TCH Low ESR Hermetic Series
SMD Low ESR Conductive Polymer Capacitors
in Hermetic package, COTS-Plus

MARKING

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

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)

<table>
<thead>
<tr>
<th>Code</th>
<th>Type</th>
<th>L</th>
<th>W</th>
<th>H Max.</th>
<th>W,</th>
<th>A</th>
<th>S Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 (CTC-21D)</td>
<td>J-lead (C-shape)</td>
<td>12.00 ±</td>
<td>12.50 ±</td>
<td>8.45</td>
<td>12.30 ±</td>
<td>2.30 ±</td>
<td>6.50 ±</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.472 ±</td>
<td>0.492 ±</td>
<td>0.333</td>
<td>0.484 ±</td>
<td>0.091 ±</td>
<td>0.256</td>
</tr>
<tr>
<td></td>
<td>J-lead (L-shape)</td>
<td>11.50 ±</td>
<td>12.50 ±</td>
<td>6.15</td>
<td>12.50 ±</td>
<td>1.90 ±</td>
<td>7.00 ±</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.453 ±</td>
<td>0.492 ±</td>
<td>0.242</td>
<td>0.492 ±</td>
<td>0.075 ±</td>
<td>0.276</td>
</tr>
<tr>
<td>9 (CTC-21D)</td>
<td>Undertab</td>
<td>11.00 ±</td>
<td>12.50 ±</td>
<td>5.95</td>
<td>10.50 ±</td>
<td>1.50 ±</td>
<td>7.80 ±</td>
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<tr>
<td></td>
<td></td>
<td>0.433 ±</td>
<td>0.492 ±</td>
<td>0.254</td>
<td>0.413 ±</td>
<td>0.059 ±</td>
<td>0.307</td>
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</tbody>
</table>

‘J’ Lead Termination (C-shape)

‘J’ Lead Termination (L-shape)

Undertab Termination
TECHNICAL SPECIFICATIONS

Technical Data: All technical data relate to an ambient temperature of +25°C

- **Capacitance Range:** 22 μF to 330 μF (for extended range under development, contact manufacturer)
- **Capacitance Tolerance:** ±20%
- **Leakage Current DCL:** 0.1CV
- **Rated Voltage DC (V<sub>R</sub>) ≤ +85°C:**
  - 10
  - 16
  - 20
  - 25
  - 35
  - 50
  - 63
  - 75
  - 100
- **Category Voltage (V<sub>S</sub>) ≤ +125°C:**
  - 7
  - 11
  - 13
  - 17
  - 23
  - 33
  - 42
  - 50
  - 66
- **Temperature Range:** -55°C to +125°C
- **Reliability:** 1% per 1000 hours at 85°C, Vr with 0.1Ω/Vseries impedance, 60% confidence level
- **Termination Finish:** Gold Plating (Undertab), Gold Plating (J-lead/L-shape), Sn/Pb Plating (J-lead/C-shape, L-shape)

HOW TO ORDER

AVX PART NUMBER

<table>
<thead>
<tr>
<th>Type</th>
<th>Case Size</th>
<th>Capacitance Code</th>
<th>Tolerance M = ±20%</th>
<th>Rated DC Voltage</th>
<th>Packaging W = Waffle</th>
<th>ESR in mΩ</th>
<th>Termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCH</td>
<td>9</td>
<td>687</td>
<td>M</td>
<td>010 = 10Vdc</td>
<td>050 = 50Vdc</td>
<td>0040</td>
<td>C</td>
</tr>
</tbody>
</table>

CAPACITANCE AND VOLTAGE RANGE (CASE CODE BEFORE THE BRACKETS)

<table>
<thead>
<tr>
<th>Capacitance (μF)</th>
<th>Code</th>
<th>Rated Voltage DC (V&lt;sub&gt;R&lt;/sub&gt;) at 85°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>156</td>
<td>10V, 16V, 20V, 25V, 35V, 50V, 63V, 75V, 100V</td>
</tr>
<tr>
<td>22</td>
<td>226</td>
<td>9(150)</td>
</tr>
<tr>
<td>33</td>
<td>336</td>
<td>9(120)</td>
</tr>
<tr>
<td>47</td>
<td>476</td>
<td>9(70)</td>
</tr>
<tr>
<td>68</td>
<td>686</td>
<td>9(55)</td>
</tr>
<tr>
<td>100</td>
<td>107</td>
<td>9(55)</td>
</tr>
<tr>
<td>150</td>
<td>157</td>
<td>9(55)</td>
</tr>
<tr>
<td>220</td>
<td>227</td>
<td>9(40)</td>
</tr>
<tr>
<td>330</td>
<td>337</td>
<td>9(40)</td>
</tr>
</tbody>
</table>

Released ratings, (ESR ratings in mOhms in parentheses)
RATINGS & PART NUMBER REFERENCE

