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Technical Report of Japan Electronics and Information Technology Industries Association

EIAJ EDR-7332

Design guideline of integrated circuits for Dual Tape Carrier packages (Type 1, Type 2) (DTP(1), DTP(2))

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Design guideline of Integrated Circuits for Dual Tape Carrier packages (Type 1, Type 2) (DTP (1), DTP (2))

1. Scope of Application

This technical report regulated outline drawings and dimensions about Dual Tape Carrier package (hereinafter referred to as DTP), which is classified as form G among the Tape Carrier package (hereinafter referred to as TCP) in **EIAJ ED-7300** [Recommended practice on Standard for the preparation of outline drawings of semiconductor packages].

Note: This technical report is the revision version to have integrated the following two standards into.

EIAJ ED-7432 (General rules for the preparation of outline drawings of integrated circuits, Dual Tape Carrier packages (Type I)), established in December 1993.

EIAJ ED-7433 (General rules for the preparation of outline drawings of integrated circuits, Dual Tape Carrier packages (Type II)), established in December 1993.

2. Definition of the Technical Terms

The definition of the technical terms used in this technical report is in conformity with **EIAJ ED-7300**, and as for the new term, it depends on the following.

(1) Sprocket hole

The holes arrayed at the both sides of a tape at the constant pitch which are used feed the tape. 2 kinds of Super and Wide are prescribed by the size of the sprocket hole.

(2) Outerlead

The composition of the package, which was arranged because of the electric, mechanical and thermal connection. It is defined as the terminal in **EIAJ ED-7300**.

(3) Test pad

The terminal part which was arranged outside outerlead to examine electricity.

(4) Lead pattern

The part which connects the interval of the IC and outerlead at the center and the interval of outerlead and the test pad electrically in the wiring.

(5) Outerlead hole

The hole which was opened outside the package main unit to form outerlead.

(6) Corner tie bar

The part which separates outerlead hole in the part of the insulation tape which was prepared for the 4 corners of the main unit to maintain a package main unit in the insulation tape.

(7) Tape format

The tape format 3 kinds are prescribed which 35mm, 48mm, 70mm. The tape that forms a package main unit inside the sprocket hole and by it the tape unit ranges with more than one piece of continuation. DTP uses only 35mm of tape format.

(8) Tape unit

The part of the tape, which was detached to contain one package main unit, the outerlead and the test pad that is connected with it.

(9) Package side hole

The hole which was provided outside the side with outerlead of the package main unit which doesn't come out to form a package main unit.

3. Background

Recent years, by the appearance of the electronic equipment with very thin types such as the IC card, and the integrated circuit package for the memory, too, becomes small and becomes thin. This technical report has a purpose of corresponding to use's increasing and promoting the standardization of the package size and securing those compatibilities about Dual Tape Carrier package Type 1, Type 2 (hereinafter referred to as DTP(1), DTP(2)). This technical report intended to standardize the outer dimensions of DTP and ensure compatibility between products as far as possible for standardization.

4. Definition of DTP

DTP(1) : The lead pattern forms in the insulation tape surface which has a sprocket hole. And the package to go out of to the direction where the lead is parallel to seating plane more with the 2 directions than the short side of the package body.

DTP(2) : The lead pattern forms in the insulation tape surface which has a sprocket hole. And the package to go out of to the direction where the lead is parallel to seating plane more with the 2 directions than the long side of the package body.

5. Numbering of Terminals

Basicaly, it follows the rule of **EIAJ ED-7300**. But it makes a package surface the surface where a lead pattern is formed and it gives a number which is peculiar to each of the terminals and the test pads.

6. Nominal Dimensions

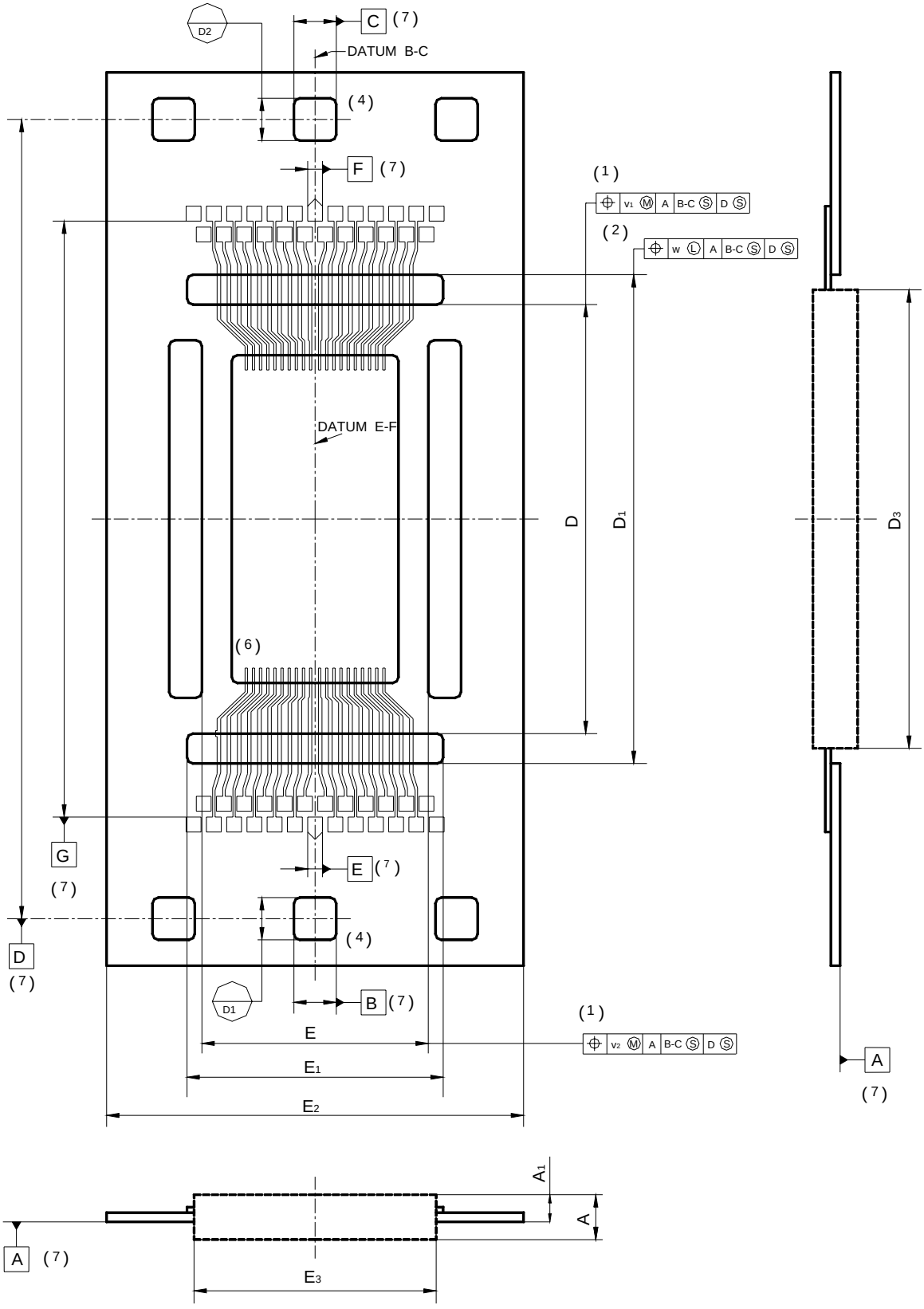
DTP(1) : Nominal Dimensions makes a size most out of the package [symbol:E X (D+1.60)].

DTP(2) : Nominal Dimensions makes package width [symbol: E nom].

7. REFERENCE CHARACTERS AND DRAWING

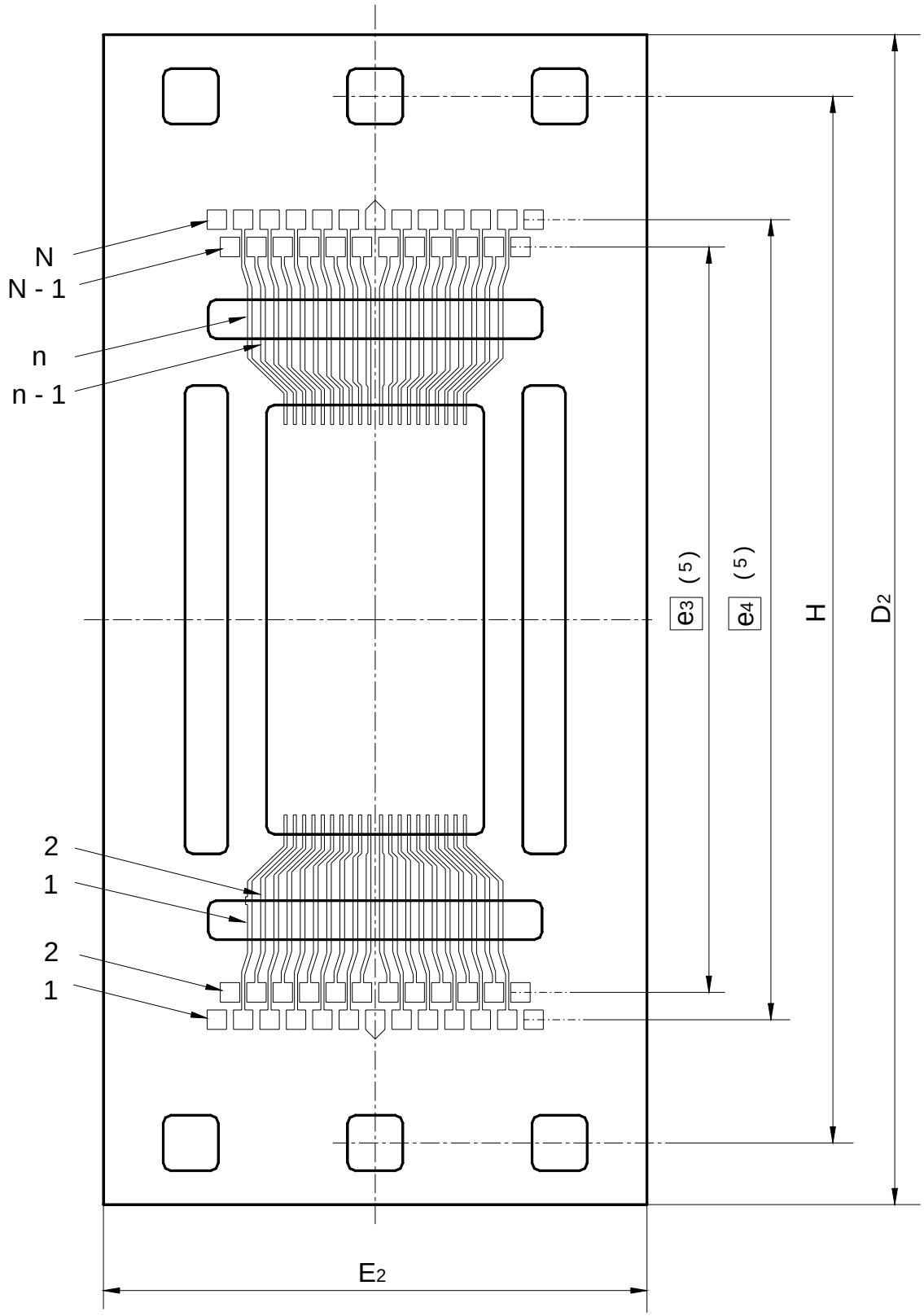
7.1 DTP (1) Outline Drawing (1)

