A detailed view of a Radeon X1000 GPU chip, showing its intricate circuitry and four mounting holes at the corners. The chip is centered within a white border. The background is a vibrant red with abstract, glowing white and grey patterns that suggest motion and technology.

RADEON X1000 Image Quality

Image Quality Feature Highlights



- **Advanced HDR with Anti-Aliasing**
- **Adaptive Anti-Aliasing**
- **Improved Texture Filtering Quality**
- **3Dc+**

Image from
Splinter Cell 3: Chaos Theory



High Dynamic Range (HDR)

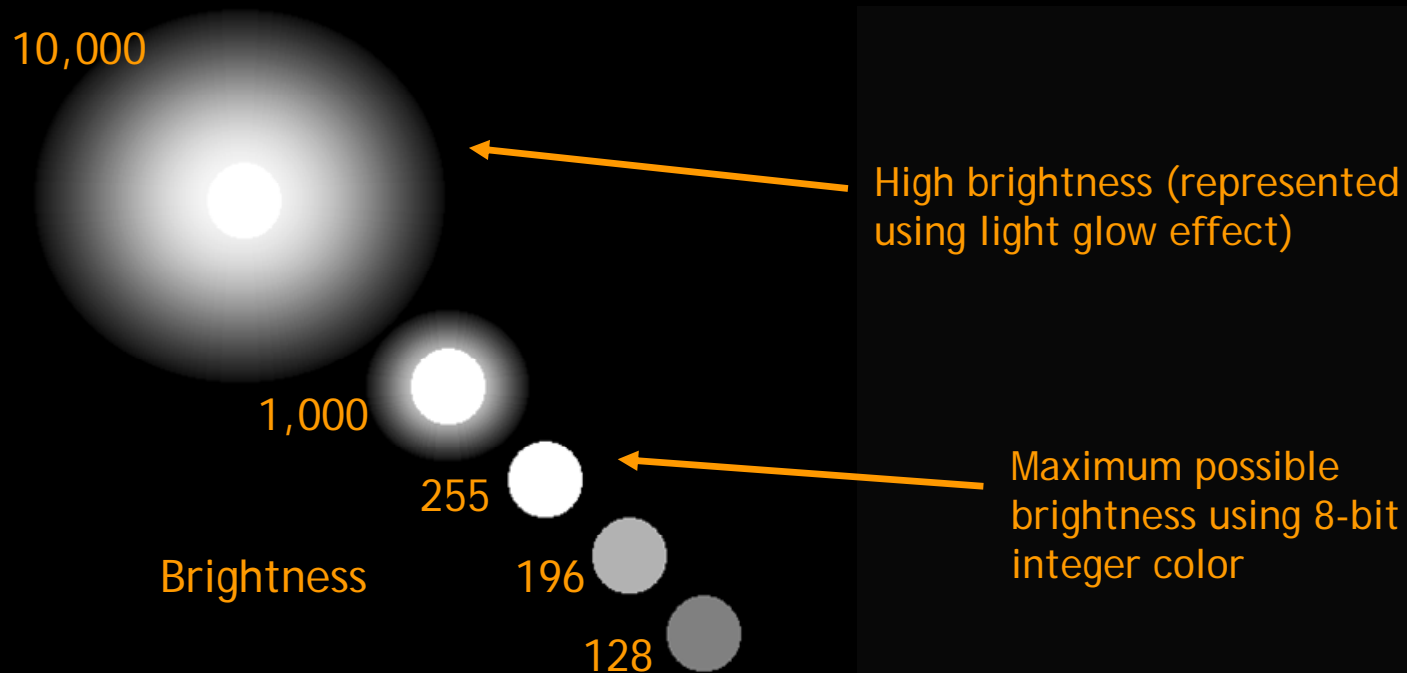


- Dynamic Range defines ratio between highest and lowest value that can be represented
 - More bits of data = greater dynamic range
 - Floating point has much greater range than integer
 - Dynamic range examples:
 - 8-bit integer – 256:1
 - 10-bit integer – 1,024:1
 - 16-bit integer – 65,536:1
 - 16-bit floating point – 2.2 trillion:1
- Most displays can only recognize values between 0 and 255 (i.e. 8 bits per color component)
 - Requires tone mapping to preserve detail
 - Light bloom and lens flare effects can help convey a sense of high brightness
- High Dynamic Range (HDR) rendering takes advantage of color formats with greater dynamic range
 - Produces more realistic images

