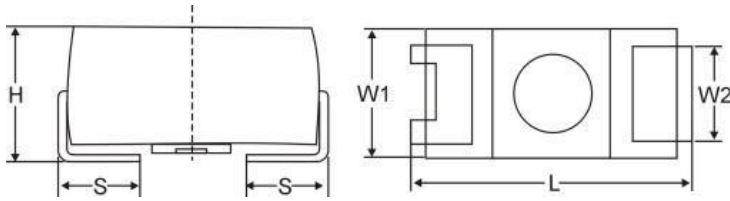


**FEATURES**

- Low ESR, Stable in electrical & storage performances
- Long lifespan, High reliability.
- Epoxy molded encapsulation, Chip, Easy for integration, Polarized.
- Typical applications include decoupling and filtering in industrial and automotive end applications, such as DC/DC converters, portable electronics, telecommunications and control units.



**DRAWING (mm)**



DIMENSIONS – MILLIMETERS (Unit: mm)						
Case Size	L	W1	H	S	W2	
<b>A</b>	<b>1206</b>	3.2±0.2	1.6±0.2	1.6±0.2	0.8±0.2	1.2±0.2
<b>B</b>	<b>1210</b>	3.5±0.2	2.8±0.2	1.9±0.2	0.8±0.2	2.2±0.2
<b>C</b>	<b>2312</b>	6.0±0.2	3.2±0.2	2.5±0.2	1.3±0.2	2.2±0.2
<b>D</b>	<b>2917</b>	7.3±0.2	4.3±0.2	2.8±0.2	1.3±0.2	2.4±0.2
<b>E</b>	<b>2917</b>	7.3±0.4	4.3±0.4	4.1±0.4	1.3±0.2	2.4±0.2
<b>V</b>	<b>2924</b>	7.3±0.4	6.1±0.4	3.6±0.4	1.35±0.2	3.0±0.2

**SPECIFICATIONS**

Temperature Range:	-55°C to +125°C									
Capacitance Range:	0.47µF ~ 1000µF									
Capacitance Tolerance:	±20%, ±10%									
Technical Data:	All technical data relate to an ambient temperature of +25°C									
Termination Finished:	Sn Plating (standard), Gold and SnPb Plating upon request									
Rated Voltage (V <sub>R</sub> ):	≤+85°C:	4	6.3	10	16	20	25	35	50	63
Category Voltage (V <sub>C</sub> ):	≤+125°C:	2.7	4	6.3	10	15	17	23	33	40
Surge Voltage (V <sub>S</sub> ):	≤+85°C:	5.2	8	13	20	26	32	46	65	82
Surge Voltage (V <sub>S</sub> ):	≤+125°C:	3.4	5	8	13	16	20	28	40	50

**Capacitance And Rated Voltage Range (Letter Denotes Case Size)**

Rated Voltage(V)	4	6.3	10	16
Capacitance (µF)	Case Size & ESR			
<b>6.8</b>				A(2000,2500),B(1200,2000)
<b>10</b>				A(1700),B(1200,2000)
<b>15</b>			A(1000,1800),B(600,900)	B(800,1000),C(600)
<b>22</b>			A(1200,1500),B(400,500)	B(700,1000),C(500,700),D(500)
<b>33</b>		A(1500,2000),B(600)	B(450,700),C(400,600),D(300,500)	C(500,700),D(300,500)
<b>47</b>	A(1500,2000),B(900,1500)	B(600,800),C(300,500)	B(500,700),C(400,600),D(300,500)	C(300,500),D(300,500),E(200,600)
<b>68</b>	B(1000,1500),C(600,1000)	B(500,700),C(500,700),D(250,500)	C(200,500),D(150,400)	C(1000),D(200,450),E(200,600)
<b>100</b>	B(450,800),C(500,1000)	B(400,700),C(300,500),D(300,500)	C(250,500),D(200,400),E(150)	C(800),D(200,500),E(200,600)
<b>150</b>	C(500,900),D(350,700),E(200,600)	C(300,500),D(300,500),E(150,300)	D(200,400),E(150,300)	D(500,600),E(200,250)
<b>220</b>	C(500,900),D(300,600),E(100,500)	C(200,500),D(150,300),E(150,300)	D(200,400),E(200,400),V(200,400)	E(200,400),V(200,400)
<b>330</b>	D(400,600),E(200,600),V(200,600)	D(150,300),E(150,300)	D(150,250),E(150,200),V(150,200)	E(180,500),V(180,500)
<b>470</b>	D(200,350),E(150,350),V(150,350)	E(150,300)	E(150,200)	E(450,600)
<b>680</b>	E(150,200)	E(150,300)	E(150,200)	
<b>1000</b>	E(150,200)			



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**Capacitance And Rated Voltage Range (Letter Denotes Case Size)**