Figure 1 (From surface of Cu pattern)



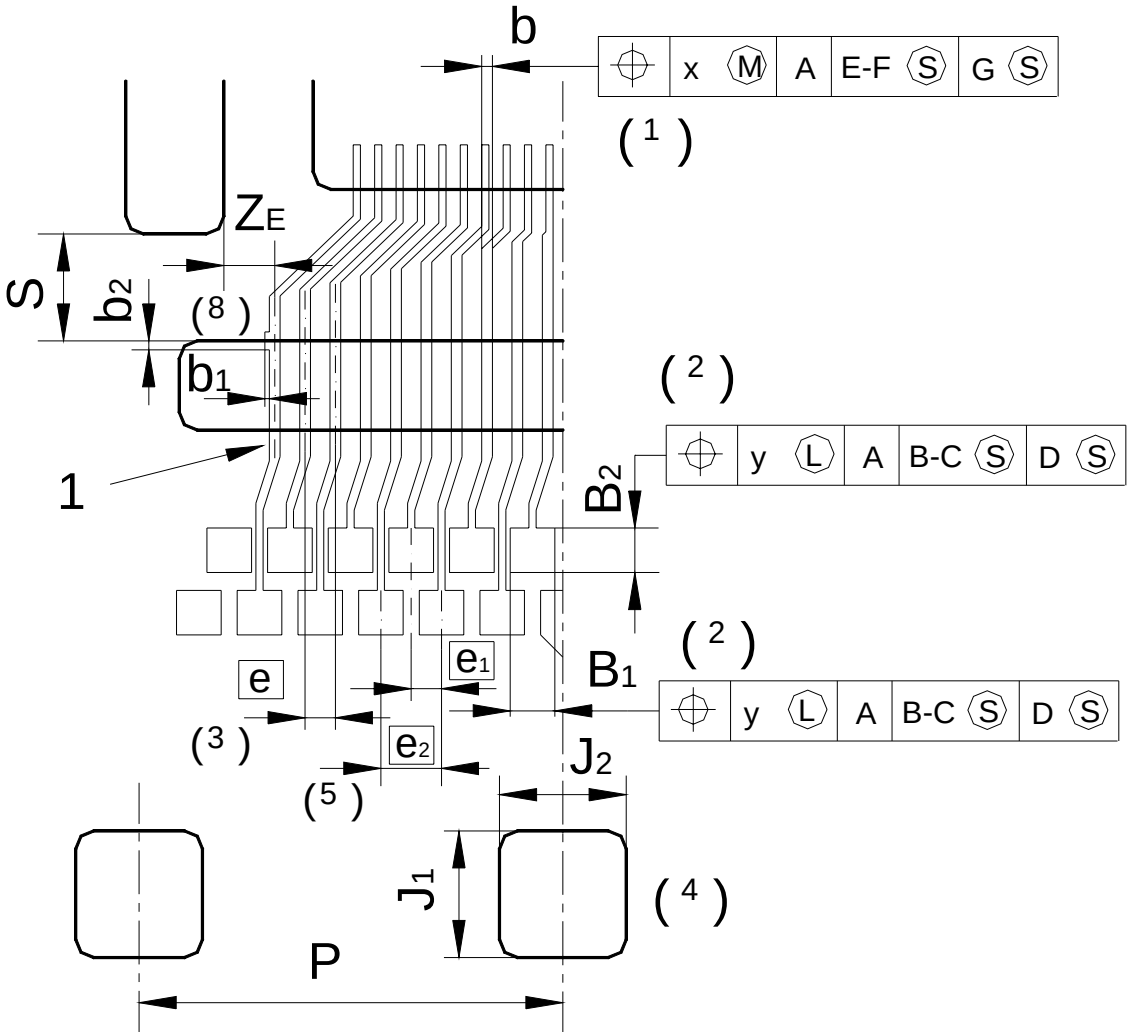
7.2 DTP (1) Outline Drawing (2)

Figure 2 (From surface of Cu pattern)



7.3 DTP (1) Test pad penumbra and outerlead penumbra detailed figure

Figure 3 (From surface of Cu pattern)



Note:

(1) The maximum material requirements (Refer to **ISO 2692/ JIS B 0023**) apply to the positional tolerance of outerleads and so on.

(2) The least material requirements (Refer to **ANSI Y14.5M**) apply to the positional tolerance of test pads and outside of outerlead hole.

(3) Specifies the true geometric position of outerlead axis.

(4) Center sprocket hole is shown.

(5) Specifies the true geometric position of test pad axis.

(6) The Index mark makes the position of the corner part where the outerlead 1 pin exists. The Index mark area, which is basically 1/16 with package body size, however in case of small package body size, it is less than 1/4 with package body size, It must be included in the shaded area entirely.

(7) Datum plane is supposed to be found from center distance sprocket hole of datum B C D . However, datum plane of outerlead supposes that it finds from the test pad of datum E F G .

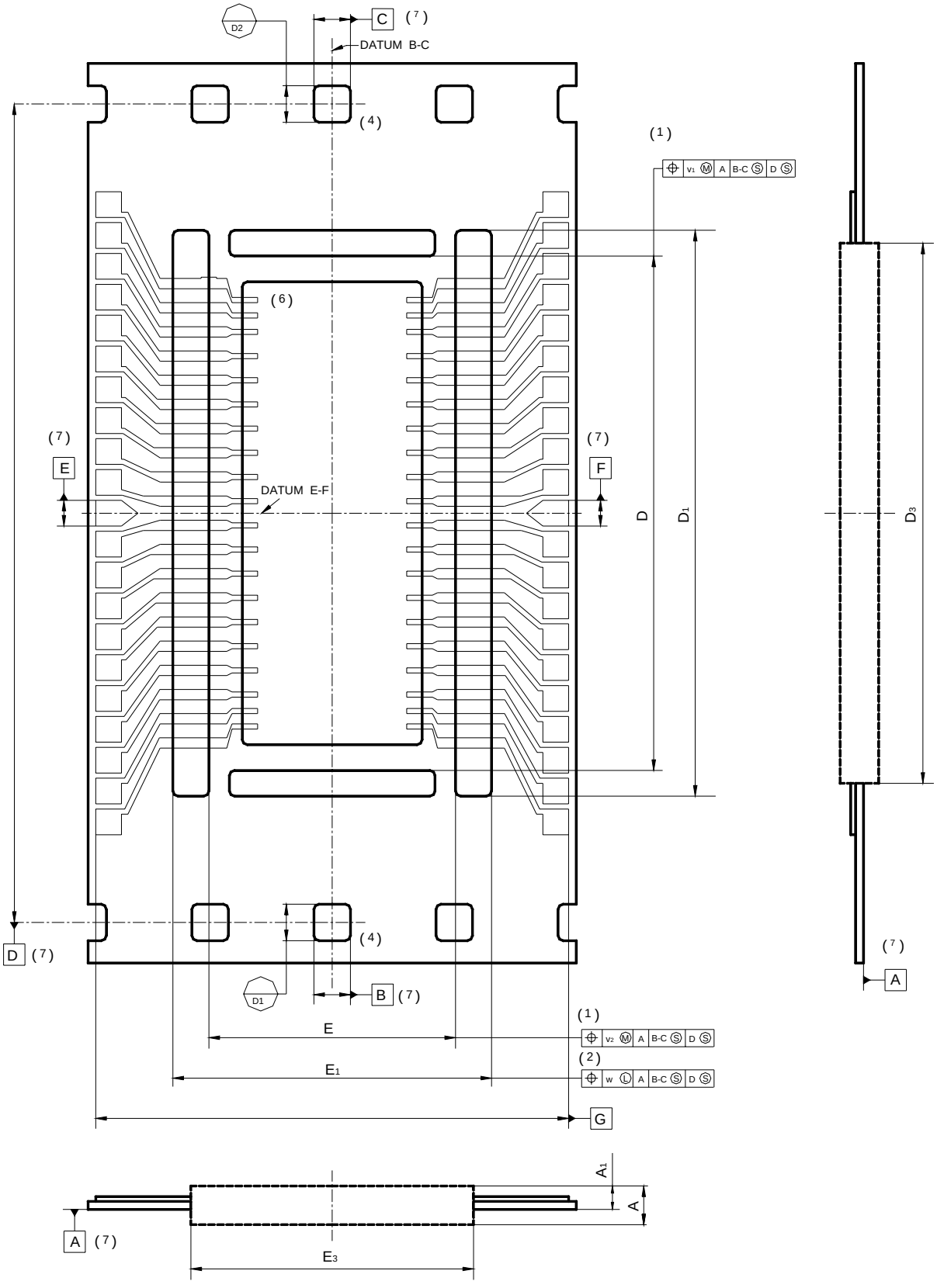
(8) part (Indicated by b_1 X b_2) with outerlead number 1 shows an index mark.

