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**Pakiranje komponent za avtomatsko obdelavo - 3. del: Pakiranje komponent za površinsko montažo na neprekinjenih trakovih**

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

Gurtung und Magazinierung von Bauelementen für automatische Verarbeitung - Teil 3: Gurtung von oberflächenmontierbaren Bauelementen auf Endlosgurten

Emballage de composants pour opérations automatisées - Partie 3: Emballage des composants pour montage en surface en bandes continues

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FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING <b>Attention IEC-CENELEC parallel voting</b> The attention of IEC National Committees members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

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

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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

This seventh edition cancels and replaces the sixth edition published in 2019. This edition constitutes a technical revision.

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

- a) addition terms and definitions.
- b) addition of a table of the classification to symbols concerning drive hole diameter and distance between the reel hole centre and the drive hole centre;
- c) addition of drive hole to the reel (optional);
- d) revision of reel hole diameter tolerances;
- e) revision of 72 mm tape size carrier tape width dimension tolerances;
- f) addition of Annex B (informative).



213 g) addition of component sizes 0201M

214 The text of this International Standard is based on the following documents:

Draft	Report on voting
40/XX/FDIS	40/XX/RVD

215  
216 Full information on the voting for its approval can be found in the report on voting indicated in  
217 the above table.

218 The language used for the development of this International Standard is English.

219 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in  
220 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available  
221 at [https://www.iec.ch/members\\_experts/refdocs](https://www.iec.ch/members_experts/refdocs). The main document types developed by IEC  
222 are described in greater detail at <https://www.iec.ch/standardsdev/publications>.

223 The committee has decided that the contents of this document will remain unchanged until the  
224 stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the  
225 specific document. At this date, the document will be

- 226 • reconfirmed,
- 227 • withdrawn,
- 228 • replaced by a revised edition, or
- 229 • amended.

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231

## INTRODUCTION

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

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## PACKAGING OF COMPONENTS FOR AUTOMATIC HANDLING –

### Part 3: Packaging of surface mount components on continuous tapes

#### 1 Scope

This part of IEC 60286 is applicable to the tape packaging of electronic components without leads or with lead stumps, 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 document also includes requirements related to the packaging of singulated die products including bare die and bumped die (flip chips).

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Mechanical standardization of semiconductor devices – Part 2: Dimensions*

#### 3 Terms and definitions and symbols

##### 3.1 Terms and definitions [oSIST prEN IEC 60286-3:2022](https://standards.iteh.ai/catalog/standards/sist/a8d5421b-3e1e-415b-80cc-c007eed1a169/osist-pr-en-iec-60286-3-2022)

For the purposes of this document, the following terms and definitions apply. Definitions apply to all tape types, unless specifically mentioned.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

##### 3.1.1

##### components

electronic part of a product that cannot be physically divided into smaller parts without losing its particular function

Note 1 to entry: This includes singulated die product.

Note 2 to entry: This is applied to all packaging-types for bare die products unless specifically mentioned otherwise.

##### 3.1.2

##### component sizes

size of component that are identified with their metric size code

Note 1 to entry: This size code is followed by a capital M.

Note 2 to entry: To avoid possible confusion with inch-based size codes, an equivalency table is shown in Table 1.

**Table 1 – Component size codes**

Metric size code	Inch size code
0201M	008004
0402M	01005
0603M	0201
1005M	0402
1608M	0603
2012M	0805

**3.1.3****packaging**

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

**3.1.4****pressed carrier tape**

<type 1b> carrier tape with concave cavities formed by compression of the base material

**3.1.5****fluff**

<type 1b> fibre from the base material attached inside the cavity

Note 1 to entry: See Figure 1.

**3.1.6****burr**

<type 1b> surface projection of tape unintentionally produced when cavity is formed

Note 1 to entry: See Figure 1.

