

## TS-UP Series 85°C, 3000 hours\*

- Compact size for general purpose and industrial applications
- 2 and 3 pin versions available
- 20mm lengths for low profile applications



Rated Working Voltage:	16 ~ 250 VDC	350 ~ 500 VDC
Operating Temperature:	-40 ~ +85°C	-25 ~ +85°C
Nominal Capacitance:	120 ~ 82000µF (±20% tolerance)	33 ~ 1000µF (±20% tolerance)
Dissipation Factor: (120 Hz, +20°C)	Working Voltage [V]:	16 25 35 50 63 80 100 160 ~ 500
	Max. D.F. (%):	50 40 35 30 25 20 20 15
For capacitance values > 33000µF, add the value of: $\frac{\text{rated cap. } [\mu\text{F}] - 33000}{1000}$		
Leakage Current:	$3\sqrt{CV}$ (µA) max. after 5 minutes; C = Capacitance in µF, V = WV	
Ripple Current Multipliers:	Frequency(Hz):	50 60 100-120 500 1k 10k- <span style="float:right">Ripple Current Ambient Temperature Factors**</span>
	16-100WV:	0.93 0.95 1.0 1.05 1.08 1.15 <span style="float:right">Temperature (°C): 85°C 70°C 60°C ≤45°C</span>
	160-500WV:	0.75 0.8 1.0 1.2 1.25 1.4 <span style="float:right">Multiplier: 1.0 1.3 1.4 1.5</span>
Endurance:	3000 hours at +85°C with maximum specified ripple current (see page 6) *2000 hours for 20mm length sizes	

\*\*Use of temperature ripple current multipliers may limit life to the hours specified for the maximum operating temperature.

### Part Number System

<b>E</b>	<b>C</b>	<b>P</b>	<b>Voltage Code</b>	<b>Series</b>	<b>Capacitance Code</b>	<b>Case Diameter</b>	<b>Insulation Options</b>
<b>Common Code / Terminal Type</b>							<b>25 ~ 50mm lengths</b>
<b>ECOS</b>						<b>B</b>	<b>A</b> PVC with top plate
<b>ECEC</b>						<b>C</b>	<b>B</b> PVC without top plate
<b>ECE3</b>						<b>D</b>	<b>20mm length</b>
						<b>E</b>	<b>L</b> PVC with top plate
							<b>G</b> PVC without top plate
							<b>Extended Capacitance Ratings</b>
							<b>X</b> PVC with top plate

