

# MAGEWELL USES AMD FPGAs TO DEVELOP LATEST USB VIDEO CAPTURE DEVICES

## CUSTOMER



## INDUSTRY

AV/Broadcast

## CHALLENGES

Magewell was looking to create a media capture device that achieved USB3.2 Gen2x2 physical layer compatibility across various USB controllers. Magewell tested other FPGA products, but ran into issues, including instability at 10 Gb/s or high-power consumption.

## SOLUTION

AMD Artix™ UltraScale+™ FPGAs provide Magewell with the performance and stability it was seeking, along with low power consumption and resource efficiency, enabling compatibility adjustments for HDMI and USB interfaces.

## RESULTS

The AMD FPGA solution offers high I/O performance, compatibility, and low power consumption that allows Magewell to deliver reliable, high-speed media capture.

## AMD TECHNOLOGY AT A GLANCE

AMD Artix™ UltraScale+™ FPGAs

*Magewell is leveraging an AMD Artix™ UltraScale+™ FPGA to implement both the physical and digital layers of USB, eliminating the need for external controllers.*

Magewell designs and develops hardware and software for media capture, conversion, and streaming, utilizing high-performance video I/O and IP workflow solutions that seamlessly bridge signals, software, streams, and screens. Its products have become a preferred choice for bringing video and audio signals into and out of IP networks, and its software for live streaming, production, and web conferencing is widely preferred for its simplicity, cost-effectiveness, and reliability. Magewell solutions are used by the world's biggest broadcasters, small houses of worship, independent producers, live streamers, sports teams, and entertainment venues.

Its industrial division, known as Magewell Industry develops very reliable, high-bandwidth frame grabber solutions for demanding machine-vision applications. These solutions leverage the advantages of high-speed SerDes technology with multiple independent IP cores and high-speed data interfaces such as CoaXPress, Camera Link, and 10GigE Vision. Magewell's Capture family of external USB capture devices has been its most popular product line and has earned its reputation as one of the easiest and most reliable ways to bring AV signals into software. It lets users capture HDMI or SDI signals into any computer – even laptops – over a USB interface. While most alternative professional video capture devices require users to install proprietary device drivers or software, the USB Capture family offers immediate compatibility with OS-native drivers on Windows-, Mac-, Linux-, and Chrome-based systems for true plug-and-play ease of use.

## CHALLENGE

Magewell has developed numerous video encoding algorithms, decoding algorithms and video capture devices on AMD FPGAs, including a recent addition to the company's USB Capture family, the USB Capture HDMI 4K Pro. Previously, due to USB bus speed limitations, the highest-end Magewell USB Capture model could capture 4K video up to only 30 fps and with 4:2:0 chroma subsampling. Its new USB Capture HDMI 4K Pro is designed to take advantage of 20 Gb/s USB 3.2 Gen 2x2 connectivity to capture 4K video up to 60 fps at 4:4:4.

Thus, the primary technical challenge the company faced was achieving USB3.2 Gen2x2 physical layer compatibility across various USB controllers.

Magewell tested other FPGA products, but ran into issues, such as instability at 10 Gb/s or high-power consumption. "We've used FPGAs in our solutions for many years to achieve future-ready flexibility, and the ability to continually innovate as required," said Nick Ma, CEO & CTO Magewell. "FPGAs allow us to upgrade our hardware solutions with new features, while implementing techniques and technologies that may not yet be available in other approaches."

Ma said the ASIC chips used in some competitors' products do not support 20 Gb/s USB transmission speeds, which means they must apply significant video compression to support 4K at 60 fps over slower USB transmission. That compression requires significant CPU resources to decompress the video once received in the computer – thus taking valuable CPU cycles away from the user's software applications – while also degrading the video quality.

## SOLUTION

"AMD Artix UltraScale+ FPGAs provide us with the performance and stability we need with lower power consumption," said Ma. "They also deliver resource efficiency and enable compatibility adjustments for HDMI and USB interfaces."

