Metallized Polypropylene Film Capacitors (MKP) in Plastic Case

B 32 652 ... B 32 656

MKP wound capacitors
Very small dimensions

Construction

- Dielectric: polypropylene
- 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
- Very small dimensions

Typical applications

- TV S-correction
- TV flyback
- Electronic ballast circuits

Terminals

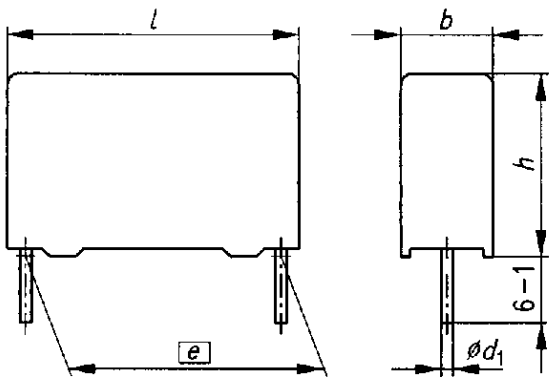
- Parallel wire leads, tinned
- Also available with (3,2 ± 0,3) mm lead length

Marking

Manufacturer's logo,
lot number for lead spacing ≤ 27,5 mm
style (MKP),
rated capacitance (coded),
capacitance tolerance (code letter),
rated dc voltage,
date of manufacture (coded)

Delivery mode

Bulk
Taped (Ammo pack or reel)
For notes on taping refer to page 278.



KMK0200-U

Dimensions in mm

Lead spacing e ± 0,4	Diameter d_1	Type
15,0	0,8	B 32 652
22,5	0,8	B 32 653
27,5	0,8	B 32 654
37,5	1,0	B 32 656

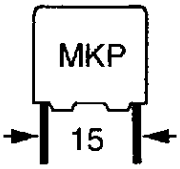
MKP

B 32 652 ... B 32 656

Overview of available types

Lead spacing	15 mm	22,5 mm	27,5 mm	37,5 mm
Type	B 32 652	B 32 653	B 32 654	B 32 656
Page	121	122	124	125

	15 mm						22,5 mm							27,5 mm							37,5 mm		
1,0 nF													2000 V_{dc}										
1,5 nF																							
2,2 nF																							
3,3 nF						1600 V_{dc}																	
4,7 nF					1250 V_{dc}																		
6,8 nF												1600 V_{dc}											
10 nF				1000 V_{dc}																			
15 nF											1250 V_{dc}								2000 V_{dc}				
22 nF																		1600 V_{dc}					
33 nF			630 V_{dc}							1000 V_{dc}							1250 V_{dc}						
47 nF									630 V_{dc}							1000 V_{dc}							
68 nF		400 V_{dc}						400 V_{dc}							630 V_{dc}								
0,10 µF							250 V_{dc}							400 V_{dc}							1000 V_{dc}		
0,15 µF	250 V_{dc}																					1250 V_{dc}	
0,22 µF																							
0,33 µF																							
0,47 µF																							
0,68 µF																							
1,0 µF																							
1,5 µF																							
2,2 µF																							
3,3 µF																							
4,7 µF																							

