SERVICES & SOLUTIONS

EMC Engineering

Custom Product Development

Advanced Testing Capabilities

SCHAFFNER

COMPONENTS

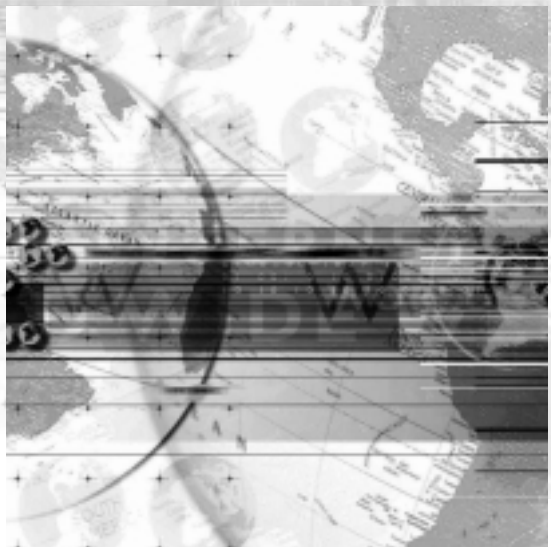
www.schaffner.com

No one needs reminding, that we live in the age of electronics. But our enjoyment of the benefits of electrical energy depends entirely on the success of manufacturers in ensuring the electromagnetic compatibility of each new product they develop.

SCHAFFNER

For over 35 years, Schaffner has worked with the international electronics manufacturing community to ensure that success.

Our business is the development and delivery of highly effective EMC solutions to electrical and electronic equipment manufacturers, world-wide. This is our sole focus - and it makes us unique. No other company has the breadth of skills, products and resources, or the depth of expertise that we can offer.



Our solutions serve the world-wide electronics community, from the smallest manufacturer seeking type approval for the first time, to the multinational building a full in-house EMC test facility.

We design and manufacture the filters and chokes which prevent equipment from generating EMI, and protect it from its effects. We develop the advanced test instruments and systems required to check the effectiveness of product designs. We provide the expertise and resources to help our customers deploy our products effectively. And we put at their disposal some of the most sophisticated test and calibration facilities in the world, to certify their sustained compliance with EMC standards.

GLOBAL PRESENCE – LOCAL SUPPORT

As the number 1 in EMC, Schaffner is in a unique position to assist manufacturers with every aspect of EMC, at every stage of the product development cycle, everywhere. With a global network of subsidiaries and distributors, several production facilities in Europe and Asia and sophisticated test and evaluation laboratories at seven strategic positions around the world, Schaffner is always very close to you.

Each of these laboratories is staffed by specialist EMC engineers and equipped with advanced instrumentation for fast and accurate assessment of electromagnetic interference (EMI) and electromagnetic immunity or susceptibility (EMS).
Available services at these locations include:

- Semi-anechoic chamber and open field testing
- Harmonics instrumentation for current and voltage to the 49th harmonic
- Emission and immunity tests according to European and international standards (EN, IEC, FCC, CISPR, Mil)

Additional services available at the accredited testing facility in Switzerland:

- Full load test set-up for motor drives (see also ‘Advanced testing under real-life conditions’)
- Safety testing and environmental simulation for passive components for electromagnetic interference suppression according to European, international and North American standards

UNSURPASSED CAPABILITIES

For initial prototype development work and investigation of products that fail early compliance testing, conducted emission tests to 30MHz or above will be performed, and near-field probes and spectrum analyzers allow radiated field strength to be measured down to board or component level at frequencies as high as 1 GHz.

DEDICATED PROPRIETARY EQUIPMENT

Some of our larger EMC test laboratories can perform radiated power testing – using broad-spectrum power meters to measure up to 1 GHz – and radiated EMI testing, using proprietary state-of-the-art pulse and noise generators.

STATE-OF-THE-ART EXPERIENCE

Each EMC test laboratory maintains close links with the main laboratory at our headquarter in Switzerland and is able to call upon this additional source of expertise whenever needed.

