

HJCA45 Series, Chip Solid Electrolyte Tantalum Capacitors



Features and Applications

1. Resin molded package, excellent sealing, chip-type, compact size, lightweight, polarized;
2. Compact, lightweight, with excellent and stable electrical performance, long service life, high reliability, and good storage stability.
3. Designed for surface-mount circuits in professional electronic applications including satellite systems, telecommunications equipment, imaging devices, and computing systems;
4. THB requirement available on request; Utilizing new technology, improve long-term storage time and operation under high temperature and humidity (85°C, 85% RH, 1000 hours)
5. Compliance military standards: QJ/PWV 142-2004, QJ/PW 142-2011*
6. Up screened options includes surge current testing of 10 cycles at +25°C and 10 cycles at -55°C/+85°C

◆ How to order

<u>HJCA45</u>	<u>D</u>	<u>476</u>	<u>M</u>	<u>010</u>	<u>R</u>	<u>T</u>
↓	↓	↓	↓	↓	↓	↓
<u>Type</u>	<u>Case Size</u>	<u>Capacitance code</u>	<u>Tolerance</u>	<u>Rated DC Voltage</u>	<u>Package</u>	<u>THB Series</u>
HJCA45	See size table	pF Code: 1st two digits represent significant figures 3rd digit represents multiplier (number of zeros to follow) 106 = 10uF 476 = 47uF	K: +/-10% M: +/-20%	Code 035: 35VDC 006 = 6.3VDC 010 = 10VDC 025 = 25VDC 035 = 35VDC 050 = 50VDC	R: Tape and Reel	T: THB Series

Key Technical Specifications

1. Operating temperature range: -55~125°C; Derating design refers to Application Guide 3.1;
2. Rated voltage, derated voltage, nominal capacitance: See Table 2;
3. Capacitance tolerance: K grade: ±10%; M grade: ±20%.
4. Room temperature DC leakage current, room temperature dissipation factor: Not exceeding Table 2 specifications;
5. Equivalent Series Resistance ESR (25°C, 100kHz): Not exceeding Table 2 specifications;
6. Dimensions and case codes: See Figure 1 and Table 1.

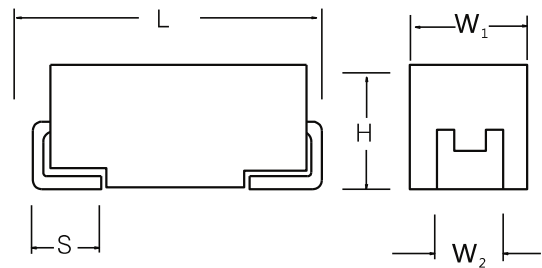


Figure 1

Table 1 Product Dimensions (mm)

Case Code	L	W ₁	H	S	W ₂
A	3.2±0.2	1.6±0.2	1.6±0.2	0.8±0.2	1.2±0.2
B	3.5±0.2	2.8±0.2	1.9±0.2	0.8±0.2	2.2±0.2
C	6.0±0.2	3.2±0.2	2.5±0.2	1.3±0.2	2.2±0.2
D	7.3±0.2	4.3±0.2	2.8±0.2	1.3±0.2	2.4±0.2
E	7.3±0.4	4.3±0.4	4.1±0.4	1.3±0.2	2.4±0.2
V	7.3±0.4	6.1±0.4	3.6±0.4	1.35±0.2	3.0±0.2
W	7.3±0.4	6.1±0.4	4.1±0.4	1.35±0.2	3.0±0.2

Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μ F)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μ A)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 4V										
2.2	A	8.0	0.5	4	5	± 10	± 12	8	6	8
3.3	A	8.0	0.5	4	5	± 10	± 12	8	6	8
4.7	B	6.0	0.5	4	5	± 10	± 12	8	6	8
4.7	A	8.0	0.5	4	5	± 10	± 12	8	6	8
6.8	B	5.5	0.5	4	5	± 10	± 12	8	6	8
6.8	A	6.0	0.5	4	5	± 10	± 12	8	6	8
10	B	4.0	0.5	4	5	± 10	± 12	8	6	8
10	A	6.0	0.5	4	5	± 10	± 12	8	6	8
15	C	3.5	0.6	4.8	6.0	± 10	± 12	8	6	8
15	B	3.5	0.6	4.8	6.0	± 10	± 12	8	6	8
15	A	4.0	0.6	4.8	6.0	± 10	± 12	8	6	8
22	C	2.5	0.8	7.0	8.8	± 10	± 12	8	6	8
22	B	3.2	0.8	7.0	8.8	± 10	± 12	8	6	8
22	A	4.0	0.8	7.0	8.8	± 10	± 12	8	6	8
33	D	2.2	1.3	10.5	13.2	± 10	± 12	8	6	8
33	C	2.2	1.3	10.5	13.2	± 10	± 12	8	6	8
33	B	3.2	1.3	10.5	13.2	± 10	± 12	8	6	8
47	D	1.6	1.8	15.0	18.8	± 10	± 12	8	6	8
47	C	1.8	1.8	15.0	18.8	± 10	± 12	8	6	8
47	B	2.6	1.8	15.0	18.8	± 10	± 12	8	6	8
68	D	1.1	2.7	21.7	27.2	± 10	± 12	8	6	8
68	C	1.5	2.7	21.7	27.2	± 10	± 12	8	6	8
68	B	2.0	2.7	21.7	27.2	± 10	± 12	8	6	8
100	D	0.9	4.0	32	40	± 10	± 12	10	8	10
100	C	1.2	4.0	32	40	± 10	± 12	10	8	10
150	E	0.5	6.0	48	60	± 10	± 12	10	8	10
150	D	0.8	6.0	48	60	± 10	± 12	10	8	10
150	C	1.0	6.0	48	60	± 10	± 12	10	8	10
220	E	0.5	8.8	70.4	88	± 12	± 14	12	10	12
220	D	0.9	8.8	70.4	88	± 12	± 14	12	10	12
220	C	1.0	8.8	70.4	88	± 12	± 14	12	10	12
330	V	0.8	13.2	105.6	132	± 12	± 14	12	10	12
330	E	0.5	13.2	105.6	132	± 12	± 14	12	10	12

Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μ F)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μ A)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 4V										
330	D	0.7	13.2	105.6	132	± 12	± 14	12	10	12
470	V	0.3	18.8	150.4	188	± 14	± 16	14	12	14
470	E	0.5	18.8	150.4	188	± 14	± 16	14	12	14
470	D	0.5	18.8	150.4	188	± 14	± 16	14	12	14
680	W	0.35	27.2	217.6	272	± 14	± 16	14	12	14
680	V	0.35	27.2	217.6	272	± 14	± 16	14	12	14
680	E	0.35	27.2	217.6	272	± 14	± 16	14	12	14
1000	W	0.2	40	320	400	± 16	± 20	18	16	18
1000	V	0.2	40	320	400	± 16	± 20	18	16	18
1000	E	0.3	40	320	400	± 16	± 20	18	16	18
Rated Voltage (U_R) 6.3V										
1.5	A	8.0	0.5	4	5	± 10	± 12	8	6	8
2.2	A	8.0	0.5	4	5	± 10	± 12	8	6	8
3.3	B	7.0	0.5	4	5	± 10	± 12	8	6	8
3.3	A	8.0	0.5	4	5	± 10	± 12	8	6	8
4.7	B	5.5	0.5	4	5	± 10	± 12	8	6	8
4.7	A	6.0	0.5	4	5	± 10	± 12	8	6	8
6.8	B	4.5	0.5	4	5	± 10	± 12	8	6	8
6.8	A	6.0	0.5	4	5	± 10	± 12	8	6	8
10	C	3.0	0.6	5.0	6.3	± 10	± 12	8	6	8
10	B	3.5	0.6	5.0	6.3	± 10	± 12	8	6	8
10	A	4.0	0.6	5.0	6.3	± 10	± 12	8	6	8
15	C	3.0	0.9	7.5	9.4	± 10	± 12	8	6	8
15	B	3.3	0.9	7.5	9.4	± 10	± 12	8	6	8
15	A	3.5	0.9	7.5	9.4	± 10	± 12	8	6	8
22	D	2.0	1.3	11.0	13.8	± 10	± 12	8	6	8
22	C	2.2	1.3	11.0	13.8	± 10	± 12	8	6	8
22	B	3.5	1.3	11.0	13.8	± 10	± 12	8	6	8
22	A	4.0	1.3	11.0	13.8	± 10	± 12	8	6	8
33	D	1.6	2.0	16.6	20.7	± 10	± 12	8	6	8
33	C	1.8	2.0	16.6	20.7	± 10	± 12	8	6	8
33	B	3.0	2.0	16.6	20.7	± 10	± 12	8	6	8
47	D	1.1	2.9	23.6	29.6	± 10	± 12	8	6	8

Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μF)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μA)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 6.3V										
47	C	1.6	2.9	23.6	29.6	± 10	± 12	8	6	8
47	B	2.6	2.9	23.6	29.6	± 10	± 12	8	6	8
68	D	0.9	4.2	34.2	42.8	± 10	± 12	8	6	8
68	C	1.2	4.2	34.2	42.8	± 10	± 12	8	6	8
68	B	2.0	4.2	34.2	42.8	± 10	± 15	10	8	10
100	E	0.8	6.3	50.4	63	± 10	± 12	10	8	10
100	D	0.8	6.3	50.4	63	± 10	± 12	10	8	10
100	C	1.0	6.3	50.4	63	± 10	± 12	10	8	10
150	E	0.7	9.4	75.6	94.5	± 10	± 12	10	8	10
150	D	0.7	9.4	75.6	94.5	± 10	± 12	10	8	10
150	C	1.1	9.4	75.6	94.5	± 10	± 12	10	8	10
220	V	0.5	13.8	110.8	138.6	± 12	± 14	12	10	12
220	E	0.7	13.8	110.8	138.6	± 12	± 14	12	10	12
220	D	0.7	13.8	110.8	138.6	± 12	± 14	12	10	12
330	V	0.3	20.7	166.3	207.9	± 12	± 14	12	10	12
330	E	0.5	20.7	166.3	207.9	± 12	± 14	12	10	12
330	D	0.5	20.7	166.3	207.9	± 12	± 14	12	10	12
470	V	0.3	29.6	236.8	296.1	± 14	± 16	14	12	14
470	E	0.4	29.6	236.8	296.1	± 14	± 16	14	12	14
470	D	0.8	29.6	236.8	296.1	± 14	± 16	14	12	14
680	W	0.3	42.8	342.7	428.4	± 14	± 16	14	12	14
680	V	0.3	42.8	342.7	428.4	± 14	± 16	14	12	14
680	E	0.3	42.8	342.7	428.4	± 14	± 16	14	12	14
1000	W	0.4	63	504	630	± 16	± 20	18	16	18
Rated Voltage (U_R) 10V										
1.0	B	6.5	0.5	4	5	± 10	± 12	6	4	6
1.0	A	10	0.5	4	5	± 10	± 12	6	4	6
1.5	A	8.0	0.5	4	5	± 10	± 12	8	6	8
2.2	B	6.0	0.5	4	5	± 10	± 12	8	6	8
2.2	A	8.0	0.5	4	5	± 10	± 12	8	6	8
3.3	B	5.0	0.5	4	5	± 10	± 12	8	6	8
3.3	A	5.5	0.5	4	5	± 10	± 12	8	6	8
4.7	B	4.5	0.5	4	5	± 10	± 12	8	6	8
4.7	A	5.0	0.5	4	5	± 10	± 12	8	6	8
6.8	C	3.5	0.6	5.4	6.8	± 10	± 12	8	6	8

Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μF)	$\hat{O} \hat{a} \hat{A}$ $\hat{O} \hat{I} \hat{a} \hat{A}$	ESR max 100KHz +25°C (Ω)	Leakage Current max(μA)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 10V										
Â È	Ó	H È	È È	Í È	Î È	† F È	† FG	ì	î	ì
Â È	œ	H È	È È	Í È	Î È	† F È	† FG	ì	î	ì
F È	Ô	H È	F È	Ì È	F È	† F È	† FG	ì	î	ì
F È	Ó	H È	F È	Ì È	F È	† F È	† FG	ì	î	ì
F È	œ	Ì È	F È	Ì È	F È	† F È	† FG	ì	î	ì
F Í	Ô	œ È	F È	F œ È	F Í	† F È	† FG	ì	î	ì
F Í	Ó	H È	F È	F œ È	F Í	† F È	† FG	ì	î	ì
F Í	œ	Î È	F È	F œ È	F Í	† F È	† FG	ì	î	ì
GG	Ö	F È	œ È	F Í È	GG	† F È	† FG	ì	î	ì
GG	Ô	F È	œ È	F Í È	GG	† F È	† FG	ì	î	ì
GG	Ó	H È	œ È	F Í È	GG	† F È	† FG	ì	î	ì
GG	œ	Î È	œ È	F Í È	GG	† F È	† FG	ì	î	ì
HH	Ï	F È	H È	G È	HH	† F È	† FG	ì	î	ì
HH	Ô	F È	H È	G È	HH	† F È	† FG	ì	î	ì
HH	Ó	H È	H È	G È	HH	† F È	† FG	ì	î	ì
II	Ò	œ È	Ì È	H È	II	† F È	† FG	ì	î	ì
II	Ï	œ È	Ì È	H È	II	† F È	† FG	ì	î	ì
II	Ô	F œ È	Ì È	H È	II	† F È	† FG	ì	î	ì
II	Ó	œ È	Ì È	H È	II	† F È	† FG	ì	î	ì
î ì	Ò	È È	Î È	Í Ì È	î ì	† F È	† FG	ì	î	ì
î ì	Ï	È È	Î È	Í Ì È	î ì	† F È	† FG	ì	î	ì
î ì	Ô	F œ È	Î È	Í Ì È	î ì	† F È	† FG	ì	î	ì
Á È È	Ò	È È	F È	Ì È	F È È	† F È	† FG	F È	ì	F È
Á È È	Ï	È È	F È	Ì È	F È È	† F È	† FG	F È	ì	F È
Á È È	Ô	F œ È	F È	Ì È	F È È	† F È	† FG	F È	ì	F È
Á Í È	X	È È	F Í	F œ È	Á Í È	† F È	† FG	F È	ì	F È
Á Í È	Ò	È È	F Í	F œ È	Á Í È	† F È	† FG	F È	ì	F È
Á Í È	Ï	È È	F Í	F œ È	Á Í È	† F È	† FG	F È	ì	F È
Á œ È	X	È È	GG	F Í Í	Á œ È	† FG	† FI	FG	F È	FG
Á œ È	Ò	È È	GG	F Í Í	Á œ È	† FG	† FI	FG	F È	FG
Á œ È	Ï	È È	GG	F Í Í	Á œ È	† FG	† FI	FG	F È	FG
Á H È	X	È È	HH	G Í	H H È	† FG	† FI	FG	F È	FG
Á H È	Ò	È È	HH	G Í	H H È	† FG	† FI	FG	F È	FG
Á H È	Ï	È È	HH	G Í	H H È	† FG	† FI	FG	F È	FG

Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μ F)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μ A)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 10V										
470	V	0.5	47	376	470	± 14	± 16	14	12	14
470	E	0.5	47	376	470	± 14	± 16	14	12	14
680	W	0.5	68	544	680	± 14	± 16	14	12	14
Rated Voltage (U_R) 16V										
0.68	A	12	0.5	4	5	± 10	± 12	6	4	6
1.0	B	6.5	0.5	4	5	± 10	± 12	6	4	6
1.0	A	10.0	0.5	4	5	± 10	± 12	6	4	6
1.5	B	8.0	0.5	4	5	± 10	± 12	8	6	8
1.5	A	8.0	0.5	4	5	± 10	± 12	8	6	8
2.2	B	5.5	0.5	4	5	± 10	± 12	8	6	8
2.2	A	6.0	0.5	4	5	± 10	± 12	8	6	8
3.3	B	4.5	0.5	4.2	5.2	± 10	± 12	8	6	8
3.3	A	5.0	0.5	4.2	5.2	± 10	± 12	8	6	8
4.7	C	3.5	0.7	6.0	7.5	± 10	± 12	8	6	8
4.7	B	3.5	0.7	6.0	7.5	± 10	± 12	8	6	8
4.7	A	3.5	0.7	6.0	7.5	± 10	± 12	8	6	8
6.8	C	2.5	1.0	8.7	10.8	± 10	± 12	8	6	8
6.8	B	3.5	1.0	8.7	10.8	± 10	± 12	8	6	8
6.8	A	4.0	1.0	8.7	10.8	± 10	± 12	8	6	8
10	C	2.0	1.6	12.8	16	± 10	± 12	8	6	8
10	B	2.5	1.6	12.8	16	± 10	± 12	8	6	8
10	A	4.0	1.6	12.8	16	± 10	± 12	8	6	8
15	D	1.8	2.4	19.2	24	± 10	± 12	8	6	8
15	C	1.8	2.4	19.2	24	± 10	± 12	8	6	8
15	B	1.6	2.4	19.2	24	± 10	± 12	8	6	8
22	E	1.0	3.5	28.1	35.2	± 10	± 12	8	6	8
22	D	1.0	3.5	28.1	35.2	± 10	± 12	8	6	8
22	C	1.1	3.5	28.1	35.2	± 10	± 12	8	6	8
22	B	2.2	3.5	28.1	35.2	± 10	± 12	8	6	8
33	E	0.9	5.2	42.2	52.8	± 10	± 12	8	6	8
33	D	0.9	5.2	42.2	52.8	± 10	± 12	8	6	8
33	C	1.2	5.2	42.2	52.8	± 10	± 12	8	6	8
47	E	0.7	7.5	60.1	75.2	± 10	± 12	8	6	8
47	D	0.8	7.5	60.1	75.2	± 10	± 12	8	6	8

Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μ F)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μ A)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 16V										
47	C	1.2	7.5	60.1	75.2	± 10	± 12	8	6	8
68	E	0.7	10.8	87.0	108.8	± 10	± 12	8	6	8
68	D	0.7	10.8	87.0	108.8	± 10	± 12	8	6	8
68	C	1.3	10.8	87.0	108.8	± 10	± 12	10	8	10
100	E	0.6	16	128	160	± 10	± 12	10	8	10
100	D	0.7	16	128	160	± 10	± 12	10	8	10
100	C	1.5	16	128	160	± 10	± 12	14	12	14
150	V	0.5	24	192	240	± 10	± 12	10	8	10
150	E	0.5	24	192	240	± 10	± 12	10	8	10
150	D	0.7	24	192	240	± 10	± 12	10	8	10
220	V	0.5	35.2	281.6	352	± 12	± 14	12	10	12
220	E	0.6	35.2	281.6	352	± 12	± 14	12	10	12
330	W	0.5	52.8	422.4	528	± 12	± 14	12	10	12
330	V	0.5	52.8	422.4	528	± 12	± 14	12	10	12
330	E	0.5	52.8	422.4	528	± 12	± 14	12	10	12
Rated Voltage (U_R) 20V										
0.47	A	14	0.5	4	5	± 10	± 12	6	4	6
0.68	A	12	0.5	4	5	± 10	± 12	6	4	6
1.0	B	9.0	0.5	4	5	± 10	± 12	6	4	6
1.0	A	10.0	0.5	4	5	± 10	± 12	6	4	6
1.5	B	6.0	0.5	4	5	± 10	± 12	8	6	8
1.5	A	8.0	0.5	4	5	± 10	± 12	8	6	8
2.2	B	3.5	0.5	4	5	± 10	± 12	8	6	8
2.2	A	5.3	0.5	4	5	± 10	± 12	8	6	8
3.3	C	3.5	0.6	5.2	6.6	± 10	± 12	8	6	8
3.3	B	4.0	0.6	5.2	6.6	± 10	± 12	8	6	8
3.3	A	3.5	0.6	5.2	6.6	± 10	± 12	8	6	8
4.7	C	2.5	0.9	7.5	9.4	± 10	± 12	8	6	8
4.7	B	3.0	0.9	7.5	9.4	± 10	± 12	8	6	8
4.7	A	4.5	0.9	7.5	9.4	± 10	± 12	8	6	8
6.8	D	1.4	1.3	10.8	13.6	± 10	± 12	8	6	8
6.8	C	2.0	1.3	10.8	13.6	± 10	± 12	8	6	8
6.8	B	1.8	1.3	10.8	13.6	± 10	± 12	8	6	8

Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μF)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μA)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 20V										
10	D	1.2	2.0	16.0	20	± 10	± 12	8	6	8
10	C	1.8	2.0	16.0	20	± 10	± 12	8	6	8
10	B	2.0	2.0	16.0	20	± 10	± 12	8	6	8
15	D	1.0	3.0	24.0	30	± 10	± 12	8	6	8
15	C	1.2	3.0	24.0	30	± 10	± 12	8	6	8
22	E	0.9	4.4	35.2	44	± 10	± 12	8	6	8
22	D	0.9	4.4	35.2	44	± 10	± 12	8	6	8
22	C	1.2	4.4	35.2	44	± 10	± 12	8	6	8
33	E	0.7	6.6	52.8	66	± 10	± 12	8	6	8
33	D	0.8	6.6	52.8	66	± 10	± 12	8	6	8
33	C	1.2	6.6	52.8	66	± 10	± 12	8	6	8
47	E	0.7	9.4	75.2	94	± 10	± 12	8	6	8
47	D	0.7	9.4	75.2	94	± 10	± 12	8	6	8
47	C	1.4	9.4	75.2	94	± 10	± 12	8	6	8
68	V	0.6	13.6	108.8	136	± 10	± 12	8	6	8
68	E	0.6	13.6	108.8	136	± 10	± 12	8	6	8
68	D	0.7	13.6	108.8	136	± 10	± 12	8	6	8
100	V	0.3	20	160	200	± 10	± 12	10	8	10
100	E	0.5	20	160	200	± 10	± 12	10	8	10
100	D	0.9	20	160	200	± 10	± 12	10	8	10
150	V	0.8	30	240	300	± 10	± 12	10	8	10
150	E	0.8	30	240	300	± 10	± 12	10	8	10
220	W	0.5	44	352	440	± 12	± 14	12	10	12
220	V	0.5	44	352	440	± 12	± 14	12	10	12
220	E	0.6	44	352	440	± 12	± 14	12	10	12
330	W	0.6	66	528	660	± 12	± 14	12	10	12
Rated Voltage (U_R) 25V										
0.33	A	15	0.5	4	5	± 10	± 12	6	4	6
0.47	A	14	0.5	4	5	± 10	± 12	6	4	6
0.68	B	7.5	0.5	4	5	± 10	± 12	6	4	6
0.68	A	10.0	0.5	4	5	± 10	± 12	6	4	6
1.0	C	5.0	0.5	4	5	± 10	± 12	6	4	6
1.0	B	6.5	0.5	4	5	± 10	± 12	6	4	6



Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μF)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μA)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 25V										
1.0	A	8.0	0.5	4	5	±10	±12	6	4	6
1.5	B	5.0	0.5	4	5	±10	±12	8	6	8
1.5	A	7.0	0.5	4	5	±10	±12	8	6	8
2.2	D	2.5	0.5	4.4	5.5	±10	±12	8	6	8
2.2	C	3.5	0.5	4.4	5.5	±10	±12	8	6	8
2.2	B	4.5	0.5	4.4	5.5	±10	±12	8	6	8
2.2	A	7.0	0.5	4.4	5.5	±10	±12	8	6	8
3.3	C	3.0	0.8	6.6	8.2	±10	±12	8	6	8
3.3	B	3.5	0.8	6.6	8.2	±10	±12	8	6	8
4.7	E	1.2	1.1	9.4	11.7	±10	±12	8	6	8
4.7	D	2.4	1.1	9.4	11.7	±10	±12	8	6	8
4.7	C	2.5	1.1	9.4	11.7	±10	±12	8	6	8
4.7	B	2.8	1.1	9.4	11.7	±10	±12	8	6	8
6.8	D	1.4	1.7	13.6	17	±10	±12	8	6	8
6.8	C	1.8	1.7	13.6	17	±10	±12	8	6	8
6.8	B	2.8	1.7	13.6	17	±10	±12	8	6	8
10	E	0.9	2.5	20	25	±10	±12	8	6	8
10	D	1.2	2.5	20	25	±10	±12	8	6	8
10	C	1.5	2.5	20	25	±10	±12	8	6	8
10	B	2.8	2.5	20	25	±10	±12	8	6	8
15	D	0.9	3.7	30	37.5	±10	±12	8	6	8
15	C	1.2	3.7	30	37.5	±10	±12	8	6	8
22	E	0.7	5.5	44	55	±10	±12	8	6	8
22	D	0.8	5.5	44	55	±10	±12	8	6	8
22	C	0.8	5.5	44	55	±10	±12	8	6	8
33	E	0.7	8.2	66	82.5	±10	±12	8	6	8
33	D	0.7	8.2	66	82.5	±10	±12	8	6	8
47	V	0.4	11.7	94	117.5	±10	±12	8	6	8
47	E	0.6	11.7	94	117.5	±10	±12	8	6	8
47	D	0.7	11.7	94	117.5	±10	±12	8	6	8
68	V	0.7	17.0	136	170	±10	±12	8	6	8
68	E	0.7	17.0	136	170	±10	±12	8	6	8
100	V	0.4	25.0	200	250	±10	±12	10	8	10
100	E	0.4	25.0	200	250	±10	±12	10	8	10
150	W	0.4	37.5	300	375	±10	±12	10	8	10



Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μF)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μA)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 35V										
0.1	A	24	0.5	4	5	±10	±12	6	4	6
0.15	A	21	0.5	4	5	±10	±12	6	4	6
0.22	A	18	0.5	4	5	±10	±12	6	4	6
0.33	A	15	0.5	4	5	±10	±12	6	4	6
0.47	B	10	0.5	4	5	±10	±12	6	4	6
0.47	A	12	0.5	4	5	±10	±12	6	4	6
0.68	B	8.0	0.5	4	5	±10	±12	6	4	6
0.68	A	8.0	0.5	4	5	±10	±12	6	4	6
1.0	B	4.0	0.5	4	5	±10	±12	6	4	6
1.0	A	7.0	0.5	4	5	±10	±12	6	4	6
1.5	C	4.5	0.5	4.2	5.2	±10	±12	8	6	8
1.5	B	5.0	0.5	4.2	5.2	±10	±12	8	6	8
2.2	C	3.5	0.7	6.1	7.7	±10	±12	8	6	8
2.2	B	4.0	0.7	6.1	7.7	±10	±12	8	6	8
3.3	D	2.5	1.1	9.2	11.5	±10	±12	8	6	8
3.3	C	2.5	1.1	9.2	11.5	±10	±12	8	6	8
3.3	B	3.5	1.1	9.2	11.5	±10	±12	8	6	8
4.7	E	1.2	1.6	13.1	16.4	±10	±12	8	6	8
4.7	D	1.5	1.6	13.1	16.4	±10	±12	8	6	8
4.7	C	2.2	1.6	13.1	16.4	±10	±12	8	6	8
4.7	B	3.5	1.6	13.1	16.4	±10	±12	8	6	8
6.8	E	0.9	2.3	19.0	23.8	±10	±12	8	6	8
6.8	D	1.3	2.3	19.0	23.8	±10	±12	8	6	8
6.8	C	1.8	2.3	19.0	23.8	±10	±12	8	6	8
10	E	0.9	3.5	28.0	35.0	±10	±12	8	6	8
10	D	1.0	3.5	28.0	35.0	±10	±12	8	6	8
10	C	1.6	3.5	28.0	35.0	±10	±12	8	6	8
15	E	0.9	5.2	42.0	52.5	±10	±12	8	6	8
15	D	0.8	5.2	42.0	52.5	±10	±12	8	6	8
15	C	1.5	5.2	42.0	52.5	±10	±12	8	6	8
22	V	0.5	7.7	61.6	77.0	±10	±12	8	6	8
22	E	0.7	7.7	61.6	77.0	±10	±12	8	6	8
22	D	0.7	7.7	61.6	77.0	±10	±12	8	6	8
33	V	0.6	11.5	92.4	115.5	±10	±12	8	6	8



Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μF)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μA)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 35V										
33	E	0.6	11.5	92.4	115.5	± 10	± 12	8	6	8
33	D	0.9	11.5	92.4	115.5	± 10	± 12	8	6	8
47	W	0.6	16.4	131.6	164.5	± 10	± 12	8	6	8
47	V	0.6	16.4	131.6	164.5	± 10	± 12	8	6	8
47	E	0.5	16.4	131.6	164.5	± 10	± 12	8	6	8
47	D	0.8	16.4	131.6	164.5	± 10	± 12	8	6	8
68	W	0.6	23.8	190.4	238.0	± 10	± 12	8	6	8
Rated Voltage (U_R) 40V										
0.1	A	23	0.5	4	5	± 10	± 12	6	4	6
0.15	A	19	0.5	4	5	± 10	± 12	6	4	6
0.22	A	16	0.5	4	5	± 10	± 12	6	4	6
0.33	B	14	0.5	4	5	± 10	± 12	6	4	6
0.33	A	14	0.5	4	5	± 10	± 12	6	4	6
0.47	B	9.0	0.5	4	5	± 10	± 12	6	4	6
0.47	A	9.0	0.5	4	5	± 10	± 12	6	4	6
0.68	C	7.5	0.5	4	5	± 10	± 12	6	4	6
0.68	B	6.0	0.5	4	5	± 10	± 12	6	4	6
1.0	C	6.0	0.5	4	5	± 10	± 12	6	4	6
1.0	B	5.0	0.5	4	5	± 10	± 12	6	4	6
1.5	C	4.5	0.6	4.8	6.0	± 10	± 12	8	6	8
1.5	B	4.0	0.6	4.8	6.0	± 10	± 12	8	6	8
2.2	D	3.0	0.8	7.0	8.8	± 10	± 12	8	6	8
2.2	C	2.5	0.8	7.0	8.8	± 10	± 12	8	6	8
3.3	D	2.0	1.3	10.5	13.2	± 10	± 12	8	6	8
3.3	C	2.0	1.3	10.5	13.2	± 10	± 12	8	6	8
4.7	D	1.5	1.8	15.0	18.8	± 10	± 12	8	6	8
4.7	C	1.5	1.8	15.0	18.8	± 10	± 12	8	6	8
6.8	E	1.2	2.7	21.7	27.2	± 10	± 12	8	6	8
6.8	D	1.2	2.7	21.7	27.2	± 10	± 12	8	6	8
10	E	0.9	4.0	32.0	40.0	± 10	± 12	8	6	8
10	D	0.9	4.0	32.0	40.0	± 10	± 12	8	6	8
15	V	0.9	6.0	48.0	60.0	± 10	± 12	8	6	8
15	E	0.7	6.0	48.0	60.0	± 10	± 12	8	6	8

Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μ F)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μ A)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 40V										
22	W	0.6	8.8	70.4	88.0	± 10	± 12	8	6	8
22	V	0.6	8.8	70.4	88.0	± 10	± 12	8	6	8
22	E	0.6	8.8	70.4	88.0	± 10	± 12	8	6	8
33	W	0.6	13.2	105.6	132	± 10	± 12	8	6	8
Rated Voltage (U_R) 50V										
0.1	A	22	0.5	4	5	± 10	± 12	6	4	6
0.15	B	15	0.5	4	5	± 10	± 12	6	4	6
0.15	A	17	0.5	4	5	± 10	± 12	6	4	6
0.22	B	14	0.5	4	5	± 10	± 12	6	4	6
0.22	A	16	0.5	4	5	± 10	± 12	6	4	6
0.33	B	12	0.5	4	5	± 10	± 12	6	4	6
0.33	A	12	0.5	4	5	± 10	± 12	6	4	6
0.47	C	8.0	0.5	4	5	± 10	± 12	6	4	6
0.47	B	7.0	0.5	4	5	± 10	± 12	6	4	6
0.68	C	7.0	0.5	4	5	± 10	± 12	6	4	6
0.68	B	5.0	0.5	4	5	± 10	± 12	6	4	6
1.0	E	2.2	0.5	4	5	± 10	± 12	6	4	6
1.0	D	2.2	0.5	4	5	± 10	± 12	6	4	6
1.0	C	5.5	0.5	4	5	± 10	± 12	6	4	6
1.0	B	4.0	0.5	4	5	± 10	± 12	6	4	6
1.5	D	4.0	0.7	6.0	7.5	± 10	± 12	8	6	8
1.5	C	4.5	0.7	6.0	7.5	± 10	± 12	8	6	8
2.2	E	2.0	1.1	8.8	11	± 10	± 12	8	6	8
2.2	D	2.5	1.1	8.8	11	± 10	± 12	8	6	8
2.2	C	3.0	1.1	8.8	11	± 10	± 12	8	6	8
3.3	E	1.8	1.6	13.2	16.5	± 10	± 12	8	6	8
3.3	D	2.0	1.6	13.2	16.5	± 10	± 12	8	6	8
3.3	C	2.5	1.6	13.2	16.5	± 10	± 12	8	6	8
4.7	E	1.4	2.3	18.8	23.5	± 10	± 12	8	6	8
4.7	D	1.5	2.3	18.8	23.5	± 10	± 12	8	6	8
4.7	C	2.2	2.3	18.8	23.5	± 10	± 12	8	6	8
6.8	E	0.9	3.4	27.2	34	± 10	± 12	8	6	8
6.8	D	0.9	3.4	27.2	34	± 10	± 12	8	6	8
10	V	0.9	5.0	40	50	± 10	± 12	8	6	8
10	E	0.7	5.0	40	50	± 10	± 12	8	6	8

Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μ F)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μ A)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 50V										
10	D	0.7	5.0	40	50	± 10	± 12	8	6	8
15	V	0.7	7.5	60	75	± 10	± 12	8	6	8
15	E	0.7	7.5	60	75	± 10	± 12	8	6	8
22	W	0.6	11	88	110	± 10	± 12	8	6	8
22	V	0.7	11	88	110	± 10	± 12	8	6	8
22	E	0.6	11	88	110	± 10	± 12	8	6	8
Rated Voltage (U_R) 63V										
0.33	C	9.0	0.5	4	5	± 10	± 12	6	4	6
0.47	C	7.0	0.5	4	5	± 10	± 12	6	4	6
0.68	C	6.0	0.5	4	5	± 10	± 12	6	4	6
1.0	C	5.0	0.6	5.0	6.3	± 10	± 12	6	4	6
1.5	D	3.5	0.9	7.5	9.4	± 10	± 12	8	6	8
2.2	D	2.0	1.3	11.0	13.8	± 10	± 12	8	6	8
3.3	D	1.5	2.0	16.6	20.7	± 10	± 12	8	6	8
4.7	E	1.0	2.9	23.6	29.6	± 10	± 12	8	6	8
6.8	E	0.9	4.2	34.2	42.8	± 10	± 12	8	6	8
10	E	0.9	6.3	50.4	63	± 10	± 12	8	6	8
15	V	0.9	9.4	75.6	94.5	± 10	± 12	8	6	8
15	E	0.9	9.4	75.6	94.5	± 10	± 12	8	6	8
22	W	0.9	13.8	110.8	138.6	± 10	± 12	8	6	8
Rated Voltage (U_R) 75V										
0.22	C	11	0.5	4	5	± 10	± 12	6	4	6
0.33	C	9.0	0.5	4	5	± 10	± 12	6	4	6
0.47	C	7.0	0.5	4	5	± 10	± 12	6	4	6
0.68	C	6.0	0.5	4.0	5.1	± 10	± 12	6	4	6
1.0	D	4.5	0.7	6.0	7.5	± 10	± 12	6	4	6
1.5	D	3.5	1.1	9.0	11.2	± 10	± 12	8	6	8
2.2	E	1.8	1.6	13.2	16.5	± 10	± 12	8	6	8
3.3	E	1.3	2.4	19.8	24.7	± 10	± 12	8	6	8
4.7	V	0.9	3.5	28.2	35.2	± 10	± 12	8	6	8
4.7	E	0.9	3.5	28.2	35.2	± 10	± 12	8	6	8
Rated Voltage (U_R) 100V										
0.22	C	10.0	0.5	4	5	± 10	± 12	6	4	6
0.33	C	8.0	0.5	4	5	± 10	± 12	6	4	6



