Film Capacitors

Metallized Polyester Film Capacitors (MKT)

Series/Type: **B32520 ... B32529**

Date: September 2019

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Typical applications

- Blocking
- Coupling, decoupling
- Bypassing
- RFI for automotive

Climatic

- Max. operating temperature: 125 °C
- Climatic category (IEC 60068-1:2013): 55/125/56

Construction

- Dielectric: polyethylene terephthalate (polyester, PET)
- Stacked-film technology for lead spacing 5 to 15 mm (= code C, D or E in digit 7 of ordering code)
- Wound capacitor technology for lead spacing 10 to 37.5 mm (= code N, Q or R in digit 7 of ordering code)
- Plastic case (UL 94 V-0)
- Epoxy resin sealing (UL 94 V-0)

Features

- High pulse strength
- High contact reliability
- RoHS-compatible
- Halogen-free capacitors available on request
- AEC-Q200D compliant

Terminals

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

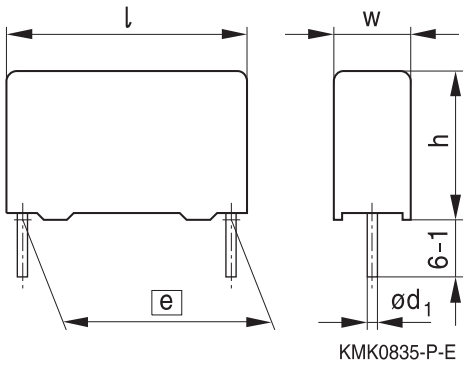
Marking

Manufacturer's logo,
rated capacitance (coded),
cap. tolerance (code letter), rated DC voltage,
date of manufacture (coded),
coded type ("1") for lead spacing 5 mm,
series and lot number for lead spacing ≥10 mm

Delivery mode

Bulk (untaped)
Taped (Ammo pack or reel)
For notes on taping, refer to chapter "Taping and packing".

Dimensional drawing



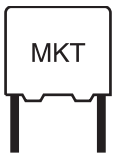
KMK0835-P-E

Dimensions in mm

Lead spacing e ±0.4	Lead diameter d_1 ±0.05	Type
5.0	0.5	B32529
7.5	0.5	B32520
10.0	0.6[1)]	B32521
15.0	0.8	B32522
22.5	0.8	B32523
27.5	0.8	B32524
37.5	1.0	B32526

1) 0.5 mm for capacitor width w = 4 mm. Exception for B32521D series.

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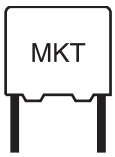


Overview of available types

Lead spacing	5.0 mm						7.5 mm				10.0 mm				
Type	B32529						B32520				B32521				
Page	6						9				10				
Technology	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s
V_R (V DC)	50	63	100	250	400	630	63	100	250	400	63	100	250	400	630
V_{RMS} (V AC)	32	40	63	160	200	400	40	63	160	200	40	63	160	200	350
C_R (µF)															
0.0010		■	■	■	■	■									
0.0015		■	■	■	■	■									
0.0022		■	■	■	■	■									
0.0033		■	■	■	■	■									
0.0047		■	■	■	■	■									
0.0068		■	■	■	■	■									
0.010		■	■	■	■	■							■	■	■
0.015		■	■	■	■	■				■			■	■	■
0.022		■	■	■	■	■				■			■	■	■
0.033		■	■	■	■	■				■			■	■	■
0.047		■	■	■	■					■		■	■	■	■
0.056													■		
0.068		■	■	■	■				■	■		■	■	■	
0.082													■		
0.10		■	■	■	■				■	■		■	■	■	
0.12													■		
0.15		■	■	■	■			■	■	■		■	■	■	
0.18													■		
0.22		■	■	■				■	■			■	■		
0.33		■	■	■				■				■	■		
0.47		■	■	■			■	■			■	■	■		
0.68		■	■				■	■			■	■			
1.0		■	■				■	■			■	■			
1.5		■					■				■				
2.2		■					■				■				
3.3	■										■				
4.7	■														

Technology: s = Stacked-film technology / w = Wound capacitor technology

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B32520 ... B32529

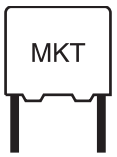
General purpose (stacked/wound)

Overview of available types

Lead spacing	15.0 mm						22.5 mm					27.5 mm				
Type	B32522						B32523					B32524				
Page	12						14					15				
Technology	s	s/w	s/w	s	w	s	w	w	w	w	w	w	w	w	w	w
V_R (V DC)	63	100	250	400	450	630	63	100	250	400	630	63	100	250	400	630
V_{RMS} (V AC)	40	63	160	200	200	350	40	63	160	200	200	40	63	160	200	220
C_R (µF)																
0.047				■		■										
0.068				■		■										
0.10			■	■	■	■					■					
0.15			■	■	■	■					■					
0.22			■	■	■	■				■	■					
0.33		■	■	■	■					■	■					■
0.39			■	■												
0.47		■	■	■	■				■	■	■					■
0.56			■	■												
0.68	■	■	■	■	■				■	■	■				■	■
1.0	■	■	■	■	■				■	■					■	■
1.5	■	■	■					■	■	■				■	■	■
2.2	■	■	■					■	■					■	■	■
3.3	■	■					■	■	■					■	■	
4.7	■	■					■	■				■	■	■	■	
6.8	■	■					■	■				■	■	■	■	
10	■						■	■				■	■	■	■	
15							■	■				■	■	■		
22							■					■	■	■		
33												■	■	■		
47												■	■			
68												■	■			
100												■				

Technology: s = Stacked-film technology / w = Wound capacitor technology

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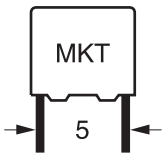


Overview of available types

Lead spacing	37.5 mm			
Type	B32526			
Page	17			
Technology	w	w	w	w
V_R (V DC)	63	100	250	400
V_{RMS} (V AC)	40	63	160	200
C_R (µF)				
3.3				
4.7				
5.6				
6.8				
8.2				
10				
15				
22				
33				
47				
56				
68				
82				
100				
150				
220				

Technology: s = Stacked-film technology / w = Wound capacitor technology

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B32529

General purpose (stacked)

Ordering codes and packing units (lead spacing 5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
50	32	3.3	7.8 × 13.0 × 7.8	B32529D5335+***	4000	3200	4000
		4.7	7.8 × 13.0 × 7.8	B32529D5475M***	4000	3200	4000
63	40	0.0010	2.5 × 6.5 × 7.3	B32529C0102+***	12800	11200	8000
		0.0015	2.5 × 6.5 × 7.3	B32529C0152+***	12800	11200	8000
		0.0022	2.5 × 6.5 × 7.3	B32529C0222+***	12800	11200	8000
		0.0033	2.5 × 6.5 × 7.3	B32529C0332+***	12800	11200	8000
		0.0047	2.5 × 6.5 × 7.3	B32529C0472+***	12800	11200	8000
		0.0068	2.5 × 6.5 × 7.3	B32529C0682+***	12800	11200	8000
		0.010	2.5 × 6.5 × 7.3	B32529C0103+***	12800	11200	8000
		0.015	2.5 × 6.5 × 7.3	B32529C0153+***	12800	11200	8000
		0.022	2.5 × 6.5 × 7.3	B32529C0223+***	12800	11200	8000
		0.033	2.5 × 6.5 × 7.3	B32529C0333+***	12800	11200	8000
		0.047	2.5 × 6.5 × 7.3	B32529C0473+***	12800	11200	8000
		0.068	2.5 × 6.5 × 7.3	B32529C0683+***	12800	11200	8000
		0.10	2.5 × 6.5 × 7.3	B32529C0104+***	12800	11200	8000
		0.15	2.5 × 6.5 × 7.3	B32529C0154+***	12800	11200	8000
		0.22	2.5 × 6.5 × 7.3	B32529C0224+***	12800	11200	8000
		0.33	3.0 × 6.5 × 7.3	B32529C0334+***	10800	9600	8000
		0.47	3.5 × 8.0 × 7.3	B32529C0474+***	9200	8000	8000
		0.68	4.5 × 9.5 × 7.3	B32529C0684+***	7200	6000	6000
		1.0	4.5 × 9.5 × 7.3	B32529C0105+***	7200	6000	6000
		1.5	6.0 × 10.5 × 7.5	B32529C0155+***	5200	4400	4000
		2.2	7.8 × 13.0 × 7.8	B32529D0225+***	4000	3200	4000
100	63	0.0010	2.5 × 6.5 × 7.3	B32529C1102+***	12800	11200	8000
		0.0015	2.5 × 6.5 × 7.3	B32529C1152+***	12800	11200	8000
		0.0022	2.5 × 6.5 × 7.3	B32529C1222+***	12800	11200	8000
		0.0033	2.5 × 6.5 × 7.3	B32529C1332+***	12800	11200	8000
		0.0047	2.5 × 6.5 × 7.3	B32529C1472+***	12800	11200	8000
		0.0068	2.5 × 6.5 × 7.3	B32529C1682+***	12800	11200	8000
		0.010	2.5 × 6.5 × 7.3	B32529C1103+***	12800	11200	8000
		0.015	2.5 × 6.5 × 7.3	B32529C1153+***	12800	11200	8000

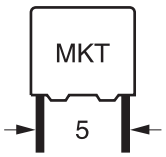
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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Ordering codes and packing units (lead spacing 5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
100	63	0.022	2.5 × 6.5 × 7.3	B32529C1223+***	12800	11200	8000
		0.033	2.5 × 6.5 × 7.3	B32529C1333+***	12800	11200	8000
		0.047	2.5 × 6.5 × 7.3	B32529C1473+***	12800	11200	8000
		0.068	2.5 × 6.5 × 7.3	B32529C1683+***	12800	11200	8000
		0.10	2.5 × 6.5 × 7.3	B32529C1104+***	12800	11200	8000
		0.15	3.0 × 6.5 × 7.3	B32529C1154+***	10800	9600	8000
		0.22	3.5 × 8.0 × 7.3	B32529C1224+***	9200	8000	8000
		0.33	3.5 × 8.0 × 7.3	B32529C1334+***	9200	8000	8000
		0.47	4.5 × 9.5 × 7.3	B32529C1474+***	7200	6000	6000
		0.68	6.0 × 10.5 × 7.5	B32529C1684+***	5200	4400	4000
		1.0	7.8 × 13.0 × 7.8	B32529D1105+***	4000	3200	4000
250	160	0.0010	2.5 × 6.5 × 7.3	B32529C3102+***	12800	11200	8000
		0.0015	2.5 × 6.5 × 7.3	B32529C3152+***	12800	11200	8000
		0.0022	2.5 × 6.5 × 7.3	B32529C3222+***	12800	11200	8000
		0.0033	2.5 × 6.5 × 7.3	B32529C3332+***	12800	11200	8000
		0.0047	2.5 × 6.5 × 7.3	B32529C3472+***	12800	11200	8000
		0.0068	2.5 × 6.5 × 7.3	B32529C3682+***	12800	11200	8000
		0.010	2.5 × 6.5 × 7.3	B32529C3103+***	12800	11200	8000
		0.015	2.5 × 6.5 × 7.3	B32529C3153+***	12800	11200	8000
		0.022	2.5 × 6.5 × 7.3	B32529C3223+***	12800	11200	8000
		0.033	3.0 × 6.5 × 7.3	B32529C3333+***	10800	9600	8000
		0.047	3.5 × 8.0 × 7.3	B32529C3473+***	9200	8000	8000
		0.068	4.5 × 9.5 × 7.3	B32529C3683+***	7200	6000	6000
		0.10	4.5 × 9.5 × 7.3	B32529C3104+***	7200	6000	6000
		0.15	5.0 × 10.0 × 7.5	B32529C3154+***	6400	5600	6000
		0.22	7.8 × 13.0 × 7.8	B32529D3224+***	4000	3200	4000
		0.33	7.8 × 13.0 × 7.8	B32529C3334+***	4000	3200	4000
		0.47	7.8 × 13.0 × 7.8	B32529C3474+***	4000	3200	4000

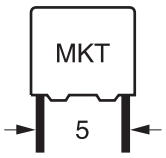
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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B32529

General purpose (stacked)

Ordering codes and packing units (lead spacing 5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
400	200	0.0010	2.5 × 6.5 × 7.3	B32529C6102+***	12800	11200	8000
		0.0015	2.5 × 6.5 × 7.3	B32529C6152+***	12800	11200	8000
		0.0022	2.5 × 6.5 × 7.3	B32529C6222+***	12800	11200	8000
		0.0033	2.5 × 6.5 × 7.3	B32529C6332+***	12800	11200	8000
		0.0047	2.5 × 6.5 × 7.3	B32529C6472+***	12800	11200	8000
		0.0068	2.5 × 6.5 × 7.3	B32529C6682+***	12800	11200	8000
		0.010	3.0 × 6.5 × 7.3	B32529E6103+***	10800	9600	8000
		0.015	3.0 × 6.5 × 7.3	B32529E6153+***	10800	9600	8000
		0.022	3.5 × 8.0 × 7.3	B32529E6223+***	9200	8000	8000
		0.033	4.5 × 9.5 × 7.3	B32529E6333+***	7200	6000	6000
		0.047	4.5 × 9.5 × 7.3	B32529E6473+***	7200	6000	6000
		0.068	6.0 × 10.5 × 7.5	B32529E6683+***	5200	4400	4000
		0.10	7.8 × 13.0 × 7.8	B32529E6104+***	4000	3200	4000
		0.15	7.8 × 13.0 × 7.8	B32529E6154+***	4000	3200	4000
630	400	0.0010	2.5 × 6.5 × 7.3	B32529C8102+***	12800	11200	8000
		0.0015	2.5 × 6.5 × 7.3	B32529C8152+***	12800	11200	8000
		0.0022	2.5 × 6.5 × 7.3	B32529C8222+***	12800	11200	8000
		0.0033	3.5 × 8.0 × 7.3	B32529C8332+***	9200	8000	8000
		0.0047	3.5 × 8.0 × 7.3	B32529C8472+***	9200	8000	8000
		0.0068	3.5 × 8.0 × 7.3	B32529C8682+***	9200	8000	8000
		0.010	5.0 × 10.0 × 7.5	B32529C8103+***	6400	5600	6000
		0.015	5.0 × 10.0 × 7.5	B32529C8153+***	6400	5600	6000
		0.022	7.8 × 13.0 × 7.8	B32529C8223+***	5200	4400	4000
		0.033	7.8 × 13.0 × 7.8	B32529C8333+***	4000	3200	4000

