

High-Precision Low-TCR Alloy Current Sensing Resistors

■ MSRPF 4026 series (4 terminal) AEC-Q200 Compliant

Features

- The MSRPF4026 series is based on precision resistive alloy and welded with vacuum electron beam welding equipment to ensure its characteristics and reliability.
- Precision machining and uniform welding provide a minimum tolerance of $\pm 0.5\%$ without trimming.
- TCR of MSRPF4026 series within the temperature range of $+20^{\circ}\text{C}$ to $+120^{\circ}\text{C}$ is $\leq \pm 75\text{ppm}/^{\circ}\text{C}$ ($1\text{m}\Omega \sim 2\text{m}\Omega$) and $\pm 50\text{ppm}/^{\circ}\text{C}$ ($3\text{m}\Omega \sim 5\text{m}\Omega$).
- The "Trimming-free" technology avoids current loss and is free of hot spots.
- The thermoelectric power is extremely low and thermal fluctuations are minimized.

Lead



free

Halogen



free

RoHS



Compliance

Applications

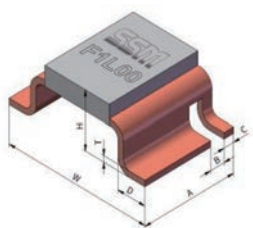
- Automotive Electronic
- Precision Power Supply
- Instrumentation
- Medical Equipment

◆ Electrical Specification

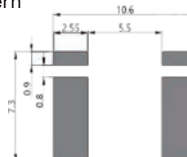
Series	Size inch. (mm)	Resistance Value	Power	Max. Current	Operating Temperature	TCR (20°C/R _{ref})	Torelance	Thermal Resistance	PKG.	
MSRPF	4026 (10166)	1 mΩ	7 W	83 A	-55°C~170°C	±75 ppm/°C	± 0.5 % ±1.0 % ±5.0 %	8.6 °C/W	1,200 pcs.	
		1.3 mΩ	7 W	73 A				10.0 °C/W		
		2 mΩ	6 W	54 A				17.6 °C/W		
		3 mΩ	5 W	40 A		±50 ppm/°C		25.3 °C/W		
		4 mΩ	4 W	31 A				32.1 °C/W		
		5 mΩ	3 W	24 A				39.7 °C/W		

◆ Dimensions

Resistor



Land Pattern



Not following the recommended land pattern design can seriously affect the temperature coefficient measurement results and current sensing accuracy!

Series	Size inch. (mm)	Resistance Value	Unit:mm						
			T	H	W	A	B	C	D
MSRPF	4026 (10166)	1 m Ω	0.4 ± 0.2	3.75 ± 0.5	10.1 ± 0.3	6.6 ± 0.3	1.0 ± 0.3	0.7 ± 0.3	2.0 ± 0.3
		1.3 m Ω	0.4 ± 0.2	3.5 ± 0.5	10.1 ± 0.3	6.6 ± 0.3	1.0 ± 0.3	0.7 ± 0.3	2.0 ± 0.3
		2 m Ω	0.4 ± 0.2	2.98 ± 0.5	10.1 ± 0.3	6.6 ± 0.3	1.0 ± 0.3	0.7 ± 0.3	2.0 ± 0.3
		3 m Ω	0.4 ± 0.2	2.85 ± 0.5	10.1 ± 0.3	6.6 ± 0.3	1.0 ± 0.3	0.7 ± 0.3	2.0 ± 0.3
		4 m Ω	0.4 ± 0.2	2.85 ± 0.5	10.1 ± 0.3	6.6 ± 0.3	1.0 ± 0.3	0.7 ± 0.3	2.0 ± 0.3
		5 m Ω	0.4 ± 0.2	2.85 ± 0.5	10.1 ± 0.3	6.6 ± 0.3	1.0 ± 0.3	0.7 ± 0.3	2.0 ± 0.3

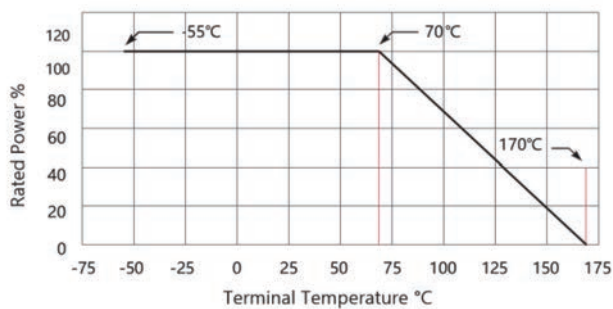
◆ Part Number information

M	S	R	P	F	4	0	2	6	A	-	2	L	0	0	-	F	1	P	2
Series (5 digits)					Size (4 digits)				TCR (1 digits)		Resistance (4 digits)				Tolerance (1 digits)		Quantity (3 digits)		
MSRPF					4026				A: $\pm 75 \text{ ppm}/^{\circ}\text{C}$ Q: $\pm 50 \text{ ppm}/^{\circ}\text{C}$		1L00 = 1 m Ω 1L30 = 1.3 m Ω 2L00 = 2 m Ω 3L00 = 3 m Ω 4L00 = 4 m Ω 5L00 = 5 m Ω				D: $\pm 0.5 \%$ F: $\pm 1 \%$ J: $\pm 5 \%$		1P2 = 1,200 pcs.		

