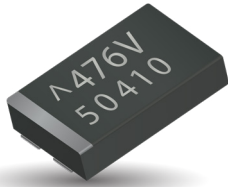


TCJ Series

Conductive Polymer Solid Electrolytic Chip Capacitors



FEATURES

- Conductive Polymer Electrode
- Benign Failure Mode Under Recommended Use Conditions
- Lower ESR
- 3x Reflow 260°C Compatible
- 100% Surge Current Tested
- CV Range: 0.47-470µF / 2.5-125V
- 16 Case Sizes Available

APPLICATIONS

- Smart Phone, Tablets, Notebook, LCD TV, Power Supplies



Elektra Award 2010



LEAD-FREE

LEAD-FREE COMPATIBLE COMPONENT



RoHS COMPLIANT

CASE DIMENSIONS:

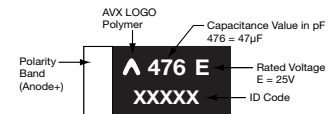
millimeters (inches)

| 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, ±0.20 (0.008) | A+0.30 (0.012) -0.20 (0.008) | S Min. |
|------|----------|------------|----------------|------------------------------|------------------------------|-------------------------|------------------------------|--------------|
| A | 1206 | 3216-18 | 3.20 (0.126) | 1.60 (0.063) | 1.60 (0.063) | 1.20 (0.047) | 0.80 (0.031) | 1.10 (0.043) |
| 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) |
| C | 2312 | 6032-28 | 6.00 (0.236) | 3.20 (0.126) | 2.60 (0.102) | 2.20 (0.087) | 1.30 (0.051) | 2.90 (0.114) |
| 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) |
| E | 2917 | 7343-43 | 7.30 (0.287) | 4.30 (0.169) | 4.10 (0.162) | 2.40 (0.094) | 1.30 (0.051) | 4.40 (0.173) |
| G | 1206 | 3216-15 | 3.20 (0.126) | 1.60 (0.063) | 1.50 (0.059) max | 1.20 (0.047) | 0.80 (0.031) | 1.10 (0.043) |
| H | 1210 | 3528-15 | 3.50 (0.138) | 2.80 (0.110) | 1.50 (0.059) max | 2.20 (0.087) | 0.80 (0.031) | 1.40 (0.055) |
| K | 1206 | 3216-10 | 3.20 (0.126) | 1.60 (0.063) | 1.00 (0.039) max | 1.20 (0.047) | 0.80 (0.031) | 1.10 (0.043) |
| R | 0805 | 2012-12 | 2.05 (0.081) | 1.30 (0.051) | 1.20 (0.047) max | 1.00±0.10 (0.039±0.004) | 0.50 (0.020) | 0.85 (0.033) |
| S | 1206 | 3216-12 | 3.20 (0.126) | 1.60 (0.063) | 1.20 (0.047) max | 1.20 (0.047) | 0.80 (0.031) | 1.10 (0.043) |
| T | 1210 | 3528-12 | 3.50 (0.138) | 2.80 (0.110) | 1.20 (0.047) max | 2.20 (0.087) | 0.80 (0.031) | 1.40 (0.055) |
| U | 2924 | 7361-43 | 7.30 (0.287) | 6.10 (0.240) | 4.10 (0.162) | 3.10 (0.122) | 1.30 (0.051) | 4.40 (0.173) |
| W | 2312 | 6032-15 | 6.00 (0.236) | 3.20 (0.126) | 1.50 (0.059) max | 2.20 (0.087) | 1.30 (0.051) | 2.90 (0.114) |
| X | 2917 | 7343-15 | 7.30 (0.287) | 4.30 (0.169) | 1.50 (0.059) max | 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) |
| 5 | 2917 | 7343-40 | 7.30 (0.287) | 4.30 (0.169) | 3.80 (0.150) | 2.40 (0.094) | 1.30 (0.051) | 4.40 (0.173) |

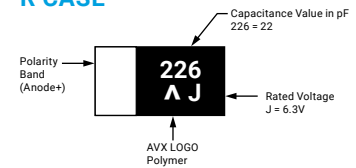
W₁ dimension applies to the termination width for A dimensional area only.

MARKING

A, B, C, D, E, G, H, K, S, T, U, W, X, Y, 5 CASE



R CASE



HOW TO ORDER

| | | | | | | | |
|------------|------------------------------|--|-----------------------|--|--|-------------|--|
| TCJ | A | 226 | M | 004 | R | 0300 | E |
| 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 002 = 2.5Vdc 035 = 35Vdc 004 = 4Vdc 050 = 50Vdc 006 = 6.3Vdc 063 = 63Vdc 010 = 10Vdc 075 = 75Vdc 016 = 16Vdc 100 = 100Vdc 020 = 20Vdc 125 = 125Vdc 025 = 25Vdc | Packaging R = Pure Tin 7" Reel S = Pure Tin 13" Reel | ESR in mΩ | Additional Character E = Black resin (It is possible to order PN without "E" as identical product) |

TECHNICAL SPECIFICATIONS (COMMON FOR ALL TCJ SERIES)

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

Capacitance Tolerance: ±20%

Leakage Current DCL: 0.1CV

Resistance to soldering heat: 3x260°C peak for max. 10s reflow

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.

