

DATA SHEET

2251 064 MP-SI

Aluminum electrolytic capacitors
Multi-Pin Snap-in

Product specification

New

File under BCcomponents, BC01

2002 Jan 25

Aluminum electrolytic capacitors

Multi-Pin Snap-in

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FEATURES

- Keyed polarity obtained by 4 snap-in terminals
- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Large types, minimized dimensions, cylindrical aluminum case, insulated with a blue sleeve
- Pressure relief in the side of the aluminum case
- Charge and discharge proof
- Long useful life: 5000 hours at 85 °C
- Very high ripple current capability.

APPLICATIONS

- General purpose, industrial and audio/video systems
- Smoothing and filtering
- Standard and switched mode power supplies
- Energy storage in pulse systems.

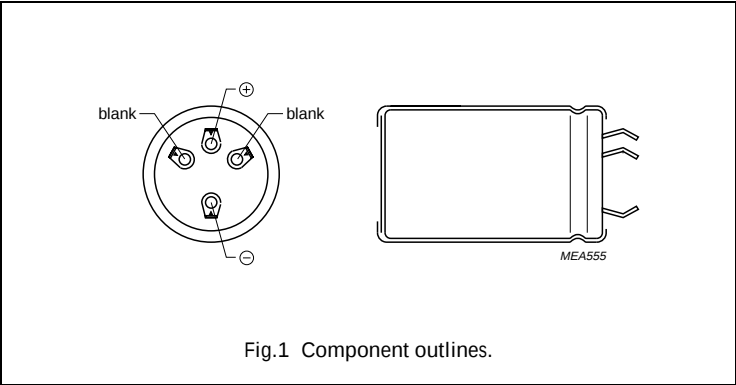
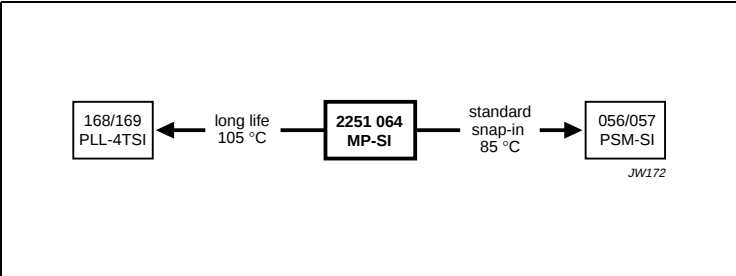


Fig.1 Component outlines.



QUICK REFERENCE DATA

DESCRIPTION	VALUE
Case size ($\varnothing D_{nom} \times L_{nom}$ in mm)	35 × 50 to 50 × 105
Rated capacitance range (E6/E12 series), C_R	330 to 16000 μF
Tolerance on C_R	±20%
Rated voltage range, U_R	100 to 450 V
Category temperature range	−40 to +85 °C
Endurance test at 85 °C	2000 hours
Useful life at 85 °C	5000 hours
Useful life at 40 °C and $1.4 \times I_R$ applied	75000 hours
Shelf life at 0 V, 85 °C	500 hours
Based on sectional specification	IEC 60384-4/EN130 300
Climatic category IEC 60068	40/085/56

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

C_R (μF)	U_R (V)				
	100	250	350	400	450
330	–	–	–	–	35 × 50
390	–	–	–	–	40 × 50
470	–	–	–	35 × 50	35 × 63/45 × 50
560	–	–	35 × 50	40 × 50	35 × 80/50 × 50 40 × 63
680	–	–	40 × 50	35 × 63/45 × 50	35 × 105/40 × 80 45 × 63
820	–	–	35 × 63/45 × 50	35 × 80/50 × 50 40 × 63	40 × 105/50 × 63 45 × 80
1000	–	–	35 × 80/50 × 50 40 × 63	35 × 105/45 × 63 40 × 80	45 × 105/50 × 80
1200	–	35 × 50	35 × 105/45 × 63 40 × 80	35 × 105/45 × 63 40 × 80	50 × 105
1400	–	40 × 50	40 × 105/50 × 63 45 × 80	45 × 105/50 × 80	–
1600	–	45 × 50	45 × 105/50 × 80	50 × 105	–
1800	–	35 × 63	–	–	–
1900	–	50 × 50	50 × 105	–	–
2100	–	40 × 63	–	–	–
2200	–	35 × 80	–	–	–
2500	–	45 × 63	–	–	–
2600	–	40 × 80	–	–	–
2700	–	35 × 105	–	–	–
3000	–	50 × 63	–	–	–
3100	–	45 × 80	–	–	–
3300	–	40 × 105	–	–	–
3700	–	50 × 80	–	–	–
3900	–	45 × 105	–	–	–
4700	35 × 50	50 × 105	–	–	–
5600	40 × 50	–	–	–	–
6800	35 × 63/45 × 50	–	–	–	–
8200	35 × 80/50 × 50 40 × 63	–	–	–	–
10000	35 × 105/45 × 63 40 × 80	–	–	–	–
11000	45 × 80/50 × 63	–	–	–	–
12000	40 × 105	–	–	–	–
13000	50 × 80	–	–	–	–
14000	50 × 80	–	–	–	–
16000	50 × 105	–	–	–	–

