SMD Aluminum Solid Capacitors with Conductive Polymer



FEATURES

- New OS-CON 94SVPD series provides improved characteristics with up to 125 °C temperature capability and 35 V maximum voltage rating in a SMD package
- Improved damp heat (steady state) 85 °C x 85 % RH performance
- Suitable for use in smoothing circuits of vehicle-mounted equipment, industrial equipment, etc.
- This product can support lead (Pb)-free reflow (2)
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

QUICK REFERENCE DATA

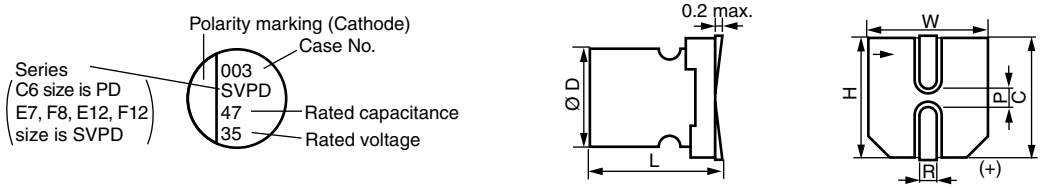
DESCRIPTION	CONDITIONS	VALUE		
Operating temperature range	-	- 55 °C to + 125 °C		
Capacitance tolerance	120 Hz	M: ± 20 %		
Tangent of loss angle (tan δ)	120 Hz	≤ values in Electrical Data and Ordering Information table		
Leakage current (μA/2 min) (or less) (1)	After 2 min	≤ values in Electrical Data and Ordering Information table		
ESR	-	≤ values in Electrical Data and Ordering Information table		
Characteristics of impedance ratio at high and low temperature	100 kHz, + 20 °C	- 55 °C	$Z/Z_{20\ °C}$	0.75 to 1.25
		+ 125 °C	$Z/Z_{20\ °C}$	0.75 to 1.0
Endurance	+ 125 °C, 2000 h rated voltage applied	ΔC/C	Within ± 20 %	
		tan δ	2 x or < than an initial standard	
		ESR	2 x or < than an initial standard	
		Leakage current	Below an initial standard	
Damp heat (steady state)	+ 85 °C, 85 % to 90 % RH, 1000 h rated voltage applied	ΔC/C	Within ± 20 %	
		tan δ	2 x or < than an initial standard	
		ESR	2 x or < than an initial standard	
		Leakage current	Below an initial standard	
Solder heat resistance (2)	(VPS) (230 °C x 75 s)	ΔC/C	Within ± 10 %	
		tan δ	1.3 x or < than an initial standard	
		ESR	1.3 x or < than an initial standard	
		Leakage current	Below an initial standard (after voltage procesing)	

Notes

(1) If any doubt arises, measure the current after applying voltage (voltage treatment). Voltage treatment: The rated voltage is applied (10 V to 35 V) for 120 min at 125 °C.

(2) Refer to "Recommended Reflow Profile" for maximum temperatures.

DIMENSIONS in millimeters



SIZE CODE	Ø D ± 0.5	L + 0.1/- 0.4	W ± 0.2	H ± 0.2	C ± 0.2	R	P ± 0.2
C6	6.3	5.9	6.6	6.6	7.3	0.6 to 0.8	2.1
E7	8.0	6.9	8.3	8.3	9.0	0.6 to 0.8	3.2
F8	10.0	7.9	10.3	10.3	11.0	0.6 to 0.8	4.6
E12	8.0	11.9	8.3	8.3	9.0	0.8 to 1.1	3.2
F12	10.0	12.6	10.3	10.3	11.0	0.8 to 1.1	4.6

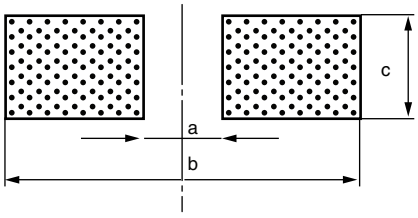
For technical questions, contact: aluminumcaps4@vishay.com

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CASE CODE LIST

CAPACITANCE (µF)	RATED VOLTAGE (SURGE AT 125 °C)			
	10.0 (11.5)	16.0 (18.4)	25.0 (29.0)	35.0 (40.0)
8.2				E7
10			C6	
18				F8
22			E7	E12
39			F8	
47			E12	F12
56	C6			
82		E7	F12	

RECOMMENDED LAND PATTERN DIMENSIONS (in millimeters)



SIZE CODE	a	b	c
C6	2.1	9.1	1.6
E7	2.8	11.1	1.9
F8	4.3	13.1	1.9
E12	2.8	11.1	1.9
F12	4.3	13.1	1.9

FREQUENCY COEFFICIENT FOR RIPPLE CURRENT

FREQUENCY	120 Hz ≤ f < 1 kHz	1 kHz ≤ f < 10 kHz	10 kHz ≤ f < 100 kHz	100 kHz ≤ f < 500 kHz
COEFFICIENT	0.05	0.3	0.7	1

