

Capacitors

Type KEU

Metallized polyester capacitors

As a dielectric high quality polyester film with good electrical properties is used. Electrodes of capacitor are vacuum metallized aluminium. The thickness of aluminium is approximately 0,01 μF to 0,04 μF , so the capacitor is self-regenerative after break down. The weak point in dielectric because of un-homogene material in some microseconds regenerate with energy of current bow of charged capacitor. In this process

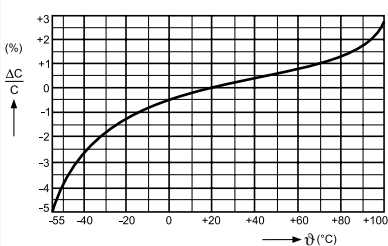
metallized layer of aluminium in the area of weak point without any damage of dielectric burns out. The weak point is blameless insulated. So metallized capacitor withstands breakdowns without a permanent short circuit with considering self healing resp. regeneration. The majority of weak points are cleared during the high voltage burning-out in the manufacturing process.

Contact surface is made by spraying the parts of metal contact material. Leads are electrically welded on contact surface. The technology and control system in production assure high liability of capacitors also in use on low voltages and high frequencies. In the case of pulse loading or loading the capacitor with alternative voltage of high gradient of growth is to consider allowed pulse loading du/dt resp. maximal allowed current.

Typical electrical characteristics of metallized polyester capacitors KEU

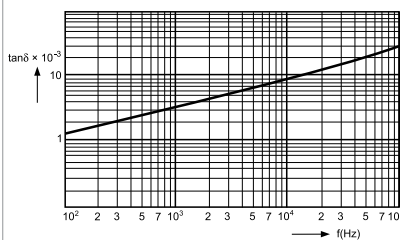
Variation of capacitance as a function of temperature

$$\frac{\Delta C}{C} = f(\vartheta) \text{ at } 1 \text{ kHz}$$



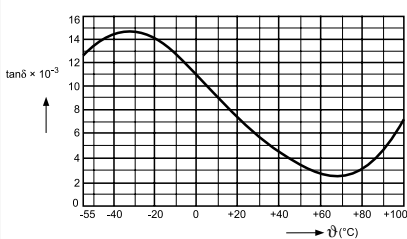
Variation of dissipation factor ($\tan\delta$) as a function of frequency

$$\tan\delta = f(f)$$



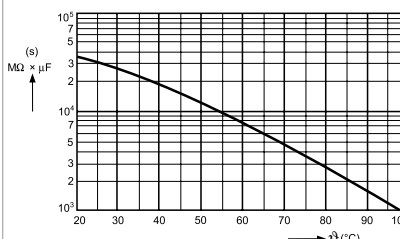
Variation of dissipation factor ($\tan\delta$) as a function of temperature

$$\tan\delta = f(\vartheta) \text{ at } 1 \text{ kHz}$$



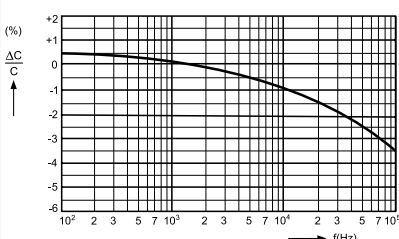
Variation of insulation resistance as a function of temperature

