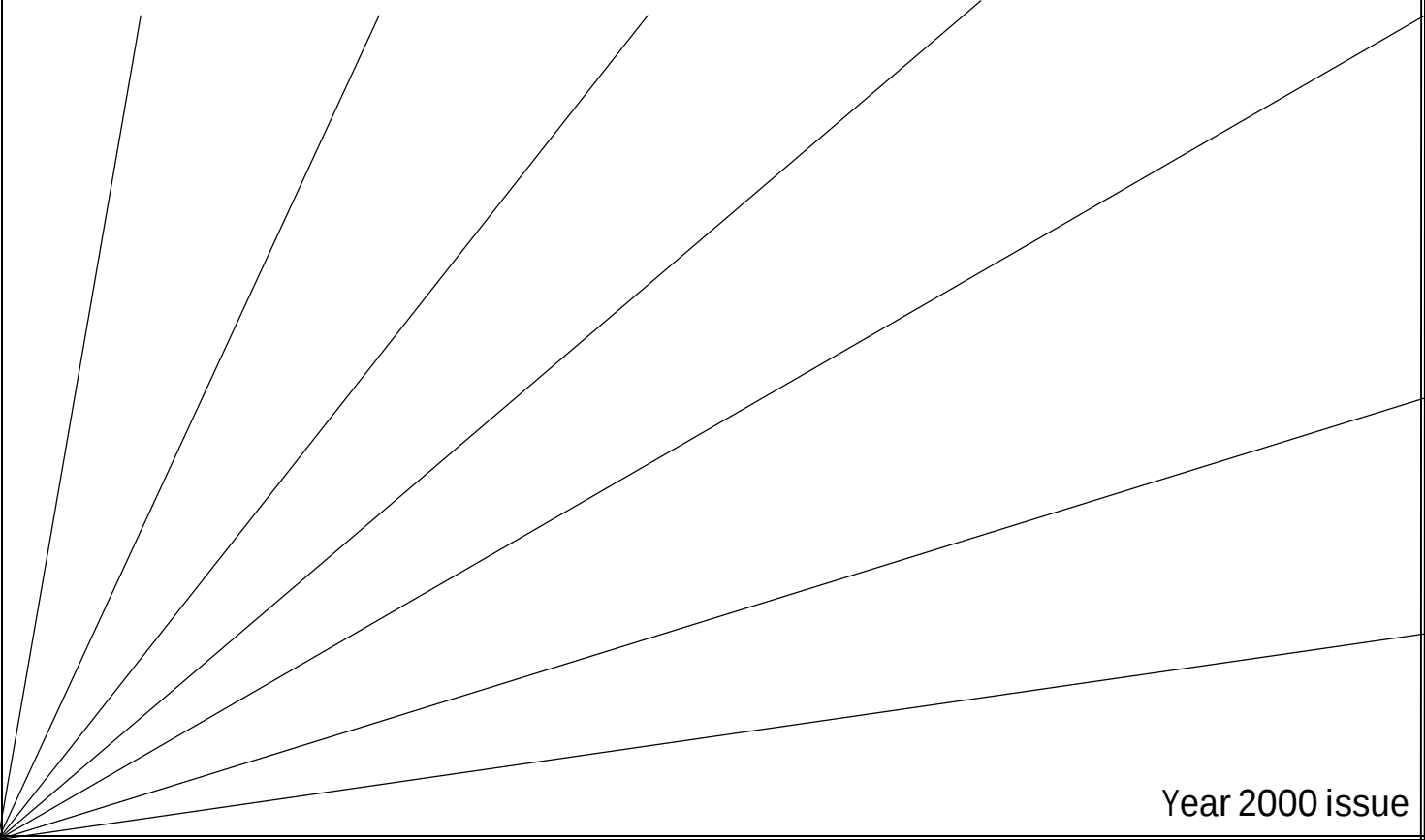




Panasonic®

Large Can

Aluminum Electrolytic Capacitors



Year 2000 issue



Matsushita Electronic Components Corporation of America (ACOM) has been manufacturing aluminum electrolytic capacitors since 1982.

ACOM initially produced the popular 2 pin, snap-in capacitor. Manufacturing has expanded with the introduction of multi-pin snap-in and computer grade capacitors.

New and expanded range products in this catalog include:

- ***Expanded capacitance ratings (TS-UP series)***
- ***Expanded case sizes***
 - ***40mm diameters (TS-UP, TS-HA, TS-HB series)***
 - ***50mm diameters, lengths to 105mm (T-UP, T-HA series)***
- ***Screw terminal products (G-AA, G-BA series)***
- ***500WV products (TS-UP, T-UP, G-AA series)***

This catalog contains general information and standard product listings for aluminum electrolytic capacitors produced by Matsushita Electronic Components Corporation of America (ACOM).

Special designs and more comprehensive technical information are available upon request. Contact your Panasonic sales representative for details.

The information contained herein is believed to be accurate at the time of publication. Design and specifications are subject to change without notice.

No ozone depleting substances (ODS) under the Montreal Protocol are used in the manufacturing process for these products.

The ACOM capacitor plant is ISO 9001 registered.

Capacitor Quick Guide

Series	Features	Endurance (Load Life)	Voltage Range (WV)	Cap. Range (μ F)	Size Range D x L (mm)	Comments	Page
2 terminal snap-in style (TS Type)							7
TS-UP	High CV	85°C 2000 ~ 3000h	16 ~ 500	33 ~ 68,000	20 x 25 ~ 40 x 50	Extended CV ratings, 40mm diameters, 500WV available	8
TS-HA	High CV High Ripple Long Life	105°C 2000 ~ 3000h	10 ~ 450	33 ~ 68,000	20 x 25 ~ 40 x 50	20mm low profile lengths available	13
TS-HB	Very High CV High Ripple Long Life	105°C 3000h	160 ~ 450	82 ~ 2,700	22 x 30 ~ 40 x 50	40mm diameters available	17
TS-XB	Premium Industrial Grade	105°C 7000h	160 ~ 450	39 ~ 2,200	22 x 25 ~ 35 x 50	Longest life TS type	19
TS-EX	VDE-0806 Specification	105°C 2000h	250	100 ~ 1,200	22 x 25 ~ 35 x 50	VDE-0806 over- voltage capability	22
4 / 5 terminal snap-in style (T Type)							23
T-UP	High CV High Ripple	85°C 3000h	16 ~ 500	470 ~ 120,000	35 x 40 ~ 50 x 105	50mm diameters, 500WV ratings available	24
T-HA	Long Life High Ripple	105°C 3000h	16 ~ 450	390 ~ 120,000	35 x 40 ~ 50 x 105	50mm diameter sizes available	27
Screw terminal "computer grade" style (G Type)							29
G-AA	High CV Industrial Grade	85°C 3000h	16 ~ 500	150 ~ 1,200,000	35 x 40 ~ 77 x 220	English and metric terminals available	30
G-BA	Long Life Industrial Grade	105°C 2000h	10 ~ 450	220 ~ 1,200,000	35 x 40 ~ 77 x 220	English and metric terminals available	34

1 General Specifications

Capacitance

Nominal capacitance is specified at 120Hz frequency and 20°C temperature. Unless specified otherwise, standard capacitance tolerance is $\pm 20\%$ of the nominal value.

Working Voltage

The maximum allowable sum of continuous DC voltage plus peak ripple voltage which can be applied to the capacitor.

Surge Voltage

The maximum transient voltage level allowed for short periods of time without sustaining permanent damage to the capacitor. Values are listed in the standard product ratings.

Leakage Current

$I = 3\sqrt{CV}$ (μA) maximum after 5 minutes of applying rated voltage. Capacitance is the nominal value in μF , voltage in VDC.

Ripple Current

The standard product tables list ripple current allowable limits at specified maximum operating temperatures.

Correction factors for other temperatures and frequencies are listed in the general sections for the general product type.

Endurance (Life) Test

Duration: Specified hours of life
 Ambient Temp.: Maximum specified operating temperature
 Applied Voltage: DC voltage with maximum specified ripple current applied (the sum of the applied DC voltage plus the peak ripple voltage should not exceed rated working voltage)

Post test requirements at +20°C:

Leakage Current: $\leq$ Initial specified value
 Cap. change: $\leq \pm 20\%$ of initial measured value
 D. F. / E.S.R.: $\leq 200\%$ of initial specified value

Shelf Life

Duration: 1000 hours
 Ambient Temp.: Maximum specified operating temperature
 Applied Voltage: None

Post test requirements at +20°C:

Same as Endurance Test requirements above.

Measurements are to be performed after applying DC working voltage for 30 minutes.

2 Life Expectancy

Panasonic capacitors have a specified life at a maximum temperature and ripple current. Typical life can be considerably longer based on actual life test results performed by the factory. This data can be provided to help the designer estimate expected life. This information is given with a 60% confidence level.

Capacitor life at lower temperatures follows "The Doubling 10°C Rule" where life is doubled for each 10°C reduction in operating temperature. The following equation is useful for determining the life of a capacitor in the application;

$$L_2 = L_1 \times 2^{\frac{T_1 - (T_2 + \Delta T)}{10}}$$

where:

L_1 = Specified life (hours) at maximum operating temperature. Typical life may be substituted (at a 60% confidence level).

L_2 = Expected life (hours) at actual operating temperature.

T_1 = Maximum operating temperature.

T_2 = Ambient temperature (°C).

ΔT = Ripple current temperature rise (°C).

It is recommended that the ripple current heat rise be limited to 15°C at lower ambient temperatures as higher temperature rises may reduce operating life.

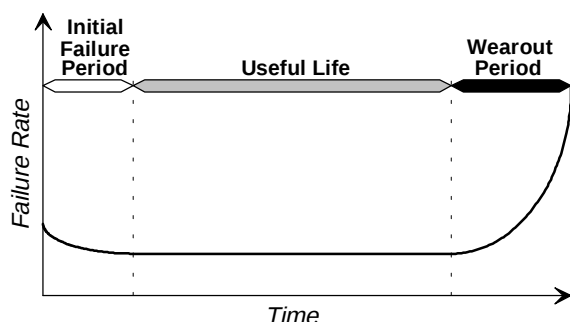
End of life is defined by the occurrence of one of the following when stabilized at 20°C;

◆ Capacitance change exceeds $\pm 20\%$ of the initial measured value.

◆ Dissipation Factor exceeds 200% of the initial specified value.

2 Life Expectancy (continued)

- ◆ Leakage Current exceeds the initial specified value.



Life Cycle of an Aluminum Electrolytic Capacitor

3 Circuit Design Considerations

Operating Temperature and Frequency

Aluminum electrolytic capacitor electrical characteristics are normally specified at a temperature of 20°C and a frequency of 120Hz. Electrical parameters are temperature and frequency dependent as follows;

(1) Effects of operating temperature

At higher temperatures, capacitance and leakage current increase while ESR decreases.

At lower temperatures, capacitance and leakage current will decrease while ESR increases.

(2) Effects of frequency

Capacitance, impedance, and ESR will decrease as frequency increases.

At lower frequencies, ripple current generated temperature will rise due to increasing ESR.

Reverse Voltage

DC capacitors have polarity which must be verified before insertion.

Avoid use in circuits with changing or uncertain polarity.

Ensure that allowable ripple currents superimposed on low DC bias voltages do not cause reverse voltage conditions.

Charge / Discharge Applications

Standard capacitors are not suitable for use in repeating charge / discharge applications.

Capacitors Connected in Parallel

Circuit resistance can approximate the series resistance of the capacitor, resulting in ripple current load imbalances. Careful design of wiring methods can minimize excessive ripple currents applied to a capacitor.

Capacitors Connected in Series

Normal DC leakage current variations among capacitors can cause voltage differences. The use of voltage dividing sharing resistors with consideration to leakage currents can compensate for voltage imbalances.

Electrical Precautions

Transient recovery voltage may be generated in the capacitor due to dielectric absorption. Typical voltage levels are less than 10% of the rated capacitor voltage. If required, this voltage can be discharged with a resistor.

The aluminum case of the capacitor has an indeterminate resistance to the cathode terminal. The vinyl sleeve on the capacitor is for marking and identification purposes and is not meant to electrically isolate the capacitor.

When designing circuits, consider worst case capacitor failure modes such as open or short circuits.

The effects of hot, electrically conductive, combustible, electrolyte liquid or vapor escaping from the safety vent should also be considered.

4 Capacitor Mounting Considerations

Circuit Board Design

Avoid wiring pattern runs which pass between the mounted capacitor and the circuit board. When dipping into a solder bath, excessive solder may collect under the capacitor by capillary action and short circuit the anode and cathode terminals.

4 Mounting Considerations (continued)

The vinyl sleeve of the capacitor can be damaged if solder passes through a lead hole for subsequently processed parts.

Electrically isolate the extra terminal(s) on T type products from the anode terminal, cathode terminal, and other circuit paths.

Clearance Requirements

Case mounted pressure relief vents require sufficient clearance to operate properly. The minimum clearance is diameter dependent as follows: 20~ 35mm diameters, 3mm minimum. 40mm diameters or greater, 5mm minimum.

Circuit Board Cleaning

Aluminum electrolytic capacitors can withstand immersion or ultrasonic cleaning with "safe" cleaning solvents for up to 5 minutes and 60°C maximum temperatures.

Most aqueous based cleaning solvents and detergents are acceptable. Some solvent groups could damage capacitors as follows:

- ♦ Halogenated cleaning solvents may permeate the capacitor seal, causing internal corrosion and failure.
- ♦ Alkali solvents may attack and dissolve the aluminum case.
- ♦ Petroleum based solvents may deteriorate the rubber seal.
- ♦ Xylene may deteriorate the rubber seal.
- ♦ Acetone may remove vinyl sleeve ink printing.

A thorough rinsing and drying process will prevent entrapment of residual solvents between the capacitor and the circuit board. Excessive drying temperatures and / or radiant heat drying sources may result in splitting or excessive shrinkage of the vinyl sleeve.

Mounting Adhesives and Coating Agents

When using mounting adhesives or coating agents, avoid materials with halogenated cleaning solvents including chloroprene based polymers.

A thorough drying process after application is required to prevent solvent entrapment between the capacitor and the circuit board.

Mounting adhesives or reinforcement clamps are recommended on 2 terminal, TS types with case sizes of ϕ 35 x 45mm or larger. Additional mounting support is also recommended for 4 or 5 terminal, T types with lengths exceeding 63mm.

5 Storage

Leakage current will increase with long storage times.

Storage times in ambient temperatures of 40°C or less can be four years or more before leakage current should be checked for conformance to the specified limit.

Longer storage times may require reforming of the capacitor to reduce leakage current below the specified limit. This can be accomplished by applying rated voltage in series with a 1000 Ω resistor for a time period of 30 ~ 60 minutes.

Under normal conditions, shelf life can exceed 10 years, providing that leakage current is checked before use.

Long term storage in high humidity conditions could cause oxidation of the terminal plating which could adversely affect solderability.

6 Safety Precautions

If the pressure relief vent of the capacitor should operate, immediately turn off the equipment and disconnect from the power source. This will minimize additional damage caused by the vaporizing electrolyte.

Avoid contact with the escaping electrolyte which can exceed 100°C temperatures.

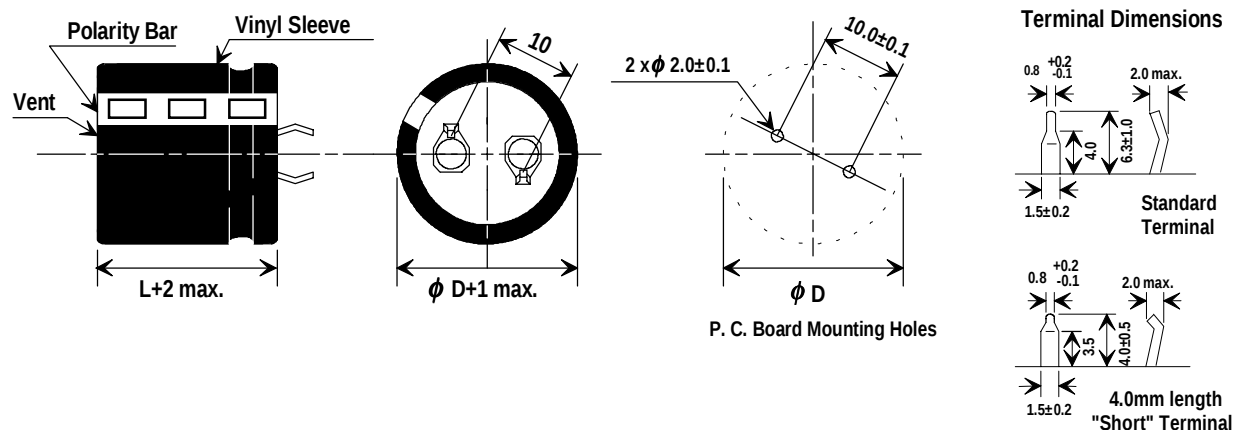
If electrolyte or vapors enter the eye, immediately flush the eye with large amounts of water and seek medical attention.

If electrolytes or vapors are ingested by mouth, gargle with water.

If electrolyte contacts the skin, wash with soap and water.

TS Type General Information

Dimensions



Ripple Current Multipliers

Ripple Current Frequency Correction Factors						
Frequency (Hz):	50	60	100~120	500	1k	10k~50k
16~100WV:	0.93	0.95	1.0	1.05	1.08	1.15
160~500WV:	0.75	0.8	1.0	1.2	1.25	1.4

Ripple Current Temperature Correction Factors					
Max. Temperature	105°C	85°C	70°C	60°C	≤45°C
TS-UP	---	1.0	1.3	1.4	1.5
TS-HA, HB, XB, EX	1.0	1.7	2.0	2.2	2.35

Note: Use of temperature correction factors can limit load life to the hours specified for the maximum operating temperature of the series.

