

DATA SHEET

DME, DMF, DMJ Series: Silicon Beam-Lead Schottky Mixer Diodes – Singles, Pairs & Quads, Bondable & Packaged Chips

Applications

- Microwave Integrated Circuits
- Mixers
- Detectors

Features

- Low 1/f noise
- Low intermodulation distortion
- Epoxy and hermetically sealed packages
- Statistical Process Control wafer fabrication
- Packages rated MSL1, 260 °C per JEDEC J-STD-020)

NEW

Skyworks offers lead (Pb)-free, RoHS (Restriction of Hazardous Substances) compliant packaging.

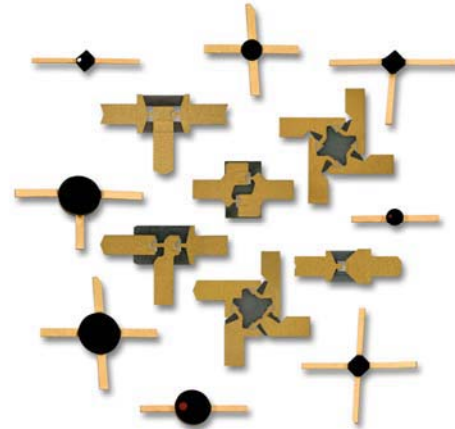


Description

Skyworks beam-lead silicon Schottky barrier mixer diodes are designed for applications through 40 GHz. The beam-lead design reduces the problem of bonding to the very small area characteristic of low capacitance junctions.

Beam-lead Schottky barrier mixer diodes are made by the deposition of a suitable barrier metal on an epitaxial silicon substrate to form the junction. The process and choice of materials result in low series resistance with a narrow spread of capacitance values for close impedance control.

A variety of forward voltages are available ranging from low values for low, or starved, local oscillator drive levels to high values for high drive, low distortion mixer applications. Beam-lead diodes are available in a wide range of packages. Capacitance ranges and series resistances are comparable with the packaged devices that are available up to, and including, the Ka-band. Unpackaged diodes are well suited for use in Microwave Integrated Circuits (MICs). The packaged devices are designed to be inserted as hybrid elements in strip, transmission line applications.



Beam-lead Schottky barrier diodes are categorized by universal mixer applications in four frequency ranges: S, C, X, Ku, K, and Ka bands as noted in Table 1. They may also be used as modulators and high-speed switches.

Beam-lead diodes are suited for balanced mixers, due to their low parasitics and uniformity.

The absolute maximum ratings of the DME, DMF, and DMJ series of Schottky mixer diodes are provided in Table 2. Electrical and physical specifications are provided in Tables 3 through 15.

Typical performance characteristics are shown in Figures 1 through 3. Typical mixer circuits are shown in Figure 4.

Table 1. Frequency Table

| Frequency Band | Frequency (GHz) |
|----------------|-----------------|
| S | 2 to 4 |
| C | 4 to 8 |
| X | 8.2 to 12.4 |
| Ku | 12.4 to 18.0 |
| K | 18.0 to 26.5 |
| Ka | 26.5 to 40.0 |

Table 2. Absolute Maximum Ratings

| Parameter | Symbol | Minimum | Typical | Maximum | Units |
|-------------------------------------|------------------|---------|---------|---------|-------------|
| Maximum current | I _{max} | | | 100 | mA |
| Power dissipation (continuous wave) | P _d | | | 75 | mW/junction |
| Storage temperature | T _{STG} | -65 | | +175 | °C |
| Operating temperature | T _A | -65 | | +175 | °C |

Note: 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 these devices are designed to be as robust as possible, Electrostatic Discharge (ESD) can damage them. These devices 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 3. Electrical Specifications: Beam-Lead Single N-Type Low, Medium, High Drive Schottky Diodes



