

## Solid-Electrolyte TANTALEX® Capacitors, Extended Capacitance Values, Hermetically-Sealed



### FEATURES

- Axial through-hole terminations: Tin/lead (SnPb), 100 % tin (RoHS compliant)
- High capacitance and small size
- Exceptional operating stability
- Hermetically-sealed, cylindrical, metal-case
- Low leakage current and low dissipation factor
- The military equivalent to the 152D is the CSR23 which is qualified to MIL-C-39003/03
- Provide proven reliability in a wide variety of high performance military, industrial and commercial markets
- Material categorization: For definitions please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS\***  
COMPLIANT

### Note

\* Lead (Pb)-containing terminations are not RoHS-compliant. Exemptions may apply.

### PERFORMANCE CHARACTERISTICS

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

**Capacitance Tolerance:** At 120 Hz, + 25 °C  
± 20 % and ± 10 % standard. ± 5 % available as special

**Dissipation Factor:** At 120 Hz, + 25 °C  
Dissipation factor, as determined from the expression  $2\pi fRC$ , shall not exceed the values listed in the Standard Ratings table

**DC Leakage Current (DCL Max.):**

**At + 25 °C:** Leakage current shall not exceed the values listed in the Standard Ratings table

**At + 85 °C:** Leakage current shall not exceed 10 times the values listed in the Standard Ratings table

**At + 125 °C:** Leakage shall not exceed 12 times the values listed in the Standard Ratings table

**Life Test:** Capacitors shall withstand rated DC voltage applied at + 85 °C for 2000 h or derated DC voltage applied at + 125 °C for 1000 h

Following the life test:

1. DCL shall not exceed 125 % of the initial requirement. In no case need the leakage current be less than 2  $\mu$ A
2. Dissipation factor shall meet the initial requirement
3. Change in capacitance shall not exceed ± 5 %

### ORDERING INFORMATION

| 152D  | 106                                                                                                                            | X0                                                            | 006                                                                                              | A                                | 2                    | T                 | E3                                                                      |
|-------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------|----------------------|-------------------|-------------------------------------------------------------------------|
| MODEL | CAPACITANCE                                                                                                                    | CAPACITANCE TOLERANCE                                         | DC VOLTAGE RATING AT 85 °C                                                                       | CASE CODE                        | STYLE NUMBER         | PACKAGING         | RoHS COMPLIANT                                                          |
|       | This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow. | X0 = ± 20 %<br>X9 = ± 10 %<br>X5 = ± 5 % *<br>* Special order | This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. | See Ratings and Case Codes table | 2 = Insulated sleeve | T = Tape and reel | E3 = 100 % tin termination (RoHS compliant)<br>Blank = SnPb termination |

### DIMENSIONS in inches [millimeters]

The image shows a schematic symbol for a capacitor on the left, consisting of two parallel lines with a ground symbol connected to the negative terminal. To the right is a detailed mechanical drawing of the capacitor. It is a cylindrical component with two leads. The top lead is labeled 'Positive lead'. Dimensions are given in inches and millimeters in brackets. The diameter of the body is 'D dia.'. The length of the body is 'L'. The distance from the end of the body to the center of the lead is 'J max.'. The lead diameter is '0.047 [1.19] max.' and the lead length is '0.125 [3.18] max.'. The leads are labeled 'Solid tinned nickel leads'. The lead diameter is also given as '1.500 ± 0.250 [38.10 ± 6.35]'.

| CASE CODE | D                                     | L                            | J<br>(MAXIMUM) | LEAD SIZE |                  |
|-----------|---------------------------------------|------------------------------|----------------|-----------|------------------|
|           | WITH INSULATING SLEEVE <sup>(1)</sup> |                              |                | AWG NO.   | NOMINAL DIAMETER |
|           |                                       |                              |                |           |                  |
| A         | 0.135 ± 0.016 [3.43 ± 0.41]           | 0.286 ± 0.031 [7.26 ± 0.79]  | 0.422 [10.72]  | 24        | 0.020 [0.51]     |
| B         | 0.185 ± 0.016 [4.70 ± 0.41]           | 0.474 ± 0.031 [12.04 ± 0.79] | 0.610 [15.49]  | 24        | 0.020 [0.51]     |
| R         | 0.289 ± 0.016 [7.34 ± 0.41]           | 0.686 ± 0.031 [17.42 ± 0.79] | 0.822 [20.88]  | 22        | 0.025 [0.64]     |
| S         | 0.351 ± 0.016 [8.92 ± 0.41]           | 0.786 ± 0.031 [19.96 ± 0.79] | 0.922 [23.42]  | 22        | 0.025 [0.64]     |

