



## Molded, SOT-23 Thin Film Resistor, Surface Mount Divider Network

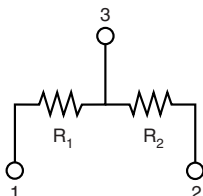


## LINKS TO ADDITIONAL RESOURCES



Vishay Dale Thin Film MPM Series Dividers provide  $\pm 2$  ppm/ $^{\circ}$ C tracking and a ratio tolerance as tight as 0.01 %, small size, and exceptional stability for all surface mount applications. The standard SOT-23 package format with unity and common standard resistance divider ratios provide easy selection for most applications requiring matched pair resistor elements. The ratios listed are available for off the shelf delivery. Ratios not listed but within the datasheet limits are available without NRE charge. See "Global Part Number Information" table for guidance how to create part number for ordering.

## SCHEMATIC



## FEATURES

- Excellent long term ratio stability ( $\Delta R \pm 0.015$  %, 2000 h,  $+70$   $^{\circ}$ C)
- Ratio tolerances to  $\pm 0.01$  %
- Low TCR tracking  $\pm 2$  ppm
- Zero ohm jumper option available
- Standard JEDEC<sup>®</sup> TO-236 package variation AB
- 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       | 2        |
|      | ABSOLUTE | RATIO    |
| TOL. | 0.1      | 0.05     |

## Note

- Typical performance TCR and tolerance does not apply to zero ohm jumper

STANDARD DIVIDER RATIOS ( $R_2/R_1$ ) COMMONLY STOCKED BY DISTRIBUTORS

| RATIO | $R_2$ ( $\Omega$ ) | $R_1$ ( $\Omega$ ) | RATIO | $R_2$ ( $\Omega$ ) | $R_1$ ( $\Omega$ ) |
|-------|--------------------|--------------------|-------|--------------------|--------------------|
| 100:1 | 100K               | 1K                 | 2:1   | 10K                | 5K                 |
| 50:1  | 50K                | 1K                 | 2:1   | 2K                 | 1K                 |
| 25:1  | 25K                | 1K                 | 1:1   | 100K               | 100K               |
| 20:1  | 20K                | 1K                 | 1:1   | 50K                | 50K                |
| 10:1  | 20K                | 2K                 | 1:1   | 25K                | 25K                |
| 10:1  | 10K                | 1K                 | 1:1   | 10K                | 10K                |
| 9:1   | 9K                 | 1K                 | 1:1   | 5K                 | 5K                 |
| 9:1   | 900                | 100                | 1:1   | 2.5K               | 2.5K               |
| 6:1   | 6K                 | 1K                 | 1:1   | 2K                 | 2K                 |
| 5:1   | 10K                | 2K                 | 1:1   | 1K                 | 1K                 |
| 5:1   | 5K                 | 1K                 | 1:1   | 500                | 500                |
| 4:1   | 8K                 | 2K                 | 1:1   | 250                | 250                |
| 4:1   | 4K                 | 1K                 | 1:2   | 5K                 | 10K                |
| 3:1   | 7.5K               | 2.5K               | 1:2.5 | 10K                | 25K                |
| 2:1   | 50K                | 25K                | 1:4   | 7.5K               | 30K                |
| 2:1   | 12K                | 6K                 | 1:9   | 10K                | 90K                |

