Film Capacitors

Metallized Polypropylene Film Capacitors (MKP)

Series/Type: **B32671L ... B32672L**

Date: July 2016

EPCOS AG is a TDK Group Company.

Typical applications
- Electronic ballasts (resonant circuits)
- SMPS
- High-frequency AC loads
- Pulse circuits

Climatic
- Max. operating temperature: 125 °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

Features
- Very high AC voltages for all frequency ranges
- Very small dimensions
- High peak voltage for short time periods
- High peak current
- High pulse withstand capability
- RoHS-compatible
- Halogen-free capacitors available on request

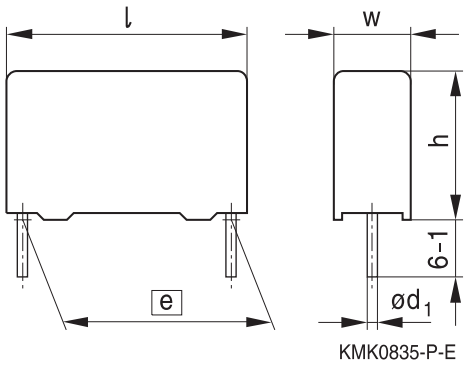
Terminals
- Parallel wire leads, lead-free tinned
- Special lead lengths available on request

Marking
- Manufacturer's logo
- lot number, series number
- Rated capacitance (coded)
- Capacitance tolerance (code letter)
- Rated voltage
- Date of manufacture (coded)

Delivery mode
- Bulk (untaped)
- Taped (Ammo pack or reel)

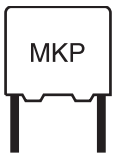
For notes on taping, refer to chapter "Taping and packing“.

Dimensional drawing



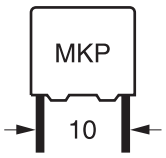
Dimensions in mm

Lead spacing e ±0.4	Lead diameter d_1 ±0.05	Type
10	0.6	B32671L
15	0.8	B32672L



Overview of available types

Lead spacing	10 mm						15 mm							
Type	B32671L						B32672L							
Page	4						6							
V_{RMS} (V AC)	200	250	250	500	600	700	160	200	250	250	500	600	700	900
V_R (V DC)	400	630	1000	1000	1600	2000	250	450	630	1000	1300	1600	2000	2000
C_R (nF)														
1.0						■							■	■
1.2					■	■							■	■
1.5					■	■							■	■
2.2					■	■							■	■
2.7					■	■							■	■
3.3				■	■	■							■	■
3.9				■	■	■							■	■
4.7			■	■	■	■							■	■
5.6				■									■	■
6.2				■								■	■	■
6.8			■	■							■	■	■	■
8.2				■								■	■	
10			■	■						■	■	■	■	
12				■								■	■	
15		■	■							■		■	■	
22	■	■	■							■	■	■	■	
33	■	■							■	■	■	■	■	
47	■	■							■	■	■	■		
56		■												
68	■							■	■	■	■			
100	■							■	■	■				
150							■	■	■	■				
220							■	■	■					
330							■	■						
390									■					
470							■	■						
680							■	■						
1000							■							



B32671L

High V AC, high temperature (wound)

Ordering codes and packing units (lead spacing 10 mm)

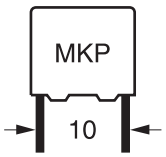
V_{RMS} f ≤1 kHz V AC	V_R V DC	C_R nF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./ MOQ	Untaped pcs./ MOQ
200	400	22	4.0 × 9.0 × 13.0	B32671L4223+***	4000	6800	4000
		33	4.0 × 9.0 × 13.0	B32671L4333+***	4000	6800	4000
		47	5.0 × 11.0 × 13.0	B32671L4473+***	3320	5200	4000
		68	5.0 × 11.0 × 13.0	B32671L4683+***	3320	5200	4000
		100	6.0 × 12.0 × 13.0	B32671L4104+***	2720	4400	4000
250	630	15	4.0 × 9.0 × 13.0	B32671L6153+***	4000	6800	4000
		22	5.0 × 11.0 × 13.0	B32671L6223+***	3320	5200	4000
		33	5.0 × 11.0 × 13.0	B32671L6333+***	3320	5200	4000
		47	6.0 × 12.0 × 13.0	B32671L6473+***	2720	4400	4000
		56	6.0 × 12.0 × 13.0	B32671L6563+***	2720	4400	4000
250	1000	4.7	4.0 × 9.0 × 13.0	B32671L9472+***	4000	6800	4000
		6.8	4.0 × 9.0 × 13.0	B32671L9682+***	4000	6800	4000
		10	5.0 × 11.0 × 13.0	B32671L9103+***	3320	5200	4000
		15	5.0 × 11.0 × 13.0	B32671L9153+***	3320	5200	4000
		22	6.0 × 12.0 × 13.0	B32671L9223+***	2720	4400	4000
500	1000	3.3	4.0 × 9.0 × 13.0	B32671L0332+***	4000	6800	4000
		3.9	4.0 × 9.0 × 13.0	B32671L0392+***	4000	6800	4000
		4.7	4.0 × 9.0 × 13.0	B32671L0472+***	4000	6800	4000
		5.6	5.0 × 11.0 × 13.0	B32671L0562+***	3320	5200	4000
		6.2	5.0 × 11.0 × 13.0	B32671L0622+***	3320	5200	4000
		6.8	5.0 × 11.0 × 13.0	B32671L0682+***	3320	5200	4000
		8.2	6.0 × 12.0 × 13.0	B32671L0822+***	2720	4400	4000
		10	6.0 × 12.0 × 13.0	B32671L0103+***	2720	4400	4000
		12	6.0 × 12.0 × 13.0	B32671L0123+***	2720	4400	4000

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series, intermediate capacitance values and closer tolerances on request.

Composition of ordering code

+ = Capacitance tolerance code:
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Straight terminals, Ammo pack
- 189 = Straight terminals, Reel
- 240 = Crimped down to lead spacing 7.5 mm, Ammo pack
- 140 = Crimped down to lead spacing 7.5 mm, Reel
- 003 = Straight terminals, untaped (lead length 3.2 ± 0.3 mm)
- 000 = Straight terminals, untaped (lead length 6−1 mm)



Ordering codes and packing units (lead spacing 10 mm)

V_{RMS} f ≤1 kHz V AC	V_R V DC	C_R nF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./ MOQ	Untaped pcs./ MOQ
600	1600	1.2	4.0 × 9.0 × 13.0	B32671L1122+***	4000	6800	4000
		1.5	4.0 × 9.0 × 13.0	B32671L1152+***	4000	6800	4000
		2.2	5.0 × 11.0 × 13.0	B32671L1222+***	3320	5200	4000
		2.7	5.0 × 11.0 × 13.0	B32671L1272+***	3320	5200	4000
		3.3	6.0 × 12.0 × 13.0	B32671L1332+***	2720	4400	4000
		3.9	6.0 × 12.0 × 13.0	B32671L1392+***	2720	4400	4000
		4.7	6.0 × 12.0 × 13.0	B32671L1472+***	2720	4400	4000
700	2000	1.0	4.0 × 9.0 × 13.0	B32671L8102+***	4000	6800	4000
		1.2	4.0 × 9.0 × 13.0	B32671L8122+***	4000	6800	4000
		1.5	4.0 × 9.0 × 13.0	B32671L8152+***	4000	6800	4000
		2.2	5.0 × 11.0 × 13.0	B32671L8222+***	3320	5200	4000
		2.7	5.0 × 11.0 × 13.0	B32671L8272+***	3320	5200	4000
		3.3	5.0 × 11.0 × 13.0	B32671L8332+***	3320	5200	4000
		3.9	6.0 × 12.0 × 13.0	B32671L8392+***	2720	4400	4000
		4.7	6.0 × 12.0 × 13.0	B32671L8472+***	2720	4400	4000

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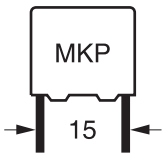
- 289 = Straight terminals, Ammo pack
- 189 = Straight terminals, Reel
- 240 = Crimped down to lead spacing 7.5 mm, Ammo pack
- 140 = Crimped down to lead spacing 7.5 mm, Reel
- 003 = Straight terminals, untaped (lead length 3.2 ± 0.3 mm)
- 000 = Straight terminals, untaped (lead length 6−1 mm)



B32672L

High V AC, high temperature (wound)

Ordering codes and packing units (lead spacing 15 mm)

V_{RMS} f ≤1 kHz V AC	V_R V DC	C_R nF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pcs./MOQ	Reel pcs./ MOQ	Untaped pcs./ MOQ
160	250	150	5.0 × 10.5 × 18.0	B32672L2154+***	4680	5200	4000
		220	6.0 × 11.0 × 18.0	B32672L2224+***	3840	4400	4000
		330	7.0 × 12.5 × 18.0	B32672L2334+***	3320	3600	4000
		470	8.5 × 14.5 × 18.0	B32672L2474+***	2720	2800	2000
		680	9.0 × 17.5 × 18.0	B32672L2684+***	2560	2800	2000
		1000	11.0 × 18.5 × 18.0	B32672L2105+***	–	2200	1000
200	450	68	5.0 × 10.5 × 18.0	B32672L4683+***	4680	5200	4000
		100	5.0 × 10.5 × 18.0	B32672L4104+***	4680	5200	4000
		150	6.0 × 11.0 × 18.0	B32672L4154+***	3840	4400	4000
		220	7.0 × 12.5 × 18.0	B32672L4224+***	3320	3600	4000
		330	8.0 × 14.0 × 18.0	B32672L4334+***	2920	3000	2000
		470	9.0 × 17.5 × 18.0	B32672L4474+***	2560	2800	2000
		680	11.0 × 18.5 × 18.0	B32672L4684+***	–	2200	1000
250	630	33	5.0 × 10.5 × 18.0	B32672L6333+***	4680	5200	4000
		47	5.0 × 10.5 × 18.0	B32672L6473+***	4680	5200	4000
		68	6.0 × 11.0 × 18.0	B32672L6683+***	3840	4400	4000
		100	7.0 × 12.5 × 18.0	B32672L6104+***	3320	3600	4000
		150	8.5 × 14.5 × 18.0	B32672L6154+***	2720	2800	2000
		220	9.0 × 17.5 × 18.0	B32672L6224+***	2560	2800	2000
		390	11.0 × 18.5 × 18.0	B32672L6394+***	–	2200	1000

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- J = ±5%

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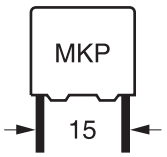
- 289 = Straight terminals, Ammo pack
- 189 = Straight terminals, Reel
- 255 = Crimped down to lead spacing 7.5 mm, Ammo pack
- 155 = Crimped down to lead spacing 7.5 mm, Reel
- 003 = Straight terminals, untaped (lead length 3.2 ± 0.3 mm)
- 000 = Straight terminals, untaped (lead length 6−1 mm)



