Intel® E7501 Scalable Performance Board Development Kit

User's Manual

February 2003

Order Number: 273844-001

Contents

Figures

Tables

Revision History

Date	Revision	Description
February 2003	001	Initial release of this document.

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About This Manual 1

This manual tells you how to set up and use the evaluation board and other components included in your Intel® E7501 Scalable Performance Board Development Kit.

1.1 Content Overview

Chapter 1, “About This Manual” – This chapter contains a description of conventions used in this manual and instructions for obtaining literature and contacting customer support.

Chapter 2, “Getting Started” – Provides complete instructions on how to configure the evaluation board and processor assembly by setting jumpers, connecting peripherals, providing power, and configuring the BIOS.

Chapter 3, “Theory of Operation” – This chapter provides information on the system design.

Chapter 4, “Hardware Reference” – This chapter provides a description of jumper settings and functions, and pinout information for each connector.

Chapter 5, “BIOS Overview” – This chapter describes how to configure the BIOS for your system configuration. A summary of all BIOS menu options is provided.

Chapter 6, “P64H2 Riser Card” – This chapter provides installation instructions for the P64H2 Riser Card, an optional item which may be included in this development kit.

Appendix A, “Bill of Materials” – This appendix contains the bill of materials for the evaluation board.

Appendix B, “Schematics” – This appendix contains schematics for selected connectors and subsystems for the evaluation board.

1.2 Text Conventions

The following notations may be used throughout this manual.

#	The pound symbol (#) appended to a signal name indicates that the signal is active low.
Variables	Variables are shown in italics. Variables must be replaced with correct values.
Instructions	Instruction mnemonics are shown in uppercase. When you are programming, instructions are not case-sensitive. You may use either upper- or lowercase.
Numbers	Hexadecimal numbers are represented by a string of hexadecimal digits followed by the character H. A zero prefix is added to numbers that begin with A through F. (For example, FF is shown as 0FFH.) Decimal and binary numbers are represented by their customary notations. (That is, 255 is a decimal number and 1111 1111 is a binary number. In some cases, the letter B is added for clarity.)
Units of Measure	The following abbreviations are used to represent units of measure:
A	amps, amperes
Gbyte	gigabytes
GHz	gigahertz
Kbyte	kilobytes
KΩ	kilo-ohms
mA	milliamps, milliamperes
Mbyte	megabytes
MHz	megahertz
ms	milliseconds
mW	milliwatts
ns	nanoseconds
pF	picofarads
W	watts
V	volts
µA	microamps, microamperes
µF	microfarads
µs	microseconds

µW	microwatts
Signal Names	Signal names are shown in uppercase. When several signals share a common name, an individual signal is represented by the signal name followed by a number, while the group is represented by the signal name followed by a variable (n). For example, the lower chip-select signals are named CS0#, CS1#, CS2#, and so on; they are collectively called CSn#. A pound symbol (#) appended to a signal name identifies an active-low signal. Port pins are represented by the port abbreviation, a period, and the pin number (e.g., P1.0).

1.3 Technical Support

1.3.1 Electronic Support Systems

Intel's site on the World Wide Web (http://www.intel.com/) provides up-to-date technical information and product support. This information is available 24 hours per day, 7 days per week, providing technical information whenever you need it.

1.3.1.1 Online Documents

Product documentation is provided online in a variety of web-friendly formats at:

http://developer.intel.com/design/intarch

1.3.2 Additional Technical Support

If you require additional technical support, please contact your field sales representative or local distributor.

1.4 Product Literature

You can order product literature from the following Intel literature centers.

1-800-548-4725 U.S. and Canada

708-296-9333 U.S. (from overseas)

44(0)1793-431155 Europe (U.K.)

44(0)1793-421333 Germany

44(0)1793-421777 France

81(0)120-47-88-32 Japan (fax only)

1.5 Related Documents

Table 1. Related Documents

Document Title	Order Number
Low Voltage Intel® Xeon™ Processor Datasheet	273766
Low Voltage Intel® Xeon™ Processor for Embedded Applications Thermal Design Guide	273764
Intel® Xeon™ Processor with 512 KB L2 Cache at 1.80 GHz to 2.8 GHz Datasheet	298642
Intel® Xeon™ Processor Specification Update	249678
Intel® Xeon™ Processor with 512 KB L2 Cache System Compatibility Guidelines	298645
Voltage Regulator Module (VRM) 9.0 DC-DC Converter Design Guidelines	249205
Voltage Regulator Module (VRM) 9.1 DC-DC Converter Design Guidelines	298646
Dual Intel® Xeon™ Processor Voltage Regulator Down (VRD) Design Guidelines	298644
ITP700 Debug Port Design Guide	249679
Intel® Xeon™ Processor Thermal Design Guidelines	298348
Intel® Xeon™ Processor and Intel E7500/E7501 Chipset Compatibile Platform Design Guide	251929
Intel® E7500 Chipset Design Guide: Intel® E7500 Chipset Memory Controller Hub (MCH) Thermal and Mechanical Design Guidelines	298647
Intel® E7501 Chipset Datasheet: Intel® E7501 Chipset Memory Controller Hub (MCH)	251927
Intel® 82870P2 PCI/PCI-X 64-bit Hub 2 (P64H2) Datasheet	290732
Intel® 82801CA I/O Controller Hub 3 (ICH3-S) Datasheet	290733
Intel® E7501 Chipset Memory Controller Hub (MCH) Specification Update	251928
Intel® 82870P2 PCI/PCI-X 64-bit Hub 2 (P64H2) Specification Update	290735
Intel® 82801CA I/O Controller Hub 3 (ICH3-S) Specification Update	290739
Intel® 82802AB/82802AC Firmware Hub (FWH)	290658
Intel® 82802 Firmware Hub: Random Number Generator	298029
Intel Architecture Software Developer's Manual, Volume 1: Basic Architecture	243190
Intel Architecture Software Developer's Manual, Volume 2: Instruction Set Reference Manual	243191
Intel Architecture Software Developer's Manual, Volume 3: System Programming Guide	243192
Intel® Pentium® 4 and Xeon™ Processor Optimization	248966
Intel® Applied Computing System Firmware Library User's Guide	273261
Intel® Applied Computing System Firmware Library Reference Manual	273260
Intel Xeon Processor with 533 MHz System Bus at 2.0 GHz to 2.8 GHz Datasheet	252135
Intel E7500/E7501/E7505 Chipset Thermal Design Guide	298647

Getting Started 2

This chapter identifies the Intel® E7501 Scalable Performance Board Development Kit's key components, features and specifications. It also tells you how to set up the board for operation.

2.1 Overview

The development kit contains a baseboard with two Intel® Xeon™ Processors with 512 Kbyte L2 cache, two Low Voltage Intel Xeon Processors, Intel E7501 chipset, and other system board components and peripheral connectors. Also included in the kit are a hard drive, power supply, and a board/component stand. Various software and documentation are also included in the kit.

Note: The evaluation board is shipped as an open system with a stand allowing for maximum flexibility in changing hardware configuration and peripherals in a lab environment. Since the board is not in a protective chassis, the user is required to observe extra precaution when handling and operating the system. Some assembly is required before use.

2.2 Evaluation Board Features

The evaluation board features are summarized below:

CPU

- Supports dual Intel® Xeon™ processors with 512 Kbytes of L2 cache and dual Low Voltage Intel® Xeon™ processors
- Supports 400/533 MHz Processor System Bus (PSB) at 3.2/4.3 Gbytes/s

Chipset

- Intel® E7501 chipset
- RGE7501MC Memory Controller Hub (MCH)
- Two Intel® 82870P2 PCI/PCI-X 64-bit Hubs 2 (P64H2)
  - — Connected to MCH via 16-bit Hub Interface 2.0 (HI 2.0) at 1.066 Gbytes/s with ECC
  - — Supports PCI-X to 133 MHz, PCI to 66 MHz
- Intel® 82801CA I/O Controller Hub 3 (ICH3-S)
  - — Connected to MCH via 8-bit Hub Interface 1.5 (HI 1.5) at 266 Mbytes/s
  - — Built-in MAC
  - — 8 Mbit 82802AC Firmware Hub (FWH)
  - — PCI 32-bit/33 MHz
  - — Two IDE controllers supporting Ultra ATA-100/66/33 IDE protocol (only one connector is available on the evaluation board)

Memory Support

- Two-channel DDR-200/266 memory interface at 3.2/4.3 Gbytes/s bandwidth, four slots per channel
- Registered/ECC memory only
- Two to six DDR-1600/1200 DIMMs
- 256 Mbytes to 12 Gbytes total memory (the system has been validated with up to 6 Gbytes of memory)

Flash System BIOS ROM

- AMI* system BIOS

Power Supply

- WTX power supply

System I/O

- On-board Intel® 82544EI Gigabit Ethernet controller
- On-board Adaptec* AIC7902 SCSI controller
- On-board video with one built-in VGA connector
- One floppy connector supporting one floppy drive
- One Ultra ATA-100/66/33 IDE connector supporting up to two IDE devices
- One built-in 16550 fast UART compatible serial port connector
- Built-in Standard/EPP/ECP parallel port connector
- Two built-in Universal Serial Bus (USB) connectors
- Built-in PS/2 keyboard and PS/2 mouse (6-pin mini-DIN) connectors

Peripheral Connectors

- One 64-bit/133 MHz PCI-X slot
- One 64-bit/100 MHz PCI-X slot
- Four 64-bit/66 MHz PCI-X slots (one contains a HI 2.0 extension)
- One 32-bit/33 MHz PCI slot (for debug and legacy support only)

2.3 Included Hardware

The following hardware is included in the development kit:

- Board/component stand and mounting hardware
- Evaluation board (baseboard) with battery
- WTX power supply
- BIOS Image from AMI* (FWH installed on board)

- Two Intel® Xeon™ Processors with 512 Kbytes L2 cache at 2.4 GHz with 533 MHz PSB (installed on board)
- Two Low Voltage Intel® Xeon™ Processors at 1.6 GHz with 400 MHz PSB
- Two fansink thermal solutions and metal attachment brackets
- Two sets of plastic processor retention mechanisms (four pieces) for the 2.4 GHz processors
- Two retention clips for the 1.6 GHz processors.
- One MCH heatsink and attachment clip
- Two 256 Mbytes DIMMs, registered with ECC
- IDE hard disk drive pre-loaded with QNX RTP*
- 40-pin IDE cable for the hard disk drive (cable will support two IDE devices
- Hardware to attach the board and the hard drive to the stand:
  - 42 screws: 6/32" (diameter) x 7/16" (length)
  - 19 female-female standoffs: 6/32" (diameter) x 5/8" (length)
  - 19 lock washers: size 6

Optionally, your kit may include a P64H2 Riser Card with installation hardware (see Chapter 6).

2.4 Software Key Features

The software in the kit was chosen to facilitate development of real-time applications based on the components used in the evaluation board. The software tools included in your kit are described in this section.

Note: Software in the kit is provided free by the vendor and is only licensed for evaluation purposes. Refer to the documentation in your development kit for further details on any terms and conditions that may be applicable to the granted licenses. Customers using tools that work with other third party products must have licensed those products. Any targets created by those tools should also have appropriate licenses. Software included in the kit is subject to change.

Refer to http://developer.intel.com/design/intarch/devkits for details on additional software from other third party vendors.

2.4.1 Embedded BIOS

The evaluation board is pre-installed and licensed with a copy of AMIBIOS8* developed by Intel. Refer to Chapter 5 for a detailed product description and instructions on using the BIOS setup.

2.4.2 Operating Systems

2.4.2.1 Wind River Tornado* Development Platform

Wind River* introduces Tornado* Development Platform, the optimized solution for the Intel® E7501 Scalable Performance Board Development Kit. The Tornado Development Platform includes VxWorks*, the most widely adopted real-time operating system (RTOS) in the embedded industry, as well as Tornado Tools, a comprehensive suite of core and optional cross-development tools and utilities, and a full range of communications options for the target connection to the host.

VxWorks is flexible, with more than 1800 powerful application program interfaces (APIs); scalable, from the simplest to the most complex product designs; reliable, used in mission-critical applications ranging from anti-lock braking systems to inter-planetary exploration; compatible with numerous industry standards, and available on all popular CPU platforms.

The VxWorks RTOS comprises the core capabilities of the wind microkernel along with advanced networking support, powerful file system and I/O management, and C++ and other standard run-time support. These core capabilities can be combined with add-on components available from Wind River and its more than 600 WindLink* partner companies.

Tornado* AE includes VxWorks* AE (a new protected operating system) as well as Tornado Tools 3.0, significant advances in the Tornado host development environment and host-target middleware.

Foremost among the VxWorks AE enhancements is the introduction of protection domains, an MMU-based feature of the kernel that provides for several types of protection against unintentional mistakes or errant code. A protection domain may be thought of as a container for code, data, and system objects, including tasks.

Protection domains offer the following types of protection:

- Protection of the kernel from errant application code
- Run-time isolation of applications from each other
- Inter-application linkage protection
- Text and read-only data protection
- Automatic resource reclamation

Additional VxWorks AE enhancements include:

- Fully integrated, virtual-memory-based memory management
- Physical memory management support
- An ELF section-oriented loader that supports out-of-order loading
- Improved wind kernel object management
- Stack overflow detection

Advances in the host development environment include a new multitasking debugger as the standard Tornado debugger, a new operating system object inspector (replacing the browser), enhancements throughout the IDE (and command line) to support the development of protection domains within VxWorks AE, simplification of host-target access management, and various other improvements in the host GUI.

Tornado 3 and Tornado AE offer:

- Intel® Xeon™ processor and Hyper Threading technology support
- 36-bit addressing
- Shared memory object
- Integrated booting strategy so users can create boot images in MP environment
- Industry accepted wind microkernel
- Protection domain management
- Resource tracking and management
- System overrun protection
- Powerful loader facilities
- Efficient deterministic task management
- Fast interrupt and exception handling
- Optimized floating-point support
- Dynamic memory management
- Networking support including large network stacks to choose from
- Fast, flexible I/O and local file system
- Advanced, integrated Tornado tools development environment

For more information, refer to the Wind River documentation included in the development kit.

2.4.2.2 QNX Realtime Platform* (RTP)

Built from over 20 years of expertise in RTOS development, the QNX Realtime OS*, a core technology of the QNX RTP, provides a powerful, massively scalable, reliable foundation for embedded systems. QNX Realtime OS offers the following features:

- **Flash File System Manager:** Features wear-leveling, on-the-fly decompression, random writes, fault recovery, and other characteristics unique to implementing a file system in flash memory.
- **CD-ROM File System Manager:** Implements the ISO-9660/Rock Ridge media standard and allows CD-ROMs and DVDs to be readily used.
- **CIFS File System Manager:** Implements the Microsoft* Common Internet File System standard and allows Windows* network file access.
- **NFS File System:** A popular network file system for enterprise-wide, heterogeneous networking, NFS lets you transparently access files on most UNIX* and Linux systems and many non-UNIX systems, including Windows.
- **Choice of TCP/IP Stacks:** QNX gives you a choice of TCP/IP stacks. Choose the Tiny TCP Manager, which provides a small implementation of TCP/IP, including ftp, ftpd, telnet, telnetd, and more. Tiny TCP also supports PPP and 802.3 networking. Or, you can use the full BSD 4.4 stack, which adds features such as routing, IP filtering, and multicasting.
- **USB Stack:** Featuring hot-swap and plug-and-play capabilities, this bus standard provides a low-cost method for adding peripheral devices to your system. The QNX RTOS implementation follows the USB 1.1 specification and supports OHCI and UHCI chips.

- **PCI Device Manager:** Provides PCI services for all managers in your system. The PCI Manager makes it possible to transparently access all PCI services.
- **Serial Manager:** Provides standard POSIX TTY device control while supporting extensions for efficient realtime protocol management.
- **PCMCIA/CardBus Server:** Ideal for small, rugged, memory-constrained devices, such as digital cameras, the PCMCIA/CardBus standard is fully supported under the QNX RTOS. The server manages host resources (memory windows, I/O ports, and IRQs) and provides utilities to start and stop processes (as cards are inserted and removed), to display server status, and to show card CIS data.

QNX Networking Infrastructure Platform

This platform is a comprehensive suite of tools and protocol stacks for OEMs building IP, optical, and storage networking equipment. It includes Qnet* micronetworking for network-distributed applications, symmetric multiprocessing (SMP), QNX High Availability Toolkit, QNX System Analysis Toolkit, plus support for a rich suite of protocol stacks (MPLS, OSPF, BGP, ATM, etc.) and tools (modeling, software measurement, etc.).

Microkernel Architecture at its Best

Tiny yet powerful, the QNX Neutrino* microkernel lies at the heart of the QNX RTOS. QNX Neutrino delivers core realtime services for embedded applications, including message passing, POSIX thread services, mutexes, condition variables, semaphores, signals, and scheduling. It can also be smoothly extended to support POSIX message queues, file systems, networking, and other OS-level capabilities with off-the-shelf, service-providing modules.

The QNX RTOS architecture offers unprecedented scalability. You can link your application code directly against the QNX Neutrino microkernel to create a single multi-threaded image for small embedded systems — as you would with a realtime executive. Or, you can run the process manager for all the advantages of a full process model and the ability to add thousands of applications — all running in MMU-protected memory. Or, applications can be run over a distributed network of SMP clusters for the ultimate in large-scale configurations. Whatever your configuration—tiny, medium, massive, or distributed— recoding is never an issue since the API remains consistent throughout.

QNX Neutrino is the world's first microkernel engineered from the ground up for the latest POSIX 1003.1 standards and drafts, including realtime and thread options. QNX Neutrino's POSIX implementation means portability of your application code and your software developers. Programmers familiar with UNIX or Linux won't need any training to feel right at home in this POSIX environment. This built-in POSIX compatibility also comes without the penalty of extra code. Even after the process manager is added to include services like process creation, pathname-space management, and memory protection, a QNX-based system is extremely small and efficient which is crucial for ROMable systems.

Conventional RTOSs use a single flat memory architecture where hard-to-detect programming errors like corrupt C pointers can cause programs to overwrite each other or the kernel. The inevitable result is system failure. A QNX-based system, however, can intelligently recover from software faults, even in drivers and other critical programs, without rebooting, because every OS component runs in its own MMU-protected address space. More importantly, because of the QNX RTOS's design, full MMU protection does not come at the expense of performance. With fast context-switch speeds and low latencies, QNX delivers reliable realtime performance.

Ever-evolving standards and changing customer demands can shorten the life cycle of your product. With QNX, you can dynamically upgrade and maintain your product in the field. Since all drivers, applications, and OS modules reside in their own memory-protected space, you can easily add new features or fix problems without interrupting service.

With QNX micronetworking (Qnet*) you can transparently access any resource in your system, local or remote. Qnet extends the message-based architecture of the QNX RTOS, integrating your entire network into a single, homogeneous set of resources. Even the smallest, memory-constrained device can make full use of another node's file system, servers, hardware resources, etc. Qnet provides fault-tolerant networking, load-balancing on the fly, extensible architecture, and transparent distributed processing.

Unlike some operating systems that try to squeeze monolithic designs or bulky windowing systems into embedded environments, the QNX RTOS was designed to reduce the cost and component count of your products. On custom Intel Architecture target systems, for example, you can eliminate the expense of a BIOS since QNX doesn't rely on BIOS calls. QNX was also designed to keep RAM requirements to an absolute minimum. For instance, it supports execute-in-place (XIP), which allows applications to run directly out of ROM or flash. And, since its system image is actually a simple read-only file system, QNX allows applications to start without a separate file system manager or command interpreter.

Device Drivers Made Easy Across Platforms

From the beginning, drivers for the QNX RTOS were designed to be source-code identical across CPUs and boards. In fact, the same binaries for a CPU can run on different boards — no more BSP nightmares sorting out the complexity of custom board- and processor-specific code. To reduce the time required to write your own device drivers, QNX provides a resource manager framework and C functions that handle the default behaviors common to most devices; all you need worry about are the low-level details specific to your device. And because each QNX driver runs as a standard process (rather than as part of the kernel itself), you can test changes in driver code without having to go through the time-consuming task of rebuilding the kernel. To do so, recompile and restart the driver on a running system.

A Host of Functionality and Development Options

QNX Software Systems has developed an efficient suite of embedding tools and run-time software components to provide everything from cross-platform connectivity to a full-featured embeddable windowing system.

QNX RTOS development is supported under the industry-standard GNU tool chain. Depending on your project, you can choose self-hosted QNX development or cross-development from Windows and Solaris* workstations. Whatever tools you choose, the QNX RTOS offers a number of productivity advantages for debugging and testing. Software faults can be immediately identified at the exact instruction, so problems that often take weeks or months to fix, can take only days. You can also drastically reduce testing time, since only changed modules need to be retested. Any field-tested modules (drivers, OS extensions, or applications) can be easily reused across products.

No other realtime OS scales so easily — just plug in the modules or drivers you need. Extend the functionality of your application with any of the following modules:

- **Embeddable QNX Photon* microGUI:** Offers a highly functional windowing system for resource-constrained embedded environments. Running in an extremely small memory footprint, QNX Photon delivers sophisticated functionality, including multimedia support, and connects seamlessly to the QNX RTOS's message-passing architecture.

QNX Photon also gives you exceptional connectivity between windowing systems. With Photon's remote user interface (RUI) technology you can view and control the GUI of a QNX embedded system from a window on a Windows or UNIX desktop. RUIs are baud-rate aware and can run across a serial or network link. For embedded systems, this can give you a graphical interface into your consoleless black box.

With the Citrix ICA* client, you can access Windows applications from your QNX-based set-top box, network computer, or any other thin client in your system.

- **Boot Modules:** Perform platform- and processor-dependent initialization for embedded systems at startup, releasing occupied memory after initialization. (Boot modules are supplied in full source for custom hardware adaptations.)
- **Process Manager:** Extends services to include support for processes (containing threads), protected memory, and pathname-space management. The pathname space can then be populated by other processes that are visible to application threads.
- **Network Manager:** Coordinates messages between local and remote nodes. The network manager module runs network drivers, protocols, and Qnet.
- **Embeddable QNX File System Manager:** Provides essential services (including hard links, long file names, etc.) of a POSIX 1003.1 file system in a low-overhead implementation.

2.5 Before You Begin

Table 2 lists additional hardware you may need for your development kit.

Table 2. Additional Hardware (Sheet 1 of 2)

VGA Monitor	You can use any standard VGA or greater resolution monitor.
Keyboard	You can use a keyboard with a PS/2 style connector or adapter.
Mouse	You can use a mouse with a PS/2 style connector or adapter.
IDE Devices	You can connect up to two IDE devices to the evaluation board. One IDE hard drive and cable are included in your kit. The cable accommodates the included hard drive and one other IDE device, such as a CD-ROM drive or another hard drive.
SCSI Devices	There are two on-board SCSI connectors, one for each channel. Each connector will support up to 15 SCSI devices. No SCSI devices or cables are included in the development kit. For additional information on SCSI, refer to Section 4.3.2.
Floppy Drive	You can connect up to two floppy drives to the connector on the evaluation board. No floppy drives or cables are included in the development kit.
Video Adapter	You can use the on-board video adapter supplied with your kit, or you may install your own PCI video adapter. You must procure and install the correct drivers for any additional video adapters.

Table 2. Additional Hardware (Sheet 2 of 2)

Network Adapter	An Intel® 82544EI Gigabit Ethernet Controller is included in the development kit. A Cat5 cable with an RJ-45 connector is required to connect this Ethernet adapter to your network. You may use a different network card other than the controller included on the board; however, you are responsible for installing the correct drivers for any additional network cards. The evaluation board supports PCI/PCI-X cards.
P64H2 Riser Card	You may have purchased a P64H2 Riser Card with your development kit. It is recommended that you install this card *after* you have initially booted and configured your system. Refer to Chapter 5 for detailed installation instructions.
Other Devices and Adapters	The evaluation board behaves much like a standard workstation or server motherboard. Many PC-compatible peripherals can be attached and configured to work with the evaluation board. For example, you may want to install a sound card or additional network adapters. You are responsible for procuring and installing any drivers required for additional devices.

