



CAPACITOR MANUFACTURER

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Specifications for approval

NO.Q/TANCAP.CA45.17-05-09

Product Name: CA45L Low ESR Chip Tantalum Capacitors

Customer: _____

Type and Specification: Full-Range

Material Code of Customer: _____

WRITTEN	CHECKED	APPROVED
Zhang Wei	Xu Xinhuai	XuSuling

Signature of Approval: _____

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Product Name	CA45L Low ESR Chip Tantalum Capacitors	
1. Scope: This specification applies to CA45L Low ESR Chip Tantalum Capacitors produced by our factory for use in electronic equipment. 2. Performing Standard: 《electronic component detailed standard CA45 Low ESR Surface Mounted Solid Capacitor Evaluation Standard E》 Q/TANCAP. 45L-03 3.Testing Condition: Room Temperature 25℃, relative Humidity 60 to 70%, Air Pressure 800 to 1060mbar. 4.Handling: It is mandatory to fully discharge capacitor to avoid failure test results. Product is polarity component. It is prohibited to connect positive poles and negative poles reversely to avoid product performance failure. 5.Checking List:		
Item	Characteristics	Testing Method
Drawing and dimension	See table (4).	Measured with Gauge
Appearance	Complete Marking 、Clear、centered.	visual
Leakage current	Less than 0.01CV or 0.5μA (whichever is greater)	Pressurize related voltage between two poles(Series connecting 1K current-limiting resistor) Read
Capacitance tolerance	±10% (K); ±20% (M)	The measurement frequency: 100 (120) HZ Voltage: 0.3±0.02V
Dissipation factor (tgδ)	See table (6).	The measurement frequency: 100 (120) HZ
ESR	See table (6).	The measurement frequency: 100(120)KHZ

Product Name		CA45L Low ESR Chip Tantalum Capacitors	
Item	Characteristics	Testing Method	
Solderability	Soldering coverage rate $\geq 95\%$	Dip capacitor into flux for two seconds, then remove excessive amount of lux, dip capacitor into $245\pm 3^{\circ}\text{C}$ welding slot with 10mm depth for three seconds, withdraw capacitor, clean capacitor with proper amount of solution, use ten times the microscope to observe.	

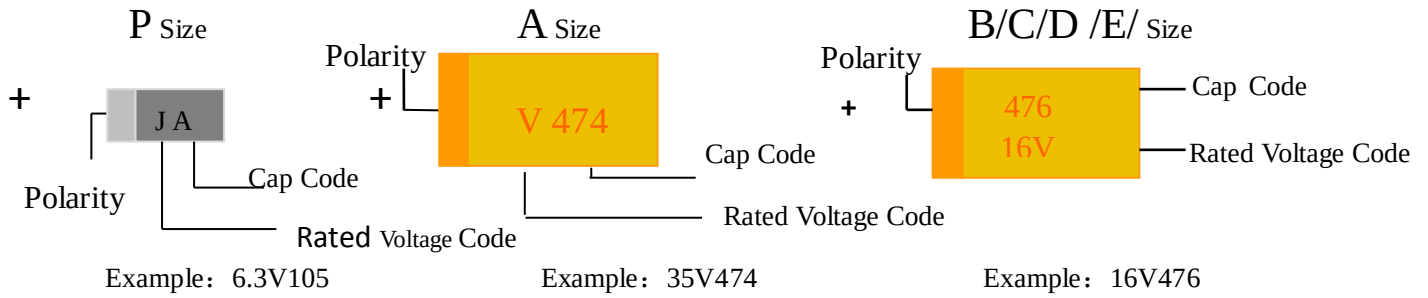
Temperature Performance Table(1)	Capacitance (μF)	Change of capacitance (%)			Max D.F (%)				Max DCL (μA)	
		-55 $^{\circ}\text{C}$	+85 $^{\circ}\text{C}$	+125 $^{\circ}\text{C}$	-55 $^{\circ}\text{C}$	+25 $^{\circ}\text{C}$	+85 $^{\circ}\text{C}$	+125 $^{\circ}\text{C}$	+85 $^{\circ}\text{C}$	+125 $^{\circ}\text{C}$
	≤ 1.0	-10	+10	+12	Below 1.5*(+25 $^{\circ}\text{C}$ value)	See table 6.	below 1.5*(+25 $^{\circ}\text{C}$ value)		$10 \cdot I_0$	$12.5 \cdot I_0$
	1.5-68									
	100-220									
	330-470									
	>470									

6. How To Order

1) Product description:

CA45L	106	M	035	D	T
Type	Capacitance(PF)	Tolerance	Rated Voltage	Case	Packaging
CA45L Low ESR Chip Tantalum Capacitors	105 10×10^5 This is expressed in Pico farads. The first two digits are the significant figures. The third is the number of zeros to follow.	$\pm 10\%$(K); $\pm 20\%$(M)	2.5V=002 4V=004 6.3V=006 10V=010 16V=016 20V=020 25V=025 35V=035 50V=050	P:2.0*1.2 A:3.2*1.6 B:3.5*2.8 C:6.0*3.2 D:7.3*4.3 E:7.3*4.3	T=Tape and reel

2)Product mark and code:



Rated Voltage Code: Table(2)

Code	e	G	J	A	C	D	E	V	T
Rated Voltage	2.5V	4V	6.3V	10V	16V	20V	25V	35V	50V

(P Size)Capacitance code: Table(3)

Cap C _R (uF)	Cap code	Cap C _R (uF)	Cap code	Cap C _R (uF)	Cap code	Cap C _R (uF)	Cap code
0.1	<u>A</u>	0.47	<u>S</u>	2.2	J	10	<u>A</u>
0.15	<u>E</u>	0.68	<u>W</u>	3.3	N	15	<u>E</u>
0.22	<u>J</u>	1	A	4.7	S	22	<u>J</u>
0.33	<u>N</u>	1.5	E	6.8	W	33	<u>N</u>

