PEH236, +165°C

Overview

These electrolytic capacitors contain a radial crown which allows them to be mounted in a standing position. They feature outstanding electrical performance, a polarized, all-welded design, tinned copper wire leads and a negative pole connected to the case. The winding is housed in a cylindrical aluminium can with a high purity aluminium lid and a high quality rubber gasket. Low ESR is a result of a low resistive electrolyte/paper system and an all-welded design. Thanks to its mechanical robustness, these capacitors are suitable for use in mobile and aircraft installations, with operation up to +165°C. KEMET automotive grade capacitors meet the demanding Automotive Electronics Council's AEC–Q200 qualification requirements.

Applications

The KEMET PEH236 is a new generation of high performance electrolytic capacitors. It is designed for automotive applications with extremely high demands and temperature requirements up to 165°C.

Benefits

- AEC–Q200 automotive qualified
- Up to 1,000 hours at +165°C
- Resistance to high ambient temperatures
- Extremely high ripple current, up to 22 Arms at 140°C
- Outstanding electrical performance
- Radial crown that allows mounting in a standing position

Part Number System

PEH236	H	F	380	0	Q	E4
Series	Rated Voltage (VDC)	Size Code	Capacitance Code (µF)	Version	Capacitance Tolerance	Packaging
Radial Crown Aluminum Electrolytic with Soldering Star Termination	H = 25 K = 40	See Dimension Table	The last two digits represent significant figures. The first digit indicates the total number digits.	0 = Standard	Q = −10 +30%	E4 = Tray

Performance Characteristics

Item	Performance Characteristics		
Capacitance Range	250 – 2,000 µF		
Rated Voltage	25 – 40 VDC		
Operating Temperature	–40 to +165°C		
Capacitance Tolerance	–10/+30%, at 100 Hz/+20°C		
Operational Lifetime	D (mm)	Rated voltage, +125°C (hours)	Rated voltage, +165°C (hours)
	16	7,400	800
	18 and 20	9,200	1,000
Shelf Life	5,000 hours at +105°C or 10 years at +40°C 0 VDC		
Leakage Current	I = 0.003 CV + 4.0 (µA)		
	C = rated capacitance (µF), V = rated voltage (VDC). Voltage applied for 5 minutes at +20°C.		
Vibration Test Specifications	Procedure		Requirements
	1.5 mm displacement amplitude or 20 g maximum acceleration. Vibration applied for three 22-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: Δ C/C < 5%
Tests at 165°C	Endurance test, +165°C, V_R, 1,000 hours, Thermal Shock, –40 to +165°C, 200 cycles, Surge Voltage test, +165°C, 1.15 x V_R, 1,000 cycles		
Standards	IEC 60384–4 long life grade 40/125/56, AEC–Q200		

Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	100 Hz	300 Hz	1 kHz	5 kHz	100 kHz
Coefficient	0.35	0.57	0.80	1.00	1.04

Test Method & Performance

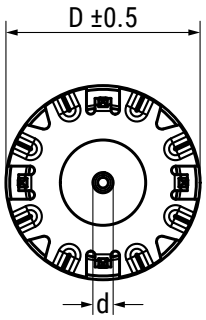
Endurance Life Test	
Conditions	Performance
Temperature	+165°C
Test Duration	1,000 hours
Ripple Current	Maximum ripple current specified in table
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor
Performance	**The following specifications will be satisfied when the capacitor is tested at +20°C:**
Capacitance Change	Within 15% of the initial value
Equivalent Series Resistance	Does not exceed 200% of the initial value
Leakage Current	Does not exceed leakage current limit

Ordering Options Table

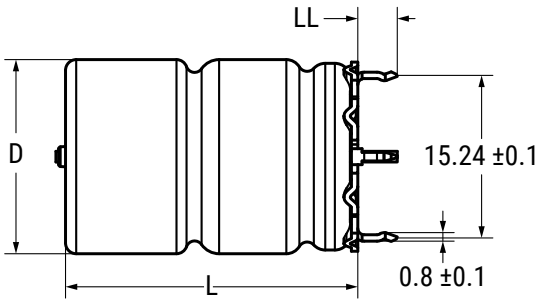
Packaging Kind	Lead Length (mm)	Lead and Packaging Code
Standard Packaging Option		
Tray	3.3 ±0.5	E4

Dimensions – Millimeters

END VIEW (+)



SIDE VIEW



Size Code	Dimensions in mm				Approximate Weight Grams
	D	L	d	LL	
	±0.5	±1	±0.03	±0.5	
F	16.0	27.7	1.0	3.3	8
G	16.0	35.7	1.0	3.3	11
M	18.0	27.5	1.0	3.3	11
N	18.0	35.5	1.0	3.3	14
V	18.0	39.5	1.0	3.3	16
H	20.0	27.7	1.0	3.3	13

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 ten years at 40°C. See sectional specification under each product for specific data.

Failure Rate

Estimated field failure rate: ≤ 0.15 ppm (failures per year/produced number of capacitors per year)
The expected failure rate for this capacitor range is based on field experience for capacitors with structural similarity.
As Per PEG Equivalents

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant and Halogen-Free.

