

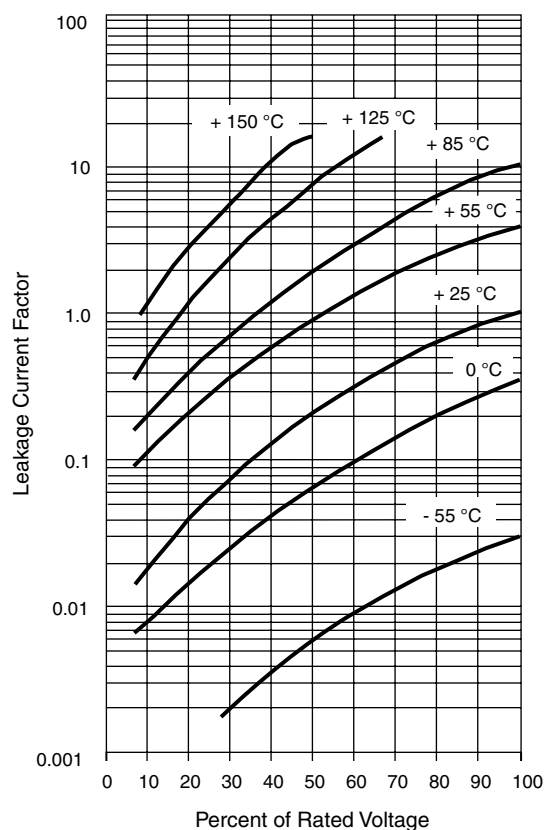


Performance Characteristics Tantalum Capacitors

CAPACITOR ELECTRICAL PERFORMANCE CHARACTERISTICS				
ITEM	PERFORMANCE CHARACTERISTICS			
Category Temperature Range	- 55 °C to + 85 °C (to + 125 °C with voltage derating)			
Capacitance Tolerance	± 20 %, ± 10 % (at 120 Hz) 2 V _{rms} (max) at + 25 °C using a capacitance bridge			
Dissipation Factor	Limit per Standard Ratings Table. Tested via bridge method, at 25 °C, 120 Hz.			
ESR	Limit per Standard Ratings Table. Tested via bridge method, at 25 °C, 100 kHz.			
Leakage Current	After application of rated voltage applied to capacitors for 5 minutes using a steady source of power with 1 kΩ resistor in series with the capacitor under test, leakage current at 25 °C is not more than 0.01 CV or 0.5 μA, whichever is greater. <i>Note that the leakage current varies with temperature and applied voltage. See graph below for the appropriate adjustment factor.</i>			
Capacitance Change by Temperature	+ 12 % Max. (at + 125 °C) + 10 % Max. (at + 85 °C) - 10 % Max. (at - 55 °C)			
Reverse Voltage	Capacitors are capable of withstanding peak voltages in the reversed direction equal to: 10 % of the DC rating at + 25 °C 5 % of the DC rating at + 85 °C Vishay does not recommend intentional or repetitive application of reverse voltage			
Temperature Derating	If capacitors are to be used at temperatures above + 25 °C, the permissible rms ripple current or voltage shall be calculated using the derating factors: 1.0 at + 25 °C 0.9 at + 85 °C 0.4 at + 125 °C			
Operating Temperature	+ 85 °C RATING		+ 125 °C RATING	
	WORKING VOLTAGE (V)	SURGE VOLTAGE (V)	WORKING VOLTAGE (V)	SURGE VOLTAGE (V)
	4	5.2	2.7	3.4
	6.3	8	4	5
	10	13	7	8
	16	20	10	12
	20	26	13	16
	25	32	17	20
	35	46	23	28
	50	65	33	40
	50 ⁽¹⁾	60	33	40
	63	76	42	50

Note⁽¹⁾ Capacitance values 15 μF and higher

TYPICAL LEAKAGE CURRENT FACTOR RANGE



Notes:

At + 25 °C, the leakage current shall not exceed the value listed in the Standard Ratings Table.

At + 85 °C, the leakage current shall not exceed 10 times the value listed in the Standard Ratings Table.

At + 125 °C, the leakage current shall not exceed 12 times the value listed in the Standard Ratings Table.

