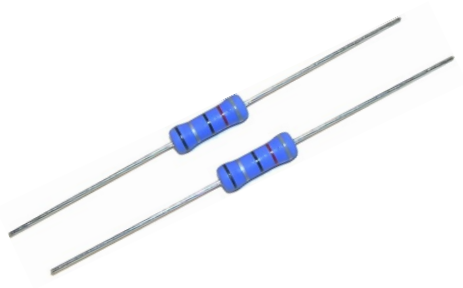
Features:

- Excellent anti-surge characteristics
- Stable characteristics through the resistance range
- Good alternative to carbon composition resistors
- Applications include power supplies, CRT's, and anti-surge circuits
- Cut and formed product is available on select sizes; contact Stackpole for details
- Flameproof coating per UL94 V-0
- RoHS compliant, lead free and halogen free
- REACH compliant



Electrical Specifications - ASR

Type/Code	Power Rating (W) @ 70ºC	Maximum Working Voltage[1] (V)	Maximum Overload Voltage (V)	Dielectric Withstand Voltage (VAC)	Surge Withstanding[2] (V)	Ohmic Range (Ω) and Tolerance
						5%
ASR14	0.25	DC 1600 AC 1150	DC 2000 AC 1500	400	1000 3000	3.3 - 510K 560K - 12M
ASR1	1	4000	5000	500	5000 10000	3.3 - 510K 560K - 12M

(1) Lesser of $\sqrt{P*R}$ or maximum working voltage.

(2) 10 discharges from a 0.01 µF capacitor every 5 seconds.

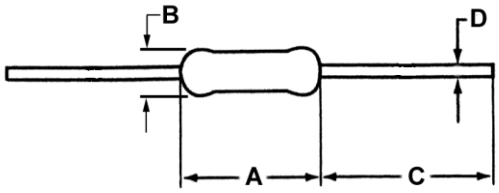
Electrical Specifications - ASRM

Type/Code	Power Rating (W) @ 70ºC	Maximum Working Voltage[1] (V)	Maximum Overload Voltage (V)	Dielectric Withstand Voltage (VAC)	Surge Withstanding[2] (V)	Ohmic Range (Ω) and Tolerance
						5%
ASRM14	0.25	500	1000	200	2000	100K - 22M
ASRM12	0.5	2000	2500	500	5000 10000	3.3 - 510K 560K - 12M
ASRM1	1	4000	5000	500	5000 10000	3.3 - 510K 560K - 12M
ASRM2	2	4000	5000	500	5000 10000	3.3 - 510K 560K - 12M

(1) Lesser of $\sqrt{P*R}$ or maximum working voltage.

(2) 10 discharges from a 0.01 µF capacitor every 5 seconds.

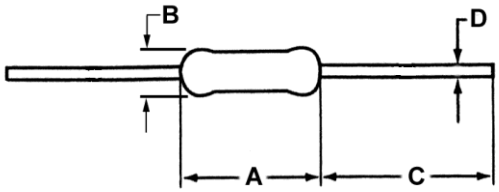
Mechanical Specifications - ASR



Type/Code	Weight (mg / pc)	A Body Length	B Body Diameter	C Lead Length (Bulk)	D Lead Diameter	Unit
ASR14	210	0.236 ± 0.012 6.00 ± 0.30	0.091 ± 0.008 2.30 ± 0.20	1.102 ± 0.118 28.00 ± 3.00	0.022 ± 0.002 0.55 ± 0.05	inches mm
ASR1	1340	0.591 ± 0.039 15.00 ± 1.00	0.197 ± 0.020 5.00 ± 0.50	1.378 ± 0.118 35.00 ± 3.00	0.031 ± 0.002 0.80 ± 0.05	inches mm

This specification may be changed at any time without prior notice.
Please confirm technical specifications before you order and/or use.

