DATA SHEET

DME, DMF, DMJ Series: Silicon Beam-Lead Schottky Mixer Diode (Singles, Pairs, and Quads) Bondable Beam-Lead Devices

Applications

- Microwave Integrated Circuits
- Mixers
- Detectors

Features

- Low 1/f noise
- Low intermodulation distortion
- Statistical Process Control wafer fabrication

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 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. Capacitance ranges and series resistances are comparable with the beam-lead devices that are available up to, and including, the Ka-band. These diodes are well suited for use in Microwave Integrated Circuits (MICs).

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

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

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

Electrical and Mechanical Specifications

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 8.

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

Table 2. Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Maximum current	Imax			100	mA
Power dissipation (continuous wave)	Pd			75	mW/junction
Storage temperature	T_{STG}	–65		+175	°C
Operating temperature	T_A	–65		+175	°C

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 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)	R_S @ 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

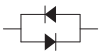
Table 4. Electrical Specifications: Beam-Lead Series Pair, N-Type Low, Medium, High Drive Schottky Diodes

Part Number	Frequency Band	C_J @ 0 V, 1 MHz (pF)	R_S @ 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 5. Electrical Specifications: Beam-Lead Common Cathode, N-Type Low, Medium, High Drive Schottky Diodes

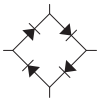
Part Number	Frequency Band	C_J @ 0 V, 1 MHz (pF)	R_S @ 5 mA (Ω)	V_B @ 10 µA (V)	V_F @ 1 mA (mV)	Drive Level	Outline Drawing
			Max.	Min.			
DMF2182-000	S, C	0.30 to 0.50	5	2	200 to 260	low	504-013
DME2205-000	S, C	0.30 to 0.50	5	3	300 to 400	medium	504-013
DMJ2208-000	S, C	0.30 to 0.50	5	4	500 to 600	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 6. Electrical Specifications: Beam-Lead Anti-Parallel, N-Type Low, Medium, High Drive Schottky Diodes



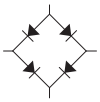
Part Number	Frequency Band	C_J @ 0 V, 1 MHz (pF)	R_S @ 5 mA (Ω)	V_B @ 10 µA (V)	V_F @ 1 mA (mV)	Drive Level	Outline Drawing
			Max.	Min.			
DMF2185-000	S, C	0.30 to 0.50	5	2	200 to 260	low	522-025
DME2282-000	S, C	0.30 to 0.50	5	3	300 to 400	medium	522-025
DMJ2303-000	S, C	0.30 to 0.50	5	4	500 to 600	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 7. 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)	R_S @ 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 8. 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)	R_S @ 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

Typical Performance Characteristics

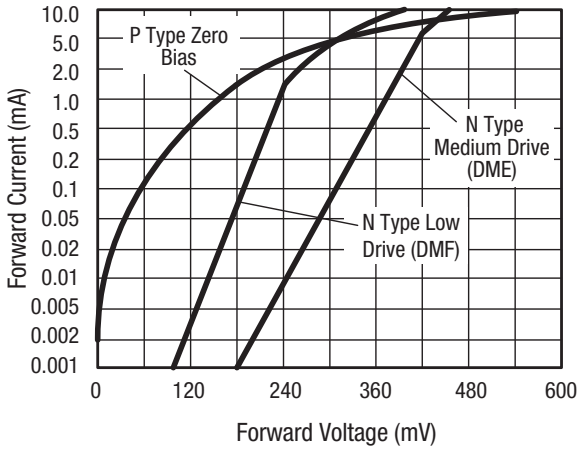


Figure 1. Typical Forward DC Characteristic Curves (Voltage vs Current)