**3.1.7****deformation**

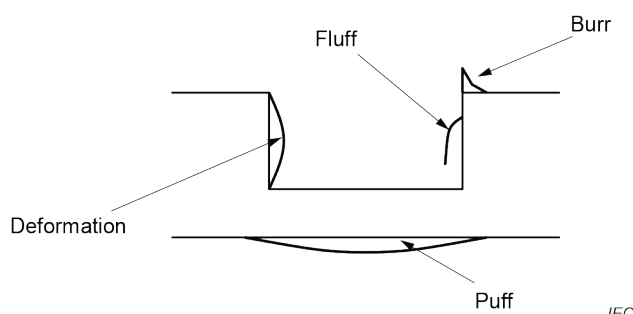
<type 1b> bulge on the inner wall of the cavity

Note 1 to entry: See Figure 1.

**3.1.8****puff**

<type 1b> bulge on the reverse side of the cavity

Note 1 to entry: See Figure 1.

**Figure 1 – Sectional view of component cavity (type 1b)**

**3.1.9****blister carrier tape**

carrier tape which is identified as tape belonging to type 2a, type 2b and type 3

Note 1 to entry This kind of tape is also called embossed carrier tape in some regions.

**3.1.10****embossed carrier tape**

carrier tape which the definition is identical to blister carrier tape

Note 1 to entry This name is used in some regions.

**3.1.11****punched carrier tape**

<type 1a>carrier tape which the concave cavities are formed by punching a hole on the base material and covering up the bottom by the cover tape

**3.2 Symbols**

The symbols used in this document are listed in Table 2.

**Table 2 – Classification to symbols concerning tape, reel and common symbols**

Symbols	Definitions	Figure references
$A$	Reel diameter	26
$A_0$	Cavity's bottom dimension in direction of unreeling	2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 20 and A.2
$B$	Reel hole key's groove width	27
$B_0$	Cavity's bottom dimension in direction of tape width	2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 20 and A.2
$B_1$	Cavity's rim in direction of tape width	8, 11 and 14
$C$	Reel hole diameter	26 and 27
$C_T$	Distance of puff under cavity in direction of tape width	5
$d$	Difference of diameter between sprocket hole and round foramen	14
$D$	Reel slot diameter	27
$D_0$	Sprocket hole diameter	2, 5, 8, 11, 14 and 17
$D_1$	Cavity's bottom hole diameter	8 and 14
$D_{DH}$	Drive hole diameter	28
$E_1$	Shorter distance in direction of width between the origin point of round sprocket hole and the edge of a side of tape	2, 5, 8, 11, 14 and 17
$E_2$	Longer distance in direction of width between the origin point of round sprocket hole and the edge of a side of tape	2, 5, 8 and 11
$F$	Distance in direction of width between the origin point of round sprocket hole and the centre of cavity	2, 5, 8, 11 and 14
$F_A$	Distance in direction of width between the origin point of round sprocket hole and the centre of compartment	17, 19, 24 and 25
$G$	Shorter distance in direction of width between the cavity and the edge of a side of tape	2, 5, 8, 11 and 17
$K_0$	Cavity depth	2, 5, 8, 11, 14 and A.3
$M$	Distance between the reel hole centre and the drive hole centre	28
$N$	Hub diameter	26