$$R_i = f(\vartheta)$$



Variation of capacitance as a function of frequency

$$\frac{\Delta C}{C} = f(f)$$



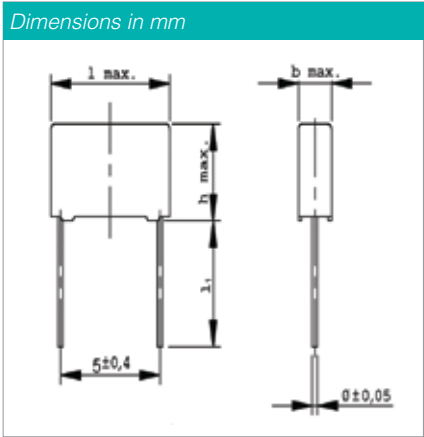
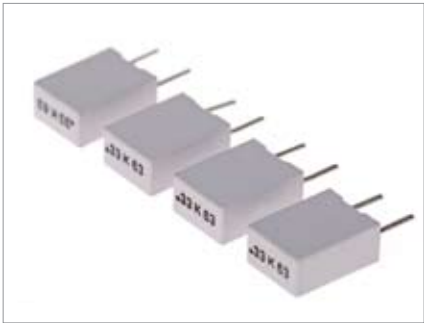
Capacitors

Type KEU1940	radial leads, pitch 5 mm
Type KEU1940 taped	

TECHNICAL DATA

General technical data

Dielectric:	polyester (polyethylene terephthalate) film
Electrodes:	vacuum metallized aluminum on dielectric
Winding:	non-inductive construction, flat shape
Leads:	tinned copper wire; standard lengths l_1 : $4^{+0,5}_{-1}$; 6^{-1} ; 16^{+2}_{-1} . Other lead lengths on request.
Encapsulation:	flame-retardant plastic case with flame-retardant epoxi resin seal, UL 94 V-0, resistant to wash in hallogenated solvents
Marking:	capacitance, tolerance, rated voltage
Climatic category:	55/105/56, IEC 60068-1
Temperature range:	- 55 °C to + 105 °C
Complies with standards:	IEC 60384-2
Taping according to:	IEC 60286-2



Diameter of leads:

b_{max} (mm)	Diameter of lead $\varnothing$ (mm)
$\leq 6,1$	0,5
$> 6,1$	0,6

Typical application:

Blocking, coupling, decoupling, by-passing, timing, oscillator circuits

TECHNICAL DATA

Electrical data

Capacitance range:	1000 pF to 4,7 μ F
Standard values of capacitance (C_R):	range E6
Capacitance tolerance:	$\pm 20\%$ (M), $\pm 10\%$ (K) and $\pm 5\%$ (J)
Rated voltage (U_R):	50 V DC, 63 V DC, 100 V DC, 250 V DC, 400 V DC
Allowed alternative voltage up 60 Hz:	30 V AC, 40 V AC, 63 V AC, 160 V AC (140 V AC), 200 V AC (160 V AC)
Category voltage (U_C):	up to + 85 °C $U_C = U_R$; from + 85 °C to + 105 °C voltage U_R is lowered for 1,25 % per 1 °C
Test voltage:	$1,4 \times U_R$, 2 s
Dissipation factor ($\tan\delta$):	$\leq 80 \times 10^{-4}$ at 1 kHz and 20 °C
Insulation resistance (R_i) at 20 °C:	

Rated capacitance C_R (μ F)	Min. R_i or $R_i \times C_R$ between terminals	
	$U_R \leq 100$ V DC	$U_R > 100$ V DC
$\leq 0,33$	15 000 M Ω	30 000 M Ω
$> 0,33$ (> 1)	5 000 s (1000 s)	30 000 M Ω

Self inductance:	1 nH/mm length of capacitor and leads
Soldering on printed circuit boards:	temperature of soldering bath 275 °C max., soldering time 4 s max.
Pulse loading (du/dt):	100 V/ μ s for $U_R = 50$ V DC and $C_r = 0,22$ μ F 25 V/ μ s for $U_R = 50$ V DC and $C_r > 0,22$ μ F 160 V/ μ s for $U_R = 63$ V DC 200 V/ μ s for $U_R = 100$ V DC 250 V/ μ s for $U_R = 250$ V DC 130 V/ μ s for $U_R = 250$ V DC (alternative dimensions) 400 V/ μ s for $U_R = 400$ V DC 200 V/ μ s for $U_R = 400$ V DC (alternative dimensions)

