

Features

- Characteristic of class 2 dielectric
- High capacitance values up to 22 μF
- 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 ≥ 1210)

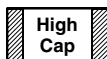
Electrical data

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 ¹⁾	V_R	6,3; 10; 16; 25	10; 16; 25; 50	VDC
Test voltage	V_{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 μF (E3+)	100 nF ... 4,7 μF (E3+)	
Max. relative capacitance change	$\Delta C/C$	± 15	± 15	%
Dissipation factor (limit value)	$\tan \delta$	$< 50 \cdot 10^{-3}$	$< 25 \cdot 10^{-3}$ $< 35 \cdot 10^{-3}$ for ≤ 25 V	
Insulation resistance ²⁾ at +25 °C	R_{ins}	$> 10^4$	$> 10^4$	M Ω
Time constant ²⁾ at +25 °C	τ	> 500	> 500	s
Operating temperature range	T_{op}	-55 ... +85	-55 ... +125	°C
Ageing ³⁾		yes	yes	

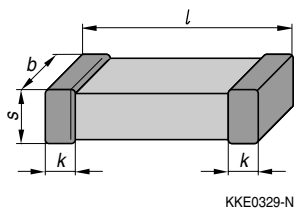
1) Note: No operation on AC line.

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

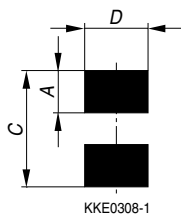
Tolerances to CECC 32101-801

Multilayer Ceramic Capacitors

HighCap; X5R and X7R

High
Cap

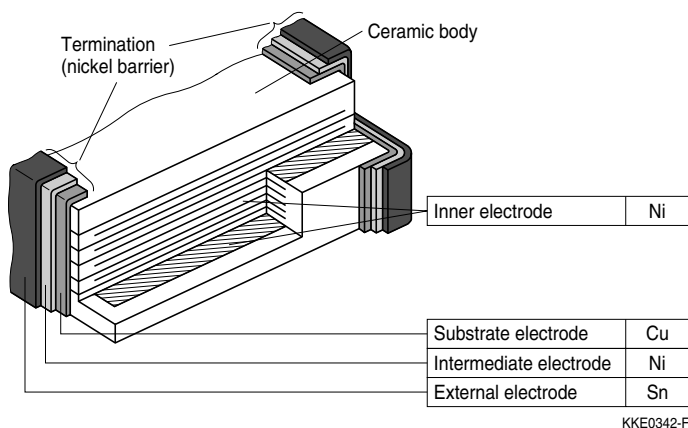
Recommended solder pad

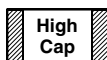


Maximum dimensions (mm)

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 ¹⁾ inch mm	0402 1005	0603 1608				0805 2012		1206 3216
Type	B37621	B37631				B37641		B37572
V_R (VDC) C_R	10	6,3	10	25	6,3	10	6,3	10
100 nF								
330 nF								
1,0 μ F								
2,2 μ F								
4,7 μ F								
10 μ F								

	X5R					
Size ¹⁾ inch mm	1210 3225				1812 4532	
Type	B37650				B37653	
V_R (VDC) C_R	6,3	10	16	25	16	25
4,7 μ F						
10 μ F						
22 μ F						

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

Multilayer Ceramic Capacitors

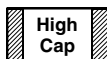
HighCap; X7R



Product range chip capacitors

	X7R								
Size ¹⁾ inch mm	0603 1608		0805 2012		1206 3216			1210 3225	
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 μ F									
2,2 μ F									
4,7 μ 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
				** $\triangle 60$	** $\triangle 62$
				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

High
Cap

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
				** $\triangle 60$	** $\triangle 62$
				pcs/reel	pcs/reel

Case size 0603

220 nF	10	B37931K8224K0**	$0,8 \pm 0,1$	4000	—
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Case size 0805

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 μ F	16	B37941K9105K0**	$1,25 \pm 0,1$	—	3000
220 nF	25	B37941K0224K0**	$0,85 \pm 0,1$	—	4000

Case size 1206

1,0 μ F	16	B37872K9105K0**	$1,15 \pm 0,1$	—	3000
2,2 μ F	16	B37872K9225K0**	$1,6 \pm 0,2$	—	2000
4,7 μ 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 μ 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

