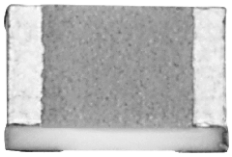
High Precision Wraparound - Wide Ohmic Value Range Thin Film Chip Resistors



For low noise and precision applications, superior stability, low temperature coefficient of resistance, and low voltage coefficient, VISHAY SFERNICE's proven precision thin film wraparound resistors exceed requirements of MIL-PRF-55342G characteristics Y ± 10 ppm/°C (- 55 °C; + 155 °C) down to ± 5 ppm/°C (- 25 °C; + 85 °C).

FEATURES

Pb-free Available

RoHS* COMPLIANT

- Load life stability at ± 70 °C for 2000 h: 0.1 % under Pn/0.05 % under Pd
- Low temperature coefficient down to **5 ppm/°C** (- 25 °C; + 85 °C)
- Very low noise < 35 dB and voltage coefficient < 0.01 ppm/V
- Wide resistance range: 10 Ω to 50 MΩ depending on size
- Tolerances to **± 0.01 %**
- In lot tracking ≤ 5 ppm/°C
- Termination: thin film technology
- Gold plated or pre-tinned terminations over nickel barrier
- Short circuits (jumpers) r < 50 mR, I < 2 A

DIMENSIONS in millimeters [inches]

CASE SIZE	DIMENSION				POWER RATING mW		LIMITING ELEMENT VOLTAGE V	RESISTANCE RANGE (2)
	A	B	C	D/E				
	MAX. TOL. + 0.152 [+ 0.006] MIN. TOL. - 0.152 [- 0.006]	MAX. TOL. + 0.127 [+ 0.005] MIN. TOL. - 0.127 [- 0.005]	MAX. TOL. + 0.127 [+ 0.005] MIN. TOL. - 0.127 [- 0.005]	MAX. TOL. + 0.13 [+ 0.005] MIN. TOL. - 0.13 [- 0.005]	Pn (1)	Pd (1)		
0402	1.00 [0.040]	0.60 [0.023]	0.5 [0.02]	0.38 [0.015]	63	40	50	10 Ω - 1 MΩ
0505	1.35 [0.053]	1.27 [0.050]	0.5 [0.02]	0.38 [0.015]	125	50	50	10 Ω - 2.5 MΩ
0603	1.52 [0.060]	0.75 [0.030]	0.5 [0.02]	0.38 [0.015]	125	100	75	10 Ω - 2.5 MΩ
0705/0805	1.91 [0.075]	1.27 [0.050]	0.5 [0.02]	0.38 [0.015]	200	125	150	10 Ω - 5 MΩ
1005	2.54 [0.100]	1.27 [0.050]	0.5 [0.02]	0.38 [0.015]	250	125	75	10 Ω - 5 MΩ
1206	3.06 [0.120]	1.60 [0.063]	0.5 [0.02]	0.38 [0.015]	330	250	200	10 Ω - 15 MΩ
1505	3.81 [0.150]	1.32 [0.054]	0.5 [0.02]	0.38 [0.015]	350	175	75	10 Ω - 10 MΩ
2010	5.08 [0.200]	2.54 [0.100]	0.5 [0.02]	0.38 [0.015]	1000	500	300	10 Ω - 50 MΩ

Note:

(1) P_n = nominal power - Pd = derated power intended to improve stability

(2) **For ohmic range versus tolerance and TCR see detailed table page 2**

* Pb containing terminations are not RoHS compliant, exemptions may apply

ELECTRICAL SPECIFICATIONS

Resistance range: 10 Ω to 50 MΩ

Resistance tolerance: ± 0.1 % to ± 1 %
± 0.01 % to ± 0.05 % on Y type

Power dissipation: **Pn:** 63 mW to 1 W
Pd: 40 mW to 500 mW
on tolerance tighter than ± 0.05 %

Temperature coefficient: see table below

CLIMATIC SPECIFICATIONS

Operating temp. range: - 55 °C to + 155 °C

For temperature up to 200 °C, please consult factory

MECHANICAL SPECIFICATIONS

Substrate: Alumina

Technology: Thin film

Film: **Nickel chromium** with mineral passivation or **CrSi**

Protection: Silicone

Terminations: **B type:** SnPb over nickel barrier for solder reflow
N type: SnAg over nickel barrier
G type: gold over nickel barrier for other applications

