

Aluminum Electrolytic Capacitors

TUP/TSP

TUP/TSP Series

Key Features

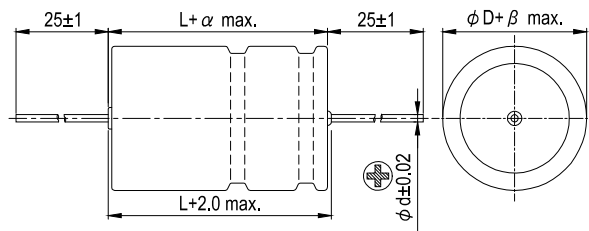
- High vibration resistance
- High ripple current capability
- Low ESR
- Useful Life 2,000 hours at 150°C
- Shelf life up to 15 years at a storage temperature of 30°C
- RoHS compliance

Specifications

Rated Voltage V_R	25 ~ 63 V _{DC}	
Surge Voltage V_S	1.15 · V_R	
Rated Capacitance C_R	360 ~ 4,500 μ F	at 100 Hz, 20°C
Capacitance Tolerance	-10% ~ +30%	
Leakage Current I_{leak} (at 20°C)	$I_{leak} \leq 0.006\mu A \cdot CV + 4\mu A$ C = Rated capacitance in μ F, V = Rated DC working voltage in V	
Useful Life 125°C: $V_R, I_{AC, R}$ 150°C: $V_R, 0.5 \cdot I_{AC, R}$	10,000 Hrs 2,000 Hrs	Requirements: Cap.: Within \pm 30% of initial value ESR: Within 300% of specified value I_{leak} : Within initial specified limit
Voltage Endurance Test 125°C: V_R	4,000 Hrs for $V_R \leq 40V$ DC 3,000 Hrs for $V_R = 63V$ DC	Requirements: Cap.: Within \pm 10% of initial value ESR: Within 130% of specified value I_{leak} : Within initial specified limit
Vibration Resistance	The wires of the Axial-Lead capacitor should be mounted at a distance of (6 \pm 1) mm from its body, which is additionally clamped. Soldering star capacitors should be mounted in a upright position and its terminals should be firmly soldered to the PCB and body additionally clamped. Vibration test according to IEC 60068-2-6, test Fc: Frequency range 10 Hz ~ 2 KHz, max. displacement amplitude 1.5 mm, max. acceleration 20 g, in total 6 hours(3*2 hours).	
Detail Specification Sectional Specification	Similar to CECC 30301-802 IEC 60384-4	

Product Dimensions

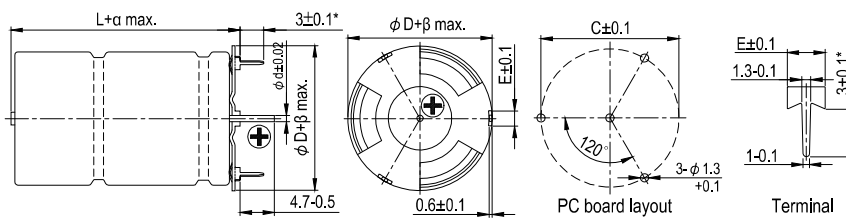
TUP Series



Unit: mm

ϕD	16	18	21
ϕd	1.0		
α	0.5		
β	0.5		

TSP Series



Unit: mm

ϕD	16	18	21
C	16.5	18.5	21.5
E	3.1		3.6
ϕd	1.0		
α	2.5		
β	1.2		



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Characteristics and Permissible Ripple Current

