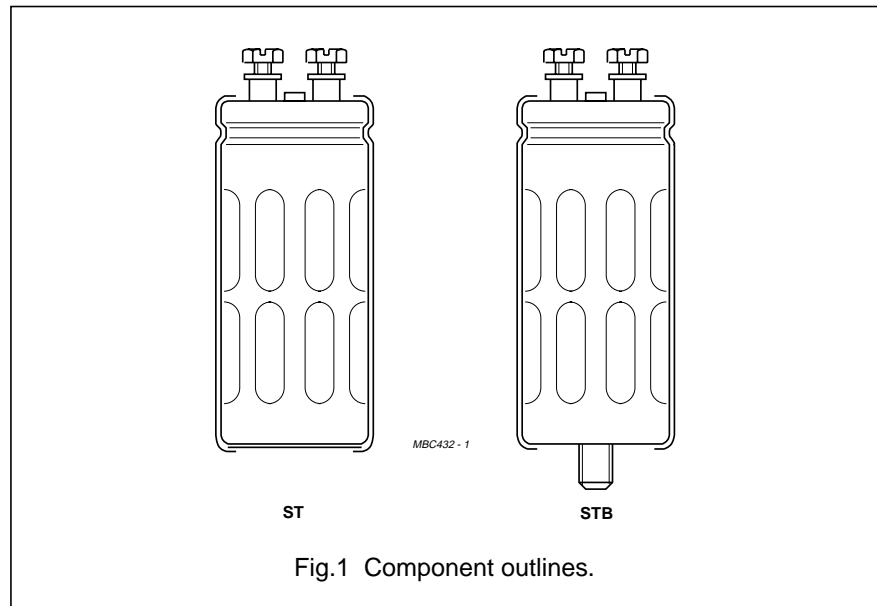


Aluminium electrolytic capacitors Power Eurodin Screw Terminals

114/115 PED-ST

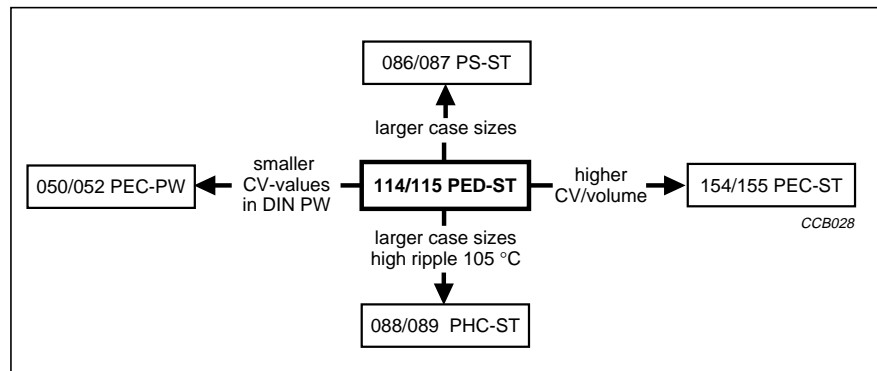
FEATURES

- 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.



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, $1.4 \times I_R$ 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	

Aluminium electrolytic capacitors Power Eurodin Screw Terminals

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Selection chart for C_R , U_R and relevant nominal case sizes ($\varnothing D \times L$ 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 ($\varnothing D \times L$ 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	–	–	–

Aluminium electrolytic capacitors

Power Eurodin Screw Terminals

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MECHANICAL DATA AND PACKAGING QUANTITIES

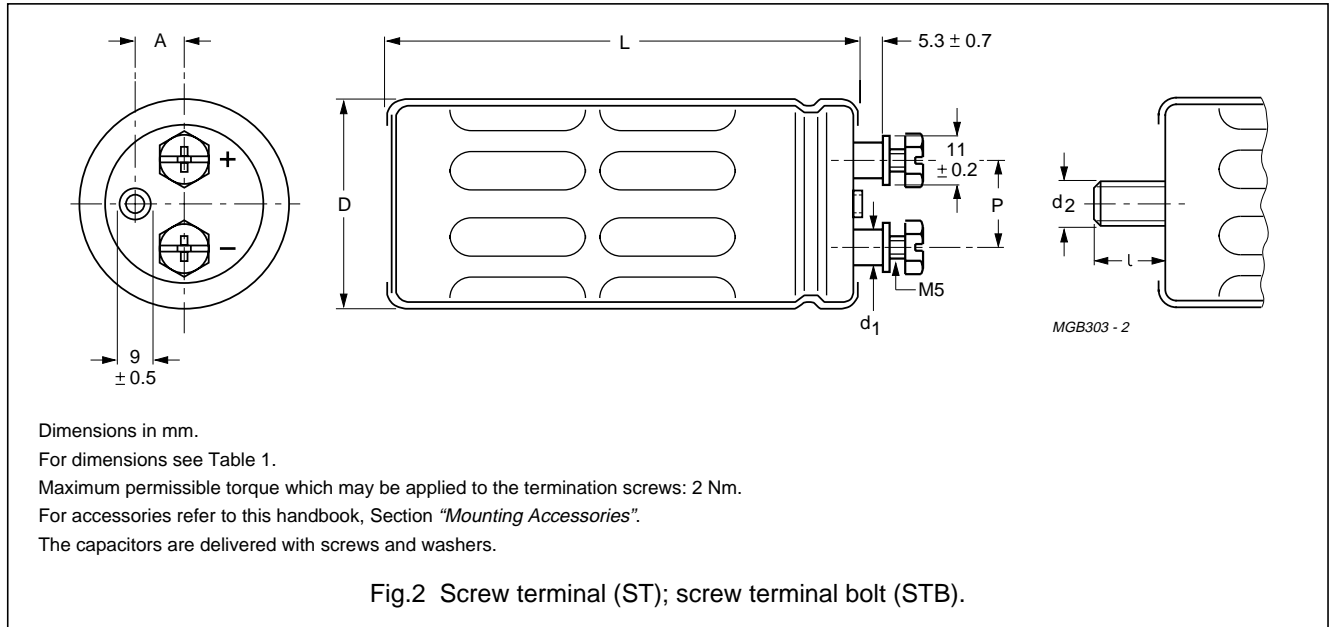


Table 1 Physical dimensions, mass and packaging information; see Fig.2

NOMINAL CASE SIZE $\varnothing D \times L$ (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 $l \times w \times h$ (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 $\pm 20\%$)
- 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".

Aluminium electrolytic capacitors
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Ordering example

Electrolytic capacitor 114 series

10000 $\mu\text{F}/25\text{ V}$; $-10/+30\%$ Nominal case size: $\varnothing 35 \times 80\text{ mm}$; ST version

Catalogue number: 2222 114 16103.

ELECTRICAL DATA AND ORDERING INFORMATION

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

SYMBOL	DESCRIPTION
C_R	rated capacitance at 100 Hz, tolerance $-10\text{ to }+30\%$
I_R	rated RMS ripple current at 100 Hz, $85\text{ }^\circ\text{C}$ and 20 kHz, $70\text{ }^\circ\text{C}$
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

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

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Power Eurodin Screw Terminals

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U_R (V)	C_R 100 Hz (μ F)	NOMINAL CASE SIZE $\varnothing D \times L$ (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 (m Ω)	Tan δ MAX. 100 Hz	Z TYP. 20 kHz (m Ω)	Z MAX. 20 kHz (m Ω)	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

Aluminium electrolytic capacitors
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U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (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 (m Ω)	Tan δ MAX. 100 Hz	Z TYP. 20 kHz (m Ω)	Z MAX. 20 kHz (m Ω)	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 $\varnothing D \times L$ (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 (m Ω)	Tan δ MAX. 100 Hz	Z TYP. 20 kHz (m Ω)	Z MAX. 20 kHz (m Ω)	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

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U_R (V)	C_R 100 Hz (μ F)	NOMINAL CASE SIZE $\varnothing D \times L$ (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 (m Ω)	Tan δ MAX. 100 Hz	Z TYP. 20 kHz (m Ω)	Z MAX. 20 kHz (m Ω)	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