2.6 Setting up the Evaluation Board

Once you have gathered the hardware described in the last section, follow the steps below to set up your development kit. This manual assumes you are familiar with basic concepts involved with installing and configuring hardware for a PC or server system. Refer to Figure 7 on page 39 for locations of connectors, jumpers, and other board components, and to Figure 8 on page 53 for locations of the peripheral connectors.

1. **Ensure a safe work environment.** Make sure you are in a static-free environment before removing any components from their anti-static packaging. The evaluation board is susceptible to electrostatic discharge, which may cause product failure or unpredictable operation.

Caution: Connecting the wrong cable or reversing a cable can damage the evaluation board and may damage the device being connected. Since the board is not in a protective chassis, use caution when connecting cables to this product.

2. **Verify kit contents.** Inspect the contents of your kit, and ensure that everything listed in Section 2.3 is included. Check for damage that may have occurred during shipment. Contact your sales representative if any items are missing or damaged.
3. **Gather tools.** You will need a Phillips-head screwdriver and a 6/32" hex wrench for installation.
4. **Check jumper settings.** Verify that the following jumpers are set correctly. For detailed descriptions of all jumpers, please refer to Section 4.5.

Table 3. Jumper Settings (Sheet 1 of 2)

Jumper	Function	Default Setting
JP1	Safe Mode	Open
JP2	Top Swap	Open
JP3	ITP Select	Short 1-2: One processor Short 2-3: Two processors
JP4	CMOS Clear	Short 1-2
JP7	No Reboot	Open
J19	Test Header	Open

Table 3. Jumper Settings (Sheet 2 of 2)

J27	Write Protect	Short 1-2
JP24, JP25, JP26, JP27	PCI-X Slot 1, Bus A Mode	All open
JP28, JP29, JP30	PCI-X Slot 2, Bus B Mode	All open
JP31, JP32, JP35	SCSI PCI/PCI-X Mode	All open
JP33, JP34	PCI-X Slots A:D Mode	Both open
J36	Test Header	Open
JP38	SMBUS 0 VSBY5	Open
JP39	SMBUS 1 VCC3	Open
JP40	SMBUS 2 VCC3	Open
JP41	SMBUS 3 VCC3	Open
JP42	Loadline Select	Short 1-2: Intel® Xeon™ Processor Open: Low Voltage Intel Xeon Processor
J71	BMC Connector	Short 5-6, 7-8, 9-10, 17-18, 19-20, 29-30

5. **Verify installed hardware.** Make sure the following hardware is populated on your evaluation board:
   - Two Intel Xeon processors or Low Voltage Intel Xeon Processor, in sockets J17 and J18
   - BIOS FWH in socket U69
   - Battery in battery holder BH1

Note: The above hardware should have been correctly installed at the factory. If they are not installed correctly, DO NOT power on the board. Correctly re-install the components before proceeding. If you suspect that any of the kit components has been damaged, contact your Intel field sales representative or local distributor for assistance.

6. **Install board on stand.** A board/component stand is provided in your kit. Refer to Figures 1 and 2 for placement of components on the assembled stand.

Note: If you choose not to use the stand, you must use processor retention mechanisms with Tuflok* fasteners instead of the processor retention mechanisms included in the kit. The parts (part number SP2307) can be ordered from Pencom at (650) 593-3288. (This should not be considered a recommendation or product endorsement by Intel Corporation.)

Figure 1. Assembled Board/Component Stand, Front View

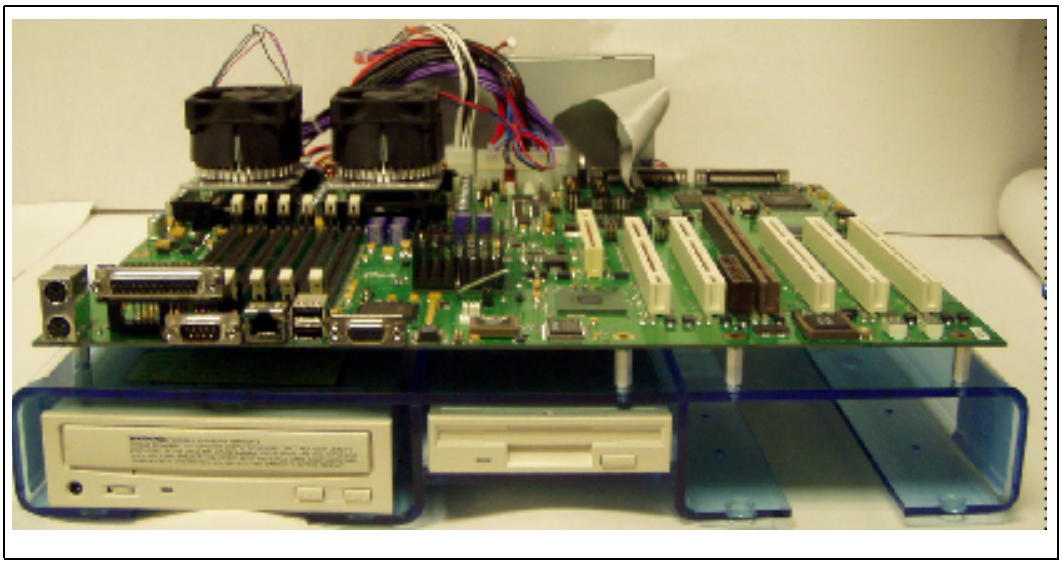
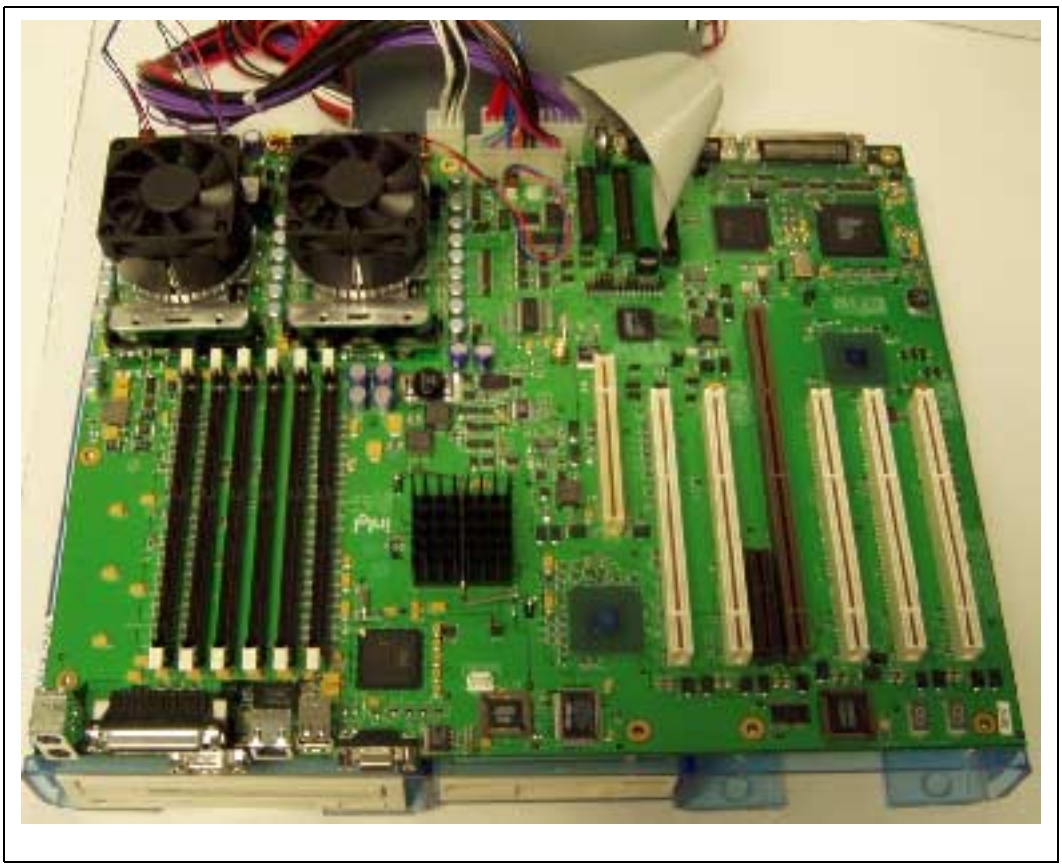


Figure 2. Assembled Board/Component Stand, Top View



To attach the board to the stand, use the following mounting hardware that is included in your kit:

- 38 screws
- 19 female-female standoffs
- 19 lock washers

The kit includes four additional screws that you will use to attach the hard drive to the stand in a later step.

See Figure 3 for a diagram of the mounting hardware. To install the board on the stand, use the following steps. To avoid damaging the board and stand, take caution not to overtighten the screws.

a. Fit a lock washer on one screw and insert it through the bottom of the top shelf of the stand.

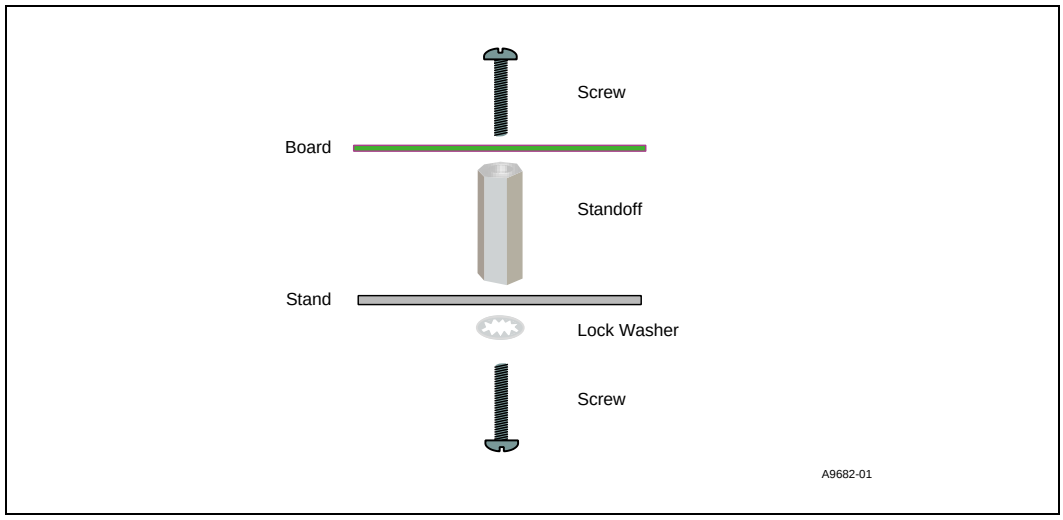
b. Using a hex wrench, screw the standoff onto the screw from the top of the shelf. Repeat for all holes in the shelf.

c. Place the board atop the standoffs, lining up the standoffs with the holes in the board. If all the holes do not line up correctly, loosen the standoffs that do not line up and re-position them.

d. Place the plastic processor retention mechanisms atop the board, lining them up above the holes astride sockets J17 and J18. Insert screws through the processor retention mechanisms into the standoffs below. Figure 4 shows one completely assembled processor assembly (rear), and one partially assembled (front).

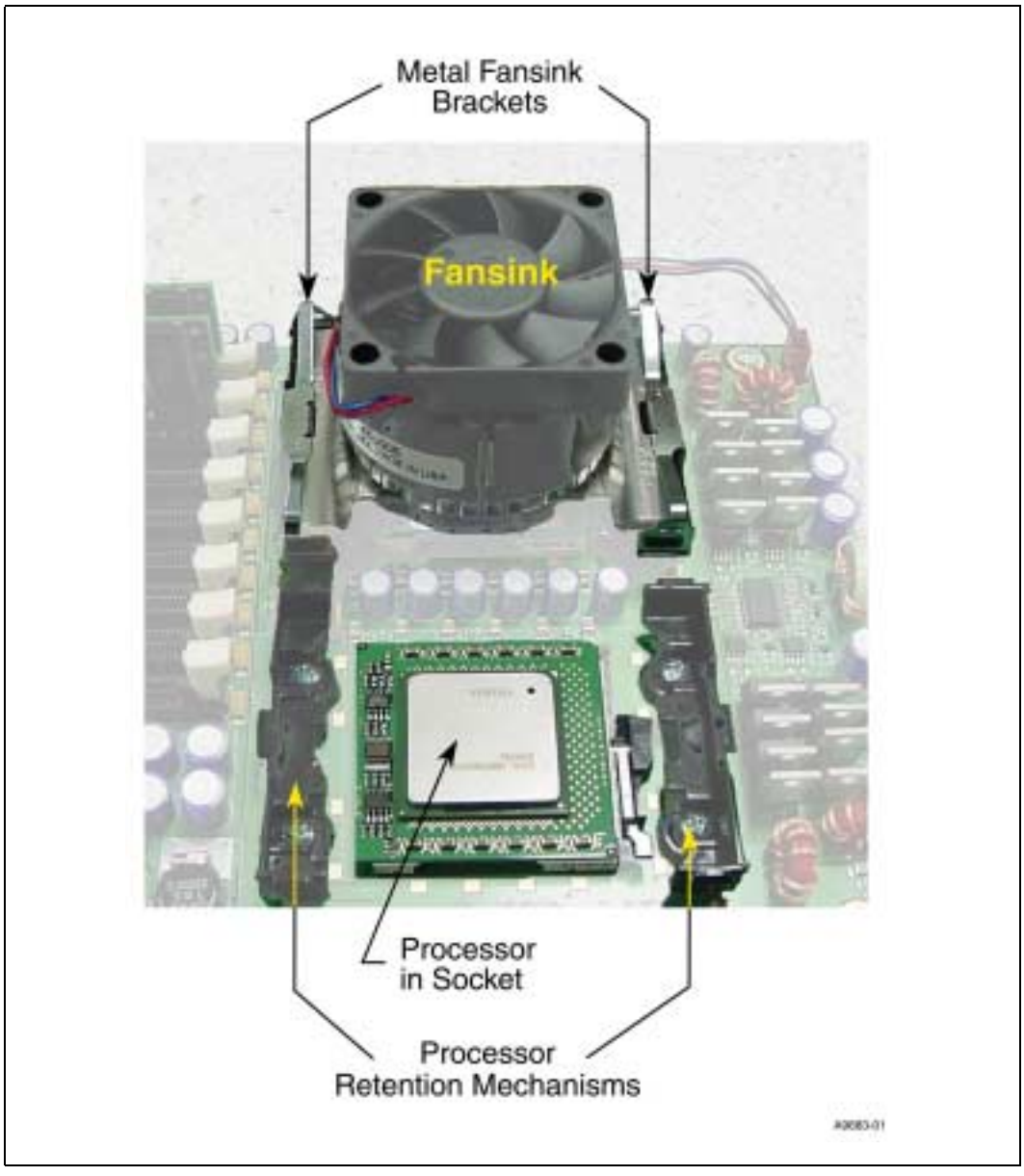
e. Insert remaining screws into the standoffs from the top of the board.

Figure 3. Mounting Hardware Installation Order



7. **Install fansinks.** You must install a fansink on each processor. Remove the green cap that is covering the thermal interface material on the bottom of the fansink. Place the fansink on top of the processor, fitting it within the plastic processor retention mechanisms. Install a metal bracket on each side of the fansink, affixing the metal rim of the fansink base to the processor retention mechanism. Repeat for the other fansink. Connect the 3-pin fansink power connectors to connectors J52 and J53 on the evaluation board. Make sure to use the proper retention clips for the Intel Xeon processors or the Low Voltage Intel Xeon processors.

Figure 4. Processor Assembly Components



8. **Install MCH heatsink.** You must install the included heatsink on the MCH (U66), using the Z-shaped metal bracket. If there is a cover on the thermal interface material on the bottom of the MCH, remove it. Place the heatsink squarely on top of the MCH. Place the center of the bracket across the center of the MCH, lining up the bracket hooks with the arch-shaped retention hooks on the evaluation board. Attach the bracket hooks to the board hooks to secure the heatsink. See Figure 5 for a picture of the installed MCH heatsink.

Figure 5. Installed MCH Heatsink

9. **Install memory.** Your kit includes two 256 Mbyte DIMMs. For dual channel configuration, you must install these in memory slots J5 and J9, the two slots furthest from the MCH. To install, ensure the tabs on the slot are open, or rotated outward from the slot. Line up the DIMM above the slot (the DIMM is keyed so that it only fits in the slot in one orientation). Firmly, but carefully, insert the DIMM into the slot until the tabs close. Repeat for the other DIMM and slot. For a single channel support, you must populate channel A.
10. **Install storage devices.** There is one IDE connector on the evaluation board, which supports two IDE devices—a master and a slave. The kit includes one IDE hard drive, preloaded with a dual-boot of QNX RTP* and Wind River VxWorks*.

For a correct boot, ensure that the included hard drive is installed as the primary master. (Master/slave settings are determined by a jumper on each IDE device. Consult the device label/documentation to verify that the jumper is set correctly for any configuration you choose.) A CD-ROM drive or additional hard drive may be installed as a primary slave device.

To install the included hard drive on the evaluation board:

a. Verify that the jumper on the hard drive is set correct for “single” or “master,” depending on your configuration.
b. Connect the short end of the IDE cable to the IDE connector J16 on the board. Ensure that the tracer on the cable is aligned with pin 1 of the connector.
c. Connect the middle connector of the cable to the hard drive. Again, ensure that the cable tracer is aligned with pin 1 of the connector.

Note: Failure to properly align the IDE cable may damage the evaluation board and/or the hard drive.

d. Connect a large 4-pin power connector from the power supply to the hard drive.

e. Install the CD-ROM drive (optional). A CD-ROM drive is not included in the kit and is not required, but you may find it useful in loading additional software. You must furnish your own CD-ROM drive. To install it on the evaluation board:

- Verify that the jumper on the CD-ROM drive is set for slave.
- Connect the unused end of the IDE cable you already attached to the evaluation board to the CD-ROM drive. Ensure that the cable tracer is aligned with pin 1 of the CD-ROM drive connector.
- Connect a large 4-pin power connector from the power supply to the CD-ROM drive.

f. Install the floppy drive (optional). A floppy disk drive is not included in your kit and is not required, but you may find it useful in loading additional software. You must furnish your own floppy drive(s) and cable. To install a floppy drive on the evaluation board:

- Connect the floppy cable to the floppy connector J34. Ensure that the tracer on the cable is aligned with pin 1 of the connector.
- Connect the other end of the floppy cable to the floppy drive.
- Connect a power cable to the floppy drive. Ensure that the tracer on the cable is aligned with pin 1 of the connector.

g. Install storage devices on the stand. Screws are included only for the hard drive. Place the devices on the stand as shown in Figures 1 and 2. Insert screws through the bottom of the stand into the holes on the bottom of each device.

11. **Connect the monitor.** Connect the monitor cable to the VGA port.
12. **Connect the keyboard and mouse.** Connect a PS/2 mouse and keyboard to the stacked PS/2 connector on the evaluation board. The bottom connector is for the mouse, and the top is for the keyboard. Alternatively, you can plug a USB keyboard and a USB mouse into one or both of the USB connectors on the evaluation board. Note that a legacy (PS/2) keyboard may be required for BIOS setup.
13. **Connect the network cable(s).** Connect a Cat5 cable with an RJ-45 connector to the Gigabit Ethernet port. Connect the other end of the cable to your network (e.g., hub, switch, network port).

Note: Standby voltages will be applied to the board whenever AC power is supplied. To completely power down the board, make sure to unplug the power supply from the wall. Depending on how the board was last powered off, it may turn on when the AC power is connected with no need to push the power button.

14. **Connect the power supply.** Make sure the power supply is turned off and unplugged. Connect the three WTX power supply cables to connectors J100, J101, and J102 on the evaluation board. Next, plug the power cord into the power supply and the wall.
15. **Power up the system.** Turn on the monitor, then turn on the evaluation board. The on-board power on/off button is located at S8. The on-board reset button is located at S9.

Caution: Ensure that the fansinks on the processor are operating. If they are not, turn off the power immediately and verify that the fansinks are connected to the board correctly (see Step 6). If the fansinks are still not operating, contact your Intel field sales representative or local distributor.

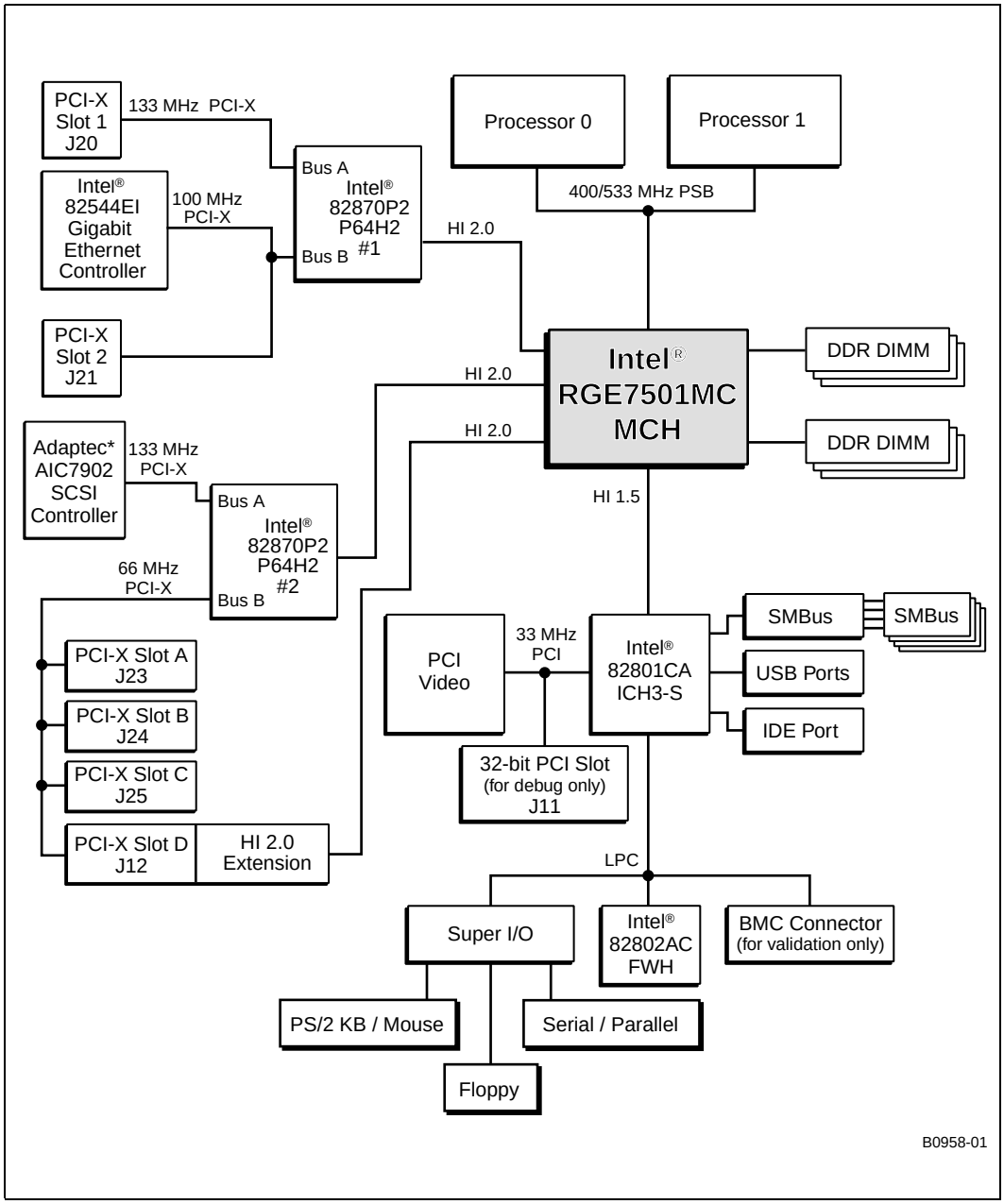
2.7 Configuring the BIOS

An AMI BIOS is pre-loaded on the evaluation board. You may need to make changes to the BIOS to enable hard disks, floppy disks and other supported features. You can use the Setup program to modify BIOS settings and control the special features of the system. Setup options are configured through a menu-driven user interface. On first boot, you may want to use the BIOS setup program to verify the date/time and boot device. Chapter 5, "BIOS Overview" contains a description of BIOS options. BIOS updates may periodically be posted to the Intel Developer web site at http://developer.intel.com/design/intarch.

Theory of Operation 3

3.1 Block Diagram

Figure 6. Block Diagram



3.2 Thermal Management

The objective of thermal management is to ensure that the temperature of each component is maintained within specified functional limits. The functional temperature limit is the range within which the electrical circuits can be expected to meet their specified performance requirements. Operation outside the functional limit can degrade system performance and cause reliability problems.