TS-UP Series two terminal snap-in

- Compact size for general purpose and industrial applications
- **NEW:** 500 WV ratings, 40mm diameter sizes, extended capacitance ratings
- Wide range of case sizes including 20mm lengths for low profile applications
- Can vent construction



Rated Working Voltage:	16 ~ 250 VDC					350 ~ 500 VDC				
Operating Temperature:	-40 ~ +85°C					-25 ~ +85°C				
Nominal Capacitance:	120 ~ 68000μF (±20% tolerance)					33 ~ 680μF (±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: $\frac{(\text{rated cap. } [\mu\text{F}] - 33000)}{1000}$									
Endurance:	3000 hours* at +85°C with maximum specified ripple current (see page 4) *2000 hours for 20mm diameter or 20mm length sizes									

Part Number System

E C Common Code/ Terminal Type	Voltage Code	P Series	Capacitance Code	Case Diameter	Suffix, Top Vinyl Plate
25 ~ 50mm lengths					
A		With Plate			
B		Without plate			
20mm length					
L		With Plate			
G		Without plate			
Extended Capacitance Ratings					
X		With plate			

TS-UP Standard Ratings

Cap. (μF)	Size (mm) D x L	Max 85°C R.C. (A _{rms})		Max. 20°C ESR (Ω)		Panasonic Part Number
		120Hz	10k~50kHz	120Hz	20kHz	
16 VDC Working, 20 VDC Surge						
6800	20 x 25	3.15	3.62	0.098	0.083	ECOS1CP682AA
8200	20 x 30	3.47	3.99	0.081	0.069	ECOS1CP822AA
10000	20 x 35	3.78	4.35	0.066	0.056	ECOS1CP103AA
12000	20 x 35	4.52	5.20	0.062	0.053	ECOS1CP123AA
15000	20 x 40	5.26	6.05	0.053	0.045	ECOS1CP153AA
4700	22 x 20	1.60	1.84	0.159	0.135	ECOS1CP472BL
10000	22 x 30	3.78	4.35	0.075	0.063	ECOS1CP103BA
12000	22 x 30	4.52	5.20	0.062	0.053	ECOS1CP123BA
15000	22 x 35	5.26	6.05	0.053	0.045	ECOS1CP153BA
18000	22 x 40	5.57	6.41	0.046	0.039	ECOS1CP183BA
22000	22 x 45	6.10	7.02	0.038	0.032	ECOS1CP223BA
6800	25 x 20	1.80	2.07	0.110	0.093	ECOS1CP682CL
10000	25 x 25	3.78	4.35	0.075	0.063	ECOS1CP103CA
12000	25 x 25	4.52	5.20	0.062	0.053	ECOS1CP123CA
15000	25 x 30	5.26	6.05	0.053	0.045	ECOS1CP153CA
18000	25 x 30	5.57	6.41	0.046	0.039	ECOS1CP183CA
22000	25 x 35	6.10	7.02	0.038	0.032	ECOS1CP223CA
27000	25 x 45	6.31	7.26	0.031	0.026	ECOS1CP273CA
33000	25 x 50	6.84	7.87	0.025	0.021	ECOS1CP333CA
10000	30 x 20	2.40	2.76	0.083	0.070	ECOS1CP103DL
22000	30 x 30	6.10	7.02	0.038	0.032	ECOS1CP223DA
27000	30 x 35	6.31	7.26	0.031	0.026	ECOS1CP273DA
33000	30 x 40	6.84	7.87	0.025	0.021	ECOS1CP333DA
39000	30 x 45	6.94	7.98	0.021	0.018	ECOS1CP393DA
47000	30 x 50	7.47	8.59	0.019	0.017	ECOS1CP473DA
15000	35 x 20	3.20	3.68	0.055	0.047	ECOS1CP153EL
33000	35 x 30	6.84	7.87	0.025	0.021	ECOS1CP333EA
39000	35 x 35	6.94	7.98	0.021	0.018	ECOS1CP393EA
47000	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
68000	40 x 40	9.05	10.41	0.018	0.017	ECOS1CP683FA
82000	40 x 50	10.29	11.83	0.016	0.015	ECOS1CP823FA
25 VDC Working, 32 VDC Surge						
4700	20 x 25	3.05	3.51	0.113	0.090	ECOS1EP472AA
5600	20 x 30	3.36	3.86	0.095	0.076	ECOS1EP562AA
6800	20 x 35	3.47	3.99	0.078	0.062	ECOS1EP682AA
8200	20 x 40	3.57	4.11	0.065	0.052	ECOS1EP822AA
3300	22 x 20	1.60	1.84	0.176	0.141	ECOS1EP332BL
6800	22 x 30	3.47	3.99	0.078	0.062	ECOS1EP682BA
8200	22 x 30	3.57	4.11	0.065	0.052	ECOS1EP822BA
10000	22 x 35	3.78	4.35	0.058	0.046	ECOS1EP103BA
12000	22 x 40	4.10	4.72	0.048	0.039	ECOS1EP123BA
15000	22 x 50	4.63	5.32	0.039	0.031	ECOS1EP153BA
4700	25 x 20	1.80	2.07	0.123	0.099	ECOS1EP472CL
6800	25 x 25	3.47	3.99	0.078	0.062	ECOS1EP682CA
8200	25 x 25	3.57	4.11	0.065	0.052	ECOS1EP822CA
10000	25 x 30	3.78	4.35	0.058	0.046	ECOS1EP103CA
12000	25 x 35	4.10	4.72	0.048	0.039	ECOS1EP123CA
15000	25 x 40	4.63	5.32	0.039	0.031	ECOS1EP153CA
18000	25 x 45	5.47	6.29	0.035	0.028	ECOS1EP183CA
22000	25 x 50	6.10	7.02	0.029	0.023	ECOS1EP223CA
6800	30 x 20	2.30	2.65	0.078	0.062	ECOS1EP682DL
10000	30 x 25	3.78	4.35	0.058	0.046	ECOS1EP103DA
12000	30 x 30	4.10	4.72	0.048	0.039	ECOS1EP123DA
15000	30 x 30	4.63	5.32	0.039	0.031	ECOS1EP153DA
18000	30 x 35	5.47	6.29	0.035	0.028	ECOS1EP183DA
22000	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
33000	30 x 50	6.84	7.87	0.020	0.017	ECOS1EP333DA
10000	35 x 20	2.70	3.11	0.061	0.049	ECOS1EP103EL
27000	35 x 35	6.21	7.14	0.025	0.020	ECOS1EP273EA
33000	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
47000	40 x 40	8.00	9.20	0.017	0.015	ECOS1EP473FA
56000	40 x 50	8.96	10.30	0.016	0.015	ECOS1EP563FA

TS-UP Standard Ratings (continued)

Cap. (μF)	Size (mm) D x L	Max 85°C R.C. (A_{rms})		Max. 20°C ESR (Ω)		Panasonic Part Number
		120Hz	10k~50kHz	120Hz	20kHz	
35 VDC Working, 44 VDC Surge						
3300	20 x 25	2.73	3.14	0.111	0.083	ECOS1VP332AA
3900	20 x 30	2.94	3.38	0.094	0.070	ECOS1VP392AA
4700	20 x 35	3.26	3.75	0.078	0.058	ECOS1VP472AA
5600	20 x 40	3.36	3.86	0.080	0.060	ECOS1VP562AA
2200	22 x 20	1.40	1.61	0.181	0.136	ECOS1VP222BL
4700	22 x 30	3.26	3.75	0.078	0.058	ECOS1VP472BA
5600	22 x 30	3.36	3.86	0.080	0.060	ECOS1VP562BA
6800	22 x 35	3.68	4.23	0.066	0.049	ECOS1VP682BA
8200	22 x 40	4.00	4.60	0.057	0.042	ECOS1VP822BA
10000	22 x 45	4.42	5.08	0.050	0.037	ECOS1VP103BA
3300	25 x 20	1.70	1.96	0.121	0.090	ECOS1VP332CL
4700	25 x 25	3.26	3.75	0.078	0.058	ECOS1VP472CA
5600	25 x 25	3.36	3.86	0.080	0.060	ECOS1VP562CA
6800	25 x 30	3.68	4.23	0.066	0.049	ECOS1VP682CA
8200	25 x 35	4.00	4.60	0.057	0.042	ECOS1VP822CA
10000	25 x 40	4.42	5.08	0.050	0.037	ECOS1VP103CA
12000	25 x 45	5.05	5.81	0.044	0.033	ECOS1VP123CA
15000	25 x 50	5.57	6.41	0.036	0.027	ECOS1VP153CA
4700	30 x 20	2.00	2.30	0.088	0.066	ECOS1VP472DL
10000	30 x 30	4.42	5.08	0.050	0.037	ECOS1VP103DA
12000	30 x 35	5.05	5.81	0.044	0.033	ECOS1VP123DA
15000	30 x 40	5.57	6.41	0.036	0.027	ECOS1VP153DA
18000	30 x 45	5.68	6.53	0.030	0.023	ECOS1VP183DA
22000	30 x 50	6.10	7.02	0.026	0.020	ECOS1VP223DA
6800	35 x 20	2.40	2.76	0.071	0.053	ECOS1VP682EL
10000	35 x 25	4.42	5.08	0.050	0.037	ECOS1VP103EA
12000	35 x 30	5.05	5.81	0.044	0.033	ECOS1VP123EA
15000	35 x 30	5.57	6.41	0.036	0.027	ECOS1VP153EA
18000	35 x 35	5.68	6.53	0.030	0.023	ECOS1VP183EA
22000	35 x 40	6.10	7.02	0.026	0.020	ECOS1VP223EA
27000	35 x 45	6.84	7.87	0.021	0.017	ECOS1VP273EA
33000	35 x 50	7.15	8.22	0.018	0.014	ECOS1VP333EA
27000	40 x 40	6.84	7.87	0.021	0.017	ECOS1VP273FA
39000	40 x 50	7.98	9.18	0.017	0.014	ECOS1VP393FA
63 VDC Working, 79 VDC Surge						
2200	20 x 35	2.52	2.90	0.151	0.113	ECOS1JP222AA
2700	20 x 40	3.73	4.29	0.123	0.092	ECOS1JP272AA
1000	22 x 20	1.20	1.38	0.381	0.286	ECOS1JP102BL
2200	22 x 30	2.52	2.90	0.151	0.113	ECOS1JP222BA
2700	22 x 35	3.73	4.29	0.123	0.092	ECOS1JP272BA
3300	22 x 40	4.10	4.72	0.105	0.079	ECOS1JP332BA
3900	22 x 45	4.44	5.11	0.098	0.073	ECOS1JP392BA
4700	22 x 50	4.86	5.59	0.081	0.061	ECOS1JP472BA
1500	25 x 20	1.30	1.50	0.254	0.191	ECOS1JP152CL
2200	25 x 25	2.52	2.90	0.151	0.113	ECOS1JP222CA
2700	25 x 30	3.73	4.29	0.123	0.092	ECOS1JP272CA
3300	25 x 30	4.10	4.72	0.105	0.079	ECOS1JP332CA
3900	25 x 35	4.44	5.11	0.098	0.073	ECOS1JP392CA
4700	25 x 40	4.86	5.59	0.081	0.061	ECOS1JP472CA
5600	25 x 45	5.36	6.16	0.068	0.051	ECOS1JP562CA
6800	25 x 50	5.84	6.72	0.061	0.046	ECOS1JP682CA
2200	30 x 20	1.50	1.73	0.173	0.130	ECOS1JP222DL
3300	30 x 25	4.10	4.72	0.105	0.079	ECOS1JP332DA
3900	30 x 30	4.44	5.11	0.098	0.073	ECOS1JP392DA
4700	30 x 30	4.86	5.59	0.081	0.061	ECOS1JP472DA
5600	30 x 35	5.36	6.16	0.068	0.051	ECOS1JP562DA
6800	30 x 40	5.84	6.72	0.061	0.046	ECOS1JP682DA
8200	30 x 45	6.00	6.90	0.051	0.038	ECOS1JP822DA
3300	35 x 20	1.70	1.96	0.126	0.094	ECOS1JP332EL
4700	35 x 25	4.86	5.59	0.081	0.061	ECOS1JP472EA
5600	35 x 30	5.36	6.16	0.068	0.051	ECOS1JP562EA
6800	35 x 30	5.84	6.72	0.061	0.046	ECOS1JP682EA
8200	35 x 35	6.00	6.90	0.051	0.038	ECOS1JP822EA
10000	35 x 40	6.52	7.50	0.041	0.033	ECOS1JP103EA
12000	35 x 50	7.15	8.22	0.035	0.028	ECOS1JP123EA
12000	40 x 40	7.15	8.22	0.035	0.028	ECOS1JP123FA
15000	40 x 50	7.53	8.66	0.033	0.027	ECOS1JP153FA
80 VDC Working, 100 VDC Surge						
1200	20 x 30	2.08	2.39	0.221	0.166	ECOS1KP122AA
1500	20 x 35	2.26	2.60	0.177	0.133	ECOS1KP152AA
1800	20 x 40	2.52	2.90	0.147	0.111	ECOS1KP182AA
2200	20 x 50	2.73	3.14	0.136	0.102	ECOS1KP222AA
680	22 x 20	1.00	1.15	0.439	0.329	ECOS1KP681BL
1500	22 x 30	2.26	2.60	0.177	0.133	ECOS1KP152BA
1800	22 x 35	2.52	2.90	0.147	0.111	ECOS1KP182BA
2200	22 x 40	2.73	3.14	0.121	0.090	ECOS1KP222BA
2700	22 x 45	2.78	3.20	0.098	0.074	ECOS1KP272BA
3300	22 x 50	3.21	3.69	0.085	0.064	ECOS1KP332BA
1000	25 x 20	1.20	1.38	0.298	0.224	ECOS1KP102CL
1500	25 x 25	2.26	2.60	0.177	0.133	ECOS1KP152CA
1800	25 x 30	2.52	2.90	0.147	0.111	ECOS1KP182CA
2200	25 x 30	2.73	3.14	0.121	0.090	ECOS1KP222CA
2700	25 x 35	2.78	3.20	0.098	0.074	ECOS1KP272CA
3300	25 x 40	3.21	3.69	0.085	0.064	ECOS1KP332CA
3900	25 x 45	3.59	4.13	0.077	0.057	ECOS1KP392CA
4700	25 x 50	4.09	4.70	0.063	0.048	ECOS1KP472CA
1500	30 x 20	1.40	1.61	0.199	0.149	ECOS1KP152DL
2200	30 x 25	2.73	3.14	0.121	0.090	ECOS1KP222DA
2700	30 x 30	2.78	3.20	0.098	0.074	ECOS1KP272DA
3300	30 x 30	3.21	3.69	0.085	0.064	ECOS1KP332DA
3900	30 x 35	3.59	4.13	0.077	0.057	ECOS1KP392DA
4700	30 x 40	4.09	4.70	0.063	0.048	ECOS1KP472DA
5600	30 x 45	4.55	5.23	0.056	0.042	ECOS1KP562DA
6800	30 x 50	5.16	5.93	0.046	0.035	ECOS1KP682DA
2200	35 x 20	1.70	1.96	0.136	0.102	ECOS1KP222EL
5600	35 x 35	4.55	5.23	0.056	0.042	ECOS1KP562EA
6800	35 x 40	5.16	5.93	0.046	0.035	ECOS1KP682EA
8200	35 x 50	5.83	6.70	0.038	0.029	ECOS1KP822EA
8200	40 x 40	5.83	6.70	0.038	0.029	ECOS1KP822FA
10000	40 x 50	6.56	7.54	0.033	0.025	ECOS1KP103FA

TS-UP Standard Ratings (continued)

