

# Thick Film Resistor Networks, Dual-In-Line, Molded DIP



## FEATURES

- Isolated, bussed, and dual terminator schematics available
- 0.160" (4.06 mm) maximum seated height and rugged, molded case construction
- Thick film resistive elements
- Low temperature coefficient (-55 °C to +125 °C)  $\pm 100$  ppm/°C
- Reduces total assembly costs
- Compatible with automatic inserting equipment
- Wide resistance range (10  $\Omega$  to 2.2 M $\Omega$ )
- Uniform performance characteristics
- Available in tube pack
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS\***  
Available

## 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.

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL/ NO. OF PINS | SCHEMATIC | POWER RATING ELEMENT <sup>(1)</sup><br>P <sub>70 °C</sub><br>W | RESISTANCE RANGE<br>$\Omega$ | TOLERANCE <sup>(3)</sup><br>$\pm$ % | TEMPERATURE COEFFICIENT<br>(-55 °C to +125 °C)<br>$\pm$ ppm/°C | TCR TRACKING <sup>(2)</sup><br>(-55 °C to +125 °C)<br>$\pm$ ppm/°C | WEIGHT<br>g |
|---------------------------|-----------|----------------------------------------------------------------|------------------------------|-------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------|-------------|
| MDP 14                    | 01        | 0.125                                                          | 10 to 2.2M                   | 1, 2, 5                             | 100                                                            | 50                                                                 | 1.3         |
|                           | 03        | 0.250                                                          | 10 to 2.2M                   |                                     |                                                                | 50                                                                 |             |
|                           | 05        | 0.125                                                          | Consult factory              |                                     |                                                                | 100                                                                |             |
| MDP 16                    | 01        | 0.125                                                          | 10 to 2.2M                   | 1, 2, 5                             | 100                                                            | 50                                                                 | 1.5         |
|                           | 03        | 0.250                                                          | 10 to 2.2M                   |                                     |                                                                | 50                                                                 |             |
|                           | 05        | 0.125                                                          | Consult factory              |                                     |                                                                | 100                                                                |             |

## Notes

(1) For resistor power ratings at +25 °C see derating curves

(2) Tighter tracking available

(3)  $\pm 2$  % standard,  $\pm 1$  %, and  $\pm 5$  % available

## GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: MDP1403100RGD04 (preferred part numbering format)

|              |   |                            |   |                                              |   |                                                                                                 |   |   |   |                                                                      |   |                                                    |   |   |                                                                                |  |  |
|--------------|---|----------------------------|---|----------------------------------------------|---|-------------------------------------------------------------------------------------------------|---|---|---|----------------------------------------------------------------------|---|----------------------------------------------------|---|---|--------------------------------------------------------------------------------|--|--|
| M            | D | P                          | 1 | 4                                            | 0 | 3                                                                                               | 1 | 0 | 0 | R                                                                    | G | D                                                  | 0 | 4 |                                                                                |  |  |
| GLOBAL MODEL |   | PIN COUNT                  |   | SCHEMATIC                                    |   | RESISTANCE VALUE                                                                                |   |   |   | TOLERANCE CODE                                                       |   | PACKAGING                                          |   |   | SPECIAL                                                                        |  |  |
| MDP          |   | 14 = 14 pin<br>16 = 16 pin |   | 01 = Bussed<br>03 = Isolated<br>00 = Special |   | R = Ω<br>K = kΩ<br>M = MΩ<br>10R0 = 10 Ω<br>680K = 680 kΩ<br>1M00 = 1.0 MΩ<br>0000 = 0 Ω Jumper |   |   |   | F = ± 1 %<br>G = ± 2 %<br>J = ± 5 %<br>S = Special<br>Z = 0 Ω Jumper |   | E04 = Lead (Pb)-free, tube<br>D04 = Tin/lead, tube |   |   | Blank = Standard (Dash Number) (up to 3 digits)<br>From 1 to 999 as applicable |  |  |

Historical Part Number Example: MDP1403101G (will continue to be accepted)

|                  |           |           |                  |                |           |
|------------------|-----------|-----------|------------------|----------------|-----------|
| MDP              | 14        | 03        | 101              | G              | D04       |
| HISTORICAL MODEL | PIN COUNT | SCHEMATIC | RESISTANCE VALUE | TOLERANCE CODE | PACKAGING |

New Global Part Numbering: MDP1405121CGD04 (preferred part numbering format)

|                 |                            |   |                         |   |                                                                                         |   |   |                                     |   |                                                    |   |   |                                                                                         |   |  |  |  |
|-----------------|----------------------------|---|-------------------------|---|-----------------------------------------------------------------------------------------|---|---|-------------------------------------|---|----------------------------------------------------|---|---|-----------------------------------------------------------------------------------------|---|--|--|--|
| M               | D                          | P | 1                       | 4 | 0                                                                                       | 5 | 1 | 2                                   | 1 | C                                                  | G | D | 0                                                                                       | 4 |  |  |  |
| GLOBAL<br>MODEL | PIN COUNT                  |   | SCHEMATIC               |   | RESISTANCE<br>VALUE                                                                     |   |   | TOLERANCE<br>CODE                   |   | PACKAGING                                          |   |   | SPECIAL                                                                                 |   |  |  |  |
| MDP             | 14 = 14 pin<br>16 = 16 pin |   | 05 = Dual<br>terminator |   | 3 digit impedance code,<br>followed by alpha<br>modifier (see Impedance<br>Codes table) |   |   | F = ± 1 %<br>G = ± 2 %<br>J = ± 5 % |   | E04 = Lead (Pb)-free, tube<br>D04 = Tin/lead, tube |   |   | Blank = Standard<br>(Dash Number)<br>(up to 3 digits)<br>From 1 to 999<br>as applicable |   |  |  |  |

