

# Wet Tantalum Capacitors Sintered Anode TANTALEX® Capacitors for Operation to +125 °C, Elastomer-Sealed



## FEATURES

- Axial through-hole terminations: standard tin / lead (SnPb), 100 % tin (RoHS-compliant) available
- Vishay Sprague model 109D tubular elastomer-sealed, sintered anode TANTALEX® capacitors fill the basic requirements for applications where a superior quality, reliable design for industrial, automotive and telecommunications application is desired.
- Model 109D capacitors are the commercial equivalents of Tansitor style WC, UWC, Mallory-NACC style TLS, TLH and the military style CL64 and CL65, designed to meet the performance requirements of military specification MIL-DTL-3965.
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS\***  
Available

HALOGEN

**FREE**

**GREEN**

(5-2008)

Available

## Note

\* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

## PERFORMANCE CHARACTERISTICS

**Operating Temperature:** -55 °C to +85 °C  
(to +125 °C with voltage derating)

**Capacitance Tolerance:** at 120 Hz, +25 °C.  
± 20 % standard. ± 10 %, ± 5 % available as special.

**DC Leakage Current (DCL max.):**  
at +25 °C, +85 °C, +125 °C: leakage current shall not exceed the values listed in the Standard Ratings tables.

**Life Test:** capacitors are capable of withstanding a 2000 h life test at a temperature of +85 °C or +125 °C at the applicable DC working voltage.

Following the life test:

1. DCL shall not exceed the initial requirements or 1 µA, whichever is greater.
2. The ESR shall meet the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement. For capacitors with voltage ratings of 15 V<sub>DC</sub> and below, change in capacitance shall not exceed + 10 %, - 25 % from the initial measurement.

| ORDERING INFORMATION |                                                                                                                               |                                                        |                                                                                                                                                       |                                  |                                                                   |                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| 109D                 | 207                                                                                                                           | X0                                                     | 006                                                                                                                                                   | C                                | 0                                                                 | E3                                                                                        |
| MODEL                | CAPACITANCE                                                                                                                   | CAPACITANCE TOLERANCE                                  | DC VOLTAGE RATING AT +85 °C                                                                                                                           | CASE CODE                        | STYLE NUMBER                                                      | RoHS-COMPLIANT                                                                            |
|                      | This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow | X0 = ± 20 %<br>X9 = ± 10 %<br>X5 = ± 5 % special order | This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V) | See Ratings and Case Codes table | 0 = no outer sleeve Standard<br>2 = outer plastic film insulation | E3 = 100 % tin termination (RoHS-compliant)<br>Blank = SnPb termination (standard design) |

## Note

- Packaging: the use of formed plastic trays for packaging these axial lead components is standard. Tape and reel is not available due to the unit weight.

**DIMENSIONS** in inches [millimeters]


| CASE CODE        | BARE TUBE                   |                                                 | WITH PLASTIC-FILM INSULATING SLEEVE |               | LEAD LENGTH                  |
|------------------|-----------------------------|-------------------------------------------------|-------------------------------------|---------------|------------------------------|
|                  | D                           | L                                               | D Max.                              | L Max.        |                              |
| C                | 0.188 ± 0.016 [4.78 ± 0.41] | 0.453 + 0.031 / - 0.016 [11.51 + 0.79 / - 0.41] | 0.219 [5.56]                        | 0.608 [15.45] | 1.500 ± 0.250 [38.10 ± 6.35] |
| F                | 0.281 ± 0.016 [7.14 ± 0.41] | 0.641 + 0.031 / - 0.016 [16.28 + 0.79 / - 0.41] | 0.312 [7.92]                        | 0.796 [20.22] | 2.250 ± 0.250 [57.15 ± 6.35] |
| T                | 0.375 ± 0.016 [9.53 ± 0.41] | 0.766 + 0.031 / - 0.016 [19.46 + 0.79 / - 0.41] | 0.406 [10.31]                       | 0.921 [23.40] | 2.250 ± 0.250 [57.15 ± 6.35] |
| K <sup>(1)</sup> | 0.375 ± 0.016 [9.53 ± 0.41] | 1.062 + 0.031 / - 0.016 [26.97 + 0.79 / - 0.41] | 0.406 [10.31]                       | 1.217 [30.91] | 2.250 ± 0.250 [57.15 ± 6.35] |

**Note**
<sup>(1)</sup> Replaces previous W case

**RATINGS AND CASE CODES (Standard)**

| μF  | 6 V | 8 V | 10 V | 15 V | 20 V | 25 V | 30 V | 35 V | 50 V | 60 V | 75 V | 100 V | 125 V |
|-----|-----|-----|------|------|------|------|------|------|------|------|------|-------|-------|
| 1.7 |     |     |      |      |      |      |      |      |      |      |      |       | C     |
| 2.5 |     |     |      |      |      |      |      |      |      |      |      | C     |       |
| 3.0 |     |     |      |      |      |      |      |      |      |      |      | C     |       |
| 3.5 |     |     |      |      |      |      |      |      |      |      | C    |       |       |
| 3.6 |     |     |      |      |      |      |      |      |      |      |      |       | C     |
| 4.0 |     |     |      |      |      |      |      |      | C    |      |      |       |       |
| 4.5 |     |     |      |      |      |      |      |      | C    |      |      |       |       |
| 4.7 |     |     |      |      |      |      |      |      |      |      |      | C     |       |
| 5.0 |     |     |      |      |      |      |      |      | C    |      |      |       |       |
| 6.8 |     |     |      |      |      |      |      |      |      |      | C    |       |       |
| 7.0 |     |     |      |      |      |      | C    |      |      |      |      |       |       |
| 8.0 |     |     |      |      |      |      | C    |      |      |      |      |       |       |
| 8.2 |     |     |      |      |      |      |      |      |      | C    |      |       |       |
| 9.0 |     |     |      |      |      |      |      |      |      |      |      |       | F     |
| 10  |     |     |      |      |      | C    |      |      | C    |      |      | F     |       |
| 11  |     |     |      |      |      |      |      |      |      |      |      | F     |       |
| 13  |     |     |      |      |      |      |      |      |      |      | F    |       |       |
| 14  |     |     |      |      |      |      |      |      |      |      |      |       | F     |
| 15  |     |     |      | C    |      |      | C    |      |      |      | F    |       |       |
| 18  |     |     |      |      |      |      |      |      |      |      |      |       | T     |
| 20  |     |     | C    |      |      |      |      |      |      | F    |      |       |       |
| 22  |     | C   |      |      |      | C    |      |      | F    |      |      | F     |       |
| 25  |     | C   |      |      |      |      |      |      | F    |      |      |       | T     |
| 27  |     |     |      |      | C    | C    |      |      |      |      |      |       |       |
| 30  | C   |     |      |      |      |      |      |      |      |      |      | T     |       |
| 33  |     |     |      | C    |      |      |      |      |      |      | F    |       |       |
| 39  |     |     |      |      |      |      |      |      |      | F    |      |       |       |
| 40  |     |     |      |      |      |      | F    |      |      |      | T    |       |       |
| 43  |     |     |      |      |      |      |      |      |      |      |      | T     |       |
| 47  |     |     | C    |      |      |      |      |      | F    |      |      |       |       |
| 50  |     |     |      |      |      | F    |      |      |      | T    |      |       |       |
| 56  |     | C   |      |      |      |      |      |      |      |      | T    |       | K     |
| 60  |     |     |      |      |      |      |      |      | T    |      |      |       |       |



