

© Copyright SEK. Reproduction in any form without permission is prohibited.

## Elektronikutrustningar – Mekaniska byggmått i 482,6 mm (19 tum)-serien – Del 3-109: Mått för chassier för inbyggda datorenheter

*Mechanical structures for electrical and electronic equipment –  
Dimensions of mechanical structures of the 482,6 mm (19 in) series –  
Part 3-109: Dimensions of chassis for embedded computing devices*

Som svensk standard gäller europastandarden EN 60297-3-109:2016. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60297-3-109:2016.

### Nationellt förord

Europastandarden EN 60297-3-109:2016

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60297-3-109, First edition, 2015 - Mechanical structures for electrical and electronic equipment - Dimensions of mechanical structures of the 482,6 mm (19 in) series - Part 3-109: Dimensions of chassis for embedded computing devices**

utarbetad inom International Electrotechnical Commission, IEC.

---

ICS 31.240.00

---

Denna standard är fastställd av SEK Svensk Elstandard, som också kan lämna upplysningar om **sakinnehållet** i standarden.  
Postadress: Box 1284, 164 29 KISTA  
Telefon: 08 - 444 14 00.  
E-post: sek@elstandard.se. Internet: www.elstandard.se

---

### *Standarder underlättar utvecklingen och höjer elsäkerheten*

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

### *SEK är Sveriges röst i standardiseringsarbetet inom elområdet*

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

### *Stora delar av arbetet sker internationellt*

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

### *Var med och påverka!*

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

### **SEK Svensk Elstandard**

Box 1284  
164 29 Kista  
Tel 08-444 14 00  
[www.elstandard.se](http://www.elstandard.se)

English Version

Mechanical structures for electrical and electronic equipment -  
Dimensions of mechanical structures of the 482,6 mm (19 in)  
series - Part 3-109: Dimensions of chassis for embedded  
computing devices  
(IEC 60297-3-109:2015)

Structures mécaniques pour équipements électriques et  
électroniques - Dimensions des structures mécaniques de  
la série 482,6 mm (19 pouces) - Partie 3-109: Dimensions  
des châssis pour dispositifs informatiques intégrés  
(IEC 60297-3-109:2015)

Mechanische Bauweisen für elektronische Einrichtungen -  
Maße der 482,6-mm-(19-in-)Bauweise -  
Teil 3-109: Maße von Einschüben für eingebettete  
Datenverarbeitung  
(IEC 60297-3-109:2015)

This European Standard was approved by CENELEC on 2015-12-28. 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, 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: Avenue Marnix 17, B-1000 Brussels

## **European foreword**

The text of document 48D/598/FDIS, future edition 1 of IEC 60297-3-109, prepared by SC 48 "Mechanical structures for electrical and electronic equipment" of IEC/TC 48 "Electrical connectors and mechanical structures for electrical and electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60297-3-109:2016.

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) 2016-09-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-12-28

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

## **Endorsement notice**

The text of the International Standard IEC 60297-3-109:2015 was approved by CENELEC as a European Standard without any modification.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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](http://www.cenelec.eu)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60297-3-100	-	Mechanical structures for electronic equipment - Dimensions of mechanical structures of the 482,6 mm (19 in) series - Part 3-100: Basic dimensions of front panels, subracks, chassis, racks and cabinets	EN 60297-3-100	-
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	EN 60529	-
IEC 61587-1	-	Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 series - Part 1: Environmental requirements, test set-up and safety aspects for cabinets, racks, subracks and chassis under indoor conditions	EN 61587-1	-
IEC 61587-3	-	Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 - Part 3: Electromagnetic shielding performance tests for cabinets and subracks	EN 61587-3	-
IEC 61587-5	-	Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 - Part 5: Seismic tests for chassis, subracks, and plug-in units	EN 61587-5	-

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references .....	7
3 Terms and definitions .....	7
4 Arrangement overview.....	7
5 Chassis dimensions.....	8
Annex A (normative) Printed board dimensions.....	11
A.1 Illustrative figure .....	11
A.2 Maximum printed board dimensions .....	11
Annex B (normative) Printed board dimensions in conjunction with fan cooling .....	13
B.1 Illustrative figure .....	13
B.2 Maximum printed board dimensions in conjunction with fan cooling .....	13
Annex C (normative) Chassis mounting options .....	16
C.1 Type A: Example for 19" cabinet mounting option .....	16
C.2 Type B: Example for 19" cabinet mounting option .....	16
C.3 Type C: Chassis mounting example .....	17
C.4 Type D: Chassis mounting option.....	17
Annex D (normative) Environmental tests .....	19
D.1 Static and dynamic load test .....	19
D.2 Seismic test .....	19
D.3 Electromagnetic shielding performance test .....	19
D.4 Degrees of protection.....	19
Annex E (informative) Extended chassis dimensions.....	20
E.1 General.....	20
E.2 Illustrative figure .....	20
E.3 Extended chassis dimensions .....	20
Figure 1 – Three dimensional grid for chassis and associated printed boards .....	6
Figure 2 – Chassis arrangement of an embedded application .....	8
Figure 3 – Chassis front dimensions .....	8
Figure 4 – Chassis depth dimensions.....	8
Figure A.1 – Chassis with printed board.....	11
Figure A.2 – Printed board dimensions .....	11
Figure B.1 – Chassis with fan cooling .....	13
Figure B.2 – Printed board dimensions in conjunction with fan cooling, example (fan depth = 28,0 mm).....	14
Figure C.1 – Type A: Chassis mounting in a 19" cabinet .....	16
Figure C.2 – Type B: Chassis mounting in a 19" cabinet .....	17
Figure C.3 – Type C: Vertical flange mounting .....	17
Figure C.4 – Type D: Horizontal flange mounting .....	18
Figure E.1 – Extended chassis example.....	20
Figure E.2 – Extended chassis – front dimensions .....	20

