DataSheet No: E16012
Version: V2
Date: 2023/08/09

睿思

PEWM3920

High-Precision Low-Inductance Alloy Current Sensing Resistor

Resistance	0.3mΩ~1.0mΩ
Tolerance	±0.5%
TCR	≤±100ppm/℃
Rated Current	89A~182A

Applications

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

Better Solution for Sustainable High End Manufacturing

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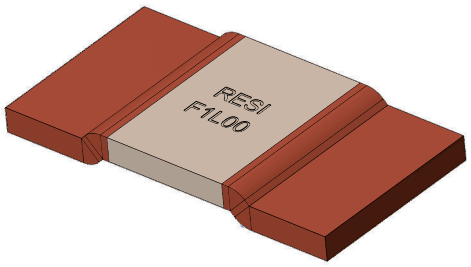
PEWM3920

High-Precision Low-Inductance
Alloy Current Sensing Resistor

Low-Inductance Alloy Current Sensing Resistor
High Precision, Reliability & Stability



RoHS AEC-Q200 3D

Introduction

PEWM 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, PEWM achieves a maximum target tolerance of ± 0.5% after stamping without trimming. TCR of PEWM series within the temperature range of +20 ℃ to +170 ℃ is ≤ ±100ppm/℃. Inductance is < 3nH.

"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.

PEWM 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, testing and measurement equipment and other fields.

Electrical Parameters

Size	Resistance	Rated Power (+70℃)	Max. Operating Current	Operating Temperature	TCR ppm/℃	Thermal Resistance*	Tolerance %
PEWM3920	0.3mΩ	10W	182A	-55℃~+170℃	≤±100 (+20℃~+170℃, 20℃Ref)	3.8℃/W	±0.5 ±1.0 ±5.0
PEWM3920	0.5mΩ	9W	134A	-55℃~+170℃	≤±100 (+20℃~+170℃, 20℃Ref)	6.3℃/W	±0.5 ±1.0 ±5.0
PEWM3920	1.0mΩ	8W	89A	-55℃~+170℃	≤±100 (+20℃~+170℃, 20℃Ref)	12.6℃/W	±0.5 ±1.0 ±5.0

* Thermal Resistance: Refer 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

Inductance of PEWM3920 current sensing resistors is less than 3nH, suitable for AC, DC low and high frequency sampling circuits.

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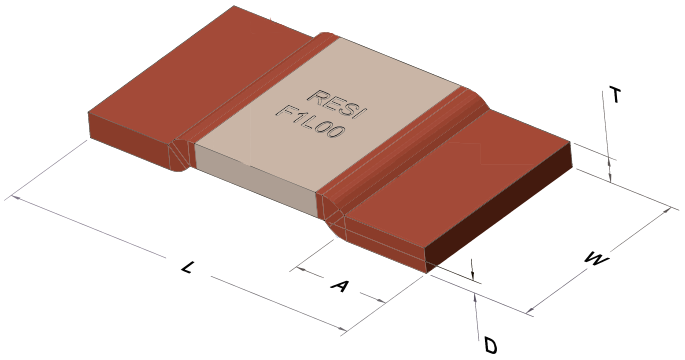
PEWM3920

High-Precision Low-Inductance
Alloy Current Sensing Resistor

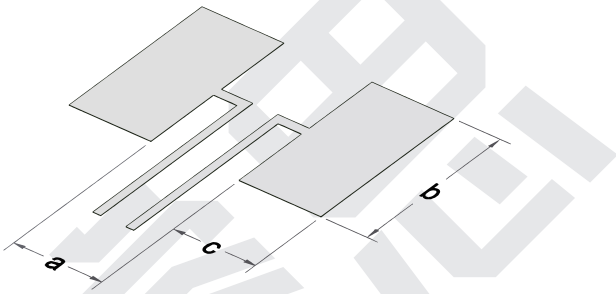
Dimensions

Unit: mm

Resistor



Solder Pad



Resistance	L	W	A	T	D	a	b	c	Packaging	Quantity Per Reel	Net Weight
0.3mΩ	10.0±0.3	5.2±0.3	2.0±0.3	1.3±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000pcs	0.59±0.1g
0.5mΩ	10.0±0.3	5.2±0.3	2.0±0.3	0.8±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000pcs	0.36±0.1g
1.0mΩ	10.0±0.3	5.2±0.3	2.0±0.3	0.4±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000pcs	0.18±0.1g

