

TLC Series



Tantalum Solid Electrolytic Chip Capacitors Consumer Series



FEATURES

- High capacitance vs. voltage ratio
- Super high volumetric efficiency
- CV range: 0.47-220 μ F / 2-35V
- 12 case sizes available
- Consumer applications (portable handheld electronics, cellular phones, digital equipments etc.)



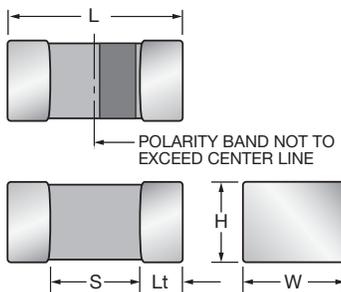
APPLICATIONS

- Consumer portable applications with space limitations

CASE DIMENSIONS: millimeters (inches)

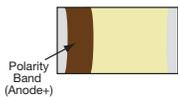
| Code | EIA Code | EIA Metric | L+0.20 (0.008) -0.00 (0.000) | W+0.15 (0.006) -0.00 (0.000) | H+0.15 (0.006) -0.00 (0.000) | Termination Spacing(S) | Minimum Termination Length (Lt) |
|------|----------|------------|--|--|--|------------------------|---------------------------------|
| A | 1206 | 3216-18 | 3.20 \pm 0.20 (0.126 \pm 0.008) | 1.60 \pm 0.20 (0.063 \pm 0.008) | 1.60 \pm 0.20 (0.063 \pm 0.008) | 1.80 (0.071) min | 0.15 (0.006) |
| D | 1206 | 3216-06 | 3.20 \pm 0.20 (0.126 \pm 0.008) | 1.60 \pm 0.20 (0.063 \pm 0.008) | 0.60 (0.024) max | 1.80 (0.071) min | 0.15 (0.006) |
| E | 0201 | 0603-03 | 0.60 \pm 0.12 (0.024 \pm 0.005) | 0.33 \pm 0.02 (0.013 \pm 0.001) | 0.33 \pm 0.02 (0.013 \pm 0.001) | 0.20 (0.008) min | 0.10 (0.004) |
| H | 0805 | 2012-10 | 2.00 (0.079) | 1.35 (0.053) | 1.00 (0.039) max | 0.70 (0.028) min | 0.15 (0.006) |
| J | 0603 | 1608-08 | 1.60 (0.063) | 0.85 (0.033) | 0.75 (0.030) max | 0.55 (0.022) min | 0.15 (0.006) |
| K | 0402 | 1005-07 | 1.00 (0.039) | 0.50 $^{+0.20}_{-0.00}$ (0.020 $^{+0.008}_{-0.000}$) | 0.50 $^{+0.20}_{-0.00}$ (0.020 $^{+0.008}_{-0.000}$) | 0.40 (0.016) min | 0.10 (0.004) |
| L | 0603 | 1608-10 | 1.60 (0.063) | 0.85 (0.033) | 0.85 (0.033) | 0.55 (0.022) min | 0.15 (0.006) |
| M | 0803 | 2008-10 | 2.00 (0.079) | 0.85 (0.033) | 0.85 (0.033) | 0.70 (0.028) min | 0.15 (0.006) |
| R | 0805 | 2012-15 | 2.00 (0.079) | 1.35 (0.053) | 1.35 (0.053) | 0.70 (0.028) min | 0.15 (0.006) |
| T | 1210 | 3528-12 | 3.50 \pm 0.20 (0.138 \pm 0.008) | 2.80 $^{+0.20}_{-0.10}$ (0.110 $^{+0.008}_{-0.004}$) | 1.20 (0.047) max | 2.00 (0.079) min | 0.15 (0.006) |
| U | 0805 | 2012-06 | 2.00 (0.079) | 1.35 (0.053) | 0.60 (0.024) max | 0.70 (0.028) min | 0.15 (0.006) |
| V | 1206 | 3216-08 | 3.20 \pm 0.20 (0.126 \pm 0.008) | 1.60 \pm 0.20 (0.063 \pm 0.008) | 0.75 (0.030) max | 1.80 (0.071) min | 0.15 (0.006) |
| Z | 0602 | 1605-07 | 1.60 (0.063) | 0.50 $^{+0.20}_{-0.00}$ (0.020 $^{+0.008}_{-0.000}$) | 0.50 $^{+0.20}_{-0.00}$ (0.020 $^{+0.008}_{-0.000}$) | 0.55 (0.022) min | 0.15 (0.006) |

