Matrox G400

Chip Specifications

Performance Characteristics and Key Features

- 0.25-micron, five layer metal process technology
- 256-bit DualBus architecture
- True 128-bit external bus to video memory
- Full AGP 2X/4X device with Multi-threaded Bus Mastering
- 8MB to 32MB frame buffer configurations supported
- True Environment Mapped Bump Mapping
- Vibrant Color Quality^2 (VCQ^2) Rendering
- 32-bit internal precision specially enhanced for multi-texturing using 32-bit source textures
- Matrox DualHead Display technology
- 32-bit Z-buffer including 8-bit stencil buffer
- Symmetric Rendering Architecture
- DirectX 6, PC 98/99, Broadcast PC, DirectShow, OpenGL compatible
- High-speed integrated RAMDAC (up to 300MHz) with UltraSharp RAMDAC technology
- Display up to 2056 x 1536 @ 32bpp
- Industry leading 3D feature set and performance
- Bilinear, trilinear and anisotropic filtering

2D Drawing Engine

- Benchmark-winning 2D performance optimized for true color operation at high resolution
- UltraSharp RAMDAC technology for highest quality analog output
- Full acceleration of all GDI and DirectDraw functions
- Linear frame buffer
- Programmable, transparent BLTter
- Linear packed pixel frame buffer
- 32-bit ultra-fast VGA core

3D Rendering Engine

- 3D Rendering Array Processor delivers up to three times the speed of the MGA-G200
- Floating Point 3D Setup Engine with dynamically re-allocatable resources:
  - *Ultra-pipelined floating point and culling engines*
  - *Optimized support for Direct3D and OpenGL triangles, strips, fans and vectors*
  - *Flexible Vertex Format natively supported*
  - *Vertex Buffers natively supported*
- Environment Mapped Bump Mapping
- Single cycle multi-texturing
- Vertex and table fog
- Specular highlighting (any color)
- True color ARGB Flat and Gouraud shading
- Vibrant Color Quality^2 (VCQ^2) Rendering:
  - *32-bit precision internal pipelines*
  - *up to 32-bit source textures*
  - *32-bit output*
  - *16-bpp dithering down from 32bpp palette for 16-bpp output*
  - *Full subpixel and subtexel correction*
  - *8-bit precision for filter coefficients*
  - *Highly saturated & separated analog color output (UltraSharp DAC)*
- Texturing support:
  - *Texture sizes up to 2048 x 2048*
  - *All texture formats are supported*
  - *non-square texture support*
  - *non-power of 2 texture support*
  - *Perspective Correct Texture Mapping*
  - *Texturing from local and AGP memory*
  - *Opaque Texture Surfaces*
  - *Alpha in Texture Palettes*
  - *Texture transparency*
  - *Mip-map non-power of 2 textures*
  - *Multiple YUV source texture formats for Video Stream Texture Mapping*
  - *Full subpicture blended DVD as texture source*
- Filtering support:
  - *11 level mip-mapping support*
  - *Bilinear Filtering*
  - *True eight-sample per pixel trilinear filtering*
  - *Anisotropic filtering*
- Alpha blending:
  - *All blend modes under DirectX 6 and OpenGL*
  - *Supports all permutations of passes including light maps, environment maps, reflection maps, etc.*
- Z-buffer support:
  - *16-bit*
  - *32-bit*
  - *24-bit plus 8-bit stencil buffer used for shadows, overlays, etc...*
- Guard Band Clipping
- Single, Double or Triple buffering
- 3D-image effects combined with no exclusion conditions
- Sort independent (full scene) anti-aliasing
- Vector/edge anti-aliasing
- Hardware dithering including dithering of LUT textures

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Video and Multimedia

High Quality full featured scaling engine

- Multiple pixel formats support (YUV planar, YUV packed, RGB 16/32)
- Independent front end and back end scalars supports overlay modes at high resolutions
- Independent X and Y scaling with high quality scaling filter, comprised of 4 taps horizontally and 3 taps vertically to produce the best quality images
- Support for unlimited number of simultaneous video windows and sprites
- Additional independent and resizable overlay for support of picture-in-picture and multiple video conferencing windows

