

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Packaging of components for automatic handling –
Part 3: Packaging of surface mount components on continuous tapes**

**Emballage de composants pour opérations automatisées –
Partie 3: Emballage des composants appropriés au montage en surface en
bandes continues**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PACKAGING OF COMPONENTS FOR AUTOMATIC HANDLING –**Part 3: Packaging of surface mount components
on continuous tapes**

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International Standard IEC 60286-3 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This fourth edition cancels and replaces the third edition issued in 1997. It constitutes a technical revision.

This edition contains the following significant technical changes with respect to the previous edition:

- a) implementation of Type IV (adhesive-backed punched plastic carrier tape for singulated bare die and other surface mount components);
- b) minor revisions related to tables, figures and references.

This bilingual version, published in 2008-08, corresponds to the English version.

The text of this standard is based on the following documents:

FDIS	Report on voting
40/1838/FDIS	40/1847/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The list of all the parts of the IEC 60286 series, under the general title *Packaging of components for automatic handling*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

PACKAGING OF COMPONENTS FOR AUTOMATIC HANDLING –

Part 3: Packaging of surface mount components on continuous tapes

INTRODUCTION

Tape packaging meets the requirements of automatic component placement machines and also covers the use of tape packaging for components for test purposes and other operations.

1 General

1.1 Scope

This part of IEC 60286 is applicable to the tape packaging of electronic components without leads or with lead stumps which are intended to be connected to electronic circuits. It includes only those dimensions that are essential for the taping of components intended for the above-mentioned purposes.

This standard also includes requirements related to the packaging of singulated die products including bare die and bumped die (flip chips).

1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60191-2:1966, *Mechanical standardization of semiconductor devices – Part 2: Dimensions*

IEC 61340-5-1:1998, *Electrostatics – Part 5-1: Protection of electronic devices from electrostatic phenomena – General requirements*¹⁾

IEC 61340-5-2:1999, *Electrostatics – Part 5-2: Protection of electronic devices from electrostatic phenomena – User guide*¹⁾

IEC 62258-3:2005, *Semiconductor die products – Part 3: Recommendations for good practice in handling, packing and storage*

ISO/IEC 16388:1999, *Information technology – Automatic identification and data capture techniques – Bar code symbology specifications – Code 39*¹⁾

ISO 11469:2000, *Plastics – Generic identification and marking of plastics products*

¹⁾ A new edition of this publication exists.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

packaging

product made of any material of any nature to be used for the containment, protection, structured alignment for automatic assembly, handling and delivery

3 Structure of the specification

The various types of tapes are as follows.

- Type I - Punched carrier tape, with top and bottom cover tape (8 mm and 12 mm)
- Type II - Blister carrier tape, with single sprocket holes (8 mm, 12 mm, 16 mm and 24 mm)
- Type III - Blister carrier tape, with double sprocket holes (32 mm to 200 mm)
- Type IV - Adhesive-backed punched plastic carrier tape for singulated bare die and other surface mount components
- Type V - Continuous pressed carrier tapes (in development)
- Type VI - Blister carrier tapes 4 mm in width (in development)

All dimensions in the tables are in millimetres.

