

## Super Tan® Wet Tantalum Capacitors with Hermetic Seal



Vishay ST represents a major breakthrough in wet tantalum capacitor technology. Its unique cathode system provides the highest capacitance per unit volume. The design facilitates a doubling of capacitance, lower ESR and higher ripple current rating compared with conventional wet tantalum products. Moreover, the ST has the capacitance stability of a solid tantalum capacitor and there are no circuit impedance restrictions.

The ST is housed in an all tantalum, hermetically sealed case and is manufactured to withstand hazardous environments. The ST is used widely in the defense and aerospace industries and whenever there is a space problem

### FEATURES

- Terminations: Standard tin/lead (Sn/Pb) 100 % tin (RoHS compliant) available terminations:
- Very High Capacitance
- 10 to 1800  $\mu$ F
- 25 to 125 VDC
- - 55 °C to + 125 °C
- Very Low ESR
- High Ripple Current
- All Tantalum Case
- Hermetically Sealed
- Low DCL
- Compliant to RoHS Directive 2002/95/EC

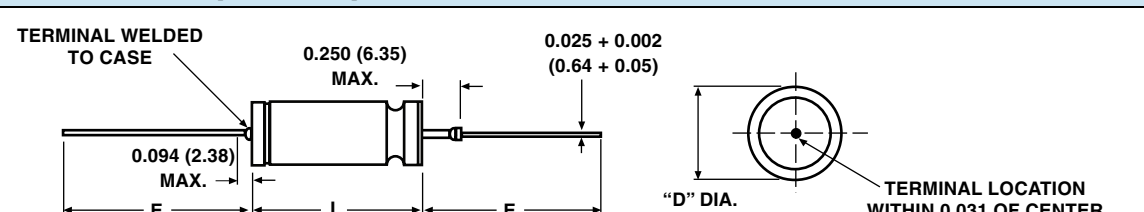


**RoHS\***  
COMPLIANT

### APPLICATION NOTES

- No continuous reverse voltage permissible.
- The peak of the applied AC ripple and the applied DC voltage must not exceed the DC voltage rating of the capacitor.
- Ripple current ratings by part number at 85 °C and 40 kHz are included in the table. Ripple current correction factors for other temperatures and frequencies are given on the next page.
- Transient reverse voltage surges are acceptable under the following conditions:  
The peak reverse voltage does not exceed 1.5 V and the peak current times the duration of the reverse transient does not exceed 0.05 ampere seconds. In addition, the repetition frequency of the reverse voltage surge is less than 10 Hz.

### DIMENSIONS in inches [millimeters]

|  |                  |                  |                              |                       |
|--|------------------|------------------|------------------------------|-----------------------|
| CASE CODE  | D MAX. INSULATED | D ± 0.016 (0.41) | L + 0.031 (0.79) UNINSULATED | E ± 0.250 (6.35) MAX. |
| T1   | 0.219 (5.56)     | 0.188 (4.78)     | 0.453 (11.51)                | 1.500 (38.10)         |
| T2   | 0.312 (7.92)     | 0.281 (7.14)     | 0.641 (16.28)                | 2.250 (57.15)         |
| L2   | 0.312 (7.92)     | 0.281 (7.14)     | 1.008 (25.60)                | 2.250 (57.15)         |
| T3   | 0.406 (10.31)    | 0.375 (9.52)     | 0.766 (19.46)                | 2.250 (57.15)         |
| T4   | 0.406 (10.31)    | 0.375 (9.52)     | 1.062 (26.97)                | 2.250 (57.15)         |

#### Notes

1. Material at egress is tantalum
2. Insulation sleeving will lap over the ends of the capacitor case.
3. Tinned nickel leads, solderable and weldable

