



Electrolytic Capacitors

QUALITY POLICY

At Evox Rifa we are totally committed to continuously improving our performance, with the goals of providing our customers with world class products and services, and meeting our owners' expectations concerning profitability and growth.

To reach these goals we are continuously working to

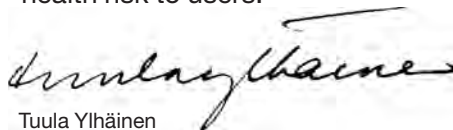
- improve quality planning and efficiency in all processes
- focus on customer needs
- optimise costs
- emphasise personnel competence and training.

In all activities we carefully respect and comply with the requirements of society and environment.

ENVIRONMENTAL POLICY

Evox Rifa is committed to:

- adhering to high standards in environmental quality
- providing a workplace that protects the health and safety of our employees and the communities close to our facilities
- supplying products that cause minimal environmental load and minimal health risk to users.



Tuula Ylhäinen
President, Evox Rifa Group

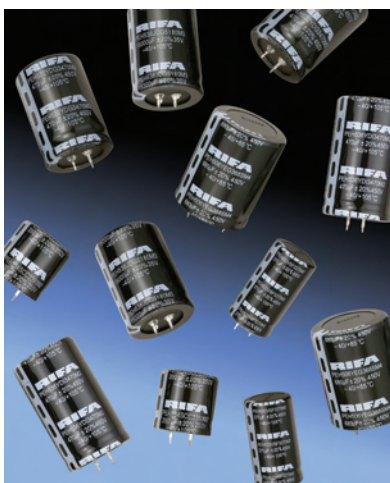
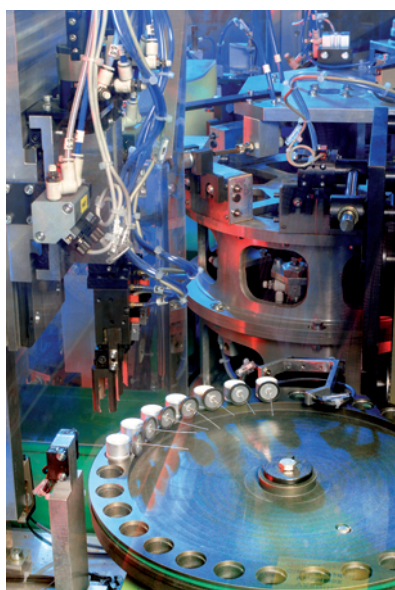


Electrolytic Capacitors

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COMPANY PRESENTATION



The combining of the Rifa and BHC ranges of electrolytic capacitors into one catalogue, gives design engineers one of the widest choices of capacitors to suit every application in power electronics equipment.

The Company's technology, developed in close co-operation with some of the leading power electronics equipment designers, ensures that our products meet the most demanding performance requirements. This technology is supported by unique modelling software that can accurately predict the capacitor performance under given operating conditions.

Our Research and Development teams are constantly evaluating the latest materials and developing electrolytes to keep our technology amongst the most widely respected in the world of power electronics. We are committed to not only satisfying customers' current needs, but to improving and developing products in anticipation of their future requirements.

Each stage of the process, from design through production to despatch, is supported by a comprehensive quality system to provide the long reliable service life that is required in applications such as; inverters for motor drives and wind turbines, automotive power electronics, uninterruptible power supplies.

With Electrolytic Capacitor production in Europe and in Asia, the Evox Rifa Group offers global customers a comprehensive range of products and logistic solutions

PRODUCT MARKING FOR TRACEABILITY

Evox Rifa Electrolytic Capacitors are marked with year and month / week of manufacturing and batch code.

Example:

ALS, ALC 165392/1 0631 = Batch 165392/1, Year 2006, Week 31
 PEG124, PEG126, PEG220, PEG225, PEG 226,
 PEH126: 0615/01 = Year 2006, Week 15, Batch No 1.
 PEH169, PEH200: 0603/85966 = Year 2006, March, Batch No 85966.
 PEH506, PEH526, PEH532, PEH534, PEH536: 0605004 = Year 2006, May, Batch No 4.

AXIAL TAPING SPECIFICATION

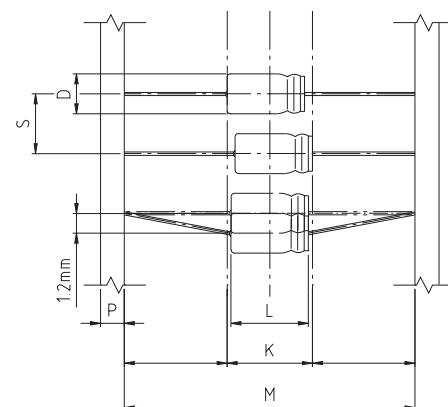
The taped capacitors are delivered in accordance with IEC 60286-1.

The components are taped so that identical poles are turned to the same side of the tape. The cathode lead tape is blue.

PEG 124

Case code	D	L	K	S	M	P	Standard Content/reel
A	10	20	21.4	15 ± 0.75	73 ± 1.5	6 ± 1	500
B	10	29	30.4	15 ± 0.75	73 ± 1.5	6 ± 1	500
C	13	20	21.4	15 ± 0.75	73 ± 1.5	6 ± 1	400
D	13	29	30.4	15 ± 0.75	73 ± 1.5	6 ± 1	400
E	13	37	38.4	15 ± 0.75	73 ± 1.5	6 ± 1	400

Dimensions in mm.

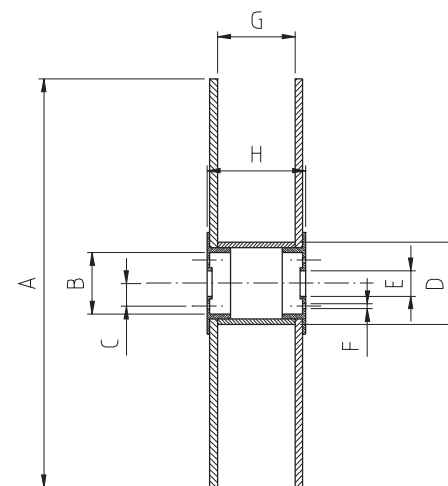


TAPING

Reel

	Standard
A Reel diameter	356 ± 2
B Inside core diameter	76.2 ± 1.5
C Feeding hole distance from reel center	27.2 ± 0.3
D Outside core diameter	82.5 ± 2
E Reel hole diameter	30.2 ± 0.4
F Feeding hole diameter	8.0 ± 0.2
G Inside reel width	90 ± 1
H Reel width	98 ± 1

Dimensions in mm.

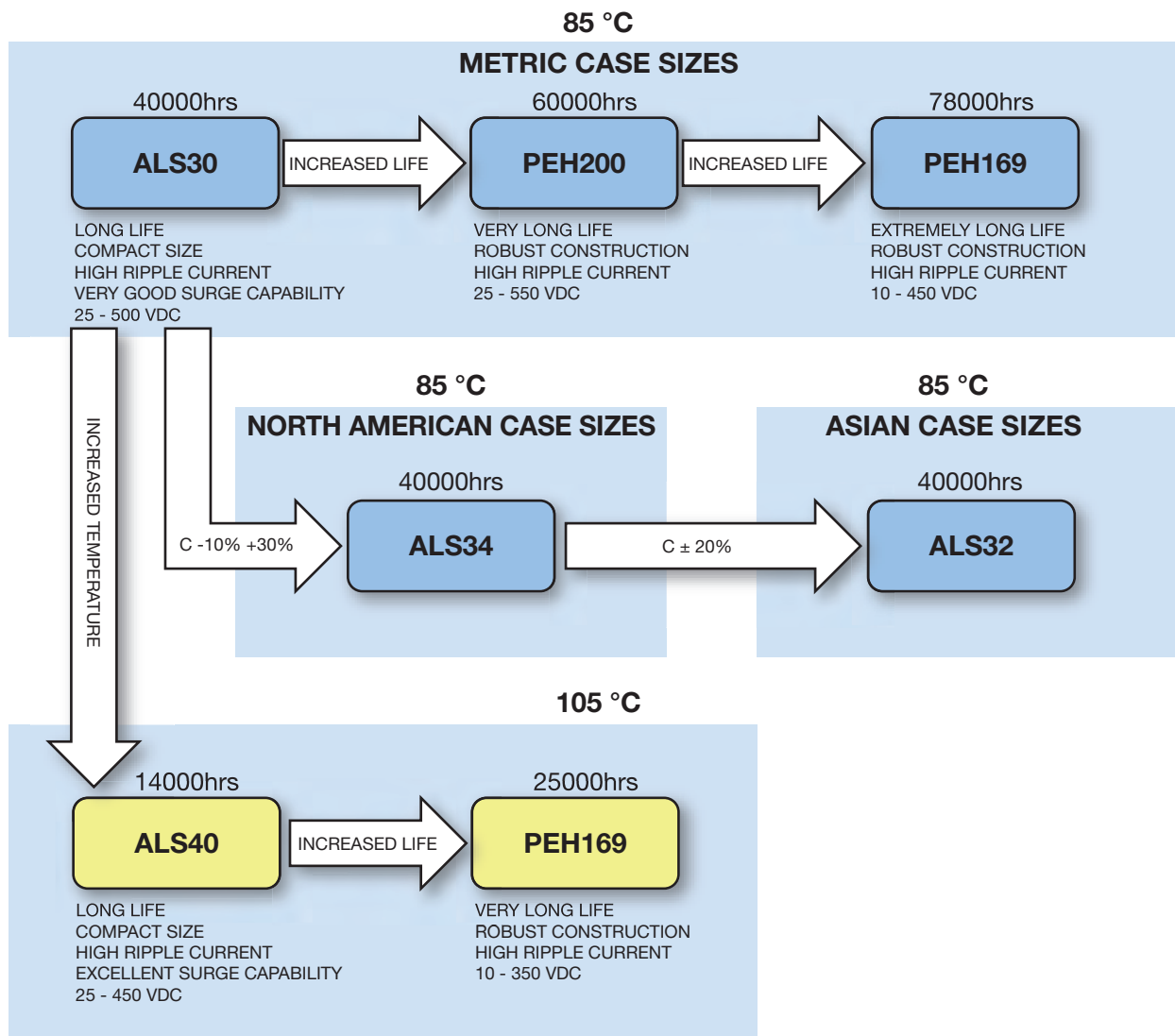


MARKING

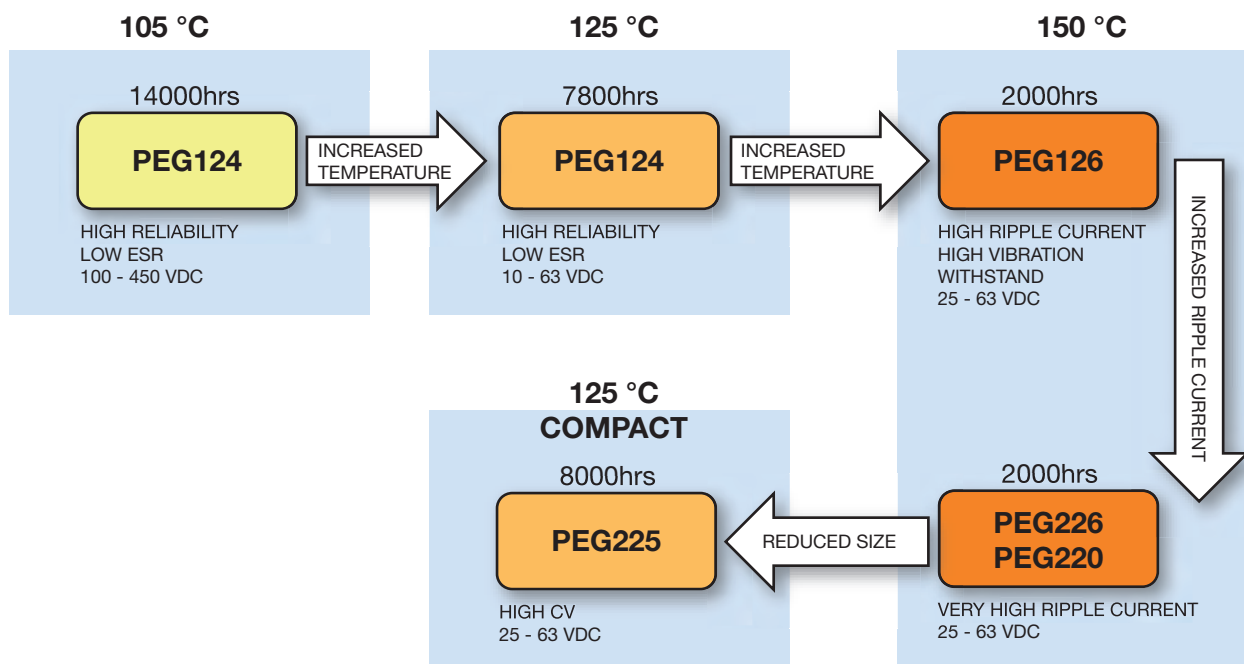
Standard marking for: PEG and PEH types

	Standard
Rated capacitance	Yes
Capacitance tolerance	Yes
Rated voltage	Yes
Date of manufacture	Yes, coded
Polarity indication	Yes
Article code	Yes

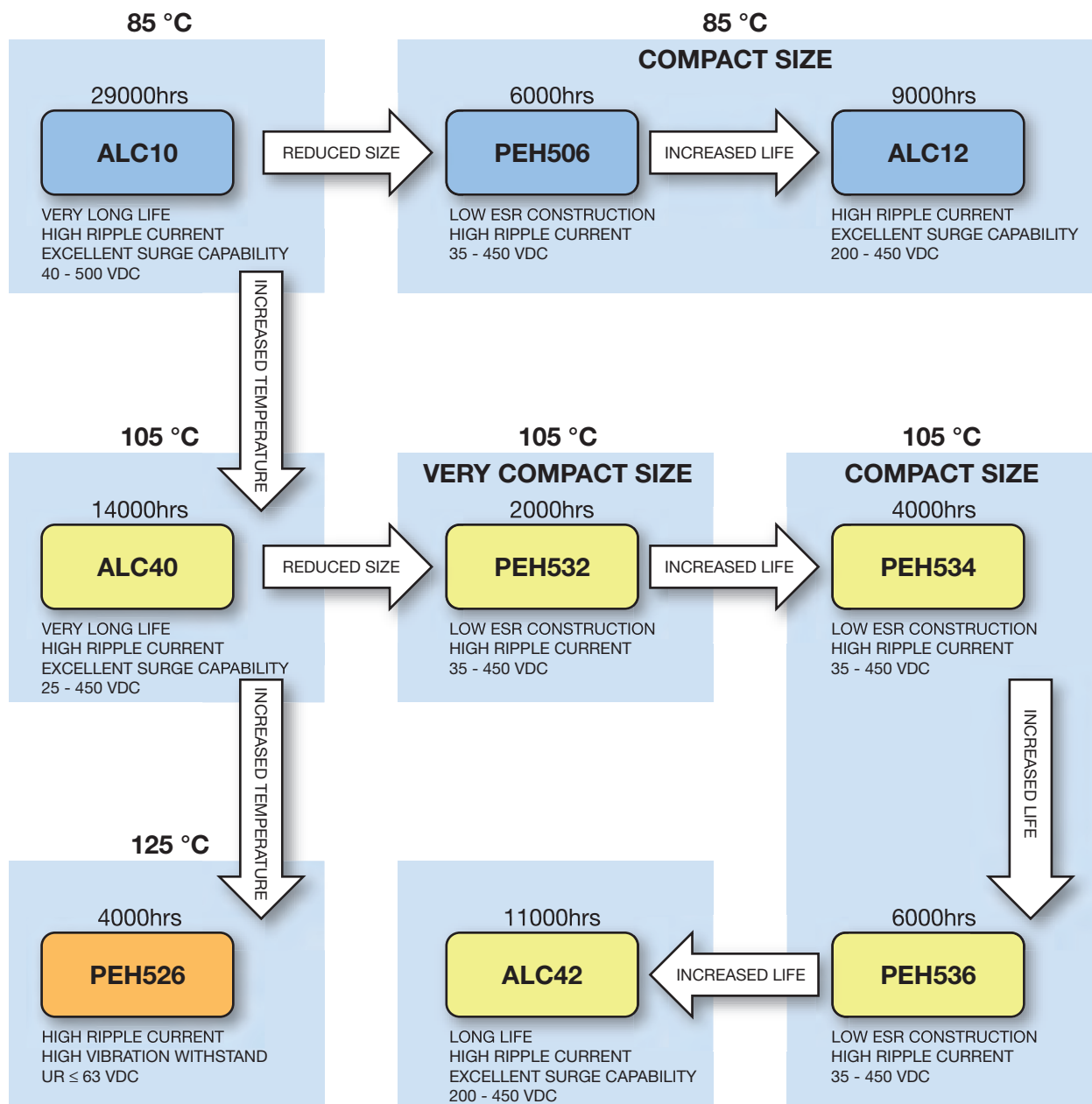
SCREW TERMINALS



AXIAL



SNAP-IN



Life expectancy figures based on operation at upper category temperature with rated d.c. voltage applied.

RIFA ELECTROLYTIC CAPACITORS

When ordering, we recommend that both the full RIFA code number and the specific characteristics of the component are quoted, in order to eliminate any possibility of interpretation error. Please see the example below.

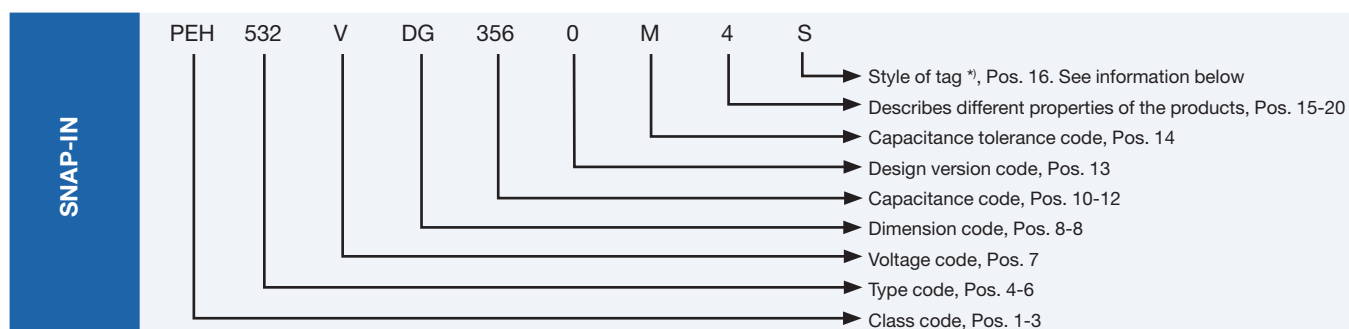
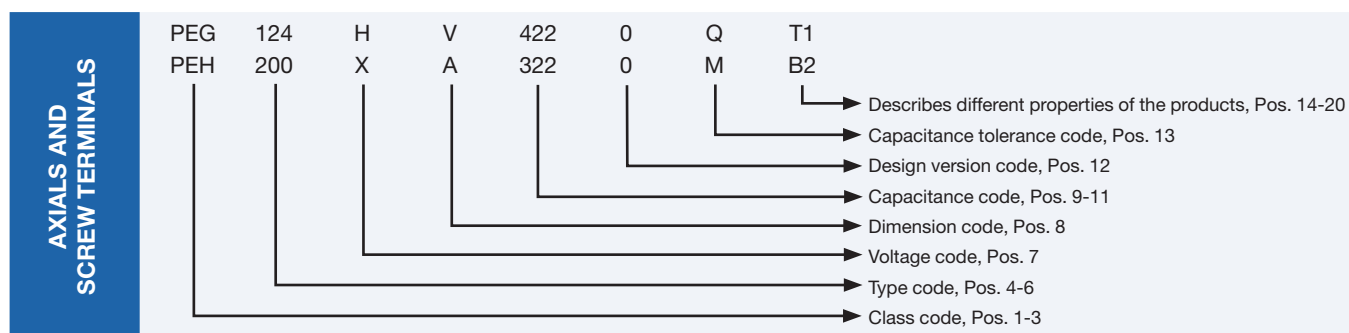
General ordering information

The RIFA article code consists of a maximum of 20 positions.

Pos 1–20

A	B	C	1	2	3	D	E	4	5	6	F	G	T	1					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

The basic version of each article is designed with a fifteen character article code.

^{*)} **Style of tag**

Blank = Standard pin length 6.3 mm
 s = Short pin length 4 mm
 P = Short pin length 5 mm
 R = Stand-off pin
 D = 0 Special Tag (out of above design)

EXAMPLE

Class code:

“P” = RIFA
 “E” = Electrolytic capacitors
 “H” = Radial terminations
 “G” = Axial terminations

Type code:

Type code indicate performance and type of terminations.

Voltage code:

Rated voltage code, the code is specified in each article table.

Dimension code:

Dimension code, the code is specified in each article table.

Capacitance code:

Number of digits in capacitance value in μF .
 The two significant digits in the capacitance value.
 Example: 2100 is the code for 10 μF
 6330 is the code for 330000 μF .

Design version code:

“0” for the basic version, “the catalogue product”. For higher performance products, CAD-products letters, from A to Z is used.

Capacitance tolerance code:

Capacitance tolerance code.
 Example: Q: $-10 + 30\%$ K: $\pm 10\%$
 M: $\pm 20\%$ J: $\pm 5\%$
 Y: $\pm 15\%$ T: $-10 + 50\%$

BHC ELECTROLYTIC CAPACITORS

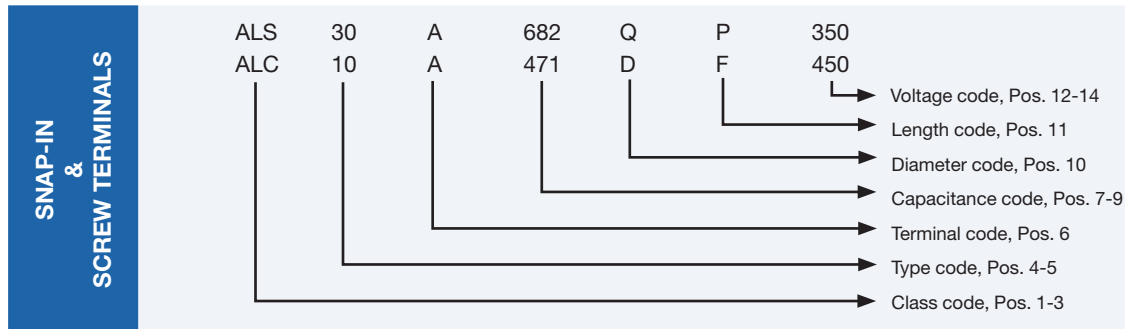
General ordering information

The BHC article code consists of 3 formats for the principle capacitor types. Where a part is required which has one or more attribute(s) that are non standard, e.g. capacitance/tolerance, case type, print detail, sleeve type & marking, bar code labelling, reduced ESR, etc., a customer special part number is assigned. In the simplest case, a special part may differ from a standard part by having the customer part number on the print detail. A special part number also makes it more difficult for third party copying as the technical specification will not be disclosed without written consent from the originating customer.

Standard part number with two digit case code

Pos 1–14

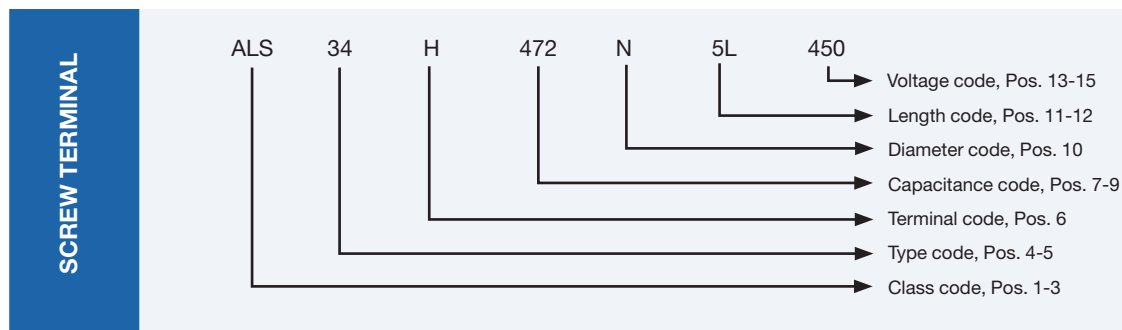
A	L	S	3	0	A	6	8	2	Q	P	3	5	0
1	2	3	4	5	6	7	8	9	10	11	12	13	14



Standard part number with three digit case code

Pos 1–15

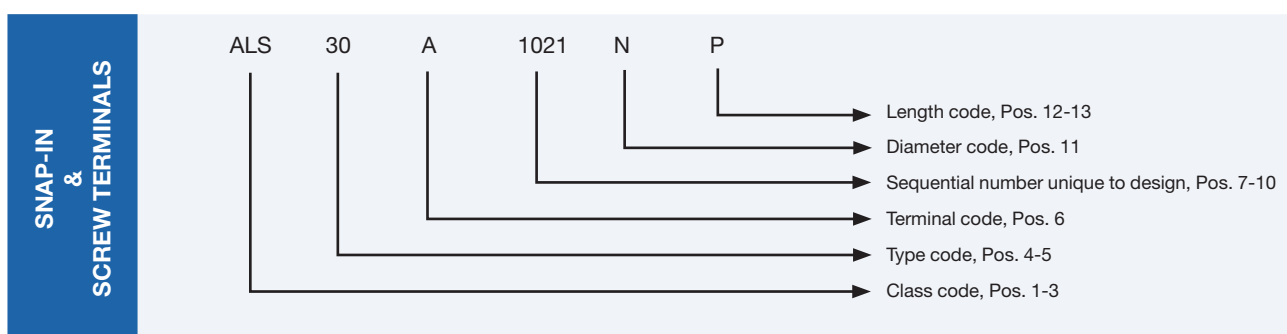
A	L	S	3	4	H	4	7	2	N	5	L	4	5	0
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15



Customer special part number

Pos 1–13

A	L	S	3	0	A	1	0	2	1	N	P	
1	2	3	4	5	6	7	8	9	10	11	12	13



BHC ELECTROLYTIC CAPACITORS

Class code: "AL" = BHC Aluminium electrolytic capacitors
 "S" = Screw terminals
 "C" = Snap-in terminations
 "P" = Solder pin (DIN) terminations
 "T" = Solder tag terminations
 "N" = T-Network

Type code: Type code indicates performance and plain can or stud mounting
 Plain can: 10, 12, 20, 22, 30, 32, 34, 40, 42
 Studded: 11, 21, 23, 31, 33, 35, 41

Terminal code: The terminal code is defined for each Class code.

ALS	ALC	ALP	ALT	ALN
A = M5 C = M6 E = 1/4-28UNF G = M6 HP High current H = 10-32UNF J = M6 LP High current M = M5 HP R = M5 Rifa	A = 2 pin 6.3mm C = 4 pin 6.3mm D = 2 pin 4.0mm E = 4 pin 4.0mm F = 3 pin 4.0mm G = 5 pin 6.3mm H = 5 pin 4.0mm J = 4 pin stand-off K = 5 pin stand-off S = 2/4 pin slotted foil	A = all types	A = all types	S = 4 pin

Capacitance code: First two digits equals first two significant figures.
 Third digit is number of zeros.
 Example: 272 = 2,700 μ F
 104 = 100,000 μ F

Diameter code: The diameter code is defined according to the following Class codes.

code	D	K	L	M	N	Q
ALS	ø36	ø51	ø64	ø66	ø77	ø90

code	B	C	D	E	F	K
ALC	ø25	ø30	ø35	ø40	ø45	ø50

code	A	B	C	D
ALP/T/N	ø25	ø30	ø35	ø40

Length code: The length code is defined according to the class code, however, some type codes within a class have different length codes.

code	A	B	C	D	E	H	F	P	T
ALS30/40	52	62	67	75	82	98	105	146	220

code	2C	2L	3C	3L	4C	JA	4L	5C	5L	5R	6L	7L	8L
ALS32/34	55	68	80	93	105	115	119	131	144	150	169	194	220

code	B	C	D	E	F	G	H	L	P
ALC	30	35	40	45	50	55	60	80	105

code	A	B	D	E	F
ALP/T/N	35	45	55	75	105

Voltage code: Rated voltage code;
 e.g. 040 = 40Vdc, 450 = 450Vdc

TERMS AND DEFINITIONS

Term	Symbol	Unit	Definition	Notes
Rated voltage	U_R	V	Maximum operating peak voltage of a non reversing type waveform for which the capacitor has been designed for continuous operating. Figure 1.	Figure 1.
DC voltage	U_{DC}	V	The mean value of the applied DC-voltage. Figure 1.	
Superimposed AC-voltage	U_{AC}	V	Maximum superimposed alternating voltage applied. Figure 1.	$U_{DC} + U_{AC} \leq U_R$
Rated reversed voltage	U_{RE}	V	The maximum permitted reverse voltage (not in continuous operation).	$U_{RE} \leq 1.0V$
Surge voltage	U_S	V	A peak voltage induced by a switching or any other disturbance of the system which is allowed for a limited number of times. Figure 1.	$1.15 \times U_R$ for $U_R \leq 315V$ $1.10 \times U_R$ for $U_R > 315V$ 1000 cycles with load period 30s and no load period 330s, $R \times C = 0.1s$.
Transient voltage	U_T	V	Some of our capacitors can withstand pulses exceeding the surge voltage. (No general ratings, value on request)	Rise time t_R , $100 \mu s < t_R < 5 ms$ Time between transients $> 5 min$. Nominal voltage applied between transients. 1000 pulses randomly applied during life time.

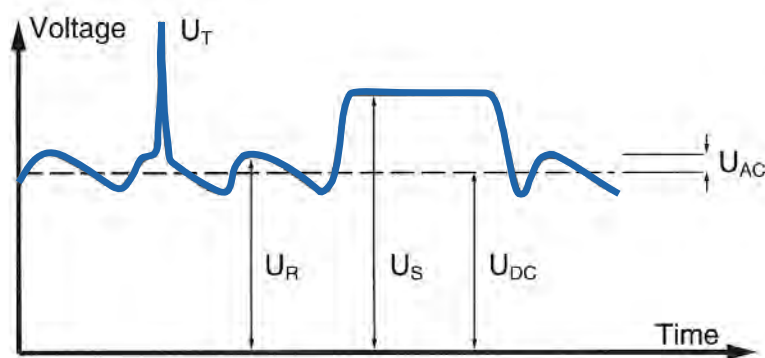


Fig 1.

Rated capacitance	C_R	F	The rated capacitance is the value which is indicated upon the capacitor.	Measured at $\leq 0.5V$ and 100 Hz without DC polarization, 20°C.
DC capacitance	C_{DC}	F	The capacitance determined on basis of the capacitors storage capacity when charged with DC voltage.	Measured acc. to DIN 41328.
Impedance	Z	Ω	Impedance between capacitor terminals.	Determines out put ripple voltage.
Equivalent series resistance	R_{ESR}	Ω	An equivalent resistance in series with the ideal capacitor representing all the losses of the capacitor.	Maximum R_{ESR} is stated at 100 kHz and 100 Hz, 20°C.
Equivalent series inductance	L_{ESL}	H	An equivalent inductance in series with the ideal capacitor representing the inductance of the winding and the terminals.	Partly determines impedance at high frequencies.
Dissipation factor	$\tan \delta$		Measure for the deviation from an ideal capacitor.	Maximum $\tan \delta$ available on request.

TERMS AND DEFINITIONS

Term	Symbol	Unit	Definition	Notes
Rated ripple current	I_{RAC}	A	Maximum rms current for continuous operation at specified service conditions.	I_{RAC} is stated at 100 Hz and upper category temperature. See Article Table.
Ripple current	I_{AC}	A	Applied ripple current at operating frequency and operating temperature.	For calculation of k_{AC} and k_{PC} .
Leakage current	I_{RL}	A	The leakage current is the current after a specified time flowing through the capacitor when a direct voltage is applied across the terminals.	Rated value (at 20°C, U_R applied, 5 minutes).
Operational leakage current	I_{OL}	A	The final direct current that appears after a prolonged operating time.	Measured after approximately 30 minutes.
Temperature range		°C	The ambient temperature interval between a lower and upper temperature limit to which the capacitor may be continuously exposed in order to function with specified parameter tolerances.	See Article Table.
Storage temperature	T_S	°C	A temperature at which the capacitor can be stored without any applied voltage and without any damage to the capacitor.	Minimum storage temperature is -55°C. Storage life at 40°C without reforming 10 years.
Ambient temperature	T_a	°C	The temperature around the capacitor.	
Case temperature	T_c	°C	The hottest part of the case.	
Hot-Spot temperature	T_h	°C	The hottest part of the winding.	Determines life, reliability and max permitted ripple current.
Shelf life		h	Shelf life is specified time for which a capacitor can be stored with no applied voltage.	See article table for each group.
Operational life	L_{OP}	h	The operational life designates the period that is achieved until the electrical parameters exceed certain values. During this time the failure rate is constant.	Operational life is defined as: $10 \leq U_R \leq 160V \Delta c/c \leq \pm 15\%$ $U_R > 160V \Delta c/c \leq \pm 10\%$ $\tan \delta \leq 1, 3 \tan \delta$ (specified value) $I_L \leq I_{RL}, R_{ESR} \leq 2R_{ESR}$ (initial value).
Failure rate	λ	h^{-1}	The failure rate is the fraction failure divided by the specified time of duty.	The failure rate is divided from our periodic tests. Therefore the failure rate is only given at the test temperature for life tests. An estimation is also given at 60°C.

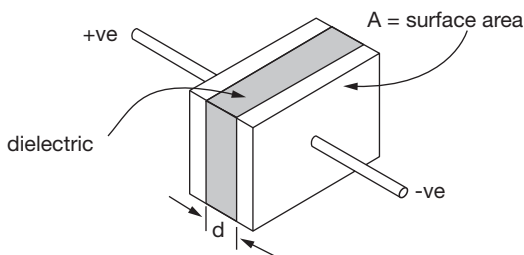
CAPACITOR CONSTRUCTION

Basic Construction of a Capacitor

The basic principle of the capacitor is to store electrical charge (Q in coulombs). The potential charge it can hold is determined by the capacitance (C in Farads) and voltage (V in volts) and is defined as:

$$Q = C \cdot V$$

The unit of capacitance, the Farad, is the capacitance of the capacitor between the plates across which there appears a potential difference of 1 volt when it is charged by 1 coulomb of electricity. The value of capacitance in a basic capacitor is proportional to the area of the plates and inversely proportional to the distance between them. Not only does this distance between the plates have an effect on capacitance but also the material that occupies the space, known as the dielectric.



If the space were to be occupied by a perfect vacuum then the capacitance can be determined by:

$$C = \frac{\epsilon_0 \cdot A}{d}$$

A = surface area of the plates in m²

d = distance between the plates (or dielectric thickness) in m

ϵ_0 = permittivity of free space - 8.85×10^{-12} F/m

In practice this space is occupied by a dielectric which has a relative permittivity to that of the vacuum as follows:

Material	Relative Permittivity
Vacuum	1.0
Air	1.0006
Paper (dry)	2 - 2.5
Polythene	2 - 2.5
Insulating oil	3 - 4
Bakelite	4.5 - 5.5
Glass	5 - 10

Therefore capacitance is determined by:

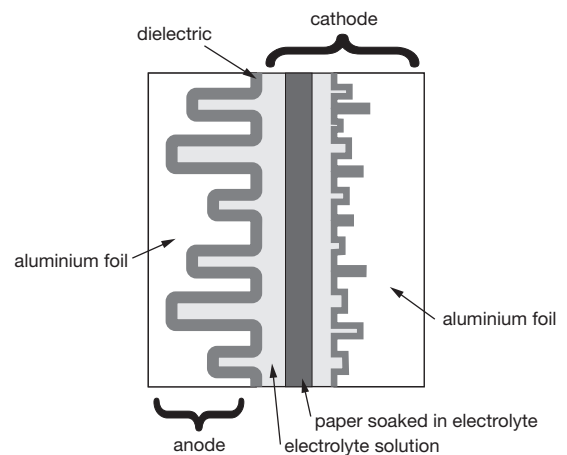
$$C = \frac{\epsilon_0 \cdot \epsilon_r \cdot A}{d}$$

ϵ_r = relative permittivity of the dielectric

Aluminium Electrolytic Capacitors

The aluminium electrolytic capacitor consists basically of two foils interleaved with an absorbent paper wound tightly into a cylinder. The main advantage of this type of capacitor is the high capacitance per unit volume due to its internal construction which consists of a very thin dielectric layer and large effective surface area.

The positive plate, or anode, is made from aluminium foil which is etched to increase the surface area. The dielectric is aluminium oxide, which is formed electrolytically onto the surface of the foil. This formed oxide layer is very thin, being proportional in thickness to the forming voltage and possesses a semiconductor characteristic. The oxide thickness for a 25 volt working capacitor is in the order of 0.045 microns.

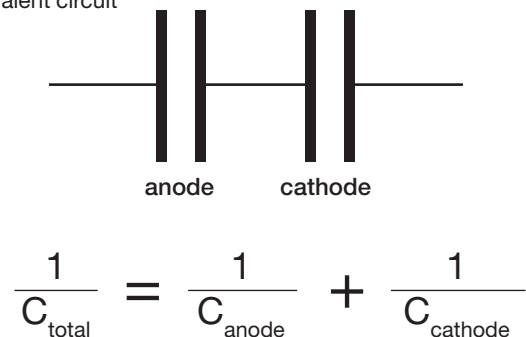


The negative plate, or cathode, is provided by an electrolyte solution for two reasons:

- allows good contact with the anode by permeating all the etched structure.
- repairs any flaws in the oxide layer when the capacitor is polarised.

The second foil, usually called the cathode foil, contacts with the electrolyte reducing the series resistance. This foil has a thin stabilised oxide film, and therefore will also possess a very high capacitance. Like the anode foil the cathode is also etched to increase the surface area. This is necessary in order to eliminate the effect on the overall capacitance by the presence of the cathode foil.

equivalent circuit



MANUFACTURING PROCESS

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then 'formed' to produce the aluminium oxide layer.

Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process aluminium 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 aluminium can, and sealed. Throughout the process all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Before being sleeved and packed each capacitor is aged and tested. The purpose of ageing is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Ageing is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device whilst 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

After completion of the production process a sample from each batch is taken by the quality department. This sample size is controlled by the use of recognised sampling tables defined in BS 6001.

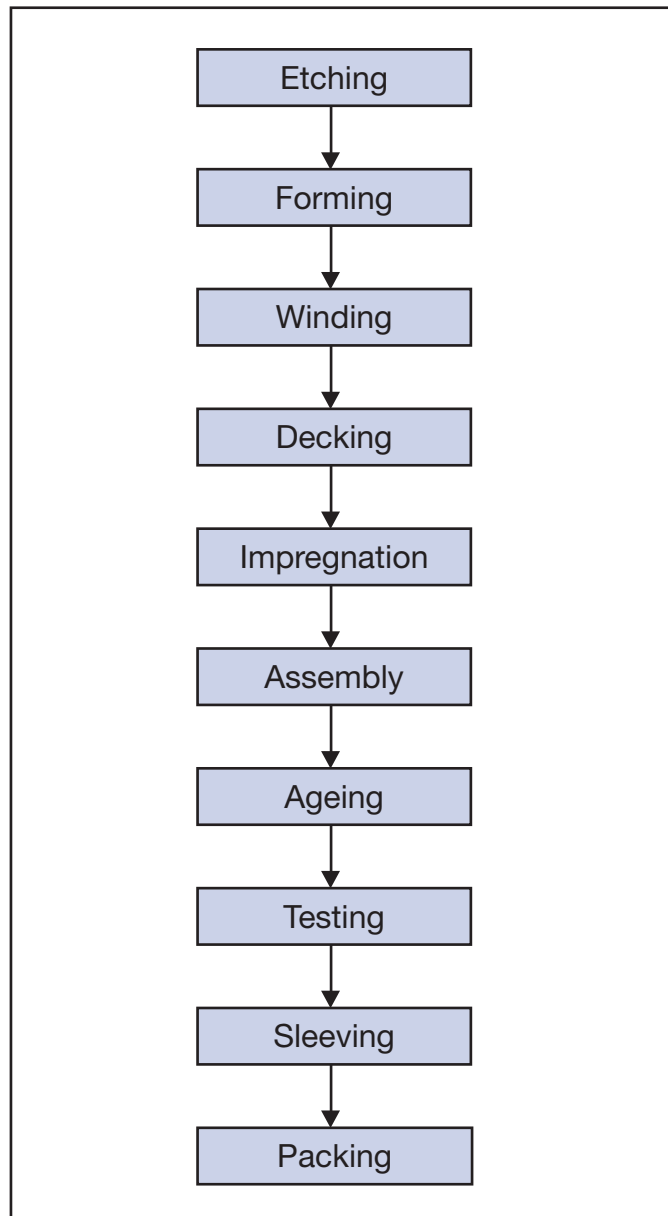
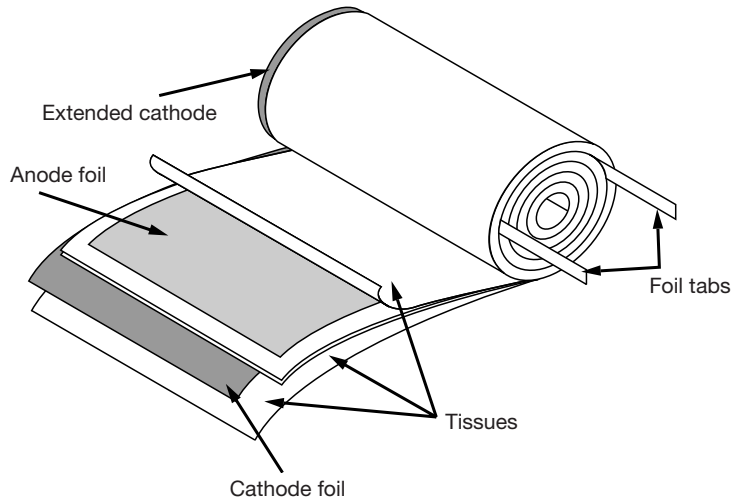
The following tests are applied and may be varied at the request of the customer. In this case the batch, or special procedure, will determine the course of action:

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



APPLICATION AND OPERATION OF ELECTROLYTIC CAPACITORS

Selection of an electrolytic capacitor for reliable operation in a particular application should be based on a complete working condition specification. This chapter will give some guidelines on how to select electrolytic capacitors.

INTRODUCTION

An electrolytic capacitor used for smoothing, energy storage or filtering of a rectified AC voltage will be loaded with an AC ripple current causing a power loss and heating of the capacitor.

The temperature in the hottest part, the Hot Spot, inside the capacitor, is the major factor influencing operational life. The Hot Spot temperature is dependent upon several factors.

- Power loss caused by AC current
- Thermal resistance between the Hot Spot and the ambient
- Ambient temperature and capacitor cooling condition.

Evox Rifa / BHC's electrolytic can types and axials are designed for operation under severe climatic conditions and for heavy ripple current load. This requires low internal losses and an efficient heat transfer between the capacitor "Hot Spot" and the ambient.

The internal thermal design and the method of mounting the capacitor are therefore of equal importance for reliability and operational life together with the capacitor's electrical design.

Long term high parameter stability is the key to Long Life, and the ability to with-stand high temperature and high ripple current. The power loss P in the capacitor can be calculated from:

$$P = R_{ESR} \times I_{AC}^2$$

R_{ESR} is dependent on the frequency f , and winding temperature. With complex current waveform it is therefore necessary to calculate the contribution from each harmonic frequency to the power loss.

$$P = R_{ESR}(f_1) \times I_{AC}^2(f_1) + R_{ESR}(f_2) \times I_{AC}^2(f_2) (W)$$

The thermal resistance R_{th} , ($^{\circ}C/W$), of a capacitor is defined from the power loss P and the temperature difference; ΔT , between the Hot Spot temperature, T_h and the ambient temperature, T_a , in the thermal equilibrium,

$$\Delta T = P \times R_{th}$$

$$\Delta T = T_h - T_a$$

The power P is assumed to be generated in the Hot Spot.

R_{th} (total thermal resistance) can be divided in two parts. R_{thhc} is the inner thermal resistance between the Hot Spot and the case. R_{thca} is the outer thermal resistance between the case and the ambient.

$$\Delta T = P \times (R_{thhc} + R_{thca})$$

R_{thhc} is dependent on the capacitor design, R_{thca} is dependent on cooling conditions. In electrolytic capacitors, heat generated in the winding is easily transferred in the axial direction. With this design a very low R_{thhc} is achieved and thus a very low temperature difference between the Hot Spot and the case.

The operational life of Long Life electrolytic capacitors is dependent upon the evaporation of electrolyte through the seal.

At voltages up to rated voltage and at high temperatures there are practically no other factors that influence the life of the capacitors. Sealing materials are selected for a minimum of diffusion losses.

Even if the Hot Spot temperature, T_h determines service life, the case temperature, T_c is better suited as a reference temperature for the calculation of service life. T_c is the temperature of a well defined surface area (the bottom of the case beneath the insulation). It is easily measured when e.g. effect of forced cooling is determined. For a certain power loss P the temperature difference between T_h and T_c is a constant.

$$T_h = T_c + P \times R_{thhc}$$

Parallel and Series Operation

Special considerations arise when electrolytic capacitors are used in series or parallel banks.

In series operation, matching of capacitance values may be necessary to avoid imbalance during charging and discharging mode. Steps must be taken to ensure adequate d.c. voltage distribution while biased, either by providing shunt resistors to compensate for inequalities in capacitor d.c. leakage currents, or some other means.

There are two major configurations to consider when constructing a series/parallel bank of capacitors - individual balancing resistors and common centre connection. Individual balancing resistors afford greater protection for the capacitors if one becomes short circuit but is more complex to construct and expensive. Common centre connections give improved balancing during steady state and transient conditions but offer the possibility of exposing one half of the bank to full voltage should one capacitor short circuit.

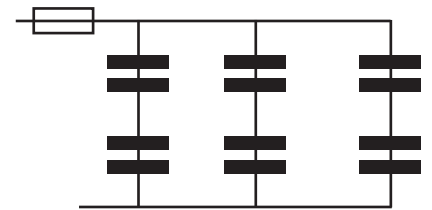
Full details on the selection and use of shunt resistors can be found in the separate application notes produced by Evox Rifa / BHC.

In parallel operation, particularly large, high voltage banks, the possibility of capacitors discharging into each other may entail special precautions in certain applications.

Series/Parallel Bank Protection

There are three major configurations to consider in protecting a series/parallel bank of capacitors. The advantages and disadvantages of each are outlined below but the final choice must be made by the equipment designer.

OPTION 1 - Fusing for whole bank



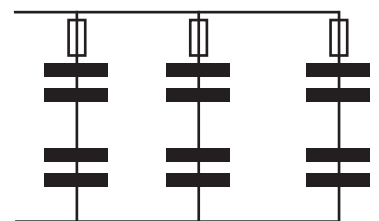
Advantages

- Simple construction
- Inexpensive

Disadvantages

- Only offers basic protection
- Cannot protect against internal discharges within bank

OPTION 2 - Individual capacitor fuses



Advantages

- Removes faulty capacitor from circuit

Disadvantages

- Expensive
- Complex assembly (busbars and fuses)

OPTION 3 - Electronic monitoring

Advantages

- May prevent serious failure by early shut down of equipment
- Optional bank discharge mechanism to prevent capacitors dumping charge into failed capacitor

Disadvantages

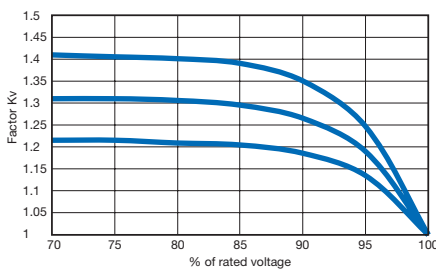
- Must be designed into control circuitry
- Complex and expensive

APPLICATION AND OPERATION OF ELECTROLYTIC CAPACITORS

Voltage Deration

If capacitors are operated at a voltage below their rated value then the reduced stress and lower leakage current will give an improvement in the life expectancy.

Since leakage current increases with temperature the benefit of a reduced operating voltage is more pronounced at higher temperatures. The graph below shows the voltage deration factor (Kv) for products with a rated temperature of 85°C and core temperatures (Tc) of 45°C, 65°C and 85°C.



The life expectancy of a capacitor at full rated voltage is multiplied by the voltage deration factor to obtain the new life expectancy at the lower operating voltage:

$$Le_{(Vop)} = Le_{(Vr)} \times Kv$$

$Le_{(Vop)}$ - Life expectancy at operating voltage

$Le_{(Vr)}$ - Life expectancy at rated voltage

Kv - Voltage deration factor

Polarity and Reversed Voltage

Aluminium Electrolytic capacitors manufactured for use in d.c. applications contain an anode foil and a cathode foil. As such they are polarised 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 catastrophic failure.

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

Aluminium electrolytic capacitors can also be manufactured for use in intermittent a.c. applications by using two anode foils in place of one anode and one cathode.

Case Polarity - due to the presence of electrolyte in the capacitor the aluminium can, stud mounting and any dummy pins will essentially be at the same potential as the negative terminal. It is therefore recommended that they are either:

- left unconnected
- connected to the same potential as the negative terminal
- insulated

Mounting

All aluminium electrolytic capacitors incorporate a safety vent, in order to relieve build up of internal pressure due to over stress or catastrophic failure. For the smaller ranges, such as snap-in or solder pin types, this takes the form of a weakened area in the side or base of the can. For the larger, screw terminal types the vent is incorporated in the deck.

In all cases consideration must be given, when mounting the capacitor, to the operation of the vent under failure conditions. It is recommended that capacitors are always mounted with the safety vent uppermost, or in the upper part of the device. Should the vent operate the least amount of electrolyte will then be expelled.

It is worth noting that screw terminal capacitors may be mounted in any position so long as the vent can operate. The operational and parametric performance is totally unaffected by the physical orientation but should the vent operate with the capacitor mounted upside down then a few drops of electrolyte may be expelled.

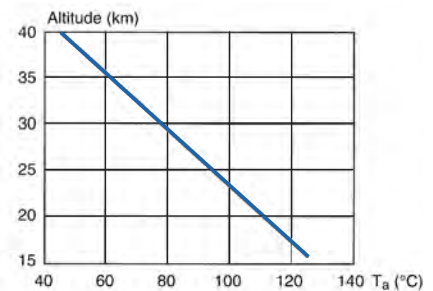
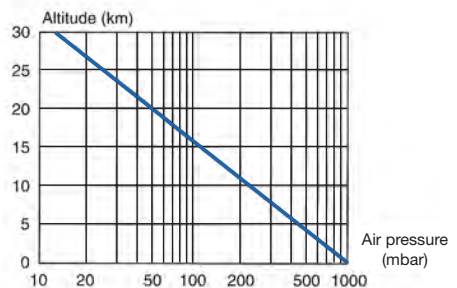
Board mounting types are designed to be mounted by their terminals alone. Larger types may have dummy pins for extra rigidity. Screw terminal and tag ended types may be fixed with a base stud or suitable mounting clamp.

Adequate space should be allowed between components for cooling air to circulate, particularly when high ripple currents are being applied.

Altitude and Low Air Pressure

If a capacitor is operated at altitude, the life will be affected slightly for two reasons. Convected heat loss will be reduced as the air density falls resulting in the capacitor running hotter with a consequent reduction in life.

As the air pressure drops the differential between the internal case pressure and external pressure increases. A complete vacuum would cause the internal pressure to rise by 15 psi (approx.). If maintained this would lead to increased electrolyte vapour loss and give a slight reduction in life expectancy.

Maximum altitude as a function of the ambient temperature (Ta)**Air pressure as a function of the altitude**

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. Evox Rifa / BHC 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-ageing a maximum charging current of twice the specified leakage current or 5mA (whichever is greater) is suggested.

CLEANING OF ELECTROLYTIC CAPACITORS

Cleaning of electrolytic capacitors

Aluminium electrolytic capacitors are susceptible to damage by certain types of cleaning solvents. Cleaning solvents that contain halogenated hydrocarbons especially chlorinated hydrocarbons are generally not recommended. The solvents can diffuse through the seal into the capacitor, and are then converted electro-chemically to free chlorides, which can cause corrosion. This can result in a pressure build-up that can destroy the capacitor.

Cleaning solvents that can be used without precautions

- 1) Cleaning solvents such as alcohols (e.g. isopropanol, methyl-, ethyl-, propyl-, or buthyl alcohol), glycol ethers (e.g. methyl-glycol) or ethylacetate are recommended.
- 2) If the other components on the circuit board are washable with water, water with a mild detergent is recommended as the mildest cleaning solvent. However, this procedure should be followed by immediate drying in hot air +85°C for 5–10 min.

to avoid hydroxide precipitation on the surface of the can.

Halogenated Hydrocarbons contain CFC's and as such are ozone depleting chemicals (ODC's). It is not recommended that they are used as cleaning solvents. In addition these solvents can be injurious to electrolytic capacitors by absorption into the rubber seals followed by subsequent diffusion into the case, and attack of the winding, leading to premature failure.

EVOX RIFA QUALITY

The quality of Evox Rifa's products and services is based on a continuous strive towards excellency throughout the whole organization. Skilled and motivated personnel, technical know-how and modern equipment combined with extensive quality assurance make Evox Rifa the supplier of components of the highest quality.

The up-to date quality tools like Statistical Process Control (SPC) in various forms, Failure Mode and Effect Analysis (FMEA), Accelerated Reliability Testing and Zero Defect Acceptance concept in final testing are the corner stones of the every day quality work. Cross-functional teams are routinely used in Problem Solving (8D method) with effective Failure Analysis support.

As a visible evidence of our quality, all the manufacturing units world wide are certified according to ISO 9001. In addition to that, the relevant factories have the automotive industry's QS9000 certifications, which is in process to be upgraded to ISO TS 16949 during 2006. The Finnish factory has

also IECQ approval. Our well known EMI suppression capacitors carry the important safety marks for world wide applications.

Evox Rifa companies have the following certificates:

ISO 14001

P.T. Evox Rifa, Batam, Indonesia

ISO 9001

BHC Components

Evox Rifa AB, Gränna, Sweden

Evox Rifa Oy, Suomussalmi, Finland

Nantong Evox Rifa Electrolytics,

P.R. China

P.T. Evox Rifa, Batam, Indonesia

ISO TS 16949

Evox Rifa AB, Gränna, Sweden

QS9000 (TS 16949 pending at the time of printing of this catalogue)

Evox Rifa Oy, Suomussalmi, Finland

Nantong Evox Rifa Electrolytics,

P.R. China

P.T. Evox Rifa, Batam, Indonesia

IECQ

Evox Rifa Oy, Suomussalmi Finland

Customer in Focus

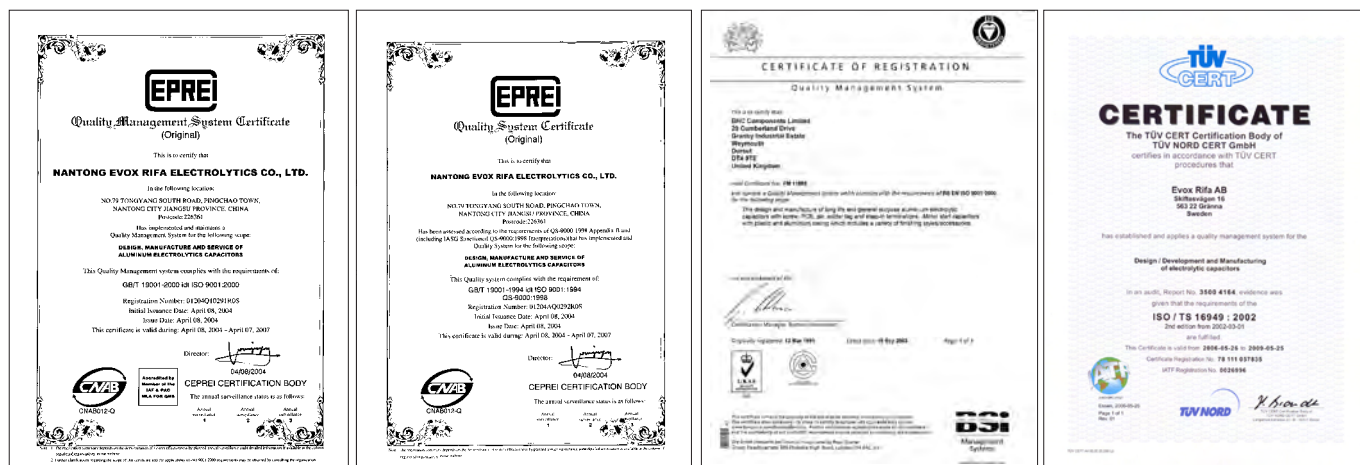
The only real measure of our total quality performance is the acceptance of our customers.

Evox Rifa's quality work has always been focused on the customer. We have actively made quality agreements with ambitious goal settings with World-Class Companies – small and large.

This active quality cooperation has been most fruitful to Evox Rifa by bringing in most modern quality tools, but especially by providing us with reliable feedback on the performance quality of our products and services.

The cooperation has not only lead to continuous improvement of the quality of our products, but sometimes also helped our customers to spot some weaknesses in their designs. A visible sign of these close links between Evox Rifa and various customers is the numerous prestigious customer approvals and the performance awards addressed to Evox Rifa and BHC Components.

CERTIFICATES FOR THE BUSINESS AREA ELECTROLYTIC CAPACITORS



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, we must utilise 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 characterised by a constant failure rate.

The wear out period characterised 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 1000 hours.

eg. $100\text{FIT} = 1 \times 10^{-7}$ failures per hour
 $= 0.01\%/1000$ hours

Type	FIT @ 40°C
ALC1_	12
ALC4_	12
ALS3_	12
ALS4_	12
ALP_	22
ALT_	22

Type	FIT @ 60°C
PEH200	100
PEH169	100

End of life Definition

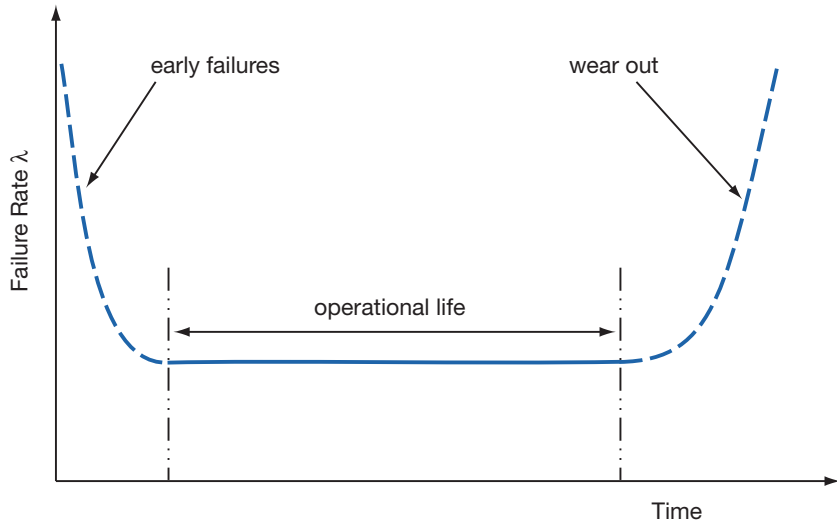
Catastrophic Failure: short circuit, open circuit or safety vent operation.

Parametric Failure:
 change in capacitance $> \pm 10\%$
 Leakage current $>$ specified limit
 ESR $> 2 \times$ initial ESR value

MBTF

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

$$\text{MTBF} = 1/\lambda$$



ENVIRONMENTAL COMMITMENT

As an environmentally conscious company, Evox Rifa (including BHC Components) is working continuously with improvements concerning the environmental effects of both our capacitors and the production of them.

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, like Lead (Pb), in electronic equipment. All products in this catalogue are produced to help our customer's obligations to guarantee their products to fulfil these legislative requirements. The only material of concern in our products has been Lead (Pb), which has been removed from all designs to fulfil the requirement of

containing less than 0,1% of Lead in any homogeneous material.

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

Some customer segments like Medical, Military and Automotive Electronics may still require e.g. the use of Lead in electrode coatings. To clarify the situation, and to distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors. See pictures to the right.

Because of customer requirements there may appear additional markings like LF = Lead Free or LFW = Lead Free Wires on the label.

RoHS

Compliant



RoHS Compliant

Examples of RoHS Compliance markings on packaging labels

PRODUCT SAFETY

THESE NOTES SHOULD BE READ IN CONJUNCTION WITH THE PRODUCT DATA SHEET. FAILURE TO OBSERVE THE RATINGS AND THE INFORMATION ON THIS SHEET MAY RESULT IN A SAFETY HAZARD.

WARNING

When potentially lethal voltages e.g. 30V a.c. (r.m.s) or 60V d.c. are applied to the terminals of this product, the use of a hazard warning label is recommended. In the case of motor start capacitors they meet the requirements of British Standard Specifications BS.5267: 1976 and reference should be made to Appendix C -Guide for installation and operation.

1. ELECTROLYTE

Aluminium electrolytic capacitors contain liquids (electrolytes) which can be hazardous. The electrolytes are conducting solutions of organic and/or boric acid, neutralised with amines or ammonia, in a variety of solvents. The major solvents are butyrolactone and ethylene glycol. Co-solvents e.g. N-methyl pyrrolidone may be present. Inorganic or organo-phosphates are present in low concentration. The physical, chemical and toxicological properties of the electrolytes are largely determined by the solvents, as summarised below:

Physical Properties

1. Low viscosity - typically 5 - 50 cp at 25°C
2. Combustible - Flash points 95 - 120°C
3. Low vapour pressure - < 20mm Hg at 25°C

Chemical properties

1. Non-corrosive.
2. Can be aggressive to many plastics, lacquers and resins.
3. Totally soluble in hot water.

Toxicology

The electrolytes are moderately toxic, with LD50 values in the range 1.5 -2g/Kg. Skin exposure can cause drying and de-fatting. Severe irritation may be caused to the mucous membranes, particularly the eyes, where conjunctivitis may result.

Safety Precautions

In the event of electrolyte escape, wash the affected area with hot water. Use rubber gloves to avoid skin contact. Any contact with the eyes should be liberally irrigated with water, and medical advice sought.

Note - the electrolyte systems do not contain materials currently listed as carcinogenic, mutagenic or teratogenic, e.g. polychlorinated biphenyls (PCB's), dimethylformamide (DMF) or dimethylacetamide (DMA).

2. INTRINSIC PROPERTIES**Operating**

D.C. capacitors are polar devices, and will operate safely only if correctly connected. Reversing the connections will result in high leakage currents which could subsequently cause short circuit failure, rupture of the safety vent and possibly explosion and fire.

Correctly polarised operation may result in the above failure modes if:

- the surge voltage is exceeded.
- the ambient temperature is too high.
- excessive ripple currents are applied.

A.C. types are non-polar. Catastrophic failure may be caused by:

- Abnormal duty cycles.
- Voltage in excess of rated value.
- Ambient temperature too high.

Non Operating

Aluminium electrolytic capacitors contain liquids which can leak out (see material content).

Damage to the encapsulation may cause leakage of the electrolyte. Excessive torque or soldering heat may affect the performance of the capacitor or damage the sealing.

Electric shock may result if capacitors are not discharged.

3. FLAMMABILITY

Most plastics and elastomers are combustible i.e. will ignite if an ignition source is applied under suitable conditions of temperature and oxygen level.

For most published data, the UL94 Horizontal or Vertical Burning System has been applied. Although useful for comparative values, this test is not practicable, as the ignition characteristics are strongly influenced by the material dimensions, and other materials with which they may be in intimate contact. Evox Rifa / BHC has completed a series of flammability tests based on a Needle Flame Test, as specified in IEC 60695-2-2. Details of the tests undertaken on both the external components and internal wind elements, can be found in a full technical article, TD005, "Flammability Characteristics" contained within BHC "Aluminium Electrolytic Capacitors - Application Notes".

4. DISPOSAL

Aluminium Electrolytic Capacitors are consignable waste under the Special Waste Regulations 1996 (Statutory Instrument 1996 No 972), which complies with the EC Hazardous Waste Directive - Directive 91/689/EEC. The electrolyte should therefore be treated as a hazardous waste and advice should be sought from the local office of the Environmental Agency regarding its disposal. In the United Kingdom there are two possible methods of disposal; high temperature incineration

and landfill, from which the user should seek the best practicable environmental option.

Due to the construction of an aluminium electrolytic capacitor, high temperature incineration may cause the component to explode due to build-up of internal pressure. In addition, incineration may also cause the emission of noxious fumes. If it is decided that this is the best practicable option then it must be carried out under controlled conditions and at a minimum temperature of 1200°C. It should also be confirmed that the incinerator is authorised under parts A or B of the Environmental Protection Act.

The alternative is to dispose of them in an engineered lined landfill site that is licensed to take materials identified on the safety sheet. It should be stressed that these capacitors are not to be disposed of in a land fill site set aside for domestic waste.

Evox Rifa / BHC strongly recommend that if there are any doubts regarding the disposal of aluminium electrolytic capacitor, that advice be sought from the local regulating authority.

In addition, Evox Rifa /BHC would like to request that users of aluminium electrolytic capacitors respect the needs of the environment and wherever possible recover as much of the materials as possible, i.e. aluminium.

5. UNSAFE USE

Most failures are of a passive nature and do not represent a safety hazard. A hazard may, however, arise if this failure causes a dangerous malfunction of the equipment in which the capacitor is employed. Circuits should be designed to fail safe under the normal modes of failure.

The usual failure mode is an increase in leakage current or short circuit. Other possible modes are decrease of capacitance, increase in dissipation factor (and impedance) or an open circuit.

Capacitors should be used in a well-ventilated enclosure or cabinet.

7. MOUNTING

Care should be taken when mounting by clamp, that any safety vent in the can is not covered.

8. FUMIGATION

In many countries throughout the world it is now common practice to fumigate shipments of products in order to control insect infestation, particularly when wooden packaging is used. Currently methyl bromide is widely used as a fumigant and this can penetrate cardboard packing and polymer bags and therefore come into direct contact with equipment or components contained within.

PRODUCT SAFETY

FUMIGATION continued

If aluminium electrolytic capacitors become exposed to methyl bromide then corrosion may occur depending upon the concentration and exposure time to the chemical.

This failure mode can affect all types of Evox Rifa / BHC aluminium electrolytic capacitors. Methyl bromide can penetrate the seals of aluminium electrolytic capacitors and cause internal corrosion of the anode connection resulting in the component becoming open circuit. The rate of corrosion will depend upon the level of exposure to methyl bromide and

also the subsequent operating conditions such as voltage and temperature. It may take months, or in some cases several years, before the component becomes open circuit.

9. DIELECTRIC ABSORPTION

A phenomenon known as dielectric absorption can cause aluminium electrolytic capacitors to re-charge themselves. The phenomenon is well known but impossible to predict with any great accuracy and so potentially any electrolytic product could be affected. Thus, a capacitor, which has been charged and then completely discharged, will appear to re-charge itself, if left open

circuit and this will manifest itself as a small voltage across the terminals of the capacitor. Generally the voltages seen are less than 20Vdc, however higher voltages have on occasion been reported.

In order to avoid any problems caused by this voltage Evox Rifa / BHC recommends that capacitors be discharged before connecting to the terminals.

FLAMMABILITY

Most plastics and elastomers are combustible i.e. will ignite if an ignition source is applied under suitable conditions of temperature and oxygen level.

For most published data, the UL 94 Horizontal and Vertical Burning system has been applied. Although useful for comparative values, this test is not practicable, as the ignition characteristics

are strongly influenced by the material dimensions, and other materials with which they may be in intimate contact.

The electrolytic capacitors manufactured and Evox Rifa Group withstand the fire hazard test according to IEC 60695-2-2 with a 30s flame exposure and the requirement to be self retardent within 10s.

The electrolytes used are **not** classified as flammable according to ASTM (American Society for Testing and Materials). The electrolytes are classified as combustible.

For the voltage ranges of 385V to 450V a special non flammable self-extinguishing electrolyte system is available for ALS ranges on request.

