SLOVENSKI STANDARD
SIST EN 140402-801:2015

01-junij-2015

Nadomešča:

SIST EN 140402-801:2006

Podrobna specifikacija: upori, nespremenljivi, za male moči, žični, za površinsko montažo (SMD) - Pravokotne oblike - Razredi stabilnosti 0,5; 1; 2

Detail specification: Fixed low power wirewound surface mount (SMD) resistors - Rectangular - Stability classes 0,5; 1; 2

Bauartspezifikation: Oberflächenmontierbare drahtgewickelte Festwiderstände (SMD) niedriger Belastbarkeit - Rechteckig - Stabilitätsklassen 0,5; 1; 2

Spécification particulière: Résistances fixes bobinées à faible dissipation pour montage en surface (CMS) - Rectangulaire - Catégories de stabilité 0,5; 1; 2

Ta slovenski standard je istoveten z: EN 140402-801:2015

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Contents

Foreword

This document (EN 140402-801:2015) has been prepared by CLC/TC 40XB "Resistors".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2015-12-15
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2017-12-15

This European Standard supersedes EN 140402-801:2005.

Preceding document on the subject covered by this specification has been:

– CECC 40 402-801:2000-02.

EN 140402-801:2015 includes the following significant technical changes with respect to EN 140402-801:2005:

– adoption of P_{70} as the rated dissipation, leaving the prior used P_{25} as an additional information;

– for style RW1607M, increase of P_{70} to 2,4 W, with P_{25} = 3,0 W;

– introduction of a test on the resistance to electrostatic discharge (ESD) in 1.7 and Annex A;

– introduction of code letters for the temperature coefficient (TCR) as in EN 60062:2005;

– revision of ordering information in 1.10.4;

– adoption of the IECQ rules of procedure according to QC 001002-3:2005;

– revision of the sample quantities and the sequence of tests in Annex A;

– editorial revision.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This specification is part of a series of documents describing fixed low power wire wound surface mount (SMD) resistors as follows:

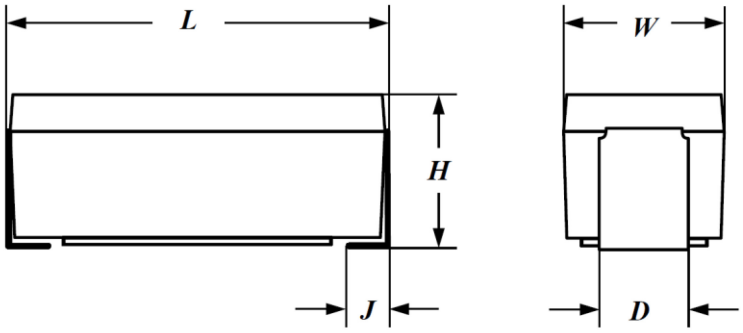
– EN 60115-1, *Fixed resistors for use in electronic equipment — Part 1: Generic specification (IEC 60115-1, modified)*

– EN 60115-8, *Fixed resistors for use in electronic equipment — Part 8: Sectional specification — Fixed surface mount resistors (IEC 60116-8, modified)*

– This detail specification.

Any detail specification within this series is written on the basis of

– EN 140402, *Blank Detail Specification: Fixed low power wirewound surface mount (SMD) resistors*.

Specification available from CENELEC Central Secretariat, Avenue Marnix 17, B – 1000 Brussels, or from the National Committees members of CENELEC	**EN 140402-801**
Electronic components of assessed quality in accordance with: EN 60115-1:2011 EN 60115-8:2012 EN 140402:2015	**Issue 2** April 2015
 Other shapes are permitted within the given dimensions. **Figure 1 — Outline and dimensions (see Table 1)**	Fixed low power wire wound resistors with rectangular base for surface mounting. Style: RW Wire wound, insulated resistor with end terminations for application on printed board and flexible foils. Assessment level EZ [a] Level P: with 100 %-test Level R: with failure rate level and 100 %-test Stability classes 0,5; 1 and 2
[a] See 2.1.1 for an explanation on the assessment level EZ.	

1 Characteristics and ratings

1.1 General

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

1.2 Dimensions and ratings

The shape and dimensions of the resistors covered by this specification are shown in Figure 1, with the specific styles and their respective dimensions given in Table 1. Other shapes are permissible within the given dimensions.

