

DATA SHEET

NAFTA 3148,
2251 008 PHCT-ST
Aluminum electrolytic capacitors
Power High Current, Screw Terminals

Preliminary specification
Supersedes data of 21st August 2001
File under BCcomponents, BC01

2002 Jan 09

Aluminum electrolytic capacitors Power High Current, Screw Terminals

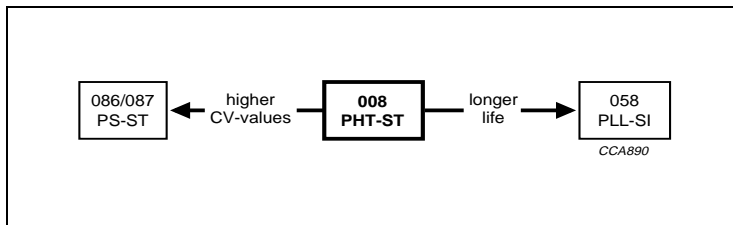
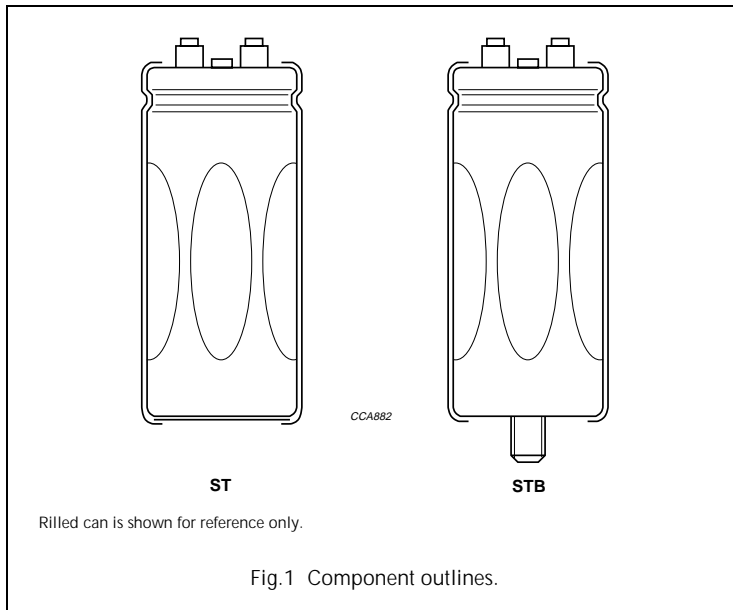
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FEATURES

- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Large types, minimized dimensions, cylindrical aluminum case, insulated with a blue sleeve
- Bolt version available for case $\varnothing D = 50, 65$ and 75 mm ($\varnothing D = 2", 2.5"$ and $3"$)
- Pressure relief in the sealing disk
- Charge and discharge proof
- High ripple current capability
- High resistance to shock and vibration
- 105 °C low volt series.

APPLICATIONS

- General purpose, computer and industrial systems
- Smoothing and filtering
- Standard and switched mode power supplies
- Welding
- Energy storage in pulse systems
- Motor control devices
- Uninterruptable power supplies (UPS).



QUICK REFERENCE DATA

DESCRIPTION	VALUE
	2251 008
Case size (in millimetres and inches)	BA 35 × 54 mm (1.375" × 2.125") to GN 76 × 220 mm (3.000" × 8.625")
Rated capacitance range, C_R	2700 to 1000000 μF
Tolerance on C_R	-10 to +30%; -10 to +50%; $\pm 20\%$ ⁽¹⁾
Rated voltage range, U_R	16 to 75 V
Category temperature range	-40 to +105 °C
Endurance test at 105 °C	1000 hours
Useful life at 105 °C	2000 hours
Useful life at 40 °C and $1.2 \times I_R$ applied	120000 hours
Shelf life at 0 V, 85 °C	500 hours
Based on sectional specification	IEC 60384-4
Climatic category IEC 60068	40/105/56

Note

1. Standard tolerance on C_R .
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Selection chart for C_R , U_R and relevant nominal case sizes ($\varnothing D \times L$ in mm); NAFTA 3148, 2251 008 PHHT-ST

Preferred types in **bold**.

