



Product Profile 2005



PoleCap PFC Capacitors

for Outdoor Low-Voltage PFC Applications

just everywhere ...

www.epcos.com

PoleCap PFC Capacitors for Outdoor Low-Voltage PFC Applications



Preview

For many years, power factor correction (PFC) has been used in applications such as industry and energy supply for buildings to improve the quality of electric power and make it more efficient. A major commercial benefit is the saving of energy costs. But power factor correction also helps to decrease the current load in transmission networks and distribution grids. By reducing the currents, net losses are lowered, electric power is saved and CO₂ emission reduced. The voltage also becomes more stable due to lower current flow, i.e. voltage drops are decreased.

This product profile is addressed to end customers, panel builders, distribution companies and power utilities in the low-voltage power distribution sector. Low-voltage power factor correction is common practice and is currently experiencing growing use in the energy distribution sector. In this case, the capacitors are mounted on poles and connected to the overhead line.

EPCOS is worldwide market leader in low-voltage power factor correction.

Important Notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of passive electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of a passive electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of a passive electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as “hazardous”)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.

We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the “General Terms of Delivery for Products and Services in the Electrical Industry” published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, CeraDiode, CSSP, SIMID, PhaseCap, PhaseMod, SIFI, SIKOREL, SilverCap, SIOV, SIP5D, SIP5K, TOPcap, UltraCap, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.

PoleCap PFC Capacitor

Inert gas-impregnated ■ Dry type ■ Triple safety system ■ Outdoor

General

Awareness of the necessity of power quality is increasing, and power factor correction (PFC) will be implemented on a growing scale in future. Enhancing power quality – improving the power factor – saves costs and ensures a fast return on investment. In low- and medium-voltage power distribution networks, PFC focuses on the power flow ($\cos \varphi$) and the optimization of voltage stability by generating reactive power to improve voltage quality and reliability at distribution level.

The requirement of the utilities or power distribution companies is to install the capacitor close to

the source of reactive power, i.e. assembled directly onto a pole. The aim of reducing grid losses, improving the power factor and enhancing the voltage quality should be achieved without additional investment in the distribution network. Especially in regions with “mixed zones”, such as rural areas with little industrial or commercial activity, PFC capacitors are mounted on the poles of the low-voltage overhead distribution lines.

The innovative PoleCap series represents a totally new approach in terms of pole-mounted and fixed PFC.

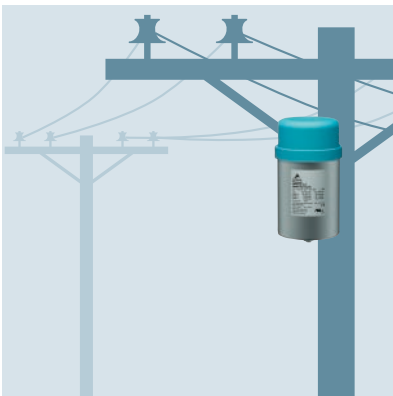


PoleCap is a new series of MKP/MKK AC PFC capacitors, an add-on-design to the well-established PhiCap/PhaseCap series approved for long-term operation – now also for outdoor applications.

PoleCap

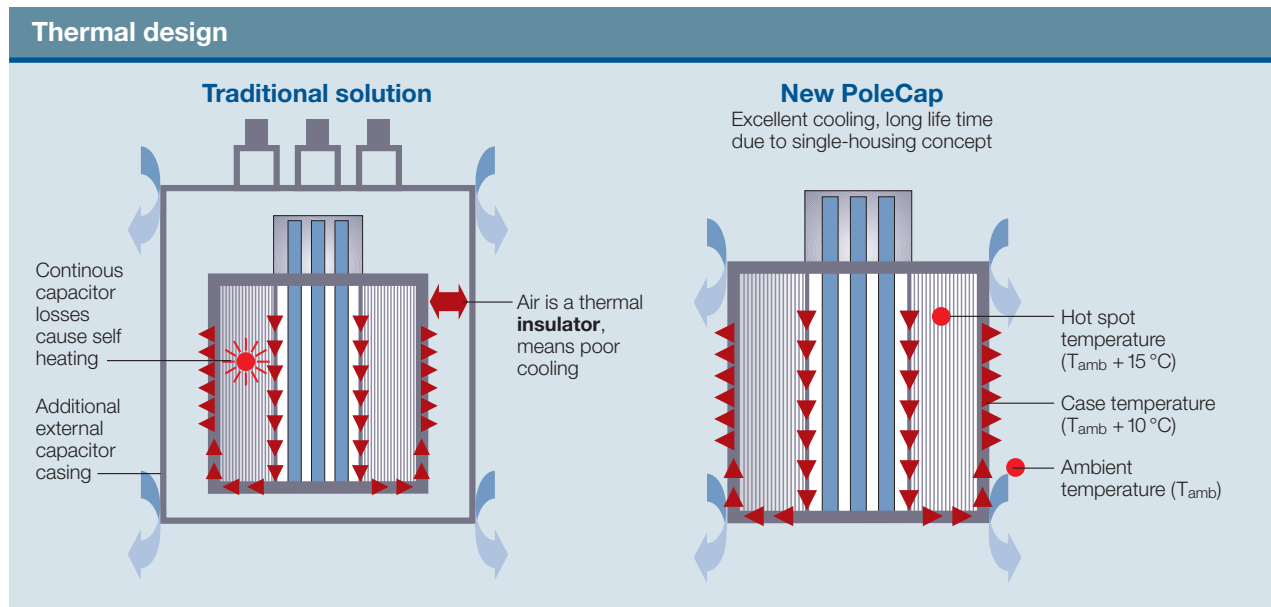
Applications

- Pole mounting, i.e. outdoor installations, connected to low-voltage overhead lines (mainly used by power distribution companies on a large scale) and mounted onto the poles of the overhead line
- Fixed PFC of an individual load, indoor as well as outdoor (e.g. if used outside of cabinets), specifically in applications with high dust or moisture concentrations (e.g. saw-mills, cement plants)
- Automatic PFC systems; factory pre-assembled cable and discharge resistors reduce labor costs and increase reliability



