IEC 60286-2

Edition 3.0 2008-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Packaging of components for automatic handling –
Part 2: Packaging of components with unidirectional leads on continuous tapes

Emballage de composants pour opérations automatisées –
Partie 2: Emballage des composants à sorties unilatérales en bandes continues

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PACKAGING OF COMPONENTS FOR AUTOMATIC HANDLING –

Part 2: Packaging of components with unidirectional leads on continuous tapes

FOREWORD

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International Standard IEC 60286-2 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This third edition cancels and replaces the second edition published in 1997 and its amendment 1 (2002) and constitutes a minor revision related to tables, figures and references.

This bilingual version, published in 2010-03, corresponds to the English version.

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

FDIS	Report on voting
40/1870/FDIS	40/1887/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.

A 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 amendment and the base publication will remain unchanged until the stability 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- withdrawn,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 2: Packaging of components with unidirectional leads on continuous tapes

1 General

1.1 Scope

This part of IEC 60286 applies to the packaging of components with two or more unidirectional leads for use in electronic equipment. In general, the tape is applied to the component leads.

This standard covers requirements for taping techniques used with equipment for automatic handling, preforming of leads, insertion and other operations and includes only those dimensions which are essential to the taping of components intended for the above-mentioned purposes.

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 60097, *Grid systems for printed circuits*

IEC 60301, *Preferred diameters of wire terminations of capacitors and resistors*

IEC 60717, *Method for the determination of the space required by capacitors and resistors with unidirectional terminations*

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

2 Terms and definitions

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

2.1
package
product made of any material of any nature to be used for the containment, protection, structured alignment for automatic assembly, handling and delivery

2.2
short terminal without tape
not held between the carrier tape and the cover tape (see Figure 1)

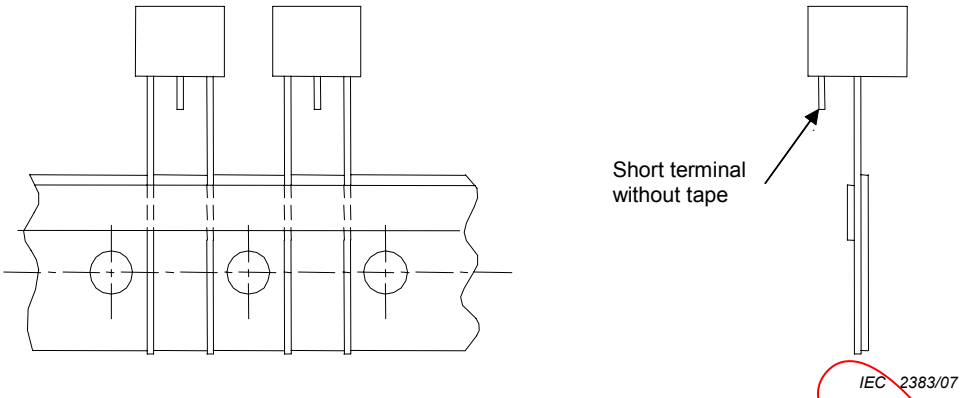


Figure 1 – Short terminal without tape

3 Dimensions

NOTE For the symbols and dimensions given below, reference is made to Figures 2, 4, 6, 7, 8, 9, and 10, and Annex A through Annex F.

3.1 Dimensions common to tapes and taped components

See Figure 2 and 3.1.1 to 3.1.7.