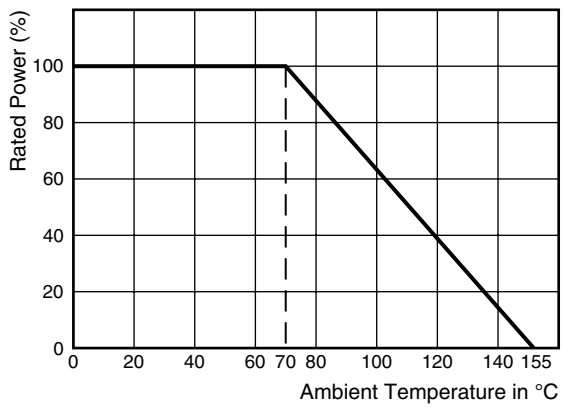
TEMPERATURE COEFFICIENT		
TCR	**CODE**	**FILM**
± 5 ppm/°C (1)	Z	NiCr
± 10 ppm/°C (2)	Y	NiCr
± 25 ppm/°C	E	NiCr
± 50 ppm/°C	H	NiCr or CrSi
± 100 ppm/°C	K	NiCr or CrSi

Notes:

(1) Reduced operating range: 0 °C; + 70 °C option available for (- 25 °C; + 85 °C)

(2) R > 50 Ω on request for lower values

POWER DERATING CURVE



TOLERANCE AND TCR VERSUS OHMIC VALUE

SIZE	VALUE RANGE	TIGHTEST TOLERANCE %	BEST TCR (ppm/°C)
P0402	10R - 1M	0.1	50
	10R - 150K	0.1	25
	39R - 150K	0.05	25
	39R - 100K	0.05	10 (5) (3)
	100R - 100K	0.02	10 (5) (3)
	250R - 100K	0.01	10 (5) (3)
P0505	10R - 2M5	0.1	50
	10R - 300K	0.1	25
	39R - 300K	0.05	25
	39R - 260K	0.05	10 (5) (3)
	100R - 260K	0.02	10 (5) (3)
	250R - 260K	0.01	10 (5) (3)
P0603	10R - 2M5	0.1	50
	10R - 500K	0.1	25
	39R - 500K	0.05	25
	39R - 332K	0.05	10 (5) (3)
	100R - 332K	0.02	10 (5) (3)
	250R - 332K	0.01	10 (5) (3)
P0705/0805	10R - 5M	0.1	50
	10R - 750K	0.1	25
	39R - 750K	0.05	25
	39R - 511K	0.05	10 (5) (3)
	100R - 511K	0.02	10 (5) (3)
	250R - 511K	0.01	10 (5) (3)
P1005	10R - 5M	0.1	50
	10R - 750K	0.1	25
	39R - 750K	0.05	25
	39R - 500K	0.05	10 (5) (3)
	100R - 500K	0.02	10 (5) (3)
	250R - 500K	0.01	10 (5) (3)
P1206	10R - 15M	0.1	50
	10R - 2M	0.1	25
	39R - 2M	0.05	25
	39R - 1M5	0.05	10 (5) (3)
	100R - 1M5	0.02	10 (5) (3)
	250R - 1M5	0.01	10 (5) (3)
P1505	10R - 10M	0.1	50
	10R - 1M	0.1	25
	39R - 1M	0.05	25
	39R - 750K	0.05	10 (5) (3)
	100R - 750K	0.02	10 (5) (3)
	250R - 750K	0.01	10 (5) (3)
P2010	10R - 50M	0.1	50
	10R - 6M	0.1	25
	39R - 6M	0.05	25
	39R - 3M	0.05	10 (5) (3)
	100R - 3M	0.02	10 (5) (3)
	250R - 3M	0.01	10 (5) (3)

Note:

(3) 5 ppm/°C in a reduced operating range (0 °C; + 70 °C). Option available for operating range (- 25 °C; + 85 °C) upon request with price adder

PACKAGING

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

SIZE	MOQ	NUMBER OF PIECES PER PACKAGE			TAPE WIDTH
		WAFFLE PACK 2" × 2"	TAPE AND REEL		
			MIN.	MAX.	
0402	100	100	100	4000	8 mm
0505					
0603					
0805 0705					
1005		221			
1206		140			
1505		60			
2010			100	2000	8 mm (1)

Note:
(1) 12 mm on request

PACKAGING RULES

Waffle Pack

Can be filled up to maximum quantity indicated in the table here above, taking into account the minimum order quantity. When quantity ordered exceeds maximum quantity of a single waffle pack, the waffle packs are stacked up on the top of each other and closed by one single cover.

To get "not stacked up" waffle pack in case of ordered quantity > maximum number of pieces per package: Please consult Vishay/Sfernice for specific ordering code

Tape and Reel

Can be filled up to maximum quantity indicated in the table here above, taking into account the minimum order quantity. When quantity ordered is between the MOQ and the maximum reel capacity, only one reel is provided.