| RATINGS AND CASE CODES (Standard) |     |     |      |      |      |      |      |      |      |      |      |       |       |
|-----------------------------------|-----|-----|------|------|------|------|------|------|------|------|------|-------|-------|
| µF                                | 6 V | 8 V | 10 V | 15 V | 20 V | 25 V | 30 V | 35 V | 50 V | 60 V | 75 V | 100 V | 125 V |
| 68                                | C   |     |      |      |      |      | F    | F    |      | T    |      |       |       |
| 70                                |     |     |      | F    |      |      |      |      |      |      |      |       |       |
| 82                                |     |     |      |      |      |      |      |      | T    |      |      |       |       |
| 86                                |     |     |      |      |      |      |      |      |      |      |      | K     |       |
| 100                               |     |     | F    |      |      | F/T  | T    |      |      |      |      |       |       |
| 110                               |     |     |      |      |      |      |      |      |      |      | K    |       |       |
| 120                               |     |     |      | F    |      |      |      | T    |      |      |      |       |       |
| 140                               | F   |     |      |      |      |      |      |      |      | K    |      |       |       |
| 150                               |     |     |      |      |      |      | T    |      |      |      |      |       |       |
| 160                               |     |     |      |      |      |      |      |      | K    |      |      |       |       |
| 170                               |     |     |      | T    |      |      |      |      |      |      |      |       |       |
| 180                               |     |     | F    |      |      | T    |      |      |      |      |      |       |       |
| 220                               |     | F   |      |      | T    |      |      |      |      |      |      |       |       |
| 250                               |     |     | T    |      |      |      |      |      |      |      |      |       |       |
| 270                               | F   |     |      | T    |      |      |      | K    |      |      |      |       |       |
| 290                               | T   | T   |      |      |      |      |      |      |      |      |      |       |       |
| 300                               |     |     |      |      |      |      | K    |      |      |      |      |       |       |
| 330                               | T   |     |      |      |      |      |      |      |      |      |      |       |       |
| 350                               |     |     |      |      |      | K    |      |      |      |      |      |       |       |
| 390                               |     |     | T    |      |      |      |      |      |      |      |      |       |       |
| 430                               |     | T   |      |      |      |      |      |      |      |      |      |       |       |
| 540                               |     |     |      | K    |      |      |      |      |      |      |      |       |       |
| 560                               | T   |     |      |      |      |      |      |      |      |      |      |       |       |
| 750                               |     |     | K    |      |      |      |      |      |      |      |      |       |       |
| 850                               |     | K   |      |      |      |      |      |      |      |      |      |       |       |
| 1200                              | K   |     |      |      |      |      |      |      |      |      |      |       |       |

| RATINGS AND CASE CODES (Extended) |     |     |      |      |      |      |      |      |      |      |      |       |       |
|-----------------------------------|-----|-----|------|------|------|------|------|------|------|------|------|-------|-------|
| µF                                | 6 V | 8 V | 10 V | 15 V | 20 V | 25 V | 30 V | 35 V | 50 V | 60 V | 75 V | 100 V | 125 V |
| 2.0                               |     |     |      |      |      |      |      |      |      |      |      | C     |       |
| 6.8                               |     |     |      |      |      |      |      |      |      |      |      |       | C     |
| 8.2                               |     |     |      |      |      |      |      |      |      |      |      | C     |       |
| 10                                |     |     |      |      |      |      |      |      |      |      |      | C     |       |
| 12                                |     |     |      |      |      |      |      |      |      |      | C    |       |       |
| 15                                |     |     |      |      |      |      |      |      |      |      | C    |       |       |
| 18                                |     |     |      |      |      |      |      |      |      | C    |      |       |       |
| 22                                |     |     |      |      |      |      |      |      | C    |      | C    |       |       |
| 27                                |     |     |      |      |      |      |      |      |      | C    |      |       | F     |
| 33                                |     |     |      |      |      |      |      | C    | C    |      |      | F     |       |
| 39                                |     |     |      |      |      |      | C    |      |      |      |      | F     | T     |
| 47                                |     |     |      |      |      | C    | C    | C    |      |      | F    |       | T     |
| 56                                |     |     |      |      | C    |      | C    |      |      |      | F    | T     | K     |
| 68                                |     |     |      | C    |      | C    |      |      |      | F    |      | T     |       |
| 82                                |     |     |      | C    | C    |      |      |      | F    |      | F    |       | K     |
| 86                                |     |     |      |      |      |      |      |      |      |      |      | K     |       |
| 100                               |     |     | C    | C    |      |      |      |      |      | F    |      |       |       |
| 110                               |     |     |      |      |      |      |      |      |      |      | T    |       |       |
| 120                               |     |     | C    |      |      |      |      | F    | F    |      |      | K     |       |
| 140                               | C   |     |      |      |      |      |      |      |      | T    |      |       |       |
| 150                               |     |     | C    |      |      |      | F    |      |      |      |      |       |       |
| 160                               |     |     |      |      |      |      |      |      | T    |      |      |       |       |



| RATINGS AND CASE CODES (Extended) |     |     |      |      |      |      |      |      |      |      |      |       |       |
|-----------------------------------|-----|-----|------|------|------|------|------|------|------|------|------|-------|-------|
| μF                                | 6 V | 8 V | 10 V | 15 V | 20 V | 25 V | 30 V | 35 V | 50 V | 60 V | 75 V | 100 V | 125 V |
| 180                               |     | C   |      |      |      | F    | F    |      |      |      | T    |       |       |
| 200                               |     |     |      |      |      |      |      |      |      |      | T    |       |       |
| 220                               |     |     |      |      | F    |      | F    | T    |      | T    | K    |       |       |
| 250                               |     |     |      |      |      |      |      |      | T    |      |      |       |       |
| 270                               |     |     |      | F    |      | F    |      |      | T    | K    | K    |       |       |
| 330                               |     |     |      | F    | F    |      | T    |      | K    |      |      |       |       |
| 350                               |     |     |      |      |      | T    |      |      |      |      |      |       |       |
| 390                               |     |     | F    | F    |      |      | T    | T    |      |      |      |       |       |
| 470                               |     | F   | F    |      |      |      | T    | K    |      |      |      |       |       |
| 510                               |     |     |      | T    |      |      |      |      |      |      |      |       |       |
| 540                               |     |     |      | T    |      |      |      |      |      |      |      |       |       |
| 560                               |     |     | F    |      |      | T    | K    |      |      |      |      |       |       |
| 680                               |     | F   |      |      |      | K    |      |      |      |      |      |       |       |
| 750                               |     |     |      |      |      | K    |      |      |      |      |      |       |       |
| 820                               | F   |     |      | T/K  |      |      |      |      |      |      |      |       |       |
| 1000                              |     |     | T    | K    |      |      |      |      |      |      |      |       |       |
| 1200                              |     |     | T/K  |      |      |      |      |      |      |      |      |       |       |
| 1500                              | T   |     | K    |      |      |      |      |      |      |      |      |       |       |
| 1800                              |     | K   |      |      |      |      |      |      |      |      |      |       |       |
| 2200                              | K   |     |      |      |      |      |      |      |      |      |      |       |       |