(9) The measurement in datum plane, it in the condition which lost a curve. It is scissors in the tape by the glass board and so on.

(10) It makes the round quantity of pulling-out hole corner of the tape equal to or less than 0.30mm.

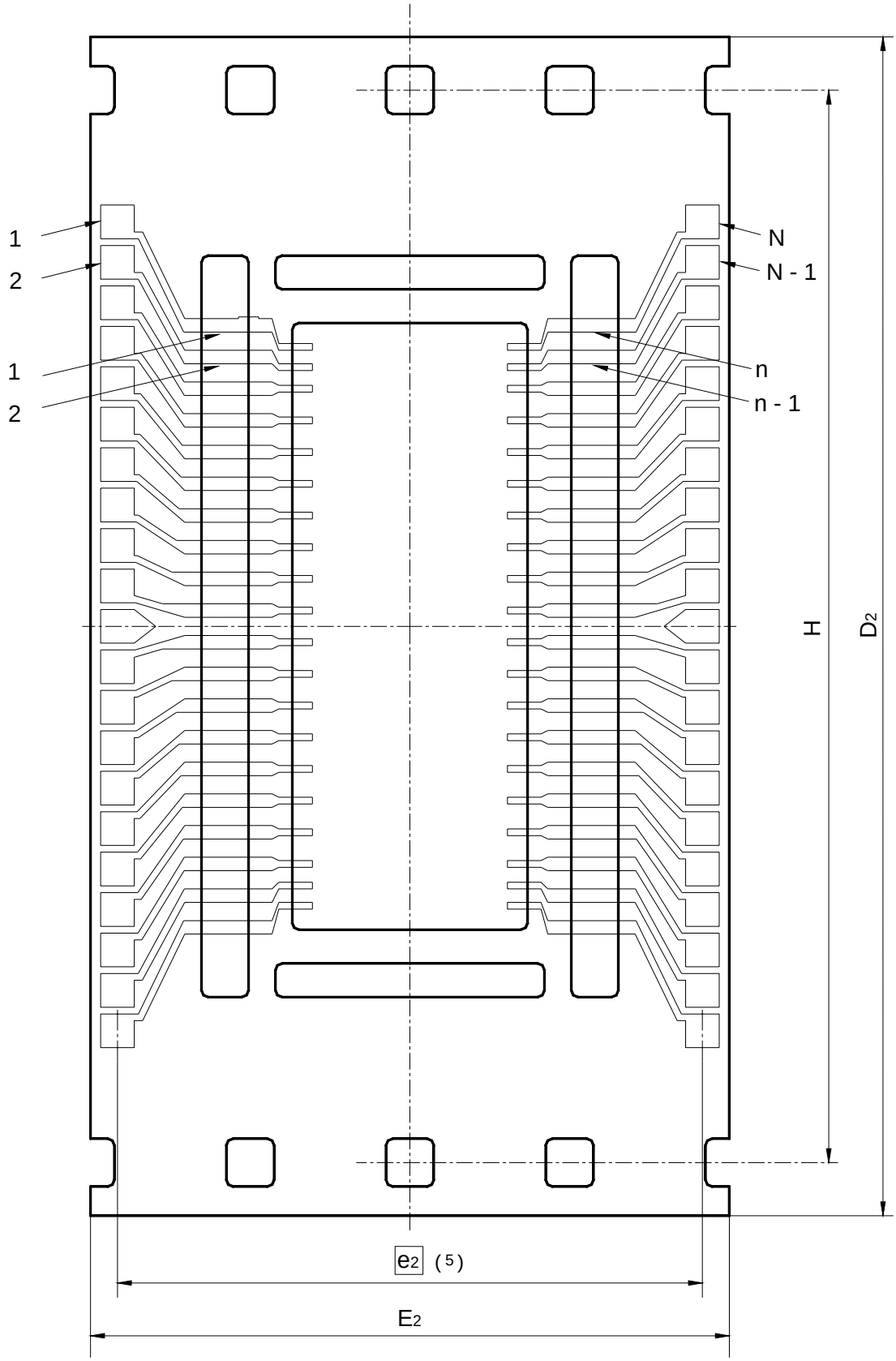
7.4 DTP (2) Outline Drawing (1)

Figure 4 (From surface of Cu pattern)



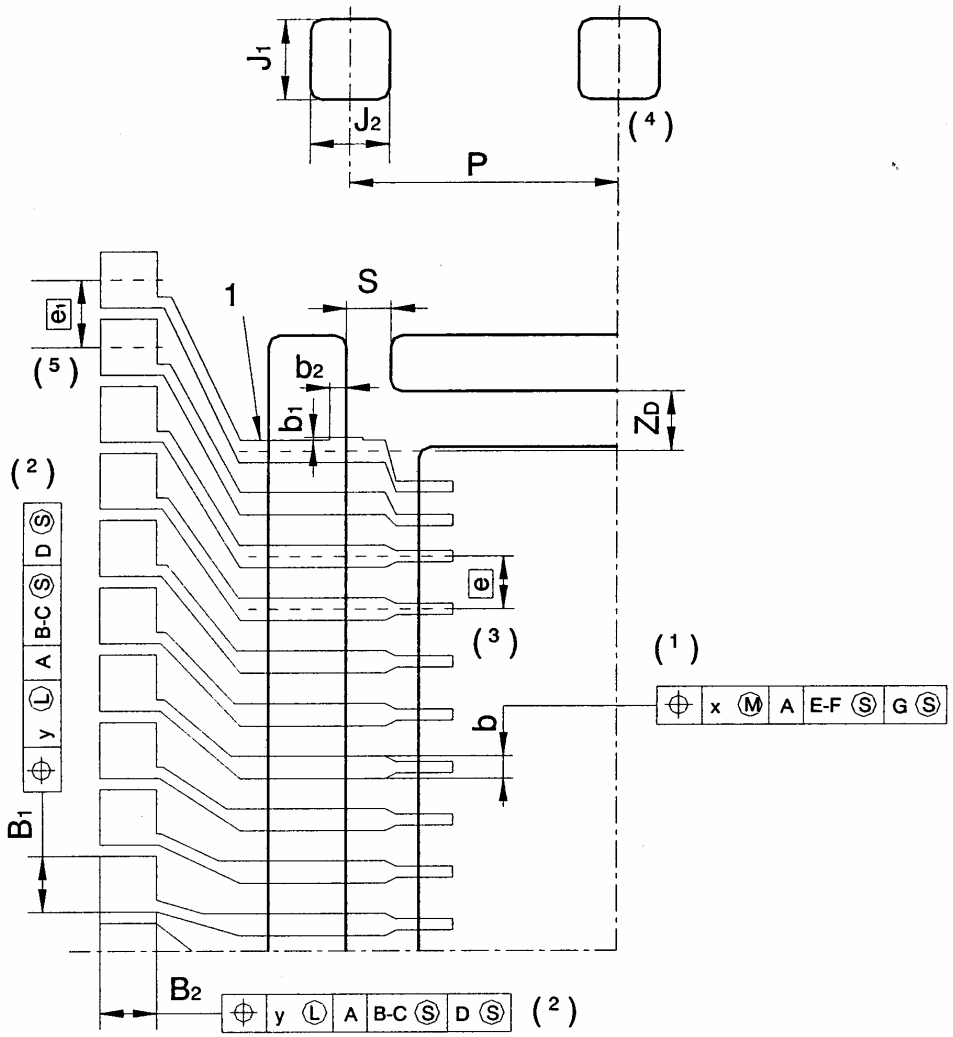
7.5 DTP (2) Outline Drawing (2)

Figure 5 (From surface of Cu pattern)



7.6 DTP (2) Test pad penumbra and outerlead penumbra detailed figure

Figure 6 (From surface of Cu pattern)



Note:

(1) The maximum material requierments (Refer to **ISO 2692/ JIS B 0023**) apply to the positional tolerance of outerleads and so on.

(2) The least material requierments (Refer to **ANSI Y14.5M**) apply to the positional tolerance of test pads.

(3) Specifies the true geometric position of outerlead axis.

(4) Center sprocket hole is shown.

(5) Specifies the true geometric position of test pad axis.

(6) The Index mark makes the position of the corner part where the outerlead 1 pin exists. The Index mark area, which is basically 1/16 with package body size, however in case of small package body size, it is less than 1/4 with package body size, It must be included in the shaded area entirely.

(7) Datum plane is supposed to be found from center distance sprocket hole of datum [B] [C] [D]. However, datum plane of outerlead supposes that it finds from the test pad of datum [E] [F] [G].

(8) ⌐ part (Indicated by b_1 X b_2) with outerlead number 1 shows an index mark.

(9) The measurement in datum plane, it in the condition which lost a curve. It is scissors in the tape by the glass board and so on.

(10) It makes the round quantity of pulling-out hole corner of the tape equal to or less than 0.30mm.

