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Construction

- Polar tantalum capacitors with solid electrolyte
- Conventional Ta-MnO_2 technology
- Flame-retardant plastic case (UL 94 V-0)
- Optionally tinned or gold-plated terminals

Features

- Outstanding reliability
- High volumetric efficiency
- Excellent solderability
- Stable temperature and frequency characteristics
- Low leakage current, low dissipation factor
- Low self-inductance
- High resistance to shock and vibration
- Suitable for use without series resistor
  (recommended operating voltage see “General Technical Information”, page 111, 4.4)
- Very low failure rate
- Operating temperature up to 150 °C

Applications

- Automotive electronics (safety applications e.g. airbag, ABS or motor management)
- Measuring and control engineering
- Medical engineering
- DC/DC converters
- Telecommunications (e.g. mobile phones, private branch exchanges)
- Data processing (e.g. laptops, main frames)

Soldering

Suitable for reflow soldering (IR and vapor phase) and wave soldering

Delivery mode

Taped and reeled in accordance with IEC 60286-3

Ordering code structure

B45196 P1225 +10*

- Passive component
- Tantalum capacitor
- Series
  196 = tinned terminals Sn100
  198 = gold-plated terminals
- Voltage (code number)
- Rated capacitance
  First two digits = significant figures
  Third digit = exponent
- Capacitance tolerance
  M = ±20 %, K = ±10 %, J = ±5 %
- Case size
  10 = A, 20 = B, 30 = C, 40 = D, 50 = E
- Reel diameter
  9 = 180 mm, 6 = 330 mm

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Specifications and characteristics in brief

For characteristic curves see “General Technical Information”, page 107 ff.

	Performance	
Series	B45196P	B45198P
Technology	Ta-MnO_2	Ta-MnO_2
Terminals	Tinned	Gold-plated
Rated voltage V_R (up to 85 °C)	4 … 50 Vdc	
Rated capacitance C_R	0,10 … 150 µF	
Capacitance tolerance	±10%, ±20% ±5% (on request)	
Operating temperature	–55 … +125 °C	
Failure rate	At 40 °C; ≤ V_R, R_S ≥ 3 Ω/V (1 fit = 1 · 10^{-9} failures/h)	
$C_R \cdot V_R \leq 330$ µF · V	≤ 0,8 fit	
$C_R \cdot V_R > 330$ µF · V	≤ 2,5 fit	
Service life	> 500 000 h	
Leakage current (V_R, 5 min, 20 °C)	10 nA/µC	
Detail specification (tinned terminals)	CECC 30801-801/-802	
IEC climatic category	To IEC 60068-1 55/125/56 (–55/+125 °C; 56 days damp heat test)	

For performance types, individual tests are carried out under more extreme conditions, supplementary to the tests specified by CECC.

Examples:

Damp heat	85 (+2) °C, 85 … 90 % relative humidity
Rapid temperature change	100 cycles, – 55 °C/+ 125 °C, 30 min.
Surge voltage	10^4 charge cycles
Impulse test	10^6 cycles

Types B45196P can be operated at temperatures up to 150 °C (under development: 175 °C).
Maximum working voltage at 150 °C: 0,5 V_R
Details for this operating condition must be agreed upon between supplier and customer.

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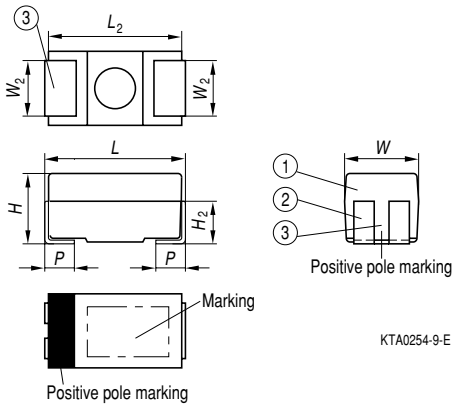
Dimensional drawing



① Encapsulation: molded epoxy resin
② NiFe; tinned surface Sn100 or gold-plated
③ Reduced slot length for case size A

