

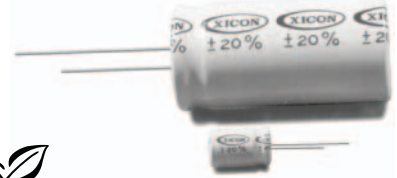


# Miniature Aluminum Electrolytic Capacitors

# XRL Series

## FEATURES

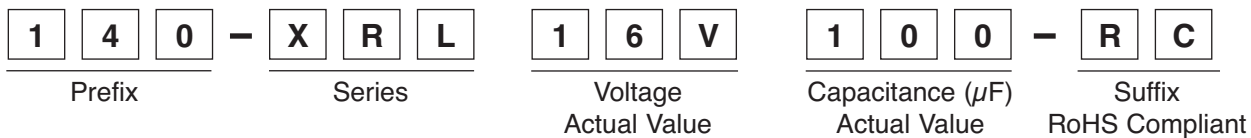
- Low impedance characteristics
- Case sizes are smaller than conventional general-purpose capacitors, with very high performance
- Can size larger than 9mm diameter has safety vents on rubber end seal
- RoHS Compliant



## CHARACTERISTICS

Item	Characteristics													
Operating Temperature Range	-40°C ~ +85°C													
Capacitance Tolerance	±20% at 120Hz, 20°C													
Leakage Current	≤100V	I = 0.01CWV or 3μA whichever is greater after 2 minutes of applied rated DC working voltage at 20°C Where: C = rated capacitance in μF; WV = rated DC working voltage												
	>100V	CWV ≤ 1000 μF: I = 0.03 CWV + 15uA; C = rated capacitance in uF CWV ≥ 1000 μF: I = 0.02 CWV + 25uA; WV = rated DC working voltage in V												
Dissipation Factor (Tan δ, at 20°C 120Hz)	Working voltage (WV)	6.3	10	16	25	35	50	63	100	160	250	350	450	
	Tan δ	0.23	0.20	0.16	0.14	0.12	0.10	0.09	0.08	0.12	0.17	0.20	0.25	
For capacitors whose capacitance exceeds 1,000μF, the specification of tan δ is increased by 0.02 for every addition of 1,000μF														
Surge Voltage	Working voltage (WV)	6.3	10	16	25	35	50	63	100	160	250	350	450	
	Surge voltage (SV)	8	13	20	32	44	63	79	125	200	300	400	500	
Low Temperature Characteristics (Imp. ratio @ 120Hz)	Working voltage (WV)	6.3	10	16	25	35	50	63	100	160	250	350	450	
	Z(-25°C)/Z(+20°C)	øD<16	6	4	3	3	2	2	2	2	3	8	12	16
		øD≥16	8	6	4	4	3	3	3	3	3	8	12	16
	Z(-40°C)/Z(+20°C)	øD<16	10	8	6	6	4	3	3	3	4	10	16	20
øD≥16		18	16	12	10	8	8	6	6	4	10	16	20	
Load Test	When returned to +20°C after 2,000 hours application of working voltage at +85°C, the capacitor will meet the following limits: Capacitance change is ≤ ±20% of initial value; tan δ is < 200% of specified value; leakage current is within specified value													
Shelf Life Test	When returned to +20°C after 1,000 hours at +85°C with no voltage applied, the capacitor will meet the following limits: Capacitance change is ≤ ±20% of initial value; tan δ is < 200% of specified value; leakage current is within specified value													

## PART NUMBERING SYSTEM



## RIPPLE CURRENT AND FREQUENCY MULTIPLIERS

Capacitance (μF)	Frequency (Hz)				
	60 (50)	120	500	1K	≥10K
<100	0.70	1.0	1.30	1.40	1.50
100 ~ 1000	0.75	1.0	1.20	1.30	1.35
>1000	0.80	1.0	1.10	1.12	1.15

## RIPPLE CURRENT AND TEMPERATURE MULTIPLIERS

Temperature (°C)	<50	70	85
Multiplier	1.78	1.4	1.0



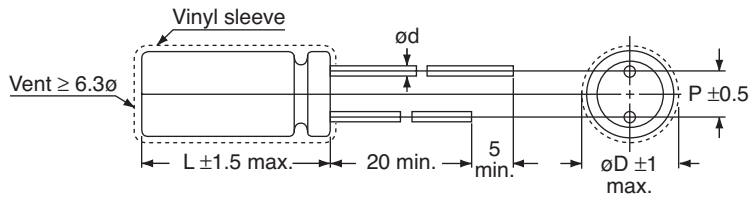
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## ■ DIMENSIONS AND PERMISSIBLE RIPPLE CURRENT



Lead Spacing and Diameter (mm)

øD	5	6.3	8	10	13	16	18	22	25
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10	12.5
ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	1.0	1.0

Tape and box is 5.0mm lead space.