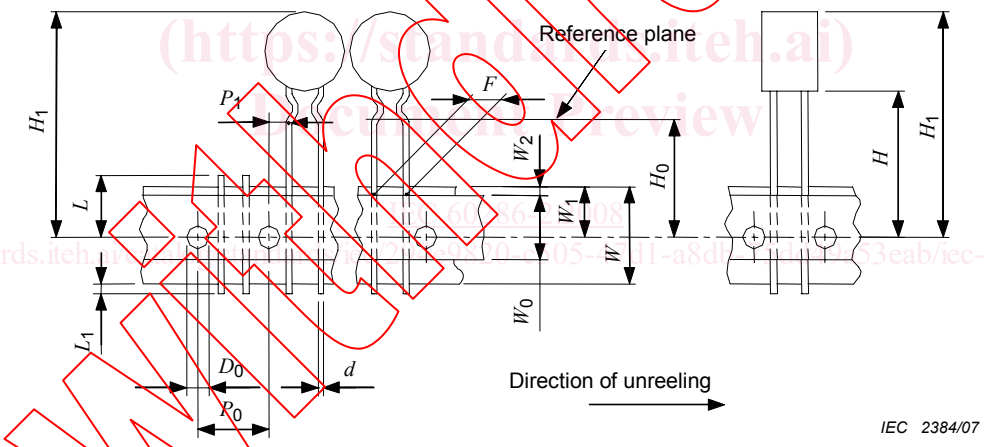


Figure 2 – Dimensions common to tapes and taped components

3.1.1 Coordinate system

The coordinate system as shown in Figure 3 shall be used as follows.

– The abscissa is a straight line through the centres of the sprocket holes in the direction of unreeling.

– The ordinate is a straight line perpendicular to the abscissa through the centre of the sprocket hole that follows the component to be checked.

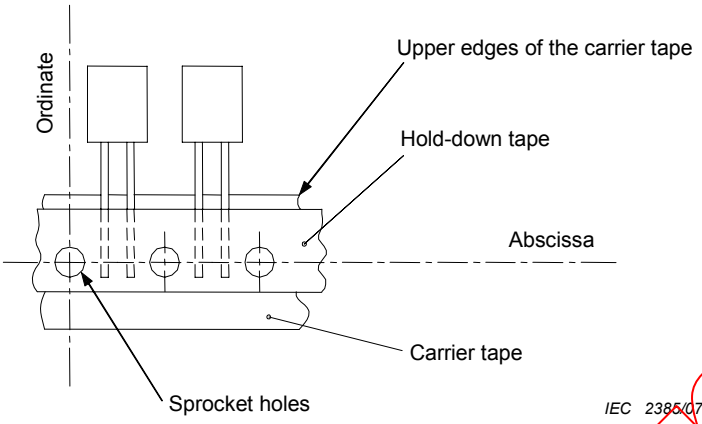


Figure 3 – Coordinate system

3.1.2 Tape width

– Carrier tape width W

W = 18 mm $^{+1}_{-0,5}$ mm

– Hold-down tape width W_0

This dimension is governed by the retention of the components in the tape. The hold-down tape shall not protrude beyond the carrier tape.

– Position of sprocket hole W_1

– Distance W_2

Between the upper edges of the carrier tape and the hold-down tape

W_2 = 3 mm max.

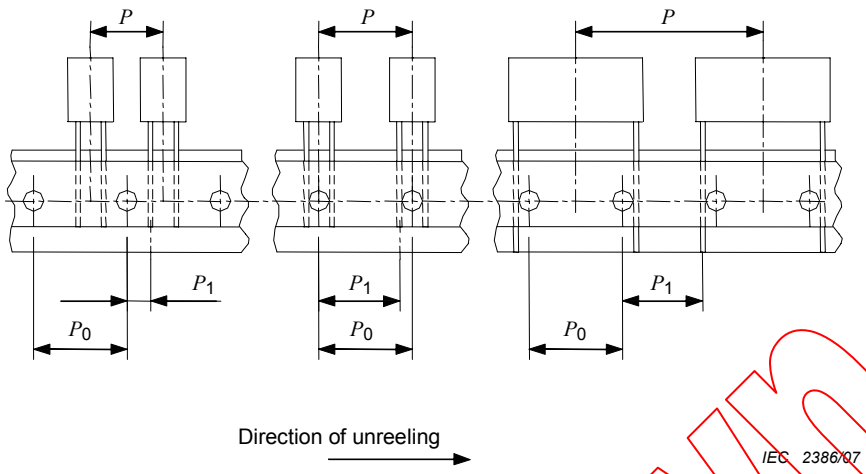
3.1.3 Pitches of components and sprocket holes

– Pitch P of the mutual components (see Annex A to Annex F)

– Pitch P_0 of the sprocket holes (see Annex A to Annex F)

– Pitch P_1 between ordinate and first lead terminal of the drawer side (see Annex A to Annex F)

– Diameter D_0 of the sprocket holes



NOTE The tolerance over any 20 sprockets hole pitches is ±1 mm.