Figure E.3 – Extended chassis – depth dimensions.....	21
Table 1 – Chassis height dimensions .....	9
Table 2 – Chassis width dimensions .....	9
Table 3 – Chassis depth dimensions.....	10
Table A.1 – Printed board width dimensions .....	12
Table A.2 – Printed board depth dimensions .....	12
Table B.1 – Printed board width dimensions in conjunction with fan cooling, example (fan depth=28,0 mm).....	15

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MECHANICAL STRUCTURES FOR ELECTRICAL AND  
 ELECTRONIC EQUIPMENT – DIMENSIONS OF MECHANICAL  
 STRUCTURES OF THE 482,6 mm (19 in) SERIES –**

**Part 3-109: Dimensions of chassis for embedded computing devices**

**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 60297-3-109 has been prepared by subcommittee 48D: Mechanical structures for electrical and electronic equipment, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment.

The text of this standard is based on the following documents:

FDIS	Report on voting
48D/598/FDIS	48D/602/RVD

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

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

A list of all parts in the IEC 60297-3 series, published under the general title *Mechanical structures for electrical and electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series*, 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 publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

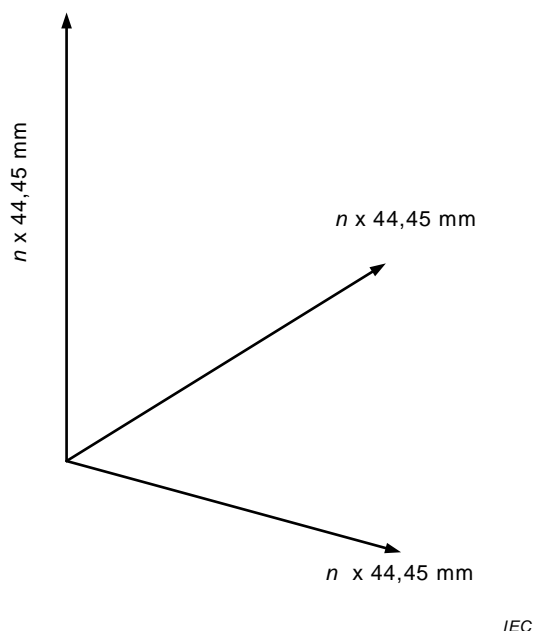
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

## INTRODUCTION

The main applications for embedded computing devices are in machine control, medical, transportation, aerospace and communication environments. For such applications single board computers are typically used.

In order to meet the different environmental conditions and handling requirements, single board computers require for mechanical, thermal and environmental protection by means of appropriate chassis designs. These devices currently reflect a very fragmented situation in the view of any existing mechanical structures dimensional standard. Due to the lack of standardization the individual solutions are realized with proprietary dimensions.

The rapidly growing market for single board computing devices calls for dimensional coordination of chassis and associated printed boards, in order to replace proprietary solutions. This standard will establish a three dimensional grid of 44,45 mm (1,75 in) for chassis and the associated printed boards, which meets best the most frequent dimensional environment of the IEC 60297 series. Once this standard is established, the design and manufacturing of embedded computing solutions will gain significant cost efficiency.



**Figure 1 – Three dimensional grid for chassis and associated printed boards**

# MECHANICAL STRUCTURES FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – DIMENSIONS OF MECHANICAL STRUCTURES OF THE 482,6 mm (19 in) SERIES –

## Part 3-109: Dimensions of chassis for embedded computing devices

### 1 Scope

This part of IEC 60297 specifies dimensions and physical properties of chassis and associated printed boards in order to provide mechanical and environmental integrity for embedded computing devices. They are used in various applications such as machine control, medical, transportation, aerospace and telecommunication, typically based on single board computers.

For the easy definition of the suitable chassis and associated single board dimensions, this standard is based on a structural grid of 44,45 mm (1,75 in).

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60297-3-100, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-100: Basic dimensions of front panels, subracks, chassis, racks and cabinets*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 61587-1, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 series – Part 1: Environmental requirements, test set-up and safety aspects for cabinets, racks, subracks and chassis under indoor conditions*

IEC 61587-3, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 3: Electromagnetic shielding performance tests for cabinets and subracks*

IEC 61587-5, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 5: Seismic tests for chassis, subracks and plug-in units*