



## Film capacitors

MKP 2 pin capacitors, RoHS compatible

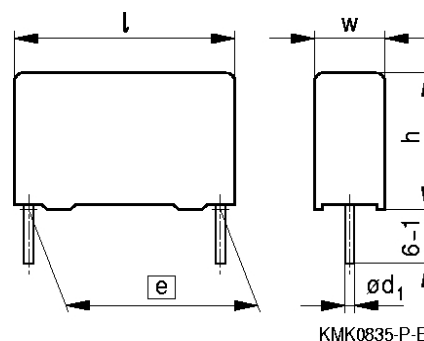
**Series/Type:** B32672...3Z  
**Ordering code:**  
Date: 2007-08-16  
Version: 1

**Climatic**

- Max. operating temperature: 110 °C
- Climatic category (IEC 60068-1) 55/110/56

**Construction**

- Dielectric: metallized polypropylene (PP)
- Wound capacitor technology
- Plastic case (UL 94 V-0)
- Epoxy resin sealing, flame retardant


 $\text{Ø}d_1 = 0.8 \text{ mm}$ 

Dimensions in mm

**Terminals**

- Parallel wire leads, lead-free tinned

**Marking**

- Manufacturer's logo
- Rated capacitance
- Tolerance
- Rated DC voltage
- Type number

**Ordering codes and packing units**

Lead spacing mm	$V_R$ V DC	$V_{RMS}$ V AC	$C_R$ $\mu\text{F}$	Max. dimensions w x h x l mm	Ordering code (composition see below)	dv/dt V/ $\mu\text{s}$	$K_0$ V <sup>2</sup> / $\mu\text{s}$	Ammo pack pcs/unit	Reel pcs/unit	Untaped pcs/unit
15	450	220	0.10	5.0 x 10.5 x 18.0	B32672Z4104+***	160	128000	1000	1700	1000
			0.15	5.0 x 10.5 x 18.0	B32672Z4154+***	160	128000	1000	1700	1000
			0.22	6.0 x 11.0 x 18.0	B32672Z4224+***	160	128000	830	1300	1000
			0.33	7.0 x 12.5 x 18.0	B32672Z4334+***	160	128000	830	1300	1000
			0.47	8.0 x 14.0 x 18.0	B32672Z4474+***	160	128000	680	1100	1000
			0.47	13.0 x 14.0 x 18.0	B32672T4474+***	160	128000	680	1100	1000
			0.68	9.0 x 17.5 x 18.0	B32672Z4684+***	160	128000	680	1100	1000
			0.68	13.0 x 14.0 x 18.0	B32672T4684+***	160	128000	-	500	300
		1.00	11.0 x 18.5 x 18.0	B32672Z4105+***	160	128000	-	550	250	

Further E series and intermediate capacitance values on request.

**Composition of ordering code**

+ = Capacitance tolerance code

 K =  $\pm 10\%$ 

 J =  $\pm 5\%$ 

(closer tolerances on request)

\*\*\* = Packing code

289 = Ammo pack

189 = Reel pack

000 = Untaped (lead length 6 - 1 mm)

