

DATA SHEET

# Silicon Beamless Schottky Diodes: Pairs and Quads

## Applications

- Microwave MIC assembly and automated high volume manufacturing lines
- Mixers

## Features

- Mechanically rugged design
- Three barrier heights for optimized mixer performance
- Wide product range: series pair, ring, bridge, and eight-diode rings
- Use in ring or crossover designs in double balanced mixers
- Virtually any LO requirement can be met with choice of barrier height
- 100% DC tested on water
- Available on film frame or waffle pack



Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.

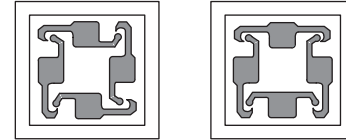
## Description

Skyworks beamless diode family is designed for a high degree of device reliability in both commercial and industrial uses. The diodes are designed to offer the utmost in performance as well as achieving price sensitive cost targets for commercial systems.

## Assembly and Handling Procedure

The process flow for assembly is:

- Die attach using nonconductive epoxy
- Wire bond
- Encapsulation (nonconductive epoxy)



## Die Attach Methods

All leadless chips are compatible with both eutectic and conductive epoxy die attach methods. Eutectic processes use Sn/Au or Sn/Pb solder. Nonconductive die attach is recommended.

## Packing Methods

1. Gel pak
2. Wafer on film frame (rejects are marked with ink):
  - Diced, ready for pick and place
  - Unsawn, whole wafer, 7-mil thick, maximum

## Wire Bonding

Two methods can be used to connect wire, ribbon, or wire mesh to the chips:

- Thermocompression
- Ballbonding

Skyworks recommends use of pure gold wire.

## Electrical and Physical Specifications

Absolute maximum ratings for the beamless Schottky diodes are provided in Table 1. Electrical specifications are noted in Table 2. SPICE model parameters are defined in Table 3.

A typical bonding configuration is illustrated in Figure 1.

**Table 1. Absolute Maximum Ratings (Note 1)**

| Parameter   | Symbol            | Minimum | Maximum        | Units       |
|---|-------------------|---------|----------------|-------------|
| Peak inverse voltage  | PIV               |         | V <sub>B</sub> | –           |
| Supply current  | I <sub>MAX</sub>  |         | 50             | mA/V        |
| Power dissipation (CW)                                      | P <sub>DISS</sub> |         | 75             | mW/junction |
| Storage temperature   | T <sub>STG</sub>  | –65     | +175           | °C          |
| Operating temperature                                       | T <sub>OP</sub>   | –65     | +150           | °C          |
| Electrostatic discharge:<br>Human Body Model (HBM), Class 0 | ESD               |         | < 250          | V           |

