

DATA SHEET

DME, DMF, DMJ Series: Silicon Beam-Lead Schottky Mixer Diodes – Singles, Pairs, and Quads in Ceramic Hermetic Packages

Applications

- Microwave integrated circuits
- Mixers
- Detectors

Features

- Low 1/f noise
- Low intermodulation distortion
- Hermetically sealed packages
- Statistical process control wafer fabrication
- Packages rated MSL1, 260 °C per JEDEC J-STD-020)

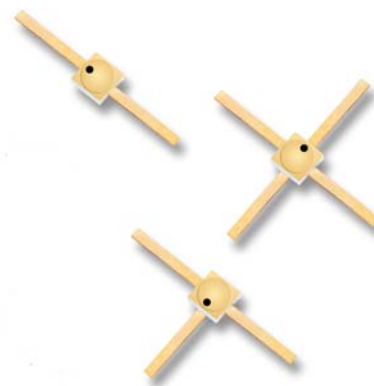
Description

The Isolink silicon Schottky barrier mixer diodes are designed for applications through 20 GHz.

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. These Schottky barrier mixer 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.

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 may also be used as modulators and high-speed switches.



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 9.

Typical performance characteristics are shown in Figures 1 through 3. Typical mixer circuits are shown in Figure 4. Package dimensions are provided in Figures 5 through 21.

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 (Note 1)

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
Electrostatic discharge: 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 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.

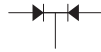
Table 3. Electrical Specifications: Beam-Lead Single N-Type Low, Medium, High Drive Schottky Diodes

Frequency Band	Part Number	Barrier	V_F @ 1.0 mA (mV)		R_s @ 5.0 mA (Ω)	Total Capacitance (CT) @ 0 V (pF)	V_B @ 10 μ A (V)
			Minimum	Maximum	Maximum	Maximum	Minimum
S, C	DMF2820-220	Low	200	260	5	0.60	2
S, C	DMF2820-250	Low	200	260	5	0.60	2
S, C	DME2127-220	Medium	300	400	5	0.60	3
S, C	DME2127-250	Medium	300	400	5	0.60	3
S, C	DMJ2823-220	High	500	600	5	0.60	4
S, C	DMJ2823-250	High	500	600	5	0.60	4
X	DMF2821-220	Low	220	300	8	0.40	2
X	DMF2821-250	Low	220	300	8	0.40	2
X	DME2957-220	Medium	325	425	8	0.40	3
X	DME2957-250	Medium	325	425	8	0.40	3
X	DMJ2777-220	High	550	650	8	0.40	4
X	DMJ2777-250	High	550	650	8	0.40	4
Ku	DMF2344-220	Low	260	330	13	0.25	2
Ku	DMF2344-230	Low	260	330	13	0.25	2
Ku	DMF2344-250	Low	260	330	13	0.25	2
Ku	DME2333-220	Medium	350	450	13	0.25	3
Ku	DME2333-230	Medium	350	450	13	0.25	3
Ku	DME2333-250	Medium	350	450	13	0.25	3
Ku	DMJ2824-220	High	500	680	13	0.25	4
Ku	DMJ2824-230	High	500	680	13	0.25	4
Ku	DMJ2824-250	High	500	680	13	0.25	4
K, Ka	DMF2822-220	Low	270	350	18	0.25	2
K, Ka	DMF2822-230	Low	270	350	18	0.25	2
K, Ka	DME2458-220	Medium	375	550	18	0.2	3
K, Ka	DME2458-230	Medium	375	550	18	0.2	3
K, Ka	DMJ2825-220	High	600	700	18	0.2	4
K, Ka	DMJ2825-230	High	600	700	18	0.2	4

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



Frequency Band	Part Number	Barrier	V _F @ 1.0 mA (mV)		R _s @ 5.0 mA (Ω)	Total Capacitance (CT) @ 0 V (pF)	V _B @ 10 uA (V)
			Minimum	Maximum	Maximum	Maximum	Minimum
S, C	DMF2835-222	Low	200	260	5	0.60	2
S, C	DMF2835-252	Low	200	260	5	0.60	2
S, C	DME2050-222	Medium	300	400	5	0.60	3
S, C	DME2050-252	Medium	300	400	5	0.60	3
S, C	DMJ2092-222	High	500	600	5	0.60	4
S, C	DMJ2092-252	High	500	600	5	0.60	4
X	DMF2826-222	Low	220	300	8	0.40	2
X	DMF2826-252	Low	220	300	8	0.40	2
X	DME2829-222	Medium	325	425	8	0.40	3
X	DME2829-252	Medium	325	425	8	0.40	3
X	DMJ2093-222	High	550	650	8	0.40	4
X	DMJ2093-252	High	550	650	8	0.40	4
Ku	DMF2827-222	Low	260	330	13	0.25	2
Ku	DMF2827-232	Low	260	330	13	0.25	2
Ku	DMF2827-252	Low	260	330	13	0.25	2
Ku	DME2830-222	Medium	350	450	13	0.25	3
Ku	DME2830-232	Medium	350	450	13	0.25	3
Ku	DME2830-252	Medium	350	450	13	0.25	3
Ku	DMJ2832-222	High	500	680	13	0.25	4
Ku	DMJ2832-232	High	500	680	13	0.25	4
Ku	DMJ2832-252	High	500	680	13	0.25	4
K, Ka	DMF2828-222	Low	270	350	18	0.2	2
K, Ka	DMF2828-232	Low	270	350	18	0.2	2
K, Ka	DME2831-222	Medium	375	550	18	0.2	3
K, Ka	DME2831-232	Medium	375	550	18	0.2	3
K, Ka	DMJ2833-222	High	600	700	18	0.2	4
K, Ka	DMJ2833-232	High	600	700	18	0.2	4

