Hongda Capacitors®
Email: sales@hongdacap.com.hk
Skype: Hongdacapacitors
Web: www.hongdacap.com.hk
Tel: +86 (0)769 82207248

CAK45 type

Chip Solid Electrolyte Tantalum Capacitors with Failure Rate Ratings

Features and Applications

- Resin molded package, good sealing, chip type, polarized;
- Small volume, light weight, excellent and stable electrical performance, long life, high reliability, good storage stability:
- Has passed the national military standard certification, through the use of aviation, security: missiles, radar, communications and other high reliability requirements of the military electronics equipment surface mounted circuit.
- Executive standard: GJB2283-95
  Replace ZZR-Q/PWV20003-20O6
- Order Form: CAK450G36M016R

Main technical performance

- Operating temperature range: -55°C~+125°C, see applicati on guide 4.1 for derating design;
- Allowable deviation of electric capacity: Class K: ±10%; Class M: ±20%;
- External dimensions: see Fig. 1 and Table 1;
- Room temperature leakage current: not exceeding the provisions of Table 2;
- Equivalent series resistance: not exceeding the provisions of Table 2;
- Loss angle tangent (tg6), high and low temperature characteristics: see table 2;
- Rated voltage, category voltage, nominal capacitance:
- see table 2.

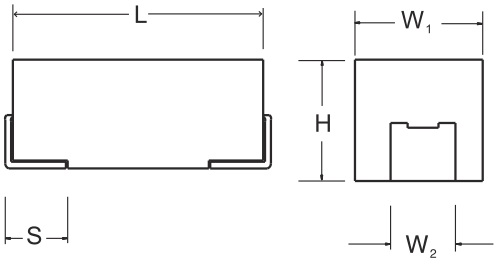

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Table 1 External dimensions of capacitors (mm)

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, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	-55℃ / +85℃	+125℃	-55℃	+25℃	+85℃ / +125℃
Rated voltage (U_R) 4V (Category Voltage 2.7V, 125℃)										
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
330	D	0.7	13.2	105.6	132	± 12	± 14	12	10	12

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	−55℃ +85℃	+125℃	−55℃	+25℃	+85℃ +125℃
Rated voltage (U_R) 4V (Category Voltage 2.7V, 125℃)										
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 (Category Voltage 4V, 125℃)										
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
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

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	-55℃ / +85℃	+125℃	-55℃	+25℃	+85℃ / +125℃
Rated voltage (U_R) 6.3V (Category Voltage 4V, 125℃)										
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*	*0.3/0.2*	*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*	*0.4/0.2*	*63*	*504*	*630*	*± 16*	*± 20*	*18*	*16*	*18*
Rated voltage (U_R) 10V (Category Voltage 7V, 125℃)										
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
6.8	B	3.5	0.6	5.4	6.8	± 10	± 12	8	6	8
6.8	A	3.5	0.6	5.4	6.8	± 10	± 12	8	6	8

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	-55℃ +85℃	+125℃	-55℃	+25℃	+85℃ +125℃
Rated voltage (U_R) 10V Category Voltage 7V, 125℃)										
10	C	3.0	1.0	8.0	10	±10	±12	8	6	8
10	B	3.5	1.0	8.0	10	±10	±12	8	6	8
10	A	4.0	1.0	8.0	10	±10	±12	8	6	8
15	C	2.5	1.5	12.0	15	±10	±12	8	6	8
15	B	3.0	1.5	12.0	15	±10	±12	8	6	8
15	*A*	*6.0*	*1.5*	*12.0*	*15*	*±10*	*±12*	*8*	*6*	*8*
22	D	1.6	2.2	17.6	22	±10	±12	8	6	8
22	C	1.8	2.2	17.6	22	±10	±12	8	6	8
22	B	3.0	2.2	17.6	22	±10	±12	8	6	8
22	*A*	*6.0*	*2.2*	*17.6*	*22*	*±10*	*±12*	*8*	*6*	*8*
33	D	1.1	3.3	26.4	33	±10	±12	8	6	8
33	C	1.5	3.3	26.4	33	±10	±12	8	6	8
33	B	3.5	3.3	26.4	33	±10	±12	8	6	8
47	E	0.9	4.7	37.6	47	±10	±12	8	6	8
47	D	0.9	4.7	37.6	47	±10	±12	8	6	8
47	C	1.2	4.7	37.6	47	±10	±12	8	6	8
47	*B*	*2.0*	*4.7*	*37.6*	*47*	*±10*	*±12*	*8*	*6*	*8*
68	E	0.5	6.8	54.4	68	±10	±12	8	6	8
68	D	0.7	6.8	54.4	68	±10	±12	8	6	8
68	C	1.2	6.8	54.4	68	±10	±12	8	6	8
100	E	0.8	10	80	100	±10	±12	10	8	10
100	D	0.7	10	80	100	±10	±12	10	8	10
100	C	1.2	10	80	100	±10	±12	10	8	10
150	V	0.5	15	120	150	±10	±12	10	8	10
150	E	0.7	15	120	150	±10	±12	10	8	10
150	D	0.7	15	120	150	±10	±12	10	8	10
220	V	0.3	22	176	220	±12	±14	12	10	12
220	E	0.5	22	176	220	±12	±14	12	10	12
220	D	0.5	22	176	220	±12	±14	12	10	12
330	V	0.3	33	264	330	±12	±14	12	10	12
330	E	0.5	33	264	330	±12	±14	12	10	12
330	*D*	*0.6*	*33*	*264*	*330*	*±12*	*±14*	*12*	*10*	*12*
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*	*0.5/0.2*	*68*	*544*	*680*	*±14*	*±16*	*14*	*12*	*14*

