

Film Capacitors

Metallized Polypropylene Film Capacitors (MKP)

Series/Type: B32651 ... B32656

Date: October 2015

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High pulse (wound)

Typical applications

- Electronic ballasts
- Switch-mode power supplies

Climatic

- Max. operating temperature: 110 °C
- Climatic category (IEC 60068-1): 55/100/56

Construction

- Dielectric: polypropylene (PP)
- Wound capacitor technology with internal series connection for $V_R \geq 1250$ V DC
- Plastic case (UL 94 V-0)
- Epoxy resin sealing

Features

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

Terminals

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

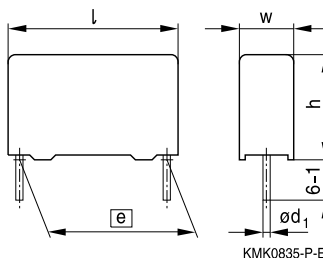
Marking

Manufacturer's logo,
lot number ($\square \leq 27.5$ mm), series number
(e.g. 651),
rated capacitance (coded), cap. tolerance (code letter),
rated DC voltage
(AC voltage for 1600 V DC/700 V AC and
2000 V DC/1000 V AC),
date of manufacture (coded)

Delivery mode

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

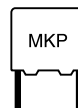
Dimensional drawing



Dimensions in mm

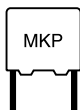
Lead spacing $e \pm 0.4$	Lead diameter $d_1 \pm 0.05$	Type
10	0.6	B32651
15	0.8	B32652
22.5	0.8	B32653
27.5	0.8	B32654
37.5	1.0	B32656

B32651 ... B32656
High pulse (wound)



Overview of available types

Lead spacing	10 mm
Type	B32651
Page	8
V_R (V DC)	1250
V_{RMS} (V AC)	450
C_R (nF)	
2.2	
3.3	
4.7	
6.8	

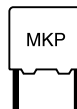


B32651 ... B32656

High pulse (wound)

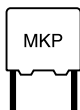
Overview of available types

Lead spacing	15 mm							
Type	B32652							
Page	9							
V_R (V DC)	250	400	630	1000	1250	1600	1600	2000
V_{RMS} (V AC)	160	200	250	250	500	500	700	700
C_R (nF)								
1.0								
1.5								
2.2								
3.3								
4.7								
5.6								
6.8								
10								
12								
15								
22								
33								
47								
56								
68								
100								
120								
150								
220								
330								
390								
470								
560								
680								
820								
1000								



Overview of available types

Lead spacing	22.5 mm							
Type	B32653							
Page	12							
V_R (V DC)	250	400	630	1000	1250	1600	2000	2000
V_{RMS} (V AC)	160	200	250	250	500	500	700	1000
C_R (nF)								
2.2								
3.3								
4.7								
6.8								
10								
12								
15								
22								
33								
47								
56								
68								
82								
100								
120								
150								
220								
330								
470								
560								
680								
1000								
1200								
1500								
2200								
3300								

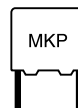


B32651 ... B32656

High pulse (wound)

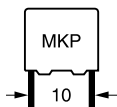
Overview of available types

Lead spacing	27.5 mm						
Type	B32654						
Page	15						
V_R (V DC)	250	400	630	1000	1250	1600	2000
V_{RMS} (V AC)	160	200	250	250	500	500	700
C_R (nF)							
22							
33							
47							
68							
82							
100							
150							
220							
330							
470							
560							
680							
820							
1000							
1200							
1500							
2200							
2700							
3300							
4700							
5600							
6800							
8200							



Overview of available types

Lead spacing	37.5 mm				
Type	B32656				
Page	17				
V_R (V DC)	850	1000	1250	1600	2000
V_{RMS} (V AC)	450	500	500	600	700
C_R (nF)					
100					
120					
150					
220					
270					
330					
390					
470					
560					
680					
820					
1000					
1200					
1500					
2200					


B32651
High pulse (wound)
Ordering codes and packing units (lead spacing 10 mm)

V_R V DC ¹⁾	V_{RMS} $f \leq 1$ kHz V AC	C_R nF	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Ammo pack pcs./MOQ	Straight terminals, Reel pcs./MOQ	Straight terminals, Untaped pcs./MOQ
1250	450	2.2	$4.0 \times 9.0 \times 13.0$	B32651A7222+***	4000	6800	4000
		3.3	$5.0 \times 11.0 \times 13.0$	B32651A7332+***	3320	5200	4000
		4.7	$5.0 \times 11.0 \times 13.0$	B32651A7472+***	3320	5200	4000
		6.8	$6.0 \times 12.0 \times 13.0$	B32651A7682+***	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:

K = $\pm 10\%$

J = $\pm 5\%$

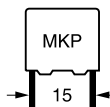
*** = Packaging code:

289 = Straight terminals, Ammo pack

189 = Straight terminals, Reel

000 = Straight terminals, Untaped (standard lead
length 6 – 1 mm)

1) For pulse loads (pulse width $\leq 1000 \mu s$), a peak voltage of 1400 V_p can be permitted.


Ordering codes and packing units (lead spacing 15 mm)

V_R V DC	V_{RMS} $f \leq 1$ kHz V AC	C_R nF	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Ammo pack pcs./MOQ	Straight terminals, Reel pcs./ MOQ	Straight terminals, Untaped pcs./ MOQ
250	160	150	$5.0 \times 10.5 \times 18.0$	B32652A3154+***	4680	5200	4000
		220	$6.0 \times 11.0 \times 18.0$	B32652A3224+***	3840	4400	4000
		330	$7.0 \times 12.5 \times 18.0$	B32652A3334+***	3320	3600	1000
		470	$8.5 \times 14.5 \times 18.0$	B32652A3474+***	2720	2800	2000
		680	$9.0 \times 17.5 \times 18.0$	B32652A3684+***	2560	2800	2000
		820	$11.0 \times 18.5 \times 18.0$	B32652A3824+***	—	2200	1000
		1000	$11.0 \times 18.5 \times 18.0$	B32652A3105+***	—	2200	1000
400	200	68	$5.0 \times 10.5 \times 18.0$	B32652A4683+***	4680	5200	4000
		100	$5.0 \times 10.5 \times 18.0$	B32652A4104+***	4680	5200	4000
		150	$6.0 \times 11.0 \times 18.0$	B32652A4154+***	3840	4400	4000
		220	$7.0 \times 12.5 \times 18.0$	B32652A4224+***	3320	3600	4000
		330	$8.5 \times 14.5 \times 18.0$	B32652A4334+***	2720	2800	2000
		470	$9.0 \times 17.5 \times 18.0$	B32652A4474+***	2560	2800	2000
		560	$11.0 \times 18.5 \times 18.0$	B32652A4564+***	—	2200	1000
		680	$11.0 \times 18.5 \times 18.0$	B32652A4684+***	—	2200	1000
630	250	33	$5.0 \times 10.5 \times 18.0$	B32652A6333+***	4680	5200	4000
		47	$5.0 \times 10.5 \times 18.0$	B32652A6473+***	4680	2800	4000
		68	$6.0 \times 11.0 \times 18.0$	B32652A6683+***	3840	4400	4000
		100	$7.0 \times 12.5 \times 18.0$	B32652A6104+***	3320	3600	4000
		150	$8.5 \times 14.5 \times 18.0$	B32652A6154+***	2720	2800	2000
		220	$9.0 \times 17.5 \times 18.0$	B32652A6224+***	2560	2800	2000
		330	$11.0 \times 18.5 \times 18.0$	B32652A6334+***	—	2200	1000
		390	$11.0 \times 18.5 \times 18.0$	B32652A6394+***	—	2200	1000

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:

K = $\pm 10\%$

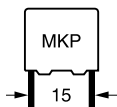
J = $\pm 5\%$

*** = Packaging code:

289 = Straight terminals, Ammo pack

189 = Straight terminals, Reel

000 = Straight terminals, Untaped (standard lead length 6 – 1 mm)



B32652

High pulse (wound)

Ordering codes and packing units (lead spacing 15 mm)

