

# High Performance EMC/EMI Filter with Earth Line Choke



- Rated currents up to 15 A
- Excellent attenuation performance
- Integrated earth line choke
- Complies with IEC/EN 60601-1
- Snap-in versions (S and S1 type)
- Hot inlet versions (HI type)



## Performance indicators

Attenuation performance



Rated current [A]



## Approvals



(CQC except HI-types)

The FN 9233 E IEC inlet filter combines an IEC inlet and mains filter with excellent filter attenuation in a small form factor. The FN 9233 E high performance power entry module offers additional EMI suppression on the earth line. Choosing the FN 9233 E product line brings you the rapid availability of a standard filter associated with the necessary safety acceptances. Standard IEC connector filters are a practical solution helping you to pass EMI system approval in a short time. A wide selection on amperage ratings, output connections, mounting possibilities and filters for medical applications are designed to offer you the desired solution. For types without additional earth line choke please consult the FN 9233 data sheet.

## Technical specifications

|                                                  |                                                                                                               |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>Maximum continuous operating voltage</b>      | 250 VAC, 50/60 Hz                                                                                             |
| <b>Operating frequency</b>                       | DC to 400 Hz                                                                                                  |
| <b>Rated currents</b>                            | 1 to 15 A @ 50°C                                                                                              |
| <b>Approvals by rated current</b>                | 1 to 10 A (ENEC, CQC)<br>1 to 15 A (UL, CSA)                                                                  |
| <b>High potential test voltage</b>               | P → PE 2000 VAC for 2 sec (standard types)<br>P → PE 2500 VAC for 2 sec (B types)<br>P → N 1000 VAC for 2 sec |
| <b>Protection category</b>                       | IP 40 according to IEC 60529                                                                                  |
| <b>Temperature range (operation and storage)</b> | -25°C to +85°C (25/85/21)                                                                                     |
| <b>Design corresponding to</b>                   | UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939                                                                    |
| <b>Flammability corresponding to</b>             | UL 94 V-2 or better                                                                                           |
| <b>MTBF @ 40°C/230 V (Mil-HB-217F)</b>           | 1,710,000 hours                                                                                               |

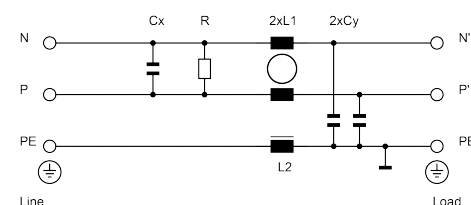
## Features and benefits

- Exceptional conducted attenuation performance, based on chokes with high saturation resistance and excellent thermal behavior
- Rear/front or snap-in mounting
- Without earth line choke see FN 9233 data sheet
- Optional medical versions (B type) comply with the requirements of IEC/EN 60601-1 for creepage and clearance, leakage current and high potential testing
- Wide mounting flanges available
- Different output connections offering maximum flexibility for assembly
- Custom-specific versions are available on request

## Typical applications

- Portable electrical and electronic equipment
- Small to medium-sized machines and household equipment
- Single-phase power supplies, switch-mode power supplies
- Test and measurement equipment
- Medical equipment
- Rack mounting equipment