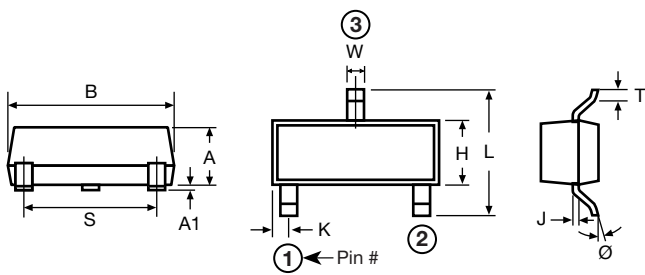
**STANDARD ELECTRICAL SPECIFICATIONS**

| TEST                           | SPECIFICATIONS                                    | CONDITIONS                                        |
|--------------------------------|---------------------------------------------------|---------------------------------------------------|
| Material                       | Passivated nichrome                               | -                                                 |
| Pin/Lead Number                | 3                                                 | -                                                 |
| Resistance Range               | 250 $\Omega$ to 100 k $\Omega$ per resistor       | -                                                 |
| Resistance for Jumper          | $\leq 50$ m $\Omega$                              | -                                                 |
| TCR: Absolute                  | $\pm 25$ ppm/ $^{\circ}\text{C}$                  | -55 $^{\circ}\text{C}$ to +125 $^{\circ}\text{C}$ |
| TCR: Tracking                  | $\pm 2$ ppm/ $^{\circ}\text{C}$ (typical)         | -55 $^{\circ}\text{C}$ to +125 $^{\circ}\text{C}$ |
| Tolerance: Absolute            | $\pm 0.05$ % to $\pm 1.0$ %                       | +25 $^{\circ}\text{C}$                            |
| Tolerance: Ratio               | $\pm 0.01$ % to $0.5$ %                           | +25 $^{\circ}\text{C}$                            |
| Power Rating: Resistor         | 100 mW                                            | Maximum at +70 $^{\circ}\text{C}$                 |
| Power Rating: Package          | 200 mW                                            | Maximum at +70 $^{\circ}\text{C}$                 |
| Stability: Absolute            | $\Delta R \pm 0.05$ %                             | 2000 h at +70 $^{\circ}\text{C}$                  |
| Stability: Ratio               | $\Delta R \pm 0.015$ %                            | 2000 h at +70 $^{\circ}\text{C}$                  |
| Voltage Coefficient            | 0.1 ppm/V                                         | -                                                 |
| Working Voltage                | 100 V max. not to exceed $\sqrt{P \times R}$      | -                                                 |
| Operating Temperature Range    | -55 $^{\circ}\text{C}$ to +125 $^{\circ}\text{C}$ | -                                                 |
| Storage Temperature Range      | -55 $^{\circ}\text{C}$ to +150 $^{\circ}\text{C}$ | -                                                 |
| Noise                          | < -30 dB                                          | -                                                 |
| Thermal EMF                    | 0.2 $\mu\text{V}/^{\circ}\text{C}$                | -                                                 |
| Shelf Life Stability: Absolute | $\Delta R \pm 0.01$ %                             | 1 year at +25 $^{\circ}\text{C}$                  |
| Shelf Life Stability: Ratio    | $\Delta R \pm 0.002$ %                            | 1 year at +25 $^{\circ}\text{C}$                  |

**Note**

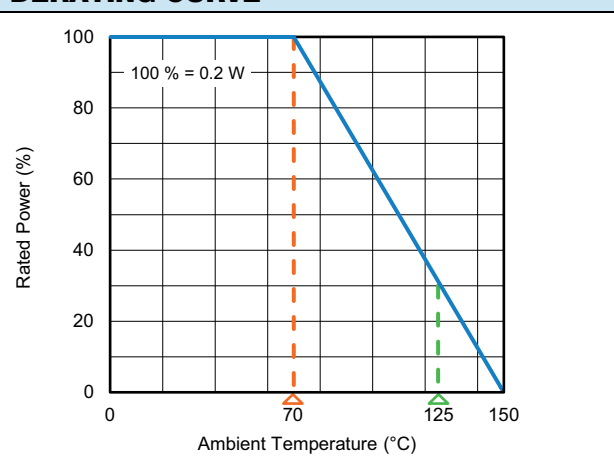
- TCR and TCR tracking are not available for parts with zero ohm jumpers

