

INTERNATIONAL STANDARD

NORME INTERNATIONALE

QC 302301

**Fixed capacitors for use in electronic equipment –
Part 18-1: Blank detail specification – Fixed aluminium electrolytic surface
mount capacitors with solid (MnO₂) electrolyte – Assessment level EZ**

**Condensateurs fixes utilisés dans les équipements électroniques –
Partie 18-1: Spécification particulière cadre – Condensateurs fixes
électrolytiques à l'aluminium pour montage en surface à électrolyte solide
(MnO₂) – Niveau d'assurance EZ**



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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Email: csc@iec.ch

Tél.: +41 22 919 02 11

Fax: +41 22 919 03 00



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

**Part 18-1: Blank detail specification –
Fixed aluminium electrolytic surface mount
capacitors with solid (MnO₂) electrolyte –
Assessment level EZ**

FOREWORD

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International Standard IEC 60384-18-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This second edition cancels and replaces the first edition published in 1993 and its amendment (1998) and constitutes a technical revision. This edition constitutes a minor revision related to tables, figures and references.

This bilingual version, published in 2008-07, corresponds to the English version.

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

CDV	Report on voting
40/1765/CDV	40/1823/RVC

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.

This International Standard is to be read in conjunction with IEC 60384-18.

The QC number that appears on the front cover of this publication is the specification number in the IEC Quality Assessment System for Electronic Components (IECQ).

The list of all parts of the IEC 60384 series, under the general title *Fixed capacitors for use in electronic equipment*, can be found on the IEC website.

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 [IEC 60384-18-1:2007](http://standards.iteh.ai/catalog/standards/sist/70eecb3a-cd43-4fa1-9b6b-9d57632fc38d/iec-60384-18-1-2007)
- amended.

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FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 18-1: Blank detail specification – Fixed aluminium electrolytic surface mount capacitors with solid (MnO₂) 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 correspond to the following information, which shall be inserted in the position indicated.

Identification of the detail specification

- (1) The “International Electrotechnical Commission” (IEC) 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).

NOTE When the capacitor is not designed for use in printed board applications, this is clearly stated in the detail specification in this position.

- (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.

NOTE The assessment level(s) to be used in a detail specification are selected from 3.5.4 of the sectional specification. This implies that one blank detail specification may be used in combination with several assessment levels, provided the grouping of the tests does not change.

- (9) Reference data on the most important properties, to allow comparison between the various capacitor types.

(1)	IEC 60384-18-1-XXX QC 302301-XXX	(2)	
ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH:	(3)	IEC 60384-18-1 QC 302301	(4)
Outline drawing: (see Table 1) (...angle projection) (7)	FIXED ALUMINIUM ELECTROLYTIC SURFACE MOUNT CAPACITORS WITH SOLID (MnO ₂) ELECTROLYTE	(5)	
		(6)	
	Assessment level(s): EZ	(8)	
(Other shapes are permitted within the dimensions given.)			

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

<https://standards.iteh.ai/catalog/standards/sist/70eecb3a-cd43-4fa1-9b6b-9d57632fc38d/iec-60384-18-1-2007>

(9)

1 General data

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

(See 1.4.2 and 4.3 of IEC 60384-18).

1.2 Dimensions

Table 1 – Case size reference and dimensions

Case size reference	Dimension(s)						
	mm						
	∅	L	H	d		

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.

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1.3 Ratings and characteristics

Rated capacitance range (see Table 2)

Tolerance on rated capacitance [IEC 60384-18-1:2007](https://standards.iteh.ai/catalog/standards/sist/70eeeb7e-47e1-206b-9d57632fc38d/iec-60384-18-1-2007)

Rated voltage <https://standards.iteh.ai/catalog/standards/sist/70eeeb7e-47e1-206b-9d57632fc38d/iec-60384-18-1-2007> (see Table 2)

Category voltage (if applicable) (see Table 2)

Climatic category

Rated temperature

Rated ripple current (see Table 3)

Tangent of loss angle (see Table 3)

Leakage current

Impedance (if applicable) (see Table 3)

Reverse voltage (if required)

Insulation resistance (if applicable)

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

Rated voltage				
Category voltage^a				
Rated capacitance μF	Case size	Case size	Case size	Case size

^a If different from the rated voltage.

Table 3 – Tangent of loss angle, impedance and rated ripple current

U_R	C	Tangent of loss angle at... °C,... Hz	Impedance at... °C ... Hz (if applicable)	Rated ripple current at... °C,... Hz
V	μF		Ω	A

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, *Fixed capacitors for use in electronic equipment – Part 1: Generic specification*

IEC 60384-18:2007, *Fixed capacitors for use in electronic equipment – Part 18: Sectional specification – Fixed aluminium electrolytic surface mount capacitors with solid (MnO_2) and non-solid electrolyte*

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

1.5 Marking

The marking of the capacitor, if applied, and the package shall be in accordance with the requirements of 1.6 of IEC 60384-18.