3.1 Type I – Punched carrier tape, with top and bottom cover tape (8 mm and 12 mm)

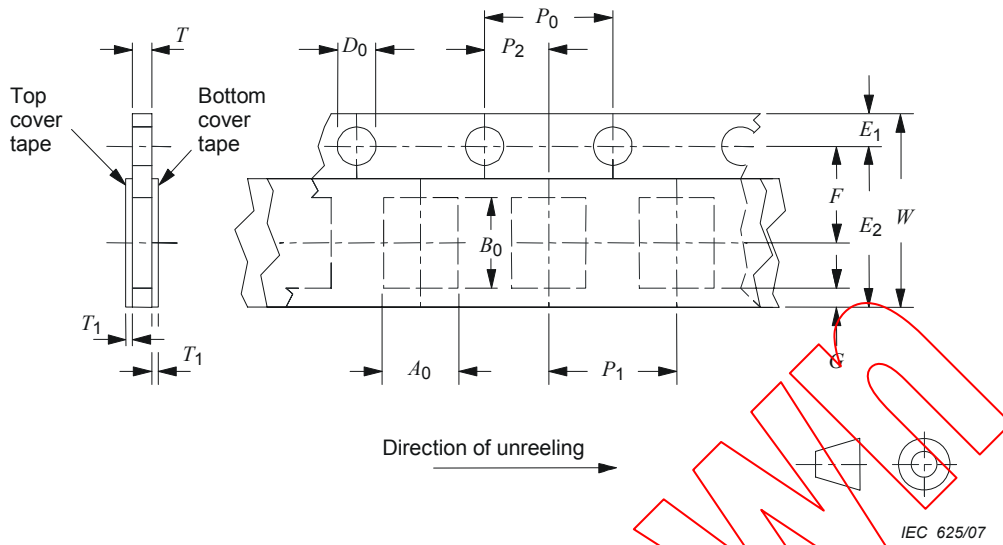


Figure 1 – 8 mm and 12 mm punched carrier-tape dimensions

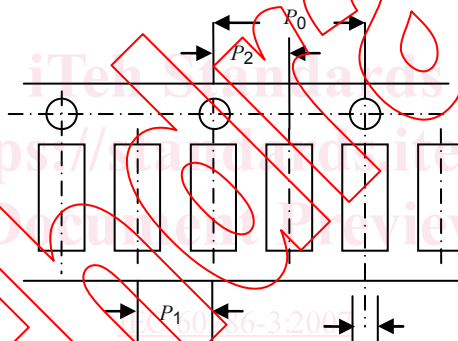


Figure 2 – Illustration of 2 mm cavity pitch

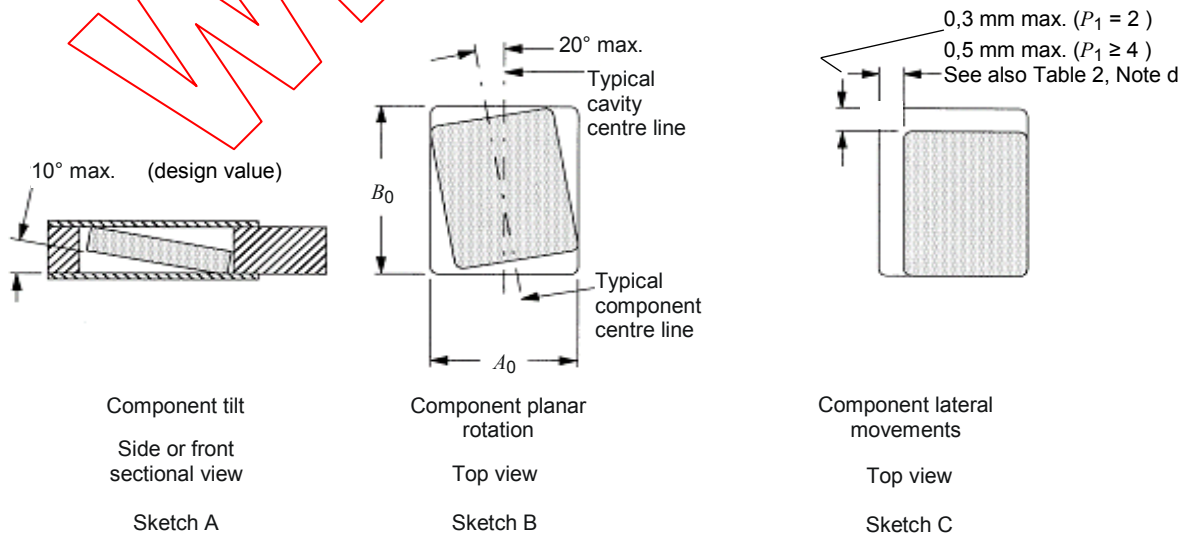


Figure 3 – Maximum component tilt, rotation and lateral movement

Table 1 – Constant dimensions of 8 mm and 12 mm punched carrier tape

Tape size	D_0	E_1	P_0	P_2	G_{\min}	T_{\max}	$T_{1\max}$	Cumulative pitch (over 10 pitches)
8 and 12	$15^{+0,1}_0$	$1,75 \pm 0,1$	$4,0 \pm 0,1$ ($P_1 \geq 4$) $4,0 \pm 0,05$ ($P_1 = 2$)	$2,0 \pm 0,05$	0,75	1,1 paper 1,6 non-paper	0,1	$\pm 0,2$

Table 2 – Variable dimensions of 8 mm and 12 mm punched carrier tape

Tape size	$E_{2\min}$	F	P_1	W	A_0, B_0, T
8	6,25	$3,5 \pm 0,05$	$4,0 \pm 0,1$ ($P_1 \geq 4$) $2,0 \pm 0,05$ ($P_1 = 2$)	$8,0^{+0,3}_{-0,1}$	See note
12	10,25	$5,5 \pm 0,05$	$4,0 \pm 0,1$ ($P_1 \geq 4$) $2,0 \pm 0,05$ ($P_1 = 2$)	$12,0^{+0,3}_{-0,1}$	

NOTE The nominal dimensions of the component compartment should be derived from the relevant component specification. The tolerances on the nominal dimensions of the compartment should be chosen so that the components cannot change their orientation within the tape and can be easily removed from the tape, with the following characteristics.