ELECTRICAL DATA AND ORDERING INFORMATION

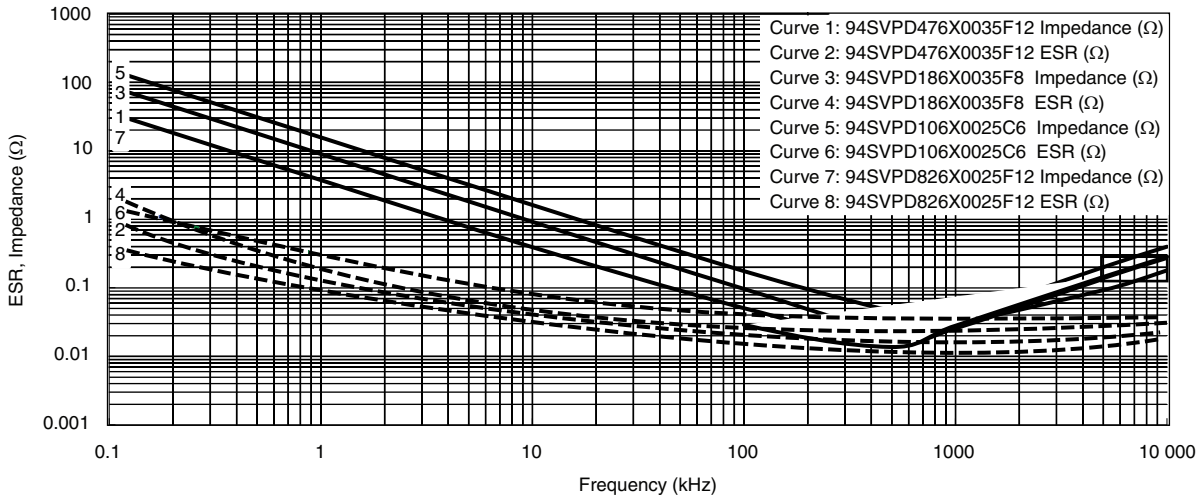
U_R (V)	C_R (µF)	CASE CODE	MAX. ESR (100 kHz TO 300 kHz) (mΩ)	RATED RIPPLE CURRENT	ALLOWABLE RIPPLE CURRENT	MAX. TANGENT OF LOSS ANGLE	MAX. LEAKAGE CURRENT (µA) [2]	PART NUMBER [1]
				100 kHz (mA) [3]				
				105 °C < Tx ≤ 125 °C	Tx ≤ 105 °C			
10	56	C6	45	538	1700	0.12	112	94SVPD566X0010C6
16	82	E7	40	670	2120	0.12	262	94SVPD826X0016E7
25	10	C6	65	474	1500	0.10	50	94SVPD106X0025C6
	22	E7	48	580	1835	0.10	110	94SVPD226X0025E7
	39	F8	45	664	2100	0.10	195	94SVPD396X0025F8
	47	E12	30	943	2980	0.12	235	94SVPD476X0025E12
	82	F12	28	1202	3800	0.12	410	94SVPD826X0025F12
35	8.2	E7	70	400	1300	0.10	57	94SVPD825X0035E7
	18	F8	60	550	1800	0.10	126	94SVPD186X0035F8
	22	E12	50	700	2300	0.12	154	94SVPD226X0035E12
	47	F12	30	1150	3650	0.12	329	94SVPD476X0035F12

Notes

(1) Capacitance tolerance: M ± 20 %
(2) After 2 min
(3) Tx: Ambient temperature

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FREQUENCY CHARACTERISTICS



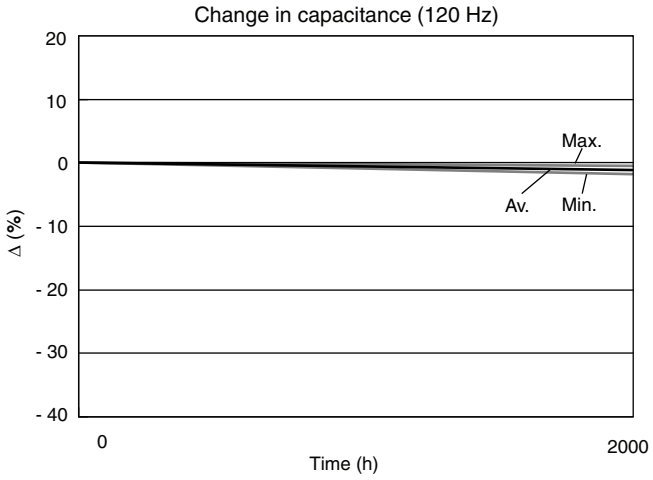
FREQUENCY (kHz)	0.12	0.5	1	10	100	500	1000	5000	10 000
94SVPD106X0025C6 IMPEDANCE (Ω)	127.769	31.001	15.608	1.612	0.176	0.046	0.032	0.093	0.179
94SVPD106X0025C6 ESR (Ω)	1.303	0.482	0.306	0.081	0.044	0.035	0.032	0.033	0.040
94SVPD186X0035F8 IMPEDANCE (Ω)	72.87	17.781	8.955	0.918	0.096	0.023	0.037	0.200	0.397
94SVPD186X0035F8 ESR (Ω)	1.681	0.333	0.179	0.043	0.027	0.023	0.023	0.026	0.034
94SVPD476X0035F12 IMPEDANCE (Ω)	30.178	7.389	3.725	0.392	0.05	0.016	0.025	0.134	0.266
94SVPD476X0035F12 ESR (Ω)	0.852	0.206	0.121	0.045	0.023	0.016	0.014	0.017	0.023
94SVPD826X0025F12 IMPEDANCE (Ω)	16.736	4.096	2.074	0.229	0.029	0.014	0.028	0.144	0.285
94SVPD826X0025F12 ESR (Ω)	0.339	0.135	0.094	0.033	0.015	0.011	0.011	0.014	0.019