Ordering codes and packing units (lead spacing 15 mm)

V_{RMS} f ≤1 kHz V AC	V_R V DC	C_R nF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pcs./MOQ	Reel pcs./ MOQ	Untaped pcs./ MOQ
250	1000	10	5.0 × 10.5 × 18.0	B32672L0103+***	4680	5200	4000
		15	5.0 × 10.5 × 18.0	B32672L0153+***	4680	5200	4000
		22	5.0 × 10.5 × 18.0	B32672L0223+***	4680	5200	4000
		33	6.0 × 11.0 × 18.0	B32672L0333+***	3840	4400	4000
		47	7.0 × 12.5 × 18.0	B32672L0473+***	3320	3600	4000
		68	8.5 × 14.5 × 18.0	B32672L0683+***	2720	2800	2000
		100	9.0 × 17.5 × 18.0	B32672L0104+***	2560	2800	2000
		150	11.0 × 18.5 × 18.0	B32672L0154+***	–	2200	1000
500	1300	6.8	5.0 × 10.5 × 18.0	B32672L7682+***	4680	5200	4000
		10	5.0 × 10.5 × 18.0	B32672L7103+***	4680	5200	4000
		22	7.0 × 12.5 × 18.0	B32672L7223+***	3320	3600	4000
		33	8.5 × 14.5 × 18.0	B32672L7333+***	2720	2800	2000
		47	9.0 × 17.5 × 18.0	B32672L7473+***	2560	2800	2000
		68	11.0 × 18.5 × 18.0	B32672L7683+***	–	2200	1000
600	1600	6.2	5.0 × 10.5 × 18.0	B32672L1622+***	4680	5200	4000
		6.8	5.0 × 10.5 × 18.0	B32672L1682+***	4680	5200	4000
		8.2	6.0 × 11.0 × 18.0	B32672L1822+***	3840	4400	4000
		10	6.0 × 11.0 × 18.0	B32672L1103+***	3840	4400	4000
		12	6.0 × 12.0 × 18.0	B32672L1123+***	3840	4400	4000
		15	7.0 × 12.5 × 18.0	B32672L1153+***	3320	3600	4000
		22	8.5 × 14.5 × 18.0	B32672L1223+***	2720	2800	2000
		33	9.0 × 17.5 × 18.0	B32672L1333+***	2560	2800	2000
		47	11.0 × 18.5 × 18.0	B32672L1473+***	–	2200	1000

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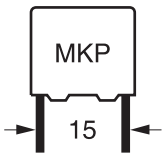
- 155 = Crimped down to lead spacing 7.5 mm, Reel
- 003 = Straight terminals, untaped (lead length 3.2 ± 0.3 mm)
- 000 = Straight terminals, untaped (lead length 6−1 mm)



B32672L

High V AC, high temperature (wound)

Ordering codes and packing units (lead spacing 15 mm)

V_{RMS} f ≤1 kHz V AC	V_R V DC	C_R nF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pcs./MOQ	Reel pcs./ MOQ	Untaped pcs./ MOQ
700	2000	1.0	5.0 × 10.5 × 18.0	B32672L8102+***	4680	5200	4000
		1.2	5.0 × 10.5 × 18.0	B32672L8122+***	4680	5200	4000
		1.5	5.0 × 10.5 × 18.0	B32672L8152+***	4680	5200	4000
		2.2	5.0 × 10.5 × 18.0	B32672L8222+***	4680	5200	4000
		2.7	5.0 × 10.5 × 18.0	B32672L8272+***	4680	5200	4000
		3.3	5.0 × 10.5 × 18.0	B32672L8332+***	4680	5200	4000
		3.9	5.0 × 10.5 × 18.0	B32672L8392+***	4680	5200	4000
		4.7	5.0 × 10.5 × 18.0	B32672L8472+***	4680	5200	4000
		5.6	6.0 × 11.0 × 18.0	B32672L8562+***	3840	4400	4000
		6.2	6.0 × 11.0 × 18.0	B32672L8622+***	3840	4400	4000
		6.8	6.0 × 11.0 × 18.0	B32672L8682+***	3840	4400	4000
		8.2	6.0 × 12.0 × 18.0	B32672L8822+***	3840	4400	4000
		10	7.0 × 12.5 × 18.0	B32672L8103+***	3320	3600	4000
		12	8.5 × 14.5 × 18.0	B32672L8123+***	2720	2800	2000
		15	8.5 × 14.5 × 18.0	B32672L8153+***	2720	2800	2000
		22	9.0 × 17.5 × 18.0	B32672L8223+***	2560	2800	2000
		33	11.0 × 18.5 × 18.0	B32672L8333+***	–	2200	1000

MOQ = Minimum Order Quantity, consisting of 4 packing units.
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Composition of ordering code

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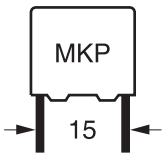
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Straight terminals, Ammo pack
- 189 = Straight terminals, Reel
- 255 = Crimped down to lead spacing 7.5 mm, Ammo pack
- 155 = Crimped down to lead spacing 7.5 mm, Reel
- 003 = Straight terminals, untaped (lead length 3.2 ± 0.3 mm)
- 000 = Straight terminals, untaped (lead length 6−1 mm)



Ordering codes and packing units (lead spacing 15 mm)

V_{RMS} f ≤1 kHz V AC	V_R V DC	C_R nF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pcs./MOQ	Reel pcs./ MOQ	Untaped pcs./ MOQ
900	2000	1.0	5.0 × 10.5 × 18.0	B32672L9102+***	4680	5200	4000
		1.2	6.0 × 11.0 × 18.0	B32672L9122+***	3840	4400	4000
		1.5	6.0 × 11.0 × 18.0	B32672L9152+***	3840	4400	4000
		2.2	7.0 × 12.5 × 18.0	B32672L9222+***	3320	3600	4000
		2.7	8.0 × 14.0 × 18.0	B32672L9272+***	2920	3000	2000
		3.3	8.5 × 14.5 × 18.0	B32672L9332+***	2720	2800	2000
		3.9	9.0 × 17.5 × 18.0	B32672L9392+***	2560	2800	2000
		4.7	9.0 × 17.5 × 18.0	B32672L9472+***	2560	2800	2000
		5.6	11.0 × 18.5 × 18.0	B32672L9562+***	–	2200	1000
		6.2	11.0 × 18.5 × 18.0	B32672L9622+***	–	2200	1000
		6.8	11.0 × 18.5 × 18.0	B32672L9682K***	–	2200	1000

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series, intermediate capacitance values and closer tolerances on request.

Composition of ordering code

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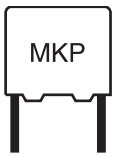
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Straight terminals, Ammo pack
- 189 = Straight terminals, Reel
- 255 = Crimped down to lead spacing 7.5 mm, Ammo pack
- 155 = Crimped down to lead spacing 7.5 mm, Reel
- 003 = Straight terminals, untaped (lead length 3.2 ± 0.3 mm)
- 000 = Straight terminals, untaped (lead length 6−1 mm)



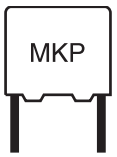
B32671L ... B32672L

High V AC, high temperature (wound)

Technical data

Reference standard: IEC 60384-16. All data given at T = 20 °C, otherwise is specified.

Operating temperature range	Max. operating temperature $T_{op,max}$	+125 °C			
	Upper category temperature T_{max}	+110 °C			
	Lower category temperature T_{min}	−55 °C			
	Rated temperature T_R	+85 °C			
Dissipation factor tan δ (in 10^{-3}) at 20 °C (upper limit values)	at	≤27 nF	27 nF< C_R ≤0.1 µF	0.1 µF < C_R ≤1 µF	>1 µF
	1 kHz	0.8	0.8	0.8	0.8
	10 kHz	1.0	1.0	1.0	–
	100 kHz	2.0	3.0	–	–
Insulation resistance R_{ins} or time constant $\tau = C_R \cdot R_{ins}$ at 20 °C, rel. humidity ≤ 65% (minimum as-delivered values)	100 GΩ (C_R ≤ 0.33 µF) 30000 s (C_R > 0.33 µF)				
DC test voltage	1.6 · V_R, 2 s				
Category voltage V_C (continuous operation with V_{DC} or V_{AC} at f ≤1 kHz)	T_{op} (°C)	DC voltage derating	AC voltage derating		
	T_{op} ≤ 85	$V_C = V_R$	$V_{C,RMS} = V_{RMS}$		
	85<T_{op}≤110	$V_C = V_R \cdot (165 - T_{op})/80$	$V_{C,RMS}=V_{RMS} \cdot (165 - T_{op})/80$		
Operating voltage V_{op} for short operating periods (V_{DC} or V_{AC} at f ≤1 kHz)	T_{op} (°C)	DC voltage (max. hours)	AC voltage (max. hours)		
	T_{op} ≤ 100	$V_{op} = 1.25 \cdot V_C$ (2000 h)	$V_{op} = 1.0 \cdot V_{C,RMS}$ (2000 h)		
	100<T_{op}≤125	$V_{op} = 1.25 \cdot V_C$ (1000 h)	$V_{op} = 1.0 \cdot V_{C,RMS}$ (1000 h)		
Reliability: Failure rate λ Service life t_{SL}	1 fit (≤ 1 · 10^{-9}/h) at 0.5 · V_R, 40 °C 200 000 h at 1.0 · V_R, 85 °C For conversion to other operating conditions and temperatures, refer to chapter "Quality, 2 Reliability".				
Failure criteria: Total failure Failure due to variation of parameters	Short circuit or open circuit Capacitance change |ΔC/C|	> 10%			
	Dissipation factor tan δ	> 4 · upper limit values			
	Insulation resistance R_{ins}	< 1500 MΩ			



Pulse handling capability

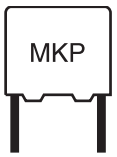
"dV/dt" represents the maximum permissible voltage change per unit of time for non-sinusoidal voltages, expressed in V/µs.

"k_0" represents the maximum permissible pulse characteristic of the waveform applied to the capacitor, expressed in $V^2/\mu s$.

