



**SLOVENSKI STANDARD**  
**SIST EN 140401-804:2011**  
**01-september-2011**

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**Podrobna specifikacija: Zelo stabilni fiksni plastni upori majhnih moči za površinsko montažo (SMD) - Pravokotni - Razreda stabilnosti 0,1 in 0,25**

Detail Specification: Fixed low power film high stability SMD resistors - Rectangular - Stability classes 0,1; 0,25

Bauartspezifikation: SMD Schicht-Festwiderstände niedriger Belastbarkeit mit hoher Stabilität - Rechteckig - Stabilitätsklassen 0,1; 0,25

Spécification particulière: Résistances fixes à couche de haute stabilité et à faible dissipation CMS - Rectangulaires - Catégories de stabilité 0,1; 0,25

<https://standards.iteh.ai/catalog/standards/sist/294b42c5-4618-497e-b332-1827510db708/sist-en-140401-804-2011>

**Ta slovenski standard je istoveten z: EN 140401-804:2011**

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**ICS:**

31.040.10      Fiksni upor      Fixed resistors

**SIST EN 140401-804:2011**      **en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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**EN 140401-804**

June 2011

ICS 31.040.10

Supersedes EN 140401-804:2005

English version

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Rectangular -  
Stability classes 0,1; 0,25**

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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.

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**CENELEC**

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

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

This European Standard was prepared by 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 140401-804 on 2011-05-09.

This document supersedes EN 140401-804:2005.

Preceding documents on the subject covered by this specification have been:

- only on resistors without established reliability, now version A:
  - CECC 40 401-010:1995-02;
  - CECC 40 401-010:1997-10.

EN 140401-804:2011 the following significant technical changes with respect to EN 140401-804:2005:

- modification of the title;
- introduction of a test on the resistance to electrostatic discharge 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 the code letters for temperature coefficient as given in EN 60062;
- revision of the ordering information in 1.9.4;
- revised information on pulse load capability in 1.10.6;
- revised information on resistance value drift in 1.10.7;
- revised information on current noise in 1.10.9;
- adoption of the IECQ rules of procedure, IEC QC 001002-3;
- revision of the sample quantities and the sequence of tests in Annex A.

Additionally, EN 140401-804:2011 is also an editorial revision of EN 140401-804:2005.

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) 2012-05-09
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-05-09

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 film surface mount (SMD) resistors
EN 140401-804	Detail Specification: Fixed low power film high stability surface mount (SMD) resistors – Rectangular – Stability classes 0,1; 0,25

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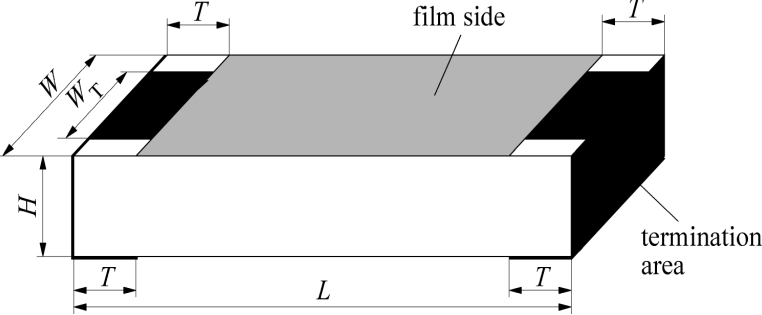
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Specification available from CENELEC Central Secretariat, Avenue Marnix 17, B – 1000 Brussels, Belgium or from the National Committees members of CENELEC	<b>EN 140401-804</b> 
Electronic components of assessed quality in accordance with: EN 60115-1:201X EN 140400:2003 EN 140401:2009	<b>Issue 2</b> (month) 201X
 <p>Other shapes are permitted within the given dimensions.</p> <p><b>Figure 1 – Outline and dimensions (see Table 1)</b></p>	<p>Fixed low power high stability film chip resistors with rectangular base for surface mounting</p> <p>Style: RR</p> <p>Ceramic substrate with protected, insulated, resistance film and solder terminations, typically thin film</p> <p>Assessment level EZ<sup>a</sup></p> <p>Version A: with 100-%-test</p> <p>Version E: with failure rate level and 100-%-test</p> <p>Stability classes 0,1 and 0,25</p>
<sup>a</sup> For explanations on assessment level EZ, see 2.1.1.	

