भारतीय मानक **IS/IEC 60384-14-1 : 2016**

Indian Standard

(*Superseding IS/QC 302401 : 1994*)

इलेक्ट्रॉनिक उपस्कर में उपभोग के लिए जड़ित संधारित्र

भाग 14 रिक्त विस्तुत विशिष्टि — विद्युतचुम्बकीय हस्तक्षेप दमन और मुख्य प्रदाय में संयोजन के लिए जड़ित संधारित्र

अनुभाग 1 मूल्यांकन लेवेल डीजेड

Fixed Capacitors for Use in Electronic Equipment

Part 14 Blank Detail Specification — Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains

Section 1 Assessment Level DZ

ICS 31.060.10

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Semiconductor Devices Components and Electronic Assembly Technology Sectional Committee, LITD 05

NATIONAL FOREWORD

This Indian Standard (Part 14/Sec 1) which is identical with IEC 60384-14-1 : 2016 'Fixed capacitors for use in electronic equipment — Part 14-1: Blank detail specification — Fixed capacitors for electromagnetic interference suppression and connection to the supply mains — Assessment level DZ' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on recommendation of the Semiconductor Devices Components and Electronic Assembly Technology Sectional Committee and approval of the Electronics and Information Technology Division Council.

IS/QC 302401 : 1994 was first published in 1994 and was identical with IEC Pub 384-14-1/IEC QC 302401 : 1993. This superseding of Standard is being done to align it with the latest version of IEC 60384-14-1 : 2016. On publication of this standards IS QC 302401 : 1994 stand withdrawn.

The text of IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminologies and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'; and
b) Comma (,) has been used as a decimal marker, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places, are listed below along with their degree of equivalence for the editions indicated:

International Standards	*Corresponding Indian Standard*	*Degree of Equivalence*
IEC 60384-1 : 2016 Fixed capacitors for use in electronic equipment — Part 1: Generic specification	IS 7305 : 2018 Fixed capacitors for use in electronic equipment — Generic specification (*second revision*)	Identical
IEC 60384-14 : 2013 Fixed capacitors for use in electronic equipment — Part 14 : Sectional specification — Fixed capacitors for electromagnetic interference suppression and connection to the supply mains	IS/QC 302400 : 1994 Fixed capacitors for use in electronic equipment: Sectional specification for fixed capacitors for electromagnetic interference suppression and connection to the supply mains	Identical with IEC 60384-14 : 1993

The technical committee has reviewed the provisions of the following International Standard referred in this adopted draft standard and has decided that it is acceptable for use in conjunction with this standard:

International Standard	*Title*
IEC 61193-2	Quality assessment systems — Part 2: Selection and use of sampling plans for inspection of electronic components and packages

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

CONTENTS

INTRODUCTION

0 Blank detail specification

0.1 General

This blank detail specification forms the basis for a uniform procedure for a common international safety mark. It implements the approval schedule for safety tests in IEC 60384-14, requires a declaration of design for parameters relevant to safety and indicates conformance tests to be conducted on every lot prior to its release and requalification tests depending on changes to the declared design.

This specification offers the assessment level DZ (zero defects).

The use of IEC 60384-14-1, may be more appropriate for components manufactured in mass production, whereas the employment of IEC 60384-14-2 (safety tests only) may be necessary in those cases where approval and requalification tests contribute considerably to the costs of the product.

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.

0.2 Identification of the detail specification

The first page of the detail specification should have the layout recommended on the next page of this blank detail specification. The numbers between square brackets correspond to the following information which shall be inserted at the position indicated:

[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, or sectional specification, as relevant.

[4] If different from the IEC number, the national number of the detail specification, date of issue and any further information required by the national system, together with any amendment numbers.

0.3 Identification of the capacitor

[5] A short description of the type of capacitor or range of capacitors. The text should be suitable for an entry in the IECQ register of approvals.

[6] Information on typical construction (when applicable). The text should be suitable for an entry in the IECQ register of approvals.

[7] Outline drawing with main dimensions which are of importance for interchangeability and/or reference to the appropriate national or international documents for outlines. Alternatively, the drawing may be given in an annex to the detail specification, but [7] should always contain an illustration of the general outer appearance of the component.

[8] The level(s) of quality assessment covered by the detail specification, as appropriate.

