## Features

- High Working Voltage: 400 V
- Low Capacitance
- Medium Power Capability
- High Frequency RF Performance
- SMT Package: 2.5 x 3.4 x 0.9 mm
- RoHS* Compliant

## Applications

- The MADP-011184 can be used for switch and attenuation designs that require low loss and low distortion.

## Description

The MACOM MADP-011184 is a dual junction single anode contact silicon ceramic passivated PIN diode. The thick I-region (200 µm) allows for low series resistance which translates to low insertion loss. Low capacitance ensure good off state isolation. The SMT package has a large cathode contact surface to allow for excellent thermal performance.

The MADP-011184 is capable of meeting the environmental requirements of MIL-STD-750 and MIL-PRF-19500.

## Ordering Information

| Part Number | Package |
|---|---|
| MADP-011184 | 100 PC Bag |
| MADP-011184-TR0500 | 500 pc Reel[1] |

1. Reference Application Note M513 for reel size information.

## Electrical Specifications, $T_A$ = 25 °C

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Forward Voltage ($V_F$) | 100 mA | V | — | — | 1.2 |
| Forward Voltage ($V_F$) | 200 mA | V | — | — | 1.5 |
| Reverse Leakage Current ($I_R$) | 300 V | nA | — | 50 | 100 |
| Total Capacitance ($C_T$) | 50 V | pF | — | 0.26 | 0.31 |
| Series Resistance ($R_S$) | 100 mA | Ω | — | 1.9 | 2.4 |
| Series Resistance ($R_S$) | 200 mA | Ω | — | 1.5 | 1.8 |
| Lifetime ($T_L$) | $I_F$ = 10 mA / $I_R$ = 6 mA | µs | — | 3.0 | — |
| Thermal Resistance ($R_{TH}$) | — | °C/W | — | 5.4 | — |

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.



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## Absolute Maximum Ratings[2,3]

| Parameter | Absolute Maximum |
|---|---|
| Power Dissipation | 25 W @ 25°C |
| Instantaneous Reverse Voltage | 400 V |
| Junction Temperature ($T_J$) | +175°C |
| Operating Temperature | -55°C to +150°C |
| Storage Temperature | -65°C to +175°C |

2. Exceeding any one or more of these limits may cause permanent damage to this device.
3. MACOM does not recommend sustained operation near these survivability limits.

## Handling Procedures

Please observe the following precautions to avoid damage:

## Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

## Assembly Instructions

The MADP-011184 may be attached to a circuit substrate using solder or conductive epoxy.

## PCB Design for SMT Packaged PIN Diodes

These devices may be soldered to a PCB using lead (Pb)-bearing or RoHS-compatible solders. The layout of the surface mount board plays a critical role in product design and must be done properly to achieve the intended performance of the device. An accurate PCB pad and solder stencil design provides a proper connection interface between the device package and the board. With the correct pad geometry, the package will self-align when subjected to a solder reflow process and will also allow for just enough excess surface area for adequate solder filleting. The solder mask should be applied over bare copper (SMOBC) to avoid solder reflow under the solder mask. The plating on the PCB could be Electroless Nickel Immersion Gold (ENIG), Electroless Nickel Electroless Palladium Immersion Gold (ENEPIG) or tin plate.

## Stencil Design

A stencil thickness of 0.100 to 0.125 mm is recommended. A laser-cut, stainless steel stencil with electro-polished trapezoidal walls is recommended. For consistent release of the solder paste from the stencil a nano coating may be applied to the stencil.



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## RoHS and Lead (Pb)-Based Reflow Profile Recommendations

The most common solder reflow method for RoHS and lead based solders is accomplished in a belt furnace using convection heat transfer. Table 1 along with Figure 1 show a typical convection reflow profile of temperature versus time. The profile reflects the three distinct heating stages, or zones (preheat, reflow, and cooling) recommended in automated reflow processes to ensure reliable, finished solder joints. The profile will vary among soldering systems and is intended as an example to use as a starting point. Other factors that can affect the profile include the density and types of components on the board, type of solder used and type of board or substrate material being used. Thermocouples should be securely attached to the top surface of a representative component to ensure the temperature exposure requirements are met. The temperature profile should be recorded by data acquisition for future reference.

In these cases, the solder temperature profile recommended by the solder manufacturer should be utilized and shall not exceed the guidelines in the table below, for proper intermetallic formation.