Part Number Information

Example: PEWM3920F1L00K9 (PEWM 3920 ±1.0% 1.0mΩ ±100ppm/°C Standard)

P	E	W	M	3	9	2	0	F	1	L	0	0	K	9

Series	Size	Tolerance	Resistance	TCR	Code
PEWM	3920	D=±0.5% F=±1.0% J=±5.0%	L300=0.3mΩ L500=0.5mΩ 1L00=1.0mΩ	K=±100ppm/°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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PEWM3920

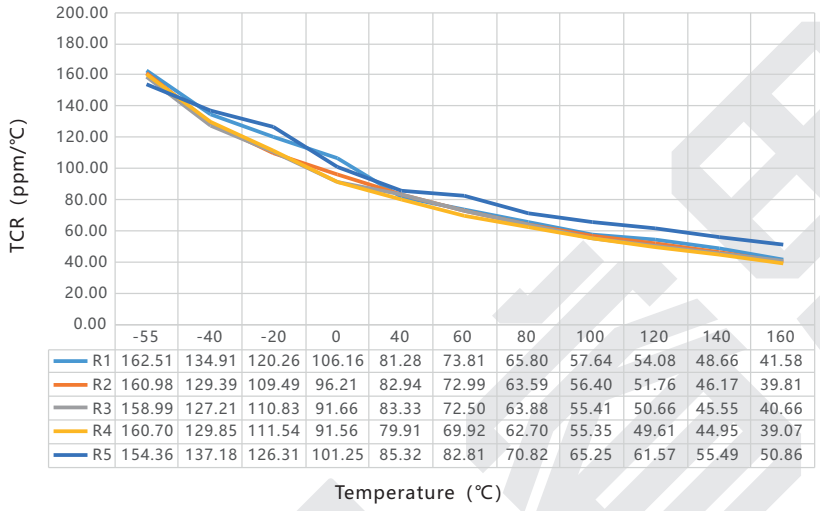
High-Precision Low-Inductance Alloy Current Sensing Resistor

Performance

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+170°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	ΔR≤±0.5%	ΔR≤±1.0%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+155°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	ΔR≤±0.1%	ΔR≤±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	ΔR≤±0.2%	ΔR≤±0.5%
Load Life	2000h @ +70°C, rated power, 90min on，30min off +70℃ refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	ΔR≤±0.5%	ΔR≤±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	ΔR≤±0.05%	ΔR≤±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	ΔR≤±0.05%	ΔR≤±0.2%
Resistance to Solder Heat	+260°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	ΔR≤±0.2%	ΔR≤±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℃ and +170℃, +20℃ Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Refer to tested curve, max. value ≤ 100ppm/℃	
Substrate Bending	2mm. Duration: 60s.	AEC-Q200 TEST 21 AEC-Q200-005	ΔR≤±0.01%	ΔR≤±0.1%
Short Time Overload	5x rated voltage, 5s	IEC 60115-1 4.13	ΔR≤±0.1%	ΔR≤±0.5%
Low Temperature Storage	-55℃ for 96h, unpowered	IEC 60068-2-1	ΔR≤±0.1%	ΔR≤±0.5%
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	ΔR≤±0.1%	ΔR≤±0.5%

