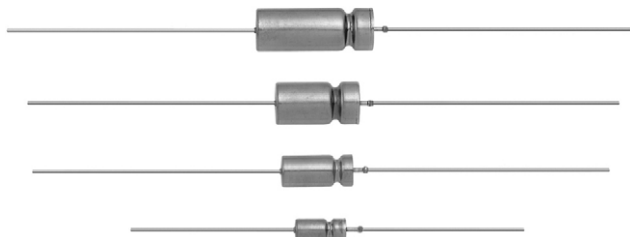




Wet Tantalum HI-TMP[®] Capacitors Tantalum Case With Glass-to-Tantalum Hermetic Seal for -55 °C to +200 °C Operation



LINKS TO ADDITIONAL RESOURCES



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 %

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 minimum 500 h life test at a temperature of +200 °C at the applicable derated DC working voltage.

FEATURES

- Models:
 - 134D - axial through-hole terminations
 - 134J - SMD, outward L-leaded terminations
 - 134L - SMD, inward L-leaded terminations
- High capacitance
- Hermetically sealed, tantalum case
- +200 °C high temperature
- Terminations: axial, standard tin / lead (SnPb)
- 100 % tin (RoHS-compliant) available
- Mounting: through-hole
- Material categorization: for definitions of compliance please see 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

APPLICATIONS

- Industrial
- Petroleum exploration
- High temperature / high stress environment



RoHS* Available

HALOGEN

FREE

GREEN

(5-2008) Available

ORDERING INFORMATION

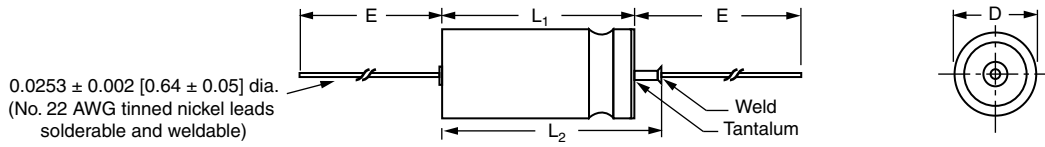
| 134D TYPE | 227 CAPACITANCE | X0 CAPACITANCE TOLERANCE | 100 DC VOLTAGE RATING AT +85 °C | K CASE CODE | 6 CASE INSULATION | E3 RoHS-COMPLIANT |
|--|---|-----------------------------|---|----------------------------------|--|--|
| 134D = axial through-hole leaded terminations 134J = SMD, outward L-leaded terminations 134L = SMD, inward L-leaded terminations | This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow | X0 = ± 20 % X9 = ± 10 % | 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 | 8 = no outer case insulation 6 = high temperature insulation film | E3 = 100 % tin termination (RoHS-compliant design) 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]

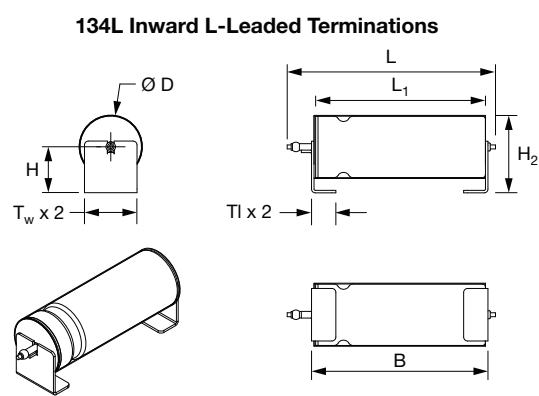
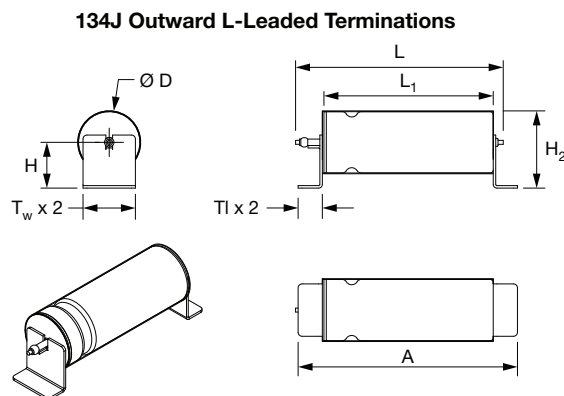