It is important that the following maximum conditions must not be exceeded during the soldering process:

| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---|---|---|
| Preheat/Soak<br>Temperature Min (TSmin)<br>Temperature Max (TSmax)<br>Time (ts) from (TSmin to TSmax) | 100°C<br>150°C<br>60 - 120 seconds | 150°C<br>200°C<br>60 - 120 seconds |
| Ramp-Up Rate (TL to TP) | 3°C/second max. | 3°C/second max. |
| Liquidous Temperature (TL)<br>Time (tL) maintained above TL | 183°C<br>60 - 150 seconds | 217°<br>60 - 150 seconds |
| Peak package body temperature (TP) | For both users and suppliers TP must not exceed the Classification temperature in Table 4. | For both users and suppliers TP must not exceed the Classification temperature in Table 5. |
| Time (tP)* within 5°C of the specified Classification temperature (TC), see reflow profile | 20* seconds | 30* seconds |
| Ramp-Down Rate (TP to TL) | 6°C/second max. | 6°C/second max |
| Time 25° to Peak Temperature | 6 minutes max. | 8 minutes max. |
| *Tolerance for peak profile temperature (TP) is defined as a supplier minimum and a user maximum | — | — |



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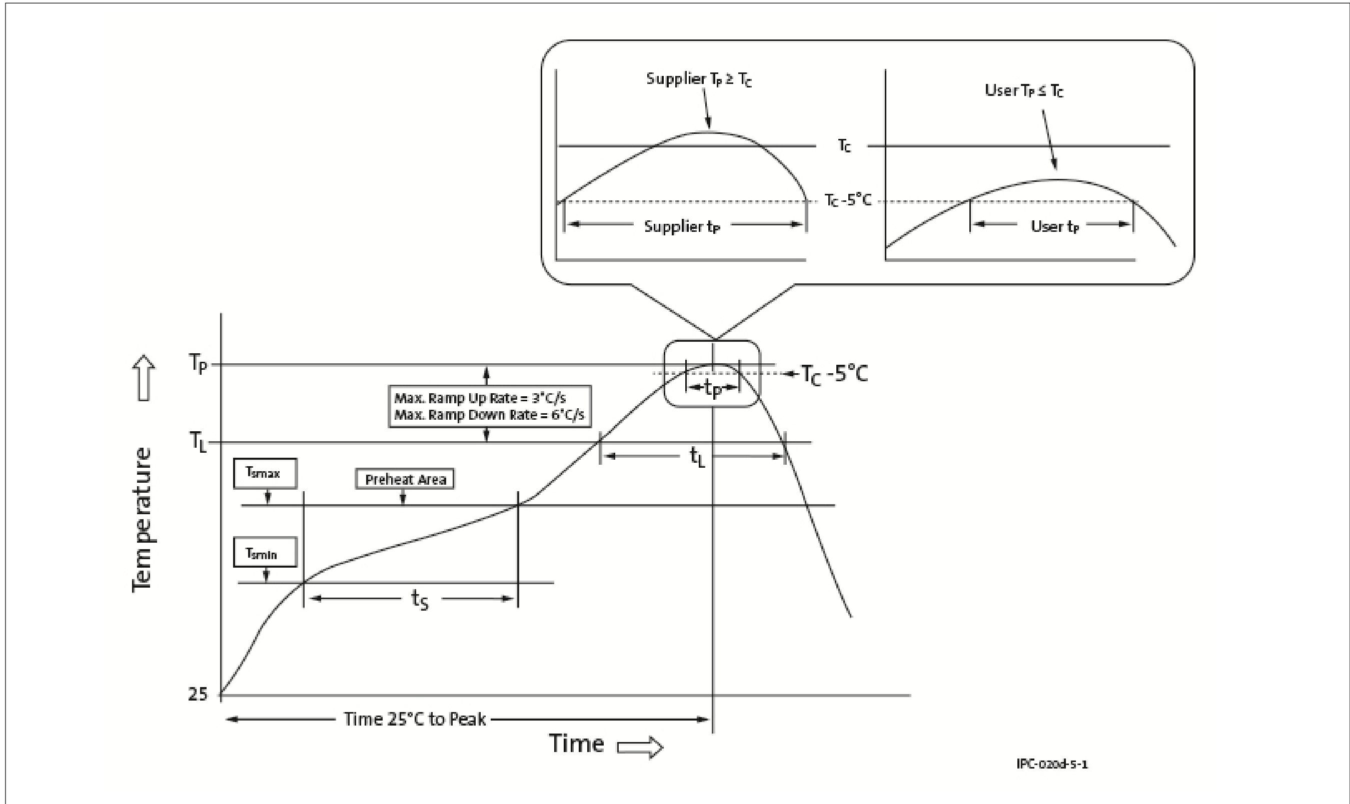
DC-0032317

## Recommended Temperature Profile




**Note 1**: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow (e.g., live-bug). If parts are reflowed in other than the normal live-bug assembly orientation (i.e., dead-bug), TP shall be within ±2°C of the live-bug TP and still meet the TC requirements, otherwise, the profile shall be adjusted to achieve the latter. To accurately measure actual peak package body temperatures refer the JEP140 for recommended thermocouple use.

**Note 2**: Reflow profiles in this document are for classification/preconditioning and are not meant to specify board assembly profiles. Actual board assembly profiles should be developed based on specific process needs and board designs and should not exceed the parameters in Table 3. For example, if TC is 260°C and time tP is 30 seconds, this means the following for the supplier and the user. For a supplier: The peak temperature must be at least 260°. The time above 255°C must be at least 30 seconds. For a user: The peak temperature must not exceed 260°. The time above 255°C must not exceed 30 seconds.