Under development



MARKING

A, D, E, H, J, K, L, M, R, T,
U, V, Z CASE



HOW TO ORDER

TLC

Type

L

Case Size
See table above

226

Capacitance Code
pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)

M

Tolerance
M= \pm 20%

006

Rated DC Voltage
002=2Vdc
003=3Vdc
004=4Vdc
006=6.3Vdc
008=8Vdc
010=10Vdc
016=16Vdc
020=20Vdc
025=25Vdc
035=35Vdc

R

Packaging
R, P = 7" Standard Tin Termination Plastic Tape
X, Q = 4 1/4" Standard Tin Termination Plastic Tape
A, M = 7" Gold Termination Plastic Tape
F, N = 4 1/4" Gold Termination Plastic Tape
H = Chip Tray (waffle)

TA

Standard Suffix
OR
4000
ESR in m Ω

Tantalum Solid Electrolytic Chip Capacitors Consumer Series

TECHNICAL SPECIFICATIONS

| | | | | | | | | | | | |
|----------------------------|--|-----|-----|-----|-----|-----|----|-----|----|------|------|
| Technical Data: | All technical data relate to an ambient temperature of +25°C | | | | | | | | | | |
| Capacitance Range: | 0.47 μ F to 220 μ F | | | | | | | | | | |
| Capacitance Tolerance: | \pm 20% | | | | | | | | | | |
| Rated Voltage (V_R) | -55°C \leq +40°C: | 2 | 3 | 4 | 6.3 | 8 | 10 | 16 | 20 | 25 | 35 |
| Category Voltage (V_C) | at 85°C: | 1 | 1.5 | 2 | 3.2 | 4 | 5 | 8 | 10 | 12.5 | 17.5 |
| Category Voltage (V_C) | at 125°C: | 0.4 | 0.6 | 0.8 | 1.3 | 1.6 | 2 | 3.2 | 4 | 5 | 7 |
| Temperature Range: | -55°C to +125°C with category voltage | | | | | | | | | | |
| Reliability: | 0.2% per 1000 hours at 85°C, 0.5x V_R with 0.1 Ω/V series impedance with 60% confidence level | | | | | | | | | | |

CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

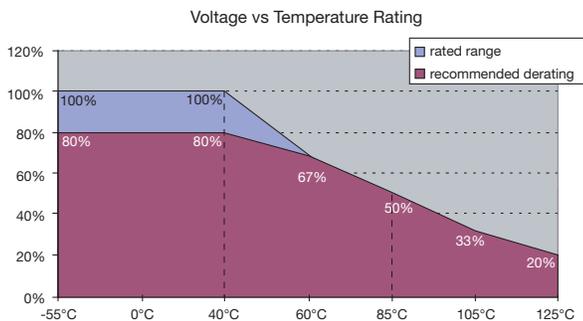
| Capacitance | | Voltage Rating DC (V_R) to 40°C | | | | | | | | | |
|-------------|------|-------------------------------------|------|-------|-----------------|----|------|-----|-----|-----|-----|
| μ F | Code | 2.0V | 3.0V | 4.0V | 6.3V | 8V | 10V | 16V | 20V | 25V | 35V |
| 0.47 | 474 | | | | E | | | K | | | |
| 1.0 | 105 | | | | K | | K | K | H | L | R |
| 2.2 | 225 | | | | K | | K | | | R | |
| 3.3 | 335 | | | | | | | L | | | |
| 4.7 | 475 | | | K | K/U | | J | | | | |
| 6.8 | 685 | | K | K | | | U | | | | |
| 10 | 106 | | K | J/K/Z | J/K/Z | | U | V | R | | |
| 15 | 156 | K | K* | K | | | H/L | | | | |
| 22 | 226 | J | J | K*/U | L/U | | L/M | | | | |
| 33 | 336 | | | L/U | H/L/L(4000)/U/V | L | H | | | | |
| 47 | 476 | L | L/R | H/L | H/R/V | D | H/R | | | | |
| 68 | 686 | | | R | R | | R* | | | | |
| 100 | 107 | | | I*/R | D*/I*/R/T | | R*/T | | | | |
| 150 | 157 | | | R* | R* | | A* | | | | |
| 220 | 227 | R* | | R*/T | | | | | | | |

