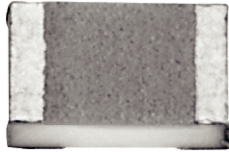


ESCC (e) 4001/023 Qualified R Failure Rate High Precision (10 ppm/°C, 0.05 %) Thin Film Chip Resistors



Vishay Sfernice Thin Film division holds ESCC QML qualification (ESCC technology flow qualification).

These HiRel components are ideal for low noise and precision applications, superior stability, low temperature coefficient of resistance, and low voltage coefficient, Vishay Sfernice's precision thin film wraparound resistors exceed requirements of MIL-PRF-55342G characteristics Y (± 10 ppm/°C).

FEATURES

- Load life stability at ± 70 °C for 2000 h: 0.25 % under P_n
- Temperature coefficient to: 10 ppm/°C
- Very low noise (< -35 dB) and voltage coefficient (< 0.01 ppm/V)
- Resistance range: 100 Ω to 3.01 M Ω (depending on size)
- Tolerances down to 0.05 %
- SnPb terminations over nickel barrier
- ESCC 4001 (generic specifications)
- ESCC 4001/023 (detailed specifications)
- ESCC qualified
- R failure rate (0.01 % per 1000 h)
- SMD wraparound chip resistor
- Halogen-free according to IEC 61249-2-21 definition

**HALOGEN
FREE**

DIMENSIONS



VARIANT NUMBER	STYLE	DIMENSIONS in millimeters							
		A		B		C		D	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
01, 05, 09	0603	1.39	2.16	0.62	1.01	0.25	1.02	0.25	0.51
02, 06, 10	0805	1.78	2.55	1.14	1.53	0.25	1.02	0.25	0.51
03, 07, 11	1206	2.87	3.64	1.47	1.86	0.25	1.02	0.25	0.51
04, 08, 12	2010	4.95	5.72	2.41	2.8	0.25	1.02	0.35	0.85
13, 14, 15	0402	0.87	1.64	0.47	0.86	0.25	1.02	0.12	0.38

END OF PRODUCTION TESTING

Mandatory testing performed at the end of the production process:

- 100 % overload: Voltage $\sqrt{(6.25 P_n \times R_n)}$ or $2 U_L$ whichever is less - duration 2 s

GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: PFRR0603Y1003BBT (preferred part number format)

P **F** **R** **R** **0** **6** **0** **3** **Y** **1** **0** **0** **3** **B** **B** **T**

TYPE

PFRR0402
PFRR0603
PFRR0805
PFRR1206
PFRR2010

TCR

Y = ± 10 ppm/°C
E = ± 25 ppm/°C

OHMIC VALUE

The first three digits are significant figures and the last digit specifies the number of zeros to follow.
Example:
3901 = 3900 Ω
1004 = 1 M Ω

TOLERANCE

W = ± 0.05 %
B = ± 0.10 %

TERMINATION

B: SnPb over nickel barrier

PACKAGING

T: For tape and reel (leave blank for waffle pack)

GLOBAL PART NUMBER INFORMATION															
ESCC Code															
4	0	0	1	0	2	3	0	9	R	1	0	0	3	B	1
ESCC SPEC	VARIANT	FAILURE RATE	OHMIC VALUE						TOLERANCE	TCR					
4001023	0402 = 15 0603 = 09 0805 = 10 1206 = 11 2010 = 12	R	The first three digits are significant figures and the last digit specifies the number of zeros to follow. Example: 3901 = 3900 Ω 1004 = 1 MΩ						W = ± 0.05 % B = ± 0.10 %	1 = ± 10 ppm/°C 2 = ± 25 ppm/°C					

Vishay Sfernice thin film is the first passive manufacturer to hold the ESCC Technology Flow Qualification, official certificate is available on ESCIES web site <https://escies.org/ReadArticle?docId=727>.

This qualification open the door to a new concept at ESA: The Failure Rate option (similar to the one offered in the MIL system), for instance R failure rate: 0.01 % per 1000 h.

New specifications describing this new concept have been released by the ESA:

2544001: Requirements for the Technology Flow Qualification of Film Resistors
<https://escies.org/escc/specifications/2544001.pdf>

26000: Failure Rate Level Sampling Plans and Procedures
<https://escies.org/escc/specifications/26000.pdf>

21300: Terms, Definitions, Abbreviations, Symbols and Units
<https://escies.org/escc/specifications/21300.pdf>

21700: General Requirements for the Marking of the ESCC Components
<https://escies.org/escc/specifications/21700.pdf>

4001: Generic Specification Resistors Fixed Film
<https://escies.org/escc/specifications/4001.pdf>

4001023: Resistors, Fixed, Chip, Thin Film, Type PHR and PFRR
<https://escies.org/escc/specifications/4001023.pdf>

Parts are delivered with space C.O.C.

Parts undergo 100 % overload at end of production process.