TCJ Series

Conductive Polymer Solid Electrolytic Chip Capacitors



CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

| Cap | | Rated Voltage DC (V _R) to 85°C | | | | | | | | | | | | |
|------|------|--|---|---|-------------------------------------|--|----------------------------------|--|--|----------------------------|----------------------|---------|----------|----------|
| μF | Code | 2.5V (e) | 4V (G) | 6.3V (J) | 10V (A) | 16V (C) | 20V (D) | 25V (E) | 35V (V) | 50V (T) | 63V (J) | 75V (P) | 100V (A) | 125V (B) |
| 0.47 | 474 | | | | | | | | | | B(400) | | | |
| 0.68 | 684 | | | | | | | | | B(400) | B(300) | | | |
| 1.0 | 105 | | | | | | | | | B(300) | B(300) C(300) | | | |
| 1.5 | 155 | | | | | | | | B(200) | B(300) C(300) | C(300) | | | |
| 2.2 | 225 | | | | | | | | B(200) | C(300) | C(200) | | | |
| 3.3 | 335 | | | | | | | | B(200) | C(200) | C(200) | | | D(250) |
| 4.7 | 475 | | | | K(300,500) | | | B(100,150) | B(200) C(200) | C(200) X(250) Y(250) | C(200) D(120) | D(150) | D(250) | |
| 6.8 | 685 | | | | | A(200) | | A(150) B(90,150) T(100,150) | C(200) | C(200) D(120) | D(120) E(100,150) | D(120) | | |
| 10 | 106 | | | A(300),R(500) | A(200,300) | A(200) B(100,200) T(100,150,200) | A(150) B(150) | A(150) B(90,100,150) | B(200) C(200) Y(70) | D(90,120) E(70,100) | E(100,150) | | | |
| 15 | 156 | | A(300) | A(300) | A(200) | B(90,150) | B(150) | B(100,150) Y(90) | B(200) C(200) D(70,100) Y(70,100) | D(150) E(70,100) | E(150) | | | |
| 22 | 226 | | A(300) | A(300), B(70), K(400),R(500) S(400),T(150) | B(70,300) T(70,150) | A(300) B(70,150) | B(90,150) X(100) Y(70) | B(100,150) C(100) D(60,100) X(100), Y(70) | D(70,100) Y(150) | D(90), E(75), E(150) | | | | |
| 33 | 336 | | A(300) | A(200) B(70,200) T(150) | B(70,200) C(100) T(70,150) | A(200) H(150) Y(45,60,70) | X(100) Y(70) | D(60,100) X(70,100) Y(60,70,100) | D(70,100) E(55,70) U(70) Y(100) | | | | | |
| 47 | 476 | | A(200) T(80) | A(70,100,200) B(55,70), R(500) T(55,70,80,120) | B(70) C(100) H(100) | D(45,70), H(150) X(45,70) Y(45,70) | D(55), X(55,70) Y(70) | D(60,100) E(50) Y(100) | E(55) U(70) Y(100) | | | | | |
| 68 | 686 | A(250) | A(250) B(70) T(80) | B(55,70) C(55,100), H(100) T(200), W(70) | D(45,55) Y(45,55) | D(50) Y(50) | D(55) E(45) Y(50) | D(70) E(50) Y(100) | | | | | | |
| 100 | 107 | A(200) B(70) | A(200) B(40,70) G(300) T(70,150) | A(100,150) B(40,45,55,70) C(70,100) T(200), W(70) | D(18,25,45,55,80) Y(18,25,45,55) | D(50) E(40) Y(50) | C(70) D(55) E(45) Y(55) | D(55,70) E(80) U(70) | | | | | | |
| 150 | 157 | B(70) | B(70) D(15) Y(15,25,45) | B(25,35,45,55,70) D(12,15,25,40) H(200),W(40,70) Y(15,25,40) | D(25,40,45,55) Y(25,40,45,55) | C(70) D(40,50,70) E(40) Y(40,50,70) | | U(70) | | | | | | |
| 220 | 227 | B(35,45,70) | B(35,45,60,70) D(12,15,25,40) Y(15,25,40) | B(70,200) D(12,15,25,35,40,50) H(170) Y(15,18,25,35,40,50) | D(15,25,40,50) Y(15,25,40,50) | D(35,50) E(50) | U(70) | | | | | | | |
| 330 | 337 | B(35,45,70,Y) (25,40) | D(15,25,40,50) Y(15,25,40,50) | D(12,15,18,25,40,50) Y(15,25,40,50) | D(25) 5(35,100) | E(35, 50,70) 5(100) | | | | | | | | |
| 470 | 477 | D(12,15,25,40,50) Y(15,25,40,50) | D(12,15,25,40,50) Y(15,25,40,50) | D(25) X(35,50,100) | | 5(100) | | | | | | | | |

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.



