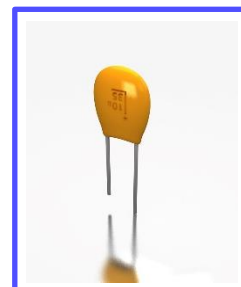
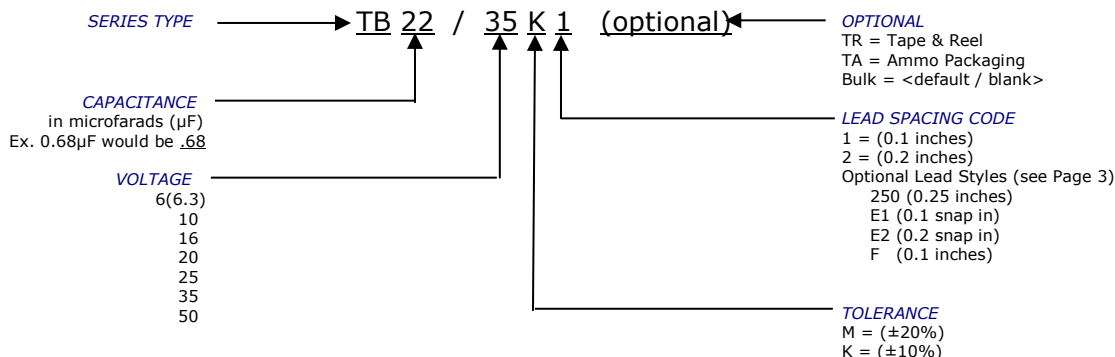


**FEATURES**

- Reliable, solid tantalum construction
- Small size per C/V combination
- Capacitance range: 0.1µF to 330µF
- Voltage range: 6.3 to 50 WVDC
- Surge tested for maximum robustness
- Meniscus control eliminates thru-hole plugging for excellent top side solder joints
- Operating Temperature range -55°C to +125°C
- Laser marking and bold polarity stripe
- Supplied bulk or available packaged for auto insertion
- Flame retardant, self extinguishing epoxy coating meets UL 94 V0 flammability classification
- Leada cutting and forming is available
- MSL (moisture sensitivity level) per IPC/Jedec J-STD-020B is level 1



**PART NUMBERING GUIDE**



**ELECTRICAL SPECIFICATION**

|   |  |    |    |    |    |    |    |  |
|---|--|----|----|----|----|----|----|--|
| Technical Data:                               | All technical data relate to an ambient temperature of +25°C   |    |    |    |    |    |    |  |
| Capacitance Range                             | 0.10µF to 330µF  |    |    |    |    |    |    |  |
| Capacitance Tolerance                         | ±10% (K); ±20% (M)   |    |    |    |    |    |    |  |
| Rated Voltage DC (V <sub>R</sub> ) ≤+85°C     | 6.3  | 10 | 16 | 20 | 25 | 35 | 50 |  |
| Category Voltage DC (V <sub>C</sub> ) ≤+125°C | 4  | 7  | 10 | 13 | 16 | 23 | 33 |  |
| Surge Voltage (V <sub>S</sub> ) ≤+85°C        | 8  | 13 | 20 | 26 | 33 | 46 | 65 |  |
| Surge Voltage (V <sub>S</sub> ) ≤+125°C       | 5  | 8  | 12 | 16 | 21 | 28 | 40 |  |
| Temperature Range                             | -55°C to +125°C with 2/3 V <sub>R</sub> (linear derating) required for operation above +85°C   |    |    |    |    |    |    |  |
| Reliability                                   | 1% per 1000 hours at rated voltage (V <sub>R</sub> ), rated temperature (85°C) and 0.1Ω/volt circuit impedance. 60% confidence level |    |    |    |    |    |    |  |
| Qualifications                                | Fixed Tantalum Specifications: CECC 30201-032<br>MSL (moisture sensitivity level): Level 1 of IPC/Jedec J-STD-020B                   |    |    |    |    |    |    |  |

