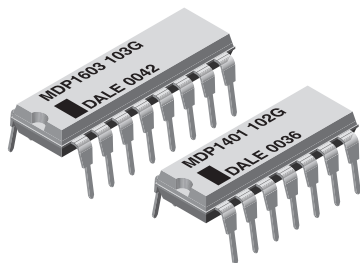


# Thick Film Resistor Networks, Dual-In-Line, Molded DIP



## 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) ± 100 ppm/°C
- Reduces total assembly costs
- Compatible with automatic inserting equipment
- Wide resistance range (10 Ω to 2.2 MΩ)
- Uniform performance characteristics
- Available in tube pack
- Compliant to RoHS directive 2002/95/EC


**RoHS\***  
COMPLIANT

## STANDARD ELECTRICAL SPECIFICATIONS

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

### Notes

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

(2) Tighter tracking available

(3) ± 2 % standard, ± 1 % and ± 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 |   |   | F = ± 1 %<br>G = ± 2 %<br>J = ± 5 %<br>S = Special |   |   | E04 = Lead (Pb)-free, tube<br>D04 = Tin/lead, tube |   |   | Blank = Standard (Dash Number) (Up to 3 digits) From 1 to 999 as applicable |   |   |  |  |  |

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

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

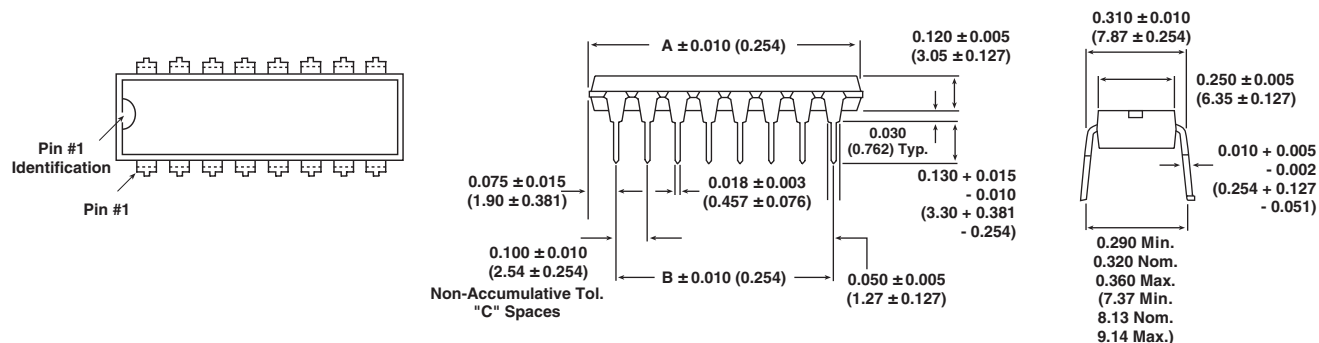
**New Global Part Numbering: MDP1405121CGD04 (preferred part numbering format)**

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

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

|                  |           |           |                    |                    |                |            |
|------------------|-----------|-----------|--------------------|--------------------|----------------|------------|
| <b>MDP</b>       | <b>14</b> | <b>05</b> | <b>221</b>         | <b>271</b>         | <b>G</b>       | <b>D04</b> |
| HISTORICAL MODEL | PIN COUNT | SCHEMATIC | RESISTANCE VALUE 1 | RESISTANCE VALUE 2 | TOLERANCE CODE | PACKAGING  |

\* Pb containing terminations are not RoHS compliant, exemptions may apply

**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**

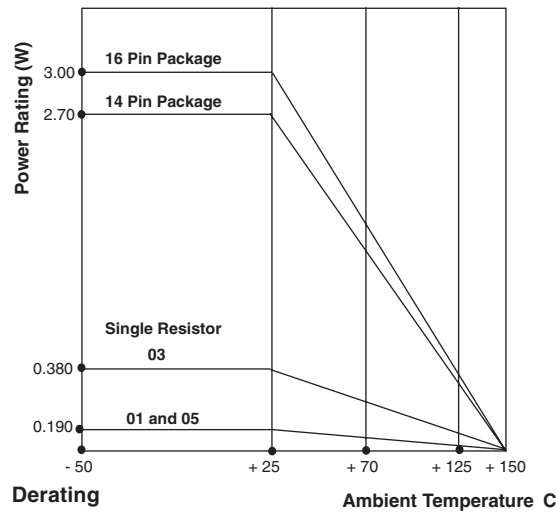
| PARAMETER                                 | UNIT      | MDP14             | MDP16 |
|-------------------------------------------|-----------|-------------------|-------|
| Package Power Rating (Maximum at + 70 °C) | W         | 1.73              | 1.92  |
| Voltage Coefficient of Resistance         | $V_{eff}$ | < 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                 |

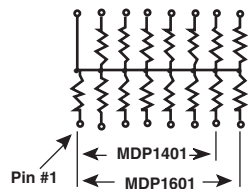
**IMPEDANCE CODES**

| CODE | R1 ( $\Omega$ ) | R2 ( $\Omega$ ) | CODE | R1 ( $\Omega$ ) | R2 ( $\Omega$ ) |
|------|-----------------|-----------------|------|-----------------|-----------------|
| 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            |



## CIRCUIT APPLICATIONS

### 01 SCHEMATIC

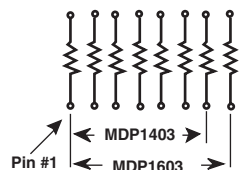


13 and 15 resistors with one pin common

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

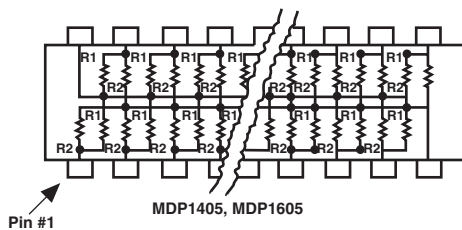


7 and 8 isolated resistors

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 line. 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.

| <b>PERFORMANCE</b>              |                                                                                                                       |                                                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| <b>TEST</b>                     | <b>CONDITIONS</b>                                                                                                     | <b>MAX. <math>\Delta R</math><br/>(TYPICAL TEST LOTS)</b> |
| 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, 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)                                                      | -                                                         |



## 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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**