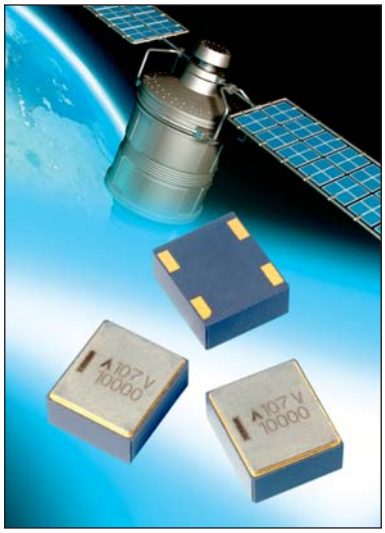
# TCH Low ESR Hermetic Series

## SMD Low ESR Tantalum Capacitors with Conductive Polymer Electrode in Hermetic Package



## FEATURES

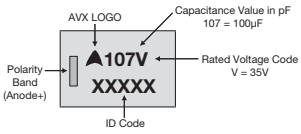
- Aerospace & Hi-Rel applications
- Low ESR conductive polymer electrode
- Endurance up to 10 000 hrs. on selected codes
- Ceramic case hermetic packaging
- Stability under humidity and ambient atmosphere exposure
- Large case sizes including CTC-21D provide high capacitance values
- Developed with ESA to suit aerospace applications
- Ongoing ESA qualification
- Manufacturing and screening utilizing AVX patented Q-Process to effectively remove components that may experience excessive parametric shifts or instability in operation life

## APPLICATIONS

- Aerospace
- Defence
- Power supplies
- Pulse power

## MARKING

### 9 CASE




For additional information on Q-process please consult the AVX technical publication "Reaching the Highest Reliability for Tantalum Capacitors" (see the link: http://www.avx.com/docs/techinfo/Qprocess.pdf)

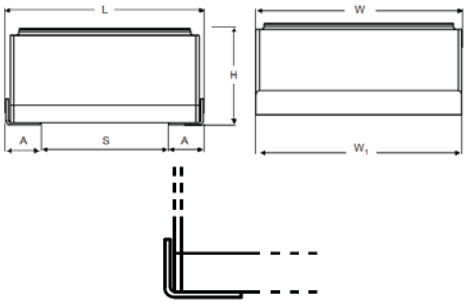
## CASE DIMENSIONS: millimeters (inches)

| Code | Type | L±0.20 (0.008) | W±0.20 (0.008) | H Max. | $W_1$±0.20 (0.008) | A±0.20 (0.008) | S Min. |
|---|---|---|---|---|---|---|---|
| 9 (CTC-21D) | J-lead (L-shape) | 11.50 ± 0.50 (0.453 ± 0.020) | 12.50 ± 0.50 (0.492 ± 0.020) | 6.15 (0.242) | 12.50 ± 0.50 (0.492 ± 0.020) | 1.90 ± 0.50 (0.075 ± 0.020) | 7.00 (0.276) |
| 9 (CTC-21D) | Undertab | 11.00 (0.433) | 12.50 (0.492) | 5.95 (0.234) | 10.50 (0.413) | 1.50 (0.059) | 7.80 (0.307) |

