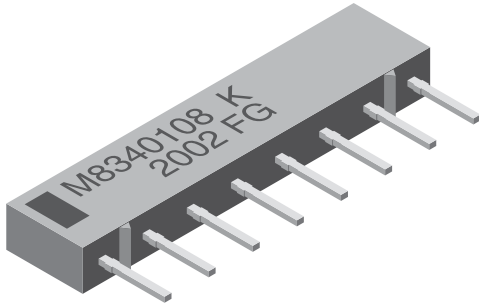




## Thick Film Resistor Networks, Military, MIL-PRF-83401 Qualified, Type RZ040 to RZ090, Single-In-Line, Molded SIP



### FEATURES

- Isolated, bussed and dual terminator schematics available
- MIL-PRF-83401 qualified
- 0.195" (4.95 mm) "A" and 0.350" (8.89 mm) "C" maximum seated heights
- Thick film resistive elements
- TCR available in "K" ( $\pm 100$  ppm/ $^{\circ}$ C) or "M" ( $\pm 300$  ppm/ $^{\circ}$ C) characteristic
- All device leads are hot-solder dipped
- Rugged molded case construction
- Compatible with automatic insertion equipment
- 100 % screen tested per group A, subgroup 1 of MIL-PRF-83401
- All devices are capable of passing the MIL-STD-202, method 210, condition D "Resistance to Soldering Heat" test
- Available in tube pack

| STANDARD ELECTRICAL SPECIFICATIONS |           |                 |           |   |   |                           |                                  |  |          |
|------------------------------------|-----------|-----------------|-----------|---|---|---------------------------|----------------------------------|--|----------|
| VISHAY DALE MODEL/ PIN NO/ PROFILE | MIL STYLE | MIL SPEC. SHEET | SCHEMATIC | POWER RATING ELEMENT $P_{70^{\circ}\text{C}}$ W | POWER RATING PACKAGE $P_{70^{\circ}\text{C}}$ W | RESISTANCE RANGE $\Omega$ | TOLERANCE <sup>(1)</sup> $\pm$ % | TEMPERATURE COEFFICIENT <sup>(2)</sup> (-55 $^{\circ}$ C to +125 $^{\circ}$ C) $\pm$ ppm/ $^{\circ}$ C | WEIGHT g |
| MSM06C                             | RZ040     | 04              | 01 (C)    | 0.20  | 1.00  | 10 to 1M                  | 1, 2, 5                          | 100, 300   | 0.7      |
|                                    |           |                 | 03 (G)    | 0.20  | 0.60  | 10 to 1M                  | 1, 2, 5                          | 100, 300   |          |
|                                    |           |                 | 05 (H)    | 0.11  | 0.88  | Consult factory           | 1, 2, 5                          | 100, 300   |          |
| MSM08C                             | RZ050     | 05              | 01 (C)    | 0.20  | 1.40  | 10 to 1M                  | 1, 2, 5                          | 100, 300   | 0.9      |
|                                    |           |                 | 03 (G)    | 0.20  | 0.80  | 10 to 1M                  | 1, 2, 5                          | 100, 300   |          |
|                                    |           |                 | 05 (H)    | 0.11  | 1.32  | Consult factory           | 1, 2, 5                          | 100, 300   |          |
| MSM10C                             | RZ060     | 06              | 01 (C)    | 0.20  | 1.80  | 10 to 1M                  | 1, 2, 5                          | 100, 300   | 1.1      |
|                                    |           |                 | 03 (G)    | 0.20  | 1.00  | 10 to 1M                  | 1, 2, 5                          | 100, 300   |          |
|                                    |           |                 | 05 (H)    | 0.11  | 1.80  | Consult factory           | 1, 2, 5                          | 100, 300   |          |
| MSM06A                             | RZ070     | 07              | 01 (C)    | 0.12  | 0.60  | 10 to 1M                  | 1, 2, 5                          | 100, 300   | 0.4      |
|                                    |           |                 | 03 (G)    | 0.12  | 0.36  | 10 to 1M                  | 1, 2, 5                          | 100, 300   |          |
|                                    |           |                 | 05 (H)    | 0.07  | 0.60  | Consult factory           | 1, 2, 5                          | 100, 300   |          |
| MSM08A                             | RZ080     | 08              | 01 (C)    | 0.12  | 0.84  | 10 to 1M                  | 1, 2, 5                          | 100, 300   | 0.5      |
|                                    |           |                 | 03 (G)    | 0.12  | 0.48  | 10 to 1M                  | 1, 2, 5                          | 100, 300   |          |
|                                    |           |                 | 05 (H)    | 0.07  | 0.84  | Consult factory           | 1, 2, 5                          | 100, 300   |          |
| MSM10A                             | RZ090     | 09              | 01 (C)    | 0.12  | 1.08  | 10 to 1M                  | 1, 2, 5                          | 100, 300   | 0.6      |
|                                    |           |                 | 03 (G)    | 0.12  | 0.60  | 10 to 1M                  | 1, 2, 5                          | 100, 300   |          |
|                                    |           |                 | 05 (H)    | 0.07  | 1.08  | Consult factory           | 1, 2, 5                          | 100, 300   |          |