3) Drawing And Dimension:

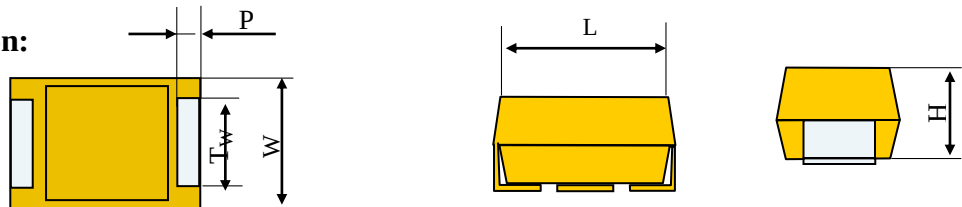


Table (4)

CASE CODE	EIA/IECQ	L	W	H	P	T _w
P	2012	2.0±0.2	1.2±0.2	1.2±0.2	0.5±0.3	1.2±0.1
A	3216	3.2±0.2	1.6±0.2	1.6±0.2	0.8±0.3	1.2±0.1
B	3528	3.5±0.2	2.8±0.2	1.9±0.2	0.8±0.3	2.2±0.1
C	6032	6.0±0.3	3.2±0.3	2.5±0.3	1.3±0.3	2.2±0.1
D	7343	7.3±0.3	4.3±0.3	2.8±0.3	1.3±0.3	2.4±0.1
E	7343	7.3±0.3	4.3±0.3	4.0±0.3	1.3±0.3	2.4±0.1

Product Name	CA45L Low ESR Chip Tantalum Capacitors
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7. Product electrical performance Parameters corresponding table

1) Capacitor case sizes of rated voltage Table(5)

VR ≤+85℃	2.5(e)	4(G)	6.3(J)	10(A)	16(C)	20(D)	25(E)	35(V)	50(T)
VC ≤+125℃	1.7	2.5	4	6.3	10	13	16	23	33
VS ≤+85℃	3.2	5	8	13	20	26	32	46	60
VR ≤+125℃	2.2	3.4	5	8	12	16	20	26	38

Temperature range: -55℃~+125℃

Cap (uF)	C _R	Cap code	Case size							
0.1	104						P		A	A
0.15	154						P		A	A/B
0.22	224						P		A	A/B
0.33	334						P	A	A	B
0.47	474					P	P	A	A/B	B/C
0.68	684					P	P/A	A	A/B	B/C
1.0	105				P	P/A	P/A	A/B	A/B	B/C
1.5	155				P/A	P/A	P/A/B	A/B	A/B/C	C/D
2.2	225		P	P/A	P/A/B	P/A/B	A/B	A/B/C	B/C	C/D
3.3	335		P/A	P/A	P/A/B	A/B	A/B/C	A/B/C	B/C	D
4.7	475		P/A	P/A	P/A/B	A/B	A/B/C	B/C	B/C/D	D/E
6.8	685		P/A	P/A/B	P/A/B	A/B/C	B/C	B/C/D	C/D	D/E
10	106		P/A/B	P/A/B	P/A/B/C	A/B/C	B/C/D	C/D	C/D/E	D/E
15	156		A/B	A/B/C	A/B/C	B/C	B/C/D	C/D	D/E	
22	226		A/B/C	A/B/C	A/B/C	B/C/D	B/C/D	C/D	D/E	
33	336	A	A/B/C	A/B/C	A/B/C/D	B/C/D	C/D	D/E	E	
47	476	A	A/B/C	A/B/C/D	B/C/D	C/D	D/E	D/E	E	
68	686	A	B/C/D	B/C/D	B/C/D	C/D	D/E	E		
100	107	B	B/C/D	B/C/D	C/D	D/E	D/E	E		
150	157	B	B/C/D	C/D/E	D/E	D/E	E			
220	227	B/C/D	C/D	C/D/E	D/E	E				
330	337	C/D	D/E	D/E	D/E					
470	477	D	D/E	D/E	E					
680	687	D/E	D/E	E						
1000	108	D/E								

2) The Corresponding Table of Electrical Performance Parameters of the Product. Table (6)

