



Metallized Polypropylene Film Capacitors (MFP)

B 32 632

Coated (Powder Dipped)

... B 32 634

MFP pulse capacitors with highest possible contact reliability

Construction

- Dielectric: polypropylene
- Film metallized on one side and metal foils internally connected in series
- Contact layer of sprayed metal
- Wound capacitor technology
- Epoxy resin coating (UL 94 V-0)

Features

- Very high pulse strength
- Highest possible contact reliability
- Self-healing properties

Typical applications

- Pulse circuits with steep voltage rise rates
- High-frequency ac current loads
- Flyback in monitors

Terminals

- Crimped wire leads, tinned, lead length (6 – 1) mm or min. 20 mm
- Double crimped wire leads, tinned
- Different lead spacings (reduced and enlarged) available, lead length (6 – 1) mm

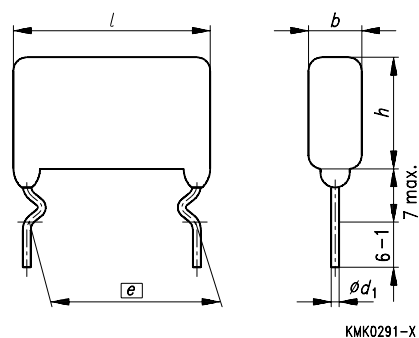
Marking

Manufacturer's logo,
style and type (P6xx),
rated capacitance,
capacitance tolerance (code letter),
rated dc voltage,
date of manufacture (coded)

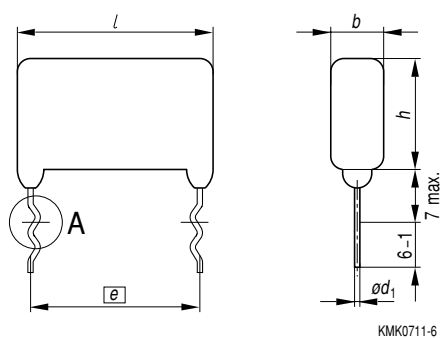
Delivery mode

Bulk (untaped)
Taped (Ammo pack or reel)
For notes on taping,
[refer to chapter "Taping and packing", page 274.](#)

Crimped version



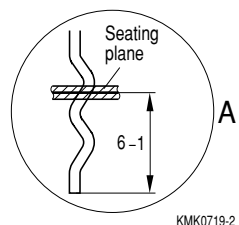
Double crimped version



Dimensions in mm

Lead spacing $e \pm 0,8$	Diameter d_1	Type
15,0	0,8	B 32 632
22,5	0,8	B 32 633
27,5	0,8	B 32 634

Detail of double crimped version





B 32 632

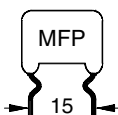
... B 32 634

MFP



Overview of available types and lead configurations

Lead spacing	15 mm					22,5 mm					27,5 mm				
Type	B 32 632					B 32 633					B 32 634				
Page	198					200					202				
0,22 nF															
0,33 nF															
0,47 nF															
0,68 nF															
1,0 nF															
1,5 nF															
2,2 nF															
3,3 nF															
4,7 nF															
6,8 nF															
10 nF															
15 nF															
22 nF															
33 nF															
47 nF															
68 nF															
0,10 µF															
0,15 µF															
0,22 µF															
0,33 µF															
Standard lead spacing															
Reduced lead spacing	7,5 mm 10 mm 12,5 mm					17,5 mm 20 mm					25 mm				
Enlarged lead spacing	17,5 mm					25 mm					25 mm				
Double crimped version															



