
VL-SVGA-1

Super VGA Card
for the STD/STD 32 Bus



MSVGA

VL-SVGA-1 Super VGA Card Reference Manual

VL-SVGA-1 Card and Keyboard Interface for Industrial Computers
using the STD 32 Bus or STD 80 Bus

VersaLogic
CORP.

STD32™

Doc. Rev. 11/94

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Notice:

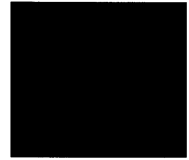
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This chapter introduces the VL-SVGA-1 video card, lists its features and specifications, and provides a brief overview of the installation and configuration process.

Using This Manual

Each chapter in this manual corresponds to a step in the installation process:

- This chapter, “Overview,” lists basic information about the VL-SVGA-1 card, specifications, and system requirements. Use this chapter to familiarize yourself with the card and its capabilities.
- Chapter 2, “Configuration,” discusses hardware modifications for a variety of configurations. Use this chapter to decide on the correct jumper pin settings for your configuration.
- Chapter 3, “Hardware Installation,” details the proper physical installation procedures and discusses the connections to the monitor and keyboard. *The card may be damaged if instructions in this chapter are not followed carefully.*
- Chapter 4, “Software Installation,” contains information about drivers and utilities for DOS and Windows users. Use this chapter to determine which drivers and utilities you will need and how to install them.

Introduction

The VL-SVGA-1 is an STD80/STD32 compatible Super VGA board with a single chip VGA controller, 512 kilobytes of RAM, an IBM AT-compatible keyboard controller, and standard connectors for monitor and keyboard cables. The card’s VGA BIOS and software provide support for DOS and Windows installations.

VGA/SVGA CONTROLLER AND ROM BIOS

A single CL-6205 VGA controller chip provides VESA-standard VGA and SVGA graphics modes and registers. With the supplied Windows drivers, performance enhancement features are enabled including 8-bit-per-pixel color expansion, improved data latches for block moves, and a 32 x 32 hardware cursor. The circuitry can output displays of up to 1024 x 768 pixels in 16 colors, or 800 x 600 pixels in 256 colors. See Appendix C, “VGA Modes and Addresses” for a complete list of supported display modes.

STD 32/STD 80 INTERFACE

The VL-SVGA-1's fully buffered bus interface comes configured for use in an STD 32 bus. It can also be easily reconfigured for compatibility with the STD 80 by modifying the data and address bus sizes. See "Configuration for the STD 80 Bus" in Chapter 2 for instructions.

VIDEO MEMORY

A single 256K x 16 bit DRAM chip provides 512 kilobytes of video RAM. A video DRAM write buffer queue increases data throughput to speed display updates. Video memory appears in the DOS memory map from A0000h to BFFFFh, and is accessible after the normal BIOS initialization sequence.

KEYBOARD INTERFACE

An Intel 8242, programmed with Phoenix Technologies' keyboard interface BIOS, functions as the VL-SVGA-1 keyboard controller. If another keyboard interface is available on your system, the VL-SVGA-1's keyboard interface can be disabled. Keyboard input can be disabled independently. See "Disabling the Keyboard Interface" in Chapter 2 for more information.

STANDARD KEYBOARD AND VIDEO CONNECTORS

The table below lists the supplied video and keyboard connectors:

Table 1: External connectors.

J1	10-pin header keyboard connector
J2	6-pin DIN PS/2-compatible keyboard connector
J3	15-pin D-shell analog VGA video monitor connector

CONFIGURABLE INTERRUPT ADDRESSES

To provide compatibility with different CPU cards and bus configurations, the VL-SVGA-1 offers configurable video and keyboard interrupts. See "

Adjusting the Video and Keyboard Interrupts" in Chapter 2 for details.

SOFTWARE DRIVERS AND UTILITIES

The included disks contain utilities and software drivers for DOS applications, as well as performance enhanced VGA drivers for Windows. See Chapter 4, "Software Installation," for a complete list of supported applications and installation instructions.

Technical Specifications

Specifications are typical at 25°C with a 5.0V supply voltage unless otherwise noted.

Size:

Meets all STD 80 and STD 32 Bus mechanical specifications

Storage Temperature:

-40°C to +85°C

Free Air Operating Temperature:

0°C to +65°C

Power Requirements:

+5V \pm 5% @ 600 mA typical

Video Interface:

Analog VGA compatible

Keyboard Interface:

AT and PS/2 compatible

CPU Requirements:

80x86 Intel or compatible processor with DOS-compatible BIOS

External Connections:

- J1: 10-pin keyboard
- J2: 6-pin DIN PS/2 keyboard
- J3: 15-pin D-shell analog video (VGA)

Bus Compatibility:

- STD 80: Full compliance, all bus speeds
- STD 32: Memory & I/O slave, SA16, SA8-I

Specifications are subject to change without notice.