Note:
The values of dV/dt and k_0 provided below must not be exceeded in order to avoid damaging the capacitor. These parameters are given for isolated pulses in such a way that the heat generated by one pulse will be completely dissipated before applying the next pulse. For a train of pulses, please refer to the curves of permissible AC voltage-current versus frequency.

dV/dt values

Lead spacing	10 mm					
Type	B32671L					
V_{RMS} (V AC)	200	250		500	600	700
V_R (V DC)	400	630	1000	1000	1600	2000
C_R (nF)	dV/dt in V/µs					
1.0	–	–	–	–	–	11000
1.2	–	–	–	–	6000	10000
1.5	–	–	–	–	5600	9500
2.2	–	–	–	–	5200	9000
2.7	–	–	–	–	5000	8600
3.3	–	–	–	4700	4700	8500
3.9	–	–	–	4300	4500	8200
4.7	–	–	810	3800	4000	8000
5.6	–	–	–	3400	–	–
6.2	–	–	–	3200	–	–
6.8	–	–	810	3100	–	–
8.2	–	–	–	2700	–	–
10	–	–	810	2500	–	–
12	–	–	–	2300	–	–
15	–	540	810	–	–	–
22	400	540	810	–	–	–
33	400	540	–	–	–	–
47	400	540	–	–	–	–
56	–	540	–	–	–	–
68	400	–	–	–	–	–
100	400	–	–	–	–	–

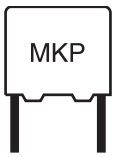


B32671L ... B32672L

High V AC, high temperature (wound)

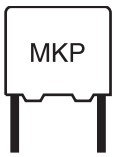
dV/dt values

Lead spacing	15 mm							
Type	B32672L							
V_{RMS} (V AC)	160	200		250	500	600	700	900
V_R (V DC)	250	450	630	1000	1300	1600	2000	2000
C_R (nF)	dV/dt in V/µs							
1.0	–	–	–	–	–	–	10000	15000
1.2	–	–	–	–	–	–	9400	14100
1.5	–	–	–	–	–	–	9000	13500
2.2	–	–	–	–	–	–	7500	11000
2.7	–	–	–	–	–	–	7100	10600
3.3	–	–	–	–	–	–	6800	10000
3.9	–	–	–	–	–	–	6000	9000
4.7	–	–	–	–	–	–	5500	8200
5.6	–	–	–	–	–	–	5000	7500
6.2	–	–	–	–	–	3600	4700	7000
6.8	–	–	–	–	1000	3500	4500	6700
8.2	–	–	–	–	–	3100	4200	–
10	–	–	–	445	1000	2800	3900	–
12	–	–	–	–	–	2600	3600	–
15	–	–	–	445	–	2300	3300	–
22	–	–	–	445	1000	2000	2900	–
33	–	–	300	445	1000	1700	2300	–
47	–	–	300	445	1000	1400	–	–
56	–	–	–	–	–	–	–	–
68	–	200	300	445	1000	–	–	–
100	–	200	300	445	–	–	–	–
150	170	200	300	445	–	–	–	–
220	170	200	300	–	–	–	–	–
330	170	200	–	–	–	–	–	–
390	–	–	300	–	–	–	–	–
470	170	200	–	–	–	–	–	–
680	170	200	–	–	–	–	–	–
1000	170	–	–	–	–	–	–	–



k_0 values

Lead spacing	10 mm					
Type	B32671L					
V_{RMS} (V AC)	200	250		500	600	700
V_R (V DC)	400	630	1000	1000	1600	2000
C_R (nF)	k_0 in $V^2/\mu s$					
1.0	–	–	–	–	–	25000000
1.2	–	–	–	–	14400000	23000000
1.5	–	–	–	–	14000000	22500000
2.2	–	–	–	–	13800000	22000000
2.7	–	–	–	–	13600000	21500000
3.3	–	–	–	9400000	13300000	21000000
3.9	–	–	–	8600000	13100000	20900000
4.7	–	–	400000	8200000	12000000	20800000
5.6	–	–	–	7600000	–	
6.2	–	–	–	6800000	–	
6.8	–	–	400000	6200000	–	
8.2	–	–	–	5400000	–	
10	–	–	400000	5000000	–	
12	–	–	–	4600000	–	
15	–	200000	400000	–	–	
22	150000	200000	400000	–	–	
33	150000	200000	–	–	–	
47	150000	200000	–	–	–	
56	–	200000	–	–	–	
68	150000	–	–	–	–	
100	150000	–	–	–	–	



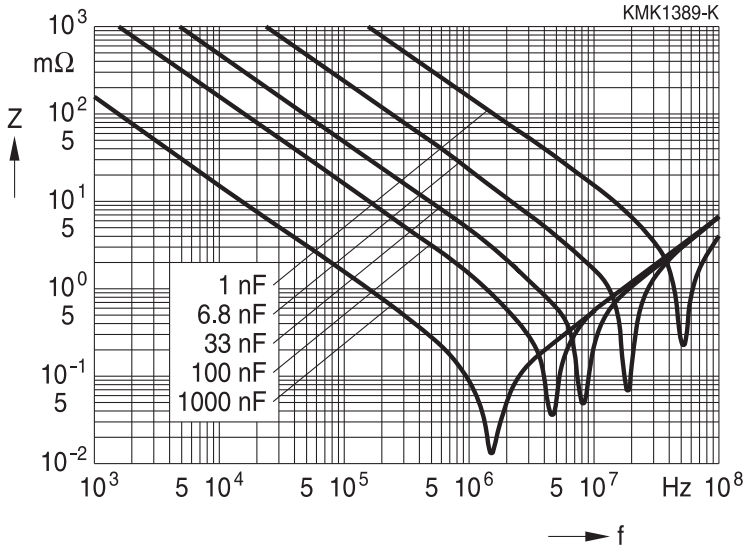
B32671L ... B32672L

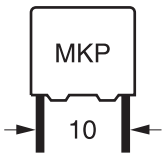
High V AC, high temperature (wound)

k_0 values

Lead spacing	15 mm							
Type	B32672L							
V_{RMS} (V AC)	160	200	250		500	600	700	900
V_R (V DC)	250	450	630	1000	1300	1600	2000	2000
C_R (nF)	k_0 in $V^2/\mu s$							
1.0	–	–	–	–	–	–	20300000	30000000
1.2	–	–	–	–	–	–	19600000	29400000
1.5	–	–	–	–	–	–	19200000	28000000
2.2	–	–	–	–	–	–	18600000	27500000
2.7	–	–	–	–	–	–	18200000	27300000
3.3	–	–	–	–	–	–	18000000	27000000
3.9	–	–	–	–	–	–	16800000	25200000
4.7	–	–	–	–	–	–	15800000	23500000
5.6	–	–	–	–	–	–	13100000	19500000
6.2	–	–	–	–	–	11520000	12700000	19000000
6.8	–	–	–	–	3000000	11200000	12300000	18400000
8.2	–	–	–	–	–	9920000	11800000	–
10	–	–	–	1000000	3000000	8960000	11100000	–
12	–	–	–	–	–	8320000	10600000	–
15	–	–	–	1000000	–	7360000	10400000	–
22	–	–	–	1000000	3000000	6400000	9300000	–
33	–	–	500000	1000000	3000000	5440000	9000000	–
47	–	–	500000	1000000	3000000	4480000	–	–
56	–	–	–	–	–	–	–	–
68	–	120000	500000	1000000	3000000	–	–	–
100	–	120000	500000	1000000	–	–	–	–
150	100000	120000	500000	1000000	–	–	–	–
220	100000	120000	500000	–	–	–	–	–
330	100000	120000	–	–	–	–	–	–
390	–	–	500000	–	–	–	–	–
470	100000	120000	–	–	–	–	–	–
680	100000		–	–	–	–	–	–
1000	100000	–	–	–	–	–	–	–

Impedance Z versus frequency f (typical values)





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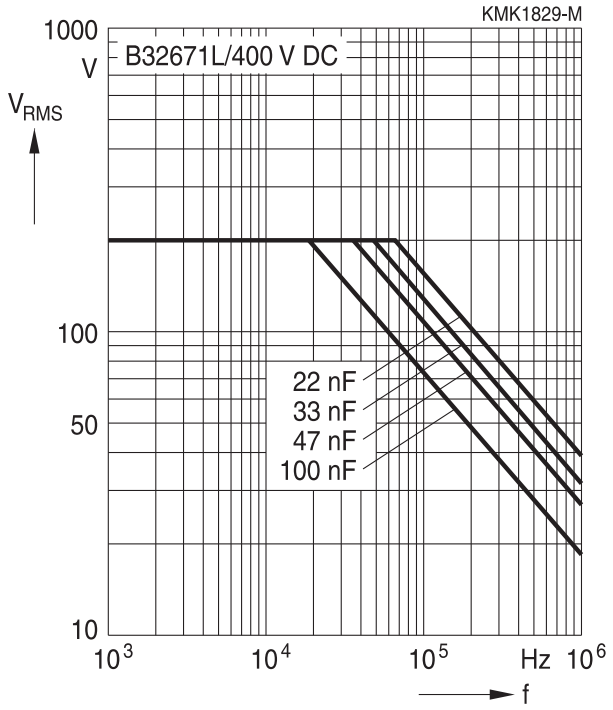
High V AC, high temperature (wound)

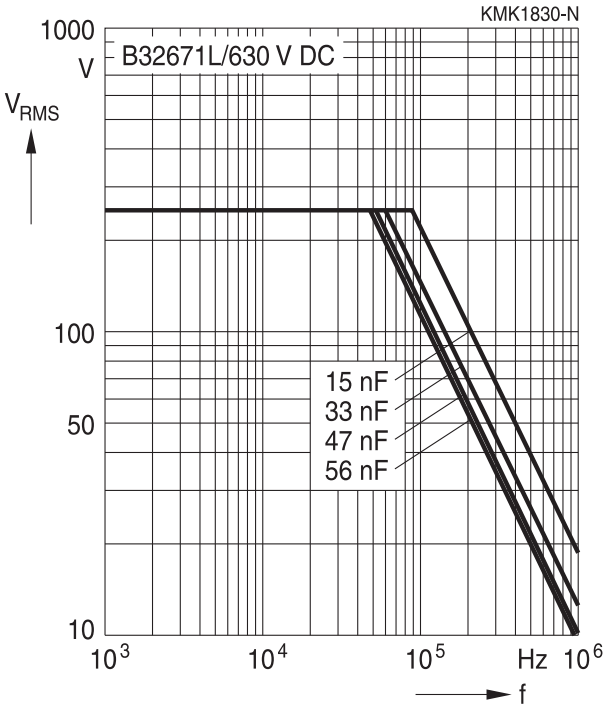
Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms $T_A \leq 100$ °C)
For T_A >100 °C, please use derating factor F_T.