**DIMENSIONS AND IMPRINTING** in inches and millimeters

|                                                                                     | DIMENSION     | INCHES |              | MILLIMETERS |              |
|-------------------------------------------------------------------------------------|---------------|--------|--------------|-------------|--------------|
|                                                                                     |               | MIN.   | MAX.         | MIN.        | MAX.         |
|  | A             | 0.031  | 0.040        | 0.79        | 1.02         |
|                                                                                     | A1            | 0.001  | 0.004        | 0.02        | 0.10         |
|                                                                                     | B             | 0.105  | 0.120        | 2.67        | 3.05         |
|                                                                                     | S             | 0.071  | 0.079        | 1.80        | 2.00         |
|                                                                                     | W             | 0.015  | 0.021        | 0.38        | 0.54         |
|                                                                                     | L             | 0.083  | 0.098        | 2.10        | 2.50         |
|                                                                                     | H             | 0.047  | 0.055        | 1.20        | 1.40         |
|                                                                                     | T             | 0.005  | 0.010        | 0.13        | 0.25         |
|                                                                                     | J             | 0.0035 | 0.0059       | 0.089       | 0.15         |
|                                                                                     | K             | 0.017  | 0.022        | 0.44        | 0.55         |
|                                                                                     | $\varnothing$ | 0      | 8 $^{\circ}$ | 0           | 8 $^{\circ}$ |

**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                    | Sn85                |
| Tin Lead and Lead (Pb)-free Finish | Plated              |

**DERATING CURVE**




## GLOBAL PART NUMBER INFORMATION

## New Global Part Numbering: MPM1003AWS

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   | M | P | M |   |   |   | 1 | 0 | 0 | 3 |   |   | A | W | S |
| M | P | M | T | 1 | 0 | 0 | 1 | 5 | 0 | 0 | 1 | A | T | 1 |   |

| GLOBAL MODEL<br>(3 or 4 digits)                                         | RESISTANCE<br>(4 or 8 digits)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | TOLERANCE AND<br>RATIO TOLERANCE <sup>(1)</sup>                                                                                                                                                                                                                                                          | PACKAGING                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MPM</b><br>(Tin lead)<br><br><b>MPMT</b><br>(Lead (Pb)-free)<br>(e3) | First 3 digits are significant figures and the last digit specifies the number of zeros to follow. When like values are required use total resistance. When dual values are required list both values.<br>0000 = zero ohm jumper for R value<br>UUUU = open connection in place of R value<br><br>Example:<br>(List R <sub>1</sub> first in part number with dual values)<br>1002 = 10K (5K / 5K)<br>1003 = 100K (50K / 50K)<br>10011002 = 1K / 10K divider<br>0000UUUU = R <sub>1</sub> = jumper, R <sub>2</sub> = open<br>UUUU0000 = R <sub>1</sub> = open, R <sub>2</sub> = jumper<br>00UUUU00 = jumper connection pin 1 to pin 2<br>0000 = R <sub>1</sub> and R <sub>2</sub> = jumpers<br>00001002 = R <sub>1</sub> = jumper, R <sub>2</sub> = 10K<br>50010000 = R <sub>1</sub> = 5K, R <sub>2</sub> = jumper | Abs. Tol.      Ratio<br><br><b>A</b> = 0.1 %      0.05 %<br><b>B</b> = 0.1 %      0.1 %<br><b>C</b> = 0.25 %      0.1 %<br><b>D</b> = 0.5 %      0.1 %<br><b>F</b> = 1 %      0.5 %<br><b>Z</b> = 0.1 % <sup>(2)</sup> 0.025 %<br><b>Q</b> = 0.05 % <sup>(2)</sup> 0.01 %<br><b>N</b> = for jumpers only | <b>BS</b> = BULK 100 min., 1 mult.<br><b>WS</b> = WAFFLE 100 min., 1 mult.<br><br>TAPE AND REEL<br><b>T0</b> = 100 min., 100 mult.<br><b>T1</b> = 1000 min., 1000 mult. <sup>(3)</sup><br><b>T3</b> = 300 min., 300 mult.<br><b>T5</b> = 500 min., 500 mult.<br><b>TF</b> = full reel 4000<br><b>TS</b> = 100 min., 1 mult. |

## Historical Part Number Example: MPM1002BW (for reference purposes only)

|        |            |                                  |           |
|--------|------------|----------------------------------|-----------|
| MPM    | 1002       | B                                | W         |
| SERIES | RESISTANCE | TOLERANCE AND<br>RATIO TOLERANCE | PACKAGING |

## Notes

- (1) For combinations of a resistor and a zero ohm jumper only the absolute tolerance applies to the resistor value  
 (2) Tolerance available 1K and up equal values only  
 (3) 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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. 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.