Wet Tantalum Capacitors, Extended Capacitance, Military Established Reliability Military MIL-PRF-M39006/33 Qualified, Style CLR93

FEATURES

- Hermetically sealed
- Tantalum cased
- Axial lead
- Tubular

PERFORMANCE CHARACTERISTICS

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

Capacitance Range: 15 µF to 680 µF

Capacitance Tolerance: ± 10 %, ± 20 %

Voltage Rating: 50 V_{DC} to 100 V_{DC}

STYLE, MILITARY SPECIFICATION SHEET

Style CLR93, M39006/33 MIL-PRF-39006/33

DESCRIPTION

Established reliability tantalum capacitors to military specification MIL-PRF-39006: In accordance with the military specification MIL-PRF-39006 all capacitors are marked with the military part number (M39006/xx-xxxx) rather than the older style designation (CLR93) and should be ordered as such.

For information on the performance characteristics of these capacitors, please refer to the latest issue of the military specification. MIL-PRF-39006 establishes 1000 h failure rate levels of 1 %, 0.1 %, and 0.01 %. When ordering these parts, care must be exercised that the correct part number expressing the appropriate failure level be specified.

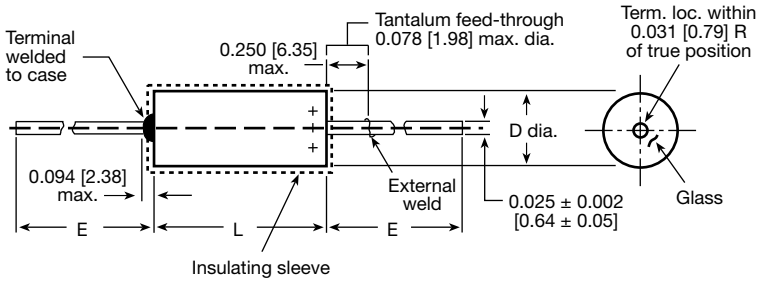
Each order for military style capacitors requiring government inspection must state whether inspection is to be at the destination or at the Vishay plant. Orders requiring source inspection cannot be shipped until this has been accomplished.

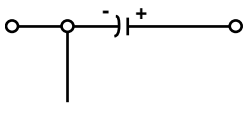
ORDERING INFORMATION

M39006	/33	-0030
BASIC DOCUMENT NUMBER	SLASH SHEET	DASH NUMBER
Indicates the basic specification; in this case MIL-PRF-39006	Indicates the specification sheet of the basic military specification	Taken from Standard Ratings table

DIMENSIONS in inches [millimeters]

Style CLR93





CASE CODE	BARE CASE		WITH INSULATING SLEEVE		E LEAD LENGTH	WEIGHT (oz./g) (Max.)
	D	L	D (Max.)	L (Max.)		
T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 / - 0.016 [11.51 + 0.79 / - 0.41]	0.219 [5.56]	0.515 [13.08]	1.500 ± 0.250 [38.10 ± 6.35]	0.10 [2.6]
T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 / - 0.016 [16.28 + 0.79 / - 0.41]	0.312 [7.92]	0.704 [17.88]	2.250 ± 0.250 [57.15 ± 6.35]	0.24 [6.2]
T3	0.375 ± 0.016 [9.52 ± 0.41]	0.766 + 0.031 / - 0.016 [19.46 + 0.79 / - 0.41]	0.406 [10.31]	0.828 [21.03]	2.250 ± 0.250 [57.15 ± 6.35]	0.46 [11.6]
T4	0.375 ± 0.016 [9.52 ± 0.41]	1.062 + 0.031/- 0.016 [26.97 + 0.79/- 0.41]	0.406 [10.31]	1.126 [28.60]	2.250 ± 0.250 [57.15 ± 6.35]	0.62 [17.7]

RATINGS AND CASE CODES

µF	50 V	60 V	75 V	100 V
15				T1
33			T1	
47		T1		
68	T1			T2
110			T2	
150		T2		T3
220	T2			T4
330			T3	
390		T3		
470	T3		T4	
560		T4		
680	T4			

