

Precision Surface Mount Resistors Wirewound or Metal Film Technologies



FEATURES

- Approved according CECC 40402-801 (wirewound)
- Wide range of ohmic values (0.04 Ω to 1 MΩ)
- Low temperature coefficient (± 25 ppm/°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



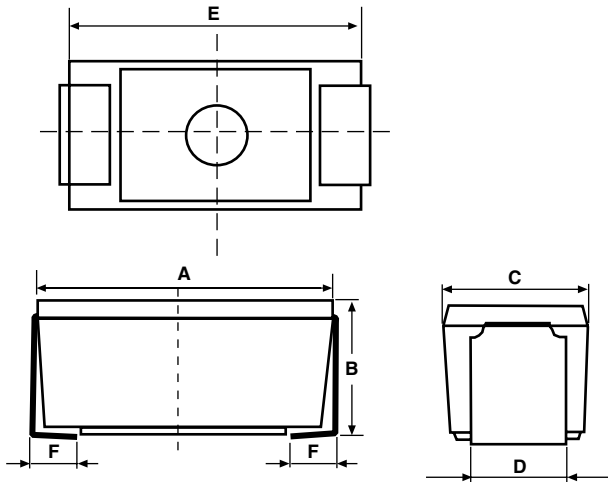
RoHS
COMPLIANT

Specially designed for surface mounting, the MSP series uses either wirewound or metal film technology. The molded package ensures mechanical and climatic protection as well as high dielectric insulation.

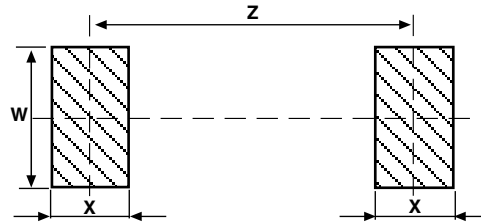
The MSP design is compatible with surface mounting equipment and can withstand wave and reflow soldering techniques.

DIMENSIONS in millimeters

MSP



RECOMMENDED SOLDERING AREAS



DIMENSIONS SERIES	DIMENSIONS									Average Mass (g)
	A	B	C	D	E	F	W	X	Z	
MSP 1	6.9	3.8	3.8	2.5	6.5	1.4	2.7	2.9	6	0.2
MSP 2	11.4	5	7	5	11	2.4	5.2	4.1	9.4	0.8
MSP 3	14.8	6.6	7	5	14.4	2.4	5.2	4.1	12.7	1.5

General tolerance: ± 0.2 mm

TECHNICAL SPECIFICATIONS						
RESISTIVE TECHNOLOGY		Wirewound			Metal Film	
Vishay Sfernice Series CECC 40402-801 Metric Size		MSP 1 B RW1 0704M	MSP 2 B RW2 1107M	MSP 3 B RW3 1607M	MSP 1 C - 0704M	MSP 2 C - 1107M
Rated Dissipation at + 25 °C, P ₂₅		1 W	2 W	2.5 W	0.5 W	1 W
Ohmic Range In Relation to Tolerance (with Preferred Ohmic Value Series)	± 5 % E24 series	0.04 2.2K	0.04 4.7K	0.04 13K	-	-
	± 2 % E48 series	0.04 2.2K	0.04 4.7K	0.05 13K	-	-
	± 1 % E96 series	0.04 2.2K	0.04 4.7K	0.05 13K	10 332K	10 1M
	± 0.5 % E96 series	0.4 2.2K	0.4 4.7K	0.3 13K	10 332K	10 1M
	± 0.1 % E192 series	-	-	-	10 332K	10 332K
Approved Range CECC 40402-801	1 % or Class 0.5	0.5 1K	0.5 2.2K	0.1 4.12K	-	-
Limiting Element Voltage, U _{max.} AC/DC		50 V	120 V	200 V	300 V	350 V