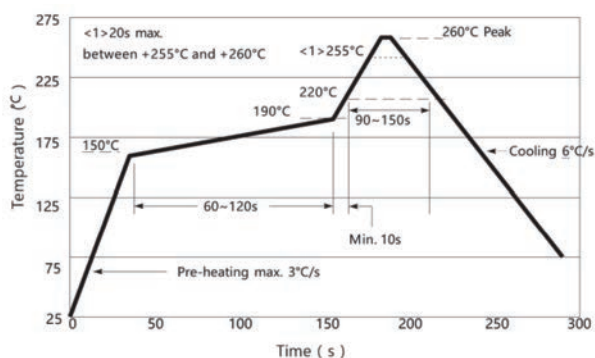
◆ Performance

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+170°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	$\Delta R \leq \pm 0.5\%$	$\Delta R \leq \pm 1.0\%$
Thermal Shock	-55°C, 15min~ambient temperature < 20s~+155°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	$\Delta R \leq \pm 0.2\%$	$\Delta R \leq \pm 0.5\%$
Bias Humidity	+85°C, 85%RH, powered no less than 10% rated power for 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	$\Delta R \leq \pm 0.2\%$	$\Delta R \leq \pm 0.5\%$
Load Life	2000h @ +70°C, rated power, 90min on, 30min off +70°C refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	$\Delta R \leq \pm 0.5\%$	$\Delta R \leq \pm 1.0\%$
Resistance to Solvent	Immerse in solvent for 3 min and wipe 10 times. Three cycles of three solvents. Dry at ambient temperature after cleaning	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage	
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	$\Delta R \leq \pm 0.05\%$	$\Delta R \leq \pm 0.2\%$
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	$\Delta R \leq \pm 0.05\%$	$\Delta R \leq \pm 0.2\%$
Resistance to Solder Heat	+260°C constant temperature heating station for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	$\Delta R \leq \pm 0.2\%$	$\Delta R \leq \pm 0.5\%$
Solderability	+245°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage	
TCR	+20°C and +120°C, +20°C Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Refer to tested curve, Max. value $\leq \pm 75\text{ppm}/^\circ\text{C}$ (1m Ω ~2m Ω) and $\pm 50\text{ppm}/^\circ\text{C}$ (3m Ω ~5m Ω)	
Substrate Bending	2mm. Duration: 60s.	AEC-Q200 TEST 21 AEC-Q200-005	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Short Time Overload	5x rated power, 5s	IEC 60115-1 4.13	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Low Temperature Storage	-55°C for 96h, unpowered	IEC 60068-2-1	$\Delta R = 0$	$\Delta R \leq \pm 0.1\%$
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	$\Delta R = 0$	$\Delta R \leq \pm 0.2\%$

◆ Derating Curve

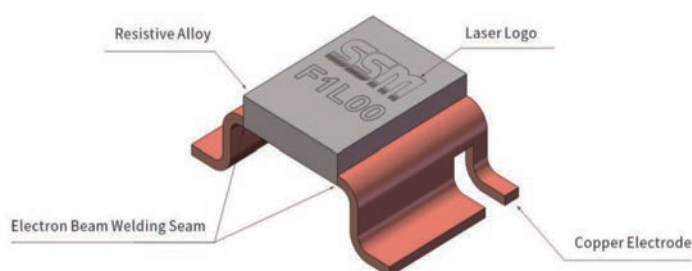


◆ Reflow Soldering Profile



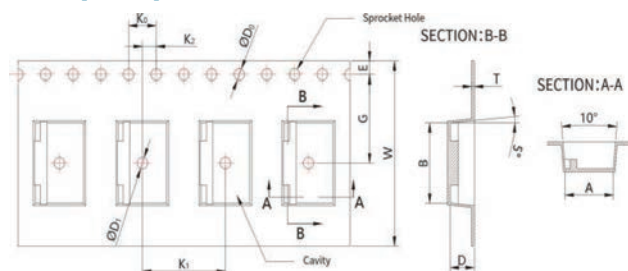
Resistor Surface Temperature:
 Pre-Heat: +150°C+190°C, 60~120sec.
 Reflow: Above +220°C, 90~150sec.
 Applicable Solder Composition: Sn-Ag-Cu