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

Frequency Band	Part Number	Barrier	$V_F @ 1.0 \text{ mA}$ (mV)		R_s @ 5.0 mA (Ω)	Total Capacitance (CT) @ 0 V (pF)	$V_B @ 10 \text{ uA}$ (V)
			Minimum	Maximum	Maximum	Maximum	Minimum
S, C	DMF2182-223	Low	200	260	5	0.60	2
S, C	DMF2182-253	Low	200	260	5	0.60	2
S, C	DME2205-223	Medium	300	400	5	0.60	3
S, C	DME2205-253	Medium	300	400	5	0.60	3
S, C	DMJ2208-223	High	500	600	5	0.60	4
S, C	DMJ2208-253	High	500	600	5	0.60	4
X	DMF2183-223	Low	220	300	8	0.40	2
X	DMF2183-253	Low	220	300	8	0.40	2
X	DME2206-223	Medium	325	425	8	0.40	3
X	DME2206-253	Medium	325	425	8	0.40	3
X	DMJ2209-223	High	550	650	8	0.40	4
X	DMJ2209-253	High	550	650	8	0.40	4
Ku	DMF2184-223	Low	260	330	13	0.25	2
Ku	DMF2184-253	Low	260	330	13	0.25	2
Ku	DME2207-223	Medium	350	450	13	0.25	3
Ku	DME2207-253	Medium	350	450	13	0.25	3
Ku	DMJ2210-223	High	500	680	13	0.25	4
Ku	DMJ2210-253	High	500	680	13	0.25	4
K, Ka	DMF2834-223	Low	270	350	18	0.2	2
K, Ka	DME2864-223	Medium	375	550	18	0.2	3
K, Ka	DMJ2836-223	High	600	700	18	0.2	4

Table 6. Electrical Specifications: Beam-Lead Anti-Parallel, N-Type Low, Medium, High Drive Schottky Diodes



Frequency Band	Part Number	Barrier	$V_F @ 1.0 \text{ mA}$ (mV)		$R_s @ 5.0 \text{ mA}$ (Ω)	Total Capacitance (CT) @ 0 V (pF)	$V_B @ 10 \text{ uA}$ (V)
			Minimum	Maximum	Maximum	Maximum	Minimum
S, C	DMF2185-221	Low	200	260	5	0.60	2
S, C	DMF2185-251	Low	200	260	5	0.60	2
S, C	DME2282-221	Medium	300	400	5	0.60	3
S, C	DME2282-251	Medium	300	400	5	0.60	3
S, C	DMJ2303-221	High	500	600	5	0.60	4
S, C	DMJ2303-251	High	500	600	5	0.60	4
X	DMF2186-221	Low	220	300	8	0.40	2
X	DMF2186-251	Low	220	300	8	0.40	2
X	DME2283-221	Medium	325	425	8	0.40	3
X	DME2283-251	Medium	325	425	8	0.40	3
X	DMJ2304-221	High	550	650	8	0.40	4
X	DMJ2304-251	High	550	650	8	0.40	4
Ku	DMF2187-221	Low	260	330	13	0.25	2
Ku	DMF2187-251	Low	260	330	13	0.25	2
Ku	DME2284-221	Medium	350	450	13	0.25	3
Ku	DME2284-251	Medium	350	450	13	0.25	3
Ku	DMJ2246-221	High	500	680	13	0.25	4
Ku	DMJ2246-251	High	500	680	13	0.25	4
K, Ka	DMF2837-221	Low	270	350	18	0.2	2
K, Ka	DME2838-221	Medium	375	550	18	0.2	3
K, Ka	DMJ2839-221	High	600	700	18	0.2	4

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



Frequency Band	Part Number	Barrier	$V_F @ 1.0 \text{ mA}$ (mV)		R_s @ 5.0 mA (Ω)	Total Capacitance (CT) @ 0 V (pF)	$V_B @ 10 \mu\text{A}$ (V)
			Minimum	Maximum	Maximum	Maximum	Minimum
S, C	DMF2865-224	Low	200	260	5	0.60	2
S, C	DMF2865-254	Low	200	260	5	0.60	2
S, C	DME2857-224	Medium	300	400	5	0.60	3
S, C	DME2857-254	Medium	300	400	5	0.60	3
S, C	DMJ2502-224	High	500	600	5	0.60	4
S, C	DMJ2502-254	High	500	600	5	0.60	4
X	DMF2011-224	Low	220	300	8	0.40	2
X	DMF2011-254	Low	220	300	8	0.40	2
X	DME2858-224	Medium	325	425	8	0.40	3
X	DME2858-254	Medium	325	425	8	0.40	3
X	DMJ2990-224	High	550	650	8	0.40	4
X	DMJ2990-254	High	550	650	8	0.40	4
Ku	DMF2012-224	Low	260	330	13	0.25	2
Ku	DMF2012-234	Low	260	330	13	0.25	2
Ku	DMF2012-254	Low	260	330	13	0.25	2
Ku	DME2859-224	Medium	350	450	13	0.25	3
Ku	DME2859-234	Medium	350	450	13	0.25	3
Ku	DME2859-254	Medium	350	450	13	0.25	3
Ku	DMJ2667-224	High	500	680	13	0.25	4
Ku	DMJ2667-234	High	500	680	13	0.25	4
Ku	DMJ2667-254	High	500	680	13	0.25	4
K, Ka	DMF2454-224	Low	270	350	18	0.25	2
K, Ka	DMF2454-234	Low	270	350	18	0.25	2
K, Ka	DME2459-224	Medium	375	550	18	0.2	3
K, Ka	DME2459-234	Medium	375	550	18	0.2	3
K, Ka	DMJ2455-224	High	600	700	18	0.2	4
K, Ka	DMJ2455-234	High	600	700	18	0.2	4

