



Overview

The KEMET AAR8S is an AEC-Q200 qualified Surface-Mount aluminum rectangular capacitor with outstanding electrical performance and high voltage capability, designed for automotive applications. It offers high capacitance, good ripple current capability, and high volumetric efficiency. Its low-profile offers significant advantages in applications where total height is a critical constraint, as its compact design ensures efficient utilization of available space, allowing seamless integration into systems with restricted vertical dimensions. Rated at 105°C, the AAR8S allows easy use of heat sink condition using the large surface area of the case to enable better thermal management, ensuring optimal performance without compromising reliability.

Applications

The KEMET AAR8S is a new generation of Rectangular Surface-Mount electrolytic capacitors. It is designed for applications mainly in the field of e-mobility, such as inverters or wall boxes and On-Board chargers looking into full SMD capability. Also, UPS and Micro Inverters can benefit of this capacitor use.

Benefits

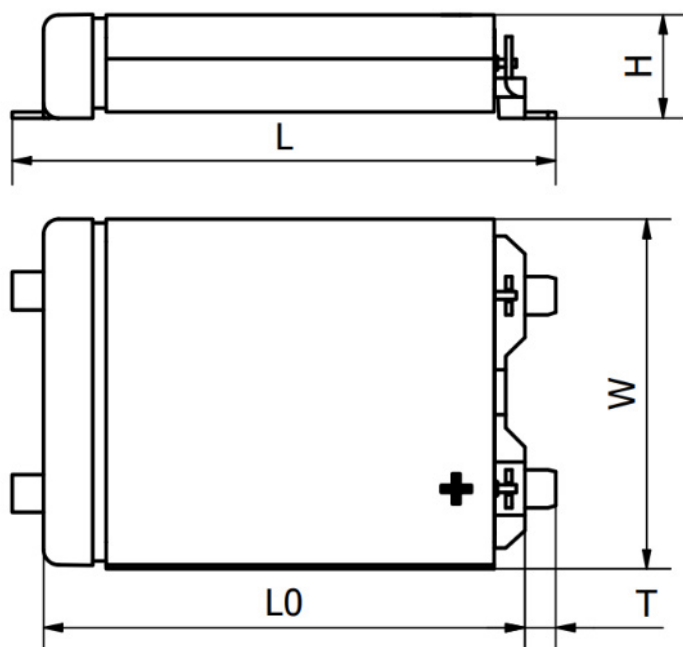
- Surface Mount Device
- Rectangular shape for good volumetric efficiency and ease of heat sinking
- Life of 2,000 hours at +105°C [(VR) and (IR) applied]
- AEC-Q200 qualified for automotive applications
- Good ripple current capability
- Excellent surge voltage capability



Part Number System

AAR8S	H	151	JF	450
Series	Termination	Capacitance Code (μF)	Size Code	Rated Voltage (VDC)
Aluminum SMD Rectangular	See Termination Table	First two digits represent significant figures. Third digit specifies number of zeros.	See Dimension Table	450 = 450

Termination Style and Dimensions – Millimeters



Size Code	Dimensions* in mm					Approximate Weight (Grams)
	L	W	T	H	L0	
	±1	±0.5	±0.3	Max	± 1	
JF	52.7	46.0	4.0	15.0	44.7	55

Note: Terminal coplanarity $\leq 200 \mu\text{m}$

Performance Characteristics

Item	Performance Characteristics	
Capacitance Range	150 μ F	
Rated Voltage	450 VDC	
Operating Temperature	-40 to +105°C	
Storage Temperature Range	-40 to +105°C	
Capacitance Tolerance	$\pm 20\%$ select values at 100 Hz/+20°C	
Operational Lifetime	Rated voltage, +105°C, Rated ripple current	
	2,000 hours	
Shelf Life	2,000 hours at +85°C or 30,000 at +40°C, 0 VDC	
Leakage Current	$I < 0.003 CV (\mu A)$	
	C = rated capacitance (μ F), V = rated voltage (VDC). Voltage applied for 5 minutes at +20°C	
Vibration Test Specifications	Procedure	Requirements
	0.35 mm displacement amplitude or 5 g maximum acceleration. Vibration applied for three directions of 4-hour sessions at 10 – 2,000 Hz (without clamping).	No leakage of electrolyte or other visible damage. Deviations in capacitance from initial measurements must not exceed $\Delta C/C \pm 5\%$

