

Aluminium electrolytic capacitors

Axial Long Life, DIN-based

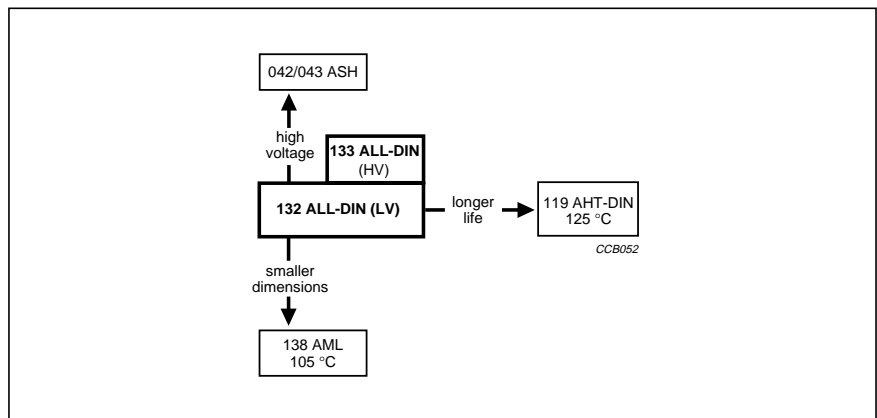
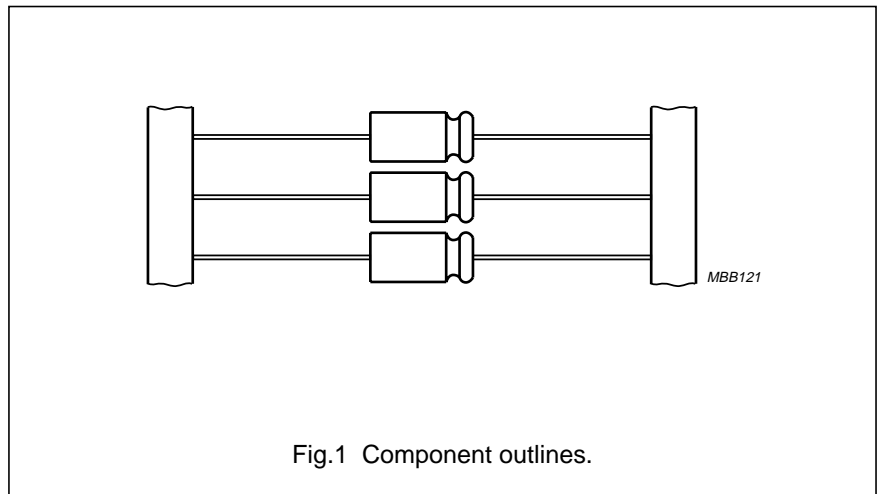
132/133 ALL-DIN

FEATURES

- Polarized aluminium electrolytic capacitors, non-solid
- Axial leads, cylindrical aluminium case, insulated with a blue sleeve
- Mounting ring version (single ended) not insulated
- Case $\varnothing 10 \times 30$ to 21×40 mm with pressure relief
- Taped versions up to $\varnothing 15 \times 30$ mm available for automatic insertion
- Charge and discharge proof
- Long useful life: 10000 to 15000 hours at 85 °C, high reliability
- High ripple current capability.

APPLICATIONS

- General industrial, power supplies, telecommunication, EDP
- Coupling, decoupling, timing; smoothing, filtering and buffering in SMPS
- For use where low mounting height is important
- Vibration and shock resistant.



QUICK REFERENCE DATA

DESCRIPTION	VALUE		
Case sizes ($\varnothing D_{nom} \times L_{nom}$ in mm)	6.5 × 18 and 8 × 18	10 × 18 and 10 × 25	10 × 30 to 21 × 40
Rated capacitance range, C_R	1 to 4700 μ F		
Tolerance on C_R	-10 to +50%		
Rated voltage range, U_R	10 to 350 V		
Category temperature range	-40 to +85 °C		
Endurance test at 105 °C	2000 hours	2000 hours	—
Endurance test at 85 °C	6000 hours	8000 hours	8000 hours
Useful life at 105 °C	3000 hours	3000 hours	—
Useful life at 85 °C	10000 hours	15000 hours	15000 hours
Useful life at 40 °C, $1.8 \times I_R$ applied	160000 hours	240000 hours	240000 hours
Shelf life at 0 V, 85 °C	500 hours		
Based on sectional specification	IEC 384-4/CECC 30300		
Detail specification	UTE C031/C033 (without approval)		
Climatic category IEC 68	40/085/56		

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Selection chart for C_R , U_R and relevant nominal case sizes ($\varnothing D_{nom} \times L_{nom}$ in mm)

Preferred types in **bold**.

C_R (μF)	U_R (V)								
	10	16	25	40	63	100	160	250	350
1.0	–	–	–	–	–	6.5 × 18	–	–	6.5 × 18
2.2	–	–	–	–	–	6.5 × 18	6.5 × 18	8 × 18	8 × 18
4.7	–	–	–	–	6.5 × 18	6.5 × 18	8 × 18	10 × 18	10 × 18
10	–	–	–	–	6.5 × 18	8 × 18	10 × 18	10 × 25	12.5 × 30 ⁽¹⁾
	–	–	–	–	–	–	–	10 × 30 ⁽¹⁾	–
22	–	–	6.5 × 18	–	8 × 18	10 × 18	10 × 25	12.5 × 30 ⁽¹⁾	15 × 30 ⁽¹⁾
	–	–	–	–	–	–	10 × 30 ⁽¹⁾	–	–
47	–	6.5 × 18	–	8 × 18	10 × 18	10 × 25	15 × 30 ⁽¹⁾	18 × 30 ⁽¹⁾	18 × 40 ⁽¹⁾
	–	–	–	–	–	10 × 30	–	–	–
68	–	–	–	–	10 × 30	12.5 × 30	15 × 30 ⁽¹⁾	18 × 40 ⁽¹⁾	21 × 40 ⁽¹⁾
100	–	8 × 18	–	10 × 18	10 × 30	15 × 30	18 × 30 ⁽¹⁾	21 × 40 ⁽¹⁾	–
150	–	–	–	12.5 × 30	15 × 30	18 × 30	18 × 40 ⁽¹⁾	–	–
220	8 × 18	10 × 18	10 × 25	12.5 × 30	15 × 30	18 × 40	21 × 40 ⁽¹⁾	–	–
	–	–	12.5 × 30	–	–	–	–	–	–
330	–	10 × 25	12.5 × 30	15 × 30	18 × 30	18 × 40	–	–	–
	–	12.5 × 30	–	–	–	–	–	–	–
470	12.5 × 30	10 × 25	12.5 × 30	15 × 30	18 × 40	21 × 40	–	–	–
	–	12.5 × 30	–	–	–	–	–	–	–
680	12.5 × 30	15 × 30	18 × 30	18 × 30	21 × 40	–	–	–	–
1000	15 × 30	15 × 30	18 × 30	18 × 40	21 × 40	–	–	–	–
1500	18 × 30	18 × 30	18 × 40	21 × 40	–	–	–	–	–
2200	18 × 30	18 × 40	21 × 40	21 × 40	–	–	–	–	–
3300	18 × 40	21 × 40	–	–	–	–	–	–	–
4700	21 × 40	21 × 40	–	–	–	–	–	–	–

