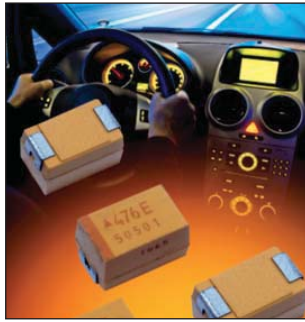


# TRM Professional Multianode



## Tantalum Ultra Low ESR Capacitor



### FEATURES

- Improved reliability – 0.5%/1khrs (twice better than standard)
- DCL reduced by 25% to 0.0075 CV
- Robust against higher thermo-mechanical stresses during assembly process
- Multi-anode construction
- Super low ESR
- CV range 4.7-1500µF / 2.5-50V
- “Mirror” construction used with D case capacitors reduces ESL to half
- Automotive, medical, aerospace, military and other hi-end application



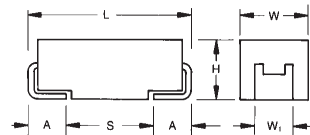
LEAD-FREE  
LEAD-FREE COMPATIBLE  
COMPONENT



SnPb termination option is not  
RoHS compliant.

### APPLICATIONS

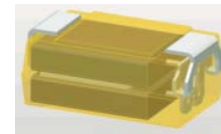
- Automotive, Avionics and Industrial high power DC/DC convertors



#### MULTIANODE CONSTRUCTION

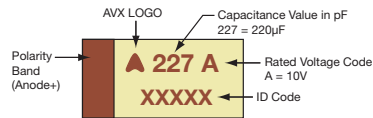


#### MULTIANODE TRM D LOW SELF INDUCTANCE CONSTRUCTION “MIRROR” DESIGN



### MARKING

#### D, E, U CASE



### CASE DIMENSIONS: millimeters (inches)

| Code | EIA Code | EIA Metric | L±0.20 (0.008) | W±0.20 (0.008)<br>-0.10 (0.004) | H±0.20 (0.008)<br>-0.10 (0.004) | W <sub>1</sub> ±0.20 (0.008) | A±0.30 (0.012)<br>-0.20 (0.008) | S Min.       |
|------|----------|------------|----------------|---------------------------------|---------------------------------|------------------------------|---------------------------------|--------------|
| 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) |
| U    | 2924     | 7361-43    | 7.30 (0.287)   | 6.10 (0.240)                    | 4.10 (0.162)                    | 3.10 (0.120)                 | 1.30 (0.051)                    | 4.40 (0.173) |

W<sub>1</sub> dimension applies to the termination width for A dimensional area only.

### HOW TO ORDER

#### TRM

Type

#### E

Case Size  
See table above

#### 108

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

#### \*

Tolerance  
K=±10%  
M=±20%

#### 004

Rated DC Voltage  
002 = 2.5Vdc  
004 = 4Vdc  
006 = 6.3Vdc  
010 = 10Vdc  
012 = 12Vdc  
016 = 16Vdc  
020 = 20Vdc  
025 = 25Vdc  
035 = 35Vdc  
050 = 50Vdc

#### R

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)  
H, K = Non RoHS

#### 0023

ESR in mΩ

### TECHNICAL SPECIFICATIONS

Technical Data:

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

Capacitance Range:

4.7 µF to 1500 µF

Capacitance Tolerance:

±10%; ±20%

| Rated Voltage (V <sub>R</sub> )    | ≤ +85°C:  | 2.5 | 4   | 6.3 | 10 | 12 | 16 | 20 | 25 | 35 | 50 |
|------------------------------------|-----------|-----|-----|-----|----|----|----|----|----|----|----|
| Category Voltage (V <sub>C</sub> ) | ≤ +125°C: | 1.7 | 2.7 | 4   | 7  | 8  | 10 | 13 | 17 | 23 | 33 |
| Surge Voltage (V <sub>S</sub> )    | ≤ +85°C:  | 3.3 | 5.2 | 8   | 13 | 16 | 20 | 26 | 32 | 46 | 65 |
| Surge Voltage (V <sub>S</sub> )    | ≤ +125°C: | 2.2 | 3.4 | 5   | 8  | 10 | 13 | 16 | 20 | 28 | 40 |

Temperature Range:

-55°C to +125°C

Reliability:

0.5% per 1000 hours at 85°C, V<sub>R</sub> with 0.1Ω/V series impedance, 60% confidence level

