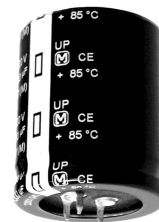


## TS-UP Series 85°C, 3000 hours\*

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



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

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

## Part Number System

|                                                           |                                         |                                   |                         |                                              |                        |                        |                              |
|-----------------------------------------------------------|-----------------------------------------|-----------------------------------|-------------------------|----------------------------------------------|------------------------|------------------------|------------------------------|
| <div><div>E</div><div>C</div><div></div><div></div></div> |                                         | <div><div></div><div></div></div> | <div><div>P</div></div> | <div><div></div><div></div><div></div></div> | <div><div></div></div> | <div><div></div></div> |                              |
| Voltage Code                                              |                                         | Series                            | Capacitance Code        | Case Diameter                                | Insulation Options     |                        |                              |
| Common Code / Terminal Type                               |                                         |                                   |                         |                                              | 25 ~ 50mm lengths      |                        |                              |
| ECOS                                                      | 2 pin, 6.3mm Length Terminal (Standard) |                                   |                         | B                                            | 22mm                   |                        | A PVC with top plate         |
| ECEC                                                      | 2 pin, 4.0mm Length "Short" Terminal    |                                   |                         | C                                            | 25mm                   |                        | B PVC without top plate      |
| ECE3                                                      | 3 Pin, 4.0mm Length Terminal            |                                   |                         | D                                            | 30mm                   |                        | 20mm length                  |
|                                                           |                                         |                                   |                         | E                                            | 35mm                   |                        | L PVC with top plate         |
| (Please see page 10 for details)                          |                                         |                                   |                         |                                              |                        |                        | G PVC without top plate      |
|                                                           |                                         |                                   |                         |                                              |                        |                        | Extended Capacitance Ratings |
|                                                           |                                         |                                   |                         |                                              |                        |                        | X PVC with top plate         |

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

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

## TS-UP Standard Ratings (continued)

| Cap.<br>(μF)                             | Size (mm)<br>D x L | Max 85°C R.C. (A <sub>rms</sub> ) |        | Max. 20°C ESR (Ω) |       | Panasonic<br>Part Number |
|------------------------------------------|--------------------|-----------------------------------|--------|-------------------|-------|--------------------------|
|                                          |                    | 120Hz                             | 10kHz~ | 120Hz             | 20kHz |                          |
| 35 VDC Working, 44 VDC Surge (continued) |                    |                                   |        |                   |       |                          |
| 5600                                     | 25 x 25            | 3.36                              | 3.86   | 0.080             | 0.060 | ECOS1VP562CA             |
| 6800                                     | 22 x 35            | 3.68                              | 4.23   | 0.066             | 0.049 | ECOS1VP682BA             |
|                                          | 25 x 30            | 3.68                              | 4.23   | 0.066             | 0.049 | ECOS1VP682CA             |
|                                          | 35 x 20            | 2.40                              | 2.76   | 0.071             | 0.053 | ECOS1VP682EL             |
| 8200                                     | 22 x 40            | 4.00                              | 4.60   | 0.057             | 0.042 | ECOS1VP822BA             |
|                                          | 25 x 35            | 4.00                              | 4.60   | 0.057             | 0.042 | ECOS1VP822CA             |
| 10000                                    | 22 x 45            | 4.42                              | 5.08   | 0.050             | 0.037 | ECOS1VP103BA             |
|                                          | 25 x 40            | 4.42                              | 5.08   | 0.050             | 0.037 | ECOS1VP103CA             |
|                                          | 30 x 30            | 4.42                              | 5.08   | 0.050             | 0.037 | ECOS1VP103DA             |
|                                          | 35 x 25            | 4.42                              | 5.08   | 0.050             | 0.037 | ECOS1VP103EA             |
| 12000                                    | 25 x 45            | 5.05                              | 5.81   | 0.044             | 0.033 | ECOS1VP123CA             |
|                                          | 30 x 35            | 5.05                              | 5.81   | 0.044             | 0.033 | ECOS1VP123DA             |
|                                          | 35 x 30            | 5.05                              | 5.81   | 0.044             | 0.033 | ECOS1VP123EA             |
| 15000                                    | 25 x 50            | 5.57                              | 6.41   | 0.036             | 0.027 | ECOS1VP153CA             |
|                                          | 30 x 40            | 5.57                              | 6.41   | 0.036             | 0.027 | ECOS1VP153DA             |
|                                          | 35 x 30            | 5.57                              | 6.41   | 0.036             | 0.027 | ECOS1VP153EA             |
| 18000                                    | 30 x 45            | 5.68                              | 6.53   | 0.030             | 0.023 | ECOS1VP183DA             |
|                                          | 35 x 35            | 5.68                              | 6.53   | 0.030             | 0.023 | ECOS1VP183EA             |
| 22000                                    | 30 x 50            | 6.10                              | 7.02   | 0.026             | 0.020 | ECOS1VP223DA             |
|                                          | 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             |
| 50 VDC Working, 63 VDC Surge             |                    |                                   |        |                   |       |                          |
| 1500                                     | 22 x 20            | 1.20                              | 1.38   | 0.254             | 0.191 | ECOS1HP152BL             |
|                                          | 22 x 25            | 1.24                              | 1.43   | 0.221             | 0.166 | ECOS1HP152BA             |