## Typical electrical schematic



## Filter selection table

| Filter              | Rated current<br>@ 50°C(25 °C) | Leakage current*<br>@ 250 VAC/50 Hz<br>(@ 120 VAC/60 Hz) | Inductance |      | Capacitance |      | Resistance<br>R | Output connections<br> | Weight |
|---------------------|--------------------------------|----------------------------------------------------------|------------|------|-------------|------|-----------------|-----------------------------------------------------------------------------------------------------------|--------|
|                     |                                |                                                          | L1         | L2   | Cx          | Cy   |                 |                                                                                                           |        |
|                     | [A]                            | [mA]                                                     | [mH]       | [mH] | [µF]        | [nF] | [kΩ]            |                                                                                                           | [g]    |
| FN 9233 Ex-1-06     | 1 (1.2)                        | 0.31 (0.18)                                              | 22.5       | 0.4  | 0.1         | 2.2  |                 | -06                                                                                                       | 46     |
| FN 9233 Ex-3-06     | 3 (3.5)                        | 0.31 (0.18)                                              | 4.6        | 0.4  | 0.1         | 2.2  |                 | -06                                                                                                       | 46     |
| FN 9233 Ex-6-06     | 6 (7.2)                        | 0.31 (0.18)                                              | 1.6        | 0.4  | 0.1         | 2.2  |                 | -06                                                                                                       | 46     |
| FN 9233 Ex-8-06     | 8 (10.6)                       | 0.31 (0.18)                                              | 0.9        | 0.4  | 0.1         | 2.2  |                 | -06                                                                                                       | 46     |
| FN 9233 Ex-10-06    | 10 (11.6)                      | 0.31 (0.18)                                              | 0.45       | 0.4  | 0.1         | 2.2  |                 | -06                                                                                                       | 46     |
| FN 9233 Ex-12-06    | 12 (12)                        | 0.31 (0.18)                                              | 0.27       | 0.1  | 0.1         | 2.2  |                 | -06                                                                                                       | 46     |
| FN 9233 Ex-15-06    | 15 (15)                        | 0.31 (0.18)                                              | 0.2        | 0.1  | 0.1         | 2.2  |                 | -06                                                                                                       | 46     |
| FN 9233 Ex-12-06HI  | 12 (12)                        | 0.31 (0.18)                                              | 0.27       | 0.1  | 0.1         | 2.2  |                 | -06                                                                                                       | 46     |
| FN 9233 Ex-15-06HI  | 15 (15)                        | 0.31 (0.18)                                              | 0.2        | 0.1  | 0.1         | 2.2  |                 | -06                                                                                                       | 46     |
| FN 9233 ExR-1-06    | 1 (1.2)                        | 0.31 (0.18)                                              | 22.5       | 0.4  | 0.1         | 2.2  | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExR-3-06    | 3 (3.5)                        | 0.31 (0.18)                                              | 4.6        | 0.4  | 0.1         | 2.2  | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExR-6-06    | 6 (7.2)                        | 0.31 (0.18)                                              | 1.6        | 0.4  | 0.1         | 2.2  | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExR-8-06    | 8 (10.6)                       | 0.31 (0.18)                                              | 0.9        | 0.4  | 0.1         | 2.2  | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExR-10-06   | 10 (11.6)                      | 0.31 (0.18)                                              | 0.45       | 0.4  | 0.1         | 2.2  | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExR-12-06   | 12 (12)                        | 0.31 (0.18)                                              | 0.27       | 0.1  | 0.1         | 2.2  | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExR-15-06   | 15 (15)                        | 0.31 (0.18)                                              | 0.2        | 0.1  | 0.1         | 2.2  | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExR-12-06HI | 12 (12)                        | 0.31 (0.18)                                              | 0.27       | 0.1  | 0.1         | 2.2  | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExR-15-06HI | 15 (15)                        | 0.31 (0.18)                                              | 0.2        | 0.1  | 0.1         | 2.2  | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExB-1-06    | 1 (1.2)                        | 0.00                                                     | 22.5       | 0.4  | 0.1         |      | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExB-3-06    | 3 (3.5)                        | 0.00                                                     | 4.6        | 0.4  | 0.1         |      | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExB-6-06    | 6 (7.2)                        | 0.00                                                     | 1.6        | 0.4  | 0.1         |      | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExB-8-06    | 8 (10.6)                       | 0.00                                                     | 0.9        | 0.4  | 0.1         |      | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExB-10-06   | 10 (11.6)                      | 0.00                                                     | 0.45       | 0.4  | 0.1         |      | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExB-12-06   | 12 (12)                        | 0.00                                                     | 0.27       | 0.1  | 0.1         |      | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExB-15-06   | 15 (15)                        | 0.00                                                     | 0.2        | 0.1  | 0.1         |      | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExB-12-06HI | 12 (12)                        | 0.00                                                     | 0.27       | 0.1  | 0.1         |      | 1000            | -06                                                                                                       | 46     |
| FN 9233 ExB-15-06HI | 15 (15)                        | 0.00                                                     | 0.2        | 0.1  | 0.1         |      | 1000            | -06                                                                                                       | 46     |

\* Maximum leakage under normal operating conditions (acc. to IEC60939-3). Note: if the neutral line is interrupted, worst case leakage could reach twice this level.

