

# TS-HA/HB Series 105°C, 3000 hours

- Long 3000 hour life at 105°C with high ripple current capability
- 2 and 3 pin versions available
- Can vent construction

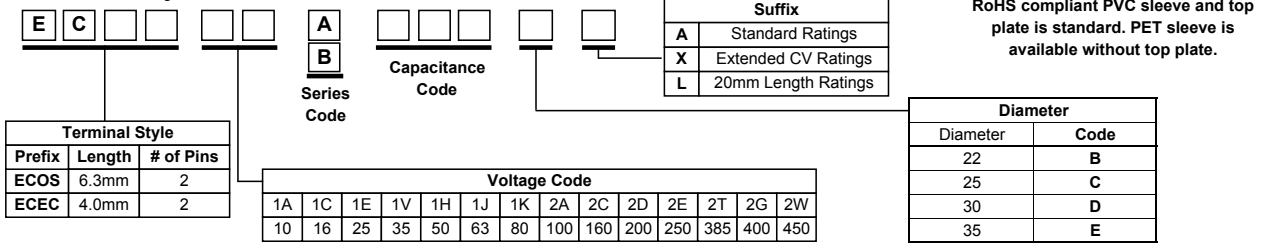
RoHS Compliant



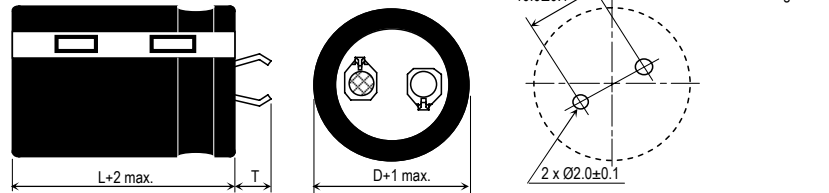
Rated Working Voltage:	10 ~ 250 VDC	385 ~ 450 VDC
Operating Temperature:	-40 ~ +105°C	-25 ~ +105°C
Nominal Capacitance:	180~68000µF	82~560µF
Capacitance Tolerance:	± 20%	
Dissipation Factor: (120 Hz, +20°C)	Working Voltage [V]:	10    16    25    35    50    63    80    100 ~ 450
	Max. D.F. (%):	55    45    35    30    25    20    17    15
For capacitance values > 33000µF, add the value of: $\frac{(\text{rated cap. } \mu\text{F}) - 33000}{1000}$		
Leakage Current:	3√CV (µA) max. after 5 minutes; C = Capacitance in µF, V = WV	
Ripple Current Multipliers:	Frequency(Hz):	50    60    100~120    500    1k    10k
	Temperature (°C):	105°C    85°C    70°C    60°C    ≤45°C
		Multiplier: 1.0    1.7    2.0    2.2    2.35
Endurance:	3000 hours* at +105°C with maximum specified ripple current (see page 4) *2000 hours for 20mm length sizes	

