

TCR Series



Professional Conductive Polymer Chip Capacitors



FEATURES

- Conductive polymer electrode
- Benign failure mode under recommended use conditions
- Robust design for long operation lifetime
- AVX maverick part control Q-process with statistical screening
- Improved basic reliability 0.5%/1000hrs
- Humidity 85°C/85%RH, Vr, (up to 500 or 1000 hours see reference table)
- -55 to +125°C operation temperature
- DCL 0.1 CxV, 0.05CV on selected codes
- 3x reflow 260°C compatible
- Low ESR

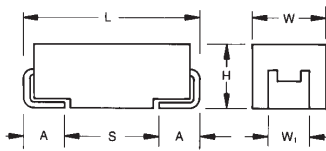


SnPb termination option is not RoHS compliant.

APPLICATIONS

- Long life time DC/DC converter applications in Telecommunications, Industrial, Avionics

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>)



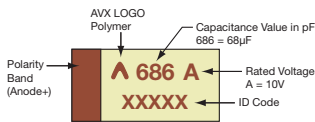
CASE DIMENSIONS: millimeters (inches)

| Code | EIA Code | EIA Metric | L±0.20 (0.008) | W+0.20 (0.008) -0.10 (0.004) | H+0.20 (0.008) -0.10 (0.004) | W _i ±0.20 (0.008) | A+0.30 (0.012) -0.20 (0.008) | S Min. |
|------|----------|------------|----------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------|
| B | 1210 | 3528-21 | 3.50 (0.138) | 2.80 (0.110) | 1.90 (0.075) | 2.20 (0.087) | 0.80 (0.031) | 1.40 (0.055) |
| D | 2917 | 7343-31 | 7.30 (0.287) | 4.30 (0.169) | 2.90 (0.114) | 2.40 (0.094) | 1.30 (0.051) | 4.40 (0.173) |
| Y | 2917 | 7343-20 | 7.30 (0.287) | 4.30 (0.169) | 2.00 (0.079) max | 2.40 (0.094) | 1.30 (0.051) | 4.40 (0.173) |

W₁ dimension applies to the termination width for A dimensional area only.

MARKING

B, D, Y CASE



HOW TO ORDER

| | | | | | | | |
|-------------|-------------------------------------|---|------------------------------|---|--|------------------|-------------------------|
| TCR | D | 476 | M | 016 | # | 0070 | J |
| 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 004 = 4Vdc 006 = 6.3Vdc 010 = 10Vdc 016 = 16Vdc 020 = 20Vdc 025 = 25Vdc 035 = 35Vdc 050 = 50Vdc | Packaging R = Pure Tin 7" Reel S = Pure Tin 13" Reel H = Tin Lead 7" Reel (contact manufacturer) K = Tin Lead 13" Reel (contact manufacturer) | ESR in mΩ | DCL J = 0.1CV |

TECHNICAL SPECIFICATIONS

| | |
|------------------------|---|
| Technical Data: | All technical data relate to an ambient temperature of +25°C |
| Capacitance Range: | 10µF to 220µF |
| Capacitance Tolerance: | ±20% |
| Leakage Current DCL: | (J) 0.1CV |
| Temperature Range: | -55°C to +125°C |
| Basic Reliability: | 0.5% per 1000 hours at 85°C, Vr with 0.1ΩV series impedance, 60% confidence level |
| Termination Finish: | Sn Plating (standard) and SnPb Plating upon request |

NOTE: Conductive Polymer Capacitors are designed to operate within the limits of the environmental conditions specified for each series. If operated continuously at their maximum temperature and / or humidity limit, or beyond these limits, capacitors may exhibit a parametric shift in capacitance and increases in ESR. These changes may occur earlier if the specified environmental conditions are exceeded. Similarly, their normal operational time period will be significantly extended if their general duty cycle includes operation below maximum temperature within humidity controlled environments. Careful attention should be paid to maximum temperature with associated high humidity environments as well as voltage derating, ripple current and current surges. Please reference the AVX Conductive Polymer Capacitor Guidelines for more information or contact factory for application assistance.



CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

| Capacitance | | Rated Voltage DC (V _r) | | | | | | | |
|-------------|------|------------------------------------|----------|---------|---------|---------|---------|---------|---------|
| μF | Code | 4V (G) | 6.3V (J) | 10V (A) | 16V (C) | 20V (D) | 25V (E) | 35V (V) | 50V (T) |
| 10 | 106 | | | | | | | D(70) | D(120) |
| 15 | 156 | | | | | | D(70) | | |
| 22 | 226 | | B(70) | | | D(70) | | | |
| 33 | 336 | | B(70) | | D(70) | | | | |
| 47 | 476 | | B(70) | | D(70) | | | | |
| 68 | 686 | | | D(70) | | | | | |
| 100 | 107 | | | D(70) | | | | | |
| 150 | 157 | | D(40) | | | | | | |
| 220 | 227 | D(40), Y(40) | | | | | | | |

Released ratings, (ESR ratings in mOhms in parentheses)

Note: Voltage ratings are minimum values. AVX reserves the right to supply higher voltage ratings in the same case size, to the same reliability standards.

RATINGS & PART NUMBER REFERENCE

| AVX Part No. | Case Size | Capacitance (μF) | Rated Voltage (V) | Maximum Operating Temperature (°C) | DCL Max. (μA) | DF Max. (%) | ESR Max @ 100kHz (mΩ) | 100kHz RMS Current (mA) | | | | Humidity 85°C/85%RH, Vr (hrs) | MSL |
|-------------------|-----------|------------------|-------------------|------------------------------------|---------------|-------------|-----------------------|-------------------------|------|-------|-------|-------------------------------|-----|
| | | | | | | | | 45°C | 85°C | 105°C | 125°C | | |
| 4 Volt | | | | | | | | | | | | | |
| TCRD227M004#0040J | D | 220 | 4 | 125 | 88 | 6 | 40 | 2400 | 1700 | 1100 | 600 | 1000 | 3 |
| TCRY227M004#0040J | Y | 220 | 4 | 125 | 88 | 6 | 40 | 2200 | 1500 | 1000 | 600 | 500 | 3 |
| 6.3 Volt | | | | | | | | | | | | | |
| TCRB226M006#0070J | B | 22 | 6.3 | 125 | 13 | 6 | 70 | 1300 | 900 | 600 | 300 | 500 | 3 |
| TCRB336M006#0070J | B | 33 | 6.3 | 125 | 19 | 6 | 70 | 1300 | 900 | 600 | 300 | 500 | 3 |
| TCRB476M006#0070J | B | 47 | 6.3 | 125 | 28 | 6 | 70 | 1300 | 900 | 600 | 300 | 500 | 3 |
| TCRD157M006#0040J | D | 150 | 6.3 | 125 | 90 | 6 | 40 | 2400 | 1700 | 1100 | 600 | 1000 | 3 |
| 10 Volt | | | | | | | | | | | | | |
| TCRD686M010#0070J | D | 68 | 10 | 125 | 68 | 6 | 70 | 1800 | 1300 | 800 | 500 | 1000 | 3 |
| TCRD107M010#0070J | D | 100 | 10 | 125 | 100 | 6 | 70 | 1800 | 1300 | 800 | 500 | 1000 | 3 |
| 16 Volt | | | | | | | | | | | | | |
| TCRD336M016#0070J | D | 33 | 16 | 125 | 52 | 6 | 70 | 1800 | 1300 | 800 | 500 | 1000 | 3 |
| TCRD476M016#0070J | D | 47 | 16 | 125 | 75 | 6 | 70 | 1800 | 1300 | 800 | 500 | 1000 | 3 |
| 20 Volt | | | | | | | | | | | | | |
| TCRD226M020#0070J | D | 22 | 20 | 125 | 44 | 8 | 70 | 1800 | 1300 | 800 | 500 | 1000 | 3 |
| 25 Volt | | | | | | | | | | | | | |
| TCRD156M025#0070J | D | 15 | 25 | 125 | 37 | 8 | 70 | 1800 | 1300 | 800 | 500 | 1000 | 3 |
| 35 Volt | | | | | | | | | | | | | |
| TCRD106M035#0070J | D | 10 | 35 | 125 | 35 | 8 | 70 | 1800 | 1300 | 800 | 500 | 1000 | 3 |
| 50 Volt | | | | | | | | | | | | | |
| TCRD106M050#0120J | D | 10 | 50 | 125 | 50 | 10 | 120 | 1400 | 1000 | 600 | 400 | 500 | 3 |