There shall be sufficient clearance surrounding the component so that

- the component does not protrude beyond either surface of the carrier tape;
- the component can be removed from the cavity in a vertical direction without mechanical restriction after the top cover tape has been removed;
- the rotation of the component is limited to a 10° max. tilt (see Figure 3, sketch A) and a 20° max. planar rotation (see Figure 3, sketch B);
- the lateral movement of the component is restricted to 0,5 mm max. ($P_1 \geq 4$), 0,3 mm max. ($P_1 = 2$) (see Figure 3, sketch C).

For components with either length or width dimensions of less than 1,2 mm, market trends are towards a planar rotation limit of 10° max. and a lateral movement of 0,2 mm max. and a component rotation depends on the agreement between suppliers and users. See also Clause 6 for die products.

For defined component positioning, the pocket positions should be defined to an origin point; in this case, the index hole. Pockets should be positioned relative to this hole.

Preferred dimensions for components should be taken from the relevant IEC specifications.

Dimensions $A_0 \leq B_0$.

3.2 Type II – Blister carrier tape, with single sprocket holes (8 mm, 12 mm, 16 mm and 24 mm)

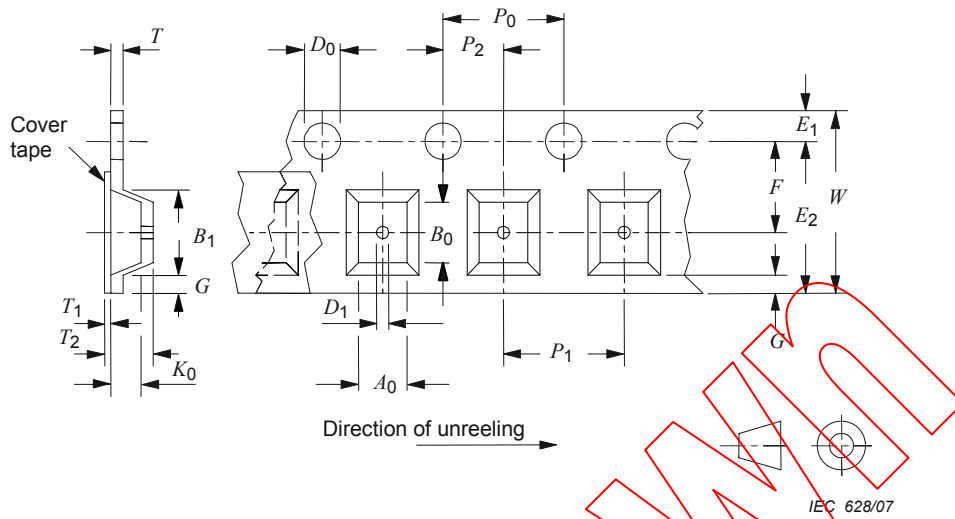


Figure 4 – Blister carrier tape dimensions (8 mm, 12 mm, 16 mm and 24 mm)