Note

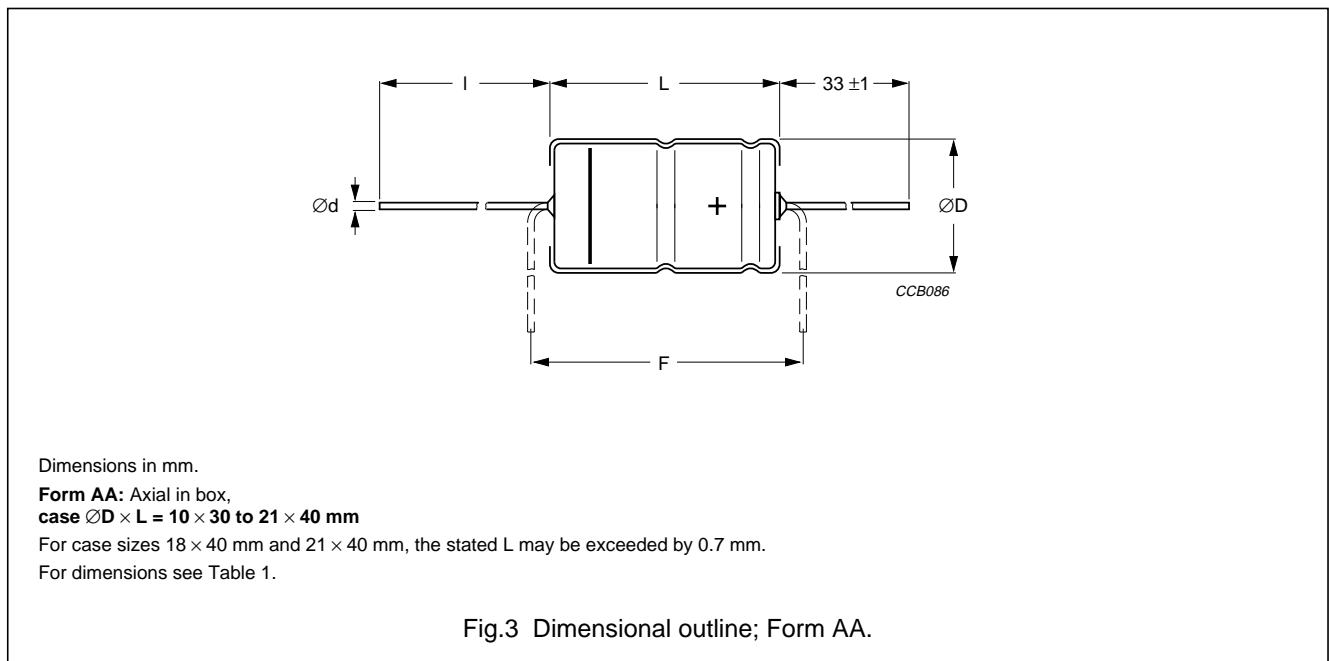
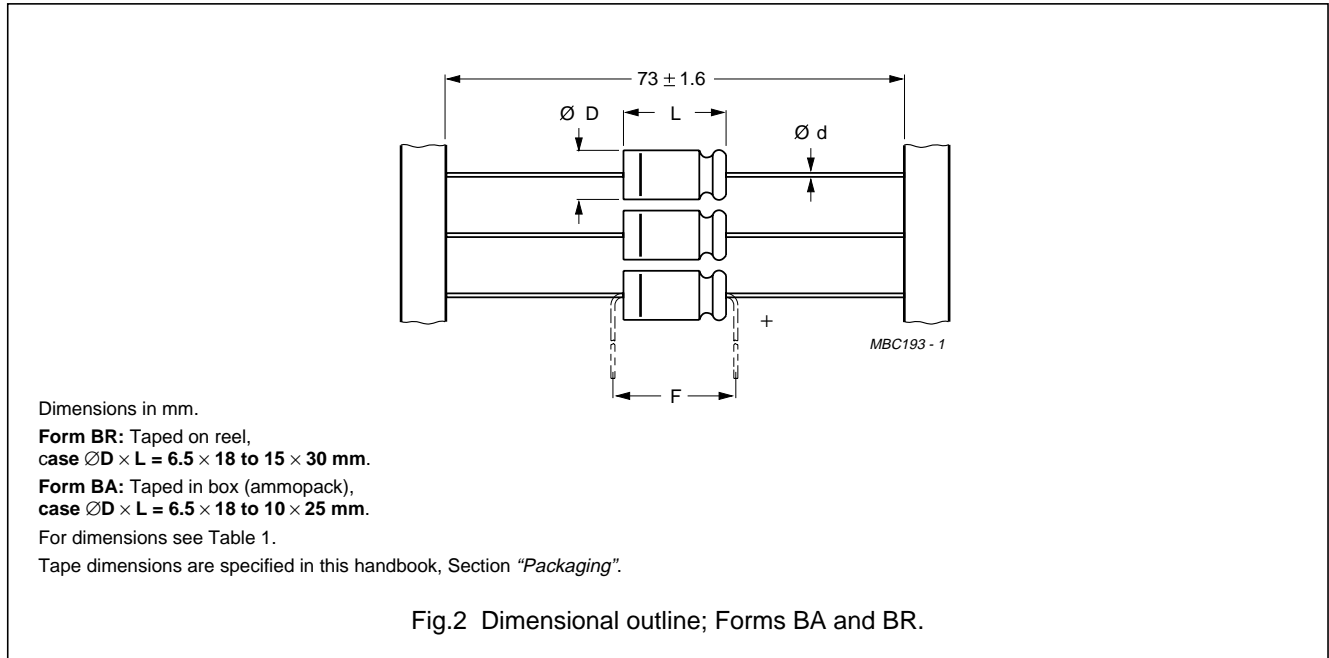
- For these CV-values see data sheet "041-043 ASH".

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MECHANICAL DATA, AVAILABLE FORMS AND PACKAGING QUANTITIES



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

NOMINAL CASE SIZE ØD × L (mm)	CASE CODE	AXIAL: FORM AA, BA, and BR					MASS (g)	PACKAGING QUANTITIES		
		Ød (mm)	l (mm)	ØD _{max} (mm)	L _{max} (mm)	F _{min} (mm)		FORM AA	FORM BA	FORM BR
6.5 × 18	4	0.8	–	6.9	18.5	25	≈1.3	–	1000	1000
8 × 18	5	0.8	–	8.5	18.5	25	≈1.7	–	500	500
10 × 18	6	0.8	–	10.5	18.5	25	≈2.5	–	500	500
10 × 25	7	0.8	–	10.5	25.0	30	≈3.3	–	500	500
10 × 30	00	0.8	55 ±1	10.5	30.5	35	≈4.8	200	–	500
12.5 × 30	01	0.8	55 ±1	13.0	30.5	35	≈7.4	200	–	400
15 × 30	02	0.8	55 ±1	15.5	30.5	35	≈11.7	200	–	250
18 × 30	03	0.8	55 ±1	18.5	30.5	35	≈12.9	200	–	–
18 × 40	04	0.8	34 ±1	18.5	41.5	45	≈19.4	100	–	–
21 × 40	05	0.8	34 ±1	21.5	41.5	45	≈24.7	100	–	–