B 32 632

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	Packing unit (pcs)		
				Ammo pack	Reel	Untaped
630 Vdc (300 Vac)	2,2 nF	6,0 × 11,5 × 19,0	B32632-A6222-+***	960	1100	1000
	3,3 nF	6,0 × 11,5 × 19,0	B32632-A6332-+***	960	1100	1000
	4,7 nF	6,0 × 11,5 × 19,0	B32632-A6472-+***	960	1100	1000
	6,8 nF	6,0 × 11,5 × 19,0	B32632-A6682-+***	960	1100	1000
	10 nF	6,0 × 11,5 × 19,0	B32632-A6103-+***	960	1100	1000
	15 nF	7,0 × 12,0 × 19,0	B32632-A6153-+***	830	900	1000
	22 nF	8,0 × 13,5 × 19,0	B32632-A6223-+***	680	700	1000
	33 nF	9,5 × 15,5 × 19,0	B32632-A6333-+***	640	700	500
1250 Vdc (450 Vac)	47 nF	12,0 × 17,0 × 19,0	B32632-A6473-+***	480	550	500
	1,0 nF	6,5 × 11,5 × 19,0	B32632-A7102-+***	960	1100	1000
	1,5 nF	6,5 × 11,5 × 19,0	B32632-A7152-+***	960	1100	1000
	2,2 nF	6,5 × 12,0 × 19,0	B32632-A7222-+***	960	1100	1000
	3,3 nF	7,0 × 12,5 × 19,0	B32632-A7332-+***	830	900	1000
	4,7 nF	7,0 × 12,5 × 19,0	B32632-A7472-+***	830	900	1000
	6,8 nF	7,5 × 14,0 × 19,0	B32632-A7682-+***	830	900	1000
	10 nF	9,0 × 15,5 × 19,0	B32632-A7103-+***	640	700	500
1600 Vdc (450 Vac)	15 nF	12,0 × 16,5 × 19,0	B32632-A7153-+***	480	550	500
	0,33 nF	6,0 × 11,5 × 19,0	B32632-A1331-+***	960	1100	1000
	0,47 nF	6,0 × 11,5 × 19,0	B32632-A1471-+***	960	1100	1000
	0,68 nF	6,0 × 11,5 × 19,0	B32632-A1681-+***	960	1100	1000
	1,0 nF	6,0 × 11,5 × 19,0	B32632-A1102-+***	960	1100	1000
	1,5 nF	6,0 × 11,5 × 19,0	B32632-A1152-+***	960	1100	1000
	2,2 nF	7,0 × 12,0 × 19,0	B32632-A1222-+***	830	900	1000
	3,3 nF	8,0 × 13,5 × 19,0	B32632-A1332-+***	680	700	1000
	4,7 nF	9,5 × 15,5 × 19,0	B32632-A1472-+***	640	700	1000
	6,8 nF	10,5 × 16,0 × 19,0	B32632-A1682-+***	570	630	500
*** Code number for packing + Code letter for capacitance tolerance	10 nF	12,5 × 17,5 × 19,0	B32632-A1103-+***	480	550	500
				289	189	see table below

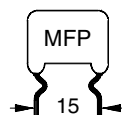
Capacitance tolerance: $\pm 10\% \triangleq K$, $\pm 5\% \triangleq J$, $\pm 3,5\% \triangleq A$ ($\pm 2,5\%$ upon request)

*** Code number for untaped versions (for Ammo pack and reel see table above):

Untaped versions (bulk)	Enlarged, standard or reduced lead spacings				
	7,5 mm	10 mm	12,5 mm	15,0 mm	17,5 mm
Lead length (6 – 1) mm	030	040	050	010	060
Lead length min. 20 mm				011	
Double crimped version, lead length (6 – 1) mm				020	



B 32 632



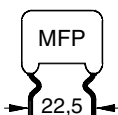
Ordering codes and packing units, lead spacing 15 mm

