

# SUNWAY R CHIP DATASHEET



## Metal Current Sensor SP Series

Tolerance :  $\pm 1\%$  /  $\pm 2\%$  /  $\pm 5\%$

Sizes : 0805 / 1206 / 2512 / 2818

*RoHS compliant & Halogen free*



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# 1. ORDERING INFORMATION

## SCOPE

This specification describes SP series current sensor - low TCR with lead-free terminations made by metal substrate.

## APPLICATIONS

- Consumer goods
- Computer
- Telecom / Datacom
- Industrial / Power supply
- Alternative Energy
- Car electronics

## FEATURES

- Halogen Free Epoxy
- AEC-Q200 qualified
- Halogen-free Epoxy
- RoHS compliant
- Reduce environmentally hazardous wastes
- High component and equipment reliability
- Non-forbidden materials used in products/production
- Low resistances applied to current sensing
- Anti-sulfur

## ORDERING EXAMPLE

The ordering code of a SP 2512 2W Chip resistor, TCR100, value 0.001  $\Omega$  with  $\pm 1\%$  tolerance, supplied in 7-inch embossed plastic tape reel is: SP2512FR001F2WPKH

## ORDERING INFORMATION-GLOBAL PART NUMBER

Global part numbers are identified by the series, sizes, tolerance, packing type, temperature coefficient, taping reel and resistance value.

### GLOBAL PART NUMBER

SP	XXXX	X	XXXX	X	XX	X	XH
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

### (1) SIZE

0805/1206/2512/2818

### (2) TOLERANCE

F =  $\pm 1.0\%$   
 G =  $\pm 2.0\%$   
 J =  $\pm 5.0\%$

### (3) RESISTANCE

Example:  
 U500 = 0.0005  $\Omega$   
 R001 = 0.001  $\Omega$   
 R100 = 0.1  $\Omega$

### (4) TEMPERATURE COEFFICIENT OF RESISTANCE

E =  $\pm 50\text{ppm}$   
 F =  $\pm 100\text{ppm}$   
 I =  $\pm 300\text{ppm}$   
 J =  $\pm 350\text{ppm}$

### (5) POWER

1C=1/2W	3W=3W
1W=1W	5W=5W
2W=2W	7W=7W

### (6) CONTROL CODE

N:Lead Free, P:Total Lead Free

### (7) PACKAGING TYPE & PRODUCT CODE

K = 07" Embossed plastic tape  
 R = 07" Paper tape  
 H = Default code

## 2. MARKING AND CONSTRUCTION

### MARKING

#### SP0805



Value=0.001Ω

SP0805: 5mΩ to 15mΩ

#### SP1206/2512/2818



Value=0.001Ω

The "R" is used as a decimal point; the other 3 digits are significant

SP1206 : 1mΩ to 100mΩ

SP2512: 1mΩ to 500mΩ

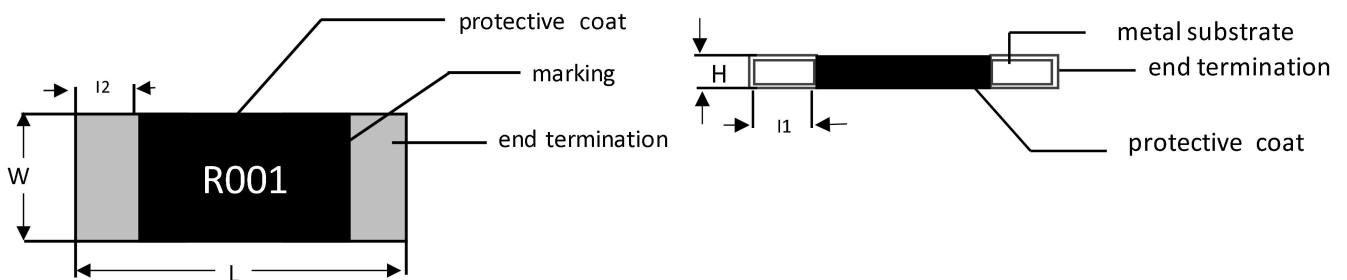
SP2818: 3mΩ to 60mΩ

### CONSTRUCTION

The resistors are constructed using outstanding TCR level material , which makes Sunway SP resistors excellent for current sensing application in battery charger circuit& DC-DC convergent.

The composition of resistive material is adjusted to give the approximate required resistance and is covered with a protective coating . Marking is printed on the top side of the resistor.

Finally ,the three external terminations(Cu/Ni/matte Tin)are added , as shown in Fig.