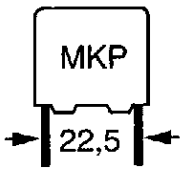


Ordering codes and packing units, lead spacing 15 mm

V_R (V_{rms} $f \leq 1$ kHz)	C_R	Maximum dimensions $b \times h \times l$ (mm)	Ordering code[1)]	Packing units (pcs)		
				Ammo pack	Reel	Untaped
250 V_{dc} (160 V_{ac})	0,15 µF	5,0 × 10,5 × 18,0	B32652-A3154-+***	1180	1300	1000
	0,22 µF	6,0 × 11,0 × 18,0	B32652-A3224-+***	1000	1100	1000
	0,33 µF	7,0 × 12,5 × 18,0	B32652-A3334-+***	840	900	1000
	0,47 µF	8,5 × 14,5 × 18,0	B32652-A3474-+***	690	700	500
	0,68 µF	9,0 × 17,5 × 18,0	B32652-A3684-+***	660	700	500
400 V_{dc} (200 V_{ac})	68 nF	5,0 × 10,5 × 18,0	B32652-A4683-+***	1180	1300	1000
	0,10 µF	5,0 × 10,5 × 18,0	B32652-A4104-+***	1180	1300	1000
	0,15 µF	6,0 × 11,0 × 18,0	B32652-A4154-+***	1000	1100	1000
	0,22 µF	7,0 × 12,5 × 18,0	B32652-A4224-+***	840	900	1000
	0,33 µF	8,5 × 14,5 × 18,0	B32652-A4334-+***	690	700	500
	0,47 µF	9,0 × 17,5 × 18,0	B32652-A4474-+***	660	700	500
630 V_{dc} (250 V_{ac})	33 nF	5,0 × 10,5 × 18,0	B32652-A6333-+***	1180	1300	1000
	47 nF	5,0 × 10,5 × 18,0	B32652-A6473-+***	1180	1300	1000
	68 nF	6,0 × 11,0 × 18,0	B32652-A6683-+***	1000	1100	1000
	0,10 µF	7,0 × 12,5 × 18,0	B32652-A6104-+***	840	900	1000
	0,15 µF	8,5 × 14,5 × 18,0	B32652-A6154-+***	690	700	500
	0,22 µF	9,0 × 17,5 × 18,0	B32652-A6224-+***	660	700	500
1000 V_{dc} (250 V_{ac})	10 nF	5,0 × 10,5 × 18,0	B32652-A103-+***	1180	1300	1000
	15 nF	5,0 × 10,5 × 18,0	B32652-A153-+***	1180	1300	1000
	22 nF	5,0 × 10,5 × 18,0	B32652-A223-+***	1180	1300	1000
	33 nF	6,0 × 11,0 × 18,0	B32652-A333-+***	1000	1100	1000
	47 nF	7,0 × 12,5 × 18,0	B32652-A473-+***	840	900	1000
	68 nF	8,5 × 14,5 × 18,0	B32652-A683-+***	690	700	500
	0,10 µF	9,0 × 17,5 × 18,0	B32652-A104-+***	660	700	500
1250 V_{dc} (500 V_{ac})	6,8 nF	5,0 × 10,5 × 18,0	B32652-A7682-+***	1180	1300	1000
	10 nF	6,0 × 11,0 × 18,0	B32652-A7103-+***	1000	1100	1000
	15 nF	7,0 × 12,5 × 18,0	B32652-A7153-+***	840	900	1000
	22 nF	8,5 × 14,5 × 18,0	B32652-A7223-+***	690	700	500
	33 nF	9,0 × 17,5 × 18,0	B32652-A7333-+***	660	700	500
1600 V_{dc} (500 V_{ac})	3,3 nF	5,0 × 10,5 × 18,0	B32652-A1332-+***	1180	1300	1000
	4,7 nF	6,0 × 11,0 × 18,0	B32652-A1472-+***	1000	1100	1000
	6,8 nF	7,0 × 12,5 × 18,0	B32652-A1682-+***	840	900	1000
	10 nF	8,5 × 14,5 × 18,0	B32652-A1103-+***	690	700	500
	15 nF	9,0 × 17,5 × 18,0	B32652-A1153-+***	660	700	500

Capacitance tolerance: ±10 % ≙ K, ±5 % ≙ J, (±3,5 % upon request)

1) Replace the + by the code letter for the required capacitance tolerance
Replace the *** by the code number for the required packing Ammo pack = 289, reel = 189 (taping cf p 278)
The ordering code for untaped components ends after the tolerance code letter.
For capacitors with 3,2 mm lead length, append code number "3" to the tolerance code, e.g. B32652-A4104-K3