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8. DTP (1) outer dimension

Table 1

Unit: mm

Description	Reference symbol	Standards	Recommended	Remarks
Nominal dimension	E X (D+1.60)	(1) Package width (E) X Package overall length (D+1.60) is applied to Nominal dimension. (2) Nominal dimension is shown below. EX(D+1.60) / EX(D+1.60) 6x14 / 8x14 6x16 / 8x16 6x18 / 8x18 6x20 / 8x20 10x14 / 12x14 10x16 / 12x16 10x18 / 12x18 10x20 / 12x20	-	(1) Line-up that Package width (E)X overall length (D+1.60) is made every 2.00mm step. (2) It makes the same rule with TSOP(1).
Package width	E	(1) It prescribes a standard value as in the following formula. $E_{nom} = 6.00 + 2k$ k = 0, 1, 2, 3 E_{nom} 6.00 8.00 10.00 12.00 (2) The range shall be $E = E_{nom} \pm 0.15$.	-	(1) It makes the same rule with TSOP(1), but it excludes E=14.00.
Package length	D	(1) It prescribes a standard value as in the following formula. $D_{nom} = 12.40 + 2h$ h= 0, 1, 2, 3 D_{nom} 12.40 14.40 16.40 18.40 (2) The range shall be $D = D_{nom} \pm 0.15$.	-	-
Outer lead hole outside length	D_1	(1) It prescribes a standard value as in the following formula. $D_{1nom} = D_{nom} + 1.60 \times 2$ (2) The range shall be $D_1 = D_{1nom} \pm 0.15$.	-	-

Table 1 (continued)

Unit: mm

Description	Reference symbol	Standards	Recommended	Remarks
Test pad pitch (1)	e_1	e_1 = 0.50	-	True geometrical position is shown.
Test pad pitch (2)	e_2	(1) e_2 = 1.00 (2) e_2 = e_1 X 2	-	
Distance of center of the inside test pad row	e_3	e_3 = 24.80	-	
Distance of center of the outside test pad row	e_4	e_4 = 26.60	-	
Test pad width	B_1	(1) B_{1nom} = 0.70 (2) The range shall be $B_1 = B_{1nom} \pm 0.03$.	-	There is a shape of the center test pad like the following figure to make the standard of datum line.
Test pad length	B_2	(1) B_{2nom} = 0.80 (2) The range shall be $B_2 = B_{2nom} \pm 0.03$.	-	

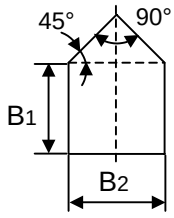


Table 1 (continued)

Unit: mm

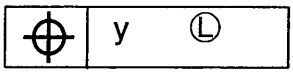
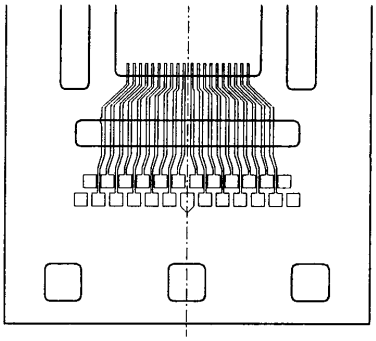
Description	Reference symbol	Standards	Recommended	Remarks
Tolerance of test pad center position	y	(1) Tolerance of test pad center position shall be specified in the outline drawing.  (2) Reference symbol "y" shall be replaced as below. $y \leqq 0.14$	y = 0.10	-
Test pad layout		(1) It prescribes a test pad layout as follows.  (2) It makes a test pad layout with 2 lines of plover layout and moreover it makes most outside an end pad the test pad of the line outside. (3) The package center and the test pad center at the center agree. (4) It doesn't use a test pad at the center as the principle.	-	-
Number of test pads	N	N = 50 (E = 6.00,8.00,10.00) N = 66 (E =12.00) (1) It is due to the rule of the test pad layout. (2) The test pad provides the number of maximum test pads regardless of the number of outer leads.	-	-

Table 1 (continued)

Unit: mm

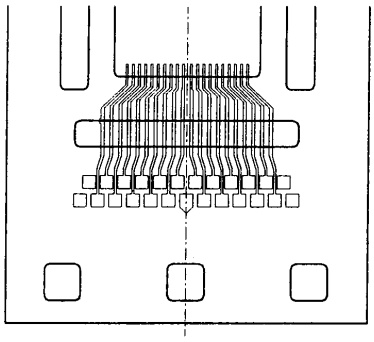
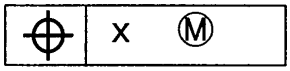
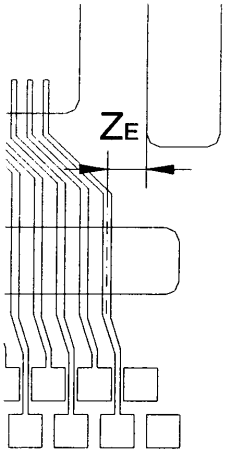
<table>
<tr><th>Description</th><th>Reference symbol</th><th>Standards</th><th>Recommended</th><th>Remarks</th></tr>
<tr><td>Outer lead layout</td><td></td><td>(1) It prescribes outer lead layout as follows.
 
(2) The outer lead center shifts to the package center in e/2.</td><td>–</td><td>–</td></tr>
<tr><td>Outer lead pitch</td><td>e</td><td><table><tr><th>e</th></tr><tr><td>0.50</td></tr><tr><td>0.40</td></tr><tr><td>0.30</td></tr></table></td><td>–</td><td>True geometrical position is shown.</td></tr>
<tr><td>Outer lead width</td><td>b</td><td>It makes a maximum and a minimum value a range in the table below to each outer lead pitch.<table><tr><th>e</th><th>b_{min}</th><th>b_{max}</th></tr><tr><td>0.50</td><td>0.10</td><td>0.30</td></tr><tr><td>0.40</td><td>0.08</td><td>0.24</td></tr><tr><td>0.30</td><td>0.06</td><td>0.18</td></tr></table></td><td><table><tr><th>e</th><th>b_{nom}</th></tr><tr><td>0.50</td><td>0.20</td></tr><tr><td>0.40</td><td>0.16</td></tr><tr><td>0.30</td><td>0.12</td></tr></table></td><td>It follows SSOP and TSOP(1) rule.</td></tr>
<tr><td>Tolerance of outer lead center position</td><td>x</td><td>(1) Tolerance of outer lead center position shall be specified in the outline drawing.
 
(2) Reference symbol " x " shall be replaced as below.
$x \leqq 0.10$</td><td><table><tr><th>e</th><th>x</th></tr><tr><td>0.50</td><td>0.10</td></tr><tr><td>0.40</td><td>0.07</td></tr><tr><td>0.30</td><td>0.065</td></tr></table></td><td>It makes the same rule with TSOP(1).</td></tr>
</table>

Table 1 (continued)

Unit: mm

<table>
<tr><th>Description</th><th>Reference symbol</th><th>Standards</th><th>Recommended</th><th>Remarks</th></tr>
<tr><td>Number of outer leads</td><td>n</td><td>(1) It prescribes the number of outer leads as follows.
 

It follows the rule of the outer lead layout. And It makes "n" value which is small out of the maximum number of the terminals and the number of the test pads which is stored in the package width (E_{nom}) in Z_E=0.20.
(2) "n" value
<table><tr><th rowspan="2">E_{nom}</th><th colspan="3">n</th></tr><tr><th>e =0.50</th><th>e =0.40</th><th>e =0.30</th></tr><tr><td>6.00</td><td>24</td><td>28</td><td>36</td></tr><tr><td>8.00</td><td>32</td><td>40</td><td>48</td></tr><tr><td>10.00</td><td>40</td><td>48</td><td>-</td></tr><tr><td>12.00</td><td>48</td><td>60</td><td>64</td></tr></table></td><td>-</td><td>(1) It makes the same rule with TSOP(1), but it excludes E=14.00.</td></tr>
<tr><td>Tape format</td><td>D_2</td><td><table><tr><th>Tape format</th><th>D_{2min}</th><th>D_{2nom}</th><th>D_{2max}</th></tr><tr><td>35</td><td>34.78</td><td>34.98</td><td>35.18</td></tr></table>The range shall be $D_2 = D_{2nom} \pm 0.20$.</td><td>-</td><td>(1) The rule of tape format 35.</td></tr>
<tr><td>Tape unit length</td><td>E_2</td><td>(1) It prescribes a standard value as in the following formula.
$E_{2nom} = P_{nom} \times k$ (P_{nom} = 4.75)
k = 3 (E=6.00,8.00,10.00)
k = 4 (E=12.00)
(2) It prescribes the tape unit length as follows.
<table><tr><th>E</th><th>$E_{2\,nom}$</th></tr><tr><td>6.00</td><td rowspan="3">14.25</td></tr><tr><td>8.00</td></tr><tr><td>10.00</td></tr><tr><td>12.00</td><td>19.00</td></tr></table></td><td>-</td><td>-</td></tr>
</table>

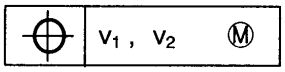
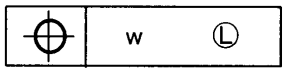
Table 1 (continued)

Unit: mm

Description	Reference symbol	Standards	Recommended	Remarks
Corner tie bar width	S	S_{nom} =2.00	-	-
Sprocket hole width	J_1	(1) J_{1nom} = 1.42 (2) The range shall be $J_1 = J_{1nom} \pm 0.03$	-	(1) The rule of tape format 35, Super.
Sprocket hole length	J_2	(1) J_{2nom} =1.42 (2) The range shall be $J_2 = J_{2nom} \pm 0.03$	-	
Sprocket hole pitch	P	(1) P_{nom} = 4.75 (2) The range shall be $P = P_{nom} \pm 0.05$.	-	-
Distance of center of the sprocket hole row	H	(1) H_{nom} = 31.83 (2) The range shall be $H = H_{nom}\ ^{+0.04}_{-0.07}$	-	(1) The rule of tape format 35, Super.
Outer lead hole width	E_1	(1) It prescribes a standard value as in the following formula. $E_{1nom} = E_{nom} + (0.35 \times 2)$ (2) The range shall be $E_1 = E_{1nom} \pm 0.15$.	-	-

Table 1 (continued)

Unit: mm

Description	Reference symbol	Standards	Recommended	Remarks
Package thickness	A	A_{max}=1.00	A_{nom} = 0.50	It makes the same rule with DTP(2).
Package upper part thickness	A_1	A_{1max} =0.70	-	
Sealing length	D_3	$D_3 \leqq D$	-	It makes the same rule with QTP, DTP(2).
Sealing width	E_3	$E_3 \leqq E$	-	
Index mark width	b_1	(1) b_{1nom}=0.15 (2) The range shall be $b_1=b_{1nom}\pm0.02$.	-	It makes the same rule with QTP, DTP(2).
Index mark length	b_2	(1) b_{2nom} = 0.30 (2) The range shall be $b_2 = b_{2nom}\pm0.15$.	-	
Tolerance of package center position	v_1 , v_2	(1) Tolerance of package center position shall be specified in the outline drawing.  (2) Reference symbol " v_1 , v_2 " shall be replaced as below. v_1, $v_2 \leqq$ 0.25	-	-
Tolerance of outer lead center position	w	(1) Tolerance of outer lead center position shall be specified in the outline drawing.  (2) Reference symbol " w " shall be replaced as below. w $\leqq$0.25	-	-

