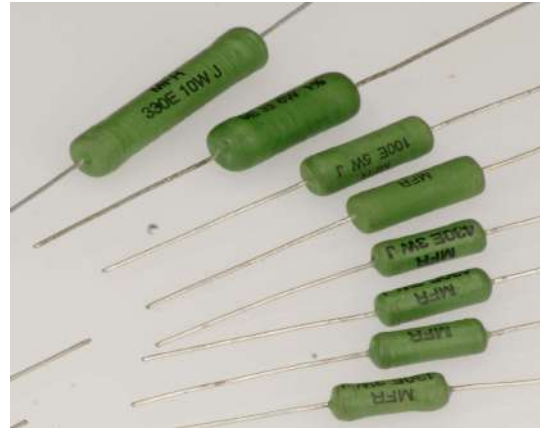


## SILICON COATED AXIAL WIREWOUND RESISTORS

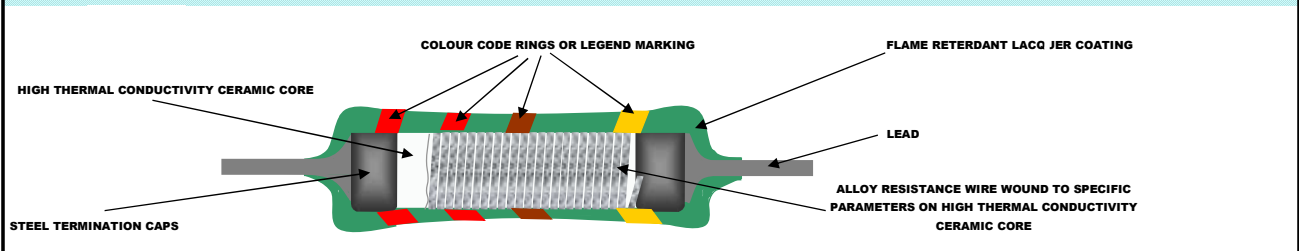
**Series : MSA**

**Features:**

- Flameproof Coating Compatible with UL standards
- **0.5W to 12** Watts rating available
- Industrial & Professional Application
- TCR as low as **+15ppm/°C** available depending on application & resistance value.
- Low Tolerance upto **±0.25%** on request can be provided
- Available in non-inductive style  
Aryton- Perry winding for lowest reactive components
- **RoHS** Compliant directive 2002/95/EC
- Lead (Pb)-free solder contacts.



**Construction :**

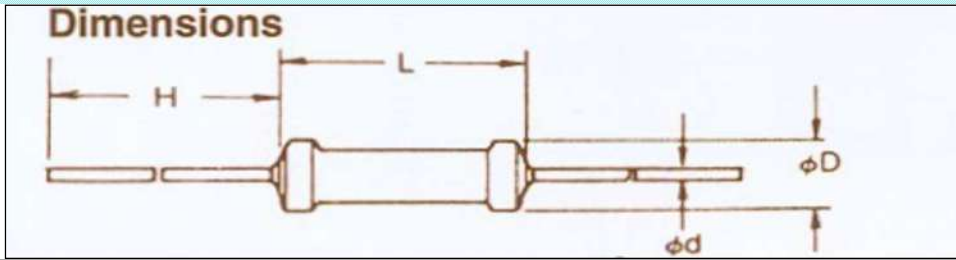


**Technical specification:**

DESCRIPTION	SERIES							
	MSA0.5	MSA1	MSA2	MSA3	MSA5	MSA7	MSA8	MSA10
Resistance range*	0.1Ω ~ 47Ω	0.1Ω ~ 150Ω	0.1Ω ~ 200Ω	0.1Ω ~ 400Ω	0.1Ω ~ 1KΩ	0.1Ω ~ 1KΩ	0.1Ω ~ 2KΩ	0.1Ω ~ 10KΩ
Resistance tolerance	±1% ~ ±5%							
Temperature coefficient	≤ 200 ppm/°C							
Maximum dissipation @ 70°C	0.5W	1W	2W	3W	5W	7W	8W	10W
Maximum permissible voltage	$\sqrt{P \times R}$							
Climatic category	55/155/56							
Stability, R max.								
Load	△ R±(1.5% +0.10Ω)							
Climatic test	△ R±(1.5% +0.10Ω)							
Soldering	△ R±(0.5% +0.05Ω)							
Short time overload	△ R±(2.0% +0.10Ω)							

**\*Note :** Higher ohmic value other than resistance range & Non inductive type are available on request

### Dimensions :



### Physical Data:

#### 1.0 GENERAL SPECIFICATION :

TYPE	WATT. @ 70°C	TOL.	TCR PPM/°C	DIMENSIONS (mm)				RESISTANCE RANGE
				L (± 1.5)	D (± 1.5)	d ± 0.05	H (MIN)	
MSA 0.5	0.5W	±1%, ±5%	≤ ±200	9.5	3.5	0.6	25 min	0.1Ω ~ 47Ω
MSA 1	1W	±1%, ±5%	≤ ±200	12	4.0	0.8	25 min	0.1Ω ~ 150Ω
MSA 2	2W	±1%, ±5%	≤ ±200	16	5.5	0.8	25 min	0.1Ω ~ 200Ω
MSA 3	3W	±1%, ±5%	≤ ±200	18	5.5	0.8	25 min	0.1Ω ~ 400Ω
MSA 5	5W	±1%, ±5%	≤ ±200	22	6.5	0.8	25 min	0.1Ω ~ 1KΩ
MSA 7	7W	±1%, ±5%	≤ ±200	25	8.0	0.8	25 min	0.1Ω ~ 1KΩ
MSA 8	8W	±1%, ±5%	≤ ±200	43	8.0	0.8	25 min	0.1Ω ~ 2KΩ
MSA 10	10W	±1%, ±5%	≤ ±200	53	8.0	0.8	25 min	0.1Ω ~ 10KΩ

**Note :** Working voltage is  $\sqrt{P \times R}$  where P is power & R is resistance in Ohms

### Non Inductive Resistors :

Low inductance Aryton - perry winding type resistors are available in this series. For non- inductive type reduces maximum resistance values shown to 50% and the continuous working voltage to 70%.