EMC ENGINEERING SERVICES AND CUSTOM PRODUCT DESIGN

In addition to offering one of the world's most comprehensive ranges of standard EMC filters, line-conditioning products, RFI suppression chokes and pulse transformers, Schaffner offers the full complement of engineering services and custom product design to support equipment manufacturers and users.

WHY USE A CUSTOM PRODUCT?

Schaffner's standard products satisfy an extremely diverse range of requirements. However, invariably there will be occasions when application-specific products offer a better technical and economical solution. Some of the key reasons for choosing custom products include:

- Meeting special mechanical layout, size, installation or connection requirements
- Ensuring conformance with overall application specifications
- Satisfying specific filtration requirements by fine-tuning parameters
- Optimizing cost/performance to exactly match the application

The decision to use a custom product should always be backed by a full technical and economic analysis.

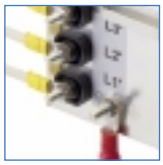
BALANCING THE EQUATION

Electronics equipment manufacturers often view the use of custom filters with some caution. A common concern is that they will somehow lose control of the costs or the process, and possibly risk delaying the introduction of a new product to market, or end up using a poorly designed filter.

SELECTING THE BEST SUPPLIER

All these issues can be satisfactory resolved from the beginning by careful choice of supplier. A prudent first step would be to check the company's credentials.

It is vital that the filter supplier is willing to work with you as a partner – preferably in the language of your choice – and has the skills, willingness, applications-awareness and necessary resources to ensure timely project completion.




SECURING LONG-TERM SUPPORT

The ideal supplier will have the capability of simulating designs to help speed development, together with comprehensive test and measurement facilities to verify the performance of the filter and its overall effect upon the product that incorporates it.

The supplier must also be able to provide high-quality prototypes as quickly as possible and maintain this quality when the filter goes into volume production.

THE IDEAL PARTNER

Schaffner is well-positioned to help on all these fronts. The company has over 35 years experience in producing high quality EMC components for the world market. Schaffner has the most comprehensive portfolio of power line filters and suppression products in the world. It produces custom AC and DC power line filters, line-conditioning products, chokes and pulse transformers for an extremely diverse range of industrial, telecommunication, power supply, medical, office, defence, aerospace and transportation applications.

BENCHMARKING THE EXPERIENCE

Schaffner's products and experience encompass everything from miniature 100mA filters weighing less than 3g to high-current 3500A industrial systems that tip the balance at well above 100kg. There is no application too large or too small for consideration.

A UNIQUE SOURCE OF HELP AND SUPPORT

Schaffner's wide-ranging expertise in EMC issues enables it to provide the most cost-effective products. Our ability to recognize EMC problems and accurately identify their origins allows us to propose solutions very fast. Our overall intention is one of long-term partnership – we want to build the best solution for you, to ensure that your own goals are met.

WORLDWIDE PRESENCE

Schaffner is renowned for the quality and responsiveness of its custom product services. The company has custom filter design and prototyping facilities at seven strategic locations world-wide. At each location, experts are available to provide help and guidance with every aspect of custom products – from initial costing and technical analysis, through design and prototype building, to test and evaluation.

LOCAL EXPERTISE

Extensive knowledge of the EMC regulations that apply in each country enables our engineers to provide support at every stage of the process. Custom products can be developed directly from customers mechanical and electrical specifications, or from investigation of the end-equipment and the compliance regulations of its intended market.

TOTAL CAPABILITIES

Schaffner's custom products are subjected to the same rigorous performance checks as standard, high-volume products. The custom design facilities are equipped with:

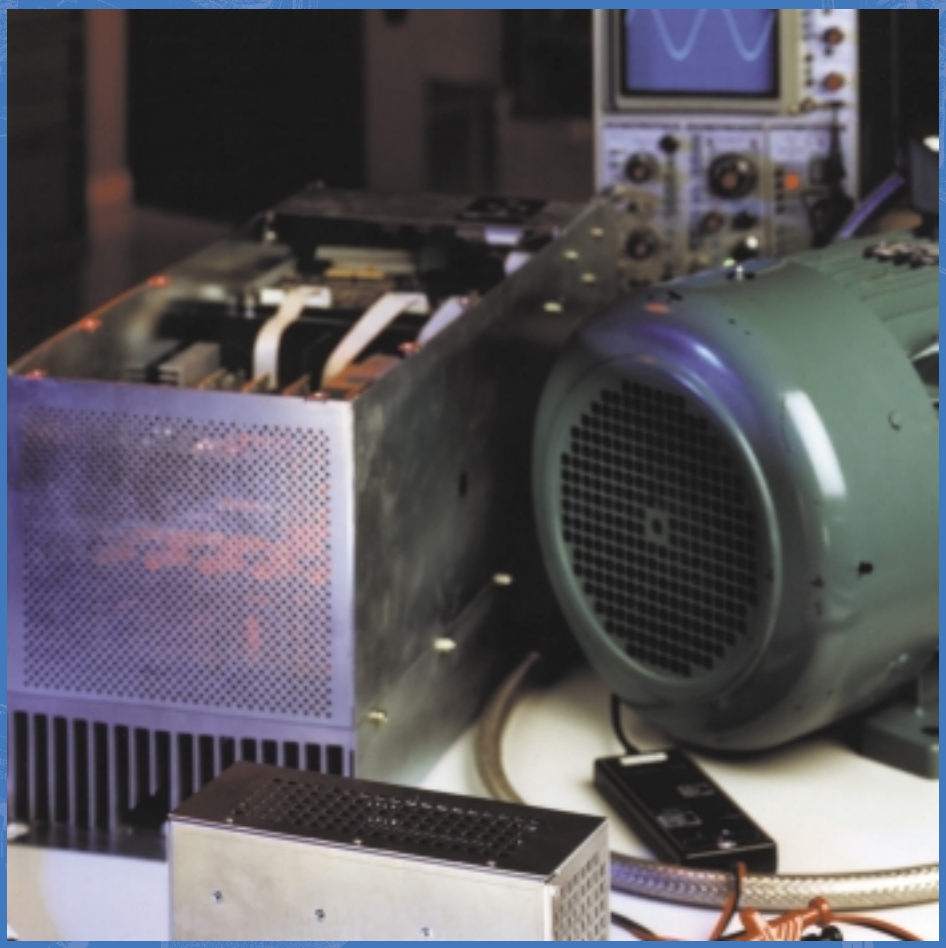
- Powerful simulator workstations and leading-edge test and measurement instrumentation for full evaluation and quantification of filter performance.
- High voltage and high current sources to verify isolation voltage and current-carrying capacity up to 6kV and 600A.
- Broad-spectrum signal generators and power meters for insertion loss measurements to above 3 GHz.
- Special high-accuracy measurement instruments to certify that the filter's temperature rise is in accordance with international safety standards such as UL, CSA and EN.

A CLEAR PATH TO SUCCESS

Schaffner is uniquely able to help customers move efficiently and easily from the prototype phase to volume production. Each custom design facility maintains close links with Schaffner's ISO 9001:2000 -approved manufacturing plants in Thailand, Hungary and Switzerland; customers can consequently benefit from both Far East manufacture for very high-volume applications and European manufacture for small- to medium-volume applications.

Whichever route you choose, our ultimate goal is the same as yours – the efficient production and delivery of cost-effective high quality products, to help ensure that your products comply with all appropriate EMC regulations, and help increace the reliability and functional security of your equipment.

ADVANCED TESTING UNDER REAL-LIFE CONDITIONS



In addition to offering the measurement and testing services mentioned in the introduction part of this brochure, Schaffner also operates a full load test set-up for motor drives. Although specified by the EMC directive, performing conducted emission tests with light loads only does not necessarily simulate problems which can occur in real life situations.

TESTING POWER DRIVE SYSTEMS WITH MAINS FILTERS

The standard that controls the compliance of PDS with the EMC Directive is EN 61800-3. This standard specifies the conducted emissions limits of EN 55011 for drives which are connected to a network that supplies domestic premises. It allows light loading for the tests on the grounds that the main emissions source is the dV/dt associated with the edges of the switched voltage waveform, which doesn't change significantly with load. Is this practice justified?

