

# TAJ Series

## Standard Tantalum

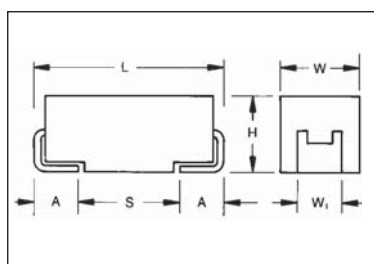


- General purpose SMT chip tantalum series
- 6 case sizes available
- Low profile options available
- CV range: 0.10-2200µF / 2.5-50V



SnPb termination option is not RoHS compliant.

### CASE DIMENSIONS: millimeters (inches)



For part marking see page 149

| Code | EIA Code | EIA Metric | L±0.20 (0.008) | W+0.20 (0.008) -0.10 (0.004) | H+0.20 (0.008) -0.10 (0.004) | W <sub>1</sub> ±0.20 (0.008) | A+0.30 (0.012) -0.20 (0.008) | S Min.       |
|------|----------|------------|----------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------|
| A    | 1206     | 3216-18    | 3.20 (0.126)   | 1.60 (0.063)                 | 1.60 (0.063)                 | 1.20 (0.047)                 | 0.80 (0.031)                 | 1.10 (0.043) |
| B    | 1210     | 3528-21    | 3.50 (0.138)   | 2.80 (0.110)                 | 1.90 (0.075)                 | 2.20 (0.087)                 | 0.80 (0.031)                 | 1.40 (0.055) |
| C    | 2312     | 6032-28    | 6.00 (0.236)   | 3.20 (0.126)                 | 2.60 (0.102)                 | 2.20 (0.087)                 | 1.30 (0.051)                 | 2.90 (0.114) |
| D    | 2917     | 7343-31    | 7.30 (0.287)   | 4.30 (0.169)                 | 2.90 (0.114)                 | 2.40 (0.094)                 | 1.30 (0.051)                 | 4.40 (0.173) |
| E    | 2917     | 7343-43    | 7.30 (0.287)   | 4.30 (0.169)                 | 4.10 (0.162)                 | 2.40 (0.094)                 | 1.30 (0.051)                 | 4.40 (0.173) |
| V    | 2924     | 7361-38    | 7.30 (0.287)   | 6.10 (0.240)                 | 3.55 (0.140)                 | 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

| TAJ  | C                            | 106                                                                                                                                      | M                             | 035                                                                                                                                    | R                                                                                                                                                                                                                                           | NJ                                           | —                                                                                                        |
|------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Type | Case Size<br>See table above | Capacitance Code<br>pF code: 1st two digits represent significant figures<br>3rd digit represents multiplier (number of zeros to follow) | Tolerance<br>K=±10%<br>M=±20% | Rated DC Voltage<br>002=2.5Vdc<br>004=4Vdc<br>006=6.3Vdc<br>010=10Vdc<br>016=16Vdc<br>020=20Vdc<br>025=25Vdc<br>035=35Vdc<br>050=50Vdc | Packaging<br>R = Pure Tin 7" Reel<br>S = Pure Tin 13" Reel<br>A = Gold Plating 7" Reel<br>B = Gold Plating 13" Reel<br>H = Tin Lead 7" Reel<br>(Contact Manufacturer)<br>K = Tin Lead 13" Reel<br>(Contact Manufacturer)<br>H, K = Non RoHS | Specification Suffix<br>NJ = Standard Suffix | Additional characters may be added for special requirements<br>V = Dry pack Option (selected codes only) |

### TECHNICAL SPECIFICATIONS

Technical Data:

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

Capacitance Range: 0.10 µF to 2200 µF

Capacitance Tolerance: ±10%; ±20%

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

Temperature Range: -55°C to +125°C

Reliability: 1% per 1000 hours at 85°C, V<sub>R</sub> with 0.1Ω/V series impedance, 60% confidence level

Qualification: CECC 30801 - 005 issue 2  
EIA 535BAAC

Termination Finished: Sn Plating (standard), Gold and SnPb Plating upon request  
For AEC-Q200 availability, please contact AVX

## Standard Tantalum

### CAPACITANCE AND RATED VOLTAGE, VR (VOLTAGE CODE) 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)                 | 16V (C)               | 20V (D)                | 25V (E)             | 35V (V) | 50V (T)               |
| 0.10        | 104  |                                            |                       |                                    |                         |                       |                        |                     | A       | A                     |
| 0.15        | 154  |                                            |                       |                                    |                         |                       |                        |                     | A       | A/B                   |
| 0.22        | 224  |                                            |                       |                                    |                         |                       |                        |                     | A       | A/B                   |
| 0.33        | 334  |                                            |                       |                                    |                         |                       |                        |                     | A       | A/B                   |
| 0.47        | 474  |                                            |                       |                                    |                         |                       |                        | A                   | A/B     | A/B/C                 |
| 0.68        | 684  |                                            |                       |                                    |                         |                       | A                      | A                   | A/B     | A/B/C                 |
| 1.0         | 105  |                                            |                       |                                    |                         | A                     | A                      | A                   | A/B     | A <sup>(M)</sup> /B/C |
| 1.5         | 155  |                                            |                       |                                    | A                       | A                     | A                      | A/B                 | A/B/C   | B/C/D                 |
| 2.2         | 225  |                                            |                       | A                                  | A                       | A/B                   | A/B                    | A/B                 | A/B/C   | B/C/D                 |
| 3.3         | 335  |                                            |                       | A                                  | A                       | A/B                   | A/B                    | A/B/C               | B/C     | C/D                   |
| 4.7         | 475  |                                            | A                     | A                                  | A/B                     | A/B                   | A/B/C                  | A/B/C               | B/C/D   | C/D                   |
| 6.8         | 685  |                                            | A                     | A/B                                | A/B                     | A/B/C                 | A/B/C                  | B/C                 | C/D     | C/D                   |
| 10          | 106  |                                            | A                     | A/B                                | A/B/C                   | A/B/C                 | A <sup>(M)</sup> */B/C | B/C/D               | C/D/E   | D/E/V                 |
| 15          | 156  |                                            | A/B                   | A/B                                | A/B/C                   | A <sup>(M)</sup> /B/C | B/C/D                  | C/D                 | C/D     | D/E/V                 |
| 22          | 226  |                                            | A                     | A/B/C                              | A/B/C                   | B/C/D                 | B/C/D                  | C/D                 | D/E     | V                     |
| 33          | 336  | A                                          | A/B                   | A/B/C                              | A/B/C/D                 | B/C/D                 | C/D                    | D/E                 | D/E/V   |                       |
| 47          | 476  | A                                          | A/B                   | A/B/C/D                            | B/C/D                   | C/D                   | C/D/E                  | D/E                 | E/V     |                       |
| 68          | 686  | A                                          | A/B/C                 | B/C/D                              | B/C/D                   | C/D                   | C <sup>(M)</sup> /D/E  | E/V                 | V       |                       |
| 100         | 107  | A/B                                        | A/B/C                 | B/C/D                              | B <sup>(M)</sup> /C/D/E | C/D/E                 | D/E/V                  | E <sup>(M)</sup> /V |         |                       |
| 150         | 157  | B                                          | B/C                   | B <sup>(M)</sup> /C/D              | C/D/E                   | D/E/V                 | E/V                    | V <sup>(M)</sup>    |         |                       |
| 220         | 227  | B/D                                        | B <sup>(M)</sup> /C/D | C/D/E                              | C/D/E                   | E/V                   |                        |                     |         |                       |
| 330         | 337  | D                                          | C/D/E                 | C/D/E                              | D/E/V                   | E <sup>(M)</sup>      |                        |                     |         |                       |
| 470         | 477  | C/D                                        | C/D/E                 | D/E/V                              | E/V                     |                       |                        |                     |         |                       |
| 680         | 687  | C/D/E                                      | D/E                   | E/V                                |                         |                       |                        |                     |         |                       |
| 1000        | 108  | D <sup>(M)</sup> /E                        | D/E/V                 | E <sup>(M)</sup> /V <sup>(M)</sup> |                         |                       |                        |                     |         |                       |
| 1500        | 158  | D/E/V <sup>(M)</sup>                       | E/V <sup>(M)</sup>    |                                    |                         |                       |                        |                     |         |                       |
| 2200        | 228  | V <sup>(M)</sup>                           |                       |                                    |                         |                       |                        |                     |         |                       |

Not recommended for new designs, higher voltage or smaller case size substitution are offered.

