

Applications

- Frequency converters
- Industrial and high-end power supplies
- Automotive DC-DC and compressor

Climatic

- Max. operating temperature: 135 °C (case)
- Climatic category (IEC 60068-1): 40/125/56

Construction

- Dielectric: polypropylene (MKP)
- Plastic case (UL 94 V-0)
- Epoxy resin sealing (UL 94 V-0)

Features

- High CV product, compact
- Good self-healing properties
- Over-voltage capability
- Low losses with high current capability
- High reliability
- Long useful life
- RoHS-compatible
- AEC-Q200E compliant

Terminals

- Parallel wire leads, lead-free tinned
- 2-pin, 4-pin
- Standard lead lengths: 6–1 mm

Marking

- Manufacturer's logo and lot number, series number, rated capacitance (coded), capacitance tolerance (code letter), rated DC voltage, date of manufacture (coded).

Delivery mode

- Bulk (untaped)



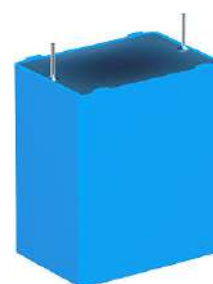
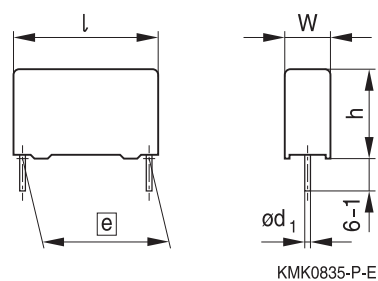
Dimensional drawings

Number of wires	Lead spacing $e \pm 0.4$	Lead diameter $d_1 \pm 0.05$	Type
2-pin	27.5	0.8	B32724A
2-pin	37.5	1.0	B32726A
2-pin	37.5	1.0	B32726T
4-pin	37.5	1.2	B32726G
4-pin	52.5	1.2	B32728G

Dimensions in mm

Dimensional drawings 2-pin versions

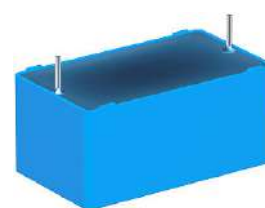
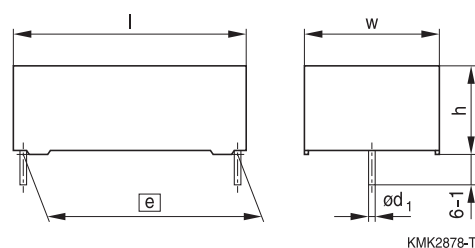
B32724A, B32726A



	B32724A	B32726A
Lead spacing $e \pm 0.4$	27.5	37.5
Lead diameter d_1	0.8	1.0

Dimensions in mm

B32726T (low profile)

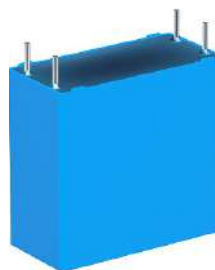
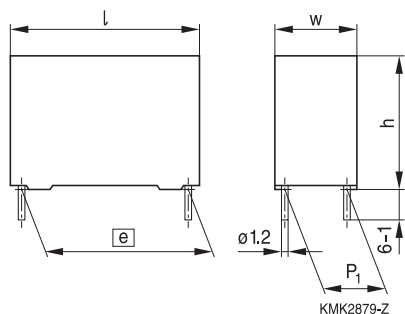


	B32726T
Lead spacing $e \pm 0.4$	37.5
Lead diameter d_1	1.0

Dimensions in mm

Dimensional drawings 4-pin versions

B32726G, B32728G



	B32726G	B32728G
Lead spacing $e \pm 0.4$	37.5	52.5
Lead diameter d_1	1.2	1.2

Dimensions in mm

Overview of available types

Lead spacing	27.5 mm			
Type	B32724			
V _R (V DC)	800	900	1000	1200
C _R (μF)				
1.0				
1.5				
2.0				
2.2				
2.5				
3.0				
4.0				
4.5				
5.0				
5.5				
6.0				
7.0				
8.0				
9.0				
10.0				
12.0				

Overview of available types

Lead spacing	37.5 mm			
Type	B32726			
V _R (V DC)	800	900	1000	1200
C _R (μF)				
2.0				
2.7				
3.0				
4.0				
5.0				
6.0				
7.0				
8.0				
9.0				
10.0				
11.0				
12.0				
14.0				
15.0				
16.0				
20.0				
22.0				
25.0				
30.0				
35.0				
40.0				

Overview of available types

Lead spacing	52.5 mm			
Type	B32728			
V _R (V DC)	800	900	1000	1200
C _R (μF)				
20.0				
27.0				
30.0				
35.0				
40.0				
45.0				
50.0				
60.0				

Ordering codes and packing units (lead spacing 27.5 mm)

$C_R^{1)}$	Max. dimensions w x h x l	P_1	Ordering code (Composition see below)	$I_{RMS}^{2)}$ 85 °C	ESR_{typ} 85 °C	ESL_{typ}	Untaped
μF	mm	mm		10 kHz A_{RMS}	10 kHz m Ω	nH	pcs./MOQ

$V_{R,85\text{ °C}} = 800\text{ V DC}$, $V_{op,105\text{ °C}} = 800\text{ V DC}$, $V_{op,135\text{ °C}} = 440\text{ V DC}$

2.2	11.0 x 19.0 x 31.5	-	B32724A8225+000	3.9	29.3	12.0	2560
3.0	11.0 x 21.0 x 31.5	-	B32724A8305+000	5.0	20.5	14.0	2560
4.0	13.5 x 23.0 x 31.5	-	B32724A8405+000	6.3	15.0	16.0	2080
5.0	14.0 x 24.5 x 31.5	-	B32724A8505K000	7.0	13.0	17.0	2080
6.0	14.0 x 28.0 x 31.5	-	B32724A8605K000	7.8	10.9	18.0	3696
7.0	16.0 x 30.0 x 31.5	-	B32724A8705+000	9.0	9.0	20.0	2128
8.0	16.0 x 32.0 x 31.5	-	B32724A8805+000	9.5	8.2	20.0	1760
9.0	18.0 x 33.0 x 31.5	-	B32724A8905+000	11.0	7.3	21.0	1600
10.0	21.0 x 31.0 x 31.5	-	B32724A8106+000	11.5	6.7	21.0	1440
12.0	22.0 x 36.5 x 31.5	-	B32724A8126+000	13.5	5.6	23.0	1280

$V_{R,85\text{ °C}} = 900\text{ V DC}$, $V_{op,105\text{ °C}} = 900\text{ V DC}$, $V_{op,135\text{ °C}} = 495\text{ V DC}$

2.0	11.0 x 19.0 x 31.5	-	B32724A9205+000	4.1	26.3	12.0	2560
2.5	12.5 x 21.5 x 31.5	-	B32724A9255+000	5.2	21.2	15.0	2240
3.0	13.5 x 23.0 x 31.5	-	B32724A9305+000	5.8	17.7	16.0	2080
4.0	15.0 x 24.5 x 31.5	-	B32724A9405+000	7.0	13.8	17.0	1920
5.0	16.0 x 30.0 x 31.5	-	B32724A9505+000	8.3	11.0	20.0	2128
6.0	16.0 x 30.0 x 31.5	-	B32724A9605K000	8.7	9.9	20.0	2128
7.0	18.0 x 33.0 x 31.5	-	B32724A9705+000	10.5	8.1	21.0	1600
8.0	21.0 x 31.0 x 31.5	-	B32724A9805K000	11.3	7.5	21.0	1440
10.0	22.0 x 36.5 x 31.5	-	B32724A9106+000	12.5	6.1	23.0	1280

MOQ = Minimum Order Quantity, consisting of 8 packing units.
Intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code
J = $\pm 5\%$
K = $\pm 10\%$

Packaging code
000 = Untaped (lead length 6–1 mm)
Other lead lengths available upon request

1) Capacitance value measured at 1 kHz

2) Max. ripple current $I_{RMS}@85\text{ °C}@10\text{ kHz}$ for a $\Delta T \leq 20\text{ °C}$ when $\Delta ESR_{typ} \leq \pm 5\%$

Ordering codes and packing units (lead spacing 27.5 mm)

$C_R^{1)}$	Max. dimensions w x h x l	P_1	Ordering code (Composition see below)	$I_{RMS}^{2)}$ 85 °C 10 kHz A_{RMS}	ESR_{typ} 85 °C 10 kHz mΩ	ESL_{typ} nH	Untaped pcs./MOQ
μF	mm	mm					
$V_{R,85\text{ °C}} = 1000\text{ V DC}$, $V_{op,105\text{ °C}} = 1000\text{ V DC}$, $V_{op,135\text{ °C}} = 550\text{ V DC}$							
1.5	11.0 x 19.0 x 31.5	-	B32724A0155+000	3.8	31.6	12.0	2560
2.0	12.5 x 21.5 x 31.5	-	B32724A0205+000	4.9	23.9	15.0	2240
3.0	14.0 x 24.5 x 31.5	-	B32724A0305+000	6.3	16.3	17.0	2080
4.5	16.0 x 30.0 x 31.5	-	B32724A0455+000	8.2	11.3	20.0	2128
6.0	18.0 x 33.0 x 31.5	-	B32724A0605+000	9.2	9.0	21.0	1600
8.0	22.0 x 36.5 x 31.5	-	B32724A0805+000	12.8	6.6	23.0	1280
$V_{R,85\text{ °C}} = 1200\text{ V DC}$, $V_{op,105\text{ °C}} = 1200\text{ V DC}$, $V_{op,135\text{ °C}} = 665\text{ V DC}$							
1.0	11.0 x 19.0 x 31.5	-	B32724A1105+000	3.5	37.6	12.0	2560
1.5	12.5 x 21.5 x 31.5	-	B32724A1155+000	4.7	26.1	15.0	2240
2.0	14.0 x 24.5 x 31.5	-	B32724A1205+000	5.8	19.6	17.0	2080
3.0	16.0 x 30.0 x 31.5	-	B32724A1305+000	7.5	13.3	20.0	2128
4.0	18.0 x 33.0 x 31.5	-	B32724A1405+000	9.4	10.4	21.0	1600
5.0	22.0 x 36.5 x 31.5	-	B32724A1505+000	11.6	8.2	23.0	1280
5.5	22.0 x 36.5 x 31.5	-	B32724A1555+000	12.0	7.7	23.0	1280

MOQ = Minimum Order Quantity, consisting of 8 packing units.
Intermediate capacitance values on request.

Composition of ordering code

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

Packaging code
000 = Untaped (lead length 6–1 mm)
Other lead lengths available upon request

1) Capacitance value measured at 1 kHz

2) Max. ripple current $I_{RMS}@85\text{ °C}@10\text{ kHz}$ for a $\Delta T \leq 20\text{ °C}$ when $\Delta ESR_{typ} \leq \pm 5\%$

Ordering codes and packing units (lead spacing 37.5 mm)

$C_R^{1)}$	Max. dimensions w x h x l	P_1	Ordering code (Composition see below)	$I_{RMS}^{2)}$ 85 °C 10 kHz A_{RMS}	ESR_{typ} 85 °C 10 kHz mΩ	ESL_{typ} nH	Untaped pcs./MOQ
μF	mm	mm					
$V_{R,85\text{ °C}} = 800\text{ V DC}$, $V_{op,105\text{ °C}} = 800\text{ V DC}$, $V_{op,135\text{ °C}} = 440\text{ V DC}$							
5.0	12.0 x 22.0 x 42.0	-	B32726A8505K000	5.5	24.9	17.7	3240
6.0	14.0 x 25.0 x 42.0	-	B32726A8605+000	6.5	19.4	19.6	2760
7.0	24.0 x 15.0 x 42.0	-	B32726T8705K000	6.8	17.8	12.0	2080
8.0	16.0 x 28.5 x 42.0	-	B32726A8805+000	8.0	14.7	21.8	1600
9.0	24.0 x 19.0 x 42.0	-	B32726T8905K000	8.0	14.0	13.0	1560
10.0	17.0 x 32.0 x 42.0	-	B32726A8106+000	9.2	11.9	22.9	1520
12.0	18.0 x 32.5 x 42.0	-	B32726A8126+000	10.0	10.0	23.0	1440
15.0	20.0 x 39.5 x 42.0	10.2	B32726G8156+000*	12.5	7.9	13.0	1280
22.0	28.0 x 37.0 x 42.0	10.2	B32726G8226+000*	16.2	5.4	14.0	880
25.0	24.0 x 44.0 x 42.0	12.7	B32726G8256+000*	17.8	4.8	15.0	1040
30.0	30.0 x 45.0 x 42.0	20.3	B32726G8306+000*	21.0	4.1	15.5	800
35.0	33.0 x 48.0 x 42.0	20.3	B32726G8356+000*	23.6	3.5	16.5	360
40.0	33.0 x 48.0 x 42.0	20.3	B32726G8406K000*	24.0	3.4	16.5	360

MOQ = Minimum Order Quantity, consisting of 8 packing units.

Intermediate capacitance values on request.

*) 2-pin version available on request.

