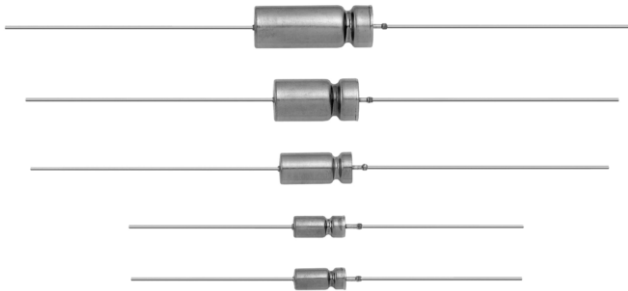


## Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 200 °C Operation



### FEATURES

- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- Standard and extended ratings
- Model 135D tantalum-case electrolytic capacitors incorporate the advantages of all the varieties of electrolytic capacitors and eliminate most of the disadvantages. These units have a 3 V reverse voltage capability at + 85 °C and a higher ripple current capability than any other electrolytic type with similar combinations of capacitance and case size.
- Designed for the aerospace applications, this capacitor was developed under partial sponsorship of the Marshall Space Flight Center, National Aeronautics and Space Administration. The capacitors have a high resistance to damage from shock and vibration. Extended range ratings and high temperature designs are available.
- Model 135D capacitors are commercial equivalents of Tansitor Style; AQ, AR, HAQ, HAR, Mallory-NACC Style; TLT, TXT, THT, THX and Military Style CLR79 and CLR81, designed to meet the performance requirements of Military Specification MIL-PRF-39006/22/25. Capacitors to meet MIL-PRF-39006/22/25 should be ordered by part numbers shown in that specification.
- Compliant to RoHS directive 2002/95/EC



**RoHS\***  
COMPLIANT

### PERFORMANCE CHARACTERISTICS

**Operating Temperature:** - 55 °C to + 85 °C  
(To + 200 °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 and above: 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 rated DC working voltage.

Following life test:

1. DCL, measured at + 85 °C rated voltage, shall not be in excess of the original requirement.
2. The equivalent series resistance shall not exceed 150 % of the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement.

### ORDERING INFORMATION

| 135D  | 306   | X0                                       | 006   | C                                | 2   | 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 % | 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 | Std. temperature (max. + 125 °C)<br>0 = No insulating sleeve<br>2 = Polyester insulation sleeve<br>3 = High temperature film insulation<br><br>High temperature (max. + 200 °C)<br>6 = High temperature film insulation<br>8 = No insulating sleeve | E3 = 100 % tin termination (RoHS compliant design)<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 recommended due to the unit weight.

\* Pb containing terminations are not RoHS compliant, exemptions may apply

**Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum  
Hermetic Seal for - 55 °C to + 200 °C Operation**

| <b>DIMENSIONS</b> in inches [millimeters]   |                      |                                |  |                          |                                 |                         |
|---|----------------------|--------------------------------|--|--------------------------|---------------------------------|-------------------------|
| <p>0.0253 ± 0.002 [0.64 ± 0.05] DIA.<br/>(NO. 22 AWG TINNED NICKEL LEADS)<br/>SOLDERABLE AND WELDABLE</p> |                      |                                |  |                          |                                 |                         |
| CASE CODE   |                      | D                              | L <sub>1</sub>                                 | L <sub>2</sub><br>(Max.) | E                               | WEIGHT<br>(g)<br>(Max.) |
| TYPE<br>135D  | DCLR 79/81<br>EQUIV. |                                |  |                          |                                 |                         |
| C   | T1                   | 0.188 ± 0.016<br>[4.78 ± 0.41] | 0.453 + 0.031 - 0.016<br>[11.51 + 0.79 - 0.41] | 0.734<br>[18.64]         | 1.500 ± 0.250<br>[38.10 ± 6.35] | 2.6                     |
| F   | T2                   | 0.281 ± 0.016<br>[7.14 ± 0.41] | 0.641 + 0.031 - 0.016<br>[16.28 + 0.79 - 0.41] | 0.922<br>[23.42]         | 2.250 ± 0.250<br>[57.15 ± 6.35] | 6.2                     |
| T   | T3                   | 0.375 ± 0.016<br>[9.53 ± 0.41] | 0.766 + 0.031 - 0.016<br>[19.46 + 0.79 - 0.41] | 1.047<br>[26.59]         | 2.250 ± 0.250<br>[57.15 ± 6.35] | 11.6                    |
| K   | T4                   | 0.375 ± 0.016<br>[9.53 ± 0.41] | 1.062 + 0.031 - 0.016<br>[26.97 + 0.79 - 0.41] | 1.343<br>[34.11]         | 2.250 ± 0.250<br>[57.15 ± 6.35] | 17.7                    |

**Note**

- For insulated parts, add 0.015" [0.38] to the diameter. The insulation shall lap over the ends of the capacitor body.