Table 8. Electrical Specifications: Beam-Lead Bridge Quad, N-Type Low, Medium, High Drive Schottky Diodes



Frequency Band	Part Number	Barrier	$V_F @ 1.0 \text{ mA}$ (mV)		$R_s @ 5.0 \text{ mA}$ (Ω)	Total Capacitance (CT) @ 0 V (pF)	$V_B @ 10 \text{ }\mu\text{A}$ (V)
			Minimum	Maximum	Maximum	Maximum	Minimum
S, C	DMF2076-225	Low	200	260	5	0.60	2
S, C	DMF2076-255	Low	200	260	5	0.60	2
S, C	DME2029-225	Medium	300	400	5	0.60	3
S, C	DME2029-255	Medium	300	400	5	0.60	3
S, C	DMJ2312-225	High	500	600	5	0.60	4
S, C	DMJ2312-255	High	500	600	5	0.60	4
X	DMF2077-225	Low	220	300	8	0.40	2
X	DMF2077-255	Low	220	300	8	0.40	2
X	DME2850-225	Medium	325	425	8	0.40	3
X	DME2850-255	Medium	325	425	8	0.40	3
X	DMJ2088-225	High	550	650	8	0.40	4
X	DMJ2088-255	High	550	650	8	0.40	4
Ku	DMF2078-225	Low	260	330	13	0.25	2
Ku	DMF2078-235	Low	260	330	13	0.25	2
Ku	DMF2078-255	Low	260	330	13	0.25	2
Ku	DME2031-225	Medium	350	450	13	0.25	3
Ku	DME2031-235	Medium	350	450	13	0.25	3
Ku	DME2031-255	Medium	350	450	13	0.25	3
Ku	DMJ2768-225	High	500	680	13	0.25	4
Ku	DMJ2768-235	High	500	680	13	0.25	4
Ku	DMJ2768-255	High	500	680	13	0.25	4
K, Ka	DMF2848-225	Low	270	350	18	0.25	2
K, Ka	DMF2848-235	Low	270	350	18	0.25	2
K, Ka	DME2851-225	Medium	375	550	18	0.2	3
K, Ka	DME2851-235	Medium	375	550	18	0.2	3
K, Ka	DMJ2852-225	High	600	700	18	0.2	4
K, Ka	DMJ2852-235	High	600	700	18	0.2	4

Table 9. Electrical Specifications: Epoxy Packaged Octo Quad Ring, N-Type Low, Medium, High Drive Schottky Diodes



Frequency Band	Part Number	Barrier	$V_F @ 1.0 \text{ mA}$ (mV)		$R_s @ 5.0 \text{ mA}$ (Ω)	Total Capacitance (CT) @ 0 V (pF)	$V_B @ 10 \mu\text{A}$ (V)
			Minimum	Maximum	Maximum	Maximum	Minimum
S to X	DMF3938-257	Low	400	520	16	0.40	4
S to X	DME3939-257	Medium	600	800	16	0.40	6
S to X	DMJ3940-257	High	1000	1200	16	0.40	8

Typical Performance Characteristics

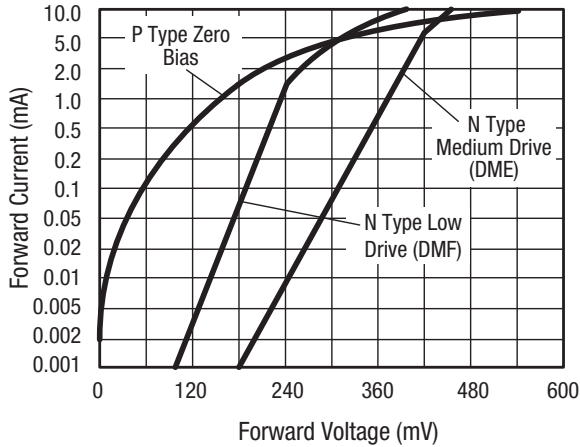


Figure 1. Typical Forward DC Characteristic Curves (Voltage vs Current)

