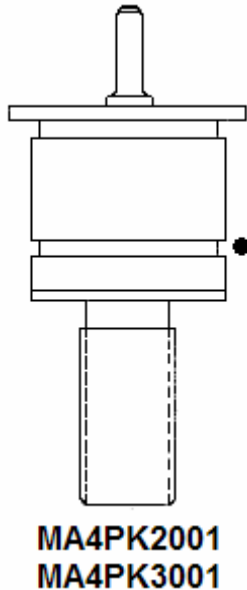


Mounting Instructions for the MA4PK2001 & MA4PK3001 High Power PIN Diodes

Rev. V1



The following application note denotes typical mounting of the MA4PK2001 & MA4PK3001 devices. The mounting of these devices are not limited to the configuration described herein and is published only as a reference and a guide.

Package Construction and Overview

The metal-ceramic packages were developed specifically for the Kilovolt PIN diode series. The packages are designed to withstand extremely high voltages and currents and to be compatible with industry standard semiconductor chip and RF circuitry. These packages meet the environmental requirements of MIL-STD-202 and MIL-STD750. The PIN diode chip is bonded to the package and the anode strap is bonded to the chip at temperatures exceeding 300°C. The anode strap has a unique, large cross-sectional area design allowing for high current capability. The packages are sealed using a projection welding technique in an inert environment. Kilovolt PIN diodes are available with a solder lug on the anode electrode to allow for a convenient and reliable Wrap-around wire connection.

Mounting

These devices were designed to be typically used in a shunt configuration with the cathode contact screw mounted to a good thermal/electrical ground. The cathode on the MA4PK2001 is fitted with a 6-40 UNF-3A screw lug. The cathode on the MA4PK3001 is fitted with a 10-32 UNF-2A screw lug. Each device has been designed with either a spline or slotted hole in the ground lug for the use of torque tools for mounting. The maximum torque is not to exceed **56 in-ounces** for the MA4PK2001 and **80 in-ounces** for the MA4PK3001. Thermally and electrically conductive paste can be used during the mounting of the device for improve contact but is not necessary.

The anode contact as previously mentioned is typically achieved via wrap-around wire assembly. The wire size and construction is typically dictated by the frequency of operation and current through the device and should not exceed maximum ratings. Figure 1 shows a typical assembly.

General Soldering Precautions

The melting temperature of solder generally exceeds the recommended maximum operating temperature of the device. When the entire device is heated to a high temperature, failure to complete soldering within a short time could result in device failure. Therefore, always observe the following instructions to minimize the thermal stress to the devices.

- Always preheat the device (failure to do so can cause excessive thermal shock and stress that can result in damage to the device).
- Limit the temperature in the reflow stage to peak temperature indicated in the following table (Figure 2).
- After completing the soldering process, allow the devices to cool naturally for at least 3 minutes. (Gradual cooling should be used, as the use of forced cooling will increase the temperature gradient and may result in latent failure due to mechanical stress).
- Avoid any mechanical stress or shock to the solder joints and devices during cooling.