Dimensional data: KEU1940

Capacitance (μ F)	Rated voltage U_R														
	50 V DC/30 V AC			63 V DC/40 V AC			100 V DC/63 V AC			250 V DC/160 V AC			400 V DC/200 V AC		
	$l_{max.}$	$h_{max.}$	$b_{max.}$	$l_{max.}$	$h_{max.}$	$b_{max.}$	$l_{max.}$	$h_{max.}$	$b_{max.}$	$l_{max.}$	$h_{max.}$	$b_{max.}$	$l_{max.}$	$h_{max.}$	$b_{max.}$
	(mm)			(mm)			(mm)			(mm)			(mm)		
0,001							7,4	6,6	2,6				7,4	6,6	2,6
0,0015							7,4	6,6	2,6				7,4	6,6	2,6
0,0022							7,4	6,6	2,6				7,4	6,6	2,6
0,0033							7,4	6,6	2,6				7,4	6,6	2,6
0,0047							7,4	6,6	2,6				7,4	6,6	2,6
0,0068							7,4	6,6	2,6	7,4	6,6	2,6	7,4	7,6	3,6
0,01							7,4	6,6	2,6	7,4	6,6	2,6	7,4	7,6	3,6
0,015							7,4	6,6	2,6	7,4	6,6	2,6	7,5	9,6	4,6
0,022							7,4	6,6	2,6	7,4	7,6	3,6	7,5	9,6	4,6
0,033							7,4	6,6	2,6	7,4	7,6	3,6	7,5	10,1	5,1
0,047							7,4	6,6	2,6	7,5	9,6	4,6	7,5	11,1	6,1
0,068							7,4	6,6	2,6	7,5	9,6	4,6			
0,1				7,4	6,6	2,6	7,4	6,6	2,6	7,5	10,1	5,1			
0,15				7,4	6,6	2,6	7,4	7,6	3,6	7,5	11,1	6,1			
0,22				7,4	6,6	2,6	7,4	7,6	3,6						
0,33				7,4	7,6	3,6	7,5	9,6	4,6						
0,47				7,4	7,6	3,6	7,5	9,6	4,6						
0,68				7,5	9,6	4,6	7,5	10,1	5,1						
1				7,5	10,1	5,1	7,5	11,1	6,1						
1,5				7,5	11,1	6,1									
2,2	7,5	11,1	6,1												
3,3	7,5	13,1	7,3												
4,7	7,5	13,1	7,3												

Alternative dimensions

Capacitance (μ F)	250 V DC/140 V AC			400 V DC/160 V AC		
	$l_{max.}$	$h_{max.}$	$b_{max.}$	$l_{max.}$	$h_{max.}$	$b_{max.}$
	(mm)			(mm)		
0,0068				7,4	6,6	2,6
0,01						
0,015				7,4	7,6	3,6
0,022	7,4	6,6	2,6			
0,033				7,5	9,6	4,6
0,047	7,4	7,6	3,6	7,5	10,1	5,1
0,068	7,4	7,6	3,6	7,5	11,1	6,1
0,1	7,5	9,6	4,6			
0,15	7,5	10,1	5,1			
0,22	7,5	11,1	6,1			