Lead spacing 10 mm

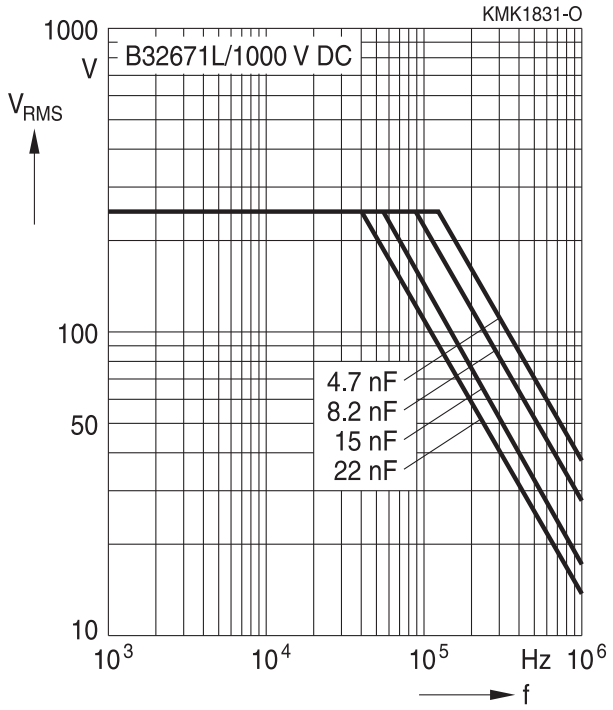
400 V DC/200 V AC



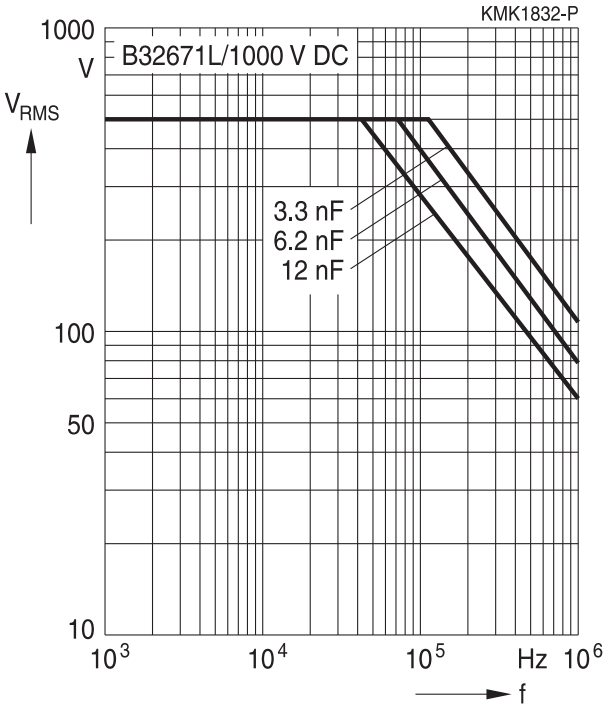
630 V DC/250 V AC

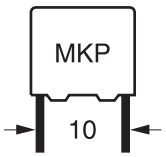


1000 V DC/250 V AC



1000 V DC/500 V AC

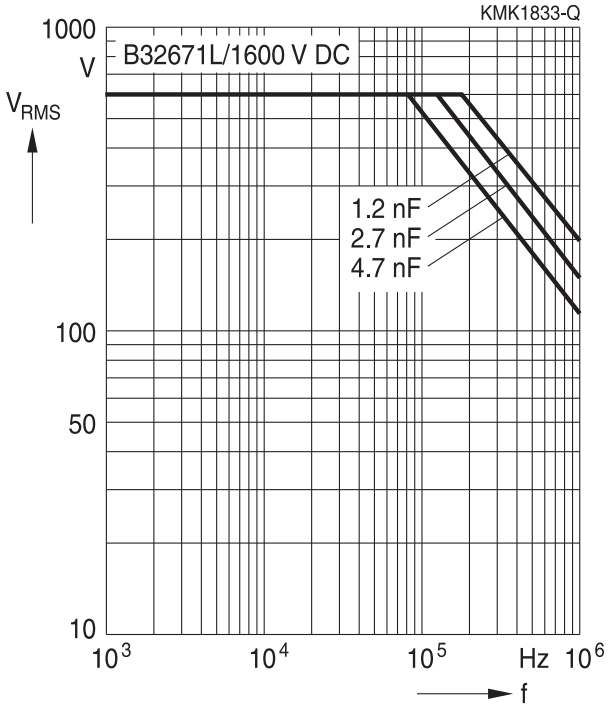




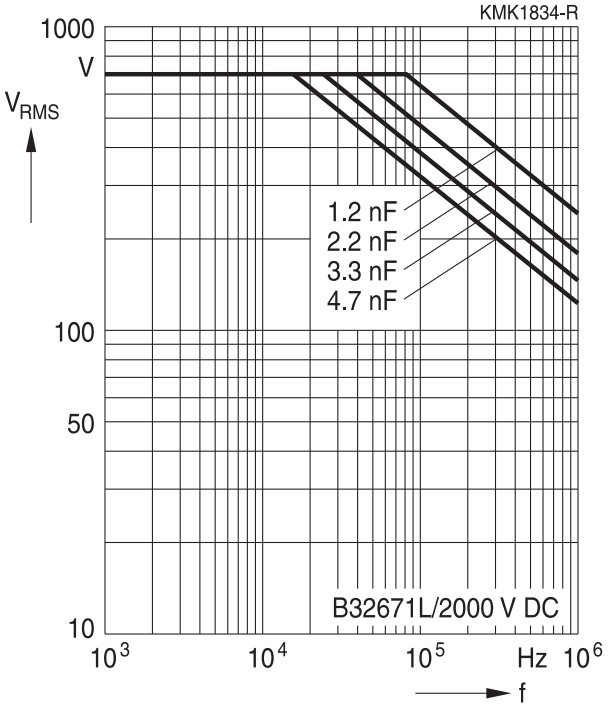
Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms $T_A \leq 100$ °C)
For T_A >100 °C, please use derating factor F_T.

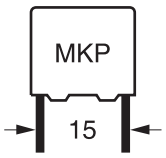
Lead spacing 10 mm

1600 V DC/600 V AC



2000 V DC/700 V AC





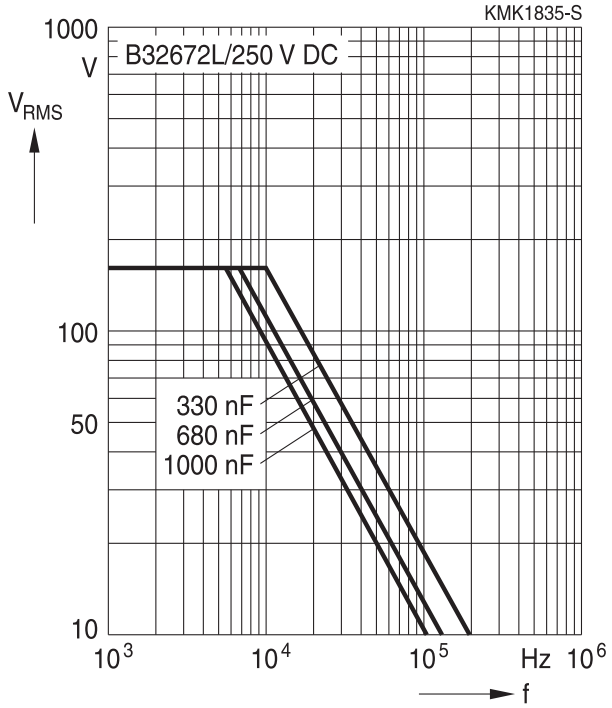
B32672L

High V AC, high temperature (wound)

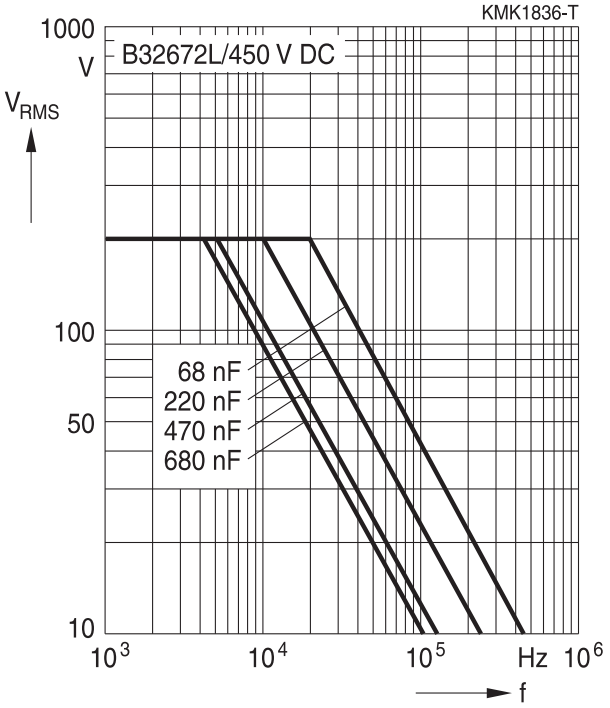
Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms $T_A \leq 100$ °C)
For T_A >100 °C, please use derating factor F_T.