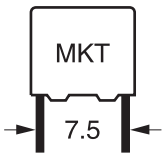
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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Ordering codes and packing units (lead spacing 7.5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
63	40	0.47	3.0 × 8.0 × 10.0	B32520C0474+***	10400	9600	8000
		0.68	4.0 × 8.5 × 10.0	B32520C0684+***	8000	7200	6000
		1.0	5.0 × 10.5 × 10.0	B32520C0105+***	6400	5600	4000
		1.5	5.0 × 10.5 × 10.0	B32520C0155+***	6400	5600	4000
		2.2	6.0 × 12.0 × 10.3	B32520C0225+***	5200	4400	3000
100	63	0.15	3.0 × 8.0 × 10.0	B32520C1154+***	10400	9600	8000
		0.22	3.0 × 8.0 × 10.0	B32520C1224+***	10400	9600	8000
		0.33	4.0 × 8.5 × 10.0	B32520C1334+***	8000	7200	6000
		0.47	5.0 × 10.5 × 10.0	B32520C1474+***	6400	5600	4000
		0.68	6.0 × 12.0 × 10.3	B32520C1684+***	5200	4400	3000
		1.0	6.0 × 12.0 × 10.3	B32520C1105+***	5200	4400	3000
250	160	0.068	3.0 × 8.0 × 10.0	B32520C3683+***	10400	9600	8000
		0.10	4.0 × 8.5 × 10.0	B32520C3104+***	8000	7200	6000
		0.15	5.0 × 10.5 × 10.0	B32520C3154+***	6400	5600	4000
		0.22	6.0 × 12.0 × 10.3	B32520C3224+***	5200	4400	3000
400	200	0.015	3.0 × 8.0 × 10.0	B32520E6153+***	10400	9600	8000
		0.022	3.0 × 8.0 × 10.0	B32520E6223+***	10400	9600	8000
		0.033	4.0 × 8.5 × 10.0	B32520E6333+***	8000	7200	6000
		0.047	4.0 × 8.5 × 10.0	B32520E6473+***	8000	7200	6000
		0.068	5.0 × 10.5 × 10.0	B32520E6683+***	6400	5600	4000
		0.10	5.0 × 10.5 × 10.0	B32520E6104+***	6400	5600	4000
		0.15	6.0 × 12.0 × 10.3	B32520E6154+***	5200	4400	3000

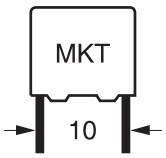
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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B32521

General purpose (stacked/wound)

Ordering codes and packing units (lead spacing 10 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
63	40	0.47	4.0 × 7.0 × 13.0	B32521C0474+***	4000	6800	4000
		0.68	4.0 × 7.0 × 13.0	B32521C0684+***	4000	6800	4000
		1.0	4.0 × 9.0 × 13.0	B32521C0105+***	4000	6800	4000
		1.5	5.0 × 11.0 × 13.0	B32521C0155+***	3320	5200	4000
		2.2	5.0 × 11.0 × 13.0	B32521C0225+***	3320	5200	4000
		3.3	6.0 × 12.0 × 13.0	B32521C0335+***	2720	4400	4000
100	63	0.047	4.0 × 7.0 × 13.0	B32521C1473+***	4000	6800	4000
		0.068	4.0 × 7.0 × 13.0	B32521C1683+***	4000	6800	4000
		0.10	4.0 × 7.0 × 13.0	B32521C1104+***	4000	6800	4000
		0.15	4.0 × 7.0 × 13.0	B32521C1154+***	4000	6800	4000
		0.22	4.0 × 7.0 × 13.0	B32521C1224+***	4000	6800	4000
		0.33	4.0 × 7.0 × 13.0	B32521C1334+***	4000	6800	4000
		0.47	4.0 × 9.0 × 13.0	B32521C1474+***	4000	6800	4000
		0.68	5.0 × 11.0 × 13.0	B32521C1684+***	3320	5200	4000
		1.0	6.0 × 12.0 × 13.0	B32521C1105+***	2720	4400	4000
250	160	0.010	4.0 × 7.0 × 13.0	B32521C3103+***	4000	6800	4000
		0.015	4.0 × 7.0 × 13.0	B32521C3153+***	4000	6800	4000
		0.022	4.0 × 7.0 × 13.0	B32521C3223+***	4000	6800	4000
		0.033	4.0 × 7.0 × 13.0	B32521C3333+***	4000	6800	4000
		0.047	4.0 × 7.0 × 13.0	B32521C3473+***	4000	6800	4000
		0.056	4.0 × 7.0 × 13.0	B32521C3563+***	4000	6800	4000
		0.068	4.0 × 7.0 × 13.0	B32521C3683+***	4000	6800	4000
		0.082	4.0 × 7.0 × 13.0	B32521C3823+***	4000	6800	4000
		0.10	4.0 × 7.0 × 13.0	B32521C3104+***	4000	6800	4000
		0.12	4.0 × 9.0 × 13.0	B32521C3124+***	4000	6800	4000
		0.15	4.0 × 9.0 × 13.0	B32521C3154+***	4000	6800	4000
		0.18	5.0 × 11.0 × 13.0	B32521C3184+***	3320	5200	4000
		0.22	5.0 × 11.0 × 13.0	B32521C3224+***	3320	5200	4000
		0.33	5.0 × 11.0 × 13.0	B32521C3334+***	3320	5200	4000
		0.47	6.0 × 12.0 × 13.0	B32521C3474+***	2720	4400	4000

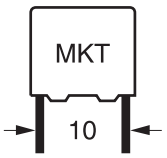
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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Ordering codes and packing units (lead spacing 10 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
400	200	0.010	4.0 × 7.0 × 13.0	B32521E6103+***	4000	6800	4000
		0.015	4.0 × 7.0 × 13.0	B32521E6153+***	4000	6800	4000
		0.022	4.0 × 7.0 × 13.0	B32521E6223+***	4000	6800	4000
		0.033	4.0 × 7.0 × 13.0	B32521E6333+***	4000	6800	4000
		0.047	4.0 × 9.0 × 13.0	B32521E6473+***	4000	6800	4000
		0.068	4.0 × 9.0 × 13.0	B32521E6683+***	4000	6800	4000
		0.10	5.0 × 11.0 × 13.0	B32521E6104+***	3320	5200	4000
		0.15	6.0 × 12.0 × 13.0	B32521E6154+***	2720	4400	4000
630	350	0.010	4.0 × 7.0 × 13.0	B32521D8103+***	–	6800	4000
		0.015	4.0 × 9.0 × 13.0	B32521D8153+***	–	6800	4000
		0.022	5.0 × 11.0 × 13.0	B32521D8223+***	–	5200	4000
		0.033	5.0 × 11.0 × 13.0	B32521D8333+***	–	5200	4000
		0.047	6.0 × 12.0 × 13.0	B32521D8473+***	–	4400	4000

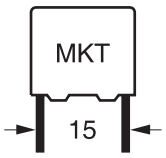
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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B32522

General purpose (stacked/wound)

Ordering codes and packing units (lead spacing 15 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF		Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./ MOQ	Untaped pcs./ MOQ
63	40	0.68		5.0 × 10.5 × 18.0	B32522C0684+***	4680	5200	4000
		1.0		5.0 × 10.5 × 18.0	B32522C0105+***	4680	5200	4000
		1.5		5.0 × 10.5 × 18.0	B32522C0155+***	4680	5200	4000
		2.2		5.0 × 10.5 × 18.0	B32522C0225+***	4680	5200	4000
		3.3		6.0 × 11.0 × 18.0	B32522C0335+***	3840	4400	4000
		4.7		7.0 × 12.5 × 18.0	B32522C0475+***	3320	3600	4000
		6.8		8.5 × 14.5 × 18.0	B32522C0685+***	2720	2800	2000
		10		9.0 × 17.5 × 18.0	B32522C0106+***	2560	2800	2000
100	63	0.33		5.0 × 10.5 × 18.0	B32522C1334+***	4680	5200	4000
		0.47		5.0 × 10.5 × 18.0	B32522C1474+***	4680	5200	4000
		0.68		5.0 × 10.5 × 18.0	B32522C1684+***	4680	5200	4000
		1.0		5.0 × 10.5 × 18.0	B32522C1105+***	4680	5200	4000
		1.0	∇	6.0 × 11.0 × 18.0	B32522Q1105+***	3840	4400	4000
		1.5		6.0 × 11.0 × 18.0	B32522C1155+***	3840	4400	4000
		1.5	∇	7.0 × 12.5 × 18.0	B32522Q1155+***	3320	3600	4000
		2.2		7.0 × 12.5 × 18.0	B32522C1225+***	3320	3600	4000
		2.2	∇	8.5 × 14.5 × 18.0	B32522Q1225+***	2720	2800	2000
		3.3		8.5 × 14.5 × 18.0	B32522C1335+***	2720	2800	2000
		3.3	∇	9.0 × 17.5 × 18.0	B32522Q1335+***	2560	2800	2000
		4.7		9.0 × 17.5 × 18.0	B32522C1475+***	2560	2800	2000
		4.7	∇	11.0 × 18.5 × 18.0	B32522Q1475+***	–	2200	1200
		6.8		11.0 × 18.5 × 18.0	B32522C1685+***	–	–	1200
250	160	0.10		5.0 × 10.5 × 18.0	B32522C3104+***	4680	5200	4000
		0.15		5.0 × 10.5 × 18.0	B32522C3154+***	4680	5200	4000
		0.22		5.0 × 10.5 × 18.0	B32522C3224+***	4680	5200	4000
		0.33		5.0 × 10.5 × 18.0	B32522C3334+***	4680	5200	4000
		0.39		5.0 × 10.5 × 18.0	B32522C3394+***	4680	5200	4000
		0.47		6.0 × 11.0 × 18.0	B32522C3474+***	3840	4400	4000
		0.56		7.0 × 12.5 × 18.0	B32522C3564+***	3320	3600	4000

∇ Wound capacitor technology

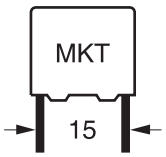
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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Ordering codes and packing units (lead spacing 15 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./ MOQ	Untaped pcs./ MOQ
250	160	0.68	7.0 × 12.5 × 18.0	B32522C3684+***	3320	3600	4000
		1.0	8.5 × 14.5 × 18.0	B32522C3105+***	2720	2800	2000
		1.0 ∇	8.5 × 14.5 × 18.0	B32522N3105+***	2720	2800	2000
		1.5	9.0 × 17.5 × 18.0	B32522C3155+***	2560	2800	2000
		1.5 ∇	9.0 × 17.5 × 18.0	B32522N3155+***	2560	2800	2000
		2.2	11.0 × 18.5 × 18.0	B32522C3225+***	–	–	1200
400	200	0.047	5.0 × 10.5 × 18.0	B32522E6473+***	4680	5200	4000
		0.068	5.0 × 10.5 × 18.0	B32522E6683+***	4680	5200	4000
		0.10	5.0 × 10.5 × 18.0	B32522E6104+***	4680	5200	4000
		0.15	5.0 × 10.5 × 18.0	B32522E6154+***	4680	5200	4000
		0.22	6.0 × 11.0 × 18.0	B32522E6224+***	3840	4400	4000
		0.33	7.0 × 12.5 × 18.0	B32522E6334+***	3320	3600	4000
		0.39	9.0 × 17.5 × 18.0	B32522E6394+***	2560	2800	2000
		0.47	9.0 × 17.5 × 18.0	B32522E6474+***	2560	2800	2000
		0.56	9.0 × 17.5 × 18.0	B32522E6564+***	2560	2800	2000
		0.68	9.0 × 17.5 × 18.0	B32522E6684+***	2560	2800	2000
		1.0	11.0 × 18.5 × 18.0	B32522E6105+***	–	–	1200
450	200	0.10 ∇	5.0 × 10.5 × 18.0	B32522N6104+***	4680	5200	4000
		0.15 ∇	5.0 × 10.5 × 18.0	B32522N6154+***	4680	5200	4000
		0.22 ∇	6.0 × 11.0 × 18.0	B32522N6224+***	3840	4400	4000
		0.33 ∇	7.0 × 12.5 × 18.0	B32522N6334+***	3320	3600	4000
		0.47 ∇	8.5 × 14.5 × 18.0	B32522N6474+***	2720	2800	2000
		0.68 ∇	9.0 × 17.5 × 18.0	B32522N6684+***	2560	2800	2000
		1.0 ∇	11.0 × 18.5 × 18.0	B32522N6105+***	–	2200	1200
630	350	0.047	5.0 × 10.5 × 18.0	B32522D8473+***	–	5200	4000
		0.068	6.0 × 11.0 × 18.0	B32522D8683+***	–	4400	4000
		0.10	7.0 × 12.5 × 18.0	B32522D8104+***	–	3600	4000
		0.15	8.5 × 14.5 × 18.0	B32522D8154+***	–	2800	2000
		0.22	9.0 × 17.5 × 18.0	B32522D8224+***	–	2800	2000

∇ Wound capacitor technology

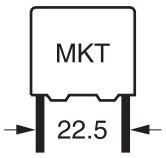
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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B32523

General purpose (wound)

