SLOVENSKI STANDARD
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Polprevodniški elementi - 5-5. del: Optoelektronske naprave - Optični sklopniki (IEC 60747-5-5:2020)

Semiconductor devices - Part 5-5: Optoelectronic devices - Photocouplers (IEC 60747-5-5:2020)

Halbleiterbauelemente - Teil 5-5: Optoelektronische Bauelemente - Optokoppler (IEC 60747-5-5:2020)

Dispositifs à semiconducteurs - Partie 5-5 : Dispositifs optoélectroniques - Photocoupleurs (IEC 60747-5-5:2020)

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ICS:

31.080.01	Polprevodniški elementi (naprave) na splošno	Semiconductor devices in general
31.260	Optoelektronika, laserska oprema	Optoelectronics. Laser equipment

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60747-5-5

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Supersedes EN 60747-5-5:2011 and all of its amendments and corrigenda (if any)

English Version

Semiconductor devices - Part 5-5: Optoelectronic devices - Photocouplers (IEC 60747-5-5:2020)

Dispositifs à semiconducteurs - Partie 5-5 : Dispositifs optoélectroniques - Photocoupleurs (IEC 60747-5-5:2020)

Halbleiterbauelemente - Teil 5-5: Optoelektronische Bauelemente - Optokoppler (IEC 60747-5-5:2020)

This European Standard was approved by CENELEC on 2020-08-24. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

The text of document 47E/706/FDIS, future edition 2 of IEC 60747-5-5, prepared by SC 47E "Discrete semiconductor devices" of IEC/TC 47 "Semiconductor devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60747-5-5:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-05-24
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-08-24

This document supersedes EN 60747-5-5:2011 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60747-5-5:2020 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60065	NOTE	Harmonized as EN 60065
IEC 60270:2000	NOTE	Harmonized as EN 60270:2001 (not modified)
IEC 60747-5-2	NOTE	Harmonized as EN 60747-5-2
IEC 60747-5-3	NOTE	Harmonized as EN 60747-5-3

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60068-1	2013	Environmental testing - Part 1: General and guidance	EN 60068-1	2014
IEC 60068-2-1	-	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	-
IEC 60068-2-2	-	Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	-
IEC 60068-2-6	-	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	-
IEC 60068-2-14	-	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN 60068-2-14	-
IEC 60068-2-17	-	Basic environmental testing procedures - Part 2-17: Tests - Test Q: Sealing	EN 60068-2-17	-
IEC 60068-2-20	-	Environmental testing - Part 2-20: Tests - Test T: Test methods for solderability and resistance to soldering heat of devices with leads	EN 60068-2-20	-
IEC 60068-2-27	-	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	-
IEC 60068-2-30	-	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	-
IEC 60068-2-58	-	Environmental testing - Part 2-58: Tests - Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)	EN 60068-2-58	-
IEC 60068-2-78	-	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	-
IEC 60112	-	Method for the determination of the proof and the comparative tracking indices of solid insulating materials	EN 60112	-

Publication	Year	Title	EN/HD	Year
IEC 60216-1	-	Electrical insulating materials - Thermal endurance properties - Part 1: Ageing procedures and evaluation of test results	EN 60216-1	-
IEC 60216-2	-	Electrical insulating materials - Thermal endurance properties - Part 2: Determination of thermal endurance properties of electrical insulating materials - Choice of test criteria	EN 60216-2	-
IEC 60664-1	2007	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	2007
IEC 60672-2	-	Ceramic and glass insulating materials - Part 2: Methods of test	EN 60672-2	-
IEC 60695-11-5	-	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance	EN 60695-11-5	-
IEC 61000-4-5	-	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	-
IEC 62368-1	2018	Audio/video, information and communication technology equipment - Part 1: Safety requirements	EN IEC 62368-1	2020

IEC 60747-5-5

Edition 2.0 2020-07

INTERNATIONAL STANDARD

Semiconductor devices – Part 5-5: Optoelectronic devices – Photocouplers

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 31.080.01; 31.260

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SEMICONDUCTOR DEVICES –

Part 5-5: Optoelectronic devices – Photocouplers

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60747-5-5 has been prepared by subcommittee 47E: Discrete semiconductor devices, of IEC technical committee 47: Semiconductor devices.

