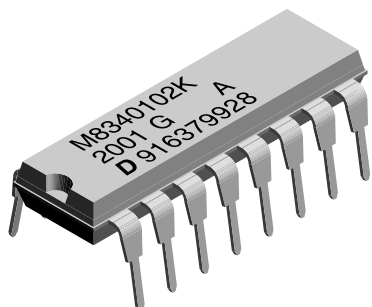




# Thick Film Resistor Networks, Military, MIL-PRF-83401 Qualified, Type RZ010 and RZ020 Dual-In-Line, Molded DIP



## FEATURES

- Isolated, bussed and dual terminator schematics available
- MIL-PRF-83401 qualified
- Epoxy molded construction
- All device leads are hot-solder dipped
- Available in tube pack
- TCR available in "K" ( $\pm 100$  ppm/ $^{\circ}$ C) or "M" ( $\pm 300$  ppm/ $^{\circ}$ C) depending on style
- 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

## STANDARD ELECTRICAL SPECIFICATIONS

| VISHAY DALE MODEL/ PIN NO. | 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 $\pm \%$ <sup>(2)</sup> | TEMPERATURE COEFFICIENT <sup>(1)</sup> ( $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ ) $\pm$ ppm/ $^{\circ}\text{C}$ | WEIGHT g |
|----------------------------|-----------|-----------------|-----------|-------------------------------------------------|-------------------------------------------------|---------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------|
| MDM14                      | RZ010     | 01              | 01 (B)    | 0.10                                            | 1.30                                            | 10 to 1M                  | 1, 2, 5                           | 100, 300                                                                                                                 | 1.3      |
|                            |           |                 | 03 (A)    | 0.20                                            | 1.40                                            | 10 to 1M                  |                                   |                                                                                                                          |          |
|                            |           |                 | 05 (J)    | 0.05                                            | 1.20                                            | Consult factory           |                                   |                                                                                                                          |          |
| MDM16                      | RZ020     | 02              | 01 (B)    | 0.10                                            | 1.50                                            | 10 to 1M                  | 1, 2, 5                           | 100, 300                                                                                                                 | 1.5      |
|                            |           |                 | 03 (A)    | 0.20                                            | 1.60                                            | 10 to 1M                  |                                   |                                                                                                                          |          |
|                            |           |                 | 05 (J)    | 0.05                                            | 1.40                                            | Consult factory           |                                   |                                                                                                                          |          |

### Notes

<sup>(1)</sup> K =  $\pm 100$  ppm/ $^{\circ}\text{C}$ ; M =  $\pm 300$  ppm/ $^{\circ}\text{C}$

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

## GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: M8340101M2201GBD04 (preferred part numbering format)

|           |                            |                            |                                                                                                    |                                     |                            |                                                                    |   |   |   |   |   |   |   |   |   |   |   |
|-----------|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------|--------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|
| M         | 8                          | 3                          | 4                                                                                                  | 0                                   | 1                          | 0                                                                  | 1 | M | 2 | 2 | 0 | 1 | G | B | D | 0 | 4 |
| MIL STYLE | SPEC SHEET                 | CHARACTERISTIC             | RESISTANCE VALUE                                                                                   | TOLERANCE                           | SCHEMATIC                  | PACKAGING                                                          |   |   |   |   |   |   |   |   |   |   |   |
| M83401    | 01 = 14 pin<br>02 = 16 pin | 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 % | A = Isolated<br>B = Bussed | D04 = Tin/lead, tube<br>DSL = Tin/lead, tube, single lot date code |   |   |   |   |   |   |   |   |   |   |   |

Historical Part Number Example: M8340101M2201GB (will continue to be accepted)

|           |            |                |                  |           |           |           |
|-----------|------------|----------------|------------------|-----------|-----------|-----------|
| M83401    | 01         | M              | 2201             | G         | B         | D04       |
| MIL STYLE | SPEC SHEET | CHARACTERISTIC | RESISTANCE VALUE | TOLERANCE | SCHEMATIC | PACKAGING |

New Global Part Numbering: M8340102KA001GJD04 (preferred part numbering format)

