PEH526, +125°C

Overview

KEMET's PEH526 is an electrolytic capacitor with outstanding electrical performance. The device is polarized, has a negative pole connected to the case and a plastic cover for the outer case.

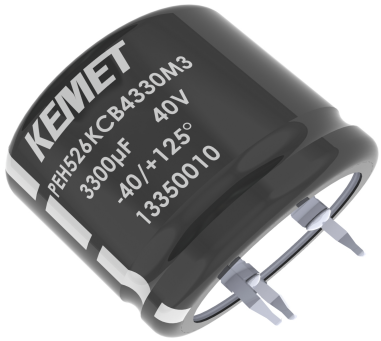
Low ESR is the result of a low resistive electrolyte/paper system. Together with the TDC thermal concept, this range gives the PEH526 a very high ripple current capability. It is suitable for use in both mobile and aircraft applications with operation up to +125°C.

Applications

KEMET's PEH526 is a high performance electrolytic capacitor designed for automotive applications with high vibrations and high ambient temperatures.

Benefits

- Designed for automotive applications
- 3,000 hours at +125°C (V_R, I_R applied)
- Resistance to vibrations
- Low ESR
- High ripple current capability



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Part Number System

PEH526	H	AB	427	0	M	3
Series	Rated Voltage (VDC)	Size Code	Capacitance Code (µF)	Version	Capacitance Tolerance	Termination
Snap-In type Aluminum Electrolytic	H = 25 K = 40 M = 63	See Dimension Table	The last two digits represent significant figures. The first digit specifies the total number of digits.	0 = Standard	M = ±20%	3 = 3 Pin

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Performance Characteristics

Item	Performance Characteristics			
Capacitance Range	820 – 6,800 µF			
Rated Voltage	25 – 80 VDC			
Operating Temperature	–40 to +125°C			
Capacitance Tolerance	±20% at 100 Hz/+20°C			
Operational Lifetime	D (mm)	Rated Voltage and Ripple Current at +125°C (hours)	Rated Voltage at +125°C (hours)	Rated Voltage at +105°C (hours)
	22 – 30	3,000	4,000	20,000
Shelf Life	5,000 hours at 105°C or 10 years at +40°C 0 VDC			
Leakage Current	I = 0.01 CV (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 2-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%	
Standards	IEC 60384–4 long life grade 40/125/56, AEC-Q200			

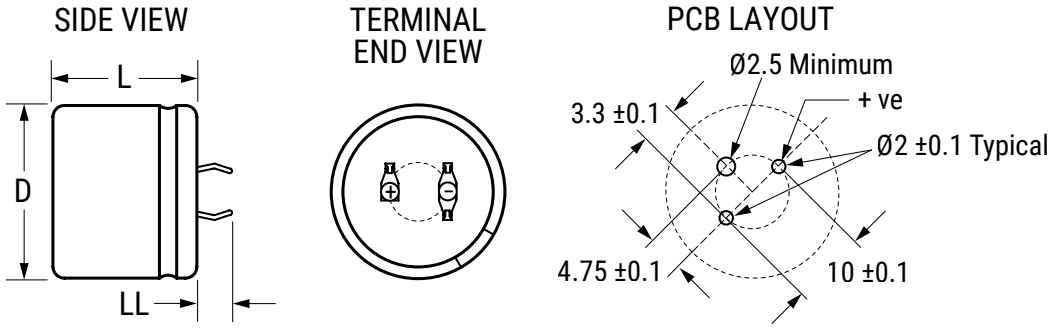
Compensation Factor of Ripple Current (RC) vs. Frequency

Frequency	300 Hz	1 kHz	5 kHz	100 kHz
Coefficient	0.70	0.89	1.00	1.03

Test Method & Performance

Endurance Life Test	
Conditions	Performance
Temperature	+125°C
Test Duration	4,000 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 300% of the specified limit
Leakage Current	Does not exceed leakage current limit

Dimensions – Millimeters



Size Code	Dimensions in mm			Approximate Weight Grams
	D	L	LL	
	±0.5	±1	±1	
AB	22	25	4	12
AC	22	30	4	14
BB	25	25	4	19
BD	25	35	4	24
CB	30	25	4	24
CD	30	35	4	34
Note: Add 0.5 mm to D and 1 mm to L for Sleeving				

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. See sectional specification under each product series for specific data.

