

High-Precision Alloy Current Sensing Resistors

■ MSREK series

AEC-Q200 Compliant

Features

- The MSREK 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.
- The TCR achieves a minimum of $\pm 100\text{ppm}/^\circ\text{C}$ over a wide temperature range of -55°C to $+170^\circ\text{C}$.
- The "Trimming-free" technology avoids current loss and is free of hot spots.
- The thermoelectric power is extremely low and thermal fluctuations are minimized.

Applications

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

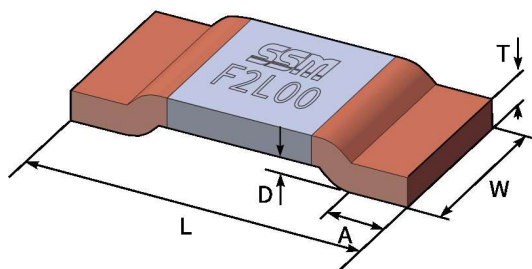


◆ Electrical Specification

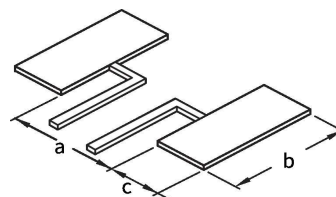
Series	Size inch. (mm)	Resistance Value	Power	Max. Operating Current	Operating Temperature	TCR (20°C Ref)	Tolerance	Thermal Resistance	PKG.
MSREK	2512 (6330)	2 mΩ	5 W	50 A	$-55^\circ\text{C} \sim +170^\circ\text{C}$	$\pm 100\text{ppm}/^\circ\text{C}$	$\pm 0.5\%$ $\pm 1.0\%$ $\pm 5.0\%$	13.2 $^\circ\text{C}/\text{W}$	4,000 pcs.
		3 mΩ	4 W	36 A				19.8 $^\circ\text{C}/\text{W}$	
		4 mΩ	3 W	27 A				24.3 $^\circ\text{C}/\text{W}$	
		5 mΩ	2.5 W	22 A				31.1 $^\circ\text{C}/\text{W}$	

◆ Dimensions

Resistor



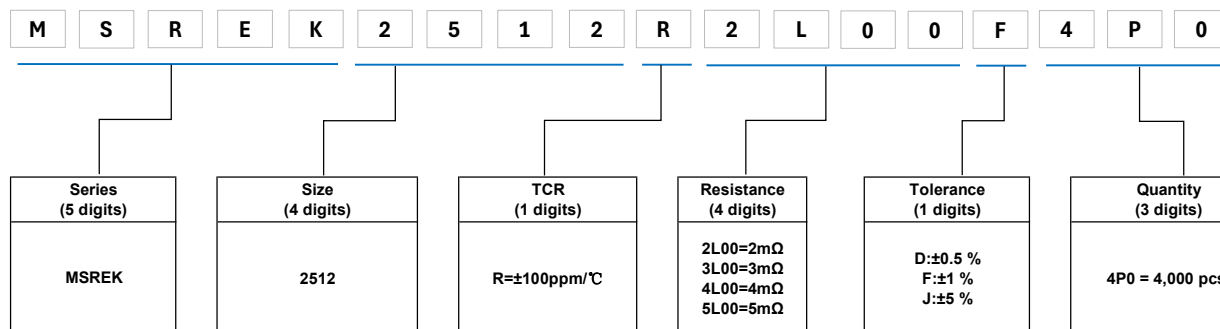
Land Pattern



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							
			L	W	A	T	D	a	b	c
MSREK	2512 (6330)	2 mΩ	6.3 \pm 0.3	3.0 \pm 0.3	1.3 \pm 0.3	0.6 \pm 0.2	0.35 \pm 0.2	3.9 \pm 0.2	3.4 \pm 0.25	1.8 \pm 0.25
		3 mΩ	6.3 \pm 0.3	3.0 \pm 0.3	1.3 \pm 0.3	0.4 \pm 0.2	0.35 \pm 0.2	3.9 \pm 0.2	3.4 \pm 0.25	1.8 \pm 0.25
		4 mΩ	6.3 \pm 0.3	3.0 \pm 0.3	1.3 \pm 0.3	0.33 \pm 0.15	0.35 \pm 0.2	3.9 \pm 0.2	3.4 \pm 0.25	1.8 \pm 0.25
		5 mΩ	6.3 \pm 0.3	3.0 \pm 0.3	1.3 \pm 0.3	0.25 \pm 0.15	0.35 \pm 0.2	3.9 \pm 0.2	3.4 \pm 0.25	1.8 \pm 0.25