Ordering codes and packing units (lead spacing 22.5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
63	40	3.3	6.0 × 15.0 × 26.5	B32523R0335+***	2720	2800	2880
		4.7	6.0 × 15.0 × 26.5	B32523R0475+***	2720	2800	2880
		6.8	6.0 × 15.0 × 26.5	B32523R0685+***	2720	2800	2880
		10	7.0 × 16.0 × 26.5	B32523R0106+***	2320	2400	2520
		15	10.5 × 16.5 × 26.5	B32523R0156+***	1560	1600	2160
		22	12.0 × 22.0 × 26.5	B32523R0226+***	–	–	1800
100	63	1.5	6.0 × 15.0 × 26.5	B32523Q1155+***	2720	2800	2880
		2.2	6.0 × 15.0 × 26.5	B32523Q1225+***	2720	2800	2880
		3.3	6.0 × 15.0 × 26.5	B32523Q1335+***	2720	2800	2880
		4.7	7.0 × 16.0 × 26.5	B32523Q1475+***	2320	2400	2520
		6.8	8.5 × 16.5 × 26.5	B32523Q1685+***	1960	2000	2040
		10	10.5 × 18.5 × 26.5	B32523Q1106+***	1560	1600	2160
		15	12.0 × 22.0 × 26.5	B32523Q1156+***	–	–	1800
250	160	0.47	6.0 × 15.0 × 26.5	B32523Q3474+***	2720	2800	2880
		0.68	6.0 × 15.0 × 26.5	B32523Q3684+***	2720	2800	2880
		1.0	6.0 × 15.0 × 26.5	B32523Q3105+***	2720	2800	2880
		1.5	7.0 × 16.0 × 26.5	B32523Q3155+***	2320	2400	2520
		2.2	10.5 × 16.5 × 26.5	B32523Q3225+***	1560	1600	2160
		3.3	11.0 × 20.5 × 26.5	B32523Q3335+***	1480	1400	2040
400	200	0.22	6.0 × 15.0 × 26.5	B32523Q6224+***	2720	2800	2880
		0.33	6.0 × 15.0 × 26.5	B32523Q6334+***	2720	2800	2880
		0.47	7.0 × 16.0 × 26.5	B32523Q6474+***	2320	2400	2520
		0.68	8.5 × 16.5 × 26.5	B32523Q6684+***	1920	2000	2040
		1.0	10.5 × 16.5 × 26.5	B32523Q6105+***	1560	1600	2160
		1.5	11.0 × 20.5 × 26.5	B32523Q6155+***	1480	1400	2040
630	200	0.10	6.0 × 15.0 × 26.5	B32523Q8104+***	2720	2800	2880
		0.15	6.0 × 15.0 × 26.5	B32523Q8154+***	2720	2800	2880
		0.22	7.0 × 16.0 × 26.5	B32523Q8224+***	2320	2400	2520
		0.33	10.5 × 16.5 × 26.5	B32523Q8334+***	1560	1600	2160
		0.47	10.5 × 20.5 × 26.5	B32523Q8474+***	1560	1600	2160
		0.68	12.0 × 22.0 × 26.5	B32523Q8684+***	–	–	1800

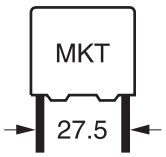
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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Ordering codes and packing units (lead spacing 27.5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
63	40	4.7	11.0 × 21.0 × 31.5	B32524R0475+***	–	1400	1280
		6.8	11.0 × 21.0 × 31.5	B32524Q0685+***	–	1400	1280
		10	11.0 × 21.0 × 31.5	B32524R0106+***	–	1400	1280
		15	11.0 × 21.0 × 31.5	B32524R0156+***	–	1400	1280
		22	11.0 × 21.0 × 31.5	B32524R0226+***	–	1400	1280
		33	12.5 × 21.5 × 31.5	B32524R0336+***	–	1200	1120
		47	18.0 × 27.5 × 31.5	B32524R0476+***	–	–	800
		68	18.0 × 27.5 × 31.5	B32524R0686+***	–	–	800
		100	22.0 × 36.5 × 31.5	B32524R0107+***	–	–	640
100	63	4.7	11.0 × 21.0 × 31.5	B32524Q1475+***	–	1400	1280
		6.8	11.0 × 21.0 × 31.5	B32524Q1685+***	–	1400	1280
		10	11.0 × 21.0 × 31.5	B32524Q1106+***	–	1400	1280
		15	11.0 × 21.0 × 31.5	B32524Q1156+***	–	1400	1280
		22	14.0 × 24.5 × 31.5	B32524Q1226+***	–	1000	1040
		33	18.0 × 27.5 × 31.5	B32524Q1336+***	–	–	800
		47	21.0 × 31.0 × 31.5	B32524Q1476+***	–	–	720
		68	22.0 × 36.5 × 31.5	B32524Q1686+***	–	–	640
250	160	1.5	11.0 × 21.0 × 31.5	B32524Q3155+***	–	1400	1280
		2.2	11.0 × 21.0 × 31.5	B32524Q3225+***	–	1400	1280
		3.3	11.0 × 21.0 × 31.5	B32524Q3335+***	–	1400	1280
		4.7	11.0 × 21.0 × 31.5	B32524Q3475+***	–	1400	1280
		6.8	11.0 × 21.0 × 31.5	B32524R3685+***	–	1400	1280
		10	12.5 × 21.5 × 31.5	B32524R3106+***	–	1200	1120
		15	15.0 × 24.5 × 31.5	B32524R3156M***	–	–	960
		15	18.0 × 27.5 × 31.5	B32524R3156J***	–	–	960
		15	18.0 × 27.5 × 31.5	B32524R3156K***	–	–	960
		22	19.0 × 30.0 × 31.5	B32524R3226+***	–	–	720
		33	22.0 × 36.5 × 31.5	B32524R3336+***	–	–	640

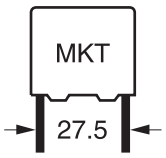
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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B32524

General purpose (wound)

Ordering codes and packing units (lead spacing 27.5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
400	200	0.68	11.0 × 19.0 × 31.5	B32524Q6684+***	–	1400	1280
		1.0	11.0 × 19.0 × 31.5	B32524Q6105+***	–	1400	1280
		1.5	11.0 × 19.0 × 31.5	B32524Q6155+***	–	1400	1280
		2.2	11.0 × 21.0 × 31.5	B32524R6225+***	–	1400	1280
		3.3	14.0 × 24.5 × 31.5	B32524R6335+***	–	1000	1040
		4.7	14.0 × 24.5 × 31.5	B32524R6475+***	–	1000	1040
		6.8	18.0 × 27.5 × 31.5	B32524R6685+***	–	–	800
		10	22.0 × 36.5 × 31.5	B32524R6106+***	–	–	640
630	220	0.33	11.0 × 21.0 × 31.5	B32524Q8334+***	–	1400	1280
		0.47	11.0 × 21.0 × 31.5	B32524Q8474+***	–	1400	1280
		0.68	11.0 × 21.0 × 31.5	B32524Q8684+***	–	1400	1280
		1.0	14.0 × 24.5 × 31.5	B32524Q8105+***	–	1000	1040
		1.5	18.0 × 27.5 × 31.5	B32524Q8155+***	–	–	800
		2.2	21.0 × 31.0 × 31.5	B32524Q8225+***	–	–	720

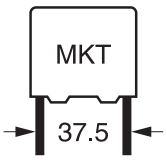
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (standard lead length 6 −1 mm)

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Ordering codes and packing units (lead spacing 37.5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
63	40	22	12.0 × 22.0 × 41.5	B32526R0226+***	–	–	1620
		33	12.0 × 22.0 × 41.5	B32526R0336+***	–	–	1620
		47	12.0 × 22.0 × 41.5	B32526R0476+***	–	–	1620
		56	24.0 × 15.0 × 41.5	B32526T0566+***	–	–	1040
		68	16.0 × 28.5 × 41.5	B32526R0686+***	–	–	800
		82	24.0 × 19.0 × 41.5	B32526T0826+***	–	–	780
		100	18.0 × 32.5 × 41.5	B32526R0107+***	–	–	720
		150	20.0 × 39.5 × 42.0	B32526R0157+***	–	–	640
		220	28.0 × 42.5 × 42.0	B32526R0227A***	–	–	440
100	63	15	12.0 × 22.0 × 41.5	B32526R1156+***	–	–	1620
		22	12.0 × 22.0 × 41.5	B32526R1226+***	–	–	1620
		33	14.0 × 25.0 × 41.5	B32526R1336+***	–	–	1380
		33	24.0 × 15.0 × 41.5	B32526T1336+***	–	–	1040
		47	16.0 × 28.5 × 41.5	B32526R1476+***	–	–	800
		47	24.0 × 19.0 × 41.5	B32526T1476+***	–	–	780
		68	18.0 × 32.5 × 41.5	B32526R1686+***	–	–	720
		100	20.0 × 39.5 × 42.0	B32526R1107+***	–	–	640
		150	28.0 × 42.5 × 42.0	B32526R1157+***	–	–	440
250	160	4.7	12.0 × 22.0 × 41.5	B32526R3475+***	–	–	1620
		6.8	12.0 × 22.0 × 41.5	B32526R3685+***	–	–	1620
		10	12.0 × 22.0 × 41.5	B32526R3106+***	–	–	1620
		15	14.0 × 25.0 × 41.5	B32526R3156+***	–	–	1380
		15	24.0 × 15.0 × 41.5	B32526T3156+***	–	–	1040
		22	16.0 × 28.5 × 41.5	B32526R3226+***	–	–	800
		22	24.0 × 19.0 × 41.5	B32526T3226+***	–	–	780
		33	20.0 × 39.5 × 42.0	B32526R3336+***	–	–	640
		47	20.0 × 39.5 × 42.0	B32526R3476+***	–	–	640
		68	28.0 × 42.5 × 42.0	B32526R3686+***	–	–	440

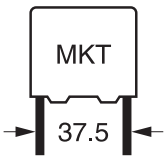
MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
M = ±20%
K = ±10%
J = ±5%
A = −15 ... +5% (220 µF type only)

*** = Packaging code:
000 = Untaped (standard lead length 6 −1 mm)

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General purpose (wound)

Ordering codes and packing units (lead spacing 37.5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./MOQ	Untaped pcs./MOQ
400	200	3.3	12.0 × 22.0 × 41.5	B32526R6335+***	–	–	1620
		4.7	12.0 × 22.0 × 41.5	B32526R6475+***	–	–	1620
		5.6	24.0 × 15.0 × 41.5	B32526T6565+***	–	–	1040
		6.8	14.0 × 25.0 × 41.5	B32526R6685+***	–	–	1380
		8.2	24.0 × 19.0 × 41.5	B32526T6825+***	–	–	780
		10	18.0 × 32.5 × 41.5	B32526R6106+***	–	–	720
		15	20.0 × 39.5 × 42.0	B32526R6156+***	–	–	640
		22	28.0 × 42.5 × 42.0	B32526R6226+***	–	–	440

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

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%
- A = −15 ... +5% (220 µF type only)

*** = Packaging code:
- 000 = Untaped (standard lead length 6 −1 mm)

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Technical data

Reference standard: IEC 60384-2:2005. AEC-Q200D compliance on request. All data given at T = 20 °C, unless otherwise specified.

Rated temperature T_R	+85 °C			
Operating temperature range	Max. operating temperature $T_{op,max}$	+125 °C		
	Upper category temperature T_{max}	+125 °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	$C_R \leq 0.1$ µF	0.1 µF < $C_R \leq 1$ µF	$C_R > 1$ µF
	1 kHz	8	8	10
	10 kHz	15	15	–
	100 kHz	30	–	–
Insulation resistance R_{ins} or time constant $\tau = C_R \cdot R_{ins}$ at 20 °C, rel. humidity ≤ 65% (minimum as-delivered values)	V_R	$C_R \leq 0.33$ µF	$C_R > 0.33$ µF	
	≤ 100 V DC	3750 MΩ	1250 s	
	≥ 250 V DC	7500 MΩ	2500 s	
DC test voltage	1.4 · V_R, 2 s			
Category voltage V_C (continuous operation with V_{DC} or V_{AC} at f ≤ 60 Hz)	T_{op} (°C)	DC voltage derating	AC voltage derating	
	$T_{op} \leq 85$	$V_C = V_R$	$V_{C,RMS} = V_{RMS}$	
	$85 < T_{op} \leq 125$	$V_C = V_R \cdot (165 - T_{op})/80$	$V_{C,RMS} = V_{RMS} \cdot (165 - T_{op})/80$	
Operating voltage V_{op} for short operating periods (V_{DC} or V_{AC} at f ≤ 60 Hz)	T_{op} (°C)	DC voltage (max. hours)	AC voltage (max. hours)	
	$T_{op} \leq 100$	$V_{op} = 1.25 \cdot V_C$ (2000 h)	$V_{op} = 1.0 \cdot V_{C,RMS}$ (2000 h)	
	$100 < T_{op} \leq 125$	$V_{op} = 1.25 \cdot V_C$ (1000 h)	$V_{op} = 1.0 \cdot V_{C,RMS}$ (1000 h)	
Biased humidity	1000 h / 40 °C / 93% relative humidity with $V_{R,DC}$			
Limit value after biased humidity test	Capacitance change $\lvert\Delta C/C\rvert$	≤ 5%		
	Dissipation factor change Δ tan δ	≤ 5 · 10^{-3} (at 1 kHz)		
	Insulation resistance R_{ins} or time constant $\tau = C_R \cdot R_{ins}$	≥ 50% of minimum as-delivered values		
Reliability:				
Failure rate λ	1 fit (≤ 1 · 10^{-9}/h) at 0.5 · V_R, 40 °C			
Service life t_{SL}	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	Short circuit or open circuit			
Failure due to variation of parameters	Capacitance change $\lvert\Delta C/C\rvert$	> 10%		
	Dissipation factor tan δ	> 2 · upper limit value		
	Insulation resistance R_{ins}	< 150 MΩ ($C_R \leq 0.33$ µF)		
	or time constant $\tau = C_R \cdot R_{ins}$	< 50 s ($C_R > 0.33$ µF)		

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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.

dV/dt values

Lead spacing		5 mm	7.5 mm	10 mm		15 mm		22.5 mm	27.5 mm	37.5 mm
Technology		S	S	S	W	S	W	W	W	W
V_R V DC	V_{RMS} V AC	dV/dt in V/µs								
50	32	200	–	–	–	–	–	–	–	–
63	40	250	120	50	–	30	–	3	1	0.8
100	63	300	150	75	–	50	5	4	3	1
250	160	400	200	150	–	100	10	8	5	4
400	200	600	275	175	–	125	–	10	8.5	6
450	200	–	–	–	–	–	20	–	–	–
630	400	800	–	320	–	150	–	15	12	–