Released Codes

Engineering samples - please contact manufacturer

*Codes under development - subject to change.

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



TLC Series



Tantalum Solid Electrolytic Chip Capacitors Consumer Series

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. | ESR Max. (Ω) @ 100kHz | MSL | 100kHz RMS Current (mA) | | |
|------------------------|-----------|------------------|-------------------|------------------------|----------------------|---------------------------|---------------|-----------------------|-----|-------------------------|------|-------|
| | | | | | | | | | | 25°C | 85°C | 125°C |
| 2 Volt @ 40°C | | | | | | | | | | | | |
| TLCK156M002#TA | K | 15 | 2 | 40 | 0.4 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK226M002#TA | J | 22 | 2 | 40 | 0.4 | 125 | 0.5 | 7.5 | 3 | 52 | 46 | 21 |
| TLCL476M002#TA | L | 47 | 2 | 40 | 0.4 | 125 | 0.9 | 7.5 | 3 | 58 | 52 | 23 |
| TLCR227M002#TA | R | 220 | 2 | 40 | 0.4 | 125 | 4.4 | 5 | 3 | 95 | 85 | 38 |
| 3 Volt @ 40°C | | | | | | | | | | | | |
| TLCK685M003#TA | K | 6.8 | 3 | 40 | 0.6 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK106M003#TA | K | 10 | 3 | 40 | 0.6 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK156M003#TA | K | 15 | 3 | 40 | 0.6 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK226M003#TA | J | 22 | 3 | 40 | 0.6 | 125 | 0.7 | 7.5 | 3 | 52 | 46 | 21 |
| TLCL476M003#TA | L | 47 | 3 | 40 | 0.6 | 125 | 1.4 | 7.5 | 3 | 58 | 52 | 23 |
| TLCR476M003#TA | R | 47 | 3 | 40 | 0.6 | 125 | 3.0 | 7.5 | 3 | 77 | 70 | 31 |
| 4 Volt @ 40°C | | | | | | | | | | | | |
| TLCK475M004#TA | K | 4.7 | 4 | 40 | 0.8 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK685M004#TA | K | 6.8 | 4 | 40 | 0.8 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK106M004#TA | J | 10 | 4 | 40 | 0.8 | 125 | 0.5 | 7.5 | 3 | 52 | 46 | 21 |
| TLCK106M004#TA | K | 10 | 4 | 40 | 0.8 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK106M004#TA | Z | 10 | 4 | 40 | 0.8 | 125 | 0.5 | 15 | 3 | 37 | 33 | 15 |
| TLCK156M004#TA | K | 15 | 4 | 40 | 0.8 | 125 | 3.0 | 15 | 3 | 32 | 28 | 13 |
| TLCU226M004#TA | U | 22 | 4 | 40 | 0.8 | 125 | 0.9 | 12 | 3 | 54 | 49 | 22 |
| TLCL336M004#TA | L | 33 | 4 | 40 | 0.8 | 125 | 1.3 | 7.5 | 3 | 58 | 52 | 23 |
| TLCU336M004#TA | U | 33 | 4 | 40 | 0.8 | 125 | 2.6 | 9 | 3 | 62 | 56 | 25 |
| TLCH476M004#TA | H | 47 | 4 | 40 | 0.8 | 125 | 1.9 | 5 | 3 | 89 | 80 | 36 |
| TLCL476M004#TA | L | 47 | 4 | 40 | 0.8 | 125 | 1.9 | 7.5 | 3 | 58 | 52 | 23 |
| TLCR686M004#TA | R | 68 | 4 | 40 | 0.8 | 125 | 2.7 | 5 | 3 | 95 | 85 | 38 |
| TLCR107M004#TA | R | 100 | 4 | 40 | 0.8 | 125 | 4.0 | 5 | 3 | 95 | 85 | 38 |
| TLCR157M004#TA | R | 150 | 4 | 40 | 0.8 | 125 | 6.0 | 5 | 3 | 95 | 85 | 38 |
| TLCR227M004#TA | R | 220 | 4 | 40 | 0.8 | 125 | 8.8 | 5 | 3 | 95 | 85 | 38 |
| TLCT227M004#TA | T | 220 | 4 | 40 | 0.8 | 125 | 8.8 | 1 | 3 | 200 | 180 | 80 |
| 6.3 Volt @ 40°C | | | | | | | | | | | | |
| TLCE474M006HTA | E | 0.47 | 6.3 | 40 | 1.3 | 125 | 1.0 | 60 | 3 | 13 | 12 | 5 |
