

## 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  $Y \pm 10 \text{ ppm}/^\circ\text{C}$  (- 55 °C; + 155 °C) down to  $\pm 5 \text{ ppm}/^\circ\text{C}$  (- 25 °C; + 85 °C).

### FEATURES

- Load life stability at  $\pm 70 \text{ }^\circ\text{C}$  for 2000 h: 0.1 % under  $P_n$ /0.05 % under  $P_d$
- 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  $\Omega$  to 50 M $\Omega$  depending on size
- Tolerances to  **$\pm 0.01 \%$**
- In lot tracking  $\leq 5 \text{ ppm}/^\circ\text{C}$
- Termination: thin film technology
- Gold plated or pre-tinned terminations over nickel barrier
- Short circuits (jumpers)  $r < 50 \text{ m}\Omega$ ,  $I < 2 \text{ A}$



### 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]	$P_n$ (1)	$P_d$ (1)		
0402	1.00 [0.040]	0.60 [0.023]	0.5 [0.02]	0.38 [0.015]	63	40	50	10 $\Omega$ - 1 M $\Omega$
0505	1.35 [0.053]	1.27 [0.050]	0.5 [0.02]	0.38 [0.015]	125	50	50	10 $\Omega$ - 2.5 M $\Omega$
0603	1.52 [0.060]	0.75 [0.030]	0.5 [0.02]	0.38 [0.015]	125	100	75	10 $\Omega$ - 2.5 M $\Omega$
0705/0805	1.91 [0.075]	1.27 [0.050]	0.5 [0.02]	0.38 [0.015]	200	125	150	10 $\Omega$ - 5 M $\Omega$
1005	2.54 [0.100]	1.27 [0.050]	0.5 [0.02]	0.38 [0.015]	250	125	75	10 $\Omega$ - 5 M $\Omega$
1206	3.06 [0.120]	1.60 [0.063]	0.5 [0.02]	0.38 [0.015]	330	250	200	10 $\Omega$ - 15 M $\Omega$
1505	3.81 [0.150]	1.32 [0.054]	0.5 [0.02]	0.38 [0.015]	350	175	75	10 $\Omega$ - 10 M $\Omega$
2010	5.08 [0.200]	2.54 [0.100]	0.5 [0.02]	0.38 [0.015]	1000	500	300	10 $\Omega$ - 50 M $\Omega$

#### Note:

(1)  $P_n$  = nominal power -  $P_d$  = 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



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

### 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

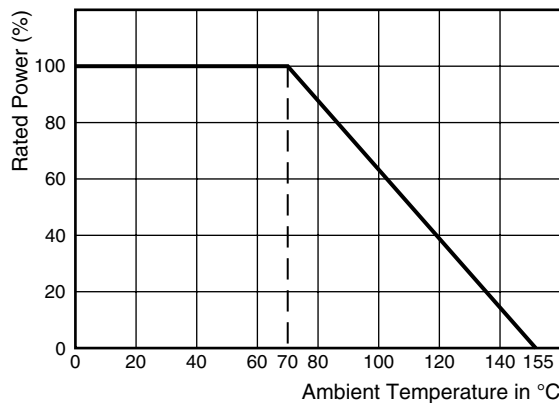
**Substrate:** Alumina  
**Technology:** Thin film  
**Film:** **Nickel chromium** with mineral passivation or **CrSi**  
**Protection:** Silicone  
**Terminations:** **B type:** SnPb over nickel barrier for solder reflow  
**N type:** SnAg over nickel barrier  
**G type:** gold over nickel barrier for other applications