Figure 1 .Typical Mounting Configuration

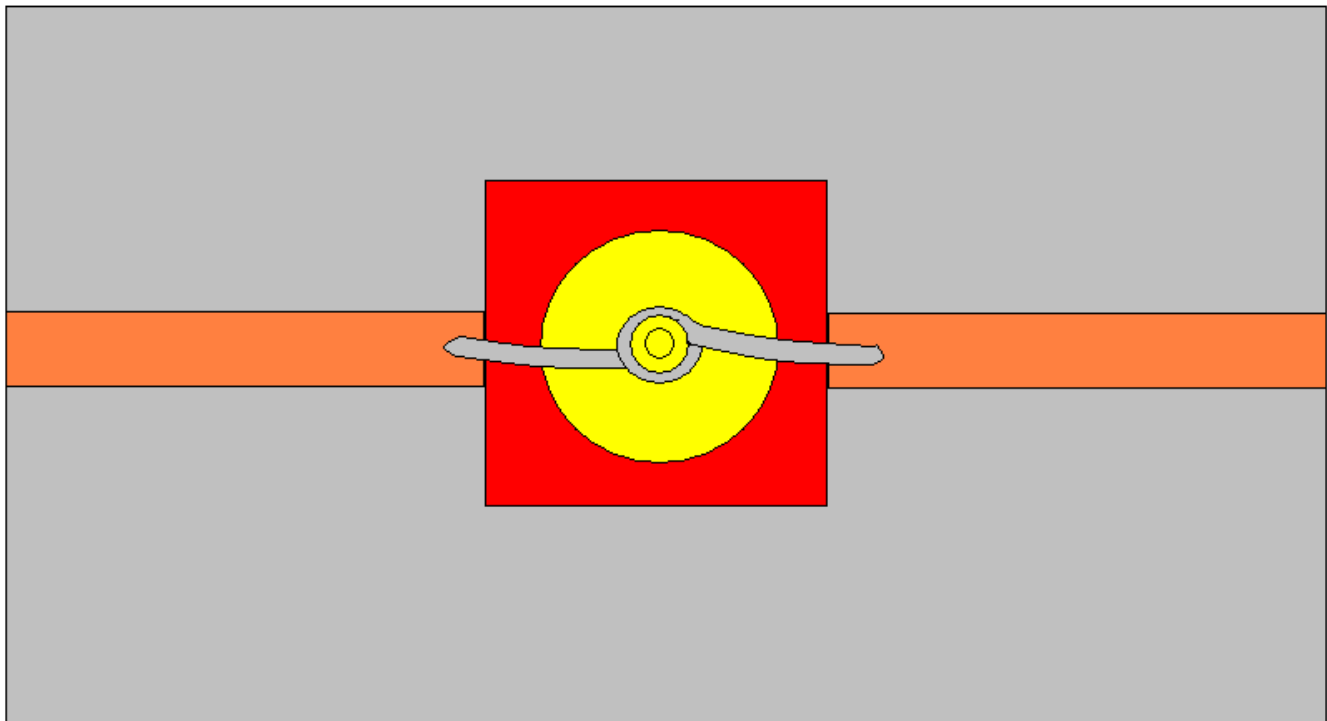