Composition of ordering code

+ = Capacitance tolerance code

J = ±5%

K = ±10%

Packaging code

000 = Untaped (lead length 6–1 mm)

Other lead lengths available upon request

1) Capacitance value measured at 1 kHz

2) Max. ripple current $I_{RMS}@85\text{ °C}@10\text{ kHz}$ for a $\Delta T \leq 20\text{ °C}$ when $\Delta ESR_{typ} \leq \pm 5\%$

Ordering codes and packing units (lead spacing 37.5 mm)

$C_R^{1)}$	Max. dimensions w x h x l	P_1	Ordering code (Composition see below)	$I_{RMS}^{2)}$ 85 °C 10 kHz A_{RMS}	ESR_{typ} 85 °C 10 kHz mΩ	ESL_{typ} nH	Untaped pcs./MOQ
μF	mm	mm					
$V_{R,85\text{ °C}} = 900\text{ V DC}$, $V_{op,105\text{ °C}} = 900\text{ V DC}$, $V_{op,135\text{ °C}} = 495\text{ V DC}$							
4.0	12.0 x 22.0 x 42.0	-	B32726A9405K000	5.0	27.9	17.7	3240
5.0	14.0 x 25.0 x 42.0	-	B32726A9505+000	6.0	20.8	19.6	2760
5.0	24.0 x 15.0 x 42.0	-	B32726T9505+000	6.0	21.3	12.0	2080
7.0	16.0 x 28.5 x 42.0	-	B32726A9705+000	7.7	15.0	21.8	1600
7.0	24.0 x 19.0 x 42.0	-	B32726T9705+000	7.5	15.3	13.0	1560
8.0	17.0 x 32.0 x 42.0	-	B32726A9805+000	8.5	13.2	22.9	1520
10.0	18.0 x 32.5 x 42.0	-	B32726A9106+000	9.7	11.0	23.0	1440
15.0	20.0 x 39.5 x 42.0	10.2	B32726G9156K000*	13.0	7.6	12.5	1280
20.0	24.0 x 44.0 x 42.0	12.7	B32726G9206+000*	16.0	5.7	14.0	1040
22.0	28.0 x 42.5 x 42.0	10.2	B32726G9226+000*	18.0	5.0	15.0	880
25.0	30.0 x 45.0 x 42.0	20.3	B32726G9256+000*	20.0	4.5	16.0	800
30.0	33.0 x 48.0 x 42.0	20.3	B32726G9306+000*	22.5	3.8	17.0	360

MOQ = Minimum Order Quantity, consisting of 8 packing units.

Intermediate capacitance values on request.

*) 2-pin version available on request.

Composition of ordering code

+ = Capacitance tolerance code

J = ±5%

K = ±10%

Packaging code

000 = Untaped (lead length 6–1 mm)

Other lead lengths available upon request

1) Capacitance value measured at 1 kHz

2) Max. ripple current $I_{RMS}@85\text{ °C}@10\text{ kHz}$ for a $\Delta T \leq 20\text{ °C}$ when $\Delta ESR_{typ} \leq \pm 5\%$

Ordering codes and packing units (lead spacing 37.5 mm)

$C_R^{1)}$	Max. dimensions w x h x l	P_1	Ordering code (Composition see below)	$I_{RMS}^{2)}$ 85 °C 10 kHz A_{RMS}	ESR_{typ} 85 °C 10 kHz mΩ	ESL_{typ} nH	Untaped pcs./MOQ
μF	mm	mm					
$V_{R,85\text{ °C}} = 1000\text{ V DC}$, $V_{op,105\text{ °C}} = 1000\text{ V DC}$, $V_{op,135\text{ °C}} = 550\text{ V DC}$							
3.0	12.0 x 22.0 x 42.0	-	B32726A0305+000	4.7	31.5	17.7	3240
4.0	14.0 x 25.0 x 42.0	-	B32726A0405+000	5.7	23.4	19.6	2760
4.0	24.0 x 15.0 x 42.0	-	B32726T0405+000	5.7	23.9	11.5	2080
6.0	24.0 x 19.0 x 42.0	-	B32726T0605K000	7.0	16.9	13.0	1560
6.0	16.0 x 28.5 x 42.0	-	B32726A0605+000	7.3	16.5	21.8	1600
7.0	17.0 x 32.0 x 42.0	-	B32726A0705+000	8.3	14.0	22.9	1520
8.0	18.0 x 32.5 x 42.0	-	B32726A0805+000	9.3	12.1	23.0	1440
10.0	20.0 x 39.5 x 42.0	10.2	B32726G0106+000*	11.6	9.5	13.0	1280
12.0	20.0 x 39.5 x 42.0	10.2	B32726G0126K000*	12.2	8.5	13.5	1280
15.0	24.0 x 44.0 x 42.0	12.7	B32726G0156+000*	15.0	6.7	15.0	1040
20.0	30.0 x 45.0 x 42.0	20.3	B32726G0206+000*	19.0	5.0	16.0	800
25.0	33.0 x 48.0 x 42.0	20.3	B32726G0256K000*	21.5	4.2	17.0	360

MOQ = Minimum Order Quantity, consisting of 8 packing units.

Intermediate capacitance values on request.

*) 2-pin version available on request.

Composition of ordering code

+ = Capacitance tolerance code

J = ±5%

K = ±10%

Packaging code

000 = Untaped (lead length 6–1 mm)

Other lead lengths available upon request

1) Capacitance value measured at 1 kHz

2) Max. ripple current $I_{RMS}@85\text{ °C}@10\text{ kHz}$ for a $\Delta T \leq 20\text{ °C}$ when $\Delta ESR_{typ} \leq \pm 5\%$

Ordering codes and packing units (lead spacing 37.5 mm)

$C_R^{1)}$	Max. dimensions w x h x l	P_1	Ordering code (Composition see below)	$I_{RMS}^{2)}$ 85 °C 10 kHz A_{RMS}	ESR_{typ} 85 °C 10 kHz mΩ	ESL_{typ} nH	Untaped pcs./MOQ
μF	mm	mm					
$V_{R,85\text{ °C}} = 1200\text{ V DC}$, $V_{op,105\text{ °C}} = 1200\text{ V DC}$, $V_{op,135\text{ °C}} = 665\text{ V DC}$							
2.0	12.0 x 22.0 x 42.0	-	B32726A1205+000	4.3	38.2	17.7	3240
2.7	24.0 x 15.0 x 42.0	-	B32726T1275+000	5.2	28.1	11.5	2080
3.0	14.0 x 25.0 x 42.0	-	B32726A1305K000	5.3	27.0	19.6	2760
4.0	16.0 x 28.5 x 42.0	-	B32726A1405+000	6.6	19.9	21.8	1600
4.0	24.0 x 19.0 x 42.0	-	B32726T1405K000	6.5	20.3	13.0	1560
5.0	17.0 x 32.0 x 42.0	-	B32726A1505K000	7.8	16.0	22.9	1520
6.0	20.0 x 39.5 x 42.0	10.2	B32726G1605+000*	9.0	13.2	23.0	1280
8.0	20.0 x 39.5 x 42.0	10.2	B32726G1805K000*	11.3	10.1	13.0	1280
10.0	28.0 x 37.0 x 42.0	10.2	B32726G1106K000*	13.7	7.9	14.0	880
11.0	24.0 x 44.0 x 42.0	12.7	B32726G1116K000*	13.7	7.3	15.0	1040
12.0	28.0 x 42.5 x 42.0	10.2	B32726G1126+000*	15.5	6.6	15.0	880
14.0	30.0 x 45.0 x 42.0	20.3	B32726G1146K000*	17.6	5.7	16.0	800
16.0	33.0 x 48.0 x 42.0	20.3	B32726G1166+000*	20.0	4.9	17.0	360

MOQ = Minimum Order Quantity, consisting of 8 packing units.

Intermediate capacitance values on request.

*) 2-pin version available on request.

Composition of ordering code

+ = Capacitance tolerance code

J = ±5%

K = ±10%

Packaging code

000 = Untaped (lead length 6–1 mm)

Other lead lengths available upon request

1) Capacitance value measured at 1 kHz

2) Max. ripple current $I_{RMS}@85\text{ °C}@10\text{ kHz}$ for a $\Delta T \leq 20\text{ °C}$ when $\Delta ESR_{typ} \leq \pm 5\%$

Ordering codes and packing units (lead spacing 52.5 mm)

$C_R^{1)}$	Max. dimensions w x h x l	P_1	Ordering code (Composition see below)	$I_{RMS}^{2)}$ 85 °C 10 kHz A_{RMS}	ESR_{typ} 85 °C 10 kHz mΩ	ESL_{typ} nH	Untaped pcs./MOQ
μF	mm	mm					
$V_{R,85\text{ °C}} = 800\text{ V DC}, V_{op,105\text{ °C}} = 800\text{ V DC}, V_{op,135\text{ °C}} = 440\text{ V DC}$							
45.0	30.0 x 45.0 x 57.5	20.3	B32728G8456+000	19.5	5.5	14.5	560
60.0	35.0 x 50.0 x 57.5	20.3	B32728G8606+000	24.0	4.2	16.5	216
$V_{R,85\text{ °C}} = 900\text{ V DC}, V_{op,105\text{ °C}} = 900\text{ V DC}, V_{op,135\text{ °C}} = 495\text{ V DC}$							
35.0	30.0 x 45.0 x 57.5	20.3	B32728G9356+000	18.5	6.2	14.5	560
50.0	35.0 x 50.0 x 57.5	20.3	B32728G9506K000	23.0	4.6	16.5	216
$V_{R,85\text{ °C}} = 1000\text{ V DC}, V_{op,105\text{ °C}} = 1000\text{ V DC}, V_{op,135\text{ °C}} = 550\text{ V DC}$							
30.0	30.0 x 45.0 x 57.5	20.3	B32728G0306K000	18.0	6.8	15.0	560
40.0	35.0 x 50.0 x 57.5	20.3	B32728G0406K000	22.0	5.2	16.5	216
$V_{R,85\text{ °C}} = 1200\text{ V DC}, V_{op,105\text{ °C}} = 1200\text{ V DC}, V_{op,135\text{ °C}} = 665\text{ V DC}$							
20.0	30.0 x 45.0 x 57.5	20.3	B32728G1206K000	16.5	8.2	14.5	560
27.0	35.0 x 50.0 x 57.5	20.3	B32728G1276K000	20.5	6.2	16.0	216

MOQ = Minimum Order Quantity, consisting of 8 packing units.

Intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code

J = ±5%

K = ±10%

Packaging code

000 = Untaped (lead length 6–1 mm)

Other lead lengths available upon request

1) Capacitance value measured at 1 kHz

2) Max. ripple current $I_{RMS}@85\text{ °C}@10\text{ kHz}$ for a $\Delta T \leq 20\text{ °C}$ when $\Delta ESR_{typ} \leq \pm 5\%$

Technical data

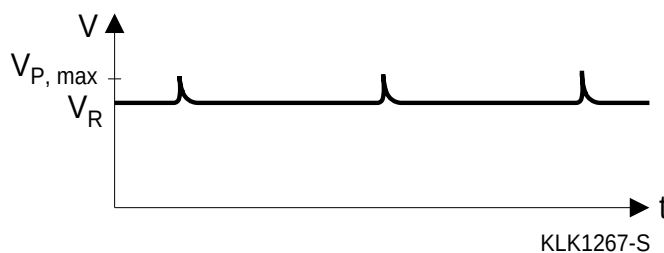
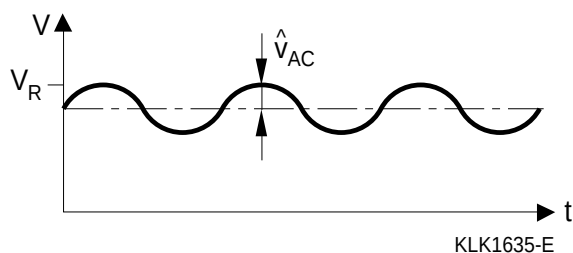
Reference: IEC60384-16:2019 and AEC-Q200E. All data given at $T = 20\text{ }^{\circ}\text{C}$, unless otherwise specified.

Operating temperature range (case)	Max. operating temperature, $T_{op,max}$				+135 °C
	Upper category temperature T_{max}				+125 °C
	Lower category temperature T_{min}				−40 °C
Rated temperature T_R	+85 °C				
Insulation resistance R_{ins} , given as time constant $\tau = C_R \cdot R_{ins}$, rel. humidity $\leq 65\%$ (minimum as-delivered values)	$\tau > 10\,000$ s (after 1 min) at 500 V DC				
Dissipation factor $\tan \delta$ (in 10^{-3}) at 25 °C (upper limit values)	2.0 at 1 kHz, $C_R \leq 20$ uF 3.0 at 1 kHz, $C_R > 20$ uF				
DC test voltage between terminals (10 s) ¹⁾	$1.5 \cdot V_R$				
Voltage test terminal to case (10 s)	2110 V AC, 50 Hz				
Pulse handling capability (V/ μ s)	I_P (A) / C (μ F)				
V_R (V DC) at 85 °C ²⁾	800	900	1000	1200	
Continuous operating voltage V_{op} (V DC) at 105 °C ²⁾	800	900	1000	1200	
Continuous operating voltage V_{op} (V DC) at 125 °C ²⁾	570	645	720	870	
Continuous operating voltage V_{op} (V DC) at 135 °C ²⁾	440	495	550	665	
For temperature between 105 °C and 125 °C ²⁾	1.4%/°C of V_{op} de-rating compared to V_{op} at 105 °C				
For temperature between 125 °C and 135 °C ²⁾	2.3%/°C of V_{op} de-rating compared to V_{op} at 125 °C				
Reliability:	Failure rate λ	5 fit ($\leq 5 \cdot 10^{-9}$ /h) at $0.5 \cdot V_R$, 40 °C For conversion to other operating conditions and temperatures, refer to chapter “Quality, 2 Reliability”.			
	Service life t_{SL}	100 000 h at V_R , 85 °C			

1) The repetition of this DC voltage test may damage the capacitor. Special care must be taken in case of use several capacitors in a parallel configuration.