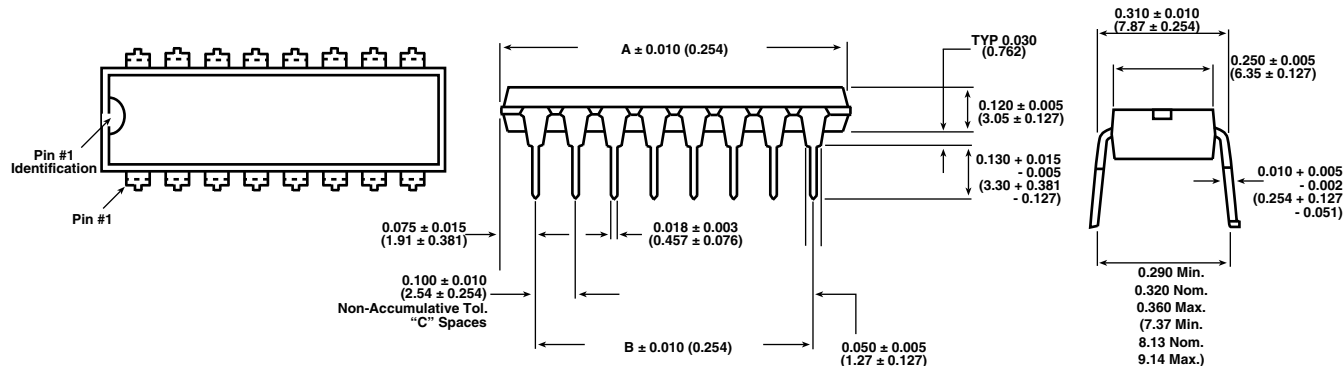
|           |                            |                            |                                                          |                                     |                        |                                                                       |   |   |   |   |   |   |   |   |   |   |   |
|-----------|----------------------------|----------------------------|----------------------------------------------------------|-------------------------------------|------------------------|-----------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|
| M         | 8                          | 3                          | 4                                                        | 0                                   | 1                      | 0                                                                     | 2 | K | A | 0 | 0 | 1 | G | J | D | 0 | 4 |
| MIL STYLE | SPEC SHEET                 | CHARACTERISTIC             | RESISTANCE VALUE                                         | TOLERANCE                           | SCHEMATIC              | PACKAGING                                                             |   |   |   |   |   |   |   |   |   |   |   |
| M83401    | 01 = 14 pin<br>02 = 16 pin | K = 100 ppm<br>M = 300 ppm | Per Std.<br>MIL. Spec.<br>(see Impedance<br>Codes table) | F = ± 1 %<br>G = ± 2 %<br>J = ± 5 % | J = Dual<br>terminator | D04 = Tin/lead, tube<br>DSL = Tin/lead, tube,<br>single lot date code |   |   |   |   |   |   |   |   |   |   |   |

Historical Part Number Example: M8340102KA001GJ (will continue to be accepted)

|           |            |                |                  |           |           |           |
|-----------|------------|----------------|------------------|-----------|-----------|-----------|
| M83401    | 02         | K              | A001             | G         | J         | D04       |
| MIL STYLE | SPEC SHEET | CHARACTERISTIC | RESISTANCE VALUE | TOLERANCE | 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)

| VISHAY DALE MODEL | A             | B             | C |
|-------------------|---------------|---------------|---|
| MDM14             | 0.750 (19.05) | 0.600 (15.24) | 6 |
| MDM16             | 0.850 (21.59) | 0.700 (17.78) | 7 |

**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                | A010 | 330                | 470                |
| A002 | 120                | 200                | A011 | 330                | 680                |
| A003 | 130                | 210                | A012 | 1.5K               | 3.3K               |
| A004 | 160                | 260                | A013 | 3K                 | 6.2K               |
| A005 | 180                | 240                | A014 | 180                | 270                |
| A006 | 180                | 390                | A015 | 270                | 270                |
| A007 | 220                | 270                | A016 | 560                | 560                |
| A008 | 220                | 330                | A017 | 560                | 1.2K               |
| A009 | 330                | 390                | A018 | 620                | 2.7K               |

**TECHNICAL SPECIFICATIONS**

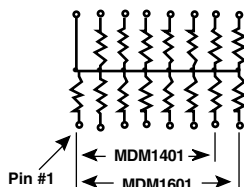
| PARAMETER                         | UNIT             | MDM SERIES  |
|-----------------------------------|------------------|-------------|
| Maximum Operating Voltage         | V <sub>DC</sub>  | 100         |
| Voltage Coefficient of Resistance | V <sub>eff</sub> | < 50 ppm    |
| Dielectric Strength               | V <sub>AC</sub>  | 200 per min |
| Insulation Resistance             | Ω                | 10 000 M    |
| Operating Temperature Range       | °C               | -55 to +125 |
| Storage Temperature Range         | °C               | -55 to +150 |

**MECHANICAL SPECIFICATIONS**

|                                |                                      |
|--------------------------------|--------------------------------------|
| Marking Resistance to Solvents | Permanency testing per MIL-PRF-83401 |
| Solderability                  | Per MIL-PRF-83401                    |
| Body                           | Molded epoxy                         |
| Terminals                      | Copper alloy, hot-solder dipped      |

## CIRCUIT APPLICATIONS

### 01 Schematic



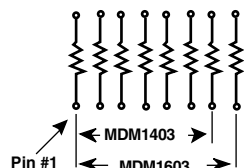
### MDM1401 (M8340101xxxxxB) MDM1601 (M8340102xxxxxB)

