

## Type MRS Series

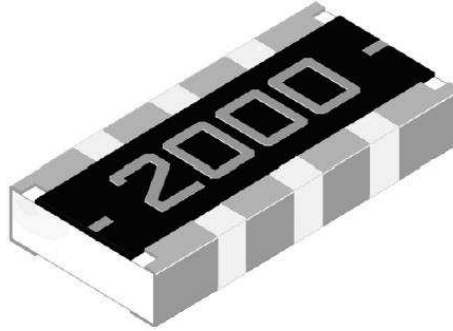
### Key Features

Advanced Thin Film Technology

Tight Tolerance

Low TCR

Tight tolerance matching and TCR tracking



**PRODUCT  
PLANNED  
FOR EOL**

**LTB  
18/08/2023**

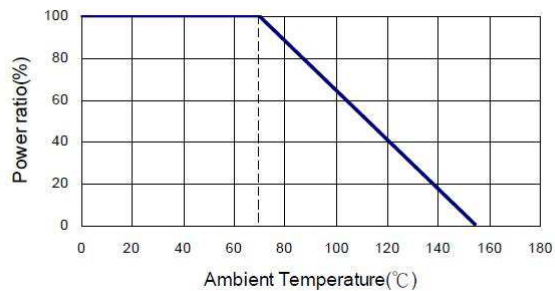
The MRS series is a chip network utilising nickel chrome sputtering on high purity alumina. This network has been designed for high volume applications and is offered with 4 isolated resistors on a single substrate (4 x 0603 resistors) at 0.1% now with flat terminals. A wide value range and alternative TCRs (Temperature Coefficient of Resistance) make this a most versatile resistor solution.

### Characteristics – Electrical

Item	Standard Power		High Power	
Power Rating (W) @ 70°C	0.0625		0.1	
Resistance Range (Ω)	24R9 ~ 60K	24R9 ~ 332K	24R9 ~ 60K	24R9 ~ 332K
Tolerance %	±0.1, ±0.25, ±0.5, ±1		±0.1, ±0.25, ±0.5, ±1	
TCR PPM/°C	±5	±10, ±15, ±25, ±50	±5	±10, ±15, ±25, ±50
Max. Operating Voltage (V)	50		75	
Max. Overload Voltage (V)	100		150	
Operating Temperature	-55 ~ +155°C			

Operating Voltage= $V(P \cdot R)$  or max. operating voltage listed above, whichever is lower  
 Overload Voltage= $2.5 \cdot V(P \cdot R)$  or max. overload voltage listed above, whichever is lower

### Derating



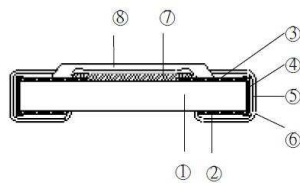
### Environmental Characteristics

Item	Requirement	Test Methods
Temperature Coefficient of Resistance (TCR)	As Spec	<b>MIL-STD-202 Method 304</b> +25/-55/+25/-125/+25°C
Short Time Overload	$\Delta R \pm 0.1$	<b>JIS-C-5201-1 4.13</b> RCWV*2.5 or Max. Overload Voltage, whichever is lower, for 5 seconds
Insulation Resistance	>1000M $\Omega$	<b>MIL-STD-102 Method 302</b> Apply 100Vdc for 1 minute
Endurance	1000Hr: $\Delta R \pm 0.15\%$ 8000Hr: $\Delta R \pm 0.3\%$	<b>MIL-STD-202 Method 108A</b> 70 $\pm 2^\circ\text{C}$ RCWV with 1.5 Hrs "ON" and 0.5 Hrs "OFF"
Damp Heat With Load	$\Delta R \pm 0.25\%$	<b>MIL-STD-202 Method 103B</b> 40 $\pm 2^\circ\text{C}$ , 90-95% RH, RCWV for 1000 Hrs with 1.5 Hrs "ON" and 0.5 Hrs "OFF"
Damp Heat With Load (85°C/85% RH)	$\Delta R \pm 0.5\%$	85 $\pm 2^\circ\text{C}$ , 80 – 90% RH. 10% of RCWV for 1000Hrs with 1.5 Hrs "ON" and 0.5 Hrs "OFF"
Dry Heat	1000Hr: $\Delta R \pm 0.25\%$ 8000Hr: $\Delta R \pm 0.5\%$	At +125°C
Bending Strength	$\Delta R \pm 0.2\%$	<b>JIS-C-5201-1 4.33</b> Bending amplitude 3mm for 10 seconds
Solderability	95% min. coverage	<b>MIL-STD-202 Method 208H</b> 245 $\pm 5^\circ\text{C}$ for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.2\%$	<b>MIL-STD-202 Method 210E</b> 260 $\pm 5^\circ\text{C}$ for 10 seconds
Dielectric Withstand Voltage	100V	MIL-STD-202 Method 301 Max Overload Voltage for 1 minute
Thermal Shock	$\Delta R \pm 0.25\%$	MIL-STD-202 Method 107G -55°C~150°C, 100 cycles
Low Temperature Operation	$\Delta R \pm 0.25\%$	JIS-C-5201-1 4.36 1 hour, -65°C followed by 45 minutes of RCWV