STANDARD RATINGS - CLR93, M39006/33-XXXX

CAPACITANCE (µF)	CASE CODE	CAP. TOL. (± %)	PART NO. M39006/33- FAILURE RATE LEVEL (%/1000 h) M 1.0	P 0.1	R 0.01	MAX. DCL (µA) AT +25 °C	MAX. DCL (µA) AT +85 °C +125 °C	MAX. DF AT 25 °C (%)	MAX. ESR AT +25 °C 120 Hz (Ω)	MAX. IMP. AT -55 °C (Ω)	MAX. CAPACITANCE CHANGE (%) AT -55 °C	MAX. CAPACITANCE CHANGE (%) AT +85 °C	MAX. CAPACITANCE CHANGE (%) AT +125 °C	MAX. [1] RIPPLE CURRENT AT +85 °C 40 kHz (mA)
50 V_{DC} AT +85 °C; 30 V_{DC} AT +125 °C														
68	T1	20	0021			1	5	9.2	1.5	35	-25	8	15	1050
68	T1	10	0022			1	5	9.2	1.5	35	-25	8	15	1050
220	T2	20	0023			2	10	17.9	0.9	17.5	-50	8	15	1800
220	T2	10	0024			2	10	17.9	0.9	17.5	-50	8	15	1800
470	T3	20	0027			3	25	31.9	0.75	10	-50	8	15	2100
470	T3	10	0028			3	25	31.9	0.75	10	-50	8	15	2100
680	T4	20	0029			5	40	43.1	0.7	10	-58	10	20	2750
680	T4	10	0030			5	40	43.1	0.7	10	-58	10	20	2750
60 V_{DC} AT +85 °C; 40 V_{DC} AT +125 °C														
47	T1	20	0031			1	5	8.5	2.0	44	-25	8	12	1050
47	T1	10	0032			1	5	8.5	2.0	44	-25	8	12	1050
150	T2	20	0033			2	10	14.9	1.1	20	-40	8	15	1650
150	T2	10	0034			2	10	14.9	1.1	20	-40	8	15	1650
390	T3	20	0037			3	25	31.8	0.9	15	-60	8	15	2100
390	T3	10	0038			3	25	31.8	0.9	15	-60	8	15	2100
560	T4	20	0039			5	40	40.5	0.8	10	-58	8	15	2750
560	T4	10	0040			5	40	40.5	0.8	10	-58	8	15	2750
75 V_{DC} AT +85 °C; 50 V_{DC} AT +125 °C														
33	T1	20	0041			1	5	7.5	2.5	66	-25	5	9	1050
33	T1	10	0042			1	5	7.5	2.5	66	-25	5	9	1050
110	T2	20	0043			2	10	12.9	1.3	24	-35	6	10	1650
110	T2	10	0044			2	10	12.9	1.3	24	-35	6	10	1650
330	T3	20	0047			3	30	29.9	1.0	12	-45	6	10	2100
330	T3	10	0048			3	30	29.9	1.0	12	-45	6	10	2100
470	T4	20	0049			5	50	38.3	0.9	12	-55	8	12	2750
470	T4	10	0050			5	50	38.3	0.9	12	-55	8	12	2750
100 V_{DC} AT +85 °C; 65 V_{DC} AT +125 °C														
15	T1	20	0051			1	5	4.8	3.5	125	-18	3	10	1050
15	T1	10	0052			1	5	4.8	3.5	125	-18	3	10	1050
68	T2	20	0053			2	10	12.9	2.1	37	-30	4	12	1650
68	T2	10	0054			2	10	12.9	2.1	37	-30	4	12	1650
150	T3	20	0057			3	25	21.7	1.6	22	-35	6	12	2100
150	T3	10	0058			3	25	21.7	1.6	22	-35	6	12	2100
220	T4	20	0059			5	50	23.9	1.2	15	-40	6	12	2750
220	T4	10	0060			5	50	23.9	1.2	15	-40	6	12	2750

Note

[1] For ripple current limits at various temperatures, voltages, and frequencies, see “Ripple Current” table.

CLR93 RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE, AND APPLIED PEAK VOLTAGE

FREQUENCY OF APPLIED RIPPLE CURRENT		120 Hz				800 Hz				1 kHz				10 kHz				40 kHz				100 kHz			
AMBIENT STILL AIR		TEMP °C				TEMP °C				TEMP °C				TEMP °C				TEMP °C				TEMP °C			
		≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125
% OF APPLIED VOLTAGE	100 %	0.60	0.39	-	-	0.71	0.43	-	-	0.72	0.46	-	-	0.88	0.55	-	-	1.0	0.63	-	-	1.1	0.69	-	-
	90 %	0.60	0.46	-	-	0.71	0.55	-	-	0.72	0.55	-	-	0.88	0.67	-	-	1.0	0.77	-	-	1.1	0.85	-	-
	80 %	0.60	0.52	0.35	-	0.71	0.62	0.42	-	0.72	0.62	0.42	-	0.88	0.76	0.52	-	1.0	0.87	0.59	-	1.1	0.96	0.65	-
	70 %	0.60	0.58	0.44	-	0.71	0.69	0.52	-	0.72	0.70	0.52	-	0.88	0.85	0.64	-	1.0	0.97	0.73	-	1.1	1.07	0.80	-
	66 2/3 %	0.60	0.60	0.46	0.27	0.71	0.71	0.55	0.32	0.72	0.72	0.55	0.32	0.88	0.88	0.68	0.40	1.0	1.0	0.77	0.45	1.1	1.1	0.85	0.50

Notes

1. At +125 °C the rated voltage of the capacitors decreases to 66 2/3 % of the +85 °C rated voltage.
2. The peak of the applied AC ripple voltage plus the applied DC voltage must not exceed the DC voltage rating of the capacitor either forward or reverse.
3. The ripple current listed represents a rating calculated using a maximum internal temperature rise (ΔT) of +50 °C at 40 kHz at + 85 °C ambient with a maximum peak rated voltage of 66 2/3 % of the +85 °C peak voltage rating.
4. The maximum allowable internal temperature rise (ΔT) decreases linearly to a calculated +10 °C rise at +125 °C ambient.
5. The internal temperature rise is directly proportional to the equivalent series resistance of the capacitor and equivalent series resistance increases with decreasing frequency.

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