The development kit is shipped with fansink thermal solutions to be installed on the processors, a heatsink to be installed on the MCH and heat spreaders installed on the P64H2s. This thermal solution has been tested in an open air environment at room temperature and is sufficient for evaluation purposes. The designer must ensure that adequate thermal management is provided for any customer-derived designs.

3.3 System Features

The Intel E7501 Scalable Performance Board Development Kit is designed to support the Intel® Xeon™ processor with 512 Kbyte L2 cache and the Low Voltage Intel Xeon processor. The architecture of the chipset provides the performance and feature set required for dual-processor based servers in the entry-level and mid-range, front-end and general-purpose server market segments. A new chipset component interconnect, the Hub Interface 2.0 (HI 2.0), is designed into the E7501 chipset to provide more efficient communication between chipset components for high-speed I/O. Each HI 2.0 provides up to 1.066 Gbytes/s bandwidth for high-speed I/O, which can be connected to a P64H2. The system bus, used to connect the processor with the E7501 chipset, utilizes a 400/533 MT/s transfer rate for data transfers, delivering 3.2/4.3 Gbytes/s. The E7501 chipset architecture supports a 144-bit wide, 200/266 MHz DDR memory interface also capable of transferring data at 3.2/4.3 Gbytes/s.

In addition to these performance features, E7501 chipset-based platforms also provide the RASUM (Reliability, Availability, Serviceability, Usability, Manageability) features required for entry-level and mid-range servers. These features include Intel x4 SDDC with StrongARM* Technology for memory, ECC for high-performance I/O, out-of-band manageability through SMBus target interfaces on all major components, memory scrubbing and auto-initialization, processor thermal monitoring and hot-plug PCI.

3.3.1 Intel® Xeon™ Processor

The Intel E7501 chipset is coupled with these Intel Xeon processors:

- Intel Xeon processor with 512 Kbytes L2 cache (533 MHz system bus) with a VID of 1.5 V and a TDP of 65 W at 2.4 GHz
- Low Voltage Intel® Xeon™ processor with a VID of 1.3 V and a TDP of 30 W at 1.6 GHz

This generation of processors delivers performance levels that are significantly higher than previous generations of IA-32 processors. The Intel Xeon processor supports a 3.2/4.3 Gbytes/s data transfer rate on the processor system bus (PSB) and has 512 Kbytes of L2 cache. Uni- or dual-processor support is available.

The Intel Xeon processor and Low Voltage Intel Xeon processor are based on the Intel® NetBurst™ microarchitecture, which includes the following advanced features:

- **Hyper-Pipelined Technology:** Branch prediction/recovery pipeline is implemented in 20 stages, whereas the previous architecture was 10 stages. This enables an increase in performance, frequency and scalability.
- **400/533 MHz System Bus:** The highest performance Intel system bus yet allows for 3.2/4.3 Gbytes of data transfer per second over a 100/133 MHz core system bus clock that is quad-pumped and buffered to achieve a sustained rate of 400/533 MT/s.
- **Execution Trace Cache:** The L1 execution trace cache stores up to 12,000 in-order decoded micro-operations. Because the decoder has been removed from the main execution loop, instructions that are branched around are not stored, resulting in maximum utilization of this cache.
- **Rapid Execution Engine:** Two arithmetic logic units (ALUs) are clocked at twice the core frequency, allowing for basic integer operations, such as Add, Subtract, Logical AND, and Logical OR, to be executed in one-half of a clock cycle.
- **Advanced Transfer Cache:** The L2 ATC is 256 Kbytes in size and delivers a much higher throughput channel between the L2 cache and processor core.
- **Advanced Dynamic Execution:** The out-of-order execution unit is very deep, which keeps it executing instructions all the time. The execution unit can view 126 instructions in-flight and up to 48 loads and 24 stores in the pipeline. Thanks to an advanced branch prediction algorithm, the number of branch mis-predictions has been reduced 33% over the P6 generation.
- **Enhanced Floating Point and Multimedia Engine:** The floating point registers have been expanded to a full 128-bits, and an additional register has been added for data movement. This improves performance of floating point and multimedia applications.
- **Streaming SIMD (single instruction, multiple data) Extensions 2 (SSE2):** SSE2 extends the SIMD capabilities in MMX by introducing 144 new instructions, which reduces the number of instructions required to execute particular program tasks, thereby increasing performance. This accelerates a broad range of applications, including video, speech, image processing, encryption, and financial, engineering, and scientific applications.

The Intel Xeon processor and Low Voltage Intel Xeon processor also feature Hyper-Threading Technology, which provides two logical processors in one physical package. Hyper-Threading increases the performance of multi-tasking and multi-threaded applications, achieving up to a 24% increase in performance. The two logical processors have their own architectural state (data registers, segment registers, control registers, debug registers, and most model specific registers), fetch and deliver units, reorder and retire units, and xAPIC (eXtended Advanced Programmable Interrupt Controller). They share the rapid execution resources and caches, firmware, and system bus interface, and therefore, all external system resources (e.g., memory). To Hyper-Threading enabled operating systems and software, the two logical processors appear as two distinct physical processors.

The evaluation board contains two 604-pin sockets for two Intel Xeon processors or two Low Voltage Intel Xeon processors.

3.3.2 Intel® E7501 Chipset

The Intel® E7501 chipset consists of three major components: the Intel® RGE7501MC Memory Controller Hub (MCH), the 82801CA I/O Controller Hub (ICH3-S), and the Intel® 82870P2 PCI/PCI-X 64-bit Hub 2 (P64H2). Additionally, the Intel® 82802AC Firmware Hub (FWH) is connected to the ICH3-S. The chipset components communicate via hub interfaces (HIs). The MCH provides four hub interface connections: one Hub Interface 1.5 (HI 1.5) for the ICH3-S and three HI 2.0s for high-speed I/O connections to P64H2s. The hub interfaces are point-to-point and therefore only support two agents (the MCH plus one I/O device). Therefore, the MCH supports a total of three P64H2s. The evaluation board contains two P64H2s.

3.3.2.1 Intel® RGE7501MC Memory Controller Hub (MCH)

The Intel RGE7501MC MCH is a 1005-ball FC-BGA (flip-chip ball grid array) package and contains the following functionality:

System Bus Features:

- Supports dual processors at 400/533 MT/s
- System bus bandwidth of 3.2/4.3 Gbytes/s
- Supports 36-bit system bus addressing model
- 12 deep in-order queue, two deep defer queue

Memory Bus Features:

- 144-bit wide, DDR-200/266 memory interface
- Memory bandwidth of 3.2/4.3 Gbytes/s
- Supports x72, ECC, registered DDR-1600/2100 DIMMs using 64 Mbit, 128 Mbit, 256 Mbit, and 512 Mbit DDR SDRAM
- Supports a minimum of 256 Mbytes and a maximum of 16 Gbytes of memory (evaluation board contains eight slots), populated in pairs (the system has been validated with up to 6 Gbytes memory)
- Supports up to 32 simultaneous open pages

I/O Features:

- Provides HI 1.5 connection for ICH3-S (Hub Interface A)
  - 266 Mbytes/s point-to-point connection for ICH3-S with parity protection
  - 8-bit wide, 66 MHz base clock, 4X data transfer
  - Parallel termination mode for longer trace lengths
  - 64-bit inbound addressing, 32-bit outbound addressing
- Provides 3 HI 2.0 connections for P64H2s (Hub Interfaces B, C, and D)
  - 1.066 Gbytes/s point-to-point connection for I/O bridges with ECC protection
  - 16-bit wide, 66 MHz base clock, 8X data transfer
  - Parallel termination mode for longer trace lengths
  - 64-bit inbound addressing, 32-bit outbound addressing

3.3.2.2 Intel® 82801CA I/O Controller Hub (ICH3-S)

The Intel® 82801CA ICH3-S provides the legacy I/O subsystem for E7501 chipset based platforms. Additionally, it integrates many advanced I/O functions. The ICH3-S includes the following features:

- Provides HI 1.5 Connection to MCH
  - 266 Mbytes/s point-to-point connection for ICH3-S with parity protection
  - 8-bit wide, 66 MHz base clock, 4X data transfer
  - Parallel termination mode for longer trace lengths
  - 64-bit inbound addressing, 32-bit outbound addressing
- Two Channel Ultra ATA-100 Bus Master IDE Controller (only one channel is utilized on the board)
- Three Universal Host Controller Interface (UHCI) USB host controllers (capabilities for six ports; only two ports are provided on the board)
- IOxAPIC
- SMBus 2.0 Controller
- LPC Interface
- AC'97 2.2 Interface (audio capabilities are not utilized on this board)
- PCI 2.2 Interface, 32-bit/33 MHz
- Integrated 10/100 Mbit Ethernet MAC (not utilized on the board)

3.3.2.3 Intel® 82870P2 PCI/PCI-X Hub 2 (P64H2)

The P64H2 provides the PCI-X, high-performance I/O capability on E7501 chipset based platforms. The P64H2 component includes:

- HI 2.0 Connection to MCH
  - 1.066 Gbytes/s point-to-point connection for I/O bridges with ECC protection
  - 16-bit wide, 66 MHz base clock, 8x data transfer
  - Parallel termination mode for longer trace lengths
  - 64-bit inbound addressing, 32-bit outbound addressing
- Two independent, 64-bit PCI-X Interfaces
- PCI-X 1.0 specification compliant
- PCI 2.2 specification compliant
- PCI-PCI Bridge 1.1 compliant
- One IOxAPIC per PCI-X bus segment
- PCI peer-to-peer write capability between PCI ports
- SMBus target for Out-of-Band (OOB) access to all internal PCI registers
- 16 external, 18 internal interrupts

3.3.2.4 Intel® 82802AC Firmware Hub (FWH)

The Firmware Hub (FWH) stores system BIOS and video BIOS, as well as an Intel Random Number Generator (RNG). The Intel RNG provides truly random numbers to enable stronger encryption, digital signing and security protocols. The FWH is key to enabling future security and manageability infrastructures for the PC platform. Intel 82802AC FWH features include:

- 32-Pin PLCC package
- 8 Mbit Flash memory
- Symmetrically-blocked Flash memory array (64 Kbytes memory sections)
- Pin- and register-based block locking
- Integrated hardware RNG
- Single-byte read/write
- Five General Purpose Inputs (GPIs)
- Operates with 33 MHz PCI clock and 3.3 V I/O

3.3.3 Boot ROM

The system boot ROM is installed on the Intel 82802AC FWH device, socketed at U69. The FWH is addressable on the LPC bus off the ICH3.

3.3.4 System I/O

The evaluation board contains the following I/O devices:

- On-board Gigabit Ethernet controller
- On-board SCSI controller
- Single floppy controller support
- Primary IDE interface (secondary IDE interface not implemented on board)
- One serial port
- One parallel port
- Two USB ports
- VGA port
- PS/2 keyboard and mouse ports

Please refer to Figure 7 for locations of on-board connectors, sockets, and jumpers, and refer to Figure 8 for the locations of the back panel connectors.

3.3.4.1 Intel® 82544EI Gigabit Ethernet Controller

The Intel 82544EI Gigabit Ethernet Controller with integrated PHY is Intel's single-chip Gigabit Ethernet solution. It supports PCI-X up to 133 MHz for faster network performance. It is capable of supporting 1000 Mbit/s, 100 Mbit/s, and 10 Mbit/s data rates. To use this controller on the evaluation board, utilize the built-in RJ-45 port with a Cat5 cable.

3.3.4.2 Adaptec* AIC7902 SCSI Controller

The Adaptec* AIC7902 provides Ultra320 (320 Mbytes/s) SCSI via PCI-X 133 MHz. There are two on-board SCSI connectors, each of which will support up to eight SCSI devices. For additional information on SCSI, refer to Section 4.3.2.

3.3.4.3 Floppy Disk Drive Support

One 34-pin floppy connector is provided on the evaluation board, which will support up to two floppy drives.

3.3.4.4 IDE Device Support

The evaluation board has a 40-pin connector for one of the IDE controllers present in the ICH3-S. The connector will support up to one master and one slave IDE device.

3.3.4.5 RS-232 Serial Port

The evaluation board provides one built-in serial port.

3.3.4.6 IEEE 1284 Parallel Port

One 25-pin DSUB IEEE 1284 Standard/EPP/ECP parallel port is provided on the evaluation board.

3.3.4.7 USB Ports

The evaluation board has two USB connectors.

3.3.4.8 VGA Port

The VGA port is a 15-pin DSUB female connector for output to a monitor.

3.3.4.9 Keyboard/Mouse Ports

There is one stacked PS/2 connector for a keyboard and mouse. The top connector is for the keyboard, and the bottom connector is for the mouse.

3.3.5 Expansion Slots and I/O Connectors

The evaluation board has the following expansion slots and I/O Connectors:

- One 64-bit/133 MHz PCI-X slot
- One 64-bit/100 MHz PCI-X slot
- Four 64-bit/66 MHz PCI-X slots (one contains a HI 2.0 extension, which is connected directly to the MCH via HI 2.0)
- One 32-bit/33 MHz PCI slot

3.3.5.1 PCI-X Slots

There are six PCI-X slots available on the evaluation board: one 133 MHz, one 100 MHz, and four 66 MHz.

3.3.5.2 HI 2.0 Extension

One of the 66 MHz PCI-X connectors contains a HI 2.0 extension, which is connected directly to the MCH via HI 2.0. If you purchased a P64H2 Riser Card for your development kit, you can utilize that card in this slot. See Chapter 6 for additional details on the P64H2 Riser Card.

3.3.5.3 PCI Slot

There is one 32-bit/33 MHz PCI connector on the evaluation board, for debug purposes only.

3.3.6 Post Code Debugger

An on-board Post Code Debugger is not implemented directly on the evaluation board. However, post code debugging can be accomplished through the use of a port 0080H PCI card.

3.3.7 In-Target Probe (ITP)

The evaluation board contains an in-target probe (ITP) connector for an ITP32B. You must use an ITP32B, which is specific to Intel Xeon processors and Intel® Pentium® 4 processors. Other ITPs (such as the ITP32F for Intel® Pentium® III processors) will not work.

3.3.8 Clock Generation

The clock synthesizer on the baseboard generates and distributes the clocks used by the entire system.

3.3.8.1 System Clocks

The CK408B Clock Synthesizer is the primary source of clock generation for most of the clocks on the baseboard. The following clock groups are found on the Intel E7501 Scalable Performance Board Development Kit. For more information on these clocks, see the *Intel® Xeon™ Processor and Intel® E7500/E7501 Chipset Compatible Platform Design Guide* (order number 251929).

Table 4. System Clocks

Clock Name	Clock Speed
CPU	100/133 MHz
PCI	33 MHz
48 MHz	48 MHz
3V66	66 MHz
REF0	4.318 MHz
USB	48 MHz
APIC	33 MHz

3.3.9 Power Supply Requirements

The Intel E7501 Scalable Performance Board uses a WTX power supply. The power supply and power cord are included in the development kit.

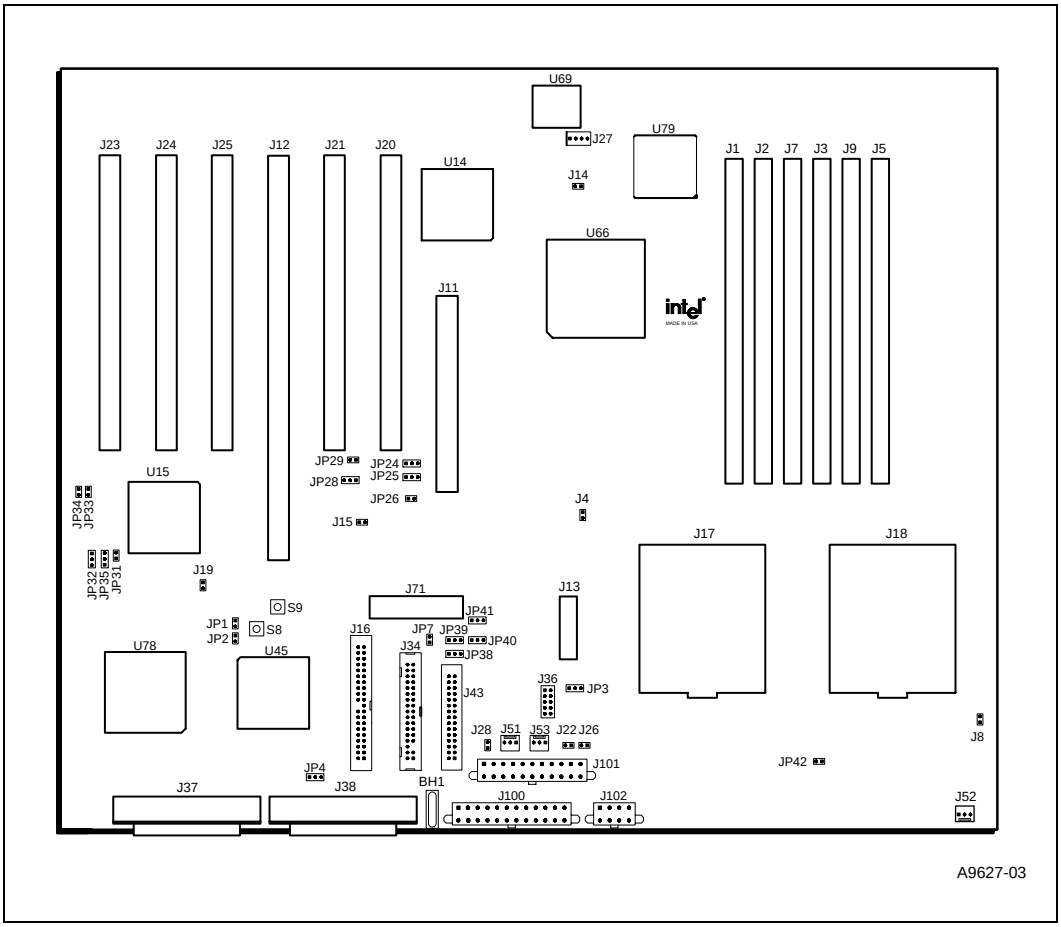
3.4 Battery Requirements

A type 2032 3V lithium coin cell battery is included on the evaluation board.

Hardware Reference 4

This section provides reference information on the hardware, including locations of evaluation board components, connector pinout information, and jumper settings.

Figure 7. Board Layout Diagram



4.1 Chipset Components

Table 5 lists the chipset and other major components on the evaluation board.

Table 5. Chipset and Major Board Components

Component Designator	Component Description
U66	Intel® RGE7501MC Memory Controller Hub (MCH)
U14, U15	Intel® 82870P2 PCI/PCI-X 64-bit Hub 2 (P64H2)
U45	Intel® 82801CA I/O Controller Hub 3 (ICH3-S)
U78	Adaptec* AIC7902 SCSI Controller
U79	Intel® 82544EI Gigabit Ethernet Controller

4.2 Expansion Slots and Sockets

Table 6 lists the expansion slots and sockets on the evaluation board.

Table 6. Expansion Slots and Sockets

Slot/Socket Reference Designator	Slot/Socket Description
J11	32/33 PCI Slot
J12	64/66 PCI-X Slot with HI 2.0 Extension (Slot D)
J20	64/133 PCI-X Slot (Slot 1, Bus A)
J21	64/100 PCI-X Slot (Slot 2, Bus B)
J23	64/66 PCI-X Slot (Slot A)
J24	64/66 PCI-X Slot (Slot B)
J25	64/66 PCI-X Slot (Slot C)
J17	Processor 1 Socket
J18	Processor 0 Socket
U69	Firmware Hub (FWH) BIOS Socket
BH1	Battery

4.2.1 32-Bit PCI Slot Connector

Table 7 shows the signals assigned to the 32-bit PCI slot connector.

Table 7. 32-bit 5V PCI Connector Pinout (J11)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A1	TRST#	B1	-12V	A32	AD16	B32	AD17
A2	+12V	B2	TCK	A33	3.3V	B33	C/BE2#
A3	TMS	B3	GND	A34	FRAME#	B34	GND
A4	TDI	B4	TDO	A35	GND	B35	IRDY#
A5	5V	B5	5V	A36	TRDY#	B36	3.3V
A6	INTA#	B6	5V	A37	GND	B37	DEVSEL#
A7	INTC#	B7	INTB#	A38	STOP#	B38	GND
A8	5V	B8	INTD#	A39	3.3V	B39	LOCK#
A9	CLKRUN	B9	PRSNT1#	A40	SDONE	B40	PERR#
A10	5V	B10	Reserved	A41	SBO#	B41	3.3V
A11	Reserved	B11	PRSNT2#	A42	GND	B42	SERR#
A12	GND	B12	GND	A43	PAR	B43	3.3V
A13	GND	B13	GND	A44	AD15	B44	C/BE1#
A14	$3.3V_{aux}$	B14	Reserved	A45	3.3V	B45	AD14
A15	RST#	B15	GND	A46	AD13	B46	GND
A16	5V	B16	CLK	A47	AD11	B47	AD12
A17	GNT#	B17	GND	A48	GND	B48	AD10
A18	GND	B18	REQ#	A49	AD9	B49	GND
A19	PME#	B19	5V	A50	KEY	B50	KEY
A20	AD30	B20	AD31	A51	KEY	B51	KEY
A21	3.3V	B21	AD29	A52	CBEO#	B52	AD8
A22	AD28	B22	GND	A53	3.3V	B53	AD7
A23	AD26	B23	AD27	A54	AD6	B54	3.3V
A24	GND	B24	AD25	A55	AD4	B55	AD5
A25	AD24	B25	3.3V	A56	GND	B56	AD3
A26	IDSEL	B26	C/BE3#	A57	AD2	B57	GND
A27	3.3V	B27	AD23	A58	AD0	B58	AD1
A28	AD22	B28	GND	A59	5V	B59	5V
A29	AD20	B29	AD21	A60	REQ64#	B60	ACK64#
A30	GND	B30	AD19	A61	5V	B61	5V
A31	AD18	B31	3.3V	A62	5V	B62	5V

4.2.2 64-bit PCI-X Connectors

Table 8 shows the signals assigned to the 64-bit PCI-X connectors.

Table 8. 64-bit 3.3V PCI-X Connector Pinout (J20, J21, J23, J24, J25, J12) (Sheet 1 of 2)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A1	TRST#	B1	-12V	A49	AD9	B49	M66EN
A2	+12V	B2	TCK	A50	GND	B50	GND
A3	TMS	B3	GND	A51	GND	B51	GND
A4	TDI	B4	TDO	A52	CBEO#	B52	AD8
A5	5V	B5	5V	A53	3.3V	B53	AD7
A6	INTA#	B6	5V	A54	AD6	B54	3.3V
A7	INTC#	B7	INTB#	A55	AD4	B55	AD5
A8	5V	B8	INTD#	A56	GND	B56	AD3
A9	Reserved	B9	PRSNT1#	A57	AD2	B57	GND
A10	3.3V	B10	Reserved	A58	AD0	B58	AD1
A11	Reserved	B11	PRSNT2#	A59	3.3V	B59	3.3V
A12	KEY	B12	KEY	A60	REQ64#	B60	ACK64#
A13	KEY	B13	KEY	A61	5V	B61	5V
A14	$3.3V_{aux}$	B14	Reserved	A62	5V	B62	5V
A15	RST#	B15	GND		KEY		KEY
A16	3.3V	B16	CLK		KEY		KEY
A17	GNT#	B17	GND	A63	GND	B63	Reserved
A18	GND	B18	REQ#	A64	C/BE7#	B64	GND
A19	PME#	B19	3.3V	A65	C/BE5#	B65	C/BE6#
A20	AD30	B20	AD31	A66	3.3V	B66	C/BE4#
A21	3.3V	B21	AD29	A67	PAR64	B67	GND
A22	AD28	B22	GND	A68	AD62	B68	AD63
A23	AD26	B23	AD27	A69	GND	B69	AD61
A24	GND	B24	AD25	A70	AD60	B70	3.3V
A25	AD24	B25	3.3V	A71	AD58	B71	AD59
A26	IDSEL	B26	C/BE3#	A72	GND	B72	AD57
A27	3.3V	B27	AD23	A73	AD56	B73	GND
A28	AD22	B28	GND	A74	AD54	B74	AD55
A29	AD20	B29	AD21	A75	3.3V	B75	AD53
A30	GND	B30	AD19	A76	AD52	B76	GND
A31	AD18	B31	3.3V	A77	AD50	B77	AD51
A32	AD16	B32	AD17	A78	GND	B78	AD49
A33	3.3V	B33	C/BE2#	A79	AD48	B79	3.3V
A34	FRAME#	B34	GND	A80	AD46	B80	AD47
A35	GND	B35	IRDY#	A81	GND	B81	AD45
A36	TRDY#	B36	3.3V	A82	AD44	B82	GND
A37	GND	B37	DEVSEL#	A83	AD42	B83	AD43

Table 8. 64-bit 3.3V PCI-X Connector Pinout (J20, J21, J23, J24, J25, J12) (Sheet 2 of 2)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A38	STOP#	B38	PCIXCAP	A84	3.3V	B84	AD41
A39	3.3V	B39	LOCK#	A85	AD40	B85	GND
A40	SDONE	B40	PERR#	A86	AD38	B86	AD39
A41	SBO#	B41	3.3V	A87	GND	B87	AD37
A42	GND	B42	SERR#	A88	AD36	B88	3.3V
A43	PAR	B43	3.3V	A89	AD34	B89	AD35
A44	AD15	B44	C/BE1#	A90	GND	B90	AD33
A45	3.3V	B45	AD14	A91	AD32	B91	GND
A46	AD13	B46	GND	A92	Reserved	B92	Reserved
A47	AD11	B47	AD12	A93	GND	B93	Reserved
A48	GND	B48	AD10	A94	Reserved	B94	GND

4.2.3 Hub Interface 2.0 Extension

Table 9 shows the signals assigned to the Hub Interface (HI) 2.0 extension.