Released codes <sup>(M)</sup> tolerance only

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 Part No.                              | Case Size | Cap (µF) | Rated Voltage (V) | DCL (µA) Max. | DF % Max. | ESR Max. (Ω) @100kHz | MSL             |
|-------------------------------------------|-----------|----------|-------------------|---------------|-----------|----------------------|-----------------|
| <b>2.5 Volt @ 85°C (1.7 Volt @ 125°C)</b> |           |          |                   |               |           |                      |                 |
| TAJA336*002#NJ                            | A         | 33       | 2.5               | 0.8           | 8         | 1.7                  | 1               |
| TAJA476*002#NJ                            | A         | 47       | 2.5               | 0.9           | 6         | 3                    | 1               |
| TAJA686*002#NJ                            | A         | 68       | 2.5               | 1.4           | 8         | 1.5                  | 1               |
| TAJA107*002#NJ                            | A         | 100      | 2.5               | 2.5           | 30        | 1.4                  | 1               |
| TAJB107*002#NJ                            | B         | 100      | 2.5               | 2.5           | 8         | 1.4                  | 1               |
| TAJB157*002#NJ                            | B         | 150      | 2.5               | 3             | 10        | 1.6                  | 1               |
| TAJB227*002#NJ                            | B         | 220      | 2.5               | 4.4           | 16        | 1.6                  | 1               |
| TAJD227*002#NJ                            | D         | 220      | 2.5               | 5.5           | 8         | 0.3                  | 1               |
| TAJD337*002#NJ                            | D         | 330      | 2.5               | 8.2           | 8         | 0.3                  | 1               |
| TAJC477*002#NJ                            | C         | 470      | 2.5               | 9.4           | 12        | 0.2                  | 1               |
| TAJD477*002#NJ                            | D         | 470      | 2.5               | 11.6          | 8         | 0.2                  | 1               |
| TAJC687*002#NJ                            | C         | 680      | 2.5               | 17.0          | 18        | 0.2                  | 1               |
| TAJD687*002#NJ                            | D         | 680      | 2.5               | 17            | 16        | 0.2                  | 1               |
| TAJE687*002#NJ                            | E         | 680      | 2.5               | 17            | 10        | 0.2                  | 1 <sup>1)</sup> |
| TAJD108M002#NJ                            | D         | 1000     | 2.5               | 25            | 20        | 0.2                  | 1               |
| TAJE108*002#NJ                            | E         | 1000     | 2.5               | 20            | 14        | 0.4                  | 1 <sup>1)</sup> |
| TAJD158*002#NJ                            | D         | 1500     | 2.5               | 37.5          | 60        | 0.2                  | 1               |
| TAJE158*002#NJ                            | E         | 1500     | 2.5               | 37            | 20        | 0.2                  | 1 <sup>1)</sup> |
| TAJV158M002#NJ                            | V         | 1500     | 2.5               | 30            | 20        | 0.2                  | 1 <sup>1)</sup> |
| TAJV228M002#NJ                            | V         | 2200     | 2.5               | 55            | 50        | 0.2                  | 1 <sup>1)</sup> |
| <b>4 Volt @ 85°C (2.7 Volt @ 125°C)</b>   |           |          |                   |               |           |                      |                 |
| TAJA336*004#NJ                            | A         | 33       | 4                 | 1.3           | 6         | 3                    | 1               |
| TAJA476*004#NJ                            | A         | 47       | 4                 | 1.9           | 8         | 2.6                  | 1               |
| TAJA686*004#NJ                            | A         | 68       | 4                 | 2.7           | 10        | 1.5                  | 1               |
| TAJB686*004#NJ                            | B         | 68       | 4                 | 2.7           | 6         | 1.8                  | 1               |
| TAJA107*004#NJ                            | A         | 100      | 4                 | 4             | 30        | 1.4                  | 1               |
| TAJB107*004#NJ                            | B         | 100      | 4                 | 4             | 8         | 0.9                  | 1               |
| TAJB157*004#NJ                            | B         | 150      | 4                 | 6             | 10        | 1.5                  | 1               |
| TAJC157*004#NJ                            | C         | 150      | 4                 | 6             | 6         | 0.3                  | 1               |
| TAJB227M004#NJ                            | B         | 220      | 4                 | 8.8           | 12        | 1.1                  | 1               |
| TAJC227*004#NJ                            | C         | 220      | 4                 | 8.8           | 8         | 1.2                  | 1               |
| TAJD227*004#NJ                            | D         | 220      | 4                 | 8.8           | 8         | 0.9                  | 1               |
| TAJC337*004#NJ                            | C         | 330      | 4                 | 13.2          | 8         | 0.3                  | 1               |
| TAJD337*004#NJ                            | D         | 330      | 4                 | 13.2          | 8         | 0.9                  | 1               |
| TAJC477*004#NJ                            | C         | 470      | 4                 | 18.8          | 14        | 0.3                  | 1               |
| TAJD477*004#NJ                            | D         | 470      | 4                 | 18.8          | 12        | 0.9                  | 1               |
| TAJE477*004#NJ                            | E         | 470      | 4                 | 18.8          | 10        | 0.5                  | 1 <sup>1)</sup> |
| TAJD687*004#NJ                            | D         | 680      | 4                 | 27.2          | 14        | 0.5                  | 1               |
| TAJE687*004#NJ                            | E         | 680      | 4                 | 27.2          | 14        | 0.9                  | 1 <sup>1)</sup> |
| TAJD108*004#NJ                            | D         | 1000     | 4                 | 40            | 60        | 0.2                  | 1               |
| TAJE108*004#NJ                            | E         | 1000     | 4                 | 40            | 14        | 0.4                  | 1 <sup>1)</sup> |
| TAJV108*004#NJ                            | V         | 1000     | 4                 | 40            | 16        | 0.2                  | 1 <sup>1)</sup> |
| TAJE158*004#NJ                            | E         | 1500     | 4                 | 60            | 30        | 0.2                  | 1 <sup>1)</sup> |
| TAJV158M004#NJ                            | V         | 1500     | 4                 | 60            | 30        | 0.2                  | 1 <sup>1)</sup> |
| <b>6.3 Volt @ 85°C (4 Volt @ 125°C)</b>   |           |          |                   |               |           |                      |                 |
| TAJA106*006#NJ                            | A         | 10       | 6.3               | 0.6           | 6         | 4                    | 1               |
| TAJA156*006#NJ                            | A         | 15       | 6.3               | 0.9           | 6         | 3.5                  | 1               |
| TAJA226*006#NJ                            | A         | 22       | 6.3               | 1.4           | 6         | 3                    | 1               |
| TAJA336*006#NJ                            | A         | 33       | 6.3               | 2.1           | 8         | 2.2                  | 1               |
| TAJA476*006#NJ                            | A         | 47       | 6.3               | 2.8           | 10        | 1.6                  | 1               |
| TAJB476*006#NJ                            | B         | 47       | 6.3               | 3             | 6         | 2                    | 1               |
| TAJC476*006#NJ                            | C         | 47       | 6.3               | 3             | 6         | 1.6                  | 1               |
| TAJB686*006#NJ                            | B         | 68       | 6.3               | 4             | 8         | 0.9                  | 1               |
| TAJC686*006#NJ                            | C         | 68       | 6.3               | 4.3           | 6         | 1.5                  | 1               |
| TAJB107*006#NJ                            | B         | 100      | 6.3               | 6.3           | 10        | 1.7                  | 1               |
| TAJC107*006#NJ                            | C         | 100      | 6.3               | 6.3           | 6         | 0.9                  | 1               |
| TAJB157M006#NJ                            | B         | 150      | 6.3               | 9.5           | 10        | 1.2                  | 1               |
| TAJC157*006#NJ                            | C         | 150      | 6.3               | 9.5           | 6         | 1.3                  | 1               |