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ORDERING INFORMATION

NAFTA part numbering system

3410

For handling in Europe and the Far East the ordering number 2251 064 xxxxx should be used

DH

Case size code (note 1)

331

Rated capacitance
2 significant digits plus multiplying factor:
0 = ×1
1 = ×10
2 = ×100
3 = ×1000
4 = ×10000
5 = ×100000

M

Tolerance
M = ±20% (standard)
S = -10/+30%
T = -10/+50%

450

Rated voltage (VDC)

H

Terminal style code
H = 4 pins
J = 5 pins (45 and 50 mm dia. code)

P

Insulation and bracket code
P = 0.2 mm (.008") polymeric

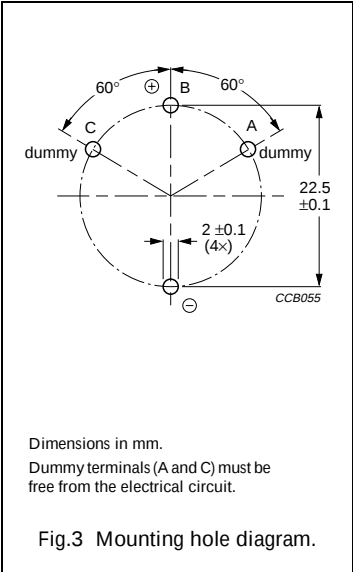
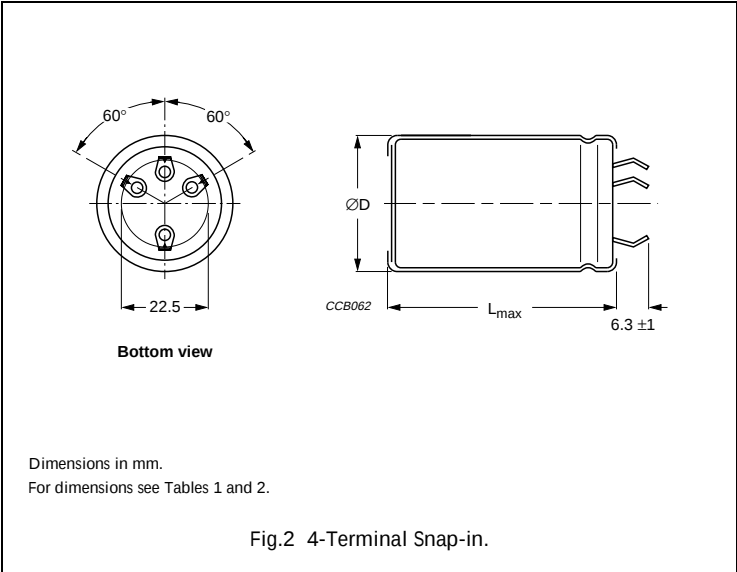
A2

Factory assigned sequence number

JW173

(1) Refer to Tables 1 and 2.

