



MATERION



ADVANCED MATERIALS
CuPack™ RF
Power Packages

CuPack™ RF Power Packages

Ideal for 5G RF Power Transistors

Cutting edge, high power Si, GaAs and GaN transistors and MMICs demand very low thermal resistance and very low RF loss. CuPacks™ deliver outstanding performance for both requirements.

These unique packages feature 0.2 mm thick copper leads and base, and an alumina ceramic ringframe. CuPacks™ are electrolytically plated with nickel + gold and are compatible with a wide range of die attach materials. CuPacks™ are surface mount packages with lead configuration options of straight, gull wing, or J-shaped forms.

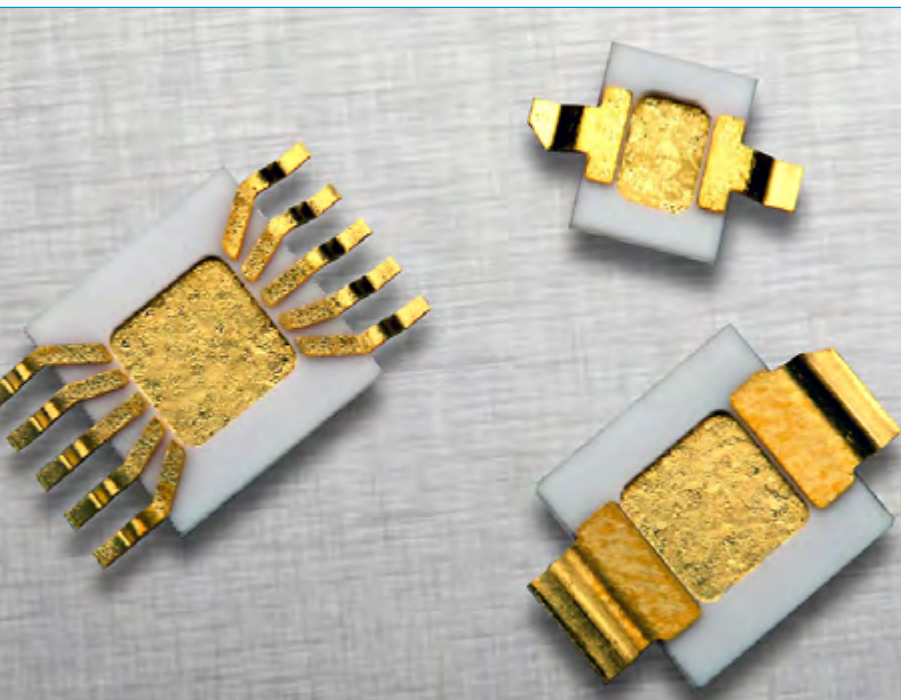
ADVANTAGES OF CUPACK™:

- Ideal for 5G GaN RF power FETs and MMICs
- Low loss at frequencies up to 10 GHz and beyond, providing the user great flexibility in designing their RF power devices
- 50Ω leads available: 0.5 mm wide copper leads
- Very low thermal resistance: die attach onto a 0.20 mm thick copper base
- Industry standard footprints, interchangeable with many leaded plastic packages
- Direct bond copper construction; narrow lead pitch is possible
- Cavity area up to 3.8mm x 3.8mm for 420°C rating (AuSi die attach)
- Cavity up to 5.0mm x 5.0mm for 320°C rating (AuSn die attach)
- Wide variety of standard designs, plus rapid fabrication of new designs based on customers drawings
- Over 15 years of proven performance and reliability!