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

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

ESR allowed to move up to 1.25 times catalog limit post mounting.

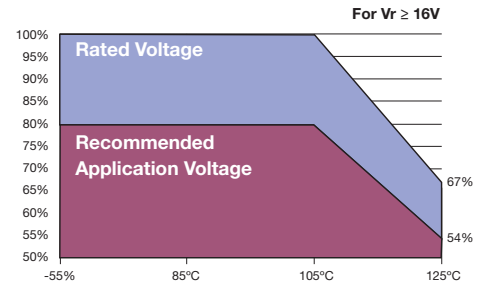
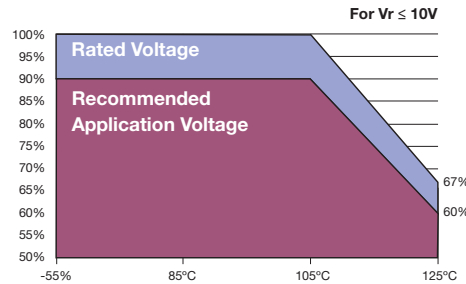
For typical weight and composition see page 261.

NOTE: AVX reserves the right to supply higher voltage ratings or tighter tolerance part in the same case size, to the same reliability standards.

RECOMMENDED DERATING FACTOR

Voltage and temperature derating as percentage of Vr.

| Rated voltage | Operating Temperature | | |
|---------------|-----------------------|-------|-------|
| | ≤85°C | 105°C | 125°C |
| ≤10V | 90% | 90% | 60% |
| ≥16V | 80% | 80% | 54% |



