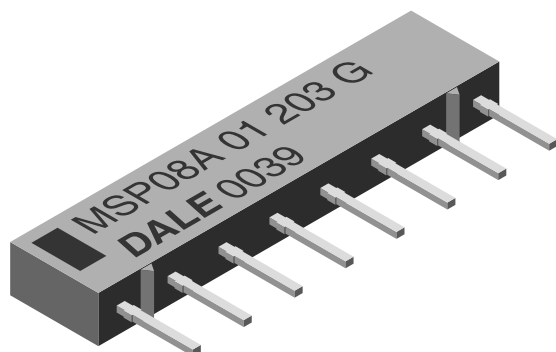


# Thick Film Resistor Networks, Single-In-Line, Molded SIP



## 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)  $\pm 100$  ppm/°C
- Rugged, molded case construction
- Reduces total assembly costs
- Compatible with automatic insertion equipment and reduces PC board space
- Wide resistance range (10  $\Omega$  to 2.2 M $\Omega$ )
- Available in tube pack
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



Available


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

## Notes

(1) Tighter tracking available

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

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 = $\Omega$ K = k $\Omega$ M = M $\Omega$ 10R0 = 10 $\Omega$ 3302 = 33 k $\Omega$ 1004 = 1 M $\Omega$ 0000 = 0 $\Omega$ Jumper	F = $\pm 1$ % G = $\pm 2$ % J = $\pm 5$ % S = Special Z = 0 $\Omega$ Jumper	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)

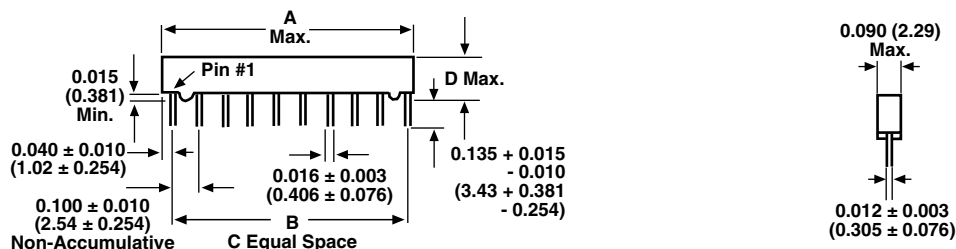
GLOBAL MODEL	PIN COUNT	PACKAGE HEIGHT	SCHEMATIC	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING	SPECIAL
MSP	06 = 6 pin 08 = 8 pin 09 = 9 pin 10 = 10 pin	A = "A" profile C = "C" profile	05 = Dual terminator	3 digit impedance code, followed by alpha modifier (see Impedance Codes table)	F = $\pm 1$ % G = $\pm 2$ % J = $\pm 5$ %	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 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 (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	0.195 (4.95) only

**TECHNICAL SPECIFICATIONS**

PARAMETER	UNIT	MSP SERIES
Package Power Rating Maximum at +25 °C and +70 °C		See Derating Curves
Voltage Coefficient of Resistance	V <sub>eff</sub>	< 50 ppm typical
Dielectric Strength	V <sub>AC</sub>	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**

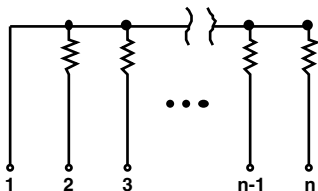
CODE	R <sub>1</sub> (Ω)	R <sub>2</sub> (Ω)	CODE	R <sub>1</sub> (Ω)	R <sub>2</sub> (Ω)
500B	82	130	141A	270	270
750B	120	200	181A	330	390
800C	130	210	191A	330	470
990A	160	260	221B	330	680
101C	180	240	281B	560	560
111C	180	270	381B	560	1.2K
121B	180	390	501C	620	2.7K
121C	220	270	102A	1.5K	3.3K
131A	220	330	202B	3K	6.2K