9. DTP (2) outer dimension

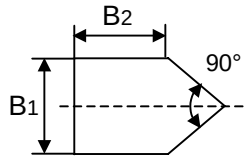
Table 2

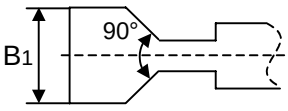
Unit: mm

Description	Reference symbol	Standards	Recommended	Remarks
Nominal dimension	E_{nom}	(1) Package width (E_{nom}) makes Nominal dimension. (2) Nominal dimension (E_{nom}) is shown below. E_{nom}: Soft metric: 0300, 0400, 0400; Hard metric: 0115, 0130, 0145, 0160	-	(1) It makes nominal dimension of Hard metric the numerical value (1 digit of the following of the decimal point) that deleted a decimal point with size value. (2) The numerical value of Soft metric is mil system. (3) It makes the same rule with SSOP (Group2, 3), TSOP(2).
Package width	E	E: Soft metric: 7.62, 8.89, 10.16; Hard metric: 11.50, 13.00, 14.50, 16.00 The range shall be $E = E_{nom} \pm 0.15$.	-	(1) It prescribes soft metric systems as in the following formula. $E_{nom} = 1.27 \times k$ (k= 6,7,8) (2) It makes the same rule with SSOP (Group2, 3), TSOP(2).
Outer lead hole outside width	E_1	(1) It prescribes a standard value as in the following formula. $E_{1nom} = E_{nom} + 1.60 \times 2$ (2) The range shall be $E_1 = E_{1nom} \pm 0.15$	-	-
Package length	D	(1) It prescribes a standard value as in the following formula. $D_{nom} = e \times (n/2-1) + 2Z_D$ $e = 1.27$ $Z_D = 0.95$ (2) The range shall be $D_1 = D_{1nom} \pm 0.15$.	-	It provides at the value which was calculated in outer lead pitch at the time of $e = 1.27$.
Outer lead hole length	D_1	(1) It prescribes a standard value as in the following formula. $D_{1nom} = D_{nom} + 2.00$ (2) The range shall be $D_1 = D_{1nom} \pm 0.15$.	-	-

Table 2 (continued)

Unit: mm

<table>
<tr><th>Description</th><th>Reference symbol</th><th>Standards</th><th>Recommended</th><th>Remarks</th></tr>
<tr><td>Test pad pitch</td><td>e_1</td><td><table><tr><th>e</th><th>e_1</th></tr><tr><td>1.27</td><td rowspan="2">1.27</td></tr><tr><td>1.00</td></tr><tr><td>0.80</td><td rowspan="3">0.80</td></tr><tr><td>0.65</td></tr><tr><td>0.50</td></tr></table></td><td>-</td><td>True geometrical position is shown.</td></tr>
<tr><td>Distance of center of the inside test pad row</td><td>e_2</td><td><table><tr><th>E</th><th>e_2</th></tr><tr><td>7.62</td><td rowspan="3">16.80</td></tr><tr><td>8.89</td></tr><tr><td>10.16</td></tr><tr><td>11.50</td><td rowspan="4">21.55</td></tr><tr><td>13.00</td></tr><tr><td>14.50</td></tr><tr><td>16.00</td></tr></table></td><td>-</td><td>True geometrical position is shown.</td></tr>
<tr><td>Test pad width</td><td>B_1</td><td><table><tr><th>e_1</th><th>B_{1nom}</th></tr><tr><td>1.27</td><td>1.00</td></tr><tr><td>0.80</td><td>0.70</td></tr></table>The range shall be
$B_1 = B_{1nom} \pm 0.03$.</td><td>-</td><td>There is a shape of the center test pad like the following figure to make the standard of datum line.
 

One side is an even number.
 

One side is an odd number.</td></tr>
<tr><td>Test pad length</td><td>B_2</td><td>(1) $B_{2nom} = 1.00$
(2) The range shall be
$B_2 = B_{2nom} \pm 0.03$.</td><td>-</td><td></td></tr>
</table>

Table 2 (continued)

Unit: mm

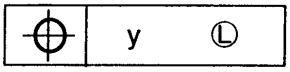
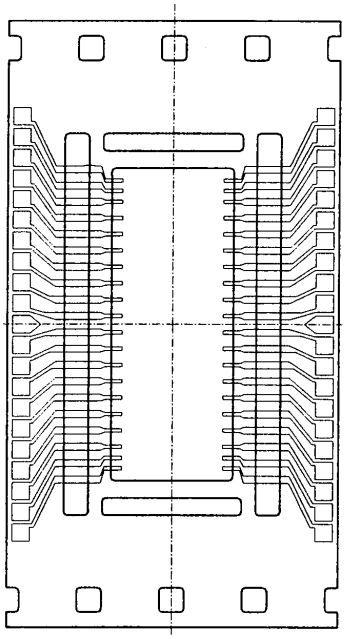
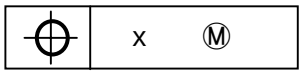
Description	Reference symbol	Standards	Recommended	Remarks
Tolerance of test pad center position	y	(1) Tolerance of test pad center position shall be specified in the outline drawing.  (2) Reference symbol " y " shall be replaced as below. $y \leqq 0.14$	y = 0.10	-
Test pad layout		(1) It prescribes a test pad layout as follows.  (2) It makes one line of test pad layout and the package center and the test pad center at the center agree. (3) When the numbers of outer leads are even number (the side), it doesn't use a center pad.	-	-
Number of test pads	N	N=42(e_1 =1.27) N=70(e_1 = 0.80) (1) It is due to the rule of the test pad layout. (2) The test pad provides the number of maximum test pads regardless of the number of outer leads.	-	-

Table 2 (continued)

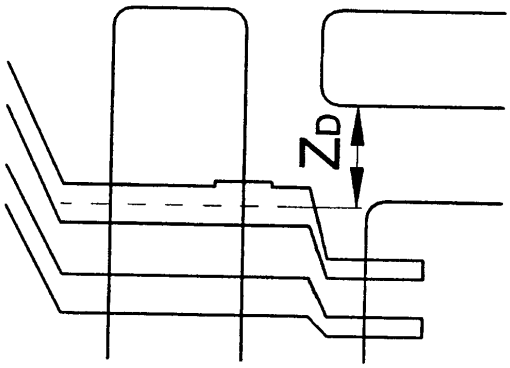
Unit: mm

<table>
<tr><th>Description</th><th>Reference symbol</th><th>Standards</th><th>Recommended</th><th>Remarks</th></tr>
<tr>
<td>Outer lead pitch</td>
<td>e</td>
<td>
<table>
<tr><th>e</th></tr>
<tr><td>1.27</td></tr>
<tr><td>1.00</td></tr>
<tr><td>0.80</td></tr>
<tr><td>0.65</td></tr>
<tr><td>0.50</td></tr>
</table>
</td>
<td>-</td>
<td>True geometrical position is shown.</td>
</tr>
<tr>
<td>Outer lead width</td>
<td>b</td>
<td>It makes a maximum and a minimum value a range in the table below to each outer lead pitch.
<table>
<tr><th>e</th><th>b_{min}</th><th>b_{max}</th></tr>
<tr><td>1.27</td><td>0.30</td><td>0.50</td></tr>
<tr><td>1.00</td><td>0.30</td><td>0.50</td></tr>
<tr><td>0.80</td><td>0.20</td><td>0.40</td></tr>
<tr><td>0.65</td><td>0.20</td><td>0.40</td></tr>
<tr><td>0.50</td><td>0.10</td><td>0.30</td></tr>
</table>
</td>
<td>
<table>
<tr><th>e</th><th>b_{nom}</th></tr>
<tr><td>1.27</td><td>0.40</td></tr>
<tr><td>1.00</td><td>0.40</td></tr>
<tr><td>0.80</td><td>0.30</td></tr>
<tr><td>0.65</td><td>0.30</td></tr>
<tr><td>0.50</td><td>0.20</td></tr>
</table>
</td>
<td>It follows SSOP and TSOP(2) rule.</td>
</tr>
<tr>
<td>Tolerance of outer lead center position</td>
<td>x</td>
<td>(1) Tolerance of outer lead center position shall be specified in the outline drawing.


(2) Reference symbol “ x ” shall be replaced as below.
$x \leq 0.25$</td>
<td>
<table>
<tr><th>e</th><th>x</th></tr>
<tr><td>1.27</td><td>0.25</td></tr>
<tr><td>1.00</td><td>0.20</td></tr>
<tr><td>0.80</td><td>0.16</td></tr>
<tr><td>0.65</td><td>0.13</td></tr>
<tr><td>0.50</td><td>0.10</td></tr>
</table>
</td>
<td>It makes the same rule with SSOP,TSOP(2) .</td>
</tr>
</table>

Table 2 (continued)