| <b>STANDARD RATINGS</b>  |              |                 |                   |                   |           |                     |               |         |                                |  |      |  |
|--|--------------|-----------------|-------------------|-------------------|-----------|---------------------|---------------|---------|--------------------------------|--|------|--|
| CAPACITANCE<br>(µF)  | CASE<br>CODE | PART NUMBER (1) | MAX. ESR          |                   | MAX. IMP. |                     | MAX. DCL (µA) |         | MAX. CAPACITANCE CHANGE (%) at |  |      | MAX.<br>RIPPLE<br>40 kHz<br>I <sub>rms</sub> |
|  |              |                 | + 25 °C<br>120 Hz | - 55 °C<br>120 Hz | + 25 °C   | + 85 °C<br>+ 125 °C | - 55 °C       | + 85 °C | + 125 °C                       |  |      |  |
| <b>6 WVDC at + 85 °C ... 4 WVDC at + 125 °C ... 3.6 WVDC at + 200 °C</b> |              |                 |                   |                   |           |                     |               |         |                                |  |      |  |
| 30   | C            | 135D306X0006C2  | 4.0               | 100               | 1.0       | 2.0                 | - 40          | + 10.5  | + 12                           |  | 820  |  |
| 68   | C            | 135D686X0006C2  | 3.2               | 60                | 1.0       | 2.0                 | - 40          | + 14    | + 16                           |  | 960  |  |
| 140  | F            | 135D147X0006F2  | 2.0               | 40                | 1.0       | 3.0                 | - 40          | + 14    | + 16                           |  | 1200 |  |
| 270  | F            | 135D277X0006F2  | 2.2               | 25                | 1.0       | 6.5                 | - 44          | + 17.5  | + 20                           |  | 1375 |  |
| 330  | T            | 135D337X0006T2  | 1.4               | 20                | 2.0       | 7.9                 | - 44          | + 14    | + 16                           |  | 1800 |  |
| 560  | T            | 135D567X0006T2  | 1.3               | 25                | 2.0       | 13.0                | - 64          | + 17.5  | + 20                           |  | 1900 |  |
| 1200   | K            | 135D128X0006K2  | 1.0               | 20                | 3.0       | 14.0                | - 80          | + 25    | + 25                           |  | 2265 |  |
| <b>8 WVDC at + 85 °C ... 5 WVDC at + 125 °C ... 4.8 WVDC at + 200 °C</b> |              |                 |                   |                   |           |                     |               |         |                                |  |      |  |
| 25   | C            | 135D256X0008C2  | 4.0               | 100               | 1.0       | 2.0                 | - 40          | + 10.5  | + 12                           |  | 820  |  |
| 56   | C            | 135D566X0008C2  | 3.3               | 59                | 1.0       | 2.0                 | - 40          | + 14    | + 16                           |  | 900  |  |
| 120  | F            | 135D127X0008F2  | 2.6               | 50                | 1.0       | 2.0                 | - 44          | + 17.5  | + 20                           |  | 1230 |  |
| 220  | F            | 135D227X0008F2  | 2.4               | 30                | 1.0       | 7.0                 | - 44          | + 17.5  | + 20                           |  | 1370 |  |
| 290  | T            | 135D297X0008T2  | 1.8               | 25                | 2.0       | 6.0                 | - 64          | + 17.5  | + 20                           |  | 1770 |  |
| 430  | T            | 135D437X0008T2  | 1.4               | 25                | 2.0       | 14.0                | - 64          | + 17.5  | + 20                           |  | 1825 |  |
| 850  | K            | 135D857X0008K2  | 1.0               | 22                | 4.0       | 16.0                | - 80          | + 25    | + 25                           |  | 2330 |  |
| <b>10 WVDC at + 85 °C ... 7 WVDC at + 125 °C ... 6 WVDC at + 200 °C</b>  |              |                 |                   |                   |           |                     |               |         |                                |  |      |  |
| 20   | C            | 135D206X0010C2  | 4.0               | 120               | 1.0       | 2.0                 | - 32          | + 10.5  | + 12                           |  | 820  |  |
| 47   | C            | 135D476X0010C2  | 3.7               | 90                | 1.0       | 2.0                 | - 36          | + 14    | + 16                           |  | 855  |  |
| 100  | F            | 135D107X0010F2  | 2.4               | 60                | 1.0       | 4.0                 | - 36          | + 14    | + 16                           |  | 1200 |  |
| 180  | F            | 135D187X0010F2  | 2.2               | 40                | 1.0       | 7.0                 | - 36          | + 14    | + 16                           |  | 1365 |  |
| 250  | T            | 135D257X0010T2  | 1.8               | 30                | 2.0       | 10.0                | - 40          | + 14    | + 16                           |  | 1720 |  |
| 390  | T            | 135D397X0010T2  | 1.5               | 25                | 2.0       | 16.0                | - 64          | + 17.5  | + 20                           |  | 1800 |  |
| 750  | K            | 135D757X0010K2  | 1.0               | 23                | 4.0       | 16.0                | - 80          | + 25    | + 25                           |  | 2360 |  |
| <b>15 WVDC at + 85 °C ... 10 WVDC at + 125 °C ... 9 WVDC at + 200 °C</b> |              |                 |                   |                   |           |                     |               |         |                                |  |      |  |
| 15   | C            | 135D156X0015C2  | 4.4               | 155               | 1.0       | 2.0                 | - 24          | + 10.5  | + 12                           |  | 780  |  |
| 33   | C            | 135D336X0015C2  | 4.0               | 90                | 1.0       | 2.0                 | - 28          | + 14    | + 16                           |  | 820  |  |
| 70   | F            | 135D706X0015F2  | 2.8               | 75                | 1.0       | 4.0                 | - 28          | + 14    | + 16                           |  | 1150 |  |
| 120  | F            | 135D127X0015F2  | 2.6               | 50                | 1.0       | 7.0                 | - 28          | + 17.5  | + 20                           |  | 1450 |  |
| 170  | T            | 135D177X0015T2  | 2.4               | 35                | 2.0       | 10.0                | - 32          | + 14    | + 16                           |  | 1480 |  |
| 270  | T            | 135D277X0015T2  | 2.2               | 30                | 2.0       | 16.0                | - 56          | + 17.5  | + 20                           |  | 1740 |  |
| 540  | K            | 135D547X0015K2  | 1.0               | 23                | 6.0       | 24.0                | - 80          | + 25    | + 25                           |  | 2330 |  |

