

# +105°C General Purpose Miniature Radial Lead, Aluminum Capacitors

## Features-

- Increased Capacitance
- Case Sizes Through 18 x 36mm
- Optional 3<sup>rd</sup> Lead On Diameters ≥ 12.5mm
- Epoxy End Seal Available

## General Specifications-

### Operating Temperature:

-40 to +105°C

### Voltage Range:

6.3 – 250 VDC

### Capacitance Range:

1.2µF to 10,000µF

### Capacitance Tolerance:

±20% (Std.)

### Case Size Range:

6.0 X 11.0mm – 18.0 X 36.0mm

### Termination:

2 or 3 Radial Leads.

### Life Validation Test:

**1,000hrs @ +105°C (dia. ≤ 8.0mm):**

**2,000hrs @ +105°C (dia. > 8.0mm):**

Δ CAP ≤ 15% (6.3 – 16VDC),

≤ 10% (25 – 250VDC)

From initial measurement.

Δ ESR ≤ 1.20X Initial specified limit.

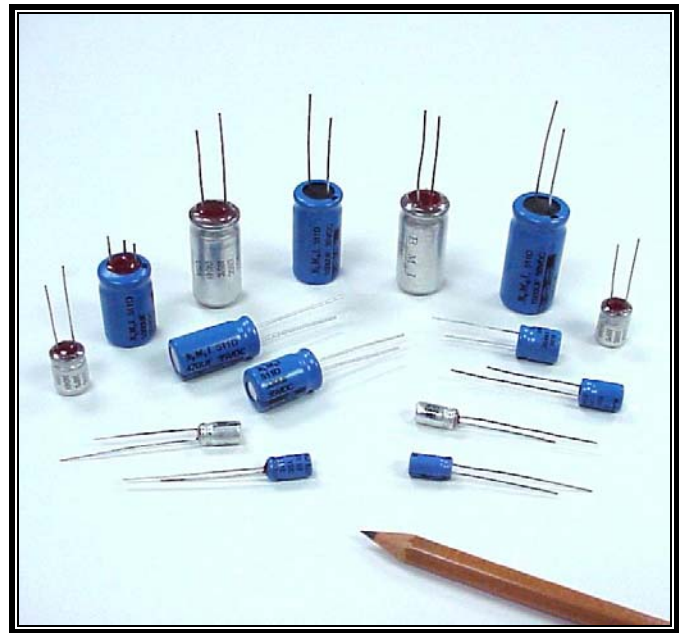
Δ DCL ≤ Initial specified limit.

### Shelf Test: 500hrs @ +105°C:

Δ CAP ≤ 10% From initial measurement.

Δ ESR ≤ 1.20X Initial specified limit.

Δ DCL ≤ 2X Initial specified limit.



### DC Leakage Current: (After 5 min. charge)

For: 6.3 – 63VDC      **I = 0.005CV**

For: 100 – 250VDC      **I = 0.01CV**

Where:

I is in µA

C is in µF

V is in Volts

### Ripple Current Multipliers:

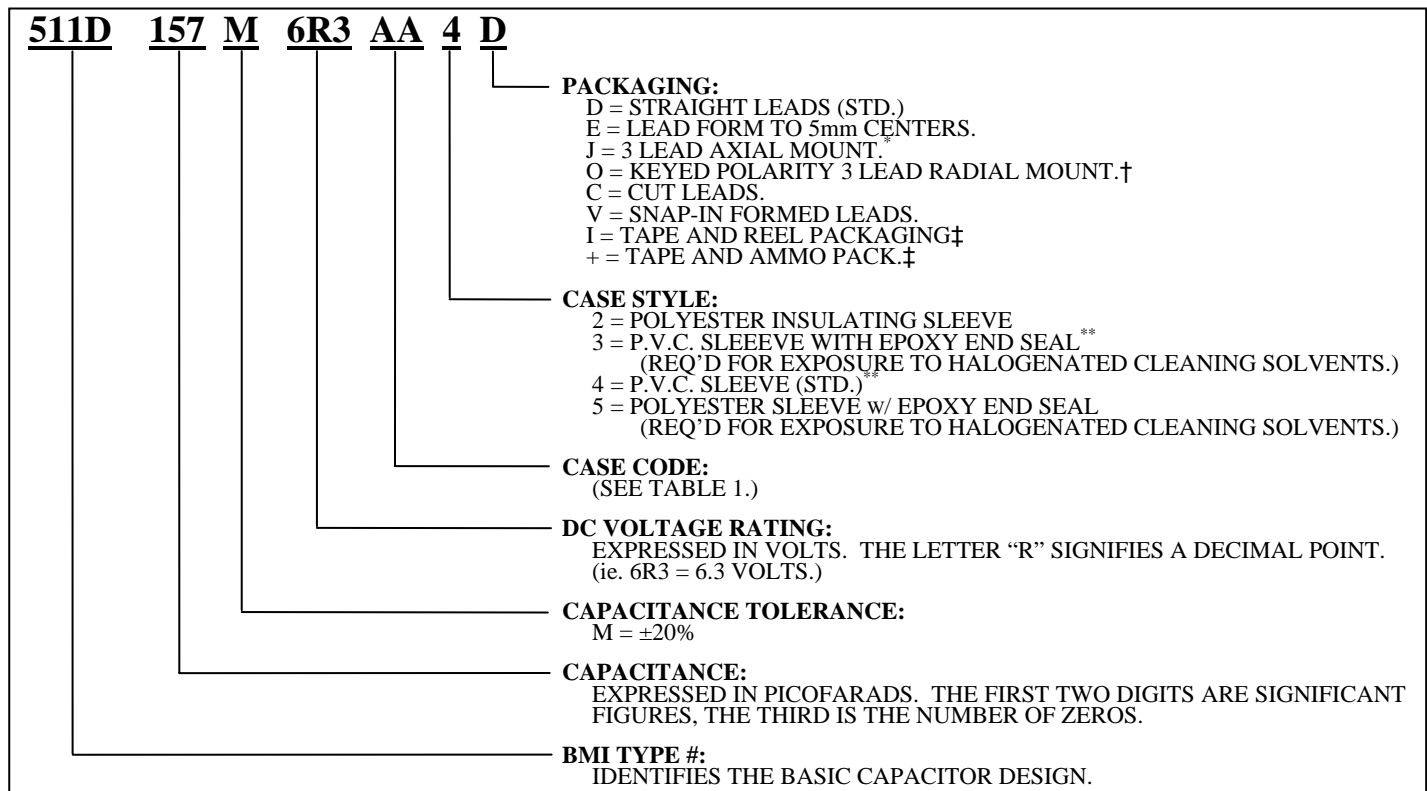
Temperature:

Ambient Temp.	Multiplier
+105°C	0.45
+95°C	0.77
+85°C	1.00
+75°C	1.18
≤ +65°C	1.34

Frequency (Hz):

VDC	50-60	100-120	300-400	1k-100k
6.3 – 25	0.85	1.00	1.05	1.10
26 – 250	0.80	1.00	1.30	1.40

## PART NUMBER BREAK-DOWN:



\*Available for 12.5, 16, and 18mm dia. units.

\*\*Sleeving rated to 105°C.

†Available for 12.5, 16, and 18mm dia. units with epoxy end-seal.

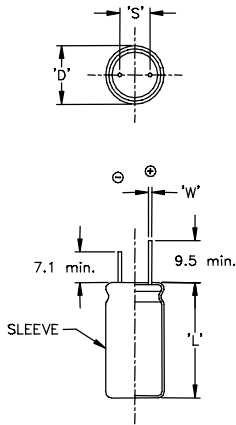
‡ Available for 6, 8, and 10 mm dia. units.