Unit: mm

<table>
<tr><th>Description</th><th>Reference symbol</th><th>Standards</th><th>Recommended</th><th>Remarks</th></tr>
<tr>
<td>Number of outer leads</td>
<td>n</td>
<td>
It prescribes the number of outer leads shown below.
(1) e =1.27
n =16+ (2 X k)
k=0,1, ... ,12
(2) e =1.00 e =0.80 e =0.65 e =0.50
The maximum number of outer lead which is gotten when making Z_D = 0.50.
<table>
<tr><td></td><td colspan="5">e</td></tr>
<tr><td>D</td><td>1.27</td><td>1.00</td><td>0.80</td><td>0.65</td><td>0.50</td></tr>
<tr><td>10.79</td><td>16</td><td>20</td><td>26</td><td>32</td><td>42</td></tr>
<tr><td>12.06</td><td>18</td><td>24</td><td>28</td><td>36</td><td>48</td></tr>
<tr><td>13.33</td><td>20</td><td>26</td><td>32</td><td>38</td><td>52</td></tr>
<tr><td>14.60</td><td>22</td><td>28</td><td>36</td><td>42</td><td>58</td></tr>
<tr><td>15.87</td><td>24</td><td>30</td><td>38</td><td>46</td><td>62</td></tr>
<tr><td>17.14</td><td>26</td><td>34</td><td>42</td><td>50</td><td>68</td></tr>
<tr><td>18.41</td><td>28</td><td>36</td><td>44</td><td>54</td><td>-</td></tr>
<tr><td>19.68</td><td>30</td><td>38</td><td>48</td><td>58</td><td>-</td></tr>
<tr><td>20.95</td><td>32</td><td>40</td><td>50</td><td>62</td><td>-</td></tr>
<tr><td>22.22</td><td>34</td><td>-</td><td>54</td><td>66</td><td>-</td></tr>
<tr><td>23.49</td><td>36</td><td>-</td><td>58</td><td>70</td><td>-</td></tr>
<tr><td>24.76</td><td>38</td><td>-</td><td>60</td><td>-</td><td>-</td></tr>
<tr><td>26.03</td><td>40</td><td>-</td><td>64</td><td>-</td><td>-</td></tr>
<tr><td>N</td><td colspan="2">42</td><td colspan="3">70</td></tr>
</table>


</td>
<td>-</td>
<td>(1)The number of maximum outer leads which is gotten when making Z_D= 0.95 at the time of e =1.27.
(2) It makes the same rule with SSOP (Group2, 3), TSOP(2). But, it makes the rules which are many at 2 pin at the time of e =0.50.</td>
</tr>
</table>

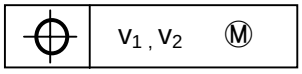
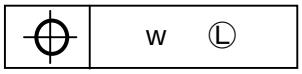
Table 2 (continued)

Unit: mm

Description	Reference symbol	Standards	Recommended	Remarks
Tape format	D_2	Tape format: 35; D_{2min}: 34.78; D_{2nom}: 34.98; D_{2max}: 35.18 The range shall be $D_2 = D_{2nom} \pm 0.20$.	–	(1) The rule of tape format 35.
Tape unit length	E_2	(1) It prescribes a standard value as in the following formula. $E_{2nom} = P_{nom} \times k$ ($P_{nom} = 4.75$) k=4 (E=7.62, 8.89,10.16) k=5 (E=11.50,13.00,14.50,16.00) (2) It prescribes tape unit length as follows. E: 7.62, 8.89, 10.16 → E_{2nom}: 19.00 E: 11.50, 13.00, 14.50, 16.00 → E_{2nom}: 23.75	–	–
Corner tie bar width	S	S_{nom}= 1.00	–	It makes the same rule with QTP.
Sprocket hole width	J_1	(1) J_{1nom} = 1.42 (2) The range shall be $J_1 = J_{1nom} \pm 0.03$	–	(1) The rule of tape format 35, Super.
Sprocket hole length	J_2	(1) J_{2nom} =1.42 (2) The range shall be $J_2 = J_{2nom} \pm 0.03$	–	
Sprocket hole pitch	P	(1) P_{nom} = 4.75 (2) The range shall be $P = P_{nom} \pm 0.05$	–	–
Distance of center of the sprocket hole row	H	(1) H_{nom} = 31.83 (2) The range shall be $H = H_{nom}{}^{+0.04}_{-0.07}$	–	(1) The rule of tape format 35, Super.

Table 2 (continued)

Unit: mm

Description	Reference symbol	Standards	Recommended	Remarks
Package thickness	A	A_{max} = 1.00	A_{nom} = 0.50	It makes the same rule with DTP(1).
Package upper part thickness	A_1	A_{1max} = 0.70	-	
Sealing length	D_3	$D_3 \leq D$	-	It makes the same rule with QTP, DTP(1).
Sealing width	E_3	$E_3 \leq E$	-	
Index mark width	b_1	(1) b_{1nom} = 0.15 (2) The range shall be $b_1 = b_{1nom} \pm 0.02$	-	It makes the same rule with QTP, DTP(1).
Index mark length	b_2	(1) b_{2nom} = 0.30 (2) The range shall be $b_2 = b_{2nom} \pm 0.15$.	-	
Tolerance of package center position	v_1 , v_2	(1) Tolerance of package center position shall be specified in the outline drawing.  (2) Reference symbol " v_1 , v_2 " shall be replaced as below. v_1 , v_2 ≤ 0.25	-	-
Tolerance of outer lead center position	w	(1) Tolerance of outer lead center position shall be specified in the outline drawing.  (2) Reference symbol " w " shall be replaced as below. $w \leq 0.25$	-	-

10. Standard Registration

When you need to register a new outline specification on the standard, complete the appendix format 5 in Technical Standardization Committee on Semiconductor Device Package steering rule, in compliance with the Standardization Rule. In order to make a package dimension table, which come under Item 2, Appendix format 5, fill the dimensions marked with (√) in the following Table.

The rule item of the TCP (QTP, DTP(1), DTP(2)) standard exceeds 30 items. Therefore, complexly when making individual standard registration completely. Then it made the registration table to have narrowed down to the item, which the minimum outward form size needs.

Incidentally, it supposes that it enters package code form type according to **EIAJ ED-7303B** (Name and Code for Integrated Circuits Package).

Table 3

Serial Number				
External Type		T-DTP(1) OO - OO. OO X OO. OO - O. OO T-DTP(2) OO - OO.OO X OO. OO - O. OO		
Reference Symbol		min	nom	max
Group1	D_2		√	
	P		√	
	H		√	
	E		√	
	E_1	√	√	√
	E_2	√	√	√
	D		√	
	D_1	√	√	√
	A			√
	A_1			√
	b	√		√
	e		√ (*1)	
	e_1		√ (*1)	
	e_2		√ (*1)	
	e_3		√ (*1,2)	
	e_4		√ (*1,2)	
	n		√	
	N		√	
	J_1		√	
	J_2		√	

(*1) true geometrical position
(*2) DTP(1) only

EIAJ EDR-7332

EXPLANATORY NOTES

1. Objective of establishment

This technical report accounts for the industrial standard of Dual Tape Carrier package Type1, Type2 (hereinafter referred to as DTP (1), DTP (2)). It was established to provide the design guideline of DTP (1) and DTP (2) when it is made in to product or when Automatic mounting machinery and associated parts are developed.

2. History of review

As the semiconductor device which corresponds to the thin electron equipment such as the IC card, And Thin Small Outline Package Type1, Type2 (hereinafter referred to as TSOP (1), TSOP (2)) which was made thin and small was standardized in March, 1988. After that, those standards revisions are done in April 1996 and those use are done, as **EIAJ EDR-7312** of TSOP (1) and **EIAJ EDR-7313** of TSOP (2). Also, as the match of the international standardization, it is proposed to International Electro technical Commission (hereinafter referred to as IEC) from Japan and it was established in 2000 as **Amendment 1 to IEC 60191-6**.

As the memory card and so on are thin and the capacity increases, by such situation, it wasn't possible to correspond only TSOP (1), TSOP (2), therefore DTP (1), DTP (2) to have made have compatibility became necessary. Then, in April 1989, it starts " TCP standardization WG " which was under Special Technical Committee on Semiconductor Device Package Outlines (currently, Technical Standardization Committee on Semiconductor Device Package). It fixed as taking up standard creating by the standardization of DTP (1), DTP (2) and QTP as the business plan. First, to deliberate about DTP (1), DTP (2) after deciding a basic item about QTP was fixed. After that, in 1991, TCP standardization WG disperses. It wasn't deliberated for about 1 year because to have been taken over by the plastic package subcommittee (currently, Integrated Circuits Package Subcommittee) but the professional field was different. Recurrence addition " TCP standardization WG " and a full-scale deliberation were begun in April 1992. It was deliberated that where to decide a datum position of DTP (1) and DTP (2). And it made a center sprocket hole a datum position because DTP (1) and DTP (2) didn't set up a tooling hole. In April 1993, DTCP which was former name was changed DTP at the Special Technical Committee on Semiconductor Device Package Outlines. Also working group name, too, was changed with " Tape Carrier Package WG ". The standardization of the package naming was deliberated in " General rule package standardization WG " (currently, General rule of semiconductor package Subcommittee), which is under The Special Technical Committee on Semiconductor Device Package Outlines. This change is because the 4 character composition of DTCP which becomes basic type of the package form came off the standard. But, the name of DTP was approved in " Dual Tape Carrier package ". Via above mentioned deliberation elapse, Tape Carrier package WG ends the last deliberation in December 1993, and pass in the semiconductor package special committee approval. It was established as JEITA standard **EIAJ ED-7432** (DTP (1)) and **EIAJ ED-7433** (DTP (2)).

In January, 2002, It began questionnaire investigation about the reconsideration of the elapse in 10 years about the TCP standards (QTP, DTP(1), DTP (2)) in Integrated Circuits Package Subcommittee. As a result, There is an answer from 12 companies in Japan, and the opinion that equal to or more than 2 companies, the revision (It keeps just as it is) are necessary was gotten about the TCP standards (QTP, DTP (1), DTP (2)). In March 2002, it was fixed that to carry forward the revision of the TCP standards in WG.

EIAJ EDR-7332

In the same way as **Amendment 1 to IEC 60191-6** (TSOP(1) and TSOP(2)), to integrate **EIAJ ED-7432** and **EIAJ ED-7433**, and that DTP technical report was revised were decided. The consideration when implementing a standardization proposal by IEC, SC47D/WG1, According to the IEC format, we placed in the design guide of integrated circuits package as the classification. It have completed a deliberation in WG and It was established in September 2002 as **EIAJ EDR-7332** to have integrated DTP (1) and DTP (2) into.

TCP relation standard, the following standard exists and results in the today.