Table 9. HI 2.0 Extension Pinout (J12)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A95	GND	B95	GND	A113	GND	B113	GND
A96	CLK200#	B96	CLK66	A114	HI11	B114	PUSTRBF
A97	CLK200	B97	GND	A115	GND	B115	GND
A98	GND	B98	Reserved	A116	HI9	B116	HI10
A99	Reserved	B99	HI_RESET#	A117	GND	B117	GND
A100	PWR_GD	B100	HCA_PRES	A118	HI20	B118	HI8
A101	GND	B101	GND	A119	GND	B119	GND
A102	Reserved	B102	Reserved	A120	HI6	B120	HI7
A103	Reserved	B103	USE_CLK200	A121	GND	B121	GND
A104	GND	B104	GND	A122	PSTRBS	B122	HI5
A105	HI19	B105	HI18	A123	GND	B123	GND
A106	HI16	B106	HI17	A124	HI4	B124	PSTRBF
A107	GND	B107	GND	A125	GND	B125	GND
A108	HI15	B108	HI21	A126	HI2	B126	HI3
A109	GND	B109	GND	A127	GND	B127	GND
A110	HI13	B110	HI14	A128	HI0	B128	HI1
A111	GND	B111	GND	A129	GND	B129	GND
A112	PUSTRBS	B112	HI12				

4.2.4 Processor Sockets

There are two mPGA604 processor sockets on the evaluation board. For a single processor implementation, socket J18 (CPU0) must be populated, and socket J17 (CPU1) must be empty. The processor is keyed so that it fits into the socket in one particular orientation. The socket is released by lifting the cam lever.

Note: Do not force the processor into the socket, or you may damage the processor and/or socket.

The evaluation board is designed to support future processor speeds. You must use identical type and speed Intel Xeon processors or Low Voltage Xeon processors in both sockets. If you have any questions about what processors to use, contact your Intel field sales representative or local distributor.

4.2.5 Firmware Hub (FWH) BIOS Socket

The Firmware Hub (FWH), or BIOS, flash memory part fits into the 32-pin socket U69, giving you the option to remove and reprogram it without the use of soldering equipment. There is only one correct orientation for the FWH part to be placed into its socket. Line up the circular marking on the FWH part, denoting pin 1, with the circular marking on the evaluation board. Pin numbering proceeds clockwise around the chip from pin 1.

4.2.6 Battery

A type 2032 3V lithium coin cell battery is used in socket BH1 on the evaluation board. The battery holder is beveled such that the battery fits into it in one particular orientation. The battery is held in place by a metal arm. To remove the battery, bend the arm slightly toward the SCSI connector.

4.3 On-Board Connectors

Table 10 lists connector reference designators that correspond to the connectors on the board.

Table 10. On-Board Connectors

Connector Reference Designator	Connector Description
J100	WTX Main Power Connector
J101	WTX Additional Power Connector
J102	WTX $12V_{DIG}$ VRM/D2D Output Power Connector
J37	SCSI Channel A Connector
J38	SCSI Channel B Connector
J16	IDE Connector
J34	Floppy Connector
J13	ITP32B Connector
J43	Front Panel Connector
J51	Auxiliary Fan Connector
J52	CPU1 Fan Connector
J53	CPU0 Fan Connector
J71	BMC Connector
J70	Debug Connector

4.3.1 WTX Power Connectors

The following tables show the signals assigned to the three WTX power connectors.

Table 11. WTX Main Power Connector (J100)

Pin	Signal Name	Function
1	3.3V	
2	3.3V	
3	3.3V	
4	3.3V	
5	3.3V	
6	com.	Ground
7	com.	Ground
8	com.	Ground
9	com.	Ground
10	com.	Ground
11	5V	
12	5V	
13	3.3V	
14	3.3V	
15	3.3V	
16	3.3V	
17	$3.3V_{AUX}$	
18	com.	Ground
19	com.	Ground
20	com.	Ground
21	com.	Ground
22	$5V_{SB}$	
23	5V	
24	5V	

Table 12. WTX Additional Power Connector (J101)

Pin	Signal Name	Function
1	5 V_{SENSE}	5 V power supply sense line
2	3.3V_{SENSE}	3.3 V power supply sense line
3	Reserved	
4	com.	Ground
5	com.	Ground
6	12V_{IO}	
7	-12V	
8	I^2C clk	Clock signal for I^2C interface
9	FanC	Signal to control fan speed in power supply
10	PS-OK	Signal indicating all power supply outputs are within limits
11	Reserved	
12	5 $V_{SENSE\ RTN}$	Return path for 5 V power supply sense line
13	3.3$V_{SENSE\ RTN}$	Return path for 3.3 V power supply sense line
14	Reserved	
15	com.	Ground
16	12V_{IO}	
17	12V_{IO}	
18	Sleep	
19	I^2C data	Data signal for I^2C interface
20	FanM	Signal indicating fan speed/status in power supply
21	PS-on	Signal to enable/disable power supply
22	Reserved	

Table 13. WTX 12V_{DIG} VRM/D2D Output Power Connector (J102)

Pin	Signal Name	Function
1	12V_{DIG}	12 V digital
2	12V_{DIG}	12 V digital
3	12V_{DIG}	12 V digital
4	Reserved	12 V power supply digital sense line
5	com.	Ground
6	com.	Ground
7	com.	Ground
8	Reserved	Return path for 12 V power supply digital sense line

4.3.2 SCSI Connectors

Table 14 shows the signals assigned to the two SCSI connectors for the Adaptec AIC7902 SCSI Controller on the evaluation board. Connector J37 is for Channel A, and connector J38 is for channel B. Each channel will support up to 15 SCSI devices. The SCSI controller supports speeds up to Ultra-320, and you must use a cable at least as fast as the devices you wish to support on a given channel. A terminator is required on each channel. Each device on a channel must have a unique SCSI ID (0-15).

Table 14. 68-pin Single-Ended/Low Voltage Differential SCSI Connector Pinout (J37, J38)

Pin	Signal Name (SE/LVD)	Pin	Signal Name (SE/LVD)
1	SR/+DB12	35	-DB12/-DB12
2	SR/+DB13	36	-DB13/-DB13
3	SR/+DB14	37	-DB14/-DB14
4	SR/+DB15	38	-DB15/-DB15
5	SR/+DBP1	39	-DBP1/-DBP1
6	SR/+DB0	40	-DB0/-DB0
7	SR/+DB1	41	-DB1/-DB1
8	SR/+DB2	42	-DB2/-DB2
9	SR/+DB3	43	-DB3/-DB3
10	SR/+DB4	44	-DB4/-DB4
11	SR/+DB5	45	-DB5/-DB5
12	SR/+DB6	46	-DB6/-DB6
13	SR/+DB7	47	-DB6/-DB6
14	SR/+P_CRCA	48	-DBP/-P_CRCA
15	GND/GND	49	GND/GND
16	DIFFSENSE	50	GND/GND
17	TPWR/TPWR	51	TPWR/TPWR
18	TPWR/TPWR	52	TPWR/TPWR
19	Reserved/Reserved	53	Reserved/Reserved
20	GND/GND	54	GND/GND
21	SR/+ATN	55	-ATN/-ATN
22	GND/GND	56	GND/GND
23	SR/+BSY	57	-BSY/BSY
24	SR/+ACK	58	-ACK/-ACK
25	SR/+RST	59	-RST/-RST
26	SR/+MSG	60	-MSG/-MSG
27	SR/+SEL	61	-SEL/-SEL
28	SR/+C/D	62	-C/D/-C/D
29	SR/+REQ	63	-REQ/-REQ
30	SR/+I/O	64	-I/O/-I/O
31	SR/+DB8	65	-DB8/-DB8
32	SR/+DB9	66	-DB9/-DB9
33	SR/+DB10	67	-DB10/-DB10
34	SR/+DB11	68	-DB11/-DB11

4.3.3 IDE Connector

Table 15 shows the signals assigned to the IDE connector.

Table 15. IDE Connector Pinout (J16)

Pin	Signal	Pin	Signal
1	Reset IDE	21	DRQ3
2	Ground	22	Ground
3	Host Data 7	23	I/O Write#
4	Host Data 8	24	Ground
5	Host Data 6	25	I/O Read#
6	Host Data 9	26	Ground
7	Host Data 5	27	IOCHRDY
8	Host Data 10	28	Ground
9	Host Data 4	29	DACK3#
10	Host Data 11	30	Ground
11	Host Data 3	31	IRQ14
12	Host Data 12	32	Reserved
13	Host Data 2	33	Addr1
14	Host Data 13	34	Primary IDE Cable Detect
15	Host Data 1	35	Addr 0
16	Host Data 14	36	Addr 2
17	Host Data 0	37	Chip Select 0#
18	Host Data 15	38	Chip Select 1#
19	Reserved	39	Activity
20	Key	40	Ground

4.3.4 Floppy Drive Connector

Table 16 shows the signals assigned to the floppy drive connector.

Table 16. Floppy Drive Connector Pinout (J34) (Sheet 1 of 2)

Pin	Signal	Pin	Signal
1	Ground	2	Drive Enable 0
3	Ground	4	Reserved
5	Key	6	Drive Enable 1
7	Ground	8	Index
9	Ground	10	Motor Enable A#
11	Ground	12	Reserved

Table 16. Floppy Drive Connector Pinout (J34) (Sheet 2 of 2)

Pin	Signal	Pin	Signal
13	Ground	14	Drive Select A#
15	Ground	16	Reserved
17	Ground	18	DIR#
19	Ground	20	STEP#
21	Ground	22	Write Data#
23	Ground	24	Write Gate#
25	Ground	26	Track 00#
27	Ground	28	Write Protect#
29	Ground	30	Read Data#
31	Ground	32	Side 1 Select#
33	Ground	34	Diskette Change#

4.3.5 ITP32B Connector

See Section 3.3.7 and ITP documentation for information on the In-Target Probe (ITP).

4.3.6 Front Panel Connector

The development kit is not shipped with a chassis, so the front panel connector is unused by default. However, if you wish to place your evaluation board in a chassis, refer to the following table for the pinout of the front panel connector.

Table 17. Front Panel Connector (J43)

Pin	Signal	Pin	Signal
1	Reserved	16	Power button
2	Ground	17	Reserved
3	Chassis Intruder	18	Ground
4	Hard drive activity LED	19	Fan Tachometer 0
5	3.3V	20	Fan Tachometer 4
6	Reserved	21	Fan Tachometer 1
7	Reserved	22	Fan Tachometer 5
8	Power LED	23	Fan Tachometer 2
9	Reserved	24	Fan Tachometer 6
10	Ground	25	Fan Tachometer 3
11	Reserved	26	Fan Tachometer 7
12	Reserved	27	Reserved
13	Reserved	28	Ground
14	Reset button	29	I^2C bus 0 clock
15	5V standby voltage	30	I^2C bus 0 data

4.3.7 Fan Connectors

There are three 12V fan connectors on the evaluation board. Use connectors J53 and J52 for the CPU0 and CPU1 fansinks, respectively. If you install another 12V fan or fansink on your evaluation board, you may use the auxiliary fan connector J51.

4.3.8 BMC Connector

The evaluation board contains a baseboard management controller (BMC) connector used in validation. The following pins must be shorted with jumpers for proper system operation: 5-6, 7-8, 9-10, 17-18, 19-20, 29-30.

4.4 DDR SDRAM Slots

The evaluation board contains eight DIMM slots for DDR SDRAM.

Table 18. DDR SDRAM Slots

DDR SDRAM Slot Designator	DDR SDRAM Slot Description
J1	DIMM 1, Channel B
J2	DIMM 1, Channel A
J7	DIMM 2, Channel B
J3	DIMM 2, Channel A
J9	DIMM 4, Channel B
J5	DIMM 4, Channel A

The six DIMM slots run parallel on two channels. For dual channel configuration, you must populate channels A and B together with identical DIMMs starting at the outermost DIMM slots, those furthest from the MCH (U66). For example, you must populate slots J5 and J9 (DIMM 4 on Channels A and B) first, and they must contain memory of exactly the same type and size. You would next populate slots J4 and J8. Pairs of DIMM slots may differ in size. You may use DIMMs of 128 Mbytes through 2 Gbytes. All DIMMs must be ECC registered memory. Do not mix component types—you must use all x4 or all x8 DIMMs on the evaluation board. For a single channel support, you must populate channel A.

4.5 Jumpers

The evaluation board has a number of jumpers that control various functions of the system. Refer to Table 19 for descriptions of the jumpers and their settings.

Table 19. Jumpers (Sheet 1 of 2)

Reference Designator	Functional Description	Settings
NOTE: For groups of jumpers with multiple options, the default setting is noted with italics.		
JP1	Safe Mode	**Open (default):** Normal mode. **Shorted:** Forces processors to operate at lowest internal frequency. For debug only. Refer to the Intel® 82801CA I/O Controller Hub 3 (ICH-S) Datasheet (order number 290733) for more information.
JP2	Top Swap	**Open (default):** Normal mode. **Shorted:** The ICH3 supports a "Top-Block Swap" mode, wherein the ICH3 swaps the top block (the boot block) in the FWH with another location. This allows for safe update of the boot block. Refer to the Intel® 82801CA I/O Controller Hub 3 (ICH-S) Datasheet (order number 290733) for more information.
JP3	ITP Select	**Short 1-2:** One processor **Short 2-3:** Two processors Use the appropriate setting for the number of processors populated on the evaluation board.
JP4	CMOS Clear	**Short 1-2 (default):** Normal mode. **Short 2-3:** To clear all CMOS settings, power down, short pins 2-3 for several minutes, move the jumper back to 1-2, and boot the system.
JP7	No Reboot	**Open (default):** Normal TCO timer reboot functionality: reboot after second timeout. **Short:** Disables TCO timer system reboot feature.
J19	Test Header	Used during manufacturing only.
J27	FWH Write Protect	**Open:** All blocks write enabled. **Short 1-2 (default):** Top block write protected. **Short 3-4:** Blocks 2-8 write protected. **Short 1-2 and 3-4:** All blocks write protected.
JP24, JP25, JP26, JP27	PCI-X Slot 1, Bus A Mode	**JP24** / **JP25** / **JP26** / **JP27** / **Mode** / **MHz** *Open* / *Open* / *Open* / *Open* / *PCI-X* / *133* Short / Open / Open / Open / PCI-X / 100 Short / Open / Short / Open / PCI-X / 66 Short / Short / Short / Open / PCI / 66 Short / Short / Short / Short / PCI / 33
JP28, JP29, JP30	PCI-X Slot 2, Bus B Mode	**JP28** / **JP29** / **JP30** / **Mode** / **MHz** *Open* / *Open* / *Open* / *PCI-X* / *100* Open / Open / Short / PCI-X / 66 Open / Short / Short / PCI / 66 Short / Short / Short / PCI / 33

Table 19. Jumpers (Sheet 2 of 2)

Reference Designator	Functional Description	Settings				
JP31, JP32, JP35	SCSI PCI/PCI-X Mode	**JP31**	**JP32**	**JP35**	**Mode**	**MHz**
		Open	*Open*	*Open*	*PCI-X*	*133*
		Open	Short	Open	PCI-X	100
		Open	Short	1-2	PCI-X	66
		Open	Short	2-3	PCI	66
		Short	Short	2-3	PCI	33
JP33, JP34	PCI-X Slots A:D Mode	**JP33**	**JP34**	**Mode**	**MHz**	
		Open	*Open*	*PCI-X*	*66*	
		Open	Short	PCI	66	
		Short	Short	PCI	33	
J36	Test Header	Used for validation purposes only.				
JP38	SMBUS 0 VSBY5	These headers are used to connect to the SMBUS. See Section 4.5.1 for pinouts.				
JP39	SMBUS 1 VCC3					
JP40	SMBUS 2 VCC3					
JP41	SMBUS 3 VCC3					
JP42	Loadline Select	**Short 1-2:** Intel Xeon processor **Open:** Low Voltage Xeon processor				

4.5.1 SMBUS Headers

The SMBUS headers are used to connect the SMBUSes. Refer to Table 20 through Table 23 for pinout information.

Table 20. SMBUS 0 VSBY5 (JP38)

Pin	Pin Description
1	I^2C bus 0 data
2	Ground
3	I^2C bus 0 clock

Table 21. SMBUS 1 VCC3 (JP39)

Pin	Pin Description
1	I^2C bus 1 data
2	Ground
3	I^2C bus 1 clock

Table 22. SMBUS 2 VCC3 (JP40)

Pin	Pin Description
1	I^2C bus 2 data
2	Ground
3	I^2C bus 2 clock

Table 23. SMBUS 3 VCC3 (JP41)

Pin	Pin Description
1	I^2C bus 3 data
2	Ground
3	I^2C bus 3 clock

4.6 Buttons

The evaluation board has power and reset buttons. Refer to Table 24 for descriptions of the buttons.

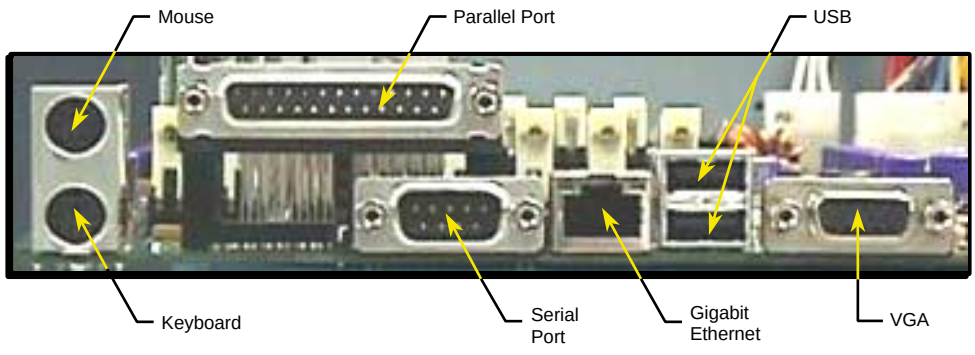
Table 24. Buttons

Switch Reference Designator	Switch Description
S8	Power Button
S9	Reset Button

4.7 Peripheral Connectors

The evaluation board contains a number of connectors for external system devices and peripherals.

Figure 8. Peripheral Connectors



4.7.1 Dual Stacked USB Connector

Table 25 shows the signals assigned to the dual stacked USB connector.

Table 25. USB Connector Pinout

Pin	Signal
1,5	Power (fused)
2,6	USBP0# [USBP1#]
3,7	USBP0 [USBP1]
4,8	Ground

4.7.2 PS/2-Style Mouse and Keyboard Connectors

Table 26 shows the signals assigned to the PS/2-style keyboard and mouse connectors. The keyboard port is on the top, and the mouse port is on the bottom.

Table 26. PS/2-Style Mouse and Keyboard Pinout

Pin	Signal
1, 7	Data
2,8	Reserved
3,9	Ground
4,10	+5 V (fused)
5,11	Clock
6,12	Reserved

4.7.3 VGA Port

Table 27 shows the signals assigned to the VGA port.

Table 27. VGA Port Signals (Sheet 1 of 2)

Pin	Signal
1	Red
2	Green
3	Blue
4	Ground
5	Ground
6	Analog Ground
7	Analog Ground
8	Analog Ground
9	Ground
10	Ground
11	Reserved
12	DDC Data

Table 27. VGA Port Signals (Sheet 2 of 2)

Pin	Signal
13	Horizontal Sync
14	Vertical Sync
15	DDC Clock

4.7.4 Parallel Port

Table 28 shows the signals assigned to the parallel port connector.

Table 28. Parallel Port Connector Pinout

Pin	Signal	Pin	Signal
1	Strobe#	14	Auto Feed#
2	Data Bit 0	15	Fault#
3	Data Bit 1	16	INIT#
4	Data Bit 2	17	SLC IN#
5	Data Bit 3	18	Ground
6	Data Bit 4	19	Ground
7	Data Bit 5	20	Ground
8	Data Bit 6	21	Ground
9	Data Bit 7	22	Ground
10	ACK#	23	Ground
11	Busy	24	Ground
12	Paper end	25	Ground
13	SLCT		

4.7.5 Serial Ports

Table 29 shows the signals assigned to the serial port connector.

Table 29. Serial Port Connector Pinout

Pin	Signal
1	DCD
2	Serial In (SIN)
3	Serial Out (SOUT)
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	RI

4.7.6 Gigabit Ethernet RJ-45 Connector

Table 30 shows the signals assigned to the gigabit Ethernet RJ-45 connector. A Cat5 cable with an RJ-45 connector is required to connect this Ethernet adapter to your network.

Table 30. Gigabit Ethernet RJ-45 Connector Pinout

Pin	Signal
1	Data 0 +
2	Data 0 -
3	Data 1 +
4	Data 1 -
5	Data 2 +
6	Data 2 -
7	Data 3 +
8	Data 3 -

BIOS Overview 5

The E7501 BIOS was created using AMIBIOS8* technology created by AMI*.

The following documents are available to overview the high-level features of AMIBIOS8:

- Amibios8.pdf
- AMIBIO8Brochure.pdf
- AboutAMIBIOS8.pdf

These files, and others, are also available for download from AMI's website (http://www.ami.com/support/doclib.cfm).

5.1 Power-On and Configuration

5.1.1 Power On

Upon power-on, the E7501 BIOS will initialize the board hardware and peripherals, communicating its progress by writing status codes to an I/O port (80h). These status codes may be monitored by installing a POST diagnostic card in the short debug PCI slot.

Documentation on the status codes that are sent to port 80h is available in the file AMIBIOS-codes.pdf. This file can be downloaded from AMI's website (http://www.ami.com/support/doclib.cfm).

After most of the hardware has been configured, including video (whether it be on-board or PCI), the user is presented with a splash screen. This splash screen displays the following information:

- BIOS information, such as build time and version
- CPU configuration
  - Number of CPUs in the system
  - Speed of the CPUs
  - Brand string
  - Family/Model/Stepping
  - Microcode update loaded

All of memory is then tested, and the progress of the test is displayed on the screen. This memory test may be skipped by pressing the <ESC> key at any time during the test.

Following the memory test, IDE devices are detected. If CMOS memory has been corrupted or is otherwise invalid, you will be prompted to load default CMOS data and continue or enter the setup utility. Press <F1> to enter the setup utility or press <F2> to load default values into CMOS and continue.

After the IDE devices are displayed, the current hardware configuration is shown, and the boot device is chosen. Then control is handed over to the boot loader on the selected boot device.

5.1.2 BIOS Setup Configuration

The E7501 BIOS provides a setup utility to customize your board. At any point during the display of the first splash screen, pressing the <DEL> key will enter BIOS setup.

