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Aluminium electrolytic capacitors
Power Eurodin Screw Terminals

114/115 PED-ST

FEATURES

- Polarized aluminium electrolytic capacitors, non-solid
- Large types, cylindrical aluminium case, insulated with a blue sleeve
- Also available in bolt version (PED-STB)
- Pressure relief in the sealing
- Charge and discharge proof
- Extremely low ESR and ESL allowing very high ripple current load, achieved by a special construction with multiple internal anode and cathode connections
- Very long useful life: 20000 hours at 85 °C
- High resistance to shock and vibration achieved by longitudinal rills and special internal construction.

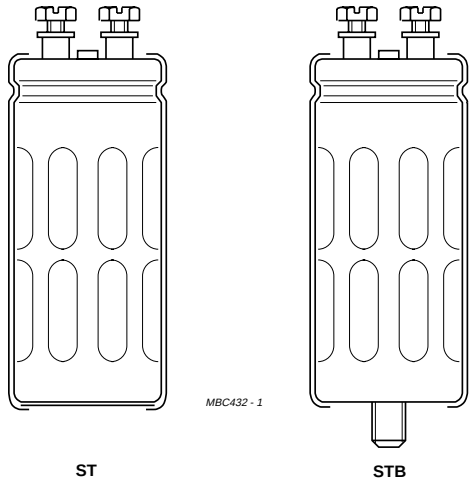
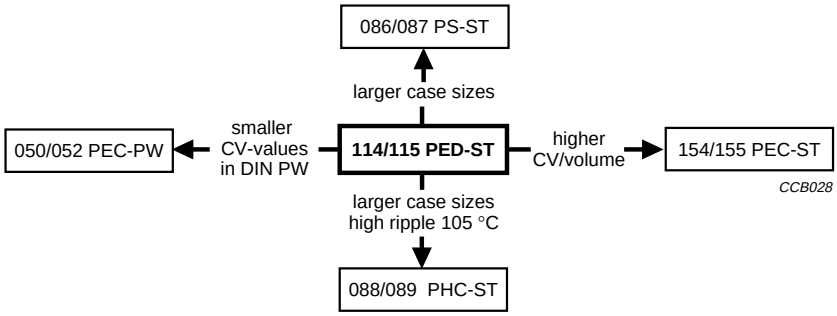


Fig.1 Component outlines.



APPLICATIONS

- Computer, telecommunications and industrial systems
- Smoothing and filtering
- Standard and switched mode power supplies
- Energy storage in pulse systems.

QUICK REFERENCE DATA

DESCRIPTION	VALUE	
	114	115
Case size ($\varnothing D_{nom} \times L_{nom}$ in mm)	35 × 60 to 75 × 105	
Rated capacitance range (E6 series), C_R	150 to 220000 µF	
Tolerance on C_R	–10 to +30%	
Rated voltage range, U_R	10 to 100 V	250 to 400 V
Category temperature range	–40 to +85 °C	
Endurance test at 85 °C	8000 hours (400 V: 2000 hours)	
Useful life at 85 °C	20000 hours (400 V: 5000 hours)	
Useful life at 40 °C, 1.4 × I_R applied	350000 hours (400 V: 90000 hours)	
Shelf life at 0 V, 85 °C	500 hours	
Based on sectional specification	IEC 384-4/CECC 30300	
Climatic category IEC 68	40/085/56	

Selection chart for C_R, U_R and relevant nominal case sizes (∅D × L in mm) for 114 series

Preferred types in **bold**.

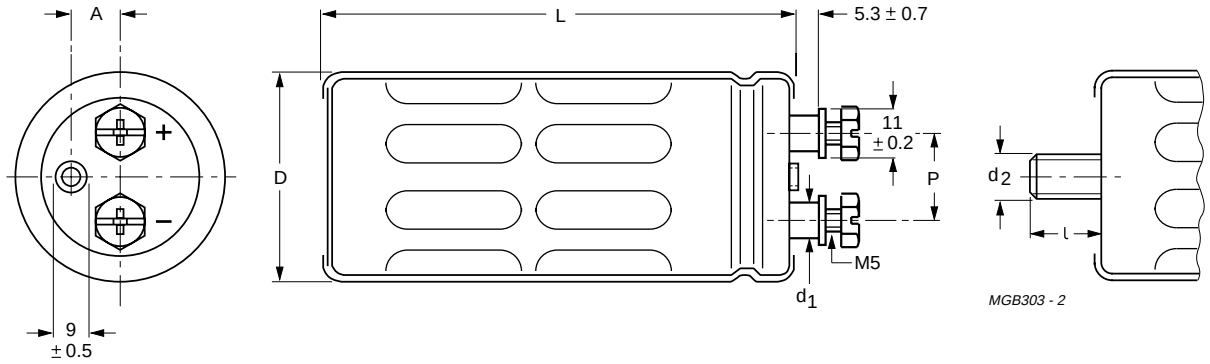
C_R (µF)	U_R (V)					
	10	**16**	**25**	**40**	**63**	**100**
1000	–	–	–	–	–	**35 × 60**
1500	–	–	–	–	–	35 × 60
2200	–	–	–	–	**35 × 60**	**35 × 80**
3300	–	–	–	35 × 60	35 × 60	35 × 105
4700	–	–	**35 × 60**	**35 × 60**	**35 × 80**	**50 × 80**
6800	–	–	35 × 60	35 × 80	35 × 105	50 × 105
10000	–	**35 × 60**	**35 × 80**	**35 × 105**	**50 × 80**	**65 × 105**
15000	35 × 60	35 × 80	35 × 105	50 × 80	50 × 105	65 × 105
22000	**35 × 80**	**35 × 105**	**50 × 80**	**50 × 105**	**65 × 105**	**75 × 105**
33000	35 × 105	50 × 80	50 × 105	65 × 105	65 × 105	–
47000	**50 × 80**	**50 × 105**	**65 × 105**	**65 × 105**	**75 × 105**	–
68000	50 × 105	65 × 105	65 × 105	75 × 105	–	–
100000	**65 × 105**	**65 × 105**	**75 × 105**	–	–	–
150000	65 × 105	75 × 105	–	–	–	–
220000	**75 × 105**	–	–	–	–	–

Selection chart for C_R, U_R and relevant nominal case sizes (∅D × L in mm) for 115 series

Preferred types in **bold**.

C_R (µF)	U_R (V)			
	250	**350**	**385**	**400**
150	–	–	35 × 60	35 × 60
220	–	**35 × 60**	**35 × 80**	**35 × 80**
330	35 × 60	35 × 80	35 × 105	35 × 105
470	**35 × 80**	**35 × 105**	**50 × 80**	**50 × 80**
680	35 × 105	50 × 80	50 × 105	50 × 105
1000	**50 × 80**	**50 × 105**	**65 × 105**	**65 × 105**
1500	50 × 105	65 × 105	65 × 105	65 × 105
2200	**65 × 105**	**65 × 105**	**75 × 105**	**75 × 105**
3300	65 × 105	75 × 105	–	–
4700	**75 × 105**	–	–	–

MECHANICAL DATA AND PACKAGING QUANTITIES



Dimensions in mm.
For dimensions see Table 1.
Maximum permissible torque which may be applied to the termination screws: 2 Nm.
For accessories refer to this handbook, Section *"Mounting Accessories"*.
The capacitors are delivered with screws and washers.

Fig.2 Screw terminal (ST); screw terminal bolt (STB).

Table 1 Physical dimensions, mass and packaging information; see Fig.2

NOMINAL CASE SIZE ∅D × L (mm)	$\varnothing D_{max}$ (mm)	L_{max} (mm)	P ±0.1 (mm)	A (mm)	d_1 ±0.2 (mm)	$d_2 \times l$	MASS (g)	PACKAGING QUANTITIES (per box)	CARDBOARD BOX DIMENSIONS l × w × h (mm)
35 × 60	36.5	63	13.0	8.4	8.0	M8 × 12	≈55	25	196 × 192 × 110
35 × 80	36.5	83	13.0	8.4	8.0	M8 × 12	≈80	25	196 × 192 × 115
35 × 105	36.5	108	13.0	8.4	8.0	M8 × 12	≈110	25	196 × 192 × 140
50 × 80	51.5	83	22.0	14.3	8.0	M12 × 16	≈160	25	293 × 273 × 115
50 × 105	51.5	108	22.0	14.3	8.0	M12 × 16	≈210	25	293 × 273 × 140
65 × 105	66.5	108	28.5	19.0	9.6	M12 × 16	≈370	10	368 × 151 × 140
75 × 105	76.5	108	32.0	21.0	9.6	M12 × 16	≈535	10	418 × 173 × 140

MARKING

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

- Rated capacitance (in μF)
- Tolerance code on rated capacitance (M for ±20%)
- Rated voltage (in V)
- Climatic category in accordance with *"IEC 68"*
- Date code (year and week) in accordance with *"IEC 62"*
- Code for factory of origin
- Name of manufacturer
- Code number (last 8 digits)
- Code for basic specification in accordance with *"IEC 384-4-1"* and *"CECC 30301"*.