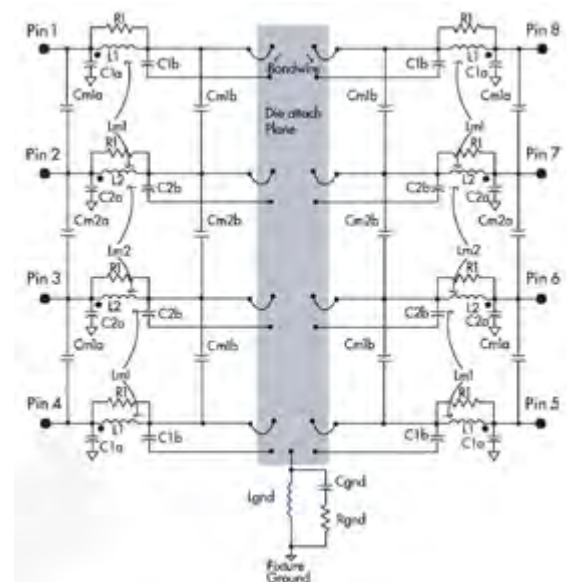
We offer a full line of high performance RF and microwave packages optimized for power devices. Ceramic air cavity packages are available in a variety of designs for GaN MMICs and FETs, Si LDMOS FETs, and GaAs FETs. In addition to CuPacks™, Materion manufactures CA-Packs™ and Hybrid CA-Packs™ optimized for cellular basestation preamplifiers and amplifiers.

ACCOUNTABILITY AND ENVIRONMENTAL REVIEW

Customers are invited to review or audit Materion's manufacturing, environmental or financial policies and practices with respect to their refines.



EQUIVALENT CIRCUIT MODEL:



Materion ... Materials to Advance the World's Technologies



COMPLIANCE AND ENVIRONMENTAL LEADERSHIP

All disposal procedures comply with state and federal regulations.

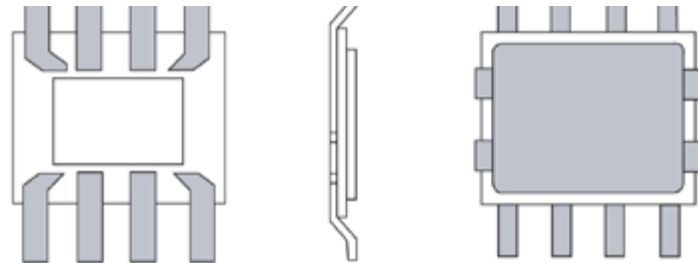
Accreditations and Certifications include:

- ISO 9001:2008 Quality System
- ISO 14001:2004 Environmental and Safety Management System
- LeanSigma

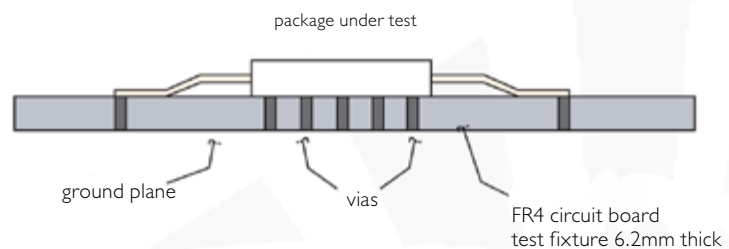
RF024 ELECTRICAL CHARACTERIZATION

Electrical Test Setup:

The RF024 CuPacks™ utilizes a copper base which is also the die pad. Below is a side view of how the package was fixtured for measurement. The vias directly under the package connect the package to the circuit board ground plane. In this case, 12 vias were used in a 6.2 mm thick FR4 circuit board, resulting in an equivalent ground inductance of 0.18 nH.



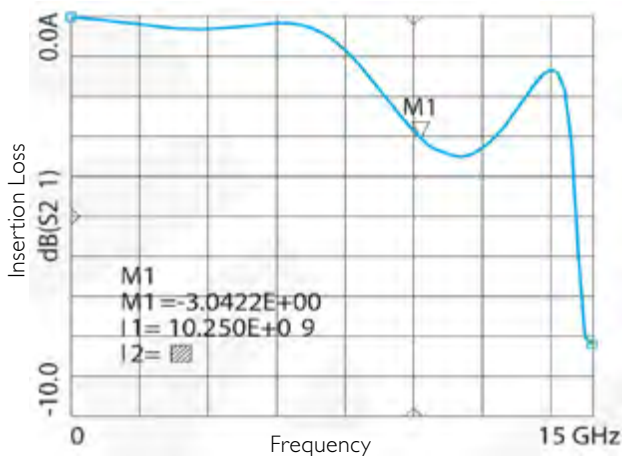
CUPACK™ RF024



Side view of fixture used to measure packages

INSERTION LOSS:

Measured thru response of RF024 package with 60 mm long 50 Ohm transmission line inside package. Response includes fixture parasitics. Lid not installed.