Fire classification of materials

		Oxygen index	Corresponding UL standard
PEG types	Tape (Polyester)	20	UL 94 HB
PEH 169 – PEH 200	Cover (phenolic - Vyncolite)	35	UL 94 V-0
	Insulating cup (polypropylene)	17	UL 94 HB
ALS	Cover (phenolic - plenco)	30	UL 94 HB
ALS/C/P/T/N ranges	Insulating sleeve (PVC)	35	UL 224 VW-1
	end disc (polypropylene)	17	UL 94 HB
ALS (on request)	Insulating sleeve (Polyolefin)	34	UL94 V-2
PEH 500 range	Sleeve (PVC)	60	UL 94 V-0
ALC/P/T/N ranges	Cover (phenolic - laminate)	51.3	NO DATA
MS/MD range	plastic case (Noryl)	32	UL 94 V-1
Accessories	PYB mounting nut (polyamid)	26	UL 94 V-2

ELECTROLYTIC CAPACITORS

This is the summary of test methods and requirements from IEC Publication 60384-4: Aluminium electrolytic capacitors with solid (MnO₂) and non-solid electrolyte. Reference to relevant test methods is given below

Test	IEC-Publ.	Procedure	Requirements
Mechanical test Robustness of terminations: Test Ua: Tensile Test Ub: Bending Test Uc: Torsion, severity 2. Test Ud: Torque, severity 1.	60068-2-21	Loading force 10 N (0,5<d≤0,8) 20 N (0,8<d≤1,25) Loading force 5 N, two bends Two successive rotations of 180° during 10-15 s, 2.0 Nm for M 5 mm thread 2.5 Nm for M 6 mm thread	No leakage of electrolyte or other visible damage. Deviations in capacitance, and tanδ from initial measurements must not exceed: ΔC/C < 5%. tanδ ≤ 1.2 x initial value.
Resistance to soldering heat Test T	60068-2-20	Solder bath method 260 °C 10 s	
Solderability Test T	60068-2-20	Solder bath method 235±5 °C / 2±0,2 s for SnPb solder 245±5 °C / 3±0,3 s for SnAgCu solder 250±5 °C / 3±0,3 s for SnCu sold	Good tinning
Rapid change of temperature Test Na	60068-2-14	5 cycles Duration of exposure: 3h Recovery period: 16h	No leakage of electrolyte or other visible damage. Deviations in capacitance and tanδ from initial measurements must not exceed: ΔC/C < 5%.
Vibration Test Fc	60068-2-6	Procedure B4 PEH 169 and PEH 200: Frequency range: 10–500 Hz Amplitude 0.75 mm or acceleration 10g. Time 3x2hrs Big cans Ø 65, 75 and 90 mm. Frequency range 10–55Hz Amplitude 0.75 mm or acceleration 10g. Time 3x2hrs ALS 30/31/32/33/34/35/40/41: Frequency range: 10–55 Hz Amplitude 0.75 mm or acceleration 10g. Time 3x2hrs. Except 220mm long cans 10-55Hz at 0.35mm or 5g for 3x0.5hrs PEG124: Frequency range: 10-500Hz Amplitude 0.75 mm or acceleration 10g. Time 3x2hrs. Ø16–20 mm to be clamped by their body PEG126 and PEH526 / 626: Clamped body Frequency range: 10-2000Hz Amplitude 1.5 mm or acceleration 20g. Time 3x2hrs PEG220, PEG225, PEG 226 Clamped body Frequency range: 10-2000Hz Amplitude 1.5 mm or acceleration 20g. Time 3x22hrs PEH 506, 532, 534, 536 ALC 10/12/40/42 Clamped body Frequency range: 10-500 Hz Amplitude 0.75 mm or acceleration 10g. Time 3x2hrs, except ø45, ø50mm: 10-55Hz at 0.35mm or 5g for 3x0.5hrs.	No leakage of electrolyte or other visible damage. Deviations in capacitance and tanδ from initial measurements must not exceed: ΔC/C < 5%.

ELECTROLYTIC CAPACITORS

Test	IEC-Publ.	Procedure	Requirements
Shock test Ea	60068-2-27	Degree of severity Acceleration: 490 m/s ² Duration of pulse: 11 ms Capacitors shall be mounted using clamps supplied by Evox Rifa / BHC or shall be mounted by their stud, reinforced with clamps supplied by Evox Rifa / BHC	No leakage of electrolyte or other visible damage. Deviations in capacitance from initial measurements must not exceed: $\Delta C/C < 5\%$.
Climatic test			
Climatic sequency Test 4.21	60384-1		
1 Dry heat Test Ba	60068-2-2	Temperature = upper category temperature. Duration 16 h	
2 Damp heat, cyclic Test Db	60068-2-30	Upper temperature 55°C 1 cycle of 24 h at 55 ± 2°C RH 95 to 100%, no voltage applied.	
3 Cold Test Aa	60068-2-1	Temperature = lower category temperature. Duration 16 h	
4 Low air pressure Test M	60068-2-13	Pressure 44 mbar (4.4 kPa) Temperature 15–35°C Duration 5 min. During the last minute the rated voltage (U_R) to be applied.	
5 Damp heat, cyclic	60068-2-30	Remaining 5 cycles. Upper temperature +55°C	No leakage of electrolyte or other damage. The marking to be legible. The difference in capacitance from the initial measurement must not exceed 10%.
Damp heat steady state Test Ca	60068-2-3	Duration: 56 days After the test a voltage test is performed between terminations connected to case and a metal foil wrapped around the insulation, V-block as an alt. 1000 VDC, 60 s. Insulation resistance measurement. 100 VDC, 60 s.	No leakage of electrolyte or other visible damage. The marking to be legible. No breakdown or flashover. Insulation resistance $\geq 100 \text{ M}\Omega$.
Life test Endurance Test 4.13 Long Life types	60384-4	(1) 2000 h at upper category temp. The ripple current given in the article list to be superimposed. PEG 124 125°C PEG 126 150°C PEG 220, 225, 226 150°C PEH 169 105°C PEH 200, PEH 506 85°C PEH 532, 534, 536 105°C PEH 526 125°C ALC 12 85°C ALS 40, ALC42 105°C (2) 5000 h at upper category temp. The ripple current given in the article list to be superimposed. PEH 169 85°C PEG 124, ALC40 105°C ALS 30/31/32/34, ALC10 85°C ALP/T/N 20/22 85°C	No leakage of electrolyte or other visible damage. The marking to be legible. $\Delta C/C + 15/-30\% U_R \leq 6.3 \text{ VDC}$ $\Delta C/C \pm 15\% 6.3 \leq U_R \leq 160 \text{ VDC}$ $\Delta C/C \pm 10\% \text{ for } U_R > 160 \text{ VDC}$ Leakage current $\leq$ the limit in the article list. $\text{ESR} \leq 2 \times \text{initial value.}$ PEH 500-range $\text{ESR} \leq 3 \times \text{initial specified limit}$ No flashover or breakdowns in voltage proof at 1000 VDC.

ELECTROLYTIC CAPACITORS

Test	IEC-Publ.	Procedure	Requirements										
Surge voltage Test 4.14	60384-4	The capacitor to be subjected to 1000 cycles of charge to voltage 0.5 min load period followed by a no load period of 5 min. 30 s. Temperature = upper category temp. Applied voltage: 1.15 x rated voltage for $U_R \leq 315$ V. 1.10 x rated voltage for $U_R > 315$ V. Time constant for charge 0.1 ± 0.05 s. Duration: 30 s Recovery: 1–2 h	No leakage of electrolyte or other visible damage. $\Delta C/C \leq 15\%$ Leakage current and tangent of the loss angle not to exceed the values given in the article list.										
Pressure relief Test 4.16	60384-4	A DC voltage is applied in the reverse direction to give a current of 1 to 10A	The pressure relief is to open in such away that any danger of explosion or fire is eliminated.										
Storage at high temperature Test Ba	60068-2-2	96 ± 4 at upper category temperature. Recovery: Minimum 16 h.	No leakage of electrolyte or other visible damage. Leakage current ≤ 2 x the maxvalue in the article list. $\Delta C/C - 10\%$										
Storage at low temperature Test Aa	60068-2-1	72 h lower category temperature acc. to table below. Category Temperature °C 25/-/- -40 40/-/- -55 55/-/- -65 Recovery: Minimum 16 h	No leakage of electrolyte or other visible damage. The marking to be legible. $\Delta C/C \leq 10\%$. The leakage current and tangent loss angle to be lower or equal to the values given in the article list.										
Characteristics at high and low temperature Test 4.19	60068-2	Test Aa of 60068-2-1 followed by test Ba of 60068-2-2 Temp: lower respectively upper category temperature. The impedance to be measured at lower category temp. Leakage current, $\tan\delta$ and capacitance to be measured at upper category temp.	The ratio of the impedance measured at lower category temperature and initially must not exceed the values in the table below. <table><tr><th>Rated voltage VDC</th><th>Ratio of impedance</th></tr><tr><td>$U_R \leq 6.3$</td><td>5</td></tr><tr><td>$6.3 < U_R < 16$</td><td>4</td></tr><tr><td>$16 < U_R \leq 160$</td><td>3</td></tr><tr><td>$U_R > 160$</td><td>6</td></tr></table>	Rated voltage VDC	Ratio of impedance	$U_R \leq 6.3$	5	$6.3 < U_R < 16$	4	$16 < U_R \leq 160$	3	$U_R > 160$	6
Rated voltage VDC	Ratio of impedance												
$U_R \leq 6.3$	5												
$6.3 < U_R < 16$	4												
$16 < U_R \leq 160$	3												
$U_R > 160$	6												
Charge and discharge Test 4.20	60384-4	Number of cycles: 10^6 Temp: 20°C Charge Applied voltage: U_R Duration: 0.5 s Time constant 0.1 s Discharge The discharge resistor to give a time constant = 0.1 s	No leakage of electrolyte or other visible damage. $\Delta C/C \leq 10\%$										
Fire Hazard Testing	60695-2-2	Needle-flame test. Duration of test flame: 30 s	Max burning time after removal of test-flame: 30 s										

PEG 124 125°C and 105°C

RoHS
Compliant

- 125°C and 105°C
- Long life > 30 years at 50°C
- Low ESR
- Low ESL

APPLICATION

Smoothing, coupling/decoupling and energy storage in telecommunication, power supply system, data processing, process control and measuring where Long Life and high reliability are of paramount importance.

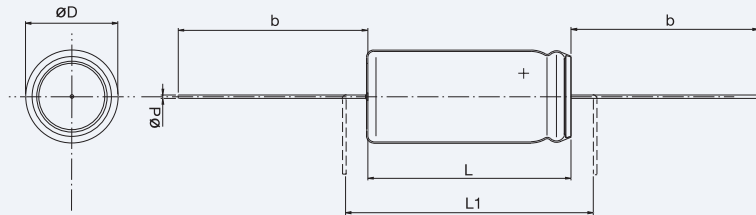
BASIC DESIGN

PEG 124 is an electrolytic capacitor with very Long Life and outstanding electrical performance. Polarized, all-welded design, tinned copper wire leads, negative pole connected to the case, plastic insulation. Long Life and very high reliability are achieved by the dimensioning of the capacitor, the careful selection of materials/methods and discipline in quality control allowing operation up to +125°C/105°C.

The PEG 124 winding is housed in a cylindrical aluminium can with a high purity aluminium lid and a high quality rubber gasket. The sealing system is designed for electrolyte leakage free operation and a very low gas-diffusion rate of electrolyte. Low ESR is a result of a low resistive electrolyte/paper system and an all-welded design. Thanks to its mechanical robustness the PEG 124 is also suitable for use in mobile and in aircraft installations.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/125/56, DIN 41240, type 1A and 1B, DIN 40040 GKF, IEC 60384-4 Long Life Grade 40/105/56, DIN 41240, type 1A and 1B, DIN 40040 GMF,
CECC	CECC 30301-053
Capacitance range	(10–450 VDC) 1–4700µF
Capacitance tolerance	–10 to +30%
Rated voltage	10–450 VDC
Temperature range	–40 to +125°C
Operational life time	27500 h at 105°C (case Ø = 20 mm)
Shelf life	5000 h at 0V +105°C or 10 years at 0V +40°C +40°C 10 years
Diameter range	10 – 20 mm



Dimensions table PEG 124 (mm)

D x L	Case code	D ±0.5	d ±0.03	L ±1	L ₁ min	b + 3/-2	Weight approx (g)
10 x 20	A	10	0.8	20.0	26.0	–	3
10 x 29	B	10	0.8	29.0	35.0	–	4
13 x 20	C	13	0.8	20.0	26.0	–	4
13 x 29	D	13	0.8	29.0	35.0	–	6
13 x 37	E	13	0.8	37.0	43.0	42	7
16 x 29	F	16	0.8	29.0	35.0	42	8
16 x 37	G	16	0.8	37.0	43.0	42	11
20 x 29	H	20	0.8	29.0	35.0	42	13
20 x 37	J	20	0.8	37.0	43.0	42	20
20 x 46	L	20	0.8	46.0	52.0	42	24

ARTICLE TABLE PEG 124 (125°C)

C _R	D x L	Case code	I _{RAC} * 125°C 100 Hz mA	I _{RAC} 60°C ≥5 kHz A	I _{RAC} 125°C ≥5 kHz A	ESR* 20°C 100 Hz Ω	ESR* 20°C 100 kHz Ω	L _{ESL} Approx. nH	Article code
μF	mm								
10 VDC (U _R)									
1000	16 x 29	F	1035	4.6	1.7	0.20	0.14	10	PEG124EF4100Q
1500	16 x 37	G	1276	5.6	2.1	0.14	0.10	12	PEG124EG4150Q
2200	20 x 37	J	1804	8.0	2.9	0.09	0.06	15	PEG124EJ4220Q
3300	20 x 46	L	2088	8.8	3.2	0.07	0.05	17	PEG124EL4330Q
16 VDC (U _R)									
68	10 x 20	A	130	0.95	0.36	2.40	1.60	5	PEG124GA2680Q
100	10 x 20	A	191	1.2	0.45	1.70	1.10	5	PEG124GA3100Q
150	10 x 29	B	287	1.5	0.61	1.10	0.71	6	PEG124GB3150Q
220	10 x 29	B	315	1.5	0.70	0.80	0.54	6	PEG124GB3220Q
220	13 x 20	C	422	3.9	1.4	0.39	0.14	6	PEG124GC322AQ
330	13 x 29	D	515	2.6	1.1	0.50	0.33	8	PEG124GD3330Q
470	13 x 20	C	645	3.9	1.5	0.25	0.12	6	PEG124GC347AQ
470	13 x 29	D	632	3.1	1.1	0.37	0.25	8	PEG124GD3470Q
680	13 x 37	E	851	4.6	1.7	0.20	0.12	10	PEG124GE3680Q
680	16 x 29	F	850	4.0	1.5	0.26	0.18	10	PEG124GF3680Q
680	16 x 29	F	1005	7.6	2.7	0.13	0.05	10	PEG124GF368AQ
1000	16 x 29	F	1166	7.6	2.8	0.11	0.05	10	PEG124GF410AQ
1000	16 x 37	G	1031	4.8	1.8	0.19	0.13	12	PEG124GG4100Q
1500	16 x 37	G	1490	9.3	3.4	0.07	0.04	12	PEG124GG415AQ
1500	20 x 37	J	1372	6.0	2.2	0.14	0.10	15	PEG124GJ4150Q
2200	16 x 37	G	1720	9.3	3.4	0.06	0.04	12	PEG124GG422AQ
2200	20 x 46	L	1782	8.0	2.9	0.09	0.06	17	PEG124GL4220Q
3300	20 x 37	J	2251	11.8	4.1	0.04	0.02	15	PEG124GJ433AQ
4700	20 x 37	J	2685	12.7	5.0	0.04	0.02	15	PEG124GJ447AQ
25 VDC (U _R)									
47	10 x 20	A	141	1.1	0.44	2.40	1.30	5	PEG124HA2470Q
100	10 x 29	B	255	1.5	0.56	1.20	0.67	6	PEG124HB3100Q
220	13 x 20	C	452	3.1	1.2	0.46	0.20	6	PEG124HC322AQ
220	13 x 29	D	448	2.6	0.96	0.59	0.32	8	PEG124HD3220Q
330	13 x 20	C	525	3.1	1.2	0.37	0.20	6	PEG124HC333AQ
330	13 x 37	E	570	3.4	1.2	0.36	0.20	10	PEG124HE3330Q
470	16 x 29	F	806	4.7	1.7	0.25	0.14	10	PEG124HF3470Q
470	16 x 29	F	827	6.1	2.1	0.20	0.08	10	PEG124HF347AQ
680	16 x 29	F	946	6.0	2.1	0.17	0.08	10	PEG124HF368AQ
680	16 x 37	G	960	5.3	1.9	0.19	0.11	12	PEG124HG3680Q
1000	16 x 37	G	1248	7.8	2.8	0.11	0.05	12	PEG124HG410AQ
1000	20 x 37	J	1323	7.4	2.6	0.12	0.07	15	PEG124HJ4100Q
1500	16 x 37	G	1437	7.8	2.8	0.09	0.06	12	PEG124HG415AQ
1500	20 x 46	L	1659	8.9	3.2	0.09	0.05	17	PEG124HL4150Q
2200	20 x 37	J	1803	9.5	3.2	0.06	0.04	15	PEG124HJ422BQ
3300	20 x 37	J	2067	9.5	3.3	0.06	0.04	15	PEG124HJ433BQ
4000	20 x 46	L	2454	12.3	4.2	0.04	0.02	17	PEG124HL440BM
40 VDC (U _R)									
33	10 x 20	A	153	1.1	0.39	2.90	1.30	5	PEG124KA2330Q
68	10 x 29	B	221	1.5	0.56	1.40	0.65	6	PEG124KB2680Q
150	13 x 20	C	381	3.1	1.2	0.58	0.20	6	PEG124KC315AQ
150	13 x 29	D	416	2.8	1.0	0.62	0.29	8	PEG124KD3150Q
220	13 x 20	C	452	3.1	1.2	0.44	0.20	6	PEG124KC322AQ
220	13 x 37	E	487	3.5	1.3	0.44	0.19	10	PEG124KE3220Q
220	16 x 29	F	575	3.9	2.0	0.41	0.19	10	PEG124KF3220Q
330	16 x 29	F	739	6.1	2.1	0.24	0.08	10	PEG124KF333AQ
330	16 x 37	G	692	4.8	1.7	0.29	0.13	12	PEG124KG3330Q
470	16 x 29	F	827	6.1	2.1	0.20	0.08	10	PEG124KF347CQ
470	20 x 37	J	898	6.0	2.1	0.22	0.10	15	PEG124KJ3470Q

* Maximum values

ARTICLE TABLE PEG 124 (125°C)

C _R	D x L	Case code	I _{RAC} * 125°C 100 Hz	I _{RAC} 60°C ≥5 kHz	I _{RAC} 125°C ≥5 kHz	ESR* 20°C 100 Hz	ESR* 20°C 100 kHz	L _{ESL} Approx.	Article code
μF	mm		mA	A	A	Ω	Ω	nH	
40 VDC (U _R)									
680	16 x 37	G	1048	7.7	2.7	0.13	0.05	12	PEG124KG368AQ
680	20 x 37	J	1132	7.3	2.6	0.15	0.07	15	PEG124KJ3680Q
1000	16 x 37	G	1242	7.8	2.8	0.11	0.05	12	PEG124KG410AQ
1000	20 x 46	L	1414	8.8	3.2	0.10	0.05	17	PEG124KL4100Q
1500	20 x 37	J	1598	9.5	3.3	0.07	0.04	15	PEG124KJ415AQ
2200	20 x 37	J	1900	9.6	3.5	0.06	0.04	15	PEG124KJ422AQ
63 VDC (U _R)									
10	10 x 20	A	76	0.9	0.35	5.90	1.60	5	PEG124MA2100Q
15	10 x 20	A	113	1.0	0.39	4.30	1.40	5	PEG124MA2150Q
22	10 x 20	A	134	1.1	0.43	3.40	1.20	5	PEG124MA2220Q
33	10 x 29	B	158	1.4	0.53	2.20	0.78	6	PEG124MB2330Q
47	10 x 29	B	190	1.6	0.57	1.60	0.55	6	PEG124MB2470Q
68	13 x 29	D	274	2.3	0.89	1.10	0.40	8	PEG124MD2680Q
100	13 x 29	D	355	3.0	1.0	0.74	0.26	8	PEG124MD3100Q
100	13 x 20	C	328	3.1	1.0	0.73	0.22	6	PEG124MC310AQ
150	16 x 29	F	491	4.0	1.4	0.50	0.18	10	PEG124MF3150Q
150	13 x 29	D	455	3.6	1.4	0.46	0.15	8	PEG124MD315AQ
220	16 x 29	F	647	6.1	2.1	0.29	0.08	10	PEG124MF322AQ
220	16 x 37	G	610	5.0	1.8	0.34	0.12	12	PEG124MG3220Q
330	16 x 29	F	737	6.1	2.1	0.24	0.08	10	PEG124MF333AQ
330	20 x 37	J	845	6.8	2.3	0.22	0.08	15	PEG124MJ3330Q
470	16 x 37	G	927	7.5	2.6	0.17	0.06	12	PEG124MG347AQ
470	20 x 46	L	1018	7.9	2.9	0.16	0.06	17	PEG124ML3470Q
680	16 x 37	G	1090	7.5	2.6	0.14	0.06	12	PEG124MG368AQ
1000	20 x 37	J	1399	9.2	3.1	0.09	0.04	15	PEG124MJ410AQ
1500	20 x 46	L	1715	10.2	3.5	0.07	0.04	17	PEG124ML415AQ

ARTICLE TABLE PEG 124 (105°C)

C _R	D x L	Case code	I _{RAC} * 105°C 100 Hz	I _{RAC} 60°C ≥5 kHz	I _{RAC} 105°C ≥5 kHz	ESR* 20°C 100 Hz	ESR* 20°C 100 kHz	L _{ESL} Approx.	Article code
μF	mm		mA	A	A	Ω	Ω	nH	
100 VDC (U _R)									
4.7	10x20	A	50	0.65	0.20	16.00	2.80	5	PEG124PA147CQ
22	10x29	B	122	1.24	0.37	3.00	1.10	6	PEG124PB222VQ
47	13x29	D	206	1.90	0.58	1.50	0.54	8	PEG124PD247VQ
47	13x37	E	192	1.50	0.45	1.80	0.92	10	PEG124PE247CQ
100	16x29	F	354	3.20	0.98	0.70	0.26	10	PEG124PF310VQ
220	16x37	G	536	3.60	1.10	0.50	0.30	12	PEG124PG322CQ
470	20x46	L	904	6.30	1.90	0.21	0.12	17	PEG124PL347VQ
200 VDC (U _R)									
5.6	10 x 20	A	49	0.38	0.11	20.00	10.0	5	PEG124RA156BM
10	10 x 29	B	65	0.47	0.17	10.00	4.20	6	PEG124RB2100Q
15	13 x 29	D	96	0.74	0.26	6.30	2.40	8	PEG124RD2150Q
22	13 x 29	D	120	0.86	0.31	4.60	1.90	8	PEG124RD2220Q
33	16 x 29	F	167	1.20	0.42	3.10	1.30	10	PEG124RF2330Q
47	16 x 29	F	210	1.50	0.53	2.20	0.92	10	PEG124RF2470Q
68	20 x 29	H	294	2.00	0.71	1.50	0.66	12	PEG124RH2680Q
100	20 x 37	J	353	2.40	0.88	1.00	0.44	15	PEG124RJ3100Q
150	20 x 46	L	446	3.10	1.10	0.69	0.30	17	PEG124RL3150Q

* Maximum values

ARTICLE TABLE PEG 124 (105°C)

C_R	D x L	Case code	I_{RAC}^* 105°C 100 Hz mA	I_{RAC} 60°C ≥5 kHz A	I_{RAC} 105°C ≥5 kHz A	ESR* 20°C 100 Hz Ω	ESR* 20°C 100 kHz Ω	L_{ESL} Approx. nH	Article code
μF	mm								
350 VDC (U_R)									
4.7	10 x 29	B	55	0.37	0.14	17.00	7.50	6	PEG124UB1470Q
6.8	13 x 29	D	92	0.59	0.22	9.00	4.20	8	PEG124UD1680Q
10	13 x 29	D	102	0.65	0.24	7.60	3.60	8	PEG124UD2100Q
22	16 x 29	F	184	1.20	0.44	3.30	1.50	10	PEG124UF2220Q
33	20 x 29	H	248	1.60	0.56	2.30	1.10	12	PEG124UH2330Q
47	20 x 37	J	328	2.10	0.77	1.50	0.66	15	PEG124UJ2470Q
68	20 x 46	L	389	2.50	0.91	1.10	0.50	17	PEG124UL2680Q
400 VDC (U_R)									
2.2	10 x 29	B	42	0.27	0.11	25.00	12.00	6	PEG124VB1220Q
4.7	13 x 29	D	78	0.52	0.21	11.00	5.10	8	PEG124VD1470Q
10	13 x 37	E	116	0.70	0.26	5.90	3.00	10	PEG124VE2100Q
22	16 x 37	G	209	1.40	0.50	2.70	1.20	12	PEG124VG2220Q
33	20 x 37	J	304	1.90	0.71	1.60	0.76	15	PEG124VJ2330Q
47	20 x 46	L	377	2.40	0.89	1.20	0.53	17	PEG124VL2470Q
450 VDC (U_R)									
1.0	10 x 20	A	30	0.21	0.08	49.00	20.00	5	PEG124YA1100Q
2.2	10 x 29	B	43	0.29	0.11	24.00	11.00	6	PEG124YB1220Q
3.3	10 x 29	B	55	0.38	0.14	17.00	7.30	6	PEG124YB1330Q
4.7	13 x 29	D	79	0.54	0.20	11.00	4.80	8	PEG124YD1470Q
6.8	13 x 29	D	97	0.61	0.22	8.30	4.00	8	PEG124YD1680Q
10	16 x 29	F	133	0.82	0.40	5.70	2.80	10	PEG124YF2100Q
10	16 x 29	F	141	1.40	0.30	4.60	1.70	10	PEG124YF210AT
15	16 x 37	G	171	1.10	0.41	3.60	1.70	12	PEG124YG2150Q
15	20 x 29	H	185	1.60	0.49	3.30	1.40	12	PEG124YH215AQ
22	20 x 29	H	240	1.60	0.56	2.40	1.10	12	PEG124YH2220Q
22	20 x 37	J	242	2.30	0.67	2.10	0.80	15	PEG124YJ222AT
33	20 x 37	J	306	2.00	0.72	1.60	0.74	15	PEG124YJ2330Q
47	20 x 46	L	377	2.40	0.89	1.20	0.53	17	PEG124YL2470Q

* Maximum values

OPERATIONAL LIFE AND RIPPLE CURRENT, PEG124 (125°C)

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

Diagram valid for Ø20 case size.
Operational life, Ø16 case size: 0.67 x diagram value
Ø13 case size: 0.44 x diagram value
Ø10 case size: 0.37 x diagram value

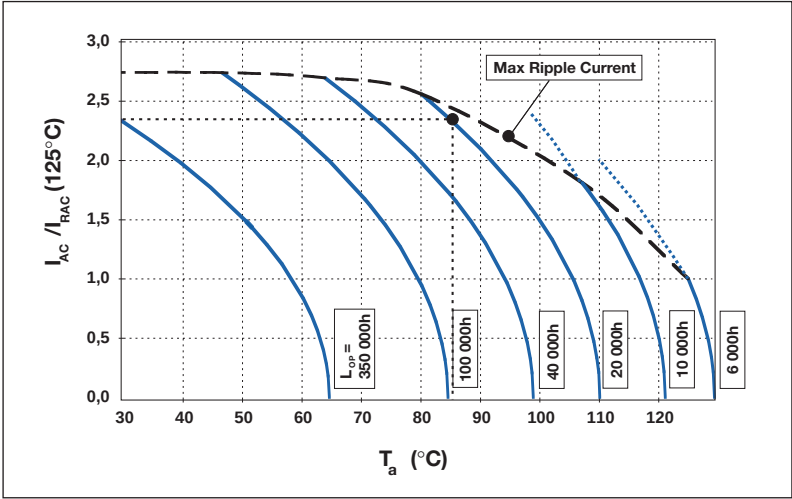
Example:
Article: PEG124MG368AQ (Ø16 x 37 mm)
Ambient temperature (T_a):85°C
Ripple current, at 10kHz (I_{AC}): 6.0 A

$I_{RAC}(125^{\circ}\text{C}, \geq 5\text{kHz}) = 2.6 \text{ A (from data table)}$
 $\rightarrow I_{AC} / I_{RAC}(125^{\circ}\text{C}) = 2.3$

Operational life: Interpolation between the L_{op} -curves $\rightarrow L_{op} \sim 20 \text{ kh} \times 0.67 = 13\text{kh}$ (blue curves)
Ø16 -factor

When the capacitor load is at 100Hz,
use $I_{AC} / I_{RAC}(125^{\circ}\text{C}, 100\text{Hz})$ as input value to the diagram (see data table). At other frequencies use $I_{AC} / I_{RAC}(125^{\circ}\text{C}, \gg 5\text{kHz}) \times 1/\text{Corr} =$

Frequency correction factor, for ripple current (Corr):



	FREQUENCY			
	300 Hz	1 kHz	5 kHz	100 kHz
Correction factor (Corr) (Typical value)	0.57	0.80	1.00	1.04

OPERATIONAL LIFE AND RIPPLE CURRENT, PEG124 (105°C)

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

Diagram valid for Ø20 case size.
Operational life, Ø16 case size: 0.67 x diagram value
Ø13 case size: 0.44 x diagram value
Ø10 case size: 0.37 x diagram value

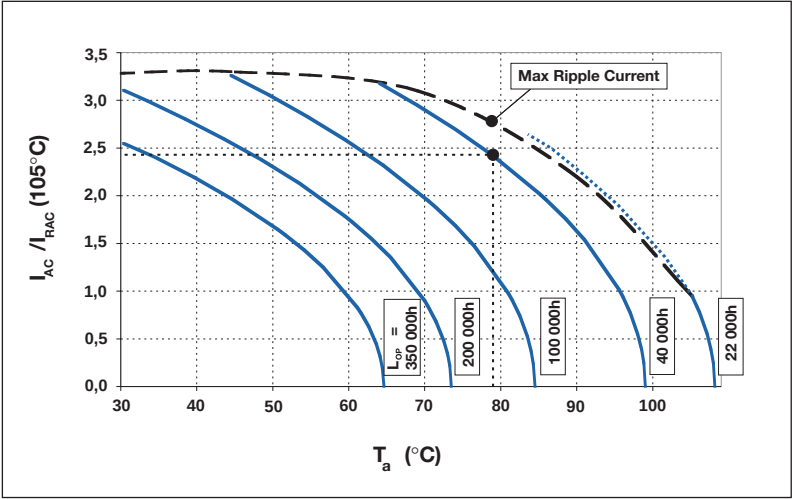
Example:
Article: PEG124RL3150Q (Ø20 x 46 mm)
Ambient temperature (T_a): 79°C
Ripple current, at 10kHz (I_{AC}): 2.7 A

$I_{RAC}(105^{\circ}\text{C}, \geq 5\text{kHz}) = 1.10 \text{ A (from data table)}$
 $\rightarrow I_{AC} / I_{RAC}(105^{\circ}\text{C}) = 2.45$

Operational life: Interpolation between the L_{op} -curves $\rightarrow L_{op} \sim 40 \text{ kh}$ (blue curves)

When the capacitor load is at 100Hz,
use $I_{AC} / I_{RAC}(105^{\circ}\text{C}, 100\text{Hz})$ as input value to the diagram (see data table). At other frequencies use $I_{AC} / I_{RAC}(105^{\circ}\text{C}, \geq 5\text{kHz}) \times 1/\text{Corr} =$

Frequency correction factor, for ripple current (Corr):



	FREQUENCY			
	300 Hz	1 kHz	5 kHz	100 kHz
Correction factor (Corr) (Typical value)	0.57	0.80	1.00	1.04

RELIABILITY

Estimated field failure rate: <2 ppm/year.
The expected failure rate, for this capacitor range, is based on field experience for capacitors with structural similarity. This failure rate is valued during first year of operation.

Expected failure rate thereafter: <1 ppm/y.
(Until end of specified operational life)

LEAKAGE CURRENT

Rated leakage current, I_{RL} (μA)

Rated voltage, U_R (V)

Rated capacitance, C_R (μF)

For $U_R \leq 160$ V and $C_R \times U_R \leq 1000$
 $I_{RL} = 0.01 \times C_R \times U_R$
 For $U_R \leq 160$ V and $C_R \times U_R > 1000$
 $I_{RL} = 0.003 \times C_R \times U_R + 4$
 For $U_R > 160$ V
 $I_{RL} = 0.006 \times C_R \times U_R + 4$

CUSTOMER DESIGN

On request PEG124 can be designed in other capacitance values.

ORDERING INFORMATION

For further ordering information please see page 8.

Pos 1–20

P	E	G	1	2	4	K	D	3	1	5	0	Q	L	1						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

Capacitance tolerances:

Pos. 13: Q: -10 to +30%

M: -20 to +20%

T1: Taped delivery on reels

L1: Packed in boxes

Quantities and weights

CASE CODE	A	B	C	D	E	F	G	H	J	L
Weight approx (g)	3	4	4	6	7	8	11	13	20	24
Standard content per reel	500	500	400	400	400 ¹					
Standard box quantity	250 ¹	200 ¹	250 ¹	200 ¹	150	125	100	150	125	100

¹ On request.

PEG 126 150°C

RoHS
Compliant

- 150°C
- Resistance to vibrations
- Low ESR
- High ripple capability

APPLICATION

PEG 126 is a high performance axial electrolytic capacitor. It is designed for automotive applications with high demands on resistance to vibrations and high ambient temperature.

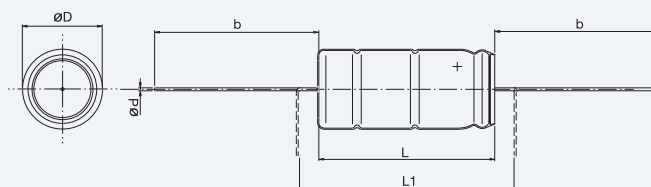
BASIC DESIGN

PEG126 is an electrolytic capacitor with outstanding electrical performance. Polarized, all-welded design, tinned copper wire leads, negative pole connected to the case, plastic insulation. The PEG 126 winding is housed in a cylindrical aluminium can with a high purity aluminium lid and a high quality

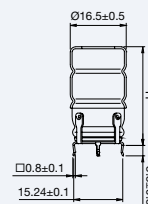
rubber gasket. Low ESR is a result of a low resistive electrolyte/paper system and an all-welded design. Thanks to its mechanical robustness the PEG 126 is suitable for use in mobile and aircraft installations, operation up to 150°C.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/125/56
Capacitance range	250-4000µF
Capacitance tolerance	-10 to +30%
Rated voltage	25-63 VDC
Temperature range	-40 to +150°C
Operational life time	8500 h at 125°C (Case Ø = 20 mm) 6500 h at 125°C (Case Ø = 16 mm)
Shelf life at	5000 h at 0V+105°C, or 10 years at 0V +40°C
Diameter range	16 – 20 mm
Resistance to vibrations	10-2000 Hz, 1.5 mm displacement amplitude or max 20 g 3x2 hours The capacitors shall be clamped by their body.
Life test	2000 h, 150°C (Case Ø = 20 mm) 1500 h, 150°C (Case Ø = 16 mm)



Radial version
See page 39



Dimensions table PEG 126 (mm)

D x L	Case code	D ±0.5	d ± 0.03	L ±1	L ₁ min	b+3/-2 Box	Weight approx (g)
16 x 29	F	16	1.0	29.0	35.0	42	8
16 x 37	G	16	1.0	37.0	43.0	42	11
20 x 29	H	20	1.0	29.0	35.0	42	13
20 x 37	J	20	1.0	37.0	43.0	42	20
20 x 46	L	20	1.0	46.0	52.0	42	24

ARTICLE TABLE PEG 126 (150°C)

C_R	D x L	I_{RAC}^* 125°C 100 Hz	I_{RAC}^* 105°C ≥5 kHz	I_{RAC}^* 125°C ≥5kHz	I_{RAC}^* 150°C ≥5kHz	ESR* 20°C 100Hz	ESR* 20°C 100kHz	L_{ESL} Approx	Article code
μF	mm	A	A	A	A	mΩ	mΩ	nH	
25 VDC (U_R)									
680	16 x 29	1.4	6.9	4.1	1.6	120	43	10	PEG126HF368EQ
1000	16 x 37	1.7	8.8	5.2	2.0	80	28	12	PEG126HG410EQ
1500	16 x 37	2.1	9.2	5.4	2.1	63	26	12	PEG126HG415EQ
2200	20 x 29	2.5	9.4	5.5	2.1	51	25	12	PEG126HH422EQ
3300	20 x 37	3.2	11.7	6.9	2.6	34	17	15	PEG126HJ433EQ
4000	20 x 46	3.7	13.1	7.7	2.9	29	14	17	PEG126HL440EM
40 VDC (U_R)									
470	16 x 29	1.1	5.9	3.5	1.3	150	45	10	PEG126KF347EQ
600	16 x 37	1.4	8.3	4.9	1.9	120	30	12	PEG126KG360EQ
1000	20 x 29	1.9	9.4	5.5	2.1	75	23	12	PEG126KH410EQ
1200	20 x 29	2.0	9.0	5.3	2.0	71	26	12	PEG126KH412EQ
1500	20 x 29	2.2	9.7	5.7	2.2	58	22	12	PEG126KH415EQ
2200	20 x 37	2.8	11.4	6.7	2.6	43	18	15	PEG126KJ422EQ
2700	20 x 46	3.1	12.1	7.1	2.7	37	17	17	PEG126KL427EQ
63 VDC (U_R)									
250	16 x 29	0.9	5.3	3.1	1.2	240	53	10	PEG126MF325EQ
370	16 x 37	1.2	6.7	3.9	1.5	160	37	12	PEG126MG337EQ
470	20 x 29	1.4	7.3	4.3	1.6	130	32	12	PEG126MH347EQ
680	20 x 37	1.7	9.0	5.3	2.0	90	23	15	PEG126MJ368EQ
900	20 x 46	2.1	10.5	6.1	2.3	69	18	17	PEG126ML390EQ

* Maximum specified values

CUSTOMER DESIGN

On request PEG126 can be designed in other capacitance values and case sizes.

INTERMITTENT RIPPLE CURRENT

During intermittent operation, the PEG 126-capacitors allows a significant increase of ripple current compared with specified values (I_{RAC} at continuous operation). Increased ripple current, with up to x1.95, is allowed at max 25% intermittence.

Example 1

Article: PEG126KL427

23A, 5kHz during 30 s, period time 120 s
(90 s without ripple)

Ambient temperature: 105°C

→ Hot-spot temperature during operation:
Max 135°C (see diagram)
 $L_{OP} = 4700h$

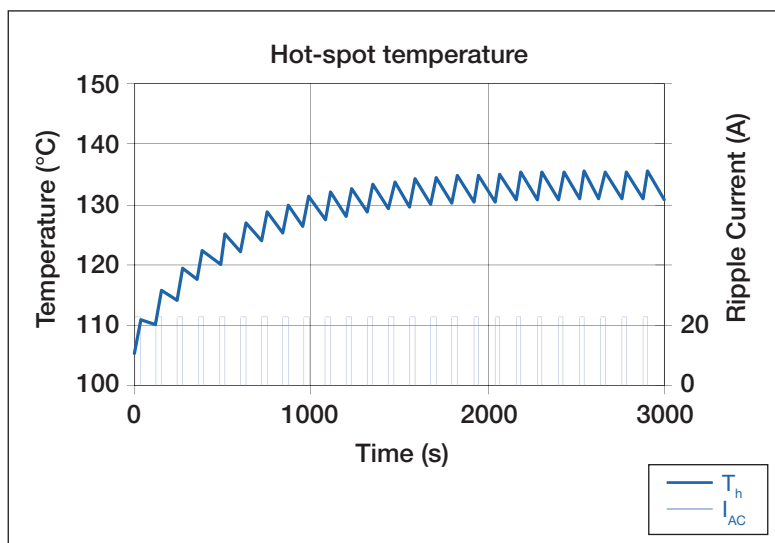
Example 2

Article: PEG126KL427

23A, 5kHz during 140 s, period time 17 minutes
(14.7 minutes without ripple, per cycle)

Ambient temperature: 105°C

→ Hot-spot temperature during operation:
Max 135°C
 $L_{OP} = 4700h$



Operational life can be calculated for arbitrary intermittence.
Please contact Customer Support.

OPERATIONAL LIFE AND RIPPLE CURRENT

OPERATIONAL LIFE (L_{op}), at ambient temperature T_a and ripple current I_{AC} .
Diagram valid for Ø20- case size.
Operational life, Ø16- case size: 0.75 x diagram value

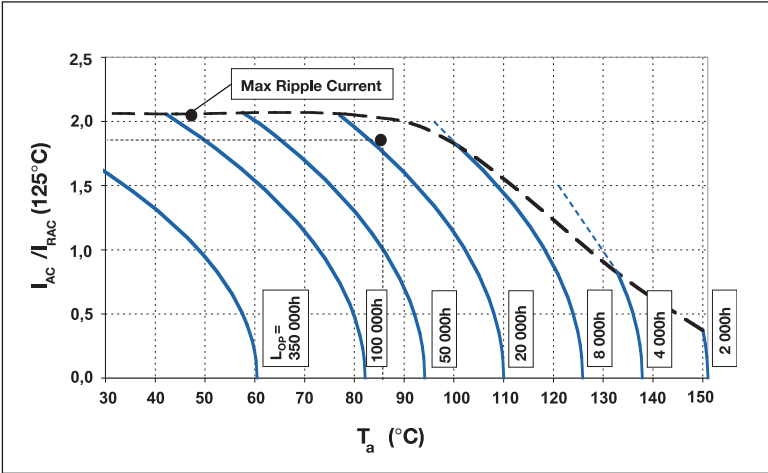
Example:
Article: PEG126KJ422EQ (Ø20 x 37 mm)
Ambient temperature (T_a): 85°C
Ripple current, at 10kHz (I_{AC}): 12 A

$I_{RAC}(125^\circ\text{C}, \geq 5\text{kHz}) = 6.7\text{A}$ (from data table)
 $\rightarrow I_{AC} / I_{RAC}(125^\circ\text{C}) = 12 / 6.7 = 1.8$

Operational life: Interpolation between the L_{op} -curves $\rightarrow L_{op} \sim 18\text{kh}$ (blue curves)

When the capacitor load is at 100Hz,
use $I_{AC} / I_{RAC}(125^\circ\text{C}, 100\text{Hz})$ as input value to the diagram (see data table). At other frequencies use $I_{AC} / I_{RAC}(125^\circ\text{C}, \geq 5\text{kHz}) \times 1/\text{Corr} =$

Frequency correction factor, for ripple current (Corr):



	FREQUENCY			
	300 Hz	1 kHz	5 kHz	100 kHz
Correction factor (Corr) (Typical value)	0.57	0.80	1.00	1.04

RELIABILITY

Estimated field failure rate: < 2 ppm/year.
The expected failure rate, for this capacitor range, is based on field experience for capacitors with structural similarity. This failure rate is valued during first year of operation. Expected failure rate thereafter: < 1 ppm/y. (Until end of specified operational life)

LEAKAGE CURRENT

Rated leakage current, I_{RL} (μA)
Rated voltage, U_R (V)
Rated capacitance, C_R (μF)
 $I_{RL} = 0.003 \times C_R \times U_R + 4$

ORDERING INFORMATION

For further ordering information please see page 8.

P	E	G	1	2	6	K	F	3	4	7	E	Q	E	1					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Capacitance tolerances:
Pos. 13: Q: -10 to +30%
M: -20 to +20%

E1: Packed in boxes

Quantities and weights

CASE CODE	F	G	H	J	L
Weight approx (g)	8	11	13	20	24
Standard box quantity	125	100	150	125	100

PEG 220 150°C

RoHS
Compliant

- 150°C
- Very high ripple current
- Up to 21A ripple, RMS, Continuous load
- High vibration resistance

APPLICATION

PEG 220 is a new generation of high performance axial electrolytic capacitors, designed for automotive applications with extremely high demands.

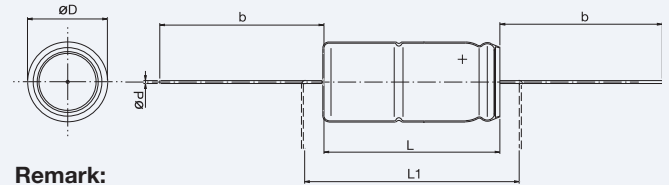
BASIC DESIGN

PEG 220 is an electrolytic capacitor with outstanding electrical performance. Polarized, all-welded design, tinned copper wire leads, negative pole connected to the case. The PEG 220 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 the PEG 220 is suitable for use in mobile and in aircraft installations, operation up to 150°C.

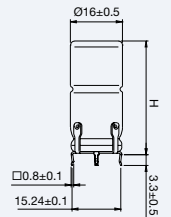
SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/125/56
Capacitance range	250 - 4700 µF
Capacitance tolerance	-10 to +30%, -20 to +20%
Rated voltage	25 - 63 VDC
Temperature range	-40 to +150°C
Shelf life at	0V +105°C 5000 h, +40°C 10 years
Diameter range	16 - 20 mm
Resistance to vibrations	10 - 2000 Hz, 1.5 mm displacement amplitude or max 20 g 3x22 hours The capacitors must be clamped by the body.
Life test	2000 h, 150°C (Ø20 case) 1500 h, 150°C (Ø16 case)



Remark:
Capacitor in standard version
is without insulation. Polyester
insulation on request

Radial version
See page 39



Dimensions table PEG 220 (mm)

D x L	Case code	D ±0.5	d ± 0.03	L ±1	L ₁ min	b±2 Box	Weight approx (g)
16 x 27	F	16	1.0	26.5	33	40	8
16 x 35	G	16	1.0	34.5	41	40	11
20 x 27	H	20	1.0	26.5	33	40	13
20 x 35	J	20	1.0	34.5	41	40	20
20 x 43	L	20	1.0	42.5	49	40	24

ARTICLE TABLE PEG 220 (150°C)

C _R	D x L	I _{RAC} * T _c =125°C ≥ 5 kHz	I _{RAC} * T _c =140°C ≥ 5 kHz	I _{RAC} * T _c =150°C ≥ 5 kHz	I _{RAC} ** T _a =125°C ≥ 5 kHz	I _{AG} (max)*** T _a =125°C ≥ 5 kHz	ESR (max) 20°C 100 Hz	ESR (max) 20°C 100 kHz	ESR (max) 125-150°C 5-100 kHz	Article code
µF	mm	A	A	A	A	A	mΩ	mΩ	mΩ	
25 VDC (U_R)										
1500	16x27	13.9	8.8	3.9	4.8	6.1	78	42	18.4	PEG220HF4150M
2200	16x35	15.8	10.0	4.5	5.8	7.4	56	31	14.3	PEG220HG4220M
2200	20x27	16.6	10.5	4.7	5.2	6.6	61	36	19.0	PEG220HH4220Q
3300	20x35	19.1	12.1	5.4	6.4	8.1	43	26	14.3	PEG220HJ4330Q
4700	20x43	21.0	13.3	5.9	7.4	9.3	32	20	11.8	PEG220HL4470Q

* Capacitor mounted with low thermal resistance path (heat-sink). Maximum ripple current continuous operation (see below).

** Rated ripple current, continuous operation at natural convection (Ø20 case 4000 h, Ø16 case 3000 h).

*** Max ripple current, at natural convection (Ø20 case 2000 h, Ø16 case 1500 h)

ARTICLE TABLE PEG 220 (150°C)

C_R	D × L	I_{RAC}^* $T_c=125^\circ\text{C}$ $\geq 5 \text{ kHz}$	I_{RAC}^* $T_c=140^\circ\text{C}$ $\geq 5 \text{ kHz}$	I_{RAC}^* $T_c=150^\circ\text{C}$ $\geq 5 \text{ kHz}$	I_{RAC}^{**} $T_a=125^\circ\text{C}$ $\geq 5 \text{ kHz}$	$I_{AC}(\text{max})^{***}$ $T_a=125^\circ\text{C}$ $\geq 5 \text{ kHz}$	ESR (max) 20°C 100 Hz mΩ	ESR (max) 20°C 100 kHz mΩ	ESR (max) 125-150°C 5-100 kHz mΩ	Article code
μF	mm	A	A	A	A	A				
40 VDC (U_R)										
800	16x27	13.6	8.6	3.9	4.7	5.9	108	43	19.2	PEG220KF3800Q
1200	16x35	15.5	9.8	4.4	5.7	7.2	74	31	14.8	PEG220KG4120Q
1500	20x27	17.1	10.8	4.8	5.4	6.8	68	33	17.8	PEG220KH4150Q
2200	20x35	19.4	12.2	5.5	6.5	8.2	49	25	13.9	PEG220KJ4220Q
2700	20x43	20.7	13.1	5.9	7.3	9.2	39	20	12.1	PEG220KL4270Q
63 VDC (U_R)										
250	16x27	10.5	6.6	3.0	3.6	4.5	233	59	32.4	PEG220MF3250Q
370	16x35	12.2	7.7	3.5	4.5	5.7	160	42	23.9	PEG220MG3370Q
470	20x27	14.2	9.0	4.0	4.5	5.7	134	41	25.9	PEG220MH3470Q
680	20x35	16.3	10.3	4.6	5.6	7.0	94	30	19.7	PEG220MJ3680Q
900	20x43	17.7	11.2	5.0	6.3	7.9	74	25	16.6	PEG220ML3900Q

* Capacitor mounted with low thermal resistance path (heat-sink). Maximum ripple current continuous operation (see below).

** Rated ripple current, continuous operation at natural convection (Ø20 case 4000 h, Ø16 case 3000 h).

*** Max ripple current, at natural convection (Ø20 case 2000 h, Ø16 case 1500 h)

RIPPLE CURRENT SPECIFICATION AND OPERATIONAL LIFE

The ripple current specification (see table above) is given at case temperature (T_c) and at ambient temperature (T_a). To be able to operate at specified ripple current at temperature T_c , the capacitor needs to be mounted with low thermal resistance path to application chassis.

Frequency correction factor, for ripple current (Corr), see table to the right:

For operational life time calculation, please see pages 148 to 149.

	FREQUENCY				
	100 Hz	300 Hz	1 kHz	5 kHz	100 kHz
Correction factor (Corr) (Typical value)	0.35	0.57	0.80	1.00	1.04

RELIABILITY

Estimated field failure rate: < 2 ppm/year.
The expected failure rate, for this capacitor range, is based on field experience for capacitors with structural similarity. This failure rate is valued during first year of operation.
Expected failure rate thereafter: < 1 ppm/y.
(Until end of specified operational life)

LEAKAGE CURRENT

Rated leakage current, I_{RL} (μA)
Rated voltage, U_R (V)
Rated capacitance, C_R (μF)
 $I_{RL} = 0.003 \times C_R \times U_R + 4$

ORDERING INFORMATION

For further ordering information please see page 8.

P	E	G	2	2	0	K	F	3	8	0	0	Q	E	1						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

Capacitance tolerances:

Pos. 13: Q: -10 to +30%

M: -20 to +20%

E1: Packed in boxes

Quantities and weights

CASE CODE	F	G	H	J	L
Weight approx (g)	8	11	13	20	24
Standard box quantity	125	100	150	125	100

PEG 225 Up to 150°C

RoHS
Compliant

- Up to 150°C
- High CV
- Extremely high ripple current
Up to 28 A ripple, RMS, Continuous load
- High vibration resistance

APPLICATION

PEG 225 is a new generation of high performance axial electrolytic capacitors, designed for automotive applications with extremely high demands.

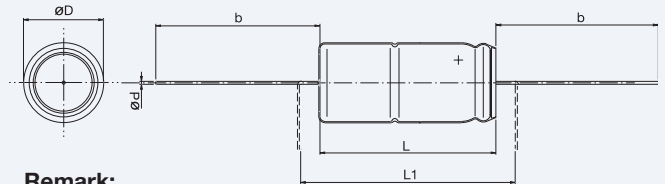
BASIC DESIGN

PEG 225 is an electrolytic capacitor with outstanding electrical performance. Polarized, all-welded design, tinned copper wire leads, negative pole connected to the case. The PEG 225 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 the PEG 225 is suitable for use in mobile and in aircraft installations, operation up to 150°C.

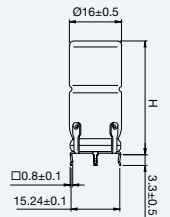
SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/125/56
Capacitance range	470 - 6300 µF
Capacitance tolerance	-10 to +30%, -20 to +20%
Rated voltage	25 - 63 VDC
Temperature range	-40 to +125°C at U _R -40 to +150°C at reduced voltage
Shelf life at	0V +105°C 5000 h, +40°C 10 years
Diameter range	16 - 20 mm
Resistance to vibrations	10 - 2000 Hz, 1.5 mm displacement amplitude or max 20 g 3x22 hours The capacitors must be clamped by the body.
Life test	2000 h, 150°C (Ø20 case) 1500 h, 150°C (Ø16 case)



Remark:
Capacitor in standard version
is without insulation. Polyester
insulation on request

Radial version
See page 39



Dimensions table PEG 225 (mm)

D x L	Case code	D ±0.5	d ± 0.03	L ±1	L ₁ min	b±2 Box	Weight approx (g)
16 x 27	F	16	1.0	26.5	33	40	8
16 x 35	G	16	1.0	34.5	41	40	11
20 x 27	H	20	1.0	26.5	33	40	13
20 x 35	J	20	1.0	34.5	41	40	20
20 x 43	L	20	1.0	42.5	49	40	24

ARTICLE TABLE PEG 225 (150°C)

C _R	D x L	I _{RAC} * T _c =125°C ≥ 5 kHz	I _{RAC} ** T _c =140°C ≥ 5 kHz	I _{RAC} ** T _c =150°C ≥ 5 kHz	I _{RAC} *** T _a =125°C ≥ 5 kHz	I _{AC} (max)**** T _a =125°C ≥ 5 kHz	ESR (max) 20°C 100 Hz	ESR (max) 20°C 100 kHz	ESR (max) 125-150°C 5-100 kHz	Article code
µF	mm	A	A	A	A	A	mΩ	mΩ	mΩ	
25 VDC (U_R) [150 °C at U_{DC} ≤ 18 V]										
2200	16x27	17.3	11.0	4.9	6.1	7.7	60	34	11.9	PEG225HF4220M
3000	16x35	19.7	12.5	5.6	7.4	9.4	44	25	9.2	PEG225HG4300M
3600	20x27	23.5	14.9	6.7	7.6	9.6	38	22	9.4	PEG225HH4360Q
4800	20x35	26.7	16.9	7.6	9.2	11.7	28	16	7.3	PEG225HJ4480Q
6300	20x43	28.3	17.9	8.0	10.2	12.9	24	14	6.5	PEG225HL4630Q

- * Capacitor mounted with low thermal resistance path (heat-sink). Maximum ripple current continuous operation.
 ** Valid for capacitor supplied with reduced DC voltage, up to 18 VDC. Capacitor mounted with low thermal resistance path.
 *** Rated ripple current, continuous operation at natural convection (Ø20 case 4000 h, Ø16 case 3000 h).
 **** Max ripple current, at natural convection and reduced voltage (Ø20 case 2000 h, Ø16 case 1500 h)

ARTICLE TABLE PEG 225 (150°C)

C_R	$D \times L$	I_{RAC}^* $T_c=125^\circ\text{C}$ $\geq 5 \text{ kHz}$	I_{RAC}^{**} $T_c=140^\circ\text{C}$ $\geq 5 \text{ kHz}$	I_{RAC}^{**} $T_c=150^\circ\text{C}$ $\geq 5 \text{ kHz}$	I_{RAC}^{***} $T_a=125^\circ\text{C}$ $\geq 5 \text{ kHz}$	$I_{AC}(\text{max})^{****}$ $T_a=125^\circ\text{C}$ $\geq 5 \text{ kHz}$	ESR (max) 20°C 100 Hz	ESR (max) 20°C 100 kHz	ESR (max) 125-150°C 5-100 kHz	Article code
μF	mm	A	A	A	A	A	m Ω	m Ω	m Ω	
40 VDC (U_R) [150 °C at $U_{DC} \leq 32 \text{ V}$]										
1200	16x27	16.6	10.5	4.7	5.8	7.4	80	36	13.0	PEG225KF4120M
1800	16x35	19.3	12.2	5.5	7.2	9.2	55	25	9.6	PEG225KG4180M
2000	20x27	22.8	14.4	6.5	7.3	9.3	50	23	10.0	PEG225KH4200Q
3000	20x35	25.8	16.3	7.3	8.9	11.3	35	17	7.8	PEG225KJ4300Q
3900	20x43	27.7	17.5	7.8	10.0	12.7	28	14	6.8	PEG225KL4390Q

63 VDC (U_R) [150 °C at $U_{DC} \leq 54 \text{ V}$]

470	16x27	12.1	7.7	3.4	4.2	5.3	156	52	24.3	PEG225MF3470Q
680	16x35	13.8	8.7	3.9	5.3	6.7	109	37	18.7	PEG225MG3680Q
900	20x27	18.0	11.4	5.1	5.8	7.3	86	31	16.1	PEG225MH3900Q
1400	20x35	20.9	13.2	5.9	7.3	9.2	57	22	11.9	PEG225MJ4140Q
1800	20x43	22.8	14.4	6.5	8.3	10.5	45	18	10.0	PEG225ML4180Q

* Capacitor mounted with low thermal resistance path (heat-sink). Maximum ripple current continuous operation (see below).

** Valid for capacitor supplied with reduced DC voltage, capacitor mounted with low thermal resistance path.

*** Rated ripple current, continuous operation at natural convection ($\varnothing 20$ case 4000 h, $\varnothing 16$ case 3000 h).

**** Max ripple current, at natural convection ($\varnothing 20$ case 2000 h, $\varnothing 16$ case 1500 h)

RIPPLE CURRENT SPECIFICATION AND OPERATIONAL LIFE

The ripple current specification (see table above) is given at case temperature (T_c) and at ambient temperature (T_a). To be able to operate at specified ripple current at temperature T_c , the capacitor needs to be mounted with low thermal resistance path to application chassis. Frequency correction factor, for ripple current (Corr), see table to the right: For operational life time calculation, please see pages 148 to 149.

	FREQUENCY				
	100 Hz	300 Hz	1 kHz	5 kHz	100 kHz
Correction factor (Corr) (Typical value)	0.35	0.57	0.80	1.00	1.04

RELIABILITY

Estimated field failure rate: < 2 ppm/year. The expected failure rate, for this capacitor range, is based on field experience for capacitors with structural similarity. This failure rate is valued during first year of operation. Expected failure rate thereafter: < 1 ppm/y. (Until end of specified operational life)

LEAKAGE CURRENT

Rated leakage current, I_{RL} (μA)
Rated voltage, U_R (V)
Rated capacitance, C_R (μF)
 $I_{RL} = 0.003 \times C_R \times U_R + 4$

ORDERING INFORMATION

For further ordering information please see page 8.

P	E	G	2	2	5	H	F	4	2	2	0	M	E	1					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Capacitance tolerances:

Pos. 13: Q: -10 to +30%

M: -20 to +20%

E1: Packed in boxes

Quantities and weights

CASE CODE	F	G	H	J	L
Weight approx (g)	8	11	13	20	24
Standard box quantity	125	100	150	125	100

PEG 226 150°C

RoHS
Compliant

- Up to 150°C
- Extremely high ripple current
Up to 28A ripple, RMS, Continuous load
- High vibration resistance

APPLICATION

PEG 226 is a new generation of high performance axial electrolytic capacitors, designed for automotive applications with extremely high demands.

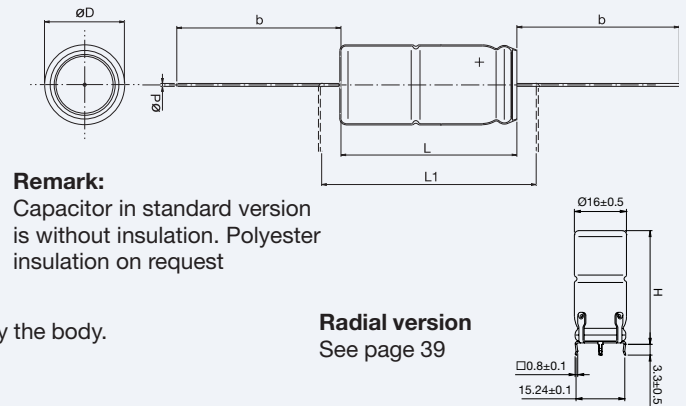
BASIC DESIGN

PEG 226 is an electrolytic capacitor with outstanding electrical performance. Polarized, all-welded design, tinned copper wire leads, negative pole connected to the case. The PEG 226 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 the PEG 226 is suitable for use in mobile and in aircraft installations, operation up to 150°C.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/125/56
Capacitance range	250 - 4700 μ F
Capacitance tolerance	-10 to +30%, -20 to +20%
Rated voltage	25 - 63 VDC
Temperature range	-40 to +150°C
Shelf life at	0V +105°C 5000 h, +40°C 10 years
Diameter range	16 - 20 mm
Resistance to vibrations	10 - 2000 Hz, 1.5 mm displacement amplitude or max 20 g 3x22 hours
Life test	The capacitors must be clamped by the body. 2000 h, 150°C (Ø20 case) 1500 h, 150°C (Ø16 case)



Dimensions table PEG 226 (mm)

D x L	Case code	D ±0.5	d ± 0.03	L ±1	L ₁ min	b±2 Box	Weight approx (g)
16 x 27	F	16	1.0	26.5	33	40	8
16 x 35	G	16	1.0	34.5	41	40	11
20 x 27	H	20	1.0	26.5	33	40	13
20 x 35	J	20	1.0	34.5	41	40	20
20 x 43	L	20	1.0	42.5	49	40	24

ARTICLE TABLE PEG 226 (150°C)

C _R	D x L	I _{RAC} * T _c =125°C ≥ 5 kHz	I _{RAC} * T _c =140°C ≥ 5 kHz	I _{RAC} * T _c =150°C ≥ 5 kHz	I _{RAC} ** T _a =125°C ≥ 5 kHz	I _{AC} (max)*** T _a =125°C ≥ 5 kHz	ESR (max) 20°C 100 Hz	ESR (max) 20°C 100 kHz	ESR (max) 125-150°C 5-100 kHz	Article code
μ F	mm	A	A	A	A	A	mΩ	mΩ	mΩ	
25 VDC (U_R)										
1500	16x27	16.8	10.6	4.7	5.9	7.4	72	36	12.7	PEG226HF4150M
2200	16x35	19.2	12.1	5.4	7.2	9.1	51	26	9.7	PEG226HG4220M
2200	20x27	22.2	14.0	6.3	7.1	9.1	50	25	10.6	PEG226HH4220Q
3300	20x35	25.8	16.3	7.3	8.9	11.3	34	17	7.8	PEG226HJ4330Q
4700	20x43	28.5	18.0	8.1	10.3	13.1	25	13	6.4	PEG226HL4470Q

- * Capacitor mounted with low thermal resistance path (heat-sink). Maximum ripple current continuous operation.
 ** Rated ripple current, continuous operation at natural convection (Ø20 case 4000 h, Ø16 case 3000 h).
 *** Max ripple current, at natural convection (Ø20 case 2000 h, Ø16 case 1500 h)

ARTICLE TABLE PEG 226 (150°C)

C_R	$D \times L$	I_{RAC}^* $T_c=125^\circ\text{C}$ $\geq 5 \text{ kHz}$	I_{RAC}^* $T_c=140^\circ\text{C}$ $\geq 5 \text{ kHz}$	I_{RAC}^* $T_c=150^\circ\text{C}$ $\geq 5 \text{ kHz}$	I_{RAC}^{**} $T_a=125^\circ\text{C}$ $\geq 5 \text{ kHz}$	$I_{AC}(\text{max})^{***}$ $T_a=125^\circ\text{C}$ $\geq 5 \text{ kHz}$	ESR (max) 20°C 100 Hz mΩ	ESR (max) 20°C 100 kHz mΩ	ESR (max) 125-150°C 5-100 kHz mΩ	Article code
μF	mm	A	A	A	A	A				
40 VDC (U_R)										
800	16x27	16.2	10.2	4.6	5.6	7.2	100	36	13.6	PEG226KF3800Q
1200	16x35	18.6	11.8	5.3	7.0	8.8	69	26	10.3	PEG226KG4120Q
1500	20x27	22.8	14.4	6.5	7.3	9.3	57	22	10.0	PEG226KH4150Q
2200	20x35	25.7	16.2	7.3	8.9	11.2	41	17	7.9	PEG226KJ4220Q
2700	20x43	27.9	17.6	7.9	10.1	12.8	32	13	6.7	PEG226KL4270Q

63 VDC (U_R)

250	16x27	11.5	7.3	3.3	4.0	5.1	227	53	26.9	PEG226MF3250Q
370	16x35	13.6	8.6	3.9	5.1	6.4	155	37	19.2	PEG226MG3370Q
470	20x27	17.3	10.9	4.9	5.5	7.0	125	32	17.5	PEG226MH3470Q
680	20x35	20.0	12.7	5.7	6.9	8.7	87	23	13.0	PEG226MJ3680Q
900	20x43	22.2	14.0	6.3	8.1	10.2	67	18	10.6	PEG226ML3900Q

* Capacitor mounted with low thermal resistance path (heat-sink). Maximum ripple current continuous operation (see below).

** Rated ripple current, continuous operation at natural convection (Ø20 case 4000 h, Ø16 case 3000 h).

*** Max ripple current, at natural convection (Ø20 case 2000 h, Ø16 case 1500 h)

RIPPLE CURRENT SPECIFICATION AND OPERATIONAL LIFE

The ripple current specification (see table above) is given at case temperature (T_c) and at ambient temperature (T_a). To be able to operate at specified ripple current at temperature T_c , the capacitor needs to be mounted with low thermal resistance path to application chassis.

Frequency correction factor, for ripple current (Corr), see table to the right:

For operational life time calculation, please see pages 148 to 149.

	FREQUENCY				
	100 Hz	300 Hz	1 kHz	5 kHz	100 kHz
Correction factor (Corr) (Typical value)	0.35	0.57	0.80	1.00	1.04

RELIABILITY

Estimated field failure rate: < 2 ppm/year.
The expected failure rate, for this capacitor range, is based on field experience for capacitors with structural similarity. This failure rate is valued during first year of operation.
Expected failure rate thereafter: < 1 ppm/y.
(Until end of specified operational life)

LEAKAGE CURRENT

Rated leakage current, I_{RL} (μA)
Rated voltage, U_R (V)
Rated capacitance, C_R (μF)
 $I_{RL} = 0.003 \times C_R \times U_R + 4$

ORDERING INFORMATION

For further ordering information please see page 8.

P	E	G	2	2	6	K	F	3	8	0	0	Q	E	1						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

Capacitance tolerances:

Pos. 13: Q: -10 to +30%

M: -20 to +20%

E1: Packed in boxes

Quantities and weights

CASE CODE	F	G	H	J	L
Weight approx (g)	8	11	13	20	24
Standard box quantity	125	100	150	125	100

Radial version (PEH)

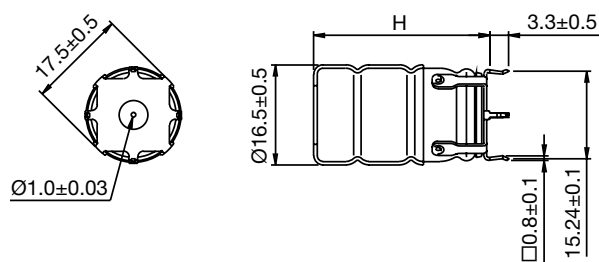
of PEG126 and PEG220-226

RoHS
Compliant

- For specifications and electrical data, please see pages 30 to 38.
All articles in axial version, case code F and G, are available also in radial version.

Dimensions table PEH 126 (mm)

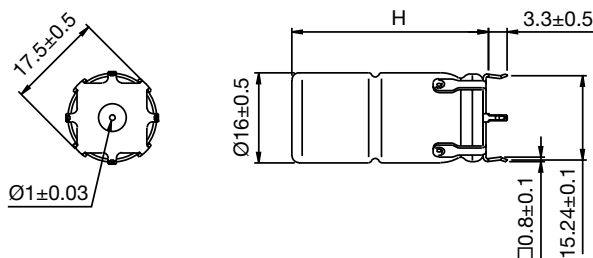
D x L	Case code	D ±0.5	H ± 1	Weight approx (g)
16 x 31	F	16.5	31	8
16 x 39	G	16.5	39	11



d x L	Case Code	H ± 1
16 x 31	F	31
16 x 39	G	39

Dimensions table PEH220-226 (mm)

D x L	Case code	D ±0.5	H ± 1	Weight approx (g)
16 x 27	F	16.0	27.5	8
16 x 35	G	16.0	35.5	11



d x L	Case Code	H ± 1
16 x 27	F	27.5
16 x 35	G	35.5

ORDERING INFORMATION

For further ordering information please see page 8.

Pos 1-20

P	E	H	X	X	X	K	D	3	1	5	0	Q	E	1					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Capacitance tolerances:
Pos. 13: Q: -10 to +30%
M: -20 to +20%

E1: Packed in boxes

Quantities and weights

CASE CODE	F	G
Weight approx (g)	8	11
Standard box quantity	100	100

ALS30 Series 85°C

RoHS
Compliant

- **Compact size**
- **Long life, 20000 hours at 85°C (Ur, Ir applied)**
- **High ripple current**
- **Excellent surge voltage capability**
- **Optimized designs available on request**

APPLICATION

Smoothing, energy storage, or pulse operation in telecommunication demanding power supplies, process control, AC-motor control, traction, welding and measuring.

