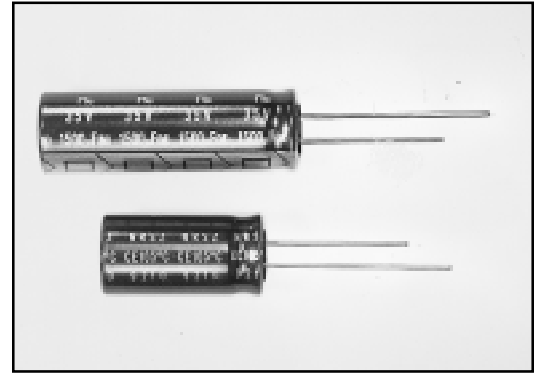


### LOW IMPEDANCE AT HIGH FREQUENCY RADIAL LEADS, POLARIZED ALUMINUM ELECTROLYTIC CAPACITORS

#### FEATURES

- VERY LOW IMPEDANCE
- LONG LIFE AT 105°C (2000 ~ 5000 hrs.)
- HIGH STABILITY AT LOW TEMPERATURE
- IDEALLY SUITED FOR USE IN SWITCHING POWER SUPPLIES AND CONVERTORS



#### CHARACTERISTICS

Rated Voltage Range		6.3 ~ 100 VDC							
Capacitance Range		0.47 ~ 12,000μF							
Operating Temperature Range		-55 ~ +105°C							
Capacitance Tolerance		± 20% (M)							
Max. Leakage Current @ (20°C)	After 1 min.	0.03CV or 4μA , whichever if greater							
	After 2 min.	0.01CV or 3μA , whichever if greater							
Max. Tan δ @ 120Hz/20°C	W.V. (Vdc)	6.3	10	16	25	35	50	63	100
	S.V. (Vdc)	8	13	20	32	44	63	79	125
	C < 1,200μF	0.22	0.19	0.16	0.14	0.12	0.10	0.08	0.07
	C = 1,500μF	0.23	0.20	0.17	0.15	0.13	0.11		
	C = 1,800μF	0.23	0.20	0.17	0.15	0.13	0.11		
	C = 2,200μF	0.24	0.21	0.18	0.16	0.14			
	C = 2,700μF	0.25	0.22	0.19	0.17	0.15			
	C = 3,300μF	0.26	0.23	0.20	0.18	0.16			
	C = 3,900μF	0.28	0.25	0.22	0.20				
	C = 4,700μF	0.29	0.26	0.23	0.21				
	C = 5,600μF	0.31	0.28	0.25					
	C = 6,800μF	0.33	0.30	0.27					
	C = 8,200μF	0.36	0.33						
	C = 10,000μF	0.40							
C = 12,000μF	0.44								
Low Temperature Stability Impedance Ratio @ 120Hz	Z-25°C/Z+20°C	3	2	2	2	2	2	2	2
	Z-40°C/Z+20°C	4	3	3	3	3	3	3	3
Load Life Test at Rated W.V. & 105°C 5,000 Hours: 12.5Ø ~ 3,000 Hours: 8 ~ 10 Ø* 2,000 Hours: 5 ~ 6.3 Ø	Capacitance Change	Within ±20% of initial measured value							
	Tan δ	Less than 200% of specified maximum value							
	Leakage Current	Less than specified maximum value							
Shelf Life Test 105°C 1,000 Hours No Load	Capacitance Change	Within ±20% of initial measured value							
	Tan δ	Less than 200% of specified maximum value							
	Leakage Current	Less than specified maximum value							

\*NRSZ102M6.3V8X20 is 4,500 Hours @ 105°C

Unless otherwise specified here, capacitor shall meet JIS C-5141 Characteristics W.

