

## Aluminum Electrolytic Capacitors Power Miniaturized Economy Snap-In

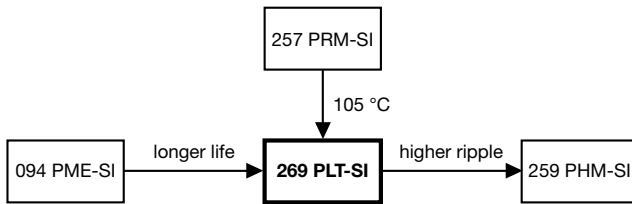


Fig. 1

QUICK REFERENCE DATA	
DESCRIPTION	VALUE
Nominal case size ( $\varnothing$ D x L in mm)	22 x 25 to 35 x 50
Rated capacitance range, $C_R$	47 $\mu$ F to 2200 $\mu$ F
Tolerance on $C_R$	$\pm 20 \%$
Rated voltage range, $U_R$	200 V to 500 V   500 V to 600 V
Temperature range	-40 °C to +105 °C
Endurance test at 105 °C	3000 h
Useful life at 105 °C	> 3000 h
Shelf life at 0 V, 105 °C	1000 h
Based on sectional specification	IEC 60384-4 / EN 130300
Climatic category IEC 60068	40 / 105 / 56   25 / 105 / 56 <sup>(1)</sup>

**Note**

<sup>(1)</sup> Capacitors can be operated in temperature range of -40 °C to +105 °C but impedance at -40 °C must be taken into consideration with regards to IEC 60068.

SELECTION CHART FOR $C_R$ , $U_R$ , AND RELEVANT NOMINAL CASE SIZES ( $\varnothing$ D x L in mm)									
$C_R$ ( $\mu$ F)	$U_R$ (V)								
	200	250	350	400	420	450	500	550	600
47	-	-	-	-	-	-	-	22 x 25	22 x 25
56	-	-	-	-	-	-	22 x 25	22 x 30	22 x 30
68	-	-	-	-	-	22 x 25	22 x 25	22 x 35 25 x 25	22 x 35 25 x 30
82	-	-	-	-	-	22 x 30	22 x 30 25 x 25	22 x 35 25 x 30	22 x 40 25 x 30
100	-	-	-	22 x 25	22 x 25	22 x 30 25 x 25	22 x 35 25 x 30	22 x 40 25 x 35 30 x 25	22 x 45 25 x 35 30 x 30

**FEATURES**

- Compact design
- Useful life: > 3000 h at 105 °C
- > 10 years 24/7 application life up to 60 °C
- Available up to 600 V
- Keyed polarity snap-in version available
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS  
COMPLIANT**
**APPLICATIONS**

- Whitegood motor control
- Consumer and telecom
- Motor controls / small drives
- Industrial cooling / heating
- Industrial lamp driver

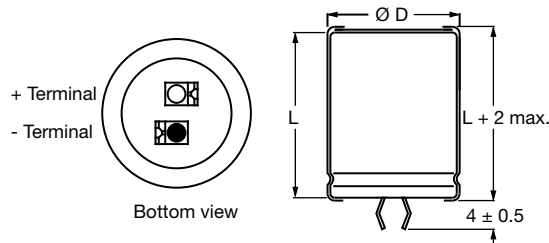
**MARKING**

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

- Rated capacitance (in  $\mu$ F)
- Tolerance code on rated capacitance, code letter in accordance with IEC 60062 (M for  $\pm 20 \%$ )
- Rated voltage (in V)
- Date code (YYMM or in 2 digits according to 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, at least last 8 digits 269 xxxxx
- Climatic category in accordance with IEC 60068



