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Technical Data | August 2020

3M™ Electrically Conductive Single-Sided Tape 1050TC Series

Product Description

3M™ Electrically Conductive Single-Sided Tape 1050TC Series is a family of single-sided conductive foil tapes that consist of a XYZ-axis conductive copper foil backing and acrylic adhesive layer with high electrical performance. Compared to other conventional single-sided conductive tapes, 3M tape 1050TC series provides excellent XYZ-axis based conductivity, reliable contacts to small size grounding areas, excellent EMI shielding and electrical reliability over time. The product's adhesive is an acrylic based adhesive which offers high adhesion and good grounding performance to many surface types which make the tape useful for grounding and EMI shielding designs.

Key Features

- XYZ-conductivity
- Excellent conformability and quick bonding
- Good handling and workability
- Excellent EMI/EMC shielding performance

3M™ Electrically Conductive Single-Sided Tape 1050TC Series



Product Construction / Materials Descriptions

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

3M™ Electrically Conductive Single-Sided Tape 1050TC Series	
Property	**Value**
Color	Copper
Conductive adhesive type	Acrylic conductive adhesive
Release liner	Transparent PET release liner

Note: The product is available in 500 mm x 100 meter. Contact your local 3M representative for more information.

Typical Physical Properties and Performance Characteristics

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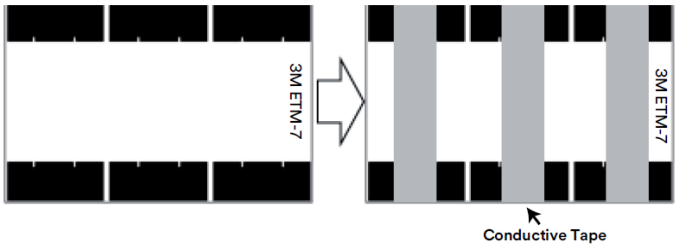
Analysis (COA) that is provided once the product is approved by 3M for general commercialization and development work is completed.

3M™ Electrically Conductive Single-Sided Tape 1050TC Series			
Properties	**Test Method**	**Typical Value***	**Typical Value***
3M tape 1050TC-25 3M tape 1050TC-20 3M tape 1050TC-18 3M tape 1050TC-15	ASTM method D1000*	Thickness 0.023 mm 0.018 mm 0.016 mm 0.014 mm	180° peel adhesion to SUS 1200 gf/inch 1200 gf/inch 1100 gf/inch 1000 gf/inch
Electrical resistance through adhesive	3M test method ETM-7**	0.015 ohms	

*Tested in accordance with ASTM method D1000. Each version typical adhesion value is shifted based on the foil characteristics and the associated impact on the peel adhesion test method.
**3M test method as described below.

ETM-7 Test Method: XY-Axis Electrical Resistance through Adhesive**

Place a strip of the single (double) side conductive tape in 10 mm x 50 mm with adhesive side down between the electrodes on 3M ETM-7 testing board. After initial hand lamination to provide for a 10 mm x 10 mm contact area between the tape and electrodes, apply a 2kg rubber roller across the tape one time. Application method simulates a typical manufacturing process that might be used to apply the tapes to a surface. After 20 minutes of dwell time, the DC resistance between the electrodes are measured with a micro-ohm meter. The resistance results are recorded after 5 ~ 30 seconds for initial resistance.



Shielding Effectiveness

Many factors determine the shielding effectiveness of a conductive adhesive tape, including type and thickness of the conductive layers, adhesive strength, degree of contact, smoothness of application surface and test frequency. For 3M™ Electrically Conductive Single-Sided Tape 1050TC, the typical shielding effectiveness is expected to be in the range of 40 dB to 70 dB, using a standard EMI shielding test methods and through the thickness of the sample tested.

Applications

3M™ Electrically Conductive Single-Sided Tape 1050TC Series is typically used for applications requiring excellent electrical conductivity and EMI/EMC shielding. Common uses include grounding and EMI shielding in equipment and components.

Application Techniques

Note: Carefully read and follow the manufacturer's precautions and directions for use when working with solvents. Tape application below 10°C (50°F) is not suggested. Once properly applied, low temperature holding power is generally satisfactory.

The bond strength of 3M™ Electrically Conductive Single-Sided Tape 1050TC Series depends on the amount of adhesive-to-surface contact developed during application and substrate type and surface conditions.

1) Firm application pressure helps develop better wet-out and adhesive contact and may lead to improved bond strength as well as electrical conductivity. Pressure must be applied to the bond area after assembly to ensure

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sufficient wet-out of the 3M tape 1050TC series adhesive to the substrates and to engage the conductive acrylic adhesive fillers with the substrates to make electrical connection. Mechanical pressure (roller, metal bar) or finger pressure at 5-15 psi. (Optimally the application conditions are determined via a set of Design of Experiments (DOE) using a range of application pressures, dwell time and temperatures (suggested initial range might include 5-15 psi, 2-5 seconds, 21°C-38°C).