Cap. (μ F)	Size (mm) D x L	Max 85°C R.C. (A_{rms})		Max. 20°C ESR (Ω)		Panasonic Part Number
		120Hz	10k-50kHz	120Hz	20kHz	
100 VDC Working, 125 VDC Surge						
560	20 x 25	1.35	1.55	0.385	0.250	ECOS2AP561AA
820	20 x 30	1.59	1.83	0.263	0.171	ECOS2AP821AA
1000	20 x 35	1.96	2.25	0.216	0.140	ECOS2AP102AA
1200	20 x 40	2.31	2.66	0.180	0.117	ECOS2AP122AA
1500	20 x 50	2.57	2.96	0.144	0.093	ECOS2AP152AA
470	22 x 20	1.00	1.15	0.459	0.298	ECOS2AP471BL
680	22 x 25	1.61	1.85	0.317	0.206	ECOS2AP681BA
1000	22 x 30	1.96	2.25	0.216	0.140	ECOS2AP102BA
1200	22 x 35	2.31	2.66	0.193	0.126	ECOS2AP122BA
1500	22 x 40	2.57	2.96	0.155	0.101	ECOS2AP152BA
1800	22 x 45	2.84	3.27	0.129	0.084	ECOS2AP182BA
2200	22 x 50	3.14	3.61	0.121	0.078	ECOS2AP222BA
680	25 x 20	1.10	1.27	0.366	0.238	ECOS2AP681CL
1000	25 x 25	1.96	2.25	0.216	0.140	ECOS2AP102CA
1200	25 x 30	2.31	2.66	0.180	0.117	ECOS2AP122CA
1500	25 x 30	2.57	2.96	0.155	0.101	ECOS2AP152CA
1800	25 x 35	2.84	3.27	0.138	0.090	ECOS2AP182CA
2200	25 x 40	3.14	3.61	0.121	0.078	ECOS2AP222CA
2700	25 x 45	3.71	4.27	0.104	0.068	ECOS2AP272CA
3300	25 x 50	4.06	4.67	0.090	0.059	ECOS2AP332CA
1000	30 x 20	1.20	1.38	0.249	0.162	ECOS2AP102DL
1500	30 x 25	2.57	2.96	0.155	0.101	ECOS2AP152DA
1800	30 x 30	2.84	3.27	0.138	0.090	ECOS2AP182DA
2200	30 x 30	3.14	3.61	0.121	0.078	ECOS2AP222DA
2700	30 x 35	3.71	4.27	0.104	0.068	ECOS2AP272DA
3300	30 x 40	4.06	4.67	0.090	0.059	ECOS2AP332DA
3900	30 x 45	4.54	5.22	0.077	0.050	ECOS2AP392DA
4700	30 x 50	5.13	5.90	0.071	0.049	ECOS2AP472DA
1500	35 x 20	1.50	1.73	0.177	0.115	ECOS2AP152EL
2200	35 x 25	3.14	3.61	0.121	0.078	ECOS2AP222EA
2700	35 x 30	3.71	4.27	0.104	0.068	ECOS2AP272EA
3900	35 x 35	4.54	5.22	0.081	0.052	ECOS2AP392EA
4700	35 x 40	5.13	5.90	0.071	0.049	ECOS2AP472EA
5600	35 x 45	5.75	6.61	0.059	0.041	ECOS2AP562EA
6800	35 x 50	6.60	7.59	0.049	0.037	ECOS2AP682EA
5600	40 x 40	5.75	6.61	0.059	0.044	ECOS2AP562FA
8200	40 x 50	7.28	8.37	0.040	0.030	ECOS2AP822FA
200 VDC Working, 250 VDC Surge						
270	20 x 30	1.41	1.97	0.614	0.276	ECOS2DP271AA
330	20 x 35	1.56	2.18	0.553	0.249	ECOS2DP331AA
470	20 x 40	1.85	2.59	0.388	0.175	ECOS2DP471AX
680	20 x 50	2.52	3.53	0.268	0.121	ECOS2DP681AX
150	22 x 20	0.65	0.91	1.326	0.597	ECOS2DP151BL
270	22 x 25	1.41	1.97	0.614	0.276	ECOS2DP271BA
330	22 x 25	1.56	2.18	0.553	0.249	ECOS2DP331BX
390	22 x 30	1.68	2.35	0.468	0.210	ECOS2DP391BA
470	22 x 35	1.85	2.59	0.388	0.175	ECOS2DP471BA
560	22 x 40	2.43	3.40	0.326	0.147	ECOS2DP561BA
680	22 x 45	2.68	3.75	0.268	0.121	ECOS2DP681BA
220	25 x 20	0.87	1.22	0.904	0.407	ECOS2DP221CL
390	25 x 25	1.68	2.35	0.468	0.210	ECOS2DP391CA
470	25 x 30	1.85	2.59	0.388	0.175	ECOS2DP471CA
560	25 x 30	2.43	3.40	0.326	0.147	ECOS2DP561CX
680	25 x 35	2.68	3.75	0.268	0.121	ECOS2DP681CA
820	25 x 45	2.93	4.10	0.222	0.100	ECOS2DP821CA
1000	25 x 45	3.25	4.55	0.199	0.090	ECOS2DP102CX
1000	25 x 50	3.25	4.55	0.199	0.090	ECOS2DP102CA
330	30 x 20	1.00	1.40	0.603	0.271	ECOS2DP331DL
560	30 x 25	2.43	3.40	0.326	0.147	ECOS2DP561DA
680	30 x 30	2.68	3.75	0.268	0.121	ECOS2DP681DA
820	30 x 30	2.93	4.10	0.222	0.100	ECOS2DP821DX
820	30 x 35	2.93	4.10	0.222	0.100	ECOS2DP821DA
1000	30 x 35	3.25	4.55	0.199	0.090	ECOS2DP102DX
250 VDC Working, 300 VDC Surge						
180	20 x 30	1.07	1.50	0.921	0.368	ECOS2EP181AA
220	20 x 35	1.17	1.64	0.754	0.301	ECOS2EP221AA
120	22 x 20	0.45	0.63	1.658	0.663	ECOS2EP121BL
180	22 x 25	1.07	1.50	0.921	0.368	ECOS2EP181BA
220	22 x 25	1.17	1.64	0.754	0.301	ECOS2EP221BX
270	22 x 30	1.31	1.83	0.614	0.246	ECOS2EP271BA
330	22 x 35	1.75	2.45	0.553	0.221	ECOS2EP331BA
390	22 x 40	1.91	2.67	0.468	0.187	ECOS2EP391BA
470	22 x 45	2.11	2.95	0.388	0.155	ECOS2EP471BA
150	25 x 20	0.65	0.91	1.326	0.531	ECOS2EP151CL
270	25 x 25	1.31	1.83	0.614	0.246	ECOS2EP271CA
330	25 x 30	1.75	2.45	0.502	0.201	ECOS2EP331CA
390	25 x 30	1.91	2.67	0.468	0.187	ECOS2EP391CX
390	25 x 35	1.91	2.67	0.468	0.187	ECOS2EP391CA
470	25 x 35	2.11	2.95	0.388	0.155	ECOS2EP471CX
470	25 x 40	2.11	2.95	0.388	0.155	ECOS2EP471CA
560	25 x 40	2.25	3.15	0.326	0.130	ECOS2EP561CX
560	25 x 45	2.25	3.15	0.326	0.130	ECOS2EP561CA
680	25 x 45	2.50	3.50	0.268	0.107	ECOS2EP681CX
680	25 x 50	2.50	3.50	0.268	0.107	ECOS2EP681CA
220	30 x 20	0.87	1.22	0.829	0.332	ECOS2EP221DL
390	30 x 25	1.91	2.67	0.425	0.170	ECOS2EP391DA
470	30 x 25	2.11	2.95	0.353	0.141	ECOS2EP471DX
470	30 x 30	2.11	2.95	0.388	0.155	ECOS2EP471DA
560	30 x 30	2.25	3.15	0.326	0.130	ECOS2EP561DX

TS-UP Standard Ratings (continued)

Cap. (μ F)	Size (mm) D x L	Max. 85°C R.C. (A_{rms}) 120Hz	Max. 85°C R.C. (A_{rms}) 10k-50kHz	Max. 20°C ESR (Ω) 120Hz	Max. 20°C ESR (Ω) 20kHz	Panasonic Part Number
400 VDC Working, 450 VDC Surge						
82	20 x 30	0.83	1.16	2.022	0.708	ECOS2GP820AA
100	20 x 35	0.92	1.29	1.658	0.580	ECOS2GP101AA
120	20 x 40	1.02	1.43	1.382	0.484	ECOS2GP121AA
47	22 x 20	0.25	0.35	3.527	1.235	ECOS2GP470BL
82	22 x 25	0.83	1.16	2.022	0.708	ECOS2GP820BA
100	22 x 30	0.92	1.29	1.658	0.580	ECOS2GP101BA
120	22 x 35	1.02	1.43	1.382	0.484	ECOS2GP121BA
150	22 x 40	1.16	1.62	1.105	0.387	ECOS2GP151BA
180	22 x 45	1.44	2.02	0.921	0.322	ECOS2GP181BA
220	22 x 50	1.49	2.09	0.754	0.264	ECOS2GP221BA
68	25 x 20	0.35	0.49	2.926	1.024	ECOS2GP680CL
100	25 x 25	0.92	1.29	1.658	0.580	ECOS2GP101CA
120	25 x 25	1.02	1.43	1.382	0.484	ECOS2GP121CX
150	25 x 30	1.16	1.62	1.105	0.387	ECOS2GP151CA
180	25 x 30	1.44	2.02	0.921	0.322	ECOS2GP181CX
180	25 x 35	1.44	2.02	0.921	0.322	ECOS2GP181CA
220	25 x 40	1.49	2.09	0.754	0.264	ECOS2GP221CA
270	25 x 45	1.67	2.34	0.675	0.236	ECOS2GP271CA
100	30 x 20	0.47	0.66	1.989	0.696	ECOS2GP101DL
150	30 x 25	1.16	1.62	1.105	0.387	ECOS2GP151DA
220	30 x 30	1.49	2.09	0.754	0.264	ECOS2GP221DA
270	30 x 35	1.67	2.34	0.675	0.236	ECOS2GP271DA
330	30 x 40	1.90	2.66	0.553	0.193	ECOS2GP331DA
390	30 x 45	2.13	2.98	0.468	0.164	ECOS2GP391DA
150	35 x 20	0.60	0.84	1.326	0.464	ECOS2GP151EL
270	35 x 30	1.67	2.34	0.675	0.236	ECOS2GP271EA
330	35 x 30	1.90	2.66	0.553	0.193	ECOS2GP331EX
330	35 x 35	1.90	2.66	0.553	0.193	ECOS2GP331EA
390	35 x 35	2.13	2.98	0.468	0.164	ECOS2GP391EX
390	35 x 40	2.13	2.98	0.468	0.164	ECOS2GP391EA
470	35 x 40	2.39	3.35	0.388	0.136	ECOS2GP471EX
470	35 x 45	2.39	3.35	0.388	0.136	ECOS2GP471EA
560	35 x 45	2.69	3.77	0.326	0.114	ECOS2GP561EX
560	35 x 50	2.69	3.77	0.326	0.114	ECOS2GP561EA
680	35 x 50	3.00	4.20	0.268	0.094	ECOS2GP681EX
560	40 x 40	2.69	3.77	0.326	0.114	ECOS2GP561FA
820	40 x 50	3.38	4.73	0.222	0.078	ECOS2GP821FA
450 VDC Working, 500 VDC Surge						
56	20 x 30	0.70	0.98	2.960	1.184	ECOS2WP560AA
82	20 x 35	0.83	1.16	2.022	0.809	ECOS2WP820AA
33	22 x 20	0.20	0.28	6.028	2.411	ECOS2WP330BL
56	22 x 25	0.70	0.98	2.960	1.184	ECOS2WP560BA
82	22 x 30	0.83	1.16	2.022	0.809	ECOS2WP820BA
100	22 x 35	0.93	1.30	1.658	0.663	ECOS2WP101BA
120	22 x 40	1.04	1.46	1.382	0.553	ECOS2WP121BA
150	22 x 50	1.19	1.67	1.105	0.442	ECOS2WP151BA
47	25 x 20	0.29	0.41	4.233	1.693	ECOS2WP470CL
82	25 x 25	0.83	1.16	2.022	0.809	ECOS2WP820CA
120	25 x 30	1.04	1.46	1.382	0.553	ECOS2WP121CA
150	25 x 40	1.19	1.67	1.105	0.442	ECOS2WP151CA
180	25 x 40	1.35	1.89	0.921	0.368	ECOS2WP181CX
180	25 x 45	1.35	1.89	0.921	0.368	ECOS2WP181CA
220	25 x 45	1.55	2.17	0.754	0.301	ECOS2WP221CX
220	25 x 50	1.55	2.17	0.754	0.301	ECOS2WP221CA
68	30 x 20	0.38	0.53	2.926	1.170	ECOS2WP680DL
120	30 x 25	1.04	1.46	1.382	0.553	ECOS2WP121DA
150	30 x 30	1.19	1.67	1.105	0.442	ECOS2WP151DA
180	30 x 30	1.35	1.89	0.921	0.368	ECOS2WP181DX
180	30 x 35	1.35	1.89	0.921	0.368	ECOS2WP181DA
220	30 x 35	1.55	2.17	0.754	0.301	ECOS2WP221DX
220	30 x 40	1.55	2.17	0.754	0.301	ECOS2WP221DA
270	30 x 45	1.78	2.49	0.675	0.270	ECOS2WP271DA
330	30 x 50	2.01	2.81	0.553	0.249	ECOS2WP331DA
100	35 x 20	0.52	0.73	1.989	0.796	ECOS2WP101EL
180	35 x 25	1.35	1.89	0.921	0.368	ECOS2WP181EA
220	35 x 30	1.55	2.17	0.754	0.301	ECOS2WP221EA
270	35 x 30	1.78	2.49	0.614	0.246	ECOS2WP271EX
270	35 x 35	1.78	2.49	0.675	0.270	ECOS2WP271EA
330	35 x 35	2.01	2.81	0.553	0.221	ECOS2WP331EX
330	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
470	35 x 50	2.53	3.54	0.423	0.233	ECOS2WP471EA
470	40 x 40	2.53	3.54	0.423	0.233	ECOS2WP471FA
680	40 x 50	3.15	4.41	0.293	0.161	ECOS2WP681FA
500 VDC Working, 550 VDC Surge						
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
82	22 x 40	0.88	1.23	2.022	0.809	ECOS2HP820BA
100	22 x 45	0.99	1.39	1.658	0.663	ECOS2HP101BA
120	22 x 50	1.13	1.58	1.382	0.553	ECOS2HP121BA
68	25 x 25	0.78	1.09	2.438	0.975	ECOS2HP680CA
82	25 x 30	0.88	1.23	2.022	0.809	ECOS2HP820CA
100	25 x 35	0.99	1.39	1.658	0.663	ECOS2HP101CA
120	25 x 40	1.13	1.58	1.382	0.553	ECOS2HP121CA
150	25 x 45	1.29	1.80	1.105	0.442	ECOS2HP151CA
180	25 x 50	1.38	1.93	0.921	0.368	ECOS2HP181CA
120	30 x 30	1.13	1.58	1.382	0.553	ECOS2HP121DA
150	30 x 35	1.29	1.80	1.105	0.442	ECOS2HP151DA
180	30 x 40	1.38	1.93	0.921	0.368	ECOS2HP181DA
220	30 x 45	1.50	2.10	0.754	0.339	ECOS2HP221DA
150	35 x 25	1.20	1.68	1.105	0.442	ECOS2HP151EA
180	35 x 30	1.36	1.90	0.921	0.368	ECOS2HP181EA
220	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
330	40 x 40	2.16	3.02	0.502	0.276	ECOS2HP331FA
470	40 x 50	2.70	3.78	0.353	0.194	ECOS2HP471FA

- 3000 hour* life at 105°C 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 ~ +105°C	-25 ~ +105°C
Nominal Capacitance:	68 ~ 68000µF (±20% tolerance)	33 ~ 470µF (±20% tolerance)
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: $\frac{\text{rated cap. } [\mu\text{F}] - 33000}{1000}$	
Endurance:	3000 hours* at +105°C with maximum specified ripple current (see page 4) *2000 hours for 20mm diameter or 20mm length sizes	

The diagram illustrates the layout of a 25 ~ 50mm length Top Vinyl Plate. It shows the following components and their codes:

- Common Code/ Terminal Type:** ECOS (6.3mm Length Terminal (Standard)), ECEC (4mm Length "Short" Terminal). (See page 7)
- Voltage Code:** A
- Series:** A
- Capacitance Code:** A, B, C, D, E, F
- Case Diameter:** A, B, C, D, E, F
- Top Vinyl Plate:** 25 ~ 50mm lengths

25 ~ 50mm lengths	
A	With Plate
B	Without plate
20mm length	
L	With Plate
G	Without plate

Cap. (μ F)	Size (mm) D x L	Max 105°C R.C. (A_{rms}) 120Hz	20°C ESR (Ω , max.) 10k-50kHz	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
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

Cap. (μ F)	Size (mm) D x L	Max 105°C R.C. (A_{rms}) 120Hz	20°C ESR (Ω , max.) 10k-50kHz	20°C ESR (Ω , max.) 120Hz	20°C ESR (Ω , max.) 20kHz	Panasonic Part Number
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
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</	

TS-HA Standard Ratings (continued)

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A _{rms}) 120Hz	20°C ESR (Ω, max.) 10k-50kHz	20°C ESR (Ω, max.) 120Hz	20kΩ	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
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
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
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

TS-HB Series two terminal snap-in

- Very compact size (20 ~ 25% smaller than TS-HA series)
- Long 3000 hour life at 105°C with high ripple current capability
- **NEW:** 40mm diameter case sizes
- Can vent construction



Rated Working Voltage:	160 ~ 250 VDC	385 ~ 450 VDC
Operating Temperature:	-40 ~ +105°C	-25 ~ +105°C
Nominal Capacitance:	330 ~ 2700μF (±20%)	82 ~ 560μF (±20%)
Dissipation Factor: (120 Hz, +20°C)	Working Voltage [V]:	160 ~ 450
	Max. D.F. (%):	15
Endurance:	3000 hours at +105°C with maximum specified ripple current (see page 4)	

Part Number System

E C 	 	B	 	 	
Common Code/ Terminal Type	Voltage Code	Series	Capacitance Code	Case Diameter	Top Vinyl Plate
ECOS 6.3mm Length Terminal (Standard)				A 20mm	A With Plate
ECEC 4.0mm Length "Short" Terminal				B 22mm	B Without plate
(See page 7)				C 25mm	
				D 30mm	
				E 35mm	
				F 40mm	

TS-HB Standard Ratings

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A _{rms}) 120Hz	10k-50kHz	20°C ESR (Ω, max.) 120Hz	20kHz	Panasonic Part Number
160 VDC Working, 200 VDC Surge						
470	22 x 30	1.40	1.96	0.423	0.190	ECOS2CB471BA
560	22 x 35	1.50	2.10	0.355	0.160	ECOS2CB561BA
680	22 x 40	1.70	2.38	0.293	0.132	ECOS2CB681BA
820	22 x 45	2.00	2.80	0.243	0.109	ECOS2CB821BA
1000	22 x 50	2.20	3.08	0.199	0.090	ECOS2CB102BA
680	25 x 30	1.70	2.38	0.293	0.132	ECOS2CB681CA
820	25 x 35	2.00	2.80	0.243	0.109	ECOS2CB821CA
1000	25 x 40	2.20	3.08	0.199	0.090	ECOS2CB102CA
1200	25 x 45	2.30	3.22	0.180	0.090	ECOS2CB122CA
1000	30 x 30	2.20	3.08	0.199	0.090	ECOS2CB102DA
1200	30 x 35	2.30	3.22	0.180	0.090	ECOS2CB122DA
1500	30 x 40	2.50	3.50	0.144	0.072	ECOS2CB152DA
1800	30 x 45	2.70	3.78	0.129	0.064	ECOS2CB182DA
1000	35 x 25	2.20	3.08	0.199	0.090	ECOS2CB102EA
1200	35 x 30	2.30	3.22	0.180	0.090	ECOS2CB122EA
1500	35 x 30	2.50	3.50	0.144	0.072	ECOS2CB152EA
1800	35 x 35	2.70	3.78	0.129	0.064	ECOS2CB182EA
2200	35 x 45	2.90	4.06	0.105	0.063	ECOS2CB222EA
2700	35 x 50	3.10	4.34	0.086	0.052	ECOS2CB272EA
2200	40 x 40	2.90	4.06	0.105	0.063	ECOS2CB222FA
3300	40 x 50	3.36	4.70	0.070	0.042	ECOS2CB332FA
200 VDC Working, 250 VDC Surge						
390	22 x 30	1.30	1.82	0.510	0.230	ECOS2DB391BA
470	22 x 35	1.40	1.96	0.423	0.190	ECOS2DB471BA
560	22 x 40	1.50	2.10	0.355	0.160	ECOS2DB561BA
680	22 x 45	1.70	2.38	0.293	0.132	ECOS2DB681BA
390	25 x 25	1.30	1.82	0.510	0.230	ECOS2DB391CA
470	25 x 30	1.40	1.96	0.423	0.190	ECOS2DB471CA
560	25 x 30	1.50	2.10	0.355	0.160	ECOS2DB561CA
680	25 x 35	1.70	2.38	0.293	0.132	ECOS2DB681CA
820	25 x 45	2.00	2.80	0.263	0.118	ECOS2DB821CA
1000	25 x 50	2.20	3.08	0.216	0.108	ECOS2DB102CA
560	30 x 25	1.50	2.10	0.355	0.160	ECOS2DB561DA
820	30 x 30	2.00	2.80	0.263	0.118	ECOS2DB821DA
1000	30 x 35	2.20	3.08	0.216	0.108	ECOS2DB102DA
1200	30 x 40	2.30	3.22	0.193	0.097	ECOS2DB122DA
1500	30 x 50	2.50	3.50	0.155	0.077	ECOS2DB152DA
820	35 x 25	2.00	2.80	0.263	0.118	ECOS2DB821EA
1000	35 x 30	2.20	3.08	0.216	0.108	ECOS2DB102EA
1200	35 x 35	2.30	3.22	0.193	0.097	ECOS2DB122EA
1500	35 x 40	2.50	3.50	0.155	0.077	ECOS2DB152EA
1800	35 x 45	2.70	3.78	0.129	0.077	ECOS2DB182EA
2200	35 x 50	2.90	4.06	0.105	0.063	ECOS2DB222EA
1800	40 x 40	2.70	3.78	0.129	0.077	ECOS2DB182FA
2700	40 x 50	3.55	4.97	0.086	0.052	ECOS2DB272FA

