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**Components for low-voltage surge
protective devices — Specifications
for avalanche breakdown diode
(ABD)**

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from Electronic Materials Manufacturers Association of Japan (EMAJ)/the Japanese Standards Association (JSA), with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

This Standard has been made based on IEC 61643-321:2001 *Components for low-voltage surge protective devices—Part 321: Specifications for avalanche breakdown diode (ABD)* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

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 Ministers 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.

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Components for low-voltage surge protective devices—Specifications for avalanche breakdown diode (ABD)

Introduction This Japanese Industrial Standard has been prepared based on the first edition of IEC 61643-321 *Components for low-voltage surge protective devices—Part 321 : Specifications for avalanche breakdown diode (ABD)* published in 2001 without modifying the technical contents.

1 Scope This part of JIS C 5381 specifies avalanche breakdown diodes (hereafter referred to as “ABDs”) which represent one type of surge protective device component (hereafter referred to as SPDC) used in the design and construction of surge protective devices connected to low-voltage power distribution systems, transmission, and signaling networks. Test specifications in this Standard are for single ABDs consisting of two terminals. However, multiple ABDs may be assembled within a single package defined as a diode array. Each diode within the array can be tested to this specification.

This Standard contains a series of test criteria for determining the electrical characteristics of the ABD. From the standard test methods described herein, the performance characteristics and ratings of the ABD can be verified or established for specific packaged designs.

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

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

IEC 61643-321:2001 *Components for low-voltage surge protective devices—Part 321 : Specifications for avalanche breakdown diode (ABD)* (IDT)

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 or the year of publication is given to these referred standards, only the edition of the indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply. The normative references without the indication of the year of publication apply only to the most recent edition (including amendments).

JIS C 0364-3:1999 *Electrical installations of buildings—Part 3 Assessment of general characteristics*

Note : IEC 60364-3 : 1993 *Electrical installations of buildings—Part 3: Assess-*

ment of general characteristics is identical with the said Standard.

IEC 60068 (all parts) *Environmental testing*

IEC 60364 (all parts) *Electrical installations of buildings*

IEC 60721 (all parts) *Classification of environmental conditions*

IEC 60747-2 : 2000 *Semiconductor devices—Discrete devices and integrated circuits—Part 2 : Rectifier diodes*

IEC 60749 : 1996 *Semiconductor devices—Mechanical and climatic test methods*

3 Definitions and symbols For the purpose of this Standard, the following definitions and symbols apply.

Note : These definitions apply to one type of SPDC known as an ABD, having both symmetrical and asymmetrical voltage-current (V - I) characteristics. Such definitions are for a unidirectional element (see figure 1). If the ABD is considered bidirectional, definitions in the third quadrant will apply in both directions of the V - I characteristic curve.

3.1 avalanche breakdown diode ABD component intended to limit transient voltages and divert surge currents. This is a two-terminal diode that may be packaged with multiple elements having a common terminal

3.2 clamping voltage V_C peak voltage measured across the ABD during the application of a peak impulse current I_{PP} for a specified waveform

Note : Due to the thermal, reactive, or other effects, peak voltage and peak pulse current are not necessarily coincident in time. Also shown as V_{CL} .

3.3 rated peak impulse current I_{PPM} rated maximum value of peak impulse current I_{PP} that may be applied without causing diode failure

Note : The impulse waveshape used for diode characterization is 10/1 000 μ s (see figure 8) unless otherwise specified.

3.4 maximum working voltage (maximum d.c. voltage) V_{WM} maximum peak working or d.c. voltage which may be continuously applied to the ABD without degradation or damaging effects. For a.c. applied voltages, the maximum working r.m.s. voltage is V_{WMrms} .

Note : It is also shown as V_{RM} (rated maximum) and known as rated stand-off voltage.

3.5 stand-by current I_D maximum current that flows through the ABD at maximum working voltage for a specified temperature

Note : Also shown as I_R for reverse leakage current.

3.6 breakdown (avalanche) voltage V_{BR} voltage measured across the ABD at a specified pulsed d.c. current I_T (or $I_{(BR)}$) on the V - I characteristics curve at, or near, the place where the avalanche occurs

3.7 capacitance C_j capacitance between two terminals of the ABD measured at a