DATA SHEET

135 RLI
Aluminium electrolytic capacitors
Radial, Low Impedance

Product specification
Supersedes data of January 1998
File under BC Components, BC01

1999 Apr 14

BC COMPONENTS

Aluminium electrolytic capacitors
Radial, Low Impedance

135 RLI

FEATURES

- Polarized aluminium electrolytic capacitors, non-solid
- Radial leads, cylindrical aluminium case with pressure relief, insulated with a blue vinyl sleeve
- Charge and discharge proof
- Long useful life:
  1500 to 2500 hours at 105 °C
- Low ESR, low impedance, high ripple current capability.

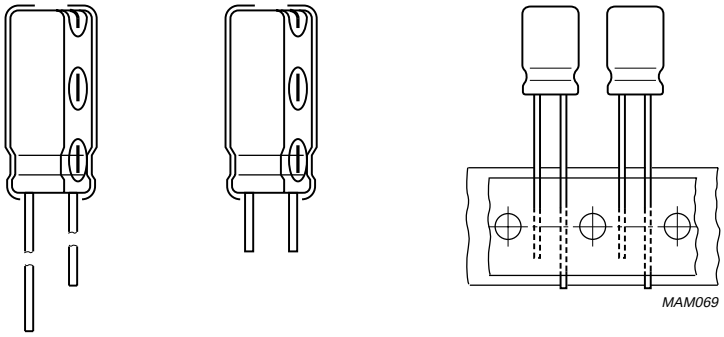
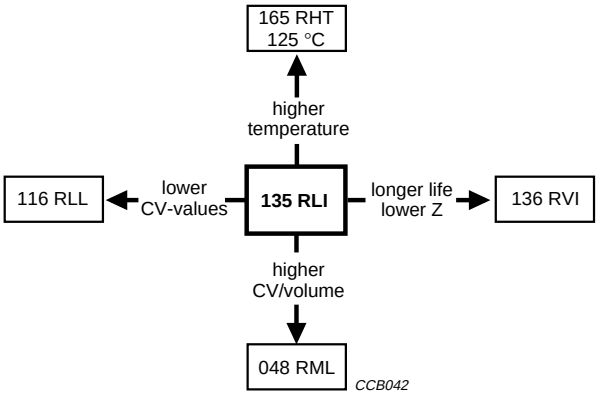


Fig.1 Component outlines.

APPLICATIONS

- General industrial, EDP, telecommunication and audio-video
- Smoothing, filtering, buffering in SMPS and DC/DC converters.



QUICK REFERENCE DATA

DESCRIPTION	VALUE	
Case sizes ($\varnothing D_{nom} \times L_{nom}$ in mm)	8×12 to 8×20	10×12 to 18×40
Rated capacitance range, C_R	22 to 10000 µF	
Tolerance on C_R	±20%	
Rated voltage range, U_R	6.3 to 100 V	
Category temperature range	–55 to +105 °C	
Endurance test at 105 °C	1000 hours	2000 hours
Useful life at 105 °C	1500 hours	2500 hours
Useful life at 40 °C, $1.3 \times I_R$ applied	150000 hours	250000 hours
Shelf life at 0 V, 105 °C	1000 hours	1000 hours
Based on sectional specification	IEC 60384-4/CECC 30300	
Climatic category IEC 60068	55/105/56	

Aluminium electrolytic capacitors
Radial, Low Impedance

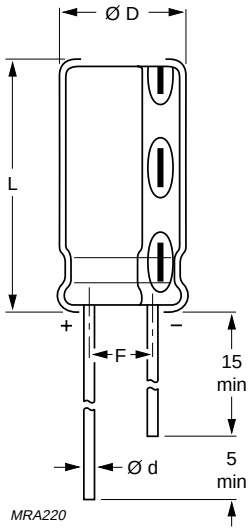
135 RLI

Selection chart for C_R, U_R and relevant nominal case sizes (∅D × L in mm)

Preferred types in **bold**.

