

VSML2512S4 Series, Current Sensor Resistor (Lead / Halogen Free)

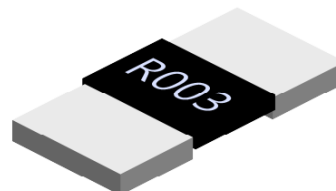
The history of revision change for the specification

Date	Revision	Changes
2022/2/9	A0	New Approval standard (Poyin)
2022/3/8	A1	Remove Marking (Poyin)
2022/4/14	A2	Add Marking (YT)
2022/7/11	A3	Add two descriptions of care note for storage in care note chapter (CH)
2022/10/27	A4	Use the same form and modify description of care note (CHW)
2023/2/24	A5	Remove ESD test item (CH)

VSML2512S4 Series, Current Sensor Resistor (Lead / Halogen Free)

Features / Applications:

- High power rating is up to 4W
- Welding construction; excellent long-term stability
- Automotive applications
- RoHS compliant and AEC-Q200 qualified



Electrical Specifications:

Characteristics ¹	Feature
Power Rating ²	4 W
Resistance Value	3 mΩ
Temperature Coefficient of Resistance (25/125 °C)	±75 ppm/°C
Operation Temperature Range	-65°C ~ +170 °C
Resistance Tolerance	± 1%
Maximum Working Voltage (V)	$(P \cdot R)^{1/2}$

1. For detail information, please refer to the table on page 3 P/N list.
2. For resistors operated at terminal temperature over 100 °C, the maximum load shall be derated in accordance with the following curve.

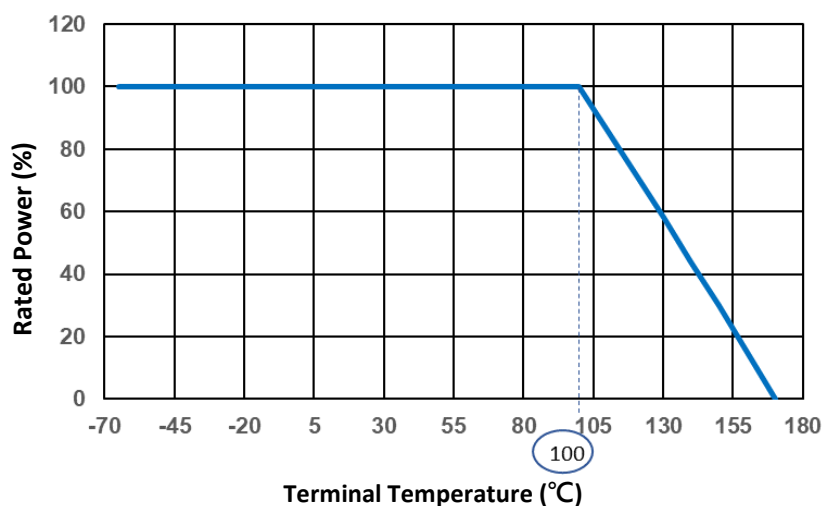
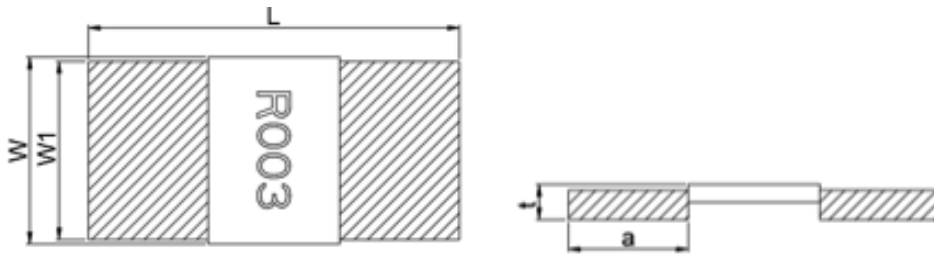


Figure 1.: Power derating curve at terminal temperature

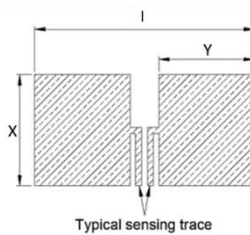
Outline Drawing:

Schematic Diagram and Marking



Dimensions (mm)	
Resistance Range (mΩ)	3
L	6.35 ± 0.25
W	3.20 ± 0.25
W1	3.05 ± 0.15
t	0.60 ± 0.25
a	2.05 ± 0.25