## Product selector

FN 9233Exx-yy-..HI-zz

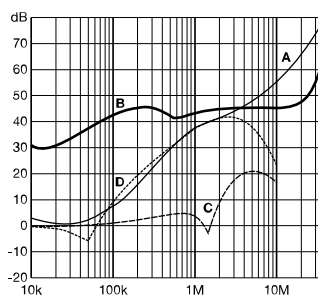
|  |                                                                                   |                                                                |                                             |
|--|-----------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------|
|  |                                                                                   | Snap-in range for S version only                               |                                             |
|  | Blank:                                                                            | Snap-in range 0.7 to 1.5mm                                     |                                             |
|  | 20:                                                                               | Snap-in range 1.5 to 2.2mm                                     |                                             |
|  |                                                                                   |                                                                |                                             |
|  | Blank:                                                                            | Standard IEC inlet type C14                                    |                                             |
|  | HI:                                                                               | Hot IEC inlet type C16 (12 and 15A types only)                 |                                             |
|  |                                                                                   |                                                                |                                             |
|  | 06:                                                                               | Faston 6.3 x 0.8mm (spade/soldering)                           |                                             |
|  |                                                                                   |                                                                |                                             |
|  | 1 to 15:                                                                          | Rated current                                                  |                                             |
|  |                                                                                   |                                                                |                                             |
|  | Blank:                                                                            | Standard version                                               |                                             |
|  | R:                                                                                | Bleed resistor                                                 |                                             |
|  | B:                                                                                | Medical version (with bleed resistor and without Y2-capacitor) |                                             |
|  |                                                                                   |                                                                |                                             |
|  |  | Blank:                                                         | Standard housing with mounting flanges      |
|  |  | U:                                                             | Housing with wider mounting flanges         |
|  |  | S:                                                             | Snap-in version, snapper on vertical side   |
|  |  | S1:                                                            | Snap-in version, snapper on horizontal side |

For example: FN 9233 E-15-06, FN 9233 ES1B-10-06-20, FN 9233 ER-12-06HI, FN 9233 EUB-8-06-20

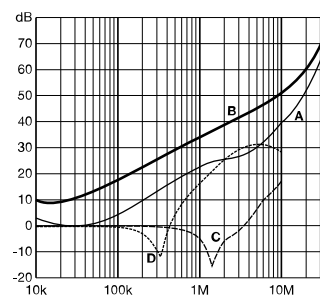
## Typical filter attenuation

Per CISPR 17; A=50  $\Omega$ /50  $\Omega$  sym; B=50  $\Omega$ /50  $\Omega$  asym; C=0.1  $\Omega$ /100  $\Omega$  sym; D=100  $\Omega$ /0.1  $\Omega$  sym

