TS-HA Series two terminal snap-in



- 3000 hour* life at 105ºC with high ripple current capability
- Wide range of case sizes including 20mm, low profile lengths
- ***NEW:*** 40mm diameter sizes through 100WV.
- Can vent construction

Rated Working Voltage:	10 ~ 250 VDC	385 ~ 450 VDC
Operating Temperature:	-40 ~ +105ºC	-25 ~ +105ºC
Nominal Capacitance:	68 ~ 68000µF (±20% tolerance)	33 ~ 470µF (±20% tolerance)
Dissipation Factor: (120 Hz, +20ºC)	Working Voltage [V]: 10 / 16 / 25 / 35 / 50 / 63 / 80 / 100 - 450 Max. D.F. (%): 55 / 45 / 35 / 30 / 25 / 20 / 17 / 15 For capacitance values > 33000µF, add the value of: $\frac{(\text{rated cap. [µF]} - 33000)}{1000}$	
Endurance:	3000 hours* at +105ºC with maximum specified ripple current (see page 4) *2000 hours for 20mm diameter or 20mm length sizes	

Part Number System

E C □ □ — □ □ — A — □ □ □ — □ — □

- **Common Code/ Terminal Type**
  - ECOS: 6.3mm Length Terminal (Standard)
  - ECEC: 4mm Length "Short" Terminal
  - (See page 7)
- **Voltage Code**
- **Series**: A
- **Capacitance Code**
- **Case Diameter**
  - A: 20mm
  - B: 22mm
  - C: 25mm
  - D: 30mm
  - E: 35mm
  - F: 40mm
- **Top Vinyl Plate**
  - 25 ~ 50mm lengths
    - A: With Plate
    - B: Without plate
  - 20mm length
    - L: With Plate
    - G: Without plate

Ripple Current Multipliers: Page 7

TS-HA Standard Ratings

Cap. (µF)	Size (mm) D x L	Max 105°C R.C. (A_{rms}) 120Hz	Max 105°C R.C. (A_{rms}) 10k~100kHz	20°C ESR (Ω, max.) 120Hz	20°C ESR (Ω, max.) 20kHz	Panasonic Part Number
10 VDC Working, 13 VDC Surge						
6800	20 x 25	1.30	1.50	0.110	0.093	ECOS1AA682AA
8200	20 x 30	1.60	1.84	0.091	0.077	ECOS1AA822AA
10000	20 x 30	1.80	2.07	0.075	0.063	ECOS1AA103AA
12000	20 x 35	2.20	2.53	0.062	0.053	ECOS1AA123AA
15000	20 x 40	2.30	2.65	0.053	0.045	ECOS1AA153AA
4700	22 x 25	0.85	0.98	0.159	0.135	ECOS1AA472BA
6800	22 x 25	1.30	1.50	0.110	0.093	ECOS1AA682BA
10000	22 x 25	1.80	2.07	0.075	0.063	ECOS1AA103BA
12000	22 x 30	2.20	2.53	0.062	0.053	ECOS1AA123BA
15000	22 x 35	2.30	2.65	0.053	0.045	ECOS1AA153BA
18000	22 x 40	2.40	2.76	0.044	0.038	ECOS1AA183BA
22000	22 x 45	2.60	2.99	0.038	0.032	ECOS1AA223BA
27000	22 x 50	3.10	3.57	0.033	0.028	ECOS1AA273BA
15000	25 x 25	2.30	2.65	0.053	0.045	ECOS1AA153CA
18000	25 x 30	2.40	2.76	0.044	0.038	ECOS1AA183CA
22000	25 x 35	2.60	2.99	0.038	0.032	ECOS1AA223CA
27000	25 x 40	3.10	3.57	0.033	0.028	ECOS1AA273CA
33000	25 x 45	3.40	3.91	0.027	0.023	ECOS1AA333CA
39000	25 x 50	3.70	4.26	0.025	0.021	ECOS1AA393CA