When a filter is used in the supply line, it must pass the full current taken by the drive. If the filter is necessary for compliance, then its attenuation must be guaranteed over the whole current range. There are two important parameters which relate the input current to the attenuation: these are saturation of the magnetic material due to supply current and operating temperature.

SUPPLY CURRENT

You might be tempted to specify a filter against the RMS current drawn by the drive at full power. This is normally inadequate. A typical three-phase bridge capacitor-input rectifier can draw more than twice its rated RMS current at the peaks of the input waveform. But, the ferrite core of an input EMI filter is designed so that the common mode inductance retains 80% of its nominal value at the filter's rated current. To protect the common mode inductance against saturation, the 80% point should occur at the peak.

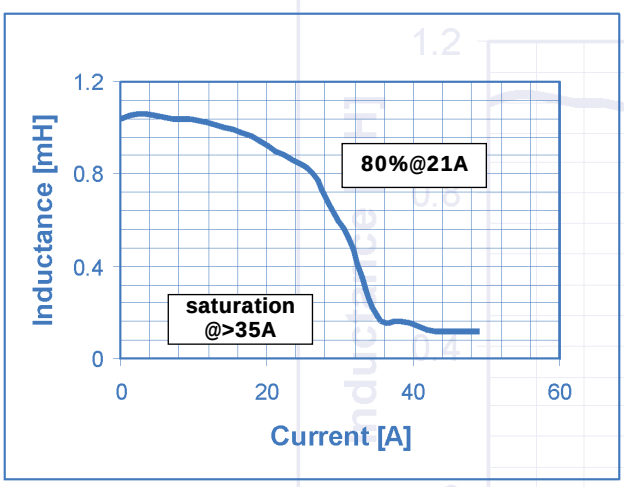


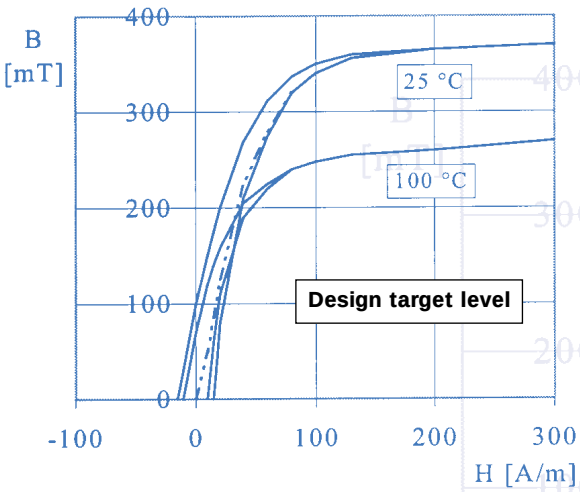
Fig.1 shows the saturation curve of a manganese-zinc ferrite core, rated for 80% inductance at 21A. Testing a PDS under light load condition, as accepted by EN 61800-3, will see the fastest rise time of the switched DC voltage but core saturation at the maximum input current peak will not occur.

Although the supply current magnetic field is compensated inside a common mode ferrite core, the stray inductance (around 1% of nominal) still leads to saturation at the peak current. The effect of a choke in saturation is mainly felt at the bottom end of the spectrum near 150kHz, where >10dB reduction in attenuation can be found.

Modern power drive systems (PDS) use high-frequency switching techniques for maximum efficiency and this makes them prime sources of RF conducted emissions. To reduce the level of these emissions, a mains filter must be used.

