

DATA SHEET

197 PGP-SI

Aluminum electrolytic capacitors
Power General Purpose Snap-in

Product specification
Supersedes data of 22nd July 2002
File under BCcomponents, BC01

2002 Sep 18

Aluminum electrolytic capacitors

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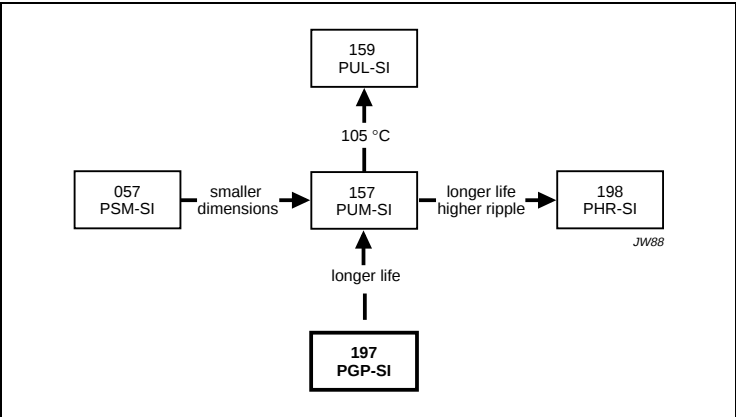
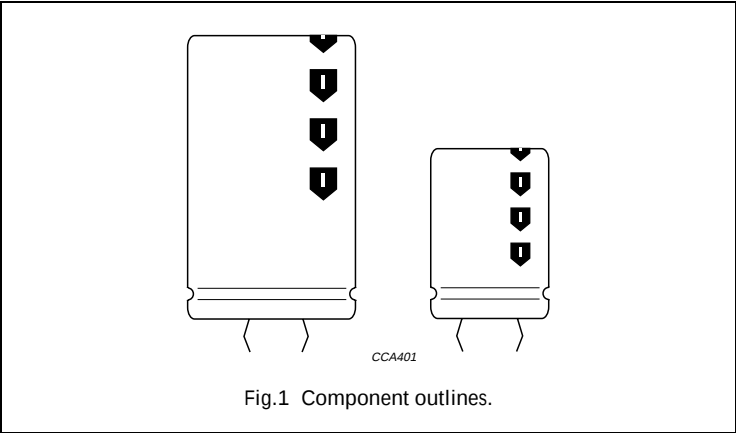
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FEATURES

- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Large types, very small dimensions, cylindrical aluminum case, insulated with a blue sleeve.

APPLICATIONS

- General purpose
- Suitable for electronic equipment
- Consumer electronics.



QUICK REFERENCE DATA

DESCRIPTION	VALUE
Case size ($\varnothing D_{nom} \times L_{nom}$ in mm)	22 × 25 to 35 × 50
Rated capacitance range (E6/E12 series), C_R	56 to 1800 μF
Tolerance on C_R	±20%
Rated voltage range, U_R	160 V; 200 V; 250 V; 400 V; 450 V
Category temperature range	−25 to +85 °C
Useful life at 85 °C	2000 hours
Useful life at 40 °C and $1.4 \times I_R$ applied	25000 hours
Shelf life at 0 V, 85 °C	1000 hours
Based on sectional specification	IEC 60384-4/EN130300/W of JISC5141