22000	30 x 25	2.60	2.99	0.038	0.032	ECOS1AA223DA
27000	30 x 30	3.10	3.57	0.033	0.028	ECOS1AA273DA
33000	30 x 35	3.40	3.91	0.027	0.023	ECOS1AA333DA
39000	30 x 40	3.70	4.26	0.025	0.021	ECOS1AA393DA
47000	30 x 45	4.20	4.83	0.023	0.020	ECOS1AA473DA
56000	30 x 50	5.00	5.75	0.022	0.019	ECOS1AA563DA
27000	35 x 25	3.10	3.57	0.033	0.028	ECOS1AA273EA
33000	35 x 30	3.40	3.91	0.027	0.023	ECOS1AA333EA
39000	35 x 30	3.70	4.26	0.025	0.021	ECOS1AA393EA
47000	35 x 35	4.20	4.83	0.023	0.020	ECOS1AA473EA
56000	35 x 40	5.00	5.75	0.022	0.021	ECOS1AA563EA
68000	35 x 50	5.50	6.33	0.021	0.020	ECOS1AA683EA
62000	40 x 40	5.42	6.23	0.023	0.022	ECOS1AA623FA
82000	40 x 50	7.36	8.46	0.018	0.017	ECOS1AA823FA
16 VDC Working, 20 VDC Surge						
6800	20 x 30	2.20	2.53	0.085	0.068	ECOS1CA682AA
8200	20 x 35	2.40	2.76	0.071	0.057	ECOS1CA822AA
10000	20 x 40	2.60	2.99	0.066	0.053	ECOS1CA103AA
3300	22 x 20	1.30	1.50	0.216	0.173	ECOS1CA332BL
3300	22 x 25	1.30	1.50	0.176	0.141	ECOS1CA332BA
4700	22 x 25	1.52	1.75	0.123	0.099	ECOS1CA472BA
6800	22 x 25	2.20	2.53	0.085	0.068	ECOS1CA682BA
8200	22 x 30	2.40	2.76	0.071	0.057	ECOS1CA822BA
10000	22 x 30	2.60	2.99	0.066	0.053	ECOS1CA103BA
12000	22 x 35	2.90	3.34	0.055	0.044	ECOS1CA123BA
15000	22 x 40	3.20	3.68	0.046	0.037	ECOS1CA153BA
18000	22 x 45	3.50	4.03	0.040	0.034	ECOS1CA183BA
4700	25 x 20	1.60	1.84	0.152	0.121	ECOS1CA472CL
10000	25 x 25	2.60	2.99	0.066	0.053	ECOS1CA103CA
12000	25 x 30	2.90	3.34	0.055	0.044	ECOS1CA123CA
15000	25 x 35	3.20	3.68	0.046	0.037	ECOS1CA153CA
18000	25 x 40	3.50	4.03	0.040	0.034	ECOS1CA183CA
22000	25 x 45	3.80	4.37	0.033	0.028	ECOS1CA223CA
27000	25 x 50	4.20	4.83	0.028	0.025	ECOS1CA273CA
6800	30 x 20	1.80	2.07	0.105	0.084	ECOS1CA682DL
12000	30 x 25	2.90	3.34	0.055	0.044	ECOS1CA123DA
15000	30 x 30	3.20	3.68	0.046	0.037	ECOS1CA153DA
18000	30 x 30	3.50	4.03	0.040	0.034	ECOS1CA183DA
22000	30 x 35	3.80	4.37	0.033	0.028	ECOS1CA223DA
27000	30 x 40	4.20	4.83	0.028	0.025	ECOS1CA273DA
33000	30 x 45	4.70	5.41	0.023	0.020	ECOS1CA333DA
39000	30 x 50	5.10	5.87	0.022	0.020	ECOS1CA393DA
10000	35 x 20	2.40	2.76	0.071	0.057	ECOS1CA103EL
18000	35 x 25	3.50	4.03	0.040	0.034	ECOS1CA183EA
22000	35 x 30	3.80	4.37	0.033	0.028	ECOS1CA223EA
27000	35 x 30	4.20	4.83	0.028	0.025	ECOS1CA273EA
33000	35 x 35	4.70	5.41	0.023	0.020	ECOS1CA333EA
39000	35 x 40	5.10	5.87	0.022	0.020	ECOS1CA393EA
47000	35 x 45	5.50	6.33	0.020	0.018	ECOS1CA473EA
56000	35 x 50	6.00	6.90	0.019	0.017	ECOS1CA563EA
47000	40 x 40	5.50	6.33	0.020	0.018	ECOS1CA473FA
68000	40 x 50	7.29	8.38	0.015	0.014	ECOS1CA683FA