2) Temperature given as operating temperature T_{op} (ambient temperature + self-heating).

Typical waveforms



Restrictions:

V_R : Maximum operating peak voltage of either polarity but of a non-reversing waveform, for which the capacitor has been designed for continuous operation.

$$\hat{u}_{AC} \leq 0.2 \cdot V_R$$

Overvoltage	Maximum duration within one day	Observation
$1.1 \cdot V_R$	30% of on-load duration	System regulation
$1.15 \cdot V_R$	30 min	System regulation
$1.2 \cdot V_R$	5 min	System regulation
$1.3 \cdot V_R$	1 min	System regulation

NOTE 1 An overvoltage equal to $1.5 \cdot V_R$ for 30 ms is permitted 1000 times during the life of the capacitor.

The amplitudes of the overvoltages that may be tolerated without significant reduction in the life time of the capacitor depend on their duration, the number of application and the capacitor temperature.

In addition these values assume that the overvoltages may appear when the internal temperature of the capacitor is less than 0 °C but within the temperature category.

NOTE 2 The average applied voltage must not be higher than the specified voltage.

Pulse handling capability

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

Note:

The values of dV/dt provided below must not be exceeded in order to avoid damaging the capacitor. These parameters are given for isolated pulses in such a way that the heat generated by one pulse will be completely dissipated before applying the next pulse.

dV/dt values

Lead spacing	27.5 mm			
Type	B32724			
V _R (V DC)	800	900	1000	1200
dV/dt (V/μs)	40	50	75	100

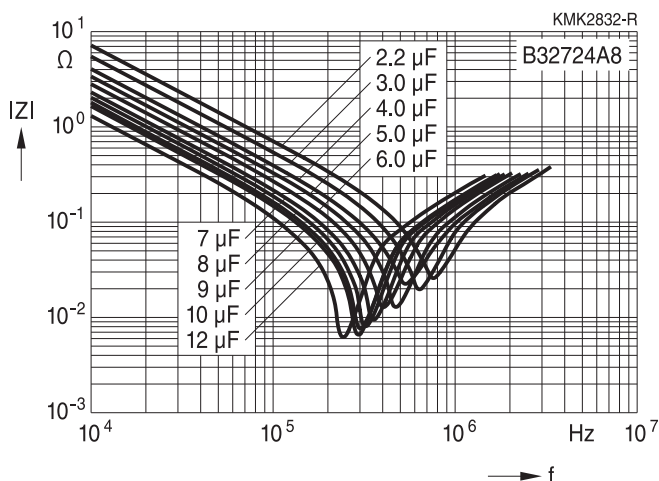
Lead spacing	37.5 mm			
Type	B32726			
V _R (V DC)	800	900	1000	1200
dV/dt (V/μs)	25	35	50	65

Lead spacing	52.5 mm			
Type	B32728			
V _R (V DC)	800	900	1000	1200
dV/dt (V/μs)	15	18	21	28

Characteristics curves

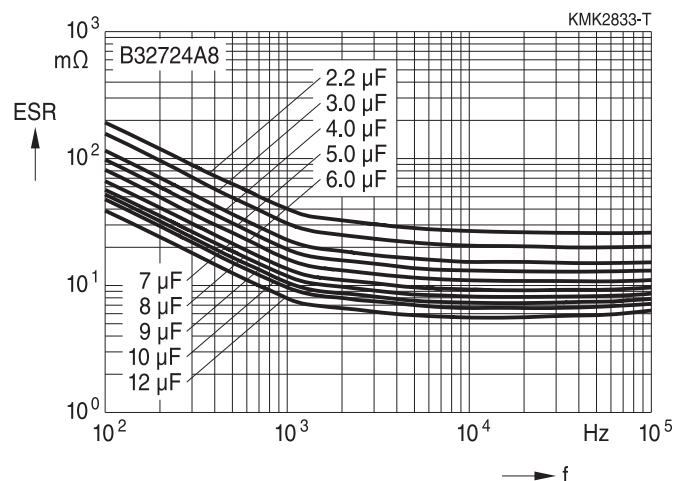
Impedance Z versus frequency f
(Typical values)

Lead spacing 27.5 mm
800 V DC



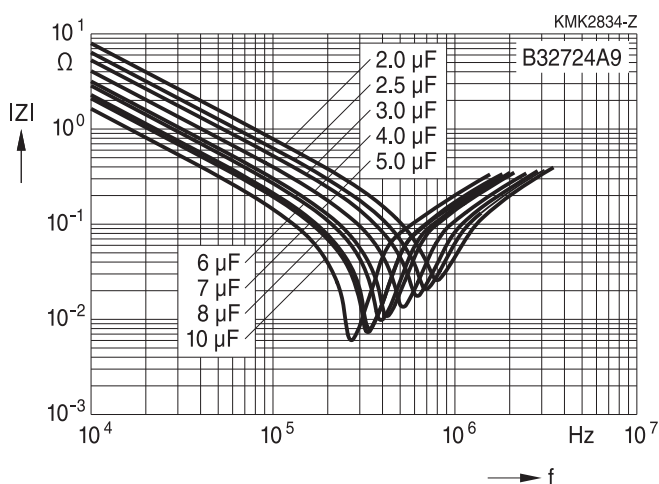
ESR versus frequency f
(Typical values)

Lead spacing 27.5 mm
800 V DC



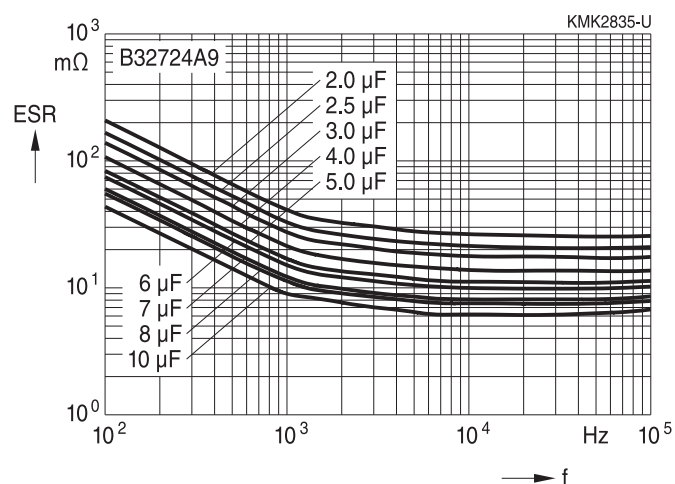
Impedance Z versus frequency f
(Typical values)

Lead spacing 27.5 mm
900 V DC



ESR versus frequency f
(Typical values)

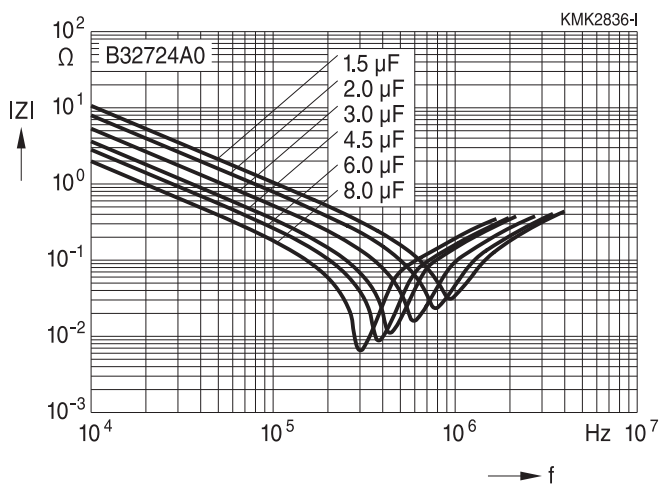
Lead spacing 27.5 mm
900 V DC



Characteristics curves

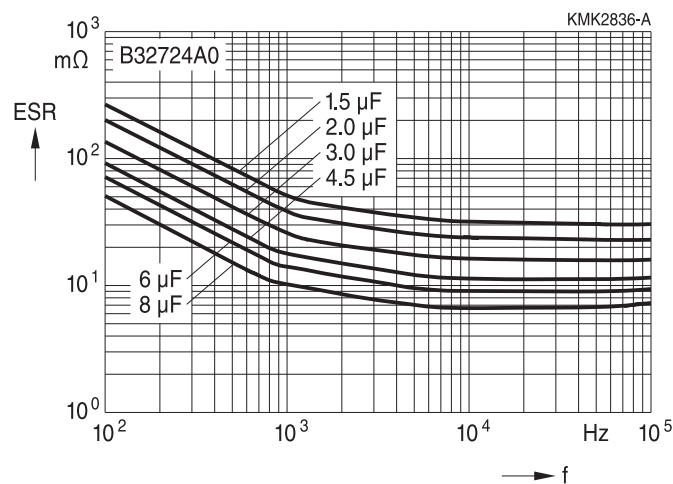
Impedance Z versus frequency f
(Typical values)

Lead spacing 27.5 mm
1000 V DC



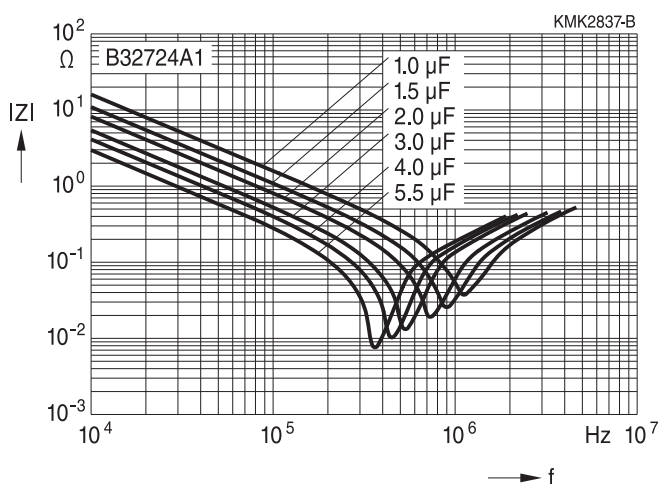
ESR versus frequency f
(Typical values)

Lead spacing 27.5 mm
1000 V DC



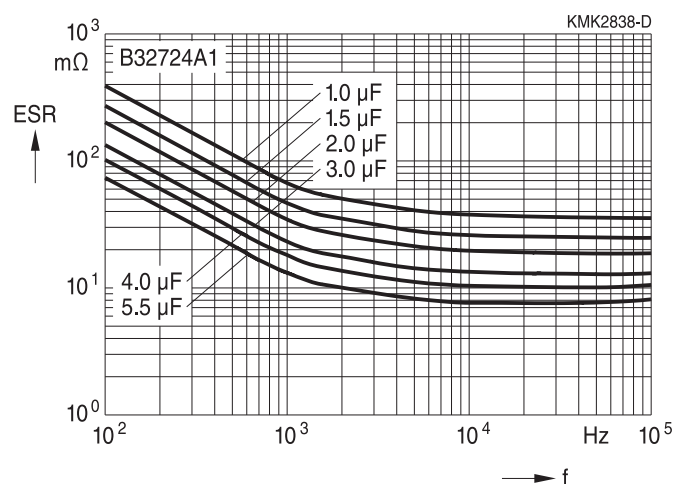
Impedance Z versus frequency f
(Typical values)

Lead spacing 27.5 mm
1200 V DC



ESR versus frequency f
(Typical values)