| STANDARD RATINGS                                                |           |                 |                         |                         |                  |                   |                                |        |         |                               |  |
|-----------------------------------------------------------------|-----------|-----------------|-------------------------|-------------------------|------------------|-------------------|--------------------------------|--------|---------|-------------------------------|--|
| CAPACITANCE (μF)                                                | CASE CODE | PART NUMBER (1) | MAX. ESR                | MAX. IMP.               | MAX. DCL (μA) AT |                   | MAX. CAPACITANCE CHANGE (%) AT |        |         | MAX. RMS                      |  |
|                                                                 |           |                 | AT +25 °C<br>120 Hz (Ω) | AT -55 °C<br>120 Hz (Ω) | +25 °C           | +85 °C<br>+125 °C | -55 °C                         | +85 °C | +125 °C | RIPPLE CURRENT<br>120 Hz (mA) |  |
| <b>6 V<sub>DC</sub> AT +85 °C; 7 V<sub>DC</sub> AT +125 °C</b>  |           |                 |                         |                         |                  |                   |                                |        |         |                               |  |
| 30                                                              | C         | 109D306X0006C0  | 4.2                     | 100                     | 1.0              | 2.0               | -40                            | +10.5  | +12     | 140                           |  |
| 68                                                              | C         | 109D686X0006C0  | 4.0                     | 60                      | 1.0              | 2.0               | -40                            | +14    | +16     | 160                           |  |
| 140                                                             | F         | 109D147X0006F0  | 2.0                     | 40                      | 1.0              | 3.0               | -40                            | +14    | +16     | 330                           |  |
| 270                                                             | F         | 109D277X0006F0  | 4.0                     | 25                      | 1.0              | 7.0               | -44                            | +17.5  | +20     | 270                           |  |
| 290                                                             | T         | 109D297X0006T0  | 2.0                     | 24                      | 2.0              | 7.0               | -70                            | +20    | +20     | 410                           |  |
| 330                                                             | T         | 109D337X0006T0  | 2.1                     | 20                      | 2.0              | 7.9               | -44                            | +14    | +16     | 410                           |  |
| 560                                                             | T         | 109D567X0006T0  | 3.0                     | 25                      | 2.0              | 13                | -64                            | +17.5  | +20     | 340                           |  |
| 1200                                                            | K         | 109D128X0006K0  | 1.6                     | 20                      | 3.0              | 14                | -80                            | +25    | +25     | 530                           |  |
| <b>8 V<sub>DC</sub> AT +85 °C; 5 V<sub>DC</sub> AT +125 °C</b>  |           |                 |                         |                         |                  |                   |                                |        |         |                               |  |
| 22                                                              | C         | 109D226X0008C0  | 6.0                     | 115                     | 1.0              | 2.0               | -40                            | +10.5  | +12     | 130                           |  |
| 25                                                              | C         | 109D256X0008C0  | 4.2                     | 100                     | 1.0              | 2.0               | -40                            | +10.5  | +12     | 140                           |  |
| 56                                                              | C         | 109D566X0008C0  | 4.0                     | 59                      | 1.0              | 2.0               | -40                            | +14    | +16     | 160                           |  |
| 220                                                             | F         | 109D227X0008F0  | 4.0                     | 30                      | 1.0              | 7.0               | -44                            | +17.5  | +20     | 270                           |  |
| 290                                                             | T         | 109D297X0008T0  | 2.0                     | 24                      | 2.0              | 9.5               | -70                            | +20    | +20     | 410                           |  |
| 430                                                             | T         | 109D437X0008T0  | 3.2                     | 25                      | 2.0              | 14                | -64                            | +17.5  | +20     | 410                           |  |
| 850                                                             | K         | 109D857X0008K0  | 1.0                     | 22                      | 4.0              | 16                | -80                            | +25    | +25     | 670                           |  |
| <b>10 V<sub>DC</sub> AT +85 °C; 7 V<sub>DC</sub> AT +125 °C</b> |           |                 |                         |                         |                  |                   |                                |        |         |                               |  |
| 20                                                              | C         | 109D206X0010C0  | 5.0                     | 175                     | 1.0              | 2.0               | -32                            | +10.5  | +12     | 140                           |  |
| 47                                                              | C         | 109D476X0010C0  | 5.0                     | 100                     | 1.0              | 2.0               | -36                            | +14    | +16     | 160                           |  |
| 100                                                             | F         | 109D107X0010F0  | 2.1                     | 60                      | 1.0              | 4.0               | -36                            | +14    | +16     | 270                           |  |
| 180                                                             | F         | 109D187X0010F0  | 4.0                     | 40                      | 1.0              | 7.0               | -36                            | +14    | +16     | 270                           |  |
| 250                                                             | T         | 109D257X0010T0  | 2.0                     | 30                      | 2.0              | 10                | -40                            | +14    | +16     | 410                           |  |
| 390                                                             | T         | 109D397X0010T0  | 3.0                     | 25                      | 2.0              | 16                | -64                            | +17.5  | +20     | 340                           |  |
| 750                                                             | K         | 109D757X0010T0  | 1.0                     | 23                      | 4.0              | 16                | -80                            | +25    | +25     | 670                           |  |

**Note**

(1) Part numbers shown are for units with ± 20 % capacitance tolerance and uninsulated capacitors. For ± 10 % units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the part number. For RoHS-compliant add "E3".