### TS-UP Standard Ratings (part numbers shown with 2 pins, 6.3mm length terminal, and top vinyl plate)

Cap. (µF)	Size (mm) D x L	Max 85°C R.C. (A <sub>rms</sub> )		Max. 20°C ESR (Ω)		Panasonic Part Number
		120Hz	10kHz~	120Hz	20kHz	
<b>16 VDC Working, 20 VDC Surge</b>						
4700	22 x 20	1.60	1.84	0.159	0.135	ECOS1CP472BL
	22 x 25	1.77	2.04	0.159	0.135	ECOS1CP472BA
6800	22 x 25	2.57	2.96	0.110	0.093	ECOS1CP682BA
	25 x 20	1.80	2.07	0.110	0.093	ECOS1CP682CL
8200	22 x 25	3.10	3.57	0.091	0.077	ECOS1CP822BA
10000	22 x 30	3.78	4.35	0.075	0.063	ECOS1CP103BA
	25 x 25	3.78	4.35	0.075	0.063	ECOS1CP103CA
	30 x 20	2.40	2.76	0.083	0.070	ECOS1CP103DL
12000	22 x 30	4.52	5.20	0.062	0.053	ECOS1CP123BA
	25 x 25	4.52	5.20	0.062	0.053	ECOS1CP123CA
15000	22 x 35	5.26	6.05	0.053	0.045	ECOS1CP153BA
	25 x 30	5.26	6.05	0.053	0.045	ECOS1CP153CA
	35 x 20	3.20	3.68	0.055	0.047	ECOS1CP153EL
18000	22 x 40	5.57	6.41	0.046	0.039	ECOS1CP183BA
	25 x 30	5.57	6.41	0.046	0.039	ECOS1CP183CA
22000	22 x 45	6.10	7.02	0.038	0.032	ECOS1CP223BA
	25 x 35	6.10	7.02	0.038	0.032	ECOS1CP223CA
	30 x 30	6.10	7.02	0.038	0.032	ECOS1CP223DA
27000	25 x 45	6.31	7.26	0.031	0.026	ECOS1CP273CA
	30 x 35	6.31	7.26	0.031	0.026	ECOS1CP273DA
33000	25 x 50	6.84	7.87	0.025	0.021	ECOS1CP333CA
	30 x 40	6.84	7.87	0.025	0.021	ECOS1CP333DA
	35 x 30	6.84	7.87	0.025	0.021	ECOS1CP333EA
39000	30 x 45	6.94	7.98	0.021	0.018	ECOS1CP393DA
	35 x 35	6.94	7.98	0.021	0.018	ECOS1CP393EA
47000	30 x 50	7.47	8.59	0.019	0.017	ECOS1CP473DA
	35 x 40	7.47	8.59	0.021	0.019	ECOS1CP473EA
56000	35 x 45	8.73	10.04	0.019	0.018	ECOS1CP563EA
68000	35 x 50	9.05	10.41	0.018	0.017	ECOS1CP683EA
<b>25 VDC Working, 32 VDC Surge</b>						
3300	22 x 20	1.60	1.84	0.176	0.141	ECOS1EP332BL
	22 x 25	1.68	1.93	0.161	0.129	ECOS1EP332BA
4700	22 x 25	2.39	2.75	0.113	0.090	ECOS1EP472BA
	25 x 20	1.80	2.07	0.123	0.099	ECOS1EP472CL
5600	22 x 25	2.86	3.29	0.095	0.076	ECOS1EP562BA
<b>25 VDC Working, 32 VDC Surge (continued)</b>						
6800	22 x 30	3.47	3.99	0.078	0.062	ECOS1EP682BA
	25 x 25	3.47	3.99	0.078	0.062	ECOS1EP682CA
	30 x 20	2.30	2.65	0.078	0.062	ECOS1EP682DL
8200	22 x 30	3.57	4.11	0.065	0.052	ECOS1EP822BA
	25 x 25	3.57	4.11	0.065	0.052	ECOS1EP822CA
10000	22 x 35	3.78	4.35	0.058	0.046	ECOS1EP103BA
	25 x 30	3.78	4.35	0.058	0.046	ECOS1EP103CA
	30 x 25	3.78	4.35	0.058	0.046	ECOS1EP103DA
	35 x 20	2.70	3.11	0.061	0.049	ECOS1EP103EL
12000	22 x 40	4.10	4.72	0.048	0.039	ECOS1EP123BA
	25 x 35	4.10	4.72	0.048	0.039	ECOS1EP123CA
	30 x 30	4.10	4.72	0.048	0.039	ECOS1EP123DA
15000	22 x 50	4.63	5.32	0.039	0.031	ECOS1EP153BA
	25 x 40	4.63	5.32	0.039	0.031	ECOS1EP153CA
	30 x 30	4.63	5.32	0.039	0.031	ECOS1EP153DA
18000	25 x 45	5.47	6.29	0.035	0.028	ECOS1EP183CA
	30 x 35	5.47	6.29	0.035	0.028	ECOS1EP183DA
22000	25 x 50	6.10	7.02	0.029	0.023	ECOS1EP223CA
	30 x 40	6.10	7.02	0.029	0.023	ECOS1EP223DA
27000	30 x 45	6.21	7.14	0.023	0.019	ECOS1EP273DA
	35 x 35	6.21	7.14	0.025	0.020	ECOS1EP273EA
33000	30 x 50	6.84	7.87	0.020	0.017	ECOS1EP333DA
	35 x 40	6.84	7.87	0.020	0.017	ECOS1EP333EA
39000	35 x 45	7.36	8.46	0.019	0.017	ECOS1EP393EA
47000	35 x 50	8.00	9.20	0.017	0.015	ECOS1EP473EA
<b>35 VDC Working, 44 VDC Surge</b>						
2200	22 x 20	1.40	1.61	0.181	0.136	ECOS1VP222BL
	22 x 25	1.52	1.75	0.166	0.124	ECOS1VP222BA
3300	22 x 25	2.29	2.63	0.111	0.083	ECOS1VP332BA
	25 x 20	1.70	1.96	0.121	0.090	ECOS1VP332CL
3900	22 x 25	2.71	3.12	0.094	0.070	ECOS1VP392BA
4700	22 x 30	3.26	3.75	0.078	0.058	ECOS1VP472BA
	25 x 25	3.26	3.75	0.078	0.058	ECOS1VP472CA
	30 x 20	2.00	2.30	0.088	0.066	ECOS1VP472DL
5600	22 x 30	3.36	3.86	0.080	0.060	ECOS1VP562BA

