

# JIS

**JAPANESE INDUSTRIAL STANDARD**

**General rules  
for printed wiring boards**

**JIS C 5010—1994**

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In the event of any doubt arising,  
the original Standard in Japanese is to be final authority.

## JAPANESE INDUSTRIAL STANDARD

J I S

## General rules for printed wiring boards

C 5010-1994

1. Scope This Japanese Industrial Standard specifies the general items, the various dimensions including the external dimensions, etc. of the printed wiring boards to be used mainly for electronic equipment (hereafter referred to as "printed boards") and also the items to be specified in relevant detail specifications.

The printed boards mentioned above means single-sided, double-sided and multilayer printed boards employing the copper-clad laminates specified in JIS C 6480.

Remarks: The following standards are cited in this Standard:

JIS C 5001 General rules for electronic components

JIS C 5012 Test methods for printed wiring boards

JIS C 5603 Terms and definitions for printed circuits

JIS C 6480 General rules of copper-clad laminates for printed wiring boards

JIS Z 3282 Soft solder

2. Definitions For the purposes of this Standard, the definitions given in JIS C 5001 and JIS C 5603 apply.

3. Grade The grades which express the precision and quality of patterns on printed board dealt with in this Standard are given below.

These grades are used in such a way that a necessary grade is selected on each item to be specified. Practical assignment of grading shall be made in the detail specification.

Class I: A class for which normal level is required.

Class II: A class for which a high level is required.

Class III: A class for which a specially high level is required.

4. Design standard and tolerance thereon

4.1 Grid dimensions

4.1.1 Basic grid As for grids of printed boards, the grid of metric system shall be used as the standard, and the grid of inch system shall be used only when compatibility with the traditional product is necessary.

Basic grid dimension of metric system: 2.50 mm

Basic grid dimension of inch system: 2.54 mm

4.1.2 Auxiliary grid If grid dimension smaller than that of basic grid in 4.1.1 is necessary, the following dimensions shall be used:

Grid of metric system: Unit of 0.5 mm (if further smaller unit is necessary, unit of 0.05 mm shall be employed)

Grid of inch system: Unit of 0.635 mm

Remarks: Grids employing smaller unit than 0.05 mm or 0.635 mm shall not be used.

#### 4.2 Reference line, reference hole and reference mark

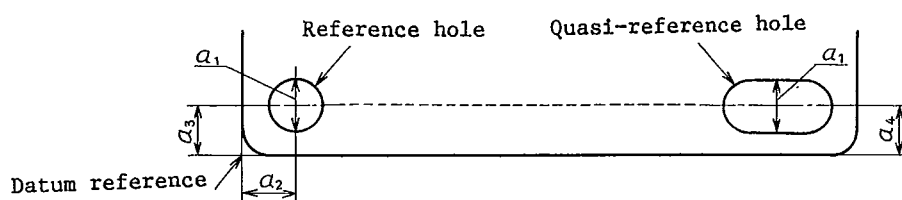
4.2.1 Reference line A reference line composed of at least two holes or a pattern shall be provided, as needed.

The reference line shall lie on the grid and should preferably lie inside of the visual outline.

4.2.2 Reference hole and quasi-reference hole Reference hole(s) and quasi-reference hole(s) shall be provided as needed.

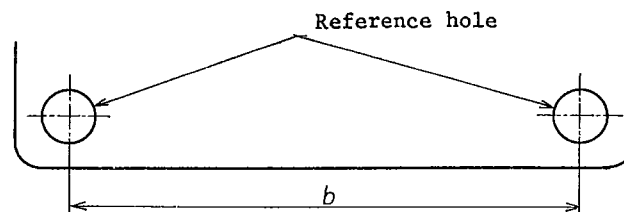
The reference hole shall be a round hole, and the quasi-reference hole shall have a shape having a width ( $a_1$ ) equal to the reference hole diameter ( $a_1$ ).