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## 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 <i>L</i> mm		Width <i>W</i> mm		Height <i>H</i> mm		Termination <i>T</i> mm		Mass <sup>a</sup> mg
metric	inch	min.	max.	min.	max.	min.	max.	min.	max.	max.
RR 1005M	RR 0402	0,95	1,05	0,45	0,55	0,30	0,40	0,05/ 0,1 <sup>b</sup>	0,35	0,8
RR 1608M	RR 0603	1,50	1,70	0,70	0,90	0,35	0,55	0,10	0,50	2,1
RR 2012M	RR 0805	1,90	2,10	1,10	1,40	0,40	0,60	0,15	0,60	6,0
RR 3216M	RR 1206	3,00	3,40	1,45	1,75	0,45	0,65	0,25	0,75	10,0
RR 5025M	RR 2010	4,80	5,20	2,30	2,70	0,35	0,75	0,35	0,85	30,0

<sup>a</sup> For information only.

<sup>b</sup> The first figure indicates the termination width on the film side, the second figure the termination width on the reverse side.  
Termination:  $W_T \geq 0,75 \times W$   
Thickness: 0,005 mm to 0,05 mm

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 for stability class 0,25

Style	Stability class	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	0,25	100	50	75	75
RR 1608M	0,25	150	75	100	75
RR 2012M	0,25	200	150	200	75
RR 3216M	0,25	400	200	300	75
RR 5025M	0,25	500	300	300	75

Table 2b – Ratings for stability class 0,1

Style	Stability class	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	0,1	63	25	75	75
RR 1608M	0,1	100	50	100	75
RR 2012M	0,1	125	75	200	75
RR 3216M	0,1	250	150	300	75
RR 5025M	0,1	330	200	300	75

Table 2c – Ratings for 0  $\Omega$  resistors

Style	Maximum current $I_{max}$ A	Maximum resistance <sup>a</sup> $R_{res max}$ m $\Omega$	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
RR 5025M	3,0	20	300	75

<sup>a</sup> The resistance value shall be measured on the film side.



## 1.2 Derating curve

Resistors covered by this specification are derated according to Figure 2.



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Figure 2 – Derating curve

For the category temperatures of stability classes, refer to Table 6.

## 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. RR 1608M, 1 % > 500 k $\Omega$  shall fulfil the requirements of stability class 0,25).

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

Style	Tolerance on rated resistance		Temperature coefficient ppm/K	Resistance range	Stability class
	%	Code <sup>a</sup>			
RR 1005M	± 1	F	± 25	100 Ω to 49,9 kΩ	0,1
				24,9 Ω to 100 kΩ	0,25
	± 0,5	D	± 10; ± 25	100 Ω to 49,9 kΩ	0,1
				100 Ω to 49,9 kΩ	0,25
	± 0,1	B	± 10	100 Ω to 49,9 kΩ	0,1
				100 Ω to 49,9 kΩ	0,25
RR 1608M	± 1	F	± 25	100 Ω to 261 kΩ	0,1
				24,9 Ω to 500 kΩ	0,25
	± 0,5	D	± 10; ± 25	100 Ω to 261 kΩ	0,1
				100 Ω to 261 kΩ	0,25
	± 0,1	B	± 10	100 Ω to 261 kΩ	0,1
				100 Ω to 261 kΩ	0,25
RR 2012M	± 1	F	± 25	100 Ω to 301 kΩ	0,1
				24,9 Ω to 750 kΩ	0,25
	± 0,5	D	± 10; ± 25	100 Ω to 301 kΩ	0,1
				100 Ω to 301 kΩ	0,25
	± 0,1	B	± 10	100 Ω to 301 kΩ	0,1
				100 Ω to 301 kΩ	0,25
RR 3216M	± 1	F	± 25	100 Ω to 1 MΩ	0,1
				24,9 Ω to 2 MΩ	0,25
	± 0,5	D	± 10; ± 25	100 Ω to 1 MΩ	0,1
				100 Ω to 1 MΩ	0,25
	± 0,1	B	± 10	100 Ω to 1 MΩ	0,1
				100 Ω to 1 MΩ	0,25
RR 5025M	± 1	F	± 25	100 Ω to 3,01 MΩ	0,1
				24,9 Ω to 6,04 MΩ	0,25
	± 0,5	D	± 10; ± 25	100 Ω to 3,01 MΩ	0,1
				100 Ω to 3,01 MΩ	0,25
	± 0,1	B	± 10	100 Ω to 3,01 MΩ	0,1
				100 Ω to 3,01 MΩ	0,25
0 Ω resistors according to Table 2c for all styles.					
<sup>a</sup> Code letters according to EN 60062.					