High Dynamic Range (HDR)



- Shaders can add a light bloom or glow effect around very bright objects for increased realism
- Takes advantage of >8 bits per color component



HDR Example



Image from Far Cry

**High
Dynamic
Range**



HDR with Anti-Aliasing!



Only Radeon X1000 series supports Floating Point HDR with MSAA

- Two of the most important image quality enhancing features
- Competing products force you to give up one to use the other
- Works with new Adaptive AA modes, plus standard Multisample AA and Temporal AA



Advanced HDR Support



Wide Range of HDR Formats for Ultimate Flexibility

- 64-bit (FP16, Int16) - maximum range
- 32-bit (Int10) - maximum speed
- Custom formats (e.g. Int10+L16) for optimal performance

Anti-Aliasing, Blending and Filtering

- Combine HDR with all other quality enhancing features of Radeon X1000 series

HDR Texture Compression

- With DXT & 3Dc+

Tone Mapping Acceleration

- Using Avivo Display Engine



Adaptive Anti-Aliasing



- Combines image quality of supersampling with speed of multisampling
- Most visible improvement on partly transparent surfaces (foliage, fences, grates, etc.)
- Performance and Quality modes
- Works seamlessly with all other ATI anti-aliasing technologies

Adaptive Anti-Aliasing



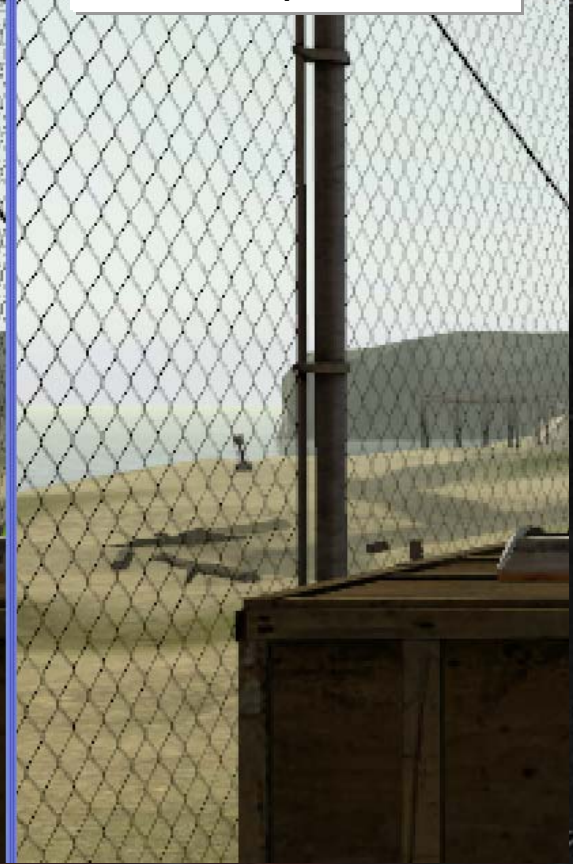
4x Multisample AA



4x Adaptive AA



6x Adaptive AA



Images from Half Life 2 by Valve Software

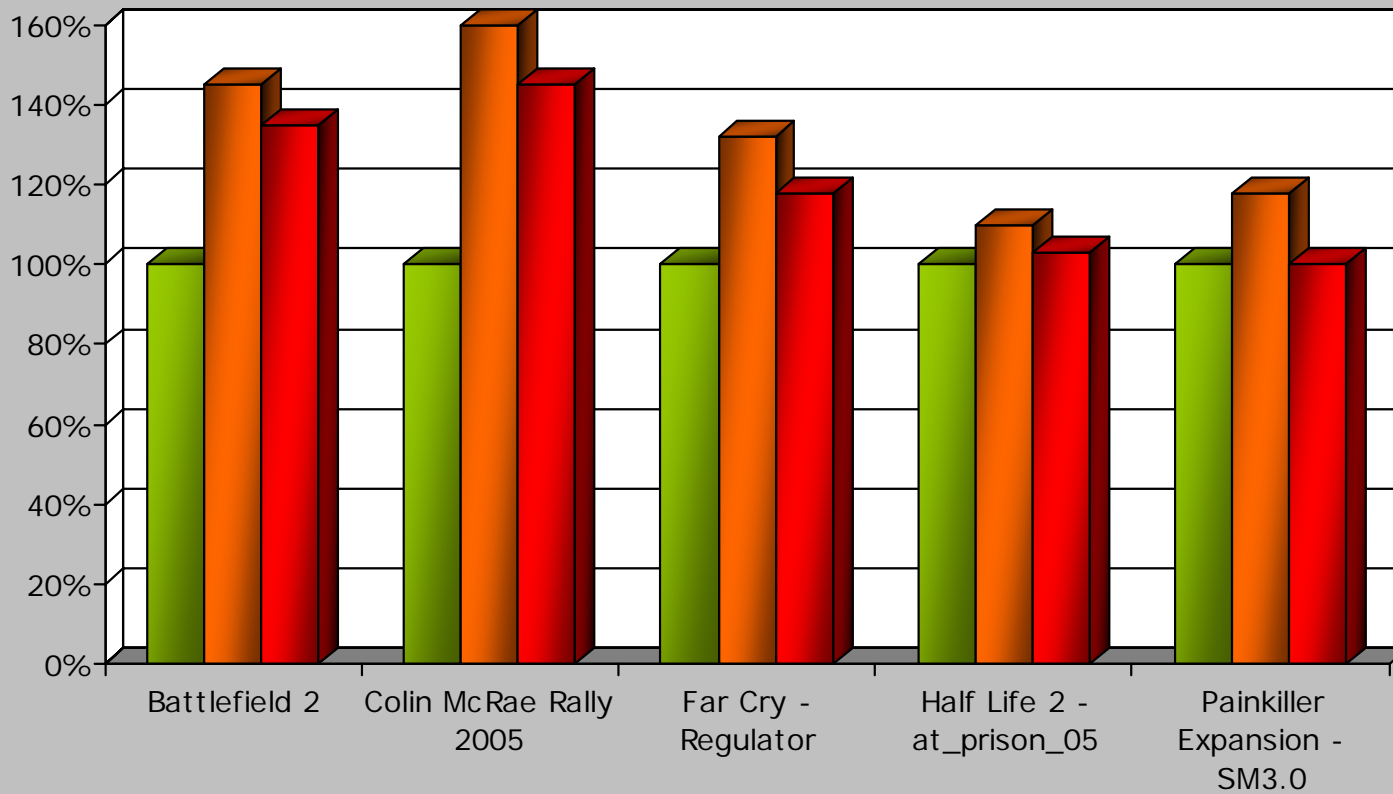
Anti-Aliasing Technology Leadership



- High Performance 6x MSAA
- Sparse Sample Patterns
- Gamma Correct Blending
- Adaptive AA
- Temporal AA
- 14x Super AA

... and all of these work with HDR!

