Agilent Technologies
Innovating the HP Way

Schottky Barrier Diodes for Stripline, Microstrip Mixers and Detectors

Technical Data

5082-2207/09
5082-2794

Features

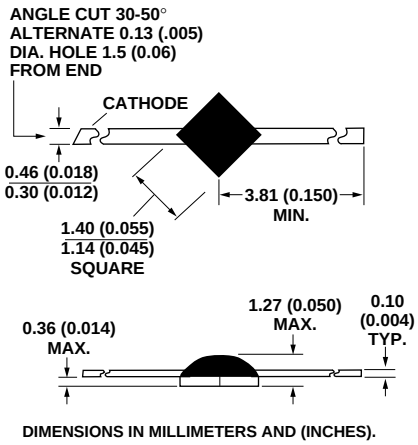
- **Small Size**
- **Low Noise Figure**
  6 dB Typical at 9 GHz
- **Rugged Design**
- **High Uniformity**
- **High Burnout Rating**
  1 W RF Pulse Power Incident
- **Both Medium and Low Barrier Available**

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. The ceramic is alumina.

Outline C2

C_p = 0.055 pF



DIMENSIONS IN MILLIMETERS AND (INCHES).

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 design techniques for an X-Band mixer.

Note:
For new designs, the HSMS-286X and HSMS-820X series of surface mount microwave diodes are recommended.

Maximum Ratings

Operating and Storage Temperature Range
C2 Packaged Diodes ..... -65°C to +150 °C
Pulse Power Incident at T_{CASE} = 25°C ..... 1 W
(1 µs pulse, Du = 0.001)
CW Power Dissipation at T_{CASE} = 25°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.
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°C

Part Number 5082-	Test Freq. (GHz)	Barrier	Maximum Noise Figure NF (dB)	IF Impedance Z_{IF} (Ω) Min.	Max.	Maximum SWR	Package	Typical Junction Capacitance C_j (pF)
2207 2209	9.375	Medium Medium	6.0 6.5	200	400	1.5:1 2.0:1	Broadband C2	0.18
2794		Low	6.5	150	350	2.0:1		
Test Conditions			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°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 KΩ 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 MΩ P_{in} = - 30 dBm Video Bandwidth = 2 MHz f = 10 GHz
Voltage Sensitivity	γ	10	mV/µW	
Video Resistance	R_V	1.8	MΩ	

SPICE Parameters

Parameter	Units	5082-2207 5082-2209	5082-2794
B_V	V	5	5
C_{J0}	pF	0.20	0.20
E_G	eV	0.69	0.69
I_{BV}	A	10E-5	10E-5
I_S	A	3 x 10E-10	4 x 10E-8
N		1.08	1.08
R_S	Ω	5	6
P_B	V	0.65	0.5
P_T		2	2
M		0.5	0.5

Typical Parameters

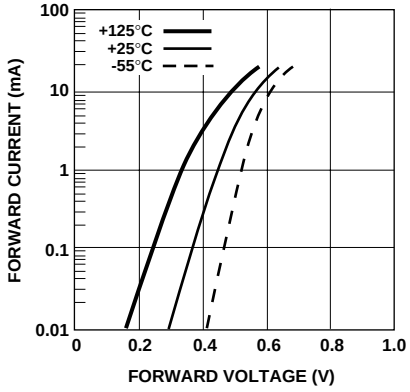


Figure 1. Typical Forward Characteristics for Medium Barrier Diodes.

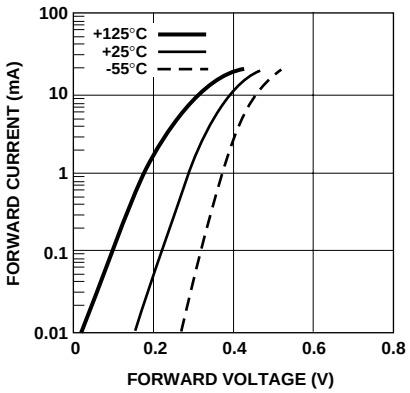


Figure 2. Typical Forward Characteristics for Low Barrier Diodes.

Typical Parameters, continued

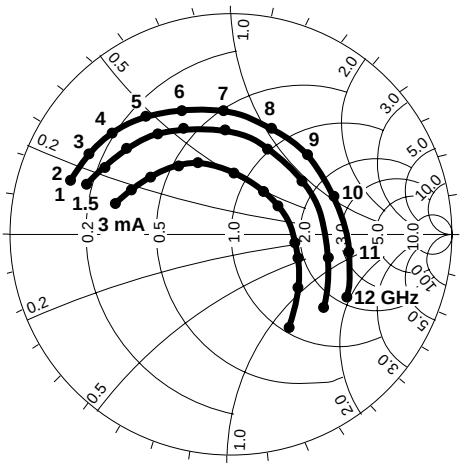


Figure 3. Typical Admittance Characteristics, 5082-2207 with Self Bias.