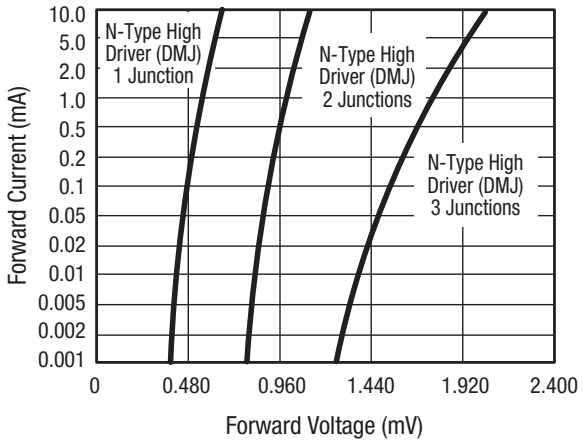


Figure 2. Typical Forward DC Characteristic Curves (Voltage vs current)

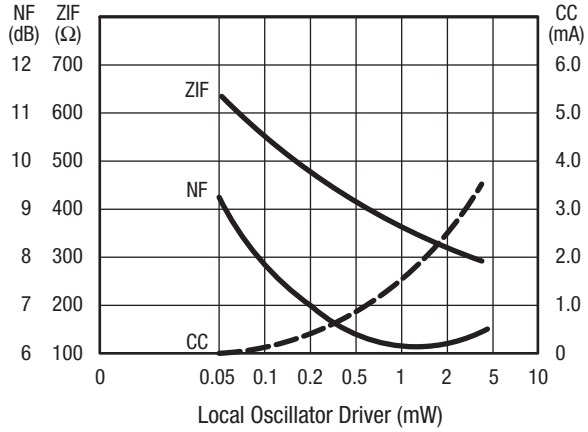


Figure 3. Typical X-Band Low Drive Mixer Diode RF Parameters vs Local Oscillator Drive

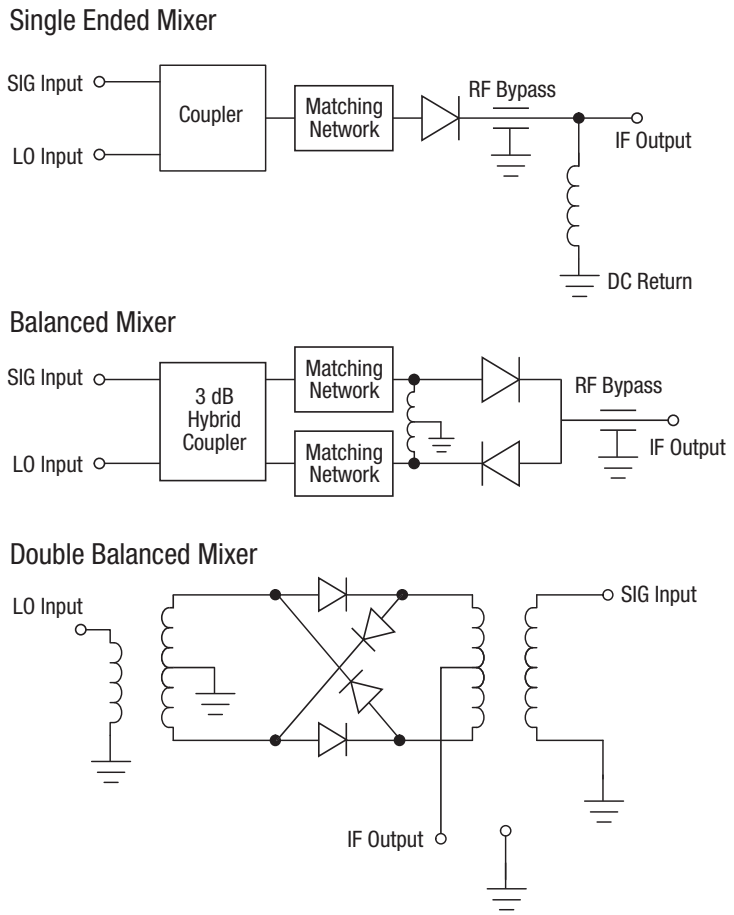


Figure 4. Typical Mixer Circuits

Dimensions and Package Information

Additional bonding and handling methods are contained in the Skyworks Application Note, *Diode Chips, Beam-Lead Diodes, Capacitors: Bonding Methods and Packaging* (document #200532).

Dimensions are provided in Figures 5 through 10.