OPERATING TEMPERATURE

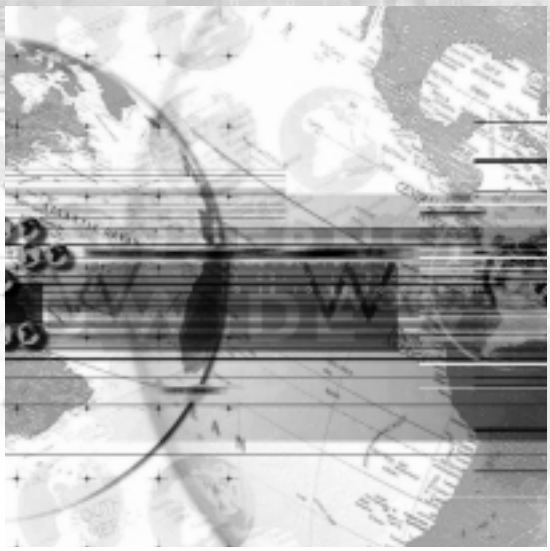
When the full rated (RMS) load current is drawn through the filter, inevitably there are losses in the core and in the winding wires. These lead to a temperature rise of the choke which can be several tens of degrees between light load and full load, and will be greatest in the core itself. The effect of this temperature rise on the ferrite's magnetization curve is shown in Fig.2. The winding is designed for, e.g. 300 mT flux density at room temperature (25°C). Again, testing a PDS at light loads will not generate these temperatures in the filter.



CONCLUSION

If the conducted emission performance of a PDS relies on the presence of a mains input filter, testing the system only at light loads as allowed in EN 61800-3 will seriously underestimate the emissions, especially at the low frequency end. Testing up to the full load current drawn through the filter is advisable.

For every new filter we develop, Schaffner engineers consider these parameters to make sure, the filter will keep its specifications under load conditions. With the equipment available to us, this is not only done by calculation or simulation but also by testing under the conditions the filter will operate in the final application. For you as our partner, this means no unpleasant surprises after the installation or expensive delays of your product's time to market. With our tested and approved, fit-and-forget filter solutions, you can satisfy your customers with equipment, which meets the latest interference and immunity standards – even under full load conditions.



Testing the filters up to the full load current drawn by the inverter is advisable

Schaffner is an ISO-registered company. It's products are designed and manufactured under the strict quality requirements of the ISO 9001 standard.

This catalogue is a sales and promotion document. It has been carefully checked. However, Schaffner does not assume any liability for errors or inaccuracies.

To obtain the latest technical datasheets, contact your local sales office.

SCHAFFNER

HEADQUARTERS
Schaffner EMV AG
CH-4542 Luterbach
Switzerland
Tel: [+41] 32 6816 626
Fax: [+41] 32 6816 641
E-mail: sales@schaffner.com

EUROLOGISTICS CENTER
Schaffner EMC S.A.S.
F-68311 Illzach
France
Tel: [+33] 3 89 31 04 00
Fax: [+33] 3 89 31 04 01

690-695A
Benteli Hallwag Druck AG / October 2001

SALES SUBSIDIARIES

China
Schaffner Beijing Liaison Office
Tel: [+86] 10 6510 1761
E-mail: chinasales@schaffner.com

Finland
Schaffner Electro Ferrum Oy
Tel: [+358] 19 326 616
E-mail: finlandsales@schaffner.com

France
Schaffner EMC S.A.S.
Tel: [+33] 1 34 34 30 60
E-mail: francesales@schaffner.com

Germany
Schaffner EMV GmbH
Tel: [+49] 721 56 910
E-mail: germanysales@schaffner.com

Italy
Schaffner EMC Srl
Tel: [+39] 02 66 04 30 45
E-mail: italysales@schaffner.com

Japan
Schaffner EMC KK
Tel: [+81] 3 3418 5822
E-mail: japansales@schaffner.com

Singapore
Schaffner EMC Pte Ltd
Tel: [+65] 377 3283
E-mail: singaporesales@schaffner.com

Sweden
Schaffner EMC AB
Tel: [+46] 8 5792 1121
E-mail: swedensales@schaffner.com

Switzerland
Schaffner EMV AG
Tel: [+41] 32 6816 626
E-mail: switzerlandsales@schaffner.com

UK
Schaffner EMC Ltd
Tel: [+44] 118 977 0070
E-mail: uksales@schaffner.com

USA
Schaffner EMC Inc
Tel: [+1] 732 225 9533
E-mail: usasales@schaffner.com

www.schaffner.com