V_R	V_{RMS} $f \leq 1$ kHz	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Ammo pack pcs./MOQ	Straight terminals, Reel pcs./ MOQ	Straight terminals, Untaped pcs./ MOQ
V DC	V AC	nF					
1000	250	10	$5.0 \times 10.5 \times 18.0$	B32652A0103+***	4680	5200	4000
		15	$5.0 \times 10.5 \times 18.0$	B32652A0153+***	4680	5200	4000
		22	$5.0 \times 10.5 \times 18.0$	B32652A0223+***	4680	5200	4000
		33	$6.0 \times 11.0 \times 18.0$	B32652A0333+***	3840	4400	4000
		47	$7.0 \times 12.5 \times 18.0$	B32652A0473+***	3320	3600	4000
		68	$8.5 \times 14.5 \times 18.0$	B32652A0683+***	2720	2800	2000
		100	$9.0 \times 17.5 \times 18.0$	B32652A0104+***	2560	2800	2000
		120	$11.0 \times 18.5 \times 18.0$	B32652A0124+***	—	2200	1000
1250	500	150	$11.0 \times 18.5 \times 18.0$	B32652A0154+***	—	2200	1000
		6.8	$5.0 \times 10.5 \times 18.0$	B32652A7682+***	4680	5200	4000
		10	$6.0 \times 11.0 \times 18.0$	B32652A7103+***	3840	4400	4000
		15	$7.0 \times 12.5 \times 18.0$	B32652A7153+***	3320	3600	4000
		22	$8.5 \times 14.5 \times 18.0$	B32652A7223+***	2720	2800	2000
		33	$9.0 \times 17.5 \times 18.0$	B32652A7333+***	2560	2800	2000
		47	$11.0 \times 18.5 \times 18.0$	B32652A7473+***	—	2200	1000
		56	$11.0 \times 18.5 \times 18.0$	B32652A7563+***	—	2200	1000
1600	500	3.3	$5.0 \times 10.5 \times 18.0$	B32652A1332+***	4680	5200	4000
		4.7	$6.0 \times 11.0 \times 18.0$	B32652A1472+***	3840	4400	4000
		6.8	$7.0 \times 12.5 \times 18.0$	B32652A1682+***	3320	3600	4000
		10	$8.5 \times 14.5 \times 18.0$	B32652A1103+***	2720	2800	2000
		15	$9.0 \times 17.5 \times 18.0$	B32652A1153+***	2560	2800	2000
		22	$11.0 \times 18.5 \times 18.0$	B32652A1223+***	—	2200	1000
1600	700	2.2	$5.0 \times 10.5 \times 18.0$	B32652J1222+***	4680	5200	4000
		3.3	$6.0 \times 11.0 \times 18.0$	B32652J1332+***	3840	4400	4000
		4.7	$7.0 \times 12.5 \times 18.0$	B32652J1472+***	3320	3600	4000
		6.8	$8.5 \times 14.5 \times 18.0$	B32652J1682+***	2720	2800	2000
		10	$9.0 \times 17.5 \times 18.0$	B32652J1103+***	2560	2800	2000
		12	$9.0 \times 17.5 \times 18.0$	B32652J1123+***	2560	2800	2000
		15	$11.0 \times 18.5 \times 18.0$	B32652J1153+***	—	2200	1000

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:

K = $\pm 10\%$

J = $\pm 5\%$

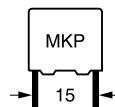
*** = Packaging code:

289 = Straight terminals, Ammo pack

189 = Straight terminals, Reel

000 = Straight terminals, Untaped (standard lead length 6 – 1 mm)

B32652
High pulse (wound)



Ordering codes and packing units (lead spacing 15 mm)

V_R	V_{RMS} $f \leq 1 \text{ kHz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Ammo pack pcs./MOQ	Straight terminals, Reel pcs./ MOQ	Straight terminals, Untaped pcs./ MOQ
V DC	V AC	nF					
2000	700	1.0	$5.0 \times 10.5 \times 18.0$	B32652A2102+***	4680	5200	4000
		1.5	$6.0 \times 11.0 \times 18.0$	B32652A2152+***	3840	4400	4000
		2.2	$7.0 \times 12.5 \times 18.0$	B32652A2222+***	3320	3600	4000
		3.3	$8.5 \times 14.5 \times 18.0$	B32652A2332+***	2720	2800	2000
		4.7	$9.0 \times 17.5 \times 18.0$	B32652A2472+***	2560	2800	2000
		5.6	$9.0 \times 17.5 \times 18.0$	B32652A2562+***	—	2200	1000
		6.8	$11.0 \times 18.5 \times 18.0$	B32652A2682+***	—	2200	1000

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:

K = $\pm 10\%$

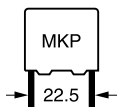
J = $\pm 5\%$

*** = Packaging code:

289 = Straight terminals, Ammo pack

189 = Straight terminals, Reel

000 = Straight terminals, Untaped (standard lead
length 6 – 1 mm)


B32653
High pulse (wound)
Ordering codes and packing units (lead spacing 22.5 mm)

V_R	V_{RMS} $f \leq 1 \text{ kHz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Ammo pack pcs./MOQ	Straight terminals, Reel pcs./ MOQ	Straight terminals, Untaped pcs./ MOQ
V DC	V AC	nF					
250	160	220	$6.0 \times 15.0 \times 26.5$	B32653A3224+***	2720	2800	2880
		330	$6.0 \times 15.0 \times 26.5$	B32653A3334+***	2720	2800	2880
		470	$7.0 \times 16.0 \times 26.5$	B32653A3474+***	2320	2400	2520
		680	$8.5 \times 16.5 \times 26.5$	B32653A3684+***	1920	2000	2040
		1000	$10.5 \times 16.5 \times 26.5$	B32653A3105+***	1560	1600	2160
		1200	$10.5 \times 18.5 \times 26.5$	B32653A3125+***	1560	1600	2160
		1500	$11.0 \times 20.5 \times 26.5$	B32653A3155+***	1480	1400	2040
		2200	$14.5 \times 29.5 \times 26.5$	B32653A3225+000	—	—	1040
		3300	$14.5 \times 29.5 \times 26.5$	B32653A3335+000	—	—	1040
400	200	150	$6.0 \times 15.0 \times 26.5$	B32653A4154+***	2720	2800	2880
		220	$6.0 \times 15.0 \times 26.5$	B32653A4224+***	2720	2800	2880
		330	$7.0 \times 16.0 \times 26.5$	B32653A4334+***	2320	2400	2520
		470	$8.5 \times 16.5 \times 26.5$	B32653A4474+***	1920	2000	2040
		680	$10.5 \times 16.5 \times 26.5$	B32653A4684+***	1560	1600	2160
		1000	$11.0 \times 20.5 \times 26.5$	B32653A4105+***	1480	1400	2040
		1200	$12.0 \times 22.0 \times 26.5$	B32653A4125+000	—	—	1800
		1500	$14.5 \times 29.5 \times 26.5$	B32653A4155+000	—	—	1040
		2200	$14.5 \times 29.5 \times 26.5$	B32653A4225+000	—	—	1040
630	250	100	$6.0 \times 15.0 \times 26.5$	B32653A6104+***	2720	2800	2880
		150	$6.0 \times 15.0 \times 26.5$	B32653A6154+***	2720	2800	2880
		220	$8.5 \times 16.5 \times 26.5$	B32653A6224+***	1920	2000	2040
		330	$10.5 \times 16.5 \times 26.5$	B32653A6334+***	1560	1600	2160
		470	$11.0 \times 20.5 \times 26.5$	B32653A6474+***	1480	1400	2040
		560	$11.0 \times 20.5 \times 26.5$	B32653A6564+***	1480	1400	2040
		680	$14.5 \times 29.5 \times 26.5$	B32653A6684+000	—	—	1040
		1000	$14.5 \times 29.5 \times 26.5$	B32653A6105+000	—	—	1040
		1200	$14.5 \times 29.5 \times 26.5$	B32653A6125+000	—	—	1040

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:

K = $\pm 10\%$

J = $\pm 5\%$

*** = Packaging code:

289 = Straight terminals, Ammo pack

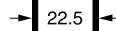
189 = Straight terminals, Reel

000 = Straight terminals, Untaped (standard lead length 6 – 1 mm)

B32653
High pulse (wound)

MKP

22.5


Ordering codes and packing units (lead spacing 22.5 mm)

