



Overview

The KEMET AAR70 is an AEC-Q200 qualified aluminum rectangular capacitor, designed for automotive applications. It offers high capacitance, high ripple current capability, and robust vibration resistance. Rated at 85°C, the AAR70 offers good volumetric efficiency in a shape that lends itself to stacking into modules. The large surface area of the aluminum case allows for easy use with a heat sink.

Applications

Typical applications are mainly in the field of e-mobility, such as on-board chargers, inverters, or wall boxes.

Benefits

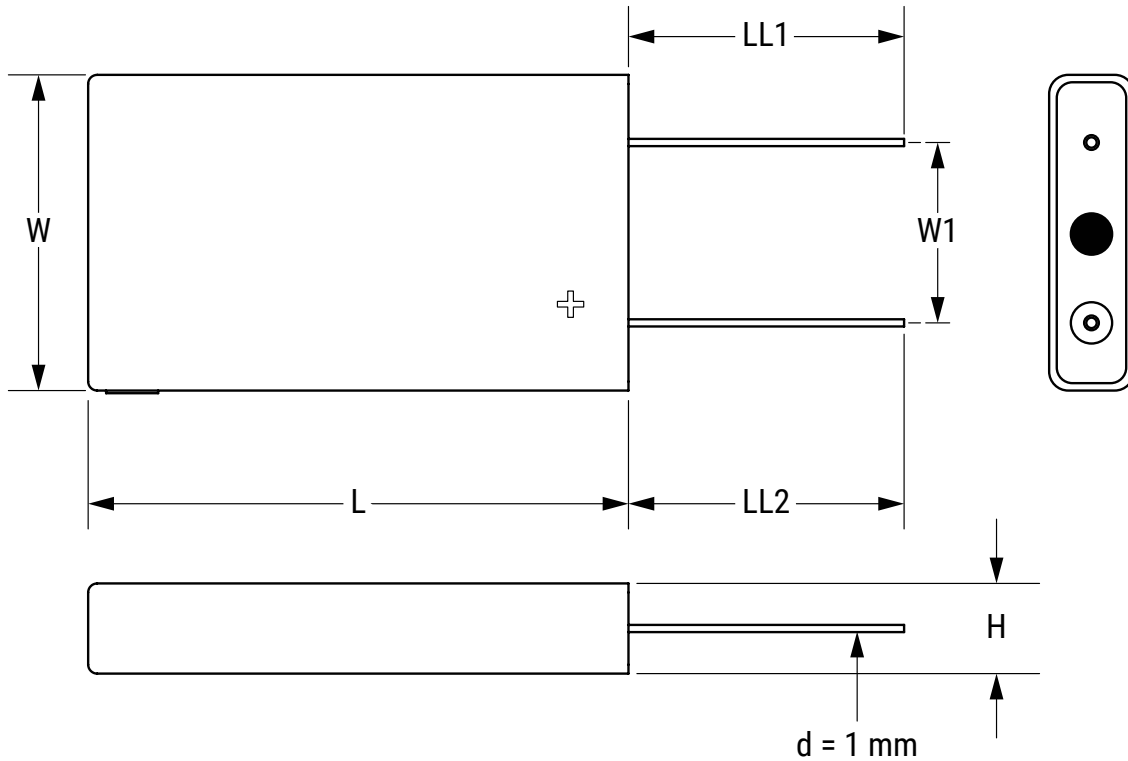
- Rectangular shape for good volumetric efficiency, modular stacking, and ease of heat sinking
- Life of 10,000 hours at +85°C [(V_R) and (I_R) applied]
- AEC-Q200 qualified for automotive applications
- High vibration up to 40 g
- High ripple current capability
- Excellent surge voltage capability
- Optimized designs available on request



Part Number System

AAR70	A	201	JF	400
Series	Termination	Capacitance Code (µF)	Size Code	Rated Voltage (VDC)
Aluminum Rectangular	See Termination Table	First two digits represent significant figures. Third digit specifies number of zeros.	See Dimension Table	400 = 400 420 = 420 450 = 450

