WHITEPAPER

# POWERING CUSTOM FPGA DESIGNS

## Deploying DC/DC Power Module Reference Design & Simulation Tools

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The term “assurance” doesn’t typically show up on an electronics system designer’s list of specifications when they’re working on a field programmable gate array (FPGA) processor-based networking or telecom’ system. Yet, at that time-critical intersection between close-to-final design, power component specification and pre-prototype development, relying on the right DC/DC point-of-load (POL) power module does demand the confidence of using field-proven power solutions coupled with a tested set of fast-track reference design tools.

### REFERENCE DESIGNS AND, OR VOLTAGE REGULATOR, POL POWER SUPPLIES

There are several core POL power supply design and simulation tools that system engineers can apply for their FGPA-based systems. The first is the use of DC/DC power supply reference designs that give engineers a set of known, ready-to-deploy tools and templates. These reference designs are customized for company-specific FPGA processors.

For example, OmniOn Power supports a range of Xilinx™ FPGAs, including its Virtex® UltraScale+™ line[1]. OmniOn, working with Xilinx requirements, offer Xilinx-specific reference designs that include FPGA schematics, a comprehensive bill of materials, and evaluation board layout guidelines, or templates. Drawing from OmniOn’s Xilinx online guides, engineers can assess the POL module that best meets their specification, power output and performance requirements.

Beyond just evaluating POL, or DC/DC converters, power modules, corresponding reference designs give system developers the confidence that all the features and specifications of the POL (for example FPGA voltage rail requirements for ripple, transient response and overall voltage tolerance) are engineered and tested to meet Xilinx standards. This provides the assurance and fast-track confidence critical to the final design and prototyping phases.

### BUT CHANGE HAPPENS – SIMULATING POWER VARIABLES

The development process isn’t static. Rather, it represents a dynamic set of changes that proceed up to, and well through, prototyping, testing and final verification stages. Such changes can range from reacting to test results of the board configuration, to incorporating evolving marketing demands in the final product. Regardless of the cause or source, designers know that requirements will change, and they need to react quickly and with confidence.

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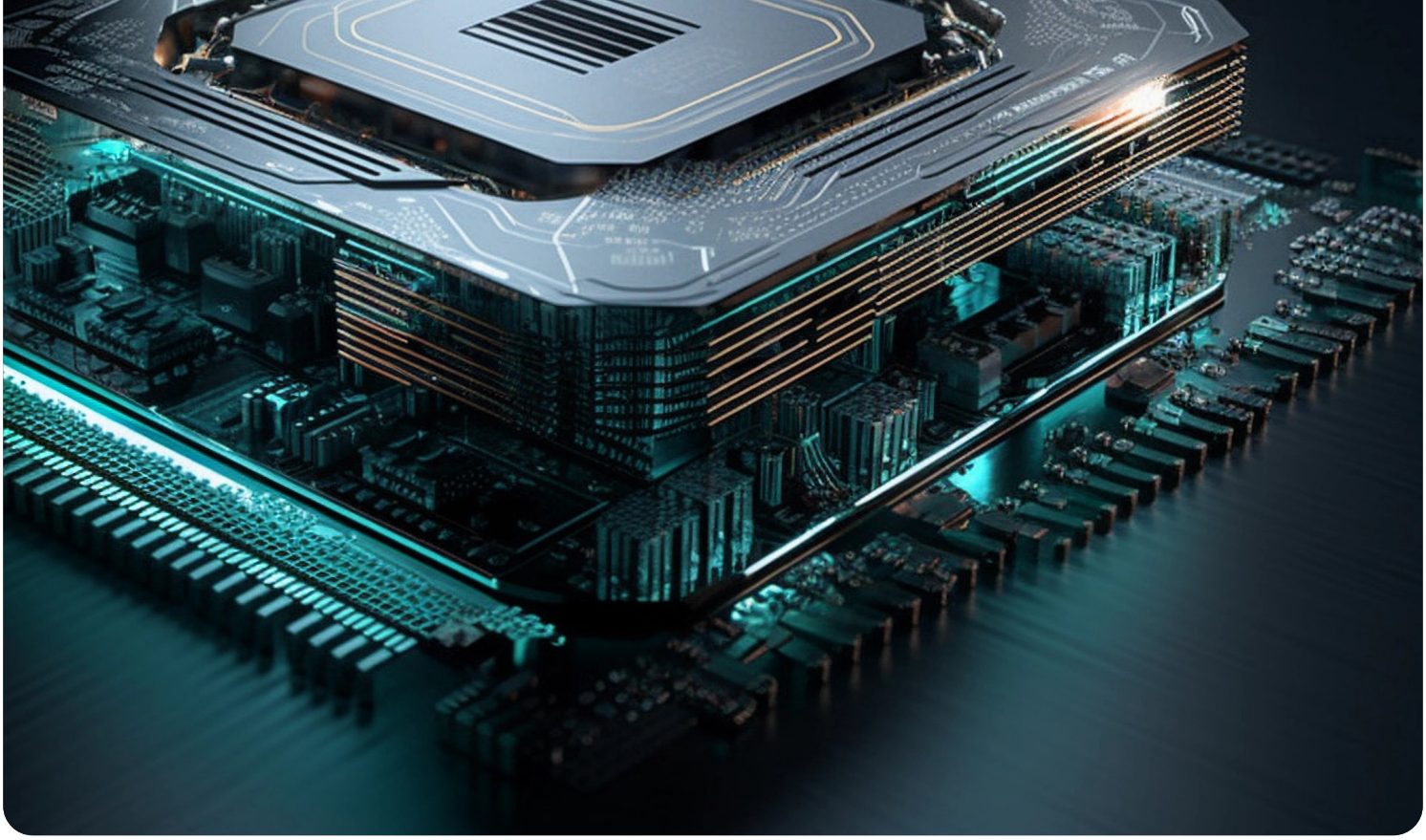