[9] Reference data giving information on the most important properties of the component which allow comparison between the various component types intended for the same or similar applications.

<table>
<tr><td></td><td>[1]</td><td>IEC 60384-14-1-XXX</td><td>[2]</td></tr>
<tr><td colspan="2" rowspan="2">ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH:

IEC 60384-1
IEC 60384-14</td><td>[3]</td><td>IEC 60384-14-1</td><td>[4]</td></tr>
<tr><td rowspan="3">FIXED CAPACITORS FOR ELECTROMAGNETIC INTERFERENCE SUPPRESSION AND CONNECTION TO THE SUPPLY MAINS (ASSESSMENT LEVEL DZ)</td><td rowspan="3">[5]</td></tr>
<tr><td rowspan="2">Outline drawing: [see Table 1]

[first angle projection]

[Other shapes are permitted within the dimensions given]</td><td rowspan="2">[7]</td></tr>
<tr><td>TYPICAL CONSTRUCTION (Examples)</td><td>[6]</td></tr>
<tr><td colspan="2"></td><td>Class/subclass</td><td>[8]</td></tr>
<tr><td colspan="4">For references [1] to [4], see 0.2.

For references [5] to [8], see 0.3.</td></tr>
</table>

<table>
<tr><td>Information on the availability of components qualified to this detail specification is given in the Qualified products list.</td><td>[9]</td></tr>
<tr><td colspan="2">For reference [9], see 0.3.</td></tr>
</table>

Indian Standard

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT

PART 14 BLANK DETAIL SPECIFICATION — FIXED CAPACITORS FOR ELECTROMAGNETIC INTERFERENCE SUPPRESSION AND CONNECTION TO THE SUPPLY MAINS

SECTION 1 ASSESSMENT LEVEL DZ

1 General data

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

See IEC 60384-14:2013, 1.4.2.

1.2 Dimensions

The dimensions are given in Table 1.

Table 1 – Dimensions

Case size reference	Dimensions mm						
	L_1	W	H	L_2	L_3	L_4	…

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

The dimensions shall be given as maximum dimensions or as nominal dimensions with a tolerance.

1.3 Ratings and characteristics

Ratings and characteristics are as listed below.

a) Capacitance range (see Table 2)
b) Tolerance on nominal capacitance
c) Rated voltage (see Table 2)
d) Climatic category
e) Rated temperature
f) Tangent of loss angle
g) Insulation resistance

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

Rated voltage				
	Case size	Case size	Case size	Case size
Nominal capacitance pF and/or nF				

1.4 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 60384-1:2016, *Fixed capacitors for use in electronic equipment – Part 1: Generic specification*

IEC 60384-14:2013, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 61193-2:2007, *Quality assessment systems – Part 2: Selection and use of sampling plans for inspection of electronic components and packages*

1.5 Marking

The marking of the capacitor, if any, and the packaging shall be in accordance with IEC 60384-14:2013, 1.6.

The details of the marking of the component and packaging shall 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 information:

a) nominal capacitance;

b) tolerance on nominal capacitance;

c) rated voltage;

d) manufacturer's type designation;

e) number and issue reference of the detail specification and style reference.

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

Additional or increased requirements should be specified only when essential. They should be given in Table 3.

Table 3 – Other characteristics

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

2 Inspection requirements

For qualification approval the procedures shall be in accordance with IEC 60384-14:2013, 3.4.

For quality conformance inspection the test schedule (see Table 4 and Table 5) includes sampling, periodicity, severities and requirements. The formation of inspection lots is covered by IEC 60384-14:2013, 3.5.1.

Table 4 – Test schedule for lot-by-lot tests (Groups A and B inspection) – Assessment level DZ

Subclause number and test[a]	D or ND [b]	Conditions of test[a]	IL [b]	c	Performance requirements[a]
Group A1	ND		S-4	0	
4.1 Visual examination					No visible damage Any marking shall be legible and correct
4.1 Dimensions (gauging)					As specified in Table 1 of this specification
Group A2	ND		I	0	
4.2.2 Capacitance					Within specified tolerance
4.2.4 Resistance (if applicable)					Within specified tolerance
4.2.3 Tangent of loss angle (metallized and ceramic capacitors only)		Frequency: ... Hz			Within specified limits
4.2.1 Voltage proof [c] (Test A)		Method:			No permanent breakdown or flashover
4.2.5 Insulation resistance (Test A)		Method:			See Table 12
Group B1	D		S-3	0	
4.5 Solderability (if applicable)		Without ageing Method:			Methods 1 and 2: good tinning Method 3: <3 s

The sampling sizes corresponding to inspection levels should be selected from IEC 61193-2:2007, Table 1.