| TYPE 134D | D | L ₁ ⁽¹⁾ | L ₂ (Max.) | E | WEIGHT (g) (Max.) |
|-----------|--------------------------------|--|-----------------------|---------------------------------|-------------------|
| CASE CODE | | | | | |
| C | 0.188 ± 0.016 [4.78 ± 0.41] | 0.453 + 0.031 / - 0.016 [11.51 + 0.79 / - 0.41] | 0.734 [18.64] | 1.500 ± 0.250 [38.10 ± 6.35] | 2.6 |
| F | 0.281 ± 0.016 [7.14 ± 0.41] | 0.641 + 0.031 / - 0.016 [16.28 + 0.79 / - 0.41] | 0.922 [23.42] | 2.250 ± 0.250 [57.15 ± 6.35] | 6.2 |
| T | 0.375 ± 0.016 [9.53 ± 0.41] | 0.766 + 0.031 / - 0.016 [19.46 + 0.79 / - 0.41] | 1.047 [26.59] | 2.250 ± 0.250 [57.15 ± 6.35] | 11.6 |
| K | 0.375 ± 0.016 [9.53 ± 0.41] | 1.062 + 0.031 / - 0.016 [26.97 + 0.79 / - 0.41] | 1.343 [34.11] | 2.250 ± 0.250 [57.15 ± 6.35] | 17.7 |

Note

(1) For insulated parts, add 0.015 inches [0.38 mm] to the diameter. The insulation shall lap over the ends of the capacitor body

SMD PRODUCT DIMENSIONS in inches [millimeters]



| TYPE 134J / 134L | A (max.) | B (max.) | TI (max.) | H (max.) | T _w ± 0.008 | H ₂ (max.) | L (max.) | L ₁ | D (max.) |
|------------------|-----------------|-----------------|----------------|----------------|------------------------|-----------------------|-----------------|--|-----------------|
| CASE CODE | | | | | | | | | |
| C | 0.773 [19.6] | 0.513 [13.0] | 0.157 [4.0] | 0.177 [4.5] | 0.158 [4.0] | 0.296 [7.5] | 0.705 [17.9] | 0.469 + 0.031 / - 0.016 [11.91 + 0.79 / - 0.41] | 0.228 [5.8] |
| F | 1.001 [25.4] | 0.720 [18.3] | 0.157 [4.0] | 0.212 [5.4] | 0.217 [5.5] | 0.374 [9.5] | 0.903 [22.9] | 0.668 + 0.012 / - 0.12 [16.97 + 0.30 / - 0.30] | 0.316 [8.0] |
| T | 1.143 [29.0] | 0.858 [21.8] | 0.157 [4.0] | 0.280 [7.1] | 0.331 [8.4] | 0.492 [12.5] | 1.051 [26.7] | 0.806 + 0.012 / - 0.12 [20.47 + 0.30 / - 0.30] | 0.397 [10.1] |
| K | 1.432 [36.4] | 1.140 [29.0] | 0.157 [4.0] | 0.295 [7.5] | 0.331 [8.4] | 0.492 [12.5] | 1.343 [34.1] | 1.062 + 0.031 / - 0.016 [26.97 + 0.79 / - 0.41] | 0.397 [10.1] |

Note

- Use appropriate adhesive between capacitor body and the board for improved mechanical strength



| RATINGS AND CASE CODES (ESR mΩ) | | | | | |
|---------------------------------|------|------|------|-------|-------|
| μF | 50 V | 60 V | 75 V | 100 V | 125 V |
| 10 | | | | | C |
| 15 | | | | C | |
| 33 | | | C | | |
| 47 | | C | | | F |
| 50 | | | | | F |
| 68 | C | | | F | |
| 100 | | | | | T |
| 110 | | | F | | |
| 150 | | F | | T | K |
| 180 | | | F | | |
| 220 | F | | | K/T | |
| 240 | | | | | K |
| 330 | | | T | | |
| 350 | | | | | K |
| 390 | | T | | | |
| 400 | | | | K | |
| 470 | T | | K | K | |
| 560 | | K | | K | |
| 680 | K | | | | |
| 750 | | | K | K | |
| 1000 | | K | K | | |