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. During re-aging a maximum charging current of twice the specified leakage current or 5 mA (whichever is greater) is suggested.

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; thus, 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.

Reliability as a function of time, R(t), is normally expressed as: $R(t)=e^{-\lambda t}$
where R(t) is the probability that the component will perform satisfactorily for time t, and λ is the failure rate.

Failure Rate

The failure rate is the number of components failing per unit time. The failure rate of most electronic components follows the characteristic pattern:

- Early failures are removed during the manufacturing process.
- The operational life is characterized by a constant failure rate.
- The wear out period is characterized by a rapidly increasing failure rate.

The failures in time (FIT) are given with a 60% confidence level for the various type codes. By convention, FIT is expressed as 1×10^{-9} failures per hour. Failure rate is also expressed as a percentage of failures per 1,000 hours.
e.g., 100 FIT = 1×10^{-7} failures per hour = 0.01%/1,000 hours

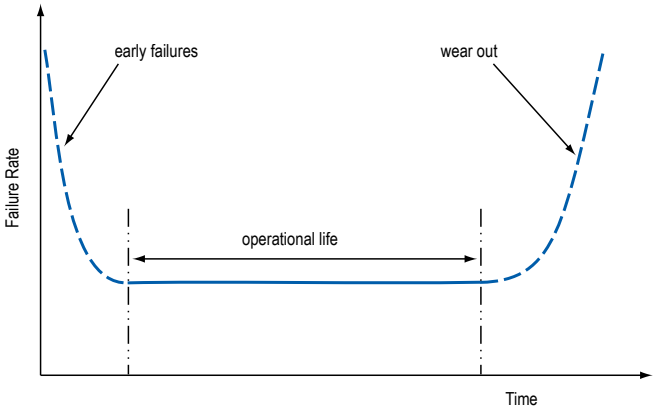
End of Life Definition
Catastrophic Failure: short circuit, open circuit or safety vent operation
Parametric Failure:

- Change in capacitance > ±10%
- Leakage current > specified limit
- ESR > 2 x initial ESR value

MTBF

The mean time between failures (MTBF) is simply the inverse of the failure rate.