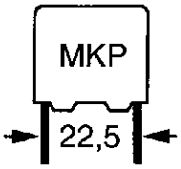


B 32 653

Ordering codes and packing units, lead spacing 22,5 mm

V_R (V_{rms} $f \leq 1$ kHz)	C_R	Maximum dimensions $b \times h \times l$ (mm)	Ordering code[1]	Packing units (pcs)		
				Ammo pack	Reel	Untaped
250 V_{dc} (160 V_{ac})	0,22 µF	6,0 × 15,0 × 26,5	B32653-A3224-+***	690	700	720
	0,33 µF	6,0 × 15,0 × 26,5	B32653-A3334-+***	690	700	720
	0,47 µF	7,0 × 16,0 × 26,5	B32653-A3474-+***	590	600	630
	0,68 µF	8,5 × 16,5 × 26,5	B32653-A3684-+***	500	500	510
	1,0 µF	10,5 × 16,5 × 26,5	B32653-A3105-+***	400	400	540
400 V_{dc} (200 V_{ac})	0,15 µF	6,0 × 15,0 × 26,5	B32653-A4154-+***	690	700	720
	0,22 µF	6,0 × 15,0 × 26,5	B32653-A4224-+***	690	700	720
	0,33 µF	7,0 × 16,0 × 26,5	B32653-A4334-+***	590	600	630
	0,47 µF	8,5 × 16,5 × 26,5	B32653-A4474-+***	500	500	510
	0,68 µF	10,5 × 16,5 × 26,5	B32653-A4684-+***	400	400	540
	1,0 µF	11,0 × 20,5 × 26,5	B32653-A4105-+***	380	350	510
630 V_{dc} (250 V_{ac})	0,10 µF	6,0 × 15,0 × 26,5	B32653-A6104-+***	690	700	720
	0,15 µF	6,0 × 15,0 × 26,5	B32653-A6154-+***	690	700	720
	0,22 µF	8,5 × 16,5 × 26,5	B32653-A6224-+***	500	500	510
	0,33 µF	10,5 × 16,5 × 26,5	B32653-A6334-+***	400	400	540
	0,47 µF	11,0 × 20,5 × 26,5	B32653-A6474-+***	380	350	510
1000 V_{dc} (250 V_{ac})	33 nF	6,0 × 15,0 × 26,5	B32653-A333-+***	690	700	720
	47 nF	6,0 × 15,0 × 26,5	B32653-A473-+***	690	700	720
	68 nF	6,0 × 15,0 × 26,5	B32653-A683-+***	690	700	720
	0,10 µF	8,5 × 16,5 × 26,5	B32653-A104-+***	500	500	510
	0,15 µF	10,5 × 16,5 × 26,5	B32653-A154-+***	400	400	540
	0,22 µF	11,0 × 20,5 × 26,5	B32653-A224-+***	380	350	510
1250 V_{dc} (500 V_{ac})	22 nF	6,0 × 15,0 × 26,5	B32653-A7223-+***	690	700	720
	33 nF	6,0 × 15,0 × 26,5	B32653-A7333-+***	690	700	720
	47 nF	8,5 × 16,5 × 26,5	B32653-A7473-+***	500	500	510
	68 nF	10,5 × 16,5 × 26,5	B32653-A7683-+***	400	400	540
	0,10 µF	11,0 × 20,5 × 26,5	B32653-A7104-+***	380	350	510

1) For instructions on how to determine the ordering code refer to page 123.

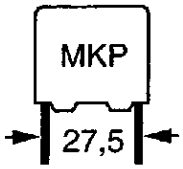


Ordering codes and packing units, lead spacing 22,5 mm

V_R (V_{rms} $f \leq 1$ kHz)	C_R	Maximum dimensions $b \times h \times l$ (mm)	Ordering code[1)]	Packing units (pcs)		
				Ammo pack	Reel	Untaped
1600 V_{dc} (500 V_{ac})	6,8 nF	6,0 × 15,0 × 26,5	B32653-A1682-+***	690	700	720
	10 nF	6,0 × 15,0 × 26,5	B32653-A1103-+***	690	700	720
	15 nF	7,0 × 16,0 × 26,5	B32653-A1153-+***	590	600	630
	22 nF	8,5 × 16,5 × 26,5	B32653-A1223-+***	500	500	510
	33 nF	10,5 × 16,5 × 26,5	B32653-A1333-+***	400	400	540
	47 nF	11,0 × 20,5 × 26,5	B32653-A1473-+***	380	350	510
2000 V_{dc} (700 V_{ac})	1,0 nF	6,0 × 15,0 × 26,5	B32653-A2102-+***	690	700	720
	1,5 nF	6,0 × 15,0 × 26,5	B32653-A2152-+***	690	700	720
	2,2 nF	6,0 × 15,0 × 26,5	B32653-A2222-+***	690	700	720
	3,3 nF	6,0 × 15,0 × 26,5	B32653-A2332-+***	690	700	720
	4,7 nF	6,0 × 15,0 × 26,5	B32653-A2472-+***	690	700	720
	6,8 nF	8,5 × 16,5 × 26,5	B32653-A2682-+***	500	500	510
	10 nF	10,5 × 16,5 × 26,5	B32653-A2103-+***	400	400	540
	15 nF	11,0 × 20,5 × 26,5	B32653-A2153-+***	380	350	510

Capacitance tolerance: ±10 % ≙ K, ±5 % ≙ J, (±3,5 % upon request)

