SLOVENSKI STANDARD

SIST EN 140401-802:2003

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Detail specification: Fixed low power non wire-wound surface mount (SMD) resistors - Rectangular - Stability classes 1; 2

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Bauartspezifikation: Oberflchenmontierbare nichtdrachtgewickelte Festwiderstnde (SMD) niedriger Belastbarkeit - Rechteckig - Stabilittsklassen 1; 2

Spcification particulire: Rsistances fixes non bobines, faible dissipation pour montage en surface (CMS) - Rectangulaires - Catgories de stabilit 1; 2

Ta slovenski standard je istoveten z: EN 140401-802:2002

ICS:

31.040.10	Fiksni upor	Fixed resistors

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EUROPEAN STANDARD

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EN 140401-802

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Supersedes CECC 40 401-802:1998

English version

Detail specification: Fixed low power non wire-wound surface mount (SMD) resistors - Rectangular - Stability classes 1; 2

Spécification particulière:
Résistances fixes non bobinées
à faible dissipation pour montage
en surface (CMS) -
Rectangulaires -
Catégories de stabilité 1; 2

Bauartspezifikation:
Oberflächenmontierbare nichtdracht-
gewickelte Festwiderstände (SMD)
niedriger Belastbarkeit -
Rechteckig -
Stabilitätsklassen 1; 2

This European Standard was approved by CENELEC on 2001-11-01. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 140401-802:2002 E

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 140401-802 on 2001-11-01.

This European Standard supersedes CECC 40 401-802:1998.

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) 2003-02-01

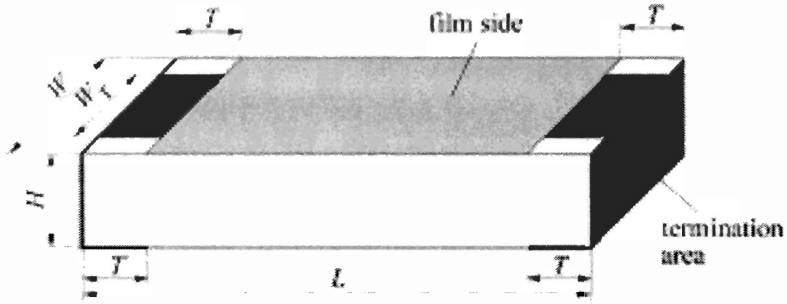
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-11-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A and C are normative and annex B is informative.

This specification is part of four documents describing fixed resistors for surface mount technology 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	Blank Detail Specification: Fixed low power non wire-wound surface mount (SMD) resistors
EN 140401-802	Detail specification: Fixed low power non wire-wound surface mount (SMD) resistors, thick film – rectangular

Contents

Specification available from CENELEC Central Secretariat, 35, Rue de Stassart, B-Brussels, or from the National Committees members of CENELEC	**EN 140401-802**
Electronic components of assessed quality in accordance with: EN 60115-1:2001 EN 140400:200X EN 140401:2002	**Issue 2** May 2002
 Other shapes are permitted within the given dimensions. **Figure 1 - Outline and dimensions (see Table 1)**	Fixed low power non wire-wound chip resistors with rectangular base without leads for surface mounting. Style: RR Ceramic substrate with protected, insulated, resistance film (thick film) and solder terminations Assessment level EZ [a] Version A: with 100-%-test Version E: with failure rate level and 100-%-test Stability classes 1 and 2
[a] For explanations on assessment level EZ see 2.1.1	

1 Characteristics and ratings

Various parameters of this component are precisely specified 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		Width *W* mm		Height *H* mm		Termination *T* mm		Weight [a] mg
metric	**inch**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**max.**
RR 1005M	RR 0402	0,95	1,10	0,45	0,60	0,25	0,40	0,10	0,35	0,8
RR 1608M	RR 0603	1,50	1,70	0,75	0,95	0,35	0,55	0,10	0,50	2,1
RR 2012M	RR 0805	1,85	2,15	1,10	1,40	0,35	0,65	0,15	0,60	6,0
RR 3216M	RR 1206	2,90	3,35	1,45	1,75	0,35	0,65	0,25	0,75	10,0
[a] For information only Termination: $W_T \geq 0,75 \cdot W$ Thickness: 0,005 to 0,05 mm										

