

# PLANAR BACK (TUNNEL) DIODES

## High Frequency Detector Series (To 18 GHz)



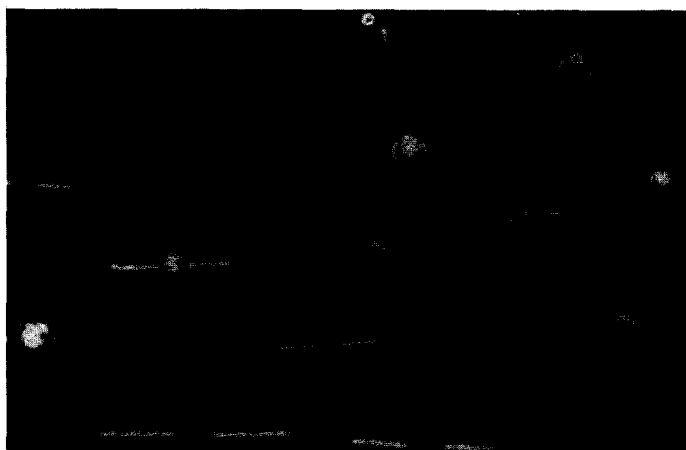
**metelics**  
CORPORATION

### FEATURES

- Rugged Germanium Planar Construction
- Excellent Temperature Stability
- No DC Bias Required
- Wide Video Bandwidth
- MIL-STD-19500 & 883 Capability

### MAXIMUM RATINGS

Storage Temperature	-65 to +125°C
Operating Temperature	-65 to +110°C
Power Handling	+17 dBm CW or 3 ERG spike
Soldering Temperature	230°C for 5 sec.