### Notes

<sup>(1)</sup>  $\pm 2$  % standard,  $\pm 1$  % and  $\pm 5$  % available.

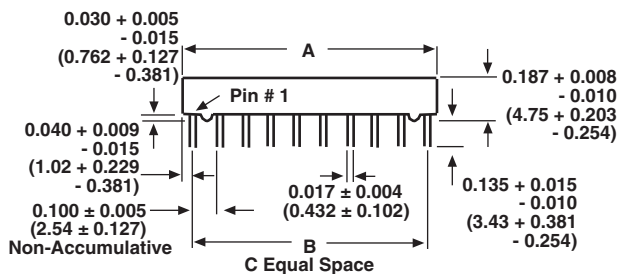
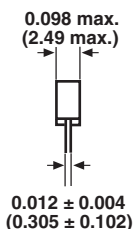
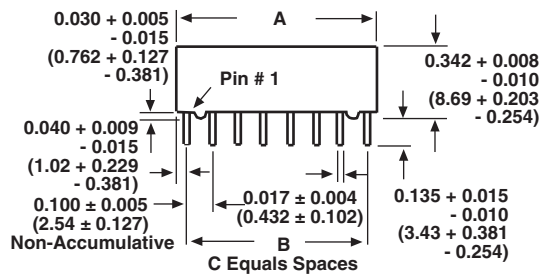
<sup>(2)</sup> K =  $\pm 100$  ppm/ $^{\circ}$ C; M =  $\pm 300$  ppm/ $^{\circ}$ C.