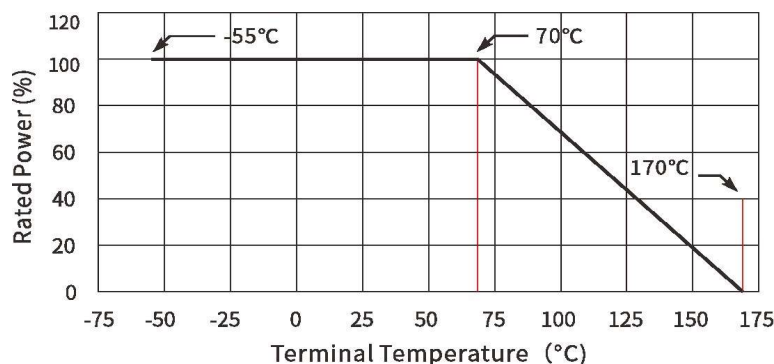
◆ Part Number information



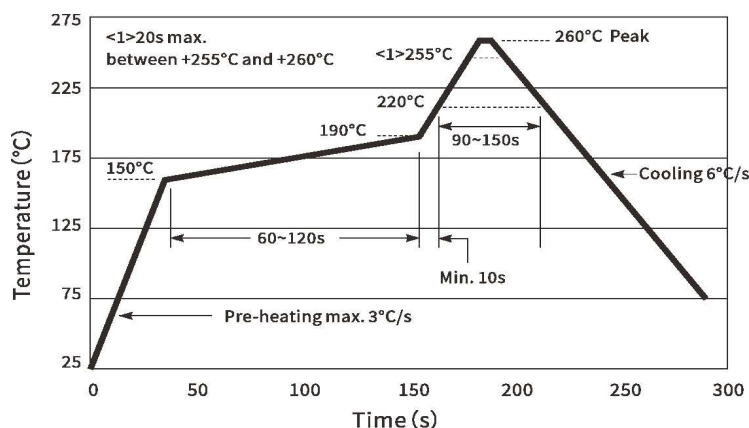
◆ Performance

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	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
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	$\Delta R \leq \pm 0.01\%$	$\Delta R \leq \pm 0.2\%$
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	$\Delta R \leq \pm 0.01\%$	$\Delta R \leq \pm 0.2\%$
Resistance to Solder Heat	+260°C tin bath 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	-55°C and +170°C, +20°C Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Within the nominal TCR	
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 voltage, 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	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$