V_R (V_{rms} , $f \leq 1$ kHz)	C_R	Maximum dimensions $b \times h \times l$ (mm)	Ordering code	Packing unit (pcs)		
				Ammo pack	Reel	Untaped
2000 Vdc (500 Vac)	0,22 nF	6,5 × 11,5 × 19,0	B32632-A2221-+***	960	1100	1000
	0,33 nF	6,5 × 11,5 × 19,0	B32632-A2331-+***	960	1100	1000
	0,47 nF	6,5 × 11,5 × 19,0	B32632-A2471-+***	960	1100	1000
	0,68 nF	6,5 × 12,5 × 19,0	B32632-A2681-+***	960	1100	1000
	1,0 nF	6,5 × 12,5 × 19,0	B32632-A2102-+***	960	1100	1000
	1,5 nF	6,5 × 12,5 × 19,0	B32632-A2152-+***	960	1100	1000
	2,2 nF	7,0 × 13,5 × 19,0	B32632-A2222-+***	830	900	500
	3,3 nF	8,5 × 15,0 × 19,0	B32632-A2332-+***	640	700	500
	4,7 nF	10,5 × 16,0 × 19,0	B32632-A2472-+***	570	630	500
	6,8 nF	12,5 × 17,5 × 19,0	B32632-A2682-+***	480	550	500
3000 Vdc (800 Vac)	0,47 nF	5,5 × 11,0 × 19,0	B32632-S4471-+***	1170	1300	1000
	0,68 nF	6,0 × 12,0 × 19,0	B32632-S4681-+***	960	1100	1000
	1,0 nF	7,5 × 13,0 × 19,0	B32632-S4102-+***	830	900	500
	1,5 nF	8,5 × 14,5 × 19,0	B32632-S4152-+***	680	700	500
	2,2 nF	10,5 × 16,0 × 19,0	B32632-S4223-+***	570	630	500
	3,3 nF	12,5 × 18,0 × 19,0	B32632-S4332-+***	480	550	500
*** Code number for packing				289	189	see table below
+ Code letter for capacitance tolerance						

Capacitance tolerance: $\pm 10\% \hat{=} K$, $\pm 5\% \hat{=} J$, $\pm 3,5\% \hat{=} A$ ($\pm 2,5\%$ upon request)

*** Code number for untaped versions (for Ammo pack and reel see table above):

Untaped versions (bulk)	Enlarged, standard or reduced lead spacings				
	7,5 mm	10 mm	12,5 mm	15,0 mm	17,5 mm
Lead lengths (6 – 1) mm	030	040	050	010	060
Lead length min. 20 mm				011	
Double crimped version, lead length (6 – 1) mm				020	



B 32 633

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	Packing unit (pcs)		
				Ammo pack	Reel	Untaped
630 Vdc (300 Vac)	22 nF	6,5 × 12,5 × 27,5	B32633-A6223-+***	680	700	1000
	33 nF	7,0 × 15,0 × 27,5	B32633-A6333-+***	580	600	500
	47 nF	8,0 × 17,0 × 27,5	B32633-A6473-+***	480	550	500
	68 nF	9,5 × 17,5 × 27,5	B32633-A6683-+***	390	400	500
	0,10 µF	11,5 × 19,5 × 27,5	B32633-A6104-+***	370	350	250
1250 Vdc (450 Vac)	10 nF	7,0 × 15,0 × 27,5	B32633-A7103-+***	580	600	500
	15 nF	8,0 × 16,0 × 27,5	B32633-A7153-+***	480	500	500
	22 nF	10,0 × 17,5 × 27,5	B32633-A7223-+***	390	400	500
	33 nF	12,0 × 19,5 × 27,5	B32633-A7333-+***	310	320	250
	47 nF	14,0 × 21,0 × 27,5	B32633-A7473-+***	230	240	250
1600 Vdc (450 Vac)	3,3 nF	7,0 × 13,0 × 27,5	B32633-A1332-+***	580	600	1000
	4,7 nF	7,0 × 13,0 × 27,5	B32633-A1472-+***	580	600	1000
	6,8 nF	7,0 × 16,0 × 27,5	B32633-A1682-+***	580	600	500
	10 nF	8,0 × 17,0 × 27,5	B32633-A1103-+***	480	500	500
	15 nF	9,5 × 17,5 × 27,5	B32633-A1153-+***	390	400	250
	22 nF	11,5 × 19,5 × 27,5	B32633-A1223-+***	310	320	250
	33 nF	15,5 × 22,5 × 27,5	B32633-A1333-+***	220	230	250
2000 Vdc (500 Vac)	2,2 nF	7,0 × 14,0 × 27,5	B32633-A2222-+***	580	600	1000
	3,3 nF	7,0 × 14,0 × 27,5	B32633-A2332-+***	580	600	1000
	4,7 nF	7,0 × 15,5 × 27,5	B32633-A2472-+***	580	600	500
	6,8 nF	9,0 × 16,5 × 27,5	B32633-A2682-+***	390	400	500
	10 nF	10,5 × 17,5 × 27,5	B32633-A2103-+***	390	400	250
	15 nF	13,0 × 20,5 × 27,5	B32633-A2153-+***	310	320	250
	22 nF	15,5 × 22,5 × 27,5	B32633-A2223-+***	220	230	250
*** Code number for packing				289	189	see table below
+ Code letter for capacitance tolerance						