| 2200                                     | 22 x 25            | 1.82                              | 2.09   | 0.151             | 0.113 | ECOS1HP222BA             |
|                                          | 25 x 20            | 1.40                              | 1.61   | 0.173             | 0.130 | ECOS1HP222CL             |
| 2700                                     | 22 x 25            | 2.23                              | 2.56   | 0.123             | 0.092 | ECOS1HP272BA             |
| 3300                                     | 22 x 30            | 2.73                              | 3.14   | 0.100             | 0.075 | ECOS1HP332BA             |
|                                          | 25 x 25            | 2.73                              | 3.14   | 0.100             | 0.075 | ECOS1HP332CA             |
|                                          | 30 x 20            | 1.70                              | 1.96   | 0.116             | 0.087 | ECOS1HP332DL             |
| 3900                                     | 22 x 30            | 2.75                              | 3.16   | 0.085             | 0.064 | ECOS1HP392BA             |
|                                          | 25 x 25            | 2.75                              | 3.16   | 0.085             | 0.064 | ECOS1HP392CA             |
| 4700                                     | 22 x 35            | 3.03                              | 3.48   | 0.071             | 0.053 | ECOS1HP472BA             |
|                                          | 25 x 30            | 3.03                              | 3.48   | 0.071             | 0.053 | ECOS1HP472CA             |
|                                          | 30 x 25            | 3.03                              | 3.48   | 0.071             | 0.053 | ECOS1HP472DA             |
|                                          | 35 x 20            | 2.10                              | 2.42   | 0.081             | 0.061 | ECOS1HP472EL             |
| 5600                                     | 22 x 40            | 3.42                              | 3.93   | 0.059             | 0.044 | ECOS1HP562BA             |
|                                          | 25 x 35            | 3.42                              | 3.93   | 0.059             | 0.044 | ECOS1HP562CA             |
|                                          | 30 x 30            | 3.42                              | 3.93   | 0.059             | 0.044 | ECOS1HP562DA             |
| 6800                                     | 22 x 50            | 3.85                              | 4.43   | 0.049             | 0.037 | ECOS1HP682BA             |
|                                          | 25 x 40            | 3.85                              | 4.43   | 0.049             | 0.037 | ECOS1HP682CA             |
|                                          | 30 x 30            | 3.85                              | 4.43   | 0.049             | 0.037 | ECOS1HP682DA             |
| 8200                                     | 25 x 45            | 4.41                              | 5.07   | 0.040             | 0.030 | ECOS1HP822CA             |
|                                          | 30 x 35            | 4.41                              | 5.07   | 0.040             | 0.030 | ECOS1HP822DA             |
| 10000                                    | 25 x 50            | 4.97                              | 5.72   | 0.036             | 0.027 | ECOS1HP103CA             |
|                                          | 30 x 40            | 4.97                              | 5.72   | 0.036             | 0.027 | ECOS1HP103DA             |
|                                          | 35 x 30            | 4.97                              | 5.72   | 0.036             | 0.027 | ECOS1HP103EA             |
| 12000                                    | 30 x 45            | 5.58                              | 6.42   | 0.032             | 0.024 | ECOS1HP123DA             |
|                                          | 35 x 35            | 5.58                              | 6.42   | 0.032             | 0.024 | ECOS1HP123EA             |
| 15000                                    | 30 x 50            | 6.44                              | 7.41   | 0.028             | 0.021 | ECOS1HP153DA             |
|                                          | 35 x 40            | 6.44                              | 7.41   | 0.028             | 0.021 | ECOS1HP153EA             |
| 18000                                    | 35 x 45            | 6.94                              | 7.98   | 0.023             | 0.018 | ECOS1HP183EA             |
| 22000                                    | 35 x 50            | 7.57                              | 8.71   | 0.021             | 0.017 | ECOS1HP223EA             |
| 63 VDC Working, 79 VDC Surge             |                    |                                   |        |                   |       |                          |
| 1000                                     | 22 x 20            | 1.20                              | 1.38   | 0.381             | 0.286 | ECOS1JP102BL             |
|                                          | 22 x 25            | 1.20                              | 1.38   | 0.332             | 0.249 | ECOS1JP102BA             |
| 1500                                     | 22 x 25            | 1.72                              | 1.98   | 0.221             | 0.166 | ECOS1JP152BA             |
|                                          | 25 x 20            | 1.30                              | 1.50   | 0.254             | 0.191 | ECOS1JP152CL             |
| 1800                                     | 22 x 25            | 2.06                              | 2.37   | 0.184             | 0.138 | ECOS1JP182BA             |
| 2200                                     | 22 x 30            | 2.52                              | 2.90   | 0.151             | 0.113 | ECOS1JP222BA             |
|                                          | 25 x 25            | 2.52                              | 2.90   | 0.151             | 0.113 | ECOS1JP222CA             |
|                                          | 30 x 20            | 1.50                              | 1.73   | 0.173             | 0.130 | ECOS1JP222DL             |
| 2700                                     | 22 x 35            | 3.73                              | 4.29   | 0.123             | 0.092 | ECOS1JP272BA             |
|                                          | 25 x 30            | 3.73                              | 4.29   | 0.123             | 0.092 | ECOS1JP272CA             |
| 3300                                     | 22 x 40            | 4.10                              | 4.72   | 0.105             | 0.079 | ECOS1JP332BA             |
|                                          | 25 x 30            | 4.10                              | 4.72   | 0.105             | 0.079 | ECOS1JP332CA             |
|                                          | 30 x 25            | 4.10                              | 4.72   | 0.105             | 0.079 | ECOS1JP332DA             |
|                                          | 35 x 20            | 1.70                              | 1.96   | 0.126             | 0.094 | ECOS1JP332EL             |
| 3900                                     | 22 x 45            | 4.44                              | 5.11   | 0.098             | 0.073 | ECOS1JP392BA             |
|                                          | 25 x 35            | 4.44                              | 5.11   | 0.098             | 0.073 | ECOS1JP392CA             |
|                                          | 30 x 30            | 4.44                              | 5.11   | 0.098             | 0.073 | ECOS1JP392DA             |
| 4700                                     | 22 x 50            | 4.86                              | 5.59   | 0.081             | 0.061 | ECOS1JP472BA             |
|                                          | 25 x 40            | 4.86                              | 5.59   | 0.081             | 0.061 | ECOS1JP472CA             |
|                                          | 30 x 30            | 4.86                              | 5.59   | 0.081             | 0.061 | ECOS1JP472DA             |

