CL-GD543X/'4X

Preliminary Product Bulletin

FEATURES

CL-GD543X/'4X Family

- **Pin- and software-compatible VGA graphics accelerators**
- **Integrated dual-clock synthesizer and 24-bit DAC**
  - — Pixel clock programmable to 135 MHz (CL-GD5434/'36), and to 86 MHz (CL-GD5430/'40)
  - — Memory clock programmable to 60 MHz (CL-GD5430/'34/'40), and to 80 MHz (CL-GD5436)
- **32-bit direct-connect CPU interface**
  - — PCI bus (v2.0 compliant) with burst-cycle support
  - — VESA® VL-Bus™ (v2.0 with 50 MHz)
  - — ISA bus (12.5 MHz) (CL-GD5434 only)
  - — Zero-wait-state write buffer for CPUs to 33 MHz
- **64-bit DRAM display memory interface**
  - — 1-, 2-, and 4-Mbyte display memory support (CL-GD5434/'36)
  - — 1/2-, 1-, and 2-Mbyte display memory support (CL-GD5430/'40)
  - — Optimized EDO (extended data out) DRAM support (CL-GD5436)
- **64 × 64 hardware cursor**
- **Glueless PCI bus interface with VGA BIOS ROM support for single 8-bit EPROM**
- **Low-power 5-V CMOS, 208-pin PQFP package**

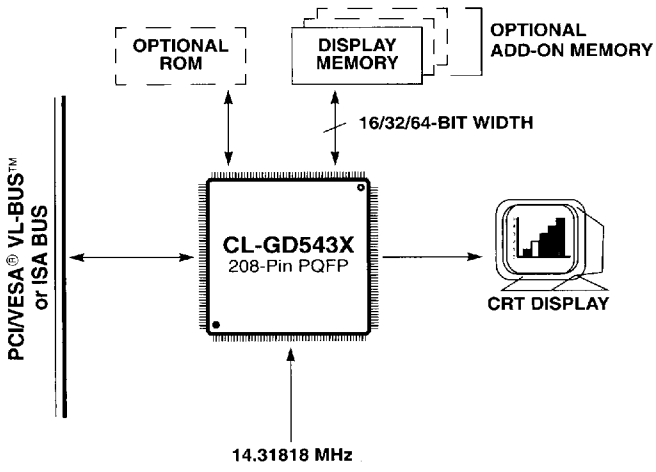
VGA GUI Accelerators

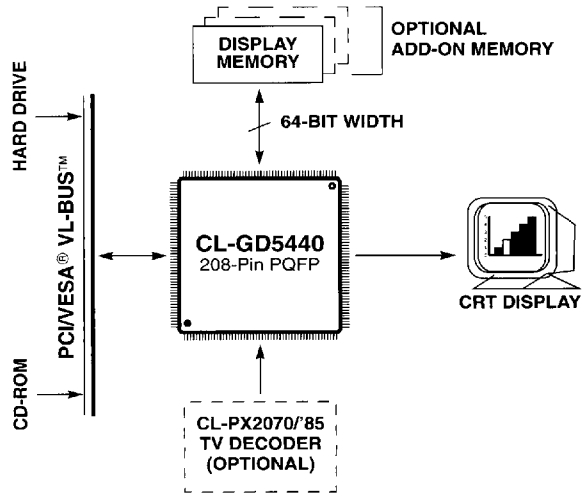
CL-GD5440	— Video Accelerator
CL-GD5434/'36	— 64-bit GUI Accelerators
CL-GD5430	— 32-bit GUI Accelerator

- **'Green PC' power-saving features**
  - — VESA® support for DPMS (display power-management signalling)
  - — Internal DAC with Power-Down mode
  - — Low-frequency DRAM refresh (CL-GD5430/'36/'40)
  - — Static monitor sync signals
- **100% hardware- and BIOS-compatible with IBM® VGA display standard**
- **Programmable dual-clock synthesizer**
- **Multimedia-ready *CL-GD5430/'34/'36***
  - — Video overlay with external video data and 'Color Keying'
  - — GENLOCK support with external HSYNC and/or VSYNC
  - — VAFC (VESA® advanced feature connector) Baseline support (CL-GD5430/'36)
  - — Horizontal pixel interpolation for baseline VAFC 2× mode (CL-GD5436)
- **CL-GD5428/'29 register- and software-compatible**

(cont.)