PoleCap PFC Capacitor

Inert gas-impregnated ■ Dry type ■ Triple safety system ■ Outdoor



Product features

Based on MKK/MKP technology, the PoleCap provides the following customer benefits:

- Connection wires provided with capacitors reduce the workload in the field and improve reliability
- Excellent heat dissipation due to single-housing concept
- Grounding provided by means of a M12 mounting stud
- Compact design and low dimensions/weight
- Simple installation and assembly
- Provided with fault identification for easy checking after installation (visible from the ground)

Electrical

- Long service life
- Wavy-cut design provides first-class inrush current withstand capability (applicable for MKK-types)
- Low dissipation factor
- High insulation resistance

Safety

- All live parts fully covered during operation
- Self-healing
- Dry technology
- Three-phase overpressure disconnecter
- Discharge resistors
- High-voltage impulse insulation

Ambient

- High insulation strength for outdoor applications (to IEC60831, 15 kV)
- Terminal cover, cable gland and connection cable made of material resistant to weather, UV radiation and aging
- Cable UV-resistant and flame retardent
- Housing of pure aluminum (corrosion optimized)
- Double housing of terminals for protection against hazardous parts, ingress of solid foreign bodies, dust and harmful effects of water

Tests

The newly designed PoleCap passed all tests performed by VDE and ERDA (Electrical Research & Development Association), based on the international IEC 60831 standard for PFC capacitors. In addition, the PoleCap has demonstrated excellent performance in outdoor temperature tests, showing that these capacitors operate at a lower temperature than those with an additional steel enclosure. The PoleCap presents better cooling due to the single-housing concept, resulting in a longer service life cycle and higher reliability.

PoleCap PFC Capacitor

Inert gas-impregnated ■ Dry type ■ Triple safety system ■ Outdoor

Self-healing

- 1 Dielectric
- 2 Metalized electrodes
- 3 Material displacing shock wave
- 4 Air gap with metal vapor
- 5,6 Plasma zone
- 7 Boundary layer between gas phase dielectric and plasma
- 8 Breakdown channel
- 9 Gas phase dielectric
- 10 Zone of displaced metalization and dielectric (isolating region)

Self-healing

An electric breakdown is possible as the result of thermal or electric overload or at the end of service life. This results in a small arc that evaporates the metalization in the region of the breakdown in a matter of microseconds. The gas pressure caused at this spot by the high temperature blows the metal vapour away of the breakdown region. This means that a non-conducting isolation region free of metalization is formed here. During and after the breakdown the capacitor is fully functional. The reduction in capacitance caused by self-healing is less than 100 pF, i. e. of an order that can only be verified by a precision measuring instrument.

Vacuum impregnation

The active winding elements are heated and then dried for a defined period. Impregnation (e.g. by gas) is performed under vacuum. In this way air and moisture are extracted from the inner capacitor, and oxidation of the electrodes as well as partial discharges are avoided. Afterwards the capacitors are hermetically sealed in cases (e.g. aluminum). This elaborate process ensures excellent capacitance stability and a long service life.

Overpressure disconnector

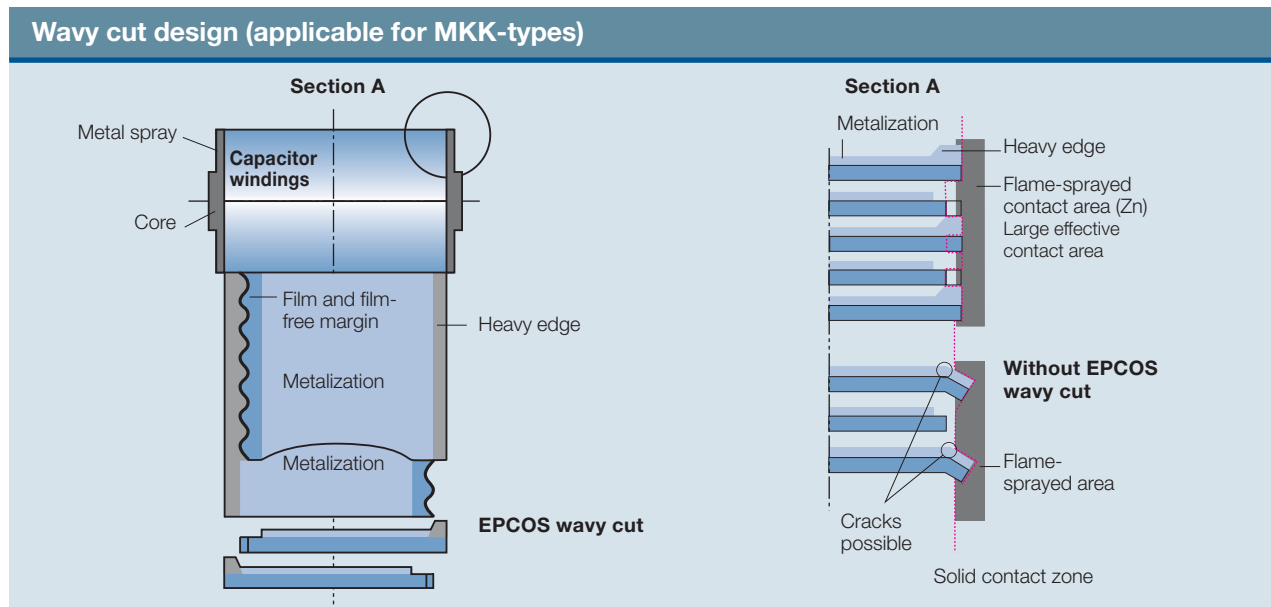
Overpressure disconnector

Electrical components do not have an unlimited life expectancy; this applies to self-healing capacitors too. As polypropylene-type capacitors seldom produce a pronounced short circuit, HRC fuses or circuit breakers alone do not offer sufficient protection. All capacitors featured in this catalog are consequently fitted with a disconnector that responds only to overpressure. If numerous electric breakdowns occur over time

or as the result of thermal or electric overload (within IEC 60831 specification), the formation of gas produces a rise in pressure inside the capacitor case. This causes a change in height because of curvature of the lid or stretching of the expansion bead. Expansion beyond a certain degree will separate the internal wires and disconnect the capacitor from the grid.

