Aluminum Capacitors
Power Ultra High Ripple Current Snap-In for Solar

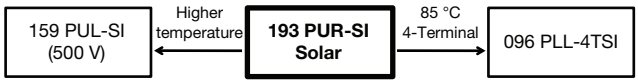

Fig. 1

FEATURES

- Long useful life: 6000 h at +105 °C
- Specified for 500 V, 50 °C operation
- High ripple current capability
- High reliability
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

APPLICATIONS

- Solar PV inverters
- Industrial motor control
- Power supply

MARKING

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

- Rated capacitance (in µF)
- Tolerance code on rated capacitance, code letter in accordance with IEC 60062 (± 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

QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Nominal case size (D x L in mm)	35 x 30 to 35 x 60
Rated capacitance range, C_R	220 µF to 560 µF
Tolerance on C_R	± 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

SELECTION CHART FOR C_R, U_R, AND RELEVANT NOMINAL CASE SIZES (Ø D x L in mm)

C_R (µF)	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

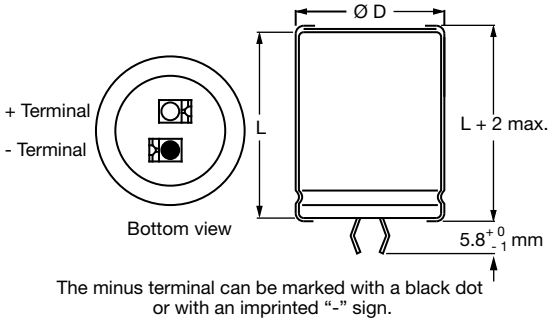

Fig. 2 - Two terminal snap-in

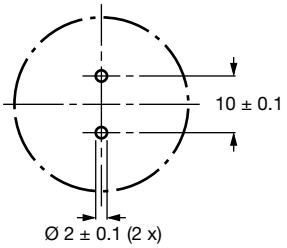

Fig. 3 - Mounting hole diagram

Table 1

DIMENSIONS in millimeters, MASS AND PACKAGING QUANTITIES					
NOMINAL CASE SIZE	Ø $D_{max.}$	$L_{max.}$	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_{amb} = 20 °C, P = 86 kPa to 106 kPa, RH = 45 % to 75 %.

ORDERING EXAMPLE

Electrolytic capacitors 470 µF/500 V

Nominal case size: Ø 35 mm x 50 mm

Ordering code: MAL219390104E3

Table 2

ELECTRICAL DATA AND ORDERING INFORMATION								
U_R (V)	U_C (V)	C_R (µF)	CASE SIZE Ø D x L (mm)	I_R 100 Hz 105 °C (A) (1)	I_L 1 min (mA)	ESR 100 Hz MAX. (mΩ)	Z 10 kHz MAX. (mΩ)	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 $U_{max.} \leq U_C$

ADDITIONAL ELECTRICAL DATA		
PARAMETER	**CONDITIONS**	**VALUE**
Voltage		
Surge voltage		$U_s = 1.1 \times U_C$
Reverse voltage		$U_{rev} \leq 1$ V
RMS value of ripple voltage		$U_{RPL} \leq 12$ 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

MULTIPLIER OF RIPPLE CURRENT (I_R) AS A FUNCTION OF FREQUENCY	
FREQUENCY (Hz)	**I_R MULTIPLIER**
50	0.80
100	1.00
200	1.20
400	1.30
1000	1.40
10 000	1.50

Table 4

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

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