| Part Number | Frequency Band | C _J @ 0 V, 1 MHz (pF) | Rs @ 5 mA (Ω) | V _B @ 10 μA (V) | V _F @ 1 mA (mV) | Drive Level | Outline Drawing |
|-------------|----------------|----------------------------------|---------------|----------------------------|----------------------------|-------------|-----------------|
| | | | Max. | Min. | | | |
| DMF2820-000 | S, C | 0.30 to 0.50 | 5 | 2 | 200 to 260 | low | 491-011 |
| DME2127-000 | S, C | 0.30 to 0.50 | 5 | 3 | 300 to 400 | medium | 491-011 |
| DMJ2823-000 | S, C | 0.30 to 0.50 | 5 | 4 | 500 to 600 | high | 491-011 |
| DMF2821-000 | X | 0.15 to 0.30 | 8 | 2 | 220 to 300 | low | 491-011 |
| DME2957-000 | X | 0.15 to 0.30 | 8 | 3 | 325 to 425 | medium | 491-011 |
| DMJ2777-000 | X | 0.15 to 0.30 | 8 | 4 | 550 to 650 | high | 491-011 |
| DMF2344-000 | Ku | 0.05 to 0.15 | 13 | 2 | 260 to 330 | low | 491-011 |
| DME2333-000 | Ku | 0.05 to 0.15 | 13 | 3 | 350 to 450 | medium | 491-011 |
| DMJ2824-000 | Ku | 0.05 to 0.15 | 13 | 4 | 500 to 680 | high | 491-011 |
| DMF2822-000 | K, Ka | 0.1 max | 18 | 2 | 270 to 350 | low | 491-011 |
| DME2458-000 | K, Ka | 0.1 max | 18 | 3 | 375 to 550 | medium | 491-011 |
| DMJ2825-000 | K, Ka | 0.1 max | 18 | 4 | 600 to 700 | high | 491-011 |

Table 4. Epoxy and Hermetic Packaged Beam-Lead Single N-Type Low, Medium, High Drive Schottky Diodes

| Part Numbers/Outline Drawings | | |
|-------------------------------|---------------------|------------------------|
| Epoxy Stripline 250 | Epoxy Stripline 230 | Hermetic Stripline 220 |
| DMF2820-250 | – | DMF2820-220 |
| DME2127-250 | – | DME2127-220 |
| DMJ2823-250 | – | DMJ2823-220 |
| DMF2821-250 | – | DMF2821-220 |
| DME2957-250 | – | DME2957-220 |
| DMJ2777-250 | – | DMJ2777-220 |
| DMF2344-250 | DMF2344-230 | DMF2344-220 |
| DME2333-250 | DME2333-230 | DME2333-220 |
| DMJ2824-250 | DMJ2824-230 | DMJ2824-220 |
| – | DMF2822-230 | DMF2822-220 |
| – | DME2458-230 | DME2458-220 |
| – | DMJ2825-230 | DMJ2825-220 |

Table 5. Electrical Specifications: Beam-Lead Series Pair, N-Type Low, Medium, High Drive Schottky Diodes



| Part Number | Frequency Band | C _J @ 0 V, 1 MHz (pF) | Rs @ 5 mA (Ω) | V _B @ 10 μA (V) | V _F @ 1 mA (mV) | Drive Level | Outline Drawing |
|-------------|----------------|----------------------------------|---------------|----------------------------|----------------------------|-------------|-----------------|
| | | | Max. | Min. | | | |
| DMF2835-000 | S, C | 0.30 to 0.50 | 5 | 2 | 200 to 260 | low | 504-012 |
| DME2050-000 | S, C | 0.30 to 0.50 | 5 | 3 | 300 to 400 | medium | 504-012 |
| DMJ2092-000 | S, C | 0.30 to 0.50 | 5 | 4 | 500 to 600 | high | 504-012 |
| DMF2826-000 | X | 0.15 to 0.30 | 8 | 2 | 220 to 300 | low | 504-012 |
| DME2829-000 | X | 0.15 to 0.30 | 8 | 3 | 325 to 425 | medium | 504-012 |
| DMJ2093-000 | X | 0.15 to 0.30 | 8 | 4 | 550 to 650 | high | 504-012 |
| DMF2827-000 | Ku | 0.05 to 0.15 | 13 | 2 | 260 to 330 | low | 504-012 |
| DME2830-000 | Ku | 0.05 to 0.15 | 13 | 3 | 350 to 450 | medium | 504-012 |
| DMJ2832-000 | Ku | 0.05 to 0.15 | 13 | 4 | 500 to 680 | high | 504-012 |
| DMF2828-000 | K, Ka | 0.1 max | 18 | 2 | 270 to 350 | low | 504-012 |
| DME2831-000 | K, Ka | 0.1 max | 18 | 3 | 375 to 550 | medium | 504-012 |
| DMJ2833-000 | K, Ka | 0.1 max | 18 | 4 | 600 to 700 | high | 504-012 |