Working Voltage (V _{DC})	Capacitance 100 Hz, 20°C (μF)	φD×L (mm)	ESR _{max} 100 Hz, 20°C (Ω)	ESR _{max} 10k Hz, 20°C (Ω)	Imp. _{max} 100k Hz, 20°C (Ω)	I _{AC, R} 10k Hz, 125°C (A _{rms})	I _{AC, max} 10k Hz, 150°C (A _{rms})	Axial-lead Part Number	Soldering star Part Number
25	1,000	16 × 25	0.098	0.053	0.050	3.6	1.8	TUP102Q1EAL-1625S	TSP102Q1ESS-1625S
	1,200	18 × 25	0.080	0.043	0.041	4.4	2.2	TUP122Q1EAL-1825S	TSP122Q1ESS-1825S
	1,300	16 × 30	0.075	0.041	0.039	4.5	2.2	TUP132Q1EAL-1630S	TSP132Q1ESS-1630S
	1,500	16 × 35	0.065	0.035	0.034	5.2	2.6	TUP152Q1EAL-1635S	TSP152Q1ESS-1635S
	1,700	18 × 30	0.057	0.031	0.029	5.5	2.7	TUP172Q1EAL-1830S	TSP172Q1ESS-1830S
	1,800	16 × 39	0.055	0.030	0.028	5.9	2.9	TUP182Q1EAL-1639S	TSP182Q1ESS-1639S
	2,200	18 × 39	0.044	0.024	0.023	7.2	3.6	TUP222Q1EAL-1839S	TSP222Q1ESS-1839S
	3,300	21 × 39	0.031	0.017	0.016	8.3	4.1	TUP332Q1EAL-2139S	TSP332Q1ESS-2139S
	4,500	21 × 49	0.023	0.013	0.012	10.4	5.2	TUP452Q1EAL-2149S	TSP452Q1ESS-2149S
40	560	16 × 25	0.129	0.053	0.050	3.6	1.8	TUP561Q1GAL-1625S	TSP561Q1GSS-1625S
	680	18 × 25	0.105	0.043	0.041	4.4	2.2	TUP681Q1GAL-1825S	TSP681Q1GSS-1825S
	720	16 × 30	0.100	0.042	0.039	4.5	2.2	TUP721Q1GAL-1630S	TSP721Q1GSS-1630S
	820	16 × 35	0.088	0.036	0.034	5.2	2.6	TUP821Q1GAL-1635S	TSP821Q1GSS-1635S
	900	18 × 30	0.080	0.033	0.031	5.4	2.7	TUP901Q1GAL-1830S	TSP901Q1GSS-1830S
	1,000	16 × 39	0.073	0.030	0.029	5.9	2.9	TUP102Q1GAL-1639S	TSP102Q1GSS-1639S
	1,400	18 × 39	0.052	0.022	0.020	7.4	3.7	TUP142Q1GAL-1839S	TSP142Q1GSS-1839S
	2,000	21 × 39	0.038	0.016	0.016	8.4	4.2	TUP202Q1GAL-2139S	TSP202Q1GSS-2139S
	2,700	21 × 49	0.028	0.012	0.012	10.5	5.2	TUP272Q1GAL-2149S	TSP272Q1GSS-2149S
63	360	16 × 25	0.173	0.058	0.055	2.6	1.3	TUP361Q1JAL-1625S	TSP361Q1JSS-1625S
	470	18 × 25	0.132	0.043	0.041	3.3	1.6	TUP471Q1JAL-1825S	TSP471Q1JSS-1825S
	510	16 × 30	0.124	0.042	0.040	3.4	1.7	TUP511Q1JAL-1630S	TSP511Q1JSS-1630S
	620	16 × 35	0.102	0.034	0.033	4.0	2.0	TUP621Q1JAL-1635S	TSP621Q1JSS-1635S
	620	18 × 30	0.100	0.033	0.032	4.1	2.0	TUP621Q1JAL-1830S	TSP621Q1JSS-1830S
	750	16 × 39	0.084	0.029	0.027	4.5	2.2	TUP751Q1JAL-1639S	TSP751Q1JSS-1639S
	820	18 × 35	0.076	0.026	0.024	5.0	2.5	TUP821Q1JAL-1835S	TSP821Q1JSS-1835S
	910	18 × 39	0.069	0.023	0.022	5.5	2.7	TUP911Q1JAL-1839S	TSP911Q1JSS-1839S
	910	21 × 30	0.071	0.025	0.024	4.8	2.4	TUP911Q1JAL-2130S	TSP911Q1JSS-2130S
	1,100	21 × 35	0.058	0.021	0.020	5.6	2.8	TUP112Q1JAL-2135S	TSP112Q1JSS-2135S
	1,300	21 × 39	0.050	0.018	0.017	6.4	3.2	TUP132Q1JAL-2139S	TSP132Q1JSS-2139S
	1,800	21 × 49	0.036	0.013	0.013	8.0	4.0	TUP182Q1JAL-2149S	TSP182Q1JSS-2149S

Part Numbering System

TUP series 1,000 μF -10% ~ +30% 40V Axial-lead 16 φ × 39L

TUP **102** **Q** **1G** **—** **=** **1639** **S**

Series name Capacitance Capacitance tolerance Rated voltage Lead forming Sealing type Case size Regional Code

Note: Please refer to "Part Numbering System" section on page 1 for more details.

