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Environmental testing— Part 2-47 : Tests—Mounting of specimens for vibration, impact and similar dynamic tests

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Reliability Center for Electronic Components of Japan (RCJ)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently **JIS C 60068-2-47: 2004** is replaced with this Standard.

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JIS C 60068 consists of the following parts;

JIS C 60068-1 *Environmental testing Part 1: General and guidance*

JIS C 60068-2-1 *Environmental testing procedures Part 2: Tests, Tests A: Cold*

JIS C 60068-2-2 *Basic environmental testing procedures Part 2: Tests, Test B: Dry heat*

JIS C 60068-2-3 *Basic environmental testing procedures Part 2: Tests, Test Ca: Damp heat, steady state*

JIS C 60068-2-6 *Environmental testing Part 2: Tests—Test Fc: Vibration (sinusoidal)*

JIS C 60068-2-7 *Basic environmental testing procedures Part 2: Tests—Test Ga and guidance: Acceleration, steady state*

JIS C 60068-2-11 *Basic environmental testing procedures Part 2: Tests—Test Ka: Salt mist*

JIS C 60068-2-13 *Basic environmental testing procedures Part 2: Tests, Test M: Low air pressure*

JIS C 60068-2-17 *Basic environmental testing procedures—Part 2: Tests—Test Q: Sealing*

JIS C 60068-2-18 *Environmental testing—Part 2-18: Tests—Test R and guidance: Water*

JIS C 60068-2-20 *Basic environmental testing procedures Part 2: Tests. Test T: Soldering*

JIS C 60068-2-21 *Environmental testing—Part 2-21: Tests—Test U: Robustness of termination and integral mounting devices*

JIS C 60068-2-27 *Basic environmental testing procedures Part 2: Tests, Test Ea and guidance: Shock*

JIS C 60068-2-28 *Environmental testing, Part 2: Tests—Guidance for damp heat tests*

JIS C 60068-2-29 *Basic environmental testing procedures Part 2: Tests Test Eb and guidance: Bump*

- JIS C 60068-2-30 *Basic environmental testing procedures Part 2: Tests Test Db: Damp heat, cyclic (12 + 12-Hour cycle)*
- JIS C 60068-2-31 *Environmental testing Part 2: Tests. Test Ec: Drop and topple, primarily for equipment-type specimens*
- JIS C 60068-2-32 *Environmental testing Part 2: Tests. Test Ed: Free fall*
- JIS C 60068-2-38 *Basic environmental testing procedures Part 2: Tests Test Z/AD: Composite temperature/humidity cyclic test*
- JIS C 60068-2-39 *Environmental testing—Part 2: Tests. Test Z/AMD: Combined sequential cold, low air pressure, and damp heat test*
- JIS C 60068-2-40 *Environmental testing Part 2: Tests, Test Z/AM: Combined cold/low air pressure tests*
- JIS C 60068-2-41 *Environmental testing Part 2: Tests, Test Z/BM: Combined dry heat/low air pressure tests*
- JIS C 60068-2-42 *Basic environmental testing procedures Part 2: Tests Test Kc: Sulphur dioxide test for contacts and connections*
- JIS C 60068-2-43 *Basic environmental testing procedures Part 2: Tests Test Kd: Hydrogen sulphide test for contacts and connections*
- JIS C 60068-2-45 *Environmental testing procedures of electronic and electrical resistance to solvents (immersion in cleaning solvents)*
- JIS C 60068-2-46 *Basic environmental testing procedures Part 2: Tests Guidance to Test Kd: Hydrogen sulphide test for contacts and connections*
- JIS C 60068-2-47 *Environmental testing—Part 2-47: Test methods—Mounting of components, equipment and other articles for vibration, impact and similar dynamic tests*
- JIS C 60068-2-48 *Environmental testing—Part 2: Tests. Guidance on the application of the tests of JIS environmental testing series to simulate the effects of storage*
- JIS C 60068-2-49 *Basic environmental testing procedures Part 2: Tests Guidance to Test Kc: Sulphur dioxide test for contacts and connections*
- JIS C 60068-2-50 *Basic environmental testing procedures Part 2: Tests Tests Z/AFc: Combined cold/vibration (sinusoidal) tests for both heat-dissipating and non-heat-dissipating specimens*
- JIS C 60068-2-51 *Basic environmental testing procedures Part 2: Tests Tests Z/BFc: Combined dry heat/vibration (sinusoidal) tests for both heat-dissipating and non-heat-dissipating specimens*
- JIS C 60068-2-52 *Environmental testing—Part 2: Tests—Test Kb: Salt mist, cyclic (sodium, chloride solution)*
- JIS C 60068-2-53 *Basic environmental testing procedures Part 2: Tests Guidance to tests Z/AFc and Z/BFc: Combined temperature (cold and dry heat) and vibration (sinusoidal) tests*
- JIS C 60068-2-54 *Environmental testing Part 2: tests. Test Ta: Soldering. Solderability testing by the wetting balance method*
- JIS C 60068-2-56 *Environmental testing Part 2: Tests. Test Cb: Damp heat, steady state, primarily for equipment*
- JIS C 60068-2-57 *Environmental testing—Electrotechnical products—Time-history vibration test method*