C_R (μF)	U_R (V)					
	16	25	40	50	63	75
2700	–	–	–	–	–	35 × 54
3900	–	–	–	–	–	–
4700	–	–	–	–	35 × 54	35 × 80
6800	–	–	–	35 × 54	35 × 80	35 × 105
8200	–	–	35 × 54	–	–	–
10000	–	–	–	35 × 80	35 × 105	–
12000	–	35 × 54	35 × 80	–	–	50 × 80
15000	–	–	–	35 × 105	–	–
18000	–	–	35 × 105	–	50 × 80	50 × 105
22000	35 × 54	35 × 80	–	–	–	50 × 130
	–	–	–	–	–	–
27000	–	–	50 × 80	50 × 80	50 × 105	50 × 143
	–	–	–	–	–	65 × 105
33000	–	35 × 105	–	–	50 × 130	65 × 118
39000	35 × 80	–	–	50 × 105	50 × 143	65 × 143
	–	–	–	–	65 × 105	76 × 105
47000	–	–	50 × 105	50 × 130	65 × 118	76 × 118
56000	35 × 105	50 × 80	50 × 130	50 × 143	65 × 143	76 × 143
	–	–	–	65 × 105	76 × 105	–
68000	–	–	50 × 143	65 × 118	76 × 118	–
	–	–	65 × 105	–	–	–
82000	50 × 80	50 × 105	65 × 118	65 × 143	76 × 143	–
	–	–	–	76 × 105	–	–
100000	–	50 × 130	65 × 143	76 × 118	–	76 × 220
	–	–	76 × 105	–	–	–
120000	50 × 105	50 × 143	76 × 118	76 × 143	–	–
	–	65 × 105	–	–	–	–
150000	50 × 130	65 × 118	76 × 143	–	76 × 220	–
	50 × 143	–	–	–	–	–
180000	–	65 × 143	–	–	–	–
	–	76 × 105	–	–	–	–
220000	65 × 105	76 × 118	–	76 × 220	–	–
270000	65 × 118	76 × 143	76 × 220	–	–	–
330000	65 × 143	–	–	–	–	–
	76 × 105	–	–	–	–	–
390000	76 × 118	–	–	–	–	–
470000	76 × 143	76 × 220	–	–	–	–
820000	76 × 220	–	–	–	–	–
1000000	76 × 220	–	–	–	–	–

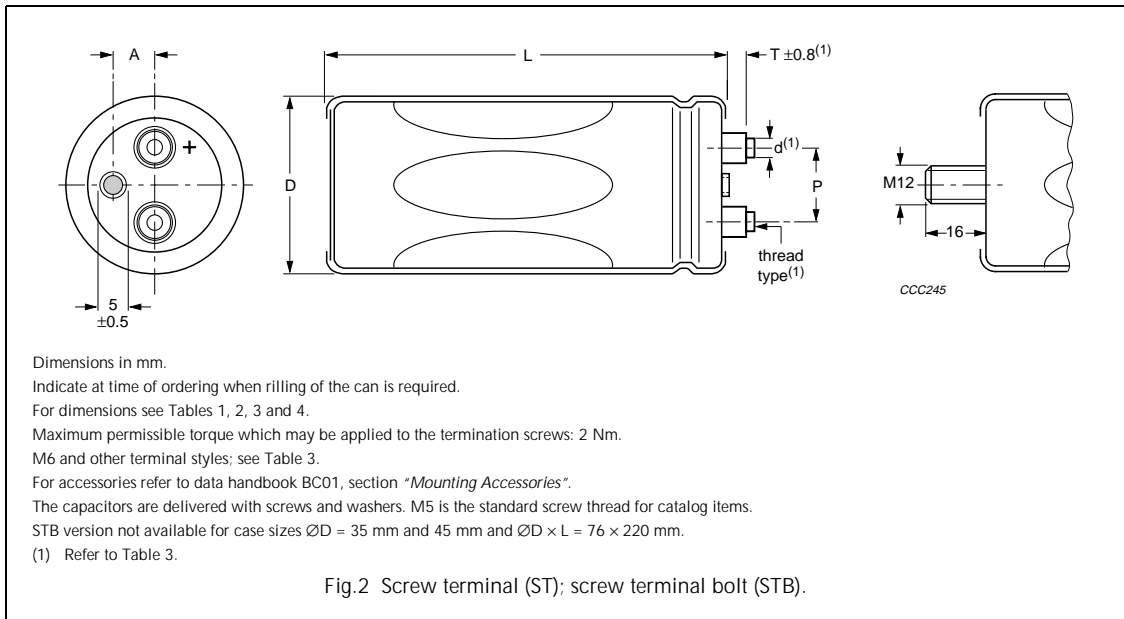
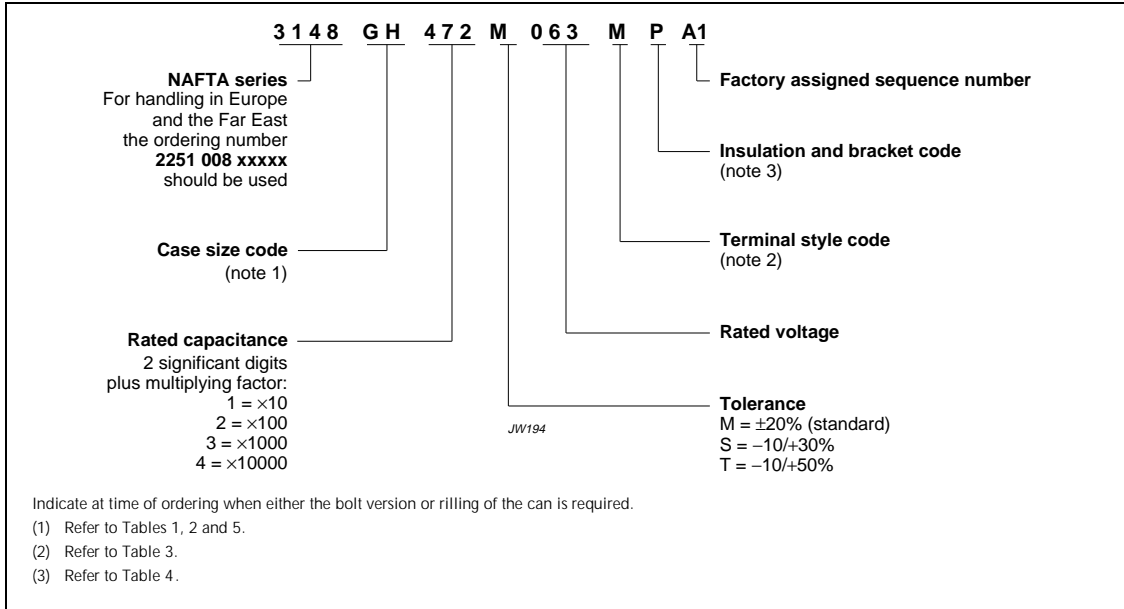
Aluminum electrolytic capacitors Power High Current, Screw Terminals