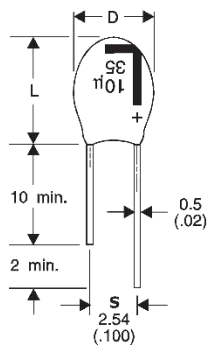
**CASE SIZE CROSS REFERENCE: CAPACITANCE AND VOLTAGE RATING (Rated Voltage DC@ 85°C)**

| Cap (µF) | 6.3V | 10V | 16V | 20V | 25V | 35V | 50V |
|----------|------|-----|-----|-----|-----|-----|-----|
| 0.10     |      |     |     |     |     | A   | A   |
| 0.15     |      |     |     |     |     | A   | A   |
| 0.22     |      |     |     |     |     | A   | A   |
| 0.33     |      |     |     |     |     | B   | A   |
| 0.47     |      |     |     |     |     | A   | A   |
| 0.68     |      |     |     |     |     | A   | B   |
| 1.0      |      |     |     |     |     | A   | C   |
| 1.5      |      |     | A   | A   | A   | A   | D   |
| 2.2      |      | A   | A   | A   | A   | B   | E   |
| 3.3      | A    | A   | A   | B   | B   | C   | F   |
| 4.7      | A    | A   | B   | C   | C   | E   | G   |
| 6.8      | A    | B   | C   | D   | D   | F   | H   |
| 10.0     | B    | C   | D   | E   | E   | F   | J   |
| 15.0     | C    | D   | E   | F   | F   | H   | K   |
| 22.0     | D    | E   | F   | H   | H   | K   |     |
| 33.0     | E    | F   | F   | J   | J   | M   |     |
| 47.0     | F    | G   | H   | K   | M   | N   |     |
| 68.0     | G    | H   | L   | N   | N   |     |     |
| 100.0    | H    | K   | M   | N   |     |     |     |
| 150.0    | K    | N   | N   |     |     |     |     |
| 220.0    | M    | O   | O   |     |     |     |     |
| 330.0    | N    | O   |     |     |     |     |     |

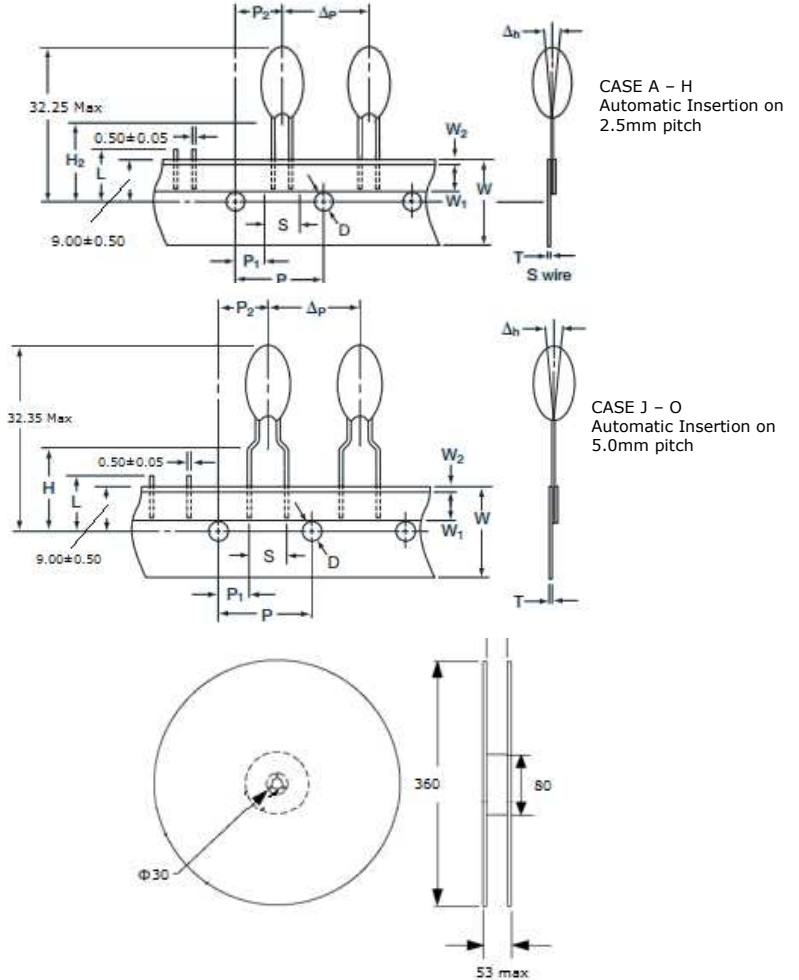
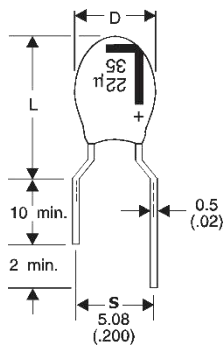
**DIMENSIONS AND LEAD SPACING**