PoleCap PFC Capacitor

Inert gas-impregnated ■ Dry type ■ Triple safety system ■ Outdoor



Compact design and wavy-cut

The broad field of application for capacitors combined with physical and economic considerations creates the need for different dielectric technologies. When it comes to low-voltage power factor correction, MKK/MKP (metalized plastic film/polypropylene) has proved to be the most suitable and economic technology to date. The thickness of the dielectric differs as a function of the voltage rating. The metalization (with zinc and aluminum as its major constituents) and heavy edge enhance-

ment with extra junctions or cross-profile metalization play a significant role in achieving high current-handling capability and stable capacitance. Three electrically separated capacitors are either built up in typical MKP-design or are wound concentrically in a single operation onto an insulated metal core tube (MKK-technology), thus ensuring excellent winding precision. The electrodes are connected by spraying the face ends of the winding elements with metal. A heavy edge and a special film-cutting technique (an optimized combination of wavy and smooth cuts) produces a maximum effective

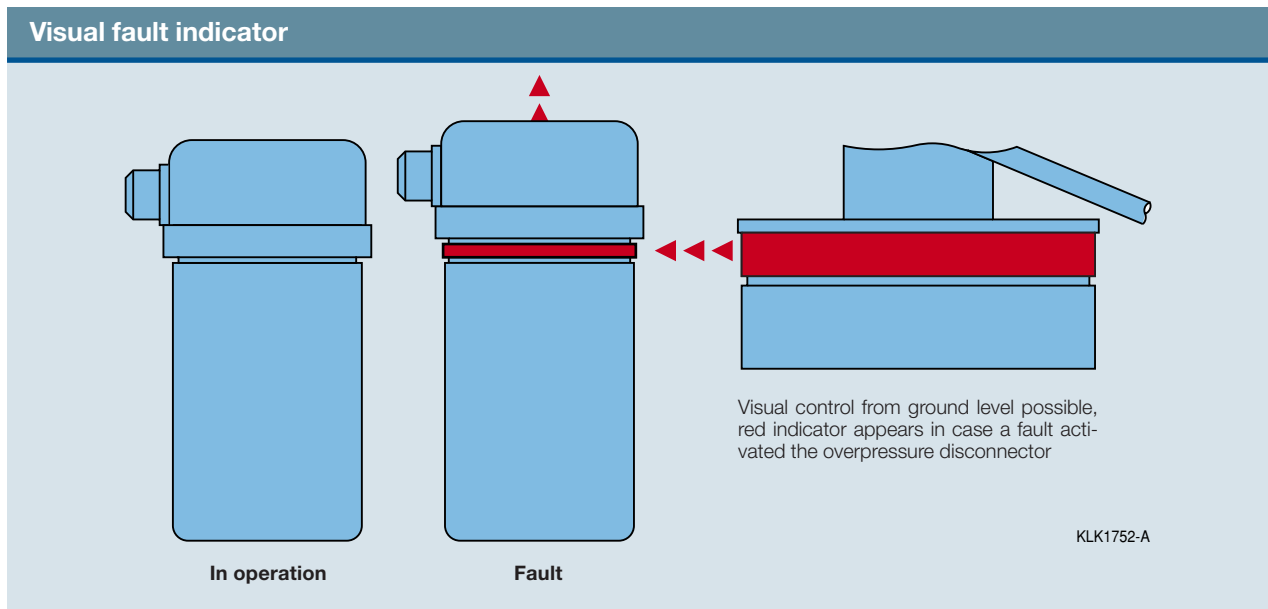
surface for the metal-spraying or contacting process (winding design). This results in high surge-current withstand capability.

The buckling effect on the film edge of the winding – the cause of contact edge problems – is eliminated in this way. Customer benefits due to the wavy-cut technique:

- Low ESR
- High dv/dt
- High impulse withstand capability
- Stabilized process
- Cracks in the contact edge are avoided due to the buckling effect
- Long service life

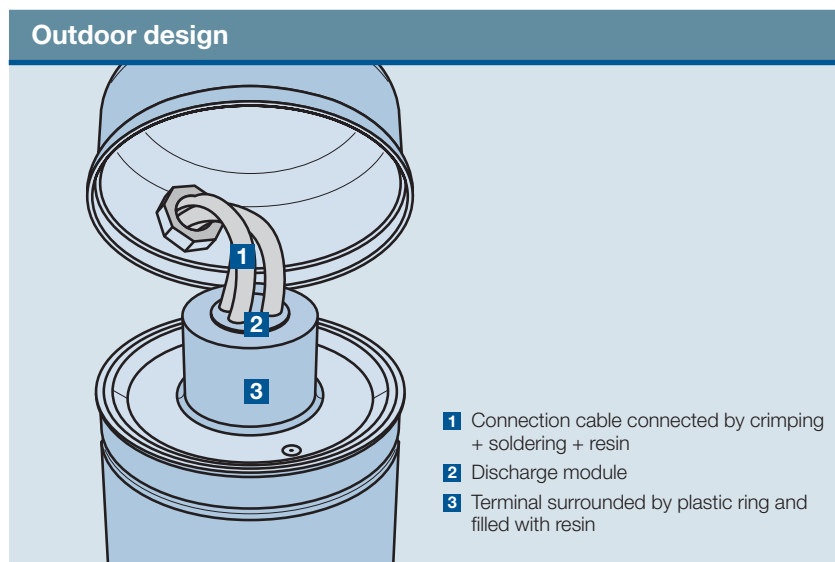
PoleCap PFC Capacitor

Inert gas-impregnated ■ Dry type ■ Triple safety system ■ Outdoor



Double terminal protection with plastic cover and resin filling, protects the capacitor and terminals against:

- Moisture and rain
- Dust
- Vibration (loose connections)
- Cable torque, e.g. animals on the cable
- Insects and animals