**Note 1:** Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

**CAUTION:** Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

**Table 2. Electrical Specifications (Per Junction) (1 of 2) (Note 1)**

| Part Number                                   | Band | Barrier | V <sub>F</sub><br>I <sub>F</sub> = 1.0 mA<br>(mV) |     | ΔV <sub>F</sub><br>I <sub>F</sub> = 1.0 mA<br>(mV) | C <sub>J</sub> (Note 2)<br>V <sub>R</sub> = 0 V,<br>f = 1 MHz<br>(pF) |      | R <sub>s</sub><br>I <sub>F</sub> = 5 mA<br>(Ω) | V <sub>B</sub><br>@ 10 μA<br>(V) | Outline<br>Drawing<br>Number |
|---|------|---------|---|-----|--|---|------|--|----------------------------------|------------------------------|
|   |      |         | Min   | Max | Max  | Min   | Max  | Max  | Min                              |                              |
| <b>Ring Quad (Note 3)</b>                     |      |         |   |     |  |   |      |  |                                  |                              |
| DMF3926-000                                   | S    | Low     | 200   | 260 | 10   | 0.30  | 0.50 | 5  | –                                | 551-002                      |
| DME3927-000                                   | S    | Medium  | 300   | 400 | 10   | 0.30  | 0.50 | 5  | –                                | 551-002                      |
| DMJ3928-000                                   | S    | High    | 500   | 600 | 10   | 0.30  | 0.50 | 5  | –                                | 551-002                      |
| DMF3942-000                                   | X    | Low     | 250   | 310 | 10   | 0.15  | 0.30 | 8  | –                                | 551-002                      |
| DME3943-000                                   | X    | Medium  | 325   | 425 | 10   | 0.15  | 0.30 | 8  | –                                | 551-002                      |
| DMJ3944-000                                   | X    | High    | 550   | 650 | 10   | 0.15  | 0.30 | 8  | –                                | 551-002                      |
| <b>Bridge Quad (Note 3)</b>                   |      |         |   |     |  |   |      |  |                                  |                              |
| DMF3929-000                                   | S    | Low     | 200   | 260 | 10   | 0.30  | 0.50 | 5  | 2                                | 551-004                      |
| DME3930-000                                   | S    | Medium  | 300   | 400 | 10   | 0.30  | 0.50 | 5  | 3                                | 551-004                      |
| DMJ3931-000                                   | S    | High    | 500   | 600 | 10   | 0.30  | 0.50 | 5  | 4                                | 551-004                      |
| DMF4102-000                                   | X    | Low     | 250   | 310 | 10   | 0.15  | 0.3  | 14   | 2                                | 551-004                      |
| DME4101-000                                   | X    | Medium  | 325   | 425 | 10   | 0.15  | 0.3  | 14   | 3                                | 551-004                      |
| DMJ4103-000                                   | X    | High    | 550   | 650 | 10   | 0.15  | 0.3  | 14   | 4                                | 551-004                      |
| <b>Series Pair (Note 3)</b>                   |      |         |   |     |  |   |      |  |                                  |                              |
| DMF3932-000                                   | S    | Low     | 200   | 260 | 10   | 0.30  | 0.50 | 5  | 2                                | 551-012                      |
| DME3933-000                                   | S    | Medium  | 300   | 400 | 10   | 0.30  | 0.50 | 5  | 3                                | 551-012                      |
| DMJ3934-000                                   | S    | High    | 500   | 600 | 10   | 0.30  | 0.50 | 5  | 4                                | 551-012                      |
| <b>Back-to-Back Ring Series Pair (Note 3)</b> |      |         |   |     |  |   |      |  |                                  |                              |
| DMF3935-000                                   | S    | Low     | 200   | 260 | 10   | 0.30  | 0.50 | 5  | –                                | 551-056                      |
| DME3936-000                                   | S    | Medium  | 300   | 400 | 10   | 0.30  | 0.50 | 5  | –                                | 551-056                      |
| DMJ3937-000                                   | S    | High    | 500   | 600 | 10   | 0.30  | 0.50 | 5  | –                                | 551-056                      |

**Table 2. Electrical Specifications (Per Junction) (2 of 2) (Note 1)**

| Part Number                                  | Band | Barrier | V <sub>F</sub><br>I <sub>F</sub> = 1.0 mA<br>(mV) |      | ΔV <sub>F</sub><br>I <sub>F</sub> = 1.0 mA<br>(mV) | C <sub>J</sub> (Note 2)<br>V <sub>R</sub> = 0 V,<br>f = 1 MHz<br>(pF) |      | R <sub>s</sub><br>I <sub>F</sub> = 5 mA<br>(Ω) | V <sub>s</sub><br>@ 10 μA<br>(V) | Outline<br>Drawing<br>Number |
|--|------|---------|---|------|--|---|------|--|----------------------------------|------------------------------|
|  |      |         | Min   | Max  | Max  | Min   | Max  | Max  | Min                              |                              |
| <b>Octoquad Ring (Note 4)</b>                |      |         |   |      |  |   |      |  |                                  |                              |
| DMF3938-000                                  | S-X  | Low     | 400   | 520  | 15   | 0.15  | 0.30 | 16   | –                                | 556-020                      |
| DME3939-000                                  | S-X  | Medium  | 600   | 800  | 15   | 0.15  | 0.30 | 16   | –                                | 556-020                      |
| DMJ3940-000                                  | S-X  | High    | 1000  | 1200 | 15   | 0.15  | 0.30 | 16   | –                                | 556-020                      |
| <b>Back-to-Back Crossover Quad, to 6 GHz</b> |      |         |   |      |  |   |      |  |                                  |                              |
| DMF3945-000                                  | S    | Low     | 200   | 260  | 15   | 0.30  | 0.50 | 5  | –                                | 588-065                      |
| DME3946-000                                  | S    | Medium  | 300   | 400  | 15   | 0.30  | 0.50 | 5  | –                                | 588-065                      |
| DMJ3947-000                                  | S    | High    | 525   | 625  | 15   | 0.30  | 0.50 | 5  | –                                | 588-065                      |