| STANDARD RATINGS                                                 |              |                            |                                     |                                     |                         |                   |                         |        |         |                                                 |
|------------------------------------------------------------------|--------------|----------------------------|-------------------------------------|-------------------------------------|-------------------------|-------------------|-------------------------|--------|---------|-------------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)                                        | CASE<br>CODE | PART NUMBER <sup>(1)</sup> | MAX. ESR                            | MAX. IMP.                           | MAX. DCL                |                   | MAX. CAPACITANCE        |        |         | MAX. RMS<br>RIPPLE<br>CURRENT<br>120 Hz<br>(mA) |
|                                                                  |              |                            | AT +25 °C<br>120 Hz<br>( $\Omega$ ) | AT -55 °C<br>120 Hz<br>( $\Omega$ ) | ( $\mu$ A) AT<br>+25 °C | +85 °C<br>+125 °C | CHANGE (%) AT<br>-55 °C | +85 °C | +125 °C |                                                 |
| <b>15 V<sub>DC</sub> AT +85 °C; 10 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                   |                         |        |         |                                                 |
| 15                                                               | C            | 109D156X0015C0             | 6.0                                 | 155                                 | 1.0                     | 2.0               | -24                     | +10.5  | +12     | 130                                             |
| 33                                                               | C            | 109D336X0015C0             | 5.0                                 | 90                                  | 1.0                     | 2.0               | -28                     | +14    | +16     | 160                                             |
| 70                                                               | F            | 109D706X0015F0             | 3.6                                 | 75                                  | 1.0                     | 4.0               | -28                     | +14    | +16     | 270                                             |
| 120                                                              | F            | 109D127X0015F0             | 4.0                                 | 50                                  | 1.0                     | 7.0               | -28                     | +17.5  | +20     | 270                                             |
| 270                                                              | T            | 109D277X0015T0             | 3.0                                 | 30                                  | 2.0                     | 16                | -56                     | +17.5  | +20     | 340                                             |
| 540                                                              | K            | 109D547X0015K0             | 1.2                                 | 23                                  | 6.0                     | 24                | -80                     | +25    | +25     | 610                                             |
| <b>20 V<sub>DC</sub> AT +85 °C; 13 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                   |                         |        |         |                                                 |
| 27                                                               | C            | 109D276X0020C0             | 5.0                                 | 100                                 | 1.0                     | 2.0               | -20                     | +11    | +14     | 160                                             |
| 220                                                              | T            | 109D227X0020T0             | 4.0                                 | 3                                   | 2.0                     | 16                | -48                     | +13    | +15     | 410                                             |
| <b>25 V<sub>DC</sub> AT +85 °C; 15 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                   |                         |        |         |                                                 |
| 10                                                               | C            | 109D106X0025C0             | 6.0                                 | 220                                 | 1.0                     | 2.0               | -16                     | +8     | +9      | 130                                             |
| 22                                                               | C            | 109D226X0025C0             | 5.0                                 | 140                                 | 1.0                     | 3.0               | -20                     | +10.5  | +12     | 160                                             |
| 50                                                               | F            | 109D506X0025F0             | 4.0                                 | 70                                  | 1.0                     | 5.0               | -28                     | +13    | +15     | 270                                             |
| 100                                                              | F            | 109D107X0025F0             | 4.0                                 | 50                                  | 1.0                     | 10                | -28                     | +13    | +15     | 270                                             |
| 100                                                              | T            | 109D107X0025T0             | 4.0                                 | 45                                  | 2.0                     | 10                | -48                     | +13    | +15     | 410                                             |
| 180                                                              | T            | 109D187X0025T0             | 4.0                                 | 32                                  | 2.0                     | 18                | -48                     | +13    | +15     | 340                                             |
| 350                                                              | K            | 109D357X0025K0             | 1.3                                 | 24                                  | 7.0                     | 28                | -70                     | +25    | +25     | 580                                             |
| <b>30 V<sub>DC</sub> AT +85 °C; 20 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                   |                         |        |         |                                                 |
| 7.0                                                              | C            | 109D705X0030C0             | 8.0                                 | 275                                 | 1.0                     | 2.0               | -16                     | +8     | +12     | 110                                             |
| 8.0                                                              | C            | 109D805X0030C0             | 7.5                                 | 275                                 | 1.0                     | 2.0               | -16                     | +8     | +12     | 130                                             |
| 15                                                               | C            | 109D156X0030C0             | 8.0                                 | 175                                 | 1.0                     | 2.0               | -20                     | +10.5  | +12     | 160                                             |
| 40                                                               | F            | 109D406X0030F0             | 4.0                                 | 65                                  | 1.0                     | 5.0               | -24                     | +10.5  | +12     | 270                                             |
| 68                                                               | F            | 109D686X0030F0             | 6.0                                 | 60                                  | 1.0                     | 8.0               | -24                     | +13    | +15     | 270                                             |
| 100                                                              | T            | 109D107X0030T0             | 6.0                                 | 40                                  | 2.0                     | 12                | -28                     | +10.5  | +12     | 410                                             |
| 150                                                              | T            | 109D157X0030T0             | 4.1                                 | 35                                  | 2.0                     | 18                | -48                     | +13    | +15     | 340                                             |
| 300                                                              | K            | 109D307X0030K0             | 1.6                                 | 25                                  | 8.0                     | 32                | -60                     | +25    | +25     | 550                                             |
| <b>35 V<sub>DC</sub> AT +85 °C; 22 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                   |                         |        |         |                                                 |
| 68                                                               | F            | 109D686X0035F0             | 6.0                                 | 60                                  | 1.0                     | 8                 | -24                     | +12    | +15     | 270                                             |
| 120                                                              | T            | 109D127X0035T0             | 4.0                                 | 38                                  | 2.0                     | 16                | -30                     | +13    | +15     | 410                                             |
| 270                                                              | K            | 109D277X0035K0             | 2.2                                 | 23                                  | 8.0                     | 32                | -45                     | +20    | +25     | 500                                             |
| <b>50 V<sub>DC</sub> AT +85 °C; 30 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                   |                         |        |         |                                                 |
| 4.5                                                              | C            | 109D455X0050C0             | 9.0                                 | 400                                 | 1.0                     | 2.0               | -16                     | +5     | +6      | 110                                             |
| 5.0                                                              | C            | 109D505X0050C0             | 9.0                                 | 400                                 | 1.0                     | 2.0               | -16                     | +5     | +6      | 130                                             |
| 10                                                               | C            | 109D106X0050C0             | 8.0                                 | 250                                 | 1.0                     | 2.0               | -24                     | +8     | +9      | 160                                             |
| 22                                                               | F            | 109D226X0050F0             | 7.0                                 | 95                                  | 1.0                     | 4.0               | -20                     | +10.5  | +12     | 230                                             |
| 25                                                               | F            | 109D256X0050F0             | 6.0                                 | 95                                  | 1.0                     | 5.0               | -20                     | +10.5  | +12     | 270                                             |
| 47                                                               | F            | 109D476X0050F0             | 6.0                                 | 70                                  | 1.0                     | 9.0               | -28                     | +13    | +15     | 270                                             |
| 60                                                               | T            | 109D606X0050T0             | 3.0                                 | 45                                  | 2.0                     | 12                | -16                     | +10.5  | +12     | 410                                             |
| 82                                                               | T            | 109D826X0050T0             | 4.0                                 | 45                                  | 2.0                     | 16                | -32                     | +13    | +15     | 340                                             |
| 160                                                              | K            | 109D167X0050K0             | 2.2                                 | 27                                  | 8.0                     | 32                | -50                     | +25    | +25     | 460                                             |

**Note**

<sup>(1)</sup> Part numbers shown are for units with  $\pm 20\%$  capacitance tolerance and uninsulated capacitors. For  $\pm 10\%$  units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the part number. For RoHS-compliant add "E3".