BASIC DESIGN

The ALS30/31 series of screw terminal capacitors cover a wide range of case sizes and voltage ratings featuring high ripple currents and long life performance. They are ideally suited for industrial and

commercial applications demanding high reliability and long life expectancy such as frequency converters, UPS systems and switch mode power supplies.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/85/56,		
Capacitance range	100 – 680000 µF		
Capacitance tolerance	–20 to +20%		
Rated voltage U _R	25–500 VDC		
Surge voltage U _s	1.15 x U _R (for U _R ≤ 250 VDC) 1.10 x U _R (for U _R ≥ 350 VDC)	Test Condition: ≤ 30s surge, 1000 cycles @ 85°C	
Surge voltage U _{ss} (Short duration)	U _R U _{ss} 200 350 250 400 350 500 400 520 415 530 450 550 500 600	Test Condition: ≤ 500ms surge, 100 cycles @ 20°C	
Leakage current I _L	= 0.006 x C _R x U _R (µA) or 6mA whichever is the smaller. Note, C _R is in µF.		Test Condition: U _R , 5mins., 20°C
Operational life time +85°C, U _R , I _R	Can Diameter 36 11000 hrs 51 18000 hrs 66 19000 hrs 77, 90 20000 hrs		End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit
+85°C, U _R	Can Diameter 36 22000 hrs 51 36000 hrs 66 38000 hrs 77, 90 40000 hrs		
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C		
Temperature range	–40 to +85°C (Operating) -55°C to +85°C (Storage)		

SPECIFICATION

Terminal styles A, R

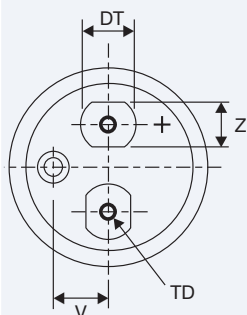


Fig. 1

Terminal styles A (ø36mm only), C, G, J, M

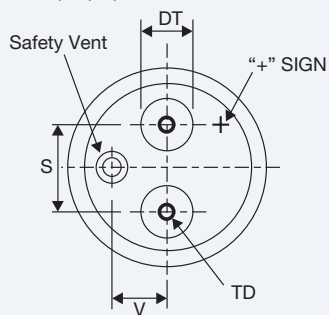
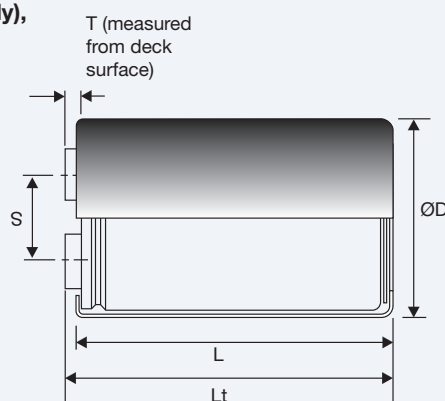
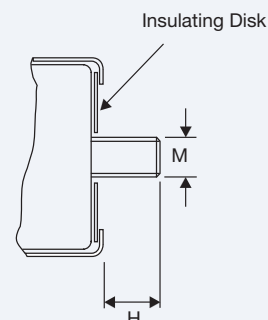


Fig. 2

ALS30
Clamp MountingALS31
Stud Mounting

Case Polarity

Due to the presence of electrolyte in the capacitor the aluminium can and stud mounting will essentially be at the same polarity as the negative terminal. We recommend that the stud and can are insulated (see accessories for insulating nuts).

Terminals options

* preferred options in bold

Term. Style	Thread	Height T - mm ±0.5	Dia. - DT mm ±0.5	Thread depth TD - mm minimum	Drawing
A*	M5	5.5	13	10	Fig.1 Z=10mm
A*	M5	7.14	8	10	Fig.2 ø36mm only
C	M6	5.5	13	10	Fig.2
G	M6	6.35	17	11.8	Fig.2
J	M6	3.17	17	8.8	Fig.2
M	M5	7.14	8	10	Fig.2
R	M5	5.5	15	10	Fig.1 Z=13mm

Terminations

Aluminium inserts with M5 threads as standard, max. torque 2NM. Optional M6 threaded inserts have a max. torque 4NM. Max. torque for stud mounting M8:4NM and M12:8NM.

Dimensions table ALS30 (sleeved) mm

Case Code	D ±1	L ±2	Lt* ±1	S ±0.5	T ±0.5	V mm	M THREAD	H ±1	MOUNTING CLIP	WEIGHT grams nom.	Terminal Style A C G J M R
DA	36	52	58.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	75	•
DB	36	62	67.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	90	•
DE	36	82	87.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	115	•
DF	36	105	111.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	140	•
KE	51	82	86.5	22.2	5.5	13.7	M12	16	V4/UTE2737	220	•
KF	51	105	110.5	22.2	5.5	13.7	M12	16	V4/UTE2737	300	•
MF	66	105	110.5	28.5	5.5	15.8	M12	16	V10/UTE2738	505	• •
ND	77	75	79.5	31.8	5.5	19	M12	16	V11	495	• • • • • •
NF	77	105	110.5	31.8	5.5	19	M12	16	V11	690	• • • • • •
NP	77	146	150.5	31.8	5.5	19	M12	16	V11	960	• • • • • •
NT	77	220	224.5	31.8	5.5	19	M12	16	V11	1450	• • • • • •
QC	90	67	71.5	31.8	5.5	25	M12	16	V90	615	• • •
QD	90	75	79.5	31.8	5.5	25	M12	16	V90	690	• • •
QH	90	98	103.5	31.8	5.5	25	M12	16	V90	900	• • •
QP	90	146	149.5	31.8	5.5	25	M12	16	V90	1345	• • •
QT	90	220	223.5	31.8	5.5	25	M12	16	V90	2000	• • •

* Dimensions Lt will change dependant on terminal style.

ARTICLE TABLE ALS30 (85°C)

Cap (μ F)	Case Size (mm)	ESR (m Ω) at 20°C	Impedance (m Ω) at 20°C	Ripple current(A) at 85°C		Type number
		100Hz (max)	10 KHz (max)	100 Hz	10 KHz	
25 VDC (U _R)						
15000	36x52	24	20	8.2	8.7	ALS3 -- 153DA025
22000	36x62	17	15	9.9	10.4	ALS3 -- 223DB025
33000	36x82	11	10	13.2	13.9	ALS3 -- 333DE025
47000	36x105	9	7	16.6	17.4	ALS3 -- 473DF025
68000	51x82	11	10	15.6	16.9	ALS3 -- 683KE025
100000	51x105	9	8	19.6	20.6	ALS3 -- 104KF025
150000	77x75	11	11	17.9	18.1	ALS3 -- 154ND025
150000	66x105	6	6	28.4	28.9	ALS3 -- 154MF025
220000	90x67	9	8	21.9	22.6	ALS3 -- 224QC025
220000	90x75	12	12	18.7	18.8	ALS3 -- 224QD025
220000	77x105	6	6	28.1	30.8	ALS3 -- 224NF025
330000	90x98	8	8	26.4	26.5	ALS3 -- 334QH025
330000	77x146	5	5	37.3	39.6	ALS3 -- 334NP025
470000	90x146	4	4	43.6	43.9	ALS3 -- 474QP025
470000	77x220	4	4	45.8	47.0	ALS3 -- 474NT025
680000	90x220	4	4	55.4	56.7	ALS3 -- 684QT025
40 VDC (U _R)						
10000	36x52	23	20	7.9	8.4	ALS3 - - 103DA040
15000	36x62	17	14	9.5	10.0	ALS3 - - 153DB040
22000	36x82	11	10	12.7	13.3	ALS3 - - 223DE040
33000	51x82	12	11	14.2	16.7	ALS3 - - 333KE040
47000	51x82	12	11	14.2	16.7	ALS3 - - 473KE040
68000	51x105	10	9	18.0	20.6	ALS3 - - 683KF040
100000	77x75	13	12	16.4	16.5	ALS3 - - 104ND040
100000	66x105	7	6	26.3	26.6	ALS3 - - 104MF040
100000	90x67	8	7	23.0	24.8	ALS3 - - 104QC040
100000	90x75	10	10	20.3	20.4	ALS3 - - 104QD040
150000	77x105	8	8	26.8	30.2	ALS3 - - 154NF040
150000	90x98	7	7	28.6	28.9	ALS3 - - 154QH040
220000	77x146	6	5	35.4	39.6	ALS3 - - 224NP040
220000	90x146	4	4	46.5	47.0	ALS3 - - 224QP040
330000	77x220	4	4	45.0	46.5	ALS3 - - 334NT040
470000	90x220	4	4	52.3	53.4	ALS3 - - 474QT040
63 VDC (U _R)						
4700	36x52	36	28	6.7	7.4	ALS3 - - 472DA063
6800	36x62	26	20	8.2	9.0	ALS3 - - 682DB063
10000	36x82	17	14	10.8	11.9	ALS3 - - 103DE063
15000	36x105	15	8	10.9	14.4	ALS3 - - 153DF063
15000	51x82	12	11	13.9	14.4	ALS3 - - 153KE063
22000	51x82	12	11	13.9	14.4	ALS3 - - 223KE063
33000	51x105	10	9	17.4	18.0	ALS3 - - 333KF063
47000	77x75	13	13	16.6	16.8	ALS3 - - 473ND063
47000	66x105	8	7	26.7	26.5	ALS3 - - 473MF063
47000	90x75	11	10	20.3	20.7	ALS3 - - 473QD063
68000	90x67	10	9	20.9	22.4	ALS3 - - 683QC063
68000	77x105	8	8	24.7	26.4	ALS3 - - 683NF063
68000	90x98	8	7	28.9	29.6	ALS3 - - 683QH063
100000	77x146	6	6	34.8	35.4	ALS3 - - 104NP063
150000	90x146	5	5	40.2	40.7	ALS3 - - 154QP063
150000	77x220	4	4	43.3	45.1	ALS3 - - 154NT063
220000	90x220	4	4	52.4	54.3	ALS3 - - 224QT063

Mounting Style 0=plain or 1=stud 

Termination Style A,C,G,J,M or R 

ARTICLE TABLE ALS30 (85°C)

Cap (μF)	Case Size (mm)	ESR (mΩ) at 20°C	Impedance (mΩ) at 20°C	Ripple current(A) at 85°C		Type number
		100Hz (max)	10 KHz (max)	100 Hz	10 KHz	
100 VDC (U _R)						
2200	36x52	69	55	4.9	5.4	ALS3 -- 222DA100
3300	36x62	49	39	6.0	6.6	ALS3 -- 332DB100
4700	36x82	33	27	7.9	8.8	ALS3 -- 472DE100
6800	36x105	23	19	10.0	11.1	ALS3 -- 682DF100
10000	51x82	28	24	10.1	10.5	ALS3 -- 103KE100
15000	51x105	20	18	12.6	13.1	ALS3 -- 153KF100
22000	77x75	25	24	12.0	12.2	ALS3 -- 223ND100
22000	66x105	13	12	18.4	19.1	ALS3 -- 223MF100
22000	90x67	15	13	18.9	20.9	ALS3 -- 223QC100
22000	90x75	21	20	14.7	15.0	ALS3 -- 223QD100
33000	77x105	15	14	17.6	19.0	ALS3 -- 333NF100
33000	90x98	13	12	20.8	21.2	ALS3 -- 333QH100
47000	77x146	10	9	25.2	25.7	ALS3 -- 473NP100
68000	90x146	9	8	29.4	29.8	ALS3 -- 683QP100
68000	77x220	7	6	40.6	41.5	ALS3 -- 683NT100
100000	90x220	6	5	30.8	33.3	ALS3 -- 104QT100
200 VDC (U _R)						
470	36x52	286	227	2.6	4.3	ALS3 -- 471DA200
680	36x62	199	158	3.9	5.4	ALS3 -- 681DB200
1000	36x82	135	107	5.1	7.1	ALS3 -- 102DE200
1500	36x105	90	72	5.6	9.1	ALS3 -- 152DF200
2200	51x82	73	60	8.2	9.7	ALS3 -- 222KE200
3300	51x105	48	40	9.2	13.1	ALS3 -- 332KF200
4700	77x75	48	42	10.6	11.5	ALS3 -- 472ND200
4700	66x105	33	27	13.0	19.1	ALS3 -- 472MF200
6800	66x105	27	23	15.7	17.7	ALS3 -- 682MF200
6800	90x67	38	29	13.7	18.5	ALS3 -- 682QC200
6800	90x75	35	31	13.3	14.3	ALS3 -- 682QD200
10000	77x105	28	25	14.9	15.9	ALS3 -- 103NF200
10000	90x98	23	20	18.8	20.3	ALS3 -- 103QH200
15000	77x146	18	16	21.4	22.7	ALS3 -- 153NP200
22000	90x146	13	12	26.7	28.0	ALS3 -- 223QP200
22000	77x220	11	9	36.1	38.7	ALS3 -- 223NT200
33000	90x220	10	9	42.2	44.8	ALS3 -- 333QT200
250 VDC (U _R)						
470	36x52	247	187	3.0	4.5	ALS3 -- 471DA250
680	36x62	172	131	3.8	5.6	ALS3 -- 681DB250
1000	36x82	117	89	5.0	7.4	ALS3 -- 102DE250
1500	51x82	86	67	6.2	9.8	ALS3 -- 152KE250
2200	51x82	69	55	7.7	9.1	ALS3 -- 222KE250
3300	51x105	45	36	10.4	12.4	ALS3 -- 332KF250
3300	77x75	52	43	10.4	11.9	ALS3 -- 332ND250
4700	66x105	31	24	15.0	18.2	ALS3 -- 472MF250
4700	90x75	38	32	13.2	14.9	ALS3 -- 472QD250
6800	90x67	35	27	13.5	17.7	ALS3 -- 682QC250
6800	77x105	29	25	15.0	16.5	ALS3 -- 682NF250
10000	90x98	24	21	17.1	18.4	ALS3 -- 103QH250
10000	77x146	19	16	21.6	24.0	ALS3 -- 103NP250
15000	90x146	14	12	27.0	29.5	ALS3 -- 153QP250
15000	77x220	12	10	32.4	36.5	ALS3 -- 153NT250
22000	77x220	9	7	36.3	45.8	ALS3 -- 223NT250
22000	90x220	12	10	42.3	47.4	ALS3 -- 223QT250

Mounting Style 0=plain or 1=stud
Termination Style A,C,G,J,M or R

ARTICLE TABLE ALS30 (85°C)

Cap (μ F)	Case Size (mm)	ESR (m Ω) at 20°C	Impedance (m Ω) at 20°C	Ripple current(A) at 85°C		Type number
		100Hz (max)	10 KHz (max)	100 Hz	10 KHz	
350 VDC (U _R)						
330	36x52	325	226	2.4	5.0	ALS3 -- 331DA350
470	36x82	223	154	3.4	7.2	ALS3 -- 471DE350
680	36x105	154	107	4.4	9.0	ALS3 -- 681DF350
1000	51x82	116	82	6.1	10.6	ALS3 -- 102KE350
1500	51x105	77	55	8.2	13.5	ALS3 -- 152KF350
2200	51x105	66	48	8.7	14.1	ALS3 -- 222KF350
2200	77x75	66	50	9.1	15.6	ALS3 -- 222ND350
2200	66x105	52	37	11.9	19.3	ALS3 -- 222MF350
3300	66x105	39	29	12.8	20.3	ALS3 -- 332MF350
3300	90x67	49	34	11.8	18.0	ALS3 -- 332QC350
3300	90x75	47	36	12.5	19.8	ALS3 -- 332QD350
4700	77x105	35	27	14.7	21.7	ALS3 -- 472NF350
4700	90x98	31	24	16.3	26.6	ALS3 -- 472QH350
6800	77x146	23	18	19.3	26.0	ALS3 -- 682NP350
6800	90x146	20	15	24.9	34.4	ALS3 -- 682QP350
10000	77x220	15	11	31.7	39.3	ALS3 -- 103NT350
15000	90x220	15	12	38.2	46.4	ALS3 -- 153QT350
400 VDC (U _R)						
220	36x52	570	387	2.1	4.4	ALS3 -- 221DA400
330	36x62	382	260	2.7	5.5	ALS3 -- 331DB400
470	36x82	267	182	3.5	7.1	ALS3 -- 471DE400
680	36x105	185	126	4.4	8.8	ALS3 -- 681DF400
1000	51x82	139	98	5.8	10.3	ALS3 -- 102KE400
1500	51x105	92	65	7.8	13.1	ALS3 -- 152KF400
1500	77x75	97	70	8.3	14.7	ALS3 -- 152ND400
2200	51x105	78	56	8.4	13.5	ALS3 -- 222KF400
2200	66x105	62	44	11.2	18.8	ALS3 -- 222MF400
2200	90x75	69	50	10.7	18.9	ALS3 -- 222QD400
3300	90x67	53	38	11.7	17.1	ALS3 -- 332QC400
3300	77x105	49	36	13.4	21.3	ALS3 -- 332NF400
3300	90x98	45	32	14.9	25.3	ALS3 -- 332QH400
4700	77x105	38	26	14.6	20.9	ALS3 -- 472NF400
4700	90x98	36	26	17.1	25.4	ALS3 -- 472QH400
4700	77x146	33	24	18.0	26.0	ALS3 -- 472NP400
6800	77x146	27	20	19.5	26.9	ALS3 -- 682NP400
6800	90x146	24	17	23.2	32.9	ALS3 -- 682QP400
6800	77x220	22	15	29.0	40.7	ALS3 -- 682NT400
10000	90x220	17	12	35.7	49.4	ALS3 -- 103QT400
415 VDC (U _R)						
220	36x52	555	368	2.1	4.4	ALS3 -- 221DA415
330	36x62	372	247	2.7	5.6	ALS3 -- 331DB415
470	36x82	261	173	3.5	7.2	ALS3 -- 471DE415
680	36x105	180	120	4.5	9.0	ALS3 -- 681DF415
1000	51x82	136	94	5.7	10.4	ALS3 -- 102KE415
1500	51x105	90	62	7.6	13.1	ALS3 -- 152KF415
1500	77x75	96	68	8.1	14.7	ALS3 -- 152ND415
2200	66x105	61	42	11.0	18.9	ALS3 -- 222MF415
2200	90x67	71	49	10.5	17.5	ALS3 -- 222QC415
2200	90x75	68	49	11.1	18.9	ALS3 -- 222QD415
3300	77x105	48	36	13.4	21.3	ALS3 -- 332NF415
3300	90x98	45	32	14.6	25.3	ALS3 -- 332QH415
4700	77x146	33	24	17.6	25.9	ALS3 -- 472NP415
6800	90x146	23	17	22.7	32.8	ALS3 -- 682QP415
6800	77x220	21	15	28.5	40.1	ALS3 -- 682NT415
10000	90x220	17	12	35.2	48.7	ALS3 -- 103QT415

Mounting Style 0=plain or 1=stud
Termination Style A,C,G,J,M or R

ARTICLE TABLE ALS30 (85°C)

Cap (μF)	Case Size (mm)	ESR (mΩ) at 20°C	Impedance (mΩ)	Ripple current(A) at 85°C		Type number
		100Hz (max)	10 KHz (max)	100 Hz	10 KHz	
450 VDC (U _R)						
150	36x52	735	485	1.8	4.1	ALS3 -- 151DA450
220	36x62	502	332	2.4	5.1	ALS3 -- 221DB450
330	36x82	335	221	3.1	6.7	ALS3 -- 331DE450
470	36x105	235	155	4.0	8.4	ALS3 -- 471DF450
680	51x82	175	117	4.9	9.9	ALS3 -- 681KE450
1000	51x105	118	79	6.5	12.6	ALS3 -- 102KF450
1500	77x75	95	65	8.7	14.9	ALS3 -- 152ND450
1500	66x105	81	52	9.5	17.4	ALS3 -- 152MF450
2200	90x67	74	46	9.6	15.4	ALS3 -- 222QC450
2200	90x75	67	47	11.5	19.0	ALS3 -- 222QD450
2200	66x105	67	47	11.1	19.3	ALS3 -- 222MF450
2200	77x105	59	41	12.2	21.1	ALS3 -- 222NF450
3300	90x75	53	33	12.6	17.9	ALS3 -- 332QD450
3300	77x105	40	30	13.8	21.2	ALS3 -- 332NF450
3300	90x98	44	30	15.6	25.5	ALS3 -- 332QH450
3300	77x146	39	27	16.1	25.1	ALS3 -- 332NP450
4700	77x146	36	26	17.1	25.2	ALS3 -- 472NP450
4700	90x146	29	19	21.0	31.8	ALS3 -- 472QP450
6800	77x220	21	14	27.4	38.8	ALS3 -- 682NT450
10000	90x220	18	13	33.4	46.5	ALS3 -- 103QT450
500 VDC (U _R)						
100	36x52	1231	847	1.6	2.9	ALS3 -- 101DA500
150	36x62	823	566	2.0	3.7	ALS3 -- 151DB500
220	36x82	560	386	2.7	4.8	ALS3 -- 221DE500
330	36x82	450	350	3.2	5.7	ALS3 -- 331DE500
330	36x105	374	258	3.5	6.2	ALS3 -- 331DF500
470	51x82	276	194	4.4	7.5	ALS3 -- 471KE500
680	51x105	190	133	5.7	9.6	ALS3 -- 681KF500
1000	77x75	173	109	7.6	12.2	ALS3 -- 102ND500
1000	66x105	137	96	8.1	13.8	ALS3 -- 102MF500
1500	77x105	91	65	10.6	17.0	ALS3 -- 152NF500
1500	90x67	110	87	9.5	14.3	ALS3 -- 152QC500
1500	90x75	119	76	10.1	15.9	ALS3 -- 152QD500
2200	90x98	80	50	13.7	21.1	ALS3 -- 222QH500
2200	77x146	62	44	14.3	21.8	ALS3 -- 222NP500
3300	77x146	54	39	15.3	22.6	ALS3 -- 332NP500
3300	90x146	51	32	19.0	28.3	ALS3 -- 332QP500
4700	77x220	37	24	24.3	33.3	ALS3 -- 472NT500
6800	90x220	27	22	26.5	41.3	ALS3 -- 682QT500

Mounting Style 0=plain or 1=stud 

 Termination Style A,C,G,J,M or R 

OPERATIONAL DATA

Operational Lifetime

Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_r) is therefore only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT = 1 x 10⁻⁹ failures per hour. Failure rates include both catastrophic and parametric failures

T _a	Failure rate per hour
85°C	250 FIT
40°C	12 FIT

MECHANICAL DATA

Mounting position

The capacitor can be mounted in any position so long as the safety vent can operate. It is possible for some electrolyte to be expelled. As this is a conducting liquid, suitable precautions should be instigated by the system designer to avoid secondary short circuits.
The capacitors are designed to be mounted in free air and are not suitable for submersion in liquid.

Vibration

10Hz to 55Hz at 0.75mm or 10g for 3x2hrs duration. Except 220mm long cans 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration.

Insulating resistance

≥ 100 Mohms at 100V d.c., across insulating sleeve.

Voltage Proof

≥ 2500V d.c., across insulating sleeve.

Safety vent

A safety vent for over pressure is featured on terminal deck. This is in the form of a rubber plug designed to relieve build up of internal pressure due to over stress or catastrophic failure.

PEH 200 85°C

RoHS
Compliant

- High CV-value
- Long Life
- Low ESR and ESL
- Compact size
- Optimized designs available on request

APPLICATION

Typical applications for the new PEH 200 would be found in Uninterruptable Power Supplies (UPS), Ground Power Units (GPU), Welding Equipments and Drives where high current ratings and compact size are important.

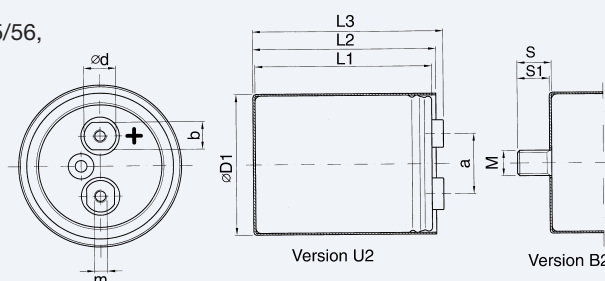
BASIC DESIGN

PEH 200 series has a polarized, all-welded design, heavy duty screw terminals, extended cathode construction, safety vent and plastic insulation. The sealing systems designed for electrolyte leakage free operation and a very low gas-diffusion rate of electrolyte.

Mechanical contact between the winding and the aluminium case allows excellent heat transfer from the winding hot spot to the ambient, which means cooler operation and very high current ratings.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/85/56, DIN 41240
Capacitance range	100–330000 µF
Capacitance tolerance	–20 to +20%
Rated voltage	25–550 VDC
Temperature range	–40 to +85°C
Shelf life	2000 h at 0V +85°C, or 4 years at 0V +40°C
Operational life time	60000 h at +85°C (Case Ø = 90 mm)
Diameter range	35–90 mm



Dimensions table PEH 200 (mm)

D x L	Case code	D1 ±1.0	L1 ±1.0	L2 ±1.0	L3 ±1.0	S	S1	M	a ±0.5	b	d	m*	Weight approx (g)
35 x 47	E	36.6	47.5	50.5	55.0	12	11.0	M8	13.0	—	8	M5	60
35 x 51	A	36.6	51.5	54.5	58.9	12	11.0	M8	13.0	—	8	M5	70
35 x 60	B	36.6	59.5	62.5	66.9	12	11.0	M8	13.0	—	8	M5	85
35 x 75	C	36.6	73.5	76.5	80.9	12	11.0	M8	13.0	—	8	M5	105
35 x 95	D	36.6	94.5	97.5	101.9	12	11.0	M8	13.0	—	8	M5	130
50 x 49	G	51.6	48.5	51.5	56.4	16	15.0	M12	22.0	13	15	M5	150
50 x 75	H	51.6	74.5	77.5	82.4	16	15.0	M12	22.0	13	15	M5	180
50 x 95	J	51.6	95.5	98.5	103.4	16	15.0	M12	22.0	13	15	M5	240
50 x 105	K	51.6	103.5	106.5	111.4	16	15.0	M12	22.0	13	15	M5	265
50 x 115	I**	51.6	115.5	118.5	123.4	16	15.0	M12	22.0	13	15	M5	300
65 x 105	O	66.6	106.0	109.2	113.0	16	14.8	M12	28.5	13	15	M5	415
65 x 115	Q**	66.6	118.0	121.2	125.0	16	14.8	M12	28.5	13	15	M5	460
65 x 130	S**	66.6	129.0	132.2	136.0	16	14.8	M12	28.5	13	15	M5	520
65 x 140	R**	66.6	141.0	144.2	148.0	16	14.8	M12	28.5	13	15	M5	650
75 x 78	L	76.6	77.0	80.2	84.0	16	14.8	M12	32.0	13	15	M5	430
75 x 98	P**	76.6	98.0	101.2	105.0	16	14.8	M12	32.0	13	15	M5	530
75 x 105	T	76.6	106.0	109.2	113.0	16	14.8	M12	32.0	13	15	M5	585
75 x 115	U	76.6	118.0	121.2	125.0	16	14.8	M12	32.0	13	15	M5	640
75 x 145	V	76.6	146.0	149.2	153.0	16	14.8	M12	32.0	13	15	M5	800
75 x 220	X	76.6	221.0	224.2	228.0	16	14.8	M12	32.0	13	15	M5	1400
90 x 78	M	91.6	76.5	79.7	83.4	16	14.8	M12	32.0	13	15	M5	750
90 x 98	N	91.6	97.5	100.7	104.4	16	14.8	M12	32.0	13	15	M5	950
90 x 145	Y	91.6	145.5	148.7	152.4	16	14.8	M12	32.0	13	15	M5	1400
90 x 220	Z	91.6	220.0	223.2	226.9	16	14.8	M12	32.0	13	15	M5	1500

* M6 and other threads on request. **on request

ARTICLE TABLE PEH 200 (85°C)

C _R	D x L	Case code	I _{RAC} * 85°C	I _{RAC} * 50°C **	I _{RAC} * 40°C	ESR* 20°C	ESR* 20°C	L _{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz mΩ	100 kHz mΩ	nH	U2 = Plain can B2 = Stud can
25 VDC (U _R)									
15000	35 x 51	A	11.9	28.7	19.0	25	21	12	PEH200HA5150M--
22000	35 x 75	C	15.2	34.3	24.4	17	14	12	PEH200HC5220M--
33000	35 x 95	D	17.8	38.0	28.1	12	10	12	PEH200HD5330M--
47000	50 x 75	H	20.2	43.3	30.1	11	10	16	PEH200HH5470M--
68000	50 x 95	J	23.4	47.4	34.6	8	7	16	PEH200HJ5680M--
100000	50 x 105	K	23.9	46.1	34.7	7	7	16	PEH200HK6100M--
150000	65 x 105	O	26.3	50.0	37.2	7	7	16	PEH200HO6150M--
220000	75 x 105	T	35.0	63.6	49.5	5	5	17	PEH200HT6220M--
330000	75 x 145	V	40.0	73.1	56.9	4	4	17	PEH200HV6330M--
40 VDC (U _R)									
6800	35 x 51	A	9.9	27.2	18.1	33	25	12	PEH200KA4680M--
10000	35 x 60	B	12.0	31.5	21.4	23	18	12	PEH200KB5100M--
15000	35 x 75	C	14.6	36.1	25.5	16	12	12	PEH200KC5150M--
22000	35 x 95	D	17.1	39.8	29.2	12	9	12	PEH200KD5220M--
33000	50 x 75	H	18.9	41.1	28.8	11	9	16	PEH200KH5330M--
47000	50 x 95	J	22.1	46.3	33.6	8	7	16	PEH200KJ5470M--
68000	65 x 105	O	25.2	49.9	35.6	7	7	16	PEH200KO5680M--
100000	65 x 105	O	24.9	46.3	36.9	8	8	16	PEH200KO6100M--
150000	75 x 115	U	35.7	67.7	51.2	5	4	17	PEH200KU6150M--
220000	75 x 145	V	34.4	62.3	48.9	5	5	17	PEH200KV6220M--
63 VDC (U _R)									
4700	35 x 51	A	9.0	26.8	18.0	32	21	12	PEH200MA4470M--
6800	35 x 75	C	11.5	32.7	23.5	21	14	12	PEH200MC4680M--
10000	35 x 95	D	13.6	36.0	27.0	15	10	12	PEH200MD5100M--
15000	50 x 75	H	16.1	37.3	26.5	14	11	16	PEH200MH5150M--
22000	50 x 95	J	19.0	42.0	30.9	10	8	16	PEH200MJ5220M--
33000	65 x 105	O	22.8	45.9	34.8	10	8	16	PEH200MO5330M--
47000	65 x 105	O	21.8	42.7	32.0	10	9	16	PEH200MO5470M--
68000	75 x 115	U	31.5	61.3	46.8	6	5	17	PEH200MU5680M--
100000	75 x 145	V	34.3	62.2	50.3	5	5	17	PEH200MV6100M--
100 VDC (U _R)									
1500	35 x 51	A	5.7	18.0	12.1	92	63	12	PEH200PA4150M--
2200	35 x 60	B	7.0	21.3	14.7	63	44	12	PEH200PB4220M--
3300	35 x 75	C	8.7	25.0	17.8	43	30	12	PEH200PC4330M--
4700	35 x 95	D	10.3	28.9	21.1	31	21	12	PEH200PD4470M--
6800	50 x 75	H	12.7	30.4	21.5	33	27	16	PEH200PH4680M--
10000	50 x 95	J	15.3	34.7	25.6	23	19	16	PEH200PJ5100M--
15000	50 x 105	K	17.3	37.6	27.9	17	14	16	PEH200PK5150M--
22000	65 x 105	O	19.3	38.7	30.1	15	13	16	PEH200PO5220M--
33000	75 x 105	T	26.3	53.0	39.8	10	8	17	PEH200PT5330M--
47000	75 x 145	V	30.8	60.5	47.3	7	6	17	PEH200PV5470M--
250 VDC (U _R)									
330	35 x 51	A	2.2	13.5	8.7	330	170	12	PEH200SA3330M--
470	35 x 60	B	2.7	15.9	10.6	240	120	12	PEH200SB3470M--
680	35 x 75	C	3.4	18.7	13.0	160	84	12	PEH200SC3680M--
1000	35 x 95	D	4.1	21.2	15.6	110	58	12	PEH200SD4100M--
1000	50 x 49	G	4.3	20.7	12.6	120	69	16	PEH200SG4100M--
1500	50 x 75	H	5.9	28.7	19.5	78	42	16	PEH200SH4150M--
2200	50 x 95	J	7.3	32.5	23.2	54	29	16	PEH200SJ4220M--
3300	65 x 105	O	10.0	39.8	29.4	38	22	16	PEH200SO4330M--
3300	75 x 78	L	10.5	43.8	29.6	38	22	17	PEH200SL4330M--
4700	65 x 105	O	11.3	38.2	27.2	29	18	16	PEH200SO4470M--

* Maximum values. ** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 200 (85°C)

C _R	D x L	Case code	I _{RAC} * 85°C	I _{RAC} * 50°C **	I _{RAC} * 40°C	ESR* 20°C	ESR* 20°C	L _{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz mΩ	100 kHz mΩ	nH	U2 = Plain can B2 = Stud can
250 VDC (U _R)									
4700	90 x 78	M	12.7	44.2	30.4	30	18	16	PEH200SM4470M--
6800	75 x 105	T	14.7	51.5	36.5	20	12	17	PEH200ST4680M--
6800	90 x 98	N	15.8	52.1	37.3	21	13	16	PEH200SN4680M--
10000	75 x 145	V	18.0	59.0	44.0	14	9	17	PEH200SV5100M--
12000	75 x 145	V	18.8	58.6	43.6	14	9	17	PEH200SV512AM--
15000	75 x 220	X	20.6	61.6	49.2	10	6	17	PEH200SX5150M--
15000	90 x 145	Y	21.8	60.1	45.5	12	8	16	PEH200SY5150M--
350 VDC (U _R)									
220	35 x 51	A	2.0	13.7	8.8	360	170	12	PEH200UA3220M--
330	35 x 60	B	2.6	16.6	11.0	240	110	12	PEH200UB3330M--
470	35 x 75	C	3.2	19.3	13.4	170	79	12	PEH200UC3470M--
680	35 x 95	D	3.8	21.9	16.0	120	55	12	PEH200UD3680M--
680	50 x 49	G	4.0	20.7	12.6	130	66	16	PEH200UG3680M--
1000	50 x 75	H	5.5	28.8	19.5	85	41	16	PEH200UH4100M--
1500	50 x 95	J	6.8	32.9	23.4	57	28	16	PEH200UJ4150M--
2200	65 x 105	O	9.4	39.8	29.2	41	21	16	PEH200UO4220M--
2200	75 x 78	L	9.8	43.5	29.4	41	21	17	PEH200UL4220M--
3300	65 x 105	O	10.9	38.6	27.5	31	17	16	PEH200UO4330M--
3300	90 x 78	M	13.1	54.0	37.0	28	15	16	PEH200UM4330M--
4700	75 x 115	U	14.5	54.7	39.5	20	11	17	PEH200UU4470M--
4700	90 x 98	N	15.0	51.3	36.7	22	13	16	PEH200UN4470M--
6800	75 x 145	V	16.8	57.0	42.3	15	8	17	PEH200UV4680M--
10000	75 x 220	X	19.4	60.8	48.5	11	7	17	PEH200UX5100M--
10000	90 x 145	Y	23.3	75.2	56.9	11	6	16	PEH200UY5100M--
15000	90 x 220	Z	27.3	79.8	64.4	8	5	16	PEH200UZ515AM--
385 VDC (U _R)									
220	35 x 51	A	2.1	14.6	9.3	330	150	12	PEH200XA3220M--
330	35 x 75	C	2.7	17.0	12.0	220	97	12	PEH200XC3330M--
470	35 x 95	D	3.3	19.1	14.2	150	69	12	PEH200XD3470M--
470	50 x 49	G	3.6	20.9	12.8	160	78	16	PEH200XG3470M--
680	50 x 75	H	4.7	26.8	18.4	110	51	16	PEH200XH3680M--
1000	50 x 95	J	5.9	31.7	22.8	76	35	16	PEH200XJ4100M--
1500	50 x 105	K	7.1	34.1	24.7	52	25	16	PEH200XK4150M--
2200	65 x 105	O	9.6	36.7	26.1	38	20	16	PEH200XO4220M--
2200	75 x 78	L	10.0	42.7	28.8	38	20	17	PEH200XL4220M--
3300	75 x 105	T	12.8	52.5	37.4	25	13	17	PEH200XT4330M--
3300	90 x 78	M	13.3	52.6	36.0	26	14	16	PEH200XM4330M--
4700	75 x 145	V	15.2	57.6	43.9	19	11	17	PEH200XV4470M--
4700	90 x 98	N	16.6	62.4	44.4	19	10	16	PEH200XN4470M--
6800	90 x 145	Y	20.9	74.8	57.2	14	8	16	PEH200XY4680M--
6800	75 x 220	X	17.4	58.9	47.0	14	8	17	PEH200XX4680M--
400 VDC (U _R)									
220	35 x 51	A	2.2	11.4	9.6	310	130	12	PEH200VA3220M--
330	35 x 75	C	2.8	14.3	12.6	210	90	12	PEH200VC3330M--
470	35 x 95	D	3.4	16.5	14.8	140	63	12	PEH200VD3470M--
470	50 x 49	G	3.7	15.0	12.7	150	73	16	PEH200VG3470M--
680	50 x 75	H	4.9	21.2	18.3	110	55	16	PEH200VH3680M--
1000	50 x 95	J	5.9	24.2	21.3	76	38	16	PEH200VJ4100M--
1500	65 x 105	O	9.1	49.1	35.1	53	27	16	PEH200VO415AQ--
1500	75 x 78	L	8.8	34.0	29.0	52	27	17	PEH200VL4150M--
2200	65 x 105	O	9.6	29.1	25.6	39	21	16	PEH200VO4220M--
2200	90 x 78	M	11.8	44.1	37.1	36	19	16	PEH200VM4220M--
3300	65 x 105	O	11.0	30.5	26.7	29	16	16	PEH200VO433AM--
3300	75 x 115	U	13.8	52.0	45.7	22	10	17	PEH200VU433AQ--
3300	90 x 98	N	14.9	52.8	45.2	25	13	16	PEH200VN4330M--

* Maximum values. ** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 200 (85°C)

C _R	D x L	Case code	I _{RAC} * 85°C	I _{RAC} * 50°C **	I _{RAC} * 40°C	ESR* 20°C	ESR* 20°C	L _{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz mΩ	100 kHz mΩ	nH	U2 = Plain can B2 = Stud can
400 VDC (U _R)									
3300	75 x 105	T	13.0	41.5	36.3	26	14	17	PEH200VT4330M--
4700	75 x 145	V	15.6	57.0	42.5	18	10	17	PEH200VV447AM--
6800	75 x 220	X	17.6	51.2	47.7	13	8	17	PEH200VX4680M--
6800	90 x 145	Y	21.4	64.1	56.8	13	7	16	PEH200VY4680M--
10000	90 x 220	Z	24.7	69.2	64.0	9	5	16	PEH200VZ5100M--
420 VDC (U _R)									
150	35 x 51	A	1.8	12.1	7.8	400	170	12	PEH200OA3150M--
220	35 x 75	C	2.3	14.3	10.3	270	110	12	PEH200OC3220M--
330	35 x 95	D	2.9	16.3	12.3	180	76	12	PEH200OD3330M--
330	50 x 49	G	3.2	20.4	12.6	190	80	16	PEH200OG3330M--
470	50 x 75	H	4.2	24.8	17.0	140	62	16	PEH200OH3470M--
680	50 x 95	J	5.1	28.1	20.4	96	44	16	PEH200OJ3680M--
1000	50 x 105	K	6.3	32.0	23.2	67	31	16	PEH200OK4100M--
1500	65 x 105	O	8.8	38.9	28.4	47	23	16	PEH200OO4150M--
1500	75 x 78	L	9.1	42.3	28.5	47	23	17	PEH200OL4150M--
2200	75 x 105	T	11.5	51.6	37.0	32	16	17	PEH200OT4220M--
2200	90 x 78	M	12.2	52.7	36.0	33	17	16	PEH200OM4220M--
2700	65 x 105	O	12.4	57.3	40.1	24	10	16	PEH200OO427AM--
3300	75 x 145	V	14.0	57.5	43.7	22	11	17	PEH200OV4330M--
3300	90 x 98	N	15.4	61.9	44.0	22	12	16	PEH200ON4330M--
4700	75 x 220	X	15.7	57.6	46.8	16	8	17	PEH200OX4470M--
4700	90 x 145	Y	18.2	62.2	47.5	17	9	16	PEH200OY4470M--
8200	90 x 220	Z	23.8	77.3	63.1	10	5	16	PEH200OZ4820M--
450 VDC (U _R)									
150	35 x 51	A	2.0	14.6	9.3	350	150	12	PEH200YA3150M--
220	35 x 75	C	2.5	16.8	11.9	240	99	12	PEH200YC3220M--
330	35 x 95	D	3.1	19.4	14.5	160	66	12	PEH200YD3330M--
330	50 x 49	G	3.5	20.8	12.7	170	75	16	PEH200YG3330M--
470	50 x 75	H	4.5	25.5	17.5	120	58	16	PEH200YH3470M--
680	50 x 95	J	5.5	28.8	20.8	86	41	16	PEH200YJ3680M--
1000	50 x 105	K	6.7	32.7	23.6	60	29	16	PEH200YK4100M--
1500	65 x 105	O	9.3	39.2	28.2	43	22	16	PEH200YO4150M--
1500	75 x 78	L	9.6	42.3	28.5	43	22	17	PEH200YL4150M--
1800	65 x 105	O	10.6	47.8	34.0	43	22	17	PEH200YO418AM--
2200	75 x 105	T	12.1	50.1	35.6	29	15	17	PEH200YT4220M--
2200	90 x 78	M	12.7	52.4	35.8	30	16	16	PEH200YM4220M--
3300	75 x 115	U	14.2	52.5	37.7	30	16	17	PEH200YU433CM--
3300	75 x 145	V	14.7	57.3	43.7	20	10	17	PEH200YV4330M--
3300	90 x 98	N	16.1	61.9	43.9	21	11	16	PEH200YN4330M--
4700	75 x 145	V	17.9	68.3	50.4	14	7	17	PEH200YV447BM--
4700	75 x 220	X	16.8	59.3	47.6	14	8	17	PEH200YX4470M--
4700	90 x 145	Y	18.9	61.4	46.9	16	9	16	PEH200YY4470M--
6000	75 x 220	X	18.5	60.5	47.8	12	7	17	PEH200YX460BQ--
8200	90 x 220	Z	24.9	77.7	63.4	10	5	16	PEH200YZ4820M--
500 VDC (U _R)									
100	35 x 51	A	1.5	6.1	3.9	1000	590	12	PEH200ZA3100M--
150	35 x 60	B	1.9	7.5	4.9	670	390	12	PEH200ZB3150M--
220	35 x 75	C	2.3	8.4	5.8	505	310	12	PEH200ZC3220M--
220	50 x 49	G	2.5	10.1	6.1	520	320	12	PEH200ZG3220M--
330	35 x 95	D	2.9	10.7	7.7	300	180	12	PEH200ZD3330M--
470	50 x 75	H	4.2	15.8	10.5	220	130	16	PEH200ZH3470M--
680	50 x 95	J	5.1	18.4	12.8	150	90	16	PEH200ZJ3680M--
1000	65 x 105	O	6.8	21.4	15.5	130	79	16	PEH200ZO4100M--
1500	75 x 105	T	9.2	29.8	21.0	82	52	17	PEH200ZT4150M--
1800	65 x 105	O	10.6	40.9	28.2	44	29	16	PEH200ZO418HM--
2200	75 x 145	V	11.1	33.7	25.1	58	38	17	PEH200ZV4220M--
3300	75 x 220	X	12.8	36.5	29.0	38	25	17	PEH200ZX4330M--

* Maximum values. ** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 200 (85°C)

C_R	D x L	Case code	I_{RAC}^* 85°C	I_{RAC}^* 50°C **	I_{RAC}^* 40°C	ESR* 20°C	ESR* 20°C	L_{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz $m\Omega$	100 kHz $m\Omega$	nH	U2 = Plain can B2 = Stud can
500 VDC (U_R)									
3300	90 x 145	Y	15.7	46.9	35.4	38	24	16	PEH200ZY4330M--
5600	90 x 220	Z	19.6	53.4	42.6	25	17	16	PEH200ZZ4560M--
550 VDC (U_R)									
680	65 x 105	O	6.6	21.1	15.4	160	110	16	PEH200TO3680M--
1000	65 x 105	O	8.0	25.2	17.9	120	76	16	PEH200TO4100M--
1200	90 x 78	M	10.2	33.7	22.6	97	63	16	PEH200TM412AM--
1200	75 x 105	T	9.5	30.5	21.6	96	62	17	PEH200TT4120M--
1500	75 x 145	V	10.6	32.3	24.4	77	49	17	PEH200TV4150M--
1800	75 x 145	V	11.6	35.3	26.3	66	42	17	PEH200TV4180M--
2200	75 x 220	X	11.1	29.4	24.1	65	45	17	PEH200TX4220M--
2700	75 x 220	X	13.4	37.8	30.1	45	29	17	PEH200TX4270M--
2700	90 x 145	Y	15.7	44.4	33.7	47	30	16	PEH200TY4270M--

* Maximum values. ** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

PEH200 - INCREASED SURGE VOLTAGE (1,15XU_R) AND TRANSIENT CAPABILITY

*** Transient measurements

Procedure

The transient voltage has been determined in the following way. Before measurement, the capacitor is charged to the rated voltage at the maximum allowed ambient temperature for 12 hours. The capacitor is then placed in the test equipment and subjected to a transient corresponding to the surge voltage. Note that no operating

voltage is applied over the capacitor. The voltage of the capacitor bank in the test equipment is increased 100 V between each pulse. Pulses are applied until the capacitor breaks. Data from the last pulse the capacitor withstand are evaluated. This procedure is repeated for 25 capacitors.

Data evaluation

The average value, μ , and the standard deviation, σ , of the maximum voltage for the 25 measurements are calculated. The transient voltage U_T is then taken as:
 $U_T = \mu - 2\sigma$

ARTICLE TABLE PEH 200 (85°C)

C _R	D x L	Case code	I _{RAC} [*] 85°C 100 Hz A	I _{RAC} [*] 50°C ** 10 kHz A	I _{RAC} [*] 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100kHz mΩ	L _{ESL} Approx. nH	U _T ^{***} V	Article code
μF	mm									U ₂ = Plain can B2 = Stud can
400 VDC (U _R), (U _{SURGE} = 460V)										
220	35 x 51	A	2.1	12.3	7.7	400	230	12	720	PEH200VA322TM--
330	35 x 75	C	2.7	14.3	9.9	270	150	12	710	PEH200VC333TM--
470	50 x 49	G	3.6	18.7	11.2	200	120	16	700	PEH200VG347TM--
560	35 x 95	D	3.6	18.0	12.9	160	91	12	700	PEH200VD356TM--
820	50 x 75	H	5.2	25.2	16.7	110	65	16	680	PEH200VH382TM--
1500	50 x 105	K	7.2	31.0	22.0	63	37	16	660	PEH200VK415TM--
2200	65 x 105	O	9.7	36.8	25.8	46	29	16	640	PEH200VO422TM--
2200	75 x 78	L	10.0	41.1	27.2	45	28	17	640	PEH200VL422TM--
2700	90 x 78	M	12.6	52.0	35.0	36	22	16	640	PEH200VM427TM--
3300	75 x 105	T	12.7	48.4	33.6	31	19	17	630	PEH200VT433TM--
4700	75 x 145	V	15.3	55.7	41.6	21	13	17	630	PEH200VV447TM--
4700	90 x 98	N	16.7	60.9	42.5	22	14	16	630	PEH200VN447TM--
8200	75 x 220	X	18.7	59.1	46.5	13	9	17	630	PEH200VX482TM--
8200	90 x 145	Y	22.5	73.6	54.9	13	9	16	630	PEH200VY482TM--
12000	90 x 220	Z	26.3	78.3	62.4	10	6	16	630	PEH200VZ512TM--
420 VDC (U _R), (U _{SURGE} = 480V)										
150	35 x 51	A	1.8	10.6	6.7	490	260	12	740	PEH200OA315TM--
270	35 x 75	C	2.6	13.6	9.4	280	140	12	730	PEH200OC327TM--
330	50 x 49	G	3.2	18.5	11.1	230	120	16	720	PEH200OG333TM--
390	35 x 95	D	3.1	15.4	11.2	190	100	12	720	PEH200OD339TM--
680	50 x 75	H	5.0	26.0	17.2	110	60	16	700	PEH200OH368TM--
1000	50 x 105	K	6.3	30.2	21.1	77	41	16	680	PEH200OK410TM--
1500	75 x 78	L	9.0	41.1	27.2	53	29	17	660	PEH200OL415TM--
1800	65 x 105	O	9.4	38.2	26.9	46	26	16	660	PEH200OO418TM--
2200	90 x 78	M	12.0	51.5	34.6	37	21	16	650	PEH200OM422TM--
2700	75 x 105	T	12.3	50.3	35.1	31	17	17	650	PEH200OT427TM--
3300	90 x 98	N	15.3	61.1	42.7	25	14	16	650	PEH200ON433TM--
3900	75 x 145	V	14.9	56.7	42.1	21	12	17	650	PEH200OV439TM--
5600	75 x 220	X	17.0	59.1	46.2	15	9	17	650	PEH200OX456TM--
5600	90 x 145	Y	18.8	60.9	45.6	19	12	16	650	PEH200OY456TM--
8200	90 x 220	Z	23.9	77.9	62.2	11	7	16	650	PEH200OZ482TM--
450 VDC (U _R), (U _{SURGE} = 515V)										
150	35 x 51	A	1.8	10.2	6.5	500	280	12	770	PEH200YA315TM--
270	35 x 75	C	2.6	13.1	9.1	280	160	12	760	PEH200YC327TM--
330	50 x 49	G	3.3	18.1	10.8	230	130	16	750	PEH200YG333TM--
390	35 x 95	D	3.2	15.1	11.1	190	100	12	750	PEH200YD339TM--
680	50 x 75	H	5.1	25.3	16.8	110	64	16	730	PEH200YH368TM--
1000	50 x 105	K	6.4	29.3	20.7	78	45	16	710	PEH200YK410TM--
1500	75 x 78	L	9.2	40.8	27.3	54	31	17	700	PEH200YL415TM--

* Maximum specified values. ** 2 m/s forced air, studmounted on 3 °C/W aluminium chassis.

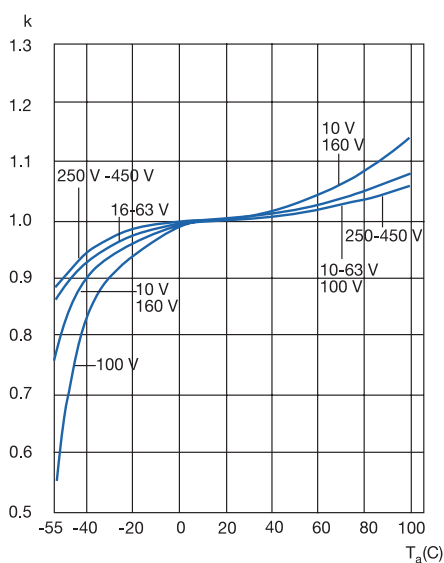
ARTICLE TABLE PEH 200 (85°C)

C_R	D x L	Case code	I_{RAC}^* 85°C 100 Hz A	I_{RAC}^* 50°C ** 10 kHz A	I_{RAC}^* 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100kHz mΩ	L_{ESL} Approx. nH	U_T^{***} V	Article code
μF	mm									U2 = Plain can B2 = Stud can
450 VDC (UR), ($U_{SURGE} = 515V$)										
1800	65 x 105	O	9.6	36.8	25.8	47	29	16	690	PEH200YO418TM--
2200	90 x 78	M	12.4	52.0	34.9	37	22	16	690	PEH200YM422TM--
2700	75 x 105	T	12.6	50.0	35.2	31	19	17	680	PEH200YT427TM--
3300	90 x 98	N	15.6	61.2	42.9	25	15	16	680	PEH200YN433TM--
3900	75 x 145	V	15.1	55.8	41.7	22	13	17	680	PEH200YV439TM--
5600	90 x 145	Y	20.7	72.7	55.0	15	10	16	680	PEH200YY456TM--
6800	75 x 220	X	18.6	59.9	46.7	14	9	17	680	PEH200YX468TM--
10000	90 x 220	Z	25.9	78.0	62.5	9	6	16	680	PEH200YZ510TM--

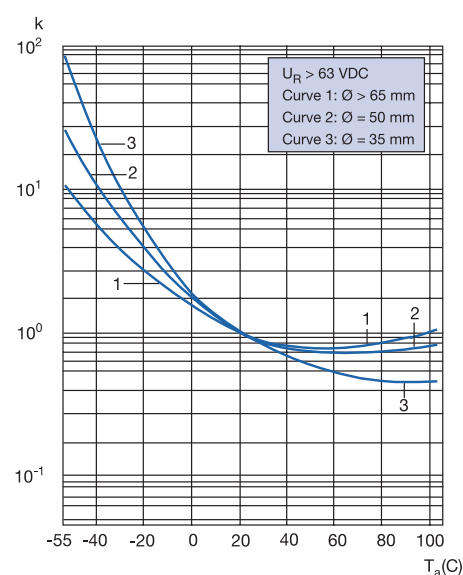
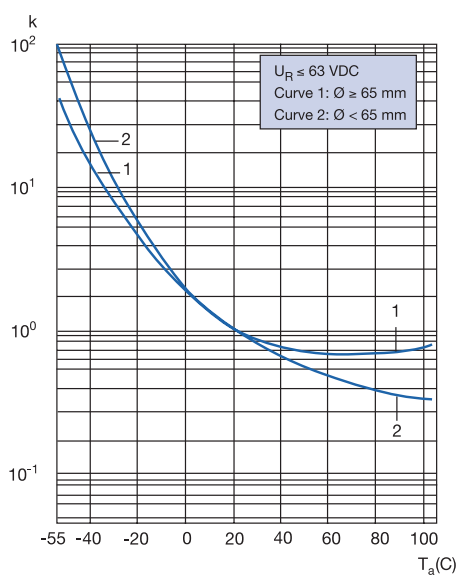
* Maximum specified values. ** 2 m/s forced air, studmounted on 3 °C/W aluminium chassis.

TECHNICAL DATA PEH 200 (85°C)

The capacitance vs ambient temperature
(T_a) at $f = 100$ Hz



ESR as a function of ambient temperature
(T_a) at $f = 100$ kHz. $k = R_{ESR}(T_a)/R_{ESR}(20°C)$



LEAKAGE CURRENT

Rated leakage current, I_{RL} (μA)Rated voltage, U_R (V)Rated capacitance, C_R (μF) $I_{RL} = 0.003 \times C_R \times U_R + 4$ ($U_R \leq 500V$)

$$I_{RL} = 0.006 \times C_R \times U_R + 4$$

THERMAL RESISTANCE

 R_{th} – short form table versus chassis area and air speed

D x L	Case code	STUDMOUNTED				CLIPMOUNTED	
		$R_{thhs} = 3^{\circ}C/W$ (0.5 m/s)	$R_{thhs} = 2^{\circ}C/W$ (0.5 m/s)	$R_{thhs} = 3^{\circ}C/W$ (2.0 m/s)	$R_{thhs} = 2^{\circ}C/W$ (2.0 m/s)	(0.5 m/s)	(2.0 m/s)
35 x 47	E	5.6	5.3	4.5	4.4	11.9	8.3
35 x 51	A	5.6	5.3	4.5	4.4	10.6	7.4
35 x 60	B	5.4	5.1	4.4	4.3	9.8	7.0
35 x 75	C	5.3	5.1	4.4	4.3	9.2	6.7
35 x 95	D	5.3	5.1	4.4	4.3	8.9	6.7
50 x 49	G	3.3	2.9	2.8	2.5	6.7	4.5
50 x 75	H	3.6	3.3	2.8	2.7	6.3	4.4
50 x 95	J	3.4	3.2	2.7	2.6	5.8	4.2
50 x 105	K	3.4	3.2	2.7	2.6	5.8	4.2
50 x 115	I	3.4	3.2	2.7	2.6	5.8	4.2
65 x 105	O	2.6	2.4	2.1	2.0	4.2	3.1
65 x 115	Q	2.6	2.4	2.1	2.0	4.2	3.1
65 x 130	S	2.6	2.4	2.1	2.0	4.2	3.1
65 x 140	R	2.6	2.4	2.1	2.0	4.2	3.1
75 x 78	L	2.3	2.0	1.8	1.7	4.1	2.7
75 x 98	P	2.3	2.0	1.8	1.7	4.0	2.7
75 x 105	T	2.3	2.1	1.7	1.6	3.7	2.6
75 x 115	U	2.2	2.0	1.6	1.5	3.5	2.5
75 x 145	V	2.2	2.0	1.6	1.5	3.4	2.5
75 x 220	X	2.3	2.1	2.0	1.9	3.4	2.6
90 x 78	M	1.9	1.7	1.6	1.4	3.4	2.2
90 x 98	N	1.9	1.7	1.5	1.4	3.1	2.1
90 x 145	Y	1.8	1.6	1.5	1.4	2.7	1.9
90 x 220	Z	1.9	1.7	1.6	1.5	2.7	2.0

OPERATIONAL DATA

Please see operational lifetime section.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_p) is therefore only given at test temperature for life tests. An estimation is also given at 60°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity.

T_a	Failure rate per hour
-------	-----------------------

85°C	1×10^{-6}
60°C	1×10^{-7}

Failure rate per hour for catastrophic plus parametric failures.

MECHANICAL DATA

Mounting position

The capacitor can be mounted upright or inclined to a horizontal position.

Clamp fixing

Clips must be ordered separately. See "Accessories".

Stud fixing

Nylon cap nut must be ordered separately. For the stud fixing insulated version the outer insulation serves as lock washer.

See "Accessories". Max tightening torque: M8: 3 Nm M12: 8 Nm. Max chassis thickness 5 mm. Mounting hole: See "Accessories".

Screw terminals

M5 x 10 according to DIN 41.248. Max tightening torque: 2.5 Nm. Must be ordered separately: See "Accessories". Recommended max connector thickness with delivered screw: 4 mm. M6 thread on request.

Insulation can

PEH200 is supplied with a polypropylene insulation can, thickness 0.8 mm. Voltage proof of the insulation sleeve: ≥ 4000 VDC.

PVC shrink sleeve only on request.

ORDERING INFORMATION

For further ordering information please see page 8.

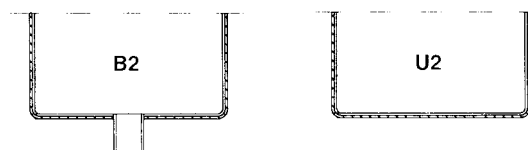
Pos 1-20

P	E	H	2	0	0	K	U	6	1	5	0	M	B	2							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		

Capacitance tolerances:

Pos. 13:M: -20 to +20%

Pos. 14-15: B2 = with bottom stud
U2 = without bottom stud

**Quantities and weights**

CASE CODE	A	B	C	D	E	G	H	I	J	K	L	M	N	O	P	R	Q	S	T	U	V	X	Y	Z
Weight approx (g)	70	85	105	130	60	150	180	300	240	265	430	750	950	415	530	650	460	520	585	640	800	1400	1400	1500

PEH 169 85°C

RoHS
Compliant

- High CV-value
- Long Life > 10 years at 50°C
- Low ESR and ESL
- High stability, 10 years shelf life
- Optimized designs available on request

APPLICATION

Smoothing, energy storage, or pulse operation in telecommunication demanding power supplies, process control, AC-motor control, traction, welding and measuring.

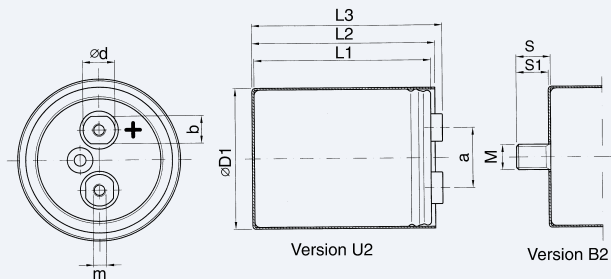
BASIC DESIGN

PEH 169 is a Long Life electrolytic capacitor with outstanding reliability and electrical performance. Polarized, all-welded design, heavy duty screw terminals, extended cathode construction, safety vent and plastic insulation. The PEH 169 winding is housed in a cylindrical aluminium can with a rein-forced moulded lid incorporating a safety vent. The sealing system is designed for electrolyte

leakage free operation and a very low gas-diffusion rate of electrolyte. Mechanical contact between the winding and the case allows excellent heat transfer from the winding to the ambient, which means cooler operation. Low ESR is a result of a low resistive paper/electrolyte system, at least two tabs per foil and all-welded design.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/85/56, DIN 41240, type 1A CECC 30300 DIN 40040 GPF, DIN 41248
CECC	CECC 30301-058, Corresponding to CECC 30301-803
British Telecom	BT No. 4513A
Capacitance range	68–470000 µF
Capacitance tolerance	–20 to +20%
Rated voltage	10–450 VDC
Temperature range	–40 to +85°C
Operational life time	78000 h at +85°C (case Ø = 90 mm)
Shelf life	5000 h at 0V +85°C, or 10 years at 0V +40°C
Diameter range	35–90 mm



Dimensions table PEH 169 (mm)

D x L	Case code	D1 ±1.0	L1 ±1.0	L2 ±1.0	L3 ±1.0	S	S1	M	a ±0.5	b	d	m*	Weight approx (g)
35 x 51	A	36.6	51.5	54.5	58.9	12	11.0	M8	13.0	—	8	M5	70
35 x 60	B	36.6	59.5	62.5	66.9	12	11.0	M8	13.0	—	8	M5	85
35 x 75	C	36.6	73.5	76.5	80.9	12	11.0	M8	13.0	—	8	M5	105
35 x 95	D	36.6	94.5	97.5	101.9	12	11.0	M8	13.0	—	8	M5	130
50 x 75	H	51.6	74.5	77.5	82.4	16	15.0	M12	22.0	13	15	M5	180
50 x 95	J	51.6	95.5	98.5	103.4	16	15.0	M12	22.0	13	15	M5	240
50 x 105	K	51.6	103.5	106.5	111.4	16	15.0	M12	22.0	13	15	M5	265
50 x 115	I**	51.6	115.5	118.5	123.4	16	15.0	M12	22.0	13	15	M5	300
65 x 105	O	66.6	106.0	109.2	113.0	16	14.8	M12	28.5	13	15	M5	415
65 x 115	Q**	66.6	118.0	121.2	125.0	16	14.8	M12	28.5	13	15	M5	460
65 x 130	S**	66.6	129.0	132.2	136.0	16	14.8	M12	28.5	13	15	M5	520
75 x 78	L	76.6	77.0	80.2	84.0	16	14.8	M12	32.0	13	15	M5	430
75 x 98	P**	76.6	98.0	101.2	105.0	16	14.8	M12	32.0	13	15	M5	530
75 x 105	T	76.6	106.0	109.2	113.0	16	14.8	M12	32.0	13	15	M5	585
75 x 115	U	76.6	118.0	121.2	125.0	16	14.8	M12	32.0	13	15	M5	640
75 x 145	V	76.6	146.0	149.2	153.0	16	14.8	M12	32.0	13	15	M5	800
75 x 220	X	76.6	221.0	224.2	228.0	16	14.8	M12	32.0	13	15	M5	1400
90 x 78	M	91.6	76.5	79.7	83.4	16	14.8	M12	32.0	13	15	M5	750
90 x 98	N	91.6	97.5	100.7	104.4	16	14.8	M12	32.0	13	15	M5	950
90 x 145	Y	91.6	145.5	148.7	152.4	16	14.8	M12	32.0	13	15	M5	1400

* M6 and other threads on request. **on request

ARTICLE TABLE PEH 169 (85°C)

C _R	D x L	Case code	I _{RAC} * 85°C	I _{RAC} * 50°C ***	I _{RAC} * 40°C	ESR* 20°C	ESR* 20°C	L _{ESL} Approx.	Article code
µF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz mΩ	100 kHz mΩ	nH	U2 = Plain can B2 = Stud can
10 VDC (U _R)									
10000	35 x 51	A	8.6	26.0	16.8	34	28	12	PEH169EA510VM--
15000	35 x 51	A	10.0	28.3	18.9	24	20	12	PEH169EA515VM--
22000	35 x 60	B	11.9	32.3	22.1	18	15	12	PEH169EB522VM--
33000	35 x 75	C	14.6	37.6	27.2	12	10	12	PEH169EC533VM--
47000	35 x 95	D	16.1	38.9	29.0	10	9	12	PEH169ED547VM--
68000	50 x 75	H	17.4	42.3	29.8	9	8	16	PEH169EH568VM--
100000	50 x 95	J	20.1	47.1	34.3	7	6	16	PEH169EJ610VM--
150000	50 x 105	K	20.7	47.4	34.7	7	7	16	PEH169EK615VM--
220000	65 x 105	O	21.9	48.2	36.0	8	8	16	PEH169EO622VM--
330000	75 x 115	U	31.4	68.1	51.9	5	4	17	PEH169EU633VM--
470000	75 x 145	V	33.6	71.0	55.5	4	4	17	PEH169EV647VM--
16 VDC (U _R)									
10000	35 x 51	A	9.1	27.4	18.3	28	22	12	PEH169GA510VM--
15000	35 x 51	A	10.5	30.8	20.5	19	15	12	PEH169GA515VM--
22000	35 x 75	C	13.2	36.2	25.7	14	11	12	PEH169GC522VM--
33000	35 x 95	D	15.4	39.7	29.4	10	8	12	PEH169GD533VM--
47000	50 x 75	H	17.8	42.6	30.6	10	8	16	PEH169GH547VM--
68000	50 x 95	J	20.2	47.0	34.6	7	7	16	PEH169GJ568VM--
100000	65 x 105	O	23.3	52.2	39.6	8	7	16	PEH169GO610VM--
150000	75 x 105	T	31.2	68.5	53.0	5	5	17	PEH169GT615VM--
220000	75 x 115	U	31.6	69.2	52.9	5	4	17	PEH169GU622VM--
330000	75 x 145	V	33.5	69.5	55.8	4	4	17	PEH169GV633VM--
25 VDC (U _R)									
6800	35 x 51	A	8.3	27.4	18.3	30	22	12	PEH169HA468VM--
10000	35 x 51	A	9.6	30.7	20.1	24	18	12	PEH169HA510VM--
15000	35 x 75	C	12.3	36.2	25.7	15	11	12	PEH169HC515VM--
22000	35 x 95	D	14.3	39.5	29.3	11	8	12	PEH169HD522VM--
33000	50 x 75	H	16.3	42.4	29.8	10	8	16	PEH169HH533VM--
47000	50 x 95	J	19.0	47.0	34.4	8	7	16	PEH169HJ547VM--
68000	65 x 105	O	21.6	49.6	37.3	8	7	16	PEH169HO568VM--
100000	75 x 105	T	30.1	61.2	52.2	5	5	17	PEH169HT610VM--
150000	75 x 115	U	31.1	69.8	53.1	5	4	17	PEH169HU615VM--
220000	75 x 145	V	33.1	71.0	55.9	4	4	17	PEH169HV622VM--
40 VDC (U _R)									
4700	35 x 51	A	7.7	28.3	18.9	32	20	12	PEH169KA447VM--
6800	35 x 60	B	9.0	30.4	21.1	23	15	12	PEH169KB468VM--
10000	35 x 75	C	10.9	33.7	24.5	18	13	12	PEH169KC510VM--
15000	35 x 95	D	13.0	37.5	28.6	11	8	12	PEH169KD515VM--
22000	50 x 75	H	16.3	45.3	32.0	11	8	16	PEH169KH522VM--
33000	50 x 95	J	17.8	46.3	32.9	9	8	16	PEH169KJ533VM--
47000	65 x 105	O	21.7	50.7	38.7	8	7	16	PEH169KO547VM--
68000	75 x 105	T	28.8	63.6	51.3	5	5	17	PEH169KT568VM--
100000	75 x 115	U	29.7	68.1	51.6	5	4	17	PEH169KU610VM--
150000	75 x 145	V	32.0	69.5	55.1	4	4	17	PEH169KV615VM--
63 VDC (U _R)									
2200	35 x 51	A	5.9	25.1	17.1	46	24	12	PEH169MA422VM--
3300	35 x 51	A	7.1	31.1	19.4	30	15	12	PEH169MA433VM--
4700	35 x 75	C	8.8	33.2	23.9	23	12	12	PEH169MC447VM--
6800	35 x 95	D	10.1	34.9	27.0	17	9	12	PEH169MD468VM--
10000	50 x 75	H	13.3	40.2	29.3	14	9	16	PEH169MH510VM--

* Maximum values.