These variables all potentially impact development costs – from reworking prototype boards to costly delays and loss of time-to-market advantages. But working with the same simulation tools used by power module providers, such as OmniOn, to test their original reference designs, electronical engineers, using Xilynx's Virtex® UltraScale+™ FPGA processors, can employ these same simulation tools to model their own late-stage changes that can occur due to conditions such as transient performance and capacitor bank needs.

## ASSEMBLING A POWER SOLUTION VERSUS A FAST-TRACK MODULAR POL PACKAGE

When evaluating third-party, pre-configured POL, or voltage regulator, power modules, a review of the time-to-market, reliability and performance advantages of a third-party power conversion module, versus developing a discrete power system, should be considered.

There is some logic for a manufacturer with skilled design, development, power expertise and production capabilities to develop their own discrete power solution. This might also apply if time-to-market factors are less critical. However, using a ready-to- deploy POL power supply can run in parallel with the faster development and time-to-market values of a FPGA processor.

## WHEN "FEWER" MEANS MORE

Building a discrete voltage regulator, or POL power device involves the specification, selection and testing of many separate components compared with up to 90 percent fewer items, or SKUs. Depending on maximum current and load requirements, a typical bill of materials (BOM) for a custom DC/DC converter can comprise 25 to 100 items. By comparison, the average BOM for ready-to-deploy OmniOn POL and supporting components is usually less than seven SKUs.

Also, by carefully controlling the board layout, component selection and advanced mounting techniques, some power modules can significantly reduce the board space required for power.

## ACCELERATING DESIGN AND TESTING TIME-TO-MARKET BENEFITS

When working to get a system design to its final stages, accelerating the power design process with a pretested power supply unit dramatically reduces any last-minute variables, freeing up time and resources to manage the final phases of design and production.

Again, the use of reference designs ensures specifications and performance requirements are already engineered and tested – and can be applied efficiently along any phase of the design cycle. The use of well-established and widely deployed POL power modules also provides both performance data and quality assurance.

Further, the availability of online design tools, such as OmniOn's Power Module Wizard and Digital Power Insight, provide a fast track for system development and deployment.

When looking at a range of features – from using proven power supplies with a more manageable bill of materials, to ready-to-apply reference design and simulation tools – electronics system designers can accelerate their FPGA-based designs while reducing development risks, all by harnessing the benefits of DC/DC converters, POL power modules.

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Vesa Jokitulppo is the senior product manager for OmniOn's line of non-isolated DC/DC converters. Prior to joining the company in 2014, Vesa held various business development, program management, marketing planning and product management positions at Microsoft and the Mobile Phones division of Nokia.

Jokitulppo holds an MS in Industrial Engineering from the University of Lappeenranta in Finland and an MS in Operations Management from the University of Nottingham in the UK.