Table 6. Epoxy and Hermetic Packaged Beam-Lead Series Pair N-Type Low, Medium, High Drive Schottky Diodes

| Part Numbers/Outline Drawings | | |
|-------------------------------|---------------------|------------------------|
| Epoxy Stripline 252 | Epoxy Stripline 232 | Hermetic Stripline 222 |
| DMF2835-252 | – | DMF2835-222 |
| DME2050-252 | – | DME2050-222 |
| DMJ2092-252 | – | DMJ2092-222 |
| DMF2826-252 | – | DMF2826-222 |
| DME2829-252 | – | DME2829-222 |
| DMJ2093-252 | – | DMJ2093-222 |
| DMF2827-252 | DMF2827-232 | DMF2827-222 |
| DME2830-252 | DME2830-232 | DME2830-222 |
| DMJ2832-252 | DMJ2832-232 | DMJ2832-222 |
| – | DMF2828-232 | DMF2828-222 |
| – | DME2831-232 | DME2831-222 |
| – | DMJ2833-232 | DMJ2833-222 |

Table 7. Electrical Specifications: Beam-Lead Common Cathode, N-Type Low, Medium, High Drive Schottky Diodes

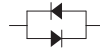


| Part Number | Frequency Band | C _J @ 0 V, 1 MHz (pF) | Rs @ 5 mA (Ω) | V _B @ 10 μA (V) | V _F @ 1 mA (mV) | Drive Level | Outline Drawing |
|-------------|----------------|----------------------------------|---------------|----------------------------|----------------------------|-------------|-----------------|
| | | | Max. | Min. | | | |
| DMF2182-000 | S, C | 0.30 to 0.50 | 5 | 2 | 200 to 260 | low | 504-013 |
| DME2205-000 | S, C | 0.30 to 0.50 | 5 | 3 | 300 to 400 | medium | 504-013 |
| DMJ2208-000 | S, C | 0.30 to 0.50 | 5 | 4 | 500 to 600 | high | 504-013 |
| DMF2183-000 | X | 0.15 to 0.30 | 8 | 2 | 220 to 300 | low | 504-013 |
| DME2206-000 | X | 0.15 to 0.30 | 8 | 3 | 325 to 425 | medium | 504-013 |
| DMJ2209-000 | X | 0.15 to 0.30 | 8 | 4 | 550 to 650 | high | 504-013 |
| DMF2184-000 | Ku | 0.05 to 0.15 | 13 | 2 | 260 to 330 | low | 504-013 |
| DME2207-000 | Ku | 0.05 to 0.15 | 13 | 3 | 350 to 450 | medium | 504-013 |
| DMJ2210-000 | Ku | 0.05 to 0.15 | 13 | 4 | 500 to 680 | high | 504-013 |
| DMF2834-000 | K, Ka | 0.1 max | 18 | 2 | 270 to 350 | low | 504-013 |
| DME2864-000 | K, Ka | 0.1 max | 18 | 3 | 375 to 550 | medium | 504-013 |
| DMJ2836-000 | K, Ka | 0.1 max | 18 | 4 | 600 to 700 | high | 504-013 |

Table 8. Epoxy and Hermetic Packaged Beam-Lead Common Cathode N-Type Low, Medium, High Drive Schottky Diodes

| Part Numbers/Outline Drawings | |
|-------------------------------|------------------------|
| Epoxy Stripline 253 | Hermetic Stripline 223 |
| DMF2182-253 | DMF2182-223 |
| DME2205-253 | DME2205-223 |
| DMJ2208-253 | DMJ2208-223 |
| DMF2183-253 | DMF2183-223 |
| DME2206-253 | DME2206-223 |
| DMJ2209-253 | DMJ2209-223 |
| DMF2184-253 | DMF2184-223 |
| DME2207-253 | DME2207-223 |
| DMJ2210-253 | DMJ2210-223 |
| – | DMF2834-223 |
| – | DME2864-223 |
| – | DMJ2836-223 |

Table 9. Electrical Specifications: Beam-Lead Anti-Parallel, N-Type Low, Medium, High Drive Schottky Diodes