### 3. DIMENSION AND ELECTRICAL CHARACTERISTICS

#### DIMENSION

TYPE	RESISTANCE	L(mm)	W(mm)	H(mm)	l1(mm)	l2(mm)
	RANGE					
SP0805	$5\text{m}\Omega \leq R \leq 15\text{m}\Omega$	$2.00 \pm 0.10$	$1.25 \pm 0.10$	$0.50 \pm 0.20$	$0.35 \pm 0.20$	$0.35 \pm 0.20$
SP1206	$1\text{m}\Omega \leq R < 6\text{m}\Omega$	$3.20 \pm 0.20$	$1.60 \pm 0.20$	$0.70 \pm 0.20$	$0.60 \pm 0.20$	$0.60 \pm 0.20$
SP1206	$6\text{m}\Omega \leq R \leq 100\text{m}\Omega$	$3.20 \pm 0.20$	$1.60 \pm 0.20$	$0.45 \pm 0.20$	$0.60 \pm 0.20$	$0.60 \pm 0.20$
SP2512	$1\text{m}\Omega \leq R \leq 500\text{m}\Omega$	$6.40 \pm 0.20$	$3.20 \pm 0.20$	$0.80 \pm 0.20$	$1.00 \pm 0.20$	$1.00 \pm 0.20$
SP2818	$3\text{m}\Omega \leq R \leq 60\text{m}\Omega$	$7.10 \pm 0.25$	$4.60 \pm 0.25$	$0.80 \pm 0.15$	$1.30 \pm 0.15$	$1.30 \pm 0.15$

Note:

1. For relevant physical dimensions ,please refer to construction outlines.
2. Please contact with sales offices , distributors and representatives in your region before ordering.

#### ELECTRICAL CHARACTERISTICS

TYPE	POWER RATING	TOLERANCE	RESISTANCE RANCE	TCR
SP0805	0.5W	1%/2%/5%	$5\text{m}\Omega \leq R \leq 15\text{m}\Omega$	$\pm 50\text{ppm}/^\circ\text{C}$
SP1206	1W	1%/2%/5%	$1\text{m}\Omega \leq R \leq 4\text{m}\Omega$	$\pm 350\text{ppm}/^\circ\text{C}$
SP1206	1W	1%/2%/5%	$4\text{m}\Omega < R \leq 100\text{m}\Omega$	$\pm 50\text{ppm}/^\circ\text{C}$
SP2512	2W	1%/2%/5%	$1\text{m}\Omega \leq R < 2\text{m}\Omega$	$\pm 350\text{ppm}/^\circ\text{C}$
SP2512	2W	1%/2%/5%	$2\text{m}\Omega \leq R \leq 500\text{m}\Omega$	$\pm 50\text{ppm}/^\circ\text{C}$
SP2512	3W	1%/2%/5%	$1\text{m}\Omega \leq R < 2\text{m}\Omega$	$\pm 350\text{ppm}/^\circ\text{C}$
SP2512	3W	1%/2%/5%	$2\text{m}\Omega \leq R \leq 100\text{m}\Omega$	$\pm 50\text{ppm}/^\circ\text{C}$
SP2818	5W	1%/2%/5%	$3\text{m}\Omega \leq R \leq 60\text{m}\Omega$	$\pm 50\text{ppm}/^\circ\text{C}$
SP2818	7W	1%/2%/5%	$3\text{m}\Omega$	$\pm 50\text{ppm}/^\circ\text{C}$

## 4. FUNCTIONAL DESCRIPTION

### FUNCTIONAL DESCRIPTION

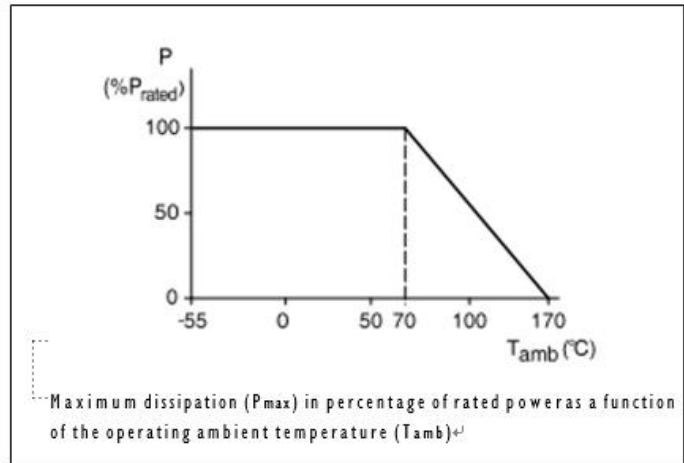
#### OPERATING TEMPERATURE RANGE

SP Range: - 55°C to +170°C

#### POWER RATING

Standard rated power at 70°C:

For detail power value, please refer to Table .



