

Aluminum Capacitors

Power High Ripple Current Snap-In

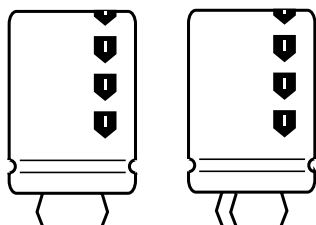
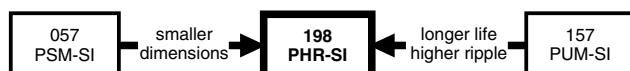


Fig. 1 Component outlines



QUICK REFERENCE DATA

DESCRIPTION	VALUE
Nominal case size (Ø D x L in mm)	22 x 25 to 35 x 60
Rated capacitance range (E6/E12 series), C _R	56 to 680 µF
Tolerance on C _R	± 20 %
Rated voltage range, U _R	400 and 450 V
Category temperature range	- 25 to + 85 °C
Endurance test at 85 °C	7000 hours
Useful life at 85 °C	15000 hours
Shelf life at 0 V, 85 °C	1000 hours
Based on sectional specification	IEC 60384-4/EN130300
Climatic category IEC 60068	25/085/56

FEATURES

- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Large types, miniaturized dimensions, cylindrical aluminum case, insulated with a blue sleeve
- Very high ripple current capability
- Keyed polarity version available
- High reliability



RoHS
COMPLIANT

APPLICATIONS

- Motor control and industrial systems
- Smoothing and filtering
- Standard and switched mode power supplies
- Energy storage in pulse systems

MARKING

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

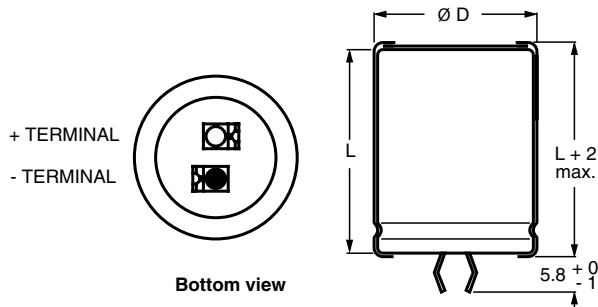
- Rated capacitance (in µF)
- Tolerance code on rated capacitance, code letter in accordance with IEC 60062 (M for ± 20 %)
- Rated voltage (in V)
- Date code (YYMM)
- Name of manufacturer
- Code for factory of origin
- '-' sign to identify the negative terminal, visible from the top and side of the capacitor
- Code number
- Climatic category in accordance with IEC 60068

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

C _R (µF)	U _R (V)	
	400	450
56	22 x 25	22 x 25
68	22 x 25	22 x 30
82	-	22 x 30
	-	25 x 25
100	22 x 30	22 x 35
	-	25 x 30
120	22 x 35	22 x 40
	25 x 30	25 x 30
	-	30 x 25
150	22 x 40	25 x 40
	25 x 35	30 x 30
	25 x 40	25 x 40
180	30 x 30	30 x 35
	35 x 25	35 x 25
	25 x 45	25 x 50
220	30 x 35	30 x 40
	35 x 30	35 x 30
	30 x 40	30 x 45
270	35 x 30	35 x 35
	30 x 45	30 x 50
330	35 x 35	35 x 40
	30 x 50	35 x 45
390	35 x 40	-
	35 x 45	35 x 50
470	35 x 50	35 x 60
560	35 x 50	35 x 60
680	35 x 60	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

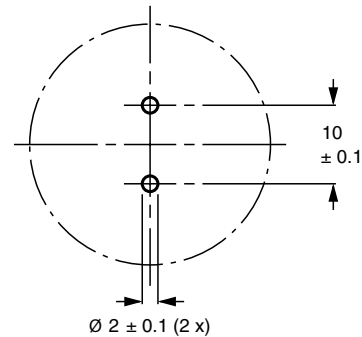
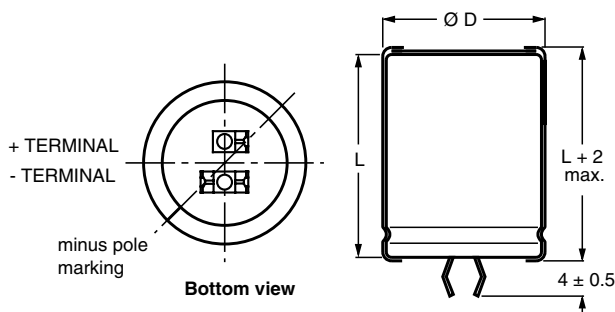