Table 2a - Ratings for stability class 2 and 1

Style	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
RR 1005M	63	50	75	75
RR 1608M	100	50	100	75
RR 2012M	125	100	200	75
RR 3216M	250	200	300	75

Table 2b - Ratings for 0 Ω resistors

Style	Maximum current I_{max} A	Maximum resistance value [a] R_{max} mΩ	Insulation voltage d.c. or a.c. (peak) U_{ins} V	
			1 min	continuous
RR 1005M	0,63	20	75	75
RR 1608M	1	20	100	75
RR 2012M	1,5	20	200	75
RR 3216M	2,0	20	300	75

[a] The resistance value shall be measured on the film side

1.2 Derating curve

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

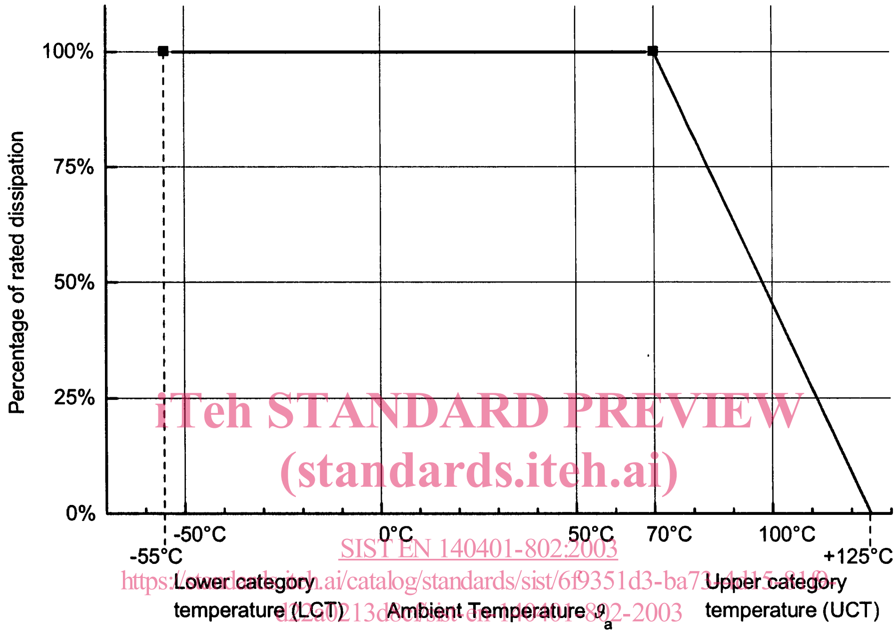


Figure 2 - Derating curve

For the category temperatures of stability classes refer to 1.5.

1.3 Resistance range and tolerance on rated resistance

Version A:

The following combinations of temperature coefficient, tolerance on rated resistance shall be used for qualification approval according to 2.2.1 and quality conformance inspection according to 2.3. Resistance values of 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. RR 1608M 1 % >1 MΩ shall fulfil the requirements of stability class 1).

Table 3a - Resistance range, tolerance on rated resistance for version A

Style	Tolerance on rated resistance		Temperature coefficient	Resistance range	Stability class
	%	Code[a]	ppm/K		
RR 1005M	± 5	J	± 200	1 Ω to 6,8 MΩ	2
	± 2	G	± 100	10 Ω to 1 MΩ	2
	± 1	F	± 100; ± 50	10 Ω to 1 MΩ	1
RR 1608M	± 5	J	± 200	1 Ω to 6,8 MΩ	2
	± 2	G	± 100	10 Ω to 1 MΩ	2
	± 1	F	± 100; ± 50	10 Ω to 1 MΩ	1
RR 2012M	± 5	J	± 200	1 Ω to 10 MΩ	2
	± 2	G	± 100	10 Ω to 1 MΩ	2
	± 1	F	± 100; ± 50	10 Ω to 1 MΩ	1
RR 3216M	± 5	J	± 200	1 Ω to 10 MΩ	2
	± 2	G	± 100	10 Ω to 1 MΩ	2
	± 1	F	± 100; ± 50	10 Ω to 1 MΩ	1
0 Ω-resistors according to Table 2b for all styles					
[a] Code letters according to EN 60062					