**Note 1:** Performance is guaranteed only under the conditions listed in this table.

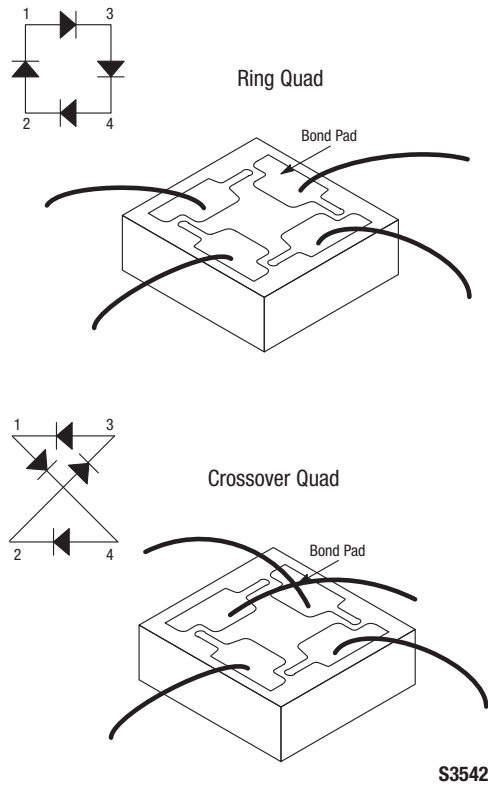
**Note 2:** C<sub>J</sub> represents total capacitance. Maximum C<sub>J</sub> unbalance @ 0 V, 1 MHz = 0.25 pF.

**Note 3:** Matching criteria V<sub>F</sub> @ 1 mA ≤ 15 mV available for matched sets.

**Note 4:** Matching criteria V<sub>F</sub> @ 1 mA ≤ 20 mV available for matched sets.

**Table 3. SPICE Model Parameters (Per Junction)**

| Part<br>Number<br>Prefix | I <sub>s</sub><br>(A)   | R <sub>s</sub><br>(Ω) | N    | T <sub>T</sub><br>(s) | C <sub>J0</sub><br>(pF) | M    | E <sub>G</sub><br>(eV) | V <sub>J</sub><br>(V) | X <sub>TI</sub> | F <sub>c</sub> | B <sub>v</sub><br>(V) | I <sub>bv</sub><br>(A) |
|--------------------------|-------------------------|-----------------------|------|-----------------------|-------------------------|------|------------------------|-----------------------|-----------------|----------------|-----------------------|------------------------|
| DMF3926                  | 2.5 x 10 <sup>-7</sup>  | 4                     | 1.04 | 1 x 10 <sup>-11</sup> | 0.42                    | 0.32 | 0.69                   | 0.51                  | 2               | 0.5            | 2                     | 1 x 10 <sup>-5</sup>   |
| DME3927                  | 1.3 x 10 <sup>-9</sup>  | 4                     | 1.04 | 1 x 10 <sup>-11</sup> | 0.39                    | 0.34 | 0.69                   | 0.65                  | 2               | 0.5            | 3                     | 1 x 10 <sup>-5</sup>   |
| DMJ3926                  | 9.0 x 10 <sup>-13</sup> | 4                     | 1.04 | 1 x 10 <sup>-11</sup> | 0.39                    | 0.42 | 0.69                   | 0.84                  | 2               | 0.5            | 3                     | 1 x 10 <sup>-5</sup>   |
| DMF4102                  | 1.1 x 10 <sup>-7</sup>  | 6                     | 1.04 | 1 x 10 <sup>-11</sup> | 0.22                    | 0.32 | 0.69                   | 0.495                 | 2               | 0.5            | 2                     | 1 x 10 <sup>-5</sup>   |
| DME4101                  | 2.4 x 10 <sup>-9</sup>  | 6                     | 1.04 | 1 x 10 <sup>-11</sup> | 0.20                    | 0.37 | 0.69                   | 0.595                 | 2               | 0.5            | 3                     | 1 x 10 <sup>-5</sup>   |
| DMJ4103                  | 8.5 x 10 <sup>-13</sup> | 6                     | 1.04 | 1 x 10 <sup>-11</sup> | 0.20                    | 0.42 | 0.69                   | 0.800                 | 2               | 0.5            | 4                     | 1 x 10 <sup>-5</sup>   |