MTBF= 1/λ



Environmental Compliance

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

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	Case Size	Ripple Current Maximum				ESR Maximum			Part Number
	100 Hz 20°C (µF)	D x L (mm)	100 Hz 125°C (A)	≥ 5 kHz 85°C (A)	≥ 5 kHz 105°C (A)	≥ 5 kHz 125°C (A)	100 Hz 20°C (mΩ)	100 kHz 20°C (mΩ)	≥ 5 kHz 125°C (mΩ)	
25	2700	22 x 25	2.0	9.7	7.4	3.7	54	30	14	PEH526HAB4270M3
25	3900	22 x 30	2.5	11.9	9.1	4.5	38	22	10	PEH526HAC4390M3
25	3900	25 x 25	2.3	10.1	7.7	3.8	41	24	14	PEH526HBB4390M3
25	5600	30 x 25	2.7	10.2	7.8	3.8	33	22	17	PEH526HCB4560M3
25	6800	25 x 35	3.4	14.4	11.0	5.5	24	14	9	PEH526HBD4680M3
40	1200	22 x 25	1.5	9.4	7.2	3.6	77	28	15	PEH526KAB4120M3
40	1500	22 x 30	1.8	11.5	8.8	4.4	59	20	11	PEH526KAC4150M3
40	1500	25 x 25	1.7	9.8	7.5	3.7	62	23	16	PEH526KBB4150M3
40	1800	22 x 25	1.7	9.6	7.3	3.7	62	28	14	PEH526KAB4180M3
40	1800	25 x 35	2.5	14.1	10.7	5.3	36	14	9	PEH526KBD4180M3
40	2200	22 x 30	2.0	11.7	8.9	4.5	49	22	11	PEH526KAC4220M3
40	2200	25 x 25	1.9	10.0	7.6	3.8	52	24	15	PEH526KBB4220M3
40	2200	30 x 25	2.1	9.8	7.4	3.7	48	22	19	PEH526KCB4220M3
40	2700	25 x 35	2.5	14.1	10.7	5.3	36	14	9	PEH526KBD4270M3
40	3300	30 x 25	2.4	10.0	7.6	3.8	40	22	18	PEH526KCB4330M3
40	3900	25 x 35	2.8	14.3	10.9	5.4	30	14	9	PEH526KBD4390M3
63	820	22 x 25	1.2	5.9	4.6	2.3	150	79	36	PEH526MAB382AM3
63	1200	22 x 30	1.5	7.4	5.7	2.9	100	55	26	PEH526MAC412AM3
63	1200	25 x 25	1.5	6.8	5.3	2.6	110	59	31	PEH526MBB412AM3
63	1800	30 x 25	1.8	7.7	5.9	2.9	76	45	29	PEH526MCB418AM3
63	2200	25 x 35	2.2	10.0	7.7	3.8	59	34	18	PEH526MBD422AM3
VDC	Rated Capacitance	Case Size	Ripple Current				ESR			Part Number

80 VDC available upon request. Contact KEMET for details.

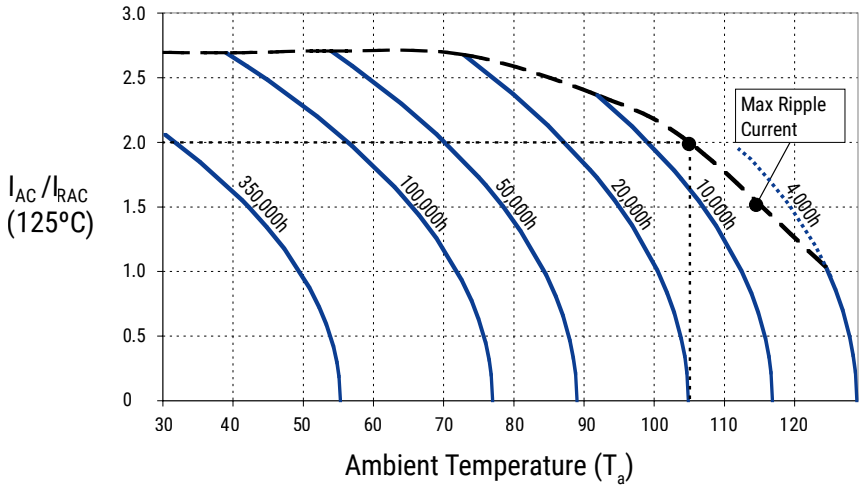
Operational Life

Operational life (L_{op}) at ambient temperature T_a and ripple current I_{AC}.

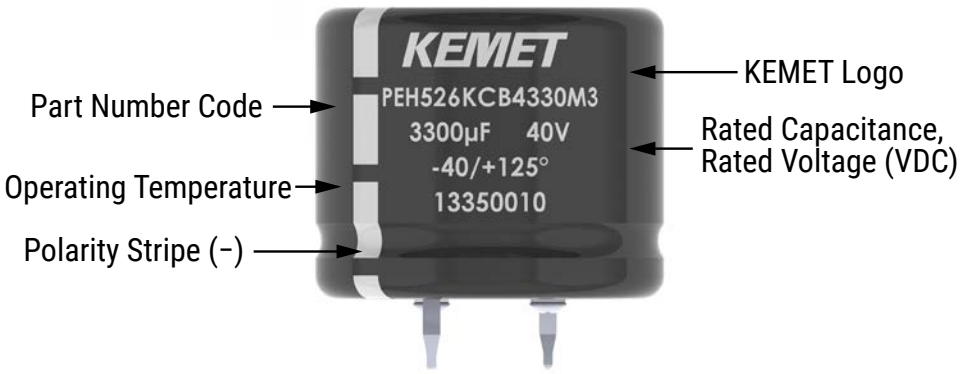
Example:
Article: PEH526KBB4220M3
Ambient temperature (T_a): +105°C
Ripple current, at 10 kHz (I_{AC}): 7.8 A