SELECTION CHART FOR C <sub>R</sub> , U <sub>R</sub> , AND RELEVANT NOMINAL CASE SIZES (∅ D x L in mm)									
C <sub>R</sub> (μF)	U <sub>R</sub> (V)								
	200	250	350	400	420	450	500	550	600
120	-	-	22 x 25	22 x 30	22 x 30 25 x 25	22 x 35 25 x 30	22 x 40 25 x 30	22 x 50 25 x 40 30 x 30	25 x 40 30 x 30 35 x 25
150	-	-	22 x 30	22 x 35	22 x 35 25 x 30	22 x 40 25 x 30 30 x 25	22 x 45 25 x 35 30 x 30	25 x 45 30 x 35 35 x 30	25 x 45 30 x 35 35 x 30
180	-	-	22 x 30 25 x 25	22 x 35 25 x 30	22 x 40 25 x 30 30 x 25	22 x 45 25 x 35 30 x 30	25 x 45 30 x 30 35 x 25	30 x 40 35 x 30	30 x 40 35 x 30
220	-	-	22 x 35 25 x 30	22 x 45 25 x 35 30 x 25	22 x 45 25 x 35 30 x 30	25 x 40 30 x 30 35 x 25	25 x 50 30 x 35 35 x 30	30 x 45 35 x 35	30 x 45 35 x 35
270	-	22 x 25	22 x 40 25 x 35	22 x 50 25 x 40 30 x 30	25 x 40 30 x 30 35 x 25	25 x 50 30 x 35 35 x 30	30 x 40 35 x 30	35 x 40	35 x 40
330	22 x 25	22 x 30 25 x 25	22 x 45 25 x 40 30 x 30	25 x 45 30 x 35	25 x 50 30 x 35 35 x 30	30 x 40 35 x 35	30 x 50 35 x 35	35 x 45	35 x 45
390	22 x 25	22 x 35 25 x 30	25 x 45 30 x 35	25 x 50 30 x 40 35 x 30	30 x 40 35 x 35	30 x 50 35 x 40	35 x 40	35 x 50	35 x 50
470	22 x 30	22 x 40 25 x 35	30 x 40	30 x 45 35 x 35	30 x 45 35 x 40	35 x 45	35 x 45	35 x 50	-
560	22 x 35 25 x 25	22 x 45 25 x 35 30 x 30	30 x 45	30 x 50 35 x 40	35 x 45	35 x 50	35 x 50	-	-
680	22 x 40 25 x 30	22 x 50 25 x 40 30 x 30 35 x 25	35 x 40	35 x 45	35 x 50	-	-	-	-
820	22 x 45 25 x 35 30 x 25	25 x 45 30 x 35 35 x 30	35 x 45	-	-	-	-	-	-
1000	22 x 50 25 x 45 30 x 30 35 x 25	30 x 45 35 x 35	-	-	-	-	-	-	-
1200	25 x 50 30 x 35 35 x 30	30 x 45 35 x 40	-	-	-	-	-	-	-
1500	30 x 40 35 x 35	35 x 45	-	-	-	-	-	-	-
1800	30 x 50 35 x 40	35 x 50	-	-	-	-	-	-	-
2200	35 x 45	-	-	-	-	-	-	-	-

**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

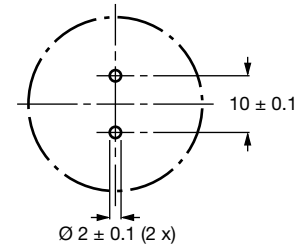
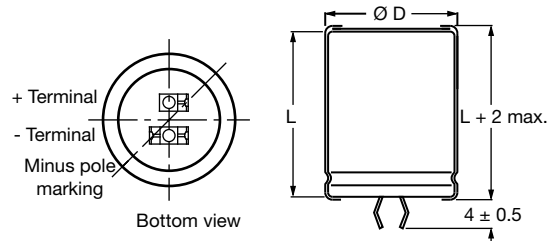
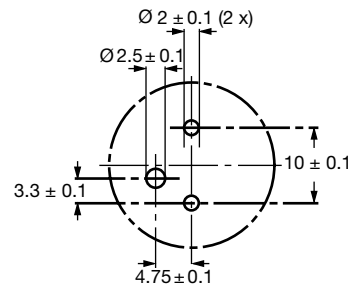


Fig. 3 - Mounting hole diagram

**THREE TERMINAL SNAP-IN**


The negative terminal has **TWO** pins which are **BOTH** electrically connected

Fig. 4 - Three terminal snap-in



The 10 mm spacing of the 2 pin snap-in is used as the base layout and a third hole is added. The third hole is closer to the negative primary hole so that polarization is always maintained, together with added mechanical stability.

