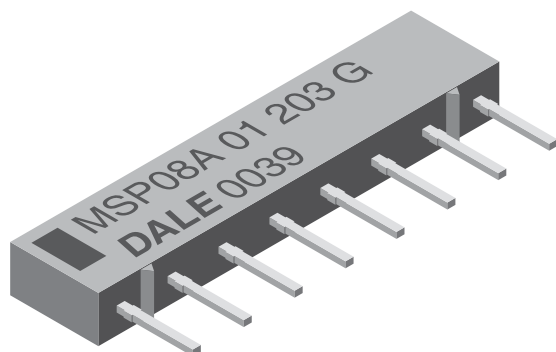


Thick Film Resistor Networks, Single-In-Line, Molded SIP



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 M Ω)
- Available in tube pack
- Material categorization: For definitions of compliance please see 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/SCHEMATIC	PROFILE	POWER RATING ELEMENT $P_{70^\circ\text{C}}$ W	RESISTANCE RANGE Ω	TOLERANCE $\pm \%$	TEMPERATURE COEFFICIENT (-55 °C to +125 °C) $\pm$ ppm/°C	TCR TRACKING ⁽¹⁾ (-55 °C to +125 °C) $\pm$ ppm/°C	MAXIMUM WORKING VOLTAGE ⁽³⁾ V _{DC}
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 = Ω K = k Ω M = M Ω 10R0 = 10 Ω 33K0 = 33 k Ω 1M00 = 1 M Ω 0000 = 0 Ω Jumper	F = $\pm 1 \%$ G = $\pm 2 \%$ J = $\pm 5 \%$ S = Special Z = 0 Ω 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)

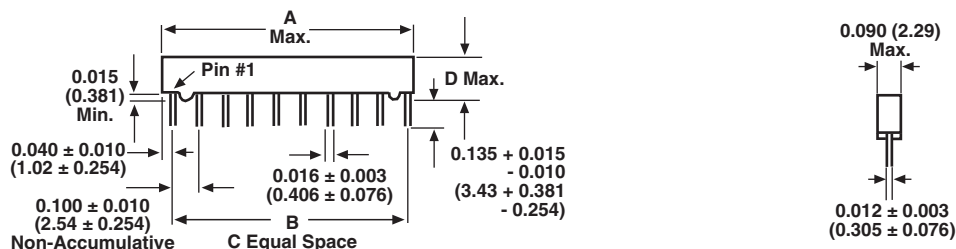
GLOBAL MODEL	PIN COUNT	PACKAGE HEIGHT	SCHEMATIC	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING	SPECIAL
MSP	06 = 6 pin 08 = 8 pin 09 = 9 pin 10 = 10 pin	A = "A" profile C = "C" profile	05 = Dual terminator	3 digit impedance code, followed by alpha modifier (see Impedance Codes table)	F = $\pm 1 \%$ G = $\pm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

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 _{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

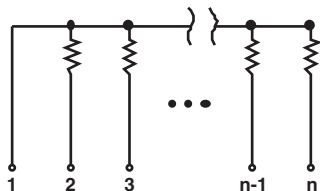
Marking Resistance to Solvents	Permanency testing per MIL-STD-202, Method 215
Solderability	Per MIL-STD-202, Method 208E, RMA flux
Body	Molded epoxy
Terminals	Copper alloy, solder plated
Weight	MSP06A = 0.4 g MSP06C = 0.7 g MSP08A = 0.5 g MSP08C = 0.9 g MSP09A = 0.55 g MSP10C = 1.1 g MSP10A = 0.6 g

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

Note

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

CIRCUIT APPLICATIONS
01 Schematic


5, 7, 8 ⁽¹⁾, or 9 resistors with one pin common

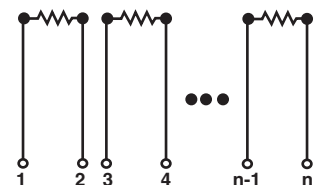
The MSPxxx01 circuit contains 5, 7, 8 ⁽¹⁾, or 9 nominally equal resistors, each connected between a common pin (pin no. 1) and a discrete PC board pin. Commonly used in the following applications:

- “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

⁽¹⁾ Available in “A” Profile only

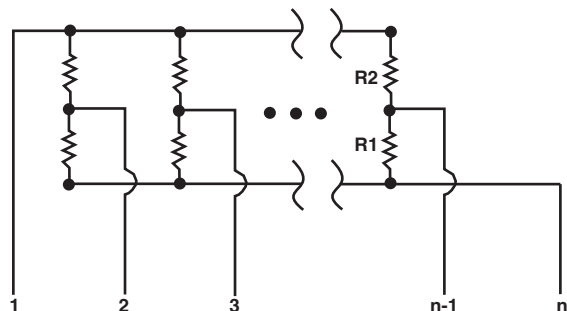
Standard E-24 resistance values stocked. Consult factory.

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

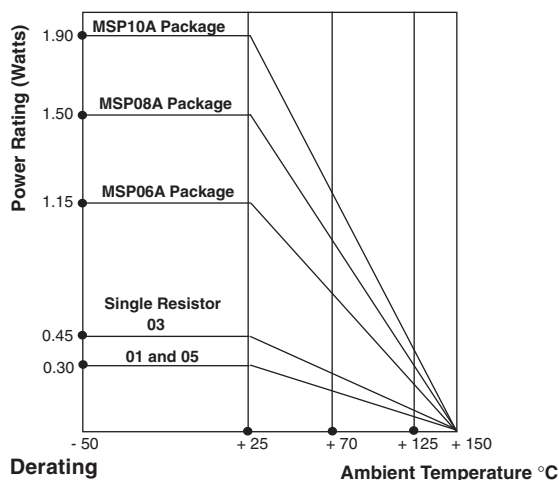
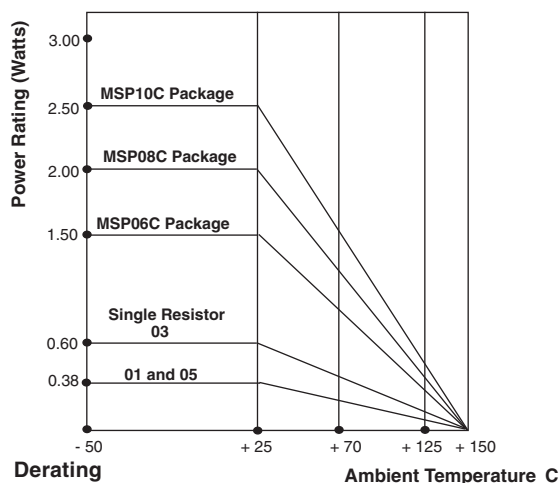
The MSPxxx05 circuits contain 4, 6, 7 ⁽²⁾, or 8 series pair of resistors. Each series pair is connected between two common lines. The junction of these resistor pairs is connected to the input terminals.

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

Note

⁽²⁾ 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. ΔR (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 % ΔR
Thermal Shock	5 cycles between -65 °C and +125 °C	$\pm$ 0.50 % ΔR
Short Time Overload	2.5 x rated working voltage 5 s	$\pm$ 0.25 % ΔR
Low Temperature Operation	45 min at full rated working voltage at -65 °C	$\pm$ 0.25 % ΔR
Moisture Resistance	240 h with humidity ranging from 80 % RH to 98 % RH	$\pm$ 0.50 % ΔR
Resistance to Soldering Heat	Leads immersed in +260 °C solder to within 1/16" of device body for 10 s	$\pm$ 0.25 % ΔR
Shock	Total of 18 shocks at 100 g's	$\pm$ 0.25 % ΔR
Vibration	12 h at maximum of 20 g's between 10 Hz and 2000 Hz	$\pm$ 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.	$\pm$ 1.00 % ΔR
Terminal Strength	4.5 pound pull for 30 s	$\pm$ 0.25 % ΔR
Insulation Resistance	10 000 M Ω (minimum)	-
Dielectric Withstanding Voltage	-	-



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.