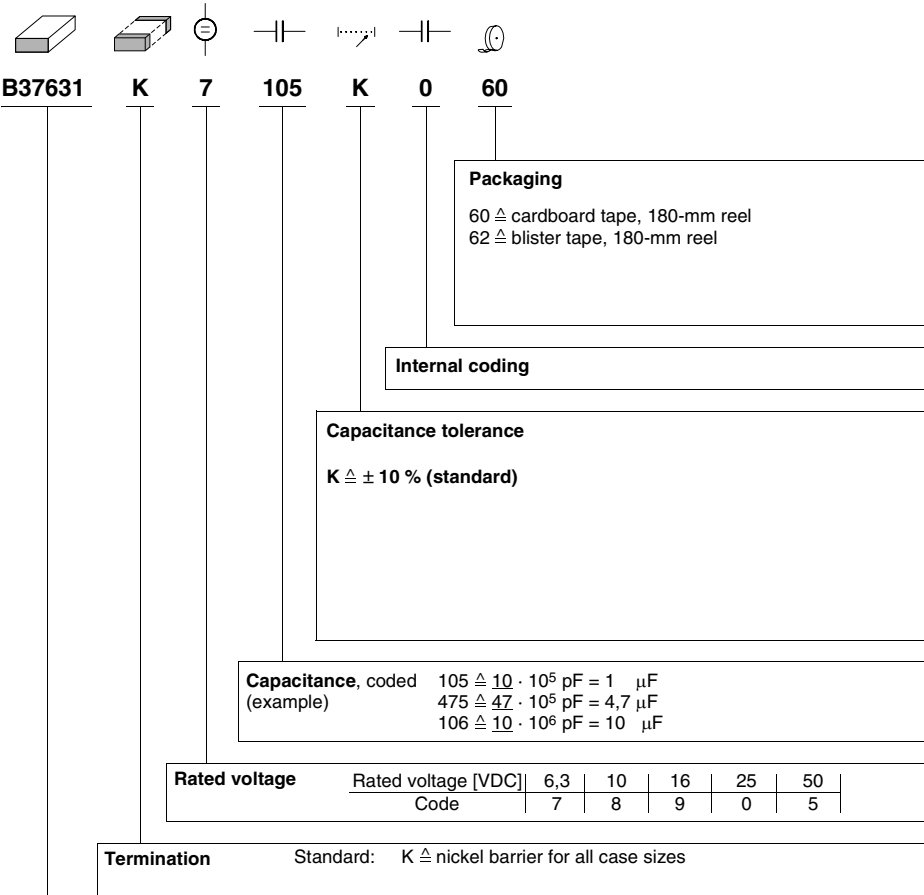


**Ordering code system**


Type and size		
Chip size (inch / mm)	Temperature characteristic	
	X5R	X7R
<b>0402</b> / 1005	B37621	–
<b>0603</b> / 1608	B37631	B37931
<b>0805</b> / 2012	B37641	B37941
<b>1206</b> / 3216	B37572	B37872
<b>1210</b> / 3225	B37650	B37950
<b>1812</b> / 4532	B37653	–


**Features**

- Characteristic of class 2 dielectric
- High capacitance values up to 22  $\mu\text{F}$
- Voltage rating from 6,3 V to 50 V
- Reduced chip thickness
- Small sizes


**Applications**

- Coupling and bypass filters

**Termination**

- For soldering: Nickel-barrier terminations (Ni)

**Options**

- Extended E3 series (E3+) and other capacitance values on request

**Delivery mode**

- Cardboard and blister tape (blister tape for chip thickness  $\geq 1,2 \pm 0,1$  mm and case sizes  $\geq 1210$ )

**Electrical data**

Temperature characteristic		X5R	X7R	
Climatic category (IEC 60068-1)		55/85/56	55/125/56	
Standard		EIA	EIA	
Dielectric		Class 2	Class 2	
Rated voltage <sup>1)</sup>	$V_R$	6,3; 10; 16; 25	10; 16; 25; 50	VDC
Test voltage	$V_{\text{test}}$	$2,5 \cdot V_R/5$ s	$2,5 \cdot V_R/5$ s	VDC
Capacitance range / E series	$C_R$	100 nF ... 22 $\mu\text{F}$ (E3+)	100 nF ... 4,7 $\mu\text{F}$ (E3+)	
Max. relative capacitance change	$\Delta C/C$	$\pm 15$	$\pm 15$	%
Dissipation factor (limit value)	$\tan \delta$	$< 50 \cdot 10^{-3}$	$< 25 \cdot 10^{-3}$ $< 35 \cdot 10^{-3}$ for $\leq 25$ V	
Insulation resistance <sup>2)</sup> at +25 °C	$R_{\text{ins}}$	$> 10^4$	$> 10^4$	M $\Omega$
Time constant <sup>2)</sup> at +25 °C	$\tau$	$> 500$	$> 500$	s
Operating temperature range	$T_{\text{op}}$	-55 ... +85	-55 ... +125	°C
Ageing <sup>3)</sup>		yes	yes	

1) Note: No operation on AC line.