ELECTRICAL DATA AND ORDERING INFORMATION

Unless otherwise specified, all electrical values in Tables 2 and 3 apply at T_{amb} = 20 °C, P = 86 to 106 kPa, RH = 45 to 75%.

SYMBOL	DESCRIPTION
C_R	rated capacitance at 100 Hz, tolerance –10 to +30%
I_R	rated RMS ripple current at 100 Hz, 85 °C and 20 kHz, 70 °C
I_{L1}	max. leakage current after 1 minute at U_R
I_{L5}	max. leakage current after 5 minutes at U_R
ESR	typical equivalent series resistance at 100 Hz
Z	impedance at 20 kHz
Tan δ	max. dissipation factor at 100 Hz

Ordering example

Electrolytic capacitor 114 series

10000 μF/25 V; –10/+30%

Nominal case size: ∅35 × 80 mm; ST version

Catalogue number: 2222 114 16103.

Table 2 Electrical data and ordering information for the **114** series; preferred types in **bold**

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	I_R 100 Hz 85 °C (A)	I_R 20 kHz 70 °C (A)	I_{L1} 1 min (mA)	I_{L5} 5 min (mA)	ESR TYP. 100 Hz (mΩ)	Tan δ MAX. 100 Hz	Z TYP. 20 kHz (mΩ)	Z MAX. 20 kHz (mΩ)	CATALOGUE NUMBER (see Table 3, note 1) 2222 ... .
10	15000	35 × 60	6	11.4	0.90	0.30	20	0.32	13	20	114 14153
	22000	**35 × 80**	7.5	14.2	1.32	0.43	14	0.33	9.5	14	**114 14223**
	33000	35 × 105	10	19	1.98	0.66	10	0.35	7.5	10	114 14333
	47000	**50 × 80**	14	26.5	2.82	0.94	7.5	0.36	5.0	9.5	**114 14473**
	68000	50 × 105	18	34	4.08	1.36	5.5	0.38	4.0	8.0	114 14683
	100000	**65 × 105**	30	50	6.00	2.00	3.5	0.34	3.0	5.0	**114 14104**
	150000	65 × 105	30	50	9.00	3.00	3.0	0.45	3.0	5.0	114 14154
	220000	**75 × 105**	37	50	13.20	4.40	2.0	0.45	2.5	4.0	**114 14224**
16	**10000**	**35 × 60**	6	11.4	0.96	0.32	22	0.22	13	20	**114 15103**
	15000	35 × 80	7.5	14.2	1.44	0.40	15	0.23	9.5	14	114 15153
	22000	**35 × 105**	10	19	2.12	0.71	11	0.25	7.0	10	**114 15223**
	33000	50 × 80	13	24.6	3.17	1.06	7.5	0.26	5.0	9.5	114 15333
	47000	**50 × 105**	18	34	4.52	1.51	5.5	0.27	4.0	8.0	**114 15473**
	68000	65 × 105	28	50	6.53	2.18	3.5	0.24	3.0	5.0	114 15683
	100000	**65 × 105**	28	50	9.60	3.20	3.0	0.31	3.0	5.0	**114 15104**
	150000	75 × 105	37	50	14.40	4.80	2.0	0.31	2.5	4.0	114 15154

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	I_R 100 Hz 85 °C (A)	I_R 20 kHz 70 °C (A)	I_{L1} 1 min (mA)	I_{L5} 5 min (mA)	ESR TYP. 100 Hz (mΩ)	Tan δ MAX. 100 Hz	Z TYP. 20 kHz (mΩ)	Z MAX. 20 kHz (mΩ)	CATALOGUE NUMBER (see Table 3, note 1) 2222 ... .
25	**4700**	**35 × 60**	5.2	10	0.71	0.24	30	0.14	15	23	**114 16472**
	6800	35 × 60	5.2	10	1.02	0.34	25	0.18	14	21	114 16682
	10000	**35 × 80**	6.7	12.7	1.50	0.50	18	0.18	10	15	**114 16103**
	15000	35 × 105	9.7	18.4	2.25	0.75	12	0.19	7.5	11	114 16153
	22000	**50 × 80**	12.5	23.7	3.30	1.10	8.5	0.19	5.5	9.5	**114 16223**
	33000	50 × 105	18	34	4.95	1.65	6.0	0.21	4.0	8.0	114 16333
	47000	**65 × 105**	27	50	7.05	2.35	4.0	0.18	3.0	5.0	**114 16473**
	68000	65 × 105	27	50	10.20	3.40	3.5	0.23	3.0	5.0	114 16683
	100000	**75 × 105**	37	50	15.00	5.0	2.5	0.23	2.5	4.0	**114 16104**
40	3300	35 × 60	4.5	8.5	0.80	0.27	37	0.13	21	32	114 17332
	4700	**35 × 60**	4.5	8.5	1.13	0.38	35	0.17	22	33	**114 17472**
	6800	35 × 80	6	11.4	1.64	0.55	25	0.17	15	23	114 17682
	10000	**35 × 105**	7.5	14.2	2.40	0.80	17	0.18	11	17	**114 17103**
	15000	50 × 80	10	19	3.60	1.20	11	0.17	7.5	13	114 17153
	22000	**50 × 105**	15	28.5	5.28	1.76	8.0	0.18	5.5	10.5	**114 17223**
	33000	65 × 105	21	40	7.92	2.64	5.0	0.16	3.5	6.0	114 17333
	47000	**65 × 105**	22	42	11.28	3.76	4.5	0.21	3.5	6.0	**114 17473**
	68000	75 × 105	30	50	16.32	5.44	3.0	0.21	3.0	4.5	114 17683
63	**2200**	**35 × 60**	3.7	7	0.84	0.28	39	0.09	22	33	**114 18222**
	3300	35 × 60	3.7	7	1.25	0.42	32	0.11	20	30	114 18332
	4700	**35 × 80**	5.2	10	1.78	0.66	23	0.11	14	21	**114 18472**
	6800	35 × 105	7.5	14.2	2.57	0.86	17	0.11	10	15	114 18682
	10000	**50 × 80**	9.5	18	3.78	1.26	12	0.12	7.5	14	**114 18103**
	15000	50 × 105	13.5	25.6	5.67	1.89	8.5	0.13	5.5	10.5	114 18153
	22000	**65 × 105**	21	40	8.32	2.77	5.0	0.11	3.5	6.0	**114 18223**
	33000	65 × 105	22	42	12.48	4.16	4.5	0.14	3.5	6.0	114 18333
	47000	**75 × 105**	30	50	17.77	5.92	3.0	0.14	3.0	4.5	**114 18473**

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	I_R 100 Hz 85 °C (A)	I_R 20 kHz 70 °C (A)	I_{L1} 1 min (mA)	I_{L5} 5 min (mA)	ESR TYP. 100 Hz (mΩ)	Tan δ MAX. 100 Hz	Z TYP. 20 kHz (mΩ)	Z MAX. 20 kHz (mΩ)	CATALOGUE NUMBER (see Table 3, note 1) 2222 ... .
100	**1000**	**35 × 60**	3.0	5.7	0.60	0.20	85	0.09	45	67	**114 19102**
	1500	35 × 60	3.3	6.3	0.90	0.30	65	0.10	40	60	114 19152
	2200	**35 × 80**	4.6	8.7	1.32	0.41	45	0.10	28	42	**114 19222**
	3300	35 × 105	6.5	12.3	1.98	0.66	30	0.10	19	28	114 19332
	4700	**50 × 80**	7.4	14.0	2.82	0.94	27	0.11	17	25	**114 19472**
	6800	50 × 105	9.9	18.8	4.08	1.36	19	0.11	12	18	114 19682
	10000	**65 × 105**	15.0	28.5	6.00	2.00	11	0.11	7	11	**114 19103**
	15000	65 × 105	15.8	30.0	9.00	3.00	10	0.12	6	10	114 19153
	22000	**75 × 105**	20.5	38.9	13.20	4.40	7	0.12	5	8	**114 19223**