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

Aluminium electrolytic capacitors

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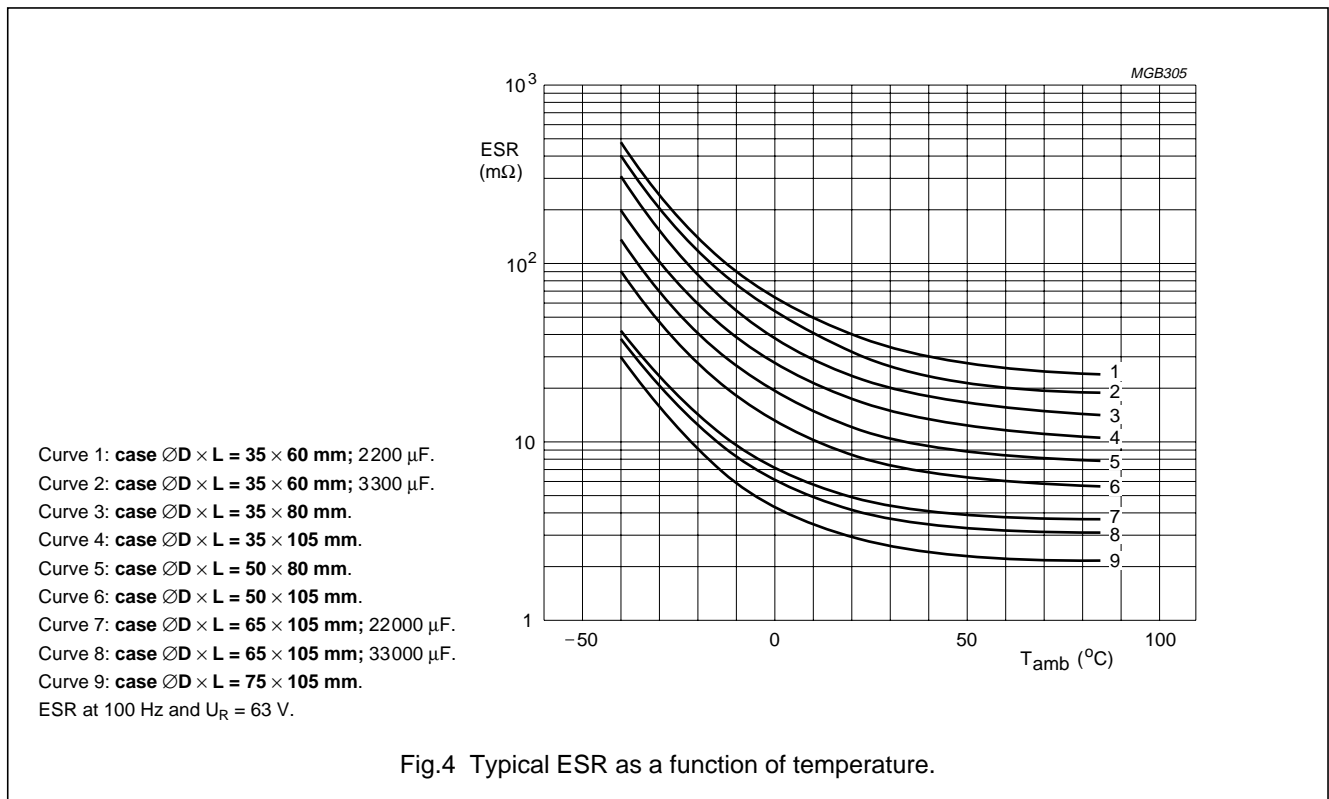
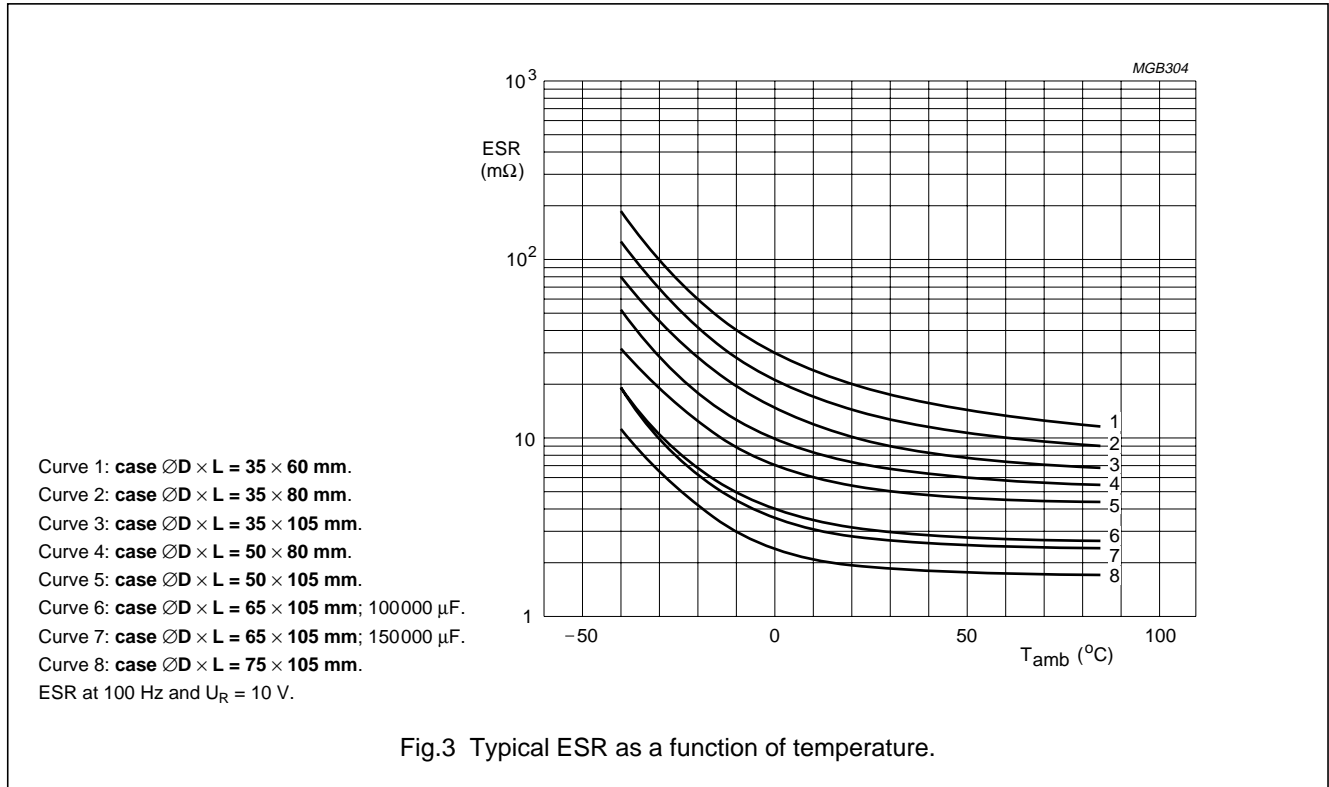
Additional electrical data

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		$U_{rev} \leq 1 \text{ V}$
Current		
Leakage current	after 1 minute at U_R	$I_{L1} \leq 0.006C_R \times U_R + 4 \mu\text{A}$
	after 5 minutes at U_R	$I_{L5} \leq 0.002C_R \times U_R + 4 \mu\text{A}$
Inductance		
Equivalent series inductance (ESL)	case $\varnothing D = 35 \text{ mm}$	typ. 13 nH
	case $\varnothing D = 50 \text{ mm}$	typ. 16 nH
	case $\varnothing D = 65 \text{ mm}$	typ. 19 nH
	case $\varnothing D = 75 \text{ mm}$	typ. 20 nH

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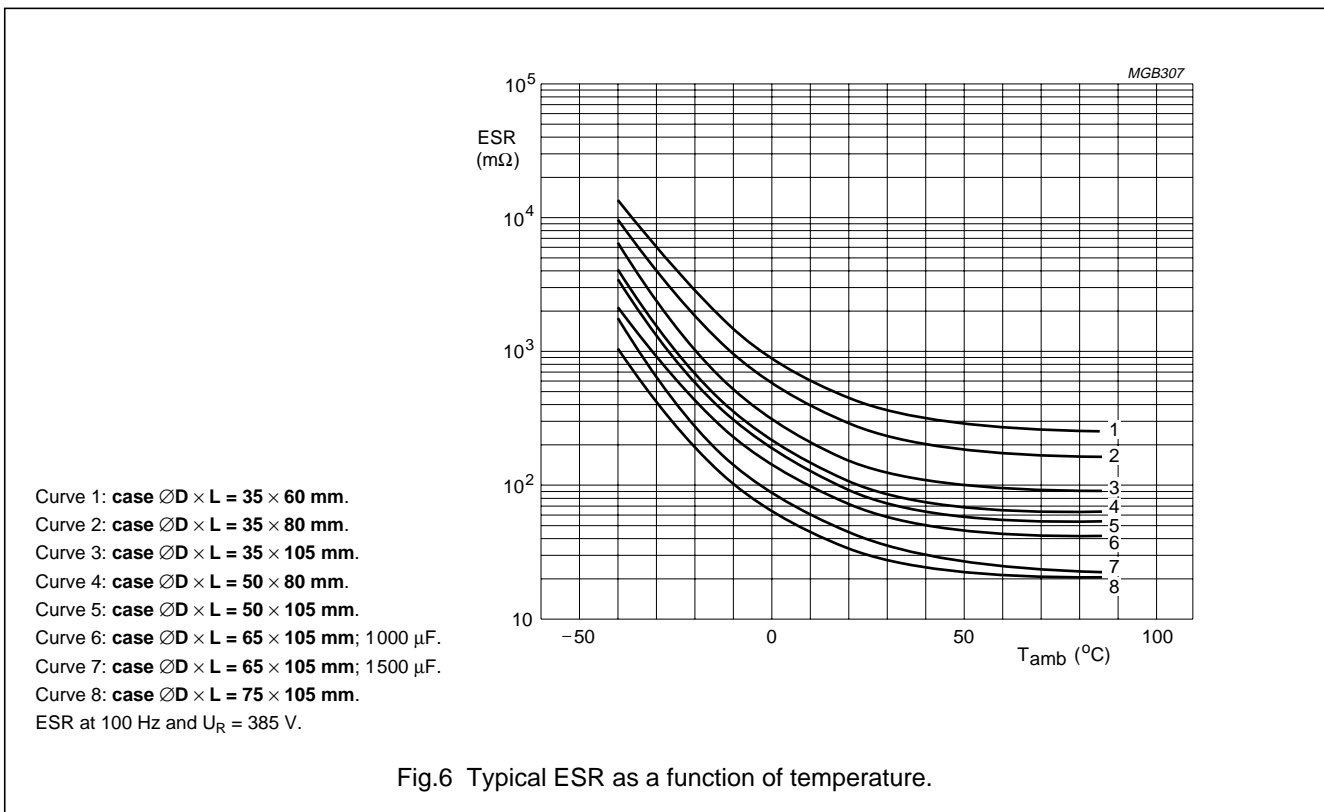
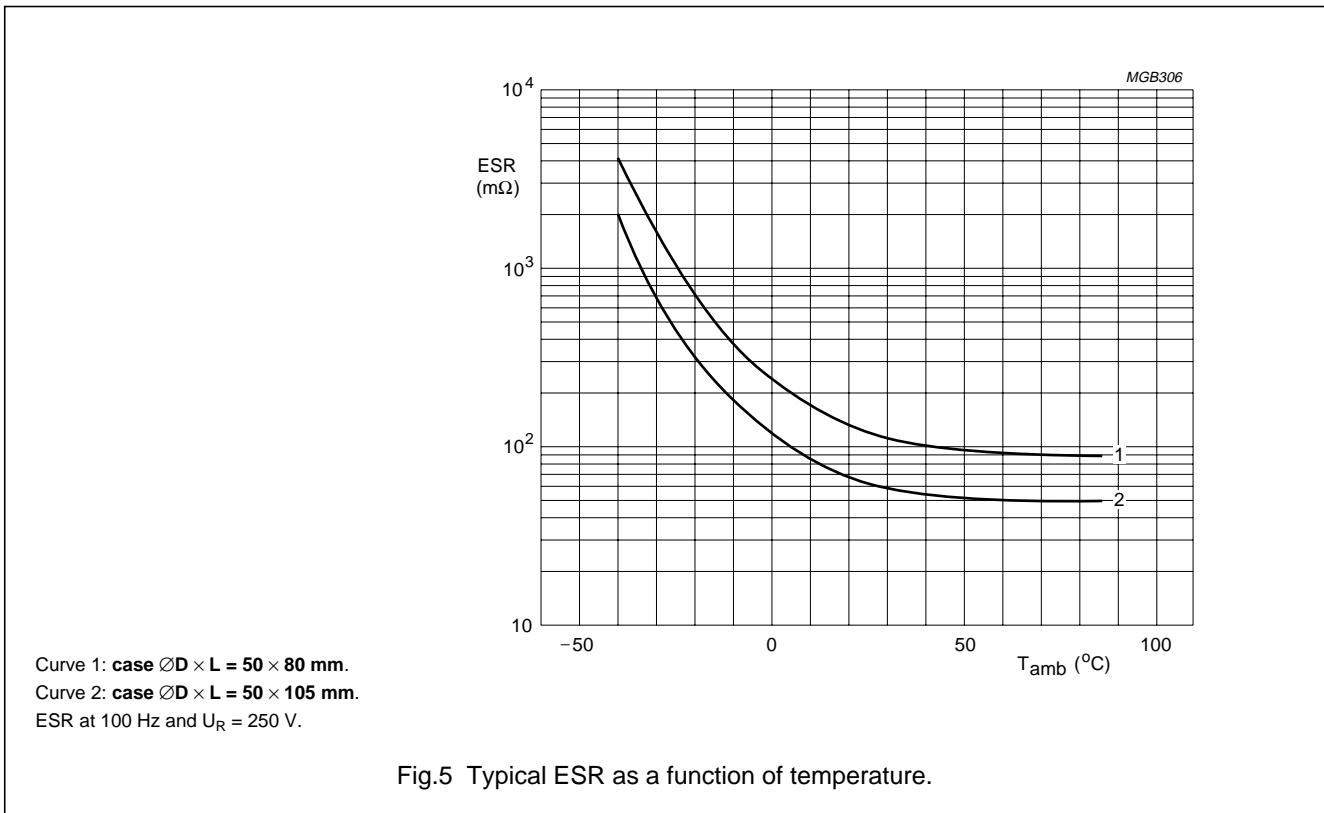
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Equivalent series resistance (ESR)



