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

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

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}

STYLE, MILITARY SPECIFICATION SHEET

Style CSR23, M39003/03 MIL-PRF-39003/3

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 (CSRxxxxxxxx) 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.

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.

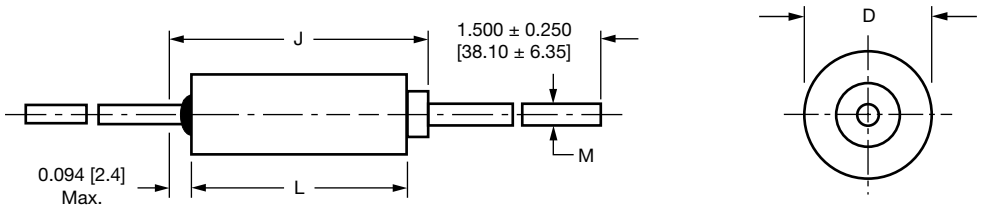
ORDERING INFORMATION

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 +85 °C, after Weibull C = -55 °C and +85 °C, before Weibull D = +25 °C, after Weibull, high temperature solder E = -55 °C and +85 °C, after Weibull, high temperature solder F = -55 °C and +85 °C, before Weibull, high temperature solder H = high temperature solder only (no surge)	Blank = bulk /TR = tape and reel, full reel /HR = tape and reel, half reel /PR = tape and reel, partial reel /RR = tape and reel, option R, full reel /WR = tape and reel, option W, full reel

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

- 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 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 (µF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39003/03- FAILURE RATE LEVEL (%/1000 h)							MAX. DCL (µA) 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	0430	2030	3030	4030	20.0	200	250	10
560	D	10	0131	0231	0331	0431	2031	3031	4031	30.0	300	375	10
15 V_{DC} AT +85 °C, SURGE = 20 V; 10 V_{DC} AT +125 °C													
4.7	A	10	0132	0232	0332	0432	2032	3032	4032	1.0	10.0	12.5	4
4.7	A	20	0133	0233	0333	0433	2033	3033	4033	1.0	10.0	12.5	4
5.6	A	10	0134	0234	0334	0434	2034	3034	4034	1.3	13.0	16.5	4
33	B	10	0135	0235	0335	0435	2035	3035	4035	6.0	60.0	75.0	6
33	B	20	0136	0236	0336	0436	2036	3036	4036	6.0	60.0	75.0	6
39	B	10	0137	0237	0337	0437	2037	3037	4037	6.0	60.0	75.0	6
150	C	10	0138	0238	0338	0438	2038	3038	4038	15.0	150	188	8
150	C	20	0139	0239	0339	0439	2039	3039	4039	15.0	150	188	8
180	C	10	0140	0240	0340	0440	2040	3040	4040	15.0	150	188	8
220	D	10	0141	0241	0341	0441	2041	3041	4041	20.0	200	250	8
220	D	20	0142	0242	0342	0442	2042	3042	4042	20.0	200	250	8
270	D	10	0143	0243	0343	0443	2043	3043	4043	20.0	200	250	8
330	D	10	0144	0244	0344	0444	2044	3044	4044	20.0	200	250	8
330	D	20	0145	0245	0345	0445	2045	3045	4045	20.0	200	250	8

STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39003/03- FAILURE RATE LEVEL (%/1000 h)							MAX. DCL (µA) 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
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
68	D	20	0175	0275	0375	0475	2075	3075	4075	15.0	150	188	6
50 V_{DC} AT +85 °C, SURGE = 65 V; 33 V_{DC} AT +125 °C													
1.2	A	10	0176	0276	0376	0476	2076	3076	4076	0.9	9.0	11.0	4
1.5	A	10	0177	0277	0377	0477	2077	3077	4077	1.2	12.0	15.0	4
1.5	A	20	0178	0278	0378	0478	2078	3078	4078	1.2	12.0	15.0	4
5.6	B	10	0179	0279	0379	0479	2079	3079	4079	4.5	45.0	56.0	4
6.8	B	10	0180	0280	0380	0480	2080	3080	4080	4.5	45.0	56.0	6
6.8	B	20	0181	0281	0381	0481	2081	3081	4081	4.5	45.0	56.0	6
22	C	10	0182	0282	0382	0482	2082	3082	4082	10.0	100	125	6
22	C	20	0183	0283	0383	0483	2083	3083	4083	10.0	100	125	6
27	C	10	0184	0284	0384	0484	2084	3084	4084	10.0	100	125	6
33	D	10	0185	0285	0385	0485	2085	3085	4085	10.0	100	125	6
33	D	20	0186	0286	0386	0486	2086	3086	4086	10.0	100	125	6
39	D	10	0187	0287	0387	0487	2087	3087	4087	10.0	100	125	6

STANDARD PACKAGING QUANTITY

CASE CODE	QUANTITY (pcs/reel)			BULK QUANTITY	
	FULL REEL /TR; /RR; /WR	HALF REEL /HR	PARTIAL REEL /PR	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	
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

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