Table 3 Electrical data and ordering information for the **115** series; preferred types in **bold**

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	I_R 100 Hz 85 °C (A)	I_R 20 kHz 70 °C (A)	I_{L1} 1 min (mA)	I_{L5} 5 min (mA)	ESR TYP. 100 Hz (mΩ)	Tan δ MAX. 100 Hz	Z TYP. 20 kHz (mΩ)	Z MAX. 20 kHz (mΩ)	CATALOGUE NUMBER (see note 1) 2222 ... .
250	330	35 × 60	1.8	3.4	0.50	0.17	300	0.15	275	500	115 13331
	470	**35 × 80**	2.5	4.7	0.71	0.24	250	0.15	140	375	**115 13471**
	680	35 × 105	3.5	6.6	1.02	0.34	180	0.15	125	300	115 13681
	1000	**50 × 80**	4.2	8	1.50	0.50	110	0.15	60	130	**115 13102**
	1500	50 × 105	6.3	12	2.25	0.75	60	0.15	40	100	115 13152
	2200	**65 × 105**	8.8	16.7	3.30	1.10	45	0.15	30	60	**115 13222**
	3300	65 × 105	10.5	20	4.95	1.65	30	0.15	25	50	115 13332
	4700	**75 × 105**	14	26.5	7.05	2.35	25	0.15	20	40	**115 13472**
350	**220**	**35 × 60**	1.9	3.6	0.47	0.16	360	0.10	220	480	**115 15221**
	330	35 × 80	2.5	4.8	0.70	0.23	245	0.10	150	320	115 15331
	470	**35 × 105**	3.2	6.1	0.99	0.33	175	0.10	105	230	**115 15471**
	680	50 × 80	3.9	7.0	1.47	0.48	140	0.10	60	130	115 15681
	1000	**50 × 105**	5.4	9.7	2.14	0.71	65	0.10	50	100	**115 15102**

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE ∅D × L (mm)	I_R 100 Hz 85 °C (A)	I_R 20 kHz 70 °C (A)	I_{L1} 1 min (mA)	I_{L5} 5 min (mA)	ESR TYP. 100 Hz (mΩ)	Tan δ MAX. 100 Hz	Z TYP. 20 kHz (mΩ)	Z MAX. 20 kHz (mΩ)	CATALOGUE NUMBER (see note 1) 2222 ... .
350	1500	65 × 105	7.7	14.8	3.15	1.05	55	0.10	30	70	115 15152
	2200	**65 × 105**	9.1	17.5	4.62	1.54	35	0.10	22	50	**115 15222**
	3300	75 × 105	10.8	19.4	6.93	2.31	30	0.12	20	45	115 15332
385	150	35 × 60	1.0	1.8	0.34	0.12	730	0.12	450	935	115 18151
	220	**35 × 80**	1.4	2.6	0.50	0.17	520	0.12	310	630	**115 18221**
	330	35 × 105	1.9	3.6	0.75	0.25	340	0.12	210	425	115 18331
	470	**50 × 80**	2.7	5.1	1.06	0.36	200	0.12	140	300	**115 18471**
	680	50 × 105	3.6	6.9	1.53	0.51	140	0.12	100	205	115 18681
	1000	**65 × 105**	5.1	9.7	2.25	0.75	95	0.12	65	125	**115 18102**
	1500	65 × 105	5.7	10.6	3.38	1.13	80	0.12	45	95	115 18152
	2200	**75 × 105**	7.3	13.8	4.95	1.65	55	0.12	40	75	**115 18222**
400	150	35 × 60	1.0	1.8	0.36	0.12	730	0.12	450	935	115 16151
	220	**35 × 80**	1.4	2.6	0.53	0.18	520	0.12	310	630	**115 16221**
	330	35 × 105	1.9	3.6	0.79	0.26	340	0.12	210	425	115 16331
	470	**50 × 80**	2.7	5.1	1.13	0.38	200	0.12	140	300	**115 16471**
	680	50 × 105	3.6	6.9	1.63	0.54	140	0.12	100	205	115 16681
	1000	**65 × 105**	5.1	9.7	2.40	0.80	95	0.12	65	125	**115 16102**
	1500	65 × 105	5.7	10.6	3.60	1.20	80	0.12	45	95	115 16152
	2200	**75 × 105**	7.3	13.8	5.28	1.76	55	0.12	40	75	**115 16222**

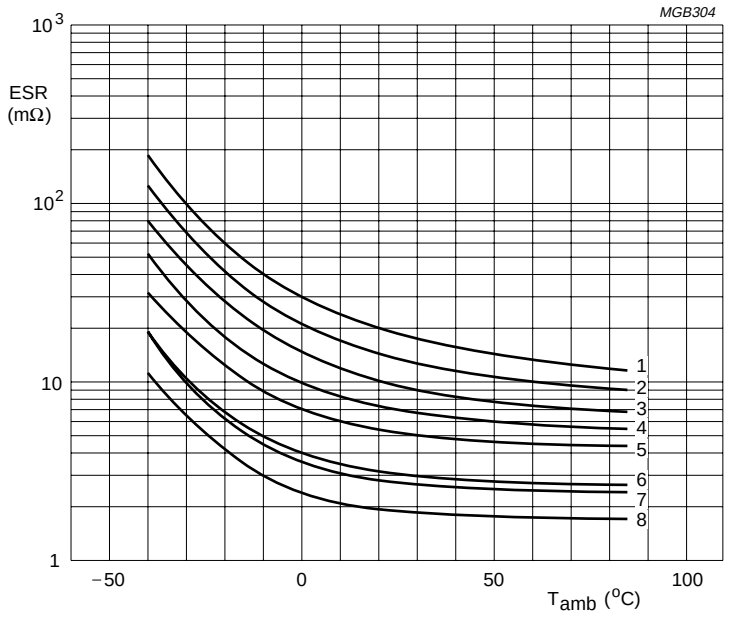
Note

1. Catalogue number applies to the ST version; for STB version (not preferred) replace 8th digit by '5' (2222 114/115 5....).

Additional electrical data

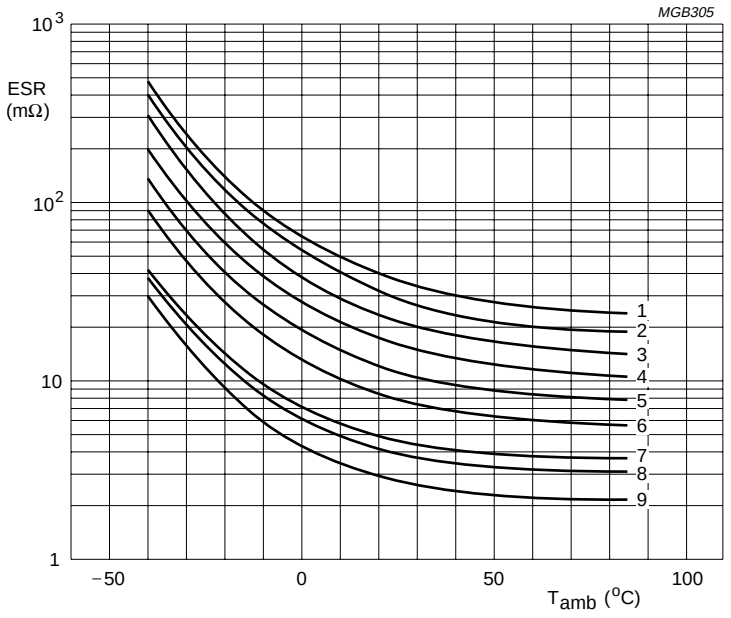
PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage for short periods	≤250 V versions	$U_S = 1.15 \times U_R$
	≥350 V versions	$U_S = 1.1 \times U_R$
Reverse voltage		$U_{rev} \leq 1$ V
Current		
Leakage current	after 1 minute at U_R	$I_{L1} \leq 0.006C_R \times U_R + 4$ μA
	after 5 minutes at U_R	$I_{L5} \leq 0.002C_R \times U_R + 4$ μA
Inductance		
Equivalent series inductance (ESL)	case ∅D = 35 mm	typ. 13 nH
	case ∅D = 50 mm	typ. 16 nH
	case ∅D = 65 mm	typ. 19 nH
	case ∅D = 75 mm	typ. 20 nH