LAND PATTERN IN MILLIMETERS			
CHIP SIZE	Z _{max}	G _{min}	X _{max}
0402	1.55	0.15	0.73
0603	2.37	0.35	0.98
0705/0805	2.76	0.74	1.40
1206	3.91	1.85	1.73
2010	5.93	3.71	2.67

Note

- Suggested land pattern: According to IPC-7351

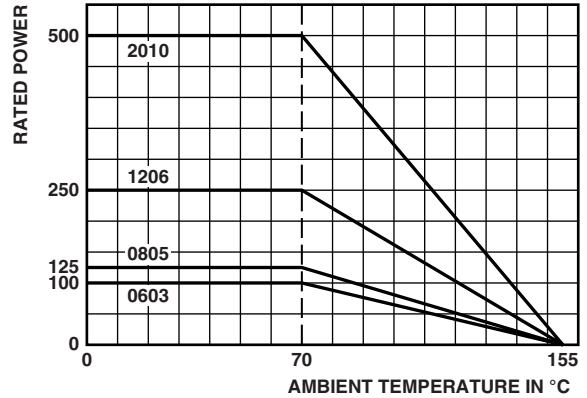
STANDARD ELECTRICAL SPECIFICATIONS					
VISHAY SFERNICE DESIGNATION	PFRR 0402	PFRR 0603	PFRR 0805	PFRR 1206	PFRR 2010
ESA specification applied	ESCC 4001/023				
Variant number	15	09	10	11	12
Power rating at + 70 °C (P _n)	0.05 W	0.1 W	0.125 W	0.25 W	0.50 W
Limiting element voltage (U _L)	30 V	50 V	100 V	150 V	200 V
Ohmic value range	Min. 100 Ω Max. 150 kΩ	Min. 100 Ω Max. 261 kΩ	Min. 100 Ω Max. 301 kΩ	Min. 100 Ω Max. 1 MΩ	Min. 100 Ω Max. 3.01 MΩ
Insulation voltage (U _i)	50 V	100 V	200 V	300 V	300 V
Temperature coefficient	± 10 ppm/°C; ± 25 ppm/°C				
Tolerance	± 0.05 %, ± 0.1 %				
Temperature range	- 55 °C to + 155 °C				
Soldering temperature (T _{so1})	260 °C, immersion 10 s				



MECHANICAL SPECIFICATIONS	
Substrate material	Alumina
Technology	Thin Film
Film	Nickel Chromium with mineral passivation
Protection	Epoxy and Silicon
Terminations	B type: SnPb over nickel barrier for solder reflow

PACKAGING				
Two types of packaging are available: waffle-pack and tape and reel.				
SIZE	NUMBER OF PIECES PER PACKAGE			TAPE WIDTH
	WAFFLE PACK 2" x 2"	TAPE AND REEL		
		MIN.	MAX.	
0402	100	100	5000	8 mm
0603			4000	
0805				
1206				
2010	60			

POWER DERATING CURVE



EXTENDED FEATURES

You may consult Vishay Sfernice for chip sizes, ohmic values and tolerances outside of the qualified range.

PERFORMANCE				
TEST	CONDITIONS	REQUIREMENTS		TYPICAL
		ESA/SCC 4001/023	MIL-PRF-55342G	
Short time overload	$U = \sqrt{(6.25 P_n \times R_n)}$ $U_{max.} < 2 U_L - 2 s$	$\pm 0.05 \% + (0.05 \Omega \times 100/R_n)$	0.10 %	$\pm 0.01 \%$
Rapid temperature change	- 55 °C/+ 155 °C 5 cycles CEI 66-2-14 Test Na	$\pm 0.05 \% + (0.05 \Omega \times 100/R_n)$	0.1 % (for 100 cycles)	$\pm 0.01 \%$ $\pm 0.015 \%$ (for 500 cycles)
Soldering (thermal shock)	260 °C/10 s CEI 68-2-20 A Test T6 (met. 1A)	$\pm 0.05 \% + (0.05 \Omega \times 100/R_n)$	-	$\pm 0.005 \%$
Terminal strength: Adhesion bend strength of end plated facing	CEI 115-1 Clause 4.32 CEI 115-1 Clause 4.33	$\pm 0.05 \% + (0.05 \Omega \times 100/R_n)$	-	$\pm 0.01 \%$
Climatic sequence	CEI 67-2-1/CEI 68-2-2 CEI 67-2-13/CEI 68-2-30	$\pm 0.10 \% + (0.05 \Omega \times 100/R_n)$	-	$\pm 0.02 \%$ Insulation resistance > 1 GΩ
Load life	2000 h P_n at + 70 °C 90°/30° cycle 8000 h	$\pm 0.25 \% + (0.05 \Omega \times 100/R_n)$ 1 % + (0.05 Ω x 100/R _n)	0.5 %	$\pm 0.05 \%$ (8000 h) Insulation resistance > 1 GΩ
High temperature exposure	2000 h P_n at + 155 °C CEI 68-2-20A Test B	$\pm 0.15 \% + (0.05 \Omega \times 100/R_n)$	$\pm 0.10 \%$ (duration 1000 h)	$\pm 0.05 \%$ Insulation resistance > 1 GΩ



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