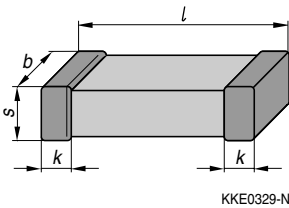
2) For  $C_R > 10$  nF the time constant  $\tau = C \cdot R_{\text{ins}}$  is given.

3) Refer to chapter "General Technical Information", page 197.

### Capacitance tolerances

Code letter	K (standard)
Tolerance	$\pm 10\%$

### Dimensional drawing

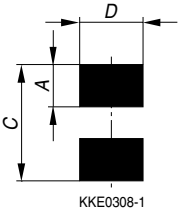


### Dimensions (mm)

Case size (inch) (mm)	0402 1005	0603 1608	0805 2012	1206 3216	1210 3225	1812 4532
<i>l</i>	$1,0 \pm 0,10$	$1,6 \pm 0,15$	$2,0 \pm 0,20$	$3,2 \pm 0,20$	$3,2 \pm 0,30$	$4,5 \pm 0,30$
<i>b</i>	$0,5 \pm 0,05$	$0,8 \pm 0,10$	$1,25 \pm 0,15$	$1,6 \pm 0,15$	$2,5 \pm 0,30$	$3,2 \pm 0,30$
<i>s</i>	$0,5 \pm 0,05$	$0,8 \pm 0,10$	1,35 max.	1,80 max.	2,70 max.	2,70 max.
<i>k</i>	0,1 – 0,4	0,1 – 0,4	0,13 – 0,75	0,25 – 0,75	0,25 – 0,75	0,25 – 1,0

Tolerances to CECC 32101-801

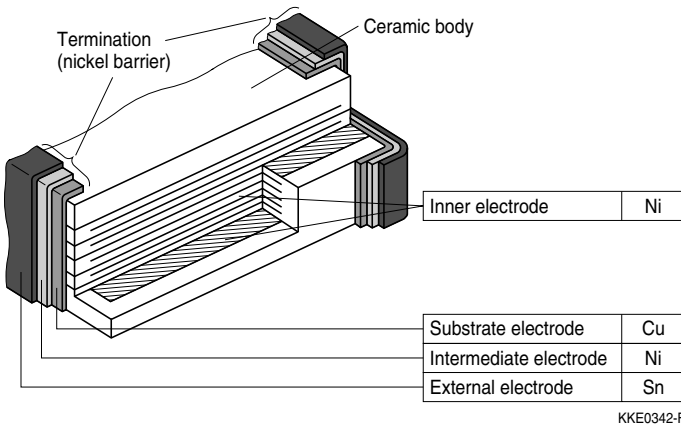
**Recommended solder pad**



**Maximum dimensions (mm)**

Case size	(inch/mm)	Type	A	C	D
0402/1005		single chip	0,6	1,7	0,6
0603/1608		single chip	1,0	3,0	1,0
0805/2012		single chip	1,2	3,4	1,3
1206/3216		single chip	1,2	4,5	1,8
1210/3225		single chip	1,2	4,5	2,8
1812/4532		single chip	1,5	6,0	3,6

**Termination**



**Product range chip capacitors**

		X5R							
Size <sup>1)</sup> inch mm		0402 1005		0603 1608		0805 2012		1206 3216	
Type		B37621		B37631		B37641		B37572	
$C_R$ \ $V_R$ (VDC)		10	6,3	10	25	6,3	10	6,3	10
100 nF									
330 nF									
1,0 $\mu$ F									
2,2 $\mu$ F									
4,7 $\mu$ F									
10 $\mu$ F									

		X5R					
Size <sup>1)</sup> inch mm		1210 3225				1812 4532	
Type		B37650				B37653	
$C_R$ \ $V_R$ (VDC)		6,3	10	16	25	16	25
4,7 $\mu$ F							
10 $\mu$ F							
22 $\mu$ F							

