DOCUMENT CHANGE REQUEST

DCR number 499	Changes required for: General	Originator: Steve Thacker - ESCC
Date: 2009/04/14	Date sent: 2009/04/14	Organisation: ESA/ESTEC
Status: IMPLEMENTED		

Title:	Resistors Fixed Film Non-Hermetically Sealed, based on type RS92 (RNC90)		
Number:	4001/011	Issue:	1

Other documents affected:

Page:

Specification 4001/011 issue 1 is re-written as issue 2 to incorporate changes resulting from the recent modification of 4001 issue 1 (per DCR409), as summarised herein (see Attached for proposed issue 2 Draft A).

The layout, format and general content

Paragraph:

Specification 4001/011 issue 1 is re-written as issue 2 to incorporate changes resulting from the recent modification of 4001 issue 1 (per DCR409), as summarised herein (see Attached for proposed issue 2 Draft A).

The layout, format and general content

Original wording:

Proposed wording:

Total reformat of this Detail Specification (from the range of various ESCC Detail Specifications, 4001/xxx, for resistors under Generic Specification No. 4001) as part of the ongoing conversion to the ESCC format.

See below for summary of changes, also see attached the proposed Issue 2 Draft A.

Note: known support for active procurement against this specification includes the following Manufacturer:
Vishay SA Sfernice/France (is willing to support procurement of all variants).

Summary of changes to the current format, layout and content is as follows:

1) General
Rewording and restructure of various sections and paragraphs of the specification, plus other editorial changes based on the layout and editorial content of other Detail Specifications already converted to ESCC format.

2) Title, Para 1.1
Amended to remove reference to commercial type number â..RS92Nâ.

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3) Table 1(a), Range of Components, Figure 2, Para 4.5.3.1, 4.5.3.2
Obsolete Variants 01, 02, 05, 06, are deleted.
Unavailable tolerances 0.005%, 0.01%, are deleted
Resistance range amended to reflect that available; is 33.2ohm to 100kohm (was 1ohm to 150kohm)

4) Table 1(b), Isolation Voltage rating added (300V)

5) Figure 1, Parameter Derating chart/requirements moved to be a note to the Maximum Ratings table (in para 1.5).

6) Para 4.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5
All deviations are deleted (no longer applicable due to the new Generic spec, format changes and deletion of obsolete variants & tolerances).

7) Para. 4.4.3. Para is deleted (this is an in-process pre-encapsulation visual PID level inspection requirement that is not usually specified in the Detail specification for this type of component).

8) Para 4.6.2 & Table 3. High & Low Temp Electrical Measurements: change the applied sampling to be a fixed sample of 5 components from the lot (to be consistent with 4001)(in para 2.6.2).

9) Para 4.7.2 Burn-in conditions: Para is deleted (details are already specified in 4001).

10) Table 2
Insulation Resistance: change the applied sampling to be a fixed sample of 5 components from the lot.
Voltage Proof limit is amended to be 420V (was 425V)(to be consistent with 4001 test condition (=1.4x isolation voltage = 1.4x300V).

11) Table 3
Amend Change in Resistance limits for 22C to 175C range to be +/-0.103% (was 0.1%) based on worse case temperature differential including the specified temperature tolerances.
Add new measurement between 22C & 125C (to confirm TC = 5ppm/C in this range).

12) Figures 5 is deleted

13) Table 6 Drying procedure is deleted from Solderability and Resistance to Soldering Heat tests (to be consistent with 4001)

14) New para 2.5 for Resistance to Soldering Heat test is added.

Justification:

(see also change details for items above):

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Part of the ongoing activity of conversion of ESA/SCC specifications to the ESCC format. Amendments are made to the format and presentation to be consistent with the various other ESCC Detail Specifications, already converted to ESCC format, as well as the ESCC Generic Specification No. 4001 issue 2.

Attachments:

4001011DraftC.pdf, null

Modifications:

The proposed specification issue is now issue 2 draft C which reflects all agreed changes between the ESCC Technical Writer and the Manufacturer VISHAY S.A. Division Sfernice for DCR499.

