

Schottky Barrier Diodes for Stripline, Microstrip Mixers and Detectors

Technical Data

5082-2200/01/02/03
5082-2207/08/09/10
5082-2765/66
5082-2774/75
5082-2785/86
5082-2794/95

Features

- **Small Size**
- **Low Noise Figure**
6 dB Typical at 9 GHz
- **Rugged Design**
- **High Uniformity**
- **High Burnout Rating**
1 W RF Pulse Power Incident
- **Both Medium and Low Barrier Available**

Description/ Applications

This family consists of medium barrier and low barrier beam lead diodes mounted in easily handled carrier packages. Low barrier diodes provide optimum noise figure at low local oscillator drive levels. Medium barrier diodes provide a wider dynamic range for lower distortion mixer designs. Application Note 976 presents impedance matching techniques for an X-Band mixer.

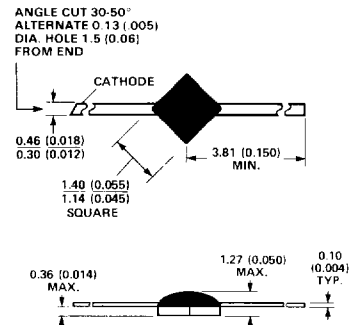
Package Characteristics

These diodes are designed for microstrip and stripline use. The kovar leads provide good continuity of transmission line impedance to the diode. Outline C2 is a plastic on ceramic package. Outline H2 has a metal ceramic hermetic seal.

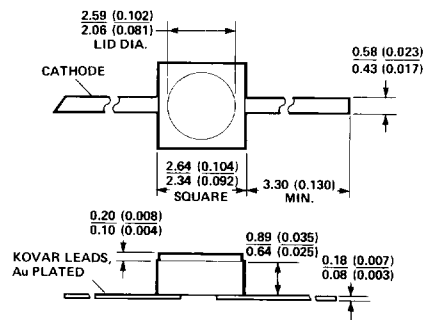
The ceramic is alumina. Metal parts are gold plated kovar.

The hermetic package, outline H2, is capable of passing many

of the environmental tests of MIL-STD-750. The applicable solderability test is reference 2031.1: 260°C, 10 seconds.



Outline C2
 $C_p = 0.055$ pF



Outline H2
 $C_p = 0.175$ pF

DIMENSIONS IN MILLIMETERS AND (INCHES).

Maximum Ratings

Operating and Storage Temperature Range

C2 Packaged Diodes -65°C to +150 °C

H2 Packaged Diodes -65°C to +175 °C

Pulse Power Incident at $T_{CASE} = 25^{\circ}C$ 1 W
(1 μs pulse, $D_u = 0.001$)

CW Power Dissipation at $T_{CASE} = 25^{\circ}C$

(Measured in an infinite heat sink) 125 mW

Derate linearly to zero at maximum operating temperature.

Diode Mounting Temperature in Packages

C2 235°C for 10 sec max.

H2 260°C for 10 sec max.

Peak Inverse Voltage 4 V

These diodes are ESD sensitive. Handle with care to avoid static discharge through the diode.

RF Electrical Specifications at $T_A = 25^{\circ}C$

Part Number 5082-	Batch Matched* 5082-	Test Freq. (GHz)	Barrier	Maximum Noise Figure NF (dB)	IF Impedance Z_{IF} (Ω)		Maximum SWR	Package	Typical Junction Capacitance C_j (pF)
					Min.	Max.			
2200	2201	9.375	Medium	6.0	200	400	1.5:1	Hermetic H2	0.18
2202	2203		Medium	6.5			2.0:1		
2765	2766		Low	6.0	150	350	1.5:1		
2785	2786		Low	6.5			2.0:1		
2207	2208	9.375	Medium	6.0	200	400	1.5:1	Broadband C2	0.18
2209	2210		Medium	6.5			2.0:1		
2774	2775		Low	6.0	150	350	1.5:1		
2794	2795		Low	6.5			2.0:1		
Test Conditions	$\Delta NF \leq 0.3$ dB $\Delta Z_{IF} \leq 25$ Ω				DC Load Resistance = 0 Ω L.O. Power = 1 mW IF = 30 MHz, 1.5 dB NF				V = 0

*Minimum batch size 20 units.

