



SLOVENSKI STANDARD SIST EN 140401:2009

01-junij-2009

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Blank Detail Specification: Fixed low power non-wire-wound surface mount (SMD) resistors

Vordruck für die Bauartspezifikation: Oberflächenmontierbare (SMD) Schicht Festwiderstände niedriger Belastbarkeit

Spécification particulière cadre: Résistance couche fixes à faible dissipation pour montage en surface (CMS)

Ta slovenski standard je istoveten z: EN 140401:2009

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 140401

April 2009

ICS 31.040.10

Supersedes EN 140401:2002

English version

**Blank Detail Specification:
Fixed low power film surface mount (SMD) resistors**

Spécification particulière cadre:
Résistances fixes à couches
et à faible dissipation
pour montage en surface (CMS)

Vordruck für Bauartspezifikation:
Oberflächenmontierbare (SMD)
Schicht-Festwiderstände
niedriger Belastbarkeit

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This European Standard was approved by CENELEC on 2009-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: avenue Marnix 17, B - 1000 Brussels

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 40XB, Resistors.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 140401 on 2009-03-01.

This European Standard supersedes EN 140401:2002.

Preceding documents on the subject covered by this specification have been

- EN 140401:1996,
- CECC 40 401:1989.

Compared to the superseded standard, the following changes have been implemented:

- modification of the title;
- introduction of a test on the resistance to electrostatic discharge (ESD) in 1.6 and Annex A;
- introduction of description and test methods for lead-free soldering in 1.8, 1.10.3 and Annex A;
- introduction of code letters for the temperature coefficient (TCR) as in EN 60062:2005;
- revision of ordering information in 1.9.4;
- adoption of the IECQ rules of procedure, IEC QC 001002-3;
- revision of the sample quantities and the sequence of tests in Annex A;
- editorial revision.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2010-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2012-03-01

This specification supports the building of a series of documents describing fixed low power film resistors as follows:

- EN 60115-1 Fixed resistors for use in electronic equipment – Part 1: Generic specification (IEC 60115-1, mod.)
- EN 140400 Sectional specification: Fixed low power surface mount (SMD) resistors
- EN 140401-xxx Relevant detail specification(s) written on the basis of this blank detail specification

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Introduction

Blank detail specification

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

In the preparation of the detail specification the content of EN 140400:2003, 1.2 shall be taken into account.

The detail specification should be written by using the preferred values given in EN 140400.

The detail specification should contain a table of contents prior the first page of the actual specification. For the use of SI units refer to ISO 1000, for the use of letter symbols to be used in electrical technology, refer to EN 60027-1.

Notes in this document shall be considered as guidance and are not part of the detail specification itself.


Identification of the detail specification and the component

The first page of the detail specification should have the layout recommended on page 5.

The numbers in square brackets correspond to the indications to be completed thereunder:

- [1] the name of the Standardisation Organisation under whose authority the detail specification is published and if applicable, the organisation from whom the detail specification is available;
- [2] the CECC symbol and the number allocated to the detail specification by the CENELEC General Secretariat;
- [3] the number and issue number of the EN generic and sectional specification as relevant; also national reference if different;
- [4] the national number of the detail specification, date of issue and any further information required by the national system, together with any amendment numbers, if different from the EN number;
- [5] a brief description of the component or range of components;
- [6] information on typical construction (where applicable);
- [7] an outline drawing with the main dimensions which are of importance for interchangeability and/or reference to the appropriate national or international document for outlines. Alternatively, this drawing may be given in an annex to the detail specification;
- [8] the level of quality assessment covered by the detail specification.

For [5] and [6] the text to be given in the detail specification should be suitable for an entry in a register of approvals and the "CENELEC Catalogue of European Standards".

Specification available from: [1]	EN 140401-... (Specification number)	 [2]
Electronic components of assessed quality in accordance with: [3] EN 60115-1:2001 + A1:2001 + A11:2007 EN 140400:2003	Issue ... [4] (Month) (Year)	
Other shapes are permitted within the given dimensions. Figure 1 – Outline and dimensions (see Table 1)	Fixed low power film surface mount (SMD) resistors, Style ... [5] (Description of the component) [6]	Assessment level EZ ^a [8] Version A: with 100 %-test Version E: with failure rate level and 100 %-test Stability classes ...
	^a For explanation on assessment level EZ see 2.1.1	

NOTE Version E is optional.

