

Tantalum Chip Capacitors

B45196H, B45198H

HighCap

**SMD**

**Construction**

- Polar tantalum capacitors with solid electrolyte
- Conventional Ta-MnO<sub>2</sub> technology
- Flame-retardant plastic case (UL 94 V-0)
- Optionally tinned or gold-plated terminals



**Features**

- Ultra-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)

**Applications**

- Telecommunications (e.g. mobile phones, private branch exchanges)
- Data processing (e.g. laptops, main frames)
- Measuring and control engineering (e.g. voltage regulators)
- Automotive electronics
- Medical engineering
- DC/DC converters

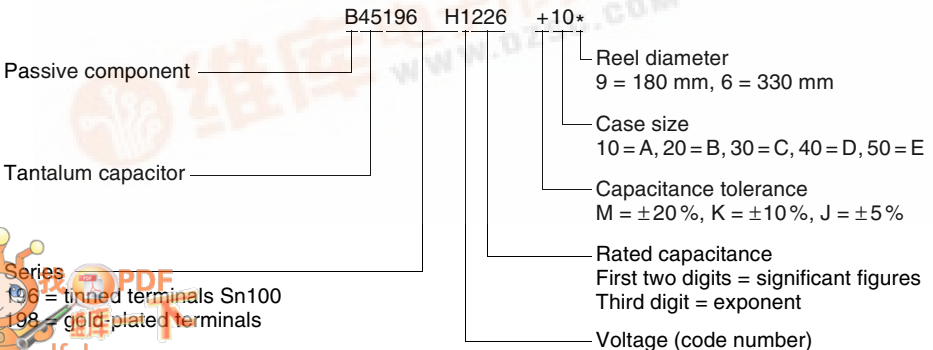
**Soldering**

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**





Tantalum Chip Capacitors

B45196H, B45198H

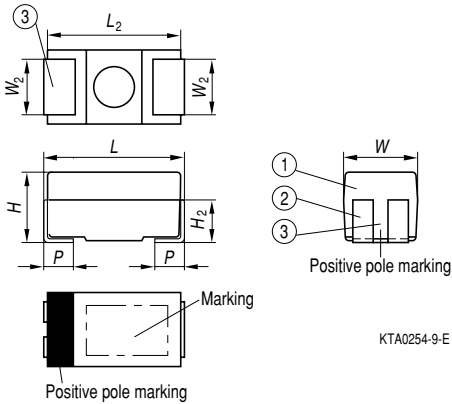
HighCap



### Specifications and characteristics in brief

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

	HighCap	
Series	B45196H	B45198H
Technology	Ta-MnO <sub>2</sub>	Ta-MnO <sub>2</sub>
Terminals	Tinned	Gold-plated
Rated voltage $V_R$ (up to 85 °C)	4 ... 50 Vdc	
Rated capacitance $C_R$	0,15 ... 1500 $\mu$ F	
Capacitance tolerance	$\pm 10\%$ , $\pm 20\%$ $\pm 5\%$ (on request)	
Operating temperature	-55 ... +125 °C	
Failure rate	At 40 °C; $\leq V_R$ , $R_S \geq 3 \Omega/V$ (1 fit = $1 \cdot 10^{-9}$ failures/h)	
$C_R \cdot V_R \leq 330 \mu F \cdot V$	$\leq 8$ fit	
$C_R \cdot V_R > 330 \mu F \cdot V$	$\leq 24$ fit	
Service life	> 500 000 h	
Leakage current ( $V_R$ , 5 min, 20 °C)	10 nA/ $\mu$ C	
Detail specification (tinned terminals)	CECC 30801-802	
IEC climatic category	To IEC 60068-1 55/125/56 (-55/+125 °C; 56 days damp heat test)	

**Dimensional drawing**


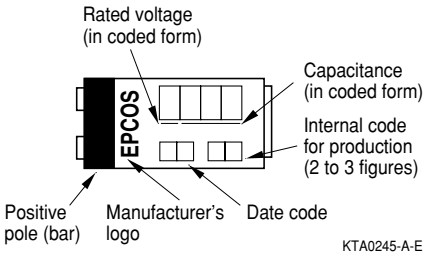
- ① Encapsulation: molded epoxy resin
- ② NiFe; tinned surface Sn100 or gold-plated
- ③ Reduced slot length for case size A

Case size	Dimensions in mm (inches)						
	<i>L</i>	<i>W</i>	<i>H</i>	<i>L</i> <sub>2</sub> typ.	<i>W</i> <sub>2</sub> ± 0,1 ±(,004)	<i>H</i> <sub>2</sub> typ.	<i>p</i> ± 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)