**TAPE AND REEL DIMENSION**

**CASE: A,B,C,D,E,F,G,H**



**CASE: J,K,L,M,N,O**



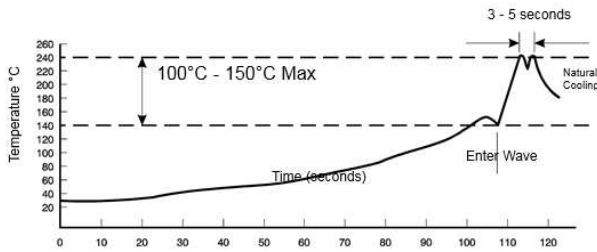
NOTE: Dimensions in millimeters (mm)

| NEMCO Size | D MAX | L MAX | S ± 0.5 | P ±0.3 | P1        | P2 ±0.4 | Δp    | H2 (MIN) | Δh     | L (MAX) | W1 (MIN) | W2 (MAX) | W +1.00 -0.50 | T ±0.2 |
|------------|-------|-------|---------|--------|-----------|---------|-------|----------|--------|---------|----------|----------|---------------|--------|
| A          | 4.5   | 7.0   | 2.5     | 12.7   | 5.05±1.00 | 6.35    | ±1.00 | 18       | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| B          | 4.5   | 7.5   | 2.5     | 12.7   | 5.05±1.00 | 6.35    | ±1.00 | 18       | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| C          | 5.0   | 8.5   | 2.5     | 12.7   | 5.05±1.00 | 6.35    | ±1.00 | 18       | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| D          | 5.0   | 9.0   | 2.5     | 12.7   | 5.05±1.00 | 6.35    | ±1.00 | 18       | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| E          | 5.5   | 9.0   | 2.5     | 12.7   | 5.05±1.00 | 6.35    | ±1.00 | 18       | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| F          | 6.0   | 10.0  | 2.5     | 12.7   | 5.05±1.00 | 6.35    | ±1.00 | 18       | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| G          | 6.5   | 10.0  | 2.5     | 12.7   | 5.05±1.00 | 6.35    | ±1.00 | 18       | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| H          | 7.0   | 10.0  | 2.5     | 12.7   | 5.05±1.00 | 6.35    | ±1.00 | 18       | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| J          | 8.0   | 10.5  | 5.0     | 12.7   | 3.85±0.70 | 6.35    | ±1.00 | N/A      | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| K          | 8.5   | 13.0  | 5.0     | 12.7   | 3.85±0.70 | 6.35    | ±1.00 | N/A      | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| L          | 9.0   | 14.0  | 5.0     | 12.7   | 3.85±0.70 | 6.35    | ±1.00 | N/A      | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| M          | 9.0   | 14.5  | 5.0     | 12.7   | 3.85±0.70 | 6.35    | ±1.00 | N/A      | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| N          | 9.0   | 16.0  | 5.0     | 12.7   | 3.85±0.70 | 6.35    | ±1.00 | N/A      | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |
| O          | 10.0  | 17.0  | 5.0     | 12.7   | 3.85±0.70 | 6.35    | ±1.00 | N/A      | 0±2.00 | 11.0    | 6.00     | 1.00     | 18            | 0.70   |

