



The First Consistent Graphics Interface for Notebook PCs

The **Mobile PCI Express Module (MXM)** is the result of a joint design effort with the industry's leading notebook manufacturers. It provides a consistent interface for PCI Express graphics in order to achieve:

- Faster time to market for the latest notebook graphics
- Multiple system configurations and price points from a single system design
- Compatibility for any graphics solution from any vendor
- Configure-to-order upgradeable graphics through the channel, or potentially by consumers

With these goals in mind NVIDIA as worked with these leading manufacturers to create a consistent graphics interface designed for notebook PC systems.

THE EVOLUTION OF NOTEBOOK GRAPHICS

The explosive growth of the notebook PC market highlights the value consumers place on portable systems. But unlike desktop PCs, notebooks are subject to restrictive size and thermal constraints. These constraints have caused manufacturers to customize their designs to the point where every new generation of graphics technology requires an extensive redesign effort.

In contrast, desktop PCs are guaranteed to have a defined mechanical, thermal, and electrical interface for graphics. The PCI Express desktop graphics specification is the latest examples of a consistent graphics interface that allows hardware manufacturers to quickly deliver new graphics processing units (GPUs) for desktop PCs.

The PCI Express transition in notebook PCs is the ideal opportunity to introduce a consistent interface for any GPU from any vendor to instantly connect to any mobile system.

ACCELERATING THE DESIGN CYCLE

Notebook designs with graphics modules are not a new concept. The industry has long acknowledged that modular designs are the best way to shorten the design cycle and to deliver the latest GPUs to the market faster. Historically this has been achieved with proprietary module designs that are customized for specific platforms.

Just as proprietary modules have accelerated the design cycle for particular notebooks, MXM would allow any notebook manufacturer to accelerate the design cycle for all notebooks designed with the MXM graphics interface.

ONE DESIGN, MANY NOTEBOOKS

Another critical issue faced by notebook manufacturers and system builders is the difficulty in supporting multiple platforms simultaneously. Multiple platforms create increased complexity for inventory management, logistics, and technical support.

Ideally a manufacturer could simply configure to order a single base platform with a range of graphics options in order to address multiple market segments and price points. Designing a system with an MXM interface provides that flexibility.

ANY GRAPHICS SOLUTION FROM ANY VENDOR

A typical notebook design with a GPU soldered onto the motherboard makes the notebook manufacturer entirely dependent on their choice of the GPU vendor as well as the graphics memory vendor. Faced with a sole-sourced component, notebook manufacturers may find themselves shipping an uncompetitive product at launch, or worse, forced to slip production ship dates because of component schedule slips.

By creating a consistent graphics interface across notebook designs, MXM would extend this flexibility across multiple platforms in the industry. This allows manufacturers to select the best graphics solution available at any time, giving customers a wider selection of the latest products.





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UPGRADEABLE NOTEBOOK GRAPHICS

An additional benefit of creating a consistent notebook graphics interface is that it provides a design specification for upgradeable graphics in a notebook.

In order to achieve varying degrees of performance for different sized systems, the MXM interface describes three types: MXM-I is designed for thin and light form factors, MXM-II is designed for mainstream form factors, and MXM-III is designed for the highest performance systems.

Notebooks and modules that comply with these mechanical specifications will be interchangeable, and thus upgradeable if the chassis is designed to support field replacement.

To support these customers and accelerate the adoption of PCI Express in notebooks, NVIDIA collaborated with all of the industry's leading ODMs to create a consistent graphics interface in the form of MXM. NVIDIA is committed to creating reference designs for all next generation GPUs using the MXM specification.



DELIVERY VEHICLE FOR NVIDIA'S NEXT-GENERATION GEFORCE 6 GO SERIES GPUS

Customers are extremely excited about ramping new graphics architectures into the market as soon as possible, particularly NVIDIA's highly anticipated GeForce 6 Go Series of products. MXM platforms represent the fastest and easiest vehicle to validate and ramp the GeForce 6 Go Series of GPUs immediately.

CO-DESIGNED WITH INDUSTRY LEADING NOTEBOOK DESIGNERS AND MANUFACTURERS

As with any major architectural transition, PCI Express introduces a great deal of production risk for notebook designers. In order to manage this risk, many Original Design Manufacturers (ODMs) are designing systems with modular graphics.

The notebook PCs market is the most dynamic segment of the PC industry, and PCI Express creates an opportunity to introduce a variety of innovative graphics solutions in the next year. By collaborating to design a consistent graphics interface in the form of MXM, the industry's leading manufacturers are introducing a revolutionary interface that will allow notebook PC graphics to advance as quickly as desktop PC graphics.



Features	Benefits
Consistent interface across all PCI-Express notebooks	Single notebook design can be leveraged for multiple market segments
Low-cost edge connector	A robust connector that handles all display and 16-lane PCI express signals
Single connector handles all display and PCI-express signals	One simple insertion for easy assembly at the lowest cost
Support for multiple GPU and video memory vendors	Creates a competitive environment by enabling multiple sources for GPUs and memories
Compatible with integrated graphics	Creates an upsell opportunity for systems with integrated graphics
NVIDIA GeForce 6 Go Series reference designs	Dramatically accelerates time to market and reduces engineering costs by using an NVIDIA reference design