The BIOS Setup utility has been functionally divided into five sections to categorize the setup options:

- Main
- Advanced
- PCI/PNP (not discussed here)
- Boot
- Security (not discussed here)
- Chipset
- Exit

These sections can be navigated using all four arrow keys. The <UP> and <DOWN> keys toggle between setup options in any given section. The <LEFT> and <RIGHT> keys switch between main BIOS setup sections. Each of these sections will be discussed briefly, in turn.

5.1.3 Help on Options

It should be noted that not all setup options are documented in this guide. The setup utility in the BIOS contains brief help descriptions for almost every setup option available. When any given setup option is highlighted (selected by moving the cursor to the item with the arrow keys), a brief description of that option is displayed in a pane on the right-hand side of the screen.

5.1.4 Main Setup

The Main BIOS setup screen contains mostly informative information on the BIOS. The following information is displayed:

- BIOS version
- BIOS build date
- BIOS ID

Please use this information when engaging with Intel customer support.

5.1.4.1 Time and Date

The Main Setup section contains fields to control the date and the time of the system. These should be set the first time the setup utility is entered.

5.1.5 Advanced Setup

The Advanced BIOS setup screen contains various menu items that allow you to configure the following system components:

- CPU
- IDE (not discussed here)
- Floppy (not discussed here)
- ACPI (not discussed here)
- Event Log (not discussed here)
- Super I/O (not discussed here)
- USB (not discussed here)
- Onboard Devices

5.1.5.1 CPU Configuration

CPU Frequency Multiplier

The E7501 board adaptation allows for the user to set the operating frequency of the processors in the system. The CPU Frequency Multiplier field accepts a decimal number representing the processor's internal clock multiplier ratio. The following equation defines how this field affects processor operating frequency:

Processor Frequency = (CPU Frequency Multiplier) * (FSB Frequency) / 4

For example, a CPU Frequency Multiplier value of "20" on a board that is populated with 400 MHz FSB processors will result in an effective processor operating frequency of 2.0 GHz.

It should be noted that not all multipliers are allowable. While the setup option may allow a value to be entered, it is not guaranteed that the entered multiplier will actually result in the intended processor frequency. The effective frequency of the processor depends on the supported frequency range of the processor. If a value entered in this option is not explicitly supported by the processor, the system should exhibit the following behavior:

- If the multiplier would target a processor frequency of below 1.2 GHz, the system will strap to 800 MHz
- If the multiplier would target a processor frequency between 1.2 GHz and the lowest supported processor frequency, the system will strap to the lowest supported processor frequency.
- If the multiplier would target a processor frequency above the highest supported processor frequency, the system will strap to the highest supported processor frequency.

Hyper Threading

A setup option is available to turn Hyper Threading on and off, as well. If you are running on an operating system that takes advantage of hyper-threading technology, you will want to have this option enabled. The setting of this option will affect how many processors are reported on the BIOS splash screen, as well as to the operating system.

5.1.5.2 Onboard Device Configuration

The Advanced Setup section allows limited configuration of non-chipset devices. The onboard Gigabit Ethernet controller and onboard SCSI controller may be enabled or disabled here. If either device is not used, it is recommended that they be disabled to improve boot time.

5.1.6 Boot Setup

The Boot Setup section contains options that controls boot devices, boot order, and other aspects of the boot process. Most of these options will not be documented here.

Quick Boot

The Quick Boot option determines whether or not a complete memory test is performed by the BIOS during boot. Enabling this option will speed up boot time of large memory configurations greatly. It is disabled by default.

5.1.7 Chipset Setup

This setup section contains options that allow the user to configure various parameters that are specific to the chipset silicon present on the board. The following silicon is configurable through this setup section:

- E7501
- P64H2
- ICH3 (not discussed here)

5.1.7.1 E7501 Setup

Memory Remapping

A configuration option is available to toggle the state of memory remapping support in the chipset. Memory remapping allows physical memory behind legacy ROM and PCI memory to be utilized. Enabling this feature allows that memory to be accessed at a region above the top of physical memory in the system.

If your E7501 system is to be operated with 4 GByte or more of memory, this option ***must*** be enabled.

5.1.7.2 P64H2 Setup

PCI-X Frequency Control

The P64H2 setup section allows some control over the PCI-X bus frequencies on the bus segments behind all P64H2 devices in the system. The BIOS is pre-programmed to cap the frequencies that all PCI-X bus segments on the E7501 board can run at. In the event that it is desired to control the frequency of the PCI-X bus segments, each segment is represented by a setup option that can be set according to the following:

Table 31. P64H2 Setup Options

Setting	Meaning
Auto	The BIOS will set the frequency of the PCI-X bus segment according to the capabilities reported by all devices on the bus segment, not to exceed the pre-programmed BIOS maximum for that segment.
33	The BIOS will program the frequency of the PCI-X bus segment to 33 MHz.
66	The BIOS will program the frequency of the PCI-X bus segment to 66 MHz.
100	The BIOS will program the frequency of the PCI-X bus segment to 100 MHz.
133	The BIOS will program the frequency of the PCI-X bus segment to 133 MHz.

Although the E7501 board only comes populated with two P64H2 devices allowing four PCI-X bus segments (designated HIB and HID in the setup options), the BIOS contains two more options to control the bus segments behind the P64H2 that is contained on the Intel P64H2 riser card, which may be inserted into the HI Riser Card Connector slot (designated HIC in the setup options). The E7501 BIOS contains support for the Intel P64H2 riser card.

5.1.8 Exit

After BIOS setup modifications have been done, you have several choices for leaving the setup utility, which are displayed on the Exit Setup screen:

- Save and Exit (F10)
- No Save and Exit
- Discard Changes (F7)
- Load Optimal Defaults (F8)
- Load Failsafe Defaults (F9)

5.1.8.1 Save Changes and Exit

This option can be chosen to save all changes made to CMOS configuration since entering BIOS setup utility and rebooting the system. All changes made in the setup utility will take affect on the subsequent boot.

5.1.8.2 Discard Changes and Exit

This option can be chosen to exit the setup utility without saving any CMOS configuration changes that have been made. Choosing this option will allow the boot to continue from where it left off before entering the setup utility.

5.1.8.3 Discard Changes

If you have made changes that you wish to undo, this option can be used to restore the CMOS buffer to the same state it was in at setup utility entry.

5.1.8.4 Load Optimal/Failsafe Defaults

Both of these options load a pre-programmed set of configuration data to CMOS.

5.1.8.5 Shortcuts

In addition to using the Exit Setup screen to choose your method of leaving the setup utility, you can also use function keys (noted above) from any point inside the setup utility.

5.2 Updating the BIOS

AMI provides an MS-DOS utility that may be used to replace the BIOS on your E7501 board with a newer version. The utility may be invoked via MS-DOS command line with one parameter, being the .rom file that represents the new BIOS image. The .rom file may be located in any location in the system accessible from MS-DOS.

This utility, along with instructions, is available for download from AMI's website (http://www.ami.com). Although the name of the actual executable file changes from release to release, this tool is packaged under the name AMIFLASH.

5.3 Troubleshooting

5.3.1 Error Messages

In some situations, you may be faced with error messages from the BIOS. AMIBIOS-Error-Messages.pdf describes some of the messages you may see. This document, along with others, is available online from AMI's website (http://www.ami.com/support/doclib.cfm).

5.3.2 Status Codes

During the boot process, the E7501 BIOS communicates its progress to the user by writing status codes to an I/O port (80h). These status codes may be monitored by installing a POST diagnostic card in the short debug PCI slot.

Documentation on the status codes that are sent to port 80h is in the file AMIBIOS-codes.pdf which is available for download from AMI's website (http://www.ami.com/support/doclib.cfm).

5.3.3 Fatal Error Codes

Some memory configurations may cause the system to stop because the BIOS can no longer function. These conditions are specific to the E7501 board adaptation, and are not documented with the reset of the POST codes in the AMI documentation. The following table details the possible board-specific fatal error codes that may be observed:

Table 32. Board-Specific Fatal Error Codes

POST Code	Name	Description
E1	Memory Not Present	Make sure memory is populated in the system. If memory has been populated in the system, it is possible that the BIOS to skipped DIMMs that are not valid for the current board configuration, and had no valid DIMMs to initialize.
E2	Memory Type Mismatch	Memory has been placed in the system that is not Registered ECC x72 DDR. Check all DIMMs.
E3	Memory Width Error	The silicon on the board doesn't support the DRAM width of one of the DIMMs populated on the board. Check the width of all DIMMs and replace any non-supported DIMMs.
E4	Memory Channel Mismatch	At least one DIMM pair (channel A and channel B) do not match, or only one DIMM is populated in the socket pair.
EA	Memory Timing Error	At least one DIMM has been placed in the system that is not fast enough to run in the current configuration. Inspect and replace slow DIMMs.
EE	Memory Size Not Supported	The size of at least one DIMM is not supported by the BIOS. Inspect and replace any unsupported DIMMs.
EF	DIMM Population Order Error	Mixed single-rank and double-rank DIMMs have been populated in the wrong order. Reorder the DIMMs such that any of the double-rank DIMMs are farther from the MCH than any of the single-rank DIMMs.

Note: The BIOS contained on your board may not generate all of the error codes listed above.

P64H2 Riser Card 6

6.1 Introduction

The P64H2 Riser Card is an optional component of the Intel E7501 Scalable Performance Board Development Kit. The Intel RGE7501MC Memory Controller Hub (MCH) supports up to three HI 2.0 connections. The board contains two Intel P64H2 components connected via HI 2.0 expansion slot. The riser card enables you to use the third HI 2.0 to provide a third P64H2 on the board.

The P64H2 Riser Card consists of one P64H2 component and three 3.3V PCI-X connectors. Bus A contains one PCI-X connector running up to 133 MHz, and Bus B contains two connectors running up to 100 MHz. Figure 9 depicts the block diagram.

Figure 9. P64H2 Riser Card Block Diagram

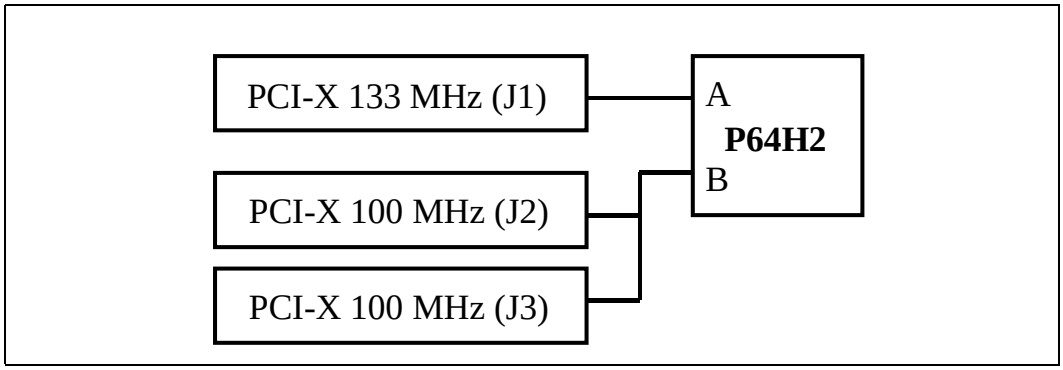
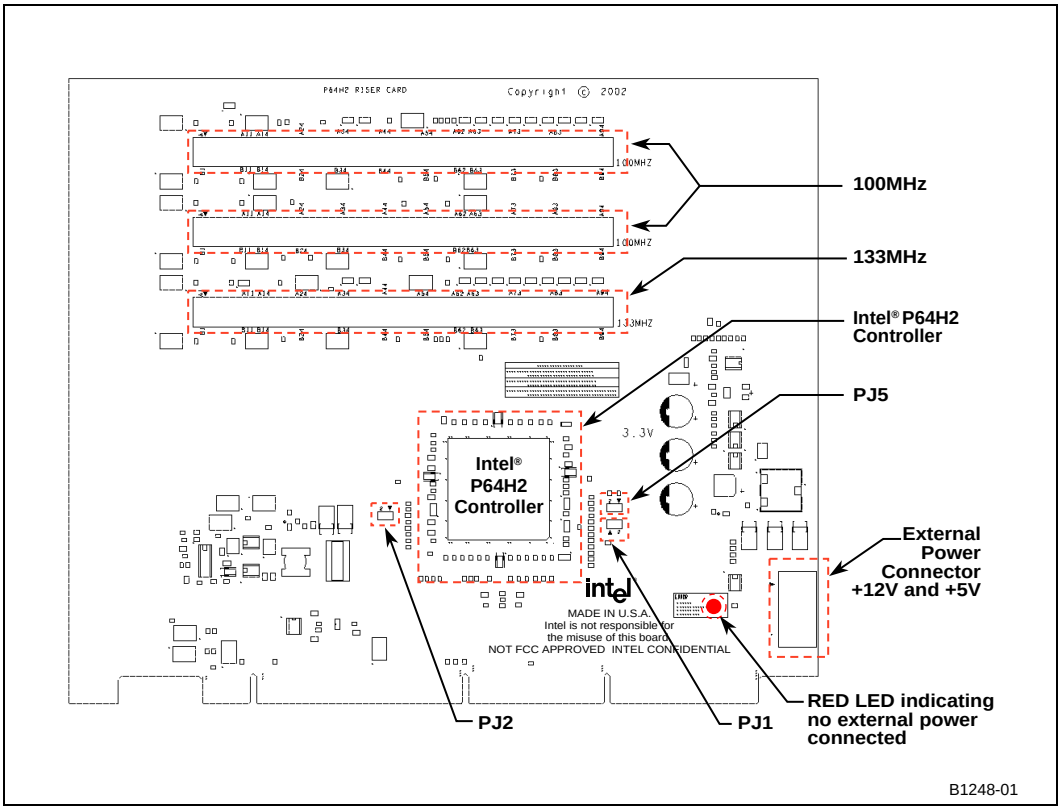


Figure 10 depicts the riser card's dimensions and the placement of the components on the board. The riser card measures 9.00" x 7.50". (Note: The figure is not drawn to scale.)

Figure 10. P64H2 Riser Card Topology



Note: Flashing red LED (CR6) shows that the supplemental power is not connected to the board and is holding the board in reset.

6.2 Hardware Installation

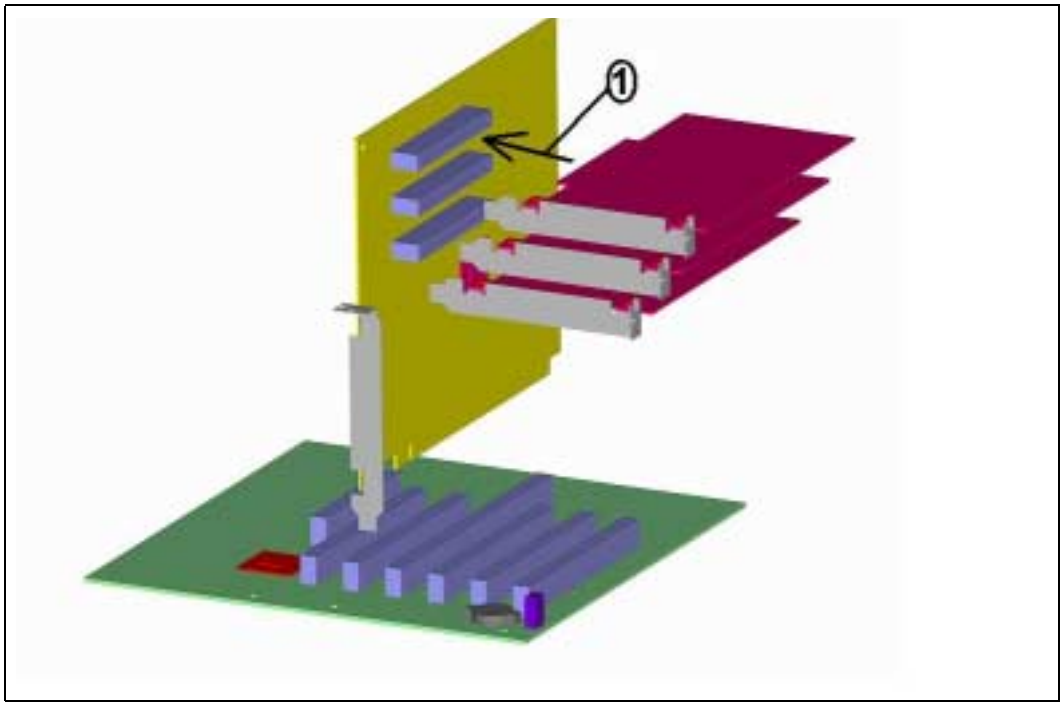
The P64H2 Riser Card hardware includes a steel bracket designed to support the weight of PCI/PCI-X cards connected to the riser card. Refer to Figure 7, “Board Layout Diagram” on page 39 and follow these steps to install the hardware:

1. Attach a free hard drive power cable (+12 V and +5 V) to the back of the riser card.

Note: Without a power supply attached to card, the system will be held in reset.

2. Insert one, two or three PCI/PCI-X cards into the slots on the riser card. See item 1 on Figure 11.

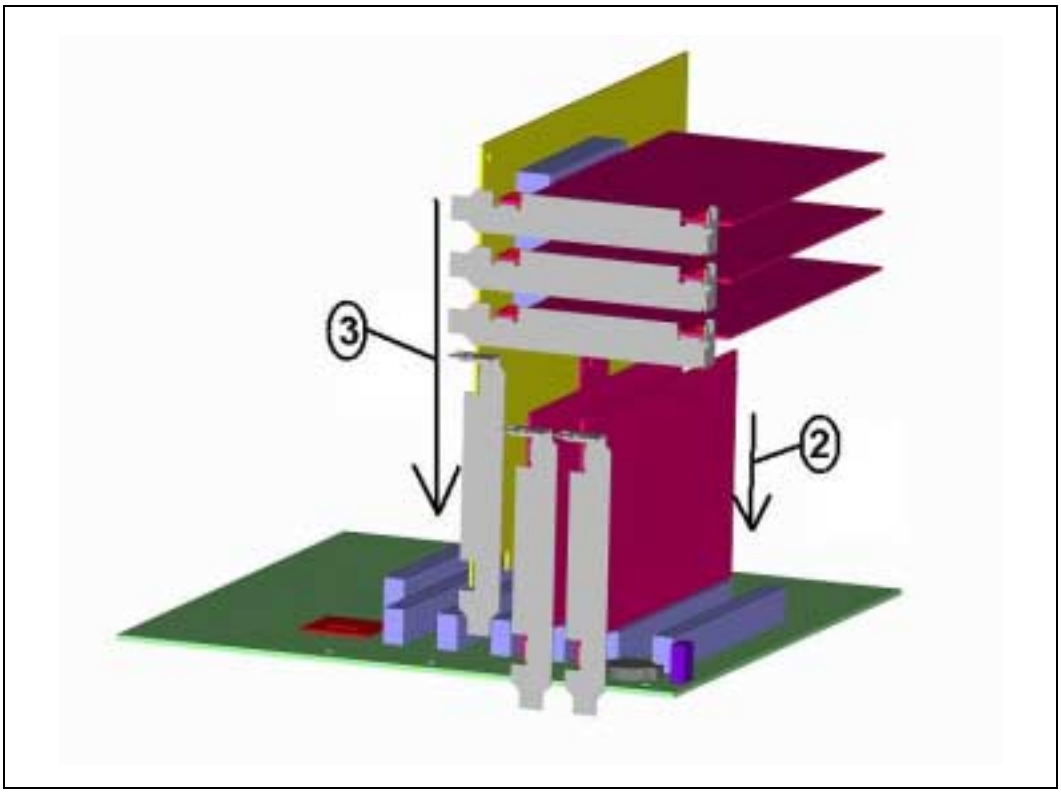
Figure 11. Inserting PCI/PCI-X Cards into the Slots on the Riser Card



3. If you are using slots J24 or J25 on the evaluation board, insert PCI/PCI-X cards into those slots before installing the P64H2 Riser Card, as shown in item 2 of Figure 12. If you are using slot J23, ensure that this slot is empty until step 6 of this installation procedure.
4. Plug the P64H2 Riser Card into slot J12 of the evaluation board (the largest slot on the board). See item 3 in Figure 12.

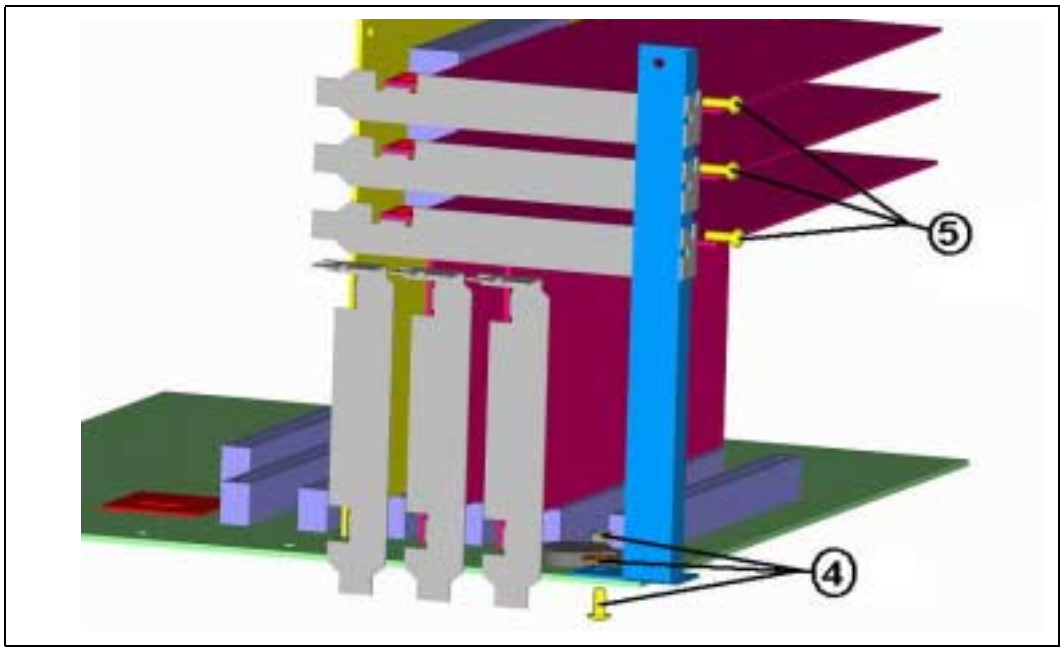
Note: Plug PCI/PCI-X cards into the evaluation board first, then plug in the Riser Card.

Figure 12. Installing the P64H2 Riser Card



5. Install the P64H2 steel bracket by first attaching it to the evaluation board baseboard using (1) 6-32 x 3/8 screw, (1) 6-32 nut, and (1) 6-32 washer. See item 4 in Figure 13.
6. Attach the faceplates of the PCI cards to the bracket using (3) 6-32 x 3/8 screws as shown in item 5 of Figure 13.

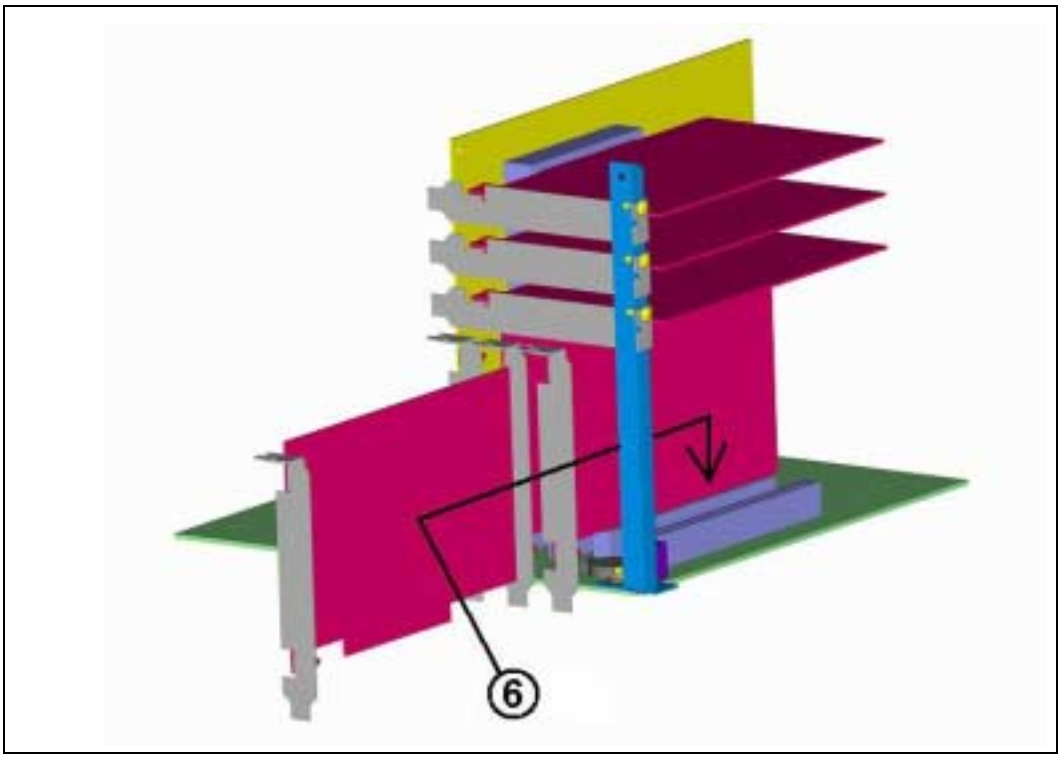
Figure 13. Installing the Bracket



7. If you are using slot J23, you can insert a PCI/PCI-X card by sliding it through the bracket enclosure and plugging it into the evaluation board. See item 6 in Figure 14.

