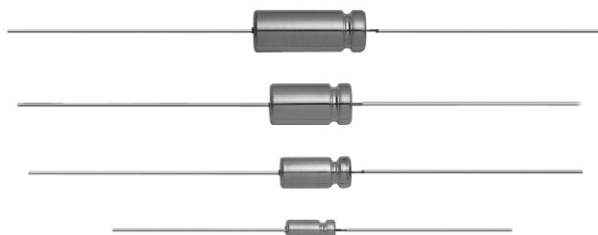


# Wet Tantalum Capacitors Sintered Anode TANTALEX™ Capacitors for Operation to +125 °C, Elastomer-Sealed



## LINKS TO ADDITIONAL RESOURCES



## 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.

## 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)



## 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

Following the life test:

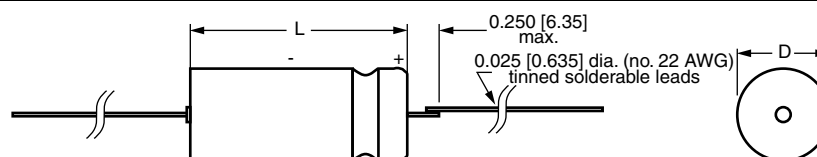
1. DCL shall not exceed the initial requirements or 1 µA, whichever is greater.
2. The ESR shall meet the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement. For capacitors with voltage ratings of 15 V<sub>DC</sub> and below, change in capacitance shall not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

**Notes**
<sup>(1)</sup> For reference only

<sup>(2)</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 | 150 V |
|-----|-----|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| 1.7 |     |     |      |      |      |      |      |      |      |      |      |       | C     | C     |
| 2.5 |     |     |      |      |      |      |      |      |      |      |      | C     |       |       |
| 3.0 |     |     |      |      |      |      |      |      |      |      |      | C     |       | C     |
| 3.5 |     |     |      |      |      |      |      |      |      |      | C    |       |       |       |
| 3.6 |     |     |      |      |      |      |      |      |      |      |      |       | C     |       |
| 4.0 |     |     |      |      |      |      |      |      |      | C    |      |       |       |       |
| 4.5 |     |     |      |      |      |      |      |      | C    |      |      |       |       |       |
| 4.7 |     |     |      |      |      |      |      |      |      |      |      | C     |       |       |
| 5.0 |     |     |      |      |      |      |      |      | C    |      |      |       |       |       |
| 6.8 |     |     |      |      |      |      |      |      |      |      | C    |       |       | F     |
| 7.0 |     |     |      |      |      |      | C    |      |      |      |      |       |       |       |
| 8.0 |     |     |      |      |      |      | C    |      |      |      |      |       |       |       |
| 8.2 |     |     |      |      |      |      |      |      |      | C    |      |       |       |       |
| 9.0 |     |     |      |      |      |      |      |      |      |      |      |       | F     |       |
| 10  |     |     |      |      |      | C    |      |      | C    |      |      | F     |       |       |
| 11  |     |     |      |      |      |      |      |      |      |      |      | F     |       | F     |
| 13  |     |     |      |      |      |      |      |      |      |      | F    |       |       |       |
| 14  |     |     |      |      |      |      |      |      |      |      |      |       | F     |       |
| 15  |     |     |      | C    |      |      | C    |      |      |      | F    |       |       |       |
| 18  |     |     |      |      |      |      |      |      |      |      |      |       | T     |       |
| 20  |     |     | C    |      |      |      |      |      |      | F    |      |       |       |       |
| 22  |     | C   |      |      |      | C    |      |      | F    |      |      | F     |       | F     |
| 25  |     | C   |      |      |      |      |      |      | F    |      |      |       | T     |       |
| 27  |     |     |      |      | C    | C    |      |      |      |      |      |       |       |       |
| 30  | C   |     |      |      |      |      |      |      |      |      |      | T     |       |       |
| 33  |     |     |      | C    |      |      |      |      |      |      | F    |       |       |       |
| 39  |     |     |      |      |      |      |      |      |      | F    |      |       |       | T     |
| 40  |     |     |      |      |      |      | F    |      |      |      | T    |       |       |       |
| 43  |     |     |      |      |      |      |      |      |      |      |      | T     |       |       |
| 47  |     |     | C    |      |      |      |      |      | F    |      |      |       |       |       |
| 50  |     |     |      |      |      | F    |      |      |      | T    |      |       |       |       |
| 56  |     | C   |      |      |      |      |      |      |      |      | T    |       | K     |       |
| 60  |     |     |      |      |      |      |      |      | T    |      |      |       |       |       |

