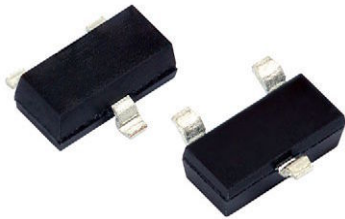


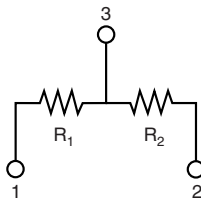


Matched Pair, Molded, Automotive, Thin Film, SOT-23, Resistor, Surface Mount Network, AEC-Q200 Qualified



Vishay Thin Film MPMA Series dividers provide ± 2 ppm/ $^{\circ}$ C tracking and a ratio tolerance as tight as ± 0.05 %, 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. MPMA is AEC-Q200 qualified and ideal for high precision automotive applications. The ratios listed are available for off the shelf delivery. If you require a non-standard ratio, consult the applications engineering group as we may be able to meet your requirements.

SCHEMATIC



FEATURES

- AEC-Q200 qualified
- Resistance range 250 Ω to 50 k Ω
- Excellent long term ratio stability ± 0.03 % over 1000 h, 125 $^{\circ}$ C
- Ratio tolerances to ± 0.05 %
- Tracking as low as ± 2 ppm/ $^{\circ}$ C
- Very low noise and voltage coefficient (< -30 dB, 0.1 ppm/V)
- Standard JEDEC TO-236 package variation AB
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS COMPLIANT
HALOGEN FREE

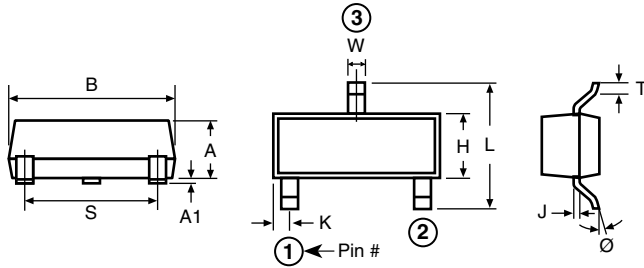
STANDARD DIVIDER RATIO (R₂/R₁)

| RATIO | R ₂ (Ω) | R ₁ (Ω) | TCR TRACKING |
|-------|-----------------------------|-----------------------------|----------------------|
| 50:1 | 50K | 1K | 10 ppm/ $^{\circ}$ C |
| 25:1 | 25K | 1K | 5 ppm/ $^{\circ}$ C |
| 20:1 | 20K | 1K | |
| 10:1 | 10K | 1K | 3 ppm/ $^{\circ}$ C |
| 9:1 | 9K | 1K | |
| 6:1 | 6K | 1K | |
| 5:1 | 10K | 2K | |
| 5:1 | 5K | 1K | |
| 4:1 | 8K | 2K | 2 ppm/ $^{\circ}$ C |
| 4:1 | 4K | 1K | |
| 2:1 | 10K | 5K | |
| 2:1 | 2K | 1K | |
| 1:1 | 50K | 50K | |
| 1:1 | 25K | 25K | |
| 1:1 | 10K | 10K | |
| 1:1 | 5K | 5K | |
| 1:1 | 2.5K | 2.5K | |
| 1:1 | 1K | 1K | |
| 1:1 | 500 | 500 | |
| 1:1 | 250 | 250 | |