Note: When possible, assemble any PCI/PCI-X cards to the mainboard before attaching the P64H2 riser card.

Figure 14. Inserting the PCI/PCI-X Card into Slot J23



6.3 Hardware Configuration

6.3.1 Jumper Settings

There are two sets of jumpers that control the speed of the PCI-X buses. Table 33 describes the jumper settings for Channel A (one 133 MHz slot), and Table 34 describes the jumper settings for Channel B (two 100 MHz slots).

Table 33. Channel A Jumper Settings J1

JP1	JP2	Frequency
No Jumper	Jumper	Default - 66 MHz
Jumper	Jumper	33 MHz
Jumper	No Jumper	Unsupported
No Jumper	No Jumper	133 MHz

Table 34. Channel B Jumper Settings J2 and J3

JP5	Frequency
No Jumper	Default – 100 MHz
Jumper	133 MHz

Note: If two cards are plugged in to slots J2 and J3, BIOS will default run the slots at 100 MHz.

6.3.2 Hot Plug and Bootable Devices

Hot plug and bootable devices are not supported on the P64H2 Riser Card.

Bill of Materials A

This appendix includes the latest bill of materials as of this printing. To obtain the latest version of the bill of materials, go to http://developer.intel.com/design/intarch.

Table 35. Bill of Materials (Sheet 1 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
18	J4,J6,J8,J14,J15,J19,J22,J26,J28,JP1,JP2, JP7,JP26,JP29,JP31,JP33,JP34, JP42	1X2HDR_TH-102276-001	FOXCONN ELECTRONICS	HB1902G
11	JP3,JP4,JP24,JP25,JP28,JP32,JP35, JP38,JP39,JP40,JP41	1X3HDR_TH-102276-003	TYCO ELECTRONICS CORPORATION	146225-3
3	J51,J52,J53	1X3HDR_TH1MT-201581-103	WIESON ELECTRONIC	2366C888-001
1	J27	1X4HDR_TH-201558-001	TYCO ELECTRONICS CORPORATION	640456-4
1	J43	2X15HDR_2MT-201418-030	FOXCONN ELECTRONICS	HL17156
1	J34	2X17HDR5_TH-732440-001	WIESON ELECTRONIC	2120C888-001
1	J16	2X20HDR20_TH-201418-040	FOXCONN ELECTRONICS, INC.	HL09207-D2
1	J50	2X30RCPT_2MH-201082-563	TYCO ELECTRONICS CORPORATION	650090-6
1	J36	2X5HDR_TH-102283-005	TYCO	146443-5
2	J37,J38	4X17SCSIRA_TH-717126-001	TYCO ELECTRONICS CORPORATION	787190-7
1	U54	IC,VLSI,VIDEO,M69000,BGA,256	ASILIANT TECHNOLOGIES	M69000
1	U113	74ACT04_SOIC-100604-183-VCC=VSA	FAIRCHILD SEMICONDUCTOR CORP	74ACT04SCX
1	U126	74AHC74_SOIC-100713-184-VCC=VSA	TEXAS INSTRUMENT	SN74AHC74DR
4	U121,U122,U123,U124	74CBT3306_SSOP-VCC=VSBY5_0	TI	SN74CBTD3306
1	U58	IC,LOG,DIG-COMP,SOP,SN74HC682DW,MAGNITU>	TI	SN74HC682DWR
1	U68	74HCT125_SOIC-100624-181-VCC=VA	PHILIPS COMPONENTS	74HCT125D-T

Table 35. Bill of Materials (Sheet 2 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
1	U125	IC,LOG,MULTIPLEX,SOT,74HCT4052D,NI	PHILLIPS	74HCT4052D
1	U57	IC,LOG, GATES,SOIC,74LVC00A,NAND	PHILLIPS	74LVC00AD-T
1	U82	74LVC08AD_SOIC-100608-361	PHILIPS COMPONENTS	74LVC08AD-T
1	U72	74LVC14_SOIC-676292-101	PHILIPS COMPONENTS	74LVC14AD-T
1	U79	IC,ASIC,CORDOVA,A0,416 BGA	INTEL	82544EI
1	U78	IC,VLSI,SCSI,AIC7902,BGA,456	ADAPTEC	AIC-7902
1	U101	AT93C46A_66_SOIC-109868-001-VCA	ATMEL	AT93C46-10SC-2.7
1	BH1	BAT ACC,HOLDR,THM,CR2032	CHIA TSE TERMINAL INDUSTRY CO., LT	B7566BP5R
1	C712	CAP-P_3216-2.2	KEMET	T491A22M006QAS
18	C710,C711,C1390,C1391,C1392, C1393,C1394,C1395,C1396,C1397, C1435,C1436,C1437,C1438,C1439, C1440,C1566,C1600	CAP-P_3216-4.7	VISHAY- SPRAGUE	293D475X0010A2W
32	C706,C709,C881,C1410,C1411, C1414,C1415,C1416,C1419,C1421, C1422,C1423,C1424,C1425,C1426, C1427,C1428,C1429,C1430,C1431, C1432,C1433,C1434,C1441,C1589, C1601,C1606,C1627,C1628,C1629, C1630,C1631	CAPT,B,10.000 UF,16.000V,+/- 20%	KEMET	T491B106M016AS7454
27	C756,C757,C758,C759,C760,C761, C762,C763,C764,C765,C766,C767, C768,C769,C770,C771,C772,C773, C774,C775,C1567,C1568,C1569, C1570,C1590,C1591,C1592	CAP-P_6032-100	KEMET	T491C107006AS
1	C776	CAP-P_6032-22	AVX/KYOCERA	TAJC226M016R
2	C656,C657	CAPT,E,1000UF,4V,+/-20%	KEMET	T510E108M004AS
8	C530,C531,C532,C533,C1555,C1556,C1557,C1558	CAPS,AL-P,E/X,180.000 uF,4.000V,+/- 20%>	PANASONIC	EEFUE0G181R
14	C681,C682,C686,C687,C690,C691, C694,C695,C1400,C1401,C1402, C1403,C1543,C1544	CAP-P_7343-22.0	VISHAY-SPRAGUE	893D226X0016D2W
4	C664,C665,C666,C667	CAP-P_7343-33.0	KEMET	T496X336M020AS454
0	C63,C64	CAP-P_7343-33.0	KEMET	T496X336M020AS454
2	C658,C659	CAP-P_7343-330UF	AVXCERAMICS	TAJE337M010SNJ
8	C1442,C1443,C1444,C1445,C1446, C1447,C1479,C1577	CAP-P_RDL-270	SANYO VIDEO COMPONENTS	16SP270M+C3

Table 35. Bill of Materials (Sheet 3 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
24	C208,C209,C210,C211,C212,C213, C214,C215,C216,C217,C218,C219, C220,C221,C222,C223,C224,C225, C226,C227,C1475,C1476,C1477, C1478	CAPA,560.000 UF,8X13,4.000V,+/- 20%,TH	UNITED/NIPPON	4PS560MAH11
4	C1481,C1482,C1483,C1484	CAP-P_RDL-820UF	UNITED/NIPPON CHEMICON	4FP820MAE5
4	C702,C703,C704,C705	CAPN_1206-10.0UF	A V X CERAMICS CORP	12066D106MAT4A
13	C445,C446,C447,C448,C449,C450, C897,C898,C899,C900,C901,C902, C903	CAPN_1210-10UF	TDK CORPORATION OF AMERICA	C3225Y5V1C106Z T0S9N
65	C1,C2,C3,C4,C5,C6,C7,C8,C9,C10, C11,C12,C13,C14,C15,C16,C17,C1 8, C19,C20,C21,C22,C23,C24,C25,C2 6, C27,C28,C29,C30,C31,C32,C33,C3 4, C35,C36,C37,C38,C39,C40,C57,C5 8, C520,C521,C522,C523,C524,C680, C683,C684,C685,C688,C689,C692, C693,C700,C701,C1398,C1399, C1404,C1405,C1531,C1546,C1587, C1588	CAPN_1210-22UF	TDK CORPORATION OF AMERICA	C3225X5R0J226M T009N
6	C1496,C1497,C1498,C1499,C1643, C1644	CAPN_508-.1UF	TDK CORPORATION OF AMERICA	C1220X7R1C104K T009N
22	C589,C590,C595,C596,C597,C598, C613,C614,C620,C621,C1450,C153 0, C1607,C1608,C1609,C1610,C1611, C1612,C1619,C1620,C1621,C1622	CAPN_603-.01UF	MURATA ELEC. NORTH AMERICA	GRM39X7R103K05 0AJ
0	C630	CAPN_603-.01UF,10%,50V,603,E	A V X CERAMICS CORP	06035C103KAT4A
34	C631,C638,C889,C1269,C1276, C1277,C1278,C1291,C1293,C1294, C1295,C1296,C1297,C1298,C1299, C1300,C1304,C1305,C1306,C1307, C1308,C1309,C1310,C1311,C1312, C1613,C1614,C1615,C1616,C1617, C1618,C1623,C1624,C1625	CAPN_603-.01UF	A V X CERAMICS CORP	06035C103MAT4A
66	C777,C779,C780,C781,C782, C783,C1313,C1314,C1315, C1316,C1317,C1318,C1321,C1322, C1325,C1326,C1327,C1328,C1329, C1330,C1331,C1332,C1333,C1334, C1335,C1336,C1337,C1338,C1342, C1343,C1344,C1345,C1346,C1347, C1348,C1349,C1350,C1351,C1352, C1353,C1354,C1355,C1356,C1357, C1358,C1359,C1360,C1361,C1362, C1363,C1364,C1365,C1366,C1367, C1368,C1369,C1370,C1371,C1374, C1375,C1376,C1379,C1598,C1599, C1670,C1671	CAPN_603-.01UF	A V X CERAMICS CORP	06035C103JAT4A

Table 35. Bill of Materials (Sheet 4 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
3	C617,C1372,C1373	CAPN_603-.047UF	A V X CERAMICS CORP	0603YC473JAT4A
41	C785,C786,C787,C788,C789,C790, C791,C792,C793,C794,C795,C796, C797,C798,C799,C800,C801,C802, C803,C804,C805,C806,C807,C808, C809,C810,C811,C812,C813,C814, C815,C816,C817,C818,C819,C820, C821,C822,C823,C824,C825	CAPN_603-.1UF	TDK CORPORATION OF AMERICA	C1608Y5V1E104ZT 009N
400	C62,C289,C290,C291,C292, C293,C294,C295,C296,C297,C298, C299,C300,C301,C302,C305,C306, C307,C308,C309,C310,C336,C337, C338,C339,C340,C341,C342,C343, C344,C345,C347,C348,C349,C350, C351,C352,C353,C354,C355,C356, C405,C406,C407,C408,C409,C410, C411,C412,C413,C414,C415,C416, C417,C418,C419,C420,C421,C422, C423,C424,C425,C426,C427,C428, C429,C430,C431,C432,C433,C434, C435,C436,C499,C500,C501,C502, C503,C504,C505,C506,C507,C508, C509,C510,C513,C515,C516,C517, C518,C615,C616,C646,C826,C827, C828,C829,C830,C831,C832,C833, C834,C835,	CAPN_603-.1UF	TDK CORPORATION OF AMERICA	C1608X7R1C104K T009T
402	C836,C837,C838,C839,C840,C841, C842,C843,C844,C845,C846,C847, C848,C849,C850,C851,C852,C853, C854,C855,C856,C857,C858,C859, C860,C861,C862,C863,C864,C865, C866,C867,C868,C869,C870,C871, C872,C873,C874,C875,C876,C883, C884,C885,C886,C887,C888,C893, C894,C895,C921,C922,C923,C924, C925,C926,C927,C928,C929,C930, C931,C932,C933,C934,C935,C936, C937,C938,C939,C940,C941,C942, C943,C944,C945,C946,C947,C948, C949,C950,C951,C952,C953,C954, C955,C956,C957,C958,C959,C960, C961,C962,C963,C964,C965,C966, C967,C968,C969,C970,C971,C972, C973,C974,C975,C976,C977,C978, C979,C980,C981,C982,C983,C984, C985,C986,C987,C988,C989,C990, C991,C992,C993,C994,C995,C996, C997,C998,C999,C1000,C1001, C1002,C1003,C1004,C1005,C1006, C1007,C1008,C1009,C1010,C1011, C1012,C1013,C1014,C1015,C1016, C1017,C1018,C1019,C1020,	Ref Des Cont…		

Table 35. Bill of Materials (Sheet 5 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
402	C1021,C1022,C1023,C1024,C1025, C1026,C1027,C1028,C1029,C1030, C1031,C1032,C1033,C1034,C1035, C1036,C1037,C1038,C1039,C1040, C1143,C1144,C1145,C1146,C1147, C1148,C1149,C1150,C1152,C1153, C1154,C1156,C1157,C1158,C1159, C1160,C1161,C1162,C1163,C1164, C1165,C1166,C1167,C1168,C1169, C1170,C1171,C1172,C1173,C1174, C1175,C1176,C1177,C1178,C1179, C1180,C1181,C1182,C1183,C1184, C1185,C1186,C1187,C1188,C1189, C1190,C1191,C1192,C1193,	Ref Des Cont…		
402	C1194,C1195,C1196,C1197,C1198, C1199,C1200,C1201,C1202,C1203, C1204,C1205,C1206,C1207,C1208, C1209,C1210,C1211,C1212,C1213, C1214,C1215,C1216,C1217,C1218, C1219,C1220,C1221,C1222,C1223, C1224,C1225,C1226,C1227,C1228, C1319,C1320,C1323,C1324,C1341, C1378,C1380,C1381,C1382,C1383, C1384,C1385,C1386,C1387,C1388, C1389,C1501,C1503,C1504,C1507, C1508,C1513,C1514,C1515,C1516, C1517,C1518,C1519,C1520,C1521, C1522,C1528,C1529,C1597,C1661, C1662,C1663,C1664,C1665,C1666, C1667,C1668,C1669	Ref Des Cont…		
0	C311,C514,C542,C543,C544,C545, C546,C547,C548,C549,C550,C551, C552,C553,C554,C555,C556,C557, C558,C559,C560,C561,C562,C563, C564,C565,C566,C567,C568,C569, C570,C571,C572,C573,C574,C575, C576,C577,C578,C579,C580,C581, C582,C583,C584,C585,C586,C587, C588	CAPN_603-.1UF		
2	C1243,C1564	CAPN_603-.22UF	TDK CORPORATION OF AMERICA	C1608Y5V1C224Z T009N
4	C1377,C1502,C1641,C1642	CAPN_603-1.0UF	A V X CERAMICS CORP	0603ZG105ZT4A
3	C619,C1584,C1585	CAPN_603-10.0PF	A V X CERAMICS CORP	06035A100JAT4A
40	C437,C438,C439,C440,C441, C442,C443,C444,C635,C642,C648, C649,C650,C651,C1272,C1273, C1274,C1279,C1281,C1282,C1283, C1284,C1285,C1286,C1287,C1288, C1290,C1301,C1302,C1303,C1339, C1340,C1449,C1560,C1575,C1576, C1602,C1603,C1604,C1605	CAPN_603-1000PF	TDK CORPORATION OF AMERICA	C1608X7R1H102K T009A
10	C632,C633,C634,C639,C640,C641, C1505,C1559,C1562,C1565	CAPN_603-100PF	MURATA ELEC. NORTH AMERICA	GRM39C0G101J05 0AJ
1	C1626	CAPN_603-1500PF	AVX	06033C152KAT2A

Table 35. Bill of Materials (Sheet 6 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
1	C618	CAPN_603-15PF	TDK CORPORATION OF AMERICA	C1608C0G1H150J T009A
17	C1244,C1245,C1246,C1247,C1248, C1249,C1250,C1251,C1252,C1253, C1254,C1255,C1256,C1257,C1258, C1259,C1260	CAPN_603-180PF	KEMET	C0603C180K5GAC 9045
1	C512	CAPN_603-2200PF	TDK CORPORATION OF AMERICA	C1608X7R1H222K T009A
16	C534,C535,C536,C537,C538,C539, C540,C541,C1261,C1262,C1263, C1264,C1265,C1266,C1267,C1268	CAPN_603-220PF	A V X CERAMICS CORP	06035C221KAT4A
2	C1270,C1271	CAPN_603-22PF	A V X CERAMICS CORP	06035A220JAT4A
0	C599,C600	CAPN_603-22PF		
4	C1509,C1510,C1511,C1512	CAPN_603-3300PF	KEMET	C0603C332K5RAC 9045
2	C645,C1563	CAPN_603-330PF	A V X CERAMICS CORP	06035C331KAT4A
8	C628,C629,C1240,C1241,C1448, C1451,C1452,C1453	CAPN_603-470PF	MURATA ELEC. NORTH AMERICA	GRM39C0G471J05 0AJ
14	C69,C70,C71,C76,C77,C622,C623, C624,C644,C1561,C1593,C1594, C1595,C1596	CAPN_603-47PF	A V X CERAMICS CORP	06035A470KAT4A
3	C1532,C1533,C1534	CAPN_603-56PF	A V X CERAMICS CORP	06035A560JAT4
4	C909,C910,C911,C912	CAPN_805-.01UF	TDK CORPORATION OF AMERICA	C2012X7R1H103K T009N
4	C1043,C1044,C1055,C1056	CAPN_805-.01UF	A V X CERAMICS CORP	08055C103KAT4A
6	C454,C1129,C1130,C1131,C1132, C1133	CAPN_805-.1UF	TDK CORPORATION OF AMERICA	C2012X7R1H104K T009N
57	C451,C452,C453,C713,C714,C715, C716,C717,C718,C719,C720,C721, C722,C723,C724,C725,C726,C727, C905,C906,C907,C908,C913,C914, C915,C916,C1041,C1042,C1053, C1054,C1081,C1085,C1086,C1089, C1090,C1091,C1093,C1094,C1095, C1096,C1097,C1098,C1099,C1100, C1101,C1106,C1107,C1108,C1110, C1111,C1125,C1126,C1548,C1549, C1550,C1552,C1553	CAPN_805-.1UF	TDK CORPORATION OF AMERICA	C2012X7R1H104M T0S9N
2	C1127,C1128	CAPN_805-.47UF	TDK CORPORATION OF AMERICA	C2012X7R1C474K T0S9N

Table 35. Bill of Materials (Sheet 7 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
64	C41,C42,C43,C44,C45,C46,C47,C48, C49,C50,C51,C52,C53,C54,C55,C56, C65,C66,C67,C68,C303,C304,C335, C346,C456,C457,C458,C459,C527, C528,C882,C904,C1045,C1046, C1047,C1048,C1049,C1050,C1051, C1052,C1057,C1058,C1059,C1060, C1061,C1062,C1063,C1064,C1078, C1079,C1080,C1112,C1113,C1114, C1115,C1124,C1134,C1135,C1136, C1137,C1506,C1547,C1551,C1554	CAPN_805-1.0UF	MURATA ELEC. NORTH AMERICA	GRM40X7R105K016AK
4	C1571,C1572,C1573,C1574	CAPN_805-1UF	KEMET	C0805C105K8RAC9045
1	C455	CAPN_805-22PF	AVX	08055A220JAT4A
1	J10	CON2XUSB_TH-642575-125	FOXCONN ELECTRONICS, INC.	UB11123-5D1
6	J1,J2,J3,J5,J7,J9	CONN,CEDG,184P,DIMM,VT,0.05,062ST	FCI BERG	55635-23302
1	J101	CONN22_WTX_TH-A84969-001	MOLEX	39-29-9222
1	J100	CONN24_WTX_MAIN_TH-650520-012	MOLEX	39-29-9242
1	J102	CONN8_WTX_DIG_TH-650520-008	MOLEX	39-29-9082
1	J71	HDR,2X15,SMT,0.100 PITCH	TYCO ELECTRONICS CORPORATION	1-146134-4
1	J11	CONPCI_TH-201082-060	FOXCONN ELECTRONICS	EH06011-PC-W
1	J29	CONVGAEDGE_TH-648546-003	FOXCONN ELECTRONICS	DZ11A36-R9
1	Y2	CRYSTAL_SM-630770-003	RALTRON	630770-003
1	Y3	XTAL,HC49S,25.0000,MHZ,20,PF,0.005%,SM	RALTRON	630770-011
4	CR4,CR7,CR26,CR79	DIODE_SM-201375-601	SEMICONDUCTOR COMPONENTS INDUSTRIE	MBRS130T3
1	CR8	DIODE_SM-201593-002	ITT SEMI	1N4148W
1	CR45	DIODE_SOT23-101350-601	ON SEMI	MMBD914LT1
5	CR3,CR5,CR6,CR78,CR80	DIODE_SOT23-693508-001	CENTRAL SEMICONDUCTOR CORP	CMPSH-3
2	CR46,CR47	DIODPAK_DPAK-201473-601	SEMICONDUCTOR COMPONENTS INDUSTRIES LLC	MBRD320T4

Table 35. Bill of Materials (Sheet 8 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
4	CR37,CR38,CR39,CR40	DIOSOT23C_SOT23C-BAT54C	PHILLIPS	BAT54C235
3	CR1,CR2,CR72	DIOSOT23C_SOT23C-BAV70LT1	PHILIPS COMPONENTS	BAV70
5	CR49,CR50,CR51,CR52,CR53	DIOSOT23S_SOT23S-202178-001	PHILIPS COMPONENTS	BAT54S
6	U93,U94,U95,U96,U97,U98	DS2119M_SSOP-714435-001	DALLAS SEMICONDUCTOR CORP.	DS2119MET&R
1	J31	DSUB25TALL_B_TH-3MT-DSUB	FOXCONN ELECTRONICS	DM11356-R1
1	J35	DSUB9_TH-2MT-302921-001	FOXCONN ELECTRONICS	DT10126-R9
1	U66	ASSY,IC,CHIPSETS,RG,N/A,82861,A,3,QC47	INTEL	RG82861 QC47
1	U8	EPM7064_PLCC-644134-201	ALTERA CORPORATION	EPM7064LC44-7
1	FB17	FBPAK4L_SM-657300-001	TDK CORPORATION OF AMERICA	ACA3216M4-120-TL
8	Q22,Q23,Q25,Q27,Q56,Q57,Q58,Q59	IC,DS,FET N,TO-263,SUB70N03-0	VISHAY	SUP70N03-09BP
2	FB4,FB5	FERRITE_SM-651080-003	MURATA ELEC. NORTHAMERICA	BLM21P300SPT1
7	FB6,FB7,FB8,FB9,FB10,FB30,FB31	FER-BEAD,0805,600.0 mOHM,2.0 A,	MURATA	BLM31A700S
5	FB13,FB14,FB15,FB16,FB18	FERR_BD_SM-651080-002	MURATA ELEC. NORTH AMERICA	BLM31P500SPT1
6	FB1,FB2,FB3,FB27,FB28,FB29	FERR_BD_SM-693286-001	MURATA ELEC. NORTH AMERICA	BLM11P600SPT1
1	Q55	FET_SOT23-201924-001	DIODES INC/ LITEON POWER SEMI	BS870
1	Q54	FET_SOT23-665805-001	FAIRCHILD SEMICONDUCTOR CORP	BSS138
2	RT3,RT4	POLYSWITCH,SMT,2.600A	Raychem	SMD260-2
1	U69	FWH_8M_PLCC-723644-016	INTEL CORP	N82802AC8SB48
1	U61	GD75232S_SSOP-621111-103_A	TEXAS INSTRUMENT	GD75232DBR
1	U65	XFMR LAN,1000 BASE T,SMT,24 Pins,SINGLE	PULSE	H5007
1	U55	IC,LIN,SOIC,HIP6301,CONTROLR	INTERSIL	HIP6301CB-TS2568
4	U48,U49,U50,U51	IC,LIN,SOIC,HIP6601,CNTRLR	INTERSIL	H1P6601BECB
1	U45	ASSY,IC,CHIPSETS,FW,N/A,82801CA,B,2,360>	INTEL CORP	FW82801CA QC43