◆ Derating Curve

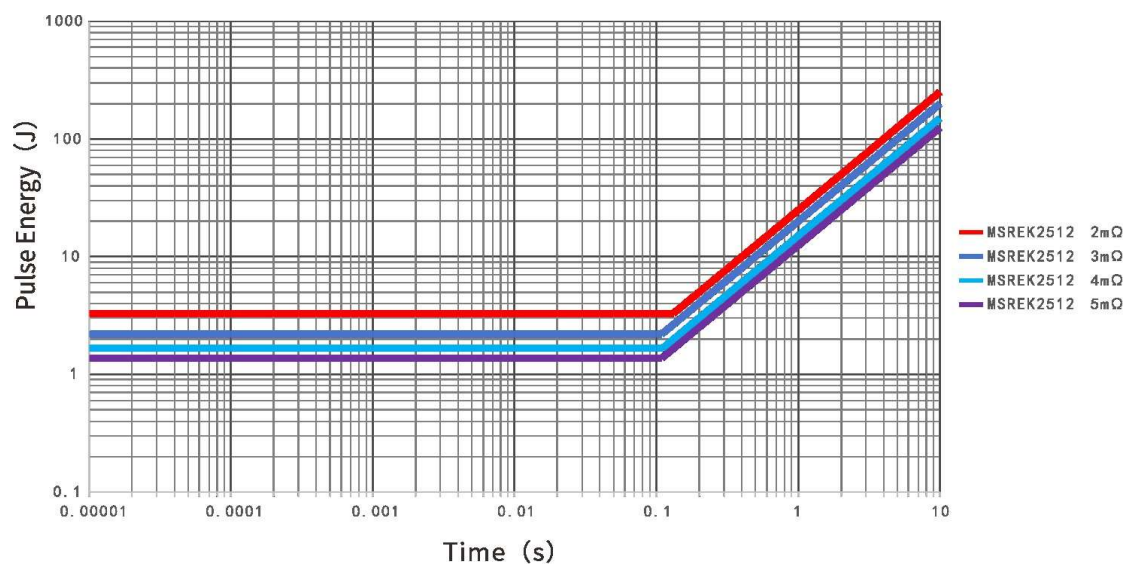


◆ Reflow Soldering Profile

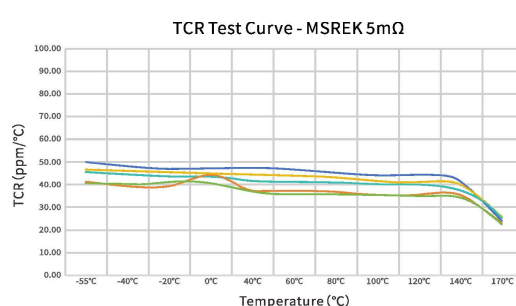
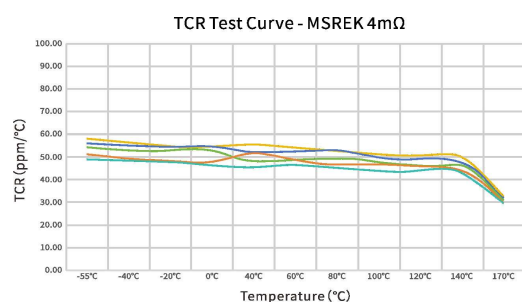
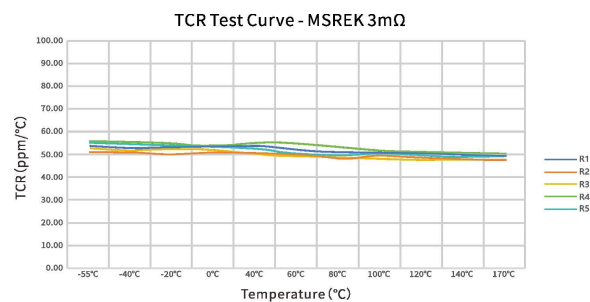
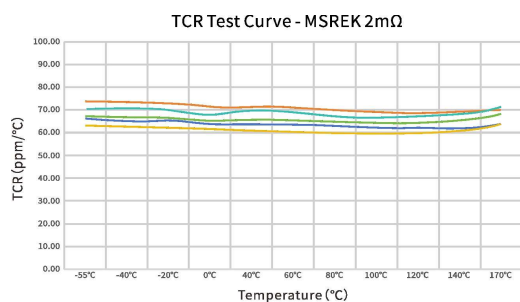


Resistor Surface Temperature :
Pre-Heat: +150°C+190°C, 60~120sec.
Reflow: Above +220°C, 90~150sec.
Applicable Solder Composition: Sn-Ag-Cu