MECHANICAL DATA AND PACKAGING QUANTITIES



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

CASE CODE	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	$\varnothing D_{\max}$ (mm)	$L_{\max}$ (mm)	MASS (g)	PACKAGING QUANTITIES (units per box)	CARDBOARD BOX DIMENSIONS $l \times w \times h$ (mm)
DF	35 × 50	36	52	≈72	100	402 × 402 × 251
DG	35 × 63	36	65	≈91	150	402 × 200 × 302
DH	35 × 80	36	82	≈115	100	402 × 402 × 251
DJ	35 × 105	36	107	≈151	100	402 × 200 × 302
EF	40 × 50	41	52	≈94	180	403 × 225 × 300
EG	40 × 63	41	65	≈118	135	403 × 225 × 300
EH	40 × 80	41	82	≈150	90	403 × 225 × 240
EJ	40 × 105	41	107	≈117	90	403 × 225 × 240
FF	45 × 50	46	52	≈119	96	324 × 216 × 289
FG	45 × 63	46	65	≈150	96	324 × 216 × 289
FH	45 × 80	46	82	≈190	72	332 × 221 × 278
FJ	45 × 105	46	107	≈250	48	332 × 221 × 318
GF	50 × 50	51	52	≈147	96	324 × 216 × 289
GG	50 × 63	51	65	≈185	96	324 × 216 × 289
GH	50 × 80	51	82	≈235	72	332 × 221 × 278
GJ	50 × 105	51	107	≈309	48	332 × 221 × 318

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

CASE CODE	NOMINAL CASE SIZE $\varnothing D \times L$ (inches)	$\varnothing D_{\max}$ (inches)	$L_{\max}$ (inches)	MASS (g)	PACKAGING QUANTITIES (units per box)	CARDBOARD BOX DIMENSIONS $l \times w \times h$ (inches)
DF	1.378 × 1.969	1.42	2.05	≈72	100	15.813 × 15.813 × 9.875
DG	1.378 × 2.480	1.42	2.56	≈91	150	15.813 × 7.875 × 11.875
DH	1.378 × 3.150	1.42	3.23	≈115	100	15.813 × 15.813 × 9.875
DJ	1.378 × 4.134	1.42	4.21	≈151	100	15.813 × 7.875 × 11.875
EF	1.575 × 1.969	1.61	2.05	≈94	180	15.875 × 8.875 × 11.813
EG	1.575 × 2.480	1.61	2.56	≈118	135	15.875 × 8.875 × 11.813
EH	1.575 × 3.150	1.61	3.23	≈150	90	15.875 × 8.875 × 9.438
EJ	1.575 × 4.134	1.61	4.21	≈197	90	15.875 × 8.875 × 9.438
FF	1.772 × 1.969	1.81	2.05	≈119	96	12.75 × 8.5 × 11.375
FG	1.772 × 2.480	1.81	2.56	≈150	96	12.75 × 8.5 × 11.375
FH	1.772 × 3.150	1.81	3.23	≈190	72	13.063 × 8.688 × 10.938
FJ	1.772 × 4.134	1.81	4.21	≈250	48	13.063 × 8.688 × 12.375
GF	1.969 × 1.969	2.01	2.05	≈147	96	12.75 × 8.5 × 11.375
GG	1.969 × 2.480	2.01	2.56	≈185	96	12.75 × 8.5 × 11.375
GH	1.969 × 3.150	2.01	3.23	≈235	72	13.063 × 8.688 × 10.938
GJ	1.969 × 4.134	2.01	4.21	≈309	48	13.063 × 8.688 × 12.375

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ELECTRICAL DATA AND ORDERING INFORMATION

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

SYMBOL	DESCRIPTION
C_R	rated capacitance at 100 Hz
I_R	rated RMS ripple current at 100 Hz and 85 °C
I_{L1}	max. leakage current after 1 minute at U_R
I_{L5}	max. leakage current after 5 minutes at U_R
ESR	max. equivalent series resistance at 100 Hz
Z	max. impedance at 10 kHz

Ordering example

Electrolytic capacitor 2251 064 series

10000 $\mu\text{F}/100\text{ V}$; $\pm 20\%$

Nominal case size: $\varnothing 45 \times 63\text{ mm}$

Catalogue number: 2251 064 39103.

