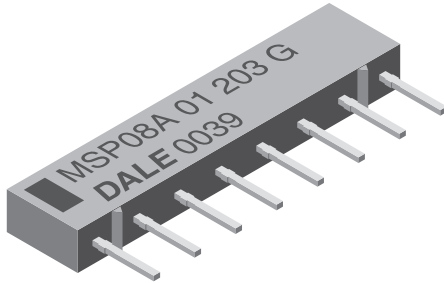


Thick Film Resistor Networks, Single-In-Line, Molded SIP


FEATURES

- Isolated, bussed and dual terminator schematics available
- 0.195" (4.95 mm) "A" or 0.350" (8.89 mm) "C" maximum seated height
- Thick film resistive elements
- Low temperature coefficient (- 55 °C to + 125 °C) ± 100 ppm/°C
- Rugged, molded case construction
- Reduces total assembly costs
- Compatible with automatic insertion equipment and reduces PC board space
- Wide resistance range (10 Ω to 2.2 MΩ)
- Available in tube pack or side-by-side pack
- Compliant to RoHS directive 2002/95/EC


RoHS*
COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL/ SCHEMATIC | PROFILE | POWER RATING ELEMENT $P_{70\text{ }^\circ\text{C}}$ W | RESISTANCE RANGE Ω | TOLERANCE (2) ± % | TEMPERATURE COEFFICIENT (- 55 °C to + 125 °C) ± ppm/°C | TCR TRACKING (1) (- 55 °C to + 125 °C) ± ppm/°C | MAXIMUM WORKING VOLTAGE (3) V _{DC} |
|-------------------------|---------|---|-----------------------|----------------------|--|---|--|
| MSPxxx01 | A C | 0.20 0.25 | 10 to 2.2M | 1, 2, 5 | 100 | 50 | 100 |
| MSPxxx03 | A C | 0.30 0.40 | 10 to 2.2M | 1, 2, 5 | 100 | 50 | 100 |
| MSPxxx05 | A C | 0.20 0.25 | 10 to 2.2M | 1, 2, 5 | 100 | 150 | 100 |

Notes

(1) Tighter tracking available

(2) ± 2 % standard, ± 1 % and ± 5 % available

 (3) Continuous working voltage shall be $\sqrt{P \times R}$ or maximum working voltage, whichever is less

GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: MSP06A031K00GDA (preferred part numbering format)

| | | | | | | | | | | | | | | | | | |
|--------------|---|------------------------------------|--|---|--|--|--|---|---|---|---|---|---|---|--|--|--|
| M | S | P | 0 | 6 | A | 0 | 3 | 1 | K | 0 | 0 | G | D | A | | | |
| GLOBAL MODEL | PIN COUNT | PACKAGE HEIGHT | SCHEMATIC | | RESISTANCE VALUE | TOLERANCE CODE | PACKAGING | SPECIAL | | | | | | | | | |
| MSP | 06 = 6 pin 08 = 8 pin 09 = 9 pin 10 = 10 pin | A = "A" profile C = "C" profile | 01 = Bussed 03 = Isolated 00 = Special | | R = Ω K = kΩ M = MΩ 10R0 = 10 Ω 680K = 680 kΩ 1M00 = 1.0 MΩ | F = ± 1 % G = ± 2 % J = ± 5 % S = Special | EJ = Lead (Pb)-free, tube DA = Tin/lead, tube | Blank = Standard (Dash Number) (Up to 3 digits) From 1 to 999 as applicable | | | | | | | | | |

Historical Part Number example: MSP06A03102G (will continue to be accepted)

| | | | | | | |
|------------------|-----------|----------------|-----------|------------------|----------------|-----------|
| MSP | 06 | A | 03 | 102 | G | D03 |
| HISTORICAL MODEL | PIN COUNT | PACKAGE HEIGHT | SCHEMATIC | RESISTANCE VALUE | TOLERANCE CODE | PACKAGING |

New Global Part Numbering: MSP08C05131AGDA (preferred part numbering format)