Equivalent series resistance (ESR)



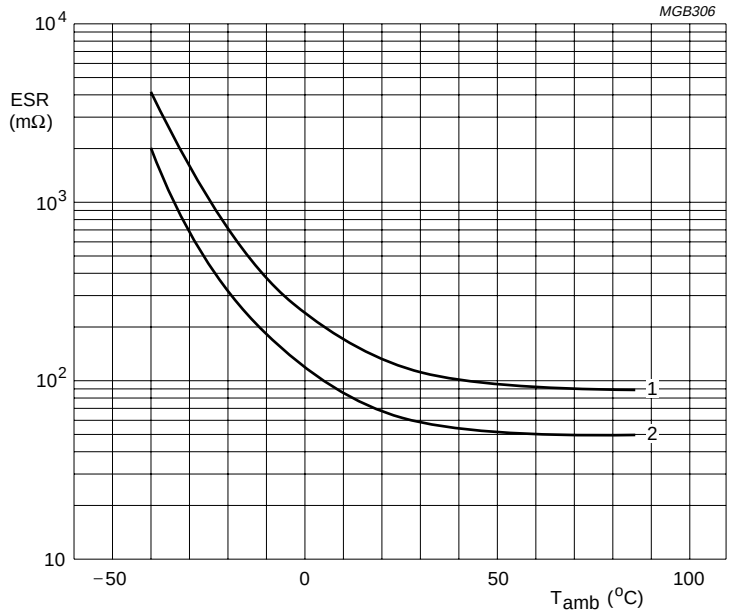
Curve 1: **case ∅D × L = 35 × 60 mm**.
Curve 2: **case ∅D × L = 35 × 80 mm**.
Curve 3: **case ∅D × L = 35 × 105 mm**.
Curve 4: **case ∅D × L = 50 × 80 mm**.
Curve 5: **case ∅D × L = 50 × 105 mm**.
Curve 6: **case ∅D × L = 65 × 105 mm**; 100000 µF.
Curve 7: **case ∅D × L = 65 × 105 mm**; 150000 µF.
Curve 8: **case ∅D × L = 75 × 105 mm**.
ESR at 100 Hz and U_R = 10 V.

Fig.3 Typical ESR as a function of temperature.



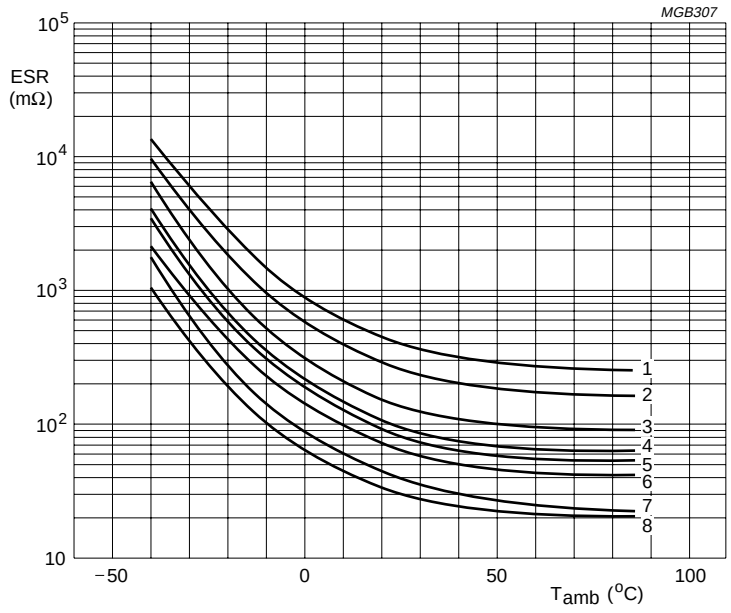
Curve 1: **case ∅D × L = 35 × 60 mm;** 2200 µF.
Curve 2: **case ∅D × L = 35 × 60 mm;** 3300 µF.
Curve 3: **case ∅D × L = 35 × 80 mm**.
Curve 4: **case ∅D × L = 35 × 105 mm**.
Curve 5: **case ∅D × L = 50 × 80 mm**.
Curve 6: **case ∅D × L = 50 × 105 mm**.
Curve 7: **case ∅D × L = 65 × 105 mm;** 22000 µF.
Curve 8: **case ∅D × L = 65 × 105 mm;** 33000 µF.
Curve 9: **case ∅D × L = 75 × 105 mm**.
ESR at 100 Hz and U_R = 63 V.

Fig.4 Typical ESR as a function of temperature.



Curve 1: **case** ∅**D** × **L = 50** × **80 mm**.
Curve 2: **case** ∅**D** × **L = 50** × **105 mm**.
ESR at 100 Hz and U_R = 250 V.

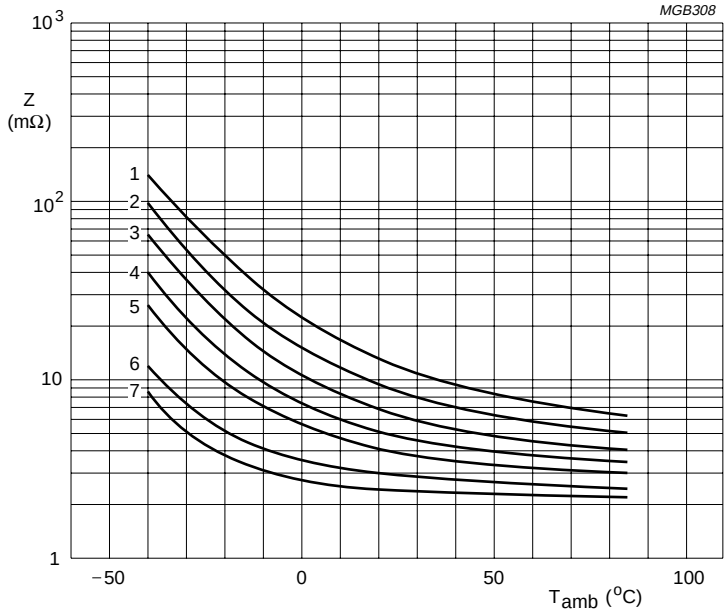
Fig.5 Typical ESR as a function of temperature.



Curve 1: **case** ∅**D** × **L = 35** × **60 mm**.
Curve 2: **case** ∅**D** × **L = 35** × **80 mm**.
Curve 3: **case** ∅**D** × **L = 35** × **105 mm**.
Curve 4: **case** ∅**D** × **L = 50** × **80 mm**.
Curve 5: **case** ∅**D** × **L = 50** × **105 mm**.
Curve 6: **case** ∅**D** × **L = 65** × **105 mm**; 1000 µF.
Curve 7: **case** ∅**D** × **L = 65** × **105 mm**; 1500 µF.
Curve 8: **case** ∅**D** × **L = 75** × **105 mm**.
ESR at 100 Hz and U_R = 385 V.

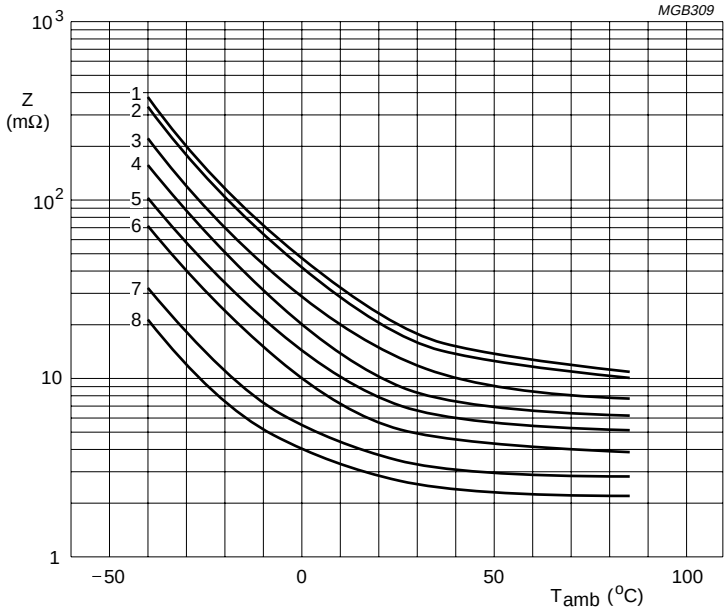
Fig.6 Typical ESR as a function of temperature.