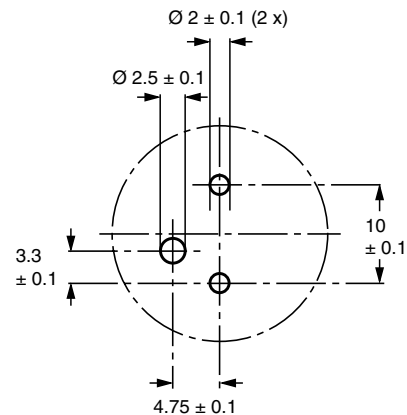
Fig. 3 Mounting hole diagram

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

DIMENSIONS in millimeters, MASS AND PACKAGING QUANTITIES					
NOMINAL CASE SIZE Ø D x L (mm)	Ø D _{max.}	L _{max.}	MASS (g)	PACKAGING QUANTITIES (units per box)	CARDBOARD BOX DIMENSIONS L x W x H
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
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
35 x 60	36	62	≈ 87	50	390 x 198 x 74

ELECTRICAL DATA	
SYMBOL	DESCRIPTION
C _R	rated capacitance at 100 Hz
I _R	rated RMS ripple current at 100 Hz, 85 °C
I _{L1}	max. leakage current after 1 minute at U _R
I _{L5}	max. leakage current after 5 minutes at U _R
ESR	typ./max. equivalent series resistance at 100 Hz
Z	typ./max. impedance at 10 kHz

Note

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

ORDERING EXAMPLE

Electrolytic capacitor 198 PHR-SI
470 µF/450 V; ± 20 %
Nominal case size: Ø 35 x 50 mm

2-terminal snap-in:

Ordering code: MAL219857471 E3
Former 12NC: 2222 19857471

3-terminal snap-in:

Ordering code: MAL219877471 E3
Former 12NC: 2222 19877471

Table 2

ELECTRICAL DATA AND ORDERING INFORMATION											
U _R (V)	C _R 100 Hz (μF)	NOMINAL CASE SIZE Ø D x L (mm)	I _R 100 Hz 85 °C (A)	I _{L1} 1 min (μA)	I _{L5} 5 min (μA)	TYP. ESR 100 Hz (mΩ)	MAX. ESR 100 Hz (mΩ)	TYP. Z 10 kHz (mΩ)	MAX. Z 10 kHz (mΩ)	ORDERING CODE MAL2198.....	
										2-TERM.	3-TERM.
400	56	22 x 25	0.72	138	49	918	1706	521	1085	56569E3	76569E3
	68	22 x 25	0.79	167	59	762	1405	434	905	56689E3	76689E3
	100	22 x 30	1.00	244	84	520	956	297	610	56101E3	76101E3
	120	22 x 35	1.14	292	100	433	796	247	450	46121E3	26121E3
	120	25 x 30	1.14	292	100	438	796	252	450	36121E3	16121E3
	150	22 x 40	1.33	364	124	348	637	199	363	66151E3	86151E3
400	150	25 x 35	1.33	364	124	351	637	202	363	36151E3	16151E3
	180	25 x 40	1.51	436	148	293	531	169	295	36181E3	16181E3
	180	30 x 30	1.49	436	148	305	531	180	295	66181E3	86181E3
	180	35 x 25	1.56	436	148	327	531	200	295	26181E3	76181E3
	220	25 x 45	1.75	532	180	241	434	139	280	36221E3	90008E3
	220	30 x 35	1.56	532	180	250	434	147	280	26221E3	76221E3
	220	35 x 30	1.81	532	180	259	434	155	280	16221E3	86221E3
	270	30 x 40	1.95	652	220	205	354	121	263	36271E3	16271E3
	270	35 x 30	1.93	652	220	222	354	137	263	66271E3	86271E3
	330	30 x 45	2.22	796	268	169	290	101	210	36331E3	16331E3
	330	35 x 35	2.18	796	268	181	290	112	210	66331E3	86331E3
	390	30 x 50	2.50	940	316	145	245	86	175	36391E3	16391E3
	390	35 x 40	2.44	940	316	154	245	95	175	66391E3	86391E3
	470	35 x 45	2.72	1132	380	129	203	80	153	36471E3	16471E3
	560	35 x 50	3.03	1348	452	110	171	70	133	46561E3	26561E3
	680	35 x 60	3.53	1636	548	91	140	57	110	46681E3	26681E3
450	56	22 x 25	0.71	155	54.4	865	1706	479	940	57569E3	77569E3
	68	22 x 30	0.82	188	65.2	709	1405	392	765	57689E3	77689E3
	82	22 x 30	0.89	225	77.8	592	1165	329	645	47829E3	27829E3
	82	25 x 25	0.91	225	77.8	604	1165	339	645	57829E3	77829E3
	100	22 x 35	1.02	274	94	485	956	270	525	47101E3	27101E3
	100	25 x 30	1.05	274	94	491	956	274	525	57101E3	77101E3
	120	22 x 40	1.14	328	112	406	796	225	443	47121E3	27121E3
	120	25 x 30	1.13	328	112	415	796	233	443	57121E3	77121E3
	120	30 x 25	1.16	328	112	431	796	248	443	67121E3	87121E3
	150	25 x 40	1.36	409	139	328	637	184	353	47151E3	27151E3
	150	30 x 30	1.36	409	139	340	637	194	353	57151E3	77151E3
	180	25 x 40	1.47	490	166	277	531	157	303	47181E3	27181E3
	180	30 x 35	1.54	490	166	282	531	161	303	57181E3	77181E3
	180	35 x 25	1.46	490	166	316	531	191	303	67181E3	87181E3
	220	25 x 50	1.71	598	202	226	434	127	263	47221E3	27221E3
	220	30 x 40	1.75	598	202	232	434	133	263	57221E3	77221E3
	220	35 x 30	1.72	598	202	248	434	148	263	67221E3	87221E3
	270	30 x 45	1.98	733	247	191	354	110	225	47271E3	27271E3
	270	35 x 35	1.96	733	247	202	354	120	225	57271E3	77271E3
	330	30 x 50	2.22	895	301	158	290	91	195	47331E3	27331E3
	330	35 x 40	2.22	895	301	167	290	100	195	57331E3	77331E3
	390	35 x 45	2.46	1057	355	142	245	85	170	57391E3	77391E3
	470	35 x 50	2.73	1273	427	120	203	73	145	57471E3	77471E3
	560	35 x 60	3.10	1516	508	100	171	60	120	57561E3	77561E3
	680	35 x 60	3.30	1840	616	88	140	55	110	57681E3	77681E3