| AVX Part No.                            | Case Size | Cap (µF) | Rated Voltage (V) | DCL (µA) Max. | DF % Max. | ESR Max. (Ω) @100kHz | MSL             |
|-----------------------------------------|-----------|----------|-------------------|---------------|-----------|----------------------|-----------------|
| <b>10 Volt @ 85°C (7 Volt @ 125°C)</b>  |           |          |                   |               |           |                      |                 |
| TAJD157*006#NJ                          | D         | 150      | 6.3               | 9.5           | 6         | 0.9                  | 1               |
| TAJC227*006#NJ                          | C         | 220      | 6.3               | 13.9          | 8         | 1.2                  | 1               |
| TAJD227*006#NJ                          | D         | 220      | 6.3               | 13.9          | 8         | 0.4                  | 1               |
| TAJE227*006#NJ                          | E         | 220      | 6.3               | 13.9          | 8         | 0.4                  | 1 <sup>1)</sup> |
| TAJC337*006#NJ                          | C         | 330      | 6.3               | 19.8          | 12        | 0.5                  | 1               |
| TAJD337*006#NJ                          | D         | 330      | 6.3               | 20.8          | 8         | 0.4                  | 1               |
| TAJE337*006#NJ                          | E         | 330      | 6.3               | 20.8          | 8         | 0.4                  | 1 <sup>1)</sup> |
| TAJD477*006#NJ                          | D         | 470      | 6.3               | 28            | 12        | 0.4                  | 1               |
| TAJE477*006#NJ                          | E         | 470      | 6.3               | 28            | 10        | 0.4                  | 1 <sup>1)</sup> |
| TAJV477*006#NJ                          | V         | 470      | 6.3               | 28            | 10        | 0.4                  | 1 <sup>1)</sup> |
| TAJE687*006#NJ                          | E         | 680      | 6.3               | 42.8          | 10        | 0.5                  | 1 <sup>1)</sup> |
| TAJV687*006#NJ                          | V         | 680      | 6.3               | 42.8          | 10        | 0.5                  | 1 <sup>1)</sup> |
| TAJE108M006#NJ                          | E         | 1000     | 6.3               | 60            | 20        | 0.2                  | 1 <sup>1)</sup> |
| TAJV108M006#NJ                          | V         | 1000     | 6.3               | 60            | 16        | 0.2                  | 1 <sup>1)</sup> |
| <b>16 Volt @ 85°C (10 Volt @ 125°C)</b> |           |          |                   |               |           |                      |                 |
| TAJA475*010#NJ                          | A         | 4.7      | 10                | 0.5           | 6         | 5                    | 1               |
| TAJA685*010#NJ                          | A         | 6.8      | 10                | 0.7           | 6         | 4                    | 1               |
| TAJA106*010#NJ                          | A         | 10       | 10                | 1             | 6         | 3                    | 1               |
| TAJA156*010#NJ                          | A         | 15       | 10                | 1.5           | 6         | 3.2                  | 1               |
| TAJB156*010#NJ                          | B         | 15       | 10                | 1.5           | 6         | 2.8                  | 1               |
| TAJA226*010#NJ                          | A         | 22       | 10                | 2.2           | 8         | 3                    | 1               |
| TAJB226*010#NJ                          | B         | 22       | 10                | 2.2           | 6         | 2.4                  | 1               |
| TAJA336*010#NJ                          | A         | 33       | 10                | 3.3           | 8         | 1.7                  | 1               |
| TAJB336*010#NJ                          | B         | 33       | 10                | 3.3           | 6         | 1.8                  | 1               |
| TAJC336*010#NJ                          | C         | 33       | 10                | 3.3           | 6         | 1.6                  | 1               |
| TAJB476*010#NJ                          | B         | 47       | 10                | 4.7           | 8         | 1                    | 1               |
| TAJC476*010#NJ                          | C         | 47       | 10                | 4.7           | 6         | 1.2                  | 1               |
| TAJB686*010#NJ                          | B         | 68       | 10                | 6.8           | 6         | 1.4                  | 1               |
| TAJC686*010#NJ                          | C         | 68       | 10                | 6.8           | 6         | 1.3                  | 1               |
| TAJB107M010#NJ                          | B         | 100      | 10                | 10            | 8         | 1.4                  | 1               |
| TAJC107*010#NJ                          | C         | 100      | 10                | 10            | 8         | 1.2                  | 1               |
| TAJD107*010#NJ                          | D         | 100      | 10                | 10            | 6         | 0.9                  | 1               |
| TAJC157*010#NJ                          | C         | 150      | 10                | 15            | 8         | 0.9                  | 1               |
| TAJD157*010#NJ                          | D         | 150      | 10                | 15            | 8         | 0.9                  | 1               |
| TAJE157*010#NJ                          | E         | 150      | 10                | 15            | 8         | 0.9                  | 1 <sup>1)</sup> |
| TAJC227*010#NJ                          | C         | 220      | 10                | 22            | 18        | 0.5                  | 1               |
| TAJD227*010#NJ                          | D         | 220      | 10                | 22            | 8         | 0.5                  | 1               |
| TAJE227*010#NJ                          | E         | 220      | 10                | 22            | 8         | 0.5                  | 1 <sup>1)</sup> |
| TAJD337*010#NJ                          | D         | 330      | 10                | 33            | 8         | 0.9                  | 1               |
| TAJE337*010#NJ                          | E         | 330      | 10                | 33            | 8         | 0.9                  | 1 <sup>1)</sup> |
| TAJV337*010#NJ                          | V         | 330      | 10                | 33            | 10        | 0.9                  | 1 <sup>1)</sup> |
| TAJE477*010#NJ                          | E         | 470      | 10                | 47            | 10        | 0.5                  | 1 <sup>1)</sup> |
| TAJV477*010#NJ                          | V         | 470      | 10                | 47            | 10        | 0.5                  | 1 <sup>1)</sup> |
| <b>16 Volt @ 85°C (10 Volt @ 125°C)</b> |           |          |                   |               |           |                      |                 |
| TAJA225*016#NJ                          | A         | 2.2      | 16                | 0.5           | 6         | 6.5                  | 1               |
| TAJA335*016#NJ                          | A         | 3.3      | 16                | 0.5           | 6         | 5                    | 1               |
| TAJB335*016#NJ                          | B         | 3.3      | 16                | 0.5           | 6         | 4.5                  | 1               |
| TAJA475*016#NJ                          | A         | 4.7      | 16                | 0.8           | 6         | 4                    | 1               |
| TAJB475*016#NJ                          | B         | 4.7      | 16                | 0.8           | 6         | 3.5                  | 1               |
| TAJA685*016#NJ                          | A         | 6.8      | 16                | 1.1           | 6         | 3.5                  | 1               |
| TAJB685*016#NJ                          | B         | 6.8      | 16                | 1.1           | 6         | 2.5                  | 1               |
| TAJA106*016#NJ                          | A         | 10       | 16                | 1.6           | 6         | 3                    | 1               |
| TAJB106*016#NJ                          | B         | 10       | 16                | 1.6           | 6         | 2.8                  | 1               |
| TAJC106*016#NJ                          | C         | 10       | 16                | 1.6           | 6         | 2                    | 1               |
| TAJA156M016#NJ                          | A         | 15       | 16                | 2.4           | 6         | 2                    | 1               |
| TAJB156*016#NJ                          | B         | 15       | 16                | 2.4           | 6         | 2.5                  | 1               |
| TAJC156*016#NJ                          | C         | 15       | 16                | 2.4           | 6         | 1.8                  | 1               |
| TAJB226*016#NJ                          | B         | 22       | 16                | 3.5           | 6         | 2.3                  | 1               |
| TAJC226*016#NJ                          | C         | 22       | 16                | 3.5           | 6         | 1                    | 1               |

<sup>1)</sup> Dry pack option (see How to order) recommended for reduction of stress during soldering. Dry pack parts should be treated as MSL 3.

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

For AEC-Q200 availability, please contact AVX.

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.

For typical weight and composition see page 142.