Rated Voltage(V)	20	25	35	50	63
Capacitance(μF)	Case Size & ESR				
0.47			A(4000,A(8000))	A(3000,6000)	
0.68			A(6000,A(7000))	B(3000,6000)	
1			A(6000,7000),B(2500,3000)	B(2500,4000),C(1800,4000)	C(2000)
1.5		A(4500,7500),B(3000,5000)	B(3000,4000),C(2500,3000)	C(1800,3000),D(1000,2500)	D(2500)
2.2		A(3000,8000),B(2500,5000)	B(2500,3000),C(2000,2500)	C(1500,2000),D(700,1000)	D(1500)
3.3	A(4000,5000),B(3000,4000)	B(2000,3000),C(1200,2000)	B(2500,3000),C(1200,2000)	C(700,1500),D(700,1500)	D(1200)
4.7	A(2500,5000),B(1500,3000), C(1000,2500)	B(1000,1200),C(1000,2000)	B(2000,2500),C(800,1000), D(700,1000)	C(700,1000),D(600,1000)	E(800)
6.8	B(1000,1800),C(800,1200)	B(2000,2500),C(1000,1500), D(700,1000)	C(700,1200),D(600,1000)	D(600,800),E(500,1000)	E(600)
10	B(1200,1800),C(600,1000), D(500,1000)	B(1500,2000),C(900,1200), D(450,800)	C(700,1000),D(400,800)	D(400,600),E(400,800)	E(450)
15	B(1500,1800),C(800,1000), D(600,800)	C(500,1000),D(400,600)	D(350,600),E(300,600)	E(400,500)	E(300)V(300)
22	C(600,900),D(400,600)	C(800,1000),D(400,600)	D(400,500),E(300,400)	E(400,500)	V(300)
33	C(600,900),D(400,600)	D(300,500),E(250,500)	D(500,700),E(300,600)		
47	C(300,400),D(250,500), E(250,500)	D(350,500),E(300,600)	D(400,900),E(400,600)		
68	D(250,300),E(250,500)	E(250,500),V(250,600)	E(800)		
100	D(300,400),E(250,300)	E(200,250),V(200,250)			
150	D(450,600),E(180,250)	E(600),V(300)			
220	E(450,600),V(250,400)				
330	E(450,600),V(450,600)				

1. Please do not use multi-meter through the measuring procedures.
2. Capacitance and DF measured at :100Hz U<sub>DC</sub> =2.2 1.0V U<sub>AC</sub> =1.0 0.5V, Frequency=100Hz. Test only applied in series equivalent circuit.
3. Voltage derating is applied at +125 The DCL parameter should be read after 5 minutes when it connected to the circuit
4. Special size and demand could consult with us.



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**Rated Voltage, Capacitance and Case Sizes**

Rated Voltage (V)	Rated CAP (μF)	Case Code	Rated Temp (°C)	Category Temp (°C)	Category Voltage (V)	Max DCL(μA) @25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	Max Ripple @100kHz IRMS(A)		
									25°C	85°C	125°C
4	47	A	85	125	2.7	1.9	11	1500	0.208	0.125	0.083
		A	85	125	2.7	1.9	11	2000	0.180	0.108	0.072
		B	85	125	2.7	1.9	8	900	0.289	0.173	0.115
		B	85	125	2.7	1.9	8	1500	0.224	0.134	0.089
	68	B	85	125	2.7	2.7	8	1000	0.274	0.164	0.110
		B	85	125	2.7	2.7	8	1500	0.224	0.134	0.089
		C	85	125	2.7	2.7	6	600	0.387	0.232	0.155
		C	85	125	2.7	2.7	6	1000	0.300	0.180	0.120
	100	B	85	125	2.7	4.0	10	450	0.408	0.245	0.163
		B	85	125	2.7	4.0	10	800	0.306	0.184	0.122
		C	85	125	2.7	4.0	10	500	0.424	0.255	0.170
		C	85	125	2.7	4.0	10	1000	0.300	0.180	0.120
	150	C	85	125	2.7	6.0	10	500	0.424	0.255	0.170
		C	85	125	2.7	6.0	10	900	0.316	0.190	0.126
		D	85	125	2.7	6.0	8	350	0.548	0.329	0.219
		D	85	125	2.7	6.0	8	700	0.387	0.232	0.155
		E	85	125	2.7	6.0	8	200	0.791	0.474	0.316
		E	85	125	2.7	6.0	8	600	0.456	0.274	0.183
	220	C	85	125	2.7	8.8	12	500	0.424	0.255	0.170
		C	85	125	2.7	8.8	12	900	0.316	0.190	0.126
		D	85	125	2.7	8.8	10	300	0.592	0.355	0.237
		D	85	125	2.7	8.8	10	600	0.418	0.251	0.167
		E	85	125	2.7	8.8	10	100	1.118	0.671	0.447
		E	85	125	2.7	8.8	10	500	0.500	0.300	0.200
	330	D	85	125	2.7	13.2	14	400	0.512	0.307	0.205
		D	85	125	2.7	13.2	14	600	0.418	0.251	0.167
		E	85	125	2.7	13.2	12	200	0.791	0.474	0.316
		E	85	125	2.7	13.2	12	600	0.456	0.274	0.183
		V	85	125	2.7	13.2	12	200	0.866	0.520	0.346
		V	85	125	2.7	13.2	12	600	0.500	0.300	0.200
	470	D	85	125	2.7	18.8	14	200	0.725	0.435	0.290
		D	85	125	2.7	18.8	14	350	0.548	0.329	0.219
		E	85	125	2.7	18.8	12	150	0.913	0.548	0.365
		E	85	125	2.7	18.8	12	350	0.598	0.359	0.239
		V	85	125	2.7	18.8	12	150	1.000	0.600	0.400
		V	85	125	2.7	18.8	12	350	0.655	0.393	0.262
680	E	85	125	2.7	27.2	14	150	0.913	0.548	0.365	
	E	85	125	2.7	27.2	14	200	0.791	0.474	0.316	
1000	E	85	125	2.7	40.0	15	150	0.913	0.548	0.365	
	E	85	125	2.7	40.0	15	200	0.791	0.474	0.316	
6.3	33	A	85	125	4	2.1	8	1500	0.208	0.125	0.083
		A	85	125	4	2.1	8	2000	0.180	0.108	0.072
		B	85	125	4	2.1	8	600	0.354	0.212	0.141
	47	B	85	125	4	3.0	8	600	0.354	0.212	0.141
		B	85	125	4	3.0	8	800	0.306	0.184	0.122
		C	85	125	4	3.0	6	300	0.548	0.329	0.219
		C	85	125	4	3.0	6	500	0.424	0.255	0.170
	68	B	85	125	4	4.3	10	500	0.387	0.232	0.155
		B	85	125	4	4.3	10	700	0.327	0.196	0.131
		C	85	125	4	4.3	8	500	0.424	0.255	0.170
		C	85	125	4	4.3	8	700	0.359	0.215	0.143
		D	85	125	4	4.3	6	250	0.648	0.389	0.259
		D	85	125	4	4.3	6	500	0.458	0.275	0.183
	100	B	85	125	4	6.3	14	400	0.433	0.260	0.173