Mechanical Specifications - ASRM



Type/Code	Weight (mg/pc)	A Body Length	B Body Diameter	C Lead Length (Bulk)	D Lead Diameter	Unit
ASRM14	110	0.126 ± 0.008 3.20 ± 0.20	0.073 ± 0.008 1.85 ± 0.20	1.102 ± 0.118 28.00 ± 3.00	0.018 ± 0.002 0.45 ± 0.05	inches mm
ASRM12	330	0.354 ± 0.039 9.00 ± 1.00	0.118 ± 0.020 3.00 ± 0.50	1.102 ± 0.118 28.00 ± 3.00	0.028 ± 0.002 0.70 ± 0.05	inches mm
ASRM1	570	0.433 ± 0.039 11.00 ± 1.00	0.157 ± 0.020 4.00 ± 0.50	1.102 ± 0.118 28.00 ± 3.00	0.031 ± 0.002 0.80 ± 0.05	inches mm
ASRM2	1340	0.591 ± 0.039 15.00 ± 1.00	0.197 ± 0.020 5.00 ± 0.50	1.378 ± 0.118 35.00 ± 3.00	0.031 ± 0.002 0.80 ± 0.05	inches mm

Performance Characteristics

Test	Test Specification	Test Condition
Temperature Coefficient of Resistance	ASRM14: ± 200 ppm/ºC All Other Sizes: - 1800 ~ 0 ppm/ºC	Measure resistance (R0) at room temperature (t), after that, measure again the resistance (R) at 100ºC higher than room temperature $TCR = \frac{R - R_0}{R_3} x \frac{10^6}{(t+100) - t}$ (ppm/ºC)
Voltage Proof	Change of resistance ≤ ± (0.5% + 0.05 Ω) No mechanical damage	Lay the resistor on the 90º angle metal V block and apply rated AC voltage for one minute
Insulation Resistance	≥ 1000 Mohm	Lay the resistor on the 90º angle metal V block and apply 100 Vdc between V block and lead wire for a minute. The insulation resistance will be measured while applying the voltage.
Solvent Resistance	There will be no damage on the insulating surface	Soak in a Isopropyl alcohol for 5 minutes. After drying up for 5 minutes, the stress of 5 N is added with the absorbent cotton. Five round trips at the rate of one round trip a second.
Overload (Short Time)	≤ ± (1% + 0.05 Ω)	Apply 2.5 times rated voltage or max overload voltage whichever is lower for 5 seconds and leave in room temperature for one hour after test.
Robustness of Terminations	Change of resistance ≤ ± (0.5% + 0.05 Ω)	Tensile: The body of the resistor is fixed, a static load is added in the direction of drawing out of the terminal, and it maintains it for 10 ± 1 seconds. Tensile strength: 10 N Bend: Component body will be fixed so that terminals are perpendicular to the floor. A static load specified below shall be applied to the terminal acting in a direction away from the body. The body of piezoelectric oscillator will be inclined through an angle of 90ºC and then retuned to its initial position in 2 or 3 seconds Bending strength: 5 N
Resistance to Soldering Heat	Change of resistance ≤ ± (1% + 0.05 Ω)	Dip the lead into a solder bath having a temperature of 260ºC ± 5ºC up to 1.5 ± 0.5 mm from the body of the resistors and hold it for 10 ± 0.5 seconds and leave in room temperature for one hour after test.
Solderability	More than 95% of the surface of the lead will be covered by new solder	Dip the lead into a solder bath having a temperature of 245ºC ± 5ºC up to 1.5 ± 0.5 mm from the body of the resistors and hold it for 5 ± 0.5 seconds.

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Performance Characteristics (cont.)

Test	Test Specification	Test Condition
Rapid Change of Temperature	Change of resistance ≤ ± (1% + 0.05 Ω)	The resistor shall be subjected to 5 continuous cycle, each as shown in the table below:
Vibration	Change of resistance ≤ ± (1% + 0.05 Ω)	Apply 1.5 mm amplitude vibration to three directions perpendicular to each other 2 hours each, total 6 hours. Vibrating frequency is 10 Hz - 55 Hz - 10 Hz cycle in 1 minute sweeping and repeat cycle
Damp Heat, Steady State	Change of resistance ≤ ± (5% + 0.05 Ω)	In the chamber having temperature of 40 ± 2ºC and relative humidity of 93 ± 3%, apply one percent of the rated power, 1.5 hour ON, 0.5 hour OFF for 1000 hours and leave in room temperature for one hour after test.
Endurance at 70ºC	Change of resistance ≤ ± (5% + 0.05 Ω)	At 70 ± 2ºC, apply rated DC voltage 1.5 ON, 0.5 hour OFF for 1000 hours and leave in room temperature for one hour after test.