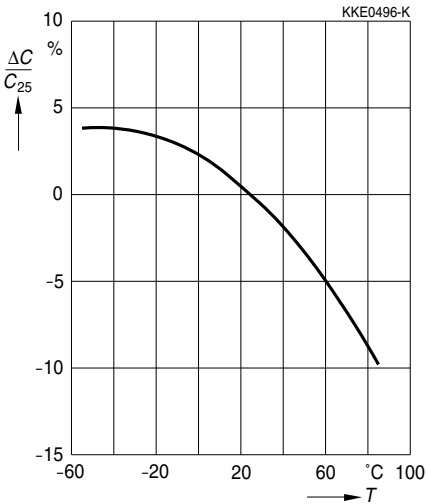
Case size 1210

2,2 μ F	25	B37950K0225K0**	$2,0 \pm 0,2$	—	2000
1,0 μ F	50	B37950K5105K0**	$2,0 \pm 0,2$	—	2000

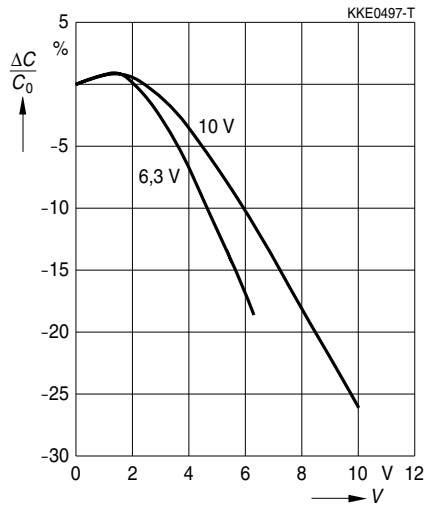
1) Other capacitance values on request.

Typical characteristics for HighCap X5R

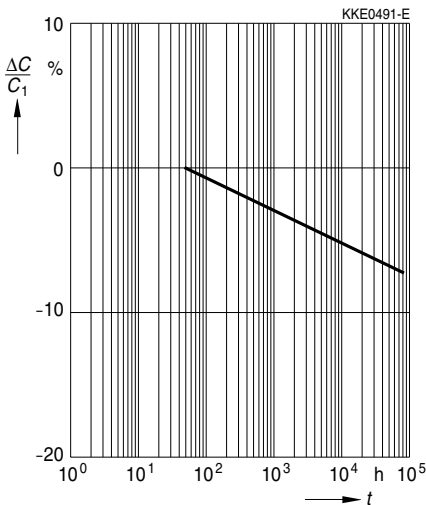
Capacitance change $\Delta C/C_{25}$ versus temperature T



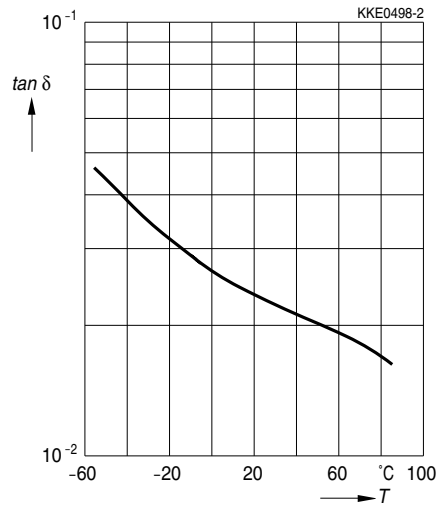
Capacitance change $\Delta C/C_0$ versus superimposed DC voltage V



