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

HALOGEN FREE

- Load life stability at ± 70 °C for 2000 h: 0.25 % under Pn
- 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 MΩ (depending on size)
- Tolerances down to 0.05 %
- SnPb terminations over nickel barrier
- ESCC 4001 (generic specifications)
- ESCC 4001/023 (detailed spececifications)
- ESCC qualified
- R failure rate (0.01 % per 1000 h)
- SMD wraparound chip resistor
- Halogen-free according to IEC 61249-2-21 definition

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	TCR	OHMIC VALUE	TOLERANCE	TERMINATION	PACKAGING
PFRR0402 **PFRR0603** **PFRR0805** **PFRR1206** **PFRR2010**	**Y** = ± 10 ppm/°C **E** = ± 25 ppm/°C	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 %	**B**: SnPb over nickel barrier	**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

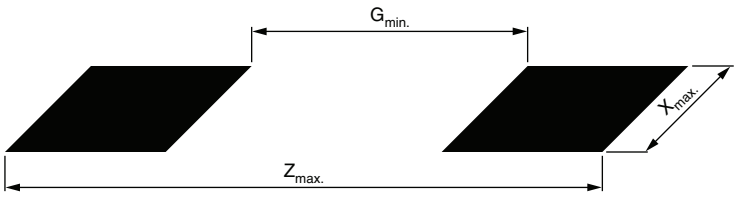
4001: Generic Specification Resistors Fixed Film
https://escies.org/escc/specifications/4001.pdf

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_{sol})	260 °C, immersion 10 s				

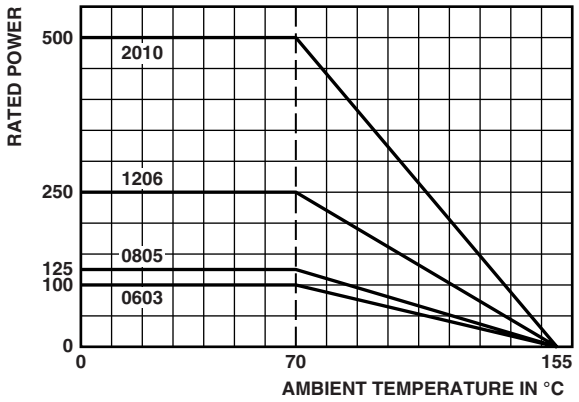
MECHANICAL SPECIFICATIONS	
Substrate material	Alumina
Technology	Thin Film
Film	**Nickel Chromium** with mineral passivation
Protection	Epoxy and Silicon
Terminations	**B type:** SnPb over nickel barrier for solder reflow

PACKAGING

Two types of packaging are available: waffle-pack and tape and reel.

SIZE	NUMBER OF PIECES PER PACKAGE			TAPE WIDTH
	WAFFLE PACK 2" × 2"	TAPE AND REEL		
		MIN.	MAX.	
0402	100	100	5000	8 mm
0603				
0805			4000	
1206	140			
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	± 0.05 % + (0.05 Ω x 100/R_n)	0.10 %	± 0.01 %
Rapid temperature change	- 55 °C/+ 155 °C 5 cycles CEI 66-2-14 Test Na	± 0.05 % + (0.05 Ω x 100/R_n)	0.1 % (for 100 cycles)	± 0.01 % ± 0.015 % (for 500 cycles)
Soldering (thermal shock)	260 °C/10 s CEI 68-2-20 A Test T6 (met. 1A)	± 0.05 % + (0.05 Ω x 100/R_n)	-	± 0.005 %
Terminal strength: Adhesion bend strength of end plated facing	CEI 115-1 Clause 4.32 CEI 115-1 Clause 4.33	± 0.05 % + (0.05 Ω x 100/R_n)	-	± 0.01 %
Climatic sequence	CEI 67-2-1/CEI 68-2-2 CEI 67-2-13/CEI 68-2-30	± 0.10 % + (0.05 Ω x 100/R_n)	-	± 0.02 % Insulation resistance > 1 GΩ
Load life	2000 h P_n at + 70 °C 90'/30' cycle 8000 h	± 0.25 % + (0.05 Ω x 100/R_n) 1 % + (0.05 Ω x 100/R_n)	0.5 %	± 0.05 % (8000 h) Insulation resistance > 1 GΩ
High temperature exposure	2000 h P_n at + 155 °C CEI 68-2-20A Test B	± 0.15 % + (0.05 Ω x 100/R_n)	± 0.10 % (duration 1000 h)	± 0.05 % Insulation resistance > 1 GΩ

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