[a] Subclause numbers of tests and performance requirements as well as the table numbers refer to the sectional specification, IEC 60384-14:2013, unless specified otherwise.

[b] D = destructive;

ND = non-destructive;

IL = inspection level;

c =acceptance criterion (permitted number of non-conforming items).

[c] The voltage proof test shall be combined with a suitable monitoring method to detect defects in insulation resistance.

Table 5 – Test schedule for periodic tests (Group C inspection) – Assessment level DZ *(1 of 4)*

Subclause number and test[a]		D or ND	Conditions of test[a]	Sample size and acceptance criterion[b]			Performance requirements[a]
				p	*n*	*c*	
Group C1A		D		6	6	0	
4.1	Dimensions (detail)						See Table 9 and Table 1 of this specification
4.4.1	Initial measurements		Capacitance				
			tan δ (if applicable) Resistance (if applicable)				
4.3	Robustness of termination		Severity: … Visual examination				No visible damage
4.4.	Resistance to soldering heat[d]		No pre-drying Method: …				
4.19	Component solvent resistance (if applicable)		Solvent: … Solvent temperature: … Method 2 Recovery:				
4.4.2	Final measurements		Visual examination				No visible damage
			Capacitance				See Table 13
			tan δ (if applicable)				For reference
			Resistance (if applicable)				See Table 13
Group C1B		D		6	12	0	
4.5	Solderability (if applicable)		Without ageing Method: …				Methods 1 and 2: good tinning Method 3: <3 s
4.20	Solvent resistance of the marking		Solvent: … Solvent temperature: … Method 1 Rubbing material: cotton wool Recovery: …				Marking shall remain legible
4.6	Rapid change of temperature[d]		T_A = lower category temperature				
			T_B = upper category temperature				
			Five cycles Duration: *t* = 30 min				
4.6.1	Inspection		Visual examination				No visible damage
4.7	Vibration[c]		Mounting as in 1.1of this specification Severity: …				
4.7.2	Inspection		Visual examination				No visible damage
4.8	Bump[c]		Mounting as for 1.1 of this specification				
or 4.9	Shock[c]		Severity: …				

Table 5 *(2 of 4)*

Subclause number and test[a]		D or ND	Conditions of test[a]	Sample size and acceptance criterion[b]			Performance requirements[a]
				p	*n*	*c*	
4.8.2	Final measurements		Visual examination				No visible damage
or			Capacitance				See 4.8.2 or 4.9.2
4.9.2			tan δ (if applicable) Resistance (if applicable)				Specify limit
Group C1		D		6	18	0	
4.10	Container sealing (if applicable, if required)		Test Qc or Test Qd, as applicable				No evidence of leakage
4.11	Climatic sequence						
4.11.1	Initial measurements[d]		Measurements made in 4.4.2, 4.8.2 or 4.9.2, as appropriate				
4.11.2	Dry heat		No measurements				
4.11.3	Damp heat, cyclic, first cycle						
4.11.4	Cold		No measurements				
4.11.5	Damp heat, cyclic, remaining cycles		No measurements				
4.11.6	Final measurements		Visual examination				No visible damage Any marking shall be legible
			Capacitance				See Table 14
			Resistance (if applicable)				See Table 14
			tan δ (if applicable)				See Table 14
			Voltage proof				See Table 14
			Insulation resistance				See Table 14
Group C2		D		6	10	0	
4.12	Damp heat, steady state						
4.12.1	Initial measurements[d]		Capacitance				
			Resistance (if applicable)				
			tan δ (metallized capacitors only)				
4.12.2	Test conditions		Ceramic capacitors: half the sample U_R applied;				
			other half no voltage applied				
			Other capacitors: No voltage applied				

