



TEST AND MEASUREMENT CASE STUDY

Versal Premium PCIe card for Network Test

In this case study, we discuss the co-development of a commodity PCIe network interface accelerator based on Versal Premium Technology, utilizing the LPDDR4 interfacing for long term availability, PCIe Gen5 host connections and custom clocking and GTM transceivers for the network interface test ports

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Project Requirements

- **Customer Requirements**

- Versal Premium Technology
- Off-the-shelf commodity availability, volume and pricing
- PCIe form-factor
- Product longevity
- High-memory bandwidth
- GTYP and GTM network interfacing
- Advanced timing inputs and clock synchronization

- **Alpha Data Requirements**

- Versal Premium PCIe form-factor product
- Off-the-shelf commodity availability
- Product longevity
- Advanced memory and GT networking connectivity



After being the first third party to market with Versal Prime and AI Core PCIe cards, Alpha Data had a follow up roadmap requirement to release a Versal Premium product soon after silicon availability.

Around this time, a customer approached Alpha Data with a requirement for a test and measurement board that was close in specification to a Versal Premium card Alpha Data had on the drawing board. The similarity in specification allowed rapid progress in moving to a common requirement capturing all the customers technical needs while producing a commodity product that many other Alpha Data customers can now also benefit from. By utilizing a commodity design and build flow, the customer also benefits from cost savings and sharing the design risk.

This joint specification process rounded out the capabilities of the PCIe card producing a powerful flexible network interface card capable of substantial back-end test and measurement processing. The customers feedback and review during the design, development and test process was extremely valuable in developing a robust product suitable for large scale deployment.

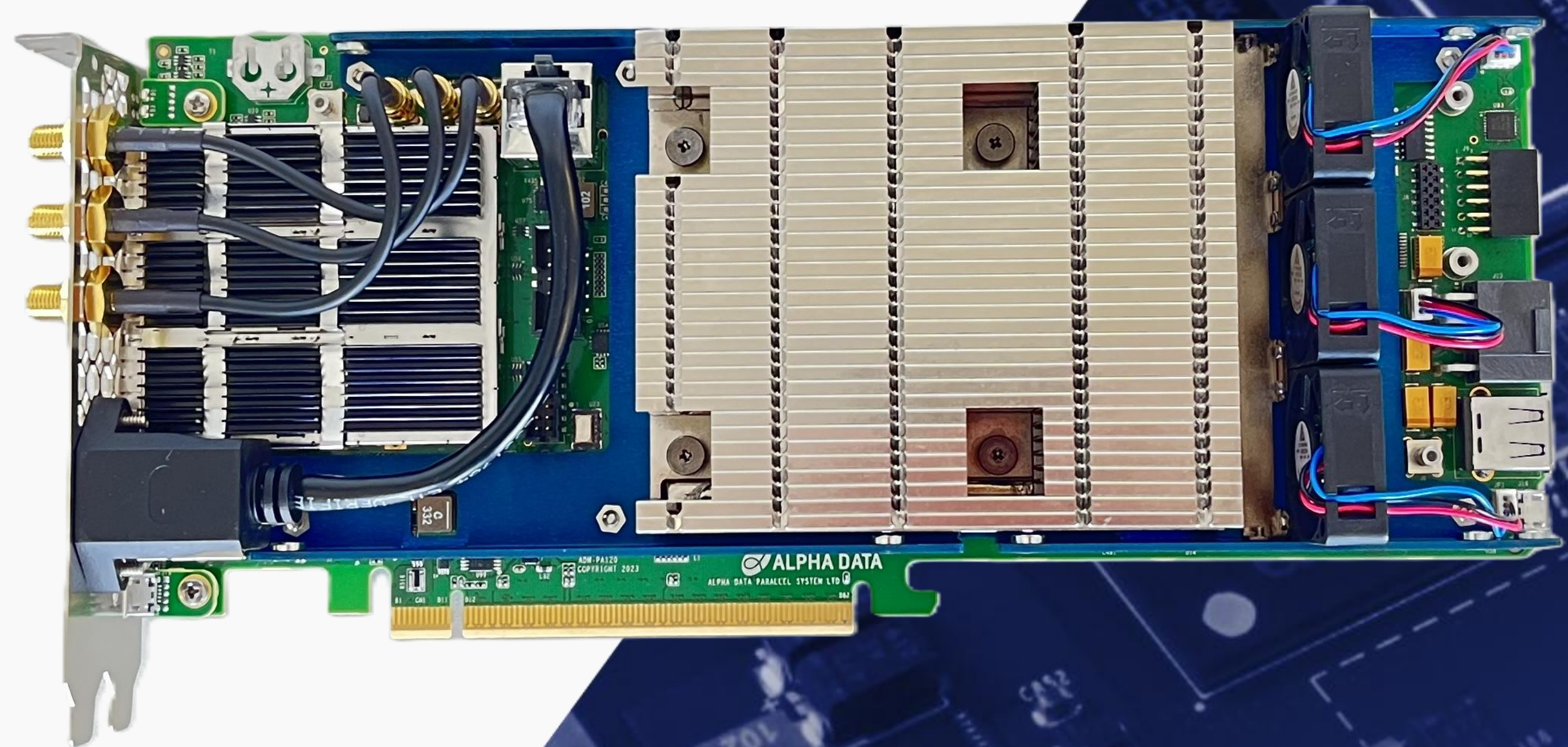
Project Challenges

- **Memory Bandwidth and Product Longevity**
 - Very high memory bandwidth was required
 - But product longevity however ruled out the use of HBM parts
 - LPDDR4 in multiple banks can however provide bandwidth close to what was needed
 - Versal Premium Hard IP and NoC allow this memory to be efficiently accessed
- **Advanced clock recovery**
 - Synchronous networking requires advanced clock devices and connections
 - ITU-T G.703 clock connections are included
 - Clock generation and jitter attenuation provided through TI LMK61E2 and Skyworks Si5344 devices
 - For 5G/SyncE/IEEE 1588 applications a Skyworks Si5402 device also supports Network Synchronization Clocks



Project Challenges

- **Software Solutions and Board Support**
 - For Vivado and Vitis development, board files are provided downloadable from the AMD board store.
 - A suite of PCIe and embedded ARM reference designs are also provided to help customers get started using the boards
 - To support the QDMA IP in the CPM5, a new ADQDMA driver was developed for Linux supporting the queue features and virtualization that network applications expect



Project Outcomes

- **A commodity product for the customer**
 - The ADM-PA120 is now a component, server qualified, that can be called off by the end customer when needed for more test and measurements systems
- **Off-the shelf, long term available PCIe solution**
 - The ADM-PA120 is available with both the VP1202 and VP1502 Versal devices for general customers and immediate shipment from stock is standard
 - A near identical VP2502 variant is also available for customers who need to deploy AI Engines in a PCIe environment (ADM-PB125)
 - Anticipated EoL for all these products is after 2040, giving customers peace of mind.