| GLOBAL PART NUMBER INFORMATION   |  |                            |  |                                     |                            |  |   |   |   |   |   |   |   |   |   |   |   |
|--|--|----------------------------|--|-------------------------------------|----------------------------|--|---|---|---|---|---|---|---|---|---|---|---|
| <b>New Global Part Numbering: M8340107K1003GCD03 (preferred part numbering format)</b> |  |                            |  |                                     |                            |  |   |   |   |   |   |   |   |   |   |   |   |
| M  | 8  | 3                          | 4  | 0                                   | 1                          | 0  | 7 | K | 1 | 0 | 0 | 3 | G | C | D | 0 | 3 |
| MIL STYLE  | SPEC SHEET   | CHARACTERISTIC             | RESISTANCE VALUE   | TOLERANCE CODE                      | SCHEMATIC                  | PACKAGING  |   |   |   |   |   |   |   |   |   |   |   |
| M83401   | 04 = 6 pin, "C" profile<br>05 = 8 pin, "C" profile<br>06 = 10 pin, "C" profile<br>07 = 6 pin, "A" profile<br>08 = 8 pin, "A" profile<br>09 = 10 pin, "A" profile | K = 100 ppm<br>M = 300 ppm | 3 digit significant figure, followed by a multiplier<br>10R0 = 10 Ω<br>3302 = 33 kΩ<br>1004 = 1 MΩ | F = ± 1 %<br>G = ± 2 %<br>J = ± 5 % | C = Bussed<br>G = Isolated | D03 = Tin/lead, tube<br>DSL = Tin/lead, tube, single lot date code |   |   |   |   |   |   |   |   |   |   |   |
| <b>Historical Part Number example: M8340107K1003GC (will continue to be accepted)</b>  |  |                            |  |                                     |                            |  |   |   |   |   |   |   |   |   |   |   |   |
| M83401   | 07   | K                          | 1003   | G                                   | C                          | D03  |   |   |   |   |   |   |   |   |   |   |   |
| MIL STYLE  | SPEC SHEET   | CHARACTERISTIC             | RESISTANCE VALUE   | TOLERANCE CODE                      | SCHEMATIC                  | PACKAGING  |   |   |   |   |   |   |   |   |   |   |   |
| <b>New Global Part Numbering: M8340104KA001GHD03 (preferred part numbering format)</b> |  |                            |  |                                     |                            |  |   |   |   |   |   |   |   |   |   |   |   |
| M  | 8  | 3                          | 4  | 0                                   | 1                          | 0  | 4 | K | A | 0 | 0 | 1 | G | H | D | 0 | 3 |
| MIL STYLE  | SPEC SHEET   | CHARACTERISTIC             | RESISTANCE VALUE   | TOLERANCE CODE                      | SCHEMATIC                  | PACKAGING  |   |   |   |   |   |   |   |   |   |   |   |
| M83401   | 04 = 6 pin, "C" profile<br>05 = 8 pin, "C" profile<br>06 = 10 pin, "C" profile<br>07 = 6 pin, "A" profile<br>08 = 8 pin, "A" profile<br>09 = 10 pin, "A" profile | K = 100 ppm<br>M = 300 ppm | Per std. MIL Spec (see Impedance Codes table)  | F = ± 1 %<br>G = ± 2 %<br>J = ± 5 % | H = Dual terminator        | D03 = Tin/lead, tube<br>DSL = Tin/lead, tube, single lot date code |   |   |   |   |   |   |   |   |   |   |   |
| <b>Historical Part Number example: M8340104KA001GH (will continue to be accepted)</b>  |  |                            |  |                                     |                            |  |   |   |   |   |   |   |   |   |   |   |   |
| M83401   | 04   | K                          | A001   | G                                   | H                          | D03  |   |   |   |   |   |   |   |   |   |   |   |
| MIL STYLE  | SPEC SHEET   | CHARACTERISTIC             | RESISTANCE VALUE   | TOLERANCE CODE                      | SCHEMATIC                  | PACKAGING  |   |   |   |   |   |   |   |   |   |   |   |

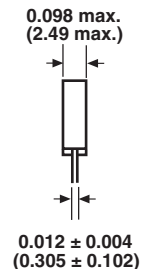
**Note**

- For additional information on packaging, refer to the Through Hole Network Packaging document ([www.vishay.com/doc?31542](http://www.vishay.com/doc?31542)).

**DIMENSIONS** in inches (millimeters)

**"A" Profile**

**"C" Profile**


| VISHAY DALE MODEL | A                                | B                | C |
|-------------------|----------------------------------|------------------|---|
| MSM06             | 0.583 ± 0.015<br>(14.81 ± 0.381) | 0.500<br>(12.70) | 5 |
| MSM08             | 0.783 ± 0.015<br>(19.89 ± 0.381) | 0.700<br>(17.78) | 7 |
| MSM10             | 0.983 ± 0.015<br>(24.97 ± 0.381) | 0.900<br>(22.86) | 9 |





| TECHNICAL SPECIFICATIONS          |                  |             |
|-----------------------------------|------------------|-------------|
| PARAMETER                         | UNIT             | MSM SERIES  |
| Maximum Operating Voltage         | V <sub>DC</sub>  | 50          |
| Voltage Coefficient of Resistance | V <sub>eff</sub> | < 50 ppm    |
| Dielectric Strength               | V <sub>AC</sub>  | 200 min.    |
| Insulation Resistance             | Ω                | 10 000M     |
| Operating Temperature Range       | °C               | -55 to +125 |
| Storage Temperature Range         | °C               | -55 to +150 |

| MECHANICAL SPECIFICATIONS |                                 |
|---------------------------|---------------------------------|
| Body                      | Molded epoxy                    |
| Terminals                 | Copper alloy, hot-solder dipped |
| Solderability             | Per MIL-PRF-83401               |

