Technical data sheet

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Manufacturer:	3M DEUTSCHLAND GMBH
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3M ELECTRICALLY CONDUCTIVE TAPE 9713

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3M™ XYZ-Axis Electrically Conductive Tape 9713

Product Description

3M™ XYZ-Axis Electrically Conductive Tape 9713 is an isotropically conductive pressure sensitive tape. 3M tape 9713 conducts electricity through the thickness (Z-axis) and in the plane of the adhesive (X, Y planes) and is ideal for EMI/RFI shield and EMI/RFI gasket attachment to metal surfaces. The tape consists of a high performance 3M adhesive loaded with conductive fibers. The result is a double-sided tape providing both good adhesion and good electrical performance. The conductive fibers in 3M tape 9713 also provide improved handling characteristics.

3M™ XYZ-Axis Electrically Conductive Tape 9713 is ideal for attaching EMI shields to electronic and electrical devices. 3M tape 9713 may be used with many types of foil laminate shields, such as aluminum/PVC or copper/PVC laminates, to provide a customized shielding solution. This tape may also be used to attach conductive fabric/foam core EMI gaskets to electronic cabinetry. 3M tape 9713 may be applied in strips or die cut to specific shapes and sizes. Compared to screws or other mechanical connectors, 3M tape 9713 provides reduced assembly time and a solid bond line with no gaps which might result in EMI emission.

Construction

Product	3M™ XYZ-Axis Electrically Conductive Tape 9713
Adhesive Type	Filled Acrylic
Filler Type	Conductive Fibers
Release Liner	Silicone-Treated Polycoated Kraft Paper
Approximate Thickness:	
Tape Only:	0.0035 in. (0.0889 mm)
Release Liner:	0.004 in. (0.010 mm)

Typical Physical Properties and Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Electrical Properties

Contact Resistance:	**Substrate Tested (Foil/Rigid Plate)**			
	Aluminum/ Aluminum	**Aluminum/ Stainless Steel**	**Copper/ Stainless Steel**	**Copper/ Copper**
	< 2.5 Ω	< 2.0 Ω	< 1.0 Ω	< 0.5 Ω
	Based upon four wire (Kelvin probe) resistance measurements made with crossed pieces of Foil/3M™ XYZ-Axis Electrically Conductive Tape 9713/Rigid plate construction using a 1.0 in x 1.0 in square piece of 3M tape 9713. The rigid metal surface was prepared with a Scotch-Brite™ pad to roughen the surface and cleaned with isopropyl alcohol.			
Outgassing: (ASTM E-595)	Total Mass Loss (TML): 1.60% Collected Volatile Condensed Materials (CVCM): 0.03% Water Vapor Recovered (WVR) 0.36%			
Minimum Overlap Length:	1/4 in. (6 mm)			
Minimum Overlap Width:	1/8 inch (3 mm)			

Adhesion Properties

	Adhesion in oz/in (g/cm)				
Substrate	**15 min. at 72°F (22°C)**	**1 hr. at 72°F (22°C)**	**24 hr. at 72°F (22°C)**	**1 hr. at 158°F (70°C)**	**24 hr. at 158°F (70°C)**
Stainless Steel	> 30 (335)	> 45 (502)	> 50 (558)	> 50 (558)	> 55 (613)
Aluminum	> 20 (223)	> 35 (390)	> 40 (446)	> 40 (446)	> 55 (613)
Copper	> 20 (223)	> 40 (446)	> 45 (502)	> 40 (446)	> 60 (669)

Based upon a 90 degree peel sample, following ASTM D3330 test method. Aluminum foil (2 mil thick) was used as the flexible backing to the 3M tape 9713. The substrates listed are all rigid metal plates. The 158°F (70°C) aged peel samples are indicative of the typical long term adhesion build expected at room temperature.

Operative Temperature Range and Shelf Life

Short Term Exposure (minutes, hours)	**Long Term (days, weeks)**
250°F (121°C)	158°F (70°C)

Shelf Life of Tape in Roll Form:	24 months from date of manufacture when stored in original cartons at 70°F (21°C) and 50% relative humidity.

Available Sizes

Available Widths:	**Standard Length**	**Maximum Length***
1/4 inch - 14 inch (5 mm - 356 mm)	36 yd (32.9 m)	108 yd (98.8 m)
Nominal Slitting Tolerance:	1/32 in (0.8 mm)	

*Special requirements for long lengths should be discussed with 3M Customer Service personnel.