**Note**

- (1) Part Numbers are for units with ± 20 % capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.

| STANDARD RATINGS  |              |                            |                         |                         |               |                           |                     |               |                                   |      |  |                                 |
|---|--------------|----------------------------|-------------------------|-------------------------|---------------|---------------------------|---------------------|---------------|-----------------------------------|------|--|---------------------------------|
| CAPACITANCE<br>( $\mu$ F)   | CASE<br>CODE | PART NUMBER <sup>(1)</sup> | MAX. ESR                |                         | MAX. IMP.     |                           | MAX. DCL ( $\mu$ A) |               | MAX. CAPACITANCE CHANGE<br>(%) at |      |  | MAX.<br>RIPPLE<br>40 kHz<br>rms |
|   |              |                            | at<br>+ 25 °C<br>120 Hz | at<br>- 55 °C<br>120 Hz | at<br>+ 25 °C | at<br>+ 85 °C<br>+ 125 °C | at<br>- 55 °C       | at<br>+ 85 °C | at<br>+ 125 °C                    |      |  |                                 |
| <b>25 WVDC at + 85 °C ... 15 WVDC at + 125 °C ... 12 WVDC at + 200 °C</b> |              |                            |                         |                         |               |                           |                     |               |                                   |      |  |                                 |
| 10  | C            | 135D106X0025C2             | 5.3                     | 220                     | 1.0           | 2.0                       | - 16                | + 8           | + 9                               | 715  |  |                                 |
| 22  | C            | 135D226X0025C2             | 4.2                     | 140                     | 1.0           | 2.0                       | - 20                | + 10.5        | + 12                              | 800  |  |                                 |
| 50  | F            | 135D506X0025F2             | 3.0                     | 70                      | 1.0           | 2.0                       | - 28                | + 13          | + 15                              | 1130 |  |                                 |
| 100   | F            | 135D107X0025F2             | 2.8                     | 50                      | 1.0           | 10.0                      | - 28                | + 13          | + 15                              | 1435 |  |                                 |
| 120   | T            | 135D127X0025T2             | 2.6                     | 38                      | 2.0           | 6.0                       | - 32                | + 13          | + 15                              | 1450 |  |                                 |
| 180   | T            | 135D187X0025T2             | 2.2                     | 32                      | 2.0           | 18.0                      | - 48                | + 13          | + 15                              | 1525 |  |                                 |
| 350   | K            | 135D357X0025K2             | 1.3                     | 24                      | 7.0           | 28.0                      | - 70                | + 25          | + 25                              | 1970 |  |                                 |
| <b>30 WVDC at + 85 °C ... 20 WVDC at + 125 °C ... 18 WVDC at + 200 °C</b> |              |                            |                         |                         |               |                           |                     |               |                                   |      |  |                                 |
| 8   | C            | 135D805X0030C2             | 6.6                     | 275                     | 1.0           | 2.0                       | - 16                | + 8           | + 12                              | 640  |  |                                 |
| 15  | C            | 135D156X0030C2             | 6.2                     | 175                     | 1.0           | 2.0                       | - 20                | + 10.5        | + 12                              | 780  |  |                                 |
| 22  | F            | 135D226X0030F2             | 4.6                     | 95                      | 1.0           | 5.0                       | - 20                | + 10.5        | + 12                              | 1005 |  |                                 |
| 40  | F            | 135D406X0030F2             | 4.0                     | 65                      | 1.0           | 5.0                       | - 24                | + 10.5        | + 12                              | 1120 |  |                                 |
| 68  | F            | 135D686X0030F2             | 2.9                     | 60                      | 1.0           | 8.0                       | - 24                | + 13          | + 15                              | 1285 |  |                                 |
| 100   | T            | 135D107X0030T2             | 2.7                     | 40                      | 2.0           | 12.0                      | - 28                | + 10.5        | + 12                              | 1450 |  |                                 |
| 150   | T            | 135D157X0030T2             | 2.3                     | 35                      | 2.0           | 18.0                      | - 48                | + 13          | + 15                              | 1525 |  |                                 |
| 300   | K            | 135D307X0030K2             | 1.4                     | 25                      | 8.0           | 32.0                      | - 60                | + 25          | + 25                              | 1950 |  |                                 |
| <b>35 WVDC at + 85 °C ... 22 WVDC at + 125 °C ... 21 WVDC at + 200 °C</b> |              |                            |                         |                         |               |                           |                     |               |                                   |      |  |                                 |
| 15  | C            | 135D156X0035C2             | 6.2                     | 175                     | 0.75          | 1.5                       | - 20                | + 10.5        | + 12                              | 660  |  |                                 |
| 68  | F            | 135D686X0035F2             | 2.9                     | 60                      | 1.0           | 2.0                       | - 24                | + 13          | + 15                              | 1195 |  |                                 |