The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

TCJ Series

Conductive Polymer Solid Electrolytic Chip Capacitors



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) | | | | Product Category | MSL |
|------------------------|-----------|------------------|-------------------|------------------------------------|---------------|-------------|------------------------|-------------------------|------|-------|-------|------------------|-----|
| | | | | | | | | 45°C | 85°C | 105°C | 125°C | | |
| TCJC155M050#0300E | C | 1.5 | 50 | 105 | 7.5 | 6 | 300 | 800 | 600 | 400 | - | 3 | 3 |
| TCJC225M050#0300E | C | 2.2 | 50 | 105 | 11 | 6 | 300 | 800 | 600 | 400 | - | 3 | 3 |
| TCJC335M050#0200E | C | 3.3 | 50 | 105 | 16.5 | 8 | 200 | 900 | 600 | 400 | - | 3 | 3 |
| TCJC475M050#0200E | C | 4.7 | 50 | 105 | 23.5 | 8 | 200 | 900 | 600 | 400 | - | 3 | 3 |
| TCJX475M050#0250E | X | 4.7 | 50 | 105 | 23.5 | 6 | 250 | 800 | 600 | 400 | - | 2 | 5 |
| TCJY475M050#0250E | Y | 4.7 | 50 | 105 | 23.5 | 6 | 250 | 900 | 600 | 400 | - | 2 | 5 |
| TCJC685M050#0200E | C | 6.8 | 50 | 105 | 34 | 8 | 200 | 900 | 600 | 400 | - | 3 | 3 |
| TCJD685M050#0120E | D | 6.8 | 50 | 105 | 34 | 10 | 120 | 1400 | 1000 | 600 | - | 3 | 3 |
| TCJD106M050#0090E | D | 10 | 50 | 105 | 50 | 10 | 90 | 1600 | 1100 | 700 | - | 3 | 3 |
| TCJD106M050#0120E | D | 10 | 50 | 105 | 50 | 10 | 120 | 1400 | 1000 | 600 | - | 3 | 3 |
| TCJE106M050#0070E | E | 10 | 50 | 105 | 50 | 6 | 70 | 1900 | 1300 | 900 | - | 3 | 3 |
| TCJE106M050#0100E | E | 10 | 50 | 105 | 50 | 6 | 100 | 1600 | 1100 | 700 | - | 3 | 3 |
| TCJD156M050#0150E | D | 15 | 50 | 125 | 75 | 8 | 150 | 1200 | 800 | 500 | 300 | 1 | 3 |
| TCJE156M050#0070E | E | 15 | 50 | 105 | 75 | 6 | 70 | 1900 | 1300 | 900 | - | 3 | 3 |
| TCJE156M050#0100E | E | 15 | 50 | 105 | 75 | 6 | 100 | 1600 | 1100 | 700 | - | 3 | 3 |
| TCJD226M050#0090E | D | 22 | 50 | 125 | 110 | 8 | 90 | 1600 | 1100 | 700 | 400 | 1 | 3 |
| TCJE226M050#0075E | E | 22 | 50 | 125 | 110 | 8 | 75 | 1800 | 1300 | 800 | 500 | 1 | 3 |
| TCJE226M050#0150E | E | 22 | 50 | 105 | 110 | 8 | 150 | 1300 | 900 | 600 | - | 2 | 3 |
| 63 Volt @ 85°C | | | | | | | | | | | | | |
| TCJB474M063#0400E | B | 0.47 | 63 | 105 | 3 | 8 | 400 | 600 | 400 | 300 | - | 3 | 3 |
| TCJB684M063#0300E | B | 0.68 | 63 | 105 | 4.3 | 8 | 300 | 600 | 400 | 300 | - | 3 | 3 |
| TCJB105M063#0300E | B | 1.0 | 63 | 105 | 6.3 | 8 | 300 | 600 | 400 | 300 | - | 3 | 3 |
| TCJC105M063#0300E | C | 1.0 | 63 | 105 | 6.3 | 6 | 300 | 800 | 600 | 400 | - | 3 | 3 |
| TCJC155M063#0300E | C | 1.5 | 63 | 105 | 9.5 | 6 | 300 | 800 | 600 | 400 | - | 3 | 3 |
| TCJC225M063#0200E | C | 2.2 | 63 | 105 | 13.9 | 6 | 200 | 900 | 600 | 400 | - | 3 | 3 |
| TCJC335M063#0200E | C | 3.3 | 63 | 105 | 20.8 | 6 | 200 | 900 | 600 | 400 | - | 3 | 3 |
| TCJC475M063#0200E | C | 4.7 | 63 | 105 | 29.6 | 6 | 200 | 900 | 600 | 400 | - | 3 | 3 |
| TCJD475M063#0120E | D | 4.7 | 63 | 105 | 29.6 | 6 | 120 | 1400 | 1000 | 600 | - | 3 | 3 |
| TCJD685M063#0120E | D | 6.8 | 63 | 105 | 42.8 | 6 | 120 | 1400 | 1000 | 600 | - | 3 | 3 |
| TCJE685M063#0100E | E | 6.8 | 63 | 105 | 42.8 | 6 | 100 | 1600 | 1100 | 700 | - | 3 | 3 |
| TCJE685M063#0150E | E | 6.8 | 63 | 105 | 42.8 | 6 | 150 | 1300 | 900 | 600 | - | 3 | 3 |
| TCJE106M063#0100E | E | 10 | 63 | 105 | 63 | 6 | 100 | 1600 | 1100 | 700 | - | 3 | 3 |
| TCJE106M063#0150E | E | 10 | 63 | 105 | 63 | 6 | 150 | 1300 | 900 | 600 | - | 3 | 3 |
| TCJE156M063#0150E | E | 15 | 63 | 105 | 94.5 | 8 | 150 | 1300 | 900 | 600 | - | 2 | 3 |
| 75 Volt @ 85°C | | | | | | | | | | | | | |
| TCJD475M075#0150E | D | 4.7 | 75 | 105 | 35.3 | 6 | 150 | 1200 | 800 | 500 | - | 3 | 3 |
| TCJD685M075#0120E | D | 6.8 | 75 | 105 | 51 | 6 | 120 | 1400 | 1000 | 600 | - | 3 | 3 |
| 100 Volt @ 85°C | | | | | | | | | | | | | |
| TCJD475M100#0250E | D | 4.7 | 100 | 105 | 47 | 8 | 250 | 900 | 600 | 400 | - | 4 | 3 |
| 125 Volt @ 85°C | | | | | | | | | | | | | |
| TCJD335M125#0250E | D | 3.3 | 125 | 105 | 41.2 | 8 | 250 | 900 | 600 | 400 | - | 4 | 3 |

