DataSheet No.:E13020

Version:V1

Date:2025/07/08

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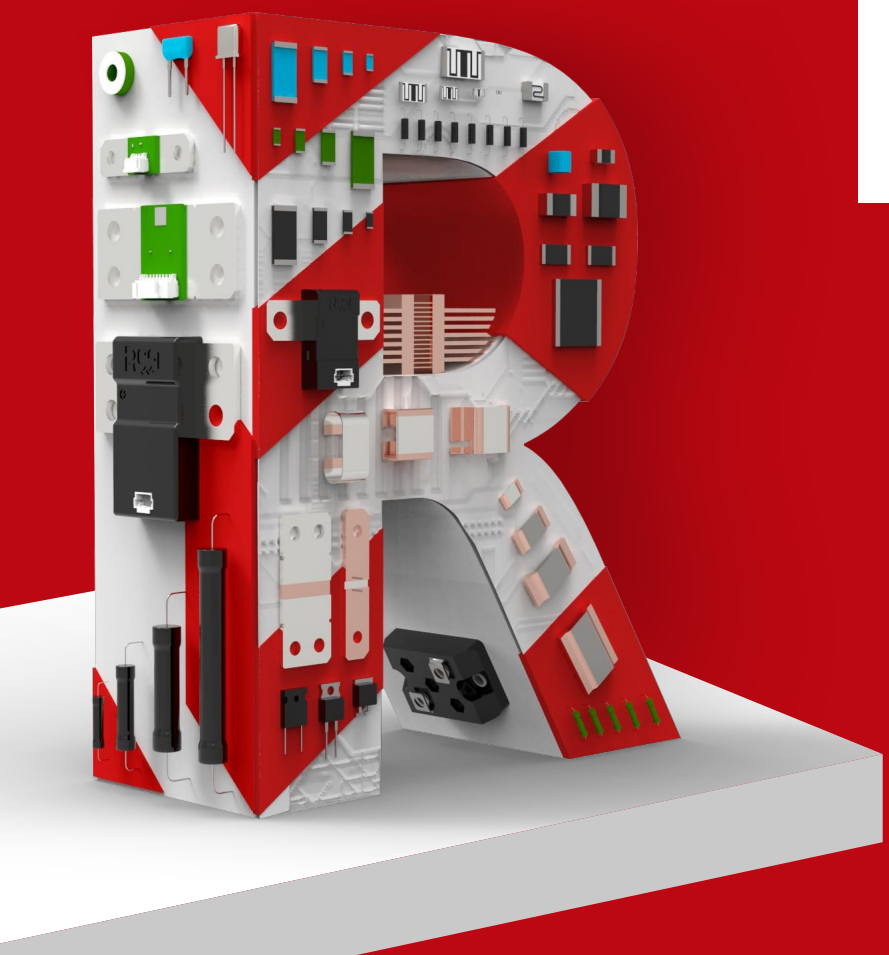
MCSF2512

Precision low TCR beam welded molded alloy current detection resistors

Resistance	3mΩ～100mΩ
Tolerance	±0.5%
TCR	±50ppm/°C
Rated Current	4A~31A



Applications

Automotive Electronics
Precision Power Supply
Instrumentation
Formation & Sorting of Battery
Medical Equipment

Better Solution for Sustainable High End Manufacturing

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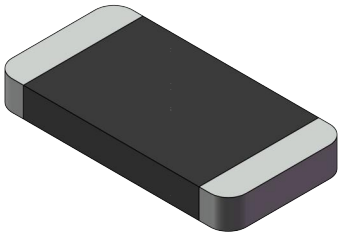
MCSF2512

Precision low TCR beam welded molded alloy current detection resistors

Tolerance of ±0.5% and TCR of ±50ppm
High Reliability and Stability



RoHS AEC-Q200 3D

Introduction

Precision low TCR beam welded molded alloy current detection resistors adopts a resistive alloy independently developed by C&B Electronics, which undergoes precision processing, then is welded by a dedicated electron beam welding equipment independently designed and manufactured by C&B Electronics to achieve continuous welding, and then is shaped by precision stamping. Based on the control ability of the resistance alloy's consistency, precision processing ability, process control ability, and precision welding ability, the product delivers a maximum target accuracy of ±0.5%. Finally, the product is encapsulated through precision molding. The resistance range of MCSF series of products is 3mΩ~100mΩ. TCR of MCSF series is ⩽±50ppm/℃ within the operating temperature range from -55℃ to +170℃. By controlling the resistive alloy materials, precision electron beam welding processes and subsequent processes, the thermal EMF is significantly reduced, while significantly improving its long-term stability. MCSF series, from raw materials, core equipment, to core processes, achieves independent and controllable production, stable quality, and timely delivery. If the standard specifications cannot meet your needs, please contact our sales for consultation. Resi is committed to providing the best precision resistor solutions to meet the needs of customers in testing and measurement, power equipment, medical equipment, precision power supply, automotive electronics, formation & sorting of battery.