**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.**

### RATINGS & PART NUMBER REFERENCE

| AVX Part No.                            | Case Size | Cap (µF) | Rated Voltage (V) | DCL (µA) Max. | DF % Max. | ESR Max. (Ω) @100kHz | MSL             |
|-----------------------------------------|-----------|----------|-------------------|---------------|-----------|----------------------|-----------------|
| TAJD226*016#NJ                          | D         | 22       | 16                | 3.5           | 6         | 1.1                  | 1               |
| TAJB336*016#NJ                          | B         | 33       | 16                | 5.3           | 8         | 2.1                  | 1               |
| TAJC336*016#NJ                          | C         | 33       | 16                | 5.3           | 6         | 1.5                  | 1               |
| TAJD336*016#NJ                          | D         | 33       | 16                | 5.3           | 6         | 0.9                  | 1               |
| TAJC476*016#NJ                          | C         | 47       | 16                | 7.5           | 6         | 0.5                  | 1               |
| TAJD476*016#NJ                          | D         | 47       | 16                | 7.5           | 6         | 0.9                  | 1               |
| TAJC686*016#NJ                          | C         | 68       | 16                | 10.9          | 6         | 1.3                  | 1               |
| TAJD686*016#NJ                          | D         | 68       | 16                | 10.9          | 6         | 0.9                  | 1               |
| TAJC107*016#NJ                          | C         | 100      | 16                | 16            | 8         | 1                    | 1               |
| TAJD107*016#NJ                          | D         | 100      | 16                | 16            | 6         | 0.6                  | 1               |
| TAJE107*016#NJ                          | E         | 100      | 16                | 16            | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJD157*016#NJ                          | D         | 150      | 16                | 24            | 6         | 0.9                  | 1               |
| TAJE157*016#NJ                          | E         | 150      | 16                | 23            | 8         | 0.3                  | 1 <sup>1)</sup> |
| TAJV157*016#NJ                          | V         | 150      | 16                | 24            | 8         | 0.5                  | 1 <sup>1)</sup> |
| TAJE227*016#NJ                          | E         | 220      | 16                | 35.2          | 10        | 0.5                  | 1 <sup>1)</sup> |
| TAJV227*016#NJ                          | V         | 220      | 16                | 35.2          | 8         | 0.9                  | 1 <sup>1)</sup> |
| TAJE337M016#NJ                          | E         | 330      | 16                | 52.8          | 30        | 0.4                  | 1 <sup>1)</sup> |
| <b>20 Volt @ 85°C (13 Volt @ 125°C)</b> |           |          |                   |               |           |                      |                 |
| TAJA105*020#NJ                          | A         | 1        | 20                | 0.5           | 4         | 9                    | 1               |
| TAJA155*020#NJ                          | A         | 1.5      | 20                | 0.5           | 6         | 6.5                  | 1               |
| TAJA225*020#NJ                          | A         | 2.2      | 20                | 0.5           | 6         | 5.3                  | 1               |
| TAJB225*020#NJ                          | B         | 2.2      | 20                | 0.5           | 6         | 3.5                  | 1               |
| TAJA335*020#NJ                          | A         | 3.3      | 20                | 0.7           | 6         | 4.5                  | 1               |
| TAJB335*020#NJ                          | B         | 3.3      | 20                | 0.7           | 6         | 3                    | 1               |
| TAJA475*020#NJ                          | A         | 4.7      | 20                | 0.9           | 6         | 4                    | 1               |
| TAJB475*020#NJ                          | B         | 4.7      | 20                | 0.9           | 6         | 3                    | 1               |
| TAJA685*020#NJ                          | A         | 6.8      | 20                | 1.4           | 6         | 2.4                  | 1               |
| TAJB685*020#NJ                          | B         | 6.8      | 20                | 1.4           | 6         | 2.5                  | 1               |
| TAJC685*020#NJ                          | C         | 6.8      | 20                | 1.4           | 6         | 2                    | 1               |
| TAJB106*020#NJ                          | B         | 10       | 20                | 2             | 6         | 2.1                  | 1               |
| TAJC106*020#NJ                          | C         | 10       | 20                | 2             | 6         | 1.2                  | 1               |
| TAJB156*020#NJ                          | B         | 15       | 20                | 3             | 6         | 2                    | 1               |
| TAJC156*020#NJ                          | C         | 15       | 20                | 3             | 6         | 1.7                  | 1               |
| TAJB226*020#NJ                          | B         | 22       | 20                | 4.4           | 6         | 1.8                  | 1               |
| TAJC226*020#NJ                          | C         | 22       | 20                | 4.4           | 6         | 1.6                  | 1               |
| TAJD226*020#NJ                          | D         | 22       | 20                | 4.4           | 6         | 0.9                  | 1               |
| TAJC336*020#NJ                          | C         | 33       | 20                | 6.6           | 6         | 1.5                  | 1               |
| TAJD336*020#NJ                          | D         | 33       | 20                | 6.6           | 6         | 0.9                  | 1               |
| TAJC476*020#NJ                          | C         | 47       | 20                | 9.4           | 6         | 0.5                  | 1               |
| TAJD476*020#NJ                          | D         | 47       | 20                | 9.4           | 6         | 0.9                  | 1               |
| TAJE476*020#NJ                          | E         | 47       | 20                | 9.4           | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJC686M020#NJ                          | C         | 68       | 20                | 13.6          | 8         | 0.5                  | 1               |
| TAJD686*020#NJ                          | D         | 68       | 20                | 13.6          | 6         | 0.4                  | 1               |
| TAJE686*020#NJ                          | E         | 68       | 20                | 13.6          | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJD107*020#NJ                          | D         | 100      | 20                | 20            | 6         | 0.5                  | 1               |
| TAJE107*020#NJ                          | E         | 100      | 20                | 20            | 6         | 0.4                  | 1 <sup>1)</sup> |
| TAJV107*020#NJ                          | V         | 100      | 20                | 20            | 8         | 0.9                  | 1 <sup>1)</sup> |
| TAJE157*020#NJ                          | E         | 150      | 20                | 30            | 8         | 0.3                  | 1 <sup>1)</sup> |
| TAJV157*020#NJ                          | V         | 150      | 20                | 30            | 8         | 0.3                  | 1 <sup>1)</sup> |
| <b>25 Volt @ 85°C (17 Volt @ 125°C)</b> |           |          |                   |               |           |                      |                 |
| TAJA474*025#NJ                          | A         | 0.47     | 25                | 0.5           | 4         | 14                   | 1               |
| TAJA684*025#NJ                          | A         | 0.68     | 25                | 0.5           | 4         | 10                   | 1               |
| TAJA105*025#NJ                          | A         | 1        | 25                | 0.5           | 4         | 8                    | 1               |
| TAJA155*025#NJ                          | A         | 1.5      | 25                | 0.5           | 6         | 7.5                  | 1               |
| TAJB155*025#NJ                          | B         | 1.5      | 25                | 0.5           | 6         | 5                    | 1               |
| TAJA225*025#NJ                          | A         | 2.2      | 25                | 0.6           | 6         | 7                    | 1               |
| TAJB225*025#NJ                          | B         | 2.2      | 25                | 0.6           | 6         | 4.5                  | 1               |
| TAJA335*025#NJ                          | A         | 3.3      | 25                | 0.8           | 6         | 3.7                  | 1               |

| AVX Part No.                            | Case Size | Cap (µF) | Rated Voltage (V) | DCL (µA) Max. | DF % Max. | ESR Max. (Ω) @100kHz | MSL             |
|-----------------------------------------|-----------|----------|-------------------|---------------|-----------|----------------------|-----------------|
| TAJB335*025#NJ                          | B         | 3.3      | 25                | 0.8           | 6         | 3.5                  | 1               |
| TAJA475*025#NJ                          | A         | 4.7      | 25                | 1.2           | 6         | 3.1                  | 1               |
| TAJB475*025#NJ                          | B         | 4.7      | 25                | 1.2           | 6         | 1.5                  | 1               |
| TAJB685*025#NJ                          | B         | 6.8      | 25                | 1.7           | 6         | 2.8                  | 1               |
| TAJC685*025#NJ                          | C         | 6.8      | 25                | 1.7           | 6         | 2                    | 1               |
| TAJB106*025#NJ                          | B         | 10       | 25                | 2.5           | 6         | 2.5                  | 1               |
| TAJC106*025#NJ                          | C         | 10       | 25                | 2.5           | 6         | 1.8                  | 1               |
| TAJD106*025#NJ                          | D         | 10       | 25                | 2.5           | 6         | 1.2                  | 1               |
| TAJC156*025#NJ                          | C         | 15       | 25                | 3.8           | 6         | 1.6                  | 1               |
| TAJD156*025#NJ                          | D         | 15       | 25                | 3.8           | 6         | 1                    | 1               |
| TAJC226*025#NJ                          | C         | 22       | 25                | 5.5           | 6         | 1.4                  | 1               |
| TAJD226*025#NJ                          | D         | 22       | 25                | 5.5           | 6         | 0.9                  | 1               |
| TAJD336*025#NJ                          | D         | 33       | 25                | 8.3           | 6         | 0.9                  | 1               |
| TAJE336*025#NJ                          | E         | 33       | 25                | 8.3           | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJD476*025#NJ                          | D         | 47       | 25                | 11.8          | 6         | 0.9                  | 1               |
| TAJE476*025#NJ                          | E         | 47       | 25                | 11.8          | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJE686*025#NJ                          | E         | 68       | 25                | 17            | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJV686*025#NJ                          | V         | 68       | 25                | 17            | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJE107M025#NJ                          | E         | 100      | 25                | 25            | 10        | 0.3                  | 1 <sup>1)</sup> |
| TAJV107*025#NJ                          | V         | 100      | 25                | 25            | 8         | 0.4                  | 1 <sup>1)</sup> |
| TAJV157M025#NJ                          | V         | 150      | 25                | 37.5          | 10        | 0.4                  | 1 <sup>1)</sup> |
| <b>35 Volt @ 85°C (23 Volt @ 125°C)</b> |           |          |                   |               |           |                      |                 |
| TAJA104*035#NJ                          | A         | 0.1      | 35                | 0.5           | 4         | 24                   | 1               |
| TAJA154*035#NJ                          | A         | 0.15     | 35                | 0.5           | 4         | 21                   | 1               |
| TAJA224*035#NJ                          | A         | 0.22     | 35                | 0.5           | 4         | 18                   | 1               |
| TAJA334*035#NJ                          | A         | 0.33     | 35                | 0.5           | 4         | 15                   | 1               |
| TAJA474*035#NJ                          | A         | 0.47     | 35                | 0.5           | 4         | 12                   | 1               |
| TAJB474*035#NJ                          | B         | 0.47     | 35                | 0.5           | 4         | 10                   | 1               |
| TAJA684*035#NJ                          | A         | 0.68     | 35                | 0.5           | 4         | 8                    | 1               |
| TAJB684*035#NJ                          | B         | 0.68     | 35                | 0.5           | 4         | 8                    | 1               |
| TAJA105*035#NJ                          | A         | 1        | 35                | 0.5           | 4         | 7.5                  | 1               |
| TAJB105*035#NJ                          | B         | 1        | 35                | 0.5           | 4         | 6.5                  | 1               |
| TAJA155*035#NJ                          | A         | 1.5      | 35                | 0.5           | 6         | 7.5                  | 1               |
| TAJB155*035#NJ                          | B         | 1.5      | 35                | 0.5           | 6         | 5.2                  | 1               |
| TAJC155*035#NJ                          | C         | 1.5      | 35                | 0.5           | 6         | 4.5                  | 1               |
| TAJA225*035#NJ                          | A         | 2.2      | 35                | 0.8           | 6         | 4.5                  | 1               |
| TAJB225*035#NJ                          | B         | 2.2      | 35                | 0.8           | 6         | 4.2                  | 1               |
| TAJC225*035#NJ                          | C         | 2.2      | 35                | 0.8           | 6         | 3.5                  | 1               |
| TAJB335*035#NJ                          | B         | 3.3      | 35                | 1.2           | 6         | 3.5                  | 1               |
| TAJC335*035#NJ                          | C         | 3.3      | 35                | 1.2           | 6         | 2.5                  | 1               |
| TAJB475*035#NJ                          | B         | 4.7      | 35                | 1.6           | 6         | 3.1                  | 1               |
| TAJC475*035#NJ                          | C         | 4.7      | 35                | 1.6           | 6         | 2.2                  | 1               |
| TAJD475*035#NJ                          | D         | 4.7      | 35                | 1.6           | 6         | 1.5                  | 1               |
| TAJC685*035#NJ                          | C         | 6.8      | 35                | 2.4           | 6         | 1.8                  | 1               |
| TAJD685*035#NJ                          | D         | 6.8      | 35                | 2.4           | 6         | 1.3                  | 1               |
| TAJC106*035#NJ                          | C         | 10       | 35                | 3.5           | 6         | 1.6                  | 1               |
| TAJD106*035#NJ                          | D         | 10       | 35                | 3.5           | 6         | 1                    | 1               |
| TAJE106*035#NJ                          | E         | 10       | 35                | 3.5           | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJC156*035#NJ                          | C         | 15       | 35                | 5.3           | 6         | 1.4                  | 1               |
| TAJD156*035#NJ                          | D         | 15       | 35                | 5.3           | 6         | 0.9                  | 1               |
| TAJD226*035#NJ                          | D         | 22       | 35                | 7.7           | 6         | 0.9                  | 1               |
| TAJE226*035#NJ                          | E         | 22       | 35                | 7.7           | 6         | 0.5                  | 1 <sup>1)</sup> |
| TAJD336*035#NJ                          | D         | 33       | 35                | 11.6          | 6         | 0.9                  | 1               |
| TAJE336*035#NJ                          | E         | 33       | 35                | 11.6          | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJV336*035#NJ                          | V         | 33       | 35                | 11.6          | 6         | 0.5                  | 1 <sup>1)</sup> |
| TAJE476*035#NJ                          | E         | 47       | 35                | 16.5          | 6         | 0.9                  | 1 <sup>1)</sup> |
| TAJV476*035#NJ                          | V         | 47       | 35                | 16.5          | 6         | 0.4                  | 1 <sup>1)</sup> |
| TAJV686*035#NJ                          | V         | 68       | 35                | 23.8          | 6         | 0.5                  | 1 <sup>1)</sup> |