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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)				
	160	200	250	400	450
56	–	–	–	–	22 × 25
68	–	–	–	22 × 25	22 × 25
82	–	–	–	22 × 25	22 × 30
	–	–	–	–	25 × 25
100	–	–	–	22 × 30	22 × 35
	–	–	–	25 × 25	25 × 30
120	–	–	–	–	22 × 40
	–	–	–	22 × 35	25 × 30
	–	–	–	25 × 35	30 × 25
150	22 × 25	22 × 25	22 × 25	22 × 35	–
	–	–	–	25 × 30	25 × 35
	–	–	–	30 × 25	30 × 30
180	22 × 25	22 × 25	22 × 25	22 × 40	–
	–	–	–	25 × 35	25 × 40
	–	–	–	30 × 25	30 × 30
	–	–	–	–	35 × 30
220	22 × 25	22 × 25	22 × 30	–	–
	–	–	25 × 25	25 × 40	30 × 35
	–	–	–	30 × 30	35 × 30
	–	–	–	–	–
270	22 × 25	22 × 25	22 × 30	–	30 × 40
	–	–	25 × 25	30 × 35	35 × 35
	–	–	–	35 × 30	–
	–	–	–	–	–
330	22 × 25	22 × 30	22 × 35	25 × 50	30 × 50
	–	25 × 25	25 × 30	30 × 40	35 × 40
	–	–	30 × 25	35 × 30	–
390	22 × 30	22 × 30	22 × 40	30 × 45	30 × 50
	–	25 × 25	25 × 35	35 × 35	35 × 50
	–	–	30 × 25	–	–
470	22 × 30	22 × 35	–	30 × 50	35 × 50
	25 × 25	25 × 30	25 × 40	35 × 40	–
	–	30 × 25	30 × 30	–	–
560	25 × 25	22 × 40	–	35 × 45	–
	30 × 25	25 × 35	–	–	–
	–	30 × 25	30 × 35	–	–
680	25 × 30	25 × 40	25 × 50	35 × 50	–
	30 × 25	30 × 30	30 × 40	–	–
	–	–	35 × 30	–	–
820	25 × 35	–	30 × 45	–	–
	–	30 × 35	35 × 35	–	–
	–	35 × 30	–	–	–

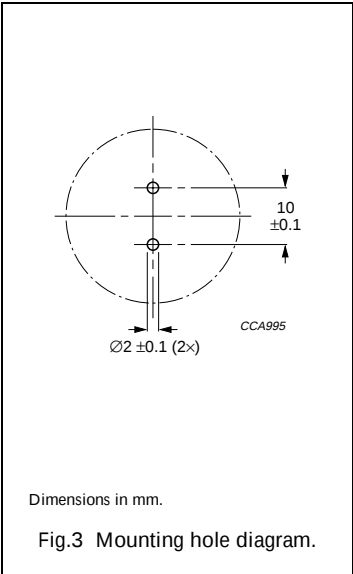
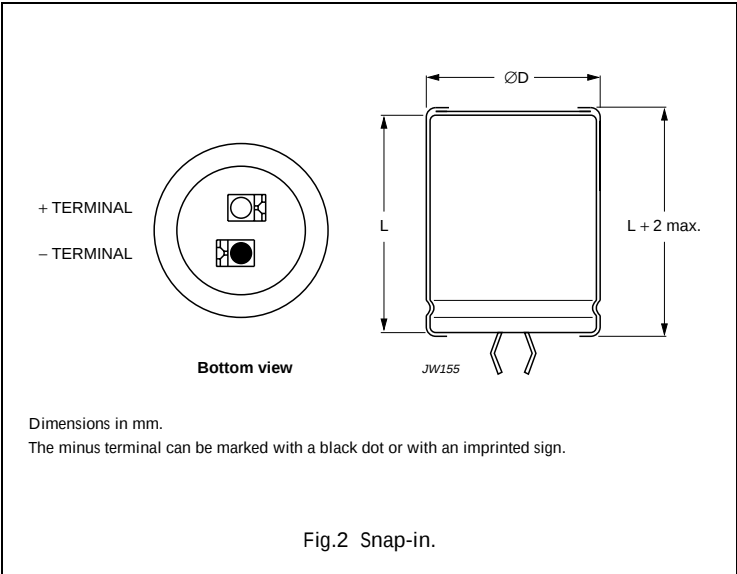
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C _R (μF)	U _R (V)				
	160	200	250	400	450
1000	25 × 40	30 × 40	30 × 50	—	—
	30 × 30	35 × 35	35 × 40	—	—
1200	30 × 35	30 × 45	35 × 50	—	—
	35 × 30	35 × 35	—	—	—
1500	35 × 35	35 × 50	—	—	—
1800	30 × 50	—	—	—	—
	35 × 40	—	—	—	—

MECHANICAL DATA AND PACKAGING QUANTITIES



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)
 - Maximum operating temperature
 - Date code (year and week)
 - '−' sign to indicate the negative terminal, visible from the top and side of the capacitor
 - Code number (last 8 digits).

