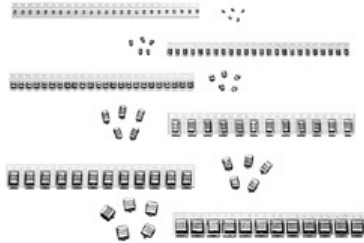


# Solid Tantalum Chip Capacitors

## TANTAMOUNT® Conformal Coated, Maximum CV, Low ESR


**FEATURES**

- Large capacitance rating range
- Lowest ESR for a surface mount tantalum chip capacitor
- 100 % surge current conditioning for C, D and R cases
- Terminations: Tin (2) standard
- 8 mm, 12 mm tape and reel packaging available per EIA 481-1 and reeling per IEC 286-3. 7" [178 mm] standard. 13" [330 mm] available
- Case code compatibility with EIA 535BAAE and CECC30801 molded chips


**RoHS\***  
COMPLIANT

**PERFORMANCE/ELECTRICAL CHARACTERISTICS**
**Operating Temperature:** - 55 °C to + 85 °C  
(To + 125 °C with voltage derating)

**Note:** Refer to Doc. 40088

**Capacitance Range:** 1.0 µF to 1500 µF

**Capacitance Tolerance:** ± 10 %, ± 20 % standard

**Voltage Rating:** 4 WVDC to 50 WVDC

**Equivalent Series Resistance:** ESR readings measured at 100 kHz, + 25 °C from 3500 mΩ to 30 mΩ

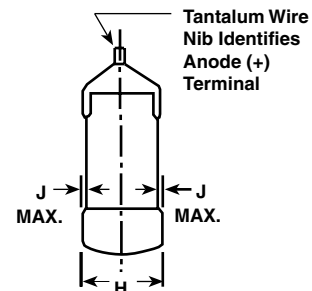
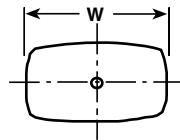
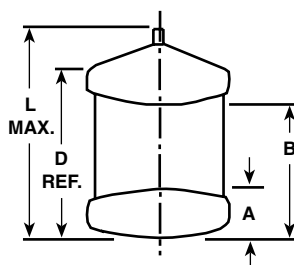
**ORDERING INFORMATION**

| 594D<br>TYPE  | 477<br>CAPACITANCE | X0<br>CAPACITANCE TOLERANCE  | 004<br>DC VOLTAGE RATING AT + 85 °C   | R<br>CASE CODE  | 2<br>TERMINATION   | T<br>PACKAGING   |
|---|--------------------|--|---|---|--|--|
| <div style="border: 1px solid black; padding: 5px; width: 100%;">                     This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.                 </div> |                    | <div style="border: 1px solid black; padding: 5px; width: 100%;"> <b>X0 = ± 20 %</b><br/>                     X9 = ± 10 %                 </div> | <div style="border: 1px solid black; padding: 5px; width: 100%;">                     This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V).                 </div> | <div style="border: 1px solid black; padding: 5px; width: 100%;">                     See Ratings and Case Codes Table                 </div> | <div style="border: 1px solid black; padding: 5px; width: 100%;"> <b>2 = 100 % Tin</b><br/>                     4 = Gold Plated<br/>                     8 = Solder Plated (60/40)<br/>                     Special Order                 </div> | <div style="border: 1px solid black; padding: 5px; width: 100%;"> <b>T = Tape and Reel</b><br/> <b>7" [178 mm] Reel</b><br/>                     W = 13" [330 mm] Reel<br/>                     See Tape and Reel Specifications.                 </div> |

**Note:**

Preferred Tolerance and reel sizes are in bold.

We reserve the right to supply higher voltage ratings and tighter capacitance tolerance capacitors in the same case size. Voltage substitutions will be marked with the higher voltage rating.