** Capacitance tolerance: -10 to +30%.

*** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 169 (85°C)

C _R	D x L	Case code	I _{RAC} [*] 85°C	I _{RAC} [*] 50°C ***	I _{RAC} [*] 40°C	ESR [*] 20°C	ESR [*] 20°C	L _{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz mΩ	100 kHz mΩ	nH	U2 = Plain can B2 = Stud can
63 VDC (U _R)									
15000	50 x 95	J	15.7	44.0	33.5	11	7	16	PEH169MJ515VM--
22000	50 x 105	K	17.9	48.2	35.8	9	7	16	PEH169MK522VM--
33000	75 x 105	T	27.5	71.3	54.4	6	5	17	PEH169MT533VM--
47000	75 x 115	U	29.6	73.0	55.9	5	4	17	PEH169MU547VM--
68000	75 x 145	V	30.0	68.8	54.2	5	4	17	PEH169MV568VM--
68000**	75 x 145	V	29.4	65.0	52.6	6	5	17	PEH169MV568AQ--
82000**	75 x 145	V	28.2	66.7	49.7	5	4	17	PEH169MV582BQ--
100 VDC (U _R)									
1000	35 x 51	A	4.1	16.4	11.1	120	75	12	PEH169PA410VM--
1500	35 x 51	A	5.0	19.5	13.1	80	51	12	PEH169PA415VM--
2200	35 x 75	C	6.1	21.5	15.5	61	41	12	PEH169PC422VM--
3300	35 x 95	D	7.4	24.3	18.3	42	29	12	PEH169PD433VM--
4700	50 x 75	H	10.5	34.4	24.3	31	22	16	PEH169PH447VM--
6800	50 x 95	J	12.6	39.2	28.7	22	15	16	PEH169PJ468VM--
10000	50 x 105	K	13.9	38.6	29.1	17	13	16	PEH169PK510VM--
15000	65 x 105	O	18.4	48.5	36.3	13	10	16	PEH169PO515VM--
22000	75 x 115	U	25.4	67.3	51.3	8	6	17	PEH169PU522VM--
33000	75 x 145	V	28.5	71.0	55.2	6	5	17	PEH169PV533VM--
33000**	75 x 145	V	27.3	67.3	51.5	7	6	17	PEH169PV533AQ--
160 VDC (U _R)									
470	35 x 51	A	2.5	13.6	9.0	240	110	12	PEH169QA347VM--
680	35 x 51	A	3.0	14.3	9.7	190	98	12	PEH169QA368VM--
1000	35 x 75	C	3.9	17.2	12.2	130	66	12	PEH169QC410VM--
1500	35 x 95	D	4.7	19.4	14.7	87	45	12	PEH169QD415VM--
2200	50 x 75	H	6.7	26.5	18.1	59	31	16	PEH169QH422VM--
3300	50 x 95	J	8.2	30.6	22.9	44	24	16	PEH169QJ433VM--
4700	65 x 105	O	10.9	35.8	26.8	31	17	16	PEH169QO447VM--
6800	75 x 105	T	14.6	50.2	37.2	21	12	17	PEH169QT468VM--
10000	75 x 115	U	17.0	53.6	41.7	16	10	17	PEH169QU510VM--
15000	75 x 145	V	19.6	58.2	43.4	12	7	17	PEH169QV515VM--
200 VDC (U _R)									
470	35 x 51	A	2.6	13.4	9.2	240	110	12	PEH169RA347VM--
680	35 x 60	B	3.3	15.2	11.1	170	79	12	PEH169RB368VM--
1000	35 x 95	D	4.0	18.9	13.9	110	53	12	PEH169RD410VM--
1500	50 x 75	H	5.8	24.0	18.1	79	40	16	PEH169RH415VM--
2200	50 x 95	J	7.0	28.3	21.5	55	28	16	PEH169RJ422VM--
3300	50 x 105	K	8.5	32.1	24.3	39	21	16	PEH169RK433VM--
4700	65 x 105	O	11.0	35.5	27.1	35	22	16	PEH169RO447VM--
6800	75 x 105	T	14.6	48.1	36.2	23	15	17	PEH169RT468VM--
10000	75 x 145	V	17.3	52.0	41.3	17	11	17	PEH169RV510VM--
250 VDC (U _R)									
220	35 x 51	A	1.8	8.4	6.0	500	260	12	PEH169SA322VM--
330	35 x 51	A	2.2	10.6	7.3	340	170	12	PEH169SA333VM--
470	35 x 60	B	2.7	11.9	8.7	240	130	12	PEH169SB347VM--
680	35 x 75	C	3.3	14.8	10.7	170	88	12	PEH169SC368VM--
1000	50 x 75	H	4.9	20.5	14.9	110	61	16	PEH169SH410VM--
1500	50 x 75	H	6.0	24.2	16.7	81	45	16	PEH169SH415VM--
2200	50 x 105	K	7.3	27.3	21.0	55	31	16	PEH169SK422VM--
3300	65 x 105	O	10.0	34.5	26.8	40	23	16	PEH169SO433VM--
4700	75 x 105	T	13.3	45.6	34.8	27	16	17	PEH169ST447VM--

* Maximum values.

** Capacitance tolerance: -10 to +30%.

*** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 169 (85°C)

C _R	D x L	Case code	I _{RAC} * 85°C	I _{RAC} * 50°C ***	I _{RAC} * 40°C	ESR* 20°C	ESR* 20°C	L _{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz mΩ	100 kHz mΩ	nH	U2 = Plain can B2 = Stud can
250 VDC (U _R)									
6800	75 x 145	V	15.8	50.6	40.3	19	11	17	PEH169SV468VM--
6800**	75 x 145	V	16.1	53.2	41.9	17	9	17	PEH169SV468AQ--
8800	75 x 145	V	17.3	60.6	45.9	15	9	17	PEH169SV488AM--
10000	75 x 220	X	17.3	50.7	43.2	14	9	17	PEH169SX510VM--
10000	90 x 145	Y	20.5	58.2	47.6	15	10	16	PEH169SY510VM--
350 VDC (U _R)									
150	35 x 51	A	1.6	7.6	5.0	630	340	12	PEH169UA315VM--
220	35 x 51	A	2.0	9.3	6.3	440	240	12	PEH169UA322VM--
330	35 x 75	C	2.5	10.8	7.8	290	160	12	PEH169UC333VM--
470	35 x 95	D	3.0	12.6	9.2	200	110	12	PEH169UD347VM--
680	50 x 75	H	4.4	18.2	13.4	140	80	16	PEH169UH368VM--
1000	50 x 95	J	5.3	20.8	16.1	99	55	16	PEH169UJ410VM--
1500	50 x 105	K	6.7	25.5	19.2	68	39	16	PEH169UK415VM--
2200	65 x 105	O	9.2	32.2	24.7	49	29	16	PEH169UO422VM--
3300	75 x 105	T	12.4	42.8	32.8	33	20	17	PEH169UT433VM--
4700	75 x 145	V	14.5	48.0	38.0	23	14	17	PEH169UV447VM--
4700**	75 x 145	V	15.1	51.8	40.7	20	11	17	PEH169UV447CQ--
6800	75 x 220	X	15.9	47.1	39.2	18	11	17	PEH169UX468VM--
6800	90 x 145	Y	18.9	53.7	43.7	19	13	16	PEH169UY468VM--
400 VDC (U _R)									
68**	35 x 51	A	1.3	5.8	4.1	1100	500	12	PEH169VA2680Q--
100**	35 x 51	A	1.5	7.2	4.9	740	360	12	PEH169VA3100Q--
100	35 x 51	A	1.5	7.8	5.3	700	320	12	PEH169VA310VM--
150**	35 x 60	B	1.8	8.7	6.3	500	240	12	PEH169VB3150Q--
150	35 x 51	A	1.8	9.4	6.3	470	220	12	PEH169VA315VM--
220**	35 x 75	C	2.2	10.1	7.5	350	170	12	PEH169VC3220Q--
220	35 x 60	B	2.2	9.8	6.8	370	200	12	PEH169VB322VM--
330**	50 x 75	H	3.3	15.1	11.3	230	110	16	PEH169VH3330Q--
330	35 x 75	C	2.8	12.2	8.9	250	130	12	PEH169VC333VM--
470**	50 x 75	H	4.0	18.9	13.5	160	78	16	PEH169VH3470Q--
470	50 x 75	H	4.1	18.7	14.0	150	73	16	PEH169VH347VM--
680**	50 x 105	K	4.9	20.3	15.4	120	59	16	PEH169VK3680Q--
680	50 x 75	H	4.7	19.5	14.5	120	68	16	PEH169VH368VM--
1000	50 x 105	K	5.8	23.0	17.6	85	47	16	PEH169VK410VM--
1000**	65 x 105	O	6.8	26.9	21.2	79	41	16	PEH169VO4100Q--
1500**	75 x 105	T	9.2	36.7	28.6	53	27	17	PEH169VT4150Q--
1500	65 x 105	O	8.2	30.8	23.8	58	32	16	PEH169VO415VM--
2200	75 x 98	P	11.2	48.4	36.2	35	17	17	PEH169VP422AM--
2200**	75 x 145	V	11.0	41.8	34.0	36	18	17	PEH169VV4220Q--
2200	75 x 105	T	10.9	40.1	31.0	40	23	17	PEH169VT422VM--
3300**	75 x 145	V	13.9	50.4	40.7	22	11	17	PEH169VV433GQ--
3300	75 x 145	V	13.3	46.0	37.3	27	15	17	PEH169VV433VM--
4400	90 x 98	N	15.5	52.1	33.7	30	22	16	PEH169VN444AM--
4700	75 x 220	X	13.8	38.5	33.8	24	16	17	PEH169VX447VM--
4700	90 x 145	Y	16.8	48.1	39.3	25	17	16	PEH169VY447VM--
420 VDC (U _R)									
68	35 x 51	A	1.0	4.5	3.2	1000	500	12	PEH169OA2680M--
100	35 x 60	B	1.2	5.5	4.0	700	340	12	PEH169OB3100M--
150	35 x 75	C	1.5	6.6	5.0	470	230	12	PEH169OC3150M--
220	35 x 95	D	1.8	7.5	5.9	320	160	12	PEH169OD3220M--
330	50 x 75	H	2.8	12.7	9.3	210	110	16	PEH169OH3330M--
470	50 x 95	J	3.4	14.4	11.0	150	75	16	PEH169OJ3470M--

* Maximum values.

** Capacitance tolerance: -10 to +30%.

*** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 169 (85°C)

C _R	D x L	Case code	I _{RAC} [*] 85°C	I _{RAC} [*] 50°C ***	I _{RAC} [*] 40°C	ESR [*] 20°C	ESR [*] 20°C	L _{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz mΩ	100 kHz mΩ	nH	U2 = Plain can B2 = Stud can
420 VDC (U _R)									
680	50 x 105	K	4.1	17.5	13.3	110	53	16	PEH169OK3680M--
1000	65 x 105	O	5.8	23.3	17.9	73	38	16	PEH169OO4100M--
1500	75 x 105	T	7.9	31.6	24.1	49	25	17	PEH169OT4150M--
2200	75 x 145	V	9.3	35.2	28.1	34	18	17	PEH169OV4220M--
3300	75 x 220	X	10.0	32.9	28.3	23	12	17	PEH169OX4330M--
3300	90 x 145	Y	12.9	44.1	36.0	24	13	16	PEH169OY4330M--
450 VDC (U _R)									
68	35 x 51	A	1.0	3.7	2.9	1140	690	12	PEH169YA2680M--
100	35 x 60	B	1.3	4.4	3.6	800	490	12	PEH169YB3100M--
150	35 x 75	C	1.5	5.5	3.9	630	420	12	PEH169YC3150M--
220	35 x 95	D	1.8	5.1	4.6	440	300	12	PEH169YD3220M--
330	50 x 75	H	3.0	9.9	8.5	230	140	16	PEH169YH3330M--
470	50 x 95	J	3.8	11.8	10.1	170	100	16	PEH169YJ3470M--
680	50 x 105	K	4.2	12.2	10.5	140	96	16	PEH169YK3680M--
1000	65 x 105	O	6.4	18.5	16.0	82	52	16	PEH169YO4100M--
1500	75 x 105	T	7.8	21.7	18.7	67	47	17	PEH169YT4150M--
2200	75 x 145	V	9.4	25.4	22.7	45	31	17	PEH169YV4220M--
3300	75 x 220	X	10.2	25.0	23.8	34	24	17	PEH169YX4330M--
3300	90 x 145	Y	12.6	30.9	28.3	35	25	16	PEH169YY4330M--

* Maximum values.

** Capacitance tolerance: -10 to +30%.

*** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

TECHNICAL DATA

Please see page 84 for technical data.

ALS34 Series 85°C

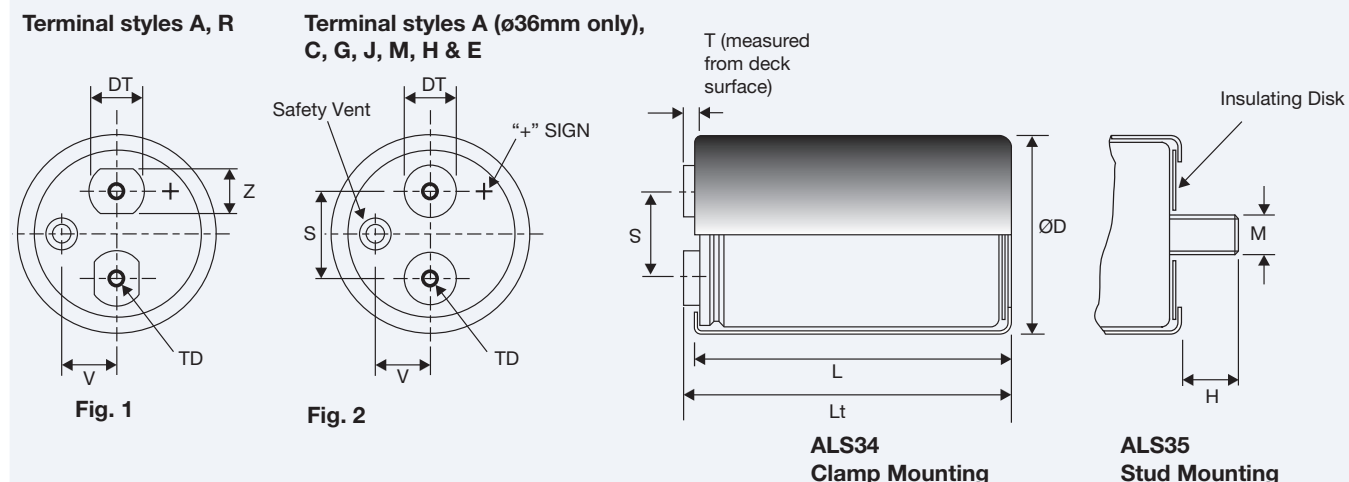
RoHS
Compliant

- Imperial case sizes and terminals for the North American Market
- Long Life, 20000 hours at 85°C (U_R, I_R applied)
- High ripple current
- Excellent surge voltage capability
- Optimized designs available on request

APPLICATION	BASIC DESIGN
• Industrial and commercial applications. • Power supplies including switch mode. • UPS systems. • Variable speed drives. • Frequency Inverters. • Welding equipment. • Energy storage in pulse discharge applications.	The ALS34/35 series of screw terminal capacitors meets the requirements of the North American market. This range offers high CV per unit volume coupled with high ripple currents and long life performance.

SPECIFICATION															
Standards	IEC 60384-4 Long Life Grade 40/85/56,														
Capacitance range	150 – 470000 µF														
Capacitance tolerance	–10 to +30%														
Rated voltage U _R	25–500 VDC														
Surge voltage U _s	U _R	25	40	50	63	75	100	160	200	250	350	400	450	500	Test Condition: ≤ 30s surge, 1000 cycles @ 25°C
	U _s	30	50	65	67	95	125	200	250	300	400	450	500	550	
Surge voltage U _{ss} (Short duration)	U _R	U _{ss}													Test Condition: ≤ 500ms surge, 1000 cycles @ 20°C
	200	350													
	250	400													
	350	500													
	400	520													
	415	530													
	450	550													
	500	600													
Leakage current I _L	= 0.006 x C _R x U _R (µA) or 6mA whichever is the smaller. Note, C _R is in µF.														Test Condition: U _R , 5mins., 20°C
Operational life time +85°C, U _R , I _R	Can Diameter (inches)														End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit
	1.375 11000 hrs														
+85°C, U _R	2 18000 hrs														
	2.5 19000 hrs														
	3 20000 hrs														
	Can Diameter (inches)														
	1.375 22000 hrs														
	2 36000 hrs														
	2.5 38000 hrs														
	3 40000 hrs														
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C														
Temperature range	–40 to +85°C (Operating) -55°C to +85°C (Storage)														

SPECIFICATION



Case Polarity

Due to the presence of electrolyte in the capacitor the aluminium can and stud mounting will essentially be at the same polarity as the negative terminal. We recommend that the stud and can are insulated (see accessories for insulating nuts)..

Terminal options (preferred options shown in bold)**

Terminal Style	Thread	Height - T mm ±0.8	Diameter - DT mm ±0.5	Height - T inches ±0.031	Diameter - DT inches ±0.019	Thread depth - TD mm / (inches) minimum	Drawing
A	M5	5.5	13	0.217	0.512	10 / (0.394")	Fig.1
A	M5	7.14	8	0.281	0.315	10 / (0.394")	Fig.2
C	M6	5.5	13	0.217	0.512	10 / (0.394")	Fig.2
E	1/4-28 UNF class 2B	6.35	17	0.250	0.670	11.8 / (0.465")	Fig.2
G	M6	6.35	17	0.250	0.670	11.8 / (0.465")	Fig.2
H**	10-32 UNF class 2B	7.14	8	0.281	0.315	10 / (0.394")	Fig.2
J	M6	3.17	17	0.125	0.670	8.8 / (0.346")	Fig.2
M	M5	7.14	8	0.281	0.315	10 / (0.394")	Fig.2
R (note 1)	M5	5.5	15	0.217	0.590	10 / (0.394")	Fig.1

Terminations

Aluminium inserts with 10-32 UNF Class 2B or M5 threads as standard, max. torque 2NM. 1/4-28 UNF Class 2B or M6 threaded inserts have a max. torque 4NM. Max. torque for stud mounting M8:4NM and M12:8NM.

Terminal availability

Terminal Style	Case Diameter mm (inches)			
	35 (1.375)	51 (2)	63.5 (2.5)	76 (3)
A ¹		•	•	•
A ²	•			
C			•	•
E			•	•
G			•	•
H	•	•	•	•
J			•	•
M	•	•	•	•
R		•		•

* Dimensions Lt will change dependant on terminal style.

Dimensions (mm)

CASE CODE	D unsleeved ±0.8	D sleeved ±0.8	L unsleeved ±1.6	L sleeved ±1.6	LT sleeved ±1	S ±0.5	T ±0.8	V	M THREAD	H ±1	MOUNTING CLIP	WEIGHT grams
D2C	34.9	35.3	54.0	55.1	61.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	80
D2L	34.9	35.3	66.7	67.8	74.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	95
D3C	34.9	35.3	79.4	80.5	87.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	115
D3L	34.9	35.3	92.1	93.2	100.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	130
D4C	34.9	35.3	104.8	105.9	112.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	150
D4L	34.9	35.3	117.5	118.6	125.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	165
D5C	34.9	35.3	130.2	131.3	138.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	185
D5L	34.9	35.3	142.9	144.0	151.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	205
K2C	50.8	51.2	54.0	55.1	61.5	22.2	7.14	13.7	M12	16	V4/UTE2737	165
K2L	50.8	51.2	66.7	67.8	74.5	22.2	7.14	13.7	M12	16	V4/UTE2737	200
K3C	50.8	51.2	79.4	80.5	87.5	22.2	7.14	13.7	M12	16	V4/UTE2737	240
K3L	50.8	51.2	92.1	93.2	100.5	22.2	7.14	13.7	M12	16	V4/UTE2737	275
K4C	50.8	51.2	104.8	105.9	112.5	22.2	7.14	13.7	M12	16	V4/UTE2737	315
K4L	50.8	51.2	117.5	118.6	125.5	22.2	7.14	13.7	M12	16	V4/UTE2737	350
K5C	50.8	51.2	130.2	131.3	137.5	22.2	7.14	13.7	M12	16	V4/UTE2737	385
K5L	50.8	51.2	142.9	144.0	151.5	22.2	7.14	13.7	M12	16	V4/UTE2737	425
L3C	63.5	63.9	79.4	80.5	85.5	28.5	7.14	15.8	M12	16	V8	370
L3L	63.5	63.9	92.1	93.2	98.5	28.5	7.14	15.8	M12	16	V8	430
L4C	63.5	63.9	104.8	105.9	111.5	28.5	7.14	15.8	M12	16	V8	485
L4L	63.5	63.9	117.5	118.6	124.5	28.5	7.14	15.8	M12	16	V8	545
L5C	63.5	63.9	130.2	131.3	136.5	28.5	7.14	15.8	M12	16	V8	600
L5L	63.5	63.9	142.9	144.0	149.5	28.5	7.14	15.8	M12	16	V8	660
N3L	76.2	76.6	92.1	93.2	98.5	31.8	7.14	19	M12	16	V11	615
N4C	76.2	76.6	104.8	105.9	111.5	31.8	7.14	19	M12	16	V11	700
N4L	76.2	76.6	117.5	118.6	124.5	31.8	7.14	19	M12	16	V11	780
N5C	76.2	76.6	130.2	131.3	136.5	31.8	7.14	19	M12	16	V11	865
N5L	76.2	76.6	142.9	144.0	149.5	31.8	7.14	19	M12	16	V11	950
N5R	76.2	76.6	149.2	150.4	155.5	31.8	7.14	19	M12	16	V11	990
N6L	76.2	76.6	168.3	169.4	174.5	31.8	7.14	19	M12	16	V11	1115

Note : Diameter ø90mm / ø4 inch case size available on request

Dimensions (inches)

CASE CODE	D unsleeved ±0.031	D sleeved ±0.031	L unsleeved ±0.062	L sleeved ±0.062	LT sleeved ±0.039	S ±0.019	T ±0.031	V	M THREAD	H ±0.039	MOUNTING CLIP	WEIGHT ounces
D2C	1.375	1.39	2.125	2.17	2.42	0.5	0.281	0.315	M8	0.472	V3/H2/UTE2736	2.8
D2L	1.375	1.39	2.625	2.67	2.93	0.5	0.281	0.315	M8	0.472	V3/H2/UTE2736	3.3
D3C	1.375	1.39	3.125	3.17	3.44	0.5	0.281	0.315	M8	0.472	V3/H2/UTE2736	4.0
D3L	1.375	1.39	3.625	3.67	3.96	0.5	0.281	0.315	M8	0.472	V3/H2/UTE2736	4.6
D4C	1.375	1.39	4.125	4.17	4.43	0.5	0.281	0.315	M8	0.472	V3/H2/UTE2736	5.3
D4L	1.375	1.39	4.625	4.67	4.94	0.5	0.281	0.315	M8	0.472	V3/H2/UTE2736	5.8
D5C	1.375	1.39	5.125	5.17	5.45	0.5	0.281	0.315	M8	0.472	V3/H2/UTE2736	6.5
D5L	1.375	1.39	5.625	5.67	5.96	0.5	0.281	0.315	M8	0.472	V3/H2/UTE2736	7.2
K2C	2	2.015	2.125	2.17	2.42	0.875	0.281	0.539	M12	0.63	V4/UTE2737	5.8
K2L	2	2.015	2.625	2.67	2.93	0.875	0.281	0.539	M12	0.63	V4/UTE2737	7.1
K3C	2	2.015	3.125	3.17	3.44	0.875	0.281	0.539	M12	0.63	V4/UTE2737	8.5
K3L	2	2.015	3.625	3.67	3.96	0.875	0.281	0.539	M12	0.63	V4/UTE2737	9.7
K4C	2	2.015	4.125	4.17	4.43	0.875	0.281	0.539	M12	0.63	V4/UTE2737	11.1
K4L	2	2.015	4.625	4.67	4.94	0.875	0.281	0.539	M12	0.63	V4/UTE2737	12.3
K5C	2	2.015	5.125	5.17	5.41	0.875	0.281	0.539	M12	0.63	V4/UTE2737	13.6
K5L	2	2.015	5.625	5.67	5.96	0.875	0.281	0.539	M12	0.63	V4/UTE2737	15.0
L3C	2.5	2.515	3.125	3.17	3.37	1.125	0.281	0.622	M12	0.63	V8	13.1
L3L	2.5	2.515	3.625	3.67	3.88	1.125	0.281	0.622	M12	0.63	V8	15.2
L4C	2.5	2.515	4.125	4.17	4.39	1.125	0.281	0.622	M12	0.63	V8	17.1
L4L	2.5	2.515	4.625	4.67	4.90	1.125	0.281	0.622	M12	0.63	V8	19.2
L5C	2.5	2.515	5.125	5.17	5.37	1.125	0.281	0.622	M12	0.63	V8	21.2
L5L	2.5	2.515	5.625	5.67	5.89	1.125	0.281	0.622	M12	0.63	V8	23.3
N3L	3	3.015	3.625	3.67	3.88	1.25	0.281	0.748	M12	0.63	V11	21.7
N4C	3	3.015	4.125	4.17	4.39	1.25	0.281	0.748	M12	0.63	V11	24.7
N4L	3	3.015	4.625	4.67	4.90	1.25	0.281	0.748	M12	0.63	V11	27.5
N5C	3	3.015	5.125	5.17	5.37	1.25	0.281	0.748	M12	0.63	V11	30.5
N5L	3	3.015	5.625	5.67	5.89	1.25	0.281	0.748	M12	0.63	V11	33.5
N5R	3	3.015	5.875	5.92	6.12	1.25	0.281	0.748	M12	0.63	V11	34.9

ARTICLE TABLE ALS34 (85°C)

Cap (μ F)	Nominal Case Size mm (inches)		ESR max. (m Ω) at 25°C		Ripple current(A) at 85°C		Part number
	Dia	Len	120Hz	20kHz	120Hz	20kHz	
25 VDC (U _R)							
15000	34.9 (1.375)	54.0 (2.125)	38	32	9.2	11.4	ALS34H153D2C025
22000	34.9 (1.375)	66.7 (2.625)	27	23	11.4	13.7	ALS34H223D2L025
33000	34.9 (1.375)	79.4 (3.125)	20	17	13.5	15.8	ALS34H333D3C025
33000	50.8 (2)	54.0 (2.125)	27	24	10.6	11.5	ALS34H333K2C025
47000	34.9 (1.375)	104.8 (4.125)	15	13	15.7	17.7	ALS34H473D4C025
47000	50.8 (2)	66.7 (2.625)	19	17	13.2	14.4	ALS34H473K2L025
68000	34.9 (1.375)	142.9 (5.625)	12	11	16.7	18.3	ALS34H683D5L025
68000	50.8 (2)	79.4 (3.125)	14	12	16.3	17.6	ALS34H683K3C025
100000	50.8 (2)	104.8 (4.125)	11	10	19.6	20.9	ALS34H104K4C025
100000	63.5 (2.5)	79.4 (3.125)	10	9	22.5	24.1	ALS34H104L3C025
150000	50.8 (2)	142.9 (5.625)	9	8	22.4	23.4	ALS34H154K5L025
150000	63.5 (2.5)	92.1 (3.625)	8	7	25.4	26.7	ALS34H154L3L025
220000	63.5 (2.5)	142.9 (5.625)	6	6	31.4	32.8	ALS34H224L5L025
220000	76.2 (3)	92.1 (3.625)	8	8	25.6	26.3	ALS34H224N3L025
330000	76.2 (3)	142.9 (5.625)	7	6	33.2	34.0	ALS34H334N5L025
470000	76.2 (3)	219.1 (8.625)	6	5	45.6	46.5	ALS34H474N8L025
40 VDC (U _R)							
10000	34.9 (1.375)	54.0 (2.125)	31	25	9.2	11.7	ALS34H103D2C040
15000	34.9 (1.375)	79.4 (3.125)	21	17	12.5	15.7	ALS34H153D3C040
22000	34.9 (1.375)	104.8 (4.125)	16	13	14.8	17.7	ALS34H223D4C040
22000	50.8 (2)	54.0 (2.125)	29	25	10.0	11.2	ALS34H223K2C040
33000	34.9 (1.375)	142.9 (5.625)	13	11	16.1	18.3	ALS34H333D5L040
33000	50.8 (2)	66.7 (2.625)	20	17	12.4	13.9	ALS34H333K2L040
47000	50.8 (2)	79.4 (3.125)	15	13	15.5	17.1	ALS34H473K3C040
68000	50.8 (2)	104.8 (4.125)	11	10	18.8	20.4	ALS34H683K4C040
68000	63.5 (2.5)	79.4 (3.125)	10	9	21.4	23.6	ALS34H683L3C040
100000	50.8 (2)	142.9 (5.625)	9	8	21.7	23.1	ALS34H104K5L040
100000	63.5 (2.5)	104.8 (4.125)	7	7	27.0	29.3	ALS34H104L4C040
150000	76.2 (3)	92.1 (3.625)	9	8	24.5	25.5	ALS34H154N3L040
220000	76.2 (3)	142.9 (5.625)	7	7	32.2	33.3	ALS34H224N5L040
330000	76.2 (3)	219.1 (8.625)	6	6	44.4	45.6	ALS34H334N8L040
50 VDC (U _R)							
6800	34.9 (1.375)	54.0 (2.125)	34	26	8.6	11.7	ALS34H682D2C050
10000	34.9 (1.375)	79.4 (3.125)	24	18	11.7	15.6	ALS34H103D3C050
15000	34.9 (1.375)	104.8 (4.125)	17	14	14.1	17.7	ALS34H153D4C050
15000	50.8 (2)	54.0 (2.125)	31	26	9.8	11.4	ALS34H153K2C050
22000	34.9 (1.375)	142.9 (5.625)	14	11	15.4	18.3	ALS34H223D5L050
22000	50.8 (2)	66.7 (2.625)	21	18	12.2	14.2	ALS34H223K2L050
33000	50.8 (2)	79.4 (3.125)	15	13	15.2	17.3	ALS34H333K3C050
33000	63.5 (2.5)	79.4 (3.125)	11	9	21.2	24.2	ALS34H333L3C050
47000	50.8 (2)	104.8 (4.125)	12	10	18.5	20.6	ALS34H473K4C050
47000	63.5 (2.5)	92.1 (3.625)	9	7	24.4	27.1	ALS34H473L3L050
68000	50.8 (2)	130.2 (5.125)	10	9	21.1	22.9	ALS34H683K5C050
68000	63.5 (2.5)	104.8 (4.125)	7	7	26.0	28.1	ALS34H683L4C050
68000	76.2 (3)	92.1 (3.625)	9	8	25.3	27.0	ALS34H683N3L050
100000	76.2 (3)	117.5 (4.625)	8	7	27.8	29.1	ALS34H104N4L050
150000	76.2 (3)	168.3 (6.625)	6	6	36.6	37.9	ALS34H154N6L050
63 VDC (U _R)							
4700	34.9 (1.375)	54.0 (2.125)	37	27	8.1	11.7	ALS34H472D2C063
6800	34.9 (1.375)	66.7 (2.625)	27	20	10.1	13.8	ALS34H682D2L063
10000	34.9 (1.375)	92.1 (3.625)	20	15	12.9	17.0	ALS34H103D3L063
10000	50.8 (2)	54.0 (2.125)	32	26	9.5	11.4	ALS34H103K2C063
15000	34.9 (1.375)	130.2 (5.125)	15	11	14.9	18.4	ALS34H153D5C063
15000	50.8 (2)	66.7 (2.625)	22	18	11.8	14.1	ALS34H153K2L063
22000	50.8 (2)	79.4 (3.125)	16	13	14.7	17.2	ALS34H223K3C063

Mounting Style 4=plain or 5=stud
Termination Style A,C,E,G,H,J,M or R

ARTICLE TABLE ALS34 (85°C)

Cap (μF)	Nominal Case Size mm (inches)		ESR max. (mΩ) at 25°C		Ripple current(A) at 85°C		Part number
	Dia	Len	120Hz	20kHz	120Hz	20kHz	
63 VDC (U _R)							
22000	63.5 (2.5)	79.4 (3.125)	11	9	20.5	24.5	ALS34H223L3C063
33000	50.8 (2)	104.8 (4.125)	12	10	18.0	20.4	ALS34H333K4C063
33000	63.5 (2.5)	92.1 (3.625)	9	7	23.8	27.2	ALS34H333L3L063
47000	50.8 (2)	130.2 (5.125)	10	9	20.6	22.7	ALS34H473K5C063
47000	63.5 (2.5)	104.8 (4.125)	8	7	25.6	28.2	ALS34H473L4C063
47000	76.2 (3)	92.1 (3.625)	9	8	25.0	27.1	ALS34H473N3L063
68000	76.2 (3)	104.8 (4.125)	8	7	26.4	28.0	ALS34H683N4C063
100000	76.2 (3)	168.3 (6.625)	6	6	36.6	38.4	ALS34H104N6L063
75 VDC (U _R)							
3300	34.9 (1.375)	54.0 (2.125)	55	43	7.1	9.4	ALS34H332D2C075
4700	34.9 (1.375)	66.7 (2.625)	40	32	8.8	11.3	ALS34H472D2L075
4700	50.8 (2)	54.0 (2.125)	50	42	7.9	9.3	ALS34H472K2C075
6800	34.9 (1.375)	79.4 (3.125)	29	24	10.6	13.2	ALS34H682D3C075
6800	50.8 (2)	66.7 (2.625)	34	28	10.0	11.7	ALS34H682K2L075
10000	34.9 (1.375)	117.5 (4.625)	21	17	13.2	16.0	ALS34H103D4L075
10000	50.8 (2)	79.4 (3.125)	24	20	12.6	14.6	ALS34H103K3C075
15000	50.8 (2)	92.1 (3.625)	21	18	13.5	14.9	ALS34H153K3L075
22000	50.8 (2)	117.5 (4.625)	15	14	16.3	17.7	ALS34H223K4L075
22000	63.5 (2.5)	79.4 (3.125)	16	14	16.6	18.0	ALS34H223L3C075
33000	63.5 (2.5)	104.8 (4.125)	11	10	21.6	23.3	ALS34H333L4C075
33000	76.2 (3)	92.1 (3.625)	13	12	20.7	21.9	ALS34H333N3L075
47000	76.2 (3)	104.8 (4.125)	12	11	21.9	22.9	ALS34H473N4C075
68000	76.2 (3)	168.3 (6.625)	9	8	31.7	32.9	ALS34H683N6L075
100000	76.2 (3)	219.1 (8.625)	8	7	38.2	39.3	ALS34H104N8L075
100 VDC (U _R)							
2200	34.9 (1.375)	54.0 (2.125)	61	46	6.6	9.3	ALS34H222D2C100
3300	34.9 (1.375)	66.7 (2.625)	43	33	8.3	11.3	ALS34H332D2L100
3300	50.8 (2)	54.0 (2.125)	52	42	7.7	9.3	ALS34H332K2C100
4700	34.9 (1.375)	79.4 (3.125)	31	24	10.1	13.2	ALS34H472D3C100
6800	34.9 (1.375)	104.8 (4.125)	23	18	12.2	15.2	ALS34H682D4C100
6800	50.8 (2)	66.7 (2.625)	32	27	9.5	10.8	ALS34H682K2L100
10000	34.9 (1.375)	142.9 (5.625)	18	14	13.7	16.4	ALS34H103D5L100
10000	50.8 (2)	79.4 (3.125)	23	20	12.0	13.5	ALS34H103K3C100
15000	50.8 (2)	104.8 (4.125)	17	15	15.0	16.5	ALS34H153K4C100
15000	63.5 (2.5)	79.4 (3.125)	16	14	16.5	18.3	ALS34H153L3C100
22000	63.5 (2.5)	104.8 (4.125)	11	10	21.5	23.8	ALS34H223L4C100
22000	76.2 (3)	92.1 (3.625)	13	12	20.8	22.5	ALS34H223N3L100
33000	76.2 (3)	104.8 (4.125)	12	11	21.9	23.1	ALS34H333N4C100
47000	76.2 (3)	168.3 (6.625)	9	8	31.7	33.3	ALS34H473N6L100
68000	76.2 (3)	219.1 (8.625)	8	7	38.4	39.8	ALS34H683N8L100
160 VDC (U _R)							
1000	34.9 (1.375)	54.0 (2.125)	149	94	4.1	7.4	ALS34H102D2C160
1500	34.9 (1.375)	66.7 (2.625)	101	65	5.3	9.2	ALS34H152D2L160
1500	50.8 (2)	54.0 (2.125)	111	74	5.4	8.3	ALS34H152K2C160
2200	34.9 (1.375)	92.1 (3.625)	70	45	7.0	11.9	ALS34H222D3L160
2200	50.8 (2)	66.7 (2.625)	76	50	6.8	10.5	ALS34H222K2L160
3300	34.9 (1.375)	117.5 (4.625)	49	32	8.7	13.8	ALS34H332D4L160
3300	50.8 (2)	79.4 (3.125)	52	35	8.7	13.1	ALS34H332K3C160
4700	50.8 (2)	92.1 (3.625)	40	28	10.3	14.2	ALS34H472K3L160
6800	50.8 (2)	117.5 (4.625)	29	21	12.7	17.0	ALS34H682K4L160
6800	63.5 (2.5)	79.4 (3.125)	29	21	13.1	17.4	ALS34H682L3C160
10000	63.5 (2.5)	104.8 (4.125)	20	15	17.2	22.7	ALS34H103L4C160
10000	76.2 (3)	92.1 (3.625)	22	16	17.2	21.8	ALS34H103N3L160
15000	76.2 (3)	104.8 (4.125)	17	14	19.2	22.8	ALS34H153N4C160
22000	76.2 (3)	142.9 (5.625)	15	12	23.3	26.4	ALS34H223N5L160

Mounting Style 4=plain or 5=stud
Termination Style A,C,E,G,H,J,M or R

ARTICLE TABLE ALS34 (85°C)

Cap (μ F)	Nominal Case Size mm (inches)		ESR max. (m Ω) at 25°C		Ripple current(A) at 85°C		Part number
	Dia	Len	120Hz	20kHz	120Hz	20kHz	
200 VDC (U _R)							
680	34.9 (1.375)	54.0 (2.125)	241	165	3.4	5.9	ALS34H681D2C200
1000	34.9 (1.375)	66.7 (2.625)	166	114	4.4	7.5	ALS34H102D2L200
1000	50.8 (2)	54.0 (2.125)	175	123	4.6	7.2	ALS34H102K2C200
1500	34.9 (1.375)	79.4 (3.125)	112	78	5.6	9.3	ALS34H152D3C200
1500	50.8 (2)	66.7 (2.625)	117	83	5.8	9.1	ALS34H152K2L200
2200	34.9 (1.375)	117.5 (4.625)	78	55	7.4	11.7	ALS34H222D4L200
2200	50.8 (2)	79.4 (3.125)	81	57	7.5	11.5	ALS34H222K3C200
3300	50.8 (2)	104.8 (4.125)	55	40	9.8	14.5	ALS34H332K4C200
4700	50.8 (2)	117.5 (4.625)	42	31	11.3	15.7	ALS34H472K4L200
4700	63.5 (2.5)	79.4 (3.125)	42	31	11.7	16.1	ALS34H472L3C200
6800	63.5 (2.5)	104.8 (4.125)	29	22	15.4	21.1	ALS34H682L4C200
6800	76.2 (3)	92.1 (3.625)	31	23	15.7	20.6	ALS34H682N3L200
10000	76.2 (3)	104.8 (4.125)	24	18	17.8	22.1	ALS34H103N4C200
15000	76.2 (3)	142.9 (5.625)	19	16	22.0	25.8	ALS34H153N5L200
22000	76.2 (3)	168.3 (6.625)	15	13	25.9	29.2	ALS34H223N6L200
250 VDC (U _R)							
680	34.9 (1.375)	54.0 (2.125)	206	134	3.5	6.3	ALS34H681D2C250
1000	34.9 (1.375)	79.4 (3.125)	140	91	4.9	8.8	ALS34H102D3C250
1000	50.8 (2)	54.0 (2.125)	154	105	4.7	7.3	ALS34H102K2C250
1500	34.9 (1.375)	104.8 (4.125)	95	63	6.3	10.9	ALS34H152D4C250
1500	50.8 (2)	66.7 (2.625)	103	70	5.9	9.2	ALS34H152K2L250
2200	34.9 (1.375)	142.9 (5.625)	67	45	7.6	12.5	ALS34H222D5L250
2200	50.8 (2)	79.4 (3.125)	71	49	7.7	11.7	ALS34H222K3C250
3300	63.5 (2.5)	79.4 (3.125)	48	33	10.8	16.2	ALS34H332L3C250
4700	50.8 (2)	142.9 (5.625)	36	25	12.5	17.7	ALS34H472K5L250
4700	63.5 (2.5)	92.1 (3.625)	35	25	13.3	19.0	ALS34H472L3L250
6800	63.5 (2.5)	142.9 (5.625)	25	18	17.7	24.7	ALS34H682L5L250
6800	76.2 (3)	92.1 (3.625)	29	22	15.5	19.9	ALS34H682N3L250
10000	76.2 (3)	142.9 (5.625)	20	15	21.4	26.9	ALS34H103N5L250
15000	76.2 (3)	168.3 (6.625)	17	13	25.4	30.1	ALS34H153N6L250
350 VDC (U _R)							
330	34.9 (1.375)	54.0 (2.125)	366	230	2.7	5.1	ALS34H331D2C350
470	34.9 (1.375)	66.7 (2.625)	258	163	3.4	6.5	ALS34H471D2L350
470	50.8 (2)	54.0 (2.125)	254	158	3.7	6.7	ALS34H471K2C350
680	34.9 (1.375)	79.4 (3.125)	180	114	4.3	8.0	ALS34H681D3C350
680	50.8 (2)	66.7 (2.625)	175	109	4.6	8.4	ALS34H681K2L350
1000	34.9 (1.375)	104.8 (4.125)	124	79	5.5	10.0	ALS34H102D4C350
1000	50.8 (2)	79.4 (3.125)	120	75	5.9	10.7	ALS34H102K3C350
1500	34.9 (1.375)	142.9 (5.625)	85	55	6.8	11.7	ALS34H152D5L350
1500	50.8 (2)	92.1 (3.625)	84	54	7.5	12.4	ALS34H152K3L350
2200	50.8 (2)	117.5 (4.625)	58	38	9.3	15.1	ALS34H222K4L350
2200	63.5 (2.5)	79.4 (3.125)	59	38	9.7	15.6	ALS34H222L3C350
3300	63.5 (2.5)	104.8 (4.125)	40	26	12.9	20.3	ALS34H332L4C350
4700	76.2 (3)	92.1 (3.625)	35	25	14.3	19.1	ALS34H472N3L350
6800	76.2 (3)	142.9 (5.625)	25	18	19.8	26.0	ALS34H682N5L350
10000	76.2 (3)	168.3 (6.625)	19	14	23.9	29.7	ALS34H103N6L350
400 VDC (U _R)							
330	34.9 (1.375)	54.0 (2.125)	355	227	2.7	5.2	ALS34H331D2C400
470	34.9 (1.375)	79.4 (3.125)	249	159	3.7	7.2	ALS34H471D3C400
470	50.8 (2)	54.0 (2.125)	262	171	3.7	6.5	ALS34H471K2C400
680	34.9 (1.375)	104.8 (4.125)	174	111	4.8	8.9	ALS34H681D4C400
680	50.8 (2)	66.7 (2.625)	181	118	4.6	8.1	ALS34H681K2L400

Mounting Style 4=plain or 5=stud
Termination Style A,C,E,G,H,J,M or R

ARTICLE TABLE ALS34 (85°C)

Cap (μF)	Nominal Case Size mm (inches)		ESR max. (mΩ) at 25°C		Ripple current(A) at 85°C		Part number
	Dia	Len	120Hz	20kHz	120Hz	20kHz	
400 VDC (U _R)							
1000	34.9 (1.375)	130.2 (5.125)	120	78	5.8	10.5	ALS34H102D5C400
1000	50.8 (2)	79.4 (3.125)	124	81	6.0	10.4	ALS34H102K3C400
1500	50.8 (2)	104.8 (4.125)	84	56	7.9	13.2	ALS34H152K4C400
1500	63.5 (2.5)	79.4 (3.125)	83	55	8.5	14.5	ALS34H152L3C400
2200	50.8 (2)	130.2 (5.125)	60	40	10.0	15.9	ALS34H222K5C400
2200	63.5 (2.5)	92.1 (3.625)	59	39	10.8	17.5	ALS34H222L3L400
3300	63.5 (2.5)	117.5 (4.625)	41	28	13.4	20.4	ALS34H332L4L400
3300	76.2 (3)	92.1 (3.625)	43	30	13.3	19.1	ALS34H332N3L400
4700	76.2 (3)	130.2 (5.125)	32	23	17.3	23.6	ALS34H472N5C400
6800	76.2 (3)	142.9 (5.625)	22	16	20.1	26.2	ALS34H682N5L400
450 VDC (U _R)							
220	34.9 (1.375)	54.0 (2.125)	398	243	2.5	5.1	ALS34H221D2C450
330	34.9 (1.375)	79.4 (3.125)	266	163	3.5	7.1	ALS34H331D3C450
330	50.8 (2)	54.0 (2.125)	279	175	3.5	6.4	ALS34H331K2C450
470	34.9 (1.375)	92.1 (3.625)	189	116	4.4	8.6	ALS34H471D3L450
470	50.8 (2)	66.7 (2.625)	195	122	4.4	8.0	ALS34H471K2L450
680	34.9 (1.375)	130.2 (5.125)	132	82	5.4	10.3	ALS34H681D5C450
680	50.8 (2)	79.4 (3.125)	136	85	5.6	10.2	ALS34H681K3C450
1000	50.8 (2)	104.8 (4.125)	94	59	7.4	13.0	ALS34H102K4C450
1000	63.5 (2.5)	79.4 (3.125)	93	58	8.0	14.3	ALS34H102L3C450
1500	50.8 (2)	130.2 (5.125)	65	42	9.5	15.8	ALS34H152K5C450
1500	63.5 (2.5)	92.1 (3.625)	64	41	10.2	17.4	ALS34H152L3L450
2200	76.2 (3)	92.1 (3.625)	47	31	12.7	19.2	ALS34H222N3L450
3300	76.2 (3)	104.8 (4.125)	34	24	14.8	20.8	ALS34H332N4C450
4700	76.2 (3)	142.9 (5.625)	27	20	18.8	24.8	ALS34H472N5L450
6800	76.2 (3)	168.3 (6.625)	23	17	22.5	29.1	ALS34H682N6L450
500 VDC (U _R)							
150	34.9 (1.375)	54.0 (2.125)	732	547	2.2	3.7	ALS34H151D2C500
220	34.9 (1.375)	66.7 (2.625)	501	375	2.8	4.8	ALS34H221D2L500
330	34.9 (1.375)	92.1 (3.625)	335	251	3.8	6.4	ALS34H331D3L500
330	50.8 (2)	54.0 (2.125)	273	188	3.7	6.1	ALS34H331K2C500
470	34.9 (1.375)	117.5 (4.625)	237	178	4.7	7.8	ALS34H471D4L500
470	50.8 (2)	66.7 (2.625)	191	131	4.6	7.7	ALS34H471K2L500
680	50.8 (2)	104.8 (4.125)	174	133	6.3	10.0	ALS34H681K4C500
680	63.5 (2.5)	79.4 (3.125)	173	132	6.8	10.9	ALS34H681L3C500
1000	50.8 (2)	130.2 (5.125)	90	62	8.6	14.4	ALS34H102K5C500
1000	63.5 (2.5)	92.1 (3.625)	119	91	8.7	13.6	ALS34H102L3L500
1500	63.5 (2.5)	104.8 (4.125)	82	63	10.7	15.9	ALS34H152L4C500
1500	76.2 (3)	92.1 (3.625)	83	65	11.1	16.2	ALS34H152N3L500
2200	76.2 (3)	117.5 (4.625)	59	46	13.7	19.1	ALS34H222N4L500
3300	76.2 (3)	168.3 (6.625)	41	32	19.8	26.7	ALS34H332N6L500
4700	76.2 (3)	219.1 (8.625)	24	18	26.4	34.7	ALS34H472N8L500

Mounting Style 4=plain or 5=stud
Termination Style A,C,E,G,H,J,M or R

OPERATIONAL DATA

Operational Lifetime

Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_p) is therefore only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT = 1×10^{-9} failures per hour. Failure rates include both catastrophic and parametric failures

T _a	Failure rate per hour
85°C	250 FIT
40°C	12 FIT

MECHANICAL DATA

Mounting position

The capacitor can be mounted in any position so long as the safety vent can operate. It is possible for some electrolyte to be expelled. As this is a conducting liquid, suitable precautions should be instigated by the system designer to avoid secondary short circuits.
The capacitors are designed to be mounted in free air and are not suitable for submersion in liquid.

Vibration

10Hz to 55Hz at 0.75mm or 10g for 3x2hrs duration. Except 220mm long cans 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration.

Insulating resistance

≥ 100 Mohms at 100V d.c., across insulating sleeve.

Voltage Proof

≥ 2500V d.c., across insulating sleeve.

Safety vent

A safety vent for over pressure is featured on terminal deck. This is in the form of a rubber plug designed to relieve build up of internal pressure due to over stress or catastrophic failure.

ALS32 Series 85°C

RoHS
Compliant

- Case sizes and terminals for the Asian Market
- Long Life, 20000 hours at 85°C (Ur, Ir applied)
- High ripple current
- Excellent surge voltage capability
- Optimized designs available on request

APPLICATION	BASIC DESIGN
• Industrial and commercial applications. • Power supplies including switch mode. • UPS systems. • Variable speed drives. • Frequency Inverters. • Welding equipment. • Energy storage in pulse discharge applications.	The ALS32/33 series of screw terminal capacitors meets the requirements of the Asian market. This range offers high CV per unit volume coupled with high ripple currents and long life performance.

SPECIFICATION		
Standards	IEC 60384-4 Long Life Grade 40/85/56,	
Capacitance range	220 – 18000 µF	
Capacitance tolerance	±20%	
Rated voltage U _R	350–500 VDC	
Surge voltage U _s	1.10 x U _R	Test Condition: ≤ 30s surge, 1000 cycles @ 85°C
Surge voltage U _{ss} (Short duration)	U _R U _{ss} 200 350 250 400 350 500 400 520 415 530 450 550 500 600	Test Condition: ≤ 500ms surge, 100 cycles @ 20°C
Leakage current I _L	= 0.006 x C _R x U _R (µA) or 6mA whichever is the smaller. Note, C _R is in µF.	Test Condition: U _R , 5mins., 20°C
Operational life time +85°C, U _R , I _R	Can Diameter 36 11000 hrs 51 18000 hrs 63.5 19000 hrs 77, 90 20000 hrs	End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit
+85°C, U _R	Can Diameter 36 22000 hrs 51 36000 hrs 63.5 38000 hrs 77, 90 40000 hrs	
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C	
Temperature range	–40 to +85°C (Operating) -55°C to +85°C (Storage)	

SPECIFICATION

Terminal style A

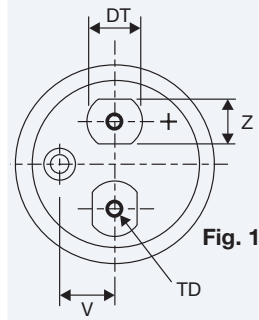


Fig. 1

Terminal styles A (ø35mm), C

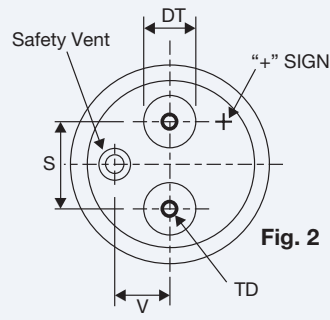
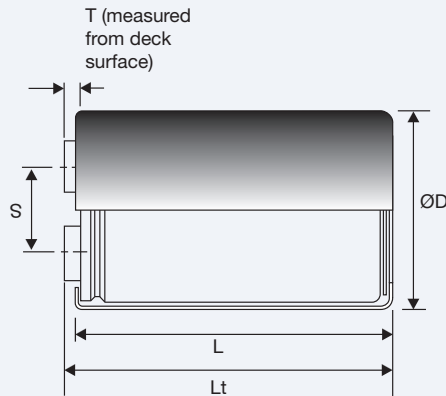
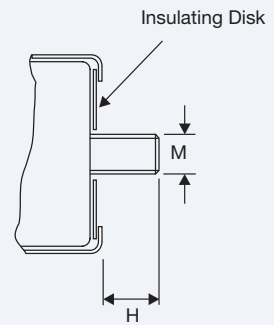


Fig. 2

ALS32
Clamp MountingALS33
Stud Mounting

Case Polarity

Due to the presence of electrolyte in the capacitor the aluminium can and stud mounting will essentially be at the same polarity as the negative terminal. We recommend that the stud and can are insulated (see accessories for insulating nuts).

Terminations

Aluminium inserts M5 threads as standard, max. torque 2NM. M6 threaded inserts have a max. torque 4NM. Max. torque for stud mounting M8:4NM and M12:8NM.

Terminal options

Terminal Style	Case Diameter Availability	Thread	Height T mm ±0.8	Diameter DT mm ±0.5	Flats Z mm	Thread depth TD mm (min.)	Drawing
A	35mm only	M5	7.14	8	-	10	Fig.2
A	51, 63.5, 76 & 90mm	M5	5.5	13	10	10	Fig.1
C	63.5, 76 & 90mm	M6	5.5	13	-	10	Fig.2

Dimensions (mm)

CASE CODE	D unsleeved ±0.8	D sleeved ±0.8	L unsleeved ±1.6	L sleeved ±1.6	LT sleeved ±1	S ±0.5	T ±0.8	V	M THREAD	H ±1	MOUNTING CLIP	WEIGHT grams
D2C	34.9	35.3	54.0	55.1	61.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	80
D2L	34.9	35.3	66.7	67.8	74.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	95
D3C	34.9	35.3	79.4	80.5	87.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	115
D3L	34.9	35.3	92.1	93.2	100.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	130
D4C	34.9	35.3	104.8	105.9	112.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	150
D4L	34.9	35.3	117.5	118.6	125.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	165
D5C	34.9	35.3	130.2	131.3	138.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	185
D5L	34.9	35.3	142.9	144.0	151.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	205
K2C	50.8	51.2	54.0	55.1	60.0	22.2	5.5	13.7	M12	16	V4/UTE2737	165
K2L	50.8	51.2	66.7	67.8	73.0	22.2	5.5	13.7	M12	16	V4/UTE2737	200
K3C	50.8	51.2	79.4	80.5	86.0	22.2	5.5	13.7	M12	16	V4/UTE2737	240
K3L	50.8	51.2	92.1	93.2	98.0	22.2	5.5	13.7	M12	16	V4/UTE2737	275
K4C	50.8	51.2	104.8	105.9	111.0	22.2	5.5	13.7	M12	16	V4/UTE2737	315
KJA	50.8	51.2	114.3	115.4	119.0	22.2	5.5	13.7	M12	16	V4/UTE2737	340
K4L	50.8	51.2	117.5	118.6	124.0	22.2	5.5	13.7	M12	16	V4/UTE2737	350
K5C	50.8	51.2	130.2	131.3	136.0	22.2	5.5	13.7	M12	16	V4/UTE2737	385
K5L	50.8	51.2	142.9	144.0	149.0	22.2	5.5	13.7	M12	16	V4/UTE2737	425
L3C	63.5	63.9	79.4	80.5	84.0	28.5	5.5	15.8	M12	16	V8	370
L3L	63.5	63.9	92.1	93.2	97.0	28.5	5.5	15.8	M12	16	V8	430
L4C	63.5	63.9	104.8	105.9	110.0	28.5	5.5	15.8	M12	16	V8	485
LJA	63.5	63.9	114.3	115.4	119.0	28.5	5.5	15.8	M12	16	V8	535
L4L	63.5	63.9	117.5	118.6	123.0	28.5	5.5	15.8	M12	16	V8	545
L5C	63.5	63.9	130.2	131.3	135.0	28.5	5.5	15.8	M12	16	V8	600
L5L	63.5	63.9	142.9	144.0	148.0	28.5	5.5	15.8	M12	16	V8	660
N3L	76.2	76.6	92.1	93.2	97.0	31.8	5.5	19	M12	16	V11	615
N4C	76.2	76.6	104.8	105.9	110.0	31.8	5.5	19	M12	16	V11	700
NJA	76.2	76.6	114.3	115.4	119.0	31.8	5.5	19	M12	16	V11	770
N4L	76.2	76.6	117.5	118.6	123.0	31.8	5.5	19	M12	16	V11	780
N5C	76.2	76.6	130.2	131.3	135.0	31.8	5.5	19	M12	16	V11	865
N5L	76.2	76.6	142.9	144.0	148.0	31.8	5.5	19	M12	16	V11	950
N5R	76.2	76.6	149.2	150.4	154.0	31.8	5.5	19	M12	16	V11	990
N6L	76.2	76.6	168.3	169.4	173.0	31.8	5.5	19	M12	16	V11	1115
N7L	76.2	76.6	193.7	194.8	198.0	31.8	5.5	19	M12	16	V11	1280
N8L	76.2	76.6	219.1	220.2	224.0	31.8	5.5	19	M12	16	V11	1450
Q5R	88.9	90	149.2	150.4	154.0	31.8	5.5	25	M12	16	V90	1360
Q6L	88.9	90	168.3	169.4	173.0	31.8	5.5	25	M12	16	V90	1520
Q7L	88.9	90	193.7	194.8	198.0	31.8	5.5	25	M12	16	V90	1870
Q8L	88.9	90	219.1	220.2	224.0	31.8	5.5	25	M12	16	V90	2000

ARTICLE TABLE ALS32 (85°C)

Cap (μ F)	Nominal Case Size mm D x L	ESR max. (m Ω) at 25°C		Ripple current(A) at 85°C		Part number
		120Hz	20kHz	120Hz	20kHz	
350 VDC (U _R)						
390	36 x 55	352	227	2.8	5.2	ALS32A391D2C350
470	36 x 80	291	187	3.5	6.7	ALS32A471D3C350
560	36 x 80	245	158	3.8	7.2	ALS32A561D3C350
680	36 x 80	203	132	4.1	7.7	ALS32A681D3C350
820	36 x 93	170	110	4.8	8.8	ALS32A821D3L350
1000	36 x 93	141	92	5.2	9.3	ALS32A102D3L350
1200	51 x 68	116	75	5.5	8.9	ALS32A122K2L350
1500	51 x 68	99	66	5.8	8.9	ALS32A152K2L350
1800	51 x 93	78	50	7.7	12.5	ALS32A182K3L350
2200	51 x 93	67	44	8.2	12.5	ALS32A222K3L350
2700	51 x 131	52	34	10.4	16.7	ALS32A272K5C350
3300	51 x 131	45	30	11.1	16.8	ALS32A332K5C350
3900	51 x 115	38	25	10.8	15.3	ALS32A392LJA350
5600	77 x 115	30	21	16.4	22.7	ALS32A562NJA350
6800	77 x 131	28	21	18.2	23.6	ALS32A682N5C350
8200	77 x 150	24	18	19.9	25.5	ALS32A822N5R350
10000	90 x 150	18	13	25.5	33.5	ALS32A103Q5R350
12000	90 x 150	16	12	25.9	32.4	ALS32A123Q5R350
15000	90 x 194	13	10	32.4	41.2	ALS32A153Q7L350
18000	90 x 220	12	9	38.5	47.6	ALS32A183Q8L350
400 VDC (U _R)						
330	36 x 55	351	207	2.6	5.4	ALS32A331D2C400
390	36 x 80	295	174	3.3	6.9	ALS32A391D3C400
470	36 x 80	246	146	3.6	7.5	ALS32A471D3C400
560	36 x 80	208	123	3.9	8.0	ALS32A561D3C400
680	36 x 93	182	112	4.5	8.7	ALS32A681D3L400
820	36 x 93	152	94	4.9	9.2	ALS32A821D3L400
1000	51 x 68	132	84	5.2	9.0	ALS32A102K2L400
1200	51 x 68	113	74	5.6	9.1	ALS32A122K2L400
1500	51 x 93	89	57	7.3	12.4	ALS32A152K3L400
1800	51 x 93	76	50	7.8	12.5	ALS32A182K3L400
2200	51 x 131	59	37	9.8	16.4	ALS32A222K5C400
2700	63.5 x 93	49	31	11.3	18.3	ALS32A272L3L400
3300	63.5 x 115	40	26	13.2	21.1	ALS32A332LJA400
3900	63.5 x 131	37	25	14.6	22.1	ALS32A392L5C400
4700	77 x 115	32	21	15.9	22.7	ALS32A472NJA400
5600	77 x 131	30	21	17.6	23.7	ALS32A562N5C400
6800	77 x 150	25	18	19.3	25.6	ALS32A682N5R400
8200	90 x 150	18	12	25.6	36.3	ALS32A822Q5R400
10000	90 x 150	16	11	26.5	35.6	ALS32A103Q5R400
12000	90 x 194	14	10	30.9	40.7	ALS32A123Q7L400
15000	90 x 220	12	9	37.4	47.7	ALS32A153Q8L400
450 VDC (U _R)						
270	36 x 55	383	215	2.5	5.4	ALS32A271D2C450
330	36 x 80	312	175	3.2	6.9	ALS32A331D3C450
390	36 x 80	265	149	3.4	7.4	ALS32A391D3C450
470	36 x 80	221	125	3.7	7.9	ALS32A471D3C450
560	36 x 93	196	115	4.2	8.6	ALS32A561D3L450
680	36 x 93	163	96	4.6	9.2	ALS32A681D3L450
820	51 x 68	142	86	5.0	9.0	ALS32A821K2L450
1000	51 x 68	120	75	5.3	9.1	ALS32A102K2L450
1200	51 x 93	94	56	6.9	12.3	ALS32A122K3L450
1500	51 x 115	75	45	8.1	14.5	ALS32A152KJA450
1800	51 x 131	63	38	9.3	16.3	ALS32A182K5C450

Mounting Style 2=plain or 3=stud
Termination Style A,C

ARTICLE TABLE ALS32 (85°C)

Cap (μ F)	Nominal Case Size	ESR max. (m Ω) at 25°C		Ripple current(A) at 85°C		Part number
	mm D x L	120Hz	20kHz	120Hz	20kHz	
450 VDC (U _R)						
2200	63.5 x 93	53	32	10.7	18.3	ALS32A222L3L450
2700	63.5 x 115	43	26	12.5	21.1	ALS32A272LJA450
3300	63.5 x 131	36	22	14.6	24.1	ALS32A332L5C450
3900	77 x 115	33	22	15.3	22.7	ALS32A392NJA450
4700	77 x 131	28	18	18.0	26.5	ALS32A472N5C450
5600	77 x 150	24	16	19.7	28.4	ALS32A562N5R450
6800	90 x 150	19	13	24.6	36.3	ALS32A682Q5R450
8200	90 x 150	17	12	25.7	35.8	ALS32A822Q5R450
10000	90 x 194	15	10	30.0	40.7	ALS32A103Q7L450
12000	90 x 220	14	10	35.7	46.9	ALS32A123Q8L450
500 VDC (U _R)						
220	36 x 55	602	427	2.3	4.1	ALS32A221D2C500
270	36 x 80	489	347	2.9	5.3	ALS32A271D3C500
330	36 x 80	402	285	3.2	5.8	ALS32A331D3C500
390	36 x 80	341	243	3.5	6.2	ALS32A391D3C500
470	36 x 93	303	221	3.9	6.8	ALS32A471D3L500
560	36 x 93	256	187	4.3	7.3	ALS32A561D3L500
680	51 x 68	219	162	4.6	7.4	ALS32A681K2L500
820	51 x 68	186	138	4.9	7.7	ALS32A821K2L500
1000	51 x 93	146	107	6.4	10.3	ALS32A102K3L500
1200	51 x 115	142	109	7.2	11.0	ALS32A122KJA500
1500	51 x 131	114	88	8.4	12.7	ALS32A152K5C500
1800	63.5 x 93	83	61	9.9	15.3	ALS32A182L3L500
2200	63.5 x 115	68	51	11.6	17.8	ALS32A222LJA500
2700	63.5 x 131	65	50	13.2	19.3	ALS32A272L5C500
3300	77 x 115	56	44	14.2	19.7	ALS32A332NJA500
3900	77 x 131	42	32	16.9	23.5	ALS32A392N5C500
4700	77 x 150	35	27	18.5	25.3	ALS32A472N5R500
5600	90 x 150	29	22	23.1	32.2	ALS32A562Q5R500
6800	90 x 150	25	19	24.1	32.3	ALS32A682Q5R500
8200	90 x 194	21	16	28.6	37.8	ALS32A822Q7L500
10000	90 x 220	18	14	34.4	44.3	ALS32A103Q8L500

Mounting Style 2=plain or 3=stud 
Termination Style A,C 

OPERATIONAL DATA

Operational Lifetime

Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_r) is therefore only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT = 1 x 10⁻⁹ failures per hour. Failure rates include both catastrophic and parametric failures

T _a	Failure rate per hour
85°C	250 FIT
40°C	12 FIT

MECHANICAL DATA

Mounting position

The capacitor can be mounted in any position so long as the safety vent can operate. It is possible for some electrolyte to be expelled. As this is a conducting liquid, suitable precautions should be instigated by the system designer to avoid secondary short circuits.
The capacitors are designed to be mounted in free air and are not suitable for submersion in liquid.

Vibration

10Hz to 55Hz at 0.75mm or 10g for 3x2hrs duration. Except 220mm long cans 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration.

Insulating resistance

≥ 100 Mohms at 100V d.c., across insulating sleeve.

Voltage Proof

≥ 2500V d.c., across insulating sleeve.

Safety vent

A safety vent for over pressure is featured on terminal deck. This is in the form of a rubber plug designed to relieve build up of internal pressure due to over stress or catastrophic failure.

ALS40 Series 105°C

RoHS
Compliant

- **Compact Size**
- **Long Life, 9000 hours at 105°C (U_R, I_R applied)**
- **High ripple current**
- **Excellent surge voltage capability**
- **Optimized designs available on request**

APPLICATION

Smoothing, energy storage, or pulse operation in telecommunication demanding power supplies, process control, AC-motor control, traction, welding and measuring.

BASIC DESIGN

The ALS40/41 series of screw terminal capacitors feature the same high ripple currents and long life characteristics as the ALS30/31 series but can operate at higher temperatures. They are similarly suited for high reliability and long life applications

such as frequency converters, UPS systems and switch mode power supplies, but the extended temperature range allows increased ripple currents at lower temperatures.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/85/56,	
Capacitance range	150 – 680000 µF	
Capacitance tolerance	–20 to +20%	
Rated voltage U _R	25–450 VDC	
Surge voltage U _s	1.15 x U _R (for U _R ≤ 250 VDC) 1.10 x U _R (for U _R ≥ 350 VDC)	Test Condition: ≤ 30s surge, 1000 cycles @ 105°C
Surge voltage U _{ss} (Short duration)	U _R U _{ss} 200 350 250 400 350 500 400 520 415 530 450 550 500 600	Test Condition: ≤ 500ms surge, 100 cycles @ 20°C
Leakage current I _L	= 0.003 x C _R x U _R (µA) or 6mA whichever is the smaller. Note, C _R is in µF.	Test Condition: U _R , 5mins., 20°C
Operational life time +105°C, U _R , I _R	Can Diameter 36 6000 hrs 51 7000 hrs 66 8000 hrs 77, 90 9000 hrs	End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit
+105°C, U _R	Can Diameter 36 10000 hrs 51 11000 hrs 66 13000 hrs 77, 90 15000 hrs	
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C	
Temperature range	–40 to +105°C (Operating) –55°C to +105°C (Storage)	

SPECIFICATION

Terminal styles A, R

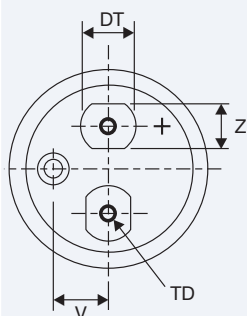


Fig. 1

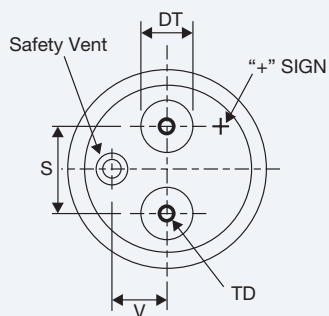
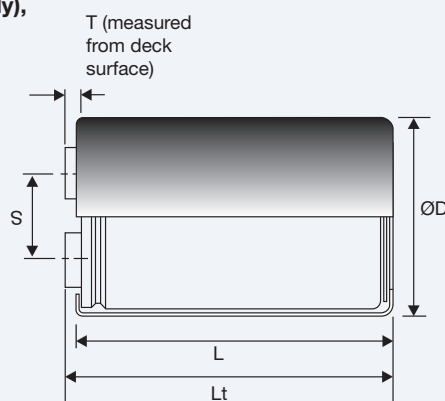
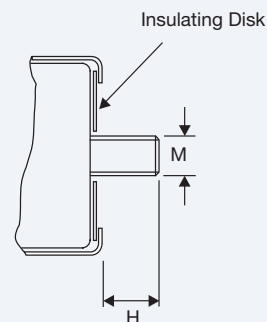
Terminal styles A (ø36mm only),
C, G, J, M

Fig. 2

ALS40
Clamp MountingALS41
Stud Mounting

Terminals options

* preferred options in bold

Term. Style	Thread	Height T - mm ±0.5	Dia. - DT mm ±0.5	Thread depth TD - mm minimum	Drawing
A*	M5	5.5	13	10	Fig.1 Z=10mm
A*	M5	7.14	8	10	Fig.2 ø36mm only
C	M6	5.5	13	10	Fig.2
G	M6	6.35	17	11.8	Fig.2
J	M6	3.17	17	8.8	Fig.2
M	M5	7.14	8	10	Fig.2
R	M5	5.5	15	10	Fig.1 Z=13mm

Terminations

Aluminium inserts with M5 threads as standard, max. torque 2NM. Optional M6 threaded inserts have a max. torque 4NM. Max. torque for stud mounting M8:4NM and M12:8NM.

Dimensions table ALS40 (sleeved) mm

Case Code	D ±1	L ±2	Lt* ±1	S ±0.5	T ±0.5	V mm	M THREAD	H ±1	MOUNTING CLIP	WEIGHT grams nom.	Terminal Style A C G J M R
DA	36	52	58.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	75	•
DB	36	62	67.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	90	•
DE	36	82	87.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	115	•
DF	36	105	111.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	140	•
KE	51	82	86.5	22.2	5.5	13.7	M12	16	V4/UTE2737	220	•
KF	51	105	110.5	22.2	5.5	13.7	M12	16	V4/UTE2737	300	•
MF	66	105	110.5	28.5	5.5	15.8	M12	16	V10/UTE2738	505	• •
ND	77	75	79.5	31.8	5.5	19	M12	16	V11	495	• • • • • •
NF	77	105	110.5	31.8	5.5	19	M12	16	V11	690	• • • • • •
NP	77	146	150.5	31.8	5.5	19	M12	16	V11	960	• • • • • •
NT	77	220	224.5	31.8	5.5	19	M12	16	V11	1450	• • • • • •
QC	90	67	71.5	31.8	5.5	25	M12	16	V90	615	• • •
QD	90	75	79.5	31.8	5.5	25	M12	16	V90	690	• • •
QH	90	98	103.5	31.8	5.5	25	M12	16	V90	900	• • •
QP	90	146	149.5	31.8	5.5	25	M12	16	V90	1345	• • •
QT	90	220	223.5	31.8	5.5	25	M12	16	V90	2000	• • •

* Dimensions Lt will change dependant on terminal style.