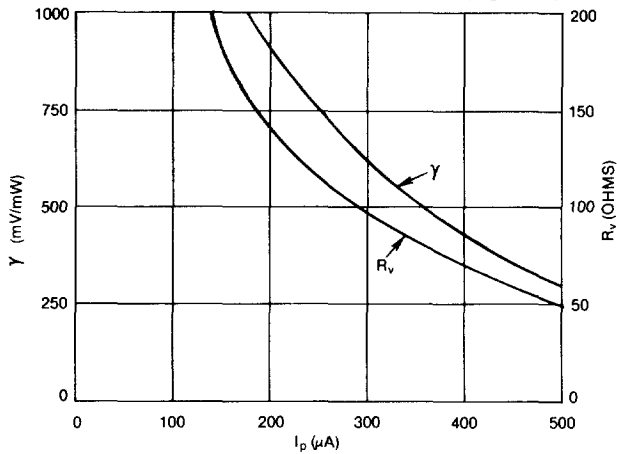


#### ELECTRICAL SPECIFICATION @ 25°C HIGH FREQUENCY SERIES (TO 18 GHz)

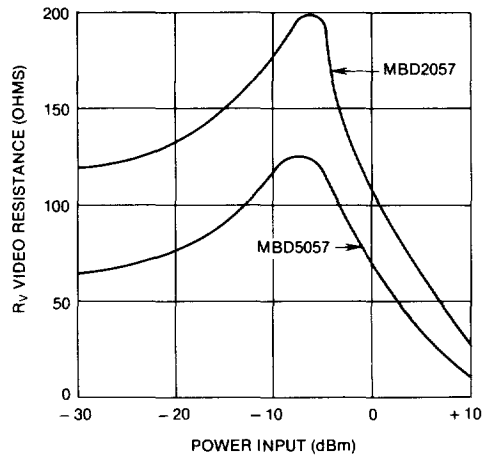
Model Outline (other packages available)	Peak Current $I_p$ (uA)		Ratio $I_p / I_V$	Reverse Voltage $V_R$ (mV)		Forward Voltage $V_F$ (mV)	Capacitance $C_T$ (pF)	Series Resistance $R_s$ (Ohms)	Detector Voltage Sensitivity (mV/mW)		Video Resistance $R_V$ (Ohms)
	Min.	Max.		Min.	Max.				Typ.	Typ.	
MBD-1057-C18	100	200	2.5	420	135	0.30	7.0	1000	180		
MBD-1057-T80	100	200	2.5	420	135	0.65	7.0	1000	180		
MBD-1057-T54	100	200	2.5	420	135	0.55	7.0	1000	180		
MBD-1057-H20	100	200	2.5	420	135	0.50	7.0	1000	180		
MBD-1057-E26	100	200	2.5	420	135	0.40	7.0	1000	180		
MBD-2057-C18	200	300	2.5	410	130	0.30	7.0	750	130		
MBD-2057-T80	200	300	2.5	410	130	0.65	7.0	750	130		
MBD-2057-T54	200	300	2.5	410	130	0.55	7.0	750	130		
MBD-2057-H20	200	300	2.5	410	130	0.50	7.0	750	130		
MBD-2057-E26	200	300	2.5	410	130	0.40	7.0	750	130		
MBD-3057-C18	300	400	2.5	400	125	0.33	7.0	500	80		
MBD-3057-T80	300	400	2.5	400	125	0.70	7.0	500	80		
MBD-3057-T54	300	400	2.5	400	125	0.60	7.0	500	80		
MBD-3057-H20	300	400	2.5	400	125	0.55	7.0	500	80		
MBD-3057-E26	300	400	2.5	400	125	0.45	7.0	500	80		
MBD-4057-C18	400	500	2.5	400	120	0.35	6.5	275	65		
MBD-4057-T80	400	500	2.5	400	120	0.75	6.5	275	65		
MBD-4057-T54	400	500	2.5	400	120	0.65	6.5	275	65		
MBD-4057-H20	400	500	2.5	400	120	0.60	6.5	275	65		
MBD-4057-E26	400	500	2.5	400	120	0.50	6.5	275	65		
MBD-5057-C18	500	600	2.5	400	110	0.40	6.5	250	60		
MBD-5057-T80	500	600	2.5	400	110	0.80	6.5	250	60		
MBD-5057-T54	500	600	2.5	400	110	0.70	6.5	250	60		
MBD-5057-H20	500	600	2.5	400	110	0.65	6.5	250	60		
MBD-5057-E26	500	600	2.5	400	110	0.55	6.5	250	60		

Test Condition:  $I_R = 500 \mu A$ ,  $I_F = 3 \text{ mA}$ ,  $f = 30 \text{ MHz}$ ,  $f = 100 \text{ MHz}$ ,  $f = 10 \text{ GHz}$ , Bias at  $V_V$ ,  $I_R = 10 \text{ mA}$ ,  $R_L = 10 \text{ Kohm}$ ,  $P_{IN} = -20 \text{ dBm}$ , Untuned

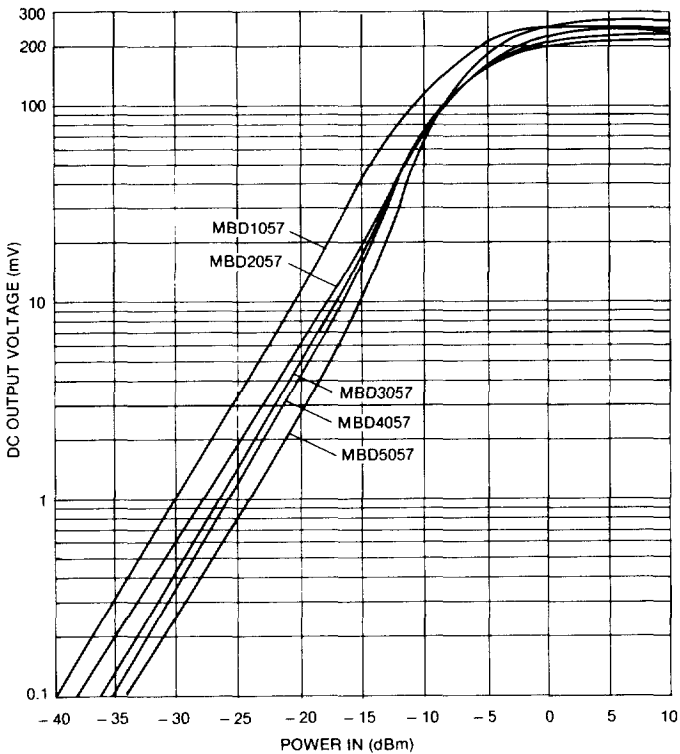
TYPICAL DETECTOR SENSITIVITY ( $\gamma$ ) and VIDEO IMPEDANCE ( $R_v$ ) vs. PEAK CURRENT ( $I_p$ )  
 $f = 10 \text{ GHz}$ ,  $-20 \text{ dBm}$ ,  $50 \text{ ohm}$  untuned broadband circuit,  $R_L = 10 \text{ K}\Omega$ ,  $25^\circ\text{C}$