Electrical Parameters

Series	Resistance	Rated Power (+70℃)	Max. Operating Current	Operating Temperature	TCR ppm/℃(+20℃Ref)	Tolerance* %
MCSF2512	3mΩ⩽R⩽10mΩ	3W	17A~31A	-55℃~+170℃	±50(-55℃～+170℃)	±0.5 ±1.0 ±5.0
MCSF2512	10mΩ＜R⩽100mΩ	2W	4A~14A	-55℃~+170℃	±50(-55℃～+170℃)	±0.5 ±1.0 ±5.0

*If you need to customize a higher resistance accuracy, such as ±0.1%, please contact us.

Applications

MCSF is only applicable to DC low - frequency sampling circuits. If there are requirements for AC or high - frequency working conditions, please select our PCSR/PCSK series or contact us.

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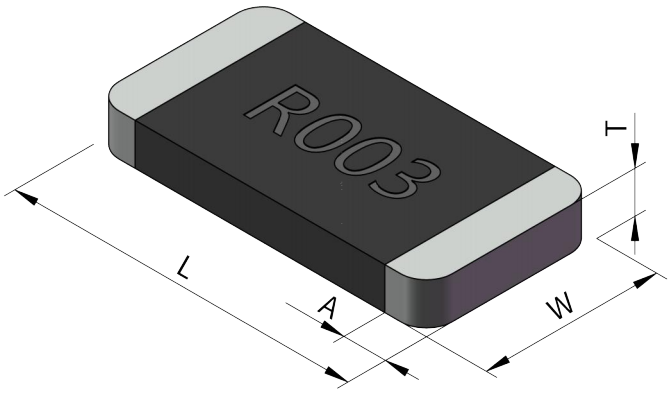
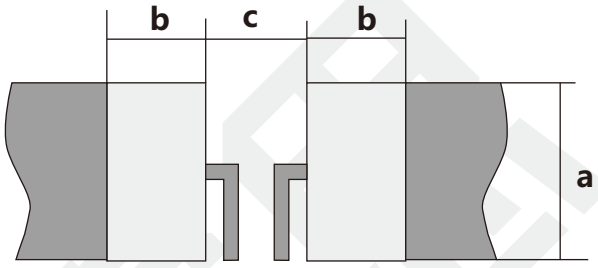
Dimensions

Unit:mm

3mΩ~4mΩ Resistor



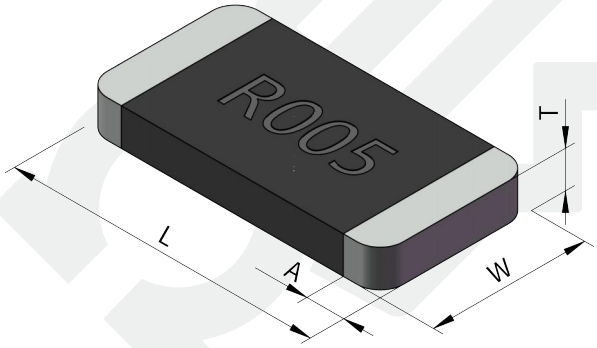
Land Pattern



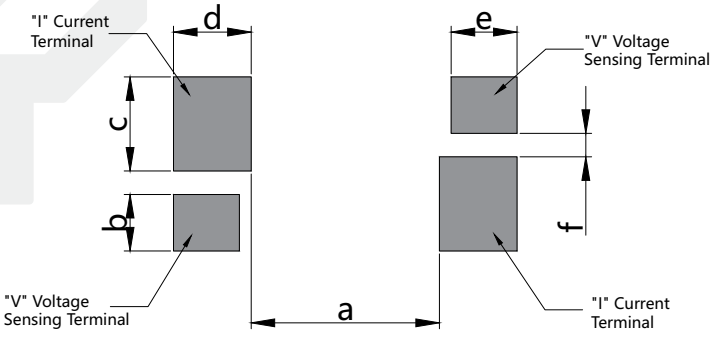
Not following the recommended land pattern design can seriously affect the temperature coefficient measurement results and current sensing accuracy!

Resistance	L	W	A	T	a	b	c	Packaging	Quantity Per Reel	Net Weight
R003~R004	6.40±0.2	3.27±0.2	1.4±0.2	0.8±0.1	3.4	2.6	2.8	Tape & Reel	4000pcs	0.11±0.03g

5mΩ~100mΩ Resistor



Land Pattern



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

Resistance	L	W	A	T	a	b
5mΩ~100mΩ	6.4±0.2	3.27±0.2	0.8±0.2	0.8±0.1	4.0	1.2

c	d	e	f	Packaging	Quantity Per Reel	Net Weight
2.0	1.65	1.4	0.5	Tape & Reel	4000pcs	0.08±0.03g

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MCSF2512

Precision low TCR beam welded molded alloy current detection resistors

Part Number Information

Example: MCSF2512FR005Q9 (MCSF2512 ±1% 5mΩ ±50ppm/°C Standard)

M	C	S	F	2	5	1	2	F	R	0	0	5	Q	9

Series	Size	Tolerance	Resistance	TCR	Code
MCSF	2512	D=±0.5% F=±1.0% J=±5.0%	R003=3mΩ R010=10mΩ R100=100mΩ	Q=±50ppm/°C	9=Standard 6=No Logo

For higher/lower resistance, tighter tolerance, higher power, lower TCR and larger size, please contact us.