TS-HB Standard Ratings (continued)

Cap. (μ F)	Size (mm) D x L	Max 105°C R.C. (A_{rms})		20°C ESR (Ω , max.)		Panasonic Part Number
		120Hz	10k-50kHz	120Hz	20kHz	
250 VDC Working, 300 VDC Surge						
180	22 x 25	0.90	1.26	0.921	0.461	ECOS2EB181BA
220	22 x 30	1.00	1.40	0.754	0.377	ECOS2EB221BA
270	22 x 35	1.10	1.54	0.614	0.307	ECOS2EB271BA
330	22 x 40	1.20	1.68	0.502	0.251	ECOS2EB331BA
390	22 x 45	1.30	1.82	0.425	0.213	ECOS2EB391BA
470	22 x 50	1.40	1.96	0.353	0.176	ECOS2EB471BA
330	25 x 30	1.20	1.68	0.502	0.251	ECOS2EB331CA
470	25 x 40	1.40	1.96	0.353	0.176	ECOS2EB471CA
560	25 x 45	1.50	2.10	0.296	0.148	ECOS2EB561CA
680	25 x 50	1.70	2.38	0.244	0.134	ECOS2EB681CA
390	30 x 25	1.30	1.82	0.425	0.213	ECOS2EB391DA
470	30 x 30	1.40	1.96	0.353	0.176	ECOS2EB471DA
680	30 x 40	1.70	2.38	0.244	0.134	ECOS2EB681DA
820	30 x 45	2.00	2.80	0.202	0.111	ECOS2EB821DA
1000	30 x 50	2.20	3.08	0.199	0.109	ECOS2EB102DA
560	35 x 25	1.50	2.10	0.296	0.148	ECOS2EB561EA
680	35 x 30	1.70	2.38	0.244	0.134	ECOS2EB681EA
820	35 x 35	2.00	2.80	0.202	0.111	ECOS2EB821EA
1000	35 x 40	2.20	3.08	0.199	0.109	ECOS2EB102EA
1200	35 x 45	2.30	3.22	0.166	0.099	ECOS2EB122EA
1500	35 x 50	2.50	3.50	0.144	0.093	ECOS2EB152EA
1200	40 x 40	2.66	3.72	0.180	0.117	ECOS2EB122FA
1800	40 x 50	3.25	4.55	0.120	0.078	ECOS2EB182FA
400 VDC Working, 450 VDC Surge						
82	22 x 30	0.64	0.90	2.022	0.708	ECOS2GB820BA
100	22 x 30	0.69	0.97	1.658	0.580	ECOS2GB101BA
120	22 x 35	0.75	1.05	1.382	0.484	ECOS2GB121BA
150	22 x 40	0.82	1.15	1.105	0.387	ECOS2GB151BA
180	22 x 45	0.95	1.33	0.921	0.322	ECOS2GB181BA
100	25 x 25	0.69	0.97	1.658	0.580	ECOS2GB101CA
120	25 x 30	0.75	1.05	1.382	0.484	ECOS2GB121CA
150	25 x 30	0.82	1.15	1.105	0.387	ECOS2GB151CA
180	25 x 35	0.95	1.33	0.921	0.322	ECOS2GB181CA
220	25 x 45	1.10	1.54	0.754	0.264	ECOS2GB221CA
270	25 x 50	1.20	1.68	0.614	0.215	ECOS2GB271CA
150	30 x 25	0.82	1.15	1.105	0.387	ECOS2GB151DA
180	30 x 30	0.95	1.33	0.921	0.322	ECOS2GB181DA
220	30 x 30	1.10	1.54	0.754	0.264	ECOS2GB221DA
270	30 x 35	1.20	1.68	0.614	0.215	ECOS2GB271DA
330	30 x 45	1.35	1.89	0.502	0.201	ECOS2GB331DA
390	30 x 50	1.55	2.17	0.425	0.170	ECOS2GB391DA
220	35 x 25	1.10	1.54	0.754	0.264	ECOS2GB221EA
270	35 x 30	1.20	1.68	0.614	0.215	ECOS2GB271EA
330	35 x 35	1.35	1.89	0.502	0.201	ECOS2GB331EA
390	35 x 40	1.55	2.17	0.425	0.170	ECOS2GB391EA
470	35 x 45	1.75	2.45	0.353	0.141	ECOS2GB471EA
560	35 x 50	1.80	2.52	0.296	0.118	ECOS2GB561EA
470	40 x 40	1.75	2.45	0.353	0.141	ECOS2GB471FA
680	40 x 50	2.10	2.94	0.244	0.098	ECOS2GB681FA
450 VDC Working, 500 VDC Surge						
82	22 x 30	0.56	0.78	2.022	0.708	ECOS2WB820BA
100	22 x 35	0.64	0.90	1.658	0.580	ECOS2WB101BA
120	22 x 40	0.72	1.01	1.382	0.484	ECOS2WB121BA
150	22 x 50	0.79	1.11	1.105	0.387	ECOS2WB151BA
82	25 x 25	0.56	0.78	2.022	0.708	ECOS2WB820CA
100	25 x 30	0.64	0.90	1.658	0.580	ECOS2WB101CA
120	25 x 35	0.72	1.01	1.382	0.484	ECOS2WB121CA
150	25 x 40	0.79	1.11	1.105	0.387	ECOS2WB151CA
180	25 x 45	0.87	1.22	0.921	0.322	ECOS2WB181CA
220	25 x 50	1.00	1.40	0.754	0.264	ECOS2WB221CA
120	30 x 25	0.72	1.01	1.382	0.484	ECOS2WB121DA
150	30 x 30	0.79	1.11	1.105	0.387	ECOS2WB151DA
180	30 x 35	0.87	1.22	0.921	0.322	ECOS2WB181DA
220	30 x 40	1.00	1.40	0.754	0.264	ECOS2WB221DA
270	30 x 45	1.19	1.67	0.614	0.215	ECOS2WB271DA
330	30 x 50	1.38	1.93	0.502	0.176	ECOS2WB331DA
150	35 x 25	0.79	1.11	1.105	0.387	ECOS2WB151EA
220	35 x 30	1.00	1.40	0.754	0.264	ECOS2WB221EA
270	35 x 35	1.19	1.67	0.614	0.215	ECOS2WB271EA
330	35 x 40	1.38	1.93	0.502	0.176	ECOS2WB331EA
390	35 x 45	1.55	2.17	0.425	0.149	ECOS2WB391EA
470	35 x 50	1.74	2.44	0.353	0.123	ECOS2WB471EA
390	40 x 40	1.68	2.35	0.425	0.170	ECOS2WB391FA
560	40 x 50	2.17	3.04	0.296	0.118	ECOS2WB561FA

TS-XB Series two terminal snap-in

- 7000 hour life at 105°C
- Suitable for long life industrial applications
- Very compact size (40 ~ 60% smaller than TS - NXA series)
- Can vent construction



Rated Working Voltage:	160 ~ 250 VDC	315 ~ 450 VDC
Operating Temperature:	-40 ~ +105°C	-25 ~ +105°C
Nominal Capacitance:	180 ~ 2200μF	39 ~ 680μF
Capacitance Tolerance:	± 20%	
Dissipation Factor:	15% maximum (120Hz, +20°C)	
Endurance:	7000 hours at +105°C with maximum specified ripple current (see page 4)	

Part Number System

E E T
Common Code/
Terminal Type

X B
Series
Code

□ □
Voltage

□ □ □
Capacitance
Code

□ □
Case Dia. /
Terminal

Case Dia.	Terminal Length	
	6.3mm	4.0mm
22mm	B	H
25mm	C	J
30mm	D	K
35mm	E	L

Top Vinyl Plate

A	With plate
B	Without plate

TS-XB Standard Ratings

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A _{rms}) 120Hz	10k-50kHz	20°C ESR (Ω, max.) 120Hz	20kHz	Panasonic Part Number
160 VDC Working, 200 VDC Surge						
270	22 x 25	1.10	1.54	0.655	0.295	EETXB2C271B□
330	22 x 30	1.20	1.68	0.536	0.241	EETXB2C331B□
390	22 x 30	1.30	1.82	0.453	0.204	EETXB2C391B□
470	22 x 35	1.40	1.96	0.376	0.169	EETXB2C471B□
560	22 x 40	1.50	2.10	0.316	0.142	EETXB2C561B□
680	22 x 45	1.70	2.38	0.260	0.117	EETXB2C681B□
390	25 x 25	1.30	1.82	0.453	0.204	EETXB2C391C□
470	25 x 30	1.40	1.96	0.376	0.169	EETXB2C471C□
560	25 x 30	1.50	2.10	0.316	0.142	EETXB2C561C□
680	25 x 35	1.70	2.38	0.260	0.117	EETXB2C681C□
820	25 x 40	2.00	2.80	0.216	0.097	EETXB2C821C□
1000	25 x 45	2.20	3.08	0.177	0.080	EETXB2C102C□
1200	25 x 50	2.30	3.22	0.160	0.080	EETXB2C122C□
560	30 x 25	1.50	2.10	0.316	0.142	EETXB2C561D□
680	30 x 30	1.70	2.38	0.260	0.117	EETXB2C681D□
820	30 x 30	2.00	2.80	0.216	0.097	EETXB2C821D□
1000	30 x 35	2.20	3.08	0.177	0.080	EETXB2C102D□
1200	30 x 40	2.30	3.22	0.160	0.080	EETXB2C122D□
1500	30 x 45	2.50	3.50	0.128	0.064	EETXB2C152D□
1800	30 x 50	2.70	3.78	0.115	0.057	EETXB2C182D□
1200	35 x 35	2.30	3.22	0.160	0.080	EETXB2C122E□
1500	35 x 35	2.50	3.50	0.128	0.064	EETXB2C152E□
1800	35 x 40	2.70	3.78	0.115	0.057	EETXB2C182E□
2200	35 x 50	2.90	4.06	0.094	0.056	EETXB2C222E□
180 VDC Working, 225 VDC Surge						
220	22 x 25	1.00	1.40	0.804	0.36	EETXB2P221B□
270	22 x 25	1.10	1.54	0.655	0.29	EETXB2P271B□
330	22 x 30	1.20	1.68	0.536	0.24	EETXB2P331B□
390	22 x 30	1.30	1.82	0.453	0.20	EETXB2P391B□
470	22 x 35	1.40	1.96	0.376	0.17	EETXB2P471B□
560	22 x 40	1.50	2.10	0.316	0.14	EETXB2P561B□
680	22 x 50	1.70	2.38	0.260	0.12	EETXB2P681B□
330	25 x 25	1.20	1.68	0.536	0.24	EETXB2P331C□
390	25 x 25	1.30	1.82	0.453	0.20	EETXB2P391C□
470	25 x 30	1.40	1.96	0.376	0.17	EETXB2P471C□
560	25 x 35	1.50	2.10	0.316	0.14	EETXB2P561C□
680	25 x 40	1.70	2.38	0.260	0.12	EETXB2P681C□
820	25 x 45	2.00	2.80	0.216	0.10	EETXB2P821C□
470	30 x 25	1.40	1.96	0.376	0.17	EETXB2P471D□
560	30 x 25	1.50	2.10	0.316	0.14	EETXB2P561D□
680	30 x 30	1.70	2.38	0.260	0.12	EETXB2P681D□
820	30 x 35	2.00	2.80	0.234	0.11	EETXB2P821D□
1000	30 x 40	2.20	3.08	0.192	0.10	EETXB2P102D□
1200	30 x 45	2.30	3.22	0.160	0.08	EETXB2P122D□
1500	30 x 50	2.50	3.50	0.138	0.07	EETXB2P152D□
820	35 x 30	2.00	2.80	0.234	0.11	EETXB2P821E□
1000	35 x 30	2.20	3.08	0.192	0.10	EETXB2P102E□
1200	35 x 35	2.30	3.22	0.172	0.09	EETXB2P122E□
1500	35 x 40	2.50	3.50	0.138	0.07	EETXB2P152E□
1800	35 x 45	2.70	3.78	0.115	0.07	EETXB2P182E□
2200	35 x 50	2.90	4.06	0.094	0.06	EETXB2P222E□

TS-XB Standard Ratings (continued)

Cap. (μ F)	Size (mm) D x L	Max 105°C R.C. (A_{rms})		20°C ESR (Ω , max.)		Panasonic Part Number
		120Hz	10k-50kHz	120Hz	20kHz	
200 VDC Working, 250 VDC Surge						
220	22 x 25	1.00	1.40	0.804	0.36	EETXB2D221B□
270	22 x 30	1.10	1.54	0.655	0.29	EETXB2D271B□
330	22 x 30	1.20	1.68	0.536	0.24	EETXB2D331B□
390	22 x 35	1.30	1.82	0.453	0.20	EETXB2D391B□
470	22 x 40	1.40	1.96	0.376	0.17	EETXB2D471B□
560	22 x 45	1.50	2.10	0.316	0.14	EETXB2D561B□
270	25 x 25	1.10	1.54	0.655	0.29	EETXB2D271C□
330	25 x 25	1.20	1.68	0.536	0.24	EETXB2D331C□
390	25 x 30	1.30	1.82	0.453	0.20	EETXB2D391C□
470	25 x 35	1.40	1.96	0.376	0.17	EETXB2D471C□
560	25 x 35	1.50	2.10	0.316	0.14	EETXB2D561C□
680	25 x 40	1.70	2.38	0.260	0.12	EETXB2D681C□
820	25 x 50	2.00	2.80	0.216	0.10	EETXB2D821C□
390	30 x 25	1.30	1.82	0.453	0.20	EETXB2D391D□
470	30 x 30	1.40	1.96	0.376	0.17	EETXB2D471D□
560	30 x 30	1.50	2.10	0.316	0.14	EETXB2D561D□
680	30 x 35	1.70	2.38	0.260	0.12	EETXB2D681D□
820	30 x 40	2.00	2.80	0.216	0.10	EETXB2D821D□
1000	30 x 45	2.20	3.08	0.177	0.09	EETXB2D102D□
1200	30 x 50	2.30	3.22	0.160	0.08	EETXB2D122D□
820	35 x 30	2.00	2.80	0.216	0.10	EETXB2D821E□
1000	35 x 35	2.20	3.08	0.177	0.09	EETXB2D102E□
1200	35 x 40	2.30	3.22	0.160	0.08	EETXB2D122E□
1500	35 x 50	2.50	3.50	0.128	0.06	EETXB2D152E□
250 VDC Working, 300 VDC Surge						
180	22 x 30	0.90	1.26	0.819	0.41	EETXB2E181B□
220	22 x 30	1.00	1.40	0.670	0.33	EETXB2E221B□
270	22 x 35	1.10	1.54	0.546	0.27	EETXB2E271B□
330	22 x 40	1.20	1.68	0.447	0.22	EETXB2E331B□
390	22 x 45	1.30	1.82	0.378	0.19	EETXB2E391B□
180	25 x 25	0.90	1.26	0.819	0.41	EETXB2E181C□
220	25 x 25	1.00	1.40	0.670	0.33	EETXB2E221C□
270	25 x 30	1.10	1.54	0.546	0.27	EETXB2E271C□
330	25 x 35	1.20	1.68	0.447	0.22	EETXB2E331C□
390	25 x 35	1.30	1.82	0.378	0.19	EETXB2E391C□
470	25 x 45	1.40	1.96	0.314	0.16	EETXB2E471C□
560	25 x 50	1.50	2.10	0.263	0.13	EETXB2E561C□
270	30 x 25	1.10	1.54	0.546	0.27	EETXB2E271D□
330	30 x 25	1.20	1.68	0.447	0.22	EETXB2E331D□
390	30 x 30	1.30	1.82	0.378	0.19	EETXB2E391D□
470	30 x 35	1.40	1.96	0.314	0.16	EETXB2E471D□
560	30 x 35	1.50	2.10	0.263	0.13	EETXB2E561D□
680	30 x 45	1.70	2.38	0.217	0.12	EETXB2E681D□
820	30 x 50	2.00	2.80	0.180	0.10	EETXB2E821D□
470	35 x 30	1.40	1.96	0.314	0.16	EETXB2E471E□
560	35 x 30	1.50	2.10	0.263	0.13	EETXB2E561E□
680	35 x 35	1.70	2.38	0.217	0.12	EETXB2E681E□
820	35 x 40	2.00	2.80	0.180	0.10	EETXB2E821E□
1000	35 x 45	2.20	3.08	0.177	0.10	EETXB2E102E□
1200	35 x 50	2.30	3.22	0.147	0.09	EETXB2E122E□
315 VDC Working, 365 VDC Surge						
82	22 x 25	0.64	0.90	1.797	0.90	EETXB2F820B□
100	22 x 30	0.69	0.97	1.474	0.74	EETXB2F101B□
120	22 x 30	0.75	1.05	1.228	0.61	EETXB2F121B□
150	22 x 35	0.82	1.15	0.982	0.49	EETXB2F151B□
180	22 x 40	0.90	1.26	0.819	0.41	EETXB2F181B□
220	22 x 45	1.00	1.40	0.737	0.37	EETXB2F221B□
120	25 x 25	0.75	1.05	1.228	0.61	EETXB2F121C□
150	25 x 30	0.82	1.15	0.982	0.49	EETXB2F151C□
180	25 x 35	0.90	1.26	0.819	0.41	EETXB2F181C□
220	25 x 40	1.00	1.40	0.737	0.37	EETXB2F221C□
270	25 x 45	1.10	1.54	0.600	0.30	EETXB2F271C□
330	25 x 50	1.20	1.68	0.491	0.25	EETXB2F331C□
150	30 x 25	0.82	1.15	0.982	0.49	EETXB2F151D□
180	30 x 25	0.90	1.26	0.819	0.41	EETXB2F181D□
220	30 x 30	1.00	1.40	0.737	0.37	EETXB2F221D□
270	30 x 35	1.10	1.54	0.600	0.30	EETXB2F271D□
330	30 x 40	1.20	1.68	0.491	0.25	EETXB2F331D□
390	30 x 45	1.30	1.82	0.453	0.23	EETXB2F391D□
470	30 x 50	1.40	1.96	0.376	0.19	EETXB2F471D□
270	35 x 30	1.10	1.54	0.600	0.30	EETXB2F271E□
330	35 x 30	1.20	1.68	0.491	0.25	EETXB2F331E□
390	35 x 35	1.30	1.82	0.453	0.23	EETXB2F391E□
470	35 x 40	1.40	1.96	0.376	0.19	EETXB2F471E□
560	35 x 45	1.50	2.10	0.316	0.16	EETXB2F561E□
680	35 x 50	1.70	2.38	0.260	0.14	EETXB2F681E□
350 VDC Working, 400 VDC Surge						
82	22 x 25	0.64	0.90	1.797	0.90	EETXB2V820B□
100	22 x 30	0.69	0.97	1.474	0.74	EETXB2V101B□
120	22 x 35	0.75	1.05	1.228	0.61	EETXB2V121B□
150	22 x 40	0.82	1.15	0.982	0.49	EETXB2V151B□
180	22 x 45	0.90	1.26	0.819	0.41	EETXB2V181B□
220	22 x 50	1.00	1.40	0.737	0.37	EETXB2V221B□
100	25 x 25	0.69	0.97	1.474	0.74	EETXB2V101C□
120	25 x 30	0.75	1.05	1.228	0.61	EETXB2V121C□
150	25 x 30	0.82	1.15	0.982	0.49	EETXB2V151C□
180	25 x 35	0.90	1.26	0.819	0.41	EETXB2V181C□
220	25 x 40	1.00	1.40	0.737	0.37	EETXB2V221C□
270	25 x 50	1.10	1.54	0.600	0.30	EETXB2V271C□
150	30 x 25	0.82	1.15	0.982	0.49	EETXB2V151D□
180	30 x 30	0.90	1.26	0.819	0.41	EETXB2V181D□
220	30 x 30	1.00	1.40	0.737	0.37	EETXB2V221D□
270	30 x 35	1.10	1.54	0.600	0.30	EETXB2V271D□
330	30 x 45	1.20	1.68	0.491	0.25	EETXB2V331D□
390	30 x 50	1.30	1.82	0.453	0.23	EETXB2V391D□
270	35 x 30	1.10	1.54	0.600	0.30	EETXB2V271E□
330	35 x 35	1.20	1.68	0.491	0.25	EETXB2V331E□
390	35 x 40	1.30	1.82	0.453	0.23	EETXB2V391E□
470	35 x 40	1.40	1.96	0.376	0.19	EETXB2V471E□
560	35 x 50	1.50	2.10	0.316	0.16	EETXB2V561E□