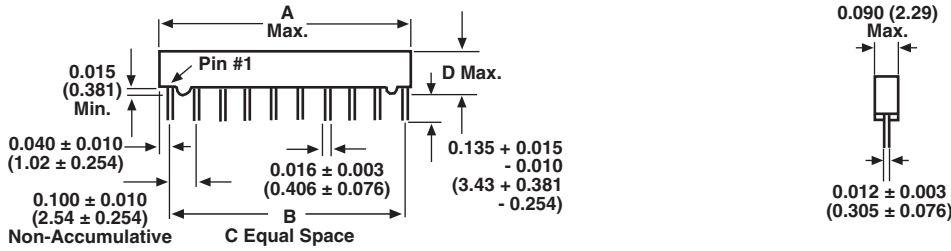
| | | | | | | | | | | | | | | | | | |
|--------------|---|------------------------------------|----------------------|---|--|-------------------------------------|--|---|---|---|---|---|---|---|--|--|--|
| M | S | P | 0 | 8 | C | 0 | 5 | 1 | 3 | 1 | A | G | D | A | | | |
| GLOBAL MODEL | PIN COUNT | PACKAGE HEIGHT | SCHEMATIC | | RESISTANCE VALUE | TOLERANCE CODE | PACKAGING | SPECIAL | | | | | | | | | |
| MSP | 06 = 6 pin 08 = 8 pin 09 = 9 pin 10 = 10 pin | A = "A" profile C = "C" profile | 05 = Dual terminator | | 3 digit impedance code, followed by alpha modifier (see Impedance Codes table) | F = ± 1 % G = ± 2 % J = ± 5 % | EJ = Lead (Pb)-free, tube DA = Tin/lead, tube | Blank = Standard (Dash Number) (Up to 3 digits) From 1 to 999 as applicable | | | | | | | | | |

Historical Part Number example: MSP08C05221331G (will continue to be accepted)

| | | | | | | | |
|------------------|-----------|----------------|-----------|--------------------|--------------------|-----------|-----------|
| MSP | 08 | C | 05 | 221 | 331 | G | D03 |
| HISTORICAL MODEL | PIN COUNT | PACKAGE HEIGHT | SCHEMATIC | RESISTANCE VALUE 1 | RESISTANCE VALUE 2 | TOLERANCE | PACKAGING |

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

DIMENSIONS in inches (millimeters)



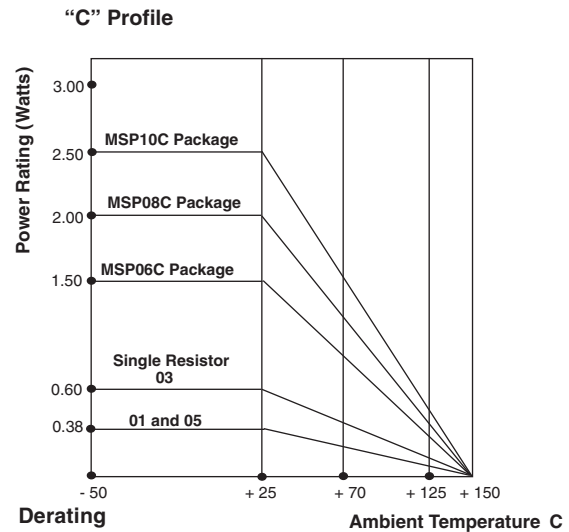
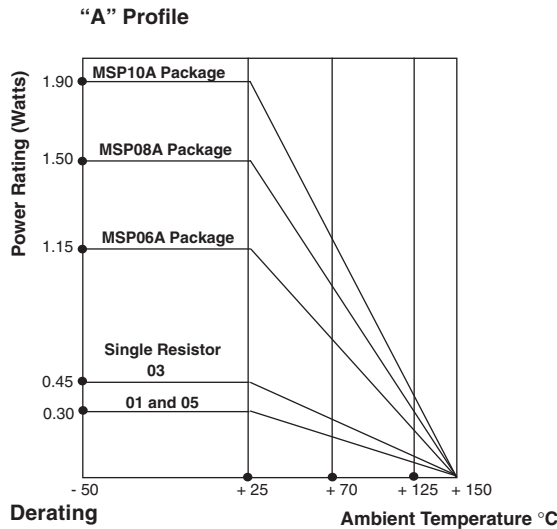
| GLOBAL MODEL | A (Max.) | B | C | D (Max.) |
|--------------|---------------|---------------|---|--|
| MSP06 | 0.590 (14.99) | 0.500 (12.70) | 5 | MSPxxA = 0.195 (4.95) MSPxxC = 0.350 (8.89) |
| MSP08 | 0.790 (20.07) | 0.700 (17.78) | 7 | |
| MSP10 | 0.990 (25.15) | 0.900 (22.86) | 9 | |
| MSP09 | 0.890 (22.61) | 0.800 (20.32) | 8 | |