Typical Detector Characteristics at $T_A = 25^{\circ}C$

Medium Barrier and Low Barrier (DC Bias)

Parameter	Symbol	Typical Value	Units	Test Conditions
Tangential Sensitivity	T_{SS}	-54	dBm	20 μA Bias, $R_L = 100$ k Ω $P_{in} = -40$ dBm Video Bandwidth = 2 MHz $f = 10$ GHz
Voltage Sensitivity	γ	6.6	mV/ μW	
Video Resistance	R_V	1400	Ω	

Low Barrier (Zero Bias)

Parameter	Symbol	Typical Value	Units	Test Conditions
Tangential Sensitivity	T_{SS}	-44	dBm	Zero Bias, $R_L = 10$ M Ω $P_{in} = -30$ dBm Video Bandwidth = 2 MHz $f = 10$ GHz
Voltage Sensitivity	γ	10	mV/ μW	
Video Resistance	R_V	1.8	M Ω	

Typical Parameters

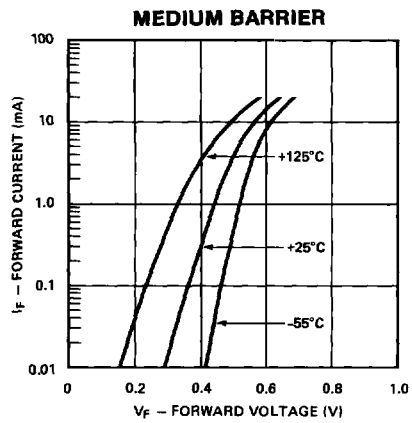


Figure 1. Typical Forward Characteristics.

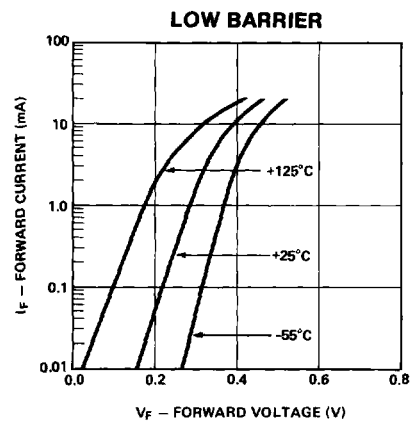


Figure 2. Typical Forward Characteristics.

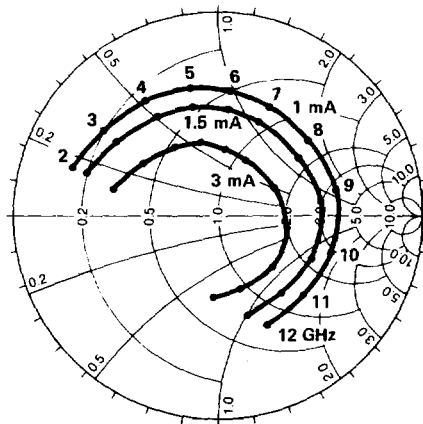


Figure 3. Typical Admittance Characteristics, 5082-2200 and 5082-2765 with Self Bias.

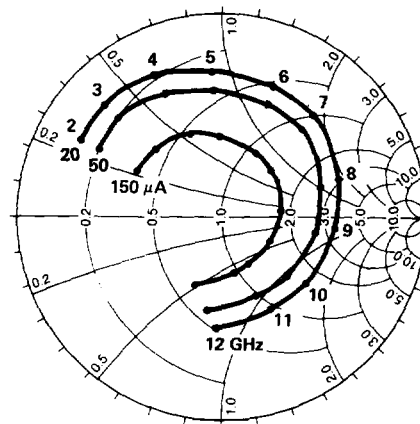


Figure 4. Typical Admittance Characteristics, 5082-2200 and 5082-2765 with External Bias.