Meets requirements of AEC-Q200

## Tantalum Ultra Low ESR Capacitor

### CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

| Capacitance |      | Rated Voltage DC ( $V_R$ ) to 85°C |                   |          |          |         |          |          |         |                 |         |
|-------------|------|------------------------------------|-------------------|----------|----------|---------|----------|----------|---------|-----------------|---------|
| $\mu$ F     | Code | 2.5V (e)                           | 4V (G)            | 6.3V (J) | 10V (A)  | 12V (B) | 16V (C)  | 20V (D)  | 25V (E) | 35V (V)         | 50V (T) |
| 4.7         | 475  |                                    |                   |          |          |         |          |          |         |                 | D(200)  |
| 6.8         | 685  |                                    |                   |          |          |         |          |          |         |                 |         |
| 10          | 106  |                                    |                   |          |          |         |          |          |         | D(120)          |         |
| 15          | 156  |                                    |                   |          |          |         |          |          |         |                 |         |
| 22          | 226  |                                    |                   |          |          |         |          |          |         | D(70)/E(60,100) |         |
| 33          | 336  |                                    |                   |          |          |         |          |          | D(65)   | E(50,65)        |         |
| 47          | 476  |                                    |                   |          |          |         | D(100)   | D(55)    | E(65)   |                 |         |
| 68          | 686  |                                    |                   |          |          |         |          |          |         |                 |         |
| 100         | 107  |                                    |                   |          |          |         |          | E(35,45) |         |                 |         |
| 150         | 157  |                                    |                   |          | D(45)    |         | E(30,40) |          |         |                 |         |
| 220         | 227  |                                    |                   |          | D(35)    | E(35)   | U(30,40) |          |         |                 |         |
| 330         | 337  |                                    | D(35)             | D(35)    | E(35)    |         |          |          |         |                 |         |
| 470         | 477  |                                    | D(35)             | E(30)    | U(23,30) |         |          |          |         |                 |         |
| 680         | 687  |                                    | E(23)             | U(18,23) |          |         |          |          |         |                 |         |
| 1000        | 108  | D(25)                              | E(23)<br>U(18,23) |          |          |         |          |          |         |                 |         |
| 1500        | 158  | E(18)<br>U(18,23)                  |                   |          |          |         |          |          |         |                 |         |

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.