CAPACITOR PERFORMANCE CHARACTERISTICS

ITEM	PERFORMANCE CHARACTERISTICS						
Surge Voltage	<p>Post application of surge voltage (rated voltage) in series with a 33 Ω resistor at the rate of 30 seconds ON, 30 seconds OFF, for 1000 successive test cycles at 85 °C, capacitors meet the characteristics requirements listed below.</p> <table> <tr> <td>Capacitance Change</td><td>Within $\pm 10\%$ of initial value</td></tr> <tr> <td>Dissipation Factor</td><td>Initial specified value or less</td></tr> <tr> <td>Leakage Current</td><td>Initial specified value or less</td></tr> </table>	Capacitance Change	Within $\pm 10\%$ of initial value	Dissipation Factor	Initial specified value or less	Leakage Current	Initial specified value or less
Capacitance Change	Within $\pm 10\%$ of initial value						
Dissipation Factor	Initial specified value or less						
Leakage Current	Initial specified value or less						
Surge Current	<p>After subjecting parts in series with a 1 Ω resistor at the rate of 3 seconds CHARGE, 3 seconds DISCHARGE, and a cap bank of 100K μF for 3 successive test cycles at 25 °C, capacitors meet the characteristics requirements listed below.</p> <table> <tr> <td>Capacitance Change</td><td>Within $\pm 10\%$ of initial value</td></tr> <tr> <td>Dissipation Factor</td><td>Initial specified value or less</td></tr> <tr> <td>Leakage Current</td><td>Initial specified value or less</td></tr> </table>	Capacitance Change	Within $\pm 10\%$ of initial value	Dissipation Factor	Initial specified value or less	Leakage Current	Initial specified value or less
Capacitance Change	Within $\pm 10\%$ of initial value						
Dissipation Factor	Initial specified value or less						
Leakage Current	Initial specified value or less						
Life Test at + 85 °C	<p>Capacitors meet the characteristic requirements listed below. After 2000 hours' application of rated voltage at 85 °C.</p> <table> <tr> <td>Capacitance Change</td><td>Within $\pm 10\%$ of initial value</td></tr> <tr> <td>Leakage Current</td><td>Shall not exceed 125 % of Initial Value</td></tr> </table>	Capacitance Change	Within $\pm 10\%$ of initial value	Leakage Current	Shall not exceed 125 % of Initial Value		
Capacitance Change	Within $\pm 10\%$ of initial value						
Leakage Current	Shall not exceed 125 % of Initial Value						
Life Test at + 125 °C	<p>Capacitors meet the characteristic requirements listed below. After 1000 hours' application $2/3$ of rated voltage at 125 °C.</p> <table> <tr> <td>Capacitance Change</td><td>Within $\pm 10\%$ of initial value</td></tr> <tr> <td>Leakage Current</td><td>Shall not exceed 125 % of Initial Value</td></tr> </table>	Capacitance Change	Within $\pm 10\%$ of initial value	Leakage Current	Shall not exceed 125 % of Initial Value		
Capacitance Change	Within $\pm 10\%$ of initial value						
Leakage Current	Shall not exceed 125 % of Initial Value						



CAPACITOR ENVIRONMENTAL CHARACTERISTICS

ITEM	CONDITION	ENVIRONMENTAL CHARACTERISTICS	
Humidity Tests	At 40 °C/90 % RH 1000 hours, no voltage applied.	Capacitance Change Dissipation Factor	Within ± 10 % of initial value Not to exceed 150 % of initial + 25 °C requirement
Temperature Cycles	At - 55 °C/+ 125 °C, 30 minutes each, for 5 cycles.	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less
Moisture Resistance	Mil-Std-202, Method 106 at rated voltage, 42 cycles.	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less
Thermal Shock	Capacitors are subjected to 5 cycles of the following: - 55 °C (+ 0 °C, - 5 °C) for 30 minutes then + 25 °C (+ 10 °C, - 5 °C) for 5 minutes, then + 125 °C (+ 3 °C, - 0 °C) for 30 minutes, then + 25 °C (+ 10 °C, - 5 °C) for 5 minutes	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less

MECHANICAL PERFORMANCE CHARACTERISTICS

TEST CONDITION	CONDITION	POST TEST PERFORMANCE	
Shear Test	Apply a pressure load of 5 N for 10 ± 1 seconds horizontally to the center of capacitor side body.	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less There shall be no mechanical or visual damage to capacitors post-conditioning.
Substrate Bend	With parts soldered onto substrate test board, apply force to the test board for a deflection of 3 mm, for a total of 3 bends at a rate of 1 mm/second.	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less
Vibration	Mil-Std-202, Method 204, Condition D, 10 Hz to 2000 Hz, 20 G Peak	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less There shall be no mechanical or visual damage to capacitors post-conditioning.
Shock	Mil-Std-202, Method 204, Condition I, 100 G Peak	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less There shall be no mechanical or visual damage to capacitors post-conditioning.
Resistance to Solder Heat	<ul style="list-style-type: none">Recommended reflow profiles temperatures and durations are located within the Capacitor Series Guides.Pb-free and Lead-Bearing Series Caps are backward and forward compatible.	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less There shall be no mechanical or visual damage to capacitors post-conditioning.
Solderability	Mil-Std-2002, Method 208, ANSI/J-Std-002, Test B. Applies only to Solder and tin plated terminations. Does not apply to gold terminations.	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less There shall be no mechanical or visual damage to capacitors post-conditioning.
Resistance to Solvents	Mil-Std-202, Method 215	Capacitance Change Dissipation Factor Leakage Current	Within ± 10 % of initial value Initial specified value or less Initial specified value or less There shall be no mechanical or visual damage to capacitors post-conditioning.
Flammability	Encapsulant materials meet UL94 VO with an oxygen index of 32 %.		