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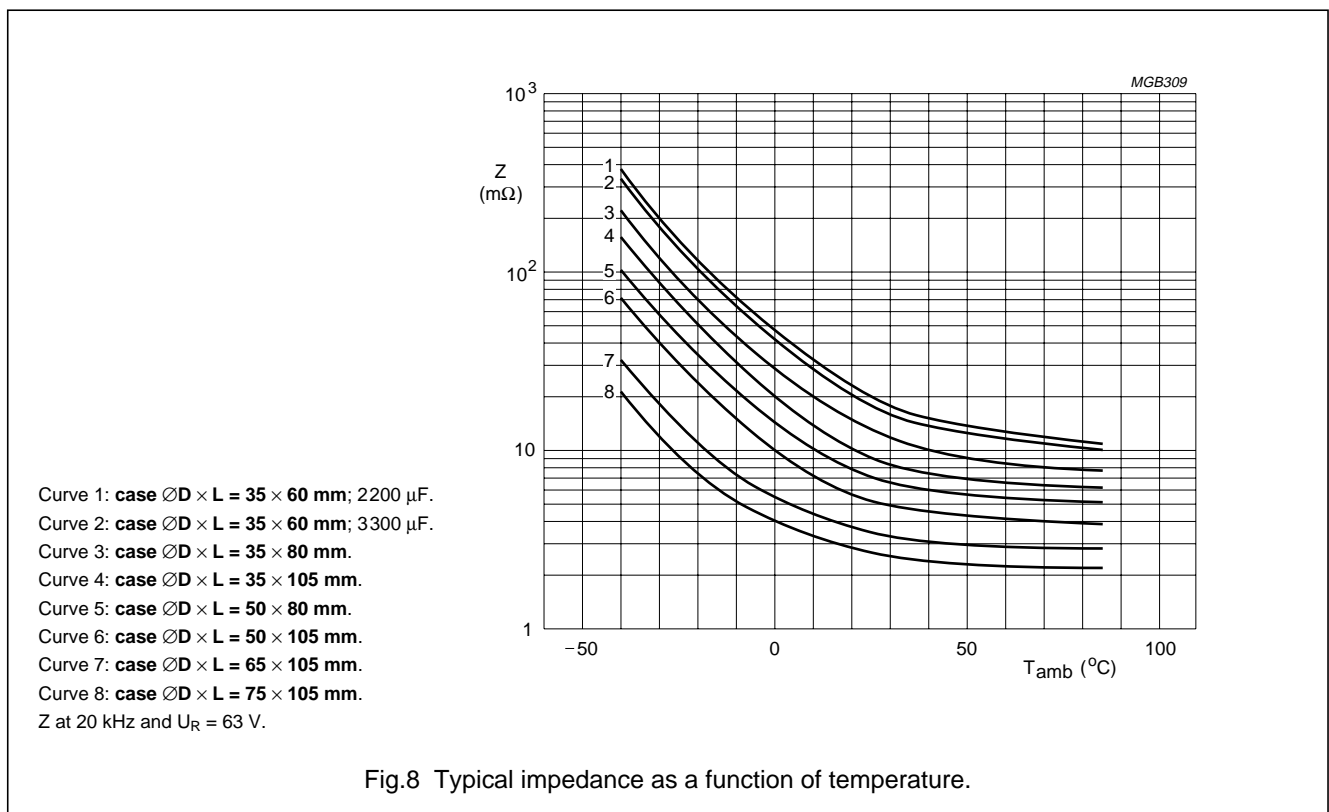
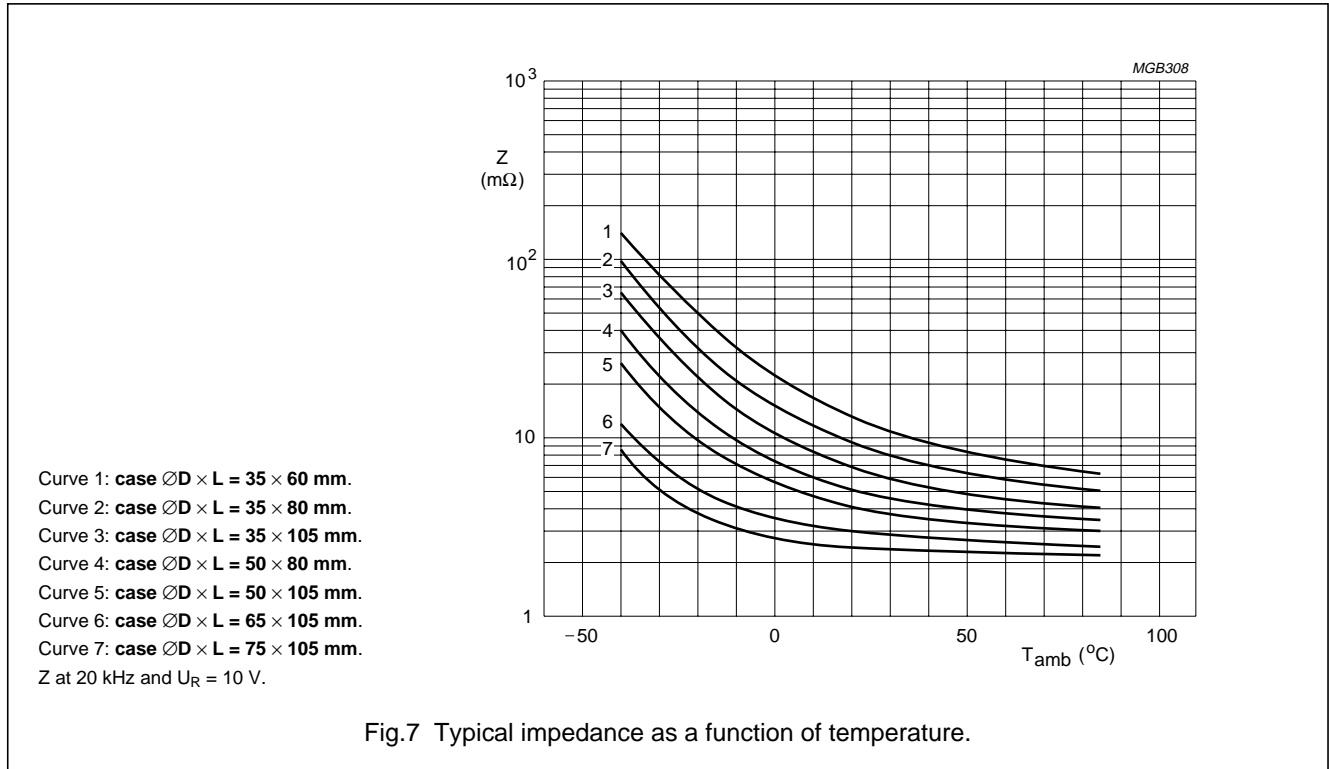
114/115 PED-ST



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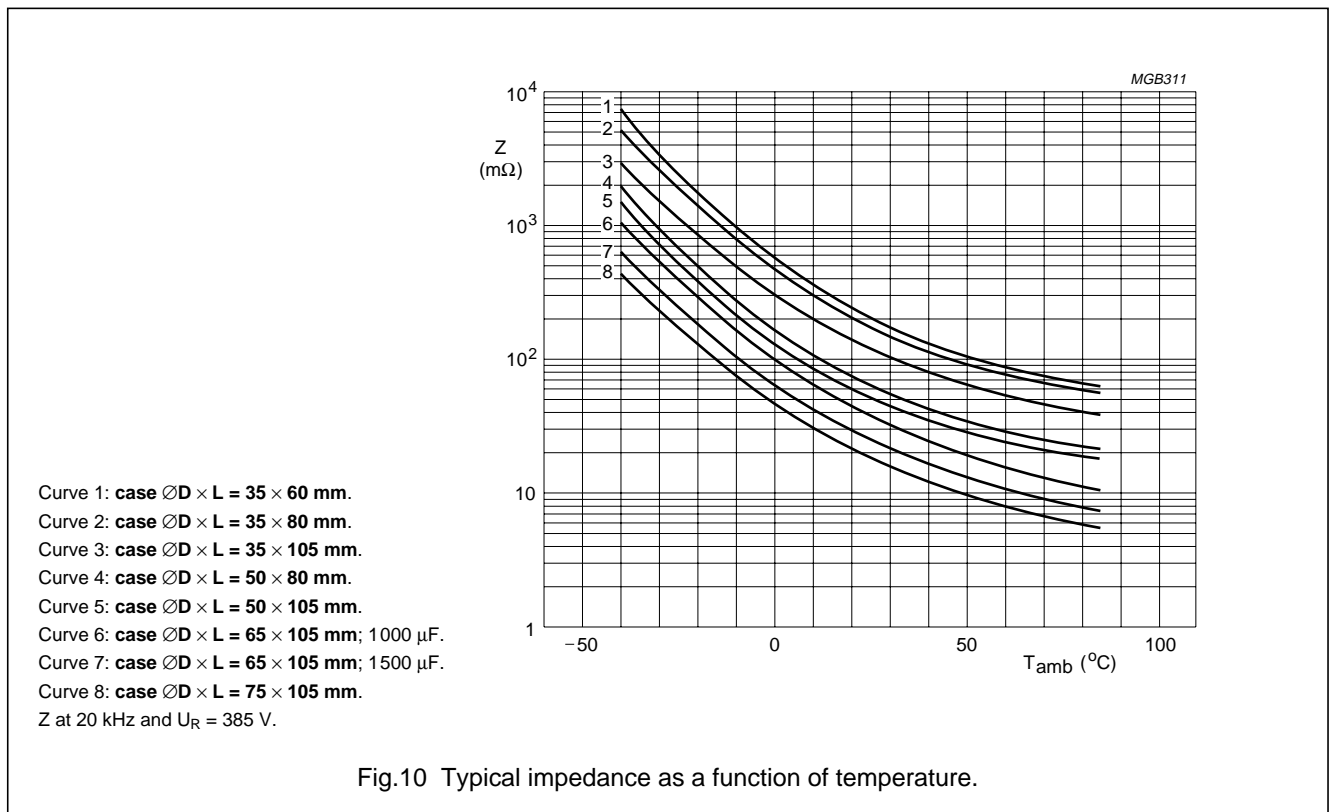
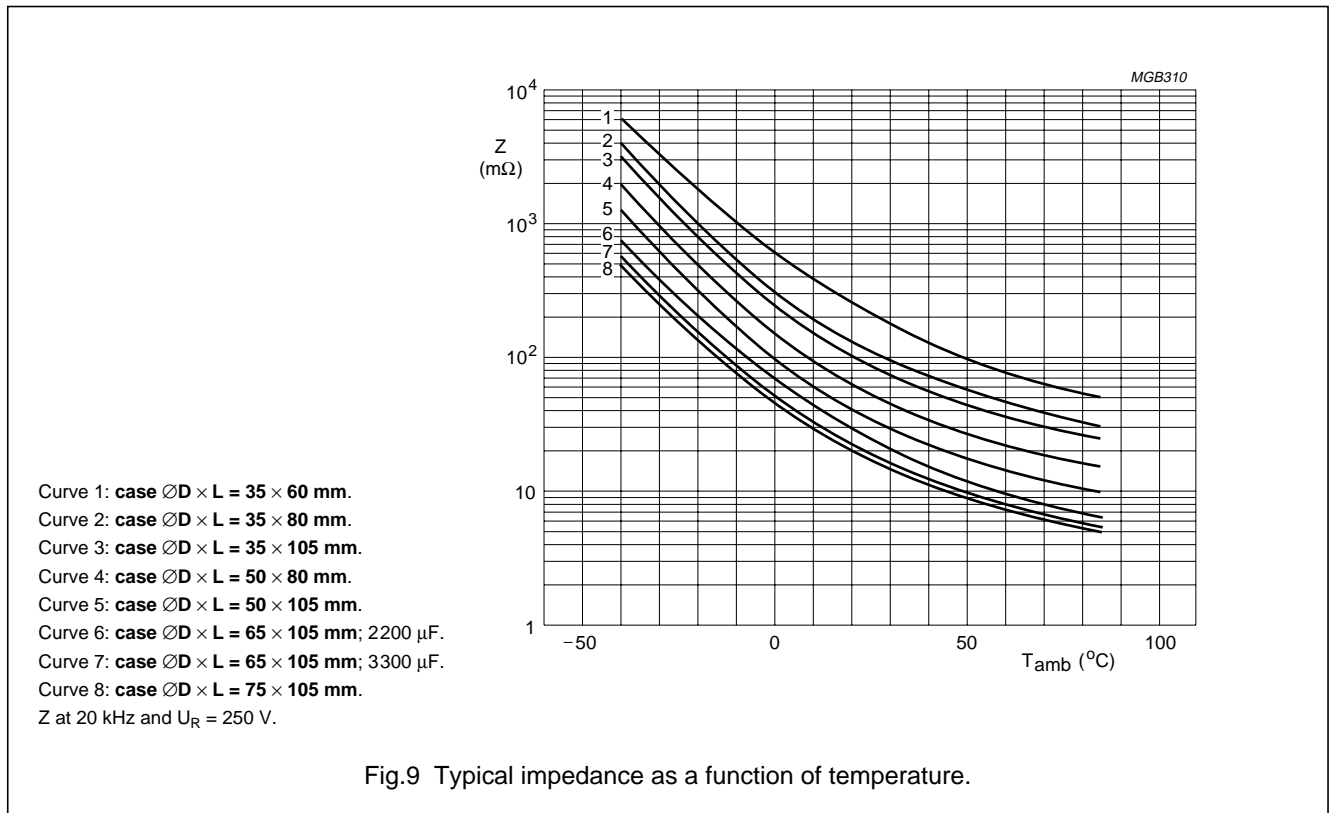
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Impedance (Z)



