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AC, AC-AT Cemented Leaded Wirewound Resistors

Product Overview

REV. 2021-08-20

INTRODUCTION

- Purpose
 - Overview of the AC, AC-AT Cemented Leaded Wirewound Resistors
- Objectives
 - Present an overview of this product's electrical parameters
 - Discuss product design and features
 - Discuss product construction
 - Present potential applications



Welcome to the Vishay AC, AC-AT Cemented Leaded Wirewound Resistors product overview. This presentation will present an overview of the AC, AC-AT products. The key functional performance parameters of the AC, AC-AT series will be discussed as well as construction and features. A selection of potential applications from typical market segments will be presented.

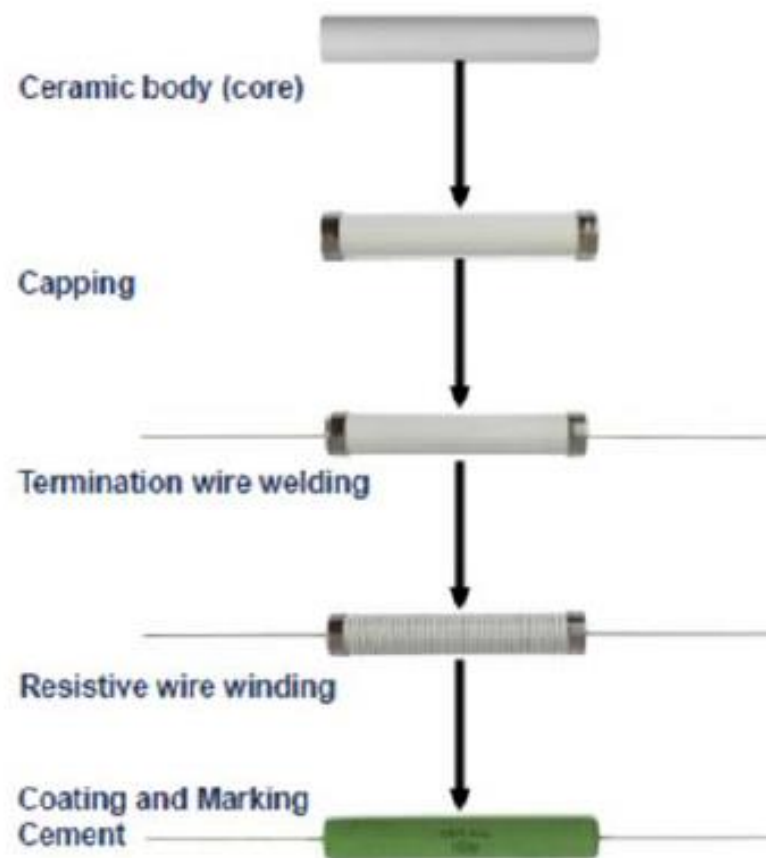
MAIN FEATURES OF THE AC, AC-AT Series

- Rated power P_{40} : 1W / 3W / 4W / 5W / 7W / 10W
- High power dissipation in small design
- Resistance range 0R1 to 27K, 5%
- AEC-Q200 automotive qualified with the AC-AT – INDUSTRY FIRST
- Non-flammable coating conforming to UL 94 V-0 and IEC 60115-1 flammability requirements
- Operating temperature from -55°C to 250°C
- Excellent pulse load capability
- Non-inductive (NI) version available
- Offered with different termination styles: WSZ (for SMD mounting), double kink, single kink and radial taped
- RoHS compliant
- Halogen free



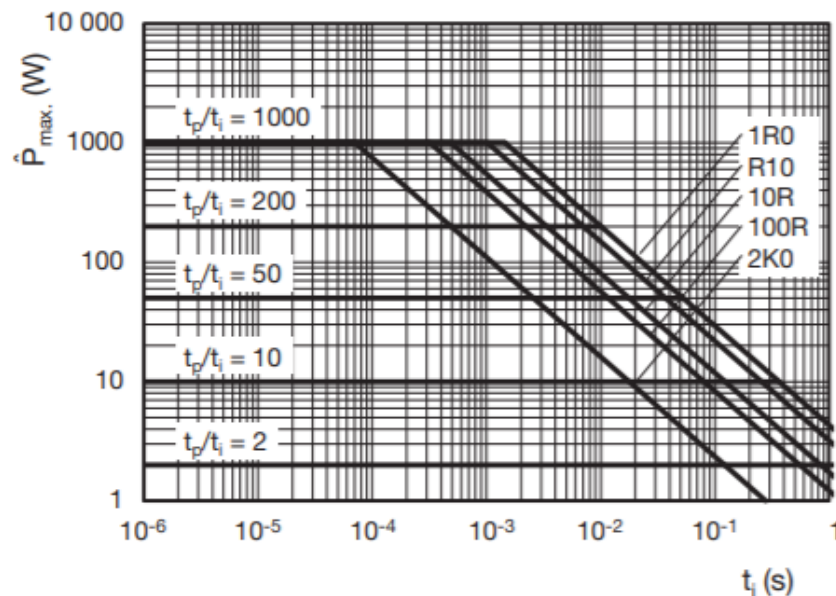
The AC series is the perfect choice for general purpose power applications with rated power from 1W to 10W. The AEC-Q200 qualified AC-AT series is the Industry first axial leaded wirewound resistor, best suited for automotive applications. The robust silicon cement coating can handle challenging ambient and operating conditions and is non-flammable conforming to UL 94 V-0 method. Various lead forms are available for AC series, i.e.: radial taped, WSZ Z-form for surface mounting, double kink, and single kink leads with defined mounting pitch. The AC series is available in a non-inductive version. The AC, AC-AT series have operating temperature up to 250°C, and they are RoHS compliant and Halogen free.