**RATINGS AND CASE CODES (Standard)**

| $\mu\text{F}$ | 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 | 150 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    | F    |      |      |      |      |      |       |       |       |
| 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)**

| $\mu\text{F}$ | 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            |     |     |      |      |      |      |      |      |      |      |      | T     |       |
| 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<br>(μF)                                        | CASE<br>CODE | PART NUMBER <sup>(1)</sup> | 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  |
|                                                            |              |                            | (Ω)       | (Ω)       |          | +125 °C |                  |        |         | 120 Hz   |
|                                                            |              |                            |           |           |          |         |                  |        |         | (mA)     |
| 6 V <sub>DC</sub> AT +85 °C; 7 V <sub>DC</sub> AT +125 °C  |              |                            |           |           |          |         |                  |        |         |          |
| 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      |
| 8 V <sub>DC</sub> AT +85 °C; 5 V <sub>DC</sub> AT +125 °C  |              |                            |           |           |          |         |                  |        |         |          |
| 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      |
| 10 V <sub>DC</sub> AT +85 °C; 7 V <sub>DC</sub> AT +125 °C |              |                            |           |           |          |         |                  |        |         |          |
| 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            | 109D757X0010K0             | 1.0       | 23        | 4.0      | 16      | -80              | +25    | +25     | 670      |

**Note**

<sup>(1)</sup> 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 | CHANGE (%) AT     |                  |        |         |                                                 |
|                                                             |              |                            |                                     |                                     | +25 °C        | +85 °C<br>+125 °C | -55 °C           | +85 °C | +125 °C |                                                 |
| 15 V <sub>DC</sub> AT +85 °C; 10 V <sub>DC</sub> AT +125 °C |              |                            |                                     |                                     |               |                   |                  |        |         |                                                 |
| 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                                             |
| 20 V <sub>DC</sub> AT +85 °C; 13 V <sub>DC</sub> AT +125 °C |              |                            |                                     |                                     |               |                   |                  |        |         |                                                 |
| 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                                             |
| 25 V <sub>DC</sub> AT +85 °C; 15 V <sub>DC</sub> AT +125 °C |              |                            |                                     |                                     |               |                   |                  |        |         |                                                 |
| 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                                             |
| 220                                                         | F            | 109D227X0025F0             | 2.6                                 | 36                                  | 3.2           | 16                | -60              | +13    | +16     | 300                                             |
| 350                                                         | K            | 109D357X0025K0             | 1.3                                 | 24                                  | 7.0           | 28                | -70              | +25    | +25     | 580                                             |
| 30 V <sub>DC</sub> AT +85 °C; 20 V <sub>DC</sub> AT +125 °C |              |                            |                                     |                                     |               |                   |                  |        |         |                                                 |
| 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                                             |
| 35 V <sub>DC</sub> AT +85 °C; 22 V <sub>DC</sub> AT +125 °C |              |                            |                                     |                                     |               |                   |                  |        |         |                                                 |
| 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                                             |
| 50 V <sub>DC</sub> AT +85 °C; 30 V <sub>DC</sub> AT +125 °C |              |                            |                                     |                                     |               |                   |                  |        |         |                                                 |
| 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>(μF)                                           | CASE<br>CODE | PART NUMBER <sup>(1)</sup> | 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  |
|                                                               |              |                            | (Ω)       | (Ω)       |          | +125 °C       |                  |        |         | 120 Hz   |
|                                                               |              |                            |           |           |          |               |                  |        |         | (mA)     |
| 60 V <sub>DC</sub> AT +85 °C; 40 V <sub>DC</sub> AT +125 °C   |              |                            |           |           |          |               |                  |        |         |          |
| 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      |
| 75 V <sub>DC</sub> AT +85 °C; 50 V <sub>DC</sub> AT +125 °C   |              |                            |           |           |          |               |                  |        |         |          |
| 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      |
| 100 V <sub>DC</sub> AT +85 °C; 65 V <sub>DC</sub> AT +125 °C  |              |                            |           |           |          |               |                  |        |         |          |
| 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      |
| 125 V <sub>DC</sub> AT +85 °C; 85 V <sub>DC</sub> AT +125 °C  |              |                            |           |           |          |               |                  |        |         |          |
| 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      |
| 150 V <sub>DC</sub> AT +85 °C; 100 V <sub>DC</sub> AT +125 °C |              |                            |           |           |          |               |                  |        |         |          |
| 1.7                                                           | C            | 109D175X0150C2             | 42        | 1100      | 1.0      | 3.0           | -14              | 7      | 8       | 110      |
| 3.0                                                           | C            | 109D305X0150C2             | 15        | 600       | 1.0      | 3.0           | -14              | 7      | 10      | 140      |
| 6.8                                                           | F            | 109D685X0150F2             | 15        | 300       | 2.0      | 10            | -14              | 10     | 12      | 250      |
| 11                                                            | F            | 109D116X0150F2             | 12        | 250       | 2.0      | 10            | -14              | 10     | 12      | 250      |
| 22                                                            | F            | 109D226X0150F2             | 4.0       | 100       | 5.0      | 25            | -20              | 12     | 15      | 250      |
| 39                                                            | T            | 109D396X0150T2             | 2.2       | 60        | 10       | 40            | -16              | 14     | 16      | 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>(μF)                                         | CASE<br>CODE | PART NUMBER <sup>(1)</sup> | 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  |
|                                                             |              |                            | (Ω)       | (Ω)       |          | +125 °C       |                  |        |         | 120 Hz   |
|                                                             |              |                            |           |           |          |               |                  |        |         | (mA)     |
| 6 V <sub>DC</sub> AT +85 °C; 7 V <sub>DC</sub> AT +125 °C   |              |                            |           |           |          |               |                  |        |         |          |
| 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      |
| 8 V <sub>DC</sub> AT +85 °C; 5 V <sub>DC</sub> AT +125 °C   |              |                            |           |           |          |               |                  |        |         |          |
| 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      |
| 10 V <sub>DC</sub> AT +85 °C; 7 V <sub>DC</sub> AT +125 °C  |              |                            |           |           |          |               |                  |        |         |          |
| 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            | 109D157X0010C0             | 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      |
| 15 V <sub>DC</sub> AT +85 °C; 10 V <sub>DC</sub> AT +125 °C |              |                            |           |           |          |               |                  |        |         |          |
| 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      |
| 20 V <sub>DC</sub> AT +85 °C; 13 V <sub>DC</sub> AT +125 °C |              |                            |           |           |          |               |                  |        |         |          |
| 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      |
| 25 V <sub>DC</sub> AT +85 °C; 15 V <sub>DC</sub> AT +125 °C |              |                            |           |           |          |               |                  |        |         |          |
| 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>(μF)                                         | 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>(Ω) | AT -55 °C<br>120 Hz<br>(Ω) | (μA) AT  |                   | CHANGE (%) AT    |        |         | RIPPLE<br>CURRENT<br>120 Hz<br>(mA) |
|                                                             |              |                            |                            |                            | +25 °C   | +85 °C<br>+125 °C | -55 °C           | +85 °C | +125 °C |                                     |
| 30 V <sub>DC</sub> AT +85 °C; 20 V <sub>DC</sub> AT +125 °C |              |                            |                            |                            |          |                   |                  |        |         |                                     |
| 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                                 |
| 35 V <sub>DC</sub> AT +85 °C; 22 V <sub>DC</sub> AT +125 °C |              |                            |                            |                            |          |                   |                  |        |         |                                     |
| 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            | 109D477X0035K0             | 1.3                        | 21                         | 9.0      | 36                | -58              | +25    | +30     | 590                                 |
| 50 V <sub>DC</sub> AT +85 °C; 30 V <sub>DC</sub> AT +125 °C |              |                            |                            |                            |          |                   |                  |        |         |                                     |
| 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                                 |
| 60 V <sub>DC</sub> AT +85 °C; 40 V <sub>DC</sub> AT +125 °C |              |                            |                            |                            |          |                   |                  |        |         |                                     |
| 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                                 |
| 75 V <sub>DC</sub> AT +85 °C; 50 V <sub>DC</sub> AT +125 °C |              |                            |                            |                            |          |                   |                  |        |         |                                     |
| 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                                 |
| 82                                                          | T            | 109D826X0075T2             | 2.5                        | 45                         | 5.0      | 20                | -25              | +16    | +20     | 400                                 |
| 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**

