

# Large Can Aluminum Electrolytic Capacitors

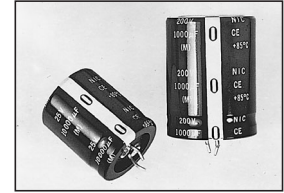
NRLRW Series

## FEATURES

- EXPANDED VALUE RANGE
- LONG LIFE AT +105°C (3,000 HOURS)
- HIGH RIPPLE CURRENT
- LOW PROFILE, HIGH DENSITY DESIGN
- SUITABLE FOR SWITCHING POWER SUPPLIES

**RoHS Compliant**  
includes all homogeneous materials

\*See Part Number System for Details



## SPECIFICATIONS

|                                                                                                                                   |                       |              |                                           |      |      |      |      |              |      |      |         |         |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------|-------------------------------------------|------|------|------|------|--------------|------|------|---------|---------|
| Operating Temperature Range                                                                                                       |                       |              | -40 ~ +105°C                              |      |      |      |      | -25 ~ +105°C |      |      |         |         |
| Rated Voltage Range                                                                                                               |                       |              | 10 ~ 100Vdc                               |      |      |      |      | 160 ~ 450Vdc |      |      |         |         |
| Rated Capacitance Range                                                                                                           |                       |              | 560 ~ 56,000μF                            |      |      |      |      | 47 ~ 2,700μF |      |      |         |         |
| Capacitance Tolerance                                                                                                             |                       |              | ±20% (M)                                  |      |      |      |      |              |      |      |         |         |
| Max. Leakage Current (μA)<br>After 5 minutes (20°C)                                                                               |                       |              | $3 \times \sqrt{C(\mu F)V}$               |      |      |      |      |              |      |      |         |         |
| Max. Tan δ<br>at 120Hz/20°C                                                                                                       | W.V. (Vdc)            |              | 10                                        | 16   | 25   | 35   | 50   | 63           | 80   | 100  | 160~400 | 420~450 |
|                                                                                                                                   | Tan δ max.            |              | 0.55                                      | 0.50 | 0.45 | 0.40 | 0.35 | 0.30         | 0.25 | 0.20 | 0.15    | 0.20    |
| Surge Voltage                                                                                                                     | W.V. (Vdc)            |              | 10                                        | 16   | 25   | 35   | 50   | 63           | 80   | 100  | 160     | 180     |
|                                                                                                                                   | S.V. (Vdc)            |              | 13                                        | 20   | 32   | 44   | 63   | 79           | 100  | 125  | 200     | 220     |
|                                                                                                                                   | W.V. (Vdc)            |              | 200                                       | 220  | 250  | 315  | 350  | 385          | 400  | 420  | 450     | -       |
|                                                                                                                                   | S.V. (Vdc)            |              | 250                                       | 270  | 300  | 365  | 400  | 435          | 450  | 470  | 500     | -       |
| Ripple Current<br>Correction Factors                                                                                              | Frequency (Hz)        |              | 50<br>(60)                                | 120  | 500  | 1K   | 10K≥ | -            | -    | -    | -       | -       |
|                                                                                                                                   | Multiplier<br>at 85°C | 10 ~ 100Vdc  | 0.90                                      | 1.00 | 1.05 | 1.10 | 1.15 | -            | -    | -    | -       | -       |
|                                                                                                                                   |                       | 160 ~ 250Vdc | 0.80                                      | 1.00 | 1.20 | 1.30 | 1.50 | -            | -    | -    | -       | -       |
|                                                                                                                                   |                       | 315 ~ 450Vdc | 0.80                                      | 1.00 | 1.20 | 1.25 | 1.40 | -            | -    | -    | -       | -       |
| Low Temperature<br>Stability (10 to 250Vdc)                                                                                       | Temperature (°C)      |              | 0                                         | -25  | -40  | -    | -    | -            | -    | -    | -       | -       |
|                                                                                                                                   | Capacitance Change    |              | -5%                                       | -15% | -30% | -    | -    | -            | -    | -    | -       | -       |
|                                                                                                                                   | Impedance Ratio       |              | 1.5                                       | 3    | 12   | -    | -    | -            | -    | -    | -       | -       |
| Load Life Test<br>3,000 hours at +105°C                                                                                           | Capacitance Change    |              | Within ±20% of initial measured value     |      |      |      |      |              |      |      |         |         |
|                                                                                                                                   | Tan δ                 |              | Less than 200% of specified maximum value |      |      |      |      |              |      |      |         |         |
|                                                                                                                                   | Leakage Current       |              | Less than specified maximum value         |      |      |      |      |              |      |      |         |         |
| Shelf Life Test<br>1,000 hours at +105°C<br>(no load)                                                                             | Capacitance Change    |              | Within ±20% of initial measured value     |      |      |      |      |              |      |      |         |         |
|                                                                                                                                   | Tan δ                 |              | Less than 200% of specified maximum value |      |      |      |      |              |      |      |         |         |
|                                                                                                                                   | Leakage Current       |              | Less than specified maximum value         |      |      |      |      |              |      |      |         |         |
| Surge Voltage Test<br>Per JIS-C-5141 (table #6, #4)<br>Surge voltage applied: 30 seconds<br>"On" and 5.5 minutes no voltage "Off" | Capacitance Change    |              | Within ±20% of initial measured value     |      |      |      |      |              |      |      |         |         |
|                                                                                                                                   | Tan δ                 |              | Less than 200% of specified maximum value |      |      |      |      |              |      |      |         |         |
|                                                                                                                                   | Leakage Current       |              | Less than specified maximum value         |      |      |      |      |              |      |      |         |         |
| Soldering Effect<br>Refer to<br>JISC5102.8.5                                                                                      | Capacitance Change    |              | Within ±10% of initial measured value     |      |      |      |      |              |      |      |         |         |
|                                                                                                                                   | Tan δ                 |              | Less than specified maximum value         |      |      |      |      |              |      |      |         |         |
|                                                                                                                                   | Leakage Current       |              | Less than specified maximum value         |      |      |      |      |              |      |      |         |         |

## MECHANICAL CHARACTERISTICS:

### 1. Safety Vent:

The capacitors are provided with a pressure sensitive safety vent on the top of can which is normally covered by a PVC patch for the purpose of insulation. The vent is designed to rupture in the event that high internal gas pressure is developed by circuit malfunction or mis-use like reverse voltage.

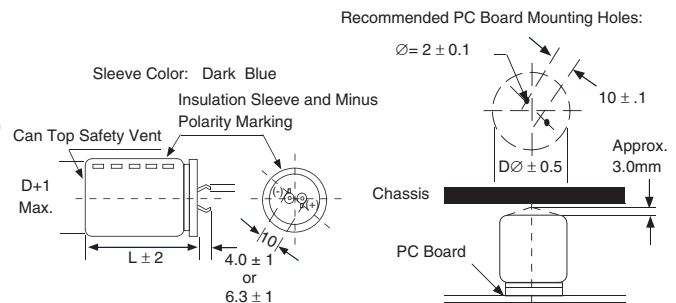
### 2. Terminal Strength:

Each terminal of the capacitor shall withstand an axial pull force of 4.5Kg for a period 10 seconds or a radial bent force of 2.5Kg for a period of 30 seconds.

## PART NUMBER SYSTEM

NRLRW 682 M 16V 20X25 S F

Series    Capacitance Code    Tolerance Code    Voltage Rating    Case Size (mm)    Lead Length (S=4mm, L=6mm)    Pb-free/RoHS compliant



## PRECAUTIONS

Please review the notes on correct use, safety and precautions found on pages T10 & T11 of NIC's Electrolytic Capacitor catalog.  
Also found at [www.niccomp.com/precautions](http://www.niccomp.com/precautions)  
If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: [tpmg@niccomp.com](mailto:tpmg@niccomp.com)

### Notice for Mounting

The space from the top of the can shall be more than (3mm) from chassis or other construction materials so that safety vent has room to expand in case of emergency.



## STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc) | Cap.<br>(μF) | Case Size<br>DxL (mm) | ESR (Ω@20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|---------------|--------------|-----------------------|--------------|-------|---------------------------------------|-------------|
|               |              |                       | 120Hz        | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 10            | 6,800        | 20x25                 | 0.135        | 0.104 | 1.31                                  | 1.50        |
|               | 8,299        | 20x30                 | 0.112        | 0.086 | 1.59                                  | 1.82        |
|               | 10,000       | 20x30                 | 0.092        | 0.071 | 1.88                                  | 2.16        |
|               |              | 22x25                 | 0.092        | 0.071 | 1.77                                  | 2.03        |
|               | 12,000       | 20x35                 | 0.076        | 0.059 | 2.18                                  | 2.50        |
|               |              | 22x30                 | 0.076        | 0.059 | 2.10                                  | 2.41        |
|               |              | 25x25                 | 0.076        | 0.059 | 1.94                                  | 2.23        |
|               | 15,000       | 20x40                 | 0.061        | 0.047 | 2.27                                  | 2.61        |
|               |              | 22x35                 | 0.061        | 0.047 | 2.23                                  | 2.56        |
|               |              | 25x30                 | 0.061        | 0.047 | 2.10                                  | 2.41        |
|               | 18,000       | 22x40                 | 0.051        | 0.039 | 2.41                                  | 2.77        |
|               |              | 25x30                 | 0.051        | 0.039 | 2.34                                  | 2.69        |
|               |              | 30x25                 | 0.051        | 0.039 | 2.25                                  | 2.58        |
|               | 22,000       | 22x45                 | 0.042        | 0.032 | 2.58                                  | 2.96        |
|               |              | 25x35                 | 0.042        | 0.032 | 2.54                                  | 2.92        |
|               |              | 30x30                 | 0.042        | 0.032 | 2.50                                  | 2.87        |
|               | 27,000       | 22x50                 | 0.034        | 0.026 | 3.17                                  | 3.64        |
|               |              | 25x40                 | 0.034        | 0.026 | 3.07                                  | 3.53        |
|               |              | 30x30                 | 0.034        | 0.026 | 2.95                                  | 3.39        |
|               | 33,000       | 25x45                 | 0.028        | 0.022 | 3.39                                  | 3.89        |
|               |              | 30x35                 | 0.028        | 0.022 | 3.33                                  | 3.82        |
|               |              | 35x30                 | 0.028        | 0.022 | 3.21                                  | 3.69        |
| 16            | 6,800        | 20x25                 | 0.122        | 0.094 | 1.80                                  | 2.07        |
|               |              | 20x30                 | 0.102        | 0.078 | 2.08                                  | 2.39        |
|               | 8,200        | 22x25                 | 0.102        | 0.078 | 2.08                                  | 2.39        |
|               |              | 20x35                 | 0.083        | 0.064 | 2.15                                  | 2.47        |
|               | 10,000       | 22x30                 | 0.083        | 0.064 | 2.15                                  | 2.47        |
|               |              | 20x40                 | 0.070        | 0.054 | 2.31                                  | 2.65        |
|               | 12,000       | 22x30                 | 0.070        | 0.054 | 2.31                                  | 2.65        |
|               |              | 25x25                 | 0.070        | 0.054 | 2.31                                  | 2.65        |
|               |              | 22x35                 | 0.056        | 0.043 | 2.68                                  | 3.08        |
|               | 15,000       | 25x30                 | 0.056        | 0.043 | 2.68                                  | 3.08        |
|               |              | 22x40                 | 0.047        | 0.036 | 3.20                                  | 3.68        |
|               | 18,000       | 25x30                 | 0.047        | 0.036 | 3.20                                  | 3.68        |
|               |              | 30x25                 | 0.047        | 0.036 | 3.20                                  | 3.68        |
|               |              | 22x45                 | 0.038        | 0.029 | 3.36                                  | 3.86        |
|               | 22,000       | 25x35                 | 0.038        | 0.029 | 3.36                                  | 3.86        |
|               |              | 30x30                 | 0.038        | 0.029 | 3.36                                  | 3.86        |
|               |              | 22x50                 | 0.031        | 0.024 | 3.85                                  | 4.42        |
|               | 27,000       | 25x40                 | 0.031        | 0.024 | 3.85                                  | 4.42        |
|               |              | 30x30                 | 0.031        | 0.024 | 3.85                                  | 4.42        |
|               |              | 25x45                 | 0.026        | 0.020 | 4.30                                  | 4.94        |
|               | 33,000       | 30x35                 | 0.026        | 0.020 | 4.30                                  | 4.94        |
|               |              | 35x30                 | 0.026        | 0.020 | 4.30                                  | 4.94        |
|               | 39,000       | 25x50                 | 0.022        | 0.017 | 4.81                                  | 5.53        |
|               |              | 30x40                 | 0.022        | 0.017 | 4.81                                  | 5.53        |
|               |              | 35x35                 | 0.022        | 0.017 | 4.81                                  | 5.53        |
|               | 47,000       | 30x45                 | 0.018        | 0.014 | 5.53                                  | 6.35        |
|               |              | 35x40                 | 0.018        | 0.014 | 5.53                                  | 6.35        |
|               | 56,000       | 30x50                 | 0.015        | 0.012 | 6.00                                  | 6.90        |
|               |              | 35x45                 | 0.015        | 0.012 | 6.00                                  | 6.90        |
|               | 68,000       | 35x50                 | 0.013        | 0.010 | 6.40                                  | 7.36        |

### STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc) | Cap.<br>( $\mu$ F) | Case Size<br>DxL (mm) | ESR ( $\Omega$ @20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|---------------|--------------------|-----------------------|-----------------------|-------|---------------------------------------|-------------|
|               |                    |                       | 120Hz                 | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 25            | 4,700              | 20x25                 | 0.159                 | 0.123 | 1.65                                  | 1.89        |
|               | 5,600              | 20x30                 | 0.134                 | 0.103 | 1.85                                  | 2.12        |
|               |                    | 22x25                 | 0.134                 | 0.103 | 1.85                                  | 2.12        |
|               | 6,800              | 20x35                 | 0.110                 | 0.085 | 2.11                                  | 2.42        |
|               |                    | 22x30                 | 0.110                 | 0.085 | 2.11                                  | 2.42        |
|               | 8,200              | 20x40                 | 0.091                 | 0.070 | 2.34                                  | 2.69        |
|               |                    | 22x30                 | 0.091                 | 0.070 | 2.34                                  | 2.69        |
|               |                    | 25x25                 | 0.091                 | 0.070 | 2.34                                  | 2.69        |
|               | 10,000             | 22x35                 | 0.075                 | 0.058 | 2.65                                  | 3.04        |
|               |                    | 25x30                 | 0.075                 | 0.058 | 2.65                                  | 3.04        |
|               | 12,000             | 22x40                 | 0.063                 | 0.048 | 2.81                                  | 3.23        |
|               |                    | 25x30                 | 0.063                 | 0.048 | 2.81                                  | 3.23        |
|               |                    | 30x25                 | 0.063                 | 0.048 | 2.81                                  | 3.23        |
|               | 15,000             | 22x45                 | 0.050                 | 0.039 | 3.13                                  | 3.59        |
|               |                    | 25x35                 | 0.050                 | 0.039 | 3.13                                  | 3.59        |
|               |                    | 30x30                 | 0.050                 | 0.039 | 3.13                                  | 3.59        |
|               | 18,000             | 25x40                 | 0.042                 | 0.032 | 3.56                                  | 4.09        |
|               |                    | 30x30                 | 0.042                 | 0.032 | 3.56                                  | 4.09        |
|               | 22,000             | 25x50                 | 0.034                 | 0.027 | 4.04                                  | 4.64        |
|               |                    | 30x35                 | 0.034                 | 0.027 | 4.04                                  | 4.64        |
|               |                    | 35x30                 | 0.034                 | 0.027 | 4.04                                  | 4.64        |
|               | 27,000             | 30x40                 | 0.028                 | 0.022 | 4.74                                  | 5.45        |
|               |                    | 35x35                 | 0.028                 | 0.022 | 4.74                                  | 5.45        |
| 35            | 33,000             | 30x50                 | 0.023                 | 0.018 | 5.50                                  | 6.32        |
|               | 39,000             | 35x40                 | 0.023                 | 0.018 | 5.50                                  | 6.32        |
|               |                    | 35x45                 | 0.020                 | 0.015 | 5.80                                  | 6.67        |
|               | 47,000             | 35x50                 | 0.016                 | 0.013 | 6.30                                  | 7.24        |
|               | 2,700              | 20x25                 | 0.246                 | 0.189 | 1.29                                  | 1.48        |
|               | 3,300              | 20x30                 | 0.201                 | 0.155 | 1.57                                  | 1.80        |
|               | 3,900              | 20x30                 | 0.171                 | 0.131 | 1.78                                  | 2.04        |
|               |                    | 22x25                 | 0.171                 | 0.131 | 1.78                                  | 2.04        |
|               | 4,700              | 20x35                 | 0.142                 | 0.109 | 2.02                                  | 2.32        |
|               |                    | 22x30                 | 0.142                 | 0.109 | 2.02                                  | 2.32        |
|               | 5,600              | 20x40                 | 0.119                 | 0.092 | 2.13                                  | 2.44        |
|               |                    | 22x35                 | 0.119                 | 0.092 | 2.13                                  | 2.44        |
|               |                    | 25x25                 | 0.119                 | 0.092 | 2.13                                  | 2.44        |
|               | 6,800              | 22x40                 | 0.098                 | 0.076 | 2.41                                  | 2.77        |
|               |                    | 25x30                 | 0.098                 | 0.076 | 2.41                                  | 2.77        |
|               | 8,200              | 22x45                 | 0.081                 | 0.063 | 2.85                                  | 3.27        |
|               |                    | 25x35                 | 0.081                 | 0.063 | 2.85                                  | 3.27        |
|               |                    | 30x25                 | 0.081                 | 0.063 | 2.85                                  | 3.27        |
|               | 10,000             | 22x50                 | 0.067                 | 0.052 | 3.05                                  | 3.50        |
|               |                    | 25x40                 | 0.067                 | 0.052 | 3.05                                  | 3.50        |
|               |                    | 30x30                 | 0.067                 | 0.052 | 3.05                                  | 3.50        |
|               | 12,000             | 25x45                 | 0.056                 | 0.043 | 3.37                                  | 3.87        |
|               |                    | 30x35                 | 0.056                 | 0.043 | 3.37                                  | 3.87        |
|               |                    | 35x30                 | 0.056                 | 0.043 | 3.37                                  | 3.87        |
|               | 15,000             | 25x50                 | 0.045                 | 0.035 | 3.72                                  | 4.27        |
|               |                    | 30x40                 | 0.045                 | 0.035 | 3.72                                  | 4.27        |
|               |                    | 35x35                 | 0.045                 | 0.035 | 3.72                                  | 4.27        |
|               | 18,000             | 30x45                 | 0.037                 | 0.029 | 4.37                                  | 5.02        |
|               |                    | 35x35                 | 0.037                 | 0.029 | 4.37                                  | 5.02        |
|               | 22,000             | 30x50                 | 0.031                 | 0.024 | 4.92                                  | 5.65        |
|               |                    | 35x40                 | 0.031                 | 0.024 | 4.92                                  | 5.65        |
|               | 27,000             | 35x50                 | 0.025                 | 0.019 | 5.30                                  | 6.09        |

## STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc) | Cap.<br>( $\mu$ F) | Case Size<br>DxL (mm) | ESR ( $\Omega$ @20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|---------------|--------------------|-----------------------|-----------------------|-------|---------------------------------------|-------------|
|               |                    |                       | 120Hz                 | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 50            | 1,800              | 20x25                 | 0.323                 | 0.248 | 1.39                                  | 1.59        |
|               |                    | 20x30                 | 0.264                 | 0.203 | 1.60                                  | 1.84        |
|               | 2,200              | 22x25                 | 0.264                 | 0.203 | 1.60                                  | 1.84        |
|               |                    | 20x35                 | 0.215                 | 0.166 | 1.73                                  | 1.98        |
|               | 2,700              | 22x30                 | 0.215                 | 0.166 | 1.73                                  | 1.98        |
|               |                    | 25x25                 | 0.215                 | 0.166 | 1.73                                  | 1.98        |
|               |                    | 20x40                 | 0.176                 | 0.136 | 1.97                                  | 2.26        |
|               | 3,300              | 22x35                 | 0.176                 | 0.136 | 1.97                                  | 2.26        |
|               |                    | 25x30                 | 0.176                 | 0.136 | 1.97                                  | 2.26        |
|               |                    | 22x40                 | 0.149                 | 0.115 | 2.22                                  | 2.55        |
|               | 3,900              | 25x30                 | 0.149                 | 0.115 | 2.22                                  | 2.55        |
|               |                    | 22x45                 | 0.124                 | 0.095 | 2.43                                  | 2.79        |
|               | 4,700              | 25x35                 | 0.124                 | 0.095 | 2.43                                  | 2.79        |
|               |                    | 30x25                 | 0.124                 | 0.095 | 2.43                                  | 2.79        |
|               |                    | 22x50                 | 0.104                 | 0.080 | 2.75                                  | 3.16        |
|               | 5,600              | 25x40                 | 0.104                 | 0.080 | 2.75                                  | 3.16        |
|               |                    | 30x30                 | 0.104                 | 0.080 | 2.75                                  | 3.16        |
|               |                    | 25x45                 | 0.086                 | 0.066 | 3.30                                  | 3.79        |
|               | 6,800              | 30x35                 | 0.086                 | 0.066 | 3.30                                  | 3.79        |
|               |                    | 25x50                 | 0.071                 | 0.055 | 3.60                                  | 4.14        |
|               | 8,200              | 30x40                 | 0.071                 | 0.055 | 3.60                                  | 4.14        |
|               |                    | 35x30                 | 0.071                 | 0.055 | 3.60                                  | 4.14        |
| 63            | 1,200              | 20x25                 | 0.415                 | 0.319 | 1.20                                  | 1.38        |
|               |                    | 20x30                 | 0.332                 | 0.256 | 1.47                                  | 1.69        |
|               | 1,500              | 22x25                 | 0.332                 | 0.256 | 1.47                                  | 1.69        |
|               |                    | 20x35                 | 0.277                 | 0.213 | 1.58                                  | 1.81        |
|               | 1,800              | 22x30                 | 0.277                 | 0.213 | 1.58                                  | 1.81        |
|               |                    | 20x40                 | 0.227                 | 0.174 | 1.82                                  | 2.09        |
|               |                    | 22x35                 | 0.227                 | 0.174 | 1.82                                  | 2.09        |
|               | 2,200              | 25x25                 | 0.227                 | 0.174 | 1.82                                  | 2.09        |
|               |                    | 22x35                 | 0.185                 | 0.142 | 2.11                                  | 2.42        |
|               |                    | 25x30                 | 0.185                 | 0.142 | 2.11                                  | 2.42        |
|               | 2,700              | 22x45                 | 0.151                 | 0.116 | 2.33                                  | 2.67        |
|               |                    | 25x35                 | 0.151                 | 0.116 | 2.33                                  | 2.67        |
|               |                    | 30x25                 | 0.151                 | 0.116 | 2.33                                  | 2.67        |
|               | 3,300              | 22x50                 | 0.128                 | 0.099 | 2.55                                  | 2.93        |
|               |                    | 25x40                 | 0.128                 | 0.099 | 2.55                                  | 2.93        |
|               |                    | 30x30                 | 0.128                 | 0.099 | 2.55                                  | 2.93        |
|               | 3,900              | 25x45                 | 0.106                 | 0.082 | 2.97                                  | 3.41        |
|               |                    | 30x35                 | 0.106                 | 0.082 | 2.97                                  | 3.41        |
|               |                    | 25x50                 | 0.089                 | 0.069 | 3.22                                  | 3.70        |
|               | 4,700              | 30x35                 | 0.089                 | 0.069 | 3.22                                  | 3.70        |
|               |                    | 35x30                 | 0.089                 | 0.069 | 3.22                                  | 3.70        |
|               |                    | 30x40                 | 0.074                 | 0.057 | 3.65                                  | 4.19        |
|               | 5,600              | 35x35                 | 0.074                 | 0.057 | 3.65                                  | 4.19        |
|               |                    | 30x50                 | 0.061                 | 0.047 | 4.04                                  | 4.64        |
|               |                    | 35x40                 | 0.061                 | 0.047 | 4.04                                  | 4.64        |
|               | 8,200              | 35x45                 | 0.050                 | 0.039 | 4.48                                  | 5.15        |
|               |                    | 35x50                 | 0.042                 | 0.032 | 4.75                                  | 5.46        |

## STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc) | Cap.<br>( $\mu$ F) | Case Size<br>DxL (mm) | ESR ( $\Omega$ @20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|---------------|--------------------|-----------------------|-----------------------|-------|---------------------------------------|-------------|
|               |                    |                       | 120Hz                 | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 80            | 820                | 20x25                 | 0.506                 | 0.389 | 1.04                                  | 1.19        |
|               | 1,000              | 20x30                 | 0.415                 | 0.319 | 1.24                                  | 1.42        |
|               |                    | 22x25                 | 0.415                 | 0.319 | 1.24                                  | 1.42        |
|               | 1,200              | 20x35                 | 0.346                 | 0.266 | 1.44                                  | 1.65        |
|               |                    | 22x30                 | 0.346                 | 0.266 | 1.44                                  | 1.65        |
|               | 1,500              | 20x35                 | 0.277                 | 0.213 | 1.59                                  | 1.82        |
|               |                    | 22x30                 | 0.277                 | 0.213 | 1.59                                  | 1.82        |
|               |                    | 25x25                 | 0.277                 | 0.213 | 1.59                                  | 1.82        |
|               | 1,800              | 20x40                 | 0.231                 | 0.178 | 1.79                                  | 2.05        |
|               |                    | 22x35                 | 0.231                 | 0.178 | 1.79                                  | 2.05        |
|               |                    | 25x30                 | 0.231                 | 0.178 | 1.79                                  | 2.05        |
|               | 2,200              | 22x40                 | 0.189                 | 0.145 | 2.03                                  | 2.33        |
|               |                    | 25x30                 | 0.189                 | 0.145 | 2.03                                  | 2.33        |
|               |                    | 30x25                 | 0.189                 | 0.145 | 2.03                                  | 2.33        |
|               | 2,700              | 22x45                 | 0.154                 | 0.119 | 2.39                                  | 2.74        |
|               |                    | 25x35                 | 0.154                 | 0.119 | 2.39                                  | 2.74        |
|               |                    | 30x30                 | 0.154                 | 0.119 | 2.39                                  | 2.74        |
|               | 3,300              | 25x40                 | 0.126                 | 0.097 | 2.64                                  | 3.03        |
|               |                    | 30x35                 | 0.126                 | 0.097 | 2.64                                  | 3.03        |
|               |                    | 25x50                 | 0.107                 | 0.082 | 2.97                                  | 3.41        |
|               | 3,900              | 30x35                 | 0.107                 | 0.082 | 2.97                                  | 3.41        |
|               |                    | 35x30                 | 0.107                 | 0.082 | 2.97                                  | 3.41        |
| 100           | 4,700              | 30x40                 | 0.089                 | 0.068 | 3.38                                  | 3.88        |
|               |                    | 35x35                 | 0.089                 | 0.068 | 3.38                                  | 3.88        |
|               | 5,600              | 30x45                 | 0.075                 | 0.057 | 3.8                                   | 4.37        |
|               |                    | 35x40                 | 0.075                 | 0.057 | 3.8                                   | 4.37        |
|               | 6,800              | 35x45                 | 0.061                 | 0.047 | 4.1                                   | 4.71        |
|               | 8,200              | 35x50                 | 0.051                 | 0.039 | 4.3                                   | 4.94        |
|               | 560                | 20x25                 | 0.593                 | 0.456 | 0.95                                  | 1.09        |
|               | 680                | 20x30                 | 0.488                 | 0.376 | 1.15                                  | 1.32        |
|               |                    | 22x25                 | 0.488                 | 0.376 | 1.15                                  | 1.32        |
|               | 820                | 20x35                 | 0.405                 | 0.312 | 1.32                                  | 1.51        |
|               |                    | 22x30                 | 0.405                 | 0.312 | 1.32                                  | 1.51        |
|               | 1,000              | 20x35                 | 0.332                 | 0.256 | 1.47                                  | 1.69        |
|               |                    | 22x30                 | 0.332                 | 0.256 | 1.47                                  | 1.69        |
|               |                    | 25x25                 | 0.332                 | 0.256 | 1.47                                  | 1.69        |
|               | 1,200              | 20x40                 | 0.277                 | 0.213 | 1.69                                  | 1.94        |
|               |                    | 22x35                 | 0.277                 | 0.213 | 1.69                                  | 1.94        |
|               |                    | 25x30                 | 0.277                 | 0.213 | 1.69                                  | 1.94        |
|               | 1,500              | 22x40                 | 0.222                 | 0.171 | 1.98                                  | 2.27        |
|               |                    | 25x35                 | 0.222                 | 0.171 | 1.98                                  | 2.27        |
|               |                    | 30x25                 | 0.222                 | 0.171 | 1.98                                  | 2.27        |
|               | 1,800              | 22x45                 | 0.185                 | 0.142 | 2.23                                  | 2.56        |
|               |                    | 25x35                 | 0.185                 | 0.142 | 2.23                                  | 2.56        |
|               |                    | 30x30                 | 0.185                 | 0.142 | 2.23                                  | 2.56        |
|               | 2,200              | 25x45                 | 0.151                 | 0.116 | 2.55                                  | 2.93        |
|               |                    | 30x35                 | 0.151                 | 0.116 | 2.55                                  | 2.93        |
|               |                    | 35x30                 | 0.151                 | 0.116 | 2.55                                  | 2.93        |
|               | 2,700              | 25x50                 | 0.123                 | 0.095 | 2.89                                  | 3.32        |
|               |                    | 30x40                 | 0.123                 | 0.095 | 2.89                                  | 3.32        |
|               |                    | 35x30                 | 0.123                 | 0.095 | 2.89                                  | 3.32        |
|               | 3,300              | 30x45                 | 0.101                 | 0.078 | 3.3                                   | 3.79        |
|               |                    | 35x35                 | 0.101                 | 0.078 | 3.3                                   | 3.79        |
|               | 3,900              | 30x50                 | 0.086                 | 0.066 | 3.67                                  | 4.22        |
|               |                    | 35x40                 | 0.086                 | 0.066 | 3.67                                  | 4.22        |
|               | 4,700              | 35x45                 | 0.071                 | 0.055 | 3.8                                   | 4.37        |
|               | 5,600              | 35x50                 | 0.06                  | 0.046 | 4.05                                  | 4.65        |

### STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc)                 | Cap.<br>(μF) | Case Size<br>DxL (mm) | ESR (Ω @20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|-------------------------------|--------------|-----------------------|---------------|-------|---------------------------------------|-------------|
|                               |              |                       | 120Hz         | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 160                           | 270          | 20x25                 | 0.922         | 0.709 | 1.10                                  | 1.65        |
|                               | 330          | 20x30                 | 0.754         | 0.580 | 1.20                                  | 1.80        |
|                               |              | 22x25                 | 0.754         | 0.580 | 1.21                                  | 1.81        |
|                               | 390          | 20x30                 | 0.638         | 0.491 | 1.24                                  | 1.86        |
|                               |              | 22x25                 | 0.638         | 0.491 | 1.30                                  | 1.95        |
|                               | 470          | 20x35                 | 0.53          | 0.408 | 1.42                                  | 2.13        |
|                               |              | 22x30                 | 0.53          | 0.408 | 1.41                                  | 2.11        |
|                               | 560          | 20x40                 | 0.445         | 0.342 | 1.57                                  | 2.35        |
|                               |              | 22x35                 | 0.445         | 0.342 | 1.54                                  | 2.31        |
|                               |              | 25x25                 | 0.445         | 0.342 | 1.51                                  | 2.26        |
|                               | 680          | 20x45                 | 0.366         | 0.282 | 1.70                                  | 2.55        |
|                               |              | 22x40                 | 0.366         | 0.282 | 1.74                                  | 2.61        |
|                               |              | 25x30                 | 0.366         | 0.282 | 1.74                                  | 2.61        |
|                               |              | 30x25                 | 0.366         | 0.282 | 1.74                                  | 2.61        |
|                               | 820          | 22x45                 | 0.304         | 0.234 | 2.00                                  | 3.00        |
|                               |              | 25x35                 | 0.304         | 0.234 | 2.00                                  | 3.00        |
|                               |              | 30x30                 | 0.304         | 0.234 | 2.00                                  | 3.00        |
|                               | 1,000        | 22x50                 | 0.249         | 0.192 | 2.25                                  | 3.37        |
|                               |              | 25x40                 | 0.249         | 0.192 | 2.25                                  | 3.37        |
|                               |              | 30x30                 | 0.249         | 0.192 | 2.25                                  | 3.37        |
|                               |              | 35x25                 | 0.249         | 0.192 | 2.25                                  | 3.37        |
|                               | 1,200        | 25x45                 | 0.208         | 0.160 | 2.49                                  | 3.73        |
|                               |              | 30x35                 | 0.208         | 0.160 | 2.49                                  | 3.73        |
|                               |              | 35x30                 | 0.208         | 0.160 | 2.45                                  | 3.67        |
|                               | 1,500        | 30x40                 | 0.166         | 0.128 | 2.84                                  | 4.26        |
|                               |              | 35x30                 | 0.166         | 0.128 | 2.68                                  | 4.02        |
| 1,800                         | 30x45        | 0.139                 | 0.107         | 3.32  | 4.98                                  |             |
|                               | 35x35        | 0.139                 | 0.107         | 3.00  | 4.50                                  |             |
| 2,200                         | 35x45        | 0.114                 | 0.087         | 3.50  | 5.25                                  |             |
| 2,700                         | 35x50        | 0.093                 | 0.071         | 4.00  | 6.00                                  |             |
| 180                           | 270          | 20x25                 | 0.922         | 0.709 | 0.93                                  | 1.39        |
|                               | 330          | 20x30                 | 0.754         | 0.580 | 1.20                                  | 1.80        |
|                               |              | 22x25                 | 0.754         | 0.580 | 1.20                                  | 1.80        |
|                               | 390          | 20x35                 | 0.638         | 0.491 | 1.30                                  | 1.95        |
|                               |              | 22x30                 | 0.638         | 0.491 | 1.35                                  | 2.02        |
|                               | 470          | 20x40                 | 0.530         | 0.408 | 1.40                                  | 2.10        |
|                               |              | 22x35                 | 0.530         | 0.408 | 1.42                                  | 2.13        |
|                               |              | 25x25                 | 0.530         | 0.408 | 1.38                                  | 2.07        |
|                               | 560          | 20x45                 | 0.445         | 0.342 | 1.55                                  | 2.32        |
|                               |              | 22x40                 | 0.445         | 0.342 | 1.60                                  | 2.40        |
|                               |              | 25x30                 | 0.445         | 0.342 | 1.55                                  | 2.32        |
|                               | 680          | 22x45                 | 0.366         | 0.282 | 1.78                                  | 2.67        |
|                               |              | 25x35                 | 0.366         | 0.282 | 1.78                                  | 2.67        |
|                               |              | 30x25                 | 0.366         | 0.282 | 1.55                                  | 2.32        |
|                               | 820          | 22x50                 | 0.304         | 0.234 | 2.00                                  | 3.00        |
|                               |              | 25x40                 | 0.304         | 0.234 | 2.00                                  | 3.00        |
|                               |              | 30x30                 | 0.304         | 0.234 | 2.00                                  | 3.00        |
|                               |              | 35x25                 | 0.304         | 0.234 | 2.00                                  | 3.00        |
|                               | 1,000        | 25x45                 | 0.249         | 0.192 | 2.25                                  | 3.37        |
|                               |              | 30x35                 | 0.249         | 0.192 | 2.25                                  | 3.37        |
|                               |              | 35x30                 | 0.249         | 0.192 | 2.26                                  | 3.39        |
|                               | 1,200        | 25x50                 | 0.208         | 0.160 | 2.54                                  | 3.81        |
|                               |              | 30x40                 | 0.208         | 0.160 | 2.52                                  | 3.78        |
|                               |              | 35x30                 | 0.208         | 0.160 | 2.60                                  | 3.90        |
|                               | 1,500        | 30x45                 | 0.166         | 0.128 | 2.90                                  | 4.35        |
|                               |              | 35x35                 | 0.166         | 0.128 | 2.95                                  | 4.42        |
| 180Vdc continued on next page |              |                       |               |       |                                       |             |

## STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc)                 | Cap.<br>(μF) | Case Size<br>DxL (mm) | ESR (Ω @20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|-------------------------------|--------------|-----------------------|---------------|-------|---------------------------------------|-------------|
|                               |              |                       | 120Hz         | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 180                           | 1,800        | 30x50                 | 0.139         | 0.107 | 3.00                                  | 4.50        |
|                               |              | 35x40                 | 0.139         | 0.107 | 3.30                                  | 4.95        |
|                               | 2,200        | 35x50                 | 0.114         | 0.087 | 3.65                                  | 5.47        |
| 200                           | 220          | 20x25                 | 1.131         | 0.870 | 1.00                                  | 1.50        |
|                               | 270          | 20x30                 | 0.922         | 0.709 | 1.10                                  | 1.65        |
|                               |              | 22x25                 | 0.922         | 0.709 | 1.10                                  | 1.65        |
|                               | 330          | 20x30                 | 0.754         | 0.580 | 1.15                                  | 1.72        |
|                               |              | 22x30                 | 0.754         | 0.580 | 1.25                                  | 1.87        |
|                               | 390          | 20x35                 | 0.638         | 0.491 | 1.25                                  | 1.87        |
|                               |              | 22x30                 | 0.638         | 0.491 | 1.31                                  | 1.96        |
|                               |              | 25x25                 | 0.638         | 0.491 | 1.31                                  | 1.96        |
|                               | 470          | 20x40                 | 0.530         | 0.408 | 1.42                                  | 2.13        |
|                               |              | 22x35                 | 0.530         | 0.408 | 1.45                                  | 2.17        |
|                               |              | 25x30                 | 0.530         | 0.408 | 1.45                                  | 2.17        |
|                               | 560          | 22x40                 | 0.445         | 0.342 | 1.60                                  | 2.40        |
|                               |              | 25x30                 | 0.445         | 0.342 | 1.60                                  | 2.40        |
|                               |              | 30x25                 | 0.445         | 0.342 | 1.60                                  | 2.40        |
|                               | 680          | 22x45                 | 0.366         | 0.282 | 1.75                                  | 2.62        |
|                               |              | 25x35                 | 0.366         | 0.282 | 1.78                                  | 2.67        |
|                               |              | 30x30                 | 0.366         | 0.282 | 1.78                                  | 2.67        |
|                               | 820          | 22x50                 | 0.304         | 0.234 | 1.95                                  | 2.92        |
|                               |              | 25x40                 | 0.304         | 0.234 | 1.95                                  | 2.92        |
|                               |              | 30x30                 | 0.304         | 0.234 | 2.00                                  | 3.00        |
|                               | 1,000        | 25x45                 | 0.249         | 0.192 | 2.10                                  | 3.15        |
|                               |              | 30x35                 | 0.249         | 0.192 | 2.30                                  | 3.45        |
|                               |              | 35x30                 | 0.249         | 0.192 | 2.30                                  | 3.45        |
|                               | 1,200        | 30x40                 | 0.208         | 0.160 | 2.64                                  | 3.96        |
|                               |              | 35x35                 | 0.208         | 0.160 | 2.65                                  | 3.97        |
|                               | 1,500        | 30x50                 | 0.166         | 0.128 | 3.08                                  | 4.62        |
|                               |              | 35x40                 | 0.166         | 0.128 | 3.08                                  | 4.62        |
|                               | 1,800        | 35x45                 | 0.139         | 0.107 | 3.48                                  | 5.22        |
|                               | 2,200        | 35x50                 | 0.114         | 0.087 | 3.55                                  | 5.32        |
| 220                           | 180          | 20x25                 | 1.382         | 1.063 | 0.86                                  | 1.29        |
|                               | 220          | 20x30                 | 1.131         | 0.870 | 1.04                                  | 1.56        |
|                               |              | 22x25                 | 1.131         | 0.870 | 0.99                                  | 1.48        |
|                               | 270          | 20x30                 | 0.922         | 0.709 | 1.08                                  | 1.62        |
|                               |              | 22x25                 | 0.922         | 0.709 | 1.04                                  | 1.56        |
|                               | 330          | 20x35                 | 0.754         | 0.580 | 1.30                                  | 1.95        |
|                               |              | 22x30                 | 0.754         | 0.580 | 1.32                                  | 1.98        |
|                               |              | 25x25                 | 0.754         | 0.580 | 1.26                                  | 1.89        |
|                               | 390          | 20x40                 | 0.638         | 0.491 | 1.45                                  | 2.17        |
|                               |              | 22x35                 | 0.638         | 0.491 | 1.42                                  | 2.13        |
|                               |              | 25x30                 | 0.638         | 0.491 | 1.45                                  | 2.17        |
|                               | 470          | 20x45                 | 0.530         | 0.408 | 1.63                                  | 2.44        |
|                               |              | 22x40                 | 0.530         | 0.408 | 1.67                                  | 2.50        |
|                               |              | 25x30                 | 0.530         | 0.408 | 1.54                                  | 2.31        |
|                               |              | 30x25                 | 0.530         | 0.408 | 1.48                                  | 2.22        |
|                               | 560          | 22x45                 | 0.445         | 0.342 | 1.77                                  | 2.65        |
|                               |              | 25x35                 | 0.445         | 0.342 | 1.66                                  | 2.49        |
|                               |              | 30x30                 | 0.445         | 0.342 | 1.65                                  | 2.47        |
|                               | 680          | 25x40                 | 0.366         | 0.282 | 1.87                                  | 2.80        |
|                               |              | 30x30                 | 0.366         | 0.282 | 1.82                                  | 2.73        |
|                               |              | 35x25                 | 0.366         | 0.282 | 1.78                                  | 2.67        |
|                               | 820          | 25x45                 | 0.304         | 0.234 | 2.04                                  | 3.06        |
|                               |              | 30x35                 | 0.304         | 0.234 | 2.00                                  | 3.00        |
|                               |              | 35x30                 | 0.304         | 0.234 | 1.93                                  | 2.89        |
| 220Vdc continued on next page |              |                       |               |       |                                       |             |



## STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc) | Cap.<br>( $\mu$ F) | Case Size<br>DxL (mm) | ESR ( $\Omega$ @ 20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|---------------|--------------------|-----------------------|------------------------|-------|---------------------------------------|-------------|
|               |                    |                       | 120Hz                  | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 220           | 1,000              | 30x40                 | 0.249                  | 0.192 | 2.48                                  | 3.72        |
|               |                    | 35x35                 | 0.249                  | 0.192 | 2.33                                  | 3.49        |
|               | 1,200              | 30x45                 | 0.208                  | 0.16  | 2.88                                  | 4.32        |
|               |                    | 35x40                 | 0.208                  | 0.16  | 2.65                                  | 3.97        |
|               | 1,500              | 35x45                 | 0.166                  | 0.128 | 2.96                                  | 4.44        |
| 250           | 220                | 20x30                 | 1.131                  | 0.870 | 1.00                                  | 1.50        |
|               |                    | 22x25                 | 1.131                  | 0.870 | 1.00                                  | 1.50        |
|               | 270                | 20x35                 | 0.922                  | 0.709 | 1.10                                  | 1.65        |
|               |                    | 22x30                 | 0.922                  | 0.709 | 1.15                                  | 1.72        |
|               | 330                | 20x40                 | 0.754                  | 0.580 | 1.20                                  | 1.80        |
|               |                    | 22x35                 | 0.754                  | 0.580 | 1.28                                  | 1.92        |
|               | 390                | 20x45                 | 0.638                  | 0.491 | 1.35                                  | 2.02        |
|               |                    | 22x40                 | 0.638                  | 0.491 | 1.49                                  | 2.23        |
|               |                    | 25x30                 | 0.638                  | 0.491 | 1.35                                  | 2.02        |
|               |                    | 30x25                 | 0.638                  | 0.491 | 1.49                                  | 2.23        |
|               | 470                | 22x45                 | 0.530                  | 0.408 | 1.60                                  | 2.40        |
|               |                    | 25x35                 | 0.530                  | 0.408 | 1.57                                  | 2.35        |
|               |                    | 30x30                 | 0.530                  | 0.408 | 1.65                                  | 2.47        |
|               | 560                | 22x50                 | 0.445                  | 0.342 | 1.72                                  | 2.58        |
|               |                    | 25x40                 | 0.445                  | 0.342 | 1.80                                  | 2.70        |
|               |                    | 30x30                 | 0.445                  | 0.342 | 1.80                                  | 2.70        |
|               | 680                | 25x45                 | 0.366                  | 0.282 | 1.85                                  | 2.77        |
|               |                    | 30x35                 | 0.366                  | 0.282 | 2.00                                  | 3.00        |
|               |                    | 35x30                 | 0.366                  | 0.282 | 2.00                                  | 3.00        |
|               | 820                | 25x50                 | 0.304                  | 0.234 | 2.10                                  | 3.15        |
|               |                    | 30x40                 | 0.304                  | 0.234 | 2.18                                  | 3.27        |
|               |                    | 35x35                 | 0.304                  | 0.234 | 2.30                                  | 3.45        |
|               | 1,000              | 30x45                 | 0.249                  | 0.192 | 2.40                                  | 3.60        |
|               |                    | 35x35                 | 0.249                  | 0.192 | 2.35                                  | 3.52        |
|               | 1,200              | 35x40                 | 0.208                  | 0.160 | 2.50                                  | 3.75        |
|               | 1,500              | 35x50                 | 0.166                  | 0.128 | 3.00                                  | 4.50        |
| 315           | 82                 | 20x25                 | 3.033                  | 2.333 | 0.64                                  | 0.89        |
|               | 100                | 20x30                 | 2.487                  | 1.913 | 0.69                                  | 0.96        |
|               |                    | 22x25                 | 2.487                  | 1.913 | 0.62                                  | 0.86        |
|               | 120                | 20x30                 | 2.073                  | 1.595 | 0.75                                  | 1.05        |
|               |                    | 22x25                 | 2.073                  | 1.595 | 0.75                                  | 1.05        |
|               |                    | 25x25                 | 2.073                  | 1.595 | 0.76                                  | 1.06        |
|               | 150                | 20x35                 | 1.658                  | 1.276 | 0.82                                  | 1.14        |
|               |                    | 22x30                 | 1.658                  | 1.276 | 0.82                                  | 1.14        |
|               |                    | 25x25                 | 1.658                  | 1.276 | 0.82                                  | 1.14        |
|               | 180                | 20x40                 | 1.382                  | 1.063 | 0.90                                  | 1.26        |
|               |                    | 22x35                 | 1.382                  | 1.063 | 0.92                                  | 1.28        |
|               |                    | 25x25                 | 1.382                  | 1.063 | 0.90                                  | 1.26        |
|               | 220                | 20x50                 | 1.131                  | 0.870 | 1.00                                  | 1.40        |
|               |                    | 22x40                 | 1.131                  | 0.870 | 1.04                                  | 1.45        |
|               |                    | 25x30                 | 1.131                  | 0.870 | 1.04                                  | 1.45        |
|               |                    | 30x25                 | 1.131                  | 0.870 | 1.04                                  | 1.45        |
|               | 270                | 22x45                 | 0.922                  | 0.709 | 1.16                                  | 1.62        |
|               |                    | 25x35                 | 0.922                  | 0.709 | 1.15                                  | 1.61        |
|               |                    | 30x25                 | 0.922                  | 0.709 | 1.15                                  | 1.61        |
|               |                    | 35x25                 | 0.922                  | 0.709 | 1.15                                  | 1.61        |
|               | 330                | 22x50                 | 0.754                  | 0.580 | 1.22                                  | 1.70        |
|               |                    | 25x40                 | 0.754                  | 0.580 | 1.23                                  | 1.72        |
|               |                    | 30x30                 | 0.754                  | 0.580 | 1.33                                  | 1.86        |
|               |                    | 35x25                 | 0.754                  | 0.580 | 1.32                                  | 1.84        |

