



NVIDIA GoForce 3D Technology

THE WORLD'S FIRST PROGRAMMABLE 3D CORE FOR HANDHELD DEVICES

NVIDIA® GoForce™ 3D technology combines ultra low-power consumption with stunning 3D shading technology, delivering for the first time ever fully interactive, photorealistic graphics on the handset platform. Leveraging the extensive NVIDIA patent portfolio, GoForce 3D technology features the industry's first shader instruction set for handheld devices. Shaders offer two fundamental benefits for handsets—significantly lower power consumption and advanced cinematic visual effects.

FIRST NVIDIA 3D GRAPHICS TECHNOLOGY FOR HANDHELD DEVICES

NVIDIA is the market leader in visual computing technology, dedicated to creating products that enhance the interactive experience on consumer and professional computing platforms. NVIDIA GoForce 3D technology is targeted at the emerging need for high-quality, high-performance, compelling graphics for the handheld market. Native hardware geometry acceleration supports industry standard OpenGL® ES and Direct3Dm APIs. This is the world's first programmable 3D core for handheld applications, driven by the vision of extending networked digital content to the handheld platform.

ARCHITECTED SPECIFICALLY FOR CELL PHONES AND HANDHELD DEVICES

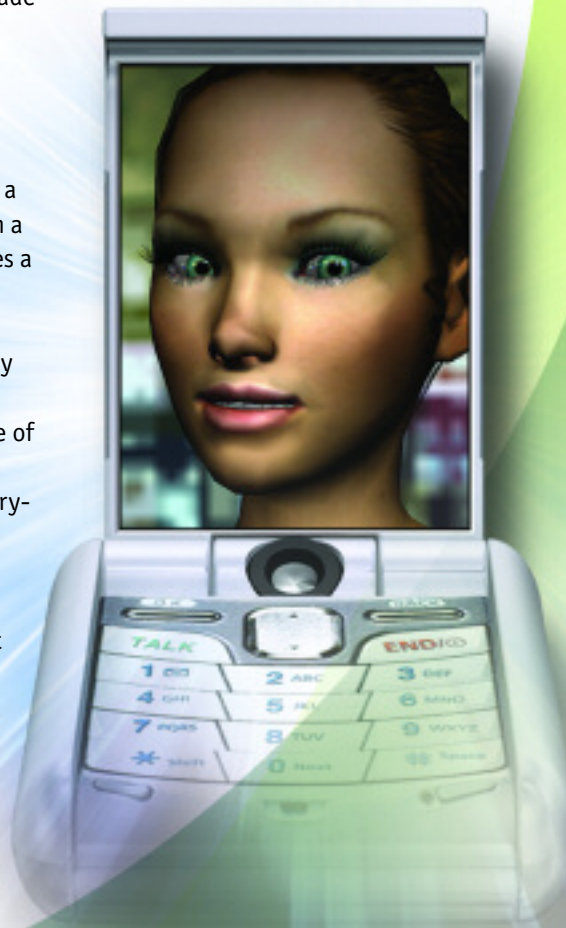
NVIDIA has invested in a brand new architecture specifically targeted to the handheld device, balancing a great visual experience with extended battery life. Unlike other offerings in this market, GoForce 3D technology is not derived from a PC-centric architecture and re-targeted at the handheld market. The result of NVIDIA's innovation is a core with extremely high 3D performance (250 million pixels/second) running at a fraction (1/10) of the power of traditional cores. Consumers can enjoy visually appealing games and interactive real-time performance without having to trade off battery life.

A PLATFORM TO SUPPORT NEXT- GENERATION HANDHELD CONTENT

GoForce 3D technology is uniquely supported by a strategy that combines a revolutionary graphics experience with a wide choice of content. NVIDIA provides a handheld software development kit (SDK), designed to allow content developers access to NVIDIA technology and help them understand the architecture in order to take advantage of all the unique features of GoForce 3D technology. The combination of industry-leading features and the content they enable will make possible the creation and delivery of games with complex scenes as well as new applications that run flawlessly on the handheld.