Fig. 5 - Mounting hole diagram

**Table 1**

<b>DIMENSIONS in millimeters, MASS AND PACKAGING QUANTITIES</b>					
<b>NOMINAL CASE SIZE Ø D x L</b>	<b>Ø D<sub>max.</sub></b>	<b>L<sub>max.</sub></b>	<b>MASS (g)</b>	<b>PACKAGING QUANTITIES (units per box)</b>	<b>CARDBOARD BOX DIMENSIONS L x W x H</b>
22 x 25	23	27	≈ 12	100	260 x 250 x 39
22 x 30	23	32	≈ 16	100	260 x 250 x 44
22 x 35	23	37	≈ 20	100	260 x 250 x 49
22 x 40	23	42	≈ 23	100	260 x 250 x 54
22 x 45	23	47	≈ 26	100	260 x 250 x 59
22 x 50	23	52	≈ 29	100	260 x 250 x 64
25 x 25	26	27	≈ 20	100	290 x 280 x 39
25 x 30	26	32	≈ 22	100	290 x 280 x 44
25 x 35	26	37	≈ 24	100	290 x 280 x 49
25 x 40	26	42	≈ 27	100	290 x 280 x 54
25 x 45	26	47	≈ 32	100	290 x 280 x 59
25 x 50	26	52	≈ 38	100	290 x 280 x 64
30 x 25	31	27	≈ 25	100	340 x 330 x 39
30 x 30	31	32	≈ 30	100	340 x 330 x 44
30 x 35	31	37	≈ 35	100	340 x 330 x 49
30 x 40	31	42	≈ 40	100	340 x 330 x 54
30 x 45	31	47	≈ 45	100	340 x 330 x 59
30 x 50	31	52	≈ 50	100	340 x 330 x 64
35 x 25	36	27	≈ 33	50	390 x 198 x 39
35 x 30	36	32	≈ 40	50	390 x 198 x 44
35 x 35	36	37	≈ 48	50	390 x 198 x 49
35 x 40	36	42	≈ 55	50	390 x 198 x 54
35 x 45	36	47	≈ 63	50	390 x 198 x 59
35 x 50	36	52	≈ 72	50	390 x 198 x 64



ELECTRICAL DATA	
SYMBOL	DESCRIPTION
$C_R$	Rated capacitance at 100 Hz
$I_R$	Rated RMS ripple current at 100 Hz, 105 °C
$I_{L5}$	Max. leakage current after 5 min at $U_R$
$\tan \delta$	Max. dissipation factor at 100 Hz

