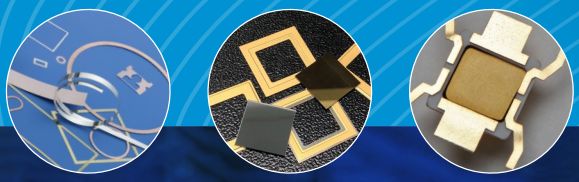
MATERION ENABLES
WHAT'S NEXT™

MATERION



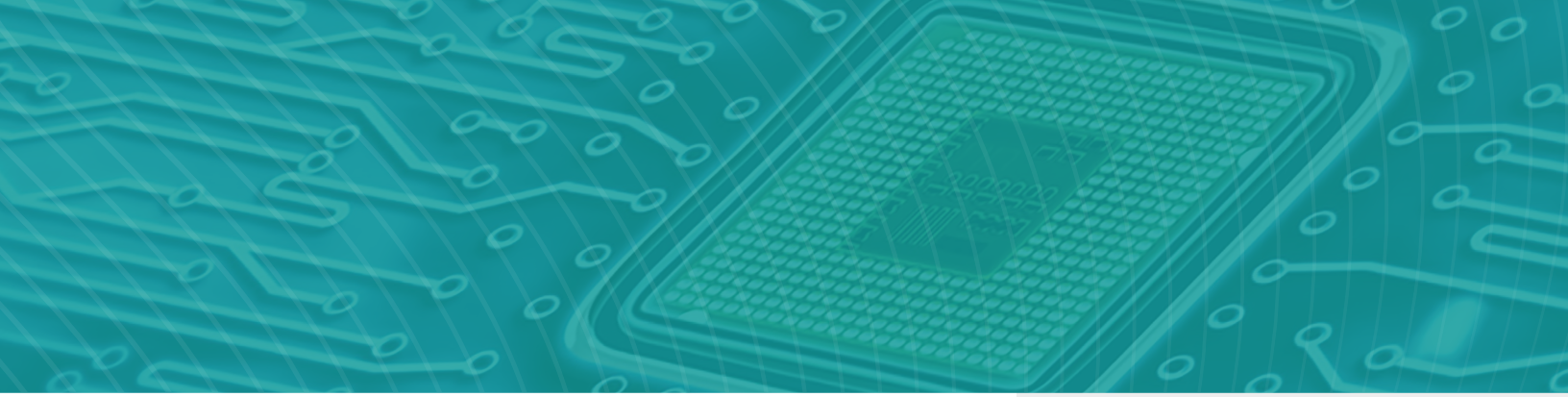
Microelectronic Packaging Materials

TABLE OF CONTENTS

WHY MATERION?

Materion's comprehensive range of packaging materials offers several advantages:

- Operations in North America and Asia
- Extensive tooling library with 10,000+ stamped preforms and cover lids
- Support for most configurations, applications and volume requirements
- Specialized precious metal alloys to complement solder applications
- Lead-free solder and braze materials
- Gold and silver alloys with excellent corrosion resistance
- Variety of alloys offering superior thermal and electrical conductivity
- Range of melting temperatures to deliver consistent performance
- Engineering support for selecting optical product or assistance fabricating new design



MICROELECTRONIC PACKAGING MATERIALS

To ensure optimal performance and reliability, sensitive electronics must be protected by secure packaging. Hermetic lids are necessary for semiconductor, MEMS, medical and optical applications to shield devices from moisture and must be impervious to gas flow. RF and microwave packages must meet the demand for very low thermal resistance and RF loss. Metals and alloys used for joining vacuum electronic devices must be free of contamination to help ensure device performance is not negatively impacted.

When it comes to your packaging needs, Materion has you covered. We supply a broad portfolio of high-reliability and high-performance microelectronic packaging materials for a variety of industries and applications. Our products include:

- Hermetic lids for sealing and protection of delicate electronics
- High-purity braze and solder alloys for joints of high integrity and strength
- Ceramic packages for very low thermal resistance and RF loss
- Multiple designs and materials customized for specific applications

MARKETS & INDUSTRIES SERVED

- Semiconductor
- MEMS
- Photonics
- Augmented Reality
- Defense
- Space
- Automotive
- Healthcare
- Telecommunication
- Aviation
- LED

MICROELECTRONIC PACKAGING PRODUCT OVERVIEW

LIDS

Hermetic and non-hermetic lids for semiconductor, MEMS, medical and optical requirements:

- Combo-Lid™ Covers – pre-assembled solder preform and lid
- Seam Seal-Lid™ Covers – for sealing heat sensitive electronics
- Solder Reflow-Lid™ Covers – cost alternative to Combo-Lid covers
- Visi-Lid™ Optical Windows – for optical packages
- Epo-Lid™ Covers – Epoxy-coated ceramic for non-hermetic uses
- Ceramic Combo-Lid™ Covers – for specialty applications

BRAZE & SOLDER ALLOYS

Materials for microelectronic packaging and high temperature joining:

- A range of AuSn and Soft Solder Preforms
- Braze Materials
- Solder Alloys
- Lead-free Solders

CERAMIC PACKAGING

RF & microwave packages for very low thermal resistance and RF loss. Complimentary packages and lids:

- BeO Packages
- CuPacks™ Packages
- Epo-Lid™ Covers
- Air Cavity Packages
- Plated Flanges

HERMETIC PACKAGING LIDS

Hermetic seals are essential to ensuring electronic products function at optimal performance. Sensitive electronic components assembled into a ceramic or metal package must be protected from environmental exposure to help ensure high performance. We know it can be challenging to find a reliable supplier with decades of experience providing high-quality hermetic lids for high-reliability applications.

For more than 40 years, Materion has provided hermetic lids for the most demanding high-reliability applications markets, including semiconductor, MEMS, photonics, AR, defense, space, automotive and more. We manufacture a range of lid options, with a variety of material compositions available to suit our customers' needs, and to support most configurations, applications and volume requirements. From ceramic to metalized, lids with windows, non-magnetic lids, and lids with and without preforms, Materion is committed to providing the highest quality materials to ensure sensitive electronics are protected by secure packaging and perform at optimal levels.

With our unique vertical integration of precious metals with precious metal alloy fabrication and in-house refining, Materion customers will benefit from our high-purity microelectronic packaging products for exceptional soldering of hermetic packages and more.