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

1.6 Ordering information

[IEC 60384-18-1:2007](https://standards.iteh.ai/catalog/standards/sist/70eecb3a-ed43-4fa1-9b6b-9d376521c58d/iec-60384-18-1-2007)

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

- rated capacitance;
- tolerance on rated capacitance;
- rated d.c. voltage;
- number and issue reference of the detail specification and style reference;
- 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 4 – Other characteristics

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

2 Inspection requirements

2.1 Procedures

2.1.1 For qualification approval, the procedures shall be in accordance with 3.4 of the sectional specification IEC 60384-18.

2.1.2 For quality conformance inspection, the test schedule (Table 5) includes sampling, periodicity, severities and requirements. The formation of inspection lots is covered by 3.5.1 of the sectional specification.

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Table 5 – Test schedule for qualification conformance inspection

Subclause number and test ^a	D ^d or ND	Conditions of test ^a	IL ^d	n ^d	c ^d	Performance requirements ^a
Group A inspection (lot-by-lot) Subgroup A0 4.22 High surge current (if required by the detail specification)	ND					100 % ^e
Subgroup A1 4.4 Visual examination 4.4 Dimensions (detail) ^b	ND		S-3 ^f	f	0	As in 4.4.2 Legible marking and as specified in 1.5 of this specification As specified in Table 1 of this specification
Subgroup A2 4.5.1 Leakage current 4.5.2 Capacitance 4.5.3 Tangent of loss angle (tan δ)	ND	Protective resistance: 1 000 Ω Frequency:... Hz Frequency:... Hz	S-3 ^f	f	0	$\leq 0,15$ CU μ A Within specified tolerance As in 4.5.3
Group B inspection (lot-by-lot) Subgroup B1 4.5.4 Impedance (if applicable) 4.7 Solderability 4.7.2 Final measurements 4.21 Solvent resistance of the marking ^c (if applicable)	D	Frequency:... Hz Test method: solder bath or reflow Solder composition: ... Flux type for solder bath: non activated or activated Solder bath temperature or reflow temperature profile: ... Visual examination Solvent:... Solvent temperature:... Method 1 Rubbing material: cotton wool Recovery time:...	S-3 ^f	f	0	As specified in Table 3 of this specification As in 4.7.2 Legible marking

^a Subclause number of tests and performance requirements refer to the sectional specification, IEC 60384-18, and Clause 1 of this specification.

^b This test may be replaced by in-production testing if the manufacturer installs statistical process control (SPC) on dimensional measurements or other mechanisms to avoid parts exceeding the limits.

^c This may be carried out on the capacitors mounted on a substrate.

^d In this table:

IL = inspection level (IEC 60410)

n = sample size

c = permissible number of non-conforming items

p = periodicity in months

D = destructive

ND = non- destructive

^e 100 % testing shall be followed by re-inspection by sampling in order to monitor outgoing quality level by non-conforming items per million (ppm). The sampling level shall be established by the manufacturer. For the calculation of ppm values any parametric failure

^f Number to be tested: sample size as directly allotted to the code letter for IL in Table 2A of IEC 60410.

Table 5 (continued)

Subclause number and test ^a	D ^d or ND	Conditions of test ^a	Sample size and criterion of acceptability ^d			Performance requirements ^a
			<i>p</i>	<i>n</i>	<i>c</i>	
Group C inspection (periodic) Subgroup C1 4.6 Resistance to soldering heat 4.6.3 Final measurements 4.20 Component solvent resistance (if applicable)	D	Temperature profile:... Recovery: 24 h ± 2 h Visual examination Capacitance Tangent of loss angle Solvent:... Solvent temperature:... Method 2 Recovery:...	3	12	0	As in 4.6.3 } See detail specification See detail specification
Subgroup C2 4.9 Substrate bending test (formerly bond strength of the end face plating)** Final measurement	D	Capacitance and impedance (with board in bent position) Visual examination	3	12	0	See detail specification No visible damage
Subgroup C3 4.3 Mounting	D	Substrate material:... Visual examination Leakage current Capacitance Tangent of loss angle Impedance (if applicable)				No visible damage $\leq 0,15 \text{ CU } \mu\text{A} / \mu\text{F}\times\text{V}$ $\Delta\text{C}/\text{C} \leq 5 \%$ of value measured initially As in 4.5.3 As in Table 3
Subgroup C3.1 4.8 Shear test (formerly adhesion) 4.10.1 Initial measurement 4.10 Rapid change of temperature 4.10.3 Final measurements	D	Visual examination Capacitance (the value obtained) in Subgroup C3 may be used) T_A = Lower category temperature T_B = Upper category temperature Five cycles Duration $t_1 = 30 \text{ min}$ Recovery: 1 h to 2 h Leakage current Capacitance Tangent of loss angle Impedance (if applicable)	6	18	0	No visible damage ≤ initial limit $\Delta\text{C}/\text{C} \leq 5 \%$ of value measured in 4.10.1 ≤ initial limit As in Table 3
The explanation of notes to tables is given at the beginning of Table 5.						
* When different substrate materials are used for the individual subgroups, the detail specification shall indicate which substrate material is used in each subgroup.						
** Not applicable to chip capacitors, which according to their detail specification shall only be mounted on alumina substrates.						