Taped version details data see page 10

Capacitors

Type KEU1930

Type KEU1930 taped

radial leads, pitch 7,5 mm

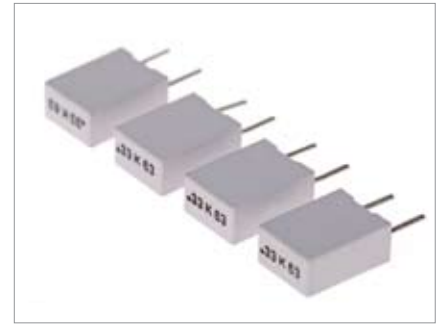
TECHNICAL DATA

General technical data

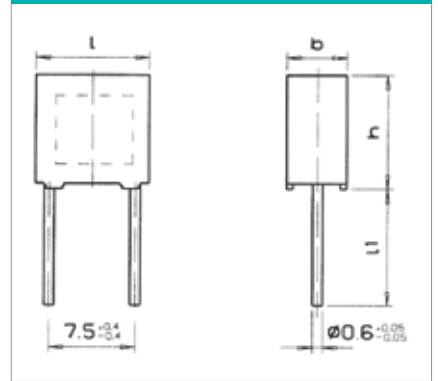
Dielectric:	polyester (polyethylene terephthalate) film
Electrodes:	vacuum metallized aluminum on dielectric
Winding:	non-inductive flat shape
Leads:	tinned copper wire; standard lengths l_1 : $4^{\pm 0,5}$; 6^{-1} ; $25^{\pm 5}$. Other lead lengths on request.
Encapsulation:	flame-retardant plastic case with flame-retardant epoxi resin seal, UL 94 V-0
Marking:	capacitance, tolerance, rated voltage
Climatic category:	55/100/56, IEC 60068-1
Temperature range:	- 55 °C to + 100 °C
Complies with standards:	IEC 60384-2

Electrical data

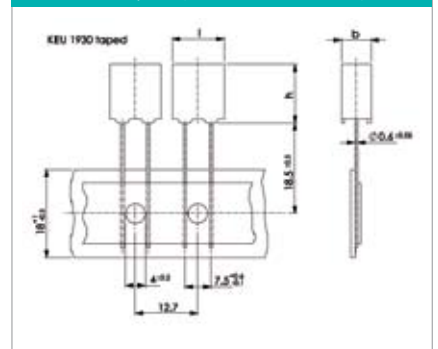
Capacitance range:	1000 pF to 1 μ F
Standard values of capacitance (C_R):	range E6
Capacitance tolerance:	$\pm 20\%$ (M), $\pm 10\%$ (K), and $\pm 5\%$ (J) on special request
Rated voltage (U_R):	63 V DC, 100 V DC, 250 V DC, 400 V DC, 630 V DC
Allowed alternative voltage up to 60 Hz:	40 V AC, 63 V AC, 160 V AC, 200 V AC, 220 V AC
Category voltage (U_C):	to + 85 °C $U_C = U_R$; from + 85 °C to + 100 °C voltage U_R is lowered for 1,25 % per 1 °C
Test voltage:	$1,6 \times U_R$, 2 s
Dissipation factor ($\tan\delta$):	$\leq 100 \times 10^{-4}$ at 1 kHz and 20 °C
Self inductance	≤ 10 nH at leads length 2 mm
Soldering on printed circuit board:	temperature of soldering bath 270 °C max., soldering time 5 s max.
Pulse loading (du/dt):	10 V/ μ s for $U_R = 63$ V DC 15 V/ μ s for $U_R = 100$ V DC 30 V/ μ s for $U_R = 250$ V DC 50 V/ μ s for $U_R = 400$ V DC 70 V/ μ s for $U_R = 630$ V DC



KEU 1930 (dimensions in mm)



KEU 1930 taped (dimensions in mm)



Insulation resistance (R_i) at 20 °C:

Rated capacitance C_R (μF)	Min. R_i or $R_i \times C_R$ between terminals	
	$U_R > 100 \text{ V DC}$	$U_R \leq 100 \text{ V DC}$
$\leq 0,33$	7500 $\text{M}\Omega$	3750 $\text{M}\Omega$
$> 0,33$	2500 s	1250 s