Temperature	Duration
Minimum Operating Temperature	30 m
Standard Atmospheric Condition	≤ 30 s
Max Operating Temperature	30 m
Standard Atmospheric Condition	≤ 30 s

Operating temperature range is - 55°C to + 155°C

Anti-Surge Characteristics

Test	Test Specification	Test Condition
Anti-Surge Characteristics 1	Change of resistance ≤ ± (10% + 0.05 Ω)	Discharge from 0.01 µF capacitor for 10 times every 5 seconds. The discharge voltage is shown in Surge Withstanding Voltage table.
Anti-Surge Characteristics 2	Change of resistance ≤ ± (5% + 0.05 Ω)	Discharge from 1 nF capacitor for 50 times every 5 seconds. The discharge voltage is shown in Surge Withstanding Voltage table.

Surge Withstanding Voltage - ASR

Type/Code	Resistance Range (Ω)	Surge Withstanding (KV)
ASR14	3.3 - 510K 560K - 33M	1 3
ASR1	3.3 - 510K 560K - 100M	5 10

Reference standards: JIS C 5201-1, IEC60115-1, IEC60065, UL1676

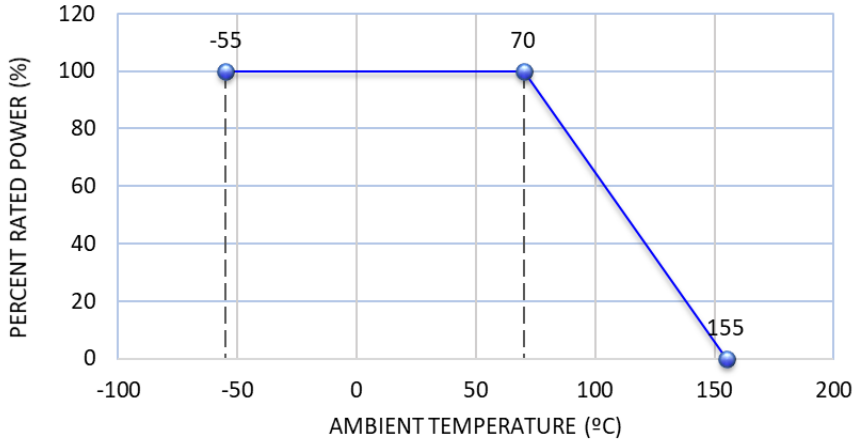
Surge Withstanding Voltage - ASRM

Type/Code	Resistance Range (Ω)	Surge Withstanding (KV)
ASRM14	100K - 22M	2
ASRM12	3.3 - 510K 560K - 33M	5 10
ASRM1	3.3 - 510K 560K - 100M	5 10
ASRM2	3.3 - 510K 560K - 100M	5 10

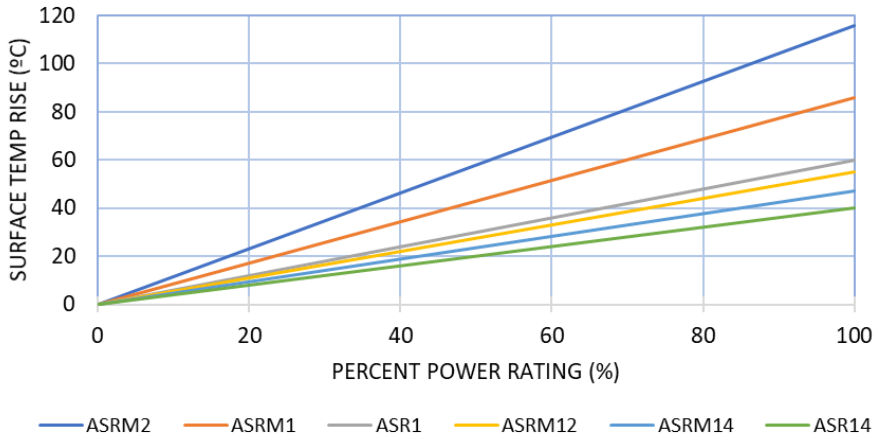
Reference standards: JIS C 5201-1, IEC60115-1, IEC60065, UL1676