Recommended Solder Pad Dimensions



Resistance Range	Dimensions		
mΩ	X (mm)	Y (mm)	I (mm)
3	3.7	3.2	7.35



Current Sensor Resistor

Type Designation:

V S M L 2512 S □ — □ □ □ □ □
(1) (2) (3) (4) (5) (6)

Note:

- (1) Series No.
- (2) Size
- (3) Terminal Type: S = Short terminal
- (4) Power Rating: 4 = 4W
- (5) Resistance Value: R003 = 0.003Ω
- (6) Tolerance: F = ±1%, G = ±2%, J = ±5%

P/N list:

P/N	R value	TCR	Power Rating	Tolerance		
	(mΩ)	(ppm/K)	(W)	1%	2%	5%
VSML2512S4-R003*	3.0	±75	4	✓		

* Note: Other values and tolerance would be available, please contact Cyntec.

Characteristics:

Electrical

Item	Specification and Requirement	Test Method
Temperature Coefficient (TCR)	As follow specification	JIS-C-5201 +25 °C / +125 °C.
Short Time Overload	$\Delta R: \pm 0.5\%$ Without damage by flashover, spark, arcing, burning or breakdown	JIS-C-5201-1 4.13 2.5 x rated power for 5 seconds.
Insulation Resistance	Over 100 M Ω on Overcoat layer face up	JIS-C-5201-1 4.6 100 V _{DC} for 60 +10/-0 seconds
Voltage Proof	$\Delta R: \pm 1\%$ Without damage by flashover, spark, arcing, burning or breakdown	JIS-C-5201-1 4.7 400 V _{AC} (rms.) for 60 +10/-0 seconds

Mechanical

Item	Specification and Requirement	Test Method
Solderability	The surface of terminal immersed shall be minimum of 95% covered with a new coating of solder	J-STD-002 Method B category 3 245 \pm 5 °C for 5 \pm 0.5 seconds.
Resistance to Solder Heat	$\Delta R: \pm 0.5\%$ Without distinct damage in appearance	MIL-STD-202 Method 210 260 \pm 5 °C for 10 \pm 1 seconds.
Board Flex	$\Delta R: \pm 1.0\%$ Without mechanical damage such as break.	AEC-Q200-005 Bending value: 2 mm for 60 \pm 1 seconds.
Vibration	$\Delta R: \pm 0.5\%$ Without distinct damage in appearance	MIL-STD-202 Method 204 5G's for 20 minutes, 12 cycles each of 3 orientations. Test from 10-2000 Hz.

Mechanical Shock	$\Delta R: \pm 0.5\%$ Without distinct damage in appearance	MIL-STD-202 Method 213 100G's peak value, 6ms, Half-sine waveform, 12.3 ft/sec.
Terminal Strength (SMD)	$\Delta R: \pm 1\%$ Without mechanical damage such as break.	AEC-Q200-006 Force of 1.8 Kg for 60 seconds.