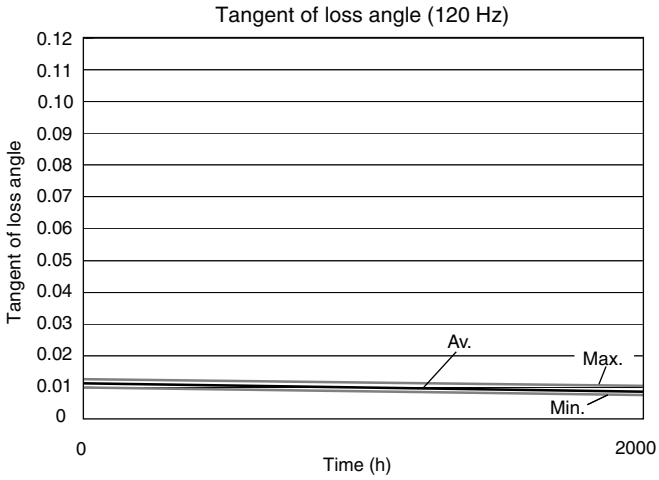
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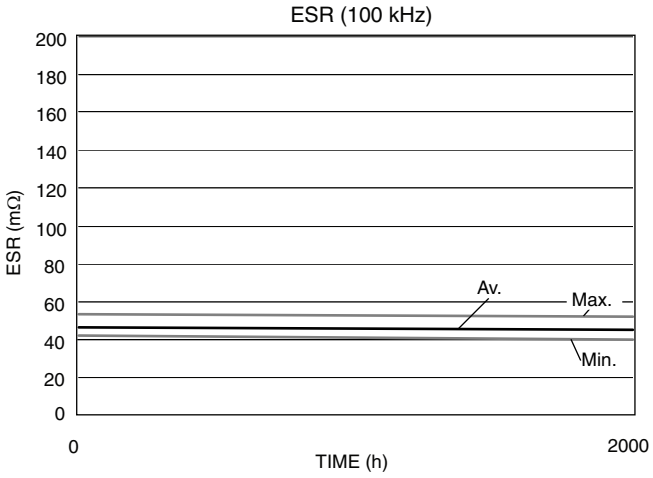
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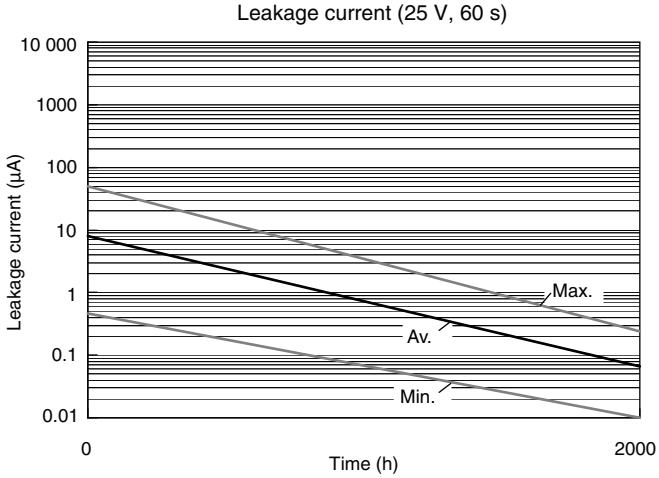
TYPICAL PARAMETERS

MODEL	TEST ITEM	TEST TEMPERATURE	APPLIED VOLTAGE	LOT. NUMBER
94SVPD106X0025C6	Endurance (after V.P.S. test)	125 °C	25 V	7130A2714









Notes

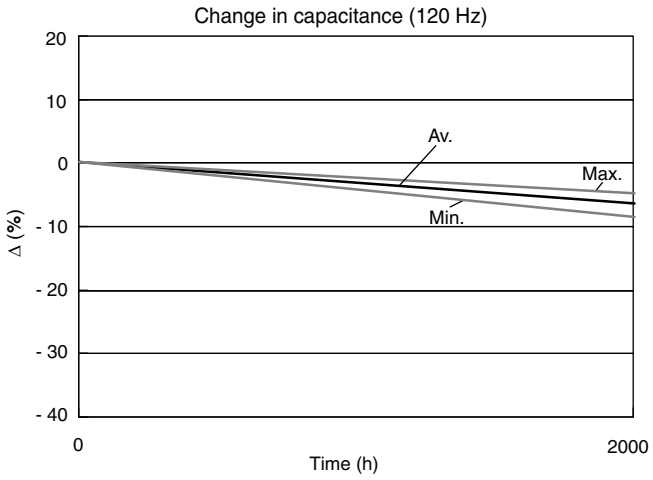
- n = 30 pieces
- V.P.S. test conditions: 230 °C x 75 s x 2 (V.P.S. = Vapor Phase Soldering method)

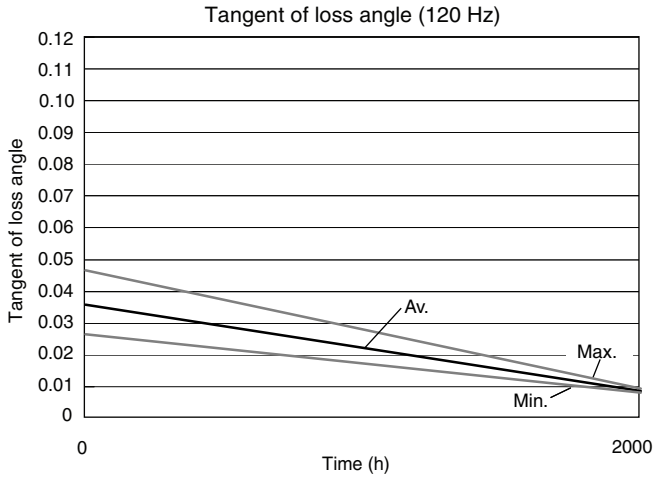
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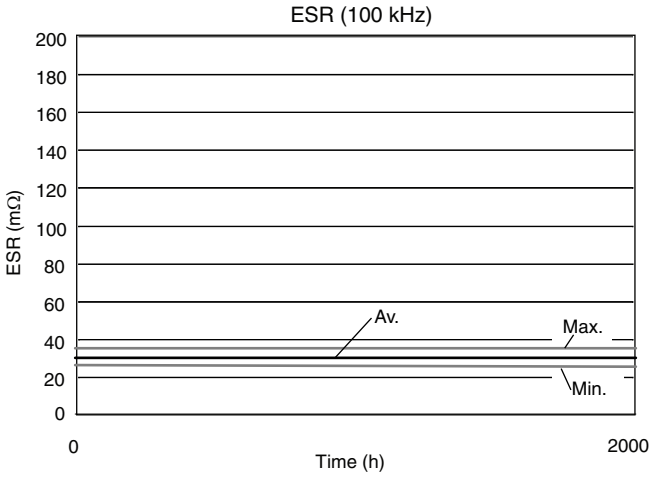
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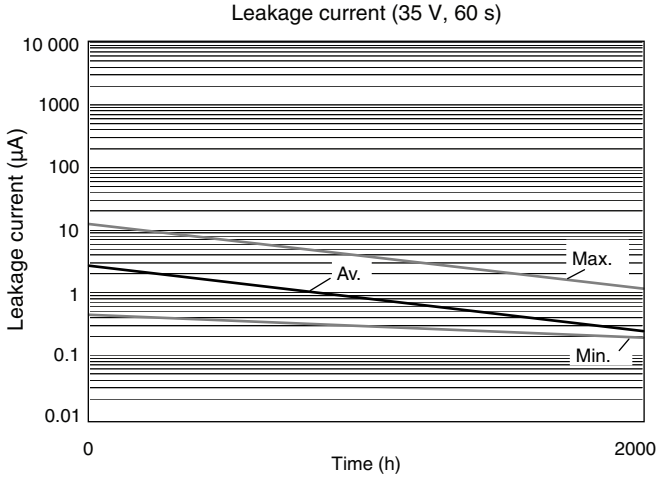
TYPICAL PARAMETERS