**DIMENSIONS** in inches [millimeters]


| CASE CODE | L (MAX.)       | W  | H  | A                              | B                            | D (REF.)       | J (MAX.)       |
|-----------|----------------|--|--|--------------------------------|------------------------------|----------------|----------------|
| B         | 0.158<br>[4.0] | 0.110 + 0.012 - 0.016<br>[2.8 + 0.3 - 0.4] | 0.075 + 0.012 - 0.024<br>[1.9 + 0.3 - 0.6] | 0.031 ± 0.012<br>[0.80 ± 0.30] | 0.097 ± 0.016<br>[2.5 ± 0.4] | 0.138<br>[3.5] | 0.004<br>[0.1] |
| C         | 0.281<br>[7.1] | 0.126 ± 0.012<br>[3.2 ± 0.3]               | 0.098 ± 0.012<br>[2.5 ± 0.3]               | 0.051 ± 0.012<br>[1.3 ± 0.30]  | 0.180 ± 0.024<br>[4.6 ± 0.6] | 0.236<br>[6.0] | 0.004<br>[0.1] |
| D         | 0.293<br>[7.5] | 0.170 + 0.012/- 0.024<br>[4.3 + 0.3/- 0.6] | 0.110 ± 0.012<br>[2.8 ± 0.3]               | 0.051 ± 0.012<br>[1.3 ± 0.30]  | 0.180 ± 0.024<br>[4.6 ± 0.6] | 0.253<br>[6.4] | 0.004<br>[0.1] |
| R         | 0.283<br>[7.2] | 0.235 + 0.012/- 0.024<br>[6.0 + 0.3/- 0.6] | 0.136 ± 0.012<br>[3.5 ± 0.3]               | 0.051 ± 0.012<br>[1.3 ± .30]   | 0.180 ± 0.024<br>[4.6 ± 0.6] | 0.243<br>[6.2] | 0.004<br>[0.1] |

**Notes:**

The anode termination (D less B) will be a minimum of 0.012" [0.3 mm].

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



| RATINGS AND CASE CODES |     |       |      |      |      |      |      |      |
|------------------------|-----|-------|------|------|------|------|------|------|
| μF                     | 4 V | 6.3 V | 10 V | 16 V | 20 V | 25 V | 35 V | 50 V |
| 1.0                    |     |       |      |      |      |      |      | B    |
| 1.5                    |     |       |      |      |      |      |      |      |
| 2.2                    |     |       |      |      |      |      | B    |      |
| 3.3                    |     |       |      |      |      | B    |      |      |
| 4.7                    |     |       |      |      | B    |      | B    | C    |
| 6.8                    |     |       |      |      | B    |      | C    | D    |
| 10                     |     |       |      |      | B    | B    |      |      |
| 15                     |     |       | B    | B    |      | C    | C/D  | R    |
| 22                     |     | B     |      |      | B/C  | C    | D    |      |
| 33                     | B   |       | B    | B/C  |      | D    | R    |      |
| 47                     |     |       | B    | B/C  | C    | D    | R    |      |
| 68                     |     |       | B/C  | C/D  |      | D/R  |      |      |
| 100                    | B*  | B     | B/C  | C/D  | D    | R    |      |      |
| 120                    |     | C     | C    |      | R    |      |      |      |
| 150                    | B/C |       | C/D  | D    |      |      |      |      |
| 180                    |     |       | D    | R    |      |      |      |      |
| 220                    |     | C/D   | C/D  | R    |      |      |      |      |
| 270                    | D   |       |      |      |      |      |      |      |
| 330                    | C*  | C/D   | D/R  | R    |      |      |      |      |
| 390                    |     | R     |      |      |      |      |      |      |
| 470                    | C/R | D/R   | R    |      |      |      |      |      |
| 560                    |     |       |      |      |      |      |      |      |
| 680                    | D   | R     | R    |      |      |      |      |      |
| 1000                   |     | R     |      |      |      |      |      |      |
| 1500                   | R   |       |      |      |      |      |      |      |