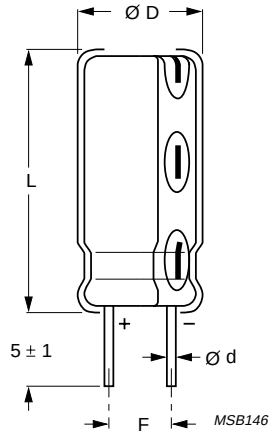
C_R (µF)	U_R (V)							
	6.3	**10**	**16**	**25**	**35**	**50**	**63**	**100**
22	–	–	–	–	–	–	–	8 × 12
47	–	–	–	–	–	–	8 × 12	–
100	–	–	–	–	8 × 12	**10 × 16**	–	**12.5 × 20**
220	–	–	8 × 12	8 × 15	8 × 20	10 × 25	**12.5 × 20**	16 × 25
330	–	–	8 × 15	–	10 × 20	12.5 × 20	–	16 × 31
	–	–	–	–	–	–	–	18 × 25
470	10 × 12	8 × 15	8 × 20	**10 × 20**	10 × 30	**12.5 × 25**	**16 × 25**	16 × 40
	–	–	–	–	–	18 × 15	–	–
680	10 × 16	–	10 × 20	–	12.5 × 25	–	16 × 31	18 × 40
1000	–	**12.5 × 16**	10 × 30	**12.5 × 25**	**12.5 × 31**	**16 × 31**	16 × 40	–
	–	–	–	–	**16 × 20**	–	–	–
1500	–	10 × 30	12.5 × 25	12.5 × 31	12.5 × 40	16 × 40	–	–
2200	12.5 × 20	**12.5 × 25**	12.5 × 31	12.5 × 40	**16 × 35**	18 × 40	–	–
	–	18 × 15	**16 × 20**	18 × 20	18 × 31	–	–	–
3300	–	12.5 × 35	–	**16 × 35**	18 × 40	–	–	–
	–	16 × 20	–	18 × 31	–	–	–	–
4700	–	16 × 31	16 × 35	18 × 40	–	–	–	–
	–	18 × 25	18 × 31	–	–	–	–	–
6800	16 × 31	16 × 35	18 × 35	–	–	–	–	–
10000	18 × 31	18 × 40	–	–	–	–	–	–

MECHANICAL DATA, AVAILABLE FORMS AND PACKAGING QUANTITIES



Dimensions in mm.
For dimensions see Table 1.

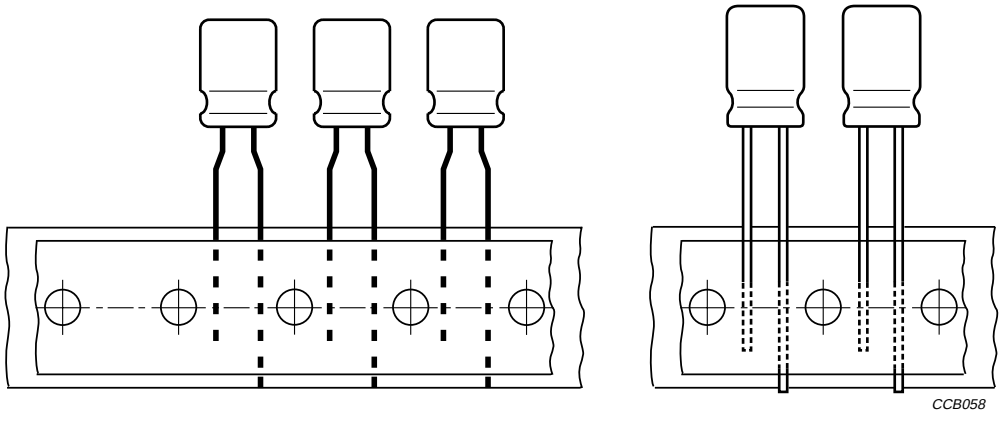
Fig.2 **Form CA**: Long leads.



Dimensions in mm.
For dimensions see Table 1.

Fig.3 **Form CB**: Cut leads.

Taped products



Form TFA:
Tape dimensions are specified in data handbook PA01, section *"Packaging"*.

Fig.4 Taped in box (ammopack).

Table 1 Physical dimensions, mass and packaging quantities; see Figs 2 and 3

NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	∅d (mm)	$\varnothing D_{max}$ (mm)	L_{max} (mm)	F (mm)	MASS (g)	PACKAGING QUANTITIES		
							FORM CA	FORM CB	FORM TFA
8 × 12	13	0.6	8.5	13	3.5 ±0.5	≈1.1	1000	2000	1000
8 × 15	13L	0.6	8.5	16	3.5 ±0.5	≈1.3	1000	2000	1000
8 × 20	13LL	0.6	8.5	21	3.5 ±0.5	≈1.5	1000	1000	1000
10 × 12	14	0.6	10.5	13.5	5 ±0.5	≈1.6	1000	500	800
10 × 16	15	0.6	10.5	17.5	5 ±0.5	≈1.9	500	500	800
10 × 20	16	0.6	10.5	22	5 ±0.5	≈2.2	500	500	800
10 × 25	16L	0.6	10.5	27	5 ±0.5	≈3.0	1000	1500	800
10 × 30	16LL	0.6	10.5	32	5 ±0.5	≈3.5	1000	750	–
12.5 × 16	17a	0.6	13	17.5	5 ±0.5	≈2.7	1000	1500	500
12.5 × 20	17	0.6	13	22	5 ±0.5	≈4.0	500	500	500
12.5 × 25	18	0.6	13	27	5 ±0.5	≈5.0	250	250	500
12.5 × 31	18L	0.6	13	33.5	5 ±0.5	≈5.5	1000	750	–
12.5 × 35	18LL	0.6	13	37.5	5 ±0.5	≈6.0	500	750	–
12.5 × 40	1240	0.6	13	42	5 ±0.5	≈7.5	500	750	–
16 × 20	19a	0.8	16.5	22	7.5 ±0.5	≈6.0	250	250	250
16 × 25	19	0.8	16.5	27	7.5 ±0.5	≈8.0	250	250	250
16 × 31	20	0.8	16.5	33.5	7.5 ±0.5	≈9.0	100	100	250
16 × 35	21	0.8	16.5	37.5	7.5 ±0.5	≈11	100	100	–
16 × 40	21L	0.8	16.5	42	7.5 ±0.5	≈13	250	500	–
18 × 15	1815	0.8	18.5	17	7.5 ±0.5	≈6.0	500	500	–
18 × 20	1820	0.8	18.5	22	7.5 ±0.5	≈8.0	100	100	–
18 × 25	1825	0.8	18.5	27.0	7.5 ±0.5	≈10	100	100	–
18 × 31	1831	0.8	18.5	33.5	7.5 ±0.5	≈12.5	100	100	–
18 × 35	22	0.8	18.5	37.5	7.5 ±0.5	≈14.5	100	100	–
18 × 40	23	0.8	18.5	42	7.5 ±0.5	≈16	250	500	–