1) Replace the + by the code letter for the required capacitance tolerance
Replace the *** by the code number for the required packing: Ammo pack = 289, reel = 189 (taping cf. p. 278)
The ordering code for untaped components ends after the tolerance code letter.
For capacitors with 3,2 mm lead length, append code number "3" to the tolerance code, e.g B32653-A1682-K3



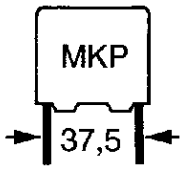
B 32 654

Ordering codes and packing units, lead spacing 27,5 mm

V_R (V_{rms} $f \leq 1$ kHz)	C_R	Maximum dimensions $b \times h \times l$ (mm)	Ordering code[1]	Packing units (pcs)		
				Ammo pack	Reel	Untaped
250 V_{dc} (160 V_{ac})	1,5 µF	11,0 × 21,0 × 31,5	B32654-A3155-+***	–	350	320
	2,2 µF	12,5 × 21,5 × 31,5	B32654-A3225-+***	–	300	280
	3,3 µF	15,0 × 24,5 × 31,5	B32654-A3335-+***	–	–	240
	4,7 µF	18,0 × 27,5 × 31,5	B32654-A3475-+***	–	–	200
400 V_{dc} (200 V_{ac})	1,0 µF	11,0 × 21,0 × 31,5	B32654-A4105-+***	–	350	320
	1,5 µF	12,5 × 21,5 × 31,5	B32654-A4155-+***	–	300	280
	2,2 µF	14,0 × 24,5 × 31,5	B32654-A4225-+***	–	–	260
	3,3 µF	19,0 × 30,0 × 31,5	B32654-A4335-+***	–	–	180
630 V_{dc} (250 V_{ac})	0,68 µF	11,0 × 21,0 × 31,5	B32654-A6684-+***	–	350	320
	1,0 µF	13,5 × 23,0 × 31,5	B32654-A6105-+***	–	250	260
	1,5 µF	18,0 × 27,5 × 31,5	B32654-A6155-+***	–	–	200
1000 V_{dc} (250 V_{ac})	0,22 µF	11,0 × 21,0 × 31,5	B32654-A224-+***	–	350	320
	0,33 µF	11,0 × 21,0 × 31,5	B32654-A334-+***	–	350	320
	0,47 µF	14,0 × 24,5 × 31,5	B32654-A474-+***	–	–	260
	0,68 µF	18,0 × 27,5 × 31,5	B32654-A684-+***	–	–	200
1250 V_{dc} (500 V_{ac})	0,10 µF	11,0 × 21,0 × 31,5	B32654-A7104-+***	–	350	320
	0,15 µF	11,0 × 21,0 × 31,5	B32654-A7154-+***	–	350	320
	0,22 µF	14,0 × 24,5 × 31,5	B32654-A7224-+***	–	–	260
	0,33 µF	18,0 × 27,5 × 31,5	B32654-A7334-+***	–	–	200
1600 V_{dc} (500 V_{ac})	47 nF	11,0 × 21,0 × 31,5	B32654-A1473-+***	–	350	320
	68 nF	11,0 × 21,0 × 31,5	B32654-A1683-+***	–	350	320
	0,10 µF	14,0 × 24,5 × 31,5	B32654-A1104-+***	–	–	260
	0,15 µF	18,0 × 27,5 × 31,5	B32654-A1154-+***	–	–	200
2000 V_{dc} (700 V_{ac})	22 nF	11,0 × 21,0 × 31,5	B32654-A2223-+***	–	350	320
	33 nF	13,5 × 23,0 × 31,5	B32654-A2333-+***	–	250	260
	47 nF	18,0 × 27,5 × 31,5	B32654-A2473-+***	–	–	200
	68 nF	19,0 × 30,0 × 31,5	B32654-A2683-+***	–	–	180

Capacitance tolerance: ±10 % ≙ K, ±5 % ≙ J, (±3,5 % upon request)

1) Replace the + by the code letter for the required capacitance tolerance
Replace the *** by the code number for the required packing: reel = 189 (taping cf. p. 278)
The ordering code for untaped components ends after the tolerance code letter
For capacitors with 3,2 mm lead length, append code number "3" to the tolerance code, e g · B32654-A4105-K3