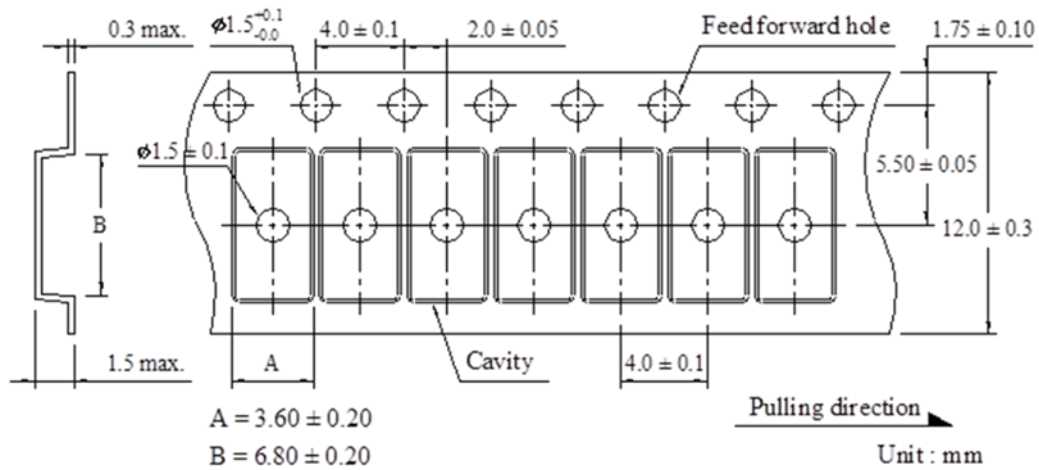
Endurance

Item	Specification and Requirement	Test Method
Temperature Cycling	$\Delta R: \pm 0.5\%$ Without distinct damage in appearance	JESD22 Method JA-104 -55 °C to 150 °C /1000cycle 30 min maximum dwell time at each temperature on FR4(PCB).
Biased Humidity	$\Delta R: \pm 0.5\%$ Without distinct damage in appearance	MIL-STD-202 Method 103 1000 hours, 85 °C /85%R.H, applied for 10% rated power.
Operational Life	$\Delta R: \pm 1.0\%$ Without distinct damage in appearance	MIL-STD-202 Method 108 70 °C, 100% rated power 1.5 hours ON, 0.5 hours Off For total 1000 hours
High Temperature Storage	$\Delta R: \pm 1.0\%$ Without distinct damage in appearance	MIL-STD-202 Method 108 170 °C for 1000 hours.
Moisture Resistance	$\Delta R: \pm 0.5\%$ Without distinct damage in appearance	MIL-STD-202 Method 106 65 °C /90-100%RH, unpowered, 7b not required

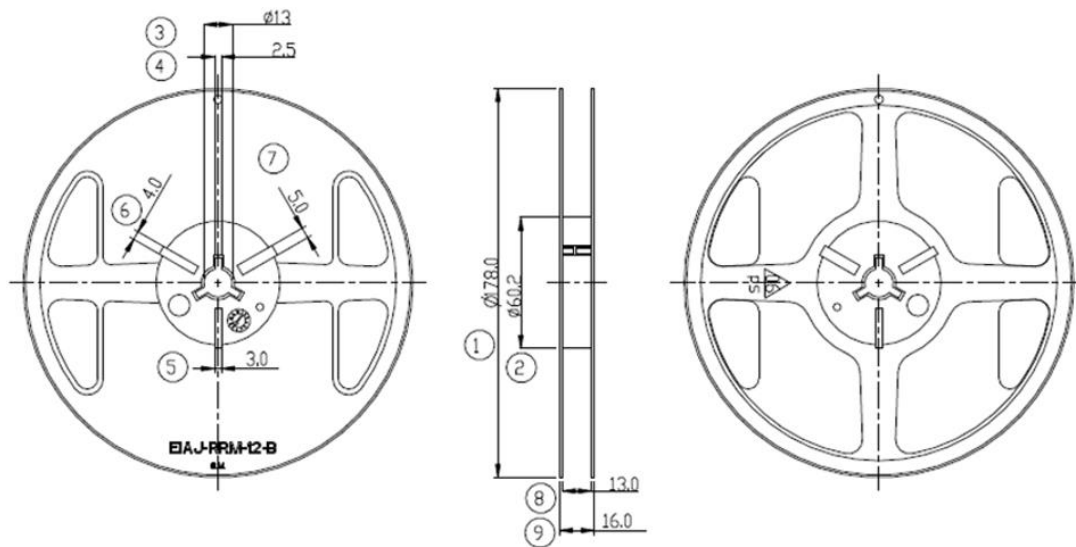
Note: Measurement at 24 ± 4 hours after test conclusion for all reliability tests-parts.

Packing Descriptions:

Dimensions:



Reel Dimensions:

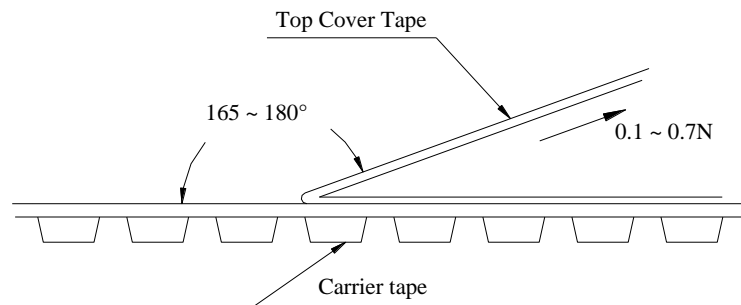


Unit: mm

Symbol	1	2	3	4	5	6	7	8	9
Size	178.0 ± 1	60.2 ± 0.5	13.0 ± 0.5	2.5 $+0.5/-0$	3.0 $+0.5/-0$	4.0 $+0.5/-0$	5.0 $+0.5/-0$	13.0 ± 0.5	16.0 ± 0.15

Peel Strength of Top Cover Tape:

The peel speed shall be about 300 mm/min and the peel force of top cover tape shall between 0.1 to 0.7 N



Number of Taping:

2,000 pieces / reel

Label Marking:

The following items shall be marked on reel

- (1) Description
- (2) Quantity
- (3) Part No.
- (4) Tapping No.