- Access to the highest quality materials
- Conformant gold products
- Lower costs
- Decreased lead times

AVAILABLE HERMETIC LIDS

Product	Applications
Combo-Lid™ Cover	High Reliability Applications
Ceramic Combo-Lid™ Cover	Specialty Applications
Getter Combo-Lid™ Cover	Packages that Require the Cavity be Free of All Gases
Visi-Lid™ Cover and Visi-Caps	Optical Packages and Sensor Applications
Non-Magnetic Lid	Specialty Applications
Seam Seal-Lid™ Lid	Sealing Heat Sensitive Electronics
Solder Reflow-Lid™ Cover	Cost Alternative to Combo-Lid Covers

Combo-Lid™ Covers

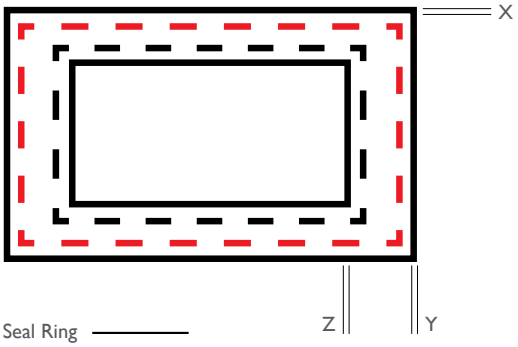
Materion's Combo-Lid™ covers are a leading choice for hermetically sealed electronic packages with the ability to function in the harshest environments, delivering superior sealing to protect high reliability applications from moisture and particulates.

Produced at global manufacturing locations in the United States, Singapore and the Philippines, Combo-Lids are available in custom designs and hermetic solutions. The base metal is Kovar™ metal or Alloy 42. Plated with nickel and gold flash, and tack welded to a solder preform, the nickel layer helps prevent corrosion, whereas the gold layer promotes solderability and extends shelf life.

LID COMPOSITION

- Kovar or Alloy 42 with nickel electroplate MIL-38510, 50-350 micro inches
- Gold electroplate MIL-G-45204B Type III, Grade A
- Length and width dimension tolerance +/- .003"
- Thickness dimension tolerance is +/-.001"
- Flatness <.001" for lids <.500" or .002" for lids >.500", burrs <.001"

LID SIZE VS. SEAL RING SIZE



Seal Ring ——————
Lid OD and Preform OD – – – –
Preform ID – – – –
X: 0.01"
Y: 0.010" - .015"
Z: 0.010" - .015"

LID FRAME

- Composition 80 +/- 1% Au, balance Sn with total impurities <149 ppm
- Length and width dimension tolerance +/- .003"
- Thickness dimension tolerance +/- .0003"

TACK WELD ASSEMBLY

- Three integral welds, Alignment +/- .005"
- Weld Splatter < .003"

DESIGN GUIDELINES

Materion can assist customers with cover lid design, frame size and related tooling. Our team is available to suggest process parameters, ensuring maximum assembly line yields. General design guidelines include:

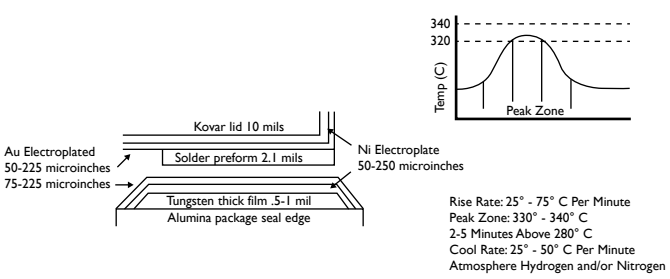
- Recommended cover OD should be .025" less than the package seal ring OD
- Preform ID should be .025" larger than the package seal ring ID, provided a minimum solder width of .025" is maintained
- The outside dimensions of the lid and preform are typically the same

PROCESSING INFORMATION

- Recommended typical clip force is 0.9-2.0 lbs
- Clip pressure varies depending on lid size, preform thickness, lid flatness and seal-ring flatness
- Typical sealing profiles allow for 2-5 minutes above 280°C (melting temperature)
- Peak temperature should not exceed 340°C
- Atmosphere: dry nitrogen or hydrogen

MECHANISM FOR SEALING MICROELECTRONIC PACKAGES

Microelectronic packages sealed with Combo-Lid™ covers: chip carriers, side metallization, dual in-line and flat packs.



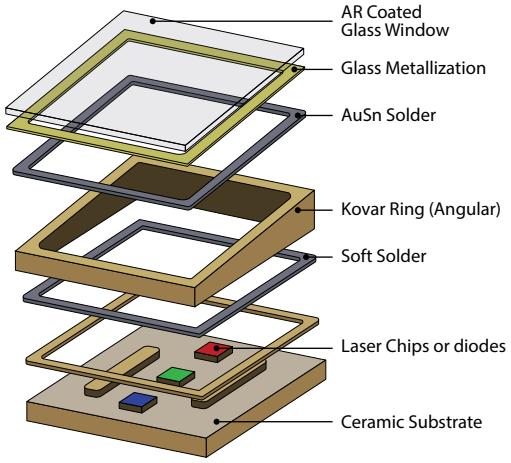
The information presented here refers to our standard products. Plating or preform properties can be midified to meet specific needs.

Visi-Lid™ Hermetic Optical Windows

Demand continues to grow for anti-reflective (AR) coated windows that can be hermetically sealed. Opto-electronic components such as MEMS, LIDAR, CMOS and CCD chips, photodiodes, laser diodes and more employ hermetic packages that must transmit light at dedicated wavelengths. The ideal optical cover lid provides a complete hermetic packaging solution. Commonly, the window must include anti-reflective (AR) coatings designed to increase transmission on either a single or a broader range of wavelengths. The combination of window material, surface finish and AR coating provides the desired transmittance of the window.

Visi-Lid cover components are manufactured in-house, and offer the following advantages:

- A variety of window substrates available including glass, sapphire, germanium, silicon and other compatible windows customized for visible, infrared or ultraviolet light operating applications
- Precise Visi-Lid cover housing with attached selectively metallized, hermetically sealed AR-coated window for high performance
- Assemblies that hermetically house optical windows onto Kovar metal etch frames that can be sealed by soldering or welding
- Stand alone, unframed windows with selective metallization, with the solder frame tack welded onto the metallized window
- Anti-reflective coatings designed for specific transmission requirements
- Choose from a variety of solder preforms that can be tack-welded to the metallized ring-frame or lid of the Visi-Lid cover, simplifying assembly onto your microelectronic housing



BENEFITS

Materion is an award-winning supplier of flexible solutions for hermetic lids and microelectronic packaging. Our unique Visi-Lid cover can be used for a range of industry applications.

- Leading-edge solution for your packaging/sealing challenges
- In-house custom-design and manufacturing capabilities
- Extensive knowledge of solder sealing systems and assembly
- Engineering support from initial design through final assembly

WINDOW MATERIALS

- Glass
- Silicon
- Germanium
- Sapphire

ANTI-REFLECTIVE COATINGS

- AR coatings for your spectrum

SELECT SOLDERS

Materion is an industry leader in developing and manufacturing solder alloys for optoelectronic applications. Materials include:

- 80Au 20Sn (liquidus: 280°C, solidus: 280°C)
- 88Pb 8Bi 4Sn 1Ag 1In (liquidus: 286°C, solidus: 268°C)
- 95.5Sn 3.8Ag .7 Cu (liquidus: 217°C, solidus: 217°C)
- 95Sn5Sb (liquidus: 240°C, solidus: 232°C)
- 90Sn 10Au (liquidus: 217°C, solidus: 217°C)

Etch Lid™ Covers

Hermetic semiconductor packages must have a reliable cover to protect their contents from the effects of the environment. However, some chips will not tolerate high temperatures during soldering, requiring low-temperature lid sealing for some applications. In these circumstances, a low-temperature seam sealing process is necessary.