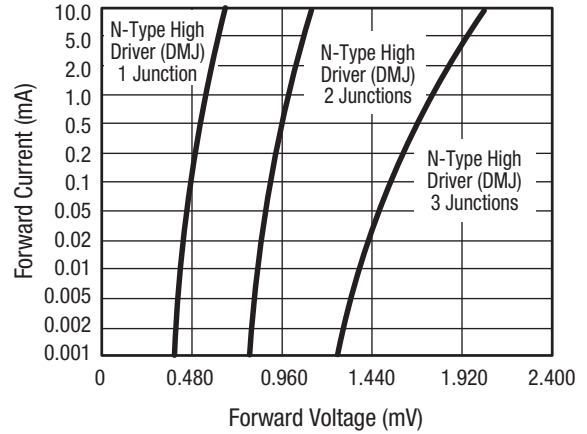


Figure 2. Typical Forward DC Characteristic Curves (Voltage vs current)

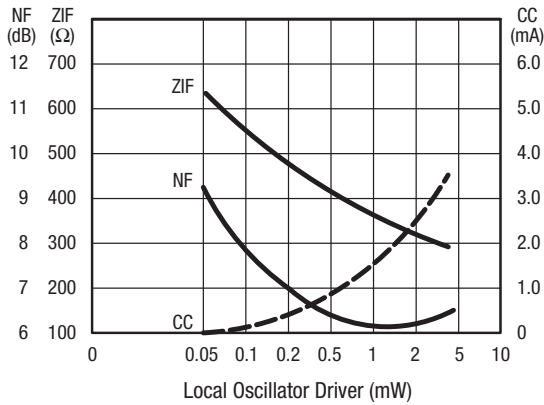
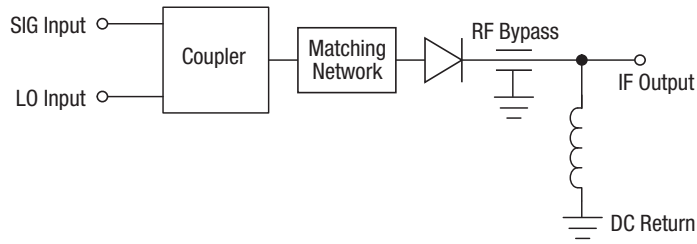
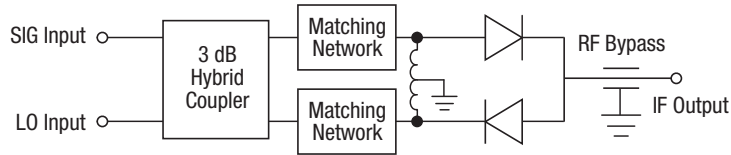


Figure 3. Typical X-Band Low Drive Mixer Diode RF Parameters vs Local Oscillator Drive