Surge Voltage

Test Condition	Voltage (VDC)
	450
≤ 30 second surge followed by a no load period of 330 seconds, 1,000 cycles at +105°C	495

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	50 Hz	100 Hz	300 Hz	1 kHz	≥ 10 kHz
Coefficient	0.75	1.00	1.45	1.80	2.10

Test Method & Performance

Endurance Life Test	
Conditions	Performance
Temperature	+105°C
Test Duration	2,000 hours
Ripple Current	Rated ripple current specified in table
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor
Performance	The following specifications will be satisfied when the capacitor is tested at +25°C (±5°C)
Capacitance Change	Within 10% of the initial value
Equivalent Series Resistance	Does not exceed 2x initial measured value
Leakage Current	Does not exceed leakage current limit

Shelf Life and Re-Ageing

Shelf Life

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however, the leakage current will very slowly increase. KEMET products are particularly stable and allow a shelf life in excess of three years at 40°C. At 85°C, product can be stored for 2,000 hours.

Re-age (Reforming) Procedure

Apply the rated voltage to the capacitor at room temperature for a period of one hour or until the leakage current has fallen to a steady value below the specified limit (not to exceed 4 hours). During re-aging, a maximum charging current of twice the specified leakage current or 5 mA (whichever is greater) is suggested. If LC does not fall within 4 hours, the capacitors should not be used in the application.

Reliability

Reliability

The reliability of a component can be defined as the probability that it will perform satisfactorily under a given set of conditions for a given length of time. In practice, it is impossible to predict with absolute certainty how any individual component will perform. Therefore, we must utilize probability theory. It is also necessary to clearly define the level of stress involved (e.g., operating voltage, ripple current, temperature, and time.) Finally, the meaning of satisfactory performance must be defined by specifying a set of conditions, which determine the end of life of the component.

End of Life Definition

Catastrophic failure: short circuit, open circuit or safety vent operation

Parametric failure:

- Change in capacitance > ±15%
- Leakage current > initial specified limit
- ESR > 2x ESR Limit

Mechanical Data

Polarity & Reversed Voltage

Aluminium electrolytic capacitors manufactured for use in DC applications contain an anode foil and a cathode foil. As such, they are polarized devices and must be connected with the +Ve to the anode foil and the -Ve to the cathode foil. If this were to be reversed, then the electrolytic process that took place in forming the oxide layer on the anode would be recreated in trying to form an oxide layer on the cathode. In forming the cathode foil in this way, heat would be generated and gas given off within the capacitor, usually leading to failure.

The cathode foil already possesses a thin stabilized oxide layer. This thin oxide layer is equivalent to a forming voltage of approximately 2 V. As a result, the capacitor can withstand a voltage reversal of up to 1.5 V for short periods. Above this voltage, the formation process will commence.

Environmental Compliance



As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production.

In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material.

KEMET will closely follow any changes in legislation world wide and makes any necessary changes in its products, whenever needed.

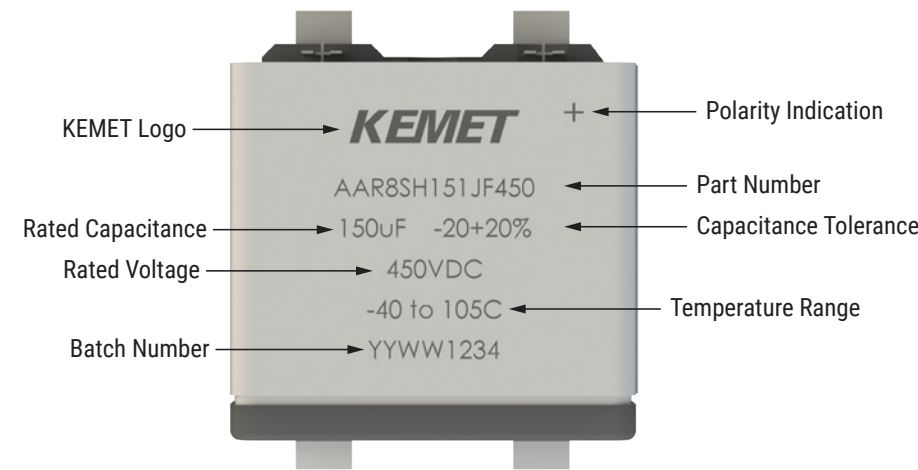
Some customer segments such as medical, military, and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as lead-free (LF) or lead-free wires (LFW) on the label.