### Note

<sup>(1)</sup> When a shrink-fitted insulation is used, it shall lap over the ends of the capacitor body

**STANDARD RATINGS**

| 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<br>(%) |
|------------------------------------------------------------------------------------------------|-----------|-----------------|--------------------------------------|----------------------------------------|
| <b>6 V<sub>DC</sub> AT + 85 °C, SURGE = 8 V; 4 V<sub>DC</sub> AT + 125 °C, SURGE = 5 V</b>     |           |                 |                                      |                                        |
| 10                                                                                             | A         | 152D106(1)006A2 | 1.0                                  | 6                                      |
| 12                                                                                             | A         | 152D126(1)006A2 | 1.0                                  | 6                                      |
| 15                                                                                             | A         | 152D156(1)006A2 | 1.0                                  | 6                                      |
| 68                                                                                             | B         | 152D686(1)006B2 | 3.0                                  | 6                                      |
| 82                                                                                             | B         | 152D826(1)006B2 | 3.0                                  | 6                                      |
| 100                                                                                            | B         | 152D107(1)006B2 | 6.0                                  | 6                                      |
| 330                                                                                            | R         | 152D337(1)006R2 | 10.0                                 | 8                                      |
| 390                                                                                            | R         | 152D397(1)006R2 | 10.0                                 | 8                                      |
| 470                                                                                            | R         | 152D477(1)006R2 | 10.0                                 | 8                                      |
| 560                                                                                            | S         | 152D567(1)006S2 | 20.0                                 | 10                                     |
| 680                                                                                            | S         | 152D687(1)006S2 | 20.0                                 | 10                                     |
| 820                                                                                            | S         | 152D827(1)006S2 | 20.0                                 | 10                                     |
| 1000                                                                                           | S         | 152D108(1)006S2 | 20.0                                 | 10                                     |
| <b>10 V<sub>DC</sub> AT + 85 °C, SURGE = 13 V; 7 V<sub>DC</sub> AT + 125 °C, SURGE = 9 V</b>   |           |                 |                                      |                                        |
| 5.6                                                                                            | A         | 152D565(1)010A2 | 1.0                                  | 4                                      |
| 6.8                                                                                            | A         | 152D685(1)010A2 | 1.0                                  | 6                                      |
| 8.2                                                                                            | A         | 152D825(1)010A2 | 1.2                                  | 6                                      |
| 10                                                                                             | A         | 152D106(1)010A2 | 1.2                                  | 6                                      |
| 47                                                                                             | B         | 152D476(1)010B2 | 4.0                                  | 6                                      |
| 56                                                                                             | B         | 152D566(1)010B2 | 5.0                                  | 6                                      |
| 68                                                                                             | B         | 152D686(1)010B2 | 6.0                                  | 6                                      |
| 82                                                                                             | B         | 152D826(1)010B2 | 7.0                                  | 6                                      |
| 150                                                                                            | R         | 152D157(1)010R2 | 8.0                                  | 8                                      |
| 180                                                                                            | R         | 152D187(1)010R2 | 8.0                                  | 8                                      |
| 220                                                                                            | R         | 152D227(1)010R2 | 12.0                                 | 8                                      |
| 270                                                                                            | R         | 152D277(1)010R2 | 13.0                                 | 8                                      |
| 330                                                                                            | S         | 152D337(1)010S2 | 16.0                                 | 8                                      |
| 390                                                                                            | S         | 152D397(1)010S2 | 16.0                                 | 10                                     |
| 470                                                                                            | S         | 152D477(1)010S2 | 16.0                                 | 10                                     |
| 560                                                                                            | S         | 152D567(1)010S2 | 20.0                                 | 10                                     |
| <b>15 V<sub>DC</sub> AT + 85 °C, SURGE = 20 V; 10 V<sub>DC</sub> AT + 125 °C, SURGE = 12 V</b> |           |                 |                                      |                                        |
| 3.9                                                                                            | A         | 152D395(1)015A2 | 1.0                                  | 4                                      |
| 4.7                                                                                            | A         | 152D475(1)015A2 | 1.0                                  | 4                                      |
| 5.6                                                                                            | A         | 152D565(1)015A2 | 1.3                                  | 4                                      |
| 6.8                                                                                            | A         | 152D685(1)015A2 | 1.3                                  | 6                                      |
| 27                                                                                             | B         | 152D276(1)015B2 | 3.0                                  | 6                                      |
| 33                                                                                             | B         | 152D336(1)015B2 | 5.0                                  | 6                                      |
| 39                                                                                             | B         | 152D396(1)015B2 | 5.0                                  | 6                                      |
| 82                                                                                             | R         | 152D826(1)015R2 | 8.0                                  | 6                                      |
| 100                                                                                            | R         | 152D107(1)015R2 | 10.0                                 | 8                                      |
| 120                                                                                            | R         | 152D127(1)015R2 | 10.0                                 | 8                                      |
| 150                                                                                            | R         | 152D157(1)015R2 | 15.0                                 | 8                                      |
| 180                                                                                            | R         | 152D187(1)015R2 | 15.0                                 | 8                                      |
| 220                                                                                            | S         | 152D227(1)015S2 | 20.0                                 | 8                                      |
| 270                                                                                            | S         | 152D277(1)015S2 | 20.0                                 | 8                                      |
| 330                                                                                            | S         | 152D337(1)015S2 | 20.0                                 | 8                                      |

