

Hermetic Schottky Diodes for Mixers and Detectors (1-18 GHz)

Technical Data

HSCH-6000 Series

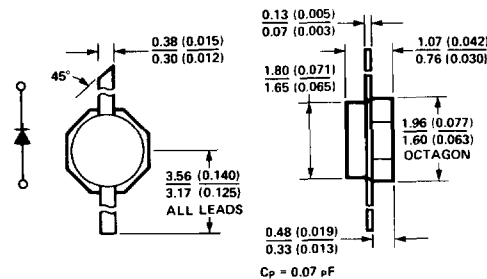
Features

- **Low Parasitic Hermetic Package**
 - High Frequency Performance
 - Meets Performance Standards of Space Level Testing
- **Lead Forming Option**
 - No Board Drilling Required
- **Rugged Construction**
 - MIL-STD-750 Compliance
- **High Uniformity**
 - Tightly Controlled Process
 - Insures Consistent Performance
- **Silicon Nitride Passivation, Tri-Metallization**
 - Stable High Temperature Performance

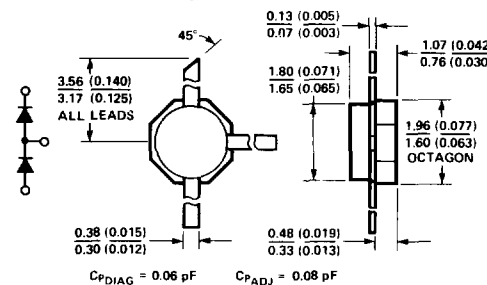
Description

These Schottky barrier diodes are fabricated by advanced epitaxial techniques. Precise process control insures uniformity and repeatability of this planar beam lead microwave semiconductor. A nitride passivation layer provides immunity from contaminants which could otherwise lead to I_R drift.

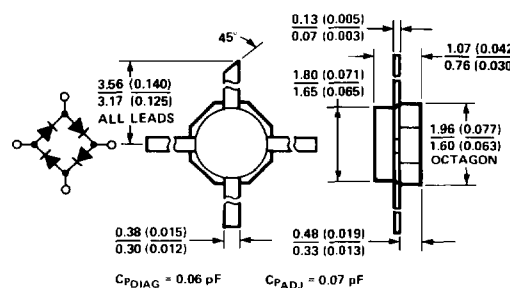
These diodes are packaged in the hermetic J package. Advanced design and assembly



Outline J-2



Outline J-3



Outline J-4

DIMENSIONS IN MILLIMETERS AND (INCHES)

processes minimize package parasitics resulting in optimum performance.

The body of the package is alumina, while the leads are gold-plated over nickel-plated Kovar. The solder glass seal and rugged construction meet the stringent requirements of space-level testing and are capable of meeting the environmental tests of MIL-STD-750.

Applications

These hermetic devices are designed for stripline and microstrip use. The design features extremely low package parasitics. The package outline also maximizes lead strength while reducing overall body size.

This design is especially useful in environments requiring high frequency and/or wide band operation.

The single diode can be used in either mixer or detector applications. The pairs can be

used in balanced mixers and can be configured to assemble bridge, star, and ring quads for Class I, II, or III type double balanced mixers. The quads are used as double balanced mixers, phase detectors, and AM and digital modulators.

Maximum Ratings

Pulse Power Incident at T_{CASE} = 25°C
(1 μs pulse, DC = 0.001) 1 W
CW Power Dissipation at T_{CASE} = 25°C
Derate Linearly to Zero at 175°C 150 mW/junction
Operating Temperature Range -65°C to +175°C
Storage Temperature Range -65°C to +200°C
Soldering Temperature 290°C Max. for 10 sec.