Aluminium electrolytic capacitors
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Aluminium electrolytic capacitors
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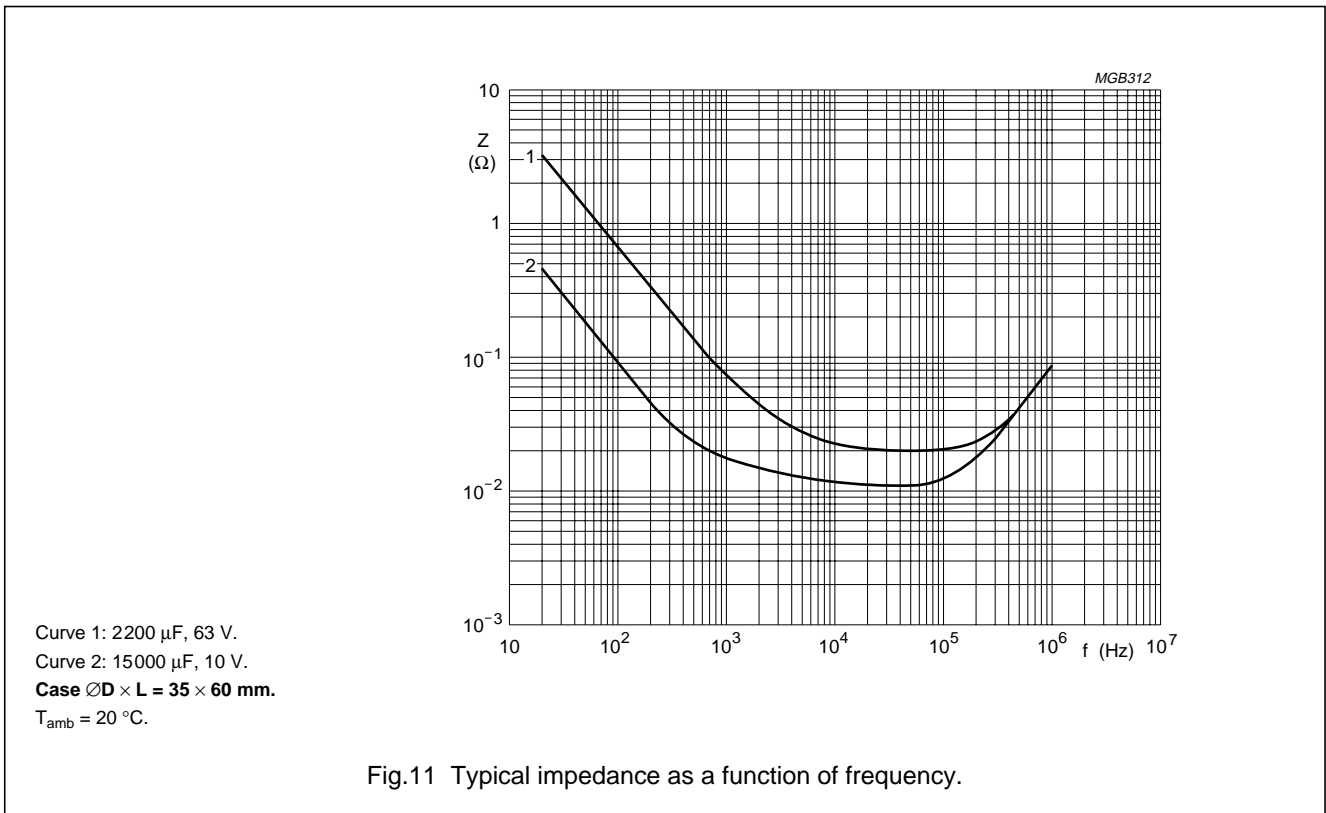


Fig.11 Typical impedance as a function of frequency.