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**CA45L SMD Chip Tantalum Capacitors Low ESR**

Rated Voltage (V)	Rated CAP (μF)	Case Code	Rated Temp (°C)	Category Temp (°C)	Category Voltage (V)	Max DCL(μA) @25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	Max Ripple @100kHz IRMS(A)		
									25°C	85°C	125°C
6.3	100	B	85	125	4	6.3	14	700	0.327	0.196	0.131
		C	85	125	4	6.3	8	300	0.548	0.329	0.219
		C	85	125	4	6.3	8	500	0.424	0.255	0.170
		D	85	125	4	6.3	8	300	0.592	0.355	0.237
		D	85	125	4	6.3	8	500	0.458	0.275	0.183
	150	C	85	125	4	9.5	12	300	0.548	0.329	0.219
		C	85	125	4	9.5	12	500	0.424	0.255	0.170
		D	85	125	4	9.5	10	300	0.592	0.355	0.237
		D	85	125	4	9.5	10	500	0.458	0.275	0.183
		E	85	125	4	9.5	10	150	0.913	0.548	0.365
	220	E	85	125	4	9.5	10	300	0.645	0.387	0.258
		C	85	125	4	13.9	14	200	0.671	0.402	0.268
		C	85	125	4	13.9	14	500	0.424	0.255	0.170
		D	85	125	4	13.9	12	150	0.837	0.502	0.335
		D	85	125	4	13.9	12	300	0.592	0.355	0.237
	330	E	85	125	4	13.9	12	150	0.913	0.548	0.365
		E	85	125	4	13.9	12	300	0.645	0.387	0.258
		D	85	125	4	20.8	14	150	0.837	0.502	0.335
		D	85	125	4	20.8	14	300	0.592	0.355	0.237
	470	E	85	125	4	20.8	14	150	0.913	0.548	0.365
		E	85	125	4	20.8	14	300	0.645	0.387	0.258
		E	85	125	4	29.6	14	150	0.913	0.548	0.365
	680	E	85	125	4	29.6	14	300	0.645	0.387	0.258
		E	85	125	4	42.8	14	150	0.913	0.548	0.365
E	E	85	125	4	42.8	14	300	0.645	0.387	0.258	
	10	15	A	85	125	6.3	1.5	8	1000	0.255	0.153
A			85	125	6.3	1.5	8	1800	0.190	0.114	0.076
B			85	125	6.3	1.5	6	600	0.354	0.212	0.141
B			85	125	6.3	1.5	6	900	0.289	0.173	0.115
22		A	85	125	6.3	2.2	12	1200	0.233	0.140	0.093
		A	85	125	6.3	2.2	12	1500	0.208	0.125	0.083
		B	85	125	6.3	2.2	6	400	0.433	0.260	0.173
		B	85	125	6.3	2.2	6	500	0.387	0.232	0.155
33		B	85	125	6.3	3.3	8	450	0.408	0.245	0.163
		B	85	125	6.3	3.3	8	700	0.327	0.196	0.131
		C	85	125	6.3	3.3	6	400	0.474	0.285	0.190
		C	85	125	6.3	3.3	6	600	0.387	0.232	0.155
47	D	85	125	6.3	3.3	6	300	0.592	0.355	0.237	
	D	85	125	6.3	3.3	6	500	0.458	0.275	0.183	
	B	85	125	6.3	4.7	10	500	0.387	0.232	0.155	
	B	85	125	6.3	4.7	10	700	0.327	0.196	0.131	
68	C	85	125	6.3	4.7	8	400	0.474	0.285	0.190	
	C	85	125	6.3	4.7	8	600	0.387	0.232	0.155	
	D	85	125	6.3	4.7	6	300	0.592	0.355	0.237	
	D	85	125	6.3	4.7	6	500	0.458	0.275	0.183	
100	C	85	125	6.3	6.8	8	200	0.671	0.402	0.268	
	C	85	125	6.3	6.8	8	500	0.424	0.255	0.170	
	D	85	125	6.3	6.8	6	150	0.837	0.502	0.335	
	D	85	125	6.3	6.8	6	400	0.512	0.307	0.205	
100	C	85	125	6.3	10.0	10	250	0.600	0.360	0.240	
	C	85	125	6.3	10.0	10	500	0.424	0.255	0.170	
	D	85	125	6.3	10.0	8	200	0.725	0.435	0.290	
	D	85	125	6.3	10.0	8	400	0.512	0.307	0.205	
E	85	125	6.3	10.0	8	150	0.913	0.548	0.365		