ARTICLE TABLE ALS40 (105°C)

Cap (μF)	Case Size (mm)	ESR (mΩ)	Impedance (mΩ)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	105°C 100 Hz	10 KHz	
25 VDC (U _R)						
15000	36x52	24	20	6.9	7.3	ALS4 -- 153DA025
22000	36x62	17	15	8.4	8.8	ALS4 -- 223DB025
33000	36x82	11	10	11.1	11.7	ALS4 -- 333DE025
47000	36x105	9	8	14.0	14.7	ALS4 -- 473DF025
68000	51x82	13	12	12.0	12.2	ALS4 -- 683KE025
100000	51x105	9	8	16.4	16.7	ALS4 -- 104KF025
150000	77x75	13	13	13.7	13.8	ALS4 -- 154ND025
150000	66x105	6	6	23.8	24.1	ALS4 -- 154MF025
150000	90x75	10	10	18.7	18.8	ALS4 -- 154QD025
220000	90x67	9	8	18.6	19.2	ALS4 -- 224QC025
220000	77x105	8	7	22.3	22.4	ALS4 -- 224NF025
330000	90x98	8	8	22.3	22.4	ALS4 -- 334QH025
330000	77x146	5	5	31.0	31.1	ALS4 -- 334NP025
470000	90x146	4	4	36.9	37.1	ALS4 -- 474QP025
470000	77x220	4	4	38.9	39.8	ALS4 -- 474NT025
680000	90x220	4	3	47.0	48.1	ALS4 -- 684QT025
40 VDC (U _R)						
10000	36x52	23	19	6.6	6.9	ALS4 -- 103DA040
10000	36x62	19	16	8.1	8.7	ALS4 -- 103DB040
15000	36x82	13	10	10.8	11.6	ALS4 -- 153DE040
22000	36x105	10	8	13.6	14.5	ALS4 -- 223DF040
33000	51x82	13	12	11.7	12.0	ALS4 -- 333KE040
47000	51x105	9	8	16.2	16.6	ALS4 -- 473KF040
68000	77x75	13	13	13.9	14.0	ALS4 -- 683ND040
100000	66x105	7	7	20.6	20.8	ALS4 -- 104MF040
100000	90x67	10	9	17.7	18.5	ALS4 -- 104QC040
100000	90x75	12	11	16.0	16.1	ALS4 -- 104QD040
100000	77x105	7	7	22.4	22.7	ALS4 -- 104NF040
150000	90x98	8	8	22.6	22.8	ALS4 -- 154QH040
150000	77x146	5	5	31.3	31.6	ALS4 -- 154NP040
220000	90x146	4	4	36.8	37.1	ALS4 -- 224QP040
220000	77x220	4	4	37.7	39.2	ALS4 -- 224NT040
330000	90x220	4	4	45.6	47.0	ALS4 -- 334QT040
63 VDC (U _R)						
3300	36x52	38	30	5.5	6.2	ALS4 -- 332DA063
4700	36x62	27	22	6.7	7.5	ALS4 -- 472DB063
6800	36x82	19	15	8.9	10.0	ALS4 -- 682DE063
10000	36x105	13	10	11.2	12.6	ALS4 -- 103DF063
15000	51x82	16	15	10.7	11.2	ALS4 -- 153KE063
22000	51x105	11	10	14.7	15.3	ALS4 -- 223KF063
22000	77x75	14	12	14.6	15.1	ALS4 -- 223ND063
33000	66x105	8	7	21.3	22.2	ALS4 -- 333MF063
33000	90x67	10	8	18.1	20.1	ALS4 -- 333QC063
33000	90x75	11	11	17.1	17.5	ALS4 -- 333QD063
47000	77x105	9	8	20.7	21.1	ALS4 -- 473NF063
47000	90x98	8	7	24.4	25.1	ALS4 -- 473QH063
68000	77x146	6	6	29.1	29.8	ALS4 -- 683NP063
100000	90x146	5	5	34.5	35.2	ALS4 -- 104QP063
100000	77x220	4	4	36.7	38.8	ALS4 -- 104NT063
150000	90x220	4	4	44.4	46.5	ALS4 -- 154QT063

Mounting Style 0=plain or 1=stud 

Termination Style A,C,G,J,M or R 

ARTICLE TABLE ALS40 (105°C)

Cap (μF)	Case Size (mm)	ESR (mΩ) at 20°C	Impedance (mΩ) at 20°C	Ripple current(A) at 105°C		Type number
		100Hz (max)	10 KHz (max)	100 Hz	10 KHz	
100 VDC (U _R)						
1500	36x52	79	62	3.9	4.5	ALS4 -- 152DA100
2200	36x62	56	44	4.8	5.5	ALS4 -- 222DB100
3300	36x82	37	29	6.4	7.4	ALS4 -- 332DE100
4700	36x105	26	21	8.1	9.3	ALS4 -- 472DF100
6800	51x82	32	28	8.0	8.4	ALS4 -- 682KE100
10000	51x105	21	18	10.9	11.5	ALS4 -- 103KF100
15000	77x75	28	26	9.7	9.9	ALS4 -- 153ND100
15000	66x105	14	12	15.8	16.7	ALS4 -- 153MF100
15000	90x75	20	18	12.9	13.4	ALS4 -- 153QD100
22000	90x67	17	16	14.3	15.2	ALS4 -- 223QC100
22000	77x105	15	13	15.5	16.0	ALS4 -- 223NF100
22000	90x98	13	11	18.4	19.0	ALS4 -- 223QH100
33000	77x146	10	10	21.6	22.2	ALS4 -- 333NP100
47000	90x146	9	8	25.9	26.5	ALS4 -- 473QP100
47000	77x220	7	6	35.4	36.6	ALS4 -- 473NT100
100000	90x220	6	6	37.2	37.9	ALS4 -- 104QT100
200 VDC (U _R)						
680	36x52	195	154	2.9	4.0	ALS4 -- 681DA200
680	36x62	188	147	3.3	4.6	ALS4 -- 681DB200
1000	36x82	128	100	4.3	6.1	ALS4 -- 102DE200
1500	36x105	86	67	5.6	7.8	ALS4 -- 152DF200
2200	51x82	71	58	6.8	8.0	ALS4 -- 222KE200
3300	51x105	47	38	9.1	10.9	ALS4 -- 332KF200
4700	77x75	48	42	8.7	9.4	ALS4 -- 472ND200
6800	66x105	27	23	12.9	14.5	ALS4 -- 682MF200
6800	90x67	37	28	11.8	15.9	ALS4 -- 682QC200
6800	90x75	36	32	10.9	11.7	ALS4 -- 682QD200
6800	77x105	29	25	13.4	14.8	ALS4 -- 682NF200
10000	90x98	23	20	15.4	16.6	ALS4 -- 103QH200
10000	77x146	19	16	19.3	21.5	ALS4 -- 103NP200
15000	90x146	14	12	24.2	26.5	ALS4 -- 153QP200
22000	77x220	11	10	29.5	31.6	ALS4 -- 223NT200
33000	90x220	10	8	34.3	36.4	ALS4 -- 333QT200
250 VDC (U _R)						
470	36x52	235	174	2.5	3.9	ALS4 -- 471DA250
680	36x62	164	122	3.2	4.8	ALS4 -- 681DB250
1000	36x82	111	83	4.2	6.3	ALS4 -- 102DE250
1000	36x105	108	79	4.7	7.5	ALS4 -- 102DF250
1500	51x82	83	64	6.2	8.2	ALS4 -- 152KE250
2200	51x105	56	42	8.3	11.1	ALS4 -- 222KF250
3300	77x75	52	42	8.5	9.7	ALS4 -- 332ND250
4700	66x105	30	24	12.3	15.0	ALS4 -- 472MF250
4700	90x67	42	30	10.9	16.3	ALS4 -- 472QC250
4700	90x75	38	32	10.7	12.1	ALS4 -- 472QD250
6800	77x105	30	25	12.1	13.4	ALS4 -- 682NF250
6800	90x98	25	20	15.1	17.3	ALS4 -- 682QH250
10000	77x146	19	16	17.5	19.5	ALS4 -- 103NP250
15000	90x146	14	12	21.9	23.9	ALS4 -- 153QP250
15000	77x220	12	10	29.2	33.0	ALS4 -- 153NT250
22000	90x220	11	9	34.1	38.2	ALS4 -- 223QT250

Mounting Style 0=plain or 1=stud 
Termination Style A,C,G,J,M or R 

ARTICLE TABLE ALS40 (105°C)

Cap (μF)	Case Size (mm)	ESR (mΩ)	Impedance (mΩ)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	105°C 100 Hz	10 KHz	
350 VDC (U _R)						
220	36x52	457	303	1.8	4.5	ALS4 -- 221DA350
330	36x62	307	204	2.4	5.7	ALS4 -- 331DB350
470	36x82	215	143	3.0	7.2	ALS4 -- 471DE350
680	36x105	149	99	3.9	8.9	ALS4 -- 681DF350
1000	51x82	113	78	5.0	10.0	ALS4 -- 102KE350
1500	51x105	75	52	6.8	12.5	ALS4 -- 152KF350
2200	77x75	66	49	8.3	13.7	ALS4 -- 222ND350
2200	66x105	51	35	9.8	17.9	ALS4 -- 222MF350
2200	90x67	74	52	9.1	16.4	ALS4 -- 222QC350
2200	90x75	56	40	9.4	17.8	ALS4 -- 222QD350
3300	77x105	41	30	11.7	19.7	ALS4 -- 332NF350
4700	90x98	31	23	14.6	23.2	ALS4 -- 472QH350
4700	77x146	27	20	15.7	23.6	ALS4 -- 472NP350
6800	90x146	19	14	20.3	29.7	ALS4 -- 682QP350
6800	77x220	23	17	25.4	35.7	ALS4 -- 682NT350
10000	90x220	21	16	31.0	42.7	ALS4 -- 103QT350
400 VDC (U _R)						
220	36x52	542	349	2.0	4.9	ALS4 -- 221DA400
220	36x62	537	344	2.1	5.4	ALS4 -- 221DB400
470	36x82	254	164	3.2	7.8	ALS4 -- 471DE400
470	36x105	251	161	3.5	8.5	ALS4 -- 471DF400
680	51x82	183	121	4.2	9.8	ALS4 -- 681KE400
1000	51x105	124	81	5.6	12.3	ALS4 -- 102KF400
1500	77x75	93	64	7.6	13.9	ALS4 -- 152ND400
2200	66x105	60	41	9.7	18.1	ALS4 -- 222MF400
2200	90x67	63	44	9.4	15.9	ALS4 -- 222QC400
2200	90x75	67	47	10.0	17.5	ALS4 -- 222QD400
2200	77x105	62	42	10.6	19.8	ALS4 -- 222NF400
3300	90x98	44	31	13.6	23.4	ALS4 -- 332QH400
4700	77x146	33	23	15.4	22.6	ALS4 -- 472NP400
6800	90x146	23	17	20.0	28.3	ALS4 -- 682QP400
6800	77x220	21	15	23.5	33.3	ALS4 -- 682NT400
10000	90x220	18	14	29.0	40.3	ALS4 -- 103QT400
415 VDC (U _R)						
220	36x52	530	331	2.0	5.0	ALS4 -- 221DA415
220	36x62	524	325	2.1	5.4	ALS4 -- 221DB415
330	36x82	349	217	2.8	7.1	ALS4 -- 331DE415
470	36x105	245	152	3.5	8.7	ALS4 -- 471DF415
680	51x82	180	115	4.4	9.9	ALS4 -- 681KE415
1000	51x105	122	77	5.8	12.3	ALS4 -- 102KF415
1500	77x75	95	65	7.6	13.8	ALS4 -- 152ND415
2200	66x105	60	39	9.7	18.1	ALS4 -- 222MF415
2200	90x67	61	43	9.4	15.8	ALS4 -- 222QC415
2200	90x75	67	47	10.0	17.3	ALS4 -- 222QD415
2200	77x105	61	41	10.7	19.7	ALS4 -- 222NF415
3300	90x98	44	30	13.6	23.3	ALS4 -- 332QH415
3300	77x146	40	27	14.2	23.6	ALS4 -- 332NP415
4700	90x146	29	19	18.5	29.8	ALS4 -- 472QP415
6800	77x220	21	14	23.0	32.5	ALS4 -- 682NT415
10000	90x220	18	14	28.3	39.3	ALS4 -- 103QT415

Mounting Style 0=plain or 1=stud 
Termination Style A,C,G,J,M or R 

ARTICLE TABLE ALS40 (105°C)

Cap (μF)	Case Size (mm)	ESR (mΩ) at 20°C 100Hz (max)	Impedance (mΩ) at 20°C 10 KHz (max)	Ripple current(A) at 105°C		Type number
				100 Hz	10 KHz	
450 VDC (U _R)						
150	36x52	721	360	1.8	4.5	ALS4 - - 151DA450
150	36x62	715	356	1.9	4.8	ALS4 - - 151DB450
220	36x82	487	242	2.5	6.2	ALS4 - - 221DE450
330	36x105	325	162	3.2	7.9	ALS4 - - 331DF450
470	51x82	239	123	4.1	9.0	ALS4 - - 471KE450
680	51x105	164	84	5.3	11.3	ALS4 - - 681KF450
1000	77x75	125	69	7.0	13.2	ALS4 - - 102ND450
1500	66x105	79	42	8.9	17.1	ALS4 - - 152MF450
1500	90x67	78	57	8.7	15.3	ALS4 - - 152QC450
1500	90x75	87	49	9.3	16.7	ALS4 - - 152QD450
1500	77x105	80	43	9.8	18.7	ALS4 - - 152NF450
2200	90x98	58	32	12.5	22.5	ALS4 - - 222QH450
2200	77x146	54	29	13.1	22.9	ALS4 - - 222NP450
3300	77x146	38	27	14.6	22.0	ALS4 - - 332NP450
3300	90x146	37	20	17.4	28.9	ALS4 - - 332QP450
4700	77x220	27	15	21.9	32.0	ALS4 - - 472NT450
6800	90x220	19	15	23.5	39.2	ALS4 - - 682QT450

Mounting Style 0=plain or 1=stud
Termination Style A,C,G,J,M or R

OPERATIONAL DATA

Operational Lifetime

Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_R) is therefore only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT = 1 x 10⁻⁹ failures per hour. Failure rates include both catastrophic and parametric failures

T_a	Failure rate per hour
85°C	220 FIT
40°C	10 FIT

MECHANICAL DATA

Mounting position

The capacitor can be mounted in any position so long as the safety vent can operate. It is possible for some electrolyte to be expelled. As this is a conducting liquid, suitable precautions should be instigated by the system designer to avoid secondary short circuits.

The capacitors are designed to be mounted in free air and are not suitable for submersion in liquid.

Vibration

10Hz to 55Hz at 0.75mm or 10g for 3x2hrs duration. Except 220mm long cans 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration.

Insulating resistance

≥ 100 Mohms at 100V d.c., across insulating sleeve.

Voltage Proof

≥ 2500V d.c., across insulating sleeve.

Safety vent

A safety vent for over pressure is featured on terminal deck. This is in the form of a rubber plug designed to relieve build up of internal pressure due to over stress or catastrophic failure.

PEH 169 105°C

RoHS
Compliant

- High performance
- Long Life, > 10 years at 50°C
- Low ESR and ESL
- High stability, 10 years shelf life
- Optimized designs available on request

APPLICATION

Smoothing, energy storage, or pulse operation in telecommunication demanding power supplies, process control, AC-motor control, traction, welding and measuring.

BASIC DESIGN

PEH 169 is a Long Life electrolytic capacitor with outstanding reliability and electrical performance. Polarized, all-welded design, heavy duty screw terminals, extended cathode construction, safety vent and plastic insulation. The PEH 169 winding is housed in a cylindrical aluminium can with a reinforced moulded lid incorporating a safety vent. The sealing system is designed

for electrolyte leakage free operation and a very low gas-diffusion rate of electrolyte. Mechanical contact between the winding and the case allows excellent heat transfer from the winding to the ambient, which means cooler operation. Low ESR is a result of a low resistive paper/electrolyte system, at least two tabs per foil and all-welded design.

SPECIFICATION

Standards

Standards IEC 60384-4 Long Life Grade 40/105/56, DIN 41240, type 1A

CECC

CECC 30300
DIN 40040 GPF, DIN 41248
CECC 30301-030,
Corresponding to
CECC 30301-803

Capacitance range

100–330000 µF

Capacitance tolerance

–10 to +30%

Rated voltage

10–350 VDC

Temperature range

–40 to +105°C

Operational life time

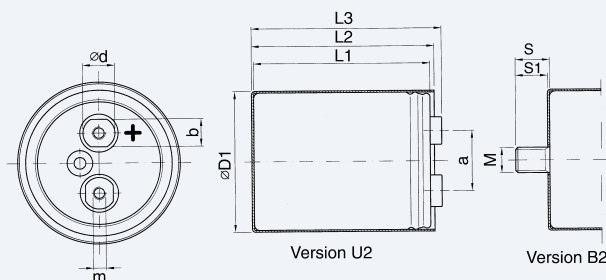
25000 h at 105°C

Shelf life

5000h at 0V +105°C, or
10 years at 0V +40°C

Diameter range

35–90 mm



Dimensions table PEH 169 (mm)

D x L	Case code	D1 ±1.0	L1 ±1.0	L2 ±1.0	L3 ±1.0	S	S1	M	a ±0.5	b	d	m*	Weight approx (g)
35 x 51	A	36.6	51.5	54.5	58.9	12	11.0	M8	13.0	—	8	M5	70
35 x 60	B	36.6	59.5	62.5	66.9	12	11.0	M8	13.0	—	8	M5	85
35 x 75	C	36.6	73.5	76.5	80.9	12	11.0	M8	13.0	—	8	M5	105
35 x 95	D	36.6	94.5	97.5	101.9	12	11.0	M8	13.0	—	8	M5	130
50 x 75	H	51.6	74.5	77.5	82.4	16	15.0	M12	22.0	13	15	M5	180
50 x 95	J	51.6	95.5	98.5	103.4	16	15.0	M12	22.0	13	15	M5	240
50 x 105	K	51.6	103.5	106.5	111.4	16	15.0	M12	22.0	13	15	M5	265
50 x 115	I**	51.6	115.5	118.5	123.4	16	15.0	M12	22.0	13	15	M5	300
65 x 105	O	66.6	106.0	109.2	113.0	16	14.8	M12	28.5	13	15	M5	415
65 x 115	Q**	66.6	118.0	121.2	125.0	16	14.8	M12	28.5	13	15	M5	460
65 x 130	S**	66.6	129.0	132.2	136.0	16	14.8	M12	28.5	13	15	M5	520
75 x 78	L	76.6	77.0	80.2	84.0	16	14.8	M12	32.0	13	15	M5	430
75 x 98	P**	76.6	98.0	101.2	105.0	16	14.8	M12	32.0	13	15	M5	530
75 x 105	T	76.6	106.0	109.2	113.0	16	14.8	M12	32.0	13	15	M5	585
75 x 115	U	76.6	118.0	121.2	125.0	16	14.8	M12	32.0	13	15	M5	640
75 x 145	V	76.6	146.0	149.2	153.0	16	14.8	M12	32.0	13	15	M5	800
75 x 220	X	76.6	221.0	224.2	228.0	16	14.8	M12	32.0	13	15	M5	1400
90 x 78	M	91.6	76.5	79.7	83.4	16	14.8	M12	32.0	13	15	M5	750
90 x 98	N	91.6	97.5	100.7	104.4	16	14.8	M12	32.0	13	15	M5	950
90 x 145	Y	91.6	145.5	148.7	152.4	16	14.8	M12	32.0	13	15	M5	1400

* M6 and other threads on request. **on request

ARTICLE TABLE PEH 169 (105°C)

C _R	D x L	Case code	I _{RAC} * 105°C	I _{RAC} * 50°C **	I _{RAC} * 40°C	ESR* 20°C	ESR* 20°C	L _{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz mΩ	100 kHz mΩ	nH	U2 = Plain can B2 = Stud can
10 VDC (U _R)									
6800	35 x 51	A	5.2	21.8	15.4	46	37	12	PEH169EA4680Q--
10000	35 x 51	A	6.2	26.3	17.5	33	27	12	PEH169EA5100Q--
15000	35 x 60	B	7.4	28.9	20.5	23	19	12	PEH169EB5150Q--
22000	35 x 75	C	8.8	34.8	24.3	17	14	12	PEH169EC5220Q--
33000	35 x 95	D	10.4	38.3	28.0	12	10	12	PEH169ED5330Q--
47000	50 x 75	H	11.0	42.9	30.0	12	10	16	PEH169EH5470Q--
68000	50 x 95	J	13.5	51.8	34.1	9	8	16	PEH169EJ5680Q--
100000	50 x 105	K	14.0	48.5	35.0	8	7	16	PEH169EK6100Q--
150000	65 x 105	O	14.7	47.6	35.5	9	8	16	PEH169EO6150Q--
220000	75 x 105	T	19.4	62.8	46.7	6	5	17	PEH169ET6220Q--
330000	75 x 145	V	22.5	70.7	54.6	4	4	17	PEH169EV6330Q--
16 VDC (U _R)									
6800	35 x 51	A	5.5	25.5	16.7	36	28	12	PEH169GA4680Q--
10000	35 x 51	A	6.4	28.0	18.9	27	21	12	PEH169GA5100Q--
15000	35 x 75	C	8.3	34.3	24.6	18	14	12	PEH169GC5150Q--
22000	35 x 95	D	9.7	38.6	28.5	13	10	12	PEH169GD5220Q--
33000	50 x 75	H	11.7	43.0	31.0	12	10	16	PEH169GH5330Q--
47000	50 x 95	J	13.2	46.2	34.5	9	8	16	PEH169GJ5470Q--
68000	65 x 105	O	14.4	47.7	36.2	9	8	16	PEH169GO5680Q--
100000	75 x 105	T	21.6	70.9	54.7	6	5	17	PEH169GT6100Q--
150000	75 x 115	U	19.8	67.3	50.0	5	5	17	PEH169GU6150Q--
220000	75 x 145	V	23.6	74.7	58.0	4	4	17	PEH169GV6220Q--
25 VDC (U _R)									
4700	35 x 51	A	4.9	24.1	16.5	41	29	12	PEH169HA4470Q--
6800	35 x 51	A	5.8	27.7	18.5	30	22	12	PEH169HA4680Q--
10000	35 x 75	C	7.1	31.2	22.8	20	15	12	PEH169HC5100Q--
15000	35 x 95	D	8.7	36.8	27.2	15	11	12	PEH169HD5150Q--
22000	50 x 75	H	11.0	42.9	30.9	13	10	16	PEH169HH5220Q--
33000	50 x 95	J	12.6	46.5	34.6	10	8	16	PEH169HJ5330Q--
47000	65 x 105	O	15.8	53.7	42.1	8	7	16	PEH169HO5470Q--
68000	75 x 105	T	20.2	68.1	51.9	6	6	17	PEH169HT5680Q--
100000	75 x 115	U	21.9	70.3	55.4	5	5	17	PEH169HU6100Q--
150000	75 x 145	V	22.1	71.4	55.3	4	4	17	PEH169HV6150Q--
40 VDC (U _R)									
3300	35 x 51	A	4.6	26.3	17.6	41	25	12	PEH169KA4330Q--
4700	35 x 60	B	5.6	29.6	20.5	30	19	12	PEH169KB4470Q--
6800	35 x 75	C	6.7	32.6	23.6	22	14	12	PEH169KC4680Q--
10000	35 x 95	D	7.8	34.8	26.8	16	11	12	PEH169KD5100Q--
15000	50 x 75	H	10.2	42.9	30.5	14	10	16	PEH169KH5150Q--
22000	50 x 95	J	11.9	46.5	34.8	10	8	16	PEH169KJ5220Q--
33000	65 x 105	O	15.0	53.8	41.4	8	7	16	PEH169KO5330Q--
47000	75 x 105	T	19.9	69.5	55.0	6	5	17	PEH169KT5470Q--
68000	75 x 115	U	20.6	70.7	53.9	6	5	17	PEH169KU5680Q--
100000	75 x 145	V	23.0	71.0	59.0	4	4	17	PEH169KV6100Q--
63 VDC (U _R)									
1500	35 x 51	A	3.5	23.1	15.9	63	31	12	PEH169MA4150Q--
2200	35 x 51	A	4.1	27.0	18.1	46	23	12	PEH169MA4220Q--
3300	35 x 75	C	5.3	31.6	22.9	30	15	12	PEH169MC4330Q--
4700	35 x 95	D	6.2	34.2	25.9	22	11	12	PEH169MD4470Q--
6800	50 x 75	H	8.5	42.6	30.8	18	10	16	PEH169MH4680Q--
10000	50 x 95	J	9.9	45.3	34.2	13	8	16	PEH169MJ5100Q--

* Maximum values

** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 169 (105°C)

C _R	D x L	Case code	I _{RAC} * 105°C	I _{RAC} * 50°C **	I _{RAC} * 40°C	ESR* 20°C	ESR* 20°C	L _{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz mΩ	100 kHz mΩ	nH	U2 = Plain can B2 = Stud can
63 VDC (U _R)									
15000	65 x 105	O	13.1	53.0	41.1	10	6	16	PEH169MO5150Q--
22000	75 x 105	T	17.7	73.0	55.8	6	4	17	PEH169MT5220Q--
33000	75 x 115	U	18.9	71.0	54.3	6	5	17	PEH169MU5330Q--
47000	75 x 145	V	20.9	73.0	58.0	5	4	17	PEH169MV5470Q--
100 VDC (U _R)									
680	35 x 51	A	2.4	14.4	9.9	160	95	12	PEH169PA3680Q--
1000	35 x 51	A	2.9	17.4	11.7	110	67	12	PEH169PA4100Q--
1500	35 x 75	C	3.6	20.5	14.9	73	44	12	PEH169PC4150Q--
2200	35 x 95	D	4.3	23.2	17.6	50	31	12	PEH169PD4220Q--
3300	50 x 75	H	6.4	33.8	23.8	30	23	16	PEH169PH4330Q--
4700	50 x 95	J	7.7	37.1	27.6	26	17	16	PEH169PJ4470Q--
6800	65 x 105	O	10.4	46.4	35.5	18	12	16	PEH169PO4680Q--
10000	65 x 105	O	11.7	49.1	36.6	14	10	16	PEH169PO5100Q--
15000	75 x 115	U	16.0	67.5	51.1	9	6	17	PEH169PU5150Q--
22000	75 x 145	V	18.2	70.6	55.3	7	5	17	PEH169PV5220Q--
160 VDC (U _R)									
330	35 x 51	A	1.4	9.6	6.6	400	210	12	PEH169QA3330Q--
470	35 x 51	A	1.7	11.2	7.6	290	160	12	PEH169QA3470Q--
680	35 x 75	C	2.1	13.8	10.3	190	100	12	PEH169QC3680Q--
1000	35 x 95	D	2.6	15.7	12.3	130	70	12	PEH169QD4100Q--
1500	50 x 75	H	3.8	22.1	16.2	93	51	16	PEH169QH4150Q--
2200	50 x 95	J	4.7	25.4	19.6	64	36	16	PEH169QJ4220Q--
3300	65 x 105	O	6.5	32.0	25.0	45	26	16	PEH169QO4330Q--
4700	75 x 105	T	8.7	48.1	36.9	26	13	17	PEH169QT4470Q--
6800	75 x 115	U	10.2	50.9	39.6	19	10	17	PEH169QU4680Q--
10000	75 x 145	V	11.9	55.7	43.2	14	8	17	PEH169QV5100Q--
200 VDC (U _R)									
330	35 x 51	A	1.5	8.1	5.6	480	300	12	PEH169RA3330Q--
470	35 x 60	B	1.8	9.7	6.9	340	210	12	PEH169RB3470Q--
680	35 x 95	D	2.2	10.0	7.9	250	160	12	PEH169RD3680Q--
1000	50 x 75	H	3.3	15.5	11.4	170	110	16	PEH169RH4100Q--
1500	50 x 95	J	4.0	18.0	14.0	120	76	16	PEH169RJ4150Q--
2200	50 x 105	K	4.9	23.1	17.2	76	49	16	PEH169RK4220Q--
3300	65 x 105	O	6.7	28.8	22.0	55	37	16	PEH169RO4330Q--
4700	75 x 105	T	8.6	41.6	31.1	33	20	17	PEH169RT4470Q--
6800	75 x 145	V	10.1	45.2	35.2	24	16	17	PEH169RV4680Q--
250 VDC (U _R)									
150	35 x 51	A	1.0	7.0	4.9	730	370	12	PEH169SA3150Q--
220	35 x 51	A	1.3	8.9	6.0	500	250	12	PEH169SA3220Q--
330	35 x 60	B	1.6	11.0	7.7	320	160	12	PEH169SB3330Q--
470	35 x 75	C	2.0	11.7	8.9	240	130	12	PEH169SC3470Q--
680	50 x 75	H	2.9	17.2	12.6	170	90	16	PEH169SH3680Q--
1000	50 x 75	H	3.5	21.0	15.5	110	58	16	PEH169SH4100Q--
1500	50 x 105	K	4.2	24.1	17.9	79	43	16	PEH169SK4150Q--
2200	65 x 105	O	5.8	25.8	23.6	56	32	16	PEH169SO4220Q--
3300	75 x 105	T	7.9	41.5	31.5	36	20	17	PEH169ST4330Q--
4700	75 x 145	V	9.2	46.6	37.8	26	14	17	PEH169SV4470Q--
6800	75 x 220	X	9.4	42.6	36.8	19	12	17	PEH169SX4680Q--
6800	90 x 145	Y	11.9	53.5	43.5	20	12	16	PEH169SY4680Q--

* Maximum values.

** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 169 (105°C)

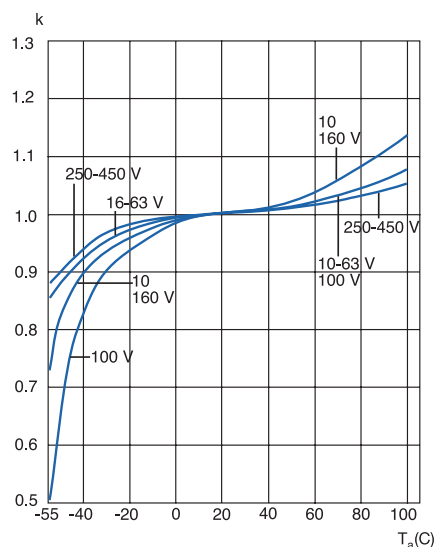
C_R	D x L	Case code	I_{RAC}^* 105°C	I_{RAC}^* 50°C **	I_{RAC}^* 40°C	ESR* 20°C	ESR* 20°C	L_{ESL} Approx.	Article code
μF	mm		100 Hz A	10 kHz A	10 kHz A	100 Hz $m\Omega$	100 kHz $m\Omega$	nH	U2 = Plain can B2 = Stud can
350 VDC (U_R)									
100	35 x 51	A	1.0	6.7	4.6	810	410	12	PEH169UA3100Q--
150	35 x 51	A	1.3	8.8	6.1	520	250	12	PEH169UA3150Q--
220	35 x 75	C	1.5	10.1	7.3	360	180	12	PEH169UC3220Q--
330	35 x 95	D	1.9	11.8	9.1	250	120	12	PEH169UD3330Q--
470	50 x 75	H	2.7	17.1	12.3	180	91	16	PEH169UH3470Q--
680	50 x 95	J	3.3	19.9	14.8	120	64	16	PEH169UJ3680Q--
1000	50 x 105	K	4.1	24.3	18.0	82	42	16	PEH169UK4100Q--
1500	65 x 105	O	5.5	30.6	23.5	60	33	16	PEH169UO4150Q--
2200	75 x 105	T	7.5	42.6	32.6	39	20	17	PEH169UT4220Q--
3300	75 x 145	V	9.0	44.1	38.0	26	14	17	PEH169UV4330Q--
4700	75 x 220	X	9.4	41.4	35.9	22	13	17	PEH169UX4470Q--
4700	90 x 145	Y	11.6	50.8	41.7	23	14	16	PEH169UY4470Q--

* Maximum values

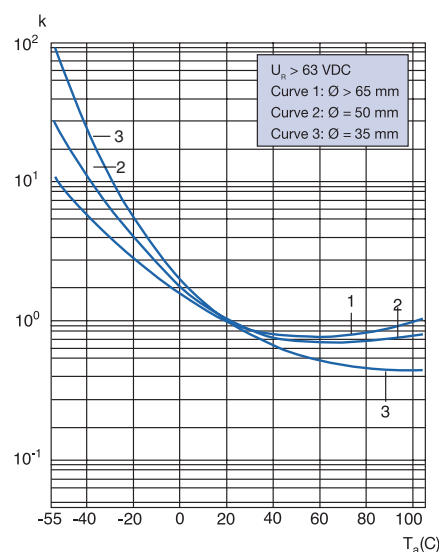
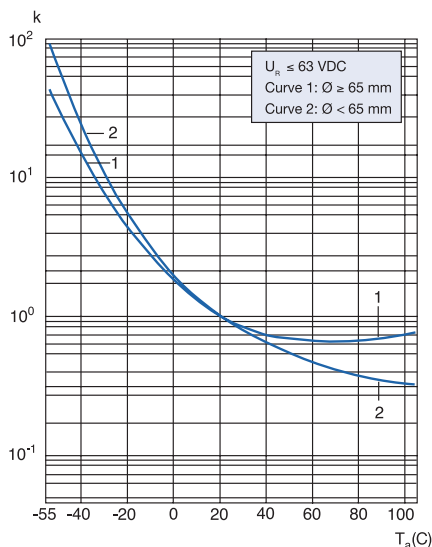
** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

TECHNICAL DATA PEH 169 (85°C AND 105°C)

The capacitance vs ambient temperature
(T_a) at $f = 100$ Hz



ESR as a function of ambient temperature
(T_a) at $f = 100$ kHz. $k = R_{ESR}(T_a)/R_{ESR}(20^\circ\text{C})$



LEAKAGE CURRENT

Rated leakage current, I_{RL} (μA).

Rated voltage, U_R (V).

Rated capacitance, C_R (μF). $I_{RL} = 0.003 \times C_R \times U_R + 4$

R_{th} – short form table versus chassis area and air speed

D x L	Case code	STUD MOUNTED				CLIP MOUNTED	
		$R_{thhs} = 3^\circ\text{C/W}$ (0.5 m/s)	$R_{thhs} = 2^\circ\text{C/W}$ (0.5 m/s)	$R_{thhs} = 3^\circ\text{C/W}$ (2.0 m/s)	$R_{thhs} = 2^\circ\text{C/W}$ (2.0 m/s)	(0.5 m/s)	(2.0 m/s)
35 x 51	A	5.6	5.3	4.5	4.4	10.6	7.4
35 x 60	B	5.4	5.1	4.4	4.3	9.8	7.0
35 x 75	C	5.3	5.1	4.4	4.3	9.2	6.7
35 x 95	D	5.3	5.1	4.4	4.3	8.9	6.7
50 x 75	H	3.6	3.3	2.8	2.7	6.3	4.4
50 x 95	J	3.4	3.2	2.7	2.6	5.8	4.2
50 x 105	K	3.4	3.2	2.7	2.6	5.8	4.2
50 x 115	I	3.4	3.2	2.7	2.6	5.8	4.2
65 x 105	O	2.6	2.4	2.1	2.0	4.2	3.1
65 x 115	Q	2.6	2.4	2.1	2.0	4.2	3.1
65 x 130	S	2.6	2.4	2.1	2.0	4.2	3.1
75 x 78	L	2.3	2.0	1.8	1.7	4.1	2.7
75 x 98	P	2.3	2.0	1.8	1.7	4.0	2.7
75 x 105	T	2.3	2.1	1.7	1.6	3.7	2.6
75 x 115	U	2.2	2.0	1.6	1.5	3.5	2.5
75 x 145	V	2.2	2.0	1.6	1.5	3.4	2.5
75 x 220	X	2.3	2.1	2.0	1.9	3.4	2.6
90 x 78	M	1.9	1.7	1.6	1.4	3.4	2.2
90 x 98	N	1.9	1.7	1.5	1.4	3.1	2.1
90 x 145	Y	1.8	1.6	1.5	1.4	2.7	1.9

OPERATIONAL DATA

Please see operational lifetime section.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (I_R) is therefore only given at test temperature for life tests. An estimation is also given at 60°C.

The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity.

T_a	Failure rate per hour
85°C	1×10^{-6}
60°C	1×10^{-7}

Failure rate per hour for catastrophic plus parametric failures.

MECHANICAL DATA

Mounting position

The capacitor can be mounted upright or inclined to a horizontal position.

Clamp fixing

Clips must be ordered separately. See "Accessories".

Stud fixing

Nylon cap nut must be ordered separately.

For the stud fixing insulated version the outer insulation serves as lock washer. See "Accessories". Max tightening torque: M8: 3 Nm M12: 8 Nm. Max chassis thickness 5 mm. Mounting hole: See "Accessories".

Screw terminals

M5 x 10 according to DIN 41.248. Max tightening torque: 2.5 Nm. Must be ordered separately: See "Accessories".

Recommended max connector thickness with delivered screw: 4 mm. M6 thread on request.

Insulation can

PEH169 is supplied with a polypropylene insulation can, thickness 0.8 mm. Voltage proof of the insulation sleeve: ≥ 4000 VDC.

PVC shrink sleeve only on request.

ORDERING INFORMATION

Pos 1-20

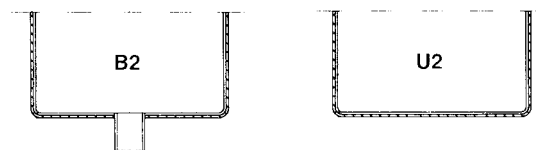
P	E	H	1	6	9	K	U	5	6	8	0	Q	B	2						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

Capacitance tolerances:

Pos. 13: Q = -10 to +30%

M: -20 to +20%

Pos. 14-15: B2 = with bottom stud
U2 = without bottom stud

**Quantities and weights**

CASE CODE	A	B	C	D	H	I	J	K	L	M	N	O	P	Q	S	T	U	V	X	Y
Weight approx (g)	70	85	105	130	180	300	240	265	430	750	950	415	530	460	520	585	640	800	1400	1400

ALC10 Series 85°C

RoHS
Compliant

- Compact size
- Long Life, 18000 hours at 85°C (U_R, I_R applied)
- High ripple current
- Excellent surge voltage capability
- Optimized designs available on request

APPLICATION

They are ideally suited for industrial and commercial applications demanding high reliability and long life expectancy such as frequency converters, UPS systems and switch mode power supplies.

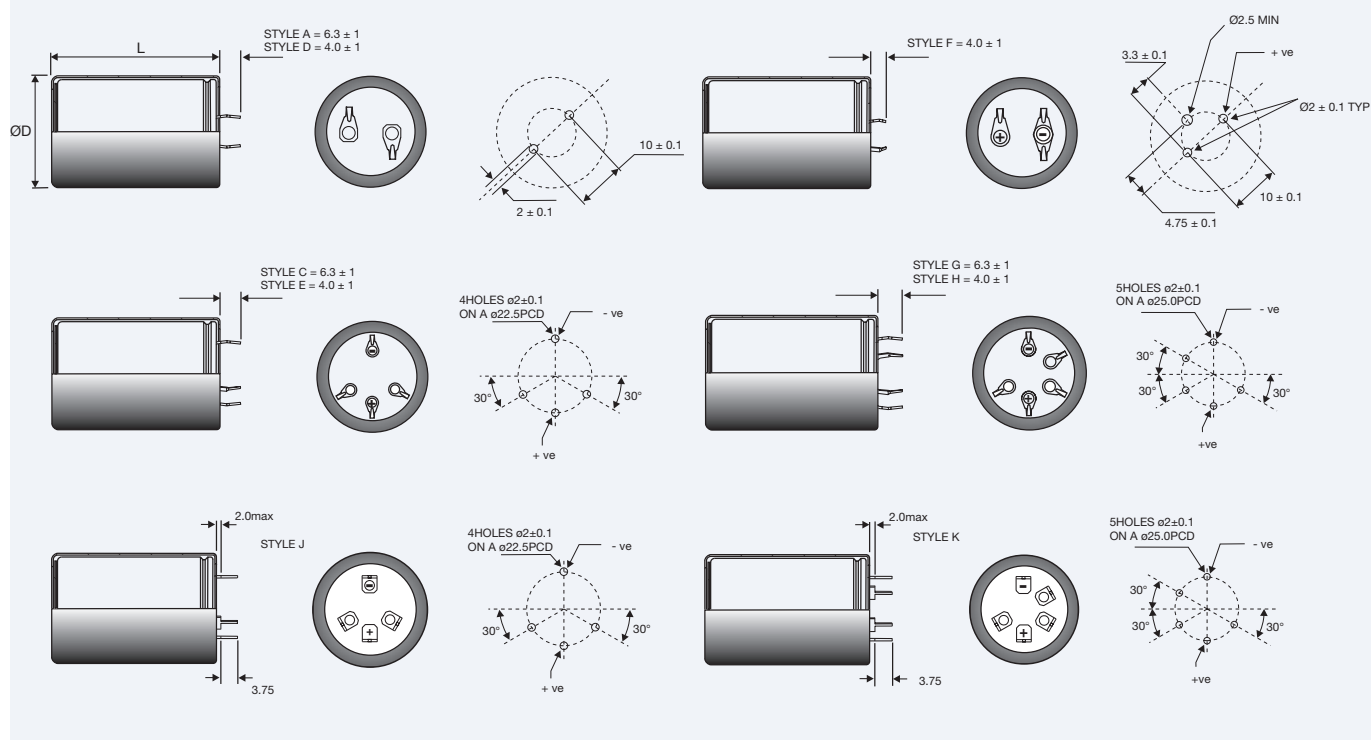
BASIC DESIGN

The ALC10 series of snap-in capacitors cover a wide range of case sizes and voltage ratings featuring high ripple current and surge voltage capability and very long life performance.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/85/56,	
Capacitance range	56 – 82000 μF	
Capacitance tolerance	–20 to +20%	
Rated voltage U _R	40–450 VDC	
Surge voltage U _s	1.15 x U _R (for U _R ≤ 250 VDC) 1.10 x U _R (for U _R ≥ 350 VDC)	Test Condition: ≤ 30s surge, 1000 cycles @ 85°C
Surge voltage U _{ss} (Short duration)	U _R U _{ss} 200 350 250 400 350 500 400 520 415 530 450 550 500 600	Test Condition: ≤ 500ms surge, 100 cycles @ 20°C
Leakage current I _L	= 0.006 x C _R x U _R (μA) or 6mA whichever is the smaller. Note, C _R is in μF.	Test Condition: U _R , 5mins., 20°C
Operational life time +85°C, U _R , I _R	Can Diameter 25 10000 hrs 30 13000 hrs 35 15000 hrs 40, 45, 50 18000 hrs	End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit
+85°C, U _R	Can Diameter 25 16000 hrs 30 21000 hrs 35 24000 hrs 40, 45, 50 29000 hrs	
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C	
Temperature range	–40 to +85°C (Operating) –55°C to +85°C (Storage)	

SPECIFICATION



Mounting

These capacitors are designed to be mounted by their terminations alone, and may be used in any position. Dummy pins must be isolated on 4 and 5 pin styles.

Terminal Style

Description	2 pin	2 pin	3 pin	4 pin	4 pin	5 pin	5 pin	4 pin	5 pin
Pin length	6.3 ± 1	4.0 ± 1	4.0 ± 1	6.3 ± 1	4.0 ± 1	6.3 ± 1	4.0 ± 1	5.75	5.75
Code	A	D	F	C	E	G	H	J	K
DIA. mm -0+1									
25	•	•	•						
30	•	•	•						
35	•	•	•	•	•			•	
40	•	•		•	•	•	•		•
45				•	•	•	•		
50				•	•	•	•		•

Case Code (Component weight, grams - nominal)

Length mm ±2	30	35	40	45	50	55	60	80	105
Dia. mm -0+1									
25	BB (28)	BC (30)	BD (35)						
30	CB (35)	CC (40)	CD (45)	CE (50)	CF (55)				
35	DB (42)	DC (50)	DD (55)	DE (65)	DF (70)	DG (75)	DH (80)	DL (105)	
40	EB (49)	EC (57)	ED (65)	EE (80)	EF (82)	EG (95)	EH (98)	EL (131)	EP (170)
45	FB (62)	FC (72)	FD (82)	FE (92)	FF (103)	FG (113)	FH (123)	FL (164)	FP (215)
50	KB (75)	KC (88)	KD (100)	KE (113)	KF (126)	KG (138)	KH (151)	KL (201)	KP (264)

Other sizes available upon request

ARTICLE TABLE ALC10 (85°C)

Cap (μF)	Case Size (mm)	ESR (mΩ)	Impedance (mΩ)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	85°C 100 Hz	10 KHz	
40 VDC (U _R)						
3900	25x30	125	103	2.33	2.53	ALC10A392BB040
4700	25x35	99	81	2.77	3.01	ALC10A472BC040
5600	30x30	115	94	2.74	2.98	ALC10A562CB040
5600	25x40	85	70	3.14	3.42	ALC10A562BD040
6800	30x35	90	74	3.26	3.55	ALC10A682CC040
8200	30x40	77	63	3.70	4.03	ALC10A822CD040
10000	35x35	86	71	3.69	4.01	ALC10A103DC040
12000	30x50	59	48	4.59	4.99	ALC10A123CF040
12000	35x40	75	62	4.14	4.50	ALC10A123DD040
15000	40x30	89	79	4.42	4.51	ALC10A153EB040
18000	35x50	55	45	5.23	5.69	ALC10A183DF040
18000	40x35	78	70	4.88	4.97	ALC10A183EC040
22000	40x40	62	56	5.81	5.92	ALC10A223ED040
27000	40x50	43	38	7.23	7.36	ALC10A273EF040
33000	40x60	33	30	8.74	8.91	ALC10A333EH040
47000	40x80	23	21	10.96	11.17	ALC10A473EL040
82000	40x105	18	17	12.63	13.44	ALC10A823EP040

63 VDC (U_R)						
2200	25x30	149	118	2.13	2.37	ALC10A222BB063
2700	25x35	128	101	2.43	2.70	ALC10A272BC063
3300	30x30	112	88	2.77	3.08	ALC10A332CB063
3300	25x40	112	88	2.73	3.04	ALC10A332BD063
4700	30x35	91	72	3.24	3.61	ALC10A472CC063
5600	30x40	83	66	3.56	3.96	ALC10A562CD063
6800	35x35	75	59	3.95	4.40	ALC10A682DC063
6800	30x50	75	59	4.07	4.53	ALC10A682CF063
8200	35x40	69	55	4.31	4.80	ALC10A822DD063
8200	40x30	82	72	3.95	4.03	ALC10A822EB063
10000	35x50	64	51	4.85	5.40	ALC10A103DF063
10000	40x35	80	72	4.58	4.67	ALC10A103EC063
12000	40x40	64	57	5.42	5.55	ALC10A123ED063
15000	40x50	44	39	7.02	7.18	ALC10A153EF063
18000	40x60	35	31	8.54	8.75	ALC10A183EH063
27000	40x80	24	21	10.53	10.78	ALC10A273EL063
39000	40x105	19	17	12.23	13.51	ALC10A393EP063

100 VDC (U_R)						
1000	25x30	243	182	1.67	2.04	ALC10A102BB100
1200	25x35	203	152	1.93	2.36	ALC10A122BC100
1500	30x40	163	122	2.30	2.81	ALC10A152CB100
1500	25x40	163	122	2.27	2.78	ALC10A152BD100
1800	30x35	137	103	2.64	3.23	ALC10A182CC100
2200	30x40	113	85	3.05	3.73	ALC10A222CD100
2700	35x35	92	69	3.57	4.37	ALC10A272DC100
2700	40x30	121	104	3.72	3.88	ALC10A272EB100
3300	30x50	76	57	4.05	4.95	ALC10A332CF100
3300	35x40	76	57	4.11	5.03	ALC10A332DD100
3300	40x35	106	92	4.09	4.24	ALC10A332EC100
3900	40x40	85	74	4.88	5.08	ALC10A392ED100
4700	35x50	55	41	5.23	6.40	ALC10A472DF100

Termination Style A,C,D,E,F,G,H,J or K 

ARTICLE TABLE ALC10 (85°C)

Cap (μF)	Case Size (mm)	ESR (mΩ)	Impedance (mΩ)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	85°C 100 Hz	10 KHz	
100 VDC (U _R)						
4700	40x45	70	61	5.60	5.83	ALC10A472EE100
5600	40x50	59	51	6.41	6.68	ALC10A562EF100
6800	40x55	53	46	6.61	6.84	ALC10A682EG100
8200	40x60	44	39	7.36	7.61	ALC10A822EH100
12000	40x80	31	27	9.14	9.45	ALC10A123EL100
18000	40x105	19	17	11.34	12.61	ALC10A183EP100
200 VDC (U _R)						
330	25x30	486	340	1.18	1.63	ALC10A331BB200
390	25x35	412	288	1.36	1.87	ALC10A391BC200
470	30x30	343	240	1.58	2.18	ALC10A471CB200
470	25x40	343	240	1.56	2.15	ALC10A471BD200
560	30x35	288	202	1.82	2.51	ALC10A561CC200
680	30x40	238	167	2.10	2.89	ALC10A681CD200
820	35x35	198	139	2.43	3.35	ALC10A821DC200
820	40x30	178	142	3.06	3.63	ALC10A821EB200
1000	30x50	163	114	2.76	3.80	ALC10A102CF200
1000	35x40	163	114	2.81	3.87	ALC10A102DD200
1000	40x35	153	124	3.43	3.99	ALC10A102EC200
1200	35x50	135	82	3.06	4.01	ALC10A122DF200
1200	40x40	124	99	4.02	4.69	ALC10A122ED200
1500	35x50	110	77	3.70	5.10	ALC10A152DF200
1500	40x45	101	81	4.61	5.38	ALC10A152EE200
1800	40x50	84	68	5.27	6.15	ALC10A182EF200
2200	40x60	67	53	6.29	7.43	ALC10A222EH200
3300	40x80	46	37	7.83	9.17	ALC10A332EL200
4700	40x105	45	32	8.08	11.73	ALC10A472EP200
5600	45x105	42	29	8.51	12.16	ALC10G562FP200
8200	50x105	33	25	9.17	11.76	ALC10G822KP200
250 VDC (U _R)						
220	25x30	727	473	0.97	1.41	ALC10A221BB250
270	25x35	593	385	1.13	1.65	ALC10A271BC250
330	30x30	486	316	1.33	1.94	ALC10A331CB250
330	25x35	490	320	1.34	1.95	ALC10A331BC250
330	25x40	486	316	1.31	1.91	ALC10A331BD250
470	30x35	343	223	1.67	2.43	ALC10A471CC250
560	30x40	288	187	1.91	2.78	ALC10A561CD250
680	35x35	238	155	2.22	3.23	ALC10A681DC250
680	30x50	238	155	2.29	3.34	ALC10A681CF250
680	40x30	187	144	2.79	3.56	ALC10A681EB250
820	35x40	198	129	2.55	3.72	ALC10A821DD250
820	40x40	153	116	3.80	4.91	ALC10A821ED250
1000	35x50	163	106	3.26	4.75	ALC10A102DF250
1000	40x45	126	96	4.33	5.58	ALC10A102EE250
1200	35x60	140	100	3.76	5.48	ALC10A122DH250
1200	40x50	104	80	4.94	6.37	ALC10A122EF250
1500	40x55	89	69	5.29	6.58	ALC10A152EG250
1800	35x80	100	82	4.60	6.69	ALC10A182DL250
1800	40x60	74	58	5.92	7.34	ALC10A182EH250
2200	40x80	57	43	7.33	9.49	ALC10A222EL250
3900	40x105	46	32	7.78	11.71	ALC10A392EP250
4700	45X105	42	29	8.22	12.11	ALC10G472FP250
5600	50x105	38	27	8.63	12.03	ALC10G562KP250

Termination Style A,C,D,E,F,G,H,J or K 

ARTICLE TABLE ALC10 (85°C)

Cap (μF)	Case Size (mm)	ESR (mΩ)	Impedance (mΩ)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	85°C 100 Hz	10 KHz	
350 VDC (U _R)						
120	25x30	1139	736	0.83	1.75	ALC10A121BB350
150	25x35	912	589	0.99	2.07	ALC10A151BC350
180	25x40	761	492	1.13	2.37	ALC10A181BD350
180	30x30	776	506	1.11	2.19	ALC10A181CB350
270	30x35	527	346	1.41	2.65	ALC10A271CC350
330	30x40	432	284	1.65	3.07	ALC10A331CD350
330	40x30	424	277	2.02	3.97	ALC10A331EB350
390	30x50	364	238	1.92	3.65	ALC10A391CF350
390	35x35	386	259	1.82	3.07	ALC10A391DC350
390	40x35	361	236	2.33	4.50	ALC10A391EC350
470	35x40	321	216	2.07	3.47	ALC10A471DD350
470	40x40	299	195	2.69	5.22	ALC10A471ED350
560	35x50	268	180	2.80	4.80	ALC10A561DF350
560	40x45	251	164	3.04	5.88	ALC10A561EE350
680	40x50	207	136	3.46	6.65	ALC10A681EF350
820	35x60	190	130	3.40	5.50	ALC10A821DH350
820	40x55	174	114	3.84	7.16	ALC10A821EG350
820	40x60	172	112	3.99	7.67	ALC10A821EH350
1000	35x80	154	104	3.90	6.40	ALC10A102DL350
1200	40x80	119	78	4.95	9.20	ALC10A122EL350
1800	40x105	81	54	6.14	10.73	ALC10A182EP350
2700	45x105	63	42	7.00	11.44	ALC10G272FP350
3300	50x105	54	36	7.54	11.57	ALC10G332KP350

400 VDC (U_R)

100	25x30	1400	943	0.77	1.60	ALC10A101BB400
120	25x35	1166	785	0.90	1.87	ALC10A121BC400
150	30x30	950	645	1.04	2.03	ALC10A151CB400
150	25x40	935	630	1.06	2.18	ALC10A151BD400
180	30x35	791	536	1.20	2.36	ALC10A181CC400
220	30x35	650	400	1.31	2.47	ALC10A221CC400
220	30x40	648	440	1.41	2.74	ALC10A221CD400
270	35x35	547	376	1.61	2.88	ALC10A271DC400
270	40x30	441	284	1.85	3.67	ALC10A271EB400
330	35x35	461	320	1.73	2.92	ALC10A331DC400
330	30x50	438	299	1.82	3.42	ALC10A331CF400
330	35x40	449	309	1.84	3.27	ALC10A331DD400
330	40x35	378	252	2.29	4.21	ALC10A331EC400
390	35x50	377	226	2.19	3.96	ALC10A391DF400
390	40x40	312	203	2.62	4.86	ALC10A391ED400
470	35x50	321	223	2.62	4.41	ALC10A471DF400
470	40x40	230	156	2.74	5.21	ALC10A471ED400
470	40x45	258	168	3.00	5.49	ALC10A471EE400
560	35x50	278	180	2.57	4.04	ALC10A561DF400
560	35x60	264	184	3.01	5.11	ALC10A561DH400
560	40x50	216	141	3.41	6.19	ALC10A561EF400
680	35x60	232	142	2.90	4.73	ALC10A681DH400
680	40x60	177	114	3.99	7.14	ALC10A681EH400
820	35x80	181	127	3.70	6.09	ALC10A821DL400
1000	35x80	112	77	3.98	6.32	ALC10A102DL400
1000	40x80	120	78	5.00	8.82	ALC10A102EL400
1500	40x105	99	68	5.79	10.16	ALC10A152EP400
2200	45x105	77	53	6.56	10.90	ALC10G222FP400
2700	50x105	66	45	7.11	11.13	ALC10G272KP400

Termination Style A,C,D,E,F,G,H,J or K 

ARTICLE TABLE ALC10 (85°C)

Cap (μ F)	Case Size (mm)	ESR (m Ω)	Impedance (m Ω)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	85°C 100 Hz	10 KHz	
450 VDC (U _R)						
68	25x30	1708	1135	0.69	1.50	ALC10A680BB450
100	25x35	1167	777	0.88	1.90	ALC10A101BC450
120	30x30	989	663	1.00	2.03	ALC10A121CB450
120	25x40	973	648	1.01	2.18	ALC10A121BD450
150	25x40	785	524	1.12	2.35	ALC10A151BD450
150	30x30	805	543	1.10	2.12	ALC10A151CB450
150	30x35	792	531	1.17	2.38	ALC10A151CC450
180	30x40	661	443	1.36	2.76	ALC10A181CD450
220	35x35	559	379	1.56	2.89	ALC10A221DC450
220	30x50	540	362	1.61	3.27	ALC10A221CF450
220	40x30	517	311	1.77	3.68	ALC10A221EB450
270	30x50	446	301	1.76	3.43	ALC10A271CF450
270	35x35	470	322	1.68	2.91	ALC10A271DC450
270	35x40	458	311	1.78	3.27	ALC10A271DD450
270	40x35	427	259	2.07	4.22	ALC10A271EC450
330	30x50	373	253	1.91	3.54	ALC10A331CF450
330	35x50	373	253	2.41	4.38	ALC10A331DF450
330	40x40	348	210	2.47	4.91	ALC10A331ED450
390	35x50	240	166	2.60	4.41	ALC10A391DF450
390	40x45	293	177	2.70	5.53	ALC10A391EE450
470	35x50	252	155	2.43	4.03	ALC10A471DF450
470	35x60	270	185	2.95	5.12	ALC10A471DH450
470	40x50	243	147	3.08	6.25	ALC10A471EF450
560	40x60	202	121	3.56	7.04	ALC10A561EH450
680	35x80	190	131	3.61	6.09	ALC10A681DL450
820	40x80	138	83	4.47	8.78	ALC10A821EL450
1000	40x80	114	75	4.95	9.32	ALC10A102EL450
1200	40x105	103	70	5.57	10.15	ALC10A122EP450
1800	45x105	82	55	6.27	10.87	ALC10G182FP450
2200	50x105	70	47	6.81	11.12	ALC10G222KP450
500 VDC (U _R)						
56	25x30	2207	1642	0.74	1.44	ALC10A560BB500
68	25x35	1816	1351	0.87	1.70	ALC10A680BC500
82	25x40	1507	1120	1.00	1.95	ALC10A820BD500
82	30x30	1527	1140	0.99	1.84	ALC10A820CB500
100	30x30	1000	765	1.08	1.94	ALC10A101CB500
100	30x35	1220	840	1.15	2.16	ALC10A101CC500
120	30x35	1052	786	1.25	2.28	ALC10A121CC500
150	30x40	843	631	1.48	2.67	ALC10A151CD500
180	30x50	699	522	1.78	3.27	ALC10A181CF500
180	35x35	728	549	1.70	2.84	ALC10A181DC500
180	40x30	699	522	1.76	3.22	ALC10A181EB500
220	35x40	596	450	1.96	3.26	ALC10A221DD500
220	40x35	571	426	2.07	3.82	ALC10A221EC500
270	35x50	481	362	2.34	3.97	ALC10A271DF500
270	40x40	466	348	2.41	4.42	ALC10A271ED500
330	40x45	382	286	2.74	5.00	ALC10A331EE500
390	35x60	340	258	2.87	4.67	ALC10A391DH500
390	40x50	324	242	3.09	5.59	ALC10A391EF500
470	40x60	269	201	3.56	6.43	ALC10A471EH500
560	35x80	240	182	3.50	5.57	ALC10A561DL500
680	40x80	187	140	4.40	7.77	ALC10A681EL500
1000	40x105	130	98	5.43	9.18	ALC10A102EP500
1500	45x105	110	82	5.97	9.76	ALC10G152FP500
1800	50x105	94	70	6.45	10.09	ALC10G182KP500

Termination Style A,C,D,E,F,G,H,J or K 

OPERATIONAL DATA	RELIABILITY	
Operational Lifetime Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.	The failure rate is derived from our periodic test results. The failure rate (λ_p) is therefore only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT = 1×10^{-9} failures per hour.	
	T_a	Failure rate per hour
	85°C	250 FIT
	40°C	12 FIT
	Failure rate per hour for catastrophic plus parametric failures.	

MECHANICAL DATA		
Mounting position The capacitor can be mounted upright or inclined to a horizontal position.	Insulating resistance ≥ 100 Mohms at 100V d.c., across insulating sleeve.	Safety vent A safety vent for over pressure is featured on either the base (opposing end to the terminals) or on the the side of the can. This is in the form of a grooved section on the surface of the can which is a weakened area and is designed to relieve build up of internal pressure due to over stress or catastrophic failure.
Vibration 10Hz to 500Hz at 0.75mm or 10g for 3x2hrs duration. 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration (45/50mm diameter cans).	Voltage Proof ≥ 2500 V d.c., across insulating sleeve.	

PEH 506 85°C

RoHS
Compliant

- Snap-In
- Long Life Grade
- PCB mounting
- Low ERS and ESL
- High ripple current

APPLICATION

Typical applications for PEH 506 would be SMPS, drives, welding equipment, UPS and other power electronic applications where high current ratings and compact size are important.

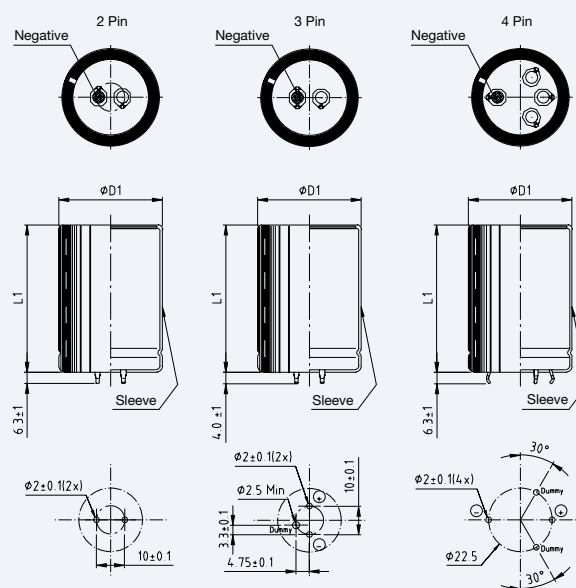
BASIC DESIGN

PEH 506 is a Long Life electrolytic capacitor designed to offer high ripple current capability and low mounting cost. The low ESR is a result of very low resistive paper/ electrolyte system.