| Part Number | Frequency Band | C _J @ 0 V, 1 MHz (pF) | Rs @ 5 mA (Ω) | V _B @ 10 μA (V) | V _F @ 1 mA (mV) | Drive Level | Outline Drawing |
|-------------|----------------|----------------------------------|---------------|----------------------------|----------------------------|-------------|-----------------|
| | | | Max. | Min. | | | |
| DMF2185-000 | S, C | 0.30 to 0.50 | 5 | 2 | 200 to 260 | low | 522-025 |
| DME2282-000 | S, C | 0.30 to 0.50 | 5 | 3 | 300 to 400 | medium | 522-025 |
| DMJ2303-000 | S, C | 0.30 to 0.50 | 5 | 4 | 500 to 600 | high | 522-025 |
| DMF2186-000 | X | 0.15 to 0.30 | 8 | 2 | 220 to 300 | low | 522-025 |
| DME2283-000 | X | 0.15 to 0.30 | 8 | 3 | 325 to 425 | medium | 522-025 |
| DMJ2304-000 | X | 0.15 to 0.30 | 8 | 4 | 550 to 650 | high | 522-025 |
| DMF2187-000 | Ku | 0.05 to 0.15 | 13 | 2 | 260 to 330 | low | 522-025 |
| DME2284-000 | Ku | 0.05 to 0.15 | 13 | 3 | 350 to 450 | medium | 522-025 |
| DMJ2246-000 | Ku | 0.05 to 0.15 | 13 | 4 | 500 to 680 | high | 522-025 |
| DMF2837-000 | K, Ka | 0.1 max | 18 | 2 | 270 to 350 | low | 522-025 |
| DME2838-000 | K, Ka | 0.1 max | 18 | 3 | 375 to 550 | medium | 522-025 |
| DMJ2839-000 | K, Ka | 0.1 max | 18 | 4 | 600 to 700 | high | 522-025 |

Table 10. Epoxy and Hermetic Packaged Beam-Lead Anti-Parallel N-Type Low, Medium, High Drive Schottky Diodes

| Part Numbers/Outline Drawings | |
|-------------------------------|------------------------|
| Epoxy Stripline 251 | Hermetic Stripline 221 |
| DMF2185-251 | DMF2185-221 |
| DME2282-251 | DME2282-221 |
| DMJ2303-251 | DMJ2303-221 |
| DMF2186-251 | DMF2186-221 |
| DME2283-251 | DME2283-221 |
| DMJ2304-251 | DMJ2304-221 |
| DMF2187-251 | DMF2187-221 |
| DME2284-251 | DME2284-221 |
| DMJ2246-251 | DMJ2246-221 |
| – | DMF2837-221 |
| – | DME2838-221 |
| – | DMJ2839-221 |

Table 11. Electrical Specifications: Beam-Lead Ring Quad, N-Type Low, Medium, High Drive Schottky Diodes



| Part Number | Frequency Band | C _J @ 0 V, 1 MHz (pF) | Rs @ 5 mA (Ω) | V _B @ 10 μA (V) | V _F @ 1 mA (mV) | Drive Level | Outline Drawing |
|-------------|----------------|----------------------------------|---------------|----------------------------|----------------------------|-------------|-----------------|
| | | | Max. | Min. | | | |
| DMF2865-000 | S, C | 0.30 to 0.50 | 5 | 2 | 200 to 260 | low | 488-002 |
| DME2857-000 | S, C | 0.30 to 0.50 | 5 | 3 | 300 to 400 | medium | 488-002 |
| DMJ2502-000 | S, C | 0.30 to 0.50 | 5 | 4 | 500 to 600 | high | 488-002 |
| DMF2011-000 | X | 0.15 to 0.30 | 8 | 2 | 220 to 300 | low | 488-002 |
| DME2858-000 | X | 0.15 to 0.30 | 8 | 3 | 325 to 425 | medium | 488-002 |
| DMJ2990-000 | X | 0.15 to 0.30 | 8 | 4 | 550 to 650 | high | 488-002 |
| DMF2012-000 | Ku | 0.05 to 0.15 | 13 | 2 | 260 to 330 | low | 488-002 |
| DME2859-000 | Ku | 0.05 to 0.15 | 13 | 3 | 350 to 450 | medium | 488-002 |
| DMJ2667-000 | Ku | 0.05 to 0.15 | 13 | 4 | 500 to 680 | high | 488-002 |
| DMF2454-000 | K, Ka | 0.1 max | 18 | 2 | 270 to 350 | low | 488-002 |
| DME2459-000 | K, Ka | 0.1 max | 18 | 3 | 375 to 550 | medium | 488-002 |
| DMJ2455-000 | K, Ka | 0.1 max | 18 | 4 | 600 to 700 | high | 488-002 |

Table 12. Epoxy and Hermetic Packaged Beam-Lead Ring Quad N-Type Low, Medium, High Drive Schottky Diodes

| Part Numbers/Outline Drawings | | |
|-------------------------------|---------------------|------------------------|
| Epoxy Stripline 254 | Epoxy Stripline 234 | Hermetic Stripline 224 |
| DMF2865-254 | – | DMF2865-224 |
| DME2857-254 | – | DME2857-224 |
| DMJ2502-254 | – | DMJ2502-224 |
| DMF2011-254 | – | DMF2011-224 |
| DME2858-254 | – | DME2858-224 |
| DMJ2990-254 | – | DMJ2990-224 |
| DMF2012-254 | DMF2012-234 | DMF2012-224 |
| DME2859-254 | DME2859-234 | DME2859-224 |
| DMJ2667-254 | DMJ2667-234 | DMJ2667-224 |
| – | DMF2454-234 | DMF2454-224 |
| – | DME2459-234 | DME2459-224 |
| – | DMJ2455-234 | DMJ2455-224 |