S = Stacked, W = Wound

k_0 values

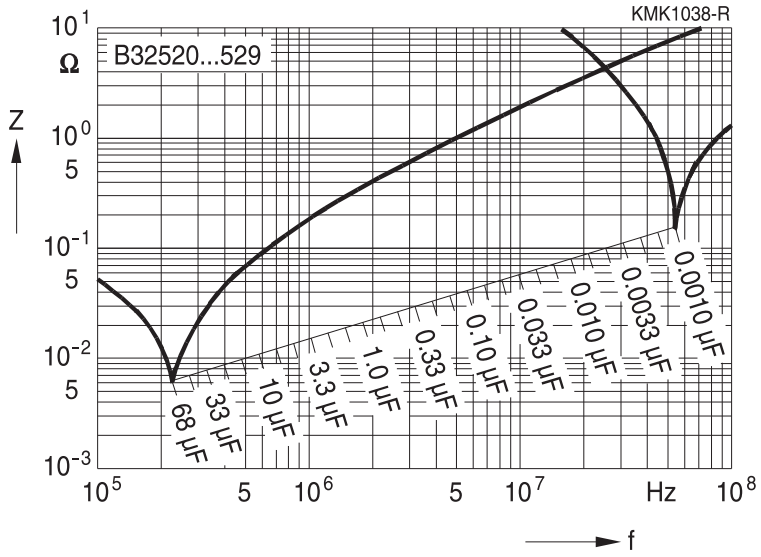
Lead spacing		5 mm	7.5 mm	10 mm		15 mm		22.5 mm	27.5 mm	37.5 mm
Technology		S	S	S	W	S	W	W	W	W
V_R V DC	V_{RMS} V AC	k_0 in $V^2/\mu s$								
50	32	20000	–	–	–	–	–	–	–	–
63	40	30000	15000	6300	–	3800	–	375	130	100
100	63	60000	30000	15000	–	10000	850	800	600	200
250	160	200000	100000	75000	–	50000	5000	4000	2500	2000
400	200	500000	220000	140000	–	100000	–	10000	8500	6000
450	200	–	–	–	–	–	15000	–	–	–
630	400	1000000	–	400000	–	190000	–	18000	15000	–

S = Stacked, W = Wound

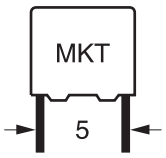
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Impedance Z versus frequency f

(typical values)



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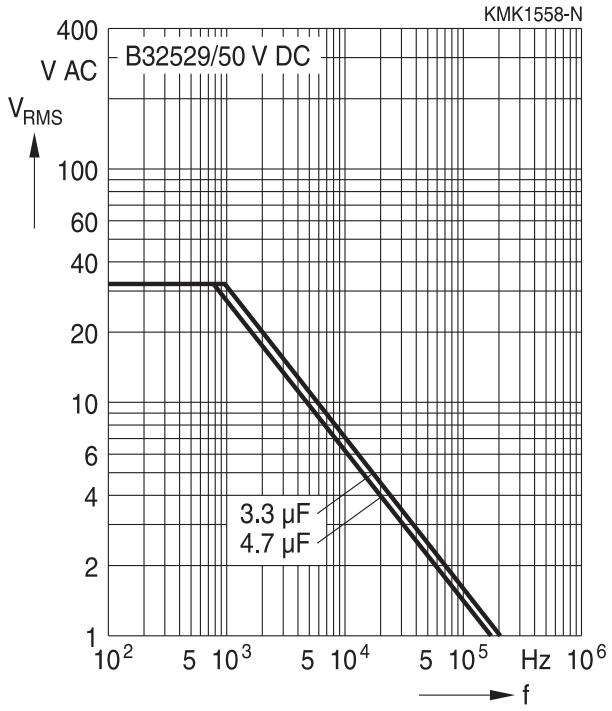
General purpose (stacked)

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

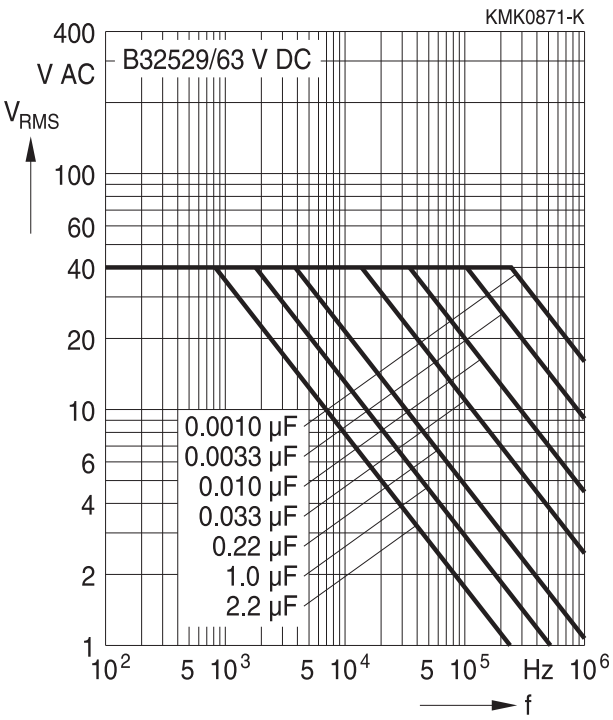
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 5 mm

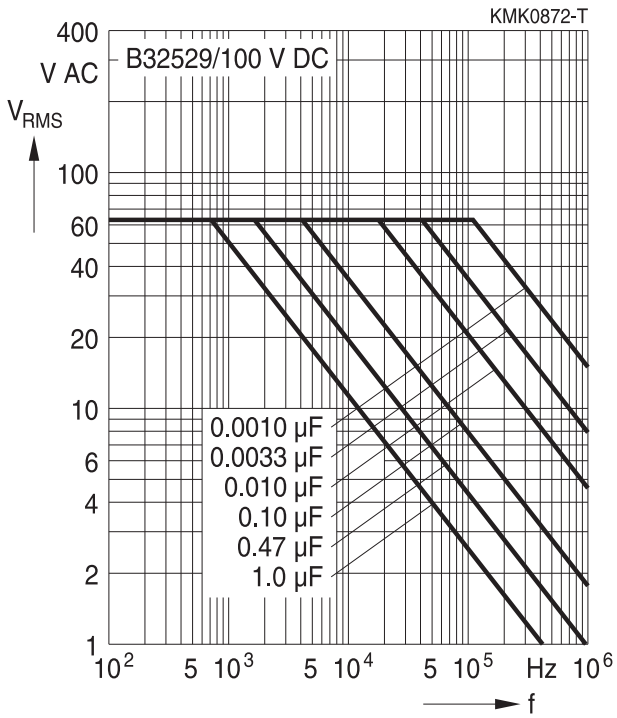
50 V DC/32 V AC



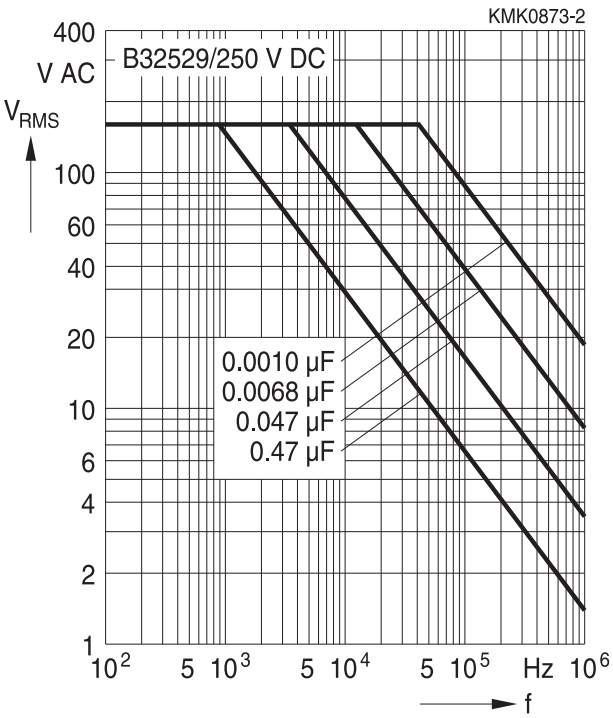
63 V DC/40 V AC



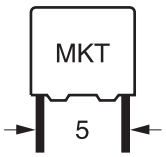
100 V DC/63 V AC



250 V DC/160 V AC



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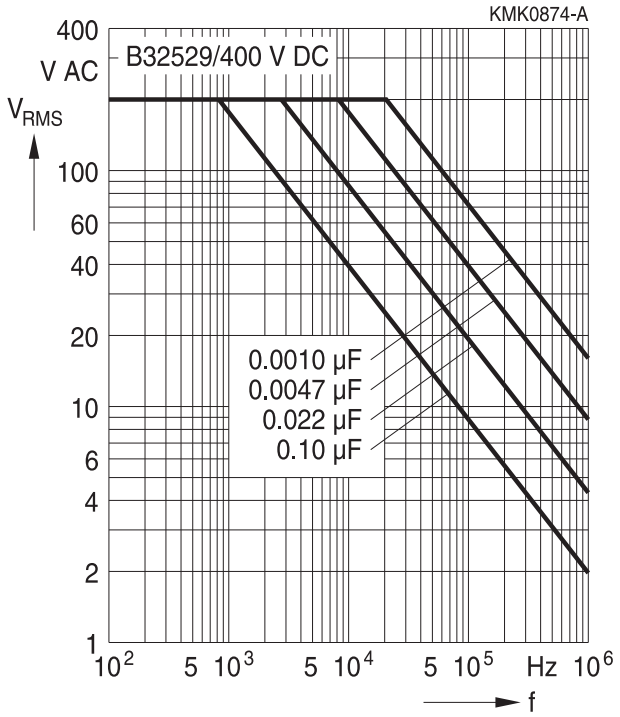


Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

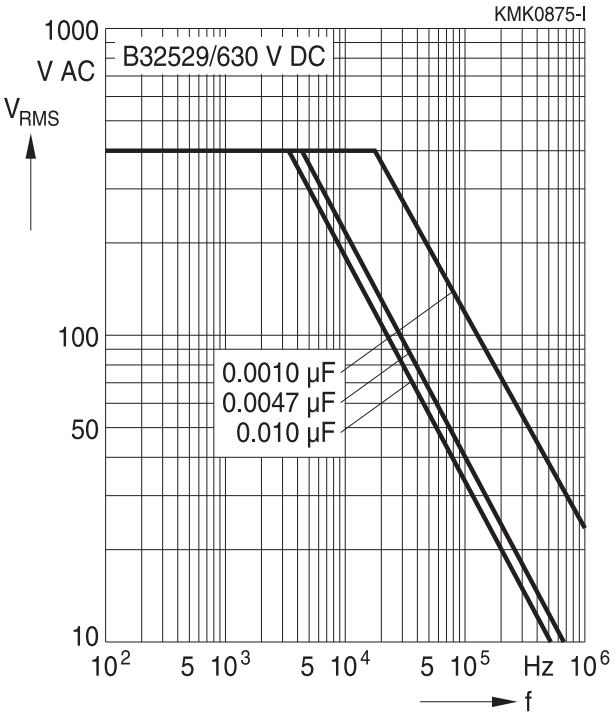
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 5 mm

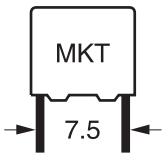
400 V DC/200 V AC



630 V DC/400 V AC



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B32520

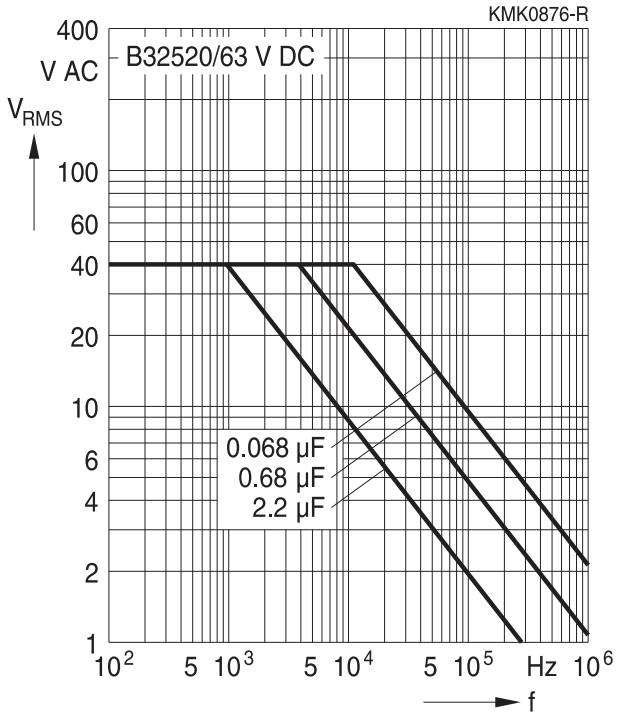
General purpose (stacked)

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

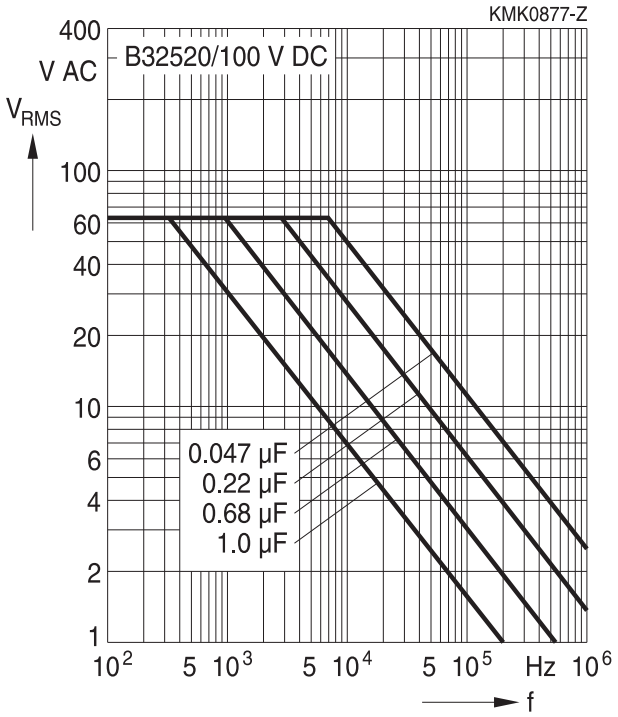
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 7.5 mm