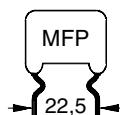
Capacitance tolerance: $\pm 10\% \triangleq K$, $\pm 5\% \triangleq J$, $\pm 3,5\% \triangleq A$ ($\pm 2,5\%$ upon request)

*** Code number for untaped versions (for Ammo pack and reel see table above):

Untaped versions (bulk)	Enlarged, standard or reduced lead spacings			
	17,5 mm	20 mm	22,5 mm	25 mm
Lead lengths (6 – 1) mm	060	070	010	080
Lead length min. 20 mm			011	
Double crimped version, lead length (6 – 1) mm			020	



B 32 633



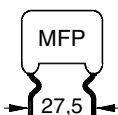
Ordering codes and packing units, lead spacing 22,5 mm

V_R (V_{rms} , $f \leq 1$ kHz)	C_R	Maximum dimensions $b \times h \times l$ (mm)	Ordering code	Packing unit (pcs)		
				Ammo pack	Reel	Untaped
2500 Vdc (750 Vac)	1,0 nF	$7,5 \times 14,0 \times 27,5$	B32633-A3102-+***	580	600	1000
	1,5 nF	$7,5 \times 15,0 \times 27,5$	B32633-A3152-+***	580	600	1000
	2,2 nF	$8,0 \times 16,0 \times 27,5$	B32633-A3222-+***	480	500	500
	3,3 nF	$9,5 \times 16,0 \times 27,5$	B32633-A3332-+***	390	400	500
	4,7 nF	$10,0 \times 18,5 \times 27,5$	B32633-A3472-+***	390	400	500
	6,8 nF	$12,0 \times 20,5 \times 27,5$	B32633-A3682-+***	310	320	250
	10 nF	$14,0 \times 23,0 \times 27,5$	B32633-A3103-+***	220	230	250
	15 nF	$17,0 \times 26,0 \times 27,5$	B32633-A3153-+***	200	200	200
3000 Vdc (800 Vac)	1,0 nF	$5,5 \times 12,0 \times 27,5$	B32633-S4102-+***	680	700	500
	1,5 nF	$6,5 \times 12,5 \times 27,5$	B32633-S4152-+***	680	700	500
	2,2 nF	$7,5 \times 14,0 \times 27,5$	B32633-S4223-+***	580	600	500
	3,3 nF	$9,0 \times 15,5 \times 27,5$	B32633-S4332-+***	480	500	500
	4,7 nF	$11,0 \times 17,0 \times 27,5$	B32633-S4472-+***	390	400	500
	6,8 nF	$13,0 \times 19,0 \times 27,5$	B32633-S4682-+***	370	350	200
*** Code number for packing				289	189	see table below
+ Code letter for capacitance tolerance						

Capacitance tolerance: $\pm 10\% \triangleq K$, $\pm 5\% \triangleq J$, $\pm 3,5\% \triangleq A$ ($\pm 2,5\%$ upon request)

*** Code number for untaped versions (for Ammo pack and reel see table above):

Untaped versions (bulk)	Enlarged, standard or reduced lead spacings			
	17,5 mm	20 mm	22,5 mm	25 mm
Lead lengths (6 – 1) mm	060	070	010	080
Lead length min. 20 mm			011	
Double crimped version, lead length (6 – 1) mm			020	