Table 1 — Style and dimensions

Style [a]		Length *L*		Width *W*		Height *H*		Termination width *D*		Termination seating length *J*		Mass [b]
		mm		mm		mm		mm		mm		mg
metric	inch [b]	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	max.
RW0503M	RW2012	4,6	5,6	2,0	3,6	2,0	3,6	1,0	2,0	0,7	1,4	120
RW0704M	RW2515	5,7	8,0	3,0	4,5	2,4	4,5	1,0	3,0	0,8	1,6	250
RW1107M	RW4527	9,8	12,5	5,5	7,5	3,9	6,0	1,8	5,6	1,4	2,8	1 000
RW1607M	RW6927	14,5	19,0	5,5	7,5	5,5	7,5	3,0	5,8	1,4	2,8	2 000

[a] The given styles correspond to the historical styles of the prior CECC 40 402-801 as follows:

Style	Historic style
RW0704M	RW1
RW1107M	RW2
RW1607M	RW3

[b] For information only.

NOTE 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 2 — Ratings

Style	Rated dissipation P_{70} W	Maximum dissipation [a] P_{25} W	Limiting element voltage d.c. or a.c. (r.m.s.) [b] U_{max} V	Insulation voltage d.c. or a.c. (peak) U_{ins} V	
				1 min	continuous
RW0503M	0,6	0,75	28	500	75
RW0704M	0,8	1,0	50	500	75
RW1107M	1,6	2,0	112	500	75
RW1607M	2,4	3,0	200	500	75

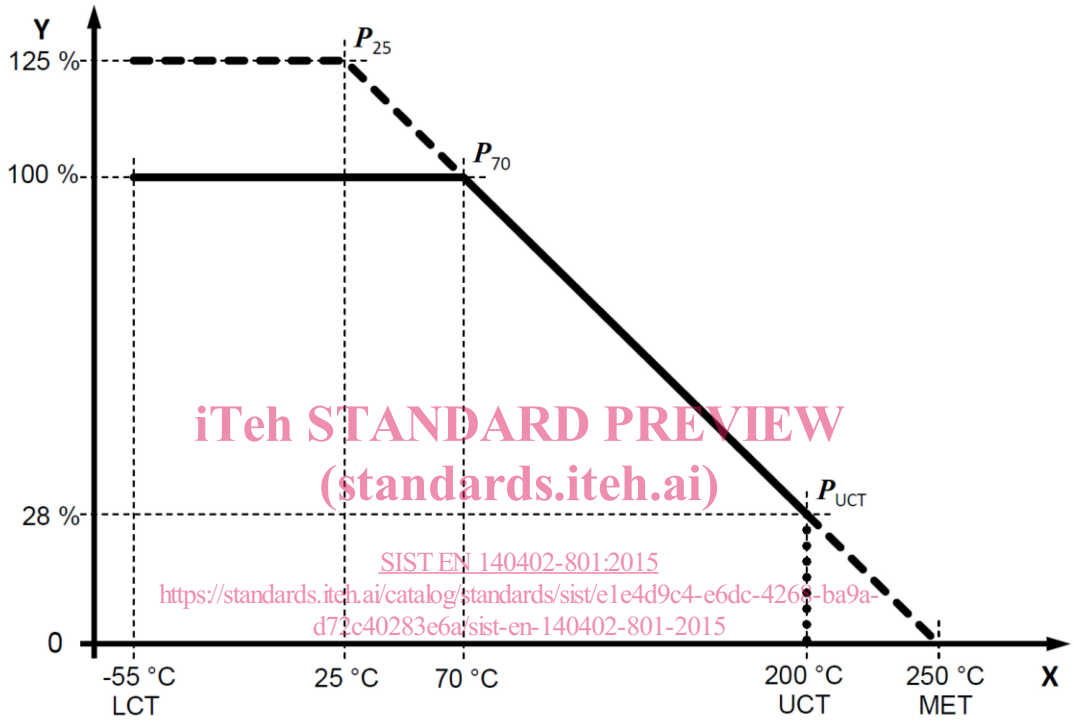
[a] For information only.

[b] For all resistance ranges given in Tables 3 and 4, the applicable voltage is determined by the rated or maximum dissipation and not limited by the limiting element voltage.

1.3 Derating curve

The permissible dissipation of resistors covered by this detail specification is the rated dissipation as given in Table 2, which is derated for an ambient temperature above the rated temperature 70 °C according to the diagram in Figure 2.

The manufacturer of the resistors covered by this detail specification may uprate the products by specification of an increased dissipation up to the maximum dissipation given in Table 2, which is derated for an ambient temperature above the reference temperature of 25 °C according to the diagram in Figure 2. The manufacturer shall support such uprating with respective test results.