Historical Part Number Example: MDP1405221271G (will continue to be accepted)

|                  |           |           |                    |                    |                |           |
|------------------|-----------|-----------|--------------------|--------------------|----------------|-----------|
| MDP              | 14        | 05        | 221                | 271                | G              | D04       |
| HISTORICAL MODEL | PIN COUNT | SCHEMATIC | RESISTANCE VALUE 1 | RESISTANCE VALUE 2 | TOLERANCE CODE | 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)

| GLOBAL MODEL | A             | B             | C |
|--------------|---------------|---------------|---|
| MDP 14       | 0.750 (19.05) | 0.600 (15.24) | 6 |
| MDP 16       | 0.850 (21.59) | 0.700 (17.78) | 7 |

**TECHNICAL SPECIFICATIONS**

| PARAMETER                                | UNIT      | MDP14             | MDP16 |
|------------------------------------------|-----------|-------------------|-------|
| Package Power Rating (Maximum at +70 °C) | W         | 1.73              | 1.92  |
| Voltage Coefficient of Resistance        | $V_{eff}$ | < 50 ppm typical  |       |
| Dielectric Strength                      | $V_{AC}$  | 200               |       |
| Insulation Resistance                    | $\Omega$  | > 10 000M minimum |       |
| Operating Temperature Range              | °C        | -55 to +125       |       |
| Storage Temperature Range                | °C        | -55 to +150       |       |

**MECHANICAL SPECIFICATIONS**

|                                |                                                |
|--------------------------------|------------------------------------------------|
| Marking Resistance to Solvents | Permanency testing per MIL-STD-202, method 215 |
| Solderability                  | Per MIL-STD-202, method 208E                   |
| Body                           | Molded epoxy                                   |
| Terminals                      | Solder plated leads                            |
| Weight                         | 14 pin = 1.3 g; 16 pin = 1.5 g                 |

**IMPEDANCE CODES**

| CODE | $R_1$ ( $\Omega$ ) | $R_2$ ( $\Omega$ ) | CODE | $R_1$ ( $\Omega$ ) | $R_2$ ( $\Omega$ ) |
|------|--------------------|--------------------|------|--------------------|--------------------|
| 500B | 82                 | 130                | 141A | 270                | 270                |
| 750B | 120                | 200                | 181A | 330                | 390                |
| 800C | 130                | 210                | 191A | 330                | 470                |
| 990A | 160                | 260                | 221B | 330                | 680                |
| 101C | 180                | 240                | 281B | 560                | 560                |
| 111C | 180                | 270                | 381B | 560                | 1.2K               |
| 121B | 180                | 390                | 501C | 620                | 2.7K               |
| 121C | 220                | 270                | 102A | 1.5K               | 3.3K               |
| 131A | 220                | 330                | 202B | 3K                 | 6.2K               |

**Note**

- For additional impedance codes, refer to the Dual Terminator Impedance Code Table document ([www.vishay.com/doc?31530](http://www.vishay.com/doc?31530)).

## CIRCUIT APPLICATIONS

### 01 Schematic



13 and 15 resistors with one pin common

The MDPXX01 circuit provides a choice of 13 and 15 nominally equal resistors, each connected between a common pin (14 and 16) and a discrete PC board 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



7 or 8 isolated resistors

The MDPXX03 provides a choice of 7 and 8 nominally equal resistors, each resistor isolated from all others and wired directly across. Commonly used in the following applications:

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

### 05 Schematic



TTL dual-line terminator; pulse squaring

The MDPXX05 circuit contains 12 and 14 series pair of resistors. Each series pair is connected between ground and a common pair. The junction of these resistor pairs is connected to the input terminals. The 05 circuits are designed for TTL dual-line termination and pulse squaring.

### Note

- Standard E24 resistance values stocked. Consult factory.

## DERATING





| PERFORMANCE                     |                                                                                                                          |                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| TEST                            | CONDITIONS                                                                                                               | MAX. $\Delta R$<br>(TYPICAL TEST LOTS) |
| Power Conditioning              | 1.5 rated power, applied 1.5 h "ON" and 0.5 h "OFF" for 100 h<br>$\pm 4$ 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 5 s                                                                                          | $\pm 0.25$ % $\Delta R$                |
| Low Temperature Operation       | 45 min at full rated working voltage at -65 °C                                                                           | $\pm 0.25$ % $\Delta R$                |
| 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 +350 °C solder to within 1/16" of device body for 3 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. Derated according to the curve. | $\pm 1.00$ % $\Delta R$                |
| 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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