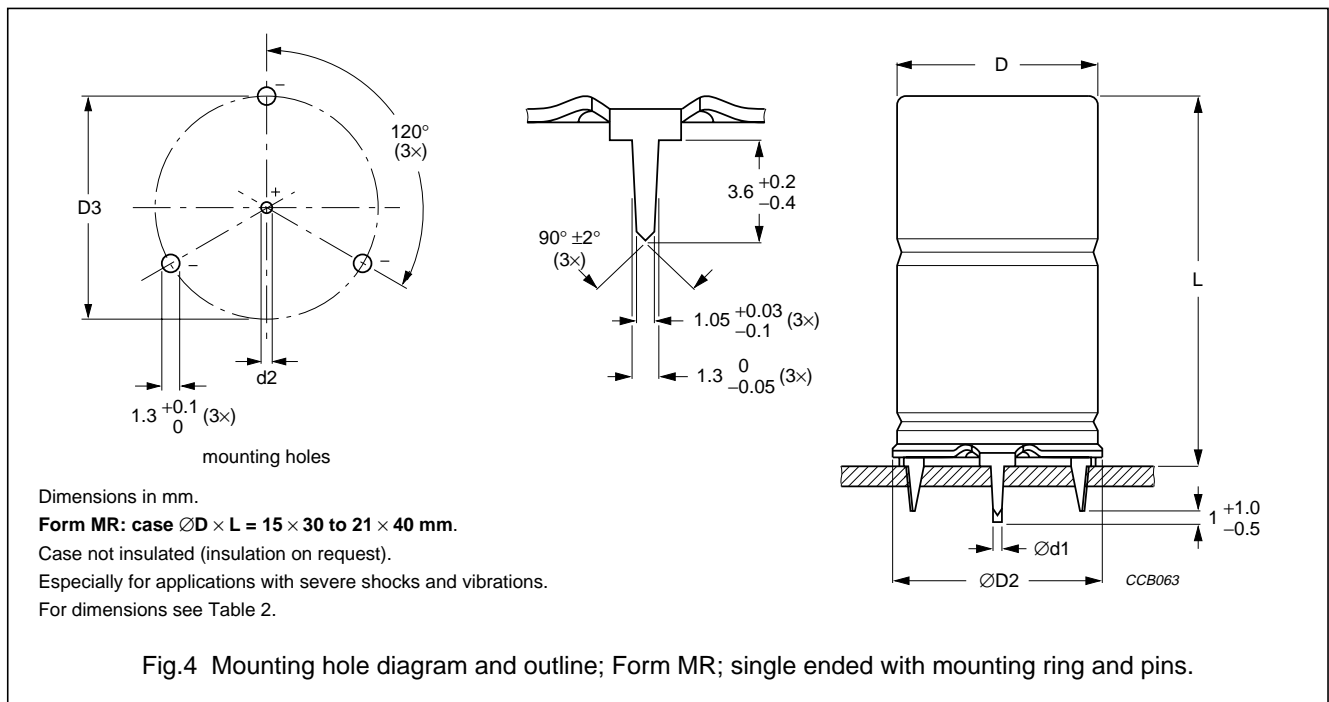


Table 2 Single ended; physical dimensions, mass and packaging quantities; see Fig.4

NOMINAL CASE SIZE ØD × L (mm)	CASE CODE	SINGLE ENDED WITH MOUNTING RING: FORM MR						MASS (g)	PACKAGING QUANTITIES
		Ød1 (mm)	Ød2 (mm)	ØD _{max} (mm)	ØD2 _{max} (mm)	D3 (mm)	L _{max} (mm)		
15 × 30	02	0.8	1.0 +0.4	15.5	17.5	16.5 ±0.2	33	≈11.7	200
18 × 30	03	0.8	1.0 +0.4	18.5	19.5	18.5 ±0.2	33	≈12.9	200
18 × 40	04	0.8	1.0 +0.4	18.5	19.5	18.5 ±0.2	45	≈19.4	100
21 × 40	05	0.8	1.0 +0.4	21.5	22.5	21.5 ±0.2	45	≈24.7	100

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ELECTRICAL DATA

Unless otherwise specified, all electrical values in Tables 3, 5, 7 and 9 apply at $T_{amb} = 20\text{ °C}$, $P = 86$ to 106 kPa , $RH = 45$ to 75% .

SYMBOL	DESCRIPTION
C_R	rated capacitance at 100 Hz (tolerance -10 to +50%)
I_R	rated RMS ripple current at 100 Hz, 85 °C
I_{L1}	max. leakage current after 1 minute at U_R
I_{L5}	max. leakage current after 5 minutes at U_R
Tan δ	max. dissipation factor at 100 Hz
ESR	equivalent series resistance at 100 Hz (calculated from tan δ_{max} and C_R)
Z	max. impedance at 10 kHz or 100 kHz

Table 3 Electrical data; preferred types in **bold**

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	I_R 100 Hz 85 °C (mA)	I_{L1} 1 min (μA)	I_{L5} 5 min (μA)	Tan δ 100 Hz	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	Z 100 kHz (Ω)
10	220	8 × 18	190	25	8.4	0.18	1.3	0.73	0.70
	470	12.5 × 30	350	32	9.4	0.18	0.61	0.26	0.60
	680	12.5 × 30	460	45	13.6	0.18	0.42	0.20	0.40
	1000	15 × 30	640	64	20	0.18	0.28	0.12	–
	1500	18 × 30	800	94	30	0.22	0.23	0.10	–
	2200	18 × 30	1100	140	44	0.22	0.16	0.09	–
	3300	18 × 40	1300	200	66	0.27	0.13	0.05	–
	4700	21 × 40	1800	290	94	0.27	0.09	0.05	–
16	47	6.5 × 18	95	11	5.5	0.14	4.7	2.6	2.2
	100	8 × 18	150	19	7.2	0.14	2.2	1.2	1.1
	220	10 × 18	250	38	11	0.14	1.0	0.55	0.55
	330	10 × 25	320	56	14.6	0.14	0.67	0.36	0.36
	330	12.5 × 30	320	36	10.6	0.14	0.67	0.36	0.60
	470	10 × 25	450	78	19	0.14	0.47	0.26	0.26
	470	12.5 × 30	450	49	15	0.14	0.47	0.26	0.40
	680	15 × 30	550	69	22	0.14	0.33	0.14	–
	1000	15 × 30	780	100	32	0.14	0.22	0.12	–
	1500	18 × 30	950	150	48	0.15	0.16	0.10	–
	2200	15 × 40	1300	220	70	0.15	0.11	0.06	–
	3300	21 × 40	1600	320	110	0.15	0.07	0.05	–
	4700	21 × 40	2300	460	150	0.15	0.05	0.05	–

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ORDERING INFORMATION**Ordering example**

Electrolytic capacitor 132 series

100 μ F/40 V; -10/+50%Nominal case size: $\varnothing 10 \times 18$ mm; Form BR

Catalogue number: 2222 132 27101.

Table 4 Ordering information; preferred types in **bold**

U _R (V)	C _R 100 Hz (μ F)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	CASE CODE	CATALOGUE NUMBER 2222			
				AXIAL			SINGLE ENDED
				IN BOX FORM AA	TAPED ON REEL FORM BR	TAPED IN BOX FORM BA	MOUNTING RING FORM MR
10	220	8 \times 18	5	–	132 24221	132 34221	–
	470	12.5 \times 30	01	132 14471	132 24471	–	–
	680	12.5 \times 30	01	132 14681	132 24681	–	–
	1000	15 \times 30	02	132 14102	132 24102	–	132 44102
	1500	18 \times 30	03	132 14152	–	–	132 44152
	2200	18 \times 30	03	132 14222	–	–	132 44222
	3300	18 \times 40	04	132 14332	–	–	132 44332
	4700	21 \times 40	05	132 14472	–	–	132 44472
16	47	6.5 \times 18	4	–	132 25479	132 35479	–
	100	8 \times 18	5	–	132 25101	132 35101	–
	220	10 \times 18	6	–	132 25221	132 35221	–
	330	10 \times 25	7	–	132 90508	132 90509	–
	330	12.5 \times 30	01	132 15331	132 25331	–	–
	470	10 \times 25	7	–	132 90507	132 90502	–
	470	12.5 \times 30	01	132 15471	132 25471	–	–
	680	15 \times 30	02	132 15681	132 25681	–	132 45681
	1000	15 \times 30	02	132 15102	132 25102	–	132 45102
	1500	18 \times 30	03	132 15152	–	–	132 45152
	2200	15 \times 40	04	132 15222	–	–	132 45222
	3300	21 \times 40	05	132 15332	–	–	132 45332
	4700	21 \times 40	05	132 15472	–	–	132 45472

