

Aluminum Capacitors

Power Ultra High Ripple Current Snap-In for Solar

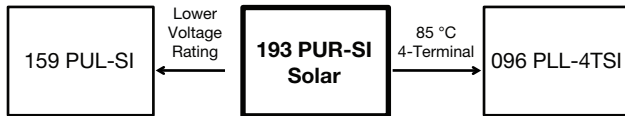


Fig. 1

QUICK REFERENCE DATA	
DESCRIPTION	VALUE
Nominal case size (D x L in mm)	35 x 30 to 35 x 40
Rated capacitance range, C_R	220 μ F to 560 μ F
Tolerance on C_R	$\pm 20 \%$
Rated voltage, U_R	500 V
Rated temperature range	- 40 °C to + 50 °C
Category voltage, U_C	450 V
Category temperature range	- 40 °C to + 105 °C
Useful life at U_C , 105 °C, I_R applied	6000 h
Endurance at U_R , 50 °C, no ripple applied	5000 h
Shelf life at 0 V, 105 °C	1000 h
Based on sectional specification	IEC 60384-4/EN130300
Climatic category IEC 60068	40/105/56
Max. RMS value of ripple voltage	12 V

FEATURES

- Specified for 500 V, 50 °C operation
- Long useful life at 450 V, 105 °C
- Long useful life at 500 V, 50 °C with no ripple current applied
- Low ESR, high ripple current capability

APPLICATIONS

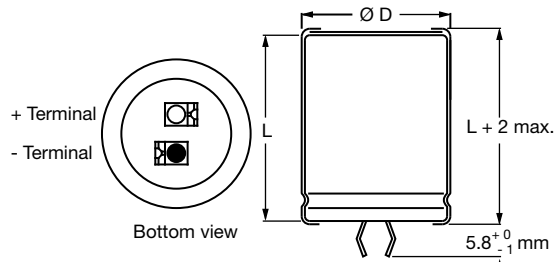
- Solar PV inverters
- Industrial motor control
- Power supply

MARKING

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

- Rated capacitance (in μ F)
- Tolerance code on rated capacitance, code letter in accordance with IEC 60062 ($\pm 20 \%$)
- Rated voltage (in V)
- Two digit date code, in accordance with IEC 60062
- Name of manufacturer
- Code for factory of origin
- “-” sign to identify the negative terminal, visible from the top and side of the capacitor
- Code number
- Climatic category in accordance with IEC 60068
- “LL” for long life grade

SELECTION CHART FOR C_R , U_R , AND RELEVANT NOMINAL CASE SIZES (\varnothing D x L in mm)					
C_R (μ F)	U_R (V)				
	500				
220	35 x 30	-	-	-	-
330	-	35 x 40	-	-	-
390	-	-	35 x 45	-	-
470	-	-	-	35 x 50	-
560	-	-	-	-	35 x 60

DIMENSIONS in millimeters AND AVAILABLE FORMS
TWO TERMINAL SNAP-IN


The minus terminal can be marked with a black dot or with an imprinted "-" sign.

Fig. 2 - Two terminal snap-in

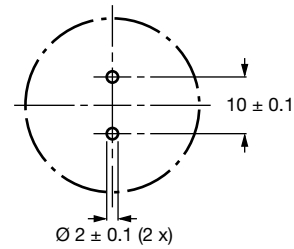


Fig. 3 - Mounting hole diagram

Table 1

DIMENSIONS in millimeters, MASS AND PACKAGING QUANTITIES					
NOMINAL CASE SIZE	$\varnothing D_{\text{max.}}$	$L_{\text{max.}}$	MASS (g)	PACKAGING QUANTITIES (unit per box)	CARDBOARD BOX DIMENSIONS L x W x H
35 x 30	36	32	40	50	390 x 198 x 44
35 x 40	36	42	56	50	390 x 198 x 54
35 x 45	36	47	64	50	390 x 198 x 59
35 x 50	36	52	72	50	390 x 198 x 64
35 x 60	36	62	88	50	390 x 198 x 74

Note

- Other case sizes, terminations and capacitance values available on request.

ELECTRICAL DATA	
SYMBOL	DESCRIPTION
C_R	Rated capacitance at 100 Hz
I_R	Rated RMS ripple current at 100 Hz and 105 °C
I_{L1}	Max. leakage current after 1 min at U_R
ESR	Max. equivalent series resistance at 100 Hz
Z	Max. impedance at 10 kHz

Note

- Unless otherwise specified, all electrical values in Table 2 apply at $T_{\text{amb}} = 20 \text{ °C}$, $P = 86 \text{ kPa}$ to 106 kPa , $RH = 45 \%$ to 75% .

ORDERING EXAMPLE

Electrolytic capacitors 470 $\mu\text{F}/500 \text{ V}$
 Nominal case size: $\varnothing 35 \text{ mm} \times 50 \text{ mm}$
 Ordering code: MAL219390104E3

Table 2

ELECTRICAL DATA AND ORDERING INFORMATION								
U_R (V)	U_C (V)	C_R (μF)	CASE SIZE $\varnothing D \times L$ (mm)	I_R 100 Hz 105 °C (A) ⁽¹⁾	I_L 1 min (mA)	ESR 100 Hz MAX. (m Ω)	Z 10 kHz MAX. (m Ω)	ORDERING CODE
500	450	220	35 x 30	1.35	0.6	900	600	MAL219390101E3
		330	35 x 40	1.74	0.9	600	400	MAL219390102E3
		390	35 x 45	1.94	1.1	500	350	MAL219390103E3
		470	35 x 50	2.18	1.3	450	300	MAL219390104E3
		560	35 x 60	2.52	1.5	350	250	MAL219390105E3

Note

- ⁽¹⁾ At $U_{\text{max.}} \leq U_C$



ADDITIONAL ELECTRICAL DATA		
PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage		$U_s = 1.1 \times U_C$
Reverse voltage		$U_{rev} \leq 1 \text{ V}$
RMS value of ripple voltage		$U_{RPL} \leq 12 \text{ V}$
Current		
Leakage current	After 1 min at U_R	$I_{L1} \leq 0.006 C_R \times U_C$
	After 5 min at U_R	$I_{L5} \leq 0.002 C_R \times U_C$
Inductance		
Equivalent series inductance (ESL)	All case sizes	ca. 20 nH

Table 3

TEST PROCEDURES AND REQUIREMENTS			
TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Endurance	IEC 60384-4/ EN130301 subclause 4.13	$T_{amb} = 50 \text{ }^\circ\text{C}$; $U_R = 500 \text{ V}$ applied; 5000 h	$\Delta C/C: \pm 15 \%$ $ESR \leq 1.5 \times \text{spec. limit}$ $Z \leq 2 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$
Useful life	EN130301 subclause 1.8.1	$T_{amb} = 105 \text{ }^\circ\text{C}$; U_C and I_R applied; 6000 h	$\Delta C/C: \pm 30 \%$ $ESR \leq 3 \times \text{spec. limit}$ $Z \leq 3 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ no short or open circuit, no visible damage total failure percentage $\leq 1 \%$
Shelf life (storage at high temperature)	IEC 60384-4/ EN130300 subclause 4.17	$T_{amb} = 105 \text{ }^\circ\text{C}$; no voltage applied; 1000 h after test: U_C to be applied for 30 min, 24 h to 48 h before measurement	$\Delta C/C: \pm 15 \%$ $ESR \leq 1.5 \times \text{spec. limit}$ $I_{L5} \leq 2 \times \text{spec. limit}$



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