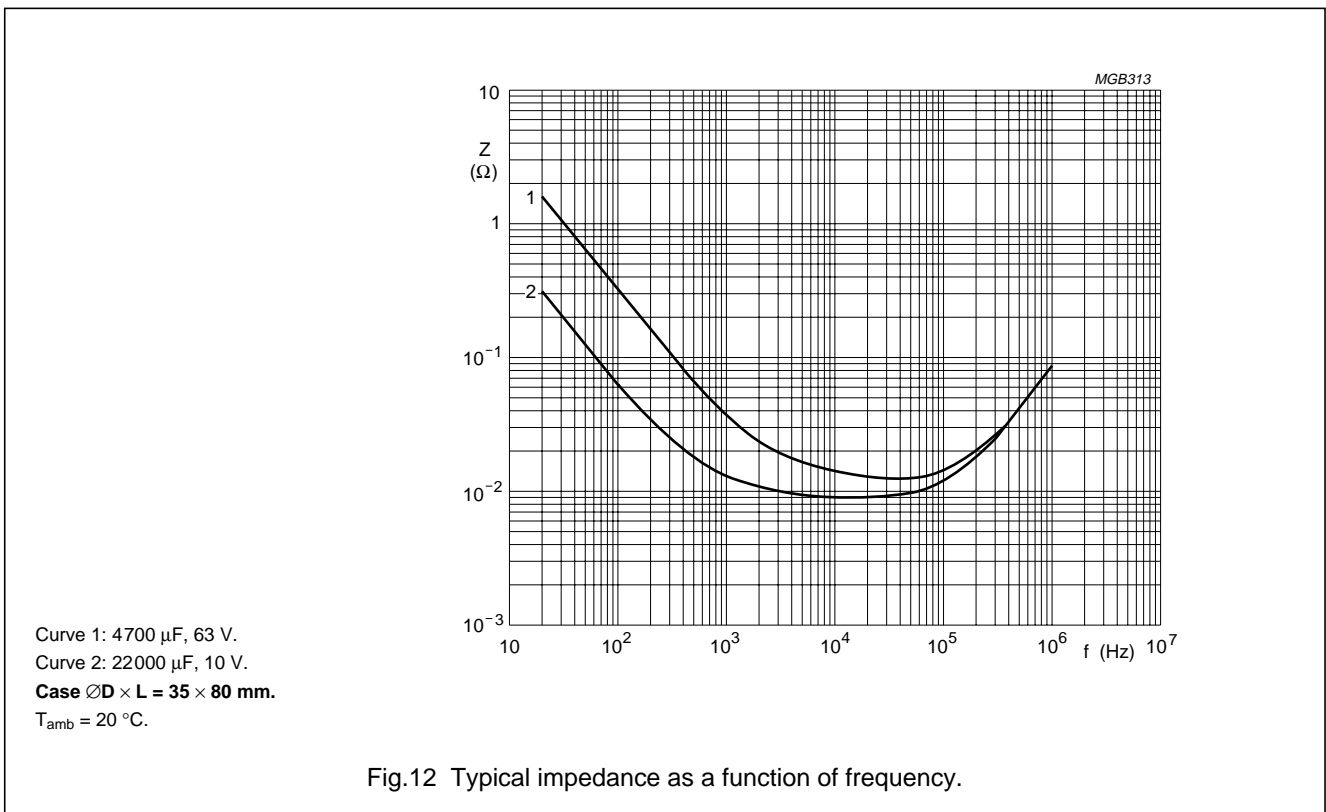
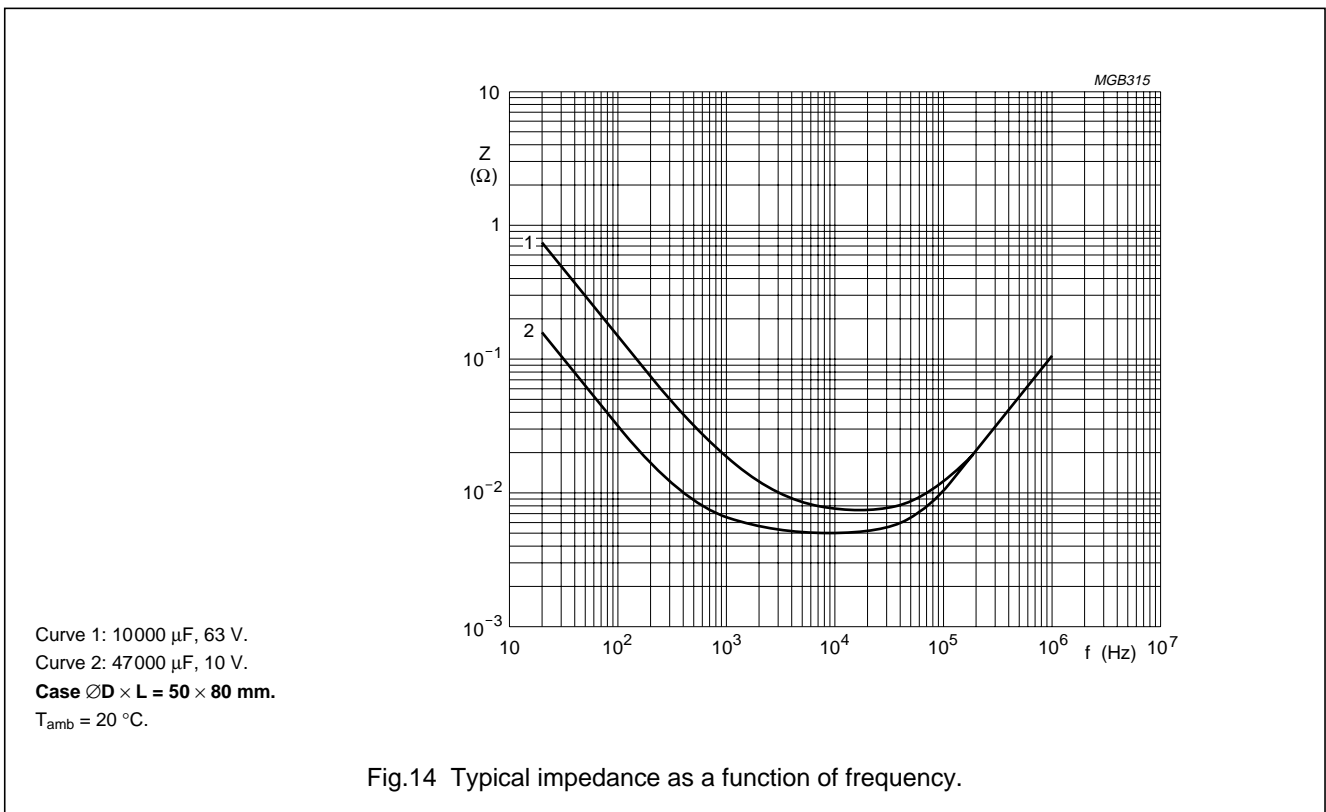
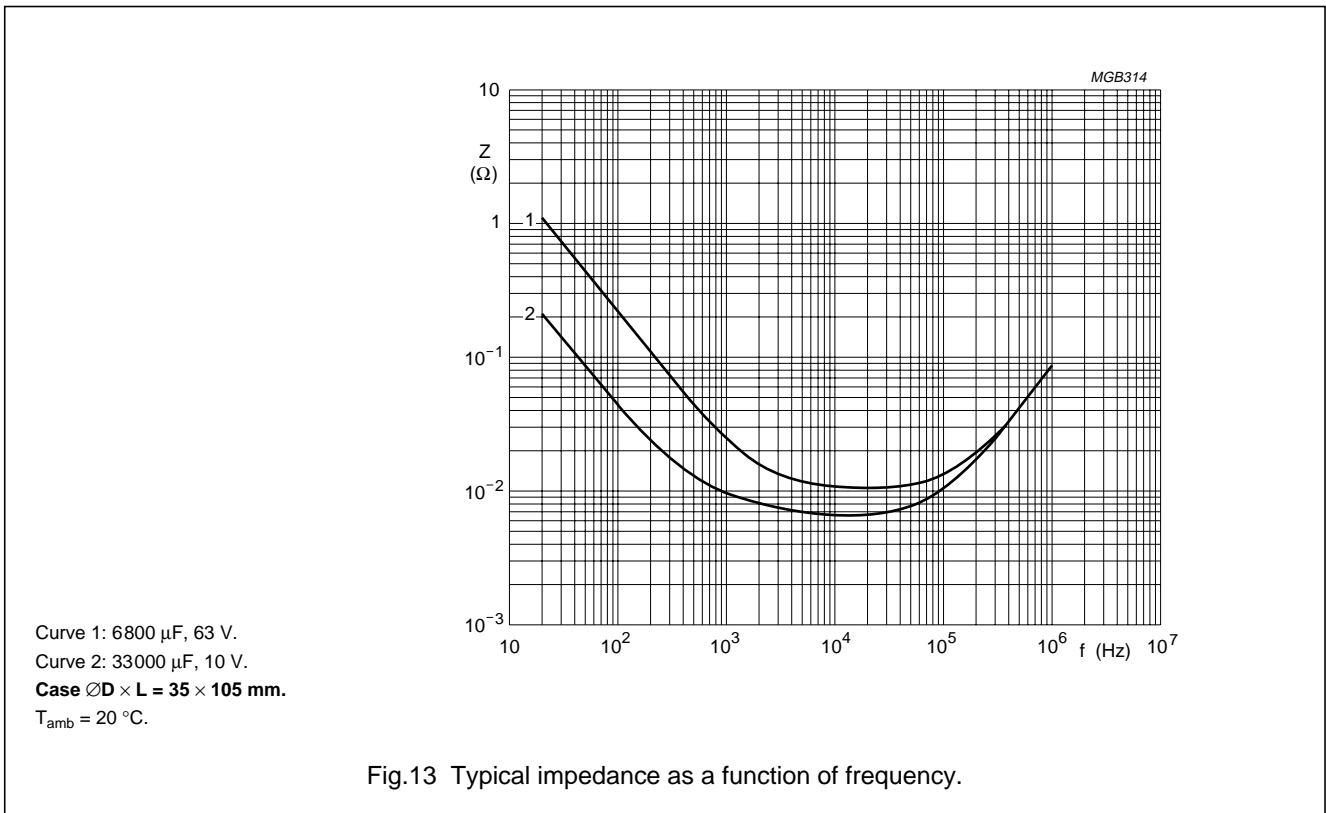


Fig.12 Typical impedance as a function of frequency.

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Aluminium electrolytic capacitors
Power Eurodin Screw Terminals

114/115 PED-ST

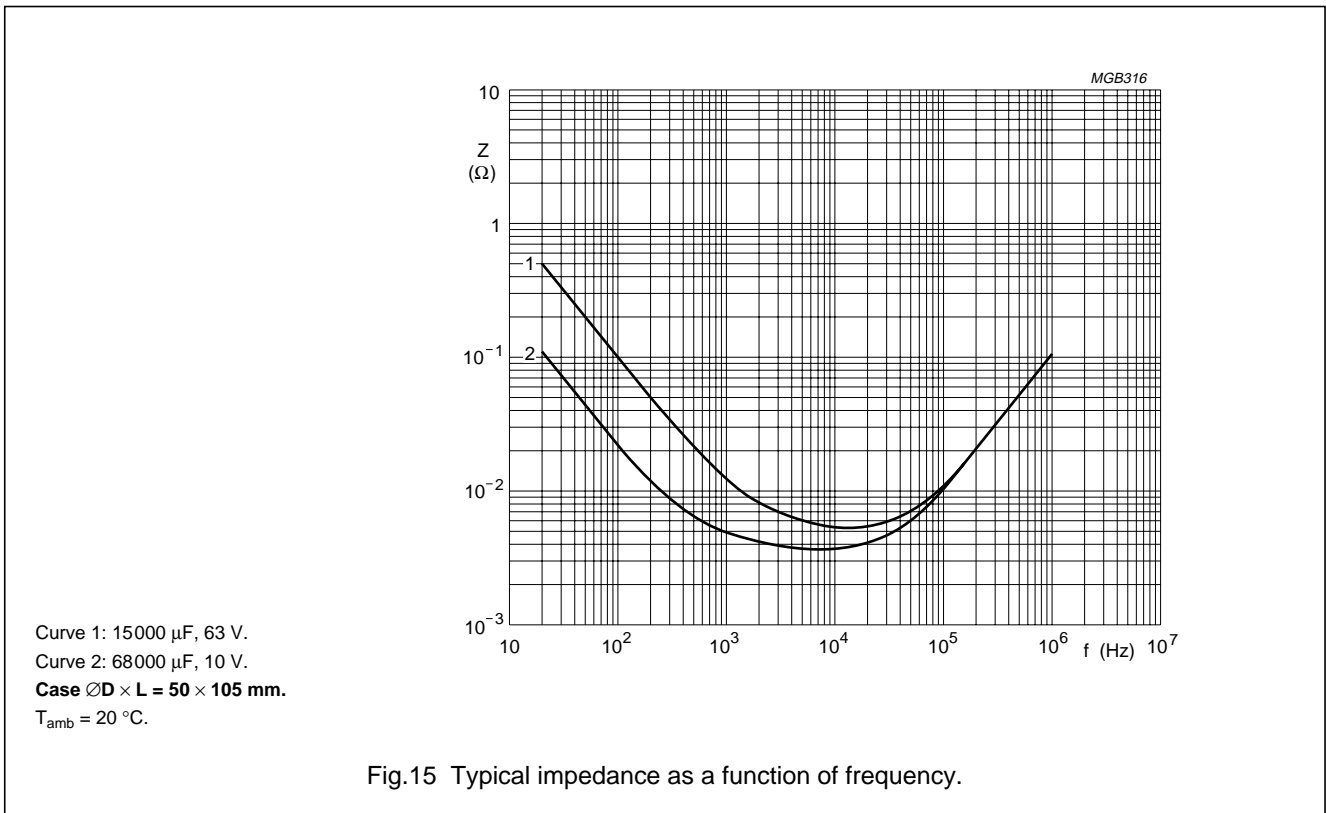


Fig.15 Typical impedance as a function of frequency.