Operating Voltage= $V(P \cdot R)$  or max. operating voltage, whichever is lower

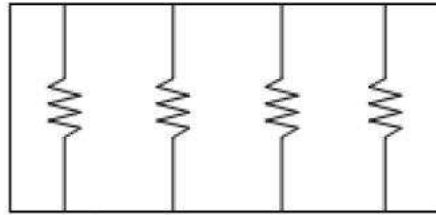
Storage Temperature 15 ~ 28°C; Humidity <80%RH

### Construction

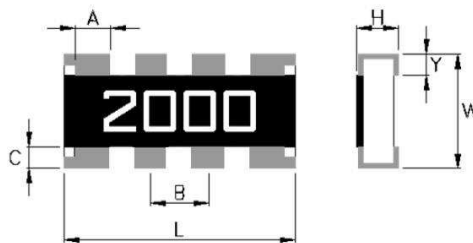


① Alumina Substrate	④ Edge Electrode	⑦ Resistor Layer
② Bottom Electrode	⑤ Barrier Layer	⑧ Overcoat
③ Top Electrode	⑥ External Electrode	

### Equivalent Circuit Diagram

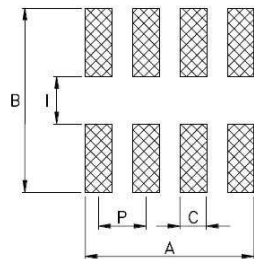


### Dimensions



$L \pm 0.15$	$W \pm 0.15$	$H \pm 0.10$	$A \pm 0.15$	$B \pm 0.05$	$C \pm 0.15$	$Y \pm 0.15$
3.20	1.60	0.55	0.50	0.80	0.30	0.30

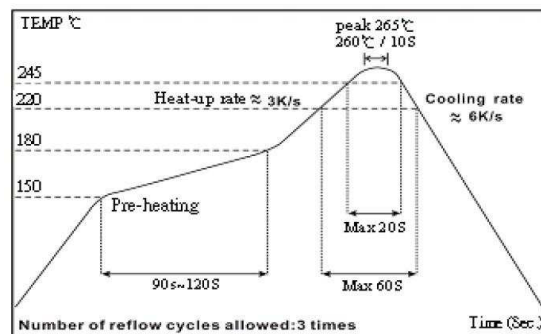
### Recommended PCB Plan



Unit: mm

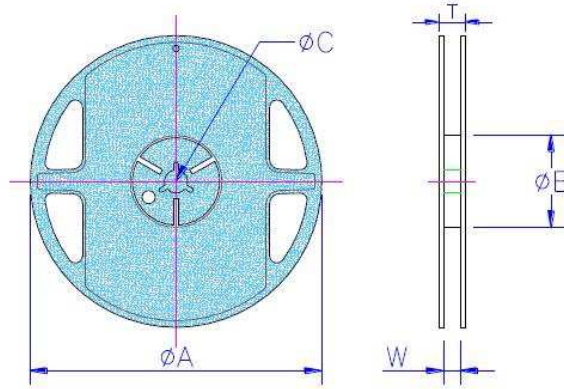
Type	A	B	C	I	P
MRS	3.10	2.85	0.45	0.80	0.80