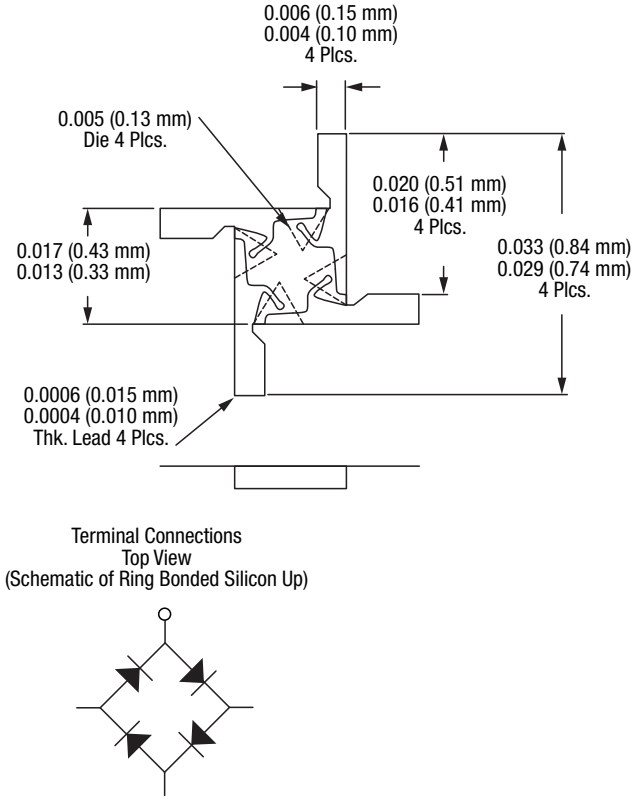


Figure 5. 488-002 Package Dimensions

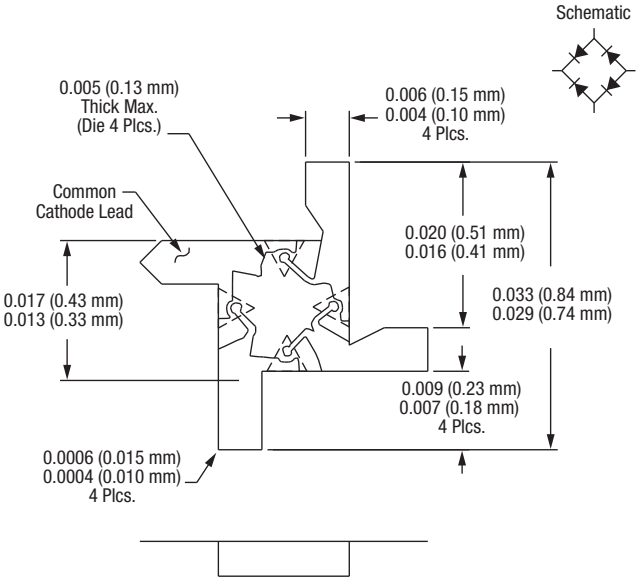


Figure 6. 488-004 Package Dimensions

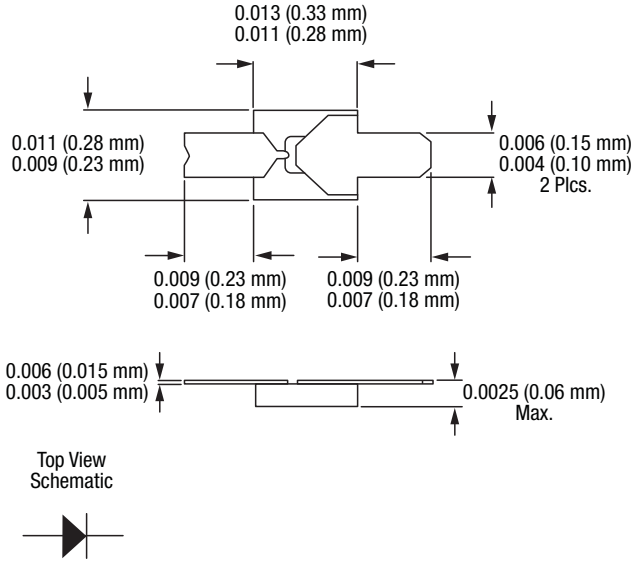


Figure 7. 491-011 Package Dimensions

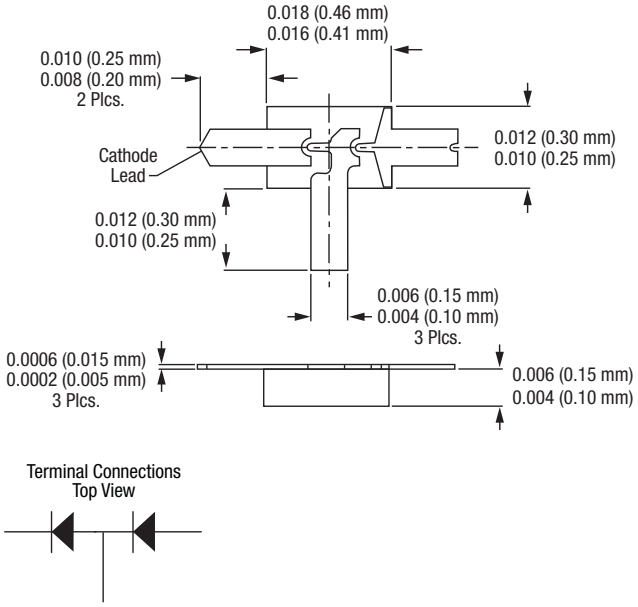