Technical Support

If you have problems that this manual can't help you solve, contact VersaLogic for technical support at **1-800-824-3163**.

For some configurations, you'll need to adjust jumper pin positions on the VL-SVGA-1 card. This chapter describes the modifications necessary for most situations. A complete list of jumper settings is available in Appendix A, "Jumpers."

Default Configuration

In most cases, you will not need to modify the jumper pin positions from their factory configuration. The figure below illustrates jumper block positions as well as the default jumper pin positions.

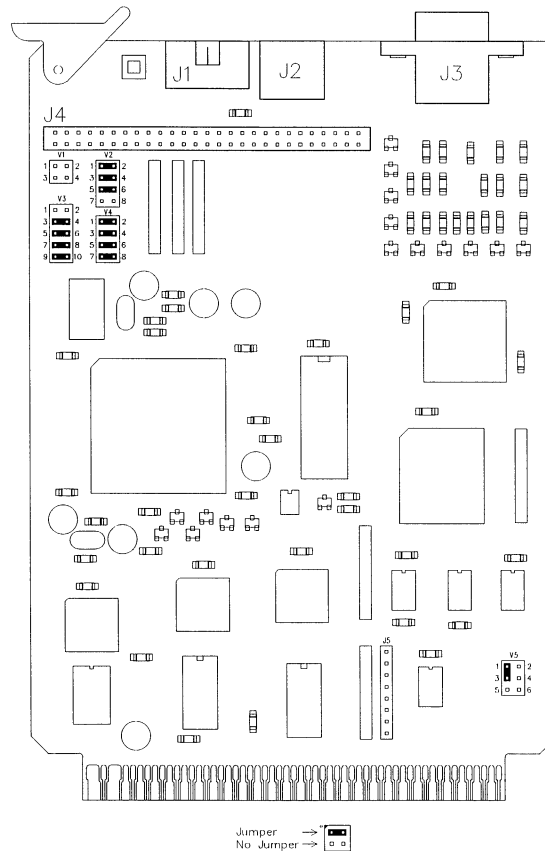


Figure 1: Default Jumper Positions

Configuration for the STD 80 Bus

The VL-SVGA-1 card is factory-configured for use with the STD 32 bus, but can also be configured for the STD 80 bus. The table below lists jumper positions for either configuration.

Table 2: Data and address bus size jumpers.

Jumper Block V3		Result
1	<input type="checkbox"/> <input type="checkbox"/>	2 STD 32 configuration, 16-bit data bus, 24-bit address bus (default)
3	<input checked="" type="checkbox"/> <input type="checkbox"/>	4
5	<input checked="" type="checkbox"/> <input type="checkbox"/>	6
7	<input checked="" type="checkbox"/> <input type="checkbox"/>	8
9	<input checked="" type="checkbox"/> <input type="checkbox"/>	10
1	<input checked="" type="checkbox"/> <input type="checkbox"/>	2 STD 80 configuration, 8-bit data bus, 20-bit address bus
3	<input type="checkbox"/> <input type="checkbox"/>	4
5	<input type="checkbox"/> <input type="checkbox"/>	6
7	<input type="checkbox"/> <input type="checkbox"/>	8
9	<input type="checkbox"/> <input type="checkbox"/>	10

Adjusting the Video and Keyboard Interrupts

The VL-SVGA-1 card generates two interrupts: a keyboard interrupt and a video interrupt. Either can be disabled or configured to use one of two STD Bus interrupt lines: INTRQ1* (P37) or INTRQ* (P44).

The keyboard interrupt is a signal for the IBM AT BIOS which indicates that there is data to be read in the keyboard buffer. For correct interaction with CPU cards from VersaLogic and most other CPU card manufacturers, leave the keyboard interrupt on INTRQ1* (P37).

The video interrupt indicates that a vertical retrace has started. This interrupt is disabled by default, but can be enabled if desired.

Table 3: Keyboard and video interrupt jumpers.

Jumper Block V5	Keyboard Interrupt	Video Interrupt
	Disabled	Disabled
	INTRQ1* (P37) (default)	Disabled (default)
	INTRQ* (P44)	Disabled
	Disabled	INTRQ1* (P37)
	Disabled	INTRQ* (P44)
	INTRQ1* (P37)	INTRQ* (P44)
	INTRQ* (P44)	INTRQ1* (P37)

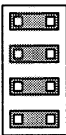
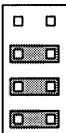
Disabling the Keyboard Interface

The CPU or another card on your system may already provide a keyboard interface. If this is the case, the VL-SVGA-1 keyboard interface must be disabled. Disabling the keyboard interface (jumper block V4, pins 1-2) differs from disabling the keyboard input (jumper block V2, pins 7-8) in the following ways:

- At system boot time, a standard IBM AT-compatible BIOS will test the keyboard interface. If the keyboard interface or the keyboard input are disabled, this test will fail.
- The jumper pins for keyboard input disable may be connected to an external switch or lock for security purposes. This switch may be turned on or off while power is supplied to the card cage. NOTE: Keyboard input must be enabled at system boot time.