#### RATED VOLTAGE

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$$V=(P \cdot R)^{1/2}$$

Where

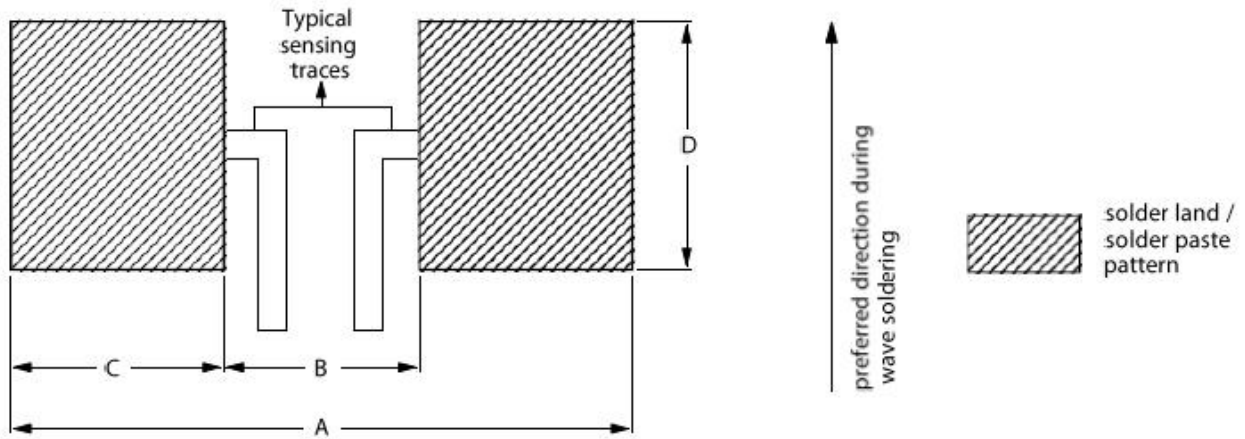
V= Continuous rated DC or AC (rms) working voltage (V)

P = Rated power (W)

R = Resistance value (Ω )

