

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

Fixed capacitors for use in electronic equipment –  
Part 25-1: Blank detail specification – Surface mount fixed aluminium electrolytic  
capacitors with conductive polymer solid electrolyte – Assessment level EZ

Condensateurs fixes utilisés dans les équipements électroniques –  
Partie 25-1: Spécification particulière cadre – Condensateurs fixes  
électrolytiques en aluminium pour montage en surface à électrolyte solide en  
polymère conducteur – Niveau d'assurance EZ



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2006 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

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

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://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 corrigenda or an amendment might have been published.

#### Useful links:

IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The advanced search enables you 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](http://webstore.iec.ch/justpublished)

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

Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

Customer Service Centre - [webstore.iec.ch/csc](http://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: [csc@iec.ch](mailto:csc@iec.ch).

### A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Liens utiles:

Recherche de publications CEI - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

La recherche avancée vous permet de trouver des publications CEI en utilisant différents critères (numéro de référence, texte, comité d'études,...).

Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

Just Published CEI - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications de la CEI. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (VEI) en ligne.

Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [csc@iec.ch](mailto:csc@iec.ch).



IEC 60384-25-1

Edition 1.0 2006-06

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Fixed capacitors for use in electronic equipment –  
Part 25-1: Blank detail specification – Surface mount fixed aluminium electrolytic  
capacitors with conductive polymer solid electrolyte – Assessment level EZ**

**Condensateurs fixes utilisés dans les équipements électroniques –  
Partie 25-1: Spécification particulière cadre – Condensateurs fixes  
électrolytiques en aluminium pour montage en surface à électrolyte solide en  
polymère conducteur – Niveau d'assurance EZ**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

N

ICS 31.060.40; 31.060.50

ISBN 978-2-83220-703-1

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –**

**Part 25-1: Blank detail specification – Surface mount fixed aluminium electrolytic capacitors with conductive polymer solid electrolyte – Assessment level EZ**

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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 60384-25-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This bilingual version (2013-05) corresponds to the monolingual English version, published in 2006-06.

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

FDIS	Report on voting
40/1734/FDIS	40/1757/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.

The French version of this standard has not been voted upon.

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

IEC 60384 consists of the following parts, under the general title *Fixed capacitors for use in electronic equipment*:

- Part 1: Generic specification
- Part 2: Sectional specification: Fixed metallized polyethylene-terephthalate film dielectric d.c. capacitors
- Part 3: Sectional specification: Fixed tantalum chip capacitors
- Part 4: Sectional specification: Aluminium electrolytic capacitors with solid and non-solid electrolyte
- Part 5: Sectional specification: Fixed mica dielectric d.c. capacitors with a rated voltage not exceeding 3 000 V – Selection of methods of test and general requirements
- Part 6: Sectional specification: Fixed metallized polycarbonate film dielectric d.c. capacitors
- Part 7: Sectional specification: Fixed polystyrene film dielectric metal foil d.c. capacitors
- Part 8: Sectional specification: Fixed capacitors of ceramic dielectric, Class 1
- Part 9: Sectional specification: Fixed capacitors of ceramic dielectric, Class 2
- Part 11: Sectional specification: Fixed polyethylene-terephthalate film dielectric metal foil d.c. capacitors
- Part 12: Sectional specification: Fixed polycarbonate film dielectric metal foil d.c. capacitors
- Part 13: Sectional specification: Fixed polypropylene film dielectric metal foil d.c. capacitors
- Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains
- Part 15: Sectional specification: Fixed tantalum capacitors with non-solid or solid electrolyte
- Part 16: Sectional specification: Fixed metallized polypropylene film dielectric d.c. capacitors
- Part 17: Sectional specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors
- Part 18: Sectional specification: Fixed aluminium electrolytic chip capacitors with solid and non-solid electrolyte
- Part 19: Sectional specification: Fixed metallized polyethylene-terephthalate film dielectric chip d.c. capacitors
- Part 20: Sectional specification: Fixed metallized polyphenylene sulphide film dielectric chip d.c. capacitors
- Part 21: Sectional specification: Fixed surface mount multilayer capacitors of ceramic dielectric, Class 1
- Part 22: Sectional specification: Fixed surface mount multilayer capacitors of ceramic dielectric, Class 2
- Part 23: Sectional specification: Fixed surface mount metallized polyethylene naphthalate film dielectric d.c. capacitors
- Part 24: Sectional specification: Surface mount fixed tantalum electrolytic capacitors with conductive polymer solid electrolyte
- Part 25: Sectional specification: Surface mount fixed aluminium electrolyte capacitors with conductive polymer solid electrolyte

All sectional specifications mentioned above do have one or more blank detail specifications being a supplementary document, containing requirements for style, layout and minimum content of detail specifications.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site 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.