1)  $l \times b$  (inch) /  $l \times b$  (mm)

**Product range chip capacitors**

		X7R								
Size <sup>1)</sup>		0603		0805		1206			1210	
inch		1608		2012		3216			3225	
mm		B37931		B37941		B37872			B37950	
Type		B37931		B37941		B37872			B37950	
$V_R$ (VDC)	$C_R$	10		16	25	16	25	50	25	50
100	nF									
220	nF									
330	nF									
470	nF									
1,0	$\mu$ F									
2,2	$\mu$ F									
4,7	$\mu$ F									

1)  $l \times b$  (inch) /  $l \times b$  (mm)

**Ordering codes and packing for HighCap, X5R, 6,3; 10; 16 and 25 VDC,  
nickel-barrier terminations**

$C_R^{1)}$	$V_R$ (VDC)	Ordering code	Chip thickness mm	Cardboard tape, Ø 180-mm reel	Blister tape, Ø 180-mm reel
				** $\triangleq$ 60	** $\triangleq$ 62
				pcs/reel	pcs/reel

**Case size 0402**

100 nF	10	B37621K8104K0**	0,5 ± 0,05	10000	–
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**Case size 0603**

1,0 µF	6,3	B37631K7105K0**	0,8 ± 0,1	4000	–
2,2 µF	6,3	B37631K7225K0**	0,8 ± 0,1	4000	–
330 nF	10	B37631K8334K0**	0,8 ± 0,1	4000	–
1,0 µF	10	B37631K8105K0**	0,8 ± 0,1	4000	–
100 nF	25	B37631K0104K0**	0,8 ± 0,1	4000	–

**Case size 0805**

4,7 µF	6,3	B37641K7475K0**	1,25 ± 0,1	–	3000
10 µF	6,3	B37641K7106K0**	1,25 ± 0,1	–	3000
1,0 µF	10	B37641K8105K0**	1,25 ± 0,1	–	3000
2,2 µF	10	B37641K8225K0**	1,25 ± 0,1	–	3000

**Case size 1206**

10 µF	6,3	B37572K7106K0**	1,6 ± 0,2	–	2000
4,7 µF	10	B37572K8475K0**	1,6 ± 0,2	–	2000
10 µF	10	B37572K8106K0**	1,6 ± 0,2	–	2000

**Case size 1210**

22 µF	6,3	B37650K7226K0**	2,5 ± 0,2	–	500
10 µF	10	B37650K8106K0**	2,0 ± 0,2	–	2000
10 µF	16	B37650K9106K0**	2,0 ± 0,2	–	2000
22 µF	16	B37650K9226K0**	2,5 ± 0,2	–	500
4,7 µF	25	B37650K0475K0**	2,0 ± 0,2	–	2000

**Case size 1812**

22 µF	16	B37653K9226K0**	2,5 ± 0,2	–	500
10 µF	25	B37653K0106K0**	2,5 ± 0,2	–	500

1) Other capacitance values on request.