I_{RAC}(125°C, ≥ 5 kHz)= 3.9 A (from data table)
→ I_{AC}/ I_{RAC}(+125°C) = 2.0

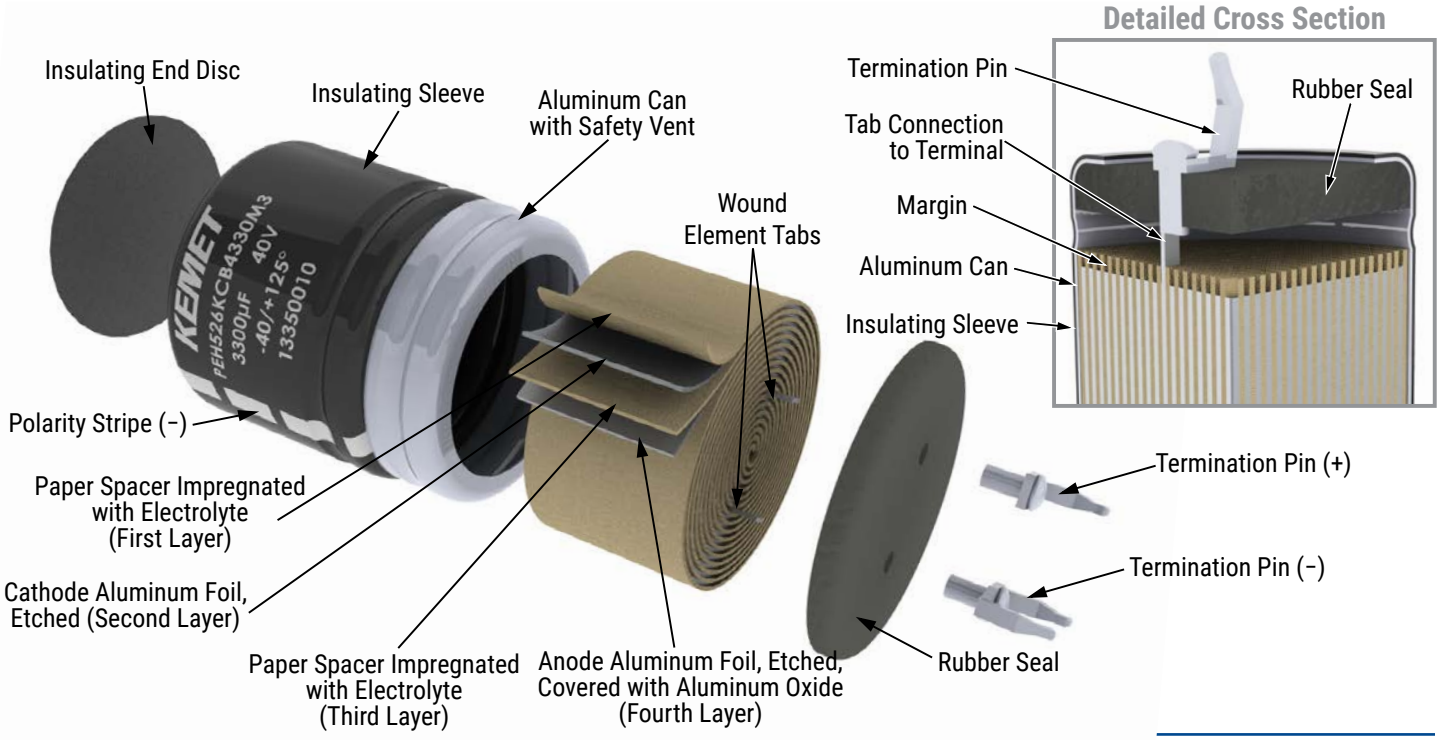
Operational life: Interpolation between the L_{op}-curves → L_{op} ~ 8 kh (blue curves)



