

# SuperTan® 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.

## PERFORMANCE CHARACTERISTICS

**Operating Temperature:** - 55 °C to + 85 °C (to + 125 °C with voltage derating)

**Capacitance Tolerance:** At 120 Hz, + 25 °C. ± 20 % standard. ± 10 % available as special.

## FEATURES

- Very high capacitance
- 10 µF to 1800 µF
- 25 V<sub>DC</sub> to 125 V<sub>DC</sub>
- Very low ESR
- High ripple current
- All Tantalum case
- Hermetically sealed
- Low DCL
- Axial through-hole terminations: Standard tin/lead (Sn/Pb) 100 % tin (RoHS compliant) available
- Compliant to RoHS Directive 2002/95/EC



## Note

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

## 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 As. In addition, the repetition frequency of the reverse voltage surge is less than 10 Hz.

| DIMENSIONS in inches [millimeters] |                  |                       |   |                      |
|------------------------------------|------------------|-----------------------|---|----------------------|
|                                    |                  |                       |   |                      |
| CASE CODE                          | D ± 0.016 [0.41] | MAX. INSULATED (DIA.) | L <sub>1</sub> + 0.031 [0.79] UNINSULATED | E ± 0.250 [6.3] MAX. |
| T1                                 | 0.188 [4.78]     | 0.219 [5.56]          | 0.453 [11.51]                             | 1.500 [38.10]        |
| T2                                 | 0.281 [7.14]     | 0.312 [7.92]          | 0.641 [16.28]                             | 2.250 [57.15]        |
| L2                                 | 0.281 [7.14]     | 0.312 [7.92]          | 1.008 [25.60]                             | 2.250 [57.15]        |
| T3                                 | 0.375 [9.52]     | 0.406 [10.31]         | 0.766 [19.46]                             | 2.250 [57.15]        |
| T4                                 | 0.375 [9.52]     | 0.406 [10.31]         | 1.062 [26.97]                             | 2.250 [57.15]        |

## Notes

- Material at egress is Tantalum
- Insulation sleeving will lap over the ends of the capacitor case
- Tinned nickel leads, solderable and weldable
- Approx. weight:  
T1: 2.3 g, T2: 5.7 g,  
T3: 9.4 g, T4: 14.8 g



| ORDERING INFORMATION                               |                                 |   |                        |                                      |                                  |   |
|--|---------------------------------|---|------------------------|--------------------------------------|----------------------------------|---|
| <b>ST</b><br>Super Tan®<br>COMMERCIAL<br>CAP. TYPE | <b>220</b><br>CAPACITANCE<br>μF | <b>100</b><br>85 °C RATED<br>DC VOLTAGE | <b>T4</b><br>CASE CODE | <b>M</b><br>CAPACITANCE<br>TOLERANCE | <b>I</b><br>INSULATING<br>SLEEVE | <b>E3</b><br>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   |              |                              |                 |                              |  |                               |                |                 |   |               |
|--|--------------|------------------------------|-----------------|------------------------------|--|-------------------------------|----------------|-----------------|---|---------------|
| CAPACITANCE<br>AT 25 °C<br>AND 120 Hz<br>(μF)                  | CASE<br>CODE | MAX.<br>ESR<br>120 Hz<br>(Ω) | MAX. DCL AT     |                              | MAX. IMP.<br>AT - 55 °C<br>AND 120 Hz<br>(Ω) | MAX. CAPACITANCE<br>CHANGE AT |                |                 | AC RIPPLE<br>85 °C<br>40 kHz<br>(mA)<br>RMS | PART NUMBER   |
|  |              |                              | + 25 °C<br>(μA) | + 85 °C/<br>+ 125 °C<br>(μA) |  | - 55 °C<br>(%)                | + 85 °C<br>(%) | + 125 °C<br>(%) |   |               |
| <b>25 V<sub>DC</sub> AT 85 °C; 15 V<sub>DC</sub> AT 125 °C</b> |              |                              |                 |                              |  |                               |                |                 |   |               |
| 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 |
| <b>30 V<sub>DC</sub> AT 85 °C; 20 V<sub>DC</sub> AT 125 °C</b> |              |                              |                 |                              |  |                               |                |                 |   |               |
| 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 |
| <b>50 V<sub>DC</sub> AT 85 °C; 30 V<sub>DC</sub> AT 125 °C</b> |              |                              |                 |                              |  |                               |                |                 |   |               |
| 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  |
| <b>60 V<sub>DC</sub> AT 85 °C; 40 V<sub>DC</sub> AT 125 °C</b> |              |                              |                 |                              |  |                               |                |                 |   |               |
| 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  |
| <b>75 V<sub>DC</sub> AT 85 °C; 50 V<sub>DC</sub> AT 125 °C</b> |              |                              |                 |                              |  |                               |                |                 |   |               |
| 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  |              |                                       |                       |                                    |   |                               |                |                 |   |               |
|---|--------------|---------------------------------------|-----------------------|------------------------------------|---|-------------------------------|----------------|-----------------|---|---------------|
| CAPACITANCE<br>AT 25 °C<br>AND 120 Hz<br>( $\mu$ F)             | CASE<br>CODE | MAX.<br>ESR<br>120 Hz<br>( $\Omega$ ) | MAX. DCL AT           |                                    | MAX. IMP.<br>AT - 55 °C<br>AND 120 Hz<br>( $\Omega$ ) | MAX. CAPACITANCE<br>CHANGE AT |                |                 | AC RIPPLE<br>85 °C<br>40 kHz<br>(mA)<br>RMS | PART NUMBER   |
|   |              |                                       | + 25 °C<br>( $\mu$ A) | + 85 °C/<br>+ 125 °C<br>( $\mu$ A) |   | - 55 °C<br>(%)                | + 85 °C<br>(%) | + 125 °C<br>(%) |   |               |
| <b>100 V<sub>DC</sub> AT 85 °C; 65 V<sub>DC</sub> AT 125 °C</b> |              |                                       |                       |                                    |   |                               |                |                 |   |               |
| 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 |
| <b>125 V<sub>DC</sub> AT 85 °C; 85 V<sub>DC</sub> AT 125 °C</b> |              |                                       |                       |                                    |   |                               |                |                 |   |               |
| 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  |
| 82  | T3           | 1.8                                   | 3                     | 25                                 | 40  | - 35                          | + 5            | + 12            | 1950  | ST82-125T3MI  |
| 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**

- (K =  $\pm$  10 %, M =  $\pm$  20 %) and insulation letter (I = Insulation, X = Uninsulated)
- 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<br>OF APPLIED<br>RIPPLE<br>CURRENT                                   |          | 120 Hz    |      |      |      | 800 Hz    |      |      |      | 1 kHz     |      |      |      | 10 kHz    |      |      |      | 40 kHz    |      |      |      | 100 kHz   |      |      |      |
|  |          | $\leq$ 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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## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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