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 such as 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 worldwide and make 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.

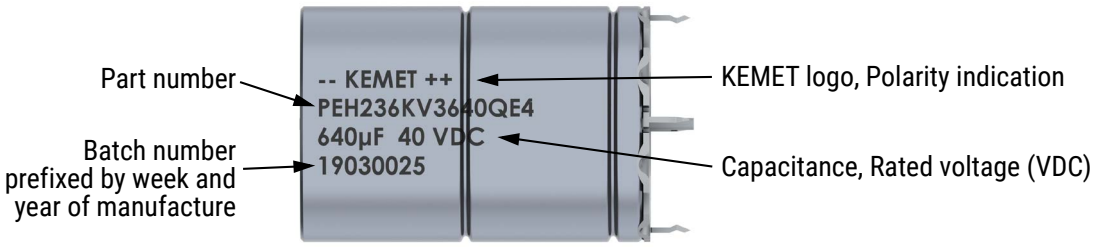
Due to customer requirements, there may appear additional markings such as lead-free (LF), or lead-free wires (LFW) on the label.

Table 1 – Ratings & Part Number Reference

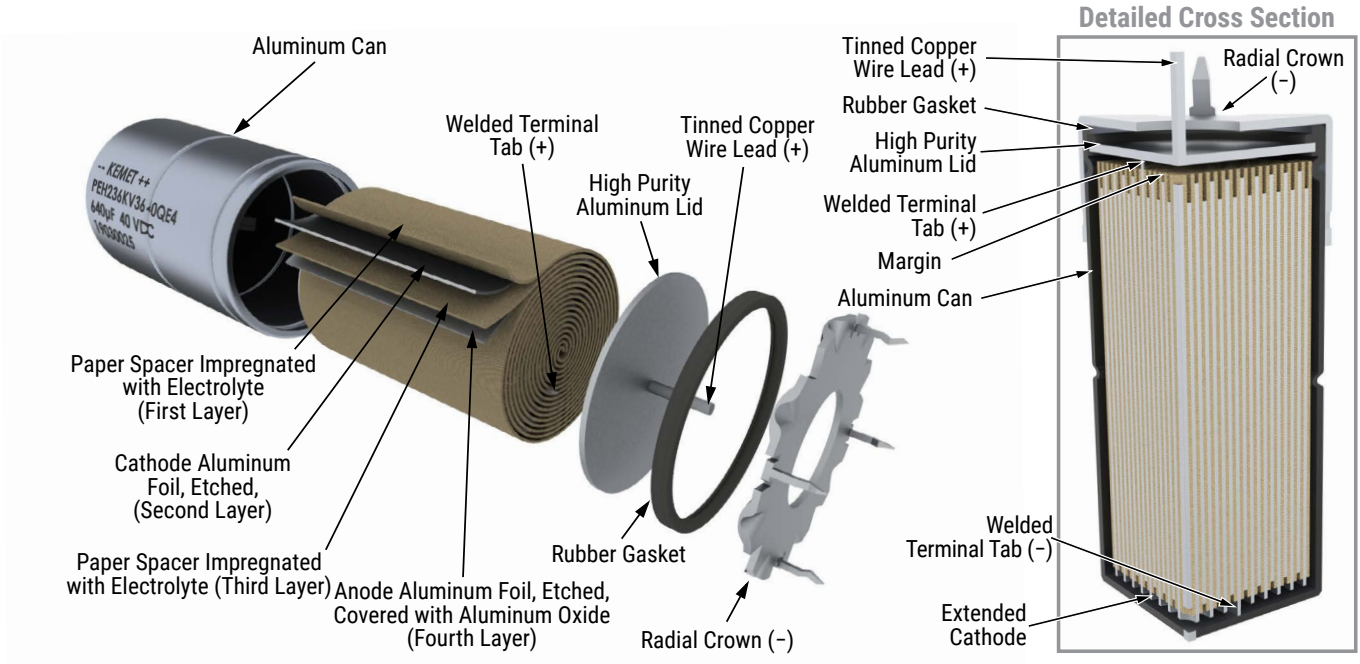
VDC	Rated Capacitance	Size Code	Case Size	Ripple Current					ESR Maximum			Part Number
				Maximum			Rated	Maximum				
	100 Hz 20°C (µF)		D x L (mm)	≥ 5 kHz 140°C (A)[1]	≥ 5 kHz 155°C (A)[1]	≥ 5 kHz 165°C (A)[1]	≥ 5 kHz 140°C (A)	≥ 5 kHz 165°C (A)	100 Hz 20°C (mΩ)	100 kHz 20°C (mΩ)	5 – 100 kHz 125 – 165°C (mΩ)	
25	800	F	16 x 27	15.6	9.9	4.4	5.8	1.6	102	37	14.6	PEH236HF3800QE4
25	1,200	G	16 x 35	17.9	11.3	5.1	7.0	2.0	69	26	11.1	PEH236HG4120QE4
25	1,200	M	18 x 27	18.2	11.5	5.1	6.8	1.9	70	27	11.8	PEH236HM4120QE4
25	1,800	N	18 x 35	20.4	12.9	5.8	8.0	2.3	49	20	9.4	PEH236HN4180QE4
25	2,000	V	18 x 39	21.3	13.5	6.0	8.6	2.4	43	17	8.6	PEH236HV4200QE4
25	1,500	H	20 x 27	22.1	14.0	6.2	7.4	2.1	57	22	10.7	PEH236HH4150QE4
40	250	F	16 x 27	14.1	8.9	4.0	5.1	1.4	210	36	17.9	PEH236KF3250QE4
40	370	G	16 x 35	16.3	10.3	4.6	6.3	1.8	144	26	13.5	PEH236KG3370QE4
40	380	M	18 x 27	16.8	10.6	4.7	6.1	1.7	141	26	13.9	PEH236KM3380QE4
40	560	N	18 x 35	19.0	12.0	5.4	7.5	2.1	97	19	10.8	PEH236KN3560QE4
40	640	V	18 x 39	19.9	12.6	5.6	7.9	2.2	85	17	9.9	PEH236KV3640QE4
40	470	H	20 x 27	20.3	12.8	5.7	6.7	1.9	116	23	12.7	PEH236KH3470QE4
VDC	Rated Capacitance	Size Code	Case Size	Ripple Current					ESR			Part Number