**Notes**

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

**ORDERING EXAMPLE**

Electrolytic capacitor 269 series

1000  $\mu\text{F}$  / 200 V;  $\pm 20\text{ %}$

Nominal case size:  $\varnothing 22\text{ mm} \times 50\text{ mm}$

**2-terminal snap-in:**

Ordering code: MAL225912102E3

**3-terminal snap-in:**

Ordering code: MAL225922102E3

Table 2

ELECTRICAL DATA AND ORDERING INFORMATION							
$U_R$ (V)	$C_R$ 100 Hz ( $\mu\text{F}$ )	NOMINAL CASE SIZE $\varnothing D \times L$ (mm)	$I_R$ 100 Hz 105 °C (A)	$I_{L5}$ 5 min (mA)	$\tan \delta$ 100 Hz	ORDERING CODE MAL2269.....	
						2-TERMINAL	3-TERMINAL
200	330	22 x 25	1.54	0.66	0.15	12331E3	22331E3
	390	22 x 25	1.69	0.78	0.15	12391E3	22391E3
	470	22 x 30	1.80	0.94	0.15	12471E3	22471E3
	560	22 x 35	1.92	1.12	0.15	12561E3	22561E3
	560	25 x 25	1.92	1.12	0.15	32561E3	42561E3
	680	22 x 40	2.20	1.36	0.15	12681E3	22681E3
	680	25 x 30	2.20	1.36	0.15	32681E3	42681E3
	820	22 x 45	2.60	1.64	0.15	12821E3	22821E3
	820	25 x 35	2.60	1.64	0.15	32821E3	42821E3
	820	30 x 25	2.60	1.64	0.15	52821E3	62821E3
	1000	22 x 50	2.80	2.00	0.15	12102E3	22102E3
	1000	25 x 45	2.80	2.00	0.15	32102E3	42102E3
	1000	30 x 30	2.80	2.00	0.15	52102E3	62102E3
	1000	35 x 25	2.80	2.00	0.15	72102E3	82102E3
	1200	25 x 50	2.85	2.40	0.15	12122E3	22122E3
	1200	30 x 35	2.85	2.40	0.15	32122E3	42122E3
	1200	35 x 30	2.85	2.40	0.15	52122E3	62122E3
	1500	30 x 40	3.00	3.00	0.15	12152E3	22152E3
1500	35 x 35	3.00	3.00	0.15	32152E3	42152E3	
1800	30 x 50	3.20	3.60	0.15	12182E3	22182E3	
1800	35 x 40	3.20	3.60	0.15	32182E3	42182E3	
2200	35 x 45	3.80	4.40	0.15	12222E3	22222E3	
250	270	22 x 25	1.15	0.68	0.15	13271E3	23271E3
	330	22 x 30	1.56	0.83	0.15	13331E3	23331E3
	330	25 x 25	1.56	0.83	0.15	33331E3	43331E3
	390	22 x 35	1.70	0.98	0.15	13391E3	23391E3
	390	25 x 30	1.70	0.98	0.15	33391E3	43391E3
	470	22 x 40	1.82	1.18	0.15	13471E3	23471E3
	470	25 x 35	1.82	1.18	0.15	33471E3	43471E3
	560	22 x 45	1.95	1.40	0.15	13561E3	23561E3
	560	25 x 35	1.95	1.40	0.15	33561E3	43561E3
	560	30 x 30	1.95	1.40	0.15	53561E3	63561E3
	680	22 x 50	2.30	1.70	0.15	13681E3	23681E3
	680	25 x 40	2.30	1.70	0.15	33681E3	43681E3
	680	30 x 30	2.30	1.70	0.15	53681E3	63681E3
	680	35 x 25	2.30	1.70	0.15	73681E3	83681E3
	820	25 x 45	2.62	2.05	0.15	13821E3	23821E3
	820	30 x 35	2.62	2.05	0.15	33821E3	43821E3
	820	35 x 30	2.62	2.05	0.15	53821E3	63821E3
	1000	30 x 45	2.95	2.50	0.15	13102E3	23102E3
	1000	35 x 35	2.95	2.50	0.15	33102E3	43102E3
	1200	30 x 45	3.15	3.00	0.15	13122E3	23122E3
1200	35 x 40	3.15	3.00	0.15	33122E3	43122E3	
1500	35 x 45	3.25	3.75	0.15	13152E3	23152E3	
1800	35 x 50	3.50	4.50	0.15	13182E3	23182E3	



