

# TRM Professional Multianode



## Tantalum Ultra Low ESR Capacitor



### FEATURES

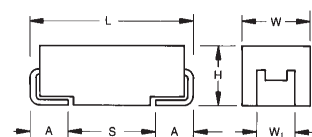
- Improved reliability – 0.5%/1khrs (twice better than standard)
- DCL reduced by 25% to 0.0075 CV
- Robust against higher thermo-mechanical stresses during assembly process
- Multi-anode construction
- Super low ESR
- CV range 4.7-1500µF / 2.5-50V
- “Mirror” construction used with D case capacitors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



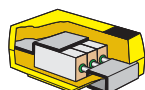
SnPb termination option is not RoHS compliant.

### APPLICATIONS

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



### MULTIANODE CONSTRUCTION

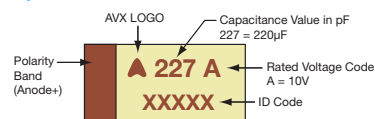


### MULTIANODE TRMD LOW SELF INDUCTANCE CONSTRUCTION “MIRROR” DESIGN



### MARKING

#### D, E CASE



### 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) | W1±0.20 (0.008) | A±0.30 (0.012) -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) |

W1 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



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

| Capacitance |      | Rated Voltage DC (V <sub>R</sub> ) to 85°C |        |          |         |         |          |          |         |                 |         |
|-------------|------|--------------------------------------------|--------|----------|---------|---------|----------|----------|---------|-----------------|---------|
| μF          | 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)          | E(150)* |
| 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  |                                            |        |          |         |         | D(55)*   | E(35,45) |         |                 |         |
| 150         | 157  |                                            |        |          | D(45)   |         | E(30,40) |          |         |                 |         |
| 220         | 227  |                                            |        |          | D(35)   | E(35)   |          |          |         |                 |         |
| 330         | 337  |                                            | D(35)  | D(35)    | E(35)   |         |          |          |         |                 |         |
| 470         | 477  |                                            | D(35)  | E(30)    |         |         |          |          |         |                 |         |
| 680         | 687  |                                            | E(23)  |          |         |         |          |          |         |                 |         |
| 1000        | 108  | D(25)                                      | E(23)  |          |         |         |          |          |         |                 |         |
| 1500        | 158  | E(18)                                      |        |          |         |         |          |          |         |                 |         |
| 2200        | 228  |                                            |        |          |         |         |          |          |         |                 |         |

Available Ratings, (ESR ratings in mOhms in brackets)

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.