The Manufacturer for this component has stated a preference to be identified as "VISHAY S.A. Division Sfernice (F)".

Additional change proposals 15 & 16 to be added to DCR499 are as follows:

New item 15, related to original DCR499 item 6), as follows:

15 Add new deviation to the generic spec in new Para 2.1.1 as follows:
2.1.1.1 Deviations from Screening Tests (Chart F3)
(a) Para. 8.3.2, Room Temperature Electrical Measurements (after Burn-in):
Additional limits to be applied during measurement of Resistance, calculated from the applicable tolerance plus an additional +/- 0.015%, shall be as follows:
(see attached 4001/011 draft 2C Para 2.1.1.1 for full details)
Electrical parameter failures to these additional limits shall be rejected and shall count towards the Check for Lot Failure during Chart F3. Electrical parameter failures to the original tolerance limits specified in Room Temperature Electrical Measurements herein, that meet these additional limits, shall still be rejected but shall not count towards the Check for Lot Failure during Chart F3.

New item 16, related to original DCR499 items 2) & 8), as follows:

16 Add new Appendix for VISHAY S.A. Division Sfernice (F) with the following 2 deviations:
.....
Items Affected: Specification Title / Based on Type Designation

Description of Deviations: The Manufacturer’s part type designation is: RCK02 HR

.....

Items Affected: High and Low Temperatures Electrical Measurements (Para. 2.6.2, Note 1)

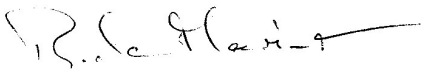
Description of Deviations: The measurements of Resistance Change over temperature may be performed on a sample of 5 prevalues selected from the total production prevalue lot.
Justification:
The appendix has been discussed and agreed with Vishay. The following justifications apply for the 2 new change proposals 15 & 16:

New item 15:
The change takes into account the previous Table 4 resistance drift limit applied over burn-in.

New item 16:
A) Based on Type No.:
Vishay do not use the MIL part number (RNC90) to identify the ESCC component, their designation is RCK02 HR and would like the ESCC spec to reflect this.

B) TCR:
Previously against the old ESCC specs (generic & detail) only ESCC level B & LAT lots were submitted to TCR.
In addition Vishay has TCR results available for all prevalue lots.
Vishay propose to do TCR on finished pieces only for each new prevalue lot. (note - a prevalue lot could be used on several customer's orders.

Approval signature:



Date signed:

2009-04-14

RESISTOR, FIXED, FILM, NON-HERMETICALLY SEALED

BASED ON TYPE RNC90

ESCC Detail Specification No. 4001/011

Issue 2 Draft C	May 2010

Document Custodian: European Space Agency - see https://escies.org

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DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

DCR No.	CHANGE DESCRIPTION
499	Specification updated to incorporate editorial and technical changes per DCR.

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1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

1.2 APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

(a) ESCC Generic Specification No. 4001.

1.3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply.

1.4 THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 40010110333R2B

- Detail Specification Reference: 4001011
- Component Type Variant Number: 03 (as required)
- Characteristic code: Resistance Value (33.2Ω): 33R2(as required)
- Characteristic code: Resistance Tolerance (±0.1%): F (as required)

1.4.1.1 Characteristics and/or Ratings Codes

Characteristics and/or ratings to be codified as part of the ESCC Component Number shall be as follows:

(a) Resistance Value expressed by means of the following codes in accordance with ESCC Basic Specification No. 21700. The unit quantity shall be ohm (Ω):

Resistance Value (Ω)	Code
XX.X	XXRX
XXX	XXX0
XXX 10^1	XXX1
XXX 10^2	XXX2
XXX 10^3	XXX3

(b) Resistance Tolerance expressed by the following codes:

Tolerance (± %)	Code Letter
0.02	P
0.05	W
0.1	B
0.2	C
0.5	D
1	F

1.4.2 Component Type Variants and Range of Components

The component type variants and range of components applicable to this specification are as follows:

Variant Number	Physical Configuration (Note 1)	Resistance Range R_n (Note 2, 3)		Tolerance (± %)	Temperature Coefficient TC ($\pm 10^{-6}/^{o}C$)	Terminal Material and Finish	Weight max (g)
		Min (Ω)	Max (kΩ)				
03	Lead Spacing: 5.08mm Lead Length: 6mm min	33.2	100	0.02, 0.05, 0.1, 0.2, 0.5, 1	5 (-55°C to +125°C) 10 (+125°C to +175°C)	A3 or A4	1
04	Lead Spacing: 3.81mm Lead Length: 6mm min	33.2	100	0.02, 0.05, 0.1, 0.2, 0.5, 1	5 (-55°C to +125°C) 10 (+125°C to +175°C)	A3 or A4	1
07	Lead Spacing: 5.08mm Lead Length: 20mm min	33.2	100	0.02, 0.05, 0.1, 0.2, 0.5, 1	5 (-55°C to +125°C) 10 (+125°C to +175°C)	A3 or A4	1
08	Lead Spacing: 3.81mm Lead Length: 20mm min	33.2	100	0.02, 0.05, 0.1, 0.2, 0.5, 1	5 (-55°C to +125°C) 10 (+125°C to +175°C)	A3 or A4	1

NOTES:

1. See Physical Dimensions.
2. Value series: E192.
3. Critical resistance: 180kΩ.

1.5 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

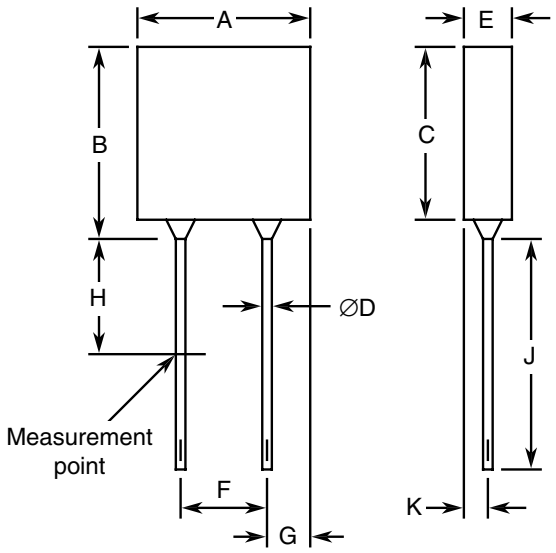
Characteristics	Symbols	Limits	Units	Remarks
Rated Dissipation	P_n	500	mW	Note 1
Limiting Element Voltage	U_L	300	V	-

Characteristics	Symbols	Limits	Units	Remarks
Rated Voltage	U_R	$\sqrt{(P_n \times R_n)}$	V	Note 2
Isolation Voltage	U_i	300	Vrms	-
Operating Temperature Range	T_{op}	-55 to +175	^oC	T_{amb}
Storage Temperature Range	T_{stg}	-65 to +175	^oC	-
Soldering Temperature	T_{sol}	+260	^oC	Note 3

NOTES:

1. For $+70^oC \leq T_{amb} \leq +125^oC$ derate linearly to 300mW. For $T_{amb}>+125^oC$ derate linearly to 0W at $T_{amb}=+175^oC$.
2. Shall never exceed Limiting Element Voltage. R_n = Rated Resistance.
3. Duration 10 seconds maximum at a distance of not less than 1.6 mm from the body.

1.6 PHYSICAL DIMENSIONS



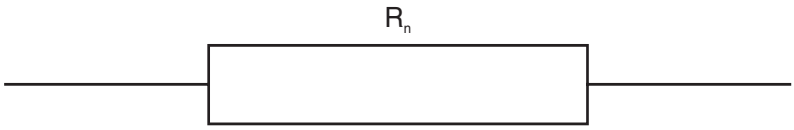
Symbols	Dimensions (mm)		Notes
	Min.	Max.	
A	-	7.5	
B	-	8	
C	-	7.5	
ØD	0.55	0.65	
E	-	2.5	
F	4.8	5.35	Variants 03, 07
	3.55	4.1	Variants 04, 08
G	1	1.5	Variants 03, 07

Symbols	Dimensions (mm)		Notes
	Min.	Max.	
	1.6	2.1	Variants 04, 08
H	4	6	
J	6	-	Variants 03, 04
	20	-	Variants 07, 08
K	-	1.5	

NOTES:

1. Slight variations in the shape of the package are allowed provided they remain within the dimensions of A, B and E.

1.7 FUNCTIONAL DIAGRAM



1.8 MATERIALS AND FINISHES

1.8.1 Body

As a minimum, a thermo-setting resin moulding shall ensure the protection of the resistor.

