Vishay

Solid-Electrolyte Tantalex™ Capacitors, Military MIL-PRF-39003/09 Qualified, Style CSR21



FEATURES

- · Hermetically sealed
- Metal cased
- Axial lead
- Weibull failure rates B, C, D
- Exponential failure rates M, P, R, S
- Low ESR
- 100 % surge current test
- Tape and reel available per EIA-296 standard

STYLE, MILITARY SPECIFICATION SHEET

Style CSR21, M39003/09 MIL-PRF-39003/9

PERFORMANCE CHARACTERISTICS

Operating Temperature: -55 °C to +125 °C (above 85 °C, voltage derating is required) **Capacitance Range:** 5.6 µF to 330 µF

Capacitance Tolerance: ± 5 %, ± 10 %, ± 20 %

Voltage Rating: 6 V_{DC} to 50 V_{DC}

DESCRIPTION

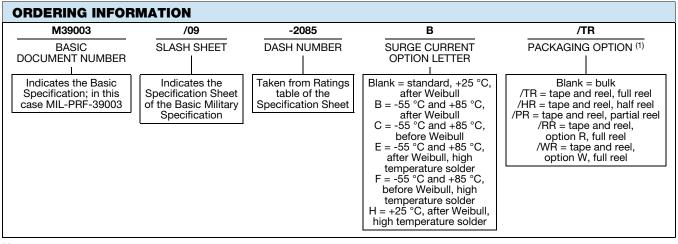
Solid-electrolyte Tantalex capacitors to military specification MIL-PRF-39003 - Exponential and Weibull Distribution: hermetically sealed, metal cased, axial leaded tubular capacitors manufactured as military style CSR21. These capacitors are furnished to the requirements of the military specification, including marking, testing and inspection.

In accordance with the specification, all capacitors are marked with the military part number (M39003/xx-xxxx) rather than the older style designation (CSRxxxxxxxxx) and should be ordered as such. All capacitors covered by MIL-PRF-39003 are now ordered with the military part number as illustrated in the Part Numbering System chart. Capacitors must not be ordered using the style number identification.

MIL-PRF-39003 establishes failure rates (expressed in percent per 1000 h) based on exponential and Weibull distribution. Care must be exercised in ordering to insure the part number correctly identifies the desired failure rate level.

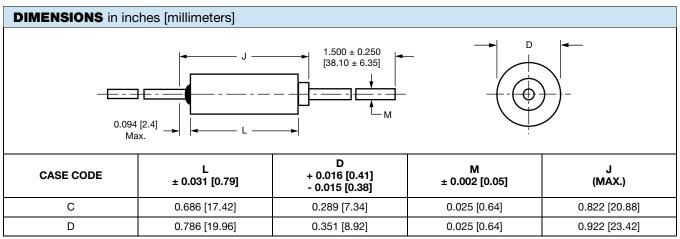
In addition, each order for military style CSR13, CSR21, CSR23 capacitors requiring government inspection must state whether inspection is to be at the destination or at the Vishay plant. Orders requiring source inspection cannot be shipped until this has been accomplished.

For information on the performance characteristics of these capacitors, please refer to the latest issue of the military specification.



Note

(1) See detailed packaging information following the Standard Ratings table



Notes

- Capacitors of this series are supplied with shrink-fitted insulation sleeve. The insulation sleeve laps over the ends of the capacitor body,
 extending by 0.015" [0.38 mm] minimum beyond each end. Dimensions L and D include insulation sleeve additives. Dimension J is always
 larger than L and is not affected by insulation sleeve
- A minimum lead length of 1.0" [25.4 mm] for use with tape and reel automatic insertion equipment is available upon request

