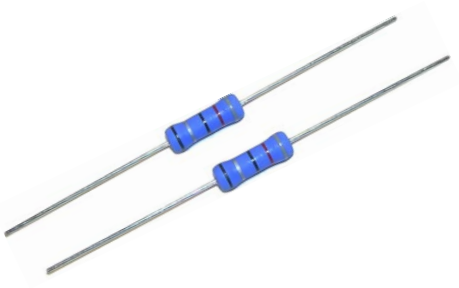
Features:

- 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 factory for details
- Flameproof coating per UL94 V-0
- RoHS compliant / lead-free

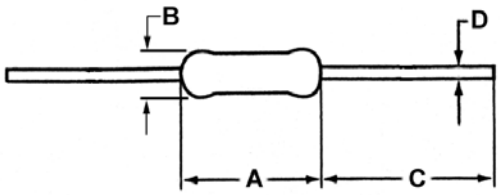


Electrical Specifications

Type / Code	Power Rating (Watts) @ 70ºC	Maximum Working Voltage (1)	Maximum Overload Voltage	Dielectric Withstand Voltage	Surge Withstanding (2)	Ohmic Range (Ω) and Tolerance
						5%
ASRM14	0.25W	500V	1000V	200VAC	2000V	100K - 22M
ASR14	0.25W	DC 1600V AC 1150V	DC 2000V AC 1500V	400VAC	1000V 3000V	3.3 - 510K 560K - 12M
ASRM12	0.5W	2000V	2500V	500VAC	5000V 10000V	3.3 - 510K 560K - 12M
ASRM1	1W	4000V	5000V	500VAC	5000V 10000V	3.3 - 510K 560K - 12M
ASR1	1W	4000V	5000V	500VAC	5000V 10000V	3.3 - 510K 560K - 12M
ASRM2	2W	4000V	5000V	500VAC	5000V 10000V	3.3 - 510K 560K - 12M

(1) Lesser of √PR or maximum working voltage.
(2) 10 discharges from a 0.01µF capacitor every 5 seconds.

Mechanical Specifications



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
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
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
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
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

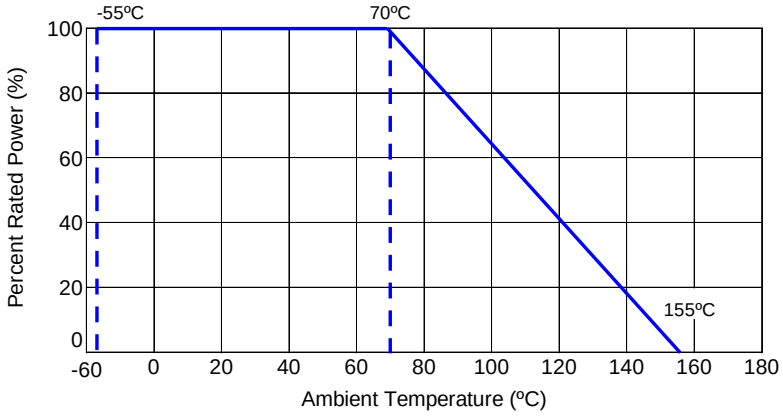
Performance Characteristics		
Test	Test Result	Test Method
Temperature Coefficient of Resistance	ASRM14: ±200 ppm/ºC All Other Sizes: -1800~0 ppm/ºC	Measure resistance (R_0) at room temperature (t), after that, measure again the resistance (R) at 100ºC higher than room temperature $TCR=\frac{R-R_0}{R_0}\times\frac{10^6}{(t+100)-t}(ppm/ºC)$
Voltage Proof	Change of resistance ≤ ± (0.5%+0.05Ω) 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 100Vdc 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 5N is added with the absorbent cotton. Five round trips at the rate of one round trip a second.
Overload (Short Time)	≤ ± (1%+0.05Ω)	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%+0.05Ω)	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: 10N 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: 5N
Resistance to Soldering Heat	Change of resistance ≤ ± (1%+0.05Ω)	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.
Rapid Change of Temperature	Change of resistance ≤ ± (1%+0.05Ω)	The resistor shall be subjected to 5 continuous cycle, each as shown in the table below: Temperature / Duration Minimum Operating Temperature / 30 m Standard Atmospheric Condition / ≤ 30 s Max Operating Temperature / 30 m Standard Atmospheric Condition / ≤ 30 s
Vibration	Change of resistance ≤ ± (1%+0.05Ω)	Apply 1.5mm amplitude vibration to three directions perpendicular to each other 2 hours each, total 6 hours. Vibrating frequency is 10Hz-55Hz-10Hz cycle in 1 minute sweeping and repeat cycle
Damp Heat, Steady State	Change of resistance ≤ ± (5%+0.05Ω)	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%+0.05Ω)	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.