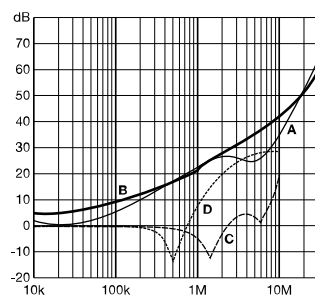
1 and 3 A types



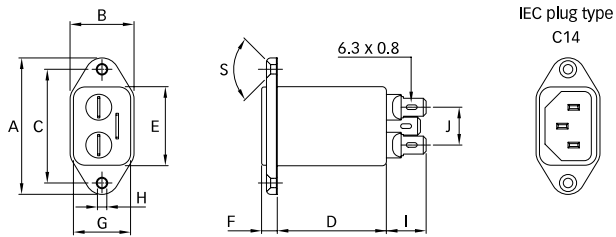
6 to 10 A types



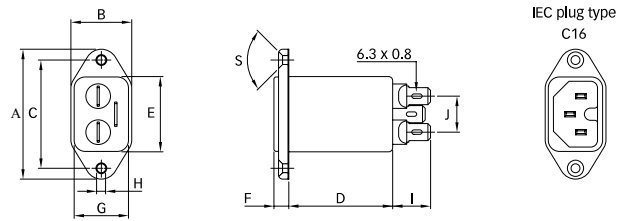
12 and 15 A types



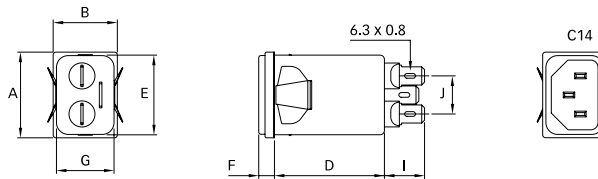
FN 9233 E



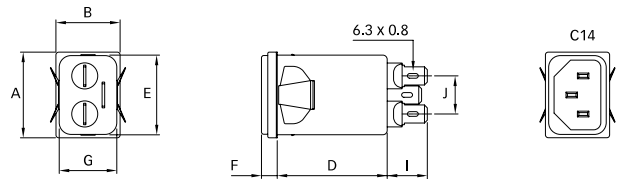
FN 9233 E-HI



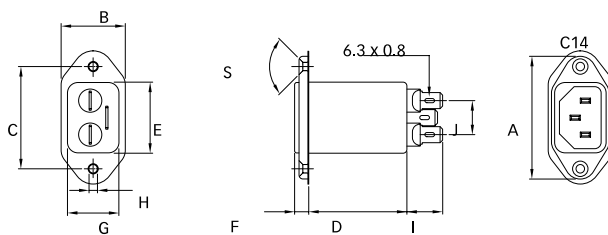
FN 9233 ES



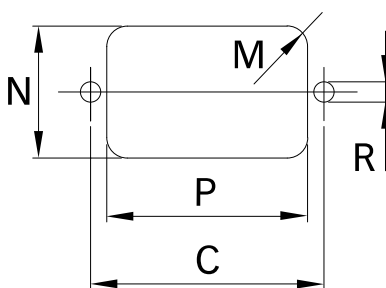
FN 9233 ES1



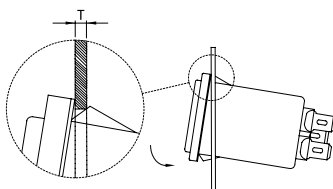
FN 9233 EU



Panel cut out



Installation



## Dimensions

|            | FN 9233 E | FN 9233 EU | FN 9233 ES | FN 9233 ES1 | FN 9233 E-HI | Tol.    |
|------------|-----------|------------|------------|-------------|--------------|---------|
| <b>A</b>   | 48        | 48         | 29.9       | 29.9        | 48           |         |
| <b>B</b>   | 22.4      | 25         | 22.4       | 22.4        | 22.4         |         |
| <b>C</b>   | 40        | 40         |            |             | 40           | 0.2     |
| <b>D</b>   | 46.8      | 46.7       | 46.8       | 46.8        | 46.8         |         |
| <b>E</b>   | 27.8      | 27.7       | 27.8       | 27.8        | 27.8         | +0.6/-0 |
| <b>F</b>   | 5.7       | 5.7        | 5.7        | 5.7         | 5.7          |         |
| <b>G</b>   | 20.1      | 20.1       | 20.1       | 20.1        | 20.1         | +0.6/-0 |
| <b>H</b>   | Ø3.3      | Ø3.3       |            |             | Ø3.3         |         |
| <b>I</b>   | 14        | 14         | 14         | 14          | 14           |         |
| <b>J</b>   | 13.3      | 13.3       | 13.3       | 13.3        | 13.3         |         |
| <b>M</b>   | R ≤3      | R ≤3       | R ≤1.5     | R ≤1.5      | R ≤3         |         |
| <b>N</b>   | 21.5      | 21.5       | 20.8       | 21.9        | 21.5         |         |
| <b>P</b>   | 28.5      | 28.5       | 29.4       | 28.5        | 28.5         |         |
| <b>R*</b>  | M3        | M3         |            |             | M3           |         |
| <b>S</b>   | 90°       | 90°        |            |             | 90°          |         |
| <b>T**</b> |           |            | 0.7 - 1.5  | 0.7 - 1.5   |              |         |
| <b>T**</b> |           |            | 1.5 - 2.2  | 1.5 - 2.2   |              |         |

\* Recommended torque for M3 (90° countersunk flat head) is 0.5 Nm

\*\* For selecting the panel thickness, please refer to the filter selector table.

All dimensions in mm; 1 inch = 25.4 mm  
Tolerances according: ISO 2768-m/EN 22768-m

Please visit [www.schaffner.com](http://www.schaffner.com) to find more details on connectors.