**Note**

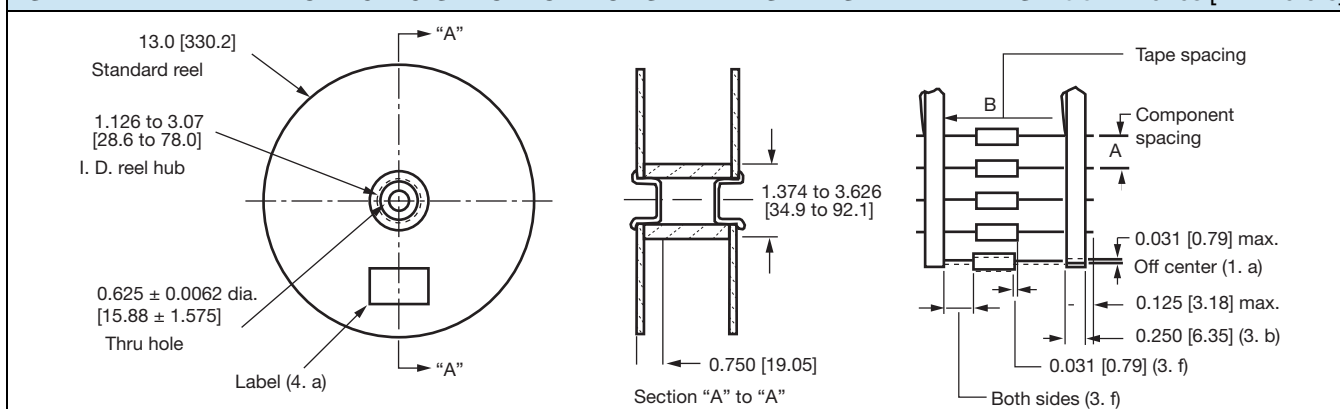
- Part number definitions:  
(1) For 10 % tolerance specify X9; for 20 % specify "X0"; for 5 % "X5" (special order)



