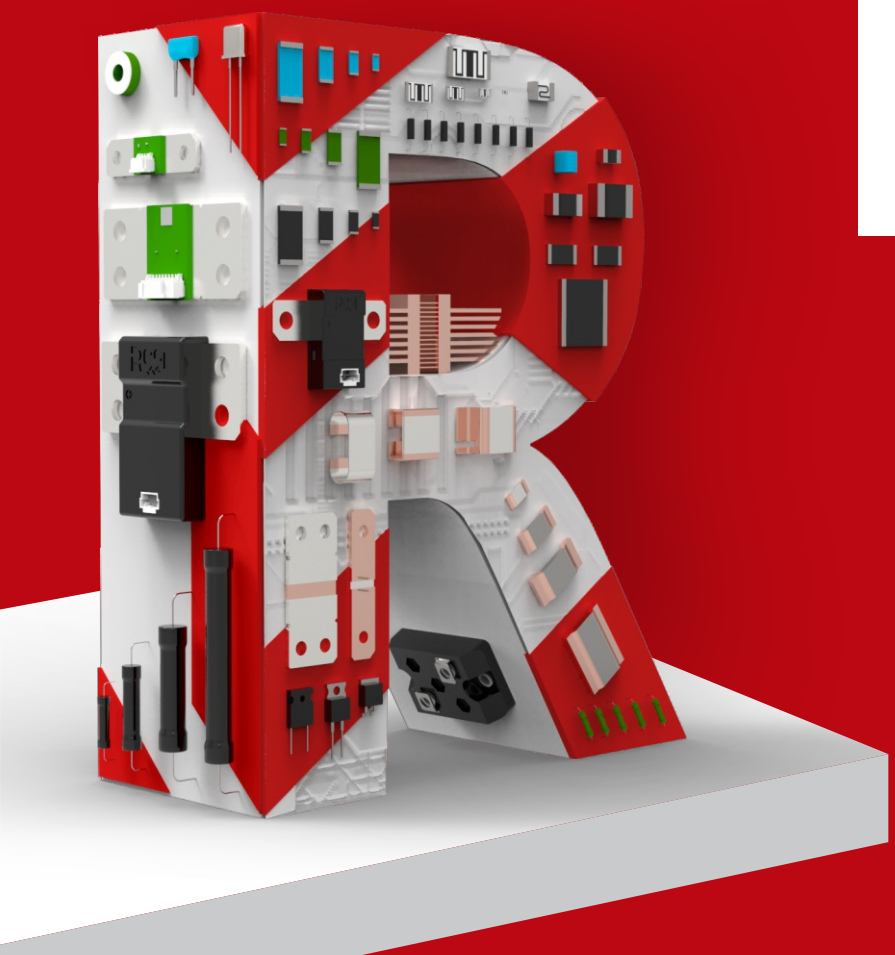
DataSheet No.:E19018
Version:V1
Date:2024/03/13

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SEWF3951

High-Precision Low-TCR Alloy Current Sensing Resistor

Resistance	0.25~0.8mΩ
Tolerance	±0.5%
TCR	±25ppm/℃
Rated Current	110A~240A



Applications

Automotive Electronics

Precision Power Supply

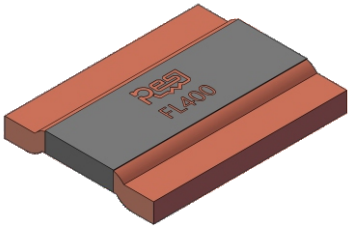
Instrumentation

Formation & Sorting of Battery

Medical Equipment

Better Solution for Sustainable High End Manufacturing

High-Precision Low-TCR Alloy Current Sensing Resistor
“Trimming Free” Technology, High Precision, Low TCR, Reliability



Introduction

SEWF3951 series is based on a precision resistive alloy, welded by a specialized electron beam welding equipment. Both resistive alloy and welding equipment are independently designed and manufactured by C&B Electronics. Because of controlling the consistency of resistive alloys, precision processing ability and efficient welding, SEWF3951 achieves a maximum target tolerance of ±0.5% after stamping without trimming. TCR of SEWF3951 series within the temperature range of +20 °C to +120 °C is ⩽ ±25ppm/°C.

"Trimming Free" technology avoids the loss of rated current caused by trimming and also avoids current accumulation hotspots caused by trimmed notch, greatly improving the reliability of the product. Meanwhile, due to the improvement of welding quality, thermal EMF of the product is significantly reduced, improving its long-term stability.