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

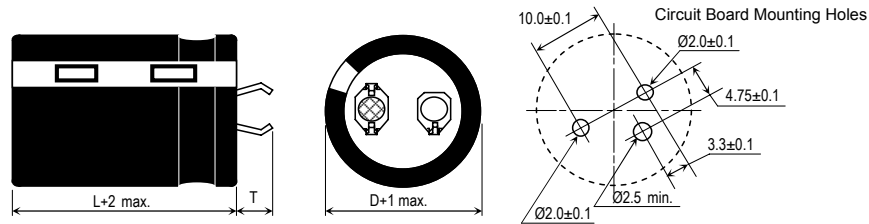
### Part Number System



2 Pin Mounting Style



3 Pin Mounting Style (Optional)



Pin Dimensions



**TS-HA Standard Ratings**

Part numbers shown with 2 pins

Cap. ( $\mu$ F)	Size (mm) D x L	Max 105°C R.C. ( $A_{rms}$ )		20°C ESR ( $\Omega$ , max.)		Panasonic Part Number (By Terminal Length)	
		120Hz	10kHz~	120Hz	20kHz	6.3mm Length Terminal	4.0mm Length Terminal
<b>10 VDC Working, 13 VDC Surge</b>							
10000	22 x 25	1.80	2.07	0.075	0.063	ECOS1AA103BA	ECEC1AA103BA
12000	22 x 30	2.20	2.53	0.062	0.053	ECOS1AA123BA	ECEC1AA123BA
15000	22 x 35	2.30	2.65	0.053	0.045	ECOS1AA153BA	ECEC1AA153BA
	25 x 25	2.30	2.65	0.053	0.045	ECOS1AA153CA	ECEC1AA153CA
18000	22 x 40	2.40	2.76	0.044	0.038	ECOS1AA183BA	ECEC1AA183BA
	25 x 30	2.40	2.76	0.044	0.038	ECOS1AA183CA	ECEC1AA183CA
22000	22 x 45	2.60	2.99	0.038	0.032	ECOS1AA223BA	ECEC1AA223BA
	25 x 35	2.60	2.99	0.038	0.032	ECOS1AA223CA	ECEC1AA223CA
	30 x 25	2.60	2.99	0.038	0.032	ECOS1AA223DA	ECEC1AA223DA
27000	22 x 50	3.10	3.57	0.033	0.028	ECOS1AA273BA	ECEC1AA273BA
	25 x 40	3.10	3.57	0.033	0.028	ECOS1AA273CA	ECEC1AA273CA
	30 x 30	3.10	3.57	0.033	0.028	ECOS1AA273DA	ECEC1AA273DA
	35 x 25	3.10	3.57	0.033	0.028	ECOS1AA273EA	ECEC1AA273EA
33000	25 x 45	3.40	3.91	0.027	0.023	ECOS1AA333CA	ECEC1AA333CA
	30 x 35	3.40	3.91	0.027	0.023	ECOS1AA333DA	ECEC1AA333DA
	35 x 30	3.40	3.91	0.027	0.023	ECOS1AA333EA	ECEC1AA333EA
39000	25 x 50	3.70	4.26	0.025	0.021	ECOS1AA393CA	ECEC1AA393CA
	30 x 40	3.70	4.26	0.025	0.021	ECOS1AA393DA	ECEC1AA393DA
	35 x 30	3.70	4.26	0.025	0.021	ECOS1AA393EA	ECEC1AA393EA
47000	30 x 45	4.20	4.83	0.023	0.020	ECOS1AA473DA	ECEC1AA473DA
	35 x 35	4.20	4.83	0.023	0.020	ECOS1AA473EA	ECEC1AA473EA
56000	30 x 50	5.00	5.75	0.022	0.019	ECOS1AA563DA	ECEC1AA563DA
	35 x 40	5.00	5.75	0.022	0.021	ECOS1AA563EA	ECEC1AA563EA
68000	35 x 50	5.50	6.33	0.021	0.020	ECOS1AA683EA	ECEC1AA683EA
<b>16 VDC Working, 20 VDC Surge</b>							
6800	22 x 25	2.20	2.53	0.085	0.068	ECOS1CA682BA	ECEC1CA682BA
8200	22 x 30	2.40	2.76	0.071	0.057	ECOS1CA822BA	ECEC1CA822BA
10000	22 x 30	2.60	2.99	0.066	0.053	ECOS1CA103BA	ECEC1CA103BA