**Film capacitors**
**MKP 2 pin capacitors, RoHS compatible**
**B32672...3Z**

Lead spacing mm	V <sub>R</sub> V DC	V <sub>RMS</sub> V AC	C <sub>R</sub> μF	Max. dimensions w x h x l mm	Ordering code (composition see below)	dv/dt V/μs	K <sub>0</sub> V <sup>2</sup> /μs	Ammo pack pcs/unit	Reel pcs/unit	Untaped pcs/unit	
15	520	277	0,047	5.0 x 10.5 x 18.0	B32672Z5473+***	200	208000	960	1100	1000	
			0.10	6.0 x 11.0 x 18.0	B32672Z5104+***	200	208000	830	900	1000	
			0.15	6.0 x 11.0 x 18.0	B32672Z5154+***	200	208000	680	700	500	
			0.22	7.0 x 12.5 x 18.0	B32672Z5224+***	200	208000	680	700	500	
			0.33	8.5 x 14.5 x 18.0	B32672Z5334+***	200	208000	640	700	500	
			0.33	13.0 x 14.0 x 18.0	B32672T5334+***	200	208000	-	500	300	
			0.47	9.0 x 17.5 x 18.0	B32672Z5474+***	200	208000	640	700	500	
			0.47	13.0 x 14.0 x 18.0	B32672T5474+***	200	208000	-	500	300	
	0.68	11.0 x 18.5 x 18.0	B32672Z5684+***	200	208000	-	550	250			
	630	310	0.068	6.0 x 11.0 x 18.0	B32672Z6683+***	250	315000	680	700	500	
			0.10	7.0 x 12.5 x 18.0	B32672Z6104+***	250	315000	680	700	500	
			0.22	8.5 x 14.5 x 18.0	B32672Z6224+***	250	315000	640	700	500	
	22.5	450	220	0.22	6.0 x 15.0 x 26.5	B32673Z4224+***	100	80000	680	700	720
				0.22	7.5 x 14.0 x 26.5	B32673T4224+***	100	80000	550	500	570
0.33				6.0 x 15.0 x 26.5	B32673Z4334+***	100	80000	680	700	720	
0.33				7.5 x 14.0 x 26.5	B32673T4334+***	100	80000	550	500	570	
0.47				6.0 x 15.0 x 26.5	B32673Z4474+***	100	80000	680	700	720	
0.47				7.5 x 14.0 x 26.5	B32673T4474+***	100	80000	550	500	570	
0.68				7.0 x 16.0 x 26.5	B32673Z4684+***	100	80000	580	600	630	
0.68				7.5 x 14.0 x 26.5	B32673T4684+***	100	80000	550	500	570	
1.00				10.5 x 16.5 x 26.5	B32673Z4105+***	100	80000	390	400	540	
1.50				11.0 x 20.5 x 26.5	B32673Z4155+***	100	80000	370	350	510	
2.20		12.0 x 22.0 x 26.5	B32673Z4225+***	100	80000	-	-	450			
520		277	0.22	6.0 x 15.0 x 26.5	B32673Z5224+***	120	125000	680	700	720	
			0.22	7.5 x 14.0 x 26.5	B32673T5224+***	120	125000	550	500	570	
			0.33	6.0 x 15.0 x 26.5	B32673Z5334+***	120	125000	680	700	720	
			0.33	7.5 x 14.0 x 26.5	B32673T5334+***	120	125000	550	500	570	
			0.47	7.0 x 16.0 x 26.5	B32673Z5474+***	120	125000	580	600	630	
			0.47	7.5 x 14.0 x 26.5	B32673T5474+***	120	125000	550	500	570	
			0.68	10.5 x 16.5 x 26.5	B32673Z5684+***	120	125000	390	400	540	
	1.00		10.5 x 20.5 x 26.5	B32673Z5105+***	120	125000	390	400	540		
1.50	12.0 x 22.0 x 26.0	B32673Z5155+***	120	125000	-	-	450				

Further E series and intermediate capacitance values on request.

Composition of ordering code see page 2

**Technical data**

Maximum operating temperature $T_{op,max}$	+110 °C		
Dissipation factor $\tan \delta$ (in $10^{-3}$ ) at 20 °C (upper limit values)		$C_R \leq 0.1 \mu F$	$0.1 \mu F < C_R$
	at 1 kHz	1.0	1.0
	100 kHz	5	–
Insulation resistance $R_{is}$ or time constant $\tau = C_R \cdot R_{is}$ at 20 °C, rel. humidity $\leq 65\%$ (minimum as-delivered values)	30 000 M $\Omega$		
DC test voltage	1.6 x $V_R$ , 2 s		
Passive flammability category In accordance with IEC 40 (CO) 752	C		
Maximum continuous AC voltage ( $V_{AC}$ )	220 V / 277 V / 310 V (50/60 Hz)		
Surge pulse test IEC 1000-4-5	1.2 $\mu s$ / 50 $\mu s$ / 1200 V 8.0 $\mu s$ / 20 $\mu s$ / 1200 V		
Damp heat test Limit values after damp heat test	56 days / 40 °C / 93% relative humidity	Capacitance change ( $\Delta C / C$ )	$\leq 5\%$
		Dissipation factor change ( $\Delta \tan \delta$ )	$\leq 0.5 \cdot 10^{-3}$ (at 1 kHz)
		Insulation resistance $R_{is}$ or time constant $\tau = C_R \cdot R_{is}$	$\leq 1,0 \cdot 10^{-3}$ (at 10 kHz) $\geq 50\%$ of minimum as-delivered values

**Pulse handling capability**

“dv/dt” values represent the maximum permissible voltage change per unit of time for non-sinusoidal voltages, expressed in V/ $\mu s$ .