SEWF3951 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 instrumentation, medical equipment, automotive electronics, precision power supplies, formation & sorting of battery, testing and measurement equipment and other fields.

RoHS　AEC-Q200　3D

Electrical Parameters

Size	Resistance	Rated Power (+70°C)	Max. Operating Current	Operating Temperature	TCR ppm/°C (+20°C Ref)	Thermal Resistance*	Tolerance %
SEWF3951	0.25mΩ	15W	240A	-55°C~+170°C	±25 (+20°C~+120°C)	2.0°C/W	±0.5 ±1.0 ±5.0
SEWF3951	0.3mΩ	15W	220A	-55°C~+170°C	±25 (+20°C~+120°C)	2.3°C/W	±0.5 ±1.0 ±5.0
SEWF3951	0.4mΩ	15W	190A	-55°C~+170°C	±25 (+20°C~+120°C)	3.2°C/W	±0.5 ±1.0 ±5.0
SEWF3951	0.8mΩ	10W	110A	-55°C~+170°C	±25 (+20°C~+120°C)	6.1°C/W	±0.5 ±1.0 ±5.0

* Thermal Resistance: Refers to the internal thermal resistance between the center of the resistive alloy and the copper electrode.
As the heat dissipation efficiency is influenced by operating environment, copper bus bars, PCB design, etc., this parameter is only for reference.

Applications

SEWF3951 series is only applicable to DC low-frequency sampling circuit. If needs of AC or high-frequency applications are present, please contact us.

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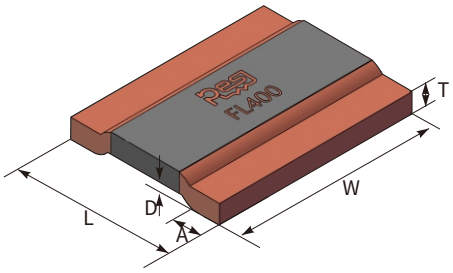
SEWF3951

High-Precision Low-TCR Alloy Current Sensing Resistor

Dimensions

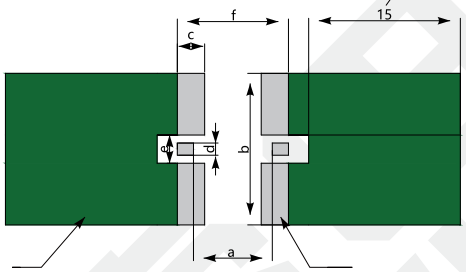
Unit：mm

Resistor



Land Pattern

It is recommended that the size here should be larger than "b", otherwise current measurement accuracy would be affected.



Current Conductive Area

Land Pattern Area

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

Resistance	L	W	A	T	D	a	b	c	d	e	f	Quantity Per reel
0.25mΩ	10.0±0.3	13.0±0.5	2.0±0.3	2.0±0.2	0.5±0.2	8.6±0.1	15±0.2	2.7±0.2	1.2±0.2	2.8±0.2	11±0.2	1200pcs
0.3mΩ	10.0±0.3	13.0±0.5	2.0±0.3	1.7±0.2	0.5±0.2	8.6±0.1	15±0.2	2.7±0.2	1.2±0.2	2.8±0.2	11±0.2	1200pcs
0.4mΩ	10.0±0.3	13.0±0.5	2.0±0.3	1.3±0.2	0.5±0.2	8.6±0.1	15±0.2	2.7±0.2	1.2±0.2	2.8±0.2	11±0.2	1200pcs
0.8mΩ	10.0±0.3	13.0±0.5	2.0±0.3	0.65±0.2	0.5±0.2	8.6±0.1	15±0.2	2.7±0.2	1.2±0.2	2.8±0.2	11±0.2	1200pcs

Part Number Information

Example：SEWF3951FL400P9 (SEWF 3951 ±1.0% 0.4mΩ ±25ppm/°C Standard)

S	E	W	F	3	9	5	1	F	L	4	0	0	P	9

Series	Size	Tolerance	Resistance	TCR	Code
SEWF	3951	D=±0.5% F=±1.0% J=±5.0%	L250=0.25mΩ L300=0.3mΩ L400=0.4mΩ L800=0.8mΩ	P=±25ppm/°C	9=Standard 0-8=Custom

