

STN	EMC IC modelovanie Časť 1: Všeobecný modelovací rámec	STN EN IEC 62433-1 35 8728
------------	--	--

EMC IC modelling - Part 1: General modelling framework

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/19

Obsahuje: EN IEC 62433-1:2019, IEC 62433-1:2019

129175

EUROPEAN STANDARD

EN IEC 62433-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2019

ICS 31.200

English Version

**EMC IC modelling - Part 1: General modelling framework
(IEC 62433-1:2019)**

Modèles de circuits intégrés pour la CEM - Partie 1: Cadre
de modèle général
(IEC 62433-1:2019)

EMV-IC-Modellierung - Teil 1: Allgemeine
Modellierungsstruktur
(IEC 62433-1:2019)

This European Standard was approved by CENELEC on 2019-04-12. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

EN IEC 62433-1:2019 (E)**European foreword**

The text of document 47A/1042/CDV, future edition 1 of IEC 62433-1, prepared by SC 47A "Integrated circuits" of IEC/TC 47 "Semiconductor devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62433-1:2019.

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) 2020-01-12
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-04-12

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 62433-1:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

CISPR 17 NOTE Harmonized as EN 55017

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62433	series	EMC IC modelling	EN 62433	series
ISO 8879	-	Information processing - Text and office systems - Standard Generalized Markup Language (SGML)	-	-
ANSI INCITS 4	1986	Information Systems - Coded Character Sets - 7-Bit American National Standard Code for Information Interchange (7-Bit ASCII)	-	-



IEC 62433-1

Edition 1.0 2019-03

INTERNATIONAL STANDARD



**EMC IC modelling –
Part 1: General modelling framework**





THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2019 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.



IEC 62433-1

Edition 1.0 2019-03

INTERNATIONAL STANDARD



EMC IC modelling – Part 1: General modelling framework

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.200

ISBN 978-2-8322-6601-4

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms, definitions, abbreviated terms and conventions.....	7
3.1 Terms and definitions.....	7
3.2 Abbreviated terms.....	10
3.3 Conventions.....	11
4 Definition of models.....	11
4.1 General.....	11
4.2 Conducted emission model	11
4.3 Radiated emission model	11
4.4 Conducted immunity model	12
4.5 Radiated immunity model.....	12
4.6 Conducted pulse immunity model.....	12
5 Modelling approaches.....	12
5.1 General.....	12
5.2 Black box modelling approach.....	13
5.3 Equivalent circuit modelling approach	13
5.4 Other modelling approaches	14
5.4.1 General	14
5.4.2 Electromagnetic modelling approach	14
5.4.3 Statistical modelling approach	14
6 Requirements of model description.....	14
7 Model data exchange format.....	14
7.1 General.....	14
7.2 IC EMCML structure.....	15
7.3 IC EMCML components.....	16
7.3.1 Root element.....	16
7.3.2 Global element	16
7.3.3 Header section	16
7.3.4 Lead element.....	17
7.3.5 Lead_definitions section	17
7.3.6 Macromodels section	17
7.3.7 Frequency section	18
7.3.8 Validity section	19
7.3.9 Pdn section	20
7.3.10 Nlb section	21
7.3.11 lbc section	21
7.3.12 Ia section.....	21
7.3.13 Ib section.....	22
7.3.14 Fb section.....	22
7.3.15 Voltage, Current and Power sections	23
7.3.16 Table section.....	23
7.3.17 Coordinate_system section.....	24
7.3.18 Reference section.....	24
Annex A (normative) Requirements for EMC IC models	25

Annex B (normative) Preliminary definitions for XML representation	26
B.1 XML basics	26
B.1.1 XML declaration.....	26
B.1.2 Basic elements	26
B.1.3 Root element.....	26
B.1.4 Comments	26
B.1.5 Line terminations	27
B.1.6 Element hierarchy.....	27
B.1.7 Element attributes	27
B.2 Keyword requirements	27
B.2.1 General	27
B.2.2 Keyword characters	27
B.2.3 Keyword syntax	28
B.2.4 File structure	28
B.2.5 Values	30
Annex C (normative) IC_EMCMML valid keywords and usage	32
C.1 Root element keywords.....	32
C.2 Global keywords	33
C.3 File header keywords	33
C.4 <i>Lead</i> keyword attributes	35
C.5 <i>Submodel</i> element attributes.....	36
C.6 <i>Vector</i> element keywords	36
C.7 <i>Lead_definitions</i> section attributes	37
C.7.1 General	37
C.7.2 <i>Lead</i> element attributes	38
C.8 <i>Validity</i> section keywords	38
C.9 <i>Subckt</i> section attributes	38
C.10 <i>Netlist</i> section keywords	39
C.11 <i>Pdn and lbc</i> section keywords.....	39
C.11.1 General	39
C.11.2 <i>Lead</i> element attributes in the <i>Pdn</i> section	40
C.11.3 <i>Lead</i> element attributes in the <i>lbc</i> section.....	42
C.12 <i>la</i> section keywords	44
C.12.1 General	44
C.12.2 <i>Lead</i> element attributes	44
C.12.3 <i>Voltage</i> section keywords	45
C.12.4 <i>Current</i> section keywords	46
C.12.5 <i>Pulse</i> element keywords	48
C.13 <i>lb</i> section keywords	50
C.13.1 <i>Lead</i> element keywords	50
C.13.2 <i>Max_power_level</i> section keywords	51
C.13.3 <i>Voltage</i> section keywords	51
C.13.4 <i>Current</i> section keywords	52
C.13.5 <i>Power</i> section keywords	53
C.13.6 <i>Test_criteria</i> section keywords.....	54
C.14 <i>Nlb</i> section keywords	55
C.15 <i>Fb</i> section keywords	56
C.15.1 <i>Lead</i> element keywords	56
C.15.2 Table element keywords	57