<sup>1)</sup> Dry pack option (see How to order) recommended for reduction of stress during soldering. Dry pack parts should be treated as MSL 3.

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

For AEC-Q200 availability, please contact AVX.

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.

For typical weight and composition see page 142.

**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.

### RATINGS & PART NUMBER REFERENCE

| AVX<br>Part No.                  | Case<br>Size | Cap<br>( $\mu$ F) | Rated<br>Voltage<br>(V) | DCL<br>( $\mu$ A)<br>Max. | DF<br>%<br>Max. | ESR<br>Max. ( $\Omega$ )<br>@100kHz | MSL             |
|----------------------------------|--------------|-------------------|-------------------------|---------------------------|-----------------|-------------------------------------|-----------------|
| 50 Volt @ 85°C (33 Volt @ 125°C) |              |                   |                         |                           |                 |                                     |                 |
| TAJA104*050#NJ                   | A            | 0.1               | 50                      | 0.5                       | 4               | 22                                  | 1               |
| TAJA154*050#NJ                   | A            | 0.15              | 50                      | 0.5                       | 4               | 15                                  | 1               |
| TAJB154*050#NJ                   | B            | 0.15              | 50                      | 0.5                       | 4               | 17                                  | 1               |
| TAJA224*050#NJ                   | A            | 0.22              | 50                      | 0.5                       | 4               | 18                                  | 1               |
| TAJB224*050#NJ                   | B            | 0.22              | 50                      | 0.5                       | 4               | 14                                  | 1               |
| TAJA334*050#NJ                   | A            | 0.33              | 50                      | 0.5                       | 4               | 17                                  | 1               |
| TAJB334*050#NJ                   | B            | 0.33              | 50                      | 0.5                       | 4               | 12                                  | 1               |
| TAJA474*050#NJ                   | A            | 0.47              | 50                      | 0.5                       | 4               | 9.5                                 | 1               |
| TAJB474*050#NJ                   | B            | 0.47              | 50                      | 0.7                       | 4               | 9.5                                 | 1               |
| TAJC474*050#NJ                   | C            | 0.47              | 50                      | 0.5                       | 4               | 8                                   | 1               |
| TAJA684*050#NJ                   | A            | 0.68              | 50                      | 0.5                       | 4               | 7.9                                 | 1               |
| TAJB684*050#NJ                   | B            | 0.68              | 50                      | 0.5                       | 4               | 8                                   | 1               |
| TAJC684*050#NJ                   | C            | 0.68              | 50                      | 0.5                       | 4               | 7                                   | 1               |
| TAJA105*050#NJ                   | A            | 1                 | 50                      | 0.5                       | 4               | 6.6                                 | 1               |
| TAJB105*050#NJ                   | B            | 1                 | 50                      | 0.5                       | 6               | 7                                   | 1               |
| TAJC105*050#NJ                   | C            | 1                 | 50                      | 0.5                       | 4               | 5.5                                 | 1               |
| TAJB155*050#NJ                   | B            | 1.5               | 50                      | 0.8                       | 8               | 5.4                                 | 1               |
| TAJC155*050#NJ                   | C            | 1.5               | 50                      | 0.8                       | 6               | 4.5                                 | 1               |
| TAJD155*050#NJ                   | D            | 1.5               | 50                      | 0.8                       | 6               | 4                                   | 1               |
| TAJB225*050#NJ                   | B            | 2.2               | 50                      | 1.1                       | 8               | 4.5                                 | 1               |
| TAJC225*050#NJ                   | C            | 2.2               | 50                      | 1.1                       | 8               | 2.5                                 | 1               |
| TAJD225*050#NJ                   | D            | 2.2               | 50                      | 1.1                       | 6               | 2.5                                 | 1               |
| TAJC335*050#NJ                   | C            | 3.3               | 50                      | 1.6                       | 6               | 2.5                                 | 1               |
| TAJD335*050#NJ                   | D            | 3.3               | 50                      | 1.7                       | 6               | 2                                   | 1               |
| TAJC475*050#NJ                   | C            | 4.7               | 50                      | 0.5                       | 4               | 1.4                                 | 1               |
| TAJD475*050#NJ                   | D            | 4.7               | 50                      | 2.4                       | 6               | 1.4                                 | 1               |
| TAJC685*050#NJ                   | C            | 6.8               | 50                      | 3.4                       | 6               | 1                                   | 1               |
| TAJD685*050#NJ                   | D            | 6.8               | 50                      | 3.4                       | 6               | 1                                   | 1               |
| TAJD106*050#NJ                   | D            | 10                | 50                      | 5                         | 6               | 0.8                                 | 1               |
| TAJE106*050#NJ                   | E            | 10                | 50                      | 5                         | 6               | 1                                   | 1 <sup>1)</sup> |
| TAJV106*050#NJ                   | V            | 10                | 50                      | 5                         | 6               | 0.65                                | 1 <sup>1)</sup> |
| TAJD156*050#NJ                   | D            | 15                | 50                      | 7.5                       | 6               | 0.6                                 | 1               |
| TAJE156*050#NJ                   | E            | 15                | 50                      | 7.5                       | 6               | 0.6                                 | 1 <sup>1)</sup> |
| TAJV156*050#NJ                   | V            | 15                | 50                      | 7.5                       | 6               | 0.6                                 | 1 <sup>1)</sup> |
| TAJV226*050#NJ                   | V            | 22                | 50                      | 11                        | 8               | 0.6                                 | 1 <sup>1)</sup> |

<sup>1)</sup> Dry pack option (see How to order) recommended for reduction of stress during soldering. Dry pack parts should be treated as MSL 3.

For AEC-Q200 availability, please contact AVX.

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.

For typical weight and composition see page 142.