**Multilayer Ceramic Capacitors**
**HighCap; X7R; 0603 to 1210**

**Ordering codes and packing for HighCap, X7R, 10, 16, 25 and 50 VDC, nickel-barrier terminations**

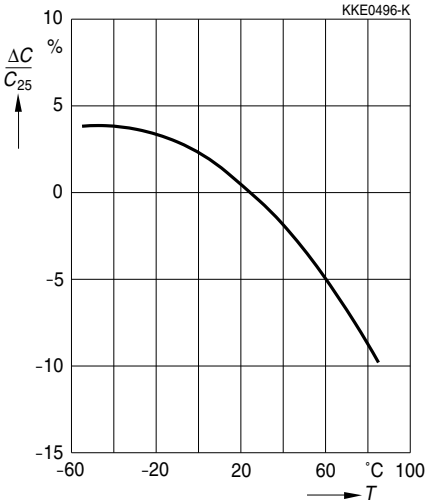
$C_R^{1)}$	$V_R$ (VDC)	Ordering code	Chip thickness mm	Cardboard tape, Ø 180-mm reel	Blister tape, Ø 180-mm reel
				** $\triangleq$ 60	** $\triangleq$ 62
				pcs/reel	pcs/reel
<b>Case size 0603</b>					
220 nF	10	B37931K8224K0**	$0,8 \pm 0,1$	4000	–
<b>Case size 0805</b>					
220 nF	16	B37941K9224K0**	$1,25 \pm 0,1$	–	3000
330 nF	16	B37941K9334K0**	$1,25 \pm 0,1$	–	3000
470 nF	16	B37941K9474K0**	$1,25 \pm 0,1$	–	3000
1,0 $\mu$ F	16	B37941K9105K0**	$1,25 \pm 0,1$	–	3000
220 nF	25	B37941K0224K0**	$0,85 \pm 0,1$	–	4000
<b>Case size 1206</b>					
1,0 $\mu$ F	16	B37872K9105K0**	$1,15 \pm 0,1$	–	3000
2,2 $\mu$ F	16	B37872K9225K0**	$1,6 \pm 0,2$	–	2000
4,7 $\mu$ F	16	B37872K9475K0**	$1,6 \pm 0,2$	–	2000
330 nF	25	B37872K0334K0**	$0,8 \pm 0,1$	4000	–
470 nF	25	B37872K0474K0**	$1,2 \pm 0,1$	–	3000
1,0 $\mu$ F	25	B37872K0105K0**	$1,6 \pm 0,2$	–	2000
220 nF	50	B37872K5224K0**	$0,8 \pm 0,1$	4000	–
330 nF	50	B37872K5334K0**	$1,2 \pm 0,1$	–	3000
470 nF	50	B37872K5474K0**	$1,2 \pm 0,1$	–	3000
<b>Case size 1210</b>					
2,2 $\mu$ F	25	B37950K0225K0**	$2,0 \pm 0,2$	–	2000
1,0 $\mu$ F	50	B37950K5105K0**	$2,0 \pm 0,2$	–	2000

1) Other capacitance values on request.

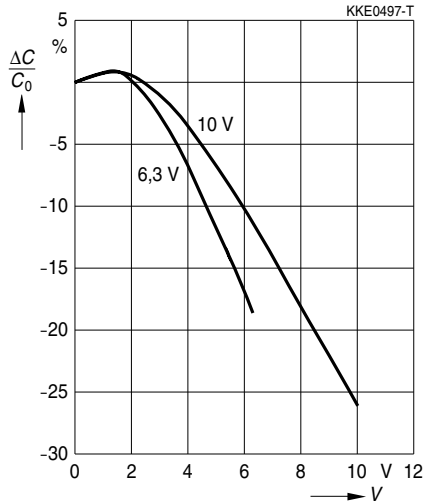


Typical characteristics for HighCap X5R

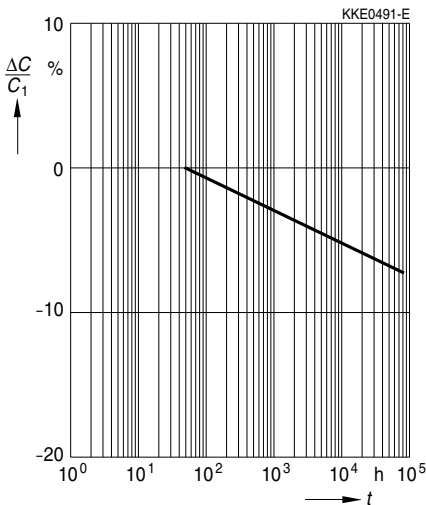
Capacitance change  $\Delta C/C_{25}$  versus temperature  $T$



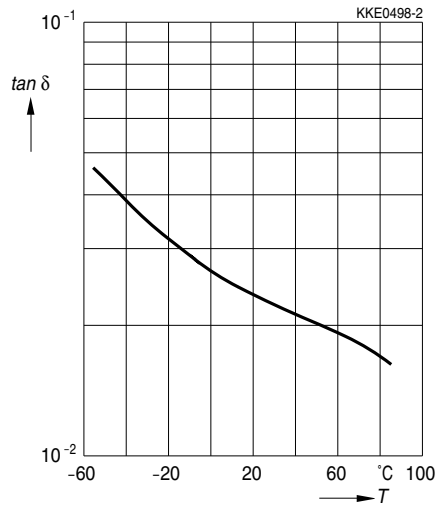
Capacitance change  $\Delta C/C_0$  versus superimposed DC voltage  $V$