Materion manufactures Etch Lid™ covers with lids composed of Kovar and other metals. These materials are used in the seam welding process to melt and fuse thinner edges of the lids to the ceramic or metal package's seal ring. The lids are ideal for hermetic applications where discrete chips are unable to withstand solder reflow temperatures in a furnace. Instead, seam sealing concentrates the heat at the perimeter of the lid. Etch Lid covers are available as the lid only, or a lid plus a solder frame. We offer combined solutions for designing and attaching solder frames of various compositions onto the thinner edges of the lids to enhance the seam seal strength. We also provide design services for lids and solder frames if the metal and ceramic seal ring dimensions or drawings are provided.

ETCH LIDS OPTIONS

Various options are available to achieve an optimal packaging solution for your application:

- Etch lid with either electroless or electrolytic Nickel plating
- Etch lid with Nickel & Gold plating
- Etch lid with Nickel & Palladium plating
- Etch lid with Nickel/Gold/Nickel/Gold plating
- Etch lid with Nickel/Gold with AuSn solder attached
- Etch lid with Ni-Au-Ni-Au plating and AuSn solder frame attached
- Etch lid with Nickel & Palladium with thin AuSn solder attached
- Etch lid with an opening for AR coated glass window attachment
- Etch lid with selected getters tack welded to the ceiling of the lid

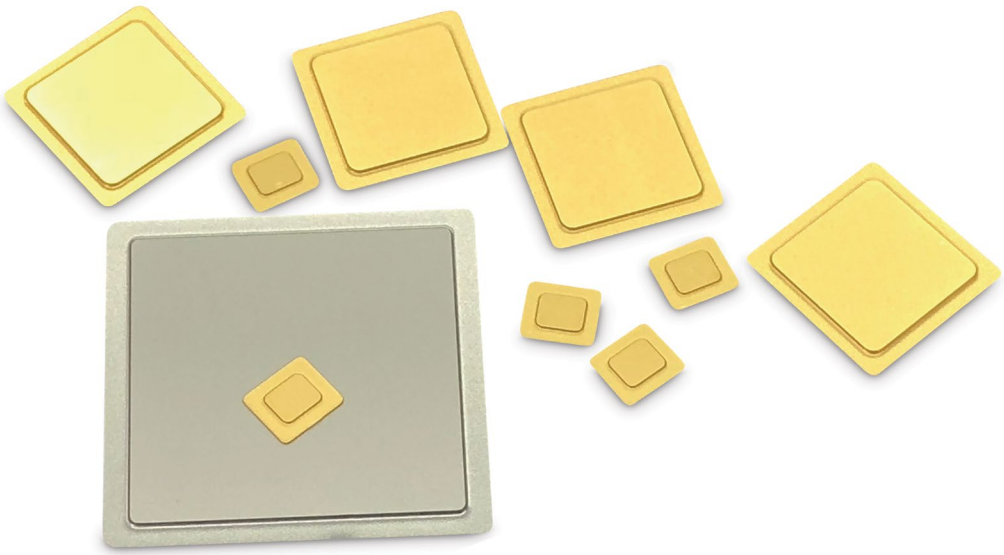
BENEFITS

Materion can manufacture a variety of lids designed to meet the most challenging hermetic sealing requirements.

- Highly effective seal ring that allows excellent soldering
- Gold-tin alloys create superior hermetic seal without flux
- Non-precious and lead-free solders available
- Edge metallization on ceramic lids for uniform fillet formation
- Preform tack welding for both metal and ceramic products

10,000+ PREFORM SHAPES FOR TACK WELDING

- Disks & Rectangles
- Squares & Frames
- Rounds & Rings
- Irregular & Complex
- Custom Shapes



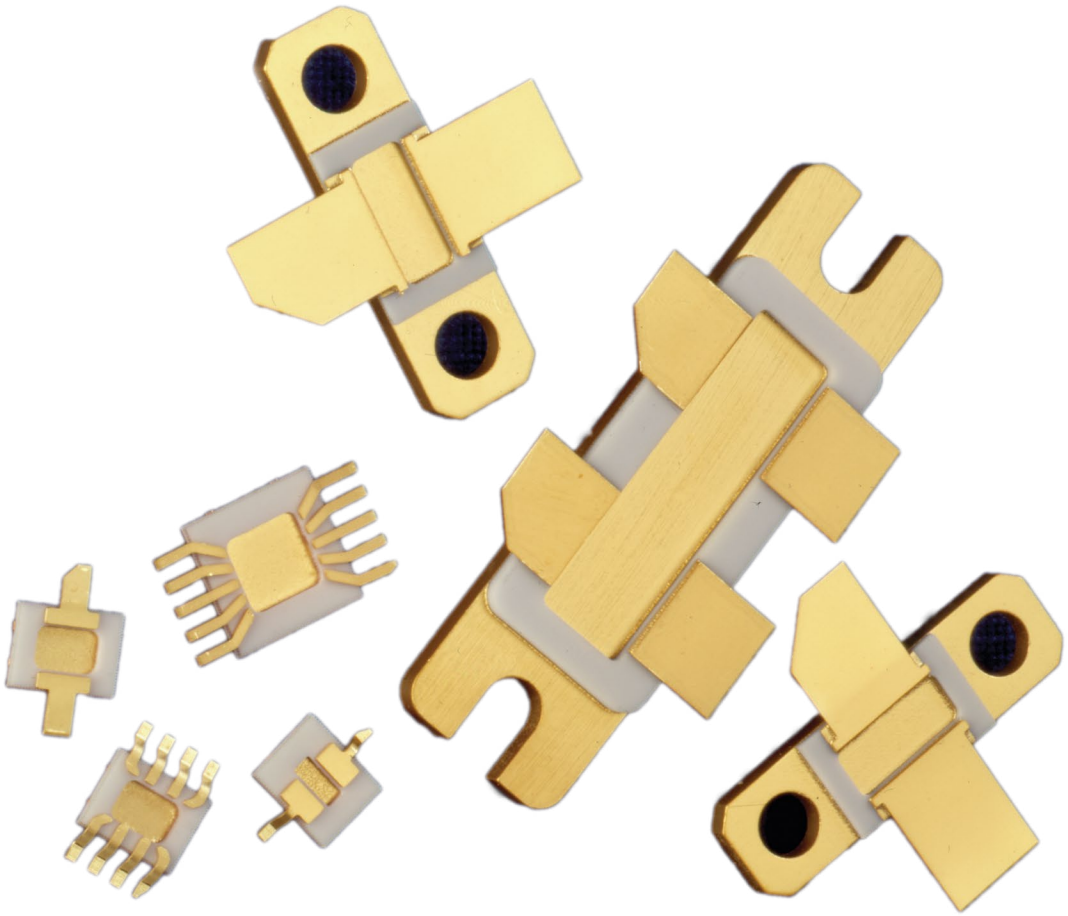
PROVEN PERFORMANCE

Our high-quality ceramic packages are plated with electrolytic nickel and gold to meet the exacting standards of the microelectronics packaging industry.