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### TS-UP Standard Ratings (continued)

Cap. (µF)	Size (mm) D x L	Max 85°C R.C. (A <sub>rms</sub> )		Max. 20°C ESR (Ω)		Panasonic Part Number	Cap. (µF)	Size (mm) D x L	Max 85°C R.C. (A <sub>rms</sub> )		Max. 20°C ESR (Ω)		Panasonic Part Number
		120Hz	10kHz-	120Hz	20kHz				120Hz	20kHz	120Hz	20kHz	
<b>160 VDC Working, 200 VDC Surge</b>							<b>200 VDC Working, 250 VDC Surge (continued)</b>						
220	22 x 20 22 x 25	0.75 0.91	1.05 1.27	0.980 0.829	0.490 0.414	ECOS2CP221BL ECOS2CP221BA	1500	30 x 45 30 x 50 35 x 35 35 x 40	3.87 3.87 3.87 3.87	5.42 5.42 5.42 5.42	0.144 0.144 0.144 0.144	0.072 0.072 0.072 0.072	ECOS2DP152DX ECOS2DP152DA ECOS2DP152EX ECOS2DP152EA
270	22 x 25 25 x 20	1.19 0.87	1.67 1.22	0.675 0.798	0.338 0.399	ECOS2CP271BA ECOS2CP271CL	1800	30 x 50 35 x 40 35 x 45	4.32 4.32 4.32	6.05 6.05 6.05	0.120 0.120 0.120	0.060 0.060 0.060	ECOS2DP182DX ECOS2DP182EX ECOS2DP182EA
330	22 x 25	1.45	2.03	0.553	0.276	ECOS2CP331BA	2200	35 x 45 35 x 50	4.92 4.92	6.89 6.89	0.098 0.098	0.054 0.054	ECOS2DP222EX ECOS2DP222EA
390	22 x 25 25 x 25 30 x 20	1.62 1.62 1.10	2.27 2.27 1.54	0.468 0.468 0.595	0.234 0.234 0.298	ECOS2CP391BX ECOS2CP391CA ECOS2CP391DL	<b>250 VDC Working, 300 VDC Surge</b>						
470	22 x 30 25 x 25	2.11 2.11	2.95 2.95	0.423 0.423	0.212 0.212	ECOS2CP471BA ECOS2CP471CA	120	22 x 20 22 x 25	0.45 0.71	0.63 0.99	1.658 1.520	0.663 0.608	ECOS2EP121BL ECOS2EP121BA
560	22 x 30 22 x 35 25 x 25 25 x 30 35 x 20	2.25 2.25 2.25 2.25 1.30	3.15 3.15 3.15 3.15 1.82	0.355 0.355 0.355 0.355 0.414	0.178 0.178 0.178 0.178 0.207	ECOS2CP561BX ECOS2CP561BA ECOS2CP561CX ECOS2CP561CA ECOS2CP561EL	150	22 x 25 25 x 20	0.89 0.65	1.25 0.91	1.216 1.326	0.486 0.531	ECOS2EP151BA ECOS2EP151CL
680	22 x 35 22 x 40 25 x 30 30 x 25	2.50 2.50 2.50 2.50	3.50 3.50 3.50 3.50	0.293 0.293 0.293 0.293	0.146 0.146 0.146 0.146	ECOS2CP681BX ECOS2CP681BA ECOS2CP681CX ECOS2CP681DA	180	22 x 25	1.07	1.50	0.921	0.368	ECOS2EP181BA
820	22 x 40 22 x 45 25 x 35 30 x 25 30 x 30	2.50 2.75 2.75 2.75 2.75	3.50 3.85 3.85 3.85 3.85	0.243 0.263 0.263 0.263 0.263	0.121 0.131 0.131 0.131 0.131	ECOS2CP821BX ECOS2CP821BA ECOS2CP821CA ECOS2CP821DX ECOS2CP821DA	220	22 x 25 30 x 20	1.17 0.87	1.64 1.22	0.754 0.829	0.301 0.332	ECOS2EP221BX ECOS2EP221DL