Capacitance change  $\Delta C/C_1$  versus time  $t$

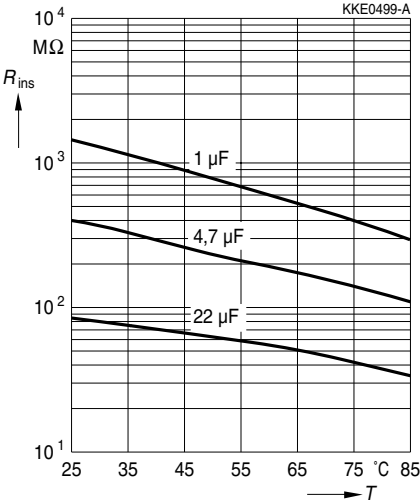


Dissipation factor  $\tan \delta$  versus temperature  $T$

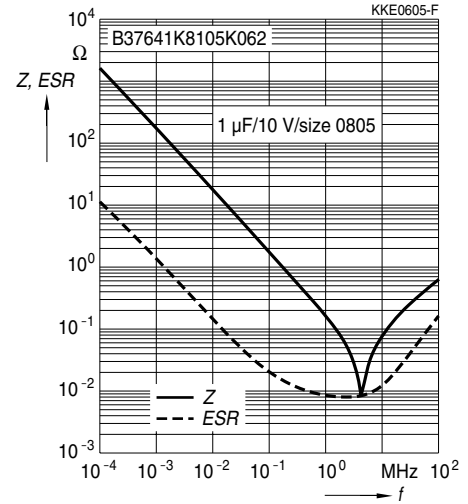


Typical characteristics for HighCap X5R

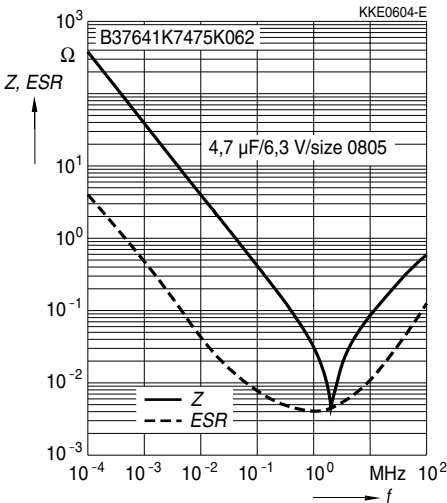
Insulation resistance  $R_{ins}$  versus temperature  $T$



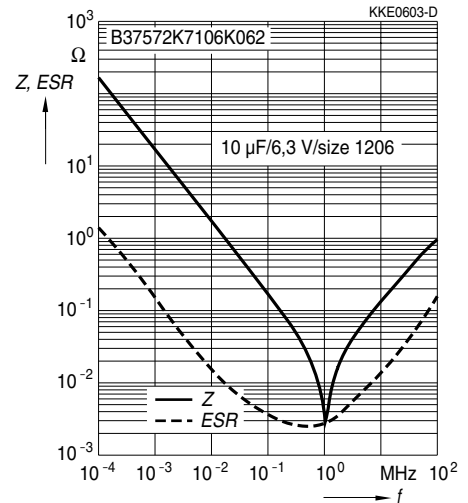
Impedance  $Z$  and ESR versus frequency  $f$