**NAFTA 3148,
2251 008 PHCT-ST**

ORDERING INFORMATION

NAFTA part numbering system

MECHANICAL DATA



Aluminum electrolytic capacitors

Power High Current, Screw Terminals

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

CASE CODE	∅D ±0.8 (mm)	L ±1.57 (mm)	P ±0.4 (mm)	A (mm)	MASS (g)	PACKAGING QUANTITIES (units per box)	CARDBOARD BOX DIMENSIONS l × w × h (mm)
Dimensions in millimetres							
BA	34.9	54.0	12.7	8.0	≈72	150	402 × 200 × 258
BB	34.9	66.7	12.7	8.0	≈90	150	402 × 200 × 258
BC	34.9	79.4	12.7	8.0	≈105	150	402 × 200 × 283
BD	34.9	92.1	12.7	8.0	≈120	100	402 × 200 × 258
BE	34.9	104.8	12.7	8.0	≈135	100	402 × 200 × 258
BF	34.9	117.5	12.7	8.0	≈170	100	402 × 200 × 258
BG	34.9	130.2	12.7	8.0	≈220	100	402 × 200 × 283
BH	34.9	142.9	12.7	8.0	≈270	100	402 × 200 × 315
DA	44.5	54.0	19.1	11.5	≈160	96	324 × 216 × 289
DB	44.5	66.7	19.1	11.5	≈175	72	332 × 221 × 278
DC	44.5	79.4	19.1	11.5	≈180	72	332 × 221 × 278
DD	44.5	92.1	19.1	11.5	≈205	48	324 × 216 × 289
DE	44.5	104.8	19.1	11.5	≈220	48	324 × 216 × 289
DF	44.5	117.5	19.1	11.5	≈235	48	324 × 216 × 289
DG	44.5	130.2	19.1	11.5	≈250	48	324 × 216 × 289
DH	44.5	142.9	19.1	11.5	≈270	24	324 × 216 × 315
EA	50.8	54.0	22.2	12.7	≈170	96	324 × 216 × 289
EB	50.8	66.7	22.2	12.7	≈180	72	332 × 221 × 278
EC	50.8	79.4	22.2	12.7	≈190	72	332 × 221 × 278
ED	50.8	92.1	22.2	12.7	≈220	48	324 × 216 × 289
EE	50.8	104.8	22.2	12.7	≈255	48	324 × 216 × 289
EF	50.8	117.5	22.2	12.7	≈290	48	324 × 216 × 289
EG	50.8	130.2	22.2	12.7	≈320	48	324 × 216 × 289
EH	50.8	142.9	22.2	12.7	≈350	48	324 × 216 × 315
FB	63.5	66.7	28.6	15.9	≈300	40	343 × 275 × 240
FC	63.5	79.4	28.6	15.9	≈370	40	343 × 275 × 240
FD	63.5	92.1	28.6	15.9	≈400	40	343 × 275 × 240
FE	63.5	104.8	28.6	15.9	≈445	40	343 × 275 × 240
FF	63.5	117.5	28.6	15.9	≈600	40	343 × 275 × 315
FG	63.5	130.2	28.6	15.9	≈650	40	343 × 275 × 315
FH	63.5	142.9	28.6	15.9	≈600	20	343 × 275 × 240
GC	76.2	79.4	31.8	19.0	≈520	60	397 × 320 × 292
GD	76.2	92.1	31.8	19.0	≈570	20	397 × 320 × 121
GE	76.2	104.8	31.8	19.0	≈600	20	397 × 320 × 121
GF	76.2	117.5	31.8	19.0	≈720	20	397 × 320 × 147
GG	76.2	130.2	31.8	19.0	≈850	20	397 × 320 × 147
GH	76.2	142.9	31.8	19.0	≈970	20	397 × 320 × 178
GJ	76.2	149.2	31.8	19.0	≈1050	20	397 × 320 × 178
GN	76.2	219.1	31.8	19.0	≈1460	16	426 × 410 × 237