**Table 1. Case Dimensions mm(in.)**

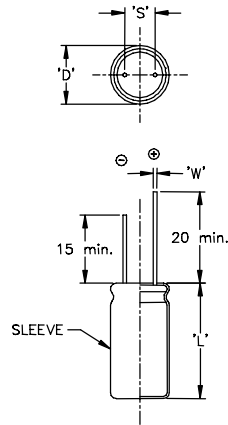
CASE CODE	NOMINAL		STYLES 2 & 4		STYLES 3 & 5 (w/EPOXY)		LEAD SPACING		WIRE GAUGE 'W'
	'D'	'L'	'D' MAX.	'L' MAX.	'D' MAX.	'L' MAX.	S ± 0.6	T ± 0.5	
AA	6.0 (0.236)	11.0 (0.433)	6.5 (0.256)	12.0 (0.472)	6.5 (0.256)	13.0 (0.512)	2.5 (0.098)	N/A	No. 22 AWG (0.025)
BB	8.0 (0.315)	12.0 (0.472)	8.5 (0.335)	13.0 (0.512)	8.5 (0.335)	14.0 (0.551)	3.5 (0.138)	N/A	No. 22 AWG (0.025)
BD	8.0 (0.315)	16.0 (0.630)	8.5 (0.335)	17.0 (0.669)	8.5 (0.335)	18.8 (0.740)	3.5 (0.138)	N/A	No. 22 AWG (0.025)
CC	10.0 (0.394)	13.0 (0.512)	10.5 (0.413)	14.3 (0.563)	10.5 (0.413)	16.0 (0.630)	5.0 (0.197)	N/A	No. 22 AWG (0.025)
CD	10.0 (0.394)	16.0 (0.630)	10.5 (0.413)	17.0 (0.669)	10.5 (0.413)	18.8 (0.740)	5.0 (0.197)	N/A	No. 22 AWG (0.025)
CG	10.0 (0.394)	20.0 (0.787)	10.5 (0.413)	21.5 (0.846)	10.5 (0.413)	23.0 (0.906)	5.0 (0.197)	N/A	No. 22 AWG (0.025)
DG	12.5 (0.492)	20.0 (0.787)	13.0 (0.512)	21.5 (0.846)	13.0 (0.512)	23.0 (0.906)	5.0 (0.197)	2.5 (0.098)	No. 20 AWG (0.032)
DK	12.5 (0.492)	25.0 (0.984)	13.0 (0.512)	26.5 (1.043)	13.0 (0.512)	29.0 (1.142)	5.0 (0.197)	2.5 (0.098)	No. 20 AWG (0.032)
DM	12.5 (0.492)	26.5 (1.043)	13.0 (0.512)	28.0 (1.102)	13.0 (0.512)	29.5 (1.161)	5.0 (0.197)	2.5 (0.098)	No. 20 AWG (0.032)
DT	12.5 (0.492)	33.5 (1.319)	13.0 (0.512)	34.2 (1.347)	13.0 (0.512)	36.0 (1.417)	5.0 (0.197)	2.5 (0.098)	No. 20 AWG (0.032)
DS	12.5 (0.492)	42.5 (1.673)	13.0 (0.512)	43.7 (1.721)	13.0 (0.512)	45.5 (1.791)	5.0 (0.197)	2.5 (0.098)	No. 20 AWG (0.032)
EK	16.0 (0.630)	25.0 (0.984)	16.5 (0.650)	26.2 (1.032)	16.5 (0.650)	27.9 (1.098)	7.5 (0.295)	3.8 (0.150)	No. 20 AWG (0.032)
EN	16.0 (0.630)	32.0 (1.260)	16.5 (0.650)	33.5 (1.319)	16.5 (0.650)	36.0 (1.417)	7.5 (0.295)	3.8 (0.150)	No. 20 AWG (0.032)
ER	16.0 (0.630)	36.0 (1.417)	16.5 (0.650)	37.5 (1.476)	16.5 (0.650)	40.0 (1.575)	7.5 (0.295)	3.8 (0.150)	No. 20 AWG (0.032)
EU	16.0 (0.630)	40.0 (1.575)	16.5 (0.650)	41.7 (1.642)	16.5 (0.650)	42.4 (1.669)	7.5 (0.295)	3.8 (0.150)	No. 20 AWG (0.032)
FR	18.0 (0.709)	36.0 (1.417)	18.5 (0.728)	37.5 (1.476)	18.5 (0.728)	40.0 (1.575)	7.5 (0.295)	3.8 (0.150)	No. 20 AWG (0.032)