| RATINGS AN | D CASE COD | ES | | | | |
|------------|------------|------|------|------|-------------|------|
| μF | 6 V | 10 V | 15 V | 20 V | 35 V | 50 V |
| 5.6 | | | | | | С |
| 6.8 | | | | | | С |
| 8.2 | | | | | | С |
| 10 | | | | | | С |
| 12 | | | | | | С |
| 15 | | | | | | С |
| 18 | | | | | | С |
| 22 | | | | | С | D |
| 27 | | | | С | D | |
| 33 | | | | С | D | |
| 39 | | | | С | D | |
| 47 | | | | С | D | |
| 56 | | | С | D | | |
| 68 | | | С | D | | |
| 82 | | С | | D | | |
| 100 | | С | | D | | |
| 120 | | С | D | | | |
| 150 | С | | D | | | |
| 180 | С | D | | | | |
| 220 | | D | | | | |
| 270 | D | | | | | |
| 330 | D | | | | | |



| CAPACITANCE (µF) | CASE CODE | CAP. TOL. (± %) | | | | IO. M3 FE LE\ | | |) h) | MAX | (. DCL (μ | A) AT | MAX. DF AT +25 °C 1 kHz | MAX. ESR AT +25 °C 100 kHz | DERA MAX. R CURF AT +2 | RIPPLE RENT 25 °C |
|---------------------|--------------|-----------------------|----------|----------|-------------------|------------------|----------|-----------|------------|----------------------|------------|------------|----------------------------------|-------------------------------------|---------------------------------|-------------------------|
| | | | M 1.0 | P 0.1 | R 0.01 | S 0.001 | B 0.1 | C 0.01 | D 0.001 | +25 °C | +85 °C | +125 °C | (%) | (Ω) | 40 kHz | 1 kHz |
| | | | 1.0 | | | | | | | ': 4 Vpc A | T +125 ° | С | | | | |
| 150 | С | 5 | 0001 | | | 0301 | | | | 4.5 | 90.0 | 113 | 10 | 0.065 | 3.3 | 2.0 |
| 150 | С | 10 | 0002 | 0102 | 0202 | 0302 | 2002 | 3002 | 4002 | 4.5 | 90.0 | 113 | 10 | 0.065 | 3.3 | 2.0 |
| 150 | С | 20 | 0003 | 0103 | 0203 | 0303 | 2003 | 3003 | 4003 | 4.5 | 90.0 | 113 | 10 | 0.065 | 3.3 | 2.0 |
| 180 | С | 5 | 0004 | 0104 | 0204 | 0304 | 2004 | 3004 | 4004 | 5.5 | 110 | 138 | 10 | 0.060 | 3.4 | 2.4 |
| 180 | С | 10 | 0005 | 0105 | 0205 | 0305 | 2005 | 3005 | 4005 | 5.5 | 110 | 138 | 10 | 0.060 | 3.4 | 2.4 |
| 270 | D | 5 | 0006 | 0106 | 0206 | 0306 | 2006 | 3006 | 4006 | 6.5 | 130 | 163 | 10 | 0.050 | 4.1 | 3.4 |
| 270 | D | 10 | 0007 | 0107 | 0207 | 0307 | 2007 | 3007 | 4007 | 6.5 | 130 | 163 | 10 | 0.050 | 4.1 | 3.4 |
| 330 | D | 5 | 8000 | 0108 | 0208 | 0308 | 2008 | 3008 | 4008 | 7.5 | 150 | 188 | 12 | 0.045 | 4.3 | 3.8 |
| 330 | D | 10 | 0009 | 0109 | 0209 | 0309 | 2009 | 3009 | 4009 | 7.5 | 150 | 188 | 12 | 0.045 | 4.3 | 3.8 |
| 330 | D | 20 | 0010 | 0110 | 0210 | 0310 | 2010 | 3010 | 4010 | 7.5 | 150 | 188 | 12 | 0.045 | 4.3 | 3.8 |
| | | | | 1 | 0 V _{DC} | AT +8 | 5 °C, | SURG | E = 13 | V; 7 V _{DC} | AT +125 | °C | | | | |