Dimensional data: KEU1930

Capacitance (μF)	Rated voltage U_R														
	63 V DC			100 V DC			250 V DC			400 V DC			630 V DC		
	$l_{\text{max.}}$	$h_{\text{max.}}$	$b_{\text{max.}}$	$l_{\text{max.}}$	$h_{\text{max.}}$	$b_{\text{max.}}$	$l_{\text{max.}}$	$h_{\text{max.}}$	$b_{\text{max.}}$	$l_{\text{max.}}$	$h_{\text{max.}}$	$b_{\text{max.}}$	$l_{\text{max.}}$	$h_{\text{max.}}$	$b_{\text{max.}}$
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
0,001													10,5	6,5	3,5
0,0015													10,5	6,5	3,5
0,0022													10,5	6,5	3,5
0,0033													10,5	6,5	3,5
0,0047										10,5	6,5	3,5	70,5	9	4
0,0068										10,5	6,5	3,5	10,5	9	4
0,01							10,5	6,5	3,5	10,5	9	4	10,5	11	5
0,015							10,5	6,5	3,5	10,5	9	4	10,5	12	6
0,022							10,5	9	4	10,5	11	5			
0,033				10,5	6,5	3,5	10,5	9	4	10,5	12	6			
0,047				10,5	6,5	3,5	10,5	9	4						
0,068	10,5	6,5	3,5	10,5	9	4	10,5	11	5						
0,1	10,5	6,5	3,5	10,5	9	4	10,5	11	5						
0,15	10,5	6,5	3,5	10,5	9	4	10,5	12	6						
0,22	10,5	9	4	10,5	11	5									
0,33	10,5	9	4	10,5	12	6									
0,47	10,5	11	5												
0,68	10,5	11	5												
1	10,5	12	6												

Taped version details data see page 10

Capacitors

Type KEU1910

radial leads, pitch 10 mm to 27,5 mm

TECHNICAL DATA

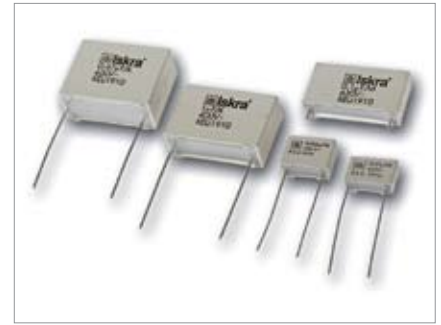
General technical data

Dielectric:	polyester (polyethylene terephthalate) film
Electrodes:	vacuum metallized aluminum on dielectric
Winding:	non-inductive flat shape
Leads:	tinned copper wire; standard lengths l_1 : $4^{\pm 0,5}$; 6^{-1} ; $25^{\pm 5}$. Other lead lengths on request.
Encapsulation:	flame-retardant plastic case with flame-retardant epoxi resin seal, UL 94 V-0
Marking:	Iskra symbol, capacitance, tolerance, rated voltage
Climatic category:	55/100/56, IEC 60068-1
Temperature range:	- 55 °C to + 100 °C
Complies with standards:	IEC 60384-2

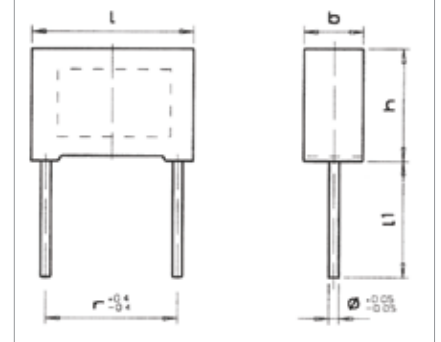
Electrical data

Capacitance range:	1000 pF to 22 μ F
Standard values of capacitance (C_R):	range E6
Capacitance tolerance:	± 20 % (M), ± 10 % (K), and ± 5 % (J) on special request
Rated voltage (U_R):	63 V DC, 100 V DC, 250 V DC, 400 V DC, 630 V DC, 1000 V DC
Allowed alternative voltage up to 60 Hz:	40 V AC, 63 V AC, 160 V AC, 200 V AC, 220 V AC, 250 V AC
Category voltage (U_C):	up to + 85 °C $U_C = U_R$; from + 85 °C to + 100 °C voltage U_R is lowered for 1,25 % per 1 °C
Test voltage:	$1,6 \times U_R$, 2 s
Dissipation factor ($\tan\delta$):	$\leq 80 \times 10^{-4}$ at 1 kHz and 20 °C
Self inductance	10 nH/cm length of capacitor and leads
Soldering on printed circuit board:	temperature of soldering bath 270 °C max., soldering time 5 s max.
Insulation resistance (R_i) at 20 °C:	