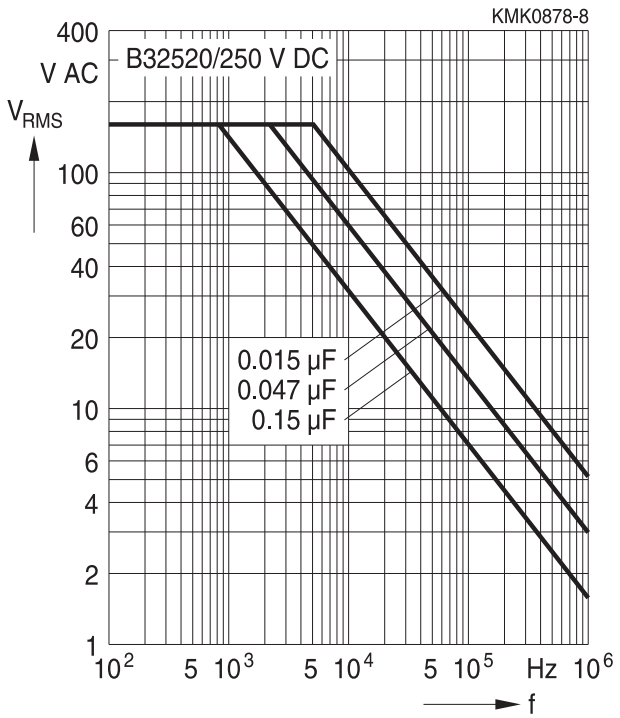
63 V DC/40 V AC



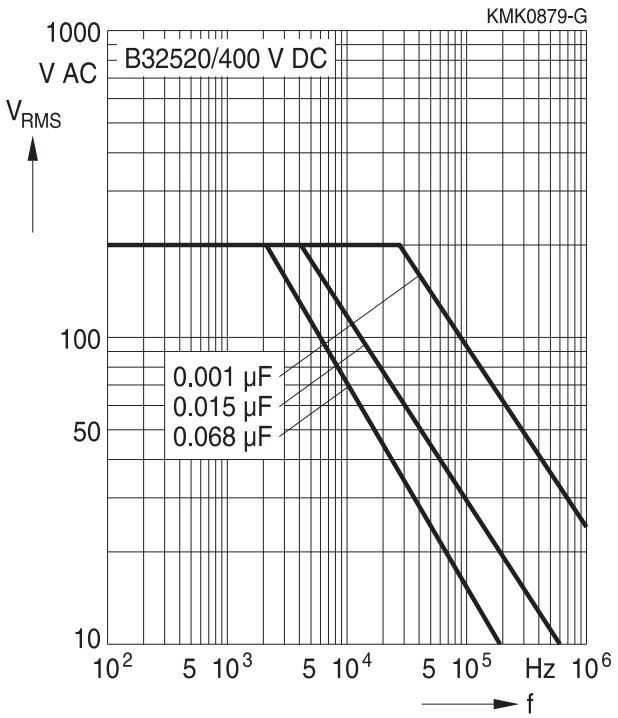
100 V DC/63 V AC



250 V DC/160 V AC



400 V DC/200 V AC



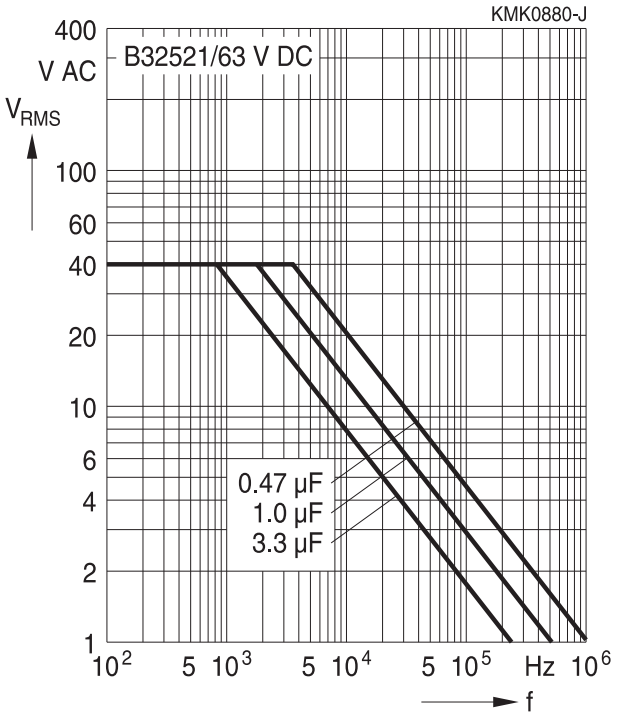
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Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

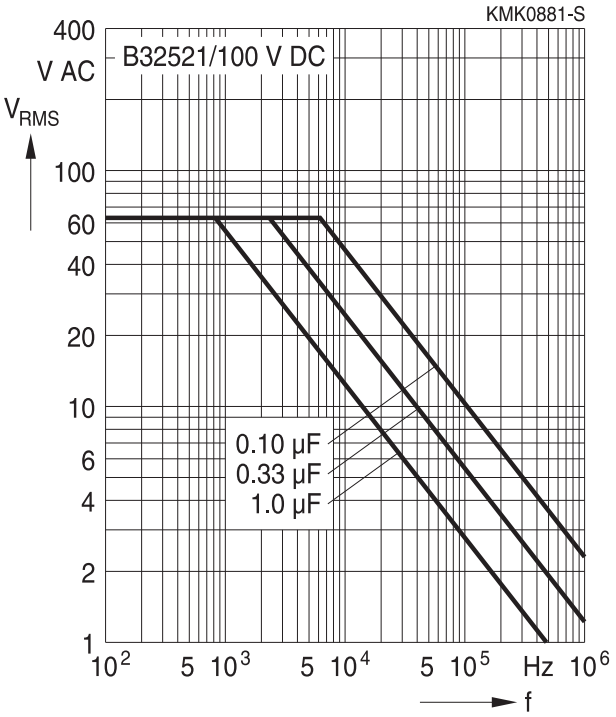
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 10 mm

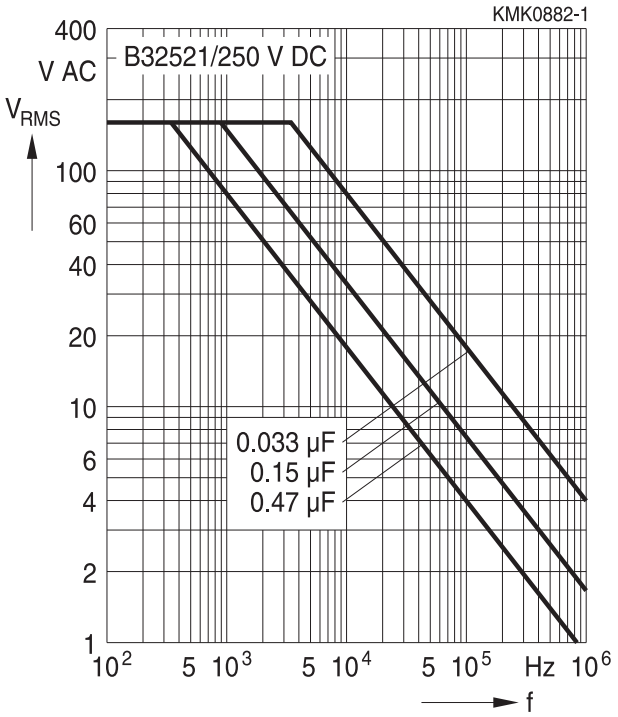
63 V DC/40 V AC



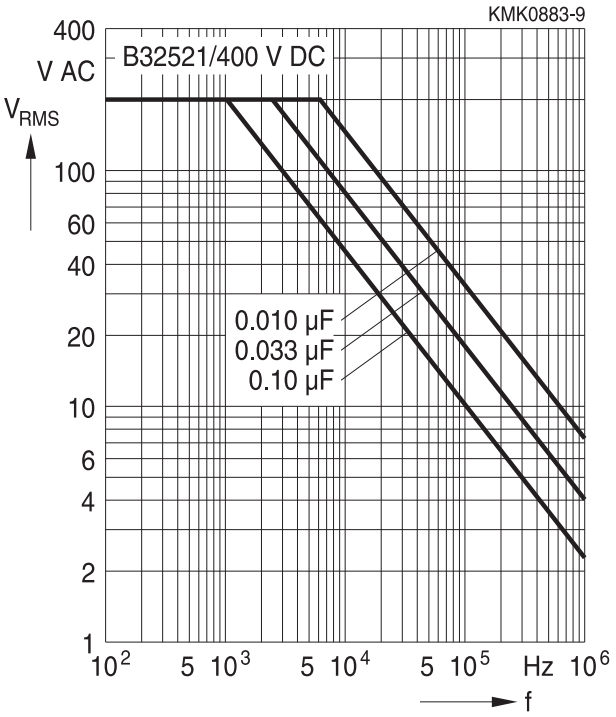
100 V DC/63 V AC



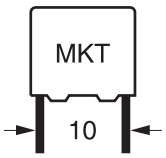
250 V DC/160 V AC



400 V DC/200 V AC



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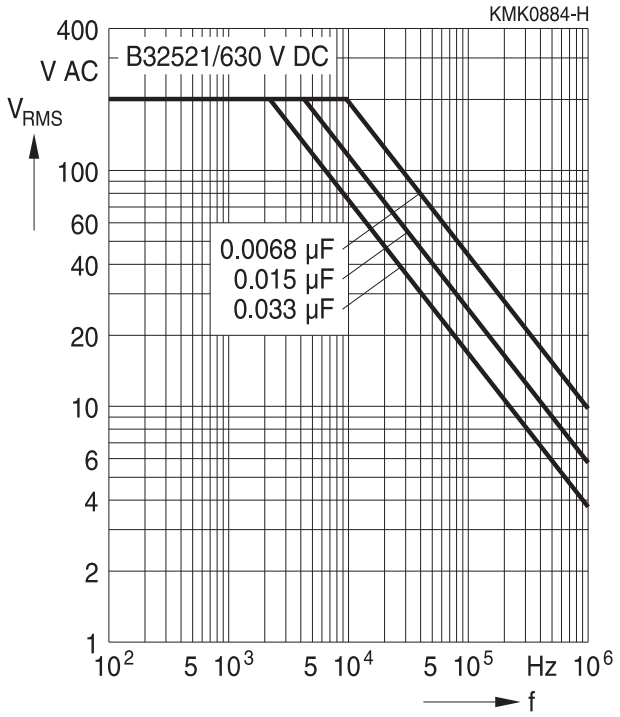


Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 10 mm

630 V DC/200 V AC



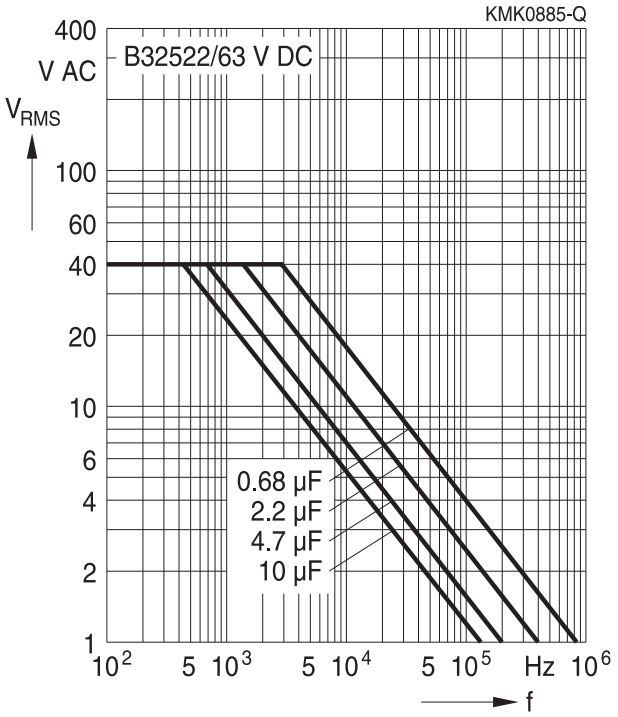
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Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

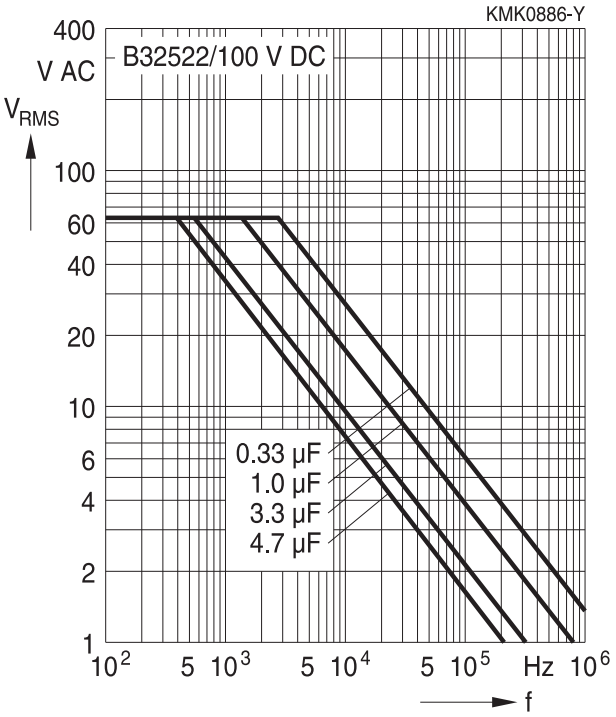
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 15 mm