| 82 | С | 5 | 0011 | 0111 | 0211 | 0311 | 2011 | 3011 | 4011 | 4.0 | 80.0 | 100 | 8 | 0.085 | 2.9 | 1.8 |
| 82 | С | 10 | 0012 | 0112 | 0212 | 0312 | 2012 | 3012 | 4012 | 4.0 | 80.0 | 100 | 8 | 0.085 | 2.9 | 1.8 |
| 100 | С | 5 | 0013 | 0113 | 0213 | 0313 | 2013 | 3013 | 4013 | 5.0 | 100 | 125 | 8 | 0.075 | 3.0 | 2.2 |
| 100 | С | 10 | 0014 | 0114 | 0214 | 0314 | 2014 | 3014 | 4014 | 5.0 | 100 | 125 | 8 | 0.075 | 3.0 | 2.2 |
| 100 | С | 20 | 0015 | 0115 | 0215 | 0315 | 2015 | 3015 | 4015 | 5.0 | 100 | 125 | 8 | 0.075 | 3.0 | 2.2 |
| 120 | С | 5 | 0016 | 0116 | 0216 | 0136 | 2016 | 3016 | 4016 | 6.0 | 120 | 150 | 8 | 0.070 | 3.2 | 2.5 |
| 120 | С | 10 | | | | 0317 | | | | 6.0 | 120 | 150 | 8 | 0.070 | 3.2 | 2.5 |
| 180 | D | 5 | | | | 0318 | | | | 9.0 | 180 | 226 | 8 | 0.060 | 3.7 | 3.4 |
| 180 | D | 10 | | | | 0319 | | | | 9.0 | 180 | 226 | 8 | 0.060 | 3.7 | 3.4 |
| 220 | D | 5 | | | | 0320 | | | | 10.0 | 200 | 250 | 10 | 0.055 | 3.9 | 3.4 |
| 220 | D | 10 | | | | 0321 | | | | 10.0 | 200 | 250 | 10 | 0.055 | 3.9 | 3.4 |
| 220 | D | 20 | 0022 | | | 0322 | | | | 10.0 | 200 | 250 | 10 | 0.055 | 3.9 | 3.4 |
| | | | | | | | | | | | AT +125 | | | | | |
| 56 | С | 5 | | | | 0323 | | | | 4.0 | 80.0 | 100 | 6 | 0.100 | 2.6 | 1.8 |
| 56 | С | 10 | | | | 0324 | | | | 4.0 | 80.0 | 100 | 6 | 0.100 | 2.6 | 1.8 |
| 68 | С | 5 | | | | 0325 | | | | 5.0 | 100 | 125 | 6 | 0.095 | 2.7 | 2.2 |
| 68 | С | 10 | | | | 0326 | | | | 5.0 | 100 | 125 | 6 | 0.095 | 2.7 | 2.2 |
| 68 | С | 20 | | | | 0327 | | | | 5.0 | 100 | 125 | 6 | 0.095 | 2.7 | 2.2 |
| 120 | D | 5 | | | | 0328 | | | | 9.0 | 180 | 226 | 8 | 0.070 | 3.5 | 2.8 |
| 120 150 | D D | 10 5 | | | | 0329 0330 | | | | 9.0 | 180 200 | 226 250 | 8 8 | 0.070 0.065 | 3.5 3.6 | 2.8 |
| 150 | D | 5 10 | | | | 0330 | | | | 10.0 10.0 | 200 | 250 250 | 8 8 | 0.065 | 3.6 | 3.1 |
| | D | 20 | | | | 0332 | | | | 10.0 | 200 | 250 250 | | 0.065 | | 3.1 |
| 150 | D | 20 | 0032 | | | | | | | | AT +125 | | 8 | 0.065 | 3.6 | 3.1 |
| 27 | С | 5 | UU33 | | | 0333 | | | | 2.5 | 50.0 | 63.0 | 5 | 0.145 | 2.2 | 1.2 |
| 27 27 | С | 10 | | | | 0334 | | | | 2.5 | 50.0 | 63.0 | 5 | 0.145 | 2.2 | 1.2 |
| 33 | С | 5 | | | | 0335 | | | | 3.5 | 70.0 | 88.0 | 5 | 0.143 | 2.3 | 1.4 |
| 33 | С | 10 | | | | 0336 | | | | 3.5 | 70.0 | 88.0 | 5 | 0.130 | 2.3 | 1.4 |
| 33 | C | 20 | | | | 0337 | | | | 3.5 | 70.0 | 88.0 | 5 | 0.130 | 2.3 | 1.4 |
| 39 | C | 5 | | | | 0338 | | | | 4.0 | 80.0 | 100 | 5 | 0.130 | 2.4 | 1.7 |
| 39 | С | 10 | | | | 0339 | | | | 4.0 | 80.0 | 100 | 5 | 0.120 | 2.4 | 1.7 |
| 47 | C | 5 | | | | 0340 | | | | 4.5 | 90.0 | 113 | 6 | 0.120 | 2.5 | 1.8 |