| STANDARD RATINGS                                                                               |           |                 |                                      |                                        |
|------------------------------------------------------------------------------------------------|-----------|-----------------|--------------------------------------|----------------------------------------|
| 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<br>(%) |
| <b>20 V<sub>DC</sub> AT + 85 °C, SURGE = 26 V; 13 V<sub>DC</sub> AT + 125 °C, SURGE = 16 V</b> |           |                 |                                      |                                        |
| 2.7                                                                                            | A         | 152D275(1)020A2 | 0.8                                  | 4                                      |
| 3.3                                                                                            | A         | 152D335(1)020A2 | 1.0                                  | 4                                      |
| 3.9                                                                                            | A         | 152D395(1)020A2 | 1.2                                  | 4                                      |
| 4.7                                                                                            | A         | 152D475(1)020A2 | 1.2                                  | 4                                      |
| 18                                                                                             | B         | 152D186(1)020B2 | 3.0                                  | 4                                      |
| 22                                                                                             | B         | 152D226(1)020B2 | 3.0                                  | 4                                      |
| 27                                                                                             | B         | 152D276(1)020B2 | 4.0                                  | 4                                      |
| 56                                                                                             | R         | 152D566(1)020R2 | 7.0                                  | 6                                      |
| 68                                                                                             | R         | 152D686(1)020R2 | 8.0                                  | 6                                      |
| 82                                                                                             | R         | 152D826(1)020R2 | 10.0                                 | 6                                      |
| 100                                                                                            | R         | 152D107(1)020R2 | 12.0                                 | 6                                      |
| 120                                                                                            | R         | 152D127(1)020R2 | 12.0                                 | 6                                      |
| 150                                                                                            | S         | 152D157(1)020S2 | 15.0                                 | 8                                      |
| 180                                                                                            | S         | 152D187(1)020S2 | 15.0                                 | 8                                      |
| 220                                                                                            | S         | 152D227(1)020S2 | 15.0                                 | 8                                      |
| <b>30 V<sub>DC</sub> AT + 85 °C, SURGE = 39 V; 20 V<sub>DC</sub> AT + 125 °C, SURGE = 26 V</b> |           |                 |                                      |                                        |
| 2.2                                                                                            | A         | 152D225(1)030A2 | 1.0                                  | 4                                      |
| 2.7                                                                                            | A         | 152D275(1)030A2 | 1.0                                  | 4                                      |
| 12                                                                                             | B         | 152D126(1)030B2 | 3.0                                  | 4                                      |
| 15                                                                                             | B         | 152D156(1)030B2 | 3.0                                  | 4                                      |
| 18                                                                                             | B         | 152D186(1)030B2 | 3.0                                  | 4                                      |
| 56                                                                                             | R         | 152D566(1)030R2 | 7.0                                  | 6                                      |
| 68                                                                                             | R         | 152D686(1)030R2 | 7.0                                  | 6                                      |
| 82                                                                                             | S         | 152D826(1)030S2 | 10.0                                 | 8                                      |
| 100                                                                                            | S         | 152D107(1)030S2 | 10.0                                 | 8                                      |
| <b>35 V<sub>DC</sub> AT + 85 °C, SURGE = 46 V; 23 V<sub>DC</sub> AT + 125 °C, SURGE = 28 V</b> |           |                 |                                      |                                        |
| 1.2                                                                                            | A         | 152D125(1)035A2 | 0.6                                  | 4                                      |
| 1.5                                                                                            | A         | 152D155(1)035A2 | 0.8                                  | 4                                      |
| 1.8                                                                                            | A         | 152D185(1)035A2 | 1.0                                  | 4                                      |
| 8.2                                                                                            | B         | 152D825(1)035B2 | 3.0                                  | 4                                      |
| 10                                                                                             | B         | 152D106(1)035B2 | 3.0                                  | 4                                      |
| 27                                                                                             | R         | 152D276(1)035R2 | 7.0                                  | 6                                      |
| 33                                                                                             | R         | 152D336(1)035R2 | 8.0                                  | 6                                      |
| 39                                                                                             | R         | 152D396(1)035R2 | 10.0                                 | 6                                      |
| 47                                                                                             | R         | 152D476(1)035R2 | 10.0                                 | 6                                      |
| 56                                                                                             | S         | 152D566(1)035S2 | 12.0                                 | 6                                      |
| 68                                                                                             | S         | 152D686(1)035S2 | 12.0                                 | 6                                      |
| 82                                                                                             | S         | 152D826(1)035S2 | 30.0                                 | 8                                      |
| 100                                                                                            | S         | 152D107(1)035S2 | 30.0                                 | 8                                      |
| <b>50 V<sub>DC</sub> AT + 85 °C, SURGE = 65 V; 33 V<sub>DC</sub> AT + 125 °C, SURGE = 40 V</b> |           |                 |                                      |                                        |
| 1.2                                                                                            | A         | 152D125(1)050A2 | 0.6                                  | 4                                      |
| 1.5                                                                                            | A         | 152D155(1)050A2 | 0.8                                  | 4                                      |
| 5.6                                                                                            | B         | 152D565(1)050B2 | 2.5                                  | 4                                      |
| 6.8                                                                                            | B         | 152D685(1)050B2 | 2.5                                  | 4                                      |
| 22                                                                                             | R         | 152D226(1)050R2 | 7.0                                  | 6                                      |
| 27                                                                                             | R         | 152D276(1)050R2 | 8.0                                  | 6                                      |
| 33                                                                                             | S         | 152D336(1)050S2 | 10.0                                 | 6                                      |
| 39                                                                                             | S         | 152D396(1)050S2 | 10.0                                 | 6                                      |
| 47                                                                                             | S         | 152D476(1)050S2 | 10.0                                 | 6                                      |
| <b>60 V<sub>DC</sub> AT + 85 °C, SURGE = 78 V; 39 V<sub>DC</sub> AT + 125 °C, SURGE = 49 V</b> |           |                 |                                      |                                        |
| 22                                                                                             | R         | 152D226(1)060R2 | 7                                    | 6                                      |

