

Digital Power Electronics

Confidently develop digital power electronic products for export markets



International market compliance

ELMG's complete digital power electronic service package includes

- Power Electronics Design
- Digital Control of Power Electronics
- Magnetic Component Design
- Thermal Management
- Motor and Motion Control
- Converter control analysis and design
- AC system interface design and power quality
- International multi-market compliance for power electronics

Digital Power Electronics Design

We are power electronics design specialists. **ELMG** expertise in converter design spans from 2W to 15MVA and includes all types of converters from small switch-modes to large mains connected converter systems and motor drives. We design power converters using MOSFETs, BJTs, IGBTs and Thyristors. We have solid expertise in the design of base and gate drive systems for all these devices.

ELMG design expertise in power electronics design includes low voltage, less than 1500V, power electronics and high voltage, 1500V to 25kV, power electronics. All power converters designed are typically designed to meet one or more of EMC, Low Voltage Directive, UL or CSA compliance requirements.

Digital control of power electronics

The complete digital control of power electronic switching circuits presents significant advantages. However some issues not apparent when using traditional non-digital control methods arise. Synchronised sampling and timer accuracy are typical areas that need attention. **ELMG** design and develop direct digital power electronic controllers base on microcontrollers, microprocessors, DSP's and FPGA's. Digital control design techniques are used to ensure system stability and robustness.

ELMG's embedded software expertise coupled with experience and knowledge of algorithm design for power electronic control allows generating gate drive signals directly from microprocessor pins. With this approach and expertise you can be sure that the converter control is flexible and reliable while avoiding problems such as those due to timer resolution causing unwanted frequency components.

ELMG: Power Electronics: expertise, experience and results

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Magnetic Component Design

ELMG are able to design both high frequency and low frequency magnetic components in a wide variety of sizes and ratings. Key areas of design knowledge include lifetime estimation and wear out mechanism analysis for high frequency transformers and inductors. Expertise and experience includes the design of saturable inductors and saturable coupled inductors.

Thermal Management

Power electronics converters generate significant amounts of heat in small volumes. **ELMG** design power converters with thermal design as a key consideration. All too often we have seen thermal design dismissed until late in the development. **ELMG** thermal design approach is to analyse, model and verify the converters thermal performance early.

AC Utility Interfaces and Power Quality

Interfacing controlled power converters to the AC mains is becoming more common. Reversible rectifiers and active filters interact with the AC system and other power converters. **ELMG** expertise in interconnected converter design extends to mains connected power converters.

A critical factor that is often overlooked in the connection of any power converter to the mains is the control influence of the input EMC filter on the controller design. Effectively the filter limits the performance of power converter and has significant effect on the converter operational stability. **ELMG** have tools and experience in this type of problem.



Motor and Motion Control

We have expertise in the design and development of power electronic converters for controlling AC motors such as induction motors, synchronous motors, permanent magnet 3 phase motors, or brushless DC motors. **ELMG** also can design DC motor drives.

Converter Control Analysis and Stability

Power converters give great controllability at very low control cost. Ensuring that the converter is stable and will operate correctly by analysis and design is the **ELMG** approach. We have expertise in small signal analysis from first principals and also use more structured modeling techniques such as state space averaging. Extensive use is made of simulation using MATLAB. **ELMG** have significant large signal modeling expertise and experience.

See Frequently Asked Questions on Power Electronics and their answers at www.elmgz.com/faq.html

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