Table 13. Electrical Specifications: Beam-Lead Bridge Quad, N-Type Low, Medium, High Drive Schottky Diodes



| Part Number | Frequency Band | C _J @ 0 V, 1 MHz (pF) | Rs @ 5 mA (Ω) | V _B @ 10 μA (V) | V _F @ 1 mA (mV) | Drive Level | Outline Drawing |
|-------------|----------------|----------------------------------|---------------|----------------------------|----------------------------|-------------|-----------------|
| | | | Max. | Min. | | | |
| DMF2076-000 | S, C | 0.30 to 0.50 | 5 | 2 | 200 to 260 | low | 488-004 |
| DME2029-000 | S, C | 0.30 to 0.50 | 5 | 3 | 300 to 400 | medium | 488-004 |
| DMJ2312-000 | S, C | 0.30 to 0.50 | 5 | 4 | 500 to 600 | high | 488-004 |
| DMF2077-000 | X | 0.15 to 0.30 | 8 | 2 | 220 to 300 | low | 488-004 |
| DME2850-000 | X | 0.15 to 0.30 | 8 | 3 | 325 to 425 | medium | 488-004 |
| DMJ2088-000 | X | 0.15 to 0.30 | 8 | 4 | 550 to 650 | high | 488-004 |
| DMF2078-000 | Ku | 0.05 to 0.15 | 13 | 2 | 260 to 330 | low | 488-004 |
| DME2031-000 | Ku | 0.05 to 0.15 | 13 | 3 | 350 to 450 | medium | 488-004 |
| DMJ2768-000 | Ku | 0.05 to 0.15 | 13 | 4 | 500 to 680 | high | 488-004 |
| DMF2848-000 | K, Ka | 0.1 max | 18 | 2 | 270 to 350 | low | 488-004 |
| DME2851-000 | K, Ka | 0.1 max | 18 | 3 | 375 to 550 | medium | 488-004 |
| DMJ2852-000 | K, Ka | 0.1 max | 18 | 4 | 600 to 700 | high | 488-004 |

Table 14. Epoxy and Hermetic Packaged Beam-Lead Bridge Quad N-Type Low, Medium, High Drive Schottky Diodes

| Part Numbers/Outline Drawings | | |
|-------------------------------|---------------------|------------------------|
| Epoxy Stripline 255 | Epoxy Stripline 235 | Hermetic Stripline 225 |
| DMF2076-255 | – | DMF2076-225 |
| DME2029-255 | – | DME2029-225 |
| DMJ2312-255 | – | DMJ2312-225 |
| DMF2077-255 | – | DMF2077-225 |
| DME2850-255 | – | DME2850-225 |
| DMJ2088-255 | – | DMJ2088-225 |
| DMF2078-255 | DMF2078-235 | DMF2078-225 |
| DME2031-255 | DME2031-235 | DME2031-225 |
| DMJ2768-255 | DMJ2768-235 | DMJ2768-225 |
| – | DMF2848-235 | DMF2848-225 |
| – | DME2851-235 | DME2851-225 |
| – | DMJ2852-235 | DMJ2852-225 |

Table 15. Electrical Specifications: Epoxy Packaged Octo Quad Ring, N-Type Low, Medium, High Drive Schottky Diodes



| Part Number | Frequency Band | C _J @ 0 V, 1 MHz (pF) | Rs @ 5 mA (Ω) | V _B @ 10 μA (V) | V _F @ 1 mA (mV) | Drive Level | Outline Drawing |
|-------------|----------------|----------------------------------|---------------|----------------------------|----------------------------|-------------|-----------------|
| | | | Max. | Min. | | | |
| DMF3938-257 | S to X | 0.15 to 0.30 | 16 | 4 | 400 to 520 | low | -257 |
| DME3939-257 | S to X | 0.15 to 0.30 | 16 | 6 | 600 to 800 | medium | -257 |
| DMJ3940-257 | S to X | 0.15 to 0.30 | 16 | 8 | 1000 to 1200 | high | -257 |