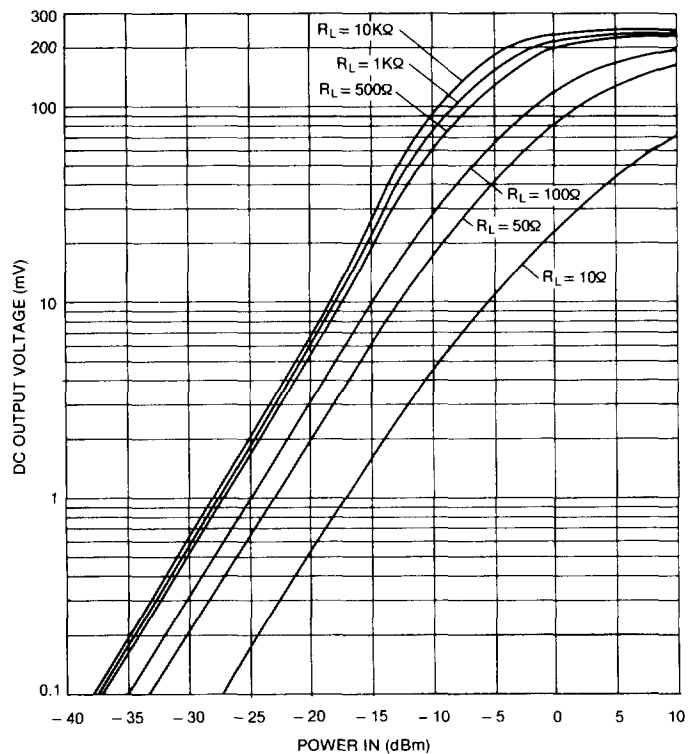
TYPICAL  $R_v$  vs. DRIVE LEVEL  
 $f = 10 \text{ GHz}$ ,  $50 \text{ ohm}$  untuned circuit,  $25^\circ\text{C}$



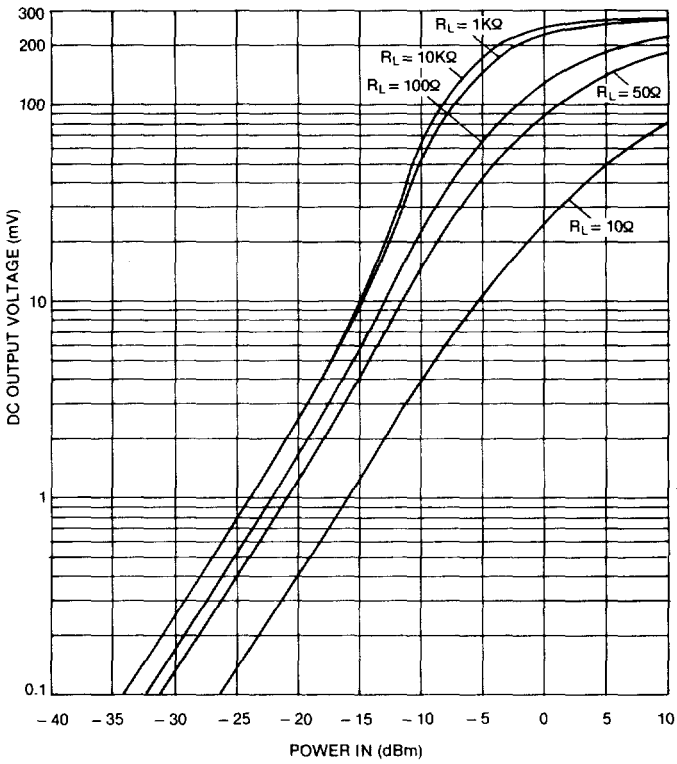
TYPICAL DETECTOR OUTPUT VOLTAGE vs. INPUT POWER  
 $f = 10 \text{ GHz}$ ,  $R_L = 10 \text{ K}\Omega$ ,  $50 \text{ ohm}$  untuned circuit,  $25^\circ\text{C}$