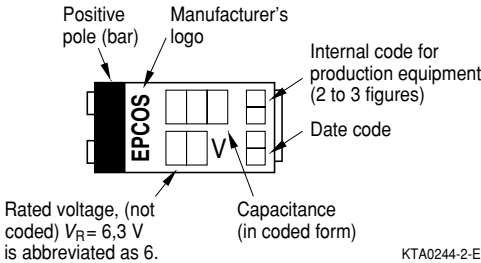
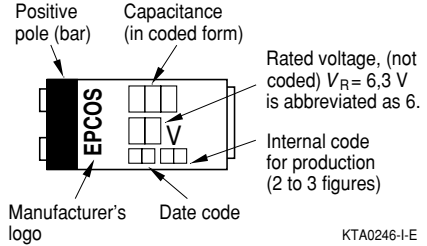


**Marking**

**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 8 = $10^8$ pF

**Date coding**

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



Tantalum Chip Capacitors

B45196H, B45198H

HighCap



Overview of available types

Series	B45196H, tinned terminals B45198H, gold-plated terminals																
$V_R$ (Vdc) up to 85°C	4	6,3		10	16	20	25	35	50								
$C_R$ ( $\mu$ F) <sup>1)</sup>																	
0,15														A			
0,22														A			
0,33																	
0,47												A		B			
0,68												A					
1,0									A		A						
1,5							A		A		B			C			
2,2						A		A		A		B		C			
3,3					A		A		A		B		B				
4,7			A		A		A		A	B		B		C			
6,8		A		A		A		A	B		B		C	C	D	E	
10		A		A		A	B	A	B		B		C	C		E	
15		A		A	B	A	B	B	C		C		C	D		E	
22		A	B	A	B	A	B	C	B	C		C		C	D	D	E
33		A	B	A	B	C	B	C	C		C		D	D	E	E	
47		A	B	C	B	C	B	C	C	D		D		D	E	E	
68		B	C	B	C	C	C	D	C	D		D		E	E		
100		B	C	B	C	D	C	D	D	E		E					
150		C	D	C	D	C	D	E	D	E							
220		C	D	C	D	E	D	E	E								
330		C	D	E	D	E	D	E									
470		D	E	D	E	E											
680		D	E	E	E	E											
1000		E	E	E													
1500		E															

Upon request



Tantalum Chip Capacitors

B45196H, B45198H

HighCap

SMD

Technical data and ordering codes

$V_R$ up to 85°C (up to 125°C) Vdc	$C_R$  μF	Case size	$\tan \delta_{\max}$ (20°C, 120 Hz)	$I_{k, \max}$ (20°C, $V_R$ , 5 min)  μA	$Z_{\max}$ (20°C, 100 kHz)  Ω	Ordering code <sup>1)</sup>  Tinned terminals
4 (2,5)	6,8	A	0,06	0,5	6,0	B45196H0685+10*
	10	A	0,06	0,5	4,5	B45196H0106+10*
	15	A	0,06	0,6	4,0	B45196H0156+10*
	22	A	0,08	0,9	3,5	B45196H0226+10*
	22	B	0,06	0,9	3,0	B45196H0226+20*
	33	A	0,08	1,3	3,0	B45196H0336+10*
	33	B	0,06	1,3	2,5	B45196H0336+20*
	47	A	0,10	1,9	2,8	B45196H0476+10*
	47	B	0,06	1,9	2,3	B45196H0476+20*
	47	C	0,06	1,9	1,6	B45196H0476+30*
	68	B	0,06	2,7	1,8	B45196H0686+20*
	68	C	0,06	2,7	1,5	B45196H0686+30*
	100	B	0,08	4,0	1,6	B45196H0107+20*
	100	C	0,08	4,0	1,4	B45196H0107+30*
	150	C	0,08	6,0	1,3	B45196H0157+30*
	150	D	0,08	6,0	0,8	B45196H0157+40*
	220	C	0,15	8,8	1,2	B45196H0227+30*
	220	D	0,08	8,8	0,8	B45196H0227+40*
	330	C	0,15	13	1,2	B45196H0337+30*
	330	D	0,10	13	0,9	B45196H0337+40*
	330	E	0,08	13	0,8	B45196H0337+50*
	470	D	0,10	19	0,9	B45196H0477+40*
	470	E	0,08	19	0,6	B45196H0477+50*
	680	D	0,12	27	0,9	B45196H0687+40*
680	E	0,12	27	0,6	B45196H0687+50*	
1000	E	0,15	40	0,6	B45196H0108+50*	
1500	E	0,15	60	0,6	B45196H0158+50*	