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

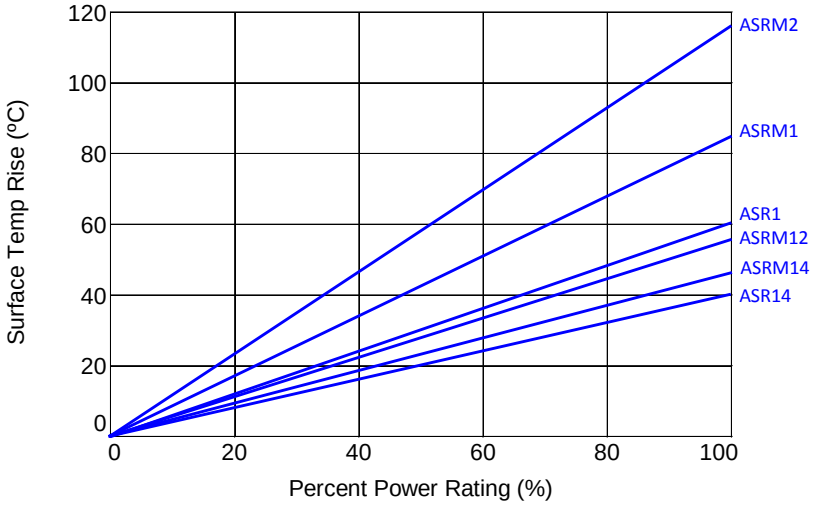
Surge Withstanding Voltage		
Type / Code	Resitance Range	Surge Withstanding
ASRM14	100K - 22MΩ	2kV
ASR14	3.3Ω - 510KΩ 560kΩ - 33MΩ	1kV 3kV
ASRM12	3.3Ω - 510KΩ 560kΩ - 33MΩ	5kV 10kV
ASRM1	3.3Ω - 510KΩ 560kΩ - 100MΩ	5kV 10kV
ASR1	3.3Ω - 510KΩ 560kΩ - 100MΩ	5kV 10kV
ASRM2	3.3Ω - 510KΩ 560kΩ - 100MΩ	5kV 10kV

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

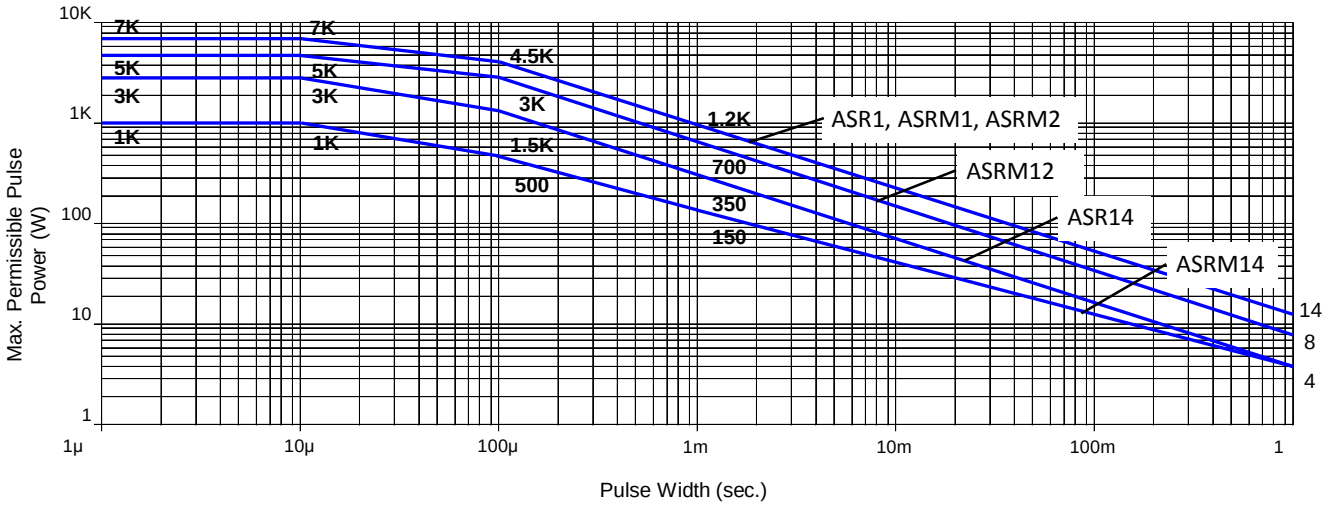
Power Derating Curve:



Heat Rise:

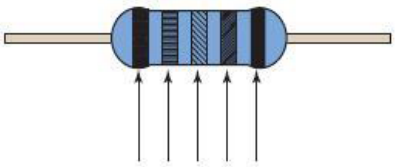


Pulse Limiting Power (single square shaped pulse):



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)

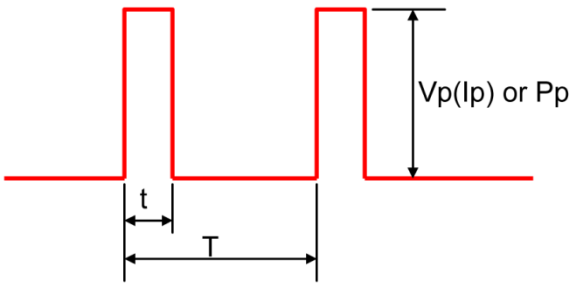
Repetitive Pulse Information

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:

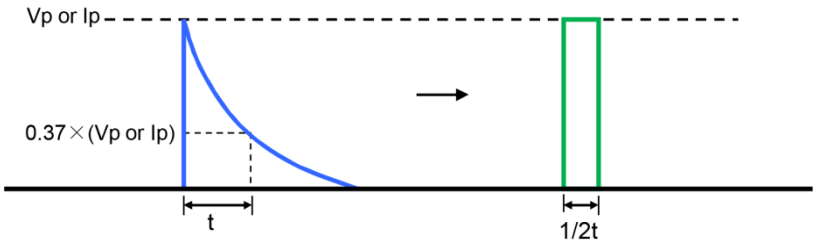
Vp: Pulse limiting voltage (V)
Ip: Pulse limiting current (A)
Pp: Pulse limiting wattage (W)
P: Power rating (W)
R: Nominal resistance (ohm)
T: Repetitive period (sec)
t: Pulse duration (sec)
K: Coefficient by resistors type (refer to below matrix)
[Vr: Rated Voltage (V), Ir: Rated Current (A)]

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.

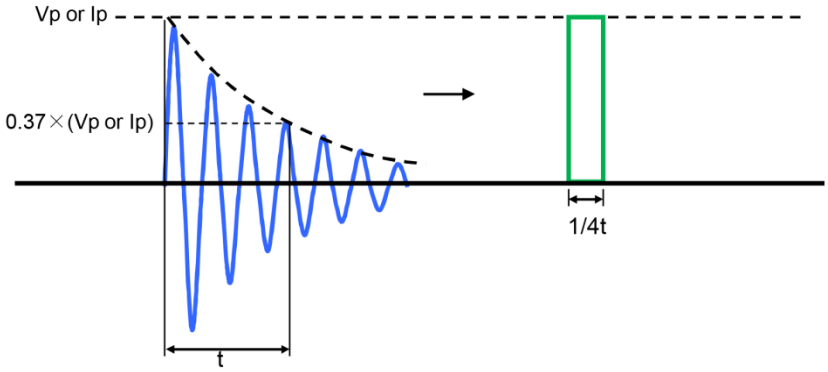
Coefficient (K) Matrix	
Resistor Type	K
ASR, ASRM	1.0

Waveform Transformation to Square Wave

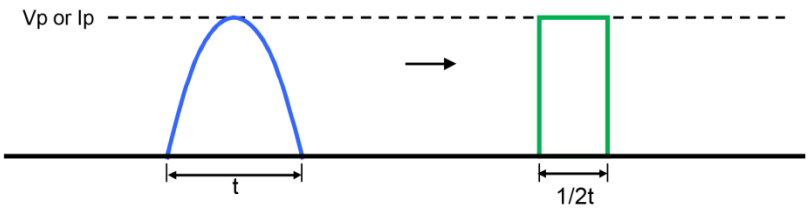
1. Discharge curve wave with time constant "t" → Square wave



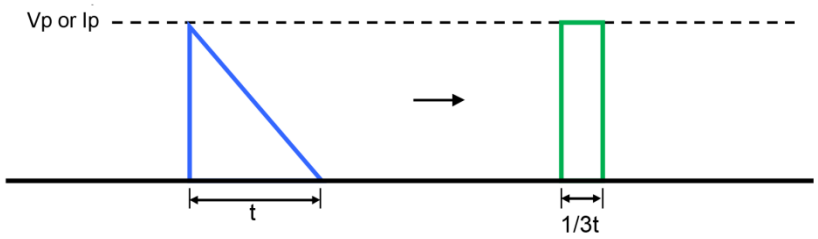
2. Damping oscillation wave with time constant of envelope "t" → Square wave



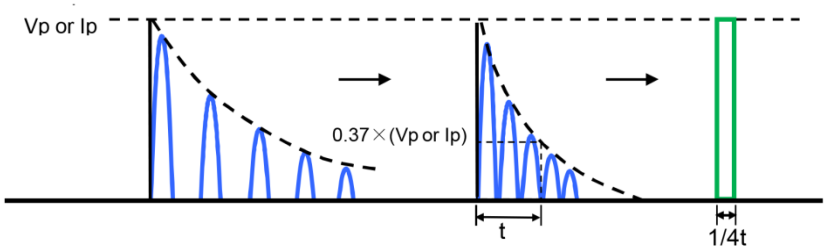
3. Half-wave rectification wave → Square wave



4. Triangular wave → Square wave



5. Special wave → Square wave



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	
ASR	Standard
ASRM	Mini

Size	Power
14	0.25W
12	0.5W
1	1W
2	2W

Tolerance	
Code	Tol
J	5%

Packaging			
Code	Description	Size	Quantity
T	Tape and Reel	ASRM14, ASR14	5000
		ASRM12, ASRM1	2500
		ASR1, ASRM2	1000
B	Bulk	ASRM14	2,000
		ASR14, ASRM12, ASRM1, ASR1, ASRM2	1,000
A	Ammo	ASRM14	5,000
		ASR14, ASRM12	2,000
		ASRM1	1,000
		ASR1, ASRM2	500

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