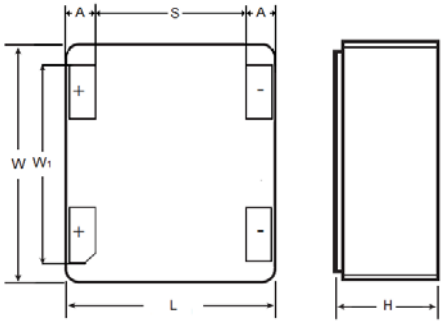
Available ratings

Engineering samples - please contact manufacturer

### 'J' Lead Termination (L-shape)




### Undertab Termination




## TECHNICAL SPECIFICATIONS

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Technical Data: | | All technical data relate to an ambient temperature of +25°C | | | | | | | | | |
| Capacitance Range: | | 15 µF to 680 µF | | | | | | | | | |
| Capacitance Tolerance: | | ±20% | | | | | | | | | |
| Leakage Current DCL: | | 0.1CV | | | | | | | | | |
| Rated Voltage ($V_R$) | ≤ +85°C | 10 | 16 | 20 | 25 | 35 | 50 | 63 | 75 | 100 | |
| Category Voltage ($V_C$) | ≤ +125°C | 7 | 11 | 13.5 | 17 | 23.5 | 33 | 42 | 50 | 66 | |
| Temperature Range: | | -55°C to +125°C | | | | | | | | | |
| Reliability: | | 1% per 1000 hours at 85ºC, Vr with 0.1Ω/Vseries impedance, 60% confidence level | | | | | | | | | |
| Termination Finish: | | Gold Plating (Undertab), Sn/Pb (J-lead) | | | | | | | | | |

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## HOW TO ORDER

## AVX PART NUMBER

| TCH | 9 | 687 | M | 016 | W | 0040 | U |
|---|---|---|---|---|---|---|---|
| **Type** | **Case Size** See table above | **Capacitance Code** pF code: 1st two digits represent significant figures 3rd digit represents multiplier (number of zeros to follow) | **Tolerance** M = ±20% | **Rated DC Voltage** 010 = 10Vdc, 016 = 16Vdc, 020 = 20Vdc, 025 = 25Vdc, 035 = 35Vdc, 050 = 50Vdc, 063 = 63Vdc, 075 = 75Vdc, 100 = 100Vdc | **Packaging** W = Waffle B = Bulk | **ESR in mΩ** | **Termination** J = 'J' lead (L-shape) U = Undertab |

LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

*For RoHS compliant products, please select correct termination style.*

## CAPACITANCE AND VOLTAGE RANGE (CASE CODE BEFORE THE BRACKETS)

| Capacitance | | Rated Voltage DC ($V_R$) at 85°C | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **µF** | **Code** | **10V** | **16V** | **20V** | **25V** | **35V** | **50V** | **63V** | **75V** | **100V** |
| 15 | 156 | | | | | | | | | 9(150)* |
| 22 | 226 | | | | | | | | 9(120)* | 9(150) |
| 33 | 336 | | | | | | | 9(100)* | 9(120) | |
| 47 | 476 | | | | | | 9(70) | 9(100)* | | |
| 68 | 686 | | | | | | 9(70)* | | | |
| 100 | 107 | | | | 9(50)* | 9(55) | | | | |
| 150 | 157 | | | 9(45)* | 9(50) | 9(55)* | | | | |
| 220 | 227 | 9(40)* | 9(40) | 9(45)* | 9(50)* | | | | | |
| 330 | 337 | 9(40) | 9(40)* | 9(45)* | | | | | | |
| 470 | 477 | 9(40)* | 9(40)* | | | | | | | |
| 680 | 687 | 9(40)* | 9(40) | | | | | | | |

Available Ratings: (ESR ratings in mOhms in brackets)
Engineering samples - please contact manufacturer
*Codes under development – upon request, please contact manufacturer

# TCH Low ESR Hermetic Series

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## RATINGS & PART NUMBER REFERENCE

