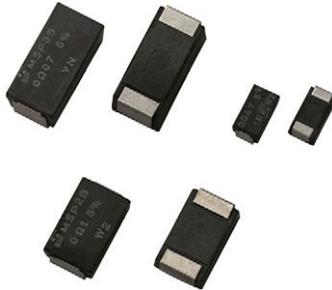


## Precision Surface Mount Resistors Wirewound Technology



### FEATURES

- According to EN 140402-801 (wirewound)
- Wide range of ohmic values (0.04  $\Omega$  to 13 k $\Omega$ )
- Low temperature coefficient ( $\pm 25$  ppm/ $^{\circ}\text{C}$  available)
- Good electrical insulation
- All welded construction and molded encapsulant
- High power ratings (up to 2.5 W)
- Stability class 0.5
- Pure matte tin termination
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

Specially designed for surface mounting, the MSP series uses wirewound technology. The molded package ensures mechanical and climatic protection as well as high dielectric insulation. The MSP design is compatible with surface mounting equipment and can withstand wave and reflow soldering techniques.

DIMENSIONS in millimeters									
SERIES	A	B	C	D	F	W	X	Z	WEIGHT in g
MSP 1	6.8	3.9	3.8	2.5	1.4	2.7	2.9	6	0.2
MSP 2	11.4	5	7	5	2.2	5.2	4.1	9.4	0.8
MSP 3	14.6	6.6	7	5	2.3	5.2	4.1	12.7	1.5

**Note**

- General tolerance:  $\pm 0.2$  mm

STANDARD ELECTRICAL SPECIFICATIONS					
MODEL	RESISTANCE RANGE $\Omega$	RATED POWER $P_{25^{\circ}\text{C}}$ W	LIMITING ELEMENT VOLTAGE V	TOLERANCE $\pm \%$	TEMPERATURE COEFFICIENT $\pm$ ppm/ $^{\circ}\text{C}$
MSP 1 B	0.04 to 2.2K	1	50	0.5, 1, 2, 5	25, 50, 100
MSP 2 B	0.04 to 4.7K	2	120	0.5, 1, 2, 5	25, 50, 100
MSP 3 B	0.04 to 13K	2.5	200	0.5, 1, 2, 5	25, 50, 100



TECHNICAL SPECIFICATIONS			
RESISTIVE TECHNOLOGY	Wirewound		
Vishay Sfernice Series	MSP 1 B	MSP 2 B	MSP 3 B
Metric Size	0704M	1107M	1607M
Rated Dissipation at +25 °C, P <sub>25</sub>	1 W	2 W	2.5 W
Ohmic Range in Relation to Tolerance (with Preferred Ohmic Value Series)	± 5 % E24 Series	0.04 to 2.2K	0.04 to 4.7K
	± 2 % E48 Series	0.1 to 2.2K	0.04 to 4.7K
	± 1 % E96 Series	0.1 to 2.2K	0.04 to 4.7K
	± 0.5 % E96 Series	1.4 to 2.2K	0.4 to 4.7K
Limiting Element Voltage, U <sub>max</sub> . AC/DC	50 V	120 V	200 V
Series	MSP 1 B	MSP 2 B	MSP 3 B
Critical Resistance	-	-	-
Temperature Coefficient	CECC 40402-801 -55 °C / +200 °C < 1 Ω ± 100 ppm/°C 1 Ω to < 10 Ω ± 50 ppm/°C ≥ 10 Ω ± 25 ppm/°C		
Failure Rate	E6 10 <sup>-6</sup> /h	E6 10 <sup>-6</sup> /h	E0 or A 10 <sup>-4</sup> /h

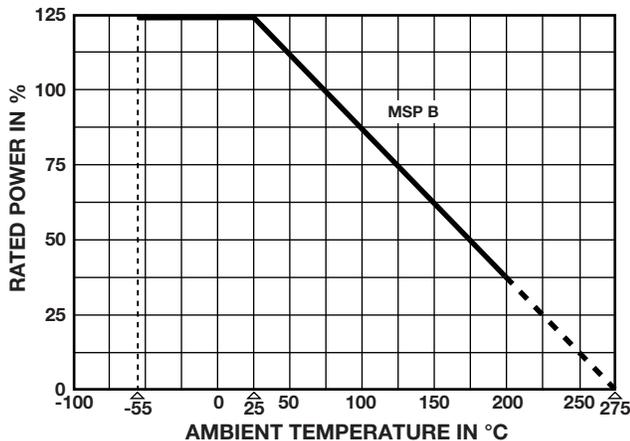
MECHANICAL SPECIFICATIONS	
RESISTIVE TECHNOLOGY	Wirewound
Encapsulant	Thermoset
Resistive Element	CuNi or NiCr
Ceramic Substrate	Alumina or Steatite
Termination	Electrolytic pure matte tin