| Cap.<br>(μF)                             | Size (mm)<br>D x L | Max 85°C R.C. (A <sub>rms</sub> ) |        | Max. 20°C ESR (Ω) |       | Panasonic<br>Part Number |
|------------------------------------------|--------------------|-----------------------------------|--------|-------------------|-------|--------------------------|
|                                          |                    | 120Hz                             | 10kHz~ | 120Hz             | 20kHz |                          |
| 63 VDC Working, 79 VDC Surge (continued) |                    |                                   |        |                   |       |                          |
| 4700                                     | 35 x 25            | 4.86                              | 5.59   | 0.081             | 0.061 | ECOS1JP472EA             |
| 5600                                     | 25 x 45            | 5.36                              | 6.16   | 0.068             | 0.051 | ECOS1JP562CA             |
|                                          | 30 x 35            | 5.36                              | 6.16   | 0.068             | 0.051 | ECOS1JP562DA             |
|                                          | 35 x 30            | 5.36                              | 6.16   | 0.068             | 0.051 | ECOS1JP562EA             |
| 6800                                     | 25 x 50            | 5.84                              | 6.72   | 0.061             | 0.046 | ECOS1JP682CA             |
|                                          | 30 x 40            | 5.84                              | 6.72   | 0.061             | 0.046 | ECOS1JP682DA             |
|                                          | 35 x 30            | 5.84                              | 6.72   | 0.061             | 0.046 | ECOS1JP682EA             |
|                                          | 8200               | 30 x 45                           | 6.00   | 6.90              | 0.051 | 0.038                    |
| 10000                                    | 35 x 35            | 6.00                              | 6.90   | 0.051             | 0.038 | ECOS1JP822EA             |
|                                          | 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             |
| 80 VDC Working, 100 VDC Surge            |                    |                                   |        |                   |       |                          |
| 680                                      | 22 x 20            | 1.00                              | 1.15   | 0.439             | 0.329 | ECOS1KP681BL             |
|                                          | 22 x 25            | 1.02                              | 1.17   | 0.390             | 0.293 | ECOS1KP681BA             |
| 1000                                     | 22 x 25            | 1.51                              | 1.74   | 0.265             | 0.199 | ECOS1KP102BA             |
|                                          | 25 x 20            | 1.20                              | 1.38   | 0.298             | 0.224 | ECOS1KP102CL             |
| 1200                                     | 22 x 25            | 1.81                              | 2.08   | 0.221             | 0.166 | ECOS1KP122BA             |
| 1500                                     | 22 x 30            | 2.26                              | 2.60   | 0.177             | 0.133 | ECOS1KP152BA             |
|                                          | 25 x 25            | 2.26                              | 2.60   | 0.177             | 0.133 | ECOS1KP152CA             |
| 1800                                     | 30 x 20            | 1.40                              | 1.61   | 0.199             | 0.149 | ECOS1KP152DL             |
|                                          | 22 x 35            | 2.52                              | 2.90   | 0.147             | 0.111 | ECOS1KP182BA             |
| 2200                                     | 25 x 30            | 2.52                              | 2.90   | 0.147             | 0.111 | ECOS1KP182CA             |
|                                          | 22 x 40            | 2.73                              | 3.14   | 0.121             | 0.090 | ECOS1KP222BA             |
| 2700                                     | 25 x 30            | 2.73                              | 3.14   | 0.121             | 0.090 | ECOS1KP222CA             |
|                                          | 30 x 25            | 2.73                              | 3.14   | 0.121             | 0.090 | ECOS1KP222DA             |
|                                          | 35 x 20            | 1.70                              | 1.96   | 0.136             | 0.102 | ECOS1KP222EL             |
|                                          | 22 x 45            | 2.78                              | 3.20   | 0.098             | 0.074 | ECOS1KP272BA             |
| 3300                                     | 25 x 35            | 2.78                              | 3.20   | 0.098             | 0.074 | ECOS1KP272CA             |
|                                          | 30 x 30            | 2.78                              | 3.20   | 0.098             | 0.074 | ECOS1KP272DA             |
|                                          | 22 x 50            | 3.21                              | 3.69   | 0.085             | 0.064 | ECOS1KP332BA             |
| 3900                                     | 25 x 40            | 3.21                              | 3.69   | 0.085             | 0.064 | ECOS1KP332CA             |
|                                          | 30 x 30            | 3.21                              | 3.69   | 0.085             | 0.064 | ECOS1KP332DA             |
| 4700                                     | 25 x 45            | 3.59                              | 4.13   | 0.077             | 0.057 | ECOS1KP392CA             |
|                                          | 30 x 35            | 3.59                              | 4.13   | 0.077             | 0.057 | ECOS1KP392DA             |
|                                          | 25 x 50            | 4.09                              | 4.70   | 0.063             | 0.048 | ECOS1KP472CA             |
| 5600                                     | 30 x 40            | 4.09                              | 4.70   | 0.063             | 0.048 | ECOS1KP472DA             |
|                                          | 30 x 45            | 4.55                              | 5.23   | 0.056             | 0.042 | ECOS1KP562DA             |
| 6800                                     | 35 x 35            | 4.55                              | 5.23   | 0.056             | 0.042 | ECOS1KP562EA             |
|                                          | 30 x 50            | 5.16                              | 5.93   | 0.046             | 0.035 | ECOS1KP682DA             |
| 8200                                     | 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             |
| 100 VDC Working, 125 VDC Surge           |                    |                                   |        |                   |       |                          |
| 470                                      | 22 x 20            | 1.00                              | 1.15   | 0.459             | 0.298 | ECOS2AP471BL             |
|                                          | 22 x 25            | 1.11                              | 1.28   | 0.459             | 0.298 | ECOS2AP471BA             |
| 560                                      | 22 x 25            | 1.32                              | 1.52   | 0.385             | 0.250 | ECOS2AP561BA             |
| 680                                      | 22 x 25            | 1.61                              | 1.85   | 0.317             | 0.206 | ECOS2AP681BA             |
|                                          | 25 x 20            | 1.10                              | 1.27   | 0.366             | 0.238 | ECOS2AP681CL             |
| 1000                                     | 22 x 30            | 1.96                              | 2.25   | 0.216             | 0.140 | ECOS2AP102BA             |
|                                          | 25 x 25            | 1.96                              | 2.25   | 0.216             | 0.140 | ECOS2AP102CA             |
|                                          | 30 x 20            | 1.20                              | 1.38   | 0.249             | 0.162 | ECOS2AP102DL             |
| 1200                                     | 22 x 35            | 2.31                              | 2.66   | 0.193             | 0.126 | ECOS2AP122BA             |
|                                          | 25 x 30            | 2.31                              | 2.66   | 0.180             | 0.117 | ECOS2AP122CA             |
| 1500                                     | 22 x 40            | 2.57                              | 2.96   | 0.155             | 0.101 | ECOS2AP152BA             |
|                                          | 25 x 30            | 2.57                              | 2.96   | 0.155             | 0.101 | ECOS2AP152CA             |
|                                          | 30 x 25            | 2.57                              | 2.96   | 0.155             | 0.101 | ECOS2AP152DA             |
|                                          | 35 x 20            | 1.50                              | 1.73   | 0.177             | 0.115 | ECOS2AP152EL             |
| 1800                                     | 22 x 45            | 2.84                              | 3.27   | 0.129             | 0.084 | ECOS2AP182BA             |
|                                          | 25 x 35            | 2.84                              | 3.27   | 0.138             | 0.090 | ECOS2AP182CA             |
|                                          | 30 x 30            | 2.84                              | 3.27   | 0.138             | 0.090 | ECOS2AP182DA             |
| 2200                                     | 22 x 50            | 3.14                              | 3.61   | 0.121             | 0.078 | ECOS2AP222BA             |
|                                          | 25 x 40            | 3.14                              | 3.61   | 0.121             | 0.078 | ECOS2AP222CA             |
|                                          | 30 x 30            | 3.14                              | 3.61   | 0.121             | 0.078 | ECOS2AP222DA             |
|                                          | 35 x 25            | 3.14                              | 3.61   | 0.121             | 0.078 | ECOS2AP222EA             |
| 2700                                     | 25 x 45            | 3.71                              | 4.27   | 0.104             | 0.068 | ECOS2AP272CA             |
|                                          | 30 x 35            | 3.71                              | 4.27   | 0.104             | 0.068 | ECOS2AP272DA             |
|                                          | 35 x 30            | 3.71                              | 4.27   | 0.104             | 0.068 | ECOS2AP272EA             |
| 3300                                     | 25 x 50            | 4.06                              | 4.67   | 0.090             | 0.059 | ECOS2AP332CA             |
|                                          | 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             |
|                                          | 35 x 35            | 4.54                              | 5.22   | 0.081             | 0.052 | ECOS2AP392EA             |
| 4700                                     | 30 x 50            | 5.13                              | 5.90   | 0.071             | 0.049 | ECOS2AP472DA             |
|                                          | 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             |