	25 x 25	2.60	2.99	0.066	0.053	ECOS1CA103CA	ECEC1CA103CA
12000	22 x 35	2.90	3.34	0.055	0.044	ECOS1CA123BA	ECEC1CA123BA
	25 x 30	2.90	3.34	0.055	0.044	ECOS1CA123CA	ECEC1CA123CA
	30 x 25	2.90	3.34	0.055	0.044	ECOS1CA123DA	ECEC1CA123DA
15000	22 x 40	3.20	3.68	0.046	0.037	ECOS1CA153BA	ECEC1CA153BA
	25 x 35	3.20	3.68	0.046	0.037	ECOS1CA153CA	ECEC1CA153CA
	30 x 30	3.20	3.68	0.046	0.037	ECOS1CA153DA	ECEC1CA153DA
18000	22 x 45	3.50	4.03	0.040	0.034	ECOS1CA183BA	ECEC1CA183BA
	25 x 40	3.50	4.03	0.040	0.034	ECOS1CA183CA	ECEC1CA183CA
	30 x 30	3.50	4.03	0.040	0.034	ECOS1CA183DA	ECEC1CA183DA
	35 x 25	3.50	4.03	0.040	0.034	ECOS1CA183EA	ECEC1CA183EA
22000	25 x 45	3.80	4.37	0.033	0.028	ECOS1CA223CA	ECEC1CA223CA
	30 x 35	3.80	4.37	0.033	0.028	ECOS1CA223DA	ECEC1CA223DA
	35 x 30	3.80	4.37	0.033	0.028	ECOS1CA223EA	ECEC1CA223EA
27000	25 x 50	4.20	4.83	0.028	0.025	ECOS1CA273CA	ECEC1CA273CA
	30 x 40	4.20	4.83	0.028	0.025	ECOS1CA273DA	ECEC1CA273DA
	35 x 30	4.20	4.83	0.028	0.025	ECOS1CA273EA	ECEC1CA273EA
33000	30 x 45	4.70	5.41	0.023	0.020	ECOS1CA333DA	ECEC1CA333DA
	35 x 35	4.70	5.41	0.023	0.020	ECOS1CA333EA	ECEC1CA333EA
39000	30 x 50	5.10	5.87	0.022	0.020	ECOS1CA393DA	ECEC1CA393DA
	35 x 40	5.10	5.87	0.022	0.020	ECOS1CA393EA	ECEC1CA393EA
47000	35 x 45	5.50	6.33	0.020	0.018	ECOS1CA473EA	ECEC1CA473EA
56000	35 x 50	6.00	6.90	0.019	0.017	ECOS1CA563EA	ECEC1CA563EA
<b>25 VDC Working, 32 VDC Surge</b>							
4700	22 x 25	2.00	2.30	0.106	0.079	ECOS1EA472BA	ECEC1EA472BA
5600	22 x 30	2.20	2.53	0.089	0.067	ECOS1EA562BA	ECEC1EA562BA
6800	22 x 30	2.40	2.76	0.073	0.055	ECOS1EA682BA	ECEC1EA682BA
	25 x 25	2.40	2.76	0.073	0.055	ECOS1EA682CA	ECEC1EA682CA
8200	22 x 35	2.70	3.11	0.061	0.045	ECOS1EA822BA	ECEC1EA822BA
	25 x 30	2.70	3.11	0.061	0.045	ECOS1EA822CA	ECEC1EA822CA
	30 x 25	2.70	3.11	0.061	0.045	ECOS1EA822DA	ECEC1EA822DA
10000	22 x 40	3.00	3.45	0.051	0.039	ECOS1EA103BA	ECEC1EA103BA
	25 x 35	3.00	3.45	0.051	0.039	ECOS1EA103CA	ECEC1EA103CA
	30 x 30	3.00	3.45	0.051	0.039	ECOS1EA103DA	ECEC1EA103DA
12000	22 x 45	3.20	3.68	0.044	0.033	ECOS1EA123BA	ECEC1EA123BA
	30 x 30	3.20	3.68	0.044	0.035	ECOS1EA123DA	ECEC1EA123DA
	35 x 25	3.20	3.68	0.044	0.035	ECOS1EA123EA	ECEC1EA123EA