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

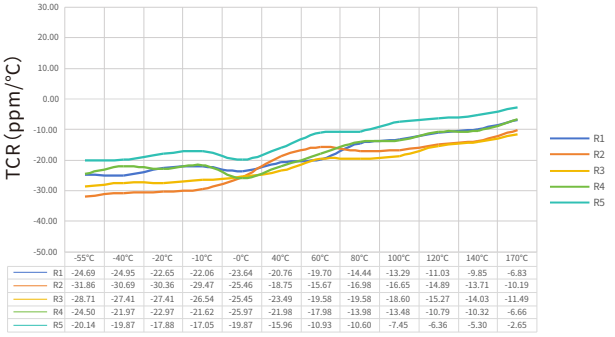
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Performance

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+170°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	△R≤±0.5%	△R≤±1.0%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+155°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	△R≤±0.1%	△R≤±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	△R≤±0.2%	△R≤±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	△R≤±0.5%	△R≤±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	△R≤±0.1%	△R≤±0.5%
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	△R≤±0.1%	△R≤±0.5%
Resistance to Solder Heat	+260°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	△R≤±0.2%	△R≤±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 ≤ 25ppm/°C	
Substrate Bending	2mm. Duration: 60s.	AEC-Q200 TEST 21 AEC-Q200-005	△R≤±0.1%	△R≤±0.5%
Short Time Overload	5x rated power, 5s	IEC 60115-1 4.13	△R≤±0.1%	△R≤±0.5%
Low Temperature Storage	-55°C for 96h, unpowered	IEC 60068-2-1	△R≤±0.1%	△R≤±0.5%
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	△R≤±0.1%	△R≤±0.5%

Temperature Coefficient of Resistance Test Curve

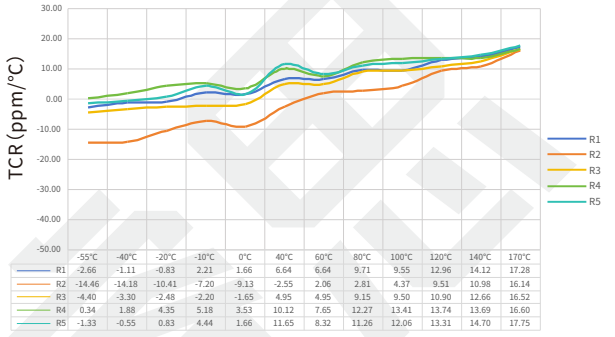
TCR Test Curve - SEWF3951 0.25mΩ



	-55°C	-40°C	-20°C	-10°C	-0°C	40°C	60°C	80°C	100°C	120°C	140°C	170°C
R1	-24.69	-24.95	-22.65	-22.06	-23.64	-20.76	-19.70	-14.44	-13.29	-11.03	-9.85	-6.83
R2	-31.86	-30.69	-30.36	-29.47	-25.46	-18.75	-15.67	-16.98	-16.65	-14.89	-13.71	-10.19
R3	-28.71	-27.41	-27.41	-26.54	-25.45	-23.49	-19.58	-19.58	-18.60	-15.27	-14.03	-11.49
R4	-24.50	-21.97	-22.97	-21.62	-25.97	-21.98	-17.98	-13.98	-13.48	-10.79	-10.32	-6.66
R5	-20.14	-19.87	-17.88	-17.05	-19.87	-15.96	-10.93	-10.60	-7.45	-6.36	-5.30	-2.65

Temperature (°C)