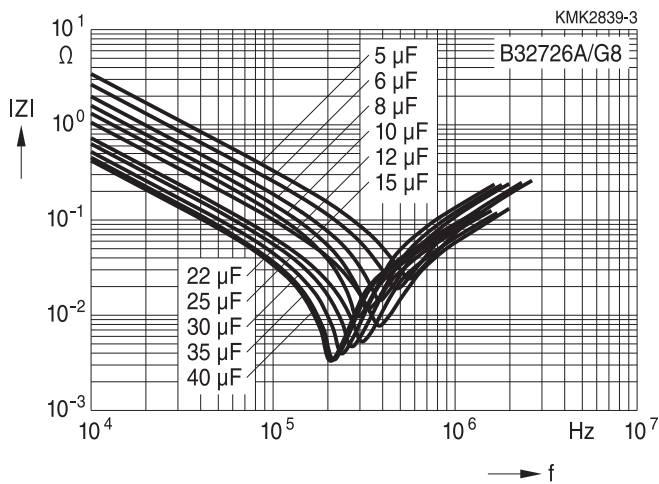
Lead spacing 27.5 mm
1200 V DC



Characteristics curves

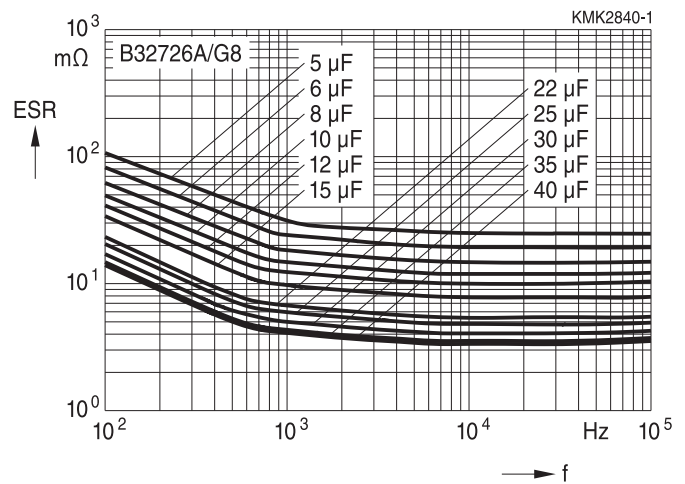
Impedance Z versus frequency f
(Typical values)

Lead spacing 37.5 mm
800 V DC



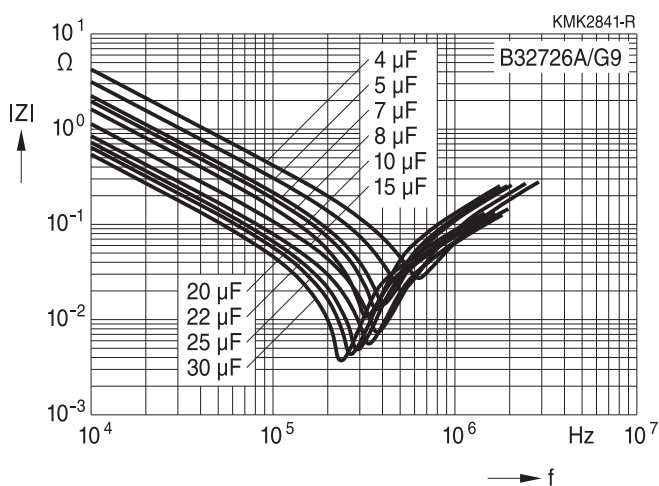
ESR versus frequency f
(Typical values)

Lead spacing 37.5 mm
800 V DC



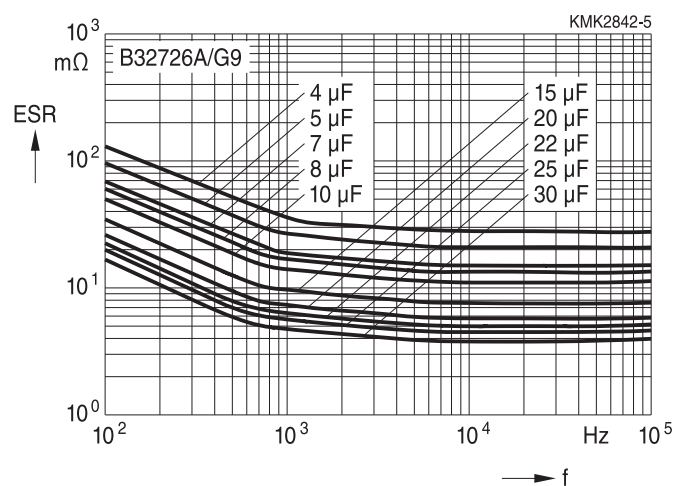
Impedance Z versus frequency f
(Typical values)

Lead spacing 37.5 mm
900 V DC



ESR versus frequency f
(Typical values)

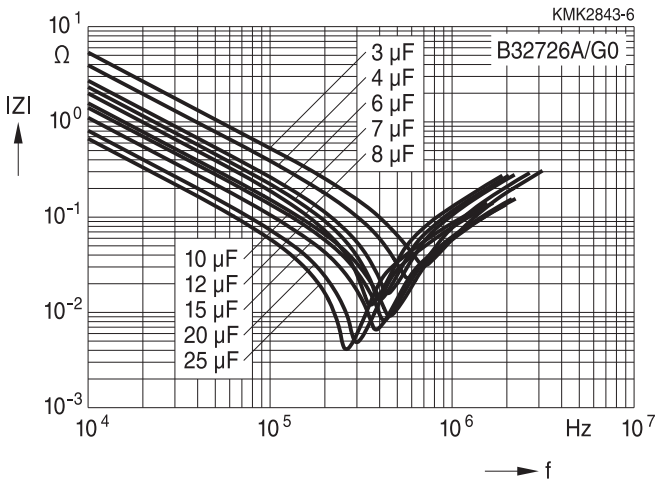
Lead spacing 37.5 mm
900 V DC



Characteristics curves

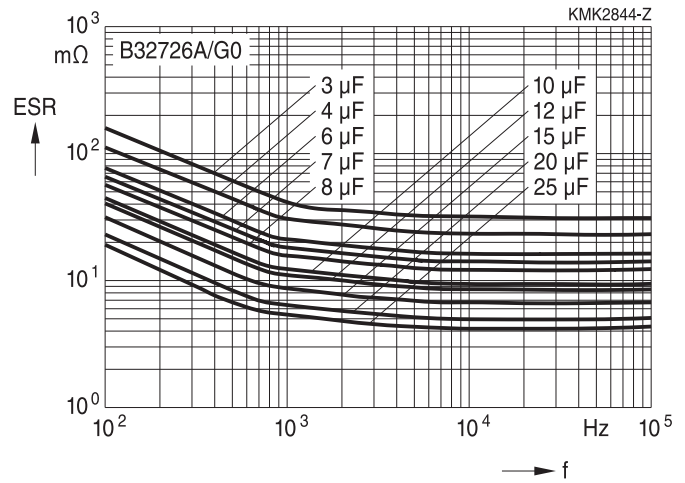
Impedance Z versus frequency f
(Typical values)

Lead spacing 37.5 mm
1000 V DC



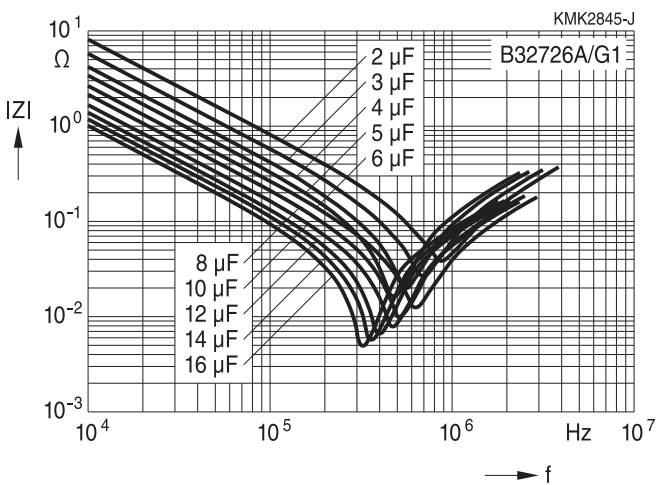
ESR versus frequency f
(Typical values)

Lead spacing 37.5 mm
1000 V DC



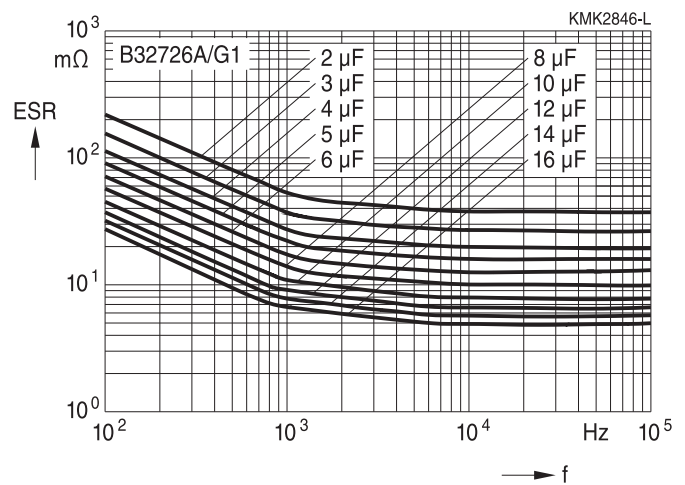
Impedance Z versus frequency f
(Typical values)

Lead spacing 37.5 mm
1200 V DC



ESR versus frequency f
(Typical values)

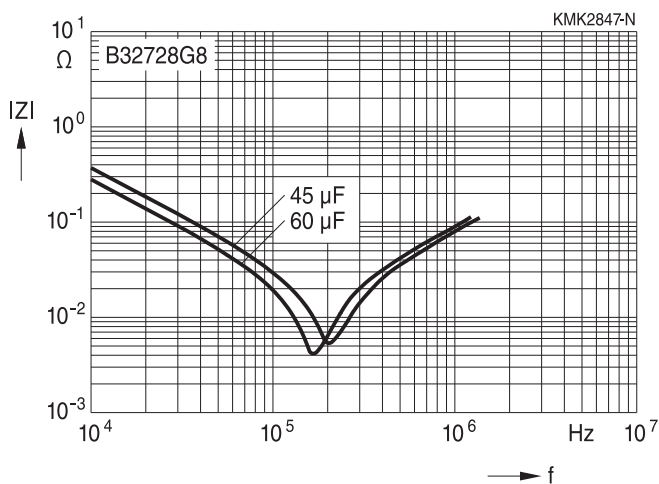
Lead spacing 37.5 mm
1200 V DC



Characteristics curves

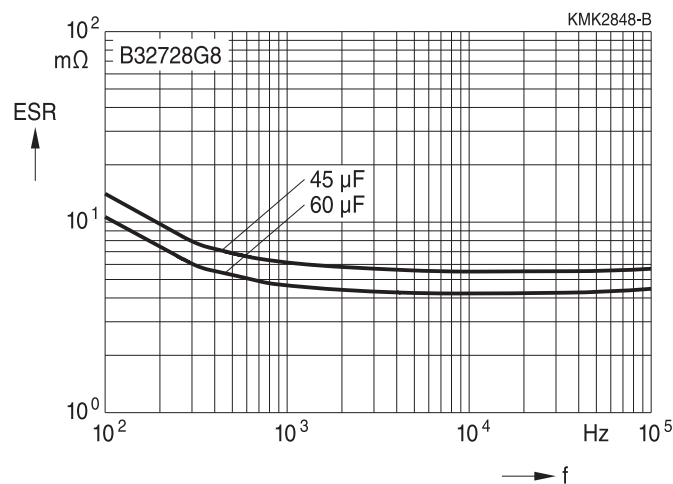
Impedance Z versus frequency f
(Typical values)

Lead spacing 52.5 mm
800 V DC



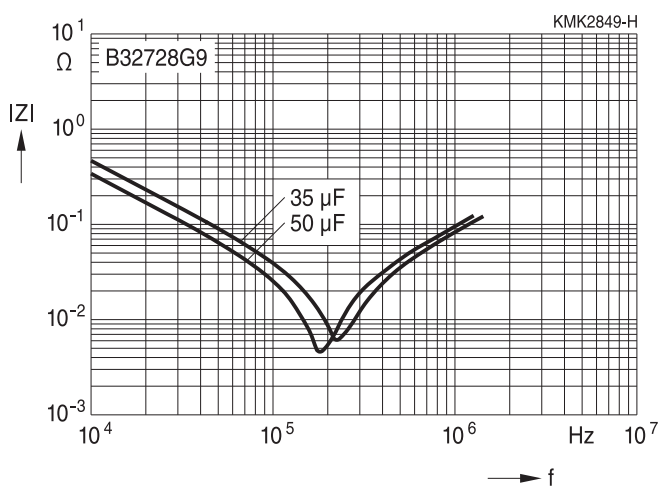
ESR versus frequency f
(Typical values)

Lead spacing 52.5 mm
800 V DC



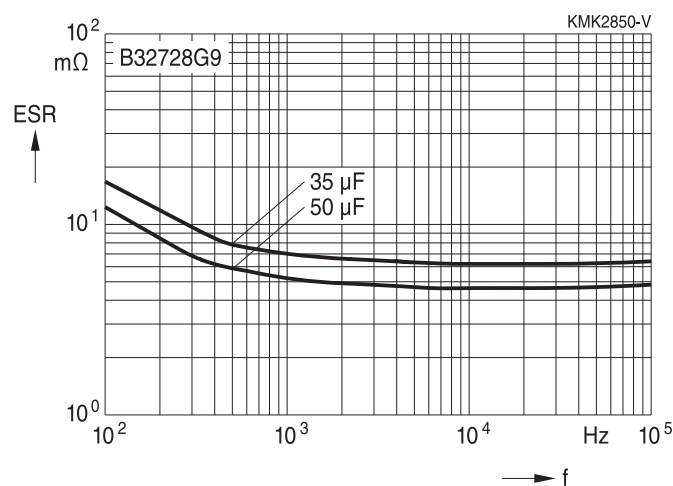
Impedance Z versus frequency f
(Typical values)