**TS-HA Standard Ratings (continued)**

Part numbers shown with 2 pins

Cap. ( $\mu$ F)	Size (mm) D x L	Max 105°C R.C. ( $A_{rms}$ )		20°C ESR ( $\Omega$ , max.)		Panasonic Part Number (By Terminal Length)	
		120Hz	10kHz~	120Hz	20kHz	6.3mm Length Terminal	4.0mm Length Terminal
<b>25 VDC Working, 32 VDC Surge (continued)</b>							
15000	25 x 45	3.60	4.14	0.036	0.031	ECOS1EA153CA	ECEC1EA153CA
	30 x 35	3.60	4.14	0.036	0.031	ECOS1EA153DA	ECEC1EA153DA
	35 x 30	3.60	4.14	0.036	0.031	ECOS1EA153EA	ECEC1EA153EA
18000	25 x 50	3.90	4.49	0.030	0.027	ECOS1EA183CA	ECEC1EA183CA
	30 x 40	3.90	4.49	0.030	0.027	ECOS1EA183DA	ECEC1EA183DA
	35 x 35	3.90	4.49	0.030	0.027	ECOS1EA183EA	ECEC1EA183EA
22000	30 x 45	4.30	4.95	0.025	0.022	ECOS1EA223DA	ECEC1EA223DA
	35 x 35	4.30	4.95	0.025	0.022	ECOS1EA223EA	ECEC1EA223EA
27000	35 x 45	4.80	5.52	0.021	0.019	ECOS1EA273EA	ECEC1EA273EA
33000	35 x 50	5.50	6.33	0.018	0.016	ECOS1EA333EA	ECEC1EA333EA
<b>35 VDC Working, 44 VDC Surge</b>							
1500	22 x 20	1.10	1.27	0.287	0.216	ECOS1VA152BL	ECEC1VA152BL
2200	25 x 20	1.40	1.61	0.196	0.147	ECOS1VA222CL	ECEC1VA222CL
3300	22 x 25	1.90	2.19	0.121	0.090	ECOS1VA332BA	ECEC1VA332BA
	30 x 20	1.70	1.96	0.131	0.098	ECOS1VA332DL	ECEC1VA332DL
3900	22 x 30	2.00	2.30	0.111	0.083	ECOS1VA392BA	ECEC1VA392BA
4700	22 x 35	2.20	2.53	0.088	0.066	ECOS1VA472BA	ECEC1VA472BA
	25 x 25	2.20	2.53	0.088	0.066	ECOS1VA472CA	ECEC1VA472CA
	35 x 20	2.00	2.30	0.095	0.071	ECOS1VA472EL	ECEC1VA472EL
5600	22 x 35	2.40	2.76	0.074	0.056	ECOS1VA562BA	ECEC1VA562BA
	25 x 30	2.40	2.76	0.074	0.056	ECOS1VA562CA	ECEC1VA562CA
	30 x 25	2.40	2.76	0.074	0.056	ECOS1VA562DA	ECEC1VA562DA
6800	22 x 40	2.60	2.99	0.061	0.046	ECOS1VA682BA	ECEC1VA682BA
	25 x 35	2.60	2.99	0.061	0.046	ECOS1VA682CA	ECEC1VA682CA
	30 x 30	2.60	2.99	0.061	0.046	ECOS1VA682DA	ECEC1VA682DA
8200	22 x 50	2.90	3.34	0.051	0.038	ECOS1VA822BA	ECEC1VA822BA
	25 x 40	2.90	3.34	0.051	0.038	ECOS1VA822CA	ECEC1VA822CA
	30 x 30	2.90	3.34	0.051	0.038	ECOS1VA822DA	ECEC1VA822DA
	35 x 25	2.90	3.34	0.051	0.038	ECOS1VA822EA	ECEC1VA822EA
10000	25 x 45	3.20	3.68	0.041	0.031	ECOS1VA103CA	ECEC1VA103CA
	30 x 35	3.20	3.68	0.041	0.031	ECOS1VA103DA	ECEC1VA103DA
	35 x 30	3.20	3.68	0.041	0.031	ECOS1VA103EA	ECEC1VA103EA
12000	25 x 50	3.50	4.03	0.035	0.026	ECOS1VA123CA	ECEC1VA123CA
	30 x 40	3.50	4.03	0.035	0.026	ECOS1VA123DA	ECEC1VA123DA
	35 x 30	3.50	4.03	0.035	0.026	ECOS1VA123EA	ECEC1VA123EA
15000	30 x 45	3.90	4.49	0.030	0.022	ECOS1VA153DA	ECEC1VA153DA
	35 x 35	3.90	4.49	0.030	0.022	ECOS1VA153EA	ECEC1VA153EA
18000	35 x 40	4.30	4.95	0.028	0.021	ECOS1VA183EA	ECEC1VA183EA
22000	35 x 50	5.00	5.75	0.023	0.017	ECOS1VA223EA	ECEC1VA223EA
<b>50 VDC Working, 63 VDC Surge</b>							
1000	22 x 20	0.90	1.04	0.265	0.199	ECOS1HA102BL	ECEC1HA102BL
1500	25 x 20	1.20	1.38	0.177	0.133	ECOS1HA152CL	ECEC1HA152CL
1800	22 x 25	1.50	1.73	0.129	0.097	ECOS1HA182BA	ECEC1HA182BA
2200	22 x 30	1.70	1.96	0.105	0.079	ECOS1HA222BA	ECEC1HA222BA
	30 x 20	1.40	1.61	0.121	0.090	ECOS1HA222DL	ECEC1HA222DL
2700	22 x 30	1.80	2.07	0.086	0.064	ECOS1HA272BA	ECEC1HA272BA
	25 x 25	1.80	2.07	0.086	0.064	ECOS1HA272CA	ECEC1HA272CA
3300	22 x 35	2.00	2.30	0.070	0.053	ECOS1HA332BA	ECEC1HA332BA
	25 x 30	2.00	2.30	0.070	0.053	ECOS1HA332CA	ECEC1HA332CA
	35 x 20	1.70	1.96	0.085	0.064	ECOS1HA332EL	ECEC1HA332EL
3900	22 x 40	2.20	2.53	0.064	0.048	ECOS1HA392BA	ECEC1HA392BA
	25 x 35	2.20	2.53	0.064	0.048	ECOS1HA392CA	ECEC1HA392CA
	30 x 25	2.20	2.53	0.064	0.048	ECOS1HA392DA	ECEC1HA392DA
4700	22 x 45	2.50	2.88	0.053	0.040	ECOS1HA472BA	ECEC1HA472BA
	25 x 40	2.50	2.88	0.053	0.040	ECOS1HA472CA	ECEC1HA472CA
4700	30 x 30	2.50	2.88	0.053	0.040	ECOS1HA472DA	ECEC1HA472DA
	35 x 25	2.50	2.88	0.053	0.040	ECOS1HA472EA	ECEC1HA472EA
5600	22 x 50	2.80	3.22	0.050	0.038	ECOS1HA562BA	ECEC1HA562BA
	25 x 40	2.80	3.22	0.050	0.038	ECOS1HA562CA	ECEC1HA562CA
	30 x 35	2.80	3.22	0.050	0.038	ECOS1HA562DA	ECEC1HA562DA
	35 x 30	2.80	3.22	0.050	0.038	ECOS1HA562EA	ECEC1HA562EA
6800	25 x 50	3.30	3.80	0.046	0.035	ECOS1HA682CA	ECEC1HA682CA
	30 x 40	3.30	3.80	0.046	0.035	ECOS1HA682DA	ECEC1HA682DA
	35 x 30	3.30	3.80	0.046	0.035	ECOS1HA682EA	ECEC1HA682EA
8200	30 x 45	3.60	4.14	0.038	0.029	ECOS1HA822DA	ECEC1HA822DA
	35 x 35	3.60	4.14	0.038	0.029	ECOS1HA822EA	ECEC1HA822EA