CERAMIC PACKAGES

Materion has developed a range of ceramic packages to meet the demand for very low thermal resistance. Our products also provide very low RF loss for RF and microwave microelectronic packaging. We can incorporate flanges of advanced materials to achieve the high-power density requirements of RF power transistors.

Our high-quality ceramic packages support a variety of RF power transistors and MMICS, including transistors fabricated in Si, GaAs and GaN. All packages are plated with electrolytic nickel and gold to meet the exacting standards of the microelectronic packaging industry.



CuPack™ Packages

Cutting edge, high power Silicon (Si), Gallium arsenide (GaAs) and Gallium nitride (GaN) transistors and MMICs demand very low thermal resistance and very low RF loss. CuPack™ packages deliver outstanding performance for both requirements. These unique packages feature 0.2 mm thick copper leads and base, and an alumina ceramic ringframe. CuPack packages are electrolytically plated with nickel + gold and are compatible with a wide range of die attach materials. CuPack packages are surface mount packages with lead configuration options of straight, gull wing, or J-shaped forms.

ADVANTAGES OF CUPACK RF POWER PACKAGES:

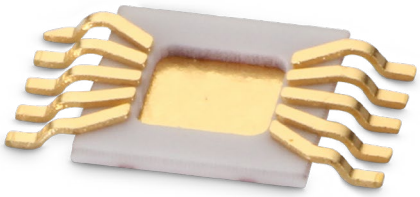
- Ideal for 5G GaN RF power FETs and MMICs
- Low loss at frequencies up to 10 GHz and beyond, providing the user great flexibility in designing their RF power devices
- 50Ω leads available: 0.5 mm wide copper leads
- Very low thermal resistance: die attach onto a 0.20 mm thick copper base
- Industry 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 customer drawings

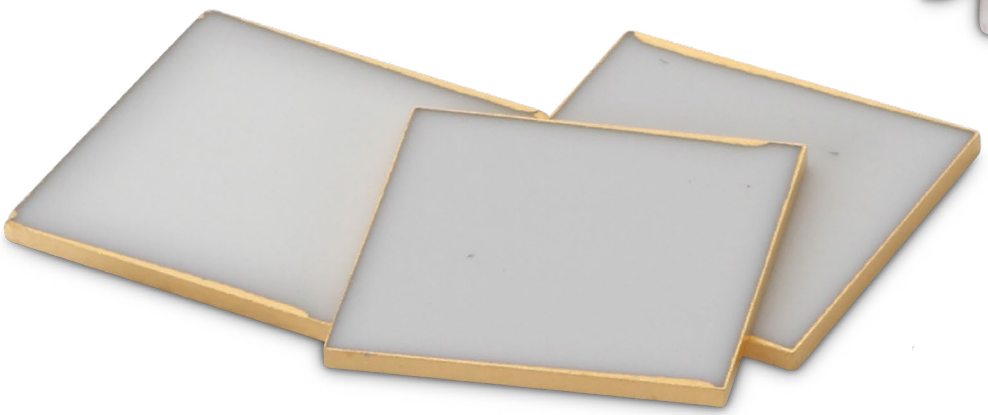
We offer high-performance RF and microwave packages optimized for power devices. Ceramic air cavity packages are available in a variety of designs for GaN MMICs and FETs, Si LDMOS FETs, and GaAs FETs.

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
- Lean Sigma





Epo-Lid™ Covers

EPOXY COATED LIDS

To complement our microelectronic packaging products, Materion offers epoxy-coated ceramic and metal lids. We are tooled for more than 100 epoxy framed lids, allowing us to design and manufacture new lids to meet specific customer requirements. Epo-Lid™ covers are available in a variety of shapes, sizes, materials and configurations.

MATERIALS

- Ceramic (Alumina)
- Metal (Plated Kovar)
- Plastic (Liquid Crystal Polymer)

SHAPES

- Square, Rectangle, Circular
- Plates or Cups

SIZES

- From 0.16" x 0.16" to 2.0" x 2.0"

CUP LIP TOPOGRAPHY

- Planar
- Notches (Garage Doors)
- Bumps

Our superior quality epoxy is extremely reliable and consistent. Lids are supplied with a layer of B-staged epoxy bonded to the lip. Epoxy thickness is controlled to ±0.0005". Our lids consistently outperform competitors' lids in terms of reliability and repeatability.

High-Performance Epoxies

To help ensure strong, reliable adhesion of components in non-hermetic packaging, Materion provides two microelectronic epoxies: MEG 150 and MEG 165. These epoxies form a strong seal to protect sensitive electrical parts from dust, moisture and short-circuiting. They also offer excellent adhesion for a variety of materials including metal, glass, alumina and plated gold, plastics (thermoset and high temperature thermoplastics) and ceramics.

Materion's high-performance microelectronic epoxies, MEG 150 and MEG 165, are supplied B-staged and are not tacky prior to curing. Once cured, they will pass gross leak hermetic testing.

MEG 150

MEG 150 is typically used to bond cup-shaped ceramic caps onto ceramic packages for RF transistors.

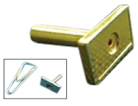
- High shear, peel and cleavage; strength over a wide temperature range
- Standard thickness 0.009" +/- 0.0005" (230 um) over the entire seal surface
- Relatively low bonding pressure required
- During the curing process, epoxy will flow to provide good conformability to leads, bumps and notches

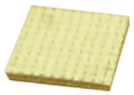
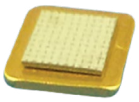
MEG 165

MEG 165 is optimal for sealing smooth, flat surfaces and serves as a low-cost alternative to solder.

- Low flow upon curing; optimal for flat sealing surfaces
- Standard thickness 0.003" =/- 0.0005" (75 um) over the entire seal surface
- Epoxy is supplied B-staged and is not tacky prior to curing
- During curing, epoxy will flow to seal two flat, smooth surfaces

Microelectronic Packaging Products

Products	Applications	Image	Lid Material	Preform Material
Combo-Lid™ Covers (Flat)	High Reliability Hermetic Packaging		Kovar or Alloy 42	Gold-Tin or Other Alloys
Combo-Lid™ Covers (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-Lid™ Covers	Medical Imaging and Signal Noise Control		Mo, CuW, Bronze, Cu	Gold-Tin or Other Alloys
Non-Magnetic Metal Combo-Lid™ Covers	High Purity Non-Magnetic Combo-Lid Covers, does not contain Nickel or Plating		Mo, CuW, Bronze, Cu	Gold-Tin or Other Alloys
Non-Magnetic BeCu Combo-Lid™ Covers	High Purity Non-Magnetic Combo-Lid Covers, does not contain Nickel or Plating		BeCu	Gold-Tin or Other Alloys
Nozzle Combo-Lid™ Covers	MEMS, Automotive, and High Reliability Hermetic Package Sealing		Kovar	Gold-Tin
Ceramic Combo-Lid™ Covers 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