Upon request

1) Replace 196H by 198H for gold-plated terminals  
+ Code letter for capacitance tolerance: M = ± 20%, K = ± 10% (J = ± 5% upon request)



Tantalum Chip Capacitors

B45196H, B45198H

HighCap



$V_R$ up to 85°C (up to 125°C) Vdc	$C_R$  $\mu F$	Case size	$\tan \delta_{max}$ (20°C, 120 Hz)	$I_{k,max}$ (20°C, $V_R$ , 5 min) $\mu A$	$Z_{max}$ (20°C, 100 kHz) $\Omega$	Ordering code 1)  Tinned terminals
6,3 (4)	4,7	A	0,06	0,5	5,5	B45196H1475+10*
	6,8	A	0,06	0,5	4,5	B45196H1685+10*
	10	A	0,06	0,6	4,0	B45196H1106+10*
	15	A	0,06	0,9	3,8	B45196H1156+10*
	15	B	0,06	0,9	3,0	B45196H1156+20*
	22	A	0,08	1,4	3,0	B45196H1226+10*
	22	B	0,06	1,4	2,5	B45196H1226+20*
	33	A	0,10	2,1	2,8	B45196H1336+10*
	33	B	0,06	2,1	2,2	B45196H1336+20*
	33	C	0,06	2,1	1,6	B45196H1336+30*
	47	B	0,06	3,0	2,0	B45196H1476+20*
	47	C	0,06	3,0	1,5	B45196H1476+30*
	68	B	0,08	4,3	1,8	B45196H1686+20*
	68	C	0,06	4,3	1,4	B45196H1686+30*
	100	B	0,12	6,3	1,6	B45196H1107+20*
	100	C	0,08	6,3	1,2	B45196H1107+30*
	100	D	0,08	6,3	0,8	B45196H1107+40*
	150	C	0,08	9,5	1,3	B45196H1157+30*
	150	D	0,08	9,5	0,8	B45196H1157+40*
	220	C	0,10	14	1,2	B45196H1227+30*
	220	D	0,08	14	0,8	B45196H1227+40*
	220	E	0,12	14	0,8	B45196H1227+50*
	330	D	0,08	21	0,8	B45196H1337+40*
	330	E	0,08	21	0,6	B45196H1337+50*
	470	D	0,15	30	0,9	B45196H1477+40*
	470	E	0,08	30	0,6	B45196H1477+50*
680	E	0,15	43	0,6	B45196H1687+50*	
1000	E	0,15	63	0,6	B45196H1108+50*	

Upon request

1) Replace 196H by 198H for gold-plated terminals  
+ Code letter for capacitance tolerance: M = ± 20%, K = ± 10% (J = ± 5% upon request)



Tantalum Chip Capacitors

B45196H, B45198H

HighCap



$V_R$ up to 85°C (up to 125°C) Vdc	$C_R$  $\mu F$	Case size	$\tan \delta_{max}$ (20°C, 120 Hz)	$I_{k,max}$ (20°C, $V_R$ , 5 min) $\mu A$	$Z_{max}$ (20°C, 100 kHz) $\Omega$	Ordering code 1)  Tinned terminals
10 (6,3)	3,3	A	0,06	0,5	5,5	B45196H2335+10*
	4,7	A	0,06	0,5	4,5	B45196H2475+10*
	6,8	A	0,06	0,7	4,0	B45196H2685+10*
	10	A	0,06	1,0	3,8	B45196H2106+10*
	10	B	0,06	1,0	3,0	B45196H2106+20*
	15	A	0,06	1,5	3,2	B45196H2156+10*
	15	B	0,06	1,5	2,5	B45196H2156+20*
	22	A	0,08	2,2	3,2	B45196H2226+10*
	22	B	0,06	2,2	2,3	B45196H2226+20*
	22	C	0,06	2,2	1,6	B45196H2226+30*
	33	B	0,06	3,3	2,0	B45196H2336+20*
	33	C	0,06	3,0	1,5	B45196H2336+30*
	47	B	0,08	4,7	1,6	B45196H2476+20*
	47	C	0,06	4,7	1,4	B45196H2476+30*
	68	C	0,06	6,8	1,2	B45196H2686+30*
	68	D	0,06	6,8	0,8	B45196H2686+40*
	100	C	0,08	10	1,2	B45196H2107+30*
	100	D	0,08	10	0,8	B45196H2107+40*
	150	C	0,10	15	1,0	B45196H2157+30*
	150	D	0,08	15	0,8	B45196H2157+40*
	150	E	0,08	15	0,8	B45196H2157+50*
	220	D	0,10	22	0,8	B45196H2227+40*
	220	E	0,08	22	0,6	B45196H2227+50*
	330	D	0,12	33	0,9	B45196H2337+40*
330	E	0,10	33	0,6	B45196H2337+50*	
470	E	0,12	47	0,6	B45196H2477+50*	
680	E	0,15	68	0,6	B45196H2687+50*	