Symbols	Definitions	Figure references
$P_0$	Pitch of the sprocket holes	2, 3, 5, 6, 8, 9, 11, 14 and 17
$P_1$	Cavity pitch	2, 3, 5, 6, 8, 9, 11, 14, 17 and 18
$P_2$	Pitch between the centre of a cavity on the same line with the origin point of round sprocket hole and the centre of the next cavity in direction of unreeling	2, 3, 5, 6, 8, 9, 11 and 14
$P_{2A}$	Pitch between the centre line of the origin point of round sprocket hole and the centre line of compartment in direction of unreeling	17, 18, 19, 24 and 25
$P_3$	Pitch between the centre of a cavity on the same line with the origin point of round sprocket hole and the centre of the second next cavity in direction of unreeling	3 and 6
$P_4$	Pitch between the centre of a cavity on the same line with the origin point of round sprocket hole and the centre of the third next cavity in direction of unreeling	3 and 6
$S$	Sprocket hole pitch in direction of width	14
$R$	Bending radius of carrier tape	21
$r$	Curvature radius of reel hole key's groove	27
$T$	Carrier tape thickness without cover tape	2, 5, 8, 11, 14, 17, 25 and A.1
$T_1$	Top cover tape thickness	2, 5, 8, 11 and 14
$T_2$	Sum of outer cavity height and top cover tape thickness	8, 11 and 14
$T_3$	Thickenss of pressed carrier tape including bulge	5 and A.1
$T_4$	Bottom cover tape thickness or Adhesive tape thickness	2 and 17
$V_1$	Compartment dimension in direction of unreeling	17 and 18
$V_2$	Compartment dimension in direction of width	17 and 18
$W$	Carrier tape width	2, 5, 8, 11, 14 and 17
$W_P$	Distance between adhesive tapes	17
$W_1$	Reel inner width (measured at hub)	26
$W_2$	Reel overall width	26
$W_3$	Reel inner width in the rim	26
$Z$	Component thickness	25

315

316 **4 Structure of the specification**

317 The various types of tapes are as follows.

- Type 1** – Punched and pressed carrier tape
- Type 1a:** Punched carrier tape, with top and bottom cover tape (tape widths: 8 mm and 12 mm)
- Type 1b:** Pressed carrier tape, with top cover tape (tape width: 8 mm)
- Type 2** – Blister carrier tape, with single round sprocket holes
- Type 2a:** Blister carrier tape, with single round sprocket holes, with top cover tape and tape pitches down to 2 mm (tape widths: 8 mm, 12 mm, 16 mm and 24 mm)
- Type 2b:** Blister carrier tape, with single round sprocket holes, with top cover tape and with 1mm tape pitch (tape widths: 4 mm)
- Type 3** – Blister carrier tape, with double sprocket holes (tape widths: 32 mm to 200 mm)
- Type 4** – Adhesive-backed punched plastic carrier tape for singulated bare die and other surface mount components (tape widths: 8 mm, 12 mm, 16 mm, and 24 mm)

## 5 Dimensional requirements for taping

### 5.1 Component cavity positioning requirements

#### 5.1.1 Requirements for type 1a, type 1b, type 2a, type 2b and type 3

For defined component positioning, the cavity shall be defined to an origin point. The origin is the centre of the round sprocket hole, defined by the crosshair of the dimension  $E_1$  and dimension  $P_0$ . The centre of the compartment shall be defined by  $P_2$  and  $F$ , relative to the round sprocket hole (see Figure 2, Figure 5, Figure 8, Figure 11 and Figure 14). When dimension  $P_1$  is smaller or equal to 2 mm, the maximum allowed pocket offset, relative to the centre of the round sprocket hole, shall be applied (see Figure 3, Figure 6, Figure 9 and Figure 12).

#### 5.1.2 Requirements for type 4

For defined component positioning, the component placement and location shall be defined to an origin. The origin is the centre of the sprocket hole, defined by the crosshair of the dimension  $E_1$  and dimension  $P_0$ . The centre of the component location shall be defined by  $P_{2A}$  and  $F_A$ , relative to the sprocket hole (see Figure 17). Type 4 does not have cavities that are used to position components. Therefore, all position measurements should be made according to the principle defined here and not to the compartments or 'pockets', which are virtual boundaries for component protection only. The term 'pocket offset' does not apply to type 4. The following applies to type 4:

- rotation and lateral movement of the component is defined by the accuracy to which it has been placed in the compartment, with reference to the target;
- the component shall not protrude above the top surface of the carrier tape (see Figure 25 a);
- the components shall not change their orientation within the tape;
- the component shall be able to be removed from the cavity or compartment in a vertical direction, without mechanical restriction.