Table 2: Rated Voltage, Ripple Current, Nominal Capacitance, ESR, Case Codes, and Temperature Characteristics. Notice: Rated Voltage VDC at 85°C

Nominal Capacitance C_R (μF)	Case Code	ESR max 100KHz +25°C (Ω)	Leakage Current max(μA)			Capacitance Variation Range (%)		Dissipation Factor max(%)		
			+25°C	+85°C	+125°C	-55°C	+125°C	-55°C	+25°C	+85°C
						+85°C				+125°C
Rated Voltage (U_R) 100V										
0.47	C	6.5	0.5	4	5	± 10	± 12	6	4	6
0.68	D	5.0	0.6	5.4	6.8	± 10	± 12	6	4	6
1.0	D	4.5	1.0	8.0	10	± 10	± 12	6	4	6
1.5	E	3.0	1.5	12.0	15	± 10	± 12	8	6	8
2.2	V	1.5	2.2	17.6	22	± 10	± 12	8	6	8
2.2	E	1.5	2.2	17.6	22	± 10	± 12	8	6	8

1. The measurement frequency of capacitance and loss tangent is 100Hz, and the measurement method is equivalent series circuit, $U_{-} = 2.2^{\circ -1.0} V$, $U_{-} = 1.0^{\circ -0.5} V$ (effective value);
2. When measuring 125°C leakage current, apply category voltage measurement;
3. It is prohibited to use a multimeter to measure giant capacitors regardless of polarity.
4. Special capacity or special size products exceeding this standard can be produced through consultation with our company.



◆ Derated Design guide line:

3.1. Derating Recommendations

3.1.1:

The failure rate of tantalum capacitors is for the DC rating (85°C, rated voltage), and varies with usage conditions (ambient temperature, applied voltage, circuit resistance, etc.). In actual circuits, there are often voltage or current peak impulses and ripple currents, or other unexpected electrical impulses, so derating design is necessary in actual use. Only in this way can the safety and reliability of the circuit be

3.1.2: Rated voltage and derated voltage

The rated voltage (U_R) of tantalum capacitors refers to the maximum DC voltage allowed to be applied to the capacitor at a rated temperature of 85°C. If it is used beyond the rated voltage, the dielectric strength of the dielectric oxide film Ta₂O₅ will be exceeded, which will lead to deterioration of the capacitor performance, and even dielectric breakdown and failure in severe cases.

The environment in which the actual circuit is used is very complex, so in the circuit design, derating design is generally adopted. According to the GJB/Z35 "Component Derating standard", the derating levels of tantalum capacitors are divided into I, II, and III., Class I derating is derated by 50% of the benchmark DC working voltage, class II derating is derated by 60% of the benchmark DC working voltage, and class III derating is derated by 70% of the benchmark DC working voltage.

When the ambient temperature is not more than 85°C, the derated reference DC working voltage is the rated voltage (U_R); when the ambient temperature is more than 85°C, the derated reference DC working voltage is the derated voltage specified in this manual for each model (U_R , U_C). In the derating design, non-solid electrolyte tantalum capacitors and conductive polymer electrolyte tantalum capacitors should be derated at least according to level III. When these two types of tantalum capacitors are used in circuits or filter circuits with high reliability requirements, it is recommended that they should be at least level II Derating; solid electrolyte (manganese dioxide) tantalum capacitors are derated at a minimum of 65% of the reference DC working voltage. When this type of tantalum capacitors are used in circuits or filter circuits with high reliability requirements, it is recommended to derate at least according to class I.

Under the conditions allowed by the design, the derating range should be increased as much as possible. For tantalum capacitors, the larger the derating range, the higher the reliability.

3.2. Reverse voltage

3.2.1:

The dielectric oxide film of tantalum capacitors has unidirectional conductivity and rectifying characteristics. When a reverse voltage is applied, a relatively large current will flow through, which tends to cause potential quality hazards, and in severe cases, may even lead to reverse breakdown and failure of the capacitor. Therefore, the reverse voltage must be strictly controlled during use. The reverse voltage resistance of various types of capacitors is shown in Table 2 below:

3.2.2:

In principle, it's forbidden to use the resistance range of multimeter to perform non-polarity testing on circuits containing tantalum capacitors or the capacitors themselves (reverse voltage can be easily applied). It should be able to withstand reverse testing of the 1.5V power supply of the multimeter if the circuit uses tantalum capacitors with voltage of 35V or above (including 35V), but 9V power supply should be absolutely not allowed.

3.2.3:

In the process of measurement and use, if the tantalum capacitor is accidentally applied to the reverse voltage exceeding the specified value. Even if its electrical parameters are still qualified, the capacitor should be scrapped.

Because the quality hidden danger caused by the reverse voltage of the capacitor has a certain latency period, it may not be manifested at that time.

Table 1 Recommended voltage for various types of products

Executive Standard	Product Type	Series	Recommended voltage	
			-55°C~85°C	85°C~125°C
GJB733	Non-Solid Electrolyte Tantalum Capacitors (Tantalum Case)	HCAK38,HCAK39, HCAK39H,HTHC1 etc.	65%U _R	42%U _R
	Non-solid Electrolyte Tantalum Capacitors (Silver Case)	HCAK35,HCAK86 etc.	65%U _R	42%U _R
GJB63	MnO. Solid Electrolyte Tantalum Capacitors (Metal Case)	HCAK,HCAK- 1 etc.	(50%-60%)U _R	40% U _R
	Polymer Solid Electrolyte Tantalum Capacitors (Metal Case)	HCAK66 etc.	(50%-60%)U _R	40% U _R
GJB2283	MnO. Chip Type Solid Electrolytic Tantalum Capacitor (Molded Plastic Package)	HCAK45,HCAK45L, HCAK45U,HCAK45M etc.	50%U _R	33%U _R
	Chip Polymer Solid Electrolyte Tantalum Capacitor (Molded Plastic Package)	HCAK55,HCAK55H etc.	50%U _R	33% U _R
GJB5437	MnO. Solid Electrolyte Tantalum Capacitors (Molded Plastic)	HCAK44,HCAK41 etc.	50%U _R	33% U _R

3.3. Influence factors of failure rate

3.3.1:

The lower the voltage across the actually added tantalum capacitor is lower than the rated voltage, the lower the failure rate of the tantalum capacitor. The failure rate of tantalum capacitors is evaluated under the maximum allowable load conditions at the rated voltage of 85°C.

