EPCOS

Metallized PET Film Capacitors

B32540 (MKT) SMD

Vakatseite

Preliminary data

SMD

SMD capacitors for standard applications

Construction

- Dielectric: **p**oly**e**thylene **t**erephthalate (PET)[1)]
- Stacked-film technology
- Uncoated

Features

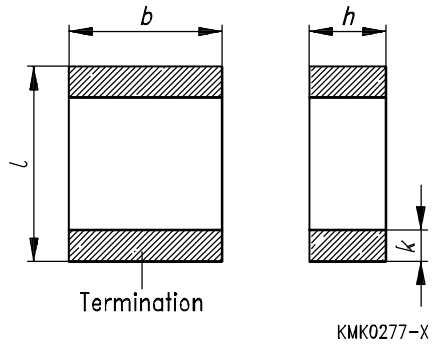
- Self-healing properties
- High stability (temperature, humidity, frequency and voltage)
- Very long service life
- No cracking
- Low ESR
- High pulse handling capability
- Capacitance range for high voltage applications (400 and 630 Vdc)

Solderability

- Reflow soldering (IR and vapor phase)

Delivery mode

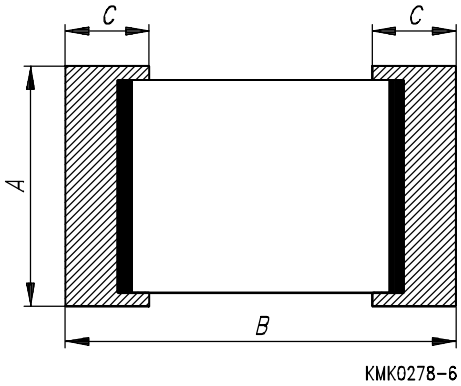
- Blister tape in accordance with IEC 60286-3, reel packing
- Reel in plastic bags hermetically sealed



Dimensions (mm)

Size	l	b	k
2824	7,1 ± 0,6	6,1 ± 0,5	0,5 ± 0,25
4030	10,2 ± 0,6	7,6 ± 0,8	0,5 ± 0,25
5040	12,7 ± 0,6	10,2 ± 0,8	0,5 ± 0,25
6054	15,2 ± 0,6	13,7 ± 0,8	0,5 ± 0,25

Recommended PCB layout



Size	A mm	B mm	C mm
2824	7,0	10,7	2,5
4030	8,6	14,0	3,0
5040	11,2	17,3	3,5
6054	14,6	19,8	3,6

1) Based on Hostaphan® SMD

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Overview of available types

Type	B32540-B…					
V_R (Vdc)	63	100	160	250	400	630
C_R						
3,3 nF						2824
4,7 nF						2824
6,8 nF						2824
10 nF						2824
15 nF						2824
22 nF						2824
33 nF					2824	4030
47 nF					2824	4030
68 nF					2824	5040
0,10 µF				2824	2824	5040
0,15 µF			2824	2824	4030	6054
0,22 µF		2824	2824	2824	4030	6054
0,33 µF		2824	2824	4030	5040	
0,47 µF	2824	2824	4030	5040	5040	
0,68 µF	2824	2824	4030	5040	6054	
1,0 µF	2824	4030	5040	6054	6054	
1,5 µF	2824	4030	5040	6054		
2,2 µF	4030	5040	6054	6054		
3,3 µF	5040	5040	6054			
4,7 µF	5040	6054				
6,8 µF	6054					

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Ordering codes and packing units