This specification may be changed at any time without prior notice.
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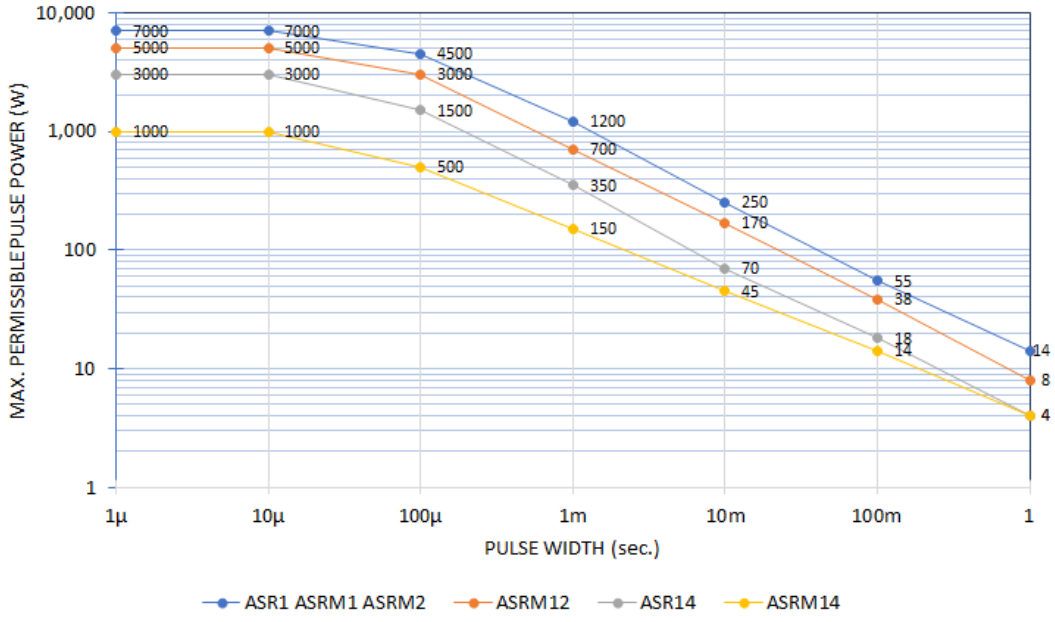
Power Derating Curve:



Heat Rise:



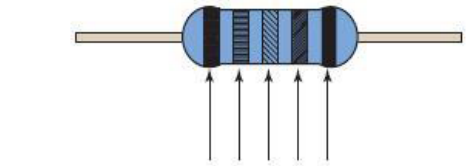
Pulse Limiting Power (single square shaped pulse):



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Color Code

Description



1, 1st band significant figure

2, 2nd band significant figure

3, Multiplier

4, Tolerance

5, Color code 5th Color Black(Anti-Surge Resistor)

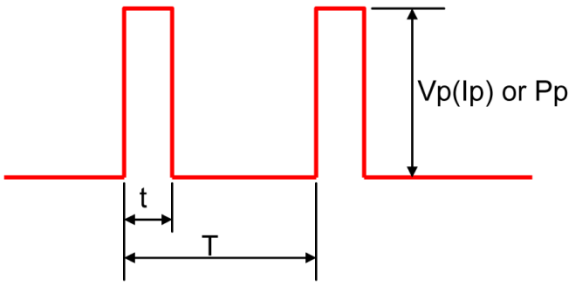
Repetitive Pulse Information

If repetitive pulses are applied to resistors, pulse wave form must be less than “Pulse limiting voltage”, “Pulse limiting current” or “Pulse limiting wattage” calculated by the formula below.

$$Vp = K\sqrt{P \times R \times T/t}$$

$$Ip = K\sqrt{P/R \times T/t}$$

$$Pp = K^2 \times P \times T/t$$



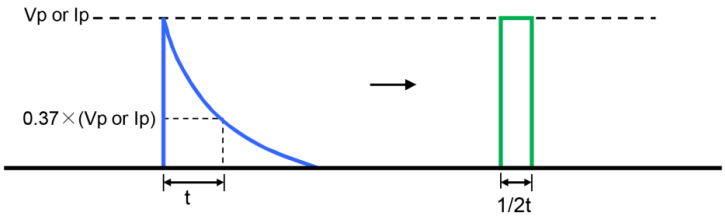
Where: Vp: Pulse limiting voltage (V)
Ip: Pulse limiting current (A)
Pp: Pulse limiting wattage (W)
P: Power rating (W)
R: Nominal resistance (ohm)
T: Repetitive period (sec)
t: Pulse duration (sec)
K: Coefficient: 1
[Vr: Rated Voltage (V), Ir: Rated Current (A)]