Products	Applications	Image	Lid Material	Preform Material
Selectively Plated Combo-Lid™ Covers	High Reliability Hermetic Package Sealing		Kovar or Al2O3	Gold-Tin or Other Alloys
Getter Tack Welded Combo-Lid™ Covers	High Reliability Hermetic Package Sealing		Kovar	Gold-Tin or Other Alloys
Palladium Combo-Lid™ Covers	High Reliability Hermetic Package Sealing		Palladium	Gold-Tin or Other Alloys
Seam Seal-Lid™ Covers	Hermetic Package Sealing without Preform		Kovar	-
Special Shaped Combo-Lid™ Covers	High Reliability Hermetic Package Sealing		Kovar	Gold-Tin
Epo-Lid™ Covers	Ceramic Lid for Non-Hermetic Packages including CuPack™ Packages		Al2O3	MEG-150 or MEG-165 Epoxy
Ceramic Air Cavity Packages	Wireless Applications - Si, GaAs and GaN		Plated Alloy 42 with Ni, NiCo or Au	Aluminua Ring Frames
Etch Lids for AR Coated Glass	Double Preform Attached Lid for Visi-Lid™ cover Application		Kovar	Gold-Tin or Other Alloys

SUPERIOR JOINING

Materion produces braze and solder alloys for microelectronic packaging and high temperature joining of vacuum electronic devices in a variety of forms including ribbon, wire, preforms and powder.

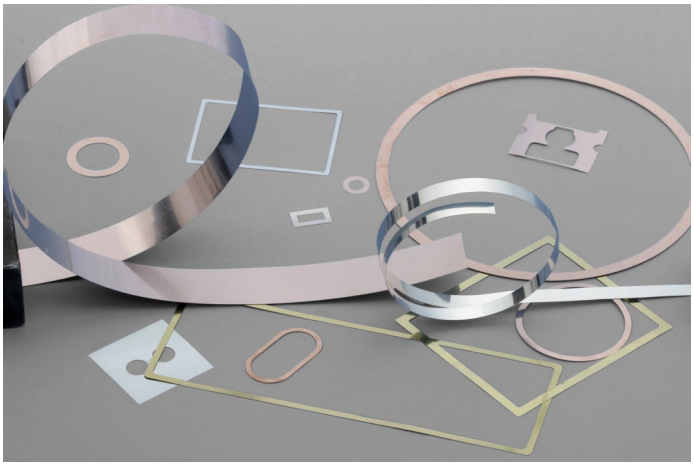
BRAZE AND SOLDER ALLOYS

To help protect delicate microelectronic devices, Materion produces high-purity alloys with extremely low impurities for optimum performance. Dedicated to delivering high-tech solutions, our braze alloys are available in a range of melting points, and our solder preforms are available in a variety of shapes, sizes and forms including wire, strip, sheet, ribbon, preforms, frames and more.

Combining our manufacturing technologies and analytical capabilities, we provide smarter solutions for your microelectronic packaging. Our alloying and casting processes are conducted in-house and are rigorously monitored by on-site laboratories to ensure the highest quality solders.

BENEFITS OF MATERION'S BRAZE AND SOLDER ALLOYS

- Braze and solder alloys produce joints of high integrity and strength
- Variety of shapes and forms available including ribbon, wire, and solder preforms
- Alloys provide superior thermal and electrical conductivity
- Extensive tooling library with 10,000+ stamping tools for solder preforms
- Range of melting temperatures deliver consistent performance
- Assistance in fabricating new product design



Braze Alloys

Materion's braze materials for microelectronic packaging and high temperature joining of vacuum electronic devices allows for superior thermal and electrical conductivity for your application. Our "ultra-clean" braze alloys are manufactured with base metals free of contamination to produce joints of high integrity and strength. Our gold braze alloys are available in customized shapes and forms including ribbon, wire, and preforms.

We rigorously limit trace impurities in braze materials to produce high purity alloys in a variety of precious and non-precious metals. Inventory includes:

- Pure metal and pure metals alloys
- Precious metals and precious metal alloys
- Lead-free alloys
- AuSn in 80/20 and 78/22
- Variety of shapes – squares, rectangles, disc, washers, frames

Braze	Alloy	Liquidus		Solidus		Density (g/cc)	Electrical Resistivity (microhms cm)	Electrical Conductivity (% IACS)	Thermal Conductivity (W/m*K)	Thermal Coefficient of Expansion (ppm/°C) (20-600°C)	Tensile Strength (psi)	Yield Strength (psi)	Elongation
		C	F	C	F								
WB1240	92Au, 8Pd	1240	2264	1200	2192	18.42	7.6	22.6	102.9	14.5	48,500	35,600	19.80%
WB1238	60Pd, 40Ni	1238	2260	1238	2260	10.54	16.7	10.3	52.4	15.7	143,300	104,000	18.00%
WB1169	30Au, 34Pd, 36Ni	1169	2136	1135	2075	11.87	26.1	6.6	37.2	14.8	131,400	92,400	47.00%
WB1121	50Au, 25Pd, 25Ni	1121	2050	1102	2016	13.38	37.4	4.6	29	15.5	124,000	104,000	23.70%
WB1078	10Au, 90Cu	1078	1972	1063	1945	9.47	4.3	40.5	176.7	19	45,200	17,700	40.00%
WB1047	72Au, 26.2Ag, 1.8Ni	1047	1917	1040	1904	15.56	11.2	15.4	73.5	16.6	46,900	26,500	56.50%
WB1037	70Au, 22Ni, 8Pd	1037	1899	1005	1841	14.79	20.4	8.5	44.8	15.2	126,600	86,500	18.00%
WB1030	35Au, 62Cu, 3Ni	1030	1886	1000	1832	11.03	12.8	13.5	65.6	18.1	66,600	30,300	32.40%
WB1025	20Au, 78Cu, 2In	1025	1877	975	1787	9.99	6.9	25	113.1	19.1	52,900	29,400	40.20%
WB1010	35Au, 65Cu	1010	1850	990	1814	11.03	8.6	20	92.5	18.5	61,100	28,300	35.10%
WB1005	37.5Au, 62.5Cu	1005	1841	985	1805	11.22	8.9	19.5	90.1	18.6	59,900	23,100	39.70%
WB1004	35.25Au, 31Cu, 14Ni, 10Pd, 9.75Mn	1004	1840	971	1780	11.11	62	2.8	21.5	17.3	137,300	100,800	18.30%
WB1000	40Au, 60Cu	1000	1832	975	1796	11.41	10.5	16.5	77.8	18.8	53,300	20,600	37.90%
WB992	70Au, 30Ni	992	1692	961	1762	14.3	16.1	10.7	54.1	15.4	137,500	131,500	15.50%
WB975	87.75Cu, 12Ge, 0.25Ni	975	1787	880	1616	9.39	N/A	N/A	N/A	22.8	42,000	15,300	5.60%
WB970	50Au, 50Cu	970	1778	955	1751	12.24	10.9	15.9	75.4	17.9	69,100	29,200	44.50%
WB955	82Au, 18Ni	955	1751	955	1751	15.96	13.3	13	63.5	16.1	125,400	111,900	11.00%