Typical Parameters (cont.)

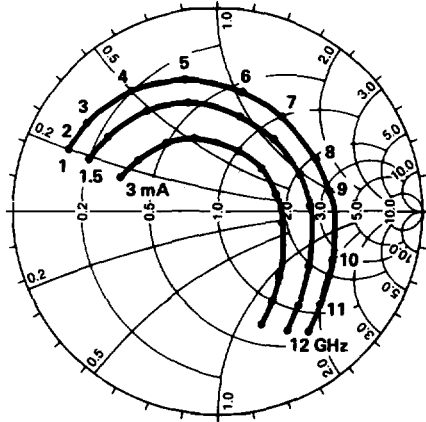


Figure 5. Typical Admittance Characteristics, 5082-2203 and 5082-2785 with Self Bias.

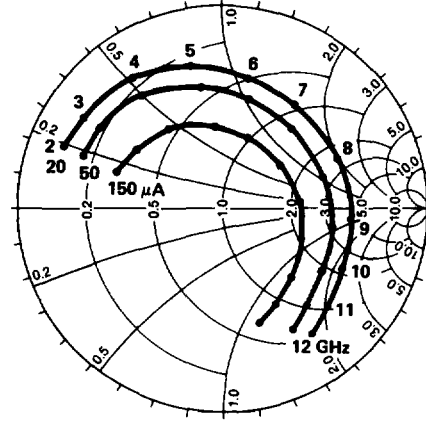


Figure 6. Typical Admittance Characteristics, 5082-2203 and 5082-2785 with External Bias.

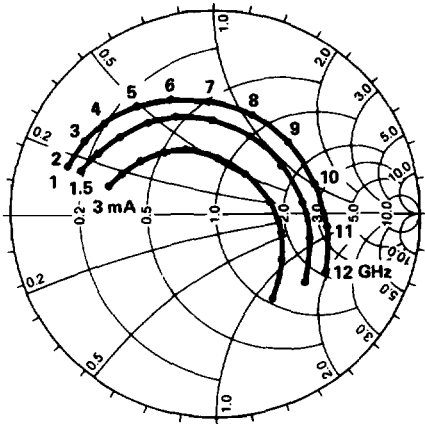


Figure 7. Typical Admittance Characteristics, 5082-2207 and 5082-2774 with Self Bias.

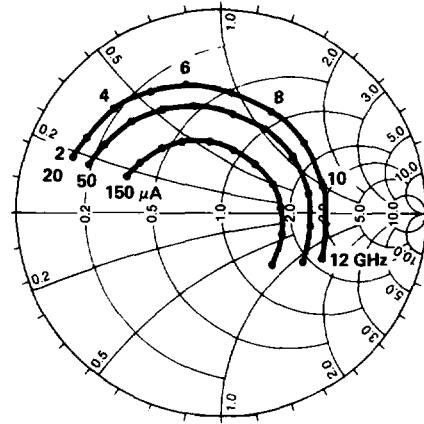


Figure 8. Typical Admittance Characteristics, 5082-2207 and 5082-2774 with External Bias.

Typical Parameters (cont.)

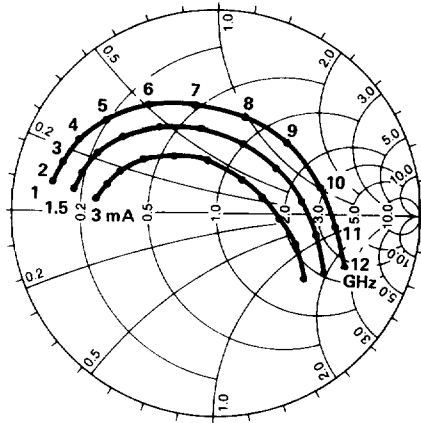


Figure 9. Typical Admittance Characteristics, 5082-2209 and 5082-2794 with Self Bias.