**MARKING**

**REFLOW PROFILE**

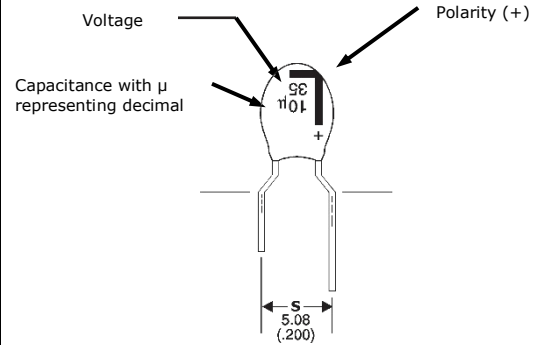
**ALL CASE SIZES**



Tantalum capacitors are lead-free system compatible system components, meeting the requirements of J-STD-020 standard. Maximum peak temperature 260°C for 10 seconds maximum, 3 reflow cycles.

There are several important general soldering considerations for tantalum capacitors.

- Soldering temperature and time should be the minimum for a good connection.
- Recommended soldering profiles are designed to insure that the temperature of the internal construction of the capacitors does not exceed +220°C.
- Positioning capacitors near components radiating heat such as power transistors should be avoided.
- Allow for an increase to ESR ratings of 1.25 x catalog limit post PCB assembly.

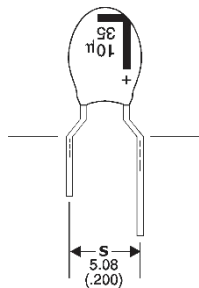


10μ = 10 μfd  
35V = 35V Rated Voltage at 85°C\*\*

\*\* NEMCO reserves the right to supply a higher voltage rating, tighter tolerance and/or lower ESR in the same case size, to the same reliability standards.

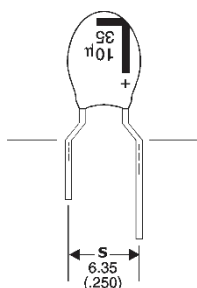
**OPTIONAL LEAD STYLES**

.200 inch Lead Spacing



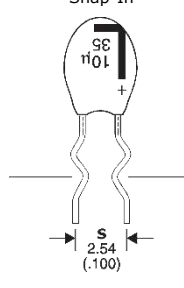
Available in Case Sizes A - H  
**P/N Suffix Code 2**

.250 inch Lead Spacing



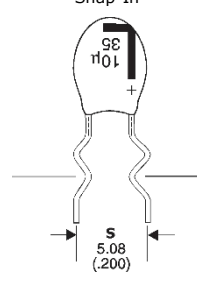
Available in Case Sizes A - O  
**P/N Suffix Code 250**

.100 inch Lead Spacing Snap-In



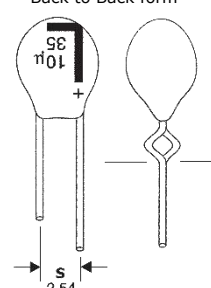
Available in Case Sizes A - H  
**P/N Suffix Code E1**  
Available in Bulk Only

.200 inch Lead Spacing Snap-In



Available in Case Sizes A - H  
**P/N Suffix Code E2**  
Available in Bulk Only

.100 inch Lead Spacing Back to Back form



Available in Case Sizes A - H  
**P/N Suffix Code F**

NOTE: Seated component heights for optional lead styles will vary based on case size. Contact your Nemco sales representative for samples of optional lead styles.

**RATINGS AND PART NUMBER REFERENCE**

| 6.3 V DC @ 85°C  |           |                |              |                |                       |  |
|------------------|-----------|----------------|--------------|----------------|-----------------------|--|
| Capacitance (µF) | Case Size | Nemco Part No. | DCL (µA) max | tan δ max. (%) | ESR @ 100kHz max. (Ω) |  |
| 3.3              | A         | TB3.3 / 6_1    | 0.5          | 6              | 13.0                  |  |
| 4.7              | A         | TB4.7 / 6_1    | 0.5          | 6              | 10.0                  |  |
| 6.8              | A         | TB6.8 / 6_1    | 0.5          | 6              | 8.0                   |  |
| 10.0             | B         | TB10 / 6_1     | 0.5          | 8              | 6.0                   |  |
| 15.0             | C         | TB15 / 6_1     | 0.8          | 8              | 5.0                   |  |
| 22.0             | D         | TB22 / 6_1     | 1.1          | 8              | 3.7                   |  |
| 33.0             | E         | TB33 / 6_1     | 1.7          | 8              | 3.0                   |  |
| 47.0             | F         | TB47 / 6_1     | 2.4          | 8              | 2.0                   |  |
| 68.0             | G         | TB68 / 6_1     | 3.4          | 8              | 1.8                   |  |
| 100.0            | H         | TB100 / 6_1    | 5.0          | 10             | 1.6                   |  |
| 150.0            | K         | TB150 / 6_2    | 7.6          | 10             | 0.9                   |  |
| 220.0            | M         | TB220 / 6_2    | 11.0         | 10             | 0.9                   |  |
| 330.0            | N         | TB330 / 6_2    | 16.6         | 10             | 0.7                   |  |