The low ESR together with the TDC thermal concept gives the PEH 506 a high ripple current capability.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/85/56, in accordance with CECC 30 301-809
Capacitance range	68–27000 μ F
Capacitance tolerance	–20 to +20%
Rated voltage	35–450 VDC
Temperature range	–40 to +85°C
Leakage current, I_{RL} (μA)	$0.003 (\mu A) \times C_R (\mu F) \times U_R (V)$
Operational life time +85°C, U_R	6000 hours
Shelf life	4 years at 0 Volt and +40°C
Diameter range	22–35 mm
Pin configuration	22–35 mm: 2-3 pins



Dimensions table PEH 532 (mm)

D x L	Case code	D1 ±0.5	L1 ±1.0	Weight approx (g)
22 x 25	AB	22.5	26	13
22 x 30	AC	22.5	31	14
22 x 35	AD	22.5	36	15
22 x 40	AE	22.5	41	17
22 x 45	AF	22.5	46	19
22 x 50	AG	22.5	51	21
25 x 25	BB	25.5	26	19
25 x 30	BC	25.5	31	21
25 x 35	BD	25.5	36	24
25 x 40	BE	25.5	41	27
25 x 45	BF	25.5	46	30
25 x 50	BG	25.5	51	33
30 x 25	CB	30.5	26	24
30 x 30	CC	30.5	31	29
30 x 35	CD	30.5	36	34
30 x 40	CE	30.5	41	39
30 x 45	CF	30.5	46	45
30 x 50	CG	30.5	51	51
35 x 25	DB	35.5	26	32

D x L	Case code	D1 ±0.5	L1 ±1.0	Weight approx (g)
35 x 30	DC	35.5	31	40
35 x 35	DD	35.5	36	48
35 x 40	DE	35.5	41	56
35 x 45	DF	35.5	46	64
35 x 50	DG	35.5	51	72
35 x 55	DH	35.5	56	85

Pin Configuration

Description	2 pin	2 pin	3 pin	4 pin	4 pin
Pin length	6.3±1	4.0±1	4.0±1	6.3±1	4.0±1
Code	2	2S	3	4	4S
DIA. mm -0+1					
22	•	•	•		
25	•	•	•		
30	•	•	•		
35	•	•	•	•	•

ARTICLE TABLE PEH 506 (85°C)

C_R	D x L	Case code	I_{RAC}^* 85°C 100 Hz A	I_{RAC}^* 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
35 VDC (U_R)								
3300	22 x 30	AC	2.9	6.4	110	92	PEH506JAC4330M2	
3900	22 x 30	AC	3.1	6.6	96	82	PEH506JAC4390M2	
4700	22 x 35	AD	3.5	7.7	79	67	PEH506JAD4470M2	
4700	25 x 30	BC	3.3	7.0	85	72	PEH506JBC4470M2	
5600	22 x 40	AE	4.0	8.6	67	56	PEH506JAE4560M2	
5600	25 x 30	BC	3.4	7.0	76	66	PEH506JBC4560M2	
6800	22 x 40	AE	4.2	8.9	58	50	PEH200JAE4680M2	
6800	25 x 35	BD	4.0	8.2	62	53	PEH506JBD4680M2	
6800	30 x 30	CC	3.6	7.2	70	62	PEH506JCC4680M2	
8200	22 x 50	AG	5.0	10.6	47	40	PEH506JAG4820M2	
8200	25 x 40	BE	4.5	9.4	52	45	PEH506JBE4820M2	
8200	30 x 30	CC	3.6	6.9	66	59	PEH560JCC4820M2	
10000	25 x 45	BF	5.0	10.4	43	38	PEH506JBF5100M2	
10000	30 x 35	CD	4.2	8.3	53	47	PEH506JCD5100M2	
10000	35 x 30	DC	3.7	7.0	66	61	PEH506JDC5100M2	
12000	25 x 50	BG	5.5	11.3	37	32	PEH506JBG5120M2	
12000	30 x 40	CE	4.8	9.4	44	39	PEH506JCE5120M2	
12000	35 x 30	DC	3.5	6.5	69	65	PEH506JDC5120M2	
15000	30 x 45	CF	5.3	10.4	37	33	PEH506JCF5150M2	
15000	35 x 35	DD	4.1	7.8	55	51	PEH506JDD5150M2	
18000	35 x 40	DE	4.7	8.9	45	42	PEH506JDE5180M2	
22000	35 x 45	DF	5.2	9.8	39	37	PEH506JDF5220M2	
27000	35 x 50	DG	5.7	10.6	35	33	PEH506JDG5270M2	
63 VDC (U_R)								
1200	22 x 25	AB	2.1	5.3	160	110	PEH506MAB4120M2	
1500	22 x 30	AC	2.5	6.4	120	89	PEH506MAC4150M2	
1800	22 x 30	AC	2.6	6.6	110	78	PEH506MAC4180M2	
2200	22 x 35	AD	3.1	7.7	87	63	PEH506MAD4220M2	
2200	25 x 30	BC	2.9	7.0	93	69	PEH506MBC4220M2	
2700	22 x 40	AE	3.5	8.8	72	52	PEH506MAE4270M2	
2700	25 x 35	BD	3.4	8.3	75	56	PEH506MBD4270M2	
3300	22 x 50	AG	4.1	10.4	58	42	PEH506MAG4330M2	
3300	25 x 40	BE	3.9	9.4	62	46	PEH506MBE4330M2	
3300	30 x 30	CC	3.3	7.0	76	60	PEH506MCC4330M2	
3900	25 x 45	BF	4.4	10.4	53	40	PEH506MBF4390M2	
3900	30 x 35	CD	3.8	8.4	62	48	PEH506MCD4390M2	
4700	25 x 50	BG	4.8	11.3	45	34	PEH506MBG4470M2	
4700	30 x 40	CE	4.4	9.6	51	40	PEH506MCE4470M2	
4700	35 x 30	DC	3.4	6.7	74	63	PEH506MDC4470M2	
5600	30 x 40	CE	4.4	9.2	48	39	PEH506MCE4560M2	
5600	35 x 35	DD	4.0	8.1	58	49	PEH506MDD4560M2	
6800	30 x 45	CF	4.9	10.2	41	33	PEH506MCF4680M2	
6800	35 x 40	DE	4.6	9.3	48	40	PEH506MDE4680M2	
8200	35 x 45	DF	5.1	10.3	41	35	PEH506MDF4820M2	
10000	35 x 50	DG	5.5	11.0	37	31	PEH506MDG5100M2	
100 VDC (U_R)								
560	22 x 25	AB	1.5	3.6	370	290	PEH506PAB3560M2	
680	22 x 30	AC	1.7	4.3	300	230	PEH506PAC3680M2	
680	25 x 25	BB	1.7	4.1	310	240	PEH506PBB3680M2	
820	22 x 35	AD	2.0	5.0	250	190	PEH506PAD3820M2	
820	25 x 30	BC	2.0	4.8	260	200	PEH506PBC3820M2	
1000	22 x 40	AE	2.3	5.7	210	160	PEH506PAE4100M2	
1000	25 x 30	BC	2.1	5.1	210	170	PEH506PBC4100M2	
1200	22 x 40	AE	2.5	6.1	170	140	PEH506PAE4120M2	
1200	25 x 35	BD	2.5	6.0	180	140	PEH506PBD4120M2	
1500	22 x 45	AF	2.8	6.9	140	110	PEH506PAF4150M2	
1500	25 x 40	BE	2.9	6.8	140	110	PEH506PBE4150M2	

* Maximum values

ARTICLE TABLE PEH 506 (85°C)

C_R	D x L	Case code	I_{RAC}^* 85°C 100 Hz A	I_{RAC}^* 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
100 VDC (U_R)								
1800	25 x 45	BF	3.2	7.6	120	95	PEH506PBF4180M2	
1800	30 x 35	CD	3.1	7.0	130	100	PEH506PCD4180M2	
2200	25 x 50	BG	3.6	8.5	100	78	PEH506PBG4220M2	
2200	30 x 40	CE	3.5	8.0	110	84	PEH506PCE4220M2	
2200	35 x 30	DC	2.9	6.2	120	100	PEH506PDC4220M2	
2700	30 x 45	CF	4.0	8.9	88	70	PEH506PCF4270M2	
2700	35 x 35	DD	3.5	7.3	100	82	PEH506PDD4270M2	
3300	30 x 50	CG	4.4	9.8	73	59	PEH506PCG4330M2	
3300	35 x 40	DE	3.9	8.4	82	68	PEH506PDE4330M2	
3900	35 x 45	DF	4.4	9.3	70	58	PEH506PDF4390M2	
4700	35 x 50	DG	4.9	10.1	60	50	PEH506PDG4470M2	
200 VDC (U_R)								
270	22 x 30	AC	1.2	5.4	510	270	PEH506RAC3270M2	
270	25 x 25	BB	1.2	4.8	520	290	PEH506RBB3270M2	
330	22 x 35	AD	1.4	6.2	420	220	PEH506RAD3330M2	
330	25 x 30	BC	1.4	5.9	420	230	PEH506RBC3330M2	
390	22 x 35	AD	1.5	6.5	360	190	PEH506RAD3390M2	
390	25 x 30	BC	1.5	6.0	360	200	PEH506RBC3390M2	
470	22 x 40	AE	1.7	7.4	300	160	PEH506RAE3470M2	
470	25 x 35	BD	1.7	7.0	300	160	PEH506RBD3470M2	
470	30 x 30	CC	1.7	6.4	310	170	PEH506RCC3470M2	
560	22 x 45	AF	1.9	8.2	250	140	PEH506RAF3560M2	
560	25 x 40	BE	1.9	8.0	250	140	PEH506RBE3560M2	
680	22 x 50	AG	2.1	9.1	210	110	PEH506RAG3680M2	
680	25 x 45	BF	2.2	8.9	210	110	PEH506RBF3680M2	
680	30 x 35	CD	2.1	7.4	220	130	PEH506RCD3680M2	
820	25 x 50	BG	2.5	9.7	170	96	PEH506RBG3820M2	
820	30 x 35	CD	2.3	7.1	190	110	PEH506RCD3820M2	
1000	30 x 40	CE	2.6	8.1	160	92	PEH506RCE4100M2	
1000	35 x 35	DD	2.5	7.2	170	100	PEH506RDD4100M2	
1200	30 x 45	CF	2.9	9.0	130	78	PEH506RCF4120M2	
1200	35 x 40	DE	2.9	8.2	140	85	PEH506RDE4120M2	
1500	35 x 45	DF	3.3	9.0	110	71	PEH506RDF4150M2	
1800	35 x 50	DG	3.6	9.8	97	61	PEH506RDG4180M2	
2200	35 x 55	DH	4.0	10.4	82	53	PEH506RDH4220M2	
250 VDC (U_R)								
220	22 x 30	AC	1.1	5.5	520	260	PEH506SAC3220M2	
220	25 x 25	BB	1.1	4.8	530	270	PEH506SBB3220M2	
270	22 x 35	AD	1.3	6.4	420	210	PEH506SAD3270M2	
270	25 x 30	BC	1.3	5.9	430	210	PEH506SBC3270M2	
330	22 x 40	AE	1.5	7.2	350	170	PEH506SAE3330M2	
330	25 x 30	BC	1.4	6.0	360	180	PEH506SBC3330M2	
330	30 x 25	CB	1.4	4.9	380	200	PEH506SCB3330M2	
390	22 x 45	AF	1.7	8.1	290	140	PEH506SAF3390M2	
390	25 x 35	BD	1.6	7.1	300	150	PEH506SBD3390M2	
470	22 x 50	AG	1.9	8.9	250	120	PEH506SAG3470M2	
470	25 x 40	BE	1.9	8.0	250	130	PEH506SBE3470M2	
470	30 x 30	CC	1.8	6.1	270	140	PEH506SCC3470M2	
560	22 x 50	AG	2.1	9.2	210	110	PEH506SAG3560M2	
560	25 x 45	BF	2.1	8.9	210	110	PEH506SBF3560M2	
680	25 x 50	BG	2.4	9.8	180	90	PEH506SBG3680M2	
680	30 x 40	CE	2.3	8.3	180	98	PEH506SCE3680M2	
680	35 x 30	DC	2.1	5.8	210	120	PEH506SDC3680M2	
820	30 x 45	CF	2.6	9.2	150	83	PEH506SCF3820M2	
820	35 x 35	DD	2.4	7.0	170	99	PEH506SDD3820M2	
1000	30 x 50	CG	3.0	10.0	130	70	PEH506SCG4100M2	
1000	35 x 40	DE	2.8	8.0	140	82	PEH506SDE4100M2	
1200	35 x 45	DF	3.1	8.9	120	70	PEH506SDF4120M2	
1500	35 x 50	DG	3.5	9.5	98	59	PEH506SDG4150M2	

* Maximum values

ARTICLE TABLE PEH 506 (85°C)

C _R	D x L	Case code	I _{RAC} * 85°C 100 Hz A	I _{RAC} * 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
350 VDC (U _R)								
82	22 x 25	AB	0.71	3.0	1600	970	PEH506UAB2820M2	
100	22 x 30	AC	0.82	3.5	1300	800	PEH506UAC3100M2	
150	22 x 35	AD	1.1	4.4	860	540	PEH506UAD3150M2	
150	25 x 30	BC	1.1	4.3	870	550	PEH506UBC3150M2	
180	22 x 40	AE	1.2	4.9	720	450	PEH506UAE3180M2	
220	22 x 45	AF	1.4	5.6	590	370	PEH506UAF3220M2	
220	25 x 35	BD	1.3	5.3	600	380	PEH506UBD3220M2	
220	30 x 30	CC	1.4	5.1	610	390	PEH506UCC3220M2	
270	22 x 50	AG	1.5	6.3	480	310	PEH506UAG3270M2	
270	25 x 40	BE	1.5	6.0	490	310	PEH506UBE3270M2	
330	25 x 50	BG	1.8	7.1	400	250	PEH506UBG3330M2	
330	30 x 40	CE	1.8	6.8	400	260	PEH506UCE3330M2	
330	35 x 30	DC	1.7	5.6	420	280	PEH506UDC3330M2	
390	25 x 50	BG	2.0	7.5	340	220	PEH506UBG3390M2	
390	30 x 40	CE	2.0	7.0	350	220	PEH506UCE3390M2	
470	30 x 45	CF	2.2	7.9	290	190	PEH506UCF3470M2	
470	35 x 35	DD	2.1	6.6	300	200	PEH506UDD3470M2	
560	30 x 50	CG	2.5	8.7	240	160	PEH506UCG3560M2	
560	35 x 40	DE	2.4	7.5	250	170	PEH506UDE3560M2	
680	35 x 45	DF	2.7	8.4	210	140	PEH506UDF3680M2	
400 VDC (U _R)								
82	22 x 30	AC	0.79	3.4	1300	810	PEH506VAC2820M2	
100	22 x 30	AC	0.87	3.7	1100	670	PEH506VAC3100M2	
100	25 x 25	BB	0.87	3.6	1100	680	PEH506VBB3100M2	
120	22 x 35	AD	1.0	4.3	920	560	PEH506VAD3120M2	
120	25 x 30	BC	1.0	4.2	930	570	PEH506VBC3120M2	
120	30 x 25	CB	1.0	4.0	940	580	PEH506VCB3120M2	
150	22 x 40	AE	1.2	4.9	740	450	PEH506VAE3150M2	
150	25 x 35	BD	1.2	4.9	740	450	PEH506VBD3150M2	
150	30 x 25	CB	1.1	4.2	770	480	PEH506VCB3150M2	
180	22 x 45	AF	1.3	5.5	620	380	PEH506VAF3180M2	
180	30 x 30	CC	1.3	5.1	630	390	PEH506VCC3180M2	
220	22 x 50	AG	1.5	6.2	510	310	PEH506VAG3220M2	
220	25 x 40	BE	1.5	6.0	510	320	PEH506VBE3220M2	
220	30 x 35	CD	1.5	5.9	520	320	PEH506VCD3220M2	
220	35 x 25	DB	1.4	4.5	550	350	PEH506VDB3220M2	
270	25 x 45	BF	1.7	6.7	420	260	PEH506VBF3270M2	
270	30 x 35	CD	1.7	6.2	430	270	PEH506VCD3270M2	
330	30 x 40	CE	1.9	7.0	350	220	PEH506VCE3330M2	
330	35 x 35	DD	1.9	6.7	360	230	PEH506VDD3330M2	
390	30 x 50	CG	2.2	8.4	290	180	PEH506VCG3390M2	
390	35 x 40	DE	2.2	7.6	300	190	PEH506VDE3390M2	
470	35 x 45	DF	2.5	8.5	250	160	PEH506VDF3470M2	
560	35 x 50	DG	2.8	9.3	210	140	PEH506VDG3560M2	
450 VDC (U _R)								
68	22 x 30	AC	0.77	3.5	1300	780	PEH506YAC2680M2	
68	25 x 25	BB	0.77	3.4	1300	790	PEH506YBB2680M2	
82	22 x 30	AC	0.85	3.7	1100	670	PEH506YAC2820M2	
82	25 x 25	BB	0.85	3.6	1100	680	PEH506YBB2820M2	
100	22 x 35	AD	0.98	4.4	910	540	PEH506YAD3100M2	
100	25 x 30	BC	0.99	4.3	920	540	PEH506YBC3100M2	
120	22 x 40	AE	1.1	5.0	760	450	PEH506YAE3120M2	
120	25 x 30	BC	1.1	4.5	780	470	PEH506YBC3120M2	
120	30 x 25	CB	1.1	4.2	800	480	PEH506YCB3120M2	
150	22 x 45	AF	1.3	5.6	620	370	PEH506YAF3150M2	
150	25 x 35	BD	1.3	5.3	620	370	PEH506YBD3150M2	
150	30 x 30	CC	1.3	5.1	630	380	PEH506YCC3150M2	
180	22 x 50	AG	1.4	6.2	520	310	PEH506YAG3180M2	

* Maximum values

ARTICLE TABLE PEH 506 (85°C)

C_R	D x L	Case code	I_{RAC}^* 85°C 100 Hz A	I_{RAC}^* 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
450 VDC (U_R)								
180	25 x 40	BE	1.4	6.0	520	310	PEH506YBE3180M2	
180	30 x 30	CC	1.4	5.3	540	330	PEH506YCC3180M2	
220	25 x 45	BF	1.6	6.8	430	260	PEH506YBF3220M2	
220	30 x 35	CD	1.6	6.2	440	270	PEH506YCD3220M2	
220	35 x 30	DC	1.6	5.6	450	280	PEH506YDC3220M2	
270	30 x 40	CE	1.9	7.1	360	220	PEH506YCE3270M2	
270	35 x 35	DD	1.9	6.7	360	230	PEH506YDD3270M2	
330	30 x 50	CG	2.2	8.5	290	170	PEH506YCG3330M2	
330	35 x 40	DE	2.2	7.6	300	180	PEH506YDE3330M2	
390	35 x 40	DE	2.3	7.4	260	160	PEH506YDE3390M2	
470	35 x 50	DG	2.7	9.3	210	130	PEH506YDG3470M2	

* Maximum values

ORDERING INFORMATION

For further ordering information please see page 8.

Pos 1–20

P	E	H	5	0	6	M	A	B	4	1	2	0	M	2					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Pos. 14: Capacitance tolerance M = -20 to +20%

Pos. 15: Pin configuration

Quantities and weights for PEH506

CASE CODE	AB	AC	AD	AE	AF	AG	BB	BC	BD	BE	BF	BG	CB	CC	CD	CE	CF	CG
Weight approx (g)	13	14	15	17	19	21	19	21	24	27	30	33	24	29	34	39	45	51

Quantities and weights for PEH506

CASE CODE	DB	DC	DD	DE	DF	DG	DH
Weight approx (g)	32	40	48	56	64	72	85

THERMAL RESISTANCE FOR DIFFERENT CASE SIZES, AS A FUNCTION OF CASE AIR SPEED V

At ambient temperature $T_a = 40^\circ\text{C}$

Case		Air speed v											
D x L		v=0,5m/s		v=1,0m/s		v=2,0m/s		v=3,0m/s		v=4,0m/s		v=5,0m/s	
mm		R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}
		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$	
22 x 25	AB	24.3	25.1	19.1	20.0	14.8	15.7	13.2	14.1	11.4	12.3	10.3	11.1
22 x 30	AC	21.3	22.5	16.8	18.0	13.2	14.4	11.7	12.9	10.2	11.4	9.2	10.4
22 x 35	AD	19.1	20.5	15.1	16.6	11.9	13.4	10.7	12.1	9.4	10.8	8.5	9.9
22 x 40	AE	17.4	19.0	13.9	15.5	11.0	12.7	9.9	11.5	8.7	10.4	7.9	9.5
22 x 45	AF	16.1	17.6	12.9	14.4	10.4	11.8	9.3	10.8	8.3	9.7	7.5	9.0
22 x 50	AG	15.1	16.8	12.2	14.0	9.8	11.6	8.9	10.6	7.9	9.7	7.2	9.0
25 x 25	BB	21.9	22.8	17.2	18.1	13.4	14.3	11.8	12.6	10.2	11.1	9.2	10.0
25 x 30	BC	19.3	20.2	15.3	16.1	12.0	12.8	10.5	11.3	9.2	10.0	8.2	9.1
25 x 35	BD	17.2	18.2	13.7	14.7	10.8	11.8	9.6	10.6	8.4	9.4	7.6	8.6
25 x 40	BE	15.8	16.9	12.6	13.7	10.0	11.2	8.9	10.0	7.8	8.9	7.1	8.2
25 x 45	BF	14.7	16.2	11.8	13.3	9.4	10.9	8.4	9.9	7.4	8.9	6.8	8.3
25 x 50	BG	13.7	15.2	11.1	12.6	8.9	10.5	8.0	9.5	7.1	8.6	6.5	8.0
30 x 25	CB	18.9	19.5	14.9	15.5	11.7	12.3	10.0	10.6	8.7	9.3	7.8	8.4
30 x 30	CC	16.4	17.1	13.1	13.8	10.2	10.9	8.8	9.5	7.7	8.4	6.9	7.6
30 x 35	CD	14.8	15.6	11.8	12.6	9.3	10.1	8.0	8.9	7.0	7.9	6.3	7.2
30 x 40	CE	13.5	14.3	10.8	11.6	8.6	9.4	7.4	8.2	6.5	7.3	5.9	6.7
30 x 45	CF	12.5	13.3	10.0	10.9	8.0	8.9	7.0	7.8	6.2	7.0	5.6	6.5
30 x 50	CG	11.9	12.9	9.7	10.7	7.8	8.8	6.8	7.8	6.1	7.1	5.5	6.6
35 x 25	DB	16.5	17.0	13.1	13.6	10.5	11.0	8.6	9.1	7.5	8.0	6.7	7.2
35 x 30	DC	14.3	14.7	11.4	11.8	9.2	9.6	7.6	8.0	6.6	7.0	5.9	6.3
35 x 35	DD	12.9	13.4	10.3	10.8	8.3	8.8	6.9	7.4	6.0	6.5	5.4	5.9
35 x 40	DE	11.8	12.5	9.5	10.1	7.7	8.3	6.4	7.1	5.6	6.3	5.1	5.7
35 x 45	DF	10.9	11.6	8.8	9.5	7.1	7.9	6.0	6.7	5.3	6.0	4.8	5.5
35 x 50	DG	10.5	11.3	8.5	9.3	7.0	7.8	5.9	6.7	5.3	6.0	4.8	5.6
35 x 55	DH	9.6	10.3	7.8	8.5	6.4	7.1	5.4	6.1	4.8	5.5	4.4	5.1
35 x 60	DI	9.1	10.2	7.4	8.5	6.2	7.2	5.2	6.3	4.7	5.7	4.3	5.3
40 x 60	EI	8.2	9.0	6.7	7.6	5.5	6.3	4.6	5.5	4.1	5.0	3.8	4.7
40 x 70	EK	7.5	8.5	6.2	7.2	5.1	6.1	4.4	5.4	3.9	4.9	3.6	4.6
40 x 80	EM	7.0	8.3	5.9	7.2	4.9	6.2	4.2	5.5	3.8	5.1	3.5	4.8
40 x 100	EQ	6.4	8.2	5.4	7.2	4.6	6.3	4.1	5.8	3.7	5.4	3.4	5.2

(R_{thca} = Thermal resistance between case and ambient)

ALC12 Series 85°C

RoHS
Compliant

- Compact Size
- 2000 hours at 85 °C (U_R , I_R applied)
- Excellent surge voltage capability
- Optimized designs available on request

APPLICATION

Designed for applications where high reliability and compact sizes are important such as switch mode power supplies and frequency converters.

BASIC DESIGN

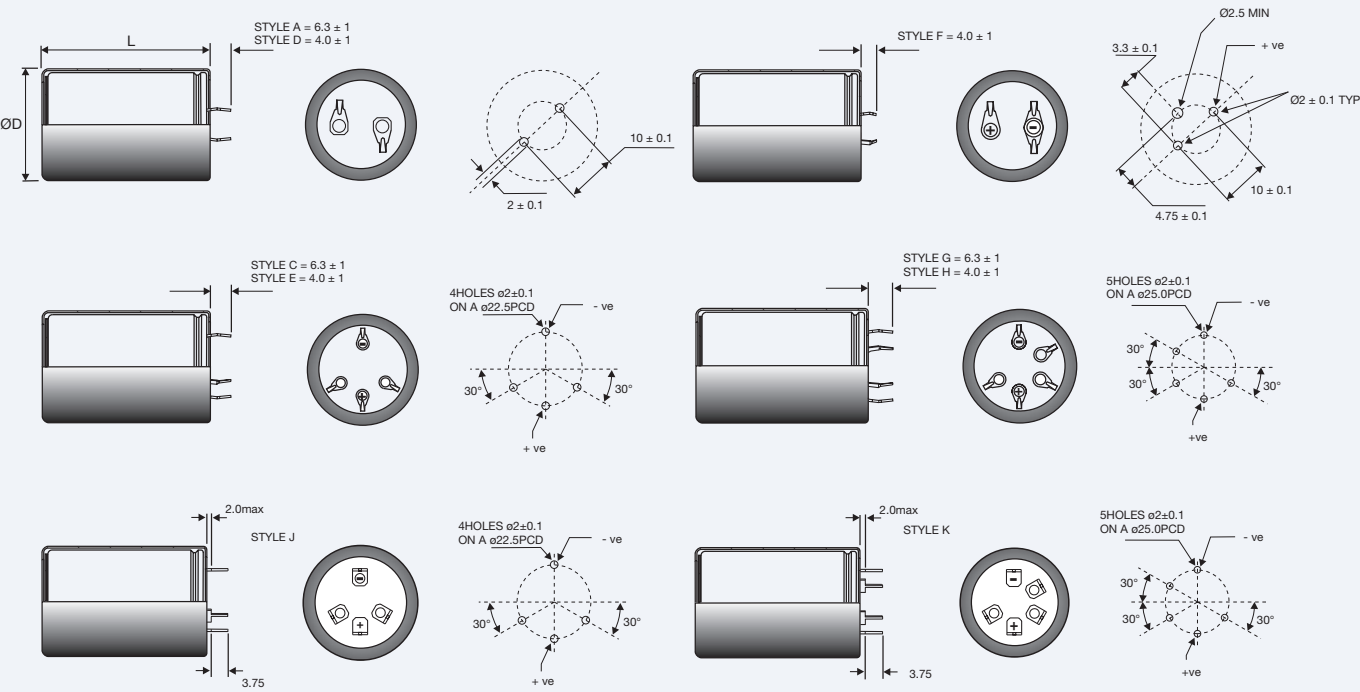
The ALC12 (85°C) is a high CV snap-in version of the ALC10 range. Both series are designed for applications where high

reliability and compact sizes are important such as switch mode power supplies and frequency converters.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/85/56,	
Capacitance range	150 – 8200 µF	
Capacitance tolerance	–20 to +20%	
Rated voltage U _R	200 - 450 VDC	
Surge voltage U _s	1.15 x U _R (for U _R ≤ 250 VDC) 1.10 x U _R (for U _R ≥ 350 VDC)	Test Condition: ≤ 30s surge, 1000 cycles @ 85°C
Surge voltage U _{ss} (Short duration)	U _R U _{ss} 200 350 250 400 350 500 400 520 415 530 450 550 500 600	Test Condition: ≤ 500ms surge, 100 cycles @ 20°C
Leakage current I _L	= 0.006 x C _R x U _R (µA) or 6mA whichever is the smaller. Note, C _R is in µF.	Test Condition: U _R , 5mins., 20°C
Operational life time +85°C, U _R , I _R	Can Diameter 30, 35, 40, 45, 50 2000 hrs	End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit
+85°C, U _R	Can Diameter 30, 35, 40, 45, 50 9000 hrs	
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C	
Temperature range	–40 to +85°C (Operating) –55°C to +85°C (Storage)	

SPECIFICATION



Mounting
These capacitors are designed to be mounted by their terminations alone, and may be used in any position. Dummy pins must be isolated on 4 and 5 pin styles.

Terminal Style

Description	2 pin	2 pin	3 pin	4 pin	4 pin	5 pin	5 pin	4 pin	5 pin
Pin length	6.3±1	4.0±1	4.0±1	6.3±1	4.0±1	6.3±1	4.0±1	5.75	5.75
Code	A	D	F	C	E	G	H	J	K
DIA. mm -0+1									
30	•	•	•						
35	•	•	•	•	•			•	
40	•	•		•	•	•	•		•
45				•	•	•	•		
50				•	•	•	•		•

CASE CODE (COMPONENT WEIGHT grams - nominal)

Length mm ±2	30	35	40	45	50	55	60	80	105
Dia. mm -0+1									
30	CB (35)	CC (40)	CD (45)	CE (50)	CF (55)				
35	DB (42)	DC (50)	DD (55)	DE (65)	DF (70)	DG (75)	DH (80)	DL (105)	
40	EB (49)	EC (57)	ED (65)	EE (80)	EF (82)	EG (95)	EH (98)	EL (131)	EP (170)
45	FB (62)	FC (72)	FD (82)	FE (92)	FF (103)	FG (113)	FH (123)	FL (164)	FP (215)
50	KB (75)	KC (88)	KD (100)	KE (113)	KF (126)	KG (138)	KH (151)	KL (201)	KP (264)

Other sizes available upon request

ARTICLE TABLE ALC12 (85°C)

Cap (μF)	Case Size (mm)	ESR (mΩ)	Impedance (mΩ)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	85°C 100 Hz	10 KHz	
200 VDC (U _R)						
560	30x30	342	224	1.75	2.81	ALC12A561CB200
680	30x35	278	181	2.06	3.36	ALC12A681CC200
1000	30x40	201	135	2.52	3.81	ALC12A102CD200
1000	35x35	218	151	2.58	3.63	ALC12A102DC200
1200	30x50	162	107	3.09	4.86	ALC12A122CF200
1200	35x40	181	125	2.96	4.18	ALC12A122DD200
1200	40x30	243	186	2.26	2.75	ALC12A122EB200
1500	40x35	190	145	2.73	3.35	ALC12A152EC200
1800	35x50	128	91	3.70	5.01	ALC12A182DF200
1800	40x40	156	119	3.17	3.90	ALC12A182ED200
2200	35x60	107	76	4.21	5.65	ALC12A222DH200
2200	40x45	132	101	3.54	4.32	ALC12A222EE200
2700	35x80	93	68	4.99	6.90	ALC12A272DL200
2700	40x55	104	79	4.27	5.26	ALC12A272EG200
3300	40x60	96	75	4.48	5.33	ALC12A332EH200
3900	40x80	78	60	5.55	6.90	ALC12A392EL200
5600	40x105	43	31	8.39	12.08	ALC12A562EP200
6800	45x105	38	28	8.85	12.05	ALC12G682FP200
8200	50x105	34	26	9.21	11.90	ALC12G822KP200
250 VDC (U _R)						
390	30x30	456	299	1.56	2.66	ALC12A391CB250
470	30x35	375	244	1.82	3.17	ALC12A471CC250
560	30x40	314	204	2.12	3.69	ALC12A561CD250
680	35x35	285	194	2.34	3.56	ALC12A681DC250
680	40x30	316	225	2.12	2.94	ALC12A681EB250
820	30x50	219	144	2.75	4.62	ALC12A821CF250
820	35x40	236	160	2.69	4.09	ALC12A821DD250
1000	40x35	232	170	2.58	3.41	ALC12A102EC250
1200	35x50	167	115	3.38	4.96	ALC12A122DF250
1200	40x40	192	140	2.99	3.96	ALC12A122ED250
1500	35x60	136	95	3.87	5.58	ALC12A152DH250
1500	40x45	160	118	3.36	4.35	ALC12A152EE250
1800	40x55	128	93	4.02	5.32	ALC12A182EG250
2200	35x80	94	66	4.79	6.81	ALC12A222DL250
2200	40x60	115	86	4.28	5.43	ALC12A222EH250
2700	40x80	85	61	5.28	7.01	ALC12A272EL250
3900	40x105	48	32	7.72	12.08	ALC12A392EP250
4700	45x105	42	29	8.22	12.11	ALC12G472FP250
5600	50x105	38	27	8.63	12.03	ALC12G562KP250
350 VDC (U _R)						
220	30x30	643	397	1.30	2.55	ALC12A221CB350
270	30x35	522	321	1.52	3.01	ALC12A271CC350
390	30x40	370	231	1.90	3.55	ALC12A391CD350
390	35x35	384	243	2.02	3.51	ALC12A391DC350
470	30x50	304	188	2.31	4.42	ALC12A471CF350
470	40x30	368	249	1.95	2.85	ALC12A471EB350
560	35x40	279	181	2.44	3.97	ALC12A561DD350
560	40x35	299	199	2.32	3.50	ALC12A561EC350
680	35x50	225	144	2.92	4.93	ALC12A681DF350
680	40x40	246	164	2.68	4.04	ALC12A681ED350
820	40x45	207	139	3.02	4.50	ALC12A821EE350
1000	35x60	163	107	3.51	5.45	ALC12A102DH350
1000	40x50	175	118	3.39	4.92	ALC12A102EF350
1200	40x60	146	99	3.89	5.62	ALC12A122EH350
1500	35x80	111	73	4.37	6.64	ALC12A152DL350
1800	40x80	100	68	4.85	6.89	ALC12A182EL350
2200	40x105	81	55	5.61	7.99	ALC12A222EP350
3300	45x105	49	32	7.53	11.79	ALC12G332FP350
3900	50x105	44	29	7.95	11.73	ALC12G392KP350

Termination Style A,C,D,E,F,G,H,J or K 

ARTICLE TABLE ALC12 (85°C)

Cap (μF)	Case Size (mm)	ESR (mΩ) at 20°C	Impedance (mΩ) at 20°C	Ripple current(A) at 85°C		Type number
		100Hz (max)	10 KHz (max)	100 Hz	10 KHz	
400 VDC (U _R)						
180	30x30	794	509	1.21	2.38	ALC12A181CB400
220	30x35	648	414	1.42	2.82	ALC12A221CC400
270	30x40	529	339	1.66	3.28	ALC12A271CD400
330	35x35	457	299	1.91	3.35	ALC12A331DC400
330	40x30	485	326	1.79	2.86	ALC12A331EB400
390	30x50	370	238	2.16	4.17	ALC12A391CF400
390	35x40	385	252	2.18	3.85	ALC12A391DD400
470	40x35	352	240	2.21	3.38	ALC12A471EC400
560	35x50	270	178	2.75	4.72	ALC12A561DF400
560	40x40	295	200	2.54	3.92	ALC12A561ED400
680	35x60	226	149	3.14	5.34	ALC12A681DH400
680	40x45	245	168	2.87	4.37	ALC12A681EE400
820	40x50	207	143	3.22	4.80	ALC12A821EF400
1000	35x80	155	102	3.90	6.52	ALC12A102DL400
1000	40x60	172	119	3.71	5.46	ALC12A102EH400
1500	40x80	115	80	4.64	6.71	ALC12A152EL400
1800	40x105	82	53	6.11	11.06	ALC12A182EP400
2700	45x105	59	39	7.11	11.40	ALC12G272FP400
3300	50x105	51	35	7.60	11.38	ALC12G332KP400
450 VDC (U _R)						
150	30x30	861	548	1.15	2.34	ALC12A151CB450
220	30x35	596	382	1.45	2.83	ALC12A221CC450
270	30x40	486	312	1.70	3.30	ALC12A271CD450
270	35x35	500	324	1.82	3.30	ALC12A271DC450
330	30x50	395	252	2.08	4.10	ALC12A331CF450
330	35x40	410	266	2.10	3.79	ALC12A331DD450
330	40x30	460	313	1.79	2.74	ALC12A331EB450
390	40x35	379	255	2.13	3.35	ALC12A391EC450
470	35x50	292	190	2.64	4.66	ALC12A471DF450
470	40x40	314	211	2.45	3.88	ALC12A471ED450
560	40x45	265	178	2.76	4.34	ALC12A561EE450
680	35x60	206	136	3.23	5.22	ALC12A681DH450
680	40x50	220	150	3.10	4.76	ALC12A681EF450
820	35x80	182	123	3.69	6.26	ALC12A821DL450
820	40x60	180	120	3.62	5.44	ALC12A821EH450
1000	40x80	156	107	4.21	6.69	ALC12A102EL450
1500	40x105	96	63	5.77	10.51	ALC12A152EP450
1800	45x105	82	55	6.27	10.87	ALC12G182FP450
2200	50x105	70	47	6.81	11.12	ALC12G222KP450

Termination Style A,C,D,E,F,G,H,J or K 

OPERATIONAL DATA

Operational Lifetime

Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_R) is therefore only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT = 1 x 10⁻⁹ failures per hour.

T_a Failure rate per hour

85°C 250 FIT

40°C 12 FIT

Failure rate per hour for catastrophic plus parametric failures.

MECHANICAL DATA

Mounting position

The capacitor can be mounted upright or inclined to a horizontal position.

Vibration

10Hz to 500Hz at 0.75mm or 10g for 3x2hrs duration. 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration (45/50mm diameter cans).

Insulating resistance

≥ 100 Mohms at 100V d.c., across insulating sleeve.

Voltage Proof

≥ 2500V d.c., across insulating sleeve.

Safety vent

A safety vent for over pressure is featured on either the base (opposing end to the terminals) or on the the side of the can. This

is in the form of a grooved section on the surface of the can which is a weakened area and is designed to relieve build up of internal pressure due to over stress or catastrophic failure.

ALC40 Series 105°C

RoHS
Compliant

- **Compact Size**
- **Long life, 9000 hours at 105 °C (U_R , I_R applied)**
- **High ripple current**
- **Excellent surge voltage capability**
- **Optimized designs available on request**

APPLICATION

BASIC DESIGN

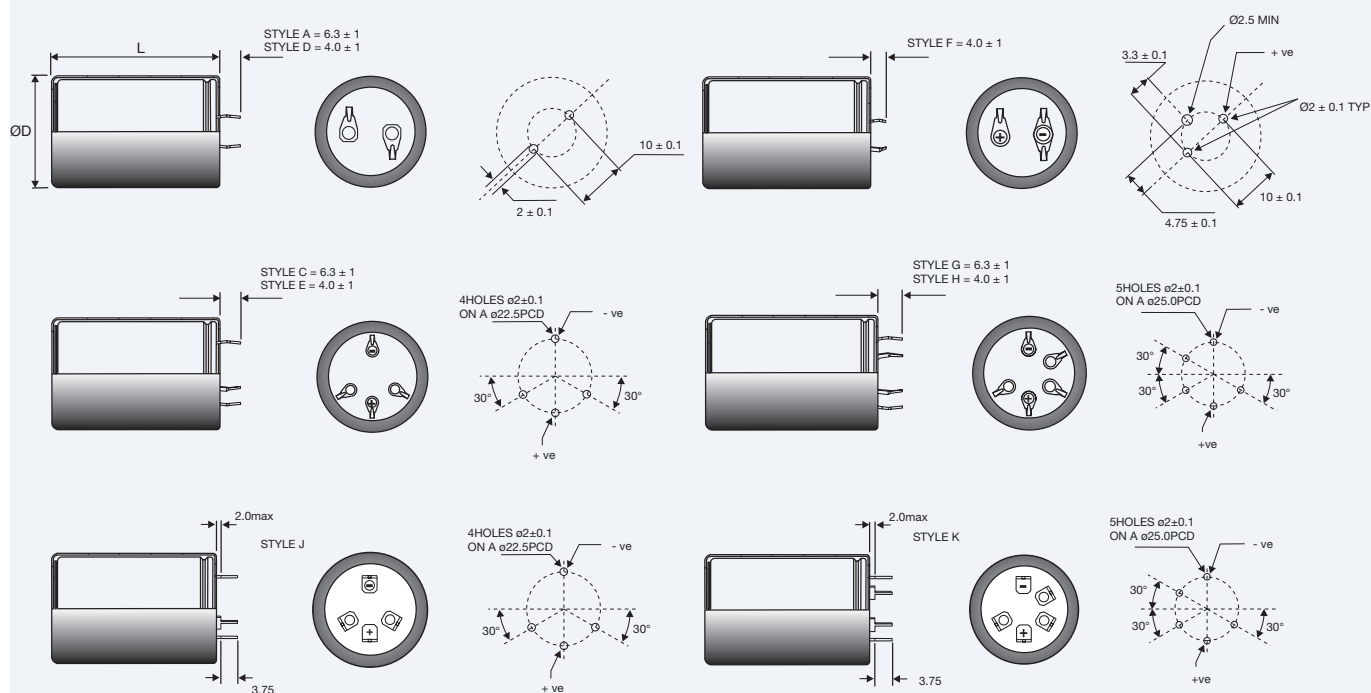
Suited for high reliability and long life applications such as frequency converters, UPS systems and switch mode power supplies, but the extended temperature range allows increased ripple currents at lower temperatures.

The ALC40 series of snap-in capacitors feature the same high ripple currents and long life characteristics as the ALC10 series but can operate at higher temperatures.

SPECIFICATION

SPECIFICATION		
Standards	IEC 60384-4 Long Life Grade 40/105/56,	
Capacitance range	47 – 120000 μF	
Capacitance tolerance	–20 to +20%	
Rated voltage U _R	25 – 450 VDC	
Surge voltage U _s	1.15 x U _R (for U _R ≤ 250 VDC) 1.10 x U _R (for U _R ≥ 350 VDC)	Test Condition: ≤ 30s surge, 1000 cycles @ 105°C
Surge voltage U _{ss} (Short duration)	U _R U _{ss} 200 350 250 400 350 500 400 520 415 530 450 550 500 600	Test Condition: ≤ 500ms surge, 100 cycles @ 20°C
Leakage current I _L	= 0.003 x C _R x U _R (μA) or 6mA whichever is the smaller. Note, C _R is in μF.	Test Condition: U _R , 5mins., 20°C
Operational life time +105°C, U _R , I _R	Can Diameter 25 6000 hrs 30 7000 hrs 35 8000 hrs 40, 45, 50 9000 hrs	End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit
+105°C, U _R	Can Diameter 25 10000 hrs 30 11000 hrs 35 13000 hrs 40, 45, 50 14000 hrs	
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C	
Temperature range	–40 to +105°C (Operating) –55°C to +105°C (Storage)	

SPECIFICATION



Mounting

These capacitors are designed to be mounted by their terminations alone, and may be used in any position. Dummy pins must be isolated on 4 and 5 pin styles.

Terminal Style

Description	2 pin	2 pin	3 pin	4 pin	4 pin	5 pin	5 pin	4 pin	5 pin
Pin length	6.3 ± 1	4.0 ± 1	4.0 ± 1	6.3 ± 1	4.0 ± 1	6.3 ± 1	4.0 ± 1	5.75	5.75
Code	A	D	F	C	E	G	H	J	K
DIA. mm -0+1									
25	•	•	•						
30	•	•	•						
35	•	•	•	•	•			•	
40	•	•		•	•	•	•		•
45				•	•	•	•		
50				•	•	•	•		•

CASE CODE (COMPONENT WEIGHT grams - nominal)

Length mm ± 2	30	35	40	45	50	55	60	80	105
Dia. mm -0+1									
25	BB (28)	BC (30)	BD (35)						
30	CB (35)	CC (40)	CD (45)	CE (50)	CF (55)				
35	DB (42)	DC (50)	DD (55)	DE (65)	DF (70)	DG (75)	DH (80)	DL (105)	
40	EB (49)	EC (57)	ED (65)	EE (80)	EF (82)	EG (95)	EH (98)	EL (131)	EP (170)
45	FB (62)	FC (72)	FD (82)	FE (92)	FF (103)	FG (113)	FH (123)	FL (164)	FP (215)
50	KB (75)	KC (88)	KD (100)	KE (113)	KF (126)	KG (138)	KH (151)	KL (201)	KP (264)

Other sizes available upon request

ARTICLE TABLE ALC40 (105°C)

Cap (μ F)	Case Size (mm)	ESR (m Ω)	Impedance (m Ω)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	105°C 100 Hz	10 KHz	
25 VDC (U _R)						
8200	25x30	183	157	1.97	2.11	ALC40A822BB025
10000	25x35	148	126	2.33	2.50	ALC40A103BC025
12000	25x40	123	105	2.74	2.93	ALC40A123BD025
12000	30x30	157	138	2.18	2.33	ALC40A123CB025
15000	30x35	125	109	2.65	2.83	ALC40A153CC025
18000	30x40	103	91	3.04	3.24	ALC40A183CD025
22000	35x35	116	104	2.91	3.10	ALC40A223DC025
27000	30x50	73	64	3.94	4.21	ALC40A273CF025
27000	35x40	96	86	3.34	3.56	ALC40A273DD025
27000	40x30	75	69	4.03	4.09	ALC40A273EB025
33000	35x50	70	63	4.32	4.61	ALC40A333DF025
33000	40x35	66	62	4.83	4.90	ALC40A333EC025
39000	35x50	69	62	4.32	4.61	ALC40A393DF025
39000	40x40	53	49	5.57	5.65	ALC40A393ED025
47000	40x50	41	37	7.30	7.40	ALC40A473EF025
56000	40x55	38	35	7.51	7.61	ALC40A563EG025
82000	40x80	22	20	11.06	11.24	ALC40A823EL025
120000	40x105	18	17	13.41	14.05	ALC40A124EP025
40 VDC (U _R)						
3900	25x30	202	166	1.87	2.09	ALC40A392BB040
5600	25x35	149	124	2.23	2.49	ALC40A562BC040
5600	30x30	171	144	2.08	2.31	ALC40A562CB040
6800	25x40	123	102	2.61	2.92	ALC40A682BD040
6800	30x35	145	120	2.55	2.84	ALC40A682CC040
8200	30x35	129	110	2.53	2.81	ALC40A822CC040
10000	30x40	107	91	2.90	3.22	ALC40A103CD040
12000	30x50	80	68	3.75	4.18	ALC40A123CF040
12000	35x35	121	106	2.77	3.08	ALC40A123DC040
12000	40x30	88	79	4.13	4.22	ALC40A123EB040
15000	35x40	100	87	3.18	3.53	ALC40A153DD040
15000	40x40	63	56	5.66	5.78	ALC40A153ED040
18000	35x50	73	64	4.12	4.58	ALC40A183DF040
18000	40x45	53	47	6.46	6.60	ALC40A183EE040
22000	40x50	43	39	7.34	7.50	ALC40A223EF040
27000	40x55	39	35	7.50	7.63	ALC40A273EG040
47000	40x80	23	21	10.42	10.59	ALC40A473EL040
68000	40x105	17	16	12.71	13.47	ALC40A683EP040
63 VDC (U _R)						
2200	25x30	227	180	1.69	1.98	ALC40A222BB063
3300	25x35	165	133	2.01	2.35	ALC40A332BC063
3900	25x40	138	111	2.36	2.75	ALC40A392BD063
3900	30x30	185	154	1.88	2.18	ALC40A392CB063
4700	30x35	148	123	2.28	2.65	ALC40A472CC063
5600	30x40	122	102	2.61	3.03	ALC40A562CD063
5600	40x30	102	90	3.82	3.91	ALC40A562EB063
6800	30x50	92	75	3.39	3.93	ALC40A682CF063
6800	35x35	141	119	2.50	2.90	ALC40A682DC063
6800	40x35	91	81	4.18	4.26	ALC40A682EC063
8200	30x50	48	35	3.33	3.98	ALC40A822CF063
8200	35x40	116	99	2.87	3.33	ALC40A822DD063
8200	40x40	72	64	5.01	5.12	ALC40A822ED063
10000	35x50	85	72	3.71	4.31	ALC40A103DF063
10000	40x45	60	53	5.69	5.81	ALC40A103EE063
12000	40x50	50	44	6.50	6.64	ALC40A123EF063
15000	40x60	39	34	7.81	7.99	ALC40A153EH063
22000	40x80	27	24	9.70	9.92	ALC40A223EL063
33000	40x105	18	17	12.01	13.01	ALC40A333EP063

Termination Style A,C,D,E,F,G,H,J or K 

ARTICLE TABLE ALC40 (105°C)

Cap (μF)	Case Size (mm)	ESR (mΩ) at 20°C	Impedance (mΩ) at 20°C	Ripple current(A) at 105°C		Type number
		100Hz (max)	10 KHz (max)	100 Hz	10 KHz	
100 VDC (U _R)						
820	25x30	294	220	1.39	1.82	ALC40A821BB100
1000	25x35	238	177	1.65	2.16	ALC40A102BC100
1200	25x40	198	147	1.93	2.53	ALC40A122BD100
1200	30x30	245	191	1.57	2.01	ALC40A122CB100
1500	30x35	195	151	1.90	2.44	ALC40A152CC100
1800	30x40	162	125	2.18	2.80	ALC40A182CD100
2200	30x50	123	94	2.82	3.63	ALC40A222CF100
2200	35x35	177	142	2.10	2.67	ALC40A222DC100
2200	40x30	128	110	3.58	3.80	ALC40A222EB100
2700	35x40	146	118	2.41	3.07	ALC40A272DD100
2700	40x40	95	80	4.92	5.24	ALC40A272ED100
3300	35x50	108	86	3.12	3.97	ALC40A332DF100
3300	40x45	78	66	5.59	5.95	ALC40A332EE100
3900	40x50	65	55	6.41	6.83	ALC40A392EF100
4700	40x55	58	50	6.67	7.04	ALC40A472EG100
5600	40x60	49	42	7.46	7.87	ALC40A562EH100
8200	40x80	34	29	9.28	9.78	ALC40A822EL100
10000	40x105	24	21	11.33	13.12	ALC40A103EP100
200 VDC (U _R)						
270	25x30	542	377	1.01	1.56	ALC40A271BB200
390	25x35	386	271	1.24	1.86	ALC40A391BC200
470	25x40	320	224	1.45	2.19	ALC40A471BD200
470	30x30	369	270	1.24	1.76	ALC40A471CB200
560	30x35	301	219	1.50	2.13	ALC40A561CC200
680	30x40	249	181	1.72	2.44	ALC40A681CD200
680	40x30	202	158	2.97	3.67	ALC40A681EB200
820	30x50	196	140	2.18	3.16	ALC40A821CF200
820	35x35	252	191	1.70	2.34	ALC40A821DC200
820	40x35	173	137	3.35	4.06	ALC40A821EC200
1000	35x40	208	158	1.95	2.69	ALC40A102DD200
1000	40x40	140	110	3.92	4.80	ALC40A102ED200
1200	35x50	159	119	2.50	3.48	ALC40A122DF200
1200	40x45	116	91	4.50	5.50	ALC40A122EE200
1500	40x50	94	74	5.13	6.23	ALC40A152EF200
1800	40x60	76	60	6.10	7.53	ALC40A182EH200
2700	40x80	52	41	7.62	9.32	ALC40A272EL200
3900	40x105	49	34	7.90	12.31	ALC40A392EP200
5600	45x105	40	28	8.68	12.54	ALC40G562FP200
6800	50x105	36	26	9.08	12.29	ALC40G682KP200
250 VDC (U _R)						
220	25x30	592	405	0.93	1.50	ALC40A221BB250
270	25x35	480	327	1.10	1.77	ALC40A271BC250
330	25x40	393	268	1.29	2.08	ALC40A331BD250
330	30x30	441	312	1.13	1.69	ALC40A331CB250
390	30x35	364	256	1.36	2.04	ALC40A391CC250
470	30x40	302	212	1.56	2.34	ALC40A471CD250
470	40x30	258	193	2.59	3.49	ALC40A471EB250
560	30x50	243	168	1.96	3.02	ALC40A561CF250
560	35x35	297	217	1.57	2.25	ALC40A561DC250
560	40x35	221	166	3.05	4.16	ALC40A561EC250
680	35x40	245	179	1.80	2.59	ALC40A681DD250
680	40x40	180	134	3.49	4.76	ALC40A681ED250
820	35x50	190	137	3.12	4.66	ALC40A821DF250
820	40x45	149	111	4.01	5.46	ALC40A821EE250
1000	35x60	164	125	3.61	5.78	ALC40A102DH250
1000	40x50	123	92	4.58	6.22	ALC40A102EF250
1200	40x55	106	80	4.93	6.51	ALC40A122EG250

Termination Style A,C,D,E,F,G,H,J or K 

ARTICLE TABLE ALC40 (105°C)

Cap (μF)	Case Size (mm)	ESR (mΩ) at 20°C	Impedance (mΩ) at 20°C	Ripple current(A) at 105°C		Type number
		100Hz (max)	10 KHz (max)	100 Hz	10 KHz	
250 VDC (U _R)						
1500	35x80	112	90	4.43	6.88	ALC40A152DL250
1800	40x80	67	50	6.77	9.27	ALC40A182EL250
2700	40x105	62	42	7.05	12.03	ALC40A272EP250
3900	45x105	50	33	7.90	12.43	ALC40G392FP250
4700	50x105	44	30	8.36	12.30	ALC40G472KP250
350 VDC (U _R)						
120	25x30	868	562	0.88	2.07	ALC40A121BB350
150	25x35	694	449	1.04	2.46	ALC40A151BC350
180	25x40	578	374	1.20	2.81	ALC40A181BD350
180	30x30	618	410	1.17	2.46	ALC40A181CB350
220	30x35	502	332	1.36	2.88	ALC40A221CC350
270	30x40	410	272	1.59	3.33	ALC40A271CD350
270	40x30	448	291	1.97	4.36	ALC40A271EB350
330	35x35	378	260	1.79	3.24	ALC40A331DC350
390	30x50	287	191	2.02	4.02	ALC40A391CF350
390	35x40	317	218	2.02	3.67	ALC40A391DD350
390	40x40	312	203	2.64	5.73	ALC40A391ED350
470	35x50	251	170	2.72	4.90	ALC40A471DF350
470	40x45	258	168	3.00	6.46	ALC40A471EE350
560	35x50	224	155	2.57	4.44	ALC40A561DF350
560	35x60	224	155	3.11	5.70	ALC40A561DH350
560	40x50	216	141	3.41	7.27	ALC40A561EF350
680	40x60	177	114	3.99	8.39	ALC40A681EH350
820	35x80	150	102	3.82	6.72	ALC40A821DL350
1000	40x80	120	78	5.00	9.98	ALC40A102EL350
1500	40x105	99	68	6.00	11.47	ALC40A152EP350
2200	45x105	77	53	6.79	12.06	ALC40G222FP350
2700	50x105	66	45	7.34	12.08	ALC40G272KP350
400 VDC (U _R)						
100	25x30	1193	788	0.85	2.09	ALC40A101BB400
120	25x35	991	653	1.00	2.45	ALC40A121BC400
150	25x40	794	524	1.17	2.83	ALC40A151BD400
150	30x30	835	562	1.14	2.46	ALC40A151CB400
180	30x35	690	463	1.31	2.88	ALC40A181CC400
220	30x40	565	379	1.54	3.33	ALC40A221CD400
220	40x30	521	320	1.88	4.36	ALC40A221EB400
270	35x35	470	322	1.73	3.23	ALC40A271DC400
270	40x35	430	266	2.21	4.95	ALC40A271EC400
330	30x50	383	258	1.98	4.02	ALC40A331CF400
330	35x40	386	266	1.98	3.64	ALC40A331DD400
330	40x40	350	216	2.56	5.76	ALC40A331ED400
390	35x50	323	221	2.64	4.66	ALC40A391DF400
390	40x45	295	182	2.88	6.48	ALC40A391EE400
470	35x50	277	192	2.51	4.40	ALC40A471DF400
470	35x60	270	185	3.04	5.78	ALC40A471DH400
470	40x50	245	151	3.28	7.30	ALC40A471EF400
560	40x55	209	130	3.62	7.78	ALC40A561EG400
680	35x80	200	131	3.72	6.69	ALC40A681DL400
680	40x60	173	107	4.08	8.58	ALC40A681EH400
1000	40x80	118	73	4.85	10.16	ALC40A102EL400
1200	40x105	103	70	5.76	11.46	ALC40A122EP400
1800	45x105	82	55	6.48	12.04	ALC40G182FP400
2200	50x105	70	47	7.02	12.08	ALC40G222KP400

Termination Style A,C,D,E,F,G,H,J or K 

ARTICLE TABLE ALC40 (105°C)

Cap (μF)	Case Size (mm)	ESR (mΩ)	Impedance (mΩ)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	105°C 100 Hz	10 KHz	
450 VDC (U _R)						
47	25x30	2011	1392	0.66	1.74	ALC40A470BB450
56	25x35	1687	1168	0.76	2.03	ALC40A560BC450
68	25x40	1391	963	0.88	2.34	ALC40A680BD450
68	30x30	1403	974	0.87	2.19	ALC40A680CB450
82	30x35	1163	807	1.01	2.54	ALC40A820CC450
100	30x40	955	663	1.18	2.95	ALC40A101CD450
120	35x35	810	565	1.36	3.11	ALC40A121DC450
150	30x50	642	446	1.54	3.67	ALC40A151CF450
150	35x40	651	454	1.57	3.53	ALC40A151DD450
150	40x30	642	447	1.73	4.14	ALC40A151EB450
180	35x50	541	377	1.88	4.27	ALC40A181DF450
180	40x35	538	374	2.01	4.70	ALC40A181EC450
220	35x50	449	315	2.28	4.71	ALC40A221DF450
220	40x40	440	306	2.34	5.47	ALC40A221ED450
270	40x50	356	248	2.80	6.74	ALC40A271EF450
330	35x60	285	198	2.91	5.53	ALC40A331DH450
330	40x55	293	204	3.14	7.29	ALC40A331EG450
390	40x60	249	174	3.50	8.04	ALC40A391EH450
470	35x80	203	138	3.51	6.68	ALC40A471DL450
560	40x80	175	122	4.32	9.57	ALC40A561EL450
820	40x105	121	85	5.34	11.05	ALC40A821EP450
1200	45x105	105	71	5.84	11.64	ALC40G122FP450
1500	50x105	86	59	6.44	11.85	ALC40G152KP450

Termination Style A,C,D,E,F,G,H,J or K 

OPERATIONAL DATA

Operational Lifetime

Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_R) is therefore only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT = 1 x 10⁻⁹ failures per hour.

T_a Failure rate per hour

85°C 220 FIT

40°C 10 FIT

Failure rate per hour for catastrophic plus parametric failures.

MECHANICAL DATA

Mounting position

The capacitor can be mounted upright or inclined to a horizontal position.

Vibration

10Hz to 500Hz at 0.75mm or 10g for 3x2hrs duration. 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration (45/50mm diameter cans).

Insulating resistance

≥ 100 Mohms at 100V d.c., across insulating sleeve.

Voltage Proof

≥ 2500V d.c., across insulating sleeve.

Safety vent

A safety vent for over pressure is featured on either the base (opposing end to the terminals) or on the the side of the can. This is in the form of a grooved section on the surface of the can which is a weakened area and is designed to relieve build up of internal pressure due to over stress or catastrophic failure.

PEH 532 105°C

RoHS
Compliant

- Snap-In
- Long Life Grade
- PCB Mounting
- Low ESR and ESL
- High ripple current

APPLICATION

Typical applications for PEH 532 would be SMPS, drives, welding equipment, UPS and other power electronic applications where high current ratings and compact size are important.

BASIC DESIGN

PEH 532 is a Long Life electrolytic capacitor designed to offer high ripple current capability and low mounting cost. The low ESR is a result of very low resistive paper/electrolyte system.

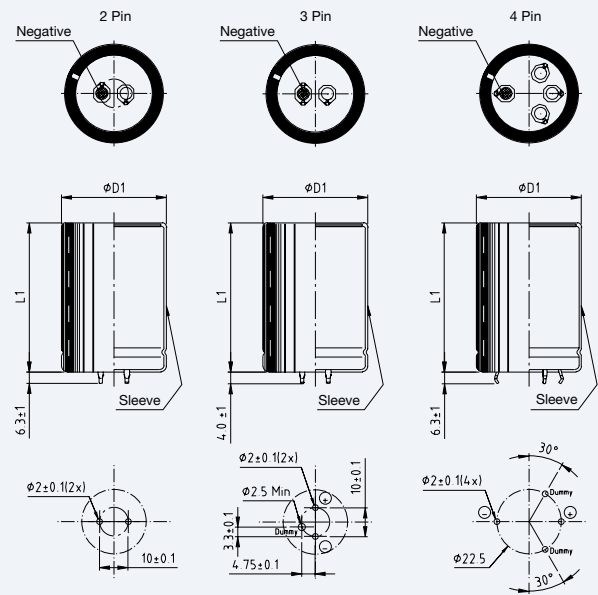
The low ESR together with the TDC thermal concept gives the PEH 532 a high ripple current capability.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/105/56, in accordance with CECC 30 301-809
Capacitance range	68–27000 μ F
Capacitance tolerance	–20 to +20%
Rated voltage	35–450 VDC
Temperature range	–40 to +105°C
Leakage current, I_{RL} (μA)	$0.003 (\mu A) \times C_R (\mu F) \times U_R (V)$
Operational life time	2000 hours at +105°C
Shelf life	4 years at 0 Volt and +40°C
Diameter range	22–35 mm

Pin configuration

Diameter range 22–35 mm: 2–3 pins



Dimensions table PEH 532 (mm)

D x L	Case code	D1 ±0.5	L1 ±1.0	Weight approx (g)
22 x 25	AB	22.5	26	13
22 x 30	AC	22.5	31	14
22 x 35	AD	22.5	36	15
22 x 40	AE	22.5	41	17
22 x 45	AF	22.5	46	19
22 x 50	AG	22.5	51	21
25 x 25	BB	25.5	26	19
25 x 30	BC	25.5	31	21
25 x 35	BD	25.5	36	24
25 x 40	BE	25.5	41	27
25 x 45	BF	25.5	46	30
25 x 50	BG	25.5	51	33
30 x 25	CB	30.5	26	24
30 x 30	CC	30.5	31	29
30 x 35	CD	30.5	36	34
30 x 40	DE	30.5	41	39
30 x 45	CF	30.5	46	45
30 x 50	CG	30.5	51	51
35 x 25	DB	35.5	26	32

D x L	Case code	D1 ±0.5	L1 ±1.0	Weight approx (g)
35 x 30	DC	35.5	31	40
35 x 35	DD	35.5	36	48
35 x 40	DE	35.5	41	56
35 x 45	DF	35.5	46	64
35 x 50	DG	35.5	51	72
35 x 55	DH	35.5	56	85

Pin Configuration

Description	2 pin	2 pin	3 pin	4 pin	4 pin
Pin length	6.3±1	4.0±1	4.0±1	6.3±1	4.0±1
Code	2	2S	3	4	4S
DIA. mm -0+1					
22	•	•	•		
25	•	•	•		
30	•	•	•		
35	•	•	•	•	•

ARTICLE TABLE PEH 532 (105°C)

C _R	D x L	Case code	I _{RAC} * 105°C 100 Hz A	I _{RAC} * 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
35 VDC (U _R)								
3300	22 x 30	AC	1.9	5.1	110	93	PEH532JAC4330M2	
3900	22 x 30	AC	2.0	5.4	97	83	PEH532JAC4390M2	
4700	22 x 35	AD	2.3	6.2	80	67	PEH532JAD4470M2	
4700	25 x 30	BC	2.1	5.8	86	74	PEH532JBC4470M2	
5600	22 x 40	AE	2.6	7.1	67	56	PEH532JAE4560M2	
5600	25 x 30	BC	2.2	5.9	78	68	PEH532JBC4560M2	
6800	22 x 40	AE	2.8	7.5	58	50	PEH532JAE4680M2	
6800	25 x 35	BD	2.6	7.0	63	54	PEH532JBD4680M2	
6800	30 x 30	CC	3.1	8.4	54	46	PEH532JCC4680M2	
8200	22 x 50	AG	3.3	8.8	47	40	PEH532JAG4820M2	
8200	25 x 40	BE	2.9	8.0	52	45	PEH532JBE4820M2	
8200	30 x 30	CC	3.3	8.8	47	40	PEH532JCC4820M2	
10000	25 x 45	BF	3.3	9.0	43	38	PEH532JBF5100M2	
10000	30 x 35	CD	3.8	10.3	38	32	PEH532JCD5100M2	
10000	35 x 30	DC	3.6	9.6	42	36	PEH532JDC5100M2	
12000	25 x 50	BG	3.6	9.9	37	32	PEH532JBG5120M2	
12000	30 x 40	CE	4.4	11.7	32	27	PEH532JCE5120M2	
12000	35 x 30	DC	3.6	9.7	38	33	PEH532JDC5120M2	
15000	30 x 45	CF	5.0	13.3	26	22	PEH532JCF5150M2	
15000	35 x 35	DD	4.2	11.5	30	26	PEH532JDD5150M2	
18000	35 x 40	DE	4.9	13.2	25	22	PEH532JDE5180M2	
22000	35 x 45	DF	5.4	14.8	21	18	PEH532JDF5220M2	
27000	35 x 50	DG	5.9	16.3	18	16	PEH532JDG5270M2	
63 VDC (U _R)								
1200	22 x 25	AB	1.3	3.7	160	120	PEH532MAB4120M2	
1500	22 x 30	AC	1.6	4.4	120	90	PEH532MAC4150M2	
1800	22 x 30	AC	1.7	4.7	110	79	PEH532MAC4180M2	
2200	22 x 35	AD	2.0	5.5	88	64	PEH532MAD4220M2	
2200	25 x 30	BC	1.9	5.2	95	71	PEH532MBC4220M2	
2700	22 x 40	AE	2.3	6.3	72	52	PEH532MAE4270M2	
2700	25 x 35	BD	2.2	6.1	76	56	PEH532MBD4270M2	
3300	22 x 50	AG	2.7	7.4	58	42	PEH532MAG4330M2	
3300	25 x 40	BE	2.5	7.0	62	46	PEH532MBE4330M2	
3300	30 x 30	CC	2.7	7.4	58	42	PEH532MCC4330M2	
3900	25 x 45	BF	2.8	7.8	53	40	PEH532MBF4390M2	
3900	30 x 35	CD	3.1	8.5	48	35	PEH532MCD4390M2	
4700	25 x 50	BG	3.1	8.7	45	34	PEH532MBG4470M2	
4700	30 x 40	CE	3.6	9.7	40	29	PEH532MCE4470M2	
4700	35 x 30	DC	3.1	8.5	46	34	PEH532MDC4470M2	
5600	30 x 40	CE	3.8	10.3	35	26	PEH532MCE4560M2	
5600	35 x 35	DD	3.7	10.1	37	28	PEH532MDD4560M2	
6800	30 x 45	CF	4.3	11.7	29	22	PEH532MCF4680M2	
6800	35 x 40	DE	4.2	11.5	31	23	PEH532MDE4680M2	
8200	35 x 45	DF	4.7	13.0	26	19	PEH532MDF4820M2	
10000	35 x 50	DG	5.2	14.4	22	17	PEH532MDG5100M2	
100 VDC (U _R)								
560	22 x 25	AB	0.96	2.6	380	290	PEH532PAB3560M2	
680	22 x 30	AC	1.1	3.1	300	240	PEH532PAC3680M2	
680	25 x 25	BB	1.1	2.9	320	250	PEH532PBB3680M2	
820	22 x 35	AD	1.3	3.5	250	190	PEH532PAD3820M2	
820	25 x 30	BC	1.3	3.5	260	200	PEH532PBC3820M2	
1000	22 x 40	AE	1.5	4.0	210	160	PEH532PAE4100M2	
1000	25 x 30	BC	1.4	3.8	220	170	PEH532PBC4100M2	
1200	22 x 40	AE	1.6	4.4	170	140	PEH532PAE4120M2	
1200	25 x 35	BD	1.6	4.4	180	140	PEH532PBD4120M2	
1500	22 x 45	AF	1.9	5.0	140	110	PEH532PAF4150M2	
1500	25 x 40	BE	1.9	5.0	140	110	PEH532PBE4150M2	

* Maximum values

ARTICLE TABLE PEH 532 (105°C)

C_R	D x L	Case code	I_{RAC}^* 105°C 100 Hz A	I_{RAC}^* 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
100 VDC (U_R)								
1800	25 x 45	BF	2.1	5.7	120	95	PEH532PBF4180M2	
1800	30 x 35	CD	2.2	6.0	120	90	PEH532PCD4180M2	
2200	25 x 50	BG	2.4	6.4	99	78	PEH532PBG4220M2	
2200	30 x 40	CE	2.6	6.9	95	73	PEH532PCE4220M2	
2200	35 x 30	DC	2.4	6.4	100	79	PEH532PDC4220M2	
2700	30 x 45	CF	2.9	7.8	78	60	PEH532PCF4270M2	
2700	35 x 35	DD	2.8	7.5	81	64	PEH532PDD4270M2	
3300	30 x 50	CG	3.3	8.9	64	50	PEH532PCG4330M2	
3300	35 x 40	DE	3.2	8.6	66	52	PEH532PDE4330M2	
3900	35 x 45	DF	3.6	9.7	56	44	PEH532PDF4390M2	
4700	35 x 50	DG	4.0	10.9	47	37	PEH532PDG4470M2	
200 VDC (U_R)								
270	22 x 30	AC	0.77	2.1	510	270	PEH532RAC3270M2	
270	25 x 25	BB	0.75	2.1	530	290	PEH532RBB3270M2	
330	22 x 35	AD	0.89	2.5	420	220	PEH532RAD3330M2	
330	25 x 30	BC	0.89	2.5	420	230	PEH532RBC3330M2	
390	22 x 35	AD	0.96	2.7	360	190	PEH532RAD3390M2	
390	25 x 30	BC	0.95	2.7	370	200	PEH532RBC3390M2	
470	22 x 40	AE	1.1	3.1	300	160	PEH532RAE3470M2	
470	25 x 35	BD	1.1	3.1	300	170	PEH532RBD3470M2	
470	30 x 30	CC	1.2	3.3	290	160	PEH532RCC3470M2	
560	22 x 45	AF	1.2	3.5	250	140	PEH532RAF3560M2	
560	25 x 40	BE	1.2	3.5	250	140	PEH532RBE3560M2	
680	22 x 50	AG	1.4	3.9	210	110	PEH532RAG3680M2	
680	25 x 45	BF	1.4	4.0	210	110	PEH532RBF3680M2	
680	30 x 35	CD	1.5	4.1	200	110	PEH532RCD3680M2	
820	25 x 50	BG	1.6	4.5	170	96	PEH532RBG3820M2	
820	30 x 35	CD	1.6	4.5	170	93	PEH532RCD3820M2	
1000	30 x 40	CE	1.8	5.2	140	76	PEH532RCE4100M2	
1000	35 x 35	DD	1.9	5.2	140	79	PEH532RDD4100M2	
1200	30 x 45	CF	2.1	5.8	120	64	PEH532RCF4120M2	
1200	35 x 40	DE	2.1	6.0	120	66	PEH532RDE4120M2	
1500	35 x 45	DF	2.5	6.9	96	53	PEH532RDF4150M2	
1800	35 x 50	DG	2.8	7.7	81	45	PEH532RDG4180M2	
2200	35 x 55	DH	3.1	8.7	67	38	PEH532RDH4220M2	
250 VDC (U_R)								
220	22 x 30	AC	0.73	2.1	520	260	PEH532SAC3220M2	
220	25 x 25	BB	0.71	2.0	540	270	PEH532SBB3220M2	
270	22 x 35	AD	0.85	2.4	420	210	PEH532SAD3270M2	
270	25 x 30	BC	0.85	2.4	430	220	PEH532SBC3270M2	
330	22 x 40	AE	0.97	2.7	350	170	PEH532SAE3330M2	
330	25 x 30	BC	0.92	2.6	360	180	PEH532SBC3330M2	
330	30 x 25	CB	0.98	2.7	350	170	PEH532SCB3330M2	
390	22 x 45	AF	1.1	3.1	290	140	PEH532SAF3390M2	
390	25 x 35	BD	1.1	3.0	300	150	PEH532SBD3390M2	
470	22 x 50	AG	1.2	3.5	250	120	PEH532SAG3470M2	
470	25 x 40	BE	1.2	3.4	250	130	PEH532SBE3470M2	
470	30 x 30	CC	1.2	3.4	250	120	PEH532SCC3470M2	
560	22 x 50	AG	1.3	3.8	210	110	PEH532SAG3560M2	
560	25 x 45	BF	1.4	3.8	210	110	PEH532SBF3560M2	
680	25 x 50	BG	1.5	4.3	180	90	PEH532SBG3680M2	
680	30 x 40	CE	1.6	4.5	170	84	PEH532SCE3680M2	
680	35 x 30	DC	1.5	4.3	180	91	PEH532SDC3680M2	
820	30 x 45	CF	1.8	5.1	140	70	PEH532SCF3820M2	
820	35 x 35	DD	1.8	5.0	150	75	PEH532SDD3820M2	
1000	30 x 50	CG	2.1	5.8	120	58	PEH532SCG4100M2	
1000	35 x 40	DE	2.1	5.8	120	61	PEH532SDE4100M2	
1200	35 x 45	DF	2.3	6.5	100	51	PEH532SDF4120M2	
1500	35 x 50	DG	2.7	7.5	81	42	PEH532SDG4150M2	

* Maximum values

ARTICLE TABLE PEH 532 (105°C)

C _R	D x L	Case code	I _{RAC} [*] 105°C 100 Hz A	I _{RAC} [*] 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
350 VDC (U _R)								
82	22 x 25	AB	0.46	1.3	1600	980	PEH532UAB2820M2	↓
100	22 x 30	AC	0.53	1.5	1300	800	PEH532UAC3100M2	
150	22 x 35	AD	0.68	1.9	860	540	PEH532UAD3150M2	
150	25 x 30	BC	0.69	1.9	870	550	PEH532UBC3150M2	
180	22 x 40	AE	0.77	2.2	720	450	PEH532UAE3180M2	
220	22 x 45	AF	0.88	2.5	590	370	PEH532UAF3220M2	
220	25 x 35	BD	0.87	2.4	600	380	PEH532UBD3220M2	
220	30 x 30	CC	0.92	2.5	590	370	PEH532UCC3220M2	
270	22 x 50	AG	0.99	2.8	480	300	PEH532UAG3270M2	
270	25 x 40	BE	0.99	2.8	490	310	PEH532UBE3270M2	
330	25 x 50	BG	1.2	3.2	400	250	PEH532UBG3330M2	
330	30 x 40	CE	1.2	3.4	390	250	PEH532UCE3330M2	
330	35 x 30	DC	1.2	3.3	400	250	PEH532UDC3330M2	
390	25 x 50	BG	1.3	3.5	340	220	PEH532UBG3390M2	
390	30 x 40	CE	1.3	3.7	330	210	PEH532UCE3390M2	
470	30 x 45	CF	1.5	4.2	280	180	PEH532UCF3470M2	
470	35 x 35	DD	1.5	4.1	280	180	PEH532UDD3470M2	
560	30 x 50	CG	1.7	4.7	230	150	PEH532UCG3560M2	
560	35 x 40	DE	1.7	4.7	240	150	PEH532UDE3560M2	
680	35 x 45	DF	1.9	5.3	190	120	PEH532UDF3680M2	
400 VDC (U _R)								
82	22 x 30	AC	0.51	1.4	1300	810	PEH532VAC2820M2	
100	22 x 30	AC	0.56	1.6	1100	670	PEH532VAC3100M2	
100	25 x 25	BB	0.56	1.6	1100	690	PEH532VBB3100M2	
120	22 x 35	AD	0.64	1.8	920	560	PEH532VAD3120M2	
120	25 x 30	BC	0.65	1.8	930	570	PEH532VBC3120M2	
120	30 x 25	CB	0.68	1.9	920	560	PEH532VCB3120M2	
150	22 x 40	AE	0.75	2.1	740	450	PEH532VAE3150M2	
150	25 x 35	BD	0.76	2.1	740	450	PEH532VBD3150M2	
150	30 x 25	CB	0.76	2.1	740	460	PEH532VCB3150M2	
180	22 x 45	AF	0.84	2.4	620	380	PEH532VAF3180M2	
180	30 x 30	CC	0.88	2.4	620	380	PEH532VCC3180M2	
220	22 x 50	AG	0.95	2.7	510	310	PEH532VAG3220M2	
220	25 x 40	BE	0.95	2.7	510	320	PEH532VBE3220M2	
220	30 x 35	CD	1.0	2.8	500	310	PEH532VCD3220M2	
220	35 x 25	DB	0.97	2.7	510	320	PEH532VDB3220M2	
270	25 x 45	BF	1.1	3.0	420	260	PEH532VBF3270M2	
270	30 x 35	CD	1.1	3.1	410	250	PEH532VCD3270M2	
330	30 x 40	CE	1.3	3.6	340	210	PEH532VCE3330M2	
330	35 x 35	DD	1.3	3.7	340	210	PEH532VDD3330M2	
390	30 x 50	CG	1.5	4.1	280	170	PEH532VCG3390M2	
390	35 x 40	DE	1.5	4.1	290	180	PEH532VDE3390M2	
470	35 x 45	DF	1.7	4.7	240	150	PEH532VDF3470M2	
560	35 x 50	DG	1.9	5.3	200	120	PEH532VDG3560M2	
450 VDC (U _R)								
68	22 x 30	AC	0.50	1.4	1300	790	PEH532YAC2680M2	
68	25 x 25	BB	0.50	1.4	1400	800	PEH532YBB2680M2	
82	22 x 30	AC	0.55	1.5	1100	670	PEH532YAC2820M2	
82	25 x 25	BB	0.55	1.5	1100	680	PEH532YBB2820M2	
100	22 x 35	AD	0.63	1.8	910	540	PEH532YAD3100M2	
100	25 x 30	BC	0.64	1.8	920	540	PEH532YBC3100M2	
120	22 x 40	AE	0.72	2.0	760	450	PEH532YAE3120M2	
120	25 x 30	BC	0.70	1.9	780	470	PEH532YBC3120M2	
120	30 x 25	CB	0.73	2.0	770	460	PEH532YCB3120M2	
150	22 x 45	AF	0.83	2.3	620	370	PEH532YAF3150M2	
150	25 x 35	BD	0.82	2.3	620	370	PEH532YBD3150M2	
150	30 x 30	CC	0.86	2.4	620	360	PEH532YCC3150M2	

* Maximum values

ARTICLE TABLE PEH 532 (105°C)

C_R	D x L	Case code	I_{RAC}^* 105°C 100 Hz A	I_{RAC}^* 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
450 VDC (U_R)								
180	22 x 50	AG	0.93	2.6	520	310	PEH532YAG3180M2	
180	25 x 40	BE	0.93	2.6	520	310	PEH532YBE3180M2	
180	30 x 30	CC	0.94	2.6	520	310	PEH532YCC3180M2	
220	25 x 45	BF	1.1	3.0	430	260	PEH532YBF3220M2	
220	30 x 35	CD	1.1	3.0	420	250	PEH532YCD3220M2	
220	35 x 30	DC	1.1	3.1	420	250	PEH532YDC3220M2	
270	30 x 40	CE	1.3	3.5	340	200	PEH532YCE3270M2	
270	35 x 35	DD	1.3	3.6	350	210	PEH532YDD3270M2	
330	30 x 50	CG	1.5	4.1	280	160	PEH532YCG3330M2	
330	35 x 40	DE	1.5	4.1	280	170	PEH532YDE3330M2	
390	35 x 40	DE	1.6	4.5	240	140	PEH532YDE3390M2	
470	35 x 50	DG	1.9	5.2	200	120	PEH532YDG3470M2	

* Maximum values

MECHANICAL DATA

The capacitor may be mounted in any position. The PEH 532 is supplied with PVC insulation sleeve, thickness 0.3 mm. Voltage proof of the insulation sleeve = 2.5 kVDC (1 min). The minus pole is marked on the case surface.