Table 3 Electrical data and ordering information for **2251 064** series

U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	CASE CODE	I_R 100 Hz 85 °C (A)	I_{L1} 1 min (μA)	I_{L5} 5 min (μA)	ESR MAX. 100 Hz (m Ω)	Tan δ MAX. 100 Hz	CATALOGUE NUMBER 2251
100	4700	35 × 50	DF	7.7	2690	944	37	0.12	064 59472
	5600	40 × 50	EF	8.1	3203	1124	38	0.14	064 59562
	6800	35 × 63	DG	9.1	3887	1364	31	0.15	064 59682
	6800	45 × 50	FF	8.9	3887	1364	37	0.18	064 49682
	8200	35 × 80	DH	10.9	4685	1644	26	0.15	064 59822
	8200	40 × 63	EG	10.4	4685	1644	27	0.16	064 49822
	8200	50 × 50	GF	9.1	4685	1644	40	0.23	064 39822
	10000	35 × 105	DJ	13.5	5711	2004	21	0.14	064 59103
	10000	40 × 80	EH	12.2	5711	2004	23	0.16	064 49103
	10000	45 × 63	FG	10.8	5711	2004	29	0.20	064 39103
	11000	45 × 80	FH	12.5	6281	2204	25	0.19	064 59113
	11000	50 × 63	GG	10.8	6281	2204	31	0.24	064 49113
	12000	40 × 105	EJ	14.6	6851	2404	21	0.16	064 59123
	13000	50 × 80	GH	12.7	7421	2604	26	0.24	064 59133
	14000	45 × 105	FJ	15	7991	2804	20	0.19	064 59143
	16000	50 × 105	GJ	15	9131	3204	22	0.24	064 59163

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U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	CASE CODE	I_R 100 Hz 85 °C (A)	I_{L1} 1 min (μA)	I_{L5} 5 min (μA)	ESR MAX. 100 Hz (m Ω)	Tan δ MAX. 100 Hz	CATALOGUE NUMBER 2251
250	1200	35 × 50	DF	5.2	1721	604	85	0.07	064 53122
	1400	40 × 50	EF	5.9	2006	704	75	0.07	064 53142
	1600	45 × 50	FF	6.3	2291	804	71	0.08	064 53162
	1800	35 × 63	DG	7.1	2576	904	55	0.07	064 53182
	1900	50 × 50	GF	7.1	2719	954	65	0.09	064 53192
	2100	40 × 63	EG	7.5	3004	1054	54	0.08	064 53212
	2200	35 × 80	DH	7.9	3146	1104	48	0.08	064 53222
	2500	45 × 63	FG	8.1	3574	1254	51	0.09	064 53252
	2600	40 × 80	EH	8.8	3716	1304	43	0.08	064 53262
	2700	35 × 105	DJ	9.4	3859	1354	40	0.08	064 53272
	3000	50 × 63	GG	9.0	4286	1504	46	0.10	064 53302
	3100	45 × 80	FH	9.6	4429	1554	41	0.09	064 53312
	3300	40 × 105	EJ	10.7	4714	1654	35	0.08	064 53332
	3700	50 × 80	GH	10.5	5284	1854	37	0.10	064 53372
	3900	45 × 105	FJ	11.5	5569	1954	34	0.09	064 53392
	4700	50 × 105	GJ	12.5	6709	2354	31	0.10	064 53472
350	560	35 × 50	DF	3.4	1129	396	89	0.07	064 55561
	680	40 × 50	EF	4.0	1368	480	159	0.07	064 55681
	820	35 × 63	DG	4.5	1647	578	132	0.07	064 55821
	820	45 × 50	FF	4.5	1647	578	145	0.08	064 45821
	1000	35 × 80	DH	5.3	2006	704	103	0.07	064 55102
	1000	40 × 63	EG	5.2	2006	704	112	0.08	064 45102
	1000	50 × 50	GF	5.2	2006	704	121	0.08	064 35102
	1200	35 × 105	DJ	6.3	2405	844	91	0.08	064 55122
	1200	40 × 80	EH	6.1	2405	844	93	0.08	064 45122
	1200	45 × 63	FG	5.8	2405	844	102	0.08	064 35122
	1400	40 × 105	EJ	7.1	2804	984	79	0.08	064 55142
	1400	45 × 80	FH	6.6	2804	984	87	0.08	064 45142
	1400	50 × 63	EJ	6.4	2804	984	91	0.09	064 35142
	1600	45 × 105	FJ	7.7	3203	1124	75	0.08	064 55162
	1600	50 × 80	GH	7.3	3203	1124	78	0.09	064 45162
	1900	50 × 105	GJ	8.6	3802	1334	66	0.09	064 55192