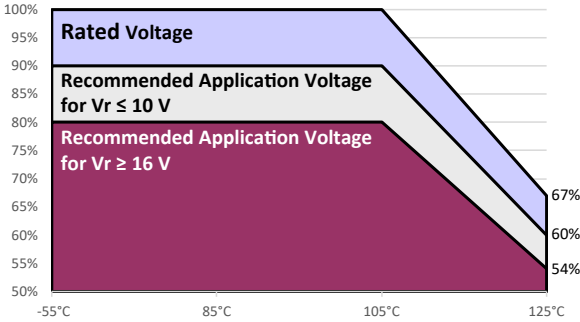
Moisture Sensitivity Level (MSL) is defined according to J-STD-020. All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5RMS with DC bias of 2.2 volts. DCL is measured at rated voltage after 5 minutes. ESR allowed to move up to 1.25 times catalog limit post mounting. For typical weight and composition see page 259.

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

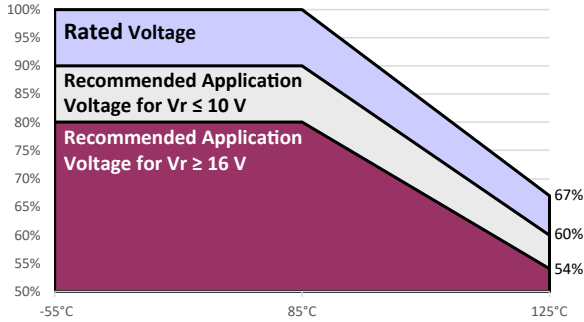
RECOMMENDED DERATING FACTOR

Voltage and temperature derating as percentage of Vr

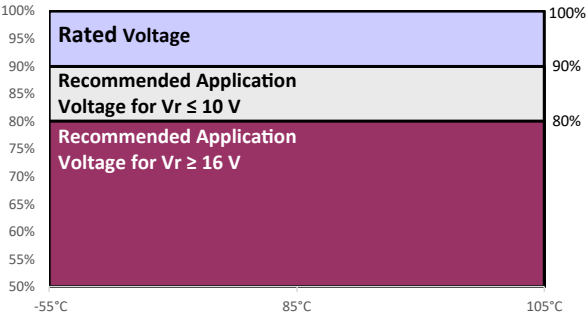
Product Category 0



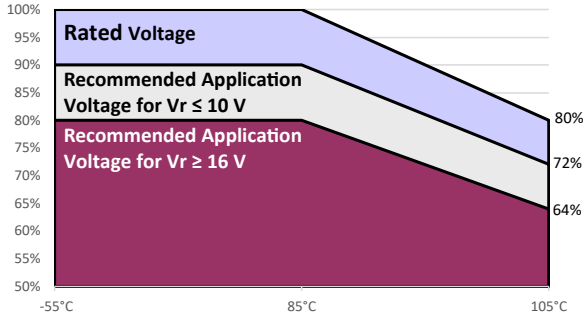
Product Category 1



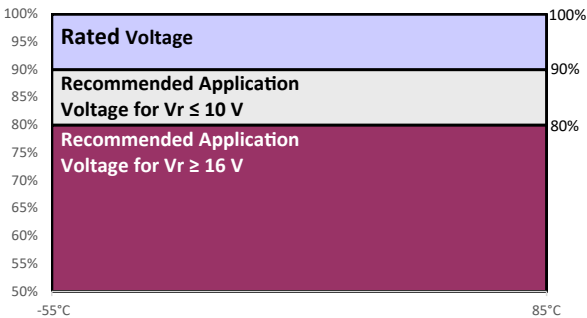
Product Category 2



Product Category 3, 4



Product Category 5



PRODUCT CATEGORY 0, 1 (TEMPERATURE RANGE -55°C TO +125°C)

| TEST | Condition | | | Characteristics | | | | | | | |
|------------------------------|--|----------------|----------------|--------------------------------|-----------------------------------|-----------|-----------|-----------|------------|-----------|--|
| Endurance | Apply rated voltage (Ur) at 85°C (CATEGORY 1) or 105°C (CATEGORY 0) or 2/3 rated voltage (Ur) at 125°C (all CATEGORIES) for 2000 hours through a circuit impedance of $\leq 0.1\Omega/V$. Stabilize at room temperature for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | 1.25 x initial limit | | | | | | |
| | | | | $\Delta C/C$ | within +10/-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 | | | | | | |
| | | | | $\Delta C/C$ | within +10/-20% of initial value | | | | | | |
| | | | | DF | 1.5 x initial limit | | | | | | |
| | | | | ESR | 2 x initial limit | | | | | | |
| Humidity | Store at 65°C and 95% relative humidity for 500 hours, with no applied voltage. Stabilize at room temperature and humidity for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | 3 x initial limit | | | | | | |
| | | | | $\Delta C/C$ | within +35/-5% of initial value | | | | | | |
| | | | | DF | 1.5 x initial limit | | | | | | |
| | | | | ESR | 2 x initial limit | | | | | | |
| Temperature Stability | Step | Temperature °C | Duration (min) | | +20°C | -55°C | +20°C | +85°C | +125°C | +20°C | |
| | 1 | +20 | 15 | DCL | IL* | n/a | IL* | 10 x IL* | 12.5 x IL* | IL* | |
| | 2 | -55 | 15 | | | | | | | | |
| | 3 | +20 | 15 | $\Delta C/C$ | n/a | +0/-20% | $\pm 5\%$ | +20/-0% | +30/-0% | $\pm 5\%$ | |
| | 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 1.3x 2/3x 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 1000 Ω | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | initial limit | | | | | | |
| | | | | $\Delta C/C$ | within +10/-20% of initial value | | | | | | |
| | | | | DF | 1.25 x initial limit | | | | | | |
| | | | | ESR | initial limit | | | | | | |
| Mechanical Shock | MIL-STD-202, Method 213, Condition C | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | initial limit | | | | | | |
| | | | | $\Delta C/C$ | within $\pm 5\%$ of initial value | | | | | | |
| | | | | DF | initial limit | | | | | | |
| | | | | ESR | initial limit | | | | | | |
| Vibration | MIL-STD-202, Method 204, Condition D | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | initial limit | | | | | | |
| | | | | $\Delta C/C$ | within $\pm 5\%$ of initial value | | | | | | |
| | | | | DF | initial limit | | | | | | |
| | | | | ESR | initial limit | | | | | | |