Ordering codes and packing units, lead spacing 37,5 mm

V_R (V_{rms} $f \leq 1$ kHz)	C_R	Maximum dimensions $b \times h \times l$ (mm)	Ordering code[1]	Packing units (pcs)		
				Ammo pack	Reel	Untaped
1000 V_{dc} (500 V_{ac})	0,47 µF	14,0 × 25,0 × 41,5	B32656-A474-+	–	–	40
	0,68 µF	16,0 × 28,5 × 41,5	B32656-A684-+	–	–	35
	1,0 µF	20,0 × 39,5 × 41,5	B32656-A105-+	–	–	30
1250 V_{dc} (500 V_{ac})	0,33 µF	16,0 × 28,5 × 41,5	B32656-A7334-+	–	–	35
	0,47 µF	18,0 × 32,5 × 41,5	B32656-A7474-+	–	–	30
	0,68 µF	20,0 × 39,5 × 41,5	B32656-A7684-+	–	–	30

Capacitance tolerance: ±10 % ≙ K, ±5 % ≙ J, (±3,5 % upon request)

1) Replace the + by the code letter for the required capacitance tolerance
For capacitors with 3,2 mm wire leads, append code number "3" to the tolerance code, e.g · B32656-A474-K3

B 32 652 ... B 32 656

Technical data

Climatic category in accordance with IEC 68-1	55/100/56		
Lower category temperature T_{min}	– 55 °C		
Upper category temperature T_{max}	+ 100 °C		
Damp heat test	56 days/40 °C/93 % relative humidity		
Limit values after damp heat test	Capacitance change $\lvert\Delta C/C\rvert$	≤ 3 %	
	Dissipation factor change $\Delta \tan \delta$	≤ $0{,}5 \cdot 10^{-3}$ (at 1 kHz)	
		≤ $1{,}0 \cdot 10^{-3}$ (at 10 kHz)	
	Insulation resistance R_{is} or time constant $\tau = C_R \cdot R_{is}$	≥ 50 % of minimum as-delivered values	
Reliability:			
Reference conditions	$0{,}5 \cdot V_R$; 40 °C		
Failure rate	$1 \cdot 10^{-9}$/h = 1 fit		
	For a conversion table for other operating conditions and temperatures refer to page 273.		
Service life	200 000 h		
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	> 4 · upper limit values	
	Insulation resistance R_{is}	< 1500 MΩ	($C_R \leq 0{,}33$ µF)
	or time constant $\tau = C_R \cdot R_{is}$	< 500 s	($C_R > 0{,}33$ µF)
DC test voltage	$1{,}6 \cdot V_R$, 2 s		
Category voltage V_C Operation with dc voltage or ac voltage V_{rms} up to 1 kHz	$T \leq$ 85 °C: $V_C = 1{,}0 \cdot V_R$ or $1{,}0 \cdot V_{rms}$ T = 100 °C: $V_C = 0{,}7 \cdot V_R$ or $0{,}7 \cdot V_{rms}$		

Dissipation factor tan δ (in 10^{-3}) at 20 °C (upper limit values)

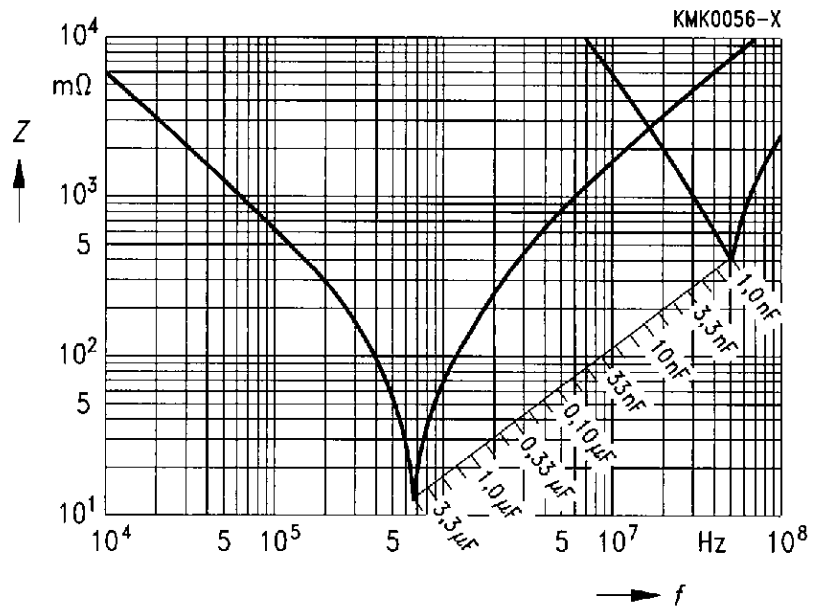
	$C_R \leq 0{,}1$ µF	0,1 µF < $C_R \leq$ 1 µF	$C_R >$ 1 µF
at 1 kHz	–	0,5	0,5
10 kHz	–	0,8	1,5
100 kHz	5,0	–	–