Hardware acceleration for DVD playback

- Full hardware subpicture support with alpha-blended overlay for high quality DVD playback or WebTV like user interfaces:
- Aspect ratio conversion supported for proper display of 4:3 and 16:9 content
- Hardware support for BOB and Weave, with subpixel compensation, for high-quality de-interlacing
- AGP 4X bus mastering of video data (with planar and packed pixel support)

Matrox Dual-Head Technology

- Second CRTC supports RGB and YUV packed and planar data in interlaced and non-interlaced rasters for PC graphics and video display to a TV or a monitor
- Full screen output to TV independent of Primary RGB display
- Together with the MGA-TVO enables multiple displays within a single AGP card:
  - monitor + monitor
  - monitor + TV
  - monitor + flat panel display (with Matrox Flat Panel configurations only)

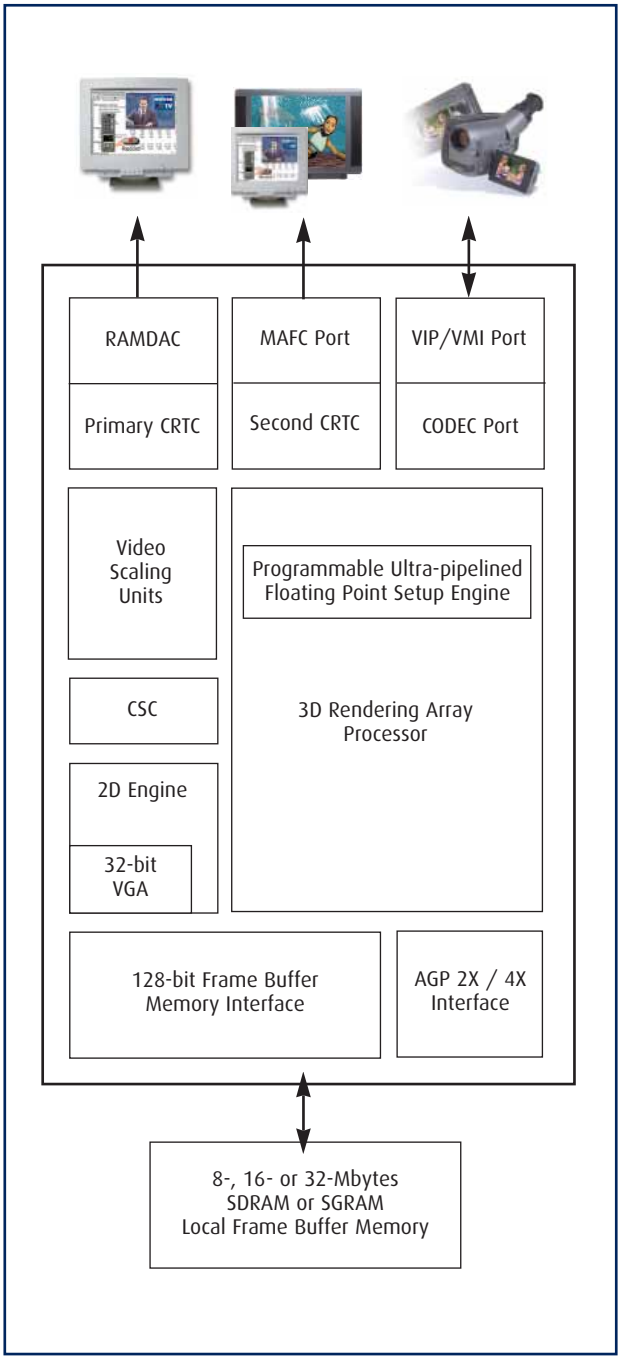
Expandable configuration

- Parallelized video input port, video CODEC port and video output port
- HD0 format support for HDTV as video input and output
- Connectivity to high quality MGA-TVO video encoder chip:
  - Supports output to TV up to 1024 x 768 @ 32 bpp
  - Software controllable flicker filter, up to 6 lines
  - Underscan and overscan capabilities
- Video input connects to industry standard video decoders (Philips, Samsung, Brooktree etc.)
- Support for independent VBI surface for WebTV, Intercast, Closed captioning and Teletext support
- Widest range of multimedia add-ons in the industry

Support for industry standards

- Full WDM support for video capture
- Full Microsoft DirectShow, PC99 and Broadcast PC compliant
- DirectDraw and Quicktime acceleration