**CA45L SMD Chip Tantalum Capacitors Low ESR**

Rated Voltage (V)	Rated CAP (μF)	Case Code	Rated Temp (°C)	Category Temp (°C)	Category Voltage (V)	Max DCL(μA) @25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	Max Ripple @100kHz IRMS(A)			
									25°C	85°C	125°C	
10	150	D	85	125	6.3	15.0	10	200	0.725	0.435	0.290	
		D	85	125	6.3	15.0	10	400	0.512	0.307	0.205	
		E	85	125	6.3	15.0	10	150	0.913	0.548	0.365	
		E	85	125	6.3	15.0	10	300	0.645	0.387	0.258	
	220	D	85	125	6.3	22.0	12	200	0.725	0.435	0.290	
		D	85	125	6.3	22.0	12	400	0.512	0.307	0.205	
		E	85	125	6.3	22.0	12	200	0.791	0.474	0.316	
		E	85	125	6.3	22.0	12	400	0.559	0.335	0.224	
	V	V	85	125	6.3	22.0	12	200	0.866	0.520	0.346	
		V	85	125	6.3	22.0	12	400	0.612	0.367	0.245	
		330	D	85	125	6.3	33.0	14	150	0.837	0.502	0.335
			D	85	125	6.3	33.0	14	250	0.648	0.389	0.259
	E		85	125	6.3	33.0	14	150	0.913	0.548	0.365	
	E		85	125	6.3	33.0	14	200	0.791	0.474	0.316	
	V	V	85	125	6.3	33.0	14	150	1.000	0.600	0.400	
		V	85	125	6.3	33.0	14	200	0.866	0.520	0.346	
470		E	85	125	6.3	47.0	14	150	0.913	0.548	0.365	
		E	85	125	6.3	47.0	14	200	0.791	0.474	0.316	
680	E	85	125	6.3	68.0	14	150	0.913	0.548	0.365		
	E	85	125	6.3	68.0	14	200	0.791	0.474	0.316		
16	6.8	A	85	125	10	1.1	6	2000	0.180	0.108	0.072	
		A	85	125	10	1.1	6	2500	0.161	0.097	0.064	
		B	85	125	10	1.1	6	1200	0.250	0.150	0.100	
		B	85	125	10	1.1	6	2000	0.194	0.116	0.077	
	10	A	85	125	10	1.6	8	1700	0.196	0.117	0.078	
		B	85	125	10	1.6	6	1200	0.250	0.150	0.100	
	B	B	85	125	10	1.6	6	2000	0.194	0.116	0.077	
		15	B	85	125	10	2.4	6	800	0.306	0.184	0.122
			B	85	125	10	2.4	6	1000	0.274	0.164	0.110
	C	C	85	125	10	2.4	6	600	0.387	0.232	0.155	
		22	B	85	125	10	3.5	8	700	0.327	0.196	0.131
			B	85	125	10	3.5	8	1000	0.274	0.164	0.110
	C	C	85	125	10	3.5	6	500	0.424	0.255	0.170	
		D	C	85	125	10	3.5	6	700	0.359	0.215	0.143
			D	85	125	10	3.5	6	500	0.458	0.275	0.183
		D	85	125	10	3.5	6	500	0.458	0.275	0.183	
	33	C	85	125	10	5.3	6	500	0.424	0.255	0.170	
		C	85	125	10	5.3	6	700	0.359	0.215	0.143	
		D	D	85	125	10	5.3	6	300	0.592	0.355	0.237
			D	85	125	10	5.3	6	500	0.458	0.275	0.183
	47	C	85	125	10	7.5	8	300	0.548	0.329	0.219	
		C	85	125	10	7.5	8	500	0.424	0.255	0.170	
		D	D	85	125	10	7.5	6	300	0.592	0.355	0.237
			D	85	125	10	7.5	6	500	0.458	0.275	0.183
		E	E	85	125	10	7.5	6	200	0.791	0.474	0.316
			E	85	125	10	7.5	6	600	0.456	0.274	0.183
	68	C	85	125	10	10.9	8	1000	0.300	0.180	0.120	
		D	85	125	10	10.9	8	200	0.725	0.435	0.290	
		D	85	125	10	10.9	8	450	0.483	0.290	0.193	
		E	E	85	125	10	10.9	6	200	0.791	0.474	0.316
			E	85	125	10	10.9	6	600	0.456	0.274	0.183
	100	C	85	125	10	16.0	12	800	0.335	0.201	0.134	
D		D	85	125	10	16.0	8	200	0.725	0.435	0.290	
		D	85	125	10	16.0	8	500	0.458	0.275	0.183	
E		85	125	10	16.0	8	200	0.791	0.474	0.316		





