

DATA SHEET

DSM8100-000: Mesa Beam Lead PIN Diode

Applications:

- Designed for switching applications

Features

- Low capacitance
- Low resistance
- Fast switching
- Oxide–nitride passivated
- Durable construction
- High voltage

Description

Skyworks' Silicon Mesa Beam Lead PIN diode is surrounded by a glass frame for superior strength and electrical performance that surpasses the standard beam lead PINs. The DSM8100-000 is designed for low resistance, low capacitance and fast switching time. The oxide-nitride passivation layers provide reliable operation and stable junction parameters that provide complete sealing of the junction permitting use in assemblies with some degree of moisture sealing. A layer of glass provides increased mechanical strength.

The DSM8100 is ideal for microstrip or stripline circuits and for circuits requiring high isolation from a series mounted diode such as broad band multi-throw switches, phase shifters, limiters, attenuators and modulators.



Absolute Maximum Ratings

Characteristic	Value
Operating temperature	-65 °C to +150 °C
Storage temperature	-65 °C to +200 °C
Power dissipation (derate linearly to zero @ 175 °C)	250 mW
Typical lead strength	8 grams pull

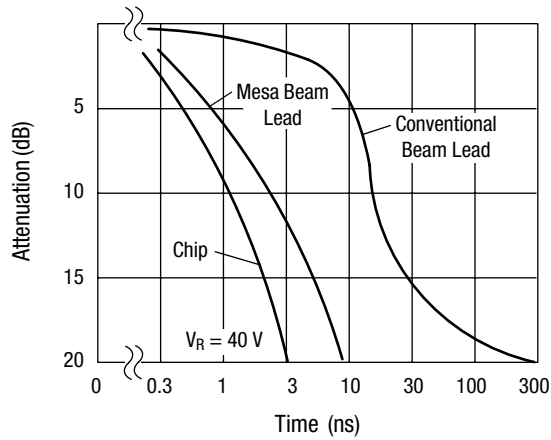
Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

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 must be employed at all times.

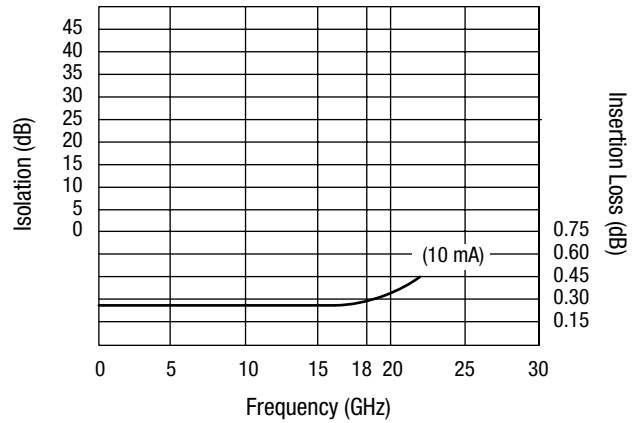
Mesa Beam Lead Diode Specifications

Part Number	Voltage Breakdown @ I_R 10 μ A (V) Min.	Capacitance Total 10 V, 1 MHz (pF) Max.	Series Resistance (Ω) 10 mA, 100 MHz Max.	C_{LT} $I_F = 10$ mA, $I_R = 6$ mA (ns) Typ.	Outline Drawing Number
DSM8100-000	60	0.025	3.5	25	389-003