MODEL	TEST ITEM	TEST TEMPERATURE	APPLIED VOLTAGE	LOT. NUMBER
94SVPD186X0035F8	Endurance (after V.P.S. test)	125 °C	35 V	6517A3254









Notes

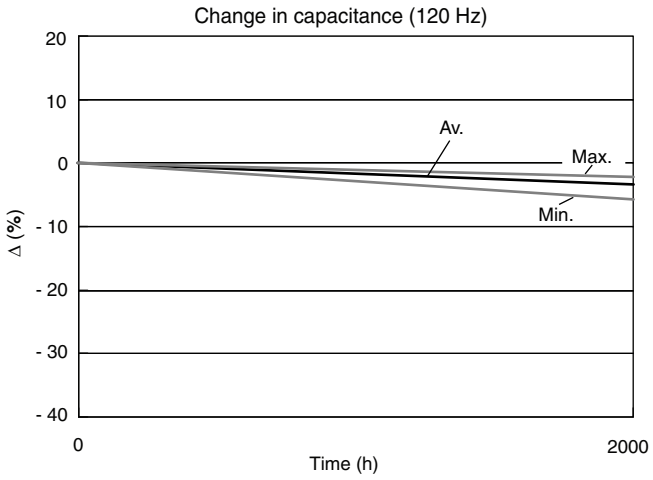
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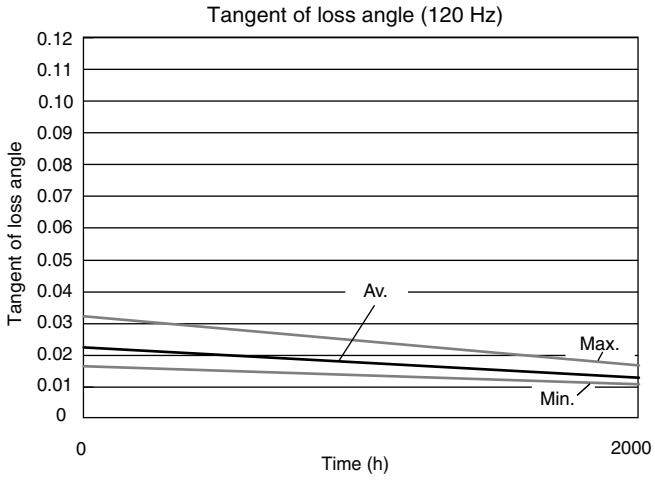
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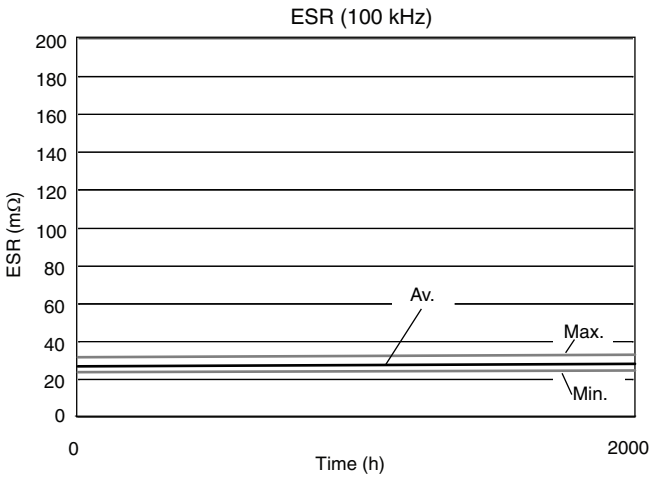
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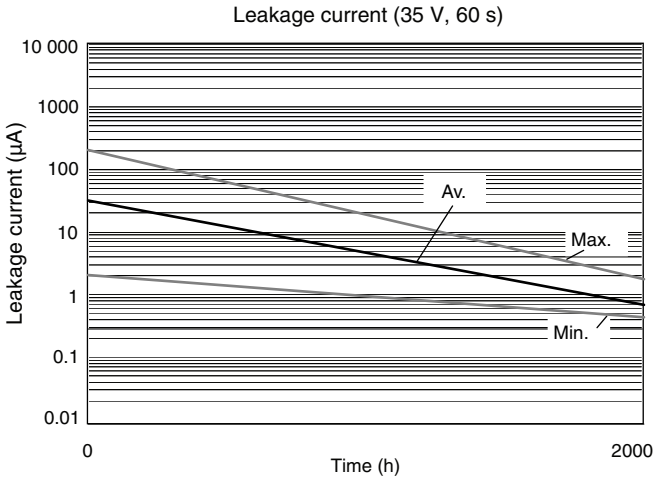
TYPICAL PARAMETERS

MODEL	TEST ITEM	TEST TEMPERATURE	APPLIED VOLTAGE	LOT. NUMBER
94SVPD476X0035F12	Endurance (after V.P.S. test)	125 °C	35 V	7209A6544