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

[IEC 60384-25-1:2006](#)

<https://standards.iteh.ai/catalog/standards/sist/ea6b5b-8b7b-4292-a7db-47ccf5419918/iec-60384-25-1-2006>

## FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

### Part 25-1: Blank detail specification – Surface mount fixed aluminium electrolytic capacitors with conductive polymer solid electrolyte – Assessment level EZ

#### Blank detail specification

A blank detail specification is a supplementary document to the sectional specification and contains requirements for style, layout and minimum content of detail specifications. Detail specifications not complying with these requirements may not be considered as being in accordance with IEC specifications nor shall they so be described.

In the preparation of detail specifications the content of 1.4 of the sectional specification shall be taken into account.

The numbers between square brackets on the first page of the detail specification correspond to the following information, which shall be inserted in the position indicated.

#### Identification of the detail specification

- iTeh STANDARD PREVIEW**  
**(standards@iuh)**
- [1] The "International Electrotechnical Commission" or the National Standards Organization under whose authority the detail specification is drafted.
- [2] The IEC or National Standards number of the detail specification, date of issue and any further information required by the national system.
- [3] The number and issue number of the IEC or national generic specification.
- [4] The IEC number of the blank detail specification.

#### Identification of the capacitor

- [5] A short description of the type of capacitor.
- [6] Information on typical construction (when applicable).
- [7] Outline drawing with main dimensions which are of importance for interchangeability and/or reference to the national or international documents for outlines. Alternatively, this drawing may be given in an annex to the detail specification.
- [8] Application or group of applications covered and/or assessment level.
- [9] Reference data on the most important properties, to allow comparison between the various capacitor types.

	[1]		[2]
ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH:	[3]	IEC 60384-25-1	[4]
Outline drawing : (see Table 1) (...angle projection)	[7]	Surface mount fixed aluminium electrolytic capacitors with conductive polymer solid electrolyte	[5]
			[6]
		Assessment level(s): EZ	[8]

Information on the availability of components qualified to this detail specification is given in EC QC 001005.

[9]

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

**1 General data**

**1.1 Recommended method(s) of mounting (to be inserted)**

(See 1.4.2 of IEC 60384-25). <https://standards.iteh.ai/catalog/standards/sist/ea6b5b-8b7b-4292-a7db-47ccf5419918/iec-60384-25-1-2006>

**1.2 Dimensions**

**Table 1 – Case size reference and dimensions**

Case size reference	Dimension						
	mm						
	<i>L</i>	<i>W</i>	<i>H</i>				

NOTE 1 When there is no case size reference, Table 1 may be omitted and the dimensions should be given in Table 2, which then becomes Table 1.

NOTE 2 The dimensions should be given as maximum dimensions or as nominal dimensions with a tolerance.

NOTE 3 *L, W, H* of the symbols of Table 1 is the example of the corner shape capacitors.



### 1.3 Ratings and characteristics

Rated capacitance range (see Table 2)

Tolerance on rated capacitance

Rated voltage (see Table 2)

Surge voltage (see Table 2)

Climatic category

Rated temperature

Rated ripple current (see Table 3)

Tangent of loss angle (see Table 3)

Leakage current (see Table 3)

Equivalent series resistance (see Table 3)

**Table 2 – Values of capacitance and of voltage related to case sizes**

Rated voltage V				
Surge voltage V				
Rated capacitance $\mu\text{F}$	Case sizes	Case sizes	Case sizes	Case sizes

IEC 60384-25-1:2006

**Table 3 – Values of rated ripple current, equivalent series resistance, tangent of loss angle and leakage current**

$U_R$ V	$C_R$ $\mu\text{F}$	Rated ripple current A	Equivalent series resistance $\text{m}\Omega$	Tangent of loss angle $\tan \delta$	Leakage current $\mu\text{A}$
		at 105 °C or 125 °C and 100 kHz (if applicable)	at 20 °C and 100 kHz	at 20 °C and 120 Hz	

**Table 4 – Values of resistance to soldering heat, damp heat, steady state and characteristics at high temperature**

$U_R$ V	$C_R$ $\mu\text{F}$	Resistance to soldering heat		Damp heat, steady state	Characteristics at high temperature
		$\Delta\text{C}/\text{C}$ %	$\Delta\text{ESR}/\text{ESR}$ %	$\Delta\text{C}/\text{C}$ %	$\Delta\text{C}/\text{C}$ %

## 1.4 Normative references

The following referenced documents are indispensable for the application 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 60384-1:1999, *Fixed capacitors for use in electronic equipment – Part 1: Generic specification*

IEC 60384-25: *Fixed capacitors for use in electronic equipment – Part 25: Sectional specification: Surface mount fixed aluminium electrolytic capacitors with conductive polymer solid electrolyte*

## 1.5 Marking

The marking of the capacitor and the package shall be in accordance with the requirements of 1.6 of IEC 60384-25.