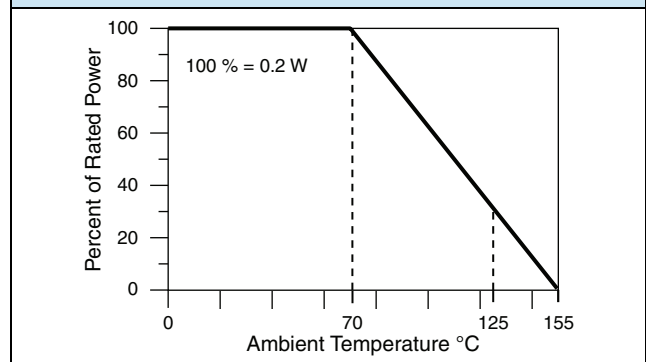
| STANDARD ELECTRICAL SPECIFICATIONS | | |
|------------------------------------|--|---------------------------------------|
| TEST | SPECIFICATIONS | CONDITIONS |
| Material | Ta2N | - |
| Pin/Lead Number | 3 | - |
| Resistance Range | 250 Ω to 50 k Ω per resistor | - |
| TCR: Absolute | ± 25 ppm/ $^{\circ}$ C | -55 $^{\circ}$ C to +125 $^{\circ}$ C |
| TCR: Tracking | Down to ± 2 ppm/ $^{\circ}$ C | -55 $^{\circ}$ C to +125 $^{\circ}$ C |
| Tolerance: Absolute | ± 0.1 % to ± 1.0 % | +25 $^{\circ}$ C |
| Tolerance: Ratio | ± 0.05 % to 0.5 % | +25 $^{\circ}$ C |
| Power Rating: Resistor | 100 mW | Maximum at +70 $^{\circ}$ C |
| Power Rating: Package | 200 mW | Maximum at +70 $^{\circ}$ C |
| Stability: Absolute | < 1 k Ω : ± 0.35 %; > 1 k Ω : ± 0.04 % | 1000 h at +125 $^{\circ}$ C |
| Stability: Ratio | < 1 k Ω : ± 0.35 %; > 1 k Ω : ± 0.03 % | 1000 h at +125 $^{\circ}$ C |
| Voltage Coefficient | 0.1 ppm/V | - |
| Working Voltage | 100 V max. not to exceed $\sqrt{P \times R}$ | - |
| Operating Temperature Range | -55 $^{\circ}$ C to +155 $^{\circ}$ C | - |
| Storage Temperature Range | -55 $^{\circ}$ C to +155 $^{\circ}$ C | - |
| Noise | < -30 dB | - |
| Thermal EMF | 0.2 μ V/ $^{\circ}$ C | - |
| Shelf Life Stability: Absolute | $\Delta R/R \pm 0.01$ % | 1 year at +25 $^{\circ}$ C |
| Shelf Life Stability: Ratio | $\Delta R/R \pm 0.002$ % | 1 year at +25 $^{\circ}$ C |

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 |
| Ø | 0 | 8° | 0 | 8° |


MECHANICAL SPECIFICATIONS

| | |
|-----------------------|---------------------------------------|
| Resistive Element | Tantalum nitride |
| Substrate Material | Ceramic |
| Body | Molded epoxy |
| Terminals | Copper alloy |
| Lead (Pb)-free Option | Solder free leads, Ni/Pd/Au plated |