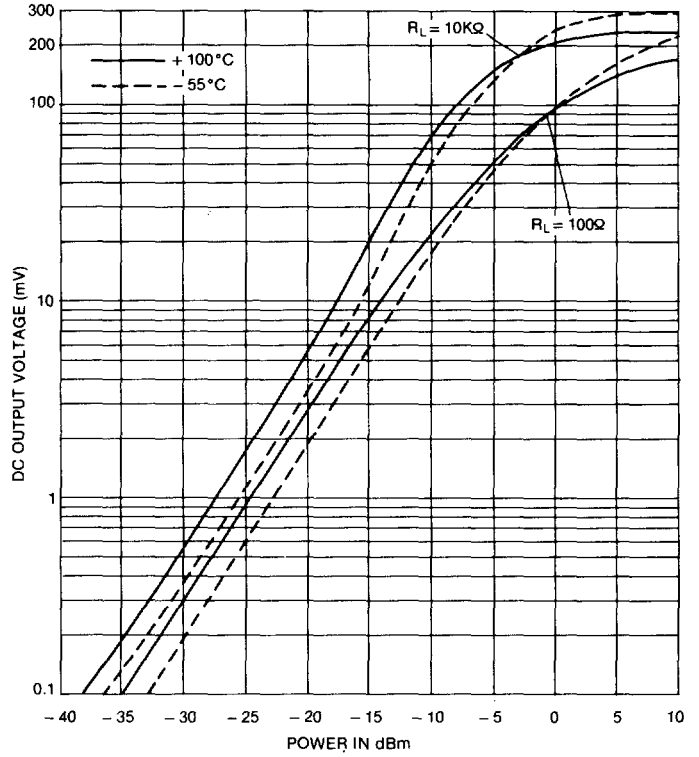
MBD2057  $V_{OUT}$  vs.  $P_{IN}$  for various load resistors  
 $f = 10 \text{ GHz}$ ,  $50 \text{ ohm}$  untuned circuit,  $25^\circ\text{C}$



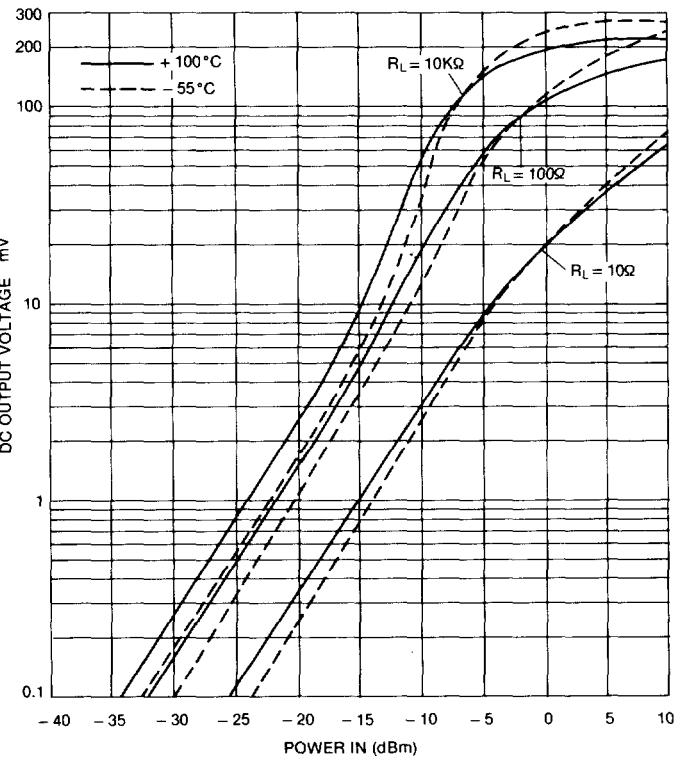
MBD5057  $V_{OUT}$  vs.  $P_{IN}$  for various load resistors  
 $f = 10$  GHz, 50 ohm untuned circuit, 25°C