## TS-UP Standard Ratings (continued)

| Cap.<br>(μF)                   | Size (mm)<br>D x L | Max 85°C R.C. (A <sub>rms</sub> ) |        | Max. 20°C ESR (Ω) |       | Panasonic<br>Part Number |
|--------------------------------|--------------------|-----------------------------------|--------|-------------------|-------|--------------------------|
|                                |                    | 120Hz                             | 10kHz~ | 120Hz             | 20kHz |                          |
| 160 VDC Working, 200 VDC Surge |                    |                                   |        |                   |       |                          |
| 220                            | 22 x 20            | 0.75                              | 1.05   | 0.980             | 0.490 | ECOS2CP221BL             |
|                                | 22 x 25            | 0.91                              | 1.27   | 0.829             | 0.414 | ECOS2CP221BA             |
| 270                            | 22 x 25            | 1.19                              | 1.67   | 0.675             | 0.338 | ECOS2CP271BA             |
|                                | 25 x 20            | 0.87                              | 1.22   | 0.798             | 0.399 | ECOS2CP271CL             |
| 330                            | 22 x 25            | 1.45                              | 2.03   | 0.553             | 0.276 | ECOS2CP331BA             |
| 390                            | 22 x 25            | 1.62                              | 2.27   | 0.468             | 0.234 | ECOS2CP391BX             |
|                                | 25 x 25            | 1.62                              | 2.27   | 0.468             | 0.234 | ECOS2CP391CA             |
|                                | 30 x 20            | 1.10                              | 1.54   | 0.595             | 0.298 | ECOS2CP391DL             |
| 470                            | 22 x 30            | 2.11                              | 2.95   | 0.423             | 0.212 | ECOS2CP471BA             |
|                                | 25 x 25            | 2.11                              | 2.95   | 0.423             | 0.212 | ECOS2CP471CA             |
| 560                            | 22 x 30            | 2.25                              | 3.15   | 0.355             | 0.178 | ECOS2CP561BX             |
|                                | 22 x 35            | 2.25                              | 3.15   | 0.355             | 0.178 | ECOS2CP561BA             |
|                                | 25 x 25            | 2.25                              | 3.15   | 0.355             | 0.178 | ECOS2CP561CX             |
|                                | 25 x 30            | 2.25                              | 3.15   | 0.355             | 0.178 | ECOS2CP561CA             |
|                                | 35 x 20            | 1.30                              | 1.82   | 0.414             | 0.207 | ECOS2CP561EL             |
| 680                            | 22 x 35            | 2.50                              | 3.50   | 0.293             | 0.146 | ECOS2CP681BX             |
|                                | 22 x 40            | 2.50                              | 3.50   | 0.293             | 0.146 | ECOS2CP681BA             |
|                                | 25 x 30            | 2.50                              | 3.50   | 0.293             | 0.146 | ECOS2CP681CX             |
|                                | 30 x 25            | 2.50                              | 3.50   | 0.293             | 0.146 | ECOS2CP681DA             |
| 820                            | 22 x 40            | 2.50                              | 3.50   | 0.243             | 0.121 | ECOS2CP821BX             |
|                                | 22 x 45            | 2.75                              | 3.85   | 0.263             | 0.131 | ECOS2CP821BA             |
|                                | 25 x 35            | 2.75                              | 3.85   | 0.263             | 0.131 | ECOS2CP821CA             |
|                                | 30 x 25            | 2.75                              | 3.85   | 0.263             | 0.131 | ECOS2CP821DX             |
|                                | 30 x 30            | 2.75                              | 3.85   | 0.263             | 0.131 | ECOS2CP821DA             |
| 1000                           | 22 x 45            | 3.00                              | 4.20   | 0.216             | 0.108 | ECOS2CP102BX             |
|                                | 25 x 40            | 3.00                              | 4.20   | 0.216             | 0.108 | ECOS2CP102CX             |
|                                | 25 x 45            | 3.00                              | 4.20   | 0.232             | 0.128 | ECOS2CP102CA             |
|                                | 30 x 30            | 3.00                              | 4.20   | 0.232             | 0.128 | ECOS2CP102DX             |
|                                | 30 x 35            | 3.00                              | 4.20   | 0.232             | 0.128 | ECOS2CP102DA             |
| 1200                           | 25 x 50            | 3.25                              | 4.55   | 0.207             | 0.114 | ECOS2CP122CA             |
|                                | 30 x 35            | 3.25                              | 4.55   | 0.207             | 0.114 | ECOS2CP122DA             |
|                                | 35 x 30            | 3.25                              | 4.55   | 0.207             | 0.114 | ECOS2CP122EA             |
| 1500                           | 25 x 50            | 3.73                              | 5.22   | 0.166             | 0.091 | ECOS2CP152CX             |
|                                | 30 x 45            | 3.73                              | 5.22   | 0.166             | 0.091 | ECOS2CP152DA             |
|                                | 35 x 30            | 3.73                              | 5.22   | 0.166             | 0.091 | ECOS2CP152EX             |
|                                | 35 x 35            | 3.73                              | 5.22   | 0.166             | 0.091 | ECOS2CP152EA             |
| 1800                           | 30 x 50            | 4.20                              | 5.88   | 0.138             | 0.083 | ECOS2CP182DA             |
|                                | 35 x 35            | 4.20                              | 5.88   | 0.138             | 0.083 | ECOS2CP182EX             |
| 2200                           | 30 x 50            | 4.78                              | 6.69   | 0.105             | 0.053 | ECOS2CP222DX             |
|                                | 35 x 40            | 4.78                              | 6.69   | 0.113             | 0.073 | ECOS2CP222EX             |
|                                | 35 x 45            | 4.78                              | 6.69   | 0.113             | 0.073 | ECOS2CP222EA             |
| 2700                           | 35 x 50            | 5.45                              | 7.63   | 0.092             | 0.060 | ECOS2CP272EA             |
| 200 VDC Working, 250 VDC Surge |                    |                                   |        |                   |       |                          |
| 150                            | 22 x 20            | 0.65                              | 0.91   | 1.326             | 0.597 | ECOS2DP151BL             |
|                                | 22 x 25            | 0.71                              | 0.99   | 1.216             | 0.547 | ECOS2DP151BA             |
| 220                            | 22 x 25            | 1.04                              | 1.46   | 0.829             | 0.373 | ECOS2DP221BA             |
|                                | 25 x 20            | 0.87                              | 1.22   | 0.904             | 0.407 | ECOS2DP221CL             |
| 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             |
|                                | 30 x 20            | 1.00                              | 1.40   | 0.603             | 0.271 | ECOS2DP331DL             |
| 390                            | 22 x 30            | 1.68                              | 2.35   | 0.468             | 0.210 | ECOS2DP391BA             |
|                                | 25 x 25            | 1.68                              | 2.35   | 0.468             | 0.210 | ECOS2DP391CA             |
| 470                            | 22 x 35            | 1.85                              | 2.59   | 0.388             | 0.175 | ECOS2DP471BA             |
|                                | 25 x 30            | 1.85                              | 2.59   | 0.388             | 0.175 | ECOS2DP471CA             |
|                                | 35 x 20            | 1.30                              | 1.82   | 0.459             | 0.206 | ECOS2DP471EL             |
| 560                            | 22 x 40            | 2.43                              | 3.40   | 0.326             | 0.147 | ECOS2DP561BA             |
|                                | 25 x 30            | 2.43                              | 3.40   | 0.326             | 0.147 | ECOS2DP561CX             |
|                                | 30 x 25            | 2.43                              | 3.40   | 0.326             | 0.147 | ECOS2DP561DA             |
| 680                            | 22 x 45            | 2.68                              | 3.75   | 0.268             | 0.121 | ECOS2DP681BA             |
|                                | 25 x 35            | 2.68                              | 3.75   | 0.268             | 0.121 | ECOS2DP681CA             |
|                                | 30 x 30            | 2.68                              | 3.75   | 0.268             | 0.121 | ECOS2DP681DA             |
| 820                            | 25 x 45            | 2.93                              | 4.10   | 0.222             | 0.100 | ECOS2DP821CA             |
|                                | 30 x 30            | 2.93                              | 4.10   | 0.222             | 0.100 | ECOS2DP821DX             |
|                                | 30 x 35            | 2.93                              | 4.10   | 0.222             | 0.100 | ECOS2DP821DA             |
|                                | 35 x 25            | 2.93                              | 4.10   | 0.222             | 0.100 | ECOS2DP821EA             |
| 1000                           | 25 x 45            | 3.25                              | 4.55   | 0.199             | 0.090 | ECOS2DP102CX             |
|                                | 25 x 50            | 3.25                              | 4.55   | 0.199             | 0.090 | ECOS2DP102CA             |
|                                | 30 x 35            | 3.25                              | 4.55   | 0.199             | 0.090 | ECOS2DP102DX             |
|                                | 30 x 40            | 3.25                              | 4.55   | 0.199             | 0.090 | ECOS2DP102DA             |
|                                | 35 x 30            | 3.25                              | 4.55   | 0.199             | 0.090 | ECOS2DP102EA             |
| 1200                           | 30 x 40            | 3.50                              | 4.90   | 0.166             | 0.075 | ECOS2DP122DX             |
|                                | 30 x 45            | 3.50                              | 4.90   | 0.166             | 0.075 | ECOS2DP122DA             |
|                                | 35 x 30            | 3.50                              | 4.90   | 0.166             | 0.075 | ECOS2DP122EX             |
|                                | 35 x 35            | 3.50                              | 4.90   | 0.166             | 0.075 | ECOS2DP122EA             |