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U_R (V)	C_R 100 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	CASE CODE	I_R 100 Hz 85 °C (A)	I_{L1} 1 min (μA)	I_{L5} 5 min (μA)	ESR MAX. 100 Hz (m Ω)	Tan δ MAX. 100 Hz	CATALOGUE NUMBER 2251
400	470	35 × 50	DF	3.3	1083	380	209	0.07	064 56471
	560	40 × 50	EF	3.8	1288	452	178	0.07	064 56561
	680	35 × 63	DG	4.2	1562	548	146	0.07	064 56681
	680	45 × 50	FF	4.3	1562	548	161	0.08	064 46681
	820	35 × 80	DH	5.0	1881	660	122	0.07	064 56821
	820	40 × 63	EG	4.9	1881	660	125	0.07	064 46821
	820	50 × 50	GF	4.9	1881	660	137	0.08	064 36821
	1000	35 × 105	DJ	6.0	2291	804	101	0.07	064 56102
	1000	40 × 80	EH	5.8	2291	804	102	0.07	064 46102
	1000	45 × 63	FG	5.5	2291	804	112	0.08	064 36102
	1200	40 × 105	EJ	6.9	2747	964	89	0.07	064 56122
	1200	45 × 80	FH	6.4	2747	964	94	0.08	064 46122
	1200	50 × 63	EJ	6.2	2747	964	97	0.08	064 36122
	1400	45 × 105	FJ	7.5	3203	1124	81	0.08	064 56142
	1400	50 × 80	GH	7.2	3203	1124	84	0.08	064 46142
	1600	50 × 105	GJ	8.2	3659	1284	73	0.08	064 56162
450	330	35 × 50	DF	2.8	858	301	291	0.07	064 57331
	390	40 × 50	EF	3.2	1012	355	246	0.07	064 57391
	470	35 × 63	DG	3.6	1217	427	205	0.07	064 57471
	470	45 × 50	FF	3.7	1217	427	220	0.07	064 47471
	560	35 × 80	DH	4.2	1448	508	172	0.07	064 57561
	560	40 × 63	EG	4.1	1448	508	174	0.07	064 47561
	560	50 × 50	GF	4.2	1448	508	188	0.07	064 37561
	680	35 × 105	DJ	5.0	1756	616	144	0.07	064 57681
	680	40 × 80	EH	4.9	1756	616	146	0.07	064 47681
	680	45 × 63	FG	4.7	1756	616	155	0.07	064 37681
	820	40 × 105	EJ	5.9	2115	742	122	0.07	064 57821
	820	45 × 80	FH	5.5	2115	742	129	0.07	064 47821
	820	50 × 63	EJ	5.3	2115	742	133	0.07	064 37821
	1000	45 × 105	FJ	6.5	2576	904	107	0.07	064 57102
	1000	50 × 80	GH	6.3	2576	904	107	0.07	064 47102
	1200	50 × 105	GJ	7.3	3089	1084	92	0.07	064 57122

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Additional electrical data

PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage	≤350 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 5 minutes at U_R	$I_{L5} \leq 0.002C_R \times U_R + 4 \text{ }\mu\text{A}$
Inductance		
Equivalent series inductance (ESL)	all case sizes	typ. 19 nH
		max. 25 nH