U _R (V)	Case Size	C _R (uF)	DCL (uA) Max.	DF (%) Max.	ESR (Ω) Max. 100kHz	Ripple current RMS 100kHz (mA)			TANCAP Part number
						25℃	85℃	125℃	
2.5V 85℃(1.7V 125℃)									
2.5	A	33	0.8	6	1.5	0.224	0.201	0.089	CA45L336*002A*
2.5	A	47	1.2	6	1.5	0.224	0.201	0.089	CA5L476*002A*
2.5	A	68	1.7	6	0.7	0.327	.295	0.131	CA45L686*002A*
2.5	B	100	2.5	8	0.7	0.348	0.314	0.139	CA45L107*002B*
2.5	B	150	3.8	8	0.5	0.412	0.371	0.165	CA45L157*002B*
2.5	B	220	5.5	8	0.5	0.412	0.371	0.165	CA45L227*002B*
2.5	C	220	5.5	8	0.2	0.742	0.667	0.297	CA45L227*002C*
2.5	D	220	5.5	8	0.2	0.866	0.779	0.346	CA45L227*002D*
2.5	C	330	8.3	12	0.2	0.742	0.667	0.297	CA45L337*002C*
2.5	D	330	8.3	12	0.2	0.866	0.779	0.346	CA45L337*002D*
2.5	D	470	11.8	12	0.15	1.000	0.900	0.400	CA45L477*002D*
2.5	D	680	117	14	0.15	1.000	0.900	0.400	CA45L687*002D*
2.5	E	680	17	14	0.15	1.049	0.944	0.420	CA45L687*002E*
2.5	D	1000	25	14	0.15	1.000	0.900	0.400	CA45L108*002D*
2.5	E	1000	25	14	0.15	1.049	0.944	0.420	CA45L108*002E*
4.0V 85℃(2.5V 125℃)									
4	P	2.2	0.5	6	7	0.09	0.087	0.039	CA45L225*004P*
4	P	3.3	05	6	3	0.147	0.132	0.059	CA45L335*004P*
4	A	3.3	0.5	6	2.5	0.173	0.156	0.069	CA45L335*004A*
4	P	4.7	0.5	6	3	0.147	0.132	0.059	CA45L475*004P*
4	A	4.7	0.5	6	2	0.194	0.174	0.077	CA45L75*004A*
4	P	6.8	0.5	6	5	0.114	0.103	0.046	CA45L685*004P*
4	A	6.8	0.5	6	2	0.194	0.174	0.077	CA45L685*004A*
4	P	10	0.5	6	3	0.147	0.132	0.059	CA45L106*004P*
4	A	10	0.5	6	1.5	0.224	0.201	0.089	CA45L106*004A*
4	B	10	0.5	6	1	0.292	0.262	0.117	CA45L106*004B*
4	A	15	0.6	6	1.5	0.224	0.201	0.089	CA45L156*004A*
4	B	15	0.6	6	0.7	0.348	0.314	0.139	CA45L156*004B*
4	A	22	0.9	6	0.9	0.289	0.260	0.115	CA45L226*004A*
4	B	22	0.9	6	0.6	0.376	0.339	0.151	CA45L226*004B*
4	C	22	0.9	6	0.5	0.469	0.422	0.188	CA45L226*004C*
4	A	33	1.3	6	3	0.158	0.142	0.063	CA45L336*004A*
4	B	33	1.3	6	0.6	0.376	0.339	0.151	CA45L336*004B*
4	C	33	1.3	6	0.3	0.606	0.545	0.242	CA45L336*004C*
4	A	47	1.9	6	0.8	0.306	0.276	0.122	CA45L476*004A*
4	B	47	1.9	6	0.5	0.412	0.371	0.165	CA45L476*004B*
4	C	47	1.9	6	0.25	0.663	0.597	0.265	CA45L476*004C*

UR (V)	Case Size	CR (uF)	DCL (uA) Max.	DF (%) Max.	ESR (Ω) Max. 100kHz	Ripple current RMS 100kHz (mA)			TANCAP Part number
						25℃	85℃	125℃	
4.0V 85℃ (2.5V 125℃)									
4	B	68	2.7	6	2	0.206	0.186	0.082	CA45L686*004B*
4	C	68	2.7	6	0.25	0.663	0.597	0.265	CA45L686*004C*
4	D	68	2.7	6	0.2	0.866	0.779	0.346	CA45L686*004D*
4	B	100	4	8	0.5	0.412	0.371	0.165	CA45L107*004B*
4	C	100	4	8	0.2	0.742	0.667	0.297	CA45L107*004C*
4	D	100	4	8	0.2	0.866	0.779	0.346	CA45L107*004D*
4	B	150	6	8	0.4	0.461	0.415	0.184	CA45L157*004B*
4	C	150	6	8	0.2	0.742	0.667	0.297	CA45L157*004C*
4	D	150	6	8	0.15	1.000	0.900	0.400	CA45L157*004D*
4	C	220	8.8	8	0.2	0.742	0.667	0.297	CA45L227*004C*
4	D	220	8.8	8	0.15	1.000	0.900	0.400	CA45L227*004D*
4	D	330	13.2	12	0.15	1.000	0.900	0.400	CA45L337*004D*
4	E	330	13.2	12	0.15	1.049	0.944	0.420	CA45L337*004E*
4	D	470	18.8	12	0.15	1.000	0.900	0.400	CA45L477*004D*
4	E	470	18.8	12	0.15	1.049	0.944	0.420	CA45L477*004E*
4	D	680	27.2	14	0.2	0.866	0.779	0.346	CA45L687*004D*
6.3V 85℃ (4.0V 125℃)									
6.3	P	2.2	0.5	6	7	0.096	0.087	0.039	CA45L225*006P*
6.3	A	2.2	0.5	6	2.5	0.173	0.156	0.069	CA45L225*006A
6.3	P	3.3	0.5	6	3	0.147	0.132	0.059	CA45L335*006P*
6.3	A	3.3	0.5	6	2.5	0.173	0.156	0.069	CA45L335*006A*
6.3	P	4.7	0.5	6	3	0.147	0.132	0.059	CA45L475*006 P*
6.3	A	4.7	0.5	6	2	0.194	0.174	0.077	CA45L475*006A*
6.3	P	6.8	0.5	6	5	0.114	0.103	0.046	CA45L685*006P*
6.3	A	6.8	0.5	6	2	0.194	0.174	0.077	CA45L685*006A*
6.3	B	6.8	0.5	6	1.2	0.266	0.240	0.106	CA45L685*006B*
6.3	P	10	0.6	6	3	0.147	0.132	0.059	CA45L106*006P*
6.3	A	10	0.6	6	1.5	0.224	0.201	0.089	CA45L106*006A*
6.3	B	10	0.6	6	1	0.292	0.262	0.117	CA45L106*006B*
6.3	A	15	0.9	6	1.5	0.224	0.201	0.089	CA45L156*006A*
6.3	B	15	0.9	6	0.7	0.348	0.314	0.139	CA45L156*006B*
6.3	C	15	0.9	6	0.6	0.428	0.385	0.171	CA45L156*006C*
6.3	A	22	1.4	6	0.9	0.289	0.260	0.115	CA45L226*006A*
6.3	B	22	1.4	6	0.6	0.376	0.339	0.151	CA45L226*006B*
6.3	C	22	1.4	6	0.5	0.469	0.422	0.188	CA45L226*006C*
6.3	A	33	2.1	8	0.8	0.306	0.276	0.122	CA45L336*006A*
6.3	B	33	2.1	6	0.6	0.376	0.339	0.151	CA45L336*006B*
6.3	C	33	2.1	6	0.3	0.606	0.545	0.242	CA45L336*006C*