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

Electrical Specifications at T_{CASE} = 25°C
Single Diode in J-2 Package

| Part Number HSCH- | Barrier | Maximum Noise Figure NF (dB) | IF Impedance Z _{IF} (Ω) | | Maximum SWR | Minimum Breakdown Voltage V _{BR} (V) | Maximum Dynamic Resistance R _D (Ω) | Maximum Forward Voltage V _F (mV) | Maximum Total Capacitance C _T (pF) |
|----------------------|---------|---|-------------------------------------|------|-------------|--|--|--|--|
| | | | Min. | Max. | | | | | |
| 6310 | Medium | 7.2 at 16 GHz | 200 | 400 | 1.5:1 | 4 | 16 | 500 | 0.22 |
| 6312 | | 6.2 at 9.375 GHz | | | | | 12 | | 0.27 |
| 6330 | Low | 7.2 at 16 GHz | 150 | 350 | | | 16 | 375 | 0.22 |
| 6332 | | 6.2 at 9.375 GHz | | | | | 12 | | 0.27 |
| Test Conditions | | DC Load Resistance = 0 Ω L.O. Power = 1 mW I _F = 30 MHz, 1.5 dB NF | | | | I _R ≤ 10 μA | I _F = 5 mA | I _F = 1 mA | V _R = 0 V f = 1 MHz |

Diode Pairs in J-3 Package

| Part Number HSCH- | Barrier | Max. Noise Figure NF (dB) | IF Impedance Z_{IF} (Ω) | | Max. SWR | Min. Breakdown Voltage V_{BR} (V) | Max. Dynamic Resistance R_D (Ω) | Max. ΔR_D (Ω) | Max. Total Capacitance C_T (pF) | Max. ΔC_T (pF) | Max. Forward Voltage V_F (mV) | Max. ΔV_F (mV) |
|----------------------------------|---------|---|---------------------------------------|------|----------|--|---|--|--------------------------------------|------------------------|------------------------------------|------------------------|
| | | | Min. | Max. | | | | | | | | |
| 6510 | Medium | 7.2 at 16 GHz | 200 | 400 | 1.5:1 | 4 | 16 | 3 | 0.22 | 0.02 | 500 | 10 |
| 6512 | | 6.2 at 9.375 GHz | | | | | 12 | | 0.27 | | | |
| 6530 | Low | 7.2 at 16 GHz | 150 | 350 | | | 16 | | 0.22 | | 375 | |
| 6532 | | 6.2 at 9.375 GHz | | | | | 12 | | 0.27 | | | |
| Test Conditions | | DC Load Resistance = 0 Ω L.O. Power = 1 mW I_F = 30 MHz, 1.5 dB NF | | | | $I_R \leq 10 \mu A$ | $I_F = 5 \text{ mA}$ | $V_R = 0 \text{ V}$ $f = 1 \text{ MHz}$ | | $I_F = 1 \text{ mA}$ | | |
| | | | | | | | | | | | | |
| Measured between adjacent leads. | | | | | | | | | | | | |

Diode Quads in J-4 Package

| Frequency Band | Part Number HSCH- | Barrier | Maximum Capacitance C_M (pF) | Maximum Measured Capacitance Difference ΔC_M (pF) | Maximum Dynamic Resistance R_D (Ω) | Maximum Resistance Difference ΔR_D (Ω) | Maximum Forward Voltage V_F (mV) | Maximum V_F Difference ΔV_F (mV) | | | | |
|----------------------------------|-------------------|---------|--|---|---|---|------------------------------------|--|----------------------|--|--|--|
| Ku 18 GHz | 6810 | Medium | 0.22 | 0.03 | 20 | 3 | 500 | 15 | | | | |
| | 6830 | Low | | | | | 375 | | | | | |
| X 12 GHz | 6812 | Medium | 0.27 | | 16 | 2 | 500 | | | | | |
| | 6832 | Low | | | | | | | 375 | | | |
| Test Conditions | | | $V_R = 0 \text{ V}$ $f = 1 \text{ MHz}$ | | | | $I_F = 5 \text{ mA}$ | | $I_F = 1 \text{ mA}$ | | | |
| | | | | | | | | | | | | |
| Measured between adjacent leads. | | | | | | | | | | | | |

Typical Parameters

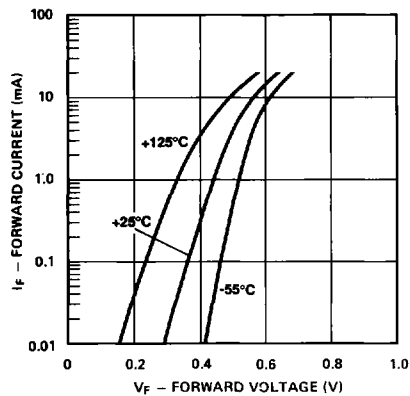


Figure 1. Typical Forward Characteristics for Medium Barrier Diodes.