### 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>(μA)<br>Max. | DF<br>%<br>Max. | ESR<br>Max. (mΩ)<br>@ 100kHz | MSL | 100kHz RMS Current (A) |       |       |
|------------------|--------------|---------------------|-------------------------|------------------------------|----------------------------|---------------------------------|---------------------|-----------------|------------------------------|-----|------------------------|-------|-------|
|                  |              |                     |                         |                              |                            |                                 |                     |                 |                              |     | 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   | 3.194                  | 2.874 | 1.277 |
| TRME158*002#0018 | E            | 1500                | 2.5                     | 85                           | 1.7                        | 125                             | 28.1                | 6               | 18                           | 3   | 3.873                  | 3.486 | 1.549 |
| 4 Volt @ 85°C    |              |                     |                         |                              |                            |                                 |                     |                 |                              |     |                        |       |       |
| TRMD337*004#0035 | D            | 330                 | 4                       | 85                           | 2.7                        | 125                             | 9.9                 | 8               | 35                           | 3   | 2.699                  | 2.429 | 1.080 |
| TRMD477*004#0035 | D            | 470                 | 4                       | 85                           | 2.7                        | 125                             | 14.1                | 8               | 35                           | 3   | 2.699                  | 2.429 | 1.080 |
| TRME687*004#0023 | E            | 680                 | 4                       | 85                           | 2.7                        | 125                             | 20.4                | 6               | 23                           | 3   | 3.426                  | 3.084 | 1.370 |
| TRME108*004#0023 | E            | 1000                | 4                       | 85                           | 2.7                        | 125                             | 30                  | 6               | 23                           | 3   | 3.426                  | 3.084 | 1.370 |
| 6.3 Volt @ 85°C  |              |                     |                         |                              |                            |                                 |                     |                 |                              |     |                        |       |       |
| TRMD337*006#0035 | D            | 330                 | 6.3                     | 85                           | 4                          | 125                             | 14.9                | 8               | 35                           | 3   | 2.699                  | 2.429 | 1.080 |
| TRME477*006#0030 | E            | 470                 | 6.3                     | 85                           | 4                          | 125                             | 21.2                | 6               | 30                           | 3   | 3.000                  | 2.700 | 1.200 |
| 10 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                 |                              |     |                        |       |       |
| TRMD157*010#0045 | D            | 150                 | 10                      | 85                           | 7                          | 125                             | 11.3                | 8               | 45                           | 3   | 2.380                  | 2.142 | 0.952 |
| TRMD227*010#0035 | D            | 220                 | 10                      | 85                           | 7                          | 125                             | 16.5                | 8               | 35                           | 3   | 2.699                  | 2.429 | 1.080 |
| TRME337*010#0035 | E            | 330                 | 10                      | 85                           | 7                          | 125                             | 24.8                | 6               | 35                           | 3   | 2.777                  | 2.500 | 1.111 |
| 12 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                 |                              |     |                        |       |       |
| TRME227*012#0035 | E            | 220                 | 12                      | 85                           | 8.4                        | 125                             | 19.8                | 6               | 35                           | 3   | 2.777                  | 2.500 | 1.111 |
| 16 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                 |                              |     |                        |       |       |
| TRMD476*016#0100 | D            | 47                  | 16                      | 85                           | 10                         | 125                             | 5.6                 | 8               | 100                          | 3   | 1.597                  | 1.437 | 0.639 |
| TRME157*016#0030 | E            | 150                 | 16                      | 85                           | 10                         | 125                             | 18                  | 6               | 30                           | 3   | 3.000                  | 2.700 | 1.200 |
| TRME157*016#0040 | E            | 150                 | 16                      | 85                           | 10                         | 125                             | 18                  | 6               | 40                           | 3   | 2.598                  | 2.338 | 1.039 |
| 20 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                 |                              |     |                        |       |       |
| TRMD476*020#0055 | D            | 47                  | 20                      | 85                           | 13                         | 125                             | 7.1                 | 8               | 55                           | 3   | 2.153                  | 1.938 | 0.861 |
| TRME107*020#0035 | E            | 100                 | 20                      | 85                           | 13                         | 125                             | 15                  | 6               | 35                           | 3   | 2.777                  | 2.500 | 1.111 |
| TRME107*020#0045 | E            | 100                 | 20                      | 85                           | 13                         | 125                             | 15                  | 6               | 45                           | 3   | 2.449                  | 2.205 | 0.980 |
| 25 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                 |                              |     |                        |       |       |
| TRMD336*025#0065 | D            | 33                  | 25                      | 85                           | 17                         | 125                             | 6.2                 | 8               | 65                           | 3   | 1.981                  | 1.783 | 0.792 |
| TRME476*025#0065 | E            | 47                  | 25                      | 85                           | 17                         | 125                             | 8.8                 | 6               | 65                           | 3   | 2.038                  | 1.834 | 0.815 |
| 35 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                 |                              |     |                        |       |       |
| TRMD106*035#0120 | D            | 10                  | 35                      | 85                           | 23                         | 125                             | 2.6                 | 8               | 120                          | 3   | 1.458                  | 1.312 | 0.583 |
| TRMD226*035#0070 | D            | 22                  | 35                      | 85                           | 23                         | 125                             | 5.8                 | 8               | 70                           | 3   | 1.909                  | 1.718 | 0.763 |
| TRME226*035#0060 | E            | 22                  | 35                      | 85                           | 23                         | 125                             | 5.8                 | 6               | 60                           | 3   | 2.121                  | 1.909 | 0.849 |
| TRME226*035#0100 | E            | 22                  | 35                      | 85                           | 23                         | 125                             | 5.8                 | 6               | 100                          | 3   | 1.643                  | 1.479 | 0.657 |
| TRME336*035#0050 | E            | 33                  | 35                      | 85                           | 23                         | 125                             | 8.7                 | 6               | 50                           | 3   | 2.324                  | 2.091 | 0.930 |
| TRME336*035#0065 | E            | 33                  | 35                      | 85                           | 23                         | 125                             | 8.7                 | 6               | 65                           | 3   | 2.038                  | 1.834 | 0.815 |
| 50 Volt @ 85°C   |              |                     |                         |                              |                            |                                 |                     |                 |                              |     |                        |       |       |
| TRMD475*050#0200 | D            | 4,7                 | 50                      | 85                           | 33                         | 125                             | 1.8                 | 8               | 200                          | 3   | 1.129                  | 1.016 | 0.452 |

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 202.