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Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
1	U60	IC,CLK_GEN,56,SSOP,GNRTR	ICS	ICS932S203AF
2	L20,L21	INDUCTOR_SM-201005-501	MURATA ELEC. NORTHAMERICA	LQG21NR10K10T2
6	L2,L3,L4,L5,L6,L9	INDUCTOR_SM-721891-008	MURATA ELEC. NORTH AMERICA	LQG21N4R7K10T2
4	L7,L8,L12,L22	CHOKE,COIL,PWR,1.0OUH,	PANASONIC INDUSTRIAL INC.	ETQP6F1R2HFA
1	L19	INDCT,54.00 nH,920.000 mA,10.00%,1206	MURATA	LQH31HN54NK01
1	L17	INDUCTOR_TH-UNKNOWN	VITEC	55P9323
4	L13,L14,L15,L16	INDUCTOR_TH-UNKNOWN70	VITEC	55P9263
1	L18	INDUCTOR_UP4-UNKNOWN	COILTRONICS	UP4-1R5
2	U2,U119	IC,LIN,DDPAK,LT1587,VREG	LINEAR	LT1587CM-1.5
2	U9,U10	LED_DISPLAY_10P_TH-717483-001	HEWLETT PACKARDCOMP.	HEWLETT - HDSP-7803
2	CR9,CR68	LED_SM-716805-001	STANLEY ELECTRIC SALES OF AMERICA	PG1112H-CR
2	CR10,CR81	LED_SM-716805-002	STANLEY ELECTRIC SALES OF AMERICA	AA1112H-TR
1	U103	IC,AMPL,DUAL,LOW PWR,	NATIONAL	LM2904M
1	U56	LPC47B27_PQFP-724051-001	STANDARD MICROSYSTEMS CORP.	LPC47B272 or LPC47B272QFP
1	U84	IC,LIN,SOT-223,LT1118CS8-2,SW	LINEAR	LT1118CS8
1	U18	IC,LIN,SOT23,LT1761ES5-1,VREG	LINEAR	LT1761ES5-1.8
1	U83	IC,LIN,DPAK,LT1764EQ,VREG	LINEAR	LT1764EQ
1	U59	IC,PWR,TRPL SPLY,LT1326CMS8	LINEAR	LTC1326CMS8
2	U44,U115	IC,RGLTR,SW,LTC1735CS-1,SO16	LINEAR	LTC1735CS-1
1	U1	LTC1929_SSOP-UNKNOWN	LINEAR TECHNOLOGY	LTC1929CG-PG
6	Q32,Q33,Q53,Q60,Q65,U12	MBT3904DUAL_SOT-710127-001	SEMICONDUCTOR COMPONENTS INDUSTRIE	MBT3904DW1T1
3	Q11,Q12,Q20	MGSF1N02LT1_SOT23-673755-001	SEMICONDUCTOR COMPONENTS INDUSTRIES LLC	MGSF1N02LT1

Table 35. Bill of Materials (Sheet 10 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
2	Q43,Q44	IC,MOSFET,SOIC-8,30V,N-CHNL	FAIRCHILD	FDS6690S
12	Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q49,Q50	IC,DS,FET N,SO8,FDS7760A	FAIRCHILD	FDS7760A
0	MH1,MH2,MH3,MH4,MH5,MH6,MH7,MH8,MH9,MH10,MH11	MTG_HOLE_TH-MTG_SPOKE_PKG		
2	U7,U11	IC,LIN,TEMP SENSE,QSOP,NE1617A	PHILLIPS	NE1617A
4	Q41,Q48,Q66,Q67	NPN_SOT23-108969-001	PHILIPS COMPONENTS	PMBT3904
1	U76	OSC,CX0,4,SMD 80.000MHZ,100PPM,3.3V,CMO>	NEL FREQUENCY CONTROLS	SJ-A2920-80.000M
2	U14,U15	ASSY,IC,CHIPSETS,RG,N/A,82870P2,B,0,SL6>	INTEL	82870P2
5	J20,J21,J23,J24,J25	PCI_X_3V_TH-201082-292	TYCO ELECTRONICS CORPORATION	145168-2
1	J12	PCI_X_VXB_TH-201082-573	FOXCONN	EH0C107-3B
2	POT1,POT2	POT_TC03_SM-UNKNOWN		
1	J40	PS2STACK_TH-201377-001	TYCO ELECTRONICS CORPORATION	84405-1
1	Q68	IC,DS,PNP XSTR,SOT223,PZT751T1	SEMICONDUCTOR COMPONENTS INDUSTRIE	PZT751T1
3	U3,U16,U17	QS3384_SOIC-UNKNOWN	IDT	IDTQS3384Q
1	U104	IC,FAN,80KHZ-1MHZ,20P,SOIC	FAIRCHILD	FAN5066
4	R736,R737,R738,R739	RESN_1206-2.2	VISHAY	CRCW12062R2JRT5
1	R454	RESN_1206-4.02	VISHAY	CRCW12064R02J
0	R427,R428	RESN_1206-4.7,5%,1206,E	VISHAY- DALE ELECTRONICS INC	CRCW12064R7JRT5
1	R814	RESN_2010-.01	IRC	LR2010-01-R010-F
1	R457	RES D,2512,5.00 mOHM,5.00%,1W,METFLM	VISHAY	WSL2512R005JR86
44	R60,R63,R89,R96, R117,R124, R125,R127,R254,R271,R272,R277, R278,R329,R330,R336,R337,R342, R343,R433,R434,R435,R436,R458, R478,R673,R674,R675,R676,R768, R770,R771,R815,R920,R929,R956, R957,R962,R963,R976,R2001,R2002,R2003,R2005	RESN_603-0	A V X CERAMICS CORP	CJ10-000-K
0	R163,R176,R194	RESN_603-0	A V X CERAMICS CORP	CJ10-000-K

Table 35. Bill of Materials (Sheet 11 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
0	R961	RESN_603-0	A V X CERAMICS CORP	CJ10-000-K
3	R474,R763,R764	RESN_603-1	KOA SPEER ELECTRONICS	RM73B1JTDD1R0J
2	R692,R695	RES D,0603,1.05K,1%	VISHAY-DALE	CRCW06031R053FRT5
1	R85	RESN_603-1.5K	ROHM CORPORATION	MCR03EZ$J#152
3	R421,R460,R817	RESN_603-10	ROHM CORPORATION	MCR03EZ$J#100
1	R98	RESN_603-100	ROHM CORPORATION	MCR03EZ$F#1000
15	R273,R279,R331,R338,R344,R350,R404,R430,R472,R651,R679,R740,R759,R1020,R1036	RESN_603-100	A V X CERAMICS CORP	CR10-101J-K
2	R653,R801	RESN_603-100K	ROHM CORPORATION	MCR03EZ$J#104
0	R930,R931	RESN_603-10K		
8	R144,R145,R199,R213,R368,R748,R749,R1044	RESN_603-10K	A V X CERAMICS CORP	CR10-1002F-K
0	R123,R204,R371,R917,R1004	RESN_603-10K		
63	R57,R59,R174,R216,R353,R354,R355,R375,R378,R381,R382,R385,R386,R389,R405,R422,R431,R468,R469,R470,R482,R489,R530,R531,R534,R535,R538,R539,R569,R570,R571,R572,R574,R646,R714,R747,R752,R765,R766,R790,R792,R793,R794,R799,R800,R803,R804,R805,R934,R940,R1007,R1008,R1009,R1010,R1021,R1022,R1029,R1030,R1031,R1035,R1038,R1039,R2015	RESN_603-10K	A V X CERAMICS CORP	CR10-103J-K
0	R537,R650	RESN_603-10K	A V X CERAMICS CORP	CR10-103J-K
2	R376,R377	RESN_603-10M	ROHM CORPORATION	MCR03EZ$J#106
2	R522,R525	RESN_603-13K	ROHM CORPORATION	MCR03EZ$F#1302
4	R83,R84,R93,R94	RESN_603-150	A V X CERAMICS CORP	CR10-1500F-K
1	R423	RESN_603-17.4K	ROHM CORPORATION	MCR03EZ$F#1742
1	R374	RES D,0603,18.20 OHM,1.00%,1/16W	AVX	CR10-18R2F-K
6	R452,R693,R694,R936,R948,R1047	RESN_603-1K	ROHM CORPORATION	MCR03EZ$F#1001

Table 35. Bill of Materials (Sheet 12 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
71	R9,R12,R16,R41,R42,R82,R116,R149, R150,R182,R183,R187,R188,R214, R217,R220,R221,R222,R223,R230, R231,R234,R235,R237,R238,R239, R242,R244,R245,R246,R247,R274, R276,R280,R281,R379,R380,R383, R466,R467,R483,R488,R491,R497, R520,R532,R559,R562,R649,R650, R652,R659,R662,R688,R689,R700, R709,R773,R774,R832,R835,R900, R908,R909,R910,R937,R938,R960, R1019,R1037,R1040	RESN_603-1K	A V X CERAMICS CORP	CR06J102TR
0	R13,R14,R15,R17,R18,R19,R20,R21, R32,R38,R39,R40,R43,R44,R181, R184,R207,R252,R253,R677,R921, R922	RESN_603-1K		
3	R429,R455,R813	RESN_603-1M	ROHM CORPORATION	MCR03EZ$J#105
4	R398,R399,R400,R401	RESN_603-2.2K	ROHM CORPORATION	MCR03EZ$J#222
1	R658	RESN_603-2.49K	ROHM CORPORATION	MCR03EZ$F#2491
2	R560,R678	RESN_603-2.7K	ROHM CORPORATION	MCR03EZ$J#272
9	R70,R71,R72,R73,R74,R75,R76,R838,R1026	RESN_603-200	ROHM CORPORATION	MCR03EZ$J#201
4	R702,R708,R1016,R1017	RESN_603-20K	ROHM CORPORATION	MCR03EZ$J#203
6	R551,R552,R899,R958,R2006,R2008	RESN_603-22	ROHM CORPORATION	MCR03EZ$J#220
2	R2013,R2014	RESN_603-220	A V X CERAMICS CORP	CR10-221J-K
4	R232,R257,R357,R361	RES D,0603,261OHM,1%	VISHAY	CRCW0603261FRT5
2	R226,R229	RESN_603-22K	ROHM CORPORATION	MCR03EZ$J#223
10	R90,R91,R100,R105,R107,R111, R212,R215,R660,R664	RESN_603-24.9	A V X CERAMICS CORP	AVX-CR10-24R9F
0	R212,R215	RESN_603-24.9		
1	R88	RESN_603-27.4	A V X CERAMICS CORP	CR10-27R4F-K
1	R1014	RESN_603-3.74K	ROHM CORPORATION	MCR03EZ$F#3741
6	R492,R512,R661,R663,R830,R831	RESN_603-300	A V X CERAMICS CORP	CR10-301J-K
3	R28,R92,R95	RESN_603-301	A V X CERAMICS CORP	CR10-3010F-K

Table 35. Bill of Materials (Sheet 13 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
32	R33,R255,R387,R397,R540,R541, R542,R543,R544,R553,R586,R587, R588,R589,R680,R755,R756,R949, R951,R952,R953,R954,R955,R959, R996,R997,R998,R999,R1000,R1001, R1002,R1003	RESN_603-33	ROHM CORPORATION	MCR03EZ$J#330
5	R224,R256,R648,R735,R935	RESN_603-330	ROHM CORPORATION	MCR03EZ$J#331
4	R393,R394,R459,R816	RESN_603-33K	ROHM CORPORATION	MCR03EZ$J#333
1	R1015	RESN_603-340K	ROHM CORPORATION	MCR03EZ$F#3403
4	R102,R104,R109,R114	RESN_603-392	A V X CERAMICS CORP	CR10-3920F-K
4	R820,R821,R822,R823	RESN_603-4.3K	ROHM CORPORATION	MCR03EZ$J#432
2	R750,R751	RESN_603-4.7	A V X CERAMICS CORP	CR10-4R7J-K
0	R797	RESN_603-4.7		
39	R369,R384,R390,R471,R475,R485, R486,R487,R490,R494,R495,R496, R499,R682,R683,R697,R704,R757, R758,R760,R761,R772,R775,R776, R777,R778,R779,R780,R781,R782, R788,R789,R1011,R1018,R1032, R1033,R2000,R2010,R2011	RESN_603-4.7K	ROHM CORPORATION	MCR03EZ$J#472
0	R684,R685	RESN_603-4.7K		
1	R681	RESN_603-4.99K	A V X CERAMICS CORP	CR10-4991F-K
2	R202,R818	RESN_603-402	VISHAY-DALE	CRCW0603402FRT5
5	R894,R895,R896,R897,R898	RESN_603-43	A V X CERAMICS CORP	CR10-430J-K
4	R99,R106,R110,R112	RESN_603-453	A V X CERAMICS CORP	CR10-4530F-K
10	R266,R267,R484,R493,R509,R511, R824,R828,R913,R2012	RESN_603-470	ROHM CORPORATION	MCR03EZ$J#471
1	R536	RESN_603-475	ROHM CORPORATION	MCR03EZ$F#4750
1	R479	RESN_603-47K	ROHM CORPORATION	MCR03EZ$J#473
40	R1,R2,R3,R4,R5,R6,R30, R34,R55,R58,R62,R65,R67,R69,R97, R148,R185,R521,R528,R545,R546, R547,R548,R549,R550,R665,R666, R667,R668,R669,R670,R671,R672, R753,R754,R841,R843,R1025,R3125,R3157	RESN_603-49.9	ROHM CORPORATION	MCR03EZ$F#49R9
0	R147,R186	RESN_603-49.9		

Table 35. Bill of Materials (Sheet 14 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
4	R101,R103,R108,R113	RESN_603-499	A V X CERAMICS CORP	CR10-4990F-K
12	R270,R275,R965,R966,R967,R968, R969,R970,R971,R972,R973,R974	RESN_603-5.6K	ROHM CORPORATION	MCR03EZ$J#562
30	R7,R22,R23,R24,R25,R26,R27,R29 , R35,R46,R48,R49,R52,R53,R77, R78,R79,R80,R81,R248,R249, R250,R251,R1012,R1013,R1023, R1024,R1027,R1028,R1090	RESN_603-51	A V X CERAMICS CORP	CR10-510J-K
1	R473	RESN_603-510	ROHM CORPORATION	MCR03EZ$J#511
4	R8,R10,R261,R510	RESN_603-56	A V X CERAMICS CORP	CR10-560J-K
1	R529	RESN_603-6.04K	ROHM CORPORATION	MCR03EZ$F#6041
2	R523,R526	RESN_603-6.98K	PANASONIC INDUSTRIAL	ERJ3EKF6981A
0	R396	RESN_603-68		
2	R11,R939	RESN_603-680	A V X CERAMICS CORP	CR10-681J-K
2	R392,R395	RESN_603-68K	ROHM CORPORATION	MCR03EZ$J#683
4	R86,R461,R462,R463	RESN_603-75	A V X CERAMICS CORP	CR10-75R0F-K
0	R84	RESN_603-75	A V X CERAMICS CORP	CR10-75R0F-K
1	R477	RESN_603-75K	ROHM CORPORATION	MCR03EZ$J#753
2	R208,R258	RESN_603-78.7	AVX	CR10-61R9F-K
1	R424	RESN_603-8.06K	ROHM CORPORATION	MCR03EZ$F#8061
4	R932,R933,R978,R1053	RESN_603-8.2K	KOA SPEER ELECTRONICS	RK73H1JTDD8201 F
53	R128,R129,R133,R137,R138, R142,R146,R152,R154,R160,R165, R167,R169,R171,R173,R178,R189, R190,R197,R200,R201,R205,R206, R211,R218,R219,R225,R227,R228, R233,R236,R241,R243,R262,R263, R264,R265,R359,R360,R362,R565, R568,R576,R578,R798,R977,R1005 , R1006,R1042,R1043,R3079,R3148, R3799	RESN_603-8.2K	ROHM CORPORATION	MCR03EZ$J#822
0	R130,R131,R132,R139,R140,R141, R153,R155,R166,R168,R170,R172, R177,R179,R191,R195,R196, R268	RESN_603-8.2K		
2	R453,R819	RESN_603-806	VISHAY-DALE	CRCW06038060FR T5
2	R210,R260	RESN_603-825	AVX	CR10-7500F-K

Table 35. Bill of Materials (Sheet 15 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
8	R500,R501,R502,R503,R504,R505,R506,R507	RESN_805-330	ROHM CORPORATION	MCR10&ZH$J*331
1	R476	RES 7.68K OHM 1/10W 1% 0805 SMD	PANASONIC	ERJ-6ENF7681V
0	R151	RESN_SM-.002		
2	R425,R426	RES D,2512,2.00 mOHM,5.00%,1W,METFLM	VISHAY-DALE	WSL2512R002JR86
0	R481	RES_603-2K,5%,603,E	A V X CERAMICS CORP	CR10-202J-K
0	R480	RES_603-330,5%,603,E	A V X CERAMICS CORP	CR10-331J-K
0	R11	RES_603-620	ROHM CORPORATION	MCR03EZ$J#621
1	J39	RJ45_JACK_TH-514215-005	TYCO ELECTRONICS CORPORATION	406549-4
0	RP273	RPAK4C-4R_SM-0	ROHM CORPORATION	MNR14E0ABJ000
4	RP205,RP274,RP275,RP282	RPAK4C-4R_SM-1.0K	KOA SPEER ELECTRONICS	CNK1J4TDD102J
46	RP13,RP14,RP15,RP16,RP17,RP18,RP19,RP20,RP21,RP22,RP23,RP24,RP25,RP26,RP27,RP28,RP29,RP30,RP31,RP32,RP33,RP34,RP35,RP66,RP67,RP68,RP69,RP70,RP71,RP72,RP73,RP74,RP75,RP76,RP77,RP78,RP79,RP80,RP81,RP82,RP83,RP84,RP85,RP86,RP87,RP88	RPAK4C-4R_SM-10	KOA SPEER ELECTRONICS	CNK1J4TDD100J
1	RP276	RPAK4C-4R_SM-100	ROHM CORPORATION	MNR14$OABJ101
1	RP197	RPAK4C-4R_SM-10K	KOA SPEER ELECTRONICS	CNK1J4TDD103J
5	RP206,RP208,RP211,RP212,RP283	RPAK4C-4R_SM-2.7K	KOA SPEER ELECTRONICS	CNK1J4TDD272J
59	RP213,RP214,RP215,RP216,RP217,RP218,RP219,RP220,RP221,RP222,RP223,RP224,RP225,RP226,RP227,RP228,RP229,RP230,RP231,RP232,RP233,RP234,RP235,RP236,RP237,RP238,RP239,RP240,RP241,RP242,RP243,RP244,RP245,RP246,RP247,RP248,RP249,RP250,RP251,RP252,RP253,RP254,RP255,RP256,RP257,RP258,RP259,RP260,RP261,RP262,RP263,RP264,RP265,RP266,RP267,RP268,RP269,RP270,RP271	33 ohm_ 1206__ 2%_ Resistor Network	PANASONIC	EXB-V8V330GV___
3	RP207,RP209,RP210	RPAK4C-4R_SM-33	KOA SPEER ELECTRONICS	CNK1J4TDD330J
3	RP280,RP288,RP289	RPAK4C-4R_SM-4.7K	KOA SPEER ELECTRONICS	CNK1J4TDD472J

Table 35. Bill of Materials (Sheet 16 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
3	RP119,RP196,RP204	RPAK4C-4R_SM-5.6K	KOA SPEER ELECTRONICS	CNK1J4TDD562J
1	RP277	RES A,1206,680.00 OHM,5.00%,1/4W,RPAK-S>	KOA	CNK1J4TDD681J
1	RP279	RPAK4C-4R_SM-75	ROHM CORPORATION	MNR14$OABJ750
71	RP9,RP10,RP120,RP121,RP122, RP123,RP124,RP125,RP126,RP127, RP128,RP129,RP130,RP131,RP132, RP133,RP134,RP135,RP136,RP137, RP138,RP140,RP141,RP142,RP144, RP145,RP146,RP147,RP148,RP149, RP150,RP153,RP154,RP155,RP156, RP157,RP158,RP159,RP160,RP161, RP162,RP163,RP164,RP165,RP166, RP167,RP168,RP169,RP170,RP171, RP172,RP173,RP174,RP175,RP176, RP177,RP178,RP179,RP180,RP181, RP182,RP183,RP184,RP185,RP186, RP198,RP199,RP200,RP201,RP202, RP203	RPAK4C-4R_SM-8.2K	KOA SPEER ELECTRONICS	CNK1J4TDD822J
1	CR74	SCHOTTKY_SM-UNKNOWN1	ON SEMI	MBR0530IT1
1	SP1	SPKR_TH-201826-001	CHALLENGE ELECTRONICS	DBX-05A
3	S8,S9,SW1	SWSPST_PB_SM_SM-672681-002	E-SWITCH	TL3304AF160QJ
2	RT1,RT2	POLYSWITCH,SMT,2.600A	LITTELFUSE INC	1812L260MR
1	RT5	THERMISTOR_1812-657448-003	RAYCHEM CORPORATION	MINISMDC110-2
2	U70,U71	TLV431A_SM-704239-001	SEMTECH CORPORTION	SC431LC5SK-1TR
2	J17,J18	CONN,SKT,604P,MPGA,0.05,SMT,ZIF	TYCO ELECTRONICS CORPORATION	1489691-1
1	Y1	XTAL4P_SM-619601-001	RALTRON	619601-001
2	R209,R259	RES D,0603,332.000OHM,1.00%,1/16W	AVX	CR10-3320F-K
1	R356	RESN_603-78.7	KOA	RK73H1JTDD78R7F

Table 35. Bill of Materials (Sheet 17 of 17)

Quantity	Reference Description	Description	Manufacturer	Manufacturer P/N
8	Q24,Q26,Q28,Q29,Q61,Q62,Q63,Q64	MOSFETN_3PIN_TH-UNKNOWN1	VISHAY	SUP85N03-04P
4	R61,R64,R66,R68	RESN_603-84.5	AVX	CR10-84R5F-K
6	R87,R134,R135,R136,R156,R157	RESN_603-39.2	A V X CERAMICS CORP	CR10-39R2F
4	J1,J2,J7,J9	CONN,MISC,DDR, 184 P,SOCKET,25DEG,062S	MOLEX	87623-0101
1	XU8	SOCKET,44PIN,PLCC	AMP	822275-1
1	R358	RESN_603-825,1%,603	A V X CERAMICS CORP	CR10-8250F-K
0	R115,R120,R524,R527	RESN_603-10	ROHM CORPORATION	MCR03EZ$J#100
0	R841,R843	RES 47 OHM 1/16W .5% 0603 SMD	DIGI - KEY	RR08Q47DCT-ND
0	R2006,R2008	RESN_603-33.2,1%,603	ROHM CORPORATION	MCR03EZ$F#33R2
1	XU69	32-POSITION PLCC SOCKET	AMP	822472-3
1	J13	CONN,HDR,2 X 13,PLG,VT,2MM,SMT,KP 26	FCI (BERG)	61698-302TR
1	U64	IC,EEPROM,SOIC,2.000 MHZ,512X8	ATMEL	AT93C66-10SC-2.7
2	No Ref Des's - Solder down Anchor's for Location U66	CONN,MISC,2 P,HEADER,ANCHOR HOO	FOXCONN ELECTRONICS, INC	HB96030-K

Schematics B

Schematics are provided for the following items listed below. Schematics are available from the Intel Developer's web site at http://developer.intel.com/design/intarch.