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

**Notes:**

- <sup>(1)</sup> Reduced operating range: 0 °C; + 70 °C option available for (- 25 °C; + 85 °C)
- <sup>(2)</sup> 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) <sup>(3)</sup>
	100R - 100K	0.02	10 (5) <sup>(3)</sup>
P0505	250R - 100K	0.01	10 (5) <sup>(3)</sup>
	10R - 2M5	0.1	50
	10R - 300K	0.1	25
	39R - 300K	0.05	25
	39R - 260K	0.05	10 (5) <sup>(3)</sup>
P0603	100R - 260K	0.02	10 (5) <sup>(3)</sup>
	250R - 260K	0.01	10 (5) <sup>(3)</sup>
	10R - 2M5	0.1	50
	10R - 500K	0.1	25
	39R - 500K	0.05	25
P0705/0805	39R - 332K	0.05	10 (5) <sup>(3)</sup>
	100R - 332K	0.02	10 (5) <sup>(3)</sup>
	250R - 332K	0.01	10 (5) <sup>(3)</sup>
	10R - 5M	0.1	50
	10R - 750K	0.1	25
P1005	39R - 750K	0.05	25
	39R - 511K	0.05	10 (5) <sup>(3)</sup>
	100R - 511K	0.02	10 (5) <sup>(3)</sup>
	250R - 511K	0.01	10 (5) <sup>(3)</sup>
	10R - 5M	0.1	50
P1206	10R - 750K	0.1	25
	39R - 750K	0.05	25
	39R - 500K	0.05	10 (5) <sup>(3)</sup>
	100R - 500K	0.02	10 (5) <sup>(3)</sup>
	250R - 500K	0.01	10 (5) <sup>(3)</sup>
P1505	10R - 15M	0.1	50
	10R - 2M	0.1	25
	39R - 2M	0.05	25
	39R - 1M5	0.05	10 (5) <sup>(3)</sup>
	100R - 1M5	0.02	10 (5) <sup>(3)</sup>
P2010	250R - 1M5	0.01	10 (5) <sup>(3)</sup>
	10R - 10M	0.1	50
	10R - 1M	0.1	25
	39R - 1M	0.05	25
	39R - 750K	0.05	10 (5) <sup>(3)</sup>
P2010	100R - 750K	0.02	10 (5) <sup>(3)</sup>
	250R - 750K	0.01	10 (5) <sup>(3)</sup>
	10R - 50M	0.1	50
	10R - 6M	0.1	25
	39R - 6M	0.05	25
P2010	39R - 3M	0.05	10 (5) <sup>(3)</sup>
	100R - 3M	0.02	10 (5) <sup>(3)</sup>
	250R - 3M	0.01	10 (5) <sup>(3)</sup>

**Note:**

<sup>(3)</sup> 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

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

### 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" x 2"	TAPE AND REEL		
			MIN.	MAX.	
0402	100	100	100	4000	8 mm
0505					
0603					
0805					
0705					
1005		221			
1206		140			
1505		60	100	2000	8 mm <sup>(1)</sup>
2010					

Note:

<sup>(1)</sup> 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 <sub>2</sub> N	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 % <sup>(2)</sup>

Note:

<sup>(2)</sup> 0.05 % under Pd



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

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	<b>0402</b> <b>0505</b> <b>0603</b> <b>0705</b> <b>0805</b> <b>1005</b> <b>1206</b> <b>1505</b> <b>2010</b>	<b>K</b> = ± 100 ppm/°C <b>H</b> = ± 50 ppm/°C <b>E</b> = ± 25 ppm/°C <b>Y</b> = ± 10 ppm/°C <b>X</b> = Jumper <b>Z</b> = ± 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	<b>L</b> = ± 0.01 % <b>P</b> = ± 0.02 % <b>W</b> = ± 0.05 % <b>B</b> = ± 0.1 % <b>C</b> = ± 0.25 % <b>D</b> = ± 0.5 % <b>F</b> = ± 1 % <b>G</b> = ± 2 % <b>J</b> = ± 5 % <b>S</b> = Special <b>X</b> = Jumper	<b>B</b> : SnPb over nickel barrier <b>N</b> : SnAg over nickel barrier <b>G</b> : Gold over nickel barrier  <b>B</b> : Lead bearing version <b>N and G</b> : Lead (Pb)-free/ RoHS version	<b>blank</b> = Waffle Pack <b>T</b> = 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	<b>0402</b> <b>0505</b> <b>0603</b> <b>0705</b> <b>0805</b> <b>1005</b> <b>1206</b> <b>1505</b> <b>2010</b>	<b>K</b> = ± 100 ppm/°C <b>H</b> = ± 50 ppm/°C <b>E</b> = ± 25 ppm/°C <b>Y</b> = ± 10 ppm/°C <b>X</b> = Jumper <b>Z</b> = ± 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	<b>L</b> = ± 0.01 % <b>P</b> = ± 0.02 % <b>W</b> = ± 0.05 % <b>B</b> = ± 0.1 % <b>C</b> = ± 0.25 % <b>D</b> = ± 0.5 % <b>F</b> = ± 1 % <b>G</b> = ± 2 % <b>J</b> = ± 5 % <b>S</b> = Special <b>X</b> = Jumper	<b>B</b> : SnPb over nickel barrier <b>N</b> : SnAg over nickel barrier <b>G</b> : Gold over nickel barrier  <b>B</b> : Lead bearing version <b>N and G</b> : Lead (Pb)-free/ RoHS version	<b>blank</b> = Waffle Pack <b>TR</b> = 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



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