## Radial-Leaded Capacitor Dimensions

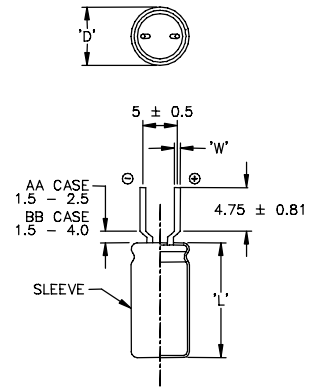
### TERMINAL CODE C



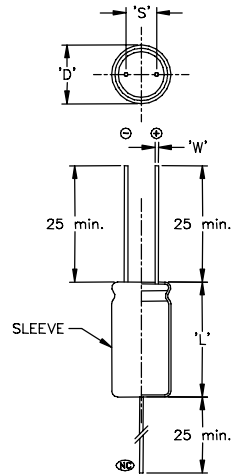
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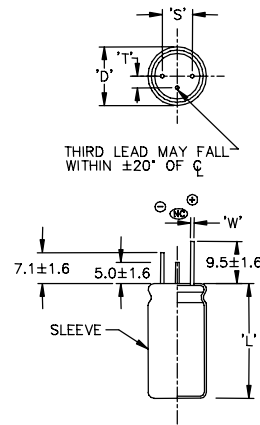
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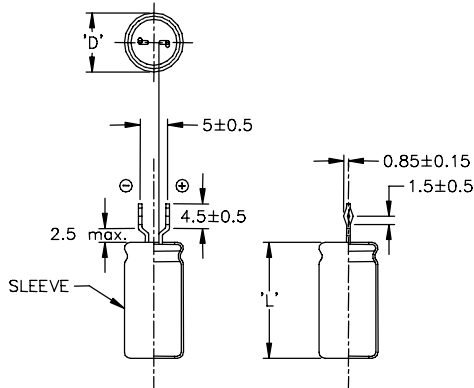
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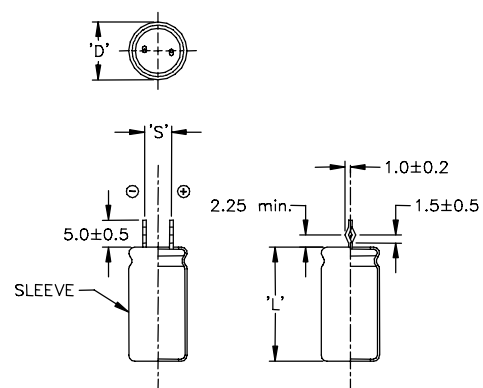
### TERMINAL CODE O



### TERMINAL CODE V 6 - 8 mm Dia.



### TERMINAL CODE V 10 - 18 mm Dia.



Dimensions in mm

⊕ Positive Lead ⊖ Negative Lead ⊕ No Charge Potential

## STANDARD RATINGS FOR TYPE 511D

Rated Capacitance ( $\mu\text{F}$ )	Catalog Number	Nominal Case Size D x L (mm)	Max. ESR	Max. ESR	Max. Ripple Current	Max. Ripple Current	Max. Z
			+25°C 120Hz ( $\Omega$ )	+25°C 20-40kHz ( $\Omega$ )	+85°C 120Hz ( $\text{A}_{\text{rms}}$ )	+85°C 20-40kHz ( $\text{A}_{\text{rms}}$ )	+25°C 100kHz ( $\Omega$ )
<b>6.3 VOLTS DC WORKING; 8 VOLTS DC SURGE</b>							
150	511D157M6R3AA4D	6.0 x 11.0	3.130	2.720	0.123	0.132	2.800
270	511D277M6R3BB4D	8.0 x 12.0	1.518	1.100	0.219	0.257	1.270
560	511D567M6R3CC4D	10.0 x 13.0	0.710	0.650	0.383	0.400	0.670
820	511D827M6R3CD4D	10.0 x 16.0	0.520	0.400	0.481	0.548	0.400
1,200	511D128M6R3CG4D	10.0 x 20.0	0.420	0.270	0.590	0.741	0.286
1,800	511D188M6R3DG4D	12.5 x 20.0	0.300	0.190	0.802	1.010	0.200
2,700	511D278M6R3DK4D	12.5 x 25.0	0.204	0.128	1.020	1.280	0.136
4,700	511D478M6R3EK4D	16.0 x 25.0	0.121	0.075	1.580	2.010	0.090
6,800	511D688M6R3EN4D	16.0 x 32.0	0.089	0.060	2.040	2.480	0.066
8,200	511D828M6R3ER4D	16.0 x 36.0	0.078	0.055	2.280	2.720	0.062
10,000	511D109M6R3FR4D	18.0 x 36.0	0.068	0.050	2.640	3.070	0.061
<b>10 VOLTS DC WORKING; 12 VOLTS DC SURGE</b>							
100	511D107M010AA4D	6.0 x 11.0	4.073	2.800	0.108	0.131	2.900
220	511D227M010BB4D	8.0 x 12.0	1.855	1.150	0.198	0.252	1.300
390	511D397M010CC4D	10.0 x 13.0	1.012	0.625	0.321	0.408	0.650
680	511D687M010CD4D	10.0 x 16.0	0.596	0.430	0.449	0.529	0.435