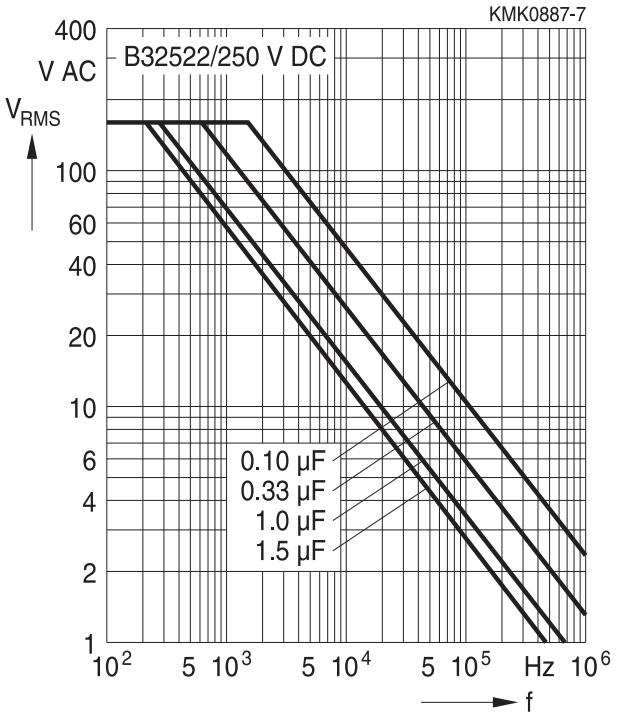
63 V DC/40 V AC



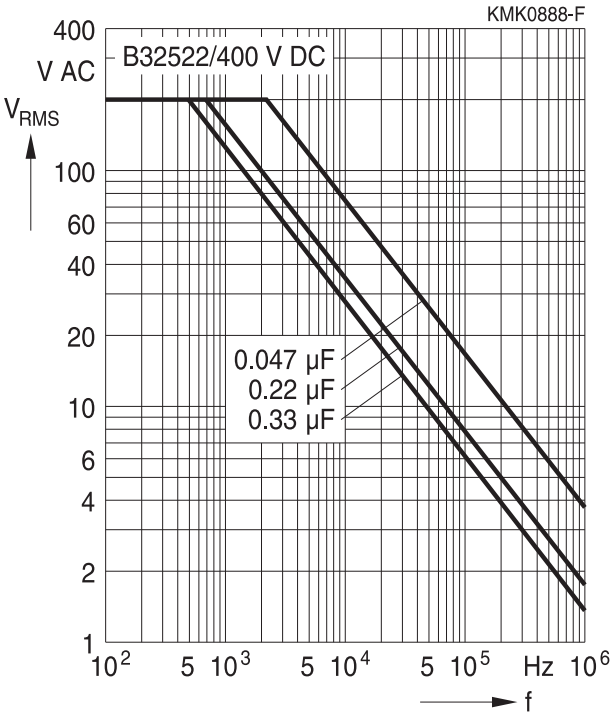
100 V DC/63 V AC



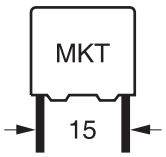
250 V DC/160 V AC



400 V DC/200 V AC



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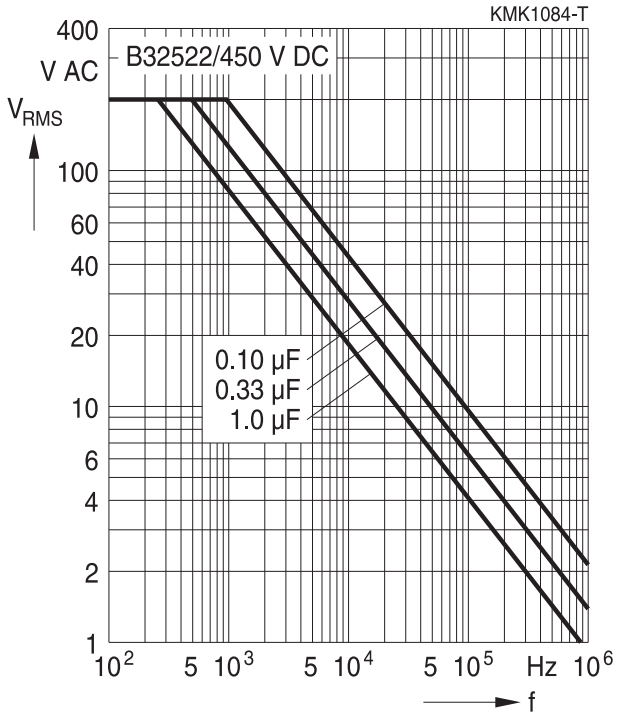
General purpose (stacked/wound)

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

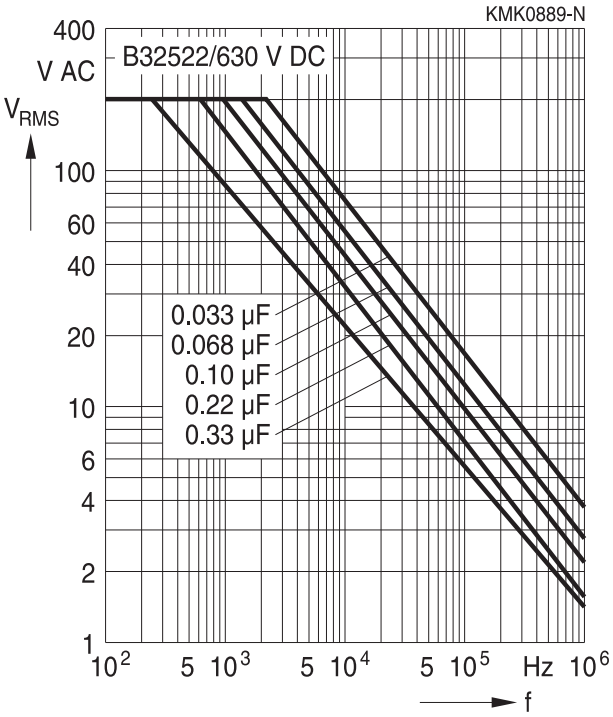
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 15 mm

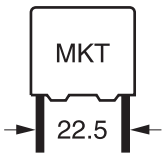
450 V DC/200 V AC



630 V DC/200 V AC



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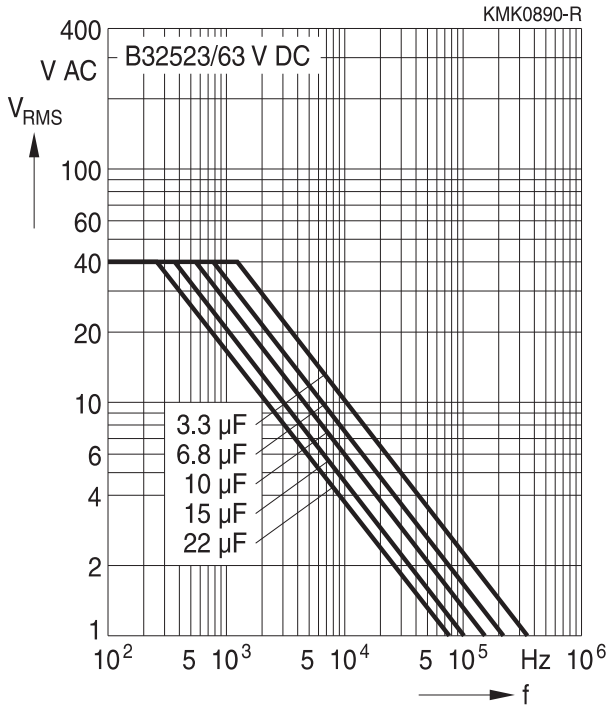


Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

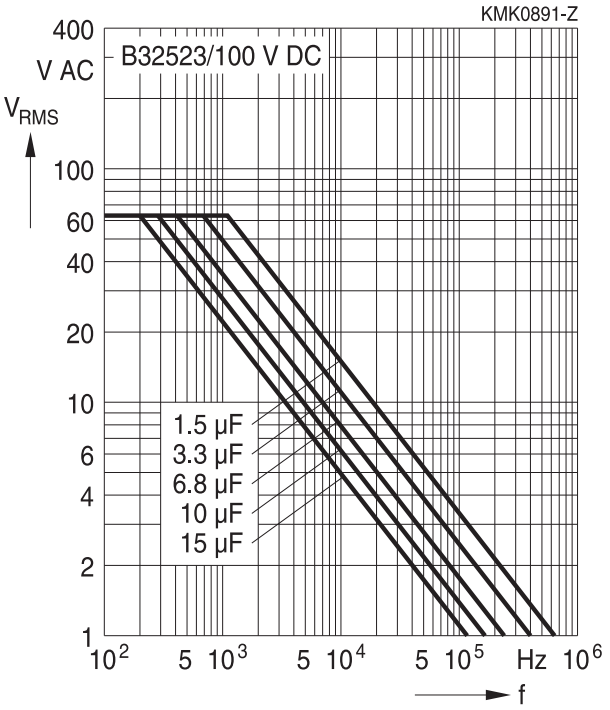
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 22.5 mm

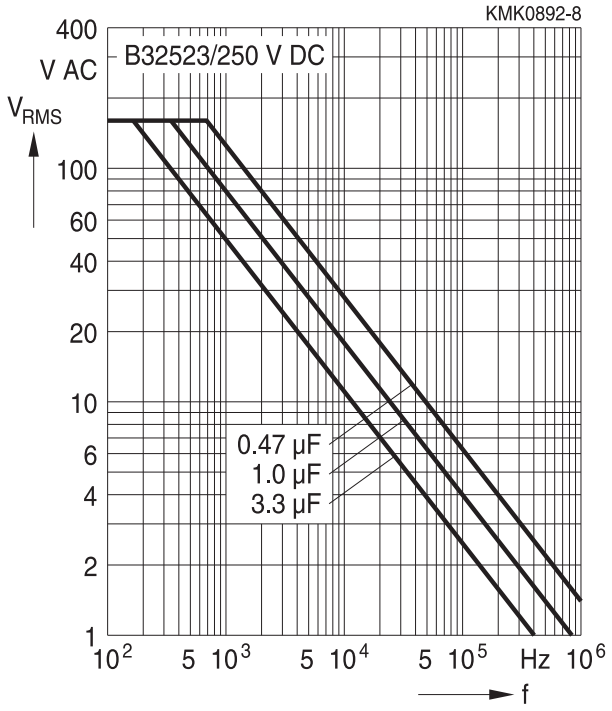
63 V DC/40 V AC



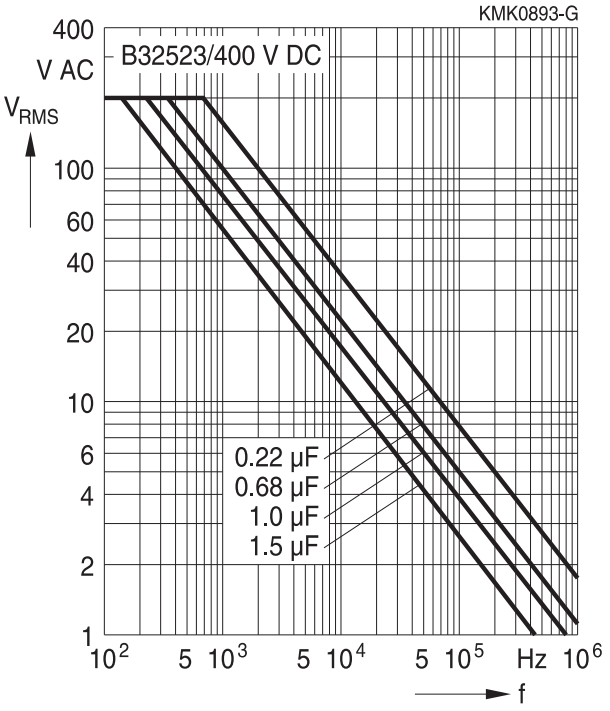
100 V DC/63 V AC



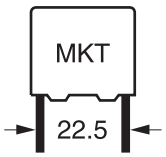
250 V DC/160 V AC



400 V DC/200 V AC



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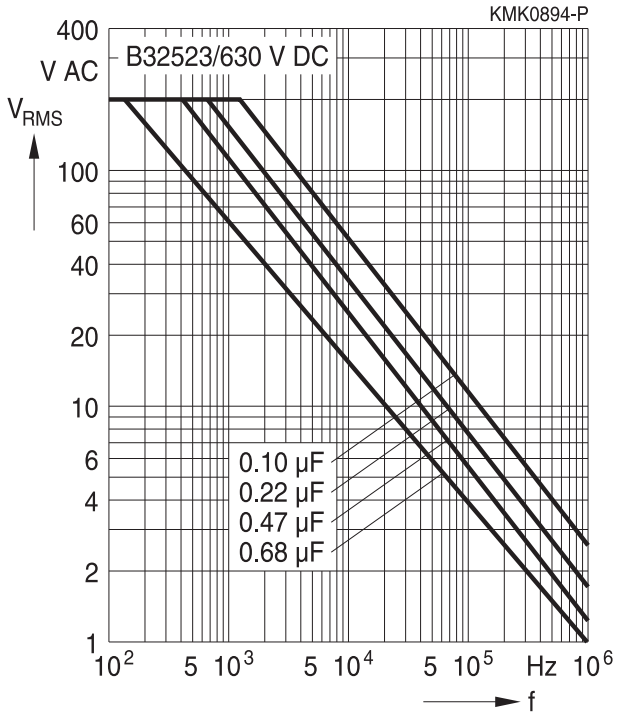


Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

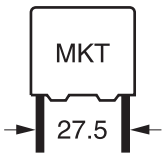
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 22.5 mm

630 V DC/200 V AC



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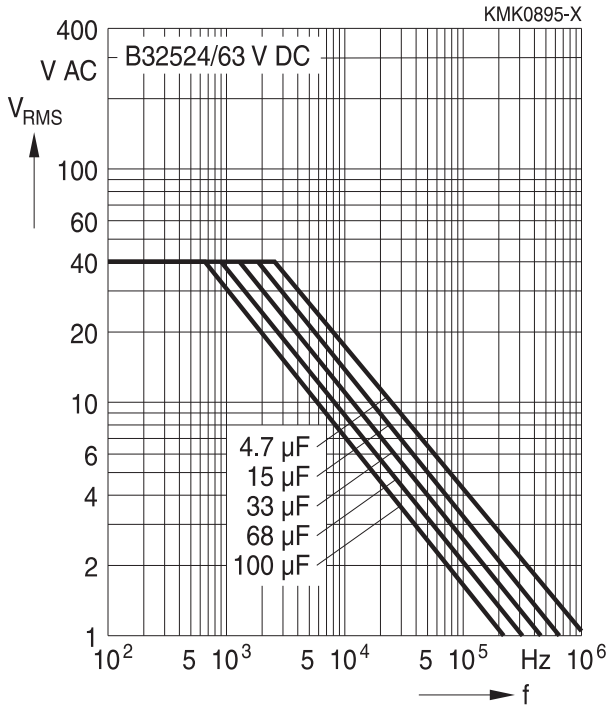


Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

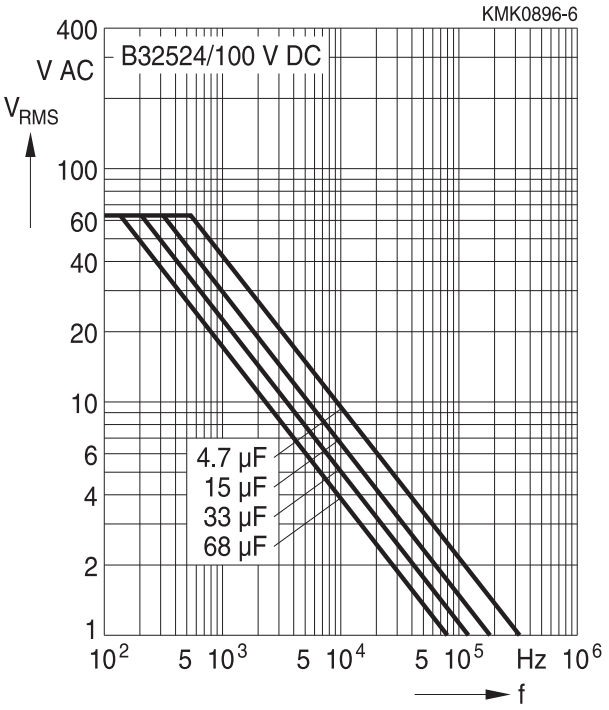
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 27.5 mm