Table 1 – Ratings & Part Number Reference

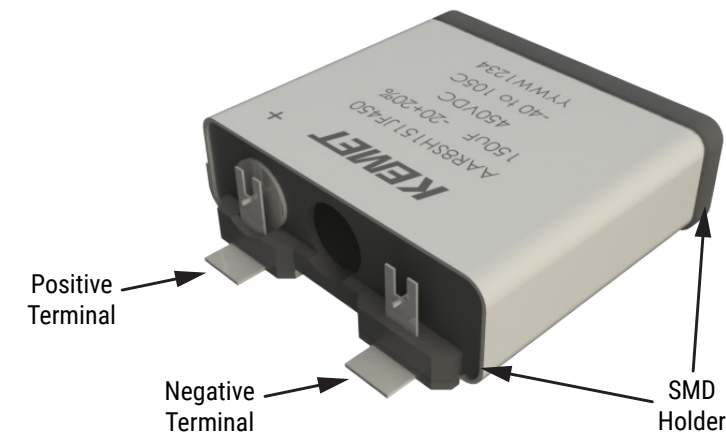
Rated Voltage	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR Maximum	Impedance Maximum	Part Number
(VDC)	100 Hz, 20°C (µF)		W x L (mm)	100 Hz, 105°C (A)	10 kHz, 105°C (A)	100 Hz, 20°C (mOhms)	10 kHz, 20°C (mOhms)	
450	150	JF	46 X 44.7	1.23	2.62	1776	1365	AAR8SH151JF450