Lead spacing 15 mm

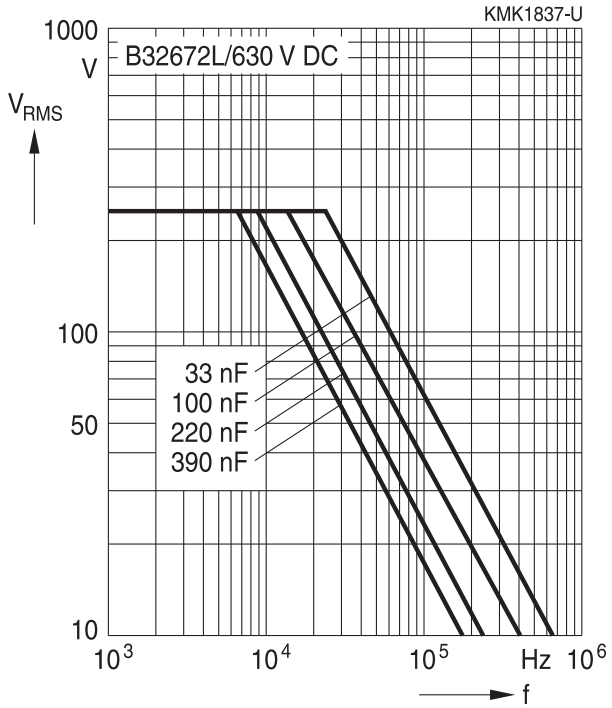
250 V DC/160 V AC



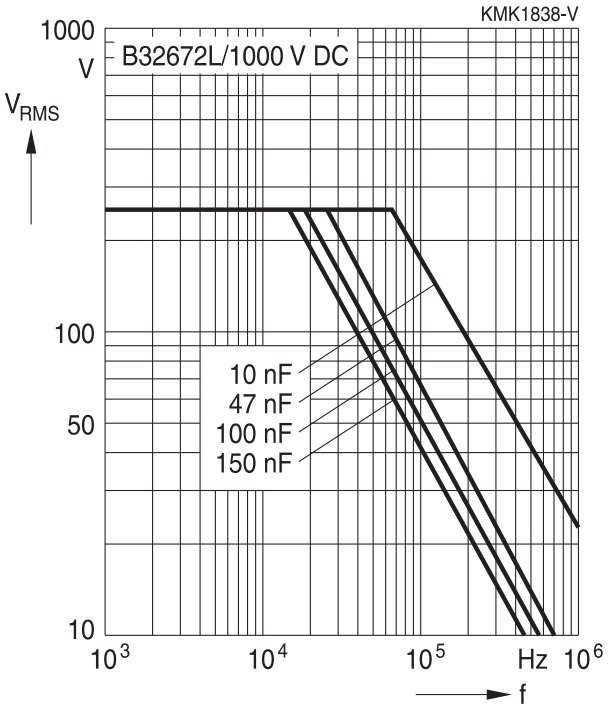
450 V DC/200 V AC

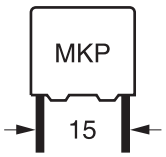


630 V DC/250 V AC



1000 V DC/250 V AC

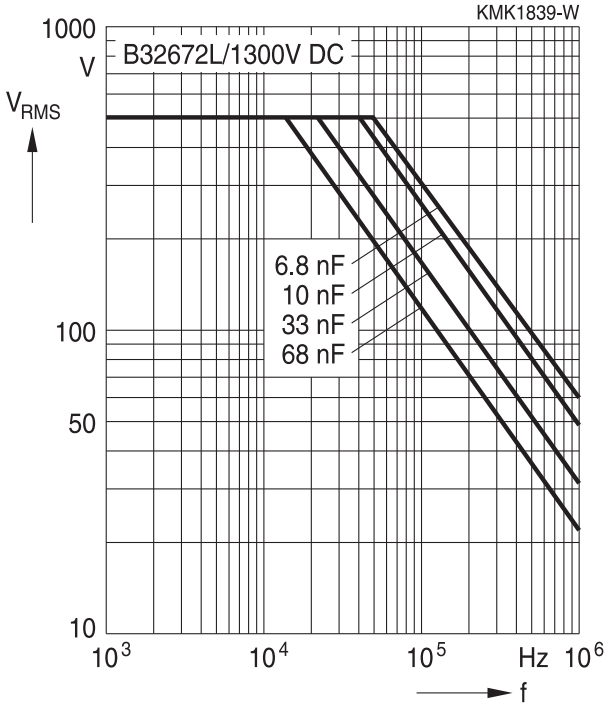




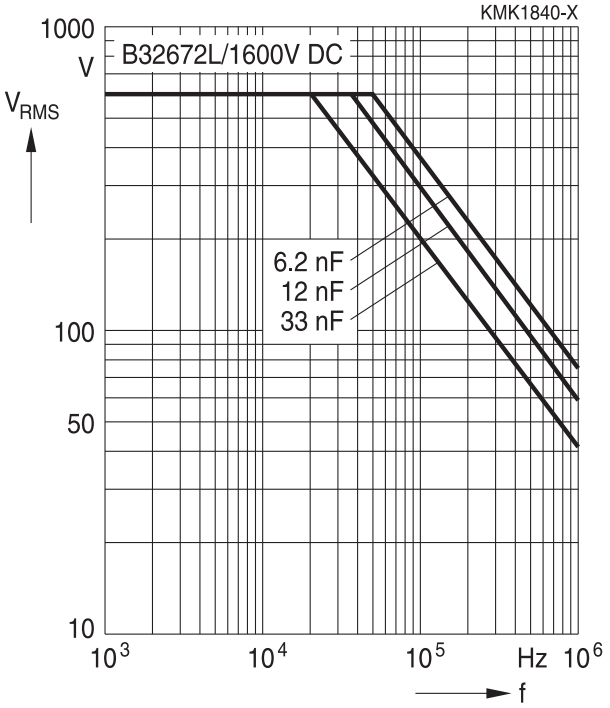
Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms $T_A \leq 100$ °C)
For T_A >100 °C, please use derating factor F_T.

Lead spacing 15 mm

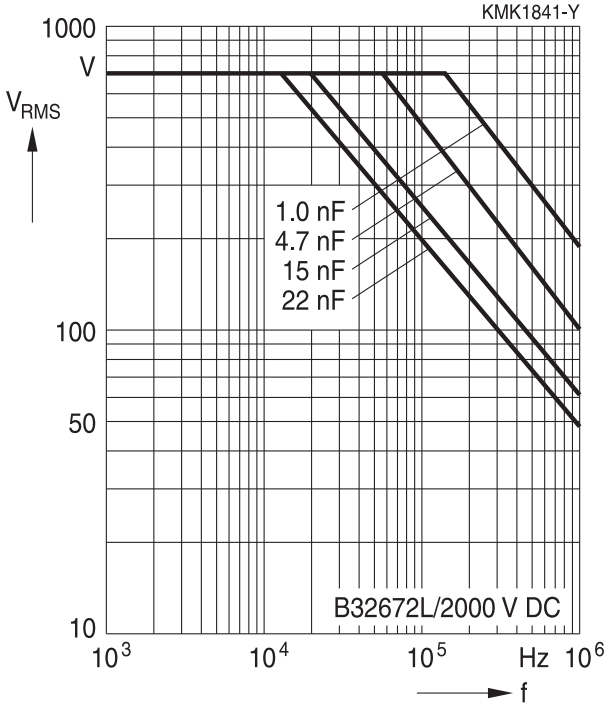
1300 V DC/500 V AC



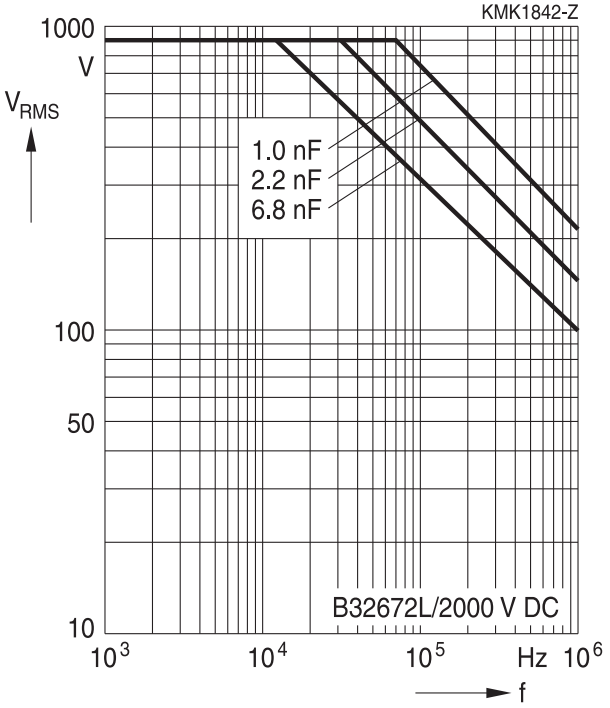
1600 V DC/600 V AC



2000 V DC/700 V AC



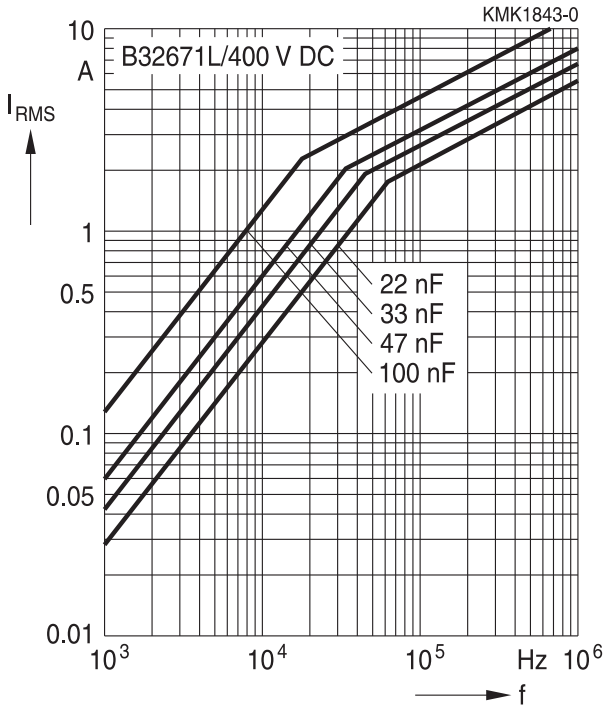
2000 V DC/900 V AC



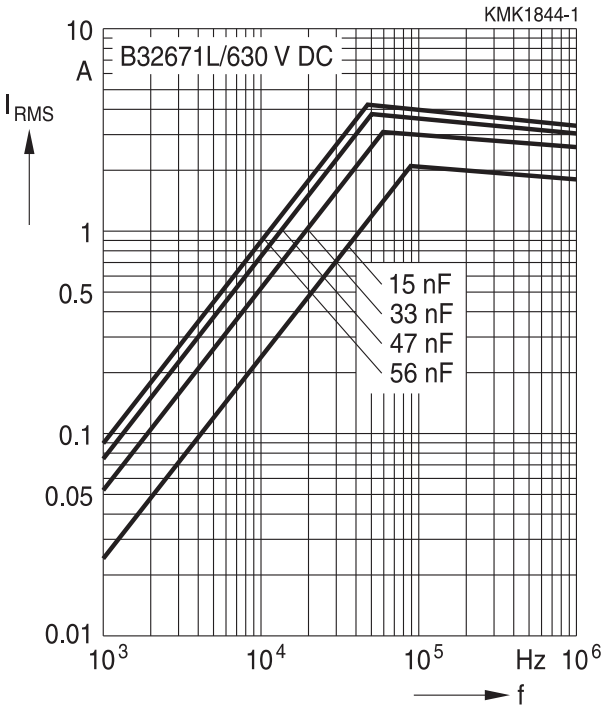
Permissible current I_{RMS} versus frequency f (for sinusoidal waveforms $T_A \leq 100$ °C)
For T_A >100 °C, please use derating factor F_T.