MARKING

The capacitors are marked (where possible) with the following information:

- Rated capacitance (in μF)
- Tolerance on rated capacitance, code letter in accordance with *"IEC 60062"*
- Rated voltage (in V)
- Upper category temperature (105 °C)
- Group number (135)
- Name of manufacturer
- Date code, in accordance with *"IEC 60062"*
- Code indicating factory of origin
- Negative terminal identification.

ELECTRICAL DATA

Unless otherwise specified, all electrical values in Tables 2, 4 and 6 apply at T_{amb} = 20 °C, P = 86 to 106 kPa, RH = 45 to 75%.

SYMBOL	DESCRIPTION
C_R	rated capacitance at 120 Hz, tolerance ± 20%
I_R	rated RMS ripple current at 120 Hz, 105 °C
I_{RH}	rated RMS ripple current at 100 kHz, 105 °C
I_{L1}	max. leakage current after 1 minute at U_R
I_{L2}	max. leakage current after 2 minutes at U_R
Tan δ	max. dissipation factor at 120 Hz
ESR	equivalent series resistance at 120 Hz (calculated from tan δ_{max} and C_R)
Z	max. impedance at 100 kHz and 20 or −10 °C

Table 2 Electrical data; preferred types in **bold**

U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	I_R 120 Hz 105 °C (mA)	I_{RH} 100 kHz 105 °C (mA)	I_{L1} 1 min (μA)	I_{L2} 2 min (μA)	Tan δ 120 Hz	ESR 120 Hz (Ω)	Z 100 kHz 20 °C (Ω)	Z 100 kHz −10 °C (Ω)
6.3	470	10 × 12	14	410	510	89	30	0.22	0.62	0.28	0.73
	680	10 × 16	15	510	640	129	43	0.22	0.43	0.22	0.57
	2200	12.5 × 20	17	1000	1100	416	140	0.24	0.14	0.089	0.23
	6800	16 × 31	20	1600	1800	1290	430	0.32	0.062	0.055	0.14
	10000	18 × 31	1831	1800	2000	1890	630	0.40	0.053	0.047	0.12
10	470	8 × 15	13L	400	500	141	47	0.19	0.54	0.24	0.62
	1000	**12.5 × 16**	**17a**	780	970	300	100	0.19	0.25	0.12	0.31
	1500	10 × 30	16LL	1000	1200	450	150	0.19	0.17	0.093	0.24
	2200	**12.5 × 25**	**18**	1200	1300	660	220	0.21	0.13	0.073	0.19
	2200	18 × 15	1815	1200	1300	660	220	0.21	0.13	0.080	0.21
	3300	12.5 × 35	18LL	1600	1800	990	330	0.23	0.092	0.052	0.14
	3300	16 × 20	19a	1200	1400	990	330	0.23	0.092	0.075	0.20
	4700	16 × 31	20	1600	1800	1410	470	0.25	0.071	0.054	0.14
	4700	18 × 25	1825	1700	1800	1410	470	0.25	0.071	0.053	0.14
	6800	16 × 35	21	1800	2000	2040	680	0.29	0.057	0.046	0.12
	10000	18 × 40	23	2200	2500	3000	1000	0.37	0.049	0.037	0.096

ORDERING EXAMPLE

Electrolytic capacitor 135 series

1000 μF/16 V; ±20%

Nominal case size: ∅10 × 30 mm; Form CB

Catalogue number: 2222 135 65102.