13 or 15 resistors with one pin common

The MDMxx01 provides the user with a choice of 13 or 15 nominally equal resistors, each connected to a common pin. Commonly used in the following applications:

- MOS/ROM Pull-up/Pull-down
- Open Collector Pull-up
- "Wired OR" Pull-up
- Power Driven Pull-up
- TTL Input Pull-down
- Digital Pulse Squaring
- TTL Unused Gate Pull-up
- High Speed Parallel Pull-up

### 03 Schematic



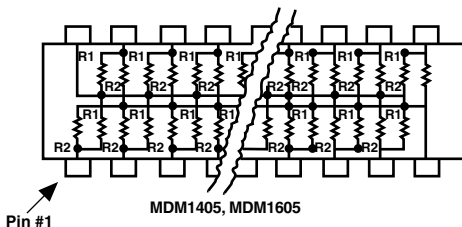
### MDM1403 (M8340101xxxxxA) MDM1603 (M8340102xxxxxA)

7 or 8 isolated resistors

The MDMxx03 provides the user with a choice of 7 or 8 nominally equal resistors, with each resistor isolated from all others. Commonly used in the following applications:

- "Wired OR" Pull-up
- Power Driven Pull-up
- Power Gate Pull-up
- Line Termination
- Long-line Impedance Balancing
- LED Current Limiting
- ECL Output Pull-down
- TTL Input Pull-down

### 05 Schematic



### MDM1405 (M8340101xxxxxJ) MDM1605 (M8340102xxxxxJ)

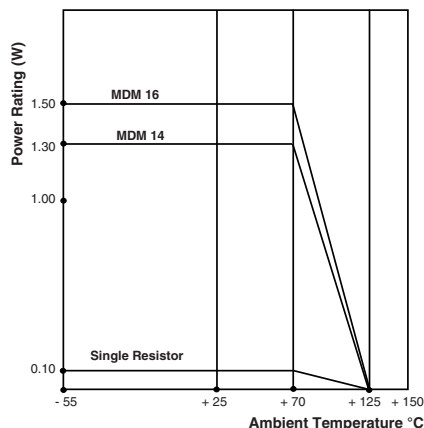
12 or 14 resistor pairs

The MDMxx05 provides the user with a choice of 12 or 14 pairs of R1/R2 resistor values for pulse squaring and TTL dual-line terminating requirements.

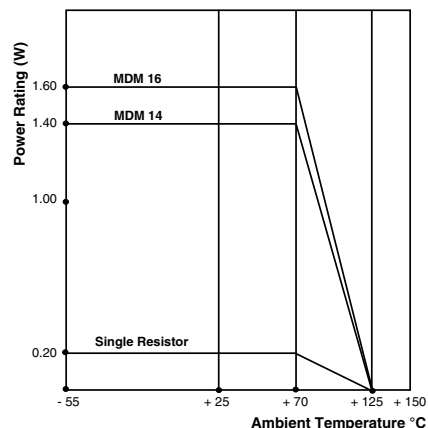
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## DERATING

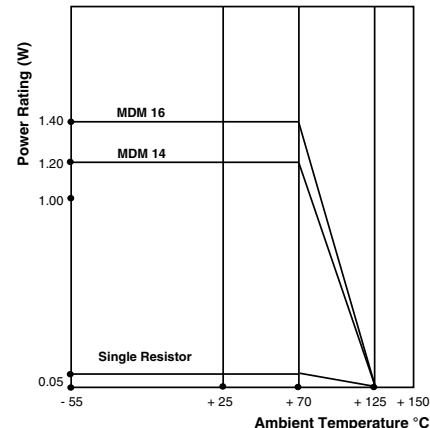
### 01 Schematic



### 03 Schematic



### 05 Schematic





| <b>PERFORMANCE</b>              |                                                                                                            |                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| <b>TEST</b>                     | <b>CONDITIONS</b>                                                                                          | <b>MAX. <math>\Delta R</math><br/>(TYPICAL TEST LOTS)</b>              |
| Power Conditioning              | 1.5 x rated power, applied 1.5 h "ON" and 0.5 h "OFF"<br>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 % $\Delta R$ (Char. K)<br>$\pm$ 0.50 % $\Delta R$ (Char. M) |
| Low Temperature Operation       | 45 min at full rated working voltage at -65 °C                                                             | $\pm$ 0.25 % $\Delta R$ (Char. K)<br>$\pm$ 0.50 % $\Delta R$ (Char. 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 1.5 h "ON",<br>0.5 h "OFF" for full 1000 h period                    | $\pm$ 0.50 % $\Delta R$ (Char. K)<br>$\pm$ 2.00 % $\Delta R$ (Char. M) |
| Terminal Strength               | 4.5 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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