*Initial Limit

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

PRODUCT CATEGORY 2, 3, 4 (TEMPERATURE RANGE -55°C TO +105°C)

| TEST | Condition | | | Characteristics | | | | | | | |
|------------------------------|---|----------------|----------------|--|-----------------------------------|-----------|-----------|-----------|------------|-----------|--|
| Endurance | Apply rated voltage (Ur) at 85°C for 2000 hours through a circuit impedance of $\leq 0.1\Omega/V$ (all CATEGORIES). And/or apply rated voltage (Ur) (CATEGORY 2) or 0.8x rated voltage (CATEGORY 3, 4) at 105°C for 2000 hours through a circuit impedance of $\leq 0.1\Omega/V$ Always stabilize at room temperature for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | 1.25 x initial limit | | | | | | |
| | | | | $\Delta C/C$ | within +10/-20% of initial value | | | | | | |
| | | | | DF | 1.5 x initial limit | | | | | | |
| | | | | ESR | 2 x initial limit | | | | | | |
| Storage Life | Store at 105°C, no voltage applied, for 2000 hours. Stabilize at room temperature for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL ($V_R \leq 75V$) | 1.25 x initial limit | | | | | | |
| | | | | DCL ($V_R > 75V$) | 2 x initial limit | | | | | | |
| | | | | $\Delta C/C$ | within +10/-20% of initial value | | | | | | |
| | | | | DF | 1.5 x initial limit | | | | | | |
| | | | | ESR | 2 x initial limit | | | | | | |
| Humidity | Store at 65°C and 95% relative humidity for 500 hours, with no applied voltage. Stabilize at room temperature and humidity for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | 3 x initial limit | | | | | | |
| | | | | $\Delta C/C$ | within +35/-5% of initial value | | | | | | |
| | | | | DF | 1.5 x initial limit | | | | | | |
| | | | | ESR | 2 x initial limit | | | | | | |
| Temperature Stability | Step | Temperature °C | Duration (min) | | +20°C | -55°C | +20°C | +85°C | +105°C | +20°C | |
| | 1 | +20 | 15 | DCL | IL* | n/a | IL* | 10 x IL* | 12.5 x IL* | IL* | |
| | 2 | -55 | 15 | | | | | | | | |
| | 3 | +20 | 15 | $\Delta C/C$ | n/a | +0/-20% | $\pm 5\%$ | +20/-0% | +30/-0% | $\pm 5\%$ | |
| | 4 | +85 | 15 | | | | | | | | |
| | 5 | +105 | 15 | DF | IL* | 1.5 x IL* | IL* | 1.5 x IL* | 2 x IL* | IL* | |
| 6 | +20 | 15 | | | | | | | | | |
| Surge Voltage | Apply 1.3x rated voltage (Ur) at 105°C for CATEGORY 2, or apply 1.3x 0.8x rated voltage (Ur) at 105°C for CATEGORY 3, 4 for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000 Ω | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | initial limit | | | | | | |
| | | | | $\Delta C/C$ | within +10/-20% of initial value | | | | | | |
| | | | | DF | 1.25 x initial limit | | | | | | |
| | | | | ESR | initial limit | | | | | | |
| Mechanical Shock | MIL-STD-202, Method 213, Condition C | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | initial limit | | | | | | |
| | | | | $\Delta C/C$ | within $\pm 5\%$ of initial value | | | | | | |
| | | | | DF | initial limit | | | | | | |
| | | | | ESR | initial limit | | | | | | |
| Vibration | MIL-STD-202, Method 204, Condition D | | | Visual examination | no visible damage | | | | | | |
| | | | | DCL | initial limit | | | | | | |
| | | | | $\Delta C/C$ | within $\pm 5\%$ of initial value | | | | | | |
| | | | | DF | initial limit | | | | | | |
| | | | | ESR | initial limit | | | | | | |

*Initial Limit

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

PRODUCT CATEGORY 5 (TEMPERATURE RANGE -55°C TO +85°C)

