

# Two-Terminal, Metal Type Current Shunt Resistor

## SSA Series



### Description

Littelfuse SSA Series is a two-terminal, ultra-low resistance shunt resistor. The SSA shunt resistors are of superior quality and are best suited for applications including power hybrid applications, frequency converters, power modules, and communication systems.

### Features & Benefits

- English case sizes 2512, 3921, and 5931
- Resistance from 0.2 mΩ~4 mΩ
- Power up to 15 W
- Tolerance down to ±1.0%
- Temperature Coefficient of Resistance (TCR) down to ±50 ppm/°C
- Small size
- High voltage
- Halogen-free, lead-free and RoHS compliant

### Additional Information



Resources



Accessories



Samples

### Application

- Hybrid Power Application
- Frequency Converter
- Power Module
- Communication System

### Electrical Specifications

Part number	Size		Resistance Value		Power (70°C)	Power (100°C)	TCR (ppm/°C)	Standard package Qty
	inch	mm	Ro (mΩ)	Rt (%)	W	W		
SSA2512L0M20FPR	2512	6432	0.2	±1.0%	6	4	±200	2000
SSA2512L0M25FPR	2512	6432	0.25	±1.0%	5	3	±175	2000
SSA2512L0M30FPR	2512	6432	0.3	±1.0%	5	4	±175	2000
SSA2512L0M50FWR	2512	6432	0.5	±1.0%	6	4	±150	3000
SSA2512LR001FWR	2512	6432	1	±1.0%	6	4	±100	3000
SSA2512LR002FWR	2512	6432	2	±1.0%	6	4	±50	3000
SSA2512LR003FWR	2512	6432	3	±1.0%	4	3	±50	3000
SSA2512LR004FWR	2512	6432	4	±1.0%	4	2	±50	3000
SSA2512L0M20JPR	2512	6432	0.2	±5.0%	6	4	±200	2000
SSA2512L0M25JPR	2512	6432	0.25	±5.0%	5	3	±175	2000
SSA2512L0M30JPR	2512	6432	0.3	±5.0%	5	4	±175	2000
SSA2512L0M50JWR	2512	6432	0.5	±5.0%	6	4	±150	3000
SSA2512LR001JWR	2512	6432	1	±5.0%	6	4	±100	3000
SSA2512LR002JWR	2512	6432	2	±5.0%	6	4	±50	3000
SSA2512LR003JWR	2512	6432	3	±5.0%	4	3	±50	3000
SSA2512LR004JWR	2512	6432	4	±5.0%	4	2	±50	3000
SSA3921L0M20FWR	3921	50110	0.2	±1.0%	9	5	±150	3000
SSA3921L0M30FWR	3921	50110	0.3	±1.0%	10	5	±150	3000
SSA3921L0M50FWR	3921	50110	0.5	±1.0%	9	5	±70	3000
SSA3921L0M75FWR	3921	50110	0.75	±1.0%	8	5	±70	3000
SSA3921LR001FWR	3921	50110	1	±1.0%	7	4	±50	3000
SSA3921LR002FWR	3921	50110	2	±1.0%	6	4	±50	3000
SSA3921LR003FWR	3921	50110	3	±1.0%	6	3	±50	3000
SSA3921LR004FWR	3921	50110	4	±1.0%	5	2,5	±50	3000
SSA3921L0M20JWR	3921	50110	0.2	±5.0%	9	5	±150	3000
SSA3921L0M30JWR	3921	50110	0.3	±5.0%	10	5	±150	3000
SSA3921L0M50JWR	3921	50110	0.5	±5.0%	9	5	±70	3000
SSA3921L0M75JWR	3921	50110	0.75	±5.0%	8	5	±70	3000