Approx. Weight

T1: 2.3 g, T2: 5.7 g  
T3: 9.4 g, T4: 14.8 g

\* Pb containing terminations are not RoHS compliant, exemptions may apply

# Super Tan® Wet Tantalum Capacitors with Hermetic Seal

Vishay

## ORDERING INFORMATION

| ST                                  | 220               | 100                       | T4        | M                        | I                                | E3  |
|-------------------------------------|-------------------|---------------------------|-----------|--------------------------|----------------------------------|---|
| SUPERTAN<br>COMMERCIAL<br>CAP. TYPE | CAPACITANCE<br>μF | 85 °C RATED DC<br>VOLTAGE | CASE CODE | CAPACITANCE<br>TOLERANCE | INSULATING<br>SLEEVE             | RoHS COMPLIANT  |
|                                     |                   |                           |           | M = ± 20 %<br>K = ± 10 % | I = Insulated<br>X = Uninsulated | E3 = 100 % tin termination<br>(RoHS compliant)<br>Blank = SnPb termination<br>(standard design) |

## STANDARD RATINGS

| CAP. AT<br>25 °C<br>and<br>120 Hz<br>(μF) | CASE<br>CODE | MAX.<br>ESR<br>Ω<br>120 Hz | MAX. DCL μA |                        | MAX. IMP.<br>AT<br>- 55 °C<br>and<br>120 Hz (Ω) | MAXIMUM CAPACITANCE<br>CHANGE % |       |        | AC RIPPLE<br>85 °C<br>40 kHz<br>mA<br>rms | PART NUMBER   |
|---|--------------|----------------------------|-------------|------------------------|---|---------------------------------|-------|--------|---|---------------|
|   |              |                            | 25 °C       | 85 °C<br>and<br>125 °C |   | - 55 °C                         | 85 °C | 125 °C |   |               |
| 25 VDC at 85 °C                           |              |                            |             |                        | 15 VDC at 125 °C                                |                                 |       |        |   |               |
| 120                                       | T1           | 1.3                        | 1           | 5                      | 25  | - 42                            | + 8   | + 12   | 1250                                      | ST120-25T1MI  |
| 560                                       | T2           | 0.83                       | 2           | 10                     | 12  | - 65                            | + 10  | + 15   | 2100                                      | ST560-25T2MI  |
| 1100                                      | L2           | 0.5                        | 3           | 25                     | 7   | - 60                            | + 20  | + 45   | 3200                                      | ST1100-25L2MI |
| 1200                                      | T3           | 0.65                       | 5           | 20                     | 7   | - 70                            | + 12  | + 18   | 2600                                      | ST1200-25T3MI |
| 1800                                      | T4           | 0.5                        | 6           | 25                     | 7   | - 72                            | + 12  | + 20   | 3100                                      | ST1800-25T4MI |
| 30 VDC at 85 °C                           |              |                            |             |                        | 20 VDC at 125 °C                                |                                 |       |        |   |               |
| 100                                       | T1           | 1.3                        | 1           | 5                      | 25  | - 38                            | + 8   | + 12   | 1200                                      | ST100-30TMI   |
| 470                                       | T2           | 0.85                       | 2           | 10                     | 15  | - 65                            | + 10  | + 18   | 1800                                      | ST470-30T2MI  |
| 950                                       | L2           | 0.5                        | 5           | 30                     | 7   | - 55                            | + 18  | + 35   | 3200                                      | ST950-30L2MI  |
| 1000                                      | T3           | 0.7                        | 7           | 25                     | 7   | - 70                            | + 10  | + 18   | 2500                                      | ST1000-30T3MI |
| 1500                                      | T4           | 0.6                        | 12          | 35                     | 6   | - 72                            | + 10  | + 20   | 3000                                      | ST1500-30T4MI |
| 50 VDC at 85 °C                           |              |                            |             |                        | 30 VDC at 125 °C                                |                                 |       |        |   |               |
| 68  | T1           | 1.5                        | 1           | 5                      | 35  | - 25                            | + 8   | + 15   | 1050                                      | ST68-50T1MI   |
| 220                                       | T2           | 0.9                        | 2           | 10                     | 17.5  | - 50                            | + 8   | + 15   | 1800                                      | ST220-50T2MI  |
| 450                                       | L2           | 0.6                        | 3           | 25                     | 7.5   | - 45                            | + 12  | + 30   | 2900                                      | ST450-50L2MI  |
| 470                                       | T3           | 0.75                       | 3           | 25                     | 10  | - 45                            | + 8   | + 15   | 2100                                      | ST470-50T3MI  |
| 680                                       | T4           | 0.7                        | 5           | 40                     | 8   | - 58                            | + 10  | + 20   | 2750                                      | ST680-50T4MI  |
| 60 VDC at 85 °C                           |              |                            |             |                        | 40 VDC at 125 °C                                |                                 |       |        |   |               |
| 47  | T1           | 2.0                        | 1           | 5                      | 44  | - 25                            | + 8   | + 12   | 1050                                      | ST47-60T1MI   |
| 150                                       | T2           | 1.1                        | 2           | 10                     | 20  | - 40                            | + 8   | + 15   | 1800                                      | ST150-60T2MI  |
| 370                                       | L2           | 0.6                        | 3           | 25                     | 9   | - 33                            | + 9   | + 20   | 2900                                      | ST370-60L2MI  |
| 390                                       | T3           | 0.9                        | 3           | 25                     | 15  | - 45                            | + 8   | + 15   | 2100                                      | ST390-60T3MI  |
| 560                                       | T4           | 0.8                        | 5           | 40                     | 10  | - 58                            | + 8   | + 15   | 2750                                      | ST560-60T4MI  |
| 75 VDC at 85 °C                           |              |                            |             |                        | 50 VDC at 125 °C                                |                                 |       |        |   |               |
| 33  | T1           | 2.5                        | 1           | 5                      | 66  | - 25                            | + 5   | + 9    | 1050                                      | ST33-75T1MI   |
| 110                                       | T2           | 1.3                        | 2           | 10                     | 24  | - 35                            | + 6   | + 10   | 1650                                      | ST110-75T2MI  |
| 250                                       | L2           | 0.8                        | 5           | 30                     | 12  | - 30                            | + 6   | + 15   | 2500                                      | ST250-75L2MI  |
| 330                                       | T3           | 1.0                        | 3           | 30                     | 12  | - 45                            | + 6   | + 10   | 2100                                      | ST330-75T3MI  |
| 470                                       | T4           | 0.9                        | 5           | 50                     | 12  | - 50                            | + 6   | + 10   | 2750                                      | ST470-75T4MI  |