UR (V)	Case Size	CR (uF)	DCL (uA) Max.	DF (%) Max.	ESR (Ω) Max. 100kHz	Ripple current RMS 100kHz (mA)			TANCAP Part number
						25℃	85℃	125℃	
6.3V 85℃ (4.0V 125℃)									
6.3	A	47	3	8	0.8	0.306	0.276	0.122	CA45L476*006A*
6.3	B	47	3	6	0.5	0.412	0.371	0.165	CA45L476*006B*
6.3	C	47	3	6	0.25	0.663	0.597	0.265	CA45L476*006C*
6.3	D	47	3	6	0.25	0.775	0.697	0.310	CA45L476*006D*
6.3	B	68	4.3	6	0.5	0.412	0.371	0.165	CA45L686*006B*
6.3	C	68	4.3	6	0.2	0.742	0.667	0.297	CA45L686*006C*
6.3	D	68	4.3	6	0.2	0.866	0.779	0.346	CA45L686*006D*
6.3	B	100	6.3	8	0.5	0.412	0.371	0.165	CA45L107*006B*
6.3	C	100	6.3	8	0.3	0.606	0.545	0.242	CA45L107*006C*
6.3	D	100	6.3	8	0.2	0.866	0.779	0.346	CA45L107*006D*
6.3	C	150	9.5	8	0.2	0.742	0.667	0.297	CA45L157*006C*
6.3	D	150	9.5	8	0.15	1.000	0.900	0.400	CA45L157*006D*
6.3	E	150	9.5	8	0.15	1.049	0.944	0.420	CA45L157*006E*
6.3	C	220	13.9	8	0.3	0.606	0.545	0.242	CA45L227*006C*
6.3	D	220	13.9	8	0.15	1.000	0.900	0.400	CA45L227*006D*
6.3	E	220	13.9	8	0.15	1.049	0.944	0.420	CA45L227*006E*
6.3	D	330	20.8	12	0.1	1.000	0.900	0.400	CA45L337*006D*
6.3	E	330	20.8	12	0.1	1.049	0.944	0.420	CA45L337*006E*
6.3	D	470	29.6	12	0.1	0.866	0.779	0.346	CA45L477*006D*
6.3	E	470	29.6	12	0.1	0.908	0.817	0.363	CA45L477*006E*
6.3	E	680	42.8	14	0.1	1.285	1.156	0.514	CA45L687*006E*
10V 85℃ (6.3V 125℃)									
10	P	1	0.5	4	9	0.085	0.076	0.034	CA45L105*010P*
10	P	1.5	0.5	6	9	0.085	0.076	0.034	CA45L155*010P*
10	A	1.5	0.5	6	6	0.112	0.101	0.045	CA45L155*010A*
10	P	2.2	0.5	6	9	0.085	0.076	0.034	CA45L225*010P*
10	A	2.2	0.5	6	2	0.194	0.174	0.077	CA45L225*010A*
10	B	2.2	0.5	6	1.5	0.238	0.214	0.095	CA45L225*010B*
10	P	3.3	0.5	6	7	0.096	0.087	0.039	CA45L335*010P*
10	A	3.3	0.5	6	4	0.137	0.123	0.055	CA45L335*010A*
10	B	3.3	0.5	6	2	0.206	0.186	0.082	CA45L335*010B*
10	A	6.8	0.7	6	1.8	0.204	0.184	0.082	CA45L685*010A*
10	B	6.8	0.7	6	1.2	0.266	0.240	0.106	CA45L685*010B*
10	P	10	1	6	2	0.180	0.162	0.072	CA45L106*010P*
10	A	10	1	6	1.8	0.204	0.184	0.082	CA45L106*010A*
10	B	10	1	6	0.8	0.326	0.293	0.130	CA45L106*010B*
10	C	10	1	6	0.8	0.371	0.334	0.148	CA45L106*010C*
10	A	15	1.5	6	1.5	0.224	0.201	0.089	CA45L156*010A*
10	B	15	1.5	6	0.7	0.348	0.214	0.139	CA45L156*010B*