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	inch	mm	Ro (mΩ)	Rt (%)	W	W		
SSA3921LR001JWR	3921	50110	1	±5.0%	7	4	±50	3000
SSA3921LR002JWR	3921	50110	2	±5.0%	6	4	±50	3000
SSA3921LR003JWR	3921	50110	3	±5.0%	6	3	±50	3000
SSA5931L0M20FDR	5931	75150	0.2	±1.0%	15	10	±125	1500
SSA5931L0M30FDR	5931	75150	0.3	±1.0%	10	7	±100	1500
SSA5931L0M50FDR	5931	75150	0.5	±1.0%	8	6	±100	1500
SSA5931L0M70FDR	5931	75150	0.7	±1.0%	7	4	±100	1500
SSA5931L0M75FDR	5931	75150	0.75	±1.0%	7	4	±100	1500
SSA5931LR001FDR	5931	75150	1	±1.0%	10	7	±50	1500
SSA5931LR002FDR	5931	75150	2	±1.0%	8	6	±50	1500
SSA5931LR003FDR	5931	75150	3	±1.0%	7	4	±50	1500
SSA5931L0M20JDR	5931	75150	0.2	±5.0%	15	10	±125	1500
SSA5931L0M30JDR	5931	75150	0.3	±5.0%	10	7	±100	1500
SSA5931L0M50JDR	5931	75150	0.5	±5.0%	8	6	±100	1500
SSA5931L0M70JDR	5931	75150	0.7	±5.0%	7	4	±100	1500
SSA5931L0M75JDR	5931	75150	0.75	±5.0%	7	4	±100	1500
SSA5931LR001JDR	5931	75150	1	±5.0%	10	7	±50	1500
SSA5931LR002JDR	5931	75150	2	±5.0%	8	6	±50	1500
SSA5931LR003JDR	5931	75150	3	±5.0%	7	4	±50	1500

### Storage / Environment Conditions

Products should be stored under the following environmental conditions.

<b>Temperature:</b>	+5 to +35 °C
<b>Humidity:</b>	45 to 85% relative humidity
<b>Moisture Sensitivity Level</b>	1, J-STD-020

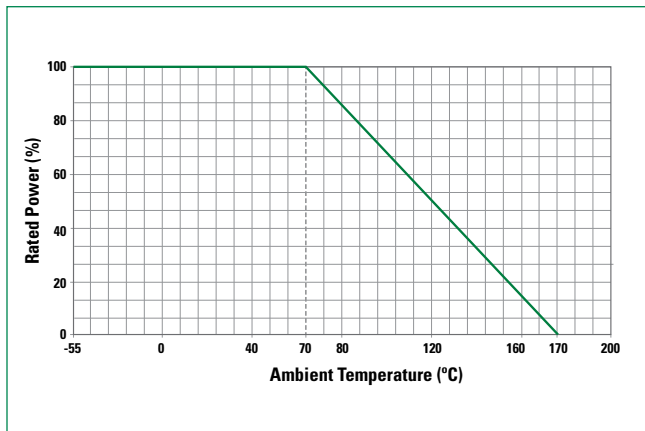
Do not keep products in environments where they may be subject to particulate contamination or harmful gases such as sulfuric acid or hydrogen chloride as it may cause oxidization on electrodes, resulting poor solderability.

Products should be stored in a space that does not expose to high temperatures, vibration, or direct sunlight.

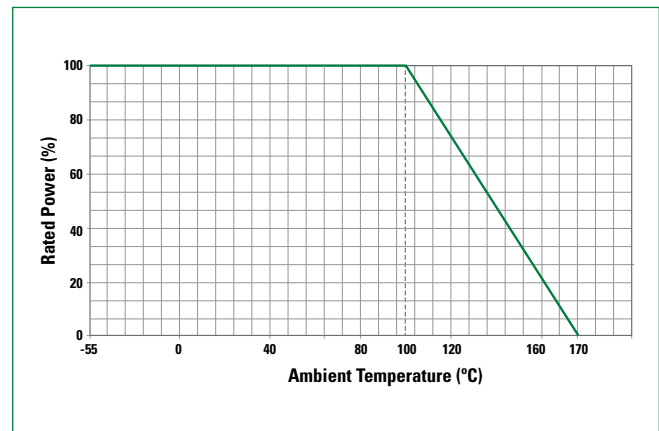
Products should be stored in the original airtight packaging until use.

### Temperature De-rating Curves

Terminal Temperature at 70°C



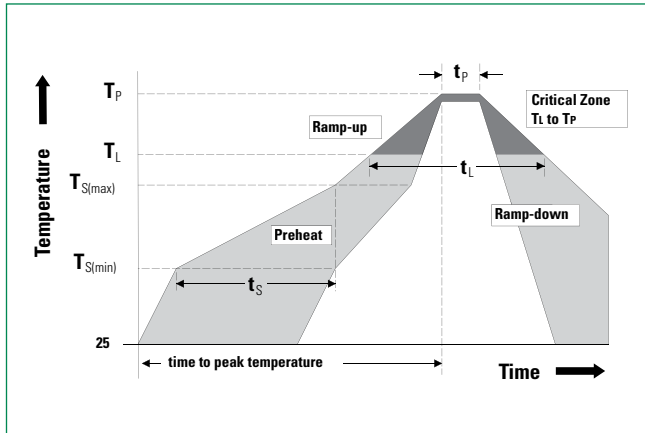
Terminal Temperature at 100°C



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### Soldering Parameters—Wave Soldering