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ELECTRICAL DATA AND ORDERING INFORMATION		Ordering example
Unless otherwise specified, all electrical values in Table 1 apply at T _{amb} = 20 °C, P = 86 to 106 kPa, RH = 45 to 75%.		Electrolytic capacitor 197 series
		1000 µF/200 V; ±20%
		Nominal case size: Ø30 × 40 mm
		Catalogue number: 2222 197 22102.

SYMBOL	DESCRIPTION
C _R	rated capacitance at 120 Hz
I _R	rated RMS ripple current at 120 Hz, 85 °C
I _{L5}	max. leakage current after 5 minutes at U _R
ESR	max. equivalent series resistance at 120 Hz; note 1

Note

1. ESR at 100 Hz is approximately 1.05 × ESR 120 Hz.

Table 1 Electrical data and ordering information

U _R (V)	C _R 120 Hz (µF)	NOMINAL CASE SIZE ØD × L (mm)	I _R 120 Hz 85 °C (A)	I _{L5} 5 min (mA)	MAX. ESR 120 Hz ⁽¹⁾ (Ω)	CATALOGUE NUMBER 2222
160	150	22 × 25	0.92	0.48	1.11	197 11151
	180	22 × 25	0.99	0.58	0.92	197 11181
	220	22 × 25	1.08	0.70	0.75	197 11221
	270	22 × 25	1.16	0.86	0.61	197 11271
	330	22 × 25	1.24	1.06	0.50	197 11331
	390	22 × 30	1.45	1.25	0.43	197 11391
	470	22 × 30	1.53	1.50	0.35	197 11471
	470	25 × 25	1.45	1.50	0.35	197 21471
	560	30 × 25	1.67	1.50	0.30	197 31561
	680	25 × 30	1.82	1.50	0.24	197 21681
	680	30 × 25	1.70	1.50	0.24	197 31681
	820	25 × 35	2.04	1.50	0.20	197 21821
	1000	30 × 30	2.07	1.50	0.17	197 31102
	1000	35 × 30	2.24	1.50	0.17	197 41102
	1200	30 × 35	2.28	1.50	0.17	197 21122
	1200	35 × 30	2.22	1.50	0.17	197 31122
	1500	35 × 35	2.42	1.50	0.15	197 21152
	1500	35 × 40	2.72	1.50	0.13	197 31152
1800	1800	30 × 50	3.08	1.50	0.11	197 11182
	1800	35 × 40	2.66	1.50	0.13	197 21182

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U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE ØD × L (mm)	I_R 120 Hz 85 °C (A)	I_{L5} 5 min (mA)	MAX. ESR 120 Hz⁽¹⁾ (Ω)	CATALOGUE NUMBER 2222
200	150	22 × 25	0.88	0.60	1.11	197 12151
	180	22 × 25	0.95	0.72	0.92	197 12181
	220	22 × 25	1.03	0.88	0.75	197 12221
	270	22 × 25	1.11	1.08	0.61	197 12271
	330	22 × 30	1.31	1.32	0.50	197 12331
	330	25 × 25	1.26	1.32	0.50	197 22331
	390	25 × 25	1.32	1.50	0.45	197 22391
	470	22 × 35	1.59	1.50	0.35	197 12471
	470	25 × 30	1.59	1.50	0.35	197 22471
	470	30 × 25	1.54	1.50	0.38	197 32471
	560	25 × 35	1.79	1.50	0.30	197 22561
	560	30 × 25	1.57	1.50	0.34	197 32561
	680	25 × 40	2.02	1.50	0.24	197 22681
	680	30 × 30	1.89	1.50	0.27	197 32681
	820	30 × 35	2.11	1.50	0.24	197 32821
	820	35 × 30	2.08	1.50	0.26	197 42821
	1000	30 × 40	2.35	1.50	0.20	197 22102
	1000	35 × 35	2.30	1.50	0.22	197 32102
	1200	30 × 45	2.62	1.50	0.17	197 12122
	1200	35 × 35	2.29	1.50	0.21	197 22122
	1500	35 × 50	3.08	1.50	0.15	197 22152