**CAGE CODE: 91637 and 2799A (formerly SH903)**

| MILITARY IMPEDANCE CODES |                    |                    |                     |                    |                    |
|--------------------------|--------------------|--------------------|---------------------|--------------------|--------------------|
| CODE                     | R <sub>1</sub> (Ω) | R <sub>2</sub> (Ω) | CODE                | R <sub>1</sub> (Ω) | R <sub>2</sub> (Ω) |
| A001                     | 82                 | 130                | A011                | 330                | 680                |
| A002                     | 120                | 200                | A012                | 1.5K               | 3.3K               |
| A003                     | 130                | 210                | A013                | 3K                 | 6.2K               |
| A004                     | 160                | 260                | A014                | 180                | 270                |
| A005                     | 180                | 240                | A015                | 270                | 270                |
| A006                     | 180                | 390                | A016                | 560                | 560                |
| A007                     | 220                | 270                | A017                | 560                | 1.2K               |
| A008                     | 220                | 330                | A018                | 620                | 2.7K               |
| A009                     | 330                | 390                | A019 <sup>(1)</sup> | 150                | 1K                 |
| A010                     | 330                | 470                | A020 <sup>(1)</sup> | 1K                 | 1K                 |

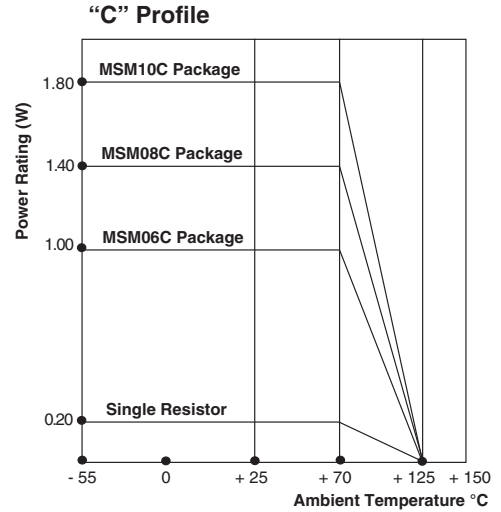
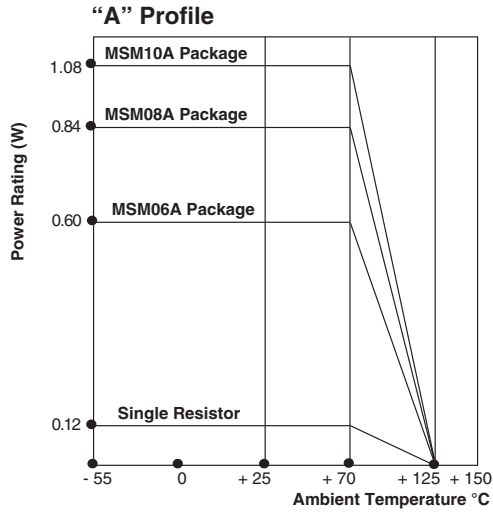
**Note**

<sup>(1)</sup> Offered for the M83401/09 product only

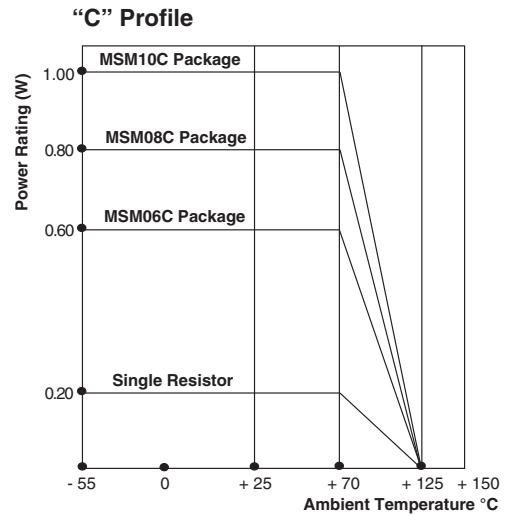
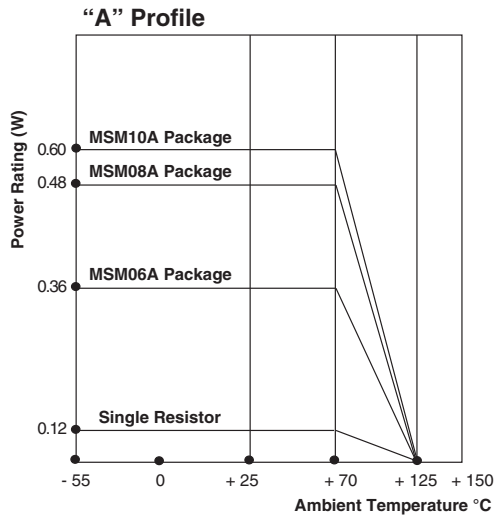


