



FEATURES

- Single-chip VGA controller with integrated RAMDAC and programmable Frequency Synthesizer
 - 65 MHz at 5.0V; 40 MHz at 3.3V
- Direct connection to 32-bit Local Bus
- Direct connection to 16-bit PI Bus, ISA (PC AT) Bus
- Direct connection to 8- and 16-bit dual- and single-scan color STN panels
- Direct connection to 9-, 12-, 15-, and 18-bit color TFT panels
- Supports 1-Mbyte video memory with two 256K x 16 or eight 256K x 4 DRAMs with a 32-bit interface
- Resolutions up to 1280 x 1024 and 1024 x 768 on LCD and CRT
- Simultaneous display on CRT and LCD panel with resolutions up to 1024 x 768 with 256 colors
- Supports 64K direct-color modes on LCD and CRT
- Windows™ performance-improvement features
 - Color expansion for 8 and 16 bits per pixel graphics
 - Packed-pixel addressing for 8 and 16 bits per pixel
 - Programmable linear memory addressing
- 3.3 or 5.0V mixed-voltage operation
 - LVTTTL, JEDEC standard 8-1 compatible
- Standby and Suspend Modes to save power
 - Dedicated pins and software control of either modes
- Low active power with Frame-Accelerator technology
 - No additional DRAMs required
- Flicker-reduction algorithms for 3 MHz and higher quick-response (mouse-quick) LCD panels
- IBM® VGA-compatible
- Packaged in a 208-pin QFP Package

High-Resolution Super VGA LCD Controller for Monochrome/Color Notebook Computers

OVERVIEW

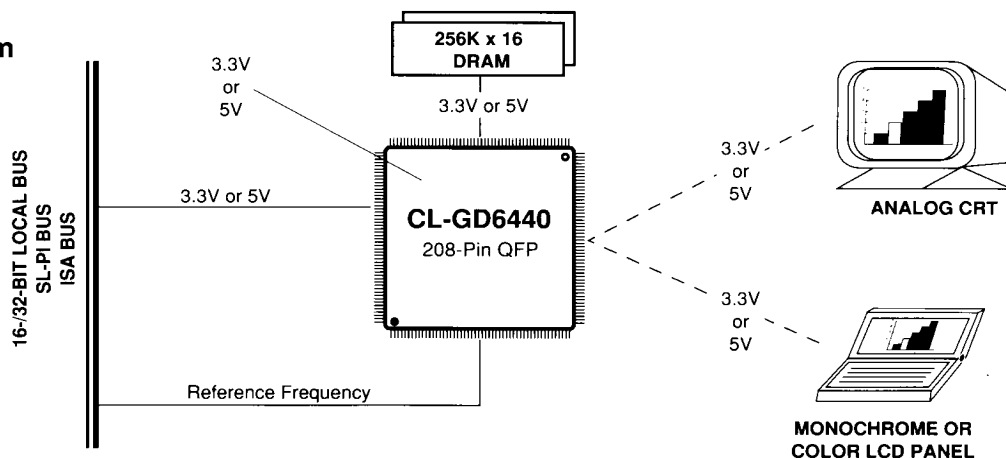
The CL-GD6440 Super VGA LCD Controller is a single-chip flat panel device for high-performance notebook computers. Combining high resolution and high performance, the CL-GD6440 enables a small-form-factor and low-power solution for the next generation of portable computers.

The CL-GD6440 achieves significant performance gains by connecting directly to the processor. A full 32-bit-wide Local Bus can be used for '386DX- and '486-class processors. A 16-bit Local Bus can be used for the Intel® '386SX and AMD® '386SXL, and in the Intel '386SL, the 16-bit PI Bus may be used.

The CL-GD6440 integrates support for a large variety of monochrome and color STN/TFT panels, including dual- and single-scan color STN panels (see Table 1, next page). It also integrates a dual-frequency synthesizer to minimize the chip count and form-factor requirements for graphics subsystems. A complete high-resolution, high-performance, monochrome and color solution can be

(cont. next page)

Functional Block Diagram



November 1992

OVERVIEW (cont.)

implemented with the CL-GD6440 and only two 256K x 16 DRAMs, occupying less than 3.5 square inches.

To improve Windows performance, the CL-GD6440 offers true packed-pixel addressing, color expansion for 8- and 16-bit-per-pixel graphics, and linear addressing capability. Other incorporated features, such as memory write buffers and internal asynchronous display data FIFOs, also boost performance.