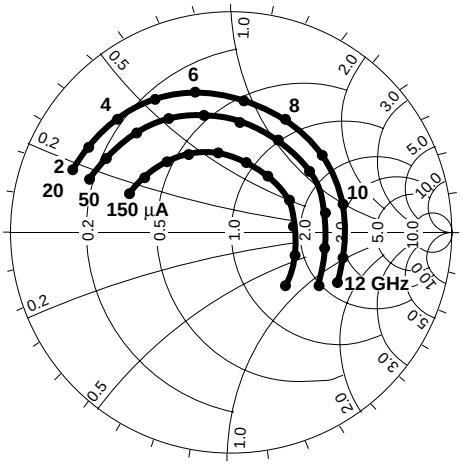


Figure 4. Typical Admittance Characteristics, 5082-2207 with External Bias.

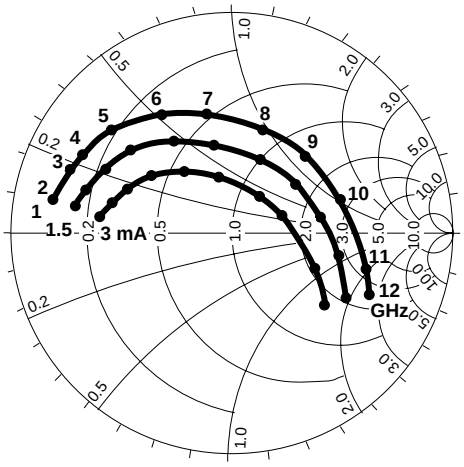


Figure 5. Typical Admittance Characteristics, 5082-2209 and 5082-2794 with Self Bias.

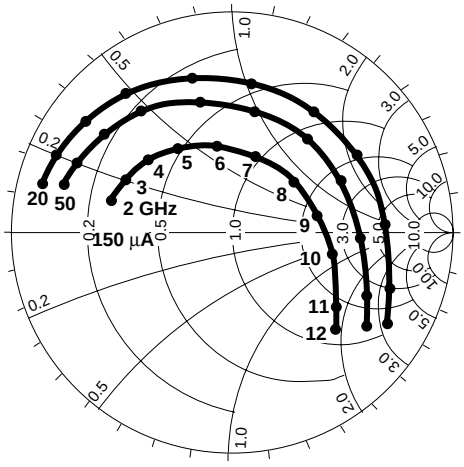


Figure 6. Typical Admittance Characteristics, 5082-2209 and 5082-2794 with External Bias.

Typical Parameters, continued

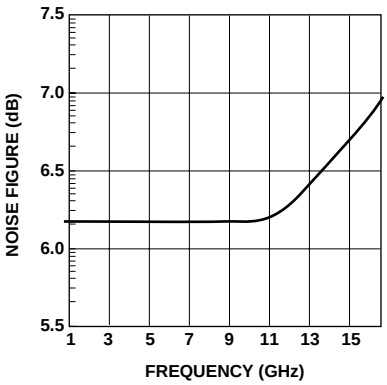
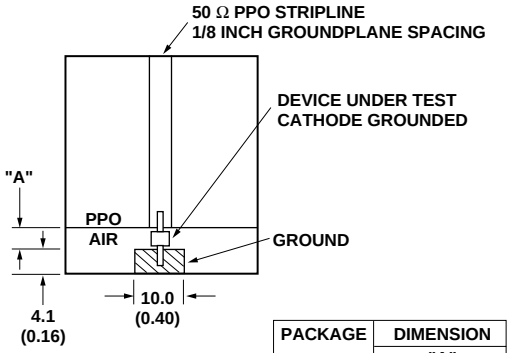


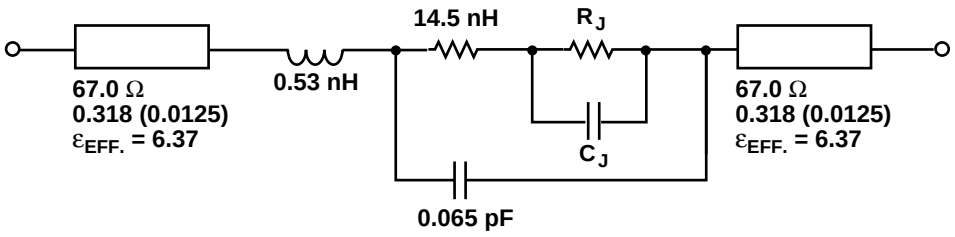
Figure 7. Typical Noise Figure vs. Frequency for 5082-2209, -2794.



PACKAGE	DIMENSION "A"
C2	1.91 ± 0.05 (0.075 ± 0.002)
H2	2.67 ± 0.05 (0.105 ± 0.002)

Figure 8. Admittance Test Circuit.

MODEL FOR C2 DIODES



DIMENSIONS IN MILLIMETERS (INCHES)

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

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Data subject to change.

Obsoletes 5965-8846E
5967-5814E (11/99)