System Block Diagrams





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DEVICE-SPECIFIC FEATURES

CL-GD5430/'34

- **Enhanced GUI acceleration**
  - 64-bit BitBLT (bit block transfer) engine (CL-GD5434)
  - 32-bit BitBLT engine (CL-GD5430)
- **Resolutions to 1280 × 1024**
  - Up to 1024 × 768 × 64K colors, non-interlaced
  - Up to 800 × 600 × 16M colors, non-interlaced
  - Up to 1280 × 1024 × 256 colors, non-interlaced
- **VESA® DDC2B monitor support *(CL–GD5434)***
- **Integrated clock filter and current reference *(CL-GD5434-I)***

CL-GD5436

- **64-bit GUI acceleration**
  - Double-buffered, memory-mapped BitBLT registers
  - Color expansion for all data widths
  - Efficient use of DRAM Fast-Page mode cycles
  - Large BitBLT data buffers
- **Accelerated support for Packed-24 modes**
  - Better performance than 32-bit true color
  - Supports Microsoft® Windows95™
  - Allows 1024 × 768 × 16M colors at 75 Hz with DRAM
- **Resolutions to 1280 × 1024**
  - Up to 1024 × 768 × 16M colors, non-interlaced
  - Up to 1280 × 1024 × 256 colors, non-interlaced
- **Integrated clock filter and current reference**
- **PCI byte-swapping for PowerPC™**
- **VESA® DDC2B monitor support**

CL-GD5440

- **Cost-effective hardware-accelerated video playback**
  - High-quality video playback from CD-ROM and disk-based files
  - High-quality video playback in 256 and 64K color modes
  - Indeo™ and Cinepack™ file playback to 30 fps
- **Continuous hardware-interpolated zoom (CD-Zoom™)**
  - X-interpolated zoom from 1× to 4×
  - Y-interpolated zoom from 2× to 4×
  - Full-screen playback to 1024 × 768
- **Integrated color space converter**
  - On-the-fly YUV-to-RGB conversion
  - YUV 4:2:2 (CCIR601)
- **Error-diffusion filtering offers color enhancement for video**
  - 'High color' quality playback in 8- and 16-bit color graphic modes
- **Unique 32-bit multimedia frame buffer**
  - Video (YUV) and graphics (RGB) share one frame buffer
  - Allows different color depths between video and graphics
  - Full operation with 512-Kbyte, 1-Mbyte, or 2-Mbyte DRAM
- **Video data encoding reduces frame-buffer bandwidth requirement**
  - High-quality video playback of 1024 × 768 in 256 colors, and 800 × 600 in 64K colors with only 1 Mbyte of DRAM
- **Resolutions to 1280 × 1024**
  - Up to 1024 × 768 × 256 colors, non-interlaced
  - Up to 800 × 600 × 64K colors, non-interlaced
  - Up to 1280 × 1024 × 16 colors, interlaced
- **Direct TV-decoder interface**
- **VESA® DDC2B monitor support**
- **Integrated clock filter and current reference**

FAMILY OVERVIEW

Based on a 64-bit GUI engine, the CL-GD543X/'4X incorporates a BitBLT (bit block transfer) VGA controller with a 24-bit true-color DAC, dual-clock synthesizer, and direct-connect 32-bit PCI and VESA® VL-Bus™ interface. Optimized for Microsoft Windows®, Windows95™, Windows NT™, OS/2®, and other graphical interfaces, the Alpine family offers performance, surpassing current DRAM and many VRAM-based GUI accelerators.

The CL-GD543X/'4X forms the heart of a cost-effective, high-performance DRAM-based graphics system. By combining a 32-bit external local bus interface with a 64-bit path to the DRAM frame buffer, the CL-GD543X/'4X eliminates the video-memory bottleneck found in traditional DRAM architectures. This combination also maximizes system-to-video bandwidth critical for outstanding graphics acceleration.

BitBLT support, linear addressing, hardware cursor, color expansion, and memory-mapped I/O are some of the many built-in CL-GD543X/'4X features that ensure outstanding GUI performance. The internal palette DAC can be configured for industry-standard 16- or 256-color VGA modes, or extended to high- and true-color modes (32K, 64K, or 16M colors).

The CL-GD5434-I, CL-GD5436, and CL-GD5440-I devices have an integrated clock filter and current reference that allow a low-cost board solution.

The highly integrated 208-pin PQFP package makes the CL-GD543X/'4X ideal for both motherboard systems and add-in cards. The only external support needed is cost-effective DRAM memory and a 14.31818-MHz frequency reference.