Typical Performance Characteristics



Figure 1. Typical Forward DC Characteristic Curves (Voltage vs Current)

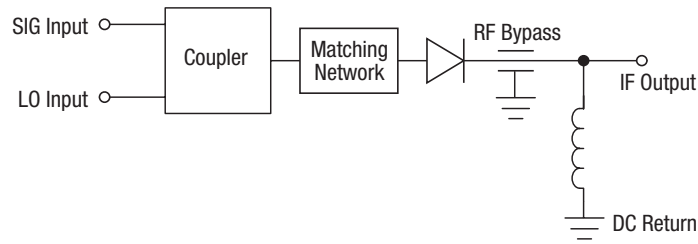


Figure 2. Typical Forward DC Characteristic Curves (Voltage vs current)

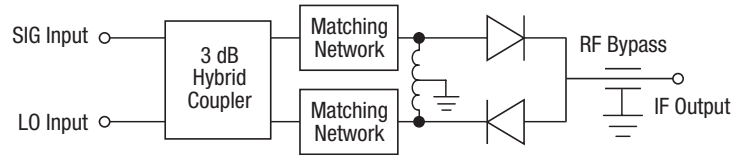


Figure 3. Typical X-Band Low Drive Mixer Diode RF Parameters vs Local Oscillator Drive

Single Ended Mixer



Balanced Mixer



Double Balanced Mixer

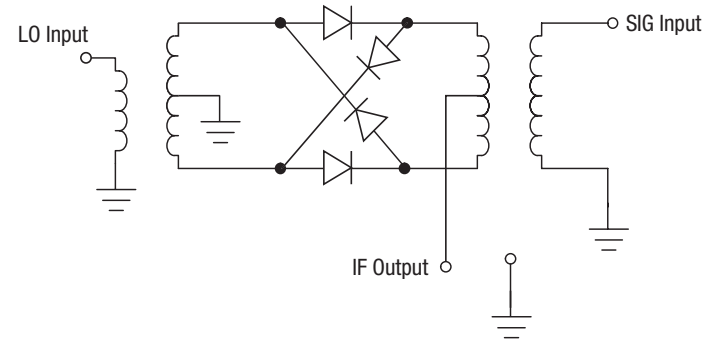


Figure 4. Typical Mixer Circuits

Shipping Information

To order a packaged diode, simply append the part number to the package outline number. For example, a Medium Drive Ring Quad Ku-band diode (part number DME2859-000) in a -234 package would be ordered as DME2859-234.

Package dimensions are provided in Figures 5 through 27.