#### RIPPLE CURRENT CORRECTION FACTORS

##### 1. Temperature Factors

Ambient Temperature	≤+70°C	+85°C	+105°C
Correction Factor	1.96	1.68	1.0

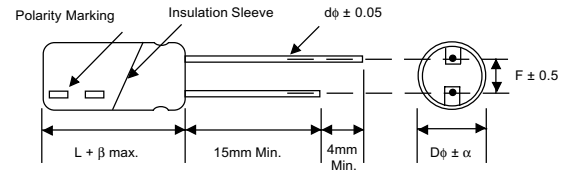
##### 2. Frequency Factors

Cap. (μF)	Frequency (Hz)			
	120	1K	10K	100K
0.47 ~ 4.7	0.40	0.68	0.78	1.0
5.6 ~ 47	0.50	0.76	0.87	1.0
56 ~ 270	0.70	0.85	0.90	1.0
330 ~ 1000	0.80	0.93	0.98	1.0
1200 ~ 12,000	0.90	0.95	1.0	1.0



### LEAD SPACING AND DIAMETER

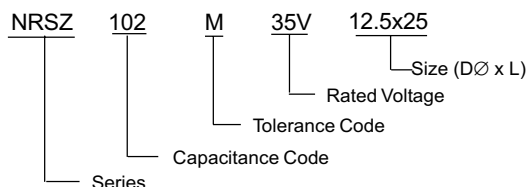
Case Dia. (D $\phi$ )	5	6.3	8	10	12.5	16	18
Lead Space (F)	2.0	2.5	3.5	5.0		7.5	
Lead Dia. (d $\phi$ )	0.5		0.6			0.8	
Dim. a	0.5						
Dim. b	1.0			2.0			



### STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

WV (Vdc)	Cap. ( $\mu$ F)	Code	Case Size D $\times$ L (mm)	Lead Space (mm)	Max. Tan $\delta$	Max. L.C. ( $\mu$ A)	Max. Impedance ( $\Omega$ )		Max. Ripple Current at 100kHz/105°C (mA $r$ ms)
							100kHz/20°C	100kHz/-10°C	
6.3	100	101	5 x 11	2.0	0.22	6.3	0.90	1.8	100
	220	221	6.3 x 11	2.5	0.22	13.9	0.30	0.60	280
	330	331	6.3 x 11	2.5	0.22	20.8	0.22	0.44	300
			8 x 11.5	3.5	0.22	20.8	0.19	0.38	410
	470	471	8 x 11.5	3.5	0.22	29.6	0.11	0.22	560
	680	681	8 x 15	3.5	0.22	42.8	0.085	0.17	730
	820	821	10 x 12.5	5.0	0.22	51.7	0.085	0.17	800
	1000	102	8 x 20	3.5	0.22	63.0	0.069	0.14	800
	1200	122	10 x 16	5.0	0.22	75.6	0.062	0.13	1050
	1500	152	10 x 20	5.0	0.23	94.5	0.044	0.088	1250
	2200	222	12.5 x 20	5.0	0.24	138	0.048	0.096	1400
	2700	272	12.5 x 25	5.0	0.25	170	0.038	0.076	1600
	3900	392	12.5 x 25	5.0	0.28	245	0.029	0.058	1800
	4700	472	12.5 x 25	5.0	0.29	296	0.029	0.058	1800
5600	562	16 x 25	7.5	0.31	353	0.022	0.044	2100	
12000	123	18 x 35.5	7.5	0.44	756	0.018	0.036	2800	
10	68	680	5 x 11	2.0	0.19	6.8	0.90	1.8	160
	82	820	5 x 11	2.0	0.19	8.2	0.65	1.3	175
	100	101	5 x 11	2.0	0.19	10.0	0.42	0.84	190
	150	151	6.3 x 11	2.5	0.19	15.0	0.31	0.62	280
	180	181	6.3 x 11	2.5	0.19	18.0	0.31	0.62	280
	220	221	6.3 x 11	2.5	0.19	22.0	0.22	0.44	300
	330	331	8 x 11.5	3.5	0.19	33.0	0.11	0.28	560
	470	471	8 x 15	3.5	0.19	47.0	0.085	0.17	610
			10 x 12.5	5.0	0.19	47.0	0.12	0.24	730
	560	561	10 x 16	5.0	0.19	56.0	0.095	0.19	735
	680	681	8 x 20	3.5	0.19	68.0	0.069	0.14	800
			10 x 12.5	5.0	0.19	68.0	0.085	0.17	800
	1000	102	12.5x16	5.0	0.19	100	0.063	0.126	1150
			10x20	5.0	0.19	100	0.050	0.10	1200
	1200	122	10 x 20	5.0	0.19	120	0.044	0.088	1250
	1500	152	10 x 22	5.0	0.20	150	0.039	0.078	1450
	2200	222	12.5 x 20	5.0	0.22	220	0.038	0.076	1400
12.5 x 25			5.0	0.22	220	0.037	0.074	1700	
2700	272	12.5 x 25	5.0	0.22	270	0.029	0.058	1800	