Braze	Alloy	Liquidus		Solidus		Density (g/cc)	Electrical Resistivity (microhms cm)	Electrical Conductivity (% IACS)	Thermal Conductivity (W/m*K)	Thermal Coefficient of Expansion (ppm/°C) (20-600°C)	Tensile Strength (psi)	Yield Strength (psi)	Elongation
		C	F	C	F								
WB950	54Ag, 21Cu, 25Pd	950	1742	900	1652	10.45	11.9	14.5	69.8	17.7	69,000	57,100	25.00%
WB949	31Au, 33.5Cu, 9.75Ni, 9.75Pd, 16Mn	949	1740	927	1700	10.63	N/A	N/A	N/A	19.5	151,700	111,200	16.00%
WB925	81.5Au, 16.5Cu, 2Ni	925	1697	910	1670	15.91	18.2	9.5	49	17.5	70,600	55,000	29.10%
WB900	65Ag, 20Cu, 15Pd	900	1652	850	1562	10.33	7.1	24.2	109.6	18.5	63,800	52,100	21.50%
WB895	75Au, 20Cu, 5Ag	895	1643	885	1625	15.17	13.1	13.2	64.2	18.3	94,400	81,600	25.30%
WB894	56Ag, 42Cu, 2Ni	894	1640	772	1420	9.76	3.3	52.8	227.4	18.8	51,500	47,600	18.70%
WB880	82Ag, 9Pd, 9Ga	880	1616	845	1553	9.91	N/A	N/A	N/A	21.1	N/A	N/A	N/A
WB853	58Ag, 32Cu, 10Pd	853	1566	824	1515	10.07	4.7	36.6	160.9	18.1	60,000	52,000	16.00%
WB845	60Au, 20Cu, 20Ag	845	1553	835	1535	13.8	13.1	13.2	64.3	18.9	99,500	96,300	10.80%
WB830	95Ag, 5Al	830	1526	780	1436	9.17	24.8	6.9	38.6	20.9	N/A	N/A	N/A
WB814	68Ag, 27Cu, 5Pd	814	1490	794	1463	10.09	3.6	48.3	208.8	19.3	54,200	47,500	10.60%
WB802	63Ag, 28.5Cu, 6Sn, 2.5Ni	802	1476	691	1276	9.72	13.2	13	63.7	19.6	57,900	51,000	50.00%
WB795	71.15Ag, 28.1Cu, 0.75Ni	795	1463	780	1436	10	2.3	75.4	320.6	21.4	48,300	39,700	29.80%
WB780	72Ag, 28Cu	780	1435	780	1435	10.01	2	85.9	363.9	19.4	51,900	42,000	21.00%
WB718	60Ag, 30Cu, 10Sn	718	1324	602	1116	9.58	23.8	7.2	39.8	21.2	57,200	35,700	36.50%
WB705	61.5Ag, 24Cu, 14.5In	705	1301	630	1166	9.5	10.6	16.2	76.7	20.4	61,800	38,600	26.60%
WB487	81Au, 19In	487	909	487	909	14.72	13.6	12.7	N/A	18.0 (400)	33,700	29,500	2.80%
WB361	88Au, 12Ge	361	682	361	682	14.69	14.2	12.2	44.5	12.6 (300)	27,000	46,600	3.40%
WB305	78Au, 22Sn	305	581	280	536	14.18	18.8	9.2	55	16.0 (250)	40,000	36,500	2.10%
WB280	80Au, 20Sn	280	536	280	536	14.53	20.7	8.3	58	16.0 (250)	40,000	36,500	2.10%
Pure Metals													
	Ag	962	1763	962	1763	10.5	1.6	105	429	19.6	18,000	N/A	40%
	Au	1064	1947	1064	1947	19.34	2.5	70	317	14.2	15,000	N/A	30%
	Cu	1085	1985	1085	1985	8.95	1.7	100	401	16.8	30,000	5,000	60%
	Ni	1455	2651	1455	2651	8.92	6.8	25.2	91	13.3	46,000	8,500	30%
	Pd	1552	2826	1552	2826	12.02	10.8	16	72	11.9	27,500	5,000	40%
	Pt	1769	3216	1769	3216	21.47	11.1	16.3	72	8.8	18,000	5,000	35%

Solder Alloys

Materion has an extensive range of precious metal alloys with superior quality and higher casting yields. Industrial solder alloys used in electronics are cast and fabricated to meet the exacting standards required by the industry and your unique application.

Our solder alloys excel in components like transistors, capacitors, diodes, insulators, chips, and conductors used in almost every popular consumer device from smartphones to computers. Due to their sensitivity to impurities, they rely on metals and alloys that are free of contamination to ensure optimal performance.

AVAILABLE SOLDER ALLOYS:

- Gold alloys
- Silver alloys
- Gold Tin alloys
- Gold Germanium alloys
- Gold Tin Copper alloys
- And more

Solder	Nominal Composition Wt%	Liquidus		Solidus		Density (g/cc)	Electrical Conductivity (%& of IACS)	Thermal Conductivity (W/m + C	Thermal Coefficient of Expansion (Micro in/in/C)(20C)	Tensile Strength (psi)
		C	F	C	F					
WS96*	30Pb, 18Sn, Bi52	96	205	96	205	9.58	3.2	15	38.0	3200
WS118	48Sn, 52In	118	244	118	244	7.30	11.7	34	20.0	1720
WS143	3Ag, 97In	143	290	143	290	7.38	4.5	73	22.0	800
WS145	58Sn, 42In	145	493	118	244	7.30	11.2	33	31.0	5900
WS149*	5Ag, 15Pb, 80In	149	300	149	288	7.85	6.7	43	28.0	2550
WS157	100In	157	315	157	315	7.31	5.6	82	24.8	575
WS174*	30Pb, 70In	174	347	165	329	8.19	8.8	38	28.0	3450
WS179	2Ag, 36Pb, 62Sn	179	354	179	354	8.41	1.9	42	27.0	6380
WS181*	37.5Pb, 37.5Sn, 25In	181	358	134	273	8.42	7.8	23	23.0	5260
WS183*	37Pb, 63Sn	183	361	183	361	8.34	11.8	51	25.0	7500
WS185*	40Pb, 60In	185	358	173	343	8.52	7.0	29	27.0	4150
WS186*	30Pb, 70Sn	186	367	183	361	8.17	12.5	53	27.0	7800
WS187	2.8Ag, 77.2Sn, 20In	187	369	175	347	7.25	9.8	54	28.0	6800
WS188*	40Pb, 60Sn	188	376	183	361	8.50	11.5	49	21.6	7610
WS199*	20Pb, 80Sn	199	39	183	361	7.85	13.8	59	24.5	5800
WS200*	45Pb, 55Sn	200	392	183	361	8.68	11.2	48	22.6	6800
WS205*	15Pb, 85Sn	205	401	183	361	7.70	13.6	58	22.0	5300
WS209*	50Pb, 50In	209	410	184	363	8.86	6.0	22	27.0	4670
WS212*	50Pb, 50Sn	212	414	183	361	8.87	10.9	47	23.6	6000
WS213*	10Pb, 90Sn	213	415	183	361	7.55	13.1	56	26.5	3300
WS217	10Au, 90Sn	217	423	217	423	7.73	10.2	28	14.0	15000
WS221	3.5Ag, 96.5Sn	221	430	221	430	7.36	16.0	33	30.2	5620
WS225*	60Pb, 40In	225	437	205	401	9.30	5.2	19	26.0	5000
WS226	3.5Ag, 95Sn, 1.5Sb	226	439	218	424	7.37	11.9	29	18.0	7300
WS226A	2.5Ag, 97.5Sn	226	439	221	430	7.34	11.2	28	19.5	6200
WS232	100Sn	232	450	232	450	7.28	15.6	73	23.5	1900
WS235	99Sn, 1Sb	235	455	235	455	7.27	12.3	29	22.0	2620
WS238*	60Pb, 40Sn	238	460	183	361	9.28	10.1	44	24.7	5400
WS238A	97Sn, 3Sb	238	460	232	450	9.28	12.1	28	25.0	4080
WS240	95Sn, 5Sb	240	464	232	450	7.25	11.9	28	27.0	5460