**CA45L SMD Chip Tantalum Capacitors Low ESR**

Rated Voltage (V)	Rated CAP (μF)	Case Code	Rated Temp (°C)	Category Temp (°C)	Category Voltage (V)	Max DCL(μA) @25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	Max Ripple @100kHz IRMS(A)		
									25°C	85°C	125°C
16	100	E	85	125	10	16.0	8	600	0.456	0.274	0.183
		D	85	125	10	24.0	12	500	0.458	0.275	0.183
	150	D	85	125	10	24.0	12	600	0.418	0.251	0.167
		E	85	125	10	24.0	10	200	0.791	0.474	0.316
		E	85	125	10	24.0	10	250	0.707	0.424	0.283
	220	E	85	125	10	35.2	12	200	0.791	0.474	0.316
		E	85	125	10	35.2	12	400	0.559	0.335	0.224
		V	85	125	10	35.2	12	200	0.866	0.520	0.346
		V	85	125	10	35.2	12	400	0.612	0.367	0.245
	330	E	85	125	10	52.8	12	180	0.833	0.500	0.333
		E	85	125	10	52.8	12	500	0.500	0.300	0.200
		V	85	125	10	52.8	12	180	0.913	0.548	0.365
		V	85	125	10	52.8	12	500	0.548	0.329	0.219
	470	E	85	125	10	75.2	16	450	0.527	0.316	0.211
E		85	125	10	75.2	16	600	0.456	0.274	0.183	
20	3.3	A	85	125	15	0.7	6	4000	0.127	0.076	0.051
		A	85	125	15	0.7	6	5000	0.114	0.068	0.046
		B	85	125	15	0.7	6	3000	0.158	0.095	0.063
		B	85	125	15	0.7	6	4000	0.137	0.082	0.055
	4.7	A	85	125	15	0.9	6	2500	0.161	0.097	0.064
		A	85	125	15	0.9	6	5000	0.114	0.068	0.046
		B	85	125	15	0.9	6	1500	0.224	0.134	0.089
		B	85	125	15	0.9	6	3000	0.158	0.095	0.063
		C	85	125	15	0.9	6	1000	0.300	0.180	0.120
		C	85	125	15	0.9	6	2500	0.190	0.114	0.076
	6.8	B	85	125	15	1.4	6	1000	0.274	0.164	0.110
		B	85	125	15	1.4	6	1800	0.204	0.122	0.082
		C	85	125	15	1.4	6	800	0.335	0.201	0.134
		C	85	125	15	1.4	6	1200	0.274	0.164	0.110
	10	B	85	125	15	2.0	6	1200	0.250	0.150	0.100
		B	85	125	15	2.0	6	1800	0.204	0.122	0.082
		C	85	125	15	2.0	6	600	0.387	0.232	0.155
		C	85	125	15	2.0	6	1000	0.300	0.180	0.120
		D	85	125	15	2.0	6	500	0.458	0.275	0.183
		D	85	125	15	2.0	6	1000	0.324	0.194	0.130
	15	B	85	125	15	3.0	6	1500	0.224	0.134	0.089
		B	85	125	15	3.0	6	1800	0.204	0.122	0.082
		C	85	125	15	3.0	6	800	0.335	0.201	0.134
		C	85	125	15	3.0	6	1000	0.300	0.180	0.120
		D	85	125	15	3.0	6	600	0.418	0.251	0.167
		D	85	125	15	3.0	6	800	0.362	0.217	0.145
	22	C	85	125	15	4.4	6	600	0.387	0.232	0.155
		C	85	125	15	4.4	6	900	0.316	0.190	0.126
		D	85	125	15	4.4	6	400	0.512	0.307	0.205
		D	85	125	15	4.4	6	600	0.418	0.251	0.167
	33	C	85	125	15	6.6	6	600	0.387	0.232	0.155
		C	85	125	15	6.6	6	900	0.316	0.190	0.126
		D	85	125	15	6.6	6	400	0.512	0.307	0.205
	47	D	85	125	15	6.6	6	600	0.418	0.251	0.167
		C	85	125	15	9.4	8	300	0.548	0.329	0.219
		C	85	125	15	9.4	8	400	0.474	0.285	0.190
		D	85	125	15	9.4	8	250	0.648	0.389	0.259
		D	85	125	15	9.4	8	500	0.458	0.275	0.183
	E	85	125	15	9.4	6	250	0.707	0.424	0.283	



**CA45L SMD Chip Tantalum Capacitors Low ESR**

Rated Voltage (V)	Rated CAP (μF)	Case Code	Rated Temp (°C)	Category Temp (°C)	Category Voltage (V)	Max DCL(μA) @25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	Max Ripple @100kHz IRMS(A)		
									25°C	85°C	125°C
20	47	E	85	125	15	9.4	6	500	0.500	0.300	0.200
	68	D	85	125	15	13.6	8	250	0.648	0.389	0.259
		D	85	125	15	13.6	8	300	0.592	0.355	0.237
		E	85	125	15	13.6	6	250	0.707	0.424	0.283
		E	85	125	15	13.6	6	500	0.500	0.300	0.200
	100	D	85	125	15	20.0	10	300	0.592	0.355	0.237
		D	85	125	15	20.0	10	400	0.512	0.307	0.205
		E	85	125	15	20.0	10	250	0.707	0.424	0.283
		E	85	125	15	20.0	10	300	0.645	0.387	0.258
	150	D	85	125	15	30.0	10	450	0.483	0.290	0.193
		D	85	125	15	30.0	10	600	0.418	0.251	0.167
		E	85	125	15	30.0	10	180	0.833	0.500	0.333
		E	85	125	15	30.0	10	250	0.707	0.424	0.283
	220	E	85	125	15	44.0	12	450	0.527	0.316	0.211
		E	85	125	15	44.0	12	600	0.456	0.274	0.183
		V	85	125	15	44.0	12	250	0.775	0.465	0.310
		V	85	125	15	44.0	12	400	0.612	0.367	0.245
	330	E	85	125	15	66.0	12	450	0.527	0.316	0.211
		E	85	125	15	66.0	12	600	0.456	0.274	0.183
		V	85	125	15	66.0	12	450	0.577	0.346	0.231
V		85	125	15	66.0	12	600	0.500	0.300	0.200	
25	1.5	A	85	125	17	0.5	6	4500	0.120	0.072	0.048
		A	85	125	17	0.5	6	7500	0.093	0.056	0.037
		B	85	125	17	0.5	6	3000	0.158	0.095	0.063
		B	85	125	17	0.5	6	5000	0.122	0.073	0.049
	2.2	A	85	125	17	0.6	6	3000	0.147	0.088	0.059
		A	85	125	17	0.6	6	8000	0.090	0.054	0.036
		B	85	125	17	0.6	6	2500	0.173	0.104	0.069
		B	85	125	17	0.6	6	5000	0.122	0.073	0.049
	3.3	B	85	125	17	0.8	6	2000	0.194	0.116	0.077
		B	85	125	17	0.8	6	3000	0.158	0.095	0.063
		C	85	125	17	0.8	6	1200	0.274	0.164	0.110
		C	85	125	17	0.8	6	2000	0.212	0.127	0.085
	4.7	B	85	125	17	1.2	6	1000	0.274	0.164	0.110
		B	85	125	17	1.2	6	1200	0.250	0.150	0.100
		C	85	125	17	1.2	6	1000	0.300	0.180	0.120
		C	85	125	17	1.2	6	2000	0.212	0.127	0.085
	6.8	B	85	125	17	1.7	6	2000	0.194	0.116	0.077
		B	85	125	17	1.7	6	2500	0.173	0.104	0.069
		C	85	125	17	1.7	6	1000	0.300	0.180	0.120
		C	85	125	17	1.7	6	1500	0.245	0.147	0.098
		D	85	125	17	1.7	6	700	0.387	0.232	0.155
		D	85	125	17	1.7	6	1000	0.324	0.194	0.130
	10	B	85	125	17	2.5	8	1500	0.224	0.134	0.089
		B	85	125	17	2.5	8	2000	0.194	0.116	0.077
		C	85	125	17	2.5	6	900	0.316	0.190	0.126
		C	85	125	17	2.5	6	1200	0.274	0.164	0.110
		D	85	125	17	2.5	6	450	0.483	0.290	0.193
		D	85	125	17	2.5	6	800	0.362	0.217	0.145
	15	C	85	125	17	3.8	6	500	0.424	0.255	0.170
		C	85	125	17	3.8	6	1000	0.300	0.180	0.120
		D	85	125	17	3.8	6	400	0.512	0.307	0.205
		D	85	125	17	3.8	6	600	0.418	0.251	0.167
22	C	85	125	17	5.5	6	800	0.335	0.201	0.134	