Energy-efficient, the CL-GD6440 is designed to operate at 3.3 or 5 volts. Mixed-voltage operation is optimized for ease of implementation of a notebook computer with reduced power consumption. The Video Memory, host bus interface, panel interface, and CRT interface may each be implemented at either 3.3 or 5V, and the voltages used for each interface may be mixed in any combination.

With integrated Frame-Accelerator technology, the CL-GD6440 enables low-power LCD operation while allowing high LCD panel vertical-refresh rates. No additional DRAMs are required for frame acceleration. In addition, Standby and Suspend Power Management Modes reduce power consumption when the system is not in active use.

The CL-GD6440 family also features SimulSCAN™, a technique introduced by Cirrus Logic for achieving simultaneous CRT and LCD operation. It allows portable computers to become a key part of presentation environments for sales-force automation, field service, and educational organizations. SimulSCAN supports both single- and dual-scan LCD panels, and fixed- and multi-frequency analog CRTs.

Table 1. CL-GD6440 Display Capabilities

CRT Mode	Monochrome STN LCD	Color STN LCD	512-Color TFT LCD
640 x 480, 16/256K ^{a, b} IBM VGA Mode 12H	640 x 480, 16/16 (gray) ^b	640 x 480, 16/256K ^b	640 x 480, 16/256K ^b
320 x 200, 256/256K ^b IBM VGA Mode 13H	320 x 200, 64/64 (gray) ^b	320 x 200, 256/256K ^b	320 x 200, 256/256K ^b
640 x 480, 256/256K ^b Extended Mode	640 x 480, 64/64 (gray) ^b	640 x 480, 256/256K ^b	640 x 480, 256/256K ^b
640 x 480, 64K/256K ^b Extended Mode	640 x 480, 64/64 (gray) ^b	640 x 480, 64K/256K ^b	640 x 480, 64K/256K ^b
1024 x 768, 16/256K ^b Extended Mode Interlaced/Non-Interlaced	1024 x 768, 16/16 (gray) ^{b, c}	1024 x 768, 16/256K ^{b, c}	1024 x 768, 16/256K ^{b, c}
1024 x 768, 256/256K ^{b, c} Extended Mode Interlaced/Non-Interlaced	1024 x 768, 64/64 (gray) ^{b, c}	n/a	1024 x 768, 256/256K ^{b, c}
1280 x 1024, 16/256K ^c Extended Mode Interlaced	1280 x 1024, 16/16 (gray) ^c	n/a	n/a

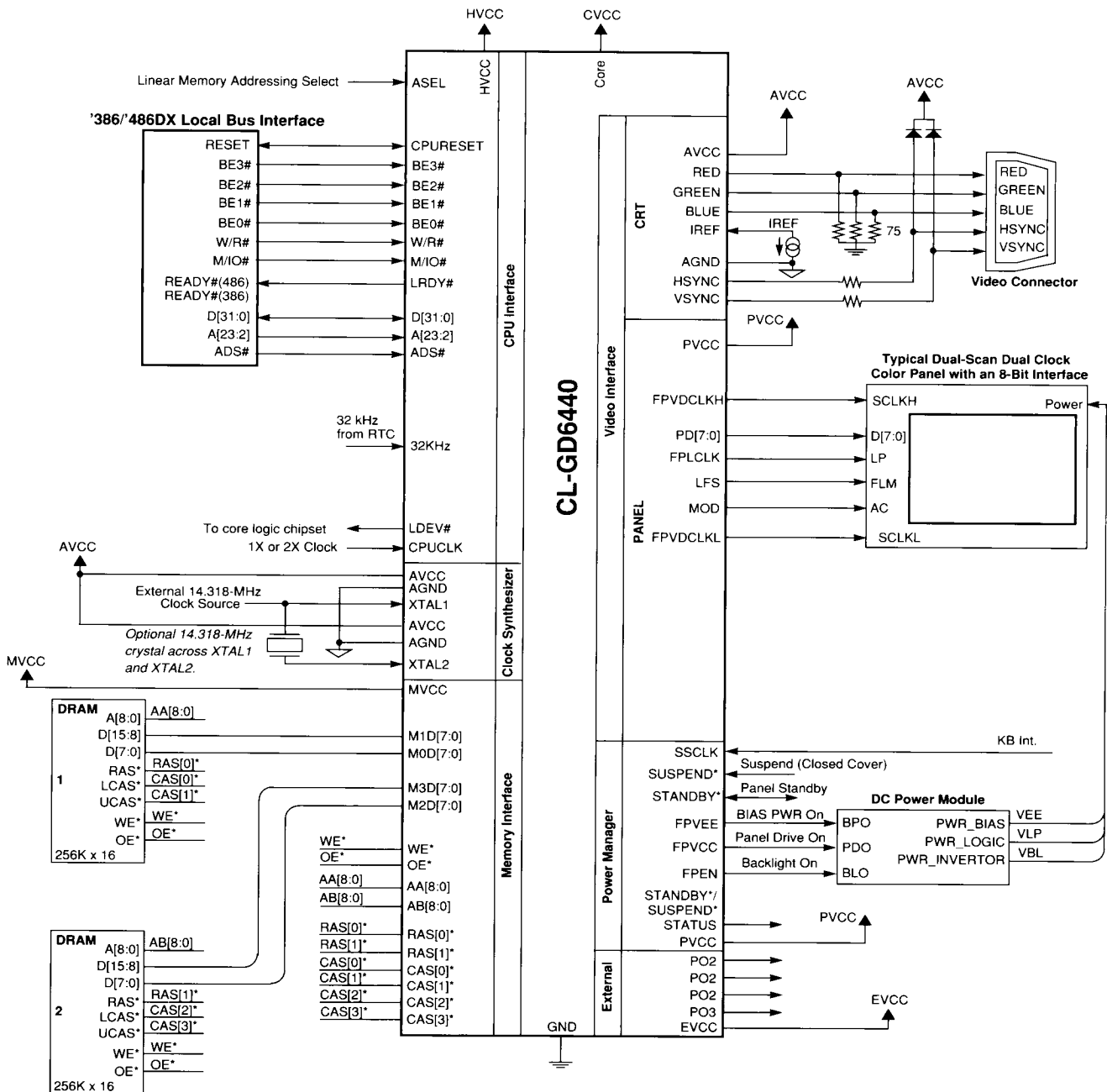
a. Color support is described as two numbers: simultaneous colors/color palette. For example: 16/256K = 16 simultaneous colors from a palette of 256K displayable color choices.