V_R (V_{rms}, f ≤ 60 Hz)	C_R	Size EIA standard	$h_{max.}$ mm	Ordering code[1)]	Packing units Pieces/reel
63 Vdc (40 Vac)	0,47 µF	2824-1	2,4	B32540-B0474-+063	1800
	0,68 µF	2824-1	2,7	B32540-B0684-+063	1800
	1,0 µF	2824-1	3,4	B32540-B0105-+063	1800
	1,5 µF	2824-3	4,8	B32540-B0155-+063	1200
	2,2 µF	4030-2	3,9	B32540-B0225-+063	1200
	3,3 µF	5040-1	3,5	B32540-B0335-+063	1000
	4,7 µF	5040-2	4,8	B32540-B0475-+063	700
	6,8 µF	6054-1	4,4	B32540-B0685-+063	600
100 Vdc (63 Vac)	0,22 µF	2824-1	2,4	B32540-B1224-+063	1800
	0,33 µF	2824-1	2,5	B32540-B1334-+063	1800
	0,47 µF	2824-1	2,6	B32540-B1474-+063	1800
	0,68 µF	2824-2	3,5	B32540-B1684-+063	1500
	1,0 µF	4030-1	2,8	B32540-B1105-+063	1600
	1,5 µF	4030-2	4,0	B32540-B1155-+063	1200
	2,2 µF	5040-1	3,5	B32540-B1225-+063	1000
	3,3 µF	5040-2	5,0	B32540-B1335-+063	700
	4,7 µF	6054-2	4,6	B32540-B1475-+063	400
160 Vdc (100 Vac)	0,15 µF	2824-1	2,6	B32540-B2154-+063	1800
	0,22 µF	2824-1	2,8	B32540-B2224-+063	1800
	0,33 µF	2824-2	3,8	B32540-B2334-+063	1500
	0,47 µF	4030-1	3,2	B32540-B2474-+063	1600
	0,68 µF	4030-2	4,3	B32540-B2684-+063	1200
	1,0 µF	5040-1	3,6	B32540-B2105-+063	1000
	1,5 µF	5040-2	5,2	B32540-B2155-+063	700
	2,2 µF	6054-1	4,7	B32540-B2225-+063	600
	3,3 µF	6054-3	6,7	B32540-B2335-+063	300

Capacitance tolerance: ± 20 % ≙ M, ± 10 % ≙ K, ± 5 % ≙ J

1) Replace the + by the code letter for the required capacitance tolerance.

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Ordering codes and packing units (cont'd)

V_R (V_{rms}, f ≤ 60 Hz)	C_R	Size EIA standard	$h_{max.}$ mm	Ordering code[1)]	Packing units Pieces/reel
250 Vdc (160 Vac)	0,10 µF	2824-1	2,7	B32540-B3104-+063	1800
	0,15 µF	2824-1	3,3	B32540-B3154-+063	1800
	0,22 µF	2824-3	4,6	B32540-B3224-+063	1200
	0,33 µF	4030-2	3,8	B32540-B3334-+063	1200
	0,47 µF	5040-1	3,2	B32540-B3474-+063	1000
	0,68 µF	5040-2	4,4	B32540-B3684-+063	700
	1,0 µF	6054-1	4,0	B32540-B3105-+063	600
	1,5 µF	6054-2	5,7	B32540-B3155-+063	400
	2,2 µF	6054-3	8,0	B32540-B3225-+063	300
400 Vdc (200 Vac)	33 nF	2824-1	2,7	B32540-B6333-+063	1800
	47 nF	2824-1	2,5	B32540-B6473-+063	1800
	68 nF	2824-1	3,4	B32540-B6683-+063	1800
	0,10 µF	2824-3	4,7	B32540-B6104-+063	1200
	0,15 µF	4030-1	3,3	B32540-B6154-+063	1600
	0,22 µF	4030-2	4,6	B32540-B6224-+063	1200
	0,33 µF	5040-1	4,0	B32540-B6334-+063	1000
	0,47 µF	5040-2	5,4	B32540-B6474-+063	700
	0,68 µF	6054-2	4,9	B32540-B6684-+063	400
	1,0 µF	6054-3	6,9	B32540-B6105-+063	300
630 Vdc (350 Vac)	3,3 nF	2824-1	2,7	B32540-B8332-+063	1800
	4,7 nF	2824-1	2,6	B32540-B8472-+063	1800
	6,8 nF	2824-1	3,4	B32540-B8682-+063	1800
	10 nF	2824-1	2,7	B32540-B8103-+063	1800
	15 nF	2824-1	2,9	B32540-B8153-+063	1800
	22 nF	2824-2	3,9	B32540-B8223-+063	1500
	33 nF	4030-1	2,8	B32540-B8333-+063	1600
	47 nF	4030-2	3,8	B32540-B8473-+063	1200
	68 nF	5040-1	3,3	B32540-B8683-+063	1000
	0,10 µF	5040-2	4,5	B32540-B8104-+063	700
	0,15 µF	6054-1	4,1	B32540-B8154-+063	600
	0,22 µF	6054-2	5,8	B32540-B8224-+063	400