Notes

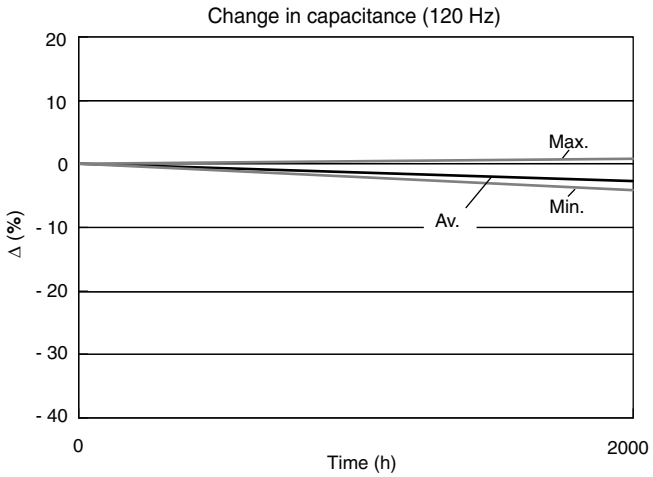
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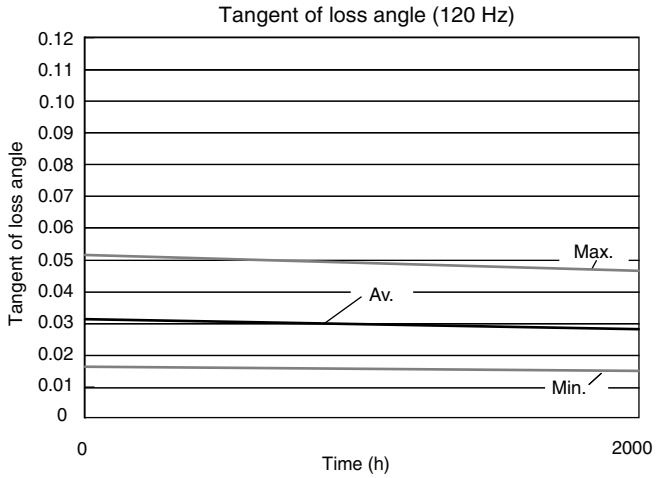
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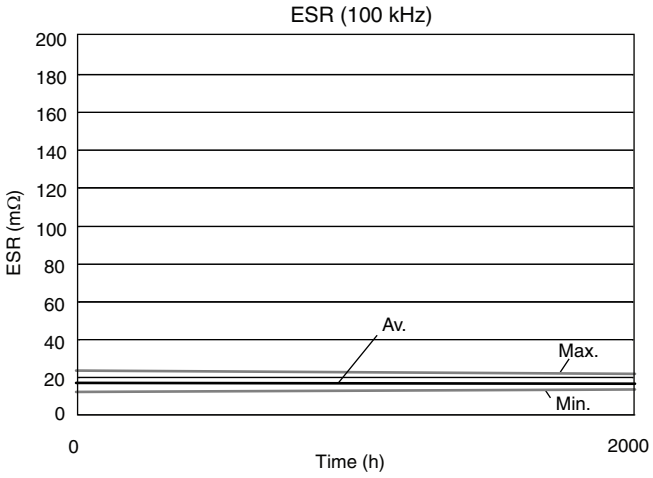
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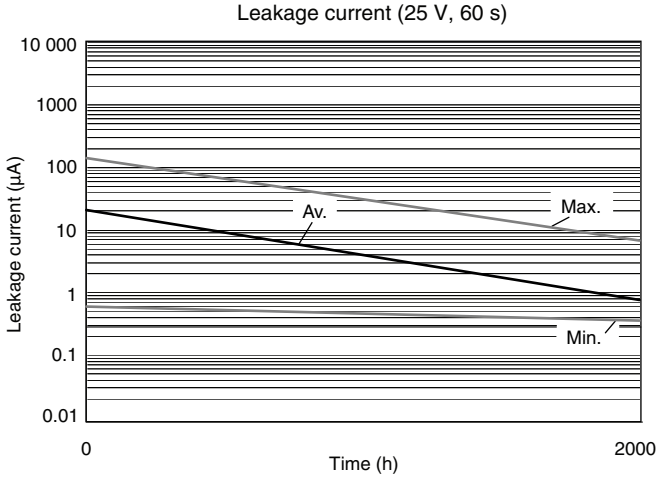
TYPICAL PARAMETERS

MODEL	TEST ITEM	TEST TEMPERATURE	APPLIED VOLTAGE	LOT. NUMBER
94SVPD826X0025F12	Endurance (after V.P.S. test)	125 °C	25 V	7527A6544









Notes

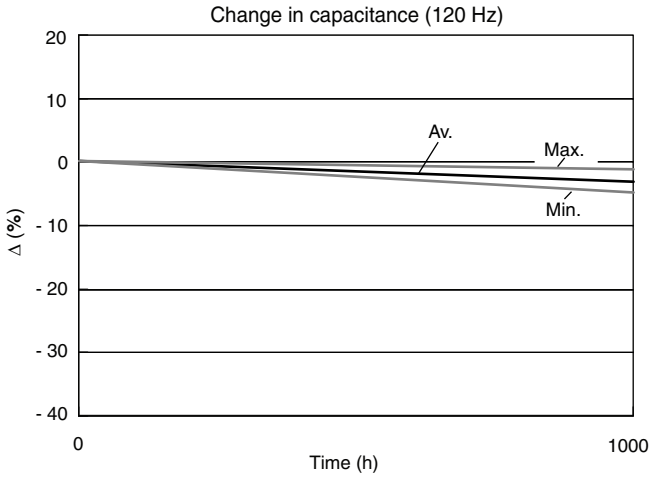
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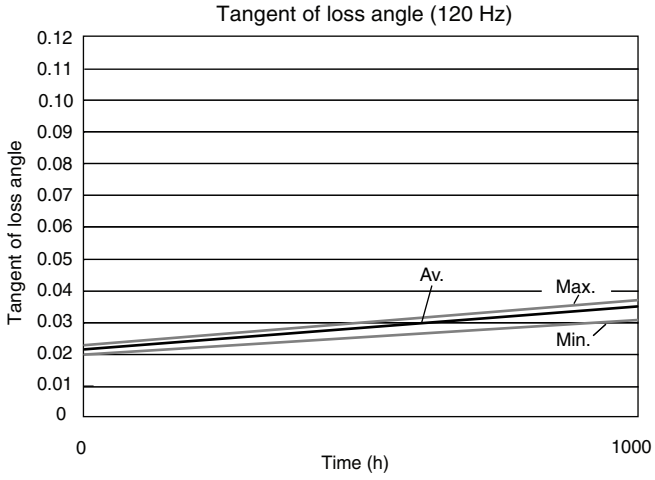
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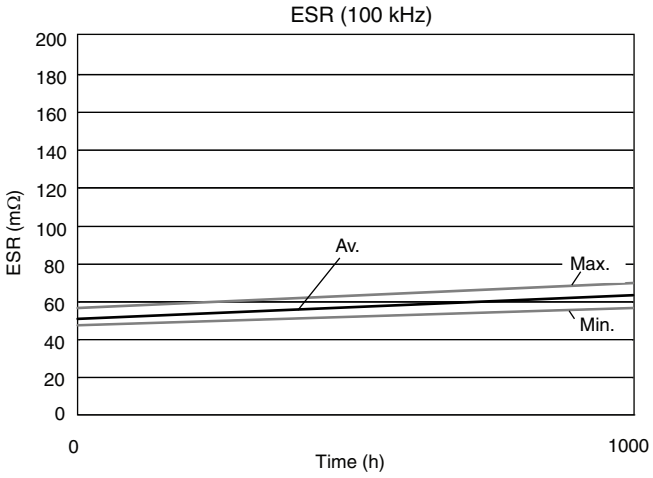
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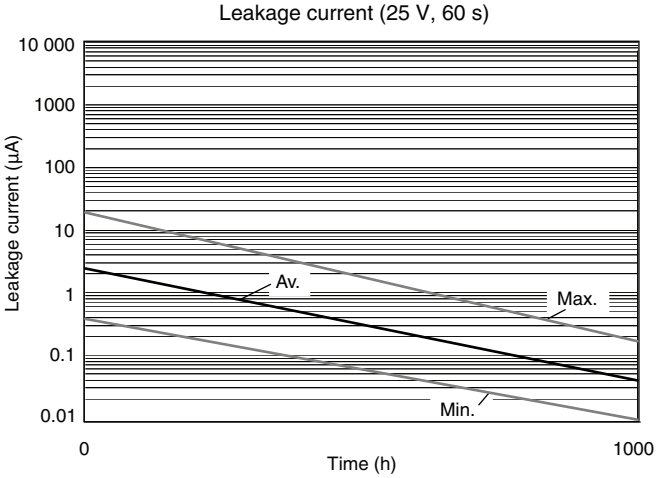
TYPICAL PARAMETERS