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ELECTRICAL DATA (continued)**Table 5** Electrical data continued; preferred types in **bold**

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	I_R 100 Hz 85 °C (mA)	I_{L1} 1 min (μA)	I_{L5} 5 min (μA)	$\text{Tan } \delta$ 100 Hz	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	Z 100 kHz (Ω)
25	22	6.5 × 18	60	8.5	5.1	0.11	8.0	4.1	2.9
	220	10 × 25	340	58	15	0.11	0.8	0.40	0.40
	220	12.5 × 30	340	37	11	0.11	0.8	0.40	0.60
	330	12.5 × 30	410	54	16.5	0.11	0.53	0.30	0.40
	470	12.5 × 30	560	75	24	0.11	0.37	0.20	–
	680	18 × 30	700	106	34	0.11	0.26	0.10	–
	1000	18 × 30	1000	150	50	0.11	0.17	0.10	–
	1500	18 × 40	1100	230	75	0.12	0.13	0.06	–
	2200	21 × 40	1850	330	110	0.13	0.09	0.05	–
40	47	8 × 18	120	22	7.8	0.09	3.0	1.6	1.4
	100	10 × 18	210	43	12	0.09	1.4	0.75	0.75
	150	10 × 25	310	63	16	0.09	0.95	0.50	0.50
	150	12.5 × 30	310	40	12	0.09	0.95	0.50	0.60
	220	12.5 × 30	410	57	17.5	0.09	0.65	0.34	0.40
	330	15 × 30	550	83	26	0.09	0.43	0.20	–
	470	15 × 30	700	120	38	0.09	0.30	0.16	–
	680	18 × 30	900	170	54	0.09	0.21	0.10	–
	1000	18 × 40	1200	240	80	0.09	0.14	0.08	–
	1500	21 × 40	1500	360	120	0.10	0.10	0.06	–
	2200	21 × 40	1900	530	180	0.10	0.07	0.05	–

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ORDERING INFORMATION (continued)**Table 6** Ordering information continued; preferred types in **bold**

U _R (V)	C _R 100 Hz (µF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	CATALOGUE NUMBER 2222			
				AXIAL			SINGLE ENDED
				IN BOX FORM AA	TAPED ON REEL FORM BR	TAPED IN BOX FORM BA	MOUNTING RING FORM MR
25	22	6.5 × 18	4	–	132 26229	132 36229	–
	220	10 × 25	7	–	132 90503	132 90504	–
	220	12.5 × 30	01	132 16221	132 26221	–	–
	330	12.5 × 30	01	132 16331	132 26331	–	–
	470	12.5 × 30	01	132 16471	132 26471	–	–
	680	18 × 30	03	132 16681	–	–	132 46681
	1000	18 × 30	03	132 16102	–	–	132 46102
	1500	18 × 40	04	132 16152	–	–	132 46152
	2200	21 × 40	05	132 16222	–	–	132 46222
40	47	8 × 18	5	–	132 27479	132 37479	–
	100	10 × 18	6	–	132 27101	132 37101	–
	150	10 × 25	7	–	132 90511	132 90512	–
	150	12.5 × 30	01	132 17151	132 27151	–	–
	220	12.5 × 30	01	132 17221	132 27221	–	–
	330	15 × 30	02	132 17331	132 27331	–	132 47331
	470	15 × 30	02	132 17471	132 27471	–	132 47471
	680	18 × 30	03	132 17681	–	–	132 47681
	1000	18 × 40	04	132 17102	–	–	132 47102
	1500	21 × 40	05	132 17152	–	–	132 47152
	2200	21 × 40	05	132 17222	–	–	132 47222

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ELECTRICAL DATA (continued)**Table 7** Electrical data continued; preferred types in **bold**

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	I_R 100 Hz 85 °C (mA)	I_{L1} 1 min (μA)	I_{L5} 5 min (μA)	$\text{Tan } \delta$ 100 Hz	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	Z 100 kHz (Ω)
63	4.7	6.5 × 18	38	6.0	4.6	0.07	24	12	5
	10	6.5 × 18	64	9.3	5.3	0.07	11	5.5	3.3
	22	8 × 18	100	17	6.8	0.07	5.1	2.5	2.1
	47	10 × 18	170	33	9.9	0.07	2.4	1.2	1.2
	68	10 × 25	210	46	12.6	0.07	1.6	0.81	0.60
	68	10 × 30	210	30	8.6	0.07	1.6	0.80	0.60
	100	10 × 30	300	42	12.6	0.07	1.1	0.60	0.40
	150	15 × 30	350	61	19	0.07	0.74	0.37	–
	220	15 × 30	520	87	28	0.07	0.50	0.25	–
	330	18 × 30	600	130	42	0.07	0.34	0.15	–
	470	18 × 40	970	180	59	0.07	0.24	0.12	–
	680	21 × 40	1000	260	86	0.07	0.16	0.08	–
	1000	21 × 40	1600	380	130	0.07	0.11	0.06	–
100	1	6.5 × 18	20	4.0	4.0	0.06	95	45	6
	2.2	6.5 × 18	30	5.2	4.4	0.06	43	20	5
	4.7	6.5 × 18	48	7.7	4.9	0.06	20	9.6	4
	10	8 × 18	73	13	6	0.06	9.5	4.5	2.8
	22	10 × 18	130	25	8.4	0.06	4.3	2	1.3
	47	10 × 25	220	50	13.4	0.06	2.0	1	0.90
	47	10 × 30	220	32	9.4	0.06	2.0	1	0.90
	68	12.5 × 30	250	45	13.5	0.06	1.4	0.80	–
	100	15 × 30	380	64	20	0.06	0.95	0.50	–
	150	18 × 30	400	94	30	0.06	0.64	0.35	–
	220	18 × 40	660	140	44	0.06	0.43	0.20	–
	330	18 × 40	700	200	66	0.06	0.29	0.15	–
	470	21 × 40	1200	290	94	0.06	0.20	0.10	–

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ORDERING INFORMATION (continued)**Table 8** Ordering information continued; preferred types in **bold**

U _R (V)	C _R 100 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	CATALOGUE NUMBER 2222			
				AXIAL			SINGLE ENDED
				IN BOX FORM AA	TAPED ON REEL FORM BR	TAPED IN BOX FORM BA	MOUNTING RING FORM MR
63	4.7	6.5 × 18	4	–	132 28478	132 38478	–
	10	6.5 × 18	4	–	132 28109	132 38109	–
	22	8 × 18	5	–	132 28229	132 38229	–
	47	10 × 18	6	–	132 28479	132 38479	–
	68	10 × 25	7	–	132 90513	132 90514	–
	68	10 × 30	00	132 18689	132 28689	–	–
	100	10 × 30	00	132 18101	132 28101	–	–
	150	15 × 30	02	132 18151	132 28151	–	132 48151
	220	15 × 30	02	132 18221	132 28221	–	132 48221
	330	18 × 30	03	132 18331	–	–	132 48331
	470	18 × 40	04	132 18471	–	–	132 48471
	680	21 × 40	05	132 18681	–	–	132 48681
	1000	21 × 40	05	132 18102	–	–	132 48102
100	1	6.5 × 18	4	–	132 29108	132 39108	–
	2.2	6.5 × 18	4	–	132 29228	132 39228	–
	4.7	6.5 × 18	4	–	132 29478	132 39478	–
	10	8 × 18	5	–	132 29109	132 39109	–
	22	10 × 18	6	–	132 29229	132 39229	–
	47	10 × 25	7	–	132 90505	132 90506	–
	47	10 × 30	00	132 19479	132 29479	–	–
	68	12.5 × 30	01	132 19689	132 29689	–	–
	100	15 × 30	02	132 19101	132 29101	–	132 49101
	150	18 × 30	03	132 19151	–	–	132 49151
	220	18 × 40	04	132 19221	–	–	132 49221
	330	18 × 40	04	132 19331	–	–	132 49331
	470	21 × 40	05	132 19471	–	–	132 49471