| AVX Part No. | Case Size | Capacitance (µF) | Rated Voltage (V) | Rated Temperature (°C) | Category Voltage (V) | Category Temperature (°C) | DCL (µA) Max. | DF % Max. | ESR Max. (mΩ) @ 100kHz | MSL | 100kHz RMS Current (A) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 25°C | 85°C | 125°C |
| **10 Volt @ 85°C** | | | | | | | | | | | | | |
| TCH9227M010W0040# | 9 | 220 | 10 | 85 | 7 | 125 | 220 | 8 | 40 | 1 | 3.16 | 2.84 | 1.26 |
| TCH9337M010W0040# | 9 | 330 | 10 | 85 | 7 | 125 | 330 | 8 | 40 | 1 | 3.16 | 2.84 | 1.26 |
| TCH9477M010W0040# | 9 | 470 | 10 | 85 | 7 | 125 | 470 | 8 | 40 | 1 | 3.16 | 2.84 | 1.26 |
| TCH9687M010W0040# | 9 | 680 | 10 | 85 | 7 | 125 | 680 | 8 | 40 | 1 | 3.16 | 2.84 | 1.26 |
| **16 Volt @ 85°C** | | | | | | | | | | | | | |
| TCH9227M016W0040# | 9 | 220 | 16 | 85 | 10 | 125 | 352 | 8 | 40 | 1 | 3.16 | 2.84 | 1.26 |
| TCH9337M016W0040# | 9 | 330 | 16 | 85 | 10 | 125 | 528 | 8 | 40 | 1 | 3.16 | 2.84 | 1.26 |
| TCH9477M016W0040# | 9 | 470 | 16 | 85 | 10 | 125 | 752 | 8 | 40 | 1 | 3.16 | 2.84 | 1.26 |
| TCH9687M016W0040# | 9 | 680 | 16 | 85 | 10 | 125 | 1088 | 8 | 40 | 1 | 3.16 | 2.84 | 1.26 |
| **20 Volt @ 85°C** | | | | | | | | | | | | | |
| TCH9157M020W0045# | 9 | 150 | 20 | 85 | 13 | 125 | 300 | 8 | 45 | 1 | 2.98 | 2.68 | 1.19 |
| TCH9227M020W0045# | 9 | 220 | 20 | 85 | 13 | 125 | 440 | 8 | 45 | 1 | 2.98 | 2.68 | 1.19 |
| TCH9337M020W0045# | 9 | 330 | 20 | 85 | 13 | 125 | 660 | 8 | 45 | 1 | 2.98 | 2.68 | 1.19 |
| **25 Volt @ 85°C** | | | | | | | | | | | | | |
| TCH9107M025W0050# | 9 | 100 | 25 | 85 | 17 | 125 | 250 | 8 | 50 | 1 | 2.83 | 2.55 | 1.13 |
| TCH9157M025W0050# | 9 | 150 | 25 | 85 | 17 | 125 | 357 | 8 | 50 | 1 | 2.83 | 2.55 | 1.13 |
| TCH9227M025W0050# | 9 | 220 | 25 | 85 | 17 | 125 | 550 | 8 | 50 | 1 | 2.83 | 2.55 | 1.13 |
| **35 Volt @ 85°C** | | | | | | | | | | | | | |
| TCH9107M035W0055# | 9 | 100 | 35 | 85 | 23 | 125 | 350 | 8 | 55 | 1 | 2.69 | 2.42 | 1.08 |
| TCH9157M035W0055# | 9 | 150 | 35 | 85 | 23 | 125 | 525 | 8 | 55 | 1 | 2.69 | 2.42 | 1.08 |
| **50 Volt @ 85°C** | | | | | | | | | | | | | |
| TCH9476M050W0070# | 9 | 47 | 50 | 85 | 33 | 125 | 235 | 8 | 70 | 1 | 2.39 | 2.15 | 0.96 |
| TCH9686M050W0070# | 9 | 68 | 50 | 85 | 33 | 125 | 340 | 8 | 70 | 1 | 2.39 | 2.15 | 0.96 |
| **63 Volt @ 85°C** | | | | | | | | | | | | | |
| TCH9336M063W0100# | 9 | 33 | 63 | 85 | 33 | 125 | 215 | 8 | 100 | 1 | 2.00 | 1.80 | 0.80 |
| TCH9476M063W0100# | 9 | 47 | 63 | 85 | 33 | 125 | 296 | 8 | 100 | 1 | 2.00 | 1.80 | 0.80 |
| **75 Volt @ 85°C** | | | | | | | | | | | | | |
| TCH9226M075W0120# | 9 | 22 | 75 | 85 | 33 | 125 | 165 | 8 | 120 | 1 | 1.82 | 1.64 | 0.73 |
| TCH9336M075W0120# | 9 | 33 | 75 | 85 | 33 | 125 | 248 | 8 | 120 | 1 | 1.82 | 1.64 | 0.73 |
| **100 Volt @ 85°C** | | | | | | | | | | | | | |
| TCH9156M100W0150# | 9 | 15 | 100 | 85 | 33 | 125 | 150 | 8 | 150 | 1 | 1.63 | 1.47 | 0.65 |
| TCH9226M100W0150# | 9 | 22 | 100 | 85 | 33 | 125 | 220 | 8 | 150 | 1 | 1.63 | 1.47 | 0.65 |

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5RMS with a maximum DC bias of 2.2V. DCL is measured at rated voltage after 5 minutes.