Case size	Dimensions in mm (inches)						
	L	W	H	L_2 typ.	$W_2 \pm 0{,}1$ ±(,004)	H_2 typ.	$p \pm 0{,}3$ ±(,012)
A (10)	3,2 ± 0,2 (,126±,008)	1,6 ± 0,2 (,063±,008)	1,6 ± 0,2 (,063±,008)	3,0 (,118)	1,2 (,047)	1,0 (,039)	0,8 (,031)
B (20)	3,5 ± 0,2 (,138±,008)	2,8 ± 0,2 (,110±,008)	1,9 ± 0,2 (,075±,008)	3,3 (,130)	2,2 (,087)	1,2 (,047)	0,8 (,031)
C (30)	6,0 ± 0,3 (,236±,012)	3,2 ± 0,3 (,126±,012)	2,5 ± 0,3 (,098±,012)	5,8 (,228)	2,2 (,087)	1,5 (,059)	1,3 (,051)
D (40)	7,3 ± 0,3 (,287±,012)	4,3 ± 0,3 (,169±,012)	2,8 ± 0,3 (,110±,012)	7,1 (,280)	2,4 (,094)	1,6 (,062)	1,3 (,051)
E (50)	7,3 ± 0,3 (,287±,012)	4,3 ± 0,3 (,169±,012)	4,1 ± 0,3 (,157±,012)	7,1 (,280)	2,4 (,094)	1,6 (,062)	1,3 (,051)

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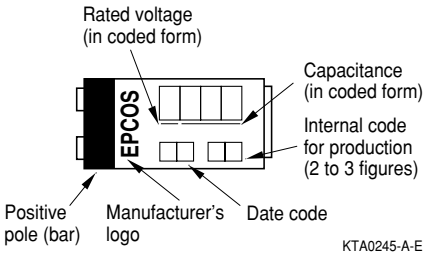
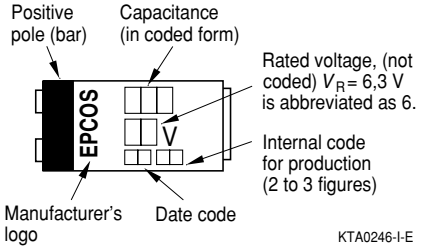
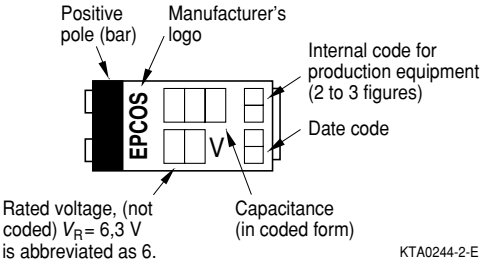
Marking

Case size A



Case size B





Case sizes C, D, E

Voltage coding for case size A

Rated voltage	4	6,3	10	16	20	25	35	50
Code letter	G	J	A	C	D	E	V	T

Capacitance coding

1st and 2nd digit	Capacitance in pF
3rd digit	Multiplier: 4 = 10^4 pF 5 = 10^5 pF 6 = 10^6 pF 7 = 10^7 pF

Date coding

Year	Month	
M = 2000	1 = January	7 = July
N = 2001	2 = February	8 = August
P = 2002	3 = March	9 = September
R = 2003	4 = April	O = October
S = 2004	5 = May	N = November
T = 2005	6 = June	D = December

In addition to the year and month of manufacture, the stamp includes another two or three figures which internally allow us an assignment to production equipment.

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Overview of available types

Series	B45196P, tinned terminals B45198P, gold-plated terminals							
V_R (Vdc) up to 85 °C	4	6,3	10	16	20	25	35	50
C_R (µF)[1]								
0,10							A	A
0,15							A	B
0,22							A	B
0,33							A	B
0,47						A	A B	C
0,68					A	A	B	C
1,0				A	A	A	B	C
1,5			A	A	A	B	C	D
2,2		A	A	A	B	B	C	D
3,3	A	A	A	A B	B	C	C	D
4,7	A	A	A B	B	B C	C	C D	D
6,8	A	A B	A B	B C	C	C D	D	E
10	A B	A B	B C	C	C	C D	D	E
15	A B	B C	B C	C	C D	D	E	
22	B C	B C	C	C D	D	D	E	
33	B C	C	D	D	D			
47	C	C D	C D	D				
68	C D	C D	D					
100	D	D	D					
150	D	D	E					