### PART NUMBERING SYSTEM



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### STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

W.V. (Vdc)	Cap. ( $\mu$ F)	Code	Case Size D $\times$ XL(mm)	Lead Space (mm)	Max. Tan $\delta$	Max. L.C. ( $\mu$ A)	Max. Impedance ( $\Omega$ )		Max. Ripple Current at 100kHz/105°C (mArms)
							100kHz/20°C	100kHz/10°C	
10	3300	332	12.5 x 25	5.0	0.23	330	0.035	0.070	1700
	3900	392	16 x 25	7.5	0.25	390	0.028	0.056	2070
	4700	472	16 x 31.5	7.5	0.26	470	0.024	0.048	2350
	5600	562	16 x 31.5	7.5	0.28	560	0.024	0.048	2350
	6800	682	16 x 35.5	7.5	0.30	680	0.022	0.044	2550
	8200	822	18 x 35.5	7.5	0.33	820	0.020	0.040	2800
16	47	470	5 x 11	2.0	0.16	7.5	0.90	1.8	180
	56	560	5 x 11	2.0	0.16	9.0	0.90	1.8	180
	100	101	6.3 x 11	2.5	0.16	16.0	0.32	0.64	280
	120	121	6.3 x 11	2.5	0.16	19.2	0.31	0.62	290
	150	151	6.3 x 11	2.5	0.16	24.0	0.22	0.44	300
	180	181	6.3 x 11	2.5	0.16	28.8	0.24	0.48	280
	220	221	8 x 11.5	3.5	0.16	35.2	0.11	0.32	560
	270	271	8 x 12.5	3.5	0.16	43.2	0.11	0.28	570
	330	331	8 x 15	3.5	0.16	52.8	0.085	0.17	730
			10 x 12.5	5.0	0.16	52.8	0.10	0.20	650
	470	471	8 x 20	3.5	0.16	75.2	0.069	0.14	800
			10 x 16	5.0	0.16	75.2	0.090	0.18	950
	680	681	10 x 20	5.0	0.16	108	0.054	0.11	1250
	820	821	10 x 20	5.0	0.16	131	0.044	0.09	1250
	1000	102	10 x 22	5.0	0.16	160	0.039	0.078	1450
	1200	122	12.5 x 20	5.0	0.16	192	0.038	0.076	1600
	1800	182	12.5 x 25	5.0	0.17	288	0.029	0.058	1800
	2200	222	12.5 x 25	5.0	0.18	352	0.037	0.074	1700
			16 x 21	7.5	0.18	352	0.040	0.08	1700
	2700	272	16 x 25	7.5	0.19	432	0.022	0.044	2100
3900	392	16 x 31.5	7.5	0.22	624	0.018	0.036	2350	
4700	472	16 x 35.5	7.5	0.23	752	0.018	0.036	2550	
5600	562	18 x 35.5	7.5	0.25	896	0.018	0.036	2800	
25	33	330	5 x 11	2.0	0.14	8.3	0.90	1.8	160
	47	470	5 x 11	2.0	0.14	11.7	0.42	0.84	190
	68	680	6.3 x 11	2.5	0.14	17.0	0.32	0.64	280
	100	101	6.3 x 11	2.5	0.14	25.0	0.22	0.48	300
	150	151	8 x 11.5	3.5	0.14	37.5	0.11	0.22	560
	180	181	8 x 12.5	3.5	0.14	45.0	0.11	0.22	570

### STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

W.V. (Vdc)	Cap. ( $\mu$ F)	Code	Case Size D x L (mm)	Lead Space (mm)	Max. Tan $\delta$	Max. L.C. ( $\mu$ A)	Max. Impedance ( $\Omega$ )		Max. Ripple Current at 100kHz/105°C (mA rms)
							100kHz/20°C	100kHz/-10°C	
25	220	221	8 x 15	3.5	0.14	55.0	0.085	0.18	730
			10 x 12.5	5.0	0.14	55.0	0.12	0.24	630
	270	271	10 x 12.5	5.0	0.14	67.5	0.085	0.18	800
			330	331	8 x 20	3.5	0.14	82.5	0.069
	10 x 16	5.0	0.14		82.5	0.09	0.18	830	
	470	471	12.5x16	5.0	0.14	117	0.063	0.126	1150
			10 x 16	5.0	0.14	117	0.065	0.13	1010
	560	561	10 x 20	5.0	0.14	140	0.044	0.088	1250
	680	681	10 x 22	5.0	0.14	170	0.039	0.078	1450
	1000	102	12.5 x 20	5.0	0.14	250	0.038	0.076	1600
	1200	122	12.5 x 25	5.0	0.14	300	0.029	0.058	1800
	1800	182	16 x 25	7.5	0.15	450	0.022	0.044	2100
	2200	222	16 x 25	7.5	0.16	550	0.029	0.058	2000
	2700	272	16 x 31.5	7.5	0.17	675	0.018	0.038	2350
3300	332	16 x 35.5	7.5	0.18	825	0.018	0.038	2550	
3900	392	18 x 31.5	7.5	0.20	975	0.018	0.046	2800	
4700	472	18 x 35.5	7.5	0.12	1175	0.021	0.042	2700	
35	22	220	5 x 11	2.0	0.12	7.7	0.42	0.84	190
	33	330	6.3 x 11	2.5	0.12	11.6	0.42	0.84	190
	47	470	6.3 x 11	2.5	0.12	16.5	0.32	0.64	280
	68	680	6.3 x 11	2.5	0.12	19.6	0.22	0.44	300
	82	820	6.3 x 11	2.5	0.14	28.7	0.24	0.48	280
	100	101	8 x 11.5	3.5	0.12	35.0	0.11	0.22	560
	120	121	8 x 12.5	3.5	0.12	42.0	0.11	0.22	570
			10 x 12.5	5.0	0.12	42.0	0.14	0.28	560
	150	151	8 x 15	3.5	0.12	52.5	0.085	0.17	730
			10 x 12.5	5.0	0.12	52.5	0.12	0.24	635
	220	221	8 x 20	3.5	0.12	77.0	0.069	0.14	800
			10 x 16	5.0	0.12	77.0	0.085	0.17	950
	330	331	10 x 20	5.0	0.12	115	0.044	0.088	1250
	390	391	10 x 20	5.0	0.12	136	0.054	0.11	1190
	470	471	10 x 20	5.0	0.12	164	0.054	0.11	1250
	560	561	12.5 x 20	5.0	0.12	196	0.042	0.084	1400
	680	681	12.5 x 20	5.0	0.12	238	0.038	0.076	1600
	1000	102	12.5 x 25	5.0	0.12	350	0.029	0.058	1800
			16 x 21	7.5	0.12	350	0.037	0.074	1700
	1200	122	16 x 25	7.5	0.12	420	0.029	0.058	2000
1500	152	16 x 25	7.5	0.13	525	0.022	0.044	2100	
2200	222	16 x 31	7.5	0.14	770	0.018	0.036	2350	
		16 x 35.5	7.5	0.14	770	0.018	0.036	2550	
2700	272	18 x 35.5	7.5	0.15	945	0.018	0.036	2800	
3300	332	18 x 35.5	7.5	0.16	1155	0.022	0.044	2700	

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## STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