Impedance (Z)



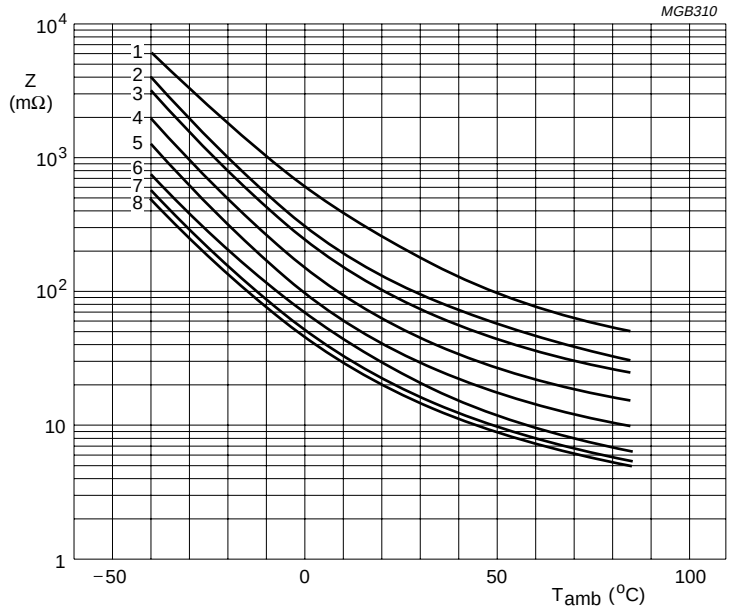
Curve 1: **case ∅D × L = 35 × 60 mm**.
Curve 2: **case ∅D × L = 35 × 80 mm**.
Curve 3: **case ∅D × L = 35 × 105 mm**.
Curve 4: **case ∅D × L = 50 × 80 mm**.
Curve 5: **case ∅D × L = 50 × 105 mm**.
Curve 6: **case ∅D × L = 65 × 105 mm**.
Curve 7: **case ∅D × L = 75 × 105 mm**.
Z at 20 kHz and U_R = 10 V.

Fig.7 Typical impedance as a function of temperature.



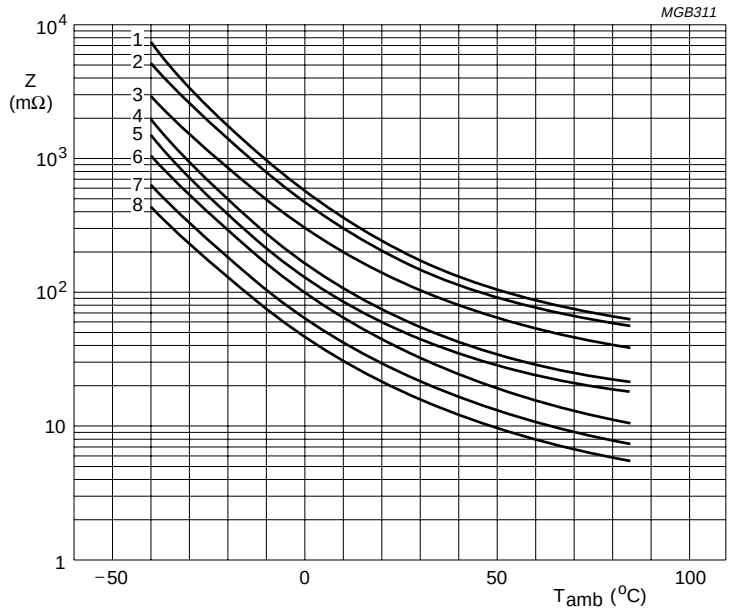
Curve 1: **case ∅D × L = 35 × 60 mm**; 2200 µF.
Curve 2: **case ∅D × L = 35 × 60 mm**; 3300 µF.
Curve 3: **case ∅D × L = 35 × 80 mm**.
Curve 4: **case ∅D × L = 35 × 105 mm**.
Curve 5: **case ∅D × L = 50 × 80 mm**.
Curve 6: **case ∅D × L = 50 × 105 mm**.
Curve 7: **case ∅D × L = 65 × 105 mm**.
Curve 8: **case ∅D × L = 75 × 105 mm**.
Z at 20 kHz and U_R = 63 V.

Fig.8 Typical impedance as a function of temperature.



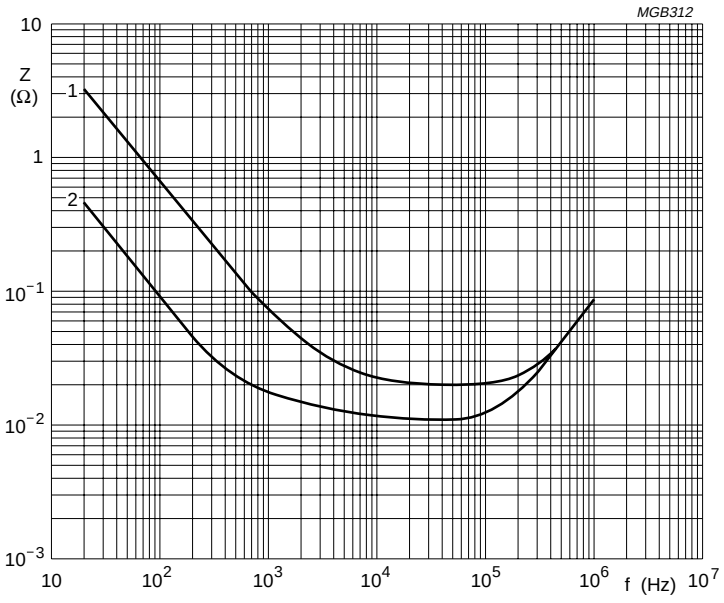
Curve 1: **case ∅D × L = 35 × 60 mm**.
Curve 2: **case ∅D × L = 35 × 80 mm**.
Curve 3: **case ∅D × L = 35 × 105 mm**.
Curve 4: **case ∅D × L = 50 × 80 mm**.
Curve 5: **case ∅D × L = 50 × 105 mm**.
Curve 6: **case ∅D × L = 65 × 105 mm**; 2200 μF.
Curve 7: **case ∅D × L = 65 × 105 mm**; 3300 μF.
Curve 8: **case ∅D × L = 75 × 105 mm**.
Z at 20 kHz and U_R = 250 V.

Fig.9 Typical impedance as a function of temperature.



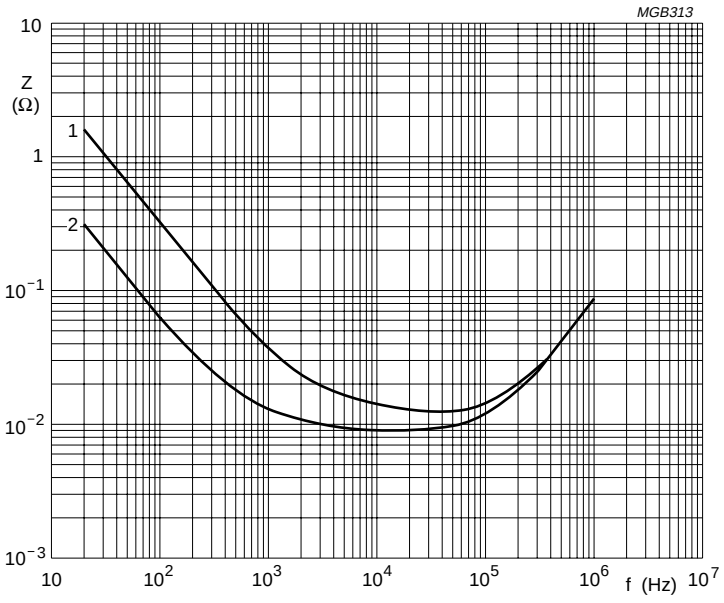
Curve 1: **case ∅D × L = 35 × 60 mm**.
Curve 2: **case ∅D × L = 35 × 80 mm**.
Curve 3: **case ∅D × L = 35 × 105 mm**.
Curve 4: **case ∅D × L = 50 × 80 mm**.
Curve 5: **case ∅D × L = 50 × 105 mm**.
Curve 6: **case ∅D × L = 65 × 105 mm**; 1000 μF.
Curve 7: **case ∅D × L = 65 × 105 mm**; 1500 μF.
Curve 8: **case ∅D × L = 75 × 105 mm**.
Z at 20 kHz and U_R = 385 V.