| 25 V DC @ 85°C   |           |                |              |                |                       |  |
|------------------|-----------|----------------|--------------|----------------|-----------------------|--|
| Capacitance (µF) | Case Size | Nemco Part No. | DCL (µA) max | tan δ max. (%) | ESR @ 100kHz max. (Ω) |  |
| 1.5              | A         | TB1.5 / 25_1   | 0.5          | 4              | 8.0                   |  |
| 2.2              | A         | TB2.2 / 25_1   | 0.5          | 6              | 6.0                   |  |
| 3.3              | B         | TB3.3 / 25_1   | 0.6          | 6              | 5.0                   |  |
| 4.7              | C         | TB4.7 / 25_1   | 0.9          | 6              | 4.0                   |  |
| 6.8              | D         | TB6.8 / 25_1   | 1.3          | 6              | 3.1                   |  |
| 10.0             | E         | TB10 / 25_1    | 2.0          | 8              | 2.5                   |  |
| 15.0             | F         | TB15 / 25_1    | 3.0          | 8              | 2.0                   |  |
| 22.0             | H         | TB22 / 25_1    | 4.4          | 8              | 1.5                   |  |
| 33.0             | J         | TB33 / 25_2    | 6.6          | 8              | 1.2                   |  |
| 47.0             | M         | TB47 / 25_2    | 9.4          | 8              | 1.0                   |  |
| 68.0             | N         | TB68 / 25_2    | 13.6         | 8              | 0.8                   |  |

| 10 V DC @ 85°C   |           |                |              |                |                       |  |
|------------------|-----------|----------------|--------------|----------------|-----------------------|--|
| Capacitance (µF) | Case Size | Nemco Part No. | DCL (µA) max | tan δ max. (%) | ESR @ 100kHz max. (Ω) |  |
| 2.2              | A         | TB2.2 / 10_1   | 0.5          | 6              | 13.0                  |  |
| 3.3              | A         | TB3.3 / 10_1   | 0.5          | 6              | 10.0                  |  |
| 4.7              | A         | TB4.7 / 10_1   | 0.5          | 6              | 8.0                   |  |
| 6.8              | B         | TB6.8 / 10_1   | 0.5          | 6              | 6.0                   |  |
| 10.0             | C         | TB10 / 10_1    | 0.8          | 8              | 5.0                   |  |
| 15.0             | D         | TB15 / 10_1    | 1.2          | 8              | 3.7                   |  |
| 22.0             | E         | TB22 / 10_1    | 1.7          | 8              | 2.7                   |  |
| 33.0             | F         | TB33 / 10_1    | 2.6          | 8              | 2.1                   |  |
| 47.0             | G         | TB47 / 10_1    | 3.7          | 8              | 1.7                   |  |
| 68.0             | H         | TB68 / 10_1    | 5.4          | 8              | 1.3                   |  |
| 100.0            | K         | TB100 / 10_2   | 8.0          | 10             | 1.0                   |  |
| 150.0            | N         | TB150 / 10_2   | 12.0         | 10             | 0.8                   |  |
| 220.0            | O         | TB220 / 10_2   | 17.6         | 10             | 0.6                   |  |
| 330.0            | O         | TB330 / 10_2   | 20.0         | 10             | 0.5                   |  |