1000	22 x 45 25 x 40 25 x 45 30 x 30 30 x 35 35 x 30	3.00 3.00 3.00 3.00 3.00 3.00	4.20 4.20 4.20 4.20 4.20 4.20	0.216 0.216 0.232 0.232 0.232 0.232	0.108 0.108 0.128 0.128 0.128 0.128	ECOS2CP102BX ECOS2CP102CX ECOS2CP102CA ECOS2CP102DX ECOS2CP102DA ECOS2CP102EA	270	22 x 30 25 x 25	1.31 1.31	1.83 1.83	0.614 0.614	0.246 0.246	ECOS2EP271BA ECOS2EP271CA
1200	22 x 40 22 x 45 25 x 35 30 x 25 30 x 30	2.50 2.75 2.75 2.75 2.75	3.50 3.85 3.85 3.85 3.85	0.243 0.263 0.263 0.263 0.263	0.121 0.131 0.131 0.131 0.131	ECOS2CP821BX ECOS2CP821BA ECOS2CP821CA ECOS2CP821DX ECOS2CP821DA	330	22 x 35 25 x 30 35 x 20	1.75 1.75 1.10	2.45 2.45 1.54	0.553 0.502 0.553	0.221 0.201 0.221	ECOS2EP331BA ECOS2EP331CA ECOS2EP331EL
1500	22 x 45 25 x 40 25 x 45 30 x 30 30 x 35 35 x 30	3.00 3.00 3.00 3.00 3.00 3.00	4.20 4.20 4.20 4.20 4.20 4.20	0.216 0.216 0.232 0.232 0.232 0.232	0.108 0.108 0.128 0.128 0.128 0.128	ECOS2CP102BX ECOS2CP102CX ECOS2CP102CA ECOS2CP102DX ECOS2CP102DA ECOS2CP102EA	390	22 x 40 25 x 30 25 x 35 30 x 25	1.91 1.91 1.91 1.91	2.67 2.67 2.67 2.67	0.468 0.468 0.468 0.425	0.187 0.187 0.187 0.170	ECOS2EP391BA ECOS2EP391CA ECOS2EP391CX ECOS2EP391DA
1800	22 x 50 30 x 35 35 x 30	3.25 3.25 3.25	4.55 4.55 4.55	0.207 0.207 0.207	0.114 0.114 0.114	ECOS2CP122CA ECOS2CP122DA ECOS2CP122EA	470	22 x 45 25 x 35 25 x 40 30 x 25 30 x 30	2.11 2.11 2.11 2.11 2.11	2.95 2.95 2.95 2.95 2.95	0.388 0.388 0.388 0.353 0.388	0.155 0.155 0.155 0.141 0.155	ECOS2EP471BA ECOS2EP471CX ECOS2EP471CA ECOS2EP471DX ECOS2EP471DA
2200	25 x 50 30 x 45 35 x 30 35 x 35	3.73 3.73 3.73 3.73	5.22 5.22 5.22 5.22	0.166 0.166 0.166 0.166	0.091 0.091 0.091 0.091	ECOS2CP152CX ECOS2CP152DA ECOS2CP152EX ECOS2CP152EA	560	25 x 40 25 x 45 30 x 30 30 x 35 35 x 25	2.25 2.25 2.25 2.25 2.25	3.15 3.15 3.15 3.15 3.15	0.326 0.326 0.326 0.326 0.326	0.130 0.130 0.130 0.130 0.130	ECOS2EP561CA ECOS2EP561CX ECOS2EP561DX ECOS2EP561DA ECOS2EP561EA
2700	30 x 50 35 x 35 4.20 5.88 0.138 0.083 ECOS2CP182DA ECOS2CP182EX ECOS2CP182EA	4.20 4.20 4.20 4.20	5.88 5.88 5.88 5.88	0.138 0.138 0.138 0.138	0.083 0.083 0.083 0.083	ECOS2CP182DA ECOS2CP182EX ECOS2CP182EA	680	25 x 45 25 x 50 30 x 35 30 x 40 35 x 30	2.50 2.50 2.50 2.50 2.50	3.50 3.50 3.50 3.50 3.50	0.268 0.268 0.268 0.268 0.268	0.107 0.107 0.107 0.107 0.107	ECOS2EP681CX ECOS2EP681CA ECOS2EP681DX ECOS2EP681DA ECOS2EP681EA
<b>200 VDC Working, 250 VDC Surge</b>							<b>350 VDC Working, 400 VDC Surge</b>						