Solder	Nominal Composition Wt%	Liquidus		Solidus		Density (g/cc)	Electrical Conductivity (%& of IACS)	Thermal Conductivity (W/m + C	Thermal Coefficient of Expansion (Micro in/in/C)(20C)	Tensile Strength (psi)
		C	F	C	F					
WS243*	63.2Pb, 35Sn, 1.8In	243	469	185	365	9.39	9.5	41	21.0	2900
WS257*	70Pb, 30Sn	257	495	183	361	9.66	9.3	41	25.6	5000
WS264*	75Pb, 25In	264	500	240	464	9.97	4.6	18	26.0	5450
WS280*	80Pb, 20Sn	280	536	183	361	10.04	8.7	37	26.5	4800
WS280A*	81Pb, 19In	280	536	270	518	10.27	4.5	17	27.0	5550
WS280B	80Au, 20Sn	280	536	280	536	14.51	7.7	57	15.9	40000
WS286*	88Pb, 8Bi, 4Sn, 1In, 1Ag	286	547	268	514	10.91	5.6	33	22.4	5317
WS288*	85Pb, 15Sn	288	550	183	361	10.48	8.5	37	27.2	4600
WS290*	2Ag, 88Pb, 10Sn	290	570	268	513	10.75	8.5	27	29.1	3260
WS292*	5Ag, 90Pb, 5Sn	292	558	292	558	11.00	7.7	26	26.0	5100
WS295*	95Pb, 5Sb	295	563	252	486	10.96	6.2	27	27.0	4200
WS296*	2.5Ag, 92.5Pb, 5Sn	296	565	287	549	11.02	7.6	26	24.0	3500
WS300*	2.5Ag, 92.5Pb, 5In	300	572	300	572	11.02	5.5	25	25.0	4560
WS302*	90Pb, 10Sn	302	576	275	527	10.50	8.2	36	27.9	4400
WS303*	2.5Ag, 97.5Pb	303	577	303	577	11.33	7.5	26	23.0	5900
WS304*	2.5Ag, 95.5Pb, 2Sn	304	579	299	570	11.20	7.6	26	23.0	3400
WS305	78Au, 22Sn	305	581	280	536	14.81	7.7	57	15.9	40000
WS309*	1.5Ag, 97.5Pb, 1Sn	309	588	309	588	11.28	6.0	23	30.4	4420
WS310*	5Ag, 90Pb, 5In	310	590	290	554	11.00	6.4	29	24.0	4500
WS341*	95Pb, 5In	314	597	300	572	11.06	5.1	21	29.0	4330
WS314A*	95Pb, 5Sn	314	597	310	590	10.80	8.1	35	28.4	4000
WS327*	100Pb	327	621	327	621	11.35	8.4	15	29.3	2750
WS361	88Au, 12Ge	361	682	361	682	14.67	11.4	44	13.4	26900
WS363	96.5Au, 3.15Si	363	685	363	685	15.70	46.4	27	12.3	37000
WS487	81Au, 19In	487	909	487	909	14.72	8.4	28	14.7	33700

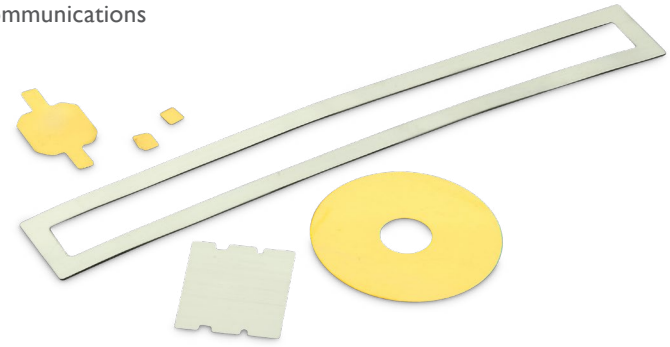
Preforms

Materion fabricates a library of preforms to meet customers' distinct needs for various materials, shapes and sizes. Our preforms includes:

- Squares, rectangles, discs, washers, and frames
- Customized shapes
- Extensive material selection for superior thermal and electrical conductivity
- Lead-free alloys available in high-quality materials including gold and silver alloys, gold-tin alloys, gold-germanium alloys, gold-tin-copper alloys and more.
- Standard thicknesses from 0.0008" to widths up to 4.500"

We manufacture preforms for industries that require superior joining for use in sensitive electronics, including:

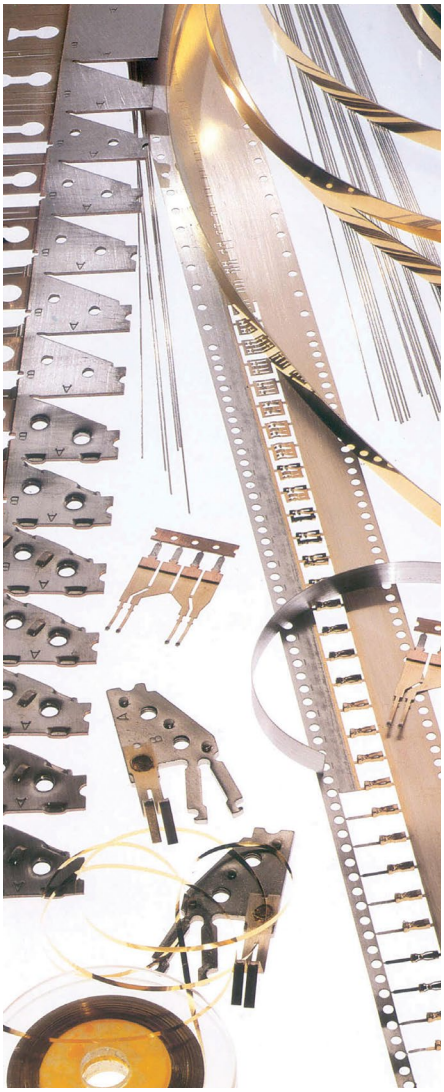
- High-power semiconductor devices
- Smart systems
- Augmented reality
- Optical devices
- Hermetic microelectronics packaging
- Military/aerospace/defense systems
- RF and microwave devices
- Communications



Silver Electrical Contact Alloys

Materion C-Series silver contact alloys combine leading-edge processes that provide superior conductivity in eight alloy compositions for a variety of applications, including automotive, medical, semiconductor and industrial.