Temperature Coefficient of Resistance Test Curve

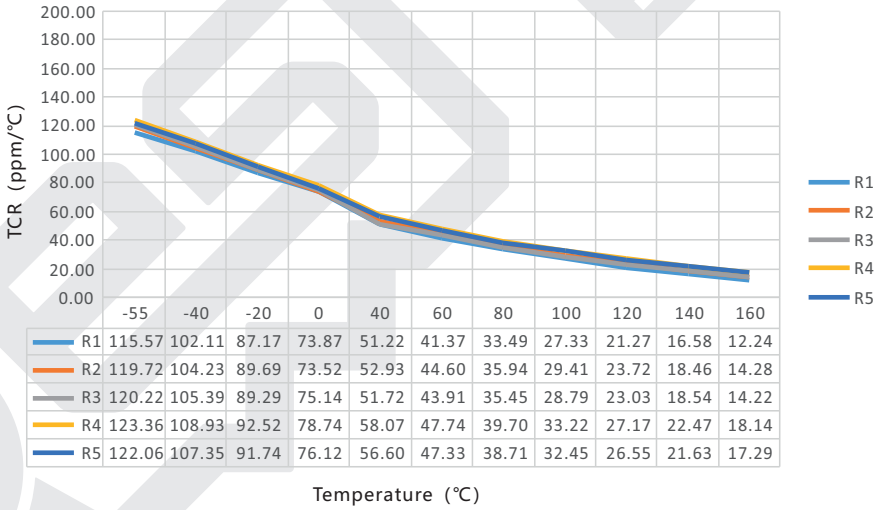
TCR Test Curve - PEWM3920 0.3mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	162.51	134.91	120.26	106.16	81.28	73.81	65.80	57.64	54.08	48.66	41.58
R2	160.98	129.39	109.49	96.21	82.94	72.99	63.59	56.40	51.76	46.17	39.81
R3	158.99	127.21	110.83	91.66	83.33	72.50	63.88	55.41	50.66	45.55	40.66
R4	160.70	129.85	111.54	91.56	79.91	69.92	62.70	55.35	49.61	44.95	39.07
R5	154.36	137.18	126.31	101.25	85.32	82.81	70.82	65.25	61.57	55.49	50.86

Temperature（℃）

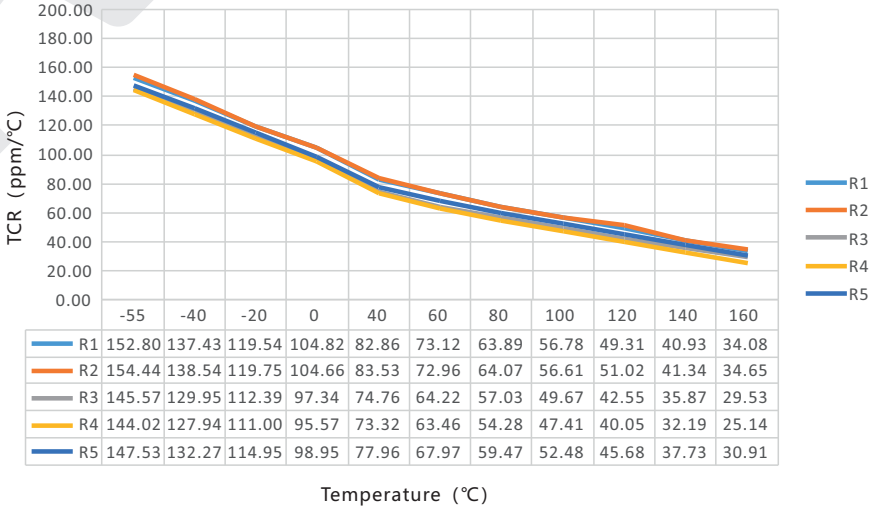
TCR Test Curve - PEWM3920 0.5mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	115.57	102.11	87.17	73.87	51.22	41.37	33.49	27.33	21.27	16.58	12.24
R2	119.72	104.23	89.69	73.52	52.93	44.60	35.94	29.41	23.72	18.46	14.28
R3	120.22	105.39	89.29	75.14	51.72	43.91	35.45	28.79	23.03	18.54	14.22
R4	123.36	108.93	92.52	78.74	58.07	47.74	39.70	33.22	27.17	22.47	18.14
R5	122.06	107.35	91.74	76.12	56.60	47.33	38.71	32.45	26.55	21.63	17.29

Temperature（℃）

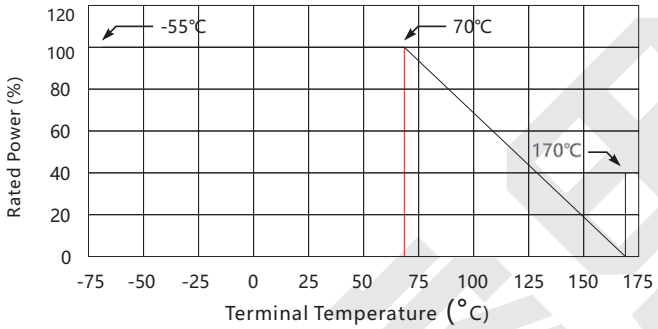
TCR Test Curve - PEWM3920 1mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	152.80	137.43	119.54	104.82	82.86	73.12	63.89	56.78	49.31	40.93	34.08
R2	154.44	138.54	119.75	104.66	83.53	72.96	64.07	56.61	51.02	41.34	34.65
R3	145.57	129.95	112.39	97.34	74.76	64.22	57.03	49.67	42.55	35.87	29.53
R4	144.02	127.94	111.00	95.57	73.32	63.46	54.28	47.41	40.05	32.19	25.14
R5	147.53	132.27	114.95	98.95	77.96	67.97	59.47	52.48	45.68	37.73	30.91