Capacitance tolerance: ± 20 % ≙ M, ± 10 % ≙ K, ± 5 % ≙ J

1) Replace the + by the code letter for the required capacitance tolerance.

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Technical data

Climatic category in accordance with IEC 60068-1:	55/100/56		
Lower category temperature T_{min}	– 55 °C		
Upper category temperature T_{max}	+ 100 °C		
Damp heat test:	56 days/40 °C/93 % relative humidity		
Limit values after damp heat test	Capacitance change $\lvert\Delta C/C\rvert$	≤ 5 %	
	Dissipation factor change $\Delta \tan \delta$	$\leq 5 \cdot 10^{-3}$ (at 1 kHz)	
	Insulation resistance R_{is}	≥ 50 % of minimum	
	or time constant $\tau = C_R \cdot R_{is}$	as-delivered values	
Soldering	Max. permissible temperature at component terminal	225 °C	
(soldering test conditions according to IEC 60068-2-58 and CECC 00802)	Wetting 215 °C, 2 s after dry heat aging 155 °C, 4 h	> 90 % of the sprayed metal layer	
Reliability:			
Reference conditions	$0{,}5 \cdot V_R$; 40 °C		
Failure rate	$1 \cdot 10^{-9}$/h = 1 fit		
	For a conversion table for other operating conditions and temperatures, refer to data book "Film Capacitors" 1998, page 276.		
Failure criteria:			
Total failure	Short circuit or open circuit		
Failure due to variation of parameters	Capacitance change $\lvert\Delta C/C\rvert$	> 10 %	
	Dissipation factor tan δ	> 2 · upper limit value	
	Insulation resistance R_{is}	< 150 MΩ ($C_R \leq 0{,}33$ µF)	
	or time constant $\tau = C_R \cdot R_{is}$	< 50 s ($C_R > 0{,}33$ µF)	
DC test voltage	$1{,}4 \cdot V_R$, 2 s		
Category voltage V_C Operation with dc voltage or ac voltage V_{rms} up to 60 Hz	T ≤ 85 °C: $V_C = 1{,}0 \cdot V_R$ or $1{,}0 \cdot V_{rms}$		
	T ≤ 100 °C: $V_C = 0{,}8 \cdot V_R$ or $0{,}8 \cdot V_{rms}$		
Category voltage for short operating periods	T ≤ 100 °C: $V_C = 1{,}25 \cdot V_R$ or $1{,}0 \cdot V_{rms}$ for max. 2000 h		
	T ≤ 125 °C: $V_C = 0{,}5 \cdot V_R$ or $0{,}5 \cdot V_{rms}$ for max. 1000 h		

Dissipation factor tan δ (in 10^{-3}) at 20 °C (upper limit values)		$C_R \leq 0{,}1$ µF	0,1 µF < $C_R \leq 6{,}8$ µF
	at 1 kHz	8	8
	10 kHz	15	15
	100 kHz	25	—

Insulation resistance R_{is} or time constant $\tau = C_R \cdot R_{is}$ at 20 °C, rel. humidity ≤ 65 % (minimum as-delivered values)	V_R	$C_R \leq 0{,}33$ µF	$C_R > 0{,}33$ µF
	≤ 100 Vdc	1000 MΩ	330 s
	≥ 250 Vdc	2000 MΩ	660 s