V_R	V_{RMS} $f \leq 1 \text{ kHz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Ammo pack pcs./MOQ	Straight terminals, Reel pcs./ MOQ	Straight terminals, Untaped pcs./ MOQ
V DC	V AC	nF					
1000	250	33	$6.0 \times 15.0 \times 26.5$	B32653A0333+***	2720	2800	2880
		47	$6.0 \times 15.0 \times 26.5$	B32653A0473+***	2720	2800	2880
		68	$6.0 \times 15.0 \times 26.5$	B32653A0683+***	2720	2800	2880
		100	$8.5 \times 16.5 \times 26.5$	B32653A0104+***	1920	2000	2040
		150	$10.5 \times 16.5 \times 26.5$	B32653A0154+***	1560	1600	2160
		220	$11.0 \times 20.5 \times 26.5$	B32653A0224+***	1480	1400	2040
		330	$14.5 \times 29.5 \times 26.5$	B32653A0334+000	—	—	2160
		470	$14.5 \times 29.5 \times 26.5$	B32653A0474+000	—	—	2160
		560	$14.5 \times 29.5 \times 26.5$	B32653A0564+000	—	—	2160
1250	500	22	$6.0 \times 15.0 \times 26.5$	B32653A7223+***	2720	2800	2880
		33	$6.0 \times 15.0 \times 26.5$	B32653A7333+***	2720	2800	2880
		47	$8.5 \times 16.5 \times 26.5$	B32653A7473+***	1920	2000	2040
		68	$10.5 \times 16.5 \times 26.5$	B32653A7683+***	1560	1600	2160
		100	$11.0 \times 20.5 \times 26.5$	B32653A7104+***	1480	1400	2040
		120	$12.0 \times 22.0 \times 26.5$	B32653A7124+000	—	—	1800
		150	$14.5 \times 29.5 \times 26.5$	B32653A7154+000	—	—	1040
		220	$14.5 \times 29.5 \times 26.5$	B32653A7224+000	—	—	1040
1600	500	6.8	$6.0 \times 15.0 \times 26.5$	B32653A1682+***	2720	2800	2880
		10	$6.0 \times 15.0 \times 26.5$	B32653A1103+***	2720	2800	2880
		15	$7.0 \times 16.0 \times 26.5$	B32653A1153+***	2320	2400	2520
		22	$8.5 \times 16.5 \times 26.5$	B32653A1223+***	1920	2000	2040
		33	$10.5 \times 16.5 \times 26.5$	B32653A1333+***	1560	1600	2160
		47	$11.0 \times 20.5 \times 26.5$	B32653A1473+***	1480	1400	2040
		56	$12.0 \times 22.0 \times 26.5$	B32653A1563+000	—	—	1800
		68	$14.5 \times 29.5 \times 26.5$	B32653A1683+000	—	—	1040
		82	$14.5 \times 29.5 \times 26.5$	B32653A1823+000	—	—	1040
		100	$14.5 \times 29.5 \times 26.5$	B32653A1104+000	—	—	1040

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:

K = $\pm 10\%$

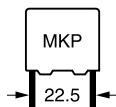
J = $\pm 5\%$

*** = Packaging code:

289 = Straight terminals, Ammo pack

189 = Straight terminals, Reel

000 = Straight terminals, Untaped (standard lead length 6 – 1 mm)


B32653
High pulse (wound)
Ordering codes and packing units (lead spacing 22.5 mm)

V_R	V_{RMS} $f \leq 1 \text{ kHz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Ammo pack pcs./MOQ	Straight terminals, Reel pcs./ MOQ	Straight terminals, Untaped pcs./ MOQ
V DC	V AC	nF					
2000	700	3.3	$6.0 \times 15.0 \times 26.5$	B32653A2332+***	2720	2800	2880
		4.7	$6.0 \times 15.0 \times 26.5$	B32653A2472+***	2720	2800	2880
		6.8	$8.5 \times 16.5 \times 26.5$	B32653A2682+***	1920	2000	2040
		10	$10.5 \times 16.5 \times 26.5$	B32653A2103+***	1560	1600	2160
		15	$11.0 \times 20.5 \times 26.5$	B32653A2153+***	1480	1400	2040
		22	$14.5 \times 29.5 \times 26.5$	B32653A2223+000	—	—	2160
		33	$14.5 \times 29.5 \times 26.5$	B32653A2333+000	—	—	2160
2000	1000	2.2	$6.0 \times 15.0 \times 26.5$	B32653A8222+***	2720	2800	2880
		3.3	$6.0 \times 15.0 \times 26.5$	B32653A8332+***	2720	2800	2880
		4.7	$8.5 \times 16.5 \times 26.5$	B32653A8472+***	1920	2000	2040
		6.8	$10.5 \times 16.5 \times 26.5$	B32653A8682+***	1560	1600	2160
		10	$10.5 \times 20.5 \times 26.5$	B32653A8103+***	1560	1600	2160
		12	$12.0 \times 22.0 \times 26.5$	B32653A8123+000	—	—	1800
		15	$14.5 \times 29.5 \times 26.5$	B32653A8153+000	—	—	2160
		22	$14.5 \times 29.5 \times 26.5$	B32653A8223+000	—	—	2160

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:

K = $\pm 10\%$

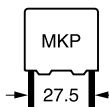
J = $\pm 5\%$

*** = Packaging code:

289 = Straight terminals, Ammo pack

189 = Straight terminals, Reel

000 = Straight terminals, Untaped (standard lead length 6 – 1 mm)


Ordering codes and packing units (lead spacing 27.5 mm)

V_R	V_{RMS} $f \leq 1 \text{ kHz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Ammo pack pcs./MOQ	Straight terminals, Reel pcs./ MOQ	Straight terminals, Untaped pcs./ MOQ
V DC	V AC	nF					
250	160	1500	$11.0 \times 21.0 \times 31.5$	B32654A3155+***	—	1400	1280
		2200	$12.5 \times 21.5 \times 31.5$	B32654A3225+***	—	1200	1120
		3300	$15.0 \times 24.5 \times 31.5$	B32654A3335+000	—	—	960
		4700	$18.0 \times 27.5 \times 31.5$	B32654A3475+000	—	—	800
		5600	$19.0 \times 30.0 \times 31.5$	B32654A3565+000	—	—	720
		6800	$22.0 \times 36.5 \times 31.5$	B32654A3685+000	—	—	640
		8200	$22.0 \times 36.5 \times 31.5$	B32654A3825+000	—	—	640
400	200	1000	$11.0 \times 21.0 \times 31.5$	B32654A4105+***	—	1400	1280
		1500	$12.5 \times 21.5 \times 31.5$	B32654A4155+***	—	1200	1120
		2200	$14.0 \times 24.5 \times 31.5$	B32654A4225+***	—	1000	1040
		3300	$19.0 \times 30.0 \times 31.5$	B32654A4335+000	—	—	720
		4700	$22.0 \times 36.5 \times 31.5$	B32654A4475+000	—	—	640
		5600	$22.0 \times 36.5 \times 31.5$	B32654A4565+000	—	—	640
630	250	680	$11.0 \times 21.0 \times 31.5$	B32654A6684+***	—	1400	1280
		1000	$13.5 \times 23.0 \times 31.5$	B32654A6105+***	—	1000	1040
		1500	$18.0 \times 27.5 \times 31.5$	B32654A6155+000	—	—	800
		2200	$18.0 \times 33.0 \times 31.5$	B32654A6225+000	—	—	800
		2700	$22.0 \times 36.5 \times 31.5$	B32654A6275+000	—	—	640
		3300	$22.0 \times 36.5 \times 31.5$	B32654A6335K000	—	—	640
1000	250	220	$11.0 \times 21.0 \times 31.5$	B32654A0224+***	—	1400	1280
		330	$11.0 \times 21.0 \times 31.5$	B32654A0334+***	—	1400	1280
		470	$14.0 \times 24.5 \times 31.5$	B32654A0474+***	—	1000	1040
		680	$18.0 \times 27.5 \times 31.5$	B32654A0684+000	—	—	800
		820	$19.0 \times 30.0 \times 31.5$	B32654A0824+000	—	—	720
		1000	$21.0 \times 31.0 \times 31.5$	B32654A0105+000	—	—	720
		1200	$22.0 \times 36.5 \times 31.5$	B32654A0125+000	—	—	640
		1500	$22.0 \times 36.5 \times 31.5$	B32654A0155K000	—	—	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:

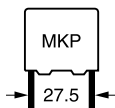
K = $\pm 10\%$

J = $\pm 5\%$

*** = Packaging code:

189 = Straight terminals, Reel

000 = Straight terminals, Untaped (standard lead length 6 – 1 mm)


B32654
High pulse (wound)
Ordering codes and packing units (lead spacing 27.5 mm)