Single Ended Mixer



Balanced Mixer



Double Balanced Mixer

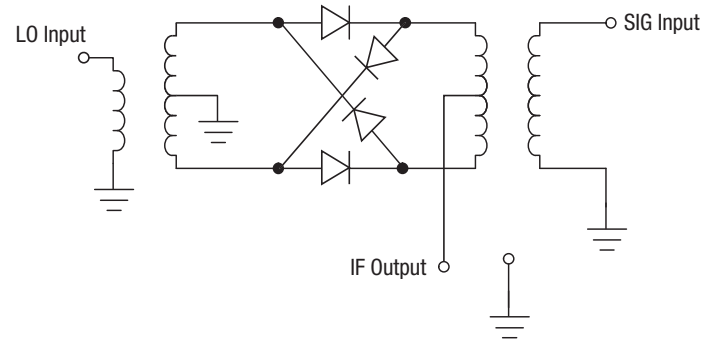


Figure 4. Typical Mixer Circuits

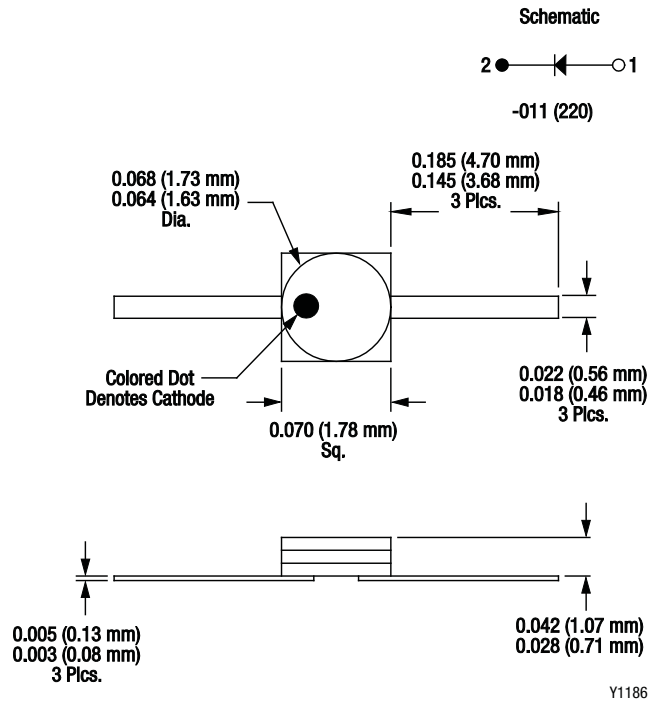


Figure 5. -220 Package Dimensions

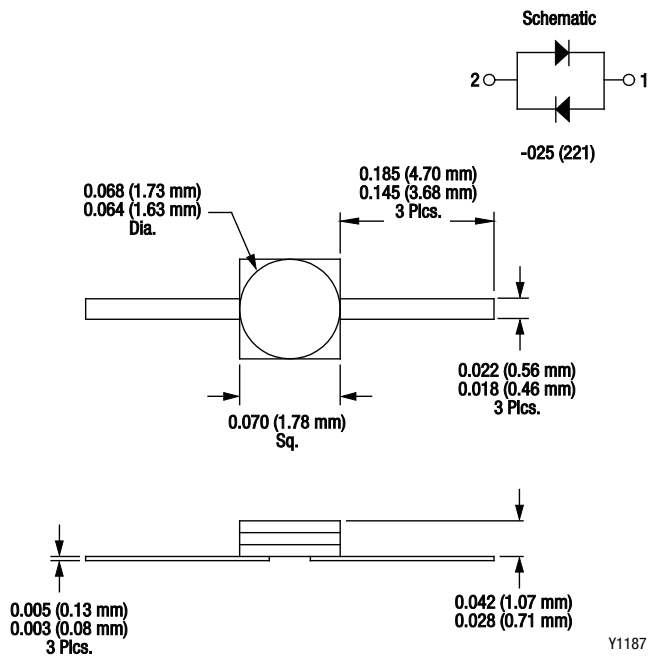


Figure 6. -221 Package Dimensions

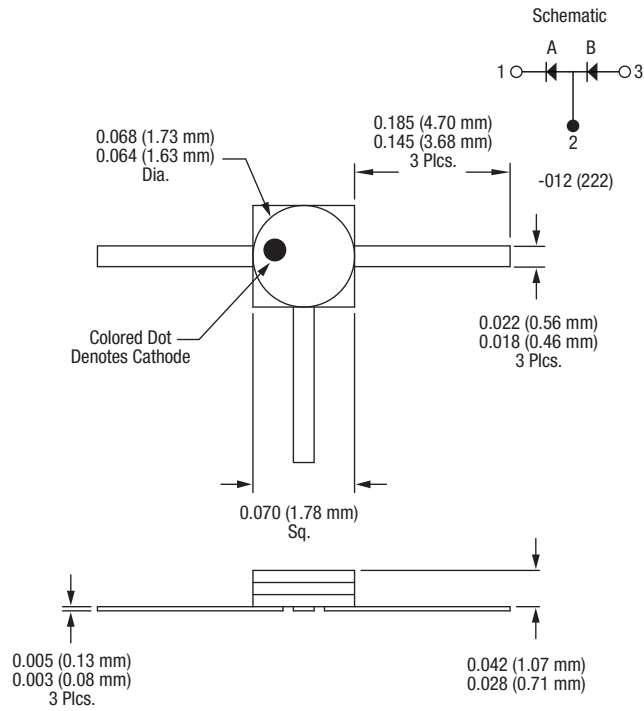


Figure 7. -222 Package Dimensions

