9890 Thermally-Conductive Adhesive Transfer Tape

Product Data Sheet

Updated : February 1996
Supersedes : November 1993

Product Description

9890 is a 10 mil version of the 3M Thermally-conductive adhesive transfer tape, and acrylic pressure sensitive film supplied on a protective release liner.

The tape yields excellent thermal conductivity and electrical insulation properties, combined with a high level of adhesion (with reworkability).

Typical applications of 9890 include ambient temperature bonding of ICs, packages, components, flex circuits and heat sinks to a variety of materials, and at the same time help provide control of heat transfer.

Physical Properties
Not for specification purposes

Adhesive Type	Acrylic	**3M ref :**
Thickness (ASTM D-3652) Tape Liner Total	 254 µm ± 0.0005 inches 50 µm 304 µm	
Release Liner	Clear Polyester	
Specific Gravity	2.0 g/cm³	
Tape Colour	White	
Shelf Life	12 months from date of despatch by 3M when stored in the original carton at 21°C (70°F) & 50 % Relative Humidity	

Performance Characteristics
Not for specification purposes

Shear Strength

Static shear 0.5 in² (323²mm) will hold listed weight for 10,000 minutes.

72°F (22°C) 1000 grams
158°F (70°C) 1000 grams

Dynamic Shear

To aluminium, 1in² (645mm²) overlap, jaw speed : 0.5 in/min (12.7 mm/min)

Condition	Lbs/in² (kPa)
22°C 70°C	75 (520) 40 (280)

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Performance Characteristics (Cont.)
Not for specification purposes

Peel Adhesion

90 degree peel to aluminium, jaw speed : 12 in/min (350 mm/min), 5 mil (0.13mm) anodised aluminium foil backing.

Condition	oz/in (N/m) width
72 hours 22°C	65 (710)
72 hours 70°C	105 (1150)

Total Mass Loss (% Volatile Material)

Measured after 4 hours at 125°C.

% wt loss < 1.0%

Dielectric Constant

ASTM D150

Condition	
1 kHz, 23°C	5.75
1 MHz, 23°C	4.79

Dielectric Strength

ASTM D149 (@ 23°C)

>750Vac/mil (>29.5 kVac/mm)

Thermal Resistance

Determined (internal 3M test method) by using a known area of Thermally conductive adhesive transfer tape to bond a transistor in a TO-220 package to an aluminium heat sink, then supplying a known amount of power to the transistor and measuring ΔT between the TO-220 package and the heat sink.

Measurements of ΔT were taken over a transistor temperature range of 20°C - 120°C, and dwell times after bonding of 1 minute to 24 hours.

Data in °C-in²/W.

0.95

Thermal Conductivity

(Internal 3M test method, using data from thermal measurements W/m-°K). K_{eff} is measured thermal conductivity which necessarily includes an interfacial component $K_{int}.K_{bulk}$ adjusts for the interfacial resistance, the latter being determined by extrapolation of the thermal resistance versus tape thickness data to zero thickness.

Therefore $K_{eff} < K_{bulk}$.

K_{bulk}	0.5
K_{eff}	0.4

Application Techniques

Thermally-conductive adhesive transfer tape allows for fast, easy application and immediate joining of substrates at room temperature with light pressure. No long cure cycles at high temperatures or clamping devices are required as with thermosetting films such as epoxies. Rather than a chemical cure cycle, thermally-conductive adhesive transfer tape has a "wetting cycle" in which, on a molecular scale, the adhesive wets and interlocks surfaces instantly. The adhesive has sufficient initial tack to hold components in position and depending on the substrate, initial bond will be 20-50% of the ultimate bond strength.

Ultimate bond strength will be achieved after an extended period at ambient temperatures or several hours at elevated temperatures. Nominal tape application temperature 70°F (21°C) or higher. Tape application is not recommended below 60°F (16°C) as the adhesive will not adequately wet the substrates which may result in bond failure.

Thermally-conductive adhesive transfer tape is supplied on a protective release liner which increases stability and permits easier handling. The tape is usually supplied in roll form with a single release liner; however, it also can be die cut to meet specific design or application needs.

Surfaces to be bonded should be clean and dry prior to tape application. Do not remove the release liner prior to application as the tape should not be handled as a free standing film. With the release liner in place, apply tape in a manner that will avoid air entrapment. Trim excess tape if necessary (or use die-cut material) and provide contact pressure to the liner with PA1 tape wipe or roller. Remove liner and apply pressure to both surfaces to be bonded.

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