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Table 2 Physical dimensions in inches (uninsulated case), mass and packaging information: see Fig.2

CASE CODE	∅D ±0.031 (inches)	L ±0.062 (inches)	P ±0.014 (inches)	A (inches)	MASS (g)	PACKAGING QUANTITIES (units per box)	CARDBOARD BOX DIMENSIONS l × w × h (inches)
Dimensions in inches							
BA	1.375	2.125	0.5	0.39	≈72	150	15.825 × 7.875 × 10.125
BB	1.375	2.625	0.5	0.39	≈90	150	15.825 × 7.875 × 10.125
BC	1.375	3.125	0.5	0.39	≈105	150	15.825 × 7.875 × 11.125
BD	1.375	3.625	0.5	0.39	≈120	100	15.825 × 7.875 × 10.125
BE	1.375	4.125	0.5	0.39	≈135	100	15.825 × 7.875 × 10.125
BF	1.375	4.625	0.5	0.39	≈170	100	15.825 × 7.875 × 10.125
BG	1.375	5.125	0.5	0.39	≈220	100	15.825 × 7.875 × 11.125
BH	1.375	5.625	0.5	0.39	≈270	100	15.825 × 7.875 × 12.400
DA	1.75	2.125	0.75	0.453	≈160	96	12.750 × 8.500 × 11.375
DB	1.75	2.625	0.75	0.453	≈175	72	13.700 × 8.700 × 11.000
DC	1.75	3.125	0.75	0.453	≈180	72	13.700 × 8.700 × 11.000
DD	1.75	3.625	0.75	0.453	≈205	48	12.750 × 8.500 × 11.375
DE	1.75	4.125	0.75	0.453	≈220	48	12.750 × 8.500 × 11.375
DF	1.75	4.625	0.75	0.453	≈235	48	12.750 × 8.500 × 11.375
DG	1.75	5.125	0.75	0.453	≈250	48	12.750 × 8.500 × 11.375
DH	1.75	5.625	0.75	0.453	≈270	24	12.750 × 8.500 × 12.400
EA	2	2.125	0.875	0.5	≈170	96	12.750 × 8.500 × 11.375
EB	2	2.625	0.875	0.5	≈180	72	13.750 × 8.700 × 11.000
EC	2	3.125	0.875	0.5	≈190	72	13.750 × 8.700 × 11.000
ED	2	3.625	0.875	0.5	≈220	48	12.750 × 8.500 × 11.375
EE	2	4.125	0.875	0.5	≈255	48	12.750 × 8.500 × 11.375
EF	2	4.625	0.875	0.5	≈290	48	12.750 × 8.500 × 11.375
EG	2	5.125	0.875	0.5	≈320	48	12.750 × 8.500 × 11.375
EH	2	5.625	0.875	0.5	≈350	48	12.750 × 8.500 × 12.400
FB	2.5	2.625	1.125	0.625	≈300	40	13.500 × 10.825 × 9.500
FC	2.5	3.125	1.125	0.625	≈370	40	13.500 × 10.825 × 9.500
FD	2.5	3.625	1.125	0.625	≈400	40	13.500 × 10.825 × 9.500
FE	2.5	4.125	1.125	0.625	≈445	40	13.500 × 10.825 × 9.500
FF	2.5	4.625	1.125	0.625	≈600	40	13.500 × 10.825 × 12.400
FG	2.5	5.125	1.125	0.625	≈650	40	13.500 × 10.825 × 12.400
FH	2.5	5.625	1.125	0.625	≈600	20	13.500 × 10.825 × 9.500
GC	3	3.125	1.25	0.75	≈520	60	15.630 × 12.600 × 11.500
GD	3	3.625	1.25	0.75	≈570	20	15.630 × 12.600 × 4.750
GE	3	4.125	1.25	0.75	≈600	20	15.630 × 12.600 × 4.750
GF	3	4.625	1.25	0.75	≈720	20	15.630 × 12.600 × 5.750
GG	3	5.125	1.25	0.75	≈850	20	15.630 × 12.600 × 5.750
GH	3	5.625	1.25	0.75	≈970	20	15.630 × 12.600 × 7.000
GJ	3	5.825	1.25	0.75	≈1050	20	15.630 × 12.600 × 7.000
GN	3	8.625	1.25	0.75	≈1460	16	16.775 × 16.125 × 9.250