Table 5 *(3 of 4)*

Subclause number and test[a]	D or ND	Conditions of test[a]	Sample size and acceptance criterion[b]			Performance requirements[a]
			p	*n*	*c*	
4.12.3 Final inspection and measurements		Visual examination				No visible damage Marking legible
		Capacitance				See Table 15
		Resistance (if applicable)				See Table 15
		tan δ (if applicable)				See Table 15
		Voltage proof				See Table 15
		Insulation resistance				See Table 15
Group C3	D					
X-capacitors			3	12	0	
Y-capacitors			3	12	0	
Lead-through capacitors			3	6	0	
4.13.1 Initial measurements[d]		Capacitance				
		Resistance (if applicable)				
		tan δ (metallized capacitors only)				
4.13 Impulse voltage		3 impulses, full wave Peak voltage: see Tables 1 and 2				See 4.13.2 and 4.13.3
4.14 Endurance		Duration: 1 000 h Voltage, current and temperature: see 4.14.3; 4.14.4, 4.14.5 and 4.14.6				
4.14.7 Final inspection and measurements		Visual examination				No visible damage Marking legible
		Capacitance				See Table 16
		Resistance (if applicable)				See Table 16
		tan δ (if applicable)				See Table 16
		Voltage proof				See Table 16
		Insulation resistance				See Table 16
Group C4	D		6	6	0	
4.15 Charge and discharge (if applicable)		Only for metallized film, metallized paper and ceramic capacitors and RC-units using such capacitors				
4.15.1 Initial measurements		Group 0 measurements may be used, provided the measuring conditions are the same as required for this test; in addition, except for RC-units tan δ shall be measured at: 10 kHz for $C_N \leq 1$ µF 1 kHz for $C_N > 1$ µF				

Table 5 *(4 of 4)*

Subclause number and test[a]	D or ND	Conditions of test[a]	Sample size and acceptance criterion[b]			Performance requirements[a]
			p	*n*	*c*	
4.15.3 Final measurements		Capacitance				See Table 17
		tan δ at same frequency as initial measurement (not for RC-units)				See Table 17
		Resistance (if applicable)				See Table 17
		Insulation resistance				See Table 17
Group C5	ND		12	4	0	
4.16 Radio frequency characteristics (if required)		Specify method				Specify limits
Group C6	D		12	6-18	0	
4.17 Passive flammability						See 4.17.1
Group C7	D		12	24	0	
4.18 Active flammability						See 4.18.4

[a] Subclause numbers of tests and performance requirements as well as the table numbers refer to the sectional specification, IEC 60384-14:2013

[b] D = destructive;

ND = non-destructive;

p = periodicity in months;

n = sample size;

c = acceptance criterion (permitted number of non-conforming items).

[c] These tests are required to be carried out every 12 months only.

[d] When, for a ceramic capacitor, a precise measurement of capacitance drift is required, preconditioning according to IEC 60384-14:2013, Annex G, should be performed as advised by the manufacturer.

Requalification tests may be required by the Certification Body when a change of the declared design as given in Annex A is intended.

The Certification Body will be informed about the intended change(s) and it decides whether requalification tests have to be performed.

As a maximum a complete requalification according to Annex A may be necessary. (See also Introduction).

Annex A
(normative)

Declaration of design

Note that this declaration is confidential to the manufacturer and the certification body.

The purpose of this description is to register essential data and the basic design of the capacitors for which approval is sought. The completed form shall be submitted to the relevant Certification Body prior to any approval testing; its circulation to the other parties is left to the decision of the manufacturer.

Changes of the declared design are permitted only after notifying the Certification Body in writing. In this case the Certifying Body will decide on necessary steps to be taken. As a maximum a complete requalification may be required.

Registration number:
(to be allocated by the Certifying Body)

1) Applicant:

2) Manufacturer:

3) Manufacturing site:

4) Type designation:

5) Class/subclass:

6) Circuit diagram:

7) Dielectric

7.1 Material,

7.2 Thickness,

7.3 Density (paper only),

7.4 Number of individual layers;

8) Electrode(s)

8.1 Material,

8.2 Kind of generation (e.g. foil, evaporated on to film or paper);

9) Capacitor element, arrangement of the individual layers:

10) Impregnant: (if applicable)

11) Encapsulation

11.1 Material(s) for cases, resins etc. (as applicable),

11.2 Material of outer insulation (if applicable);

12) Outline dimensions

_____	_____	_____	_____
Location	Date	Name	Signature

Bureau of Indian Standards

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.

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