Lead spacing 52.5 mm
900 V DC



ESR versus frequency f
(Typical values)

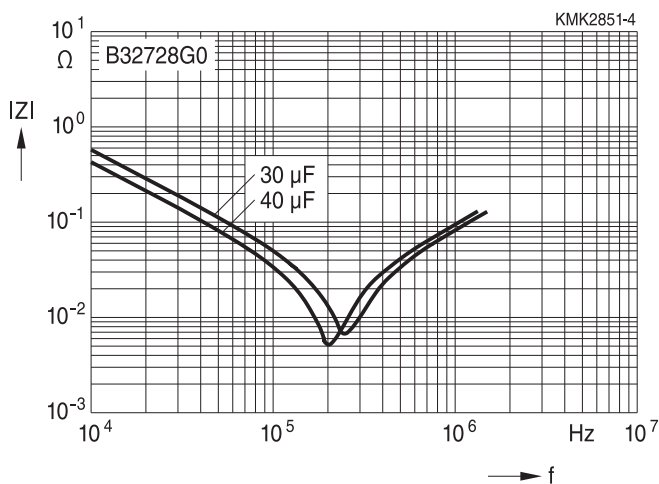
Lead spacing 52.5 mm
900 V DC



Characteristics curves

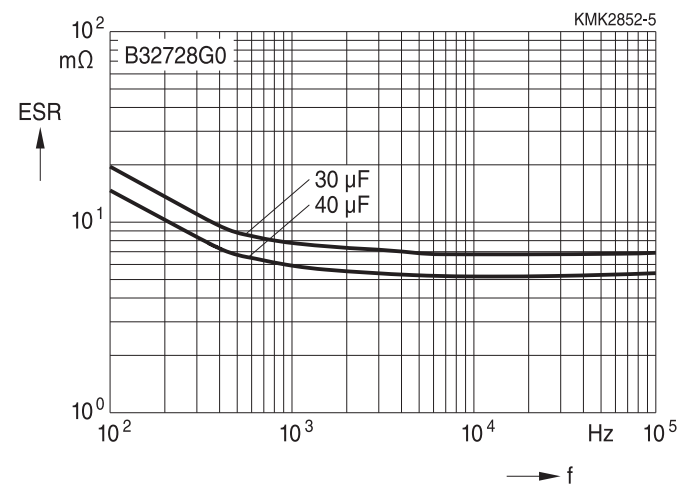
Impedance Z versus frequency f
(Typical values)

Lead spacing 52.5 mm
1000 V DC



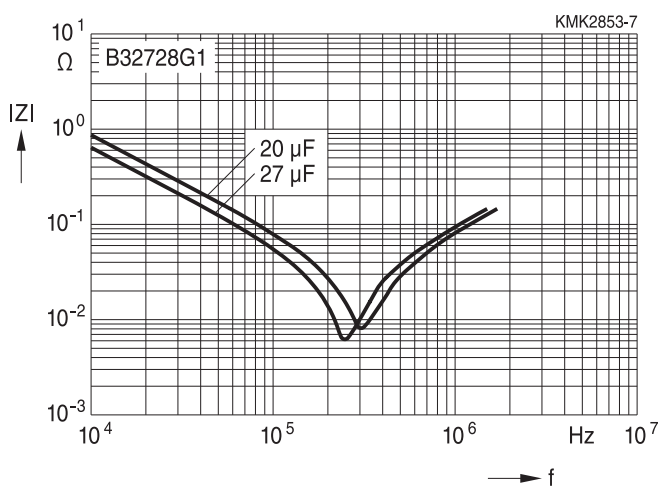
ESR versus frequency f
(Typical values)

Lead spacing 52.5 mm
1000 V DC



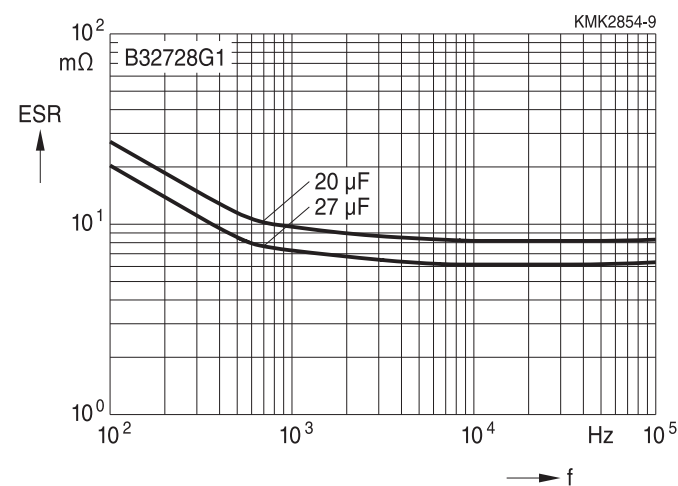
Impedance Z versus frequency f
(Typical values)

Lead spacing 52.5 mm
1200 V DC



ESR versus frequency f
(Typical values)

Lead spacing 52.5 mm
1200 V DC

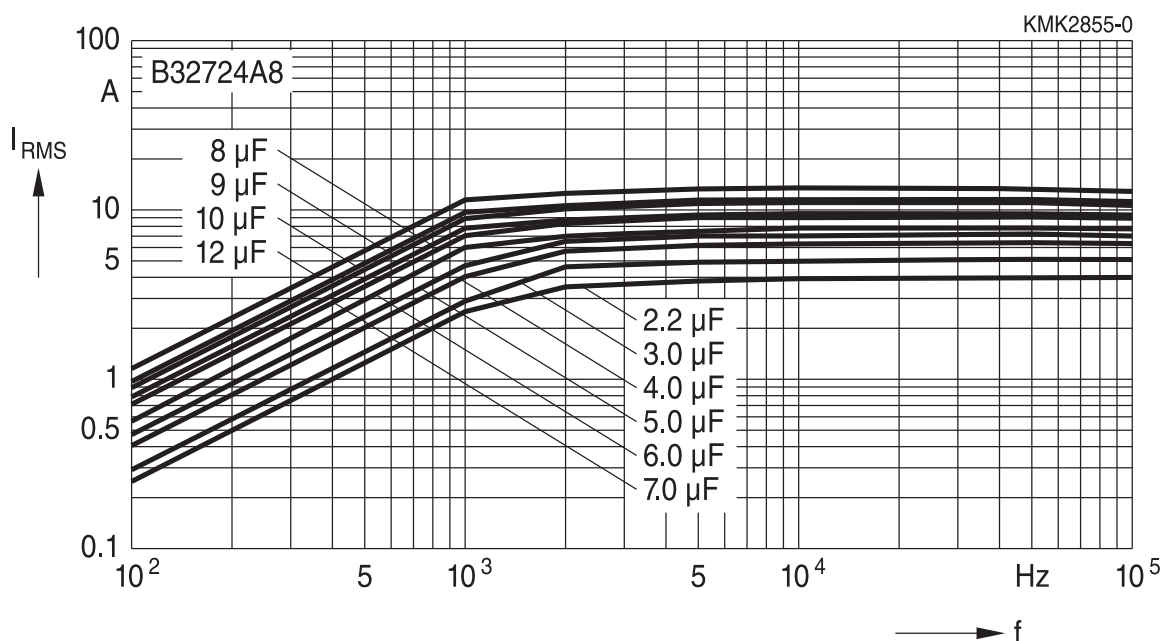


Characteristics curves

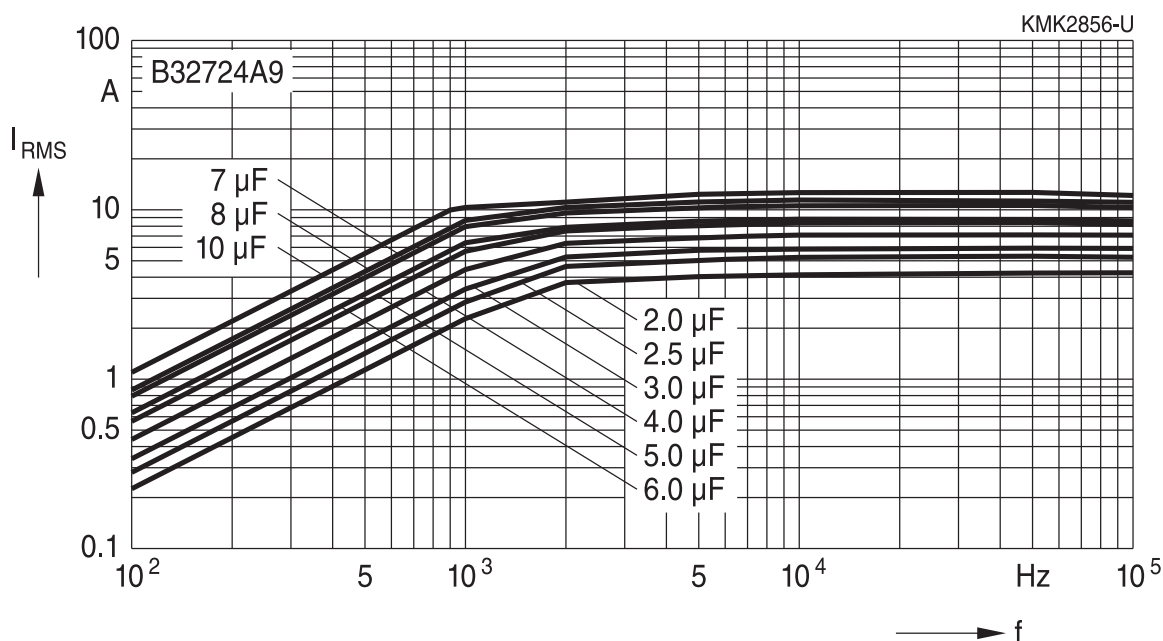
Permissible current I_{RMS} versus frequency f at $T_a \leq 85^\circ\text{C}$

Lead spacing 27.5 mm

800 V DC



900 V DC

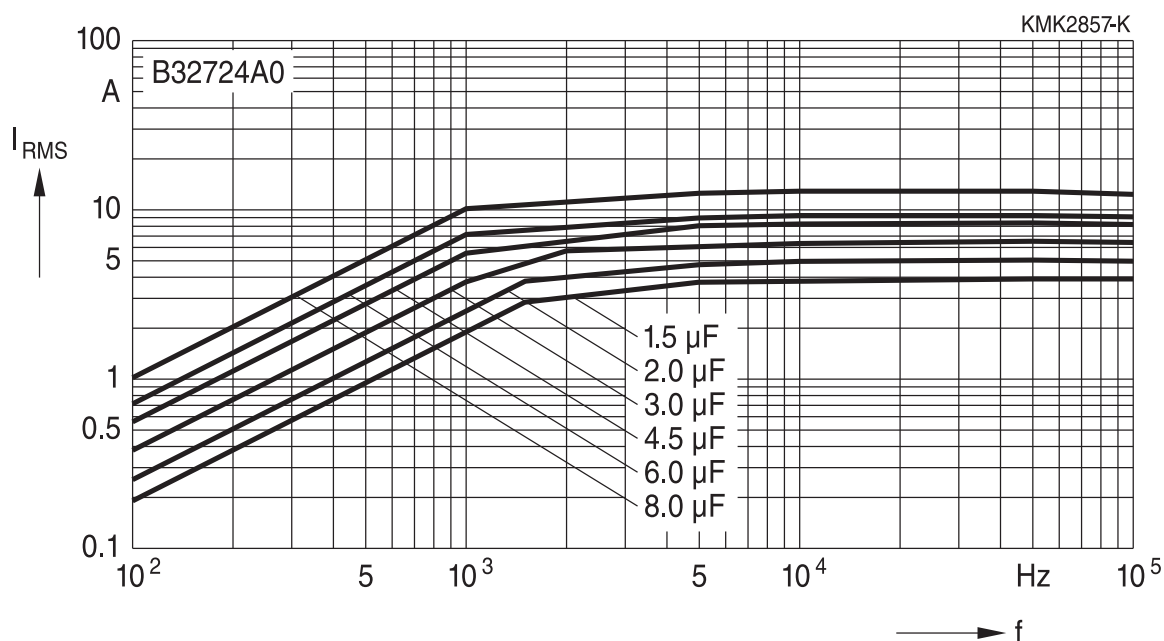


Characteristics curves

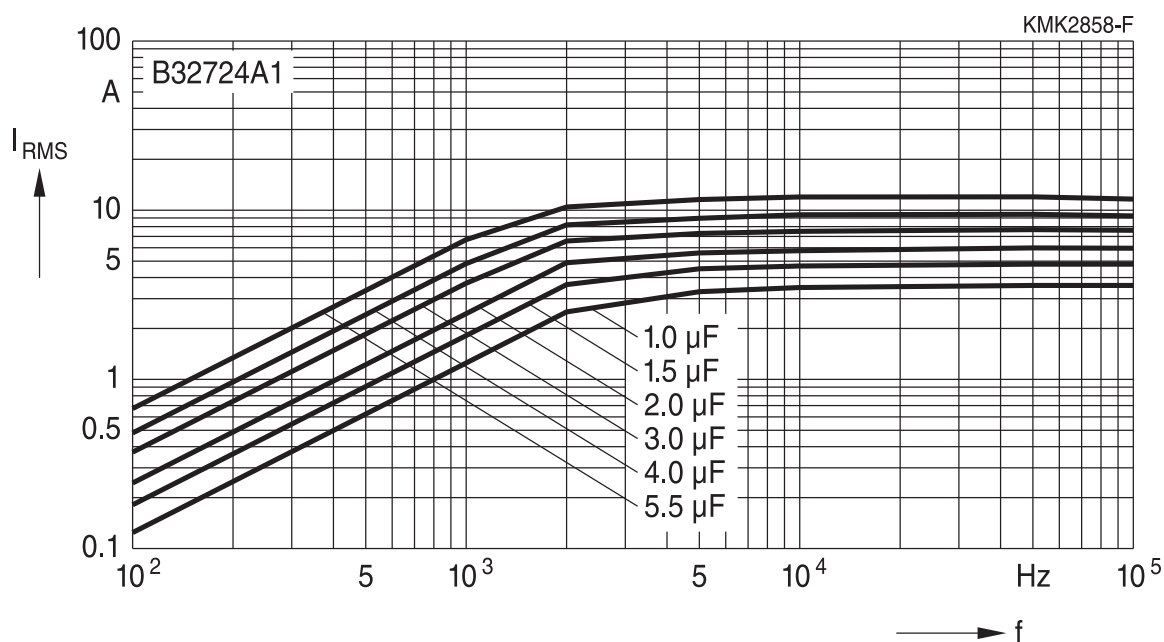
Permissible current I_{RMS} versus frequency f at $T_a \leq 85^\circ\text{C}$