### Flammability:

The resistor coating will not burn or emit incandescent particles under any condition of applied temperature or power overload.

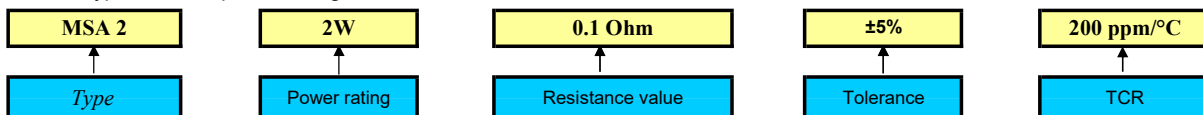
### Marking:

The MSA type the nominal resistance & tolerance are marked on the resistor body using four coloured bands. OR marked using LEGEND marking; for e.g : MFR

0E1 5W J

### Part Numbering Information:

**Part Number :** Type number, power rating, resistance value, tolerance, tcr.



**Examples:** PART NO. : MSA 2, 2W, 0.1 Ohm, ±5%, 200ppm/°C

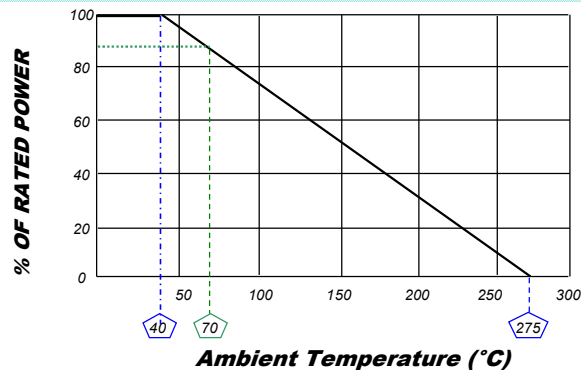
### Packing Information:

MSA Type / series can be supplied in taped & bulk form. As well as some parts can be supplied in reel on request.

### Performance Data (Procedure & Requirements):

TEST	PROCEDURE	REQUIREMENTS
<b>Robustness Of Termination</b> 1. Tensile Test 2. Bend Test 3. Torsion Test	Load 10 N for 10 sec. Load 5 N 90° , 180° , 90° 3 X 360° in opposite directions	No visual damage No visual damage No visual damage $\Delta R/R$ max.: $\pm(0.50\% + 0.05 \Omega)$
<b>Solderability Test</b>	16 hrs steam or 16 hrs. at 155°C 10 sec. $\pm 0.5$ sec. in solder at 260° $\pm 5^\circ\text{C}$ Using flux	>95% coverage covered (good tinning) & no damage
<b>Resistance To Soldering Heat</b>	at 350°C for 3 sec., 2.5mm from the body	$\Delta R/R$ max.: $\pm(0.5\% + 0.05 \Omega)$
<b>Temperature Cycling</b>	30 minutes at -40°C & 30 minutes at 200°C Total 5 number of cycles.	No visual damage $\Delta R/R$ max.: $\pm(1.0\% + 0.05 \Omega)$
<b>Dry Heat Test</b>	16 hrs at 275°C	$\Delta R/R$ max.: $\pm(1.0\% + 0.05 \Omega)$
<b>Cold Test</b>	2 hrs at -55°C	$\Delta R/R$ max.: $\pm(0.50\% + 0.05 \Omega)$
<b>Short Time Overload</b>	5 X Rated power for 5 sec. upto 3W size 10 X Rated power for 5 sec. from 5W size to 10W size	$\Delta R/R$ max.: $\pm(2.0 + 0.05 \Omega)$
<b>Endurance @ 40°C</b>	1000 hrs. load with Pn (power nominal) 1.5 hr. ON & 0.5 hr. OFF	No visual damage $\Delta R/R$ max.: $\pm(5.0\% + 0.1 \Omega)$
<b>Endurance @ 70°C</b>	1000 hrs. load with 0.9Pn (power nominal) 1.5 hr. ON & 0.5 hr. OFF	No visual damage $\Delta R/R$ max.: $\pm(5.0\% + 0.1 \Omega)$
<b>Endurance @ Upper Category Temperature</b>	1000 hrs. at 275°C with no load	No visual damage $\Delta R/R$ max.: $\pm(5.0\% + 0.1 \Omega)$
<b>Temperature Rise Test</b>	Horizontally mounted, loaded with Pn	Hot spot temperature less than maximum body temperature
<b>Damp Heat Steady State</b>	56 days, 40°C; 90 to 95% Rh; dissipation $\leq 0.01Pn$	No visual damage $\Delta R/R$ max.: $\pm(5.0\% + 0.1 \Omega)$
<b>Temperature Coefficient</b>	At 25/-40/25 °C & 25/200/25 °C	Within specified limits
<b>Insulation Resistance</b>	V- Block method for 1 minute duration At 500 V dc	> 10 <sup>3</sup> M $\Omega$

### Derating Curve:



MFR reserves the right to make changes in product specification without notice or liability.

All information is subject to MFR's own data & is considered accurate at the time of going to print.

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