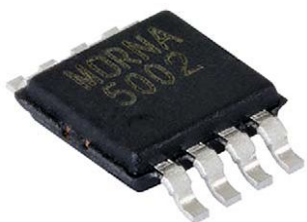
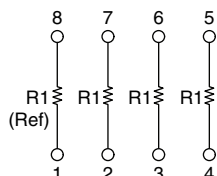


# Molded, Compact, 0.65 mm Pitch, Dual-In-Line Thin Film Resistor, Surface-Mount Network 0.01 % Ratio Tolerance and 1 ppm/°C TCR Tracking



MORN series resistor networks feature four isolated resistors with standard 0.65 mm (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 offerings 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)



**RoHS\***  
Available  
**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 ( $R_1 =$ )

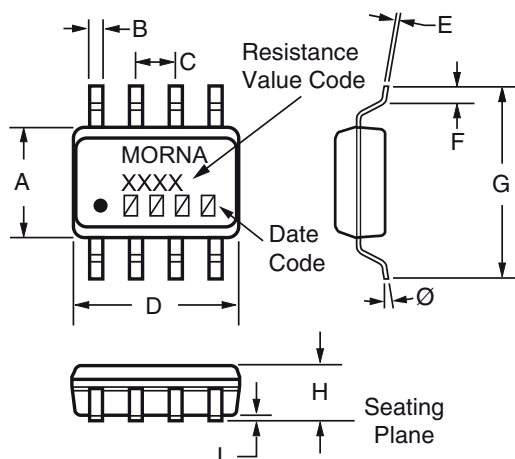
500 $\Omega$	10 k $\Omega$
1 k $\Omega$	20 k $\Omega$
2 k $\Omega$	25 k $\Omega$
4.99 k $\Omega$	50 k $\Omega$
5 k $\Omega$	100 k $\Omega$

## Note

- Consult factory for additional values and schematics.

## STANDARD ELECTRICAL SPECIFICATIONS

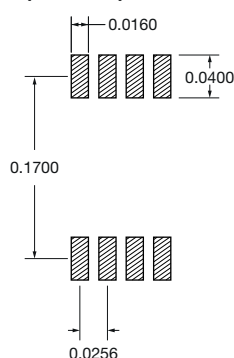
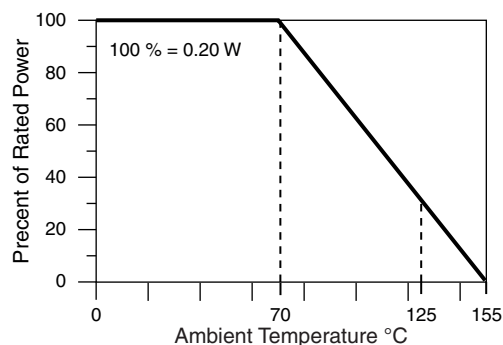
TEST	SPECIFICATIONS	CONDITIONS
Material	Passivated nichrome	-
Pin/Lead Number	8	-
Resistance Range	400 $\Omega$ to 100 k $\Omega$ per resistor	-
TCR: Absolute	$\pm 25$ ppm/°C	-55 °C to +125 °C
TCR: Tracking	$\pm 1$ ppm/°C (typical) ; $\pm 2$ ppm/°C (max.)	-55 °C to +125 °C
Tolerance: Absolute	$\pm 0.05$ % 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

**DIMENSIONS AND IMPRINTING** in inches and millimeters


DIMENSION	INCHES	MILLIMETERS
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° to 8°	0° to 8°

**Note**

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

**LAND PATTERN DIMENSIONS**
**MORN MSOP MO-187AA  
(MORN-8)**

**DERATING CURVE**

**MECHANICAL SPECIFICATIONS**

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		PACKAGING		
<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 zeros to follow. R designates the decimal point.		Abs. Tol.      Ratio		TAPE AND REEL		
<b>MORNT</b> (Lead (Pb)-free) (e3)				Example: <b>1002</b> = 10 k $\Omega$ <b>1003</b> = 100 k $\Omega$ <b>4991</b> = 4.99 k $\Omega$ <b>5000</b> = 500 $\Omega$		<b>Q</b> = $\pm 0.05\%$ <sup>(1)</sup> $\pm 0.01\%$ <b>Z</b> = $\pm 0.1\%$ <sup>(1)</sup> $\pm 0.025\%$ <b>A</b> = $\pm 0.1\%$ $\pm 0.05\%$ <b>B</b> = $\pm 0.1\%$ $\pm 0.1\%$ <b>C</b> = $\pm 0.25\%$ $\pm 0.1\%$ <b>D</b> = $\pm 0.5\%$ $\pm 0.1\%$ <b>F</b> = $\pm 1\%$ $\pm 0.5\%$		<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

- (1) Tolerance available 1K and up  
(2) Preferred packaging code



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