| TLCK225M006#TA | K | 2.2 | 6.3 | 40 | 1.3 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK475M006#TA | K | 4.7 | 6.3 | 40 | 1.3 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCU475M006#TA | U | 4.7 | 6.3 | 40 | 1.3 | 125 | 0.5 | 5 | 3 | 84 | 75 | 33 |
| TLCK106M006#TA | J | 10 | 6.3 | 40 | 1.3 | 125 | 0.6 | 7.5 | 3 | 52 | 46 | 21 |
| TLCK106M006#TA | K | 10 | 6.3 | 40 | 1.3 | 125 | 3.1 | 15 | 3 | 32 | 28 | 13 |
| TLCK106M006#TA | Z | 10 | 6.3 | 40 | 1.3 | 125 | 0.6 | 15 | 3 | 37 | 33 | 15 |
| TLCL226M006#TA | L | 22 | 6.3 | 40 | 1.3 | 125 | 1.4 | 7.5 | 3 | 58 | 52 | 23 |
| TLCU226M006#TA | U | 22 | 6.3 | 40 | 1.3 | 125 | 2.8 | 12 | 3 | 54 | 49 | 22 |
| TLCH336M006#TA | H | 33 | 6.3 | 40 | 1.3 | 125 | 2.0 | 5 | 3 | 89 | 80 | 36 |
| TLCL336M006#TA | L | 33 | 6.3 | 40 | 1.3 | 125 | 2.1 | 7.5 | 3 | 58 | 52 | 23 |
| TLCL336M006#4000 | L | 33 | 6.3 | 40 | 1.3 | 125 | 2.1 | 4 | 3 | 79 | 71 | 32 |
| TLCU336M006#TA | U | 33 | 6.3 | 40 | 1.3 | 125 | 10.4 | 7.5 | 3 | 68 | 61 | 27 |
| TLCV336M006#TA | V | 33 | 6.3 | 40 | 1.3 | 125 | 4.2 | 5 | 3 | 84 | 75 | 33 |
| TLCH476M006#TA | H | 47 | 6.3 | 40 | 1.3 | 125 | 3.0 | 5 | 3 | 89 | 80 | 36 |
| TLCR476M006#TA | R | 47 | 6.3 | 40 | 1.3 | 125 | 6.0 | 5 | 3 | 95 | 85 | 38 |
| TLCV476M006#TA | V | 47 | 6.3 | 40 | 1.3 | 125 | 6.0 | 15 | 3 | 48 | 43 | 19 |
| TLCR686M006#TA | R | 68 | 6.3 | 40 | 1.3 | 125 | 4.3 | 5 | 3 | 95 | 85 | 38 |
| TLCR107M006#TA | R | 100 | 6.3 | 40 | 1.3 | 125 | 6.0 | 5 | 3 | 95 | 85 | 38 |
| TLCT107M006#TA | T | 100 | 6.3 | 40 | 1.3 | 125 | 31.5 | 15 | 3 | 52 | 46 | 21 |
| TLCR157M006#TA | R | 150 | 6.3 | 40 | 1.3 | 125 | 9.5 | 5 | 3 | 95 | 85 | 38 |
| 8 Volt @ 40°C | | | | | | | | | | | | |
| TLCL336M008#TA | L | 33 | 8 | 40 | 1.6 | 125 | 26.4 | 10 | 3 | 50 | 45 | 20 |
| TLCD476M008#TA | D | 47 | 8 | 40 | 1.6 | 125 | 18.8 | 7 | 3 | 71 | 64 | 28 |
| 10 Volt @ 40°C | | | | | | | | | | | | |
| TLCK225M010#TA | K | 2.2 | 10 | 40 | 2 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK475M010#TA | J | 4.7 | 10 | 40 | 2 | 125 | 0.5 | 10 | 3 | 45 | 40 | 18 |
| TLCU685M010#TA | U | 6.8 | 10 | 40 | 2 | 125 | 0.7 | 5 | 3 | 84 | 75 | 33 |
| TLCU106M010#TA | U | 10 | 10 | 40 | 2 | 125 | 1.0 | 5 | 3 | 84 | 75 | 33 |
| TLCH156M010#TA | H | 15 | 10 | 40 | 2 | 125 | 1.5 | 5 | 3 | 58 | 52 | 23 |
| TLCL156M010#TA | L | 15 | 10 | 40 | 2 | 125 | 1.5 | 7.5 | 3 | 89 | 80 | 36 |
| TLCL226M010#TA | L | 22 | 10 | 40 | 2 | 125 | 11 | 10 | 3 | 50 | 45 | 20 |
| TLCL226M010#TA | M | 22 | 10 | 40 | 2 | 125 | 2.2 | 7.5 | 3 | 63 | 57 | 25 |
| TLCH336M010#TA | H | 33 | 10 | 40 | 2 | 125 | 3.3 | 5 | 3 | 89 | 80 | 36 |
| TLCH476M010#TA | H | 47 | 10 | 40 | 2 | 125 | 23.5 | 7.5 | 3 | 73 | 66 | 29 |
| TLCR476M010#TA | R | 47 | 10 | 40 | 2 | 125 | 4.7 | 5 | 3 | 95 | 85 | 38 |
| TLCR686M010#TA | R | 68 | 10 | 40 | 2 | 125 | 6.8 | 5 | 3 | 95 | 85 | 38 |
| TLCR107M010#TA | R | 100 | 10 | 40 | 2 | 125 | 10 | 5 | 3 | 95 | 85 | 38 |
| TLCT107M010#TA | T | 100 | 10 | 40 | 2 | 125 | 10 | 1 | 3 | 200 | 180 | 80 |
| TLCA157M010#TA | A | 150 | 10 | 40 | 2 | 125 | 7.5 | 5 | 3 | 89 | 80 | 36 |



