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Testing methods of surface mounting switches for use in electronic equipment

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for establishment of Japanese Industrial Standard submitted by the Electronic Industries Association of Japan (EIAJ)/the Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

For the testing methods of switches for use in electronic equipment, **JIS C 5441** : 1994 has been already established, but the testing methods peculiar to surface mounting switches are not specified, and such methods are not specified in **JIS C 5443** : 1997 and the International Standard corresponding thereto **IEC 61020-1**. **JIS C 5441** and **JIS C 5443** which have been established and published are in conformity with the respective International Standards. If the testing methods of surface mounting switches for use in electronic equipment are added to the above JIS's, the said conformity is spoiled, therefore this Standard is established for the testing methods peculiar to surface mounting switches in this occasion.

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Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	1
3 Definitions	2
4 Standard conditions for testing	2
4.1 Standard conditions	2
4.2 Referee conditions	2
5 Solderability test	2
5.1 Purpose	2
5.2 Tests	2
5.3 Specimen preparation	3
5.4 Initial measurements	3
5.5 Accelerated aging	3
5.6 Method 1: Solder bath method at 235 °C	3
5.7 Method 2: Solder iron method at 260 °C	5
5.8 Method 3: Re-flow bath method at 215 °C	6
5.9 Recovery	7
5.10 Final measurements	7
5.11 Information to be given in the detail specification	7
6 Resistance to soldering heat test	7
6.1 Purpose	7
6.2 Tests	7
6.3 Specimen preparation	8
6.4 Initial measurements	8
6.5 Method 1: Solder bath method at 260 °C	8
6.6 Method 2: Soldering iron method at 300 °C	8

6.7	Method 3: Re-flow bath method at 235 °C	9
6.8	Recovery	9
6.9	Final measurements.....	9
6.10	Information to be given in the detail specification	10
7	Testing method for resistance to flexure of printed board	10
7.1	Purpose	10
7.2	Testing printed circuit board	10
7.3	Method for mounting the specimen to the circuit board.....	10
7.4	Soldering method	11
7.5	Pre-conditioning	11
7.6	Initial measurements	11
7.7	Test	11
7.8	Recovery	12
7.9	Final measurements.....	12
7.10	Information to be given in the detail specification	12
8	Method for adhesion test	13
8.1	Purpose	13
8.2	Testing printed circuit board	13
8.3	Mounting of specimen	13
8.4	Testing device.....	13
8.5	Pre-conditioning	13
8.6	Initial measurements	13
8.7	Test	14
8.8	Recovery	14
8.9	Final measurements.....	14
8.10	Information to be given in the detail specification	14
9	Method for pull-off strength test.....	14
9.1	Purpose	14
9.2	Testing printed circuit board	14

9.3	Mounting of specimen	14
9.4	Pre-conditioning	14
9.5	Initial measurements	14
9.6	Application of load	15
9.7	Recovery	15
9.8	Final measurements	16
9.9	Information to be given in the detail specification	16
10	Body strength test	16
10.1	Purpose	16
10.2	Pre-conditioning	16
10.3	Initial measurements	16
10.4	Test	16
10.5	Recovery	17
10.6	Final measurements	17
10.7	Information to be given in the detail specification	17
	Related standards	18

Testing methods of surface mounting switches for use in electronic equipment

Introduction This Japanese Industrial Standard specifies testing methods peculiar to surface mounting switches for use in electronic equipment based on relating Japanese Industrial Standards and other relating Standards.

The IEC Standard number is based on the new numbering system of IEC Standards put in force on January 1st, 1997, and the Standard published before the said date is numbered by adding 60000 to the former number. This is only the change in the numbering system and the contents remain unchanged.

1 Scope This Japanese Industrial Standard specifies testing methods peculiar to surface mounting switches for use in electronic equipment (hereafter referred to as "switches").

Remarks : The peculiar test methods mean the following test methods:

Soldering test method

- Solderability test
- Resistance to soldering heat test

Mechanical strength test method

- Test for resistance to flexure of printed board
- Adhesion test
- Pull-off strength test
- Body strength test

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of coming into effect is given to these referred standards, only the edition of indicated year constitutes the provision of this Standard but the revision and amendment made thereafter are not applied. The normative references without the indication of the year of coming into effect apply limiting only to the most recent edition (including amendments).