\* Preliminary values, contact factory for availability

| STANDARD/EXTENDED RATINGS   |           |                  |                          |                               |                                 |                              |  |
|---|-----------|------------------|--------------------------|-------------------------------|---------------------------------|------------------------------|--|
| CAPACITANCE (μF)  | CASE CODE | PART NUMBER      | MAX. DCL AT + 25 °C (μA) | MAX. DF AT + 25 °C 120 Hz (%) | MAX. ESR AT + 25 °C 100 kHz (Ω) | MAX. RIPPLE 100 kHz Irms (A) |  |
| <b>4 WVDC AT + 85 °C, SURGE = 5.2 V . . . 2.7 WVDC AT + 125 °C, SURGE = 3.4 V</b> |           |                  |                          |                               |                                 |                              |  |
| 33  | B         | 594D336X_004B2T  | 1.3                      | 6                             | 0.38                            | 0.47                         |  |
| 100*  | B*        | 594D107X_004B2T* | 4.0*                     | 8*                            | 0.30*                           | 0.53*                        |  |
| 150   | B         | 594D157X_004B2T  | 6.0                      | 8                             | 0.25                            | 0.58                         |  |
| 150   | C         | 594D157X_004C2T  | 6.0                      | 8                             | 0.08                            | 1.17                         |  |
| 270   | D         | 594D277X_004D2T  | 10.8                     | 8                             | 0.06                            | 1.58                         |  |
| 330*  | C*        | 594D337X_004C2T* | 13.2*                    | 8*                            | 0.08*                           | 1.17*                        |  |
| 470   | C         | 594D477X_004C2T  | 18.8                     | 10                            | 0.075                           | 1.21                         |  |
| 470   | R         | 594D477X_004R2T  | 18.8                     | 10                            | 0.045                           | 2.36                         |  |
| 680   | D         | 594D687X_004D2T  | 27.2                     | 12                            | 0.060                           | 1.58                         |  |
| 1500  | R         | 594D158X_004R2T  | 60.0                     | 20                            | 0.030                           | 2.89                         |  |
| <b>6.3 WVDC AT + 85 °C, SURGE = 8 V . . . 4 WVDC AT + 125 °C, SURGE = 5 V</b>     |           |                  |                          |                               |                                 |                              |  |
| 22  | B         | 594D226X_6R3B2T  | 1.4                      | 6                             | 0.380                           | 0.47                         |  |
| 100   | B         | 594D107X_6R3B2T  | 6.3                      | 6                             | 0.250                           | 0.58                         |  |
| 120   | C         | 594D127X_6R3C2T  | 7.6                      | 8                             | 0.085                           | 1.48                         |  |
| 220   | C         | 594D227X_6R3C2T  | 13.9                     | 8                             | 0.080                           | 1.37                         |  |
| 220   | D         | 594D227X_6R3D2T  | 13.9                     | 8                             | 0.065                           | 1.52                         |  |
| 330   | C         | 594D337X_6R3C2T  | 20.8                     | 8                             | 0.080                           | 1.17                         |  |
| 330   | C         | 594D337X_6W3C2T  | 20.8                     | 8                             | 0.080                           | 1.17                         |  |
| 330   | D         | 594D337X_6R3D2T  | 20.8                     | 8                             | 0.060                           | 1.58                         |  |
| 390   | R         | 594D397X_6R3R2T  | 24.6                     | 8                             | 0.045                           | 2.36                         |  |
| 470   | D         | 594D477X_6R3D2T  | 29.6                     | 10                            | 0.060                           | 1.58                         |  |
| 470   | D         | 594D477X_6W3D2T  | 29.6                     | 10                            | 0.060                           | 1.58                         |  |
| 470   | R         | 594D477X_6R3R2T  | 29.6                     | 10                            | 0.050                           | 2.24                         |  |
| 680   | R         | 594D687X_6R3R2T  | 42.8                     | 12                            | 0.045                           | 2.36                         |  |
| 680   | R         | 594D687X_6W3R2T  | 42.8                     | 12                            | 0.045                           | 2.36                         |  |
| 1000  | R         | 594D108X_6R3R2T  | 63.0                     | 16                            | 0.030                           | 2.89                         |  |
| 1000  | R         | 594D108X_6W3R2T  | 63.0                     | 16                            | 0.030                           | 2.89                         |  |

\* Preliminary values, contact factory for availability. For 10 % tolerance, specify "9"; for 20 % tolerance, change to "0".