**TS-HA Standard Ratings (continued)**

Part numbers shown with 2 pins

Cap. ( $\mu$ F)	Size (mm) D x L	Max 105°C R.C. ( $A_{rms}$ )		20°C ESR ( $\Omega$ , max.)		Panasonic Part Number (By Terminal Length)	
		120Hz	10kHz~	120Hz	20kHz	6.3mm Length Terminal	4.0mm Length Terminal
<b>50 VDC Working, 63 VDC Surge (continued)</b>							
10000	30 x 50	4.00	4.60	0.033	0.025	ECOS1HA103DA	ECEC1HA103DA
	35 x 40	4.00	4.60	0.033	0.025	ECOS1HA103EA	ECEC1HA103EA
12000	35 x 45	4.50	5.18	0.028	0.022	ECOS1HA123EA	ECEC1HA123EA
15000	35 x 50	4.80	5.52	0.022	0.018	ECOS1HA153EA	ECEC1HA153EA
<b>63 VDC Working, 79 VDC Surge</b>							
680	22 x 20	0.90	1.04	0.463	0.347	ECOS1JA681BL	ECEC1JA681BL
1000	25 x 20	1.20	1.38	0.315	0.236	ECOS1JA102CL	ECEC1JA102CL
1200	22 x 25	1.40	1.61	0.235	0.176	ECOS1JA122BA	ECEC1JA122BA
1500	22 x 30	1.50	1.73	0.188	0.141	ECOS1JA152BA	ECEC1JA152BA
	30 x 20	1.30	1.50	0.210	0.157	ECOS1JA152DL	ECEC1JA152DL
1800	22 x 30	1.70	1.96	0.157	0.117	ECOS1JA182BA	ECEC1JA182BA
	25 x 25	1.70	1.96	0.157	0.117	ECOS1JA182CA	ECEC1JA182CA
2200	22 x 35	2.00	2.30	0.128	0.096	ECOS1JA222BA	ECEC1JA222BA
	25 x 30	2.00	2.30	0.128	0.096	ECOS1JA222CA	ECEC1JA222CA
	35 x 20	1.50	1.73	0.143	0.107	ECOS1JA222EL	ECEC1JA222EL
2700	22 x 40	2.20	2.53	0.104	0.078	ECOS1JA272BA	ECEC1JA272BA
	25 x 35	2.20	2.53	0.104	0.078	ECOS1JA272CA	ECEC1JA272CA
	30 x 25	2.20	2.53	0.104	0.078	ECOS1JA272DA	ECEC1JA272DA
3300	22 x 50	2.50	2.88	0.090	0.068	ECOS1JA332BA	ECEC1JA332BA
	25 x 40	2.50	2.88	0.090	0.068	ECOS1JA332CA	ECEC1JA332CA
	30 x 30	2.50	2.88	0.090	0.068	ECOS1JA332DA	ECEC1JA332DA
	35 x 25	2.50	2.88	0.090	0.068	ECOS1JA332EA	ECEC1JA332EA
3900	25 x 45	2.70	3.11	0.077	0.057	ECOS1JA392CA	ECEC1JA392CA
	30 x 35	2.70	3.11	0.077	0.057	ECOS1JA392DA	ECEC1JA392DA
	35 x 30	2.70	3.11	0.077	0.057	ECOS1JA392EA	ECEC1JA392EA
4700	25 x 50	3.00	3.45	0.063	0.048	ECOS1JA472CA	ECEC1JA472CA
	30 x 40	3.00	3.45	0.063	0.048	ECOS1JA472DA	ECEC1JA472DA
	35 x 30	3.00	3.45	0.063	0.048	ECOS1JA472EA	ECEC1JA472EA
5600	30 x 45	3.30	3.80	0.053	0.040	ECOS1JA562DA	ECEC1JA562DA
	35 x 35	3.30	3.80	0.053	0.040	ECOS1JA562EA	ECEC1JA562EA
6800	30 x 50	3.60	4.14	0.049	0.037	ECOS1JA682DA	ECEC1JA682DA
	35 x 40	3.60	4.14	0.049	0.037	ECOS1JA682EA	ECEC1JA682EA
8200	35 x 45	3.90	4.49	0.040	0.030	ECOS1JA822EA	ECEC1JA822EA
10000	35 x 50	4.40	5.06	0.033	0.028	ECOS1JA103EA	ECEC1JA103EA
<b>80 VDC Working, 100 VDC Surge</b>							
470	22 x 20	0.80	0.92	0.459	0.298	ECOS1KA471BL	ECEC1KA471BL
560	25 x 20	1.00	1.15	0.317	0.206	ECOS1KA681CL	ECEC1KA681CL
820	22 x 25	1.20	1.38	0.222	0.145	ECOS1KA821BA	ECEC1KA821BA
1000	22 x 30	1.30	1.50	0.182	0.119	ECOS1KA102BA	ECEC1KA102BA
	25 x 25	1.30	1.50	0.182	0.119	ECOS1KA102CA	ECEC1KA102CA
	30 x 20	1.20	1.38	0.216	0.140	ECOS1KA102DL	ECEC1KA102DL
1200	22 x 30	1.50	1.73	0.166	0.116	ECOS1KA122BA	ECEC1KA122BA
	25 x 25	1.50	1.73	0.166	0.116	ECOS1KA122CA	ECEC1KA122CA
1500	22 x 35	1.70	1.96	0.133	0.093	ECOS1KA152BA	ECEC1KA152BA
	25 x 30	1.70	1.96	0.133	0.093	ECOS1KA152CA	ECEC1KA152CA
	35 x 20	1.40	1.61	0.155	0.108	ECOS1KA152EL	ECEC1KA152EL
1800	22 x 40	1.80	2.07	0.111	0.077	ECOS1KA182BA	ECEC1KA182BA
	25 x 35	1.80	2.07	0.111	0.077	ECOS1KA182CA	ECEC1KA182CA
	30 x 25	1.80	2.07	0.111	0.077	ECOS1KA182DA	ECEC1KA182DA
2200	22 x 45	2.10	2.42	0.090	0.063	ECOS1KA222BA	ECEC1KA222BA
	25 x 35	2.10	2.42	0.090	0.063	ECOS1KA222CA	ECEC1KA222CA
	30 x 30	2.10	2.42	0.090	0.063	ECOS1KA222DA	ECEC1KA222DA
	35 x 25	2.10	2.42	0.090	0.063	ECOS1KA222EA	ECEC1KA222EA
2700	25 x 45	2.40	2.76	0.074	0.055	ECOS1KA272CA	ECEC1KA272CA
	30 x 35	2.40	2.76	0.074	0.055	ECOS1KA272DA	ECEC1KA272DA
	35 x 30	2.40	2.76	0.074	0.055	ECOS1KA272EA	ECEC1KA272EA
3300	25 x 50	2.60	2.99	0.065	0.049	ECOS1KA332CA	ECEC1KA332CA
	30 x 40	2.60	2.99	0.065	0.049	ECOS1KA332DA	ECEC1KA332DA
	35 x 30	2.60	2.99	0.065	0.049	ECOS1KA332EA	ECEC1KA332EA
3900	30 x 45	3.00	3.45	0.060	0.045	ECOS1KA392DA	ECEC1KA392DA
	35 x 35	3.00	3.45	0.060	0.045	ECOS1KA392EA	ECEC1KA392EA
4700	30 x 50	3.30	3.80	0.049	0.037	ECOS1KA472DA	ECEC1KA472DA
	35 x 40	3.30	3.80	0.049	0.037	ECOS1KA472EA	ECEC1KA472EA
5600	35 x 45	3.70	4.26	0.050	0.038	ECOS1KA562EA	ECEC1KA562EA
6800	35 x 50	3.90	4.49	0.041	0.031	ECOS1KA682EA	ECEC1KA682EA