Figure 4 – Pitches of components sprocket holes

The grid is defined as lead spacing e = 2,5 mm shall be used (see IEC 60097).

NOTE 1 Components with a lead spacing of $F = 3 \times e$ may be delivered with the sprocket holes arranged between the leads of the component (see Figure 4).

NOTE 2 Components with a lead spacing of $F = 8 \times e$ to $11 \times e$ may be delivered with one or two sprocket holes arranged between the leads of the component (see Figure 4).

3.1.4 Dimensions of either components position from abscissa

– Distance H

Between the abscissa and the bottom plane of the component body

H = 18 mm $^{+2}_{-0}$ mm

Seating plane

The method for determining the seating plane is given in IEC 60717.

– For components with straight leads: The bottom of the component body, including any projections which support the component on the printed board (line in parallel to the reference abscissa through the bottom point nearest to the tape).
– For components with crimped (or otherwise preformed) leads: The seating plane depends on the profile of the crimp, the diameter of the leads and the hole size in the printed board. For this reason a reference plane is defined, for components with crimped leads only, as follows.

Reference plane

The line parallel to the abscissa through the lowest centre of the radius of curvature of the bending of the crimp (see Figure 5).

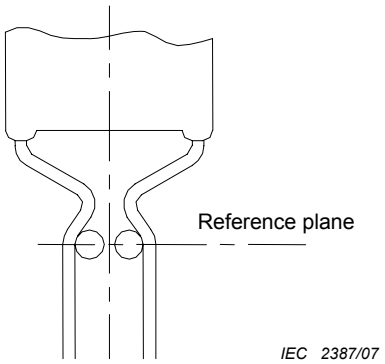


Figure 5 – Reference plane

– Distance H_0 (for crimped leads only)

  Between the abscissa and the reference plane of components with crimped leads.

  H_0 = 16 mm ± 0,5 mm

– Distance H_1

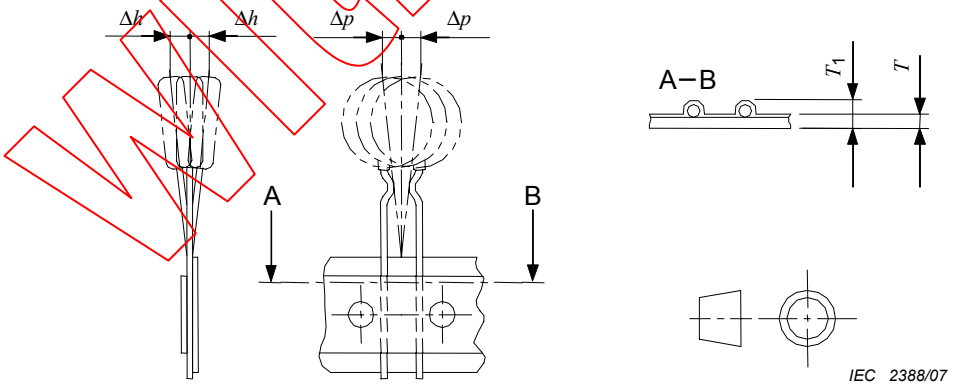
  Between the abscissa and the top of the body of the components (see Annex A to Annex F).

3.1.5 Diameter d of lead terminal and tape thickness

– Diameter d of lead terminal

Diameter d of lead terminal select in accordance with IEC 60301.

Market trend for automatic insertion: Where lead spacing is F = 5 mm, the recommended lead diameters are 0,6 mm max.; and where lead spacing is F = 7,5 mm, the recommended lead diameters are 0,8 mm max.



NOTE When the lead type is not a circle, a circle going through the corners of the non-circular cross-section is considered to be the equivalent circular cross-section.

Figure 6 – Diameter d of lead terminal and thickness and maximum permissible deviation

– Thickness T

  (See Annex A to Annex F.)

– Thickness T_1

$T_1 = T + d$

3.1.6 Maximum permissible deviation

From the nominal position: Maximum lateral deviation Δh of the component body vertical to the tape plane: $l\Delta hl$ = 2 mm max.