1 Characteristics and ratings

Various parameters of this component are precisely defined in this specification. Unspecified parameters may vary from one component to another.

1.1 Dimensions and ratings

Table 1 – Style and dimensions

Style		Length L mm		mm		mm		mm		Mass ^a mg
metric	x	min.	max.	min.	max.	min.	max.	min.	max.	max.

^a For information only.

^x Optional column for additional information (e.g. size code).

NOTE See EN 140400:2003, 1.2 a).

Information about manufacturers who have components qualified to this detail specification is available in the approvals section of the website <http://www.iecq.org>.

Table 2a – Ratings

Style	x	Rated dissipation P_{70} mW	Limiting element voltage d.c. or a.c. (r.m.s.) U_{\max} V	Insulation voltage d.c. or a.c. (peak) U_{ins} V	
				1 min	continuous

x Optional column for additional information (e.g. stability class, rated dissipation at other ambient temperature than 70 °C)

NOTE 1 See EN 140400:2003, 1.2 g), h), i).

NOTE 2 Should it be necessary to control further parameters, a more detailed specification should be used. Then the additional test method(s) shall be fully described and appropriate limits and inspection levels (IL) shall be specified.

Table 2b – Ratings for 0 Ω resistors

Style	Maximum current I_{\max} A	Maximum resistance $R_{\text{res max}}$ mΩ	Insulation voltage d.c. or a.c. (peak) U_{ins} V	
			1 min	continuous

NOTE Table 2b is optional.

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1.2 Derating curve

Resistors covered by this specification are derated according to the following diagram:

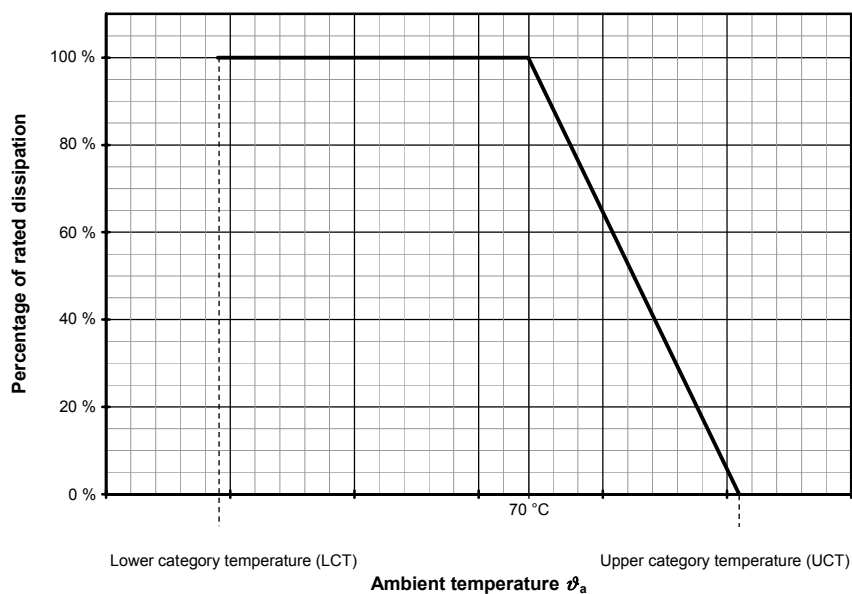


Figure 2 – Derating curve

NOTE 1 See EN 140400:2003, 1.2 g).

NOTE 2 A larger area of operation may be given in the detail specification, provided it includes all the area given above.

1.3 Resistance range and tolerance on rated resistance

1.3.1 Version A

The following combinations of temperature coefficient and tolerance on rated resistance may be approved only. Products from this extent shall be used for the qualification approval according to 2.2.1 and for the quality conformance inspection according to 2.3. Resistance values of an E-series according to IEC 60063 shall be used.

The qualification of resistance values below or beyond the specified resistance values is permitted if they fulfil the requirements of the closest stability class (e.g. Style ... shall fulfil the requirements of stability class ...).