◆ Construction & Marking



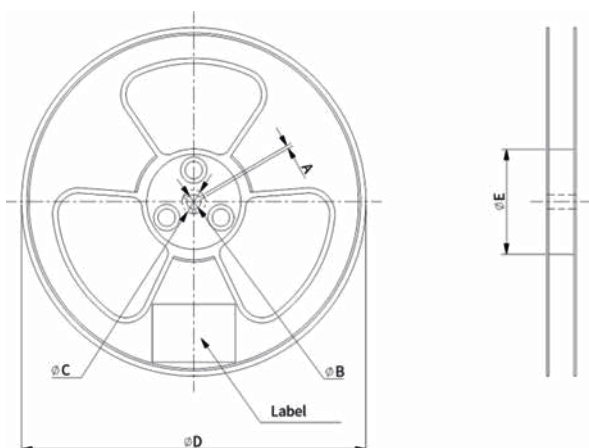
SSM: Brand
F: Tolerance
1L00: Resistance

◆ Tape Specification



Series	Size inch. (mm)	Resistance Value	Unit:mm											
			A	B	$\phi D0$	$\phi D1$	K0	K1	K2	E	G	W	D	T
MSRPF	4026 (10166)	1 m Ω	7.0 $\pm$ 0.1	10.5 $\pm$ 0.1	1.5 $\pm$ 0.1	1.5 $\pm$ 0.1	4.0 $\pm$ 0.1	12.0 $\pm$ 0.1	2.00 $\pm$ 0.1	1.75 $\pm$ 0.1	11.5 $\pm$ 0.1	24.0 $\pm$ 0.3	4.2 $\pm$ 0.1	0.4 $\pm$ 0.05
		1.3 m Ω	7.0 $\pm$ 0.1	10.5 $\pm$ 0.1	1.5 $\pm$ 0.1	1.5 $\pm$ 0.1	4.0 $\pm$ 0.1	12.0 $\pm$ 0.1	2.00 $\pm$ 0.1	1.75 $\pm$ 0.1	11.5 $\pm$ 0.1	24.0 $\pm$ 0.3	4.2 $\pm$ 0.1	0.4 $\pm$ 0.05
		2 m Ω	7.0 $\pm$ 0.1	10.5 $\pm$ 0.1	1.5 $\pm$ 0.1	1.5 $\pm$ 0.1	4.0 $\pm$ 0.1	12.0 $\pm$ 0.1	2.00 $\pm$ 0.1	1.75 $\pm$ 0.1	11.5 $\pm$ 0.1	24.0 $\pm$ 0.3	3.5 $\pm$ 0.1	0.4 $\pm$ 0.05
		3 m Ω	7.0 $\pm$ 0.1	10.5 $\pm$ 0.1	1.5 $\pm$ 0.1	1.5 $\pm$ 0.1	4.0 $\pm$ 0.1	12.0 $\pm$ 0.1	2.00 $\pm$ 0.1	1.75 $\pm$ 0.1	11.5 $\pm$ 0.1	24.0 $\pm$ 0.3	3.5 $\pm$ 0.1	0.4 $\pm$ 0.05
		4 m Ω	7.0 $\pm$ 0.1	10.5 $\pm$ 0.1	1.5 $\pm$ 0.1	1.5 $\pm$ 0.1	4.0 $\pm$ 0.1	12.0 $\pm$ 0.1	2.00 $\pm$ 0.1	1.75 $\pm$ 0.1	11.5 $\pm$ 0.1	24.0 $\pm$ 0.3	3.5 $\pm$ 0.1	0.4 $\pm$ 0.05
		5 m Ω	7.0 $\pm$ 0.1	10.5 $\pm$ 0.1	1.5 $\pm$ 0.1	1.5 $\pm$ 0.1	4.0 $\pm$ 0.1	12.0 $\pm$ 0.1	2.00 $\pm$ 0.1	1.75 $\pm$ 0.1	11.5 $\pm$ 0.1	24.0 $\pm$ 0.3	3.5 $\pm$ 0.1	0.4 $\pm$ 0.05

◆ Reel Specification



Series	Unit:mm					
	Size inch. (mm)	A	ϕB	ϕC	ϕD	ϕE
MSRPF	4026 (10166)	1.5 Min.	13.0 $\pm$ 0.5/-0.2	20.2 Min.	330 $\pm$ 2	100 $\pm$ 2