CUSTOMIZED PRODUCTS

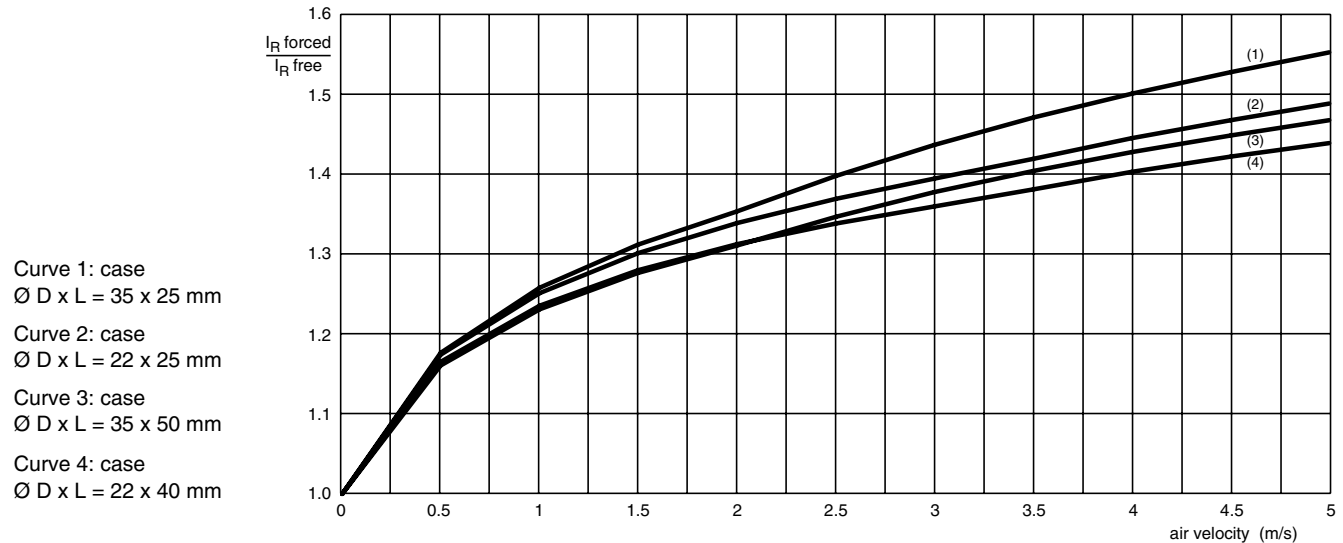
If you are unable to find the capacitor you require, please contact your local Vishay BCcomponents sales organization; we are able to design and manufacture customized capacitors to meet your specific requirements.



ADDITIONAL ELECTRICAL DATA		
PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage	≥ 400 V versions	$U_S = 1.1 \times U_R$
Reverse voltage		≤ 1 V
Current		
Leakage current	After 1 minute at U_R	$I_{L1} \leq 0.006 C_R \times U_R + 4 \mu A$
	After 5 minutes at U_R	$I_{L5} \leq 0.002 C_R \times U_R + 4 \mu A$
Inductance		
Equivalent series inductance (ESL)	All case sizes	typ. 19 nH
		max. 25 nH

Table 3

MULTIPLIER OF RIPPLE CURRENT (I_R) AS A FUNCTION OF FREQUENCY	
FREQUENCY (Hz)	I_R MULTIPLIER
50	0.86
100	1.00
300	1.17
600	1.24
1000	1.29
$\geq 10\ 000$	1.40

RIPPLE CURRENT AND USEFUL LIFEFig. 6 Multiplier of ripple current (I_R) as a function of air-flow

MAXIMUM RIPPLE CURRENT MULTIPLIER			
PARAMETER	CONDITION	MAXIMUM RIPPLE CURRENT MULTIPLIER	VALUE
Ambient temperature (T_{amb})	70 °C	from nomogram; see Fig.7	1.57
Operating frequency (f)	300 Hz	from frequency table; see Table	1.17
Air-flow	2 m/s	from air-flow; see Fig.6	1.35

Note

Calculation example for case Ø D x L = 35 x 25 mm

Therefore the maximum ripple current multiplier at 70 °C, 300 Hz and 2 m/s air-flow = $1.57 \times 1.17 \times 1.35 = 2.48$.