Table 3a – Resistance range and tolerance on rated resistance for version A

Style	Tolerance on rated resistance		Temperature coefficient $10^{-6}/K$	Resistance range	Stability class ^b
	%	Code ^a			
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0 Ω resistors according to Table 2b for styles ...					
^a Code letters according to EN 60062:2005.					
^b For the category temperatures of stability classes refer to Table 6.					

1.3.2 Version E

The following combinations of temperature coefficient, tolerance on rated resistance, resistance range and E-series according to IEC 60063 are permitted only. Products from this extent shall be used for the qualification approval according to 2.2.2 and for the quality conformance inspection according to 2.3 and are permitted only:

Table 3b – Resistance range and tolerance on rated resistance for version E

Style	Tolerance on rated resistance		Temperature coefficient $10^{-6}/K$	Resistance range	Stability class ^b	E series
	%	Code ^a				
0 Ω resistors according to Table 2b for styles ...						
^a Code letters according to EN 60062:2005.						
^b For the category temperatures of stability classes, refer to Table 6.						

NOTE Table 3b is only required for version E and should be a subset of Table 3a.

1.4 Variation of resistance with temperature and temperature rise

Table 4 – Temperature coefficients and permissible change of resistance

Temperature coefficient			Limit of resistance change $\Delta R/R$			
$10^{-6}/K$	Code ^a	Code ^b	%			
			LCT / Reference temperature °C		Reference temperature / UCT °C	
			... / 20	... / 20	20 / ...	20 / ...

^a Code letters according to EN 60062:2005.
^b Historical code letters according to ..., for information only.

NOTE 1 Second code column with historical reference is optional.

NOTE 2 See EN 140400:2003, 1.2 f).

Table 5 – Limit of temperature rise

Stability class	Limit of temperature rise at rated dissipation
	$T_r \leq \dots$
	$T \leq \dots$

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1.5 Climatic categories

NOTE See EN 140400:2003, 1.2 b).

Table 6 – Climatic categories

Stability class	Climatic category LCT / UCT / Duration
	... / ... / ...
	... / ... / ...

1.6 Limits for change of resistance at tests

NOTE See EN 140400:2003, 1.2 c).

Table 7a – Limits for change of resistance at tests

Stability class	Limit of resistance change $\Delta R/R$			
	EN 60115-1 ^a	EN 60115-1 ^a		EN 60115-1 ^a
4.23 Climatic sequence	4.24 Damp heat, steady state 4.25.3 Endurance at upper category temperature	4.25.1 Endurance at 70 °C		4.13 Overload
		1 000 h	Extended, 8 000 h	4.18 Resistance to soldering heat
				4.19 Rapid change of temperature, 5 cycles
				4.22 Vibration
				4.33 Substrate bending

^a EN 60115-1:2001 + A1:2001 + A11:2007.

Table 7b – Limits for change of resistance at tests

Stability class	Limit of resistance change $\Delta R/R$			
	EN 60115-1 ^a	EN 60115-1 ^a	EN 60115-1 ^a	EN 60115-1 ^a
4.19 Rapid change of temperature, ≥ 100 cycles	4.27 Single pulse high voltage overload test	4.27 Periodic electric overload	4.40 Electrostatic discharge ^b	

