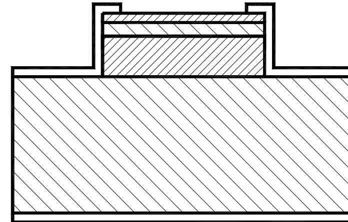
# Microwave high-temperature 4HSiC pin diode

## Features

- Mesa construction
- $SiO_2$ Passivation
- Gold metallisation
- Thermocompression bonding
- Ultrasonic bonding



## Description

High-voltage 4HSiC pin diodes offer improved performance characteristics in various microwave semiconductor applications. These advantages result from the inherent semiconductor material properties of 4HSiC including high operating and ultimate temperature, low resistance and fast switching speed.

The 4HSiC pin diode chip has 6 µm thick intrinsic region and well-controlled resistance. The Gold metallisation of top and bottom of chip is compatible with the most hybrid manufacture processes.

Low loss of modulators, switches and phase shifter circuits (up to 40 GHz) is achievable as a result of low parasitic series resistance in the conducting and non-conducting state.

## Electrical Specification @ +25°C

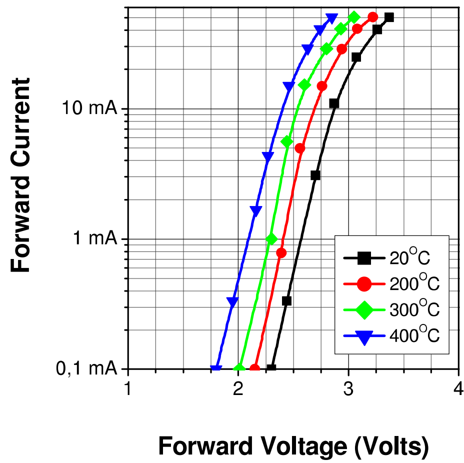
| Model | Maximum Forward $R_s$ @ 40 mA, 1 MHz (Ohms) | Capacitance @ 1 MHz - 40 Volts Maximum (pF) | Minimum Reverse Voltage $V_B$ @ 10 µA (Volts) | Nominal Switching[1] Speed (ns) | Carrier[2] Lifetime (ns) | Contact diameter (mm) |
|---|---|---|---|---|---|---|
| **FOSiC-A** | 4.0 | 0.40 | 300 | 25.0 | 15.0 | 160.0 |
| **FOSiC-B** | 5.0 | 0.30 | 300 | 25.0 | 15.0 | 110.0 |

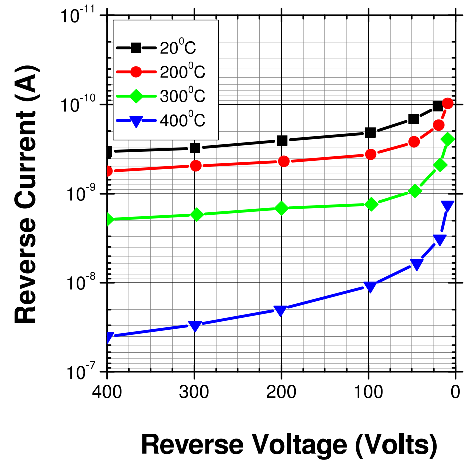
**Notes:**
1. **Switching speed is measured between 2 dB and 20 dB loss in a shunt mounted 5.0 GHz switch.**
2. **Carrier lifetime is measured at 10 mA using stored charge measurements.**