TS-HA Standard Ratings (continued)

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A_{rms}) 120Hz	Max 105°C R.C. (A_{rms}) 10k~100kHz	20°C ESR (Ω, max.) 120Hz	20°C ESR (Ω, max.) 20kHz	Panasonic Part Number
25 VDC Working, 32 VDC Surge						
4700	20 x 30	2.00	2.30	0.106	0.079	ECOS1EA472AA
5600	20 x 35	2.20	2.53	0.089	0.067	ECOS1EA562AA
6800	20 x 40	2.40	2.76	0.073	0.055	ECOS1EA682AA
2200	22 x 20	1.30	1.50	0.241	0.181	ECOS1EA222BL
2200	22 x 25	1.30	1.50	0.241	0.181	ECOS1EA222BA
3300	22 x 25	1.62	1.86	0.161	0.121	ECOS1EA332BA
4700	22 x 25	2.00	2.30	0.106	0.079	ECOS1EA472BA
5600	22 x 30	2.20	2.53	0.089	0.067	ECOS1EA562BA
6800	22 x 30	2.40	2.76	0.073	0.055	ECOS1EA682BA
8200	22 x 35	2.70	3.11	0.061	0.045	ECOS1EA822BA
10000	22 x 40	3.00	3.45	0.051	0.039	ECOS1EA103BA
12000	22 x 45	3.20	3.68	0.044	0.033	ECOS1EA123BA
3300	25 x 20	1.60	1.84	0.161	0.121	ECOS1EA332CL
6800	25 x 25	2.40	2.76	0.073	0.055	ECOS1EA682CA
8200	25 x 30	2.70	3.11	0.061	0.045	ECOS1EA822CA
10000	25 x 35	3.00	3.45	0.051	0.039	ECOS1EA103CA
12000	25 x 40	3.20	3.68	0.044	0.035	ECOS1EA123CA
15000	25 x 45	3.60	4.14	0.036	0.031	ECOS1EA153CA
18000	25 x 50	3.90	4.49	0.030	0.027	ECOS1EA183CA
4700	30 x 20	1.80	2.07	0.113	0.085	ECOS1EA472DL
8200	30 x 25	2.70	3.11	0.061	0.045	ECOS1EA822DA
10000	30 x 30	3.00	3.45	0.051	0.039	ECOS1EA103DA
12000	30 x 30	3.20	3.68	0.044	0.035	ECOS1EA123DA
15000	30 x 35	3.60	4.14	0.036	0.031	ECOS1EA153DA
18000	30 x 40	3.90	4.49	0.030	0.027	ECOS1EA183DA
22000	30 x 45	4.30	4.95	0.025	0.022	ECOS1EA223DA
6800	35 x 20	2.30	2.65	0.080	0.060	ECOS1EA682EL
12000	35 x 25	3.20	3.68	0.044	0.035	ECOS1EA123EA
15000	35 x 30	3.60	4.14	0.036	0.031	ECOS1EA153EA
18000	35 x 35	3.90	4.49	0.030	0.027	ECOS1EA183EA
22000	35 x 35	4.30	4.95	0.025	0.022	ECOS1EA223EA
27000	35 x 45	4.80	5.52	0.021	0.019	ECOS1EA273EA
33000	35 x 50	5.50	6.33	0.018	0.016	ECOS1EA333EA
33000	40 x 40	5.50	6.33	0.018	0.016	ECOS1EA333FA
47000	40 x 50	6.47	7.44	0.015	0.014	ECOS1EA473FA
50 VDC Working, 63 VDC Surge						
1800	20 x 30	1.50	1.73	0.129	0.097	ECOS1HA182AA
2200	20 x 35	1.70	1.96	0.105	0.079	ECOS1HA222AA
2700	20 x 40	1.80	2.07	0.086	0.064	ECOS1HA272AA
1000	22 x 20	0.90	1.04	0.265	0.199	ECOS1HA102BL
1000	22 x 25	0.90	1.04	0.232	0.174	ECOS1HA102BA
1500	22 x 25	1.25	1.44	0.155	0.116	ECOS1HA152BA
1800	22 x 25	1.50	1.73	0.129	0.097	ECOS1HA182BA
2200	22 x 30	1.70	1.96	0.105	0.079	ECOS1HA222BA
2700	22 x 30	1.80	2.07	0.086	0.064	ECOS1HA272BA
3300	22 x 35	2.00	2.30	0.070	0.053	ECOS1HA332BA
3900	22 x 40	2.20	2.53	0.064	0.048	ECOS1HA392BA
4700	22 x 45	2.50	2.88	0.053	0.040	ECOS1HA472BA
5600	22 x 50	2.80	3.22	0.050	0.038	ECOS1HA562BA
1500	25 x 20	1.20	1.38	0.177	0.133	ECOS1HA152CL
2700	25 x 25	1.80	2.07	0.086	0.064	ECOS1HA272CA
3300	25 x 30	2.00	2.30	0.070	0.053	ECOS1HA332CA
3900	25 x 35	2.20	2.53	0.064	0.048	ECOS1HA392CA
4700	25 x 40	2.50	2.88	0.053	0.040	ECOS1HA472CA
5600	25 x 40	2.80	3.22	0.050	0.038	ECOS1HA562CA
6800	25 x 50	3.30	3.80	0.046	0.035	ECOS1HA682CA
2200	30 x 20	1.40	1.61	0.121	0.090	ECOS1HA222DL
3900	30 x 25	2.20	2.53	0.064	0.048	ECOS1HA392DA
4700	30 x 30	2.50	2.88	0.053	0.040	ECOS1HA472DA
5600	30 x 35	2.80	3.22	0.050	0.038	ECOS1HA562DA
6800	30 x 40	3.30	3.80	0.046	0.035	ECOS1HA682DA
8200	30 x 45	3.60	4.14	0.038	0.029	ECOS1HA822DA
10000	30 x 50	4.00	4.60	0.033	0.025	ECOS1HA103DA
3300	35 x 20	1.70	1.96	0.085	0.064	ECOS1HA332EL
4700	35 x 25	2.50	2.88	0.053	0.040	ECOS1HA472EA
5600	35 x 30	2.80	3.22	0.050	0.038	ECOS1HA562EA
6800	35 x 30	3.30	3.80	0.046	0.035	ECOS1HA682EA
8200	35 x 35	3.60	4.14	0.038	0.029	ECOS1HA822EA
10000	35 x 40	4.00	4.60	0.033	0.025	ECOS1HA103EA
12000	35 x 45	4.50	5.18	0.028	0.022	ECOS1HA123EA
15000	35 x 50	4.80	5.52	0.022	0.018	ECOS1HA153EA
15000	40 x 40	4.80	5.52	0.022	0.018	ECOS1HA153FA
22000	40 x 50	5.15	5.92	0.016	0.013	ECOS1HA223FA