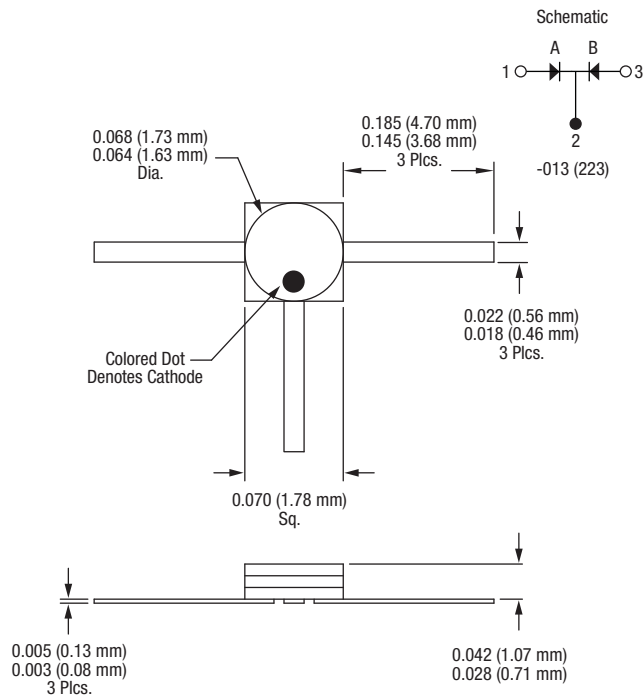


Figure 8. -223 Package Dimensions

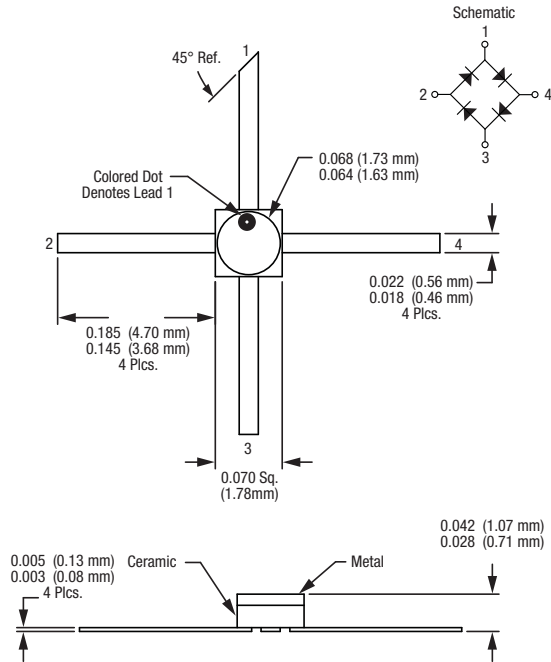


Figure 9. -224 Package Dimensions

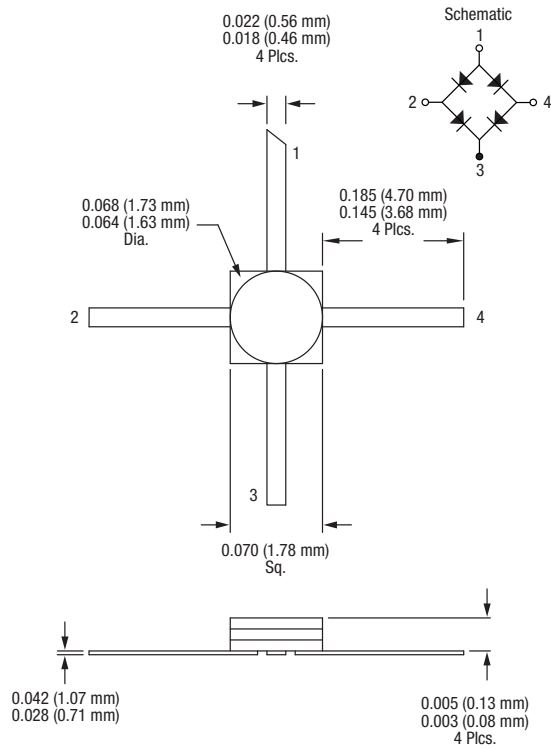


Figure 10. -225 Package Dimensions

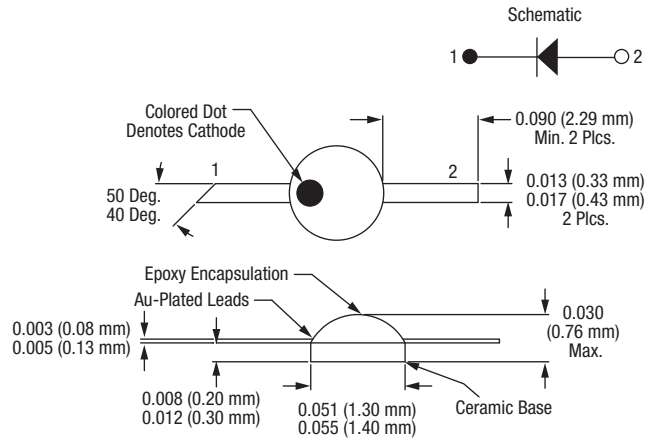


Figure 11. -230 Package Dimensions

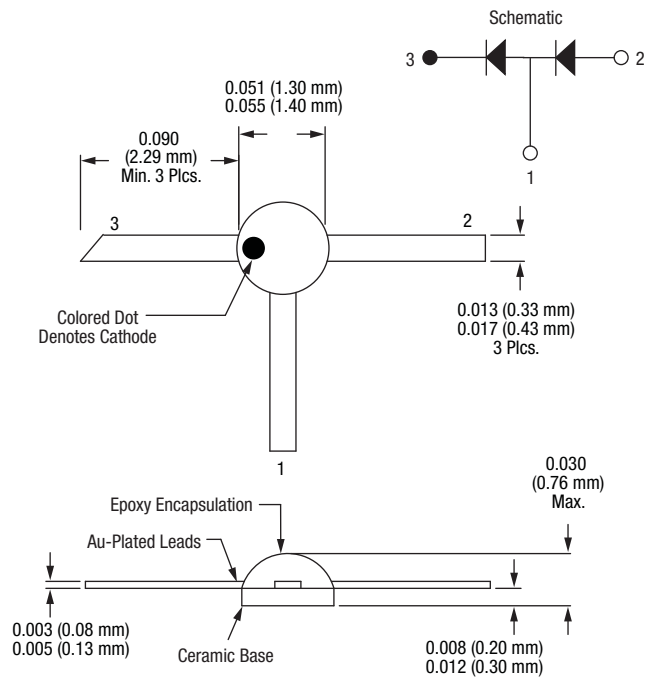


Figure 12. -232 Package Dimensions