315Vdc continued on next page



## STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc) | Cap.<br>( $\mu$ F) | Case Size<br>DxL (mm) | ESR ( $\Omega$ @20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|---------------|--------------------|-----------------------|-----------------------|-------|---------------------------------------|-------------|
|               |                    |                       | 120Hz                 | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 315           | 390                | 25x45                 | 0.638                 | 0.491 | 1.40                                  | 1.96        |
|               |                    | 30x35                 | 0.638                 | 0.491 | 1.47                                  | 2.05        |
|               |                    | 35x30                 | 0.638                 | 0.491 | 1.47                                  | 2.05        |
|               | 470                | 30x40                 | 0.530                 | 0.408 | 1.70                                  | 2.38        |
|               |                    | 35x30                 | 0.530                 | 0.408 | 1.70                                  | 2.38        |
|               | 560                | 30x45                 | 0.445                 | 0.342 | 2.05                                  | 2.87        |
|               |                    | 35x35                 | 0.445                 | 0.342 | 1.90                                  | 2.66        |
|               | 680                | 30x50                 | 0.366                 | 0.282 | 2.14                                  | 2.99        |
|               |                    | 35x40                 | 0.366                 | 0.282 | 2.17                                  | 3.03        |
| 350           | 820                | 35x45                 | 0.304                 | 0.234 | 2.20                                  | 3.08        |
|               | 68                 | 20x25                 | 3.658                 | 2.814 | 0.47                                  | 0.65        |
|               | 82                 | 20x30                 | 3.033                 | 2.333 | 0.55                                  | 0.77        |
|               | 100                | 20x30                 | 2.487                 | 1.913 | 0.60                                  | 0.84        |
|               |                    | 22x25                 | 2.487                 | 1.913 | 0.69                                  | 0.96        |
|               | 120                | 20x35                 | 2.073                 | 1.595 | 0.70                                  | 0.98        |
|               |                    | 22x30                 | 2.073                 | 1.595 | 0.75                                  | 1.05        |
|               |                    | 25x25                 | 2.073                 | 1.595 | 0.75                                  | 1.05        |
|               | 150                | 20x40                 | 1.658                 | 1.276 | 0.78                                  | 1.09        |
|               |                    | 22x35                 | 1.658                 | 1.276 | 0.82                                  | 1.14        |
|               |                    | 25x30                 | 1.658                 | 1.276 | 0.83                                  | 1.16        |
|               | 180                | 20x45                 | 1.382                 | 1.063 | 0.88                                  | 1.23        |
|               |                    | 22x40                 | 1.382                 | 1.063 | 0.92                                  | 1.28        |
|               |                    | 25x30                 | 1.382                 | 1.063 | 0.92                                  | 1.28        |
|               |                    | 30x25                 | 1.382                 | 1.063 | 0.92                                  | 1.28        |
|               | 220                | 22x45                 | 1.131                 | 0.870 | 1.05                                  | 1.47        |
|               |                    | 25x35                 | 1.131                 | 0.870 | 1.05                                  | 1.47        |
|               |                    | 30x30                 | 1.131                 | 0.870 | 1.02                                  | 1.42        |
|               | 270                | 22x50                 | 0.922                 | 0.709 | 1.18                                  | 1.65        |
|               |                    | 25x40                 | 0.922                 | 0.709 | 1.18                                  | 1.65        |
|               |                    | 30x30                 | 0.922                 | 0.709 | 1.18                                  | 1.65        |
|               |                    | 35x25                 | 0.922                 | 0.709 | 1.20                                  | 1.68        |
|               | 330                | 25x45                 | 0.754                 | 0.580 | 1.30                                  | 1.82        |
|               |                    | 30x35                 | 0.754                 | 0.580 | 1.35                                  | 1.89        |
|               |                    | 35x30                 | 0.754                 | 0.580 | 1.22                                  | 1.70        |
|               | 390                | 25x50                 | 0.638                 | 0.491 | 1.45                                  | 2.03        |
|               |                    | 30x40                 | 0.638                 | 0.491 | 1.52                                  | 2.12        |
|               |                    | 35x35                 | 0.638                 | 0.491 | 1.48                                  | 2.07        |
|               | 470                | 30x45                 | 0.530                 | 0.408 | 1.65                                  | 2.31        |
|               |                    | 35x35                 | 0.530                 | 0.408 | 1.70                                  | 2.38        |
|               | 560                | 30x50                 | 0.445                 | 0.342 | 1.85                                  | 2.59        |
|               |                    | 35x40                 | 0.445                 | 0.342 | 1.90                                  | 2.66        |
|               | 680                | 35x45                 | 0.366                 | 0.282 | 2.00                                  | 2.80        |
| 385           | 56                 | 20x25                 | 4.441                 | 3.416 | 0.42                                  | 0.58        |
|               | 68                 | 20x30                 | 3.658                 | 2.814 | 0.47                                  | 0.65        |
|               |                    | 22x25                 | 3.658                 | 2.814 | 0.49                                  | 0.68        |
|               | 82                 | 20x30                 | 3.033                 | 2.333 | 0.52                                  | 0.72        |
|               |                    | 22x25                 | 3.033                 | 2.333 | 0.55                                  | 0.77        |
|               | 100                | 20x35                 | 2.487                 | 1.913 | 0.60                                  | 0.84        |
|               |                    | 22x30                 | 2.487                 | 1.913 | 0.66                                  | 0.92        |
|               |                    | 25x25                 | 2.487                 | 1.913 | 0.66                                  | 0.92        |
|               | 120                | 20x40                 | 2.073                 | 1.595 | 0.68                                  | 0.95        |
|               |                    | 22x35                 | 2.073                 | 1.595 | 0.71                                  | 0.99        |
|               |                    | 25x25                 | 2.073                 | 1.595 | 0.71                                  | 0.99        |
|               | 150                | 22x40                 | 1.658                 | 1.276 | 0.83                                  | 1.16        |
|               |                    | 25x30                 | 1.658                 | 1.276 | 0.83                                  | 1.16        |
|               |                    | 30x25                 | 1.658                 | 1.276 | 0.77                                  | 1.07        |

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### STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc) | Cap.<br>( $\mu$ F) | Case Size<br>DxL (mm) | ESR ( $\Omega$ @ 20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|---------------|--------------------|-----------------------|------------------------|-------|---------------------------------------|-------------|
|               |                    |                       | 120Hz                  | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 385           | 180                | 22x45                 | 1.382                  | 1.063 | 0.92                                  | 1.28        |
|               |                    | 25x35                 | 1.382                  | 1.063 | 0.92                                  | 1.28        |
|               |                    | 30x30                 | 1.382                  | 1.063 | 0.89                                  | 1.24        |
|               | 220                | 22x50                 | 1.131                  | 0.870 | 1.03                                  | 1.44        |
|               |                    | 25x40                 | 1.131                  | 0.870 | 1.03                                  | 1.44        |
|               |                    | 30x30                 | 1.131                  | 0.870 | 1.01                                  | 1.41        |
|               |                    | 35x25                 | 1.131                  | 0.870 | 1.03                                  | 1.44        |
|               | 270                | 25x45                 | 0.922                  | 0.709 | 1.14                                  | 1.59        |
|               |                    | 30x35                 | 0.922                  | 0.709 | 1.15                                  | 1.61        |
|               |                    | 35x30                 | 0.922                  | 0.709 | 1.13                                  | 1.58        |
|               | 330                | 30x40                 | 0.754                  | 0.580 | 1.32                                  | 1.84        |
|               |                    | 35x30                 | 0.754                  | 0.580 | 1.35                                  | 1.89        |
|               | 390                | 30x45                 | 0.638                  | 0.491 | 1.46                                  | 2.04        |
|               |                    | 35x35                 | 0.638                  | 0.491 | 1.50                                  | 2.10        |
|               | 470                | 30x50                 | 0.530                  | 0.408 | 1.72                                  | 2.40        |
|               |                    | 35x40                 | 0.530                  | 0.408 | 1.79                                  | 2.50        |
|               | 560                | 35x45                 | 0.445                  | 0.342 | 1.99                                  | 2.78        |
| 400           | 56                 | 20x25                 | 4.441                  | 3.416 | 0.51                                  | 0.71        |
|               | 68                 | 20x30                 | 3.658                  | 2.814 | 0.56                                  | 0.78        |
|               |                    | 22x25                 | 3.658                  | 2.814 | 0.52                                  | 0.72        |
|               | 82                 | 20x30                 | 3.033                  | 2.333 | 0.64                                  | 0.89        |
|               |                    | 22x25                 | 3.033                  | 2.333 | 0.64                                  | 0.89        |
|               | 100                | 20x35                 | 2.487                  | 1.913 | 0.70                                  | 0.98        |
|               |                    | 22x30                 | 2.487                  | 1.913 | 0.70                                  | 0.98        |
|               |                    | 25x25                 | 2.487                  | 1.913 | 0.70                                  | 0.98        |
|               | 120                | 20x40                 | 2.073                  | 1.595 | 0.75                                  | 1.05        |
|               |                    | 22x35                 | 2.073                  | 1.595 | 0.75                                  | 1.05        |
|               |                    | 25x25                 | 2.073                  | 1.595 | 0.75                                  | 1.05        |
|               | 150                | 20x45                 | 1.658                  | 1.276 | 0.83                                  | 1.16        |
|               |                    | 22x40                 | 1.658                  | 1.276 | 0.88                                  | 1.23        |
|               |                    | 25x30                 | 1.658                  | 1.276 | 0.88                                  | 1.23        |
|               |                    | 30x25                 | 1.658                  | 1.276 | 0.82                                  | 1.14        |
|               | 180                | 22x45                 | 1.382                  | 1.063 | 0.98                                  | 1.37        |
|               |                    | 25x35                 | 1.382                  | 1.063 | 0.98                                  | 1.37        |
|               |                    | 30x30                 | 1.382                  | 1.063 | 0.95                                  | 1.33        |
|               | 220                | 22x50                 | 1.131                  | 0.870 | 1.10                                  | 1.54        |
|               |                    | 25x40                 | 1.131                  | 0.870 | 1.10                                  | 1.54        |
|               |                    | 30x30                 | 1.131                  | 0.870 | 1.10                                  | 1.54        |
|               |                    | 35x25                 | 1.131                  | 0.870 | 1.10                                  | 1.54        |
|               | 270                | 25x45                 | 0.922                  | 0.709 | 1.21                                  | 1.69        |
|               |                    | 30x35                 | 0.922                  | 0.709 | 1.22                                  | 1.70        |
|               |                    | 35x30                 | 0.922                  | 0.709 | 1.22                                  | 1.70        |
|               | 330                | 30x40                 | 0.754                  | 0.580 | 1.44                                  | 2.01        |
|               |                    | 35x30                 | 0.754                  | 0.580 | 1.44                                  | 2.01        |
|               | 390                | 30x45                 | 0.638                  | 0.491 | 1.55                                  | 2.17        |
|               |                    | 35x35                 | 0.638                  | 0.491 | 1.60                                  | 2.24        |
|               | 470                | 35x40                 | 0.530                  | 0.408 | 1.90                                  | 2.66        |
|               | 560                | 35x45                 | 0.445                  | 0.342 | 2.12                                  | 2.96        |
| 420           | 56                 | 20x25                 | 5.921                  | 4.555 | 0.44                                  | 0.61        |
|               | 68                 | 20x30                 | 4.877                  | 3.751 | 0.49                                  | 0.68        |
|               |                    | 22x25                 | 4.877                  | 3.751 | 0.51                                  | 0.71        |
|               | 82                 | 20x35                 | 4.044                  | 3.111 | 0.54                                  | 0.75        |
|               |                    | 22x30                 | 4.044                  | 3.111 | 0.65                                  | 0.91        |
|               |                    | 25x25                 | 4.044                  | 3.111 | 0.65                                  | 0.91        |