| CAPACITANCE (µF) | CASE CODE | CAP. TOL. (± %) | FAILURE RATE LI | | | | | MAX. DCL (μA) AT | | | MAX. DF AT +25 °C 1 kHz | MAX. ESR AT +25 °C 100 kHz | DERATED MAX. RIPPLE CURRENT AT +25 °C (A) | | | |
|---------------------|--------------|-----------------------|-----------------|----------|-------------------|------------|----------|------------------|------------|-----------------------|----------------------------------|-------------------------------------|---|------------|--------|------|
| | | | M 1.0 | P 0.1 | R 0.01 | S 0.001 | В 0.1 | C 0.01 | D 0.001 | +25 °C | +85 °C | +125 °C | (%) | (Ω) | 40 kHz | 1 kH |
| | | | | | | | | | | V; 13 V _{DC} | AT +125 | °C | | | | |
| 47 | С | 10 | 0041 | 0141 | 0241 | 0341 | 2041 | 3041 | 4041 | 4.5 | 90.0 | 113 | 6 | 0.110 | 2.5 | 1.8 |
| 47 | С | 20 | 0042 | 0142 | 0242 | 0342 | 2042 | 3042 | 4042 | 4.5 | 90.0 | 113 | 6 | 0.110 | 2.5 | 1.8 |
| 56 | D | 5 | 0043 | 0143 | 0243 | 0343 | 2043 | 3043 | 4043 | 5.5 | 110 | 138 | 6 | 0.100 | 2.9 | 2.2 |
| 56 | D | 10 | 0044 | 0144 | 0244 | 0344 | 2044 | 3044 | 4044 | 5.5 | 110 | 138 | 6 | 0.100 | 2.9 | 2.2 |
| 68 | D | 5 | 0045 | 0145 | 0245 | 0345 | 2045 | 3045 | 4045 | 7.0 | 140 | 175 | 6 | 0.095 | 3.0 | 2.4 |
| 68 | D | 10 | 0046 | 0146 | 0246 | 0346 | 2046 | 3046 | 4046 | 7.0 | 140 | 175 | 6 | 0.095 | 3.0 | 2.4 |
| 68 | D | 20 | 0047 | 0147 | 0247 | 0347 | 2047 | 3047 | 4047 | 7.0 | 140 | 175 | 6 | 0.095 | 3.0 | 2.4 |
| 82 | D | 5 | 0048 | 0148 | 0248 | 0348 | 2048 | 3048 | 4048 | 8.0 | 160 | 200 | 6 | 0.085 | 3.1 | 2.5 |
| 82 | D | 10 | 0049 | 0149 | 0249 | 0349 | 2049 | 3049 | 4049 | 8.0 | 160 | 200 | 6 | 0.085 | 3.1 | 2.5 |
| 100 | D | 5 | 0050 | 0150 | 0250 | 0350 | 2050 | 3050 | 4050 | 10.0 | 200 | 250 | 8 | 0.075 | 3.3 | 2.5 |
| 100 | D | 10 | 0051 | 0151 | 0251 | 0351 | 2051 | 3051 | 4051 | 10.0 | 200 | 250 | 8 | 0.075 | 3.3 | 2.5 |
| 100 | D | 20 | 0052 | 0152 | 0252 | 0352 | 2052 | 3052 | 4052 | 10.0 | 200 | 250 | 8 | 0.075 | 3.3 | 2.5 |
| | | | | 35 | 5 V _{DC} | AT +8 | 5 °C, S | SURGE | E = 46 | V; 23 V _{DC} | AT +125 | °C | | | | |
| 22 | С | 5 | 0053 | | | 0353 | | | | 4.0 | 80.0 | 100 | 4 | 0.160 | 2.1 | 1.5 |
| 22 | С | 10 | 0054 | 0154 | 0254 | 0354 | 2054 | 3054 | 4054 | 4.0 | 80.0 | 100 | 4 | 0.160 | 2.1 | 1.5 |
| 22 | С | 20 | 0055 | 0155 | 0255 | 0355 | 2055 | 3055 | 4055 | 4.0 | 80.0 | 100 | 4 | 0.160 | 2.1 | 1.5 |
| 27 | D | 5 | | | | 0356 | | | | 4.5 | 90.0 | 113 | 4 | 0.145 | 2.4 | 1.9 |
| 27 | D | 10 | | | | 0357 | | | | 4.5 | 90.0 | 113 | 4 | 0.145 | 2.4 | 1.9 |