Marking

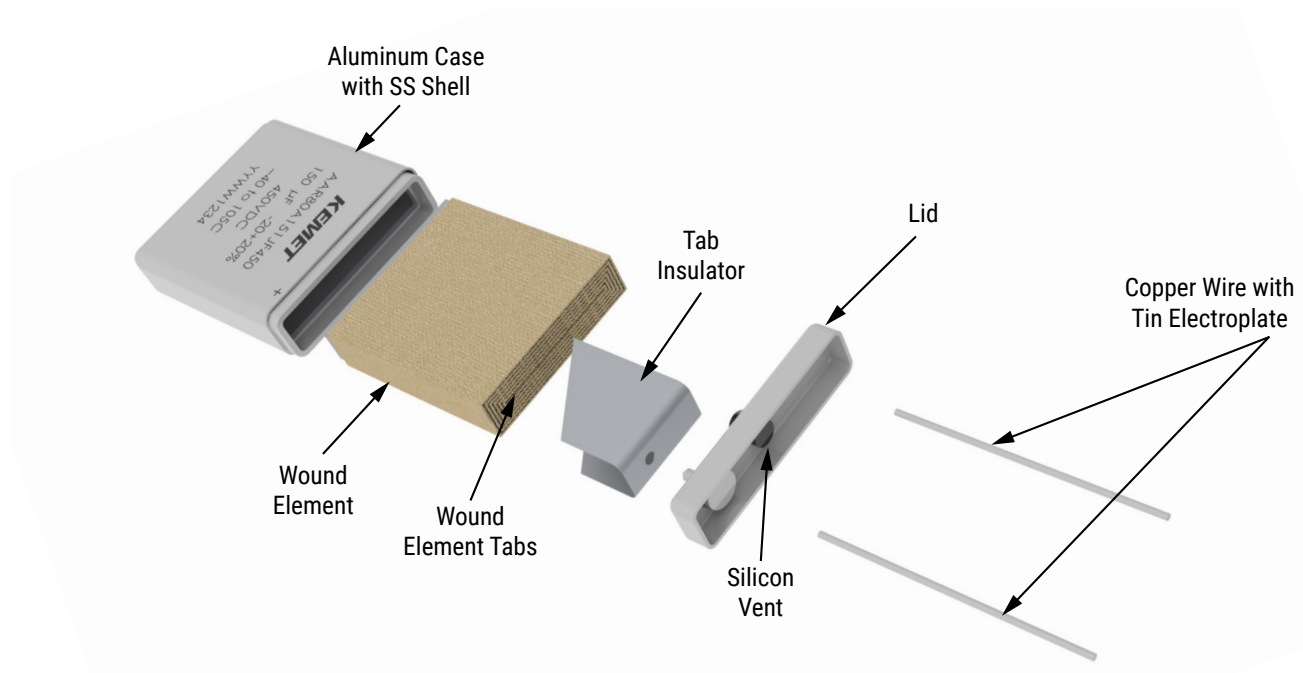


*Print shown is representative

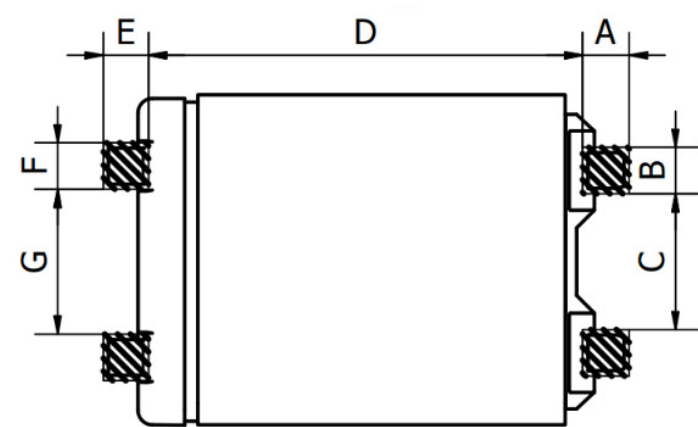
Construction



Construction cont.



Landing Pad



Size Code	A	B	C	D	E	F	G
JF	6.5	6.5	18.9	60.4	6.3	6.5	20.15
Units in mm							

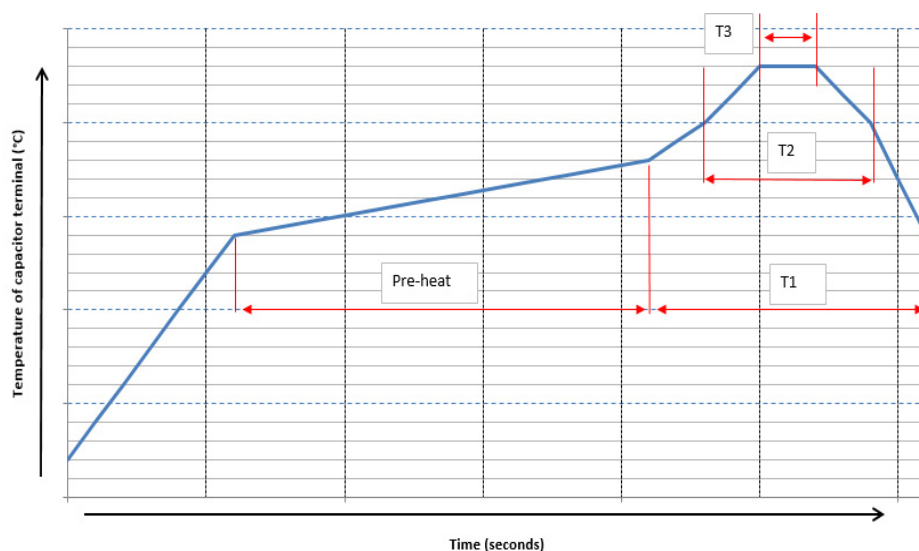
Reflow Soldering

The soldering conditions should be within the specified conditions below:

- Vapor heat transfer systems are not recommended.
- The system should be thermal, such as infra-red radiation or hot blast.
- Observe the soldering conditions as shown below.
- Do not exceed these limits and avoid repeated reflowing.

Time Period	Preheating	T1	T2	T3
Temperature (°C)	150 - 180	≥ 200	≤ 230	≤ 240
Time (seconds)		60 - 180	≤ 40	≤ 20
Reflow can be performed per the above parameters up to 1x				

The resistance to soldering heat corresponds to AEC Q-200 [condition J]. Guideline for reflow is as table above.



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Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

KEMET requires its products to be packaged and shipped on pallets. This is because KEMET's products are specifically designed to be packed onto pallets during shipment. If for any reason, the products are removed from pallets by the shipping party and shipped to the end customer, then additional external protection is required. In this instance, an external box with two carton layers and an upwards orientation sticker must be used by the shipping party, with the empty space filled with filling material, and afterwards sealing the box. If this packing and packaging guideline is not followed by the shipping party, the shipping party, and not KEMET, will be held responsible for any packaging, packing and/or product damages upon delivery of the products to the end customer. KEMET hereby disclaims any liability for damages to the products or otherwise that have been, or threaten to be, inflicted, result from or are in any way related to the packaging, packing or damage by the shipping party in contravention of the packing and packaging guidelines herein.

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