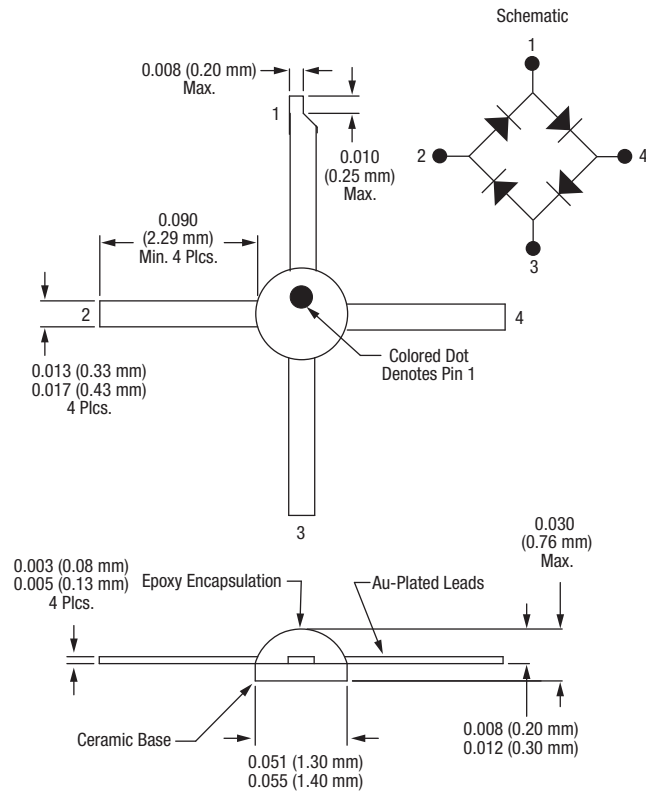


Figure 13. -234 Package Dimensions

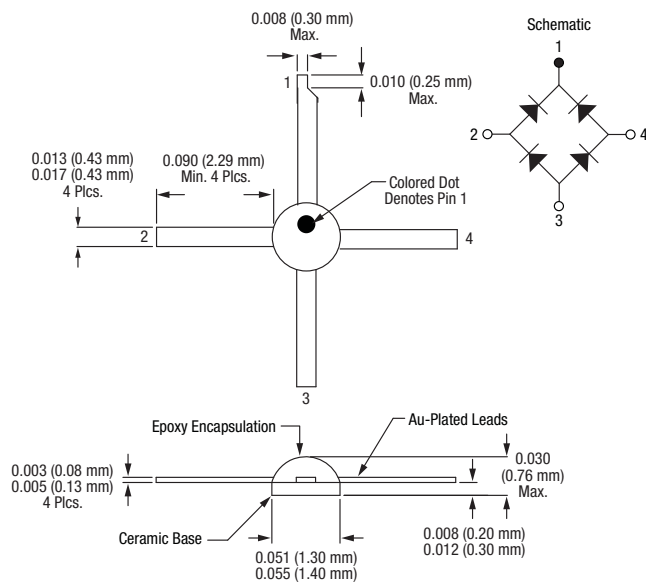


Figure 14. -235 Package Dimensions

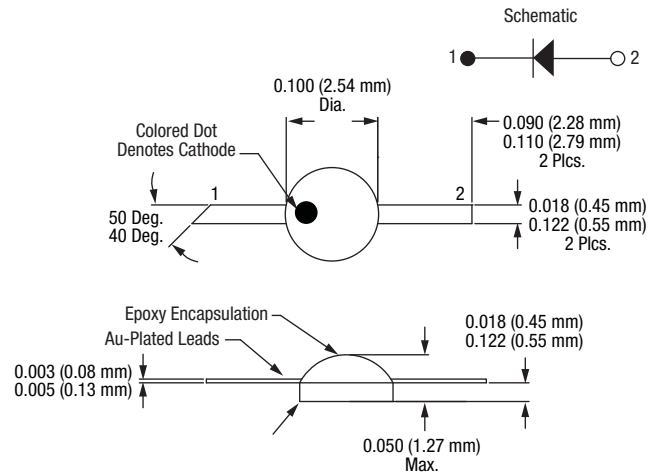


Figure 15. -250 Package Dimensions

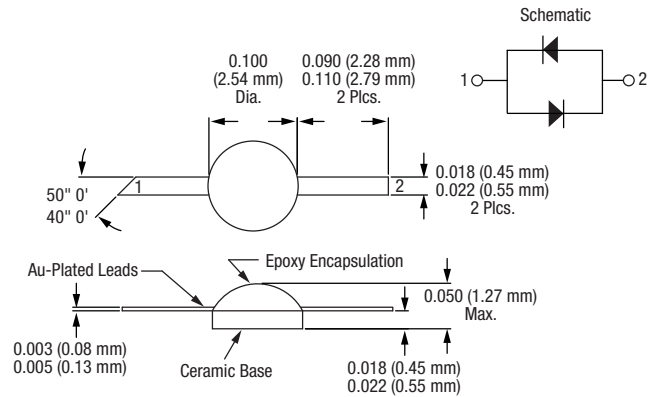


Figure 16. -251 Package Dimensions

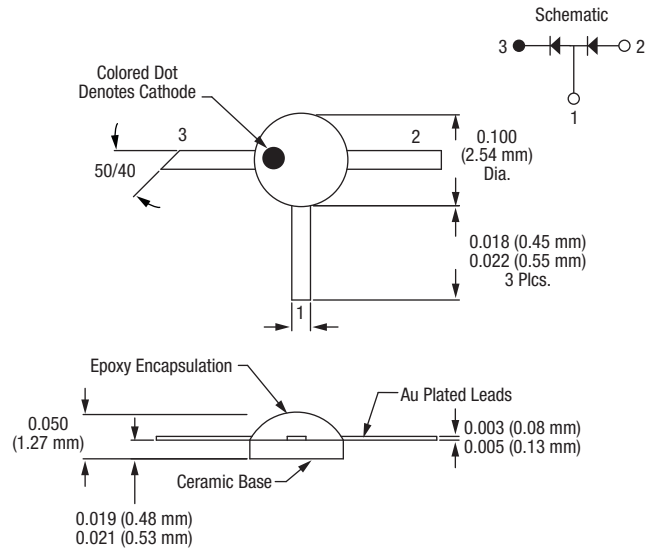


Figure 17. -252 Package Dimensions