ORDERING INFORMATION

For further ordering information please see page 8.

Pos 1–20

P	E	H	5	3	2	M	A	B	4	1	2	0	M	2						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

Pos. 14: Capacitance tolerance M = –20 to +20%

Pos. 15: Pin configuration

Quantities and weights for PEH532

CASE CODE	AB	AC	AD	AE	AF	AG	BB	BC	BD	BE	BF	BG	CB	CC	CD	CE	CF
Weight approx (g)	13	14	15	17	19	21	19	21	24	27	30	33	24	29	34	39	45

Quantities and weights for PEH532

CASE CODE	CG	DB	DC	DD	DE	DF	DG	DH
Weight approx (g)	51	32	40	48	56	64	72	85

Fig. 1

$C_T = C(f=100 \text{ Hz}, T_h) / C(f=100 \text{ Hz}, T_h = 20^\circ\text{C})$ vs T_h

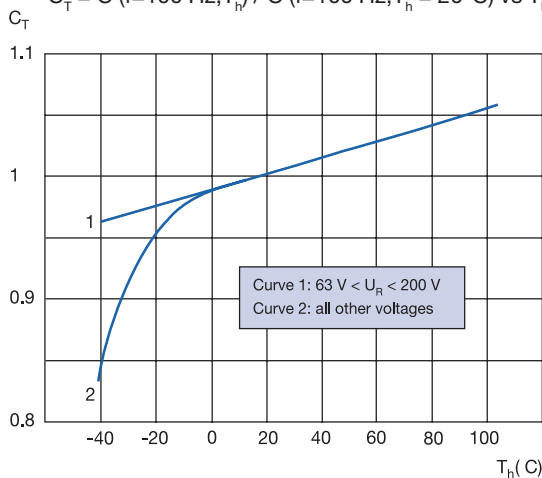


Fig. 2

$K_T = \text{ESR}(f, T_h) / \text{ESR}(f, T_h = 20^\circ\text{C})$ vs T_h , $U_R < 200 \text{ V}$

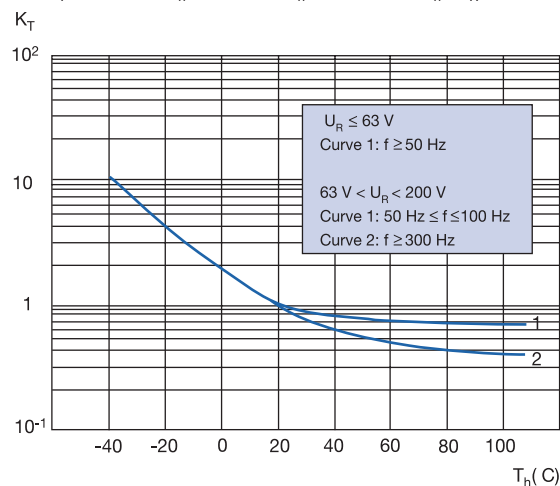


Fig. 4

$k_f = \text{ESR}(f, T_h = 20^\circ\text{C}) / \text{ESR}(f = 100 \text{ Hz}, T_h = 20^\circ\text{C})$ vs f

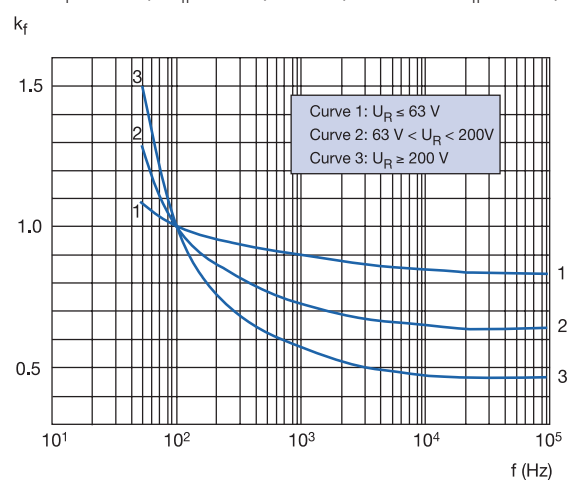
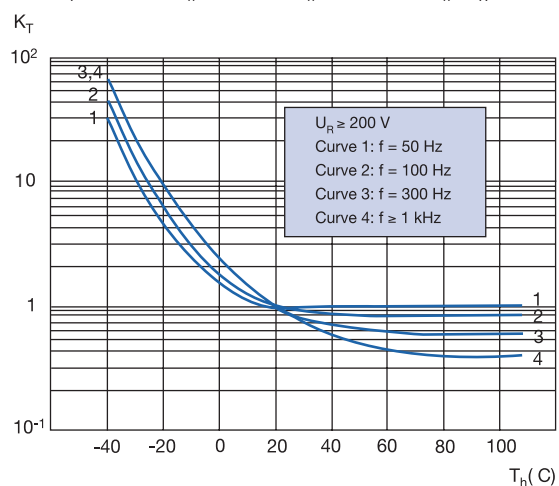


Fig. 5

$K_T = \text{ESR}(f, T_h) / \text{ESR}(f, T_h = 20^\circ\text{C})$ vs T_h , $U_R \geq 200 \text{ V}$



THERMAL RESISTANCE FOR DIFFERENT CASE SIZES, AS A FUNCTION OF CASE AIR SPEED V

At ambient temperature $T_a = 40^\circ\text{C}$

Case		Air speed v											
D x L mm		v=0,5m/s		v=1,0m/s		v=2,0m/s		v=3,0m/s		v=4,0m/s		v=5,0m/s	
		R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}
		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$	
22 x 25	AB	24.3	25.1	19.1	20.0	14.8	15.7	13.2	14.1	11.4	12.3	10.3	11.1
22 x 30	AC	21.3	22.5	16.8	18.0	13.2	14.4	11.7	12.9	10.2	11.4	9.2	10.4
22 x 35	AD	19.1	20.5	15.1	16.6	11.9	13.4	10.7	12.1	9.4	10.8	8.5	9.9
22 x 40	AE	17.4	19.0	13.9	15.5	11.0	12.7	9.9	11.5	8.7	10.4	7.9	9.5
22 x 45	AF	16.1	17.6	12.9	14.4	10.4	11.8	9.3	10.8	8.3	9.7	7.5	9.0
22 x 50	AG	15.1	16.8	12.2	14.0	9.8	11.6	8.9	10.6	7.9	9.7	7.2	9.0
25 x 25	BB	21.9	22.8	17.2	18.1	13.4	14.3	11.8	12.6	10.2	11.1	9.2	10.0
25 x 30	BC	19.3	20.2	15.3	16.1	12.0	12.8	10.5	11.3	9.2	10.0	8.2	9.1
25 x 35	BD	17.2	18.2	13.7	14.7	10.8	11.8	9.6	10.6	8.4	9.4	7.6	8.6
25 x 40	BE	15.8	16.9	12.6	13.7	10.0	11.2	8.9	10.0	7.8	8.9	7.1	8.2
25 x 45	BF	14.7	16.2	11.8	13.3	9.4	10.9	8.4	9.9	7.4	8.9	6.8	8.3
25 x 50	BG	13.7	15.2	11.1	12.6	8.9	10.5	8.0	9.5	7.1	8.6	6.5	8.0
30 x 25	CB	18.9	19.5	14.9	15.5	11.7	12.3	10.0	10.6	8.7	9.3	7.8	8.4
30 x 30	CC	16.4	17.1	13.1	13.8	10.2	10.9	8.8	9.5	7.7	8.4	6.9	7.6
30 x 35	CD	14.8	15.6	11.8	12.6	9.3	10.1	8.0	8.9	7.0	7.9	6.3	7.2
30 x 40	CE	13.5	14.3	10.8	11.6	8.6	9.4	7.4	8.2	6.5	7.3	5.9	6.7
30 x 45	CF	12.5	13.3	10.0	10.9	8.0	8.9	7.0	7.8	6.2	7.0	5.6	6.5
30 x 50	CG	11.9	12.9	9.7	10.7	7.8	8.8	6.8	7.8	6.1	7.1	5.5	6.6
35 x 25	DB	16.5	17.0	13.1	13.6	10.5	11.0	8.6	9.1	7.5	8.0	6.7	7.2
35 x 30	DC	14.3	14.7	11.4	11.8	9.2	9.6	7.6	8.0	6.6	7.0	5.9	6.3
35 x 35	DD	12.9	13.4	10.3	10.8	8.3	8.8	6.9	7.4	6.0	6.5	5.4	5.9
35 x 40	DE	11.8	12.5	9.5	10.1	7.7	8.3	6.4	7.1	5.6	6.3	5.1	5.7
35 x 45	DF	10.9	11.6	8.8	9.5	7.1	7.9	6.0	6.7	5.3	6.0	4.8	5.5
35 x 50	DG	10.5	11.3	8.5	9.3	7.0	7.8	5.9	6.7	5.3	6.0	4.8	5.6
35 x 55	DH	9.6	10.3	7.8	8.5	6.4	7.1	5.4	6.1	4.8	5.5	4.4	5.1
35 x 60	DI	9.1	10.2	7.4	8.5	6.2	7.2	5.2	6.3	4.7	5.7	4.3	5.3
40 x 60	EI	8.2	9.0	6.7	7.6	5.5	6.3	4.6	5.5	4.1	5.0	3.8	4.7
40 x 70	EK	7.5	8.5	6.2	7.2	5.1	6.1	4.4	5.4	3.9	4.9	3.6	4.6
40 x 80	EM	7.0	8.3	5.9	7.2	4.9	6.2	4.2	5.5	3.8	5.1	3.5	4.8
40 x 100	EQ	6.4	8.2	5.4	7.2	4.6	6.3	4.1	5.8	3.7	5.4	3.4	5.2

 $(R_{thca} = \text{Thermal resistance between case and ambient})$

PEH 534 105°C

RoHS
Compliant

- Snap-In
- Long Life Grade
- PCB Mounting
- Low ESR and ESL
- High ripple current

APPLICATION

Typical applications for PEH 534 would be SMPS, drives, welding equipment, UPS and other power electronic applications where high current ratings and compact size are important.

BASIC DESIGN

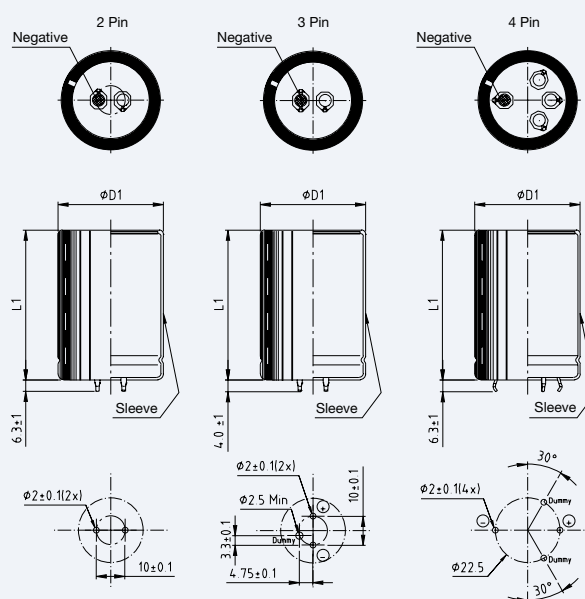
PEH 534 is a Long Life electrolytic capacitor designed to offer high ripple current capability and low mounting cost. The low ESR is a result of very low resistive paper/electrolyte system.

The low ESR together with the TDC thermal concept gives the PEH 534 a high ripple current capability.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/105/56, in accordance with CECC 30 301-809
Capacitance range	150–22000 μ F
Capacitance tolerance	–20 to +20%
Rated voltage	35–450 VDC
Temperature range	–40 to +105°C
Leakage current, I_{RL} (μA)	$0.003 (\mu A) \times C_R (\mu F) \times U_R (V)$
Operational life time	4000 hours at +105°C
Shelf life	4 years at 0 Volt and +40°C
Diameter range	25–35 mm

Pin configuration	
Diameter range	25–35 mm: 2–3 pins



Dimensions table PEH 534 (mm)

D x L	Case code	D1 ±0.5	L1 ±1.0	Weight approx (g)
25 x 30	BC	25.5	31	21
25 x 35	BD	25.5	36	24
25 x 40	BE	25.5	41	27
25 x 45	BF	25.5	46	30
25 x 50	BG	25.5	51	33
30 x 25	CB	30.5	26	24
30 x 30	CC	30.5	31	29
30 x 35	CD	30.5	36	34
30 x 40	CE	30.5	41	39
30 x 45	CF	30.5	46	45
30 x 50	CG	30.5	51	51
35 x 25	DB	35.5	26	32
35 x 30	DC	35.5	31	40
35 x 35	DD	35.5	36	48
35 x 40	DE	35.5	41	56
35 x 45	DF	35.5	46	64
35 x 50	DG	35.5	51	72

Pin Configuration

Description	2 pin	2 pin	3 pin	4 pin	4 pin
Pin length	6.3±1	4.0±1	4.0±1	6.3±1	4.0±1
Code	2	2S	3	4	4S
DIA. mm -0+1					
25	•	•	•		
30	•	•	•		
35	•	•	•	•	•

ARTICLE TABLE PEH 534 (105°C)

C _R	D x L	Case code	I _{RAC} * 105°C 100 Hz A	I _{RAC} * 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
35 VDC (U _R)								
5600	25 x 30	BC	2.3	7.6	54	43	PEH534JBC4560M2	
6800	25 x 35	BD	2.7	9.0	43	34	PEH534JBD4680M2	
6800	30 x 25	CB	2.9	9.8	40	31	PEH534JCB4680M2	
8200	25 x 40	BE	3.1	10.2	36	28	PEH534JBE4820M2	
8200	30 x 30	CC	3.5	12.1	31	23	PEH534JCC4820M2	
8200	35 x 25	DB	3.1	10.0	37	29	PEH534JDB4820M2	
10000	25 x 45	BF	3.5	11.3	31	24	PEH534JBF5100M2	
10000	30 x 35	CD	4.1	14.3	25	18	PEH534JCD5100M2	
15000	30 x 45	CF	5.3	17.8	17	13	PEH534JCF5150M2	
15000	35 x 35	DD	4.5	14.4	21	17	PEH534JDD5150M2	
22000	35 x 50	DG	6.2	20.1	14	11	PEH534JDG5220M2	
63 VDC (U _R)								
2200	25 x 30	BC	1.9	6.9	92	43	PEH534MBC4220M2	
3300	25 x 40	BE	2.5	9.3	61	34	PEH534MBE4330M2	
3300	30 x 30	CC	2.7	10.6	56	31	PEH534MCC4330M2	
4700	30 x 40	CE	3.6	14.0	39	28	PEH534MCE4470M2	
4700	35 x 30	DC	3.1	11.2	44	23	PEH534MDC4470M2	
5600	30 x 45	CF	4.0	15.6	33	29	PEH534MCF4560M2	
5600	35 x 35	DD	3.7	13.3	36	24	PEH534MDD4560M2	
6800	30 x 50	CG	4.5	17.1	28	18	PEH534MCG4680M2	
6800	35 x 40	DE	4.2	15.2	30	13	PEH534MDE4680M2	
8200	35 x 45	DF	4.7	16.8	26	17	PEH534MDF4820M2	
10000	35 x 50	DG	5.2	18.4	22	11	PEH534MDG5100M2	
100 VDC (U _R)								
1500	25 x 40	BE	1.9	7.0	140	110	PEH534PBE4150M2	
1500	30 x 30	CC	2.0	7.4	130	100	PEH534PCC4150M2	
2200	30 x 40	CE	2.6	9.8	91	70	PEH534PCE4220M2	
2200	35 x 30	DC	2.4	8.8	96	75	PEH534PDC4220M2	
3300	30 x 50	CG	3.3	12.4	62	48	PEH534PCG4330M2	
3300	35 x 40	DE	3.3	11.7	64	50	PEH534PDE4330M2	
3900	35 x 45	DF	3.6	13.1	54	43	PEH534PDF4390M2	
4700	35 x 50	DG	4.1	14.5	46	36	PEH534PDG4470M2	
200 VDC (U _R)								
470	25 x 35	BD	1.1	7.1	290	160	PEH534RBD3470M2	
560	25 x 40	BE	1.3	8.0	250	130	PEH534RBE3560M2	
560	30 x 30	CC	1.3	8.9	240	130	PEH534RCC3560M2	
680	25 x 45	BF	1.4	8.9	200	110	PEH534RBF3680M2	
680	30 x 35	CD	1.5	10.4	200	100	PEH534RCD3680M2	
680	35 x 30	DC	1.5	9.8	200	110	PEH534RDC3680M2	
820	30 x 40	CE	1.7	11.8	160	87	PEH534RCE3820M2	
820	35 x 30	DC	1.6	9.8	170	93	PEH534RDC3820M2	
1000	30 x 50	CG	2.0	13.9	130	71	PEH534RCG4100M2	
1000	35 x 35	DD	1.9	11.6	140	75	PEH534RDD4100M2	
1500	35 x 45	DF	2.5	14.7	93	51	PEH534RDF4150M2	
250 VDC (U _R)								
390	25 x 40	BE	1.1	7.9	290	140	PEH534SBE3390M2	
390	30 x 30	CC	1.1	8.7	280	140	PEH534SCC3390M2	
470	25 x 45	BF	1.3	8.8	240	120	PEH534SBF3470M2	
470	30 x 35	CD	1.3	10.1	240	110	PEH534SCD3470M2	
470	35 x 30	DC	1.3	9.6	240	120	PEH534SDC3470M2	
560	25 x 50	BG	1.4	9.6	200	100	PEH534SBG3560M2	

* Maximum values

ARTICLE TABLE PEH 534 (105°C)

C _R	D x L	Case code	I _{RAC} [*] 105°C 100 Hz A	I _{RAC} [*] 40°C 20 kHz A	ESR [*] 20°C 100 Hz mΩ	ESR [*] 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
250 VDC (U _R)								
560	30 x 40	CE	1.5	11.4	200	95	PEH534SCE3560M2	
680	30 x 45	CF	1.7	12.8	160	79	PEH534SCF3680M2	
680	35 x 35	DD	1.7	11.5	170	83	PEH534SDD3680M2	
820	30 x 50	CG	1.9	14.2	140	66	PEH534SCG3820M2	
820	35 x 40	DE	1.9	13.1	140	69	PEH534SDE3820M2	
1000	35 x 45	DF	2.2	14.6	110	57	PEH534SDF4100M2	
350 VDC (U _R)								
220	25 x 40	BE	0.91	5.8	560	350	PEH534UBE3220M2	
220	30 x 30	CC	0.93	6.0	550	340	PEH534UCC3220M2	
220	35 x 25	DB	0.94	5.8	560	350	PEH534UDB3220M2	
330	30 x 40	CE	1.2	8.0	370	230	PEH534UCE3330M2	
330	35 x 30	DC	1.2	7.4	370	230	PEH534UDC3330M2	
390	30 x 45	CF	1.4	9.0	310	190	PEH534UCF3390M2	
390	35 x 35	DD	1.4	8.6	320	200	PEH534UDD3390M2	
470	35 x 40	DE	1.6	9.7	260	160	PEH534UDE3470M2	
560	35 x 45	DF	1.8	10.9	220	140	PEH534UDF3560M2	
400 VDC (U _R)								
150	25 x 35	BD	0.78	5.1	680	410	PEH534VBD3150M2	
150	30 x 25	CB	0.78	5.2	680	400	PEH534VCB3150M2	
220	25 x 45	BF	1.0	6.5	470	280	PEH534VBF3220M2	
220	30 x 35	CD	1.0	7.1	460	270	PEH534VCD3220M2	
220	35 x 30	DC	1.1	7.0	460	280	PEH534VDC3220M2	
330	30 x 45	CF	1.4	9.2	310	180	PEH534VCF3330M2	
330	35 x 35	DD	1.4	8.7	310	190	PEH534VDD3330M2	
390	30 x 50	CG	1.5	10.2	260	160	PEH534VCG3390M2	
390	35 x 40	DE	1.5	9.8	260	160	PEH534VDE3390M2	
470	35 x 45	DF	1.8	11.1	220	130	PEH534VDF3470M2	
560	35 x 50	DG	2.0	12.3	180	110	PEH534VDG3560M2	
450 VDC (U _R)								
150	25 x 40	BE	0.88	5.8	570	330	PEH534YBE3150M2	
150	30 x 30	CC	0.89	6.1	560	330	PEH534YCC3150M2	
150	35 x 25	DB	0.90	5.9	570	330	PEH534YDB3150M2	
220	30 x 40	CE	1.2	8.1	380	220	PEH534YCE3220M2	
220	35 x 30	DC	1.2	7.5	390	230	PEH534YDC3220M2	
330	30 x 50	CG	1.5	10.3	260	150	PEH534YCG3330M2	
330	35 x 40	DE	1.5	9.9	260	150	PEH534YDE3330M2	
390	35 x 45	DF	1.7	11.3	220	130	PEH534YDF3390M2	
470	35 x 50	DG	1.9	12.4	180	110	PEH534YDG3470M2	

* Maximum values

MECHANICAL DATA

The capacitor may be mounted in any position. The PEH 534 is supplied with PVC insulation sleeve, thickness 0.3 mm. Voltage proof of the insulation sleeve = 2.5 kVDC (1 min). The minus pole is marked on the case surface.

ORDERING INFORMATION

For further ordering information please see page 8.

Pos 1–20

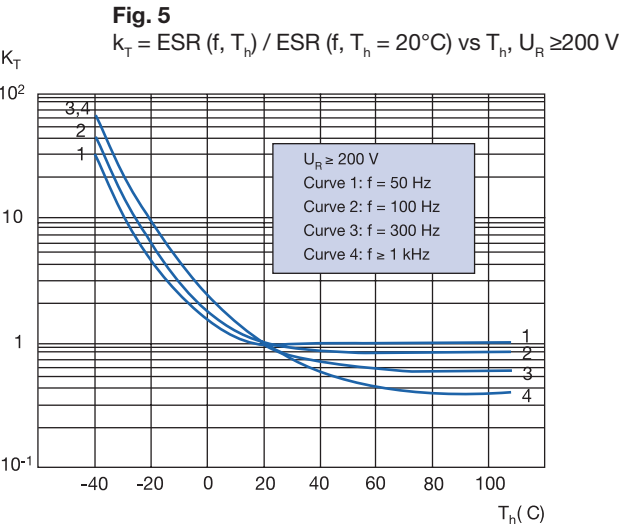
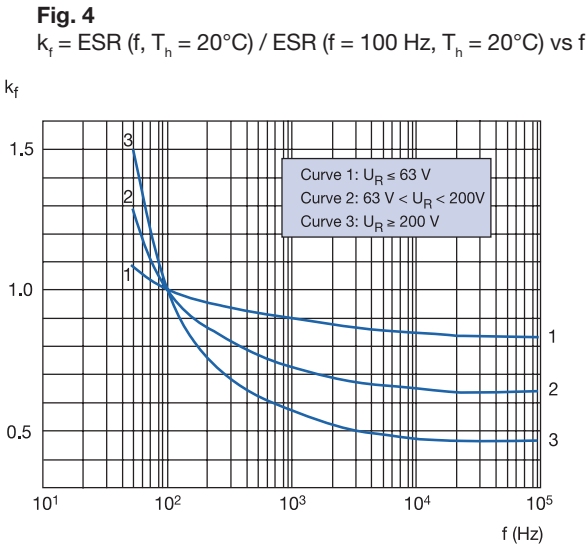
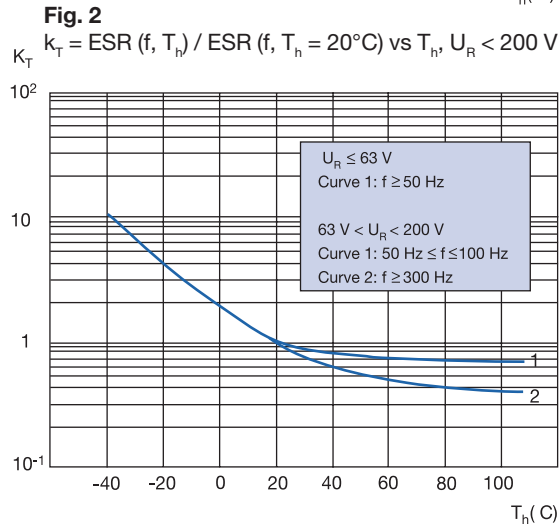
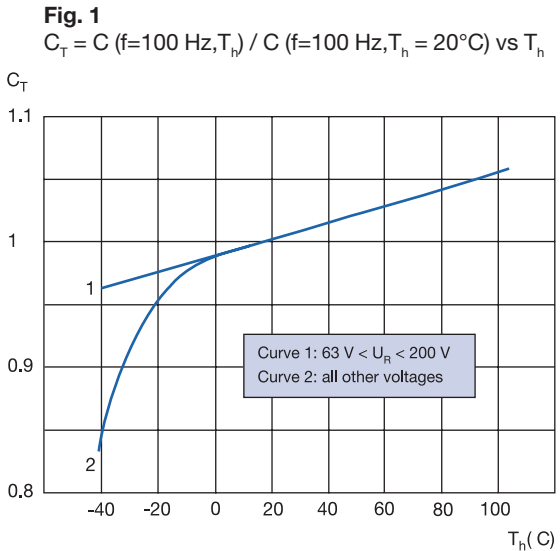
P	E	H	5	3	4	J	B	C	4	5	6	0	M	2					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Pos. 14: Capacitance tolerance M = -20 to +20%
Pos. 15: Pin configuration

Quantities and weights for PEH534

CASE CODE	BC	BD	BE	BF	BG	CB	CC	CD	CE	CF	CG	DB	DC	DD	DE	DF	DG
Weight approx (g)	21	24	27	30	33	24	29	34	39	45	51	32	40	48	56	64	72

TYPICAL DATA PEH 534



THERMAL RESISTANCE FOR DIFFERENT CASE SIZES, AS A FUNCTION OF CASE AIR SPEED V

At ambient temperature $T_a = 40^\circ\text{C}$

Case		Air speed v											
D x L mm		v=0,5m/s		v=1,0m/s		v=2,0m/s		v=3,0m/s		v=4,0m/s		v=5,0m/s	
		R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}
		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$	
22 x 25	AB	24.3	25.1	19.1	20.0	14.8	15.7	13.2	14.1	11.4	12.3	10.3	11.1
22 x 30	AC	21.3	22.5	16.8	18.0	13.2	14.4	11.7	12.9	10.2	11.4	9.2	10.4
22 x 35	AD	19.1	20.5	15.1	16.6	11.9	13.4	10.7	12.1	9.4	10.8	8.5	9.9
22 x 40	AE	17.4	19.0	13.9	15.5	11.0	12.7	9.9	11.5	8.7	10.4	7.9	9.5
22 x 45	AF	16.1	17.6	12.9	14.4	10.4	11.8	9.3	10.8	8.3	9.7	7.5	9.0
22 x 50	AG	15.1	16.8	12.2	14.0	9.8	11.6	8.9	10.6	7.9	9.7	7.2	9.0
25 x 25	BB	21.9	22.8	17.2	18.1	13.4	14.3	11.8	12.6	10.2	11.1	9.2	10.0
25 x 30	BC	19.3	20.2	15.3	16.1	12.0	12.8	10.5	11.3	9.2	10.0	8.2	9.1
25 x 35	BD	17.2	18.2	13.7	14.7	10.8	11.8	9.6	10.6	8.4	9.4	7.6	8.6
25 x 40	BE	15.8	16.9	12.6	13.7	10.0	11.2	8.9	10.0	7.8	8.9	7.1	8.2
25 x 45	BF	14.7	16.2	11.8	13.3	9.4	10.9	8.4	9.9	7.4	8.9	6.8	8.3
25 x 50	BG	13.7	15.2	11.1	12.6	8.9	10.5	8.0	9.5	7.1	8.6	6.5	8.0
30 x 25	CB	18.9	19.5	14.9	15.5	11.7	12.3	10.0	10.6	8.7	9.3	7.8	8.4
30 x 30	CC	16.4	17.1	13.1	13.8	10.2	10.9	8.8	9.5	7.7	8.4	6.9	7.6
30 x 35	CD	14.8	15.6	11.8	12.6	9.3	10.1	8.0	8.9	7.0	7.9	6.3	7.2
30 x 40	CE	13.5	14.3	10.8	11.6	8.6	9.4	7.4	8.2	6.5	7.3	5.9	6.7
30 x 45	CF	12.5	13.3	10.0	10.9	8.0	8.9	7.0	7.8	6.2	7.0	5.6	6.5
30 x 50	CG	11.9	12.9	9.7	10.7	7.8	8.8	6.8	7.8	6.1	7.1	5.5	6.6
35 x 25	DB	16.5	17.0	13.1	13.6	10.5	11.0	8.6	9.1	7.5	8.0	6.7	7.2
35 x 30	DC	14.3	14.7	11.4	11.8	9.2	9.6	7.6	8.0	6.6	7.0	5.9	6.3
35 x 35	DD	12.9	13.4	10.3	10.8	8.3	8.8	6.9	7.4	6.0	6.5	5.4	5.9
35 x 40	DE	11.8	12.5	9.5	10.1	7.7	8.3	6.4	7.1	5.6	6.3	5.1	5.7
35 x 45	DF	10.9	11.6	8.8	9.5	7.1	7.9	6.0	6.7	5.3	6.0	4.8	5.5
35 x 50	DG	10.5	11.3	8.5	9.3	7.0	7.8	5.9	6.7	5.3	6.0	4.8	5.6
35 x 55	DH	9.6	10.3	7.8	8.5	6.4	7.1	5.4	6.1	4.8	5.5	4.4	5.1
35 x 60	DI	9.1	10.2	7.4	8.5	6.2	7.2	5.2	6.3	4.7	5.7	4.3	5.3
40 x 60	EI	8.2	9.0	6.7	7.6	5.5	6.3	4.6	5.5	4.1	5.0	3.8	4.7
40 x 70	EK	7.5	8.5	6.2	7.2	5.1	6.1	4.4	5.4	3.9	4.9	3.6	4.6
40 x 80	EM	7.0	8.3	5.9	7.2	4.9	6.2	4.2	5.5	3.8	5.1	3.5	4.8
40 x 100	EQ	6.4	8.2	5.4	7.2	4.6	6.3	4.1	5.8	3.7	5.4	3.4	5.2

(R_{thca} = Thermal resistance between case and ambient)

PEH 536 105°C

RoHS
Compliant

- Snap-In
- Ultra Long Life Grade
- PCB Mounting
- Low ESR and ESL
- High ripple current

APPLICATION

Typical applications for PEH 536 would be SMPS, drives, welding equipment, UPS and other power electronic applications where high current ratings and compact size are important.

BASIC DESIGN

PEH 536 is a Long Life electrolytic capacitor designed to offer high ripple current capability and low mounting cost. The low ESR is a result of very low resistive paper/electrolyte system.

The low ESR together with the TDC thermal concept gives the PEH 536 a high ripple current capability.

SPECIFICATION

Standards

IEC 60384-4 Long Life Grade 40/105/56, in accordance with CECC 30 301-809

Capacitance range

47-18000 μ F

Capacitance tolerance

-20 to +20%

Rated voltage

35-450 VDC

Temperature range

-40 to +105°C

Leakage current, I_{RL} (μ A)

$0.003 (\mu A) \times C_R (\mu F) \times U_R (V)$

Operational life time

6000 hours at +105°C

Shelf life

4 years at 0 Volt and +40°C

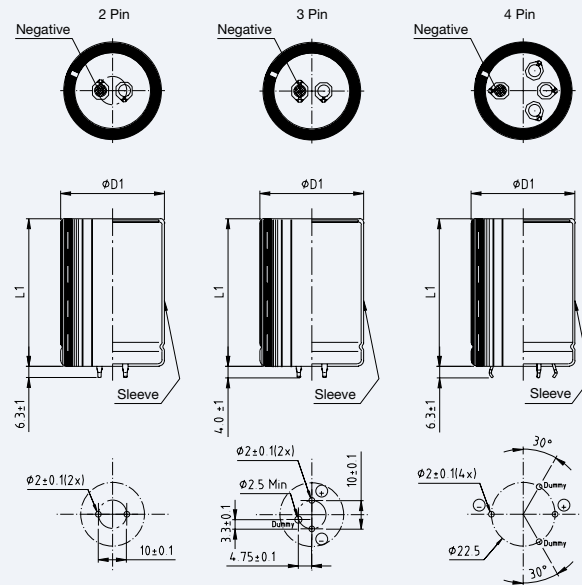
Diameter range

22-40 mm

Pin configuration

Diameter range

22-35 mm: 2-3 pins
40 mm: 4 pins



Dimensions table PEH 536 (mm)

D x L	Case code	D1 ±0.5	L1 ±1.0	Weight approx (g)
22 x 30	AC	22.5	31	14
22 x 35	AD	22.5	36	15
22 x 40	AE	22.5	41	17
22 x 45	AF	22.5	46	19
22 x 50	AG	22.5	51	21
25 x 25	BB	25.5	26	19
25 x 30	BC	25.5	31	21
25 x 35	BD	25.5	36	24
25 x 40	BE	25.5	41	27
25 x 45	BF	25.5	46	30
25 x 50	BG	25.5	51	33
30 x 25	CB	30.5	26	24
30 x 30	CC	30.5	31	29
30 x 35	CD	30.5	36	34
30 x 40	CE	30.5	41	39
30 x 45	CF	30.5	46	45
30 x 50	CG	30.5	51	51
35 x 25	DB	35.5	26	32
35 x 30	DC	35.5	31	40
35 x 35	DD	35.5	36	48
35 x 40	DE	35.5	41	56
35 x 45	DF	35.5	46	64
35 x 50	DG	35.5	51	72
35 x 55	DH	35.5	56	85

D x L	Case code	D1 ±0.5	L1 ±1.0	Weight approx (g)
35 x 60	DI	35.5	61	88
40 x 60	EI	40.5	61	115
40 x 70	EK	40.5	71	135
40 x 80	EM	40.5	81	155
40 x 100	EQ	40.5	101	175

Pin Configuration

Description	2 pin	2 pin	3 pin	4 pin	4 pin
Pin length	6.3±1	4.0±1	4.0±1	6.3±1	4.0±1
Code	2	2S	3	4	4S
DIA. mm -0+1					
22	•	•	•		
25	•	•	•		
30	•	•	•		
35	•	•	•	•	•
40	•	•	•	•	•

ARTICLE TABLE PEH 536 (105°C)

C_R	D x L	Case code	I_{RAC}^* 105°C 100 Hz A	I_{RAC}^* 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
35 VDC (U_R)								
3900	22 x 35	AD	2.4	9.0	54	39	PEH536JAD4390M2	
3900	25 x 30	BC	2.2	7.8	60	45	PEH536JBC4390M2	
4700	22 x 40	AE	2.8	0.2	45	33	PEH536JAE4470M2	
5600	25 x 35	BD	2.7	9.1	44	34	PEH536JBD4560M2	
5600	30 x 30	CC	2.4	7.8	53	43	PEH536JCC4560M2	
5600	35 x 25	DB	2.0	5.9	78	68	PEH536JDB4560M2	
6800	25 x 40	BE	3.1	10.4	37	28	PEH536JBE4680M2	
6800	30 x 35	CD	2.9	9.4	42	33	PEH536JCD4680M2	
8200	25 x 45	BF	3.4	11.6	31	24	PEH536JBF4820M2	
8200	30 x 35	CD	2.8	8.9	42	35	PEH536JCD4820M2	
8200	35 x 30	DC	3.7	12.6	30	23	PEH536JDC4820M2	
10000	25 x 50	BG	3.7	12.3	27	21	PEH536JBG5100M2	
10000	30 x 40	CE	4.6	16.6	22	16	PEH536JCE5100M2	
12000	30 x 45	CF	5.1	18.1	19	14	PEH536JCF5120M2	
12000	35 x 35	DD	4.4	14.5	22	17	PEH536JDD5120M2	
15000	35 x 40	DE	5.0	16.5	18	14	PEH536JDE5150M2	
18000	35 x 50	DG	6.1	20.4	14	11	PEH536JDG5180M2	
63 VDC (U_R)								
1800	22 x 35	AD	1.9	7.3	100	74	PEH536MAD4180M2	
1800	25 x 30	BC	2.0	8.2	97	68	PEH536MBC4180M2	
1800	30 x 25	CB	2.0	7.8	100	72	PEH536MCB4180M2	
2200	25 x 35	BD	2.1	7.8	88	65	PEH536MBD4220M2	
2200	30 x 30	CC	2.3	9.4	81	57	PEH536MCC4220M2	
2200	35 x 25	DB	2.3	8.6	86	62	PEH536MDB4220M2	
2700	22 x 50	AG	2.5	9.8	68	49	PEH536MAG4270M2	
2700	25 x 40	BE	2.4	8.9	73	53	PEH536MBE4270M2	
2700	30 x 35	CD	2.7	10.9	66	46	PEH536MCD4270M2	
3300	25 x 50	BG	2.8	10.7	58	43	PEH536MBG4330M2	
3300	30 x 35	CD	2.9	11.5	55	40	PEH536MCD4330M2	
3900	30 x 40	CE	3.3	13.0	47	34	PEH536MCE4390M2	
3900	35 x 30	DC	3.0	10.9	52	38	PEH536MDC4390M2	
4700	30 x 45	CF	3.7	14.6	39	28	PEH536MCF4470M2	
4700	35 x 35	DD	3.5	12.9	42	31	PEH536MDD4470M2	
6800	35 x 45	DF	4.5	16.4	30	22	PEH536MDF4680M2	
8200	35 x 50	DG	5.0	17.9	25	19	PEH536MDG4820M2	
100 VDC (U_R)								
560	22 x 30	AC	1.1	4.3	320	240	PEH536PAC3560M2	
560	25 x 25	BB	1.1	4.0	330	250	PEH536PBB3560M2	
680	22 x 35	AD	1.2	5.0	260	190	PEH536PAD3680M2	
680	25 x 30	BC	1.2	4.8	270	200	PEH536PBC3680M2	
820	22 x 40	AE	1.4	5.6	220	160	PEH536PAE3820M2	
820	25 x 30	BC	1.3	5.1	230	170	PEH536PBC3820M2	
820	30 x 25	CB	1.4	5.6	220	160	PEH536PCB3820M2	
1000	25 x 35	BD	1.6	6.0	180	140	PEH536PBD4100M2	
1000	30 x 30	CC	1.7	6.6	180	130	PEH536PCC4100M2	
1200	25 x 40	BE	1.8	6.8	150	120	PEH536PBE4120M2	
1200	30 x 35	CD	1.9	7.7	150	110	PEH536PCD4120M2	
1500	25 x 50	BG	2.1	8.1	120	92	PEH536PBG4150M2	
1500	30 x 40	CE	2.2	8.9	120	88	PEH536PCE4150M2	
2200	30 x 50	CG	2.8	11.2	81	61	PEH536PCG4220M2	
2200	35 x 40	DE	2.8	10.9	83	62	PEH536PDE4220M2	
2700	35 x 45	DF	3.2	12.3	68	51	PEH536PDF4270M2	
3300	35 x 50	DG	3.6	13.8	56	43	PEH536PDG4330M2	
4700	35 x 55	DH	4.3	15.8	42	32	PEH536PDH4470M2	

* Maximum values

ARTICLE TABLE PEH 536 (105°C)

C_R	D x L	Case code	I_{RAC}^* 105°C 100 Hz A	I_{RAC}^* 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
200 VDC (U_R)								
220	22 x 30	AC	0.71	5.4	550	270	PEH536RAC3220M2	
270	25 x 30	BC	0.82	5.9	460	220	PEH536RBC3270M2	
330	22 x 40	AE	0.93	7.2	370	180	PEH536RAE3330M2	
330	25 x 35	BD	0.95	6.9	370	190	PEH536RBD3330M2	
470	22 x 50	AG	1.2	8.8	260	130	PEH536RAG3470M2	
470	25 x 40	BE	1.2	8.1	270	130	PEH536RBE3470M2	
560	25 x 45	BF	1.3	9.1	220	110	PEH536RBF3560M2	
560	30 x 35	CD	1.4	10.4	220	110	PEH536RCD3560M2	
680	25 x 50	BG	1.5	10.0	180	93	PEH536RBG3680M2	
680	30 x 40	CE	1.6	11.8	180	88	PEH536RCE3680M2	
680	35 x 35	DD	1.6	11.5	180	90	PEH536RDD3680M2	
820	30 x 45	CF	1.8	13.3	150	73	PEH536RCF3820M2	
820	35 x 35	DD	1.8	11.8	150	77	PEH536RDD3820M2	
1000	30 x 50	CG	2.0	14.8	120	61	PEH536RCG4100M2	
1000	35 x 40	DE	2.0	13.5	130	63	PEH536RDE4100M2	
1200	35 x 50	DG	2.3	16.2	100	52	PEH536RDG4120M2	
250 VDC (U_R)								
150	22 x 30	AC	0.62	5.3	660	280	PEH536SAC3150M2	
220	22 x 40	AE	0.81	7.0	450	190	PEH536SAE3220M2	
220	25 x 30	BC	0.79	6.0	460	200	PEH536SBC3220M2	
270	25 x 35	BD	0.91	7.1	370	160	PEH536SBD3270M2	
330	25 x 40	BE	1.0	8.1	300	130	PEH536SBE3330M2	
330	30 x 30	CC	1.1	8.8	300	130	PEH536SCC3330M2	
390	25 x 45	BF	1.2	9.0	260	110	PEH536SBF3390M2	
470	25 x 50	BG	1.3	9.9	210	96	PEH536SBG3470M2	
470	30 x 40	CE	1.4	11.7	210	91	PEH536SCE3470M2	
560	30 x 45	CF	1.6	13.1	180	76	PEH536SCF3560M2	
680	30 x 50	CG	1.8	14.5	150	63	PEH536SCG3680M2	
680	35 x 40	DE	1.8	13.4	150	66	PEH536SDE3680M2	
820	35 x 45	DF	2.0	15.0	120	55	PEH536SDF3820M2	
1000	35 x 50	DG	2.3	16.5	100	46	PEH536SDG4100M2	
350 VDC (U_R)								
100	22 x 30	AC	0.56	3.9	1000	600	PEH536UAC3100M2	
100	25 x 25	BB	0.56	3.7	1100	620	PEH536UBB3100M2	
120	22 x 35	AD	0.64	4.5	870	500	PEH536UAD3120M2	
150	22 x 40	AE	0.74	5.2	700	400	PEH536UAE3150M2	
150	25 x 30	BC	0.72	4.7	710	410	PEH536UBC3150M2	
180	22 x 45	AF	0.84	5.8	580	340	PEH536UAF3180M2	
220	22 x 50	AG	0.95	6.5	480	280	PEH536UAG3220M2	
220	25 x 40	BE	0.95	6.2	480	280	PEH536UBE3220M2	
270	25 x 50	BG	1.1	7.4	390	230	PEH536UBG3270M2	
270	30 x 40	CE	1.2	8.1	390	220	PEH536UCE3270M2	
330	30 x 45	CF	1.3	9.2	320	180	PEH536UCF3330M2	
330	35 x 35	DD	1.3	8.7	320	190	PEH536UDD3330M2	
470	35 x 40	DE	1.6	10.5	230	130	PEH536UDE3470M2	
560	35 x 45	DF	1.8	11.8	190	110	PEH536UDF3560M2	
560	35 x 50	DG	1.9	12.4	190	110	PEH536UDG3560M2	
680	35 x 60	DI	2.2	14.3	160	91	PEH536UDI3680M2	
1000	40 x 80	EM	2.9	18.5	110	63	PEH536UEM4100M4	

* Maximum values

ARTICLE TABLE PEH 536 (105°C)

C _R	D x L	Case code	I _{RAC} [*] 105°C 100 Hz A	I _{RAC} [*] 40°C 20 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code	Pin configuration
μF	mm							
400 VDC (U _R)								
68	22 x 30	AC	0.50	3.6	1300	710	PEH536VAC2680M2	↓
68	25 x 25	BB	0.50	3.5	1300	720	PEH536VBB2680M2	
82	22 x 35	AD	0.57	4.2	1100	590	PEH536VAD2820M2	
100	22 x 35	AD	0.63	4.6	870	480	PEH536VAD3100M2	
100	25 x 30	BC	0.64	4.4	880	490	PEH536VBC3100M2	
120	22 x 40	AE	0.71	5.2	720	400	PEH536VAE3120M2	
150	22 x 50	AG	0.83	6.1	580	320	PEH536VAG3150M2	
150	25 x 40	BE	0.84	5.9	580	330	PEH536VBE3150M2	
150	30 x 30	CC	0.86	6.2	580	320	PEH536VCC3150M2	
180	30 x 35	CD	0.98	7.1	480	270	PEH536VCD3180M2	
180	35 x 30	DC	1.0	7.1	480	270	PEH536VDC3180M2	
220	25 x 50	BG	1.1	7.4	400	220	PEH536VBG3220M2	
220	30 x 40	CE	1.1	8.2	390	220	PEH536VCE3220M2	
270	30 x 45	CF	1.3	9.3	320	180	PEH536VCF3270M2	
330	30 x 50	CG	1.5	10.5	260	150	PEH536VCG3330M2	
330	35 x 40	DE	1.5	10.1	270	150	PEH536VDE3330M2	
390	35 x 45	DF	1.7	11.3	230	130	PEH536VDF3390M2	
470	35 x 50	DG	1.9	12.6	190	110	PEH536VDG3470M2	
560	35 x 55	DH	2.1	13.9	160	89	PEH536VDH3560M2	
680	40 x 60	EI	2.5	15.9	130	74	PEH536VEI3680M4	
1000	40 x 80	EM	3.1	19.7	90	51	PEH536VEM4100M4	
1500	40 x 100	EQ	3.9	22.9	61	35	PEH536VEQ4150M4	
450 VDC (U _R)								
47	22 x 30	AC	0.44	3.4	1500	840	PEH536YAC2470M2	
68	22 x 40	AE	0.57	4.4	1100	580	PEH536YAE2680M2	
68	25 x 30	BC	0.57	4.1	1100	580	PEH536YBC2680M2	
100	22 x 45	AF	0.72	5.4	720	390	PEH536YAF3100M2	
100	25 x 35	BD	0.72	5.2	730	400	PEH536YBD3100M2	
120	22 x 50	AG	0.81	6.0	600	330	PEH536YAG3120M2	
150	25 x 45	BF	0.94	6.7	490	270	PEH536YBF3150M2	
150	30 x 35	CD	0.97	7.2	480	260	PEH536YCD3150M2	
180	30 x 40	CE	1.1	8.2	400	220	PEH536YCE3180M2	
220	30 x 45	CF	1.3	9.3	330	180	PEH536YCF3220M2	
220	35 x 40	DE	1.3	9.4	330	180	PEH536YDE3220M2	
270	30 x 50	CG	1.4	10.4	270	150	PEH536YCG3270M2	
270	35 x 45	DF	1.5	10.7	270	150	PEH536YDF3270M2	
330	35 x 50	DG	1.7	11.9	220	120	PEH536YDG3330M2	
390	35 x 55	DH	1.9	13.2	190	100	PEH536YDH3390M2	
470	35 x 60	DI	2.1	14.5	160	86	PEH536YDI3470M2	
560	40 x 60	EI	2.4	16.0	130	73	PEH536YEI3560M4	
680	40 x 70	EK	2.7	17.9	110	61	PEH536YEK3680M4	
1000	40 x 100	EQ	3.4	21.9	75	42	PEH536YEQ4100M4	

* Maximum values.

MECHANICAL DATA

The capacitor may be mounted in any position. The PEH 536 is supplied with PVC insulation sleeve, thickness 0.3 mm. Voltage proof of the insulation sleeve = 2.5 kVDC (1 min). The minus pole is marked on the case surface.

ORDERING INFORMATION

For further ordering information please see page 8.
Pos 1–20

P	E	H	5	3	6	J	A	B	4	3	9	0	M	2						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

Pos. 14: Capacitance tolerance M = -20 to +20%
Pos. 15: Pin configuration

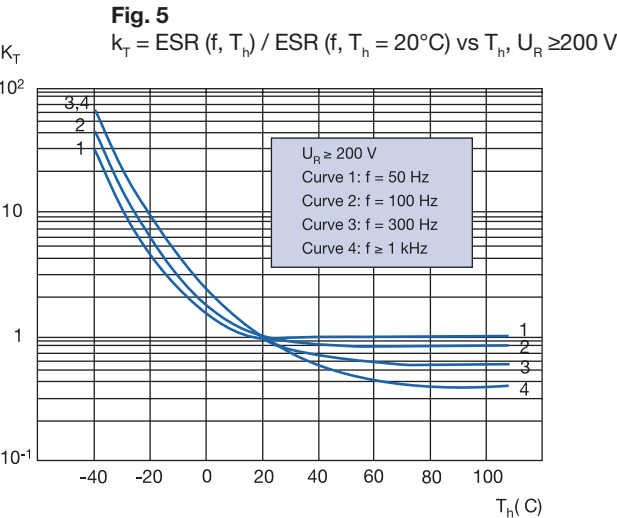
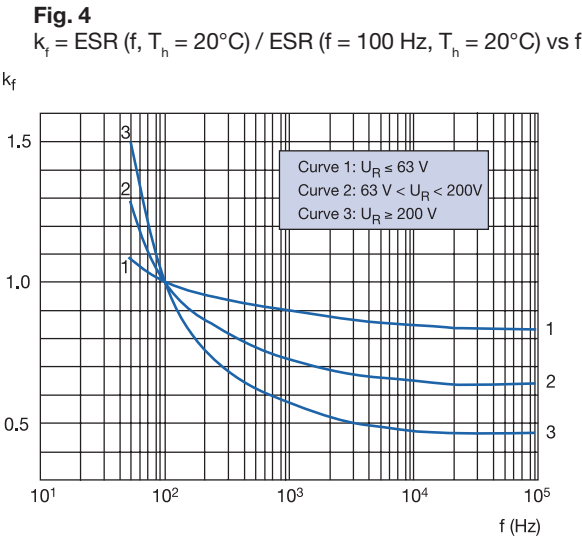
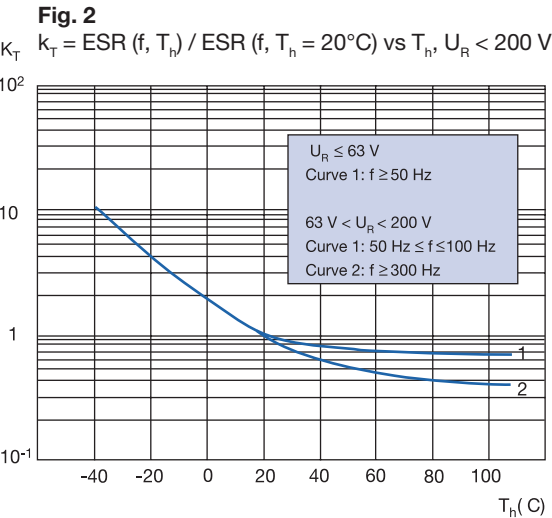
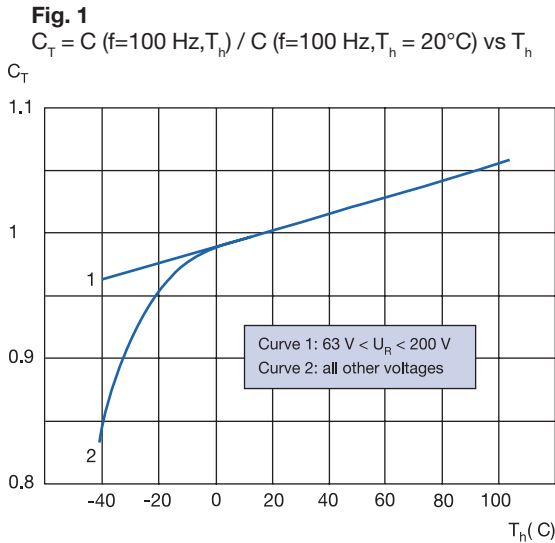
Quantities and weights for PEH536

CASE CODE	AC	AD	AE	AF	AG	BB	BC	BD	BE	BF	BG	CB	CC	CD	CE	CF	CG	DB	DC
Weight approx (g)	14	15	17	19	21	19	21	24	27	30	33	24	29	34	39	45	51	32	40

Quantities and weights for PEH536

CASE CODE	DD	DE	DF	DG	DH	DI	EI	EK	EM	EQ
Weight approx (g)	48	56	64	72	85	88	115	135	155	175

TYPICAL DATA PEH 536



THERMAL RESISTANCE FOR DIFFERENT CASE SIZES, AS A FUNCTION OF CASE AIR SPEED V

At ambient temperature $T_a = 40^\circ\text{C}$

Case		Air speed v											
D x L		v=0,5m/s		v=1,0m/s		v=2,0m/s		v=3,0m/s		v=4,0m/s		v=5,0m/s	
mm		R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}
		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$	
22 x 25	AB	24.3	25.1	19.1	20.0	14.8	15.7	13.2	14.1	11.4	12.3	10.3	11.1
22 x 30	AC	21.3	22.5	16.8	18.0	13.2	14.4	11.7	12.9	10.2	11.4	9.2	10.4
22 x 35	AD	19.1	20.5	15.1	16.6	11.9	13.4	10.7	12.1	9.4	10.8	8.5	9.9
22 x 40	AE	17.4	19.0	13.9	15.5	11.0	12.7	9.9	11.5	8.7	10.4	7.9	9.5
22 x 45	AF	16.1	17.6	12.9	14.4	10.4	11.8	9.3	10.8	8.3	9.7	7.5	9.0
22 x 50	AG	15.1	16.8	12.2	14.0	9.8	11.6	8.9	10.6	7.9	9.7	7.2	9.0
25 x 25	BB	21.9	22.8	17.2	18.1	13.4	14.3	11.8	12.6	10.2	11.1	9.2	10.0
25 x 30	BC	19.3	20.2	15.3	16.1	12.0	12.8	10.5	11.3	9.2	10.0	8.2	9.1
25 x 35	BD	17.2	18.2	13.7	14.7	10.8	11.8	9.6	10.6	8.4	9.4	7.6	8.6
25 x 40	BE	15.8	16.9	12.6	13.7	10.0	11.2	8.9	10.0	7.8	8.9	7.1	8.2
25 x 45	BF	14.7	16.2	11.8	13.3	9.4	10.9	8.4	9.9	7.4	8.9	6.8	8.3
25 x 50	BG	13.7	15.2	11.1	12.6	8.9	10.5	8.0	9.5	7.1	8.6	6.5	8.0
30 x 25	CB	18.9	19.5	14.9	15.5	11.7	12.3	10.0	10.6	8.7	9.3	7.8	8.4
30 x 30	CC	16.4	17.1	13.1	13.8	10.2	10.9	8.8	9.5	7.7	8.4	6.9	7.6
30 x 35	CD	14.8	15.6	11.8	12.6	9.3	10.1	8.0	8.9	7.0	7.9	6.3	7.2
30 x 40	CE	13.5	14.3	10.8	11.6	8.6	9.4	7.4	8.2	6.5	7.3	5.9	6.7
30 x 45	CF	12.5	13.3	10.0	10.9	8.0	8.9	7.0	7.8	6.2	7.0	5.6	6.5
30 x 50	CG	11.9	12.9	9.7	10.7	7.8	8.8	6.8	7.8	6.1	7.1	5.5	6.6
35 x 25	DB	16.5	17.0	13.1	13.6	10.5	11.0	8.6	9.1	7.5	8.0	6.7	7.2
35 x 30	DC	14.3	14.7	11.4	11.8	9.2	9.6	7.6	8.0	6.6	7.0	5.9	6.3
35 x 35	DD	12.9	13.4	10.3	10.8	8.3	8.8	6.9	7.4	6.0	6.5	5.4	5.9
35 x 40	DE	11.8	12.5	9.5	10.1	7.7	8.3	6.4	7.1	5.6	6.3	5.1	5.7
35 x 45	DF	10.9	11.6	8.8	9.5	7.1	7.9	6.0	6.7	5.3	6.0	4.8	5.5
35 x 50	DG	10.5	11.3	8.5	9.3	7.0	7.8	5.9	6.7	5.3	6.0	4.8	5.6
35 x 55	DH	9.6	10.3	7.8	8.5	6.4	7.1	5.4	6.1	4.8	5.5	4.4	5.1
35 x 60	DI	9.1	10.2	7.4	8.5	6.2	7.2	5.2	6.3	4.7	5.7	4.3	5.3
40 x 60	EI	8.2	9.0	6.7	7.6	5.5	6.3	4.6	5.5	4.1	5.0	3.8	4.7
40 x 70	EK	7.5	8.5	6.2	7.2	5.1	6.1	4.4	5.4	3.9	4.9	3.6	4.6
40 x 80	EM	7.0	8.3	5.9	7.2	4.9	6.2	4.2	5.5	3.8	5.1	3.5	4.8
40 x 100	EQ	6.4	8.2	5.4	7.2	4.6	6.3	4.1	5.8	3.7	5.4	3.4	5.2

(R_{thca} = Thermal resistance between case and ambient)

ALC42 Series 105°C

RoHS
Compliant

- **Compact Size**
- **2000 hours at 105 °C (U_R , I_R applied)**
- **Excellent surge voltage capability**
- **Optimized designs available on request**

APPLICATION

BASIC DESIGN

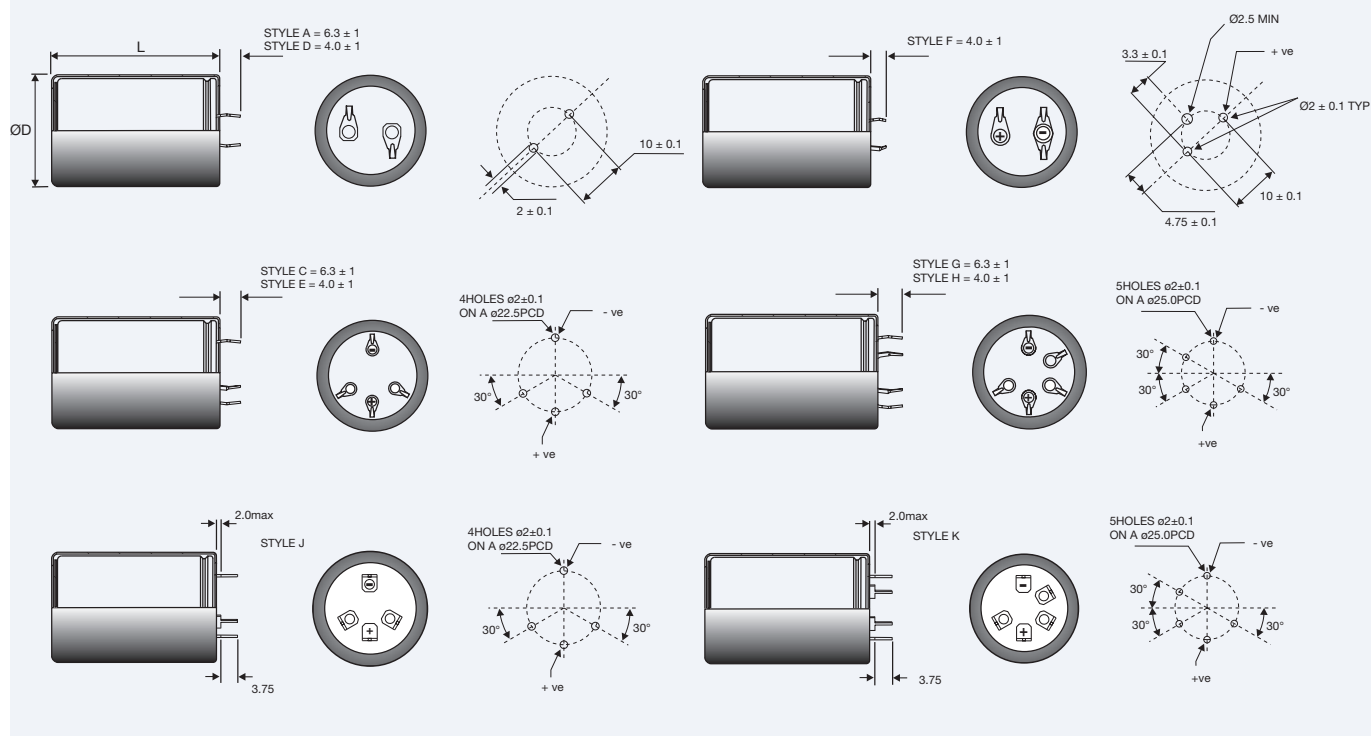
Designed for applications where high reliability and compact sizes are important such as switch mode power supplies and frequency converters.

The ALC42 (105°C) is a high CV snap-in version of the ALC40 range.

SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/105/56,	
Capacitance range	120 – 6800 μF	
Capacitance tolerance	–20 to +20%	
Rated voltage U _R	200 - 450 VDC	
Surge voltage U _s	1.15 x U _R (for U _R ≤ 250 VDC) 1.10 x U _R (for U _R ≥ 350 VDC)	Test Condition: ≤ 30s surge, 1000 cycles @ 105°C
Surge voltage U _{ss} (Short duration)	U _R U _{ss} 200 350 250 400 350 500 400 520 415 530 450 550 500 600	Test Condition: ≤ 500ms surge, 100 cycles @ 20°C
Leakage current I _L	= 0.003 x C _R x U _R (μA) or 6mA whichever is the smaller. Note, C _R is in μF.	Test Condition: U _R , 5mins., 20°C
Operational life time +105°C, U _R , I _R	Can Diameter 30, 35, 40, 45, 50 2000 hrs	End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit
+105°C, U _R	Can Diameter 30, 35, 40, 45, 50 11000 hrs	
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C	
Temperature range	–40 to +105°C (Operating) –55°C to +105°C (Storage)	

SPECIFICATION



Mounting

These capacitors are designed to be mounted by their terminations alone, and may be used in any position. Dummy pins must be isolated on 4 and 5 pin styles.

Terminal Style

Description	2 pin	2 pin	3 pin	4 pin	4 pin	5 pin	5 pin	4 pin	5 pin
Pin length	6.3 ± 1	4.0 ± 1	4.0 ± 1	6.3 ± 1	4.0 ± 1	6.3 ± 1	4.0 ± 1	5.75	5.75
Code	A	D	F	C	E	G	H	J	K
DIA. mm -0+1									
30	•	•	•						
35	•	•	•	•	•			•	
40	•	•		•	•	•	•		•
45				•	•	•	•		
50				•	•	•	•		•

CASE CODE (COMPONENT WEIGHT grams - nominal)

Length mm ± 2	30	35	40	45	50	55	60	80	105
Dia. mm -0+1									
30	CB (35)	CC (40)	CD (45)	CE (50)	CF (55)				
35	DB (42)	DC (50)	DD (55)	DE (65)	DF (70)	DG (75)	DH (80)	DL (105)	
40	EB (49)	EC (57)	ED (65)	EE (80)	EF (82)	EG (95)	EH (98)	EL (131)	EP (170)
45	FB (62)	FC (72)	FD (82)	FE (92)	FF (103)	FG (113)	FH (123)	FL (164)	FP (215)
50	KB (75)	KC (88)	KD (100)	KE (113)	KF (126)	KG (138)	KH (151)	KL (201)	KP (264)

Other sizes available upon request

ARTICLE TABLE ALC42 (105°C)

Cap (μ F)	Case Size (mm)	ESR (m Ω)	Impedance (m Ω)	Ripple current(A) at		Type number
		at 20°C 100Hz (max)	at 20°C 10 KHz (max)	105°C 100 Hz	10 KHz	
200 VDC (U _R)						
560	30x30	328	213	1.78	2.88	ALC42A561CB200
680	30x35	266	171	2.09	3.46	ALC42A681CC200
820	30x40	220	142	2.44	4.04	ALC42A821CD200
1000	35x35	213	148	2.58	3.61	ALC42A102DC200
1000	40x30	252	186	2.26	2.87	ALC42A102EB200
1200	30x50	156	102	3.14	4.98	ALC42A122CF200
1200	35x40	176	122	2.97	4.17	ALC42A122DD200
1200	40x35	199	145	2.73	3.55	ALC42A122EC200
1500	35x50	137	93	3.64	5.24	ALC42A152DF200
1500	40x40	163	119	3.15	4.07	ALC42A152ED200
1800	40x45	138	101	3.54	4.53	ALC42A182EE200
2200	35x60	105	75	4.21	5.60	ALC42A222DH200
2200	40x50	119	89	3.92	4.91	ALC42A222EF200
2200	40x55	109	79	4.24	5.52	ALC42A222EG200
2700	35x80	89	65	5.06	7.01	ALC42A272DL200
2700	40x60	99	74	4.49	5.57	ALC42A272EH200
3300	40x80	81	61	5.52	7.16	ALC42A332EL200
4700	40x105	46	32	8.22	12.69	ALC42A472EP200
5600	45x105	41	29	8.68	12.61	ALC42G562FP200
6800	50x105	36	26	9.09	12.39	ALC42G682KP200
250 VDC (U _R)						
390	30x30	442	285	1.59	2.81	ALC42A391CB250
470	30x35	362	232	1.86	3.36	ALC42A471CC250
560	30x40	303	194	2.16	3.92	ALC42A561CD250
680	35x35	278	187	2.36	3.64	ALC42A681DC250
680	40x30	313	221	2.12	2.95	ALC42A681EB250
820	30x50	212	137	2.80	4.87	ALC42A821CF250
820	35x40	230	155	2.72	4.19	ALC42A821DD250
820	40x35	251	175	2.55	3.62	ALC42A821EC250
1000	40x40	206	144	2.95	4.18	ALC42A102ED250
1200	35x50	160	110	3.40	5.04	ALC42A122DF250
1200	40x45	174	122	3.31	4.65	ALC42A122EE250
1500	35x60	134	92	3.90	5.66	ALC42A152DH250
1500	40x50	146	104	3.70	5.02	ALC42A152EF250
1800	35x80	105	70	4.64	7.19	ALC42A182DL250
1800	40x55	127	92	4.01	5.31	ALC42A182EG250
2700	40x80	84	60	5.28	7.02	ALC42A272EL250
3300	40x105	53	34	7.47	12.71	ALC42A332EP250
4700	45x105	41	28	8.32	12.45	ALC42G472FP250
5600	50x105	37	26	8.70	12.21	ALC42G562KP250
350 VDC (U _R)						
220	30x30	704	461	1.34	2.74	ALC42A221CB350
270	30x35	571	373	1.57	3.26	ALC42A271CC350
330	30x40	468	306	1.84	3.80	ALC42A331CD350
390	35x35	420	282	2.06	3.65	ALC42A391DC350
390	40x30	451	311	1.91	3.01	ALC42A391EB350
470	30x50	332	218	2.37	4.75	ALC42A471CF350
470	35x40	349	234	2.37	4.20	ALC42A471DD350
560	40x35	328	230	2.34	3.51	ALC42A561EC350
680	35x50	246	166	2.98	5.09	ALC42A681DF350
680	40x40	270	189	2.71	4.06	ALC42A681ED350
820	35x60	204	140	3.40	5.75	ALC42A821DH350
820	40x50	216	149	3.31	5.19	ALC42A821EF350
1000	40x55	182	127	3.63	5.48	ALC42A102EG350
1200	35x80	140	96	4.21	7.01	ALC42A122DL350
1200	40x60	160	114	3.83	5.62	ALC42A122EH350
1500	40x80	120	84	4.76	7.20	ALC42A152EL350
2200	40x105	72	48	6.71	12.34	ALC42A222EP350

Termination Style A,C,D,E,F,G,H,J or K 

ARTICLE TABLE ALC42 (105°C)

Cap (μF)	Case Size (mm)	ESR (mΩ) at 20°C	Impedance (mΩ) at 20°C	Ripple current(A) at 105°C		Type number
		100Hz (max)	10 KHz (max)	100 Hz	10 KHz	
350 VDC (U _R)						
2700	45x105	62	41	7.26	12.35	ALC42G272FP350
3300	50x105	53	36	7.77	12.21	ALC42G332KP350
400 VDC (U _R)						
180	30x30	733	467	1.28	2.73	ALC42A181CB400
220	30x35	587	375	1.49	3.25	ALC42A221CC400
270	30x40	488	310	1.75	3.79	ALC42A271CD400
330	35x35	426	280	1.99	3.61	ALC42A331DC400
330	40x30	458	308	1.84	2.96	ALC42A331EB400
390	30x50	342	218	2.28	4.74	ALC42A391CF400
390	35x40	360	235	2.21	4.17	ALC42A391DD400
390	40x35	377	251	2.18	3.65	ALC42A391EC400
470	40x40	313	208	2.52	4.22	ALC42A471ED400
560	35x50	250	164	2.88	5.06	ALC42A561DF400
560	40x45	264	176	2.84	4.71	ALC42A561EE400
680	35x60	211	139	3.27	5.72	ALC42A681DH400
680	40x50	222	149	3.19	5.14	ALC42A681EF400
820	40x55	189	128	3.50	5.45	ALC42A821EG400
1000	35x80	145	96	4.06	6.96	ALC42A102DL400
1200	40x80	128	86	4.56	7.20	ALC42A122EL400
1800	40x105	76	49	6.41	12.32	ALC42A182EP400
2200	45x105	65	42	6.96	12.32	ALC42G222FP400
2700	50x105	55	37	7.48	12.17	ALC42G272KP400
450 VDC (U _R)						
120	30x30	918	580	1.13	2.69	ALC42A121CB450
180	30x35	622	396	1.40	3.20	ALC42A181CC450
220	30x40	510	324	1.69	3.73	ALC42A221CD450
220	35x35	525	335	1.80	3.66	ALC42A221DC450
270	30x50	412	262	2.06	4.67	ALC42A271CF450
270	35x40	428	275	2.08	4.19	ALC42A271DD450
270	40x30	476	320	1.78	2.90	ALC42A271EB450
330	40x35	385	257	2.13	3.54	ALC42A331EC450
390	40x40	323	215	2.44	4.12	ALC42A391ED450
470	35x50	260	171	2.78	4.94	ALC42A471DF450
470	40x45	270	180	2.70	4.59	ALC42A471EE450
560	40x50	230	154	3.02	5.03	ALC42A561EF450
680	35x80	187	125	3.69	6.88	ALC42A681DL450
680	40x60	191	128	3.55	5.73	ALC42A681EH450
820	40x80	161	109	4.20	7.21	ALC42A821EL450
1200	40x105	102	66	5.70	11.82	ALC42A122EP450
1500	45x105	84	55	6.29	12.03	ALC42G152FP450
1800	50x105	72	48	6.79	12.07	ALC42G182KP450

Termination Style A,C,D,E,F,G,H,J or K 

OPERATIONAL DATA

Operational Lifetime
Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_p) is therefore only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT = 1 x 10⁻⁹ failures per hour.

