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Interested committees:

Title: BS EN 60749-34-1 Ed.1.0 Semiconductor devices - Mechanical and climatic test methods Part 34-1: Power cycling test for power semiconductor module

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

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- ii) affects other national standard(s)
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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



47/2759/CD

COMMITTEE DRAFT (CD)

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IEC TC 47 : SEMICONDUCTOR DEVICES

SECRETARIAT:

Korea, Republic of

SECRETARY:

Mr Cheolung Cha

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☒ QUALITY ASSURANCE

☐ SAFETY

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Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Semiconductor devices - Mechanical and climatic test methods - Part 34-1: Power cycling test for power semiconductor module

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SEMICONDUCTOR DEVICES –
MECHANICAL AND CLIMATIC TEST METHODS –****Part 34-1: Power cycling test for Power semiconductor module****FOREWORD**

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International Standard IEC 60749 has been prepared by IEC technical committee TC47.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
47/XX/FDIS	47/XX/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

96 A list of all parts in the IEC 60749 series, published under the general title semiconductor
97 devices –mechanical and climatic test methods, can be found on the IEC website.

98 The committee has decided that the contents of this document will remain unchanged until the
99 stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to
100 the specific document. At this date, the document will be

- 101 • reconfirmed,
102 • withdrawn,
103 • replaced by a revised edition, or
104 • amended.

105

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INTRODUCTION

108 A power semiconductor module is affected with thermal and mechanical stresses due to the
109 power dissipation of the internal semiconductor dies and internal connectors. This happens
110 when low voltage operating biases for forward conduction (load currents) are periodically
111 applied and removed, causing rapid changes of temperature. The power cycling test is
112 intended to simulate the temperature swing in typical applications of power electronics, which
113 is different from the stable temperature under the HTOL (High Temperature Operating Life)
114 (see IEC 60749-23). Exposure to this test may not induce the same failure mechanisms as
115 exposure to the Thermal Cycle test, or Thermal Shock test. This test is a destructive test and
116 will cause wear-out failure of the DUT if it is driven above the specification of the device.
117 The power cycle test is applied to general industrial power semiconductor modules such as are used
118 for motor control, robots, and renewable energy generation. The power cycle test has two modes: a
119 short-time test (based on cycle time) that simulates rapid acceleration and deceleration of the
120 equipment, and a long-time test (based on cycle time) that simulates repeated operation and stop of
121 the equipment. The short-time test mainly verifies the effect of the temperature change of T_{vj} , and
122 causes the deterioration of the joint between the chip and the wire and that of the solder under the
123 chip. The long-time test verifies the effect of the temperature change of T_c , and causes the
124 deterioration of the solder between the metallic base plate and the insulating substrate and the
125 deterioration of the solder under the chip.
126 The power cycle test is performed in two cases: a certification test for the products whose power cycle
127 lifetime model has already been confirmed, and a lifetime model validation test for the products whose
128 lifetime model has not been confirmed. The purpose of the certification test is to verify that the product
129 has a life longer than the specified cycle.
130 On the other hand, the purpose of the lifetime model validation test is to statistically estimate the
131 power cycle lifetime model from the test results and obtain the expected lifetime model of power
132 modules. This is required when the customer designs the lifetime of their products.