Caution Do **not** plug in or unplug the keyboard from the VL-SVGA-1 card while the power to the card cage is on.

Table 4: Keyboard interface disable jumper.

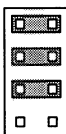
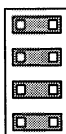
Jumper Block V4		Result
1		Interface enabled (default)
1		Interface disabled

Note If you disable the keyboard interface, be sure to disable the keyboard interrupts as well by removing jumpers crossing V5(1-3) or V5(2-4). See “Adjusting the Video and Keyboard Interrupts” earlier in this chapter for more information.

Disabling Keyboard Input

Jumper V2(7-8) controls the state of keyboard input. By wiring this jumper to a switch or lock, keyboard access can be controlled externally while the computer is on.

Table 5: Keyboard operation inhibit jumper.

Jumper Block V2		Result
1		Keyboard input allowed (default)
1		Keyboard input inhibited

Other Jumpers

Other jumpers on VL-SVGA-1 card are reserved for factory use only. These jumpers should be left in their default, factory-shipped positions. For a list of these positions, see Appendix A, “Jumpers,” or see the illustration at the beginning of this chapter.

This chapter describes VL-SVGA-1 card installation procedures and describes the external connections for keyboard and video equipment.

Caution Electrostatic discharge (ESD) can damage cards, disk drives, and other components. Do the installation procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part on the card cage.

Cards can be extremely sensitive to ESD and always require careful handling. After removing the card from its protective wrapper or from the card cage, place the card on a grounded, static-free surface, component side up. Use an anti-static foam pad if available, but not the card wrapper. Do not slide the card over any surface. During storage or shipment, protect the card with anti-static foam or bubble wrap.

Card Insertion

1. Select any numbered slot for the VL-SVGA-1 card. Be aware that CPU, floppy disk, and hardware cards may require particular slots or positioning in the card cage. Consult the CPU card's documentation to determine the correct card placement for these components.

Note Do **not** install the VL-SVGA-1 card into slot X (the leftmost slot on STD 32 card cages).

1. Turn the power to the card cage **off**. Installing or removing cards from the card cage while the power is on may damage both the backplane and the cards.
2. Slide the card into the slot. On most STD card cages, the card should be inserted with the card ejector at the top. Refer to the card cage documentation for the correct orientation.

Monitor and Keyboard Connections

The VL-SVGA-1 provides three connectors for connection to a VGA monitor and a keyboard. These connectors are found next to the card ejector as shown in the figure below.

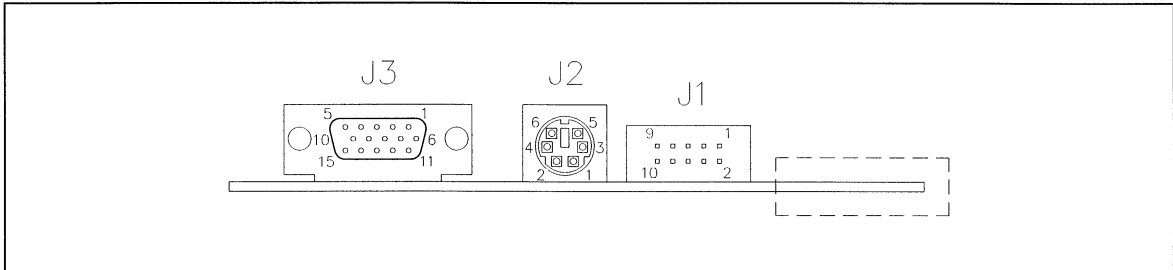


Figure 2: Connectors

Note Connectors J4 and J5 on the VL-SVGA-1 card are reserved for future use.

Caution Do **not** connect or disconnect a monitor or keyboard from the VL-SVGA-1 while power is supplied to the card cage.

CONNECTING THE MONITOR

Any standard VGA monitor may be connected to the VL-SVGA-1's 15-pin mini-D connector (J3). The pinouts for this connector are shown below.

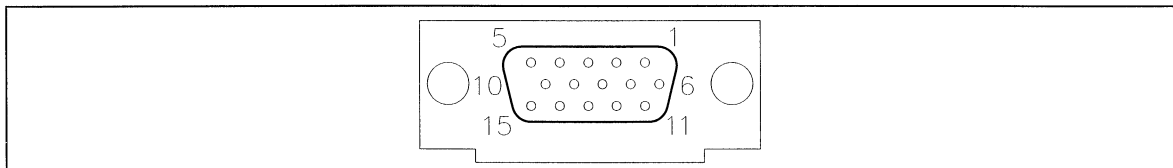


Figure 3: 15-Pin VGA Connector

Table 6: 15-pin VGA connector pinouts (J3).