Version E:

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

Table 3b - Resistance range, tolerance on rated resistance for version E

Style	Tolerance on rated resistance		Temperature coefficient	Resistance range	Stability class	E series
	%	Code[a]	ppm/K			
RR 1005M	± 5	J	± 200	1 Ω to 6,8 MΩ	2	E24
	± 1	F	± 100	10 Ω to 1 MΩ	1	E96
RR 1608M	± 5	J	± 200	1 Ω to 6,8 MΩ	2	E24
	± 1	F	± 100	10 Ω to 1 MΩ	1	E96
RR 2012M	± 5	J	± 200	1 Ω to <10 Ω	2	E24
				>1 MΩ to 10 MΩ	2	
	± 1	F	± 100	10 Ω to 1 MΩ	1	E96
			± 50	10 Ω to 1 MΩ	1	
RR 3216M	± 5	J	± 200	1 Ω to <10 Ω	2	E24
				>1 MΩ to 10 MΩ	2	
	± 1	F	± 100	10 Ω to 1 MΩ	1	E96
			± 50	10 Ω to 1 MΩ	1	
0 Ω-resistors according to Table 2b for all styles						
[a] Code letters according to EN 60062						

1.4 Variation of resistance with temperature and temperature rise

Table 4 - Temperature coefficients and percentage change of resistance (acc. to EN 140400, Table 2)

Temperature coefficient		Limit of resistance change $\Delta R/R$ (%)		
ppm/K	Code[a]	Temp. charact. 20 °C / 70 °C	LCT / Ref. temp. - 55 °C / 20 °C	Ref. temp. / UCT 20 °C / 125 °C
± 200	A[b]	± 1 %	± 1,5 %	± 2,1 %
± 100	B	± 0,5 %	± 0,75 %	± 1,05 %
± 50	C	± 0,25 %	± 0,375 %	± 0,525 %
[a] Code letter according to EN 140400, Table 2				
[b] Tightening of the definition of the code letter "A" against the requirements of EN 140400, Table 2				

The limit of temperature rise at rated dissipation is $T_r \leq 55$ K.
The thermal resistance is calculated to $R_{th} = T_r / P_{70}$.

1.5 Climatic categories

The climatic category (LCT / UCT / Duration) is 55 / 125 / 56.

1.6 Limits for change of resistance at tests

Table 5 - Limits for change of resistance at tests

Stability class	Limit of resistance change $\Delta R/R$			
	EN 60115-1, 4.23 Climatic sequence 4.24 Damp heat, steady state 4.25.3 Endurance at upper category temperature	EN 60115-1, 4.25.1 Endurance at 70 °C		EN 60115-1, 4.13 Overload 4.18 Resistance to soldering heat 4.19 Rapid change of temperature 4.22 Vibration 4.33 Substrate bending test
		1 000 h	Extended, 8 000 h	
2	± (2 % R + 0,1 Ω)	± (2 % R + 0,1 Ω)	± (4 % R + 0,1 Ω) [a]	± (0,5 % R + 0,05 Ω)
1	± (1 % R + 0,05 Ω)	± (1 % R + 0,05 Ω)	± (2 % R + 0,1 Ω) [a]	± (0,25 % R + 0,05 Ω)
[a] Tightening of the general definition of stability classes against the requirements of EN 140400, 2.1.4				

1.7 Non-linear properties

(for resistance values ≥10 Ω)

If measurement of non-linearity according to 2.1.1 is required the measured values shall be above the limits given in the diagram below. The resistors shall be tested according to IEC 60440 where the test voltage shall be the rated voltage.