| STANDARD RATINGS                                                  |              |                            |                                     |                                     |                         |                   |                  |        |         |                                                 |
|-------------------------------------------------------------------|--------------|----------------------------|-------------------------------------|-------------------------------------|-------------------------|-------------------|------------------|--------|---------|-------------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)                                         | CASE<br>CODE | PART NUMBER <sup>(1)</sup> | MAX. ESR                            | MAX. IMP.                           | MAX. DCL                |                   | MAX. CAPACITANCE |        |         | MAX. RMS<br>RIPPLE<br>CURRENT<br>120 Hz<br>(mA) |
|                                                                   |              |                            | AT +25 °C<br>120 Hz<br>( $\Omega$ ) | AT -55 °C<br>120 Hz<br>( $\Omega$ ) | ( $\mu$ A) AT<br>+25 °C | +85 °C<br>+125 °C | -55 °C           | +85 °C | +125 °C |                                                 |
| <b>60 V<sub>DC</sub> AT +85 °C; 40 V<sub>DC</sub> AT +125 °C</b>  |              |                            |                                     |                                     |                         |                   |                  |        |         |                                                 |
| 4.0                                                               | C            | 109D405X0060C0             | 10.0                                | 550                                 | 1.0                     | 2.0               | -16              | +5     | +6      | 110                                             |
| 8.2                                                               | C            | 109D825X0060C0             | 8.0                                 | 275                                 | 1.0                     | 2.0               | -24              | +8     | +9      | 140                                             |
| 20                                                                | F            | 109D206X0060F0             | 5.0                                 | 105                                 | 1.0                     | 5.0               | -16              | +10.5  | +12     | 270                                             |
| 39                                                                | F            | 109D396X0060F0             | 7.0                                 | 90                                  | 1.0                     | 9.0               | -28              | +10.5  | +12     | 230                                             |
| 50                                                                | T            | 109D506X0060T0             | 4.0                                 | 50                                  | 2.0                     | 12                | -16              | +10.5  | +12     | 410                                             |
| 68                                                                | T            | 109D686X0060T0             | 6.0                                 | 50                                  | 2.0                     | 16                | -32              | +10.5  | +12     | 340                                             |
| 140                                                               | K            | 109D147X0060K0             | 2.4                                 | 28                                  | 8.0                     | 32                | -40              | +20    | +20     | 430                                             |
| <b>75 V<sub>DC</sub> AT +85 °C; 50 V<sub>DC</sub> AT +125 °C</b>  |              |                            |                                     |                                     |                         |                   |                  |        |         |                                                 |
| 3.5                                                               | C            | 109D355X0075C0             | 10.0                                | 650                                 | 1.0                     | 2.0               | -16              | +5     | +6      | 110                                             |
| 6.8                                                               | C            | 109D685X0075C0             | 8.0                                 | 300                                 | 1.0                     | 2.0               | -20              | +8     | +9      | 140                                             |
| 13                                                                | F            | 109D136X0075F0             | 6.0                                 | 160                                 | 1.0                     | 4.0               | -16              | +8     | +9      | 190                                             |
| 15                                                                | F            | 109D156X0075F0             | 6.5                                 | 150                                 | 1.0                     | 5.0               | -16              | +8     | +9      | 270                                             |
| 33                                                                | F            | 109D336X0075F0             | 7.0                                 | 90                                  | 1.0                     | 10                | -24              | +10.5  | +15     | 230                                             |
| 40                                                                | T            | 109D406X0075T0             | 5.0                                 | 60                                  | 2.0                     | 12                | -16              | +10.5  | +12     | 410                                             |
| 56                                                                | T            | 109D566X0075T0             | 6.0                                 | 60                                  | 2.0                     | 17                | -28              | +10.5  | +15     | 300                                             |
| 110                                                               | K            | 109D117X0075K0             | 3.1                                 | 29                                  | 9.0                     | 36                | -35              | +20    | +20     | 400                                             |
| <b>100 V<sub>DC</sub> AT +85 °C; 65 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                   |                  |        |         |                                                 |
| 2.5                                                               | C            | 109D255X0100C0             | 26.5                                | 950                                 | 1.0                     | 2.0               | -16              | +7     | +8      | 100                                             |
| 3.0                                                               | C            | 109D305X0100C0             | 10.0                                | 800                                 | 1.0                     | 2.0               | -16              | +7     | +8      | 110                                             |
| 4.7                                                               | C            | 109D475X0100C0             | 10.0                                | 500                                 | 1.0                     | 2.0               | -16              | +7     | +8      | 130                                             |
| 10                                                                | F            | 109D106X0100F0             | 6.0                                 | 215                                 | 1.0                     | 4.0               | -16              | +7     | +8      | 190                                             |
| 11                                                                | F            | 109D116X0100F0             | 6.0                                 | 200                                 | 1.0                     | 4.0               | -16              | +7     | +8      | 230                                             |
| 22                                                                | F            | 109D226X0100F0             | 7.0                                 | 100                                 | 1.0                     | 9.0               | -16              | +7     | +8      | 230                                             |
| 30                                                                | T            | 109D306X0100T0             | 4.0                                 | 80                                  | 2.0                     | 12                | -16              | +7     | +8      | 340                                             |
| 43                                                                | T            | 109D436X0100T0             | 6.0                                 | 70                                  | 2.0                     | 17                | -20              | +7     | +8      | 300                                             |
| 86                                                                | K            | 109D866X0100K0             | 3.1                                 | 30                                  | 9.0                     | 36                | -25              | +15    | +15     | 400                                             |
| <b>125 V<sub>DC</sub> AT +85 °C; 85 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                   |                  |        |         |                                                 |
| 1.7                                                               | C            | 109D175X0125C0             | 54.6                                | 1250                                | 1.0                     | 2.0               | -16              | +7     | +8      | 100                                             |
| 3.6                                                               | C            | 109D365X0125C0             | 15.0                                | 600                                 | 1.0                     | 2.0               | -16              | +7     | +8      | 110                                             |
| 9.0                                                               | F            | 109D905X0125F0             | 15.0                                | 240                                 | 1.0                     | 5.0               | -16              | +7     | +8      | 210                                             |
| 14                                                                | F            | 109D146X0125F0             | 12.0                                | 167                                 | 1.0                     | 7.0               | -16              | +7     | +8      | 190                                             |
| 18                                                                | T            | 109D186X0125T0             | 11.0                                | 129                                 | 2.0                     | 9.0               | -16              | +7     | +8      | 340                                             |
| 25                                                                | T            | 109D256X0125T0             | 10.0                                | 93                                  | 2.0                     | 13                | -16              | +7     | +8      | 260                                             |
| 56                                                                | K            | 109D566X0125K0             | 4.1                                 | 3.2                                 | 10                      | 40                | -25              | +15    | +15     | 400                                             |

**Note**

<sup>(1)</sup> Part numbers shown are for units with  $\pm 20\%$  capacitance tolerance and uninsulated capacitors. For  $\pm 10\%$  units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the part number. For RoHS-compliant add "E3".