ENVIRONMENTAL SPECIFICATIONS	
RESISTIVE TECHNOLOGY	Wirewound
Temperature Range	-55 °C to 275 °C
Climatic Category (LCT/UCT/days)	55/200/56

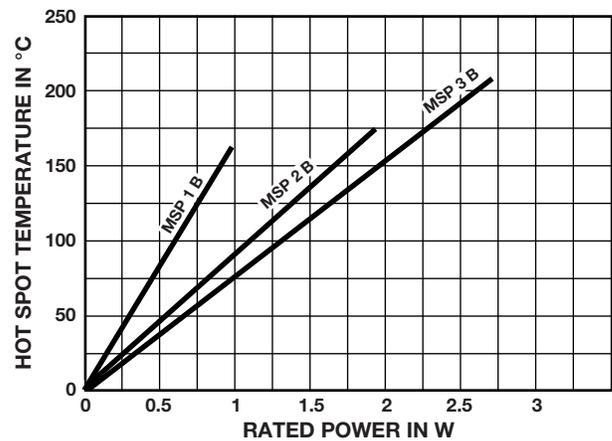


PERFORMANCE		
TESTS	CONDITIONS	REQUIREMENTS
	Wirewound	Wirewound EN 140402-801
Short Time Overload	IEC 60115-1 $5 P_r$ or $U = 2 U_{max}/5$ s	$\pm (0.25 \% + 0.05 \Omega)$
Load Life	IEC 60115-1 90'/30' cycles 1000 h $P_r$ + 25 °C 8000 h $P_r$	$\pm (0.5 \% + 0.05 \Omega)$ $\pm (3 \% + 0.05 \Omega)$
Dielectric w/s Voltage	IEC 60115-1 $U_{RMS} = 500$ V/60 s	No flashover or breakdown Leakage current < 10 $\mu$ A
Rapid Change of Temperature	IEC 60115-1 IEC 60068-2-14 Test Na 5 cycles (30' at LCT/30' at UCT) -55 °C / +200 °C	$\pm (0.25 \% + 0.05 \Omega)$
Climatic Sequence	IEC 60115-1 -55 °C / +200 °C	$\pm (0.5 \% + 0.05 \Omega)$
Humidity (Steady State)	IEC 60115-1 IEC 60068-2-3 Test Ca 95 % HR/40 °C 56 days	$\pm (0.5 \% + 0.05 \Omega)$
Substrate Bending Test	IEC 60115-1 IEC 60068-2-21 Test $U_{e3}$ 2 mm/10 times	$\pm (0.25 \% + 0.05 \Omega)$
Shock	IEC 60115-1 IEC 60068-2-27 Test Ea 50 g's/half sine/3 times by direction (i.e. 18 shocks)	$\pm (0.25 \% + 0.05 \Omega)$
Vibration	IEC 60115-1 IEC 60068-2-6 Test Fc 10 Hz/2000 Hz	$\pm (0.25 \% + 0.05 \Omega)$
Resistance to Soldering Heat	IEC 60115-1 IEC 60068-2-58 Solder Bath 260 °C/10 s	$\pm (0.5 \% + 0.05 \Omega)$

**POWER RATING**



**TEMPERATURE RISE**



**SURFACE MOUNTING OF MSP B**

Soldering cycle: 2 min at 215 °C or 10 s at 260 °C or with an iron 40 W: 3 s at 350 °C.

Soldering is possible by wave, reflow and vapor phase.