Fig. 1. Reference hole and quasi-reference hole



- (1) Tolerance on hole pitch when two reference holes are used The tolerance on hole pitch ( $b$ ) of reference holes illustrated in Fig. 2 shall be specified in the detail specification.

Fig. 2. Tolerance on hole pitch when two reference holes are used



- (2) Positional tolerance of reference hole and quasi-reference hole  
The permissible deviation from the position of reference hole ( $a_2, a_3$ ), and the position of quasi-reference hole ( $a_4$ ) designed relative to the datum reference as illustrated in Fig. 1, shall be specified in the detail specification.
- (3) Tolerances on reference hole diameter and quasi-reference hole width  
The tolerance on reference hole diameter ( $a_1$ ) and tolerance on quasi-reference hole width ( $a_1$ ) shall be specified in the detail specification.

#### 4.2.3 Reference mark and component location mark

- (1) Shapes and dimensions of reference mark and component location mark  
The shapes and dimensions of reference mark and component location mark illustrated in Fig. 3 shall be as given in Table 1.

Fig. 3. Reference mark and component location mark

(An example is shown.)

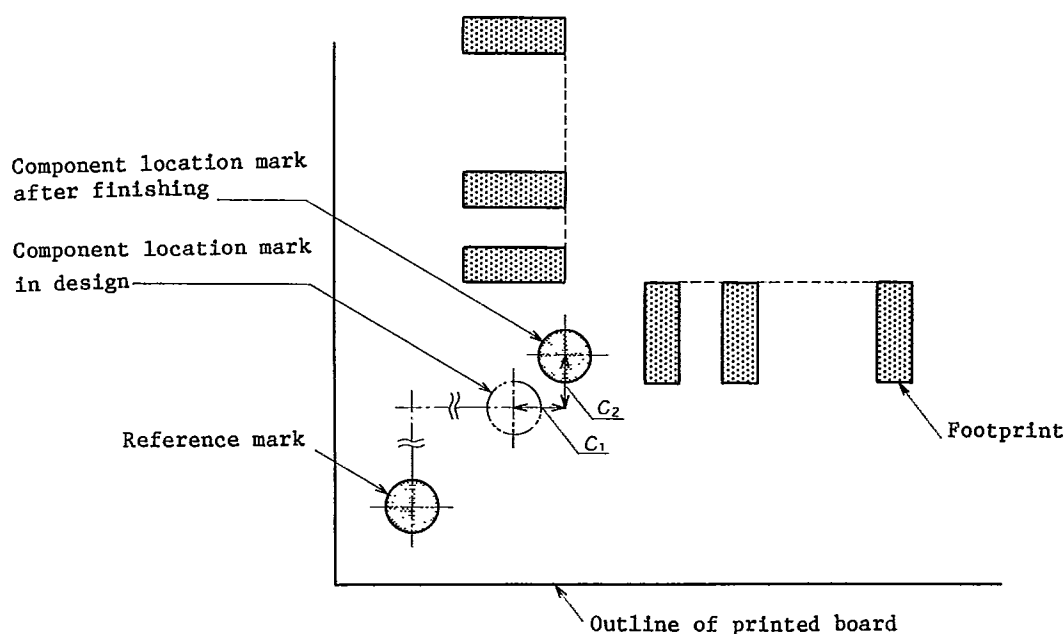


Table 1. Shapes and dimensions of reference mark and component location mark

Unit: mm

| Item                                       | Shape    | Diameter |
|--------------------------------------------|----------|----------|
| Reference mark and component location mark | Circular | 1.0      |

- (2) Tolerances on reference mark diameter and component location mark diameter The tolerances on reference mark diameter and component location mark diameter shall be specified in the detail specification.
- (3) Positional tolerances of reference mark and component location mark The positional tolerances of reference mark and component location mark ( $c_1, c_2$ ) shown in Fig. 3 shall be specified in the detail specification.

