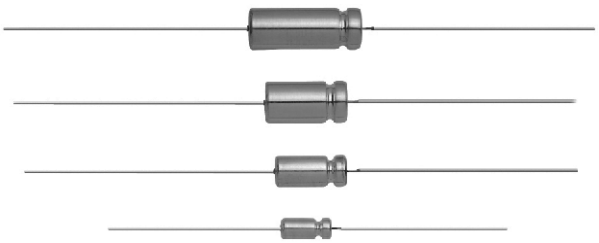
# Wet Tantalum Capacitors Sintered Anode TANTALEX® Capacitors for Operation to +125 °C, Elastomer-Sealed



## 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

Pb-free Available

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 $V_{DC}$ 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 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.



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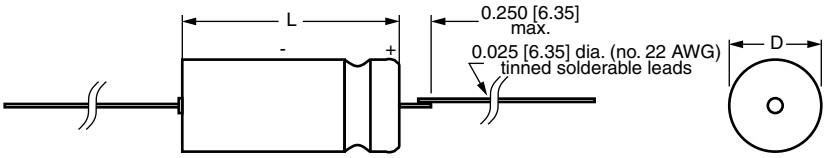
## DIMENSIONS in inches [millimeters]




| 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 (1) | 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**
(1) 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 | | | | |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| 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 | | | | |


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## 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 AT +25 °C 120 Hz (Ω) | MAX. IMP. AT -55 °C 120 Hz (Ω) | MAX. DCL (µA) AT | | MAX. CAPACITANCE CHANGE (%) AT | | | MAX. RMS RIPPLE CURRENT 120 Hz (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | +25 °C | +85 °C +125 °C | -55 °C | +85 °C | +125 °C | |
| **6 $V_{DC}$ AT +85 °C; 7 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 5 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 7 $V_{DC}$ 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 | 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“.


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## STANDARD RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER [1] | MAX. ESR AT +25 °C 120 Hz (Ω) | MAX. IMP. AT -55 °C 120 Hz (Ω) | MAX. DCL (µA) AT | | MAX. CAPACITANCE CHANGE (%) AT | | | MAX. RMS RIPPLE CURRENT 120 Hz (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | +25 °C | +85 °C +125 °C | -55 °C | +85 °C | +125 °C | |
| **15 $V_{DC}$ AT +85 °C; 10 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 13 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 15 $V_{DC}$ 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 |
| 350 | K | 109D357X0025K0 | 1.3 | 24 | 7.0 | 28 | -70 | +25 | +25 | 580 |
| **30 $V_{DC}$ AT +85 °C; 20 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 22 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 30 $V_{DC}$ 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**

[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“.


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## STANDARD RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER [1] | MAX. ESR AT +25 °C 120 Hz (Ω) | MAX. IMP. AT -55 °C 120 Hz (Ω) | MAX. DCL (µA) AT | | MAX. CAPACITANCE CHANGE (%) AT | | | MAX. RMS RIPPLE CURRENT 120 Hz (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | +25 °C | +85 °C +125 °C | -55 °C | +85 °C | +125 °C | |
| **60 $V_{DC}$ AT +85 °C; 40 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 50 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 65 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 85 $V_{DC}$ 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 |

**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“.


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## EXTENDED RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER [1] | MAX. ESR AT +25 °C 120 Hz (Ω) | MAX. IMP. AT -55 °C 120 Hz (Ω) | MAX. DCL (µA) AT | | MAX. CAPACITANCE CHANGE (%) AT | | | MAX. RMS RIPPLE CURRENT 120 Hz (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | +25 °C | +85 °C +125 °C | -55 °C | +85 °C | +125 °C | |
| **6 $V_{DC}$ AT +85 °C; 7 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 5 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 7 $V_{DC}$ 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 | 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 |
| **15 $V_{DC}$ AT +85 °C; 10 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 13 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 15 $V_{DC}$ 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**

[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“.


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## EXTENDED RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER [1] | MAX. ESR AT +25 °C 120 Hz (Ω) | MAX. IMP. AT -55 °C 120 Hz (Ω) | MAX. DCL (µA) AT | | MAX. CAPACITANCE CHANGE (%) AT | | | MAX. RMS RIPPLE CURRENT 120 Hz (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | +25 °C | +85 °C +125 °C | -55 °C | +85 °C | +125 °C | |
| **30 $V_{DC}$ AT +85 °C; 20 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 22 $V_{DC}$ 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 | 109D477X0035T0 | 1.3 | 21 | 9.0 | 36 | -58 | +25 | +30 | 590 |
| **50 $V_{DC}$ AT +85 °C; 30 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 40 $V_{DC}$ 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 $V_{DC}$ AT +85 °C; 50 $V_{DC}$ 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 |
| 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 ± 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“.


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## EXTENDED RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER [1] | MAX. ESR AT +25 °C 120 Hz (Ω) | MAX. IMP. AT -55 °C 120 Hz (Ω) | MAX. DCL (µA) AT | | MAX. CAPACITANCE CHANGE (%) AT | | | MAX. RMS RIPPLE CURRENT 120 Hz (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | +25 °C | +85 °C +125 °C | -55 °C | +85 °C | +125 °C | |
| **100 $V_{DC}$ AT +85 °C; 65 $V_{DC}$ 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 | K | 109D866X0100K0 | 3.2 | 30 | 10 | 40 | -25 | +15 | +15 | 370 |
| 120 | K | 109D127X0100K0 | 2.8 | 30 | 12 | 48 | -35 | +15 | +17 | 440 |
| **125 $V_{DC}$ AT +85 °C; 85 $V_{DC}$ 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**

[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“.


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