CL-GD5430/'34

The software- and pin-compatible CL-GD5430/'34 allow OEMs to meet different price and performance targets with one graphic subsystem design. Built on a 1-Mbyte frame buffer, the CL-GD5430 can be quickly upgraded to the higher-performance CL-GD5434. With a 2-Mbyte frame buffer, the CL-GD5434 offers performance beyond current 32-bit standard and interleaved architectures.

Operating at pixel clock rates programmable to 135 MHz (CL-GD5434) and 86 MHz (CL-GD5430), the CL-GD543X devices supports standard and VESA high-resolution extended modes. Display resolutions up to 1280 × 1024 are supported.

CL-GD5436

The CL-GD5436 is a high-performance accelerated super VGA controller. The CL-GD5436 features a 64-bit BitBLT engine and a 64-bit display memory interface with support for EDO DRAMs.

Operating at pixel clock rates programmable to 135 MHz and memory clock rates programmable to 80 MHz, the CL-GD5436 supports resolutions and color depths at the following standard refresh rates:

Resolution	256 Colors	64K Colors	16M Colors
640 × 480	75 Hz	75 Hz	75 Hz
800 × 600	75 Hz	75 Hz	75 Hz
1024 × 768	75 Hz	75 Hz	75 Hz
1280 × 1024	75 Hz	43i Hz	–

The CL-GD5436 supports Packed-24 RGB video modes, providing 16M colors at only 3 bytes per pixel. This allows 1024 × 768 true color at a 75-Hz refresh rate with DRAMs. The CL-GD5436 also supports three types of byte-swapping on the PCI bus, which provide PowerPC™ support.

CL-GD5440

The CL-GD5440 is the first product in its class to integrate on a single chip the CL-GD5430 (32-bit graphics accelerator) and the CL-PX2070/'85 video-processor accelerator (video technology from Pixel Semiconductor). Hardware-accelerated zoom with X and Y linear interpolation and color space conversion are combined with an enhanced BitBLT accelerator, integrated 24-bit RAMDAC, and a dual-clock synthesizer.

The CL-GD5440 accelerates both graphics and video playback for Microsoft Windows and Windows NT, OS/2, and other graphical interfaces. High-quality video playback is supported in both 64K, and the popular 256-color modes, allowing video playback without compromising graphics performance.

Operating at pixel clock rates programmable to 86 MHz, the CL-GD5440 supports standard and VESA high-resolution extended modes. Display resolutions up to 1280 × 1024 are supported.

A flexible 512-Kbyte to 2-Mbyte frame buffer, glueless PCI and VESA VL-Bus interface, and direct interface to NTSC/PAL decoder (and fully integrated video/graphics accelerator) provides OEMs with a cost-effective multimedia solution.

CD-Zoom, 'on-the-fly' color space conversion, video data encoding/decoding, and a multi-format frame buffer are integrated features that ensure high-performance video playback.

CIRRUS LOGIC

UNIQUE FEATURES

BENEFITS

Cost Effectiveness

- Interface to as few as one DRAM (CL-GD5430/'34/'40) or two DRAMs (CL-GD5434/'36), built-in true-color palette DAC and dual-frequency synthesizer
  - ❒ Minimizes chip count, system cost, and board space for cost-effective solution.
- Interface to ×4, ×8, ×16 DRAMs
  - ❒ Allows design flexibility for appropriate type and amount of memory.

High Performance

- Hardware BitBLT for Microsoft® Windows®
  - ❒ Accelerates GUIs such as Microsoft® Windows® and similar applications.
- 32-bit PCI, VESA® VL-Bus™, and local bus interface
  - ❒ Increases system throughput.
- 64-bit-wide DRAM interface (CL-GD5434/'36 only)
  - ❒ Eliminates display-memory bottleneck.
- Independent video and DRAM timing
  - ❒ Optimizes timing for increased performance.
- Maximum Fast-Page mode access to display-memory DRAMs
  - ❒ Improves CPU performance by accessing maximum bandwidth available from DRAM display memory.
- Host access to DRAMs through advanced write buffers
  - ❒ Provides fast host access for writes to display memory.
- EDO DRAM support (CL-GD5436)
  - ❒ Uses latest DRAM technology.
- 32-bit memory-mapped BitBLT Control registers
  - ❒ Improves graphics-application performance.
- 15-, 16-, or 24-bit true-color palette DAC
  - ❒ Provides high-color and true-color display for photo-realistic images. 32K, 64K, or 16M colors on screen at once for lifelike images.