“K<sub>0</sub>” represents the maximum permissible pulse characteristic of the waveform applied to the capacitor, expressed in V<sup>2</sup>/ $\mu s$ .

Note: The maximum values of dv/dt and K<sub>0</sub> must not be exceeded in order to avoid damaging the capacitor.

## Cautions and warnings

### General notes on soldering

Permissible heat-exposure loads on film capacitors are primarily characterized by the upper category temperature  $T_{max}$ . Long exposure to temperatures above this type-related temperature limit can lead to changes in the plastic dielectric and thus irreversibly change a capacitor's electrical characteristics. For short exposure times (as in practical soldering processes), the heat load (and thus the possible effects on the capacitor) will also depend on other factors such as:

- The pre-heating temperature and time.
- The forced cooling immediately after soldering.
- The terminal characteristics: diameter, length, thermal resistance, special configurations (e.g. crimping).
- The height of the capacitor above the solder bath.
- Shadowing by neighboring components.
- Additional heating due to heat dissipation by neighboring components.
- Use of solder-resistant coatings.

The overheating associated with some of these factors can usually be reduced by suitable countermeasures. For example, if a pre-heating step cannot be avoided, an additional or reinforced cooling process may have to be included.

### Cleaning

To determine whether a particular solvent, often used to remove flux residues and other substances, is suitable for the capacitors described, please refer to latest data book "Film Capacitors", in which this information is available. Even when suitable solvents are used, a reversible change of the electrical characteristics may occur in uncoated capacitors immediately after they have been washed. Thus it is always recommended to dry the components (e.g. 4 h at 70 °C) before they are subjected to subsequent electrical testing.

### Embedding of capacitors in finished assemblies

In many applications, finished circuit assemblies are embedded in plastic resins. In this case, both chemical and thermal influences of the embedding ("potting") and curing processes must be taken into account. Our experience has shown that the following potting materials can be recommended considering maximum curing temperature 100 °C:

- Non-flexible epoxy resins with acid-anhydride hardeners
- Chemically inert, non-conducting fillers

### Storage conditions

All capacitors listed in this product profile can be stored for short periods at any temperature within the entire range of category temperatures. For long storage periods, however, the following conditions should be observed:

- Storage temperature – 40 to +40 °C
- Maximum relative humidity 80%, no dew allowed on the capacitor
- Maximum duration 24 months (12 months for taped components)

**Resistance to vibration**

A capacitor's ability to withstand vibration (e.g. such as that occurring in applications involving rotating machinery) is tested to IEC 60068-2-6. The test procedure used here involves continuous sinusoidal vibration along three orthogonal axes, with a continuously varying frequency (10 ... 500 Hz), an acceleration amplitude of 10 g, a displacement amplitude of 0.75 mm and a duration of 360 minutes for each axis. EPCOS offers film capacitors specially designed for operation under more severe vibration regimes such as those found in automotive applications. Consult our catalog "Film Capacitors for Automotive Electronics".

**Passive flammability**

The passive flammability test is applied to ensure that components bearing the corresponding qualification contribute less energy to the combustion behavior of their immediate vicinity than is required to ignite them. This measure is designed to contain any localized fire that may occur. In the respective tests, the capacitors are subjected to a standardized flame to evaluate their combustion behavior by checking whether the flame persists for longer than a maximum permissible period or not. The severity of the test is determined essentially by the test flame and exposure time in accordance with various international standards (IEC 60040 CO 752 (amendment to IEC 60384-1), IEC 60695-2-2 and UL 1414). Unless the detail specifications stipulate otherwise, EMI suppression capacitors are tested to IEC 60384-14, section 4.17, test severity categories B and C.

## 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](http://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, BAOKE, Alu-X, CeraDiode, CSSP, MiniBlue, MKK, MLSC, MotorCap, PCC, PhaseCap, PhaseMod, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SIMID, SineFormer, SIOV, SIP5D, SIP5K, ThermoFuse, 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](http://www.epcos.com/trademarks).