V_R	V_{RMS} $f \leq 1 \text{ kHz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Ammo pack pcs./MOQ	Straight terminals, Reel pcs./ MOQ	Straight terminals, Untaped pcs./ MOQ
V DC	V AC	nF					
1250	500	100	$11.0 \times 21.0 \times 31.5$	B32654A7104+***	—	1400	1280
		150	$11.0 \times 21.0 \times 31.5$	B32654A7154+***	—	1400	1280
		220	$14.0 \times 24.5 \times 31.5$	B32654A7224+***	—	1000	1040
		330	$18.0 \times 27.5 \times 31.5$	B32654A7334+000	—	—	800
		470	$21.0 \times 31.0 \times 31.5$	B32654A7474+000	—	—	720
		560	$22.0 \times 36.5 \times 31.5$	B32654A7564+000	—	—	640
		680	$22.0 \times 36.5 \times 31.5$	B32654A7684+000	—	—	640
1600	500	47	$11.0 \times 21.0 \times 31.5$	B32654A1473+***	—	1400	1280
		68	$11.0 \times 21.0 \times 31.5$	B32654A1683+***	—	1400	1280
		100	$14.0 \times 24.5 \times 31.5$	B32654A1104+***	—	1000	1040
		150	$18.0 \times 27.5 \times 31.5$	B32654A1154+000	—	—	800
		220	$21.0 \times 31.0 \times 31.5$	B32654A1224+000	—	—	784
2000	700	22	$11.0 \times 21.0 \times 31.5$	B32654A2223+***	—	1400	1280
		33	$13.5 \times 23.0 \times 31.5$	B32654A2333+***	—	1000	1040
		47	$18.0 \times 27.5 \times 31.5$	B32654A2473+000	—	—	800
		68	$19.0 \times 30.0 \times 31.5$	B32654A2683+000	—	—	720
		82	$22.0 \times 36.5 \times 31.5$	B32654A2823+000	—	—	640
		100	$22.0 \times 36.5 \times 31.5$	B32654A2104+000	—	—	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:

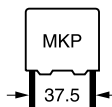
K = $\pm 10\%$

J = $\pm 5\%$

*** = Packaging code:

189 = Straight terminals, Reel

000 = Straight terminals, Untaped (standard lead length 6 – 1 mm)


Ordering codes and packing units (lead spacing 37.5 mm)

V_R	V_{RMS} $f \leq 1 \text{ kHz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Untaped pcs./MOQ
V DC	V AC	nF			
850	450	220	$12.0 \times 22.0 \times 42.0$	B32656A8224+000	1620
		330	$12.0 \times 22.0 \times 42.0$	B32656A8334+000	1620
		470	$12.0 \times 22.0 \times 42.0$	B32656A8474+000	1620
		680	$16.0 \times 28.5 \times 42.0$	B32656A8684+000	800
		680	$24.0 \times 15.0 \times 41.5$	B32656T8684+000	1040
		820	$24.0 \times 19.0 \times 41.5$	B32656T8824+000	780
		1000	$18.0 \times 32.5 \times 42.0$	B32656A8105+000	720
1000	500	470	$14.0 \times 25.0 \times 42.0$	B32656A0474+000	1380
		470	$24.0 \times 15.0 \times 41.5$	B32656T0474+000	1040
		680	$16.0 \times 28.5 \times 42.0$	B32656A0684+000	800
		680	$24.0 \times 19.0 \times 41.5$	B32656T0684+000	780
		1000	$20.0 \times 39.5 \times 42.0$	B32656A0105+000	640
		1200	$28.0 \times 37.0 \times 42.0$	B32656A0125+000	440
		1500	$28.0 \times 37.0 \times 42.0$	B32656A0155+000	440
1250	500	2200	$30.0 \times 45.0 \times 42.0$	B32656A0225+000	400
		220	$14.0 \times 25.0 \times 42.0$	B32656A7224+000	1380
		270	$24.0 \times 15.0 \times 41.5$	B32656T7274+000	1040
		330	$16.0 \times 28.5 \times 42.0$	B32656A7334+000	800
		390	$24.0 \times 19.0 \times 41.5$	B32656T7394+000	780
		470	$18.0 \times 32.5 \times 42.0$	B32656A7474+000	720
		680	$20.0 \times 39.5 \times 42.0$	B32656A7684+000	640
		820	$28.0 \times 37.0 \times 42.0$	B32656A7824+000	440
		1000	$28.0 \times 37.0 \times 42.0$	B32656A7105+000	440
		1200	$28.0 \times 42.5 \times 41.5$	B32656A7125+000	440

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

Further E series and intermediate capacitance values on request.

Composition of ordering code

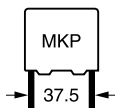
+ = Capacitance tolerance code:

K = $\pm 10\%$

J = $\pm 5\%$

*** = Packaging code:

000 = Straight terminals, Untaped (standard lead
length 6 – 1 mm)



B32656

High pulse (wound)

V_R	V_{RMS} $f \leq 1 \text{ kHz}$	C_R	Max. dimensions $w \times h \times l$ mm	Ordering code (composition see below)	Straight terminals, Untaped pcs./MOQ
V DC	V AC	nF			
1600	600	100	$12.0 \times 22.0 \times 42.0$	B32656J1104+000	1620
		150	$14.0 \times 25.0 \times 42.0$	B32656J1154+000	1380
		150	$24.0 \times 15.0 \times 41.5$	B32656T1154+000	1040
		220	$16.0 \times 28.5 \times 42.0$	B32656J1224+000	800
		220	$24.0 \times 19.0 \times 41.5$	B32656T1224+000	780
		330	$20.0 \times 39.5 \times 41.5$	B32656J1334+000	640
		470	$28.0 \times 37.0 \times 42.0$	B32656J1474+000	440
		560	$28.0 \times 37.0 \times 42.0$	B32656J1564+000	440
		680	$28.0 \times 42.5 \times 41.5$	B32656J1684+000	440
		820	$30.0 \times 45.0 \times 42.0$	B32656J1824+000	400
2000	700	100	$14.0 \times 25.0 \times 42.0$	B32656J2104+000	1380
		100	$24.0 \times 15.0 \times 41.5$	B32656T2104+000	1040
		120	$24.0 \times 19.0 \times 41.5$	B32656T2124+000	780
		150	$18.0 \times 32.5 \times 42.0$	B32656J2154+000	720
		220	$20.0 \times 39.5 \times 42.0$	B32656J2224+000	640
		330	$28.0 \times 37.0 \times 42.0$	B32656J2334+000	440
		470	$30.0 \times 45.0 \times 42.0$	B32656J2474+000	400

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

Further E series and intermediate capacitance values on request.

Composition of ordering code

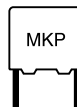
+ = Capacitance tolerance code:

K = $\pm 10\%$

J = $\pm 5\%$

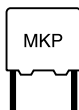
*** = Packaging code:

000 = Straight terminals, Untaped (standard lead
length 6 – 1 mm)



Technical data

Operating temperature range	Max. operating temperature $T_{op,max}$ +110 °C Upper category temperature T_{max} +100 °C Lower category temperature T_{min} −55 °C Rated temperature T_R +85 °C				
Dissipation factor $\tan \delta$ (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)	$C_R \leq 0.33 \mu F$		$C_R > 0.33 \mu F$		
	100 GΩ		30000 s		
DC test voltage	1.6 · V_R , 2 s				
Category voltage V_C (continuous operation with V_{DC} or V_{AC} at $f \leq 1$ kHz)	T_A (°C)	DC voltage derating		AC voltage derating	
	$T_A \leq 85$	$V_C = V_R$		$V_{C,RMS} = V_{RMS}$	
	$85 < T_A \leq 100$	$V_C = V_R \cdot (165 - T_A)/80$		$V_{C,RMS} = V_{RMS} \cdot (165 - T_A)/80$	
Operating voltage V_{op} for short operating periods (V_{DC} or V_{AC} at $f \leq 1$ kHz)	T_A (°C)	DC voltage (max. hours)		AC voltage (max. hours)	
	$T_A \leq 85$	$V_{op} = 1.25 \cdot V_C$ (2000 h)		$V_{op} = 1.0 \cdot V_{C,RMS}$ (2000 h)	
	$85 < T_A \leq 100$	$V_{op} = 1.25 \cdot V_C$ (2000 h)		$V_{op} = 1.0 \cdot V_{C,RMS}$ (2000 h)	
Damp heat test Limit values after damp heat test	56 days/40 °C/93% relative humidity Capacitance change $ \Delta C/C $ ≤ 3% Dissipation factor change $\Delta \tan \delta$ ≤ 0.5 · 10 ^{−3} (at 1 kHz) ≤ 1.0 · 10 ^{−3} (at 10 kHz) Insulation resistance R_{ins} ≥ 50% of minimum or time constant $\tau = C_R \cdot R_{ins}$ as-delivered values				
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 $ \Delta C/C $ > 10% Dissipation factor $\tan \delta$ > 4 · upper limit value Insulation resistance R_{ins} < 1500 MΩ ($C_R \leq 0.33 \mu F$) or time constant $\tau = C_R \cdot R_{ins}$ < 500 s ($C_R > 0.33 \mu F$)				



B32651 ... B32656

High pulse (wound)

Pulse handling capability

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

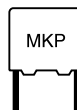
"k₀" represents the maximum permissible pulse characteristic of the waveform applied to the capacitor, expressed in V²/ μ s.