UR (V)	Case Size	CR (uF)	DCL (uA) Max.	DF (%) Max.	ESR (Ω) Max. 100kHz	Ripple current RMS 100kHz (mA)			TANCAP Part number
						25℃	85℃	125℃	
10V 85℃ (6.3V 125℃)									
10	C	15	1.5	6	0.5	0.469	0.422	0.188	CA45L156*010C*
10	A	22	2.2	8	0.9	0.289	0.260	0.115	CA45L226*010A*
10	B	22	2.2	6	0.7	0.348	0.314	0.139	CA45L226*010B*
10	C	22	2.2	6	0.3	0.606	0.545	0.242	CA45L226*010C*
10	A	33	3.3	6	0.7	0.327	0.295	0.131	CA45L336*010A*
10	B	33	3.3	6	0.5	0.412	0.371	0.165	CA45L336*010B*
10	C	33	3.3	6	0.3	0.606	0.545	0.242	CA45L336*010C*
10	D	33	3.3	6	0.25	0.775	0.697	0.310	CA45L336*010D*
10	B	47	4.7	8	0.5	0.412	0.371	0.165	CA45L476*010B*
10	C	47	4.7	6	0.3	0.606	0.545	0.242	CA45L476*010C*
10	D	47	4.7	6	0.2	0.866	0.779	0.346	CA45L476*010D*
10	B	68	6.8	6	0.6	0.376	0.339	0.151	CA45L686*010B*
10	C	68	6.8	6	0.3	0.606	0.545	0.242	CA45L686*010C*
10	D	68	6.8	6	0.2	0.866	0.779	0.346	CA45L686*010D*
10	C	100	10	8	0.2	0.742	0.667	0.297	CA45L107*010C*
10	D	100	10	8	0.15	1.000	0.900	0.400	CA45L107*010D*
10	D	150	15	8	0.15	1.000	0.900	0.400	CA45L157*010D*
10	E	150	15	8	0.15	1.049	0.944	0.420	CA45L157*010E*
10	D	220	22	8	0.15	1.000	0.900	0.400	CA45L227*010D*
10	E	220	22	8	0.15	1.049	0.944	0.420	CA45L227*010E*
10	D	330	33	12	0.15	1.000	0.900	0.400	CA45L337*010D*
10	E	330	33	12	0.15	1.285	1.156	0.514	CA45L337*010E*
10	E	470	47	12	0.2	0.908	0.817	0.363	CA45L477*010E*
16V 85℃ (10V 125℃)									
16	P	0.47	0.5	4	9	0.085	0.076	0.034	CA45L474*016P*
16	P	0.68	0.5	4	9	0.085	0.076	0.034	CA45L684*016P*
16	P	1	0.5	4	9	0.085	0.076	0.034	CA45L105*016P*
16	A	1	0.5	4	6	0.112	0.101	0.045	CA45L105*016A*
16	P	1.5	0.5	6	4	0.127	0.115	0.051	CA45L155*016P*
16	A	1.5	0.5	6	4	0.137	0.123	0.055	CA45L155*016A*
16	P	2.2	0.5	6	7	0.096	0.087	0.039	CA45L225*016P*
16	A	2.2	0.5	6	3	0.158	0.142	0.063	CA45L225*016A*
16	B	2.2	0.5	6	2	0.206	0.186	0.082	CA45L225*016B*
16	A	3.3	0.5	6	2	0.194	0.174	0.077	CA45L335*016A*
16	B	3.3	0.5	6	1.5	0.238	0.214	0.095	CA45L335*016B*
16	A	4.7	0.8	6	2	0.194	0.174	0.077	CA45L475*016A*
16	B	4.7	0.8	6	1.5	0.238	0.214	0.095	CA45L475*016B*
16	A	6.8	1.1	6	1.5	0.224	0.201	0.089	CA45L685*016A*
16	B	6.8	1.1	6	1.2	0.266	0.240	0.106	CA45L685*016B*

UR (V)	Case Size	CR (uF)	DCL (uA) Max.	DF (%) Max.	ESR (Ω) Max. 100kHz	Ripple current RMS 100kHz (mA)			TANCAP Part number
						25℃	85℃	125℃	
16V 85℃ (10V 125℃)									
16	C	6.8	1.1	6	0.8	0.371	0.334	0.148	CA45L685*016C*
16	A	10	1.6	8	3	0.158	0.142	0.063	CA45L106*016A*
16	B	10	1.6	6	0.8	0.326	0.293	0.130	CA45L106*016B*
16	C	10	1.6	6	0.5	0.469	0.422	0.188	CA45L106*016C*
16	B	15	2.4	6	0.8	0.326	0.293	0.130	CA45L156*016B*
16	C	15	2.4	6	0.4	0.524	0.472	0.210	CA45L156*016C*
16	B	22	3.5	8	0.6	0.376	0.339	0.151	CA45L226*016B*
16	C	22	3.5	6	0.3	0.606	0.545	0.242	CA45L226*016C*
16	D	22	3.5	6	0.25	0.775	0.697	0.310	CA45L226*016D*
16	C	33	5.3	6	0.3	0.606	0.545	0.242	CA45L336*016C*
16	D	33	5.3	6	0.2	0.866	0.779	0.346	CA45L336*016D*
16	C	47	7.5	6	0.4	0.524	0.472	0.210	CA45L476*016C*
16	D	47	7.5	6	0.2	0.866	0.779	0.346	CA45L476*016D*
16	C	68	10.9	6	0.2	0.742	0.667	0.297	CA45L686*016C*
16	D	68	10.9	6	0.15	1.000	0.900	0.400	CA45L686*016D*
16	D	100	16	8	0.15	1.000	0.900	0.400	CA45L107*016D*
16	E	100	16	8	0.15	1.049	0.944	0.420	CA45L107*016E*
16	D	150	24	8	0.2	0.866	0.779	0.346	CA45L157*016D*
16	E	150	24	8	0.2	0.908	0.817	0.363	CA45L157*016E*
16	E	220	35.2	8	0.2	0.908	0.817	0.363	CA45L227*016E*
20V 85℃ (13V 125℃)									
20	P	0.1	0.5	4	9	0.085	0.076	0.034	CA45L104*020P*
20	P	0.15	0.5	4	9	0.085	0.076	0.034	CA45L154*020P*
20	P	0.22	0.5	4	9	0.085	0.076	0.034	CA45L224*020P*
20	P	0.33	0.5	4	9	0.085	0.076	0.034	CA45L334*020P*
20	P	0.47	0.5	4	9	0.085	0.076	0.034	CA45L474*020P*
20	P	0.68	0.5	4	9	0.085	0.076	0.034	CA45L684*020P*
20	A	0.68	0.5	4	8	0.097	0.087	0.039	CA45L684*020A*
20	P	1	0.5	4	6	0.104	0.094	0.042	CA45L105*020P*
20	A	1	0.5	4	3	0.158	0.142	0.063	CA45L105*020A*
20	P	1.5	0.5	6	5	0.114	0.103	0.046	CA45L155*020P*
20	A	1.5	0.5	6	4	0.137	0.123	0.055	CA45L155*020A*
20	B	1.5	0.5	6	3	0.168	0.151	0.067	CA45L155*020B*
20	A	2.2	0.5	6	3	0.158	0.142	0.063	CA45L225*020A*
20	B	2.2	0.5	6	1.5	0.238	0.214	0.095	CA45L225*020B*
20	A	3.3	0.7	6	2.5	0.173	0.156	0.069	CA45L335*020A*
20	B	3.3	0.7	6	1.2	0.266	0.240	0.106	CA45L335*020B*
20	C	3.3	0.7	6	0.6	0.428	0.385	0.171	CA45L335*020C*
20	A	4.7	0.9	6	1.8	0.204	0.184	0.082	CA45L475*020A*