**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.

# TAJ Automotive Range



## Standard Tantalum - Automotive Product Range

### TAJ AUTOMOTIVE RANGE CAPACITANCE AND RATED VOLTAGE, $V_R$ (VOLTAGE CODE) RANGE (LETTER DENOTES CASE SIZE)

| Capacitance          |                   | Rated voltage DC ( $V_R$ ) to 85°C |                       |                       |                   |                   |                     |                 |
|----------------------|-------------------|------------------------------------|-----------------------|-----------------------|-------------------|-------------------|---------------------|-----------------|
| $\mu F$              | Code              | 6.3V (J)                           | 10V (A)               | 16V (C)               | 20V (D)           | 25V (E)           | 35V (V)             | 50V (T)         |
| 0.10<br>0.15<br>0.22 | 104<br>154<br>224 |                                    |                       |                       |                   |                   |                     | A               |
| 0.33<br>0.47<br>0.68 | 334<br>474<br>684 |                                    |                       |                       |                   | A<br>A<br>A       | A<br>A<br>A         | A<br>A/B<br>B   |
| 1.0<br>1.5<br>2.2    | 105<br>155<br>225 |                                    | A                     | A<br>A<br>A           | A<br>A<br>A/B     | A<br>A<br>A/B     | A/B<br>A/B<br>B/C   | B/C<br>C<br>C/D |
| 3.3<br>4.7<br>6.8    | 335<br>475<br>685 | A                                  | A/B<br>A/B<br>A/B     | A/B<br>A/B<br>A/B     | A/B<br>A/B<br>B/C | B<br>B/C<br>B/C   | B/C<br>B/C/D<br>C/D | C/D<br>C/D<br>D |
| 10<br>15<br>22       | 106<br>156<br>226 | A/B<br>A<br>A/B/C                  | A/B<br>A/B/C<br>A/B/C | A/B/C<br>B/C<br>B/C/D | B/C<br>B/C<br>C/D | C/D<br>C/D<br>C/D | C/D<br>D<br>D/E     | D/E<br>E        |
| 33<br>47<br>68       | 336<br>476<br>686 | A/B<br>B/C<br>B/C                  | B/C<br>B/C/D<br>C/D   | C/D<br>C/D<br>C/D     | C/D<br>D<br>D/E   | D<br>D/E          | E                   |                 |
| 100<br>150<br>220    | 107<br>157<br>227 | C/D<br>C/D<br>D                    | C/D<br>D/E<br>D/E     | D/E<br>E              | E                 |                   |                     |                 |
| 330<br>470<br>680    | 337<br>477<br>687 | D/E<br>D/E<br>E                    | E                     |                       |                   |                   |                     |                 |

Not recommended for new designs, higher voltage or smaller case size substitution are offered.

Released codes

Engineering samples - please contact manufacturer

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

## HOW TO ORDER

| TAJ  | C               | 106                                                                                                                | M                    | 035                                                       |                                           | T                                                                     | NJ                   | V                          |
|------|-----------------|--------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------|----------------------|----------------------------|
| Type | Case Size       | Capacitance Code                                                                                                   | Tolerance            | Rated DC Voltage                                          |                                           | Packaging                                                             | Specification Suffix | Dry Pack Option            |
|      | See table above | pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow) | K = ±10%<br>M = ±20% | 006 = 6.3Vdc<br>010 = 10Vdc<br>016 = 16Vdc<br>020 = 20Vdc | 025 = 25Vdc<br>035 = 35Vdc<br>050 = 50Vdc | T = Automotive Lead Free 7" Reel<br>U = Automotive Lead Free 13" Reel | NJ = Std Suffix      | (D,E case sizes mandatory) |

## TECHNICAL SPECIFICATIONS

|                               |                                                                                             |     |    |    |    |    |    |    |
|-------------------------------|---------------------------------------------------------------------------------------------|-----|----|----|----|----|----|----|
| Technical Data:               | All technical data relate to an ambient temperature of +25°C                                |     |    |    |    |    |    |    |
| Capacitance Range:            | 0.22 $\mu F$ to 680 $\mu F$                                                                 |     |    |    |    |    |    |    |
| Capacitance Tolerance:        | $\pm 10\%$ ; $\pm 20\%$                                                                     |     |    |    |    |    |    |    |
| Rated Voltage ( $V_R$ )       | $\leq +85^\circ C$ :                                                                        | 6.3 | 10 | 16 | 20 | 25 | 35 | 50 |
| Category Voltage ( $V_C$ )    | $\leq +125^\circ C$ :                                                                       | 4   | 7  | 10 | 13 | 17 | 23 | 33 |
| Surge Voltage ( $V_S$ )       | $\leq +85^\circ C$ :                                                                        | 8   | 13 | 20 | 26 | 32 | 46 | 65 |
| Surge Voltage ( $V_S$ )       | $\leq +125^\circ C$ :                                                                       | 5   | 8  | 13 | 16 | 20 | 28 | 40 |
| Temperature Range:            | -55°C to +125°C                                                                             |     |    |    |    |    |    |    |
| Environmental Classification: | 55/125/56 (IEC 68-2)                                                                        |     |    |    |    |    |    |    |
| Reliability:                  | 1% per 1000 hours at 85°C, $V_R$ with 0.1 $\Omega/V$ series impedance, 60% confidence level |     |    |    |    |    |    |    |
| Termination Finished:         | Sn Plating (standard), Gold and SnPb Plating upon request                                   |     |    |    |    |    |    |    |
|                               | Meets requirements of AEC-Q200                                                              |     |    |    |    |    |    |    |