Note:

The values of dV/dt and k₀ provided below must not be exceeded in order to avoid damaging the capacitor.

dV/dt values

Lead spacing		10 mm	15 mm	22.5 mm	27.5 mm	37.5 mm
V _R V DC	V _{RMS} V AC	dV/dt in V/ μ s				
250	160	—	200	120	50	—
400	200	—	300	180	100	—
630	250	—	400	300	150	—
850	450	—	—	—	—	90
1000	250	—	975	600	300	—
	500	—	—	—	—	100
1250	450	4000	—	—	—	—
	500	—	1850	1150	600	140
1600	500	—	4500	2400	1000	—
	600	—	—	—	—	210
	700	—	5200	—	—	—
2000	700	—	8000	7000	2300	200
	1000	—	—	7500	—	—

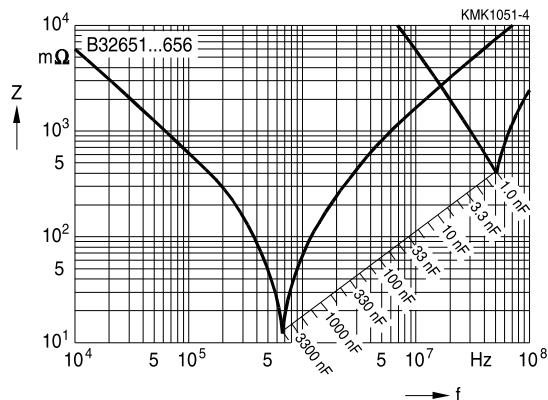


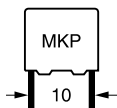
k_0 values

Lead spacing		10 mm	15 mm	22.5 mm	27.5 mm	37.5 mm
V_R	V_{RMS}	k_0 in $V^2/\mu s$				
V DC	V AC					
250	160	—	100 000	60 000	25 000	—
400	200	—	250 000	200 000	110 000	—
630	250	—	500 000	350 000	250 000	—
850	450	—	—	—	—	153 000
1000	250	—	3 000 000	1 500 000	1 000 000	—
	500	—	—	—	—	180 000
1250	450	25 000 000	—	—	—	—
	500	—	9 000 000	3 750 000	2 000 000	350 000
1600	500	—	20 000 000	10 000 000	4 000 000	—
	600	—	—	—	—	672 000
	700	—	28 000 000	—	—	—
2000	700	—	60 000 000	40 000 000	15 000 000	800 000
	1000	—	—	50 000 000	—	—

Impedance Z versus frequency f

(typical values)





B32651

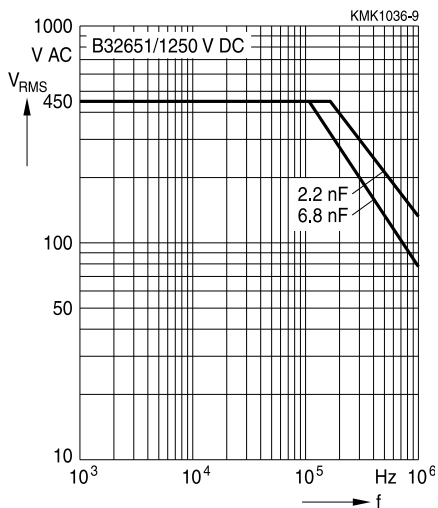
High pulse (wound)

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 90^\circ\text{C}$)

For $T_A > 90^\circ\text{C}$, please refer to "General technical information", section 3.2.3.

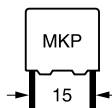
Lead spacing 10 mm

1250 V DC/450 V AC



B32652

High pulse (wound)

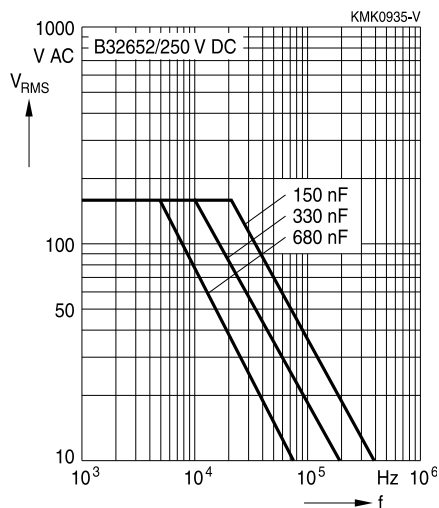


Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 90^\circ C$)

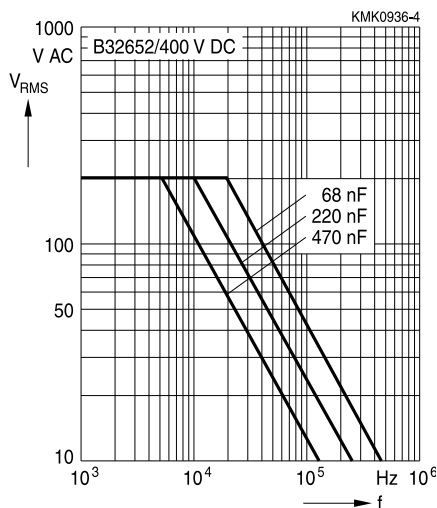
For $T_A > 90^\circ C$, please refer to "General technical information", section 3.2.3.

Lead spacing 15 mm

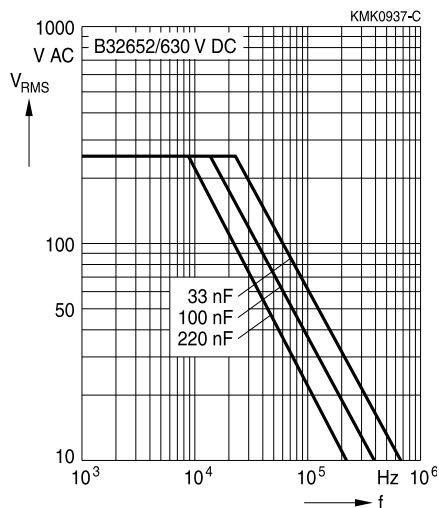
250 V DC/160 V AC



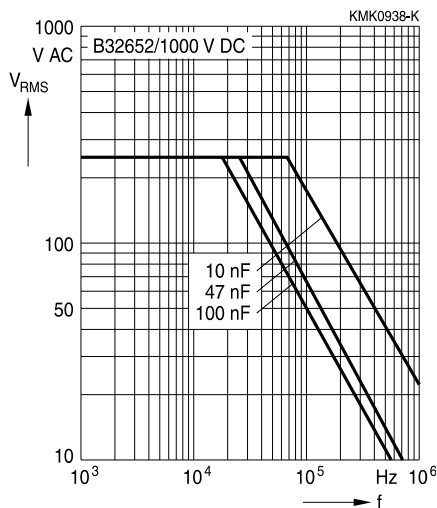
400 V DC/200 V AC

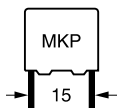


630 V DC/250 V AC



1000 V DC/250 V AC





B32652

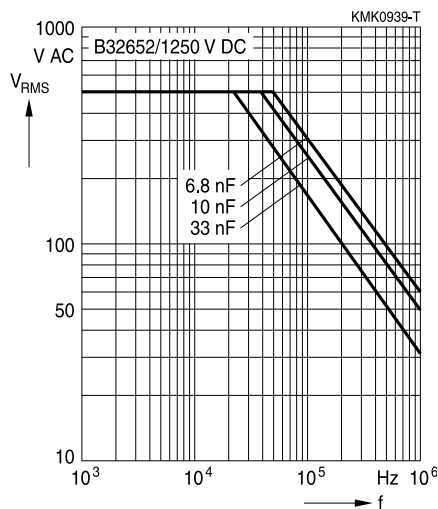
High pulse (wound)

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 90^\circ\text{C}$)

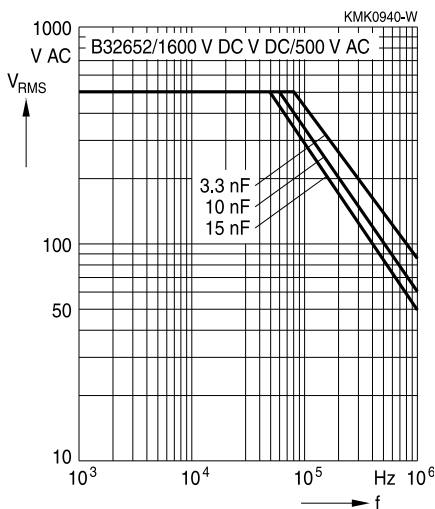
For $T_A > 90^\circ\text{C}$, please refer to "General technical information", section 3.2.3.