Marking

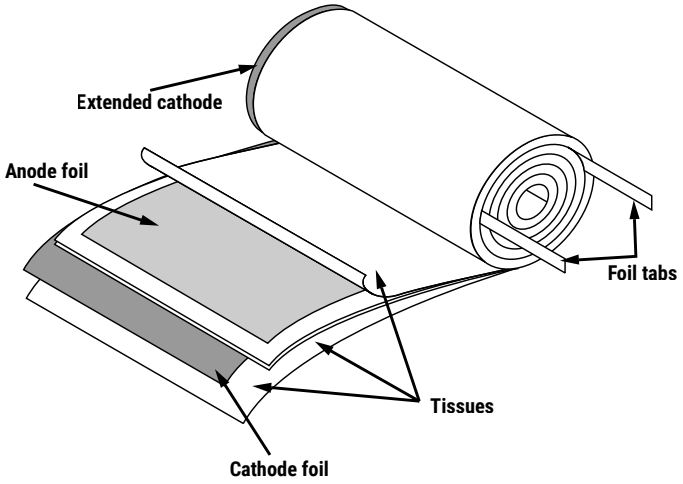


Construction



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 deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with electrolyte before being housed in a suitable container, usually an aluminum can, and 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 sleeved and 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 normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete.

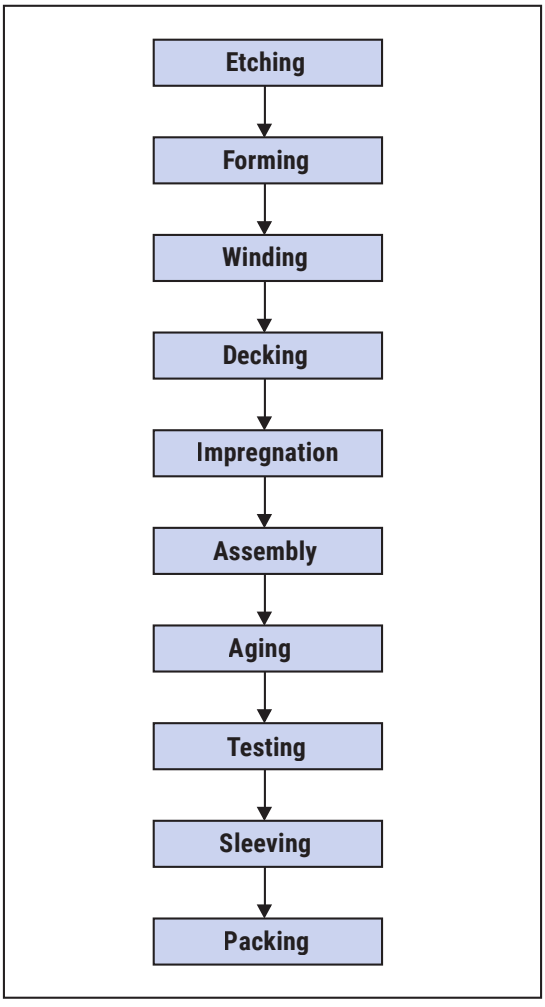
Damage to the oxide layer can occur due to variety of reasons:
- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

A sample from each batch is taken by the quality department after completion of the production process.

The following tests are applied and may be varied at the request of the customer. In this case the batch, or special procedure, will determine the course of action.

Electrical:
- Leakage current
- Capacitance
- ESR
- Impedance
- Tan Delta

Mechanical/Visual:
- Overall dimensions
- Torque test of mounting stud
- Print detail
- Box labels
- Packaging, including packed quantity



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

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