### Notes

- (K = ± 10 %, M = ± 20 %) and insulation letter (I = Insulation, X = Uninsulated)
- Part Numbers shown are for units with ± 20 % capacitance tolerance and uninsulated capacitors. For ± 10 units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the Part Number.
- For RoHS compliant add "E3" for suffix.

**STANDARD RATINGS**

| CAP. AT<br>25 °C<br>and<br>120 Hz<br>( $\mu$ F) | CASE<br>CODE | MAX.<br>ESR<br>$\Omega$<br>120 Hz | MAX. DCL $\mu$ A |                        | MAX. IMP.<br>AT<br>- 55 °C<br>and<br>120 Hz ( $\Omega$ ) | MAXIMUM CAPACITANCE<br>CHANGE % |       |        | AC RIPPLE<br>85 °C<br>40 kHz<br>mA<br>rms | PART NUMBER   |
|---|--------------|-----------------------------------|------------------|------------------------|--|---------------------------------|-------|--------|---|---------------|
|   |              |                                   | 25 °C            | 85 °C<br>and<br>125 °C |  | - 55 °C                         | 85 °C | 125 °C |   |               |
| 100 VDC at 85 °C                                |              |                                   |                  |                        |  | 65 VDC at 125 °C                |       |        |   |               |
| 15  | T1           | 3.5                               | 1                | 5                      | 125  | - 18                            | + 3   | + 10   | 1050                                      | ST15-100T1MI  |
| 68  | T2           | 2.1                               | 2                | 10                     | 37   | - 30                            | + 4   | + 12   | 1650                                      | ST68-100T2MI  |
| 120   | L2           | 1.0                               | 3                | 25                     | 20.5   | - 30                            | + 4   | + 12   | 2200                                      | ST120-100L2MI |
| 150   | T3           | 1.6                               | 3                | 25                     | 22   | - 35                            | + 6   | + 12   | 2100                                      | ST150-100T3MI |
| 220   | T4           | 1.2                               | 5                | 50                     | 15   | - 40                            | + 6   | + 12   | 2750                                      | ST220-100T4MI |
| 125 VDC at 85 °C                                |              |                                   |                  |                        |  | 85 VDC at 125 °C                |       |        |   |               |
| 10  | T1           | 5.5                               | 1                | 5                      | 175  | - 15                            | + 3   | + 10   | 1050                                      | ST10-125T1MI  |
| 47  | T2           | 2.3                               | 2                | 10                     | 47   | - 25                            | + 5   | + 12   | 1650                                      | ST47-125T2MI  |
| 90  | L2           | 1.3                               | 5                | 25                     | 25   | - 22                            | + 4   | + 15   | 2000                                      | ST90-125L2MI  |
| 100   | T3           | 1.8                               | 3                | 25                     | 35   | - 35                            | + 5   | + 12   | 2100                                      | ST100-125T3MI |
| 150   | T4           | 1.6                               | 5                | 50                     | 20   | - 35                            | + 6   | + 12   | 2750                                      | ST150-125T4MI |