| EXTENDED RATINGS                                                 |              |                            |                                     |                                     |                         |                                    |                  |     |     |                           |
|------------------------------------------------------------------|--------------|----------------------------|-------------------------------------|-------------------------------------|-------------------------|------------------------------------|------------------|-----|-----|---------------------------|
| CAPACITANCE<br>( $\mu$ F)                                        | CASE<br>CODE | PART NUMBER <sup>(1)</sup> | MAX. ESR                            | MAX. IMP.                           | MAX. DCL                |                                    | MAX. CAPACITANCE |     |     | MAX. RMS                  |
|                                                                  |              |                            | AT +25 °C<br>120 Hz<br>( $\Omega$ ) | AT -55 °C<br>120 Hz<br>( $\Omega$ ) | ( $\mu$ A) AT<br>+25 °C | ( $\mu$ A) AT<br>+85 °C<br>+125 °C | CHANGE (%) AT    |     |     | 120 Hz<br>CURRENT<br>(mA) |
| <b>6 V<sub>DC</sub> AT +85 °C; 7 V<sub>DC</sub> AT +125 °C</b>   |              |                            |                                     |                                     |                         |                                    |                  |     |     |                           |
| 140                                                              | C            | 109D147X0006C2             | 3.0                                 | 54                                  | 2.0                     | 9.0                                | -45              | +13 | +16 | 160                       |
| 820                                                              | F            | 109D827X0006F0             | 2.5                                 | 18                                  | 3.0                     | 14                                 | -88              | +16 | +20 | 300                       |
| 1500                                                             | T            | 109D158X0006T0             | 1.5                                 | 18                                  | 5.0                     | 20                                 | -90              | +20 | +25 | 480                       |
| 2200                                                             | K            | 109D228X0006K0             | 1.0                                 | 13                                  | 6.0                     | 24                                 | -90              | +25 | +30 | 670                       |
| <b>8 V<sub>DC</sub> AT +85 °C; 5 V<sub>DC</sub> AT +125 °C</b>   |              |                            |                                     |                                     |                         |                                    |                  |     |     |                           |
| 180                                                              | C            | 109D187X0008C0             | 3.0                                 | 45                                  | 2.0                     | 9.0                                | -60              | +13 | +16 | 180                       |
| 470                                                              | F            | 109D477X0008F0             | 2.5                                 | 25                                  | 3.0                     | 14                                 | -75              | +16 | +20 | 300                       |
| 680                                                              | F            | 109D687X0008F0             | 2.5                                 | 22                                  | 3.0                     | 14                                 | -90              | +16 | +20 | 300                       |
| 1800                                                             | K            | 109D188X0008K0             | 1.0                                 | 14                                  | 7.0                     | 25                                 | -60              | +20 | +30 | 670                       |
| <b>10 V<sub>DC</sub> AT +85 °C; 7 V<sub>DC</sub> AT +125 °C</b>  |              |                            |                                     |                                     |                         |                                    |                  |     |     |                           |
| 100                                                              | C            | 109D107X0010C0             | 3.0                                 | 60                                  | 2.0                     | 9.0                                | -50              | +13 | +16 | 160                       |
| 120                                                              | C            | 109D127X0010C0             | 4.0                                 | 60                                  | 2.0                     | 9.0                                | -45              | +13 | +16 | 160                       |
| 150                                                              | C            | 109D477X0010F0             | 3.0                                 | 54                                  | 2.0                     | 9.0                                | -55              | +13 | +16 | 180                       |
| 390                                                              | F            | 109D397X0010F0             | 2.5                                 | 30                                  | 3.0                     | 16                                 | -70              | +16 | +20 | 300                       |
| 470                                                              | F            | 109D477X0010F0             | 2.5                                 | 30                                  | 3.0                     | 16                                 | -65              | +16 | +20 | 300                       |
| 560                                                              | F            | 109D567X0010F0             | 2.5                                 | 27                                  | 3.0                     | 16                                 | -77              | +16 | +20 | 300                       |
| 1000                                                             | T            | 109D108X0010T0             | 1.5                                 | 20                                  | 5.0                     | 20                                 | -75              | +20 | +25 | 480                       |
| 1200                                                             | K            | 109D128X0010K0             | 1.0                                 | 18                                  | 7.0                     | 25                                 | -75              | +30 | +30 | 670                       |
| 1200                                                             | T            | 109D128X0010T0             | 1.5                                 | 18                                  | 5.0                     | 20                                 | -88              | +20 | +25 | 480                       |
| 1500                                                             | K            | 109D158X0010K0             | 1.0                                 | 15                                  | 7.0                     | 25                                 | -88              | +25 | +30 | 670                       |
| <b>15 V<sub>DC</sub> AT +85 °C; 10 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                                    |                  |     |     |                           |
| 68                                                               | C            | 109D686X0015C0             | 4.0                                 | 80                                  | 2.0                     | 9.0                                | -40              | +13 | +16 | 140                       |
| 82                                                               | C            | 109D826X0015C0             | 4.0                                 | 80                                  | 2.0                     | 9.0                                | -38              | +13 | +16 | 160                       |
| 100                                                              | C            | 109D107X0015C0             | 4.0                                 | 72                                  | 2.0                     | 9.0                                | -44              | +13 | +16 | 160                       |
| 270                                                              | F            | 109D277X0015F0             | 2.5                                 | 35                                  | 3.0                     | 16                                 | -60              | +16 | +20 | 300                       |
| 330                                                              | F            | 109D337X0015F0             | 2.5                                 | 35                                  | 3.0                     | 16                                 | -60              | +16 | +20 | 300                       |
| 390                                                              | F            | 109D397X0015F0             | 2.5                                 | 31                                  | 3.0                     | 16                                 | -66              | +16 | +20 | 300                       |
| 510                                                              | T            | 109D517X0015T0             | 1.8                                 | 25                                  | 6.0                     | 24                                 | -65              | +20 | +25 | 340                       |
| 540                                                              | T            | 109D547X0015T0             | 1.8                                 | 22                                  | 6.0                     | 24                                 | -77              | +20 | +25 | 440                       |
| 820                                                              | T            | 109D827X0015T0             | 1.8                                 | 22                                  | 6.0                     | 24                                 | -77              | +20 | +25 | 440                       |
| 820                                                              | K            | 109D827X0015K0             | 1.2                                 | 20                                  | 8.0                     | 32                                 | -70              | +30 | +30 | 610                       |
| 1000                                                             | K            | 109D108X0015K0             | 1.2                                 | 17                                  | 8.0                     | 32                                 | -77              | +25 | +30 | 610                       |
| <b>20 V<sub>DC</sub> AT +85 °C; 13 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                                    |                  |     |     |                           |
| 56                                                               | C            | 109D566X0020C0             | 4.3                                 | 90                                  | 2.0                     | 9.0                                | -38              | +13 | +16 | 140                       |
| 82                                                               | C            | 109D826X0020C0             | 4.3                                 | 81                                  | 2.0                     | 9.0                                | -43              | +13 | +16 | 160                       |
| 220                                                              | F            | 109D227X0020F0             | 2.7                                 | 35                                  | 3.0                     | 16                                 | -60              | +16 | +20 | 300                       |
| 330                                                              | F            | 109D337X0020F0             | 2.7                                 | 31                                  | 3.0                     | 16                                 | -66              | +16 | +20 | 300                       |
| <b>25 V<sub>DC</sub> AT +85 °C; 15 V<sub>DC</sub> AT +125 °C</b> |              |                            |                                     |                                     |                         |                                    |                  |     |     |                           |
| 47                                                               | C            | 109D476X0025C0             | 4.3                                 | 100                                 | 2.0                     | 9.0                                | -35              | +12 | +15 | 140                       |
| 68                                                               | C            | 109D686X0025C0             | 4.3                                 | 90                                  | 2.0                     | 9.0                                | -40              | +12 | +15 | 160                       |
| 180                                                              | F            | 109D187X0025F0             | 2.7                                 | 37                                  | 3.0                     | 16                                 | -55              | +13 | +16 | 300                       |
| 270                                                              | F            | 109D277X0025F0             | 2.7                                 | 33                                  | 3.0                     | 16                                 | -62              | +13 | +16 | 300                       |
| 350                                                              | T            | 109D357X0025T0             | 1.8                                 | 27                                  | 7.0                     | 28                                 | -60              | +20 | +25 | 440                       |
| 560                                                              | T            | 109D567X0025T0             | 1.8                                 | 24                                  | 7.0                     | 28                                 | -72              | +20 | +25 | 440                       |
| 680                                                              | K            | 109D687X0025K0             | 1.2                                 | 19                                  | 8.0                     | 32                                 | -72              | +25 | +30 | 610                       |
| 750                                                              | K            | 109D757X0025K2             | 1.0                                 | 18                                  | 8.0                     | 29                                 | -60              | +25 | +25 | 610                       |