CONSTRUCTION OF AC, AC-AT SERIES

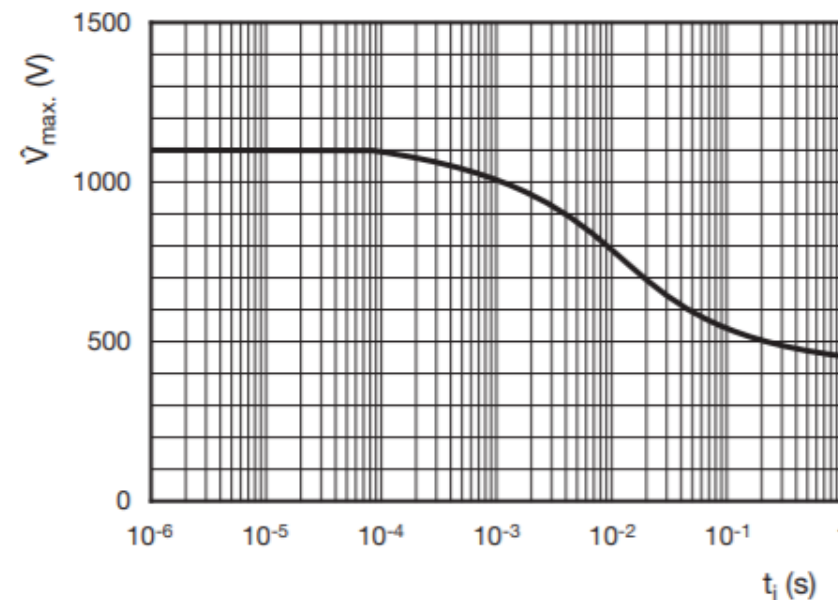


The base construction of the AC, AC-AT series is a ceramic substrate, also known as ceramic rod. Metal caps are pressed over the ends of the rod. The resistor element is a resistive wire which is wound in a single layer on a ceramic rod. The ends of the resistive wire and the leads are connected to the caps by welding. Tinned copper clad iron leads with low heat conductivity are employed permitting the use of relatively short leads to obtain stable mounting without overheating. The resistor is coated with a green silicon cement which is non-flammable, will not drip even at high overloads and is resistant to cleaning solvents specified as per IEC 60115-1.

