Application Note
M567

CR-15 Package Handling and Mounting Procedure

Rev. V5

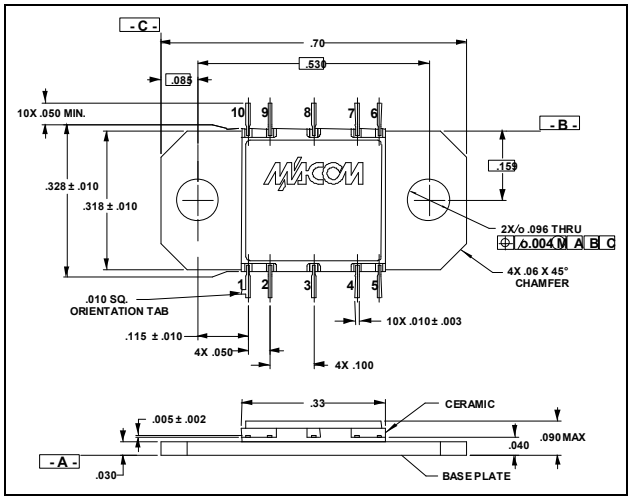
Introduction

The CR-15 is a high frequency, low thermal resistance package, which should be given special attention during cavity design and package mounting, to insure proper electrical and thermal performance. The package consists of a co-fired ceramic construction with a copper-tungsten base and iron-nickel-cobalt leads. The finish consists of electrolytic gold over nickel plate.

After component installation, the package is hermetically sealed using a ceramic lid and an 80/20 gold/tin eutectic solder. This bolt down style package provides a robust interface between a highly integrated GaAs MMIC device and a circuit board which may be assembled using conventional surface mount techniques.

The CR-15 has successfully completed a rigorous in-house package qualification program, which exceeds the requirements of industry guidelines for package element evaluation.

CR-15 Package Outline



Mounting Cavity Design

For a PC board thickness of 0.010 inches or greater, the mounting cavity dimensions should be 0.324 x 0.708 inches with a tolerance of ± 0.002 inches. The PC board cutout dimensions should be 0.336 x 0.708 inches with a tolerance of ± 0.002 inches regardless of board thickness. Consistent device location with respect to the circuit board is important in order to achieve repeatable performance. This can be accomplished by integration techniques which minimize variations in device location within the cavity.

Peeling stresses exerted on the package lead to ceramic joint of the package, should be avoided. Damage to the package lead attach area is typically caused by mounting the device into an excessively deep cavity. The cavity depth should be designed so that the package leads are nominally 0.004" above the circuit board. This relationship of the lead to circuit board height will be affected by several factors, including the circuit board and metalization thicknesses, the circuit board attachment method, and the thickness of any shim material used under the package.

Mounting Surface Concerns

Surface discontinuities or flatness steps in the mounting surface should be avoided. Typical causes for these deformities are variations in machining depth, inadequate casting finish or foreign particles on the surface. It is highly recommended that the CR-15 cavity floor be milled to a flatness of 0.0005 inches maximum, and a surface finish of 32 micro-inches maximum, using a single tool path. Any abrupt changes in the cavity floor flatness may cause catastrophic or latent damage to the device, voiding the manufacturer's warranty.

A thin shim made of a ductile material may be used prior to installation of the CR-15, if desired, to improve the thermal performance of the package to housing interface. The shim material should be selected so as to preclude any dissimilar metal interaction. A gold plated copper shim of 0.001 inch thickness is recommended for outdoor environments, while a 0.001 inch thickness is aluminum shim is a lower cost option suitable for more protected environments. The shim should be dimensioned to match those of the CR-15 base to insure that the shim rests in the cavity floor without binding. A shim that has been manufactured or installed improperly may prevent the CR-15 package from fully seating into the cavity floor.

The use of thermally conductive grease is not recommended.

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Mounting Hardware / Torque Sequence

Size #2 socket head cap screws and medium split lock washers are recommended. The mounting hardware should initially be installed finger tight (approximately 4 inch-ounces), followed by a controlled torque of 48 inch-ounces , in an alternating torque sequence. The use of two separate calibrated torque screw drives is recommended for this purpose, especially in high volume applications. Manual drive is acceptable, but electric or pneumatic drive torque tools are preferred to minimize operator fatigue. Incorrect installation torque may cause inconsistent electrical and thermal performance and lead to device failure.

Package Lead Soldering Recommendations

A 63/37 tin/lead eutectic is the preferred solder for pre-tinning and attaching the package lead to the surrounding circuit board. Since the typical thickness of gold plating on the package leads is 50 micro-inches minimum, pre-tinning of the package leads may be necessary to reduce gold embrittlement in the solder joint. Pre-tinning will result in the highest reliability connection, especially when solder volumes are relatively low. The necessity to pre-tin will depend on the particular application and the soldering equipment being used.

For applications where surface mount components are to be installed after the CR-15 installation, this package will not be damaged when subjected to typical convection or IR over reflow profiles. M/A-COM Tech Application Note M538 may be used as a guide for maximum allowable reflow time and temperature.

Alternatively, the package leads may be individually soldered. Whether an iron or hot gas soldering equipment is used, care should be take to insure that the temperature is well controlled and the assembly environment is electric static discharge (ESD) safe.

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