Performance

Test	Test Method	Standards	Typical	Max.
Short Time Overload	2.5x rated power, 5s	IEC 60115-1 4.13	△R≤±0.05%	△R≤±0.5%
Load Life	+70°C for 2000h, rated power, 90min on, 30min off +70°C refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	△R≤±0.1%	△R≤±0.5%
TCR	-55°C and +170°C, +20°C Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	In the range of ±50ppm/°C	
Temperature Cycling	-55°C, 15min~ambient temperature <20s~+155°C, 15min, 1000cycles	MIL-STD-202 Method 107	△R≤±0.05%	△R≤±0.3%
Bias Humidity	+85°C, 85%RH, powered 10% rated power for 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	△R≤±0.05%	△R≤±0.3%
Low Temperature Storage	-55°C for 96h, unpowered	IEC 60068-2-1	△R≤±0.02%	△R≤±0.2%
High Temperature Storage	+170°C for 1000h, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	△R≤±0.05%	△R≤±0.5%
Moisture Resistance	Step1~7, 24h is 1 cycle, 10 cycles, unpowered	MIL-STD-202 Method 106	△R≤±0.2%	△R≤±0.5%
Substrate Bending	2mm. Duration: 60s.	AEC-Q200 TEST 21 AEC-Q200-005	△R≤±0.2%	△R≤±0.5%
Terminal strength	17.7N. Duration: 60s.	AEC-Q200 TEST 22 AEC-Q200-006	△R≤±0.01%	△R≤±0.1%
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	
Flammability	Bunsen burner is burned twice for 10s	UL-94 V-0 or V-1	V-0 or V-1 compliant	
Resistance to Solder Heat	+260°C, 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	△R≤±0.03%	△R≤±0.3%
Solderability	+245°C tin pot,5s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage	

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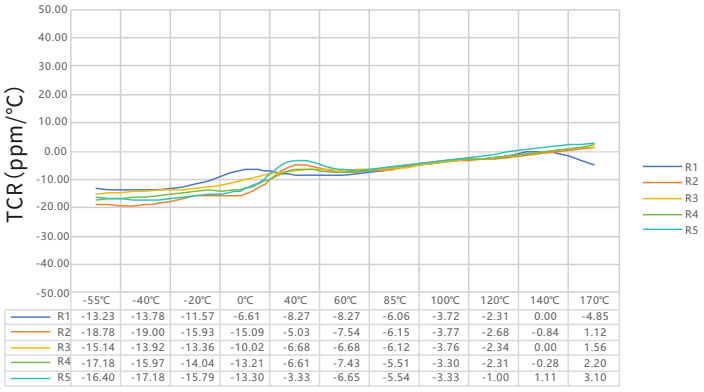
Temperature Coefficient of Resistance Test Curve

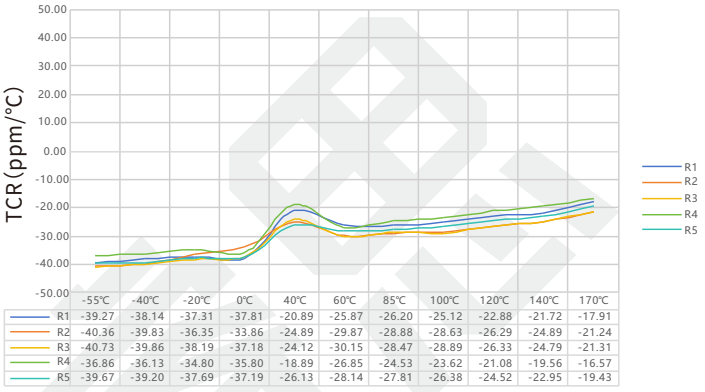
TCR Test Curve - MCSF2512 3mΩ



	-55℃	-40℃	-20℃	0℃	40℃	60℃	85℃	100℃	120℃	140℃	170℃
R1	-13.23	-13.78	-11.57	-6.61	-8.27	-8.27	-6.06	-3.72	-2.31	0.00	-4.85
R2	-18.78	-19.00	-15.93	-15.09	-5.03	-7.54	-6.15	-3.77	-2.68	-0.84	1.12
R3	-15.14	-13.92	-13.36	-10.02	-6.68	-6.68	-6.12	-3.76	-2.34	0.00	1.56
R4	-17.18	-15.97	-14.04	-13.21	-6.61	-7.43	-5.51	-3.30	-2.31	-0.28	2.20
R5	-16.40	-17.18	-15.79	-13.30	-3.33	-6.65	-5.54	-3.33	-1.00	1.11	3.10

Temperature (°C)