Lead spacing 10 mm

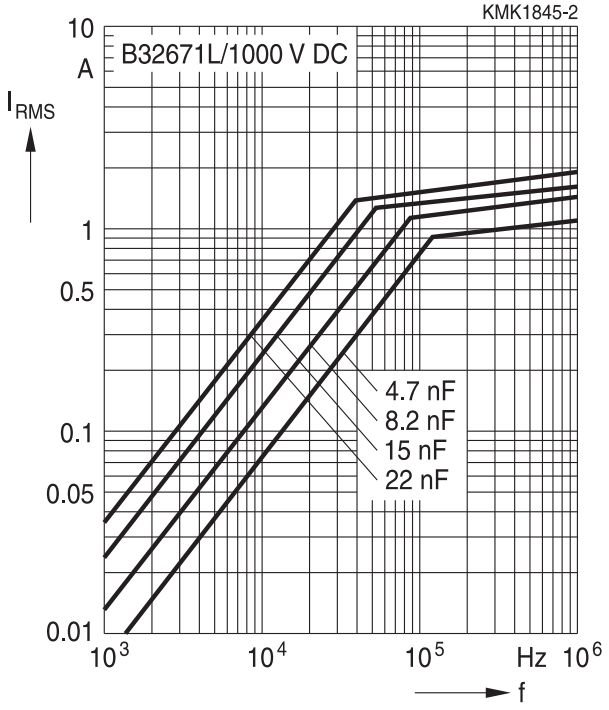
400 V DC/200 V AC



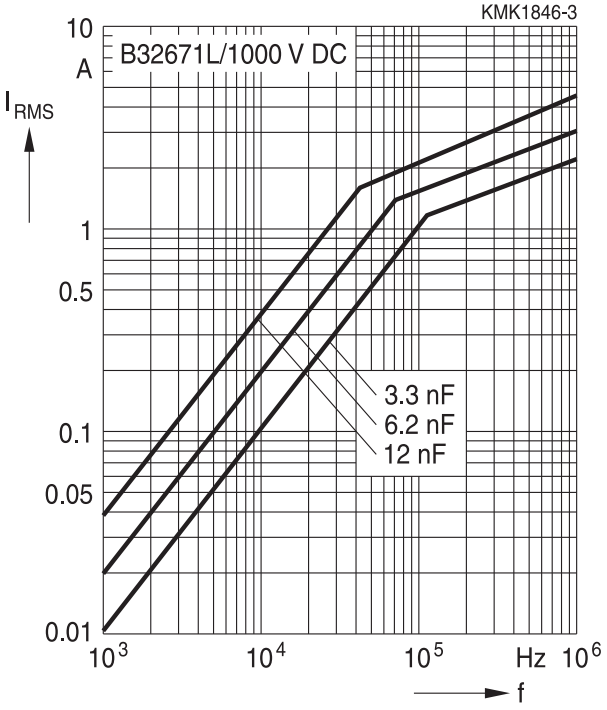
630 V DC/250 V AC

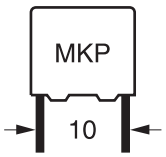


1000 V DC/250 V AC



1000 V DC/500 V AC

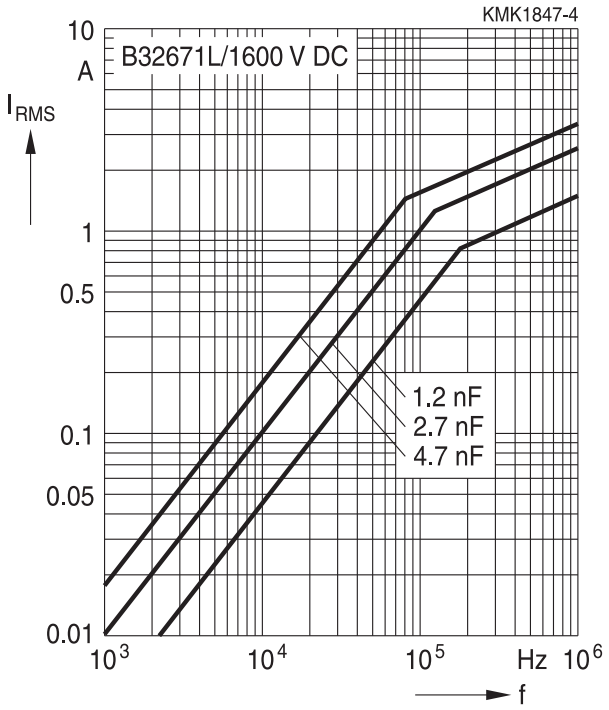




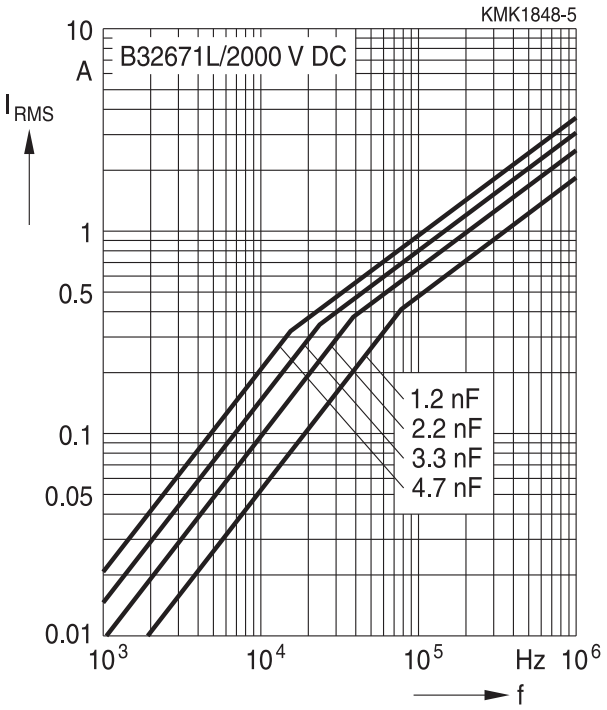
Permissible current I_{RMS} versus frequency f (for sinusoidal waveforms $T_A \leq 100$ °C)
For T_A >100 °C, please use derating factor F_T.

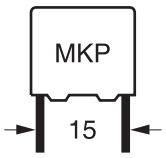
Lead spacing 10 mm

1600 V DC/600 V AC



2000 V DC/700 V AC





B32672L

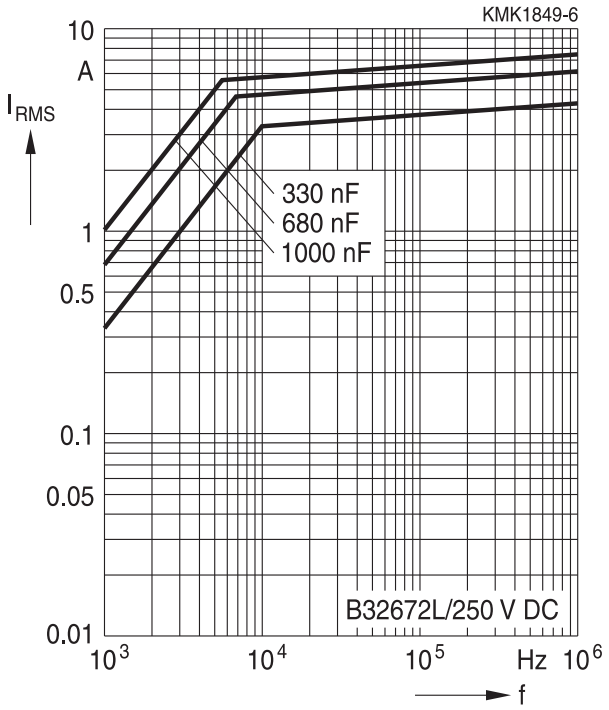
High V AC, high temperature (wound)

Permissible current I_{RMS} versus frequency f (for sinusoidal waveforms $T_A \leq 100$ °C)

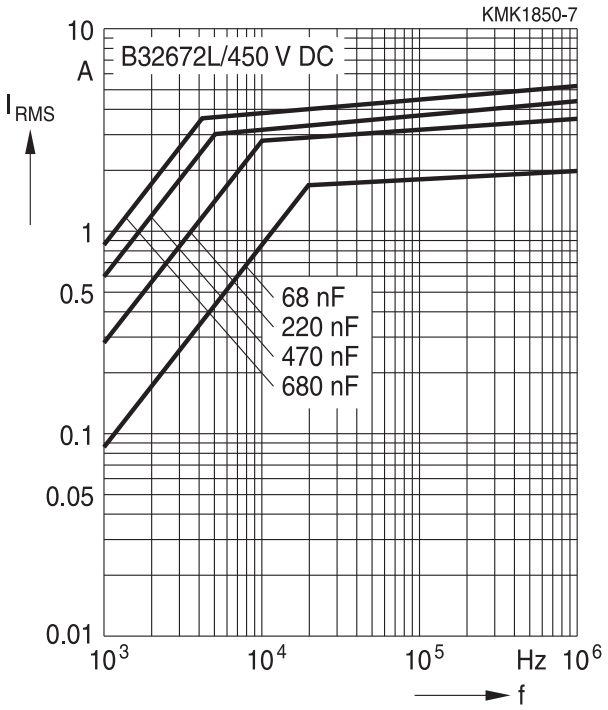
For T_A >100 °C, please use derating factor F_T.