UR (V)	Case Size	CR (uF)	DCL (uA) Max.	DF (%) Max.	ESR (Ω) Max. 100kHz	Ripple current RMS 100kHz (mA)			TANCAP Part number
						25℃	85℃	125℃	
20V 85℃(13V 125℃)									
20	B	4.7	0.9	6	1	0.292	0.262	0.117	CA45L475*020B*
20	C	4.7	0.9	6	0.6	0.428	0.385	0.171	CA45L475*020C*
20	B	6.8	1.4	6	1	0.292	0.262	0.117	CA45L685*020B*
20	C	6.8	1.4	6	0.6	0.428	0.385	0.171	CA45L685*020C*
20	B	10	2	8	1	0.292	0.262	0.117	CA45L106*020B*
20	C	10	2	6	0.5	0.469	0.422	0.188	CA45L106*020C*
20	D	10	2	6	0.3	0.707	0.636	0.283	CA45L106*020D*
20	B	15	3	6	0.5	0.412	0.371	0.165	CA45L156*020B*
20	C	15	3	6	0.4	0.524	0.472	0.210	CA45L156*020C*
20	D	15	3	6	0.3	0.707	0.636	0.283	CA45L156*020D*
20	B	22	4.4	8	0.4	0.461	0.415	0.184	CA45L226*020B*
20	C	22	4.4	6	0.4	0.524	0.472	0.210	CA45L226*020C*
20	D	22	4.4	6	0.3	0.707	0.636	0.283	CA45L226*020D*
20	C	33	6.6	6	0.3	0.606	0.545	0.242	CA45L336*020C*
20	D	33	6.6	6	0.2	0.866	0.779	0.346	CA45L336*020D*
20	D	47	9.4	6	0.2	0.866	0.779	0.346	CA45L476*020D*
20	E	47	9.4	6	0.2	0.908	0.817	0.363	CA45L476*020E*
20	D	68	13.6	6	0.2	0.866	0.779	0.346	CA45L686*020D*
20	E	68	13.6	6	0.2	0.908	0.817	0.363	CA45L686*020E*
20	D	100	20	8	0.15	1.000	0.900	0.400	CA45L107*020D*
20	E	100	20	8	0.2	0.908	0.817	0.363	CA45L107*020E*
20	E	150	30	8	0.3	0.742	0.667	0.397	CA45L157*020E*
25V 85℃(16V 125℃)									
25	A	0.33	0.5	4	9	0.091	0.082	0.037	CA45L334*025A*
25	A	0.47	0.5	4	7	0.104	0.093	0.041	CA45L474*025A*
25	A	0.68	0.5	4	6	0.112	0.101	0.045	CA45L684*025A*
25	A	1	0.5	4	4	0.137	0.123	0.055	CA45L105*025A*
25	B	1	0.5	4	2	0.206	0.186	0.082	CA45L105*025B*
25	A	1.5	0.5	6	3	0.158	0.142	0.063	CA45L155*025A*
25	B	1.5	0.5	6	1.5	0.238	0.214	0.095	CA45L155*025B*
25	A	2.2	0.6	6	2	0.194	0.174	0.077	CA45L225*025A*
25	B	2.2	0.6	6	0.9	0.307	0.277	0.123	CA45L225*025B*
25	C	2.2	0.6	6	1.2	0.303	0.272	0.121	CA45L225*025C*
25	A	3.3	0.8	6	1.5	0.224	0.201	0.089	CA45L335*025A*
25	B	3.3	0.8	6	1.5	0.238	0.214	0.095	CA45L335*025B*
25	C	3.3	0.8	6	1.2	0.303	0.272	0.121	CA45L335*025C*
25	B	4.7	1.2	6	0.7	0.348	0.314	0.139	CA45L475*025B*
25	C	4.7	1.2	6	0.6	0.428	0.385	0.171	CA45L475*025C*