**TS-HA/HB Standard Ratings (continued)**

Part numbers shown with 2 pins

Cap. ( $\mu$ F)	Size (mm) D x L	Max 105°C R.C. ( $A_{rms}$ )		20°C ESR ( $\Omega$ , max.)		Panasonic Part Number (By Terminal Length)	
		120Hz	10kHz~	120Hz	20kHz	6.3mm Length Terminal	4.0mm Length Terminal
<b>100 VDC Working, 125 VDC Surge</b>							
330	22 x 20	0.80	1.20	0.653	0.392	ECOS2AA331BL	ECEC2AA331BL
470	25 x 20	1.00	1.50	0.459	0.275	ECOS2AA471CL	ECEC2AA471CL
560	22 x 25	1.10	1.65	0.296	0.178	ECOS2AA561BA	ECEC2AA561BA
680	30 x 20	1.10	1.65	0.317	0.190	ECOS2AA681DL	ECEC2AA681DL
820	22 x 30	1.40	2.10	0.202	0.121	ECOS2AA821BA	ECEC2AA821BA
	25 x 25	1.40	2.10	0.202	0.121	ECOS2AA821CA	ECEC2AA821CA
1000	22 x 35	1.70	2.55	0.182	0.109	ECOS2AA102BA	ECEC2AA102BA
	25 x 30	1.70	2.55	0.182	0.109	ECOS2AA102CA	ECEC2AA102CA
	35 x 20	1.20	1.80	0.216	0.129	ECOS2AA102EL	ECEC2AA102EL
1200	22 x 40	1.80	2.70	0.152	0.091	ECOS2AA122BA	ECEC2AA122BA
	25 x 35	1.80	2.70	0.152	0.091	ECOS2AA122CA	ECEC2AA122CA
	30 x 25	1.80	2.70	0.152	0.091	ECOS2AA122DA	ECEC2AA122DA
1500	22 x 45	2.10	3.15	0.122	0.073	ECOS2AA152BA	ECEC2AA152BA
	25 x 40	2.10	3.15	0.122	0.079	ECOS2AA152CA	ECEC2AA152CA
	30 x 30	2.10	3.15	0.122	0.079	ECOS2AA152DA	ECEC2AA152DA
	35 x 25	2.10	3.15	0.122	0.079	ECOS2AA152EA	ECEC2AA152EA
1800	25 x 45	2.30	3.45	0.111	0.072	ECOS2AA182CA	ECEC2AA182CA
	30 x 35	2.30	3.45	0.111	0.072	ECOS2AA182DA	ECEC2AA182DA
	35 x 30	2.30	3.45	0.111	0.072	ECOS2AA182EA	ECEC2AA182EA
2200	25 x 50	2.60	3.90	0.090	0.059	ECOS2AA222CA	ECEC2AA222CA
	30 x 40	2.60	3.90	0.090	0.059	ECOS2AA222DA	ECEC2AA222DA
	35 x 30	2.60	3.90	0.090	0.059	ECOS2AA222EA	ECEC2AA222EA
2700	30 x 45	2.90	4.35	0.080	0.052	ECOS2AA272DA	ECEC2AA272DA
	35 x 35	2.90	4.35	0.080	0.052	ECOS2AA272EA	ECEC2AA272EA
3300	30 x 50	3.20	4.80	0.075	0.053	ECOS2AA332DA	ECEC2AA332DA
	35 x 40	3.20	4.80	0.075	0.053	ECOS2AA332EA	ECEC2AA332EA
3900	35 x 45	3.60	5.40	0.064	0.045	ECOS2AA392EA	ECEC2AA392EA
4700	35 x 50	3.80	5.70	0.053	0.040	ECOS2AA472EA	ECEC2AA472EA
<b>160 VDC Working, 200 VDC Surge</b>							
470	22 x 30	1.40	1.96	0.423	0.190	ECOS2CB471BA	ECEC2CB471BA
560	22 x 35	1.50	2.10	0.355	0.160	ECOS2CB561BA	ECEC2CB561BA
680	22 x 40	1.70	2.38	0.293	0.132	ECOS2CB681BA	ECEC2CB681BA
	25 x 30	1.70	2.38	0.293	0.132	ECOS2CB681CA	ECEC2CB681CA
820	22 x 45	2.00	2.80	0.243	0.109	ECOS2CB821BA	ECEC2CB821BA
	25 x 35	2.00	2.80	0.243	0.109	ECOS2CB821CA	ECEC2CB821CA
1000	22 x 50	2.20	3.08	0.199	0.090	ECOS2CB102BA	ECEC2CB102BA
	25 x 40	2.20	3.08	0.199	0.090	ECOS2CB102CA	ECEC2CB102CA
	30 x 30	2.20	3.08	0.199	0.090	ECOS2CB102DA	ECEC2CB102DA
	35 x 25	2.20	3.08	0.199	0.090	ECOS2CB102EA	ECEC2CB102EA
1200	25 x 45	2.30	3.22	0.180	0.090	ECOS2CB122CA	ECEC2CB122CA
	30 x 35	2.30	3.22	0.180	0.090	ECOS2CB122DA	ECEC2CB122DA
	35 x 30	2.30	3.22	0.180	0.090	ECOS2CB122EA	ECEC2CB122EA
1500	30 x 40	2.50	3.50	0.144	0.072	ECOS2CB152DA	ECEC2CB152DA
	35 x 30	2.50	3.50	0.144	0.072	ECOS2CB152EA	ECEC2CB152EA
1800	30 x 45	2.70	3.78	0.129	0.064	ECOS2CB182DA	ECEC2CB182DA
	35 x 35	2.70	3.78	0.129	0.064	ECOS2CB182EA	ECEC2CB182EA
2200	35 x 45	2.90	4.06	0.105	0.063	ECOS2CB222EA	ECEC2CB222EA
2700	35 x 50	3.10	4.34	0.086	0.052	ECOS2CB272EA	ECEC2CB272EA
<b>200 VDC Working, 250 VDC Surge</b>							
390	22 x 30	1.30	1.82	0.510	0.230	ECOS2DB391BA	ECEC2DB391BA
	25 x 25	1.30	1.82	0.510	0.230	ECOS2DB391CA	ECEC2DB391CA
470	22 x 35	1.40	1.96	0.423	0.190	ECOS2DB471BA	ECEC2DB471BA
470	25 x 30	1.40	1.96	0.423	0.190	ECOS2DB471CA	ECEC2DB471CA
560	22 x 40	1.50	2.10	0.355	0.160	ECOS2DB561BA	ECEC2DB561BA
	25 x 30	1.50	2.10	0.355	0.160	ECOS2DB561CA	ECEC2DB561CA
	30 x 25	1.50	2.10	0.355	0.160	ECOS2DB561DA	ECEC2DB561DA
680	22 x 45	1.70	2.38	0.293	0.132	ECOS2DB681BA	ECEC2DB681BA
	25 x 35	1.70	2.38	0.293	0.132	ECOS2DB681CA	ECEC2DB681CA
820	25 x 45	2.00	2.80	0.263	0.118	ECOS2DB821CA	ECEC2DB821CA
	30 x 30	2.00	2.80	0.263	0.118	ECOS2DB821DA	ECEC2DB821DA
	35 x 25	2.00	2.80	0.263	0.118	ECOS2DB821EA	ECEC2DB821EA
1000	25 x 50	2.20	3.08	0.216	0.108	ECOS2DB102CA	ECEC2DB102CA
	30 x 35	2.20	3.08	0.216	0.108	ECOS2DB102DA	ECEC2DB102DA
	35 x 30	2.20	3.08	0.216	0.108	ECOS2DB102EA	ECEC2DB102EA
1200	30 x 40	2.30	3.22	0.193	0.097	ECOS2DB122DA	ECEC2DB122DA
	35 x 35	2.30	3.22	0.193	0.097	ECOS2DB122EA	ECEC2DB122EA