1,000	511D108M010CG4D	10.0 x 20.0	0.407	0.290	0.603	0.715	0.290
1,200	511D128M010DG4D	12.5 x 20.0	0.371	0.206	0.721	0.968	0.206
1,800	511D188M010DK4D	12.5 x 25.0	0.265	0.138	0.930	1.280	0.138
3,300	511D338M010EK4D	16.0 x 25.0	0.166	0.086	1.350	1.880	0.094
4,700	511D478M010EN4D	16.0 x 32.0	0.122	0.060	1.740	2.480	0.067
5,600	511D568M010ER4D	16.0 x 36.0	0.104	0.056	1.970	2.690	0.063
8,200	511D828M010FR4D	18.0 x 36.0	0.094	0.056	2.240	2.910	0.063
<b>16 VOLTS DC WORKING; 20 VOLTS DC SURGE</b>							
82	511D826M016AA4D	6.0 x 11.0	4.294	2.940	0.106	0.127	2.950
150	511D157M016BB4D	8.0 x 12.0	2.433	1.250	0.173	0.241	1.250
270	511D277M016CC4D	10.0 x 13.0	1.081	0.685	0.310	0.390	0.680
470	511D477M016CD4D	10.0 x 16.0	0.748	0.442	0.419	0.522	0.442
680	511D687M016CG4D	10.0 x 20.0	0.521	0.295	0.533	0.709	0.295
820	511D827M016DG4D	12.5 x 20.0	0.429	0.208	0.671	0.963	0.208
1,500	511D158M016DK4D	12.5 x 25.0	0.243	0.140	0.971	1.270	0.140
2,200	511D228M016EK4D	16.0 x 25.0	0.176	0.090	1.310	1.840	0.098
3,300	511D338M016EN4D	16.0 x 32.0	0.147	0.062	1.580	2.440	0.067
3,900	511D398M016ER4D	16.0 x 36.0	0.125	0.058	1.800	2.650	0.063
5,600	511D568M016FR4D	18.0 x 36.0	0.100	0.055	2.170	2.930	0.059
<b>25 VOLTS DC WORKING; 35 VOLTS DC SURGE</b>							
47	511D476M025AA4D	6.0 x 11.0	6.120	2.940	0.089	0.127	2.950
100	511D107M025BB4D	8.0 x 12.0	2.914	1.350	0.158	0.232	1.350
180	511D187M025CC4D	10.0 x 13.0	1.590	0.950	0.256	0.331	0.900
270	511D277M025CD4D	10.0 x 16.0	1.086	0.550	0.333	0.468	0.500
390	511D397M025CG4D	10.0 x 20.0	0.724	0.300	0.452	0.703	0.305
560	511D567M025DG4D	12.5 x 20.0	0.508	0.208	0.616	0.963	0.205
820	511D827M025DK4D	12.5 x 25.0	0.351	0.140	0.808	1.270	0.140
1,200	511D128M025EK4D	16.0 x 25.0	0.239	0.110	1.127	1.660	0.105
1,800	511D188M025EN4D	16.0 x 32.0	0.194	0.080	1.380	2.150	0.080
2,200	511D228M025ER4D	16.0 x 36.0	0.162	0.064	1.580	2.520	0.074
3,300	511D338M025FR4D	18.0 x 36.0	0.150	0.060	1.770	2.810	0.064