PoleCap PFC Capacitor

Inert gas-impregnated ■ Dry type ■ Triple safety system ■ Outdoor

Technical data and limit values		
Standards IEC 60831-1+2, EN 60831-1+2		
Overvoltage	V_{max}	$V_R + 10\%$ (up to 8 h daily) / $V_R + 15\%$ (up to 30 min daily) / $V_R + 20\%$ (up to 5 min daily) / $V_R + 30\%$ (up to 1 min daily)
Overcurrent	I_{max}	$1.3 \times I_R$ (including combined effects of harmonics, overvoltages and capacitance tolerance)
Inrush current	I_S	Up to $200 \times I_R$
Losses: – Dielectric – Total (terminals)		< 0.2 W/kvar < 0.45 W/kvar
Rated frequency	f	50/60 Hz
Capacitance tolerance		$\pm 5\%$
Test voltage, terminal/terminal	V_{TT}	$2.15 \times V_R$, AC, 10 s
Test voltage, terminal/case	V_{TC}	Up to $V_R \leq 660$ V: 3000 VAC, 10 s; above $V_R = 660$ V: 6000 VAC, 10 s
Mean life expectancy	$t_{LD(C_0)}$	Up to 100 000 h
Ambient temperature		–40/D; max. temp. 55 °C; max. mean 24 h = 45 °C; max. mean 1 year = 35 °C; lowest temperature = –40 °C
Cooling		Natural
Altitude		Max. 4 000 m above sea level
Mounting position		Random
Mounting and grounding		Threaded M12 stud on bottom of case
Safety		Dry technology, overpressure disconnecter, self-healing, maximum allowed fault current 10 000 A in accordance with UL 810-standard
Discharge resistors		Discharge module included, < 50 V in 60 sec ¹⁾
Case		Extruded aluminum
Enclosure		IP54
Dielectric		Polypropylene film
Impregnation		Inert gas
Connection cables		Length 2 m (UV resistant and water proof)
Number of switching operations		Max. 5 000 switchings operations per year according to IEC 60831
Lightning impulse voltage test (terminals/container)		15 kVp

1) Type B25671A3497A375: < 50 V in 70 s

PoleCap PFC Capacitor

Inert gas-impregnated ■ Dry type ■ Triple safety system ■ Outdoor

Three-phase capacitors												
Type	50 Hz		60 Hz		C _R		d x h	Weight	Ordering code	Qty. per box ^{*)}	Qty. per pallet	Cable cross section mm ²
	Output kvar	I _R A	Output kvar	I _R A	μF	mm	kg					
Rated voltage 400 VAC, 50/60 Hz, delta connection												
MKP400-D-0.5-P	0.50	1.0	0.60	1.0	3 x 3.5	82 x 210	0.4	B25671A4002A500	4	120	1	
MKP400-D-1.0-P	1.00	1.0	1.20	2.0	3 x 6.5	82 x 210	0.5	B25671A4012A000	4	120	1	
MKP400-D-2.0-P	2.00	3.0	2.40	3.0	3 x 13.5	82 x 210	0.5	B25671A4022A000	4	120	1.5	
MKP400-D-3.0-P	3.00	4.0	3.60	5.0	3 x 20	82 x 210	0.6	B25671A4032A000	4	120	2.5	
MKP400-D-4.0-P	4.00	6.0	4.80	7.0	3 x 26.5	82 x 210	0.6	B25671A4042A000	4	120	2.5	
MKK400-D-05-P	5.00	7.0	6.00	9.0	3 x 33	125 x 217	1.5	B25671A3996A375	4	48	2.5	
MKK400-D-07.5-P	7.50	11.0	9.00	13.0	3 x 50	125 x 217	1.5	B25671A3147A375	4	48	2.5	
MKK400-D-10-P	10.40	15.0	12.50	18.0	3 x 69	125 x 217	1.7	B25671A3207A375	4	48	4	
MKK400-D-12.5-P	12.50	18.0	15.00	22.0	3 x 83	125 x 217	1.8	B25671A3247A375	4	48	6	
MKK400-D-15-P	15.00	22.0	18.00	26.0	3 x 99.5	125 x 217	2.0	B25671A3297A375	4	48	6	
MKK400-D-20-P	20.80	30.0	25.00	36.0	3 x 138	145 x 253	2.7	B25671A3417A375	4	48	10	
MKK400-D-25-P ³⁾	25.00	36.0	–	–	3 x 166	145 x 253	2.9	B25671A3497A375	4	48	10	
Rated voltage 440 VAC, 50/60 Hz, delta connection												
MKP440-D-0.5-P	0.50	1.0	0.60	1.0	3 x 2.8	82 x 210	0.4	B25671A4002A540	4	120	1	
MKP440-D-1.0-P	1.00	1.0	1.20	1.0	3 x 5.5	82 x 210	0.5	B25671A4012A040	4	120	1	
MKP440-D-2.0-P	2.00	3.0	2.40	4.0	3 x 11.0	82 x 210	0.5	B25671A4022A040	4	120	1.5	
MKP440-D-3.0-P	3.00	4.0	3.60	5.0	3 x 16.5	82 x 210	0.6	B25671A4032A040	4	120	2.5	
MKP440-D-4.0-P	4.00	5.0	4.80	6.0	3 x 22	82 x 210	0.6	B25671A4042A040	4	120	2.5	
MKK440-D-05-P	5.00	7.0	6.00	8.0	3 x 27	125 x 217	1.5	B25671A4826A375	4	48	2.5	
MKK440-D-07.5-P	7.50	10.0	9.00	12.0	3 x 41	125 x 217	1.5	B25671A4127A375	4	48	2.5	
MKK440-D-10.4-P	10.40	14.0	12.50	16.0	3 x 57	125 x 217	1.7	B25671A4177A375	4	48	4	
MKK440-D-11.2-P	11.20	15.0	13.40	18.0	3 x 61	125 x 217	1.8	B25671A4187A375	4	48	4	
MKK440-D-12.5-P	12.50	16.0	15.00	20.0	3 x 69	125 x 217	1.9	B25671A4207A375	4	48	6	
MKK440-D-14.2-P	14.20	19.0	17.00	22.0	3 x 78	125 x 217	2.0	B25671A4237A365	4	48	6	
MKK440-D-15-P	15.00	20.0	18.00	24.0	3 x 82	125 x 217	2.1	B25671A4247A375	4	48	6	
MKK440-D-18.8-P	18.80	25.0	22.60	30.0	3 x 103	145 x 253	2.7	B25671A4307A375	4	48	10	
MKK440-D-20-P	20.80	27.0	25.00	33.0	3 x 114	145 x 253	2.8	B25671A4347A375	4	48	10	
MKK440-D-25-P	25.00	33.0	–	–	3 x 137	145 x 253	3.0	B25671A4417A375	4	48	10	
Rated voltage 525 VAC, 50/60 Hz, delta connection												
MKP525-D-0.5-P	0.50	1.0	0.60	1.0	3 x 2.0	82 x 210	0.4	B25671A5002A520	4	120	1	
MKP525-D-1.0-P	1.00	1.0	1.20	1.0	3 x 4.0	82 x 210	0.4	B25671A5012A020	4	120	1	
MKP525-D-2.0-P	2.00	2.0	2.40	2.0	3 x 8.0	82 x 210	0.5	B25671A5022A020	4	120	1.5	
MKP525-D-3.0-P	3.00	3.0	3.60	4.0	3 x 12.0	82 x 210	0.5	B25671A5032A020	4	120	2.5	
MKP525-D-4.0-P	4.00	4.0	4.80	5.0	3 x 16.0	82 x 210	0.5	B25671A5042A020	4	120	2.5	
MKP525-D-5.0-P	5.00	6.0	6.00	7.0	3 x 19.5	82 x 210	0.6	B25671A5052A020	4	120	2.5	
MKK525-D-06.3-P	6.30	7.0	7.50	8.0	3 x 24	125 x 217	1.4	B25671A5726A375	4	48	2.5	
MKK525-D-08.3-P	8.30	9.0	10.00	11.0	3 x 32	125 x 217	1.5	B25671A5966A375	4	48	2.5	
MKK525-D-10-P	10.40	11.0	12.50	14.0	3 x 40	125 x 217	1.8	B25671A5127A375	4	48	4	
MKK525-D-12.5-P	12.50	14.0	15.00	17.0	3 x 48	125 x 217	2.0	B25671A5147A375	4	48	6	
MKK525-D-15-P	15.00	17.0	18.00	20.0	3 x 58	125 x 253	2.2	B25671A5177A375	4	48	6	
MKK525-D-16.7-P	16.70	18.0	20.00	22.0	3 x 64	125 x 253	2.3	B25671A5197A375	4	48	6	
MKK525-D-20-P	20.80	22.0	25.00	28.0	3 x 80	145 x 253	2.9	B25671A5247A375	4	48	10	
MKK525-D-25-P	25.00	28.0	30.00 ²⁾	33.0 ²⁾	3 x 96	145 x 253	3.2	B25671A5287A375	4	48	10	
MKK525-D-30-P ¹⁾	30.00	33.0	–	–	3 x 115	145 x 253	3.1	B25671A5347A375	4	48	10	