**Note**

<sup>(1)</sup> Part numbers shown are for units with  $\pm 20\%$  capacitance tolerance and uninsulated capacitors. For  $\pm 10\%$  units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the part number. For RoHS-compliant add "E3".



| EXTENDED RATINGS                                                 |              |                 |              |              |          |         |                  |        |         |          |
|------------------------------------------------------------------|--------------|-----------------|--------------|--------------|----------|---------|------------------|--------|---------|----------|
| CAPACITANCE<br>( $\mu$ F)                                        | CASE<br>CODE | PART NUMBER (1) | MAX. ESR     | MAX. IMP.    | MAX. DCL |         | MAX. CAPACITANCE |        |         | MAX. RMS |
|                                                                  |              |                 | AT +25 °C    | AT -55 °C    | (μA) AT  |         | CHANGE (%) AT    |        |         | RIPPLE   |
|                                                                  |              |                 | 120 Hz       | 120 Hz       | +25 °C   | +85 °C  | -55 °C           | +85 °C | +125 °C | CURRENT  |
|                                                                  |              |                 | ( $\Omega$ ) | ( $\Omega$ ) |          | +125 °C |                  |        |         | 120 Hz   |
|                                                                  |              |                 |              |              |          |         |                  |        |         | (mA)     |
| <b>30 V<sub>DC</sub> AT +85 °C; 20 V<sub>DC</sub> AT +125 °C</b> |              |                 |              |              |          |         |                  |        |         |          |
| 39                                                               | C            | 109D396X0030C0  | 5.2          | 110          | 2.0      | 9.0     | -28              | +10    | +12     | 140      |
| 47                                                               | C            | 109D476X0030C0  | 5.2          | 100          | 2.0      | 9.0     | -30              | +10    | +12     | 140      |
| 56                                                               | C            | 109D566X0030C0  | 5.2          | 100          | 2.0      | 9.0     | -38              | +12    | +15     | 140      |
| 150                                                              | F            | 109D157X0030F0  | 2.5          | 40           | 3.0      | 9.0     | -40              | +12    | +15     | 300      |
| 180                                                              | F            | 109D187X0030F0  | 2.5          | 40           | 3.0      | 16      | -45              | +13    | +16     | 300      |
| 220                                                              | F            | 109D227X0030F0  | 2.5          | 36           | 3.0      | 16      | -60              | +13    | +16     | 300      |
| 330                                                              | T            | 109D337X0030T0  | 1.8          | 28           | 8.0      | 16      | -45              | +20    | +25     | 440      |
| 390                                                              | T            | 109D397X0030T0  | 1.8          | 28           | 8.0      | 32      | -50              | +20    | +25     | 440      |
| 470                                                              | T            | 109D477X0030T0  | 1.8          | 25           | 8.0      | 32      | -65              | +20    | +25     | 550      |
| 560                                                              | K            | 109D567X0030K0  | 1.3          | 20           | 9.0      | 32      | -65              | +25    | +30     | 590      |
| <b>35 V<sub>DC</sub> AT +85 °C; 22 V<sub>DC</sub> AT +125 °C</b> |              |                 |              |              |          |         |                  |        |         |          |
| 33                                                               | C            | 109D336X0035C0  | 5.2          | 130          | 2.0      | 9.0     | -30              | +10    | +12     | 140      |
| 47                                                               | C            | 109D476X0035C0  | 5.2          | 115          | 2.0      | 9.0     | -35              | +10    | +12     | 140      |
| 120                                                              | F            | 109D127X0035F0  | 2.5          | 45           | 3.0      | 16      | -45              | +13    | +16     | 300      |
| 220                                                              | T            | 109D227X0035T0  | 1.8          | 30           | 8.0      | 32      | -45              | +20    | +25     | 440      |
| 390                                                              | T            | 109D337X0035T0  | 1.8          | 27           | 8.0      | 32      | -58              | +20    | +25     | 440      |
| 470                                                              | K            | 109D477X0035T0  | 1.3          | 21           | 9.0      | 36      | -58              | +25    | +30     | 590      |
| <b>50 V<sub>DC</sub> AT +85 °C; 30 V<sub>DC</sub> AT +125 °C</b> |              |                 |              |              |          |         |                  |        |         |          |
| 22                                                               | C            | 109D226X0050C0  | 5.0          | 150          | 2.0      | 9.0     | -24              | +10    | +12     | 140      |
| 33                                                               | C            | 109D336X0050C0  | 5.0          | 135          | 2.0      | 9.0     | -29              | +10    | +12     | 140      |
| 82                                                               | F            | 109D826X0050F0  | 2.5          | 55           | 4.0      | 24      | -35              | +10    | +15     | 300      |
| 120                                                              | F            | 109D127X0050F0  | 2.5          | 49           | 4.0      | 24      | -42              | +12    | +15     | 300      |
| 160                                                              | T            | 109D167X0050T0  | 1.8          | 32           | 6.0      | 32      | -35              | +20    | +25     | 420      |
| 250                                                              | T            | 109D257X0050T0  | 1.8          | 29           | 8.0      | 32      | -40              | +20    | +25     | 440      |
| 270                                                              | T            | 109D277X0050T0  | 1.8          | 29           | 8.0      | 32      | -46              | +20    | +25     | 440      |
| 330                                                              | K            | 109D337X0050K0  | 1.5          | 22           | 9.0      | 36      | -46              | +25    | +30     | 550      |
| <b>60 V<sub>DC</sub> AT +85 °C; 40 V<sub>DC</sub> AT +125 °C</b> |              |                 |              |              |          |         |                  |        |         |          |
| 18                                                               | C            | 109D186X0060C0  | 5.0          | 160          | 3.0      | 12      | -20              | +10    | +12     | 140      |
| 27                                                               | C            | 109D276X0060C0  | 5.0          | 144          | 3.0      | 12      | -24              | +10    | +12     | 140      |
| 68                                                               | F            | 109D686X0060F0  | 3.0          | 60           | 3.0      | 20      | -30              | +12    | +15     | 270      |
| 100                                                              | F            | 109D107X0060F0  | 2.5          | 54           | 4.0      | 20      | -36              | +12    | +15     | 300      |
| 140                                                              | T            | 109D147X0060T0  | 2.0          | 32           | 8.0      | 32      | -30              | +16    | +20     | 420      |
| 220                                                              | T            | 109D227X0060T0  | 1.8          | 29           | 8.0      | 32      | -40              | +16    | +20     | 440      |
| 270                                                              | K            | 109D277X0060K0  | 1.5          | 23           | 9.0      | 36      | -45              | +20    | +25     | 550      |
| <b>75 V<sub>DC</sub> AT +85 °C; 50 V<sub>DC</sub> AT +125 °C</b> |              |                 |              |              |          |         |                  |        |         |          |
| 12                                                               | C            | 109D126X0075C0  | 5.0          | 175          | 2.0      | 12      | -12              | +8     | +10     | 140      |
| 15                                                               | C            | 109D156X0075C0  | 5.0          | 160          | 2.0      | 12      | -14              | +10    | +12     | 140      |
| 22                                                               | C            | 109D226X0075C0  | 5.0          | 157          | 3.0      | 12      | -19              | +10    | +12     | 140      |
| 47                                                               | F            | 109D476X0075F0  | 3.0          | 75           | 4.0      | 24      | -18              | +10    | +12     | 270      |
| 56                                                               | F            | 109D566X0075F0  | 3.0          | 70           | 4.0      | 24      | -20              | +12    | +15     | 270      |
| 82                                                               | F            | 109D826X0075F0  | 2.5          | 63           | 4.0      | 24      | -30              | +12    | +15     | 300      |
| 110                                                              | T            | 109D117X0075T0  | 2.0          | 33           | 9.0      | 36      | -25              | +16    | +20     | 420      |
| 180                                                              | T            | 109D187X0075T0  | 1.8          | 30           | 9.0      | 36      | -35              | +16    | +20     | 440      |
| 200                                                              | T            | 109D207X0075T0  | 1.8          | 29           | 8.0      | 32      | -40              | +20    | +25     | 440      |
| 220                                                              | K            | 109D227X0075K0  | 2.2          | 24           | 10       | 40      | -40              | +20    | +25     | 450      |
| 270                                                              | K            | 109D277X0075K2  | 1.3          | 24           | 10       | 40      | -40              | +20    | +25     | 450      |