- JIS C 60068-2-58 *Environmental testing—Part 2: Tests—Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*
- JIS C 60068-2-59 *Environmental testing—Part 2: Test methods Test Fe: Vibration—Sine-beat method*
- JIS C 60068-2-60 *Environmental testing—Part 2: Tests—Test Ke: Flowing mixed gas corrosion test*
- JIS C 60068-2-61 *Environmental testing Part 2: Test methods Test Z/ABDM: Climatic sequence*
- JIS C 60068-2-64 *Environmental testing Part 2: Test methods—Test Fh: Vibration, broad-band random (digital control) and guidance*
- JIS C 60068-2-65 *Environmental testing—Part 2-65: Vibration, acoustically induced*
- JIS C 60068-2-66 *Environmental testing—Part 2: Test methods—Test Cx: Damp heat, steady state (unsaturated pressurized vapour)*
- JIS C 60068-2-67 *Environmental testing—Part 2: Tests—Test Cy: Damp heat, steady state, accelerated test primarily intended for components*
- JIS C 60068-2-68 *Environmental testing—Electrotechnical products—Dust and sand test*
- JIS C 60068-2-70 *Environmental testing—Part 2: Tests—Test Xb: Abrasion of markings and letterings caused by rubbing of fingers and hands*
- JIS C 60068-2-75 *Environmental testing—Part 2-75: Tests—Test Eh: Hammer tests*
- JIS C 60068-2-77 *Environmental testing—Part 2-77: Tests—Test 77: Body strength and impact shock*
- JIS C 60068-2-78 *Environmental testing—Part 2-78: Tests—Test Cab: Damp heat, steady state*
- JIS C 60068-2-81 *Environmental testing—Part 2-81: Shock—Shock response spectrum synthesis*
- JIS C 60068-3-1 *Background information, Section One—Cold and dry heat tests*
- JIS C 60068-3-2 *Basic environmental testing procedures Part 3: Background information Section Two—Combined temperature/low air pressure tests*
- JIS C 60068-3-3 *Environmental testing—Part 3: Guidance Seismic test method for equipments*
- JIS C 60068-3-4 *Environmental testing—Part 3-4: Supporting documentation and guidance—Damp heat tests*
- JIS C 60068-3-5 *Environmental testing—Part 3-5: Supporting documentation and guidance—Confirmation of the performance of temperature chambers*
- JIS C 60068-3-6 *Environmental testing—Part 3-6: Supporting documentation and guidance—Confirmation of the performance of temperature/humidity chambers*
- JIS C 60068-3-7 *Environmental testing—Part 3-7: Supporting documentation and guidance—Measurements in temperature chambers for tests A and B (with load)*
- JIS C 60068-3-8 *Environmental testing—Part 3-8: Supporting documentation and guidance—Selecting amongst vibration tests*

Environmental testing—Part 2-47 : Tests— Mounting of specimens for vibration, impact and similar dynamic tests

Introduction

This Japanese Industrial Standard has been prepared based on the third edition of **IEC 60068-2-47** published in 2005 without modifying the technical contents.

This Standard defines the requirements and gives information regarding the mounting of components, equipment and other articles and packaged products (hereafter referred to as “specimens”) when they are subjected to vibration, impact and similar dynamic tests.

In all cases, component-type specimens are mounted as stated in the relevant specification. Where these details are not specified, a number of standardized methods of mounting are given in this Standard.