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Table 3 NAFTA terminal style code; standard types in **bold**.

CODE	TERMINAL STYLE	THREAD TYPE	d (mm)	T (mm)	d (inches)	T (inches)
A	high post	10-32	8	6.4	.315	0.250
B	low post	10-32	8	1.6	.315	0.063
D	high current; see note 1	¹ / ₄ -28	17	3.2	.670	0.125
J	high current; see note 1	M6	17	3.2	.670	0.125
M	high post	M5	8	6.4	.315	0.250
K	high current; see note 1	¹ / ₄ -28	17	6.4	.670	0.250

Note

- Case ØD = 65 mm (2.5") and ØD = 76 mm (3.0") cans only; for 30 A and up.

Table 4 NAFTA insulation and clamp/bracket codes; standard types in **bold**. See note 1

CODE	CLAMP/BRACKET	INSULATION TYPE	DIMENSION ADDERS		
			D	L	H
			Dimensions in mm		
P	no	0.2 mm polymeric	+0.51	+0.81	+0.61
H	no	0.3 mm polymeric	+0.63	+1.58	+1.14
N	no	none	–	–	–
R	yes	0.2 mm polymeric	+0.51	+0.81	+0.61
J	yes	0.3 mm polymeric	+0.63	+1.58	+1.14
X	yes	none	–	–	–
			Dimensions in inches		
P	no	0.008" polymeric	+0.020	+0.032	+0.024
H	no	0.012" polymeric	+0.030	+0.062	+0.045
N	no	none	–	–	–
R	yes	0.008" polymeric	+0.020	+0.032	+0.024
J	yes	0.012" polymeric	+0.030	+0.062	+0.045
X	yes	none	–	–	–

Note

- For clamp/bracket dimensions refer to data handbook BC01, section "Mounting Accessories".

MARKING

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

- Rated capacitance (in µF)
- Tolerance on rated capacitance
- Rated voltage (in V)
- Date code in "yyww" (year, week) format
- Name of manufacturer
- NAFTA code number 17 digits
- Code number 12 digits (12NC; NAFTA customers will not see the 12NC).

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ELECTRICAL DATA AND ORDERING INFORMATION

Unless otherwise specified, all electrical values in Table 5 apply at $T_{amb} = 25\text{ }^{\circ}\text{C}$,
 $P = 86\text{ to }106\text{ kPa}$, $RH = 45\text{ to }75\%$.

SYMBOL	DESCRIPTION
C_R	rated capacitance at 100/120 Hz
I_R	rated RMS ripple current at 105 °C
I_{L5}	max. leakage current after 5 minutes at U_R
ESR	max. equivalent series resistance at 100/120 Hz
Z	impedance at 20 kHz on request
Tan δ	max. dissipation factor at 100/120 Hz

Ordering example

Electrolytic capacitor 2251 008 series

18000 $\mu\text{F}/75\text{ V}$; $\pm 20\%$

High post code "M", insulation type
 "P", 0.2 mm polymeric

Nominal case size:

$\varnothing 50 \times 105\text{ mm}$, ST version

Catalogue number: 2251 008 12183.