| TEST | Condition | | | Characteristics | | | | | | |
|------------------------------|--|---------------|---------------|--------------------------------|-----------------------------------|-----------|-----------|-----------|-----------|--|
| Endurance | Apply rated voltage (Ur) at 85°C for 2000 hours through a circuit impedance of $\leq 0.1\Omega/V$. Stabilize at room temperature for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | |
| | | | | DCL | 1.25 x initial limit | | | | | |
| | | | | $\Delta C/C$ | within +10/-20% of initial value | | | | | |
| | | | | DF | 1.5 x initial limit | | | | | |
| | | | | ESR | 2 x initial limit | | | | | |
| Storage Life | Store at 85°C, no voltage applied, for 2000 hours. Stabilize at room temperature for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | |
| | | | | DCL | 1.25 x initial limit | | | | | |
| | | | | $\Delta C/C$ | within +10/-20% of initial value | | | | | |
| | | | | DF | 1.5 x initial limit | | | | | |
| | | | | ESR | 2 x initial limit | | | | | |
| Humidity | Store at 65°C and 95% relative humidity for 500 hours, with no applied voltage. Stabilize at room temperature and humidity for 1-2 hours before measuring. | | | Visual examination | no visible damage | | | | | |
| | | | | DCL | 5 x initial limit | | | | | |
| | | | | $\Delta C/C$ | within +35/-5% of initial value | | | | | |
| | | | | DF | 1.5 x initial limit | | | | | |
| | | | | ESR | 2 x initial limit | | | | | |
| Temperature Stability | Step | Temperature°C | Duration(min) | | +20°C | -55°C | +20°C | +85°C | +20°C | |
| | 1 | +20 | 15 | DCL | IL* | n/a | IL* | 10 x IL* | IL* | |
| | 2 | -55 | 15 | $\Delta C/C$ | n/a | +0/-20% | $\pm 5\%$ | +20/-0% | $\pm 5\%$ | |
| | 3 | +20 | 15 | DF | IL* | 1.5 x IL* | IL* | 1.5 x IL* | IL* | |
| | 4 | +85 | 15 | | | | | | | |
| | 5 | +125 | 15 | | | | | | | |
| Surge Voltage | Apply 1.3x rated voltage (Ur) at 85°C for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000 Ω | | | Visual examination | no visible damage | | | | | |
| | | | | DCL | initial limit | | | | | |
| | | | | $\Delta C/C$ | within +10/-20% of initial value | | | | | |
| | | | | DF | 1.25 x initial limit | | | | | |
| | | | | | | | | | | |
| Mechanical Shock | MIL-STD-202, Method 213, Condition C | | | Visual examination | no visible damage | | | | | |
| | | | | DCL | initial limit | | | | | |
| | | | | $\Delta C/C$ | within $\pm 5\%$ of initial value | | | | | |
| | | | | DF | initial limit | | | | | |
| | | | | ESR | initial limit | | | | | |
| Vibration | MIL-STD-202, Method 204, Condition D | | | Visual examination | no visible damage | | | | | |
| | | | | DCL | initial limit | | | | | |
| | | | | $\Delta C/C$ | within $\pm 5\%$ of initial value | | | | | |
| | | | | DF | initial limit | | | | | |
| | | | | ESR | initial limit | | | | | |