### Reflow Solder Profile



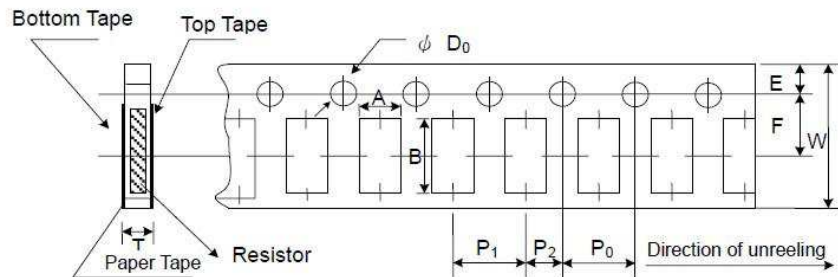
## Packaging

### Reel Specification



Pack / Quantity	Tape Width	Reel Diameter	ØA	ØB	ØC	W ±0.5	T ±0.5
Paper   5K	8mm	7 inch	178.5	60	13.0	9.0	12.5

### Paper Tape Specification



A±0.1	B±0.1	W±0.2	E±0.1	F±0.05	P <sub>0</sub> ±0.1	P <sub>1</sub> ±0.05	P <sub>2</sub> ±0.05	ØD <sub>0</sub> +0.1/-0	T±0.1
1.95	3.50	8.0	1.75	3.5	4.0	4.0	2.0	1.5	0.85

### Marking

4 Digit Marking – 3 significant figures plus number of following zeros.

Example:

Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ	332KΩ
Marking	1000	2201	1002	4992	1003	3323

## Tolerance Matching and TCR Tracking

Accuracy Grade Table						
Tolerance Grade			TCR Grade			
Code	Absolute Tolerance	Tolerance Matching	Code	Absolute TCR	TCR Tracking	Resistance Value
B0	±0.1%	N/A	A0	±5ppm	N/A	24R9 ~ 60K
B3	±0.1%	0.1%	A5	±5ppm	±5ppm	24R9 ~ 60K
C0	±0.25%	N/A	C0	±10ppm	N/A	24R9 ~ 332K
C2	±0.25%	0.25%	C4	±10ppm	±10ppm	24R9 ~ 332K
C3	±0.25%	1%	C5	±10ppm	±5ppm	24R9 ~ 60K
D0	±0.5%	N/A	D0	±15ppm	N/A	24.9 ~ 332K
D1	±0.5%	0.5%	D3	±15ppm	15ppm	24.9 ~ 332K
D2	±0.5%	0.25%	D4	±15ppm	10ppm	24.9 ~ 332K
F0	±1%	N/A	D5	±15ppm	5ppm	24.9~60K
F1	±1%	0.5%	F0	±25ppm	N/A	24.9~332K
F2	±1%	0.25%	F2	±25ppm	25ppm	24.9~332K
			F3	±25ppm	15ppm	24.9K~332K
			F4	±25ppm	10ppm	24.9K~332K
			G0	±50ppm	N/A	24.9~332K
			G1	±50ppm	50ppm	24.9K~332K
			G2	±50ppm	25ppm	24.9K~332K

## How To Order

MRS	10K	B	F		
Common Part	Resistance Value	Absolute Tolerance	Absolute TCR	Tolerance Matching	TCR Tracking
MRS – Standard Power	100R (100Ω)	B - ±0.1%	A - ±5ppm	As Chart above.	As Chart above.
MRSP – High Power	1K0 (1000Ω)	C - ±0.25%	C - ±10ppm	For N/A leave Blank	For N/A leave Blank
	10K (10,000Ω)	D - ±0.5%	D - ±15ppm		
	100K (100,000Ω)	F - ±1%	F - ±25ppm		
			G - ±50ppm		