# MIPI C-PHY/D-PHY TEST SOLUTIONS WITH AMD VERSAL<sup>TM</sup> PREMIUM SERIES GEN 2

### SOLUTION BRIEF

With enhanced MIPI C-PHY/D-PHY silicon features, AMD Versal<sup>™</sup> Premium Series Gen 2 supports emerging connectivity standards in display and camera testing.

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together we advance\_

### **OVERVIEW**

MIPI C-PHY/D-PHY connectivity standards are used across a broad range of applications including consumer, automotive, and industrial industries. With the growing use of these standards across industries, testing capabilities for MIPI C-PHY/D-PHY are required in semiconductor automated test and instrumentation equipment.

The MIPI C-PHY/D-PHY testing equipment needs to support a large number of tests and channel models and provide internal debug visibility and flexibility to ensure the device testers are meeting the specification required. Test instruments need the capability to support transmit and receive at the desired specifications.

AMD Versal<sup>™</sup> Premium Series Gen 2 devices are the first AMD devices to support MIPI C-PHY. With previous D-PHY support, Versal Premium Series Gen 2 devices are designed to improve connectivity capabilities and support both C-PHY and D-PHY standards across the same set of I/O pins, giving flexibility to users to swap in test modules seamlessly.

AMD provides comprehensive solutions and support along with hard C-PHY and D-PHY IP, including CSI and DSI controllers that support receive and transmit. Custom CSI and DSI can be implemented using AMD provided C-PHY/D-PHY solutions.

## HIGHLIGHTS

### I/O CAPABILITY

- Up to 10 I/O banks with PL fabric-facing connectivity
- Support for C-PHY 4.5 GSPS and D-PHY 4.5 Gb/s
- Multi-node I/O supporting LVDS, and single-ended GPIOs

### **DEVICE CAPABILITY**

- Scalable device series with LUT capacity ranging from 600k LUTs to 1.5M LUTs
- Increased DSP capability in Versal Premium Series Gen 2 devices enable more data processing—with 1.2-1.9X more DSP-to-logic ratio than previous-generation Versal Premium Series devices<sup>1</sup>
- Enables smaller form factor testers with package sizes as small as 35 mm x 35 mm

### I/O CAPABILITY

- Versal Premium Series Gen 2 devices offer 1.9-2.9X more total memory bandwidth by connecting to CXL<sup>®</sup> memory expander modules versus LPDDR5X memory alone<sup>2</sup>
- Versal Premium Series Gen 2 offers 1.5-2.7X faster connectivity to DDR/LPDDR memory (at up to 8533 Mb/s) vs. the competition<sup>3</sup>

### **KEY BENEFITS**

### **C-PHY AND D-PHY SUPPORT**

With the same I/O pins, transmit and receive for both C-PHY and D-PHY standards are supported

#### LARGE TEST BATCH

With a large number of I/O banks with fabric connectivity, numerous devices under test are supported

# SUPPORTS HIGH MEMORY AND I/O BANDWIDTH

Supports DDR5-6400 and LPDDR5X-8533 external memory interfaces and next-generation transceivers at up to 128 Gb/s line rate<sup>4</sup>



## TARGET APPLICATIONS



### **CAMERA SENSOR TEST**

Consumer and automotive markets need industry standards to verify camera sensors are meeting the market's requirements. Industry connectivity requirements are based on the MIPI Alliance camera sensor test standards to service the market's next-generation technology. Versal Premium Series Gen 2 devices offer the following features to meet the MIPI Alliance camera sensor test requirements:

- Dedicated silicon features C-PHY data rate up to 4.5 GSPS
- AMD solutions for CSI IP for both transmit and receive
- Standardized PPI interface for custom controller integration

#### **DISPLAY PANEL TEST**

Next-generation consumer, mobile, and automotive products include display panels for user interfacing. These markets need industrystandard display panel tests to ensure display panels are performing as designed. Versal Premium Series Gen 2 devices meet the MIPI Alliance display panel test standards with the below features:

- Dedicated silicon features with a D-PHY data rate up to 4.5 GSPS
- AMD solutions for DSI IP for both transmit and receive
- Standardized PPI interface for custom controller integration

### SEMICONDUCTOR AUTOMATED TEST

With more demand for semiconductor integration in a variety of markets, semiconductor automated test becomes increasingly crucial. Using the latest MIPI Alliance standards to verify connectivity functionality, semiconductor automated test equipment performs tests on devices in large batches to ensure device requirements are met. To serve the variety of semiconductor automated tests, Versal Premium Series Gen 2 devices offer many features to support the various test requirements.

- High compute density
- · Increased DSP capability over the previous-generation Versal Premium Series devices
- High I/O count supports the large number of DUT ports
- Supports D-PHY and C-PHY standards on the same I/O pins
- Lower design efforts by using the same base PCB board between iterations

### MIPI CAMERA SENSOR AND DISPLAY TEST APPLICATION



### **FEATURES**



FEATURE	HIGHLIGHTS
PROCESSING SYSTEM	<ul> <li>Complex algorithm processing and decision-making tasks</li> <li>Dual-core Arm<sup>®</sup> Cortex<sup>®</sup>-A72 application processing unit</li> <li>Dual-core Arm Cortex-R5F real-time processing unit</li> </ul>
DSP ENGINES	<ul> <li>DSP-rich architecture with up to 7,616 DSP58 Engines</li> <li>Wide range of modes supporting fixed and floating point data types suitable for DSP and ML applications</li> </ul>
PCIe INTERFACES	<ul> <li>Up to 2 Tb/s aggregate bandwidth across 16 lanes (two x8 links) operating at 64 Gb/s per lane</li> <li>Enhanced security features with Integrity and Data Encryption (IDE) support in hard IP</li> </ul>
DEDICATED MEMORY CONTROLLERS	<ul> <li>Supports DDR5 up to 6400 Mb/s and LPDDR5X up to 8533 Mb/s</li> <li>Hard inline ECC and encryption for data integrity and security</li> </ul>
CONNECTIVITY IP	<ul> <li>Up to 3.1 Tb/s of scalable Ethernet throughput</li> <li>Multirate: 400/200/100/50/40/25/10G</li> <li>Multi-standard: FlexE, Flex-0, eCPRI, FCoE, and OTN</li> </ul>

## **NEXT STEPS**

- For more information on Versal Premium Series Gen 2 devices, visit www.amd.com/versal-premium-gen2
- For more information on Test and Measurement, visit www.amd.com/en/solutions/test-and-measurement.html

#### ENDNOTES

- 1. Based on AMD internal analysis of AMD Versal Premium Series Gen 2 devices vs. previous-generation Versal Premium Series devices, as of July 2024. Actual DSP-to-logic ratio will vary based on system configuration and other factors. (VER-061)
- Based on AMD internal analysis of the total memory bandwidth (CXL 3.1 and LPDDR5X memory components) available with AMD Versal Premium Series Gen 2 devices vs. comparable devices with LPDDR5X memory alone. Memory bandwidth will vary based on system configuration and other factors. (VER-059)
- Based on AMD internal analysis of Versal Premium Series Gen 2 device DDR/LPDDR memory interface specifications vs. the same competitive devices, as of July 2024. Actual performance will vary based on system configuration and other factors. (VER-058)
- 4. Data is preliminary and subject to change. (VER-063)

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