NOTE The details of the marking of the component and package should be given in full in the detail specification.

## 1.6 Ordering information

Orders for capacitors covered by this specification shall contain, in clear or in coded form, the following minimum information:

- a) rated capacitance;
- b) tolerance on rated capacitance;
- c) rated d.c. voltage;
- d) number and issue reference of the detail specification and style reference;
- e) packaging instructions.

## 1.7 Certified records of released lots

Required/not required.

## 1.8 Additional information (not for inspection purposes)

## 1.9 Additional or increased severities or requirements to those specified in the generic and/or sectional specification

NOTE Additions or increased requirements should be specified only when essential.

**Table 5 – Other characteristics**

<p>This table is to be used for defining characteristics which are additional to, or more severe than, those given in the sectional specification.</p>
--

## 2 Inspection requirements

### 2.1 Procedures

**2.1.1** For qualification approval, the procedures shall be in accordance with 3.4 of IEC 60384-25.

**2.1.2** For quality conformance inspection, the test schedule (Table 6) includes sampling, periodicity, severities and requirements. The formation of inspection lots is covered by 3.5.1 of IEC 60384-25.

**Table 6 – Test schedule for quality conformance inspection**

Subclause number and test <sup>a</sup>	D or ND <sup>b</sup>	Conditions of test <sup>a</sup>	Number of specimens and number of non-conforming items <sup>b</sup>			Performance requirements <sup>a</sup>
			<i>IL</i>	<i>n</i>	<i>c</i>	
<b>Group A inspection</b> (lot-by-lot)  <b>Subgroup A0</b> 4.20 High surge current (if applicable) 4.5.1 Leakage current 4.5.2 Capacitance 4.5.3 Tangent of loss angle ( $\tan \delta$ ) 4.5.4 Equivalent series resistance (ESR)	ND	Protective resistor: 1 000 $\Omega$  Frequency: 120 Hz Frequency: 120 Hz  Frequency: 100 kHz	100 % <sup>c</sup>			As in Table 3  Within specified tolerance As in Table 3  As in Table 3
<b>Subgroup A1</b> 4.4 Visual examination	ND		S-3	<sup>d</sup>	0	As in 4.4.2 Legible marking (if required) and as specified in the detail specification
<b>Subgroup A2</b> 4.4 Dimension (detail) <sup>e</sup>	ND		S-3	<sup>d</sup>	0	As specified in Table 1 of this specification
<b>Group B inspection</b> (lot-by-lot)  4.7 Solderability 4.7.1 Test 4.7.2 Final measurement 4.19 Solvent resistance of the marking (if applicable)	D	See detail specification for the method Visual examination  Solvent: ... Solvent temperature: ... Method 1 Rubbing material: cotton wool Recovery time: ...	S-3	<sup>d</sup>	0	As in 4.7.2  Legible marking

Table 6 (continued)

Subclause number and test <sup>a</sup>	D or ND <sup>b</sup>	Conditions of test <sup>a</sup>	Number of specimens and number of non-conforming items <sup>b</sup>			Performance requirements <sup>a</sup>
			p	n	c	
<b>Group C inspection (Periodic)</b> <b>Subgroup C1</b> 4.6 Resistance to soldering heat 4.6.1 Initial measurement 4.6.2 Test 4.6.3 Final measurement 4.18 Component solvent resistance (if applicable)	D	Capacitance Method: ... Deflection: ...s Reflow profile: ... Recovery: 24 h ± 2 h Visual examination Leakage current Capacitance Tangent of loss angle (tan δ) Equivalent series resistance (ESR) Solvent: ... Solvent temperature: ... Method 2 Recovery: ...	3	12	0 g	For use as reference value As in 4.6.3 As in Table 3 As in Table 4 As in Table 3 As in Table 4 See detail specification
<b>Sub group C2</b> 4.9 Substrate bending test 4.9.1 Initial measurement 4.9.3 Final inspection	D	Capacitance Capacitance (with printed board in bent position)	3	12	0 g	For use as reference value See detail specification
<b>Sub group C3</b> 4.3 Mounting <sup>h</sup> 4.3. Initial measurement 4.3.3 Final inspection	D	Substrate material: ... Capacitance (the value obtained in 4.5.2 may be used) Visual examination Leakage current Capacitance Tangent of loss angle (tan δ) Equivalent series resistance (ESR)				No visible damage As in Table 3 $\Delta C/C \leq \pm 15\%$ at $U_R \leq 4$ $\Delta C/C \leq \pm 10\%$ at $U_R > 4$ As in Table 3 See detail specification