Table 3 Ordering information; preferred types in **bold**

U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	CATALOGUE NUMBER 2222					
				BULK PACKAGING				TAPED	
				LONG LEADS		CUT LEADS			
				FORM CA	F (mm)	FORM CB	F (mm)	FORM TFA	F (mm)
6.3	470	10 × 12	14	135 53471	5.0	135 63471	5.0	135 33471	5.0
	680	10 × 16	15	135 53681	5.0	135 63681	5.0	135 33681	5.0
	2200	12.5 × 20	17	135 53222	5.0	135 63222	5.0	135 33222	5.0
	6800	16 × 31	20	135 53682	7.5	135 63682	7.5	135 33682	7.5
	10000	18 × 31	1831	135 53103	7.5	135 63103	7.5	–	–
10	470	8 × 15	13L	135 54471	3.5	135 84471	3.5	135 34471	5.0
	1000	**12.5 × 16**	**17a**	135 54102	5.0	**135 64102**	5.0	**135 34102**	5.0
	1500	10 × 30	16LL	135 54152	5.0	135 64152	5.0	–	–
	2200	**12.5 × 25**	**18**	135 54222	5.0	**135 64222**	5.0	**135 34222**	5.0
	2200	18 × 15	1815	135 90001	7.5	135 90002	7.5	–	–
	3300	12.5 × 35	18LL	135 54332	5.0	135 64332	5.0	–	–
	3300	16 × 20	19a	135 90025	7.5	135 90026	7.5	135 90042	7.5
	4700	16 × 31	20	135 54472	7.5	135 64472	7.5	135 34472	7.5
	4700	18 × 25	1825	135 90003	7.5	135 90004	7.5	–	–
	6800	16 × 35	21	135 54682	7.5	135 64682	7.5	–	–
	10000	18 × 40	23	135 54103	7.5	135 64103	7.5	–	–

ELECTRICAL DATA (continued)

Table 4 Electrical data continued; preferred types in **bold**

U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	I_R 120 Hz 105 °C (mA)	I_{RH} 100 kHz 105 °C (mA)	I_{L1} 1 min (μA)	I_{L2} 2 min (μA)	Tan δ 120 Hz	ESR 120 Hz (Ω)	Z 100 kHz 20 °C (Ω)	Z 100 kHz −10 °C (Ω)
16	220	8 × 12	13	220	400	106	35	0.16	0.96	0.33	0.86
	330	8 × 15	13L	350	500	158	53	0.16	0.64	0.23	0.60
	470	8 × 20	13LL	520	650	226	75	0.16	0.45	0.18	0.47
	680	10 × 20	16	690	860	326	110	0.16	0.31	0.14	0.36
	1000	10 × 30	16LL	920	1200	480	160	0.16	0.21	0.091	0.24
	1500	12.5 × 25	18	1200	1300	720	240	0.16	0.14	0.072	0.19
	2200	12.5 × 31	18L	1400	1500	1060	350	0.18	0.11	0.063	0.16
	2200	**16 × 20**	**19a**	1200	1400	1060	350	0.18	0.11	0.073	0.19
	4700	16 × 35	21	1800	2000	2260	750	0.22	0.062	0.046	0.12
	4700	18 × 31	1831	1800	2000	2260	750	0.22	0.062	0.046	0.12
	6800	18 × 35	22	2000	2200	3260	1100	0.26	0.051	0.040	0.10
25	220	8 × 15	13L	350	500	165	55	0.14	0.84	0.23	0.60
	470	**10 × 20**	**16**	690	860	353	120	0.14	0.40	0.14	0.36
	1000	**12.5 × 25**	**18**	1100	1300	750	250	0.14	0.19	0.071	0.18
	1500	12.5 × 31	18L	1400	1500	1125	380	0.14	0.12	0.062	0.16
	2200	12.5 × 40	1240	1800	2000	1650	550	0.16	0.10	0.044	0.11
	2200	18 × 20	1820	1400	1600	1650	550	0.16	0.10	0.060	0.16
	3300	**16 × 35**	**21**	1800	2000	2475	830	0.18	0.072	0.045	0.12
	3300	18 × 31	1831	1800	2000	2475	830	0.18	0.072	0.045	0.12
	4700	18 × 40	23	2200	2500	3525	1200	0.20	0.056	0.036	0.94
35	100	8 × 12	13	280	400	105	35	0.12	1.59	0.32	0.83
	220	8 × 20	13LL	460	650	231	77	0.12	0.72	0.18	0.47
	330	10 × 20	16	610	860	347	120	0.12	0.48	0.13	0.34
	470	10 × 30	16LL	920	1200	490	160	0.12	0.34	0.089	0.23
	680	12.5 × 25	18	1100	1300	714	240	0.12	0.23	0.070	0.18
	1000	**12.5 × 31**	**18L**	1400	1500	1050	350	0.12	0.16	0.061	0.16
	1000	**16 × 20**	**19a**	1100	1370	1050	350	0.12	0.16	0.071	0.18
	1500	12.5 × 40	1240	1800	2000	1575	530	0.12	0.11	0.043	0.11
	2200	**16 × 35**	**21**	1800	2000	2310	770	0.14	0.084	0.044	0.11
	2200	18 × 31	1831	1800	2000	2310	770	0.14	0.084	0.044	0.11
	3300	18 × 40	23	2200	2500	3465	1200	0.16	0.064	0.035	0.091