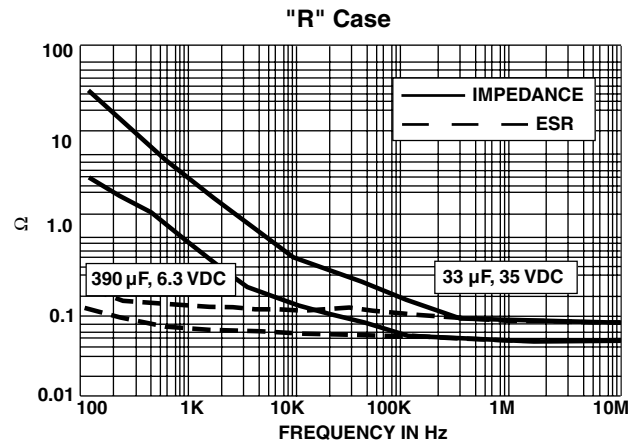
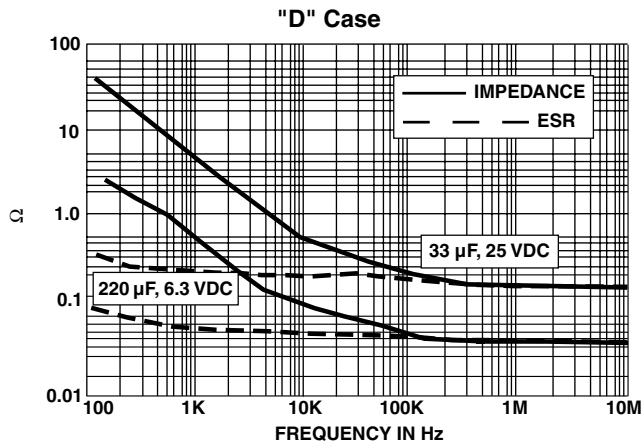
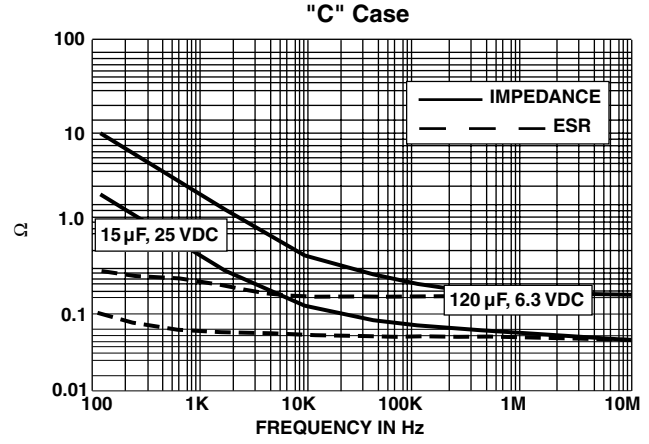
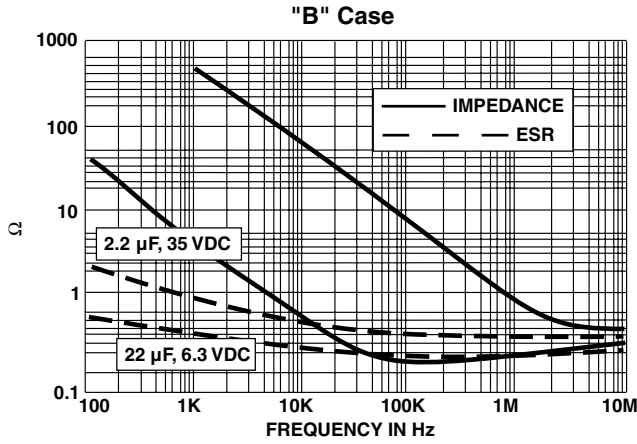
Solid Tantalum Chip Capacitors  
TANTAMOUNT®, Conformal Coated,  
Maximum CV, Low ESR