1.8.2 Terminations

The terminal material and finish shall be as specified in Component Type Variants and Range of Components in accordance with the requirements of ESCC Basic Specification No. 23500.

2. REQUIREMENTS

2.1 GENERAL

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.

2.1.1 Deviations from the Generic Specification

2.1.1.1 Deviations from Screening Tests (Chart F3)

(a) Para. 8.3.2, Room Temperature Electrical Measurements (after Burn-in):
Additional limits to be applied during measurement of Resistance, calculated from the applicable tolerance plus an additional ±0.015%, shall be as follows:

Tolerance (± %)	Post Burn-in Resistance Limits	
	Min	Max
0.02	0.99965 R_n	1.00035 R_n
0.05	0.99935 R_n	1.00065 R_n
0.1	0.99885 R_n	1.00115 R_n
0.2	0.99785 R_n	1.00215 R_n
0.5	0.99485 R_n	1.00515 R_n
1	0.98985 R_n	1.01015 R_n

Electrical parameter failures to these additional limits shall be rejected and shall count towards the Check for Lot Failure during Chart F3. Electrical parameter failures to the original tolerance limits specified in Room Temperature Electrical Measurements herein, that meet these additional limits, shall still be rejected but shall not count towards the Check for Lot Failure during Chart F3.

2.2 MARKING

The marking of all components delivered to this specification shall be in accordance with the requirements of ESCC Basic Specification No. 21700. When the component is too small to accommodate all of the marking specified, as much as space permits shall be marked and the marking information, in full, shall accompany each component in its primary package.

The information to be marked and the order of precedence, shall be as follows:

(a) The ESCC qualified components symbol (for ESCC qualified components only).
(b) The ESCC Component Number.
(c) Traceability information.

2.3 OVERLOAD

The test conditions for Overload, tested as specified in the ESCC Generic Specification, shall be as follows:

Voltage: $\sqrt{(4P_n x R_n)}$ or 450V, whichever is less.

Duration: 5s minimum.

2.4 ROBUSTNESS OF TERMINATIONS - SUBSTRATE BENDING TEST

The test conditions for the Tensile Test, tested as specified in the ESCC Generic Specification, shall be as follows:

Force: 10N

Duration: 5 to 10s

2.5 RESISTANCE TO SOLDERING HEAT

The test conditions for Resistance to Soldering Heat, tested as specified in the ESCC Generic Specification, shall be as follows:

Temperature: 260°C

Duration: 10(+0−1)s

2.6 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

2.6.1 Room Temperature Electrical Measurements

The measurements shall be performed at T_{amb}=+22 ±3°C.

Characteristics	Symbols	ESCC 4001 Test Method and Conditions	Tolerance (± %)	Limits		Units
				Min	Max	
Resistance	R_A	Para. 8.3.1.1	0.02	0.9998 R_n	1.0002 R_n	Ω
			0.05	0.9995 R_n	1.0005 R_n	
			0.1	0.999 R_n	1.001 R_n	
			0.2	0.998 R_n	1.002 R_n	
			0.5	0.995 R_n	1.005 R_n	
			1	0.99 R_n	1.01 R_n	
Insulation Resistance	R_I	Para. 8.3.1.2 V=100V Note 1	All	1000	-	MΩ
Voltage Proof	U_p	Para. 8.3.1.3	All	420	-	Vrms

NOTES:

1. The measurements shall be performed on a sample of 5 components with 0 failures permitted. In the event of any failure a 100% inspection may be performed.