| Cap.<br>(μF)                               | Size (mm)<br>D x L | Max 85°C R.C. (A <sub>rms</sub> ) |        | Max. 20°C ESR (Ω) |       | Panasonic<br>Part Number |
|--------------------------------------------|--------------------|-----------------------------------|--------|-------------------|-------|--------------------------|
|                                            |                    | 120Hz                             | 10kHz~ | 120Hz             | 20kHz |                          |
| 200 VDC Working, 250 VDC Surge (continued) |                    |                                   |        |                   |       |                          |
| 1500                                       | 30 x 45            | 3.87                              | 5.42   | 0.144             | 0.072 | ECOS2DP152DX             |
|                                            | 30 x 50            | 3.87                              | 5.42   | 0.144             | 0.072 | ECOS2DP152DA             |
|                                            | 35 x 35            | 3.87                              | 5.42   | 0.144             | 0.072 | ECOS2DP152EX             |
|                                            | 35 x 40            | 3.87                              | 5.42   | 0.144             | 0.072 | ECOS2DP152EA             |
| 1800                                       | 30 x 50            | 4.32                              | 6.05   | 0.120             | 0.060 | ECOS2DP182DX             |
|                                            | 35 x 40            | 4.32                              | 6.05   | 0.120             | 0.060 | ECOS2DP182EX             |
|                                            | 35 x 45            | 4.32                              | 6.05   | 0.120             | 0.060 | ECOS2DP182EA             |
| 2200                                       | 35 x 45            | 4.92                              | 6.89   | 0.098             | 0.054 | ECOS2DP222EX             |
|                                            | 35 x 50            | 4.92                              | 6.89   | 0.098             | 0.054 | ECOS2DP222EA             |
| 250 VDC Working, 300 VDC Surge             |                    |                                   |        |                   |       |                          |
| 120                                        | 22 x 20            | 0.45                              | 0.63   | 1.658             | 0.663 | ECOS2EP121BL             |
|                                            | 22 x 25            | 0.71                              | 0.99   | 1.520             | 0.608 | ECOS2EP121BA             |
| 150                                        | 22 x 25            | 0.89                              | 1.25   | 1.216             | 0.486 | ECOS2EP151BA             |
|                                            | 25 x 20            | 0.65                              | 0.91   | 1.326             | 0.531 | ECOS2EP151CL             |
| 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             |
|                                            | 30 x 20            | 0.87                              | 1.22   | 0.829             | 0.332 | ECOS2EP221DL             |
| 270                                        | 22 x 30            | 1.31                              | 1.83   | 0.614             | 0.246 | ECOS2EP271BA             |
|                                            | 25 x 25            | 1.31                              | 1.83   | 0.614             | 0.246 | ECOS2EP271CA             |
| 330                                        | 22 x 35            | 1.75                              | 2.45   | 0.553             | 0.221 | ECOS2EP331BA             |
|                                            | 25 x 30            | 1.75                              | 2.45   | 0.502             | 0.201 | ECOS2EP331CA             |
|                                            | 35 x 20            | 1.10                              | 1.54   | 0.553             | 0.221 | ECOS2EP331EL             |
|                                            |                    |                                   |        |                   |       |                          |
| 390                                        | 22 x 40            | 1.91                              | 2.67   | 0.468             | 0.187 | ECOS2EP391BA             |
|                                            | 25 x 30            | 1.91                              | 2.67   | 0.468             | 0.187 | ECOS2EP391CX             |
|                                            | 25 x 35            | 1.91                              | 2.67   | 0.468             | 0.187 | ECOS2EP391CA             |
|                                            | 30 x 25            | 1.91                              | 2.67   | 0.425             | 0.170 | ECOS2EP391DA             |
| 470                                        | 22 x 45            | 2.11                              | 2.95   | 0.388             | 0.155 | ECOS2EP471BA             |
|                                            | 25 x 35            | 2.11                              | 2.95   | 0.388             | 0.155 | ECOS2EP471CX             |
|                                            | 25 x 40            | 2.11                              | 2.95   | 0.388             | 0.155 | ECOS2EP471CA             |
|                                            | 30 x 25            | 2.11                              | 2.95   | 0.353             | 0.141 | ECOS2EP471DX             |
|                                            | 30 x 30            | 2.11                              | 2.95   | 0.388             | 0.155 | ECOS2EP471DA             |
| 560                                        | 25 x 40            | 2.25                              | 3.15   | 0.326             | 0.130 | ECOS2EP561CX             |
|                                            | 25 x 45            | 2.25                              | 3.15   | 0.326             | 0.130 | ECOS2EP561CA             |
|                                            | 30 x 30            | 2.25                              | 3.15   | 0.326             | 0.130 | ECOS2EP561DX             |
|                                            | 30 x 35            | 2.25                              | 3.15   | 0.326             | 0.130 | ECOS2EP561DA             |
|                                            | 35 x 25            | 2.25                              | 3.15   | 0.326             | 0.130 | ECOS2EP561EA             |
| 680                                        | 25 x 45            | 2.50                              | 3.50   | 0.268             | 0.107 | ECOS2EP681CX             |
|                                            | 25 x 50            | 2.50                              | 3.50   | 0.268             | 0.107 | ECOS2EP681CA             |
|                                            | 30 x 35            | 2.50                              | 3.50   | 0.268             | 0.107 | ECOS2EP681DX             |
|                                            | 30 x 40            | 2.50                              | 3.50   | 0.268             | 0.107 | ECOS2EP681DA             |
|                                            | 35 x 30            | 2.50                              | 3.50   | 0.268             | 0.107 | ECOS2EP681EA             |
| 820                                        | 30 x 40            | 2.50                              | 3.50   | 0.222             | 0.089 | ECOS2EP821DX             |
|                                            | 30 x 45            | 2.77                              | 3.88   | 0.222             | 0.089 | ECOS2EP821DA             |
|                                            | 35 x 30            | 2.77                              | 3.88   | 0.222             | 0.089 | ECOS2EP821EX             |
|                                            | 35 x 35            | 2.77                              | 3.88   | 0.243             | 0.109 | ECOS2EP821EA             |
| 1000                                       | 30 x 45            | 3.32                              | 4.65   | 0.182             | 0.073 | ECOS2EP102DX             |
|                                            | 30 x 50            | 3.32                              | 4.65   | 0.199             | 0.090 | ECOS2EP102DA             |
|                                            | 35 x 35            | 3.32                              | 4.65   | 0.199             | 0.090 | ECOS2EP102EX             |
|                                            | 35 x 40            | 3.32                              | 4.65   | 0.199             | 0.099 | ECOS2EP102EA             |
| 1200                                       | 35 x 40            | 3.53                              | 4.94   | 0.166             | 0.083 | ECOS2EP122EX             |
|                                            | 35 x 45            | 3.53                              | 4.94   | 0.166             | 0.083 | ECOS2EP122EA             |
| 1500                                       | 35 x 50            | 4.04                              | 5.66   | 0.133             | 0.066 | ECOS2EP152EA             |
| 350 VDC Working, 400 VDC Surge             |                    |                                   |        |                   |       |                          |
| 82                                         | 22 x 25            | 0.83                              | 1.16   | 2.022             | 0.708 | ECOS2VP820BA             |
| 100                                        | 22 x 30            | 0.91                              | 1.27   | 1.658             | 0.580 | ECOS2VP101BA             |
| 120                                        | 22 x 30            | 1.00                              | 1.40   | 1.382             | 0.484 | ECOS2VP121BA             |
|                                            | 25 x 25            | 1.00                              | 1.40   | 1.382             | 0.484 | ECOS2VP121CA             |
| 150                                        | 22 x 35            | 1.12                              | 1.57   | 1.105             | 0.387 | ECOS2VP151BA             |
|                                            | 25 x 25            | 1.12                              | 1.57   | 1.105             | 0.387 | ECOS2VP151CX             |
|                                            | 25 x 30            | 1.12                              | 1.57   | 1.105             | 0.387 | ECOS2VP151CA             |
|                                            | 30 x 25            | 1.12                              | 1.57   | 1.105             | 0.387 | ECOS2VP151DA             |
| 180                                        | 22 x 40            | 1.22                              | 1.71   | 0.921             | 0.322 | ECOS2VP181BA             |
|                                            | 25 x 30            | 1.22                              | 1.71   | 0.921             | 0.322 | ECOS2VP181CX             |
|                                            | 25 x 35            | 1.22                              | 1.71   | 0.921             | 0.322 | ECOS2VP181CA             |
|                                            | 30 x 25            | 1.22                              | 1.71   | 0.921             | 0.322 | ECOS2VP181DA             |
| 220                                        | 22 x 45            | 1.44                              | 2.02   | 0.754             | 0.264 | ECOS2VP221BA             |
|                                            | 25 x 35            | 1.44                              | 2.02   | 0.754             | 0.264 | ECOS2VP221CX             |
|                                            | 25 x 40            | 1.44                              | 2.02   | 0.754             | 0.264 | ECOS2VP221CA             |
|                                            | 30 x 25            | 1.44                              | 2.02   | 0.754             | 0.264 | ECOS2VP221DX             |
|                                            | 30 x 30            | 1.44                              | 2.02   | 0.754             | 0.264 | ECOS2VP221DA             |
| 270                                        | 35 x 25            | 1.44                              | 2.02   | 0.754             | 0.264 | ECOS2VP221EA             |
|                                            |                    |                                   |        |                   |       |                          |