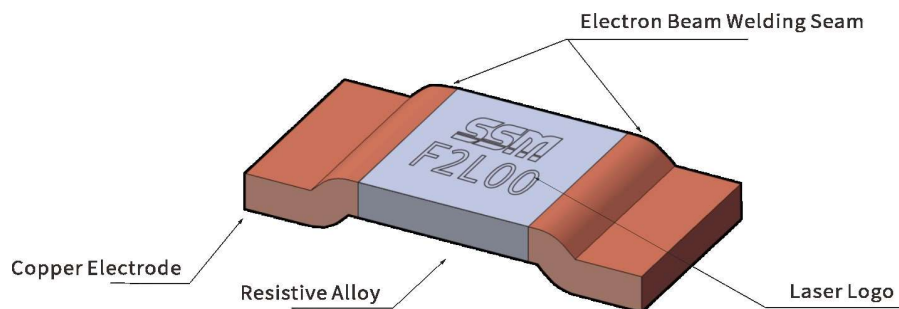
◆ Maximum Pulse Energy Curve



◆ Temperature Coefficient of Resistance Test Curve

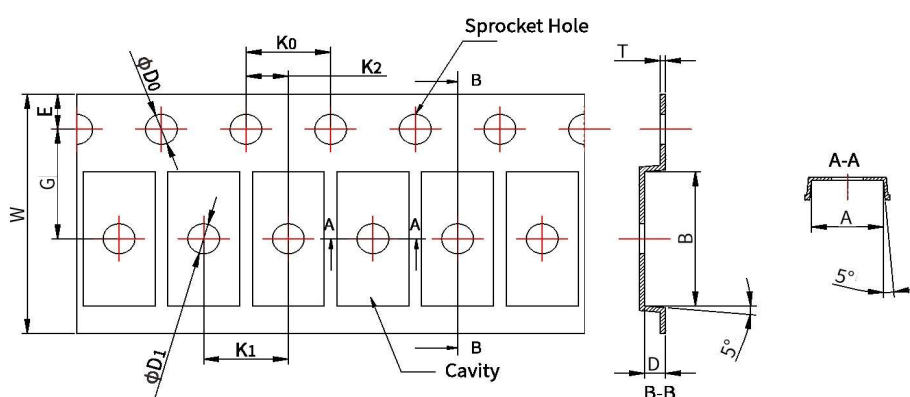


◆ Construction & Marking



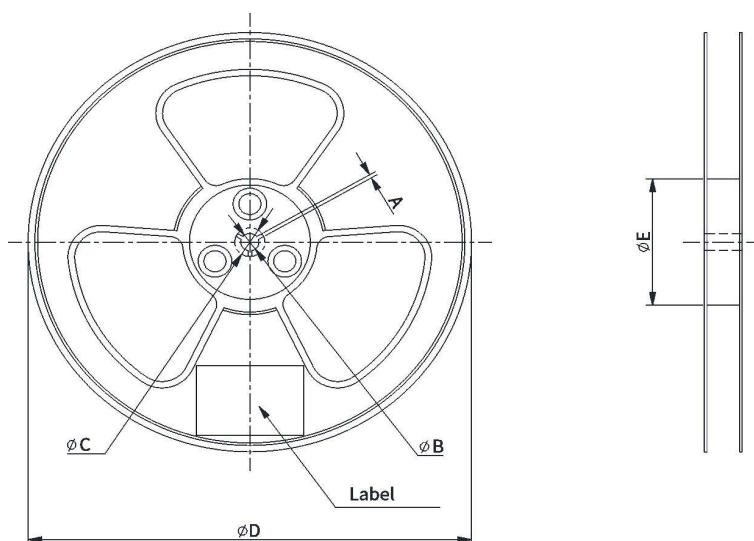
SSM : Brand
F : Tolerance
2L00 : Resistance

◆ Tape Specification



Series	Size inch. (mm)	Resistance Value	Unit:mm											
			A	B	φD0	φD1	K0	K1	K2	E	G	W	D	T
MSREK	2512 (6330)	2 mΩ	3.40±0.2	6.75±0.2	1.5±0.1	1.5±0.1	4.00±0.1	4.00±0.1	2.00±0.1	1.75±0.1	5.50±0.05	12.00±0.2	1.00±0.1	0.23±0.05
		3 mΩ	3.30±0.2	6.60±0.2	1.5±0.1	1.5±0.1	4.00±0.1	4.00±0.1	2.00±0.1	1.75±0.1	5.50±0.05	12.00±0.2	0.90±0.1	0.23±0.05
		4 mΩ	3.20±0.2	6.50±0.2	1.5±0.1	1.5±0.1	4.00±0.1	4.00±0.1	2.00±0.1	1.75±0.1	5.50±0.05	12.00±0.2	0.73±0.1	0.23±0.05
		5 mΩ	3.20±0.2	6.50±0.2	1.5±0.1	1.5±0.1	4.00±0.1	4.00±0.1	2.00±0.1	1.75±0.1	5.50±0.05	12.00±0.2	0.73±0.1	0.23±0.05