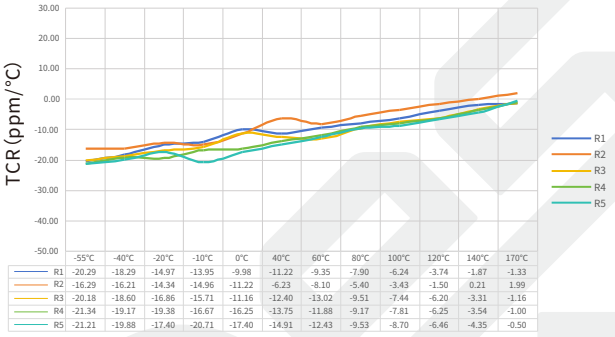
TCR Test Curve - SEWF3951 0.3mΩ



	-55°C	-40°C	-20°C	-10°C	0°C	40°C	60°C	80°C	100°C	120°C	140°C	170°C
R1	-2.66	-1.11	-0.83	2.21	1.66	6.64	6.64	9.71	9.55	12.96	14.12	17.28
R2	-14.46	-14.18	-10.41	-7.20	-9.13	-2.55	2.06	2.81	4.37	9.51	10.98	16.14
R3	-4.40	-3.30	-2.48	-2.20	-1.65	4.95	4.95	9.15	9.50	10.90	12.66	16.52
R4	0.34	1.88	4.35	5.18	3.53	10.12	7.65	12.27	13.41	13.74	13.69	16.60
R5	-1.33	-0.55	0.83	4.44	1.66	11.65	8.32	11.26	12.06	13.31	14.70	17.75

Temperature (°C)

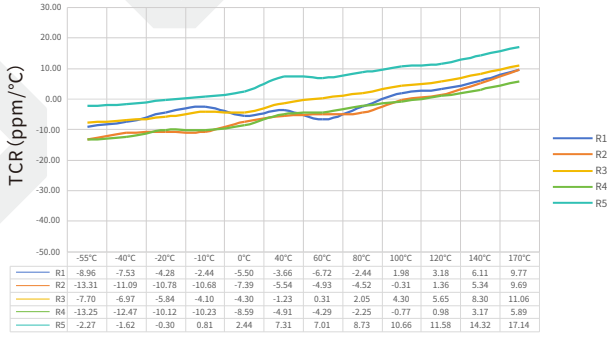
TCR Test Curve - SEWF3951 0.4mΩ



	-55°C	-40°C	-20°C	-10°C	0°C	40°C	60°C	80°C	100°C	120°C	140°C	170°C
R1	-20.29	-18.29	-14.97	-13.95	-9.98	-11.22	-9.35	-7.90	-6.24	-3.74	-1.87	-1.33
R2	-16.29	-16.21	-14.34	-14.96	-11.22	-6.23	-8.10	-5.40	-3.43	-1.50	0.21	1.99
R3	-20.18	-18.60	-16.86	-15.71	-11.16	-12.40	-13.02	-9.51	-7.44	-6.20	-3.31	-1.16
R4	-21.34	-19.17	-19.38	-16.67	-16.25	-13.75	-11.88	-9.17	-7.81	-6.25	-3.54	-1.00
R5	-21.21	-19.88	-17.40	-20.71	-17.40	-14.91	-12.43	-9.53	-8.70	-6.46	-4.35	-0.50

Temperature (°C)

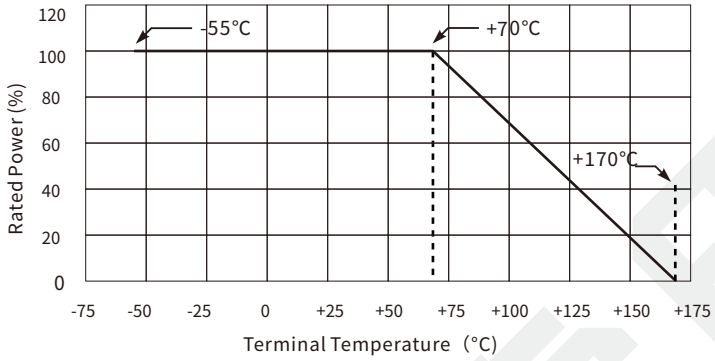
TCR Test Curve - SEWF3951 0.8mΩ



	-55°C	-40°C	-20°C	-10°C	0°C	40°C	60°C	80°C	100°C	120°C	140°C	170°C
R1	-8.96	-7.53	-4.28	-2.44	-5.50	-3.66	-6.72	-2.44	1.98	3.18	6.11	9.77
R2	-13.31	-11.09	-10.78	-10.68	-7.39	-5.54	-4.93	-4.52	-0.31	1.36	5.34	9.69
R3	-7.70	-6.97	-5.84	-4.10	-4.30	-1.23	0.31	2.05	4.30	5.65	8.30	11.06
R4	-13.25	-12.47	-10.12	-10.23	-8.59	-4.91	-4.29	-2.25	-0.77	0.98	3.17	5.89
R5	-2.27	-1.62	-0.30	0.81	2.44	7.31	7.01	8.73	10.66	11.58	14.32	17.14

Temperature (°C)