**CA45L SMD Chip Tantalum Capacitors Low ESR**

Rated Voltage (V)	Rated CAP (μF)	Case Code	Rated Temp (°C)	Category Temp (°C)	Category Voltage (V)	Max DCL(μA) @25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	Max Ripple @100kHz IRMS(A)		
									25°C	85°C	125°C
25	22	C	85	125	17	5.5	6	1000	0.300	0.180	0.120
		D	85	125	17	5.5	6	400	0.512	0.307	0.205
		D	85	125	17	5.5	6	600	0.418	0.251	0.167
	33	D	85	125	17	8.3	8	300	0.592	0.355	0.237
		D	85	125	17	8.3	8	500	0.458	0.275	0.183
		E	85	125	17	8.3	6	250	0.707	0.424	0.283
		E	85	125	17	8.3	6	500	0.500	0.300	0.200
		D	85	125	17	11.8	8	350	0.548	0.329	0.219
		D	85	125	17	11.8	8	500	0.458	0.275	0.183
	47	E	85	125	17	11.8	6	300	0.645	0.387	0.258
		E	85	125	17	11.8	6	600	0.456	0.274	0.183
		E	85	125	17	17.0	8	250	0.707	0.424	0.283
	68	E	85	125	17	17.0	8	500	0.500	0.300	0.200
		V	85	125	17	17.0	8	250	0.775	0.465	0.310
		V	85	125	17	17.0	8	600	0.500	0.300	0.200
	100	E	85	125	17	25.0	10	200	0.791	0.474	0.316
		E	85	125	17	25.0	10	250	0.707	0.424	0.283
		V	85	125	17	25.0	10	200	0.866	0.520	0.346
		V	85	125	17	25.0	10	250	0.775	0.465	0.310
	150	E	85	125	17	37.5	10	600	0.456	0.274	0.183
V		85	125	17	37.5	10	300	0.707	0.424	0.283	
35	0.47	A	85	125	23	0.5	6	4000	0.127	0.076	0.051
		A	85	125	23	0.5	6	8000	0.090	0.054	0.036
	0.68	A	85	125	23	0.5	6	6000	0.104	0.062	0.042
		A	85	125	23	0.5	6	7000	0.096	0.058	0.039
	1	A	85	125	23	0.5	6	6000	0.104	0.062	0.042
		A	85	125	23	0.5	6	7000	0.096	0.058	0.039
		B	85	125	23	0.5	4	2500	0.173	0.104	0.069
		B	85	125	23	0.5	4	3000	0.158	0.095	0.063
	1.5	B	85	125	23	0.5	6	3000	0.158	0.095	0.063
		B	85	125	23	0.5	6	4000	0.137	0.082	0.055
		C	85	125	23	0.5	6	2500	0.190	0.114	0.076
		C	85	125	23	0.5	6	3000	0.173	0.104	0.069
	2.2	B	85	125	23	0.8	6	2500	0.173	0.104	0.069
		B	85	125	23	0.8	6	3000	0.158	0.095	0.063
		C	85	125	23	0.8	6	2000	0.212	0.127	0.085
		C	85	125	23	0.8	6	2500	0.190	0.114	0.076
	3.3	B	85	125	23	1.2	6	2500	0.173	0.104	0.069
		B	85	125	23	1.2	6	3000	0.158	0.095	0.063
		C	85	125	23	1.2	6	1200	0.274	0.164	0.110
		C	85	125	23	1.2	6	2000	0.212	0.127	0.085
	4.7	B	85	125	23	1.6	8	2000	0.194	0.116	0.077
		B	85	125	23	1.6	8	2500	0.173	0.104	0.069
		C	85	125	23	1.6	6	800	0.335	0.201	0.134
		C	85	125	23	1.6	6	1000	0.300	0.180	0.120
		D	85	125	23	1.6	6	700	0.387	0.232	0.155
		D	85	125	23	1.6	6	1000	0.324	0.194	0.130
	6.8	C	85	125	23	2.4	6	700	0.359	0.215	0.143
		C	85	125	23	2.4	6	1200	0.274	0.164	0.110
		D	85	125	23	2.4	6	600	0.418	0.251	0.167
		D	85	125	23	2.4	6	1000	0.324	0.194	0.130
10	C	85	125	23	3.5	6	700	0.359	0.215	0.143	
	C	85	125	23	3.5	6	1000	0.300	0.180	0.120	
	D	85	125	23	3.5	6	400	0.512	0.307	0.205	