Vishay Sprague

| <b>STANDARD/EXTENDED RATINGS</b>  |           |                 |                                      |                                 |                                   |  |
|---|-----------|-----------------|--------------------------------------|---------------------------------|-----------------------------------|--|
| CAPACITANCE<br>( $\mu$ F)   | CASE CODE | PART NUMBER     | MAX. DCL<br>AT + 25 °C<br>( $\mu$ A) | MAX. DF<br>AT + 25 °C<br>120 Hz | MAX. ESR<br>AT + 25 °C<br>100 kHz | MAX. RIPPLE<br>100 kHz<br>I <sub>rms</sub> |
| <b>10 WVDC AT + 85 °C, SURGE = 13 V . . . 7 WVDC AT + 125 °C, SURGE = 8 V</b>   |           |                 |                                      |                                 |                                   |  |
| 15  | B         | 594D156X_010B2T | 1.5                                  | 6                               | 0.50                              | 0.41                                       |
| 33  | B         | 594D336X_010B2T | 3.3                                  | 6                               | 0.50                              | 0.41                                       |
| 47  | B         | 594D476X_010B2T | 4.7                                  | 6                               | 0.40                              | 0.46                                       |
| 68  | B         | 594D686X_010B2T | 6.8                                  | 6                               | 0.350                             | 0.49                                       |
| 68  | C         | 594D686X_010C2T | 6.8                                  | 6                               | 0.100                             | 1.05                                       |
| 100   | B         | 594D107X_010B2T | 10                                   | 12                              | 0.250                             | 0.57                                       |
| 100   | C         | 594D107X_010C2T | 10                                   | 8                               | 0.095                             | 1.08                                       |
| 120   | C         | 594D127X_010C2T | 10.2                                 | 7                               | 0.095                             | 1.08                                       |
| 150   | C         | 594D157X_010C2T | 15                                   | 8                               | 0.090                             | 1.11                                       |
| 150   | D         | 594D157X_010D2T | 15                                   | 8                               | 0.075                             | 1.41                                       |
| 180   | D         | 594D187X_010D2T | 14.4                                 | 7                               | 0.090                             | 1.29                                       |
| 220   | C         | 594D227X_010C2T | 22                                   | 8                               | 0.100                             | 1.05                                       |
| 220   | D         | 594D227X_010D2T | 22                                   | 8                               | 0.065                             | 1.52                                       |
| 330   | D         | 594D337X_010D2T | 33                                   | 8                               | 0.065                             | 1.52                                       |
| 330   | R         | 594D337X_010R2T | 33                                   | 8                               | 0.045                             | 2.36                                       |
| 470   | R         | 594D477X_010R2T | 47                                   | 10                              | 0.045                             | 2.36                                       |
| 680   | R         | 594D687X_010R2T | 68                                   | 14                              | 0.045                             | 2.36                                       |
| <b>16 WVDC AT + 85 °C, SURGE = 20 V . . . 10 WVDC AT + 125 °C, SURGE = 12 V</b> |           |                 |                                      |                                 |                                   |  |
| 15  | B         | 594D156X_016B2T | 2.4                                  | 6                               | 0.55                              | 0.39                                       |
| 33  | B         | 594D336X_016B2T | 5.3                                  | 6                               | 0.500                             | 0.41                                       |
| 33  | C         | 594D336X_016C2T | 5.3                                  | 6                               | 0.150                             | 0.86                                       |
| 47  | B         | 594D476X_016B2T | 7.5                                  | 6                               | 0.72                              | 0.34                                       |
| 47  | C         | 594D476X_016C2T | 7.5                                  | 6                               | 0.110                             | 1.00                                       |
| 68  | C         | 594D686X_016C2T | 10.9                                 | 6                               | 0.123                             | 0.95                                       |
| 68  | D         | 594D686X_016D2T | 10.9                                 | 6                               | 0.095                             | 1.26                                       |
| 100   | C         | 594D107X_016C2T | 16                                   | 8                               | 0.080                             | 1.17                                       |
| 100   | D         | 594D107X_016D2T | 16                                   | 8                               | 0.075                             | 1.41                                       |
| 150   | D         | 594D157X_016D2T | 24                                   | 8                               | 0.085                             | 1.33                                       |
| 180   | R         | 594D187X_016R2T | 28.8                                 | 8                               | 0.055                             | 2.13                                       |
| 220   | R         | 594D227X_016R2T | 35.2                                 | 8                               | 0.055                             | 2.13                                       |
| 330   | R         | 594D337X_016R2T | 52.8                                 | 8                               | 0.055                             | 2.13                                       |