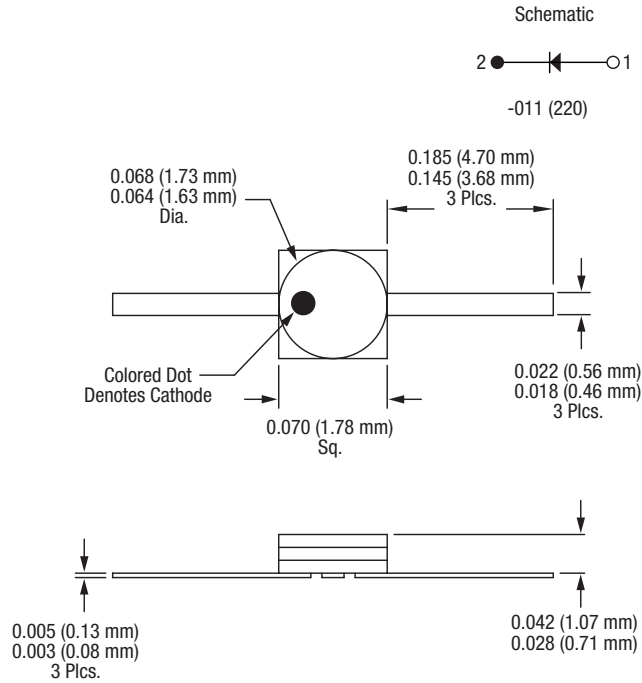


Figure 5. -220 Package Dimensions



Figure 6. -221 Package Dimensions

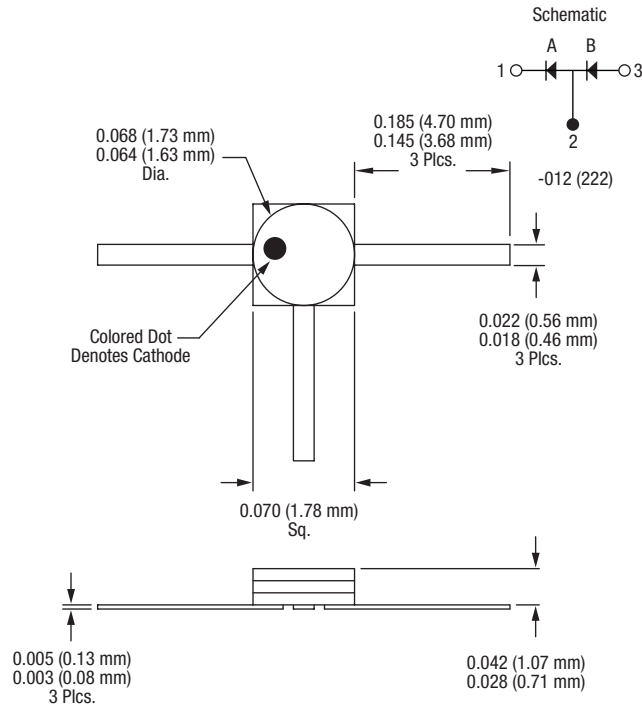


Figure 7. -222 Package Dimensions

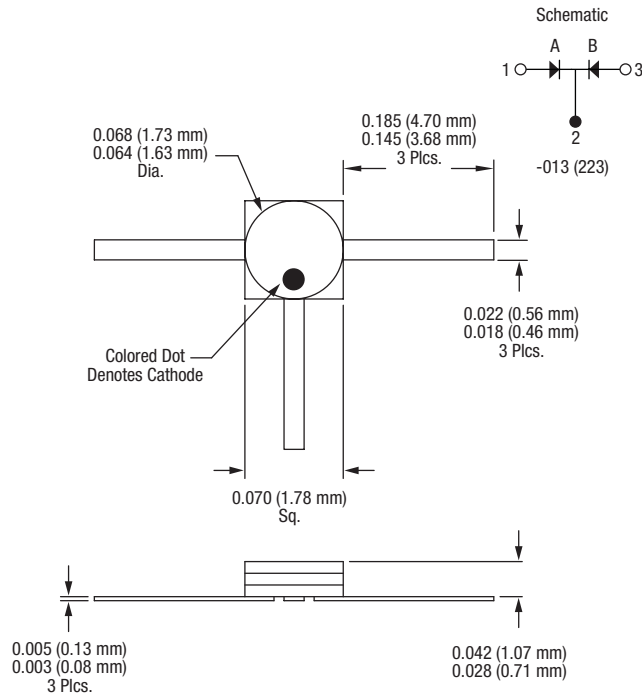


Figure 8. -223 Package Dimensions

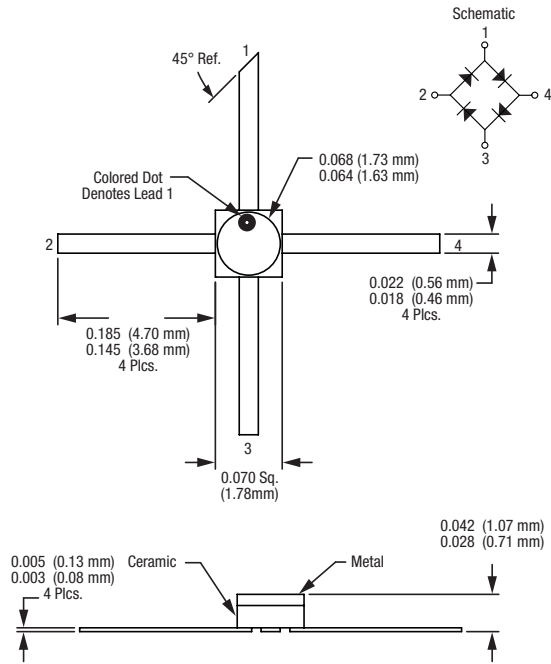


Figure 9. -224 Package Dimensions

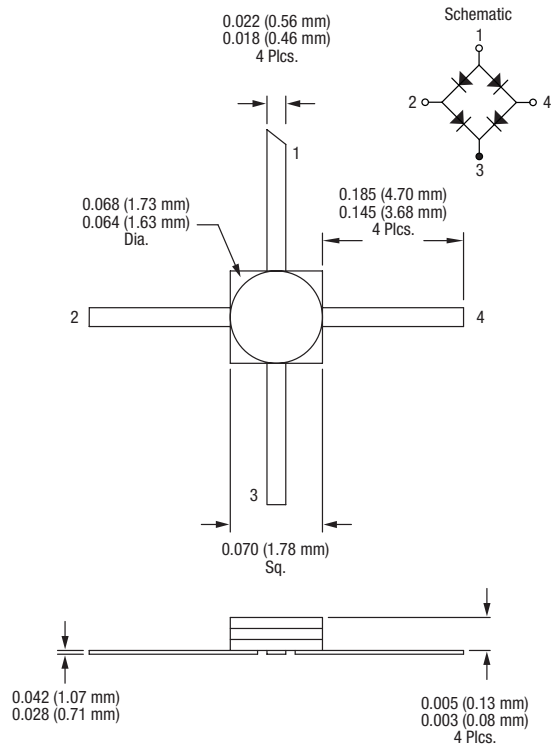


Figure 10. -225 Package Dimensions



Figure 11. -230 Package Dimensions



Figure 12. -232 Package Dimensions



Figure 13. -234 Package Dimensions



Figure 14. -235 Package Dimensions

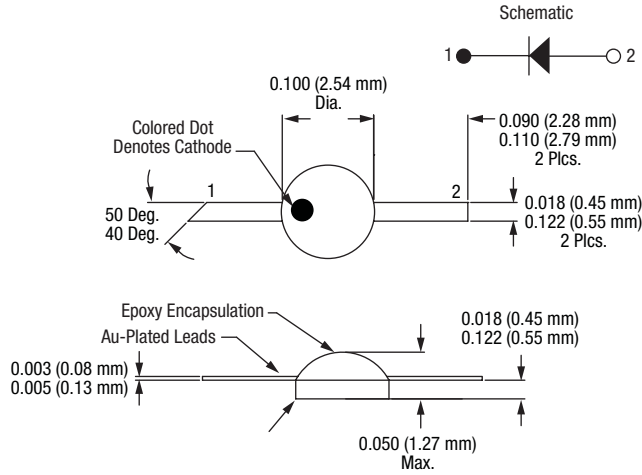


Figure 15. -250 Package Dimensions