C.15.3 Test_characteristics element attributes	58
Bibliography.....	59
Figure B.1 – Multiple XML files	29
Figure B.2 – XML files with data files (*.dat)	29
Figure B.3 – XML files with additional files	30
Figure C.1 – Pulse signal as defined using the Pulse element.....	50
Table 1 – Attributes of <i>Lead</i> keyword in the <i>Lead_definitions</i> section	17
Table 2 – General definition of the <i>Subckt</i> attributes	18
Table 3 – Definition of the <i>Validity</i> section	19
Table A.1 – Requirements for model description	25
Table B.1 – Valid logarithmic units	31
Table C.1 – <i>Root</i> element keywords.....	32
Table C.2 – Global keywords	33
Table C.3 – <i>Header</i> element keywords.....	34
Table C.4 – <i>Lead</i> element keywords	35
Table C.5 – <i>Submodel</i> element keywords	36
Table C.6 – <i>Vector</i> element keywords	37
Table C.7 – Valid elements in the <i>Lead_definitions</i> section	37
Table C.8 – Attributes of the <i>Lead</i> element in the <i>Lead_definitions</i> section	38
Table C.9 – <i>Validity</i> element keywords.....	38
Table C.10 – <i>Subckt</i> element keywords	39
Table C.11 – <i>Netlist</i> element keywords	39
Table C.12 – <i>Pdn</i> element keywords	40
Table C.13 – Attributes of the <i>Lead</i> element in the <i>Pdn</i> section	41
Table C.14 – Attributes of the <i>Lead</i> element in the <i>Ibc</i> section	43
Table C.15 – Valid keywords in the <i>Ia</i> section.....	44
Table C.16 – Attributes of the <i>Lead</i> element in the <i>Ia</i> section.....	44
Table C.17 – <i>Voltage</i> element keywords	45
Table C.18 – <i>Current</i> element keywords	47
Table C.19 – Attributes of the <i>Pulse</i> element	48
Table C.20 – <i>Lead</i> element keywords in the <i>Ib</i> section.....	50
Table C.21 – <i>Max_power_level</i> section keywords	51
Table C.22 – <i>Voltage</i> section keywords	52
Table C.23 – <i>Current</i> section keywords.....	53
Table C.24 – <i>Power</i> section keywords.....	54
Table C.25 – <i>Test_criteria</i> section keywords	55
Table C.26 – <i>Lead</i> element keywords in the <i>Nlb</i> section	55
Table C.27 – <i>Lead</i> element keywords in the <i>Fb</i> section.....	56
Table C.28 – <i>Table</i> element keywords in the <i>Fb</i> section.....	57
Table C.29 – <i>Test_characteristics</i> element keywords in the <i>Fb</i> section	58

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EMC IC MODELLING –

Part 1: General modelling framework

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62433-1 has been prepared by subcommittee 47A: Integrated circuits, of IEC technical committee 47: Semiconductor devices.

IEC 62433-1 cancels and replaces IEC TS 62433-1 published in 2011. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC TS 62433 1:2011:

Incorporation of a data exchange format for an integrated circuit's model representation.

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

CDV	Report on voting
47A/1042/CDV	47A/1055/RVC

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 of the IEC 62433 series, under the general title *EMC IC modelling*, can be found on the IEC website.

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

EMC IC MODELLING –

Part 1: General modelling framework

1 Scope

This part of IEC 62433 specifies the framework and methodology for EMC IC macro-modelling. Terms that are commonly used in IEC 62433 (all parts), different modelling approaches, requirements and data-exchange format for each model category that is standardized in this series are defined in this document.

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 62433 (all parts), *EMC IC modelling*

ISO 8879, *Information processing – Text and office systems – Standard Generalized Markup Language (SGML)*

ANSI INCITS 4:1986, *Information Systems – Coded Character Sets – 7-Bit American National Standard Code for Information Interchange (7-Bit ASCII)*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN