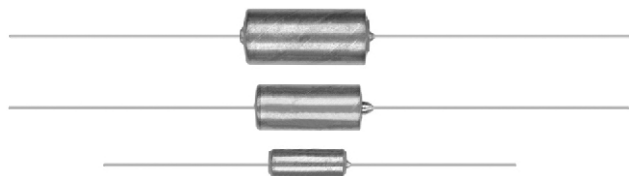




Solid-Electrolyte TANTALEX® Capacitors, Military MIL-PRF-39003/03 Qualified, Style CSR23



PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 125 °C
(above 85 °C, voltage derating is required)

Capacitance Range: 1.2 µF to 1000 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 CSR23. 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 (CSRxxxxxxx) 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.

FEATURES

- Hermetically sealed
- Metal cased
- Axial lead
- Weibull failure rates B, C, D
- Exponential failure rates M, P, R, S
- Tape and reel available per EIA-296 standard

STYLE, MILITARY SPECIFICATION SHEET

Style CSR23, M39003/03 MIL-PRF-39003/03

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 Sprague plant. Orders requiring source inspection cannot be shipped until this has been accomplished.

Style CS13 capacitors previously shown in MIL-C-26655 are directly replaced by style CSR13 and style CSR23 capacitors are extended capacitance range versions of military style CSR13.

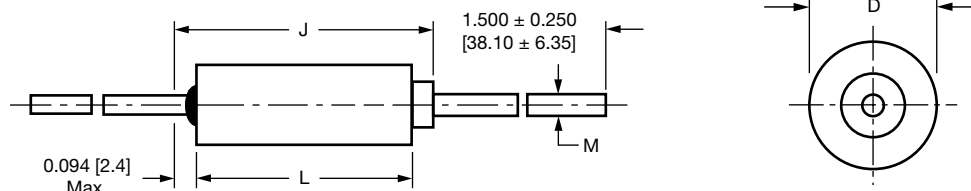
For information on the performance characteristics of these capacitors, please refer to the latest issue of the military specification.

ORDERING INFORMATION

M39003	/03	-2046	A	/TR
BASIC DOCUMENT NUMBER	SLASH SHEET	DASH NUMBER	SURGE CURRENT OPTION LETTER	PACKAGING OPTION ⁽¹⁾
Indicates the Basic Specification; in this case MIL-PRF-39003	Indicates the Specification Sheet of the Basic Military Specification	Taken from Ratings table of the Specification Sheet	Blank = Standard (no surge current) A = + 25 °C, after Weibull B = - 55 °C and + 55 °C, after Weibull C = - 55 °C and + 55 °C, before Weibull D = + 25 °C, after Weibull, high temperature solder E = - 55 °C and + 55 °C, after Weibull, high temperature solder F = - 55 °C and + 55 °C, before Weibull, high temperature solder H = High temperature solder only (no surge)	Blank = Bulk /TR = Tape and reel /HR = Tape and reel, half reel /PR = Tape and reel, partial reel /RR = Tape and reel, option R /WR = Tape and reel, option W

Note

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

**DIMENSIONS** in inches [millimeters]

CASE CODE	L ± 0.031 [0.79]	D + 0.016 [0.41] - 0.015 [0.38]	M ± 0.002 [0.05]	J (MAX.)
A	0.286 [7.26]	0.135 [3.43]	0.020 [0.51]	0.422 [10.72]
B	0.474 [12.04]	0.185 [4.70]	0.020 [0.51]	0.610 [15.49]
C	0.686 [17.42]	0.289 [7.34]	0.025 [0.64]	0.822 [20.88]
D	0.786 [19.96]	0.351 [8.92]	0.025 [0.64]	0.922 [23.42]

Notes

- The case insulation shall extend 0.015" [0.38 mm] minimum beyond each end. However, when a shrink-fitted insulation is used, it shall lap over the ends of the capacitor body.
- A minimum lead length of 1.0" [2.54 mm] for use with tape and reel automatic insertion equipment is available upon request.

RATINGS AND CASE CODES

μF	6 V	10 V	15 V	20 V	35 V	50 V
1.2						A
1.5						A
1.8					A	
2.7				A		
3.3				A		
3.9				A		
4.7			A			
5.6			A			B
6.8		A				B
8.2		A			B	
10	A				B	
12	A					
18				B		
22				B		C
27				B		C
33			B		C	D
39			B		C	D
47		B			C	
56		B		C	D	
68		B		C	D	
82		B		C		
100	B			C		
120				C		
150			C	D		
180			C	D		
220		C	D			
270		C	D			
330	C		D			
390	C	D				
470	C	D				
560		D				
680	D					
820	D					
1000	D					



STANDARD RATINGS

CAPACITANCE (μ F)	CASE CODE	CAP. TOL. ($\pm$ %)	PART NO. M39003/03- FAILURE RATE LEVEL (%/1000 h)							MAX. DCL (μ A) AT			MAX. DF (%) AT
			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	- 55 °C TO + 125 °C
6 V _{DC} AT + 85 °C, SURGE = 8 V; 4 V _{DC} AT + 125 °C													
10	A	10	0101	0201	0301	0401	2001	3001	4001	0.90	9.0	11.0	6
10	A	20	0102	0202	0302	0402	2002	3002	4002	0.90	9.0	11.0	6
12	A	10	0103	0203	0303	0403	2003	3003	4003	1.0	10.0	12.5	6
100	B	10	0104	0204	0304	0404	2004	3004	4004	6.0	60.0	75.0	8
100	B	20	0105	0205	0305	0405	2005	3005	4005	6.0	60.0	75.0	8
330	C	10	0106	0206	0306	0406	2006	3006	4006	15.0	150	188	8
330	C	20	0107	0207	0307	0407	2007	3007	4007	15.0	150	188	8
390	C	10	0108	0208	0308	0408	2008	3008	4008	15.0	150	188	10
470	C	10	0109	0209	0309	0409	2009	3009	4009	15.0	150	188	10
470	C	20	0110	0210	0310	0410	2010	3010	4010	15.0	150	188	10
680	D	10	0111	0211	0311	0411	2011	3011	4011	20.0	200	250	10
680	D	20	0112	0212	0312	0412	2012	3012	4012	20.0	200	250	10
820	D	10	0113	0213	0313	0413	2013	3013	4013	20.0	200	250	10
1000	D	10	0114	0214	0314	0414	2014	3014	4014	30.0	300	375	10
1000	D	20	0115	0215	0315	0415	2015	3015	4015	30.0	300	375	10
10 V _{DC} AT + 85 °C, SURGE = 13 V; 7 V _{DC} AT + 125 °C													
6.8	A	10	0116	0216	0316	0416	2016	3016	4016	1.0	10.0	12.5	6
6.8	A	20	0117	0217	0317	0417	2017	3017	4017	1.0	10.0	12.5	6
8.2	A	10	0118	0218	0318	0418	2018	3018	4018	1.2	12.0	15.0	6
47	B	10	0119	0219	0319	0419	2019	3019	4019	5.0	50.0	63.0	6
47	B	20	0120	0220	0320	0420	2020	3020	4020	5.0	50.0	63.0	6
56	B	10	0121	0221	0321	0421	2021	3021	4021	6.0	60.0	75.0	6
68	B	10	0122	0222	0322	0422	2022	3022	4022	7.0	70.0	88.0	6
68	B	20	0123	0223	0323	0423	2023	3023	4023	7.0	70.0	88.0	6
82	B	10	0124	0224	0324	0424	2024	3024	4024	8.0	80.0	100	6
220	C	10	0125	0225	0325	0425	2025	3025	4025	15.0	150	188	8
220	C	20	0126	0226	0326	0426	2026	3026	4026	15.0	150	188	8
270	C	10	0127	0227	0327	0427	2027	3027	4027	15.0	150	188	8
390	D	10	0128	0228	0328	0428	2028	3028	4028	20.0	200	250	10
470	D	10	0129	0229	0329	0429	2029	3029	4029	20.0	200	250	10
470	D	20	0130	0230	0330								



STANDARD RATINGS

CAPACITANCE (μ F)	CASE CODE	CAP. TOL. ($\pm$ %)	PART NO. M39003/03- FAILURE RATE LEVEL (%/1000 h)							MAX. DCL (μ A) AT			MAX. DF (%) AT
			M	P	R	S	B	C	D	+ 25 °C	+ 85 °C	+ 125 °C	- 55 °C TO + 125 °C
			1.0	0.1	0.01	0.001	0.1	0.01	0.001				
20 V _{DC} AT + 85 °C, SURGE = 26 V; 13 V _{DC} AT + 125 °C													
2.7	A	10	0146	0246	0346	0446	2046	3046	4046	0.80	8.0	10.0	4
3.3	A	10	0147	0247	0347	0447	2047	3047	4047	1.0	10.0	12.5	4
3.3	A	20	0148	0248	0348	0448	2048	3048	4048	1.0	10.0	12.5	4
3.9	A	10	0149	0249	0349	0449	2049	3049	4049	1.2	12.0	15.0	4
18	B	10	0150	0250	0350	0450	2050	3050	4050	4.0	40.0	50.0	6
22	B	10	0151	0251	0351	0451	2051	3051	4051	4.0	40.0	50.0	6
22	B	20	0152	0252	0352	0452	2052	3052	4052	4.0	40.0	50.0	6
27	B	10	0153	0253	0353	0453	2053	3053	4053	5.0	50.0	63.0	6
56	C	10	0154	0254	0354	0454	2054	3054	4054	9.0	90.0	110	6
68	C	10	0155	0255	0355	0455	2055	3055	4055	10.0	100	125	6
68	C	20	0156	0256	0356	0456	2056	3056	4056	10.0	100	125	6
82	C	10	0157	0257	0357	0457	2057	3057	4057	10.0	100	125	6
100	C	10	0158	0258	0358	0458	2058	3058	4058	15.0	150	188	6
100	C	20	0159	0259	0359	0459	2059	3059	4059	15.0	150	188	6
120	C	10	0160	0260	0360	0460	2060	3060	4060	15.0	150	188	6
150	D	10	0161	0261	0361	0461	2061	3061	4061	20.0	200	250	8
150	D	20	0162	0262	0362	0462	2062	3062	4062	20.0	200	250	8
180	D	10	0163	0263	0363	0463	2063	3063	4063	20.0	200	250	8
35 V _{DC} AT + 85 °C, SURGE = 46 V; 23 V _{DC} AT + 125 °C													
1.8	A	10	0164	0264	0364	0464	2064	3064	4064	1.0	10.0	12.5	4
8.2	B	10	0165	0265	0365	0465	2065	3065	4065	3.5	35.0	44.0	6
10	B	10	0166	0266	0366	0466	2066	3066	4066	4.0	40.0	50.0	6
10	B	20	0167	0267	0367	0467	2067	3067	4067	4.0	40.0	50.0	6
33	C	10	0168	0268	0368	0468	2068	3068	4068	10.0	100	125	6
33	C	20	0169	0269	0369	0469	2069	3069	4069	10.0	100	125	6
39	C	10	0170	0270	0370	0470	2070	3070	4070	10.0	100	125	6
47	C	10	0171	0271	0371	0471	2071	3071	4071	10.0	100	125	6
47	C	20	0172	0272	0372	0472	2072	3072	4072	10.0	100	125	6
56	D	10	0173	0273	0373	0473	2073	3073	4073	15.0	150	188	6
68	D	10	0174	0274	0374	0474	2074	3074	4074	15.0	150	188	6</

**STANDARD PACKAGING QUANTITY**

CASE CODE	QUANTITY (pcs/reel)			BULK QUANTITY	
	FULL REEL	HALF REEL	PARTIAL REEL	PER TRAY	PER BOX
A	1000	500	100	n/a	100
B	1000	500	100	20	100
C	500	250	100	20	100
D	500	250	100	20	80

INSIDE TAPE SPACING

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

PRODUCT INFORMATION

Quick Reference Guide	www.vishay.com/doc?40037
Selector Guide	www.vishay.com/doc?49054
Parameter Comparison Guide	www.vishay.com/doc?40033
Mounting of Through-Hole Components	www.vishay.com/doc?40108
Frequently Asked Questions	www.vishay.com/doc?40110



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