UR (V)	Case Size	CR (uF)	DCL (uA) Max.	DF (%) Max.	ESR (Ω) Max. 100kHz	Ripple current RMS 100kHz (mA)			TANCAP Part number
						25℃	85℃	125℃	
25V 85℃ (16V 125℃)									
25	C	4.7	1.2.	6	0.6	0.428	0.385	0.171	CA45L475*025C*
25	B	6.8	1.7	6	0.7	0.348	0.314	0.139	CA45L685*025B*
25	C	6.8	1.7	6	0.5	0.469	0.422	0.188	CA45L685*025C*
25	D	6.8	1.7	6	0.3	0.707	0.636	0.283	CA45L685*025D*
25	C	10	2.5	6	0.5	0.469	0.422	0.188	CA45L106*025C*
25	D	10	2.5	6	0.4	0.612	0.551	0.245	CA45L106*025D*
25	C	15	3.8	6	0.3	0.606	0.545	0.242	CA45L156*025C*
25	D	15	3.8	6	0.3	0.707	0.636	0.283	CA45L156*025D*
25	C	22	5.5	6	0.4	0.524	0.472	0.210	CA45L226*025C*
25	D	22	5.5	6	0.3	0.707	0.636	0.283	CA45L226*025D*
25	D	33	8.3	6	0.3	0.707	0.363	0.283	CA45L336*025D*
25	E	33	8.3	6	0.3	0.742	0.667	0.297	CA45L336*025E*
25	D	47	11.8	6	0.25	0.775	0.697	0.310	CA45L476*025D*
25	E	47	11.8	6	0.15	1.049	0.944	0.420	CA45L476*025E*
25	E	68	17	6	0.2	0.908	0.817	0.363	CA45L686*025E*
25	E	100	25	8	0.25	0.812	0.731	0.325	CA45L107*025E*
35V 85℃ (23V 125℃)									
35	A	0.1	0.5	4	9	0.091	0.082	0.037	CA45L104*035A*
35	A	0.15	0.5	4	6	0.112	0.101	0.045	CA45L154*035A*
35	A	0.22	0.5	4	6	0.112	0.101	0.045	CA45L224*035A*
35	A	0.33	0.5	4	6	0.112	0.101	0.045	CA45L334*035A*
35	A	0.47	0.5	4	4	0.137	0.123	0.055	CA45L474*035A*
35	B	0.47	0.5	4	2.5	0.184	0.166	0.074	CA45L474*035B*
35	A	0.68	0.5	4	6	0.112	0.101	0.045	CA45L684*035A*
35	B	0.68	0.5	4	2.5	0.184	0.166	0.074	CA45L684*035B*
35	A	1	0.5	4	3	0.158	0.142	0.063	CA45L105*035A*
35	B	1	0.5	4	2	0.206	0.186	0.082	CA45L105*035B*
35	A	1.5	0.5	6	3	0.158	0.142	0.063	CA45L155*035A*
35	B	1.5	0.5	6	2.5	0.184	0.166	0.074	CA45L155*035B*
35	C	1.5	0.5	6	2	0.235	0.211	0.094	CA45L155*035C*
35	B	2.2	0.8	6	2	0.206	0.186	0.082	CA45L225*035B*
35	C	2.2	0.8	6	1	0.332	0.298	0.133	CA45L225*035C*
35	B	3.3	1.2	6	1	0.292	0.262	0.117	CA45L335*035B*
35	C	3.3	1.2	6	0.7	0.396	0.357	0.159	CA45L335*035C*
35	B	4.7	1.6	6	0.1	0.206	0.186	0.082	CA45L475*035B*
35	C	4.7	1.6	6	0.6	0.428	0.385	0.171	CA45L475*035C*
35	D	4.7	1.6	6	0.7	0.463	0.417	0.185	CA45L475*035D*
35	C	6.8	2.4	6	0.5	0.469	0.422	0.188	CA45L685*035C*
35	D	6.8	2.4	6	0.5	0.548	0.493	0.219	CA45L685*035D*

UR (V)	Case Size	CR (uF)	DCL (uA) Max.	DF (%) Max.	ESR (Ω) Max. 100kHz	Ripple current RMS 100kHz (mA)			TANCAP Part number
						25℃	85℃	125℃	
35V 85℃ (23V 125℃)									
35	C	10	3.5	6	1.2	0.303	0.272	0.121	CA45L106*035C*
35	D	10	3.5	6	0.3	0.707	0.636	0.283	CA45L106*035D*
35	E	10	3.5	6	0.2	0.908	0.817	0.363	CA45L106*035E*
35	D	15	5.3	6	0.3	0.707	0.636	0.283	CA45L156*035D*
35	E	15	5.3	6	0.3	0.742	0.667	0.297	CA45L156*035E*
35	D	22	7.7	6	0.4	0.612	0.551	0.245	CA45L226*035D*
35	E	22	7.7	6	0.3	0.742	0.667	0.297	CA45L226*035E*
35	E	33	11.6	6	0.3	0.742	0.667	0.297	CA45L336*035E*
35	E	47	16.5	6	0.3	0.742	0.667	0.297	CA45L476*035E*
50V 85℃ (33V 125℃)									
50	A	0.1	0.5	4	9	0.091	0.082	0.037	CA45L104*050A*
50	A	0.15	0.5	4	9	0.091	0.082	0.037	CA45L154*050A*
50	B	0.15	0.5	4	9	0.097	0.087	0.039	CA45L154*050B*
50	A	0.22	0.5	4	7	0.104	0.093	0.041	CA45L224*050A*
50	B	0.22	0.5	4	7	0.110	0.099	0.044	CA45L224*050B*
50	B	0.33	0.5	4	2.5	0.184	0.166	0.074	CA45L334*050B*
50	B	0.47	0.5	4	2	0.206	0.186	0.082	CA45L474*050B*
50	C	0.47	0.5	4	1.8	0.247	0.222	0.099	CA45L474*050C*
50	B	0.68	0.5	4	3	0.168	0.151	0.067	CA45L684*050B*
50	C	0.68	0.5	4	1.6	0.262	0.236	0.105	CA45L684*050C*
50	B	1	0.5	4	4	0.146	0.131	0.058	CA45L105*050B*
50	C	1	0.5	4	1.6	0.262	0.236	0.105	CA45L105*050C*
50	C	1.5	0.8	6	2	0.235	0.211	0.094	CA45L155*050C*
50	D	1.5	0.8	6	1	0.387	0.349	0.155	CA45L155*050D*
50	C	2.2	1.1	6	1.5	0.271	0.244	0.108	CA45L225*050C*
50	D	2.2	1.1	6	1.2	0.354	0.318	0.141	CA45L225*050D*
50	D	3.3	1.7	6	0.8	0.433	0.390	0.173	CA45L335*050D*
50	D	4.7	2.4	6	0.7	0.463	0.417	0.185	CA45L475*050D*
50	E	4.7	2.4	6	0.5	0.574	0.517	0.230	CA45L475*050E*
50	D	6.8	3.4	6	0.6	0.500	0.450	0.200	CA45L685*050D*
50	E	6.8	3.4	6	0.5	0.574	0.517	0.230	CA45L685*050E*
50	D	10	5	6	0.5	0.548	0.493	0.219	CA45L106*050D*
50	E	10	5	6	0.5	0.574	0.517	0.230	CA45L106*050E*