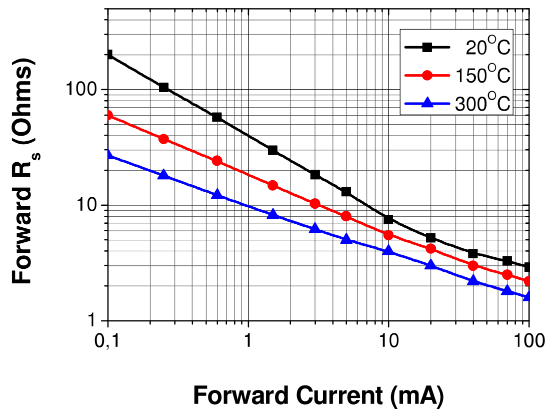
## Maximum Ratings

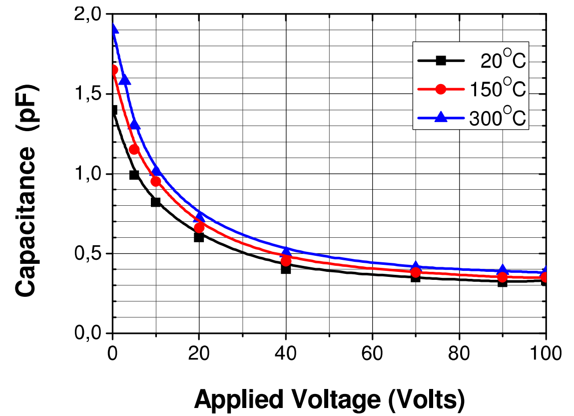
| Parameter | Absolute Maximum |
|---|---|
| Temperature | |
| Operating | -65°C to +300°C |
| Storage | -65°C to +400°C |
| Voltage | Breakdown Voltage |
| Power Dissipation | 500 mW @ +25°C |

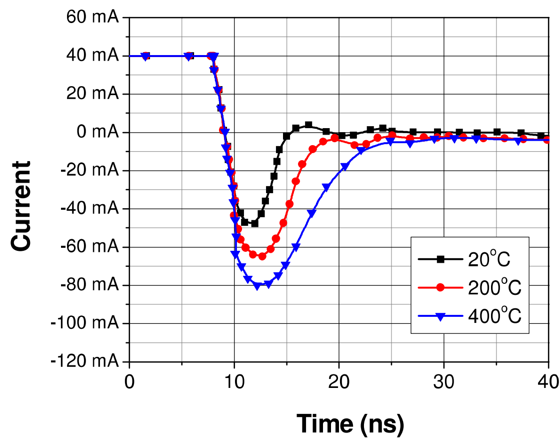
## Typical Performance Curves

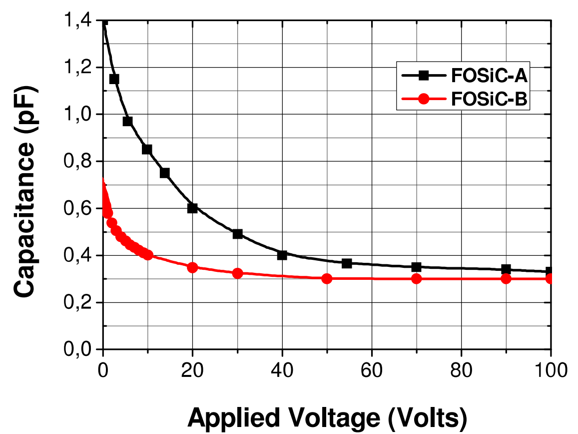


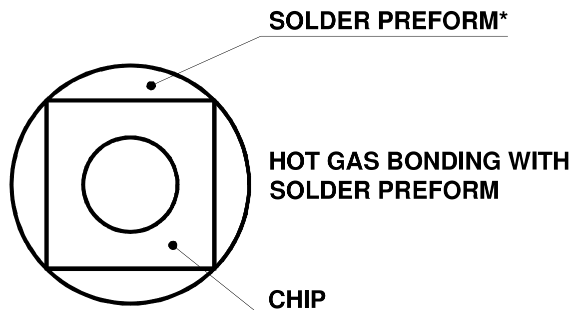



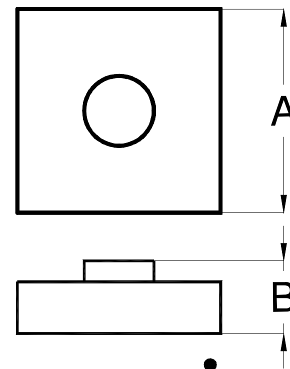
## Chip Bonding

The use of solder preform (Au-Ge) with an eutectic melting point of 356℃ is recommended. A clean gold plated surface is required to insure good wetting. The solder preform should be large enough to provide chip soldering within areas, as shown.
The temperature at the solder area should be approximately 450° C.




* Recommended thickness of solder preform is 0.025 mm (1 mil).

## Package Outline




| Dim | Millimeters | |
|---|---|---|
| | Min. | Max. |
| A | 0.510 | 0.550 |
| B | 0.100 | 0.150 |

• Denotes Cathode

## Ribbon and Wire Attachment

It is recommended that thermo-compression bonding be used. The wire diameter or ribbon width should be smaller than the diameter of the anode contact. Typical bonding force should be between 20 and 25 grams and should not exceed 30 grams. During the process of wire bonding by thermocompression technique it is recommended to use a heated stage. The stage temperature should be approximately 350° C.