Product Guide

Selection Chart

TUR / TSR -40 ~ +125°C High Ripple Current 125°C, 3,000 Hrs	TUK / TSK -40 ~ +125°C Long Life Time 125°C, 5,000 Hrs 140°C, 2,000 Hrs	TUP / TSP -40 ~ +150°C High Temperature 125°C, 10,000 Hrs 150°C, 2,000 Hrs
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Capacitor Series Table

Series	Highlights	Temperature	Rated Voltage Range (V, DC)	Capacitance Range (µF)	Page
TUR / TSR	High Ripple Current	-40 ~ 125°C	25 ~ 40	1,400 ~ 10,000	3 ~ 4
TUK / TSK	High Reliability, Long Lifetime	-40 ~ 125°C	25 ~ 100	220 ~ 10,000	5 ~ 6
TUP / TSP	High Temperature	-40 ~ 150°C	25 ~ 63	360 ~ 4,500	7 ~ 8

Part Numbering System

Product Code Guide

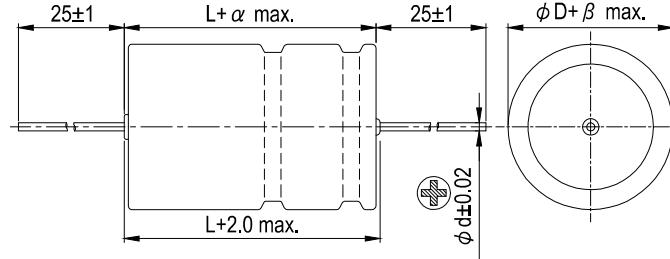
Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Example:	T	U	R	1	7	2	Q	1	E	A	L	-	1	8	3	0		

Digit	Description																										
1 ~ 3	Series Name When the series name is represented by only two letters, a hyphen, "-", is used to fill the third space.																										
4 ~ 6	Capacitance <table border="1"> <thead> <tr> <th>Capacitance</th> <th>220</th> <th>300</th> <th>700</th> <th>1,000</th> <th>4,700</th> <th>5,600</th> <th>10,000</th> </tr> </thead> <tbody> <tr> <th>Code</th> <td>221</td> <td>301</td> <td>701</td> <td>102</td> <td>472</td> <td>562</td> <td>103</td> </tr> </tbody> </table>	Capacitance	220	300	700	1,000	4,700	5,600	10,000	Code	221	301	701	102	472	562	103										
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7	Capacitance Tolerance <table border="1"> <thead> <tr> <th>Tolerance</th> <th>K</th> <th>M</th> <th>N</th> <th>Q</th> </tr> </thead> <tbody> <tr> <th>Code</th> <td>±10%</td> <td>±20%</td> <td>±30%</td> <td>-10 ~ +30%</td> </tr> </tbody> </table>	Tolerance	K	M	N	Q	Code	±10%	±20%	±30%	-10 ~ +30%																
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8 ~ 9	Rated Voltage <table border="1"> <thead> <tr> <th>Voltage (WV)</th> <th>25</th> <th>35</th> <th>40</th> <th>50</th> <th>63</th> <th>75</th> <th>100</th> </tr> </thead> <tbody> <tr> <th>Code</th> <td>1E</td> <td>1V</td> <td>1G</td> <td>1H</td> <td>1J</td> <td>1R</td> <td>2A</td> </tr> </tbody> </table>	Voltage (WV)	25	35	40	50	63	75	100	Code	1E	1V	1G	1H	1J	1R	2A										
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10 ~ 11	Lead Forming <table border="1"> <thead> <tr> <th>AL</th> <th>SS</th> <th>PP</th> </tr> </thead> <tbody> <tr> <td>Axial-lead,</td> <td>Soldering star</td> <td>Two plate</td> </tr> </tbody> </table>	AL	SS	PP	Axial-lead,	Soldering star	Two plate																				
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12	Sealing Type - : Standard																										
13 ~ 16	Case Size <table border="1"> <thead> <tr> <th>φ D×L</th> <th>16×25</th> <th>16×30</th> <th>16×35</th> <th>16×39</th> <th>18×25</th> <th>18×30</th> <th>18×35</th> <th>18×39</th> <th>21×30</th> <th>21×35</th> <th>21×39</th> <th>21×49</th> </tr> </thead> <tbody> <tr> <th>Code</th> <td>1625</td> <td>1630</td> <td>1635</td> <td>1639</td> <td>1825</td> <td>1830</td> <td>1835</td> <td>1839</td> <td>2130</td> <td>2135</td> <td>2139</td> <td>2149</td> </tr> </tbody> </table>	φ D×L	16×25	16×30	16×35	16×39	18×25	18×30	18×35	18×39	21×30	21×35	21×39	21×49	Code	1625	1630	1635	1639	1825	1830	1835	1839	2130	2135	2139	2149
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Code	1625	1630	1635	1639	1825	1830	1835	1839	2130	2135	2139	2149															
17	Lead Wire and Marking Type																										
18	Supplement Code: For special control purposes																										