TS-XB Standard Ratings (continued)

Cap. (μ F)	Size (mm) D x L	Max 105°C R.C. (A_{rms})		20°C ESR (Ω , max.)		Panasonic Part Number
		120Hz	10k~50kHz	120Hz	20kHz	
400 VDC Working, 450 VDC Surge						
56	22 x 25	0.51	0.71	2.631	0.92	EETXB2G560B□
68	22 x 30	0.56	0.78	2.167	0.76	EETXB2G680B□
82	22 x 35	0.64	0.90	1.797	0.63	EETXB2G820B□
100	22 x 35	0.69	0.97	1.474	0.52	EETXB2G101B□
120	22 x 40	0.75	1.05	1.228	0.43	EETXB2G121B□
150	22 x 50	0.82	1.15	0.982	0.34	EETXB2G151B□
68	25 x 25	0.56	0.78	2.167	0.76	EETXB2G680C□
82	25 x 25	0.64	0.90	1.797	0.63	EETXB2G820C□
100	25 x 30	0.69	0.97	1.474	0.52	EETXB2G101C□
120	25 x 35	0.75	1.05	1.228	0.43	EETXB2G121C□
150	25 x 40	0.82	1.15	0.982	0.34	EETXB2G151C□
180	25 x 45	0.90	1.26	0.819	0.29	EETXB2G181C□
220	25 x 50	1.00	1.40	0.670	0.23	EETXB2G221C□
120	30 x 25	0.75	1.05	1.228	0.43	EETXB2G121D□
150	30 x 30	0.82	1.15	0.982	0.34	EETXB2G151D□
180	30 x 35	0.90	1.26	0.819	0.29	EETXB2G181D□
220	30 x 40	1.00	1.40	0.670	0.23	EETXB2G221D□
270	30 x 45	1.10	1.54	0.546	0.19	EETXB2G271D□
330	30 x 50	1.20	1.68	0.447	0.18	EETXB2G331D□
180	35 x 25	0.90	1.26	0.819	0.29	EETXB2G181E□
220	35 x 30	1.00	1.40	0.670	0.23	EETXB2G221E□
270	35 x 35	1.10	1.54	0.546	0.19	EETXB2G271E□
330	35 x 40	1.20	1.68	0.447	0.18	EETXB2G331E□
390	35 x 45	1.30	1.82	0.378	0.15	EETXB2G391E□
470	35 x 50	1.40	1.96	0.314	0.13	EETXB2G471E□

Cap. (μ F)	Size (mm) D x L	Max 105°C R.C. (A_{rms})		20°C ESR (Ω , max.)		Panasonic Part Number
		120Hz	10k~50kHz	120Hz	20kHz	
450 VDC Working, 500 VDC Surge						
39	22 x 25	0.37	0.52	3.779	1.32	EETXB2W390B□
47	22 x 30	0.40	0.56	3.135	1.10	EETXB2W470B□
56	22 x 35	0.47	0.66	2.631	0.92	EETXB2W560B□
68	22 x 40	0.53	0.74	2.167	0.76	EETXB2W680B□
82	22 x 45	0.56	0.78	1.797	0.63	EETXB2W820B□
100	22 x 50	0.64	0.90	1.474	0.52	EETXB2W101B□
56	25 x 25	0.47	0.66	2.631	0.92	EETXB2W560C□
68	25 x 30	0.53	0.74	2.167	0.76	EETXB2W680C□
82	25 x 35	0.56	0.78	1.797	0.63	EETXB2W820C□
100	25 x 40	0.64	0.90	1.474	0.52	EETXB2W101C□
120	25 x 45	0.72	1.01	1.228	0.43	EETXB2W121C□
150	25 x 50	0.79	1.11	0.982	0.34	EETXB2W151C□
82	30 x 25	0.56	0.78	1.797	0.63	EETXB2W820D□
100	30 x 30	0.64	0.90	1.474	0.52	EETXB2W101D□
120	30 x 30	0.72	1.01	1.228	0.43	EETXB2W121D□
150	30 x 40	0.79	1.11	0.982	0.34	EETXB2W151D□
180	30 x 45	0.87	1.22	0.819	0.29	EETXB2W181D□
220	30 x 50	1.00	1.40	0.670	0.23	EETXB2W221D□
150	35 x 30	0.79	1.11	0.982	0.34	EETXB2W151E□
180	35 x 35	0.87	1.22	0.819	0.29	EETXB2W181E□
220	35 x 40	1.00	1.40	0.670	0.23	EETXB2W221E□
270	35 x 45	1.19	1.67	0.546	0.19	EETXB2W271E□
330	35 x 50	1.38	1.93	0.447	0.16	EETXB2W331E□

- High reliability design for abnormal overvoltage conditions
- 2000 hour, 105°C endurance with high ripple current capability
- VDE-0806 Specification

Rated Working Voltage:	250 VDC
Operating Temperature:	-40 ~ +105°C
Nominal Capacitance:	100 ~ 1200μF
Dissipation Factor:	20% max. (120 Hz, +20°C)
Endurance:	2000 hours at +105°C with maximum specified ripple current (see page 4)
Overvoltage Characteristics:	Capacitor shall not vent or short-circuit when 360 VDC is applied for a time period of 7 hours; Condition A: 70°C ambient temperature Condition B: 35°C ambient temperature

Diagram illustrating the marking code structure:

- Common Code/Terminal Type**: ECOS (6.3mm length terminal (Standard)), ECFC (4.0mm length terminal)
- Voltage Code**: (2 boxes)
- Series**: G
- Capacitance Code**: (3 boxes)
- Case Diameter**: (1 box)
- Overvoltage Temperature**: X (Condition A (70°C)), K (Condition B (35°C))

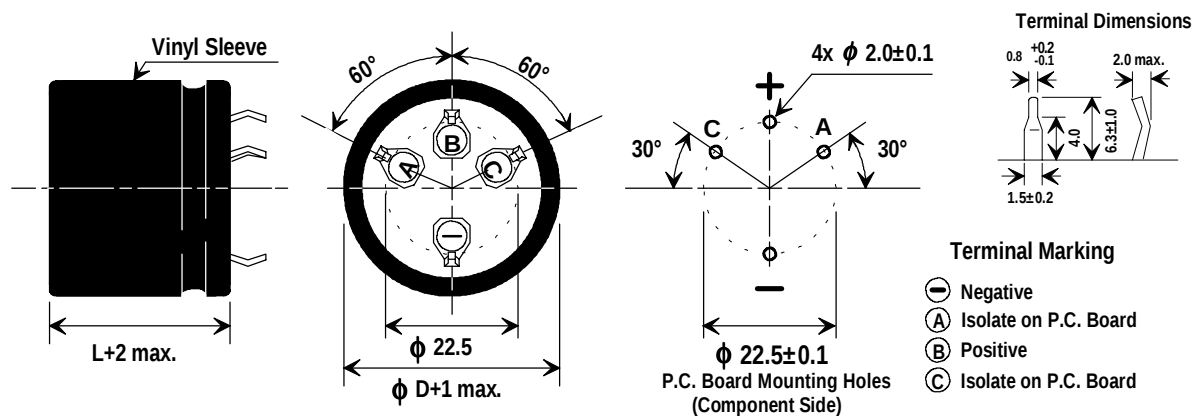
Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A _{rms}) 120Hz 10k-50kHz		Max 20°C ESR (Ω) 120Hz 20kHz		Panasonic Part Number
250 VDC Working, Condition A (70°C)						
100	22 x 25	0.70	0.98	1.768	0.884	ECOS2EG101DX
120	22 x 30	0.75	1.05	1.474	0.737	ECOS2EG121EX
150	22 x 30	0.80	1.12	1.179	0.589	ECOS2EG151EX
180	22 x 35	0.90	1.26	0.982	0.491	ECOS2EG181FX
220	22 x 40	1.00	1.40	0.804	0.402	ECOS2EG221GX
270	22 x 45	1.10	1.54	0.655	0.327	ECOS2EG271GX
330	22 x 50	1.20	1.68	0.536	0.268	ECOS2EG331HX
150	25 x 25	0.80	1.12	1.179	0.589	ECOS2EG151JX
180	25 x 30	0.90	1.26	0.982	0.491	ECOS2EG181KX
220	25 x 30	1.00	1.40	0.804	0.402	ECOS2EG221KX
270	25 x 35	1.10	1.54	0.655	0.327	ECOS2EG271LX
330	25 x 40	1.20	1.68	0.536	0.268	ECOS2EG331MX
390	25 x 45	1.30	1.82	0.453	0.227	ECOS2EG391MX
470	25 x 50	1.40	1.96	0.376	0.188	ECOS2EG471NX
220	30 x 25	1.00	1.40	0.804	0.402	ECOS2EG221QX
270	30 x 30	1.10	1.54	0.655	0.327	ECOS2EG271RX
330	30 x 30	1.20	1.68	0.536	0.268	ECOS2EG331RX
390	30 x 35	1.30	1.82	0.453	0.227	ECOS2EG391SX
470	30 x 40	1.40	1.96	0.376	0.188	ECOS2EG471TX
560	30 x 45	1.50	2.10	0.316	0.158	ECOS2EG561TX
680	30 x 50	1.70	2.38	0.260	0.130	ECOS2EG681UX
330	35 x 25	1.20	1.68	0.536	0.268	ECOS2EG331WX
390	35 x 30	1.30	1.82	0.453	0.227	ECOS2EG391XX
470	35 x 30	1.40	1.96	0.376	0.188	ECOS2EG471YX
560	35 x 35	1.50	2.10	0.316	0.158	ECOS2EG561VX
680	35 x 40	1.70	2.38	0.260	0.130	ECOS2EG681YX
820	35 x 45	2.00	2.80	0.252	0.126	ECOS2EG821YX
1000	35 x 50	2.20	3.08	0.206	0.103	ECOS2EG102ZX

Cap. (μF)	Size (mm) D x L	Max 105°C R.C. (A _{rms}) 120Hz 10k-50kHz		Max 20°C ESR (Ω) 120Hz 20kHz		Panasonic Part Number
250 VDC Working, Condition B (35°C)						
120	22 x 25	0.75	1.05	1.474	0.737	ECOS2EG121DK
150	22 x 30	0.80	1.12	1.179	0.589	ECOS2EG151EK
180	22 x 30	0.90	1.26	0.982	0.491	ECOS2EG181EK
220	22 x 35	1.00	1.40	0.804	0.402	ECOS2EG221FK
270	22 x 40	1.10	1.54	0.655	0.327	ECOS2EG271GK
330	22 x 45	1.20	1.68	0.536	0.268	ECOS2EG331GK
390	22 x 50	1.30	1.82	0.453	0.227	ECOS2EG391HK
180	25 x 25	0.90	1.26	0.982	0.491	ECOS2EG181JK
220	25 x 30	1.00	1.40	0.804	0.402	ECOS2EG221KK
270	25 x 30	1.10	1.54	0.655	0.327	ECOS2EG271KK
330	25 x 35	1.20	1.68	0.536	0.268	ECOS2EG331LK
390	25 x 40	1.30	1.82	0.453	0.227	ECOS2EG391MK
470	25 x 45	1.40	1.96	0.376	0.188	ECOS2EG471NK
560	25 x 50	1.50	2.10	0.316	0.158	ECOS2EG561NK
270	30 x 25	1.10	1.54	0.655	0.327	ECOS2EG271QK
330	30 x 30	1.20	1.68	0.536	0.268	ECOS2EG331RK
390	30 x 30	1.30	1.82	0.453	0.227	ECOS2EG391RK
470	30 x 35	1.40	1.96	0.376	0.188	ECOS2EG471SK
560	30 x 40	1.50	2.10	0.316	0.158	ECOS2EG561TK
680	30 x 45	1.70	2.38	0.260	0.130	ECOS2EG681TK
820	30 x 50	2.00	2.80	0.216	0.108	ECOS2EG821UK
390						

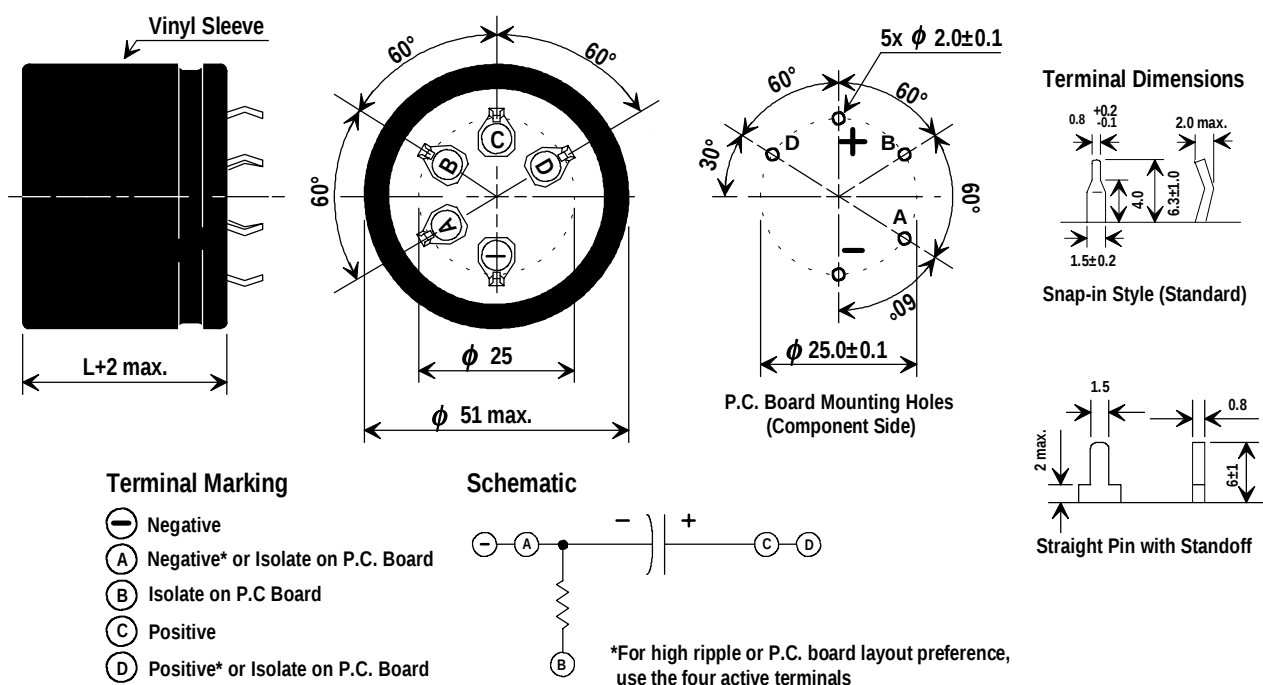
T Type General Information

Dimensions

T Type $\phi 35$ & 40mm Diameters



T Type $\phi 50$ mm Diameter



Ripple Current Multipliers

Ripple Current Frequency Correction Factors						
Frequency (Hz):	50	60	100~120	500	1k	10k~50k
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 Temperature Correction Factors					
Max. Temperature	105°C	85°C	70°C	60°C	$\leq 45^\circ\text{C}$
T-UP	---	1.0	1.3	1.4	1.5
T-HA	1.0	1.7	2.0	2.2	2.35

Note: Use of temperature correction factors can limit load life to the hours specified for the maximum operating temperature of the series.