Pin #	Signal	Description
1	RED	Red video
2	GREEN	Green video
3	BLUE	Blue video
4	SW3	Auto configuration input
5	GND	Digital ground
6	RGND	Red return (analog ground)
7	GGND	Green return (analog ground)
8	BGND	Blue return (analog ground)
9	NC	No connect
10	SGND	Sync return (digital ground)
11	SW1	Auto configuration input
12	SW2	Auto configuration input
13	HSYNC	Horizontal sync
14	VSYNC	Vertical sync
15	NC	No connect

CONNECTING THE KEYBOARD

Two keyboard ports are supplied on the VL-SVGA-1 card. A keyboard with a 6-pin PS/2 connector can be connected directly to the card through port J2. Keyboards with the larger 5-pin IBM AT keyboard connector can be connected to the PS/2 connector with an adapter available from VersaLogic (VersaLogic part number 9579). A panel-mounted connector (part number 9580) is also available from VersaLogic that connects the 10-pin latching header to a panel-mounted PS/2 connector.

Caution Do **not** plug two keyboards into the VL-SVGA-1. Use either the 6-pin PS/2 connector (J2), or the 10-pin header connector (J1), but not both.

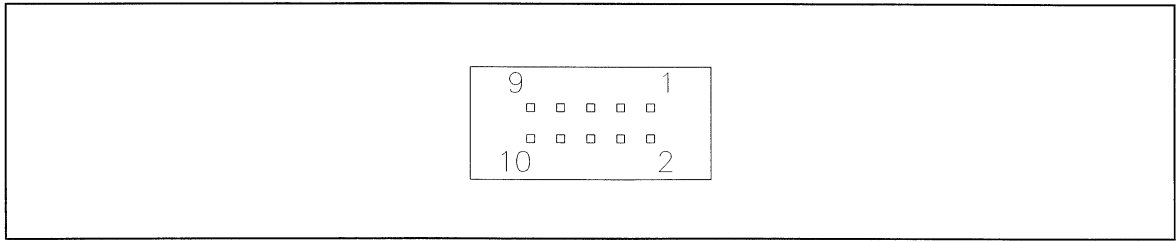
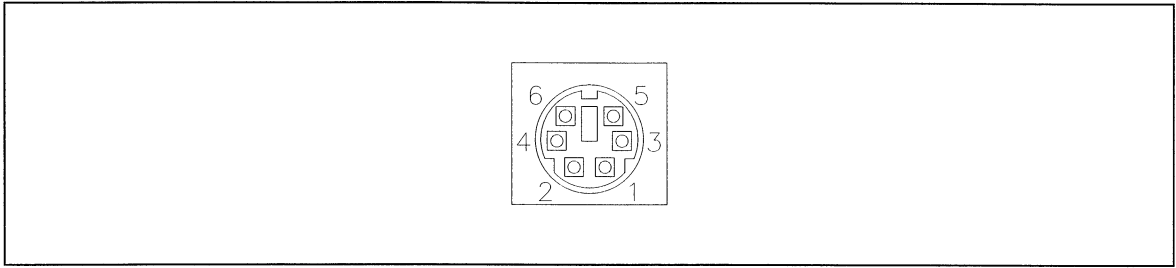


Figure 4: 10-Pin Header Connector

Table 7: 10-pin keyboard connector pinouts (J1).

Pin #	Signal	Description
1	GND	Signal ground
2	KBD CLK	Keyboard clock
3	GND	Signal ground
4	KBD DATA	Keyboard data
5	GND	Signal ground
6	NC	No connect
7	V _{cc}	+5V
8	NC	No connect
9	V _{cc}	+5V
10	NC	No connect

**Figure 5: 6-Pin PS/2 Connector****Table 8: 6-pin keyboard connector pinouts (J2).**

Pin #	Signal	Description
1	KBD DATA	Keyboard data
2	NC	No connect
3	GND	Signal ground
4	V _{cc}	+5V
5	KBD CLK	Keyboard clock
6	NC	No connect

After configuring and installing the VL-SVGA-1 card, you will need to install software drivers and utilities. This chapter describes the software installation and configuration process for DOS and Windows.

DOS Installation

To install the DOS drivers and utilities, simply run the INSTALL program on the “DOS Display Drivers and Utilities” disk. On-screen menus and options will guide you through the installation process. The INSTALL program can install the following DOS software drivers:

- WordStar versions 5.5 and 7.0
- WordStar 2000 3.5
- WordPerfect 5.1
- Microsoft Word, versions 5.0 and 5.5
- Lotus 1-2-3, versions 2.x and 3.1
- AutoShade 2.0
- AutoCAD 386, versions 11 and 12
- AutoDesk 3D Studio, versions 1.0 and 2.0

For other DOS applications that require video drivers, try standard VGA drivers.

The INSTALL program can also install the following utilities:

- CLVESA.COM. Some applications require VESA video modes. If this is the case, either run this program before starting the application, or call it from the AUTOEXEC.BAT file.
- CLMODE.EXE. Via on-screen menus, this program allows you to change video modes and video refresh frequencies on the fly.