Moisture Sensitivity Level (MSL) is defined according to J-STD-020.

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## QUALIFICATION TABLE

<table>
<tr><th rowspan="2">TEST</th><th colspan="7">TCH low ESR hermetic series (Temperature range -55ºC to +125ºC)</th></tr>
<tr><th colspan="3">Condition</th><th colspan="4">Characteristics</th></tr>
<tr><td rowspan="5">Endurance</td><td colspan="3" rowspan="5">Determine after application of rated voltage for 2000 (10000) +48/0 hours at 85±2ºC and then leaving min. 2 hours at room temperature. Also determine of 125ºC temperature, category voltage for 2000 +48/-0 hours and then leaving min. 2 hours at room temperature. Power supply impedance to be < 3Ω.</td><td>Visual examination</td><td colspan="3">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="3">1.25 x initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="3">within ±20% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">1.5 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">2 x initial limit</td></tr>
<tr><td rowspan="5">Storage Life</td><td colspan="3" rowspan="5">125ºC, 0V, 2000h</td><td>Visual examination</td><td colspan="3">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="3">2 x initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="3">within ±20% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">1.5 x initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">2 x initial limit</td></tr>
<tr><td rowspan="5">Humidity</td><td colspan="3" rowspan="5">Determine after storage without applied voltage at 40±2ºC and 90±2% relative humidity for 56 days and then recovery min. 2 hours at room temperature.</td><td>Visual examination</td><td colspan="3">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="3">1.25 x initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="3">within ±10% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">1.25 x initial limit</td></tr>
<tr><td rowspan="8">Temperature Stability</td><td>Step</td><td>Temperature°C</td><td>Duration (min)</td><td></td><td>+20ºC</td><td>-55ºC</td><td>+20ºC</td><td>+85ºC</td><td>+125ºC</td><td>+20ºC</td></tr>
<tr><td>1</td><td>+22</td><td>15</td><td>DCL</td><td>IL*</td><td>n/a</td><td>IL*</td><td>10 x IL*</td><td>12.5 x IL*</td><td>IL*</td></tr>
<tr><td>2</td><td>-55</td><td>15</td><td>ΔC/C</td><td>IL*</td><td>+0/-20%</td><td>±5%</td><td>+20/-0%</td><td>+30/-0%</td><td>±5%</td></tr>
<tr><td>3</td><td>+22</td><td>15</td><td>DF</td><td>IL*</td><td>1.5 x IL*</td><td>IL*</td><td>1.5 x IL*</td><td>2 x IL*</td><td>IL*</td></tr>
<tr><td>4</td><td>+85</td><td>15</td><td rowspan="3">ESR</td><td rowspan="3">1.25 x IL*</td><td rowspan="3">1.25 x IL*</td><td rowspan="3">1.25 x IL*</td><td rowspan="3">1.5 x IL*</td><td rowspan="3">1.5 x IL*</td><td rowspan="3">1.25 x IL*</td></tr>
<tr><td>5</td><td>+125</td><td>15</td></tr>
<tr><td>6</td><td>+22</td><td>15</td></tr>
<tr><td rowspan="5">Surge Voltage</td><td colspan="3" rowspan="5">Test temperature: 85ºC+3/0ºC<br>Surge voltage: 1.3 x rated voltage<br>Series protection resistance: 33Ω<br>Discharge resistance: 33Ω<br>Number of cycles: 1000x<br>Cycle duration: 6 min; 30 sec charge,<br>5 min 30 sec discharge</td><td>Visual examination</td><td colspan="3">no visible damage</td></tr>
<tr><td>DCL</td><td colspan="3">initial limit</td></tr>
<tr><td>ΔC/C</td><td colspan="3">within ±20% of initial value</td></tr>
<tr><td>DF</td><td colspan="3">initial limit</td></tr>
<tr><td>ESR</td><td colspan="3">1.25 x initial limit</td></tr>
</table>

*Initial Limit

LifeElectronics
Живое партнерство

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*ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703*

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