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A_{rms}) 120Hz	Max 105°C R.C. (A_{rms}) 10k~100kHz	20°C ESR (Ω, max.) 120Hz	20°C ESR (Ω, max.) 20kHz	Panasonic Part Number
35 VDC Working, 44 VDC Surge						
3300	20 x 30	1.90	2.19	0.121	0.090	ECOS1VA332AA
3900	20 x 35	2.00	2.30	0.111	0.083	ECOS1VA392AA
4700	20 x 40	2.20	2.53	0.088	0.066	ECOS1VA472AA
1500	22 x 20	1.10	1.27	0.287	0.216	ECOS1VA152BL
1500	22 x 25	1.10	1.27	0.287	0.216	ECOS1VA152BA
2200	22 x 25	1.48	1.70	0.196	0.147	ECOS1VA222BA
3300	22 x 25	1.90	2.19	0.121	0.090	ECOS1VA332BA
3900	22 x 30	2.00	2.30	0.111	0.083	ECOS1VA392BA
4700	22 x 35	2.20	2.53	0.088	0.066	ECOS1VA472BA
5600	22 x 35	2.40	2.76	0.074	0.056	ECOS1VA562BA
6800	22 x 40	2.60	2.99	0.061	0.046	ECOS1VA682BA
8200	22 x 50	2.90	3.34	0.051	0.038	ECOS1VA822BA
2200	25 x 20	1.40	1.61	0.196	0.147	ECOS1VA222CL
4700	25 x 25	2.20	2.53	0.088	0.066	ECOS1VA472CA
5600	25 x 30	2.40	2.76	0.074	0.056	ECOS1VA562CA
6800	25 x 35	2.60	2.99	0.061	0.046	ECOS1VA682CA
8200	25 x 40	2.90	3.34	0.051	0.038	ECOS1VA822CA
10000	25 x 45	3.20	3.68	0.041	0.031	ECOS1VA103CA
12000	25 x 50	3.50	4.03	0.035	0.026	ECOS1VA123CA
3300	30 x 20	1.70	1.96	0.131	0.098	ECOS1VA332DL
5600	30 x 25	2.40	2.76	0.074	0.056	ECOS1VA562DA
6800	30 x 30	2.60	2.99	0.061	0.046	ECOS1VA682DA
8200	30 x 30	2.90	3.34	0.051	0.038	ECOS1VA822DA
10000	30 x 35	3.20	3.68	0.041	0.031	ECOS1VA103DA
12000	30 x 40	3.50	4.03	0.035	0.026	ECOS1VA123DA
15000	30 x 45	3.90	4.49	0.030	0.022	ECOS1VA153DA
4700	35 x 20	2.00	2.30	0.095	0.071	ECOS1VA472EL
8200	35 x 25	2.90	3.34	0.051	0.038	ECOS1VA822EA
10000	35 x 30	3.20	3.68	0.041	0.031	ECOS1VA103EA
12000	35 x 30	3.50	4.03	0.035	0.026	ECOS1VA123EA
15000	35 x 35	3.90	4.49	0.030	0.022	ECOS1VA153EA
18000	35 x 40	4.30	4.95	0.028	0.021	ECOS1VA183EA
22000	35 x 50	5.00	5.75	0.023	0.017	ECOS1VA223EA
22000	40 x 40	5.00	5.75	0.023	0.017	ECOS1VA223FA
27000	40 x 50	5.44	6.26	0.020	0.015	ECOS1VA273FA
63 VDC Working, 79 VDC Surge						
1200	20 x 30	1.40	1.61	0.235	0.176	ECOS1JA122AA
1500	20 x 35	1.50	1.73	0.188	0.141	ECOS1JA152AA
1800	20 x 40	1.70	1.96	0.157	0.117	ECOS1JA182AA
680	22 x 20	0.90	1.04	0.463	0.347	ECOS1JA681BL
680	22 x 25	0.90	1.04	0.414	0.311	ECOS1JA681BA
1000	22 x 25	1.17	1.35	0.282	0.211	ECOS1JA102BA
1200	22 x 25	1.40	1.61	0.235	0.176	ECOS1JA122BA
1500	22 x 30	1.50	1.73	0.188	0.141	ECOS1JA152BA
1800	22 x 30	1.70	1.96	0.157	0.117	ECOS1JA182BA
2200	22 x 35	2.00	2.30	0.128	0.096	ECOS1JA222BA
2700	22 x 40	2.20	2.53	0.104	0.078	ECOS1JA272BA
3300	22 x 50	2.50	2.88	0.090	0.068	ECOS1JA332BA
1000	25 x 20	1.20	1.38	0.315	0.236	ECOS1JA102CL
1800	25 x 25	1.70	1.96	0.157	0.117	ECOS1JA182CA
2200	25 x 30	2.00	2.30	0.128	0.096	ECOS1JA222CA
2700	25 x 35	2.20	2.53	0.104	0.078	ECOS1JA272CA
3300	25 x 40	2.50	2.88	0.090	0.068	ECOS1JA332CA
3900	25 x 45	2.70	3.11	0.077	0.057	ECOS1JA392CA
4700	25 x 50	3.00	3.45	0.063	0.048	ECOS1JA472CA
1500	30 x 20	1.30	1.50	0.210	0.157	ECOS1JA152DL
2700	30 x 25	2.20	2.53	0.104	0.078	ECOS1JA272DA
3300	30 x 30	2.50	2.88	0.090	0.068	ECOS1JA332DA
3900	30 x 35	2.70	3.11	0.077	0.057	ECOS1JA392DA
4700	30 x 40	3.00	3.45	0.063	0.048	ECOS1JA472DA
5600	30 x 45	3.30	3.80	0.053	0.040	ECOS1JA562DA
6800	30 x 50	3.60	4.14	0.049	0.037	ECOS1JA682DA
2200	35 x 20	1.50	1.73	0.143	0.107	ECOS1JA222EL
3300	35 x 25	2.50	2.88	0.090	0.068	ECOS1JA332EA
3900	35 x 30	2.70	3.11	0.077	0.057	ECOS1JA392EA
4700	35 x 30	3.00	3.45	0.063	0.048	ECOS1JA472EA
5600	35 x 35	3.30	3.80	0.053	0.040	ECOS1JA562EA
6800	35 x 40	3.60	4.14	0.049	0.037	ECOS1JA682EA
8200	35 x 45	3.90	4.49	0.040	0.030	ECOS1JA822EA
10000	35 x 50	4.40	5.06	0.033	0.028	ECOS1JA103EA
12000	40 x 40	4.52	5.20	0.030	0.026	ECOS1JA123FA
15000	40 x 50	4.80	5.52	0.027	0.023	ECOS1JA153FA

Design and specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.
Whenever a doubt about safety arises from this product, please contact us immediately for technical consultation.

TS-HA Standard Ratings (continued)