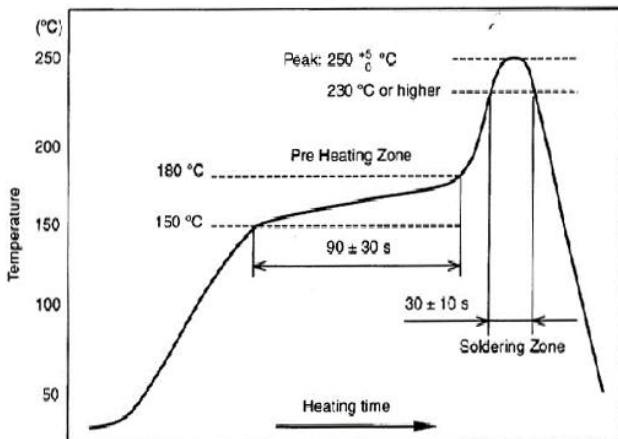
# 5. FOOTPRINT AND SOLDERING PROFILES

## FUNCTIONAL DESCRIPTION



Single resistor chips recommended dimensions of footprints

TYPE	A	B	C	D
SP0805	3.0	1.0	1.0	1.5
SP1206	5.0	1.6	1.7	1.8
SP2512	8.3	4.1	2.1	4.0
SP2818	9.52	2.5	3.51	5.1

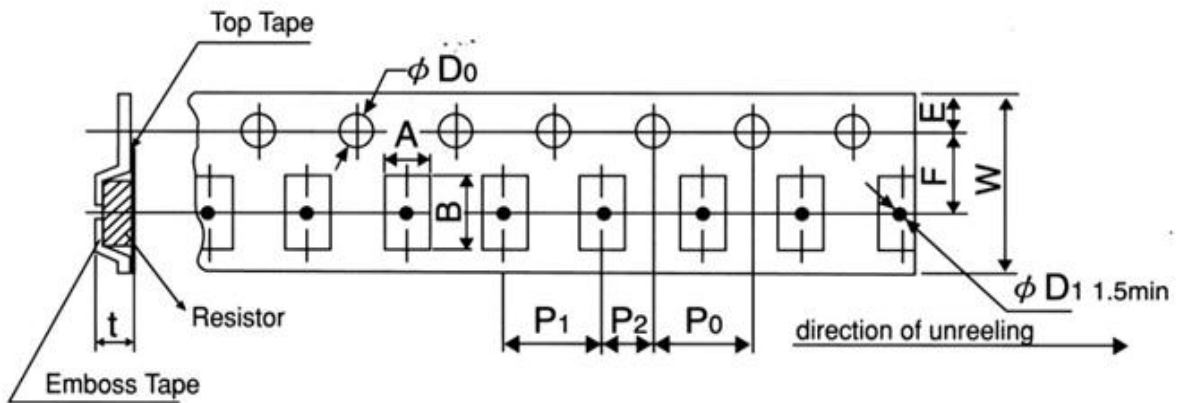


Peak value:  $250+5/-0$  °C, 5 s,  
 Preheating zone: 150~180°C,  $90\pm 30$  s,  
 Welding zone: 230°C or higher,  $30\pm 10$  s

## 6. PACKING STYLE & PACKAGING QUANTITY

### PACKING STYLE AND PACKAGING QUANTITY

TYPE	PACKING STYLE	REEL DIMENSION	QUANTITY
SP0805	Paper taping reel (P)	7"	5000
SP1206	Paper taping reel (P)	7"	5000
SP2512	Embossed taping reel (K)	7"	4000
SP2818	Embossed taping reel (K)	7"	1000

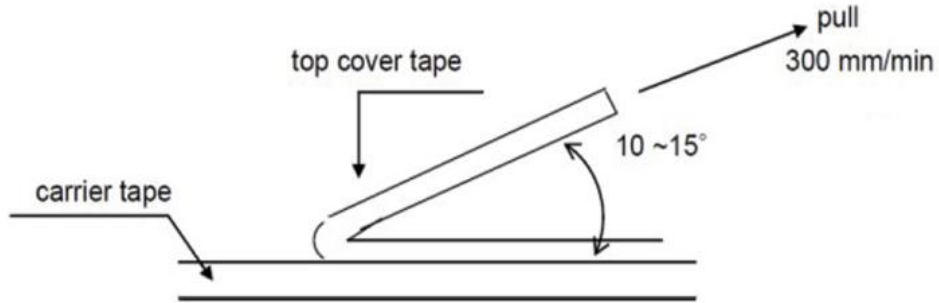


TYPE	A	B	W	F	E	P1	P2	P0	D0	t
SP0805	1.65±0.05	2.4±0.05	8.0±0.1	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.1	1.5+0.1/0	0.85±0.1
SP1206	2.0±0.15	3.6±0.2	8.0±0.2	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.05	1.5+0.1/0	0.84±0.1
SP2512	3.5±0.15	6.8±0.2	12.0±0.2	5.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.05	1.5+0.1/0	1.23±0.1
SP2818	5.0±0.1	7.5±0.1	16±0.1	7.5±0.05	1.75±0.1	8.0±0.1	2.0±0.05	4.0±0.1	1.5+0.1/0	1.4±0.1