MODEL	TEST ITEM	TEST TEMPERATURE	APPLIED VOLTAGE	TEST HUMIDITY	LOT. NUMBER
94SVPD106X0025C6	Damp heat (steady state) (after V.P.S. test)	85 °C	25 V	85 %	7530A2714









Notes

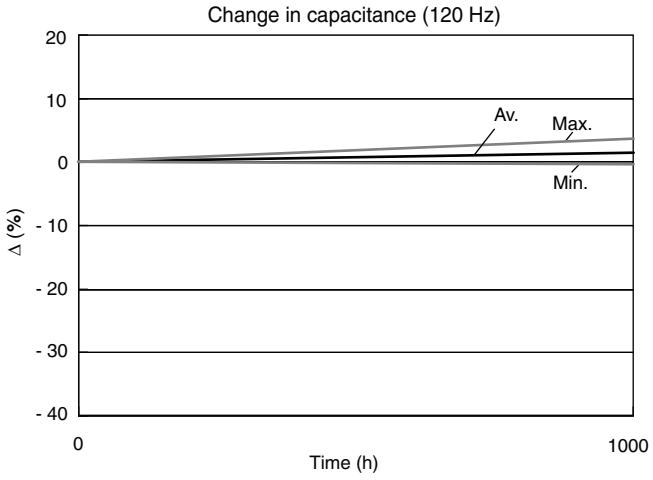
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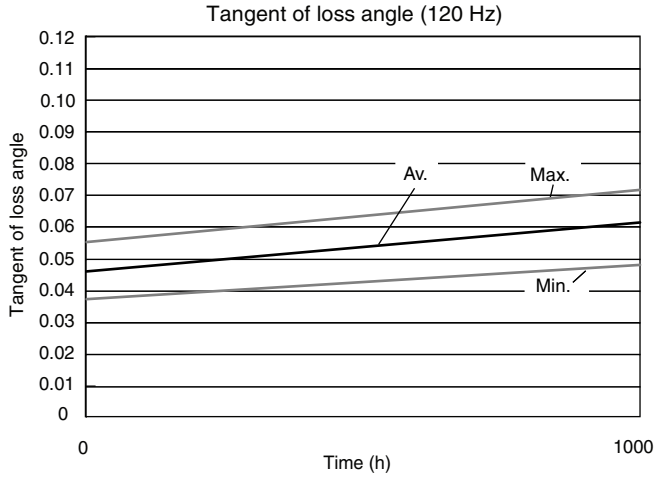
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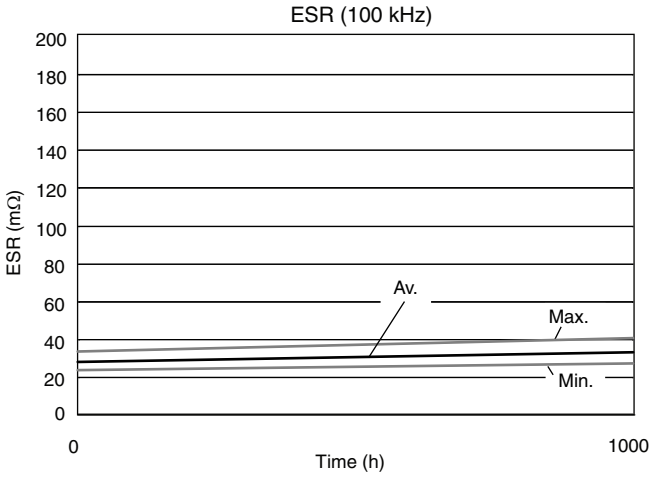
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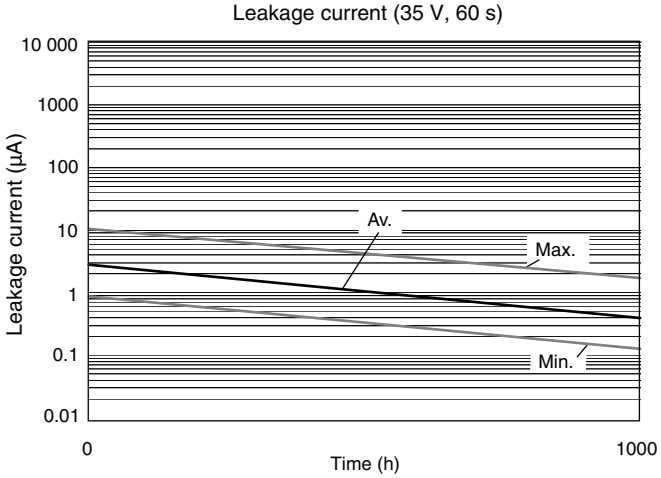
TYPICAL PARAMETERS

