



NVIDIA GeForce GTX 580  
GPU Datasheet

# NVIDIA GeForce GTX 580 GPU Datasheet

## 3D Graphics

- Full Microsoft® DirectX® 11 Shader Model 5.0 support:
  - NVIDIA PolyMorph Engine with distributed HW tessellation engines
  - BC6H and BC7 texture compression formats
  - Gather4 extensions
- OpenGL 4.1 support
- Advanced image quality features:
  - 32x coverage sample antialiasing
  - Transparent multisampling and transparent supersampling
  - 16x angle independent anisotropic filtering
  - 128-bit floating point high dynamic-range (HDR) lighting with antialiasing; 32-bit per-component floating point texture filtering and blending
- Interactive ray tracing support
- Full-speed frame buffer blending
- Full-speed FP16 texture filtering
- Advanced lossless compression algorithms for color, texture, and zdata
- Support for normal map compression
- Adaptive z-cull
- Early-Z

## GPU Computing

- NVIDIA CUDA™ technology—allows the GPU cores to provide performance improvements for applications such as video transcoding, gaming, ray tracing, and physics. API support includes:
  - CUDA C
  - CUDA C++
  - DirectCompute 5.0
  - OpenCL
  - Java, Python, and Fortran
- Third Generation Streaming Multiprocessor (SM)
  - 32 CUDA cores per SM
  - Dual Warp Scheduler simultaneously schedules and dispatches instructions from two independent warps
  - 64 KB of RAM with a configurable partitioning of shared memory and L1 cache
- Second Generation Parallel Thread Execution ISA
  - Unified Address Space with Full C++ Support

- Optimized for OpenCL and DirectCompute
- Full IEEE 754-2008 32-bit and 64-bit precision
- Full 32-bit integer path with 64-bit extensions
- Memory access instructions to support transition to 64-bit addressing
- Improved Performance through Predication
- Improved Memory Subsystem
  - NVIDIA Parallel DataCache™ hierarchy with Configurable L1 and Unified L2 Caches
  - Greatly improved atomic memory operation performance
- NVIDIA GigaThread™ Engine
  - 10x faster application context switching
  - Concurrent kernel execution
  - Out of order thread block execution

## NVIDIA Technology

- NVIDIA SLI® technology—patented hardware and software technology allows up to four NVIDIA GeForce GPUs to run in parallel to scale performance and enhance image quality on today's top games.
- NVIDIA PhysX™ technology—allows advanced physics effects to be simulated and rendered on the GPU.
- NVIDIA 3D Vision™ Ready— GeForce GPU support for NVIDIA 3D Vision, bringing a fully immersive stereoscopic 3D experience to the PC.
- NVIDIA 3D Vision Surround™ Ready—scale games across 3 panels by leveraging the power of multiple GPUs in an NVIDIA SLI configuration. Combine with 3D Vision technology for the ultimate 3 panel stereoscopic 3D gaming experience.

## GPU Interfaces

- Designed for PCI Express 2.0 ×16 for a peak bandwidth (counting both directions) of up to 20 gigabytes (GB) per second (PCIe 2.0 devices are backwards compatible with PCI Express 1.x devices).
- Up to 384-bit GDDR5 memory interface (memory interface width may vary by model)

## Advanced Display Functionality

- Two pipelines for dual independent display
- Two dual-link DVI outputs for digital flat panel display resolutions up to 2560×1600
- Dual integrated 400 MHz RAMDACs for analog display resolutions up to and including 2048×1536 at 85 Hz
- HDMI 1.4a support including GPU accelerated Blu-ray 3D support, x.v.Color, HDMI Deep Color, and 7.1 digital surround sound. See [www.nvidia.com/3dty](http://www.nvidia.com/3dty) for more details.
- Displayport 1.1a support
- HDCP support up to 2560×1600 resolution on all digital outputs
- 10-bit internal display processing, including support for 10-bit scanout
- Underscan/overscan compensation and hardware scaling

## Video

- NVIDIA® PureVideo® HD technology with VP4 programmable video processor
- Decode acceleration for MPEG-2, MPEG-4 Part 2 Advanced Simple Profile, H.264, MVC, VC1, DivX (version 3.11 and later), and Flash (10.1 and later)
- Blu-ray dual-stream hardware acceleration (supporting HD picture-in-picture playback)
- Advanced spatial-temporal de-interlacing
- Noise reduction
- Edge enhancement
- Bad edit correction
- Inverse telecine (2:2 and 3:2 pull-down correction)
- High-quality scaling
- Motion Compensation
- Video color correction
- Dynamic contrast enhancement and color stretch

## Digital Audio

- Support for the following audio modes:
  - Dolby Digital (AC3), DTS 5.1, Multi-channel (7.1) LPCM, Dolby Digital Plus (DD+), MPEG2/MPEG4 AAC
- Data rates of 44.1 KHz, 48 KHz, 88.2 KHz, 96 KHz, 176 KHz, and 192 KHz
- Word sizes of 16-bit, 20-bit, and 24-bit

## Power Management Technology

- Advanced power and thermal management for optimal acoustics, power, and performance based on usage:
  - ASPM power management
  - Adaptive Clocking
  - Adaptive Power States
  - Advanced fan control
  - Power and temperature monitoring

## Operating Systems

- Windows 7 (32-bit and 64-bit)
- Windows Vista (32-bit and 64-bit)
- Windows XP (32-bit and 64-bit)
- Linux
- FreeBSD x86

## Process Technology

- 3.0 billion transistors in 40 nm process technology

### **Notice**

ALL NVIDIA DESIGN SPECIFICATIONS, REFERENCE BOARDS, FILES, DRAWINGS, DIAGNOSTICS, LISTS, AND OTHER DOCUMENTS (TOGETHER AND SEPARATELY, "MATERIALS") ARE BEING PROVIDED "AS IS." NVIDIA MAKES NO WARRANTIES, EXPRESSED, IMPLIED, STATUTORY, OR OTHERWISE WITH RESPECT TO THE MATERIALS, AND EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE.

Information furnished is believed to be accurate and reliable. However, NVIDIA Corporation assumes no responsibility for the consequences of use of such information or for any infringement of patents or other rights of third parties that may result from its use. No license is granted by implication or otherwise under any patent or patent rights of NVIDIA Corporation. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. NVIDIA Corporation products are not authorized for use as critical components in life support devices or systems without express written approval of NVIDIA Corporation.

### **Trademarks**

NVIDIA, the NVIDIA logo, and GeForce, SLI, 3D Vision, PhysX, PureVideo, GigaThread, Parallel DataCache, and CUDA are trademarks or registered trademarks of NVIDIA Corporation in the United States and other countries. Other company and product names may be trademarks of the respective companies with which they are associated.

### **Copyright**

© 2010 NVIDIA Corporation. All rights reserved.



**NVIDIA.**