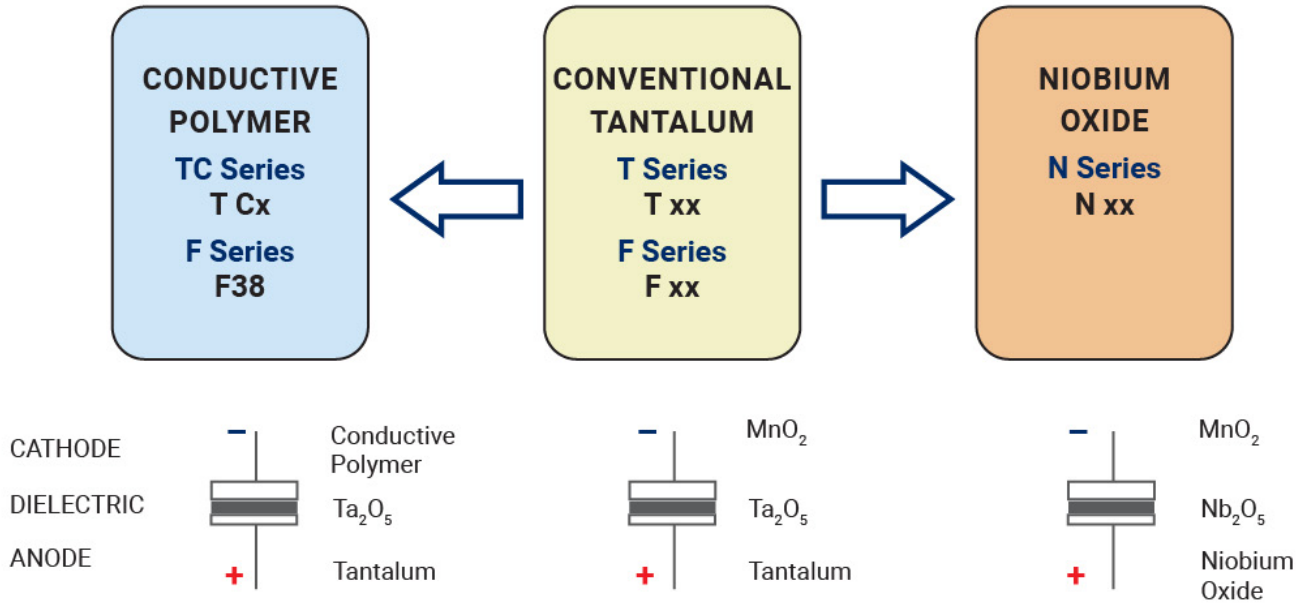
*Initial Limit

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

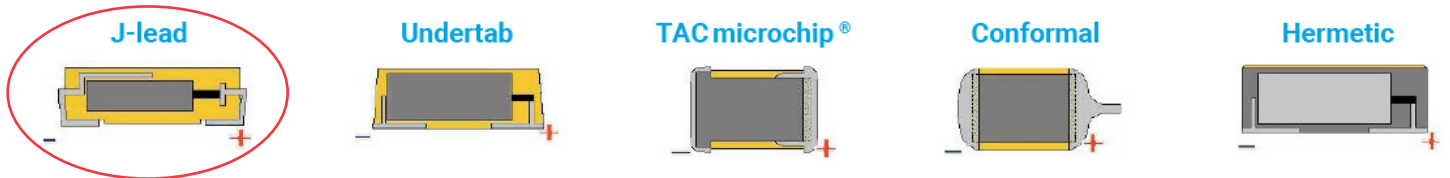