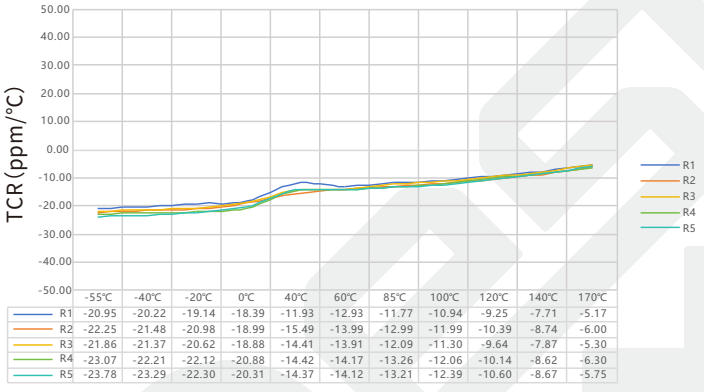
TCR Test Curve - MCSF2512 5mΩ



	-55℃	-40℃	-20℃	0℃	40℃	60℃	85℃	100℃	120℃	140℃	170℃
R1	-39.27	-38.14	-37.31	-37.81	-20.89	-25.87	-26.20	-25.12	-22.88	-21.72	-17.91
R2	-40.36	-39.83	-36.35	-33.86	-24.89	-29.87	-28.88	-28.63	-26.29	-24.89	-21.24
R3	-40.73	-39.86	-38.19	-37.18	-24.12	-30.15	-28.47	-28.89	-26.33	-24.79	-21.31
R4	-36.86	-36.13	-34.80	-35.80	-18.89	-26.85	-24.53	-23.62	-21.08	-19.56	-16.57
R5	-39.67	-39.20	-37.69	-37.19	-26.13	-28.14	-27.81	-26.38	-24.52	-22.95	-19.43

Temperature (°C)

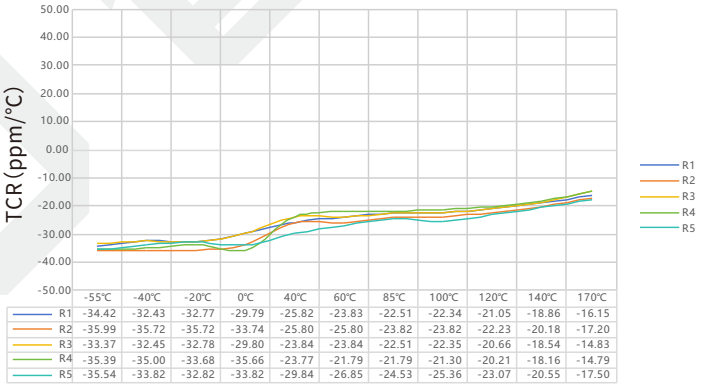
TCR Test Curve - MCSF2512 10mΩ



	-55℃	-40℃	-20℃	0℃	40℃	60℃	85℃	100℃	120℃	140℃	170℃
R1	-20.95	-20.22	-19.14	-18.39	-11.93	-12.93	-11.77	-10.94	-9.25	-7.71	-5.17
R2	-22.25	-21.48	-20.98	-18.99	-15.49	-13.99	-12.99	-11.99	-10.39	-8.74	-6.00
R3	-21.86	-21.37	-20.62	-18.88	-14.41	-13.91	-12.09	-11.30	-9.64	-7.87	-5.30
R4	-23.07	-22.21	-22.12	-20.88	-14.42	-14.17	-13.26	-12.06	-10.14	-8.62	-6.30
R5	-23.78	-23.29	-22.30	-20.31	-14.37	-14.12	-13.21	-12.39	-10.60	-8.67	-5.75

Temperature (°C)

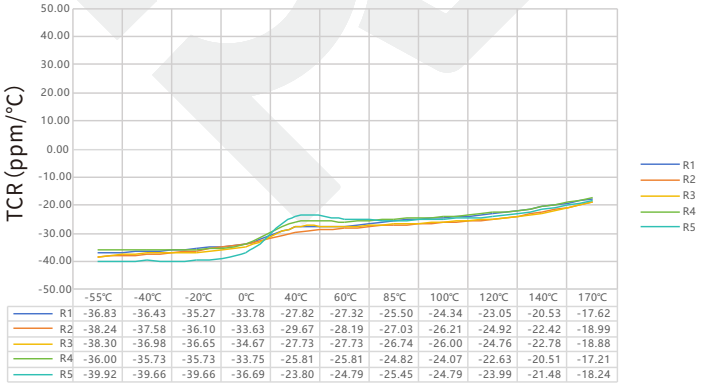
TCR Test Curve - MCSF2512 25mΩ



	-55℃	-40℃	-20℃	0℃	40℃	60℃	85℃	100℃	120℃	140℃	170℃
R1	-34.42	-32.43	-32.77	-29.79	-25.82	-23.83	-22.51	-22.34	-21.05	-18.86	-16.15
R2	-35.99	-35.72	-35.72	-33.74	-25.80	-25.80	-23.82	-23.82	-22.23	-20.18	-17.20
R3	-33.37	-32.45	-32.78	-29.80	-23.84	-23.84	-22.51	-22.35	-20.66	-18.54	-14.83
R4	-35.39	-35.00	-33.68	-35.66	-23.77	-21.79	-21.79	-21.30	-20.21	-18.16	-14.79
R5	-35.54	-33.82	-32.82	-33.82	-29.84	-26.85	-24.53	-25.36	-23.07	-20.55	-17.50