Rated capacitance C_R (μ F)	Min. R_i or $R_i \times C_R$ between terminals	
	$U_R > 100$ V DC	$U_R \leq 100$ V DC
$\leq 0,33$	30000 M Ω	15000 M Ω
$> 0,33$	10000 s	5000 s



KEU1910 (dimensions in mm)



Diameter of leads:

Pitch r (mm)	Diameter of lead ϕ (mm)
10	0,6
15; 22,5; 27,5	0,8

Pulse loading (du/dt):

U_R (V DC)	Pitch r (mm)			
	10	15	22,5	27,5
	Allowed pulse loading (V/ μ s)			
63	9	6	3	2,5
100	12	8	5	4
250	22	14	9	7
400	35	20	12	10
630	45	32	17	13
1000	90	45	26	20

Dimensional data: KEU1910

Capacitance (μF)	Rated voltage U _R																			
	63 V DC				100 V DC				250 V DC				400 V DC				630 V DC			
	l _{max.}	h _{max.}	b _{max.}	r	l _{max.}	h _{max.}	b _{max.}	r	l _{max.}	h _{max.}	b _{max.}	r	l _{max.}	h _{max.}	b _{max.}	r	l _{max.}	h _{max.}	b _{max.}	r
	(mm)				(mm)				(mm)				(mm)				(mm)			
0,001																				
0,0015																				
0,0022																				
0,0033																				
0,0047																	13	9	4	10
0,0068																	13	9	4	10
0,01													13	9	4	10	13	9	4	10
0,015													13	9	4	10	13	9	4	10
0,022													13	9	4	10	13	10,5	5	10
0,033									13	9	4	10	13	9	4	10	13	11,5	6	10
0,047									13	9	4	10	13	9	4	10				
0,068					13	9	4	10	13	9	4	10	13	10,5	5	10				
0,1					13	9	4	10	13	9	4	10	13	11,5	6	10				
0,15					13	9	4	10	13	9,5	4,3	10								
0,22	13	9	4	10	13	10,5	5	10	13	10,5	5	10								
0,33	13	9	4	10	13	11,5	6	10												
0,47	13	9	4	10																
0,68	13	9,5	4,3	10																
1	13	10,5	5	10																
1,5	13	11,5	6	10																
0,01																			18	11
0,015																			18	11
0,022																			18	11
0,033																	18	11	5,5	15
0,047																	18	13	7	15
0,068													18	11	5	15	18	14,5	8,5	15
0,1													18	11	5	15	18	16,5	8,5	15
0,15													18	11	5	15	18	18,5	9	15
0,22													18	12	6	15				
0,33					18	11	5	15	18	11	5	15	18	13	7	15				
0,47					18	11	5	15	18	12	6	15	18	14,5	8,5	15				
0,68	18	11	5	15	18	12	6	15	18	13	7	15								
1	18	11	5	15	18	13,5	7,5	15	18	14,5	8,5	15								
1,5	18	11	5	15	18	16,5	8,5	15												
2,2	18	12	6	15																
3,3	18	13	7	15																
4,7	18	14,5	8,5	15																