Customized products available upon request. Minimum order quantity 200 pieces.

1) Temperature class deviation –40/C max. 50 °C

2) Temperature class deviation –40/B max. 45 °C

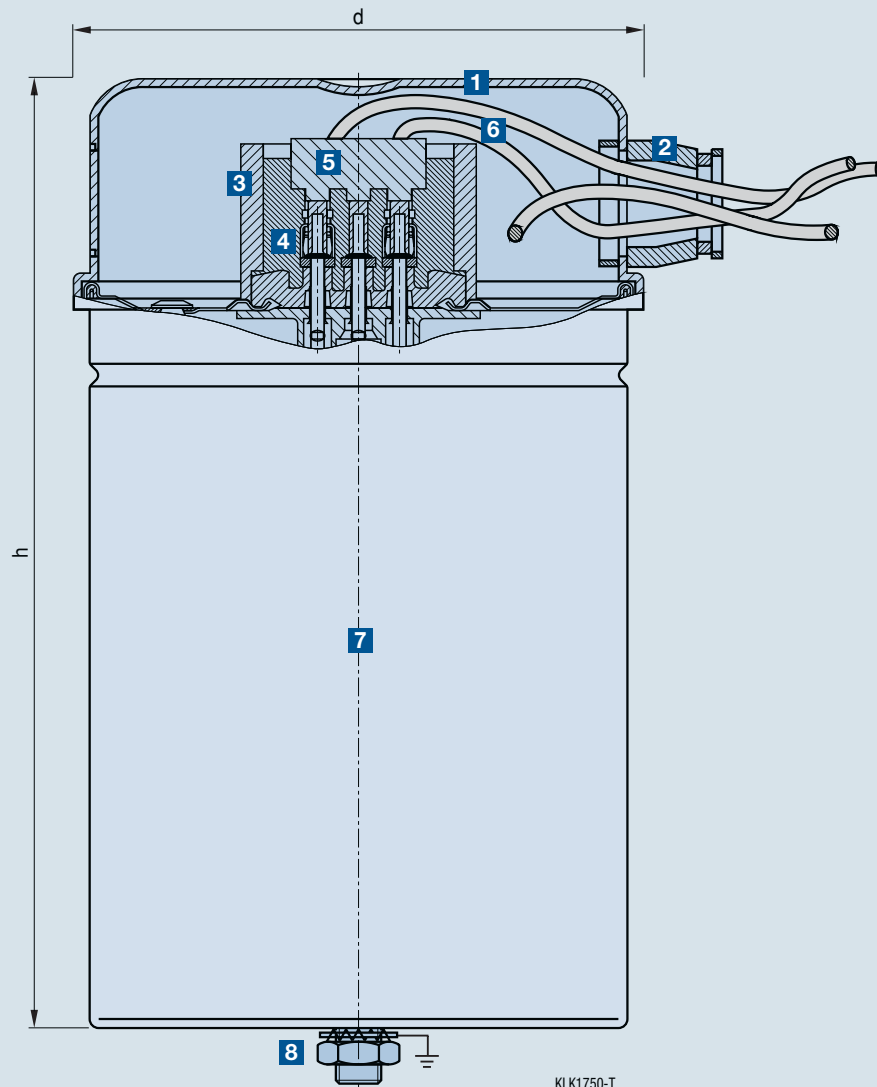
3) Discharge time: < 50 V in 70 s

*) Packing units for capacitors equal minimum order quantity. Orders will be rounded up to packing unit or multiple thereof.