MODEL	TEST ITEM	TEST TEMPERATURE	APPLIED VOLTAGE	TEST HUMIDITY	LOT. NUMBER
94SVPD186X0035F8	Damp heat (steady state) (after V.P.S. test)	85 °C	35 V	85 %	6517A3254









Notes

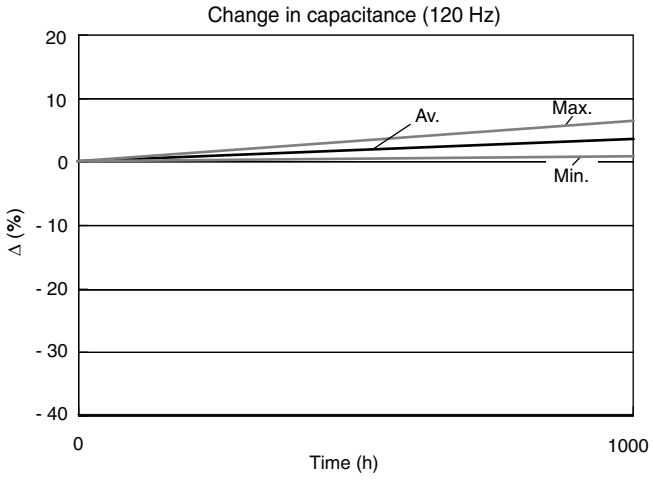
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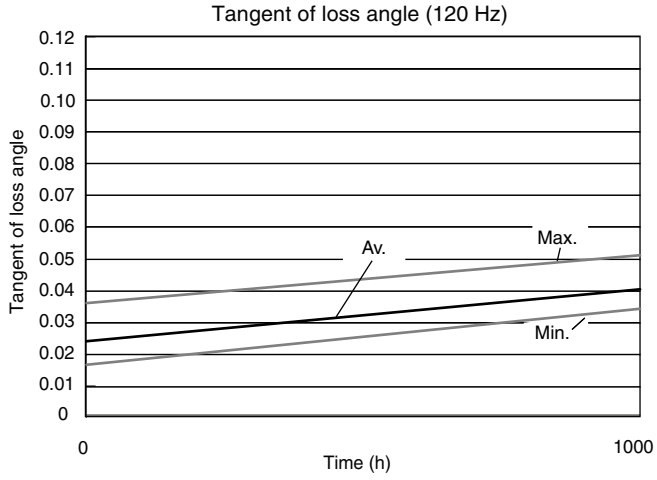
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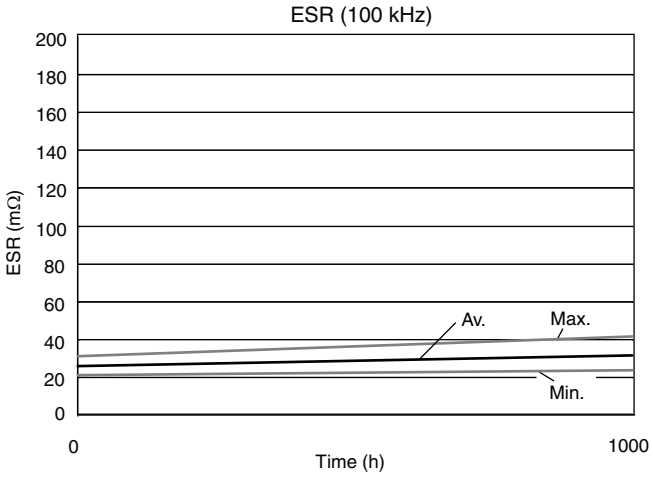
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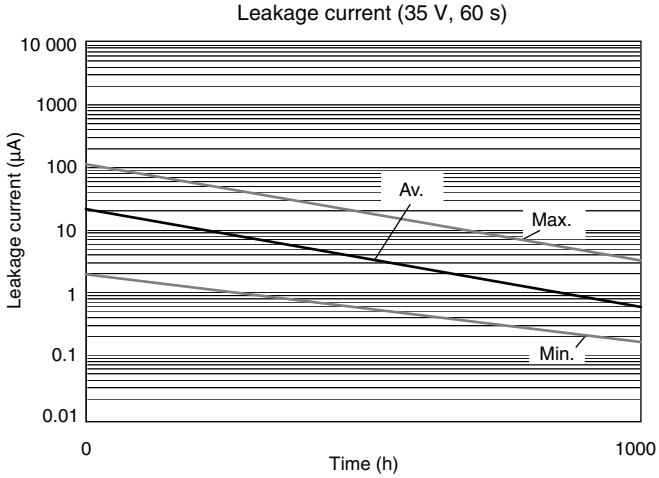
TYPICAL PARAMETERS

MODEL	TEST ITEM	TEST TEMPERATURE	APPLIED VOLTAGE	TEST HUMIDITY	LOT. NUMBER
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Notes