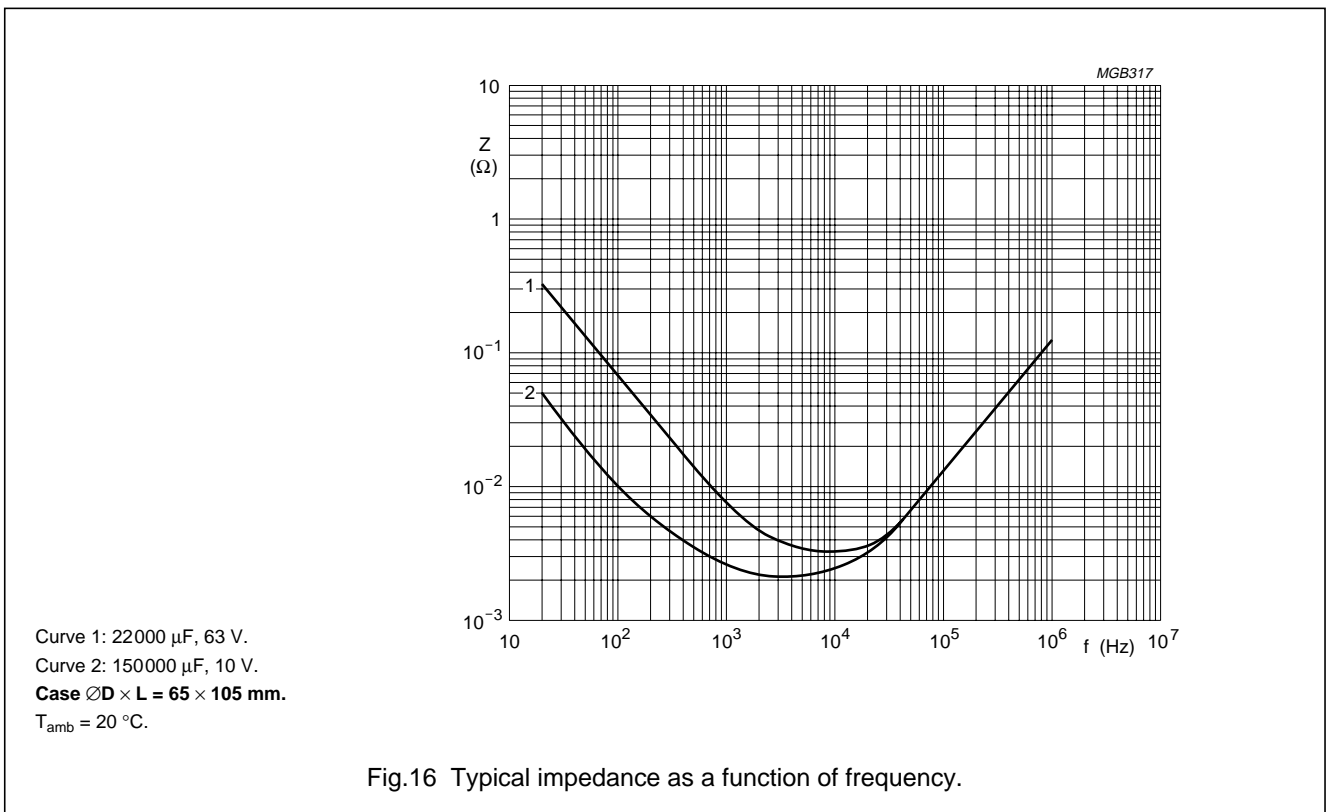


Fig.16 Typical impedance as a function of frequency.

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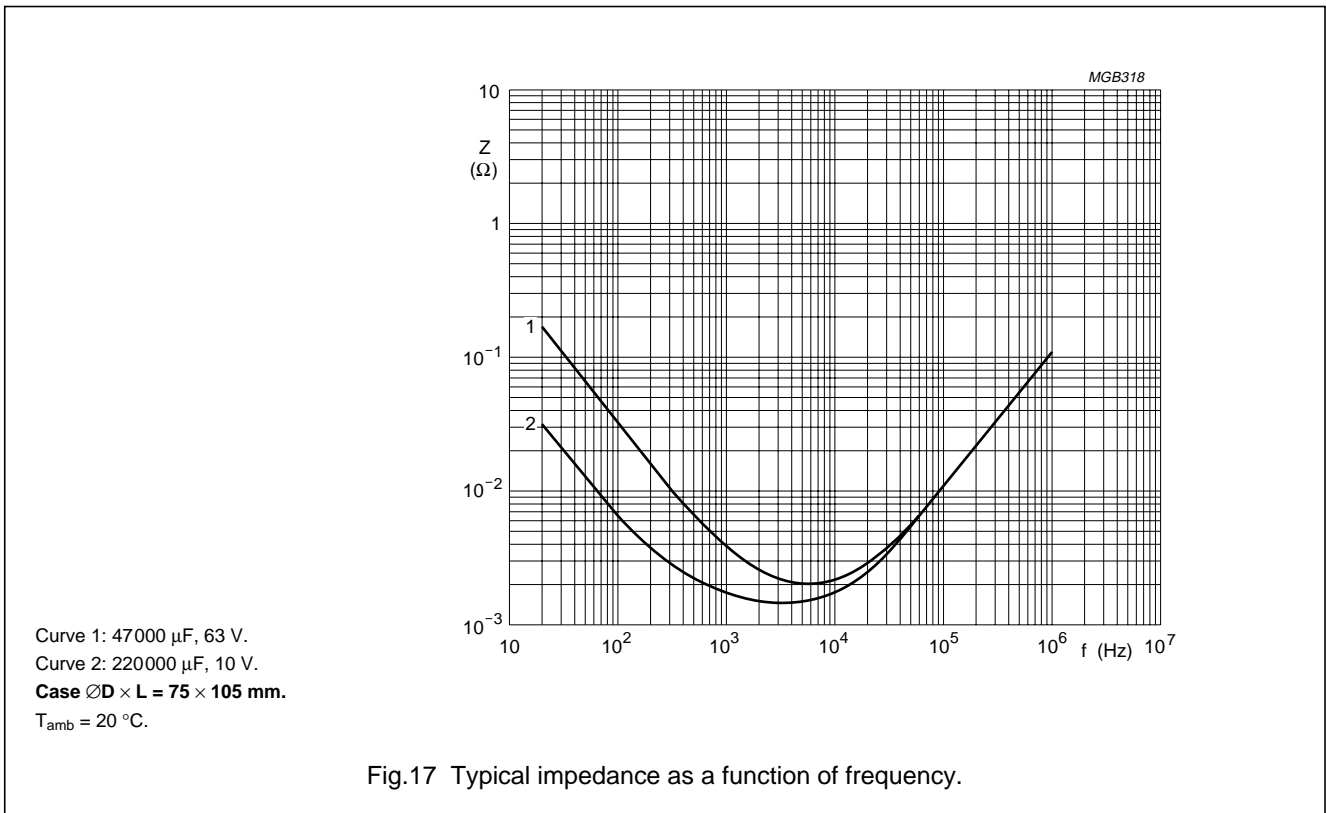


Fig.17 Typical impedance as a function of frequency.

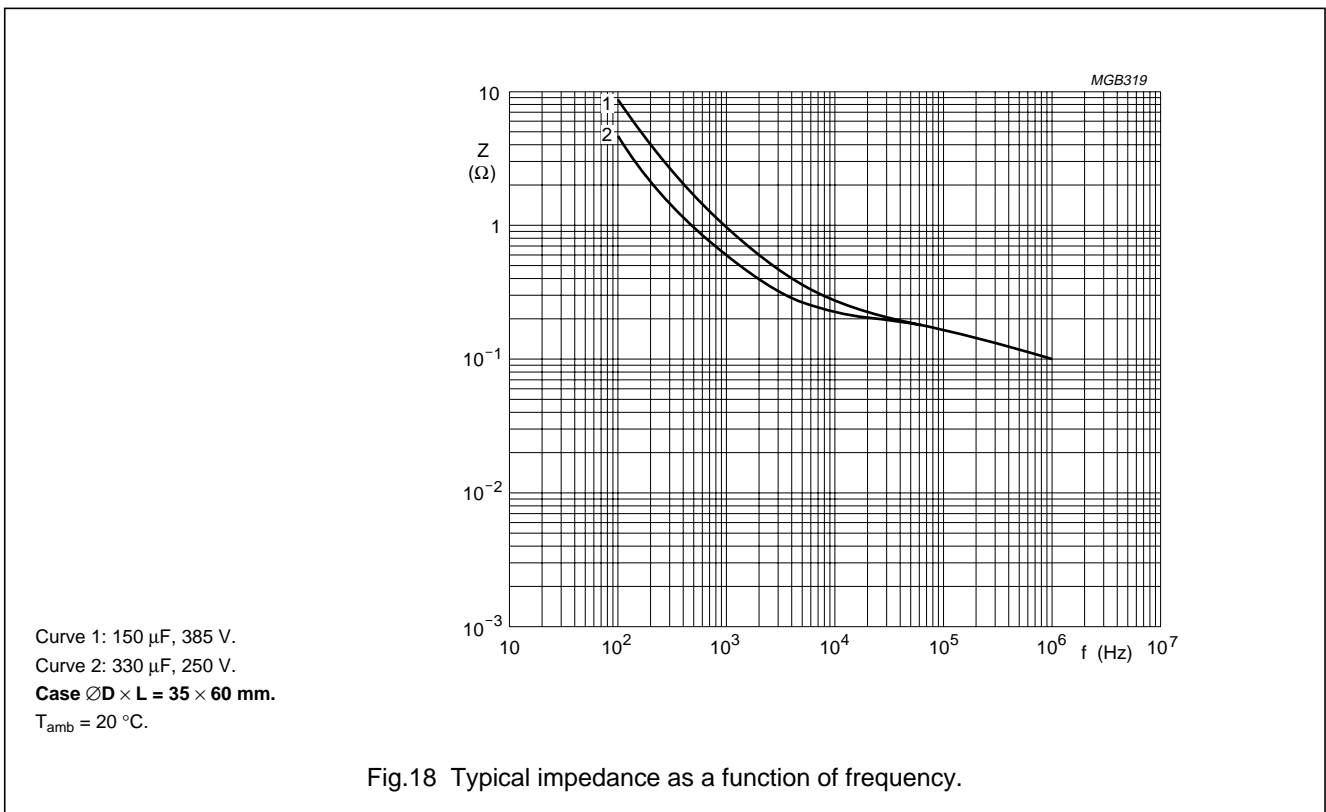


Fig.18 Typical impedance as a function of frequency.

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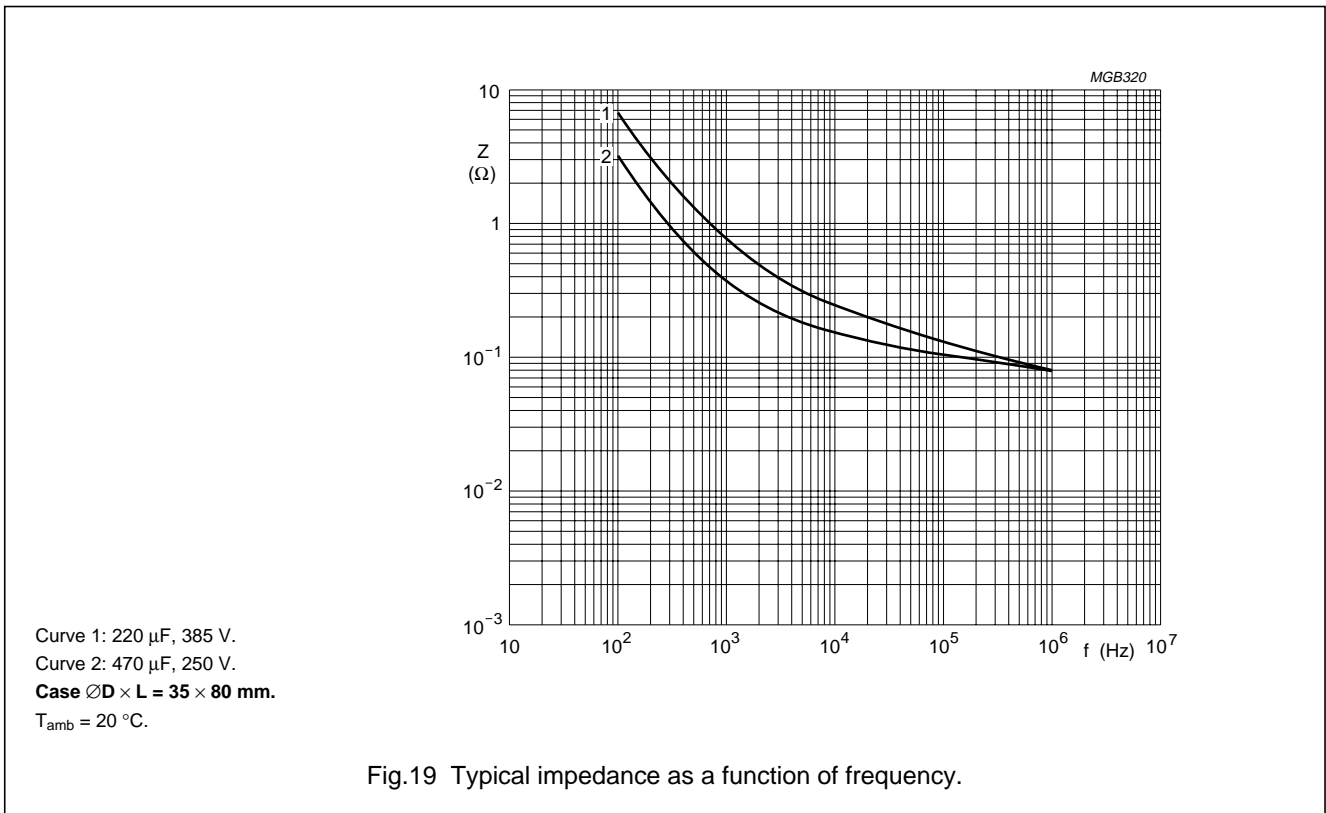


Fig.19 Typical impedance as a function of frequency.