Temperature (°C)

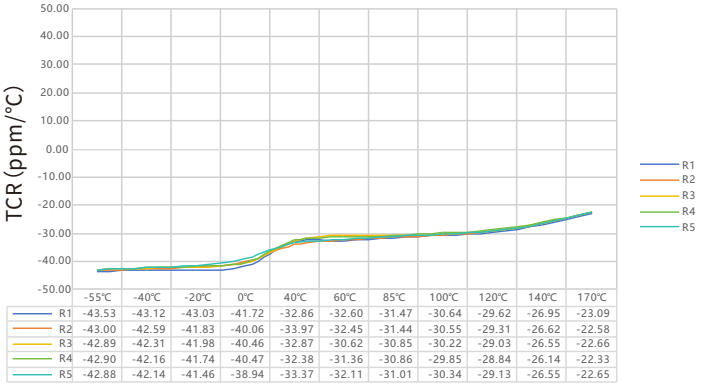
TCR Test Curve - MCSF2512 50mΩ



	-55℃	-40℃	-20℃	0℃	40℃	60℃	85℃	100℃	120℃	140℃	170℃
R1	-36.83	-36.43	-35.27	-33.78	-27.82	-27.32	-25.50	-24.34	-23.05	-20.53	-17.62
R2	-38.24	-37.58	-36.10	-33.63	-29.67	-28.19	-27.03	-26.21	-24.92	-22.42	-18.99
R3	-38.30	-36.98	-36.65	-34.67	-27.73	-27.73	-26.74	-26.00	-24.76	-22.78	-18.88
R4	-36.00	-35.73	-35.73	-33.75	-25.81	-25.81	-24.82	-24.07	-22.63	-20.51	-17.21
R5	-39.92	-39.66	-39.66	-36.69	-23.80	-24.79	-25.45	-24.79	-23.99	-21.48	-18.24

Temperature (°C)

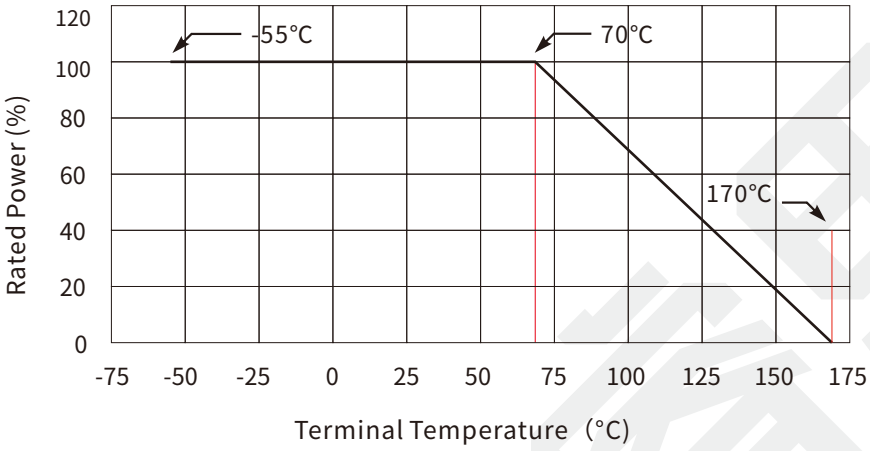
TCR Test Curve - MCSF2512 100mΩ



	-55℃	-40℃	-20℃	0℃	40℃	60℃	85℃	100℃	120℃	140℃	170℃
R1	-43.53	-43.12	-43.03	-41.72	-32.86	-32.60	-31.47	-30.64	-29.62	-26.95	-23.09
R2	-43.00	-42.59	-41.83	-40.06	-33.97	-32.45	-31.44	-30.55	-29.31	-26.62	-22.58
R3	-42.89	-42.31	-41.98	-40.46	-32.87	-30.62	-30.85	-30.22	-29.03	-26.55	-22.66
R4	-42.90	-42.16	-41.74	-40.47	-32.38	-31.36	-30.86	-29.85	-28.84	-26.14	-22.33
R5	-42.88	-42.14	-41.46	-38.94	-33.37	-32.11	-31.01	-30.34	-29.13	-26.55	-22.65