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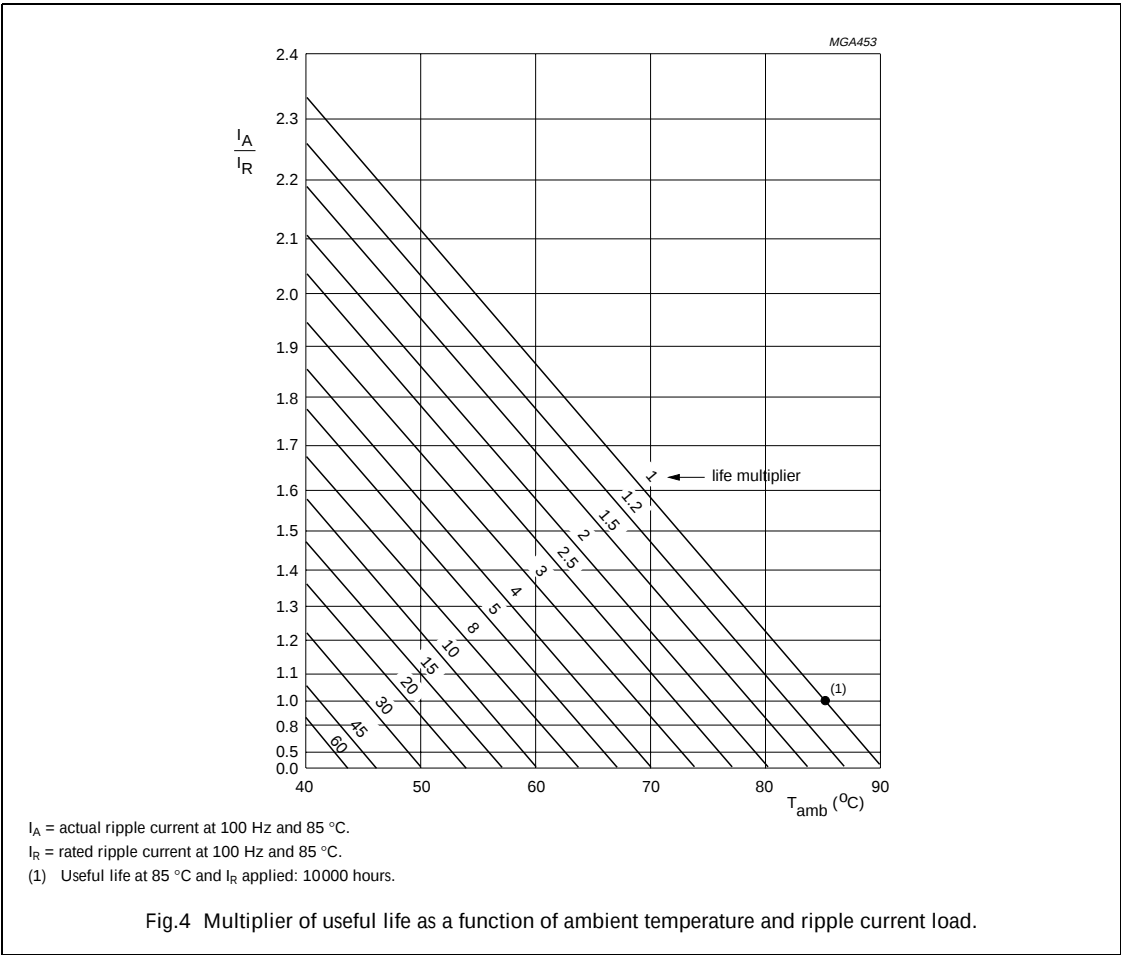
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RIPPLE CURRENT AND USEFUL LIFE

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

FREQUENCY (Hz)	I _R MULTIPLIER	
	U _R = ≤100 V	U _R = >100 V
50	0.86	0.86
100	1.00	1.00
300	1.15	1.25
1000	1.35	1.40
≥10000	1.45	1.50



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SPECIFIC TESTS AND REQUIREMENTS

General tests and requirements are specified in data handbook BC01, section “*Tests and Requirements*”.

Table 5 Test procedures and requirements

TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Endurance	IEC 60384-4/ EN130300 subclause 4.13	$T_{amb} = 85\text{ °C}$; U_R applied; 2000 hours	$U_R \leq 100\text{ V}$; $\Delta C/C$: $\pm 15\%$ $U_R > 100\text{ V}$; $\Delta C/C$: $\pm 15\%$ $ESR \leq 2 \times \text{spec. limit}$ $Z \leq 2 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$
Useful life	CECC 30301 subclause 1.8.1	$T_{amb} = 85\text{ °C}$; U_R and I_R applied; 5000 hours	$U_R \leq 100\text{ V}$; $\Delta C/C$: $\pm 35\%$ $U_R > 100\text{ V}$; $\Delta C/C$: $\pm 30\%$ $ESR \leq 3 \times \text{spec. limit}$ $Z \leq 3 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ no short or open circuit, no visible damage total failure percentage: $\leq 4\%$
Shelf life (storage at high temperature)	IEC 60384-4/ EN130300 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	$\Delta C/C$: $\pm 10\%$ $ESR \leq 1.2 \times \text{spec. limit}$ $I_{L5} \leq 2 \times \text{spec. limit}$

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 60068*”
- Date code (year and week) in accordance with “*IEC 60062*”
- Code for factory of origin
- Name of manufacturer
- ‘-’ sign to indicate the negative terminal, visible from the top and side of the capacitor
- Code number (last 8 digits)
- Code for basic specification in accordance with “*IEC 60384-4-1*” and “*CECC 30301*”.