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IEC
62025-1

Second edition
2007-05

High frequency inductive components – Non-electrical characteristics and measuring methods –

Part 1: Fixed, surface mounted inductors for use in electronic and telecommunication equipment



Reference number
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HIGH FREQUENCY INDUCTIVE COMPONENTS –
NON-ELECTRICAL CHARACTERISTICS AND MEASURING METHODS –****Part 1: Fixed, surface mounted inductors for use in electronic and
telecommunication equipment**

FOREWORD

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International Standard IEC 62025-1 has been prepared by IEC technical committee 51: Magnetic components and ferrite materials.

This second edition cancels and replaces the first edition published in 2002. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- nomenclature of dimensions in Figure 1 has been changed;
- a new Table 1, Letter code for inductance values, has been added;
- dimensions for shapes in Table 2 and Table 5 have been added;
- new operating temperature ratings in Table 9 have been added.

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

FDIS	Report on voting
51/883/FDIS	51/889/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 of the IEC 62025 series, published under the general title *High frequency inductive components – Non-electrical characteristics and measuring methods*, 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- withdrawn,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
- amended.

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

HIGH FREQUENCY INDUCTIVE COMPONENTS – NON-ELECTRICAL CHARACTERISTICS AND MEASURING METHODS –

Part 1: Fixed, surface mounted inductors for use in electronic and telecommunication equipment

1 Scope and object

This part of IEC 62025 applies to fixed, surface mounted inductors and ferrite beads.

Should conflict arise between these specifications and the detail specifications, the latter will take precedence.

The object of this standard is to establish requirements for fixed, surface mounted inductors, to describe terms, to give recommendations for standard values and dimensions and to give guidance on fixed, surface mounted inductors.

2 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 61605: 2005, *Fixed inductors for use in electronic and telecommunication equipment-Marking codes*

3 Graphical symbols and designations

3.1 Designation

Designation of the fixed, surface mounted inductors is expressed by 12 digits. Designation of ferrite beads shall be specified in the detail specifications.

□ □ □	□ □ □ □	□ □ □ □ □	□ □ □ □ □ □	□ □ □ □ □ □ □
a)	b)	c)	d)	e)

a) Identification of the type of inductor:

fixed, surface mounted inductors shall be identified by the three alphabetic characters 'LCL'.

b) Indication of outline dimensions:

the outline dimensions of the surface mounted inductor shall be indicated by a four-digit number based on two significant figures for each dimension of L and W (or H). As for the dimensions of shape D, the first two digits indicate the longer side dimension L , and the last two digits indicate the shorter side dimension W , as shown in Figure 1. As for the dimensions of shape K, the first two digits indicate the outline dimension L , and the last two digits indicate the height dimension H .

c) Indication of shape:

a single alphabetic character as given in Figure 1 indicates the shape for fixed, surface mounted inductors.

The shape codes are classified by the base shape of inductors.

D: rectangular

K: square

d) Indication of nominal inductance:

Three alphanumeric characters specified in IEC 61605, Clause 4 indicate the nominal inductance value.