(1) EIAJ ED-7431, EIAJ ED-7431A (General rules for the preparation of outline drawings of integrated circuits, Quad Tape Carrier package (QTP)), The deliberation begins from April 1989 by " TCP standardization WG " which was temporarily placed under Special Technical Committee on Semiconductor Device Package Outlines. After that, it was deliberated in the continuation in " Tape Carrier Package WG " and it was established in April 1993, then it was revised in October 1994.

(2) EIAJ ED-7431-1, EIAJ ED-7431-1A (Recommended Outline Drawings for Carriers, Quad Tape Carrier package Carriers (QTP Carrier)), The deliberation begins from April 1989 by " TCP standardization WG " which was temporarily placed under Special Technical Committee on Semiconductor Device Package Outlines. After that, it was deliberated in the continuation in "Tape Carrier Package WG" and it was established in February 1993, then it was revised in December 1994.

(3) EIAJ EDR-7331 (Design guideline of integrated circuits for Quad Tape Carrier package and Carrier (QTP and QTP Carrier)), Reconsideration in 10 years was admitted to be necessary about the TCP standards (QTP, DTP (1), DTP (2)) in Integrated Circuits Package Subcommittee which is under Technical Standardization Committee on Semiconductor Device Package. It was deliberated from March 2002 and it was established in September 2002. It integrated **EIAJ ED-7431A** and **EIAJ ED-7431-1A** as the standard of QTP and the carrier and it issued them as the identical book. As the custom way, in Technical Standardization Committee on Semiconductor Device Package, packaging, a socket, a tray and so on are published as another standard. When integrating the standard of QTP and the carrier, it got agreement by Integrated Circuits Package Subcommittee and socket Subcommittee that are under in Technical Standardization Committee on Semiconductor Device Package and the JEITA secretariat. Also, as for standard No, it gave **EIAJ EDR-73XX**, which is the package relation standard No (socket relation standard No is **EIAJ EDR-77XX**).

(4) EIAJ ED-7432 (General rules for the preparation of outline drawings of integrated circuits, Dual Tape Carrier packages Type I(DTP (I)), The deliberation begins from April 1989 by " TCP standardization WG " which was temporarily placed under Special Technical Committee on Semiconductor Device Package Outlines. After that, it was deliberated in the continuation in "Tape Carrier Package WG" and it was established in February 1993, then it was revised in December 1994.

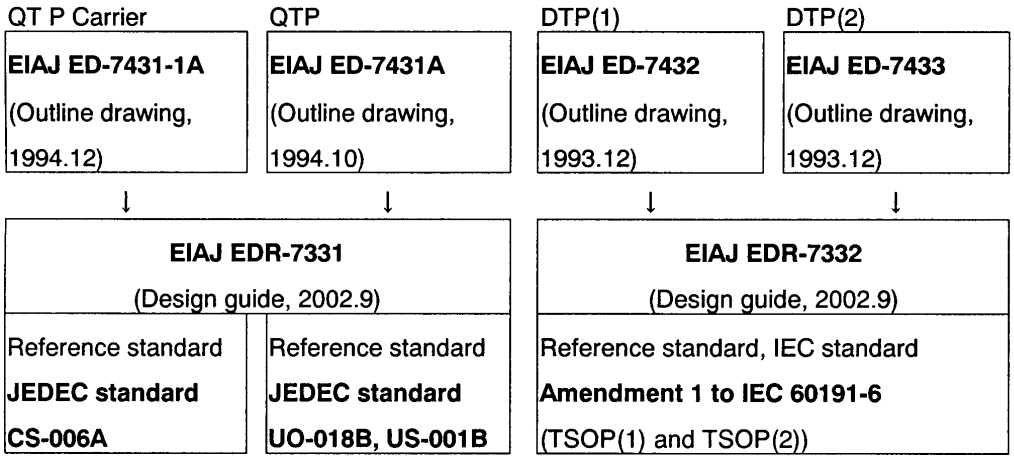
(5) EIAJ ED-7433 (General rules for the preparation of outline drawings of integrated circuits, Dual Tape Carrier packages Type II (DTP (II)), The deliberation begins from April 1989 by " TCP standardization WG " which was temporarily placed under Special Technical Committee on Semiconductor Device Package Outlines. After that, it was deliberated in the continuation in "Tape Carrier Package WG" and it was established in February 1993, then it was revised in December 1994.

EIAJ EDR-7332

(6) EIAJ EDR-7332 (Design guideline of Integrated Circuits for Dual Tape Carrier packages Type 1, Type 2 (DTP (1), DTP (2)), Reconsideration in 10 years was admitted to be necessary about the TCP standards (QTP, DTP (1), DTP (2)) in Integrated Circuits Package Subcommittee which is under Technical Standardization Committee on Semiconductor Device Package. It was deliberated from March 2002 and it was established in September 2002. It is **EIAJ ED-7432** and **EIAJ ED-7433** integration versions.

The elapses of the deliberation of TCP relation standards are shown in **explanation table 1** with the flow chart.

Explanation table 1



3. Basic idea

(1) Datum

Based on **IEC global drawing format** (Revision of **IEC 60191-6** Global drawing format (establishment schedule in 2002)), this technical report adopts a datum, a geometrical tolerance and the point of view. In case of adoption of the datum, it is reference in the JEDEC standard and the registration packages.

(2) Dimensions display

The display dimension in this technical report was based on the ISO standard and made “mm“ display. In the way of converting from “ inch “ to the “mm “, it quoted **IEC Publication 191-3** and it made the number of the effective digits 2 digits of the following of the decimal point.

Minimum values (min): The third decimal places to be reckoned as an unit.

Recommended values (nom): The third decimal places to be rounded off.

Maximum values (max): The third decimal places to be omitted.

Furthermore, in specifying each dimensional value, the concept set by the design centers was clearly shown by means of using the designed standard values (recommended nominal value) as guideline for standardization.

(3) Concept of the package design

When standardizing TCP outline, it considered for standardization of the examination, the handling, the package size to become possible especially. Therefore, It made a concept basic that ” Fixed Test

Pad Layout, Variable Package Size " " Fixed Package Size, Variable Terminal Pitch ".

By **JEDEC standard UO-017A** (establishment in October 1988), The concept to make the outer lead pitch and the test pad pitch of QTP identical and moreover, that try to design a package by fixing package body size and changing an outer lead pitch. That is, it was introducing the concept of " Fixed Package Size, Variable Pad Pitch & Layout " " Fixed Test Pad Pitch, Fixed Terminal Pitch ". However, this doesn't become about not preparing a test socket by it every package, and moreover, as for the package with the fine pitch, which is the advantage of QTP, the test pad, too, becomes a fine pitch. Therefore, there is a fault that the test becomes very difficult. Then, it made a test pad constant regardless of the lead pitch and moreover, it made the concept to design a package by fixing package body size and changing an outer lead pitch. This concept was adopted for the **JEDEC standard US-001B** (establishment in November 1993), and applied to the JEITA standard **EIAJ EDR-73321** (QTP, QTP Carrier), **EIAJ EDR-7332** (DTP (1), DTP (2)), too.

(4) For the compatibility with TSOP (1) and TSOP (2), as for package width (E), package length (D), outer lead pitch (e), outer lead width (b) and number of outer lead (n), those were based on TSOP (1) (**EIAJ EDR-7312**) and TSOP (2) (**EIAJ EDR-7313**).

(5) Package name

As explained in History of review, Because the DTCP 4 character composition came off the standard with the deliberation of the previous standard, it was changed with DTP. It provided that the name of DTP is " Dual Tape Carrier packages ". According to **EIAJ ED-7303B** (Name and Code for Integrated Circuits Package), it changed the part of number of DTP(I), DTP (II) to DTP(1), DTP (2) from this technical report.

4. Background for dimensional provisions

(1) Nominal dimension

DTP(1) : Nominal Dimensions makes a size most out of the package [symbol: E X (D+1.60)].

DTP(2) : Nominal Dimensions makes package width [symbol: E nom].

(2) Package width (E)

DTP(1): E =6.00, 8.00, 10.00,12.00mm

DTP(2) : E =7.62(300mil), 8.89(350mil), 10.16(400mil) E =11.50, 13.00, 14.50, 16.00mm

At old **EIAJ ED-7433** (DTP (2)), Equal to or more than E=11.43(450mil) rules were E=11.43(450mil), 12.70(500mil), 13.97 (550mil), 15.24(600mil). However, it changed according to the revision of TSOP (2).

(3) Outer lead pitch (e)

DTP(1): e =0.50, 0.40, 0.30mm

DTP(2) : e =1.27, 1.00, 0.80, 0.65, 0.50mm

At old **EIAJ ED-7433** (DTP (2)), e =1.27, 1.00, 0.80, 0.65mm was prescribed, this technical report added e =0.50mm to DTP (2) according to TSOP (2).

(4) Number of the test pads (N)

It stores up adoption in the concept of " Fixed Test Pad Layout, Variable Package Size " " Fixed Package Size, Variable Terminal Pitch". Therefore, regardless of the number of outer lead (n) and number of the maximum test pads (N_{max}) is

DTP(1) : It provides according to the package width(E).

In case of E=12.00mm N_{max}=66

In case of E =6.00, 8.00, 10.00mm N_{max}=50

DTP(2) : It provides according to the test pad pitch(e_1).

In case of e_1 =0.80mm N_{max}=70

In case of e_1 =1.27mm N_{max}=42

(5) Tape format (D_2)

The tape format 3 kinds are prescribed which 35mm, 48mm, and 70mm. The tape that forms a package main unit inside the sprocket hole and by it the tape unit ranges with more than one piece of continuation. DTP uses only 35mm of tape format.

(6) Tape unit width (E_2) It considers a manufacturing and the sprocket hole pitch (P=4.75mm) makes positive duple, therefore

DTP(1) : In case of E =12.00mm 19.00mm (P X 4)

In case of E =6.00, 8.00, 10.00mm 14.25mm (P X 3)

DTP(2) : In case of E =7.62(300mil), 8.89(350mil), 10.16(400mil) 19.00mm (P X 4)

In case of E =11.50, 13.00, 14.50, 16.00mm 23.75mm (P X 5)

(7) Sprocket hole (J_1 X J_2)

The tape format adopted 35mm Super Wide because 35mm Super Wide was possible to design it judged from the package size and even if it prepared a test pad.