Lead spacing 27.5 mm

1000 V DC



1200 V DC

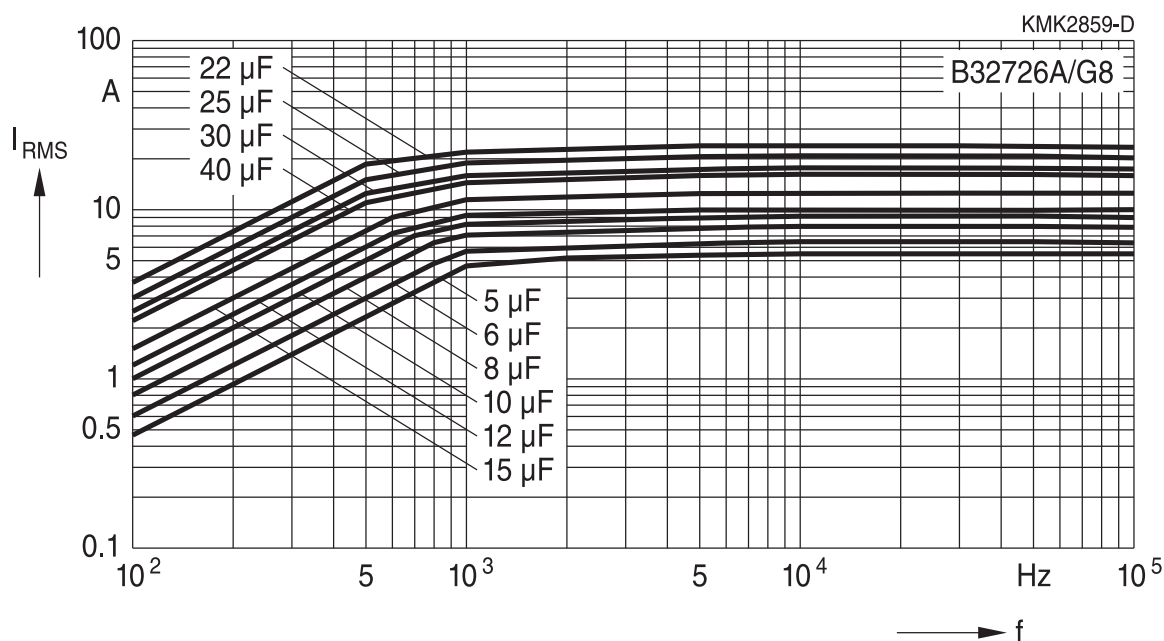


Characteristics curves

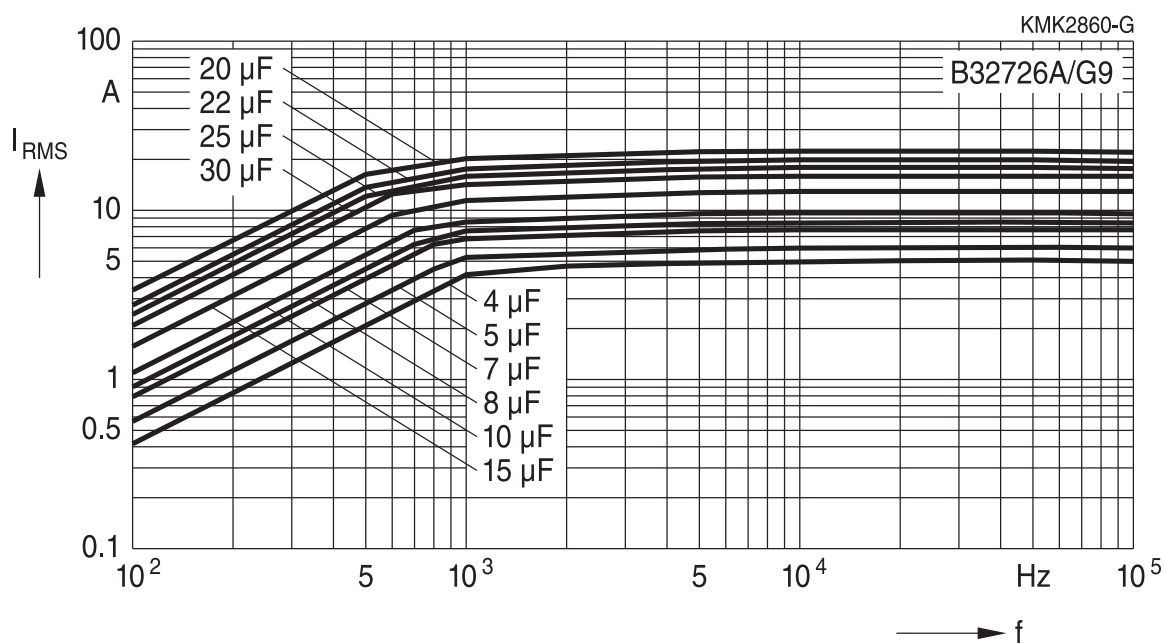
Permissible current I_{RMS} versus frequency f at $T_a \leq 85^\circ\text{C}$

Lead spacing 37.5 mm

800 V DC



900 V DC

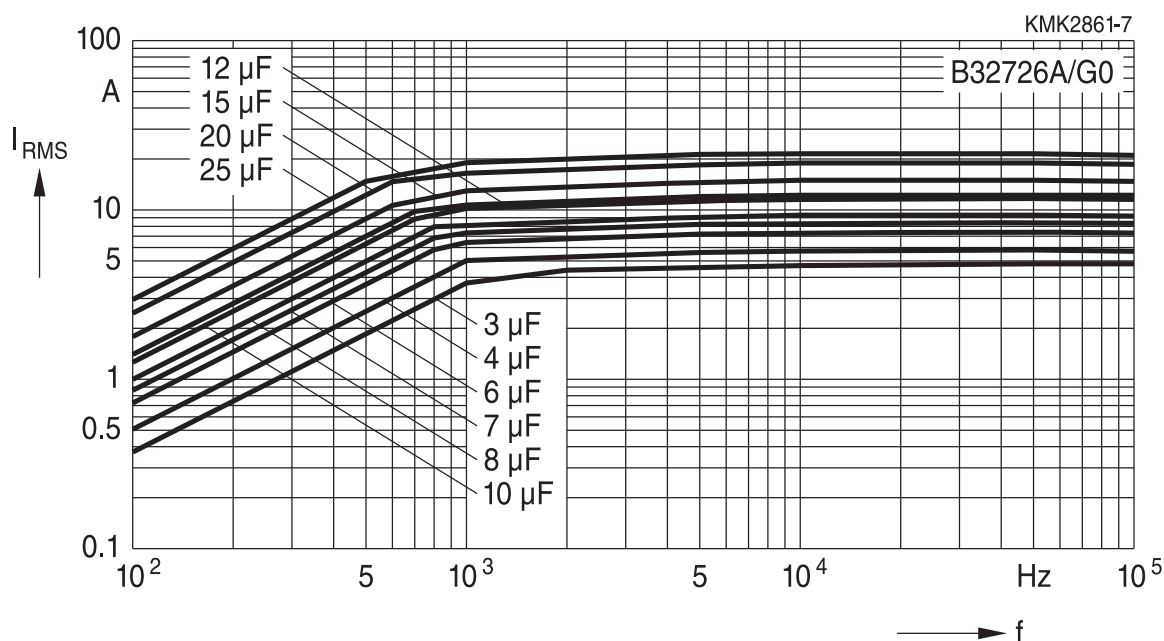


Characteristics curves

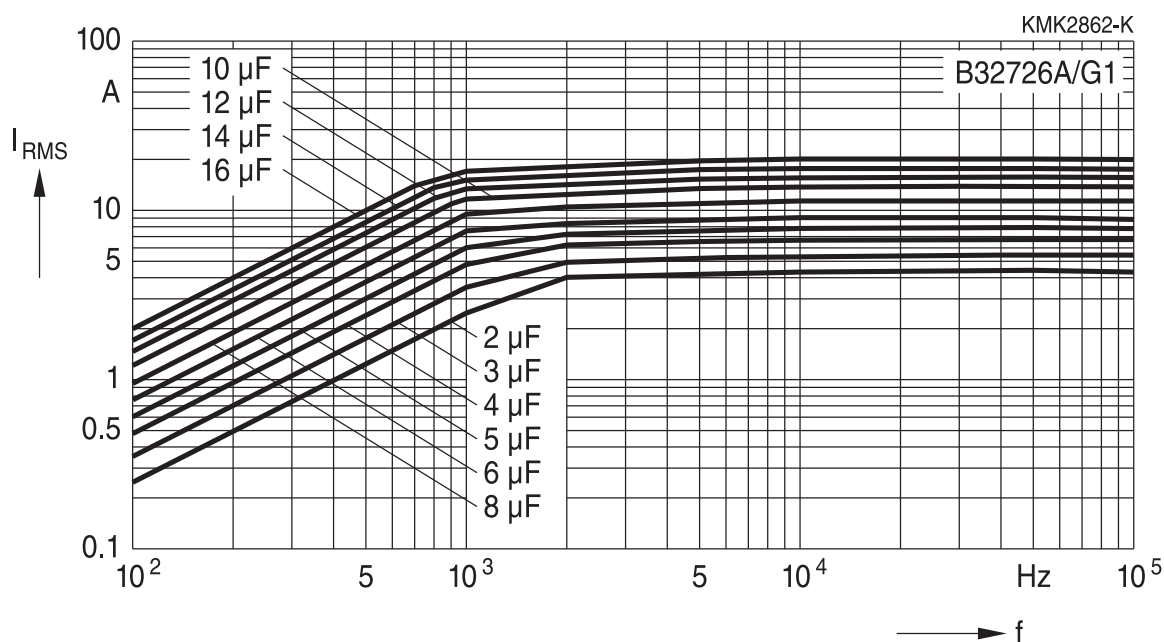
Permissible current I_{RMS} versus frequency f at $T_a \leq 85^\circ\text{C}$