Figure 8. 504-012 Package Dimensions

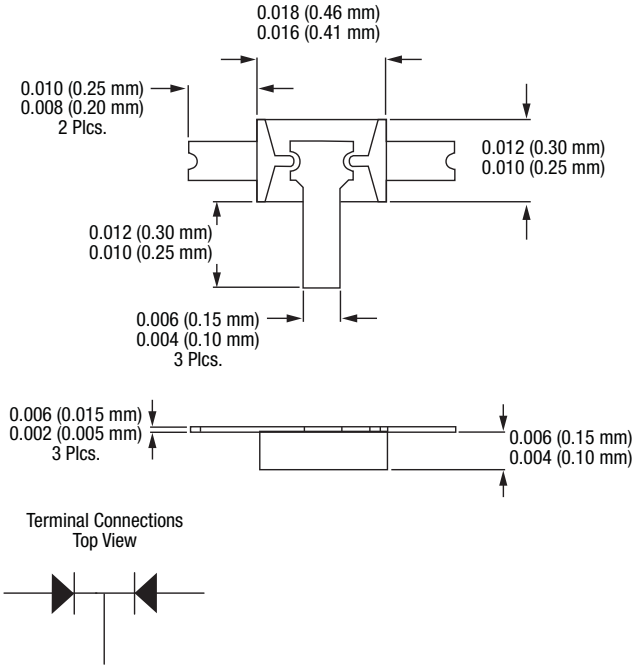


Figure 9. 504-013 Package Dimensions

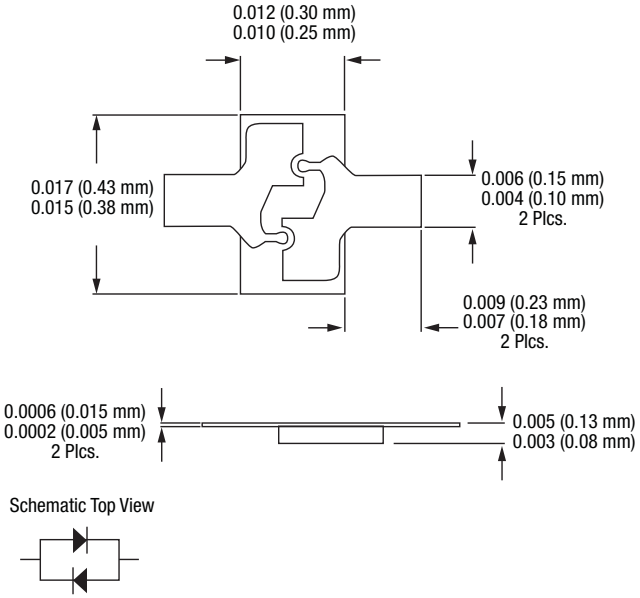


Figure 10. 522-025 Package Dimensions

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