Other utilities are included, but are not intended for general use with the VL-SVGA-1 card.

Windows Installation

The VL-SVGA-1 card is compatible with the “VGA (640 x 480, 16 colors)” and “Super VGA (800 x 600, 16 colors)” drivers supplied with Microsoft® Windows®. However, higher-resolution video modes are available with Cirrus Logic’s video drivers, supplied on the disk labeled “Microsoft Windows 3.1 Display Drivers”. To install the drivers, follow these steps:

1. Run **Windows Setup** from the **Accessories** group in the Program Manager.
2. Select **Change System Settings** from the **Options** menu.
3. To the right of **Display**, click the down arrow and select **Other Display (Requires a disk from OEM)...** from the list.
4. Insert the disk labeled “Microsoft Windows 3.1 Display Drivers” into the disk drive, and enter the letter for that drive (usually “A:” or “B:”). Click **OK**.
5. Select a VGA mode from the list, and click **OK**.
6. Click **OK** in the **Change System Settings** dialog to load and install the new drivers.
7. Restart Windows.

Appendix A: Jumpers

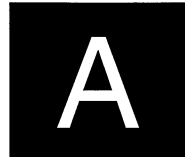


Table 9: Jumpers.

Jumpers	Result
Jumper Block V2	
1 2 3 4 5 6 7 8	Keyboard input allowed (default)
1 2 3 4 5 6 7 8	Keyboard input inhibited
Jumper Block V3	
1 2 3 4 5 6 7 8 9 10	16-bit data bus, 24-bit address bus for STD 32 configurations (default)
1 2 3 4 5 6 7 8 9 10	8-bit data bus, 20-bit address bus for STD 80 configurations
Jumper Block V4	
1 2 3 4 5 6 7 8	Keyboard interface enabled (default)
1 2 3 4 5 6 7 8	Keyboard interface disabled

Jumpers	Result
Jumper Block V5	
1 2 3 4 5 6	Keyboard interrupt: disabled Video interrupt: disabled
1 2 3 4 5 6	Keyboard interrupt: INTRQ1* (P37) Video interrupt: disabled (default)
1 2 3 4 5 6	Keyboard interrupt: INTRQ* (P44) Video interrupt: disabled
1 2 3 4 5 6	Keyboard interrupt: disabled Video interrupt: INTRQ1* (P37)
1 2 3 4 5 6	Keyboard interrupt: disabled Video interrupt: INTRQ* (P44)
1 2 3 4 5 6	Keyboard interrupt: INTRQ1*(P37) Video interrupt: INTRQ* (P44)
1 2 3 4 5 6	Keyboard interrupt: INTRQ* (P44) Video interrupt: INTRQ1* (P37)

Appendix B: Registers

B

Some of the registers in the tables below contain “X” as a digit. In these cases, substitute “B” for Monochrome Mode or “D” for Color Mode.

Table 10: VGA general registers.

Name	Address	Index
Misc. Output	03C2h (W)	-
Misc. Input	03CCh (R)	-
Feature Control	03XAh (W)	-
Feature Control	03CAh (R)	-
Input Status 0	03C2h	-
Input Status 1	03XAh	-
Pixel Mask	03C6h	-
Pixel Read Mode	03C7h (W)	-
DAC State	03C7h (R)	-
Pixel Write Mode	03C8h	-
Pixel Data	03C9h	-

Table 12: VGA attribute registers.

Name	Address	Index
Attribute Controller Index	03C0h (W) 03C1h (R)	-
Attribute Controller Palette	03C0h (W) 03C1h (R)	0h-Fh
Attribute Controller Mode	03C0h (W) 03C1h (R)	10h
Overscan Color	03C0h (W) 03C1h (R)	11h
Color Plane Enable	03C0h (W) 03C1h (R)	12h
Pixel Panning	03C0h (W) 03C1h (R)	13h
Color Select	03C0h (W) 03C1h (R)	14h

Table 11: VGA sequencer registers.

Name	Address	Index
Sequencer Index	03C4h	-
Reset	03C5h	0
Clock Mode	03C5h	1
Plane Mask	03C5h	2
Char. Map Select	03C5h	3
Memory Mode	03C5h	4

Table 13: CRT controller registers.