Precision Surface Mount Resistors
Wirewound or Metal Film Technologies

Vishay Sfernice

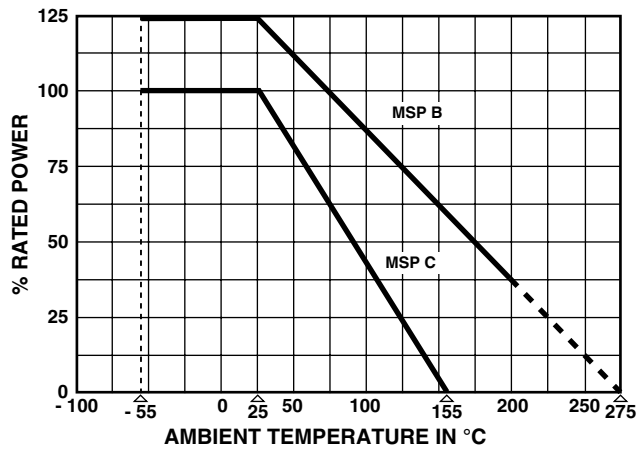
TECHNICAL SPECIFICATIONS (continued)					
RESISTIVE TECHNOLOGY	Wirewound			Metal Film	
Series	MSP 1 B	MSP 2 B	MSP 3 B	MSP 1 C	MSP 1 C
Critical Resistance	-	-	-	180K	122.5K
Temperature Coefficient, TC	CECC 40402-801 - 55 °C/+ 200 °C < 1 Ω ± 100 ppm/°C 1 Ω to < 10 Ω ± 50 ppm/°C ≥ 10 Ω ± 25 ppm/°C			- 55 °C/+ 155 °C 10 to 332 kΩ K3: ± 50 ppm/°C K4: ± 25 ppm/°C > 332 kΩ K3: ± 50 ppm/°C	
Failure Rate with CECC Approval	E6 10 ⁻⁶ /h	E6 10 ⁻⁶ /h	E0 or A 10 ⁻⁴ /h	-	-

MECHANICAL SPECIFICATIONS		
	Wirewound	Metal Film
Encapsulant	Thermoset	
Resistive Element	CuNi or NiCr	NiCr or NiP
Ceramic Substrate	Alumina or Steatite	Alumina
Termination	Electrolytic pure matte tin	

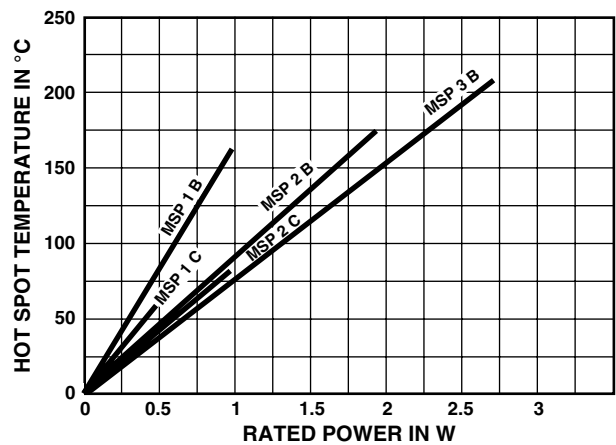
ENVIRONMENTAL SPECIFICATIONS		
	Wirewound	Metal Film
Temperature Range	- 55 °C to 275 °C	- 55 °C to 155 °C
Climatic Category (LCT/UCT/days)	55/200/56	55/125/10

PERFORMANCE				
TESTS	CONDITIONS		REQUIREMENTS	
	Wirewound	Metal Film	Wirewound CECC 40402-801	Metal Film
Short Time Overload	IEC 60115-1 5 P _r or U = 2 U _{max} /5 s		± (0.25 % + 0.05 Ω)	± 0.25 %
Load Life	IEC 60115-1 90'/30' cycles 1000 h P _r + 25 °C 8000 h P _r		± (0.5 % + 0.05 Ω) ± (3 % + 0.05 Ω)	± 1 % -
Dielectric w/s Voltage	IEC 60115-1 U _{RMS} = 500 V/60 s		No flashover or breakdown Leakage current < 10 μA	
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 - 55 °C/+ 125 °C		± (0.25 % + 0.05 Ω)	± 0.25 %
Climatic Sequence	IEC 60115-1 - 55 °C/+ 200 °C - 55 °C/+ 125 °C		± (0.5 % + 0.05 Ω)	± 0.5 %
Humidity (Steady State)	IEC 60115-1 IEC 60068-2-3 Test Ca 95 % HR/40 °C 56 days 10 days		± (0.5 % + 0.05 Ω)	± 1 %
Substrate Bending Test	IEC 60115-1 IEC 60068-2-21 Test U ₆₃ 2 mm/10 times		± (0.25 % + 0.05 Ω)	± 0.25 %
Shock	IEC 60115-1 IEC 60068-2-27 Test Ea 50 g's/half sine/ 3 times by direction (i.e. 18 shocks)		± (0.25 % + 0.05 Ω)	N/A
Vibration	IEC 60115-1 IEC 60068-2-6 Test Fc 10/2000 Hz 10/500 Hz		± (0.25 % + 0.05 Ω)	± 0.25 %
Resistance to Soldering Heat	IEC 60115-1 IEC 60068-2-58 Solder bath 260 °C/10 s		± (0.5 % + 0.05 Ω)	N/A