T _a	Failure rate per hour
85°C	230 FIT
40°C	11 FIT

Failure rate per hour for catastrophic plus parametric failures.

MECHANICAL DATA

Mounting position
The capacitor can be mounted upright or inclined to a horizontal position.

Insulating resistance
≥ 100 Mohms at 100V d.c., across insulating sleeve.

Safety vent
A safety vent for over pressure is featured on either the base (opposing end to the terminals) or on the the side of the can. This is in the form of a grooved section on the surface of the can which is a weakened area and is designed to relieve build up of internal pressure due to over stress or catastrophic failure.

Vibration
10Hz to 500Hz at 0.75mm or 10g for 3x2hrs duration. 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration (45/50mm diameter cans).

Voltage Proof
≥ 2500V d.c., across insulating sleeve.

PEH 526 / 626

RoHS
Compliant

- Designed for automotive applications
- Temperature rating 125 °C
- Resistance to vibrations
- Low ESR, High ripple current capability

APPLICATION

A high performance electrolytic capacitor designed for automotive applications with high vibrations and high ambient temperatures.

BASIC DESIGN

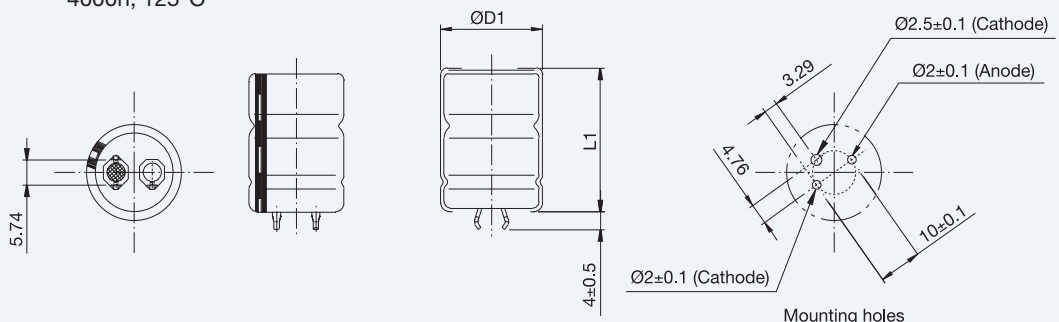
An electrolytic capacitor with outstanding electrical performance. It is polarized with the negative pole connected to the case. The outer case has a plastic cover. The low ESR is a result of a low resistive

electrolyte/paper system. Together with the TDC thermal concept, this range has very high ripple current capability. The capacitor is suitable for both mobile and aircraft applications, with operation up to 125°C.

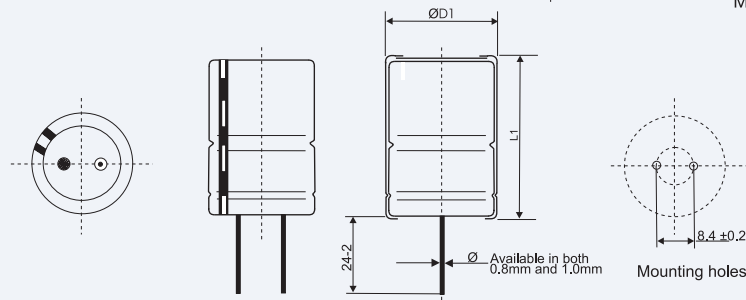
SPECIFICATION

Standards	IEC 60384-4 Long Life Grade 40/125/56 In accordance with CECC 30 301-809
Capacitance range	820-6800 μ F
Capacitance tolerance	-20 to +20%
Rated voltage	25-80 VDC
Temperature range	-40 to +125°C
Leakage current, I_{RL} (μA)	$0.01 (\mu A) \times C_R (\mu F) \times U_R (V)$
Operational life time	4000h at 125°C, 20 000h at 105°C
Shelf life	0V +105°C 5000 h, +40°C 10 years
Diameter range	22 - 30 mm
Resistance to vibrations	10 - 2000 Hz, 1.5 mm displacement amplitude or max. 20 g 3x2 hours. The capacitor shall be clamped by their body.
Life test	4000h, 125°C

PEH526



PEH626



Dimensions table (mm)

D x L	Case code	D1 ± 0.5	L1 ± 1.0	Weight approx (g)
22 x 25	AB	22	26	12
22 x 30	AC	22	31	14
25 x 25	BB	25	26	19
25 x 35	BD	25	36	24
30 x 25	CB	30	26	24
30 x 35	CD	30	36	34

Pin Configuration

Description	3 pin snap-in	radial lead $\varnothing 0.8$ mm	radial lead $\varnothing 1.0$ mm
Pin length	4.0 $\pm$ 1	24 $\pm$ 2	24 $\pm$ 2
Code	3	08	10
DIA. mm -0+1			
22	•	•	•
25	•	•	•
30	•	•	•
35	•	•	•

ARTICLE TABLE PEH 526 / 626

C _R	D x L	I _{RAC} [*] 125°C 100 Hz	I _{RAC} [*] 85°C ≥5 kHz	I _{RAC} [*] 105°C ≥5 kHz	I _{RAC} [*] 125°C ≥5 kHz	ESR* 20°C 100 Hz	ESR* 20°C 100 kHz	ESR* 125°C ≥5 kHz	Article code	Pin configuration
μF	mm	A	A	A	A	mΩ	mΩ	mΩ		
25 VDC (U _R)										↓
2700	22 x 25	2.0	9.7	7.4	3.7	54	30	14	PEH - 26HAB4270M--	
3900	22 x 30	2.5	11.9	9.1	4.5	38	22	10	PEH - 26HAC4390M--	
3900	25 x 25	2.3	10.1	7.7	3.8	41	24	14	PEH - 26HBB4390M--	
5600	30 x 25	2.7	10.2	7.8	3.8	33	22	17	PEH - 26HCB4560M--	
6800	25 x 35	3.4	14.4	11.0	5.5	24	14	9	PEH - 26HBD4680M--	
40 VDC (U _R)										
1200	22 x 25	1.5	9.4	7.2	3.6	77	28	15	PEH - 26KAB4120M--	
1500	22 x 30	1.8	11.5	8.8	4.4	59	20	11	PEH - 26KAC4150M--	
1500	25 x 25	1.7	9.8	7.5	3.7	62	23	16	PEH - 26KBB4150M--	
1800	22 x 25	1.7	9.6	7.3	3.7	62	28	14	PEH - 26KAB4180M--	
1800	25 x 35	2.5	14.1	10.7	5.3	36	14	9	PEH - 26KBD4180M--	
2200	22 x 30	2.0	11.7	8.9	4.5	49	22	11	PEH - 26KAC4220M--	
2200	25 x 25	1.9	10.0	7.6	3.8	52	24	15	PEH - 26KBB4220M--	
2200	30 x 25	2.1	9.8	7.4	3.7	48	22	19	PEH - 26KCB4220M--	
2700	25 x 35	2.5	14.1	10.7	5.3	36	14	9	PEH - 26KBD4270M--	
3300	30 x 25	2.4	10.0	7.6	3.8	40	22	18	PEH - 26KCB4330M--	
3900	25 x 35	2.8	14.3	10.9	5.4	30	14	9	PEH - 26KBD4390M--	
63 VDC (U _R)										
820	22 x 25	1.2	5.9	4.6	2.3	150	79	36	PEH - 26MAB382AM--	
1200	22 x 30	1.5	7.4	5.7	2.9	100	55	26	PEH - 26MAC412AM--	
1200	25 x 25	1.5	6.8	5.3	2.6	110	59	31	PEH - 26MBB412AM--	
1800	30 x 25	1.8	7.7	5.9	2.9	76	45	29	PEH - 26MCB418AM--	
2200	25 x 35	2.2	10.0	7.7	3.8	59	34	18	PEH - 26MBD422AM--	

* Maximum specified values

5 = Snap-in
6 = Radial lead

80 VDC (U_R) capacitors available upon request

OPERATIONAL LIFE AND RIPPLE CURRENT

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

Example:

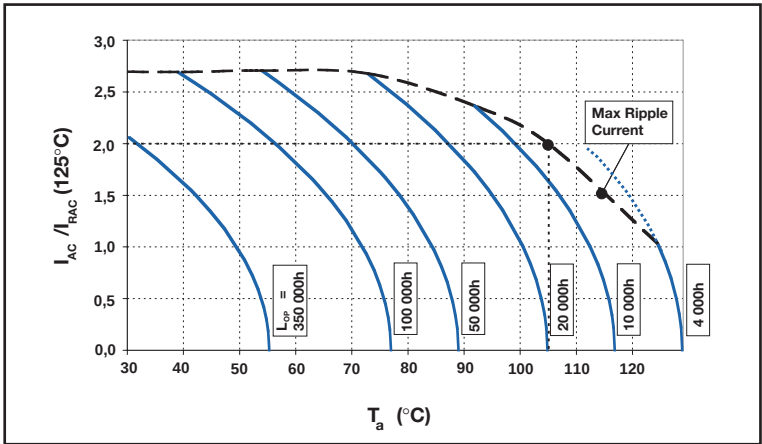
Article: PEH526KBB4220M3
Ambient temperature (T_a): 105°C
Ripple current, at 10kHz (I_{AC}): 7.6 A

I_{RAC}(125°C, ≥5kHz) = 3.8 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)

When the capacitor load is at 100Hz, use I_{AC} / I_{RAC}(125°C, 100Hz) as input value to the diagram (see data table). At other frequencies use I_{AC} / I_{RAC}(125°C, ≥ 5kHz) x 1/Corr =

Frequency correction factor, for ripple current (Corr):



	FREQUENCY			
	300 Hz	1 kHz	5 kHz	100 kHz
Correction factor (Corr) (Typical value)	0.70	0.89	1.00	1.03

LEAKAGE CURRENT

Rated leakage current, I_{RL} (μA)Rated voltage, U_R (V)Rated capacitance, C_R (μF) $I_{RL} = 0.01 \times C_R (\mu F) \times U_R (V)$

CUSTOMER DESIGN

On request PEH526 can be designed in other capacitance values.

ORDERING INFORMATION

For further ordering information please see page 8.

Pos 1–20

P	E	H	5	2	6	K	A	C	4	1	5	0	M	3					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Pos. 14: Capacitance tolerance M = -20 to +20%**Pos. 15 - 16: Pin configuration: 3 = three pin version, 08 = Ø 0.8 mm radial leads, 10 = Ø 1.0 mm radial leads**

CASE CODE	AB	AC	BB	BD	CB	CD
Weight approx (g)	12	14	19	24	24	34

THERMAL RESISTANCE FOR DIFFERENT CASE SIZES, AS A FUNCTION OF CASE AIR SPEED V

At ambient temperature $T_a = 40^\circ\text{C}$

Case		Air speed v											
D x L mm		v=0,5m/s		v=1,0m/s		v=2,0m/s		v=3,0m/s		v=4,0m/s		v=5,0m/s	
		R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}
		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$		$^\circ\text{C/W}$	
22 x 25	AB	24.3	25.1	19.1	20.0	14.8	15.7	13.2	14.1	11.4	12.3	10.3	11.1
22 x 30	AC	21.3	22.5	16.8	18.0	13.2	14.4	11.7	12.9	10.2	11.4	9.2	10.4
22 x 35	AD	19.1	20.5	15.1	16.6	11.9	13.4	10.7	12.1	9.4	10.8	8.5	9.9
22 x 40	AE	17.4	19.0	13.9	15.5	11.0	12.7	9.9	11.5	8.7	10.4	7.9	9.5
22 x 45	AF	16.1	17.6	12.9	14.4	10.4	11.8	9.3	10.8	8.3	9.7	7.5	9.0
22 x 50	AG	15.1	16.8	12.2	14.0	9.8	11.6	8.9	10.6	7.9	9.7	7.2	9.0
25 x 25	BB	21.9	22.8	17.2	18.1	13.4	14.3	11.8	12.6	10.2	11.1	9.2	10.0
25 x 30	BC	19.3	20.2	15.3	16.1	12.0	12.8	10.5	11.3	9.2	10.0	8.2	9.1
25 x 35	BD	17.2	18.2	13.7	14.7	10.8	11.8	9.6	10.6	8.4	9.4	7.6	8.6
25 x 40	BE	15.8	16.9	12.6	13.7	10.0	11.2	8.9	10.0	7.8	8.9	7.1	8.2
25 x 45	BF	14.7	16.2	11.8	13.3	9.4	10.9	8.4	9.9	7.4	8.9	6.8	8.3
25 x 50	BG	13.7	15.2	11.1	12.6	8.9	10.5	8.0	9.5	7.1	8.6	6.5	8.0
30 x 25	CB	18.9	19.5	14.9	15.5	11.7	12.3	10.0	10.6	8.7	9.3	7.8	8.4
30 x 30	CC	16.4	17.1	13.1	13.8	10.2	10.9	8.8	9.5	7.7	8.4	6.9	7.6
30 x 35	CD	14.8	15.6	11.8	12.6	9.3	10.1	8.0	8.9	7.0	7.9	6.3	7.2
30 x 40	CE	13.5	14.3	10.8	11.6	8.6	9.4	7.4	8.2	6.5	7.3	5.9	6.7
30 x 45	CF	12.5	13.3	10.0	10.9	8.0	8.9	7.0	7.8	6.2	7.0	5.6	6.5
30 x 50	CG	11.9	12.9	9.7	10.7	7.8	8.8	6.8	7.8	6.1	7.1	5.5	6.6
35 x 25	DB	16.5	17.0	13.1	13.6	10.5	11.0	8.6	9.1	7.5	8.0	6.7	7.2
35 x 30	DC	14.3	14.7	11.4	11.8	9.2	9.6	7.6	8.0	6.6	7.0	5.9	6.3
35 x 35	DD	12.9	13.4	10.3	10.8	8.3	8.8	6.9	7.4	6.0	6.5	5.4	5.9
35 x 40	DE	11.8	12.5	9.5	10.1	7.7	8.3	6.4	7.1	5.6	6.3	5.1	5.7
35 x 45	DF	10.9	11.6	8.8	9.5	7.1	7.9	6.0	6.7	5.3	6.0	4.8	5.5
35 x 50	DG	10.5	11.3	8.5	9.3	7.0	7.8	5.9	6.7	5.3	6.0	4.8	5.6
35 x 55	DH	9.6	10.3	7.8	8.5	6.4	7.1	5.4	6.1	4.8	5.5	4.4	5.1
35 x 60	DI	9.1	10.2	7.4	8.5	6.2	7.2	5.2	6.3	4.7	5.7	4.3	5.3
40 x 60	EI	8.2	9.0	6.7	7.6	5.5	6.3	4.6	5.5	4.1	5.0	3.8	4.7
40 x 70	EK	7.5	8.5	6.2	7.2	5.1	6.1	4.4	5.4	3.9	4.9	3.6	4.6
40 x 80	EM	7.0	8.3	5.9	7.2	4.9	6.2	4.2	5.5	3.8	5.1	3.5	4.8
40 x 100	EQ	6.4	8.2	5.4	7.2	4.6	6.3	4.1	5.8	3.7	5.4	3.4	5.2

(R_{thca} = Thermal resistance between case and ambient)

ALP/T 20/22 Series 85°C

RoHS
Compliant

- Solder tag (ALT) and DIN standard solder pin (ALP)
- Long Life 26000 hours at 85 °C (Ur, Ir applied)
- ALC snap-in should be considered for new designs

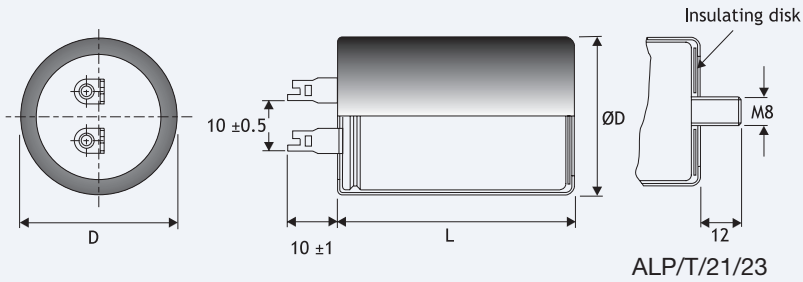
APPLICATION	BASIC DESIGN
It should be pointed out that the ALP, solder pin, ranges are an older design and as such should not be considered for any new applications. Details are incorporated here, primarily, for maintenance/replacement purposes.	The ALP/T20 features low ESR, high ripple current ratings and outstandingly good high frequency impedance. The ALP/T22 has the same features as the ALP/T20 series but with a very high CV per unit volume.

SPECIFICATION		
Standards	IEC 60384-4, DIN 41238, BS CECC 30301-033 (ALP/T20 only)	
Capacitance range	22 – 150000 µF	
Capacitance tolerance	-10 to +30% ALP/T 20 (except 200V ±20%) -20 to +20% ALP/T 22	
Rated voltage U _R	40 - 450 VDC	
Surge voltage U _s	1.15 x U _R (for U _R ≤ 250 VDC) 1.10 x U _R (for U _R ≥ 350 VDC)	Test Condition: ≤ 30s surge, 1000 cycles @ 85°C
Leakage current I _L	= 0.006 x C _R x U _R (µA) or 6mA whichever is the smaller. Note, C _R is in µF.	Test Condition: U _R , 5mins., 20°C
Operational life time +85°C, U _R , I _R	Can Diameter 25 12000 hrs 30 15000 hrs 35 18000 hrs 40 26000 hrs	End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C	
Temperature range	-40 to +85°C (Operating) -55°C to +105°C (Storage)	

SPECIFICATION

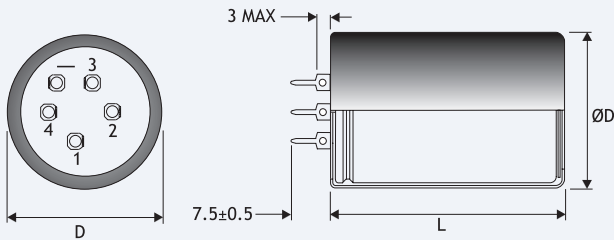
ALT Tag style

Designed for flying lead connection.

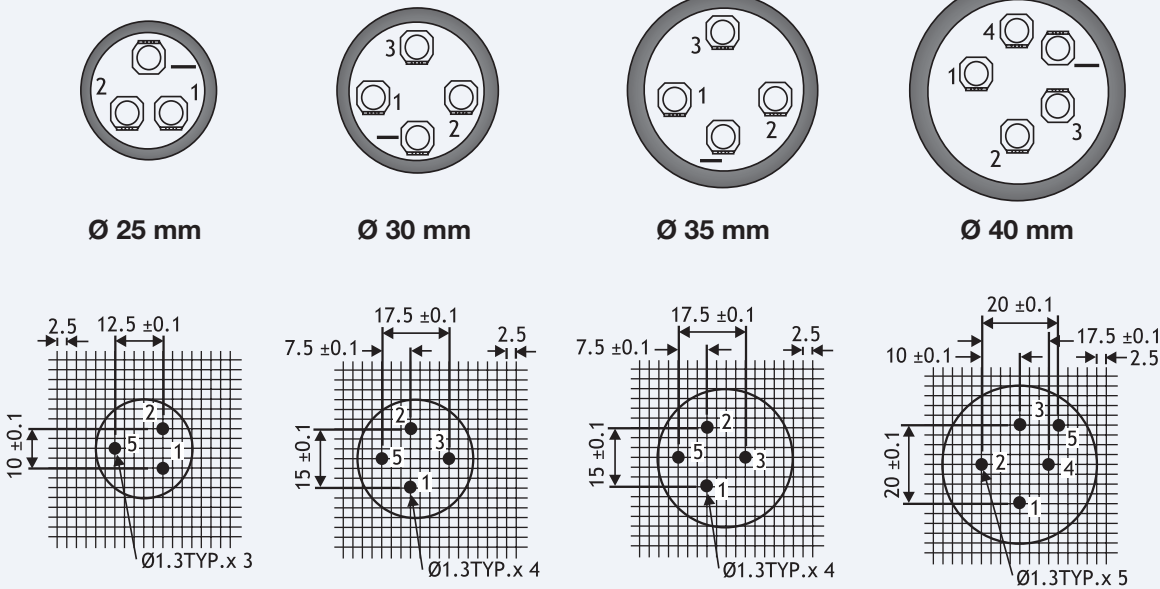


ALP Pin style

Designed for PCB mounting to DIN 41238.



ALP Pin and mounting configurations



Printed circuit board hole positions, viewed from component side.
Connections: Hole 1 represents +ve, Hole 5 represents -ve. Terminals 2,3 and 4 may be at negative terminal potential due to the presence of electrolyte. They are intended for mechanical connections only. It is recommended that they are soldered to the printed circuit board. Additional dummy pins are provided for stability. Note that the case and dummy pins may be at negative terminal potential.

Dimensions (sleeved) mm

Case Code	D ±1	L ±2	Mounting Clip for Alt Style	Weight grams nom.
AA	25	35	V2/H1	30
AB	25	45	V2/H1	39
BB	30	45	-	50
CB	35	45	V3/H2	65
CD	35	55	V3/H2	75
DB	40	45	V9	80
DD	40	55	V9	95
DE	40	75	V9	125
DF	40	105	V9	170

Can size (mm) / rating data - ALP/T20 series

Cap μF	Rated Voltage U _R						
	40	63	100	200	250	400	450
22							25x35
33							25x35
47						25x35	25x35
68						25x45	25x45
100					25x35	30x45	30x45
150				25x35	25x45	35x45	35x55
220				25x45	30x45	35x55 / 40x45	40x55
330				30x45	35x45	40x55	40x75
470			25x35	35x45	35x55 / 40x45	40x75	40x105
680			25x45	35x55 / 40x45	40x55	40x105	
1000		25x35	30x45	40x55	40x75		
1500	25x35	25x45	35x45	40x75	40x105		
2200	25x45	30x45	35x55 / 40x45	40x105			
3300	30x45	35x45	40x55				
4700	35x45	35x55 / 40x45	40x75				
6800	35x55 / 40x45	40x55	40x105				
10000	40x55	40x75					
15000	40x75	40x105					
22000	40x105						

Can size (mm) / rating data - ALP/T22 series

Cap μF	Rated Voltage U _R						
	40	63	100	200	250	385	450
47							25x35
68						25x35	25x45
100					25x35	25x45	30x45
150				25x35	25x45	30x45	35x45
220				25x45	30x45	35x45	35x55 / 40x45
330				30x45	35x45	35x55 / 40x45	40x55
470				35x45	35x55 / 40x45	40x55	40x75
680			25x35	35x55 / 40x45	40x55	40x75	40x105
1000			25x45	40x55	40x75	40x105	
1500			30x45	40x75	40x105		
2200		25x35	35x45	40x105			
3300	25x35	25x45	35x55 / 40x45				
4700	25x45	30x45	40x55				
6800	30x45	35x45	40x75				
10000	35x45	35x55 / 40x55	40x105				
15000	35x55 / 40x45	40x75					
22000	40x55	40x105					
33000	40x75						
47000	40x105						

ALN20S Series 85°C

RoHS
Compliant

- 4 Pin Solder tag
- Long Life 18000 hours at 85 °C (Ur, Ir applied)
- Slit Foil technology



APPLICATION

A new generation of audio capacitors is now available from BHC – T-Network Capacitor (TNC). The TNC has been designed specifically for audio applications by DNM design and is being manufactured in the UK by BHC.

BASIC DESIGN

In a normal capacitor unwanted resistance and inductance force the input and output together electrically, making its unwanted characteristics very critical for performance - figure 1.

The new T-Network capacitor (TNC) behaves differently because the input must flow along the capacitor plate to reach the output. The signal is forced into pure capacitance with most of the unwanted resistance and inductance appearing on each side of the bulk capacitance. The residual defects, therefore, tend to assist capacitance filtering in the T-Network design - figure 2.

The TNC is designed for the most demanding filtering situations and it will redefine performance standards in many non-audio applications. For use in audio amplifiers, the TNC incorporates current slit foil technology to produce the ultimate audio capacitor. These capacitors give excellent results against standard components on a direct replacement. However, TNC high frequency performance is so enhanced that the H.F. compensation of test amplifiers may need resetting for best results.

Figure 1: Conventional capacitor

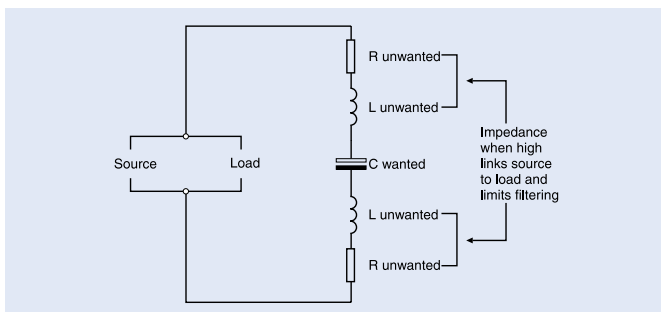
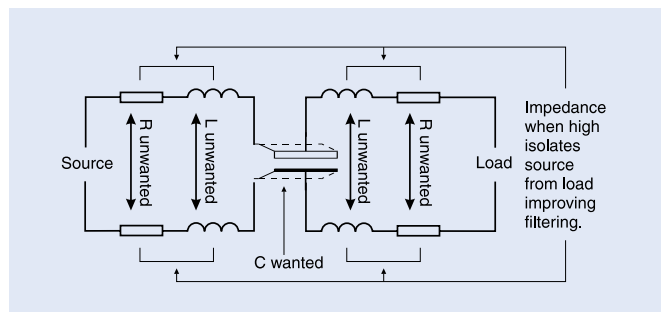


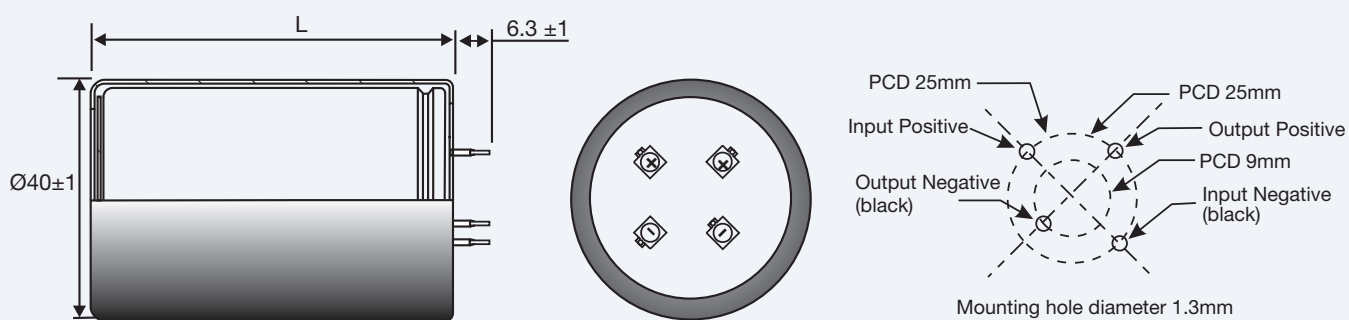
Figure 2: T-Network capacitor



SPECIFICATION

Standards	IEC 60384-4		
Capacitance range	10000 μF		
Capacitance tolerance	±20% (-10% +30% where specified)		
Rated voltage U _R	50 - 100 VDC		
Surge voltage U _S	1.15 x U _R	Test Condition: ≤ 30s surge, 1000 cycles @ 85°C	
Leakage current I _L	= 0.006 x C _R x U _R (μA) or 6mA whichever is the smaller. Note, C _R is in μF.	Test Condition: U _R , 5mins., 20°C	
Operational life time +85°C, U _R , I _R	18000 hours	End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit	
+85°C, U _R	29000 hours		
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C		
Temperature range	-40 to +85°C (Operating) -55°C to +85°C (Storage)		

SPECIFICATION



Dimensions (sleeved) mm

Part Number	Capacitance μF	U_R V	Length $L \pm 2$ mm
ALN20S1053DD	10,000 -10% +30%	50V	55
ALN20S1106DD	10,000 $\pm 20\%$	50V	55
ALN20S1067DD	10,000 $\pm 20\%$	63V	55
ALN20S1107DE	10,000 $\pm 20\%$	80V	75
ALN20S1108DF	10,000 $\pm 20\%$	100V	105

ALC10S Series 85°C

RoHS
Compliant

- 2 Pin Snap-in
- Long Life 18000 hours at 85 °C (Ur, Ir applied)
- Slit Foil technology

APPLICATION

Modern electrolytic capacitors are designed for use in power supplies so most aspects of their design have been optimised for this application. Some of the advances in design may not be beneficial in audio applications where the requirements of the capacitors are very different.

BHC, in collaboration with an audio research company, DNM Design, have produced the Slit Foil Capacitor specifically for audio applications. This is a patented design which eliminates circulating currents in the aluminium foils. This spurious current flow on the capacitor plates is known to occur, but is not apparent in most applications.

BASIC DESIGN

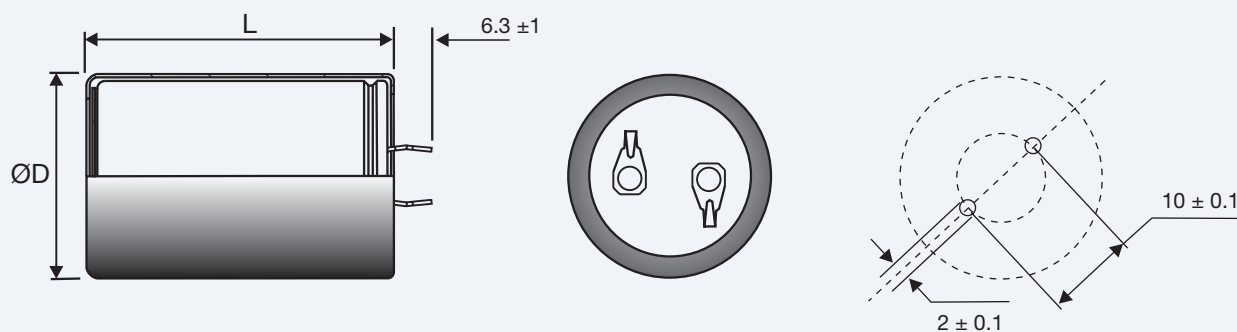
Slit foil capacitor research has also indicated that improvements in the general construction of the capacitors give better results in audio where the fidelity of the waveshape is very important. Great attention has been paid to the construction details which can affect the performance, i.e. foil type, its connections

and the mechanical construction. BHC manufacture a range of capacitors for this type of application in screw terminal, solder tag or board mounting configurations. Details of capacitance and case sizes available in the Slit Foil Capacitors range are available from our sales office.

SPECIFICATION

Standards	IEC 60384-4		
Capacitance range	10000 μF		
Capacitance tolerance	±20%		
Rated voltage U _R	50 - 100 VDC		
Surge voltage U _S	1.15 x U _R	Test Condition: ≤ 30s surge, 1000 cycles @ 85°C	
Leakage current I _L	= 0.006 x C _R x U _R (μA) or 6mA whichever is the smaller. Note, C _R is in μF.	Test Condition: U _R , 5mins., 20°C	
Operational life time +85°C, U _R , I _R	Can Diameter 35 15000 hrs 40 18000 hrs	End of Life requirement: ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I _L ≤ initial specified limit	
+85°C, U _R	Can Diameter 35 24000 hrs 40 29000 hrs		
Shelf Life	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C		
Temperature range	-40 to +85°C (Operating) -55°C to +85°C (Storage)		

SPECIFICATION



Dimensions (sleeved) mm

Part Number	Capacitance μF	U_R V	Size ($\varnothing D \times L$) mm mm
ALC10S1102DF	10,000	50	35x50
ALC10S1103DH	10,000	63	35x60
ALC10S1104DL	10,000	80	35x80
ALC10S1105EX	10,000	100	40x90

MS/MD Series 60/70°C

RoHS
Compliant

- Intermittent AC Motor Starting
- 6.3 mm Double amp tags (quick connect types)
- VDE approved to EN 60252-2

APPLICATION

A range of aluminium electrolytic capacitors specifically designed for a.c. operation which help to start the motor by providing a leading current to the auxillary winding. The capacitor is not permanently connected to the winding of the motor and is switched off after starting, usually automatically.

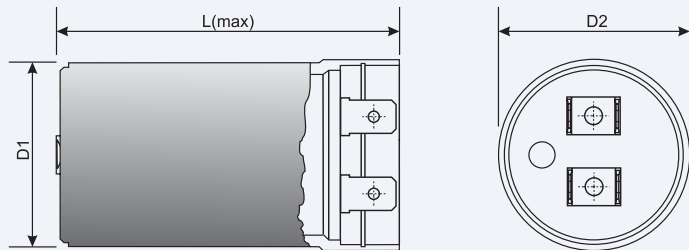
BASIC DESIGN

Capacitors for this application are designed for intermittent duty only, and capable of withstanding the a.c. voltage applied to the motor during starting. The capacitor construction comprise either double anode

or O-style (double anode and floating cathode) windings and are housed in a moulded plastic case. The MD series is VDE approved to EN 60252-2 for the defined ratings.

SPECIFICATION

Standards	DIN EN 60252-2:- AC Motor Capacitors - Part 2 : Motor Start Capacitors
Capacitance range	25 μ F to 750 μ F
Capacitance tolerance	$\pm 10\%$ or -0% $+25\%$
Rated voltage U_R	120V - 330Vac 50Hz
Surge voltage U_s	$1.25 \times U_R$
Endurance life time	
+70°C, $1.1U_R$	MD types 500 hrs (at specified duty cycle)
+60°C, $1.1U_R$	MS types 500 hrs (at specified duty cycle)
Shelf Life	2 years
Temperature range	-20°C to +70°C MD types -20°C to +60°C MS types



Dimensions mm

Case Code	D1 ± 0.5	D2 ± 0.5	Lmax
AA	38	39	75
AB	38	39	90
AC	38	39	116

VDE Approvals to EN 60252-2

Rated Voltage	220V	260V
Capacitor type	MD	MD
Capacitance (μ F)	(note 1)	(note 2)
30	AA	
40	AA AB	AB
50	AA AB	AB
60	AA AB	AB
70	AB	AB
80	AB AC	AB
90	AC	
100	AC	
120	AC	
125	AC	

Note 1: Duty cycles approved;

220V @ SD=3 & ED=1.7%
280V @ SD=1 & ED=0.55%
300V @ SD=1 & ED=0.1%

Note 2: Duty cycles approved;

260V @ SD=3 & ED=1.7%
330V @ SD=1 & ED=0.55%

General approval notes;

- valid for both $\pm 10\%$ and $-0 +25\%$ tolerance.
- valid for intermediate capacitance values in increments of 1 μ F between 30 μ F and 100 μ F and in increments of 5 μ F between 100 μ F and 125 μ F.

120Vac

Type number	Min. Cap. (μF)	Max. Cap. (μF)	Tolerance	Can Size (mm)	Duty Cycle	
					@ 120V rms	@ 150V rms
---MS12AAMA1STD	25	325	-0% +25%	38x75	1.67%	
---MS12AAMK1STD	25	360	±10%	38x75	1.67%	
---MS12ABMA1STD	85	460	-0% +25%	38x90	1.67%	
---MS12ABMK1STD	90	510	±10%	38x90	1.67%	
---MS12ACMA1STD	120	670	-0% +25%	38x116	1.67%	
---MS12ACMK1STD	130	750	±10%	38x116	1.67%	
---MD12AAMA1STD	25	325	-0% +25%	38x75	1.67%	0.55%
---MD12AAMK1STD	25	360	±10%	38x75	1.67%	0.55%
---MD12ABMA1STD	85	460	-0% +25%	38x90	1.67%	0.55%
---MD12ABMK1STD	90	510	±10%	38x90	1.67%	0.55%
---MD12ACMA1STD	120	670	-0% +25%	38x116	1.67%	0.55%
---MD12ACMK1STD	130	750	±10%	38x116	1.67%	0.55%

220Vac

Type number	Min. Cap. (μF)	Max. Cap. (μF)	Tolerance	Can Size (mm)	Duty Cycle	
					@ 220V rms	@ 280V rms
---MS22AAMA1STD	30	65	-0% +25%	38x75	1.67%	
---MS22AAMK1STD	30	70	±10%	38x75	1.67%	
---MS22ABMA1STD	40	90	-0% +25%	38x90	1.67%	
---MS22ABMK1STD	40	100	±10%	38x90	1.67%	
---MS22ACMA1STD	55	130	-0% +25%	38x116	1.67%	
---MS22ACMK1STD	65	150	±10%	38x116	1.67%	
---MD22AAMA1STD	30	65	-0% +25%	38x75	1.67%	0.55%
---MD22AAMK1STD	30	70	±10%	38x75	1.67%	0.55%
---MD22ABMA1STD	40	90	-0% +25%	38x90	1.67%	0.55%
---MD22ABMK1STD	40	100	±10%	38x90	1.67%	0.55%
---MD22ACMA1STD	55	130	-0% +25%	38x116	1.67%	0.55%
---MD22ACMK1STD	65	150	±10%	38x116	1.67%	0.55%

260Vac

Type number	Min. Cap. (μF)	Max. Cap. (μF)	Tolerance	Can Size (mm)	Duty Cycle	
					@ 260V rms	@ 330V rms
---MS26AAMA1STD	25	55	-0% +25%	38x75	1.67%	
---MS26AAMK1STD	25	60	±10%	38x75	1.67%	
---MS26ABMA1STD	35	75	-0% +25%	38x90	1.67%	
---MS26ABMK1STD	35	85	±10%	38x90	1.67%	
---MS26ACMA1STD	50	110	-0% +25%	38x116	1.67%	
---MS26ACMK1STD	55	125	±10%	38x116	1.67%	
---MD26AAMA1STD	25	50	-0% +25%	38x75	1.67%	0.55%
---MD26AAMK1STD	25	55	±10%	38x75	1.67%	0.55%
---MD26ABMA1STD	30	70	-0% +25%	38x90	1.67%	0.55%
---MD26ABMK1STD	35	80	±10%	38x90	1.67%	0.55%
---MD26ACMA1STD	45	100	-0% +25%	38x116	1.67%	0.55%
---MD26ACMK1STD	50	115	±10%	38x116	1.67%	0.55%

* Capacitance code
e.g. 030=30μF, 120=120μF

TECHNICAL DATA

Dual Voltage Rating

The MD range of capacitors is designed with a dual voltage rating. The lower voltage rating relates to a duty cycle of 1.67% and the upper voltage rating relates to a duty cycle of 0.55%.

Power Factor

The tangent of the loss angle for motor start capacitors shall not exceed 0.1 and shall be calculated as follows:

$$\tan \delta = \frac{W}{V \times I} = \frac{\text{true watts}}{\text{apparent watts}}$$

Duty Cycle

The standard rating is 1.67% or 1/60th full time and corresponds to a maximum duty of 20 starts, each of three seconds duration per hour. It is expressed as 3/1.67 (a 3 minute cycle with 1.67% duration during which the capacitor may be energised). If the same capacitor is to be used for a duty cycle of 60 starts per hour the cycle duration will be 1 minute. The operation time per cycle will then have to be reduced to 1.67% of 1 minute (i.e. 1 second). Alternative duty cycles are available on request.

Presence of Run Capacitor

When the motor is fitted with both starting and run capacitors, consideration should be given to fitting of the appropriate discharge resistor to the starting capacitor. This is to protect the run capacitor from damage through discharge of the starting capacitor.

Container Form

Cylindrical mouldings, meeting creepage and clearance distances, according to IEC 60335-1 and flammability ratings according to UL94-V1.

TECHNICAL DATA

Discharge Resistors

A discharge resistor may be fitted to a motor start capacitor to prevent electrical overstress of the capacitor and or for safety reasons. In accordance with BS5267 and IEC 60252, the resistor value should be such that it reduces the voltage on the capacitor, from the line voltage to less than 50V within 60 secs.
The resistor value may be approximated as follows:

$$R \text{ (k}\Omega\text{) max.} = \frac{T}{\text{Rated capacitance } \mu\text{F}}$$

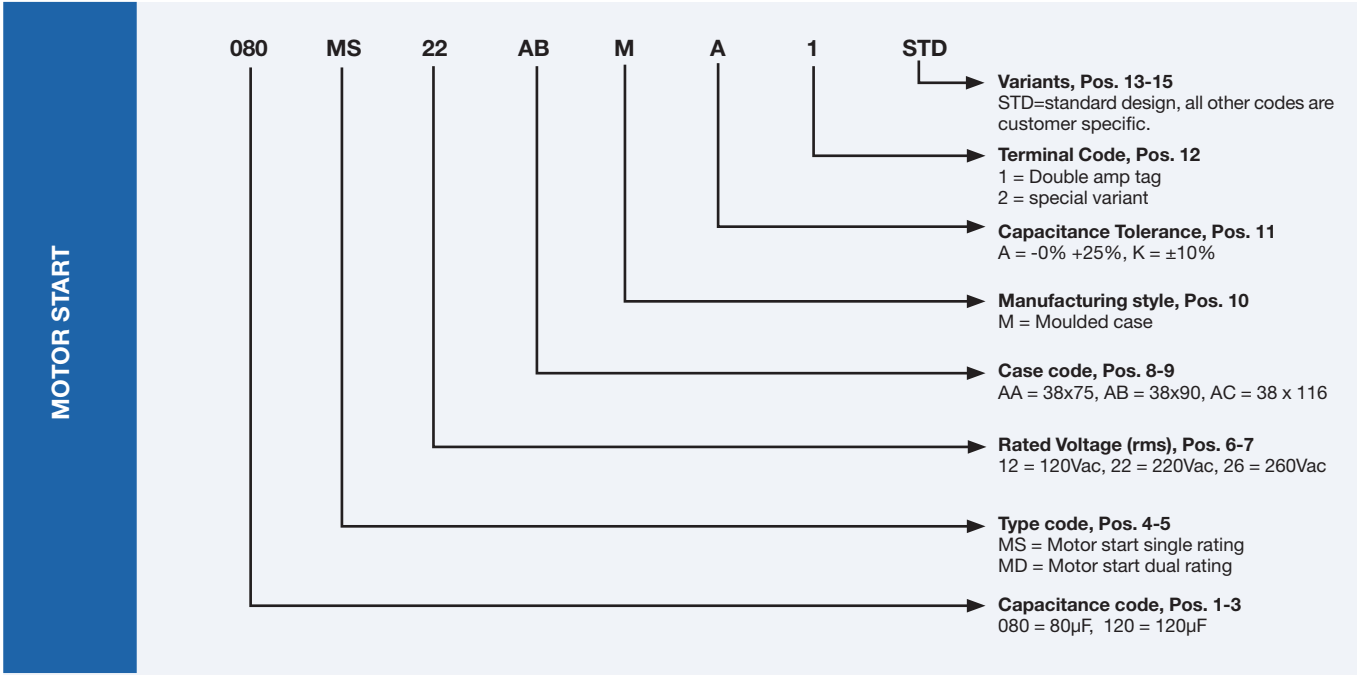
Rated Voltage (d.c.)	T
120	50000
220	32000
260	30000
280	28000
330	26000

Value (kOhms)	Wattage
5.6	2W
15	2W
33	0.5W
56	1W
82	2W
100	1W

PART NUMBERING

Pos 1–15

0	8	0	M	S	2	2	A	B	M	A	1	S	T	D
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15



Operational life time section

LIFE TIME CALCULATION OF RIFA ELECTROLYTIC CAPACITORS

$P_{LOSS} = I_{RMS}^2 \times ESR$
 P_{LOSS} = Power losses in the capacitor
 I_{RMS} = Ripple current
 ESR = Equivalent serie resistance
 $T_h = T_a + P_{LOSS} \times R_{th}$
 T_h = Hot spot temperature
 T_a = Ambient temperature
 R_{th} = Thermal resistance
 A = Expected life time at 85°C hotspot temperature (hours)

$$L_{OP} = \text{Expected life time} = A \times 2^{\frac{85-T_h}{C}} \text{ hours}$$

Capacitor	Diameter	A	C
PEG124	10	36000	11
	13	43000	11
	16	65000	11
	20	97000	11
PEG 126	16	64000	12
	20	85000	12
PEG 220, PEG 225, PEG 226	16	64000	12
	20	85000	12
PEH 532	22-40	6500	12
PEH 534	22-40	13000	12
PEH 536	22-40	19500	12
PEH 506	22-40	6000	12
PEH 526	25-35	63000*	12
PEH 169	35	29000	12
	50	35000	12
	65	44000	12
	75	58000	12
	90	78000	12
PEH 200	35	20000	12
	50	24000	12
	65	30000	12
	75	40000	12
	90	60000	12

* = L_{OP} (125°C) limited to 4000h

Capacitor		Max T_a	Max T_h at Max T_a
PEG 124	125°C	125°C	129°C
	105°C	105°C	108°C
PEG 126	150°C	150°C	151°C
PEG 220, PEG 225, PEG 226	150°C	150°C	151°C
PEH 532	105°C	105°C	110°C
PEH 534	105°C	105°C	110°C
PEH 536	105°C	105°C	110°C
PEH 506	85°C	85°C	97°C
PEH 526	125°C	125°C	129°C
PEH 169	85°C	85°C	100°C ($U_R \leq 420$ VDC)
	85°C	85°C	95°C ($U_R = 450$ VDC)
	105°C	105°C	112°C
PEH 200	85°C	85°C	100°C
	105°C	105°C	110°C

Note: Operational life time for BHC types can be found in separate application notes, TD003

CALCULATION EXAMPLE, PEH 200

Article No: PEH200OO427AMB2

Input: Ambient temperature = 70°C
 Ripple current = 30A (10kHz)
 ESR (85°C, 10 kHz) = 5.8 mΩ
 Thermal resistance $R_{th} = 2.6^\circ\text{C/W}$

Calculation: $P_{LOSS} = I_{RMS}^2 \times ESR = 30^2 \times 5.8 \times 10^{-3} = 5.3 \text{ W}$
 Hot spot temp. $T_h = T_a + R_{th} \times P_{LOSS} = 70 + 2.6 \times 5.3 = 84^\circ\text{C}$
 The assumption of hot-spot temp 85°C when we get ESR was OK!

Output: Expected Life time $L_{OP} = 30000 \times 2^{\frac{85-84}{12}} = 31 \text{ k hours}$

Remark! ESR (T_h , f) values, of a given article number, is available upon request. Please contact customer support.

Equivalent series resistance factor k as a function of frequency and winding hot-spot temperature.
 $k = ESR(T_{hs}, f) / ESR(20^\circ\text{C}, 100\text{Hz})$

ESR (20°C, 100Hz) =

26 mΩ (Maximum value)
 18 mΩ (Typical value)

Freq. f	Hot-spot temperature T _h (°C)													
kHz	-40	-30	-20	-10	0	10	20	30	40	50	60	70	85	100
0.050	13.0	7.9	4.9	3.1	2.2	1.7	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.7
0.100	12.5	7.4	4.4	2.6	1.7	1.2	1.0	0.93	0.89	0.88	0.88	0.88	0.91	0.95
0.200	12.2	7.2	4.1	2.4	1.4	0.96	0.75	0.66	0.61	0.58	0.56	0.56	0.56	0.58
0.300	12.2	7.1	4.0	2.3	1.3	0.88	0.66	0.57	0.52	0.48	0.46	0.45	0.45	0.45
0.400	12.1	7.1	4.0	2.2	1.3	0.84	0.62	0.52	0.47	0.43	0.41	0.39	0.39	0.39
0.500	12.1	7.0	4.0	2.2	1.3	0.81	0.60	0.50	0.44	0.40	0.38	0.36	0.35	0.36
0.600	12.1	7.0	3.9	2.2	1.3	0.80	0.58	0.48	0.42	0.38	0.35	0.34	0.33	0.33
0.800	12.1	7.0	3.9	2.2	1.2	0.78	0.56	0.46	0.40	0.36	0.33	0.31	0.30	0.30
1.000	12.0	7.0	3.9	2.2	1.2	0.76	0.55	0.44	0.39	0.34	0.31	0.29	0.28	0.28
2.000	12.0	7.0	3.9	2.1	1.2	0.74	0.52	0.42	0.36	0.31	0.28	0.26	0.25	0.24
5.000	12.0	6.9	3.9	2.1	1.2	0.72	0.51	0.40	0.34	0.30	0.26	0.24	0.23	0.22
10.000	12.0	6.9	3.9	2.1	1.2	0.72	0.50	0.40	0.34	0.29	0.26	0.23	0.22	0.21
20.000	12.0	6.9	3.9	2.1	1.2	0.71	0.50	0.39	0.33	0.29	0.25	0.23	0.22	0.21
50.000	12.0	6.9	3.9	2.1	1.2	0.71	0.50	0.39	0.33	0.29	0.25	0.23	0.21	0.21
100.000	12.0	6.9	3.9	2.1	1.2	0.71	0.50	0.39	0.33	0.29	0.25	0.23	0.21	0.21

CALCULATION EXAMPLE, PEG 22X (PEG 220, PEG 225, PEG 226)

Article No: PEG 226KL4270Q

Thermal parameters , PEG220, PEG225 and PEG226:

Input data: Capacitor case temperature $T_c = 125^\circ\text{C}$
 Ripple current = 27.9 A ($\geq 5 \text{ kHz}$)
 ESR (125°C, 5 kHz) = 6.7 mΩ
 (see catalogue sheet)
 Thermal resistance $R_{thhc} = 2.4^\circ\text{C/W}$
 (Hot-spot to case, see table)

Calculation: $P_{LOSS} = I_{RMS}^2 \times ESR = 27.9^2 \times 6.7 \times 10^{-3} = 5.2 \text{ W}$
 Hot spot temp. $T_h = T_a + R_{thhc} \times P_{LOSS} = 125 + 2.4 \times 5.2 = 137.5^\circ\text{C}$

Output: Expected Life time, $L_{OP} = 85 \text{ kh} \times 2^{\frac{85-137.5}{12}} = 4.1 \text{ k hours}$

See table on page 148 (parameter "A")

Max allowed hot-spot temperature, continuous operation:

$T_{hmax} = 0.5 \times T_c + 75^\circ\text{C}$ (heat-sinked)
 $T_h - T_c = \text{max } 15^\circ\text{C}$
 $T_{hmax} = 0.5 \times T_a + 75^\circ\text{C}$ (not heat-sinked)
 $T_h - T_a = \text{max } 40^\circ\text{C}$

Internal Thermal Res. Typ. Natural Conv. Typ. Heat Sink

Article	C_{thw} (J/°C)	C_{thc} (J/°C)	C_{thtot} (J/°C)	R_{thhc} (C/W)	R_{thca} (C/W)	R_{thcc} (C/W)
PEG 22X F-Case	5.8	2.2	8.0	3.5	26	2.0
PEG 22X G-Case	8.0	2.5	10.4	3.5	21	2.0
PEG 22X H-Case	10.0	3.4	13.4	2.4	21	1.5
PEG 22X J-Case	14.0	4.1	18.2	2.4	18	1.5
PEG 22X L-Case	18.4	4.6	23.0	2.4	16	1.5

ESR correction factor, vs. frequency [ESR / ESR (5kHz, 125°C)]

	Frequency			
	100 Hz	300 Hz	1 kHz	$\geq 5 \text{ kHz}$
Correction factor (Corr)	8.0	3.0	1.5	1.0

ESR correction factor, vs. temperature [ESR / ESR (5kHz, 125°C)]

	Temperature			
	-10°C	60°C	105°C	125°C
Correction factor (Corr)	4.4	1.3	1.1	1.0

PYR 5008 and 7511 resistors

- For voltage balancing and/or discharge of electrolytic capacitors
- Fits capacitor diameters 50–90 mm
- Easy to mount

APPLICATION

Voltage balancing of series connected electrolytic can type capacitors and/or discharge purposes.

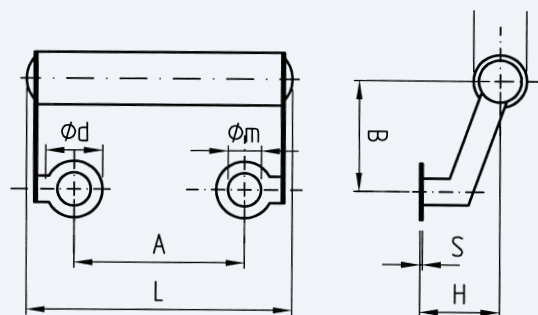
BASIC DESIGN

The PYR resistors are wire wound on a ceramic core and coated with high temperature silicone. The mounting brackets

are made of stainless steel and connected by two point spot welding.

SPECIFICATION

Standards	CECC 40201, MIL -R26E
Resistance range	10–47 k Ω
Resistance tolerance	+/- 5%
Rated voltage	700 VDC acc. to CECC 40201-003
Temperature range	-55 to +105°C



Dimensions table PYR (mm)

Type	A	L ± 1	d ± 2	m	B	H ± 1	S ± 1	D max	Weight approx (g)
PYR 5008	22.0*	40	10.6	6.3	21	15	0.4	10	9
PYR 7511	32.0	50	10.6	6.3	21	15	0.4	10	11

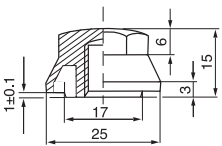
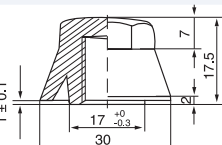
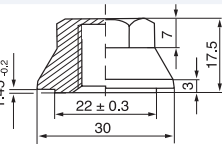
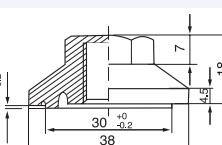
* Brackets are adjustable up to $A = 28.5$

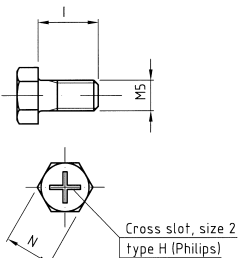
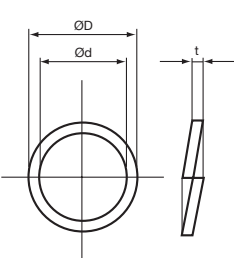
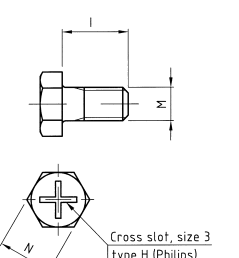
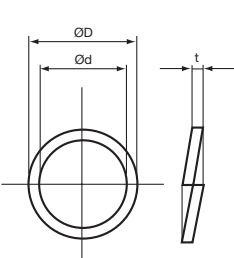
Article table PYR

Article code	R (k Ω)*	P _{max} (W) 40°C	P _{max} (W) 85°C	P _{max} (W) 105°C	Fits cap. diameter
PYR 5008 / 47	47	10	8	7	50–65
PYR 7511 / 10	10	13	11	10	75–90
PYR 7511 / 18	18	13	11	10	75–90
PYR 7511 / 27	27	13	11	10	75–90
PYR 7511 / 47	47	13	11	10	75–90

* Other R values on request

MOUNTING DATA FOR THE ACCESSORIES

NYLON CAP NUTS	Mounting hole mm (min)	Max chassis thickness (mm)	Width of jaws (mm)	Creepage distance (mm)	Test voltage 50–60 Hz 1 min (KVAC)	Max tightening torque (NM)	Capacitor diameter (mm)
 PYB 7033, M8	Ø 17.5	5	17	4.5	2.5	3	Ø = 35
 PYB 7026, M12	Ø 17.5	5	19	2.5	2,5	8	Ø > 35
 PYB 7041, M12	Ø 22.5	5	19	5	2.5	8	Ø > 35
 PYB 7042, M12	Ø 30.5	5	19	9	4	8	Ø > 35

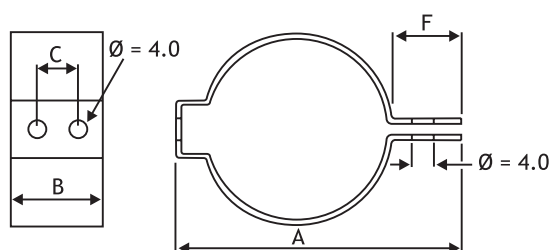
SCREWS STAINLESS STEEL	WASHERS STAINLESS STEEL	M	l	D	d	t	S	Max tightening torque (NM)
 PYC 6750, M5	 PYC 7150, M5	M5	10	8.7	5.1	1.2	10	3
 PYC 6751, M6*	 PYC 6756, M6*	M6	12	11.1	6.1	1.6	12	5 *

* M6 and M5 (max connector thickness 3 mm incl. washer)

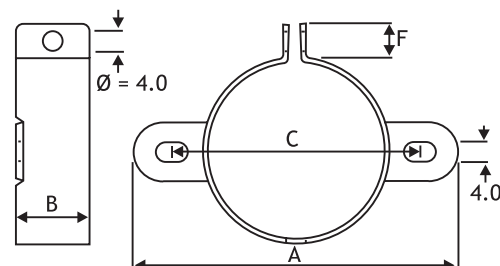
CLIPS

DIMENSIONS mm MATERIAL Zinc plated steel**Horizontal Mounting**

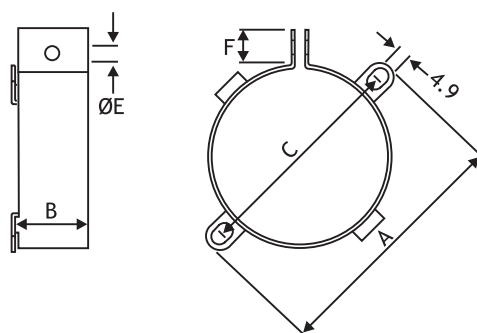
TYPE	CAN DIA	A	B	C	F
H1	25.0	40.0	22.3	12.8	10.0
H2	35.0	52.0	22.3	12.8	10.0

**Vertical Mounting**

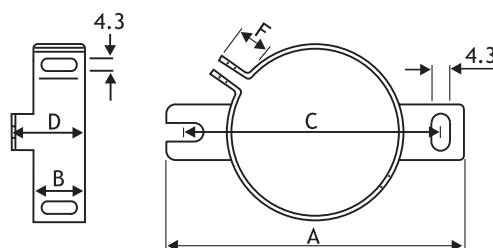
TYPE	CAN DIA	A	B	C	F
V2	25.0	49.0	19.0	37.0	10.0
V3	35.0	58.0	19.0	45.0	9.0
V9	40.0	65.0	19.0	52.4	9.5



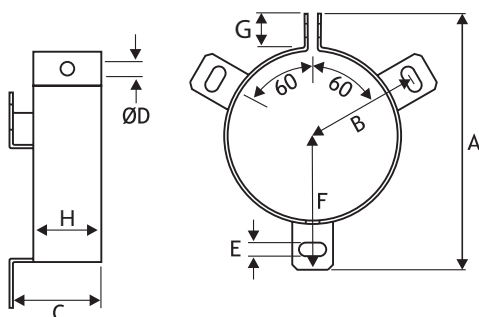
TYPE	CAN DIA	A	B	C	E	F
V4	51.0	75.0	25.4	64.0	5.0	10.0
V6	45.0	69.5	17.4	58.0	4.0	10.0
V8	63.5	88.9	25.4	77.5	5.0	9.5
PYC6041	35	64	19	52	4.5	11.5



TYPE	CAN DIA	A	B	C	D	F
UTE2736	35.0	63.0	12.2	54.0	17.2	9.0



TYPE	CAN DIA	A	B	C	D	E	F	G	H
V10	65.0	90.0	40.0	30.0	5.0	4.5	-	10	20
V11	76.0	103.0	45.5	30.0	5.0	4.5	-	10	20
V90	90.0	116.0	53.5	30.0	5.0	4.5	-	10	20
UTE2737	50.0	75.5	33.5	27.0	4.3	4.3	39.5	10	20
UTE2738	65.0	88.5	39.0	27.0	4.3	4.3	45.0	10	20
UTE2739	72.0	97.0	44.0	28.0	4.3	4.3	50.0	10	20
PYC6042	50	78	32.5	30	5.5	4.5	39	12	19
PYC6043	65	90.5	38	36	5.5	4.5	44	12	25
PYC6044	75	100.5	43	36	5.5	4.5	49	12	25
PYC6045	90	115.5	50.5	36	5.5	4.5	56.5	12	25

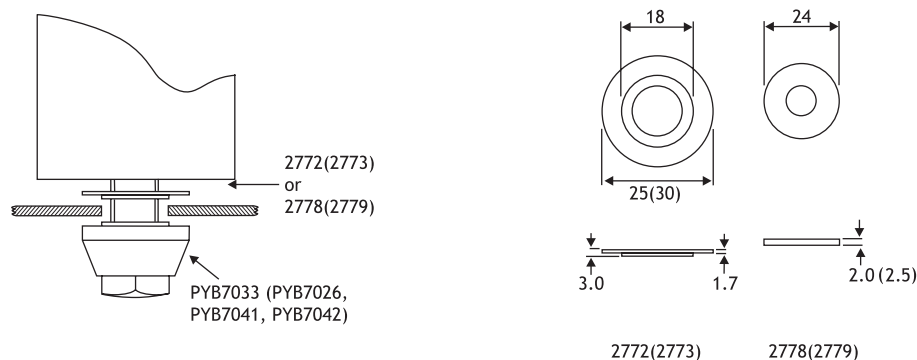
**Notes**

When using mounting clamps care should be taken not to obscure any safety vent in the can. Delivered without bolts and nuts for mounting. PYC clips are for PEH169 & PEH200 capacitors.

MOUNTING KITS

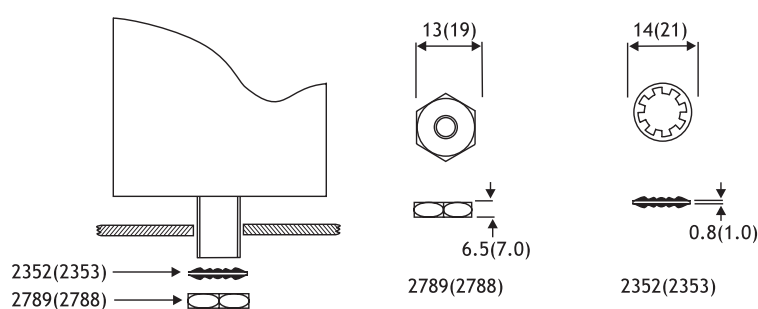
INSULATED VERSION

M8 Stud (M12 Stud)



NON-INSULATED VERSION

M8 Stud (M12 Stud)



Dimensions mm. All the above accessories may be ordered individually using the part number shown, or as kits using the kit part numbers shown below.

Kit Contents and Ordering Information

STANDARD KITS

Part code	Description	Kit order number			
		2740	2741	2782	2785
2352	Steel washer M8	-	-	•	-
2353	Steel washer M12	-	-	-	•
2772	Stepped poly washer M8	•	-	-	-
2773	Stepped poly washer M12	-	•	-	-
2778	Plain poly washer M8	•	-	-	-
2779	Plain poly washer M12	-	•	-	-
2788	Steel nut M12	-	-	-	•
2789	Steel nut M8	-	-	•	-
PYB7033	Nylon nut M8	•	-	-	-
PYB7026	Nylon nut M12	-	•	-	-

SPECIAL KITS

Part code	Description	Kit order number			
		2690	2691	2692	2693
2352	Steel washer M8	-	-	•	-
2353	Steel washer M12	•	-	-	•
2772	Stepped poly washer M8	-	•	•	-
2773	Stepped poly washer M12	•	-	-	•
2778	Plain poly washer M8	-	•	•	-
2779	Plain poly washer M12	-	-	-	•
2788	Steel nut M12	•	-	-	•
2789	Steel nut M8	-	•	•	-
PYB7041	Nylon nut M12	-	-	-	-
PYB7042	Nylon nut M12	-	-	-	-

LIMITED WARRANTY ELECTROLYTIC CAPACITORS

Evox Rifa AB warrants that the goods manufactured by Evox Rifa AB are free from defects in design, materials and workmanship.

Evox Rifa AB liability under this warranty shall be limited to replacement or repair free of charge, at Evox Rifa AB factory, provided that notification of such failure or defect is given to Evox Rifa AB immediately upon the same becoming apparent and that on Evox Rifa AB's request the goods are promptly returned to Evox Rifa AB carriage paid. In case goods thus returned as defective, prove to be without fault or defect, Evox Rifa AB is entitled to charge buyer 10% of the value of returned goods.

If the goods supplied or part there of are not manufactured by or branded RIFA, Evox Rifa AB will only extend to buyer the benefit of the warranty granted by the manufacturer of the goods. Evox Rifa AB liability is further limited to a period of 12 months from the date of shipment to the buyer.

Evox Rifa AB shall not be liable for any defect which is due to accident, fair wear and tear, negligent use, tampering, improper handling, improper use, improper operation or improper storage or any other default on the part of any other person other than Evox Rifa AB.

Evox Rifa AB shall have no other liabilities in case of defective goods than those stated

above and shall under no circumstances be liable for any consequential loss or damage arising from the use of goods sold by Evox Rifa AB. Liability under paragraph 823 BGB is expressly excluded.

The above limitations of Evox Rifa AB liability for defective goods shall apply also with regards to product liability, and Evox Rifa AB shall have no responsibility for injury to persons or for damage to goods or property of any kind.

In case of product liability claims from third parties against Evox Rifa AB, not falling within Evox Rifa AB liability in accordance to the above, buyer shall hold Evox Rifa AB harmless.

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PEG124	125°C / 105°C	24
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PEG220	150°C	33
PEG225	150°C	35
PEG226	150°C	37
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ALC40	105°C	104
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