BREAKTHROUGH NVIDIA NPOWER TECHNOLOGY DELIVERS INDUSTRY- LEADING BATTERY LIFE

GoForce 3D technology integrates some of the key components of NVIDIA nPower technology, which saves precious battery life, enabling over ten times the energy efficiency as compared to equivalent software-based solutions. Implementation of hardware-based processing, static and dynamic clock-gating, and the support for full on-chip processing enable GoForce 3D technology-based solutions to optimize power consumption at the system level, thus delivering a visually compelling 3D experience without compromising battery life.





FEATURES		BENEFITS
PERFORMANCE	Geometry Processor	The integrated geometry processor performs complex transform and setup calculations, while offloading the main CPU in the handheld. The geometry processor enables rich 3D applications to run extremely fast while consuming minimal power.
	64-bit 2D Graphics Engine	High-performance precision graphics that improve everything from simple text scrolling to playing a fast-motion game. There are a lot of 2D operations in 3D applications, so it is important to have great 2D performance so the application, as a whole, delivers awesome performance. The 2D engine enables rich UIs and snappy UI performance.
IMAGE QUALITY	Programmable Shader Technology	First 3D core with programmable shader technology for handhelds. Desktop-class graphics technology in your handheld. Stunning photorealistic, graphics quality. Invoke lifelike avatars, play games with amazingly high-quality images on your handset.
	Multitexture Support	Multitexturing efficiently can apply up to 6 simultaneous textures to every pixel, enabling high-quality 3D images to be rendered efficiently on the handheld. Multitexturing enables rendering of realistic graphics including partially reflective surfaces and accurate reproduction of the interplay between light and shadows. GoForce 3D supports multitexture in an intelligent manner reducing system traffic, thus enabling lifelike 3D graphics and long battery life.
POWER SAVINGS	NVIDIA nPower Technology	NVIDIA's unique approach to maximizing battery life both in standby and active modes. nPower technology utilizes a host of optimizations—on chip processing, multiple hardware processors, dynamic clocking—to minimize power consumption in active modes. The battery lasts longer when you are taking pictures, viewing your album, playing games, making video clips or playing video.
	Early Z	GoForce 3D core optimizes the processing and hence power consumption of your handset by identifying non-visible sections of a frame and discarding them. This saves up to 60% of processing requirements leaving ample performance headroom or extending the handheld's battery life.
COMPATIBILITY	Standards Support	Support for widely deployed and standard APIs ensures that popular content is available and optimized to run on the GoForce3D core. This ensures a choice of compelling content and applications for the consumer. Developers of 3D content using these industry standards can therefore offer their handheld games and applications to users of devices that employ GoForce 3D technology.

NVIDIA GOFORCE 3D SPECIFICATIONS

3D ENGINE

- Geometry transform engine (floating point and fixed point)
- 16-bpp (RGB565) color with 16-bit Z (high quality dithering)
- 40-bit color pipeline with signed non-integer color (over bright)
- 8 surfaces (color, Z, texture 1-6)
- Programmable pixel shader
- Fog, perspective correction, alpha-blending
- Mip-mapping
- Bilinear/trilinear filtered texturing
- 4/8-bit palettized texture, 16-bit (1555ARGB, 565RGB, 4444ARGB)
- Multitexture support (up to 6 simultaneous textures)
- Super-sampled antialiasing
- Compressed texture support (DXT)
- 250 million pixels/sec.
- 5 million vertices/sec.
- 5 million triangles/sec.

2D ENGINE

- 8-bpp (palettized), 16-bpp and 32-bpp
- Rectangle draw and BitBLT with 3-operand raster operation (ROP)
- All-angle Bresenham line drawing with sub-pixel resolution and ROP
- Mono (text) to color expansion
- Mono pattern or mono source transparency
- Source or destination color transparency
- Clipping
- Drawing synchronization with LCD display controller / 3D unit

POWER MANAGEMENT

- Automatic power-down of unused pipelines (nPower)
- Normal, standby, and sleep modes
- Architectural-level power management
- Gated-clock power management
- Circuit-level power management
- Low-voltage operation

STANDARDS

- OpenGL ES 1.0 and 1.1 supported
- Mobile D3D Supported
- JSR184 Supported



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