This second edition cancels and replaces the first edition published in 2007 and Amendment 1:2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) optional data sheet basic insulation rating in accordance with IEC 60664-1:2007, 6.1.3.5;
b) editorial corrections on the use of V_{IORM};
c) editorial corrections on Figure 2: Time intervals for method b);
d) addition of an alternative surge pulse V_{IOSM} test method.

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

FDIS	Report on voting
47E/706/FDIS	47E/714/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.

A list of all parts in the IEC 60747 series, published under the general title *Semiconductor devices*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

SEMICONDUCTOR DEVICES –

Part 5-5: Optoelectronic devices – Photocouplers

1 Scope

This part of IEC 60747 specifies the terminology, essential ratings, characteristics, safety tests, as well as the measuring methods for photocouplers.

NOTE The term "optocoupler" can also be used instead of "photocoupler".

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-1:2013, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-17, *Basic environmental testing procedures – Part 2-17: Tests – Test Q: Sealing*

IEC 60068-2-20, *Environmental testing – Part 2-20: Tests – Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-58, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60216-1, *Electrical insulating materials – Thermal endurance properties – Part 1: Ageing procedures and evaluation of test results*

IEC 60216-2, *Electrical insulating materials – Thermal endurance properties – Part 2: Determination of thermal endurance properties of electrical insulating materials – Choice of test criteria*

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60672-2, *Ceramic and glass insulating materials – Part 2: Methods of test*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 62368-1:2018, *Audio/video, information and communication technology equipment – Part 1: Safety requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses: ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
photocoupler
optoelectronic device designed for the transfer of electrical signals by utilizing optical radiation to provide coupling with electrical isolation between the input and the output

Note 1 to entry: Different types of photocouplers include ambient-rated or case-rated photocouplers, for signal-isolation applications.

3.1.1
DC input photocoupler
photocoupler consisting at the input of a photoemitter to which DC current is applied

3.1.2
AC input photocoupler
photocoupler consisting at the input of antiparallel photoemitters to which AC current is applied

3.1.3
phototransistor output photocoupler
photocoupler whose photosensitive element is a phototransistor

Note 1 to entry: Phototransistor is a transistor in which the current produced by the photoelectric effect in the neighbourhood of the emitter-base junction acts as base current, which is amplified.

3.1.4
photothyristor photocoupler
photocoupler whose photosensitive element is a photothyristor

Note 1 to entry: Photothyristor is a thyristor that is designed to be triggered by optical radiation.

Note 2 to entry: Gate terminal may or may not be provided.

3.1.5
phototriac output photocoupler
photocoupler whose photosensitive element is a phototriac and photocoupler whose photosensitive element is a phototriac and output is triac

Note 1 to entry: A phototriac is a triac that is designed to be triggered by optical radiation.

3.1.6
IC photocoupler
photocoupler whose photosensitive element is a photodiode/phototransistor and an integrated circuit

3.1.7
FET photocoupler
photocoupler with one or more field-effect transistors (FETs) in the output stage

Note 1 to entry: A FET is activated by photoemitter by direct optical radiation from a photoemitter.

3.1.8
photodiode photocoupler
photocoupler whose photosensitive element is a photodiode or photodiode array

3.1.9
IC input photocoupler
photocoupler whose input element consists of an integrated circuit and a photoemitter

3.1.10
solid state opto-relay
photocoupler whose output switches digitally without requiring a supply voltage

Note 1 to entry: The term "solid state opto-relay" includes photorelay, photothyristor photocoupler, phototriac photocoupler and FET/IGBT photocoupler.

3.1.11
current transfer ratio
$H_{f(ctr)}$
ratio of the DC output current to the DC input current, the output voltage being held constant

Note 1 to entry: The abbreviated term CTR (DC) is sometimes used instead of a symbol.

3.1.12
small-signal short-circuit forward current transfer ratio
$h_{f(ctr)}$
ratio of the AC output current to the AC input current, the output being short-circuited to AC

Note 1 to entry: The abbreviated term CTR (AC) is sometimes used instead of a symbol.

3.2
cut-off frequency
f_{co}
frequency at which the modulus of the small-signal current transfer ratio has decreased to $1/\sqrt{2}$ of its low-frequency value

3.3
input-to-output capacitance
C_{IO}
total capacitance between all input terminals or pins connected together and all output terminals or pins connected together