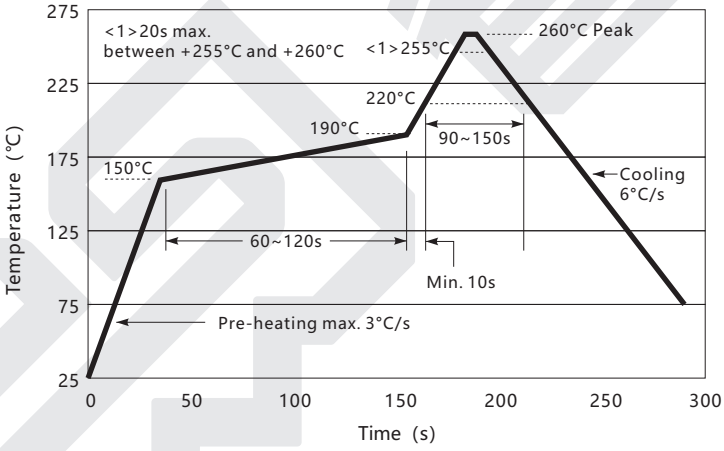
Temperature（℃）

Derating Curve

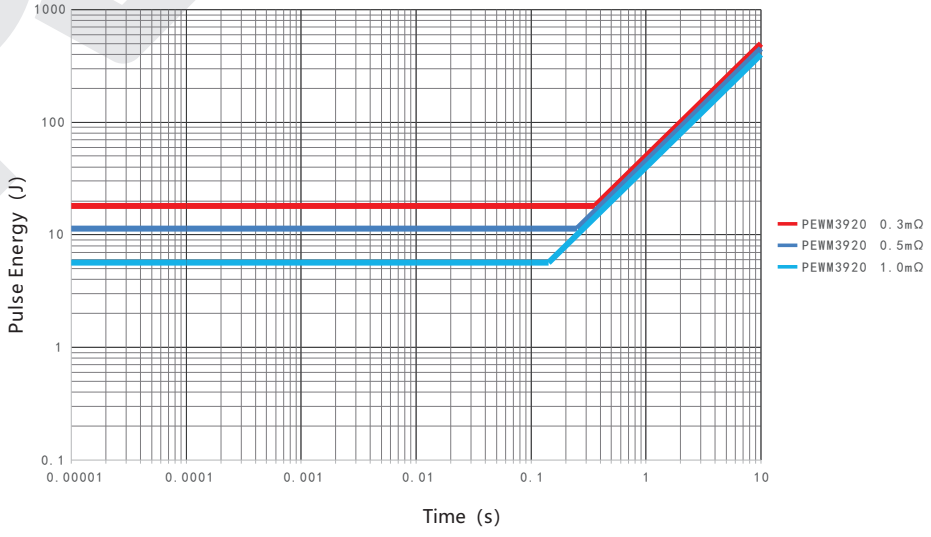


Reflow Soldering Profile

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



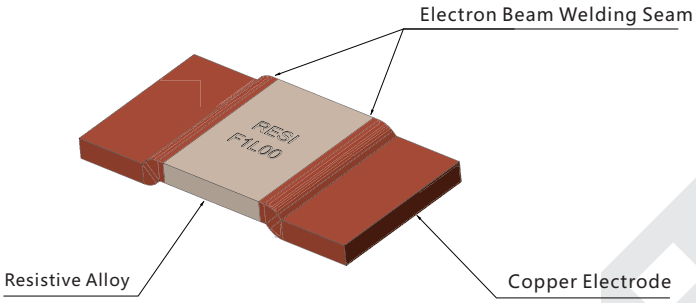
Maximum Pulse Energy Curve



PEWM3920

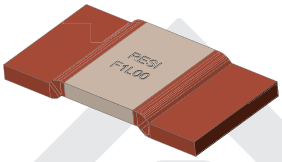
High-Precision Low-Inductance
Alloy Current Sensing Resistor

Construction



Marking

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

Size	Illustration	Demonstration
3920		RESI: Brand F: Tolerance 1L00: 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, 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.

