

# Synopsys and OCZ

## OCZ Achieves First-Pass Silicon Success for SSD Controller Using Synopsys DesignWare IP and Synopsys Professional Services



*There are times when projects call for third-party physical design tools and IP blocks, and we found that the combination of Synopsys' IP, tools, and consulting services allowed us to deliver this project faster than we could have done otherwise."*



**Brian McMath**

Technical Director, OCZ Technology

### Business

OCZ Technology Group, Inc. is a leader in the manufacturing and distribution of solid state drives (SSDs) and offers high-performance components for computing devices and systems, including enterprise-class power management products and industrial power accessories.

### Challenges

- ▶ Meet aggressive project schedule for SSD product through first time right controller
- ▶ Reduce integration risk with reliable IP
- ▶ Accelerate development of implementation design flow

### Synopsys Solution

- ▶ Proven DesignWare® IP including:
  - DDR2/3-Lite PHY
  - DesignWare Embedded Memory Compilers
  - DesignWare STAR Memory System®
- ▶ IP integration services from Synopsys Professional Services
- ▶ Lynx Design System for RTL-to-GDSII design environment

### Benefits

- ▶ Achieved first-pass silicon success and met aggressive time-to-market goal

- ▶ Reduced integration risk with silicon-proven DesignWare IP and expert IP integration services
- ▶ Accelerated deployment of complete SoC design flow

### Overview

OCZ's NAND flash Vector SSDs, powered by the company's internally developed "Indilinx Barefoot 3" controller, provide exceptional input/output operations per second (IOPS) and deliver superior sustained performance over time regardless of data stream format. These high performance SSDs are designed for use in laptops, notebooks, and desktop systems where the highest storage performance is required. As a key player in the competitive SSD market, OCZ recognizes the need to deliver reliable, high-performance solutions and get them to market quickly. OCZ decided that the flexibility of developing their Barefoot 3 controller in-house was critical to their long-term product design and roadmap strategy. However, to meet their broader design goals and tape out on schedule, they needed additional proven IP along with an integrated tool flow and development platform. OCZ was able to fulfill this combination of requirements with Synopsys' silicon-proven DesignWare IP, Synopsys' consulting services, and Lynx Design System.

## High-Quality DesignWare IP

OCZ knew that to achieve their aggressive goals, they would need to select proven and reliable IP for their design. “When time-to-market is tight and your target is to have ‘first-time-right’ silicon, you don’t want to add the risk of using unproven IP,” said Brian McMath, Technical Director at OCZ. “The choice to use the DesignWare DDR2/3-Lite PHY was an easy one because we’ve successfully integrated it before and it has been silicon proven in multiple designs.”

The OCZ development team took advantage of the unique DesignWare DDR PHY Compiler to create and view various layout options until they had optimized the configuration. In addition, the DDR PHY Compiler’s integrated I/O capability enabled the team to construct a custom pad ring with confidence that there would be a good match between the DDR PHY and the DDR I/O in their design.

“We chose the DesignWare Embedded Memories on a 65GP process because they are a proven product that we knew would reduce risk and enable us to meet our performance goals,” said McMath. The design team also liked the idea of an integrated memory test and repair solution that was part of the flow. “STAR Memory System was the obvious BIST solution because of its tight integration with the memories,” said McMath. “We wanted memories with BIST wrappers already instantiated. We particularly liked the ability to insert SMS at the RTL level, as that reduced the disruption and timing changes caused by late-changing RTL.”

## Integrated Tool Flow and Development Platform

Having used Synopsys’ IC Compiler place-and-route technology with good results in the past, OCZ was confident that the tool would generate the best layout. OCZ particularly liked the tight correlation between Synopsys’ IC Compiler™, Design Compiler® and PrimeTime® tools, which reduced the number of design iterations and accelerated design completion. Additionally, they used Synopsys’ Lynx Design System, which gave them a pre-validated RTL-to-GDSII design environment that allowed them to better manage the complexity of their design project. Lynx helped them maintain visibility into key project metrics and expedite implementation.

## Expert IP Integration Services

Recognizing the challenges of doing the physical implementation of a complex design on a very aggressive schedule, OCZ decided to augment their design team with design consultants from Synopsys Professional Services. “Having somebody onsite who was expert with the tools and experienced with the IP was extremely valuable to us,” said McMath. Ultimately, the combination of IP, tools, and experienced layout resources saved the OCZ design team time and, with 97,482/92,005 IOPS read & write performance\*, enabled them to surpass their performance goals. “By using Synopsys IP, tools, and services, we achieved significantly more than we set out to, particularly in terms of performance,” said McMath. “We plan to use the Synopsys tool flow and DesignWare IP for upcoming projects and have every confidence Synopsys will continue to meet our design requirements.”

\* <http://uk.hardware.info/reviews/3531/10/ocz-vector-256gb-ssd-review-with-indilinx-barefoot-3-iometer>

*“A plus point of using Synopsys Professional Services was their expertise in integrating the DDR3 PHY. Having experienced experts complement our team made it possible for us to implement the design much faster than if we had done it on our own.”*

**Brian McMath**  
Technical Director, OCZ Technology