T-UP Series multi terminal snap-in

- **NEW** 50mm diameter sizes with five P. C. mount terminals
- **NEW** lengths up to 105mm
- Endurance rating of 3000 hours at 85°C
- 4 or 5 terminal mounting provides stability and keyed polarity
- Can vent construction



Rated Working Voltage:	16 ~ 250 VDC	350 ~ 500 VDC
Operating Temperature:	-40 ~ +85°C	-25 ~ +85°C
Nominal Capacitance:	1200 ~ 270000μF (±20% tolerance)	220 ~ 2700μF (±20% tolerance)
Endurance:	3000 hours at +85°C with maximum specified ripple current (see page 4)	

Part Number System

E C E		P			A
T Type Common Code / Number of Terminals ECET 4 terminal ϕ 35 & 40mm dia. ECEP 5 terminal ϕ 50mm dia.	Voltage Code	Series	Capacitance Code	Diameter Code	Terminal Shape (see pg.23) A Snap-in (Standard) E Straight pin with standoff (Available on ϕ 50mm dia.)

T-UP Standard Ratings

Cap. (μF)	Size (mm) D x L	Max 85°C R.C. (A _{rms}) 120 Hz 10k–50kHz		Max 20°C E.S.R. (Ω) 120Hz 20kHz		Panasonic Part Number	Cap. (μF)	Size (mm) D x L	Max 85°C R.C. (A _{rms}) 120Hz 10k–50kHz		Max 20°C E.S.R. (Ω) 120Hz 20kHz		Panasonic Part Number
16 VDC Working, 20 VDC Surge							25 VDC Working, 32 VDC Surge						
47000	35 x 40	7.47	8.59	0.021	0.019	ECET1CP473EA	33000	35 x 40	6.84	7.87	0.019	0.015	ECET1EP333EA
68000	35 x 50	9.05	10.41	0.018	0.017	ECET1CP683EA	47000	35 x 50	8.00	9.20	0.014	0.012	ECET1EP473EA
82000	35 x 63	10.02	11.52	0.016	0.015	ECET1CP823EA	56000	35 x 63	8.85	10.18	0.015	0.013	ECET1EP563EA
100000	35 x 80	11.00	12.65	0.015	0.014	ECET1CP104EA	68000	35 x 80	10.43	11.99	0.013	0.011	ECET1EP683EA
120000	35 x 105	12.81	14.73	0.014	0.013	ECET1CP124EA	100000	35 x 105	11.97	13.77	0.010	0.008	ECET1EP104EA
56000	40 x 40	9.05	10.41	0.022	0.021	ECET1CP563FA	39000	40 x 40	8.00	9.20	0.020	0.018	ECET1EP393FA
82000	40 x 50	10.29	11.83	0.016	0.015	ECET1CP823FA	56000	40 x 50	8.96	10.30	0.016	0.015	ECET1EP563FA
100000	40 x 63	11.36	13.06	0.018	0.017	ECET1CP104FA	68000	40 x 63	10.25	11.79	0.017	0.015	ECET1EP683FA
120000	40 x 80	12.42	14.28	0.017	0.016	ECET1CP124FA	100000	40 x 80	12.08	13.89	0.012	0.011	ECET1EP104FA
180000	40 x 105	14.85	17.08	0.013	0.012	ECET1CP184FA	150000	40 x 105	14.07	16.18	0.011	0.010	ECET1EP154FA
120000	50 x 50	13.17	15.15	0.014	0.013	ECEP1CP124HA	82000	50 x 50	12.29	14.13	0.016	0.015	ECEP1EP823HA
150000	50 x 63	14.40	16.56	0.012	0.011	ECEP1CP154HA	100000	50 x 63	13.45	15.47	0.014	0.013	ECEP1EP104HA
180000	50 x 80	15.69	18.04	0.011	0.010	ECEP1CP184HA	120000	50 x 80	15.29	17.58	0.012	0.011	ECEP1EP124HA
220000	50 x 92	16.73	19.24	0.010	0.009	ECEP1CP224HA	150000	50 x 92	16.01	18.41	0.011	0.010	ECEP1EP154HA
270000	50 x 105	17.79	20.46	0.009	0.008	ECEP1CP274HA	180000	50 x 105	16.89	19.42	0.010	0.009	ECEP1EP184HA
35 VDC Working, 44 VDC Surge							50 VDC Working, 63 VDC Surge						
22000	35 x 40	6.10	7.02	0.026	0.020	ECET1VP223EA	15000	35 x 40	6.44	7.41	0.028	0.021	ECET1HP153EA
33000	35 x 50	7.15	8.22	0.018	0.014	ECET1VP333EA	22000	35 x 50	7.57	8.71	0.021	0.017	ECET1HP223EA
39000	35 x 63	7.94	9.13	0.015	0.012	ECET1VP393EA	27000	35 x 63	8.31	9.56	0.018	0.015	ECET1HP273EA
47000	35 x 80	9.53	10.96	0.014	0.011	ECET1VP473EA	33000	35 x 80	9.23	10.61	0.015	0.012	ECET1HP333EA
68000	35 x 105	10.62	12.21	0.010	0.008	ECET1VP683EA	47000	35 x 105	10.27	11.81	0.014	0.011	ECET1HP473EA
27000	40 x 40	6.84	7.87	0.021	0.017	ECET1VP273FA	18000	40 x 40	6.94	7.98	0.023	0.017	ECET1HP183FA
39000	40 x 50	7.98	9.18	0.017	0.014	ECET1VP393FA	27000	40 x 50	8.12	9.34	0.018	0.015	ECET1HP273FA
47000	40 x 63	9.58	11.02	0.016	0.013	ECET1VP473FA	33000	40 x 63	9.10	10.47	0.018	0.014	ECET1HP333FA
56000	40 x 80	10.30	11.85	0.015	0.012	ECET1VP563FA	39000	40 x 80	10.12	11.64	0.015	0.012	ECET1HP393FA
82000	40 x 105	12.02	13.82	0.012	0.009	ECET1VP823FA	56000	40 x 105	11.47	13.19	0.012	0.009	ECET1HP563FA
56000	50 x 50	10.94	12.58	0.015	0.012	ECEP1VP563HA	33000	50 x 50	10.48	12.05	0.018	0.014	ECEP1HP333HA
68000	50 x 63	11.93	13.72	0.013	0.011	ECEP1VP683HA	47000	50 x 63	11.54	13.27	0.013	0.010	ECEP1HP473HA
82000	50 x 80	13.06	15.02	0.012	0.010	ECEP1VP823HA	56000	50 x 80	12.46	14.33	0.012	0.009	ECEP1HP563HA
100000	50 x 92	13.97	16.07	0.011	0.009	ECEP1VP104HA	68000	50 x 92	13.17	15.15	0.011	0.009	ECEP1HP683HA
120000	50 x 105	14.86	17.09	0.010	0.008	ECEP1VP124HA	82000	50 x 105	13.87	15.95	0.011	0.008	ECEP1HP823HA

T-UP Standard Ratings (continued)

Cap. (μF)	Size (mm) D x L	Max. 85°C R.C. (A _{rms}) 120 Hz	Max. 20°C E.S.R. (Ω) 10k-50kHz	Max. 20°C E.S.R. (Ω) 120Hz	Max. 20°C E.S.R. (Ω) 20kHz	Panasonic Part Number
63 VDC Working, 79 VDC Surge						
10000	35 x 40	6.52	7.50	0.041	0.033	ECET1JP103EA
12000	35 x 50	7.15	8.22	0.035	0.028	ECET1JP123EA
15000	35 x 63	7.71	8.87	0.028	0.022	ECET1JP153EA
18000	35 x 80	9.41	10.82	0.023	0.018	ECET1JP183EA
27000	35 x 105	10.38	11.94	0.015	0.012	ECET1JP273EA
12000	40 x 40	7.15	8.22	0.035	0.028	ECET1JP123FA
15000	40 x 50	7.53	8.66	0.033	0.027	ECET1JP153FA
18000	40 x 63	9.25	10.64	0.028	0.022	ECET1JP183FA
27000	40 x 80	9.97	11.47	0.018	0.015	ECET1JP273FA
33000	40 x 105	11.76	13.52	0.015	0.012	ECET1JP333FA
27000	50 x 50	10.86	12.49	0.018	0.015	ECEP1JP273HA
33000	50 x 63	11.67	13.42	0.017	0.013	ECEP1JP333HA
47000	50 x 80	12.78	14.70	0.013	0.010	ECEP1JP473HA
51000	50 x 92	13.34	15.34	0.012	0.010	ECEP1JP513HA
56000	50 x 105	13.93	16.02	0.012	0.009	ECEP1JP563HA
100 VDC Working, 125 VDC Surge						
4700	35 x 40	5.13	5.90	0.071	0.049	ECET2AP472EA
6800	35 x 50	6.60	7.59	0.049	0.037	ECET2AP682EA
8200	35 x 63	7.05	8.11	0.040	0.030	ECET2AP822EA
10000	35 x 80	7.74	8.90	0.033	0.025	ECET2AP103EA
12000	35 x 105	8.57	9.86	0.028	0.021	ECET2AP123EA
5600	40 x 40	5.75	6.61	0.059	0.044	ECET2AP562FA
8200	40 x 50	7.28	8.37	0.040	0.030	ECET2AP822FA
10000	40 x 63	7.97	9.17	0.033	0.025	ECET2AP103FA
12000	40 x 80	8.65	9.95	0.028	0.021	ECET2AP123FA
15000	40 x 105	10.12	11.64	0.022	0.017	ECET2AP153FA
10000	50 x 50	8.82	10.14	0.033	0.025	ECEP2AP103HA
15000	50 x 63	10.07	11.58	0.022	0.017	ECEP2AP153HA
18000	50 x 80	11.00	12.65	0.018	0.014	ECEP2AP183HA
22000	50 x 92	11.76	13.52	0.015	0.011	ECEP2AP223HA
27000	50 x 105	12.53	14.41	0.014	0.010	ECEP2AP273HA
250 VDC Working, 300 VDC Surge						
1200	35 x 40	3.32	4.65	0.166	0.083	ECET2EP122EA
1500	35 x 50	4.04	5.66	0.133	0.066	ECET2EP152EA
1800	35 x 63	4.49	6.29	0.111	0.055	ECET2EP182EA
2200	35 x 80	4.94	6.92	0.090	0.045	ECET2EP222EA
3900	35 x 105	7.47	10.46	0.051	0.026	ECET2EP392EA
1500	40 x 40	4.04	5.66	0.133	0.066	ECET2EP152FA
1800	40 x 50	4.49	6.29	0.111	0.055	ECET2EP182FA
2200	40 x 63	4.94	6.92	0.090	0.045	ECET2EP222FA
3300	40 x 80	7.00	9.80	0.060	0.030	ECET2EP332FA
4700	40 x 105	8.88	12.43	0.042	0.021	ECET2EP472FA
2700	50 x 50	6.77	7.79	0.074	0.037	ECEP2EP272HA
3300	50 x 63	7.79	10.91	0.060	0.030	ECEP2EP332HA
4700	50 x 80	9.65	13.51	0.042	0.021	ECEP2EP472HA
5600	50 x 92	10.80	15.12	0.036	0.018	ECEP2EP562HA
6800	50 x 105	12.16	17.02	0.029	0.015	ECEP2EP682HA
400 VDC Working, 450 VDC Surge						
470	35 x 40	2.39	3.35	0.388	0.136	ECET2GP471EA
560	35 x 50	2.72	3.81	0.326	0.114	ECET2GP561EA
820	35 x 63	3.55	4.97	0.222	0.078	ECET2GP821EA
1200	35 x 80	4.52	6.33	0.152	0.053	ECET2GP122EA
1500	35 x 105	5.44	7.62	0.122	0.043	ECET2GP152EA
560	40 x 40	2.69	3.77	0.326	0.114	ECET2GP561FA
820	40 x 50	3.38	4.73	0.222	0.078	ECET2GP821FA
1200	40 x 63	4.52	6.33	0.152	0.053	ECET2GP122FA
1500	40 x 80	5.50	7.70	0.122	0.043	ECET2GP152FA
1800	40 x 105	6.53	9.14	0.101	0.035	ECET2GP182FA
1000	50 x 50	4.76	5.47	0.199	0.080	ECEP2GP102HA
1200	50 x 63	5.47	7.66	0.166	0.066	ECEP2GP122HA
1500	50 x 80	6.47	9.06	0.133	0.053	ECEP2GP152HA
1800	50 x 92	7.35	10.29	0.111	0.044	ECEP2GP182HA
2200	50 x 105	8.43	11.80	0.090	0.036	ECEP2GP222HA
80 VDC Working, 100 VDC Surge						
6800	35 x 40	5.16	5.93	0.046	0.035	ECET1KP682EA
8200	35 x 50	5.83	6.70	0.038	0.029	ECET1KP822EA
10000	35 x 63	6.38	7.34	0.033	0.025	ECET1KP103EA
12000	35 x 80	6.92	7.96	0.028	0.021	ECET1KP123EA
22000	35 x 105	9.86	11.34	0.015	0.011	ECET1KP223EA
8200	40 x 40	5.83	6.70	0.038	0.029	ECET1KP822FA
10000	40 x 50	6.56	7.54	0.033	0.025	ECET1KP103FA
12000	40 x 63	7.29	8.38	0.028	0.021	ECET1KP123FA
15000	40 x 80	8.93	10.27	0.024	0.018	ECET1KP153FA
27000	40 x 105	11.35	13.05	0.015	0.012	ECET1KP273FA
18000	50 x 50	10.00	11.50	0.023	0.017	ECEP1KP183HA
22000	50 x 63	11.08	12.74	0.019	0.014	ECEP1KP223HA
27000	50 x 80	12.33	14.18	0.015	0.012	ECEP1KP273HA
33000	50 x 92	13.37	15.38	0.014	0.010	ECEP1KP333HA
39000	50 x 105	14.34	16.49	0.013	0.010	ECEP1KP393HA
200 VDC Working, 250 VDC Surge						
1800	35 x 40	4.32	6.05	0.120	0.060	ECET2DP182EA
2200	35 x 50	4.92	6.89	0.098	0.054	ECET2DP222EA
2700	35 x 63	5.50	7.70	0.080	0.044	ECET2DP272EA
3300	35 x 80	6.44	9.02	0.065	0.036	ECET2DP332EA
5600	35 x 105	8.90	12.46	0.038	0.021	ECET2DP562EA
2200	40 x 40	4.92	6.89	0.098	0.054	ECET2DP222FA
2700	40 x 50	5.41	7.57	0.080	0.044	ECET2DP272FA
3300	40 x 63	6.32	8.85	0.065	0.036	ECET2DP332FA
4700	40 x 80	8.38	11.73	0.046	0.025	ECET2DP472FA
6800	40 x 105	8.65	12.11	0.032	0.017	ECET2DP682FA
3900	50 x 50	8.22	9.45	0.055	0.030	ECEP2DP392HA
4700	50 x 63	9.32	13.05	0.046	0.025	ECEP2DP472HA
6800	50 x 80	11.41	15.97	0.032	0.017	ECEP2DP682HA
7500	50 x 92	12.28	17.19	0.029	0.016	ECEP2DP752HA
8200	50 x 105	13.16	18.42	0.026	0.014	ECEP2DP822HA
350 VDC Working, 400 VDC Surge						
470	35 x 40	2.40	3.36	0.388	0.175	ECET2VP471EA
680	35 x 50	2.96	4.14	0.366	0.165	ECET2VP681EA
1000	35 x 63	3.80	5.32	0.249	0.112	ECET2VP102EA
1200	35 x 80	4.42	6.19	0.207	0.093	ECET2VP122EA
1800	35 x 105	5.79	8.11	0.138	0.062	ECET2VP182EA
680	40 x 40	2.96	4.14	0.366	0.165	ECET2VP681FA
1000	40 x 50	3.80	5.32	0.249	0.112	ECET2VP102FA
1200	40 x 63	4.42	6.19	0.207	0.093	ECET2VP122FA
1800	40 x 80	5.85	8.19	0.138	0.062	ECET2VP182FA
2200	40 x 105	6.91	9.67	0.113	0.051	ECET2VP222FA
1200	50 x 50	5.18	5.96	0.207	0.093	ECEP2VP122HA
1500	50 x 63	6.01	8.41	0.166	0.075	ECEP2VP152HA
1800	50 x 80	6.89	9.65	0.138	0.062	ECEP2VP182HA
2200	50 x 92	7.79	10.91	0.113	0.051	ECEP2VP222HA
2700	50 x 105	8.80	12.32	0.092	0.041	ECEP2VP272HA
450 VDC Working, 500 VDC Surge						
330	35 x 40	2.01	2.81	0.553	0.249	ECET2WP331EA
470	35 x 50	2.53	3.54	0.423	0.233	ECET2WP471EA
560	35 x 63	2.90	4.06	0.355	0.195	ECET2WP561EA
820	35 x 80	3.78	5.29	0.243	0.133	ECET2WP821EA
1200	35 x 105	4.80	6.72	0.166	0.091	ECET2WP122EA
470	40 x 40	2.53	3.54	0.423	0.233	ECET2WP471FA
680	40 x 50	3.15	4.41	0.293	0.161	ECET2WP681FA
820	40 x 63	3.70	5.18	0.243	0.133	ECET2WP821FA
1200	40 x 80	4.84	6.78	0.166	0.091	ECET2WP122FA
1500	40 x 105	5.81	8.13	0.133	0.073	ECET2WP152FA
820	50 x 50	4.31	4.96	0.263	0.145	ECEP2WP821HA
1000	50 x 63	4.96	6.94	0.216	0.119	ECEP2WP102HA
1200	50 x 80	5.71	7.99	0.180	0.099	ECEP2WP122HA
1500	50 x 92	6.55	9.17	0.144	0.079	ECEP2WP152HA
1800	50 x 105	7.36	10.30	0.120	0.066	ECEP2WP182HA