PoleCap PFC Capacitor

Inert gas-impregnated ■ Dry type ■ Triple safety system ■ Outdoor

Detail drawings



KLK1750-T

- 1** Plastic protective cover (UV resistant material)
- 2** Cable gland
- 3** Plastic protective cylinder
- 4** Epoxy resin sealing IP 54
- 5** Ceramic discharge resistor
- 6** Connection cable (UV resistant and water proof):
Length 2 m, cross section see page 11
- 7** Aluminum can (99.5% Pure)
- 8** M12 mounting stud
 - Toothed locked washer DIN 6797-J13
 - Hexagon nut DIN 439-BM12
 - Tightening torque = 10 Nm max.

Cautions, Installation and Maintenance

- In case of dents of more than 2 mm depth or any other mechanical damage, capacitors must not be used at all.
- To ensure the full functionality of the overpressure disconnecter, elastic elements must not be hindered and a minimum space of 5 cm has to be kept above each capacitor.
- Do not handle the capacitor before it is discharged to max. 10% of rated voltage.
- Resonance cases must be avoided by appropriate application design in any case.
- Handle capacitors carefully, because they may still be charged even after disconnection due to faulty discharging devices.
- Protect the capacitor properly against overcurrent and short circuit.
- When the red stripe of the visual fault indicator can be seen, the capacitor has to be replaced in any case.
- Failure to follow cautions may result, worst case, in premature failures, bursting and fire.

Discharging

Capacitors must be discharged to a maximum of 10% of rated voltage before they are switched in again. This prevents an electric impulse discharge in the application, influences the capacitor's service life and protects against electric shock. The capacitor must be discharged to 75 V or less within 3 minutes. There must be not any switch, fuse or any other disconnecting device in the circuit between the power capacitor and the discharging device. PoleCap capacitors have a pre-mounted ceramic discharge module; alternatively discharge reactors are available from EPCOS. Discharge and short circuit capacitor before handling!

Service life expectancy

Electrical components do not have an unlimited service life expectancy; this applies to self-healing capacitors too. The maximum service life expectancy may vary depending on the application the capacitor is used in.

Safety

- Ensure good, effective grounding for capacitor enclosures.
- Provide means of disconnecting and insulating a faulty component/bank.
- Handle capacitors carefully, because they may still be charged even after disconnection due to faulty discharging devices.
- The terminals of capacitors, connected bus bars and cables as well as other devices may also be energized.
- Follow good engineering practice.

Overcurrent and short circuit protection

- Use HRC fuses or MCCBs for short circuit protection. Short circuit protection and connecting cables should be selected so that 1.5 times the rated capacitor current can be permanently handled.
- HRC fuses do not protect a capacitor against overload – they are only for short circuit protection.

- The HRC fuse rating should be 1.6 to 1.8 times rated capacitor current.
- Do not use HRC fuses to switch capacitors (risk of arcing).
- Use thermal magnetic overcurrent relays for overload protection.

Resonance cases

Resonance cases must be avoided by appropriate application design in any case. Maximum total RMS capacitor current (incl. fundamental harmonic current) specified in technical data must not be exceeded.

Overtemperature

Exceeding maximum allowed temperature may set the safety device out of operation.

Overpressure Disconnecter

To ensure full functionality of an overpressure disconnecter, the following must be observed:

1. The elastic elements must not be hindered, i.e.
 - connecting lines must be flexible leads (cables),
 - there must be sufficient space (min. 5 cm) for expansion above the connections (see "Clearing distance for overpressure disconnecter").
 - folding beads must not be retained by clamps.
2. Maximum allowed fault current of 10 000 A in accordance with UL 810 standard must be assured by the application.
3. Stress parameters of the capacitor must be within the IEC 60831 specification.

Re-switching vs. phase-opposition

In case of voltage interruption, a sufficient discharge time has to be ensured to avoid phase-opposition and resulting high inrush currents.

Cautions, Installation and Maintenance

Vibration resistance

The resistance to vibration of capacitors corresponds to IEC 68, part 2–6.

Max. test conditions:

Test duration	2 h
Frequency range 1	0 ... 55 Hz corresponding to max. 0.7 g
Displacement amplitude	0.75 mm

These figures apply to the capacitor alone.

Because the fixing and the terminals may influence the vibration properties, it is necessary to check stability when a capacitor is built in and exposed to vibration. Irrespective of this, you are advised not to locate capacitors where vibration amplitude reaches the maximum in strongly vibrating equipment.

Mechanical protection

The PoleCap capacitor has to be installed in a way that mechanical damages and dents in the aluminum can are avoided.

Clearing distance for overpressure disconnecter

Above each capacitor, a minimum space of 5 cm has to be kept. This will allow the visual control to work and enable a longitudinal extension of the can to secure the over-pressure disconnecter work.

Grounding

The threaded bottom stud of the capacitor has to be used for grounding. In case grounding is done via metal chassis that the capacitor is mounted to, the layer of varnish beneath the washer and nut should be removed. The maximum tightening torque is 10 Nm.

Choosing the best spot for mounting

Especially in regions with long periods of sunshine and high temperatures, the PoleCap should be installed in such a way that it is located in the shadow of the pole for most of the daylight. In addition to the natural cooling by the wind in combination with the single-housing of the

capacitor, this will help to keep the hot spot temperature at the lowest level possible.

Maintenance

- Check tightness of the connections/terminals periodically.
- Take current reading twice a year and compare with nominal current. Use a harmonic analyser or true effective RMS-meter.
- In case of current above the nominal current check your application for modifications.
- If a significant increase in the amount of non-linear loads has been detected, then a consultant has to be called in for a harmonic study.
- In case of the presence of harmonics installation of a de-tuned capacitor bank (reactors) must be considered.
- Check the discharge resistors/reactors and in case of doubt, check their function:
 - (1) power the capacitor up and down.
 - (2) After 60 seconds the voltage between the terminals must decline to less than 50 V¹⁾.
- Check the temperature of capacitors directly after operation for a longer period, but make sure that the capacitors have been switched off. In case of excessive temperature of individual capacitors, it is recommended to replace these capacitors as this should be an indication for loss factor increase which is a sign for reaching end of life.

Storage and operating conditions

Do not use or store capacitors in corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. In dusty environments regular maintenance and cleaning especially of the terminals is required to avoid conductive path between phases and/or phases and ground.

Note

For detailed information about PFC capacitors and cautions, refer to the latest version of EPCOS PFC Product Profile.