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U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE ØD × L (mm)	I_R 120 Hz 85 °C (A)	I_{L5} 5 min (mA)	MAX. ESR 120 Hz⁽¹⁾ (Ω)	CATALOGUE NUMBER 2222
250	150	22 × 25	0.89	0.75	1.11	197 13151
	180	22 × 25	0.96	0.90	0.92	197 13181
	220	22 × 30	1.13	1.10	0.75	197 13221
	220	25 × 25	1.11	1.10	0.75	197 23221
	270	22 × 30	1.22	1.35	0.61	197 13271
	270	25 × 25	1.18	1.35	0.61	197 23271
	330	22 × 35	1.41	1.50	0.50	197 13331
	330	25 × 30	1.42	1.50	0.50	197 23331
	330	30 × 25	1.39	1.50	0.50	197 33331
	390	22 × 40	1.59	1.50	0.43	197 13391
	390	25 × 35	1.60	1.50	0.43	197 23391
	390	30 × 25	1.44	1.50	0.43	197 33391
	470	25 × 40	1.80	1.50	0.35	197 23471
	470	30 × 30	1.72	1.50	0.35	197 33471
	560	30 × 35	1.92	1.50	0.30	197 33561
	680	25 × 50	2.27	1.50	0.24	197 13681
	680	30 × 40	2.15	1.50	0.24	197 23681
	680	35 × 30	1.95	1.50	0.27	197 33681
	820	30 × 45	2.40	1.50	0.20	197 13821
	820	35 × 35	2.15	1.50	0.24	197 23821
1000	1000	30 × 50	2.66	1.50	0.17	197 13102
	1000	35 × 40	2.30	1.50	0.21	197 23102
1200	1200	35 × 50	2.88	1.50	0.19	197 13122

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U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE ØD × L (mm)	I_R 120 Hz 85 °C (A)	I_{L5} 5 min (mA)	MAX. ESR 120 Hz⁽¹⁾ (Ω)	CATALOGUE NUMBER 2222
400	68	22 × 25	0.57	0.55	3.66	197 16689
	82	22 × 25	0.62	0.66	3.03	197 16829
	100	22 × 30	0.73	0.80	2.49	197 16101
	100	25 × 25	0.73	0.80	2.49	197 26101
	120	22 × 35	0.84	0.96	2.07	197 16121
	120	25 × 35	0.89	0.96	2.07	197 26121
	150	22 × 35	0.93	1.20	1.66	197 16151
	150	25 × 30	0.94	1.20	1.66	197 26151
	150	30 × 25	0.96	1.20	1.66	197 36151
	180	25 × 35	1.07	1.44	1.38	197 26181
	180	30 × 25	1.03	1.44	1.38	197 36181
	220	25 × 40	1.23	1.50	1.13	197 26221
	220	30 × 30	1.21	1.50	1.13	197 36221
	270	30 × 35	1.38	1.50	0.92	197 26271
	270	35 × 30	1.41	1.50	0.92	197 36271
	330	30 × 40	1.57	1.50	0.75	197 26331
	330	35 × 30	1.49	1.50	0.78	197 36331
	390	30 × 45	1.75	1.50	0.64	197 16391
	390	35 × 35	1.67	1.50	0.66	197 26391
	470	30 × 50	1.96	1.50	0.53	197 16471
	470	35 × 40	1.87	1.50	0.56	197 26471
	560	35 × 45	2.08	1.50	0.47	197 16561
	680	35 × 50	2.31	1.50	0.39	197 16681