W.V. (Vdc)	Cap. ( $\mu$ F)	Code	Case Size D x L(mm)	Lead Space (mm)	Max. Tan $\delta$	Max. L.C. ( $\mu$ A)	Max Impedance		Max. Ripple Current at 100kHz/105°C (mA rms)
							100kHz/20°C	100kHz/-10°C	
50	1.0	1R0	5 x 11	2.0	0.10	3.0	3.3	6.6	30
	2.2	2R2	5 x 11	2.0	0.10	3.0	3.0	6.0	45
	4.7	4R7	5 x 11	2.0	0.10	3.0	2.0	4.0	90
	10	100	5 x 11	2.0	0.10	5.0	1.7	3.4	110
	15	150	5 x 11	2.0	0.10	7.5	1.2	2.4	130
	18	180	5 x 11	2.0	0.10	9.0	1.0	2.0	150
	22	220	5 x 11	2.0	0.10	11.0	0.70	1.4	160
	33	330	6.3 x 11	2.5	0.10	16.5	0.55	1.1	200
	39	390	6.3 x 11	2.5	0.10	19.5	0.55	1.1	200
	47	470	6.3 x 11	2.5	0.10	23.5	0.43	0.86	220
	68	680	8 x 11.5	3.5	0.10	34.0	0.26	0.52	360
	82	820	8 x 12.5	3.5	0.10	41.0	0.24	0.48	400
	100	101	8 x 15	3.5	0.10	50.0	0.18	0.36	500
			10 x 12.5	5.0	0.10	50.0	0.25	0.50	520
	120	121	10 x 12.5	5.0	0.10	60.0	0.16	0.32	550
	150	151	8 x 20	3.5	0.10	75.0	0.16	0.32	650
	180	181	10 x 16	5.0	0.10	90.0	0.12	0.24	760
	220	221	10 x 20	5.0	0.10	110	0.10	0.20	850
	330	331	10 x 22	5.0	0.10	165	0.072	0.16	1000
	470	471	12.5 x 20	5.0	0.10	235	0.059	0.12	1200
560	561	12.5 x 25	5.0	0.10	280	0.045	0.092	1400	
1000	102	16 x 25	7.5	0.10	500	0.039	0.078	1750	
1200	122	16 x 31.5	7.5	0.10	600	0.025	0.058	2100	
1500	152	16 x 35.5	7.5	0.11	750	0.025	0.058	2300	
1800	182	18 x 35.5	7.5	0.11	900	0.024	0.048	2400	

## STANDARD PRODUCTS, CASE SIZES AND SPECIFICATIONS

W.V. (Vdc)	Cap. (μF)	Code	Case Size DØ XL(mm)	Lead Space (mm)	Max. Tanδ	Max. L.C. (μA)	Max Impedance		Max. Ripple Current at 100kHz/105°C (mA rms)
							100kHz/20°C	100kHz/-10°C	
63	18	180	5 x 11	2.0	0.08	7.6	1.6	3.2	140
	33	330	6.3 x 11	2.5	0.08	17.0	0.90	1.8	200
	39	390	6.3 x 11	2.5	0.08	24.6	0.90	1.80	200
	47	470	8 x 11.5	3.5	0.08	29.6	0.52	1.04	275
	56	560	8 x 11.5	3.5	0.08	35.3	0.52	1.04	275
	68	680	8 x 11.5	3.5	0.08	42.8	0.52	1.04	275
	82	820	8 x 15	3.5	0.08	51.7	0.34	0.68	360
	120	121	8 x 20	3.5	0.08	75.6	0.21	0.42	510
			10 x 12.5	5.0	0.08	75.6	0.26	0.52	420
	150	151	10 x 16	5.0	0.08	91.5	0.20	0.40	525
	220	221	10 x 20	5.0	0.08	138	0.15	0.30	765
	270	271	10 x 22	5.0	0.08	170	0.12	0.24	840
	330	331	12.5 x 20	5.0	0.08	208	0.10	0.20	960
	470	471	12.5 x 25	5.0	0.08	296	0.064	0.13	1200
	680	681	16 x 25	7.5	0.08	428	0.052	0.11	1500
1000	102	16 x 31.5	7.5	0.08	630	0.042	0.09	1750	
100	5.6	5R6	5 x 11	2.0	0.07	5.6	2.7	5.4	120
	10	100	6.3 x 11	2.5	0.07	10	1.4	2.8	120
	12	120	6.3 x 11	2.5	0.07	12	1.4	2.8	170
	15	150	8 x 11.5	3.5	0.07	15	0.81	1.62	230
	22	220	8 x 11.5	3.5	0.07	22	0.81	1.62	230
	27	270	8 x 15	3.5	0.07	27	0.64	1.3	295
	39	390	8 x 20	3.5	0.07	39	0.36	0.72	400
	47	470	10 x 16	5.0	0.07	47	0.35	0.70	420
	68	680	10 x 20	5.0	0.07	68	0.24	0.48	630
	100	101	12.5 x 20	5.0	0.07	100	0.15	0.30	800
	150	151	12.5 x 25	5.0	0.07	150	0.11	0.22	920
	220	221	16 x 25	7.5	0.07	220	0.071	0.15	1100
	330	331	16 x 31.5	7.5	0.07	330	0.049	0.10	1490
	390	391	16 x 35.5	7.5	0.07	390	0.043	0.09	1630
470	471	18 x 35.5	7.5	0.07	470	0.038	0.08	1700	

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