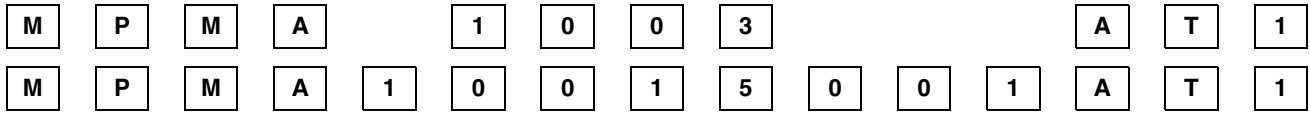
DERATING CURVE

ENVIRONMENTAL TESTS

| ENVIRONMENTAL TEST | CONDITIONS | SUGGESTED PRODUCT LIMITS ABS/RATIO | MAX. VALUES ABS/RATIO |
|------------------------------|--|------------------------------------|-----------------------|
| High Temperature Exposure | < 1 kΩ: MIL-STD-202, 108, 1000 h at 125 °C | ± 0.5 %/± 0.5 % | ± 0.35 %/± 0.35 % |
| | > 1 kΩ: MIL-STD-202, 108, 1000 h at 125 °C | ± 0.25 %/± 0.1 % | ± 0.02 %/± 0.008 % |
| Temperature Cycling | JESD22, JA-104, 1000 cycles at -55 °C to +125 °C | ± 0.25 %/± 0.1 % | ± 0.1 %/± 0.027 % |
| Moisture Resistance | MIL-STD-202, 106 | ± 0.25 %/± 0.1 % | ± 0.03%/± 0.012 % |
| Biased Humidity | MIL-STD-202, 103, 1000 h at 85 °C, 85 % RH, 10 % P | ± 1.0 %/± 0.5 % | ± 0.4 %/± 0.34 % |
| Life | < 1 kΩ: MIL-STD-202, 108 at 125 °C, 1000 h | ± 0.5 %/± 0.5 % | ± 0.35 %/± 0.35 % |
| | > 1 kΩ: MIL-STD-202, 108 at 125 °C, 1000 h | ± 0.5 %/± 0.1 % | ± 0.04 %/± 0.03 % |
| Mechanical Shock | MIL-STD-202, 213, condition C | ± 0.25 %/± 0.1 % | ± 0.03 %/± 0.018 % |
| Vibration | MIL-STD-204, 10 Hz to 2 kHz | ± 0.25 %/± 0.1 % | ± 0.02 %/± 0.047 % |
| Resistance to Soldering Heat | MIL-STD-202, 210, condition B | ± 0.25 %/± 0.1 % | ± 0.13 %/± 0.24 % |
| Electrostatic Discharge | < 1 kΩ: AEC-Q200-002 at 500 V human body | ± 0.5 % | ± 0.50 % |
| | > 1 kΩ: AEC-Q200-002 at 1000 V human body | ± 0.5 % | ± 0.25 % |
| Solderability | J-STD-002 method B and B1 | Visual | Visual |
| Terminal Strength | AEC-Q200-006 at 1 kg for 60 s | ± 0.25 %/± 0.1 % | ± 0.02 %/± 0.018 % |
| Flame Retardance | AEC-Q200-001 para 4.0 | Visual | Visual |



GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: MPMA1003AWS



| GLOBAL MODEL (3 or 4 digits) | RESISTANCE (4 or 8 digits) | TOLERANCE AND RATIO TOLERANCE | PACKAGING | | | | | | | | | | | | |
|--|---|--|-----------|-------|------------------|--------|------------------|-------|-------------------|-------|------------------|-------|----------------|-------|--|
| <p>MPMA Ni/Pd/Au = e4 termination</p> | <p>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.</p> <p>Example: (List R₁ first in part number with dual values)</p> <p>1002 = 10K (5K/5K) 1003 = 100K (50K/50K) 10011002 = 1K/10K divider</p> | <table border="1"> <thead> <tr> <th>Abs. Tol.</th> <th>Ratio</th> </tr> </thead> <tbody> <tr> <td>A = 0.1 %</td> <td>0.05 %</td> </tr> <tr> <td>B = 0.1 %</td> <td>0.1 %</td> </tr> <tr> <td>C = 0.25 %</td> <td>0.1 %</td> </tr> <tr> <td>D = 0.5 %</td> <td>0.1 %</td> </tr> <tr> <td>F = 1 %</td> <td>0.5 %</td> </tr> </tbody> </table> | Abs. Tol. | Ratio | A = 0.1 % | 0.05 % | B = 0.1 % | 0.1 % | C = 0.25 % | 0.1 % | D = 0.5 % | 0.1 % | F = 1 % | 0.5 % | <p>TAPE AND REEL</p> <p>T1 = 1000 min., 1000 mult ⁽¹⁾</p> <p>T5 = 500 min., 500 mult</p> <p>TF = Full reel 4000</p> <p>TP = 100 min., 1 mult (package unit single lot date code)</p> <p>TS = 100 min., 1 mult</p> |
| Abs. Tol. | Ratio | | | | | | | | | | | | | | |
| A = 0.1 % | 0.05 % | | | | | | | | | | | | | | |
| B = 0.1 % | 0.1 % | | | | | | | | | | | | | | |
| C = 0.25 % | 0.1 % | | | | | | | | | | | | | | |
| D = 0.5 % | 0.1 % | | | | | | | | | | | | | | |
| F = 1 % | 0.5 % | | | | | | | | | | | | | | |

Note

⁽¹⁾ Preferred packaging code



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