2.6.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	ESCC 4001 Test Method and Conditions (Note 1)	Limits		Units
			Min	Max	
Resistance Change between -55 (+3-0)°C and +22 ± 3°C	$\Delta R_A/R_A$	Para. 8.3.1.1	-0.04	+0.04	%

Characteristics	Symbols	ESCC 4001 Test Method and Conditions (Note 1)	Limits		Units
			Min	Max	
Resistance Change between +125 ±3°C and +22 ± 3°C	$\Delta R_A/R_A$	Para. 8.3.1.1	-0.0545	+0.0545	%
Resistance Change between +175 (+0 -3)°C and +22 ± 3°C	$\Delta R_A/R_A$	Para. 8.3.1.1	-0.103	+0.103	%

NOTES:

1. The measurements shall be performed on a sample of 5 components selected from the total production lot.

2.7 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

The components shall be mounted as specified in the ESCC Generic Specification.

Unless otherwise specified, the measurements shall be performed at T_{amb}=+22 ±3°C.

Unless otherwise specified the test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements.

Test Reference per ESCC No. 4001	Characteristics	Symbols	Limits		Units
			Min	Max	
Rapid Change of Temperature					
Initial Measurement	Resistance	R_A	Record Values		
Final Measurement	Change in Resistance	$\Delta R_A/R_A$	±(0.05 + 0.01Ωx100/R_n)		%
Vibration					
Initial Measurement	Resistance	R_A	Record Values		
Final Measurement	Change in Resistance	$\Delta R_A/R_A$	±(0.02 + 0.01Ωx100/R_n)		%
Robustness of Terminations					
Initial Measurement	Resistance	R_A	Record Values		
Final Measurement	Change in Resistance	$\Delta R_A/R_A$	±(0.02 + 0.01Ωx100/R_n)		%
Resistance to Soldering Heat					
Initial Measurement	Resistance	R_A	Record Values		
Final Measurement	Change in Resistance	$\Delta R_A/R_A$	±(0.02 + 0.01Ωx100/R_n)		%
Solderability					

Test Reference per ESCC No. 4001	Characteristics	Symbols	Limits		Units
			Min	Max	
Initial Measurement	Resistance	R_A	Record Values		
Final Measurement	Change in Resistance	$\Delta R_A/R_A$	$\pm(0.02 + 0.01\Omega x100/R_n)$		%
Climatic Sequence					
Initial Measurements (Procedure 1)	Resistance (after drying)	R_A	Record Values		
Final Measurements	Change in Resistance	$\Delta R_A/R_A$	$\pm(0.05 + 0.01\Omega x100/R_n)$		%
	Insulation Resistance (V_T=100V)	R_I	100	-	MΩ
Operating Life					
Initial Measurement (0 hour)	Resistance	R_A	Record Values		
Intermediate Measurements (1000 hours)	Change in Resistance	$\Delta R_A/R_A$	$\pm(0.05 + 0.01\Omega x100/R_n)$		%
Final Measurements (2000 hours)	Change in Resistance	$\Delta R_A/R_A$	$\pm(0.05 + 0.01\Omega x100/R_n)$		%
	Insulation Resistance (V_T=100V)	R_I	1000	-	MΩ

2.8 BURN-IN CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T_{amb}	+70 ±3	^oC
Test Voltage	V_T	$\sqrt{(P_n \times R_n)}$ or U_L whichever is less	V

NOTES:

1. After Burn-in, the components shall be removed from the chamber and allowed to cool under normal atmospheric conditions for a minimum of 4 hours.

2.9 OPERATING LIFE CONDITIONS

The conditions shall be as specified for Burn-in.

APPENDIX A

AGREED DEVIATION FOR VISHAY S.A. Division Sfernice (F)

Items Affected	Description of Deviations
Specification Title / Based on Type Designation	The Manufacturer's part type designation is: RCK02 HR
High and Low Temperatures Electrical Measurements (Para. 2.6.2, Note 1)	The measurements of Resistance Change over temperature may be performed on a sample of 5 prevalues selected from the total production prevalue lot.