**Note 3**: All components in the test load shall meet the classification profile requirements.

**Note 4**: SMD packages classified to a given moisture sensitivity level by using Procedures or Criteria defined within any previous version of J-STD-020, JESD22-A112 (rescinded), IPC-SM-786 (rescinded) do not need to be reclassified to the current revision unless a change in classification level or a higher peak classification temperature is desired.



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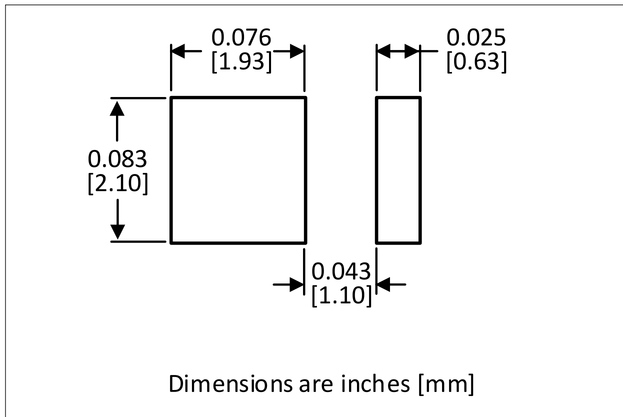
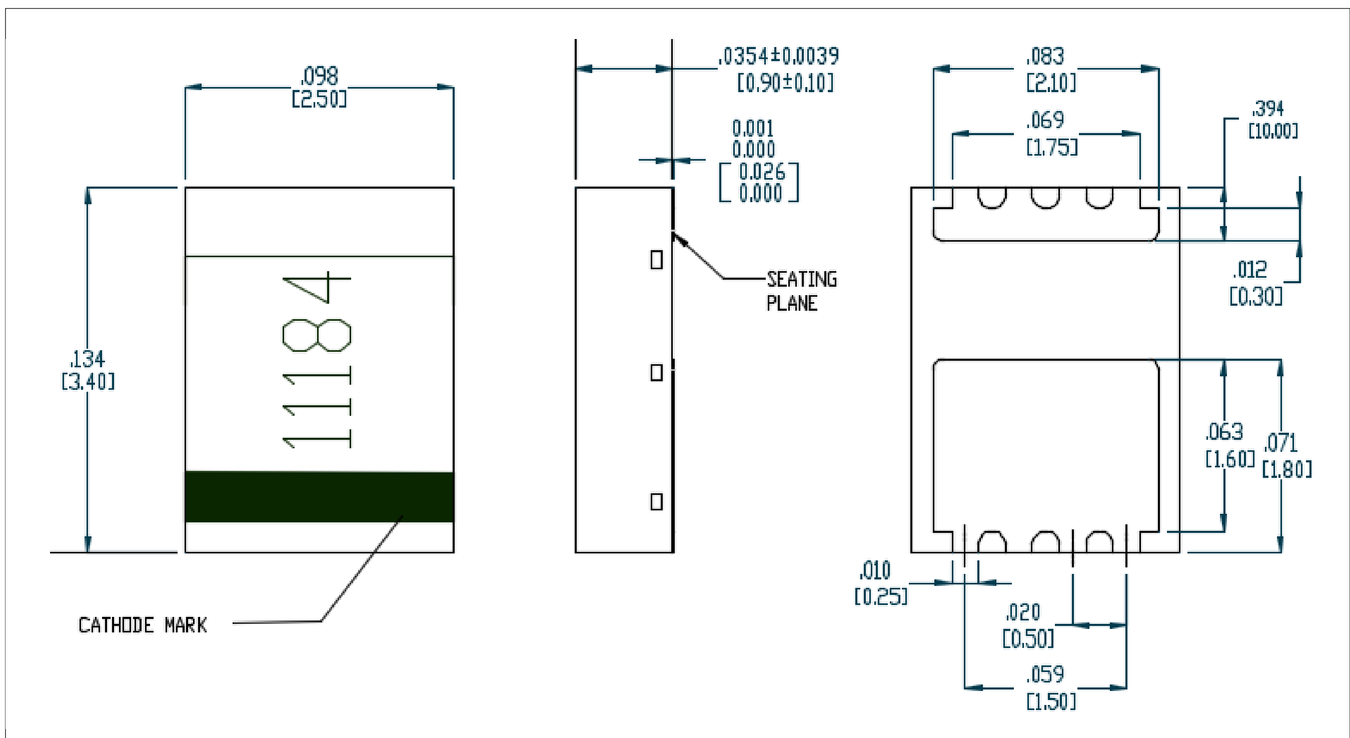
## Recommended Land Pad: 2.5 x 3.4 mm




## Outline Drawings: 2.5 x 3.4 x 0.9 mm



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