When several reels are needed for ordered quantity within MOQ and maximum reel capacity: Please consult Vishay/Sfernice for specific ordering code

PERFORMANCE

TESTS	CONDITIONS	Ta_2N DRIFTS NiCr			
		MIL-PRF-55342G requirements	Typical performances	MIL-PRF-55342G	Typical performances
Thermal Shock	MIL-PRF-55342G MIL-STD-202 F-Method 107 F	± 0.25 %	± 0.02 %	± 0.05 %	± 0.02 %
Short Time Overload	MIL-PRF-55342G PARA 3.10.4.7.5	± 0.10 %	± 0.01 %	± 0.05 %	± 0.01 %
Low Temperature Operation	MIL-PRF-55342G PARA 3.9 and 4.7.4	± 0.25 %	± 0.01 %	± 0.05 %	± 0.01 %
Resistance to Solder Heat	MIL-PRF-55342G PARA 3.12, 4.7.7, 4.7.1.2	± 0.25 %	± 0.04 %	± 0.05 %	± 0.03 %
Moisture Resistance	MIL-PRF-55342G PARA 3.13 and 4.7.8 MIL-STD-202 F-Method 106 E	± 0.40 %	± 0.01 %	± 0.10 %	± 0.01 %
High Temperature	MIL-PRF-55342G PARA 3.11 and 4.7.6	± 0.20 %	± 0.075 %	± 0.05 %	± 0.05 %
Load Life	MIL-PRF-55342G 2000 h Pn at 70 °C MIL-STD-202 F-Method 108 A	± 0.50 %	± 0.15 %	± 0.5 %	± 0.10 % (2)

Note:
(2) 0.05 % under Pd

GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: P0505Y1003BBT0933

P	0	5	0	5	Y	1	0	0	3	B	B	T	0	9	3	3

GLOBAL MODEL	SIZE	TCR	VALUE	TOLERANCE	TERMINATION	PACKAGING	OPTION
P	**0402** **0505** **0603** **0705** **0805** **1005** **1206** **1505** **2010**	**K** = ± 100 ppm/°C **H** = ± 50 ppm/°C **E** = ± 25 ppm/°C **Y** = ± 10 ppm/°C **X** = Jumper **Z** = ± 5 ppm (0.70 °C)	The first three digits (2 digits are enough for tolerance G and J) are significant figures and the last digit specifies the number of zeros to follow, R designates decimal point 10R0 = 10 Ω 3901 = 3900 Ω 1004 = 1 MΩ 0R00 = Jumper	**L** = ± 0.01 % **P** = ± 0.02 % **W** = ± 0.05 % **B** = ± 0.1 % **C** = ± 0.25 % **D** = ± 0.5 % **F** = ± 1 % **G** = ± 2 % **J** = ± 5 % **S** = Special **X** = Jumper	**B:** SnPb over nickel barrier **N:** SnAg over nickel barrier **G:** Gold over nickel barrier **B:** Lead bearing version **N and G:** Lead (Pb)-free/ RoHS version	**blank** = Waffle Pack **T** = Tape (1)	Leave blank if no option

Historical Part Number example: P 0505 Y 1003 B B TR R0933 e2

P	0505	Y	1003	B	B	TR	R0933	e2
HISTORICAL MODEL	SIZE	TCR	VALUE	TOLERANCE	TERMINATION	PACKAGING	OPTION	RoHS
P	**0402** **0505** **0603** **0705** **0805** **1005** **1206** **1505** **2010**	**K** = ± 100 ppm/°C **H** = ± 50 ppm/°C **E** = ± 25 ppm/°C **Y** = ± 10 ppm/°C **X** = Jumper **Z** = ± 5 ppm (0.70 °C)	The first three digits (2 digits are enough for tolerance G and J) are significant figures and the last digit specifies the number of zeros to follow, R designates decimal point 10R0 = 10 Ω 3901 = 3900 Ω 1004 = 1 MΩ 0R00 = Jumper	**L** = ± 0.01 % **P** = ± 0.02 % **W** = ± 0.05 % **B** = ± 0.1 % **C** = ± 0.25 % **D** = ± 0.5 % **F** = ± 1 % **G** = ± 2 % **J** = ± 5 % **S** = Special **X** = Jumper	**B:** SnPb over nickel barrier **N:** SnAg over nickel barrier **G:** Gold over nickel barrier **B:** Lead bearing version **N and G:** Lead (Pb)-free/ RoHS version	**blank** = Waffle Pack **TR** = Tape (1)	Leave blank if no option	e2: tin/silver e4: gold blank: SnPb

Note:

- Chips ready to be trimmed available. (P_{trim}) - Please consult Sfernice.

(1) For specific quantity of parts per packaging please consult Sfernice

Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.