Note 1: If T > 10 → T = 10 (sec), T / t > 1000 → T / t = 1000.
Note 2: If T > 10 and T / t > 1000, “Pulse Limiting power (Single pulse) is applied.
Note 3: If Vp < Vr (Ip < Ir or Pp < P), Vr (Ir, P) is Vp (Ip, Pp).
Note 4: Pulse limiting voltage (Current, Wattage) is applied at less than rated ambient temperature. If ambient temperature is more than the rated temperature (70°C), please decrease power rating according to “Power Derating Curve”.
Note 5: Please assure sufficient margin for use period and conditions for “Pulse limiting voltage”.
Note 6: If the pulse waveform is not square wave, please judge after transform the waveform into square wave according to “Waveform Transformation to Square Wave” information.

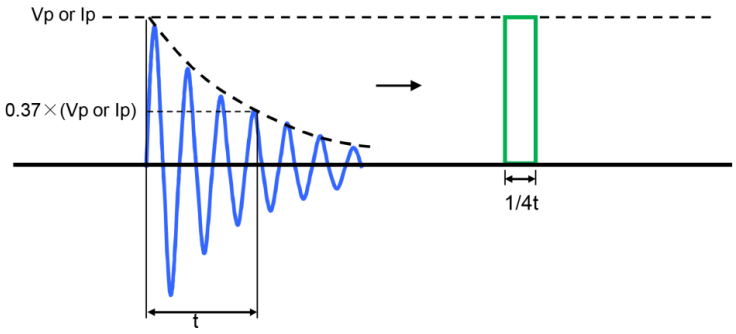
This specification may be changed at any time without prior notice.
Please confirm technical specifications before you order and/or use.

Waveform Transformation to Square Wave

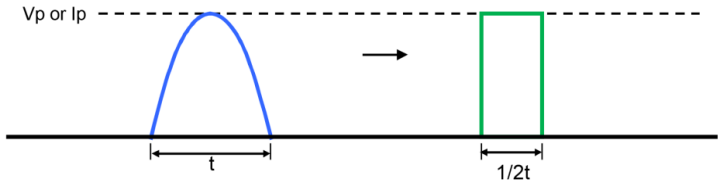
1. Discharge curve wave with time constant “t” → Square wave



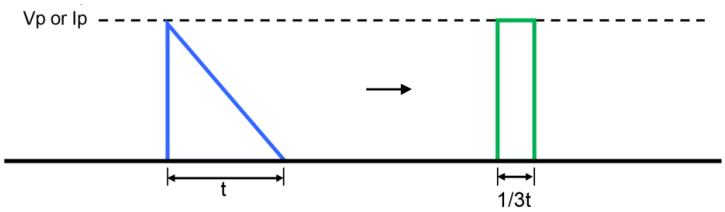
2. Damping oscillation wave with time constant of envelope “t” → Square wave



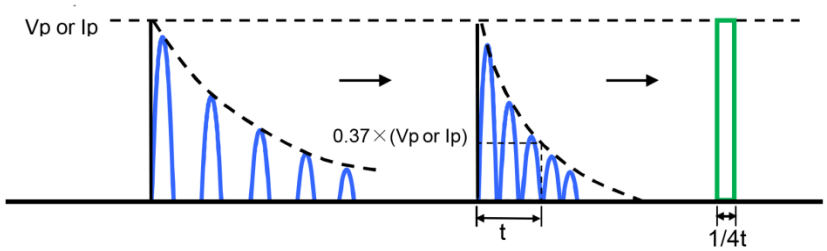
3. Half-wave rectification wave → Square wave



4. Triangular wave → Square wave



5. Special wave → Square wave



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Recommended Solder Profile

This information is intended as a reference for solder profiles for Stackpole resistive components. These profiles should be compatible with most soldering processes. These are only recommendations. Actual numbers will depend on board density, geometry, packages used, etc., especially those cells labeled with "*".