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### STANDARD PRODUCT LIST, CASE SIZE AND SPECIFICATIONS

| W.V.<br>(Vdc) | Cap.<br>(μF) | Case Size<br>DxL (mm) | ESR (Ω @ 20°C) |       | Max. Ripple Current<br>(Arms @ 105°C) |             |
|---------------|--------------|-----------------------|----------------|-------|---------------------------------------|-------------|
|               |              |                       | 120Hz          | 20KHz | 120Hz                                 | 10K ~ 50KHz |
| 420           | 100          | 20x35                 | 3.316          | 2.551 | 0.61                                  | 0.85        |
|               |              | 22x30                 | 3.316          | 2.551 | 0.68                                  | 0.95        |
|               |              | 25x25                 | 3.316          | 2.551 | 0.67                                  | 0.93        |
|               | 120          | 20x40                 | 2.764          | 2.126 | 0.70                                  | 0.98        |
|               |              | 22x35                 | 2.764          | 2.126 | 0.73                                  | 1.02        |
|               |              | 25x30                 | 2.764          | 2.126 | 0.76                                  | 1.06        |
|               |              | 30x25                 | 2.764          | 2.126 | 0.81                                  | 1.13        |
|               | 150          | 20x45                 | 2.211          | 1.701 | 0.78                                  | 1.09        |
|               |              | 22x40                 | 2.211          | 1.701 | 0.86                                  | 1.20        |
|               |              | 25x35                 | 2.211          | 1.701 | 0.87                                  | 1.21        |
|               |              | 30x25                 | 2.211          | 1.701 | 0.84                                  | 1.17        |
|               | 180          | 22x45                 | 1.843          | 1.417 | 0.96                                  | 1.34        |
|               |              | 25x35                 | 1.843          | 1.417 | 0.95                                  | 1.33        |
|               |              | 30x30                 | 1.843          | 1.417 | 0.97                                  | 1.35        |
|               |              | 35x25                 | 1.843          | 1.417 | 0.91                                  | 1.27        |
|               | 220          | 25x40                 | 1.508          | 1.160 | 1.08                                  | 1.51        |
|               |              | 30x35                 | 1.508          | 1.160 | 1.14                                  | 1.59        |
|               |              | 35x30                 | 1.508          | 1.160 | 1.07                                  | 1.49        |
|               | 270          | 25x50                 | 1.229          | 0.945 | 1.38                                  | 1.93        |
|               |              | 30x35                 | 1.229          | 0.945 | 1.20                                  | 1.68        |
|               |              | 35x35                 | 1.229          | 0.945 | 1.29                                  | 1.80        |
|               | 330          | 30x40                 | 1.005          | 0.773 | 1.37                                  | 1.91        |
|               |              | 35x35                 | 1.005          | 0.773 | 1.44                                  | 2.01        |
|               | 390          | 30x45                 | 0.851          | 0.654 | 1.50                                  | 2.10        |
|               |              | 35x40                 | 0.851          | 0.654 | 1.63                                  | 2.28        |
|               | 470          | 35x45                 | 0.706          | 0.543 | 1.88                                  | 2.63        |
| 450           | 47           | 20x25                 | 7.055          | 5.427 | 0.39                                  | 0.54        |
|               | 56           | 20x30                 | 5.921          | 4.555 | 0.51                                  | 0.71        |
|               |              | 22x25                 | 5.921          | 4.555 | 0.44                                  | 0.61        |
|               | 68           | 20x35                 | 4.877          | 3.751 | 0.56                                  | 0.78        |
|               |              | 22x30                 | 4.877          | 3.751 | 0.53                                  | 0.74        |
|               | 82           | 20x35                 | 4.044          | 3.111 | 0.64                                  | 0.89        |
|               |              | 22x30                 | 4.044          | 3.111 | 0.64                                  | 0.89        |
|               |              | 25x25                 | 4.044          | 3.111 | 0.64                                  | 0.89        |
|               | 100          | 20x45                 | 3.316          | 2.551 | 0.69                                  | 0.96        |
|               |              | 22x35                 | 3.316          | 2.551 | 0.69                                  | 0.96        |
|               |              | 25x30                 | 3.316          | 2.551 | 0.69                                  | 0.96        |
|               |              | 30x25                 | 3.316          | 2.551 | 0.69                                  | 0.96        |
|               | 120          | 20x50                 | 2.764          | 2.126 | 0.75                                  | 1.05        |
|               |              | 22x40                 | 2.764          | 2.126 | 0.75                                  | 1.05        |
|               |              | 25x30                 | 2.764          | 2.126 | 0.75                                  | 1.05        |
|               |              | 30x25                 | 2.764          | 2.126 | 0.80                                  | 1.12        |
|               | 150          | 22x45                 | 2.211          | 1.701 | 0.88                                  | 1.23        |
|               |              | 25x35                 | 2.211          | 1.701 | 0.88                                  | 1.23        |
|               |              | 30x30                 | 2.211          | 1.701 | 0.88                                  | 1.23        |
|               |              | 35x25                 | 2.211          | 1.701 | 0.75                                  | 1.05        |
|               | 180          | 25x40                 | 1.843          | 1.417 | 0.95                                  | 1.33        |
|               |              | 30x30                 | 1.843          | 1.417 | 1.00                                  | 1.40        |
|               |              | 35x30                 | 1.843          | 1.417 | 0.86                                  | 1.20        |
|               | 220          | 25x45                 | 1.508          | 1.160 | 1.10                                  | 1.54        |
|               |              | 30x35                 | 1.508          | 1.160 | 1.12                                  | 1.56        |
|               |              | 35x30                 | 1.508          | 1.160 | 1.05                                  | 1.47        |
|               | 270          | 30x40                 | 1.229          | 0.945 | 1.28                                  | 1.79        |
|               |              | 35x35                 | 1.229          | 0.945 | 1.27                                  | 1.77        |
|               | 330          | 30x50                 | 1.005          | 0.773 | 1.45                                  | 2.03        |
|               |              | 35x40                 | 1.005          | 0.773 | 1.45                                  | 2.03        |
|               | 390          | 35x40                 | 0.851          | 0.654 | 1.65                                  | 2.31        |
|               | 470          | 35x50                 | 0.706          | 0.543 | 1.85                                  | 2.59        |