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ELECTRICAL DATA (continued)**Table 9** Electrical data continued; preferred types in **bold**

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	I_R 100 Hz 85 °C (mA)	I_{L1} 1 min (μA)	I_{L5} 5 min (μA)	$\text{Tan } \delta$ 100 Hz	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	Z 100 kHz (Ω)
160	2.2	6.5 × 18	22	50	20	0.10	72	55	30
	4.7	8 × 18	37	50	20	0.10	34	26	20
	10	10 × 18	61	50	20	0.10	16	12	10
	22	10 × 25	120	50	20	0.10	7.2	5.5	2.5
250	2.2	8 × 18	25	50	20	0.10	72	50	30
	4.7	10 × 18	37	50	20	0.10	34	23	16
	10	10 × 25	66	50	20	0.10	16	11	9
350	1	6.5 × 18	15	50	20	0.10	160	100	40
	2.2	8 × 18	25	50	20	0.10	72	45	28
	4.7	10 × 18	43	50	20	0.10	34	21	15

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ORDERING INFORMATION (continued)**Table 10** Ordering information continued; preferred types in **bold**

U _R (V)	C _R 100 Hz (µF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	CATALOGUE NUMBER 2222			
				AXIAL			SINGLE ENDED
				IN BOX FORM AA	TAPED ON REEL FORM BR	TAPED IN BOX FORM BA	MOUNTING RING FORM MR
160	2.2	6.5 × 18	4	–	133 21228	133 31228	–
	4.7	8 × 18	5	–	133 21478	133 31478	–
	10	10 × 18	6	–	133 21109	133 31109	–
	22	10 × 25	7	–	133 90502	133 90503	–
250	2.2	8 × 18	5	–	133 23228	133 33228	–
	4.7	10 × 18	6	–	133 23478	133 33478	–
	10	10 × 25	7	–	133 23109	133 33109	–
350	1	6.5 × 18	4	–	133 25108	133 35108	–
	2.2	8 × 18	5	–	133 25228	133 35228	–
	4.7	10 × 18	6	–	133 25478	133 35478	–

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 62"
- Rated voltage (in V)
- Upper category temperature (85 °C)
- Group number (132 or 133)
- Name of manufacturer (PHILIPS)
- Date code, in accordance with "IEC 62"
- Code indicating factory of origin
- Band to identify the negative terminal.

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Aluminium electrolytic capacitors

Axial Long Life, DIN-based

132/133 ALL-DIN

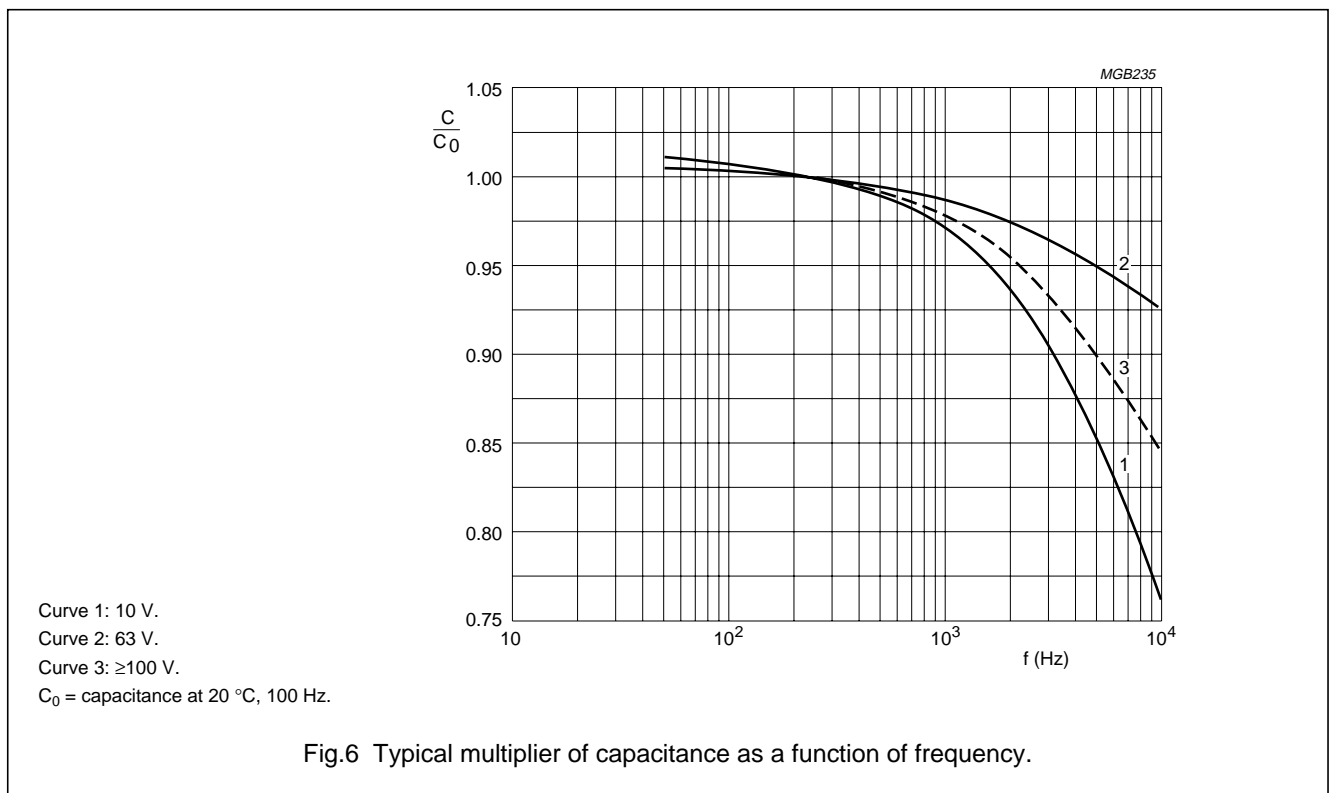
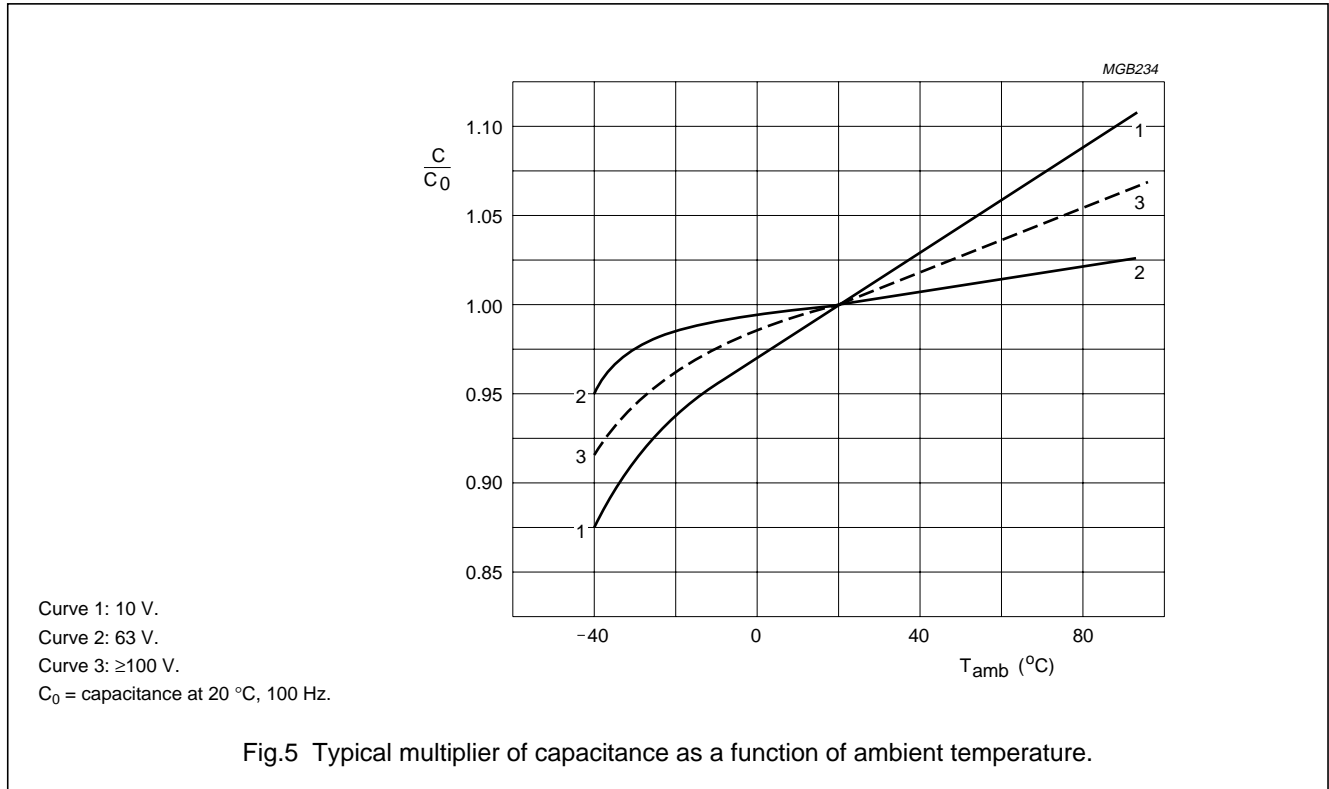
ELECTRICAL DATA (continued)**Additional electrical data**

