Film Capacitors

Metallized Polyester Film Capacitors (MKT)

Series/Type: **B32520 ... B32529**
Date: May 2009

Typical applications

- Blocking
- Coupling, decoupling
- Bypassing
- RFI for automotive

Climatic

- Max. operating temperature: 125 °C
- Climatic category (IEC 60068-1): 55/125/56

Construction

- Dielectric: polyethylene terephthalate (polyester, PET)
- Stacked-film technology for lead spacing 5 to 15 mm
  = code C, D or E in digit 7 of ordering code
- Wound capacitor technology for lead spacing 10 to 27.5 mm
  = code N, Q or R in digit 7 of ordering code
- Plastic case (UL 94 V-0)
- Epoxy resin sealing (UL 94 V-0)

Features

- High pulse strength
- High contact reliability

Terminals

- Parallel wire leads, lead-free tinned
- Special lead lengths available on request

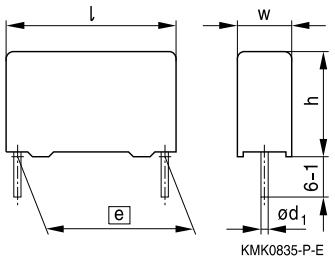
Marking

Manufacturer's logo,
rated capacitance (coded), cap. tolerance (code letter),
rated DC voltage, date of manufacture (coded),
coded type ("1") for lead spacing 5 mm,
series and lot number for lead spacing ≥10 mm

Delivery mode

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

Dimensional drawing



KMK0835-P-E

Dimensions in mm

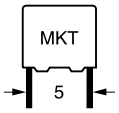
Lead spacing e ±0.4	Lead diameter d_1	Type
5.0	0.5	B32529
7.5	0.5	B32520
10.0	0.6[1)]	B32521
15.0	0.8	B32522
22.5	0.8	B32523
27.5	0.8	B32524
37.5	1.0	B32526

1) 0.5 mm for capacitor width w = 4 mm

Overview of available types

Lead spacing	5.0 mm					7.5 mm				10.0 mm				
Type	B32529					B32520				B32521				
Page	6					10				12				
Technology	s	s	s	s	s	s	s	s	s	s	s	s	s	w
V_R (V DC)	63	100	250	400	630	63	100	250	400	63	100	250	400	630
V_{RMS} (V AC)	40	63	160	200	400	40	63	160	200	40	63	160	200	200
C_R (µF)														
0.0010	■	■	■	■	■				■					
0.0015	■	■	■	■	■				■					
0.0022	■	■	■	■	■				■					
0.0033	■	■	■	■	■				■					
0.0047	■	■	■	■	■				■					
0.0068	■	■	■	■	■				■					■
0.010	■	■	■	■	■				■				■	■
0.015	■	■	■	■	■			■	■				■	■
0.022	■	■	■	■	■			■	■				■	■
0.033	■	■	■	■	■			■	■			■	■	■
0.047	■	■	■	■			■	■	■			■	■	
0.068	■	■	■	■		■	■	■	■			■	■	
0.10	■	■	■	■		■	■	■	■		■	■	■	
0.15	■	■	■	■		■	■	■	■		■	■	■	
0.22	■	■	■			■	■	■			■	■		
0.33	■	■	■			■	■				■	■		
0.47	■	■	■			■	■			■	■	■		
0.68	■	■				■	■			■	■			
1.0	■	■				■	■			■	■			
1.5	■					■				■				
2.2	■					■				■				
3.3	■									■				
4.7	■													

Technology: s = Stacked-film technology / w = Wound capacitor technology



Ordering codes and packing units (lead spacing 5 mm)

V_R V DC	V_{RMS} f ≤60 Hz V AC	C_R µF	Max. dimensions w × h × l mm	Ordering code (composition see below)	Ammo pack pcs./MOQ	Reel pcs./ MOQ	Untaped pcs./ MOQ
100	63	0.0010	2.5 × 6.5 × 7.2	B32529C1102+***	12800	11200	8000
		0.0015	2.5 × 6.5 × 7.2	B32529C1152+***	12800	11200	8000
		0.0022	2.5 × 6.5 × 7.2	B32529C1222+***	12800	11200	8000
		0.0033	2.5 × 6.5 × 7.2	B32529C1332+***	12800	11200	8000
		0.0047	2.5 × 6.5 × 7.2	B32529C1472+***	12800	11200	8000
		0.0068	2.5 × 6.5 × 7.2	B32529C1682+***	12800	11200	8000
		0.010	2.5 × 6.5 × 7.2	B32529C1103+***	12800	11200	8000
		0.015	2.5 × 6.5 × 7.2	B32529C1153+***	12800	11200	8000
		0.022	2.5 × 6.5 × 7.2	B32529C1223+***	12800	11200	8000
		0.033	2.5 × 6.5 × 7.2	B32529C1333+***	12800	11200	8000
		0.047	2.5 × 6.5 × 7.2	B32529C1473+***	12800	11200	8000
		0.068	2.5 × 6.5 × 7.2	B32529C1683+***	12800	11200	8000
		0.10	2.5 × 6.5 × 7.2	B32529C1104+***	12800	11200	8000
		0.15	3.0 × 6.5 × 7.2	B32529C1154+***	10800	9600	8000
		0.22	3.5 × 8.0 × 7.2	B32529C1224+***	9200	8000	8000
		0.33	3.5 × 8.0 × 7.2	B32529C1334+***	9200	8000	8000
		0.47	4.5 × 9.5 × 7.3	B32529C1474+***	7200	6000	6000
		0.68	6.0 × 10.5 × 7.5	B32529C1684+***	5200	4400	4000
		1.0	7.8 × 13.0 × 7.8	B32529D1105+***	4000	3200	4000

MOQ = Minimum Order Quantity, consisting of 4 packing units.
Further E series and intermediate capacitance values on request.

