

SEMI G76-0299 (Reapproved 0706) SPECIFICATION FOR POLYIMIDE-BASED ADHESIVE TAPE USED IN TAPE CARRIER PACKAGES (TCP)

This standard was technically approved by the global Assembly & Packaging Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on May 16, 2006. It was available at www.semi.org in June 2006 and on CD-ROM in July 2006. Originally published February 1999.

1 Purpose

1.1 This standard addresses the adhesive demands of tape carrier packages (TCPs) and how reliability, versatility and cost may be optimized. The standardization of polyimide adhesive tape used in TCP is being promoted in order to meet these demands.

2 Scope

2.1 This standard defines the standard for polyimide-based adhesive tapes (hereinafter "tape").

NOTICE: This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety and health practices and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 JIS Standards¹

C-1303 — High Insulation Resistance Meters

C-2110 — Testing Methods for Electric Strength of Solid Insulating Materials

C-2318 — Polyester Films for Electrical Purposes

P-8101 — Testing Method for Dissolving Pulp

Z-3282 — Soft Solder

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Terminology

4.1 *camber* — Curvature of the tape strip edge.

4.2 *machine direction (MD) curl* — Curvature along the length of the tape.

4.3 *transverse direction (TD) curl* — Transverse bowing of the tape.

4.4 *twist* — Angular rotation of one end of the tape with reference to the other end.

4.5 *wakame* — Waviness along the edge of the tape.

5 Ordering Information

5.1 The following items shall be included in purchase orders for tape which conforms to this standard:

5.1.1 Type of adhesive material

5.1.2 Type of base film

5.1.3 Width of adhesive material

5.1.4 Width of base film

5.1.5 Length of product

6 Requirements

6.1 *Structure of Polyimide Adhesive Tape Used in TCP* — Adhesive material is applied to polyimide film defined in § 6.2. When necessary, a protective film may be used to stop adhesion of the adhesive material to the back of the tape to prevent contamination of the adhesive material, improve puncture characteristics, etc.

6.2 *Base Film Thickness and Width*

¹ Japanese Standards Association, 1-24, Akasaka 4 Chome, Minato-ku, Tokyo, Japan

6.2.1 Base Film Thickness (see Table 1)

Table 1 Base Film Thickness

<i>Thickness (μm)</i>	<i>Tolerance (μm)</i>
50.0	± 4.0
75.0	± 5.0
125.0	± 8.0

#1 For thicknesses other than those above, use nominal value thickness denoted in μm .

6.2.2 Base Film Width (see Table 2)

Table 2 Base Film Width

<i>Width (mm)</i>	<i>Tolerance (mm)</i>
34.975	± 0.10
48.175	± 0.10
69.95	± 0.10

#1 For widths other than those above, use nominal value width denoted in mm.

6.3 Adhesive Material Thickness and Width

6.3.1 Adhesive Material Thickness (see Table 3)

Table 3 Adhesive Material Thickness

<i>Center Thickness $t/\mu\text{m}$</i>	<i>Tolerance/μm</i>
$10.0 \leq t < 14.0$	± 2.0
$14.0 \leq t < 20.0$	± 3.0

#1 For thicknesses other than those above, use nominal value thickness denoted in μm .

6.3.2 Adhesive Material Width (see Table 4)

Table 4 Adhesive Material Width

<i>Width/mm</i>	<i>Tolerance/mm</i>
29.7	± 0.1
42.7	± 0.1
60.6	± 0.1
64.4	± 0.1

#1 For widths other than those above, use nominal value width denoted in mm.

6.4 Distance from Edge of Base Film to Edge of Adhesive Material (see Table 5)

Table 5 Distance from Edge of Base Film to Edge of Adhesive Material

Base Film Width/mm	Adhesive Material Width/mm	Distance/mm
34.975	29.7	≥2.40
48.175	42.7	≥2.40
69.95	60.6	≥4.40
69.95	64.4	≥2.40

6.5 Cover Film Type, Thickness and Width

6.5.1 Cover Film Thickness (see Table 6)

Table 6 Cover Film Thickness

Thickness at Center/ μm	Tolerance/ μm
10.0–50.0	±2.0

#1 For thicknesses other than those above, use nominal value thickness denoted in μm .

6.5.2 Cover Film Width — Use the same measurements as found in § 6.3.2.

6.6 Adhesive Tape Thickness and Tolerance

6.6.1 *Adhesive Tape Thickness* — Use the sum of the nominal thicknesses of the base film, adhesive material and cover film.

6.6.2 *Tolerance* — Use the sum of the nominal tolerances of the base film, adhesive material and cover film.

6.7 Characteristics (see Table 7)

Table 7 Characteristics of Adhesive Tape

Item	Condition	Unit	Test Method	Value
Copper Foil Adhesive Strength	Normal	N/cm	¶ 8.5.1 (a)	>5
	Heated	N/cm	¶ 8.5.1 (b)	>1
	Soaked in solvent	N/cm (see #3)	¶ 8.5.1 (c)	>3
Cover Film Release Strength	Normal	N/cm	§ 8.5.2	<0.2
Insulation Resistance	Normal	Ω	¶ 8.6.3 (3)(a)	Not Specified
	In High Temp. High Humidity	Ω (see #4)	¶ 8.6.3 (3)(b)	Not Specified
	In High Temp. High Humidity, Under Bias	Ω (see #5)	¶ 8.6.3 (3)(c)	Not Specified
Volume Resistivity	Normal	$\Omega\text{ cm}$	§ 8.6.1	>10 ¹³
Surface Resistivity	Normal	Ω	§ 8.6.2	>10 ¹⁰
Voltage Resistance	Normal	Ω	§ 8.6.4	No Flash-over
Relative Permittivity	Normal	-	§ 8.6.5	<4.0