ORDERING INFORMATION (continued)

Table 5 Ordering information continued; preferred types in **bold**

U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	CATALOGUE NUMBER 2222					
				BULK PACKAGING				TAPED	
				LONG LEADS		CUT LEADS			
				FORM CA	F (mm)	FORM CB	F (mm)	FORM TFA	F (mm)
16	220	8 × 12	13	135 55221	3.5	135 85221	3.5	135 35221	5.0
	330	8 × 15	13L	135 55331	3.5	135 85331	3.5	135 35331	5.0
	470	8 × 20	13LL	135 55471	3.5	135 85471	3.5	135 35471	5.0
	680	10 × 20	16	135 55681	5.0	135 65681	5.0	135 35681	5.0
	1000	10 × 30	16LL	135 55102	5.0	135 65102	5.0	–	–
	1500	12.5 × 25	18	135 55152	5.0	135 65152	5.0	135 35152	5.0
	2200	12.5 × 31	18L	135 55222	5.0	135 65222	5.0	–	–
	2200	**16 × 20**	**19a**	135 90007	7.5	**135 90008**	7.5	**135 90043**	7.5
	4700	16 × 35	21	135 55472	7.5	135 65472	7.5	–	–
	4700	18 × 31	1831	135 90009	7.5	135 90011	7.5	–	–
	6800	18 × 35	22	135 55682	7.5	135 65682	7.5	–	–
25	220	8 × 15	13L	135 56221	3.5	135 86221	3.5	135 36221	5.0
	470	**10 × 20**	**16**	135 56471	5.0	**135 66471**	5.0	**135 36471**	5.0
	1000	**12.5 × 25**	**18**	135 56102	5.0	**135 66102**	5.0	**135 36102**	5.0
	1500	12.5 × 31	18L	135 56152	5.0	135 66152	5.0	–	–
	2200	12.5 × 40	1240	135 56222	5.0	135 66222	5.0	–	–
	2200	18 × 20	1820	135 90012	7.5	135 90013	7.5	–	–
	3300	**16 × 35**	**21**	135 56332	7.5	**135 66332**	7.5	–	–
	3300	18 × 31	1831	135 90014	7.5	135 90015	7.5	–	–
	4700	18 × 40	23	135 56472	7.5	135 66472	7.5	–	–
35	100	8 × 12	13	135 50101	3.5	135 80101	3.5	135 30101	5.0
	220	8 × 20	13LL	135 50221	3.5	135 80221	3.5	135 30221	5.0
	330	10 × 20	16	135 50331	5.0	135 60331	5.0	135 30331	5.0
	470	10 × 30	16LL	135 50471	5.0	135 60471	5.0	–	–
	680	12.5 × 25	18	135 50681	5.0	135 60681	5.0	135 30681	5.0
	1000	**12.5 × 31**	**18L**	135 50102	5.0	**135 60102**	5.0	–	–
	1000	**16 × 20**	**19a**	135 90016	7.5	**135 90017**	7.5	**135 90044**	7.5
	1500	12.5 × 40	1240	135 50152	5.0	135 60152	5.0	–	–
	2200	**16 × 35**	**21**	135 50222	7.5	**135 60222**	7.5	–	–
	2200	18 × 31	1831	135 90018	7.5	135 90019	7.5	–	–
	3300	18 × 40	23	135 50332	7.5	135 60332	7.5	–	–

ELECTRICAL DATA (continued)