| <b>20 WVDC AT + 85 °C, SURGE = 26 V . . . 13 WVDC AT + 125 °C, SURGE = 16 V</b> |           |                 |                                      |                                 |                                   |  |
| 4.7   | B         | 594D475X_020B2T | 0.9                                  | 6                               | 0.90                              | 0.31                                       |
| 6.8   | B         | 594D685X_020B2T | 1.4                                  | 6                               | 0.90                              | 0.31                                       |
| 10  | B         | 594D106X_020B2T | 2.0                                  | 6                               | 0.85                              | 0.32                                       |
| 22  | B         | 594D226X_020B2T | 4.4                                  | 6                               | 0.60                              | 0.38                                       |
| 22  | C         | 594D226X_020C2T | 4.4                                  | 6                               | 0.150                             | 0.86                                       |
| 47  | C         | 594D476X_020C2T | 9.4                                  | 6                               | 0.140                             | 0.89                                       |
| 47  | D         | 594D476X_020D2T | 9.4                                  | 6                               | 0.095                             | 1.26                                       |
| 100   | D         | 594D107X_020D2T | 20                                   | 8                               | 0.085                             | 1.33                                       |
| 120   | R         | 594D127X_020R2T | 24                                   | 8                               | 0.080                             | 1.77                                       |
| <b>25 WVDC AT + 85 °C, SURGE = 32 V . . . 17 WVDC AT + 125 °C, SURGE = 20 V</b> |           |                 |                                      |                                 |                                   |  |
| 3.3   | B         | 594D335X_025B2T | 0.8                                  | 6                               | 1.50                              | 0.24                                       |
| 10  | B         | 594D106X_025B2T | 2.5                                  | 6                               | 0.900                             | 0.31                                       |
| 15  | C         | 594D156X_025C2T | 3.8                                  | 6                               | 0.220                             | 0.70                                       |
| 22  | C         | 594D226X_025C2T | 5.5                                  | 6                               | 0.200                             | 0.74                                       |
| 33  | D         | 594D336X_025D2T | 8.3                                  | 6                               | 0.130                             | 1.05                                       |
| 47  | D         | 594D476X_025D2T | 11.8                                 | 6                               | 0.130                             | 1.07                                       |
| 68  | D         | 594D686X_025D2T | 17                                   | 8                               | 0.200                             | 1.00                                       |
| 68  | R         | 594D686X_025R2T | 17                                   | 6                               | 0.095                             | 1.60                                       |
| 100   | R         | 594D107X_025R2T | 25                                   | 8                               | 0.090                             | 1.67                                       |
| <b>35 WVDC AT + 85 °C, SURGE = 46 V . . . 23 WVDC AT + 125 °C, SURGE = 28 V</b> |           |                 |                                      |                                 |                                   |  |
| 2.2   | B         | 594D225X_035B2T | 0.8                                  | 6                               | 1.70                              | 0.22                                       |
| 4.7   | B         | 594D475X_035B2T | 1.6                                  | 6                               | 1.40                              | 0.25                                       |
| 6.8   | C         | 594D685X_035C2T | 2.4                                  | 6                               | 0.43                              | 0.51                                       |
| 15  | C         | 594D156X_035C2T | 5.3                                  | 6                               | 0.40                              | 0.52                                       |
| 15  | D         | 594D156X_035D2T | 5.3                                  | 6                               | 0.27                              | 0.75                                       |
| 22  | D         | 594D226X_035D2T | 7.7                                  | 6                               | 0.27                              | 0.75                                       |
| 33  | R         | 594D336X_035R2T | 11.6                                 | 6                               | 0.20                              | 1.12                                       |
| 47  | R         | 594D476X_035R2T | 16.6                                 | 6                               | 0.20                              | 1.12                                       |
| <b>50 WVDC AT + 85 °C, SURGE = 65 V . . . 33 WVDC AT + 125 °C, SURGE = 38 V</b> |           |                 |                                      |                                 |                                   |  |
| 1.0   | B         | 594D105X_050B2T | 0.5                                  | 4                               | 3.5                               | 0.16                                       |
| 4.7   | C         | 594D475X_050C2T | 2.4                                  | 6                               | 1.0                               | 0.33                                       |
| 6.8   | D         | 594D685X_050D2T | 3.4                                  | 6                               | .45                               | 0.58                                       |
| 15  | R         | 594D156X_050R2T | 7.5                                  | 6                               | .35                               | 0.85                                       |

\* Preliminary values, contact factory for availability. For 10 % tolerance, specify "9"; for 20 % tolerance, change to "0".

**TYPICAL CURVES AT + 25 °C, IMPEDANCE AND ESR VS. FREQUENCY**





## Disclaimer

All product specifications and data are subject to change without notice.

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