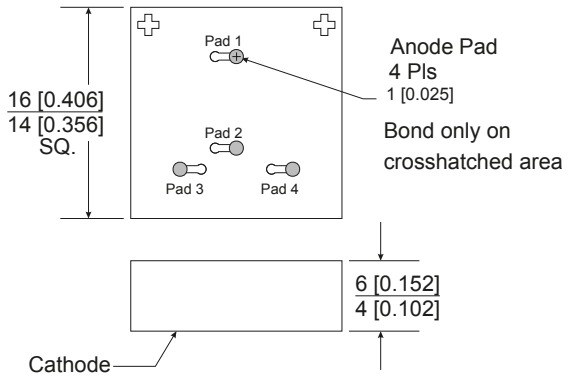




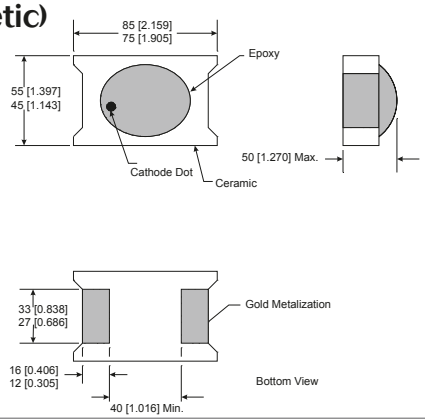
Planar Back (Tunnel) Diodes
MBD Series

Outline Drawings

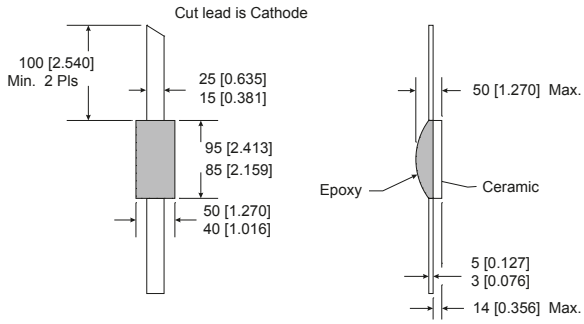
C18



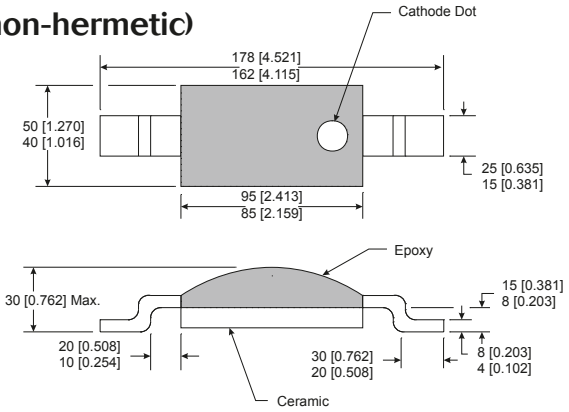
0805-2
(non-hermetic)



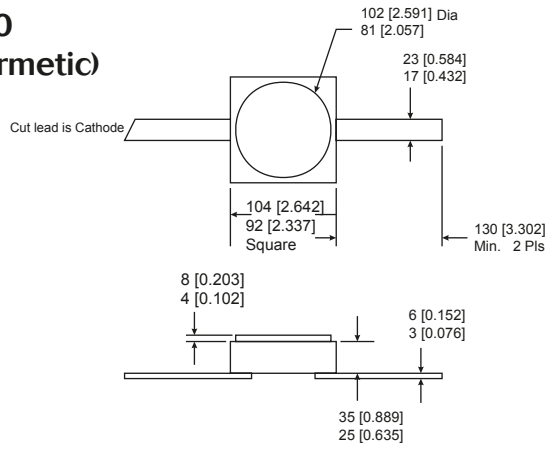
E28
(non-hermetic)



E28X
(non-hermetic)

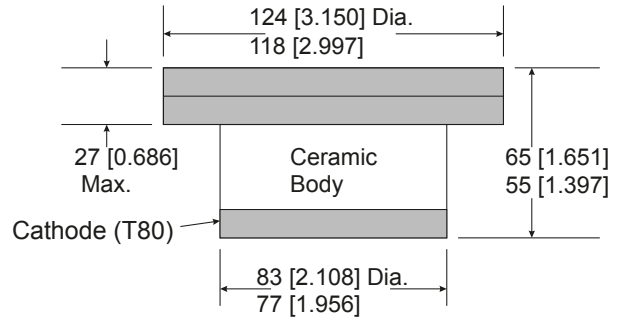


H20
(hermetic)

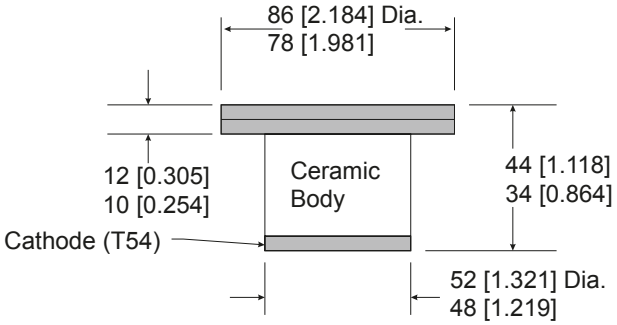


Outline Drawings (Continued)

T80
(hermetic)



T54
(hermetic)



CHIP ASSEMBLY

The germanium planar back (tunnel) diode is sensitive to mechanical pressure and high temperatures.

Die attach: Conductive epoxy only with maximum curing temperatue of +125°C

Wire Bond:0.7 mil Gold wire and thermo-compression wedge bond within the following:

Stage Temperature: +155 °C maximum for 20 seconds max
Tip Temperature: +160 °C maximum
Bonding Pressure: 20 grams maximum

Bonding is performed on the larger diameter offset bonding pad (see figure 1) and not over the junction.

figure 1

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