| STANDARD RATINGS | | | | | | | | | | | | |
|---|---------------------------------|---------------|-------------------|--------|-------------------------------------|-----------------------------------|-------------------|--------|---|-------------|--|-----|
| CAPACITANCE AT 25 °C 120 Hz (μF) | MAX. CASE CODE ESR (Ω) | MAX. DCL (μA) | | | MAX. IMP., Z AT -25 °C (Ω) | MAX. ΔCAP. AT -25 °C (%) | TYP. ΔCAP. (%) | | AC RIPPLE 85 °C 40 kHz (mA) RMS | PART NUMBER | LIFE TEST PERFORMANCE (h AT +200 °C) | |
| | | 25 °C | 85 °C / 125 °C | 200 °C | | | 85 °C | 125 °C | | | | |
| 50 V_{DC} AT 85 °C; 30 V_{DC} AT 125 °C; 30 V_{DC} AT 200 °C | | | | | | | | | | | | |
| 68 | C | 1.50 | 1 | 5 | 50 | 22 | -6 | 12 | 55 | 1400 | 134(1)686(2)050C(3)(4) | 500 |
| 220 | F | 0.90 | 2 | 10 | 100 | 9 | -15 | 13 | 50 | 2300 | 134(1)227(2)050F(3)(4) | 500 |
| 470 | T | 0.75 | 3 | 25 | 250 | 6 | -24 | 10 | 25 | 2650 | 134(1)477(2)050T(3)(4) | 500 |
| 680 | K | 0.70 | 5 | 40 | 400 | 4 | -22 | 12 | 40 | 2900 | 134(1)687(2)050K(3)(4) | 500 |
| 60 V_{DC} AT 85 °C; 40 V_{DC} AT 125 °C; 36 V_{DC} AT 200 °C | | | | | | | | | | | | |
| 47 | C | 2.00 | 1 | 5 | 50 | 34 | -8 | 8 | 12 | 1250 | 134(1)476(2)060C(3)(4) | 500 |
| 150 | F | 1.10 | 2 | 10 | 100 | 13 | -11 | 10 | 30 | 2050 | 134(1)157(2)060F(3)(4) | 500 |
| 390 | T | 0.90 | 3 | 25 | 250 | 7 | -27 | 10 | 25 | 2450 | 134(1)397(2)060T(3)(4) | 500 |
| 560 | K | 0.80 | 5 | 40 | 400 | 5 | -21 | 12 | 40 | 2700 | 134(1)567(2)060K(3)(4) | 500 |
| 1000 | K | 0.50 | 20 | 120 | 1200 | 3 | -25 | < 12 | < 15 | 3500 | 134(1)108(2)060K(3)(4) | 500 |
| 75 V_{DC} AT 85 °C; 50 V_{DC} AT 125 °C; 45 V_{DC} AT 200 °C | | | | | | | | | | | | |
| 33 | C | 2.50 | 1 | 5 | 50 | 45 | -3.5 | 8 | 25 | 1100 | 134(1)336(2)075C(3)(4) | 500 |
| 110 | F | 1.30 | 2 | 10 | 100 | 16 | -8 | 8 | 30 | 1900 | 134(1)117(2)075F(3)(4) | 500 |
| 180 | F | 1.50 | 5 | 25 | | | | 15 | 20 | 2000 | 134(1)187(2)075F(3)(4) | 500 |
| 330 | T | 1.00 | 3 | 30 | 300 | 8 | -30 | 10 | 25 | 2300 | 134(1)337(2)075T(3)(4) | 500 |
| 470 | K | 0.90 | 5 | 50 | 500 | 6 | -20 | 10 | 40 | 2550 | 134(1)477(2)075K(3)(4) | 500 |
| 750 | K | 0.60 | 20 | 120 | | 3 | -25 | < 10 | < 15 | 3500 | 134(1)757(2)075K(3)(4) | 500 |
| 1000 | K | 0.50 | 25 | 90 | | 3 | -30 | < 20 | < 25 | 3500 | 134(1)108(2)075K(3)(4) | 500 |