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



Dissipation factor $\tan \delta$ versus temperature T



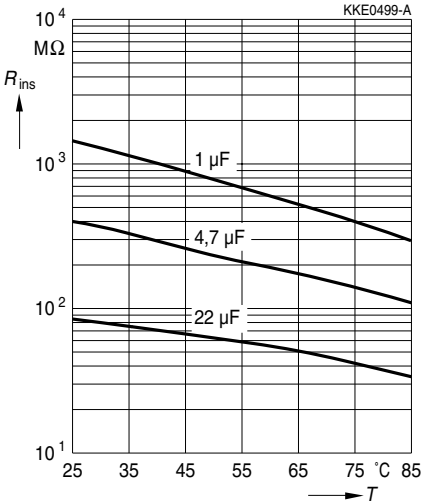
Multilayer Ceramic Capacitors

HighCap; X5R

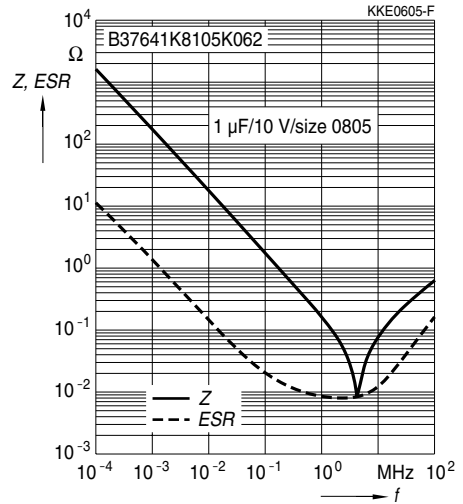
High
Cap

Typical characteristics for HighCap X5R

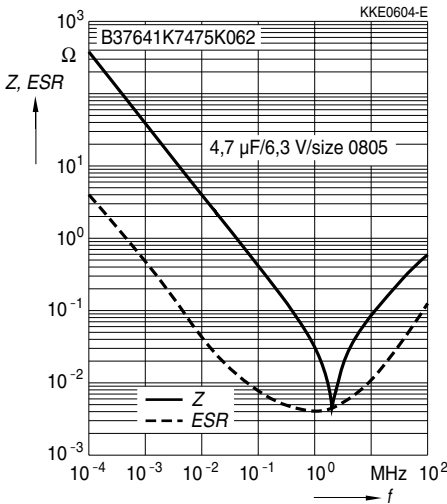
Insulation resistance R_{ins} versus temperature T