Compatibility

- Compatible with VGA and VESA® standards
  - ❒ Allows compatibility with installed base of systems and software.
- Drivers supplied at various resolutions for Windows® 3.1, Windows NT™, Windows95™, AutoCAD7®, OS/2®, and other key applications
  - ❒ Provides a 'ready-to-go' solution that minimizes the need for additional driver development.
- Connects directly to IBM® PS/2® and multifrequency analog monitors
  - ❒ Drives all industry-standard, high-resolution PC-monitors to ensure compatibility.

Multimedia

- Overlay, color keying, and GENLOCK
  - ❒ Allows 16-bit-pixel interfacing through the VESA® connector for multimedia applications.

CL-GD5440–Specific

- Hardware-interpolated video zoom
  - ❒ Increases speed and quality of video playback at full screen.
- Single video-and-graphics frame buffer
  - ❒ Increases DRAM efficiency — RGB and YCrCb share one frame buffer.
- Hardware YUV-to-RGB conversion
  - ❒ Reduces CPU overhead with a multiformat frame buffer.
- Video data encoding converts 16-bit YUV pixels into 8-bit data
  - ❒ Reduces frame buffer bandwidth requirement.
- Vision Port™ enhanced feature connector
  - ❒ Enables CD-Zoom™ functionality on the VAFC or 8-bit standard feature connector; this eliminates need for an additional frame buffer and controller.
- Direct TV-decoder interface
  - ❒ Removes need for separate video frame buffer.

SOFTWARE SUPPORT

CL-GD543X VGA Software Drivers

Cirrus Logic provides an extensive and expanding range of software drivers to enhance the resolution and performance of many software packages. However note, that the CL-GD543X/'4X VGA graphics portion of a system *does not* require software drivers to run applications in standard-resolution mode.

Software Drivers	Resolution Supported[a]	No. of Colors
Microsoft® Windows® v3.1	640 × 480, 800 × 600, 1024 × 768, 1280 × 1024 640 × 480, 800 × 600, 1024 × 768, 1280 × 1024 640 × 480, 800 × 600, 1024 × 768	256 65,536 16.8 million
Microsoft® Windows NT™ v3.1	640 × 480, 800 × 600, 1024 × 768, 1280 × 1024	16 and 256
Microsoft® Windows NT™ v3.5	640 × 480, 800 × 600, 1024 × 768, 1280 × 1024	16 256 65,536
Microsoft® Windows NT™ v3.5 for PowerPC™	640 × 480, 800 × 600, 1024 × 768, 1280 × 1024	16 256 65,536
OS/2® v2.1, v2.1.1, v3.0	640 × 480, 800 × 600, 1024 × 768, 1280 × 1024 640 × 480, 800 × 600, 1024 × 768, 1280 × 1024 640 × 480	256 65,536 16.8 million
AutoCAD® v11, v12 Autoshade® v2.0 w/ Renderman, 3D Studio v1, v2	640 × 480, 800 × 600, 1024 × 768, 1280 × 1024 640 × 480, 800 × 600, 1024 × 768, 1280 × 1024 640 × 480, 800 × 600, 1024 × 768, 1280 × 1024 640 × 480, 800 × 600, 1024 × 768, 1280 × 1024 640 × 480, 800 × 600, 1024 × 768	16 256 32,768 65,536 16.8 million
WordStar® v5.5–7.0	800 × 600, 1024 × 768	16
SCO[b] UNIX®	640 × 480, 800 × 600, 1024 × 768	16 and 256

[a] All resolutions may not run on all monitor types; 640 × 480 drivers will run on IBM® PS/2®-type monitors. Extended resolutions are dependent upon monitor type and VGA system implementation.

[b] Shipped by Santa Cruz Operations.

BIOS SUPPORT

- **Fully IBM® VGA-compatible BIOS**
- **Relocatable, 32 Kbytes with VESA® VL-Bus™ and PCI local bus support**
- **VBE (VESA® BIOS extensions) support in ROM**
- **Support for DPMS (display power management signaling) in ROM**
- **VESA® monitor timing-compliant**

UTILITIES

- **Manufacturing test**
- **Windows DOS utilities**
- **Video mode configuration utility — CLMODE**
- **Set resolution in Windows — WINMODE**
- **Configured OEM system integration — OEMSI**