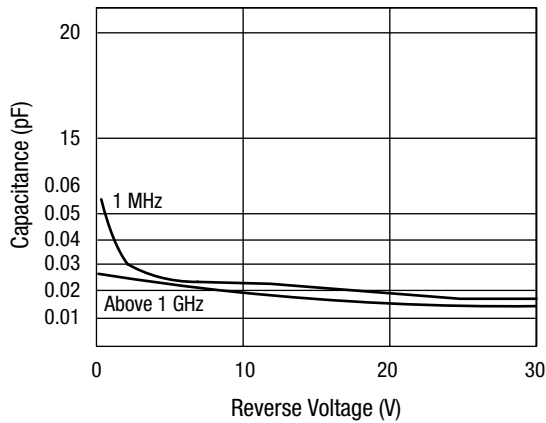
Typical Performance Data



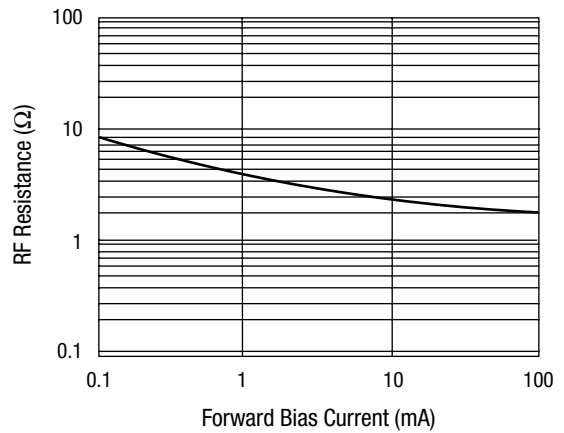
Switching Time Data



Typical Isolation and Insertion Loss Characteristics

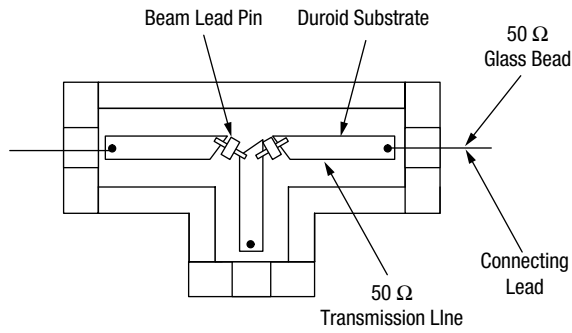


Typical Capacitance vs. Reverse Voltage

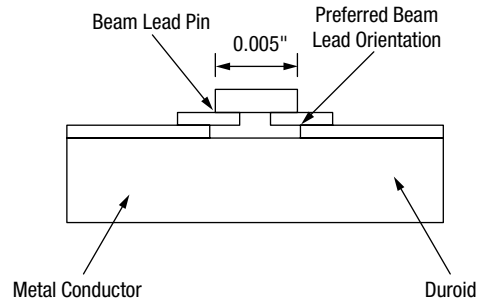


Typical RF Resistance vs. Forward Bias Current

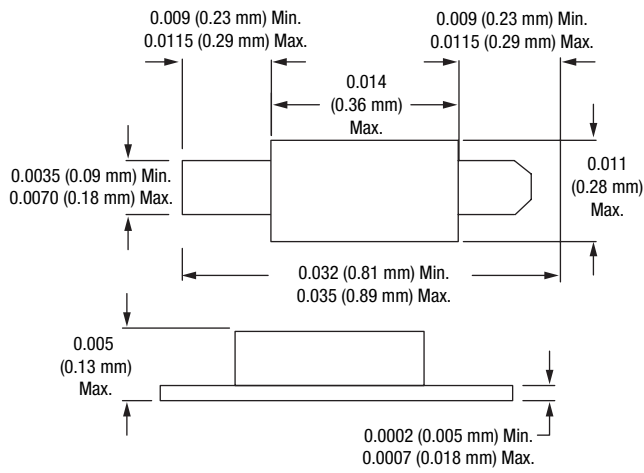
Typical SPDT Circuit Arrangement



Typical Beam Lead Mounting



389-003



Beam-Lead Diodes

Handling

Due to their small size, beam-lead devices are fragile and should be handled with extreme care. The individual plastic packages should be handled and opened carefully, so that no undue mechanical strain is applied to the packaged device. It is recommended that the beam-lead devices be handled through use of a vacuum pencil using an appropriate size vacuum needle or a pointed wooden stick such as a sharpened Q-tip or match stick. The device will adhere to the point and can easily be removed from the container and positioned accurately for bonding without damage. Such handling should be done under a binocular microscope with magnification in the range of 20X to 30X.

Special handling precautions are also required to avoid electrical damage, such as static discharge.

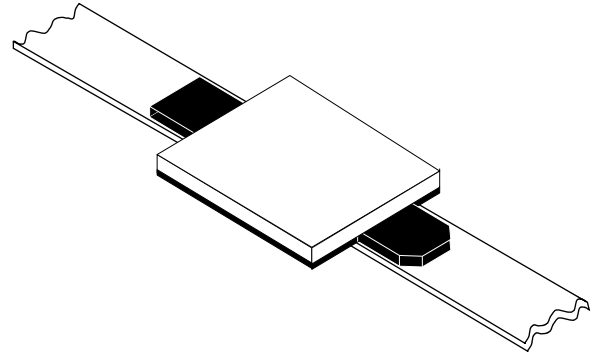
Bonding

The DSM8100-000 can best be bonded to substrates by means of thermocompression bonding. Essentially this type of bonding involves pressing the gold beam of the device against the gold plated metalized substrate under proper conditions of heat and pressure so that a metallurgical bond joint between the two occurs.

Procedure

The beam-lead devices to be bonded should be placed on a clean, hard surface such as a microscope slide. It is recommended that the beam side of the device be down so that this side will be toward the substrate when bonded. The device can be picked up by pressing lightly against one beam with the heated tip. The substrate can then be appropriately positioned under the tip and the device brought down against the substrate, with proper pressure applied by means of the weld head.

A bonding tip temperature in the 350 °C to 450 °C range is recommended along with a bonding force of 50 to 70 grams. The bonding time is in the range of 2 to 3 seconds. Optimum bonding conditions should be determined by trial and error to compensate for slight variations in the condition of the substrate, bonding tip, and the type of device being bonded.



Equipment

The heat and pressure are obtained through use of a silicon carbide bonding tip with a radius of two to three mils. Such an item is available from several commercial sources. In order to supply the required tip-travel and apply proper pressure, a standard miniature weld head can be used. Also available is a heated wedge shank which is held by the weld head and in turn holds the tip and supplies heat to it. The wedge shank is heated by means of a simple AC power supply or a pulse type heated tool.

Substrate

For optimum bonding a gold plated surface at least 100 microinches thick is necessary. Although it is possible to bond to relatively soft metalized substrate material such as epoxy-fiber-glass, etc., optimum bonding occurs when a hard material such as ceramic can be used.

Quality

If a good bond has been obtained, it is impossible to separate the beam-lead device from the metalized substrate without damage. If the device is destructively removed, the beam will tear away, leaving the bonded portion attached to the substrate.

Beam-Lead Packaging

The DSM8100-000 is shipped in 2" x 2" black gel packs. The beam-leads are mounted on the gel, the devices are covered with a piece of lint-free release paper, on top of which is placed a piece of conductive foam.

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