**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                  | TRM professional multianode series (Temperature range -55°C to +125°C)                                                                                                                                                                                                                         |               |               |                    |                              |           |       |           |            |       |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|--------------------|------------------------------|-----------|-------|-----------|------------|-------|
|                       | Condition                                                                                                                                                                                                                                                                                      |               |               | Characteristics    |                              |           |       |           |            |       |
| Endurance             | Determine after application of rated voltage for 2000 +48/-0 hours at 85±2°C and then leaving 1-2 hours at room temperature. Also determine of 125°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                | initial limit                |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ΔC/C               | within ±10% of initial value |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | DF                 | initial limit                |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ESR                | 1.25 x initial limit         |           |       |           |            |       |
| Storage Life          | 125°C, 0V, 2000h                                                                                                                                                                                                                                                                               |               |               | Visual examination | no visible damage            |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | DCL                | 1.25 x initial limit         |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ΔC/C               | within ±10% of initial value |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | DF                 | initial limit                |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ESR                | 1.25 x initial limit         |           |       |           |            |       |
| Humidity              | Determine after storage without applied voltage at 65±2°C and 95±2% relative humidity for 500 hours and then recovery 1-2 hours at room temperature.                                                                                                                                           |               |               | Visual examination | no visible damage            |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | DCL                | 1.5 x initial limit          |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ΔC/C               | within ±10% of initial value |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | DF                 | 1.2 x initial limit          |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ESR                | 1.25 x initial limit         |           |       |           |            |       |
| Biased Humidity       | Determine after leaving for 1000 hours at 85±2°C, 85% relative humidity and rated voltage and then recovery 1-2 hours at room temperature.                                                                                                                                                     |               |               | Visual examination | no visible damage            |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | DCL                | 2 x initial limit            |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ΔC/C               | within ±10% of initial value |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | DF                 | 1.2 x initial limit          |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ESR                | 1.25 x initial limit         |           |       |           |            |       |
| Temperature Stability | Step                                                                                                                                                                                                                                                                                           | Temperature°C | Duration(min) |                    | +20°C                        | -55°C     | +20°C | +85°C     | +125°C     | +20°C |
|                       | 1                                                                                                                                                                                                                                                                                              | +20±2         | 15            | DCL                | IL*                          | n/a       | IL*   | 10 x IL*  | 12.5 x IL* | IL*   |
|                       | 2                                                                                                                                                                                                                                                                                              | -55+0/-3      | 15            | ΔC/C               | n/a                          | +0/-10%   | ±5%   | +10/-0%   | +12/-0%    | ±5%   |
|                       | 3                                                                                                                                                                                                                                                                                              | +20±2         | 15            | DF                 | IL*                          | 1.5 x IL* | IL*   | 1.5 x IL* | 2 x IL*    | IL*   |
|                       | 4                                                                                                                                                                                                                                                                                              | +85+3/-0      | 15            |                    |                              |           |       |           |            |       |
|                       | 5                                                                                                                                                                                                                                                                                              | +125+3/-0     | 15            |                    |                              |           |       |           |            |       |
| Surge Voltage         | Test temperature: 125°C±3/0°C<br>Test voltage: Category voltage at 125°C<br>Surge voltage: 1.3 x category voltage at 125°C<br>Series protection resistance 1000±100Ω<br>Discharge resistance: 1000Ω<br>Number of cycles: 1000x<br>Cycle duration: 6 min; 30 sec charge, 5 min 30 sec discharge |               |               | Visual examination | no visible damage            |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | DCL                | initial limit                |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ΔC/C               | within ±5% of initial value  |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | DF                 | initial limit                |           |       |           |            |       |
|                       |                                                                                                                                                                                                                                                                                                |               |               | ESR                | 1.25 x initial limit         |           |       |           |            |       |

\*Initial Limit