B 32 634

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	Packing unit (pcs) Untaped
630 Vdc (300 Vac)	0,10 μ F	9,5 $\times$ 18,0 $\times$ 32,5	B32634-A6104-+***	250
	0,15 μ F	12,0 $\times$ 22,0 $\times$ 32,5	B32634-A6154-+***	200
	0,22 μ F	13,5 $\times$ 22,5 $\times$ 32,5	B32634-A6224-+***	200
	0,33 μ F	16,0 $\times$ 25,5 $\times$ 32,5	B32634-A6334-+***	150
1250 Vdc (450 Vac)	33 nF	9,5 $\times$ 18,0 $\times$ 32,5	B32634-A7333-+***	250
	47 nF	11,5 $\times$ 20,0 $\times$ 32,5	B32634-A7473-+***	250
	68 nF	13,0 $\times$ 23,0 $\times$ 32,5	B32634-A7683-+***	200
	0,10 μ F	16,0 $\times$ 26,0 $\times$ 32,5	B32634-A7104-+***	150
1600 Vdc (450 Vac)	15 nF	8,5 $\times$ 17,0 $\times$ 32,5	B32634-A1153-+***	500
	22 nF	10,0 $\times$ 18,5 $\times$ 32,5	B32634-A1223-+***	250
	33 nF	12,0 $\times$ 22,0 $\times$ 32,5	B32634-A1333-+***	250
	47 nF	14,0 $\times$ 22,5 $\times$ 32,5	B32634-A1473-+***	200
	68 nF	16,0 $\times$ 25,5 $\times$ 32,5	B32634-A1683-+***	150
2000 Vdc (500 Vac)	10 nF	8,5 $\times$ 17,0 $\times$ 32,5	B32634-A2103-+***	500
	15 nF	10,0 $\times$ 20,0 $\times$ 32,5	B32634-A2153-+***	250
	22 nF	12,0 $\times$ 22,0 $\times$ 32,5	B32634-A2223-+***	250
	33 nF	15,0 $\times$ 25,0 $\times$ 32,5	B32634-A2333-+***	200

Capacitance tolerance: $\pm 10\% \hat{=}$ K, $\pm 5\% \hat{=}$ J, $\pm 3,5\% \hat{=}$ A ($\pm 2,5\%$ upon request)

+ Code letter for capacitance tolerance

*** Code number for untaped versions:

Untaped versions (bulk)	Enlarged, standard or reduced lead spacings	
	25 mm	27,5 mm
Lead lengths (6 – 1) mm	090	010
Lead length min. 20 mm		011
Double crimped version, lead length (6 – 1) mm		020



B 32 632

... B 32 634

MFP



Technical data

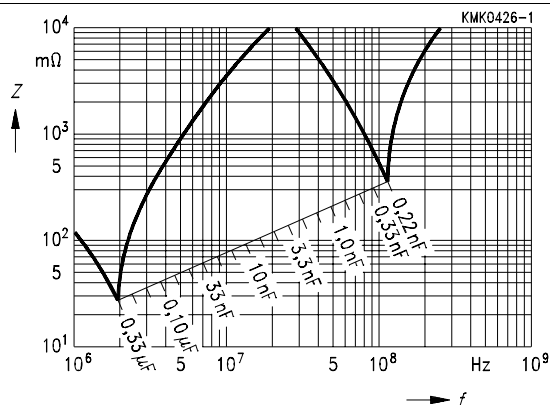
Climatic category in accordance with IEC 60068-1	55/100/56
Lower category temperature $T_{\min}$	– 55 °C
Upper category temperature $T_{\max}$	+ 100 °C
Damp heat test	56 days/40 °C/93 % relative humidity
Limit values after damp heat test	Capacitance change $ \Delta C/C $ $\leq 2 \%$ Dissipation factor change $\Delta \tan \delta$ $\leq 1,0 \cdot 10^{-3}$ (at 10 kHz) Insulation resistance R_{is} $\geq 50 \%$ of minimum as-delivered values
Reliability:	
Reference conditions	0,5 · V_R ; 40 °C
Failure rate	$2 \cdot 10^{-9}/\text{h} = 2 \text{ fit}$ For a conversion table for other operating conditions and temperatures, refer to chapter "Quality assurance", page 327 .
Service life	200 000 h
Failure criteria:	
Total failure	Short circuit or open circuit
Failure due to variation of parameters	Capacitance change $ \Delta C/C $ $> 10 \%$ Dissipation factor $\tan \delta$ $4 \cdot$ upper limit values Insulation resistance R_{is} $< 1500 \text{ M}\Omega$
DC test voltage	$2,0 \cdot V_R$, 2 s
Category voltage V_C Operation with dc voltage or ac voltage V_{rms} up to 1 kHz	$T \leq 85 \text{ °C}$: $V_C = 1,0 \cdot V_R$ or $1,0 \cdot V_{\text{rms}}$
Dissipation factor $\tan \delta$ at 20 °C (upper limit values)	$1,0 \cdot 10^{-3}$ (at 10 kHz)
Insulation resistance R_{is} at 20 °C, rel. humidity $\leq 65 \%$ (minimum as-delivered values)	100 G Ω



B 32 632 ...