<table>
<thead>
<tr>
<th>AVX Part No.</th>
<th>Case Size</th>
<th>Capacitance (μF)</th>
<th>Rated Voltage (V)</th>
<th>Rated Temperature (ºC)</th>
<th>Category Voltage (V)</th>
<th>Category Temperature (ºC)</th>
<th>DCL Max. (μA)</th>
<th>DF Max. (%)</th>
<th>ESR Max. @ 100kHz (mΩ)</th>
<th>100kHz RMS Current (A)</th>
<th>Endurance at 85ºC (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCH9337M010W0040#</td>
<td>9</td>
<td>330</td>
<td>10</td>
<td>85</td>
<td>7</td>
<td>125</td>
<td>330</td>
<td>8</td>
<td>40</td>
<td>3.16</td>
<td>2.84</td>
</tr>
<tr>
<td>TCH9227M016W0040#</td>
<td>9</td>
<td>220</td>
<td>16</td>
<td>85</td>
<td>10</td>
<td>125</td>
<td>352</td>
<td>8</td>
<td>40</td>
<td>3.16</td>
<td>2.84</td>
</tr>
<tr>
<td>TCH9015M025W0050#</td>
<td>9</td>
<td>150</td>
<td>25</td>
<td>85</td>
<td>17</td>
<td>125</td>
<td>375</td>
<td>8</td>
<td>50</td>
<td>2.83</td>
<td>2.55</td>
</tr>
<tr>
<td>TCH9010M035W0055#</td>
<td>9</td>
<td>100</td>
<td>35</td>
<td>85</td>
<td>23</td>
<td>125</td>
<td>350</td>
<td>8</td>
<td>55</td>
<td>2.69</td>
<td>2.42</td>
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<tr>
<td>TCH9015M035W0055#</td>
<td>9</td>
<td>150</td>
<td>35</td>
<td>85</td>
<td>23</td>
<td>125</td>
<td>525</td>
<td>8</td>
<td>55</td>
<td>2.69</td>
<td>2.42</td>
</tr>
<tr>
<td>TCH9476M050W0070#</td>
<td>9</td>
<td>47</td>
<td>50</td>
<td>85</td>
<td>33</td>
<td>125</td>
<td>235</td>
<td>8</td>
<td>70</td>
<td>2.39</td>
<td>2.15</td>
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<td>TCH9336M075W0120#</td>
<td>9</td>
<td>33</td>
<td>75</td>
<td>85</td>
<td>50</td>
<td>125</td>
<td>248</td>
<td>8</td>
<td>120</td>
<td>1.82</td>
<td>1.64</td>
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<tr>
<td>TCH9226M100W0150#</td>
<td>9</td>
<td>22</td>
<td>100</td>
<td>85</td>
<td>66</td>
<td>125</td>
<td>220</td>
<td>8</td>
<td>150</td>
<td>1.63</td>
<td>1.47</td>
</tr>
</tbody>
</table>

All technical data relates to an ambient temperature of +25ºC. 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. All TCH products are MSL1.

RECOMMENDED DERATING FACTOR

Voltage and temperature derating as percentage of Vr

![Graph showing recommended derating factor](image-url)
# QUALIFICATION TABLE

## TCH low ESR hermetic series (Temperature range -55°C to +125°C)

<table>
<thead>
<tr>
<th>TEST</th>
<th>Condition</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| **Endurance**               | Apply rated voltage (Ur) at 85°C for 2000 (10000) hours and / or apply category voltage (Uc) at 125°C for 2000 hours through a circuit impedance of <3Ω. Stabilize at room temperature for 2 hours before measuring. | Visual examination  
no visible damage  
DCL  
1.25 x initial limit  
ΔC/C  
within ±20% of initial value  
DF  
1.5 x initial limit  
ESR  
2 x initial limit |
| **Storage Life**            | Store at 125°C, no voltage applied, for 2000 hours. Stabilize at room temperature for 1-2 hours before measuring. | Visual examination  
no visible damage  
DCL  
2 x initial limit  
ΔC/C  
within ±20% of initial value  
DF  
1.5 x initial limit  
ESR  
2 x initial limit |
| **Humidity**                | Store at 40°C and 90% relative humidity for 56 days, with no applied voltage. Stabilize at room temperature and humidity for min. 2 hours before measuring. | Visual examination  
no visible damage  
DCL  
1.25 x initial limit  
ΔC/C  
within ±10% of initial value  
DF  
initial limit  
ESR  
1.25 x initial limit |
| **Temperature Stability**  | Apply 1.3x rated voltage (Ur) at 85°C through protection series resistance 330 for Ur ≤50V or 1.15x rated voltage (Ur) at 85°C through protection series resistance 10000 for Ur >50V for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through discharge resistance of 330 | Visual examination  
no visible damage  
DCL  
10 x IL*  
ΔC/C  
+0/-20%  
DF  
2 x IL*  
ESR  
1.25 x IL* |
| **Surge Voltage**           | Apply 1.3x rated voltage (Ur) at 85°C through protection series resistance 330 for Ur ≤50V or 1.15x rated voltage (Ur) at 85°C through protection series resistance 10000 for Ur >50V for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through discharge resistance of 330 | Visual examination  
no visible damage  
DCL  
initial limit  
ΔC/C  
within ±20% of initial value  
DF  
initial limit  
ESR  
1.25 x initial limit |
| **Mechanical Shock/Vibration** | MIL-STD-202, Method 213, Condition C, 100 G peak  
MIL-STD-202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak | Visual examination  
no visible damage  
DCL  
initial limit  
ΔC/C  
within ±10% of initial value  
DF  
initial limit  
ESR  
1.25 x initial limit |

*Initial Limit
SOLID ELECTROLYTIC CAPACITOR ROADMAP

CONDUCTIVE POLYMER
TC Series
T Cx
F Series
F38

CONVENTIONAL TANTALUM
T Series
T xx
F Series
F xx

NIOBIUM OXIDE
N Series
N xx

CATHODE
DIELECTRIC
Tantalum
Ta₂O₅
Conductive polymer

ANODE
MnO₂
Nb₂O₅

FIVE CAPACITOR CONSTRUCTION STYLES

J = J-lead
Undertab
TACmicrochip®
Conformal
Hermetic

SERIES LINE UP: Conductive Polymer

High Rel. & Special

TCH hermetics
Hermetically sealed

TCB COTS+

TCS COTS+ multianode

TCJ

TCO high temp
TCQ AEC-Q200

TCM multianode

Lowest ESR

Industrial & Automotive

Standard

F38 miniature undertab
TCN low profile undertab

Standard Low Profile

High Energy

J-CAP™ low profile undertab