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A_{rms}) 120Hz	Max 105°C R.C. (A_{rms}) 10k~100kHz	20°C ESR (Ω, max.) 120Hz	20°C ESR (Ω, max.) 20kHz	Panasonic Part Number
80 VDC Working, 100 VDC Surge						
820	20 x 30	1.20	1.38	0.222	0.145	**ECOS1KA821AA**
1000	20 x 35	1.30	1.50	0.182	0.119	**ECOS1KA102AA**
1200	20 x 40	1.50	1.73	0.166	0.116	**ECOS1KA122AA**
470	22 x 20	0.80	0.92	0.459	0.298	**ECOS1KA471BL**
470	22 x 25	0.80	0.92	0.388	0.272	**ECOS1KA471BA**
680	22 x 25	1.00	1.15	0.268	0.188	**ECOS1KA681BA**
820	22 x 25	1.20	1.38	0.222	0.145	**ECOS1KA821BA**
1000	22 x 30	1.30	1.50	0.182	0.119	**ECOS1KA102BA**
1200	22 x 30	1.50	1.73	0.166	0.116	**ECOS1KA122BA**
1500	22 x 35	1.70	1.96	0.133	0.093	**ECOS1KA152BA**
1800	22 x 40	1.80	2.07	0.111	0.077	**ECOS1KA182BA**
2200	22 x 45	2.10	2.42	0.090	0.063	**ECOS1KA222BA**
680	25 x 20	1.00	1.15	0.317	0.206	**ECOS1KA681CL**
1000	25 x 25	1.30	1.50	0.182	0.119	**ECOS1KA102CA**
1200	25 x 25	1.50	1.73	0.166	0.116	**ECOS1KA122CA**
1500	25 x 30	1.70	1.96	0.133	0.093	**ECOS1KA152CA**
1800	25 x 35	1.80	2.07	0.111	0.077	**ECOS1KA182CA**
2200	25 x 35	2.10	2.42	0.090	0.063	**ECOS1KA222CA**
2700	25 x 45	2.40	2.76	0.074	0.055	**ECOS1KA272CA**
3300	25 x 50	2.60	2.99	0.065	0.049	**ECOS1KA332CA**
1000	30 x 20	1.20	1.38	0.216	0.140	**ECOS1KA102DL**
1800	30 x 25	1.80	2.07	0.111	0.077	**ECOS1KA182DA**
2200	30 x 30	2.10	2.42	0.090	0.063	**ECOS1KA222DA**
2700	30 x 35	2.40	2.76	0.074	0.055	**ECOS1KA272DA**
3300	30 x 40	2.60	2.99	0.065	0.049	**ECOS1KA332DA**
3900	30 x 45	3.00	3.45	0.060	0.045	**ECOS1KA392DA**
4700	30 x 50	3.30	3.80	0.049	0.037	**ECOS1KA472DA**
1500	35 x 20	1.40	1.61	0.155	0.108	**ECOS1KA152EL**
2200	35 x 25	2.10	2.42	0.090	0.063	**ECOS1KA222EA**
2700	35 x 30	2.40	2.76	0.074	0.055	**ECOS1KA272EA**
3300	35 x 30	2.60	2.99	0.065	0.049	**ECOS1KA332EA**
3900	35 x 35	3.00	3.45	0.060	0.045	**ECOS1KA392EA**
4700	35 x 40	3.30	3.80	0.049	0.037	**ECOS1KA472EA**
5600	35 x 45	3.70	4.26	0.050	0.038	**ECOS1KA562EA**
6800	35 x 50	3.90	4.49	0.041	0.031	**ECOS1KA682EA**
6800	40 x 40	3.90	4.49	0.041	0.031	**ECOS1KA682FA**
8200	40 x 50	4.29	4.93	0.036	0.027	**ECOS1KA822FA**
160 VDC Working, 200 VDC Surge						
220	20 x 25	1.00	1.40	0.829	0.373	**ECOS2CA221AA**
270	20 x 30	1.10	1.54	0.675	0.304	**ECOS2CA271AA**
330	20 x 35	1.20	1.68	0.653	0.294	**ECOS2CA331AA**
390	20 x 40	1.30	1.82	0.468	0.210	**ECOS2CA391AA**
150	22 x 20	0.55	0.77	1.437	0.647	**ECOS2CA151BL**
150	22 x 25	0.61	0.85	1.216	0.547	**ECOS2CA151BA**
220	22 x 25	0.90	1.26	0.829	0.373	**ECOS2CA221BA**
270	22 x 25	1.10	1.54	0.675	0.304	**ECOS2CA271BA**
330	22 x 30	1.20	1.68	0.553	0.249	**ECOS2CA331BA**
390	22 x 30	1.30	1.82	0.553	0.249	**ECOS2CA391BA**
470	22 x 35	1.40	1.96	0.529	0.238	**ECOS2CA471BA**
560	22 x 40	1.50	2.10	0.385	0.173	**ECOS2CA561BA**
680	22 x 45	1.70	2.38	0.317	0.143	**ECOS2CA681BA**
220	25 x 20	0.75	1.05	0.980	0.441	**ECOS2CA221CL**
390	25 x 25	1.30	1.82	0.553	0.249	**ECOS2CA391CA**
470	25 x 30	1.40	1.96	0.459	0.206	**ECOS2CA471CA**
560	25 x 30	1.50	2.10	0.385	0.173	**ECOS2CA561CA**
680	25 x 35	1.70	2.38	0.317	0.143	**ECOS2CA681CA**
820	25 x 40	2.00	2.80	0.263	0.118	**ECOS2CA821CA**
1000	25 x 45	2.20	3.08	0.216	0.108	**ECOS2CA102CA**
1200	25 x 50	2.30	3.22	0.180	0.090	**ECOS2CA122CA**
330	30 x 20	1.00	1.40	0.553	0.249	**ECOS2CA331DL**
560	30 x 25	1.50	2.10	0.385	0.173	**ECOS2CA561DA**
680	30 x 30	1.70	2.38	0.317	0.143	**ECOS2CA681DA**
820	30 x 30	2.00	2.80	0.263	0.118	**ECOS2CA821DA**
1000	30 x 35	2.20	3.08	0.216	0.108	**ECOS2CA102DA**
1200	30 x 40	2.30	3.22	0.180	0.090	**ECOS2CA122DA**
1500	30 x 45	2.50	3.50	0.166	0.083	**ECOS2CA152DA**
1800	30 x 50	2.70	3.78	0.138	0.083	**ECOS2CA182DA**
470	35 x 20	1.15	1.61	0.459	0.206	**ECOS2CA471EL**
1500	35 x 35	2.50	3.50	0.166	0.083	**ECOS2CA152EA**
1800	35 x 40	2.70	3.78	0.138	0.069	**ECOS2CA182EA**
2200	35 x 50	2.90	4.06	0.113	0.057	**ECOS2CA222EA**