Anti-Aliasing Performance



■ GeForce 7800 GTX (4x AA) ■ Radeon X1800 XT (4x AA) ■ Radeon X1800 XT (6x AA)

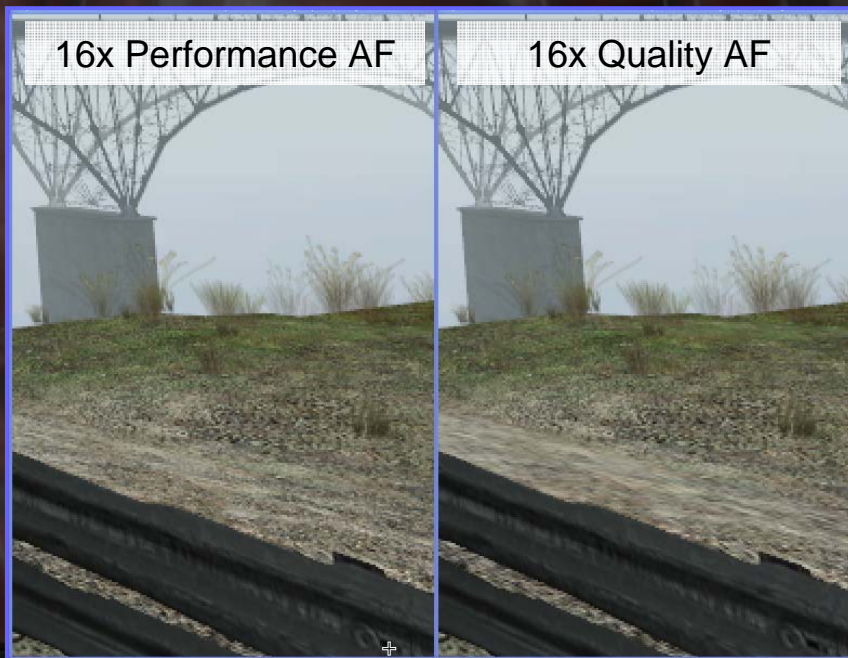
Notes:
AMD FX57, Windows XP SP2, DirectX 9.0c
Xpress200P chipset 1GB

Improved Texture Filtering

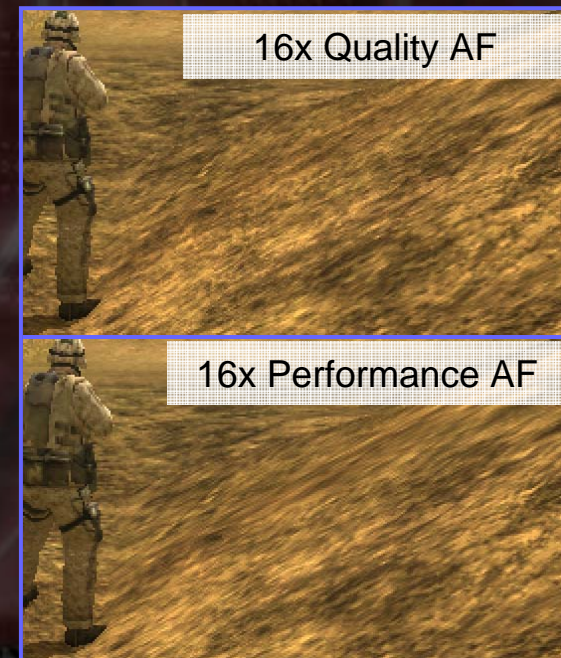


- New high quality Anisotropic Filtering mode
- Increased trilinear filtering precision
- Sharper, clearer textures

Half Life 2



Battlefield 2



3Dc+



- High quality normal map compression
 - Up to 4:1
 - Works on any two-channel texture format
- Latest version adds support for single-channel textures
 - 2:1 compression
 - Useful for luminance maps, shadow maps, material properties, HDR textures, and more



Architectural Summary



Focus on Efficiency

- Reduce idle time and latency
- Improve memory access management

Shader Model 3.0 "Done Right"

- High performance dynamic flow control
- Full speed 128-bit rendering

Driving Image Quality Forward

- Advanced high dynamic range rendering
- Adaptive anti-aliasing
- Improved texture filtering quality

Flexibility and Scalability

- Decoupling processing units from rigidly defined pipelines