B 32 634

Impedance Z
versus
frequency f
(typical values)



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/ μ s (for $V_{pp} = V_R$)		
	Lead spacing		
	15 mm	22,5 mm	27,5 mm
630 Vdc	5 000	3 000	2 000
1250 Vdc	12 000	7 000	4 500
1600 Vdc	14 000	9 000	5 500
2000 Vdc	17 000	12 000	7 000
2500 Vdc	—	14 000	—
3000 Vdc	18 000	15 000	—

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 in chapter “General technical information”, page 302.

V_R	Pulse characteristic k_0 in V ² / μ s (for $V_{pp} \leq V_R$)		
	Lead spacing		
	15 mm	22,5 mm	27,5 mm
630 Vdc	6 300 000	3 800 000	2 500 000
1250 Vdc	30 000 000	17 500 000	11 000 000
1600 Vdc	45 000 000	29 000 000	17 500 000
2000 Vdc	68 000 000	48 000 000	28 000 000
2500 Vdc	—	59 000 000	—
3000 Vdc	108 000 000	90 000 000	—



B 32 632

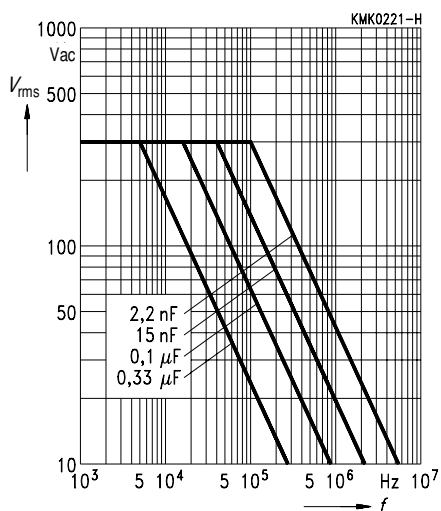
... B 32 634

MFP

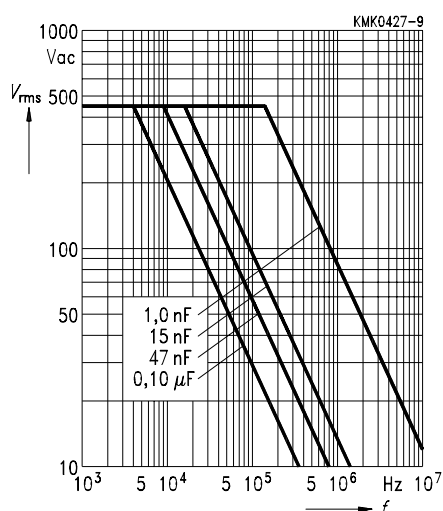
Permissible ac voltage V_{rms} versus frequency f