Pulse handling capability

Maximum permissible voltage change per unit of time for non-sinusoidal voltages (pulse, sawtooth)

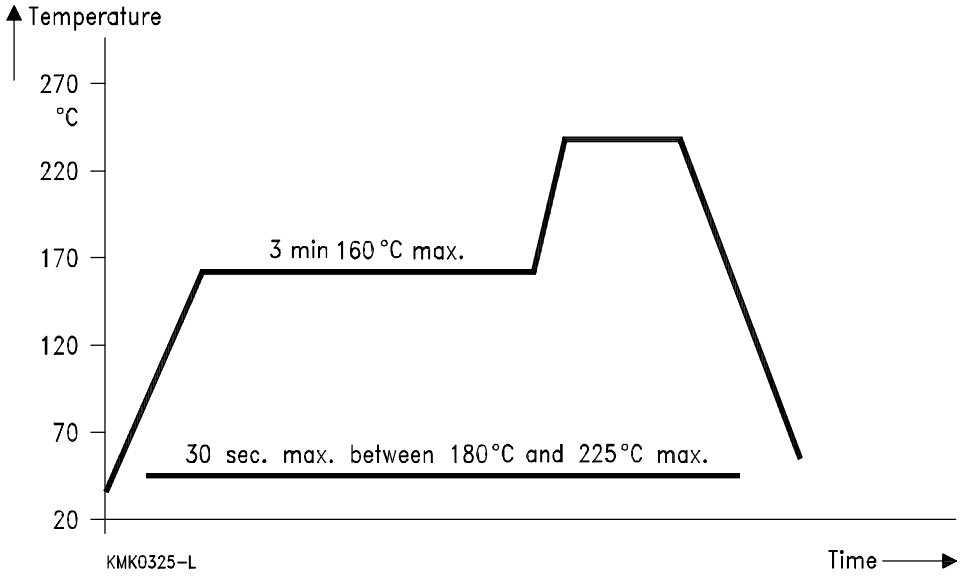
V_R	Max. rate of voltage rise V_{pp}/τ in V/µs (for $V_{pp} = V_R$)			
	2824	4030	5040	6054
63 Vdc	80	65	50	40
100 Vdc	100	75	50	50
160 Vdc	140	100	80	70
250 Vdc	200	150	125	100
400 Vdc	225	175	150	125
630 Vdc	240	190	165	135

For $V_{pp} < V_R$, the permissible voltage rise rate V_{pp}/τ may be multiplied by the factor V_R/V_{pp}. Also refer to the calculation example in data book "Film Capacitors" 1998, page 250.

V_R	Pulse characteristic k_0 in $V^2/\mu s$ (for $V_{pp} \leq V_R$)			
	2824	4030	5040	6054
63 Vdc	10 000	5 000	5 000	5 000
100 Vdc	20 000	15 000	10 000	10 000
160 Vdc	45 000	30 000	25 000	20 000
250 Vdc	100 000	75 000	60 000	50 000
400 Vdc	180 000	140 000	120 000	100 000
630 Vdc	300 000	240 000	210 000	170 000

Recommended soldering profile

Infrared-reflow or vapor phase soldering.



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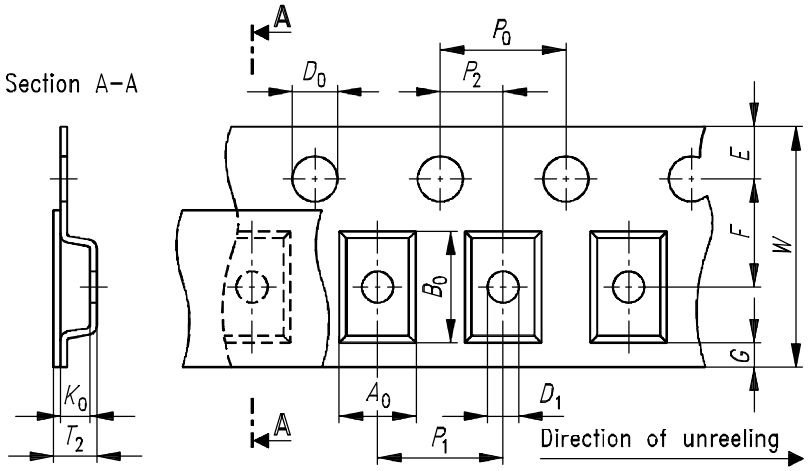
Taping