QUALIFICATION TABLE

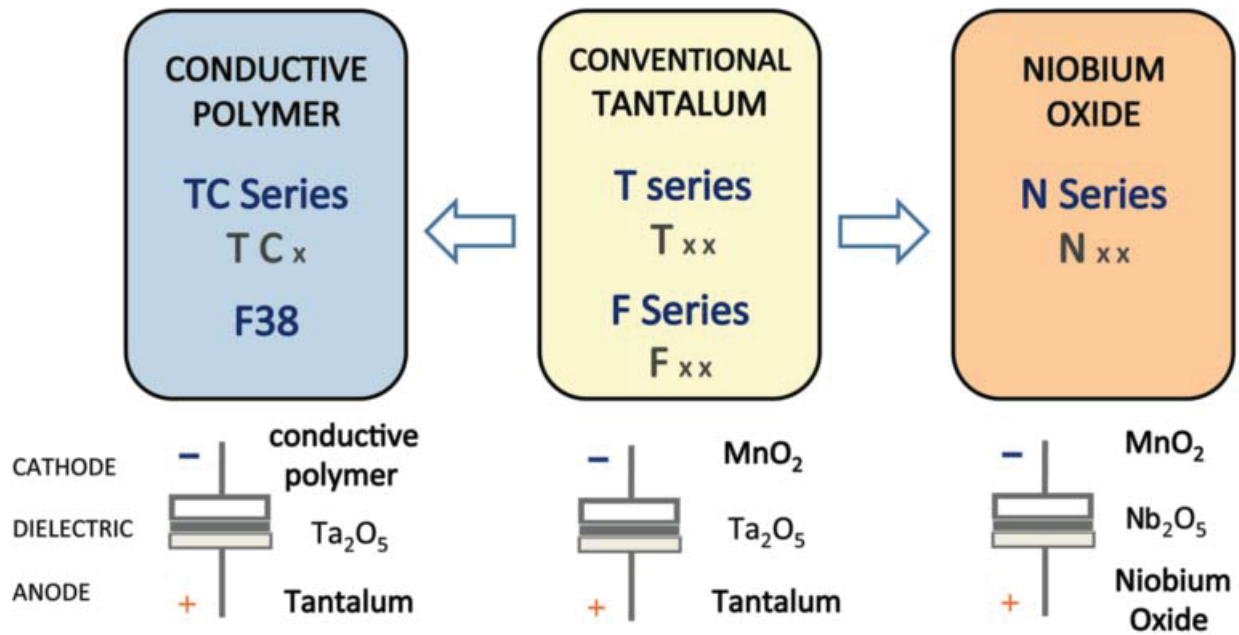
| TEST | TCR series (Temperature range -55°C to +125°C) | | | | | | | | | |
|-----------------------------------|---|---------------|---------------|--------------------|----------------------------------|-----------|-------|-----------|-----------|-----|
| | Condition | | | Characteristics | | | | | | |
| Endurance | Apply rated voltage (Ur) at 105°C and / or 2/3 rated voltage (Ur) at 125°C for 2000 hours through a circuit impedance of ≤0.1Ω/V. Stabilize at room temperature for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | |
| | | | | DCL | 2 x initial limit | | | | | |
| | | | | ΔC/C | within +20/-30% of initial value | | | | | |
| | | | | DF | 2 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 | 2 x initial limit | | | | | |
| | | | | ESR | 2 x initial limit | | | | | |
| Biased Humidity | Apply rated voltage (Ur) at 85°C, 85% relative humidity for 500 or 1000 hours. Stabilize at room temperature and humidity for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | |
| | | | | DCL | 3 x initial limit | | | | | |
| | | | | ΔC/C | within +30/-20% of initial value | | | | | |
| | | | | DF | 1.5 x initial limit | | | | | |
| | | | | ESR | 2 x initial limit | | | | | |
| Temperature Stability | Step | Temperature°C | Duration(min) | | | | | | | |
| | 1 | +20 | 15 | +20°C | -55°C | +20°C | +85°C | +125°C | +20°C | |
| | 2 | -55 | 15 | DCL | IL* | n/a | IL* | 10 x IL* | 2.5 x IL* | IL* |
| | 3 | +20 | 15 | ΔC/C | n/a | ±20% | ±5% | ±20% | ±30% | ±5% |
| | 4 | +85 | 15 | DF | IL* | 1.5 x IL* | IL* | 1.5 x IL* | 2 x IL* | IL* |
| | 5 | +125 | 15 | | | | | | | |
| 6 | +20 | 15 | | | | | | | | |
| Surge Voltage | Apply 1.3 x 2/3 rated voltage (Ur) at 125°C for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000Ω | | | Visual examination | no visible damage | | | | | |
| | | | | DCL | initial limit | | | | | |
| | | | | ΔC/C | within +20/-30% of initial value | | | | | |
| | | | | DF | 1.25 x initial limit | | | | | |
| | | | | ESR | 1.25 x initial limit | | | | | |
| Mechanical Shock/Vibration | MIL-STD-202, Method 213, Condition I, 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

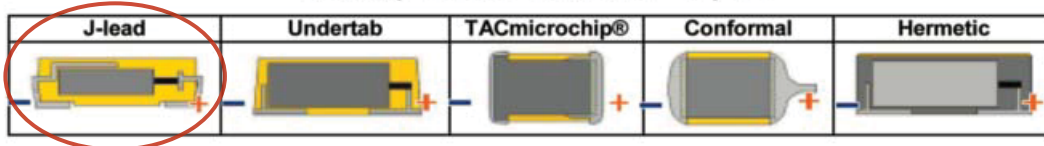
For use outside of recommended conditions and special request, please contact AVX.

Initial measurement max. 1hr after the removal from dry pack or after pretreatment at 85°C for 24 hours.

AVX SOLID ELECTROLYTIC CAPACITOR ROADMAP



Five Capacitor Construction Styles



SERIES LINE UP: CONDUCTIVE POLYMER