Dimensions – Millimeters



Size Code	Dimensions in mm						Approximate Weight (Grams)
	H	W	L	LL1	LL2	W1	
	±0.3	±0.5	±0.5	± 2	± 2	± 1	
JF	12	44.5	38.1	38.0	40	25.5	35
JH	12	44.5	50.8	38.0	40	25.5	45
JJ	12	44.5	57.2	38.0	40	25.5	50

Case Aluminum

Leads Copper wire with tin electroplate

Performance Characteristics

Item	Performance Characteristics	
Capacitance Range	160 – 360 μ F	
Rated Voltage	400 – 450 VDC	
Operating Temperature	–40 to +85°C	
Storage Temperature Range	–40 to +85°C	
Capacitance Tolerance	\pm 20% select values at 100 Hz/+20°C	
Operational Lifetime	Rated voltage, +85°C, Rated ripple current	
	10,000 hours	
Shelf Life	2,000 hours at +85°C or 30,000 at +40°C, 0 VDC	
Leakage Current	$I < 0.006 CV$ (μ A)	
	C = rated capacitance (μ F), V = rated voltage (VDC). Voltage applied for 5 minutes at +20°C	
Vibration Test Specifications	Procedure	Requirements
	1.5 mm displacement amplitude or 40 g maximum acceleration. Vibration applied for three directions of 4-hour sessions at 10 – 2,000 Hz. (Capacitor clamped by body.)	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)		
	400	420	450
\leq 30 second surge followed by a no load period of 330 seconds, 1,000 cycles at +85°C	440	462	495

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	50 Hz	100 Hz	300 Hz	1 kHz	\geq 10 kHz
Coefficient	0.75	1.00	1.50	2.00	2.30

Test Method & Performance

Endurance Life Test	
Conditions	Performance
Temperature	+85°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 for voltages
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-ageing, 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. Aluminium electrolytic capacitors can also be manufactured for the use in intermittent AC applications by using two anode foils in place of one anode and one cathode.

Mounting Position

The capacitor can be mounted upright or inclined to a horizontal position. For the vibration specifications to be valid, the capacitor must always be clamped by the body. The leads and connection tabs cannot provide the support necessary to stabilize the capacitor.

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.

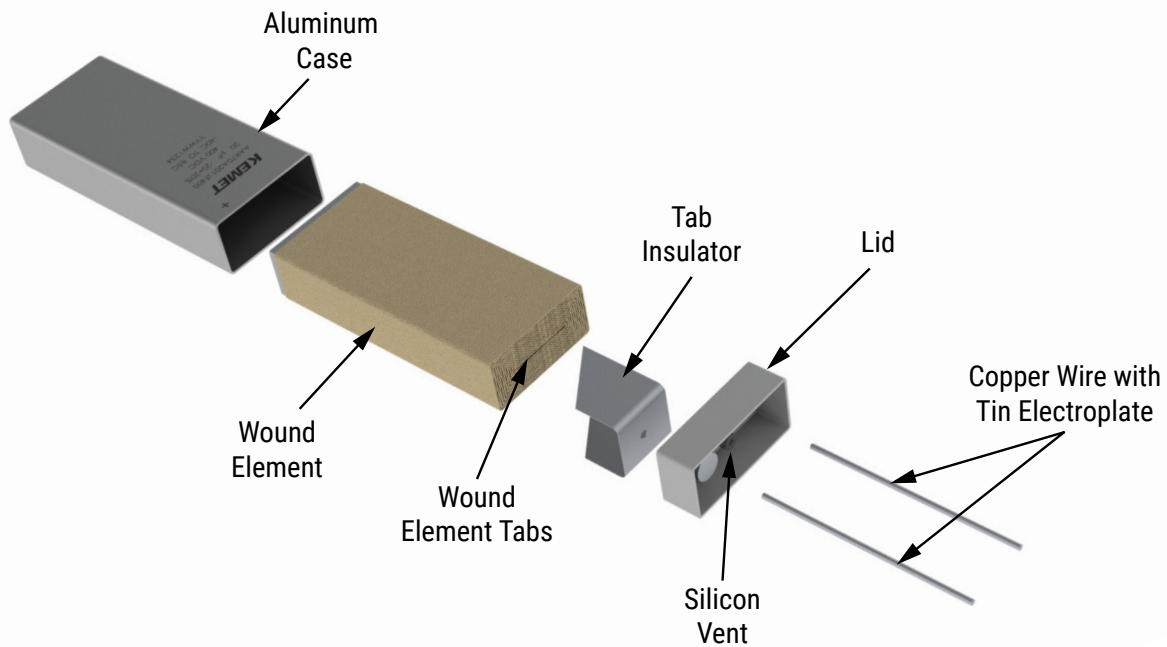
Some customer segments such as medical, military, and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