Table 1 – Letter code for inductance value

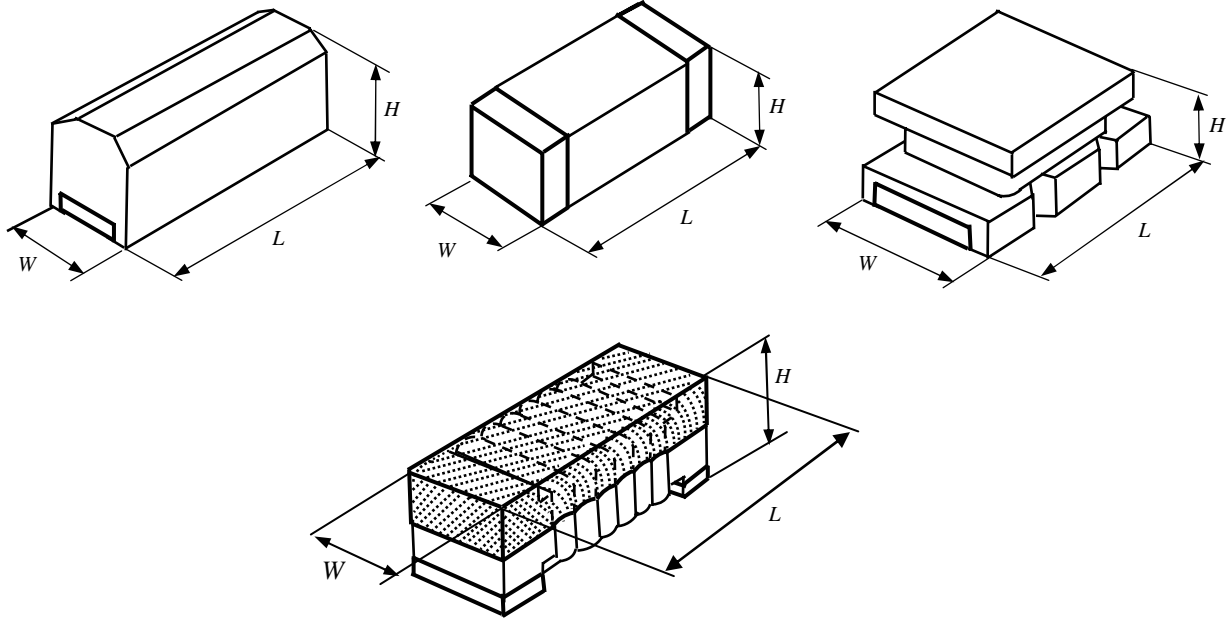
Inductance values	Digit and letter code
0,1 nH 0,47 nH	N10 N47
1 nH 4,7 nH	1N0 4N7
10 nH 47 nH	10N 47N
0,1 µH 0,47 µH	R10 R47
1 µH 4,7 µH	1R0 4R7
10 µH 47 µH	100 470
100 µH 470 µH	101 471
1 mH 4,7 mH	102 472
10 mH 47 mH	103 473
100 mH 470 mH	104 474
1 H 4,7 H	105 475
10 H 47 H	106 476

e) Indication of tolerance for inductance:

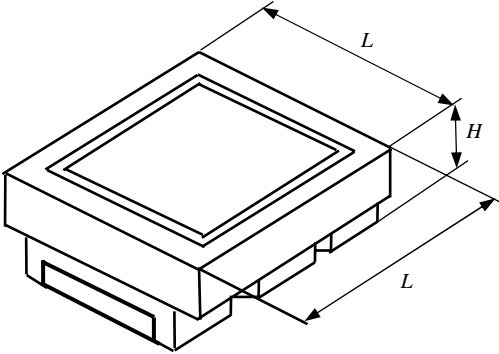
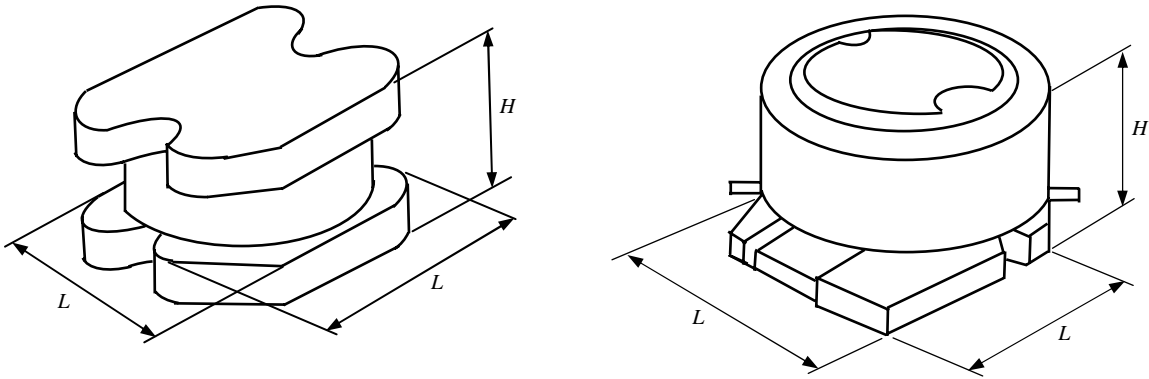
Single alphabetic characters specified in Table 8 indicate the tolerance for the inductance value.