**Notes**

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- Part Numbers shown are for units with  $\pm 20\%$  capacitance tolerance and uninsulated capacitors. For  $\pm 10$  units, change the digit following the letter "X" from "0" to "9". For units with outer plastic-film insulation, substitute "2" for "0" at the end of the Part Number.
- For RoHS compliant add "E3" for suffix.

**RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE AND APPLIES PEAK VOLTAGE**

| FREQUENCY OF<br>APPLIED<br>RIPPLE<br>CURRENT |          | 120 Hz    |      |      |      | 800 Hz    |      |      |      | 1 kHz     |      |      |      | 10 kHz    |      |      |      | 40 kHz    |      |      |      | 100 kHz   |      |      |      |
|--|----------|-----------|------|------|------|-----------|------|------|------|-----------|------|------|------|-----------|------|------|------|-----------|------|------|------|-----------|------|------|------|
| AMBIENT STILL<br>AIR TEMP. IN °C             |          | $\leq 55$ | 85   | 105  | 125  | $\leq 55$ | 85   | 105  | 125  | $\leq 55$ | 85   | 105  | 125  | $\leq 55$ | 85   | 105  | 125  | $\leq 55$ | 85   | 105  | 125  | $\leq 55$ | 85   | 105  | 125  |
| % of<br>85 °C<br>rated<br>peak<br>voltage    | 100 %    | 0.60      | 0.39 | -    | -    | 0.71      | 0.43 | -    | -    | 0.72      | 0.46 | -    | -    | 0.88      | 0.55 | -    | -    | 1.0       | 0.63 | -    | -    | 1.1       | 0.69 | -    | -    |
|  | 90 %     | 0.60      | 0.46 | -    | -    | 0.71      | 0.55 | -    | -    | 0.72      | 0.55 | -    | -    | 0.88      | 0.67 | -    | -    | 1.0       | 0.77 | -    | -    | 1.1       | 0.85 | -    | -    |
|  | 80 %     | 0.60      | 0.52 | 0.35 | -    | 0.71      | 0.62 | 0.42 | -    | 0.72      | 0.62 | 0.42 | -    | 0.88      | 0.76 | 0.52 | -    | 1.0       | 0.87 | 0.59 | -    | 1.1       | 0.96 | 0.65 | -    |
|  | 70 %     | 0.60      | 0.58 | 0.44 | -    | 0.71      | 0.69 | 0.52 | -    | 0.72      | 0.70 | 0.52 | -    | 0.88      | 0.85 | 0.64 | -    | 1.0       | 0.97 | 0.73 | -    | 1.1       | 1.07 | 0.80 | -    |
|  | 66 2/3 % | 0.60      | 0.60 | 0.46 | 0.27 | 0.71      | 0.71 | 0.55 | 0.32 | 0.72      | 0.72 | 0.55 | 0.32 | 0.88      | 0.88 | 0.68 | 0.40 | 1.0       | 1.0  | 0.77 | 0.45 | 1.1       | 1.1  | 0.85 | 0.50 |



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