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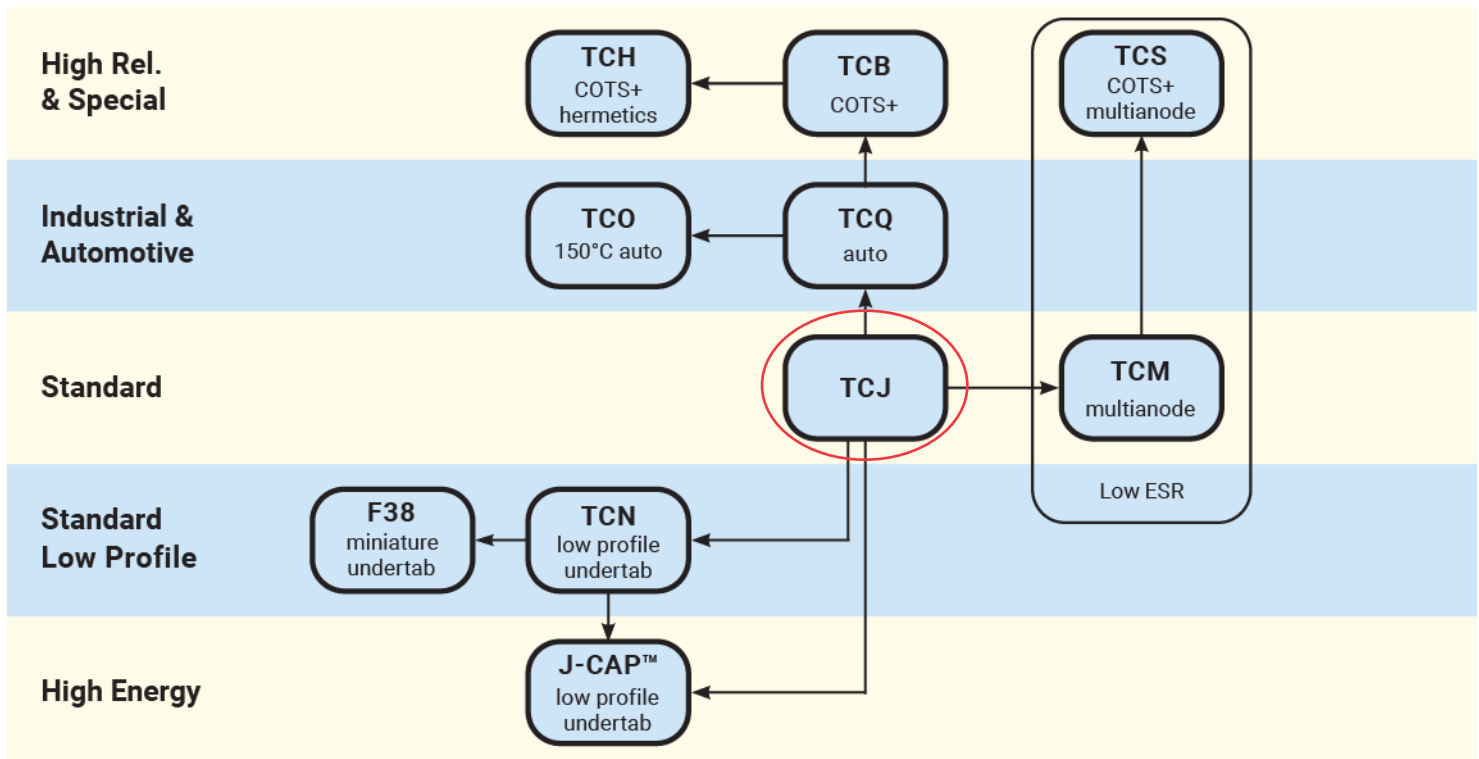
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