## STANDARD RATINGS FOR TYPE 511D

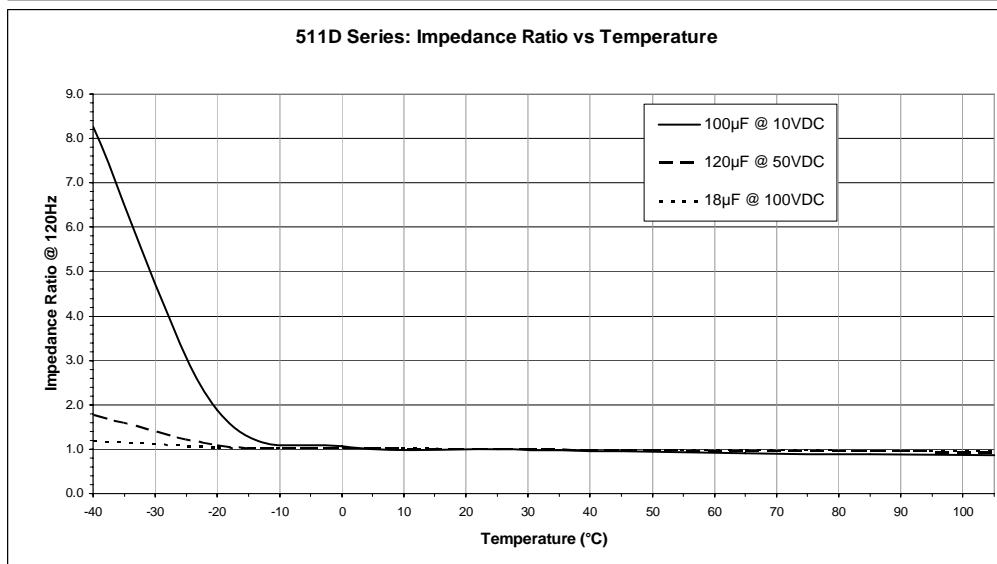
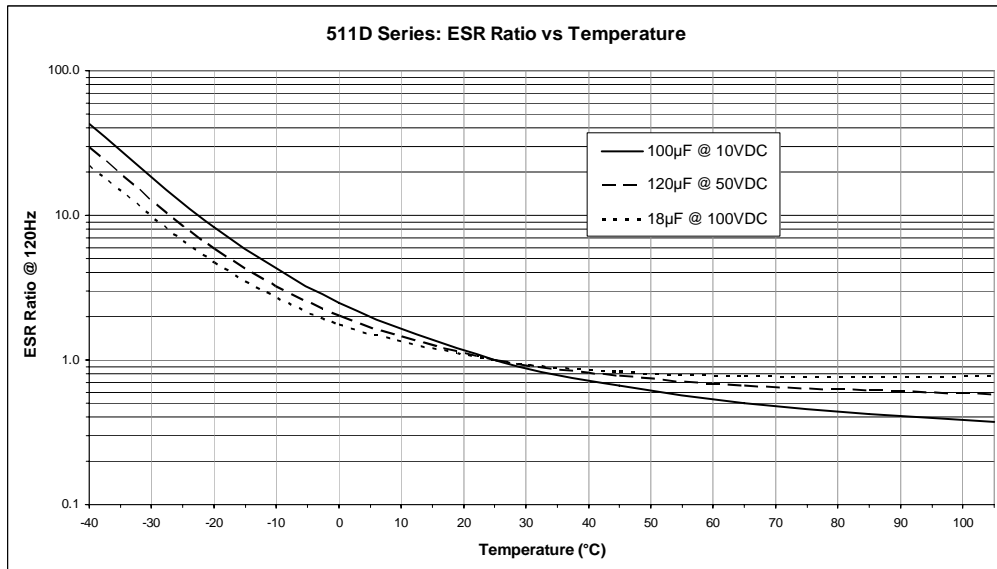
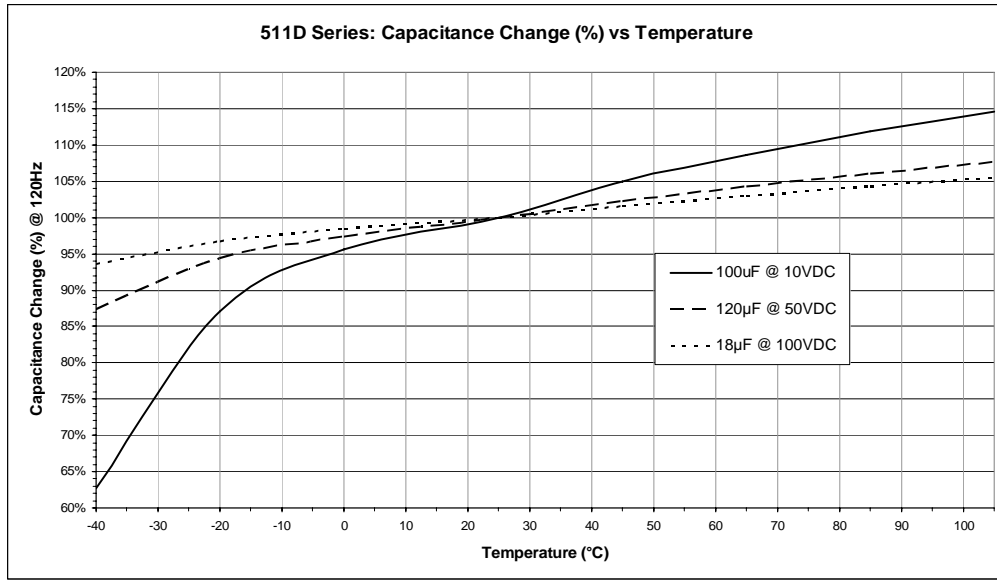
Rated Capacitance ( $\mu$ F)	Catalog Number	Nominal Case Size D x L (mm)	Max. ESR	Max. ESR	Max. Ripple Current	Max. Ripple Current	Max. Z
			+25°C 120Hz ( $\Omega$ )	+25°C 20-40kHz ( $\Omega$ )	+85°C 120Hz (A <sub>rms</sub> )	+85°C 20-40kHz (A <sub>rms</sub> )	+25°C 100kHz ( $\Omega$ )
<b>35 VOLTS DC WORKING; 45 VOLTS DC SURGE</b>							
33	511D336M035AA4D	6.0 x 11.0	6.777	3.600	0.084	0.115	3.500
68	511D686M035BB4D	8.0 x 12.0	3.260	1.400	0.149	0.228	1.400
120	511D127M035CC4D	10.0 x 13.0	1.830	1.010	0.239	0.323	0.980
220	511D227M035CD4D	10.0 x 16.0	1.016	0.460	0.344	0.512	0.470
330	511D337M035CG4D	10.0 x 20.0	0.677	0.305	0.468	0.697	0.310
390	511D397M035DG4D	12.5 x 20.0	0.554	0.210	0.590	0.959	0.220
680	511D687M035DK4D	12.5 x 25.0	0.326	0.150	0.838	1.236	0.157
1,000	511D108M035EK4D	16.0 x 25.0	0.223	0.110	1.170	1.660	0.112
1,500	511D158M035EN4D	16.0 x 32.0	0.165	0.078	1.490	2.180	0.078
1,800	511D188M035ER4D	16.0 x 36.0	0.132	0.060	1.760	2.610	0.062
2,200	511D228M035FR4D	18.0 x 36.0	0.121	0.060	1.980	2.810	0.062
<b>50 VOLTS DC WORKING; 63 VOLTS DC SURGE</b>							
22	511D226M050AA4D	6.0 x 11.0	7.330	3.750	0.081	0.113	3.410
47	511D476M050BB4D	8.0 x 12.0	3.884	1.510	0.137	0.221	1.450
82	511D826M050CC4D	10.0 x 13.0	1.940	1.050	0.232	0.315	1.010
120	511D127M050CD4D	10.0 x 16.0	1.320	0.466	0.302	0.509	0.488
180	511D187M050CG4D	10.0 x 20.0	0.881	0.311	0.411	0.691	0.321
270	511D277M050DG4D	12.5 x 20.0	0.601	0.221	0.567	0.937	0.231
390	511D397M050DK4D	12.5 x 25.0	0.401	0.181	0.756	1.130	0.175