### 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.

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

Style	Tolerance on rated resistance		Temperature coefficient ppm/K	Resistance range	Stability class	E series
	%	Code <sup>a</sup>				
RR 1005M	± 1	F	± 25	24,9 Ω to 97,6 Ω	0,25	E96
				100 Ω to 49,9 kΩ	0,1	
	± 0,1	B	± 10	100 Ω to 49,9 kΩ	0,1	E192
RR 1608M	± 1	F	± 25	24,9 Ω to 97,6 Ω	0,25	E96
				100 Ω to 261 kΩ	0,1	
				267 kΩ to 500 kΩ	0,25	
	± 0,1	B	± 10	100 Ω to 261 kΩ	0,1	E192
RR 2012M	± 1	F	± 25	24,9 Ω to 97,6 Ω	0,25	E96
				100 Ω to 301 kΩ	0,1	
				309 kΩ to 750 kΩ	0,25	
	± 0,1	B	± 10	100 Ω to 301 kΩ	0,1	E192
RR 3216M	± 1	F	± 25	24,9 Ω to 97,6 Ω	0,25	E96
				100 Ω to 1 MΩ	0,1	
				1,02 MΩ to 2 MΩ	0,25	
	± 0,1	B	± 10	100 Ω to 1 MΩ	0,1	E192
RR 5025M	± 1	F	± 25	24,9 Ω to 97,6 Ω	0,25	E96
				100 Ω to 3,01 MΩ	0,1	
				3,09 MΩ to 6,04 MΩ	0,25	
	± 0,1	B	± 10	100 Ω to 3,01 MΩ	0,1	E192

0 Ω resistors according to Table 2c for all styles.

<sup>a</sup> 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  
(according to EN 140400:2003, Table 2)**

Temperature coefficient				Limit of resistance change $\Delta R/R$ %		
$10^{-6}/K^a$	Code <sup>b</sup>	Code <sup>c</sup>	Code <sup>d</sup>	LCT / Reference temperature °C	Reference temperature / UCT °C	
				- 55 / 20	20 / 125	20 / 155
± 25	Q	D	E	± 0,188	± 0,262	± 0,338
± 10	N	F	Y	± 0,075	± 0,105	± 0,135

<sup>a</sup> The unit  $10^{-6}/K$  is traditionally referred to as ppm/K.  
<sup>b</sup> Code letters according to EN 60062.  
<sup>c</sup> Historical code letters according to EN 140400, for information only.  
<sup>d</sup> Historical code letters according to CECC 40401-010, for information only.

**Table 5 – Limit of temperature rise**

Stability class	Limit of temperature rise at rated dissipation
0,1	$T_r \leq 55 \text{ K}$
0,25	$T_r \leq 85 \text{ K}$

The thermal resistance is calculated to  $R_{th} = T_r / P_{70}$ .  
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## 1.5 Climatic categories

**Table 6 – Climatic categories**

Stability class	Climatic category LCT / UCT / Duration
0,1	55 / 125 / 56
0,25	55 / 155 / 56

## 1.6 Limits for change of resistance at tests

Table 7a – Limits for change of resistance at tests

Stability class	Limit of resistance change $\Delta R$			
	EN 60115-1:201X, 4.23 Climatic sequence 4.24 Damp heat, steady state 4.25.3 Endurance at upper category temperature	EN 60115-1:201X, 4.25.1 Endurance at 70 °C		EN 60115-1:201X, 4.13 Overload 4.18 Resistance to soldering heat 4.19 Rapid change of temperature 4.22 Vibration 4.33 Substrate bending
		1 000 h	Extended, 8 000 h	
0,25	$\pm (0,25 \% R + 0,05 \Omega)$	$\pm (0,25 \% R + 0,05 \Omega)$	$\pm (0,5 \% R + 0,05 \Omega)$	$\pm (0,05 \% R + 0,01 \Omega)$
0,1	$\pm (0,1 \% R + 0,02 \Omega)$	$\pm (0,1 \% R + 0,02 \Omega)$	$\pm (0,25 \% R + 0,02 \Omega)$	$\pm (0,05 \% R + 0,01 \Omega)$

Table 7b – Limits for change of resistance at tests

Stability class	Limit of resistance change $\Delta R$			
	EN 60115-1:201X, 4.19 Rapid change of temperature, 1 000 cycles	EN 60115-1:201X, 4.27 Single-pulse high-voltage overload test	EN 60115-1:201X, 4.39 Periodic-pulse overload test	EN 60115-1:201X, 4.38 Electrostatic discharge <sup>a</sup>
0,25	$\pm (0,25 \% R + 0,05 \Omega)$	$\pm (0,5 \% R + 0,05 \Omega)$	$\pm (1 \% R + 0,05 \Omega)$	$\pm (0,5 \% R + 0,05 \Omega)$
0,1	$\pm (0,25 \% R + 0,05 \Omega)$	$\pm (0,5 \% R + 0,05 \Omega)$	$\pm (1 \% R + 0,05 \Omega)$	$\pm (0,5 \% R + 0,05 \Omega)$

<sup>a</sup> Human Body Model (HBM) according to EN 61340-3-1, 3 positive + 3 negative discharges.