Lead spacing 37.5 mm

1000 V DC



1200 V DC

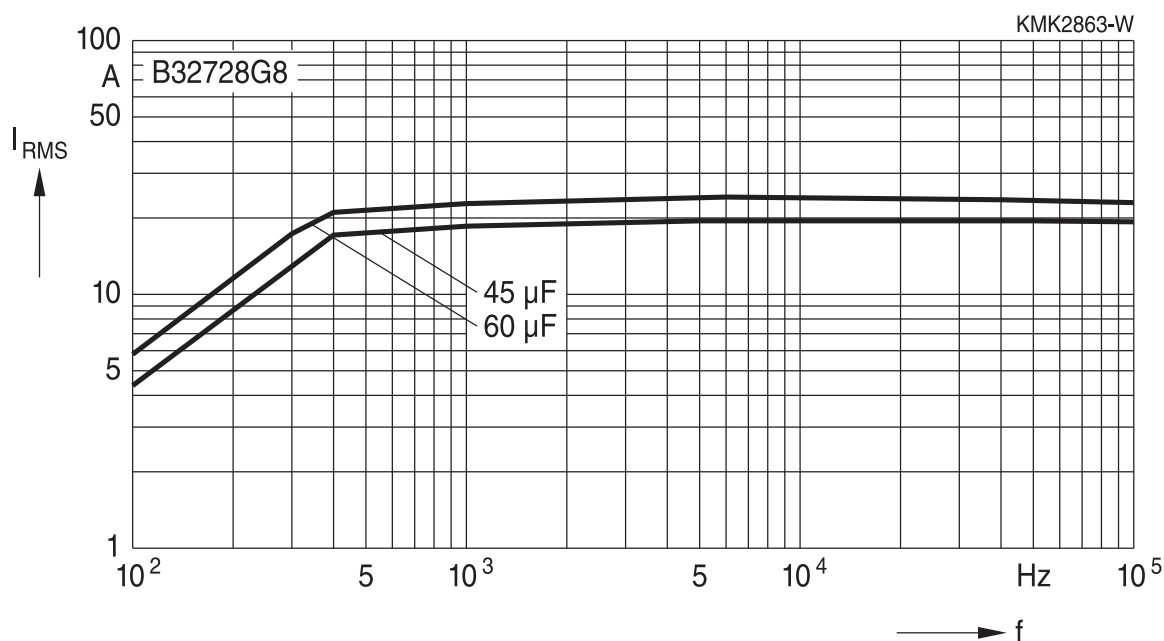


Characteristics curves

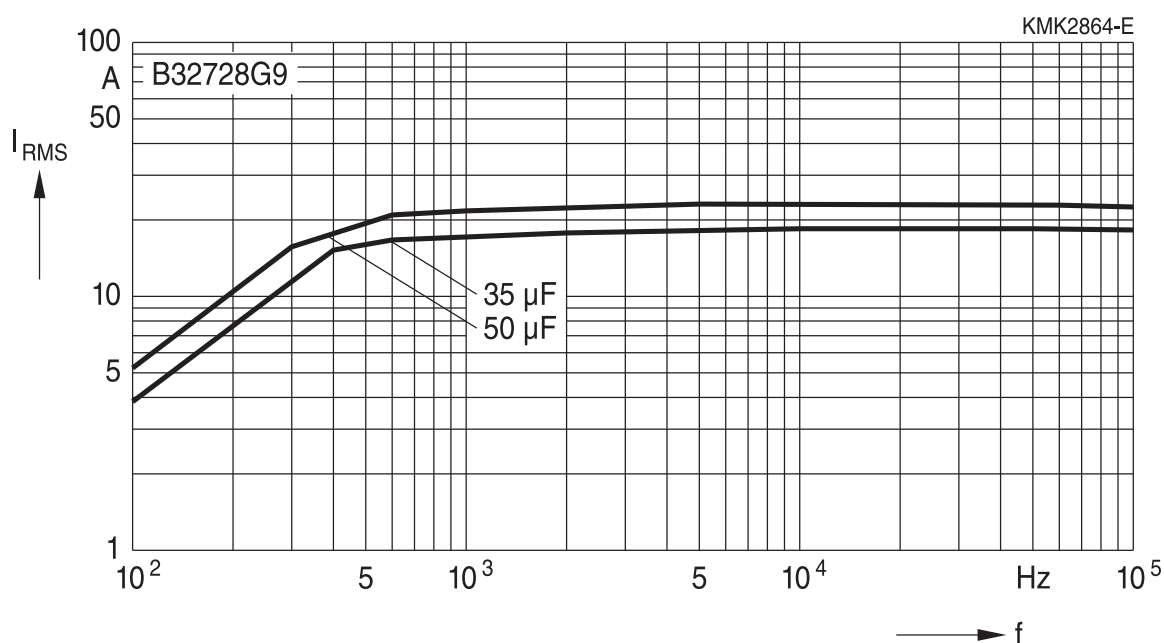
Permissible current I_{RMS} versus frequency f at $T_a \leq 85^\circ\text{C}$

Lead spacing 52.5 mm

800 V DC



900 V DC

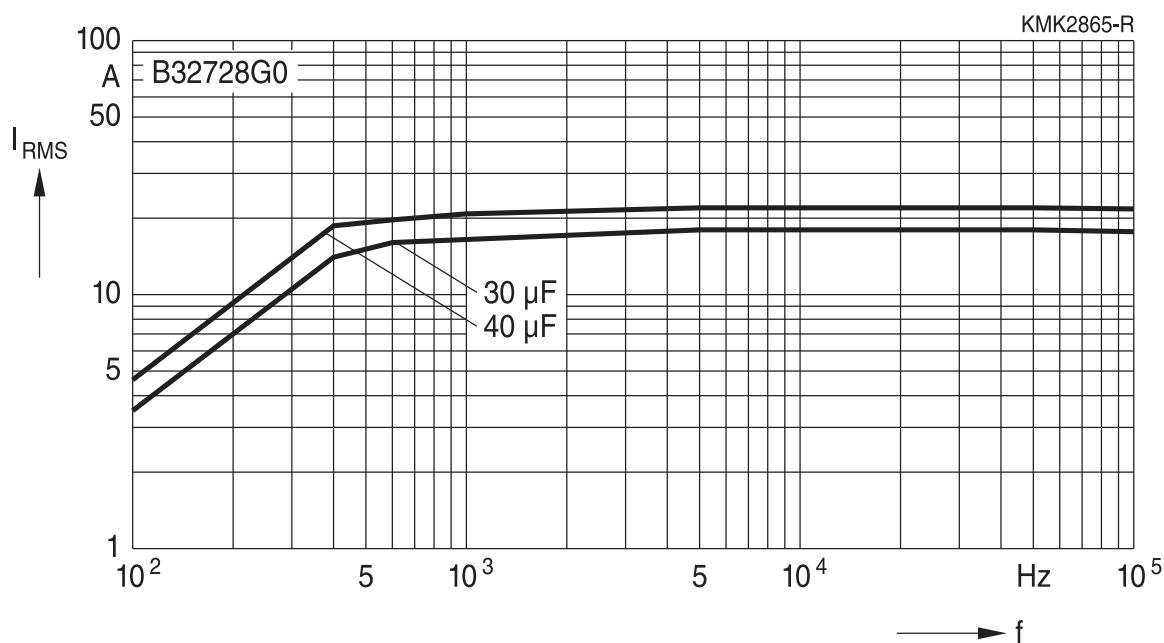


Characteristics curves

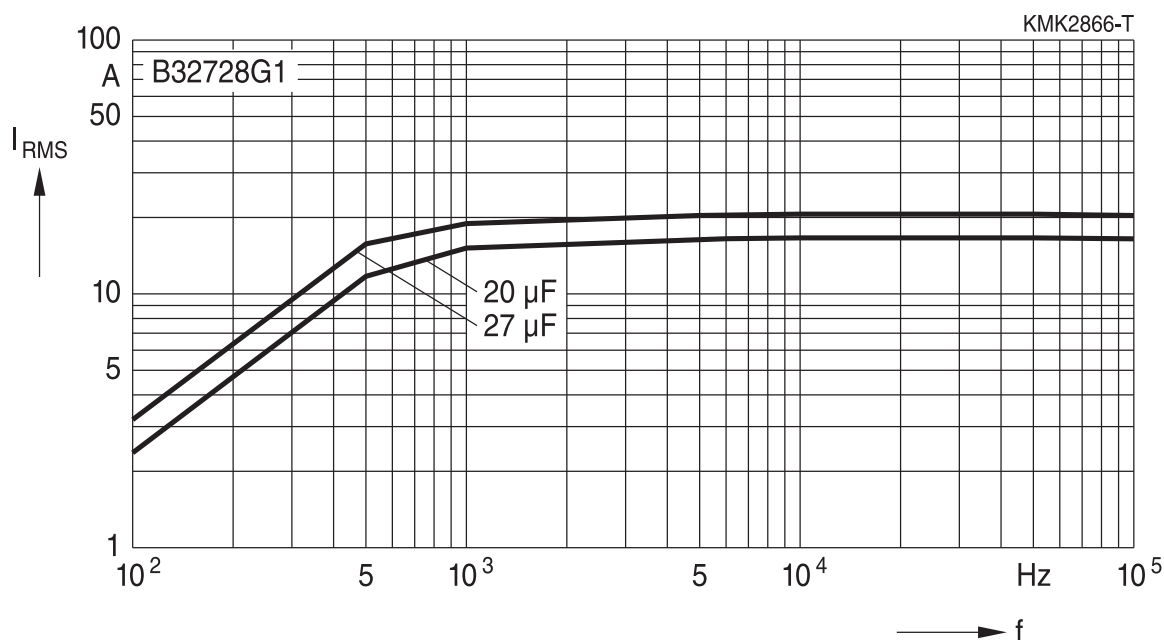
Permissible current I_{RMS} versus frequency f at $T_a \leq 85^\circ\text{C}$

Lead spacing 52.5 mm

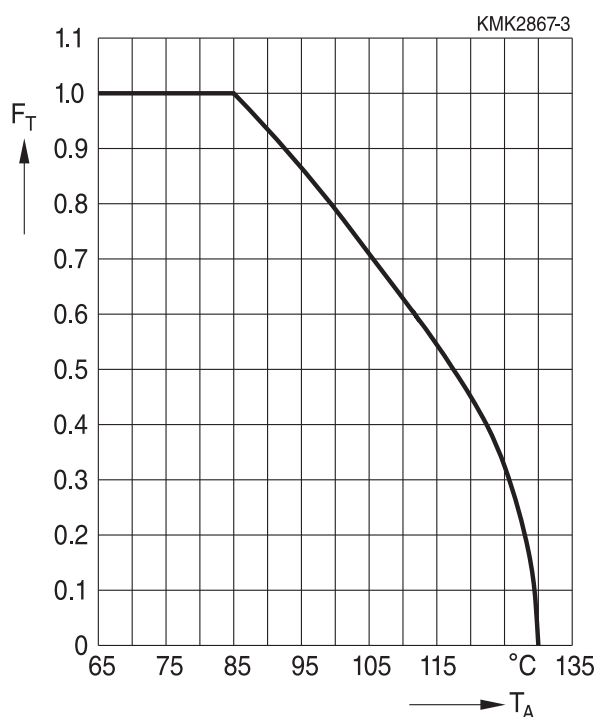
1000 V DC



1200 V DC



Curves characteristics (I_{RMS} derating versus temperature)



Maximum I_{RMS} current as function of the ambient temperature: $I_{RMS}(T_{amb}) = \text{Factor} \times I_{RMS}(85\text{ °C})$

Heat transference for self heating calculation

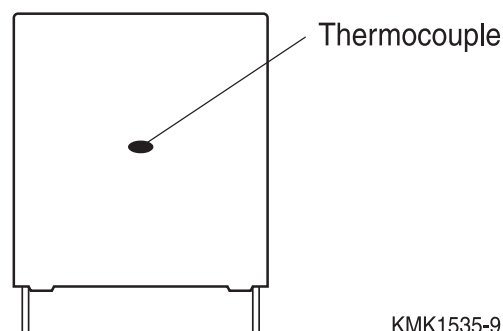


Figure 1

Box dimensions			Equivalent heat coefficient
w (mm)	h (mm)	l (mm)	G (mW/°C)
9.0	18.0	22	21
11.0	19.0	31.5	24
11.0	21.0	31.5	28
12.5	21.5	31.5	30
13.5	23.0	31.5	32
14.0	24.5	31.5	35
15.0	24.5	31.5	36
16.0	30.0	31.5	40
18.0	27.5	31.5	44
18.0	33.0	31.5	48
19.0	30.0	31.5	48
21.0	31.0	31.5	51
22.0	36.5	31.5	58
18.0	32.5	42.0	59
20.0	39.5	42.0	72
24.0	19.0	42.0	48
24.0	15.0	42.0	44
28.0	37.0	42.0	83
24.0	44.0	42.0	84
28.0	42.5	42.0	90
30.0	45.0	42.0	100
33.0	48.0	42.0	110
42.5	60.0	42.5	150
30.0	45.0	57.5	125
35.0	50.0	57.5	145
38.0	57.5	57.5	165
45.0	55.0	57.5	180
45.0	57.0	57.5	185
45.0	65.0	57.5	200

The equivalent heat coefficient “G (mW/°C)” is given for measuring the temperature on the lateral surface of the plastic box as Figure 1 shows. By using a thermocouple and avoiding effect of radiation and convection the temperature measured during operation conditions should be a result of the dissipated power divided by the equivalent heat coefficient.

Self heating by power dissipation & equivalent heat coefficient

The I_{RMS} and consequently the power dissipation must be limited during operation in order to not exceed the maximum limit of ΔT allowed for this series. ΔT given for this series is equal or lower than 15 °C at operating temperature (85 °C), for higher ambient temperatures $\Delta T_{max}(T)$ will have the same derating factor than I_{RMS} vs temperature and then an equivalent derating as per:

$$\Delta T_{max}(T) = (\text{Factor})^2 \times \Delta T(85\text{ °C})$$

For any particular I_{RMS} the ΔT may be calculated by:

$$\Delta T(^{\circ}\text{C}) = P_{dis}(\text{mW}) / G(\text{mW}/^{\circ}\text{C})$$

Where $\Delta T(^{\circ}\text{C})$ is the difference between the temperature measured on the box (see figure 1) and the ambient temperature when capacitor is working during normal operation; $\Delta T(^{\circ}\text{C}) = T_{op}(^{\circ}\text{C}) - T_{amb}(^{\circ}\text{C})$. It represents the increasing of temperature provoked by the I_{RMS} during operation. $G(\text{mW}/^{\circ}\text{C})$ is the equivalent heat coefficient described above and $P_{dis}(\text{mW})$ is the dissipated power defined by:

$$P_{dis}(\text{mW}) = ESR_{typ}(\text{m}\Omega) \times I_{RMS}^2(A_{RMS})$$

Example for thermal calculation:

We will take B32728G0306K (30 μF /1000 V) as reference type for thermal calculation. Considering the following load and capacitor characteristics:

I_{RMS} : 7 A_{RMS} at 10 kHz

T_A : 95 °C

Box: 30 x 45 x 57.5

$G(\text{mW}/^{\circ}\text{C})$: 125

Then we have to search the ESR_{typ} at 10 kHz what is approx 6.8 m Ω .