## DERATING

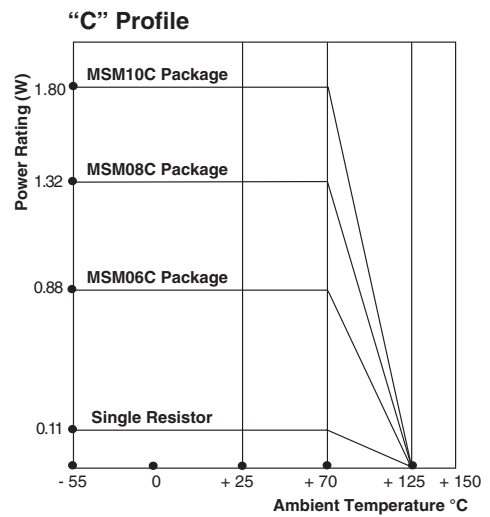
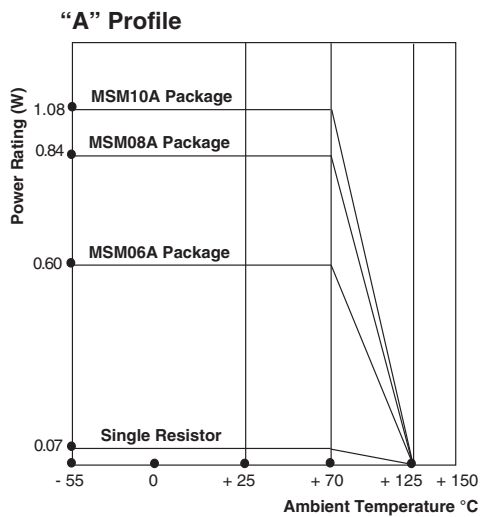
### 01 Schematic