# TAJ Automotive Range



## Standard Tantalum - Automotive Product Range

### RATINGS & PART NUMBER REFERENCE

| AVX Part No.*                           | Case Size | Cap (µF) | Rated Voltage (V) | DCL (µA) Max. | DF % Max. | ESR Max. (Ω) @100kHz | MSL |
|-----------------------------------------|-----------|----------|-------------------|---------------|-----------|----------------------|-----|
| <b>6.3 Volt @ 85°C (4 Volt @ 125°C)</b> |           |          |                   |               |           |                      |     |
| TAJA335*006TNJ                          | A         | 3.3      | 6.3               | 0.5           | 6         | 7                    | 1   |
| TAJA106*006TNJ                          | A         | 10       | 6.3               | 0.6           | 6         | 4                    | 1   |
| TAJB106*006TNJ                          | B         | 10       | 6.3               | 0.6           | 6         | 3                    | 1   |
| TAJA156*006TNJ                          | A         | 15       | 6.3               | 0.9           | 6         | 3.5                  | 1   |
| TAJA226*006TNJ                          | A         | 22       | 6.3               | 1.4           | 6         | 3                    | 1   |
| TAJB226*006TNJ                          | B         | 22       | 6.3               | 1.4           | 6         | 2.5                  | 1   |
| TAJC226*006TNJ                          | C         | 22       | 6.3               | 1.4           | 6         | 2                    | 1   |
| TAJA336*006TNJ                          | A         | 33       | 6.3               | 2.1           | 8         | 2.2                  | 1   |
| TAJB336*006TNJ                          | B         | 33       | 6.3               | 2.1           | 6         | 2.2                  | 1   |
| TAJB476*006TNJ                          | B         | 47       | 6.3               | 3             | 6         | 2                    | 1   |
| TAJC476*006TNJ                          | C         | 47       | 6.3               | 3             | 6         | 1.6                  | 1   |
| TAJB686*006TNJ                          | B         | 68       | 6.3               | 4             | 8         | 0.9                  | 1   |
| TAJC686*006TNJ                          | C         | 68       | 6.3               | 4.3           | 6         | 1.5                  | 1   |
| TAJC107*006TNJ                          | C         | 100      | 6.3               | 6.3           | 6         | 0.9                  | 1   |
| TAJD107*006TNJV                         | D         | 100      | 6.3               | 6.3           | 6         | 0.9                  | 3   |
| TAJC157*006TNJ                          | C         | 150      | 6.3               | 9.5           | 6         | 1.3                  | 1   |
| TAJD157*006TNJV                         | D         | 150      | 6.3               | 9.5           | 6         | 0.9                  | 3   |
| TAJD227*006TNJV                         | D         | 220      | 6.3               | 13.9          | 8         | 0.4                  | 3   |
| TAJD337*006TNJV                         | D         | 330      | 6.3               | 20.8          | 8         | 0.4                  | 3   |
| TAJE337*006TNJV                         | E         | 330      | 6.3               | 20.8          | 8         | 0.4                  | 3   |
| TAJD477*006TNJV                         | D         | 470      | 6.3               | 28            | 12        | 0.4                  | 3   |
| TAJE477*006TNJV                         | E         | 470      | 6.3               | 28            | 10        | 0.4                  | 3   |
| TAJE687*006TNJV                         | E         | 680      | 6.3               | 42.8          | 10        | 0.5                  | 3   |
| <b>10 Volt @ 85°C (7 Volt @ 125°C)</b>  |           |          |                   |               |           |                      |     |
| TAJA225*010TNJ                          | A         | 2.2      | 10                | 0.5           | 6         | 7                    | 1   |
| TAJA475*010TNJ                          | A         | 4.7      | 10                | 0.5           | 6         | 5                    | 1   |
| TAJB475*010TNJ                          | B         | 4.7      | 10                | 0.5           | 6         | 4                    | 1   |
| TAJA685*010TNJ                          | A         | 6.8      | 10                | 0.7           | 6         | 4                    | 1   |
| TAJB685*010TNJ                          | B         | 6.8      | 10                | 0.7           | 6         | 3                    | 1   |
| TAJA106*010TNJ                          | A         | 10       | 10                | 1             | 6         | 3                    | 1   |
| TAJB106*010TNJ                          | B         | 10       | 10                | 1             | 6         | 2.1                  | 1   |
| TAJA156*010TNJ                          | A         | 15       | 10                | 1.5           | 6         | 3.2                  | 1   |
| TAJB156*010TNJ                          | B         | 15       | 10                | 1.5           | 6         | 2.8                  | 1   |
| TAJC156*010TNJ                          | C         | 15       | 10                | 1.5           | 6         | 2                    | 1   |
| TAJA226*010TNJ                          | A         | 22       | 10                | 2.2           | 8         | 3                    | 1   |
| TAJB226*010TNJ                          | B         | 22       | 10                | 2.2           | 6         | 2.4                  | 1   |
| TAJC226*010TNJ                          | C         | 22       | 10                | 2.2           | 6         | 1.8                  | 1   |
| TAJB336*010TNJ                          | B         | 33       | 10                | 3.3           | 6         | 1.8                  | 1   |
| TAJC336*010TNJ                          | C         | 33       | 10                | 3.3           | 6         | 1.6                  | 1   |
| TAJB476*010TNJ                          | B         | 47       | 10                | 4.7           | 8         | 1                    | 1   |
| TAJC476*010TNJ                          | C         | 47       | 10                | 4.7           | 6         | 1.2                  | 1   |
| TAJD476*010TNJV                         | D         | 47       | 10                | 4.7           | 6         | 0.4                  | 3   |
| TAJC686*010TNJ                          | C         | 68       | 10                | 6.8           | 6         | 1.3                  | 1   |
| TAJD686*010TNJV                         | D         | 68       | 10                | 6.8           | 6         | 0.9                  | 3   |
| TAJC107*010TNJ                          | C         | 100      | 10                | 10            | 8         | 1.2                  | 1   |
| TAJD107*010TNJV                         | D         | 100      | 10                | 10            | 6         | 0.9                  | 3   |
| TAJD157*010TNJV                         | D         | 150      | 10                | 15            | 8         | 0.9                  | 3   |
| TAJE157*010TNJV                         | E         | 150      | 10                | 15            | 8         | 0.9                  | 3   |
| TAJD227*010TNJV                         | D         | 220      | 10                | 22            | 8         | 0.5                  | 3   |
| TAJE227*010TNJV                         | E         | 220      | 10                | 22            | 8         | 0.5                  | 3   |
| TAJE337*010TNJV                         | E         | 330      | 10                | 33            | 8         | 0.9                  | 3   |
| <b>16 Volt @ 85°C (10 Volt @ 125°C)</b> |           |          |                   |               |           |                      |     |
| TAJA105*016TNJ                          | A         | 1        | 16                | 0.5           | 4         | 11                   | 1   |
| TAJA225*016TNJ                          | A         | 2.2      | 16                | 0.5           | 6         | 6.5                  | 1   |
| TAJA335*016TNJ                          | A         | 3.3      | 16                | 0.5           | 6         | 5                    | 1   |
| TAJB335*016TNJ                          | B         | 3.3      | 16                | 0.5           | 6         | 4.5                  | 1   |
| TAJA475*016TNJ                          | A         | 4.7      | 16                | 0.8           | 6         | 4                    | 1   |
| TAJB475*016TNJ                          | B         | 4.7      | 16                | 0.8           | 6         | 3.5                  | 1   |

| AVX Part No.*                           | Case Size | Cap (µF) | Rated Voltage (V) | DCL (µA) Max. | DF % Max. | ESR Max. (Ω) @100kHz | MSL |
|-----------------------------------------|-----------|----------|-------------------|---------------|-----------|----------------------|-----|
| <b>6.3 Volt @ 85°C (4 Volt @ 125°C)</b> |           |          |                   |               |           |                      |     |
| TAJA685*016TNJ                          | A         | 6.8      | 16                | 1.1           | 6         | 3.5                  | 1   |
| TAJB685*016TNJ                          | B         | 6.8      | 16                | 1.1           | 6         | 2.5                  | 1   |
| TAJA106*016TNJ                          | A         | 10       | 16                | 1.6           | 6         | 3                    | 1   |
| TAJB106*016TNJ                          | B         | 10       | 16                | 1.6           | 6         | 2.8                  | 1   |
| TAJC106*016TNJ                          | C         | 10       | 16                | 1.6           | 6         | 2                    | 1   |
| TAJB156*016TNJ                          | B         | 15       | 16                | 2.4           | 6         | 2.5                  | 1   |
| TAJC156*016TNJ                          | C         | 15       | 16                | 2.4           | 6         | 1.8                  | 1   |
| TAJB226*016TNJ                          | B         | 22       | 16                | 3.5           | 6         | 2.3                  | 1   |
| TAJC226*016TNJ                          | C         | 22       | 16                | 3.5           | 6         | 1                    | 1   |
| TAJD226*016TNJV                         | D         | 22       | 16                | 3.5           | 6         | 1.1                  | 3   |
| TAJC336*016TNJ                          | C         | 33       | 16                | 5.3           | 6         | 1.5                  | 1   |
| TAJD336*016TNJV                         | D         | 33       | 16                | 5.3           | 6         | 0.9                  | 3   |
| TAJC476*016TNJ                          | C         | 47       | 16                | 7.5           | 6         | 0.5                  | 1   |
| TAJD476*016TNJV                         | D         | 47       | 16                | 7.5           | 6         | 0.9                  | 3   |
| TAJC686*016TNJ                          | C         | 68       | 16                | 10.9          | 6         | 1.3                  | 1   |
| TAJD686*016TNJV                         | D         | 68       | 16                | 10.9          | 6         | 0.9                  | 3   |
| TAJD107*016TNJV                         | D         | 100      | 16                | 16            | 6         | 0.6                  | 3   |
| TAJE107*016TNJV                         | E         | 100      | 16                | 16            | 6         | 0.9                  | 3   |
| TAJE157*016TNJV                         | E         | 150      | 16                | 23            | 8         | 0.3                  | 3   |
| <b>20 Volt @ 85°C (13 Volt @ 125°C)</b> |           |          |                   |               |           |                      |     |
| TAJA105*020TNJ                          | A         | 1        | 20                | 0.5           | 4         | 9                    | 1   |
| TAJA155*020TNJ                          | A         | 1.5      | 20                | 0.5           | 6         | 6.5                  | 1   |
| TAJA225*020TNJ                          | A         | 2.2      | 20                | 0.5           | 6         | 5.3                  | 1   |
| TAJB225*020TNJ                          | B         | 2.2      | 20                | 0.5           | 6         | 3.5                  | 1   |
| TAJA335*020TNJ                          | A         | 3.3      | 20                | 0.7           | 6         | 4.5                  | 1   |
| TAJB335*020TNJ                          | B         | 3.3      | 20                | 0.7           | 6         | 3                    | 1   |
| TAJA475*020TNJ                          | A         | 4.7      | 20                | 0.9           | 6         | 4                    | 1   |
| TAJB475*020TNJ                          | B         | 4.7      | 20                | 0.9           | 6         | 3                    | 1   |
| TAJB685*020TNJ                          | B         | 6.8      | 20                | 1.4           | 6         | 2.5                  | 1   |
| TAJC685*020TNJ                          | C         | 6.8      | 20                | 1.4           | 6         | 2                    | 1   |
| TAJB106*020TNJ                          | B         | 10       | 20                | 2             | 6         | 2.1                  | 1   |
| TAJC106*020TNJ                          | C         | 10       | 20                | 2             | 6         | 1.2                  | 1   |
| TAJB156*020TNJ                          | B         | 15       | 20                | 3             | 6         | 2                    | 1   |
| TAJC156*020TNJ                          | C         | 15       | 20                | 3             | 6         | 1.7                  | 1   |
| TAJC226*020TNJ                          | C         | 22       | 20                | 4.4           | 6         | 1.6                  | 1   |
| TAJD226*020TNJV                         | D         | 22       | 20                | 4.4           | 6         | 0.9                  | 3   |
| TAJC336*020TNJ                          | C         | 33       | 20                | 6.6           | 6         | 1.5                  | 1   |
| TAJD336*020TNJV                         | D         | 33       | 20                | 6.6           | 6         | 0.9                  | 3   |
| TAJD476*020TNJV                         | D         | 47       | 20                | 9.4           | 6         | 0.9                  | 3   |
| TAJD686*020TNJV                         | D         | 68       | 20                | 13.6          | 6         | 0.4                  | 3   |
| TAJE686*020TNJV                         | E         | 68       | 20                | 13.6          | 6         | 0.9                  | 3   |
| TAJE107*020TNJV                         | E         | 100      | 20                | 20            | 6         | 0.4                  | 3   |
| <b>25 Volt @ 85°C (17 Volt @ 125°C)</b> |           |          |                   |               |           |                      |     |
| TAJA474*025TNJ                          | A         | 0.47     | 25                | 0.5           | 4         | 14                   | 1   |
| TAJA684*025TNJ                          | A         | 0.68     | 25                | 0.5           | 4         | 10                   | 1   |
| TAJA105*025TNJ                          | A         | 1        | 25                | 0.5           | 4         | 8                    | 1   |
| TAJA155*025TNJ                          | A         | 1.5      | 25                | 0.5           | 6         | 7.5                  | 1   |
| TAJA225*025TNJ                          | A         | 2.2      | 25                | 0.6           | 6         | 7                    | 1   |
| TAJB225*025TNJ                          | B         | 2.2      | 25                | 0.6           | 6         | 4.5                  | 1   |
| TAJB335*025TNJ                          | B         | 3.3      | 25                | 0.8           | 6         | 3.5                  | 1   |
| TAJB475*025TNJ                          | B         | 4.7      | 25                | 1.2           | 6         | 1.5                  | 1   |
| TAJC475*025TNJ                          | C         | 4.7      | 25                | 1.2           | 6         | 2.4                  | 1   |
| TAJB685*025TNJ                          | B         | 6.8      | 25                | 1.7           | 6         | 2.8                  | 1   |
| TAJC685*025TNJ                          | C         | 6.8      | 25                | 1.7           | 6         | 2                    | 1   |
| TAJC106*025TNJ                          | C         | 10       | 25                | 2.5           | 6         | 1.8                  | 1   |
| TAJD106*025TNJV                         | D         | 10       | 25                | 2.5           | 6         | 1.2                  | 3   |
| TAJC156*025TNJ                          | C         | 15       | 25                | 3.8           | 6         | 1.6                  | 1   |
| TAJD156*025TNJV                         | D         | 15       | 25                | 3.8           | 6         | 1                    | 3   |
| TAJC226*025TNJ                          | C         | 22       | 25                | 5.5           | 6         | 1.4                  | 1   |