MGA 453

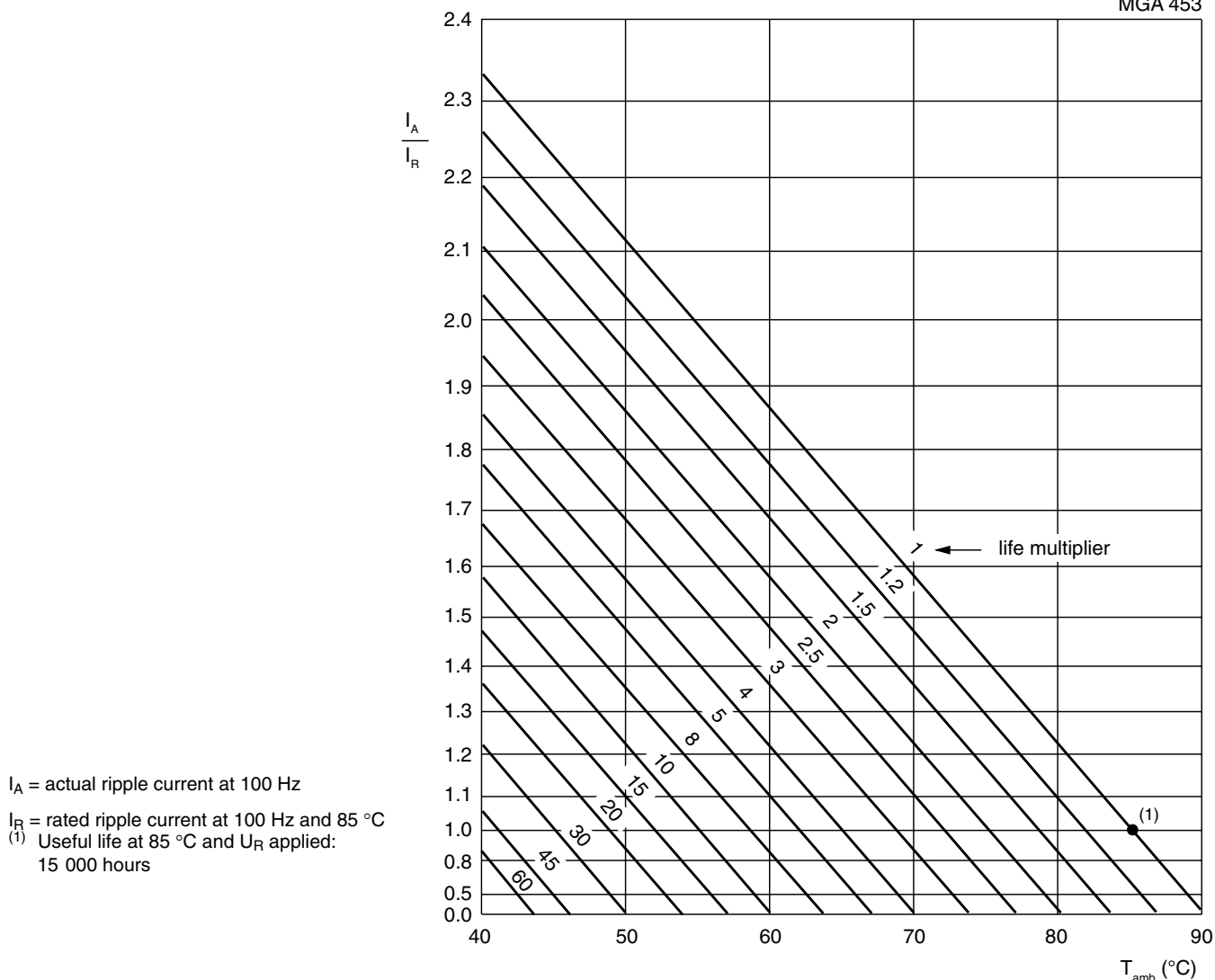


Table 4

TEST PROCEDURES AND REQUIREMENTS			
TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Endurance	IEC 60384-4/ EN130300 subclause 4.13	$T_{amb} = 85\text{ °C}$; U_R applied; 7000 hours	$\Delta C/C: \pm 10\%$ $ESR \leq 2 \times \text{spec. limit}$ $IL5 \leq \text{spec. limit}$
Useful life	CECC 30301 subclause 1.8.1	$T_{amb} = 85\text{ °C}$; U_R and I_R applied; 15 000 hours	$\Delta C/C: \pm 30\%$ $ESR \leq 3 \times \text{spec. limit}$ $IL5 \leq \text{spec. limit}$
Shelf life (storage at high temperature)	IEC 60384-4/ EN130300 subclause 4.17	$T_{amb} = 85\text{ °C}$; no voltage applied; 1000 hours after test: U_R to be applied for 30 minutes, 24 to 48 hours before measurement	$\Delta C/C: \pm 15\%$ $ESR \leq 2 \times \text{spec. limit}$ $IL5 \leq 2 \times \text{spec. limit}$



Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: org@lifeelectronics.ru

www.lifeelectronics.ru