<b>Profile Feature</b>		Pb-Free Assembly
<b>Average Ramp-Up Rate (<math>T_{S(max)}</math> to <math>T_p</math>)</b>		3 °C / second Max.
<b>Preheat</b>	<b>Temperature Minimum (<math>T_{S(min)}</math>)</b>	150 °C
	<b>Temperature Maximum (<math>T_{S(max)}</math>)</b>	200 °C
	<b>Time (<math>T_{S(min)}</math> to (<math>T_{S(max)}</math>)</b>	60–180 seconds
<b>Time maintained above</b>	<b>Temperature Minimum (<math>T_l</math>)</b>	217 °C
	<b>Time (<math>t_l</math>)</b>	60–150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 +0 °C
<b>Time within 5 °C of Actual Peak Temperature (<math>t_p</math>)</b>		20–40 seconds
<b>Ramp-Down Rate</b>		6 °C / second Max.
<b>Time 25 °C to Peak Temperature</b>		8 minutes Max.

### Reliability Specifications

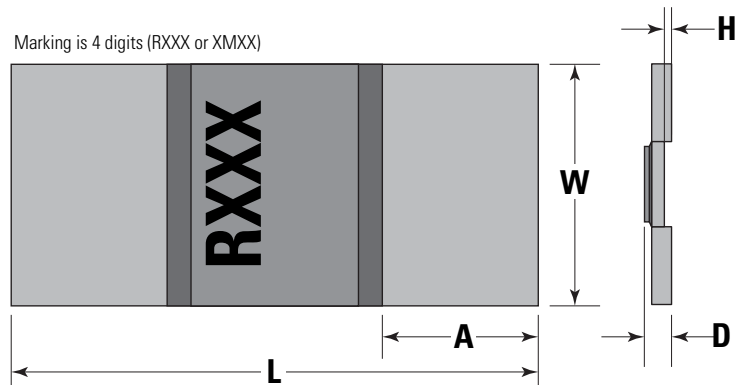
Test	Procedure	Specifications
<b>Resistance Data</b>	Resistance data at 25 °C	Must meet datasheet requirements
<b>TCR Data</b>	Tested at 25 °C and 125 °C $TCR = (R_b - R_a) / R_a \times 1 / (T_b - T_a) \times 10^6$	Must meet datasheet requirements
<b>Dimensional Data</b>	Measure all dimensions specified in datasheet	Must meet datasheet requirements
<b>Short Time Overload</b> JIS-C-5201, 4.13	Applied voltage: 2.5X rated voltage. Test duration: 5 seconds	±1.0%
<b>Operational Life</b> MIL-STD-202, Method 108	Condition D Steady State $T_A = 125$ °C at rated power Test period: 1,000 hours	±1.0%
<b>Biased Humidity</b> MIL-STD-202, Method 103	Test Condition: 85 °C / 85% RH 10% of operating power Test period: 1,000 hours	±1.0%
<b>Temperature Cycle (Thermal Shock)</b> JESD22-A-104	Repeat 1,000 cycles as follows: -55 °C (30 min.) / +155 °C (30 min.) Transition time of 1 minute maximum	±1.0%
<b>Resistance To Solder Heat</b> J-STD-020	One reflow cycle according to JEDEC J-STD-020, cool down then parts are immersed into a molten solder bath with a temperature of 260 °C for a period of $10 \pm 1$ seconds	Part must meet initial specifications following testing
<b>High Temperature Exposure</b> MIL-STD-202, Method 108, Condition D	Test Temperature: Maximum rated operational temperature Test period: 1,000 hours No electrical load	±1.0%
<b>Vibration</b> MIL-STD-202, Method 204, Condition B	Frequency: 10–2,000 Hz Acceleration: 15G Test Duration: 20 mins / 12 Cycles	±1.0%
<b>Mechanical Shock</b> IEC60115-1, 4.21	Force: 100G Test Duration: 6 ms	±1.0%
<b>Solderability</b> MIL-STD-202, Method 208H, Category 3	Dipped into molten solder for $3 \pm 1$ seconds at 245 °C Flux activity type R0	New solder coverage of 90% minimum