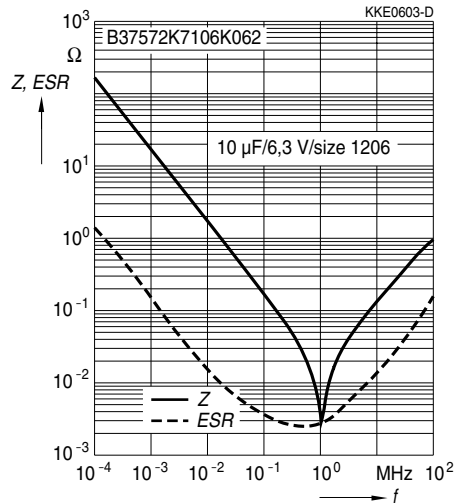
Impedance Z and ESR versus frequency f



Impedance Z and ESR versus frequency f

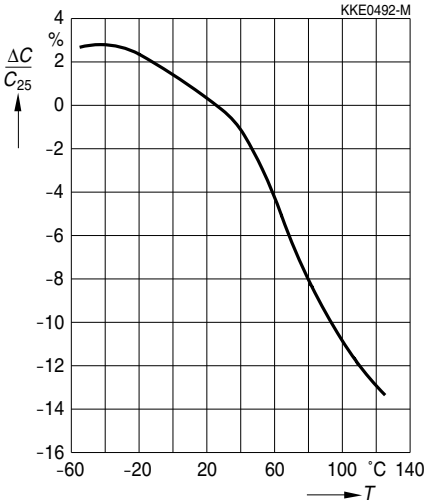


Impedance Z and ESR versus frequency f

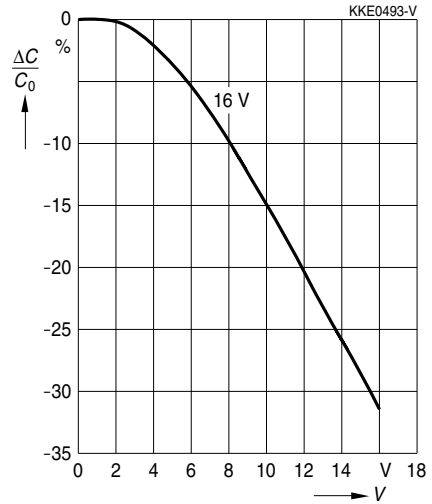


Typical characteristics for HighCap X7R

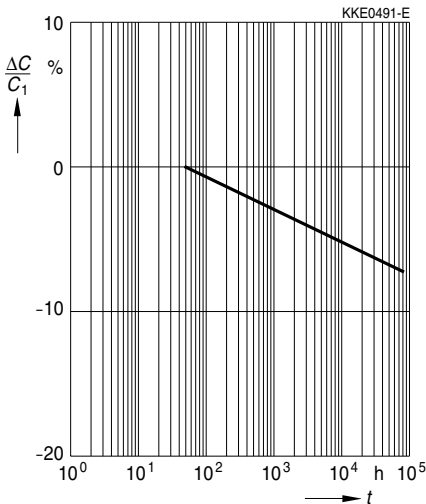
Capacitance change $\Delta C/C_{25}$ versus temperature T



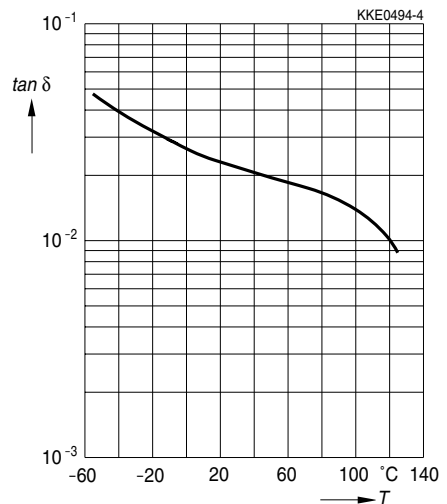
Capacitance change $\Delta C/C_0$ versus superimposed DC voltage V



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

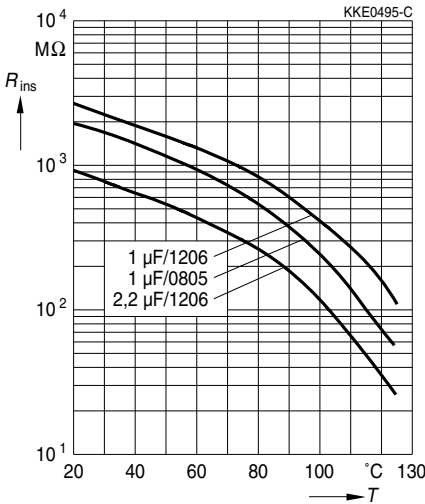


Dissipation factor $\tan \delta$ versus temperature T

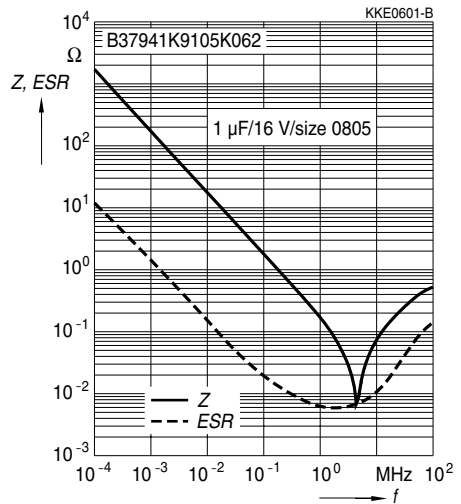


Typical characteristics for HighCap X7R

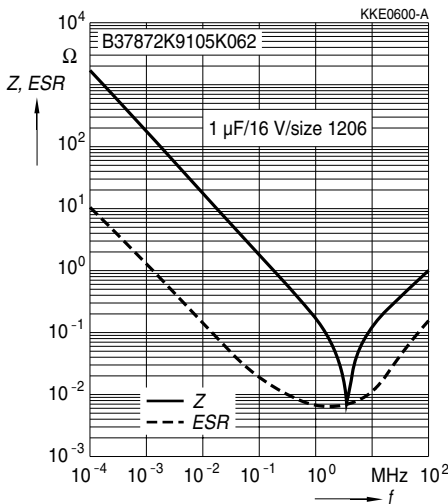
Insulation resistance R_{ins} versus temperature T



Impedance Z and ESR versus frequency f



Impedance Z and ESR versus frequency f



Impedance Z and ESR versus frequency f