Value ( $\mu$ F)	Working Voltage (WV); Dimensions: $\phi$ D x L (mm); Ripple Current: mA/RMS @ 120Hz, 85°C													
	10		16		25		35		50		63		100	
	$\phi$ D x L	mA	$\phi$ D x L	mA	$\phi$ D x L	mA	$\phi$ D x L	mA	$\phi$ D x L	mA	$\phi$ D x L	mA	$\phi$ D x L	mA
.10									5 x 11	1.5	5 x 11	3.0	5 x 11	3.0
.22									5 x 11	3.5	5 x 11	4.5	5 x 11	5.8
.33									5 x 11	5.0	5 x 11	7.5	5 x 11	8.8
.47					5 x 11	6.0			5 x 11	7.0	5 x 11	9.5	5 x 11	12
1.0					5 x 11	10			5 x 11	15	5 x 11	17	5 x 11	22
2.2			5 x 11	20	5 x 11	16			5 x 11	29	5 x 11	28	5 x 11	33
3.3			5 x 11	30	5 x 11	25			5 x 11	35	5 x 11	34	5 x 11	40
4.7			5 x 11	41	5 x 11	31	5 x 11	40	5 x 11	42	5 x 11	45	5 x 11	48
10	5 x 11	54	5 x 11	49	5 x 11	54	5 x 11	58	5 x 11	65	5 x 11	70	6.3 x 11	80
22	5 x 11	70	5 x 11	75	5 x 11	80	5 x 11	87	5 x 11	95	6.3 x 11	115	8 x 11.5	135
33	5 x 11	84	5 x 11	90	5 x 11	97	6.3 x 11	115	6.3 x 11	136	8 x 11.5	150	10 x 16	195
47	5 x 11	100	5 x 11	110	5 x 11	115	6.3 x 11	145	6.3 x 11	165	8 x 11.5	190	10 x 16	255
100	5 x 11	145	6.3 x 11	180	6.3 x 11	190	8 x 11.5	240	8 x 11.5	260	10 x 12	320	10 x 20	370
220	6.3 x 11	250	8 x 11.5	300	8 x 11.5	320	10 x 12	420	10 x 16	490	10 x 20	565	13 x 25	675
330	8 x 11.5	350	8 x 11.5	370	10 x 12.5	470	10 x 16	570	13 x 20	635	13 x 20	765	16 x 32	972
470	8 x 11.5	415	10 x 12.5	520	10 x 16	620	10 x 16	740	13 x 20	860	16 x 25	1050	18 x 36	1135
1000	10 x 12.5	650	10 x 16	785	13 x 20	1090	13 x 20	1145	16 x 25	1530	16 x 25	1700	22 x 40	2600
2200	13 x 20	1240	13 x 20	1295	16 x 25	1660	16 x 32	1890	18 x 40	2231	18 x 40	2385		
3300	13 x 20	1420	16 x 25	1840	16 x 32	2070	18 x 36	2430	22 x 40	2785	22 x 40	3000		
4700	16 x 25	1980	16 x 32	2260	18 x 36	2520	18 x 36	2700	25 x 40	3300	25 x 40	3560		
6800	16 x 25	2220	16 x 32	2520	18 x 36	2880	22 x 41	2900						
10000	18 x 36	2880	18 x 36	3080	22 x 40	3440								

Value ( $\mu$ F)	Working Voltage (WV); Dimensions: $\phi$ D x L (mm); Ripple Current: mA/RMS @ 120Hz, 85°C							
	160		250		350		450	
	$\phi$ D x L	mA	$\phi$ D x L	mA	$\phi$ D x L	mA	$\phi$ D x L	mA
.47	5 x 11	13	8 x 11.5	21	8 x 11.5	21	10 x 12.5	26
1.0	5 x 11	20	8 x 11.5	32	8 x 11.5	32	10 x 12.5	38
2.2	6.3 x 11	34	8 x 11.5	49	10 x 16	63	10 x 16	63
3.3	8 x 11.5	50	10 x 12.5	70	10 x 16	78	10 x 20	86
4.7	8 x 11.5	60	10 x 16	93	10 x 20	103	13 x 20	120
10	10 x 16	115	10 x 20	150	13 x 20	174	13 x 25	192
22	13 x 20	216	13 x 20	255	13 x 25	282	16 x 25	354
33	13 x 20	270	13 x 25	348	16 x 32	438	18 x 36	426
47	13 x 25	354	16 x 25	468	16 x 36	500	18 x 40	555
100	16 x 25	582	18 x 40	822	18 x 40	685	22 x 45	750
220	18 x 36	900	22 x 40	1134				
330	18 x 40	1010						