Our silver electrical contact alloys offer controllable stiffness and hardness and are custom cast and fabricated to your precise requirements. We offer robust electrical contact performance in highly corrosive environments to replace outdated methods of electroplating.



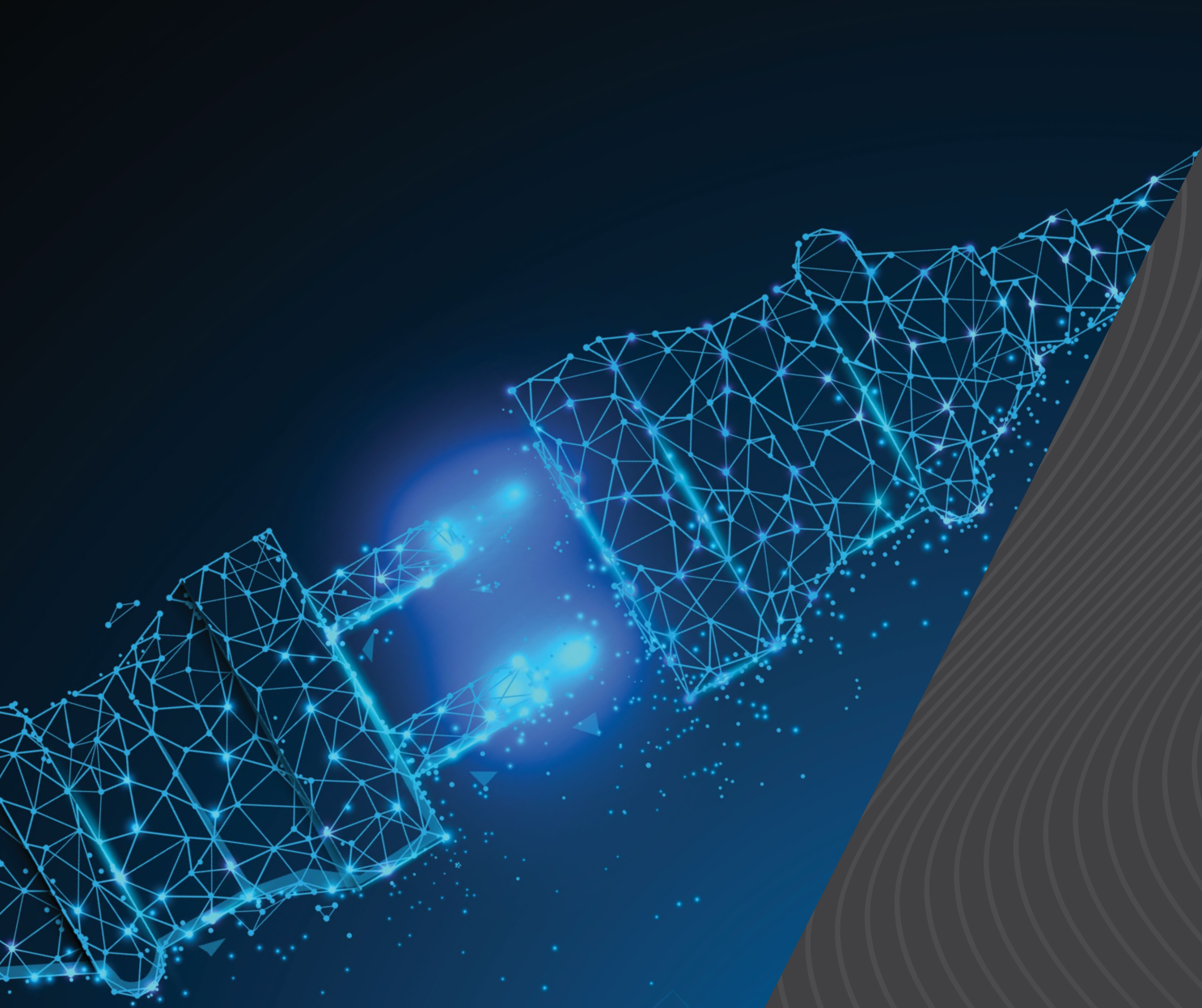
AVAILABLE IN A VARIETY OF CONVENIENT SIZES

Our silver electrical contact alloys are available in ribbon form with multiple widths and thicknesses to meet a range of component needs. They are also compatible with high volume stamping.

EXTENSIVE IN-HOUSE TOOLING & TESTING CAPABILITIES

We have an extensive tool library to select the most appropriate form of alloy for your applications. Our in-house alloy experts can provide unique tooling for your custom requirements. Our high-performance alloys perform better than competitors in rigorous testing, and we are a true development partner in corrosion testing.

Alloy	Nominal Composition	Density (G/Cc)	Astm Equiv.	Compare To*	Electrical Conductivity %Iacs	Resistivity (Microhms Cm)	Tempers Available
C102	69Au, 25Ag, 6Pt	16.0	B522	WE 1	10	15.8	AR, A, WQ
C103	35Pd, 30Ag, 14Cu, 10Au, 10Pt, 1Zn	11.8	B540	Paliney 7	4.9-5.5	35.2-31.3	AR, A, WQ
C105	44Pd, 38Ag, 16Cu, 1Pt, 1Ni	10.8	B563	Paliney 6	5.6-6.7	34.8-25.8	AR, A, WQ
C106	72Ag, 28Cu	10.0	B628	-	84-89.5	2.0-1.9	AR, A
C109	60Pd, 40Ag	11.6	B731	R -156	4.1	42.0	AR, A
C110	75Au, 25Ag	15.9	-	Ney Oro 28	16.8	10.3	AR, A
C117	Ag, Mg, Ni	10.4	-	Consil 995	75	2.3	AR, A
C118	90Ag, 10Cu	10.31	-	Coin Silver	79-94	2.1-1.8	AR, A



SILVER ELECTRICAL CONTACT ALLOYS BY MATERION IMPROVES ELECTRONIC PACKAGING PERFORMANCE

FOR MORE PRODUCT INFORMATION AND TO REQUEST A QUOTE, VISIT MATERION.COM

Contact Us - Buffalo

2978 Main Street
Buffalo, NY 14214
+1 800.327.1355

Contact Us - Singapore

28 Woodlands Loop #01-00
Singapore 738308
Phone: +65 6559 4450

Materion Global Headquarters

6070 Parkland Boulevard
Mayfield Heights, OH 44124 USA