Name	Address	Index
Horz. Total	03X5h	0h
Horz. Display End	03X5h	1h
Horz. Blanking Start	03X5h	2h
Horz. Blanking End	03X5h	3h
Horz. Sync Start	03X5h	4h
Horz. Sync End	03X5h	5h
Vertical Total	03X5h	6h
Overflow	03X5h	7h
Screen A Row Scan	03X5h	8h
Cell Height	03X5h	9h
Cursor Start	03X5h	Ah
Cursor End	03X5h	Bh
Screen Start Add. High	03X5h	Ch
Screen Start Add. Low	03X5h	Dh
Cursor Location High	03X5h	Eh
Cursor Location Low	03X5h	Fh
Vertical Sync Start	03X5h	10h
Vertical Sync End	03X5h	11h
Vertical Display End	03X5h	12h
Offset	03X5h	13h
Underline Row Scan	03X5h	14h
Vertical Blanking Start	03X5h	15h
Vertical Blanking End	03X5h	16h
CRTC Mode Control	03X5h	17h
Line Compare	03X5h	18h
Graphic Data Readback	03X5h	22h
Attribute Toggle Readback	03X5h	24h
Attribute Index Readback	03X5h	26h

Table 14: VGA graphics controller registers.

Name	Address	Index
Graphics Controller Index	03CEh	-
Set / Reset	03CFh	0
Set / Reset Enable	03CFh	1
Color Compare	03CFh	2
Data Rotate	03CFh	3
Read Map Select	03CFh	4
Mode	03CFh	5
Miscellaneous	03CFh	6
Color Don't Care	03CFh	7
Bit Mask	03CFh	8

Table 15: Keyboard interface registers.

Name	Address	Index
Data In/Out	0060h	-
Command	0064h	-

Appendix C: VGA/SVGA Modes and Addresses



Table 16: DOS memory addresses.

Address	Usage
B8000h - BFFFFh	Color Text
B0000h - B7FFFh	Monochrome Text
A0000h - AFFFFh	VGA Graphics
A0000h - BFFFFh	Extended VGA Graphics
C0000h - C7FFFh	Video BIOS

Table 17: VGA graphics modes.

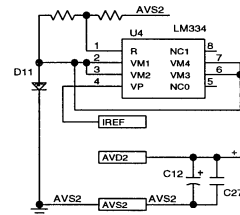
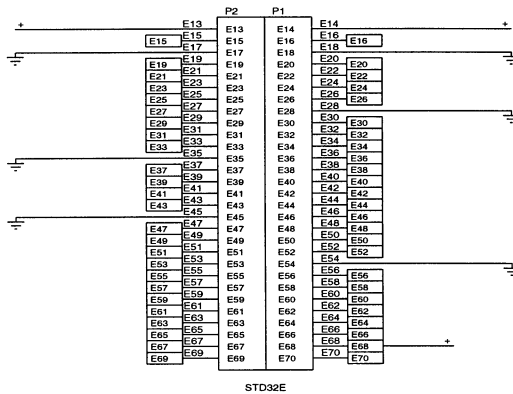
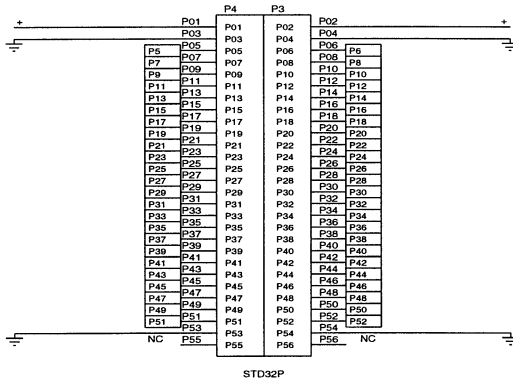
Mode	# Colors/ Palette	Col x Rows	Cell	Screen	Mode	Clk MHz	Horz KHz	Vert Hz
0h, 1h	16/256K	40x25	9x16	360x400	Text	28	31.5	70
2h, 3h	16/256K	80x25	9x16	720x400	Text	28	31.5	70
4h, 5h	4/256K	40x25	8x8	320x200	Gfx	25	31.5	70
6h	2/256K	80x25	8x8	640x200	Gfx	25	31.5	70
7h	Mono	80x25	9x16	720x400	Text	28	31.5	70
Dh	16/256K	40x25	8x8	320x200	Gfx	25	31.5	70
Eh	16/256K	80x25	8x8	640x200	Gfx	25	31.5	70
Fh	Mono	80x25	8x14	640x350	Gfx	25	31.5	70
10h	16/256K	80x25	8x14	640x350	Gfx	25	31.5	70
11h	2/256K	80x30	8x16	640x480	Gfx	25	31.5	60
12h	16/256K	80x30	8x16	640x480	Gfx	25	31.5	60
13h	256/256K	40x25	8x8	320x200	Gfx	25	31.5	70

Table 18: Extended VGA graphics modes.