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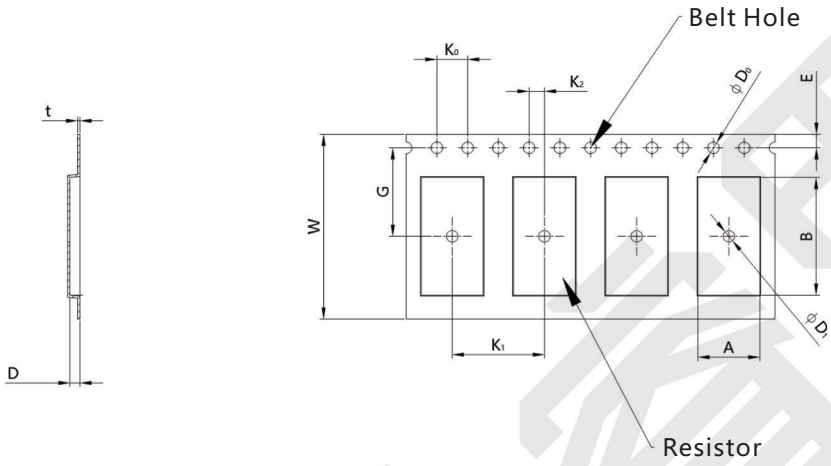
Packaging

Tape Specifications

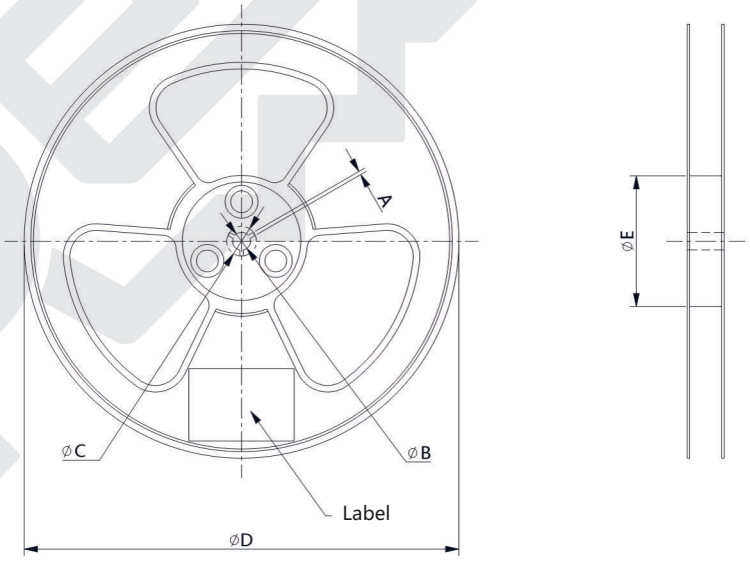
Unit: mm



Resistance	A	B	φD0	φD1	K0	K1	K2	E	G	W	D	t
0.3mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	2.1±0.1	0.3±0.05
0.5mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	1.5±0.1	0.3±0.05
1.0mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	1.5±0.1	0.3±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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Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Current
PEWM3920DL300K9	3920	±0.5%	0.3mΩ	≤±100ppm/℃	10.0W	182A
PEWM3920DL500K9	3920	±0.5%	0.5mΩ	≤±100ppm/℃	9.0W	134A
PEWM3920D1L00K9	3920	±0.5%	1.0mΩ	≤±100ppm/℃	8.0W	89A
PEWM3920FL300K9	3920	±1.0%	0.3mΩ	≤±100ppm/℃	10.0W	182A
PEWM3920FL500K9	3920	±1.0%	0.5mΩ	≤±100ppm/℃	9.0W	134A
PEWM3920F1L00K9	3920	±1.0%	1.0mΩ	≤±100ppm/℃	8.0W	89A
PEWM3920JL300K9	3920	±5.0%	0.3mΩ	≤±100ppm/℃	10.0W	182A
PEWM3920JL500K9	3920	±5.0%	0.5mΩ	≤±100ppm/℃	9.0W	134A
PEWM3920J1L00K9	3920	±5.0%	1.0mΩ	≤±100ppm/℃	8.0W	89A

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2022.07.28	LWW
V1	Add TCR test curve	2022.10.28	LWW
V2	Add a new resistance 0.3mR; Change datasheet to the new template	2023.08.06	LWW

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