| 270   | K            | 135D277X0035K2             | 1.4                     | 26                      | 3.0           | 12.0                      | - 58                | + 25          | + 25                              | 1950 |  |                                 |
| <b>50 WVDC at + 85 °C ... 30 WVDC at + 125 °C ... 30 WVDC at + 200 °C</b> |              |                            |                         |                         |               |                           |                     |               |                                   |      |  |                                 |
| 5   | C            | 135D505X0050C2             | 8.0                     | 400                     | 1.0           | 2.0                       | - 16                | + 5           | + 6                               | 580  |  |                                 |
| 10  | C            | 135D106X0050C2             | 6.4                     | 250                     | 1.0           | 2.0                       | - 24                | + 8           | + 9                               | 715  |  |                                 |
| 25  | F            | 135D256X0050F2             | 4.6                     | 95                      | 1.0           | 5.0                       | - 20                | + 10.5        | + 12                              | 1005 |  |                                 |
| 47  | F            | 135D476X0050F2             | 3.7                     | 70                      | 1.0           | 9.0                       | - 28                | + 13          | + 15                              | 1155 |  |                                 |
| 60  | T            | 135D606X0050T2             | 2.9                     | 45                      | 2.0           | 12.0                      | - 16                | + 10.5        | + 12                              | 1335 |  |                                 |
| 82  | T            | 135D826X0050T2             | 2.5                     | 45                      | 2.0           | 16.0                      | - 32                | + 13          | + 15                              | 1400 |  |                                 |
| 160   | K            | 135D167X0050K2             | 1.5                     | 27                      | 8.0           | 32.0                      | - 50                | + 25          | + 25                              | 1900 |  |                                 |
| <b>60 WVDC at + 85 °C ... 40 WVDC at + 125 °C ... 36 WVDC at + 200 °C</b> |              |                            |                         |                         |               |                           |                     |               |                                   |      |  |                                 |
| 4   | C            | 135D405X0060C2             | 9.3                     | 550                     | 1.0           | 2.0                       | - 16                | + 5           | + 6                               | 525  |  |                                 |
| 8.2   | C            | 135D825X0060C2             | 6.6                     | 275                     | 1.0           | 2.0                       | - 24                | + 8           | + 9                               | 625  |  |                                 |
| 20  | F            | 135D206X0060F2             | 4.7                     | 105                     | 1.0           | 5.0                       | - 16                | + 8           | + 9                               | 930  |  |                                 |
| 39  | F            | 135D396X0060F2             | 3.4                     | 90                      | 1.0           | 9.0                       | - 28                | + 10.5        | + 15                              | 1110 |  |                                 |
| 50  | T            | 135D506X0060T2             | 2.9                     | 50                      | 2.0           | 12.0                      | - 16                | + 10.5        | + 12                              | 1330 |  |                                 |
| 68  | T            | 135D686X0060T2             | 2.5                     | 50                      | 2.0           | 16.0                      | - 32                | + 10.5        | + 15                              | 1365 |  |                                 |
| 140   | K            | 135D147X0060K2             | 1.5                     | 28                      | 8.0           | 32.0                      | - 40                | + 20          | + 20                              | 1850 |  |                                 |
| <b>75 WVDC at + 85 °C ... 50 WVDC at + 125 °C ... 45 WVDC at + 200 °C</b> |              |                            |                         |                         |               |                           |                     |               |                                   |      |  |                                 |
| 3.5   | C            | 135D355X0075C2             | 9.5                     | 650                     | 1.0           | 2.0                       | - 16                | + 5           | + 6                               | 525  |  |                                 |
| 6.8   | C            | 135D685X0075C2             | 6.8                     | 300                     | 1.0           | 2.0                       | - 20                | + 8           | + 9                               | 610  |  |                                 |
| 15  | F            | 135D156X0075F2             | 5.3                     | 150                     | 1.0           | 5.0                       | - 16                | + 8           | + 9                               | 890  |  |                                 |
| 33  | F            | 135D336X0075F2             | 4.2                     | 90                      | 1.0           | 10.0                      | - 24                | + 10.5        | + 15                              | 1000 |  |                                 |
| 40  | T            | 135D406X0075T2             | 3.0                     | 60                      | 2.0           | 12.0                      | - 16                | + 10.5        | + 12                              | 1250 |  |                                 |
| 56  | T            | 135D566X0075T2             | 2.6                     | 60                      | 2.0           | 17.0                      | - 28                | + 10.5        | + 15                              | 1335 |  |                                 |
| 110   | K            | 135D117X0075K2             | 1.5                     | 29                      | 9.0           | 36.0                      | - 35                | + 20          | + 20                              | 1850 |  |                                 |

**Note**

<sup>(1)</sup> Part Numbers are for units with  $\pm 20\%$  capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.



Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for - 55 °C to + 200 °C Operation

| STANDARD RATINGS   |           |                 |                      |                      |               |                        |                                |         |          |                        |
|--|-----------|-----------------|----------------------|----------------------|---------------|------------------------|--------------------------------|---------|----------|------------------------|
| CAPACITANCE (µF)   | CASE CODE | PART NUMBER (1) | MAX. ESR             | MAX. IMP.            | MAX. DCL (µA) |                        | MAX. CAPACITANCE CHANGE (%) at |         |          | MAX. RIPPLE 40 kHz rms |
|  |           |                 | at + 25 °C<br>120 Hz | at - 55 °C<br>120 Hz | at + 25 °C    | at + 85 °C<br>+ 125 °C | - 55 °C                        | + 85 °C | + 125 °C |                        |
| <b>100 WVDC at + 85 °C . . . 65 WVDC at + 125 °C . . . 60 WVDC at + 200 °C</b> |           |                 |                      |                      |               |                        |                                |         |          |                        |
| 2.5  | C         | 135D255X0100C2  | 10.6                 | 950                  | 1.0           | 2.0                    | - 16                           | + 7     | + 8      | 505                    |
| 4.7  | C         | 135D475X0100C2  | 8.5                  | 500                  | 1.0           | 2.0                    | - 16                           | + 7     | + 8      | 565                    |
| 11   | F         | 135D116X0100F2  | 6.0                  | 200                  | 1.0           | 4.0                    | - 16                           | + 7     | + 8      | 835                    |
| 22   | F         | 135D226X0100F2  | 4.8                  | 100                  | 1.0           | 9.0                    | - 16                           | + 7     | + 8      | 965                    |
| 30   | T         | 135D306X0100T2  | 3.3                  | 80                   | 2.0           | 12.0                   | - 16                           | + 7     | + 8      | 1240                   |
| 43   | T         | 135D436X0100T2  | 2.6                  | 70                   | 2.0           | 17.0                   | - 20                           | + 7     | + 8      | 1335                   |
| 82   | K         | 135D826X0100K2  | 1.6                  | 39                   | 3.0           | 24                     | - 24                           | + 18    | + 18     | 1860                   |
| 86   | K         | 135D866X0100K2  | 1.6                  | 30                   | 9.0           | 36.0                   | - 25                           | + 15    | + 15     | 1800                   |
| <b>125 WVDC at + 85 °C . . . 85 WVDC at + 125 °C . . . 75 WVDC at + 200 °C</b> |           |                 |                      |                      |               |                        |                                |         |          |                        |
| 1.7  | C         | 135D175X0125C2  | 15.6                 | 1250                 | 1.0           | 2.0                    | - 16                           | + 7     | + 8      | 415                    |
| 3.6  | C         | 135D365X0125C2  | 10.0                 | 600                  | 1.0           | 2.0                    | - 16                           | + 7     | + 8      | 520                    |
| 9  | F         | 135D905X0125F2  | 7.4                  | 240                  | 1.0           | 5.0                    | - 16                           | + 7     | + 8      | 755                    |
| 14   | F         | 135D146X0125F2  | 5.7                  | 167                  | 1.0           | 7.0                    | - 16                           | + 7     | + 8      | 860                    |
| 18   | T         | 135D186X0125T2  | 3.7                  | 129                  | 2.0           | 9.0                    | - 16                           | + 7     | + 8      | 1130                   |
| 25   | T         | 135D256X0125T2  | 3.2                  | 93                   | 2.0           | 13.0                   | - 16                           | + 7     | + 8      | 1200                   |
| 56   | K         | 135D566X0125K2  | 1.6                  | 32                   | 10.0          | 40.0                   | - 25                           | + 15    | + 15     | 1800                   |

Note

(1) Part Numbers are for units with ± 20 % capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.

| EXTENDED RATINGS   |           |                 |                      |                      |               |                        |                                |         |          |                        |
|--|-----------|-----------------|----------------------|----------------------|---------------|------------------------|--------------------------------|---------|----------|------------------------|
| CAPACITANCE (µF)   | CASE CODE | PART NUMBER (1) | MAX. ESR             | MAX. IMP.            | MAX. DCL (µA) |                        | MAX. CAPACITANCE CHANGE (%) at |         |          | MAX. RIPPLE 40 kHz rms |
|  |           |                 | at + 25 °C<br>120 Hz | at - 55 °C<br>120 Hz | at + 25 °C    | at + 85 °C<br>+ 125 °C | - 55 °C                        | + 85 °C | + 125 °C |                        |
| <b>6 WVDC at + 85 °C . . . 4 WVDC at + 125 °C . . . 3.6 WVDC at + 200 °C</b> |           |                 |                      |                      |               |                        |                                |         |          |                        |
| 220  | C         | 135D227X0006C2  | 3.0                  | 36                   | 2             | 9                      | - 64                           | + 13    | + 16     | 1000                   |
| 560  | F         | 135D567X0006F2  | 2.5                  | 21                   | 3             | 9                      | - 77                           | + 16    | + 20     | 1500                   |
| 820  | F         | 135D827X0006F2  | 2.5                  | 18                   | 3             | 14                     | - 88                           | + 16    | + 20     | 1500                   |
| 1200   | T         | 135D128X0006T2  | 1.5                  | 18                   | 5             | 18                     | - 88                           | + 20    | + 25     | 1900                   |
| 1500   | T         | 135D158X0006T2  | 1.5                  | 18                   | 5             | 20                     | - 90                           | + 20    | + 25     | 1900                   |
| 2200   | K         | 135D228X0006K2  | 1.0                  | 13                   | 6             | 24                     | - 90                           | + 25    | + 30     | 2300                   |
| <b>8 WVDC at + 85 °C . . . 5 WVDC at + 125 °C . . . 4.8 WVDC at + 200 °C</b> |           |                 |                      |                      |               |                        |                                |         |          |                        |
| 180  | C         | 135D187X0008C2  | 3.0                  | 45                   | 2             | 9                      | - 60                           | + 13    | + 16     | 1000                   |
| 680  | F         | 135D687X0008F2  | 2.5                  | 22                   | 3             | 14                     | - 83                           | + 16    | + 20     | 1500                   |
| 1500   | T         | 135D158X0008T2  | 1.5                  | 18                   | 5             | 20                     | - 90                           | + 20    | + 25     | 1900                   |
| 1800   | K         | 135D188X0008K2  | 1.0                  | 14                   | 7             | 25                     | - 90                           | + 25    | + 30     | 2300                   |
| <b>10 WVDC at + 85 °C . . . 7 WVDC at + 125 °C . . . 6 WVDC at + 200 °C</b>  |           |                 |                      |                      |               |                        |                                |         |          |                        |
| 120  | C         | 135D127X0010C2  | 3.2                  | 54                   | 2             | 6                      | - 40                           | + 14    | + 16     | 900                    |
| 150  | C         | 135D157X0010C2  | 3.0                  | 54                   | 2             | 9                      | - 55                           | + 13    | + 16     | 900                    |
| 390  | F         | 135D397X0010F2  | 2.5                  | 27                   | 3             | 9                      | - 66                           | + 16    | + 20     | 1450                   |
| 560  | F         | 135D567X0010F2  | 2.5                  | 27                   | 3             | 16                     | - 77                           | + 16    | + 20     | 1450                   |
| 1200   | T         | 135D128X0010T2  | 1.5                  | 18                   | 5             | 20                     | - 88                           | + 20    | + 25     | 1850                   |
| 1500   | K         | 135D158X0010K2  | 1.0                  | 15                   | 7             | 25                     | - 88                           | + 25    | + 30     | 2300                   |