150	22 x 20 22 x 25	0.65 0.71	0.91 0.99	1.326 1.216	0.597 0.547	ECOS2DP151BL ECOS2DP151BA	82	22 x 25	0.83	1.16	2.022	0.708	ECOS2VP820BA
220	22 x 25 25 x 20	1.04 0.87	1.46 1.22	0.829 0.904	0.373 0.407	ECOS2DP221BA ECOS2DP221CL	100	22 x 30	0.91	1.27	1.658	0.580	ECOS2VP101BA
270	22 x 25	1.41	1.97	0.614	0.276	ECOS2DP271BA	120	22 x 30 25 x 25	1.00 1.00	1.40 1.40	1.382 1.382	0.484 0.484	ECOS2VP121BA ECOS2VP121CA
330	22 x 25 30 x 20	1.56 1.00	2.18 1.40	0.553 0.603	0.249 0.271	ECOS2DP331BX ECOS2DP331DL	150	22 x 35 25 x 25 30 x 25	1.12 1.12 1.12	1.57 1.57 1.57	1.105 1.105 1.105	0.387 0.387 0.387	ECOS2VP151BA ECOS2VP151CX ECOS2VP151CA ECOS2VP151DA
390	22 x 30 25 x 25	1.68 1.68	2.35 2.35	0.468 0.468	0.210 0.210	ECOS2DP391BA ECOS2DP391CA	180	22 x 40 25 x 30 25 x 35 30 x 25	1.22 1.22 1.22 1.22	1.71 1.71 1.71 1.71	0.921 0.921 0.921 0.921	0.322 0.322 0.322 0.322	ECOS2VP181BA ECOS2VP181CX ECOS2VP181CA ECOS2VP181DA
470	22 x 35 25 x 30 35 x 20	1.85 1.85 1.30	2.59 2.59 1.82	0.388 0.388 0.459	0.175 0.175 0.206	ECOS2DP471BA ECOS2DP471CA ECOS2DP471EL	220	22 x 45 25 x 35 25 x 40 30 x 25 30 x 30 35 x 25	1.44 1.44 1.44 1.44 1.44 1.44	2.02 2.02 2.02 2.02 2.02 2.02	0.754 0.754 0.754 0.754 0.754 0.754	0.264 0.264 0.264 0.264 0.264 0.264	ECOS2VP221BA ECOS2VP221CX ECOS2VP221CA ECOS2VP221DX ECOS2VP221DA ECOS2VP221EA
560	22 x 40 25 x 30 30 x 25	2.43 2.43 2.43	3.40 3.40 3.40	0.326 0.326 0.326	0.147 0.147 0.147	ECOS2DP561BA ECOS2DP561CX ECOS2DP561DA	270	25 x 40 30 x 30 30 x 35 35 x 25	1.66 1.66 1.66 1.66	2.32 2.32 2.32 2.32	0.614 0.614 0.614 0.614	0.215 0.215 0.215 0.215	ECOS2VP271CX ECOS2VP271DX ECOS2VP271DA ECOS2VP271EX
680	22 x 45 25 x 35 30 x 30	2.68 2.68 2.68	3.75 3.75 3.75	0.268 0.268 0.268	0.121 0.121 0.121	ECOS2DP681BA ECOS2DP681CA ECOS2DP681DA							
820	25 x 45 30 x 30 30 x 35 35 x 25	2.93 2.93 2.93 2.93	4.10 4.10 4.10 4.10	0.222 0.222 0.222 0.222	0.100 0.100 0.100 0.100	ECOS2DP821BA ECOS2DP821CA ECOS2DP821DX ECOS2DP821DA ECOS2DP821EA							
1000	25 x 45 25 x 50 30 x 35 30 x 40 35 x 30	3.25 3.25 3.25 3.25 3.25	4.55 4.55 4.55 4.55 4.55	0.199 0.199 0.199 0.199 0.199	0.090 0.090 0.090 0.090 0.090	ECOS2DP102CX ECOS2DP102CA ECOS2DP102DX ECOS2DP102DA ECOS2DP102EA							
1200	30 x 40 30 x 45 35 x 30 35 x 35	3.50 3.50 3.50 3.50	4.90 4.90 4.90 4.90	0.166 0.166 0.166 0.166	0.075 0.075 0.075 0.075	ECOS2DP122DX ECOS2DP122DA ECOS2DP122EX ECOS2DP122EA							