# TRM Professional Multianode



## Tantalum Ultra Low ESR Capacitor

### RATINGS & PART NUMBER REFERENCE

| AVX<br>Part No.  | Case<br>Size | Capacitance<br>(μF) | Rated<br>Voltage<br>(V) | Rated<br>Temperature<br>(°C) | Category<br>Voltage<br>(V) | Category<br>Temperature<br>(°C) | DCL<br>Max.<br>(μA) | DF<br>Max.<br>(%) | ESR<br>Max.<br>@ 100kHz<br>(mΩ) | 100kHz RMS Current (A) |       |       | MSL |
|------------------|--------------|---------------------|-------------------------|------------------------------|----------------------------|---------------------------------|---------------------|-------------------|---------------------------------|------------------------|-------|-------|-----|
|                  |              |                     |                         |                              |                            |                                 |                     |                   |                                 | 25°C                   | 85°C  | 125°C |     |
| 2.5 Volt @ 85°C  |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRMD108*002#0025 | D            | 1000                | 2.5                     | 85                           | 1.7                        | 125                             | 18.8                | 8                 | 25                              | 3.194                  | 2.874 | 1.277 | 3   |
| TRME158*002#0018 | E            | 1500                | 2.5                     | 85                           | 1.7                        | 125                             | 28.1                | 6                 | 18                              | 3.873                  | 3.486 | 1.549 | 3   |
| TRMU158*002#0018 | U            | 1500                | 2.5                     | 85                           | 1.7                        | 125                             | 22.5                | 6                 | 18                              | 4.048                  | 3.643 | 1.619 | 3   |
| TRMU158*002#0023 | U            | 1500                | 2.5                     | 85                           | 1.7                        | 125                             | 22.5                | 6                 | 23                              | 3.581                  | 3.223 | 1.433 | 3   |
| 4 Volt @ 85°C    |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRMD337*004#0035 | D            | 330                 | 4                       | 85                           | 2.7                        | 125                             | 9.9                 | 8                 | 35                              | 2.699                  | 2.429 | 1.080 | 3   |
| TRMD477*004#0035 | D            | 470                 | 4                       | 85                           | 2.7                        | 125                             | 14.1                | 8                 | 35                              | 2.699                  | 2.429 | 1.080 | 3   |
| TRME687*004#0023 | E            | 680                 | 4                       | 85                           | 2.7                        | 125                             | 20.4                | 6                 | 23                              | 3.426                  | 3.084 | 1.370 | 3   |
| TRME108*004#0023 | E            | 1000                | 4                       | 85                           | 2.7                        | 125                             | 30                  | 6                 | 23                              | 3.426                  | 3.084 | 1.370 | 3   |
| TRMU108*004#0018 | U            | 1000                | 4                       | 85                           | 2.7                        | 125                             | 30                  | 6                 | 18                              | 4.048                  | 3.643 | 1.619 | 3   |
| TRMU108*004#0023 | U            | 1000                | 4                       | 85                           | 2.7                        | 125                             | 30                  | 6                 | 23                              | 3.581                  | 3.223 | 1.433 | 3   |
| 6.3 Volt @ 85°C  |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRMD337*006#0035 | D            | 330                 | 6.3                     | 85                           | 4                          | 125                             | 14.9                | 8                 | 35                              | 2.699                  | 2.429 | 1.080 | 3   |
| TRME477*006#0030 | E            | 470                 | 6.3                     | 85                           | 4                          | 125                             | 21.2                | 6                 | 30                              | 3.000                  | 2.700 | 1.200 | 3   |
| TRMU687*006#0018 | U            | 680                 | 6.3                     | 85                           | 4                          | 125                             | 30.6                | 6                 | 18                              | 4.048                  | 3.643 | 1.619 | 3   |
| TRMU687*006#0023 | U            | 680                 | 6.3                     | 85                           | 4                          | 125                             | 30.6                | 6                 | 23                              | 3.581                  | 3.223 | 1.433 | 3   |
| 10 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRMD157*010#0045 | D            | 150                 | 10                      | 85                           | 7                          | 125                             | 11.3                | 8                 | 45                              | 2.380                  | 2.142 | 0.952 | 3   |
| TRMD227*010#0035 | D            | 220                 | 10                      | 85                           | 7                          | 125                             | 16.5                | 8                 | 35                              | 2.699                  | 2.429 | 1.080 | 3   |
| TRME337*010#0035 | E            | 330                 | 10                      | 85                           | 7                          | 125                             | 24.8                | 6                 | 35                              | 2.777                  | 2.500 | 1.111 | 3   |
| TRMU477*010#0023 | U            | 470                 | 10                      | 85                           | 7                          | 125                             | 35.3                | 8                 | 23                              | 3.581                  | 3.223 | 1.433 | 3   |
| TRMU477*010#0030 | U            | 470                 | 10                      | 85                           | 7                          | 125                             | 35.3                | 8                 | 30                              | 3.136                  | 2.822 | 1.254 | 3   |
| 12 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRME227*012#0035 | E            | 220                 | 12                      | 85                           | 8.4                        | 125                             | 19.8                | 6                 | 35                              | 2.777                  | 2.500 | 1.111 | 3   |
| 16 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRMD476*016#0100 | D            | 47                  | 16                      | 85                           | 10                         | 125                             | 5.6                 | 8                 | 100                             | 1.597                  | 1.437 | 0.639 | 3   |
| TRME157*016#0030 | E            | 150                 | 16                      | 85                           | 10                         | 125                             | 18                  | 6                 | 30                              | 3.000                  | 2.700 | 1.200 | 3   |
| TRME157*016#0040 | E            | 150                 | 16                      | 85                           | 10                         | 125                             | 18                  | 6                 | 40                              | 2.598                  | 2.338 | 1.039 | 3   |
| TRMU227*016#0030 | U            | 220                 | 16                      | 85                           | 10                         | 125                             | 26.4                | 8                 | 30                              | 3.136                  | 2.822 | 1.254 | 3   |
| TRMU227*016#0040 | U            | 220                 | 16                      | 85                           | 10                         | 125                             | 26.4                | 8                 | 40                              | 2.716                  | 2.444 | 1.086 | 3   |
| 20 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRMD476*020#0055 | D            | 47                  | 20                      | 85                           | 13                         | 125                             | 7.1                 | 8                 | 55                              | 2.153                  | 1.938 | 0.861 | 3   |
| TRME107*020#0035 | E            | 100                 | 20                      | 85                           | 13                         | 125                             | 15                  | 6                 | 35                              | 2.777                  | 2.500 | 1.111 | 3   |
| TRME107*020#0045 | E            | 100                 | 20                      | 85                           | 13                         | 125                             | 15                  | 6                 | 45                              | 2.449                  | 2.205 | 0.980 | 3   |
| 25 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRMD336*025#0065 | D            | 33                  | 25                      | 85                           | 17                         | 125                             | 6.2                 | 8                 | 65                              | 1.981                  | 1.783 | 0.792 | 3   |
| TRME476*025#0065 | E            | 47                  | 25                      | 85                           | 17                         | 125                             | 8.8                 | 6                 | 65                              | 2.038                  | 1.834 | 0.815 | 3   |
| 35 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRMD106*035#0120 | D            | 10                  | 35                      | 85                           | 23                         | 125                             | 2.6                 | 8                 | 120                             | 1.458                  | 1.312 | 0.583 | 3   |
| TRMD226*035#0070 | D            | 22                  | 35                      | 85                           | 23                         | 125                             | 5.8                 | 8                 | 70                              | 1.909                  | 1.718 | 0.763 | 3   |
| TRME226*035#0060 | E            | 22                  | 35                      | 85                           | 23                         | 125                             | 5.8                 | 6                 | 60                              | 2.121                  | 1.909 | 0.849 | 3   |
| TRME226*035#0100 | E            | 22                  | 35                      | 85                           | 23                         | 125                             | 5.8                 | 6                 | 100                             | 1.643                  | 1.479 | 0.657 | 3   |
| TRME336*035#0050 | E            | 33                  | 35                      | 85                           | 23                         | 125                             | 8.7                 | 6                 | 50                              | 2.324                  | 2.091 | 0.930 | 3   |
| TRME336*035#0065 | E            | 33                  | 35                      | 85                           | 23                         | 125                             | 8.7                 | 6                 | 65                              | 2.038                  | 1.834 | 0.815 | 3   |
| 50 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                   |                                 |                        |       |       |     |
| TRMD475*050#0200 | D            | 4.7                 | 50                      | 85                           | 33                         | 125                             | 1.8                 | 8                 | 200                             | 1.129                  | 1.016 | 0.452 | 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, 0.5V RMS with a maximum DC bias of 2.2 volts.