TLC Series



Tantalum Solid Electrolytic Chip Capacitors Consumer Series

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. | ESR Max. (Ω) @ 100kHz | MSL | 100kHz RMS Current (mA) | | |
|-----------------------|-----------|------------------|-------------------|------------------------|----------------------|---------------------------|---------------|-----------------------|-----|-------------------------|------|-------|
| | | | | | | | | | | 25°C | 85°C | 125°C |
| 16 Volt @ 40°C | | | | | | | | | | | | |
| TLCK474M016#TA | K | 0.47 | 16 | 40 | 3.2 | 125 | 0.5 | 15 | 3 | 32 | 28 | 13 |
| TLCK105M016#TA | K | 1 | 16 | 40 | 3.2 | 125 | 0.8 | 15 | 3 | 32 | 28 | 13 |
| TLCL335M016#TA | L | 3.3 | 16 | 40 | 3.2 | 125 | 0.5 | 7.5 | 3 | 58 | 52 | 23 |
| TLCV106M016#TA | V | 10 | 16 | 40 | 3.2 | 125 | 1.6 | 2 | 3 | 132 | 119 | 53 |
| 20 Volt @ 40°C | | | | | | | | | | | | |
| TLCH225M020#TA | H | 2.2 | 20 | 40 | 4 | 125 | 0.5 | 7.5 | 3 | 89 | 80 | 36 |
| TLCR106M020#TA | R | 10 | 20 | 40 | 4 | 125 | 0.6 | 5 | 3 | 95 | 85 | 38 |
| 25 Volt @ 40°C | | | | | | | | | | | | |
| TLCL105M025#TA | L | 1.0 | 25 | 40 | 5 | 125 | 0.5 | 7.5 | 3 | 58 | 85 | 23 |
| TLCR225M025#TA | R | 2.2 | 25 | 40 | 5 | 125 | 0.6 | 5 | 3 | 95 | 85 | 38 |
| 35 Volt @ 40°C | | | | | | | | | | | | |
| TLCR105M035#TA | R | 1.0 | 35 | 40 | 7 | 125 | 0.5 | 5 | 3 | 95 | 85 | 38 |