ELECTRICAL DATA AND ORDERING INFORMATION							
U <sub>R</sub> (V)	C <sub>R</sub> 100 Hz (μF)	NOMINAL CASE SIZE Ø D x L (mm)	I <sub>R</sub> 100 Hz 105 °C (A)	I <sub>L5</sub> 5 min (mA)	tan δ 100 Hz	ORDERING CODE MAL2269.....	
						2-TERMINAL	3-TERMINAL
350	120	22 x 25	0.82	0.42	0.15	15121E3	25121E3
	150	22 x 30	0.95	0.53	0.15	15151E3	25151E3
	180	22 x 30	0.95	0.63	0.15	15181E3	25181E3
	180	25 x 25	0.95	0.63	0.15	35181E3	45181E3
	220	22 x 35	1.05	0.77	0.15	15221E3	25221E3
	220	25 x 30	1.05	0.77	0.15	35221E3	45221E3
	270	22 x 40	1.20	0.95	0.15	15271E3	25271E3
	270	25 x 35	1.20	0.95	0.15	35271E3	45271E3
	330	22 x 45	1.60	1.16	0.15	15331E3	25331E3
	330	25 x 40	1.60	1.16	0.15	35331E3	45331E3
	330	30 x 30	1.60	1.16	0.15	55331E3	65331E3
	390	25 x 45	1.75	1.37	0.15	15391E3	25391E3
	390	30 x 35	1.75	1.37	0.15	35391E3	45391E3
	470	30 x 40	1.85	1.65	0.15	15471E3	25471E3
	560	30 x 45	1.98	1.96	0.15	15561E3	25561E3
680	35 x 40	2.30	2.38	0.15	15681E3	25681E3	
820	35 x 45	2.60	2.87	0.15	15821E3	25821E3	
400	100	22 x 25	0.77	0.40	0.15	16101E3	26101E3
	120	22 x 30	0.84	0.48	0.15	16121E3	26121E3
	150	22 x 35	0.97	0.60	0.15	16151E3	26151E3
	180	22 x 35	0.98	0.72	0.15	16181E3	26181E3
	180	25 x 30	0.98	0.72	0.15	36181E3	46181E3
	220	22 x 45	1.15	0.88	0.15	16221E3	26221E3
	220	25 x 35	1.15	0.88	0.15	36221E3	46221E3
	220	30 x 25	1.15	0.88	0.15	56221E3	66221E3
	270	22 x 50	1.28	1.08	0.15	16271E3	26271E3
	270	25 x 40	1.28	1.08	0.15	36271E3	46271E3
	270	30 x 30	1.28	1.08	0.15	56271E3	66271E3
	330	25 x 45	1.68	1.32	0.15	16331E3	26331E3
	330	30 x 35	1.68	1.32	0.15	36331E3	46331E3
	390	25 x 50	1.80	1.56	0.15	16391E3	26391E3
	390	30 x 40	1.80	1.56	0.15	36391E3	46391E3
	390	35 x 30	1.80	1.56	0.15	56391E3	66391E3
	470	30 x 45	1.90	1.88	0.15	16471E3	26471E3
	470	35 x 35	1.90	1.88	0.15	36471E3	46471E3
560	30 x 50	2.20	2.24	0.15	16561E3	26561E3	
560	35 x 40	2.20	2.24	0.15	36561E3	46561E3	
680	35 x 45	2.39	2.72	0.15	16681E3	26681E3	
420	100	22 x 25	0.78	0.42	0.15	14101E3	24101E3
	120	22 x 30	0.86	0.50	0.15	14121E3	24121E3
	120	25 x 25	0.86	0.50	0.15	34121E3	44121E3
	150	22 x 35	0.98	0.63	0.15	14151E3	24151E3
	150	25 x 30	0.98	0.63	0.15	34151E3	44151E3
	180	22 x 40	1.02	0.76	0.15	14181E3	24181E3
	180	25 x 30	1.02	0.76	0.15	34181E3	44181E3
	180	30 x 25	1.02	0.76	0.15	54181E3	64181E3
	220	22 x 45	1.18	0.92	0.15	14221E3	24221E3
	220	25 x 35	1.18	0.92	0.15	34221E3	44221E3
	220	30 x 30	1.18	0.92	0.15	54221E3	64221E3
	270	25 x 40	1.30	1.13	0.15	14271E3	24271E3
	270	30 x 30	1.30	1.13	0.15	34271E3	44271E3
	270	35 x 25	1.30	1.13	0.15	54271E3	64271E3
	330	25 x 50	1.70	1.39	0.15	14331E3	24331E3
	330	30 x 35	1.70	1.39	0.15	34331E3	44331E3
	330	35 x 30	1.70	1.39	0.15	54331E3	64331E3
	390	30 x 40	1.82	1.64	0.15	14391E3	24391E3
	390	35 x 35	1.82	1.64	0.15	34391E3	44391E3
	470	30 x 45	1.92	1.97	0.15	14471E3	24471E3
	470	35 x 40	1.92	1.97	0.15	34471E3	44471E3
560	35 x 45	2.25	2.35	0.15	14561E3	24561E3	
680	35 x 50	2.45	2.86	0.15	14681E3	24681E3	