Upon request

1) Additional ratings upon request

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Technical data and ordering codes

V_R up to 85 °C (up to 125 °C) [up to 150 °C]	C_R	Case size	tan δ_{max} (20 °C, 120 Hz)	$I_{lk,\ max}$ (20 °C, V_R, 5 min)	Z_{max} (20 °C, 100 kHz)	Ordering code [1] Tinned terminals
Vdc	µF			µA	Ω	
4	3,3	A	0,045	0,5	5,9	B45196P0335+10⋆
(2,5)	4,7	A	0,045	0,5	4,6	B45196P0475+10⋆
[2]	6,8	A	0,045	0,5	3,9	B45196P0685+10⋆
	10	A	0,045	0,5	2,9	B45196P0106+10⋆
	10	B	0,045	0,5	2,7	B45196P0106+20⋆
	15	A	0,045	0,6	2,7	B45196P0156+10⋆
	15	B	0,045	0,6	2,6	B45196P0156+20⋆
	22	B	0,045	0,9	1,8	B45196P0226+20⋆
	22	C	0,045	0,9	1,7	B45196P0226+30⋆
	33	B	0,045	1,3	1,5	B45196P0336+20⋆
	33	C	0,045	1,3	1,5	B45196P0336+30⋆
	47	C	0,045	1,9	1,1	B45196P0476+30⋆
	68	C	0,045	2,7	0,9	B45196P0686+30⋆
	68	D	0,045	2,7	0,8	B45196P0686+40⋆
	100	D	0,06	4,0	0,6	B45196P0107+40⋆
	150	D	0,06	6,0	0,6	B45196P0157+40⋆

1) Replace 196P by 198P for gold-plated terminals
+ Code letter for capacitance tolerance: M = ± 20 %, K = ± 10 % (J = ± 5 % upon request)
⋆ Code number for reel diameter: 9 = 180 mm, 6 = 330 mm

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V_R up to 85 °C (up to 125 °C) [up to 150 °C] Vdc	C_R µF	Case size	tan δ_{max} (20 °C, 120 Hz)	$I_{lk, max}$ (20 °C, V_R, 5 min) µA	Z_{max} (20 °C, 100 kHz) Ω	Ordering code [1] Tinned terminals
6,3 (4) [3,2]	2,2	A	0,045	0,5	6,5	B45196P1225+10*
	3,3	A	0,045	0,5	4,6	B45196P1335+10*
	4,7	A	0,045	0,5	3,6	B45196P1475+10*
	6,8	A	0,045	0,5	2,9	B45196P1685+10*
	6,8	B	0,045	0,5	2,7	B45196P1685+20*
	10	A	0,045	0,6	2,7	B45196P1106+10*
	10	B	0,045	0,6	2,1	B45196P1106+20*
	15	B	0,045	0,9	1,8	B45196P1156+20*
	15	C	0,045	1,0	1,7	B45196P1156+30*
	22	B	0,045	1,4	1,5	B45196P1226+20*
	22	C	0,045	1,4	1,3	B45196P1226+30*
	33	C	0,045	2,1	1,1	B45196P1336+30*
	47	C	0,045	3,0	0,8	B45196P1476+30*
	47	D	0,045	3,0	0,8	B45196P1476+40*
	68	C	0,045	4,3	0,8	B45196P1686+30*
	68	D	0,045	4,3	0,6	B45196P1686+40*
	100	D	0,06	6,3	0,6	B45196P1107+40*
	150	D	0,06	9,5	0,5	B45196P1157+40*

Upon request

1) Replace 196P by 198P for gold-plated terminals
+ Code letter for capacitance tolerance: M = ± 20 %, K = ± 10 % (J = ± 5 % upon request)
* Code number for reel diameter: 9 = 180 mm, 6 = 330 mm