Lead spacing 15 mm

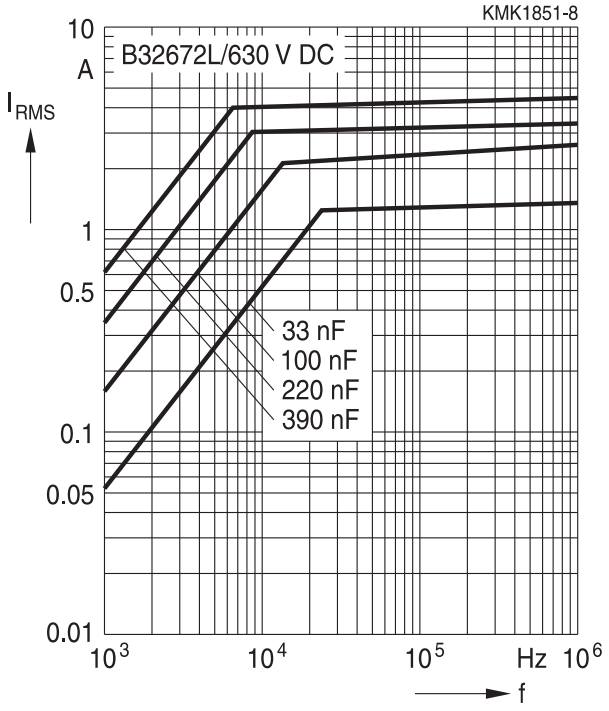
250 V DC/160 V AC



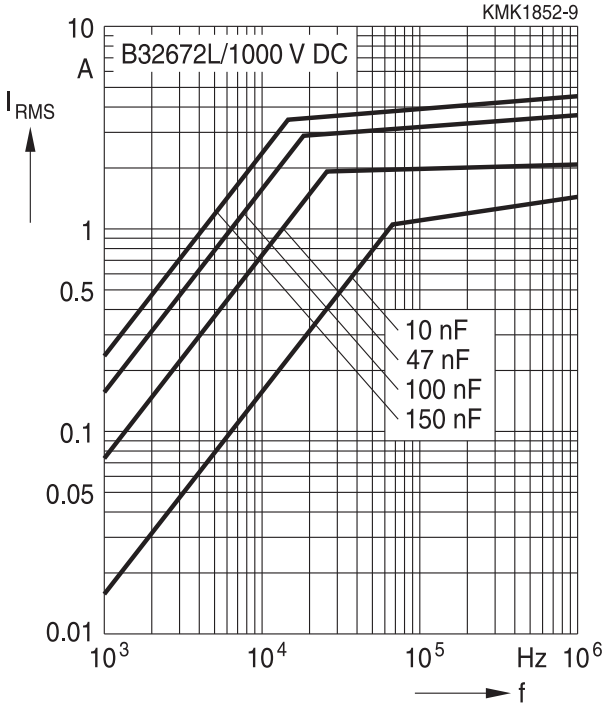
450 V DC/200 V AC

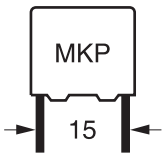


630 V DC/250 V AC



1000 V DC/250 V AC

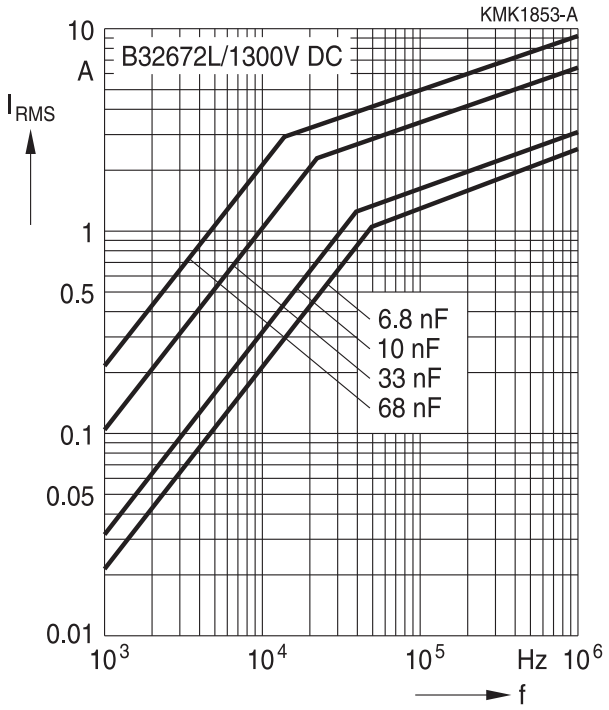




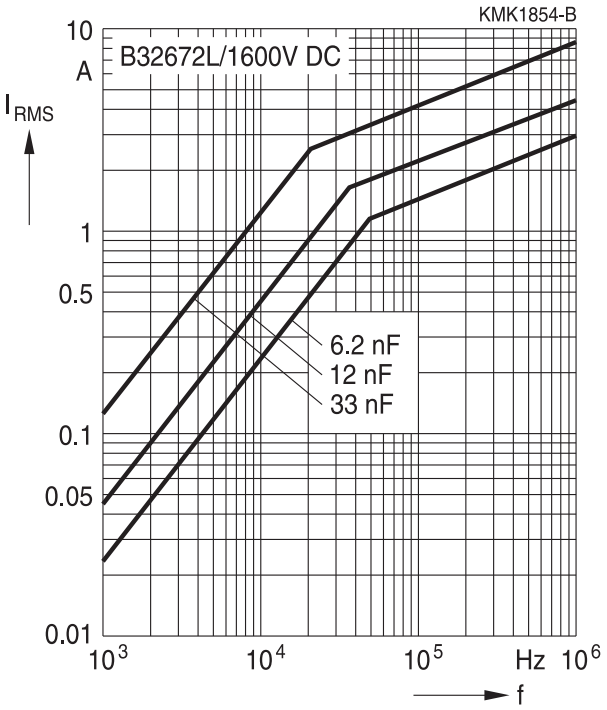
Permissible current I_{RMS} versus frequency f (for sinusoidal waveforms $T_A \leq 100$ °C)
For T_A >100 °C, please use derating factor F_T.

Lead spacing 15 mm

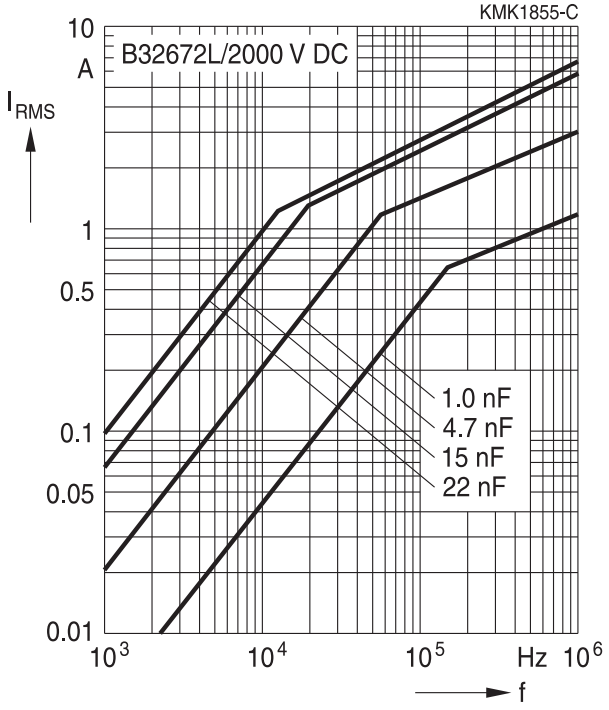
1300 V DC/500 V AC



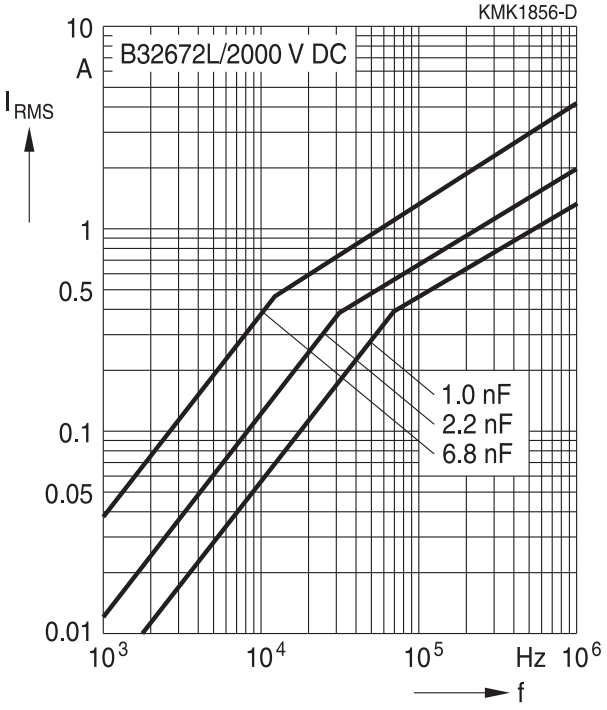
1600 V DC/600 V AC



2000 V DC/700 V AC



2000 V DC/900 V AC



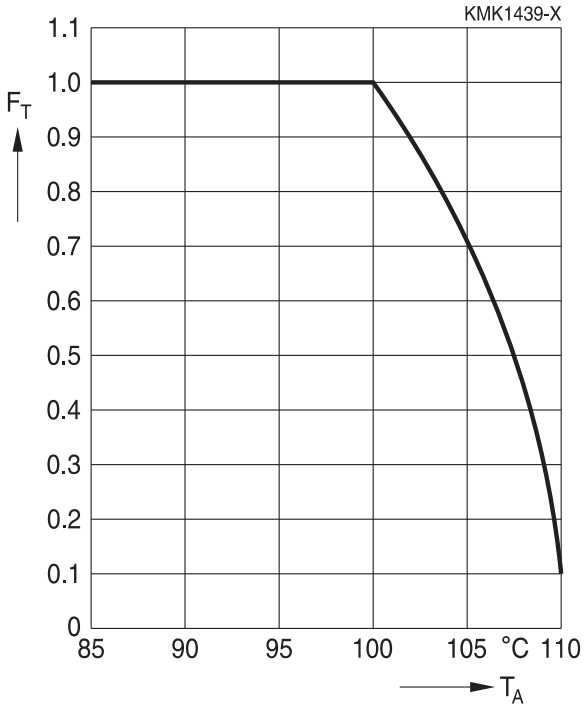
Maximum AC voltage (V_{RMS}), current (I_{RMS}) vs. frequency and temperature for T_A > 100 ºC

The graphs described in the previous section for the permissible AC voltage (V_{RMS}) or current (I_{RMS}) vs. frequency are given for a maximum ambient temperature $T_A \leq 100$ ºC. In case of higher ambient temperatures (T_A), the self-heating (ΔT) of the component must be reduced to avoid that temperature of the component ($T_{op} = T_A + \Delta T$) reaches values above maximum operating temperature.The factor F_T shall be applied in the following way:

$$I_{RMS}(T_A) = I_{RMS,T_A \leq 100\,^{\circ}C} \cdot F_T(T_A)$$

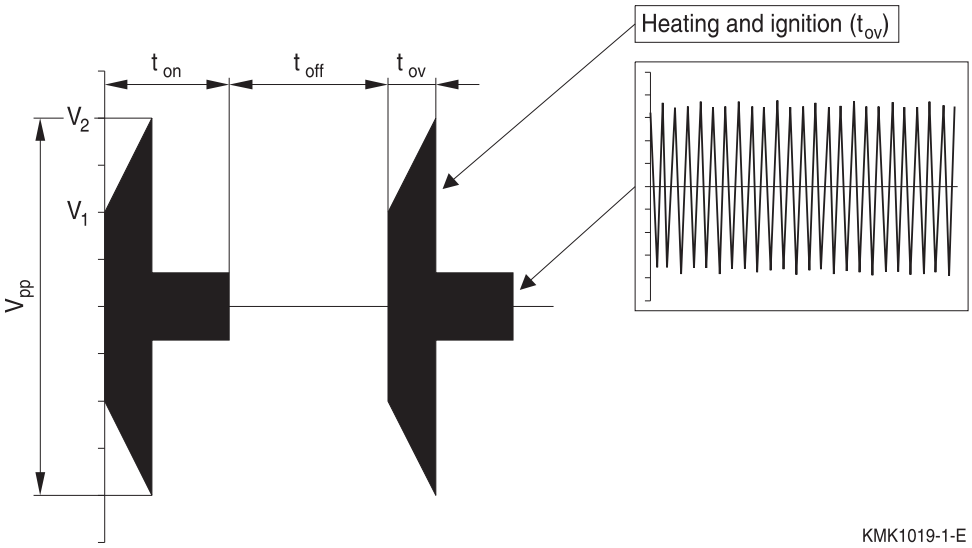
$$V_{RMS}(T_A) = V_{RMS,T_A \leq 100\,^{\circ}C} \cdot F_T(T_A)$$

And F_T is given by the following curve:



Operation at overvoltages during heating and ignition of lamps ($T_A \leq 40$ °C)

In lighting applications, the capacitors can be subjected to overvoltages during the heating and ignition periods. An overvoltage occurs when the operation voltage exceeds the permissible AC voltage at the resonant frequency f_r.