PULSE POWER AND PULSE VOLTAGE



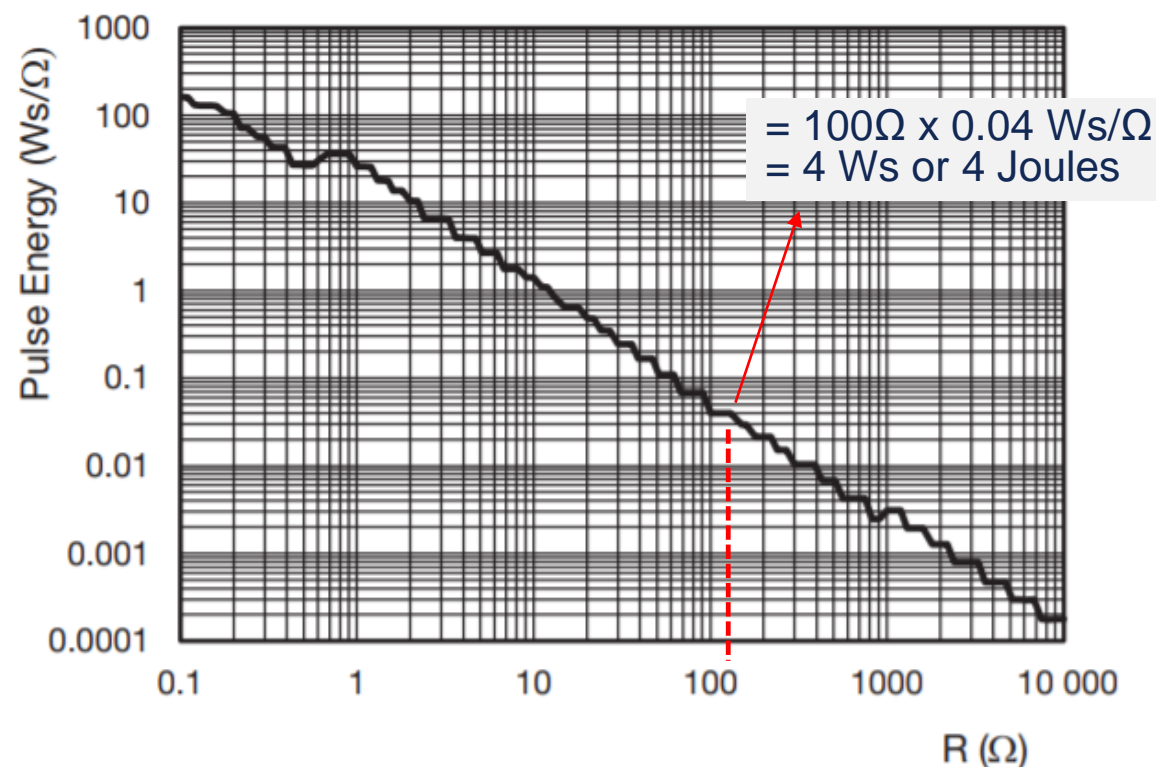
AC01 and AC01-AT Pulse on a regular basis; max. permissible peak pulse power (\hat{P}_{max}) as a function of pulse duration (t_i)



AC01 and AC01-AT Pulse on a regular basis; max. permissible peak pulse voltage (\hat{V}_{max}) as a function of pulse duration (t_i)

The pulse load graph above shows the peak power as a function of pulse duration for the AC01, AC01-AT series that can withstand nearly 1000W for 1μs square single pulse. The same type of graph can be found in product datasheet for the other sizes up to 10W with the AC10, AC10-AT. Additionally, to be used along with the pulse load graph, whichever shows lesser peak voltage, mostly applicable for high resistance values, the datasheet specifies the surge voltage curve as a function of pulse duration. The AC01, AC01-AT can handle 1100V, for pulse durations lower than 100μs.

PULSE ENERGY GRAPH



AC05 and AC05-AT Pulse capability; E (Ws) as a function of R (Ω)

Pulse energy graphs are also available for the AC, AC-AT series with energy as a function of the resistance value. Energy in joules or watt-seconds is calculated with the help of the R -value to be used in the application. The designer may choose the resistance value on X axis and look for the corresponding energy in watt-second/ohm value on Y axis. Multiplying both the resistance value to the corresponding energy in watt-second/ohm will result in the total pulse energy for the given resistor for adiabatic conditions. Please see example above for AC05, AC05-AT 100 ohms that can handle 4 Joules.

APPLICATIONS



ALTERNATIVE ENERGY

- Power Meter
- Smart Grid Solutions
- Inverter
- Energy Storage
- Wall connector



CONSUMER

- Domestic Appliances
- Home automation



INDUSTRIAL

- Arc Fault Breaker
- Fire Control Systems
- Power Supply
- Fly-back converter
- Electronic motor starting
- AC/DC Power Supply
- UPS



AUTOMOTIVE

- Dual Traction Inverter
- Pre-charge and discharge
- Load dump in braking system
- Snubber resistor in RC network



MEDICAL

- Defibrillator
- Instrumentation Power Supply

The AC, AC-AT wirewound resistor series are designed for alternative energy, automotive (the AC-AT series is AEC-Q200 qualified, specifically for use in automotive applications), consumer, industrial and medical applications where customer application requires rated power of 1W up to 10W. For a given application, requirements of ohmic value, rated power, peak voltage, pulse shape, pulse duration, lead bending, and environmental conditions may be submitted to recommend the most suitable product.

SUMMARY AC, AC-AT

- Rated power *P40* from 1W up to 10W
- AC-AT AEC-Q200 automotive qualified – INDUSTRY FIRST
- Non-flammable lacquer which meets flammability requirements
- High maximum operating temperature up to 250°C
- Excellent pulse load capability
- Different pre-formed leads: Radial, Z-bend and Single/Double kink
- Non-Inductive version available
- RoHS compliant
- Halogen free

In summary, the Vishay AC, AC-AT series is the most suitable product recommended for applications specifically with power rating up to 10W. The product is RoHS compliant and has a non-flammable lacquer which meets IEC 60115-1 and UL 94V-0 flammability requirements. Its AEC-Q200 automotive qualification offers an industry first axial leaded wirewound resistor for automotive applications, having an excellent pulse load capability and maximum operating temperature up to 250°C.