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, 0.5V RMS with a maximum DC bias of 2.2 volts. DCL is measured at rated voltage after 5 minutes.

DCL allowed to move up to 2.00 times the limit post mounting.

For typical weight and composition see page 212.

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

QUALIFICATION TABLE

| TEST | TLC series (Temperature range -55°C to +125°C) | | | | | | | | | | | | | |
|-----------------------|---|---------------|----------------|-----------------------|--------------------|-------|------------------------------|---------|------------|------------|------------|------------|------------|------------|
| | Condition | | | | Characteristics | | | | | | | | | |
| Endurance | Determine after application of rated voltage for 2000 +48/-0 hours at 40±2°C and then leaving 1-2 hours at room temperature. Also determine of 85°C temperature, category voltage for 2000 +48/-0 hours and then leaving 1-2 hours at room temperature. Power supply impedance to be ≤0.1Ω/V. | | | | Visual examination | | no visible damage | | | | | | | |
| | | | | | DCL | | 1.25 x initial limit | | | | | | | |
| | | | | | ΔC/C | | within ±30% of initial value | | | | | | | |
| | | | | | DF | | 1.5 x initial limit | | | | | | | |
| Humidity | Determine after storage without applied voltage at 40±2°C and 90-95% relative humidity for 56 days and then recovery 1-2 hours at room temperature. | | | | Visual examination | | no visible damage | | | | | | | |
| | | | | | DCL | | 2 x initial limit | | | | | | | |
| | | | | | ΔC/C | | ±30% of initial value | | | | | | | |
| | | | | | DF | | 1.25 x initial limit | | | | | | | |
| Temperature Stability | Step | Temperature°C | Duration (min) | Voltage Applied | | | | | | | | | | |
| | 1 | +20±2 | 15 | N/A | +20°C | -55°C | +20°C | +40°C | +60°C | +85°C | +125°C | +20°C | | |
| | 2 | -55+0/-3 | 15 | N/A | DCL | | IL* | n/a | IL* | 1.25 x IL* | 1.25 x IL* | 1.25 x IL* | 1.25 x IL* | IL* |
| | 3 | +20±2 | 15 | N/A | ΔC/C | | n/a | +0/-25% | ±5% | +10/-0% | +10/-0% | +20/-0% | +25/-0% | +20/-10% |
| | 4 | +40+2/-0 | 15 | V _R | DF | | IL* | n/a | 1.25 x IL* |
| | 5 | +60+2/-0 | 15 | 0.66 x V _R | | | | | | | | | | |
| | 6 | +85+3/-0 | 15 | 0.50 x V _R | | | | | | | | | | |
| | 7 | +125+3/-0 | 15 | 0.20 x V _R | | | | | | | | | | |
| 8 | +20±2 | 15 | N/A | | | | | | | | | | | |
| Surge Voltage | Test temperature: 40°C+3/0°C Test voltage: 1.3 x rated voltage Series protection resistance 1000±100Ω Discharge resistance: 1000Ω Number of cycles: 1000x Cycle duration: 6 min; 30 sec charge, 5 min 30 sec discharge | | | | Visual examination | | no visible damage | | | | | | | |
| | | | | | DCL | | 2 x initial limit | | | | | | | |
| | | | | | ΔC/C | | within ±30% of initial value | | | | | | | |
| | | | | | DF | | 1.25 x initial limit | | | | | | | |

*Initial Limit