<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>(μF)                                          | CASE<br>CODE | PART NUMBER <sup>(1)</sup> | MAX. ESR<br>AT +25 °C<br>120 Hz<br>(Ω) | MAX. IMP.<br>AT -55 °C<br>120 Hz<br>(Ω) | MAX. DCL<br>(μA) AT |                   | MAX. CAPACITANCE<br>CHANGE (%) AT |        |         | MAX. RMS<br>RIPPLE<br>CURRENT<br>120 Hz<br>(mA) |
|                                                              |              |                            |                                        |                                         | +25 °C              | +85 °C<br>+125 °C | -55 °C                            | +85 °C | +125 °C |                                                 |
| 100 V <sub>DC</sub> AT +85 °C; 65 V <sub>DC</sub> AT +125 °C |              |                            |                                        |                                         |                     |                   |                                   |        |         |                                                 |
| 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                                                           | T            | 109D866X0100T0             | 3.2                                    | 30                                      | 10                  | 40                | -25                               | +15    | +15     | 370                                             |
| 120                                                          | K            | 109D127X0100K0             | 2.8                                    | 30                                      | 12                  | 48                | -35                               | +15    | +17     | 440                                             |
| 125 V <sub>DC</sub> AT +85 °C; 85 V <sub>DC</sub> AT +125 °C |              |                            |                                        |                                         |                     |                   |                                   |        |         |                                                 |
| 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**

<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"



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