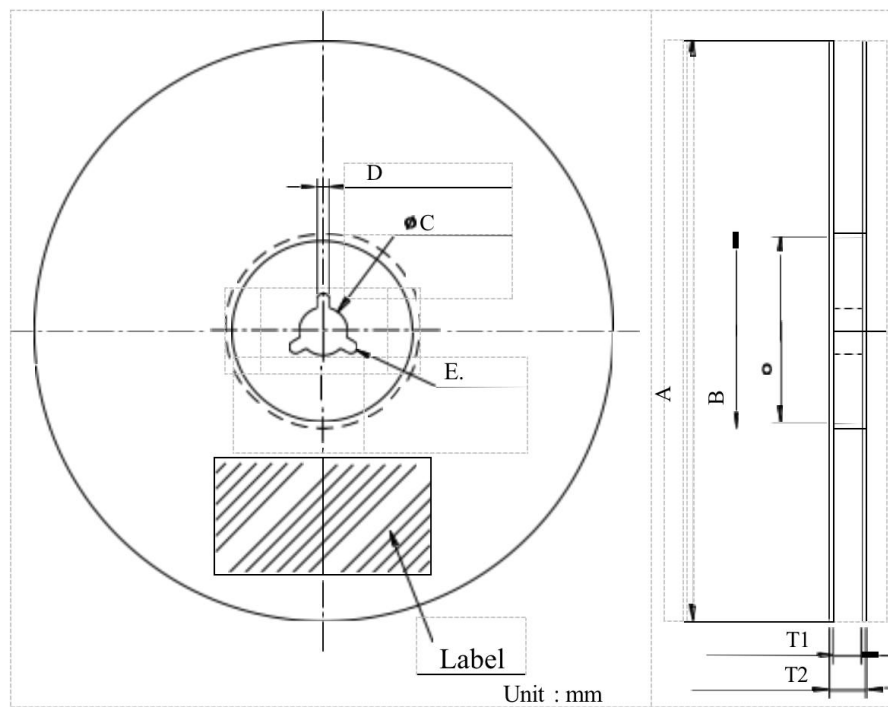


## PEEL-OFF FORCE

Peel-off forces of both paper/PE and embossed/blister tapes are in accordance with "IEC 60286-3"; that is, at a peel-off speed of  $300 \pm 10$  mm/minute, 0.1 N to 1.0 N for 8 mm tape and 0.1 N to 1.3 N for tape larger than 8 mm. The peel-off angle should be between  $165^\circ$  and  $180^\circ$ .



## REEL SPECIFICATION



Unit : mm

Unit: mm

TYPE	A	B	C	D	E	T1
SP0805	$178 \pm 2.0$	$60 \pm 1.0$	$13 \pm 1.0$	$2.0 \pm 0.5$	$>22$	$9.0 \pm 0.3$
SP1206	$178 \pm 2.0$	$60 \pm 1.0$	$13 \pm 1.0$	$2.0 \pm 0.5$	$>22$	$9.0 \pm 0.3$
SP2512	$178 \pm 2.0$	$60 \pm 1.0$	$13 \pm 1.0$	$2.0 \pm 0.5$	$>22$	$13 \pm 0.3$
SP2818	$178 \pm 2.0$	$60 \pm 1.0$	$13 \pm 1.0$	$2.0 \pm 0.5$	$>22$	$17.4 \pm 0.5$

# 7. TESTS AND REQUIREMENTS

## TESTS AND REQUIREMENTS

Project	Test Method	Specifications and Requirements
<b>Temperature coefficient (TCR)</b>	Resistance values were measured at 25(T1, R1) and 125(T2, R2), and TCR was calculated as $(R2-R1)/(R1 (T2-T1)) * 10^6$	Refer to TCR specifications for physical features
<b>Short Time Overload</b>	0805~2512 :5 times rated power, maintain 5s; 2818: 3 times rated power, maintain 5s	$\Delta R \leq \pm (1.0\%+0.05m\Omega)$
<b>Insulation resistance</b>	Apply 100V±15V DC voltage between electrode and substrate, hold for 60 seconds, then measure insulation resistance	> 100MΩ
<b>Withstand voltage</b>	An alternating current with an effective value of the maximum overload voltage is applied between the electrode and the substrate at a rate of approximately 100V/S, maintaining 60±5s	No breakdown or arc
<b>Solder ability</b>	245°C±5°C tin tank, hold 2s±0.5s	At least 95% of surface area of electrode shall be covered with new solder
<b>Resistance to Soldering Heat</b>	260°C±5°C tin tank, hold for 10s±1s	$\Delta R \leq \pm (0.5\%+0.05m\Omega)$ , no visible damage
<b>Bending test</b>	Bending distance 2mm, hold time 60s±5s	$\Delta R \leq \pm (0.5\%+0.05m\Omega)$ , no visible damage
<b>Solvent resistance</b>	Isopropanol (IPA) at 23°C±5°C for 10 hours	No obvious damage to appearance
<b>High Temperature Exposure</b>	150°C±2°C, 1000H, stand for 1H, test the resistance value	$\Delta R \leq \pm (1.0\%+0.05m\Omega)$
<b>Low Temperature Exposure</b>	-55°C±2°C, 1000H, stand for 1H, test the resistance value	$\Delta R \leq \pm (1.0\%+0.05m\Omega)$
<b>Rapid change of Temperature</b>	-55°C 30 minutes ~ normal temperature 5 minutes ~155°C 30 minutes, 1000 cycles	$\Delta R \leq \pm (1.0\%+0.05m\Omega)$
<b>Load Life</b>	70°C±2°C, 1000 hours, rated power, 1.5 hours on / 0.5 hours off	$\Delta R \leq \pm (1.0\%+0.05m\Omega)$
<b>Moisture with Load</b>	85°C±2°C, 85%±3%RH, 1000 hours, rated power, 1.5 hours on / 0.5 hours off	$\Delta R \leq \pm (1.0\%+0.05m\Omega)$

## 8. REVISION HISTORY

### REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTIONN
Version 1	24-03-2022	-	-First issue of this specification

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