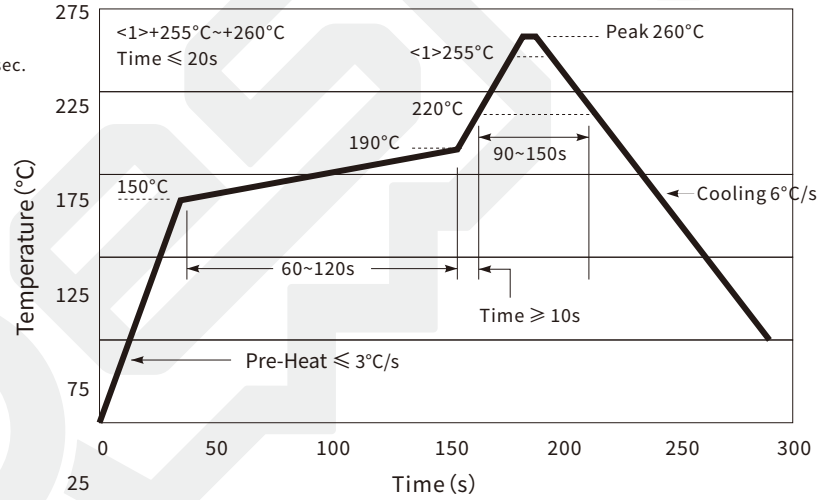
Temperature (°C)

Derating Curve



Reflow Soldering Profile

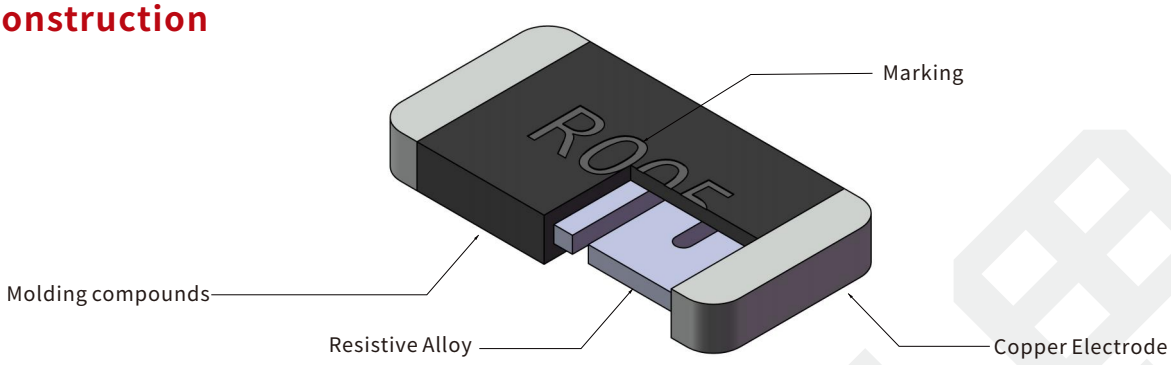
Resistor Surface Temperature:
Pre-Heat:+150°C~+190°C, 60~120sec.
Reflow:+220°C以上, 90~150sec.
Applicable Solder Composition:
Sn-Ag-Cu solder.



MCSF2512

Precision low TCR beam welded molded alloy current detection resistors

Construction



Marking

Marking: Resistance

Size	Illustration	Demonstration
2512		R005=5mΩ R100=100mΩ

***The character direction of taping products is not uniformly standardized, that is, there will be differences in product character direction in the same plate material.**

Storage Instructions

(1) Resistors should be stored at a temperature of 5 to 35℃, 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 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.

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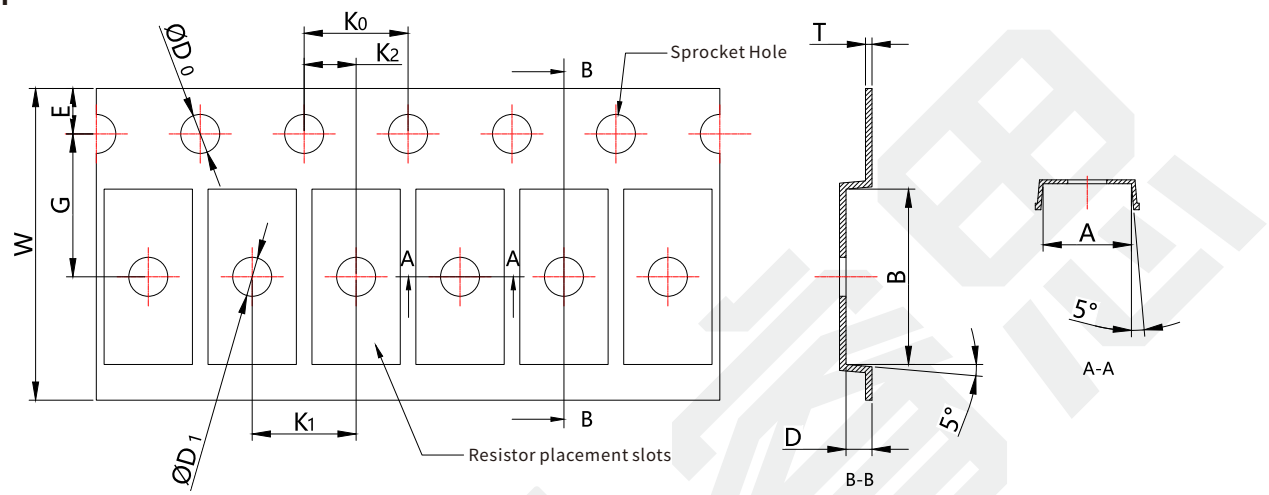
Packaging