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

\*Please use "U" instead of "T" in the suffix letter for 13" reel packaging

Please use specific PN for automotive version – see "HOW TO ORDER".

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.

For typical weight and composition see page 142.

**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.**

# TAJ Automotive Range



## Standard Tantalum - Automotive Product Range

### RATINGS & PART NUMBER REFERENCE

| AVX<br>Part No.*                        | Case<br>Size | Cap<br>(µF) | Rated<br>Voltage<br>(V) | DCL<br>(µA)<br>Max. | DF<br>%<br>Max. | ESR<br>Max. (Ω)<br>@100kHz | MSL |
|-----------------------------------------|--------------|-------------|-------------------------|---------------------|-----------------|----------------------------|-----|
| TAJD226*025TNJV                         | D            | 22          | 25                      | 5.5                 | 6               | 0.9                        | 3   |
| TAJD336*025TNJV                         | D            | 33          | 25                      | 8.3                 | 6               | 0.9                        | 3   |
| TAJD476*025TNJV                         | D            | 47          | 25                      | 11.8                | 6               | 0.9                        | 3   |
| TAJE476*025TNJV                         | E            | 47          | 25                      | 11.8                | 6               | 0.9                        | 3   |
| <b>35 Volt @ 85°C (23 Volt @ 125°C)</b> |              |             |                         |                     |                 |                            |     |
| TAJA334*035TNJ                          | A            | 0.33        | 35                      | 0.5                 | 4               | 15                         | 1   |
| TAJA474*035TNJ                          | A            | 0.47        | 35                      | 0.5                 | 4               | 12                         | 1   |
| TAJA684*035TNJ                          | A            | 0.68        | 35                      | 0.5                 | 4               | 8                          | 1   |
| TAJA105*035TNJ                          | A            | 1           | 35                      | 0.5                 | 4               | 7.5                        | 1   |
| TAJB105*035TNJ                          | B            | 1           | 35                      | 0.5                 | 4               | 6.5                        | 1   |
| TAJA155*035TNJ                          | A            | 1.5         | 35                      | 0.5                 | 6               | 7.5                        | 1   |
| TAJB155*035TNJ                          | B            | 1.5         | 35                      | 0.5                 | 6               | 5.2                        | 1   |
| TAJB225*035TNJ                          | B            | 2.2         | 35                      | 0.8                 | 6               | 4.2                        | 1   |
| TAJC225*035TNJ                          | C            | 2.2         | 35                      | 0.8                 | 6               | 3.5                        | 1   |
| TAJB335*035TNJ                          | B            | 3.3         | 35                      | 1.2                 | 6               | 3.5                        | 1   |
| TAJC335*035TNJ                          | C            | 3.3         | 35                      | 1.2                 | 6               | 2.5                        | 1   |
| TAJB475*035TNJ                          | B            | 4.7         | 35                      | 1.6                 | 6               | 3.1                        | 1   |
| TAJC475*035TNJ                          | C            | 4.7         | 35                      | 1.6                 | 6               | 2.2                        | 1   |
| TAJD475*035TNJV                         | D            | 4.7         | 35                      | 1.6                 | 6               | 1.5                        | 3   |
| TAJC685*035TNJ                          | C            | 6.8         | 35                      | 2.4                 | 6               | 1.8                        | 1   |
| TAJD685*035TNJV                         | D            | 6.8         | 35                      | 2.4                 | 6               | 1.3                        | 3   |
| TAJC106*035TNJ                          | C            | 10          | 35                      | 3.5                 | 6               | 1.6                        | 1   |
| TAJD106*035TNJV                         | D            | 10          | 35                      | 3.5                 | 6               | 1                          | 3   |
| TAJD156*035TNJV                         | D            | 15          | 35                      | 5.3                 | 6               | 0.9                        | 3   |
| TAJD226*035TNJV                         | D            | 22          | 35                      | 7.7                 | 6               | 0.9                        | 3   |
| TAJE226*035TNJV                         | E            | 22          | 35                      | 7.7                 | 6               | 0.5                        | 3   |
| TAJE336*035TNJV                         | E            | 33          | 35                      | 11.6                | 6               | 0.9                        | 3   |
| <b>50 Volt @ 85°C (33 Volt @ 125°C)</b> |              |             |                         |                     |                 |                            |     |
| TAJA224*050TNJ                          | A            | 0.22        | 50                      | 0.5                 | 4               | 18                         | 1   |
| TAJA334*050TNJ                          | A            | 0.33        | 50                      | 0.5                 | 4               | 17                         | 1   |
| TAJA474*050TNJ                          | A            | 0.47        | 50                      | 0.5                 | 4               | 9.5                        | 1   |
| TAJB474*050TNJ                          | B            | 0.47        | 50                      | 0.7                 | 4               | 9.5                        | 1   |
| TAJB684*050TNJ                          | B            | 0.68        | 50                      | 0.5                 | 4               | 8                          | 1   |
| TAJB105*050TNJ                          | B            | 1           | 50                      | 0.5                 | 6               | 7                          | 1   |
| TAJC105*050TNJ                          | C            | 1           | 50                      | 0.5                 | 4               | 5.5                        | 1   |
| TAJC155*050TNJ                          | C            | 1.5         | 50                      | 0.8                 | 6               | 4.5                        | 1   |
| TAJC225*050TNJ                          | C            | 2.2         | 50                      | 1.1                 | 8               | 2.5                        | 1   |
| TAJD225*050TNJV                         | D            | 2.2         | 50                      | 1.1                 | 6               | 2.5                        | 3   |
| TAJC335*050TNJ                          | C            | 3.3         | 50                      | 1.6                 | 6               | 2.5                        | 1   |
| TAJD335*050TNJV                         | D            | 3.3         | 50                      | 1.7                 | 6               | 2                          | 3   |
| TAJC475*050TNJ                          | C            | 4.7         | 50                      | 0.5                 | 4               | 1.4                        | 1   |
| TAJD475*050TNJV                         | D            | 4.7         | 50                      | 2.4                 | 6               | 1.4                        | 3   |
| TAJD685*050TNJV                         | D            | 6.8         | 50                      | 3.4                 | 6               | 1                          | 3   |
| TAJD106*050TNJV                         | D            | 10          | 50                      | 5                   | 6               | 0.8                        | 3   |
| TAJE106*050TNJV                         | E            | 10          | 50                      | 5                   | 6               | 1                          | 3   |
| TAJE156*050TNJV                         | E            | 15          | 50                      | 7.5                 | 6               | 0.6                        | 3   |

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

\*Please use "U" instead of "T" in the suffix letter for 13" reel packaging

Please use specific PN for automotive version – see "HOW TO ORDER".

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.

For typical weight and composition see page 142.

**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.