Lead spacing 15 ... 27,5 mm

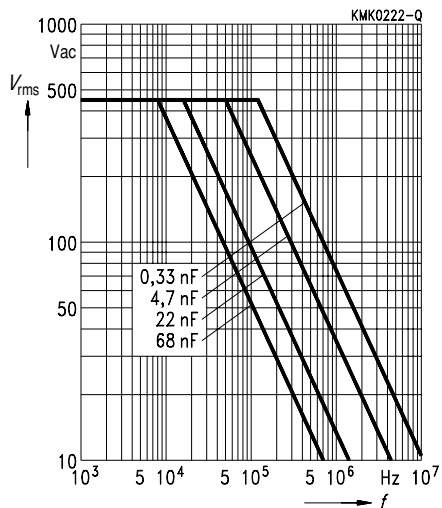
630 Vdc/300 Vac



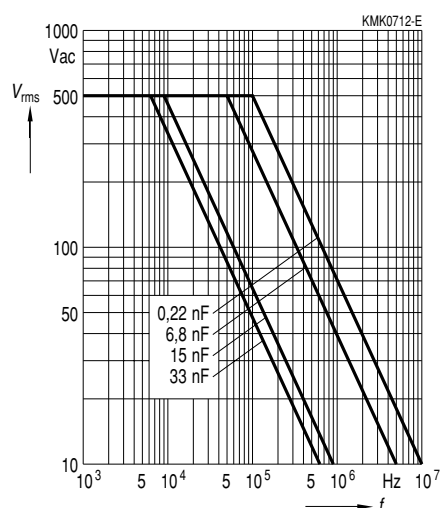
1250 Vdc/450 Vac



1600 Vdc/450 Vac



2000 Vdc/500 Vac





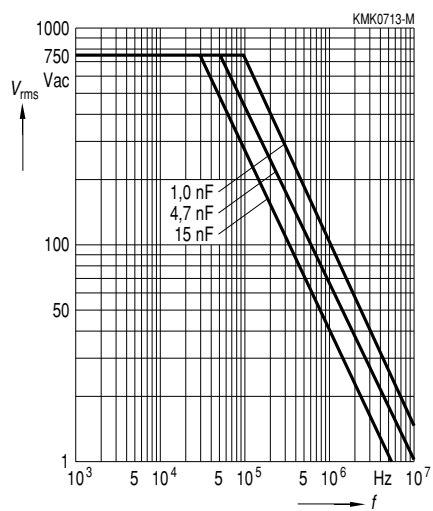
B 32 632 ...

B 32 634

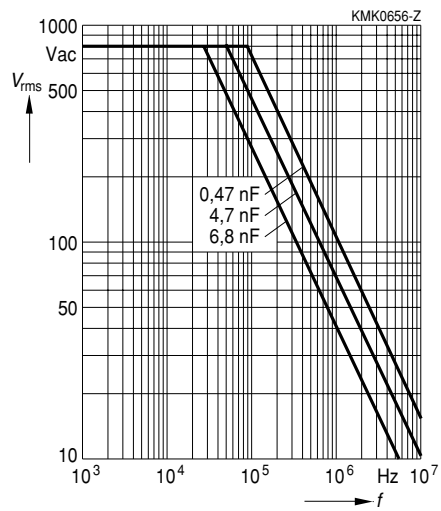
Permissible ac voltage V_{rms} versus frequency f

Lead spacing 15 ... 27,5 mm

2500 Vdc/ 750 Vac



3000 Vdc/800 Vac





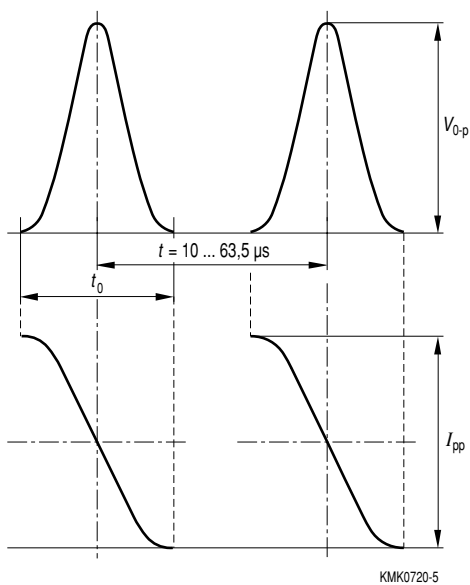
B 32 632

... B 32 634



Flyback application **permissible voltage and current / waveform**

Permissible current I_{pp} versus frequency for a duty cycle of 20 % ($t_0/t = 0,2$):



Approximation formular for duty cycle higher than 20 %:

$$I'_{pp} = I_{pp} \sqrt[3]{\frac{t_0}{t}}$$



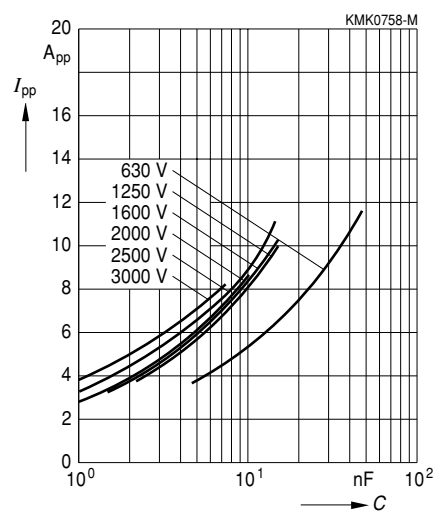
B 32 632 ...