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### Dimensions

All dimensions in mm

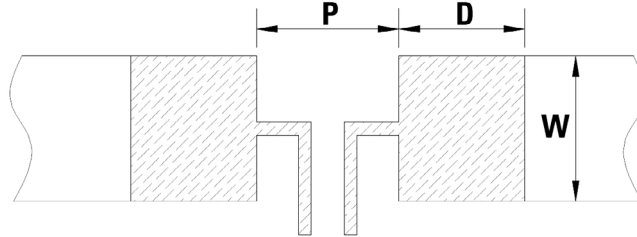


Part Number	Resistance Value	W	L	H	A	D
SSA2512	0.2mΩ	3.02 ±0.25	6.35 ±0.20	0.35 ±0.05	1.00 ±0.30	1.40
	0.25mΩ					1.06
	0.3mΩ					1.40
	0.5mΩ					0.85
	1mΩ					0.44
	2mΩ					0.67
	3mΩ					0.42
	4mΩ					0.33
SSA3921	0.2mΩ	5.20 ±0.30	10.0 ±0.30	0.50 ±0.10	2.00 ±0.30	1.40
	0.3mΩ					1.28
	0.5mΩ					0.83
	0.75mΩ					0.56
	1mΩ					0.42
	2mΩ					0.58
	3mΩ					0.38
	4mΩ					0.28
SSA5931	0.2mΩ	7.75 ±0.30	15.0 ±0.30	0.50 ±0.10	4.00 ±0.30	1.35
	0.3mΩ					1.13
	0.5mΩ					0.62
	0.7mΩ					0.43
	0.75mΩ					0.38
	1mΩ					1.07
	2mΩ					0.49
	3mΩ					0.34

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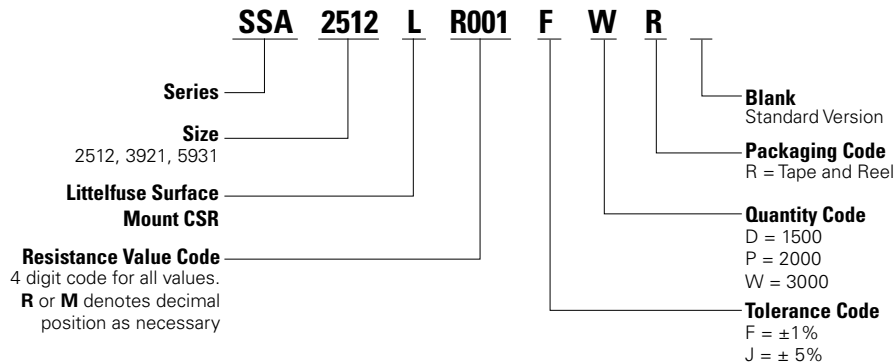
### Recommended Land Pattern



Part Number	Resistance	P	D	W
SSA2512	0.2 mΩ~4 mΩ	3.60 mm	1.60 mm	3.40 mm
SSA3921	0.2 mΩ~4 mΩ	5.60 mm	2.70 mm	6.20 mm
SSA5931	0.2 mΩ~3 mΩ	5.60 mm	5.20 mm	8.75 mm

**Note:** Provisions must be made to ensure that the part does not exceed the maximum operating temperature in the customers application.

### Part Numbering System



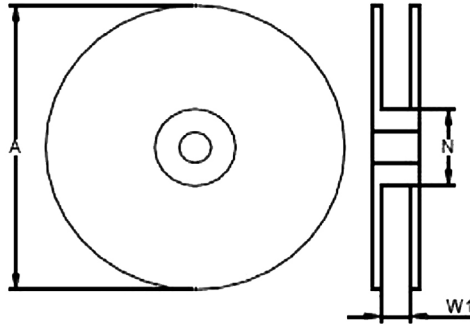
### Packaging

Part Number	Resistance Value (Ω)	Halogen Free	Packaging Option	Quantity	Quantity & Packaging Codes
SSA2512	0.2 mΩ~0.3 mΩ	Yes	Tape and Reel	2000	PR
	0.5 mΩ~4 mΩ	Yes	Tape and Reel	3000	WR
SSA3921	0.2 mΩ~4 mΩ	Yes	Tape and Reel	3000	WR
SSA5931	0.2 mΩ~3 mΩ	Yes	Tape and Reel	1500	DR

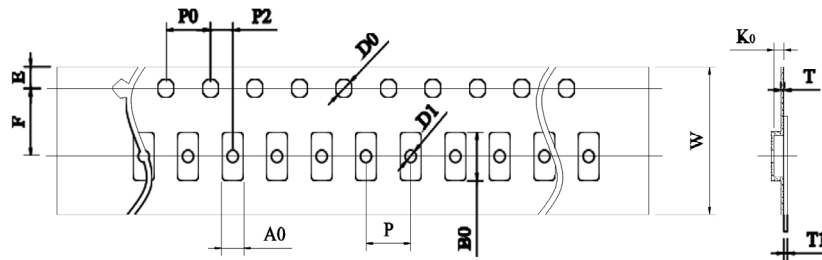
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### Tape and Reel Specifications