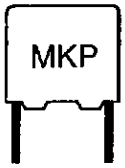
Insulation resistance R_{is} or time constant $\tau = C_R \cdot R_{is}$ at 20 °C, rel. humidity ≤ 65 % (minimum as-delivered values)

$C_R \leq 0{,}33$ µF	$C_R > 0{,}33$ µF
100 GΩ	30 000 s

MKP

Impedance Z
versus
frequency f
(typical values)





B 32 652 ... B 32 656

Pulse handling capability

Maximum permissible voltage change per unit of time for non-sinusoidal voltages (pulse, sawtooth)

V_R	Max. rate of voltage rise V_{pp}/τ in V/µs (for $V_{pp} = V_R$)			
	Lead spacing			
	15 mm	22,5 mm	27,5 mm	37,5 mm
250 V_{dc}	140	80	50	–
400 V_{dc}	200	100	70	–
630 V_{dc}	270	140	100	–
1000 V_{dc}	400	230	150	90
1250 V_{dc}	800	500	400	140
1600 V_{dc}	1500	1000	700	–
2000 V_{dc}	–	1400	900	–

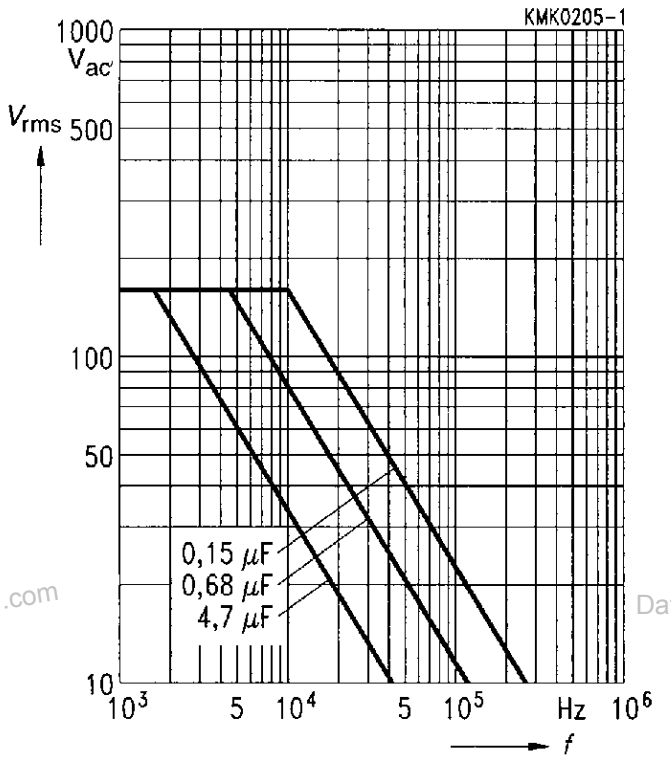
For $V_{pp} < V_R$, the permissible voltage rise rate value V_{pp}/τ may be multiplied by the factor V_R/V_{pp}. Also refer to the calculation example on page 246.

V_R	Pulse characteristic k_0 in $V^2/\mu s$ (for $V_{pp} \leq V_R$)			
	Lead spacing			
	15 mm	22,5 mm	27,5 mm	37,5 mm
250 V_{dc}	70 000	40 000	25 000	–
400 V_{dc}	160 000	80 000	55 000	–
630 V_{dc}	340 000	170 000	120 000	–
1000 V_{dc}	800 000	450 000	300 000	180 000
1250 V_{dc}	2 000 000	1 250 000	1 000 000	350 000
1600 V_{dc}	4 800 000	3 200 000	2 200 000	–
2000 V_{dc}	–	5 600 000	3 600 000	–

