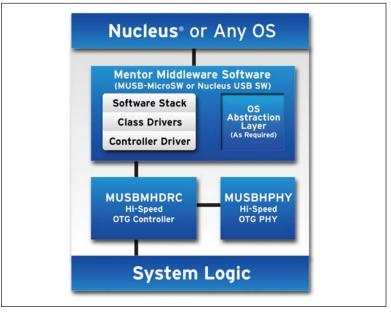
# **USB Subsystem IP**

## DATASHEET



Mentor Graphics is the only IP vendor to offer a fully supported USB subsystem assembled from a combination of silicon-proven hardware and software IP.

Today's complex SoC designs have higher levels of integration and tighter constraints for size, timing, and power. This places a heighten expectation on design teams and design elements for a successful, on-time delivery of the final product. Along with these design complexities, the USB interface with its large list of applications and broad acceptance, makes integration an even greater challenge. Often overlooked because of its peripheral label, USB can incur unnecessary costs during the implementation process if integration is not done correctly or without proper forethought.

The preferred approach to addressing USB's complex and flexible peripheral interface requires that not only pre-verified and silicon-proven IP blocks be used, but also that these blocks be integrated into a silicon-proven, spec-compliant subsystem – to reduce integration errors and even more significant design setbacks.

#### Introducing the Industry's first USB Subsystem IP

Mentor Graphics® is the only IP vendor today to offer a fully supported USB subsystem that is easily assembled from a combination of silicon-proven hardware and software IP. The primary advantage of the Mentor USB subsystem is based on the fact that hardware and software have already been fully integrated, verified, and silicon proven numerous times. This greatly reduces the risks associated with integrating multiple IP from different vendors, reduces integration costs, and significant improves time to market for both the silicon manufacturers and their end customers.

#### **USB Subsystem IP Components:**

#### HARDWARE:

- MUSBMHDRC: USB HS/FS Dual-Role Controller
  - USB OTG and Embedded Host
- MUSBHPHY: USB HS/FS UTMI+ PHY
  - USB OTG and Embedded Host
  - Optional Charge Pump

#### **SOFTWARE:**

- Mentor USB software consists of a stack, class driver, and controller. The software is fully integrated, optimized, verified, and certified with Mentor hardware IP for Embedded Host and Device and OTG subsystem applications
  - $\cdot$  USB 1.1 and 2.0 Compliant (Basic-Speed and Hi-Speed)
  - · OS and processor architecture agnostic
  - · Extensive class driver support: mass storage, human interface (HID), CCID, printer still image comm., RNDIS, audio, video, DFU, virtual serial, PictBridge, and MTP

# Industry Recognized/USB Implementers Forum (IF)

- Basic-Speed & Hi-Speed USB-IF Certification
- USB-IF Logo Certifiable as Embedded, Host, Dual-Role, or USB Device
- Basic-Speed & Hi-Speed OTG Certification
- USB-IF Logo Certifiable as OTG while preserving Embedded Host and Device capability
- Mentor's MUSBMHDRC used in USB-IF Hi-Speed OTG Protocol Tester (HSOPT)



### **USB Subsystem IP Components**

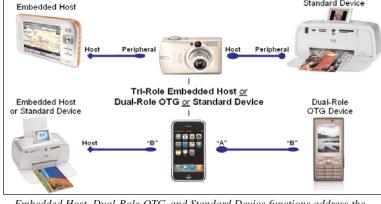
Mentor's USB subsystem includes a Hi-Speed OTG Controller (MUSBMHDRC) with a Hi-Speed USB 2.0 PHY (MUSBHPHY), and a USB micro-software component (MUSB-MicroSW) or the Nucleus® USB software - all are USB-IF certified and optimized to work seamlessly together.

#### Hi-Speed 2.0 OTG USB Controller

The MUSBMHDRC controller offers user-selectable dual-role USB capabilities. So when it's used with the MUSB-MicroSW it can implement an embedded host, a USB peripheral, or a fully USB compliant OTG device on demand.

#### **USB Software**

The Mentor USB feature set combines powerful and fully optimized control functions (both flexible and configurable) into a highly portable architecture ideally suited for Embedded Host, Device, or OTG applications. The two versions of Mentor USB software available today address a variety of applications:



Embedded Host, Dual-Role OTG, and Standard Device functions address the connectivity requirements of the rapidly evolving mobile device market.

1) MicroSW: This soft-

ware is not OS or CPU defined. Because it's OS agnostic, MicroSW can be easily ported to any OS. MicroSW offers the stack, class drivers (including mass storage), HID, printer, audio, and the controller driver for Mentor USB hardware IP.

2) Nucleus USB: This software operates in the widely deployed Nucleus OS environment. Nucleus USB offers a full-feature stack and contains a vast array of class drivers including mass storage, HID, CCID, printer still image comm., RNDIS, audio, video, DFU, virtual serial, PictBridge, MTP, and the controller driver for Mentor USB hardware IP. Nucleus USB can also take advantage of the software simulation tool through Mentor's EDGE Developer suite.

#### Hi-Speed 2.0 USB PHY

The MUSBHPHY, a Hi-Speed PHY developed to the SMIC 130nm process, is silicon-proven and USB-IF certified for Embedded Host. It supports Host, Hub, Device, Embedded Host, and OTG applications. All of these features are especially well suited for the embedded space, with their low-power requirements and small footprint.

#### Compliance & Logo Certification

All four components of the Mentor Graphics USB subsystem are USB-IF certified. In fact, the MUSBMHDRC controller has been selected for use in the development of the USB-IF OTG Protocol Tester – the gold standard OTG

Standard Device

test reference!

# Benefits of Implementing Mentor's USB Subsystem

The benefits of Mentor's USB subsystem IP technology include the use of fully integrated, verified, and certified Mentor IP, which can be used together or independently.

The USB subsystem can significantly reduce product design risks and costs, while shortening lengthy design times to market.

Mentor's USB subsystem can eliminate many of the bothersome product development issues commonly experienced when working with multiple vendor IP components. Finally, with Mentor's IP expertise and integration knowledge built into each subsystem product, customers can take advantage of the experience of a world leader in IP development.

#### Visit www.mentor.com/ip for additional IP product information.

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