B 32 634

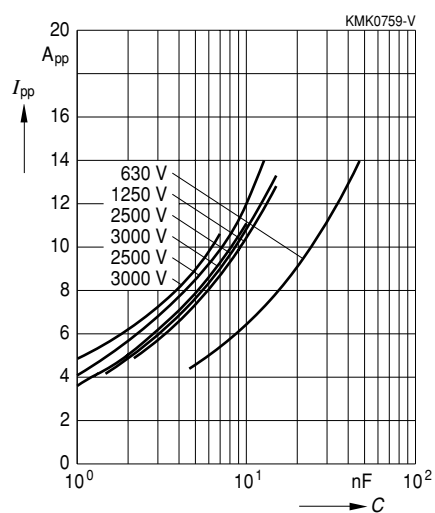
Flyback application

Permissible current I_{pp} versus rated capacitance C_R

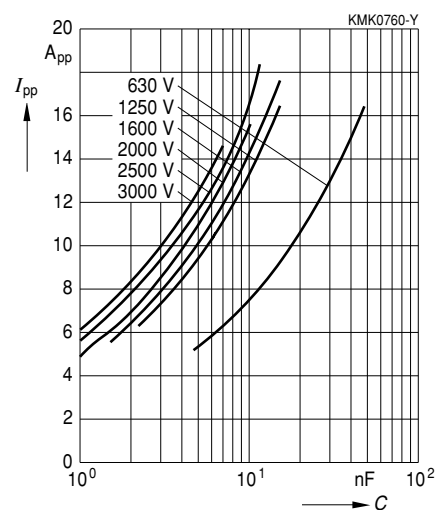
Frequency = 15,75 kHz



Frequency = 31,5 kHz



Frequency = 95 kHz



Herausgegeben von EPCOS AG**Marketing Kommunikation, Postfach 80 17 09, 81617 München, DEUTSCHLAND**

© EPCOS AG 2000. Alle Rechte vorbehalten. Vervielfältigung, Veröffentlichung, Verbreitung und Verwertung dieser Broschüre und ihres Inhalts ohne ausdrückliche Genehmigung der EPCOS AG nicht gestattet.

Mit den Angaben in dieser Broschüre werden die Bauelemente spezifiziert, keine Eigenschaften zugesichert. Bestellungen unterliegen den vom ZVEI empfohlenen Allgemeinen Lieferbedingungen für Erzeugnisse und Leistungen der Elektroindustrie, soweit nichts anderes vereinbart wird.

Diese Broschüre ersetzt die vorige Ausgabe.

Fragen über Technik, Preise und Liefermöglichkeiten richten Sie bitte an den Ihnen nächstgelegenen Vertrieb der EPCOS AG oder an unsere Vertriebsgesellschaften im Ausland.

Bauelemente können aufgrund technischer Erfordernisse Gefahrstoffe enthalten. Auskünfte darüber bitten wir unter Angabe des betreffenden Typs ebenfalls über die zuständige Vertriebsgesellschaft einzuholen.

Published by EPCOS AG**Marketing Communications, P.O. Box 80 17 09, 81617 Munich, GERMANY**

© EPCOS AG 2000. All Rights Reserved. Reproduction, publication and dissemination of this brochure and the information contained therein without EPCOS' prior express consent is prohibited.

The information contained in this brochure describes the type of component and shall not be considered as guaranteed characteristics. Purchase orders are subject to the General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry recommended by the ZVEI (German Electrical and Electronic Manufacturers' Association), unless otherwise agreed.

This brochure replaces the previous edition.

For questions on technology, prices and delivery please contact the Sales Offices of EPCOS AG or the international Representatives.

Due to technical requirements components may contain dangerous substances. For information on the type in question please also contact one of our Sales Offices.