PARAMETER	CONDITIONS	VALUE	
		AXIAL	SINGLE ENDED
Voltage			
Surge voltage for short periods	$U_R = 10$ to 250 V	$U_s \leq 1.15 \times U_R$	
	$U_R = 350$ V	$U_s \leq 1.1 \times U_R$	
Reverse voltage		$U_{rev} \leq 1$ V	
Current			
Leakage current	after 1 minute:		
	case $\varnothing D \times L = 6.5 \times 18$ to 10×25 mm: $U_R = 10$ to 100 V $U_R = 160$ to 350 V	$I_{L1} \leq 0.01C_R \times U_R + 3 \mu A$ $I_{L1} \leq 50 \mu A$	
	case $\varnothing D \times L = 10 \times 30$ to 21×40 mm: $U_R = 10$ to 100 V	$I_{L1} \leq 0.006C_R \times U_R + 3 \mu A$	
	after 5 minutes:		
	case $\varnothing D \times L = 6.5 \times 18$ to 10×25 mm: $U_R = 10$ to 100 V $U_R = 160$ to 350 V	$I_{L5} \leq 0.002C_R \times U_R + 4 \mu A$ $I_{L5} \leq 20 \mu A$	
	case $\varnothing D \times L = 10 \times 30$ to 21×40 mm: $U_R = 10$ to 100 V	$I_{L5} \leq 0.002C_R \times U_R + 4 \mu A$	
Inductance			
Equivalent series inductance (ESL)	case $\varnothing D \times L$ mm:		
	6.5×18	typ. 15 nH	–
	8×18	typ. 35 nH	–
	10×18	typ. 69 nH	–
	10×25	typ. 38 nH	–
	10×30	typ. 38 nH	–
	12.5×30	typ. 46 nH	–
	15×30	typ. 48 nH	typ. 39 nH
	18×30	typ. 50 nH	typ. 39 nH
	18×40	typ. 54 nH	typ. 39 nH
21×40	typ. 59 nH	typ. 39 nH	

Aluminium electrolytic capacitors
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Capacitance (C)

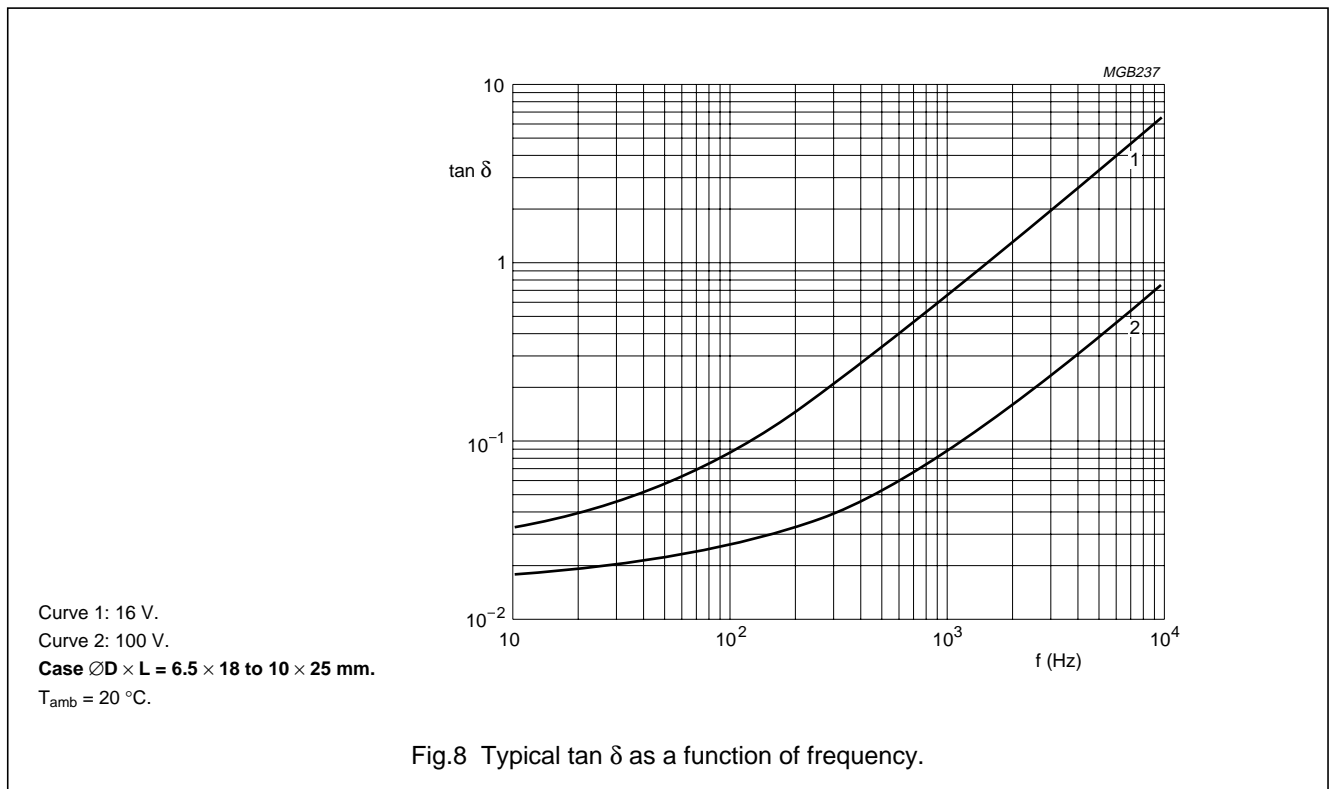
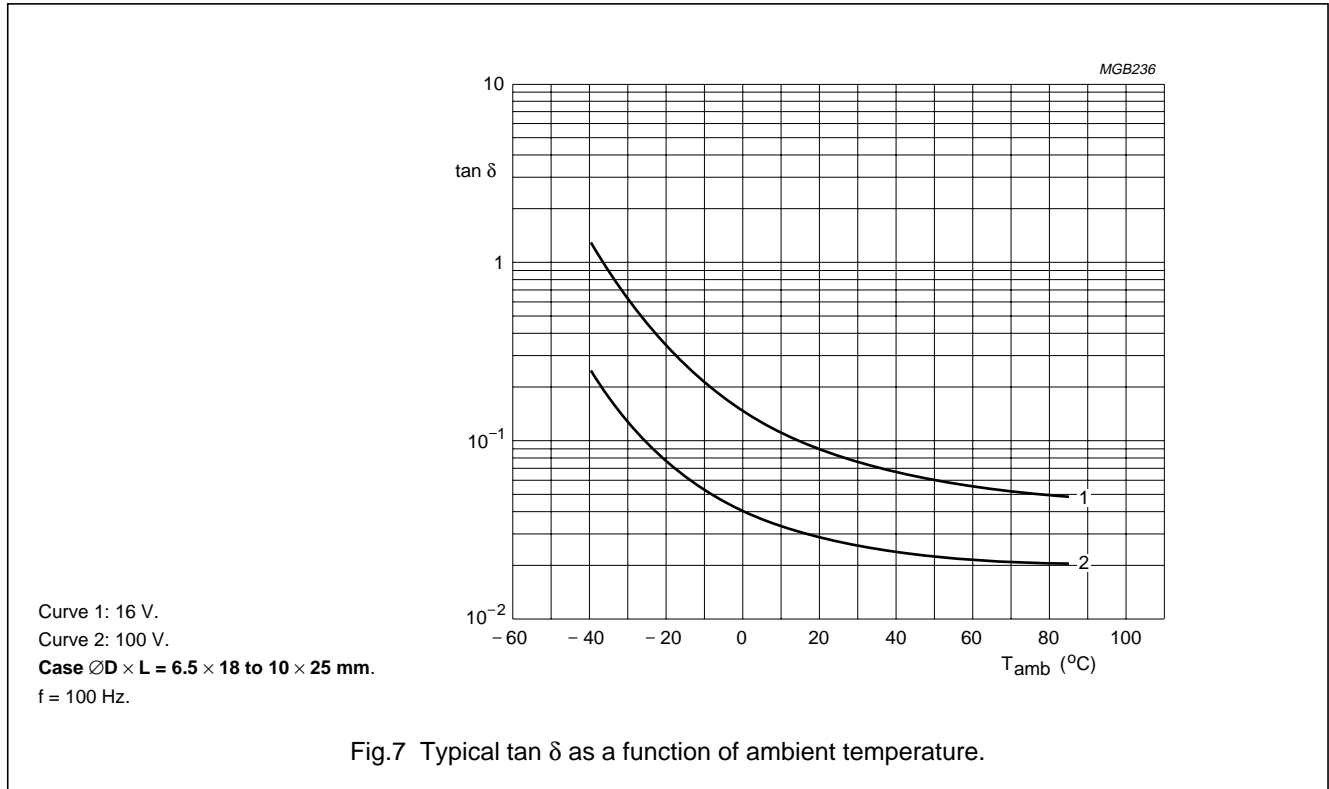