b. This resolution is compatible with SimulSCAN, a technique introduced by Cirrus Logic for achieving simultaneous CRT and LCD operation.

c. Only at 5-volt operation.

Professional Notebook Detailed System Block Diagram

32-Bit Local Bus, Dual-Scan Color STN Panel,
and 256K x 16 DRAM Connections



CL-GD6440 PANEL SUPPORT

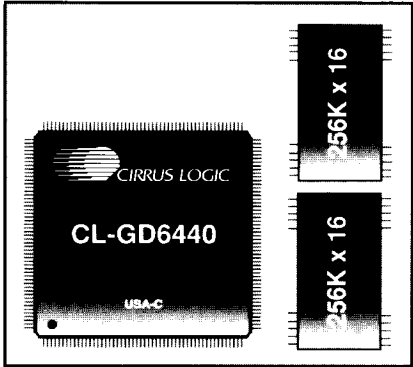
A variety of monochrome and color STN/TFT panels are supported by the CL-GD6440. For ease of design and to achieve the smallest form factor, the CL-GD6440 has built-in support for most 8- and 16-

bit single- and dual-scan STN panels, and 9- and 12-bit TFT panels. The CL-GD6440 will support 15- and 18-bit TFT panels when they become available (see Table 2 below).

Table 2. CL-GD6440 Flat Panel Support^a

	Panel Type	Definition
1	m2dd-8	Monochrome, Dual-scan 8-bit Interface
2	m2dd-16	Monochrome, Dual-scan 16-bit Interface
3	m16ss-4	Monochrome, Single-scan 4-bit Interface (4-bit Plasma)
4	m16ss-8	Monochrome, Single-scan 8-bit Interface (8-bit Plasma)
5	m2ss-1	Monochrome, Single-scan 1-bit Interface (EL)
6	m2ss-4	Monochrome, Single-scan 4-bit Interface
7	m2ss-8	Monochrome, Single-scan 8-bit Interface
8	c8ss-8	8-color, Single-scan Non-interleaved 8-bit Interface
9	c8ss-d-8	8-color, Single-scan Non-interleaved 8-bit Interface (Dual Clock)
10	c8ss-16	8-color, Single-scan Non-interleaved 16-bit Interface
11	c8ssi-8	8-color, Single-scan Interleaved 8-bit Interface
12	c8ssi-d-8	8-color, Single-scan Interleaved 8-bit Interface (Dual Clock)
13	c8ssi-16	8-color, Single-scan Interleaved 16-bit Interface
14	c8dd-8	8-color, Dual-scan 8-bit Interface
15	c8dd-16	8-color, Dual-scan 16-bit Interface
16	c8ss-3	8-color, Single-scan 3-bit Interface
17	c64ss-6	64-color, Single-scan 6-bit Interface
18	c512ss-9	512-color, Single-scan 9-bit Interface
19	c4kss-12	4K Color, Single-scan 12-bit Interface
20	c32kss-15	32K Color, Single-scan 15-bit Interface
21	c256ss-18	256K Color, Single-scan 18-bit Interface

a. Consult Cirrus Logic for specific panel types.