1) Type B25671A3497A375: < 50 V in 70 s

EPCOS Worldwide

Europe/Europa

Austria/Österreich
Bulgaria/Bulgarien
Romania/Rumänien
Serbia & Montenegro/
Serbien & Montenegro

EPCOS CSSE
Siemensstr. 92
1210 Wien
☎ +43 51 70 72 56 30
FAX +43 51 70 75 56 30

Belgium/Belgien
Luxembourg/Luxemburg
Netherlands/Niederlande
Siemens N.V.

Agency for EPCOS
Building 23
Charloisesteenweg 116
1060 Brussel
☎ +32 3 2 87 39 18
FAX +32 2 5 36 28 57

Czech Republic/
Tschechische Republik
EPCOS s.r.o.
Evropská 33a
160 00 Praha 6
☎ +420 2 33 03 22 81
FAX +420 2 33 03 22 89

Finland/Finnland

EPCOS Nordic OY
P.O. Box 275
02601 Espoo
☎ +358 10 5 11 32 00
FAX +358 10 5 11 22 85

France/Frankreich

EPCOS SAS
"Les Borromées"
3, avenue du Stade de France
93210 Saint-Denis La Plaine Cedex
☎ +33 1 49 46 67 89
FAX +33 1 49 46 67 87

Germany/Deutschland

Switzerland/Schweiz
EPCOS AG
Vertrieb Deutschland, Schweiz
Postfach 801709
81617 München
Customer Service:
☎ (D) 0 180 5 00 33 48
(0,12 Euro/Min.)
(CH) 08 48 37 26 71
FAX +49 89 63 62 80 10

Great Britain/Großbritannien

Ireland/Irland
EPCOS UK Ltd.
Electronic Parts & Components
Siemens House
Oldbury, Bracknell
Berkshire RG 12 8 FZ
☎ +44 13 44 39 66 89
FAX +44 13 44 39 66 90

Greece/Griechenland

AZEGO Hellas S.A.
7, Palama str.
15126 Marousi Athens
☎ +30 2 295 04 16 01
FAX +30 22 95 04 16 46

Hungary/Ungharn

EPCOS Kft. Értékesítési iroda
Sales Offices
Lajos utca 48 - 66.
1036 Budapest
☎ +36 1 436 07 27
FAX +36 1 436 07 21

Italy/Italien

Siemens S. p. A.
Settore EPCOS
Casella Postale 17154
Viale Piero e Alberto Pirelli, 10
20126 Milano
☎ +39 02 24 36 42 65
FAX +39 02 24 36 43 80

Poland/Polen

Siemens Sp. z o.o
ul. Zupnicza 11
P.O.B. 159
03-821 Warszawa
☎ +48 22 8 70 91 50
FAX +48 22 8 70 91 59

Portugal

EPCOS AG
R. Elias Garcia 249 3º B
2700-320 Amadora
☎ +351 21 49 33 476
+351 91 75 67 927
FAX +351 21 4933 476

Russia/Russland

OOO Siemens
EPCOS Division
ul. Malaya Kaluzhskaya 19
119071 Moscow
☎ +7 095 7 37 24 17
+7 095 7 37 24 18
FAX +7 095 7 37 23 46

Slovakia/Slowakei

EPCOS Sales Representative
Hviezdoslavovo námestie 1688/15
026 01 Dolný Kubín
☎ +42 1 43 5 82 36 73
FAX +42 1 43 5 82 37 33

Slovenia/Slovenien

Bosnia and Herzegovina/
Bosnien Herzegovina
Croatia/Kroatien
EPCOS Sales Representative
Omersova 5
1000 Ljubljana
☎ +386 1 510 12 91
FAX +386 1 510 12 92

Spain/Spanien
Siemens S.A.
Division de Componentes
Ronda de Europa, 5
28760 Tres Cantos (Madrid)
☎ +34 91 5 14 80 00
FAX +34 91 5 14 70 14

Sweden/Schweden

Denmark/Dänemark

Norway/Norwegen

EPCOS Nordic AB
P.O. Box 46
16493 Kista
☎ +46 8 4 77 27 00
FAX +46 8 4 77 27 01

Turkey/Türkei

Siemens Sanayi ve Ticaret A.S.
EPCOS
Yakacik Yolu No. 111
23 No' lu Bina Kat:3
81430 Kartal Istanbul
☎ +90 216 4 59 31 75
FAX +90 216 4 59 31 30

Africa/Afrika

Republic of South Africa/

Südafrika
Electrocomp (PTY) Ltd.
Cnr. Galaxy Avenue & Electron
Street
Linbro Business Park
Sandton
P.O. Box 1023, Bramley 2018
☎ +27 11 458 90 03
FAX +27 11 458 90 34

America/Amerika

South America/Südamerika

EPCOS do Brasil Ltda.
Av. Pedroso de Moraes
1553 - 4º andar
05419-001 - Sao Paulo - SP
☎ +55 11 38 17 34 41
FAX +55 11 38 17 34 43

NAFTA

EPCOS, Inc.
186 Wood Avenue South
Iselin, NJ 08830
☎ +1 732 9 06 43 00
FAX +1 732 6 32 28 30

USA

EPCOS, Inc.
Peabody Office Building
1 Newbury Street
Peabody, MA 01960-3830
☎ +1 978 5 35 55 52
FAX +1 978 5 35 62 25

EPCOS, Inc.
1607 Squaw Walden Lane
Apex, NC 27523
☎ +1 919 3 03 59 33
FAX +1 919 3 03 59 34

EPCOS, Inc.
3116 Val Vista Drive
P.O. Box 3724
Easton, PA 18043-3724
☎ +1 610 4 38 06 46
FAX +1 610 4 38 36 55

EPCOS, Inc.
12300 Ford Road
Suite 405
Dallas, TX 75234
☎ +1 972 4 81 88 18
FAX +1 972 4 81 88 58

EPCOS, Inc.
11770 Bernardo Plaza Court,
Suite 101
San Diego, CA 92128
☎ +1 858 6 76 36 88
FAX +1 858 6 76 36 87

EPCOS, Inc.
110 Peyton Road
Huntsville, AL 35748
☎ +1 256 7 76 95 23
FAX +1 256 7 76 95 24