For this solution in particular, Magewell used an AMD Artix UltraScale+ FPGA to implement both the physical and digital layers for USB, eliminating the need for external controllers. The FPGA handles high-speed data transmission and complex algorithms, serving as the core processing unit. Integrated HDMI2.0 and USB3.2 interfaces via SerDes eliminated additional interface chips. Its internal CPU soft core enabled HDMI and USB control, enhancing product market competitiveness by simplifying the hardware design.

Magewell has a tremendous reputation responding promptly to its customers' needs and product suggestions. Across all their product lines, the company periodically releases new firmware updates that expand or enhance the features of its solutions to improve the operation of the products or even to support new industry technologies and trends. The use of AMD FPGAs in its solutions gives Magewell some flexibility and allows it to be very responsive to new market trends affecting customer needs.

## RESULT

"AMD FPGA solutions offer high I/O performance, compatibility, and low power consumption that meet our product requirements," Ma said. "The devices' abundant I/O and logic resources deliver reliable, high-speed operation, while their high-performance SerDes support various interface protocols. Furthermore, the AMD software development tools have enhanced product development and debugging efficiency."

Ma said that since integrating AMD technology into Magewell designs, the company has realized enhanced I/O (GTH) performance, which has allowed Magewell to achieve high-quality data transfer and compatibility with various USB controllers, while the FPGA's efficient internal logic facilitated 20 Gb/s of USB data processing.

"The FPGA's powerful logic and I/O integration shortened the development time and accelerated Magewell's time to market," Ma said. "Additionally, the AMD development tools (AMD Vivado™ Design Suite) provided efficient compilation, easy debugging, and a comprehensive simulation environment." Ma added that the design experience was mostly smooth, with AMD providing the company with extensive technical documentation, and an FAE team that always responded promptly to their questions.

AMD FPGAs provided robust I/O, high-performance logic, and user-friendly tools that allowed Magewell to focus on functional optimization. The simulation capabilities, particularly for GTH, facilitated early-stage debugging. Consolidation of all functions in one single FPGA reduced product size and enhanced stability and reliability. The company has also benefited from close, multi-faceted communication with AMD on future product development.

### ABOUT MAGEWELL

Magewell develops innovative, high-performance video I/O and IP workflow solutions that seamlessly bridge signals, software, streams, and screens. The simplicity, reliability, and cost-effectiveness of Magewell's capture, conversion, and streaming products make them the preferred choice of integrators and end-users for bringing high-quality AV signals into and out of IP networks and popular software. Magewell solutions power applications including live streaming, event production, video conferencing, video distribution, remote learning, medical imaging & others. For more information, go to <https://www.magewell.com/>

### ABOUT AMD COST-OPTIMIZED PORTFOLIO

The combination of TSMC 16 nm FinFET process with new UltraRAM and SmartConnect technologies enables AMD to continue delivering 'More than Moore's Law' value to the market. In particular, the AMD Artix UltraScale+ devices are cost-optimized FPGAs based on an advanced, production-proven 16 nm architecture for exceptional performance/watt. With up to 16 Gb/s transceivers for advanced protocols and high FPGA DSP performance, Artix UltraScale+ FPGAs maximize system performance for cost-sensitive and low-power applications in machine vision, networking, 4K broadcast, and a range of Industrial IoT and edge markets.

### ABOUT AMD

For more than 50 years, AMD has driven innovation in high-performance computing, graphics, and visualization technologies. Billions of people, leading Fortune 500 businesses, and cutting-edge scientific research institutions around the world rely on AMD technology daily to improve how they live, work, and play. AMD employees are focused on building leadership, high-performance, and adaptive products that push the boundaries of what is possible. For more information about how AMD is **enabling today and inspiring tomorrow**, visit the [AMD \(NASDAQ: AMD\) website](#), [blog](#), [LinkedIn](#), and [X](#) pages.

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