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U_R (V)	C_R 120 Hz (μF)	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	I_R 120 Hz 85 °C (A)	I_{L5} 5 min (mA)	MAX. ESR 120 Hz ⁽¹⁾ (Ω)	CATALOGUE NUMBER 2222
450	56	22 × 25	0.53	0.28	4.44	197 17569
	68	22 × 25	0.58	0.34	3.66	197 17689
	82	22 × 30	0.68	0.41	3.03	197 17829
	82	25 × 25	0.68	0.41	3.03	197 27829
	100	22 × 35	0.78	0.50	2.49	197 17101
	100	25 × 30	0.80	0.50	2.49	197 27101
	120	22 × 40	0.89	0.60	2.07	197 17121
	120	25 × 30	0.86	0.60	2.07	197 27121
	120	30 × 25	0.89	0.60	2.07	197 37121
	150	25 × 35	1.00	0.75	1.66	197 27151
	150	30 × 30	1.05	0.75	1.66	197 37151
	180	25 × 40	1.14	0.90	1.38	197 27181
	180	30 × 30	1.13	0.90	1.38	197 37181
	180	35 × 30	1.22	0.90	1.38	197 47181
	220	30 × 35	1.29	1.10	1.13	197 27221
	220	35 × 30	1.32	1.10	1.13	197 37221
	270	30 × 40	1.47	1.35	0.92	197 17271
	330	30 × 50	1.74	1.50	0.75	197 17331
	330	35 × 40	1.69	1.50	0.75	197 27331
	390	35 × 50	1.97	1.50	0.64	197 27391
	470	35 × 50	2.10	1.50	0.53	197 17471

Note

1. ESR at 100 Hz is approximately $1.05 \times$ ESR 120 Hz.

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Additional electrical data

PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage	≥400 V versions	$U_s = 1.1 \times U_R$
	≤250 V versions	$U_s = 1.15 \times U_R$
Reverse voltage	≤1 V	–
Current		
Leakage current	after 5 minutes at U_R	$I_{L5} \leq 0.02C_R \times U_R$ or 1.5 mA, whichever is smaller

Table 2 Low temperature characteristic (at 120 Hz)

DESCRIPTION		U_R (V) ⁽¹⁾				
		160	200	250	400	450
Impedance ratio	$Z(-25\text{ °C})/Z(+20\text{ °C})$	4	4	4	4	4

Note

1. Impedance ratio shall not exceed the given values.

Table 3 Dissipation factor ($\tan \delta$ at 120 Hz, 20 °C)

DESCRIPTION		U_R (V)				
		160	200	250	400	450
$\tan \delta$ (max.)		0.10 ⁽¹⁾	0.10 ⁽¹⁾	0.10 ⁽¹⁾	0.15	0.15

Note

1. 0.15 for $\varnothing D = 35$ mm.

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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	
	160 to 250 V	400 and 450 V
60	0.81	0.9
100	0.97	0.95
120	1.0	1.0
500	1.32	1.2
1000	1.45	1.3
≥ 10000	1.50	1.4

SPECIFIC TESTS AND REQUIREMENTS

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

Table 5 Test procedures and requirements

TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Useful life	CECC 30301 subclause 1.8.1	$T_{amb} = 85\text{ }^{\circ}\text{C}$; U_R and I_R applied: 2000 hours	$\Delta C/C$: $\pm 30\%$ ESR $\leq 3 \times$ spec. limit $I_{L5} \leq$ spec. limit no short or open circuit, no visible damage total failure percentage: $\leq 3\%$
Shelf life (storage at high temperature)	IEC 60384-4/ EN130300 subclause 4.17	$T_{amb} = 85\text{ }^{\circ}\text{C}$; no voltage applied; 1000 hours after test: U_R to be applied for 30 minutes, 24 to 48 hours before measurement	$\Delta C/C$: $\pm 20\%$ ESR $\leq 2 \times$ spec. limit $I_{L5} \leq 1 \times$ spec. limit