**CA45L SMD Chip Tantalum Capacitors Low ESR**

Rated Voltage (V)	Rated CAP (μF)	Case Code	Rated Temp(°C)	Category Temp (°C)	Category Voltage (V)	Max DCL(μA)@25°C	Max DF(%) @25°C 100Hz	Max ESR (mΩ) @25°C 100KHz	Max Ripple @100kHz IRMS(A)			
									25 °C	85 °C	125 °C	
35	10	D	85	125	23	3.5	6	800	0.362	0.217	0.145	
		D	85	125	23	5.3	6	350	0.548	0.329	0.219	
	15	D	85	125	23	5.3	6	600	0.418	0.251	0.167	
		E	85	125	23	5.3	6	300	0.645	0.387	0.258	
		E	85	125	23	5.3	6	600	0.456	0.274	0.183	
		E	85	125	23	7.7	6	300	0.645	0.387	0.258	
	22	D	85	125	23	7.7	6	400	0.512	0.307	0.205	
		D	85	125	23	7.7	6	500	0.458	0.275	0.183	
		E	85	125	23	7.7	6	300	0.645	0.387	0.258	
		E	85	125	23	7.7	6	400	0.559	0.335	0.224	
		E	85	125	23	11.6	8	500	0.458	0.275	0.183	
		E	85	125	23	11.6	8	700	0.387	0.232	0.155	
	33	E	85	125	23	11.6	6	300	0.645	0.387	0.258	
		E	85	125	23	11.6	6	600	0.456	0.274	0.183	
		D	85	125	23	16.5	8	400	0.512	0.307	0.205	
		D	85	125	23	16.5	8	900	0.342	0.205	0.137	
47	E	85	125	23	16.5	6	400	0.559	0.335	0.224		
	E	85	125	23	16.5	6	600	0.456	0.274	0.183		
	E	85	125	23	23.8	8	800	0.395	0.237	0.158		
	E	85	125	23	23.8	8	800	0.395	0.237	0.158		
50	0.47	A	85	125	33	0.5	6	3000	0.147	0.088	0.059	
		A	85	125	33	0.5	6	6000	0.104	0.062	0.042	
	0.68	B	85	125	33	0.5	6	3000	0.158	0.095	0.063	
		B	85	125	33	0.5	6	6000	0.112	0.067	0.045	
	1	B	85	125	33	0.5	6	2500	0.173	0.104	0.069	
		B	85	125	33	0.5	6	4000	0.137	0.082	0.055	
		C	85	125	33	0.5	4	1800	0.224	0.134	0.089	
		C	85	125	33	0.5	4	4000	0.150	0.090	0.060	
	1.5	C	85	125	33	0.8	6	1800	0.224	0.134	0.089	
		C	85	125	33	0.8	6	3000	0.173	0.104	0.069	
		D	85	125	33	0.8	6	1000	0.324	0.194	0.130	
		D	85	125	33	0.8	6	2500	0.205	0.123	0.082	
	2.2	C	85	125	33	1.1	6	1500	0.245	0.147	0.098	
		C	85	125	33	1.1	6	2000	0.212	0.127	0.085	
		D	85	125	33	1.1	6	700	0.387	0.232	0.155	
		D	85	125	33	1.1	6	1000	0.324	0.194	0.130	
	3.3	C	85	125	33	1.7	6	700	0.359	0.215	0.143	
		C	85	125	33	1.7	6	1500	0.245	0.147	0.098	
		D	85	125	33	1.7	6	700	0.387	0.232	0.155	
	4.7	D	85	125	33	1.7	6	1500	0.265	0.159	0.106	
		C	85	125	33	2.4	6	700	0.359	0.215	0.143	
		C	85	125	33	2.4	6	1000	0.300	0.180	0.120	
		D	85	125	33	2.4	6	600	0.418	0.251	0.167	
	6.8	D	85	125	33	2.4	6	1000	0.324	0.194	0.130	
		D	85	125	33	3.4	6	600	0.418	0.251	0.167	
		D	85	125	33	3.4	6	800	0.362	0.217	0.145	
		E	85	125	33	3.4	6	500	0.500	0.300	0.200	
	10	E	85	125	33	3.4	6	1000	0.354	0.212	0.141	
		D	85	125	33	5.0	6	400	0.512	0.307	0.205	
		D	85	125	33	5.0	6	600	0.418	0.251	0.167	
		E	85	125	33	5.0	6	400	0.559	0.335	0.224	
	15	E	85	125	33	5.0	6	800	0.395	0.237	0.158	
		E	85	125	33	7.5	6	400	0.559	0.335	0.224	
		E	85	125	33	7.5	6	500	0.500	0.300	0.200	
	22	E	85	125	33	11.0	8	400	0.559	0.335	0.224	
		E	85	125	33	11.0	8	500	0.500	0.300	0.200	
	63	1	C	85	125	40	0.6	6	2000	0.212	0.127	0.085
		1.5	D	85	125	40	0.9	6	2500	0.205	0.123	0.082
		2.2	D	85	125	40	1.4	6	1500	0.265	0.159	0.106
		3.3	D	85	125	40	2.1	6	1200	0.296	0.177	0.118
4.7		E	85	125	40	3.0	6	800	0.395	0.237	0.158	
6.8		E	85	125	40	4.3	6	600	0.456	0.274	0.183	
10		E	85	125	40	6.3	8	450	0.527	0.316	0.211	
15		E	85	125	40	9.5	8	300	0.645	0.387	0.258	
		V	85	125	40	9.5	8	300	0.707	0.424	0.283	
22	V	85	125	40	13.9	8	300	0.707	0.424	0.283		