Taped version details data see page 10

Dimensional data: KEU1910

Capacitance (μF)	Rated voltage U _R																							
	63 V DC				100 V DC				250 V DC				400 V DC				630 V DC				1000 V DC			
	l _{max.}	h _{max.}	b _{max.}	r	l _{max.}	h _{max.}	b _{max.}	r	l _{max.}	h _{max.}	b _{max.}	r	l _{max.}	h _{max.}	b _{max.}	r	l _{max.}	h _{max.}	b _{max.}	r	l _{max.}	h _{max.}	b _{max.}	r
	(mm)				(mm)				(mm)				(mm)				(mm)				(mm)			
0,033																					26,5	15	6	22,5
0,047																					26,5	15	6	22,5
0,068																					26,5	15	6	22,5
0,1																	26,5	15	6	22,5	26,5	16,5	8,5	22,5
0,15																	26,5	15	6	22,5	26,5	18,5	10	22,5
0,22													26,5	15	6	22,5	26,5	16	7	22,5				
0,33													26,5	15	6	22,5	26,5	18,5	9	22,5				
0,47									26,5	15	6	22,5	26,5	15	6	22,5	26,5	20,5	11	22,5				
0,68									26,5	15	6	22,5	26,5	16	7	22,5								
1									26,5	15	6	22,5	26,5	18,5	9	22,5								
1,5					26,5	16	7	22,5	26,5	16	7	22,5	26,5	20,5	11	22,5								
2,2					26,5	16,5	8,5	22,5	26,5	18,5	9	22,5												
3,3	26,5	15	6	22,5	26,5	18,5	10	22,5	26,5	20,5	11	22,5												
4,7	26,5	15	6	22,5																				
6,8	26,5	16	7	22,5																				
10	26,5	17	8,5	22,5																				
15	26,5	20,5	11	22,5																				
0,15																					32	17	9	27,5
0,22																					32	19	10	27,5
0,33																	32	17	9	27,5	32	22	13	27,5
0,47																	32	19	10	27,5	32	24,5	15	27,5
0,68													32	17	9	27,5	32	21	12	27,5	32	28	18	27,5
1													32	17	9	27,5	32	23,5	14	27,5				
1,5									32	17	9	27,5	32	19	10	27,5	32	26,5	17	27,5				
2,2									32	17	9	27,5	32	21	12	27,5								
3,3									32	19	10	27,5	32	24,5	15	27,5								
4,7					32	20	11	27,5	32	21	12	27,5	32	28	18	27,5								
6,8					32	22	13	27,5	32	24,5	15	27,5												
10	32	17	9	27,5	32	28,5	15	27,5	32	28	18	27,5												
15	32	20	11	27,5																				

Taped version details data see page 11

Capacitors

Type KEU1012

axial leads

TECHNICAL DATA

General technical data

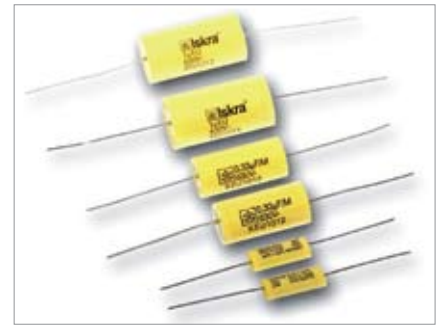
Dielectric:	polyester (polyethylene terephthalate) film
Electrodes:	vacuum metallized aluminum on dielectric
Winding:	non-inductive construction, cylindric shape
Leads:	tinned copper wire
Encapsulation:	polyester film, ends sealed with epoxy resin
Marking:	capacitance, tolerance, rated voltage (at larger dimensions also Iskra symbol, type designation)
Climatic category:	55/100/21, IEC 60068-1
Temperature range:	- 55 °C to + 100 °C
Complies with standards:	IEC 60384-2