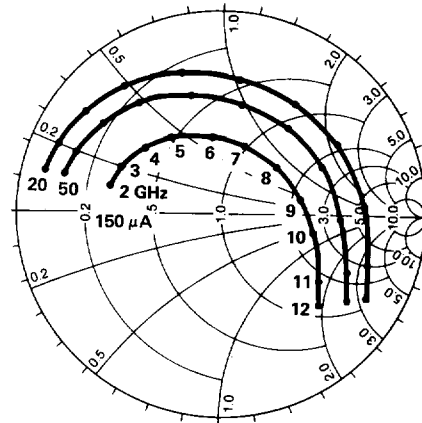


Figure 10. Typical Admittance Characteristics, 5082-2209 and 5082-2794 with External Bias.

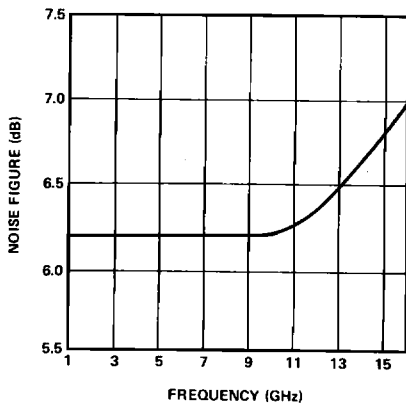


Figure 11. Typical Noise Figure vs. Frequency for 5082-2209, -2794.

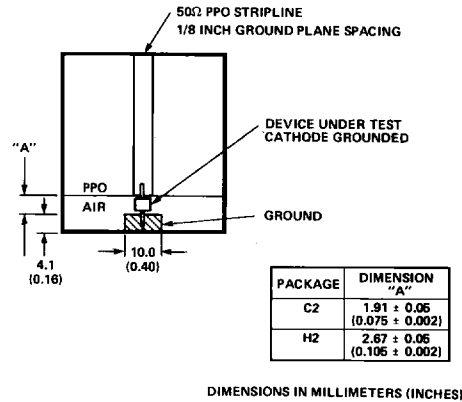
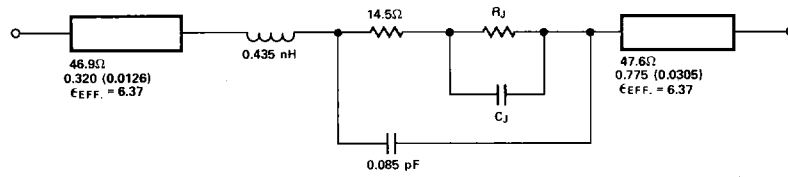


Figure 12. Admittance Test Circuit.

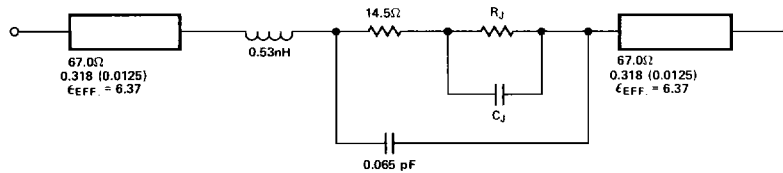
MODEL FOR H2 DIODES



DIMENSIONS IN MILLIMETERS (INCHES)

Parameter	Symbol	1 mA Rect. Current	20 μ A Ext. Bias	Units
		5082-2200, 5082-2765	5082-2200, 5082-2765	
Junction Resistance	R_J	258	545	Ω
Junction Capacitance	C_J	0.255	0.302	pF

MODEL FOR C2 DIODES



DIMENSIONS IN MILLIMETERS (INCHES)

Parameter	Symbol	1 mA Rect. Current	20 μ A Ext. Bias	Units
		5082-2207, 5082-2774	5082-2207, 5082-2774	
Junction Resistance	R_J	338	421	Ω
Junction Capacitance	C_J	0.189	0.195	pF