Table 5 Electrical data and ordering information for **008 PHC-ST** preferred types in **bold**

U_R (V)	C_R 100/120 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	CASE CODE	I_R 100/120 Hz 105 °C (A)	I_{L5} 5 min (mA)	ESR MAX. 100/120 Hz (m Ω)	Tan δ MAX. 100/120 Hz	CATALOGUE NUMBER (see note 1) 2251
16	22000	35 × 54	BA	12	1.78	10	0.18	008 15223
	39000	35 × 80	BC	17	2.37	7	0.22	008 15393
	56000	35 × 105	BE	21	2.84	6	0.27	008 15563
	82000	50 × 80	EC	24	3.44	6	0.40	008 15823
	120000	50 × 105	EE	30	4.16	6	0.49	008 15124
	150000	50 × 130	EG	30	4.65	4	0.49	008 15154
	150000	50 × 143	EH	30	4.65	4	0.49	008 25154
	220000	65 × 105	FE	44	5.63	3	0.54	008 15224
	270000	65 × 118	FF	48	6.00	3	0.66	008 15274
	330000	65 × 143	FH	50	6.00	3	0.81	008 15334
	330000	76 × 105	GE	50	6.00	3	0.81	008 25334
	390000	76 × 118	GF	50	6.00	3	0.96	008 15394
	470000	76 × 143	GH	50	6.00	2	0.77	008 15474
	820000	76 × 220	GN	50	6.00	2	1.34	008 15824
1000000	76 × 220	GN	50	6.00	2	1.47	008 15105	
25	12000	35 × 54	BA	6.8	1.64	32	0.31	008 16123
	22000	35 × 80	BC	9.6	2.22	22	0.40	008 16223
	33000	35 × 105	BE	12	2.72	17	0.46	008 16333
	56000	50 × 80	EC	21	3.55	7	0.32	008 16563
	82000	50 × 105	EE	28	4.30	5	0.33	008 16823
	100000	50 × 130	EG	30	4.74	5	0.41	008 16104
	120000	50 × 143	EH	30	5.20	4	0.39	008 16124
	120000	65 × 105	FE	35	5.20	5	0.49	008 26124
	150000	65 × 118	FF	38	5.81	4	0.49	008 16154
	180000	65 × 143	FH	41	6.00	4	0.59	008 16184
	180000	76 × 105	GE	42	6.00	4	0.59	008 26184

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U_R (V)	C_R 100/120 Hz (μ F)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	CASE CODE	I_R 100/120 Hz 105 °C (A)	I_{L5} 5 min (mA)	ESR MAX. 100/120 Hz (m Ω)	Tan δ MAX. 100/120 Hz	CATALOGUE NUMBER (see note 1) 2251
25	220000	76 × 118	GF	46	6.00	4	0.72	008 16224
	270000	76 × 143	GH	49	6.00	4	0.88	008 16274
	470000	76 × 220	GN	50	6.00	3	1.15	008 16474
40	8200	35 × 54	BA	6.1	1.72	39	0.26	008 17822
	12000	35 × 80	BC	8.7	2.08	27	0.26	008 17123
	18000	35 × 105	BE	11	2.55	20	0.29	008 17183
	27000	50 × 80	EC	19	3.12	9	0.20	008 17273
	47000	50 × 105	EE	25	4.11	6	0.23	008 17473
	56000	50 × 130	EG	30	4.49	5	0.23	008 17563
	68000	50 × 143	EH	30	4.95	5	0.28	008 17683
	68000	65 × 105	FE	32	4.95	5	0.28	008 27683
	82000	65 × 118	FF	35	5.43	5	0.33	008 17823
	100000	65 × 143	FH	38	6.00	5	0.41	008 17104
	100000	76 × 105	GE	38	6.00	5	0.41	008 27104
	120000	76 × 118	GF	42	6.00	4	0.39	008 17124
	150000	76 × 143	GH	46	6.00	4	0.49	008 17154
270000	76 × 220	GN	50	6.00	3	0.66	008 17274	
50	6800	35 × 54	BA	5.9	1.75	42	0.23	008 11682
	10000	35 × 80	BC	8.4	2.12	28	0.23	008 11103
	15000	35 × 105	BE	11	2.60	21	0.26	008 11153
	27000	50 × 80	EC	14	3.49	15	0.33	008 11273
	39000	50 × 105	EE	19	4.19	11	0.35	008 11393
	47000	50 × 130	EG	21	4.60	10	0.38	008 11473
	56000	50 × 143	EH	24	5.02	9	0.41	008 11563
	56000	65 × 105	FE	26	5.02	8	0.37	008 21563
	68000	65 × 118	FF	29	5.53	7	0.39	008 11683
	82000	65 × 143	FH	34	6.00	6	0.40	008 11823
	82000	76 × 105	GE	32	6.00	6	0.40	008 21823
	100000	76 × 118	GF	36	6.00	6	0.49	008 11104
	120000	76 × 143	GH	39	6.00	5	0.49	008 11124
	220000	76 × 220	GN	50	6.00	4	0.72	008 11224
	63	4700	35 × 54	BA	5.9	1.63	42	0.16
6800		35 × 80	BC	8.4	1.96	29	0.16	008 18682
10000		35 × 105	BE	11	2.38	21	0.17	008 18103
18000		50 × 80	EC	14	3.19	15	0.22	008 18183
27000		50 × 105	EE	19	3.91	11	0.24	008 18273
33000		50 × 130	EG	23	4.33	9	0.24	008 18333
39000		50 × 143	EH	25	4.70	9	0.29	008 18393