SMD

V_R up to 85 °C (up to 125 °C) [up to 150 °C] Vdc	C_R µF	Case size	tan δ_{max} (20 °C, 120 Hz)	$I_{lk, max}$ (20 °C, V_R, 5 min) µA	Z_{max} (20 °C, 100 kHz) Ω	Ordering code [1] Tinned terminals
10	1,5	A	0,045	0,5	6,5	B45196P2155+10*
(6,3)	2,2	A	0,045	0,5	4,6	B45196P2225+10*
[5]	3,3	A	0,045	0,5	3,6	B45196P2335+10*
	4,7	A	0,045	0,5	2,9	B45196P2475+10*
	4,7	B	0,045	0,5	2,7	B45196P2475+20*
	6,8	A	0,045	0,7	2,7	B45196P2685+10*
	6,8	B	0,045	0,7	2,1	B45196P2685+20*
	10	B	0,045	1,0	1,8	B45196P2106+20*
	10	C	0,045	1,0	1,7	B45196P2106+30*
	15	B	0,045	1,5	1,5	B45196P2106+20*
	15	C	0,045	1,5	1,4	B45196P2156+30*
	22	C	0,045	2,2	1,1	B45196P2226+30*
	33	D	0,045	3,3	0,8	B45196P2336+40*
	47	C	0,045	4,7	0,8	B45196P2476+30*
	47	D	0,045	4,7	0,6	B45196P2476+40*
	68	D	0,045	6,8	0,6	B45196P2686+40*
	100	D	0,06	10	0,6	B45196P2107+40*
	150	E	0,06	15	0,5	B45196P2157+50*
16	1,0	A	0,030	0,5	6,5	B45196P3105+10*
(10)	1,5	A	0,045	0,5	5,2	B45196P3155+10*
[8]	2,2	A	0,045	0,5	4,3	B45196P3225+10*
	3,3	A	0,045	0,6	3,4	B45196P3335+10*
	3,3	B	0,045	0,6	3,0	B45196P3335+20*
	4,7	B	0,045	0,8	2,1	B45196P3475+20*
	6,8	B	0,045	1,1	1,8	B45196P3685+20*
	6,8	C	0,045	1,1	1,7	B45196P3685+30*
	10	C	0,045	1,6	1,4	B45196P3106+30*
	15	C	0,045	2,4	1,1	B45196P3156+30*
	22	C	0,045	3,6	1,0	B45196P3226+30*
	22	D	0,045	3,6	0,8	B45196P3226+40*
	33	D	0,045	5,3	0,7	B45196P3336+40*
	47	D	0,045	7,5	0,6	B45196P3476+40*

Upon request

1) Replace 196P by 198P for gold-plated terminals
+ Code letter for capacitance tolerance: M = ± 20 %, K = ± 10 % (J = ± 5 % upon request)
* Code number for reel diameter: 9 = 180 mm, 6 = 330 mm

SMD

V_R up to 85 °C (up to 125 °C) [up to 150 °C] Vdc	C_R µF	Case size	tan δ_{max} (20 °C, 120 Hz)	$I_{lk, max}$ (20 °C, V_R, 5 min) µA	Z_{max} (20 °C, 100 kHz) Ω	Ordering code [1] Tinned terminals
20 (13) [10]	0,68	A	0,030	0,5	7,8	B45196P4684+10⋆
	1,0	A	0,030	0,5	5,9	B45196P4105+10⋆
	1,5	A	0,045	0,5	5,2	B45196P4155+10⋆
	2,2	B	0,045	0,5	3,6	B45196P4225+20⋆
	3,3	B	0,045	0,7	2,7	B45196P4335+20⋆
	4,7	B	0,045	1,0	1,9	B45196P4475+20⋆
	4,7	C	0,045	1,0	1,7	B45196P4475+30⋆
	6,8	C	0,045	1,4	1,3	B45196P4685+30⋆
	10	C	0,045	2,0	1,1	B45196P4106+30⋆
	15	C	0,045	3,0	1,0	B45196P4156+30⋆
	15	D	0,045	3,0	0,9	B45196P4156+40⋆
	22	D	0,045	4,4	0,7	B45196P4226+40⋆
	33	D	0,045	6,6	0,6	B45196P4336+40⋆
25 (16) [12,5]	0,47	A	0,030	0,5	8,5	B45196P5474+10⋆
	0,68	A	0,030	0,5	6,5	B45196P5684+10⋆
	1,0	A	0,030	0,5	5,2	B45196P5105+10⋆
	1,5	B	0,045	0,5	4,2	B45196P5155+20⋆
	2,2	B	0,045	0,6	3,0	B45196P5225+20⋆
	3,3	C	0,045	0,9	2,0	B45196P5335+30⋆
	4,7	C	0,045	1,2	1,6	B45196P5475+30⋆
	6,8	C	0,045	1,7	1,4	B45196P5685+30⋆
	6,8	D	0,045	1,7	1,1	B45196P5685+40⋆
	10	C	0,045	2,5	1,1	B45196P5106+30⋆
	10	D	0,045	2,5	0,9	B45196P5106+40⋆
	15	D	0,045	3,8	0,7	B45196P5156+40⋆
	22	D	0,045	5,5	0,6	B45196P5226+40⋆