EQUIVALENT CIRCUIT VALUES:

| LI | Lm1 | L2 | Lm2 | Lgnd | RI | Rgnd |
|--------|--------|-------|--------|--------|---------|-------|
| 1.55nH | 0.54nH | 1.4nH | 0.42nH | 0.18nH | 5K Ohms | 1 Ohm |

| Cl a | Cl b | Cm1 a | Cm1 b | C2 a | C2 b | Cm2 a | Cm2 b | Cgnd |
|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| 0.03pF | 0.25pF | .003pF | .034pF | 0.01pF | 0.18pF | .001pF | .034pF | 0.7pF |

| Packaging Products | Applications | Illustrations | Lid Material | Preform Material |
|---|--|--|-------------------------------------|--------------------------|
| Combo-Lids™ (Flat) | High reliability hermetic packaging |  | Kovar or Alloy 42 | Gold-Tin or other alloys |
| Combo-Lids™ (Drawn) | High reliability hermetic packaging where die height is higher than package cavity depth |  | Kovar or Alloy 42 | Gold-Tin or other alloys |
| Non-magnetic Metal Combo-Lids™ | Medical Imaging and signal noise control |  | Mo, CuW, Bronze, Cu | Gold-Tin or other alloys |
| Non-magnetic Metal Combo-Lid™ | High Purity non-magnetic combo lids, does not contain Nickel or plating |  | Mo, CuW, Bronze, Cu | Gold-Tin or other alloys |
| Non-magnetic BeCu Combo-Lids™ | High Purity non-magnetic combo lids, does not contain Nickel or plating |  | BeCu | Gold-Tin or other alloys |
| Nozzle Combo-Lids™ | MEMS, Automotive and High reliability hermetic package sealing |  | Kovar | Gold-Tin |
| Ceramic Combo-Lids™ with edge metallization | Non-magnetic applications |  | Al2O3 | Gold-Tin or other alloys |
| Tack welding services for Ceramic Lids | Non-magnetic applications |  | Al2O3 | Gold-Tin or other alloys |
| Selectively plated Combo-Lids™ | High reliability hermetic package sealing |  | Kovar or Al2O3 | Gold-Tin or other alloys |
| Getter Tack welded Combo-Lids™ | High reliability hermetic package sealing |  | Kovar | Gold-Tin or other alloys |
| Palladium Combo-Lids™ | High reliability and hermetic package sealing |  | Kovar with Palladium | Gold-Tin or other alloys |
| Seam Seal-Lids™ | Hermetic package sealing without preform |  | Kovar | — |
| Special Shaped Combo-Lids™ | High reliability hermetic package sealing |  | Kovar | Gold-Tin |
| Epo-Lids™ | Ceramic Lid for non-hermetic packages including CuPacks™ |  | Al2O3 | MEG-150 or MEG-165 Epoxy |
| Ceramic Air Cavity Packages | Wireless Applications - Si, GaAs and GaN RF power transistors |  | Plated Alloy 42 with Ni, NiCo or Au | Alumina ring frames |
| Etch Lids for AR Coated Glass | Double preform attached lid for Visi-Lid™ application |  | Kovar | Gold-Tin or other alloys |



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MATERION CORPORATION
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MATERION ADVANCED MATERIALS is a global advanced materials company, dedicated to providing solutions that enable our customers' technologies and drive their growth. Our products include precious and non-precious specialty metals, precision optical filters, inorganic chemicals and powders, specialty coatings, specialty-engineered beryllium alloys, beryllium and beryllium composites, and engineered clad and plated metal systems. The Materion business is structured to enhance our ability to provide customers with innovative, best total-cost solutions.