

# INTERNATIONAL STANDARD

# IEC 60384-10

1989

AMENDMENT 2  
2000-09

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Amendment 2

**Fixed capacitors for use in electronic equipment –**

**Part 10:  
Sectional specification: Fixed multilayer ceramic  
chip capacitors**

*Amendement 2*

*Condensateurs fixes utilisés dans les équipements  
électroniques –*

*Partie 10:  
Spécification intermédiaire: Condensateurs fixes  
chipses à diélectrique en céramique multicouche*

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Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE

**H**

*For price, see current catalogue*

## FOREWORD

This amendment has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

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

FDIS	Report on voting
40/1144/FDIS	40/1180/RVD

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

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2005. At this date, the publication will be

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- withdrawn;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

A bilingual version of this publication may be issued at a later date.

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### 2.2.6 Temperature characteristic of capacitance

Replace Table V by the following new table V:

Sub-class letter code	Max. capacitance change within the category temperature range with respect to the capacitance at 20 °C measured with and without a d.c. voltage applied		Category temperature and corresponding number code				
			–55/+125 °C	–55/+85 °C	–40/+85 °C	–25/+85 °C	–10/+85 °C
	Without d.c. voltage applied	With d.c. voltage* applied	1	2	3	4	6
2B	±10	Requirements specified in the relevant specification	–	x	x	x	–
2C	±20		x	x	x	–	–
2D	+20/-30		–	–	–	x	–
2E	+22/-56		–	x	x	x	x
2F	+30/-80		–	x	x	x	x
2R	±15		x	–	–	–	–
2X	±15		x	–	–	–	–

\* d.c. voltage applied is either rated voltage or the voltage specified in the relevant specification.

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**Table VI**

Change in the first column of the table, in the row for "Group no. 3", the footnote reference "(2)" to "(3)"

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**4.5.2 Requirements**

Replace, on page 51, the first sentence of the paragraph numbered "4." by:

For chips less than, or equal to, 2 mm in length the ceramic shall be free from conducting smears (metallization, tinning ...) of diameter greater than 0,1 mm over a zone at least 0,3 mm in length.

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**4.6.1.1 Measuring conditions**

Replace the table for "Class 2" by the following new table:

Sub-class	Measuring voltage	Referee voltage
2B, 2C, 2X	$1,0 \pm 0,2$ V	$1,00 \pm 0,02$ V
2D, 2E, 2F, 2R	$0,3 \pm 0,2$ V or requirements specified in the relevant specification	$0,3 \pm 0,02$ V or requirements specified in the relevant specification

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**4.6.1.2 Requirements**

In the second paragraph, replace "Group 2A" by "Group 3".

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**4.10.4 Final inspection, measurements and requirements**

Replace the table "For Class 1 capacitors" by the following new table:

$\alpha$ rated in $10^{-6}/^{\circ}\text{C}$	Requirements(*)
$+100 \geq \alpha \geq -750$	0,5 % or 0,5 pF
$-750 > \alpha \geq -1\ 500$ and SL (1C) and UM (1D)	1 % or 1 pF
* whichever is the greater.	

Replace, on page 63, the table “For class 2 capacitors” by the following new table:

Sub-class	Requirements
2B, 2C and 2X	±10 %
2D and 2R	±15 %
2E and 2F	±20 %

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#### 4.12.5 Final inspection, measurements and requirements

Replace the table “For Class 1 capacitors” by the following new table:

$\alpha$ rated in $10^{-6}/^{\circ}\text{C}$	Requirements(*)
$+100 \geq \alpha \geq -750$	1 % or 1 pF
$-750 > \alpha \geq -1\ 500$ and SL (1C) and UM (1D)	2 % or 1 pF
*whichever is the greater.	

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#### 4.13.7 Final inspection, measurements and requirements

In the table “For Class 1 capacitors”, on page 69, change the row for “Capacitance” as follows:

Measurement	Measuring conditions	$\alpha$ rated and (sub-class)	Requirement
Capacitance	Subclause 4.6.1	$+100 \geq \alpha \geq -750$ (1B)	Capacitance change $\leq 3$ % or 1 pF (*)
		$-750 > \alpha \geq -1\ 500$ (1F) SL (1C) and UM (1D)	Capacitance change $\leq 5$ % or 1 pF (*)

In the table “For class 2 capacitors”, change the rows for “Capacitance” and “Tangent of loss angle” as follows.