1) Replace 196P by 198P for gold-plated terminals
+ Code letter for capacitance tolerance: M = ± 20 %, K = ± 10 % (J = ± 5 % upon request)
⋆ Code number for reel diameter: 9 = 180 mm, 6 = 330 mm

SMD

V_R up to 85 °C (up to 125 °C) [up to 150 °C] Vdc	C_R µF	Case size	tan δ_{max} (20 °C, 120 Hz)	$I_{lk,\ max}$ (20 °C, V_R, 5 min) µA	Z_{max} (20 °C, 100 kHz) Ω	Ordering code [1] Tinned terminals
35 (23) [17,5]	0,10	A	0,030	0,5	28	B45196P6104+10⋆
	0,15	A	0,030	0,5	23	B45196P6154+10⋆
	0,22	A	0,030	0,5	15	B45196P6224+10⋆
	0,33	A	0,030	0,5	11	B45196P6334+10⋆
	0,47	A	0,030	0,5	10	B45196P6474+10⋆
	0,47	B	0,030	0,5	8,0	B45196P6474+20⋆
	0,68	B	0,030	0,5	5,5	B45196P6684+20⋆
	1,0	B	0,030	0,5	4,4	B45196P6105+20⋆
	1,5	C	0,045	0,6	3,3	B45196P6155+30⋆
	2,2	C	0,045	0,8	2,2	B45196P6225+30⋆
	3,3	C	0,045	1,2	1,7	B45196P6335+30⋆
	4,7	C	0,045	1,7	1,3	B45196P6475+30⋆
	4,7	D	0,045	1,7	1,0	B45196P6475+40⋆
	6,8	D	0,045	2,4	0,9	B45196P6685+40⋆
	10	D	0,045	3,5	0,7	B45196P6106+40⋆
	15	E	0,045	5,3	0,5	B45196P6156+50⋆
	22	E	0,045	7,7	0,5	B45196P6226+50⋆
50 (33) [25]	0,10	A	0,030	0,5	27	B45196P7104+10⋆
	0,15	B	0,030	0,5	22	B45196P7154+20⋆
	0,22	B	0,030	0,5	15	B45196P7224+20⋆
	0,33	B	0,030	0,5	11	B45196P7334+20⋆
	0,47	C	0,030	0,5	6,5	B45196P7474+30⋆
	0,68	C	0,030	0,5	5,5	B45196P7684+30⋆
	1,0	C	0,030	0,5	3,3	B45196P7105+30⋆
	1,5	D	0,045	0,8	2,8	B45196P7155+40⋆
	2,2	D	0,045	1,1	2,0	B45196P7225+40⋆
	3,3	D	0,045	1,7	1,1	B45196P7335+40⋆
	4,7	D	0,045	2,4	0,9	B45196P7475+40⋆
	6,8	E	0,045	3,4	0,5	B45196P7685+50⋆
	10	E	0,045	5,0	0,5	B45196P7106+50⋆

Upon request

1) Replace 196P by 198P for gold-plated terminals
+ Code letter for capacitance tolerance: M = ± 20 %, K = ± 10 % (J = ± 5 % upon request)
⋆ Code number for reel diameter: 9 = 180 mm, 6 = 330 mm

Herausgegeben von EPCOS AG
Unternehmenskommunikation, Postfach 80 17 09, 81617 München, DEUTSCHLAND
☎ ++49 89 636 09, FAX (0 89) 636-2 26 89

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☎ ++49 89 636 09, FAX (0 89) 636-2 26 89

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