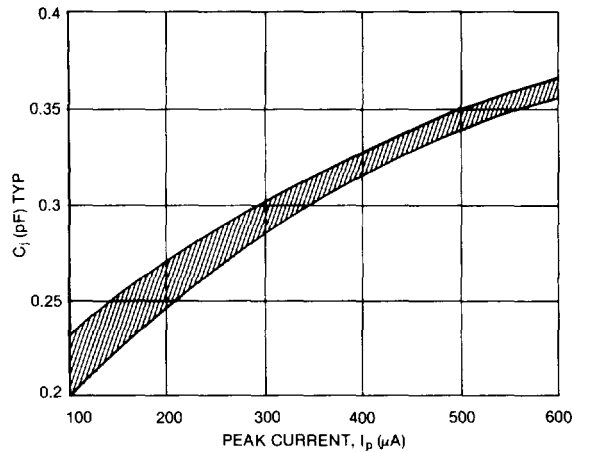
MBD2057  $V_{OUT}$  vs.  $P_{IN}$  TEMPERATURE CURVES  
 $f = 10$ GHz, 50 ohm untuned circuit

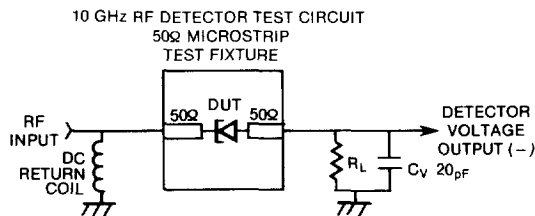


MBD5057  $V_{OUT}$  vs.  $P_{IN}$  TEMPERATURE CURVES  
 $f = 10$  GHz, 50 ohm untuned circuit

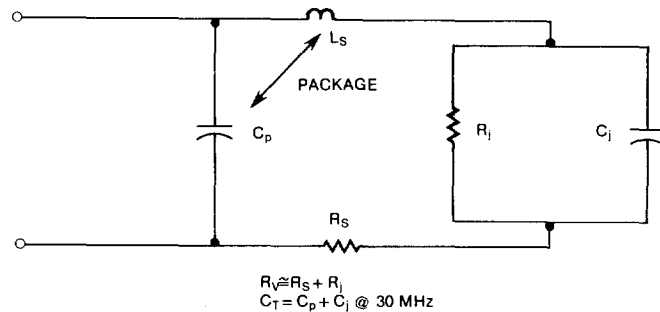


TYPICAL JUNCTION CAPACITANCE vs. PEAK CURRENT

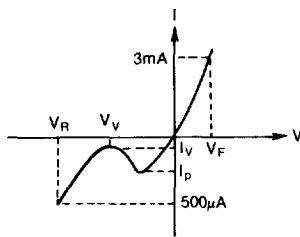




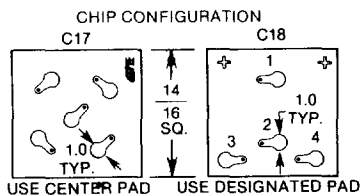
DIODE EQUIVALENT CIRCUIT



BACK DIODE PARAMETERS



**POLARITY:** FOR DETECTOR APPLICATIONS  
HEAT SINK IS CATHODE  
DIE BONDING PAD IS ANODE



1. Dimensions in mils
2. Thickness 4 to 6 mils
3. Pads and backside are gold

## CHIP ASSEMBLY

The alloyed junction of the germanium planar tunnel (or back diode) is sensitive to mechanical pressure and high temperatures. Thus it must be handled as follows (as an example):

**Die attach: Epoxy only: less than 125°C cure temperature recommended.**

**Wire Bond: 160°C base 160°C capillary temperature, pressure less than 20 grams. A wedge bond is done on an off-set bonding pad. Bonding should not be done directly over the junction. Bond wire angle should leave small end of pad visually clear to assure junction is not bonded over.**

CAUTION: STATIC SENSITIVE DEVICES