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A_{rms}) 120Hz	Max 105°C R.C. (A_{rms}) 10k~100kHz	20°C ESR (Ω, max.) 120Hz	20°C ESR (Ω, max.) 20kHz	Panasonic Part Number
100 VDC Working, 125 VDC Surge						
560	20 x 30	1.10	1.65	0.296	0.178	**ECOS2AA561AA**
820	20 x 35	1.40	2.10	0.202	0.121	**ECOS2AA821AA**
1000	20 x 40	1.70	2.55	0.182	0.109	**ECOS2AA102AA**
330	22 x 20	0.80	1.20	0.653	0.392	**ECOS2AA331BL**
330	22 x 25	0.80	1.20	0.553	0.332	**ECOS2AA331BA**
470	22 x 25	0.92	1.38	0.388	0.233	**ECOS2AA471BA**
560	22 x 25	1.10	1.65	0.296	0.178	**ECOS2AA561BA**
820	22 x 30	1.40	2.10	0.202	0.121	**ECOS2AA821BA**
1000	22 x 35	1.70	2.55	0.182	0.109	**ECOS2AA102BA**
1200	22 x 40	1.80	2.70	0.152	0.091	**ECOS2AA122BA**
1500	22 x 45	2.10	3.15	0.122	0.073	**ECOS2AA152BA**
470	25 x 20	1.00	1.50	0.459	0.275	**ECOS2AA471CL**
820	25 x 25	1.40	2.10	0.202	0.121	**ECOS2AA821CA**
1000	25 x 30	1.70	2.55	0.182	0.109	**ECOS2AA102CA**
1200	25 x 35	1.80	2.70	0.152	0.091	**ECOS2AA122CA**
1500	25 x 40	2.10	3.15	0.122	0.079	**ECOS2AA152CA**
1800	25 x 45	2.30	3.45	0.111	0.072	**ECOS2AA182CA**
2200	25 x 50	2.60	3.90	0.090	0.059	**ECOS2AA222CA**
680	30 x 20	1.10	1.65	0.317	0.190	**ECOS2AA681DL**
1200	30 x 25	1.80	2.70	0.152	0.091	**ECOS2AA122DA**
1500	30 x 30	2.10	3.15	0.122	0.079	**ECOS2AA152DA**
1800	30 x 35	2.30	3.45	0.111	0.072	**ECOS2AA182DA**
2200	30 x 40	2.60	3.90	0.090	0.059	**ECOS2AA222DA**
2700	30 x 45	2.90	4.35	0.080	0.052	**ECOS2AA272DA**
3300	30 x 50	3.20	4.80	0.075	0.053	**ECOS2AA332DA**
1000	35 x 20	1.20	1.80	0.216	0.129	**ECOS2AA102EL**
1500	35 x 25	2.10	3.15	0.122	0.079	**ECOS2AA152EA**
1800	35 x 30	2.30	3.45	0.111	0.072	**ECOS2AA182EA**
2200	35 x 30	2.60	3.90	0.090	0.059	**ECOS2AA222EA**
2700	35 x 35	2.90	4.35	0.080	0.052	**ECOS2AA272EA**
3300	35 x 40	3.20	4.80	0.075	0.053	**ECOS2AA332EA**
3900	35 x 45	3.60	5.40	0.064	0.045	**ECOS2AA392EA**
4700	35 x 50	3.80	5.70	0.053	0.040	**ECOS2AA472EA**
4700	40 x 40	3.80	5.70	0.053	0.040	**ECOS2AA472FA**
6800	40 x 50	4.57	6.86	0.037	0.027	**ECOS2AA682FA**
200 VDC Working, 250 VDC Surge						
220	20 x 30	1.00	1.40	0.754	0.339	**ECOS2DA221AA**
270	20 x 35	1.10	1.54	0.614	0.276	**ECOS2DA271AA**
330	20 x 40	1.20	1.68	0.502	0.226	**ECOS2DA331AA**
100	22 x 20	0.50	0.70	1.989	0.895	**ECOS2DA101BL**
100	22 x 25	0.50	0.70	1.658	0.746	**ECOS2DA101BA**
150	22 x 25	0.68	0.95	1.105	0.497	**ECOS2DA151BA**
220	22 x 25	1.00	1.40	0.754	0.339	**ECOS2DA221BA**
270	22 x 30	1.10	1.54	0.614	0.276	**ECOS2DA271BA**
330	22 x 30	1.20	1.68	0.502	0.226	**ECOS2DA331BA**
390	22 x 35	1.30	1.82	0.425	0.191	**ECOS2DA391BA**
470	22 x 40	1.40	1.96	0.353	0.159	**ECOS2DA471BA**
560	22 x 45	1.50	2.10	0.296	0.133	**ECOS2DA561BA**
150	25 x 20	0.65	0.91	1.326	0.597	**ECOS2DA151CL**
270	25 x 25	1.10	1.54	0.614	0.276	**ECOS2DA271CA**
330	25 x 25	1.20	1.68	0.502	0.226	**ECOS2DA331CA**
390	25 x 30	1.30	1.82	0.425	0.191	**ECOS2DA391CA**
470	25 x 35	1.40	1.96	0.353	0.159	**ECOS2DA471CA**
560	25 x 35	1.50	2.10	0.296	0.133	**ECOS2DA561CA**
680	25 x 40	1.70	2.38	0.244	0.110	**ECOS2DA681CA**
820	25 x 50	2.00	2.80	0.222	0.111	**ECOS2DA821CA**
220	30 x 20	0.87	1.22	0.904	0.407	**ECOS2DA221DL**
390	30 x 25	1.30	1.82	0.425	0.191	**ECOS2DA391DA**
470	30 x 25	1.40	1.96	0.353	0.159	**ECOS2DA471DA**
560	30 x 30	1.50	2.10	0.296	0.133	**ECOS2DA561DA**
680	30 x 30	1.70	2.38	0.244	0.110	**ECOS2DA681DA**
820	30 x 35	2.00	2.80	0.222	0.111	**ECOS2DA821DA**
1000	30 x 45	2.20	3.08	0.199	0.099	**ECOS2DA102DA**
1200	30 x 50	2.30	3.22	0.166	0.083	**ECOS2DA122DA**
330	35 x 20	1.10	1.54	0.603	0.271	**ECOS2DA331EL**
820	35 x 30	2.00	2.80	0.222	0.111	**ECOS2DA821EA**
1000	35 x 35	2.20	3.08	0.199	0.099	**ECOS2DA102EA**
1200	35 x 40	2.30	3.22	0.166	0.083	**ECOS2DA122EA**
1500	35 x 50	2.50	3.50	0.144	0.072	**ECOS2DA152EA**