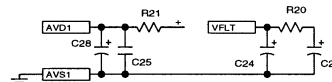
Mode	# Colors/ Palette	Col x Rows	Cell	Screen	Mode	Clk MHz	Horz KHz	Vert Hz
14h	16/256K	132x25	8x16	1056x400	Text	41.5	31.5	70
54h	16/256K	132x43	8x8	1056x350	Text	41.5	31.5	70
55h	16/256K	132x25	8x14	1056x350	Text	41.5	31.5	70
58h,6Ah	16/256K	100x37	8x16	800x600	Gfx	36	35.2	56
58h,6Ah	16/256K	100x37	8x16	800x600	Gfx	40	37.8	56
58h,6Ah	16/256K	100x37	8x16	800x600	Gfx	50	48.1	56
5Ch	256/256K	100x37	8x16	800x600	Gfx	36	35.2	56
5Ch	256/256K	100x37	8x16	800x600	Gfx	40	37.8	56
5Ch	256/256K	100x37	8x16	800x600	Gfx	50	48.1	56
5Dh	16/256K	128x48	8x16	1024x768	Gfx	65	48.3	60
5Dh	16/256K	128x48	8x16	1024x768	Gfx	44.9	35.5	87
5F	256/256K	80x30	8x16	640x480	Gfx	25	31.5	60
5F	256/256K	80x30	8x16	640x480	Gfx	31.5	37.9	72

D

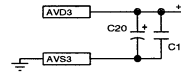
Appendix D: Schematics



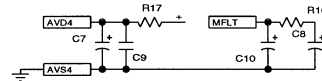
NOTE: AVS2 is treated the same as digital gnd (it ties in directly to the digital ground plane). It is not isolated like AVS1, AVS3, and AVS4.



NOTE: Tie in to digital gnd plane only at GD6205 pin 51.



NOTE: Tie in to digital gnd plane only at GD6205 pin 90.

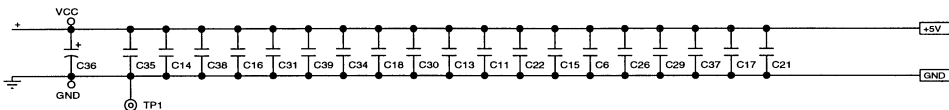


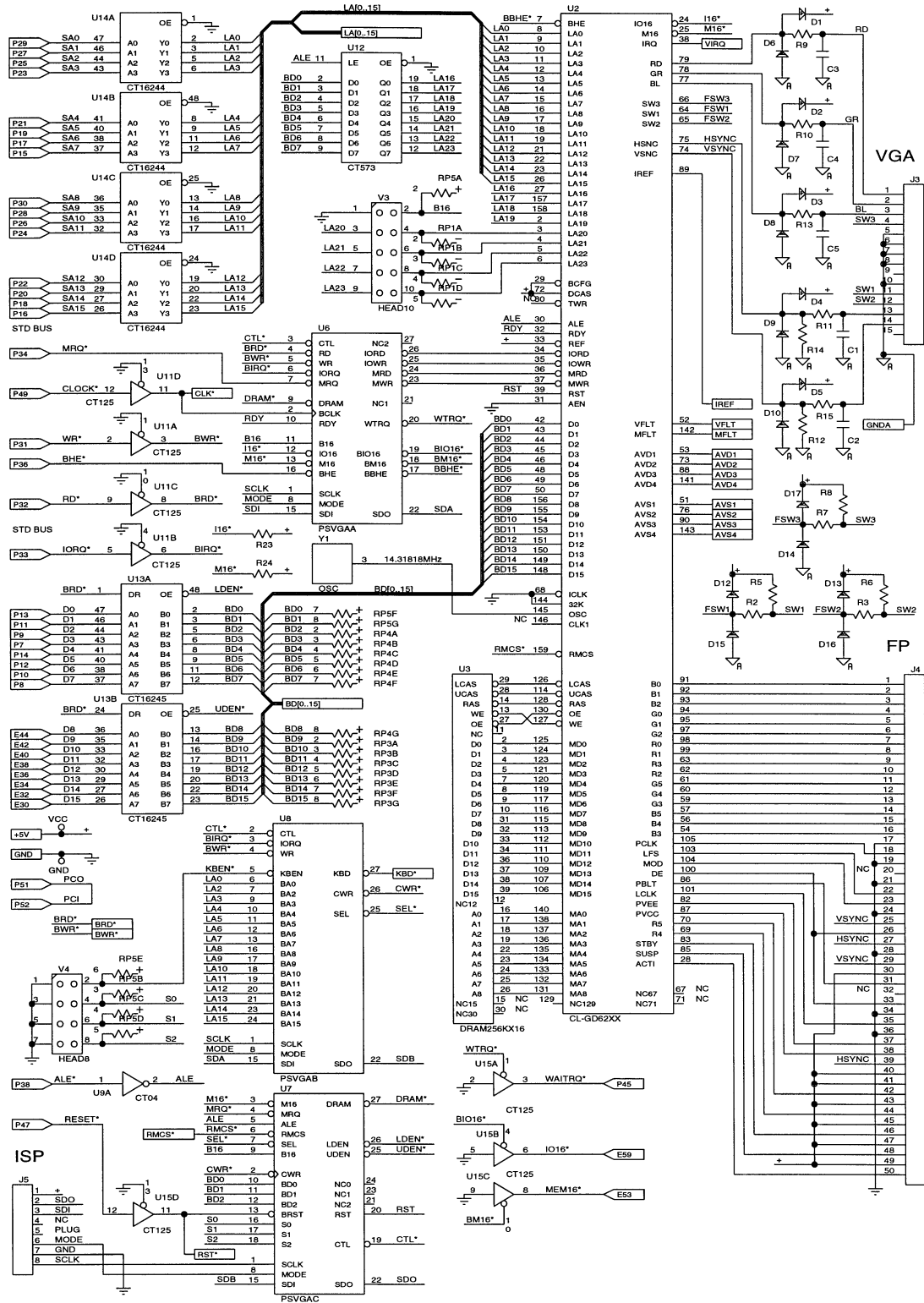
NOTE: Tie in to digital gnd plane only at GD6205 pin 143.