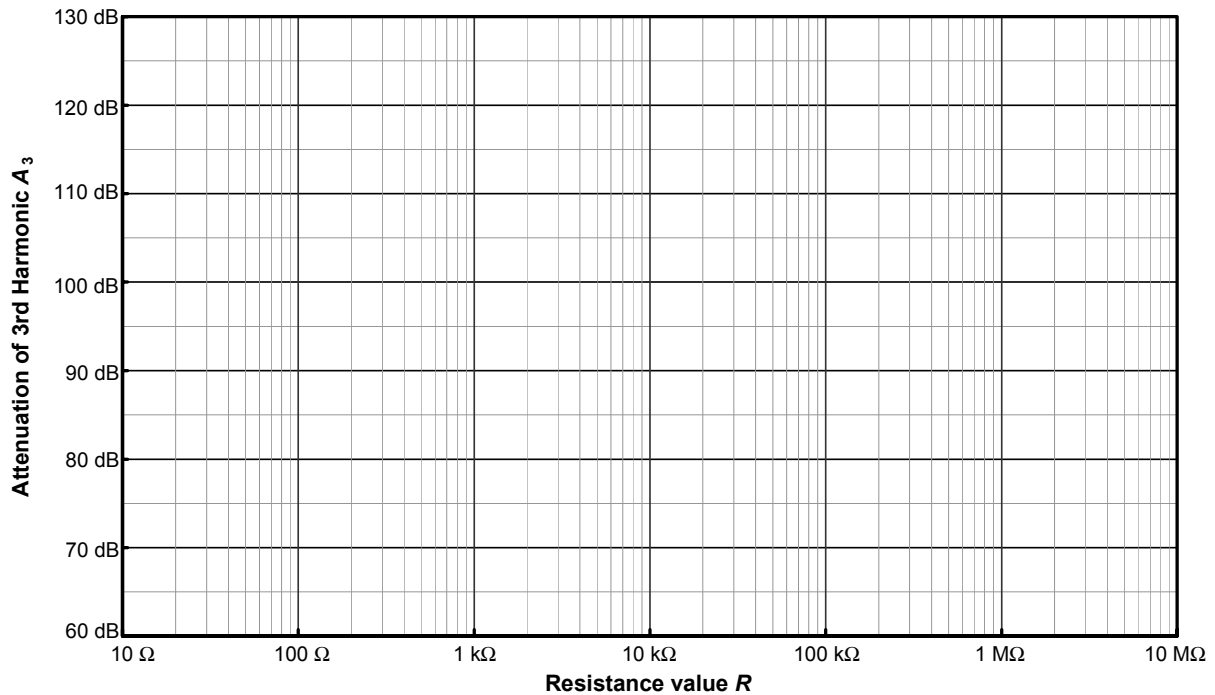
^a EN 60115-1:2001 + A1:2001 + A11:2007.

^b Human body model (HBM) according to EN 61340-3-1, 3 positive + 3 negative discharges.

NOTE The number of cycles for the rapid change of temperature test should preferably be 1 000.

1.7 Non-linearity

If for resistors in the range $10 \Omega \leq R \leq \dots$ measurement of non-linearity is required according to 2.1.2, the measured values shall be above the limits given in the diagram below. The resistors shall be tested according to IEC/TR 60440 where the test voltage shall be the rated voltage.



NOTE The X-scale shall be in accordance to the resistance range given in Table 3a.

Figure 3 – Limits of non-linearity in resistance
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1.8 Tests related to soldering

1.8.1 Severities for solderability testing

Solderability testing shall be preceded by an accelerated ageing according to EN 60068-2-58:2004, 5.2, Test Td: 4 h at 155 °C dry heat.

To prove the compatibility of resistors according to this specification with lead free solder, e.g. SnCu, SnCuNi, SnAg or SnAgCu and traditional SnPb solder, solderability shall be tested with both types of solder.

- a) Solderability with traditional SnPb solder shall be tested according to EN 60068-2-58:2004, 8.2.1, Test Td, solder bath method, with the following conditions:

Solder alloy:	Sn60Pb40 or Sn63Pb37
Solder bath temperature:	(235 ± 5) °C
Immersion time:	(2 ± 0,2) s

- b) Solderability with lead-free solder shall be tested according to EN 60068-2-58:2004, 8.1.1, Test Td, solder bath method, with the following conditions (Group 3):

Solder alloy:	Sn96,5Ag3,0Cu0,5
Solder bath temperature:	(245 ± 5) °C
Immersion time:	(3 ± 0,3) s

 or with the following conditions (Group 4):

Solder alloy:	Sn99,3Cu0,7
Solder bath temperature:	(250 ± 5) °C
Immersion time:	(3 ± 0,3) s

The categories Group 3 and Group 4 are defined in EN 60068-2-58 for the discrimination of the wide variety of lead-free solder alloys by means of the related typical soldering processes and their specific temperature ranges. Group 3, described as „medium-high temperature“, lists examples of solder alloys SnAg, SnAgCu and SnAgBi, all intended for both reflow and flow (wave) soldering. Group 4, described as „high temperature“, covers SnCu solder, primarily intended for flow (wave) soldering.