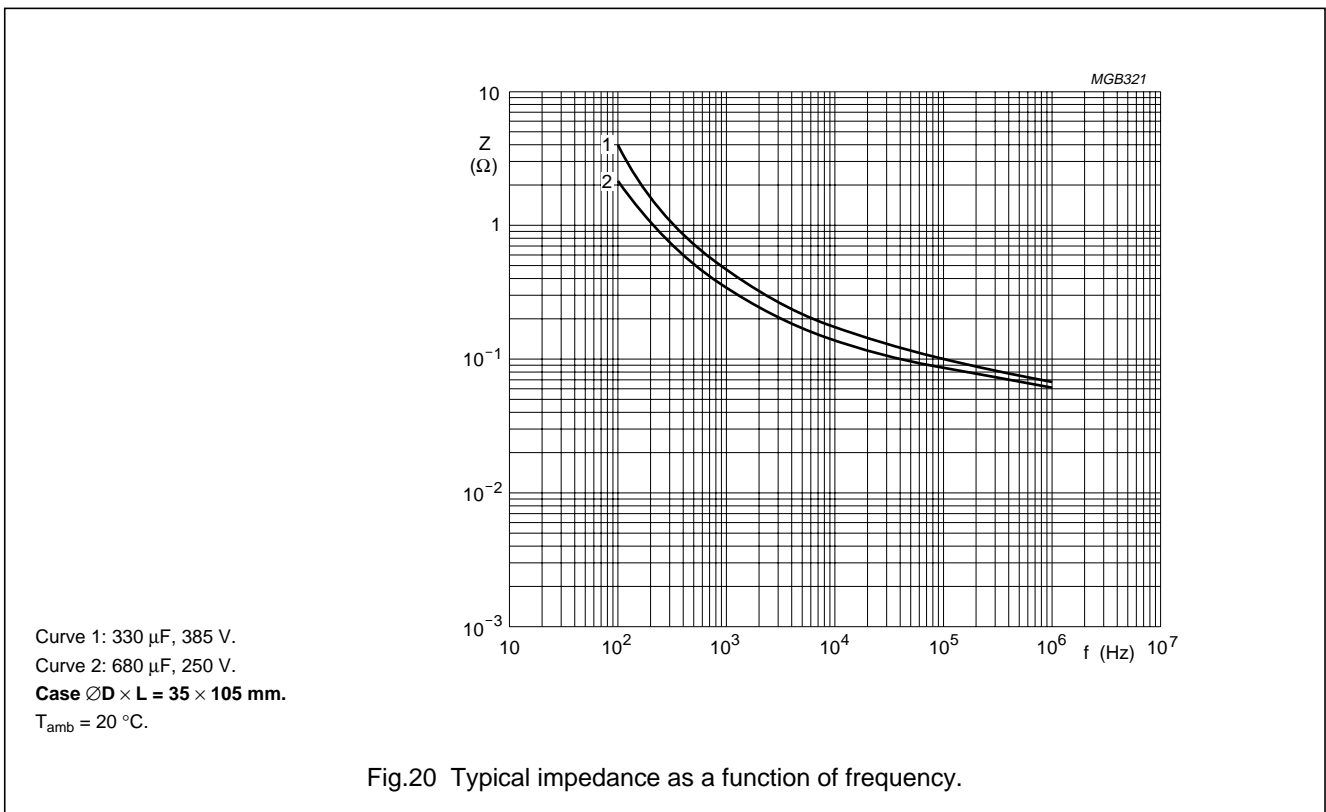
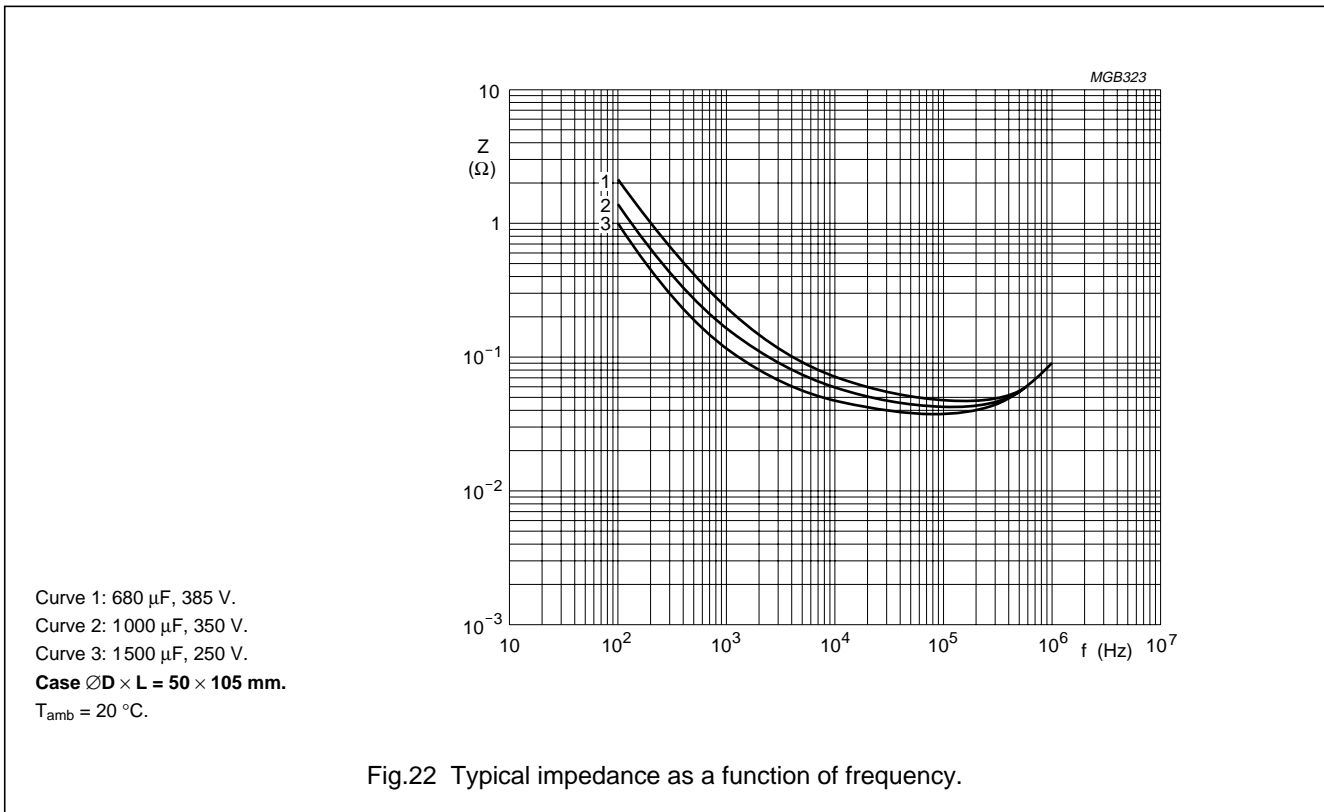
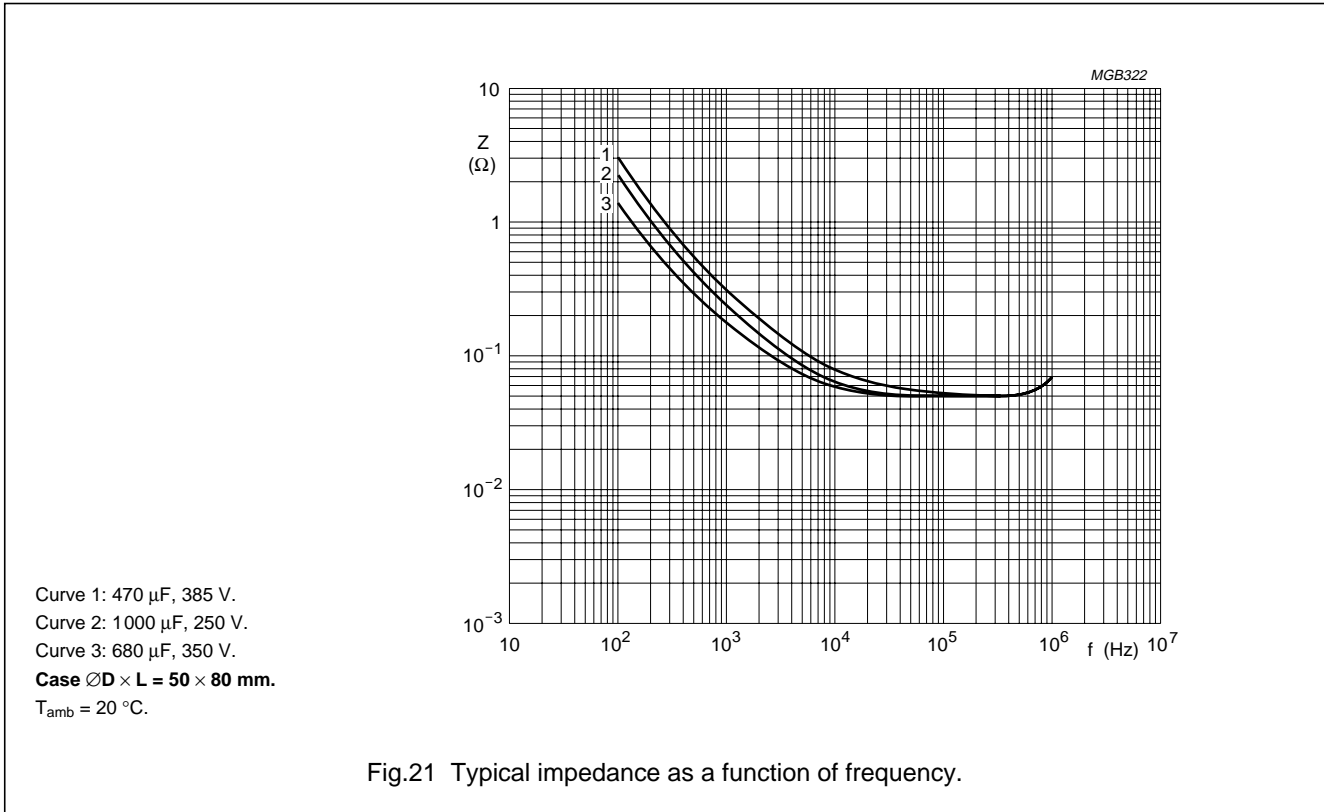


Fig.20 Typical impedance as a function of frequency.