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U_R (V)	C_R 100/120 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	CASE CODE	I_R 100/120 Hz 105 °C (A)	I_{L5} 5 min (mA)	ESR MAX. 100/120 Hz (m Ω)	Tan δ MAX. 100/120 Hz	CATALOGUE NUMBER (see note 1) 2251
63	39000	65 × 105	FE	26	4.70	8	0.25	008 28393
	47000	65 × 118	FF	28	5.16	7	0.27	008 18473
	56000	65 × 143	FH	31	5.63	7	0.32	008 18563
	56000	76 × 105	GE	32	5.63	7	0.32	008 28563
	68000	76 × 118	GF	36	6.00	6	0.33	008 18683
	82000	76 × 143	GH	39	6.00	5	0.33	008 18823
	150000	76 × 220	GN	50	6.00	4	0.49	008 18154
75	2700	35 × 54	BA	5.7	1.35	46	0.10	008 12272
	4700	35 × 80	BC	8.2	1.78	30	0.12	008 12472
	6800	35 × 105	BE	10	2.14	22	0.12	008 12682
	12000	50 × 80	EC	14	2.85	16	0.16	008 12123
	18000	50 × 105	EE	18	3.49	12	0.18	008 12183
	22000	50 × 130	EG	22	3.85	10	0.18	008 12223
	27000	50 × 143	EH	24	4.27	9	0.20	008 12273
	27000	65 × 105	FE	25	4.27	8	0.18	008 22273
	33000	65 × 118	FF	28	4.72	7	0.19	008 12333
	39000	65 × 143	FH	33	5.13	6	0.19	008 12393
	39000	76 × 105	GE	33	5.13	6	0.19	008 22393
	47000	76 × 118	GF	35	5.63	6	0.23	008 12473
	56000	76 × 143	GH	41	6.00	5	0.23	008 12563
	100000	76 × 220	GN	50	6.00	4	0.33	008 12104

Note

- Catalogue type applies to the terminal style "M", high post (see Table 3); the insulation type "P", 0.2 mm polymeric (see Table 4); tolerance $\pm 20\%$ and to the ST version; for STB version (not preferred) replace 8th digit by '5' if ST version is '1' (2222 088/089 5....) or replace 8th digit by '6' if ST version is '2' (2222 088/089 6....). STB version is not available for $\varnothing D = 35$ mm and 45 mm and for case size $\varnothing 76 \times 220$ mm.

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Table 6 Additional electrical data

PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage for short periods	all versions	$U_S = 1.3 \times U_R$
Reverse voltage		$U_{rev} \leq 1 \text{ V}$
Current		
Leakage current	after 5 minutes at U_R	$I_{L5} \leq 0.003 \times \sqrt{C \times V}$ (mA) or 6 mA, whichever is less
Inductance		
Equivalent series inductance (ESL)	case ØD = 35 mm, (1.375")	typ. 18 nH
	case ØD = 45 mm, (1.75")	typ. 23 nH
	case ØD = 50 mm, (2.0")	typ. 25 nH
	case ØD = 65 mm, (2.5")	typ. 27 nH
	case ØD = 76 mm, (3.0")	typ. 29 nH