Size	Resistance Value ( $\Omega$ )	A $\pm$ 5 (mm)	N $\pm$ 2 (mm)	W1 $\pm$ 1 (mm)
2512	0.3 m $\Omega$ ~4.0 m $\Omega$	178	60	13.0
3921	0.2 m $\Omega$ ~4.0 m $\Omega$	330	100	24.5
5931	0.2 m $\Omega$ ~3.0 m $\Omega$	330	100	24.5



Size	Resistance ( $\Omega$ )	W (mm)	P0 (mm)	P (mm)	P2 (mm)	A0 (mm)	B0 (mm)	D0 (mm)	F (mm)	E (mm)	T (mm)	T1 (mm)	K0 (mm)
2512	0.2m $\Omega$ ~0.3m $\Omega$	12.00 $\pm$ 0.30	4.00 $\pm$ 0.10	4.00 $\pm$ 0.10	2.00 $\pm$ 0.10	3.40 $\pm$ 0.20	6.75 $\pm$ 0.20	1.55 $\pm$ 0.10	5.50 $\pm$ 0.10	1.75 $\pm$ 0.10	0.20 $\pm$ 0.10	Max 0.10	1.85 $\pm$ 0.20
	0.5m $\Omega$ , 2m $\Omega$	12.00 $\pm$ 0.30	4.00 $\pm$ 0.10	4.00 $\pm$ 0.10	2.00 $\pm$ 0.10	3.40 $\pm$ 0.20	6.75 $\pm$ 0.20	1.55 $\pm$ 0.10	5.50 $\pm$ 0.10	1.75 $\pm$ 0.10	0.40 $\pm$ 0.10	Max 0.10	1.30 $\pm$ 0.20
	1m $\Omega$ , 3m $\Omega$ , 4m $\Omega$	12.00 $\pm$ 0.30	4.00 $\pm$ 0.10	4.00 $\pm$ 0.10	2.00 $\pm$ 0.10	3.40 $\pm$ 0.20	6.75 $\pm$ 0.20	1.55 $\pm$ 0.10	5.50 $\pm$ 0.10	1.75 $\pm$ 0.10	0.20 $\pm$ 0.10	Max 0.10	0.98 $\pm$ 0.20
3921	0.2m $\Omega$ ~0.3m $\Omega$	24.00 $\pm$ 0.30	4.00 $\pm$ 0.10	8.00 $\pm$ 0.10	2.00 $\pm$ 0.10	5.70 $\pm$ 0.20	11.50 $\pm$ 0.20	1.55 $\pm$ 0.10	11.50 $\pm$ 0.10	1.75 $\pm$ 0.10	0.30 $\pm$ 0.10	Max 0.10	2.10 $\pm$ 0.10
	0.5m $\Omega$ ~4m $\Omega$	24.00 $\pm$ 0.30	4.00 $\pm$ 0.10	8.00 $\pm$ 0.10	2.00 $\pm$ 0.10	5.70 $\pm$ 0.20	11.50 $\pm$ 0.20	1.55 $\pm$ 0.10	11.50 $\pm$ 0.10	1.75 $\pm$ 0.10	0.30 $\pm$ 0.10	Max 0.10	1.50 $\pm$ 0.10
5931	0.2m $\Omega$ ~0.3m $\Omega$ , 1m $\Omega$	24.00 $\pm$ 0.30	4.00 $\pm$ 0.10	12.00 $\pm$ 0.10	2.00 $\pm$ 0.10	8.25 $\pm$ 0.20	15.50 $\pm$ 0.20	1.55 $\pm$ 0.10	11.50 $\pm$ 0.10	1.75 $\pm$ 0.10	0.30 $\pm$ 0.10	Max 0.10	2.10 $\pm$ 0.10
	0.5m $\Omega$ ~0.75m $\Omega$ , 2m $\Omega$ ~3m $\Omega$	24.00 $\pm$ 0.30	4.00 $\pm$ 0.10	12.00 $\pm$ 0.10	2.00 $\pm$ 0.10	8.25 $\pm$ 0.20	15.50 $\pm$ 0.20	1.55 $\pm$ 0.10	11.50 $\pm$ 0.10	1.75 $\pm$ 0.10	0.30 $\pm$ 0.10	Max 0.10	1.50 $\pm$ 0.10

**Note:** Tape and reel packaging in accordance to EIA-481

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