100% Matte Tin / RoHS Compliant Terminations

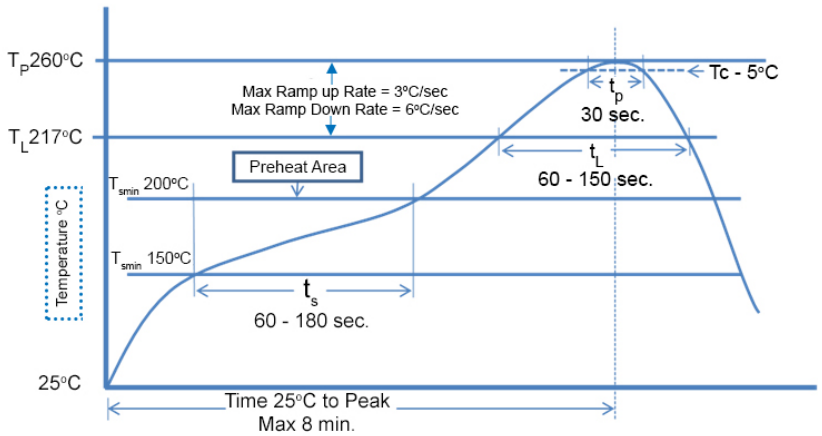
Soldering iron recommended temperatures: 330°C to 350°C with minimum duration.
Maximum number of reflow cycles: 3.

Wave Soldering			
Description	Maximum	Recommended	Minimum
Preheat Time	80 seconds	70 seconds	60 seconds
Temperature Diff.	140°C	120°C	100°C
Solder Temp.	260°C	250°C	240°C
Dwell Time at Max.	10 seconds	5 seconds	*
Ramp DN (°C/sec)	N/A	N/A	N/A

Temperature Diff. = Defference between final preheat stage and soldering stage.

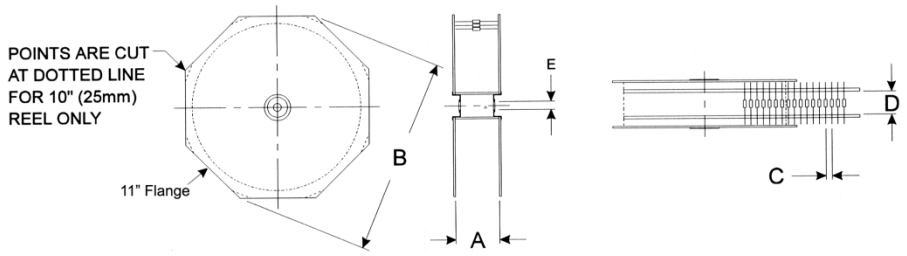
Convection IR Reflow			
Description	Maximum	Recommended	Minimum
Ramp Up (°C/sec)	3°C/sec	2°C/sec	*
Dwell Time > 217°C	150 seconds	90 seconds	60 seconds
Solder Temp.	260°C	245°C	*
Dwell Time at Max.	30 seconds	15 seconds	10 seconds
Ramp DN (°C/sec)	6°C/sec	3°C/sec	*

Recommended Lead Free Resistor Reflow Profile



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Packaging Specifications – Tape and Reel



Reeled in accordance with EIA-296-F

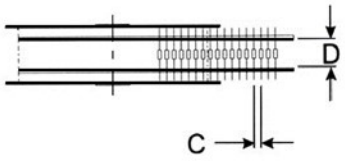
Series	Size (W)	A max(1)	B max	C	D(2)	Tape	Unit
ASR	1/4	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 +0.079/-0.039 52.00 +2.00/-1.00	0.250 6.35	inches mm
	1	3.189 ± 0.118 81.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.394 ± 0.020 10.00 ± 0.50	2.480 +0.079/-0.039 63.00 +2.00/-1.00	0.250 6.35	inches mm
ASRM	1/4	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 +0.079/-0.039 52.00 +2.00/-1.00	0.250 6.35	inches mm
	1/2	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 +0.079/-0.039 52.00 +2.00/-1.00	0.250 6.35	inches mm
	1	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 +0.079/-0.039 52.00 +2.00/-1.00	0.250 6.35	inches mm
	2	3.189 ± 0.118 81.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.394 ± 0.020 10.00 ± 0.50	2.480 +0.079/-0.039 63.00 +2.00/-1.00	0.250 6.35	inches mm

Dimension "E": This is a non-critical dimension that does not have a tolerance in the standard.
Range of diameters is from 0.547 inches (13.90 mm) to 1.500 inches (38.10 mm).