Maximum deviation of the component body in the tape plane ΔP: $l\Delta pl$ = 1,3 mm max.

Maximum deviation of the component leads in the seating plane (valid from the upper edge of the tape for all values of P_1 to the seating plane or reference plane respectively) ΔP_1:

$l\Delta P_1 l$ = 0,7 mm max.

P_1 is the distance between the ordinate and the first lead of the following component (in the direction of unreeling).

NOTE 1 For new designs, e = 2,5 mm should be used (see IEC 60097).

NOTE 2 When this option (sprocket holes between the leads) is used, care should be taken that the leads do not interfere with the sprocket holes.

NOTE 3 For cases where interchangeability cannot be guaranteed, see the notes in 3.1.3.

3.1.7 Maximum permissible protrusion of the ends of the leads (see Figure 2)

– Protrusion L_1 beyond the lower side of the carrier tape L_1 = 2 mm max.

NOTE 1 Market trend is towards smaller values.

– Protrusion L (In the case of cut-out components)

The length L of the residual leads beyond the upper tape edge measured from the abscissa: L = 11 mm max.

NOTE 2 Any protrusion on either side should be avoided whenever possible.

3.2 Dimensions common to tapes and taped components with two leads

(See Figures 2, 6 and 7.)

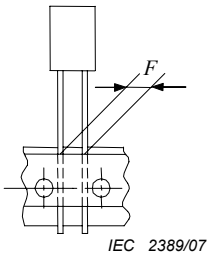


Figure 7 – Dimensions common to tapes and taped components with two leads

3.2.1 Lead spacing F of components

(See Annex A to Annex F.)

3.2.2 Tolerance on lead spacing F

Tolerance on lead spacing F shall be $^{+0,5}_{-0,2}$ mm

NOTE Components should be taped and handled so that the lead spacings can easily be maintained within tolerances after separation or removal from the tape.

3.3 Dimensions common to tapes and taped components with three leads

(See Figure 8.)

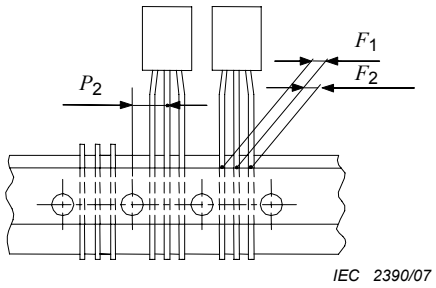


Figure 8 – Dimensions common to tapes and taped components with three leads

3.3.1 Lead spacing F_1 and F_2 of components

(See Annex E to Annex F.)

3.3.2 Tolerance on lead spacing F_1 and F_2

Tolerance on lead spacing F_1 and F_2 shall be $^{+0,4}_{-0,1}$ mm.

3.3.3 Distance P_2

Between the ordinate and the centre lead of the component on the drawer side (see Annex E and Annex F).

3.4 Dimensions common to tapes and taped components with short terminal without tape

3.4.1 Type of taping with short terminal without tape

3.4.1.1 Single line for carrier tape with short terminal without tape

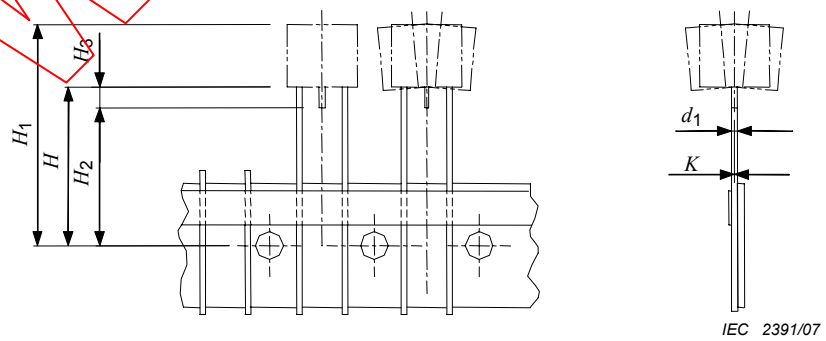


Figure 9 – Single line for carrier tape with short terminal without tape