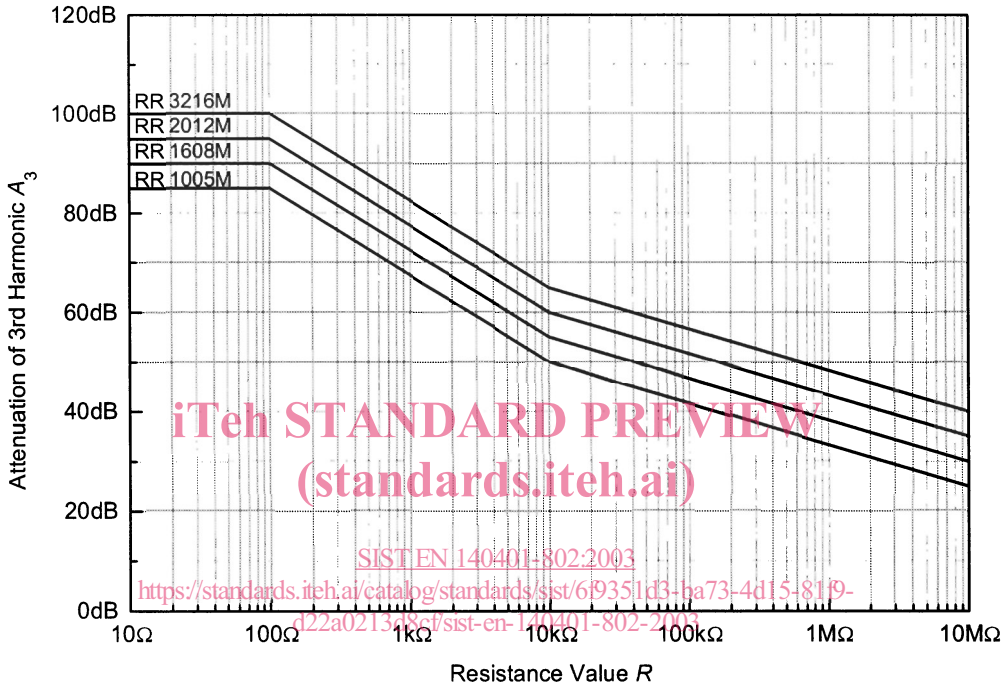


Figure 3 - Limits of non-linearity in resistors

1.8 Marking, packaging and ordering designation

1.8.1 Component

Surface mount resistors are generally not marked on the body. However, if some marking is applied to the body, the resistor shall be marked with the rated resistance according to EN 60062, section 3 or with the code letter according to Table 6 and as many of the remaining items listed in 2.4.1 of EN 60115-1 (only version A).

For version E the component shall be marked according to EN 60062, section 3 or with the code letter according to Table 6. The marking of the style RR 1005M and RR 1608M is not required.

Table 6 - Letter coding

Resistance range of the series E 96	Code letter
1 Ω to 9,76 Ω	1R00 to 9R76
10 Ω to 97,6 Ω	10R0 to 97R6
100 Ω to 976 Ω	1000 to 9760
1 kΩ to 9,76 kΩ	1001 to 9761
10 kΩ to 97,6 kΩ	1002 to 9762
100 kΩ to 976 kΩ	1003 to 9763
1 MΩ to 9,76 MΩ	1004 to 9764

1.8.2 Package

The package of the component shall be marked with ordering information in accordance to 1.8.4 with additionally

- CECC sign of conformity,
- CECC manufacturer code,
- NATO manufacturer code (only version E, if required),
- date code of manufacture according to EN 60062, additional information is allowed.

1.8.3 Packaging / Taping

Components may be taped or put in a bulk case. Taping shall be in accordance with EN 60286-3 type I. Bulk case packaging shall be in accordance with EN 60286-6. For environmental protection packaging into bulk cases is preferred.

1.8.4 Ordering information

Orders for resistors covered by this specification shall contain the following information:

- detail specification number;
- assessment level;
- style;
- temperature coefficient;
- rated resistance;
- tolerance on rated resistance;
- failure rate level (only Version E);
- form of delivery, packing method (in addition to the ordering information given in the examples below).