| STANDARD RATINGS | | | | | | | | | | | | |
|--|--------------|------------------------------|---------------|-------------------|--------|-------------------------------------|-----------------------------------|-------------------|--------|---|------------------------|--|
| CAPACITANCE AT 25 °C 120 Hz (μF) | CASE CODE | MAX. 120 Hz ESR (Ω) | MAX. DCL (μA) | | | MAX. IMP., Z AT -25 °C (Ω) | MAX. ΔCAP. AT -25 °C (%) | TYP. ΔCAP. (%) | | AC RIPPLE 85 °C 40 kHz (mA) RMS | PART NUMBER | LIFE TEST PERFORMANCE (h AT +200 °C) |
| | | | 25 °C | 85 °C / 125 °C | 200 °C | | | 85 °C | 125 °C | | | |
| 100 V_{DC} AT 85 °C; 65 V_{DC} AT 125 °C; 60 V_{DC} AT 200 °C | | | | | | | | | | | | |
| 15 | C | 3.50 | 1 | 5 | 50 | 95 | -2.5 | 8 | 25 | 950 | 134(1)156(2)100C(3)(4) | 500 |
| 68 | F | 2.10 | 2 | 10 | 100 | 25 | -6 | 8 | 25 | 1500 | 134(1)686(2)100F(3)(4) | 500 |
| 150 | T | 1.60 | 3 | 25 | 250 | 14 | -12 | 8 | 22 | 1800 | 134(1)157(2)100T(3)(4) | 500 |
| 220 | T | 1.60 | 5 | 30 | 300 | 15 | -40 | 10 | 15 | 1800 | 134(1)227(2)100T(3)(4) | 500 |
| 220 | K | 1.20 | 5 | 50 | 500 | 13 | -44 | 8 | 15 | 2200 | 134(1)227(2)100K(3)(4) | 1000 |
| 400 | K | 0.70 | 10 | 120 | 1200 | 5 | -15 | 10 | 15 | 3250 | 134(1)407(2)100K(3)(4) | 500 |
| 470 | K | 0.70 | 25 | 200 | 2000 | 8 | -15 | 5 | 10 | 3250 | 134(1)477(2)100K(3)(4) | 1000 |
| 560 | K | 0.70 | 25 | 200 | 2000 | 5 | -25 | 15 | 20 | 5500 | 134(1)567(2)100K(3)(4) | 1000 |
| 750 | K | 0.90 | 30 | 150 | 1500 | 4 | -30 | 20 | 25 | 4500 | 134(1)757(2)100K(3)(4) | 500 |
| 125 V_{DC} AT 85 °C; 85 V_{DC} AT 125 °C; 75 V_{DC} AT 200 °C | | | | | | | | | | | | |
| 10 | C | 5.50 | 1 | 5 | 50 | 145 | -2.5 | 8 | 20 | 750 | 134(1)106(2)125C(3)(4) | 500 |
| 47 | F | 2.30 | 2 | 10 | 100 | 35 | -5 | 7 | 20 | 1450 | 134(1)476(2)125F(3)(4) | 500 |
| 50 | F | 2.30 | 3 | 10 | 100 | 35 | -5 | 7 | 20 | 1450 | 134(1)506(2)125F(3)(4) | 500 |
| 100 | T | 1.80 | 3 | 25 | 250 | 24 | -20 | 8 | 20 | 1700 | 134(1)107(2)125T(3)(4) | 500 |
| 150 | K | 1.60 | 5 | 50 | 500 | 13 | -10 | 6 | 12 | 1900 | 134(1)157(2)125K(3)(4) | 500 |
| 240 | K | 0.80 | 10 | 50 | 500 | 10 | -10 | 6 | 12 | 2500 | 134(1)247(2)125K(3)(4) | 500 |
| 350 | K | 0.80 | 25 | 250 | 2500 | 15 | -55 | 8 | 12 | 3250 | 134(1)357(2)125K(3)(4) | 1000 ⁽¹⁾ |

Notes

- Part number definitions:
 - (1) Model type:
 - 134D - axial through-hole terminations
 - 134J - SMD, outward L-leaded terminations
 - 134L - SMD, inward L-leaded terminations
 - (2) Capacitance tolerance: X9 = 10 %, X0 = 20 %
 - (3) Style number: 8 = no film insulation, 6 = high temperature film insulation
 - (4) Termination: blank = standard tin/lead, E3 = RoHS-compliant 100 % tin
- ⁽¹⁾ This rating withstands 62 V_{DC} at 200 °C for 1000 h

| RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE, AND APPLIED PEAK VOLTAGE | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------|--------|------|------|------|--------|------|------|------|-------|------|------|------|--------|------|------|------|--------|------|------|------|---------|------|------|------|
| FREQUENCY OF APPLIED RIPPLE CURRENT | | 120 Hz | | | | 800 Hz | | | | 1 kHz | | | | 10 kHz | | | | 40 kHz | | | | 100 kHz | | | |
| | | ≤ 55 | 85 | 105 | 125 | ≤ 55 | 85 | 105 | 125 | ≤ 55 | 85 | 105 | 125 | ≤ 55 | 85 | 105 | 125 | ≤ 55 | 85 | 105 | 125 | ≤ 55 | 85 | 105 | 125 |
| % of 85 °C rated peak voltage | 100 % | 0.60 | 0.39 | - | - | 0.71 | 0.43 | - | - | 0.72 | 0.46 | - | - | 0.88 | 0.55 | - | - | 1.0 | 0.63 | - | - | 1.1 | 0.69 | - | - |
| | 90 % | 0.60 | 0.46 | - | - | 0.71 | 0.55 | - | - | 0.72 | 0.55 | - | - | 0.88 | 0.67 | - | - | 1.0 | 0.77 | - | - | 1.1 | 0.85 | - | - |
| | 80 % | 0.60 | 0.52 | 0.35 | - | 0.71 | 0.62 | 0.42 | - | 0.72 | 0.62 | 0.42 | - | 0.88 | 0.76 | 0.52 | - | 1.0 | 0.87 | 0.59 | - | 1.1 | 0.96 | 0.65 | - |
| | 70 % | 0.60 | 0.58 | 0.44 | - | 0.71 | 0.69 | 0.52 | - | 0.72 | 0.70 | 0.52 | - | 0.88 | 0.85 | 0.64 | - | 1.0 | 0.97 | 0.73 | - | 1.1 | 1.07 | 0.80 | - |
| | 66 2/3 % | 0.60 | 0.60 | 0.46 | 0.27 | 0.71 | 0.71 | 0.55 | 0.32 | 0.72 | 0.72 | 0.55 | 0.32 | 0.88 | 0.88 | 0.68 | 0.40 | 1.0 | 1.0 | 0.77 | 0.45 | 1.1 | 1.1 | 0.85 | 0.50 |