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Aluminium electrolytic capacitors
Axial Long Life, DIN-based

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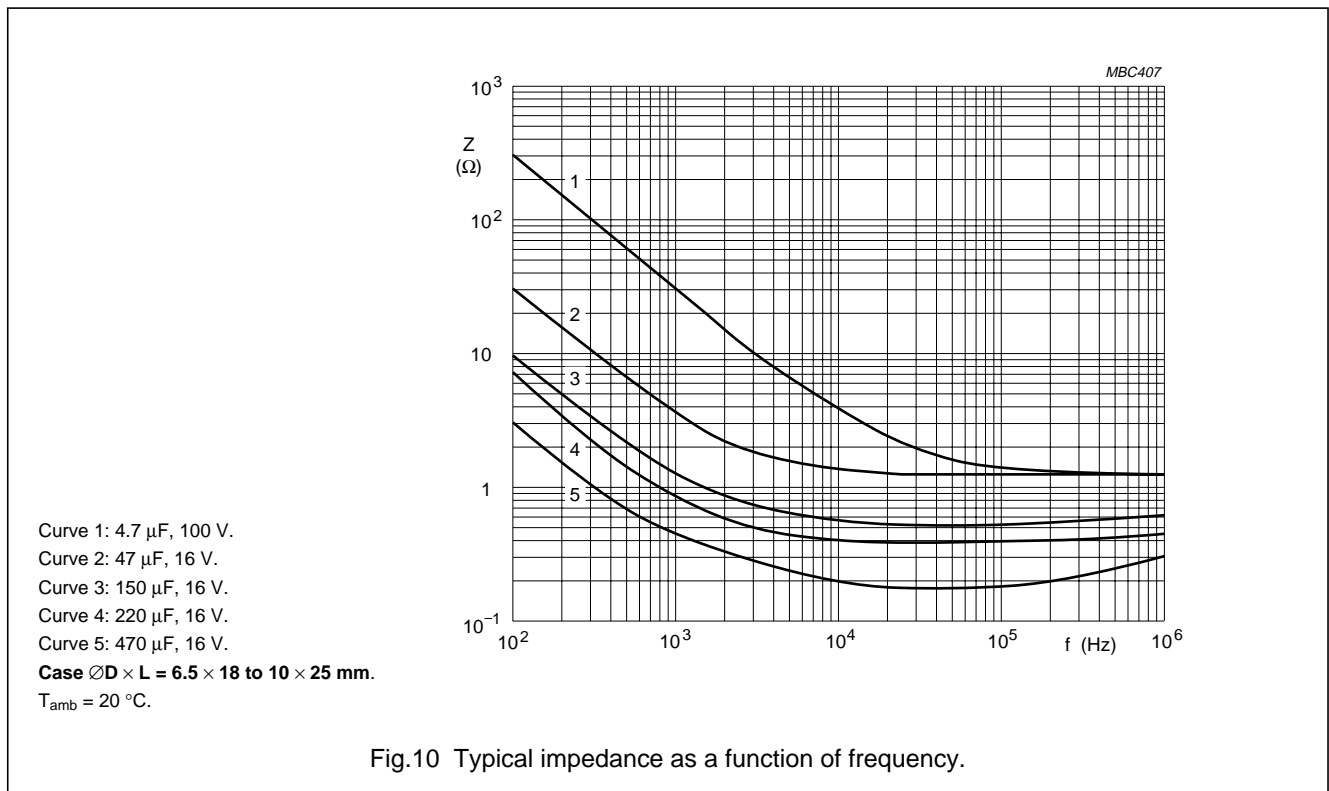
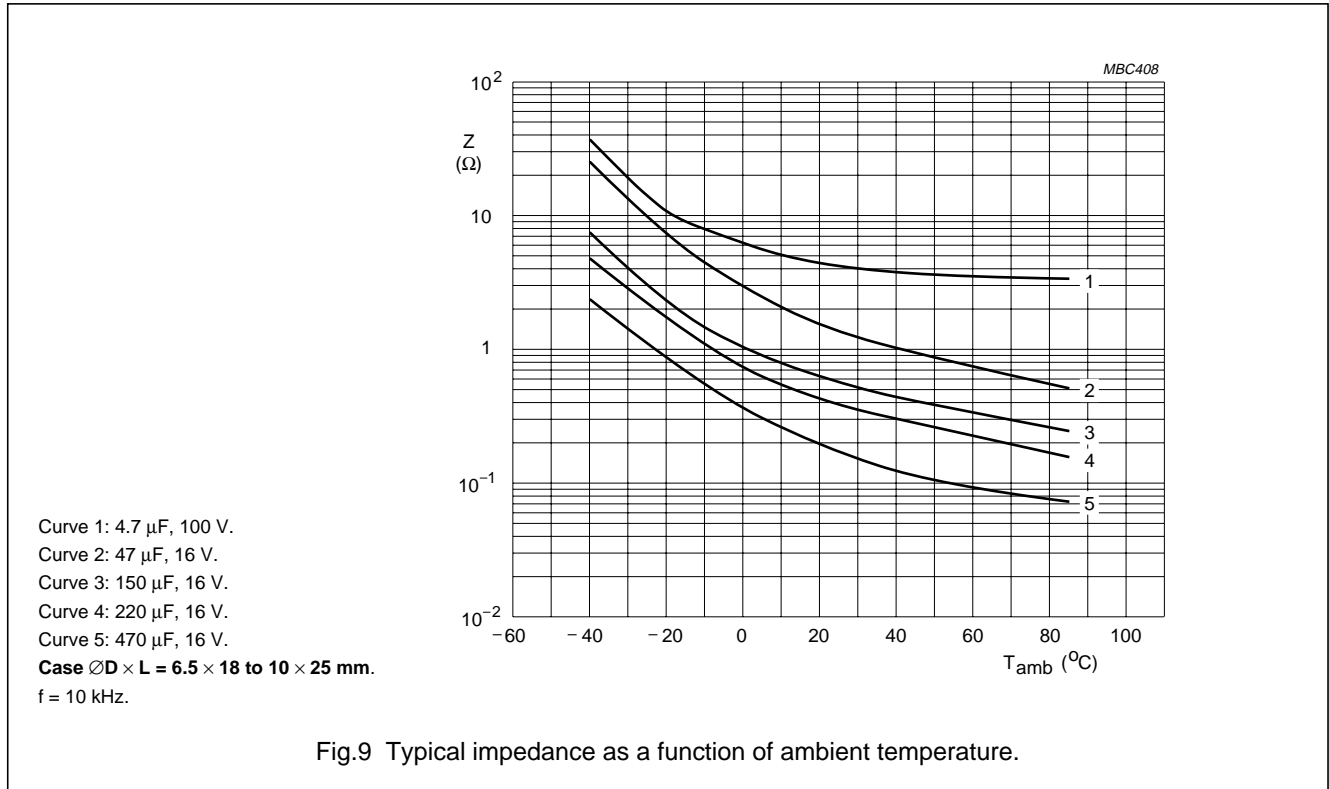
Dissipation factor ($\tan \delta$)