Impedance  $Z$  and ESR versus frequency  $f$

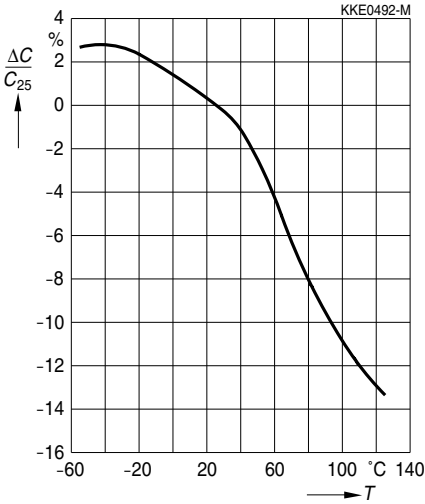


Impedance  $Z$  and ESR versus frequency  $f$

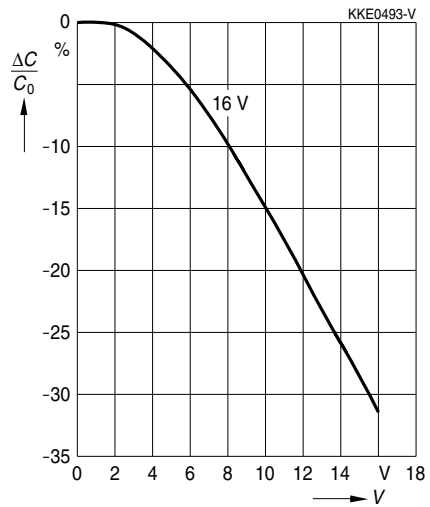


Typical characteristics for HighCap X7R

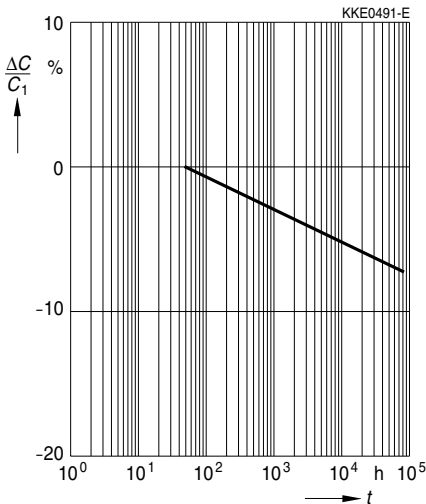
Capacitance change  $\Delta C/C_{25}$  versus temperature  $T$



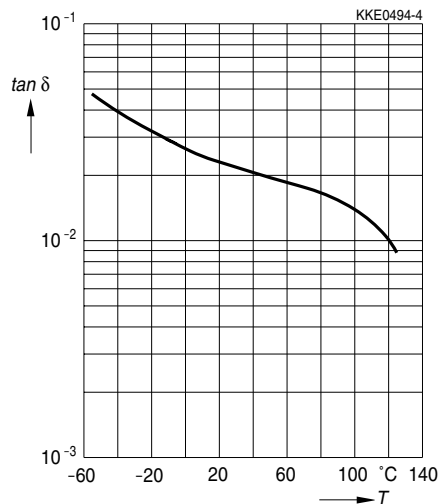
Capacitance change  $\Delta C/C_0$  versus superimposed DC voltage  $V$



Capacitance change  $\Delta C/C_1$  versus time  $t$

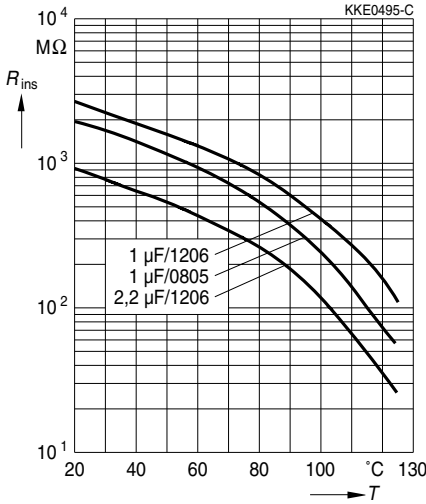


Dissipation factor  $\tan \delta$  versus temperature  $T$

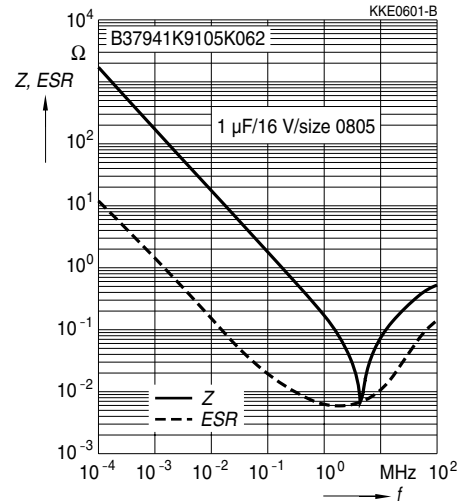


Typical characteristics for HighCap X7R

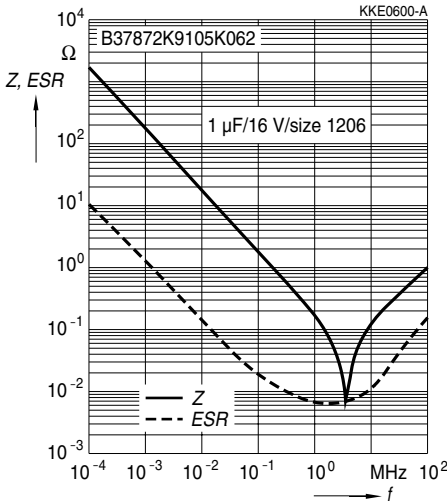
Insulation resistance  $R_{ins}$  versus temperature  $T$



Impedance  $Z$  and ESR versus frequency  $f$



Impedance  $Z$  and ESR versus frequency  $f$



Impedance  $Z$  and ESR versus frequency  $f$