3.3.2:

Another factor that affects the failure is the series resistance connected to the outer circuit of the capacitor. The greater the resistance in series with the capacitor in the outer circuit circuit, the lower the failure rate.

Failure rate grade: 2.0%/1000h is expressed as L; 1.0%/1000h is expressed as M; 0.1%/1000h is expressed as P; 0.01%/1000h is expressed as R, 0.001%/1000h is expressed as S.

Table 2 Reverse voltage resistance of various types of products

Executive Standard	Product Type		Series	Withstand reverse voltage
GJB733	Non-Solid Electrolyte Tantalum Capacitors	All tantalum capacitors with tantalum case	HCAK38, HCAK39, HCAK38T etc.	Resistant to 3V reverse voltage
		Hybrid Tantalum Capacitors	HTHC1, HTHC2, HTHC1W, HCAK36S1, HCAK36S1W etc.	Not resistant to reverse voltage
		Silver case	HCAK35, HCAK35X, HCAK86, HCAK81 etc.	Not resistant to reverse voltage
GJB63	Solid Electrolyte Tantalum Capacitors		HCAK, HCAK-1, HCAK-8, HGCA, HGCA411C etc.	Generally, reverse voltage is not allowed, let alone used in pure AC circuits. If it is unavoidable, it is allowed to apply a reverse voltage not greater than the following in a short period of time, and its value is: below 25°C: $\leq 10\%U_R$ or 1V (whichever is smaller); below 85°C: $\leq 5\%U_R$ or 0.5V (whichever is smaller); below 125°C: $\leq 1\%U_R$ or 0.1V (whichever is smaller). Note: If the capacitor needs to work in a circuit with reverse voltage for a long time, please use a bipolar tantalum capacitor, but it can only be used in a DC or pulsating circuit with a low frequency of polarity change.
	Polymer Solid Electrolyte Tantalum Capacitors		HCAK66 etc.	Not resistant to reverse voltage
GJB5437	Solid Electrolyte Tantalum Capacitors		HCAK44, HCAK41 etc.	Not resistant to reverse voltage
GJB2283	Chip Tantalum Solid Electrolyte Tantalum Capacitors		HCAK45, HCAK45L, HCAK45U, HCAK45M etc.	Not resistant to reverse voltage
	Chip Polymer Solid Electrolyte Tantalum Capacitors		HCAK55, HCAK55H etc.	Not resistant to reverse voltage

3.4 Ripple Current

3.4.1 The sum of the DC bias and the peak value of the AC partial voltage must not exceed the rated voltage of the capacitor.

3.4.2 The sum of the AC negative peak value and the DC bias must not exceed the allowable reverse voltage of the capacitor.

3.4.3 When ripple current passes through the tantalum capacitor, it produces active power loss, which in turn increases the probability of thermal breakdown failure caused by the capacitor's own temperature rise. Therefore, it is necessary to limit the ripple current through the capacitor or the allowable power loss of the capacitor. The relationship between the power loss (P_{st}) and the ripple current (I_{rms}) is expressed by the following formula: $P_{st} = V_- \times I_{st} + I_{rms}^2 \times R = I_{rms}^2 \times R_s$

Where: V_- : DC bias (V); I_{st} : Leakage current (uA); R_s : Equivalent series resistance (Ω); I_{rms} : Ripple current (mA).

It can be seen from the above formula that the power loss increases when R_s or I_{rms} increases. Therefore, it is necessary to control the power loss of tantalum capacitors in high-frequency circuits.

3.4.3.1 The allowable power loss of various solid electrolyte tantalum capacitors according to the heat dissipation efficiency of the case size is shown in Table 3.

Table 3 Allowable Power Loss and Temperature Class Coefficient of Solid Electrolyte Tantalum Capacitors

Allowable Power Loss		Temperature Class Coefficient			Allowable Power Loss		Temperature Class Coefficient					
Product Structure	Case	Power loss (W)	Temperature (°C)	Class Coefficient	Product Structure	Case	Power loss (W)	Temperature (°C)	Class Coefficient			
Hermetically Sealed Solid Tantalum Capacitors	A	0.09	25	1.0	Molded Chip Solid Tantalum Capacitors	A	0.080	25	1.0			
	B	0.10				B	0.098					
	C	0.125				C	0.114					
	D	0.18				L	0.118					
	0	0	0.09	85		0.9	D			0.157	85	0.6
		1	0.09	125		0.4	E			0.172	125	0.4
		2	0.10				F			0.147		
		3	0.115				V			0.212		
		4	0.12				W			0.215		
		5	0.17				X			0.314		
		6	0.20				G			0.321		
							Z			0.355		
						S	0.383					
				T	0.429							
				Y	0.433							

Note:

- The allowable power loss of the capacitor is specified under the condition that the whole machine can normally dissipate heat naturally. When the whole machine is sealed with components, appropriate adjustments should be made due to the reduced heat dissipation conditions.
- The allowable power loss of similar capacitors can be taken with reference to the case size corresponding to the same surface area.

3.4.3.2 The maximum effective value of ripple current allowed for various non-solid capacitors according to the case size (85°C, 40kHz, 0.66U_R) is shown in Tables 4 and 5. The ripple current coefficient values under different operating voltages, frequencies and temperature conditions are shown in Table 4.

Table 4 Maximum Ripple Current (Effective Value) of HCAK31, HCAK81, HCAK38, HCAK39, HCAK39 Capacitors

Series	HCAK31, HCAK81	HCAK38	HCAK39	HCAK39
Case	I _{rms} (mA)			
T1	50	415	700	1400
T2	200	755	1200	2200
T3	500	1130	1500	2700
T4	600	1800	1900	3400

Table 5 Maximum ripple current (Effective Value) of non-solid electrolytic capacitors

Case	0	1	2	3	4	5	6	7	8
I _{rms} (mA)	40	50	105	280	380	500	600	750	850

Note: Specification is subject to change without further notice. For more details and updates, please visit our website.

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