

# Synopsys and Movidius

First-Pass Silicon Success for Myriad 2 Vision Processing Unit with DesignWare USB 3.0, LPDDR3/2 & MIPI D-PHY IP



*Selecting Synopsys DesignWare IP and design tools for our low-power, high-performance Myriad 2 VPU gave us peace of mind, a seamless and mature end-to-end design process, and most importantly, first-silicon success.”*



**Sean Mitchell**

Chief Operating Officer, Movidius

## Business

Movidius is a vision processor company that designs compact, high-performance, ultra low power, computational imaging and vision processing chips, software and development tools, and reference designs. Movidius' architecture delivers a new wave of intelligent and contextually aware experiences for consumers in mobile and wearable devices, robotics, and other consumer and industrial camera applications.

## Challenges

- ▶ Obtain a portfolio of proven IP solutions
- ▶ Differentiate the SoC by meeting aggressive power and performance budgets
- ▶ Deliver a complex 28nm design on a tight timeline

## Synopsys Solutions

DesignWare® IP including:

- ▶ MIPI D-PHY
- ▶ USB 3.0 PHY and Dual Role Device Controller
- ▶ Gen2 DDR multiPHY supporting LPDDR3/2 and uMCTL2 Controller
- ▶ AMBA 2.0 APB I2C and Synchronous Serial Interface
- ▶ Memory compilers and logic libraries

## Benefits

- ▶ Focused design resources on their core competencies
- ▶ Reduced integration risk and achieved first-pass silicon success with DesignWare IP
- ▶ Received excellent technical support from an expert team

## Overview

Movidius' Myriad 2 vision processing unit (VPU) is designed for high-performance, low-power computer vision applications including wearable devices, smartphones and tablets. Its unique combination of high performance, low power, and programmability enhance the image processing capabilities of devices used in indoor navigation, 3D scanning, and immersive gaming with multi-aperture and multi-spectral cameras.

Movidius' focus on mobile devices makes minimizing area and power consumption while maximizing performance paramount. The Myriad 2 VPU offers a small footprint that delivers high computational images with low power consumption.

Movidius focused on first-silicon success to establish leadership in their rapidly expanding market. Facing a new process technology node with resources focused on their core technology differentiators,

Movidius required a reliable IP provider who could provide a wide range of high-quality IP that would cover their resource gaps. Synopsys' DesignWare IP offered a complete portfolio of proven solutions, making it possible for Movidius to work with a single, trusted supplier.

### High-Quality DesignWare IP

Movidius knew that for their VPU's success, they needed flexible IP that could be implemented quickly. The variety of end markets that the Myriad 2 targets, from cameras to displays, have a wide range of configuration requirements. Movidius evaluated several IP vendors and found that Synopsys offered the breadth of PHY, controller, memory and logic library IP that they required.

The DesignWare USB 3.0 PHY, USB 3.0 Dual Role Device Controller, Gen2 DDR multiPHY, and uMCTL2 DDR Controller offered the benefits of small area, low power consumption and high performance that were critical to the Myriad 2 VPU's success. DesignWare Memories' Ultra High-Density Two-Port Register File (UHD 2P RF) further reduced the VPU's area and power consumption, and the Logic Libraries offered an optimal balance of power, performance, and area use. The DesignWare MIPI D-PHY offered high levels of flexibility that enabled the Myriad 2 to be configured application by application.

"The DesignWare MIPI D-PHY offered configurability in the twelve lanes that no other vendor could match," said Sean Mitchell, Chief Operating Officer, Movidius. "The MIPI D-PHY can be configured for CSI-2 or DSI and TX or RX, which is critical for our product's success in multiple markets."

Due to Synopsys' reputation as a trusted IP vendor, Movidius had confidence that the DesignWare IP would work together easily and seamlessly fit into

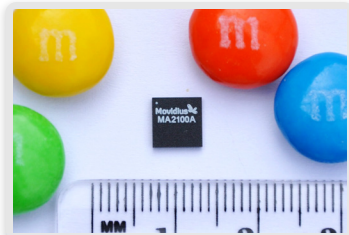
Synopsys' design flows. "Knowing that the IP is verified to work together and will fit into our larger design flow was important," said Mitchell. "We trusted that the IP was going to work, and what we designed is working exactly as expected."

### Expert and Responsive Services and Support

Movidius found that the IP integration went as planned, but when additional assistance was needed, Synopsys Professional Services and application consultants were ready to help. "Synopsys was very responsive in getting us to the 'core of knowledge' regarding a particular tool or IP product," said Mitchell. "Synopsys Professional Services helped us with a particularly tricky part of the design. They understood our product, leveraged Synopsys' internal expertise, and accelerated parts of our design flow."

### Future Product Development

Now that Movidius' Myriad 2 VPU has been successfully deployed to the market, they are developing their next-generation design. "Synopsys' combination of product breadth, high-quality IP, and excellent technical support makes it natural for us to continue using their products," said Mitchell. "We expect to continue developing a strong, multi-year and multi-project relationship with Synopsys."



**Movidius Myriad 2 vision processing unit**

*"Integrating the DesignWare IP into our complex system was faster than expected, and verification of the IP in our wide range of required configurations went smoothly. Synopsys offers an optimal 'one stop shop' with a full portfolio of IP, verification, services, and tools. Using Synopsys helps ensure our success."*

**Sean Mitchell**

Chief Operating Officer, Movidius