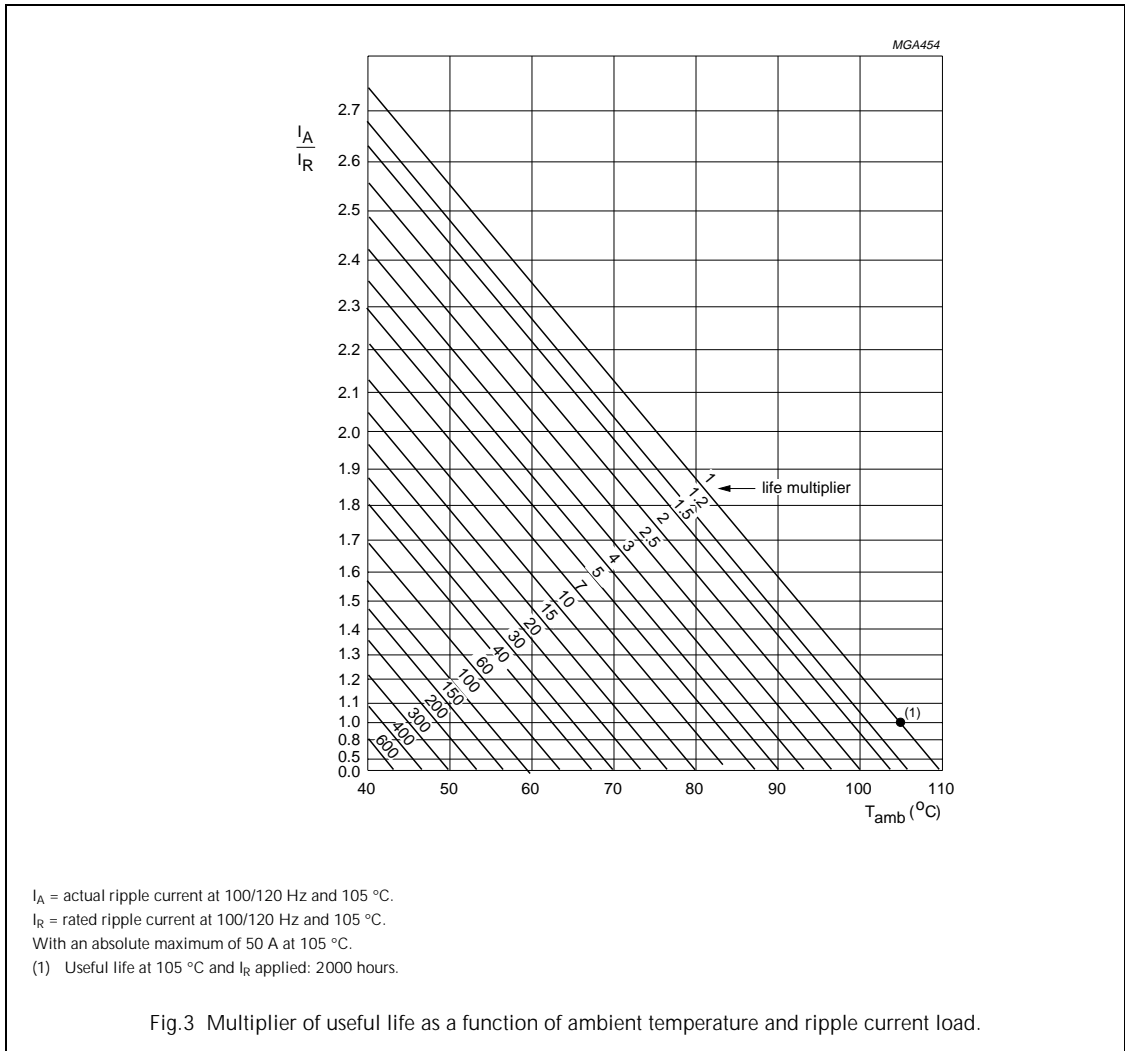
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RIPPLE CURRENT AND USEFUL LIFE

Table 7 Multiplier of ripple current (I_R) as a function of frequency

FREQUENCY (Hz)	I_R MULTIPLIER	
	2251 008	
60	0.9	
100/120	1.00	
300	1.15	
1000	1.25	
≥ 10000	1.30	



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SPECIFIC TESTS AND REQUIREMENTS

General tests and requirements are specified in data handbook BC01, section "Tests and Requirements".

Table 8 Test procedures and requirements

TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Endurance	IEC 60384-4 subclause 4.13	$T_{amb} = 105\text{ °C}$; U_R applied; 1000 hours	$\Delta C/C: \pm 10\%$ $ESR \leq 2 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$
Useful life	CECC 30301 subclause 1.8.1	$T_{amb} = 105\text{ °C}$; U_R and I_R applied; 2000 hours	$\Delta C/C: \pm 15\%$ $ESR \leq 3 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ no short or open circuit, no visible damage total failure percentage: $\leq 3\%$
Shelf life (storage at high temperature)	IEC 60384-4 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	$\Delta C/C: \pm 10\%$ $I_{L5} \leq 2 \times \text{spec. limit}$ $ESR \leq 1.75 \times \text{spec. limit}$