Ceramic and Metal Repackaging of Plastic Encapsulated Microcircuits for Hermetic Solutions

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The vast majority of COTS (Commercial off the Shelf) integrated circuits (ICs) are manufactured as plastic encapsulation microcircuits (PEMs) in order to provide economically priced components for volume requirements within a wide array of commercial consumer applications. Many COTS microcircuit functions, which originally could be found in hermetic packages to satisfy DoD requirements decades ago, are now no longer manufactured due to insufficient demand to support ceramic and metal packaging component lines, and therefore access to the more rugged, hermetic versions of these products, regardless of their ability to function at temperature ranges outside commercial requirements, is extremely rare. In many cases, these COTS components can be functionally screened to military temperature ranges of -55°C to +125°C versus the far less demanding commercial and industrial temperature ranges of 0°C to +70°C and -40°C to +85°C, respectively.

Aside from MIL-STD temperature screening, equivalent military and space ceramic/metal versions of these devices can be supported and manufactured through refined and production-controlled die extraction techniques from PEM versions to enable the same die to be assembled into hermetic packaging. Global Circuit Innovations also possesses a proprietary technique to chemically remove the original bond and wire followed by an electroless plating process which cleans the original aluminum pad and deposits nickel, palladium, and immersion gold for subsequent bonding on a relatively pristine bond pad. In this manner, almost any procurable PEM die from authorized and mainstream distributors can be transformed into a ruggedized version capable of passing MIL-STD 883 Method 5004 screening and/or MIL-STD 883 Method 5005 qualification. Ultimately, a Class S qualification could be achieved as well.