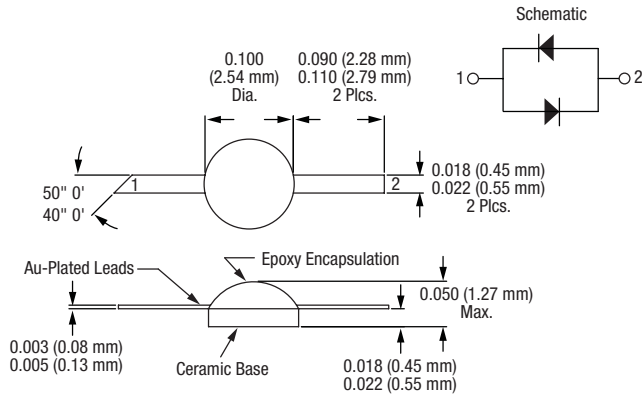


Figure 16. -251 Package Dimensions



Figure 17. -252 Package Dimensions



Figure 18. -253 Package Dimensions



Figure 19. -254 Package Dimensions



Figure 20. -255 Package Dimensions



Figure 21. -257 Package Dimensions



Figure 22. 488-002 Package Dimensions



Figure 23. 488-004 Package Dimensions

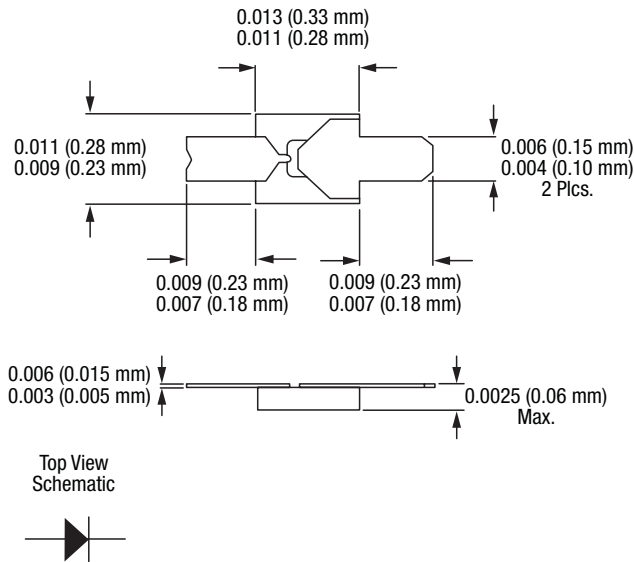


Figure 24. 491-011 Package Dimensions



Figure 25. 504-012 Package Dimensions



Figure 26. 504-013 Package Dimensions

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Figure 27. 522-025 Package Dimensions

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