Pages 1 to 13

RESISTOR, FIXED, FILM, NON-HERMETICALLY SEALED

BASED ON TYPE RNC90

ESCC Detail Specification No. 4001/011

Issue 2	May 2010

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

LEGAL DISCLAIMER AND COPYRIGHT

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.

TABLE OF CONTENTS

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.

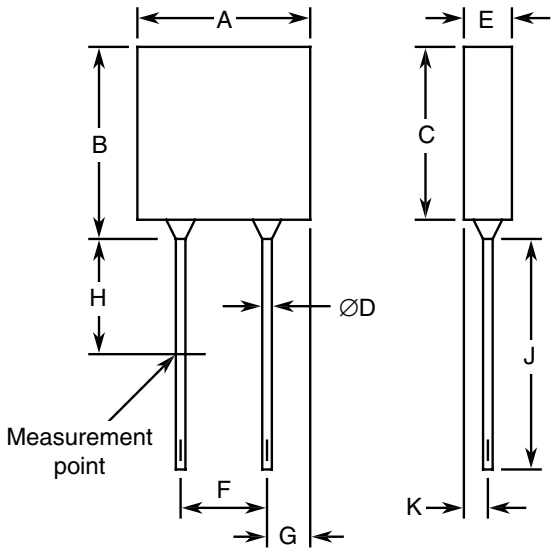
Characteristics	Symbols	Limits	Units	Remarks
Rated Dissipation	P_n	500	mW	Note 1
Limiting Element Voltage	U_L	300	V	-

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



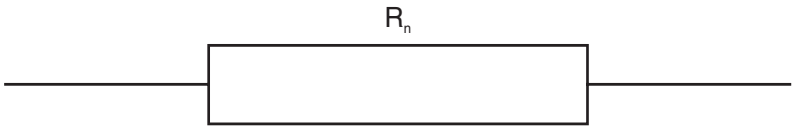
Symbols	Dimensions (mm)		Notes
	Min.	Max.	
A	-	7.5	
B	-	8	
C	-	7.5	
ØD	0.55	0.65	
E	-	2.5	
F	4.8	5.35	Variants 03, 07
	3.55	4.1	Variants 04, 08
G	1	1.5	Variants 03, 07

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.