**TS-HB Standard Ratings (continued)**

Part numbers shown with 2 pins

Cap. ( $\mu$ F)	Size (mm) D x L	Max 105°C R.C. ( $A_{rms}$ )		20°C ESR ( $\Omega$ , max.)		Panasonic Part Number (By Terminal Length)	
		120Hz	10kHz~	120Hz	20kHz	6.3mm Length Terminal	4.0mm Length Terminal
<b>200 VDC Working, 250 VDC Surge (continued)</b>							
1500	30 x 50	2.50	3.50	0.155	0.077	ECOS2DB152DA	ECEC2DB152DA
	35 x 40	2.50	3.50	0.155	0.077	ECOS2DB152EA	ECEC2DB152EA
1800	35 x 45	2.70	3.78	0.129	0.077	ECOS2DB182EA	ECEC2DB182EA
2200	35 x 50	2.90	4.06	0.105	0.063	ECOS2DB222EA	ECEC2DB222EA
<b>250 VDC Working, 300 VDC Surge</b>							
180	22 x 25	0.90	1.26	0.921	0.461	ECOS2EB181BA	ECEC2EB181BA
220	22 x 30	1.00	1.40	0.754	0.377	ECOS2EB221BA	ECEC2EB221BA
270	22 x 35	1.10	1.54	0.614	0.307	ECOS2EB271BA	ECEC2EB271BA
330	22 x 40	1.20	1.68	0.502	0.251	ECOS2EB331BA	ECEC2EB331BA
	25 x 30	1.20	1.68	0.502	0.251	ECOS2EB331CA	ECEC2EB331CA
390	22 x 45	1.30	1.82	0.425	0.213	ECOS2EB391BA	ECEC2EB391BA
	30 x 25	1.30	1.82	0.425	0.213	ECOS2EB391DA	ECEC2EB391DA
470	22 x 50	1.40	1.96	0.353	0.176	ECOS2EB471BA	ECEC2EB471BA
	25 x 40	1.40	1.96	0.353	0.176	ECOS2EB471CA	ECEC2EB471CA
	30 x 30	1.40	1.96	0.353	0.176	ECOS2EB471DA	ECEC2EB471DA
560	25 x 45	1.50	2.10	0.296	0.148	ECOS2EB561CA	ECEC2EB561CA
	35 x 25	1.50	2.10	0.296	0.148	ECOS2EB561EA	ECEC2EB561EA
680	25 x 50	1.70	2.38	0.244	0.134	ECOS2EB681CA	ECEC2EB681CA
	30 x 40	1.70	2.38	0.244	0.134	ECOS2EB681DA	ECEC2EB681DA
	35 x 30	1.70	2.38	0.244	0.134	ECOS2EB681EA	ECEC2EB681EA
820	30 x 45	2.00	2.80	0.202	0.111	ECOS2EB821DA	ECEC2EB821DA
	35 x 35	2.00	2.80	0.202	0.111	ECOS2EB821EA	ECEC2EB821EA
1000	30 x 50	2.20	3.08	0.199	0.109	ECOS2EB102DA	ECEC2EB102DA
	35 x 40	2.20	3.08	0.199	0.109	ECOS2EB102EA	ECEC2EB102EA
1200	35 x 45	2.30	3.22	0.166	0.099	ECOS2EB122EA	ECEC2EB122EA
1500	35 x 50	2.50	3.50	0.144	0.093	ECOS2EB152EA	ECEC2EB152EA
<b>385 VDC Working, 425 VDC Surge</b>							
82	22 x 30	0.64	0.90	2.022	0.809	ECOS2TB820BA	ECEC2TB820BA
100	22 x 30	0.69	0.97	1.658	0.663	ECOS2TB101BA	ECEC2TB101BA
	25 x 25	0.69	0.97	1.658	0.663	ECOS2TB101CA	ECEC2TB101CA
120	22 x 35	0.75	1.05	1.382	0.553	ECOS2TB121BA	ECEC2TB121BA
	25 x 30	0.75	1.05	1.382	0.553	ECOS2TB121CA	ECEC2TB121CA
150	22 x 40	0.82	1.15	1.105	0.442	ECOS2TB151BA	ECEC2TB151BA
	25 x 30	0.82	1.15	1.105	0.442	ECOS2TB151CA	ECEC2TB151CA
	30 x 25	0.82	1.15	1.105	0.442	ECOS2TB151DA	ECEC2TB151DA
180	22 x 45	0.95	1.33	0.921	0.368	ECOS2TB181BA	ECEC2TB181BA
	25 x 35	0.95	1.33	0.921	0.368	ECOS2TB181CA	ECEC2TB181CA
	30 x 30	0.95	1.33	0.921	0.368	ECOS2TB181DA	ECEC2TB181DA
220	25 x 45	1.10	1.54	0.754	0.301	ECOS2TB221CA	ECEC2TB221CA
	30 x 30	1.10	1.54	0.829	0.332	ECOS2TB221DA	ECEC2TB221DA
	35 x 25	1.10	1.54	0.829	0.332	ECOS2TB221EA	ECEC2TB221EA
270	25 x 50	1.20	1.68	0.675	0.270	ECOS2TB271CA	ECEC2TB271CA
	35 x 30	1.20	1.68	0.675	0.270	ECOS2TB271EA	ECEC2TB271EA
330	30 x 45	1.35	1.89	0.553	0.221	ECOS2TB331DA	ECEC2TB331DA
	35 x 35	1.35	1.89	0.553	0.221	ECOS2TB331EA	ECEC2TB331EA
390	30 x 50	1.55	2.17	0.510	0.204	ECOS2TB391DA	ECEC2TB391DA
470	35 x 45	1.75	2.45	0.423	0.212	ECOS2TB471EA	ECEC2TB471EA
560	35 x 50	1.80	2.52	0.355	0.178	ECOS2TB561EA	ECEC2TB561EA
<b>400 VDC Working, 450 VDC Surge</b>							
82	22 x 30	0.64	0.90	2.022	0.708	ECOS2GB820BA	ECEC2GB820BA
100	22 x 30	0.69	0.97	1.658	0.580	ECOS2GB101BA	ECEC2GB101BA
	25 x 25	0.69	0.97	1.658	0.580	ECOS2GB101CA	ECEC2GB101CA
120	22 x 35	0.75	1.05	1.382	0.484	ECOS2GB121BA	ECEC2GB121BA
	25 x 30	0.75	1.05	1.382	0.484	ECOS2GB121CA	ECEC2GB121CA
150	22 x 40	0.82	1.15	1.105	0.387	ECOS2GB151BA	ECEC2GB151BA
	25 x 30	0.82	1.15	1.105	0.387	ECOS2GB151CA	ECEC2GB151CA
	30 x 25	0.82	1.15	1.105	0.387	ECOS2GB151DA	ECEC2GB151DA
180	22 x 45	0.95	1.33	0.921	0.322	ECOS2GB181BA	ECEC2GB181BA
	25 x 35	0.95	1.33	0.921	0.322	ECOS2GB181CA	ECEC2GB181CA
	30 x 30	0.95	1.33	0.921	0.322	ECOS2GB181DA	ECEC2GB181DA
220	25 x 45	1.10	1.54	0.754	0.264	ECOS2GB221CA	ECEC2GB221CA
	30 x 30	1.10	1.54	0.754	0.264	ECOS2GB221DA	ECEC2GB221DA
	35 x 25	1.10	1.54	0.754	0.264	ECOS2GB221EA	ECEC2GB221EA
270	25 x 50	1.20	1.68	0.614	0.215	ECOS2GB271CA	ECEC2GB271CA
	30 x 35	1.20	1.68	0.614	0.215	ECOS2GB271DA	ECEC2GB271DA
	35 x 30	1.20	1.68	0.614	0.215	ECOS2GB271EA	ECEC2GB271EA