Lead spacing 15 mm

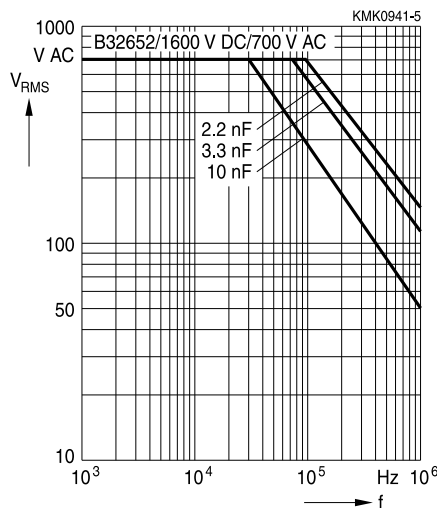
1250 V DC/500 V AC



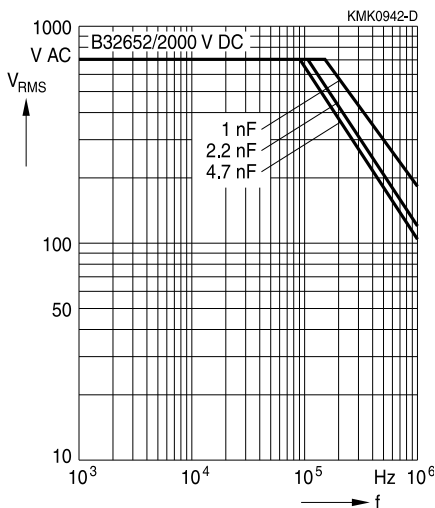
1600 V DC/500 V AC



1600 V DC/700 V AC



2000 V DC/700 V AC



B32653

High pulse (wound)

MKP

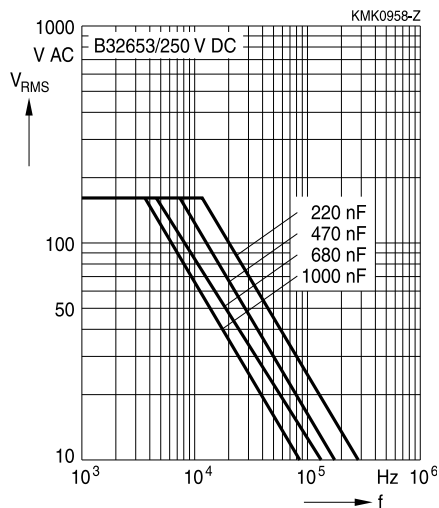
22.5

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 90^\circ C$)

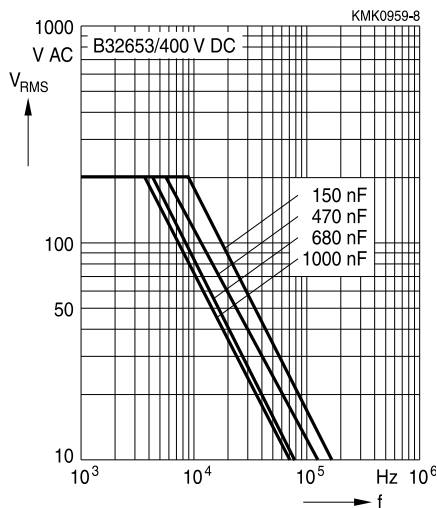
For $T_A > 90^\circ C$, please refer to "General technical information", section 3.2.3.

Lead spacing 22.5 mm

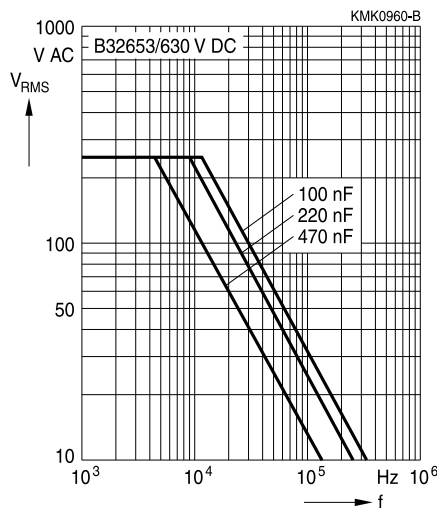
250 V DC/160 V AC



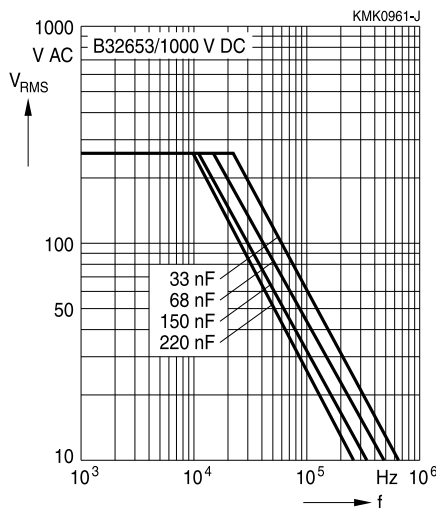
400 V DC/200 V AC

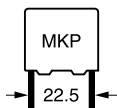


630 V DC/250 V AC



1000 V DC/250 V AC





B32653

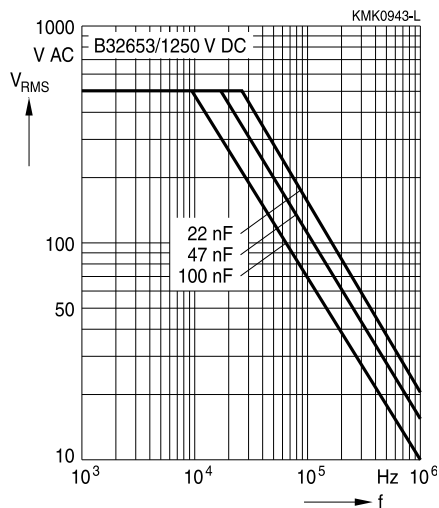
High pulse (wound)

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 90^\circ\text{C}$)

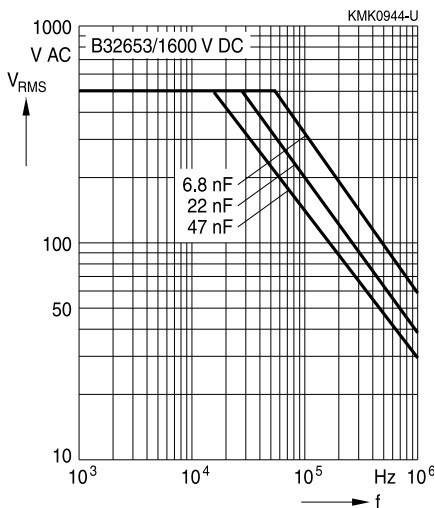
For $T_A > 90^\circ\text{C}$, please refer to "General technical information", section 3.2.3.

Lead spacing 22.5 mm

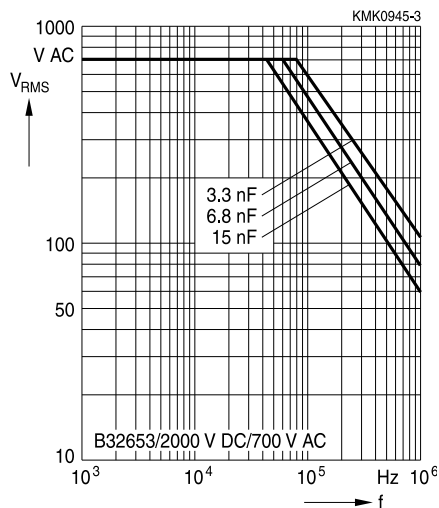
1250 V DC/500 V AC



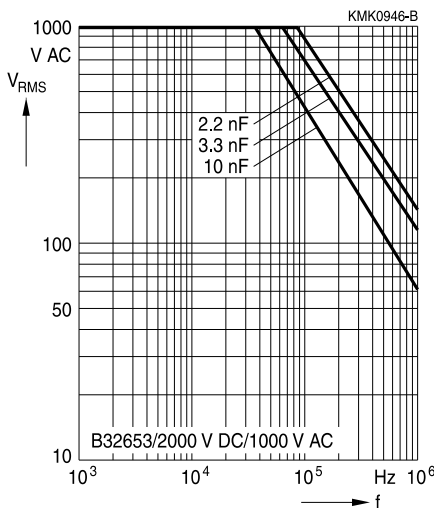
1600 V DC/500 V AC



2000 V DC/700 V AC



2000 V DC/1000 V AC



B32654

High pulse (wound)