ELECTRICAL DATA AND ORDERING INFORMATION							
U <sub>R</sub> (V)	C <sub>R</sub> 100 Hz (µF)	NOMINAL CASE SIZE Ø D x L (mm)	I <sub>R</sub> 100 Hz 105 °C (A)	I <sub>L5</sub> 5 min (mA)	tan δ 100 Hz	ORDERING CODE MAL2269.....	
						2-TERMINAL	3-TERMINAL
450	68	22 x 25	0.60	0.31	0.20	17689E3	27689E3
	82	22 x 30	0.67	0.37	0.20	17829E3	27829E3
	100	22 x 30	0.82	0.45	0.20	17101E3	27101E3
	100	25 x 25	0.82	0.45	0.20	37101E3	47101E3
	120	22 x 35	0.88	0.54	0.20	17121E3	27121E3
	120	25 x 30	0.88	0.54	0.20	37121E3	47121E3
	150	22 x 40	1.02	0.68	0.20	17151E3	27151E3
	150	25 x 30	1.02	0.68	0.20	37151E3	47151E3
	150	30 x 25	1.02	0.68	0.20	57151E3	67151E3
	180	22 x 45	1.04	0.81	0.20	17181E3	27181E3
	180	25 x 35	1.04	0.81	0.20	37181E3	47181E3
	180	30 x 30	1.04	0.81	0.20	57181E3	67181E3
	220	25 x 40	1.20	0.99	0.20	17221E3	27221E3
	220	30 x 30	1.20	0.99	0.20	37221E3	47221E3
	220	35 x 25	1.20	0.99	0.20	57221E3	67221E3
	270	25 x 50	1.35	1.22	0.20	17271E3	27271E3
	270	30 x 35	1.35	1.22	0.20	37271E3	47271E3
	270	35 x 30	1.35	1.22	0.20	57271E3	67271E3
	330	30 x 40	1.72	1.49	0.20	17331E3	27331E3
	330	35 x 35	1.72	1.49	0.20	37331E3	47331E3
	390	30 x 50	1.86	1.76	0.20	17391E3	27391E3
	390	35 x 40	1.86	1.76	0.20	37391E3	47391E3
	470	35 x 45	2.10	2.12	0.20	17471E3	27471E3
	560	35 x 50	2.30	2.52	0.20	37561E3	47561E3
500	56	22 x 25	0.50	0.28	0.20	19569E3	29569E3
	68	22 x 25	0.62	0.34	0.20	19689E3	29689E3
	82	22 x 30	0.71	0.41	0.20	19829E3	29829E3
	82	25 x 25	0.71	0.41	0.20	39829E3	49829E3
	100	22 x 35	0.84	0.50	0.20	19101E3	29101E3
	100	25 x 30	0.84	0.50	0.20	39101E3	49101E3
	120	22 x 40	0.90	0.60	0.20	19121E3	29121E3
	120	25 x 30	0.90	0.60	0.20	39121E3	49121E3
	150	22 x 45	1.05	0.75	0.20	19151E3	29151E3
	150	25 x 35	1.05	0.75	0.20	39151E3	49151E3
	150	30 x 30	1.05	0.75	0.20	59151E3	69151E3
	180	25 x 45	1.11	0.90	0.20	19181E3	29181E3
	180	30 x 30	1.11	0.90	0.20	39181E3	49181E3
	180	35 x 25	1.11	0.90	0.20	59181E3	69181E3
	220	25 x 50	1.24	1.10	0.20	19221E3	29221E3
	220	30 x 35	1.24	1.10	0.20	39221E3	49221E3
	220	35 x 30	1.24	1.10	0.20	59221E3	69221E3
	270	30 x 40	1.40	1.35	0.20	19271E3	29271E3
	270	35 x 30	1.40	1.35	0.20	39271E3	49271E3
	330	30 x 50	1.75	1.65	0.20	19331E3	29331E3
	330	35 x 35	1.75	1.65	0.20	39331E3	49331E3
	390	35 x 40	1.90	1.95	0.20	19391E3	29391E3
	470	35 x 45	2.10	2.35	0.20	19471E3	29471E3
	560	35 x 50	2.35	2.80	0.20	19561E3	29561E3