| 33 | D | 5 | 0058 | 0158 | 0258 | 0358 | 2058 | 3058 | 4058 | 5.5 | 110 | 138 | 5 | 0.130 | 2.5 | 1.9 |
| 33 | D | 10 | 0059 | 0159 | 0259 | 0359 | 2059 | 3059 | 4059 | 5.5 | 110 | 138 | 5 | 0.130 | 2.5 | 1.9 |
| 33 | D | 20 | 0060 | 0160 | 0260 | 0360 | 2060 | 3060 | 4060 | 5.5 | 110 | 138 | 5 | 0.130 | 2.5 | 1.9 |
| 39 | D | 5 | 0061 | 0161 | 0261 | 0361 | 2061 | 3061 | 4061 | 7.0 | 140 | 175 | 5 | 0.120 | 2.6 | 2.0 |
| 39 | D | 10 | 0062 | 0162 | 0262 | 0362 | 2062 | 3062 | 4062 | 7.0 | 140 | 175 | 5 | 0.120 | 2.6 | 2.0 |
| 47 | D | 5 | | | | 0363 | | | | 8.0 | 160 | 200 | 5 | 0.110 | 2.7 | 2.2 |
| 47 | D | 10 | 0064 | 0164 | 0264 | 0364 | 2064 | 3064 | 4064 | 8.0 | 160 | 200 | 5 | 0.110 | 2.7 | 2.2 |
| 47 | D | 20 | 0065 | 0165 | 0265 | 0365 | 2065 | 3065 | 4065 | 8.0 | 160 | 200 | 5 | 0.110 | 2.7 | 2.2 |
| | | | | 50 |) Vnc | AT +8 | 5 °C. S | SURGI | E = 65 | V; 33 V _{DC} | AT +125 | °C | | | | |
| 5.6 | С | 5 | 0066 | | | 0366 | | | | 2.2 | 45.0 | 56.0 | 3 | 0.300 | 1.5 | 0.6 |
| 5.6 | C | 10 | | | | 0367 | | | | 2.2 | 45.0 | 56.0 | 3 | 0.300 | 1.5 | 0.6 |
| 6.8 | C | 5 | | | | 0368 | | | | 2.2 | 45.0 | 56.0 | 3 | 0.275 | 1.6 | 0.7 |
| 6.8 | C | 10 | | | | 0369 | | | | 2.2 | 45.0 | 56.0 | 3 | 0.275 | 1.6 | 0.7 |
| 6.8 | C | 20 | | | | 0370 | | | | 2.2 | 45.0 | 56.0 | 3 | 0.275 | 1.6 | 0.7 |
| 8.2 | C | 5 | | | | 0371 | | | | 2.5 | 50.0 | 63.0 | 3 | 0.250 | 1.6 | 0.9 |
| 8.2 | C | 10 | | | | 0372 | | | | 2.5 | 50.0 | 63.0 | 3 | 0.250 | 1.6 | 0.9 |
| 10 | C | 5 | | | | 0373 | | | | 2.5 | 50.0 | 63.0 | 3 | 0.230 | 1.7 | 1.1 |
| 10 | C | 10 | | | | 0374 | | | | 2.5 | 50.0 | 63.0 | 3 | 0.230 | 1.7 | 1.1 |
| 10 | C | 20 | | | | 0375 | | | | 2.5 | 50.0 | 63.0 | 3 | 0.230 | 1.7 | 1.1 |
| 12 | C | 5 | | | | 0376 | | | | 3.0 | 60.0 | 75.0 | 3 | 0.210 | 1.8 | 1.3 |
| 12 | C | 10 | | | | 0377 | | | | 3.0 | 60.0 | 75.0 | 3 | 0.210 | 1.8 | 1.3 |
| 15 | C | 5 | | | | 0378 | | | | 4.0 | 80.0 | 100 | 3 | 0.190 | 1.9 | 1.4 |
| 15 | C | 10 | | | | 0379 | | | | 4.0 | 80.0 | 100 | 3 | 0.190 | 1.9 | 1.4 |
| 15 | C | 20 | | | | 0380 | | | | 4.0 | 80.0 | 100 | 3 | 0.190 | 1.9 | 1.4 |
| 18 | C | 5 | | | | 0381 | | | | 4.5 | 90.0 | 113 | 4 | 0.175 | 2.0 | 1.4 |
| 18 | C | 10 | | | | 0382 | | | | 4.5 | 90.0 | 113 | 4 | 0.175 | 2.0 | 1.4 |
| 22 | D | 5 | | | | 0383 | | | | 4.5 5.5 | 110 | 138 | 4 | 0.173 | 2.3 | 1.7 |
| 22 | D | 10 | | | | 0384 | | | | 5.5 | 110 | 138 | 4 | 0.160 | 2.3 | 1.7 |
| 22 | D | 20 | | | | 0385 | | | | 5.5 | 110 | 138 | 4 | 0.160 | 2.3 | 1.7 |