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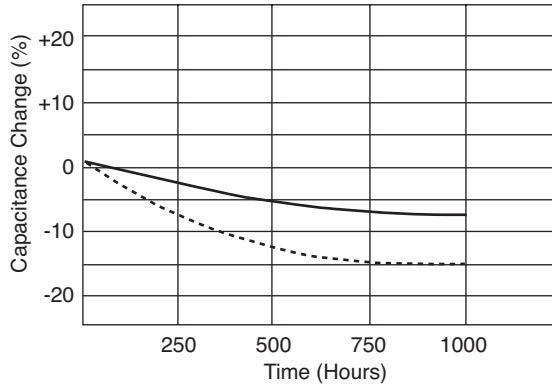
# XRL Series

## TYPICAL PERFORMANCE CHARACTERISTICS

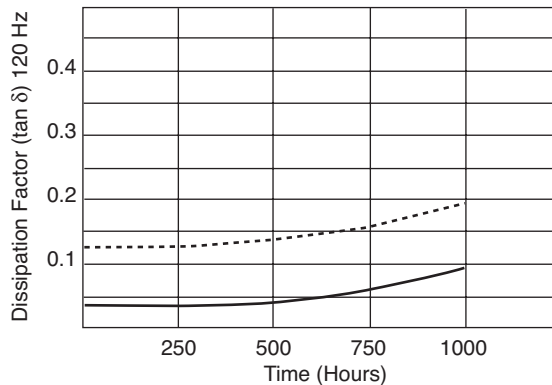
----- 1000 $\mu$ F 16V  
————— 1 $\mu$ F 50V

### Life Test

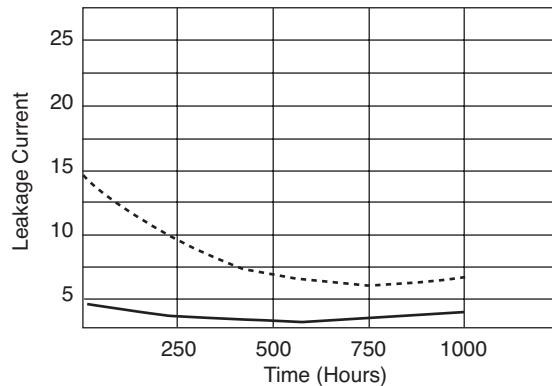
Capacitance Change vs. Time (at +85°C)



Dissipation Factor vs. Time (at +85°C)

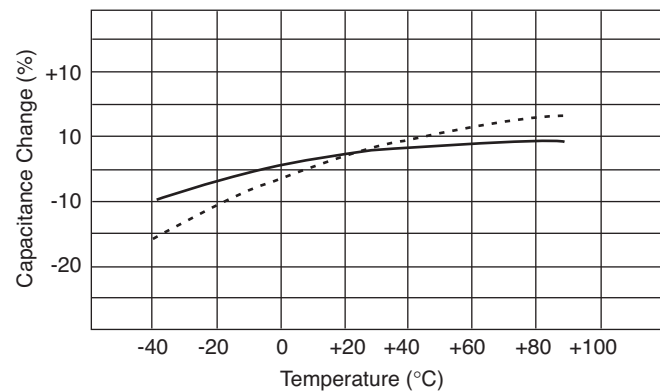


Leakage Current vs. Time (at +85°C)

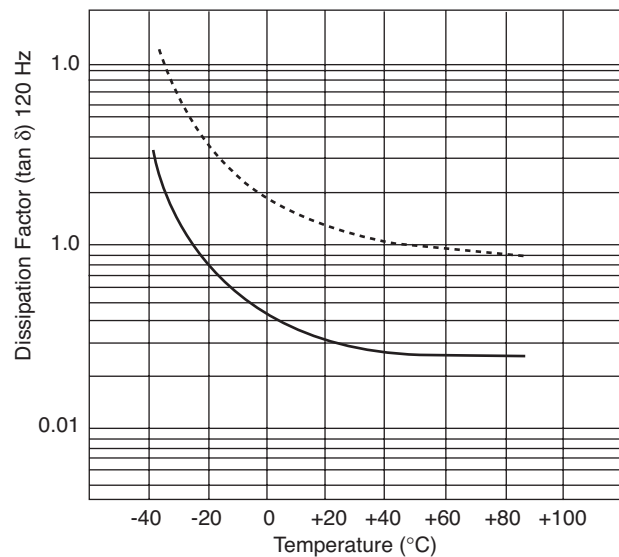


### Temperature Characteristics

Capacitance Change vs. Temperature



Dissipation Factor vs. Temperature



Impedance vs. Frequency

