3M™ Thermally Conductive Adhesive Tape 8940

Product Description

3M™ Thermally Conductive Adhesive Tape 8940 is designed to provide an efficient heat transfer path between heat generating components and heat sinks or other cooling devices. The tape consists of a carrier, highly loaded with thermally conductive fillers, coated on both sides with a high temperature resistance acrylic pressure sensitive adhesive.

Features and Benefits

- High mechanical strength
- Wider and longer roll is available
- Halogen free
- Low outgassing
- Ideal for thin bonding applications
- Good thermal transfer
- High temperature resistance
- Easy to convert

Product Construction

	3M™ Thermally Conductive Adhesive Tape 8940
Color	Beige
Carrier	Filled Copolymer
Adhesive Type	Modified Acrylic Adhesive
Tape Type	Double-Coated
Tape Thickness	0.190 mm
Liner Thickness	0.075 mm

Typical Applications

Applications requiring thin bonding with good thermal transfer. The tape performance properties have been primarily adapted to meet the demanding criteria for use in Automotive Electronic Thermal Management. Typical applications are: Engine Control Units, ABS Systems, Gear Control Units.

Typical Properties and Performance Characteristics

Note: The following technical information for 3M™ Thermally Conductive Adhesive Tape 8940 should be considered representative or typical only and should not be used for specification purposes.

Thermal Properties

Test	Unit	Value	Test Method
Thermal Conductivity at 25°C	W/m*K	0.4	Mod. ASTM D 5470
Coefficient of Thermal Expansion (-40 to +150°C)	mm/°C	140 x 10^6	3M Method (TMA)
Thermal Impedance	°C•in²/W	0.78	3M
	°C•cm²/W	5.1	3M

Electrical Properties

Test	Unit	Value	Test Method
Breakdown Voltage typical value(*1)	kV	9.5	IEC 60243-1
Dielectric Strength typical value(*2)	kV/mm	52.8	IEC 60243-1
Volume Resistivity	Ω•cm	2.5 x 10^{13}	ASTM D257

Footnote:

(*1) Average value (not for specification purposes). Standard deviation of 1.6 kV has been observed.

(*2) Average value (not for specification purposes). Standard deviation of 10 kV/mm has been observed.

Mechanical Properties

	Test	Unit	Value	Test Method
90° Peel Adhesion to Aluminum Substrate ($AlMg_3$; R_a; 0.48 µm; R_z; 2.4 µm)	20 min dwell time @ room temperature 24 hour dwell time @ room temperature @ 150°C @ 180°C	N/cm N/cm N/cm N/cm	5.0 6.0 4.9 2.4	AFERA 4001 AFERA 4001 AFERA 4001 AFERA 4001
Lap Shear	20 min dwell time @ room temperature 24 hour dwell time @ room temperature After 24 hour @ 150°C After 24 hour @ -40°C	MPa MPa MPa MPa	5.3 9.0 6.8 9.0	ASTM D 1002 ASTM D 1002 ASTM D 1002 ASTM D 1002
Holding Power	1000 g load @ room temperature 500 g load @ 70°C	Minutes Minutes	10,000+ 10,000+	AFERA 4012 AFERA 4012
Tensile Strength	Tensile Strength Elongation at break	N/mm² %	6-7 80-120	EN ISO 527-2 EN ISO 527-2
Liner Properties	Liner release	cN/25.4 mm	15	FINAT TM3
Temperature Performance	Thermal Stability 225°C Dwell @ 60 min (Tape was applied between a glass and an aluminum panel) Continuous Operating Temperature Range	Visual °C	No Change -40 up to 150	3M 3M

Typical Properties and Performance Characteristics (continued)

Note: The following technical information for 3M™ Thermally Conductive Adhesive Tape 8940 should be considered representative or typical only and should not be used for specification purposes.

Thermal Resistance Properties

Test	Unit	Value	Test Method
Thermal Gravimetric Analysis* Mass loss @ 200°C	%	< 0.2	3M
Mass loss @ 150°C after 4 hours	%	< 0.3	3M

*Average value (not for specification purposes).

Flammability Class

UL 94 V-0, File E253171, Flame rating applies to adhesive film (3M™ Thermally Conductive Adhesive Tape 8940) bonded to 3.0 mm minimum thickness aluminum on one side and 0.86 mm minimum thickness FR-4 laminate on other side.

Application Guidelines

1) Substrate surfaces should be clean and dry prior to tape application. Isopropyl alcohol (isopropanol) applied with a lint-free wipe or swab should be adequate for removing surface contamination such as dust or finger prints. Do not use "denatured alcohol" or glass cleaners which often contain oily components. Allow the surface to dry for several minutes before applying the tape. More aggressive solvents (such as acetone, methyl ethyl ketone (MEK) or toluene) may be required to remove heavier contamination (grease, machine oils, solder flux, etc.) but should be followed by a final isopropanol wipe as described above.

Note: Be sure to read and follow the manufacturers' precautions and directions when using primers and solvents.

2) Apply the tape to one substrate at a modest angle with the use of a squeegee, rubber roller pressure to help reduce the potential for air entrapment under the tape during its application. The liner can be removed after positioning the tape onto the first substrate.

3) Assemble the part by applying compression to the substrates to ensure a good wetting of the substrate surfaces with the tape. Proper application of pressure (amount of pressure, time applied, temperature applied) will depend upon design of the parts. The preferred pressure at room temperature is a minimum of 1 kg/cm^2 for 5 seconds. For fragile parts lower pressure may be needed.

Rigid substrates are more difficult to bond without air entrapment as most rigid parts are not flat. Flexible substrates can be bonded to rigid or flexible parts with much less concern about air entrapment because one of the flexible substrates can conform to the other substrate.

Shelf Life

Product shelf life is 2 years from date of manufacture when stored at room temperature conditions 22°C and 50% R. H. in the product original packaging.

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.

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