Table 6 Electrical data continued; preferred types in **bold**

U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	I_R 120 Hz 105 °C (mA)	I_{RH} 100 kHz 105 °C (mA)	I_{L1} 1 min (μA)	I_{L2} 2 min (μA)	Tan δ 120 Hz	ESR 120 Hz (Ω)	Z 100 kHz 20 °C (Ω)	Z 100 kHz −10 °C (Ω)
50	**100**	**10 × 16**	**15**	450	640	150	50	0.10	1.33	0.20	0.52
	220	10 × 25	16L	730	1000	330	110	0.10	0.60	0.11	0.29
	330	12.5 × 20	17	790	1100	495	170	0.10	0.40	0.081	0.22
	470	**12.5 × 25**	**18**	1100	1300	705	240	0.10	0.28	0.068	0.19
	470	18 × 15	1815	1000	1300	705	240	0.10	0.28	0.074	0.19
	1000	**16 × 31**	**20**	1500	1800	1500	500	0.10	0.13	0.050	0.13
	1500	16 × 40	21L	2100	2300	2250	750	0.10	0.088	0.035	0.091
	2200	18 × 40	23	2200	2500	3300	1100	0.12	0.072	0.034	0.091
63	47	8 × 12	13	220	300	89	30	0.08	2.26	0.56	1.5
	220	**12.5 × 20**	**17**	630	890	416	140	0.08	0.48	0.16	0.42
	470	**16 × 25**	**19**	1200	1400	888	300	0.08	0.23	0.091	0.25
	680	16 × 31	20	1400	1800	1285	430	0.08	0.16	0.065	0.18
	1000	16 × 40	21L	1800	2200	1890	630	0.08	0.11	0.049	0.13
100	22	8 × 12	13	120	310	66	22	0.07	4.22	0.53	1.4
	100	**12.5 × 20**	**17**	630	890	300	100	0.07	0.93	0.15	0.40
	220	16 × 25	19	1000	1400	660	220	0.07	0.42	0.086	0.23
	330	16 × 31	20	1300	1800	990	330	0.07	0.28	0.062	0.17
	330	18 × 25	1825	1200	1700	990	330	0.07	0.28	0.074	0.20
	470	16 × 40	21L	1800	2200	1410	470	0.07	0.20	0.047	0.13
	680	18 × 40	23	1900	2400	2040	680	0.07	0.14	0.043	0.12

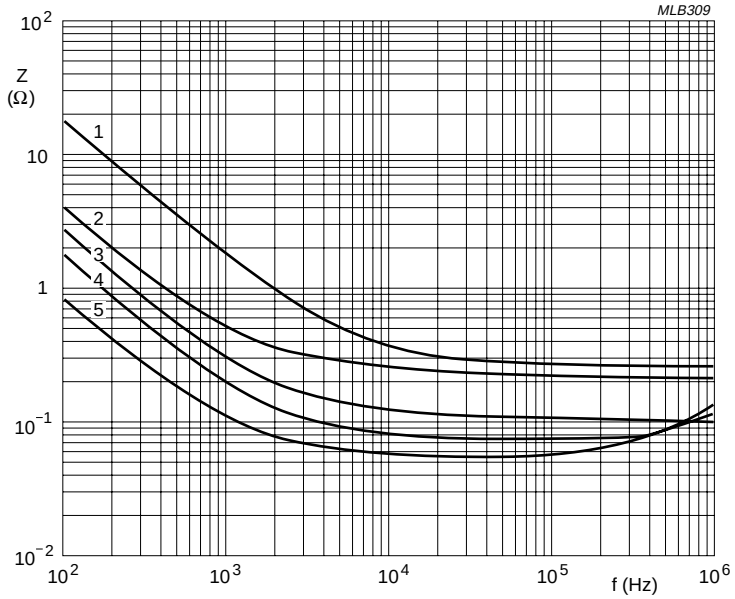
ORDERING INFORMATION (continued)

Table 7 Ordering information continued; preferred types in **bold**

U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	CATALOGUE NUMBER 2222					
				BULK PACKAGING				TAPED	
				LONG LEADS		CUT LEADS			
				FORM CA	F (mm)	FORM CB	F (mm)	FORM TFA	F (mm)
50	**100**	**10 × 16**	**15**	135 51101	5.0	**135 61101**	5.0	**135 31101**	5.0
	220	10 × 25	16L	135 51221	5.0	135 61221	5.0	135 31221	5.0
	330	12.5 × 20	17	135 51331	5.0	135 61331	5.0	135 31331	5.0
	470	**12.5 × 25**	**18**	135 51471	5.0	**135 61471**	5.0	**135 31471**	5.0
	470	18 × 15	1815	135 90021	7.5	135 90022	7.5	–	–
	1000	**16 × 31**	**20**	135 51102	7.5	**135 61102**	7.5	**135 31102**	7.5
	1500	16 × 40	21L	135 51152	7.5	135 61152	7.5	–	–
	2200	18 × 40	23	135 51222	7.5	135 61222	7.5	–	–
63	47	8 × 12	13	135 58479	3.5	135 88479	3.5	135 38479	5.0
	220	**12.5 × 20**	**17**	135 58221	5.0	**135 68221**	5.0	**135 38221**	5.0
	470	**16 × 25**	**19**	135 58471	7.5	**135 68471**	7.5	**135 38471**	7.5
	680	16 × 31	20	135 58681	7.5	135 68681	7.5	135 38681	7.5
	1000	16 × 40	21L	135 58102	7.5	135 68102	7.5	–	–
100	22	8 × 12	13	135 59229	3.5	135 89229	3.5	135 39229	5.0
	100	**12.5 × 20**	**17**	135 59101	5.0	**135 69101**	5.0	**135 39101**	5.0
	220	16 × 25	19	135 59221	7.5	135 69221	7.5	–	–
	330	16 × 31	20	135 59331	7.5	135 69331	7.5	–	–
	330	18 × 25	1825	135 90023	7.5	135 90024	7.5	–	–
	470	16 × 40	21L	135 59471	7.5	135 69471	7.5	–	–
	680	18 × 40	23	135 59681	7.5	135 69681	7.5	–	–