**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



5, 7, 8 <sup>(1)</sup>, or 9 resistors with one pin common

The MSPxxx01 circuit contains 5, 7, 8 <sup>(1)</sup>, 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:

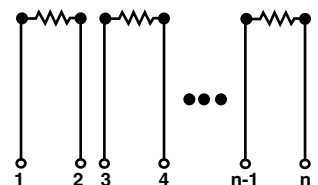
- “Wired OR” Pull-up
- Power Gate Pull-up
- TTL Input Pull-down
- MOS/ROM Pull-up/Pull-down
- Open Collector Pull-up
- TTL Unused Gate Pull-up

#### Note

<sup>(1)</sup> Available in “A” Profile only

Standard E-24 resistance values stocked. Consult factory.

### 03 Schematic

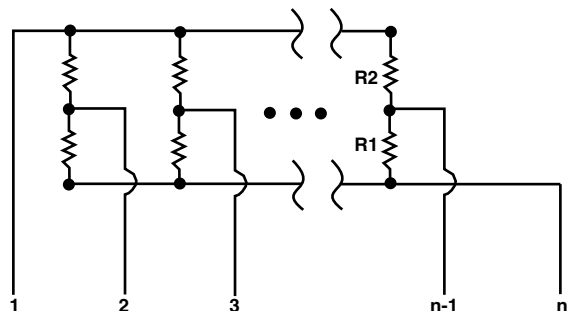


3, 4 or 5 isolated resistors

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.

Standard E-24 resistance values stocked. Consult factory.

### 05 Schematic



Pulse squaring and TTL dual-line terminators

The MSPxxx05 circuits contain 4, 6, 7 <sup>(2)</sup>, 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.

The 05 circuits are designed for TTL dual-line termination and pulse squaring.

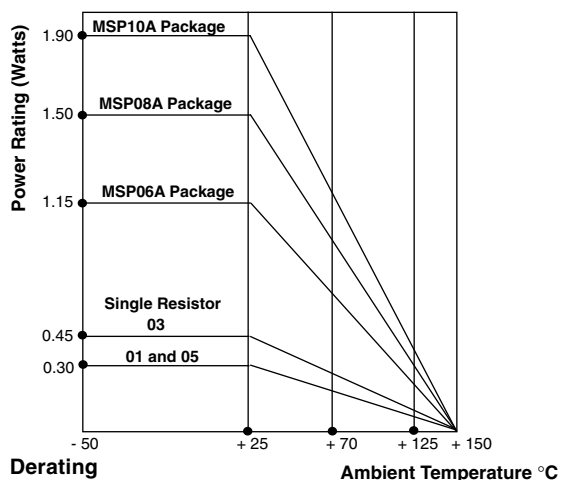
#### Note

<sup>(2)</sup> Available in “A” Profile only

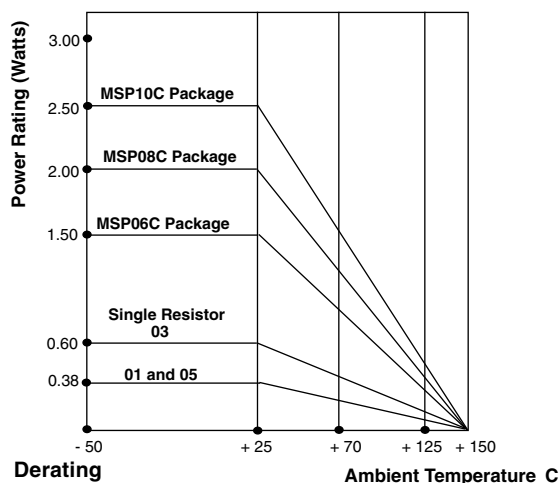
Many dual terminator resistance values stocked. Consult factory.

## DERATING

### “A” Profile



### “C” Profile



**"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. $\Delta R$ (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 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 +260 °C solder to within 1/16" of device 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", 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	-	-



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