Derating Curve



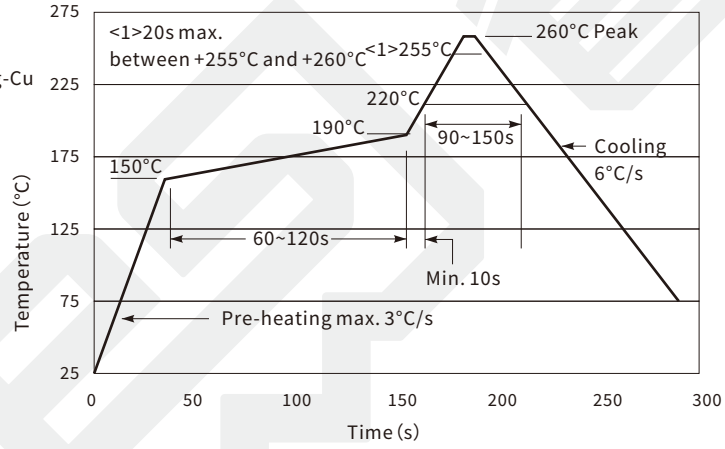
Reflow Soldering Profile

Resistor Surface Temperature:

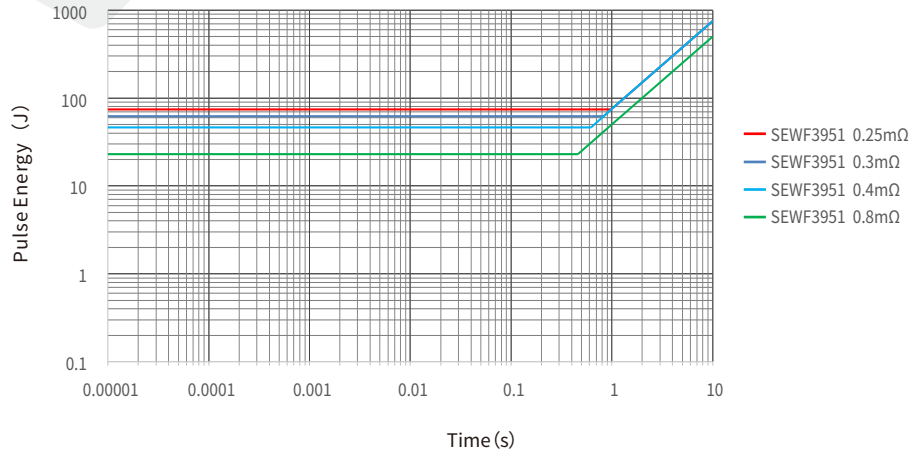
Pre-Heat: +150°C~+190°C,60~120sec.

Reflow: Above +220°C,90~150sec.

Applicable Solder Composition: Sn-Ag-Cu



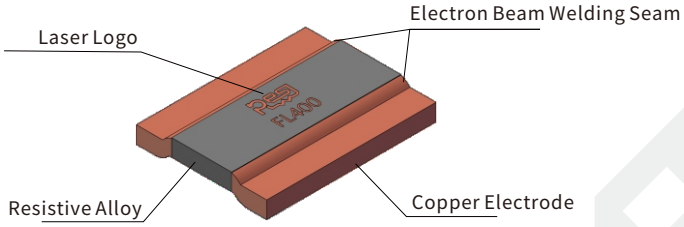
Maximum Pulse Energy Curve



SEWF3951

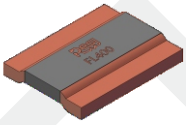
High-Precision Low-TCR Alloy Current Sensing Resistor

Construction



Marking

The first line (four digits) represents brand. The second line (five digits) represents tolerance and resistance.

Size	Illustration	Demonstration
3951		RESI:Brand F:Tolerance L400:Resistance

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, H_2S, 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.