560	511D567M050EK4D	16.0 x 25.0	0.281	0.121	1.040	1.590	0.121
820	511D827M050EN4D	16.0 x 32.0	0.194	0.083	1.380	2.110	0.083
1,000	511D108M050ER4D	16.0 x 36.0	0.161	0.065	1.590	2.510	0.068
<b>63 VOLTS DC WORKING; 75 VOLTS DC SURGE</b>							
12	511D126M063AA4D	6.0 x 11.0	12.01	4.010	0.064	0.109	3.810
27	511D276M063BB4D	8.0 x 12.0	5.450	1.610	0.116	0.214	1.510
47	511D476M063CC4D	10.0 x 13.0	3.076	1.170	0.184	0.299	1.110
82	511D826M063CD4D	10.0 x 16.0	1.760	0.501	0.262	0.491	0.511
150	511D157M063CG4D	10.0 x 20.0	1.010	0.331	0.385	0.671	0.341
150	511D157M063DG4D	12.5 x 20.0	1.010	0.250	0.439	0.879	0.255
270	511D277M063DK4D	12.5 x 25.0	0.345	0.201	0.815	1.070	0.211
470	511D477M063EK4D	16.0 x 25.0	0.307	0.125	0.995	1.560	0.125
680	511D687M063EN4D	16.0 x 32.0	0.214	0.101	1.320	1.930	0.101
820	511D827M063ER4D	16.0 x 36.0	0.176	0.071	1.520	2.410	0.072
1,200	511D128M063FR4D	18.0 x 36.0	0.165	0.065	1.690	2.710	0.068
<b>100 VOLTS DC WORKING; 125 VOLTS DC SURGE</b>							
4.7	511D475M100AA4D	6.0 x 11.0	30.79	4.310	0.041	0.106	4.210
10	511D106M100BB4D	8.0 x 12.0	14.63	1.810	0.071	0.202	1.710
18	511D185M100CC4D	10.0 x 13.0	8.010	1.250	0.114	0.289	1.250
33	511D336M100CD4D	10.0 x 16.0	4.440	0.531	0.165	0.477	0.531
56	511D566M100CG4D	10.0 x 20.0	2.550	0.351	0.241	0.651	0.351
56	511D566M100DG4D	12.5 x 20.0	2.550	0.265	0.276	0.854	0.265
120	511D127M100DK4D	12.5 x 25.0	1.210	0.215	0.437	1.030	0.215
180	511D187M100EK4D	16.0 x 25.0	0.801	0.134	0.616	1.510	0.134
270	511D277M100EN4D	16.0 x 32.0	0.545	0.108	0.824	1.850	0.108
330	511D337M100ER4D	16.0 x 36.0	0.444	0.076	0.958	2.320	0.078
470	511D477M100FR4D	18.0 x 36.0	0.361	0.071	1.150	2.610	0.074