T-UP Standard Ratings (continued)

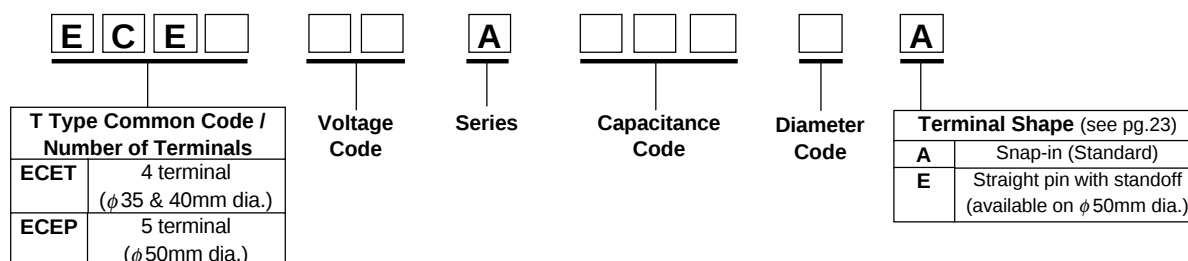
Cap. (μ F)	Size (mm) D x L	Max. 85°C R.C. (A_{rms}) 120 Hz	Max. 20°C E.S.R. (Ω) 10k-50kHz	Max. 20°C E.S.R. (Ω) 120Hz	Max. 20°C E.S.R. (Ω) 20kHz	Panasonic Part Number
500 VDC Working, 550 VDC Surge						
270	35 x 40	1.76	2.46	0.614	0.276	ECET2HP271EA
390	35 x 50	2.22	3.11	0.425	0.234	ECET2HP391EA
470	35 x 63	2.58	3.61	0.353	0.194	ECET2HP471EA
680	35 x 80	3.21	4.49	0.244	0.134	ECET2HP681EA
820	35 x 105	3.97	5.56	0.202	0.111	ECET2HP821EA
330	40 x 40	2.16	3.02	0.502	0.276	ECET2HP331FA
470	40 x 50	2.70	3.78	0.353	0.194	ECET2HP471FA
560	40 x 63	3.11	4.35	0.326	0.179	ECET2HP561FA
820	40 x 80	3.88	5.43	0.222	0.122	ECET2HP821FA
1200	40 x 105	5.90	8.26	0.152	0.084	ECET2HP122FA
560	50 x 50	3.52	4.05	0.355	0.195	ECEP2HP561HA
680	50 x 63	4.07	5.70	0.293	0.161	ECEP2HP681HA
1000	50 x 80	5.05	7.07	0.199	0.109	ECEP2HP102HA
1200	50 x 92	5.74	8.04	0.166	0.091	ECEP2HP122HA
1500	50 x 105	6.65	9.31	0.144	0.079	ECEP2HP152HA

T-HA Series multi terminal snap-in

- **NEW** 50mm Diameter Sizes with Five P. C. Mount Terminals
- **NEW** lengths up to 105mm
- Endurance rating of 3000 hours at 105°C
- 4 or 5 terminal mounting provides stability and keyed polarity
- Can vent construction



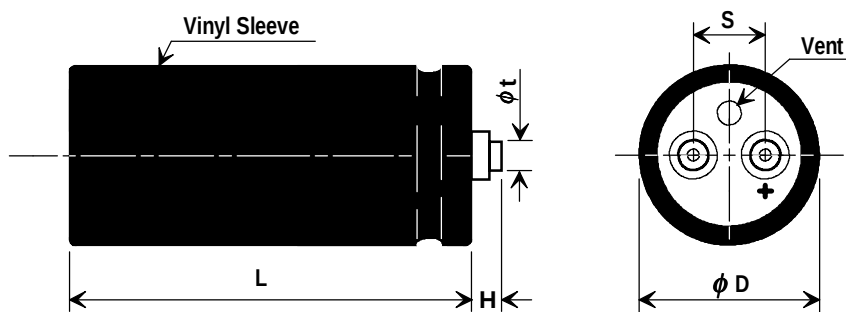
Rated Working Voltage:	16 ~ 250 VDC	350 ~ 450 VDC
Operating Temperature:	-40 ~ +105°C	-25 ~ +105°C
Nominal Capacitance:	1000~ 250000μF (±20% tolerance)	330 ~ 2200μF (±20% tolerance)
Endurance:	3000 hours at +105°C with maximum specified ripple current (see page 4)	

Part Number System**T-HA Standard Ratings**

Cap.	Size (mm)	Max 105°C R.C. (A _{rms})		Max 20°C ESR (Ω)		Panasonic	Cap.	Size (mm)	Max 105°C R.C. (A _{rms})		Max 20°C ESR (Ω)		Panasonic
(μF)	D x L	120 Hz	10k-50kHz	120Hz	20kHz	Part Number	(μF)	D x L	120Hz	10k-50kHz	120Hz	20kHz	Part Number
16 VDC Working, 20 VDC Surge							25 VDC Working, 32 VDC Surge						
39000	35 x 40	5.10	5.87	0.022	0.020	ECET1CA393EA	27000	35 x 40	4.80	5.52	0.018	0.017	ECET1EA273EA
56000	35 x 50	6.00	6.90	0.019	0.017	ECET1CA563EA	33000	35 x 50	5.50	6.33	0.018	0.016	ECET1EA333EA
68000	35 x 63	6.62	7.61	0.017	0.015	ECET1CA683EA	47000	35 x 63	6.56	7.54	0.017	0.015	ECET1EA473EA
100000	35 x 80	8.03	9.23	0.015	0.013	ECET1CA104EA	56000	35 x 80	7.25	8.34	0.015	0.013	ECET1EA563EA
120000	35 x 105	8.71	10.02	0.014	0.012	ECET1CA124EA	82000	35 x 105	8.58	9.87	0.013	0.012	ECET1EA823EA
47000	40 x 40	5.50	6.33	0.020	0.018	ECET1CA473FA	33000	40 x 40	5.50	6.33	0.018	0.016	ECET1EA333FA
68000	40 x 50	7.29	8.38	0.015	0.014	ECET1CA683FA	47000	40 x 50	6.47	7.44	0.015	0.014	ECET1EA473FA
82000	40 x 63	7.66	8.81	0.017	0.015	ECET1CA823FA	56000	40 x 63	7.17	8.25	0.014	0.013	ECET1EA563FA
120000	40 x 80	8.79	10.11	0.014	0.012	ECET1CA124FA	82000	40 x 80	8.68	9.98	0.013	0.012	ECET1EA823FA
150000	40 x 105	9.88	11.36	0.013	0.012	ECET1CA154FA	100000	40 x 105	9.76	11.22	0.012	0.010	ECET1EA104FA
120000	50 x 50	9.02	10.37	0.015	0.014	ECEP1CA124HA	82000	50 x 50	9.20	10.58	0.016	0.015	ECEP1EA823HA
150000	50 x 63	10.15	11.67	0.014	0.013	ECEP1CA154HA	100000	50 x 63	10.02	11.52	0.015	0.013	ECEP1EA104HA
180000	50 x 80	11.02	12.67	0.013	0.012	ECEP1CA184HA	120000	50 x 80	10.93	12.57	0.013	0.012	ECEP1EA124HA
220000	50 x 92	11.71	13.47	0.012	0.011	ECEP1CA224HA	150000	50 x 92	11.70	13.46	0.012	0.011	ECEP1EA154HA
250000	50 x 105	12.31	14.16	0.011	0.010	ECEP1CA254HA	180000	50 x 105	12.42	14.28	0.010	0.009	ECEP1EA184HA
35 VDC Working, 44 VDC Surge							50 VDC Working, 63 VDC Surge						
18000	35 x 40	4.30	4.95	0.028	0.021	ECET1VA183EA	10000	35 x 40	4.00	4.60	0.033	0.025	ECET1HA103EA
22000	35 x 50	5.00	5.75	0.023	0.017	ECET1VA223EA	15000	35 x 50	4.80	5.52	0.022	0.018	ECET1HA153EA
27000	35 x 63	5.53	6.36	0.025	0.018	ECET1VA273EA	18000	35 x 63	5.27	6.06	0.020	0.016	ECET1HA183EA
39000	35 x 80	6.52	7.50	0.019	0.014	ECET1VA393EA	27000	35 x 80	6.16	7.08	0.015	0.012	ECET1HA273EA
47000	35 x 105	8.07	9.28	0.017	0.013	ECET1VA473EA	33000	35 x 105	7.23	8.31	0.013	0.010	ECET1HA333EA
22000	40 x 40	5.00	5.75	0.023	0.017	ECET1VA223FA	15000	40 x 40	4.80	5.52	0.022	0.018	ECET1HA153FA
27000	40 x 50	5.44	6.26	0.020	0.015	ECET1VA273FA	22000	40 x 50	5.15	5.92	0.016	0.013	ECET1HA223FA
33000	40 x 63	6.61	7.60	0.019	0.014	ECET1VA333FA	27000	40 x 63	6.05	6.96	0.015	0.012	ECET1HA273FA
47000	40 x 80	7.79	8.96	0.018	0.013	ECET1VA473FA	39000	40 x 80	7.55	8.68	0.014	0.011	ECET1HA393FA
68000	40 x 105	9.27	10.66	0.016	0.012	ECET1VA683FA	47000	40 x 105	8.18	9.41	0.012	0.010	ECET1HA473FA
47000	50 x 50	8.25	9.49	0.021	0.016	ECEP1VA473HA	33000	50 x 50	7.75	8.91	0.018	0.014	ECEP1HA333HA
56000	50 x 63	9.07	10.43	0.019	0.014	ECEP1VA563HA	39000	50 x 63	8.40	9.66	0.016	0.013	ECEP1HA393HA
68000	50 x 80	10.07	11.58	0.017	0.013	ECEP1VA683HA	47000	50 x 80	9.19	10.57	0.014	0.011	ECEP1HA473HA
82000	50 x 92	10.89	12.52	0.015	0.011	ECEP1VA823HA	56000	50 x 92	9.79	11.26	0.012	0.009	ECEP1HA563HA
100000	50 x 105	11.75	13.51	0.013	0.010	ECEP1VA104HA	68000	50 x 105	10.42	11.98	0.011	0.009	ECEP1HA683HA

G Type General Information

Dimensions (mm)



Case Code	Nominal Size D x L	Sleeved Case Dimensions			Terminal Specifications				
		$\phi D \pm 0.79$	$L \pm 1.58$	$S \pm 0.41$	Terminal Code	Thread	Thread Depth	$H \pm 0.79$	$\phi t \pm 0.25$
CA	35 x 41	35.4	42.1	12.7	E	10-32 NF-2B	9.5	6.4	8.0
CC	35 x 54		54.8		L	10-32 NF-2B	5.5	1.6	8.0
CE	35 x 67		67.5		M	M5	9.5	6.4	8.0
CG	35 x 79		80.2		H	1/4-28 NF-2B	11.9	6.4	17.4
CH	35 x 92		92.9		J	1/4-28 NF-2B	8.7	2.8	17.4
CK	35 x 105		105.6		X	M6	11.9	6.4	17.4
CL	35 x 117		118.3		Y	M6	8.7	2.8	17.4
CN	35 x 130		131.0						
CP	35 x 143		143.7						
FB	51 x 48	51.3	48.4	21.9					
FC	51 x 54		54.8						
FE	51 x 67		67.5						
FG	51 x 79		80.2						
FH	51 x 92		92.9						
FK	51 x 105		105.6						
FL	51 x 117		118.3						
FN	51 x 130		131.0						
FP	51 x 143		143.7						
GG	64 x 79	64.0	80.2	28.6					
GH	64 x 92		92.9						
GK	64 x 105		105.6						
GL	64 x 130		118.3						
GN	64 x 130		131.0						
GP	64 x 143		143.7						
HG	76 x 79	76.7	80.2	31.8					
HH	76 x 92		92.9						
HK	76 x 105		105.6						
HL	76 x 117		118.3						
HN	76 x 130		131.0						
HP	76 x 143		143.7						
HW	76 x 219		219.9						

Terminal Code	Nominal Diameter				Max. ripple current (A)
	35mm	51mm	64mm	76mm	
E	S	S	S	S	30
L	O	O	O	O	
M	O	O	O	O	
H	N.A.	N.A.	O	O	50
J	N.A.	N.A.	O	O	
X	N.A.	N.A.	O	O	
Y	N.A.	N.A.	O	O	

S: standard O: optional N.A.: not available

Ripple Current Multipliers

Ripple Current Frequency Correction Factors						
Frequency (Hz):	50	60	100~120	300~360	1k	10k~50k
16~100 WV:	0.9	0.95	1.0	1.05	1.08	1.15
160~500 WV:	0.75	0.8	1.0	1.2	1.25	1.4

Ripple Current Temperature Correction Factors					
Max. Temperature	105°C	85°C	70°C	60°C	≤45°C
G-AA	---	1.0	1.6	2.0	2.2
G-BA	1.0	1.75	2.0	2.2	2.35

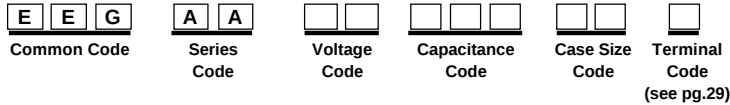
Note: Use of temperature correction factors can limit load life to the hours specified for the maximum operating temperature of the series.

G-AA Series screw terminal style

- General purpose for industrial applications
- High ripple current with 3000 hour life
- High CV designs
- Customized designs available



Rated Working Voltage:	16 ~ 500 VDC
Operating Temperature:	-40 ~ +85°C
Nominal Capacitance:	150 ~ 1200000µF
Capacitance Tolerance:	± 20%
Endurance:	3000 hours at +85°C with maximum specified ripple current (see page 4)

Part Number System**G-AA Typical Ratings**

Cap. (µF)	Nominal Size D x L (mm)	Max 85°C R.C. (A _{rms})		20°C ESR (Ω, max.)		Panasonic Part Number	Cap. (µF)	Nominal Size D x L (mm)	Max 85°C R.C. (A _{rms})		20°C ESR (Ω, max.)		Panasonic Part Number
		120Hz	10k-50kHz	120Hz	20kHz				120Hz	10k-50kHz	120Hz	20kHz	
16 VDC Working, 20 VDC Surge							20 VDC Working, 24 VDC Surge						
33000	35 x 41	5.16	5.93	0.0313	0.0281	EEGAA1C333CA□	27000	35 x 41	4.95	5.69	0.0327	0.0295	EEGAA1D273CA□
39000	35 x 54	5.86	6.74	0.0269	0.0242	EEGAA1C393CC□	33000	35 x 54	5.72	6.58	0.0274	0.0246	EEGAA1D333CC□
56000	35 x 67	7.30	8.40	0.0196	0.0177	EEGAA1C563CE□	47000	35 x 67	7.12	8.19	0.0202	0.0181	EEGAA1D473CE□
68000	35 x 79	8.31	9.56	0.0167	0.0150	EEGAA1C683CG□	56000	35 x 79	8.05	9.26	0.0174	0.0157	EEGAA1D563CG□
82000	35 x 92	9.37	10.78	0.0143	0.0129	EEGAA1C823CH□	68000	35 x 92	9.12	10.49	0.0149	0.0134	EEGAA1D683CH□
100000	35 x 105	10.51	12.09	0.0123	0.0110	EEGAA1C104CK□	82000	35 x 105	10.21	11.74	0.0129	0.0116	EEGAA1D823CK□
120000	35 x 117	11.67	13.42	0.0107	0.0096	EEGAA1C124CL□	100000	35 x 117	11.45	13.17	0.0112	0.0100	EEGAA1D104CL□
130000	35 x 130	12.41	14.27	0.0101	0.0091	EEGAA1C134CN□	110000	35 x 130	12.25	14.09	0.0104	0.0094	EEGAA1D114CN□
150000	35 x 143	13.44	15.46	0.0091	0.0082	EEGAA1C154CP□	120000	35 x 143	13.04	15.00	0.0098	0.0088	EEGAA1D124CP□
82000	51 x 48	10.01	11.51	0.0143	0.0129	EEGAA1C823FB□	68000	51 x 48	9.75	11.21	0.0149	0.0134	EEGAA1D683FB□
100000	51 x 54	11.01	12.66	0.0123	0.0110	EEGAA1C104FC□	82000	51 x 54	10.70	12.31	0.0129	0.0116	EEGAA1D823FC□
120000	51 x 67	12.41	14.27	0.0107	0.0096	EEGAA1C124FE□	100000	51 x 67	12.17	14.00	0.0112	0.0100	EEGAA1D104FE□
150000	51 x 79	13.98	16.08	0.0091	0.0082	EEGAA1C154FG□	120000	51 x 79	13.57	15.61	0.0098	0.0088	EEGAA1D124FG□
180000	51 x 92	15.42	17.73	0.0081	0.0073	EEGAA1C184FH□	150000	51 x 92	15.22	17.50	0.0085	0.0077	EEGAA1D154FH□
220000	51 x 105	16.93	19.47	0.0072	0.0064	EEGAA1C224FK□	180000	51 x 105	16.68	19.18	0.0076	0.0069	EEGAA1D184FK□
270000	51 x 130	19.08	21.94	0.0052	0.0047	EEGAA1C274FN□	220000	51 x 130	18.86	21.69	0.0068	0.0061	EEGAA1D224FN□
330000	51 x 143	20.63	23.72	0.0070	0.0063	EEGAA1C334FP□	270000	51 x 143	20.50	23.58	0.0061	0.0055	EEGAA1D274FP□
270000	64 x 79	19.31	22.21	0.0064	0.0057	EEGAA1C274GG□	220000	64 x 79	19.08	21.94	0.0068	0.0061	EEGAA1D224GG□
330000	64 x 92	21.02	24.17	0.0057	0.0052	EEGAA1C334GH□	270000	64 x 92	20.89	24.02	0.0061	0.0055	EEGAA1D274GH□
390000	64 x 105	22.50	25.88	0.0053	0.0048	EEGAA1C394GK□	330000	64 x 105	22.62	26.01	0.0056	0.0050	EEGAA1D334GK□
470000	64 x 117	24.11	27.73	0.0049	0.0044	EEGAA1C474GL□	390000	64 x 117	24.21	27.84	0.0052	0.0047	EEGAA1D394GL□
500000	64 x 130	25.05	28.81	0.0048	0.0043	EEGAA1C504GN□	430000	64 x 130	25.38	29.19	0.0050	0.0045	EEGAA1D434GN□
560000	64 x 143	26.23	30.16	0.0046	0.0041	EEGAA1C564GP□	470000	64 x 143	26.49	30.46	0.0049	0.0044	EEGAA1D474GP□
390000	76 x 79	23.79	27.36	0.0053	0.0048	EEGAA1C394HG□	330000	76 x 79	23.92	27.51	0.0056	0.0050	EEGAA1D334HG□
470000	76 x 92	25.51	29.34	0.0049	0.0044	EEGAA1C474HH□	390000	76 x 92	25.62	29.46	0.0052	0.0047	EEGAA1D394HH□
560000	76 x 105	27.08	31.14	0.0046	0.0041	EEGAA1C564HK□	470000	76 x 105	27.34	31.44	0.0049	0.0044	EEGAA1D474HK□
680000	76 x 117	28.74	33.05	0.0043	0.0039	EEGAA1C684HL□	560000	76 x 117	29.03	33.38	0.0046	0.0041	EEGAA1D564HL□
750000	76 x 130	29.88	34.36	0.0042	0.0037	EEGAA1C754HN□	620000	76 x 130	30.25	34.79	0.0045	0.0040	EEGAA1D624HN□
820000	76 x 143	30.97	35.62	0.0040	0.0036	EEGAA1C824HP□	680000	76 x 143	31.41	36.12	0.0044	0.0039	EEGAA1D684HP□
1200000	76 x 219	36.78	42.30	0.0037	0.0033	EEGAA1C125HW□	1000000	76 x 219	37.54	43.17	0.0040	0.0036	EEGAA1D105HW□