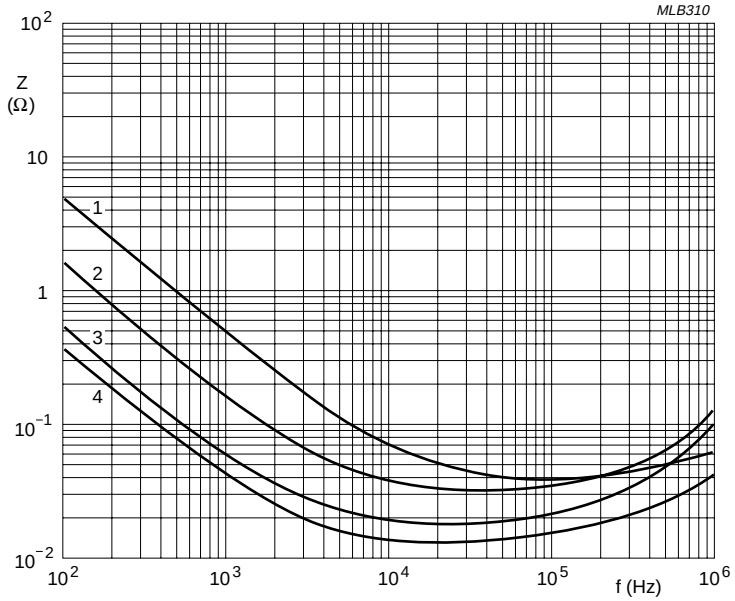
Additional electrical data

PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage for short periods		$U_S \leq 1.15\ U_R$
Reverse voltage		$U_{rev} \leq 1$ V
Current		
Leakage current	after 1 minute at U_R	$I_{L1} \leq 0.03 C_R \times U_R$
	after 2 minutes at U_R	$I_{L2} \leq 0.01 C_R \times U_R$
Capacitance (C)		
Ratio of capacitance at 120 Hz	U_R = 6.3 V	$C_{-55\ °C}/C_{20\ °C} \geq 0.7$
	U_R = 10 to 100 V	$C_{-55\ °C}/C_{20\ °C} \geq 0.8$
Impedance (Z)		
Ratio of impedance at 120 Hz		$Z_{-55\ °C}/Z_{20\ °C} \leq 3$



Curve 1: 100 µF, 35 V; ∅**D** × **L = 8** × **12 mm**.
Curve 2: 470 µF, 6.3 V; ∅**D** × **L = 10** × **12 mm**.
Curve 3: 680 µF, 16 V; ∅**D** × **L = 10** × **20 mm**.
Curve 4: 1000 µF, 25 V; ∅**D** × **L = 12.5** × **25 mm**.
Curve 5: 2200 µF, 16 V; ∅**D** × **L = 16** × **20 mm**.
T_{amb} = 20 °C.

Fig.5 Typical impedance as a function of frequency.