Tape Specifications

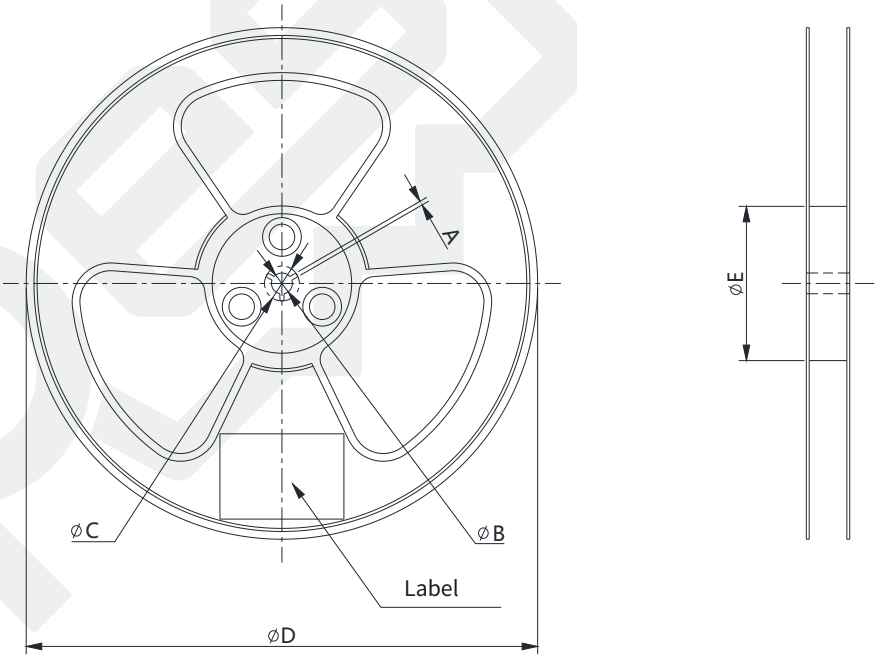
Unit:mm



Resistance	A	B	ϕD0	ϕD1	K0	K1	K2	E	G	W	D	T
3mΩ-100mΩ	3.40±0.2	6.75±0.2	1.5±0.1	1.5±0.1	4.0±0.1	4.0±0.1	2.0±0.1	1.75±0.1	5.5±0.1	12.0±0.3	1.0±0.2	0.25±0.05

Reel Specifications

Unit:mm



A	ϕB	ϕC	ϕD	ϕE
1.5 min.	13.5 +0.5/-0.2	20.2 Min.	178±2	60±2

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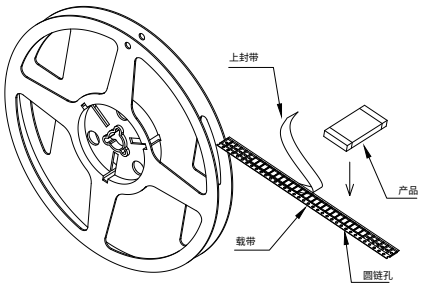
Packaging

(1) 4000 pcs. resistors are packed in a tape and wrapped in a reel;

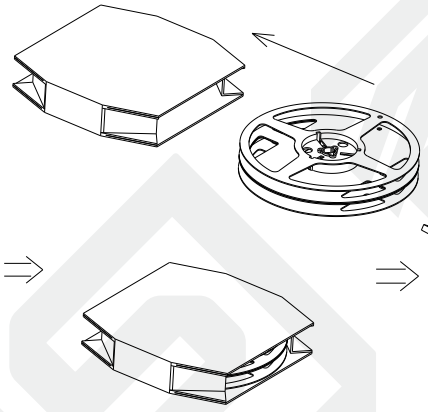
(2) Every 2 reels are packed by a cardboard sleeve case. The size of the cardboard is 180mm*180mm*35mm;

(3) Place every 8 cases into a box (64000pcs. / box).

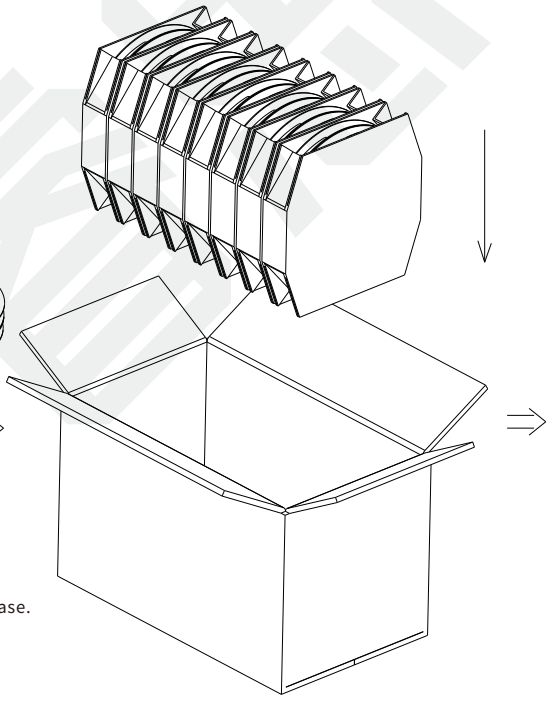
Note: In the event that the ordered quantity or partial cartons do not align with the specified quantities, the final shipping configuration shall be subject to our company' s standard packaging.