DCL is measured at rated voltage after 5 minutes.

The EIA & CECC standards for low ESR Solid Tantalum Capacitors allow an ESR movement to 1.25 times catalogue limit post mounting.

For typical weight and composition see page 269.

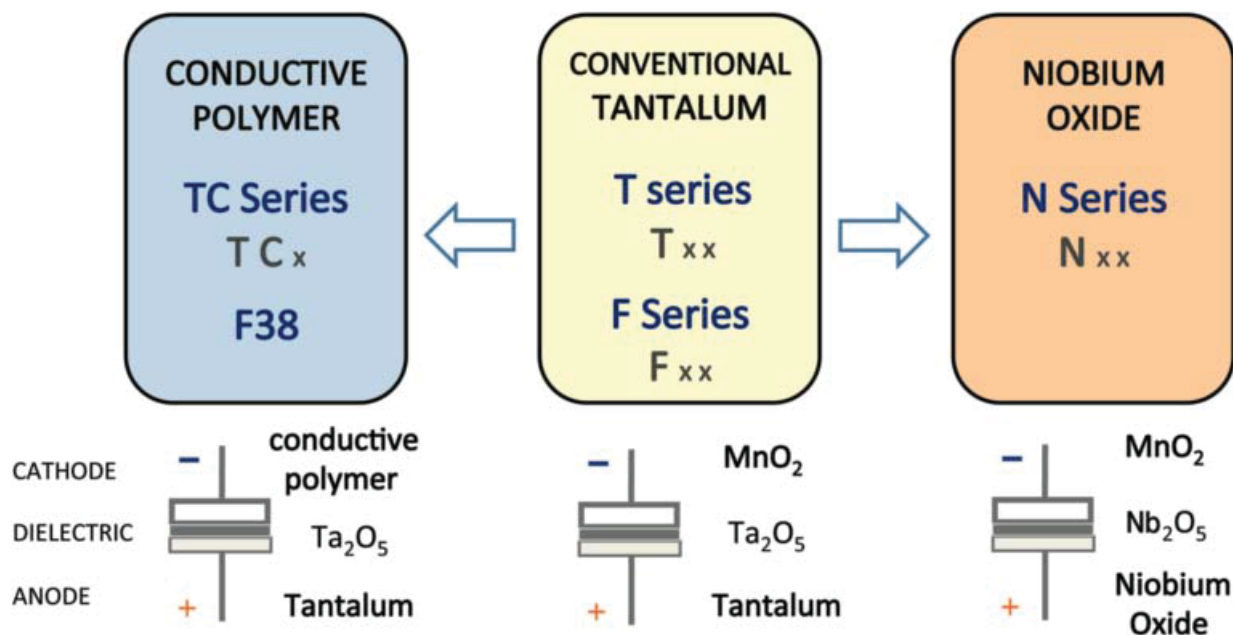
**NOTE: AVX reserves the right to supply higher voltage ratings or tighter tolerance part in the same case size, to the same reliability standards.**