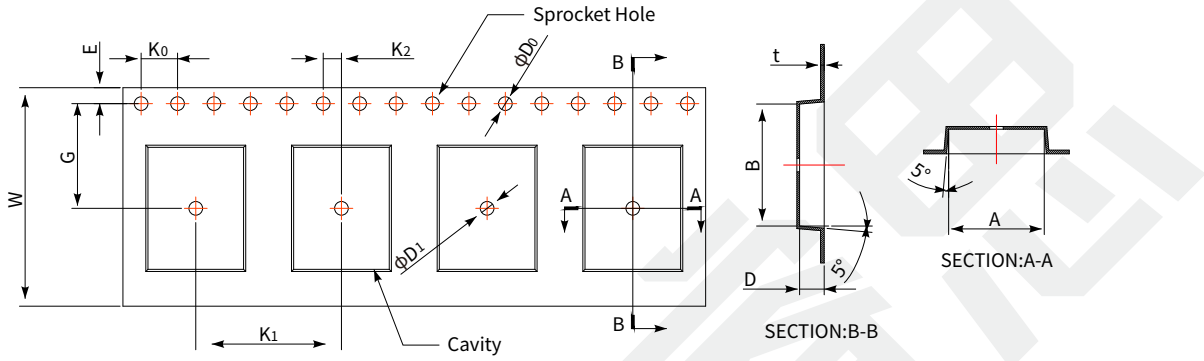
(7) If the resistor is not used after being moved from the packaging, it should be stored under vacuum to avoid risks such as poor welding caused by oxidation of the resistor.

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Packaging

Tape Specifications

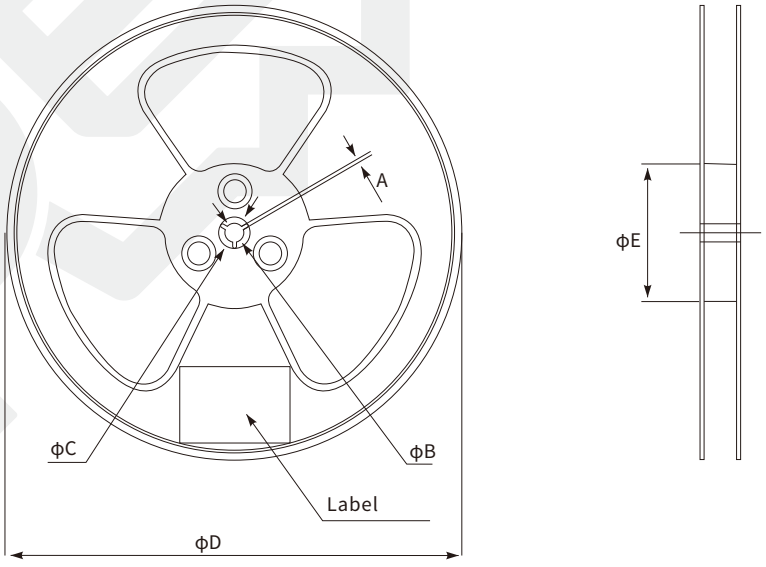
Unit:mm



Resistance	A	B	ΦD0	ΦD1	K0	K1	K2	E	G	W	D	t
0.25mΩ	10.5±0.2	13.4±0.2	1.5±0.1	1.5±0.1	4±0.1	16±0.1	2±0.1	1.75±0.1	11.5±0.1	24±0.3	2.7±0.1	0.4±0.05
0.3mΩ	10.5±0.2	13.4±0.2	1.5±0.1	1.5±0.1	4±0.1	16±0.1	2±0.1	1.75±0.1	11.5±0.1	24±0.3	2.7±0.1	0.4±0.05
0.4mΩ	10.5±0.2	13.4±0.2	1.5±0.1	1.5±0.1	4±0.1	16±0.1	2±0.1	1.75±0.1	11.5±0.1	24±0.3	2.7±0.1	0.4±0.05
0.8mΩ	10.5±0.2	13.4±0.2	1.5±0.1	1.5±0.1	4±0.1	16±0.1	2±0.1	1.75±0.1	11.5±0.1	24±0.3	2.7±0.1	0.4±0.05

Reel Specifications

Unit:mm



A	ΦB	ΦC	ΦD	ΦE
1.5 Min.	13.0 +0.5/-0.2	20.2 Min.	330±2	100±2

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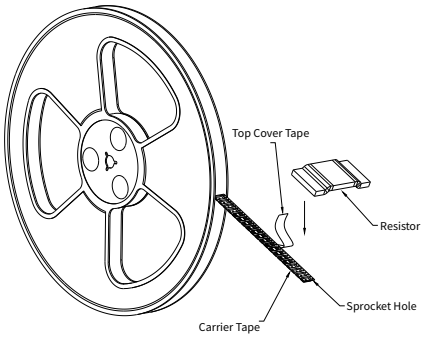
Packaging

(1) 1200 pcs. resistors are packed in a tape and wrapped in a reel;