## STANDARD RATINGS FOR TYPE 511D

Rated Capacitance ( $\mu$ F)	Catalog Number	Nominal Case Size D x L (mm)	Max. ESR	Max. ESR	Max. Ripple Current	Max. Ripple Current	Max. Z
			+25°C 120Hz ( $\Omega$ )	+25°C 20-40kHz ( $\Omega$ )	+85°C 120Hz (A <sub>rms</sub> )	+85°C 20-40kHz (A <sub>rms</sub> )	+25°C 100kHz ( $\Omega$ )
<b>160 VOLTS DC WORKING; 185 VOLTS DC SURGE</b>							
1.8	511D185M160AA4D	6.0 x 11.0	88.01	27.01	0.023	0.042	26.01
3.9	511D395M160BB4D	8.0 x 12.0	40.01	12.25	0.043	0.077	12.01
6.8	511D685M160CC4D	10.0 x 13.0	23.57	7.310	0.067	0.119	7.310
10	511D106M160CD4D	10.0 x 16.0	16.09	4.910	0.086	0.157	4.910
15	511D156M160CG4D	10.0 x 20.0	11.01	3.610	0.116	0.203	3.610
22	511D226M160DG4D	12.5 x 20.0	7.330	3.210	0.162	0.245	3.210
33	511D336M160DK4D	12.5 x 25.0	4.880	2.250	0.216	0.319	2.250
56	511D566M160EK4D	16.0 x 25.0	2.810	1.210	0.329	0.501	1.210
68	511D686M160EN4D	16.0 x 32.0	2.350	0.721	0.396	0.717	0.721
100	511D107M160ER4D	16.0 x 36.0	1.610	0.531	0.504	0.876	0.531
120	511D127M160FR4D	18.0 x 36.0	1.320	0.471	0.598	1.010	0.481
<b>200 VOLTS DC WORKING; 225 VOLTS DC SURGE</b>							
1.5	511D155M200AA4D	6.0 x 11.0	110.0	33.11	0.021	0.038	33.01
3.3	511D335M200BB4D	8.0 x 12.0	48.81	14.01	0.039	0.072	13.90
5.6	511D565M200CC4D	10.0 x 13.0	28.08	8.410	0.061	0.111	8.410
8.2	511D825M200CD4D	10.0 x 16.0	19.41	4.910	0.078	0.156	4.910
12	511D126M200CG4D	10.0 x 20.0	13.21	3.610	0.106	0.203	3.610
22	511D226M200DG4D	12.5 x 20.0	7.330	3.210	0.162	0.245	3.210
33	511D336M200DK4D	12.5 x 25.0	4.880	2.250	0.216	0.319	2.250
47	511D476M200EK4D	16.0 x 25.0	3.384	1.210	0.299	0.501	1.210
68	511D686M200EN4D	16.0 x 32.0	2.350	0.721	0.396	0.717	0.721
82	511D826M200ER4D	16.0 x 36.0	1.940	0.531	0.458	0.876	0.531
120	511D127M200FR4D	18.0 x 36.0	1.420	0.481	0.577	0.991	0.491
<b>250 VOLTS DC WORKING; 275 VOLTS DC SURGE</b>							
1.2	511D125M250AA4D	6.0 x 11.0	132.0	34.91	0.019	0.037	34.01
2.7	511D275M250BB4D	8.0 x 12.0	60.01	15.91	0.035	0.067	15.01
3.9	511D395M250CC4D	10.0 x 13.0	40.01	10.61	0.051	0.099	10.01
6.8	511D685M250CD4D	10.0 x 16.0	23.57	5.010	0.071	0.155	5.010
10	511D106M250CG4D	10.0 x 20.0	16.09	3.760	0.096	0.198	3.760
12	511D126M250DG4D	12.5 x 20.0	13.20	3.220	0.121	0.245	3.220
18	511D186M250DK4D	12.5 x 25.0	8.810	2.250	0.161	0.319	2.250
33	511D336M250EK4D	16.0 x 25.0	4.880	1.270	0.249	0.489	1.270
47	511D476M250EN4D	16.0 x 32.0	3.380	0.721	0.331	0.717	0.721
56	511D566M250ER4D	16.0 x 36.0	2.080	0.531	0.381	0.867	0.531
82	511D826M250FR4D	18.0 x 36.0	1.940	0.491	0.493	0.983	0.501

## 511D TYPICAL PERFORMANCE PROFILES

### TEMPERATURE CHARACTERISTICS



## 511D TYPICAL PERFORMANCE PROFILES

### FREQUENCY CHARACTERISTICS