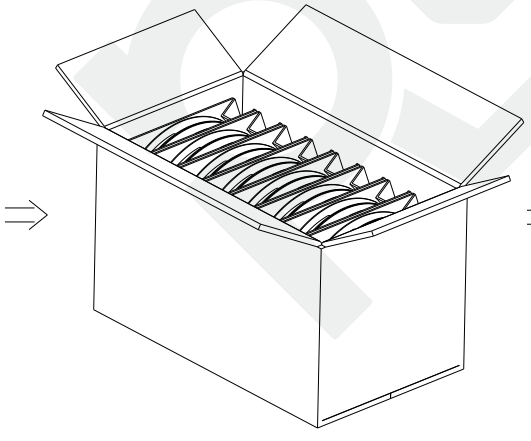
1.4000 pcs. resistors are packed in a tape and wrapped in a reel.



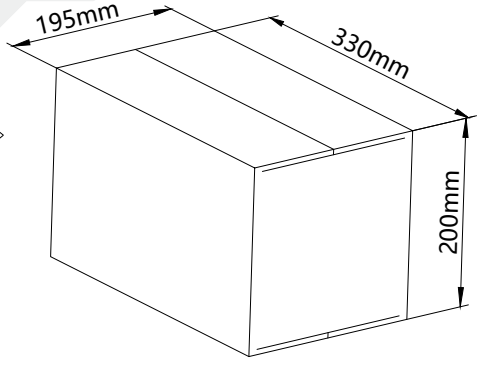
2.Every 2 reels are packed by a cardboard sleeve case.



3.Place every 8 cases into a box (64000 pcs. / box).



4.For the last box, 8 cardboard sleeve casesshould be placed regardless of quantity of the product, preventing shaking.



5.Box size: 330mm*195mm*200mm.

Popular Part Numbers

Part Number	Size	Tolearance	Resistance	Marking	TCR	Power	Max. Operating Current
MCSF2512DR003Q9	2512	±0.5%	3.0mΩ	Marked	±50ppm/°C	3W	31A
MCSF2512FR003Q9	2512	±1.0%	3.0mΩ	Marked	±50ppm/°C	3W	31A
MCSF2512JR003Q9	2512	±5.0%	3.0mΩ	Marked	±50ppm/°C	3W	31A
MCSF2512DR005Q9	2512	±0.5%	5.0mΩ	Marked	±50ppm/°C	3W	24A
MCSF2512FR005Q9	2512	±1.0%	5.0mΩ	Marked	±50ppm/°C	3W	24A
MCSF2512JR005Q9	2512	±5.0%	5.0mΩ	Marked	±50ppm/°C	3W	24A
MCSF2512DR010Q9	2512	±0.5%	10mΩ	Marked	±50ppm/°C	3W	17A
MCSF2512FR010Q9	2512	±1.0%	10mΩ	Marked	±50ppm/°C	3W	17A
MCSF2512JR010Q9	2512	±5.0%	10mΩ	Marked	±50ppm/°C	3W	17A
MCSF2512DR020Q9	2512	±0.5%	20mΩ	Marked	±50ppm/°C	2W	10A
MCSF2512FR020Q9	2512	±1.0%	20mΩ	Marked	±50ppm/°C	2W	10A
MCSF2512JR020Q9	2512	±5.0%	20mΩ	Marked	±50ppm/°C	2W	10A
MCSF2512DR025Q9	2512	±0.5%	25mΩ	Marked	±50ppm/°C	2W	8A
MCSF2512FR025Q9	2512	±1.0%	25mΩ	Marked	±50ppm/°C	2W	8A
MCSF2512JR025Q9	2512	±5.0%	25mΩ	Marked	±50ppm/°C	2W	8A
MCSF2512DR050Q9	2512	±0.5%	50mΩ	Marked	±50ppm/°C	2W	6A
MCSF2512FR050Q9	2512	±1.0%	50mΩ	Marked	±50ppm/°C	2W	6A
MCSF2512JR050Q9	2512	±5.0%	50mΩ	Marked	±50ppm/°C	2W	6A
MCSF2512DR100Q9	2512	±0.5%	100mΩ	Marked	±50ppm/°C	2W	4A
MCSF2512FR100Q9	2512	±1.0%	100mΩ	Marked	±50ppm/°C	2W	4A
MCSF2512JR100Q9	2512	±5.0%	100mΩ	Marked	±50ppm/°C	2W	4A

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2025.03.03	LWW
V0	The datasheet description has been updated	2025.07.08	LWW

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