

**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



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
	16~100WV:	0.93    0.95    1.0    1.05    1.08    1.15
	160~450WV:	0.75    0.8    1.0    1.2    1.25    1.4
Ripple Current Ambient Temperature Factors**		
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**

E C        

A        

B    **Capacitance Code**

**Series Code**

**Suffix**  
 A Standard Ratings  
 X Extended CV Ratings  
 L 20mm Length Ratings

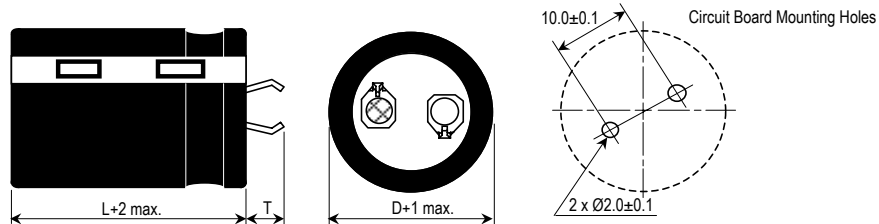
**RoHS compliant PVC sleeve and top plate is standard. PET sleeve is available without top plate.**

Terminal Style		
Prefix	Length	# of Pins
ECOS	6.3mm	2
ECEC	4.0mm	2
ECE3	4.0mm	3

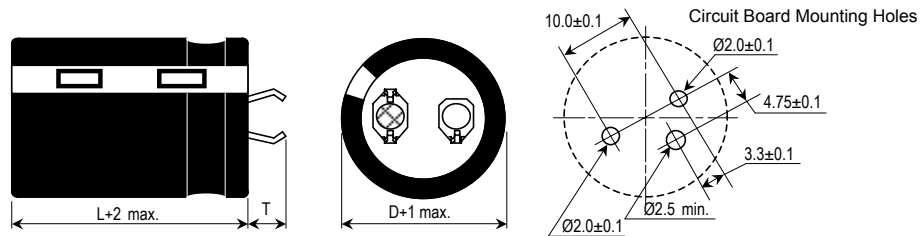
Voltage Code													
1A	1C	1E	1V	1H	1J	1K	2A	2C	2D	2E	2T	2G	2W
10	16	25	35	50	63	80	100	160	200	250	385	400	450

Diameter	
Diameter	Code
22	B
25	C
30	D
35	E

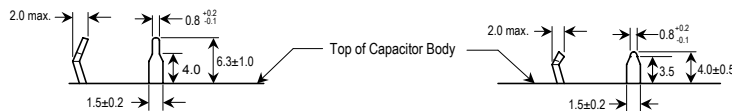
2 Pin Mounting Style



3 Pin Mounting Style



Pin Dimensions



"T" 6.3mm Length: Standard on 2 Pin Mounting Style

4mm Length: Standard on 3 Pin, Available on 2 Pin Mounting Styles

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When safety concerns arise, please contact Panasonic immediately for technical consultation.

## 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>							
3300	22 x 20	1.30	1.50	0.216	0.173	ECOS1CA332BL	ECEC1CA332BL
4700	25 x 20	1.60	1.84	0.152	0.121	ECOS1CA472CL	ECEC1CA472CL
6800	22 x 25	2.20	2.53	0.085	0.068	ECOS1CA682BA	ECEC1CA682BA
	30 x 20	1.80	2.07	0.105	0.084	ECOS1CA682DL	ECEC1CA682DL
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
	35 x 20	2.40	2.76	0.071	0.057	ECOS1CA103EL	ECEC1CA103EL
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>							
2200	22 x 20	1.30	1.50	0.241	0.181	ECOS1EA222BL	ECEC1EA222BL
3300	25 x 20	1.60	1.84	0.161	0.121	ECOS1EA332CL	ECEC1EA332CL
4700	22 x 25	2.00	2.30	0.106	0.079	ECOS1EA472BA	ECEC1EA472BA
	30 x 20	1.80	2.07	0.113	0.085	ECOS1EA472DL	ECEC1EA472DL
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
	35 x 20	2.30	2.65	0.080	0.060	ECOS1EA682EL	ECEC1EA682EL

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## TS-HA Standard Ratings (continued)

Part numbers shown with 2 pins

Cap. ( $\mu\text{F}$ )	Size (mm) D x L	Max 105°C R.C. ( $A_{\text{rms}}$ )		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>							
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
	25 x 40	3.20	3.68	0.044	0.035	ECOS1EA123CA	ECEC1EA123CA
	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
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

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## 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>							
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
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

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## 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>80 VDC Working, 100 VDC Surge (continued)</b>							
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
<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

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## 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>							
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
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

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## 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>							
100	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
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

Design and specifications are subject to change without notice.

Contact the factory or your sales representative for technical specifications before purchase and/or use.

When safety concerns arise, please contact Panasonic immediately for technical consultation.