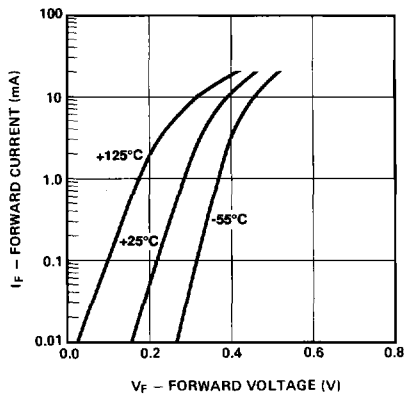


Figure 2. Typical Forward Characteristics for Low Barrier Diodes.

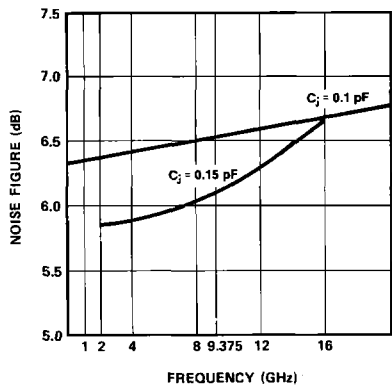


Figure 3. Typical Noise Figure vs. Frequency for J-Packages.

Typical Parameters (cont.)

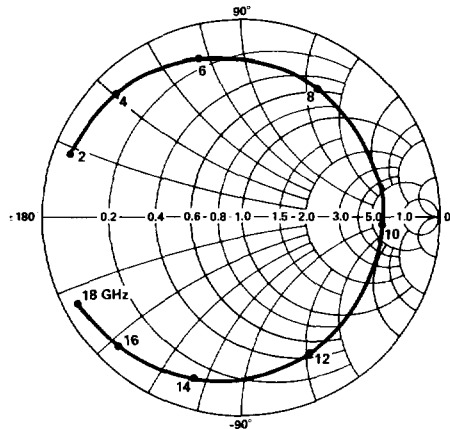


Figure 4. Typical Admittance Characteristics with 20 μ A External Bias. HSCH-6310, -6330.

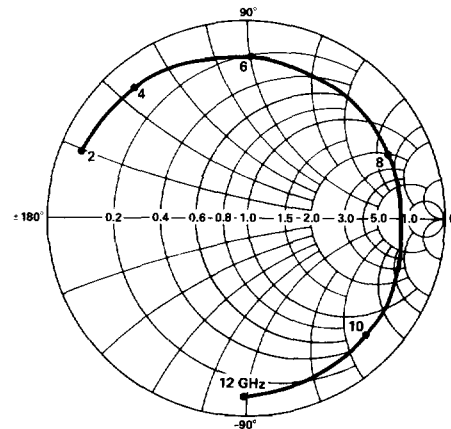
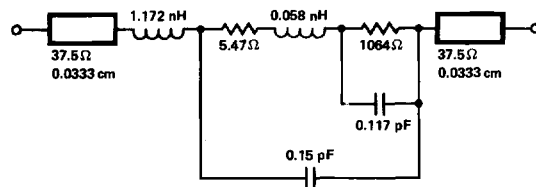
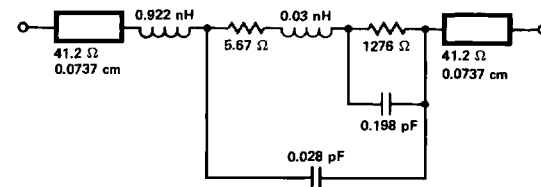


Figure 5. Typical Admittance Characteristics with 20 μ A External Bias. HSCH-6312, -6332.

MODEL FOR J-2 PACKAGE SCHOTTKY DIODES AT 20 μ A EXTERNAL BIAS HSCH-6310, -6330



MODEL FOR J-2 PACKAGE SCHOTTKY DIODES AT 20 μ A EXTERNAL BIAS HSCH-6312, -6332



Special Order Information

In the event that mounting these diodes in the circuit requires leads formed as shown below, this lead configuration

can be ordered directly. Please refer to the following table for order information.

| | |
|--|--|
| | <p>Straight Lead Order Information Specify: Part Number (HSCH-6XXX) No Option Required</p> |
| | <p>Formed Lead Order Information Specify: Part Number (HSCH-6XXX) Option Number F01 All electrical tests are made prior to lead forming</p> |