Taping in accordance with IEC 60286-3 (blister tape)

Tape dimensions



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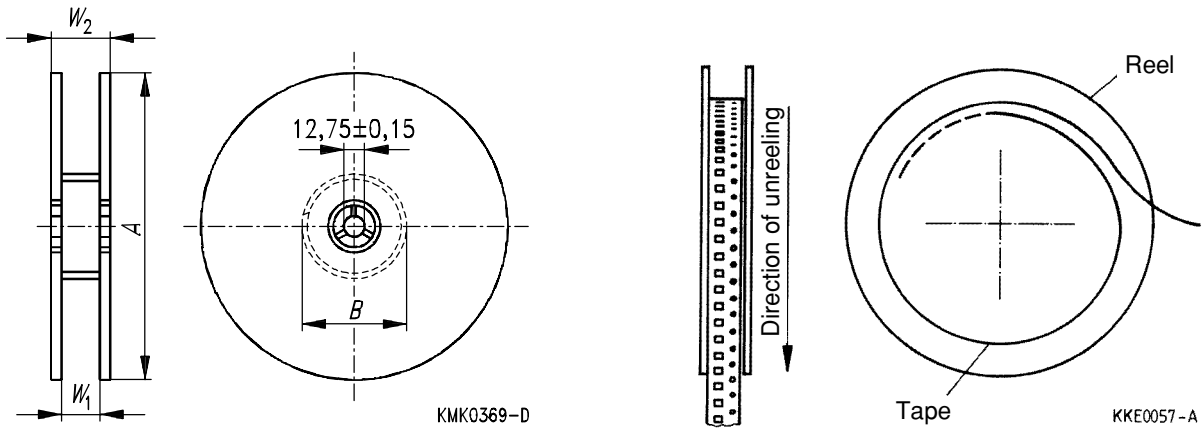
Dimensions (mm)	Size 2824	4030	5040	6054	Tolerance (mm)
A_0, B_0, K_0	refer to table below				
W	16	16	24	24	± 0,3
E	1,75	1,75	1,75	1,75	± 0,1
F	7,5	7,5	11,5	11,5	± 0,1
G	1,2	0,8	1,2	1,2	min.
D_0 D_1	1,5 1,5	1,5 1,5	1,5 1,5	1,5 1,5	+ 0,1/ – 0 min.
P_0 P_1 P_2	4 12 2	4 12 2	4 16 2	4 24 2	± 0,1 ± 0,1 ± 0,1
T_2	6,5	6,5	6,5	9,5	max.

Size	A_0	B_0	K_0	Tolerance	Packing units
2824-1	7,0	7,7	3,4	± 0,1	1800
2824-2	7,0	7,7	4,0	± 0,1	1500
2824-3	7,0	7,7	5,0	± 0,1	1200
4030-1	8,8	10,6	3,7	± 0,1	1600
4030-2	8,8	10,6	4,6	± 0,1	1200
5040-1	11,4	13,4	4,3	± 0,2	1000
5040-2	11,4	13,4	5,5	± 0,2	700
6054-1	14,9	15,9	4,5	± 0,2	600
6054-2	14,9	15,9	5,8	± 0,2	400
6054-3	14,9	15,9	8,1	± 0,2	300

Preliminary data

SMD

Packing



Dimensions (mm)	Size				Tolerance
	2824	4030	5040	6054	
Carrier tape width	16	16	24	24	
W_1	16,4	16,4	24,4	24,4	+ 2/– 0
W_2	22,4	22,4	30,4	30,4	max.
A	330	330	330	330	± 2,0
B	62	62	90	90	± 1,5

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