**Note**

- Part number definitions:  
(1) For 10 % tolerance specify X9; for 20 % specify "X0"; for 5 % "X5" (special order)

**STANDARD REEL PACKAGING SPECIFICATIONS - MEETS EIA STANDARD RS-296 in inches [millimeters]**


| CASE CODE | TYPE 150D UNITS WITH INSULATING SLEEVE |                              | LEAD SIZE |              | COMPONENT SPACING            | TAPE SPACING                 | UNITS PER REEL |
|-----------|----------------------------------------|------------------------------|-----------|--------------|------------------------------|------------------------------|----------------|
|           | D                                      | L                            | AWG NO.   | NOM. DIA.    | A                            | B                            |                |
| A         | 0.135 ± 0.016 [3.43 ± 0.41]            | 0.286 ± 0.031 [7.26 ± 0.79]  | 24        | 0.020 [0.51] | 0.200 ± 0.015 [5.08 ± 0.38]  | 2.500 ± 0.062 [63.5 ± 1.57]  | 1000           |
| B         | 0.185 ± 0.016 [4.70 ± 0.41]            | 0.474 ± 0.031 [12.04 ± 0.79] | 24        | 0.020 [0.51] | 0.200 ± 0.015 [5.08 ± 0.38]  | 2.500 ± 0.062 [63.5 ± 1.57]  | 1000           |
| R         | 0.289 ± 0.016 [7.34 ± 0.41]            | 0.686 ± 0.031 [17.42 ± 0.79] | 22        | 0.025 [0.64] | 0.400 ± 0.015 [10.16 ± 0.38] | 2.875 ± 0.062 [73.03 ± 1.57] | 500            |
| S         | 0.351 ± 0.016 [8.92 ± 0.41]            | 0.786 ± 0.031 [19.96 ± 0.79] | 22        | 0.025 [0.64] | 0.400 ± 0.015 [10.16 ± 0.38] | 2.875 ± 0.062 [73.03 ± 1.57] | 500            |

**STANDARD REEL PACKAGING INFORMATION**
**1. Component Leads**

- Component leads shall not be bent beyond 0.047" [1.19 mm] maximum from their nominal position when measured from the leading edge of the component lead at the lead egress from the component.
- The "C" dimension shall be governed by the overall length of the reel packaged component. The distance between flanges shall be 0.125" to 0.250" [3.18 mm to 6.35 mm] greater than the overall component length.

**2. Orientation**

All polarized components must be oriented to one direction. The cathode lead tape shall be a color and the anode lead tape shall be white.

**3. Reeling**

- Components on any reel shall not represent more than two date codes when date code identification is required.
- Component leads shall be positioned between pairs of 0.250" [6.35 mm] tape.
- The disposable reels have hubs and corrugated fibreboard flanges and core or equivalent.
- A minimum of 12.0" [304.8 mm] leader of tape shall be provided before the first and after the last component on the reel.
- 50 lb or 60 lb. Kraft paper must be wound between layer of components as far as necessary for component protection. Width of paper to be 0.062" to 0.250" [1.57 mm to 6.35 mm] less than the "C" dimension of the reel.

- A row of components must be centered between tapes ± 0.047" [1.19 mm]. In addition, individual components may deviate from center of component row ± 0.031" [0.79 mm].
- Staples shall not be used for splicing. Not more than 4 layers of tape shall be used in any splice area and no tape shall be offset from another by more than 0.031" [0.79 mm] non-cumulative. Tape splices shall overlap at least 6.0" [152.4 mm] for butt joints and at least 3.0" [76.2 mm] for lap joints and shall not be weaker than unspliced tape. Universal splicing clips may also be used.
- Quantity per reel shall be controlled so that tape components and cover shall not extend beyond the smallest dimension of the flange (either across flats or diameter). Once the quantity per reel for each part number has been established, future orders for that part number shall be packaged in that quantity. When order or release quantity is less than the established quantity, a standard commercial pack is to be used.
- A maximum of 0.25 % of the components per reel quantity may be missing without consecutive missing components.
- Adequate protection must be provided to prevent physical damage to both reel and components during shipment and storage.

**4. Marking**

Minimum reel and carton marking shall consist of the following: Customer part number, purchase order no., quantity, package date, manufacturer's name, electrical value, date code, Vishay Sprague part number and country of origin.



## Disclaimer

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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.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**

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<http://moschip.ru/get-element>

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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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