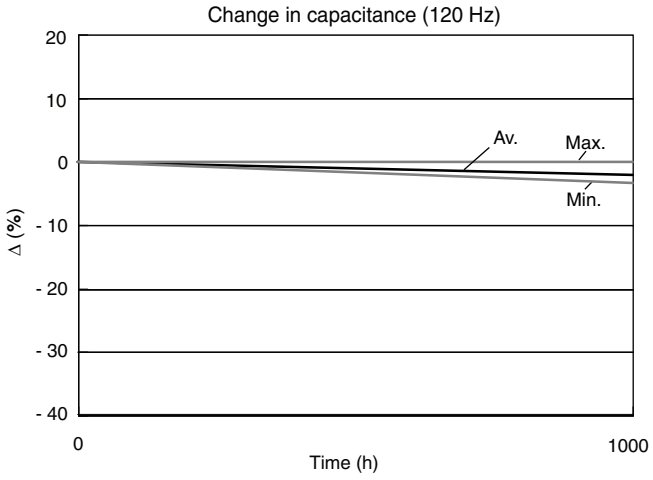
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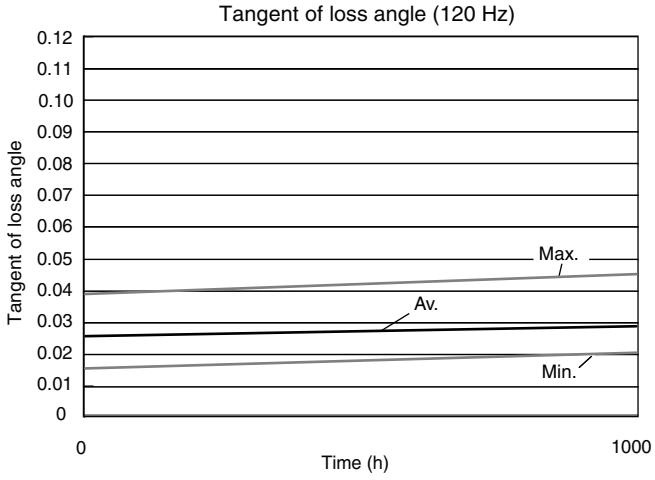
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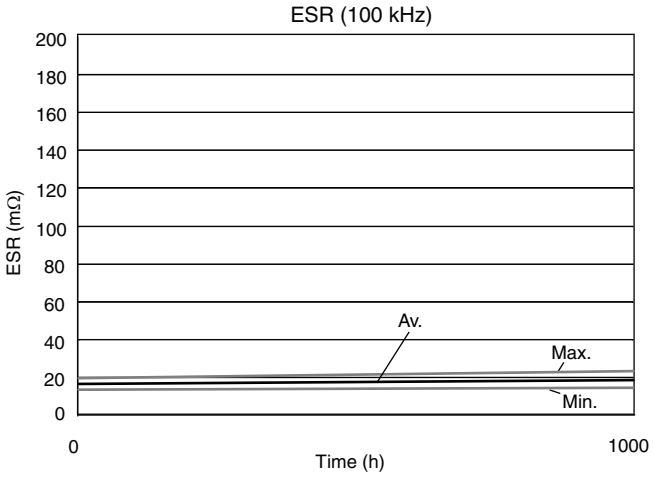
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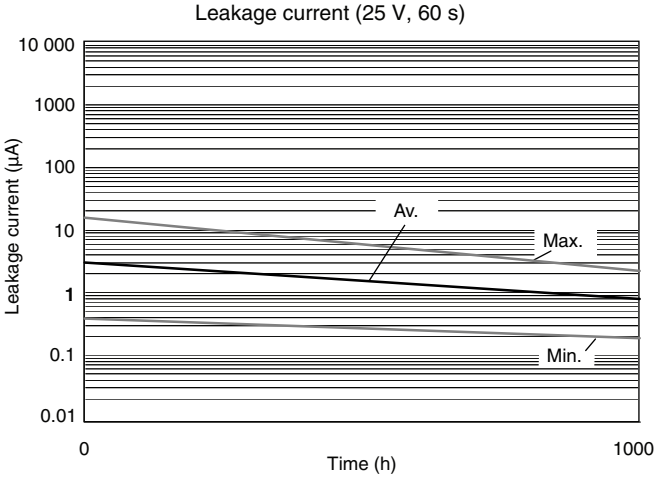
TYPICAL PARAMETERS

MODEL	TEST ITEM	TEST TEMPERATURE	APPLIED VOLTAGE	TEST HUMIDITY	LOT. NUMBER
94SVPD826X0025F12	Damp heat (steady state) (after V.P.S. test)	85 °C	25 V	85 %	6806A6724









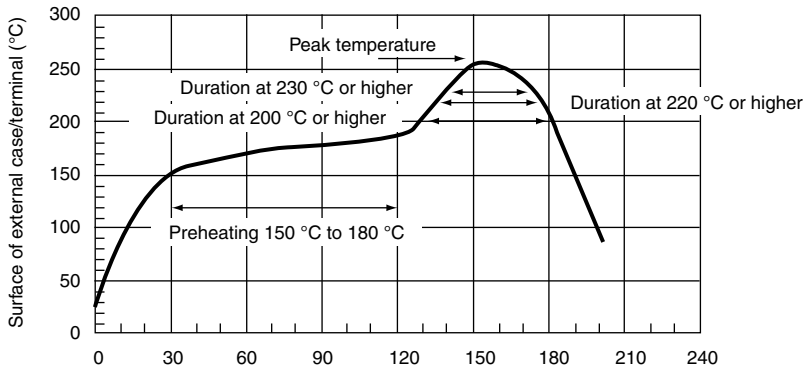
Notes

- n = 30 pieces
- V.P.S. test conditions: 230 °C x 75 s x 2 (V.P.S. = Vapor Phase Soldering method)

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RECOMMENDED REFLOW PROFILE



Vishay OS-CON has different characteristics against soldering heat from conventional aluminum electrolytic capacitors or tantalum capacitors because of its unique materials and structure.

Please note the following points on soldering of Vishay OS-CON 94SVPD series to draw out the best performance.

ITEM	94SVPD SERIES	
Peak temperature (max.)	250 °C	260 °C
Preheat	150 °C to 180 °C 90 ± 30 s	
200 °C over time (max.)	60 s	60 s
220 °C over time (max.)	50 s	50 s
230 °C over time (max.)	40 s	40 s
Reflow number	Twice or less	Only 1 time

Note

- All temperatures are measured on the topside of the Al-can and terminal surface.

Attention:

Reflow soldering may reduce the capacitance of products before or after soldering even if soldering conditions stipulated in Recommended Reflow Condition are met. Though the actual reflow conditions are subject to change depending on the kind of reflow soldering method, please be aware that the peak temperature at the top of Al-case and electrode terminals should not exceed peak temperature. Particular notice should be given to the time that Vishay OS-CON is heated at 200 °C or higher during reflow. Be aware that soldering considerably deviating from these conditions will cause problems such as a 50 % reduction in capacitance, and a considerable increase in leakage current.

The leakage current value may increase (from a few µA to a few mA) even within the above conditions. When the Vishay OS-CON is used in a DC circuit, the leakage current will decrease gradually through self-recovery after voltage is applied. If your reflow profile (reflow temperature, number of reflows, etc.) deviates from the above conditions for mounting the 94SVPD series, please consult with Vishay OS-CON.

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Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.