Key

X ambient temperature ϑ_{amb}

Y fraction of the rated dissipation P_{70}

Figure 2 — Derating curve

NOTE Climatic tests and the assessment of the temperature coefficient of resistance apply the upper category temperature, UCT, as the highest temperature, whereas the loads applied under endurance testing aim to subject the resistive element to the maximum element temperature, MET.

The use of the full specified dissipation and temperature range results in a high temperature on the substrate (PCB) and in the solder joints. It may hence be required to select suitable substrate material and suitable solder material in order to maintain the reliability of the assembly.

1.4 Resistance range and tolerance on rated resistance

1.4.1 Level P

NOTE Product classification to Level P adopts and succeeds the former Version A as used in prior revisions of this detail specification.

Table 3 gives the combinations of temperature coefficient, tolerance on resistance and resistance range which may be approved to Level P according to this detail specification. The respective E Series are specified as a recommendation only for Level P.

Products from the extent given in Table 3 shall be used for the initial product qualification approval to Level P according to 2.2.2, and for the quality conformance inspection according to 2.3.

The qualification of resistances below or above the specified resistance ranges is permissible if they fulfil the requirements of the stability class prescribed for the closest resistance within a specified range; e.g. resistors of Style RW0704M, 1 %, > 2,43 kΩ shall fulfil the requirements of stability class 1.

Table 3 — Resistance range and tolerance on rated resistance for Level P

Style	Tolerance on rated resistance		Temperature coefficient [a]		Resistance range	Stability class	E Series [c]
	%	Code [b]	10^{-6}/K	Code [b]			
RW0503M	± 5	J	See Table 5.		0,047 Ω to 1 kΩ	2	E24
	± 1	F			0,1 Ω to 1 kΩ	1	E96
	± 0,5	D			0,1 Ω to 1 kΩ	0,5	E192
RW0704M	± 5	J			0,047 Ω to 2,4 kΩ	2	E24
	± 1	F			0,1 Ω to 2,43 kΩ	1	E96
	± 0,5	D			0,1 Ω to 2,43 kΩ	0,5	E192
RW1107M	± 5	J			0,047 Ω to 5,6 kΩ	2	E24
	± 1	F			0,1 Ω to 5,62 kΩ	1	E96
	± 0,5	D			0,1 Ω to 5,62 kΩ	0,5	E192
RW1607M	± 5	J			0,047 Ω to 13 kΩ	2	E24
	± 1	F			0,1 Ω to 13 kΩ	1	E96
	± 0,5	D			0,1 Ω to 13 kΩ	0,5	E192

[a] The waivers given in EN 60115-1:2011, 4.8.5 concerning the measurement of the temperature coefficient at resistors below 10 Ω and below 5 Ω shall not apply for this specification. A suitable test method shall be applied in order to ensure the required measurement accuracy.

[b] Code letters according to EN 60062.

[c] E Series according to IEC 60063.

The range of resistors approved in each style, together with the associated temperature coefficient and tolerance, shall be given in the register of approvals, as available for example on the website http://www.iecq.org.

1.4.2 Level R

NOTE Product classification to Level R adopts and succeeds the former Version E as used in prior revisions of this detail specification.

Table 4 gives the combinations of temperature coefficient, tolerance on resistance, resistance range and mandatory E Series which may be approved to Level R according to this detail specification.

Products from the extent given in Table 4 shall be used for the initial product qualification approval to Level P according to 2.2.3, and for the quality conformance inspection according to 2.3.

Table 4 — Resistance range and tolerance on rated resistance for Level R

Style	Tolerance on rated resistance		Temperature coefficient [a]		Resistance range	Stability class	E Series [c]
	%	Code [b]	10^{-6}/K	Code [b]			
RW0503M	± 5	J	See Table 5		0,47 Ω to 510 Ω	2	E24
	± 0,5	D			0,464 Ω to 511 Ω	0,5	E96
RW0704M	± 5	J			0,47 Ω to 1,2 kΩ	2	E24
	± 0,5	D			0,475 Ω to 1,21 kΩ	0,5	E96
RW1107M	± 5	J			0,47 Ω to 3,0 kΩ	2	E24
	± 0,5	D			0,475 Ω to 3,01 kΩ	0,5	E96
RW1607M	± 5	J			0,47 Ω to 6,8 kΩ	2	E24
	± 0,5	D			0,475 Ω to 6,81 kΩ	0,5	E96

[a] The waivers given in EN 60115-1:2011, 4.8.5 concerning the measurement of the temperature coefficient at resistors below 10 Ω and below 5 Ω shall not apply for this specification. A suitable test method shall be applied in order to ensure the required measurement accuracy.

[b] Code letters according to EN 60062.