So according to: $P_{dis}(\text{mW}) = ESR_{typ}(\text{m}\Omega) \times I_{RMS}^2(A_{RMS})$

we have the following: $P_{dis}(\text{mW}) = 6.8\text{ m}\Omega \times 7\text{ }A_{RMS}^2 = 333.2\text{ mW}$

And as per: $\Delta T(^{\circ}\text{C}) = P_{dis}(\text{mW}) / G(\text{mW}/^{\circ}\text{C})$

we have the following: $\Delta T(^{\circ}\text{C}) = 333.2(\text{mW}) / 125(\text{mW}/^{\circ}\text{C}) = 2.67\text{ }^{\circ}\text{C}$

What is below of the $\Delta T_{max}(95\text{ }^{\circ}\text{C}) = (\text{Factor})^2 \times \Delta T(85\text{ }^{\circ}\text{C}) = (0.85)^2 \times 20\text{ }^{\circ}\text{C} = 14.45\text{ }^{\circ}\text{C}$

On the other hand, we may confirm previous page that max I_{RMS} @10 kHz@85 °C = 18.0 A_{RMS}

And then max I_{RMS} for 95 °C of ambient temperature is defined as follows:

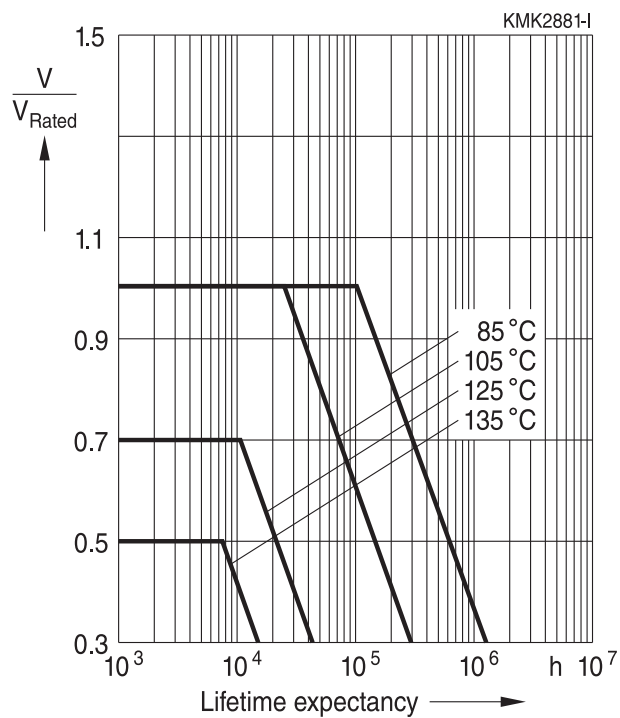
$$I_{RMS}(95\text{ }^{\circ}\text{C}) = \text{Factor} \times I_{RMS}(85\text{ }^{\circ}\text{C}) = 0.85 \times 18.0\text{ }A_{RMS} = 15.3\text{ }A_{RMS}$$

What confirms once again that I_{RMS} (7 A_{RMS} @10 kHz) is below the max specified for such frequency and ambient temperature.

Service life:

Lifetime expectancy - typical curve

(800 V DC/900 V DC/1000 V DC/1200 V DC/B3272# - A/T/G8/9/0/1)



Note: Confidence level of 95%

Testing and standards

Test description	Reference	Test conditions	Performance requirements
Electrical parameters (Routine test)	IEC 61071:2017	Voltage between terminals, $1.5 V_R$, during 10 s Insulation resistance, R_{ins} at 500 V Capacitance, C at 1 kHz (room temperature) Dissipation factor, $\tan \delta$ at 1/10 kHz (room temperature)	Within specified limits
Robustness of terminations (Type test)	IEC 60068-2-21:2021	Tensile strength (test Ua1)	Capacitance and $\tan \delta$ within specified limits
		Wire diameter	
		0.5 < d_1 ≤ 0.8 mm	
		0.8 < d_1 ≤ 1.25 mm	10 N
Resistance to soldering heat (Type test)	IEC 60068-2-20:2021, test Tb, method 1A	Solder bath temperature at 260 ± 5 °C, immersion for 10 ± 1 seconds	No visible damage $ \Delta C/C_0 \leq 2\%$ $ \Delta \tan \delta \leq 0.002$ (1 kHz)
Temperature cycling (Type test)	AEC-Q200E	−55 °C ... +85 °C, 1000 cycles	No visible damage $ \Delta C/C_0 \leq 5\%$ $ \Delta \tan \delta \leq 0.004$ (1 kHz) $R_{ins} \geq 50\%$ of initial limit
Vibration (Type test)	IEC 60384-16:2019	Test F _C : vibration sinusoidal Displacement: 0.75 mm Acceleration: 98 m/s ² Frequency: 10 Hz ... 500 Hz Test duration: 3 orthogonal axes, 2 hours each axe	No visible damage $ \Delta C/C_0 \leq 2\%$ $ \Delta \tan \delta \leq 0.002$ (1 kHz) $R_{ins} \geq 50\%$ of initial limit
Bump (Type test)	IEC 60384-16:2019	Test Eb: Total 4000 bumps with 390 m/s ² mounted on PCB Duration: 6 ms	
Biased humidity (Type test)		60 °C / 95% RH / V_R / 1000 hours	No visible damage $ \Delta C/C_0 \leq 5\%$ $ \Delta \tan \delta \leq 0.005$ (1 kHz) $R_{ins} \geq 50\%$ of initial limit
Endurance test (Type test)	IEC 60384-16:2019	105 °C / $1.25 V_R$ / 1000 hours	No visible damage $ \Delta C/C_0 \leq 5\%$ $ \Delta \tan \delta \leq 0.005$ (1 kHz) $R_{ins} \geq 50\%$ of initial limit

Test description	Reference	Test conditions	Performance requirements
Endurance test (Type test)	IEC 60384-16:2019	125 °C / 1.25 V _{OP} @125 °C / 1000 hours	No visible damage $ \Delta C/C_0 \leq 5\%$ $ \Delta \tan \delta \leq 0.005$ (1 kHz) $R_{ins} \geq 50\%$ of initial limit
Endurance test (Type test)		135 °C / 1.1 V _{OP} @135 °C / 1000 hours	No visible damage $ \Delta C/C_0 \leq 5\%$ $ \Delta \tan \delta \leq 0.005$ (1 kHz) $R_{ins} \geq 50\%$ of initial limit

Soldering

Solderability of leads

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

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

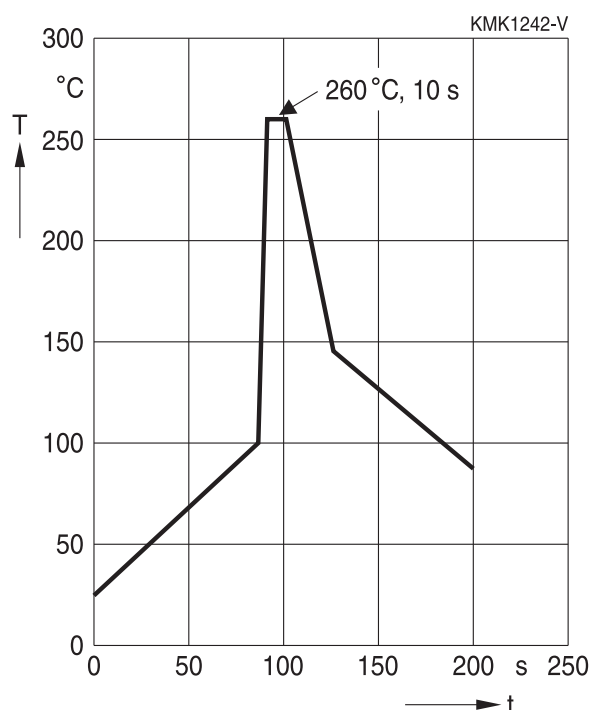
Solder bath temperature	245 ±5 °C
Soldering time	3.0 ±0.3 s
Immersion depth	2.0 +0/–0.5 mm from capacitor body or seating plane
Evaluation criteria: Visual inspection	Wetting of wire surface by new solder ≥ 95%, free-flowing solder

Resistance to soldering heat

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

Conditions:

Series	Solder bath temperature	Soldering time
MKT boxed (except 2.5 x 6.5 x 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 x 6.5 x 7.2 mm)		5 ± 1 s
MKP (lead spacing ≤ 7.5 mm)		
MKT uncoated (lead spacing ≤ 10 mm) insulated (B32559)		< 4 s recommended soldering profile for MKT uncoated (lead spacing ≤ 10 mm) and insulated (B32559)



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

General notes on soldering

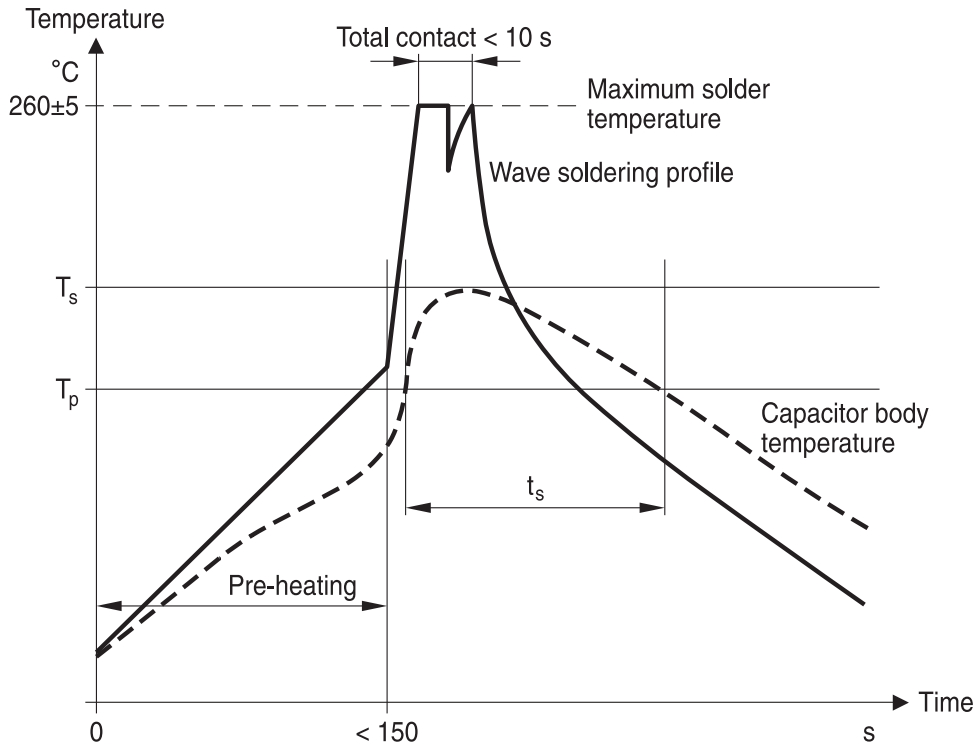
Permissible heat exposure loads on film capacitors are primarily characterized by the upper category temperature $T_{\max}$. Long exposure to temperatures above this type-related temperature limit can lead to changes in the plastic dielectric and thus change irreversibly a capacitor's electrical characteristics.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

TDK Recommendations

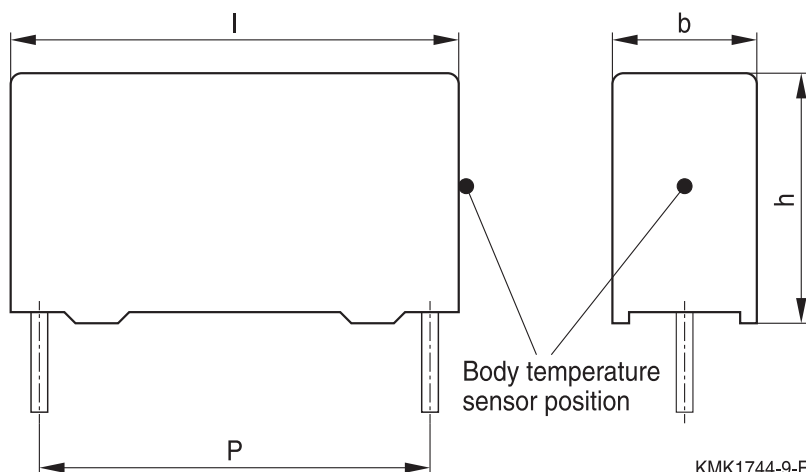
As a reference, the recommended wave soldering profile for our film capacitors is as follows:



T_s : Capacitor body maximum temperature at wave soldering

T_p : Capacitor body maximum temperature at pre-heating

KMK1745-A-E



KMK1744-9-E