TS-HA Standard Ratings (continued)

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A_{rms}) 120Hz	Max 105°C R.C. (A_{rms}) 10k~100kHz	20°C ESR (Ω, max.) 120Hz	20°C ESR (Ω, max.) 20kHz	Panasonic Part Number
250 VDC Working, 300 VDC Surge						
180	20 x 35	0.90	1.26	0.921	0.461	ECOS2EA181AA
220	20 x 40	1.00	1.40	0.754	0.377	ECOS2EA221AA
68	22 x 20	0.40	0.56	2.926	1.463	ECOS2EA680BL
68	22 x 25	0.40	0.56	2.438	1.219	ECOS2EA680BA
100	22 x 25	0.55	0.77	1.658	0.829	ECOS2EA101BA
150	22 x 25	0.75	1.05	1.105	0.553	ECOS2EA151BA
180	22 x 30	0.90	1.26	0.921	0.461	ECOS2EA181BA
220	22 x 30	1.00	1.40	0.754	0.377	ECOS2EA221BA
270	22 x 35	1.10	1.54	0.614	0.307	ECOS2EA271BA
330	22 x 40	1.20	1.68	0.502	0.251	ECOS2EA331BA
390	22 x 45	1.30	1.82	0.425	0.213	ECOS2EA391BA
100	25 x 20	0.50	0.70	1.989	0.995	ECOS2EA101CL
180	25 x 25	0.90	1.26	0.921	0.461	ECOS2EA181CA
220	25 x 25	1.00	1.40	0.754	0.377	ECOS2EA221CA
270	25 x 30	1.10	1.54	0.614	0.307	ECOS2EA271CA
330	25 x 35	1.20	1.68	0.502	0.251	ECOS2EA331CA
390	25 x 35	1.30	1.82	0.425	0.213	ECOS2EA391CA
470	25 x 45	1.40	1.96	0.353	0.176	ECOS2EA471CA
560	25 x 50	1.50	2.10	0.296	0.148	ECOS2EA561CA
150	30 x 20	0.65	0.91	1.326	0.663	ECOS2EA151DL
270	30 x 25	1.10	1.54	0.614	0.307	ECOS2EA271DA
330	30 x 25	1.20	1.68	0.502	0.251	ECOS2EA331DA
390	30 x 30	1.30	1.82	0.425	0.213	ECOS2EA391DA
470	30 x 35	1.40	1.96	0.353	0.176	ECOS2EA471DA
560	30 x 35	1.50	2.10	0.296	0.148	ECOS2EA561DA
680	30 x 45	1.70	2.38	0.244	0.122	ECOS2EA681DA
820	30 x 50	2.00	2.80	0.202	0.101	ECOS2EA821DA
220	35 x 20	0.87	1.22	0.904	0.452	ECOS2EA221EL
470	35 x 30	1.40	1.96	0.353	0.176	ECOS2EA471EA
560	35 x 30	1.50	2.10	0.296	0.148	ECOS2EA561EA
680	35 x 35	1.70	2.38	0.244	0.122	ECOS2EA681EA
820	35 x 40	2.00	2.80	0.202	0.101	ECOS2EA821EA
1000	35 x 45	2.20	3.08	0.199	0.099	ECOS2EA102EA
1200	35 x 50	2.30	3.22	0.166	0.083	ECOS2EA122EA
400 VDC Working, 450 VDC Surge						
56	20 x 30	0.51	0.71	2.368	0.829	ECOS2GA560AA
68	20 x 35	0.56	0.78	1.950	0.683	ECOS2GA680AA
82	20 x 40	0.64	0.90	1.617	0.566	ECOS2GA820AA
33	22 x 20	0.20	0.28	5.024	1.758	ECOS2GA330BL
33	22 x 25	0.30	0.42	4.521	1.582	ECOS2GA330BA
47	22 x 25	0.43	0.60	2.822	0.988	ECOS2GA470BA
56	22 x 25	0.51	0.71	2.368	0.829	ECOS2GA560BA
68	22 x 30	0.56	0.78	1.950	0.683	ECOS2GA680BA
82	22 x 35	0.64	0.90	1.617	0.566	ECOS2GA820BA
100	22 x 35	0.69	0.97	1.326	0.464	ECOS2GA101BA
120	22 x 40	0.75	1.05	1.105	0.387	ECOS2GA121BA
150	22 x 50	0.82	1.15	0.884	0.309	ECOS2GA151BA
47	25 x 20	0.25	0.35	3.527	1.235	ECOS2GA470CL
68	25 x 25	0.56	0.78	1.950	0.683	ECOS2GA680CA
82	25 x 25	0.64	0.90	1.617	0.566	ECOS2GA820CA
100	25 x 30	0.69	0.97	1.326	0.464	ECOS2GA101CA
120	25 x 35	0.75	1.05	1.105	0.387	ECOS2GA121CA
150	25 x 40	0.82	1.15	0.884	0.309	ECOS2GA151CA
180	25 x 45	0.95	1.33	0.737	0.258	ECOS2GA181CA
220	25 x 50	1.10	1.54	0.603	0.211	ECOS2GA221CA
68	30 x 20	0.35	0.49	2.438	0.853	ECOS2GA680DL
120	30 x 25	0.75	1.05	1.105	0.387	ECOS2GA121DA
150	30 x 30	0.82	1.15	0.884	0.309	ECOS2GA151DA
180	30 x 35	0.95	1.33	0.737	0.258	ECOS2GA181DA
220	30 x 40	1.10	1.54	0.603	0.211	ECOS2GA221DA
270	30 x 45	1.20	1.68	0.491	0.172	ECOS2GA271DA
330	30 x 50	1.35	1.89	0.402	0.161	ECOS2GA331DA
100	35 x 20	0.47	0.66	1.658	0.580	ECOS2GA101EL
180	35 x 25	0.95	1.33	0.737	0.258	ECOS2GA181EA
220	35 x 30	1.10	1.54	0.603	0.211	ECOS2GA221EA
270	35 x 35	1.20	1.68	0.491	0.172	ECOS2GA271EA
330	35 x 40	1.35	1.89	0.402	0.161	ECOS2GA331EA
390	35 x 45	1.55	2.17	0.340	0.136	ECOS2GA391EA
470	35 x 50	1.75	2.45	0.282	0.127	ECOS2GA471EA