[1] *Capacitor-mounted with low thermal resistance path (heat-sink).*

Marking

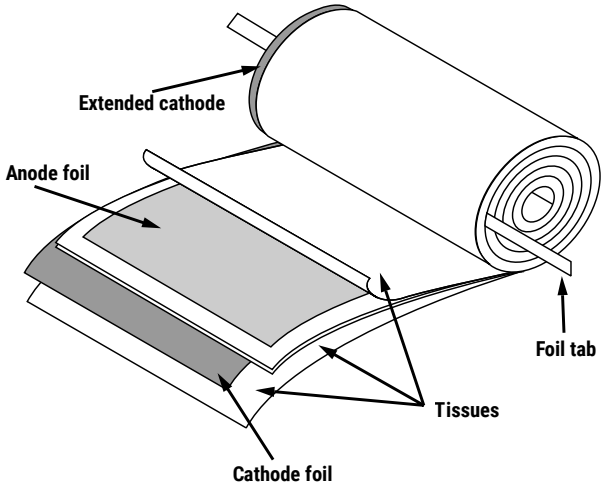


Construction



Construction Data

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then “formed” to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.



The winding is assembled to the capacitor Al-can and to the Al-lid. The can is filled with electrolyte and the winding is impregnated during a vacuum treatment. The capacitor is sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is carried out at elevated temperature and is accomplished by applying voltage to the device while carefully controlling the supply current. The process takes between 2 and 20 hours, depending on voltage rating.

Damage to the oxide layer can occur due to a variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

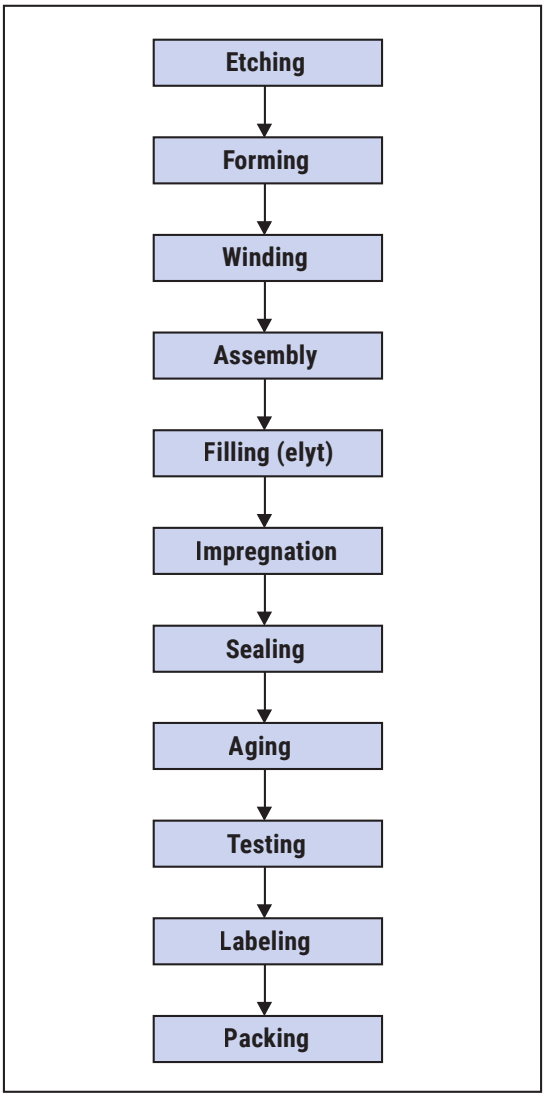
The following tests are applied for each individual capacitor.

Electrical:

- Leakage current
- Capacitance
- ESR
- Tan Delta

Mechanical/Visual:

- Pull strength test of wire terminals
- Print detail
- Box labels
- Packaging, including packed quantity



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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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