PROFESSIONAL NOTEBOOK DESIGN PRIORITIES	SUPPORTING FEATURES
Performance	■ 32-bit Local Bus ■ 16-bit PI Bus ■ 32-bit Video Memory Interface ■ 1-Mbyte Video Memory ■ True-packed pixel addressing ■ Color expansion for 8/16-bit-per-pixel graphics ■ Linear memory addressing
Display Quality	■ 1024 x 768 / 256 colors on LCD and CRT ■ 800 x 600 / 256 colors on CRT ■ 640 x 480 / 64K colors on LCD and CRT ■ 640 x 480 / 256 colors on LCD and CRT ■ SimulSCAN™ capability
Form Factor 	■ Two 256K x 16 DRAM architecture ■ Frame Acceleration without additional DRAMs ■ Integrated Dual-frequency Synthesizer ■ Integrated RAMDAC ■ Integrated color STN support ■ On-chip panel power sequencing logic
Low Power	■ Mixed 3.3/5.0V operation ■ Low Standby and Suspend Power Modes ■ Hardware/software control of Standby and Suspend Modes

Direct Sales Offices

Domestic

N. CALIFORNIA

San Jose
TEL: 408/436-7110
FAX: 408/437-8960

S. CALIFORNIA

Tustin
TEL: 714/258-8303
FAX: 714/258-8307

Thousand Oaks

TEL: 805/371-5381
FAX: 805/371-5382

**ROCKY MOUNTAIN
AREA**

Denver, CO
TEL: 303/682-0050
FAX: 303/682-0053

**SOUTH CENTRAL
AREA**

Austin, TX
TEL: 512/794-8490
FAX: 512/794-8069

Plano, TX

TEL: 214/985-2334
FAX: 214/964-3119

CENTRAL AREA

Chicago, IL
TEL: 708/490-5940
FAX: 708/490-5942

**NORTHEASTERN
AREA**

Andover, MA
TEL: 508/474-9300
FAX: 508/474-9149

New Brunswick, NJ

TEL: 908/603-7757
FAX: 908/603-7756

**SOUTH EASTERN
AREA**

Boca Raton, FL
TEL: 407/362-5225
FAX: 407/362-5235

International**GERMANY**

Herrsching
TEL: 49/08152-2030
FAX: 49/08152-6211

JAPAN

Tokyo
TEL: 81/3-5389-5300
FAX: 81/3-5389-5540

SINGAPORE

TEL: 65/3532122
FAX: 65/3532166

TAIWAN

Taipei
TEL: 886/2-718-4533
FAX: 886/2-718-4526

UNITED KINGDOM

Hertfordshire, England
TEL: 44/0727-872424
FAX: 44/0727-875919

The Company

Cirrus Logic, Inc., produces high-integration peripheral controller circuits for mass storage, graphics, and data communications. Our products are used in leading-edge personal computers, engineering workstations, and office automation equipment.

The Cirrus Logic formula combines innovative architectures in silicon with system design expertise. We deliver complete solutions — chips, software, evaluation boards, and manufacturing kits — on-time, to help you win in the marketplace.

Cirrus Logic's fabless manufacturing strategy, unique in the semiconductor industry, employs a full manufacturing infrastructure to ensure maximum product quality, availability and value for our customers.

Talk to our systems and applications specialists; see how you can benefit from a new kind of semiconductor company.

© Copyright, Cirrus Logic, Inc., 1992

Advance product information describes products which are in development and subject to developmental changes. Cirrus Logic, Inc., believes the information contained in this document is accurate and reliable. However, it is marked *Advance* and is subject to change without notice. No responsibility is assumed by Cirrus Logic, Inc., for its use, nor for infringements of patents or other rights of third parties. This document implies no license under patents or copyrights. Trademarks in this document belong to their respective companies. Cirrus Logic, Inc., products are covered under one or more of the following U.S. patents: 4,293,783; Re. 31,287; 4,763,332; 4,777,635; 4,839,896; 4,931,946; 4,975,828; 4,979,173; 5,032,981; 5,122,783; 5,131,015; 5,140,595; 5,157,618.

CIRRUS LOGIC, Inc., 3100 West Warren Ave. Fremont, CA 94538
TEL: 510/623-8300 FAX: 510/226-2180

356440-001

034261 ✓