Equipment-type specimens should be mounted by their normal means of attachment unless otherwise stated in the relevant specification.

An attempt is made, in the first instance, to categorize specimens into either component or equipment types and then to proceed to test accordingly. If this is not possible, for example for packaged items, this Standard may still be relevant, but relates to the packaging and not to the contents. It should be noted that this Standard does not apply to the testing of empty packaging.

General guidance is provided in Annex A, as appropriate for both the specification writer and the test engineer. Specific guidance on the testing of packaged products is given in Annex B. Annex C provides guidance on the methodology for modifying a half sine pulse test, used as input to a packaged specimen, when the packaging is not available.

In some instances, requirements and guidance on mounting are included, partly or wholly, in the individual standards of the **JIS C 60068-2** series. Where such a standard is called up by the relevant specification, it will need to be studied as well as this Standard.

1 Scope

This Standard provides methods for mounting products, whether packaged or unpackaged, as well as mounting requirements for equipment and other articles, for the series of dynamic tests in **JIS C 60068-2**, that is impact, vibration and acceleration, steady-state. When they are fastened to the test apparatus and subjected to these tests, whether packaged or unpackaged, they are referred to as specimens.

NOTE : The International Standard corresponding to this Standard is as follows.

IEC 60068-2-47 : 2005 *Environmental testing—Part 2-47: Test—Mounting of specimens for vibration, impact and similar dynamic tests* (IDT)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For these standards, only the edition of indicated year shall be applied so that the revisions (including amendments) made thereafter are not applied.

JIS B 0153 *Glossary of terms used in mechanical vibration and shock*

NOTE : Corresponding International Standard: ISO 2041 : 1990 *Vibration and shock—Vocabulary* (MOD)

JIS C 60068-1 : 1993 *Environmental testing Part 1: General and guidance*

NOTE : Corresponding International Standard: IEC 60068-1 : 1988 *Environmental testing. Part 1: General and guidance* (IDT)

IEC 60068-2-55 : 1987 *Environmental testing. Part 2: Tests. Test Ee and guidance: Bounce*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions used in **JIS C 60068-1** and **JIS B 0153** and the following apply.

3.1 package

result of the packing operation, consisting of the packaging and its contents, for example, electronic devices prepared for transport

3.2 packaging

product made of any material of any nature to be used for the containment, protection, handling and delivery, for example, a corrugated fibreboard box

4 General

The relevant specification shall state whether the effect of gravitational force is important. If so, the specimen shall be mounted in such a way that the gravitational force acts in the same direction as it would in use. Where the effect of gravitational force is not important, the specimen may be mounted in any attitude.

If significant for the test results, the relevant specification shall also state

- a) the temperature limits within which the specimen shall be tested,
- b) the maximum level of magnetic interference which may be imposed on the specimen and/or the orientation of the specimen in relation to the direction of the magnetic field (for example, near an electrodynamic vibration generator),
- c) the relative humidity limits within which the specimen shall be tested.

5 Mounting, where the specimen is a component

The mounting method to be used shall be as stated in the relevant specification (see **A.1**).

Where the method of mounting is not specified but is obvious from the design, as in figure 1, this method shall be used. Where it is not obvious, the mounting methods shall, whenever possible, be chosen in accordance with the principles shown in figures

2, 3 or 4, bearing in mind whether the intention is to load dynamically the leads and/or the body or to determine the internal robustness.

When the specimen is to be tested with additional leads attached, these shall be so arranged that they impose similar restraint and mass to those when the specimen is used in its normal manner.

In all cases, components shall be fastened to a rigid test fixture or directly to the mounting surface of the test apparatus. The most common failure mode for electronic components as shown in figures 1, 2 and 3 is not failure of the component itself but of the solder connection due to flexure of the printed circuit board. Testing of the complete printed circuit board is essential.

NOTE : A “rigid test fixture” is one where there are no resonances within the test range or where the requirements of the test tolerances can be met at all fixing points.