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	-55℃ +85℃	+125℃	-55℃	+25℃	+85℃ +125℃
Rated voltage(U_R) 16V (Category Voltage 10V，125℃)										
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
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*

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	−55℃ / +85℃	+125℃	−55℃	+25℃	+85℃ / +125℃
Rated voltage (U_R) 16V (Category Voltage 10V, 125℃)										
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*	*0.5/0.3*	*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 (Category Voltage 13V, 125℃)										
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
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

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	-55℃ +85℃	+125℃	-55℃	+25℃	+85℃ +125℃
Rated voltage (U_R) 20V (Category Voltage 13V, 125℃)										
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*	*0.6/0.15*	*66*	*528*	*660*	*±12*	*±14*	*12*	*10*	*12*
Rated voltage (U_R) 25V (Category Voltage 17V, 125℃)										
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
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

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	−55℃ / +85℃	+125℃	−55℃	+25℃	+85℃ / +125℃
Rated voltage (U_R) 25V (Category Voltage 17V, 125℃)										
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*	0.4/0.3	*37.5*	*300*	*375*	*±10*	*±12*	*10*	*8*	*10*
Rated voltage (U_R) 35V (Category Voltage 23V, 125℃)										
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

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	-55℃ +85℃	+125℃	-55℃	+25℃	+85℃ +125℃
Rated voltage (U_R) 35V (Category Voltage 23V, 125℃)										
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
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*

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	-55℃ +85℃	+125℃	-55℃	+25℃	+85℃ +125℃
Rated voltage (U_R) 35V (Category Voltage 23V, 125℃)										
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 (Category Voltage 25V, 125℃)										
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
22	*W*	*0.6/0.4*	*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*	*0.6/0.3*	*13.2*	*105.6*	*132*	*± 10*	*± 12*	*8*	*6*	*8*

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	-55℃ / +85℃	+125℃	-55℃	+25℃	+85℃ / +125℃
Rated voltage (U_R) 50V (Category Voltage 33V, 125℃)										
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
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*

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	−55℃ +85℃	+125℃	−55℃	+25℃	+85℃ +125℃
Rated voltage (U_R) 50V (Category Voltage 33V, 125℃)										
15	E	0.7	7.5	60	75	± 10	± 12	8	6	8
22	W	0.6/0.3	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 (Category Voltage 40V, 125℃)										
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	0.9/0.5	13.8	110.8	138.6	± 10	± 12	8	6	8
Rated voltage (U_R) 75V (Category Voltage 50V, 125℃)										
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 (Category Voltage 63V, 125℃)										
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
0.47	C	6.5	0.5	4	5	± 10	± 12	6	4	6

Table 2 Rated voltage, category voltage, nominal capacitance, equivalent series resistance (ESR), shell code and high and low temperature characteristics of capacitors

Nominal capacitance (C_R) μF	Case code	ESR max 100KHz +25℃ Ω	Leakage current max μA			Capacitance variation range		Loss tangent max %		
			+25℃	+85℃	+125℃	−55℃ / +85℃	+125℃	−55℃	+25℃	+85℃ / +125℃
Rated voltage (U_R) 100V (Category Voltage 63V, 125℃)										
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*

Note:
1, prohibit the use of multimeter without polarity measurement of tantalum capacitors;
2, Capacitance, loss angle tangent of the measurement frequency of 100Hz, U _= 2.2°_oV, U _= 1.0°_05V (RMS);
3, When measuring the leakage current at 125℃, please apply the category voltage;
4, Special size requirements or large-capacity products can be negotiated with our company for production;
5, There are two standards for ESR. The standard behind the slash is the new standard that is stricter than the detailed specification of CAK45. If there is any need, please indicate it when ordering;
6, The product specifications in italics in the table are extended specifications.