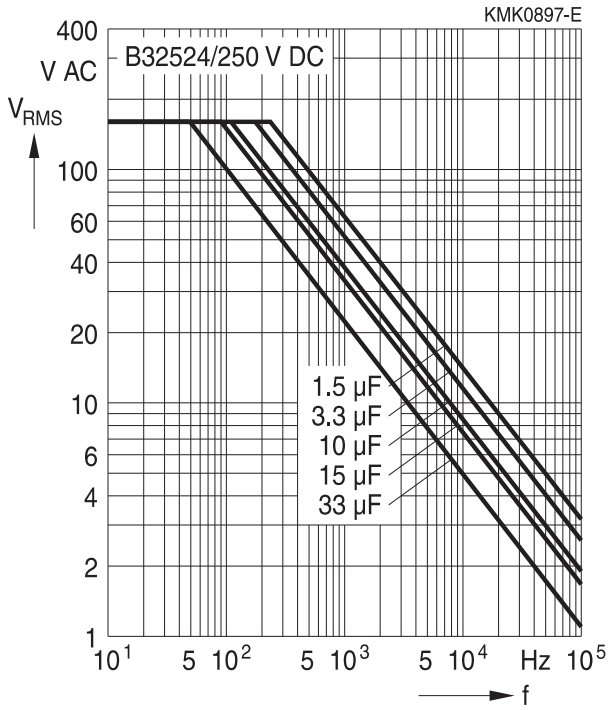
63 V DC/40 V AC



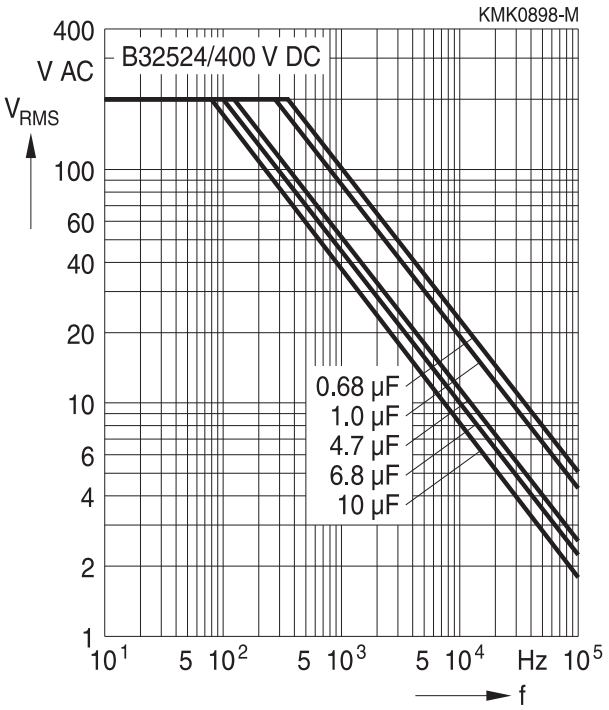
100 V DC/63 V AC



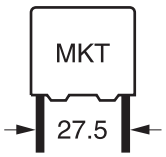
250 V DC/160 V AC



400 V DC/200 V AC



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B32524

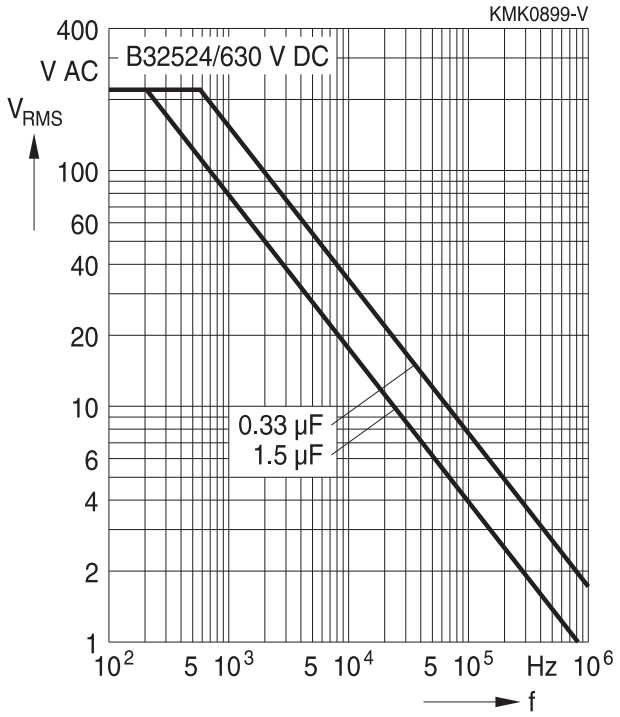
General purpose (wound)

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

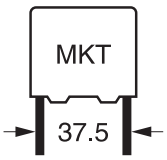
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 27.5 mm

630 V DC/220 V AC



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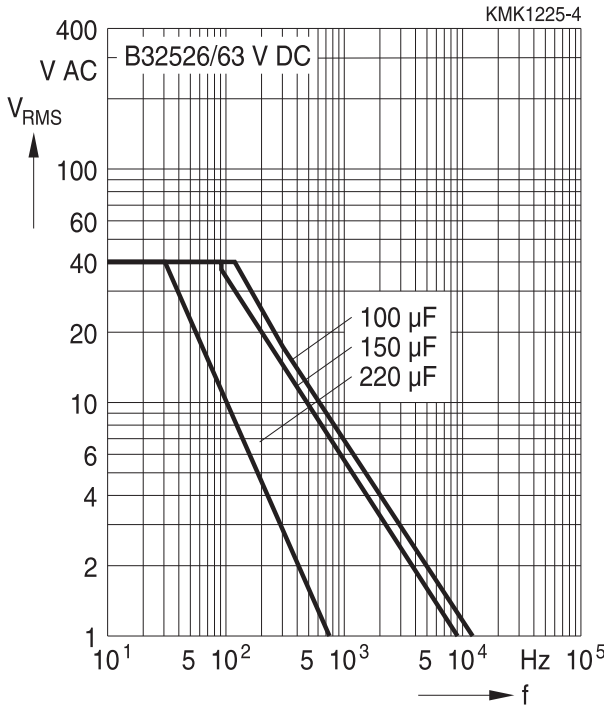


Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 55$ °C)

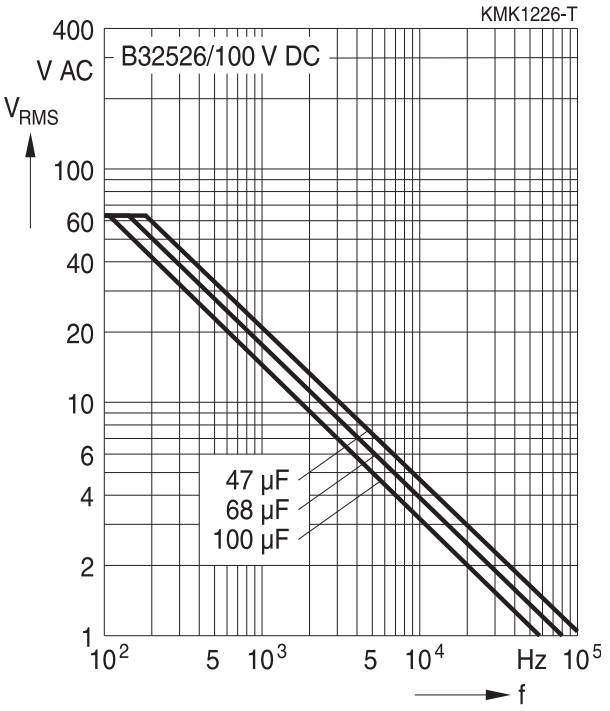
For T_A >55 °C, please refer to "General technical information", section 3.2.3.

Lead spacing 37.5 mm

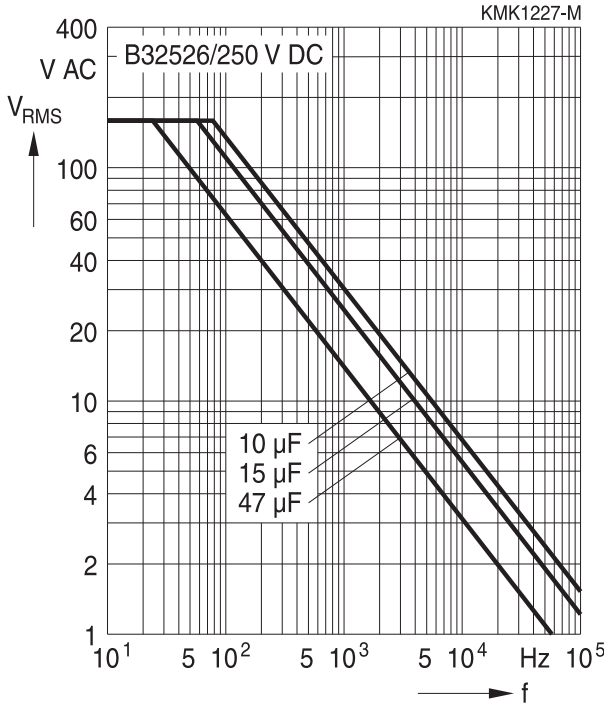
63 V DC/40 V AC



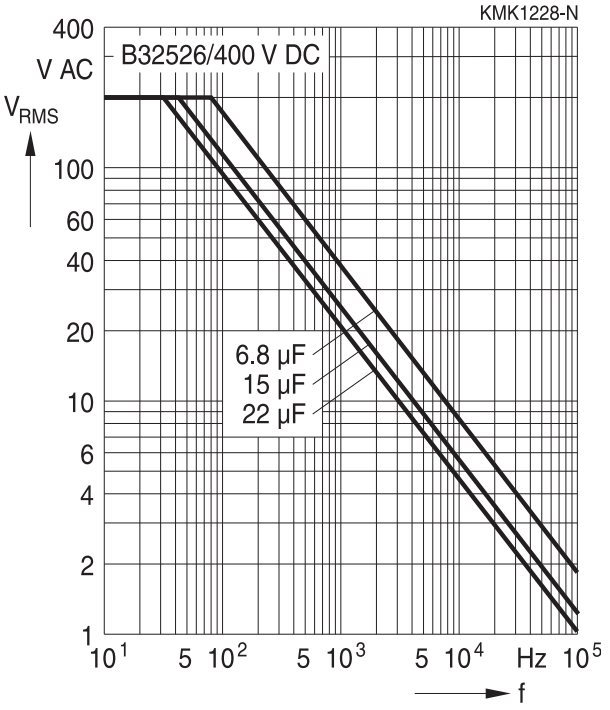
100 V DC/63 V AC



250 V DC/160 V AC



400 V DC/200 V AC



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Mounting guidelines

1 Soldering

1.1 Solderability of leads

The solderability of terminal leads is tested to IEC 60068-2-20:2008, test Ta, method 1.

Before a solderability test is carried out, terminals are subjected to accelerated ageing (to IEC 60068-2-2:2007, test Ba: 4 h exposure to dry heat at 155 °C). Since the ageing temperature is far higher than the upper category temperature of the capacitors, the terminal wires should be cut off from the capacitor before the ageing procedure to prevent the solderability being impaired by the products of any capacitor decomposition that might occur.

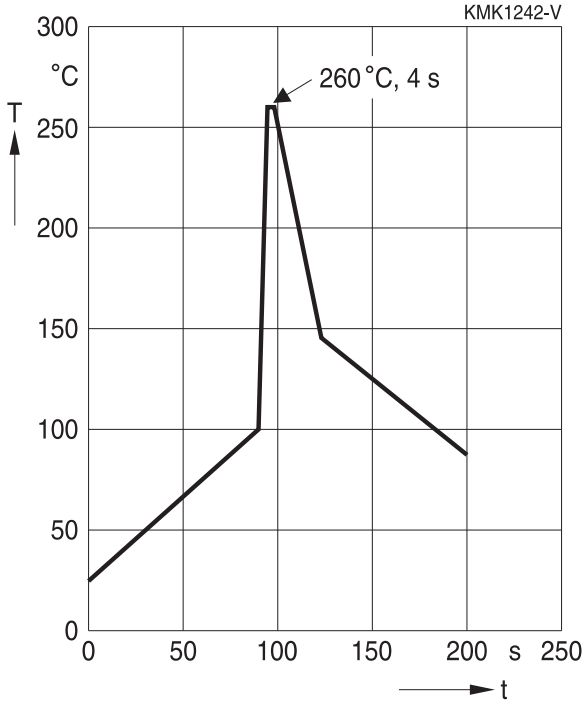
Solder bath temperature	235 ±5 °C
Soldering time	2.0 ±0.5 s
Immersion depth	2.0 +0/−0.5 mm from capacitor body or seating plane
Evaluation criteria: Visual inspection	Wetting of wire surface by new solder ≥90%, free-flowing solder

1.2 Resistance to soldering heat

Resistance to soldering heat is tested to IEC 60068-2-20:2008, test Tb, method 1.
Conditions:

Series		Solder bath temperature	Soldering time
MKT	boxed (except 2.5 × 6.5 × 7.2 mm) coated uncoated (lead spacing >10 mm)	260 ±5 °C	10 ±1 s
MFP MKP	(lead spacing >7.5 mm)		
MKT	boxed (case 2.5 × 6.5 × 7.2 mm)		5 ±1 s
MKP MKT	(lead spacing ≤7.5 mm) uncoated (lead spacing ≤10 mm) insulated (B32559)		<4 s recommended soldering profile for MKT uncoated (lead spacing ≤ 10 mm) and insulated (B32559)

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Immersion depth	2.0 +0/−0.5 mm from capacitor body or seating plane
Shield	Heat-absorbing board, (1.5 ±0.5) mm thick, between capacitor body and liquid solder
Evaluation criteria:	
Visual inspection	No visible damage
$\Delta C/C_0$	2% for MKT/MKP/MFP 5% for EMI suppression capacitors
tan δ	As specified in sectional specification

1.3 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 change irreversibly a capacitor's electrical characteristics. For short exposures (as in practical soldering processes) the heat load (and thus the possible effects on a capacitor) will also depend on other factors like:

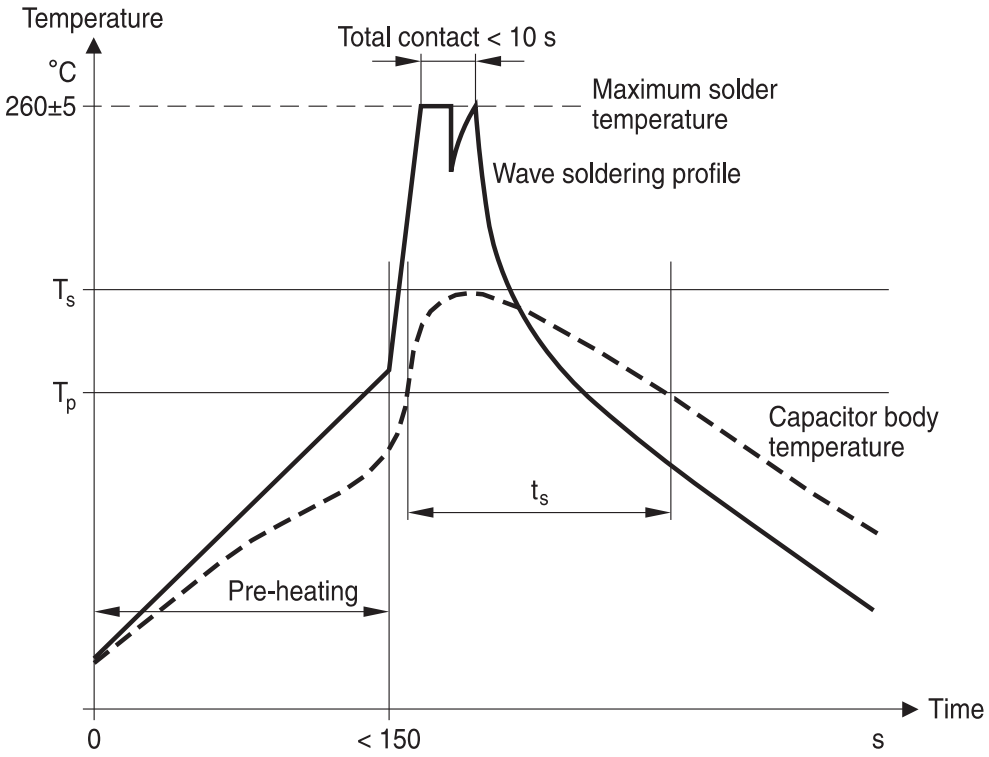
- Pre-heating temperature and time
- Forced cooling immediately after soldering
- Terminal characteristics:
  diameter, length, thermal resistance, special configurations (e.g. crimping)
- Height of capacitor above solder bath
- Shadowing by neighboring components
- Additional heating due to heat dissipation by neighboring components
- Use of solder-resist coatings

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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 possibly have to be included.

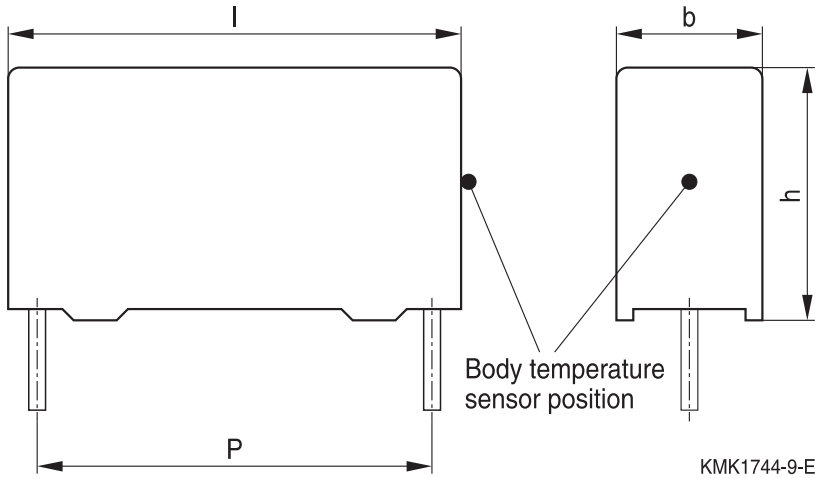
Recommendations

As a reference, the recommended wave soldering profile for our film capacitors is as follows:



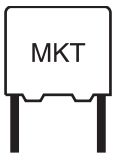
T_s: Capacitor body maximum temperature at wave soldering
T_p: Capacitor body maximum temperature at pre-heating

KMK1745-A-E



KMK1744-9-E

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Body temperature should follow the description below:

- MKP capacitor
  During pre-heating: $T_p \leq 110$ °C
  During soldering: $T_s \leq 120$ °C, $t_s \leq 45$ s
- MKT capacitor
  During pre-heating: $T_p \leq 125$ °C
  During soldering: $T_s \leq 160$ °C, $t_s \leq 45$ s

When SMD components are used together with leaded ones, the film capacitors should not pass into the SMD adhesive curing oven. The leaded components should be assembled after the SMD curing step.

Leaded film capacitors are not suitable for reflow soldering.

In order to ensure proper conditions for manual or selective soldering, the body temperature of the capacitor (T_s) must be ≤120 °C.

One recommended condition for manual soldering is that the tip of the soldering iron should be <360 °C and the soldering contact time should be no longer than 3 seconds.

For uncoated MKT capacitors with lead spacings ≤10 mm (B32560/B32561) the following measures are recommended:

- pre-heating to not more than 110 °C in the preheater phase
- rapid cooling after soldering

Please refer to our Film Capacitors Data Book in case more details are needed.

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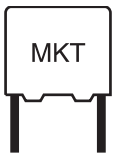
Cautions and warnings

- Do not exceed the upper category temperature (UCT).
- Do not apply any mechanical stress to the capacitor terminals.
- Avoid any compressive, tensile or flexural stress.
- Do not move the capacitor after it has been soldered to the PC board.
- Do not pick up the PC board by the soldered capacitor.
- Do not place the capacitor on a PC board whose PTH hole spacing differs from the specified lead spacing.
- Do not exceed the specified time or temperature limits during soldering.
- Avoid external energy inputs, such as fire or electricity.
- Avoid overload of the capacitors.
- Consult us if application is with severe temperature and humidity condition.
- There are no serviceable or repairable parts inside the capacitor. Opening the capacitor or any attempts to open or repair the capacitor will void the warranty and liability of TDK Electronics.
- Please note that the standards referred to in this publication may have been revised in the meantime.

The table below summarizes the safety instructions that must always be observed. A detailed description can be found in the relevant sections of the chapters "General technical information" and "Mounting guidelines".

Topic	Safety information	Reference chapter "General technical information"
Storage conditions	Make sure that capacitors are stored within the specified range of time, temperature and humidity conditions.	4.5 "Storage conditions"
Flammability	Avoid external energy, such as fire or electricity (passive flammability), avoid overload of the capacitors (active flammability) and consider the flammability of materials.	5.3 "Flammability"
Resistance to vibration	Do not exceed the tested ability to withstand vibration. The capacitors are tested to IEC 60068-2-6:2007. TDK Electronics 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".	5.2 "Resistance to vibration"

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Topic	Safety information	Reference chapter "Mounting guidelines"
Soldering	Do not exceed the specified time or temperature limits during soldering.	1 "Soldering"
Cleaning	Use only suitable solvents for cleaning capacitors.	2 "Cleaning"
Embedding of capacitors in finished assemblies	When embedding finished circuit assemblies in plastic resins, chemical and thermal influences must be taken into account. Caution: Consult us first, if you also wish to embed other uncoated component types!	3 "Embedding of capacitors in finished assemblies"

Display of ordering codes for TDK Electronics products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications, on the company website, or in order-related documents such as shipping notes, order confirmations and product labels. The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products.
Detailed information can be found on the Internet under
www.tdk-electronics.tdk.com/orderingcodes.

Correlation of data sheet values and modelling tool outputs

Data sheet values and results of design tools may deviate as they have not been derived in the same context.
While data sheets show individual parameter statements without considering a possible dependency to other parameters. Tools model a complete given scenario as input and processed inside the tool.
Furthermore as we constantly strive to improve our models, the results of tools can change over time and be a non-binding indication only.

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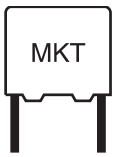
Symbols and terms

Symbol	English	German
α	Heat transfer coefficient	Wärmeübergangszahl
α_C	Temperature coefficient of capacitance	Temperaturkoeffizient der Kapazität
A	Capacitor surface area	Kondensatoroberfläche
β_C	Humidity coefficient of capacitance	Feuchtekoeffizient der Kapazität
C	Capacitance	Kapazität
C_R	Rated capacitance	Nennkapazität
ΔC	Absolute capacitance change	Absolute Kapazitätsänderung
$\Delta C/C$	Relative capacitance change (relative deviation of actual value)	Relative Kapazitätsänderung (relative Abweichung vom Ist-Wert)
$\Delta C/C_R$	Capacitance tolerance (relative deviation from rated capacitance)	Kapazitätstoleranz (relative Abweichung vom Nennwert)
dt	Time differential	Differentielle Zeit
Δt	Time interval	Zeitintervall
ΔT	Absolute temperature change (self-heating)	Absolute Temperaturänderung (Selbsterwärmung)
$\Delta \tan \delta$	Absolute change of dissipation factor	Absolute Änderung des Verlustfaktors
ΔV	Absolute voltage change	Absolute Spannungsänderung
dV/dt	Time differential of voltage function (rate of voltage rise)	Differentielle Spannungsänderung (Spannungsflankensteilheit)
$\Delta V/\Delta t$	Voltage change per time interval	Spannungsänderung pro Zeitintervall
E	Activation energy for diffusion	Aktivierungsenergie zur Diffusion
ESL	Self-inductance	Eigeninduktivität
ESR	Equivalent series resistance	Ersatz-Serienwiderstand
f	Frequency	Frequenz
f_1	Frequency limit for reducing permissible AC voltage due to thermal limits	Grenzfrequenz für thermisch bedingte Reduzierung der zulässigen Wechselspannung
f_2	Frequency limit for reducing permissible AC voltage due to current limit	Grenzfrequenz für strombedingte Reduzierung der zulässigen Wechselspannung
f_r	Resonant frequency	Resonanzfrequenz
F_D	Thermal acceleration factor for diffusion	Therm. Beschleunigungsfaktor zur Diffusion
F_T	Derating factor	Deratingfaktor
i	Current (peak)	Stromspitze
I_C	Category current (max. continuous current)	Kategoriestrom (max. Dauerstrom)

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Symbol	English	German
I_{RMS}	(Sinusoidal) alternating current, root-mean-square value	(Sinusförmiger) Wechselstrom
i_z	Capacitance drift	Inkonstanz der Kapazität
k_0	Pulse characteristic	Impulskennwert
L_S	Series inductance	Serieninduktivität
λ	Failure rate	Ausfallrate
λ_0	Constant failure rate during useful service life	Konstante Ausfallrate in der Nutzungsphase
λ_{test}	Failure rate, determined by tests	Experimentell ermittelte Ausfallrate
P_{diss}	Dissipated power	Abgegebene Verlustleistung
P_{gen}	Generated power	Erzeugte Verlustleistung
Q	Heat energy	Wärmeenergie
ρ	Density of water vapor in air	Dichte von Wasserdampf in Luft
R	Universal molar constant for gases	Allg. Molarkonstante für Gas
R	Ohmic resistance of discharge circuit	Ohmscher Widerstand des Entladekreises
R_i	Internal resistance	Innenwiderstand
R_{ins}	Insulation resistance	Isolationswiderstand
R_P	Parallel resistance	Parallelwiderstand
R_S	Series resistance	Serienwiderstand
S	severity (humidity test)	Schärfegrad (Feuchtetest)
t	Time	Zeit
T	Temperature	Temperatur
τ	Time constant	Zeitkonstante
tan δ	Dissipation factor	Verlustfaktor
tan δ_D	Dielectric component of dissipation factor	Dielektrischer Anteil des Verlustfaktors
tan δ_P	Parallel component of dissipation factor	Parallelanteil des Verlfustfaktors
tan δ_S	Series component of dissipation factor	Serienanteil des Verlustfaktors
T_A	Temperature of the air surrounding the component	Temperatur der Luft, die das Bauteil umgibt
T_{max}	Upper category temperature	Obere Kategorietemperatur
T_{min}	Lower category temperature	Untere Kategorietemperatur
t_{OL}	Operating life at operating temperature and voltage	Betriebszeit bei Betriebstemperatur und -spannung
T_{op}	Operating temperature, $T_A + \Delta T$	Beriebstemperatur, $T_A + \Delta T$
T_R	Rated temperature	Nenntemperatur
T_{ref}	Reference temperature	Referenztemperatur
t_{SL}	Reference service life	Referenz-Lebensdauer

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Symbol	English	German
V_{AC}	AC voltage	Wechselspannung
V_C	Category voltage	Kategoriespannung
$V_{C,RMS}$	Category AC voltage	(Sinusförmige) Kategorie-Wechselspannung
V_{CD}	Corona-discharge onset voltage	Teilentlade-Einsatzspannung
V_{ch}	Charging voltage	Ladespannung
V_{DC}	DC voltage	Gleichspannung
V_{FB}	Fly-back capacitor voltage	Spannung (Flyback)
V_i	Input voltage	Eingangsspannung
V_o	Output voltage	Ausgangsspannung
V_{op}	Operating voltage	Betriebsspannung
V_p	Peak pulse voltage	Impuls-Spitzenspannung
V_{pp}	Peak-to-peak voltage Impedance	Spannungshub
V_R	Rated voltage	Nennspannung
$\hat{v}_R$	Amplitude of rated AC voltage	Amplitude der Nenn-Wechselspannung
V_{RMS}	(Sinusoidal) alternating voltage, root-mean-square value	(Sinusförmige) Wechselspannung
V_{SC}	S-correction voltage	Spannung bei Anwendung "S-correction"
V_{sn}	Snubber capacitor voltage	Spannung bei Anwendung "Beschaltung"
Z	Impedance	Scheinwiderstand
e	Lead spacing	Rastermaß

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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, we are 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 a 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 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 an electronic component could endanger human life or health (e.g. in accident prevention or lifesaving 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 an electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
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Important notes

7. **Our manufacturing sites serving the automotive business apply the IATF 16949 standard.** The IATF certifications confirm our compliance with requirements regarding the quality management system in the automotive industry. Referring to customer requirements and customer specific requirements (“CSR”) TDK always has and will continue to have the policy of respecting individual agreements. Even if IATF 16949 may appear to support the acceptance of unilateral requirements, we hereby like to emphasize that **only requirements mutually agreed upon can and will be implemented in our Quality Management System.** For clarification purposes we like to point out that obligations from IATF 16949 shall only become legally binding if individually agreed upon.
8. The trade names EPCOS, CarXield, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, ExoCore, FilterCap, FormFit, LeaXield, MiniBlue, MiniCell, MKD, MKK, ModCap, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, ThermoFuse, WindCap, XieldCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.tdk-electronics.tdk.com/trademarks.

Release 2020-06

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