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## TS-UP Standard Ratings (continued)

Cap. ( $\mu$ F)	Size (mm) D x L	Max. 85°C R.C. ( $A_{ms}$ )		Max. 20°C ESR ( $\Omega$ )		Panasonic Part Number
		120Hz	10kHz-	120Hz	20kHz	
<b>450 VDC Working, 500 VDC Surge (continued)</b>						
270	35 x 35	1.78	2.49	0.675	0.270	ECOS2WP271EA
330	30 x 50	2.01	2.81	0.553	0.249	ECOS2WP331DA
	35 x 35	2.01	2.81	0.553	0.221	ECOS2WP331EX
	35 x 40	2.01	2.81	0.553	0.249	ECOS2WP331EA
390	35 x 45	2.24	3.14	0.510	0.255	ECOS2WP391EA
470	35 x 45	2.53	3.54	0.423	0.233	ECOS2WP471EX
	35 x 50	2.53	3.54	0.423	0.233	ECOS2WP471EA
<b>500 VDC Working, 550 VDC Surge (continued)</b>						
47	22 x 25	0.63	0.88	3.527	1.411	ECOS2HP470BA
56	22 x 30	0.70	0.98	2.960	1.184	ECOS2HP560BA
68	22 x 35	0.78	1.09	2.438	0.975	ECOS2HP680BA
	25 x 25	0.78	1.09	2.438	0.975	ECOS2HP680CA
82	22 x 40	0.88	1.23	2.022	0.809	ECOS2HP820BA
	25 x 30	0.88	1.23	2.022	0.809	ECOS2HP820CA
100	22 x 45	0.99	1.39	1.658	0.663	ECOS2HP101BA
	25 x 35	0.99	1.39	1.658	0.663	ECOS2HP101CA
120	22 x 50	1.13	1.58	1.382	0.553	ECOS2HP121BA
	25 x 40	1.13	1.58	1.382	0.553	ECOS2HP121CA
	30 x 30	1.13	1.58	1.382	0.553	ECOS2HP121DA
150	25 x 45	1.29	1.80	1.105	0.442	ECOS2HP151CA
	30 x 35	1.29	1.80	1.105	0.442	ECOS2HP151DA
	35 x 25	1.20	1.68	1.105	0.442	ECOS2HP151EA
180	25 x 50	1.38	1.93	0.921	0.368	ECOS2HP181CA
	30 x 40	1.38	1.93	0.921	0.368	ECOS2HP181DA
	35 x 30	1.36	1.90	0.921	0.368	ECOS2HP181EA
220	30 x 45	1.50	2.10	0.754	0.339	ECOS2HP221DA
	35 x 35	1.54	2.16	0.754	0.301	ECOS2HP221EA
270	35 x 40	1.76	2.46	0.614	0.276	ECOS2HP271EA
330	35 x 45	1.99	2.79	0.502	0.251	ECOS2HP331EA
390	35 x 50	2.22	3.11	0.425	0.234	ECOS2HP391EA