(8) Datum position

QTP datum position is a tooling hole, but DTP(1) and DTP(2) doesn't set up a tooling hole. Therefore, it made a sprocket hole of the package center position (J_1 X J_2) a datum position.

(9) Package side hole tie bar

It sets up a package side hole to make a package main unit position clear. However, that a package side hole is transformed is thought of by method of the molding. Therefore, It may provide Package side hole tie bar as the option. Incidentally, it makes the shape of tie bar free. (Explanation figure reference)

(10) Index mark width (b_1), length (b_2)

TCP standards (QTP, DTP (1), DTP (2)) prescribes index mark width with b_1=0.15$\pm$0.02mm, length with b_2=0.30$\pm$0.15mm. It made the same rule which JEDEC standard **US-001B**.

(11) Number of test pads(N) and Number of outer leads(n)

TCP (QTP, DTP (1), DTP (2)) is a semi-processed article basically and it is impossible to give a terminal number, considering until jisso process. It follows **EIAJ ED-7300** in Number of test pads(N) and Number of outer leads(n), together. It made a copper foil surface the upper side (From surface of Cu pattern) and it prescribed the lower left counterclockwise as the 1st. Also, it doesn't use all test pads. And it gives a number to outer lead and the test pad as follows.

Number of outer leads :1,2,3 ……..n

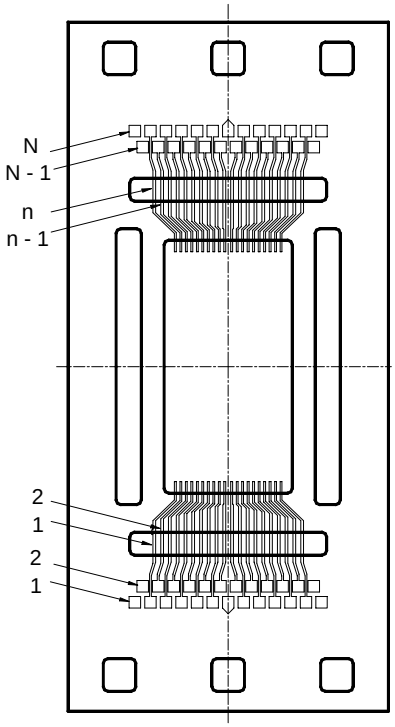
Number of test pads :1,2,3 ……..N

(12) The way of showing Number of test pads (N) , Number of outer leads (n)

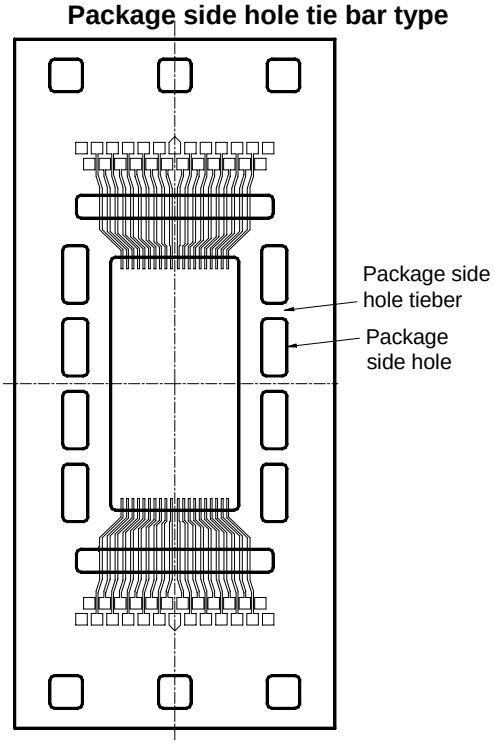
Details are shown in the explanation figure. It makes an explanation figure the figure, which was seen from surface of Cu pattern.

DTP (1)

Explanation figure 1-1

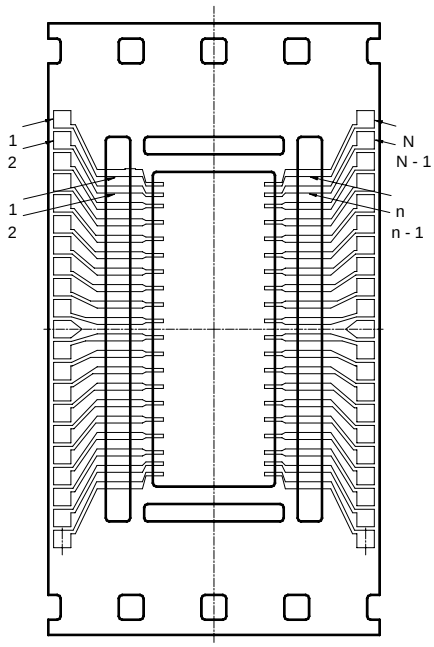


Explanation figure 1-2 (Option)
Package side hole tie bar type

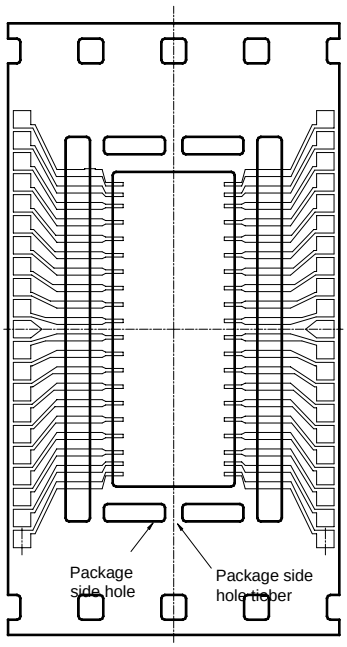


DTP (2)

Explanation figure 2-1



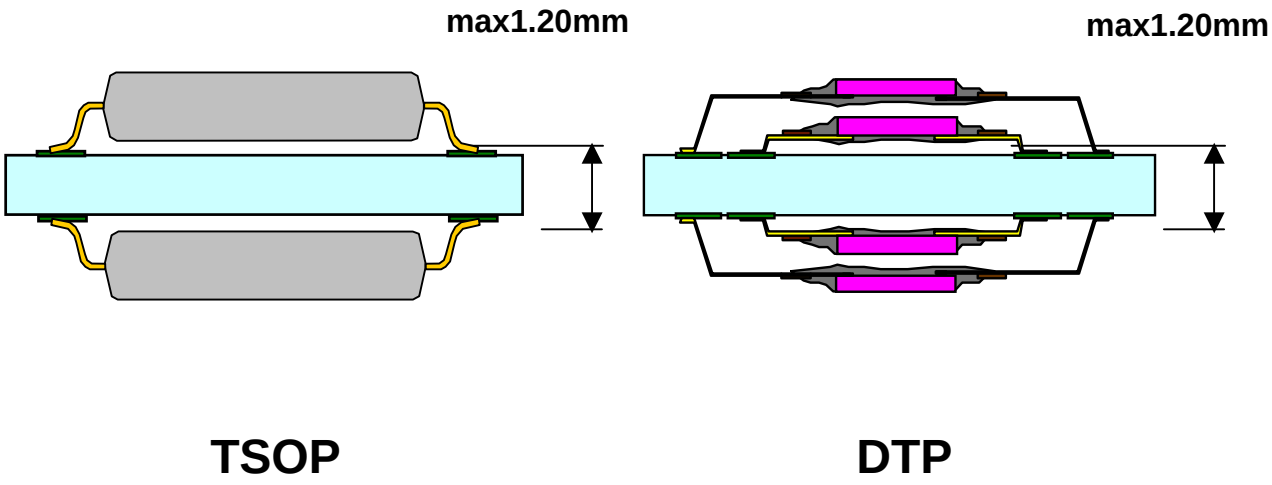
Explanation figure 2-2(Option)
Package side hole tie bar type



5. The surface mount technology of DTP

DTP outline and size that was semi-processed article basically and it is different from the jisso style, actually. The jisso style of DTP to have compared with TSOP, which is used for memory module, is shown **explanation figure 3**. DTP realizes stack up by 2 packages at the seated height 1.20mm in the merit of thin package.

Explanation figure 3



6. The reference standard

(1) IEC standard

Revision of IEC 60191-6 Global drawing format (establishment schedule in 2002)

Amendment 1 to IEC 60191-6(TSOP(1) and TSOP(2), establishment in 2000)

(The related standard, **EIAJ EDR-7312** and **EIAJ EDR-7313**, establishment in April, 1996)

(2) JEDEC standard

UO-017A (QTP, establishment in October, 1988) (The related standard, **CO-009A**)

UO-018B (QTP, establishment in July, 1993) (The related standard, **EIAJ EDR-7331**)

US-001B (QTP, establishment in November, 1993) (The related standard, **EIAJ EDR-7331**)

CO-009A (QTP Carrier, establishment in July, 1989) (The related standard, **UO- 017A**)

CS-006A (QTP Carrier, establishment in November, 1993) (The related standard, **EIAJ EDR-7331**)

CS-001B (QTP Carrier magazine, establishment in March, 1996)

(3) JEITA standard

EIAJ EDR-7312 (Design guideline of integrated circuits for Thin Small Outline Package(Type I), TSOP(I)) , establishment in April, 1996.

EIAJ ED-7311-1 (Standard of integrated circuits package, TSOP(1)) establishment in August, 1997.

EIAJ EDR-7313 (Design guideline of integrated circuits for Thin Small Outline Package(Type II), TSOP(II)) , establishment in April, 1996.

EIAJ ED-7311-2 (Standard of integrated circuits package, TSOP(2)) establishment in August, 1997.

EIAJ EDR-7331 (Design guideline of integrated circuits for Quad Tape Carrier packages and Carrier (QTP and Carrier)), establishment in September, 2002.

EIAJ ED-7303B (Name and Code for Integrated Circuits Package), establishment schedule in 2002.

7. COMMITTEE MEMBERS

The IC Package Sub-committee of the Technical Standardization Committee on Semiconductor Device Packages has mainly deliberated this standard. The subcommittee members are shown below.

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