Electrical data

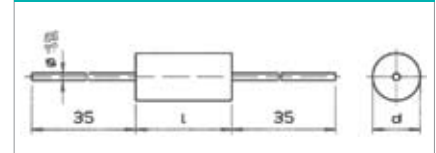
Capacitance range:	1000 pF to 10 µF
Standard values of capacitance (C_R):	range E6
Capacitance tolerance:	± 20 % (M), ± 10 % (K), and ± 5 % (J) on special request
Rated voltage (U_R):	63 V DC, 100 V DC, 250 V DC, 400 V DC, 630 V DC, 1000 V DC
Allowed alternative voltage up to 60 Hz:	440 V AC, 63 V AC, 160 V AC, 200 V AC, 220 V AC, 250 V AC
Category voltage (U_C):	up to + 85 °C $U_C = U_R$; from + 85 °C to + 100 °C voltage U_R is lowered for 1,25 % per 1 °C
Test voltage:	1,6 x U_R , 2 s
Dissipation factor ($\tan\delta$):	≤ 80 x 10 ⁻⁴ at 1 kHz and 20 °C
Self inductance	10 nH/cm length of capacitor and leads
Soldering on printed circuit board:	temperature of soldering bath 270 °C max., soldering time 5 s max.

Insulation resistance (R_i) at 20 °C:

Rated capacitance C_R (µF)	Min. R_i or $R_i \times C_R$ between terminals	
	$U_R > 100$ V DC	$U_R \leq 100$ V DC
≤ 0,33	30000 MΩ	15000 MΩ
> 0,33	10000 s	5000 s



KEU1012 (dimensions in mm)



Diameter of leads:

Capacitor length l_{max} (mm)	Diameter of leads ϕ (mm)
11; 14; 19	0,6
26,5; 31,5	0,8

Pulse loading (du/dt):

U_R (V DC)	l_{max} (mm)				
	11	14	19	26,5	31,5
Allowed pulse loading (V/µs)					
63	12	9	6	3	2,5
100	18	12	8	5	4
250	32	22	14	9	7
400	55	35	20	12	10
630	70	45	32	17	13
1000	-	90	45	26	20

Dimensional data: KEU1012

Capa- citan- ce (μ F)	Rated voltage U_R											
	63 V DC		100 V DC		250 V DC		400 V DC		630 V DC		1000 V DC	
	$d_{max.}$	$l_{max.}$	$d_{max.}$	$l_{max.}$	$d_{max.}$	$l_{max.}$	$d_{max.}$	$l_{max.}$	$d_{max.}$	$l_{max.}$	$d_{max.}$	$l_{max.}$
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
0,001									5	11	5	14
0,0015									5	11	5	14
0,0022									5	11	5	14
0,0033									5	11	5,5	14
0,0047									5	11	6	14
0,0068									5,5	11	7	14
0,01							5	11	5	14	6	19
0,015							5	11	5,5	14	6,5	19
0,022							5	11	6,5	14	7,5	19
0,033							5,5	11	6	19	8,5	19
0,047					5	11	5,5	14	6,5	19	10	19
0,068			5	11	5,5	11	6	14	7,5	19	9	26,5
0,1			5	11	5,5	14	7	14	9	19	10,5	26,5
0,15	5	11	5	11	6	14	6,5	19	8,5	26,5	11,5	31,5
0,22	5	11	6	11	7	14	7,5	19	10	26,5	13,5	31,5
0,33	5,5	11	6	14	6,5	19	9	19	12	26,5	16	31,5
0,47	6	14	6,5	14	7,5	19	8,5	26,5	12,5	31,5	18,5	31,5
0,68	6	14	7,5	14	8,5	19	10	26,5	14,5	31,5		
1	7	14	7	19	8,5	26,5	10,5	31,5	17,5	31,5		
1,5	6,5	19	8,5	19	10	26,5	12,5	31,5				
2,2	7,5	19	9,5	19	11	31,5	15	31,5				
3,3	9	19	9,5	26,5	13	31,5	18	31,5				
4,7	9	26,5	11	26,5	15	31,5						
6,8	10	26,5	12	31,5	18	31,5						
10	10,5	31,5	14	31,5	21	31,5						

Taped version details data see page 12