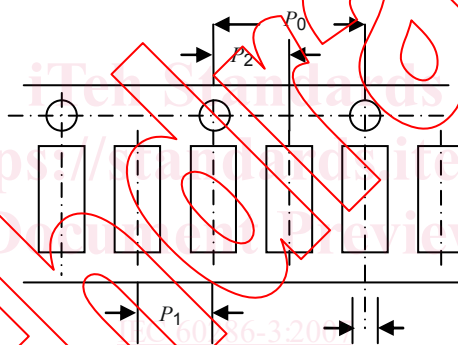


Figure 5 – Illustration of 2 mm cavity pitch

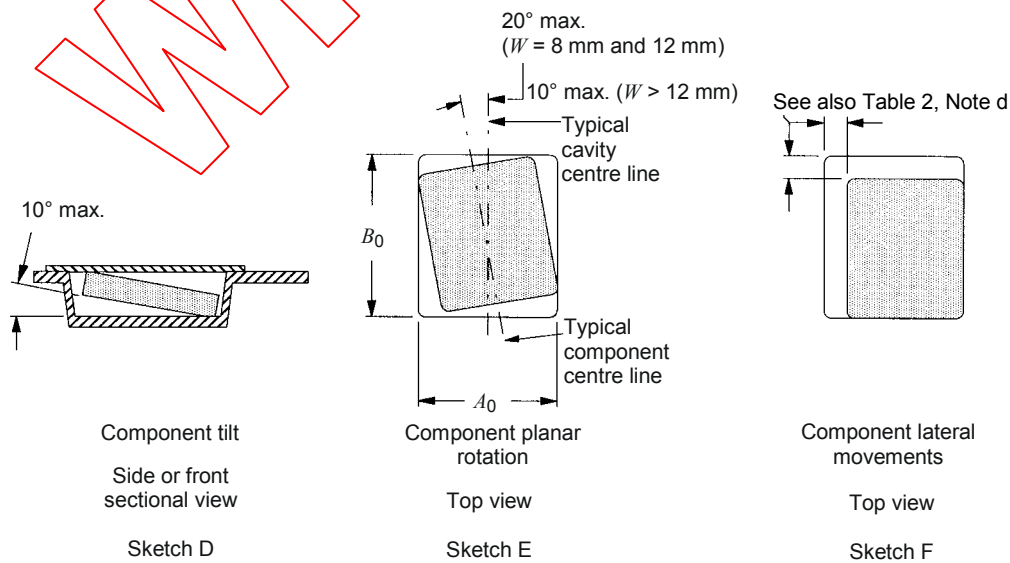


Figure 6 – Maximum component tilt, rotation and lateral movement

Table 3 – Constant dimensions of 8 mm to 24 mm blister carrier tape

Tape size	D_0	E_1	G_{\min}	P_0	T_{\max}	$T_{1\max}$	Cumulative pitch (over 10 pitches)
8 to 24	$15^{+0,1}_0$	$1,75 \pm 0,1$	0,75	$4,0 \pm 0,1$ ($P_1 \geq 4$) $4,0 \pm 0,05$ ($P_1 = 2$)	0,6	0,1	$\pm 0,2$

Table 4 – Variable dimensions of 8 mm to 24 mm blister carrier tape

Tape size	$B_{1\max}$	$D_{1\min}^a$	$E_{2\min}$	F	P_1	P_2	$T_{2\max}$	W	A_0, B_0, K_0
8	4,35	0,3	6,25	$3,5 \pm 0,05$	$2,0 \pm 0,05$ $4,0 \pm 0,1$	$2,0 \pm 0,05$	3,5	$8,0^{+0,3}_{-0,1}$	See Note
12	8,2	1,5	10,25	$5,5 \pm 0,05$	$2,0 \pm 0,05$ $4,0 \pm 0,1$ or $12,0 \pm 0,1$ in 4,0 increments	$2,0 \pm 0,05$	6,5	$12,0^{+0,3}_{-0,1}$	
16	12,1	1,5	14,25	$7,5 \pm 0,1$	$4,0 \pm 0,1$ to $16,0 \pm 0,1$ in 4,0 increments	$2,0 \pm 0,1$	9,5	$16,0^{+0,3}_{-0,1}$	
24	20,1	1,5	22,25	$11,5 \pm 0,1$	$4,0 \pm 0,1$ to $24,0 \pm 0,1$ in 4,0 increments	$2,0 \pm 0,1$	12,5	$24,0^{+0,3}_{-0,1}$	

NOTE The nominal dimensions of the component compartment should be derived from the relevant component specification. The tolerances on the nominal sizes of the compartment should be selected so that the components cannot change their orientation within the tape and can be easily removed from the tape, with the following characteristics.

There shall be sufficient clearance surrounding the component so that

- the component does not protrude above the top surface of the carrier tape;
- the component can be removed from the cavity in a vertical direction without mechanical restriction after the top cover tape has been removed;
- the rotation of the component is limited to a 10° max. tilt (see Figure 6, sketch D), a 20° max. planar rotation for $W = 8$ mm and 12 mm and a 10° max. planar rotation for $W = 16$ mm and 24 mm (see Figure 6, sketch E);
- the lateral movement of the component is restricted to 0,5 mm max. (see Figure 6, sketch F).

For components with either length or width dimensions of less than 1,2 mm, market trends are towards a planar rotation limit of 10° max. and lateral movements of 0,2 mm max. See also Clause 6 for die products.