**Note**

(1) Part numbers shown are for units with  $\pm 20\%$  capacitance tolerance and uninsulated capacitors. For  $\pm 10\%$  units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the part number. For RoHS-compliant add "E3".





| <b>EXTENDED RATINGS</b>                                           |              |                 |                                     |                                     |                         |                                    |                         |        |         |                                                 |
|-------------------------------------------------------------------|--------------|-----------------|-------------------------------------|-------------------------------------|-------------------------|------------------------------------|-------------------------|--------|---------|-------------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)                                         | CASE<br>CODE | PART NUMBER (1) | MAX. ESR                            | MAX. IMP.                           | MAX. DCL                |                                    | MAX. CAPACITANCE        |        |         | MAX. RMS<br>RIPPLE<br>CURRENT<br>120 Hz<br>(mA) |
|                                                                   |              |                 | AT +25 °C<br>120 Hz<br>( $\Omega$ ) | AT -55 °C<br>120 Hz<br>( $\Omega$ ) | ( $\mu$ A) AT<br>+25 °C | ( $\mu$ A) AT<br>+85 °C<br>+125 °C | CHANGE (%) AT<br>-55 °C | +85 °C | +125 °C |                                                 |
| <b>100 V<sub>DC</sub> AT +85 °C; 65 V<sub>DC</sub> AT +125 °C</b> |              |                 |                                     |                                     |                         |                                    |                         |        |         |                                                 |
| 2.0                                                               | C            | 109D205X0100C0  | 14.0                                | 870                                 | 3.0                     | 12                                 | -20                     | +12    | +12     | 100                                             |
| 8.2                                                               | C            | 109D825X0100C0  | 6.0                                 | 250                                 | 3.0                     | 12                                 | -12                     | +12    | +12     | 130                                             |
| 10                                                                | C            | 109D106X0100C0  | 6.0                                 | 200                                 | 3.0                     | 12                                 | -17                     | +10    | +12     | 130                                             |
| 33                                                                | F            | 109D336X0100F0  | 3.5                                 | 85                                  | 4.0                     | 24                                 | -18                     | +15    | +15     | 250                                             |
| 39                                                                | F            | 109D396X0100F0  | 3.5                                 | 80                                  | 5.0                     | 24                                 | -20                     | +12    | +15     | 250                                             |
| 56                                                                | T            | 109D566X0100T0  | 2.2                                 | 45                                  | 9.0                     | 36                                 | -20                     | +15    | +15     | 400                                             |
| 68                                                                | T            | 109D686X0100T0  | 2.2                                 | 40                                  | 10                      | 40                                 | -30                     | +14    | +16     | 400                                             |
| 86                                                                | K            | 109D866X0100K0  | 3.2                                 | 30                                  | 10                      | 40                                 | -25                     | +15    | +15     | 370                                             |
| 120                                                               | K            | 109D127X0100K0  | 2.8                                 | 30                                  | 12                      | 48                                 | -35                     | +15    | +17     | 440                                             |
| <b>125 V<sub>DC</sub> AT +85 °C; 85 V<sub>DC</sub> AT +125 °C</b> |              |                 |                                     |                                     |                         |                                    |                         |        |         |                                                 |
| 6.8                                                               | C            | 109D685X0125C0  | 11.7                                | 300                                 | 3.0                     | 12                                 | -14                     | +10    | +12     | 130                                             |
| 27                                                                | F            | 109D276X0125F0  | 3.5                                 | 90                                  | 5.0                     | 24                                 | -18                     | +12    | +15     | 250                                             |
| 39                                                                | T            | 109D396X0125T0  | 2.2                                 | 60                                  | 10                      | 40                                 | -16                     | +14    | +16     | 400                                             |
| 47                                                                | T            | 109D476X0125T0  | 2.2                                 | 50                                  | 10                      | 40                                 | -26                     | +14    | +16     | 400                                             |
| 56                                                                | K            | 109D566X0125K0  | 4.1                                 | 32                                  | 10                      | 40                                 | -25                     | +15    | +15     | 330                                             |
| 82                                                                | K            | 109D826X0125K0  | 2.8                                 | 32                                  | 12                      | 48                                 | -30                     | +15    | +17     | 440                                             |

**Note**

(1) Part numbers shown are for units with  $\pm$  20 % capacitance tolerance and uninsulated capacitors. For  $\pm$  10 % units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the part number. For RoHS-compliant add "E3".



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