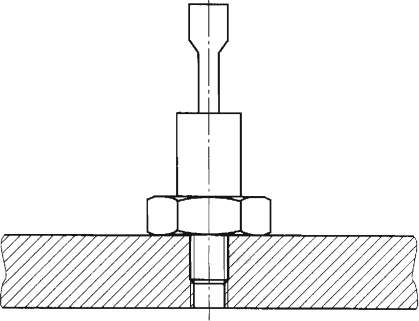
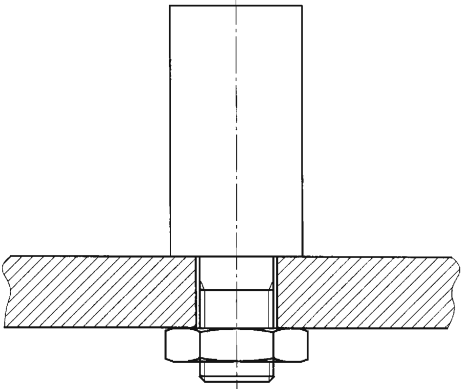
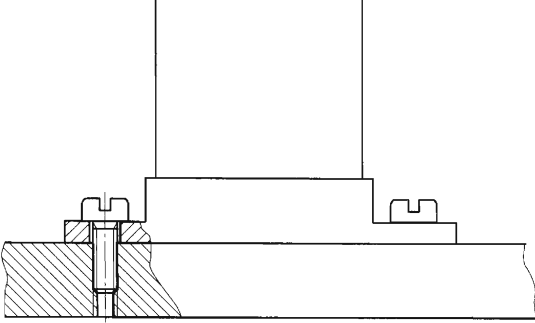
Methods of mounting	Examples
	Components provided with obvious means of mounting, for example diodes, electrolytic capacitors, rectifiers, switches, connectors, relays, transformers, power transistors
	
	

Figure 1 Examples of obvious means of mounting components

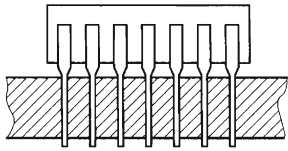
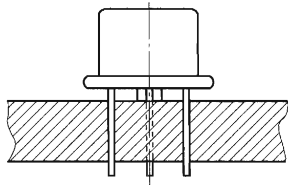
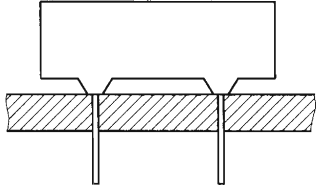
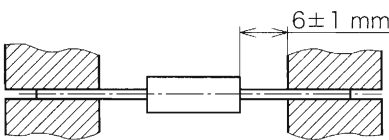
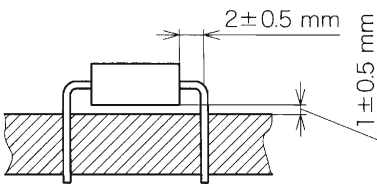
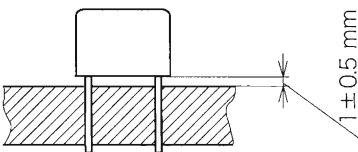
Methods of mounting	Examples
	Components such as transistors, integrated circuits, relays and others where the distance to the fixture is limited by design
	
	Resistors, capacitors
	Resistors, capacitors, inductors, diodes
	Resistors, capacitors, inductors, diodes, transistors NOTE: It is important that the relevant specification states whether or not the component is in contact with the mounting surface.
	

Figure 2 Examples of mounting of components by the leads only

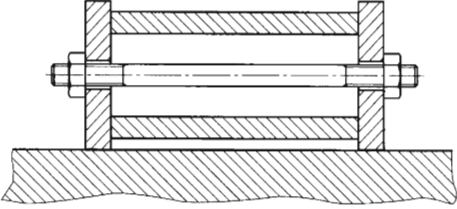
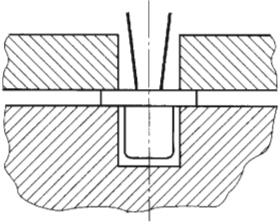
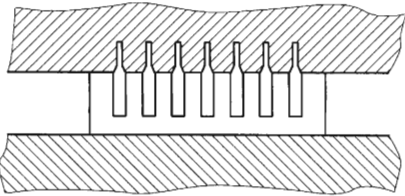
Methods of mounting	Examples
	Tubular components, the coating of which is fragile, such as high-power resistors
	Transistors, diodes
	Integrated circuits

Figure 3 Examples of mounting of components by the body only