Item	Condition	Unit	Test Method	Value
Dielectric Dissipation Factor	Normal	-	§ 8.6.5	<0.07
Solder Heat Resistance	Normal	-	§ 8.7.1	No Delamination No Swelling
Heat Shrinkage	Normal	%	§ 8.7.3	<0.5
Coefficient of Thermal Expansion	-	cm/cm/°C	§ 8.7.4	$<3.0 \times 10^{-5}$
Tensile Strength	-	Mpa	§ 8.7.5	>100
Elongation	Normal	%	§ 8.7.5	>20
Water Absorption	Normal	%	§ 8.7.2	<4.0
Flammability	Normal	-	§ 8.7.6	Not Specified

#1 *Normal Condition* — Normal condition refers to a temperature of $23 \pm 5^{\circ}\text{C}$, and relative humidity of $55 \pm 15\%$.

#2 *Heated Condition* — See § 8.5.1, (3)(b).

#3 *Soaked in Solvent* — See § 8.5.1, (3)(c).

#4 *High Temperature, High Humidity* — See § 8.6.3, (3)(b).

#5 *High Temperature, High Humidity, Under Bias* — See § 8.6.3, (3)(c).

6.8 *Appearance and Defects* — See Table 8. Width and thickness for the base film, adhesive material and cover film are not particularly specified.

Table 8 Appearance and Defects

Item	Test Method	Unit	Value
MD Curl	§ 8.8.1	mm	<15
TD Curl	§ 8.8.2	mm	<6
Wakame	§ 8.8.3	Number/m	<20 of <2 mm, 0 of >2 mm
Camber	§ 8.8.4	mm/m	<1
Twist	§ 8.8.5	Degrees	<135
Defect	§ 8.8.6	#/m or #/100 m	<5/m between 0.1 mm^2 and 1 mm^2 or, <10/100 m of $>1 \text{ mm}^2$

7 Sampling

7.1 A sampling plan shall be defined between the user and supplier.

8 Test Methods

8.1 Test Conditions

8.1.1 *Normal* — Normal condition refers to a temperature of $23 \pm 5^{\circ}\text{C}$, and relative humidity of $55 \pm 15\%$.

8.2 Materials

8.2.1 *Material Preparation* — Unless otherwise specified, take the needed length of material from the inner part of the roll after peeling off the first three layers.

8.2.2 *Lamination* — Use the following steps to prepare materials which require lamination:

- (1) *Material* — Unless otherwise specified, use a copper foil which has previously been decided upon by the user and supplier.
- (2) *Lamination Method* — Unless otherwise specified, a method used shall be agreed between user and supplier.
- (3) *Curing* — Unless otherwise specified, a method used shall be agreed between user and supplier.

8.2.3 *Etching* — For material which requires etching, unless otherwise specified, a method used shall be agreed between user and supplier.

8.2.4 *Plating* — For material which requires plating, unless otherwise specified, a method used shall be agreed between user and supplier.

8.2.5 *Test Pattern* — The pattern used in Figure 1 is recommended for the shape and dimensions of the test pattern. Where this is not applicable, a pattern used shall be agreed between user and supplier.

8.3 *Pre-Conditioning* — Unless otherwise specified, leave the sample materials in normal condition for 24 ± 4 hours.

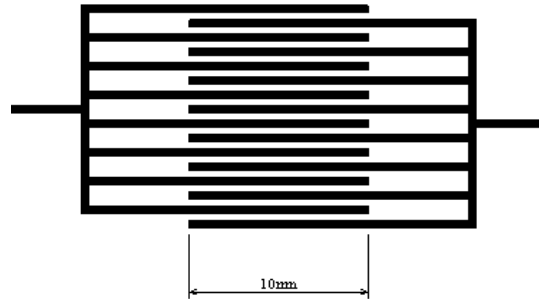


Figure 1
Test Pattern

Table 9 Test Pattern

<i>Line Pitches</i> (μm)	<i>Line Widths</i> (μm)	<i>Line Spacings</i> (μm)
90	45	45
70	35	35
60	30	30
50	25	25
40	20	20

8.4 Dimension Test Procedure

8.4.1 Thickness

- (1) *Equipment* — Use a micrometer standardized to JIS C-2318 or equivalent.
- (2) *Material* — Use the TCP polyimide adhesive tape as received from the supplier.
- (3) *Measurement* — Measure the center, and 3 points at least 1 m apart in the MD direction, and calculate the average.

8.4.2 Width

- (1) *Equipment* — Use a projector capable of reading a minimum of 0.001 mm integrals.
- (2) *Material* — Use the TCP polyimide adhesive tape as received from the supplier.
- (3) *Measurement* — Measure the TD direction length in 3 points at least 1 m apart in the MD direction, and calculate the average.

8.5 Mechanical Efficiency Tests

8.5.1 Copper Foil Adhesive Strength

- (1) *Equipment*
 - (a) A pull tester with an appropriate measurement range, having a tolerance of $\pm 5\%$ of the indicated value, and capable of maintaining a cross-head speed of 10–50 mm/min.
 - (b) A pull tester with a sample retention heating device or sample chamber for retaining surface temperature for measuring conditions.