Product Guide

Dimensional and Lead Forming Drawings

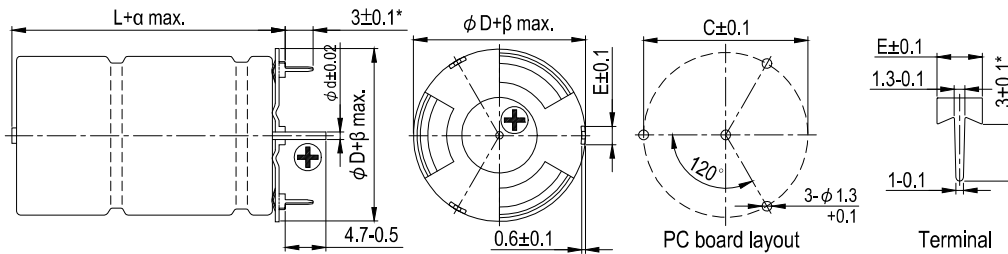
Axial-lead capacitors



Dimensions and packing units

$\phi D \times L$ mm	$\phi D + \beta$ (max.) $\times L + \alpha$ (max.) mm	ϕd mm	Q'ty / Tray pcs	Q'ty / Box pcs
16 × 25	16.5 × 25.5	1.0	45	315
16 × 30	16.5 × 30.5	1.0	45	315
16 × 35	16.5 × 35.5	1.0	45	315
16 × 39	16.5 × 39.5	1.0	45	315
18 × 25	18.5 × 25.5	1.0	45	315
18 × 30	18.5 × 30.5	1.0	45	315
18 × 35	18.5 × 35.5	1.0	45	315
18 × 39	18.5 × 39.5	1.0	45	315
21 × 30	21.5 × 30.5	1.0	45	270
21 × 35	21.5 × 35.5	1.0	45	270
21 × 39	21.5 × 39.5	1.0	45	270
21 × 49	21.5 × 49.5	1.0	35	210

Soldering star capacitors



Dimensions and packing units

$\phi D \times L$ mm	$\phi D + \beta$ (max.) $\times L + \alpha$ (max.) mm	ϕd mm	$C \pm 0.1$ mm	$E \pm 0.1$ mm	Q'ty / Tray pcs	Q'ty / Box pcs
16 × 25	17.2 × 27.5	1.0	16.5	3.1	45	315
16 × 30	17.2 × 32.5	1.0	16.5	3.1	45	315
16 × 35	17.2 × 37.5	1.0	16.5	3.1	45	315
16 × 39	17.2 × 41.5	1.0	16.5	3.1	35	245
18 × 25	19.2 × 27.5	1.0	18.5	3.1	45	315
18 × 30	19.2 × 32.5	1.0	18.5	3.1	45	315
18 × 35	19.2 × 37.5	1.0	18.5	3.1	45	315
18 × 39	19.2 × 41.5	1.0	18.5	3.1	35	245
21 × 30	22.2 × 32.5	1.0	21.5	3.6	45	270
21 × 35	22.2 × 37.5	1.0	21.5	3.6	45	270
21 × 39	22.2 × 41.5	1.0	21.5	3.6	35	210
21 × 49	22.2 × 51.5	1.0	21.5	3.6	35	210