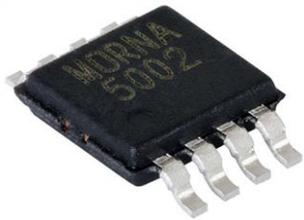


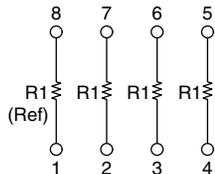
# Molded, Compact, 0.65 mm Pitch, Dual-In-Line Thin Film Resistor, Surface Mount Network

## 0.01 % Ratio Tolerance and 1 ppm/°C TCR Tracking



MORN series resistor networks feature four isolated resistors with standard 0.65mm (25.6 mil) pitch lead spacing. The networks feature close TCR tracking and tight ratio tolerance and are ideally suited for unity gain operational amplifier circuitry. The standard resistance offering listed are available for immediate delivery.

### SCHEMATICS



### FEATURES

- Low TCR tracking of  $\pm 1$  ppm/°C and ratio tolerance as low as  $\pm 0.01$  %
- 1.10 mm (0.043 mil) maximum seated height
- Excellent long term Ratio stability,  $\pm 0.015$  % over 2000 h at 70 °C
- JEDEC® MO-187 variation AA package (25 mil pitch, QSOP)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



HALOGEN  
**FREE**

### Note

\* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

### TYPICAL PERFORMANCE

	ABSOLUTE	TRACKING
TCR	25	1
	ABSOLUTE	RATIO
TOL.	0.1	0.01

### STANDARD RESISTANCE OFFERING ( $R_1 =$ )

500 $\Omega$	10 k $\Omega$
1 k $\Omega$	20 k $\Omega$
2 k $\Omega$	25 k $\Omega$
4.99 k $\Omega$	50 k $\Omega$
5 k $\Omega$	100 k $\Omega$

### Notes

- Lead (Pb)-free containing terminations are not RoHS compliant, exemptions.
- Consult factory for additional values and schematics.

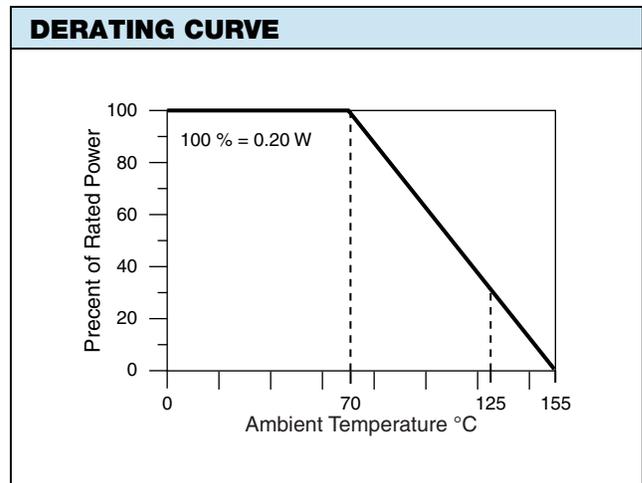
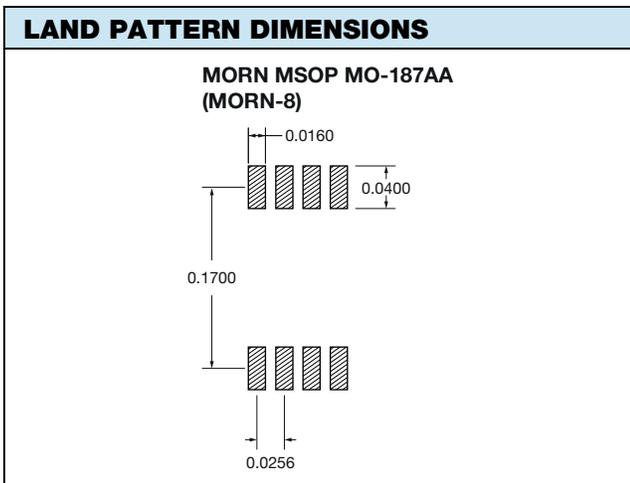
### STANDARD ELECTRICAL SPECIFICATIONS