Figure 1 Matrox G400 Chip Diagram



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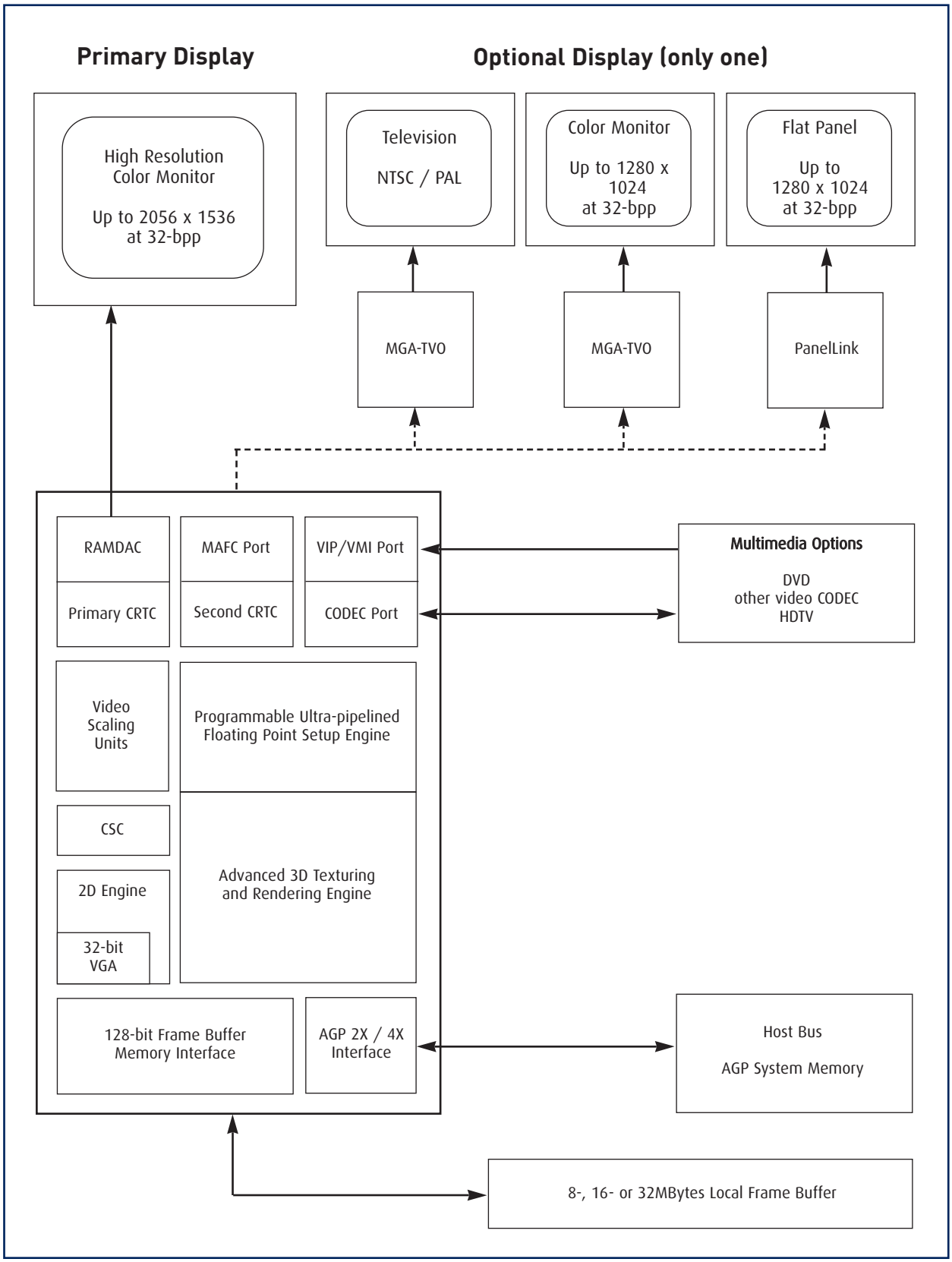

* The MGA-TVO supports monitor resolutions up to 1024 x 768. The MGA-TVO can also act as an external RAMDAC, and can support up to 1280 x 1024 in RGB mode.