### QUALIFICATION TABLE

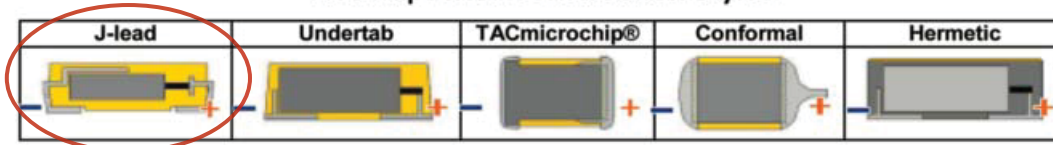
| TEST                         | TRM professional multianode series (Temperature range -55°C to +125°C)                                                                                                                                    |               |               |                    |                                    |           |            |            |            |            |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|--------------------|------------------------------------|-----------|------------|------------|------------|------------|
|                              | Condition                                                                                                                                                                                                 |               |               | Characteristics    |                                    |           |            |            |            |            |
| <b>Endurance</b>             | Apply rated voltage (Ur) at 85°C and / or category voltage (Uc) at 125°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                | initial limit                      |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | $\Delta C/C$       | within $\pm 10\%$ of initial value |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | DF                 | initial limit                      |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | ESR                | 1.25 x initial limit               |           |            |            |            |            |
| <b>Storage Life</b>          | 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                | 1.25 x initial limit               |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | $\Delta C/C$       | within $\pm 10\%$ of initial value |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | DF                 | initial limit                      |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | ESR                | 1.25 x initial limit               |           |            |            |            |            |
| <b>Humidity</b>              | 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                | 1.5 x initial limit                |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | $\Delta C/C$       | within $\pm 10\%$ of initial value |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | DF                 | 1.2 x initial limit                |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | ESR                | 1.25 x initial limit               |           |            |            |            |            |
| <b>Biased Humidity</b>       | Apply rated voltage (Ur) at 85°C, 85% relative humidity for 1000 hours. Stabilize at room temperature and humidity for 1-2 hours before measuring.                                                        |               |               | Visual examination | no visible damage                  |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | DCL                | 2 x initial limit                  |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | $\Delta C/C$       | within $\pm 10\%$ of initial value |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | DF                 | 1.2 x initial limit                |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | ESR                | 1.25 x initial limit               |           |            |            |            |            |
| <b>Temperature Stability</b> | 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            | $\Delta C/C$       | n/a                                | +0/-10%   | $\pm 5\%$  | +10/-0%    | +12/-0%    | $\pm 5\%$  |
|                              | 3                                                                                                                                                                                                         | +20           | 15            | DF                 | IL*                                | 1.5 x IL* | IL*        | 1.5 x IL*  | 2 x IL*    | IL*        |
|                              | 4                                                                                                                                                                                                         | +85           | 15            | ESR                | 1.25 x IL*                         | 2.5 x IL* | 1.25 x IL* | 1.25 x IL* | 1.25 x IL* | 1.25 x IL* |
|                              | 5                                                                                                                                                                                                         | +125          | 15            |                    |                                    |           |            |            |            |            |
|                              | 6                                                                                                                                                                                                         | +20           | 15            |                    |                                    |           |            |            |            |            |
| <b>Surge Voltage</b>         | Apply 1.3x category voltage (Uc) 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 $\Omega$                              |               |               | Visual examination | no visible damage                  |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | DCL                | initial limit                      |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | $\Delta C/C$       | within $\pm 5\%$ of initial value  |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | DF                 | initial limit                      |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | ESR                | 1.25 x initial limit               |           |            |            |            |            |
| <b>Mechanical Shock</b>      | MIL-STD-202, Method 213, Condition F                                                                                                                                                                      |               |               | Visual examination | no visible damage                  |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | DCL                | initial limit                      |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | $\Delta C/C$       | within $\pm 5\%$ of initial value  |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | DF                 | initial limit                      |           |            |            |            |            |
|                              |                                                                                                                                                                                                           |               |               | ESR                | 1.25 x initial limit               |           |            |            |            |            |
| <b>Vibration</b>             | 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                | 1.25 x initial limit               |           |            |            |            |            |

\*Initial Limit

### AVX SOLID ELECTROLYTIC CAPACITOR ROADMAP



### Five Capacitor Construction Styles



### SERIES LINE UP: CONVENTIONAL SMD MnO<sub>2</sub>