## TS-UP Standard Ratings (continued)

| Cap.<br>(μF)                               | Size (mm)<br>D x L | Max. 85°C R.C. (A <sub>rms</sub> ) |        | Max. 20°C ESR (Ω) |       | Panasonic<br>Part Number |
|--------------------------------------------|--------------------|------------------------------------|--------|-------------------|-------|--------------------------|
|                                            |                    | 120Hz                              | 10kHz~ | 120Hz             | 20kHz |                          |
| 350 VDC Working, 400 VDC Surge (continued) |                    |                                    |        |                   |       |                          |
| 330                                        | 35 x 30            | 1.66                               | 2.32   | 0.614             | 0.215 | ECOS2VP271EA             |
|                                            | 25 x 50            | 1.88                               | 2.63   | 0.502             | 0.176 | ECOS2VP331CA             |
|                                            | 30 x 35            | 1.88                               | 2.63   | 0.502             | 0.176 | ECOS2VP331DX             |
|                                            | 30 x 40            | 1.88                               | 2.63   | 0.502             | 0.176 | ECOS2VP331DA             |
|                                            | 35 x 30            | 1.88                               | 2.63   | 0.502             | 0.176 | ECOS2VP331EA             |
| 390                                        | 25 x 50            | 2.06                               | 2.88   | 0.425             | 0.149 | ECOS2VP391CX             |
|                                            | 30 x 40            | 2.06                               | 2.88   | 0.425             | 0.149 | ECOS2VP391DX             |
|                                            | 30 x 45            | 2.06                               | 2.88   | 0.468             | 0.164 | ECOS2VP391DA             |
|                                            | 35 x 30            | 2.06                               | 2.88   | 0.425             | 0.149 | ECOS2VP391EX             |
|                                            | 35 x 35            | 2.06                               | 2.88   | 0.425             | 0.149 | ECOS2VP391EA             |
| 470                                        | 30 x 50            | 2.40                               | 3.36   | 0.388             | 0.136 | ECOS2VP471DA             |
|                                            | 35 x 35            | 2.40                               | 3.36   | 0.353             | 0.123 | ECOS2VP471EX             |
|                                            | 35 x 40            | 2.40                               | 3.36   | 0.353             | 0.123 | ECOS2VP471EA             |
| 560                                        | 30 x 50            | 2.60                               | 3.64   | 0.326             | 0.114 | ECOS2VP561DX             |
|                                            | 35 x 40            | 2.60                               | 3.64   | 0.296             | 0.104 | ECOS2VP561EX             |
|                                            | 35 x 45            | 2.60                               | 3.64   | 0.296             | 0.104 | ECOS2VP561EA             |
| 680                                        | 35 x 45            | 2.96                               | 4.14   | 0.293             | 0.117 | ECOS2VP681EX             |
|                                            | 35 x 50            | 2.96                               | 4.14   | 0.293             | 0.117 | ECOS2VP681EA             |
| 820                                        | 35 x 50            | 3.55                               | 4.97   | 0.243             | 0.097 | ECOS2VP821EX             |
| 385 VDC Working, 435 VDC Surge             |                    |                                    |        |                   |       |                          |
| 47                                         | 22 x 20            | 0.25                               | 0.35   | 4.233             | 1.481 | ECOS2TP470BL             |
| 68                                         | 22 x 25            | 0.76                               | 1.06   | 2.438             | 0.853 | ECOS2TP680BA             |
|                                            | 25 x 20            | 0.35                               | 0.49   | 2.926             | 1.024 | ECOS2TP680CL             |
| 82                                         | 22 x 25            | 0.83                               | 1.16   | 2.022             | 0.708 | ECOS2TP820BA             |
| 100                                        | 22 x 30            | 0.92                               | 1.29   | 1.658             | 0.580 | ECOS2TP101BA             |
|                                            | 25 x 25            | 0.92                               | 1.29   | 1.658             | 0.580 | ECOS2TP101CA             |
|                                            | 30 x 20            | 0.47                               | 0.66   | 1.989             | 0.696 | ECOS2TP101DL             |
| 120                                        | 22 x 35            | 1.02                               | 1.43   | 1.382             | 0.553 | ECOS2TP121BA             |
|                                            | 25 x 25            | 1.02                               | 1.43   | 1.382             | 0.553 | ECOS2TP121CX             |
|                                            | 25 x 30            | 1.02                               | 1.43   | 1.382             | 0.553 | ECOS2TP121CA             |
| 150                                        | 22 x 35            | 1.16                               | 1.62   | 1.105             | 0.442 | ECOS2TP151BX             |
|                                            | 22 x 40            | 1.16                               | 1.62   | 1.105             | 0.442 | ECOS2TP151BA             |
|                                            | 25 x 30            | 1.16                               | 1.62   | 1.105             | 0.442 | ECOS2TP151CA             |
|                                            | 30 x 25            | 1.16                               | 1.62   | 1.105             | 0.442 | ECOS2TP151DA             |
|                                            | 35 x 20            | 0.60                               | 0.84   | 1.326             | 0.531 | ECOS2TP151EL             |
| 180                                        | 22 x 40            | 1.44                               | 2.02   | 0.921             | 0.368 | ECOS2TP181BX             |
|                                            | 22 x 45            | 1.44                               | 2.02   | 0.921             | 0.368 | ECOS2TP181BA             |
|                                            | 25 x 30            | 1.44                               | 2.02   | 0.921             | 0.368 | ECOS2TP181CX             |
|                                            | 25 x 35            | 1.44                               | 2.02   | 0.921             | 0.368 | ECOS2TP181CA             |
|                                            | 30 x 25            | 1.44                               | 2.02   | 0.921             | 0.368 | ECOS2TP181DX             |
|                                            | 30 x 30            | 1.44                               | 2.02   | 0.921             | 0.368 | ECOS2TP181DA             |
| 220                                        | 22 x 45            | 1.49                               | 2.09   | 0.829             | 0.373 | ECOS2TP221BX             |
|                                            | 22 x 50            | 1.49                               | 2.09   | 0.829             | 0.373 | ECOS2TP221BA             |
|                                            | 25 x 40            | 1.49                               | 2.09   | 0.829             | 0.373 | ECOS2TP221CA             |
|                                            | 30 x 30            | 1.49                               | 2.09   | 0.829             | 0.373 | ECOS2TP221DA             |
| 270                                        | 25 x 45            | 1.67                               | 2.34   | 0.675             | 0.304 | ECOS2TP271CA             |