POWER RATING CHART



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.

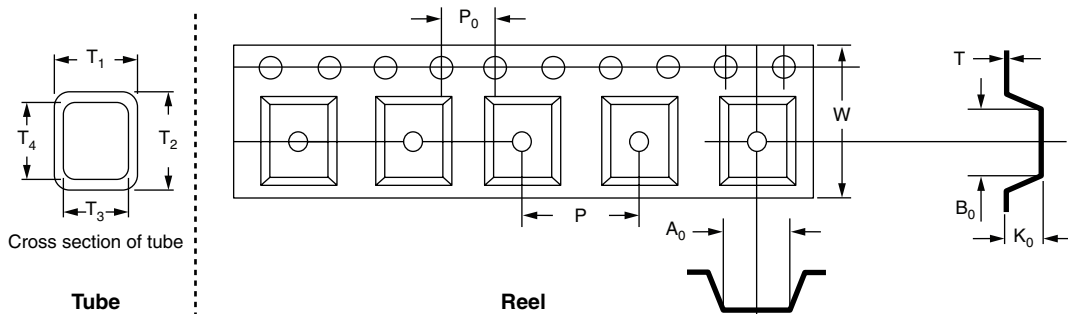
NON INDUCTIVE WINDING FOR MSP B

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						
	T ₁	T ₂	T ₃	T ₄	Length	A ₀	B ₀	K ₀	P ₀	W	T	P
MSP 1	6.6	6.8	4.6	4.8	530	3.9	7.35	4.25	4	12	0.254	8
MSP 2	9.2	8.7	8	7.5	615	7.43	11.91	5.36	4	24	0.368	12
MSP 3						N/A						

MARKING

SFERNICE trademark, ohmic value (in Ω), tolerance (in %), series and style, technology, manufacturing date.



ORDERING INFORMATION									
MSP	1	B		48U7	± 1 %	TC	BA100NA	e3	
SERIES	STYLE	TECHNOLOGY	NON INDUCTIVE	OHMIC VALUE	TOLERANCE	Applicable only in "C" technology	PACKAGING	LEAD (Pb)-FREE	
		B: Wirewound C: Metal Film	WINDING Optional						

SAP PART NUMBERING GUIDELINES																	
M	S	P		1	B	4	8	R	7	0	F		T	2	0	E	3
GLOBAL MODEL	OPTION	SIZE	OHMIC VALUE				TOL.	TEMP. COEF.	PACKAGING	SPECIAL	RoHS						
MSP	Blank or N (Non inductive winding)	1B 2B 3B 1C 2C B = Wirewound C = Metal Film	The first four digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point. 48R70 = 48.7 Ω 48701 = 48 700 Ω 10002 = 100 000 Ω R0100 = 0.01 Ω R4700 = 0.47 Ω ...				B = 0.1 % F = 1 % G = 2 % J = 5 % K = 10 %	Blank or Applicable only on metal film technologies 1C and 2C: E ≥ K3 or H ≥ K4	S14 = Bag (100 pieces) R10 = Reel (500 pieces) T25 = Tube (70 pieces) T17 = Tube (40 pieces) T20 = Tube (50 pieces)	As applicable	E3 = Pure tin						



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.