



INNOSILICON

 **Imagination**

Case Study

IMAGINATION AND INNOSILICON

Enabling Innosilicon's First High-Performance GPU
for Data Centre and Desktop

Enabling Innosilicon's First High-Performance GPU for Data Centre

Innosilicon might not be a familiar name to Western ears, it's a big name in the Chinese technology market. Starting in the mid-2000s, Innosilicon is known as a world-class one-stop-shop for high-speed mixed-signal IP and custom ASIC solutions. It also pioneered significant breakthroughs in advanced DDR high-bandwidth memory technology; its GDDR6X PHY and controller IP was the first in the world to be silicon-proven.

Backing up its ambitions, the company has worked with Foundries worldwide using process nodes down to as low as 5nm, specialising in advanced FinFET production techniques for the most advanced and efficient manufacturing outcomes. To date, Innosilicon has enabled its customers to achieve huge success, with billions of chips in mass-production worldwide.

Aiming for the clouds

Now Innosilicon is setting its sights on the cloud-gaming GPU market – and with good reason. Cloud gaming, 5G, and the metaverse are bringing explosive demand for low latency and high-quality graphics rendering power – not on portable devices or desktop PCs – but in data centres. Thanks to the proliferation of smart devices and the development of 5G networking an increasing number of Android-based applications are moving into the cloud.



Innosilicon has the bold ambition of breaking the OS-market oligopoly by delivering competitive Linux and Android solutions to bring more choices to data centre customers. However, the inefficient, brute-force approach of traditional GPU designs is not a great fit for this, as in data centres minimising heat and power are of critical concern.

To solve this challenge, Innosilicon needed an efficient, scalable, cost-effective solution, and, to ensure performance was competitive in the desired timeframe, it had to be designed quickly. It needed a partner that could not only provide class-leading IP but also had the experience and expertise to help bring the solution to market.

The perfect partnership

To do this, Innosilicon turned to Imagination Technologies. Imagination has been delivering innovative 3D graphics solutions for over 25 years. Its PowerVR architecture, with its focus on delivering the highest performance with the greatest bandwidth efficiency in the lower power envelope, help kickstart the mobile gaming revolution. At the heart of the PowerVR architecture is its tile-based deferred rendering (TBDR) architecture, a unique, highly patented approach that eliminates the unnecessary processing of hidden pixels in the 3D scene. This approach makes its designs perfect to meet the challenge of the cloud-gaming data centre revolution.

IMG BXT – an exceptional leap in performance

The standout choice to meet Innosilicon's needs was Imagination's IMG BXT, a high-end performance-focused option from the IMG B-Series. Tuned to deliver the maximum FPS/W, BXT boasts up to 70% higher compute density compared to competing desktop GPU designs as well as up to 25% lower area and up to 30% lower power than previous Imagination designs.

[Learn more about IMG BXT](#)



BXT architecture highlights include an advanced de-centralised multi-core architecture, and HyperLane technology, an industry-leading virtualization solution that unlocks the efficient processing of multiple tasks to ensure data centre customers can maximise the use of GPU hardware, especially when it comes to cloud gaming applications.

Meanwhile, IMGIC multi-level image compression delivers outstanding image quality at the lowest possible bandwidth cost, while reducing processing cycles per frame, to boost performance and lower power consumption.

Proven GPU IP that unlocks innovative product design

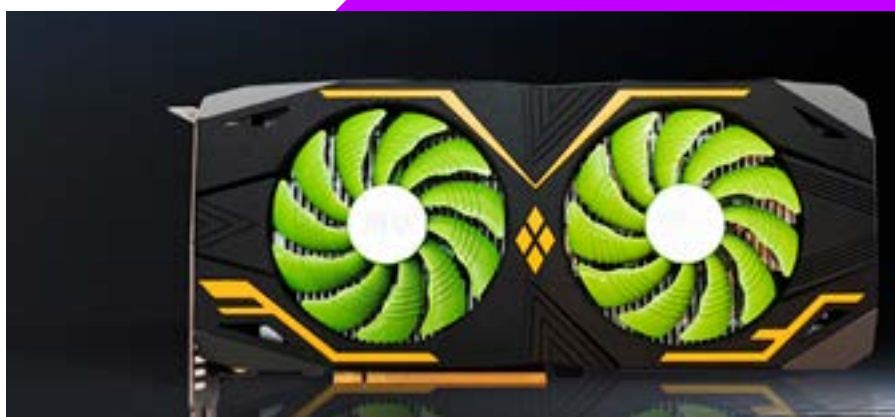
After working with Imagination to bring its GPU design concept to life, Innosilicon launched its first-generation graphics card, the Fantasy One in 2021. Supporting 4K displays and multi-channel video codecs the Fantasy One graphics card is built using a 12nm fabrication process is PCI Express 4.0 ready and features DisplayPort 1.4 and HDMI 2.1 connections. The dual-chip board can be fitted with up to 32GB of GDDR6X memory and delivers up to 10 FLOPS of FP32 performance, 50 TOPS of INT8 Performance and 320 GPixel/s.

API support includes Vulkan, OpenGL®, OpenCL™, and OpenGL® ES, making it ideal for running Android or Linux applications.

With the fast growth of cloud computing market, GPU innovation is becoming a crucial differentiator. In Imagination we found the right partner to help us deliver products that go above and beyond our customers' expectations. Fantasy One is our first server-level graphics card that's designed for both desktop and cloud applications. By integrating IMG BXT GPU technology, we were able to create an incredibly power-efficient solution, that delivers 4K performance in a PCI-E Gen 4 GPU. Thanks to the GPU's scalable architecture, it can be tailored to meet the demands of 5G cloud gaming and data centre implementations.

Roger Mao, Executive Vice President, Innosilicon.

[Learn more about Fantasy One](#)



Solving challenges together

Designing such a graphics card was no small feat and came with a variety of elements to juggle.

These included balancing the compute shader as well as various fixed-function pipelines that are dedicated to processing graphics primitives such as vertex, texture, and fragments. Even a single bottleneck could jeopardize the performance of the whole system. These factors pose challenges when designing a GPU from the ground up, especially in a short time frame.

However, the selection of GPU architecture from a company as a starting point with as much experience and know-how as Imagination has enabled Innosilicon to greatly reduce design risk and deliver a highly performant, high-quality product. The Fantasy One meets the need for high-quality rendering with low latency, which is specifically required for Android applications in the data centre. It's no surprise then that the Fantasy One graphics card has seen great success since its launch, both with data centre customers as well as the desktop community.

Commenting on the collaboration, Mao, observed, "With the fast growth of the cloud computing market, GPU innovation is becoming a crucial differentiator. In Imagination, we found the right partner to help us deliver products that go above and beyond our customers' expectations.

Watch how we collaborated with Innosilicon





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