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| STANDARD PACKAGING QUANTITY | | | | | | | | | |
|-----------------------------|-----------------------------------|------------------|---------------------|----------|---------|--|--|--|--|
| | QUANTITY (pcs/reel) BULK QUANTITY | | | | | | | | |
| CASE CODE | FULL REEL /TR; /RR; /WR | HALF REEL /HR | PARTIAL REEL /PR | PER TRAY | PER BOX | | | | |
| С | 500 | 250 | 100 | 20 | 100 | | | | |
| D | 500 | 250 | 100 | 20 | 80 | | | | |

| INSIDE TAPE SPACING | | | | | | | | | |
|---------------------|-----------|------------------------------|--|--|--|--|--|--|--|
| PACKAGING OPTION | CASE CODE | TAPE SPACING | | | | | | | |
| /TR; /HR; /PR | C, D | 2.88 ± 0.02 [73.0 ± 0.51] | | | | | | | |
| /RR | C, D | 2.47 ± 0.02 [62.7 ± 0.51] | | | | | | | |
| /WR | C, D | 2.05 ± 0.02 [52.1 ± 0.51] | | | | | | | |

| PRODUCT INFORMATION | | | | | | | |
|--|--------------------------|--|--|--|--|--|--|
| Mounting of Through-Hole Components | www.vishay.com/doc?40108 | | | | | | |
| Solid Tantalum Capacitors (With MnO ₂ Electrolyte) Voltage Derating | www.vishay.com/doc?40246 | | | | | | |
| SELECTOR GUIDES | | | | | | | |
| Selector Guide | www.vishay.com/doc?49054 | | | | | | |
| FAQ | | | | | | | |
| Frequently Asked Questions | www.vishay.com/doc?40110 | | | | | | |



Legal Disclaimer Notice

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