2) Heat may be applied simultaneously with pressure to improve wetting, final bond strength and electrical conductivity. Suggested temperature range to evaluate is in the 38°C-60°C range.
3) To obtain optimum adhesion, the bonding surfaces must be clean, dry and well unified. Some typical surface cleaning solvents are isopropyl alcohol or heptane.

Exposed Foil Based Tapes Handling and Visual Criteria

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes. Final product specifications and testing methods will be outlined in the products Certificate of Analysis (COA) that is provided once the product is approved by 3M for general commercialization and development work is completed.

3M™ Electrically Conductive Single-Sided Tape 1050TC Series is a family of single-sided conductive foil tapes that consist of a XYZ-axis conductive copper foil backing and acrylic adhesive layer with high electrical performance. Compared to other 3M single-sided conductive tapes such as the 3M™ Electrically Conductive Single-Sided Tape 1020BC series and 3M™ Electrically Conductive Single-Sided Tape 3304BC type, the un-coated foil surface of the 3M tape 1050TC series allows for various visual cosmetic surface variations to be more easily identified. The Black layer on the 3M tape 1020BC and 3M tape 3304BC effectively hides these various visual items due to the black color and light reflection difference.

In addition, the 3M tape 1050TC series has very thin tape versions. As tapes become thinner, typical processing and handling conditions for a thin tape versus a thicker tape can lead to more visual cosmetic variations. Thicker tapes and/or black layer coated tapes do not as readily show these visual cosmetic variations.

To ensure a proper inspection criteria is applied at the Outgoing and Incoming Visual Quality Control Inspections (OQC/IQC) for 3M tapes 1050TC series cosmetic features it is important to review the COA for the current visual inspection criteria, and acceptable limits for items such a minor foil surface bumps (qty allowed, size, etc.), minor dents (size, qty allowed) typical foil visual blemish, minor scratches (minimal depth, light, no crease, foil deformation), copper color variations, etc. The COA reflects the criteria used for quality control inspections

In addition, care should be used in storage, handling, converting and application of the 3M tape 1050TC series to help ensure foreign contamination does not contact the copper surface. Foreign contamination could lead to cosmetic variations such as oxidation, corrosion, pitting, discoloration, etc. Examples of potential contamination include, but are not limited to, finger prints, oils, spittle, environmental gases or particulates and condensates. Users should use mitigating procedures to protect the exposed foils series from these concerns, such as wearing gloves and face masks, and converting/assembly/parts storage in controlled environments of 21°C (70°F) and < 50% relative humidity and non-corrosive environments.

The customer is responsible to test and demonstrate that 3M tape 1050TC series is fit for an end users environmental conditions and duration, along with handling, converting and assembly practices.

Storage and Shelf Life

The shelf life of 3M™ Electrically Conductive Single-Sided Tape 1050TC Series is 12 months from the date of manufacture when stored in roll form, in the original packaging materials, and stored at 21°C (70°F) and 50% relative humidity.

Once the tape is removed from the original packaging materials, the tape should be converted, shipped and stored in the prescribed temperature and humidity-controlled conditions to ensure stable tape performance. Adhesion, tack, conductivity and reliability of the tape in an application can be reduced if the tape is not controlled to the prescribed handling and usage conditions.

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In addition, in some application's the tape may be converted (die cut, laminated to other materials or release/processing liners) in such a manner that the release liner that the product tape is shipped with is removed and the different release or processing/carrier liner is applied to the adhesive side of the tape. The new release/carrier liner may transfer release agents (silicone, fluro-polymer, etc.) to the tape's adhesive surface and thus reduce the applied tack and/or adhesion strength of the tape in the end user's application to a surface versus when no release/carrier liner changes have occurred. Any proposed release/carrier liners to be used with the tape should be tested with the tape to ensure that the tapes performance is not negatively impacted for the intended end use application and that shelf life is not negatively impacted. If a poor performing liner is selected for a liner exchange, it can have a significant negative impact on the conductive tapes adhesion/tack/electrical performance and/or significantly reduce shelf life.

Certificate of Analysis (COA)

The 3M Certificate of Analysis (COA) for this product is established when the product is manufactured and deemed commercially available from 3M. The COA contains the 3M test methods, specifications limits and test results for the products performance attributes that the product will be supplied against. Contact your local 3M representative for this product's COA.

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Regulatory: For regulatory information about this product, contact your 3M representative.

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use: Many factors beyond 3M's control and uniquely within user's control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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