JIS C 0021 : 1995 *Basic environmental testing procedures Part 2 : Tests, Test B : Dry heat*

JIS C 0022 : 1987 *Basic environmental testing procedures Part 2 : Tests, Test Ca : Damp heat, steady state*

JIS C 0050 : 1996 *Basic environmental testing procedures Part 2 : Tests, Test T : Soldering*

JIS C 0051 : 1994 *Basic environmental testing procedures Part 2 : Tests, Test U : Robustness of terminations and integral mounting devices*

JIS C 0054 : 1994 *Environmental testing Part 2 : Tests—Test Td : Solderability, resistance to dissolution of metallization and to soldering heat of Surface Mounting Devices (SMD)*

JIS C 5441 : 1994 *Testing methods of switches for use in electronic equipment*

JIS C 5443 : 1997 *Generic specification of switches for use in electronic equipment*

JIS C 6484 : 1997 *Copper-clad laminates for printed wiring boards—Glass fabric base, epoxy resin*

JIS K 8101 *Ethanol (99.5)*

JIS K 8839 *2-Propanol*

JIS Z 3282 *Soft solders—Chemical compositions and forms*

3 Definitions For the purposes of this Standard in addition to the definitions specified in **JIS C 5443** and **JIS C 5441**, the following principal definitions apply.

- a) **surface mounting switch** A small sized switch which has terminals, frame shape and functions suitable for surface mounting on a printed circuit board.
- b) **solder levelling** An action to distribute again or partially remove the molten solder on or from a printed circuit board by applying enough heat and mechanical force.

4 Standard conditions for testing

4.1 Standard conditions The tests and measurements shall be made under the conditions stated in Table 1 based on 3.1 of **JIS C 5441**.

Table 1 Standard conditions

Temperature	Relative humidity	Air pressure
15 °C to 35 °C	25 % to 85 %	86 kPa to 106 kPa

4.2 Referee conditions The referee conditions shall be as given in Table 2 based on 3.2 of **JIS C 5441**.

Table 2 Referee conditions

Temperature	Relative humidity	Air pressure
20 °C ± 2 °C	60 % to 70 %	86 kPa to 106 kPa

5 Solderability test

5.1 Purpose The purpose of this test is to evaluate solderability of switch terminations.

5.2 Tests The test shall be carried out in accordance with either of the methods a) to c) stated below as specified in the detail specification.

- a) **Method 1: Solder bath method at 235 °C** The test method shall be as specified in 8.8.6 of **JIS C 5441**. This method may be used to determine de-wetting of solder by changing the temperature of solder and the duration of dipping.

- b) **Method 2: Soldering iron method at 260 °C** This method applies to switches for which a) method 1 (solder bath at 235 °C) and c) method 3 (re-flow bath at 215 °C) are impracticable or which are soldered by means of a soldering iron.
- c) **Method 3: Re-flow bath method at 215 °C** This method applies to switches which are subjected to re-flow soldering.

5.3 Specimen preparation The surface to be tested shall be in the “as received” condition and shall not be touched by the fingers or otherwise contaminated. The specimen shall not be cleaned prior to the test. If required by the detail specification, the specimen may be degreased by immersion in a neutral organic solvent at room temperature.

5.4 Initial measurements The initial measurements shall be carried out on the items stated below, as specified in the detail specification.

- a) Appearance (see 5.1 of JIS C 5441)
- b) Functional operation (see 6 of JIS C 5441)
- c) Contact resistance (see 7.1 of JIS C 5441)
- d) Insulation resistance (see 7.2 of JIS C 5441)
- e) Dielectric withstand voltage (see 7.3 of JIS C 5441)
- f) Operating force (see 8.4 of JIS C 5441)

5.5 Accelerated aging If accelerated aging is specified in the detail specification, the switch to be tested (hereafter “specimen”) shall be subjected to the accelerated aging by one of the procedures stated in a) to c) and then, carry out d) below.

- a) **Aging 1 (steam aging)** The 1 h steam aging is carried out. The procedure shall be as stated in 8.8.5 1) of JIS C 5441.
- b) **Aging 2 (damp heat aging)** The aging is carried out by exposing the specimen to atmospheric conditions of a temperature $40\text{ °C} \pm 2\text{ °C}$ and a relative humidity of 90 % to 95 % for 10 days based on JIS C 0022.
- c) **Aging 3 (dry heat aging)** The aging is carried out by exposing the specimen to atmospheric condition of a temperature $155\text{ °C} \pm 2\text{ °C}$ for 16 h based on JIS C 0021.
- d) **Recovery after aging** At the end of aging, the specimen is exposed to the standard atmospheric conditions for testing for not less than 2 h and not more than 24 h.

5.6 Method 1: Solder bath method at 235 °C The test procedures shall be as given in 8.8.6 of JIS C 5441.

5.6.1 Solder The solder shall be that specified in annex B of JIS C 0050, i.e. H60A, H60S and H63 specified in JIS Z 3282 or the solder of constituents specified in B1 of the said annex.