Fig.10 Typical impedance as a function of temperature.



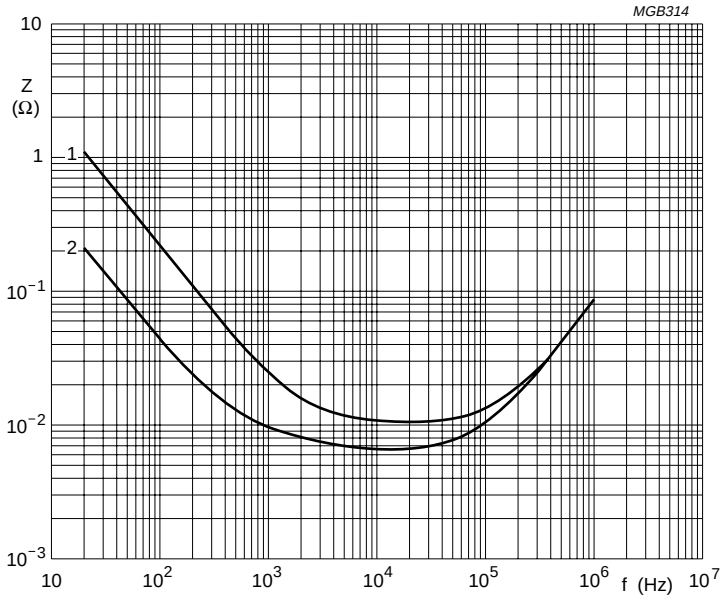
Curve 1: 2200 µF, 63 V.
Curve 2: 15000 µF, 10 V.
Case ∅D × L = 35 × 60 mm.
T_{amb} = 20 °C.

Fig.11 Typical impedance as a function of frequency.



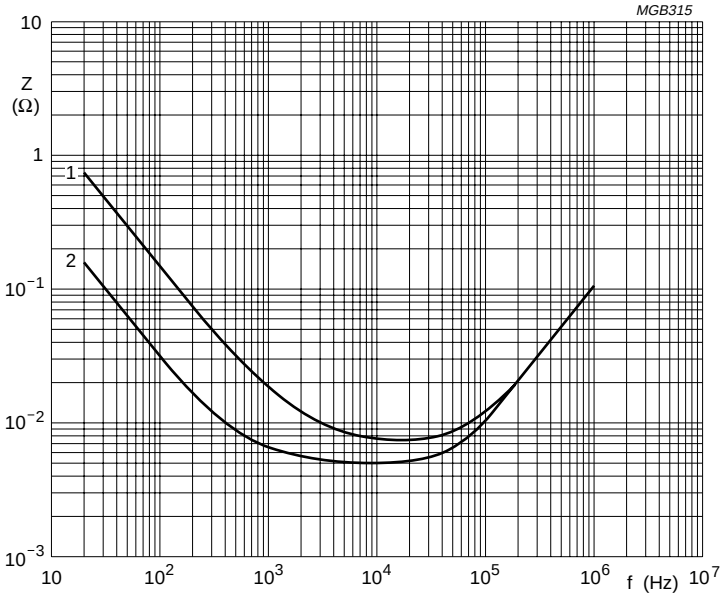
Curve 1: 4700 µF, 63 V.
Curve 2: 22000 µF, 10 V.
Case ∅D × L = 35 × 80 mm.
T_{amb} = 20 °C.

Fig.12 Typical impedance as a function of frequency.



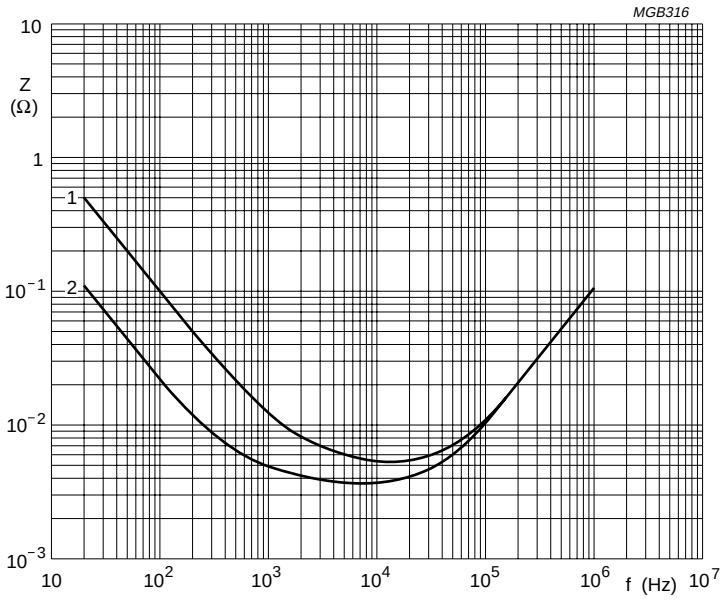
Curve 1: 6800 μF, 63 V.
Curve 2: 33000 μF, 10 V.
Case ∅D × L = 35 × 105 mm.
T_{amb} = 20 °C.

Fig.13 Typical impedance as a function of frequency.



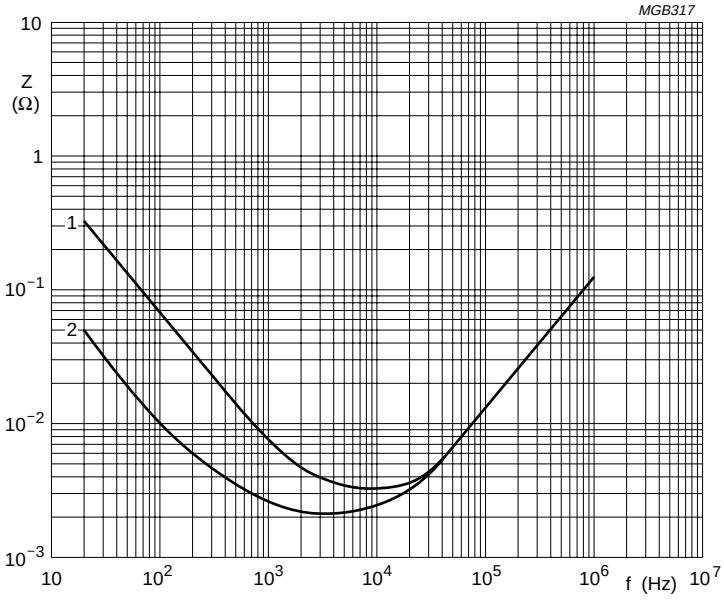
Curve 1: 10000 μF, 63 V.
Curve 2: 47000 μF, 10 V.
Case ∅D × L = 50 × 80 mm.
T_{amb} = 20 °C.

Fig.14 Typical impedance as a function of frequency.



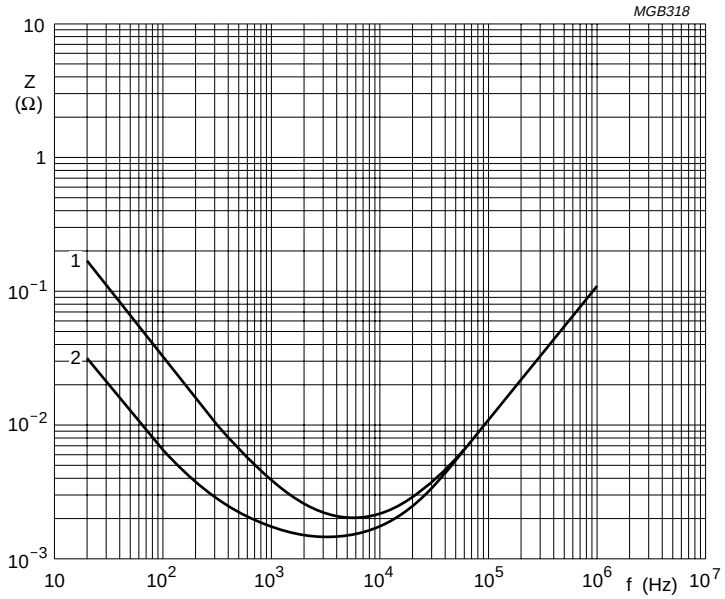
Curve 1: 15000 µF, 63 V.
Curve 2: 68000 µF, 10 V.
Case ∅D × L = 50 × 105 mm.
T_{amb} = 20 °C.