Note

(1) Part Numbers are for units with ± 20 % capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.

| EXTENDED RATINGS  |              |                 |                         |                         |                     |                           |                                   |         |          |                                 |
|---|--------------|-----------------|-------------------------|-------------------------|---------------------|---------------------------|-----------------------------------|---------|----------|---------------------------------|
| CAPACITANCE<br>( $\mu$ F)   | CASE<br>CODE | PART NUMBER (1) | MAX. ESR                | MAX. IMP.               | MAX. DCL ( $\mu$ A) |                           | MAX. CAPACITANCE CHANGE<br>(%) at |         |          | MAX.<br>RIPPLE<br>40 kHz<br>rms |
|   |              |                 | at<br>+ 25 °C<br>120 Hz | at<br>- 55 °C<br>120 Hz | at<br>+ 25 °C       | at<br>+ 85 °C<br>+ 125 °C | - 55 °C                           | + 85 °C | + 125 °C |                                 |
| <b>15 WVDC at + 85 °C ... 10 WVDC at + 125 °C ... 9 WVDC at + 200 °C</b>  |              |                 |                         |                         |                     |                           |                                   |         |          |                                 |
| 82  | C            | 135D826X0015C2  | 3.9                     | 72                      | 2                   | 6                         | - 35                              | + 12    | + 16     | 900                             |
| 100   | C            | 135D107X0015C2  | 3.9                     | 72                      | 2                   | 9                         | - 44                              | + 13    | + 16     | 900                             |
| 270   | F            | 135D277X0015F2  | 2.5                     | 31                      | 3                   | 9                         | - 62                              | + 16    | + 15     | 1450                            |
| 390   | F            | 135D397X0015F2  | 2.5                     | 31                      | 3                   | 16                        | - 66                              | + 16    | + 20     | 1450                            |
| 680   | T            | 135D687X0015T2  | 1.8                     | 22                      | 6                   | 18                        | - 74                              | + 20    | + 25     | 1800                            |
| 820   | T            | 135D827X0015T2  | 1.8                     | 22                      | 6                   | 24                        | - 77                              | + 20    | + 25     | 1800                            |
| 1000  | K            | 135D108X0015K2  | 1.2                     | 17                      | 8                   | 32                        | - 77                              | + 25    | + 30     | 2330                            |
| <b>25 WVDC at + 85 °C ... 15 WVDC at + 125 °C ... 12 WVDC at + 200 °C</b> |              |                 |                         |                         |                     |                           |                                   |         |          |                                 |
| 47  | C            | 135D476X0025C2  | 5.2                     | 100                     | 2                   | 6                         | - 23                              | + 12    | + 15     | 800                             |
| 56  | C            | 135D566X0025C2  | 4.3                     | 90                      | 2                   | 6                         | - 25                              | + 12    | + 15     | 850                             |
| 68  | C            | 135D686X0025C2  | 4.3                     | 90                      | 2                   | 9                         | - 40                              | + 12    | + 15     | 850                             |
| 180   | F            | 135D187X0025F2  | 2.7                     | 33                      | 3                   | 9                         | - 54                              | + 13    | + 15     | 1400                            |
| 270   | F            | 135D277X0025F2  | 2.7                     | 33                      | 3                   | 16                        | - 62                              | + 13    | + 16     | 1400                            |
| 390   | T            | 135D397X0025T2  | 1.8                     | 25                      | 6                   | 18                        | - 55                              | + 18    | + 25     | 1500                            |
| 470   | T            | 135D477X0025T2  | 1.8                     | 24                      | 6                   | 18                        | - 65                              | + 18    | + 25     | 1750                            |
| 560   | T            | 135D567X0025T2  | 1.8                     | 24                      | 7                   | 28                        | - 72                              | + 20    | + 25     | 1750                            |
| 680   | K            | 135D687X0025K2  | 1.2                     | 19                      | 8                   | 32                        | - 72                              | + 25    | + 30     | 2100                            |
| <b>30 WVDC at + 85 °C ... 20 WVDC at + 125 °C ... 18 WVDC at + 200 °C</b> |              |                 |                         |                         |                     |                           |                                   |         |          |                                 |
| 47  | C            | 135D476X0030C2  | 5.2                     | 100                     | 2                   | 6                         | - 23                              | + 12    | + 15     | 800                             |
| 56  | C            | 135D566X0030C2  | 5.2                     | 100                     | 2                   | 9                         | - 38                              | + 12    | + 15     | 800                             |
| 150   | F            | 135D157X0030F2  | 2.5                     | 36                      | 3                   | 9                         | - 42                              | + 13    | + 15     | 1200                            |