|                                            | 30 x 35            | 1.67                               | 2.34   | 0.675             | 0.304 | ECOS2TP271DA             |
|                                            | 35 x 25            | 1.67                               | 2.34   | 0.675             | 0.304 | ECOS2TP271EX             |
|                                            | 35 x 30            | 1.67                               | 2.34   | 0.675             | 0.304 | ECOS2TP271EA             |
| 330                                        | 25 x 50            | 1.90                               | 2.66   | 0.553             | 0.249 | ECOS2TP331CX             |
|                                            | 30 x 40            | 1.90                               | 2.66   | 0.553             | 0.249 | ECOS2TP331DA             |
|                                            | 35 x 30            | 1.90                               | 2.66   | 0.553             | 0.249 | ECOS2TP331EX             |
|                                            | 35 x 35            | 1.90                               | 2.66   | 0.553             | 0.249 | ECOS2TP331EA             |
| 390                                        | 30 x 45            | 2.13                               | 2.98   | 0.468             | 0.210 | ECOS2TP391DA             |
|                                            | 35 x 35            | 2.13                               | 2.98   | 0.468             | 0.210 | ECOS2TP391EX             |
|                                            | 35 x 40            | 2.13                               | 2.98   | 0.468             | 0.210 | ECOS2TP391EA             |
| 470                                        | 30 x 50            | 2.39                               | 3.35   | 0.388             | 0.175 | ECOS2TP471DA             |
|                                            | 35 x 40            | 2.39                               | 3.35   | 0.388             | 0.175 | ECOS2TP471EX             |
|                                            | 35 x 45            | 2.39                               | 3.35   | 0.388             | 0.175 | ECOS2TP471EA             |
| 560                                        | 35 x 45            | 2.69                               | 3.77   | 0.326             | 0.147 | ECOS2TP561EX             |
|                                            | 35 x 50            | 2.69                               | 3.77   | 0.326             | 0.147 | ECOS2TP561EA             |
| 680                                        | 35 x 50            | 3.00                               | 4.20   | 0.268             | 0.121 | ECOS2TP681EX             |
| 400 VDC Working, 450 VDC Surge             |                    |                                    |        |                   |       |                          |
| 47                                         | 22 x 20            | 0.25                               | 0.35   | 3.527             | 1.235 | ECOS2GP470BL             |
|                                            | 22 x 25            | 0.47                               | 0.66   | 3.527             | 1.235 | ECOS2GP470BA             |
| 68                                         | 22 x 25            | 0.69                               | 0.97   | 2.438             | 0.853 | ECOS2GP680BA             |
|                                            | 25 x 20            | 0.35                               | 0.49   | 2.926             | 1.024 | ECOS2GP680CL             |
| 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             |
|                                            | 25 x 25            | 0.92                               | 1.29   | 1.658             | 0.580 | ECOS2GP101CA             |
|                                            | 30 x 20            | 0.47                               | 0.66   | 1.989             | 0.696 | ECOS2GP101DL             |
| 120                                        | 22 x 35            | 1.02                               | 1.43   | 1.382             | 0.484 | ECOS2GP121BA             |
|                                            | 25 x 25            | 1.02                               | 1.43   | 1.382             | 0.484 | ECOS2GP121CX             |
|                                            | 25 x 30            | 1.02                               | 1.43   | 1.382             | 0.484 | ECOS2GP121CA             |
| 150                                        | 22 x 40            | 1.16                               | 1.62   | 1.105             | 0.387 | ECOS2GP151BA             |
|                                            | 25 x 30            | 1.16                               | 1.62   | 1.105             | 0.387 | ECOS2GP151CA             |
| 400 VDC Working, 450 VDC Surge (continued) |                    |                                    |        |                   |       |                          |
| 150                                        | 30 x 25            | 1.16                               | 1.62   | 1.105             | 0.387 | ECOS2GP151DA             |
|                                            | 35 x 20            | 0.60                               | 0.84   | 1.326             | 0.531 | ECOS2GP151EL             |
|                                            | 180                | 22 x 45                            | 1.44   | 2.02              | 0.921 | 0.368                    |
| 220                                        | 25 x 30            | 1.44                               | 2.02   | 0.921             | 0.368 | ECOS2GP181CX             |
|                                            | 25 x 35            | 1.44                               | 2.02   | 0.921             | 0.368 | ECOS2GP181CA             |
|                                            | 25 x 40            | 1.44                               | 2.02   | 0.921             | 0.368 | ECOS2GP181DA             |
| 270                                        | 25 x 45            | 1.67                               | 2.34   | 0.675             | 0.236 | ECOS2GP271CA             |
|                                            | 30 x 35            | 1.67                               | 2.34   | 0.675             | 0.236 | ECOS2GP271EX             |
|                                            | 35 x 30            | 1.67                               | 2.34   | 0.675             | 0.236 | ECOS2GP271EA             |
| 330                                        | 30 x 40            | 1.90                               | 2.66   | 0.553             | 0.193 | ECOS2GP331DA             |
|                                            | 35 x 30            | 1.90                               | 2.66   | 0.553             | 0.193 | ECOS2GP331EX             |
|                                            | 35 x 35            | 1.90                               | 2.66   | 0.553             | 0.193 | ECOS2GP331EA             |
| 390                                        | 30 x 45            | 2.13                               | 2.98   | 0.468             | 0.164 | ECOS2GP391DA             |
|                                            | 35 x 35            | 2.13                               | 2.98   | 0.468             | 0.164 | ECOS2GP391EX             |
|                                            | 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             |
|                                            | 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             |
|                                            | 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             |
| 420 VDC Working, 470 VDC Surge             |                    |                                    |        |                   |       |                          |
| 82                                         | 22 x 30            | 0.83                               | 1.16   | 2.426             | 0.849 | ECOS2SP820BA             |
| 100                                        | 22 x 30            | 0.92                               | 1.29   | 1.989             | 0.696 | ECOS2SP101BA             |
|                                            | 25 x 25            | 0.92                               | 1.29   | 1.989             | 0.696 | ECOS2SP101CA             |