(1) Reference value only. The "A" dimension shall be governed by the overall length of the taped component.
The distance between flanges shall be 0.059 inches (1.50 mm) to 0.315 (8.00 mm) greater than the overall component.

(2) The given dimension "D" expresses the standard width spacing. A 26mm narrow spacing is available as option "N" packaging code.

Taping Specifications – Ammo



Series	C	D	Tape	Unit
ASR/ASRM All sizes (except ASR1, ASRM2)	0.197 ± 0.020 5.00 ± 0.50	2.047 +0.079/-0.039 52.00 +2.00/-1.00	0.250 6.35	inches mm
ASR1, ASRM2	0.394 ± 0.020 10.00 ± 0.50	2.047 +0.079/-0.039 52.00 +2.00/-1.00	0.250 6.35	inches mm

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RoHS Compliance

Stackpole Electronics has joined the worldwide effort to reduce the amount of lead in electronic components and to meet the various regulatory requirements now prevalent, such as the European Union's directive regarding "Restrictions on Hazardous Substances" (RoHS 3). As part of this ongoing program, we periodically update this document with the status regarding the availability of our compliant components. All our standard part numbers are compliant to EU Directive 2011/65/EU of the European Parliament as amended by Directive (EU) 2015/863/EU as regards the list of restricted substances.

RoHS Compliance Status

Standard Product Series	Description	Package / Termination Type	Standard Series RoHS Compliant	Lead-Free Termination Composition	Lead-Free Mfg. Effective Date (Std Product Series)	Lead-Free Effective Date Code (YY/WW)
ASR	Anti-Surge Leaded Resistor	Axial	YES (1)	99.3/0.7 Sn/Cu	Apr-05	05/14
ASRM	Mini-Anti Surge Leaded Resistor	Axial	YES (1)	99.3/0.7 Sn/Cu	Apr-05	05/14

Note (1): RoHS compliant by means of exemption 7c-I

"Conflict Metals" Commitment

We at Stackpole Electronics, Inc. are joined with our industry in opposing the use of metals mined in the "conflict region" of the eastern Democratic Republic of the Congo (DRC) in our products. Recognizing that the supply chain for metals used in the electronics industry is very complex, we work closely with our own suppliers to verify to the extent possible that the materials and products we supply do not contain metals sourced from this conflict region. As such, we are in compliance with the requirements of Dodd-Frank Act regarding Conflict Minerals.

Compliance to "REACH"

We certify that all passive components supplied by Stackpole Electronics, Inc. are SVHC (Substances of Very High Concern) free and compliant with the requirements of EU Directive 1907/2006/EC, "The Registration, Evaluation, Authorization and Restriction of Chemicals", otherwise referred to as REACH. Contact us for complete list of REACH Substance Candidate List.

Environmental Policy

It is the policy of Stackpole Electronics, Inc. (SEI) to protect the environment in all localities in which we operate. We continually strive to improve our effect on the environment. We observe all applicable laws and regulations regarding the protection of our environment and all requests related to the environment to which we have agreed. We are committed to the prevention of all forms of pollution.

How to Order

1	2	3	4	5	6	7	8	9	10	11
A	S	R	1	4	J	A	1	0	0	K

Product Series	
Code	Description
ASR	Standard
ASRM	Mini

Power Rating	
Code	W
14	0.25
12	0.5
1	1
2	2

Tolerance	
Code	Tol
J	5%

Packaging			
Code	Description	Product Code	Quantity
T	Tape and Reel	ASRM14, ASR14	5000
		ASRM12, ASRM1	2500
		ASR1, ASRM2	1000
B	Bulk	ASRM14	2000
		ASR14, ASRM12, ASRM1, ASR1, ASRM2	1000
A	Ammo	ASRM14	5000
		ASR14, ASRM12	2000
		ASRM1	1000
		ASR1, ASRM2	500

Resistance Value
Four characters with the multiplier used as the decimal holder.
10 ohm = 10R0 560 Kohm = 560K 1 Mohm = 1M00

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