MKP

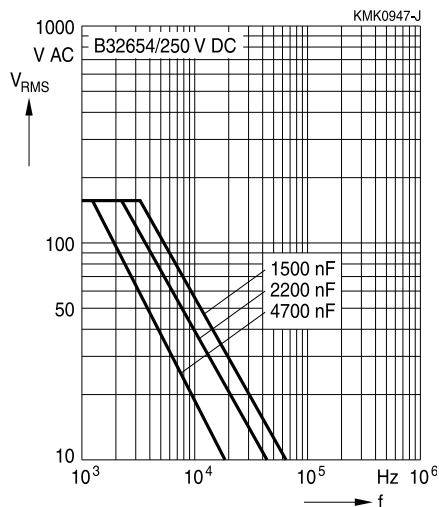
27.5

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 90^\circ\text{C}$)

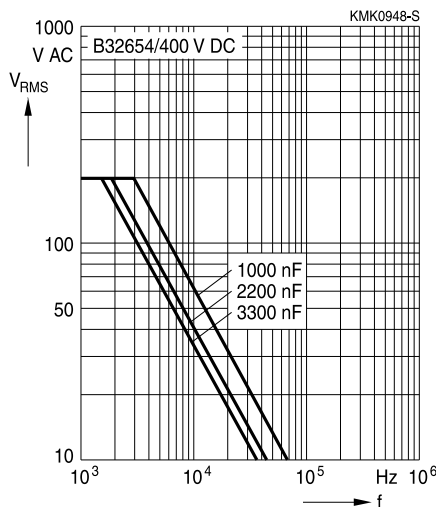
For $T_A > 90^\circ\text{C}$, please refer to "General technical information", section 3.2.3.

Lead spacing 27.5 mm

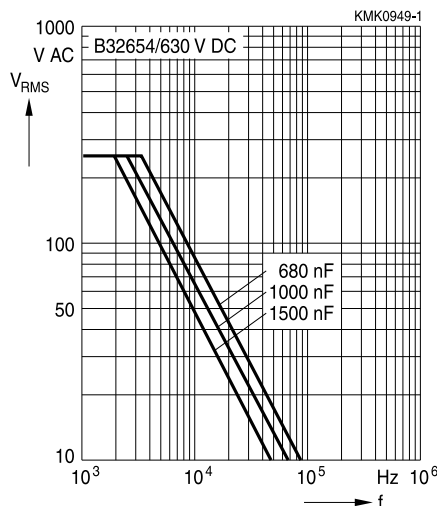
250 V DC/160 V AC



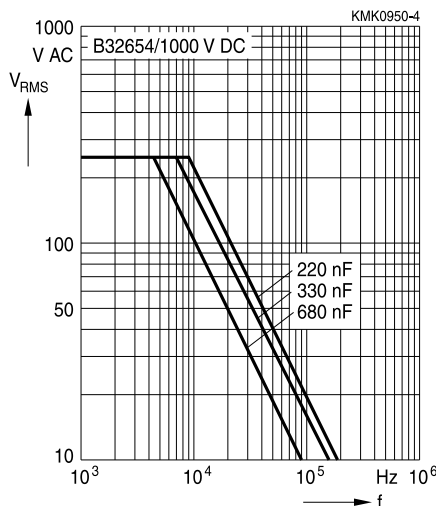
400 V DC/200 V AC

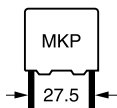


630 V DC/250 V AC



1000 V DC/250 V AC





B32654

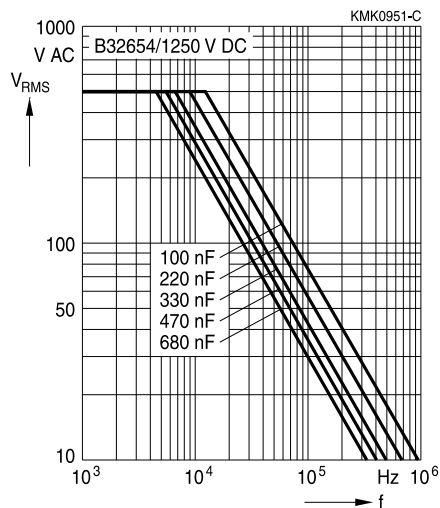
High pulse (wound)

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 90^\circ\text{C}$)

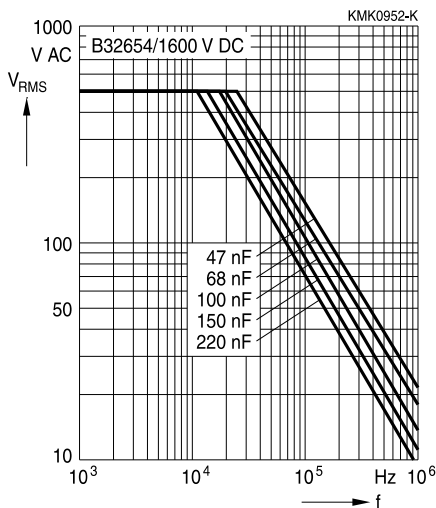
For $T_A > 90^\circ\text{C}$, please refer to "General technical information", section 3.2.3.

Lead spacing 27.5 mm

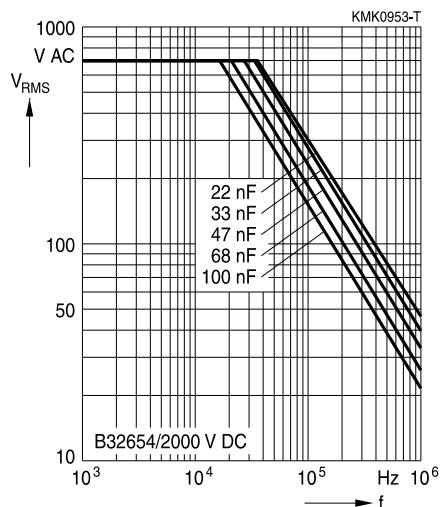
1250 V DC/500 V AC



1600 V DC/500 V AC



2000 V DC/700 V AC



B32656

High pulse (wound)

MKP

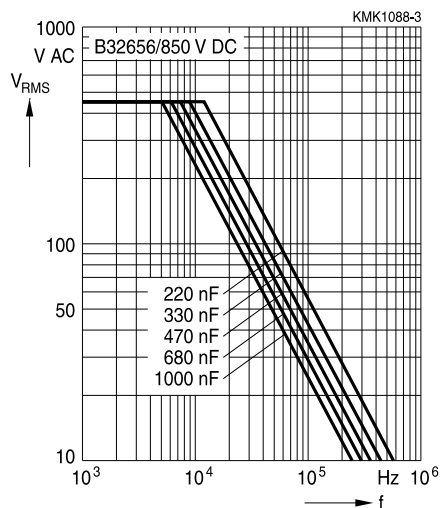
37.5

Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 90^\circ\text{C}$)

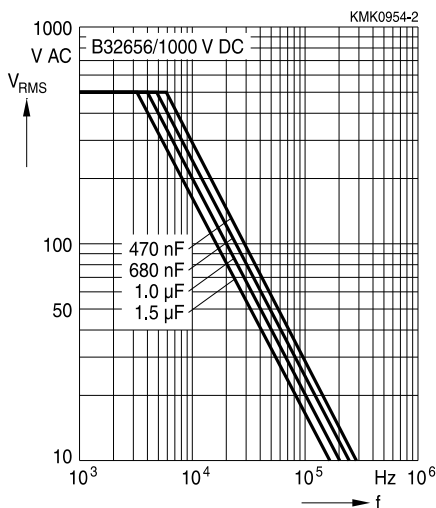
For $T_A > 90^\circ\text{C}$, please refer to "General technical information", section 3.2.3.