Fig.15 Typical impedance as a function of frequency.



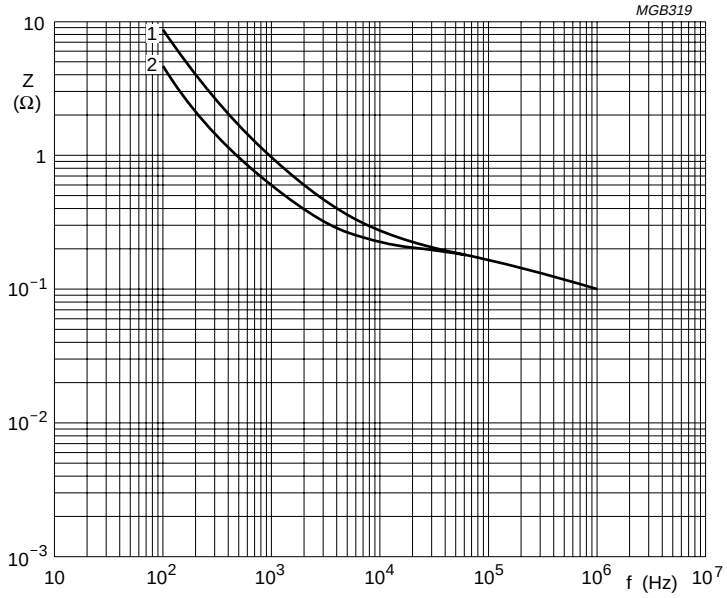
Curve 1: 22000 µF, 63 V.
Curve 2: 150000 µF, 10 V.
Case ∅D × L = 65 × 105 mm.
T_{amb} = 20 °C.

Fig.16 Typical impedance as a function of frequency.



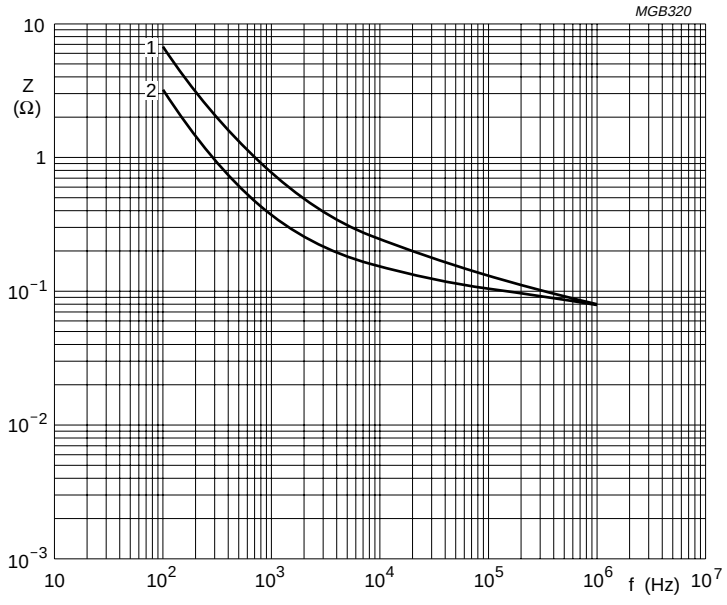
Curve 1: 47000 µF, 63 V.
Curve 2: 220000 µF, 10 V.
Case ∅D × L = 75 × 105 mm.
T_{amb} = 20 °C.

Fig.17 Typical impedance as a function of frequency.



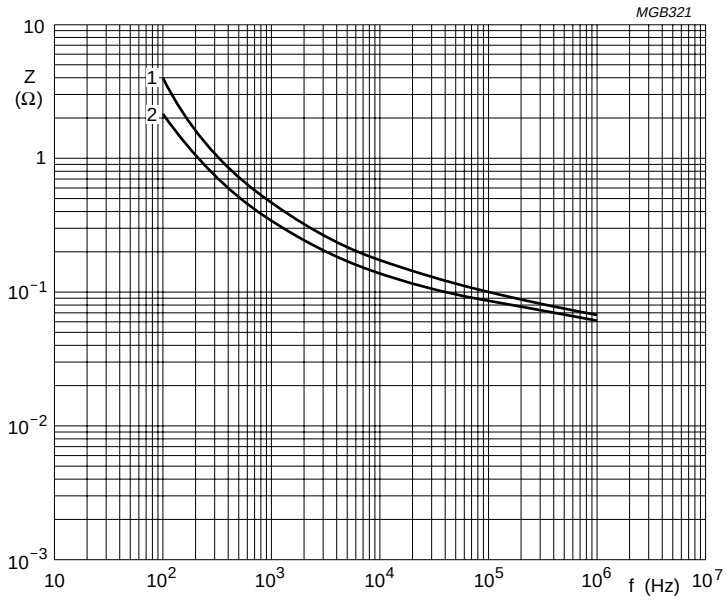
Curve 1: 150 µF, 385 V.
Curve 2: 330 µF, 250 V.
Case ∅D × L = 35 × 60 mm.
T_{amb} = 20 °C.

Fig.18 Typical impedance as a function of frequency.



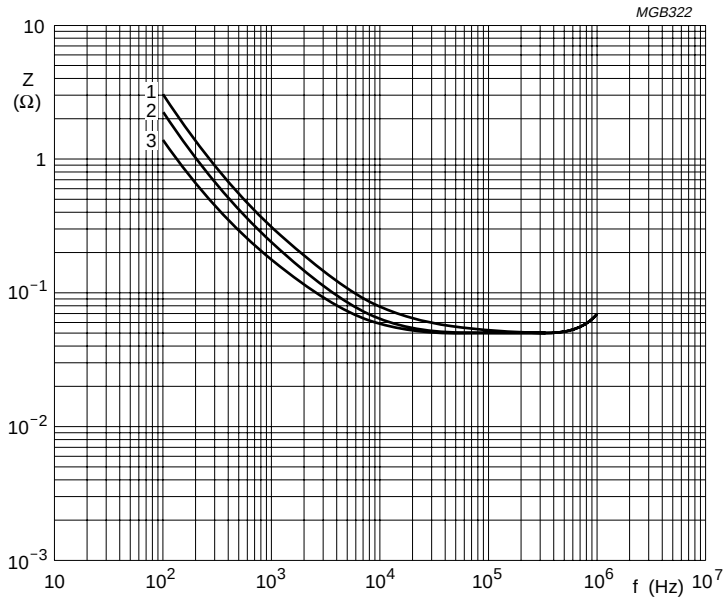
Curve 1: 220 µF, 385 V.
Curve 2: 470 µF, 250 V.
Case ∅D × L = 35 × 80 mm.
T_{amb} = 20 °C.

Fig.19 Typical impedance as a function of frequency.



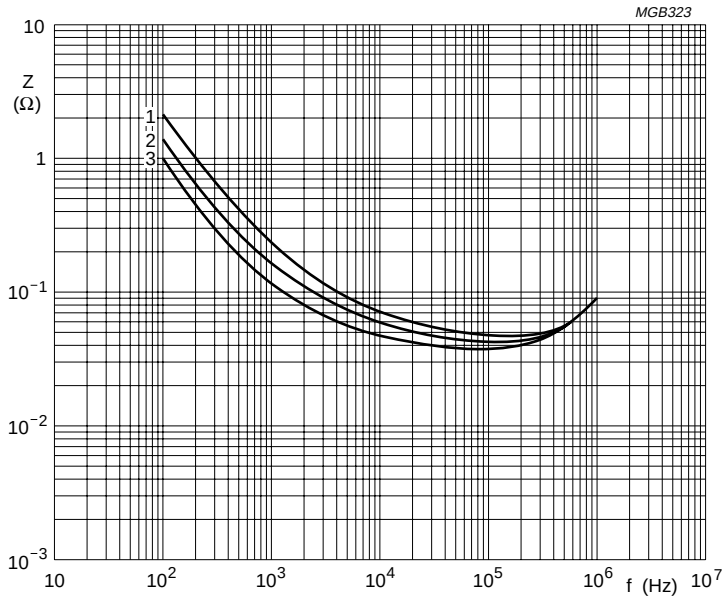
Curve 1: 330 µF, 385 V.
Curve 2: 680 µF, 250 V.
Case ∅D × L = 35 × 105 mm.
T_{amb} = 20 °C.