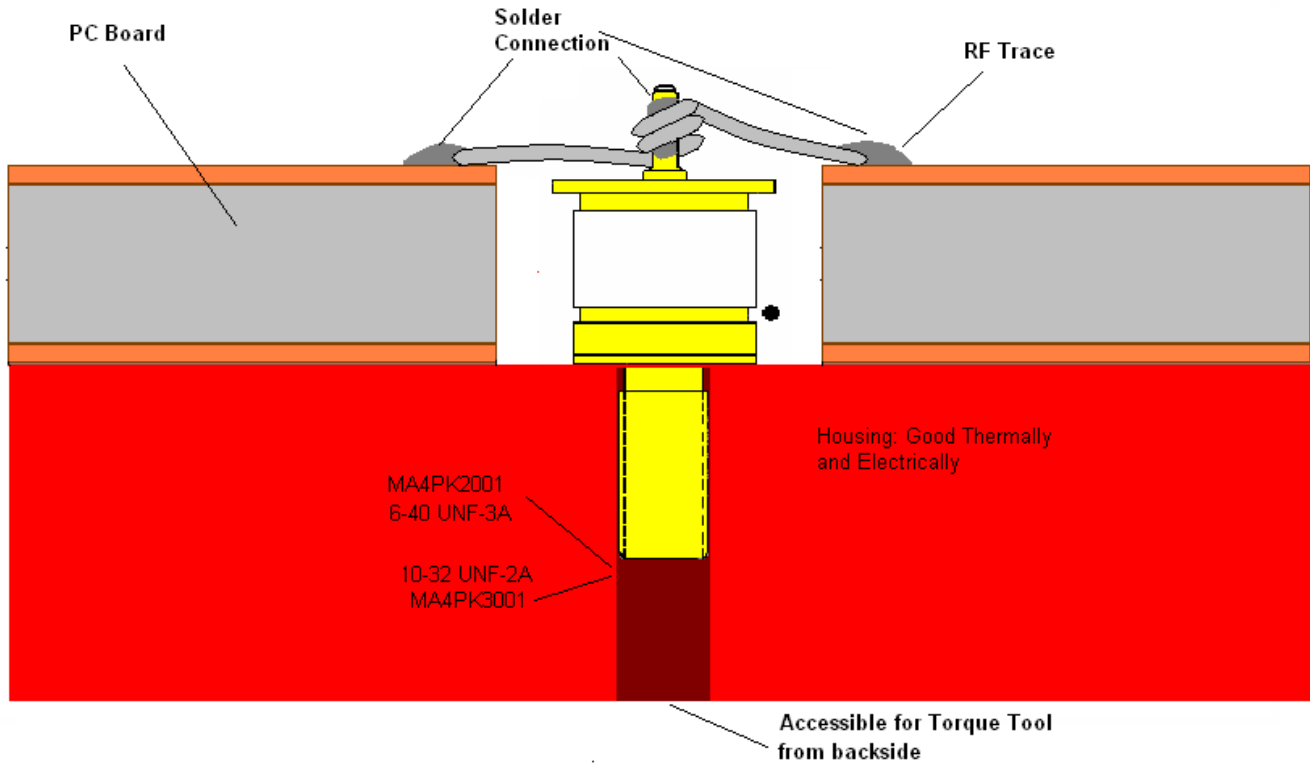
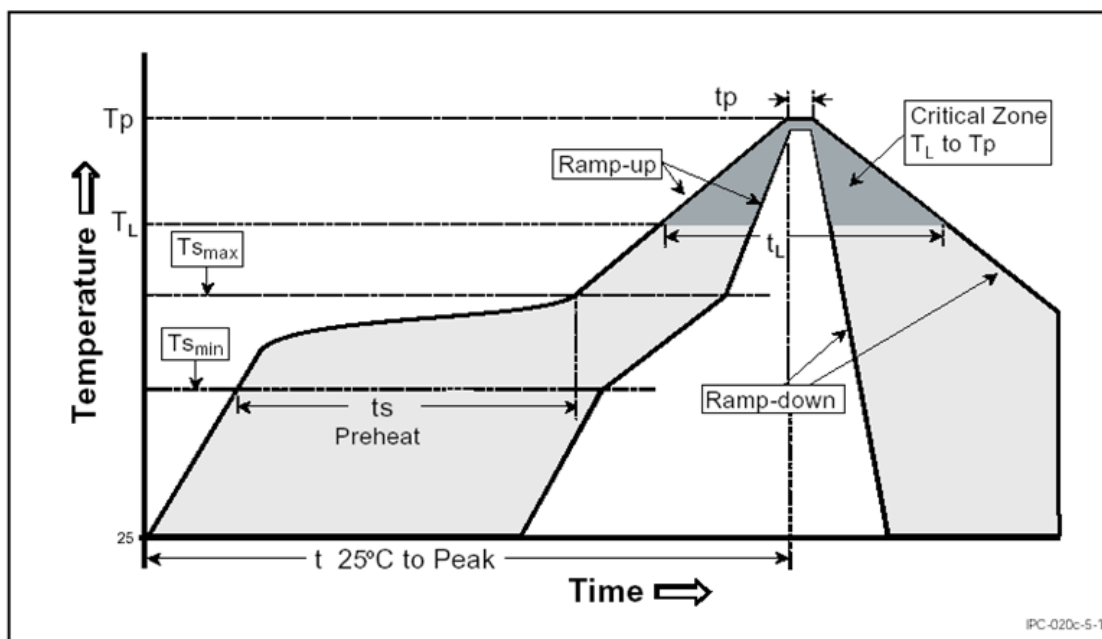