EPCOS, Inc.
118 Governor's Square
Fayetteville, GA 30215
☎ +1 770 6 31 12 60
FAX +1 770 6 31 28 60

EPCOS, Inc.
5700 Lake Worth Road
Suite 209-5
Lake Worth, FL 33463
☎ +1 561 9 65 15 44
FAX +1 561 9 65 15 43

EPCOS, Inc.
1400 East Touhy Avenue, Suite
430
Des Plaines, IL 60018
☎ +1 847 299 7220
FAX +1 847 299 7240

EPCOS, Inc.
301 Prospect Street
Newport Beach, CA 92663
☎ +1 949 548 1242
FAX +1 949 548 1712

EPCOS, Inc.
21540 Shore Vista Lane
Noblesville, IN 46060
☎ +1 317 9 84 54 05
FAX +1 732 8 75 07 82

Crystal Technology, Inc.
An EPCOS Company
1040 East Meadow Circle
Palo Alto, CA 94303-4230
☎ +1 650 8 56 79 11
FAX +1 650 3 54 01 73

Asia/Asien

PR China/VR China

Baoke Electronic
(Wuxi) Co Ltd
1058 Jianzhu Road
Liyuan Economic Development
Zone
Wuxi 214072, Jiangsu
☎ +86 510 2 23 85 88
FAX +86 510 2 23 85 78

EPCOS (Shanghai) Ltd.
Beijing Office
Room 2203, No. 24A
East Ocean Centre
Jian Guo Men Wai Street
Chao Yang District
Beijing 100004
☎ +86 10 65 15 78 54
FAX +86 10 65 15 59 19

EPCOS (Shanghai) Ltd.
Shanghai Office
Room 633 - 641, 6/F, Shanghai
Central Plaza
No. 381 Huai Hai Zhong Road
Shanghai, 200020
☎ +86 21 63 91 68 90
FAX +86 21 63 91 68 89

EPCOS (Shanghai) Ltd.
Shenzhen Office
Room 402, 4/F., Hantang Building
Overseas Chinese Town, Shenzhen
Guangdong Province, P.R. China
ZIP Code: 518053
☎ +86 7 55 26 93 57 57
FAX +86 7 55 26 93 57 57

EPCOS (Xiaogan) Co., Ltd
257-1, Changzheng Road
Xiaogan 432104, Hubei
☎ +86 7 1 22 85 35 88
FAX +86 7 1 22 85 87 34

EPCOS Ltd.
Suite 1208-11, 12/F
World Finance Centre
North Tower, Harbour City
Tsim Sha Tsui
Kowloon, Hong Kong
☎ +85 2 31 01 56 00
FAX +85 2 31 01 56 46

India/Indien

EPCOS India Private Ltd.
Sales
14/2, Brunton Road
Bangalore 560 025
☎ +91 80 25 55 96 40
+91 80 25 55 96 50
FAX +91 80 25 55 96 45

Israel

Nisko Projects
Electronics & Communications
(1999) Ltd.
2a, Habarzel Street
Tel Aviv 69710
☎ +972 37 65 73 00
FAX +972 37 65 73 33

Japan

EPCOS KK
Shin-Yokohama Square Building
11F
2-3-12 Shin-Yokohama, Kohoku-ku
Yokohama, Kanagawa 222-0033
☎ +81 45 4 78 72 00
FAX +81 45 4 78 72 25

EPCOS KK
Hankyu Terminal Building 9F,
1-1-4 Shibata, Kita-ku
Osaka, Osaka 530-0012
☎ +81 6 62 92 69 11
FAX +81 6 62 92 69 15

Korea

Siemens Ltd.
Epos Division
11 th floor, PMK Bldg.
746 Yeoksam-dong,
Gangnam-gu,
Seoul 135-080, Korea
☎ +82 2 34 50 75 81
FAX +82 2 34 50 75 98

Malaysia

EPCOS SDN. BHD.
Kuala Lumpur Sales Office
Suite 11.01A Menara Merais
No. 1 Jalan 19/3
46300 Petaling Jaya
Selangor
☎ +60 3 79 60 81 80
FAX +60 3 79 60 81 82

Philippines/Philippinen

Siemens Inc.
EPCOS Department
12/F Floor Salcedo Tower B
169 H.V. De La Costa St.
Salcedo Village
Makati City 1227, Manila
☎ +63 2 8 78 94 41
FAX +63 2 8 78 94 40

Singapore/Singapur

EPCOS PTE LTD
166 Kallang Way
Singapore 349249
☎ +65 68 41 20 11
FAX +65 67 44 69 92

Taiwan

EPCOS Taiwan Co. Ltd.
4F-1, No.3-1 Yuan Qu Street
Nankang Dist. Taipei 115
☎ +886 2 26 55 76 76
FAX +886 2 55 59 02 88

Thailand
Schmidt Electronics (Thailand) Ltd.
202 Le Concorde Tower
23rd Floor, Ratchadapisek Road
Huaykwang, Bangkok 10320
☎ +66 2 694 14 70 5
FAX +66 2 694 14 76

Australia/Australien

Australia/Australien
Siemens Ltd.
Components Division
Head Office
885 Mountain Highway
Bayswater, VIC 3153
☎ +61 3 97 21 70 39
FAX +61 3 97 21 72 75

Die Adressen unserer Distributoren
finden Sie im Internet unter
www.epcos.de/sales

For an up to date overview of our
worldwide distribution network
please refer to our website at
www.epcos.com/sales

Herausgegeben von EPCOS AG, Corporate Communications
Postfach 80 17 09, 81617 München, DEUTSCHLAND
☎ +49 89 636-09, FAX +49 89 636-2 26 89

© EPCOS AG 2005. Vervielfältigung, Veröffentlichung, Verbreitung und Verwertung dieser
Broschüre und ihres Inhalts ohne ausdrückliche Genehmigung der EPCOS AG nicht
gestattet.

Published by EPCOS AG, Corporate Communications
P.O.B. 80 17 09, 81617 Munich, GERMANY
☎ +49 89 636-09, FAX +49 89 636-2 26 89

© EPCOS AG 2005. Reproduction, publication and dissemination of this brochure and the
information contained therein without EPCOS' prior express consent is prohibited.

09/05