## Accessories for IEC Inlet Filters and Power Entry Modules

The accessories displayed are a selection of available accessories for IEC Inlet filters and IEC Power entry modules. As they are displayed in a general way there might be variants of the filters where the accessories are not available.

For further information please ask your local Schaffner Sales Partner and visit our homepage <https://www.schaffner.com/>.

### Power Cord with Locking System for Inlet Filters IL 13, IL 13 P, IL 19



Link to Datasheet: [Datasheet IEC C13/C19 locking cable](#)

The locking system has a tensile force of typical 200N.

It is recommended to use it with flange mount filters.

Lock Power Cords with IEC Inlets and Filters"

Schaffner power cords with IEC lock guard against

accidental disconnection of all electrical appliances

with an IEC inlet. No exchange or modification of the

IEC inlet or IEC inlet filter system is

needed. Easy

retrofit for all electronic equipments and devices.

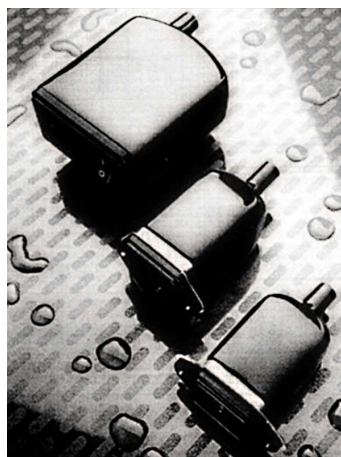
### IEC C13 Rewireable Connector for individual Power Cord with Locking System



Link to Datasheet: [Datasheet IEC C13 rewireable](#)

The locking system has a tensile force of typical 300N. It is recommended to use it with flange mount filters. For details refer to our Application Note "Using IEC Lock Power Cords with IEC Inlets and Filters" Schaffner power connector with IEC lock guard against accidental disconnection of all electrical appliances with an IEC inlet. No exchange or modification of the IEC inlet or IEC inlet filter system is needed. Easy retrofit for all electronic equipments and devices.

### IB - Insulating Boots



There is a full range of insulating boots available from Schaffner that provide a physical cover for the exposed terminals on the back of IEC Inlet Filters.

These boots fit the simplest non-fused and unswitched style up to the fully fused and switched IEC filtered inlet.

The boots are made from a durable black PVC material that conforms to UL94-V0 flammability requirements.

The boots slip easily over the back of the filter and reduce the risk of

electrical shock to maintenance

personnel whilst protecting the filter

from environmental hazard such as the ingress of dust and moisture.



## Headquarters, global innovation and development

### Switzerland

#### Schaffner Group

Nordstrasse 11  
4542 Luterbach  
T +41 32 681 66 26  
[info@schaffner.com](mailto:info@schaffner.com)  
[www.schaffner.com](http://www.schaffner.com)



## Sales and application centers

### China

#### Schaffner EMC Ltd. Shanghai

T20-3 C, No 565 Chuangye Road,  
Pudong district  
201201 Shanghai  
T +86 21 3813 9500  
[cschina@schaffner.com](mailto:cschina@schaffner.com)  
[www.schaffner.com.cn](http://www.schaffner.com.cn)

### Finland

#### Schaffner Oy

Sauvonrinne 19 H  
08500 Lohja  
T +358 50 468 7284  
[finlandsales@schaffner.com](mailto:finlandsales@schaffner.com)

### France

#### Schaffner EMC S.A.S.

16-20 Rue Louis Rameau  
95875 Bezons  
T +33 1 34 34 30 60  
F +33 1 39 47 02 28  
[francesales@schaffner.com](mailto:francesales@schaffner.com)

### Germany

#### Schaffner Deutschland GmbH

Schoemperlenstrasse 12B  
76185 Karlsruhe  
T +49 721 56910  
F +49 721 569110  
[germanysales@schaffner.com](mailto:germanysales@schaffner.com)

### India

#### Schaffner India Pvt. Ltd

REGUS WORLD TRADE CENTRE  
WTC, 22nd Floor Unit No 2238, Brigade  
Gateway Campus, 26/1, Dr. Rajkumar Road  
Malleshwaram (W)  
560055 Bangalore  
T +91 80 67935355  
[indiasales@schaffner.com](mailto:indiasales@schaffner.com)