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Impedance (Z)



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Aluminium electrolytic capacitors

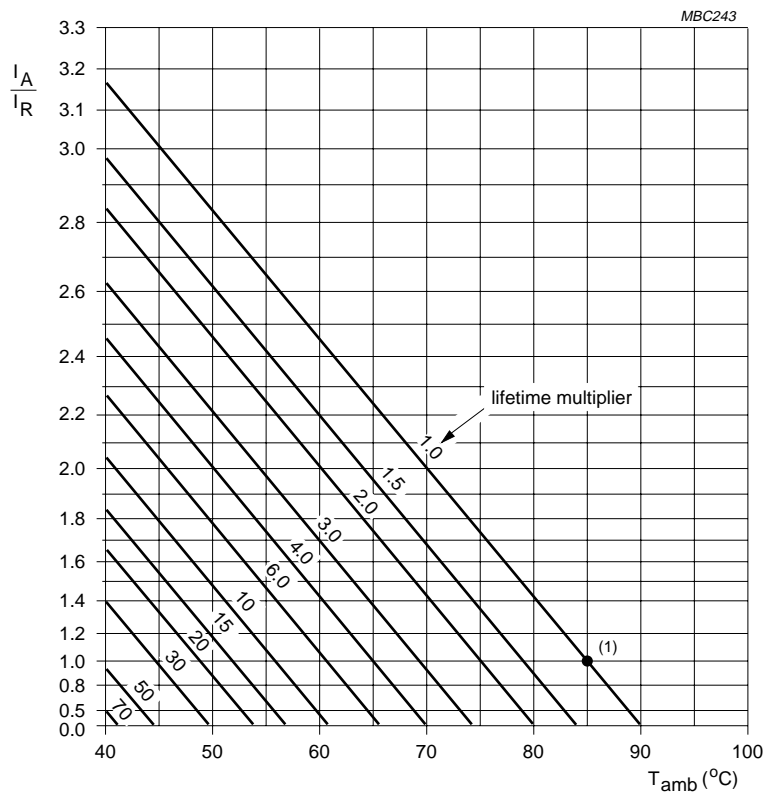
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RIPPLE CURRENT AND USEFUL LIFE

Table 11 Multiplier of ripple current (I_R/I_{R0}) as a function of frequency; I_{R0} = ripple current at 85 °C, 100 Hz

FREQUENCY (Hz)	I_R MULTIPLIER		
	$U_R = 10 \text{ to } 16 \text{ V}$	$U_R = 25 \text{ to } 63 \text{ V}$	$U_R = 100 \text{ to } 350 \text{ V}$
50	0.95	0.9	0.85
100	1.0	1.0	1.0
300	1.07	1.12	1.2
1000	1.12	1.2	1.3
3000	1.15	1.25	1.35
≥ 10000	1.2	1.3	1.4



I_A = actual ripple current at 100 Hz.

I_R = rated ripple current at 100 Hz, 85 °C.

- (1) Useful life at 85 °C and I_R applied;
 case $\varnothing D \times L = 6.5 \times 18$ and 8×18 mm: 10000 hours
 case $\varnothing D \times L = 10 \times 18$ to 21×40 mm: 15000 hours.

Fig.11 Multiplier of useful life as a function of ambient temperature and ripple current load.

Aluminium electrolytic capacitors

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SPECIFIC TESTS AND REQUIREMENTS

General tests and requirements are specified in this handbook, Section "Tests and Requirements".

Table 12 Test procedures and requirements

TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Endurance	IEC 384-4/ CECC 30300, subclause 4.13	$T_{amb} = 85\text{ °C}$; U_R applied; case $\varnothing D \times L = 6.5 \times 18$ and 8×18 mm: 6000 hours; case $\varnothing D \times L = 10 \times 18$ to 21×40 mm: 8000 hours	$U_R = 10$ to 160 V; $\Delta C/C: \pm 15\%$ $U_R = 250$ to 350 V; $\Delta C/C: \pm 10\%$ $\tan \delta \leq 1.3 \times \text{spec. limit}$ $Z \leq 2 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$
Useful life	CECC 30301, subclause 1.8.1	$T_{amb} = 85\text{ °C}$; U_R and I_R applied; case $\varnothing D \times L = 6.5 \times 18$ and 8×18 mm: 10000 hours; case $\varnothing D \times L = 10 \times 18$ to 21×40 mm: 15000 hours	$U_R = 10$ to 160 V; $\Delta C/C: \pm 45\%$ $U_R = 250$ to 350 V; $\Delta C/C: \pm 30\%$ $\tan \delta \leq 3 \times \text{spec. limit}$ $Z \leq 3 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ no short or open circuit total failure percentage: $\leq 1\%$
Shelf life (storage at high temperature)	IEC 384-4/ CECC 30300, subclause 4.17	$T_{amb} = 85\text{ °C}$; no voltage applied; 500 hours after test: U_R to be applied for 30 minutes, 24 to 48 hours before measurement	$\Delta C/C$, $\tan \delta$, Z : for requirements see 'Endurance test' above $I_{L5} \leq 2 \times \text{spec. limit}$