Remark:

- All technical data measured at 25 ℃.
- Capacitance and loss test conditions: U = 1.7 ~ 2.2V, U partial = 0 ~ 1V (RMS), the measurement frequency: 100(120)HZ
- The leakage current should be measured after 5 minutes application of rated voltage should +125 ℃ with voltage derating.

Note: 1) "*" indicates that 125 ℃ Capacitance change of ± 15%.

2) "#" Indicates that the capacity change rate of 125 ℃ ± 20%, provided only the capacity deviation of the M-Class.

1) Carrier Tape

Case Code	W	Qty/reel (178mm)
P	8.4+1.5	3000
A、B	8.4+1.5	2000
C、D	12.4+2	500
E	12.4+2	400

Correct Use of Tantalum Chip Capacitors

1. Ripple Current and Ripple Voltage

If ripple current is applied, heat is generated within capacitor by Joule's heat (power dissipation) and it may affect to reliability of the capacitor.

(1) Power Dissipation

The actual power dissipated in capacitor is calculated using the formula1. :

$P=I^2 \times ESR$Formula 1

Where:

P: power Dissipation (Watts)

I: Ripple Current (Arms)

ESR: Equivalent Series Resistance (Ω)

Table 1 Dissipation Ratings

Case Code	Maximum Power Dissipation Watts,100KHz,at 25℃
P	0.025
A	0.075
B	0.085
C	0.110
D	0.150
E	0.150

(2) Ripple Current

Using P Max from Table 1, maximum ripple current (Arms) may be determined as follow:

$$I = \frac{V_P}{ESR} \times K \times F \dots \dots \dots \text{Formula 2}$$

Where:

K: Temperature Derating Factor.... Table 2

F: Frequency Derating Factor...Table 3

ESR: Refer to Ratings

Table 2: Temperature Derating Factor

Temperature	Temperature Derating Factor K
25°C	1
85°C	0.9
125°C	0.4

Table 3: Frequency Derating Factor

Type	10KHz	100 KHz	500 KHz	1MHz
MnO2	0.80	1.00	1.15	1.20
Polymer	0.75	1.00	1.10	1.30

Ripple voltage E is calculated using the formula 3.

$$E = Z \times I \dots \dots \dots \text{Formula 3}$$

Where:

E: Ripple voltage

Z: Impedance at specified frequency

(3) Ripple Voltage

The ripple voltage that may be applied is limited by three criteria:

- The power dissipated in the ESR of the capacitor must not exceed the appropriate value specified in Table 1.
- The sum of DC voltage and peak value of the ripple voltage must not exceed the rated voltage.
- The negative peak value of the ripple voltage must not exceed the permissible reverse voltage value specified in the following section, Reverse Voltage.

2. Reverse Voltage

Because the solid tantalum capacitor is of polar type, do not apply a reverse voltage to it. If reverse voltage cannot be avoided, it must be applied for a short time and must not exceed the following values:

25°C10% max. of rated voltage or 1Vdc, whichever is smaller.

85°C5% max. of rated voltage or 0.5Vdc, whichever is smaller.

125°C1% max. of rated voltage or 0.1Vdc, whichever is smaller.

The capacitors should not be operated continuously in reverse mode, even within these limits.

3. Applied Voltage

- (1) For general application, apply 70% or less of the rated voltage to the capacitor.
- (2) When the capacitor is used in a power line or a low-impedance circuit, keep the applied voltage within 30% of the rated voltage to avoid the adverse influence of inrush current.
- (3) Derated voltage at 85°C or more.
- (4) When using a Chip-type capacitor at a temperature of 85°C or higher, calculate reduced voltage U_T from the following expression. Note, however, that the ambient temperature must not exceed 125°C

$$U_T = V_0(U_R - U_C)(T - 85)/40$$

Where:

U_R : rated voltage (V)

U_C : derated voltage at 125°C

T: ambient temperature (°C)

4. Current (Series Resistance)

Reliability of tantalum capacitor is increased by inserting a series resistance of at least 3Ω/V into circuits where current flow is momentary (Switching circuit, charge/discharge circuits, etc) If the capacitor is in a low-impedance circuit, the voltage applied to the capacitor should be less than 1/2 to 1/3 of DC rated voltage.

5. In the Case of Short-Circuit

Manganese oxide tantalum capacitor (conventional tantalum capacitor) is heated and may generate fire and be burned depending upon its excess current, time and other factors.

When design the circuit, provide as much margin as possible to maintain capacitor reliability.

6. Product Soldering

SMT Tantalum Capacitor is suitable for Reflow soldering, not suitable for wave flow soldering and hand soldering. Reflow soldering temperature must be $\leq 260^\circ\text{C}$ for $5 < \text{seconds}$. If hand soldering is necessary, soldering iron power should be $\leq 25\text{W}$, temperature $< 300^\circ\text{C}$, soldering time < 3 seconds, it is prohibited to contact soldering iron top with product leads and main product, use melted tin solder to contact leaded soldering.