#### 4.3 External dimensions

4.3.1 External dimensions It is preferable that the external dimensions of a printed board allows the arrangement of board within the panel dimensions given in Table 2.

Table 2. Panel dimensions

Unit: mm

| Size of copper-clad laminate | Number of dividing copper-clad laminate |                        |           |           |           |
|------------------------------|-----------------------------------------|------------------------|-----------|-----------|-----------|
|                              | 4                                       | 6                      | 8         | 9         | 12        |
| 1000 × 1000                  | 500 × 500                               | 333 × 500              | 250 × 500 | 333 × 333 | -         |
| 1000 × 1200                  | 500 × 600                               | 333 × 600<br>500 × 400 | 500 × 300 | 333 × 400 | 250 × 400 |

4.3.2 Tolerances on external dimensions Tolerances on external dimensions of printed boards shall be specified in the detail specification.

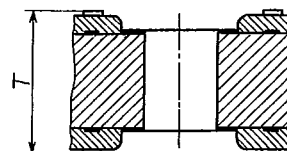
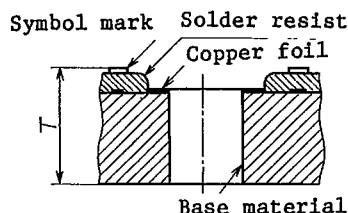
#### 4.4 Total board thickness

4.4.1 Total board thickness It is preferable that the total board thickness ( $T$ ) shown in Fig. 4 should comply with Table 3.

Fig. 4. Total board thickness

- (1) Single-sided printed board      (2) Double-sided printed board

(without through-hole plating)



- (3) Double-sided printed board      (4) Multilayer printed board

(with through-hole plating)

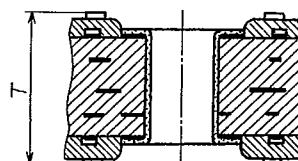
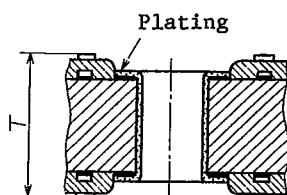


Table 3. Total board thickness

Unit: mm

| Classification                               | Total board thickness <sup>(1)</sup>                       |
|----------------------------------------------|------------------------------------------------------------|
| Single-sided and double-sided printed boards | 0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 1.0, 1.2, 1.6, 2.0, 2.4, 3.2 |
| Multilayer printed board                     | 0.3, 0.4, 0.6, 0.8, 1.0, 1.2, 1.6, 2.0, 2.4, 3.2           |

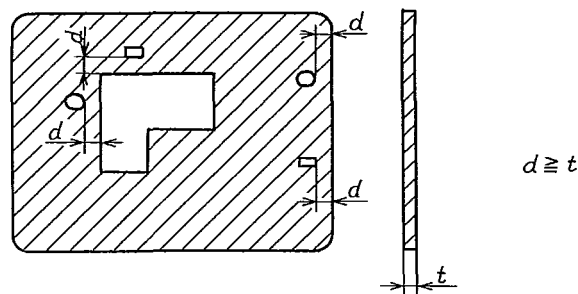
Note <sup>(1)</sup> This is not the board thickness of copper-clad laminate, but means the total board thickness of printed board.

4.4.2 Tolerances on total board thickness Tolerances on total board thickness shall be specified in the detail specification.

#### 4.5 Holes

4.5.1 Distance between hole and board edge The minimum distance ( $d$ ) from inside of hole to board end shall be not less than the thickness ( $t$ ) of the printed board as shown in Fig. 5. The distance shall also satisfy the provision of 4.7.5.

Fig. 5. Distance between hole and board end



4.5.2 Position of hole The center of a hole shall lie on the intersection of grid (including auxiliary grid). The allowable deviation ( $|\vec{e}|$ ) of a hole from the position specified in the design by means of coordinates employing the reference hole as the original point shown in Fig. 6 shall be specified in the detail specification. However, via holes are out of subject.

Fig. 6. Position of component hole