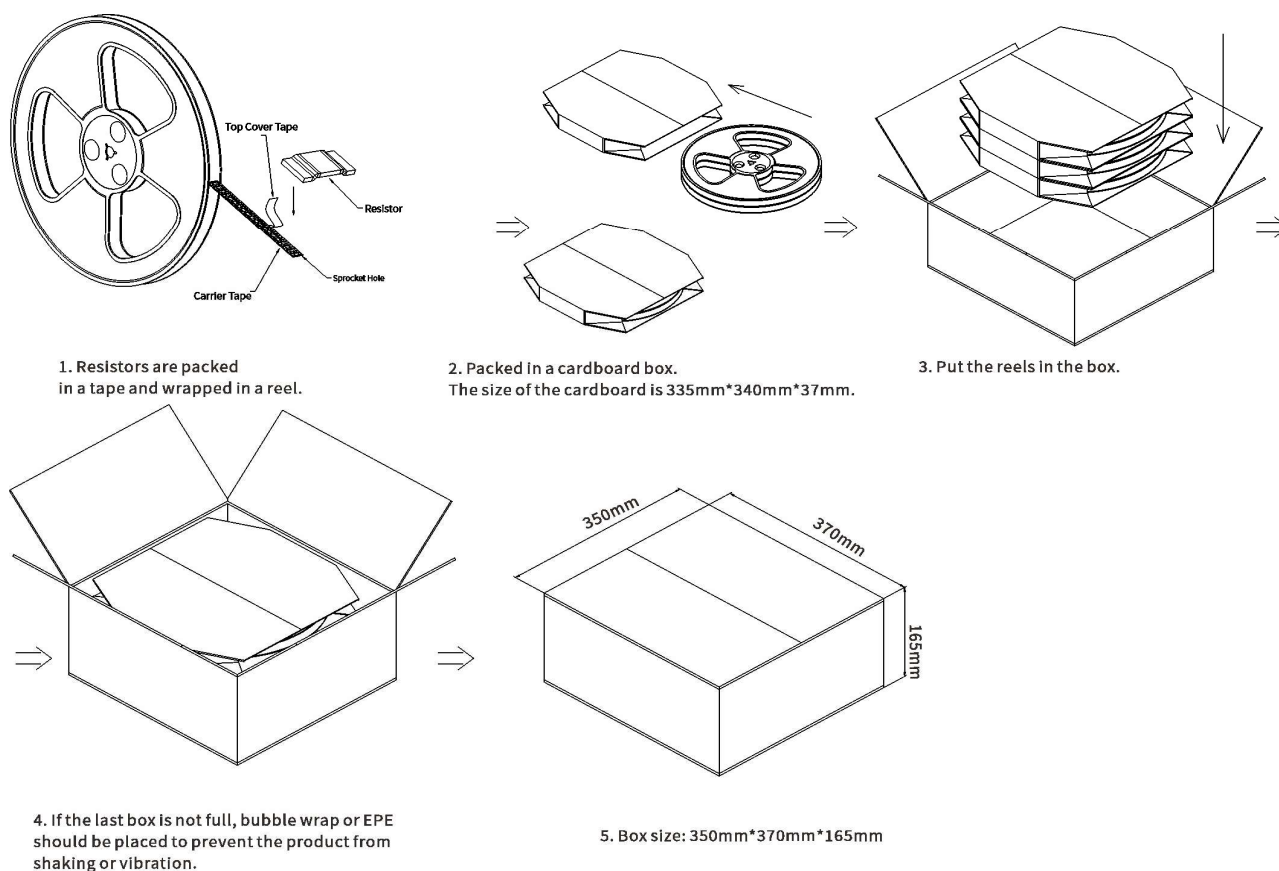
◆ Reel Specification



Series	Size inch. (mm)	Unit:mm				
		A	φB	φC	φD	φE
MSREK	2512 (6330)	1.5 Min.	13.0+0.5/-0.2	20.2 Min.	330±2	100±2

◆ Packaging

Size 2512(6330): 4000 pcs/reel, 6 reel/box



◆ Storage Instructions

- (1) Resistors should be stored at a temperature of 5 to 35°C, with a humidity of <60% RH.
The humidity should be kept as low as possible.
- (2) Resistors should be protected from direct sunlight.
- (3) Resistors should be stored in a clean and dry environment free of harmful gases (HCl, Sulfuric acid, H₂S, etc.)
- (4) Do not move the resistor from the packaging unless use it.
- (5) Under the above storage conditions, the resistor can be stored for at least 1 year.

◆ Usage Suggestions

- (1) Please protect the surface of the resistor during use. Prevent defects such as scratches, bumps, and oil stains on the surface.
- (2) Do not use sharp tweezers to move the resistor. Scratches on the surface can cause resistance drift and resistor failure.
- (3) When installing and using resistors, avoid the impact of mechanical stress on the resistor.
- (4) The long-term operating power of resistors should be ≤ rated power to avoid resistance drift caused by long-term overload.
- (5) Please refer to the derating curve when operating under high temperature conditions or poor heat dissipation environment.
- (6) If the operating conditions exceed the pulse specified in the pulse curve, a systematic evaluation is required.
- (7) If the resistor is not used after being moved from the packaging, it should be stored under vacuum to avoid risks such as poor welding caused by oxidation of the resistor.