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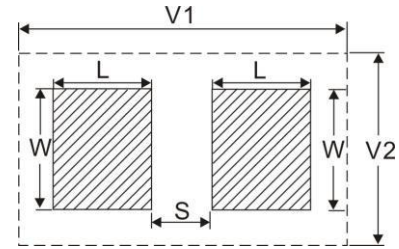
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**Density Level A:** For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes.

**Density Level B:** For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.

**Density Level C:** For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC standard 7351 (IPC-7351).

1 Height of these chips may create problems in wave soldering. 2 Land pattern geometry is too small for silkscreen outline.



## Soldering Process

WEET tantalum capacitors are compatible with wave (single or dual), convection, IR, or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. WEET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J STD 020D standard for moisture sensitivity testing. The devices can safely withstand a maximum of three reflow passes at these conditions.

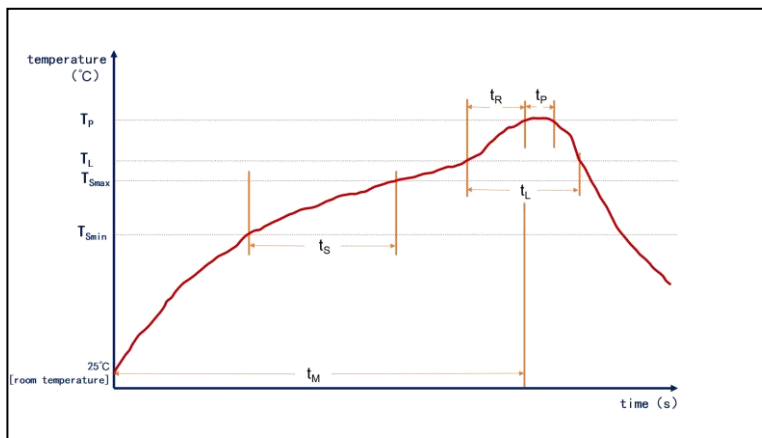
Hand soldering should be performed with care due to the difficulty in process control. If performed, care should be taken to avoid contact of the soldering iron to the molded case. The iron should be used to heat the solder pad, applying solder between the pad and the termination, until reflow occurs. Once reflow occurs, the iron should be removed immediately. "Wiping" the edges of a chip and heating the top surface is not recommended.

During typical reflow operations, a slight darkening of the gold-colored epoxy may be observed. This slight darkening is normal and not harmful to the product. Marking permanency is not affected by this change.

Curve Characteristics	Tin Lead Solder	Lead-free Solder
Preheating Minimum Temperature ( $T_{Smin}$ )	100°C	150°C
Preheat Maximum Temperature ( $T_{Smax}$ )	150°C	200°C
Warming-up Time ( $t_s$ )	60 – 120 seconds	60 – 120 seconds
Heating Rate ( $T_L$ to $T_P$ )	$\leq 3^\circ\text{C} / \text{seconds}$	$\leq 3^\circ\text{C} / \text{seconds}$
Melting Point of Solder Paste ( $T_L$ )	183°C	217°C
Melting Time of Solder Paste ( $t_L$ )	60 – 150 seconds	60 – 150 seconds
Peak Temperature ( $T_P$ )	220°C* or 235°C**	245°C* or 250°C**
Peak Temperature Holding Time, Deviation Less than 5°C ( $t_P$ )	$\leq 10$ seconds	$\leq 5$ seconds
Cooling Rate ( $T_P$ to $T_L$ )	$\leq 6^\circ\text{C} / \text{seconds}$	$\leq 6^\circ\text{C} / \text{seconds}$
Room Temperature 25°C to Peak Temperature Time	$\leq 6$ minutes	$\leq 8$ minutes

Note: All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow.

\*Case Size D, \*\*Case Size A, B, C



Recommended Reflow Profile



**PN Structure:**

10uF 25V +/-10% B case Tape/Reel RoHS

Body Mark: E100

WTC	250	K	100	B	T	R	100
Series	Voltage	Tolerance	Capacitance	Case	Packing	Pb	ESR
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>

**1. Voltage & Mark**

040	4V	G
060	6.3V	J
100	10V	A
160	16V	C
200	20V	D
250	25V	E
350	35V	V
500	50V	T

**2. Tolerance**

J	±5.0%
K	±10%
M	±20%

**3. Capacitance**

0R1	0.1uF
R22	0.22uF
010	1uF
2R2	2.2uF
100	10uF
221	220uF

**4. Case**

A	B	C	D
---	---	---	---

**5. Packing**

T	Tape/Reel
---	-----------

**6. Pb**

R	RoHS
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