| 220   | F            | 135D227X0030F2  | 2.5                     | 36                      | 3                   | 16                        | - 60                              | + 13    | + 16     | 1200                            |
| 390   | T            | 135D397X0030T2  | 1.8                     | 25                      | 6                   | 18                        | - 55                              | + 18    | + 25     | 1500                            |
| 470   | T            | 135D477X0030T2  | 1.8                     | 25                      | 8                   | 32                        | - 65                              | + 20    | + 25     | 1500                            |
| 560   | K            | 135D567X0030K2  | 1.3                     | 20                      | 9                   | 36                        | - 65                              | + 25    | + 30     | 2000                            |
| <b>35 WVDC at + 85 °C ... 22 WVDC at + 125 °C ... 21 WVDC at + 200 °C</b> |              |                 |                         |                         |                     |                           |                                   |         |          |                                 |
| 39  | C            | 135D396X0035C2  | 4.1                     | 61                      | 2                   | 6                         | - 22                              | + 12    | + 14     | 820                             |
| 120   | F            | 135D127X0035F2  | 2.5                     | 31                      | 3                   | 10                        | - 40                              | + 13    | + 15     | 1315                            |
| 330   | T            | 135D337X0035T2  | 1.8                     | 20                      | 6                   | 18                        | - 50                              | + 16    | + 25     | 1640                            |
| 370   | K            | 135D377X0035K2  | 1.3                     | 15                      | 9                   | 36                        | - 60                              | + 25    | + 30     | 2040                            |
| <b>40 WVDC at + 85 °C ... 25 WVDC at + 125 °C ... 20 WVDC at + 200 °C</b> |              |                 |                         |                         |                     |                           |                                   |         |          |                                 |
| 39  | C            | 135D396X0040C2  | 4.1                     | 61                      | 2                   | 6                         | - 22                              | + 12    | + 14     | 820                             |
| <b>50 WVDC at + 85 °C ... 30 WVDC at + 125 °C ... 30 WVDC at + 200 °C</b> |              |                 |                         |                         |                     |                           |                                   |         |          |                                 |
| 33  | C            | 135D336X0050C2  | 5.0                     | 135                     | 2                   | 9                         | - 29                              | + 10    | + 12     | 700                             |
| 100   | F            | 135D107X0050F2  | 2.8                     | 49                      | 4                   | 12                        | - 36                              | + 13    | + 15     | 1200                            |
| 120   | F            | 135D127X0050F2  | 2.5                     | 49                      | 4                   | 24                        | - 42                              | + 12    | + 15     | 1200                            |
| 270   | T            | 135D277X0050T2  | 2.0                     | 30                      | 8                   | 32                        | - 46                              | + 20    | + 25     | 1450                            |
| 330   | K            | 135D337X0050K2  | 1.5                     | 30                      | 9                   | 36                        | - 46                              | + 25    | + 30     | 1900                            |
| <b>60 WVDC at + 85 °C ... 40 WVDC at + 125 °C ... 36 WVDC at + 200 °C</b> |              |                 |                         |                         |                     |                           |                                   |         |          |                                 |
| 18  | C            | 135C186X0060C2  | 7.0                     | 160                     | 2                   | 12                        | - 20                              | + 7     | + 8      | 700                             |
| 27  | C            | 135D276X0060C2  | 5.0                     | 144                     | 3                   | 12                        | - 24                              | + 10    | + 12     | 700                             |
| 82  | F            | 135D826X0060F2  | 2.9                     | 54                      | 4                   | 16                        | - 30                              | + 15    | + 15     | 1100                            |
| 100   | F            | 135D107X0060F2  | 2.5                     | 54                      | 4                   | 20                        | - 36                              | + 12    | + 15     | 1100                            |
| 220   | T            | 135D227X0060T2  | 1.8                     | 29                      | 8                   | 32                        | - 40                              | + 16    | + 20     | 1400                            |
| 270   | K            | 135D277X0060K2  | 1.4                     | 23                      | 9                   | 36                        | - 45                              | + 20    | + 25     | 1850                            |
| 330   | K            | 135D337X0060K2  | 1.3                     | 31                      | 10                  | 40                        | - 72                              | + 25    | + 25     | 1850                            |

**Note**

(1) Part Numbers are for units with  $\pm 20\%$  capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.



Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum  
Hermetic Seal for - 55 °C to + 200 °C Operation

135D

Vishay

| <b>EXTENDED RATINGS</b>  |              |                            |                         |                         |                     |                           |                         |         |          |                                 |
|--|--------------|----------------------------|-------------------------|-------------------------|---------------------|---------------------------|-------------------------|---------|----------|---------------------------------|
| CAPACITANCE<br>( $\mu$ F)  | CASE<br>CODE | PART NUMBER <sup>(1)</sup> | MAX. ESR                | MAX. IMP.               | MAX. DCL ( $\mu$ A) |                           | MAX. CAPACITANCE CHANGE |         |          | MAX.<br>RIPPLE<br>40 kHz<br>rms |
|  |              |                            | at<br>+ 25 °C<br>120 Hz | at<br>- 55 °C<br>120 Hz | at<br>+ 25 °C       | at<br>+ 85 °C<br>+ 125 °C | - 55 °C                 | + 85 °C | + 125 °C |                                 |
| <b>63 WVDC at + 85 °C . . . 40 WVDC at + 125 °C . . . 31 WVDC at + 200 °C</b>  |              |                            |                         |                         |                     |                           |                         |         |          |                                 |
| 10   | C            | 135D106X0063C2             | 5.3                     | 250                     | 1.0                 | 2.0                       | - 20                    | + 8     | + 9      | 715                             |
| 27   | C            | 135D276X0063C2             | 5.0                     | 144                     | 3                   | 12                        | - 24                    | + 10    | + 12     | 700                             |
| 100  | F            | 135D107X0063F2             | 2.5                     | 54                      | 2                   | 12                        | - 36                    | + 12    | + 15     | 1100                            |
| <b>75 WVDC at + 85 °C . . . 50 WVDC at + 125 °C . . . 45 WVDC at + 200 °C</b>  |              |                            |                         |                         |                     |                           |                         |         |          |                                 |
| 12   | C            | 135D126X0075C2             | 5.1                     | 157                     | 3                   | 12                        | - 19                    | + 10    | + 12     | 600                             |
| 22   | C            | 135D226X0075C2             | 5.1                     | 157                     | 3                   | 12                        | - 19                    | + 10    | + 12     | 600                             |
| 68   | F            | 135D686X0075F2             | 3.0                     | 63                      | 4                   | 16                        | - 25                    | + 12    | + 15     | 1000                            |
| 82   | F            | 135D826X0075F2             | 2.5                     | 63                      | 4                   | 24                        | - 30                    | + 12    | + 15     | 1000                            |
| 180  | T            | 135D187X0075T2             | 2.2                     | 30                      | 9                   | 36                        | - 35                    | + 16    | + 20     | 1300                            |
| 220  | K            | 135D227X0075K2             | 1.8                     | 24                      | 10                  | 40                        | - 40                    | + 20    | + 25     | 1800                            |
| 300  | K            | 135D307X0075K2             | 1.8                     | 32                      | 12                  | 48                        | - 60                    | + 22    | + 22     | 2000                            |
| <b>100 WVDC at + 85 °C . . . 65 WVDC at + 125 °C . . . 60 WVDC at + 200 °C</b> |              |                            |                         |                         |                     |                           |                         |         |          |                                 |
| 10   | C            | 135D106X0100C2             | 5.9                     | 200                     | 3                   | 12                        | - 17                    | + 10    | + 12     | 800                             |
| 39   | F            | 135D396X0100F2             | 3.5                     | 80                      | 5                   | 24                        | - 20                    | + 12    | + 15     | 1300                            |
| 68   | T            | 135D686X0100T2             | 2.2                     | 40                      | 10                  | 40                        | - 30                    | + 14    | + 16     | 1600                            |
| 120  | K            | 135D127X0100K2             | 2.7                     | 30                      | 12                  | 48                        | - 35                    | + 15    | + 17     | 2000                            |
| <b>125 WVDC at + 85 °C . . . 85 WVDC at + 125 °C . . . 75 WVDC at + 200 °C</b> |              |                            |                         |                         |                     |                           |                         |         |          |                                 |
| 6.8  | C            | 135D685X0125C2             | 11.7                    | 300                     | 3                   | 12                        | - 14                    | + 10    | + 12     | 700                             |
| 27   | F            | 135D276X0125F2             | 3.5                     | 90                      | 5                   | 24                        | - 18                    | + 12    | + 15     | 1200                            |
| 47   | T            | 135D476X0125T2             | 2.2                     | 50                      | 10                  | 40                        | - 26                    | + 14    | + 16     | 1500                            |
| 68   | K            | 135D686X0125K2             | 2.2                     | 32                      | 11                  | 44                        | - 28                    | + 15    | + 16     | 1850                            |
| 82   | K            | 135D826X0125K2             | 2.8                     | 32                      | 12                  | 48                        | - 30                    | + 15    | + 17     | 1900                            |

**Note**

<sup>(1)</sup> Part Numbers are for units with  $\pm$  20 % capacitance tolerance, standard + 125 °C maximum temperature, standard polyesterfilm insulation, and tin-lead terminations. For other capacitance tolerances, other maximum temperatures, insulation and termination options, please consult ORDERING INFORMATION on page 1 for proper part number.



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