Upon request

1) Replace 196H by 198H for gold-plated terminals  
+ Code letter for capacitance tolerance: M = ± 20%, K = ± 10% (J = ± 5% upon request)




**Tantalum Chip Capacitors**
**B45196H, B45198H**
**HighCap**
**SMD**

$V_R$ up to 85°C (up to 125°C) Vdc	$C_R$  $\mu\text{F}$	Case size	$\tan \delta_{\max}$ (20°C, 120 Hz)	$I_{k, \max}$ (20°C, $V_R$ , 5 min) $\mu\text{A}$	$Z_{\max}$ (20°C, 100 kHz) $\Omega$	Ordering code 1)  Tinned terminals
16 (10)	2,2	A	0,06	0,5	6,5	B45196H3225+10*
	3,3	A	0,06	0,5	5,0	B45196H3335+10*
	4,7	A	0,06	0,8	4,0	B45196H3475+10*
	6,8	A	0,06	1,1	3,8	B45196H3685+10*
	6,8	B	0,06	1,1	3,0	B45196H3685+20*
	10	A	0,06	1,6	3,0	B45196H3106+10*
	10	B	0,06	1,6	2,5	B45196H3106+20*
	15	B	0,06	2,4	2,3	B45196H3156+20*
	15	C	0,06	2,4	1,6	B45196H3156+30*
	22	B	0,06	3,5	2,6	B45196H3226+20*
	22	C	0,06	3,5	1,5	B45196H3226+30*
	33	C	0,06	5,3	1,4	B45196H3336+30*
	47	C	0,06	7,5	1,4	B45196H3476+30*
	47	D	0,06	7,5	0,8	B45196H3476+40*
	68	C	0,06	11	1,2	B45196H3686+30*
	68	D	0,06	11	0,8	B45196H3686+40*
	100	D	0,08	16	0,8	B45196H3107+40*
100	E	0,08	16	0,8	B45196H3107+50*	
150	D	0,10	24	0,9	B45196H3157+40*	
150	E	0,08	24	0,6	B45196H3157+50*	
220	E	0,10	35	0,9	B45196H3227+50*	

1) Replace 196H by 198H for gold-plated terminals

 + Code letter for capacitance tolerance: M =  $\pm 20\%$ , K =  $\pm 10\%$  (J =  $\pm 5\%$  upon request)



Tantalum Chip Capacitors

B45196H, B45198H

HighCap



$V_R$ up to 85°C (up to 125°C) Vdc	$C_R$  $\mu F$	Case size	$\tan \delta_{max}$ (20°C, 120 Hz)	$I_{k, max}$ (20°C, $V_R$ , 5 min) $\mu A$	$Z_{max}$ (20°C, 100 kHz) $\Omega$	Ordering code 1)  Tinned terminals
20 (13)	1,5	A	0,06	0,5	8,0	B45196H4155+10*
	2,2	A	0,06	0,5	6,0	B45196H4225+10*
	3,3	A	0,06	0,7	4,0	B45196H4335+10*
	4,7	A	0,06	0,9	3,5	B45196H4475+10*
	4,7	B	0,06	0,9	3,0	B45196H4475+20*
	6,8	B	0,06	1,4	2,5	B45196H4685+20*
	10	B	0,06	2,0	2,3	B45196H4106+20*
	10	C	0,06	2,0	1,6	B45196H4106+30*
	15	C	0,06	3,0	1,5	B45196H4156+30*
	22	C	0,06	4,4	1,4	B45196H4226+30*
	33	C	0,06	6,6	1,5	B45196H4336+30*
	33	D	0,06	6,6	0,8	B45196H4336+40*
	47	D	0,06	9,4	0,8	B45196H4476+40*
	47	E	0,06	9,4	0,8	B45196H4476+50*
	68	D	0,06	14	0,9	B45196H4686+40*
68	E	0,06	14	0,8	B45196H4686+50*	
100	E	0,08	20,0	0,8	B45196H4107+50*	
25 (16)	1,0	A	0,04	0,5	8,0	B45196H5105+10*
	1,5	A	0,06	0,5	7,0	B45196H5155+10*
	2,2	A	0,06	0,6	7,0	B45196H5225+10*
	3,3	B	0,06	0,8	4,0	B45196H5335+20*
	4,7	B	0,06	1,2	3,2	B45196H5475+20*
	6,8	B	0,06	1,7	2,8	B45196H5685+20*
	6,8	C	0,06	1,7	2,0	B45196H5685+30*
	10	C	0,06	2,5	1,6	B45196H5106+30*
	15	C	0,06	3,8	1,5	B45196H5156+30*
	22	C	0,06	5,5	1,4	B45196H5226+30*
	22	D	0,06	5,5	0,8	B45196H5226+40*
	33	D	0,06	8,3	0,8	B45196H5336+40*
	33	E	0,06	8,3	0,8	B45196H5336+50*
	47	D	0,06	12	0,8	B45196H5476+40*
	47	E	0,06	12	0,8	B45196H5476+50*
68	E	0,06	17	0,9	B45196H5686+50*	