**Figure 1. Typical Bonding Configuration**

**Package Information**

Skyworks silicon beamless Schottky diodes are provided in Gel paks and on film frame. Package dimensions are provided in Figures 2 through 7.

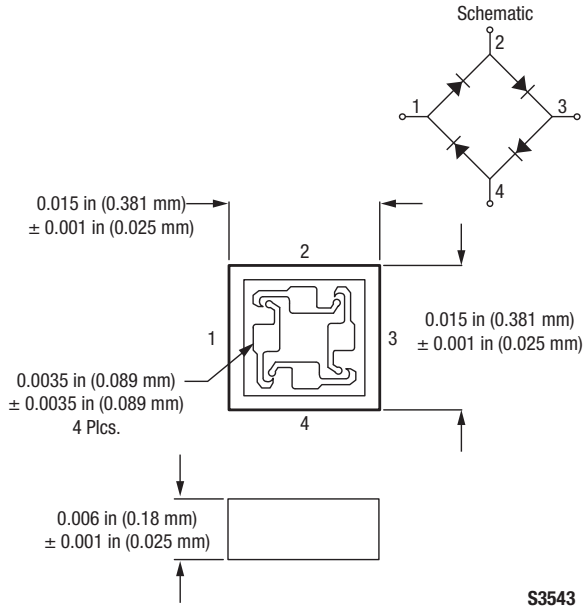


Figure 2. 551-002 Package Dimensions

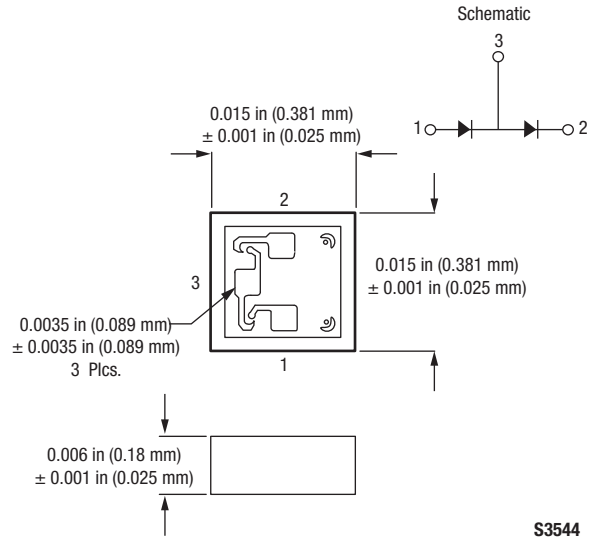


Figure 3. 551-012 Package Dimensions

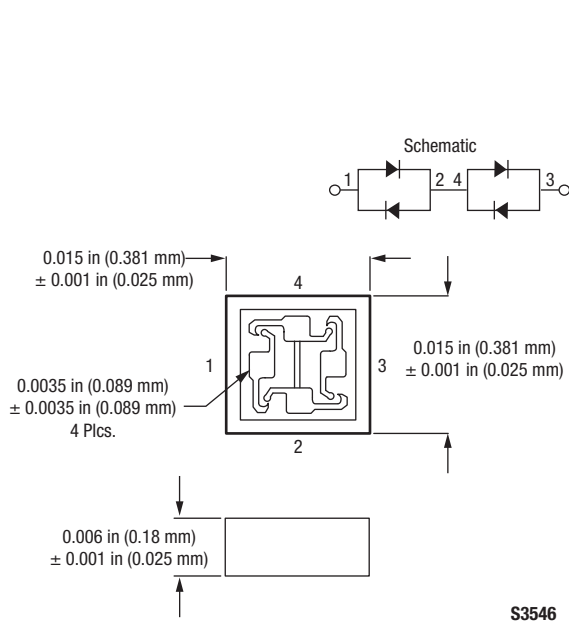


Figure 4. 551-056 Package Dimensions

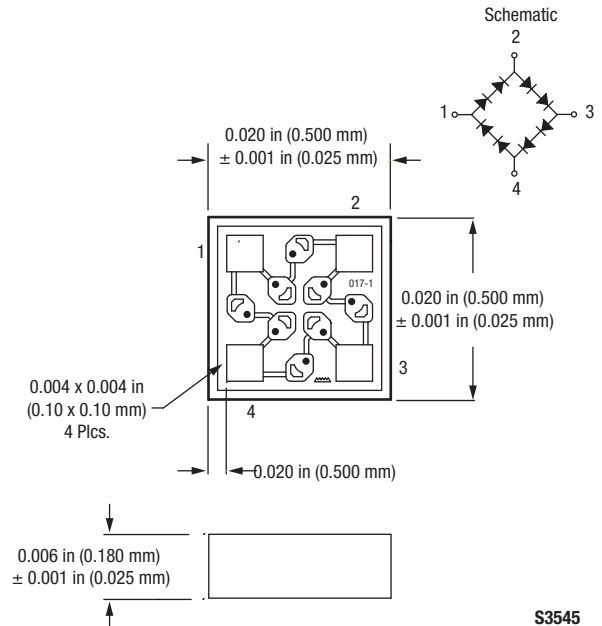