## TS-HB Standard Ratings (continued)

Part numbers shown with 2 pins

Cap. ( $\mu$ F)	Size (mm) D x L	Max 105°C R.C. ( $A_{rms}$ )		20°C ESR ( $\Omega$ , max.)		Panasonic Part Number (By Terminal Length)	
		120Hz	10kHz~	120Hz	20kHz	6.3mm Length Terminal	4.0mm Length Terminal
<b>400 VDC Working, 450 VDC Surge (continued)</b>							
330	30 x 45	1.35	1.89	0.502	0.201	ECOS2GB331DA	ECEC2GB331DA
	35 x 35	1.35	1.89	0.502	0.201	ECOS2GB331EA	ECEC2GB331EA
390	30 x 50	1.55	2.17	0.425	0.170	ECOS2GB391DA	ECEC2GB391DA
	35 x 40	1.55	2.17	0.425	0.170	ECOS2GB391EA	ECEC2GB391EA
470	35 x 45	1.75	2.45	0.353	0.141	ECOS2GB471EA	ECEC2GB471EA
560	35 x 50	1.80	2.52	0.296	0.118	ECOS2GB561EA	ECEC2GB561EA
<b>420 VDC Working, 470 VDC Surge</b>							
100	22 x 30	0.64	0.90	1.824	0.821	ECOS2SB101BA	ECEC2SB101BA
	25 x 25	0.64	0.90	1.824	0.821	ECOS2SB101CA	ECEC2SB101CA
120	22 x 35	0.72	1.01	1.520	0.684	ECOS2SB121BA	ECEC2SB121BA
	25 x 30	0.72	1.01	1.520	0.684	ECOS2SB121CA	ECEC2SB121CA
150	22 x 40	0.79	1.11	1.216	0.547	ECOS2SB151BA	ECEC2SB151BA
	25 x 30	0.79	1.11	1.216	0.547	ECOS2SB151CA	ECEC2SB151CA
	30 x 25	0.79	1.11	1.216	0.547	ECOS2SB151DA	ECEC2SB151DA
180	22 x 45	0.87	1.22	1.013	0.456	ECOS2SB181BA	ECEC2SB181BA
	25 x 40	0.87	1.22	1.013	0.456	ECOS2SB181CA	ECEC2SB181CA
	30 x 30	0.87	1.22	1.013	0.456	ECOS2SB181DA	ECEC2SB181DA
220	25 x 45	1.00	1.40	0.829	0.373	ECOS2SB221CA	ECEC2SB221CA
	30 x 30	1.00	1.40	0.829	0.373	ECOS2SB221DA	ECEC2SB221DA
	35 x 25	1.00	1.40	0.829	0.373	ECOS2SB221EA	ECEC2SB221EA
270	25 x 50	1.19	1.67	0.675	0.304	ECOS2SB271CA	ECEC2SB271CA
	30 x 40	1.19	1.67	0.675	0.304	ECOS2SB271DA	ECEC2SB271DA
	35 x 30	1.19	1.67	0.675	0.304	ECOS2SB271EA	ECEC2SB271EA
330	30 x 45	1.38	1.93	0.553	0.249	ECOS2SB331DA	ECEC2SB331DA
	35 x 35	1.38	1.93	0.553	0.249	ECOS2SB331EA	ECEC2SB331EA
390	30 x 50	1.55	2.17	0.468	0.210	ECOS2SB391DA	ECEC2SB391DA
	35 x 40	1.55	2.17	0.468	0.210	ECOS2SB391EA	ECEC2SB391EA
470	35 x 45	1.74	2.44	0.388	0.175	ECOS2SB471EA	ECEC2SB471EA
560	35 x 50	1.90	2.66	0.326	0.147	ECOS2SB561EA	ECEC2SB561EA
<b>450 VDC Working, 500 VDC Surge</b>							
82	22 x 30	0.56	0.78	2.022	0.708	ECOS2WB820BA	ECEC2WB820BA
	25 x 25	0.56	0.78	2.022	0.708	ECOS2WB820CA	ECEC2WB820CA
100	22 x 35	0.64	0.90	1.658	0.580	ECOS2WB101BA	ECEC2WB101BA
	25 x 30	0.64	0.90	1.658	0.580	ECOS2WB101CA	ECEC2WB101CA
120	22 x 40	0.72	1.01	1.382	0.484	ECOS2WB121BA	ECEC2WB121BA
	25 x 35	0.72	1.01	1.382	0.484	ECOS2WB121CA	ECEC2WB121CA
	30 x 25	0.72	1.01	1.382	0.484	ECOS2WB121DA	ECEC2WB121DA
150	22 x 50	0.79	1.11	1.105	0.387	ECOS2WB151BA	ECEC2WB151BA
	25 x 40	0.79	1.11	1.105	0.387	ECOS2WB151CA	ECEC2WB151CA
	30 x 30	0.79	1.11	1.105	0.387	ECOS2WB151DA	ECEC2WB151DA
	35 x 25	0.79	1.11	1.105	0.387	ECOS2WB151EA	ECEC2WB151EA
180	25 x 45	0.87	1.22	0.921	0.322	ECOS2WB181CA	ECEC2WB181CA
	30 x 35	0.87	1.22	0.921	0.322	ECOS2WB181DA	ECEC2WB181DA
220	25 x 50	1.00	1.40	0.754	0.264	ECOS2WB221CA	ECEC2WB221CA
	30 x 40	1.00	1.40	0.754	0.264	ECOS2WB221DA	ECEC2WB221DA
	35 x 30	1.00	1.40	0.754	0.264	ECOS2WB221EA	ECEC2WB221EA
270	30 x 45	1.19	1.67	0.614	0.215	ECOS2WB271DA	ECEC2WB271DA
	35 x 35	1.19	1.67	0.614	0.215	ECOS2WB271EA	ECEC2WB271EA
330	30 x 50	1.38	1.93	0.502	0.176	ECOS2WB331DA	ECEC2WB331DA
	35 x 40	1.38	1.93	0.502	0.176	ECOS2WB331EA	ECEC2WB331EA
390	35 x 45	1.55	2.17	0.425	0.149	ECOS2WB391EA	ECEC2WB391EA
470	35 x 50	1.74	2.44	0.353	0.123	ECOS2WB471EA	ECEC2WB471EA