TEST	SPECIFICATIONS	CONDITIONS
Material	Passivated nichrome	-
Pin/Lead Number	8	-
Resistance Range	400 $\Omega$ to 100 k $\Omega$ per resistor	-
TCR: Absolute	$\pm 25$ ppm/°C	-55 °C to +125 °C
TCR: Tracking	$\pm 1$ ppm/°C (typical) ; $\pm 2$ ppm/°C (max.)	-55 °C to +125 °C
Tolerance: Absolute	$\pm 0.05$ % to $\pm 1.0$ %	+25 °C
Tolerance: Ratio	$\pm 0.01$ % to $\pm 0.5$ %	+25 °C
Power Rating: Resistor	50 mW	Maximum at +70 °C
Power Rating: Package	200 mW	Maximum at +70 °C
Stability: Absolute	$\Delta R \pm 0.05$ %	2000 h at +70 °C
Stability: Ratio	$\Delta R \pm 0.015$ %	2000 h at +70 °C
Voltage Coefficient	0.1 ppm/V (typical)	-
Working Voltage	50 V max. not to exceed $\sqrt{P \times R}$	-
Operating Temperature Range	-55 °C to +125 °C	-
Storage Temperature Range	-55 °C to +155 °C	-
Noise	$\leq -30$ dB	-
Thermal EMF	0.08 $\mu$ V/°C	-
Shelf Life Stability: Absolute	$\Delta R \pm 0.01$ %	1 year at +25 °C
Shelf Life Stability: Ratio	$\Delta R \pm 0.002$ %	1 year at +25 °C

<b>DIMENSIONS AND IMPRINTING</b> in inches and millimeters			
	<b>DIMENSION</b>	<b>INCHES</b>	<b>MILLIMETERS</b>
	A	0.118	3.00
	B	$0.0118 \pm 0.0086$	$0.3 \pm 0.08$
	C	0.0256	0.65
	D	0.118 max.	3.00
	E	$0.006 \pm 0.003$	$0.16 \pm 0.08$
	F	$0.024 \pm 0.008$	$0.60 \pm 0.20$
	G	0.193	4.90
	H	0.043 max.	1.10
	I	0.006 max.	0.15 max.
Ø	$0^\circ$ to $8^\circ$	$0^\circ$ to $8^\circ$	

**Note**

- Marking - Vishay symbol, part number from ordering information.



<b>MECHANICAL SPECIFICATIONS</b>	
Resistive Element	Passivated nichrome
Substrate Material	Silicon
Body	Molded epoxy
Terminals	Copper alloy
Lead (Pb)-free Option	100 % matte tin
Tin Lead Option	Sn90
Tin Lead and Lead (Pb)-free Finish	Plated



GLOBAL PART NUMBER INFORMATION				
New Global Part Numbering: MORNA1002AUF				
M	O	R	N	T
A	1	0	0	2
A	U	F		
GLOBAL MODEL (4 or 5 digits)	SCHEMATIC	RESISTANCE	TOLERANCE AND RATIO TOLERANCE	
<b>MORN</b> (Tin Lead)	<b>A</b> = 4 isolated equal resistors	First 3 digits are significant figures and the last digit specifies the number of zeroes to follow. R designates the decimal point.	Abs. Tol.	Ratio
<b>MORNT</b> (Lead (Pb)-free) (e3)		Example: <b>1002</b> = 10 kΩ <b>1003</b> = 100 kΩ <b>4991</b> = 4.99 kΩ <b>5000</b> = 500 Ω	<b>Q</b> = ± 0.05 % <sup>(1)</sup>	± 0.01 %
			<b>Z</b> = ± 0.1 % <sup>(1)</sup>	± 0.025 %
			<b>A</b> = ± 0.1 %	± 0.05 %
			<b>B</b> = ± 0.1 %	± 0.1 %
			<b>C</b> = ± 0.25 %	± 0.1 %
			<b>D</b> = ± 0.5 %	± 0.1 %
			<b>F</b> = ± 1 %	± 0.5 %
			PACKAGING	
			TAPE AND REEL	
			<b>T0</b> = 100 min., 100 mult	
			<b>T1</b> = 1000 min., 1000 mult <sup>(2)</sup>	
			<b>T3</b> = 300 min., 300 mult	
			<b>T5</b> = 500 min., 500 mult	
			<b>TF</b> = Full reel 300	
			<b>TS</b> = 100 min., 1 mult	
			<b>UF</b> = TUBED	

**Notes**

<sup>(1)</sup> Tolerance available 1K and up

<sup>(2)</sup> Preferred packaging code



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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 in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

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

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**