4 Shape

The shapes of fixed, surface mounted inductors and ferrite beads are classified as shown in the Figure 1.



Shape D



Shape K

IEC 624/07

Figure 1 – Shapes of inductor and ferrite beads (examples)

5 Dimensions

5.1 Shape D

- a) Outline dimensions L (long side) and W (short side) of shape D shall be chosen from the values marked with X in Table 2. These values have been selected from the R 20 series, but the values 0,315; 0,56 and 3,15 have been rounded off to 0,3; 0,6 and 3,2 respectively. 1,25 may be rounded off to 1,2.
- b) Dimensions of height greater than 1,00 mm shall be chosen from Table 3. These values are taken from the R 20 series where, however, the values 1,12; 2,24; 3,15 and 3,55 have been rounded off to 1,1; 1,2; 2,2; 3,2 and 3,6 respectively. 1,25 may be rounded off to 1,2. Dimensions of height, smaller than 1,00 mm shall be selected from Table 4.

Table 2 – Dimensions for shape D

Dimensions in millimetres

L (long side)	W (short side)																
	0,2	0,3	0,4	0,5	0,8	1,0	1,25 (1,2)	1,6	1,8	2,0	2,5	3,2	4,0	5,0	5,6	6,3	7,1
0,4	X																
0,6		X															
0,8			X														
1,0				X													
1,2						X											
1,6					X	X											
2,0						X	X	X									
2,5									X	X							
3,2								X	X		X						
4,0																	
4,5								X			X	X					
5,0													X				
5,6														X			
6,3															X		
7,1																X	
8,0																	X

Table 3 – Dimensions of height for shape D (R 20 series)

Dimensions in millimetres

1,0	1,1	1,25 (1,2)	1,4	1,6	1,8	2,0	2,2	2,5	2,8	3,2
3,6	4,0	4,5	5,0	5,6	6,3	7,1	8,0	9,0	10,0	

Table 4 – Dimensions of height for shape D less than 1,00 mm*Dimensions in millimetres*

0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,85	0,9
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5.2 Shape K

Outline dimensions L and H of shape K shall be chosen from the values marked with X in Table 5. These values are based on R 20 series.

Table 5 – Dimensions for shape K*Dimensions in millimetres*

L (length)	H (height)																				
	0,6	0,8	0,9	1,0	1,1	1,2	1,4	1,6	1,8	2,0	2,2	2,5	3,2	4,0	4,5	5,0	6,3	7,1	8,0	9,0	
2,5	X	X		X					X												
2,8	X	X	X	X	X																
3,2				X		X	X	X													
3,6										X											
4,0				X		X	X	X	X	X		X									
4,5													X								
5,0							X			X	X			X	X						
5,6									X							X					
6,3																	X				
7,1																		X			
8,0														X						X	
9,0																					X
10,0														X		X					
12,0																X					

5.3 Tolerances for outline dimensions

Tolerances for outline dimension and height shall be selected from Table 6.

Table 6 – Tolerances for outline dimension and height

Outline dimensions (X) mm	Tolerances mm	
	Standard	Maximum
$X \leq 0,6$	$\pm 0,05$	$\pm 0,10$
$0,6 < X \leq 1,0$	$\pm 0,10$	$\pm 0,20$
$1,0 < X \leq 1,6$	$\pm 0,15$	$\pm 0,30$
$1,6 < X \leq 2,5$	$\pm 0,20$	$\pm 0,40$
$2,5 < X \leq 4,0$	$\pm 0,30$	$\pm 0,60$
$4,0 < X \leq 8,0$	$\pm 0,40$	$\pm 0,80$
$8,0 < X \leq 10,0$	$\pm 0,50$	$\pm 1,00$

6 Ratings and characteristics

6.1 Nominal inductance or impedance

The preferred values of nominal inductance or impedance shall be selected from the numeric values of the E 24 series in Table 7 and their decimal multiples or submultiples.