Figure 2. Suggested Reflow Conditions¹ and Reflow Profile

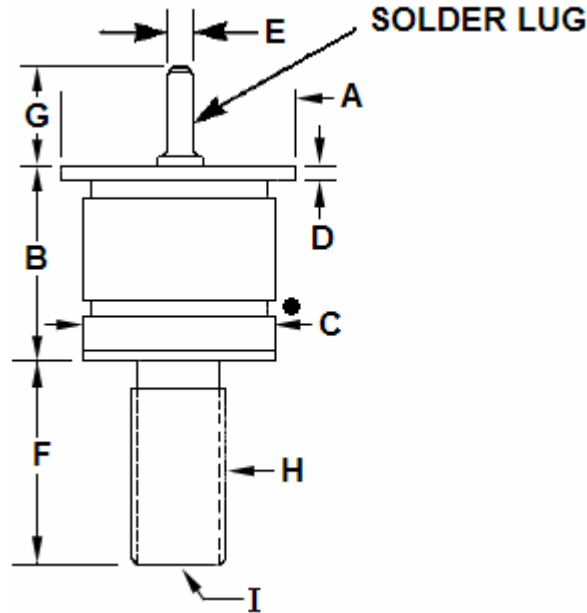
| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---|------------------------------------|------------------------------------|
| Average Ramp-Up Rate ($T_{S_{max}}$ to T_p) | 3°C/second max. | 3°C/second max. |
| Preheat — Temperature Min ($T_{S_{min}}$) — Temperature Max ($T_{S_{max}}$) — Time ($T_{S_{min}}$ to $T_{S_{max}}$) | 100°C 150°C 60 - 120 seconds | 150°C 200°C 60 - 180 seconds |
| Time maintained above: — Temperature (T_L) — Time (t_L) | 183°C 60 - 150 seconds | 217°C 60 - 150 seconds |
| Peak Temperature (T_p) | 240 +0/-5 °C ² | 260°C max. ³ |
| Time within 5°C of actual Peak Temperature (t_p) | 10 - 30 seconds | 20 - 40 seconds |
| Ramp-Down Rate | 6°C/second max. | 6°C/second max. |
| Time 25°C to Peak Temperature | 6 minutes max. | 8 minutes max. |

1. All temperatures refer to topside of the package, measured on the body surface.
2. Temperature applies to packages with a thickness <2.5 mm and a volume <350 mm³ (refer to JEDEC J-STD-020 for other package sizes).
3. Temperature applies to all packages with a thickness <1.6 mm and to packages with a thickness between 1.6 - 2.5 mm along with a volume <350 mm³ (refer to JEDEC J-STD-020 for other package sizes).

Reflow Profile



DIMENSIONS



| DIM | MA4PK2001 CASE STYLE 1082 | | | | MA4PK3001 CASE STYLE 1084 | | | |
|-----|-------------------------------|-------|-----------------------------|------|-------------------------------|-------|-----------------------------|-------|
| | INCHES | | MILLIMETERS | | INCHES | | MILLIMETERS | |
| | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX |
| A | 0.304 | 0.316 | 7.72 | 8.02 | 0.468 | 0.485 | 11.90 | 12.30 |
| B | 0.286 | 0.292 | 7.26 | 7.42 | 0.387 | 0.411 | 9.83 | 10.40 |
| C | 0.245 | 0.255 | 6.22 | 6.48 | 0.390 | 0.400 | 9.90 | 10.10 |
| D | 0.023 | 0.031 | 0.58 | 0.79 | 0.028 | 0.042 | 0.71 | 1.06 |
| E | 0.060 | 0.065 | 1.52 | 1.65 | 0.060 | 0.065 | 1.52 | 1.65 |
| F | 0.281 | 0.305 | 7.14 | 7.75 | 0.425 | 0.445 | 10.80 | 11.30 |
| G | 0.190 | 0.205 | 4.83 | 5.21 | 0.190 | 0.205 | 4.83 | 5.21 |
| H | 6-40 UNF-3A | | | | 10-32 UNF-2A | | | |
| I | .072 SPLINE X .070 DP | | | | 0.50 SLOT X .060 DP | | | |
| | C_p = .45 pF | | L_s = 2 nH | | C_p = .75 pF | | L_s = 3 nH | |