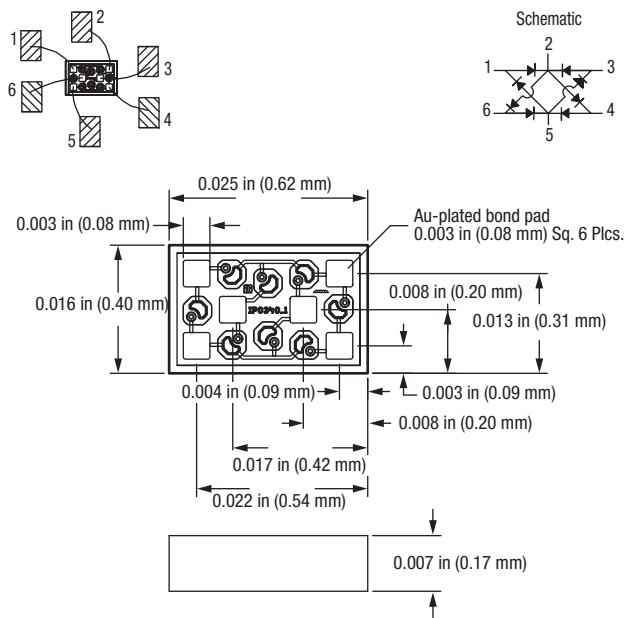


Figure 5. 556-020 Package Dimensions

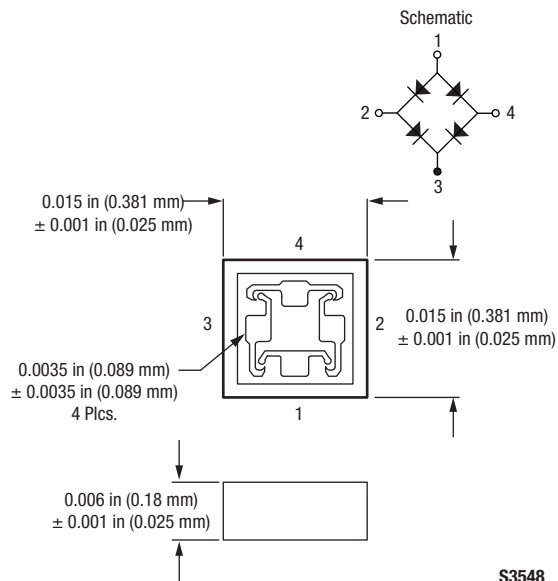
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Measurement tolerance = ± 0.001 in (± 0.025 mm)

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**Figure 6. 588-065 Package Dimensions**



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**Figure 7. 551-004 Package Dimensions**

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