| 35V DC @ 85°C    |           |                |              |                |                       |  |
|------------------|-----------|----------------|--------------|----------------|-----------------------|--|
| Capacitance (µF) | Case Size | Nemco Part No. | DCL (µA) max | tan δ max. (%) | ESR @ 100kHz max. (Ω) |  |
| 0.10             | A         | TB.1 / 35_1    | 0.5          | 4              | 26.0                  |  |
| 0.15             | A         | TB.15 / 35_1   | 0.5          | 4              | 21.0                  |  |
| 0.22             | A         | TB.22 / 35_1   | 0.5          | 4              | 17.0                  |  |
| 0.33             | B         | TB.33 / 35_1   | 0.5          | 4              | 15.0                  |  |
| 0.47             | A         | TB.47 / 35_1   | 0.5          | 4              | 13.0                  |  |
| 0.68             | A         | TB.68 / 35_1   | 0.5          | 4              | 10.0                  |  |
| 1.0              | A         | TB1 / 35_1     | 0.5          | 4              | 8.0                   |  |
| 1.5              | A         | TB1.5 / 35_1   | 0.5          | 4              | 6.0                   |  |
| 2.2              | B         | TB2.2 / 35_1   | 0.6          | 6              | 5.0                   |  |
| 3.3              | C         | TB3.3 / 35_1   | 0.9          | 6              | 4.0                   |  |
| 4.7              | E         | TB4.7 / 35_1   | 1.3          | 6              | 3.0                   |  |
| 6.8              | F         | TB6.8 / 35_1   | 1.9          | 6              | 2.5                   |  |
| 10.0             | F         | TB10 / 35_1    | 2.8          | 8              | 2.0                   |  |
| 15.0             | H         | TB15 / 35_1    | 4.2          | 8              | 1.6                   |  |
| 22.0             | K         | TB22 / 35_2    | 6.1          | 8              | 1.3                   |  |
| 33.0             | M         | TB33 / 35_2    | 9.2          | 8              | 1.0                   |  |
| 47.0             | N         | TB47 / 35_2    | 10.0         | 8              | 0.8                   |  |

| 16 V DC @ 85°C   |           |                |              |                |                       |  |
|------------------|-----------|----------------|--------------|----------------|-----------------------|--|
| Capacitance (µF) | Case Size | Nemco Part No. | DCL (µA) max | tan δ max. (%) | ESR @ 100kHz max. (Ω) |  |
| 1.5              | A         | TB1.5 / 16_1   | 0.5          | 4              | 10.0                  |  |
| 2.2              | A         | TB2.2 / 16_1   | 0.5          | 6              | 8.0                   |  |
| 3.3              | A         | TB3.3 / 16_1   | 0.5          | 6              | 6.0                   |  |
| 4.7              | B         | TB4.7 / 16_1   | 0.6          | 6              | 5.0                   |  |
| 6.8              | C         | TB6.8 / 16_1   | 0.8          | 6              | 4.0                   |  |
| 10.0             | D         | TB10 / 16_1    | 1.2          | 8              | 3.2                   |  |
| 15.0             | E         | TB15 / 16_1    | 1.9          | 8              | 2.5                   |  |
| 22.0             | F         | TB22 / 16_1    | 2.8          | 8              | 2.0                   |  |
| 33.0             | F         | TB33 / 16_1    | 4.2          | 8              | 1.6                   |  |
| 47.0             | H         | TB47 / 16_1    | 6.0          | 8              | 1.3                   |  |
| 68.0             | L         | TB68 / 16_2    | 8.7          | 8              | 1.0                   |  |
| 100.0            | M         | TB100 / 16_2   | 12.8         | 10             | 0.8                   |  |
| 150.0            | N         | TB150 / 16_2   | 19.2         | 10             | 0.6                   |  |
| 220.0            | O         | TB220 / 16_2   | 20.0         | 10             | 0.5                   |  |