TYPICAL PERFORMANCE CHARACTERISTICS OF 134D, 134J, 134L CAPACITORS

| ELECTRICAL CHARACTERISTICS | |
|---------------------------------|--|
| ITEM | PERFORMANCE CHARACTERISTICS |
| Operating temperature range | -55 °C to +85 °C (to +200 °C with voltage derating) |
| Capacitor tolerance | ± 20 %, ± 10 % at 120 Hz, at +25 °C |
| Capacitor change by temperature | Limit per Standard Ratings table |
| ESR | Limit per Standard Ratings table, at +25 °C, 120 Hz |
| Impedance | Limit per Standard Ratings table, at -55 °C, 120 Hz |
| DCL (leakage current) | Limit per Standard Ratings table |
| AC ripple current | Limit per Standard Ratings table, at +85 °C and 40 kHz |
| Reverse voltage | None |
| Surge voltage | Surge voltage shall be in accordance with MIL-PRF-39006 and Table 2 of DSCC93026. The DC rated surge voltage is the maximum voltage to which the capacitors can be subjected under any conditions including transients and peak ripple at the highest line voltage. The DC surge voltage is 115 % of rated DC voltage. |

| PERFORMANCE CHARACTERISTICS | |
|-----------------------------|--|
| ITEM | PERFORMANCE CHARACTERISTICS |
| Life testing | Capacitors shall be capable of withstanding a minimum 500 h life test at a temperature +200 °C at derated voltage. |

| ENVIRONMENTAL CHARACTERISTICS | | |
|-------------------------------|--------------------------------------|---|
| ITEM | CONDITION | COMMENTS |
| Seal | MIL-PRF-39006 | When the capacitors are tested as specified in MIL-PRF-39006, there shall be no evidence of leakage. |
| Moisture resistance | MIL-PRF-39006 | Moisture resistance shall be in accordance with MIL-PRF-39006. Number of cycles: 10 continuous cycles |
| Barometric pressure (reduced) | MIL-STD-202, method 105, condition E | Altitude 150 000 feet |

| MECHANICAL CHARACTERISTICS | | |
|----------------------------|-------------------------|--|
| ITEM | TEST METHOD | CONDITION |
| Shock (specified pulse) | MIL-STD-202, method 213 | Test condition I (100 g) |
| Vibration, high frequency | MIL-STD-202, method 204 | Test condition D (20 g peak) |
| Thermal shock | MIL-STD-202, method 107 | Test condition A, 30 cycles |
| Solderability | MIL-STD-202, method 208 | ANSI/J-STD-002, test A Solderability shall be in accordance with MIL-PRF-39006. |
| Terminal strength | MIL-STD-202, method 211 | Terminal strength shall be in accordance with MIL-PRF-39006. |
| Resistance to solder heat | MIL-STD-202, method 210 | Test condition C The capacitors shall meet the requirements of MIL-PRF-39006. |
| Terminals | MIL-STD-1276 | Terminals shall be as specified in MIL-STD-1276. The length and diameter of the terminals shall be as specified in Dimensions table. All terminals shall be permanently secured internally and externally, as applicable. All external joints shall be welded. |
| Marking | MIL-STD-1285 | Marking of capacitors conforms to method I of MIL-STD-1285 and include capacitance (in µF), capacitance tolerance letter, rated voltage, date code, lot symbol, and Vishay trademark. |

| SELECTOR GUIDES | |
|----------------------------|--|
| Tantalum Selector Guide | www.vishay.com/doc?49054 |
| Parameter Comparison Guide | www.vishay.com/doc?42088 |



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