Lead spacing 37.5 mm

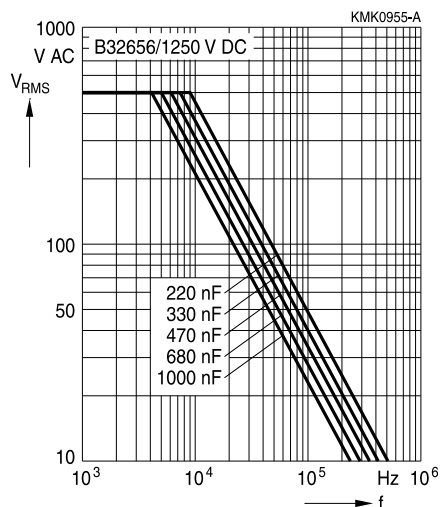
850 V DC/450 V AC



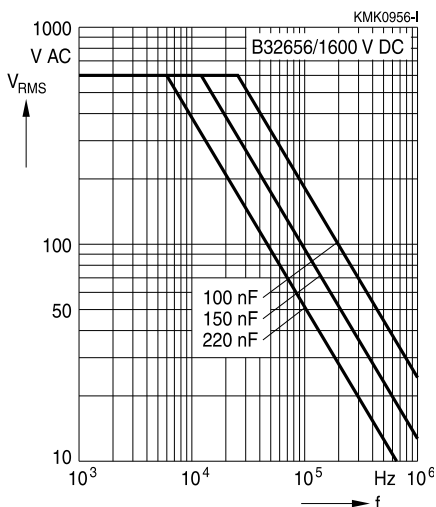
1000 V DC/500 V AC

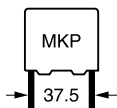


1250 V DC/500 V AC



1600 V DC/600 V AC





B32656

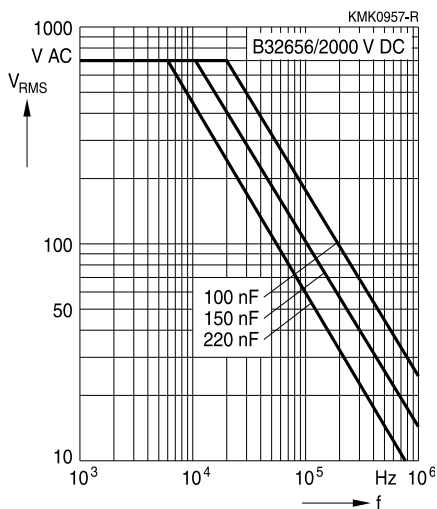
High pulse (wound)

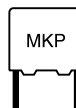
Permissible AC voltage V_{RMS} versus frequency f (for sinusoidal waveforms, $T_A \leq 90^\circ\text{C}$)

For $T_A > 90^\circ\text{C}$, please refer to "General technical information", section 3.2.3.

Lead spacing 37.5 mm

2000 V DC/700 V AC





Mounting guidelines

1 Soldering

1.1 Solderability of leads

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

Before a solderability test is carried out, terminals are subjected to accelerated ageing (to IEC 60068-2-2, 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.

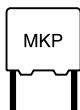
Solder bath temperature	235 ±5 °C
Soldering time	2.0 ±0.5 s
Immersion depth	2.0 +0/-0.5 mm from capacitor body or seating plane
Evaluation criteria:	
Visual inspection	Wetting of wire surface by new solder ≥90%, free-flowing solder

1.2 Resistance to soldering heat

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

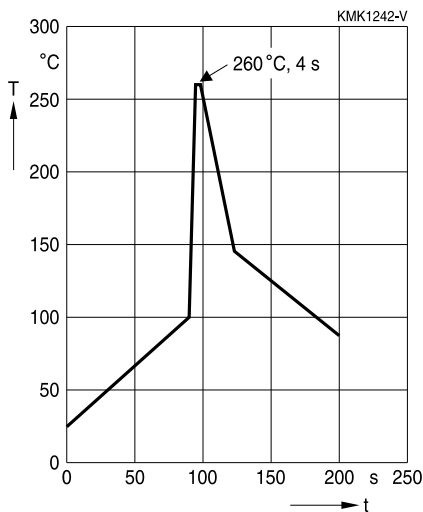
Conditions:

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 (lead spacing ≤ 7.5 mm)		< 4 s
MKT uncoated (lead spacing ≤ 10 mm) insulated (B32559)		recommended soldering profile for MKT uncoated (lead spacing ≤ 10 mm) and insulated (B32559)

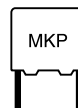


B32651 ... B32656

High pulse (wound)



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
$\tan \delta$	As specified in sectional specification



1.3 General notes on soldering

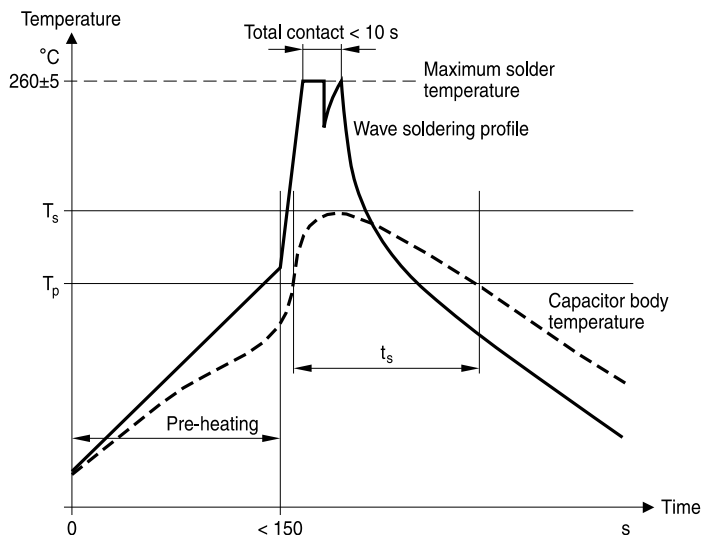
Permissible heat exposure loads on film capacitors are primarily characterized by the upper category temperature $T_{\max}$. Long exposure to temperatures above this type-related temperature limit can lead to changes in the plastic dielectric and thus change irreversibly a capacitor's electrical characteristics. 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

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.

EPCOS recommendations

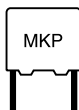
As a reference, the recommended wave soldering profile for our film capacitors is as follows:



T_s : Capacitor body maximum temperature at wave soldering

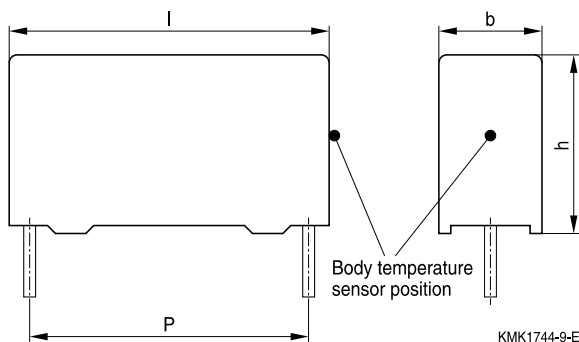
T_p : Capacitor body maximum temperature at pre-heating

KMK1745-A-E



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High pulse (wound)



Body temperature should follow the description below:

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

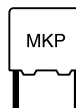
When SMD components are used together with leaded ones, the film capacitors should not pass into the SMD adhesive curing oven. The leaded components should be assembled after the SMD curing step.

Leaded film capacitors are not suitable for reflow soldering.

For uncoated MKT capacitors with lead spacings $\leq 10\text{ mm}$ (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 EPCOS Film Capacitor Data Book in case more details are needed.

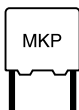


Cautions and warnings

- 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.

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. EPCOS offers film capacitors specially designed for operation under more severe vibration regimes such as those found in automotive applications. Consult our catalog "Film Capacitors for Automotive Electronics".	5.2 "Resistance to vibration"



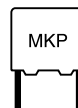
B32651 ... B32656

High pulse (wound)

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"

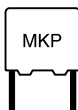
Display of ordering codes for EPCOS products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications and the website of EPCOS, 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.epcos.com/orderingcodes.



Symbols and terms

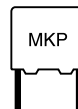
Symbol	English	German
α	Heat transfer coefficient	Wärmeübergangszahl
α_C	Temperature coefficient of capacitance	Temperaturkoeffizient der Kapazität
A	Capacitor surface area	Kondensatoroberfläche
β_C	Humidity coefficient of capacitance	Feuchtekoeffizient der Kapazität
C	Capacitance	Kapazität
C_R	Rated 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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High pulse (wound)

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 (Feuchtest)
t	Time	Zeit
T	Temperature	Temperatur
τ	Time constant	Zeitkonstante
$\tan \delta$	Dissipation factor	Verlustfaktor
$\tan \delta_D$	Dielectric component of dissipation factor	Dielektrischer Anteil des Verlustfaktors
$\tan \delta_P$	Parallel component of dissipation factor	Parallelanteil des Verlustfaktors
$\tan \delta_S$	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	Betriebstemperatur
T_R	Rated temperature	Nenntemperatur
T_{ref}	Reference temperature	Referenztemperatur
t_{SL}	Reference service life	Referenz-Lebensdauer



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	Ausgangssspannung
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

Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of 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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