ELECTRICAL DATA AND ORDERING INFORMATION							
U <sub>R</sub> (V)	C <sub>R</sub> 100 Hz (µF)	NOMINAL CASE SIZE Ø D x L (mm)	I <sub>R</sub> 100 Hz 105 °C (A)	I <sub>L5</sub> 5 min (mA)	tan δ 100 Hz	ORDERING CODE MAL2269.....	
						2-TERMINAL	3-TERMINAL
550	47	22 x 25	0.42	0.26	0.20	10479E3	20479E3
	56	22 x 30	0.52	0.31	0.20	10569E3	20569E3
	68	22 x 35	0.64	0.37	0.20	10689E3	20689E3
	68	25 x 25	0.64	0.37	0.20	30689E3	40689E3
	82	22 x 35	0.74	0.45	0.20	10829E3	20829E3
	82	25 x 30	0.74	0.45	0.20	30829E3	40829E3
	100	22 x 40	0.85	0.55	0.20	10101E3	20101E3
	100	25 x 35	0.85	0.55	0.20	30101E3	40101E3
	100	30 x 25	0.85	0.55	0.20	50101E3	60101E3
	120	22 x 50	0.92	0.66	0.20	10121E3	20121E3
	120	25 x 40	0.92	0.66	0.20	30121E3	40121E3
	120	30 x 30	0.92	0.66	0.20	50121E3	60121E3
	150	25 x 45	1.05	0.83	0.20	10151E3	20151E3
	150	30 x 35	1.05	0.83	0.20	30151E3	40151E3
	150	35 x 30	1.05	0.83	0.20	50151E3	60151E3
	180	30 x 40	1.15	0.99	0.20	10181E3	20181E3
	180	35 x 30	1.15	0.99	0.20	30181E3	40181E3
	220	30 x 45	1.28	1.21	0.20	10221E3	20221E3
	220	35 x 35	1.28	1.21	0.20	30221E3	40221E3
	270	35 x 40	1.45	1.49	0.20	10271E3	20271E3
330	35 x 45	1.78	1.82	0.20	10331E3	20331E3	
390	35 x 50	1.90	2.15	0.20	10391E3	20391E3	
470	35 x 50	2.15	2.59	0.20	10471E3	20471E3	
600	47	22 x 25	0.45	0.28	0.20	11479E3	21479E3
	56	22 x 30	0.54	0.34	0.20	11569E3	21569E3
	68	22 x 35	0.64	0.41	0.20	11689E3	21689E3
	68	25 x 30	0.64	0.41	0.20	31689E3	41689E3
	82	22 x 40	0.74	0.49	0.20	11829E3	21829E3
	82	25 x 30	0.74	0.49	0.20	31829E3	41829E3
	100	22 x 45	0.88	0.60	0.20	11101E3	21101E3
	100	25 x 35	0.88	0.60	0.20	31101E3	41101E3
	100	30 x 30	0.88	0.60	0.20	51101E3	61101E3
	120	25 x 40	0.94	0.72	0.20	11121E3	21121E3
	120	30 x 30	0.94	0.72	0.20	31121E3	41121E3
	120	35 x 25	0.94	0.72	0.20	51121E3	61121E3
	150	25 x 45	1.12	0.90	0.20	11151E3	21151E3
	150	30 x 35	1.12	0.90	0.20	31151E3	41151E3
	150	35 x 30	1.12	0.90	0.20	51151E3	61151E3
	180	30 x 40	1.18	1.08	0.20	11181E3	21181E3
	180	35 x 30	1.18	1.08	0.20	31181E3	41181E3
	220	30 x 45	1.32	1.32	0.20	11221E3	21221E3
	220	35 x 35	1.32	1.32	0.20	31221E3	41221E3
	270	35 x 40	1.50	1.62	0.20	11271E3	21271E3
330	35 x 45	1.80	1.98	0.20	11331E3	21331E3	
390	35 x 50	1.92	2.34	0.20	11391E3	21391E3	

ADDITIONAL ELECTRICAL DATA		
PARAMETER	CONDITIONS	VALUE
<b>Voltage</b>		
Surge voltage	$\geq 200$ V versions	$U_S = 1.1 \times U_R$
Reverse voltage	$\leq 1$ V	-
<b>Current</b>		
Leakage current	After 5 min at $U_R$	$I_{L5} \leq 0.01 C_R \times U_R$
<b>Inductance</b>		
Equivalent series inductance (ESL)	All case sizes	Typ. 19 nH
		Max. 25 nH