Composition of ordering code

+ = Capacitance tolerance code:
- M = ±20%
- K = ±10%
- J = ±5%

*** = Packaging code:
- 289 = Ammo pack
- 189 = Reel
- 000 = Untaped (lead length 6 −1 mm)

Technical data

Operating temperature range	Max. operating temperature $T_{op,max}$	+125 °C		
	Upper category temperature T_{max}	+125 °C		
	Lower category temperature T_{min}	−55 °C		
	Rated temperature T_R	+85 °C		
Dissipation factor tan δ (in 10^{-3})	at	$C_R \leq 0.1$ µF	0.1 µF < $C_R \leq 1$ µF	$C_R > 1$ µF
at 20 °C	1 kHz	8	8	10
(upper limit values)	10 kHz	15	15	–
	100 kHz	30	–	–
Insulation resistance R_{ins}	V_R	$C_R \leq 0.33$ µF	$C_R > 0.33$ µF	
or time constant $\tau = C_R \cdot R_{ins}$	≤ 100 V DC	3750 MΩ	1250 s	
at 20 °C, rel. humidity ≤ 65%	≥ 250 V DC	7500 MΩ	2500 s	
(minimum as-delivered values)				
DC test voltage	1.4 · V_R, 2 s			
Category voltage V_C	T_A (°C)	DC voltage derating	AC voltage derating	
(continuous operation with V_{DC}	$T_A \leq 85$	$V_C = V_R$	$V_{C,RMS} = V_{RMS}$	
or V_{AC} at f ≤ 60 Hz)	$85 < T_A \leq 125$	$V_C = V_R \cdot (165 - T_A)/80$	$V_{C,RMS} = V_{RMS} \cdot (165 - T_A)/80$	
Operating voltage V_{op} for	T_A (°C)	DC voltage (max. hours)	AC voltage (max. hours)	
short operating periods	$T_A \leq 100$	$V_{op} = 1.25 \cdot V_C$ (2000 h)	$V_{op} = 1.0 \cdot V_{C,RMS}$ (2000 h)	
(V_{DC} or V_{AC} at f ≤ 60 Hz)	$100 < T_A \leq 125$	$V_{op} = 1.25 \cdot V_C$ (1000 h)	$V_{op} = 1.0 \cdot V_{C,RMS}$ (1000 h)	
Damp heat test	56 days/40 °C/93% relative humidity			
Limit values after damp	Capacitance change $\lvert\Delta C/C\rvert$	≤ 5%		
heat test	Dissipation factor change Δ tan δ	≤ 5 · 10^{-3} (at 1 kHz)		
	Insulation resistance R_{ins}	≥ 50% of minimum		
	or time constant $\tau = C_R \cdot R_{ins}$	as-delivered values		
Reliability:				
Failure rate λ	1 fit (≤ 1 · 10^{-9}/h) at 0.5 · V_R, 40 °C			
Service life t_{SL}	200 000 h at 1.0 · V_R, 85 °C			
	For conversion to other operating conditions and temperatures, refer to chapter "Quality, 2 Reliability".			
Failure criteria:				
Total failure	Short circuit or open circuit			
Failure due to variation	Capacitance change $\lvert\Delta C/C\rvert$	> 10%		
of parameters	Dissipation factor tan δ	> 2 · upper limit value		
	Insulation resistance R_{ins}	< 150 MΩ ($C_R \leq 0.33$ µF)		
	or time constant $\tau = C_R \cdot R_{ins}$	< 50 s	($C_R > 0.33$ µF)	

Pulse handling capability

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

"k_0" represents the maximum permissible pulse characteristic of the waveform applied to the capacitor, expressed in $V^2/\mu s$.

Note:
The values of dV/dt and k_0 provided below must not be exceeded in order to avoid damaging the capacitor.

dV/dt values

Lead spacing		5 mm	7.5 mm	10 mm		15 mm		22.5 mm	27.5 mm	37.5 mm
Technology		S	S	S	W	S	W	W	W	W
V_R V DC	V_{RMS} V AC	dV/dt in V/µs								
63	40	250	120	50	–	30	–	3	1	0.8
100	63	300	150	75	–	50	5	4	3	1
250	160	400	200	150	–	100	10	8	5	4
400	200	600	275	175	–	125	–	10	8.5	6
450	200	–	–	–	–	–	20	–	–	–
630	400	800	–	–	20	–	25	15	12	–

S = Stacked, W = Wound

k_0 values

Lead spacing		5 mm	7.5 mm	10 mm		15 mm		22.5 mm	27.5 mm	37.5 mm
Technology		S	S	S	W	S	W	W	W	W
V_R V DC	V_{RMS} V AC	k_0 in $V^2/\mu s$								
63	40	30000	15000	6300	–	3800	–	375	130	100
100	63	60000	30000	15000	–	10000	850	800	600	200
250	160	200000	100000	75000	–	50000	5000	4000	2500	2000
400	200	500000	220000	140000	–	100000	–	10000	8500	6000
450	200	–	–	–	–	–	15000	–	–	–
630	400	1000000	–	–	25000	–	30000	18000	15000	–

S = Stacked, W = Wound