[c] E Series according to IEC 60063.

The range of resistors approved in each style, together with the associated temperature coefficient and tolerance, shall be given in the register of approvals, as available for example on the website http://www.iecq.org.

1.5 Variation of resistance with temperature and temperature rise

The permissible limits for the reversible change of resistance at variation of resistance with temperature tests are given in Table 5 for the category temperatures applied in this detail specification.

Table 5 — Temperature coefficients and permissible change of resistance

Temperature coefficient			Resistance range	Limit of resistance change $\Delta R/R$ [d] %	
				Lower TCR	Upper TCR
10^{-6}/K [a]	Code [b]	Code [c]	Ω	LCT / Reference temperature -55 °C / 20 °C	Reference temperature / UCT 20 °C / 200 °C
± 250	U	A	R < 0,47	± 1,875	± 4,5
± 100	S	B	0,47 ≤ R < 1	± 0,75	± 1,8
± 50	R	C	1 ≤ R ≤ 10	± 0,375	± 0,9
± 25	Q	D	R > 10	± 0,188	± 0,45

[a] The unit 10^{-6}/K is traditionally referred to as ppm/K.

[b] Code letters according to EN 60062.

[c] Historical code letters according to EN 140400, for information only.

[d] The waivers given in EN 60115-1:2011, 4.8.5 concerning the measurement of the temperature coefficient at resistors below 10 Ω and below 5 Ω shall not apply for this specification. A suitable test method shall be applied in order to ensure the required measurement accuracy.

The permissible temperature rise $(\Delta\vartheta)_{max}$ for the temperature rise test according to EN 60115-1:2011, 4.14 is given in Table 6.

Table 6 — Limit of temperature rise

Stability class	Limit of temperature rise at rated dissipation
0,5; 1; 2	$\Delta\vartheta \leq 180$ K

The thermal resistance is calculated to $R_{th} = (\Delta\vartheta)_{max} / P_{70}$.

1.6 Climatic categories

The climatic categories applied in this detail specification are given in Table 7.

Table 7 — Climatic categories

Stability class	Climatic category LCT / UCT / Duration
0,5; 1; 2	55 / 200 / 56

The upper category temperature (UCT), which is used for a number of test procedures, is lower than the maximum element temperature (MET), which may be observed in application conditions.

1.7 Limits for change of resistance at tests

The permissible limits for the change of resistance at tests are given in Table 8 for the stability classes applied in this detail specification.

Table 8 — Limits for change of resistance at tests

Stability class	Limit of resistance change ΔR Ω					
	Long term tests			Short term tests	Advanced stress tests	
	EN 60115-1:2011, 4.23 Climatic sequence 4.24 Damp heat, steady state 4.25.3 Endurance at a maximum temperature	EN 60115-1:2011, 4.25.1 Endurance at the rated temperature 70 °C [a] or 4.25.2 Endurance at room temperature		EN 60115-1:2011, 4.13 Short time overload 4.18 Resistance to soldering heat 4.19 Rapid change of temperature, 5 cycles 4.21 Shock 4.22 Vibration 4.33 Substrate bending test	EN 60115-1:2011, 4.19 Rapid change of temperature, 100 cycles 4.27 Single-pulse high-voltage overload test [b] 4.38 Electrostatic discharge [c]	EN 60115-1:2011, 4.39 Periodic-pulse overload test
		1 000 h	Extended, 8 000 h			
2	± (2 % R + 5 mΩ) [d]	± (2 % R + 5 mΩ) [d]	± (5 % R + 5 mΩ) [d]	± (0,5 % R+ 2 mΩ) [d]	± (1 % R + 2 mΩ) [d]	± (2 % R + 5 mΩ) [d]
1	± (1 % R + 2 mΩ) [d]	± (1 % R + 2 mΩ) [d]	± (2 % R + 2 mΩ) [d]	± (0,25 % R+ 2 mΩ) [d]	± (0,5 % R+ 2 mΩ) [d]	± (1 % R + 2 mΩ) [d]
0,5	± (0,5 % R + 2 mΩ) [d]	± (0,5 % R + 2 mΩ) [d]	± (1 % R + 2 mΩ) [d]	± (0,1 % R + 1m Ω) [d]		

[a] Testing endurance at the rated temperature 70 °C is mandatory for Level R.

[b] This test shall be applied to resistors of 10 Ω or above.

[c] Human body model (HBM) according to EN 61340-3-1, 3 positive + 3 negative discharges.

[d] Tightening of the general definition of stability classes against the requirements of EN 60115-8:2012, 2.1.4.