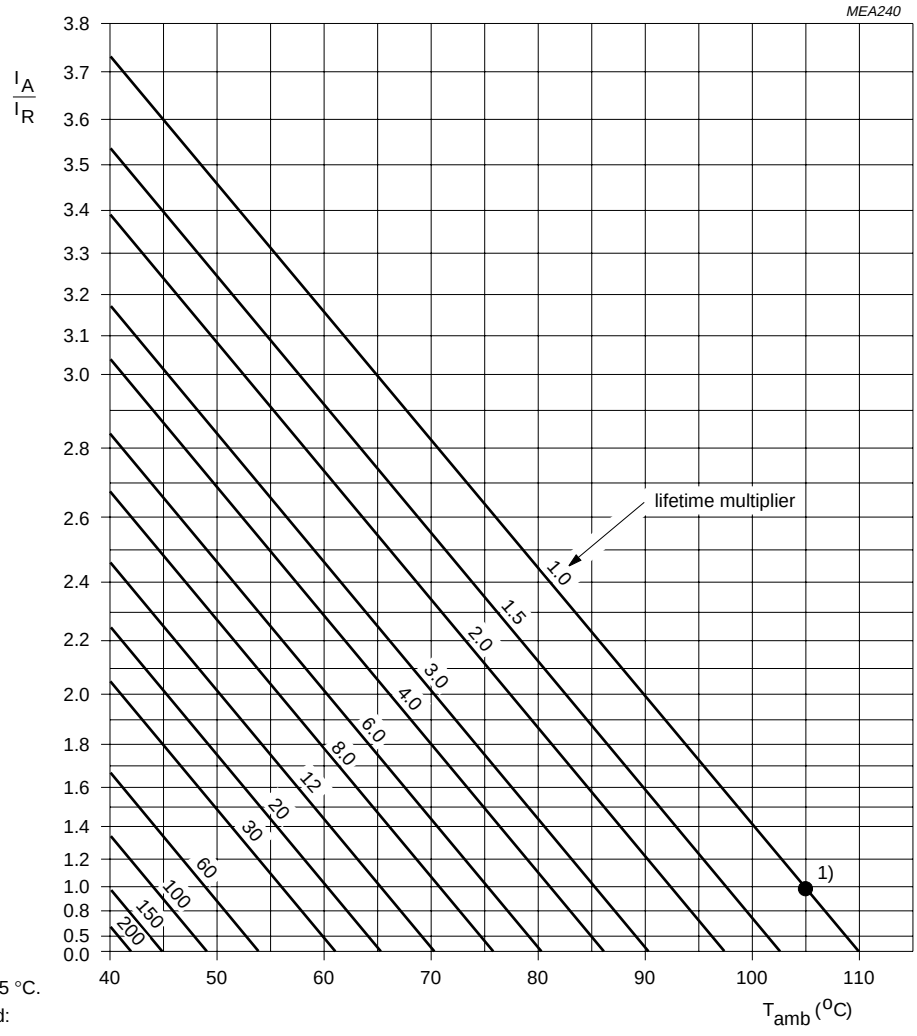
Curve 1: 330 µF, 100 V; ∅**D** × **L = 18** × **25 mm**.
Curve 2: 1000 µF, 50 V; ∅**D** × **L = 16** × **31 mm**.
Curve 3: 3300 µF, 35 V; ∅**D** × **L = 18** × **40 mm**.
Curve 4: 4700 µF, 25 V; ∅**D** × **L = 18** × **40 mm**.
T_{amb} = 20 °C.

Fig.6 Typical impedance as a function of frequency.

RIPPLE CURRENT AND USEFUL LIFE

Table 8 Multiplier of ripple current (I_R/I_{RO}) as a function of frequency; I_{RO} = ripple current at 100 kHz

FREQUENCY (Hz)	I_R MULTIPLIER			
	22 μF	**33 to 330 μF**	**470 to 1 000 μF**	**>1 000 μF**
50	0.4	0.6	0.65	0.8
120	0.5	0.7	0.8	0.9
300	0.6	0.8	0.9	0.95
1000	0.8	0.9	0.98	0.98
10000	0.9	0.95	1.0	1.0
100000	1.0	1.0	1.0	1.0



I_A = actual ripple current at 100 kHz.

I_R = rated ripple current at 100 kHz, 105 °C.

(1) Useful life at 105 °C and I_R applied:
∅**D = 8 mm**: 1500 hours
∅**D = 10 to 18 mm**: 2500 hours.

Fig.7 Multiplier of useful life as a function of ambient temperature and ripple current load.

SPECIFIC TESTS AND REQUIREMENTS

General tests and requirements are specified in data handbook PA01, section *"Tests and Requirements"*.

Table 9 Test procedures and requirements

TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	**REFERENCE**		
Endurance	IEC 60384-4/ CECC 30300 subclause 4.13	T_{amb} = 105 °C; U_R applied; ∅D = 8 mm: 1000 hours ∅D = 10 to 18 mm: 2000 hours	ΔC/C: ±20% tan δ ≤ 2 × spec. limit I_{L2} ≤ spec. limit
Useful life	CECC 30301 subclause 1.8.1	T_{amb} = 105 °C; U_R and I_R applied; ∅D = 8 mm: 1500 hours ∅D = 10 to 18 mm: 2500 hours	ΔC/C: ±50% tan δ ≤ 3 × spec. limit Z ≤ 3 × spec. limit I_{L2} ≤ spec. limit no short or open circuit total failure percentage: ≤1%
Shelf life (storage at high temperature)	IEC 60384-4/ CECC 30 300, subclause 4.17	T_{amb} = 105 °C; no voltage applied; 1000 hours after test: U_R to be applied for 30 minutes, 24 to 48 hours before measurement	ΔC/C: ±20% tan δ ≤ 1.5 × spec. limit I_{L2} ≤ spec. limit

CAUTION
CLEANING SOLVENTS, ADHESIVES, COATING MATERIALS
Some cleaning agents, adhesives or coating materials have an adverse affect on electrolytic capacitors. For cleaning, varnishing, coating, lacquering, embedding or gluing at the capacitor's sealing, ensure that the materials used are halogene-free in all their constituent parts (base material, thinners, binders, reacting agents, propellants, additives).

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Customers of BC Components who are using or selling these products for use in such applications do so at their own risk and agree to fully indemnify BC Components for any damages resulting from such improper use or sale.