### 03 Schematic



### 05 Schematic



| CIRCUIT APPLICATIONS       |   |  |
|----------------------------|---|--|
| <p><b>01 Schematic</b></p> | <p>5, 7 or 9 resistors with one pin common</p> <p>“A” Profile<br/>                     MSM06A01 (M8340107xxxxxC)<br/>                     MSM08A01 (M8340108xxxxxC)<br/>                     MSM10A01 (M8340109xxxxxC)</p> <p>“C” Profile<br/>                     MSM06C01 (M8340104xxxxxC)<br/>                     MSM08C01 (M8340105xxxxxC)<br/>                     MSM10C01 (M8340106xxxxxC)</p> <p>The MSM06A01, MSM08A01, MSM10A01, MSM06C01, MSM08C01, and MSM10C01 molded single-in-line resistor networks provide the user with a choice of 5, 7, or 9 nominally equal resistors, each connected to a common pin (Pin No. 1).</p> <p>Commonly used in the following applications:</p> <ul style="list-style-type: none"> <li>• “Wired OR” pull-up</li> <li>• Power Gate pull-up</li> <li>• MOS/ROM pull-up/pull-down</li> <li>• Open collector pull-up</li> <li>• TTL input pull-down</li> <li>• TTL unused gate pull-up</li> </ul>  |  |
| <p><b>03 Schematic</b></p> | <p>3, 4 or 5 isolated resistors</p> <p>“A” Profile<br/>                     MSM06A03 (M8340107xxxxxG)<br/>                     MSM08A03 (M8340108xxxxxG)<br/>                     MSM10A03 (M8340109xxxxxG)</p> <p>“C” Profile<br/>                     MSM06C03 (M8340104xxxxxG)<br/>                     MSM08C03 (M8340105xxxxxG)<br/>                     MSM10C03 (M8340106xxxxxG)</p> <p>The MSM06A03, MSM08A03, MSM10A03, MSM06C03, MSM08C03, and MSM10C03 molded single-in-line resistor networks provide the user with a choice of 3, 4, or 5 nominally equal resistors. Each resistor is isolated from all others.</p> <p>Commonly used in the following applications:</p> <ul style="list-style-type: none"> <li>• “Wired OR” pull-up</li> <li>• Power driven pull-up</li> <li>• Power gate pull-up</li> <li>• Line termination</li> <li>• Long-line impedance balance</li> <li>• LED current limiting</li> <li>• ECL output pull-down</li> <li>• TTL input pull-down</li> </ul> |  |
| <p><b>05 Schematic</b></p> | <p>4, 6 or 8 resistor pairs</p> <p>“A” Profile<br/>                     MSM06A05 (M8340107xxxxxH)<br/>                     MSM08A05 (M8340108xxxxxH)<br/>                     MSM10A05 (M8340109xxxxxH)</p> <p>“C” Profile<br/>                     MSM06C05 (M8340104xxxxxH)<br/>                     MSM08C05 (M8340105xxxxxH)<br/>                     MSM10C05 (M8340106xxxxxH)</p> <p>The MSM06A05, MSM08A05, MSM10A05, MSM06C05, MSM08C05, and MSM10C05 molded single-in-line resistor networks provide the user with a choice of 4, 6, or 8 pair of <math>R_1/R_2</math> resistor values for pulse squaring and TTL dual-line terminating requirements.</p>  |  |

| PERFORMANCE                     |   |  |
|---------------------------------|---|--|
| TEST                            | CONDITIONS  | MAX. $\Delta R$ (TYPICAL TEST LOTS)  |
| Power Conditioning              | 1.5 x rated power, applied 1.5 h “ON” and 0.5 h “OFF” for 100 h $\pm$ 4 h at +25 °C ambient temperature | $\pm$ 0.50 % $\Delta R$  |
| Thermal Shock                   | 5 cycles between -65 °C and +125 °C   | $\pm$ 0.50 % $\Delta R$  |
| Short Time Overload             | 2.5 x rated working voltage for 5 s   | $\pm$ 0.25 % $\Delta R$ (Characteristic K)<br>$\pm$ 0.50 % $\Delta R$ (Characteristic M) |
| Low Temperature Operation       | 45 min at full rated working voltage at -65 °C  | $\pm$ 0.25 % $\Delta R$ (Characteristic K)<br>$\pm$ 0.50 % $\Delta R$ (Characteristic M) |
| Moisture Resistance             | 240 h with humidity ranging from 80 % RH to 98 % RH   | $\pm$ 0.50 % $\Delta R$  |
| Resistance to Soldering Heat    | Leads immersed in +260 °C solder to within 1/16" of body for 10 s                                       | $\pm$ 0.25 % $\Delta R$  |
| Shock                           | Total of 18 shocks at 100 g's   | $\pm$ 0.25 % $\Delta R$  |
| Vibration                       | 12 h at maximum of 20 g's between 10 Hz and 2000 Hz   | $\pm$ 0.25 % $\Delta R$  |
| Load Life                       | 1000 h at +70 °C, rated power applied<br>1.5 h “ON”, 0.5 h “OFF” for full 1000 h period                 | $\pm$ 0.50 % $\Delta R$ (Characteristic K)<br>$\pm$ 2.00 % $\Delta R$ (Characteristic M) |
| Terminal Strength               | 4 1/2 pound pull for 30 s   | $\pm$ 0.25 % $\Delta R$  |
| Insulation Resistance           | 10 000 M $\Omega$ (minimum)   | -  |
| Dielectric Withstanding Voltage | No evidence of arcing or damage (200 V <sub>RMS</sub> for 1 min)  | -  |



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