

Application Note for the Mounting of Chip Devices

This application note covers the recommended mounting techniques for the proper conduction cooling and RF performance of a surface mounted (flangeless) chip attenuator, termination or resistor.

Initial Considerations:

There are two primary considerations for a surface mounted power device; Power Dissipation and RF Performance. In order to remove the dissipated power from this type chip they must be provided with adequate conductive cooling. This will prevent excessive chip temperatures leading to damage and early failure of the device. RF performance is also dependent on proper mounting. Since these devices are being mounted to a circuit board, inductance to ground is introduced by the vias to the ground plane. To reduce this effect and lower the thermal resistance between the component and ground plane, the following items are recommended:

1. Maximize the use of thermally conductive vias around and under the device.
2. Use of heavy copper cladding (2 oz.) on the circuit board as a heat spreader.

Solders:

Aeroflex-KDI recommends the use of the solders in the chart below when installing a surface mount chip. Also listed are recommended platings for the heatsink/baseplate that a device might be mounted to instead of a circuit board.

| Solder Type | Liquidous Temp. (degrees C.) | Recommended Platings for Heatsink/Baseplates |
|-------------|---------------------------------|-------------------------------------------------|
| SN63 | 183 eutectic | Nickel, Silver |
| SN96 | 221 eutectic | Nickel, Silver |
| 80Au/20Sn | 280 eutectic | Gold over Nickel |

Mounting:

The first step when mounting a chip device to the circuit board is to determine the proper size and location of the solder pads. Aeroflex-KDI recommends providing pads that are 0.010” to 0.020” over the device’s termination size and are centered on the axis of the chip. This allows for self-centering of the chip and a proper solder fillet formation. Skewing and “tombstoning” can occur if this is not followed. See *Figure 1*

Preparation:

1. Before any solder attachment, parts and circuit boards must be free of any oils or dirt. Isopropyl alcohol can be used for this task.
2. Apply a small amount of RMA flux (MIL-F-14256) to the areas to be soldered.
3. SN63 solder is generally recommended for use. This may be a perform, solder paste or wire. If preforms are used, select a size that is 0.005” to 0.010” larger than the size of the pad.
4. When soldering is complete the circuit board must be cleaned to remove any flux residue. This can be done in an ultrasonic cleaner or vapor degreaser. Flux manufacturers have recommended solvents or cleaning solutions for their products.

Pretinning:

Pretinning can be done with either a solder pot or by depositing and reflowing solder on the device.

(Aeroflex-KDI can supply pretinned devices, SN63 or SN96)

Tabs:

When attaching tabs to a device we recommend using SN96 (221 °C) to attach the tab to the chip. Then, solder the tab to the circuit board using SN63 (183 °C)

Wire Bonding:

Attach the device to the circuit board using solder as described above. Clean and remove any flux residues. Ultrasonically bond wire or ribbon to gold termination pads using a wedge or ball bonder.

NOTE: Gold plated chips are required for this method.

Tuning:

Maximum VSWR, as specified on the data sheet, can be achieved without additional tuning. Lower VSWR can be achieved with stub or lumped element tuning. However, this can result in a narrower useable bandwidth.

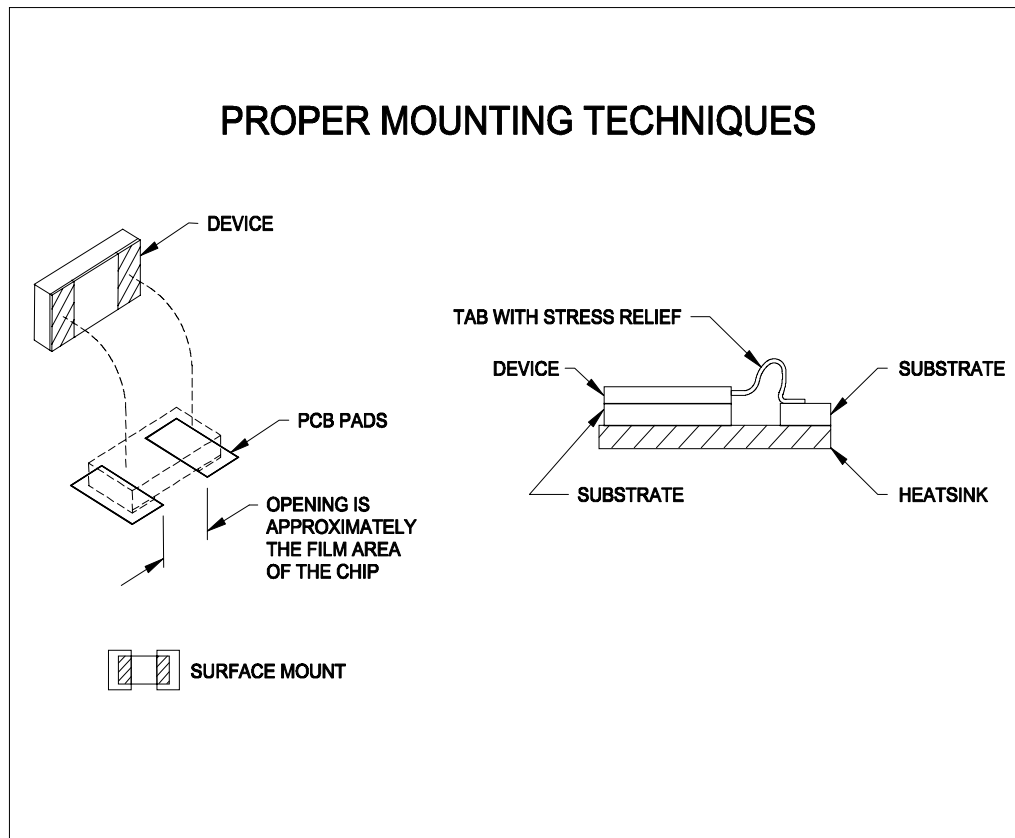


Figure 1.