Measurement	Measuring conditions	Requirements			
		Sub-classes 2B, 2C and 2X	Sub-classes 2D and 2R	Sub-class 2E	Sub-class 2F
Capacitance	Subclause 4.6.1	$\frac{\Delta C}{C} \leq \pm 10$ %	$\frac{\Delta C}{C} \leq \pm 15$ %	$\frac{\Delta C}{C} \leq \pm 20$ %	$\frac{\Delta C}{C} \leq \pm 30$ %
Tangent of loss angle	Subclause 4.6.2	$\leq 2 \times$ value of subclause 4.6.2			

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**4.14.5 Final inspection, measurements and requirements**

In the table “For class 1 capacitors”, replace the row for “capacitance” as follows:

Measurement	Measuring conditions	$\alpha$ rated and (sub-class)	Requirements
Capacitance	Subclause 4.6.1	+100 $\geq$ $\alpha$ $\geq$ -750 (1B)	Capacitance change $\leq$ 2 % or 1 pF
		-750 $>$ $\alpha$ $\geq$ -1 500 (1F) SL (1C) and UM (1D)	Capacitance change $\leq$ 3 % or 1 pF (*)

In the table “For class 2 capacitors”, on page 73, replace the row for “Tangent of loss angle” as follows:

Measurement	Measuring conditions	Requirements			
		Sub-classes 2B, 2C and 2X	Sub-classes 2D and 2R	Sub-class 2E	Sub-class 2F
Tangent of loss angle	Subclause 4.6.2	$\leq 2 \times$ value of subclause 4.6.2			

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**4.15.5 Final inspection, measurements and requirements**

In the table “For class 1 capacitors”, on page 75, replace the row for “Capacitance” as follows:

Measurement	Measuring conditions	$\alpha$ rated and (sub-class)	Requirements
Capacitance	Subclause 4.6.1	+100 $\geq$ $\alpha$ $\geq$ -750 (1B)	Capacitance change $\leq$ 3 % or 1 pF (*)
		-750 $>$ $\alpha$ $\geq$ -1 500 (1F) SL (1C) and UM (1D)	Capacitance change $\leq$ 3 % or 1 pF (*)

Insert between the heading “For class 2 capacitors” and the table the following paragraph:

“The capacitors shall be measured and shall meet the requirements given in the table below. If the capacitance value is less than the minimum value permitted, then after the other measurements have been made, the capacitors shall be preconditioned according to 4.1 and the requirement in the table shall be met.”

In the table “For Class 2 capacitors”, change the row for “Tangent of loss angle” as follows:

Measurement	Measuring conditions	Requirements			
		Sub-classes 2B, 2C and 2X	Sub-classes 2D and 2R	Sub-class 2E	Sub-class 2F
Tangent of loss angle	Subclause 4.6.2	$\tan \delta \leq 2 \times$ value of subclause 4.6.2			

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**Appendix A**

*Replace the whole page by the following:*

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**Withdrawn**

## Appendix A

### Guide for the specification and coding of dimensions of multilayer ceramic chip capacitors

The following table shows values of length and width dimensions and codes for combinations of these dimensions.

The code for a particular size is the code for the length followed by the code for the width, i.e., 4532M corresponds to 4,5 mm × 3,2 mm.

Length (L <sub>1</sub> ) mm			1,0	1,25	1,6	2,0	2,5	3,2	4,0	4,5	5,0	5,7	6,3	8,0	10,0
Width (W) mm	Tolerance		±0,05	±0,1	±0,1	±0,1	±0,15	±0,2	±0,3	±0,3	±0,4	±0,4	±0,4	±0,5	±0,6
	Code*		10 (04)	12 (05)	16 (06)	20 (08)	25 (10)	32 (12)	40 (16)	45 (18)	50 (20)	57 (22)	63 (25)	80 (32)	100 (40)
0,5	±0,05	05M (02)	x												
0,8	±0,1	08M (03)			x										
1,0	±0,1	10M (04)													
1,25	±0,1	12M (05)				x									
1,6	±0,15	16M (06)						x							
2,0	±0,2	20M (08)							x						
2,5	±0,2	25M (10)								x					
3,2	±0,2	32M (12)									x				
4,0	±0,3	40M (16)										x			
4,5	±0,3	45M (18)											x		
5,0	±0,4	50M (20)												x	
5,7	±0,4	57M (22)													x
6,3	±0,5	63M (25)													

\* Metric size codes are preferred; between brackets the old inch codes are added for reference purposes.  
x These are preferred size codes.

On page 81, replace:

“Dimension  $L_4$  should equal or exceed 0,4 mm

Dimensions  $L_2$  and  $L_3$  should be  $\geq 0,1$  mm and  $\leq 1,0$  mm.”

by

“Dimension  $L_4$  should equal or exceed 0,3 mm

Dimensions  $L_2$  and  $L_3$  should be  $\geq 0,1$  mm and  $\leq 1,5$  mm.”

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