| 120                                        | 22 x 35            | 1.02                               | 1.43   | 1.658             | 0.580 | ECOS2SP121BA             |
|                                            | 25 x 30            | 1.02                               | 1.43   | 1.658             | 0.580 | ECOS2SP121CA             |
| 150                                        | 22 x 40            | 1.16                               | 1.62   | 1.326             | 0.464 | ECOS2SP151BA             |
|                                            | 25 x 30            | 1.16                               | 1.62   | 1.326             | 0.464 | ECOS2SP151CA             |
|                                            | 30 x 25            | 1.16                               | 1.62   | 1.326             | 0.464 | ECOS2SP151DA             |
| 180                                        | 22 x 45            | 1.44                               | 2.02   | 1.105             | 0.387 | ECOS2SP181BA             |
|                                            | 25 x 35            | 1.44                               | 2.02   | 1.105             | 0.387 | ECOS2SP181CA             |
|                                            | 30 x 30            | 1.44                               | 2.02   | 1.105             | 0.387 | ECOS2SP181DA             |
| 220                                        | 25 x 45            | 1.49                               | 2.09   | 0.904             | 0.316 | ECOS2SP221CA             |
|                                            | 30 x 30            | 1.49                               | 2.09   | 0.904             | 0.316 | ECOS2SP221DA             |
|                                            | 35 x 25            | 1.49                               | 2.09   | 0.904             | 0.316 | ECOS2SP221EA             |
| 270                                        | 25 x 50            | 1.67                               | 2.34   | 0.737             | 0.258 | ECOS2SP271CA             |
|                                            | 30 x 35            | 1.67                               | 2.34   | 0.737             | 0.258 | ECOS2SP271DA             |
|                                            | 35 x 30            | 1.67                               | 2.34   | 0.737             | 0.258 | ECOS2SP271EA             |
| 330                                        | 30 x 45            | 1.90                               | 2.66   | 0.603             | 0.211 | ECOS2SP331DA             |
|                                            | 35 x 35            | 1.90                               | 2.66   | 0.603             | 0.211 | ECOS2SP331EA             |
| 390                                        | 30 x 50            | 2.13                               | 2.98   | 0.510             | 0.179 | ECOS2SP391DA             |
|                                            | 35 x 40            | 2.13                               | 2.98   | 0.510             | 0.179 | ECOS2SP391EA             |
| 470                                        | 35 x 45            | 2.39                               | 3.35   | 0.423             | 0.148 | ECOS2SP471EA             |
| 560                                        | 35 x 50            | 2.69                               | 3.77   | 0.355             | 0.124 | ECOS2SP561EA             |
| 450 VDC Working, 500 VDC Surge             |                    |                                    |        |                   |       |                          |
| 33                                         | 22 x 20            | 0.20                               | 0.28   | 6.028             | 2.411 | ECOS2WP330BL             |
|                                            | 22 x 25            | 0.41                               | 0.57   | 6.028             | 2.411 | ECOS2WP330BA             |
| 47                                         | 22 x 25            | 0.59                               | 0.83   | 4.233             | 1.693 | ECOS2WP470BA             |
|                                            | 25 x 20            | 0.29                               | 0.41   | 4.233             | 1.693 | ECOS2WP470CL             |
| 56                                         | 22 x 25            | 0.70                               | 0.98   | 2.960             | 1.184 | ECOS2WP560BA             |
| 68                                         | 30 x 20            | 0.38                               | 0.53   | 2.926             | 1.170 | ECOS2WP680DL             |
| 82                                         | 22 x 30            | 0.83                               | 1.16   | 2.022             | 0.809 | ECOS2WP820BA             |
|                                            | 25 x 25            | 0.83                               | 1.16   | 2.022             | 0.809 | ECOS2WP820CA             |
| 100                                        | 22 x 35            | 0.93                               | 1.30   | 1.658             | 0.663 | ECOS2WP101BA             |
|                                            | 35 x 20            | 0.52                               | 0.73   | 1.989             | 0.796 | ECOS2WP101EL             |
| 120                                        | 22 x 40            | 1.04                               | 1.46   | 1.382             | 0.553 | ECOS2WP121BA             |
|                                            | 25 x 30            | 1.04                               | 1.46   | 1.382             | 0.553 | ECOS2WP121CA             |
|                                            | 30 x 25            | 1.04                               | 1.46   | 1.382             | 0.553 | ECOS2WP121DA             |
| 150                                        | 22 x 50            | 1.19                               | 1.67   | 1.105             | 0.442 | ECOS2WP151BA             |
|                                            | 25 x 40            | 1.19                               | 1.67   | 1.105             | 0.442 | ECOS2WP151CA             |
|                                            | 30 x 30            | 1.19                               | 1.67   | 1.105             | 0.442 | ECOS2WP151DA             |
| 180                                        | 25 x 40            | 1.35                               | 1.89   | 0.921             | 0.368 | ECOS2WP181CX             |
|                                            | 25 x 45            | 1.35                               | 1.89   | 0.921             | 0.368 | ECOS2WP181CA             |
|                                            | 30 x 30            | 1.35                               | 1.89   | 0.921             | 0.368 | ECOS2WP181DX             |
|                                            | 30 x 35            | 1.35                               | 1.89   | 0.921             | 0.368 | ECOS2WP181DA             |
|                                            | 35 x 25            | 1.35                               | 1.89   | 0.921             | 0.368 | ECOS2WP181EA             |
| 220                                        | 25 x 45            | 1.55                               | 2.17   | 0.754             | 0.301 | ECOS2WP221CX             |
|                                            | 25 x 50            | 1.55                               | 2.17   | 0.754             | 0.301 | ECOS2WP221CA             |
|                                            | 30 x 35            | 1.55                               | 2.17   | 0.754             | 0.301 | ECOS2WP221DX             |
|                                            | 30 x 40            | 1.55                               | 2.17   | 0.754             | 0.301 | ECOS2WP221DA             |
|                                            | 35 x 30            | 1.55                               | 2.17   | 0.754             | 0.301 | ECOS2WP221EA             |
| 270                                        | 30 x 45            | 1.78                               | 2.49   | 0.675             | 0.270 | ECOS2WP271DA             |
|                                            | 35 x 30            | 1.78                               | 2.49   | 0.614             | 0.246 | ECOS2WP271EX             |

## TS-UP Standard Ratings (continued)

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