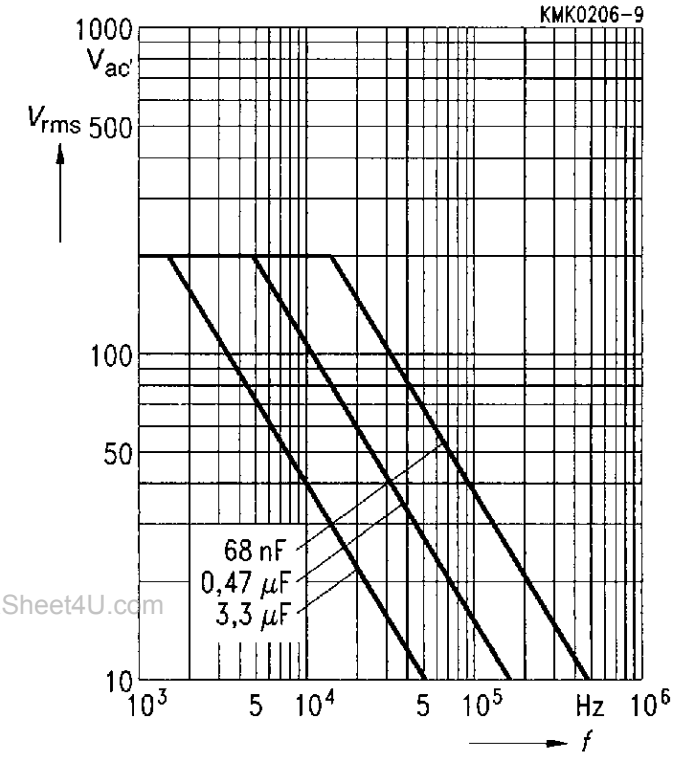
Permissible ac voltage V_{rms} versus frequency f