The centre of the component compartment is defined by P_2 and F , relative to the sprocket holes, as shown in Figure 4 with tolerances given in the table above. The centre of the index hole is defined by P_2 and F , relative to the sprocket holes, as shown in Figure 4 with the tolerances given in the table above.

Preferred dimensions for components shall be taken from the relevant IEC specifications.

Dimensions $A_0 \leq B_0$.

Dimension K_0 should comply with the component tilt in sketch D.

In the case of $P_1 = 2$ mm, the off-set between the centre of the component compartment and the centre of the sprocket hole should not be more than 0,05 mm (see Figure 5).

^a Optionally, for easy and reliable removal of the component, or for component inspection or for any applicable application, the cavity may have a hole in the centre of the bottom.

3.3 Type III – Blister carrier tape, with double sprocket holes (32 mm to 200 mm)

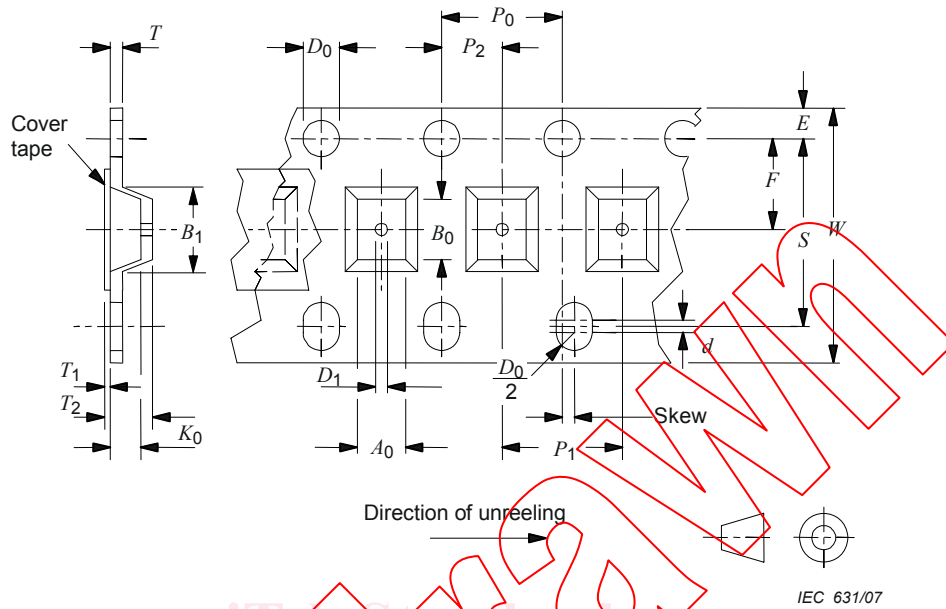


Figure 7 – Blister carrier tape

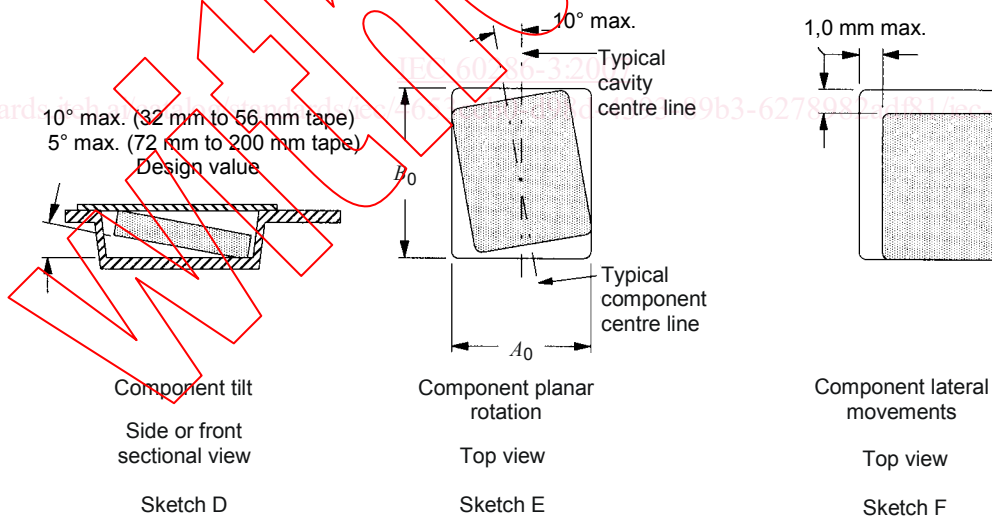


Figure 8 – Maximum component tilt, rotation and lateral movement