G-BA Series screw terminal style

- Long life for industrial applications
- 2000 hour life @ 105°C with ripple current applied
- High CV design
- Customized designs available



Rated Working Voltage:	10 ~ 450 VDC
Operating Temperature:	-40 ~ +105°C
Nominal Capacitance:	220 ~ 1200000μF
Capacitance Tolerance:	± 20%
Endurance:	2000 hours at +105°C with maximum specified ripple current (see page 4)

Part Number SystemCommon Code/
Terminal StyleSeries
CodeVoltage
CodeCapacitance
CodeCase Size
CodeTerminal
Code
(see pg. 29)**G-BA Typical Ratings**

Cap. (μF)	Nominal Size D x L (mm)	Max 105°C R.C. (A_{rms})		20°C ESR (Ω , max.)		Panasonic Part Number	Cap. (μF)	Nominal Size D x L (mm)	Max 105°C R.C. (A_{rms})		20°C ESR (Ω , max.)		Panasonic Part Number
		120Hz	10k-50kHz	120Hz	20kHz				120Hz	10k-50kHz	120Hz	20kHz	
10 VDC Working, 13 VDC Surge							16 VDC Working, 20 VDC Surge						
33000	35 x 41	4.67	5.37	0.0402	0.0362	EEGBA1A333CA□	22000	35 x 41	4.47	5.14	0.0435	0.0392	EEGBA1C223CA□
39000	35 x 54	5.31	6.11	0.0345	0.0310	EEGBA1A393CC□	33000	35 x 54	5.65	6.50	0.0301	0.0271	EEGBA1C333CC□
56000	35 x 67	6.62	7.61	0.0249	0.0224	EEGBA1A563CE□	47000	35 x 67	6.99	8.04	0.0221	0.0199	EEGBA1C473CE□
75000	35 x 79	7.86	9.04	0.0194	0.0174	EEGBA1A753CG□	56000	35 x 79	7.89	9.07	0.0191	0.0172	EEGBA1C563CG□
82000	35 x 92	8.52	9.80	0.0180	0.0162	EEGBA1A823CH□	68000	35 x 92	8.91	10.25	0.0163	0.0146	EEGBA1C683CH□
100000	35 x 105	9.56	10.99	0.0153	0.0138	EEGBA1A104CK□	82000	35 x 105	9.93	11.42	0.0141	0.0126	EEGBA1C823CK□
120000	35 x 117	10.64	12.24	0.0132	0.0119	EEGBA1A124CL□	91000	35 x 117	10.71	12.32	0.0130	0.0117	EEGBA1C913CL□
130000	35 x 130	11.32	13.02	0.0125	0.0112	EEGBA1A134CN□	100000	35 x 130	11.44	13.16	0.0121	0.0109	EEGBA1C104CN□
150000	35 x 143	12.28	14.12	0.0112	0.0101	EEGBA1A154CP□	120000	35 x 143	12.55	14.43	0.0106	0.0096	EEGBA1C124CP□
82000	51 x 48	9.10	10.47	0.0180	0.0162	EEGBA1A823FB□	56000	51 x 48	8.81	10.13	0.0191	0.0172	EEGBA1C563FB□
100000	51 x 54	10.03	11.53	0.0153	0.0138	EEGBA1A104FC□	75000	51 x 54	10.07	11.58	0.0151	0.0136	EEGBA1C753FC□
120000	51 x 67	11.32	13.02	0.0132	0.0119	EEGBA1A124FE□	100000	51 x 67	11.78	13.55	0.0121	0.0109	EEGBA1C104FE□
150000	51 x 79	12.77	14.69	0.0112	0.0101	EEGBA1A154FG□	120000	51 x 79	13.06	15.02	0.0106	0.0096	EEGBA1C124FG□
180000	51 x 92	14.11	16.23	0.0098	0.0089	EEGBA1A184FH□	150000	51 x 92	14.56	16.74	0.0092	0.0082	EEGBA1C154FH□
220000	51 x 105	15.53	17.86	0.0086	0.0077	EEGBA1A224FK□	180000	51 x 105	15.87	18.25	0.0082	0.0073	EEGBA1C184FK□
270000	51 x 130	17.54	20.17	0.0076	0.0068	EEGBA1A274FN□	220000	51 x 130	17.83	20.50	0.0073	0.0065	EEGBA1C224FN□
330000	51 x 143	19.00	21.85	0.0067	0.0061	EEGBA1A334FP□	270000	51 x 143	19.26	22.15	0.0065	0.0059	EEGBA1C274FP□
270000	64 x 79	17.74	20.40	0.0076	0.0068	EEGBA1A274GG□	180000	64 x 79	17.09	19.65	0.0082	0.0073	EEGBA1C184GG□
330000	64 x 92	19.36	22.26	0.0067	0.0061	EEGBA1A334GH□	220000	64 x 92	18.67	21.47	0.0073	0.0065	EEGBA1C224GH□
390000	64 x 105	20.76	23.87	0.0062	0.0056	EEGBA1A394GK□	270000	64 x 105	20.21	23.24	0.0065	0.0059	EEGBA1C274GK□
470000	64 x 117	22.29	25.63	0.0056	0.0051	EEGBA1A474GL□	330000	64 x 117	21.76	25.02	0.0059	0.0053	EEGBA1C334GL□
510000	64 x 130	23.27	26.76	0.0054	0.0049	EEGBA1A514GN□	390000	64 x 130	23.08	26.54	0.0055	0.0050	EEGBA1C394GN□
560000	64 x 143	24.29	27.93	0.0052	0.0047	EEGBA1A564GP□	470000	64 x 143	24.46	28.13	0.0051	0.0046	EEGBA1C474GP□
390000	76 x 79	21.95	25.24	0.0062	0.0056	EEGBA1A394HG□	330000	76 x 79	22.32	25.67	0.0059	0.0053	EEGBA1C334HG□
470000	76 x 92	23.58	27.12	0.0056	0.0051	EEGBA1A474HH□	390000	76 x 92	23.79	27.36	0.0055	0.0050	EEGBA1C394HH□
560000	76 x 105	25.08	28.84	0.0052	0.0047	EEGBA1A564HK□	470000	76 x 105	25.25	29.04	0.0051	0.0046	EEGBA1C474HK□
680000	76 x 117	26.68	30.68	0.0048	0.0044	EEGBA1A684HL□	510000	76 x 117	26.29	30.23	0.0050	0.0045	EEGBA1C514HL□
750000	76 x 130	27.76	31.92	0.0047	0.0042	EEGBA1A754HN□	560000	76 x 130	27.32	31.42	0.0048	0.0043	EEGBA1C564HN□
820000	76 x 143	28.79	33.11	0.0045	0.0041	EEGBA1A824HP□	620000	76 x 143	28.36	32.61	0.0047	0.0042	EEGBA1C624HP□
1200000	76 x 219	34.30	39.45	0.0041	0.0036	EEGBA1A125HW□	1000000	76 x 219	34.01	39.11	0.0041	0.0037	EEGBA1C105HW□

Aluminum Electrolytic Capacitors

G-BA Typical Ratings (continued)

Cap. (μ F)	Nominal Size D x L (mm)	Max 105°C R.C. (A_{rms}) 120Hz	20°C ESR (Ω , max.) 10k-50kHz	20°C ESR (Ω , max.) 120Hz	20°C ESR (Ω , max.) 20kHz	Panasonic Part Number
300 VDC Working, 350 VDC Surge						
390	35 x 41	1.11	1.55	0.378	0.283	EEGBA2U391CA□
470	35 x 54	1.29	1.81	0.314	0.235	EEGBA2U471CC□
680	35 x 67	1.65	2.31	0.217	0.163	EEGBA2U681CE□
820	35 x 79	1.90	2.66	0.180	0.135	EEGBA2U821CG□
1000	35 x 92	2.19	3.07	0.147	0.111	EEGBA2U102CH□
1200	35 x 105	2.50	3.50	0.123	0.092	EEGBA2U122CK□
1500	35 x 117	2.90	4.06	0.098	0.074	EEGBA2U152CL□
1600	35 x 130	3.09	4.33	0.092	0.069	EEGBA2U162CN□
1800	35 x 143	3.38	4.73	0.082	0.061	EEGBA2U182CP□
1000	51 x 48	2.32	3.25	0.147	0.111	EEGBA2U102FB□
1200	51 x 54	2.59	3.63	0.123	0.092	EEGBA2U122FC□
1500	51 x 67	3.06	4.28	0.098	0.074	EEGBA2U152FE□
2200	51 x 79	3.86	5.40	0.067	0.050	EEGBA2U222FG□
2700	51 x 92	4.44	6.22	0.055	0.041	EEGBA2U272FH□
3300	51 x 105	5.07	7.10	0.045	0.033	EEGBA2U332FK□
3900	51 x 130	5.87	8.22	0.038	0.028	EEGBA2U392FN□
4700	51 x 143	6.62	9.27	0.031	0.024	EEGBA2U472FP□
3300	64 x 79	5.61	7.85	0.045	0.033	EEGBA2U332GG□
3900	64 x 92	6.32	8.85	0.038	0.028	EEGBA2U392GH□
4700	64 x 105	7.14	10.00	0.031	0.024	EEGBA2U472GK□
5600	64 x 117	8.04	11.26	0.026	0.020	EEGBA2U562GL□
6200	64 x 130	8.68	12.15	0.024	0.018	EEGBA2U622GN□
6800	64 x 143	9.32	13.05	0.022	0.016	EEGBA2U682GP□
5100	76 x 79	7.80	10.92	0.032	0.024	EEGBA2U512HG□
6200	76 x 92	8.87	12.42	0.026	0.020	EEGBA2U622HH□
6800	76 x 105	9.54	13.36	0.024	0.018	EEGBA2U682HK□
8200	76 x 117	10.77	15.08	0.020	0.015	EEGBA2U822HL□
9100	76 x 130	11.62	16.27	0.018	0.013	EEGBA2U912HN□
10000	76 x 143	12.47	17.46	0.016	0.012	EEGBA2U103HP□
18000	76 x 219	18.99	26.59	0.010	0.007	EEGBA2U183HW□
400 VDC Working, 450 VDC Surge						
270	35 x 41	0.97	1.36	0.546	0.355	EEGBA2G271CA□
330	35 x 54	1.13	1.58	0.447	0.290	EEGBA2G331CC□
390	35 x 67	1.31	1.83	0.378	0.246	EEGBA2G391CE□
560	35 x 79	1.65	2.31	0.263	0.171	EEGBA2G561CG□
680	35 x 92	1.90	2.66	0.217	0.141	EEGBA2G681CH□
820	35 x 105	2.17	3.04	0.180	0.117	EEGBA2G821CK□
910	35 x 117	2.38	3.33	0.162	0.105	EEGBA2G911CL□
1000	35 x 130	2.57	3.60	0.147	0.096	EEGBA2G102CN□
1200	35 x 143	2.91	4.07	0.123	0.080	EEGBA2G122CP□
560	51 x 48	1.82	2.55	0.263	0.171	EEGBA2G561FB□
680	51 x 54	2.04	2.86	0.217	0.141	EEGBA2G681FC□
1000	51 x 67	2.61	3.65	0.147	0.096	EEGBA2G102FE□
1200	51 x 79	2.98	4.17	0.123	0.080	EEGBA2G122FG□
1500	51 x 92	3.46	4.84	0.098	0.064	EEGBA2G152FH□
1800	51 x 105	3.92	5.49	0.082	0.053	EEGBA2G182FK□
2200	51 x 130	4.61	6.45	0.067	0.044	EEGBA2G222FN□
2700	51 x 143	5.25	7.35	0.055	0.035	EEGBA2G272FP□
2200	64 x 79	4.61	6.45	0.067	0.044	EEGBA2G222GG□
2700	64 x 92	5.28	7.39	0.055	0.035	EEGBA2G272GH□
3300	64 x 105	6.01	8.41	0.045	0.029	EEGBA2G332GK□
3600	64 x 117	6.47	9.06	0.041	0.027	EEGBA2G362GL□
3900	64 x 130	6.92	9.69	0.038	0.025	EEGBA2G392GN□
4700	64 x 143	7.79	10.91	0.031	0.020	EEGBA2G472GP□
3300	76 x 79	6.29	8.81	0.049	0.032	EEGBA2G332HG□
3900	76 x 92	7.05	9.87	0.042	0.027	EEGBA2G392HH□
4700	76 x 105	7.95	11.13	0.034	0.022	EEGBA2G472HK□
5200	76 x 117	8.59	12.03	0.031	0.020	EEGBA2G522HL□
5600	76 x 130	9.14	12.80	0.029	0.019	EEGBA2G562HN□
6800	76 x 143	10.30	14.42	0.024	0.015	EEGBA2G682HP□
10000	76 x 219	14.19	19.87	0.018	0.011	EEGBA2G103HW□
450 VDC Working, 500 VDC Surge						
220	35 x 41	0.88	1.23	0.670	0.435	EEGBA2W221CA□
270	35 x 54	1.03	1.44	0.546	0.355	EEGBA2W271CC□
330	35 x 67	1.21	1.69	0.447	0.290	EEGBA2W331CE□
470	35 x 79	1.51	2.11	0.314	0.204	EEGBA2W471CG□
560	35 x 92	1.73	2.42	0.263	0.171	EEGBA2W561CH□
680	35 x 105	1.98	2.77	0.217	0.141	EEGBA2W681CK□
750	35 x 117	2.16	3.02	0.196	0.128	EEGBA2W751CL□
820	35 x 130	2.33	3.26	0.180	0.117	EEGBA2W821CN□
1000	35 x 143	2.65	3.71	0.147	0.096	EEGBA2W102CP□
470	51 x 48	1.67	2.34	0.314	0.204	EEGBA2W471FB□
560	51 x 54	1.85	2.59	0.263	0.171	EEGBA2W561FC□
820	51 x 67	2.36	3.30	0.180	0.117	EEGBA2W821FE□
1000	51 x 79	2.72	3.81	0.147	0.096	EEGBA2W102FG□
1200	51 x 92	3.10	4.34	0.123	0.080	EEGBA2W122FH□
1500	51 x 105	3.58	5.01	0.098	0.064	EEGBA2W152FK□
1800	51 x 130	4.17	5.84	0.082	0.053	EEGBA2W182FN□
2200	51 x 143	4.74	6.64	0.067	0.044	EEGBA2W222FP□
1500	64 x 79	3.80	5.32	0.098	0.064	EEGBA2W152GG□
1800	64 x 92	4.31	6.03	0.082	0.053	EEGBA2W182GH□
2200	64 x 105	4.91	6.87	0.067	0.044	EEGBA2W222GK□
2700	64 x 117	5.61	7.85	0.055	0.035	EEGBA2W272GL□
3300	64 x 130	6.36	8.90	0.045	0.029	EEGBA2W332GN□
3900	64 x 143	7.09	9.93	0.038	0.025	EEGBA2W392GP□
2700	76 x 79	5.69	7.97	0.060	0.039	EEGBA2W272HG□
3300	76 x 92	6.48	9.07	0.049	0.032	EEGBA2W332HH□
3900	76 x 105	7.24	10.14	0.042	0.027	EEGBA2W392HK□
4300	76 x 117	7.82	10.95	0.038	0.025	EEGBA2W432HL□
4700	76 x 130	8.37	11.72	0.034	0.022	EEGBA2W472HN□
5600	76 x 143	9.35	13.09	0.029	0.019	EEGBA2W562HP□
9100	76 x 219	13.54	18.96	0.019	0.013	EEGBA2W912HW□