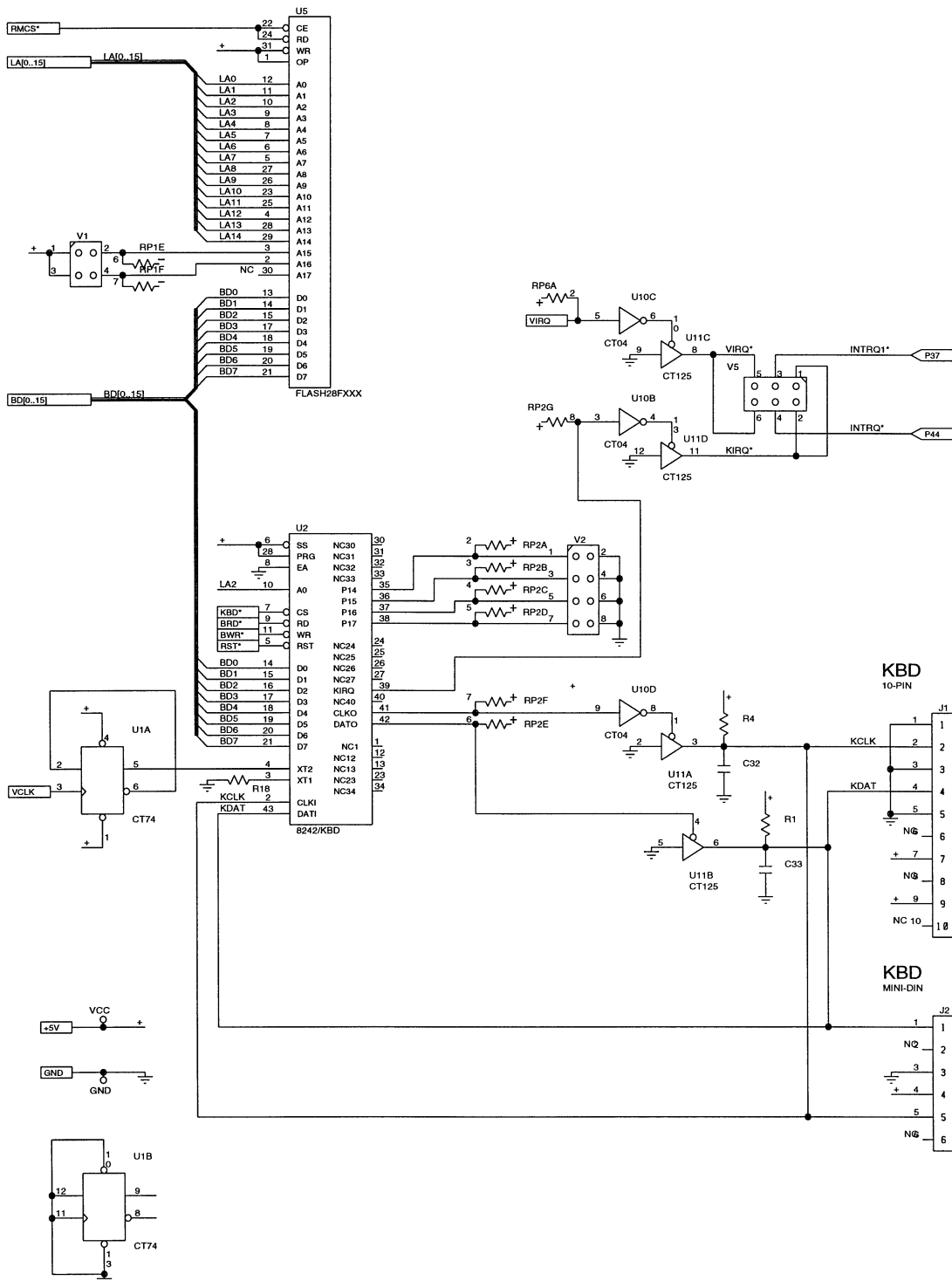


NOTE: GND4 is not isolated from digital gnd. All components on the GND4 net tie in directly to the digital gnd plane.

BYPASS NOTE: Each of the VCC pins on U2 need a bypass cap as close to the pin as possible.







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