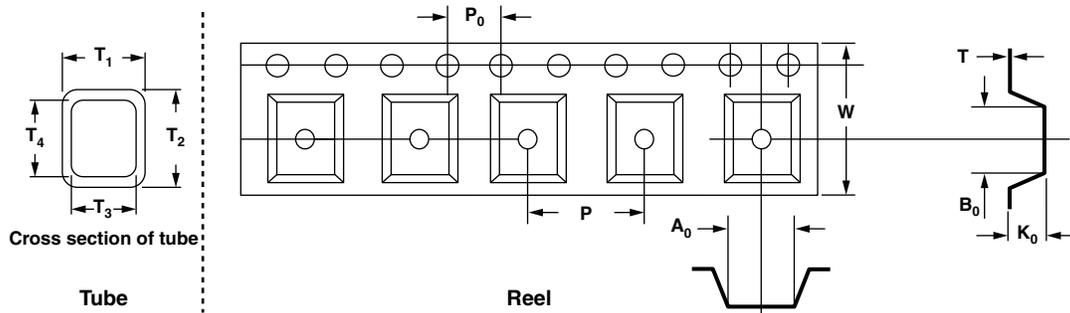
**NON INDUCTIVE WINDING FOR MSP B**

Non-inductive (Ayrton Perry) winding available.

Please consult Vishay Sfernice.

**PACKAGING**

In bulk (plastic bag of 100 units or multiples)  
 In tube: MSP1 70 units per tube  
           MSP2 50 units per tube  
           MSP3 40 units per tube  
 In reel of 500 units for MSP1 and MSP2

**DIMENSIONS** in millimeters - Informative Data


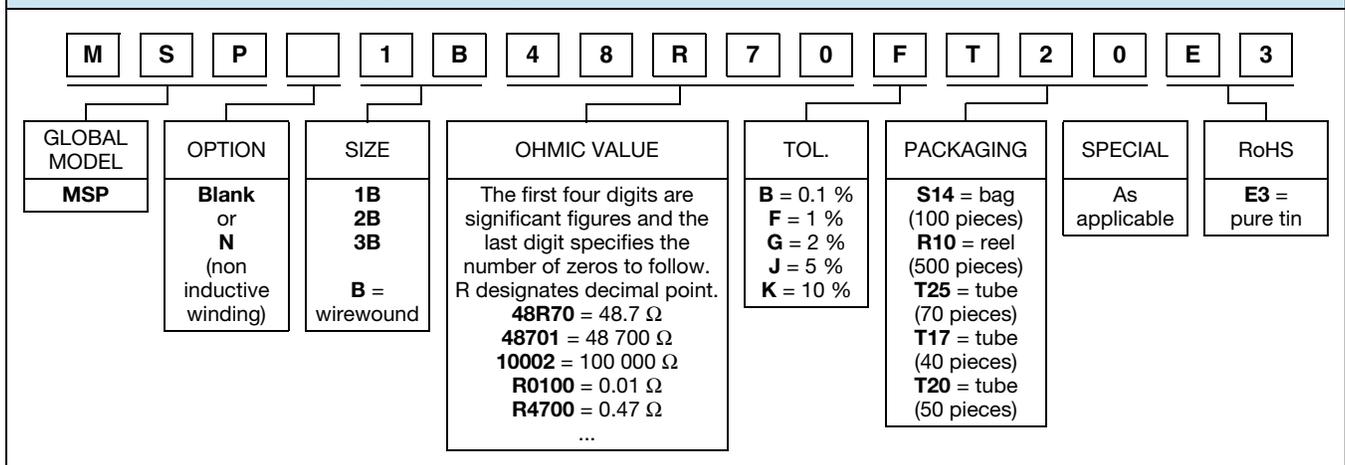
	TUBE PACKAGING					REEL PACKAGING						
	T1	T2	T3	T4	LENGTH	A0	B0	K0	P0	W	T	P
<b>MSP 1</b>	6.6	6.8	4.6	4.8	530	3.9	7.35	4.25	4	12	0.254	8
<b>MSP 2</b>	9.2	8.7	8	7.5	615	7.43	11.91	5.36	4	24	0.368	12
<b>MSP 3</b>						n/a						

**MARKING**

Vishay Sfernice trademark, ohmic value (in  $\Omega$ ), tolerance (in %), series and style, technology, manufacturing date.

**ORDERING INFORMATION**

<b>MSP</b>	<b>1</b>	<b>B</b>		<b>48U7</b>	$\pm 1\%$	<b>TC</b>	<b>BA100</b>	<b>e3</b>
SERIES	STYLE	TECHNOLOGY	NON INDUCTIVE WINDING	OHMIC VALUE	TOLERANCE	Applicable only in "C" technology	PACKAGING	LEAD (Pb)-FREE
		B: wirewound	Optional					

**SAP PART NUMBERING GUIDELINES**




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