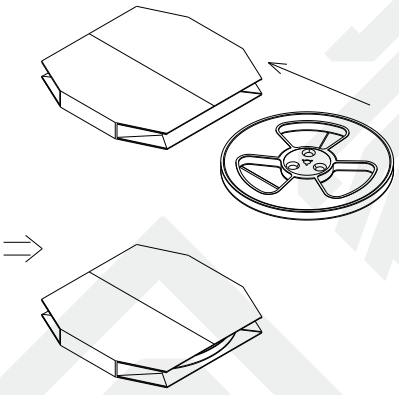
(2) Every reel are packed by a cardboard sleeve case. The size of the cardboard is 335mm*340mm*37mm;

(3) Place every 3 cases into a box(3600 pcs./box);

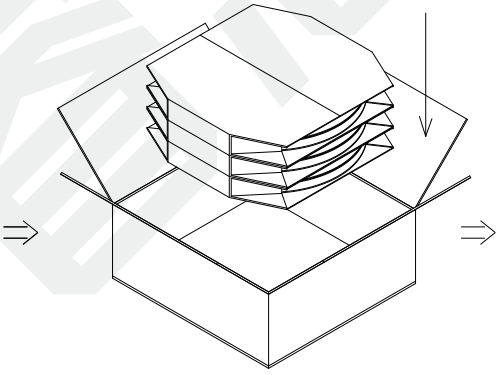
(4) Box size: 350mm*370mm*165mm.



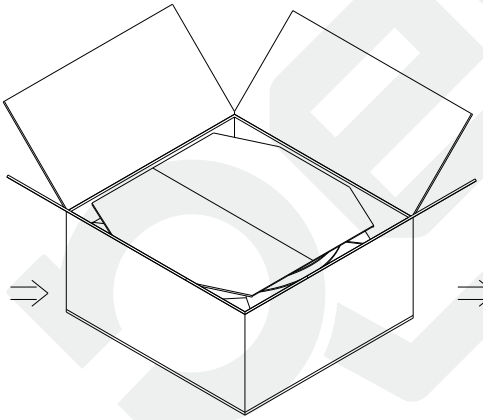
1. 1200 pcs. resistors are packed in a tape and wrapped in a reel.



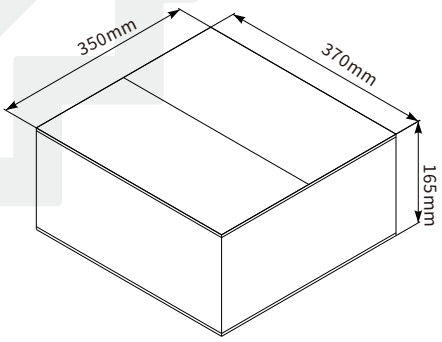
2. .Every reels are packed by a cardboard sleeve case. The size of the cardboard is 335mm*340mm*37mm;



3. Place every 3 cases into a box (3600 pcs. / box).



4. Bubble wrap or EPE should be placed to prevent products from shaking or vibration.



5. Box size: 350mm*370mm*165mm

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Current
SEWF3951DL250P9	3951	±0.5%	0.25mΩ	±25ppm/°C	15W	240A
SEWF3951FL250P9	3951	±1.0%	0.25mΩ	±25ppm/°C	15W	240A
SEWF3951JL250P9	3951	±5.0%	0.25mΩ	±25ppm/°C	15W	240A
SEWF3951DL300P9	3951	±0.5%	0.3mΩ	±25ppm/°C	15W	220A
SEWF3951FL300P9	3951	±1.0%	0.3mΩ	±25ppm/°C	15W	220A
SEWF3951JL300P9	3951	±5.0%	0.3mΩ	±25ppm/°C	15W	220A
SEWF3951DL400P9	3951	±0.5%	0.4mΩ	±25ppm/°C	15W	190A
SEWF3951FL400P9	3951	±1.0%	0.4mΩ	±25ppm/°C	15W	190A
SEWF3951JL400P9	3951	±5.0%	0.4mΩ	±25ppm/°C	15W	190A
SEWF3951DL800P9	3951	±0.5%	0.8mΩ	±25ppm/°C	10W	110A
SEWF3951FL800P9	3951	±1.0%	0.8mΩ	±25ppm/°C	10W	110A
SEWF3951JL800P9	3951	±5.0%	0.8mΩ	±25ppm/°C	10W	110A

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2023.12.27	LWW
V1	Add the dimensions of solder pad;	2024.03.13	LWW

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