### Italy

#### Schaffner EMC S.r.l.

Via Ticino, 30  
20900 Monza (MB)  
T +39 039 21 41 070  
[italysales@schaffner.com](mailto:italysales@schaffner.com)

### Japan

#### Schaffner EMC K.K.

1-32-12, Kamiuma, Setagaya-ku  
7F Mitsui-seimei Sangenjaya Bldg.  
154-0011 Tokyo  
T +81 3 5712 3650  
F +81 3 5712 3651  
[japansales@schaffner.com](mailto:japansales@schaffner.com)  
[www.schaffner.jp](http://www.schaffner.jp)

### Singapore

#### Schaffner EMC Pte Ltd.

#05-09, Kg Ubi Ind. Estate  
408705 Singapore  
T +65 6377 3283  
F +65 6377 3281  
[singaporesales@schaffner.com](mailto:singaporesales@schaffner.com)

### Spain

#### Schaffner EMC España

Calle Caléndula 93, Miniparc III, Edificio E  
El Soto de Moraleja, Alcobendas  
28109 Madrid  
T +34 917 912 900  
F +34 917 912 901  
[spainsales@schaffner.com](mailto:spainsales@schaffner.com)

### Sweden

#### Schaffner EMC AB

Tegeluddsvägen 76, 2tr  
115 28 Stockholm  
T +46 8 5050 2425  
[swedensales@schaffner.com](mailto:swedensales@schaffner.com)  
[www.schaffner.com](http://www.schaffner.com)

### Switzerland

#### Schaffner EMV AG

Nordstrasse 11  
4542 Luterbach  
T +41 32 681 66 26  
[switzerlandsales@schaffner.com](mailto:switzerlandsales@schaffner.com)

### Taiwan R.O.C.

#### Schaffner EMV Ltd.

20 Floor-2, No 97, Section 1, XinTai 5th Road  
22175 XiZhi District New Taipei City 22175  
T +886 2 2697 5500  
F +886 2 2697 5533  
[taiwansales@schaffner.com](mailto:taiwansales@schaffner.com)  
[www.schaffner.com.tw](http://www.schaffner.com.tw)

### Thailand

#### Schaffner EMC Co. Ltd.

Northern Region Industrial Estate  
67 Moo 4 Tambon Ban Klang  
Amphur Muang P.O. Box 14  
51000 Lamphun  
T +66 53 58 11 04  
F +66 53 58 10 19  
[thailandsales@schaffner.com](mailto:thailandsales@schaffner.com)

### United Kingdom

#### Schaffner Ltd.

5 Ashville Way, Molly Millars Lane  
Wokingham  
RG41 2PL Berkshire  
T +44 118 9770070  
F +44 118 9792969  
[uksales@schaffner.com](mailto:uksales@schaffner.com)

### USA

#### Schaffner EMC Inc.

52 Mayfield Avenue  
08837 Edison, New Jersey  
T +1 800 367 5566  
T +1 732 225 9533  
F +1 732 225 4789  
[usasales@schaffner.com](mailto:usasales@schaffner.com)  
[www.schaffnerusa.com](http://www.schaffnerusa.com)

#### Schaffner North America

6722 Thirlane Road  
24019 Roanoke, Virginia  
T +1 276 228 7943  
F +1 276 228 7953

#### Schaffner North America

823 Fairview Road  
24382 Wytheville, Virginia  
T +1 276 228 7943  
F +1 276 228 7258

To find your local partner within Schaffner's global network: [www.schaffner.com](http://www.schaffner.com)

© 2018 Schaffner Group

The content of this document has been carefully checked and understood. However, neither Schaffner nor its subsidiaries assume any liability whatsoever for any errors or inaccuracies of this document and the consequences thereof. Published specifications are subject to change without notice. Product suitability for any area of application must ultimately be determined by the customer. In all cases, products must never be operated outside their published specifications. Schaffner does not guarantee the availability of all published products. This disclaimer shall be governed by substantive Swiss law and resulting disputes shall be settled by the courts at the place of business of Schaffner Holding AG. Latest publications and a complete disclaimer can be downloaded from the Schaffner website. All trademarks recognized.

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](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)