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

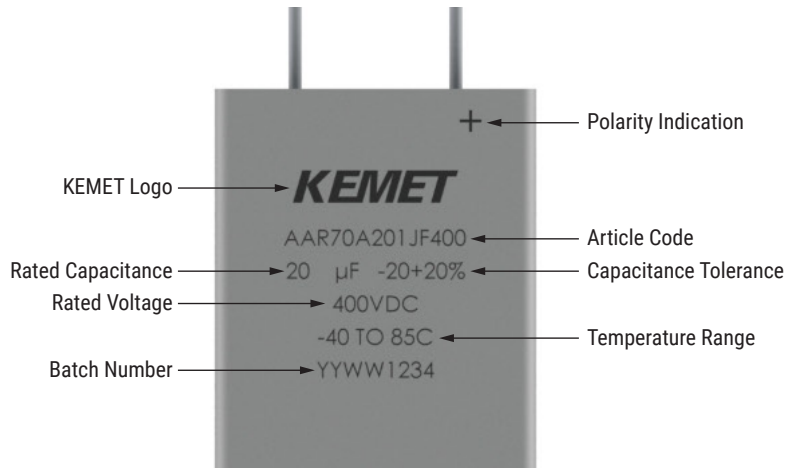
Table 1 – Ratings & Part Number Reference

Rated Voltage (VDC)	Rated Capacitance 100 Hz 20°C (µF)	Size Code	Case Size W x L (mm)	Ripple Current		ESR Maximum 100 Hz 20°C (mOhms)	Impedance Maximum 10 kHz 20°C (mOhms)	Part Number
				100 Hz 85°C (A)	10 kHz 85°C (A)			
400	200	JF	44.5 x 38.1	1.4	3.3	694	386	AAR70A201JF400
400	300	JH	44.5 x 50.8	1.9	4.3	454	254	AAR70A301JH400
400	360	JJ	44.5 x 57.2	2.2	4.8	392	220	AAR70A361JJ400
420	180	JF	44.5 x 38.1	1.4	3.3	718	394	AAR70A181JF420
420	270	JH	44.5 x 50.8	1.9	4.3	468	260	AAR70A271JH420
420	330	JJ	44.5 x 57.2	2.1	4.8	404	222	AAR70A331JJ420
450	160	JF	44.5 x 38.1	1.3	3.2	746	404	AAR70A161JF450
450	240	JH	44.5 x 50.8	1.8	4.3	488	266	AAR70A241JH450
450	300	JJ	44.5 x 57.2	2.0	4.8	420	228	AAR70A301JJ450
(VDC)	100 Hz 20°C (µF)		W x L (mm)	100 Hz 85°C (A)	10 kHz 85°C (A)	100 Hz 20°C (mOhms)	10 kHz 20°C (mOhms)	
Rated Voltage	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR Maximum	Impedance Maximum	Part Number

Construction



Marking



**Print shown is representative*

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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.

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