Upon request

1) Replace 196H by 198H for gold-plated terminals  
+ Code letter for capacitance tolerance: M = ± 20 %, K = ± 10 % (J = ± 5 % upon request)



Tantalum Chip Capacitors

B45196H, B45198H

HighCap



$V_R$ up to 85°C (up to 125°C) Vdc	$C_R$  $\mu F$	Case size	$\tan \delta_{max}$ (20°C, 120 Hz)	$I_{k,max}$ (20°C, $V_R$ , 5 min) $\mu A$	$Z_{max}$ (20°C, 100 kHz) $\Omega$	Ordering code 1)  Tinned terminals
35 (23)	0,47	A	0,04	0,5	11	B45196H6474+10*
	0,68	A	0,04	0,5	8,0	B45196H6684+10*
	1,0	A	0,04	0,5	7,0	B45196H6105+10*
	1,5	B	0,06	0,5	6,0	B45196H6155+20*
	2,2	B	0,06	0,8	4,0	B45196H6225+20*
	3,3	B	0,06	1,2	3,5	B45196H6335+20*
	4,7	C	0,06	1,6	2,0	B45196H6475+30*
	6,8	C	0,06	2,4	1,8	B45196H6685+30*
	10	C	0,06	3,5	1,6	B45196H6106+30*
	15	D	0,06	5,3	0,8	B45196H6156+40*
	22	D	0,06	7,7	0,8	B45196H6226+40*
	22	E	0,06	7,7	0,8	B45196H6226+50*
	33	E	0,06	12	0,8	B45196H6336+50*
47	E	0,06	16	0,9	B45196H6476+50*	
50 (33)	0,15	A	0,04	0,5	22	B45196H7154+10*
	0,22	A	0,04	0,5	18	B45196H7224+10*
	0,47	B	0,04	0,5	9,0	B45196H7474+20*
	1,5	C	0,06	0,8	4,4	B45196H7155+30*
	2,2	C	0,06	1,1	3,2	B45196H7225+30*
	6,8	D	0,06	3,4	0,8	B45196H7685+40*
	6,8	E	0,06	3,4	0,8	B45196H7685+50*
	10	E	0,06	5,0	0,8	B45196H7106+50*
	15	E	0,06	7,5	0,9	B45196H7156+50*

Upon request

1) Replace 196H by 198H for gold-plated terminals  
+ Code letter for capacitance tolerance: M = ± 20 %, K = ± 10 % (J = ± 5 % upon request)

oder an unsere Vertriebsgesellschaften im Ausland. Bauelemente können aufgrund technischer E halten. Auskünfte darüber bitten wir unter Angabe des betreffenden Typs ebenfalls über die zuständ zuholen.

**Published by EPCOS AG**

**Corporate Communications, P.O. Box 80 17 09, 81617 Munich, GERMANY**

**☎ ++49 89 636 09, FAX (089) 636-2 26 89**

© EPCOS AG 2002. Reproduction, publication and dissemination of this brochure and the informa EPCOS' prior express consent is prohibited.

Purchase orders are subject to the General Conditions for the Supply of Products and Services of Industry recommended by the ZVEI (German Electrical and Electronic Manufacturers' Association).

This brochure replaces the previous edition.

For questions on technology, prices and delivery please contact the Sales Offices of EPCOS AG or tives.

Due to technical requirements components may contain dangerous substances. For information o also contact one of our Sales Offices.