For a repetitive application of on/off switching pulses (as for example in the life tests applied by electronic ballast manufacturers), limits have to be imposed on the time periods under overvoltage and on the duty cycle, in order to keep the capacitance value within the required margins:

- The overvoltage time t_{OV} should be less than 1 sec.
- The K_0 calculated in the overvoltage period (see general technical information) shall be lower than the maximum K_0 provided.
- The maximum duty cycle of the overvoltage is given by

$$\frac{t_{OV}}{t_{on} + t_{off}} \leq \left(\frac{V_{RMS}}{V_{RMS,OV}}\right)^2 \cdot 0.5$$

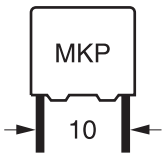
  where $V_{RMS,ov}$ is the RMS voltage during period t_{OV}

$$V_{rms,OV} = \sqrt{\frac{V_1^2 + V_1 \cdot V_2 + V_2^2}{6}}$$

  and V_{RMS} is the permissible AC voltage for continuous operation at the resonant frequency f_r (given by the “permissible AC voltage versus frequency f” graphics in theprevious pages).

- The drift of capacitance depends on the V_{pp} attained, and the total time under overvoltage, which is calculated in hours as follows:
  $(N_i \cdot t_{OV}) / 3600$
  where N_i is the number of overvoltage impulses and t_{OV} is expressed in seconds.

The maximum drift of capacitance as a function of both parameters is provided graphically in the following pages.



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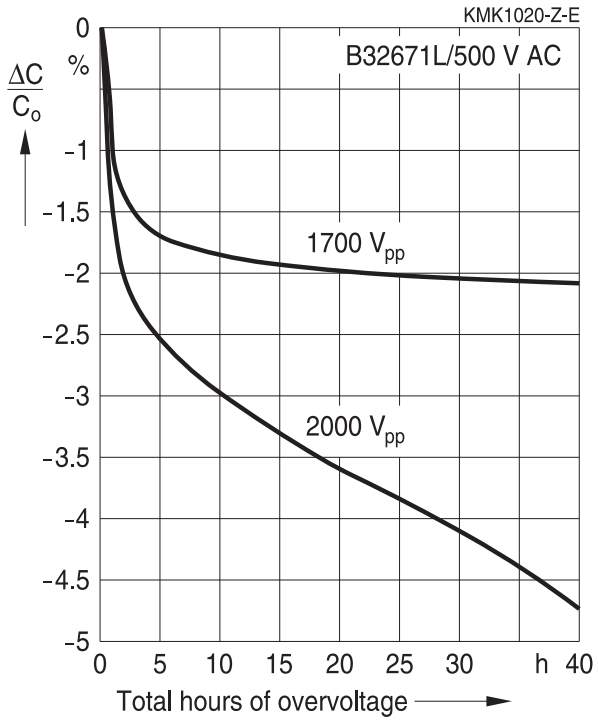
High V AC, high temperature (wound)

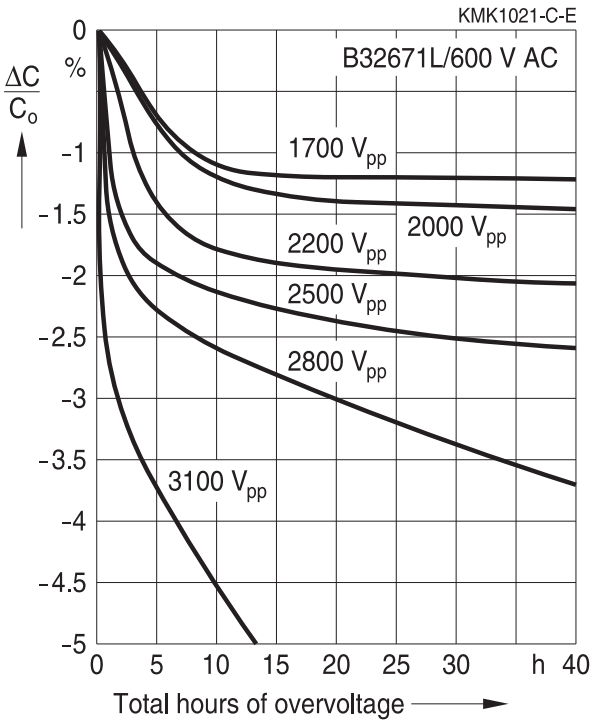
Estimation of the maximum drift of capacitance value in function of the number of total hours overvoltage

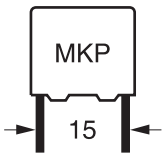
Lead spacing 10 mm

500 V AC/1000 V DC



600 V AC/1600 V DC

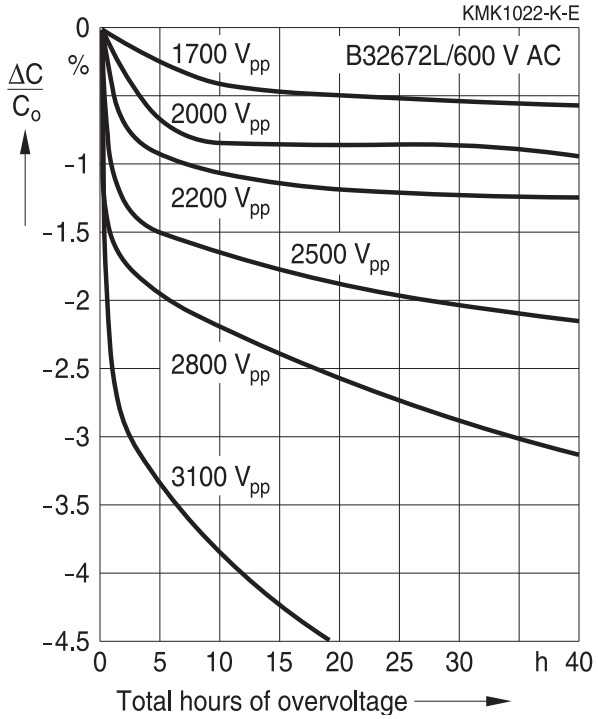




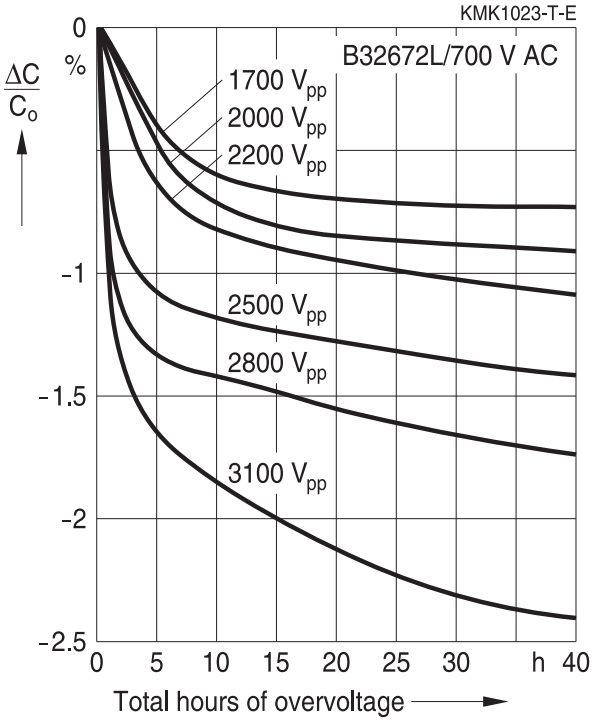
Estimation of the maximum drift of capacitance value in function of the number of total hours overvoltage

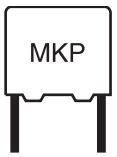
Lead spacing 15 mm

600 V AC/1600 V DC



700 V AC/2000 V DC





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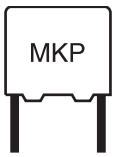
High V AC, high temperature (wound)

Testing and Standards

Test	Reference	Conditions of test	Performance requirements
Electrical Parameters	IEC 60384-16	Voltage proof, 1.6 V_R, 1 minute Insulation resistance, R_{INS} Capacitance, C Dissipation factor, tan δ	Within specified limits
Robustness of terminations	IEC 60068-2-21	Tensile strength (test Ua1) Wire diameter: Tensile force 0.5 < d1 ≤ 0.8 mm: 10 N	Capacitance and tan δ within specified limits
Resistance to soldering heat	IEC 60068-2-20, test Tb, method 1A	Solder bath temperature at 260 ± 5 °C, immersion for 10 seconds	$\Delta C/C_0 \leq 2\%$ $\lvert\Delta \tan\delta\rvert \leq 0.002$
Rapid change of temperature	IEC 60384-16	T_A = lower category temperature T_B = upper category temperature Five cycles, duration t = 30 min.	
Vibration	IEC 60384-16	Test Fc: vibration sinusoidal Displacement: 0.75 mm Accleration: 98 m/s² Frequency: 10 Hz ... 500 Hz Test duration: 3 orthogonal axes, 2 hours each axe	No visible damage
Bump	IEC 60384-16	Test Eb: Total 4000 bumps with 390 m/s² mounted on PCB 6 ms duration	No visible damage $\lvert\Delta C/C_0\rvert \leq 2\%$ $\lvert\Delta \tan\delta\rvert \leq 0.002$ $R_{INS} \geq 50\%$ of initial limit
Climatic sequence	IEC 60384-16	Dry heat Tb / 16 h. Damp heat cyclic, 1st cycle +55 °C / 24h / 95% ... 100% RH Cold Ta / 2h Damp heat cyclic, 5 cycles +55 °C / 24h / 95% ... 100% RH	No visible damage $\lvert\Delta C/C_0\rvert \leq 3\%$ $\lvert\Delta \tan\delta\rvert \leq 0.001$ $R_{INS} \geq 50\%$ of initial limit
Damp Heat Steady State	IEC 60384-16	Test Ca 40 °C / 93% RH / 56 days	No visible damage $\lvert\Delta C/C_0\rvert \leq 3\%$ $\lvert\Delta \tan\delta\rvert \leq 0.001$ $R_{INS} \geq 50\%$ of initial limit
High temperature high humidity with load		60 °C / 95% RH / 1000 hours with $V_{R,DC}$	No visible damage $\lvert\Delta C/C_0\rvert \leq 10\%$ $\lvert\Delta \tan\delta\rvert \leq 0.002$ $R_{INS} \geq 50\%$ of initial limit



Test	Reference	Conditions of test	Performance requirements
Endurance	IEC60384-16	85 °C/ 1.25 V_R / 2000 hours	No visible damage $\lvert\Delta C/C_0\rvert \leq 5\%$ $\lvert\Delta \tan\delta\rvert \leq 0.002$ $R_{INS} \geq 50\%$ of initial limit
Endurance	IEC60384-16	110 °C/ 1.25 V_C / 2000 hours	No visible damage $\lvert\Delta C/C_0\rvert \leq 10\%$ $\lvert\Delta \tan\delta\rvert \leq 0.002$ $R_{INS} \geq 50\%$ of initial limit

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