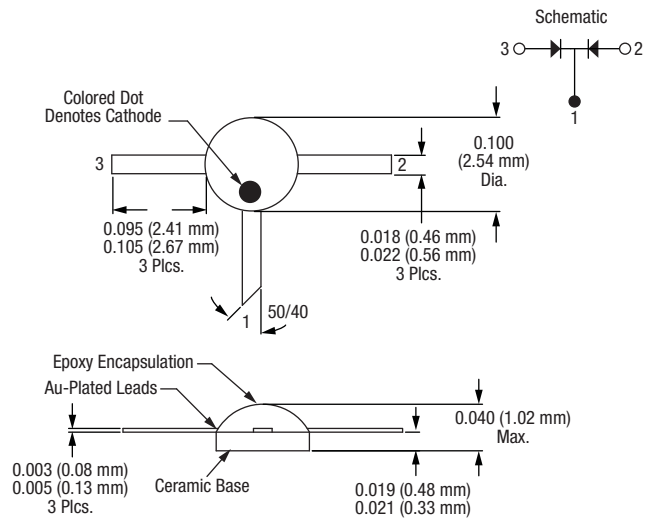


Figure 18. -253 Package Dimensions

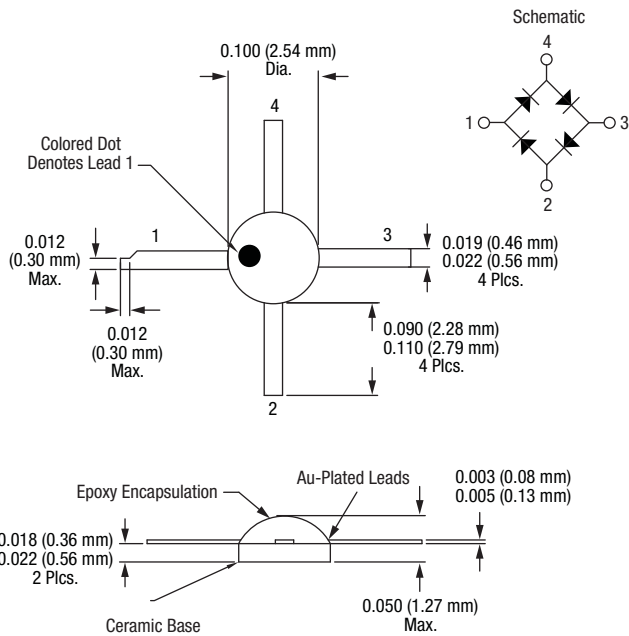


Figure 19. -254 Package Dimensions

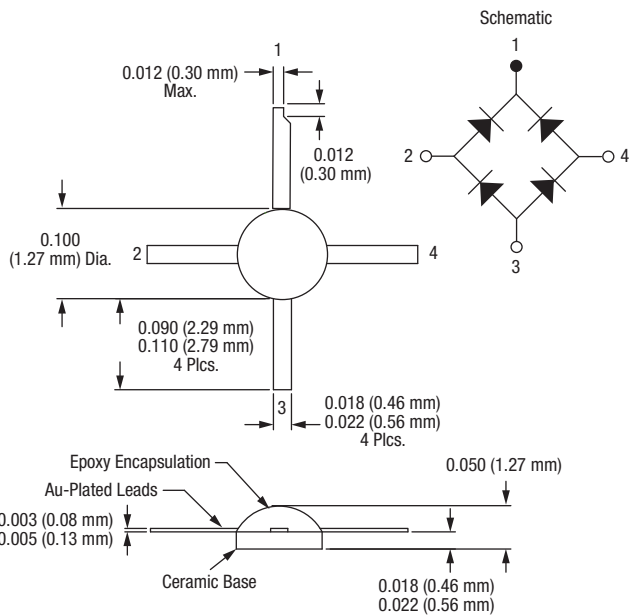


Figure 20. -255 Package Dimensions

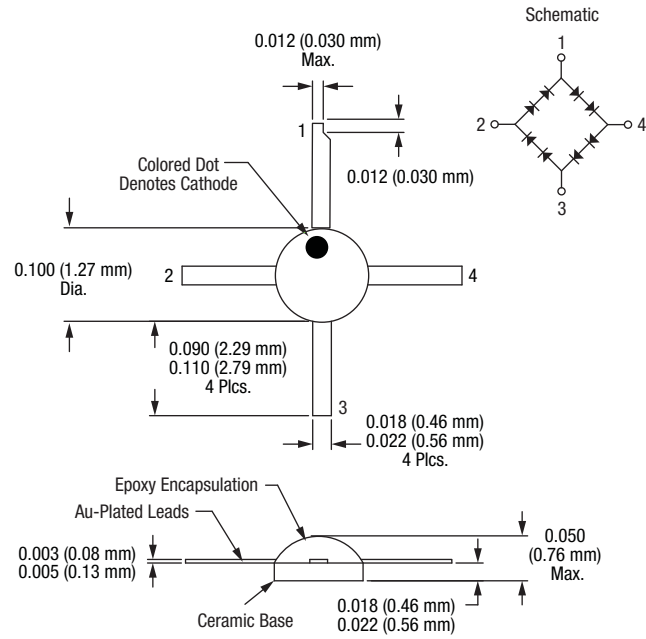


Figure 21. -257 Package Dimensions

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