Lead spacing 15 ... 37,5 mm

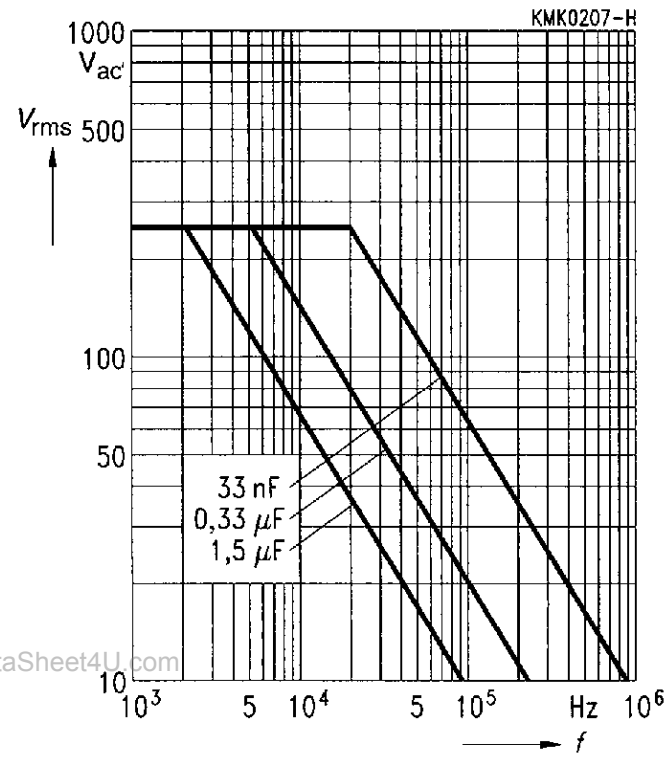
250 V_{dc} / 160 V_{ac}



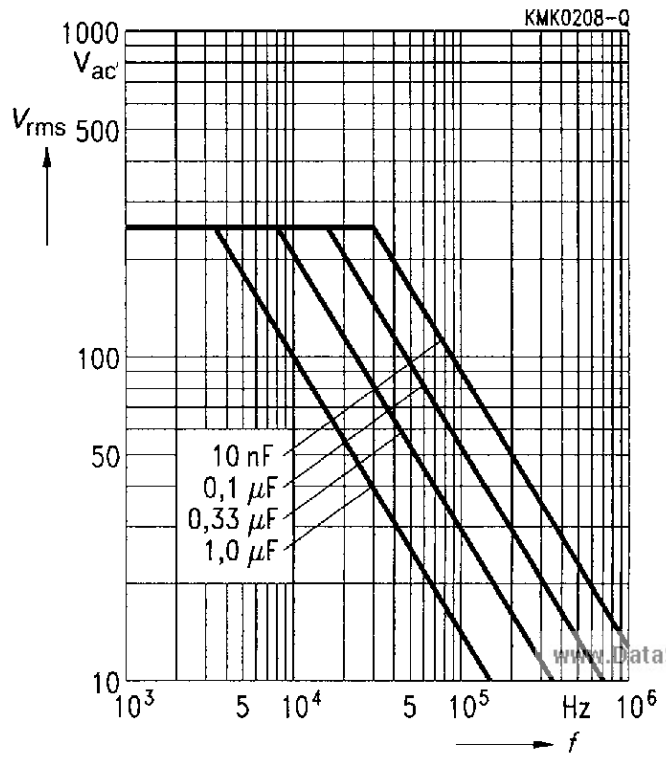
400 V_{dc} / 200 V_{ac}



630 V_{dc} / 250 V_{ac}



1000 V_{dc} / 250 V_{ac}



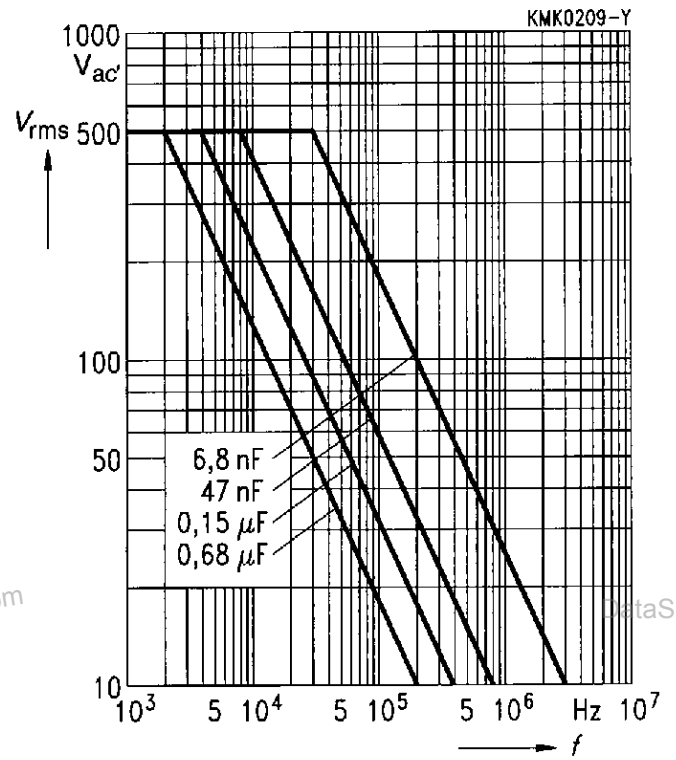
MKP

B 32 652 ... B 32 656

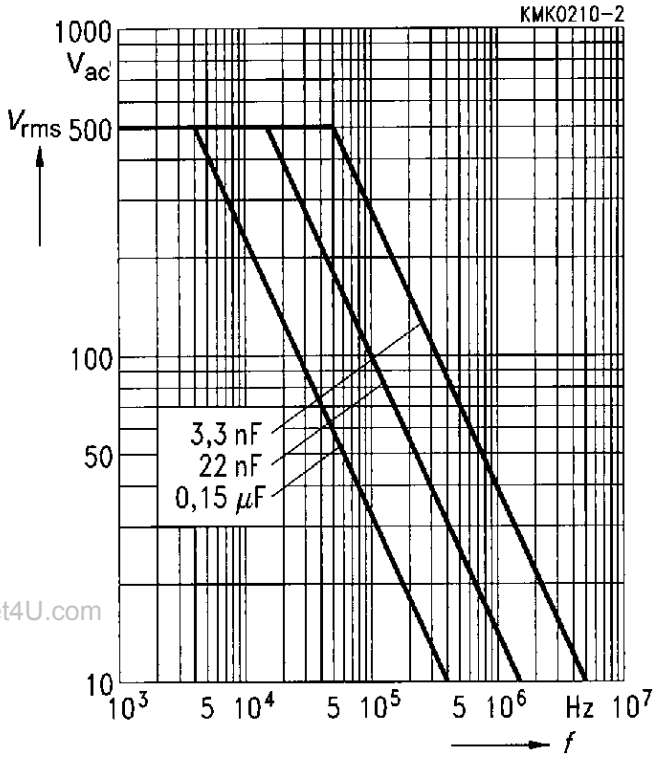
Permissible ac voltage V_{rms} versus frequency f

Lead spacing 15 ... 37,5 mm

1250 V_{dc} / 500 V_{ac}



1600 V_{dc} / 500 V_{ac}



2000 V_{dc} / 700 V_{ac}