Care Note:

Care note for storage

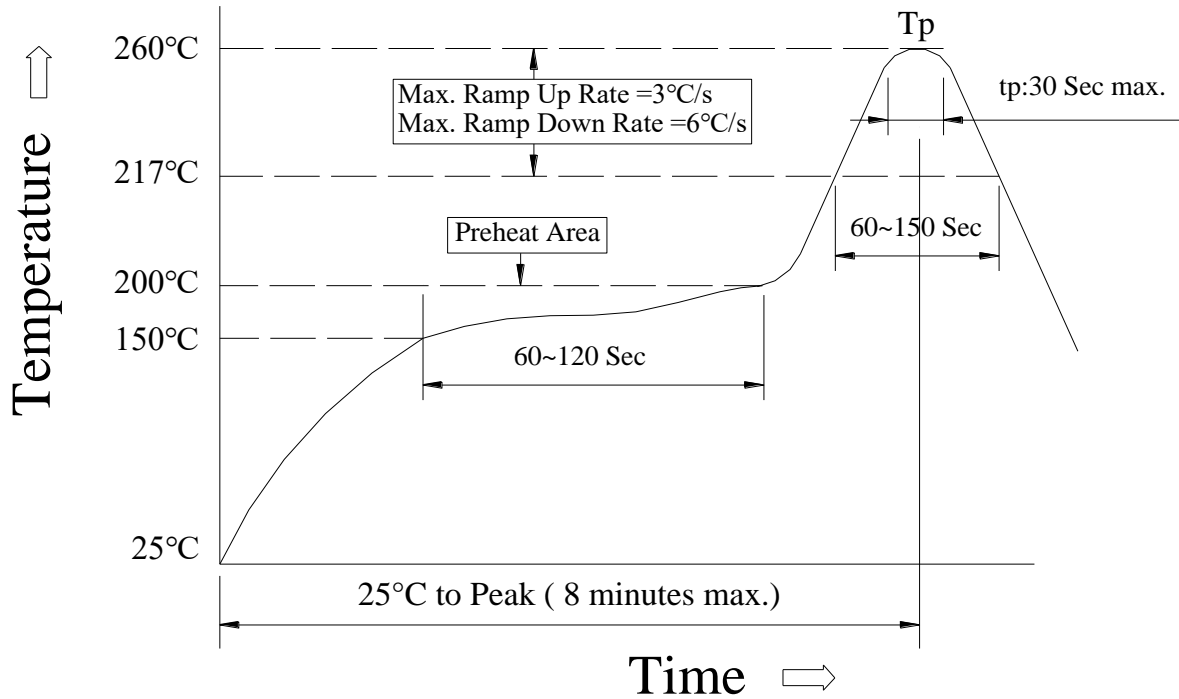
- (1) Current sensor resistor shall be stored in a room where temperature and humidity must be controlled.
(temperature from 5 to 35 °C; humidity < 60% RH. However, humidity should be kept as low as possible.)
- (2) Current sensor resistor shall be stored to prevent from direct sunshine.
- (3) Current sensor resistor shall be stored without moisture, dust and harmful gas (chloridation hydrogen, sulfurous acid, and sulfuration hydrogen), or the current sensor resistor will fail on solderability test.
- (4) Expiration date: One year after shipping date (product is required to return after expiration date)
- (5) Solderability should be confirmed in case of exceeding 12 months.

Care note for operating and handling

- (1) Protect the edge and coating of the sensors from mechanical stress.
- (2) Avoid bending of printing circuit board (PCB) when cutting and fixing it on support body to reduce mechanical stress on sensors.
- (3) Sensor should be used within the condition of specification.
Note: if the voltage loaded on the sensor is higher than specified value, the current sensor resistor may fail due to temperature rise.
- (4) The loaded voltage should consider terminal temperature of the sensor according to the derating curve.
- (5) When applying a high current over suggested specification (pulse current, shock current) to the current sensor resistor, it is necessary to re-evaluate the operating condition before using it.

Reflow profile:

Suggested Reflow Profile



(1) Reflow Soldering Method:

Reflow Soldering	Tp: 255~260 °C	Max.30 seconds (Tp)
	217 °C	60~150 seconds
Pre-Heat	150 ~ 200 °C	60~120 seconds
Time (25 °C to peak temperature)	8 minutes max.	

Reference: JEDEC J-STD-020E