| 50V DC @ 85°C    |           |                |              |                |                       |  |
|------------------|-----------|----------------|--------------|----------------|-----------------------|--|
| Capacitance (µF) | Case Size | Nemco Part No. | DCL (µA) max | tan δ max. (%) | ESR @ 100kHz max. (Ω) |  |
| 0.10             | A         | TB.1 / 50_1    | 0.5          | 4              | 26.0                  |  |
| 0.15             | A         | TB.15 / 50_1   | 0.5          | 4              | 21.0                  |  |
| 0.22             | A         | TB.22 / 50_1   | 0.5          | 4              | 17.0                  |  |
| 0.33             | A         | TB.33 / 50_1   | 0.5          | 4              | 15.0                  |  |
| 0.47             | A         | TB.47 / 50_1   | 0.5          | 4              | 13.0                  |  |
| 0.68             | B         | TB.68 / 50_1   | 0.5          | 4              | 10.0                  |  |
| 1.0              | C         | TB1 / 50_1     | 0.5          | 4              | 8.0                   |  |
| 1.5              | D         | TB1.5 / 50_1   | 0.6          | 4              | 5.0                   |  |
| 2.2              | E         | TB2.2 / 50_1   | 0.8          | 6              | 3.5                   |  |
| 3.3              | F         | TB3.3 / 50_1   | 1.3          | 6              | 3.0                   |  |
| 4.7              | G         | TB4.7 / 50_1   | 1.8          | 6              | 2.5                   |  |
| 6.8              | H         | TB6.8 / 50_1   | 2.7          | 6              | 2.0                   |  |
| 10.0             | J         | TB10 / 50_2    | 4.0          | 8              | 1.6                   |  |
| 15.0             | K         | TB15 / 50_2    | 6.0          | 8              | 1.2                   |  |

| 20 V DC @ 85°C   |           |                |              |                |                       |  |
|------------------|-----------|----------------|--------------|----------------|-----------------------|--|
| Capacitance (µF) | Case Size | Nemco Part No. | DCL (µA) max | tan δ max. (%) | ESR @ 100kHz max. (Ω) |  |
| 1.5              | A         | TB1.5 / 20_1   | 0.5          | 4              | 9.0                   |  |
| 2.2              | A         | TB2.2 / 20_1   | 0.5          | 6              | 7.0                   |  |
| 3.3              | B         | TB3.3 / 20_1   | 0.5          | 6              | 5.5                   |  |
| 4.7              | C         | TB4.7 / 20_1   | 0.7          | 6              | 4.5                   |  |
| 6.8              | D         | TB6.8 / 20_1   | 1.0          | 6              | 3.6                   |  |
| 10.0             | E         | TB10 / 20_1    | 1.6          | 8              | 2.9                   |  |
| 15.0             | F         | TB15 / 20_1    | 2.4          | 8              | 2.3                   |  |
| 22.0             | H         | TB22 / 20_1    | 3.5          | 8              | 1.8                   |  |
| 33.0             | J         | TB33 / 20_2    | 5.2          | 8              | 1.4                   |  |
| 47.0             | K         | TB47 / 20_2    | 7.5          | 8              | 1.2                   |  |
| 68.0             | N         | TB68 / 20_2    | 10.8         | 8              | 0.9                   |  |
| 100.0            | N         | TB100 / 20_2   | 16.0         | 10             | 0.6                   |  |

\_ Insert tolerance M(±20%) or K(±10%) to complete the Nemco part number

NEMCO reserves the right to supply a higher voltage rating, tighter tolerance and/or lower ESR in the same case size, to the same reliability standards.

**PACKAGING REFERENCE**

| CASE SIZE | STANDARD PACKAGING IS BULK | TAPE AND REEL | AMMO |
|-----------|----------------------------|---------------|------|
| A         | 1000                       | 1500          | 3000 |
| B         | 1000                       | 1250          | 3000 |
| C         | 1000                       | 1250          | 3000 |
| D         | 1000                       | 1250          | 3000 |
| E         | 1000                       | 1000          | 2500 |
| F         | 1000                       | 1000          | 2500 |
| G         | 1000                       | 750           | 2500 |
| H         | 1000                       | 750           | 2000 |
| J         | 500                        | 750           | 1000 |
| K         | 500                        | 500           | 1000 |
| L         | 500                        | 500           | 1000 |
| M         | 500                        | 500           | 1000 |
| N         | 500                        | N/A           | N/A  |
| O         | 500                        | N/A           | N/A  |