Application Techniques

- To obtain maximum adhesion, the bonding surfaces must be clean and dry. Isopropyl alcohol is recommended as a cleaning solvent.*
- Bond strength is dependent upon the amount of adhesive-to-surface contact developed. This wetted area can be increased by applying 3M™ XYZ-Axis Electrically Conductive Tape 9713 firmly with a roller or finger pressure to exclude air entrapment. Adhesion is optimized when the substrates are flat or conformable substrates. Adhesion increases after application, up to 24 hours later, due to increased wetting by the tape.
- Electrical performance is dependent upon the nature of the metal and its surface. Most metal surfaces give enhanced electrical performance with 3M tape 9713 when the surface has been lightly abraded. Scotch-Brite™ pads are recommended for preparing the metal surface.
- 3M tape 9713 should be applied between 60°F - 100°F (15°C - 38°C). Tape application below 50°F (10°C) is not recommended because the adhesive will be too firm to wet the substrates, resulting in low adhesion. Warming the substrates to 100°F (38°C) facilitates adhesion. Once properly applied, low temperature holding power is generally satisfactory.
- 3M tape 9713 can be removed by separating the parts using torque for rigid parts or peel for flexible ones. Remove the adhesive by pulling off as much as possible by hand. Residual adhesive may be removed by rubbing with your finger or by application of 3M™ Packaging Tape over the residual adhesive followed by removal of the packaging tape. The surfaces should be cleaned again before applying a new piece of 3M tape 9713. The force required to separate the parts and/or remove the adhesive can be reduced by softening the adhesive by heating to 158°F -212°F (70°C - 100°C) or using solvents such as acetone.*

***Note:** Carefully read and follow the manufacturer's precautions and directions for use when handling cleaning solvents.

General Information

3M™ XYZ-Axis Electrically Conductive Tape 9713 provides good adhesion to metal surfaces and provides low electrical resistance that is stable over time. The pressure sensitive nature and fiber reinforcement of 3M tape 9713 makes this product convenient to use and 3M tape 9713 also has very good handling properties. 3M tape 9713 also has good liner release.

Application Ideas

- **Attaching Foil Laminate EMI Shields**

  3M™ XYZ-Axis Electrically Conductive Tape 9713 is ideal for attaching foil laminate EMI shields to electronic and electrical devices. These shields typically consist of either copper or aluminum foils laminated to PVC. 3M tape 9713 provides good adhesion (initial and ultimate) as well as low electrical resistance. 3M tape 9713 may be applied in strips or die cut to specific shapes and sizes. Compared to screws or other mechanical connector, 3M tape 9713 provides reduced assembly time and a solid bond line with no gaps for EMI emission.

- **Attaching EMI Gaskets**

  3M tape 9713 may also be used for attaching EMI gaskets to electronic cabinets, such as server cabinets or disk drive array cabinets. These gaskets typically consist of conductive fabric over a foam core, and come in a variety of shapes and sizes. 3M tape 9713 may be cut into strips as narrow as 1/8 inch to provide adhesion for even the narrowest of gaskets. 3M tape 9713 may also be pre-applied to the gasket for reduced final cabinet assembly time.

- **Grounding Computer Antistatic and Glare Reduction Screens**

  Computer antistatic and glare reduction screens need to be electrically attached to the grounding mechanism. 3M tape 9713 penetrates through anti-smudge coatings over the conductive layer to make an electrical connection. Placing 3M tape 9713 along the edges of such a screen provides many connection points to the antistatic coating resulting in good electrical performance.

- **Assembly of EMI Cages in Telecommunications Equipment**

  3M tape 9713 is ideal for assembly of an EMI cage to a printed circuit board, often required in telecommunications equipment. The EMI cages are typically constructed from aluminum frames and lids to protect components on the PCB from EMI/RFI. The metal frame needs to be grounded to a wide copper trace etched around the perimeter of the components to be protected. 3M tape 9713 is applied as a die cut in the shape of the etched perimeter trace, then the frame is bonded to the perimeter trace. 3M tape 9713 provides the shape of the etched perimeter trace, then the frame is bonded to the perimeter trace. 3M tape 9713 provides for rapid assembly and grounding in one step. Compared with solder attach or liquid conductive adhesive attachment of the EMI cage, 3M tape 9713 reduces assembly time and exposure to elevated temperatures.

Certification/Recognition

MSDS: 3M has not prepared a MSDS for this product which is not subject to the MSDS requirements of the Occupational Safety and Health Administration's Hazard Communication Standard, 29 C.F.R. 1910.1200(b)(6)(v). When used under reasonable conditions or in accordance with the 3M directions for use, the product should not present a health and safety hazard. However, use or processing of the product in a manner not in accordance with the directions for use may affect its performance and present potential health and safety hazards.

TSCA: This product is defined as an article under the Toxic Substances Control Act and therefore, it is exempt from inventory listing requirements.

RoHS: This product complies with the requirements of EU Directive 2002/95/EC and 2005/618/EC.

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-251-8634. Address correspondence to: 3M Electronics Markets Materials Division, Building 225-3S-06, St. Paul, MN 55144-1000. Our fax number is 651-778-4244 or 1-877-369-2923. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-787-750-3000. In Mexico, phone: 52-70-04-00.

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