| TECHNICAL SPECIFICATIONS | | |
|--|-----------|---------------------|
| PARAMETER | UNIT | MSP SERIES |
| Package Power Rating Maximum at + 25 °C and + 70 °C | | See Derating Curves |
| Voltage Coefficient of Resistance | V_{eff} | < 50 ppm typical |
| Dielectric Strength | V_{AC} | 200 |
| Isolation Resistance (03 Schematic) | Ω | > 100 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-STD-202, Method 215 |
| Solderability | Per MIL-STD-202, Method 208E, RMA flux |
| Body | Molded epoxy |
| Terminals | Copper alloy, solder plated |
| Weight | MSP06A = 0.4 g MSP06C = 0.7 g MSP08A = 0.5 g MSP08C = 0.9 g MSP09A = 0.55 g MSP10C = 1.1 g MSP10A = 0.6 g |

| IMPEDANCE CODES | | | | | |
|-----------------|--------------------|--------------------|------|--------------------|--------------------|
| CODE | R ₁ (Ω) | R ₂ (Ω) | CODE | R ₁ (Ω) | R ₂ (Ω) |
| 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 | |
|----------------------------|--|
| <p>01 Schematic</p> | <p>5, 7, 8⁽¹⁾ or 9 resistors with one pin common</p> <p>The MSPxxx01 circuit contains 5, 7, 8⁽¹⁾ or 9 nominally equal resistors, each connected between a common pin (pin no. 1) and a discrete PC board pin. Commonly used in the following applications:</p> <ul style="list-style-type: none"> • "Wired OR" Pull-up • Power Gate Pull-up • TTL Input Pull-down • MOS/ROM Pull-up/Pull-down • Open Collector Pull-up • TTL Unused Gate Pull-up <p>Note ⁽¹⁾ Available in "A" Profile only</p> <p>Standard E-24 resistance values stocked. Consult factory.</p> |
| <p>03 Schematic</p> | <p>3, 4 or 5 isolated resistors</p> <p>The MSPxxx03 circuit contains 3, 4 or 5 resistors of nominally equal value in a compact package. Each resistor is connected to two discrete PC pins.</p> <p>Standard E-24 resistance values stocked. Consult factory.</p> |
| <p>05 Schematic</p> | <p>Pulse squaring and TTL dual-line terminators</p> <p>The MSPxxx05 circuits contain 4, 6, 7⁽²⁾ or 8 series pair of resistors. Each series pair is connected between two common lines. The junction of these resistor pairs is connected to the input terminals.</p> <p>The 05 circuits are designed for TTL dual-line termination and pulse squaring.</p> <p>Note ⁽²⁾ Available in "A" Profile only</p> <p>Many dual terminator resistance values stocked. Consult factory.</p> |



| “A” PROFILE + 70 °C PACKAGE RATINGS | |
|--|--------|
| MSP10A | 1.25 W |
| MSP09A | 1.12 W |
| MSP08A | 1.00 W |
| MSP06A | 0.75 W |

| “C” PROFILE + 70 °C PACKAGE RATINGS | |
|--|--------|
| MSP10C | 1.60 W |
| MSP08C | 1.30 W |
| MSP06C | 1.00 W |

Note
 • Higher power ratings available. Contact factory.

| PERFORMANCE | | |
|---------------------------------|--|-----------------------------|
| TEST | CONDITIONS | MAX. ΔR (TYPICAL TEST LOTS) |
| Power Conditioning | 1.5 x rated power, applied 1.5 h “ON” and 0.5 h “OFF” for 100 h ± 4 h at + 25 °C ambient temperature | ± 0.50 % ΔR |
| Thermal Shock | 5 cycles between - 65 °C and + 125 °C | ± 0.50 % ΔR |
| Short Time Overload | 2.5 x rated working voltage 5 s | ± 0.25 % ΔR |
| Low Temperature Operation | 45 min at full rated working voltage at - 65 °C | ± 0.25 % ΔR |
| Moisture Resistance | 240 h with humidity ranging from 80 % RH to 98 % RH | ± 0.50 % ΔR |
| Resistance to Soldering Heat | Leads immersed in + 260 °C solder to within 1/16” of device body for 10 s | ± 0.25 % ΔR |
| Shock | Total of 18 shocks at 100 g's | ± 0.25 % ΔR |
| Vibration | 12 h at maximum of 20 g's between 10 Hz and 2000 Hz | ± 0.25 % ΔR |
| 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. | ± 1.00 % ΔR |
| Terminal Strength | 4.5 pound pull for 30 s | ± 0.25 % ΔR |
| Insulation Resistance | 10 000 MΩ (minimum) | - |
| Dielectric Withstanding Voltage | - | - |



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