**RIPPLE CURRENT AND USEFUL LIFE**

MGA454

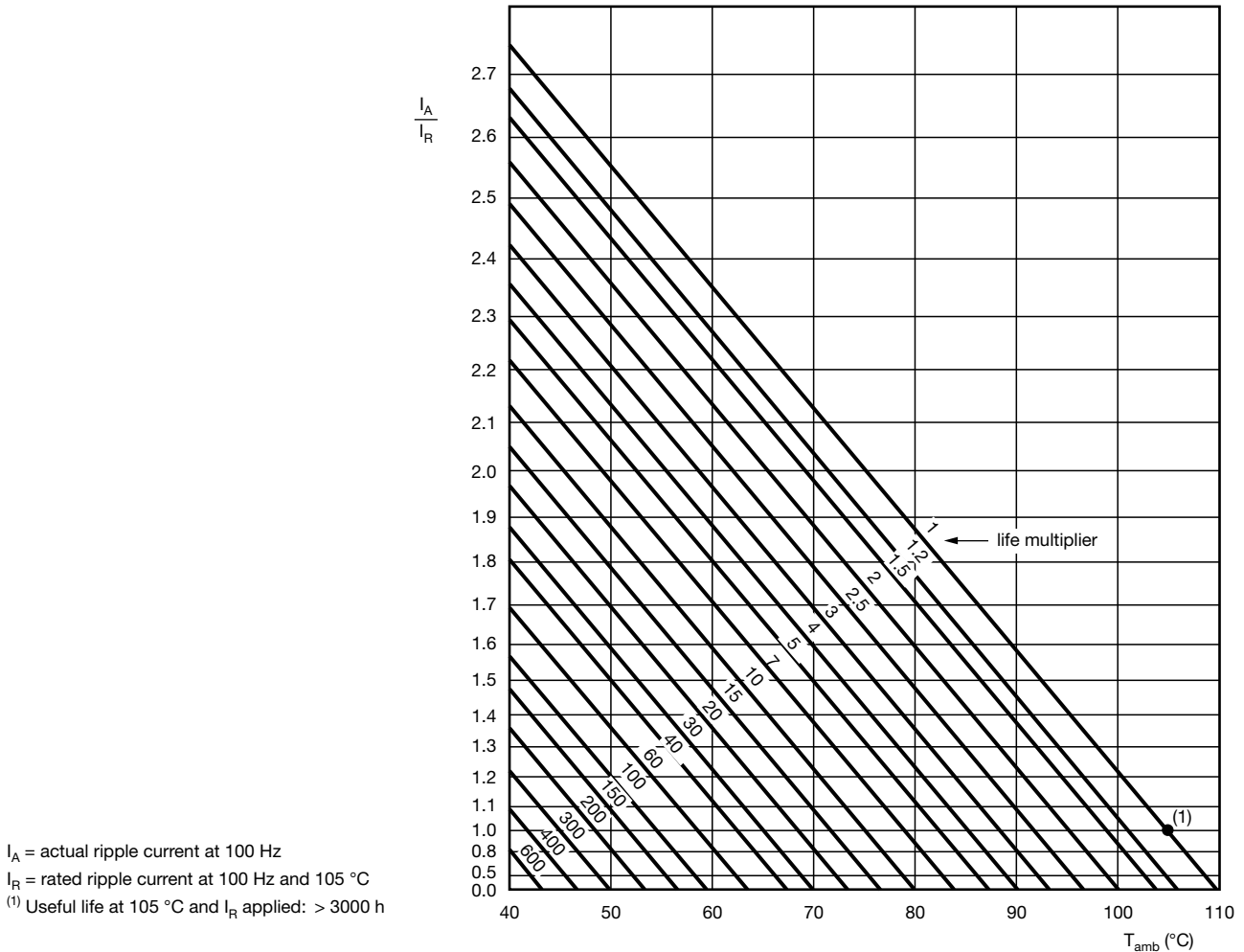


Fig. 6 - Multiplier of useful life as a function of ambient temperature and ripple current load

**Table 3**

ENDURANCE TEST DURATION AND USEFUL LIFE	
ENDURANCE AT 105 °C (h)	USEFUL LIFE AT 105 °C (h)
3000	> 3000

**Note**

- Multiplier of useful life code: MGA454





Table 4

MULTIPLIER OF RIPPLE CURRENT ( $I_R$ ) AS A FUNCTION OF FREQUENCY					
FREQUENCY (Hz)					
50	100	120	200	1000	$\geq 10\ 000$
$I_R$ MULTIPLIER					
0.8	1.0	1.05	1.2	1.4	1.5

Table 5

TEST PROCEDURES AND REQUIREMENTS			
TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Endurance	IEC 60384-4 / EN 130300 subclause 4.13	$T_{amb} = 105\ ^\circ\text{C}$ ; $U_R$ applied; 3000 h	$\Delta C/C: \pm 10\ \%$ $ESR \leq 1.3 \times \text{spec. limit}$ $Z \leq 2 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$
Useful life		$T_{amb} = 105\ ^\circ\text{C}$ ; $U_R$ and $I_R$ applied; > 3000 h	$\Delta C/C: \leq \pm 20\ \%$ $\tan \delta \leq 2 \text{ times initial spec. limit}$ $I_{L5} \leq \text{spec. limit}$
Shelf life	IEC 60384-4 / EN 130300 subclause 4.17	$T_{amb} = 105\ ^\circ\text{C}$ ; no voltage applied; 1000 h  After test: $U_R$ to be applied for 30 min, 24 h to 48 h before measurement	$\Delta C/C: \pm 10\ \%$ $ESR \leq 1.2 \times \text{spec. limit}$ $I_{L5} \leq 2 \times \text{spec. limit}$

Statements about product lifetime are based on calculations and internal testing. They should only be interpreted as estimations. Also due to external factors, the lifetime in the field application may deviate from the calculated lifetime. In general, nothing stated herein shall be construed as a guarantee of durability.



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