Fig.20 Typical impedance as a function of frequency.



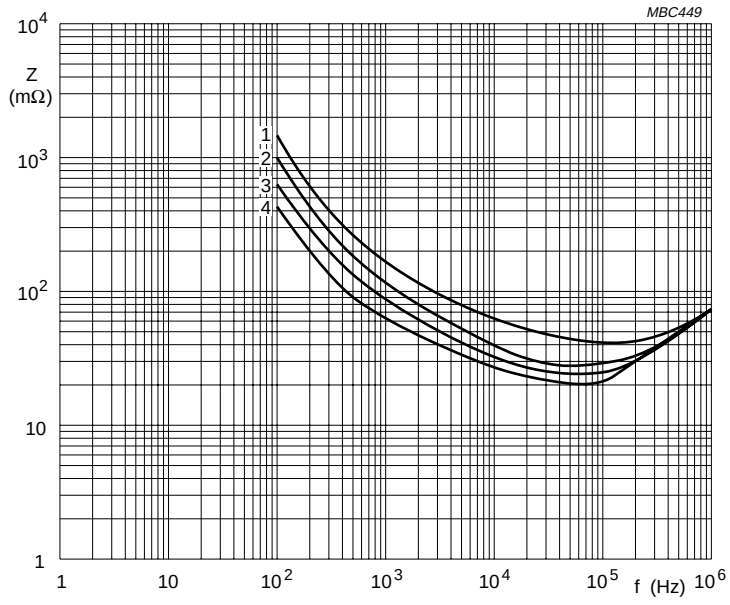
Curve 1: 470 µF, 385 V.
Curve 2: 1000 µF, 250 V.
Curve 3: 680 µF, 350 V.
Case ∅D × L = 50 × 80 mm.
T_{amb} = 20 °C.

Fig.21 Typical impedance as a function of frequency.



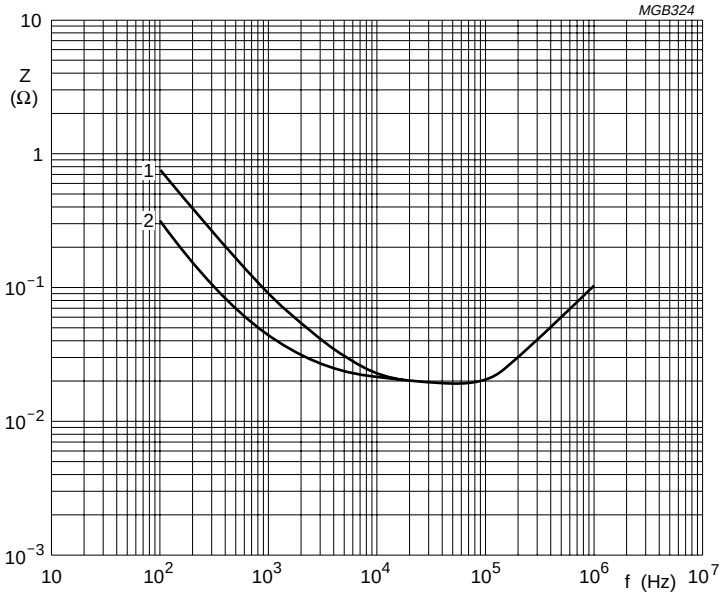
Curve 1: 680 µF, 385 V.
Curve 2: 1000 µF, 350 V.
Curve 3: 1500 µF, 250 V.
Case ∅D × L = 50 × 105 mm.
T_{amb} = 20 °C.

Fig.22 Typical impedance as a function of frequency.



Curve 1: 1000 µF, 385 V.
Curve 2: 1500 µF, 385 V.
Curve 3: 2200 µF, 250 V.
Curve 4: 3300 µF, 250 V.
Case ∅D × L = 65 × 105 mm.
T_{amb} = 20 °C.

Fig.23 Typical impedance as a function of frequency.



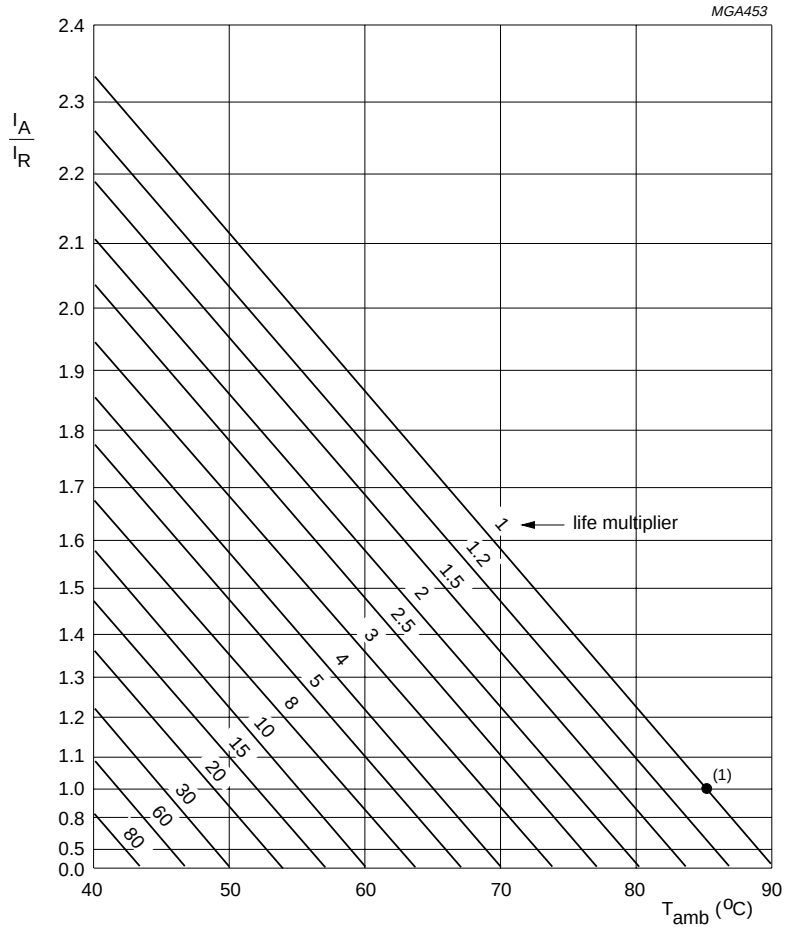
Curve 1: 2200 µF, 385 V.
Curve 2: 4700 µF, 250 V
Case ∅D × L = 75 × 105 mm.
T_{amb} = 20 °C.

Fig.24 Typical impedance as a function of frequency.

RIPPLE CURRENT AND USEFUL LIFE

Table 4 Multiplier of ripple current (I_R) as a function of frequency

FREQUENCY (Hz)	I_R MULTIPLIER
50	0.83
100	1.00
200	1.10
400	1.15
1000	1.19
≥2000	1.20



I_A = actual ripple current at 100 Hz and 85 °C.
I_R = rated ripple current at 100 Hz and 85 °C.
With an absolute maximum of 50 A at 85 °C
(1) Useful life at 85 °C and I_R applied: 20000 hours (5000 hours for 400 V types).

Fig.25 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 this handbook, Section *"Tests and Requirements"*.

Table 5 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 °C; U_R applied; 8000 hours (400 V types: 2000 hours)	$U_R \leq 100$ V; $\Delta C/C$: ±15% $U_R > 100$ V; $\Delta C/C$: ±10% $Z \leq 2 \times$ spec. limit $I_{L5} \leq$ spec. limit
Useful life	CECC 30301 subclause 1.8.1	T_{amb} = 85 °C; U_R and I_R applied; 20000 hours (400 V types: 5000 hours)	$U_R \leq 100$ V; $\Delta C/C$: ±45% $U_R > 100$ V; $\Delta C/C$: ±30% $Z \leq 3 \times$ spec. limit $I_{L5} \leq$ spec. limit no short or open circuit, no visible damage total failure percentage: $U_R \leq 100$ V: ≤1%; $U_R > 100$ V: ≤3%
Shelf life (storage at high temperature)	IEC 384-4/ CECC 30300 subclause 4.17	T_{amb} = 85 °C; no voltage applied; 500 hours after test: U_R to be applied for 30 minutes, 24 to 48 hours before measurement	$\Delta C/C$: ±10% $I_{L5} \leq 2 \times$ spec. limit

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