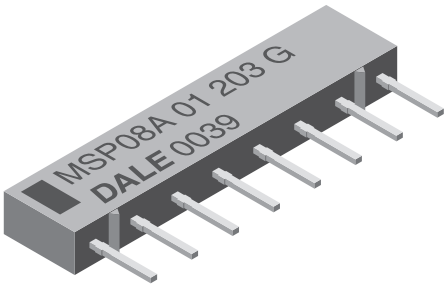
Thick Film Resistor Networks, Single-In-Line, Molded SIP



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

Pb Available

e1 RoHS* COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL/ SCHEMATIC	PROFILE	POWER RATING ELEMENT $P_{70\,°C}$ 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			

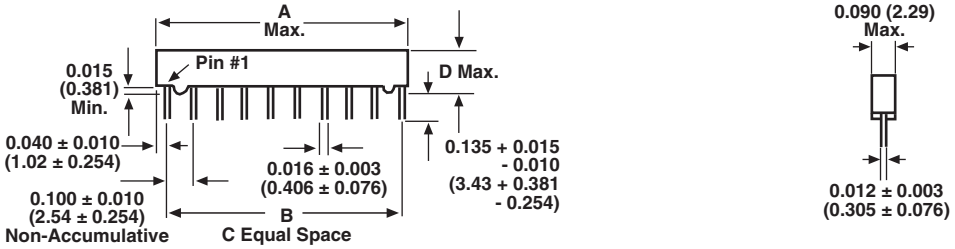
GLOBAL MODEL	PIN COUNT	PACKAGE HEIGHT	SCHEMATIC	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING	SPECIAL
MSP	**06** = 6 pin **08** = 8 pin **09** = 9 pin **10** = 10 pin	**A** = "A" profile **C** = "C" profile	**05** = Dual terminator	3 digit impedance code, followed by alpha modifier (see Impedance Codes table)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

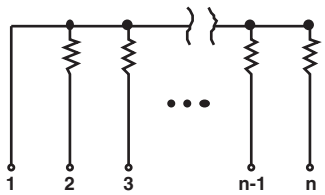
Marking Resistance to Solvents	Permanency testing per MIL-STD-202, Method 215	
Solderability	Per MIL-STD-202, Method 208E, RMA flux	
Body	Molded epoxy	
Terminals	Copper alloy, solder plated	
Weight	MSP06A = 0.4 g MSP08A = 0.5 g MSP09A = 0.55 g MSP10A = 0.6 g	MSP06C = 0.7 g MSP08C = 0.9 g MSP10C = 1.1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

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:

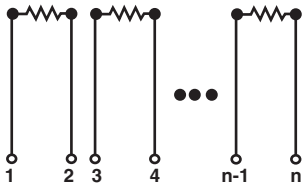
- "Wired OR" Pull-up
- Power Gate Pull-up
- TTL Input Pull-down
- MOS/ROM Pull-up/Pull-down
- Open Collector Pull-up
- TTL Unused Gate Pull-up

Note

[1] Available in "A" Profile only

Standard E-24 resistance values stocked. Consult factory.

03 Schematic

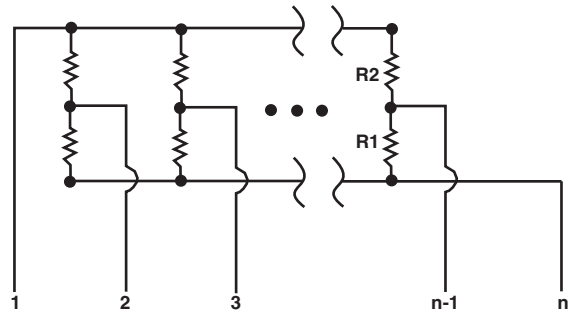


3, 4 or 5 isolated resistors

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.

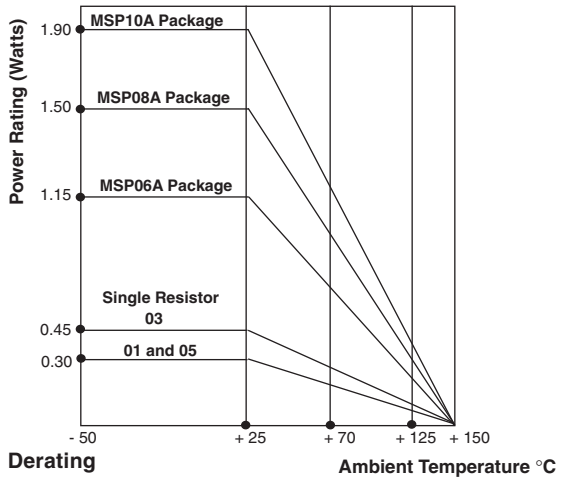
The 05 circuits are designed for TTL dual-line termination and pulse squaring.

Note

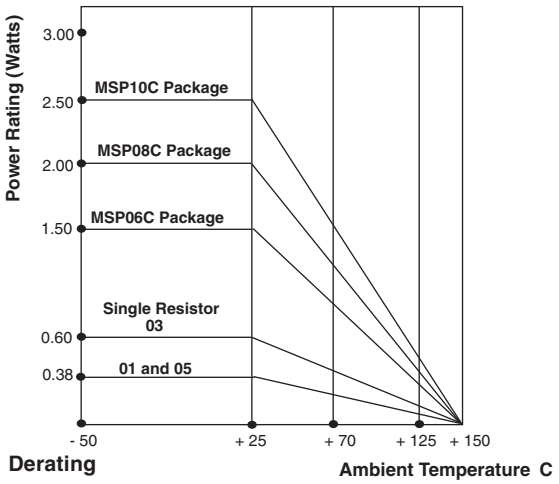
[2] Available in "A" Profile only

Many dual terminator resistance values stocked. Consult factory.

"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 ± 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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