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A_{rms}) 120Hz	Max 105°C R.C. (A_{rms}) 10k~100kHz	20°C ESR (Ω, max.) 120Hz	20°C ESR (Ω, max.) 20kHz	Panasonic Part Number
385 VDC Working, 435 VDC Surge						
56	20 x 30	0.51	0.71	2.368	0.829	ECOS2TA560AA
68	20 x 35	0.56	0.78	1.950	0.683	ECOS2TA680AA
82	20 x 40	0.64	0.90	1.617	0.566	ECOS2TA820AA
33	22 x 20	0.20	0.28	5.024	1.758	ECOS2TA330BL
56	22 x 25	0.51	0.71	2.368	0.829	ECOS2TA560BA
68	22 x 30	0.56	0.78	1.950	0.683	ECOS2TA680BA
82	22 x 35	0.64	0.90	1.617	0.566	ECOS2TA820BA
100	22 x 35	0.69	0.97	1.326	0.464	ECOS2TA101BA
120	22 x 35	0.75	1.05	1.105	0.387	ECOS2TA121BA
150	22 x 50	0.82	1.15	0.884	0.309	ECOS2TA151BA
47	25 x 20	0.25	0.35	3.527	1.235	ECOS2TA470CL
68	25 x 25	0.56	0.78	1.950	0.683	ECOS2TA680CA
82	25 x 25	0.64	0.90	1.617	0.566	ECOS2TA820CA
100	25 x 30	0.69	0.97	1.326	0.464	ECOS2TA101CA
120	25 x 30	0.75	1.05	1.105	0.387	ECOS2TA121CA
150	25 x 40	0.82	1.15	0.884	0.309	ECOS2TA151CA
180	25 x 45	0.95	1.33	0.737	0.258	ECOS2TA181CA
220	25 x 50	1.10	1.54	0.603	0.211	ECOS2TA221CA
68	30 x 20	0.35	0.49	2.438	0.853	ECOS2TA680DL
150	30 x 30	0.82	1.15	0.884	0.309	ECOS2TA151DA
180	30 x 35	0.95	1.33	0.737	0.258	ECOS2TA181DA
220	30 x 40	1.10	1.54	0.603	0.211	ECOS2TA221DA
270	30 x 45	1.20	1.68	0.491	0.172	ECOS2TA271DA
330	30 x 50	1.35	1.89	0.402	0.161	ECOS2TA331DA
100	35 x 20	0.47	0.66	1.658	0.580	ECOS2TA101EL
180	35 x 25	0.95	1.33	0.737	0.258	ECOS2TA181EA
220	35 x 30	1.10	1.54	0.603	0.211	ECOS2TA221EA
270	35 x 35	1.20	1.68	0.491	0.172	ECOS2TA271EA
330	35 x 40	1.35	1.89	0.402	0.161	ECOS2TA331EA
390	35 x 45	1.55	2.17	0.340	0.136	ECOS2TA391EA
470	35 x 50	1.75	2.45	0.282	0.127	ECOS2TA471EA
450 VDC Working, 500 VDC Surge						
56	22 x 25	0.40	0.56	2.368	0.947	ECOS2WA560BA
68	22 x 30	0.50	0.70	1.950	0.780	ECOS2WA680BA
82	22 x 35	0.56	0.78	1.617	0.647	ECOS2WA820BA
100	22 x 40	0.64	0.90	1.326	0.531	ECOS2WA101BA
120	22 x 45	0.72	1.01	1.105	0.442	ECOS2WA121BA
150	22 x 50	0.79	1.11	0.884	0.354	ECOS2WA151BA
68	25 x 25	0.50	0.70	1.950	0.780	ECOS2WA680CA
100	25 x 30	0.64	0.90	1.326	0.531	ECOS2WA101CA
120	25 x 35	0.72	1.01	1.105	0.442	ECOS2WA121CA
150	25 x 40	0.79	1.11	0.884	0.354	ECOS2WA151CA
180	25 x 45	0.87	1.22	0.737	0.295	ECOS2WA181CA
220	25 x 50	1.00	1.40	0.678	0.271	ECOS2WA221CA
100	30 x 25	0.64	0.90	1.326	0.531	ECOS2WA101DA
150	30 x 30	0.79	1.11	0.884	0.354	ECOS2WA151DA
180	30 x 35	0.87	1.22	0.737	0.295	ECOS2WA181DA
220	30 x 40	1.00	1.40	0.678	0.271	ECOS2WA221DA
270	30 x 45	1.17	1.64	0.614	0.246	ECOS2WA271DA
330	30 x 50	1.38	1.93	0.502	0.201	ECOS2WA331DA
150	35 x 25	0.79	1.11	0.884	0.354	ECOS2WA151EA
220	35 x 30	1.00	1.40	0.678	0.271	ECOS2WA221EA
270	35 x 35	1.17	1.64	0.614	0.246	ECOS2WA271EA
330	35 x 40	1.38	1.93	0.502	0.201	ECOS2WA331EA
390	35 x 50	1.55	2.17	0.425	0.170	ECOS2WA391EA

Design and specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.
Whenever a doubt about safety arises from this product, please contact us immediately for technical consultation.