The detail specification sheet should clearly note whether the value given is inductance or impedance, as well as the units and measuring frequency. The choice of specifying either inductance or impedance depends on the intended application for the inductor.

Table 7 – E 24 series for nominal inductance or impedance

1,0	1,1	1,2	1,3	1,5	1,6	1,8	2,0	2,2	2,4	2,7	3,0
3,3	3,6	3,9	4,3	4,7	5,1	5,6	6,2	6,8	7,5	8,2	9,1

6.2 Tolerance for nominal inductance or impedance

The tolerance for nominal inductance or impedance shall be selected from Table 8 which includes the tolerances specified in 4.1 of IEC 61605.

Table 8 – Tolerance for nominal inductance or impedance

Tolerance	$\pm 0,05$ nH	$\pm 0,1$ nH	$\pm 0,2$ nH	$\pm 0,3$ nH	$\pm 0,5$ nH	± 1 %	± 2 %	± 3 %	± 5 %	± 10 %	± 15 %	± 20 %	± 25 %	± 30 %
Letter code	W	B	C	S	D	F	G	H	J	K	L	M	-	N
NOTE 1 nH should be applied to inductance only.														
NOTE 2 ± 25 % should be applied to impedance only.														

6.3 Operating temperature range

The operating temperature range shall be selected from a lower temperature and a higher temperature in Table 9.

Table 9 – Temperatures to be selected for operating temperature ranges

Lower temperature °C	Higher temperature °C
– 55	+ 155
– 40	+ 150
– 25	+ 125
– 10	+ 105
	+ 100
	+ 85
	+ 70
	+ 40

NOTE Unless otherwise specified, operating temperature is ambient temperature plus temperature rise of components.

Table 10 – User reference / Examples of application and operating temperature range

Category applies	Temperature range °C	Standard identification
Automobile and aerospace	– 55 to + 155	Mil PRF 27 Class V
	– 55 to + 150	IEC 62211 Level S
	– 55 to + 125	-
	– 40 to + 150	-
	– 40 to + 125	AEC Q200 Grade 1 IEC 62211 Level A
Telecommunication and power supply	– 55 to + 105	Mil PRF 27 Class R
	– 55 to + 85	Mil PRF 27 Class Q
	– 40 to + 125	IEC 62211 Level B
	– 40 to + 105	AEC Q200 Grade 2 IEC 62211 Level B
	– 40 to + 85	AEC Q200 Grade 3 IEC 62211 Level B
Consumer and commercial electronics	– 40 to + 85	IEC 62211 Level C AEC Q200 Grade 3
	– 25 to + 105	-
	– 25 to + 100	-
	– 25 to + 85	-
	– 25 to + 70	IEC 62211 Level D
	0 to + 70	AEC Q200 Grade 4

NOTE AEC Q200 and IEC 62211 are component-level reliability specifications. A distinction exists between component-level and system-level specifications.

7 Marking

The selection of type(s) of marking information is subject to agreement between supplier and user. In lieu of such an agreement, the marking information should be as published in the supplier's data sheet. One or more of the following types of marking information is recommended on the body or the package:

- a) user part number;
- b) serial number, lot code or date code;
- c) characteristics as specified in IEC 61605;
- d) supplier part number and logo or mark;
- e) quantity (package only).

8 Direction marking or shape of polarity

For the purpose of indicating the winding start location, or the first pin number, or first electrode, either a mark or a shape should be used. A shape indicator is a corner cut, or small circle indent, or other molded feature that indicates polarity on the inductor (if such indication is necessary).

Bibliography

IEC 62211, *Inductive components – Reliability management*

AEC Q200, *Stress Test Qualification For Passive Components*

Mil PRF 27, *General Specification for Transformers and Inductors (Audio, Power, and High-Power Pulse)*

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