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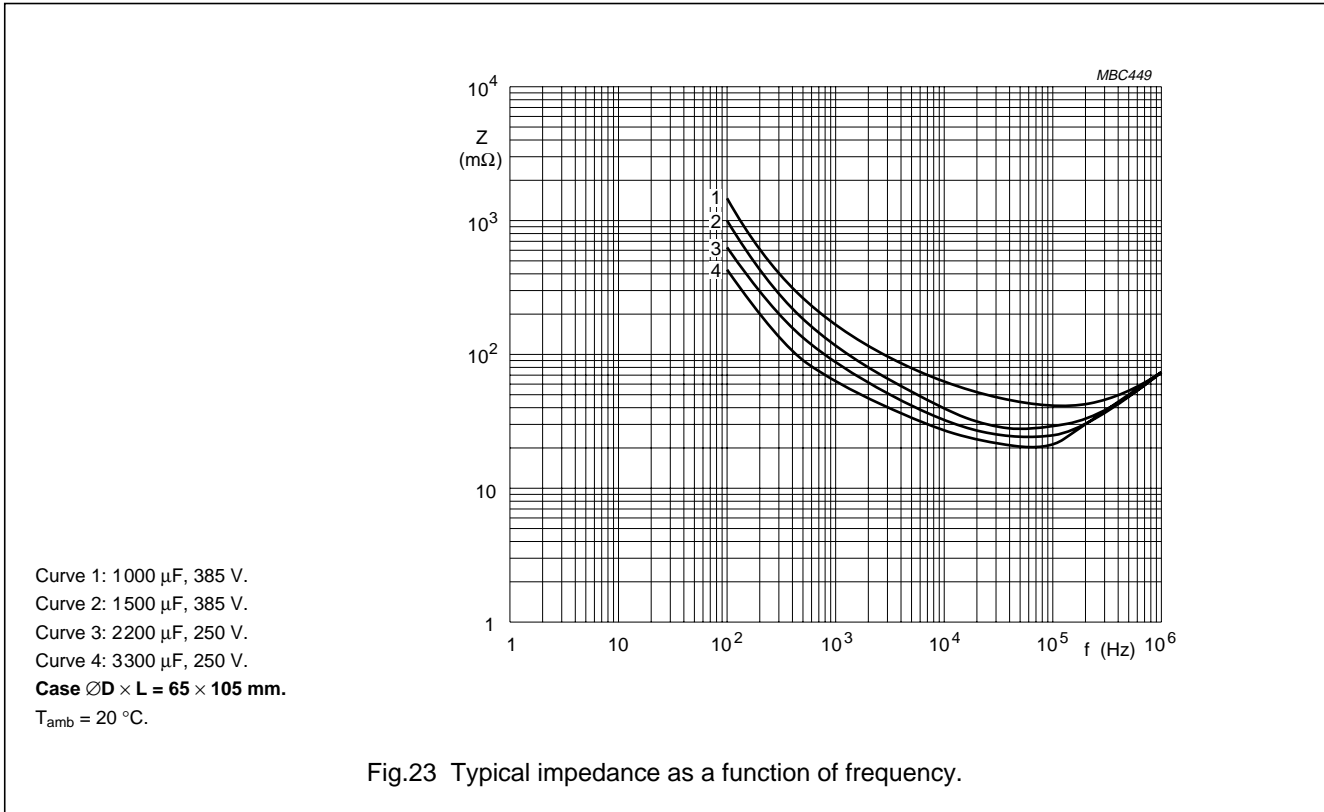


Fig.23 Typical impedance as a function of frequency.

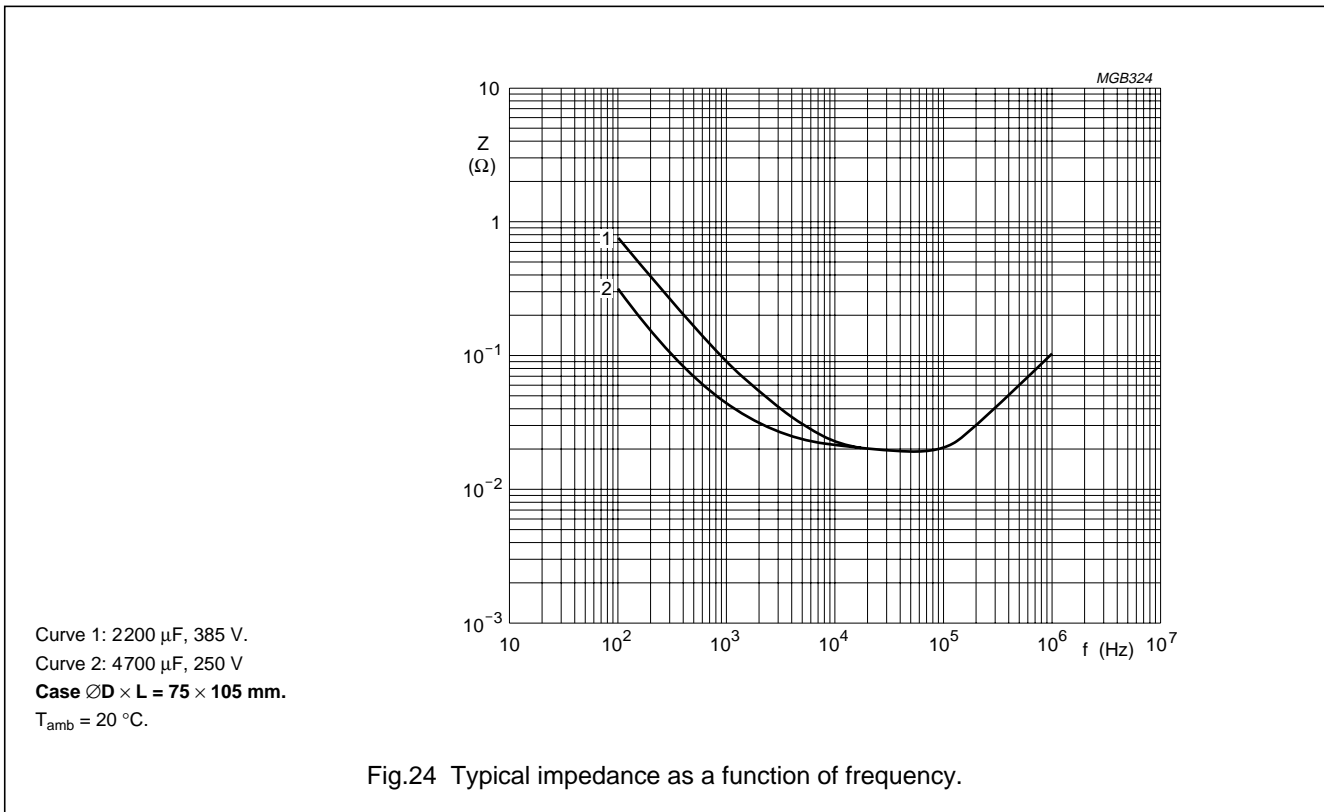


Fig.24 Typical impedance as a function of frequency.

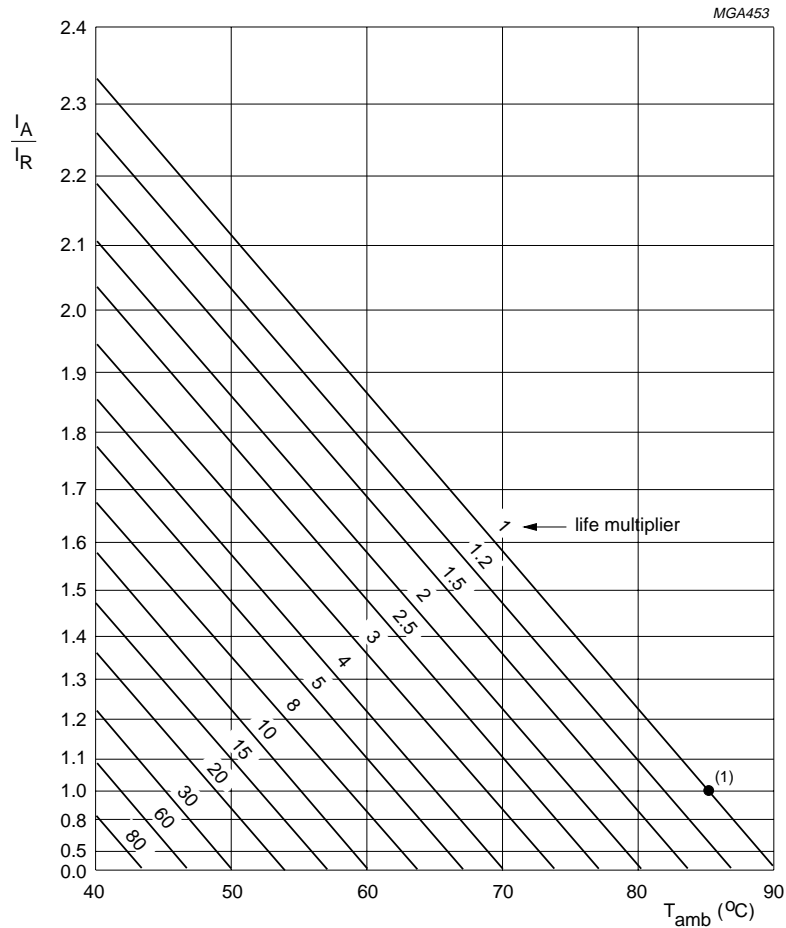
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RIPPLE CURRENT AND USEFUL LIFE

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.

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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	$T_{amb} = 85\text{ °C}$; U_R applied; 8000 hours (400 V types: 2000 hours)	$U_R \leq 100\text{ V}$; $\Delta C/C: \pm 15\%$ $U_R > 100\text{ V}$; $\Delta C/C: \pm 10\%$ $Z \leq 2 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$
Useful life	CECC 30301 subclause 1.8.1	$T_{amb} = 85\text{ °C}$; U_R and I_R applied; 20000 hours (400 V types: 5000 hours)	$U_R \leq 100\text{ V}$; $\Delta C/C: \pm 45\%$ $U_R > 100\text{ V}$; $\Delta C/C: \pm 30\%$ $Z \leq 3 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ no short or open circuit, no visible damage total failure percentage: $U_R \leq 100\text{ V}$: $\leq 1\%$; $U_R > 100\text{ V}$: $\leq 3\%$
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	$\Delta C/C: \pm 10\%$ $I_{L5} \leq 2 \times \text{spec. limit}$