- System Block Diagram
- Processor Connector 0
- Processor Connector 1
- Processor Decoupling
- ITP, CPU GTL VREF
- MCH System Bus
- MCH HUB I/F
- MCH Power/Ground
- DDR A Series Resistors
- DDR A DIMMs
- DDR A Term
- DDR B Series Resistors
- DDR B DIMMs
- DDR B Term
- P64H2 #1
- P64H2 #2
- P64H2 #1 PCI Pullups
- P64H2 #2 PCI Pullups
- PCI-X Slots hot plug logic
- PCI-X Slots power control
- Slots A-D hot plug logic
- PCI-X slots power control
- Slots A-D hot plug bus switches
- PCI-X slots 1, 2, A, B, C
- 82808AA - PCI-X Slot D
- ICH3
- ICH3, USB, IDE connectors
- 32-bit PCI slot (debug)
- Video
- Power connectors, VID/VRD control logic

- Voltage regulators, reset control
- CK-408B
- FWH, LPC connector (debug)
- SIO, Legacy I/O
- LAN
- SCSI
- Front panel connector, BMC connector
- SMBus mux logic
- Spare gates, mounting holes

DUAL INTEL® XEON® PROCESSOR / E7501 CHIPSET
EVALUATION KIT BOARD SCHEMATICS
REV B1

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SYSTEM BLOCK DIAGRAM

ITP

604 PIN XEON
PROCESSOR 0

604 PIN XEON
PROCESSOR 1

PCI-X SLOT1
DEVICE A

133MHZ PCI-X

G-BIT LAN
DEVICE A

100MHZ PCI-X

PCI-X SLOT2
DEVICE B

BUS SWITCHES

BUS A
P64H2 #1
BUS B

HI 2.0

DDR DIMM

DDR DIMM

E7501 MCH

SCSI
DEVICE A

133MHZ PCI-X

BUS A
P64H2 #2
BUS B

HI 2.0

HI 2.0

BUS SWITCHES

66MHZ PCI-X

HI 1.5

SMBUS 2.0

PCI-X SLOTS A-D

PCI VIDEO

33MHZ PCI

ICH3

USB PORTS

IDE PORTS

32BIT PCI SLOT
FOR DEBUG ONLY

SMBUS

82808AA CONNECTOR

LPC

SUPER I/O

BMC

FWH

PS2 KEYBD/MOUSE

FLOPPY

SERIAL/PARALLEL

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FSB_A<35..3>_N

FSB_AP0_N
FSB_AP1_N

FSB_DBI<3..0>_N

FSB_DP<3..0>_N

FSB_HREQ<4..0>_N

RESERVED<7>
RESERVED<6>
RESERVED<5>
RESERVED<4>
RESERVED<3>
RESERVED<2>
RESERVED<1>

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CPUVCC

1X2HDR
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CPU1_BCLK1
CPU1_BCLK0
FSB_BPRI_N
FSB_DEFER_N
CPU_BREQ2_3_N
CPU0_BREQ0_N
CPU1_BREQ0_N
CPU1_COMP1
CPU1_COMP0
CPU1_GTL_VREF1
CPU1_GTL_VREF2
CPU1_LINT1_NMI
ICH3_LINT0_INTR
ICH3_IGNNE_N
ICH3_INIT_N
FSB_RS<2..0>_N
CPU1_ODTEN
ICH3_CPUPWRGD
FSB_CPURST_N
CPU1_TESTHI6
CPU1_TESTHI5
CPU1_TESTHI4
CPU1_TESTHI3
CPU1_TESTHI2
CPU1_TESTHI1
CPU1_TESTHI0
ITP_TMS_P
ICH3_A20M_N
FSB_RSP_N
ICH3_CPUSLP_N
CPU1_SMI_N
CPU_STPCLK_N
FSB_HTRDY_N
ITP_TRST_N
ITP_TCK_P
ITP_TDI_P1
ITP_TDO_P1

CAPS CLOSE TO PINS:
F9, W9, F23, W23

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FSB_ADS_N
FSB_ADSTB<1..0>_N
CPU_BPM5_N
CPU_BPM4_N
CPU_BPM3_N
CPU_BPM2_N
CPU_BPM1_N
CPU_BPM0_N
CPU1_BSEL1
CPU1_BSEL0
FSB_DSTBN<3..0>_N
FSB_DSTBP<3..0>_N
CPU1_VID<4..0>
CPU1_VCC_SENSE
CPU1_VSS_SENSE
CPU_FERR_N
CPU_FORCEPR_N
FSB_HIT_N
FSB_HITM_N
FSB_HLOCK_N
FSB_BERR_N
CPU_PROC_HOT_N
CPU1_SKTOCC_N
CPU1_SMB_PRT
CPU1_THRM_DA
CPU1_THRM_DC
CPU_THRM_TRIP_N
FSB_BINIT_N
FSB_BNR_N
FSB_DBSY_N
FSB_DRDY_N

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VCC3

3A U2
LTC1587CM1_5
VID_VCC
1.5V

CPU1_VCCA
CPU1_VSSA
CPU1_VCCIOPLL
CPU1_VCCPLL

CAD NOTE:
CAPS CLOSE TO
PINS: AB4, AD4, AA5, AD1

PROCESSOR 1 SOCKET
("MIDDLE" PROCESSOR)

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PROCESSOR 1 SOCKET

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U6	GND<162>	GND<81>	H4		
U4	GND<161>	GND<80>	H30		
U30	GND<160>	GND<79>	H28		
U28	GND<159>	GND<78>	H26		
U26	GND<158>	GND<77>	H24		
U24	GND<157>	GND<76>	H2		
U2	GND<156>	GND<75>	G9		
T9	GND<155>	GND<74>	G5		
T7	GND<154>	GND<73>	G31		
T5	GND<153>	GND<72>	G3		
T31	GND<152>	GND<71>	G29		
T3	GND<151>	GND<70>	G27		
T29	GND<150>	GND<69>	G25		
T27	GND<149>	GND<68>	G1		
T25	GND<148>	GND<67>	F7		
T23	GND<147>	GND<66>	F30		
T1	GND<146>	GND<65>	F28		
R8	GND<145>	GND<64>	F25		
R6	GND<144>	GND<63>	F2		
R4	GND<143>	GND<62>	F19		
R30	GND<142>	GND<61>	F13		
R28	GND<141>	GND<60>	E9		
R26	GND<140>	GND<59>	E31		
R24	GND<139>	GND<58>	E29		
R2	GND<138>	GND<57>	E23		
P9	GND<137>	GND<56>	E17		
P7	GND<136>	GND<55>	E15		
P5	GND<135>	GND<54>	E1		
P31	GND<134>	GND<53>	D5		
P3	GND<133>	GND<52>	D30		
P29	GND<132>	GND<51>	D28		
P27	GND<131>	GND<50>	D27		
P25	GND<130>	GND<49>	D21		
P23	GND<129>	GND<48>	D2		
P1	GND<128>	GND<47>	D11		
N8	GND<127>	GND<46>	C7		
N6	GND<126>	GND<45>	C31		
N4	GND<125>	GND<44>	C29		
N30	GND<124>	GND<43>	C25		
N28	GND<123>	GND<42>	C19		
N26	GND<122>	GND<41>	C13		
N24	GND<121>	GND<40>	B9		
N2	GND<120>	GND<39>	B30		
M8	GND<119>	GND<38>	B28		
M6	GND<118>	GND<37>	B23		
M4	GND<117>	GND<36>	B2		
M30	GND<116>	GND<35>	B17		
M28	GND<115>	GND<34>	B15		
M26	GND<114>	GND<33>	AE27		
M24	GND<113>	GND<32>	AE21		
M2	GND<112>	GND<31>	AE2		
L9	GND<111>	GND<30>	AE11		
L7	GND<110>	GND<29>	AD9		
L5	GND<109>	GND<28>	AD31		
L31	GND<108>	GND<27>	AD3		
L3	GND<107>	GND<26>	AD23		
L29	GND<106>	GND<25>	AD17		
L27	GND<105>	GND<24>	AD15		
L25	GND<104>	GND<23>	AC7		
L23	GND<103>	GND<22>	AC25		
L1	GND<102>	GND<21>	AC2		
K8	GND<101>	GND<20>	AC19		
K6	GND<100>	GND<19>	AC13		
K4	GND<99>	GND<18>	AB5		
K30	GND<98>	GND<17>	AB31		
K28	GND<97>	GND<16>	AB27		
K26	GND<96>	GND<15>	AB21		
K24	GND<95>	GND<14>	AB11		
K2	GND<94>	GND<13>	AB1		
J9	GND<93>	GND<12>	AA9		
J7	GND<92>	GND<11>	AA30		
J5	GND<91>	GND<10>	AA23		
J31	GND<90>	GND<9>	AA2		
J3	GND<89>	GND<8>	AA17		
J29	GND<88>	GND<7>	AA15		
J27	GND<87>	GND<6>	A5		
J25	GND<86>	GND<5>	A31		
J23	GND<85>	GND<4>	A29		
J1	GND<84>	GND<3>	A27		
H8	GND<83>	GND<2>	A21		
H6	GND<82>	GND<1>	A11		

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REV 0.5 SKT

CPUVCC

J17
XEON_604

U5	VCC<162>	VCC<81>	H7
U31	VCC<161>	VCC<80>	H5
U3	VCC<160>	VCC<79>	H31
U29	VCC<159>	VCC<78>	H3
U27	VCC<158>	VCC<77>	H29
U25	VCC<157>	VCC<76>	H27
U23	VCC<156>	VCC<75>	H25
U1	VCC<155>	VCC<74>	H23
T8	VCC<154>	VCC<73>	H1
T6	VCC<153>	VCC<72>	G8
T4	VCC<152>	VCC<71>	G6
T30	VCC<151>	VCC<70>	G4
T28	VCC<150>	VCC<69>	G30
T26	VCC<149>	VCC<68>	G28
T24	VCC<148>	VCC<67>	G26
T2	VCC<147>	VCC<66>	G24
R9	VCC<146>	VCC<65>	G2
R7	VCC<145>	VCC<64>	F4
R5	VCC<144>	VCC<63>	F31
R31	VCC<143>	VCC<62>	F29
R3	VCC<142>	VCC<61>	F22
R29	VCC<141>	VCC<60>	F16
R27	VCC<140>	VCC<59>	F1
R25	VCC<139>	VCC<58>	E6
R23	VCC<138>	VCC<57>	E30
R1	VCC<137>	VCC<56>	E28
P8	VCC<136>	VCC<55>	E26
P6	VCC<135>	VCC<54>	E20
P4	VCC<134>	VCC<53>	E2
P30	VCC<133>	VCC<52>	D8
P28	VCC<132>	VCC<51>	D31
P26	VCC<131>	VCC<50>	D29
P24	VCC<130>	VCC<49>	D24
P2	VCC<129>	VCC<48>	D18
N9	VCC<128>	VCC<47>	D14
N7	VCC<127>	VCC<46>	D1
N5	VCC<126>	VCC<45>	C4
N31	VCC<125>	VCC<44>	C30
N3	VCC<124>	VCC<43>	C28
N29	VCC<123>	VCC<42>	C22
N27	VCC<122>	VCC<41>	C2
N25	VCC<121>	VCC<40>	C16
N23	VCC<120>	VCC<39>	B6
N1	VCC<119>	VCC<38>	B31
M9	VCC<118>	VCC<37>	B29
M7	VCC<117>	VCC<36>	B26
M5	VCC<116>	VCC<35>	B20
M31	VCC<115>	VCC<34>	AE8
M3	VCC<114>	VCC<33>	AE3
M29	VCC<113>	VCC<32>	AE24
M27	VCC<112>	VCC<31>	AE18
M25	VCC<111>	VCC<30>	AE14
M23	VCC<110>	VCC<29>	AD6
M1	VCC<109>	VCC<28>	AD30
L8	VCC<108>	VCC<27>	AD26
L6	VCC<107>	VCC<26>	AD20
L4	VCC<106>	VCC<25>	AD2
L30	VCC<105>	VCC<24>	AC4
L28	VCC<104>	VCC<23>	AC31
L26	VCC<103>	VCC<22>	AC3
L24	VCC<102>	VCC<21>	AC22
L2	VCC<101>	VCC<20>	AC16
K9	VCC<100>	VCC<19>	AB8
K7	VCC<99>	VCC<18>	AB30
K5	VCC<98>	VCC<17>	AB24
K31	VCC<97>	VCC<16>	AB2
K3	VCC<96>	VCC<15>	AB18
K29	VCC<95>	VCC<14>	AB14
K27	VCC<94>	VCC<13>	AA6
K25	VCC<93>	VCC<12>	AA4
K23	VCC<92>	VCC<11>	AA31
K1	VCC<91>	VCC<10>	AA26
J8	VCC<90>	VCC<9>	AA20
J6	VCC<89>	VCC<8>	AA1
J4	VCC<88>	VCC<7>	A8
J30	VCC<87>	VCC<6>	A30
J28	VCC<86>	VCC<5>	A28
J26	VCC<85>	VCC<4>	A24
J24	VCC<84>	VCC<3>	A2
J2	VCC<83>	VCC<2>	A18
H9	VCC<82>	VCC<1>	A14

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REV 0.5 SKT

CPUVCC

R134 39.2
R135 39.2
R136 39.2
R156 39.2
R157 39.2

C69 47PF
C70 47PF
C71 47PF
C75 47PF
C77 47PF

11A6 6A2 4A2 BI FSB_BINIT_N
11A6 6A2 4A2 BI FSB_BNR_N
11A6 6A2 4A2 BI FSB_BERR_N
11A6 6A2 4A2 BI FSB_HIT_N
11D3 6B2 4B2 BI FSB_HITM_N

CPUVCC

J17
XEON_604

Y30	VCC<181>	GND<187>	Y7
Y22	VCC<180>	GND<186>	Y5
Y2	VCC<179>	GND<185>	Y31
Y16	VCC<178>	GND<184>	Y3
W31	VCC<177>	GND<183>	Y25
W29	VCC<176>	GND<182>	Y19
W27	VCC<175>	GND<181>	Y13
W25	VCC<174>	GND<180>	Y1
W1	VCC<173>	GND<179>	W4
V8	VCC<172>	GND<178>	W30
V6	VCC<171>	GND<177>	W28
V4	VCC<170>	GND<176>	W26
V30	VCC<169>	GND<175>	W24
V28	VCC<168>	GND<174>	W2
V26	VCC<167>	GND<173>	V9
V24	VCC<166>	GND<172>	V7
V2	VCC<165>	GND<171>	V5
U9	VCC<164>	GND<170>	V31
U7	VCC<163>	GND<169>	V3
		GND<168>	V29
Y10	VCC/VTT<9>	GND<167>	V27
F10	VCC/VTT<8>	GND<166>	V25
E12	VCC/VTT<7>	GND<165>	V23
C10	VCC/VTT<6>	GND<164>	V1
B12	VCC/VTT<5>	GND<163>	U8
AD12	VCC/VTT<4>		
AC10	VCC/VTT<3>		
AA12	VCC/VTT<2>		
B4	VCC/VTT<1>		

VCC3
1X2HDR J4
785 BI CPU_VID_VCC
AE29 VID_VCC<2>
AE28 VID_VCC<1>
1X2HDR J6
A4 VCC_VID
C5 VCCVIDLB/VTT
R3 49.9 1% 603
C1 OPTIMIZED/COMPAT*

	N/C<10>	Y29
	N/C<9>	AE30
	N/C<8>	AD29 CPU_SMBUS_WP
	N/C<7>	AD28 CPU_SMBALERT_N OUT 781
	N/C<6>	AC29 I2C_BUS2_DAT BI 71A1 72A5 7C3 12C6
	N/C<5>	AC28 I2C_BUS2_CLK BI 7B2 12C6 71A1 72A5 6D3 7C3
	N/C<4>	AB29
	N/C<3>	AB28
	N/C<2>	AA29
	N/C<1>	AA28

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VCC3

R181 1K 5% EMPTY 603
R183 1K 5% CH 603
R182 1K 5% CH 603
R184 1K 5% EMPTY 603

U11
NE1617A

4A2 IN	CPU1_THRM_DA	VCC	TEST<5>
4A2 IN	CPU1_THRM_DC	D+	TEST<4>
		D-	TEST<3>
		ADD1	TEST<2>
		ADD0	TEST<1>
7C3 72A8 71A1 12C6 7B2 5B3 IN	I2C_BUS2_CLK	SCLK	ALERT*
72A5 71A1 12C6 7C3 7B2 5B3 BI	I2C_BUS2_DAT	SDATA	GND<2>
		STBY*	GND<1>

IC

VCC3

Q11 FET
43C6 4A2 IN CPU1_SMB_PRT
R274 1K
R116 1K

R13 1K EMPTY
R21 1K EMPTY
R922 1K 5% 603 EMPTY
R921 1K 5% 603 EMPTY
OUT 782
R19 1K EMPTY
R18 1K EMPTY
R15 1K EMPTY
R14 1K EMPTY
VCC3
R17 1K EMPTY
R16 1K
R12 1K EMPTY
R20 1K EMPTY

SMBUS PARTITION 2
CPU0 THERMAL SENSOR = 32
CPU0 IDROM = A2

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 5	REV

PROCESSOR 0 SOCKET
("END" PROCESSOR)

CAD NOTE:
CAPS CLOSE TO PINS
AB4, AD4, AA5

CAPS CLOSE TO PINS:
F9, W9, F23, W23

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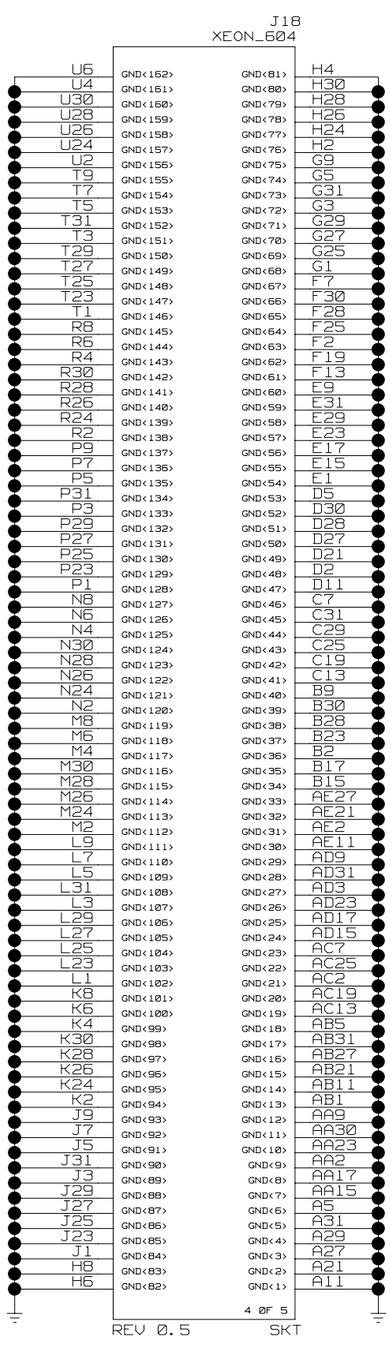
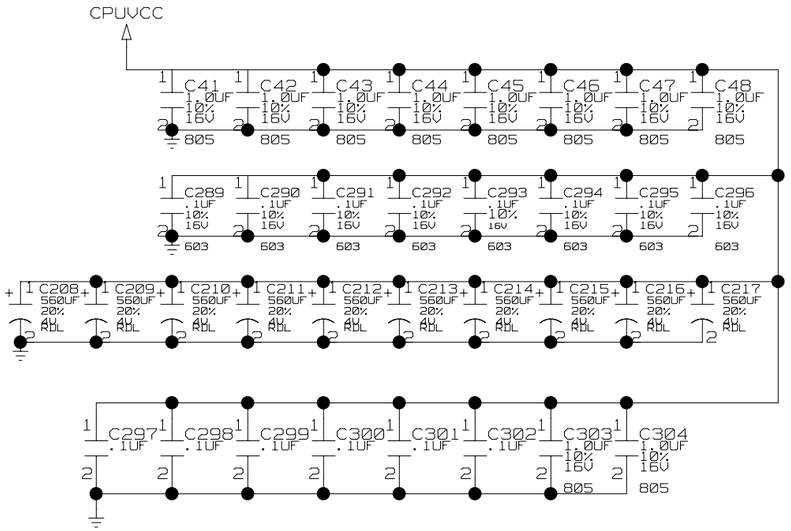
PROCESSOR 0 SOCKET



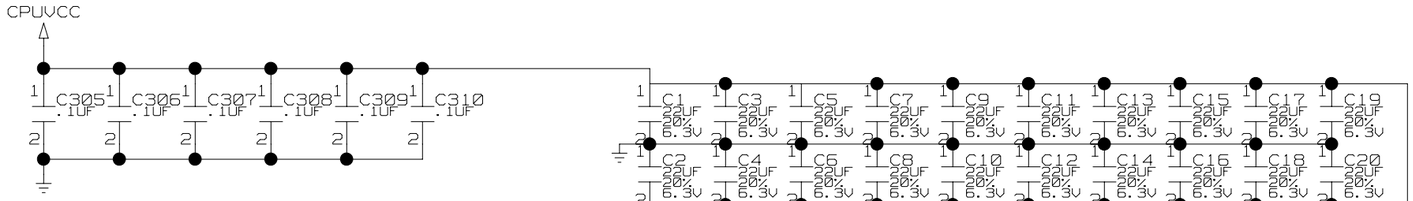
INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 7	REV

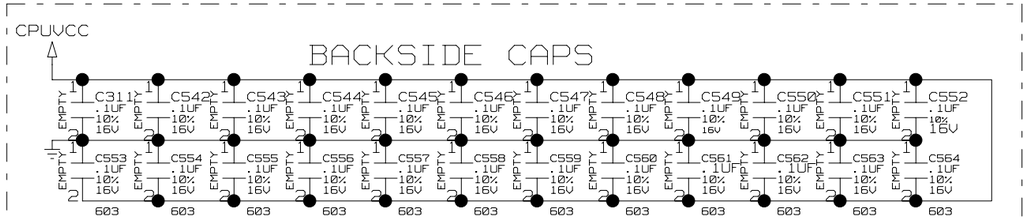
BLANK

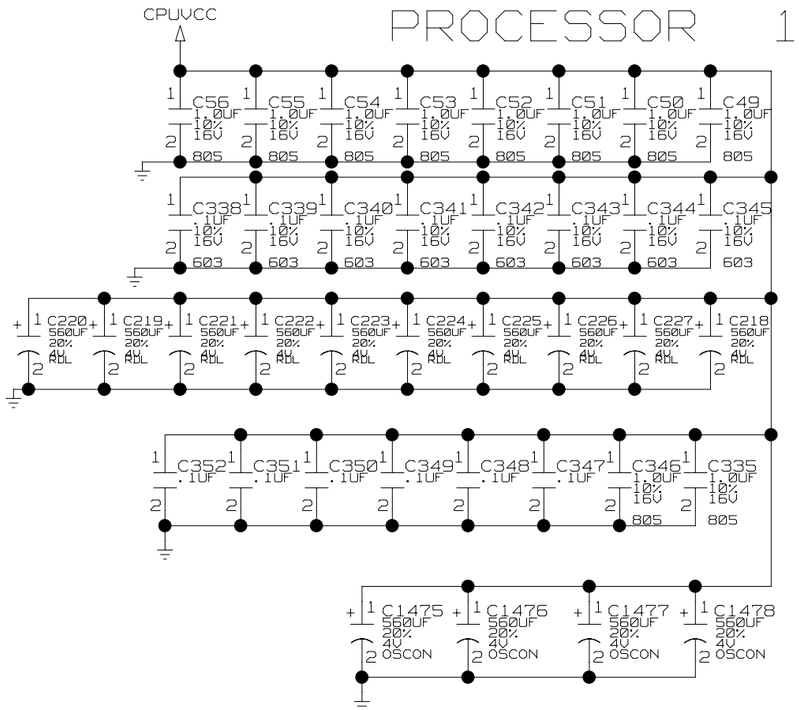
INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 8 / REV



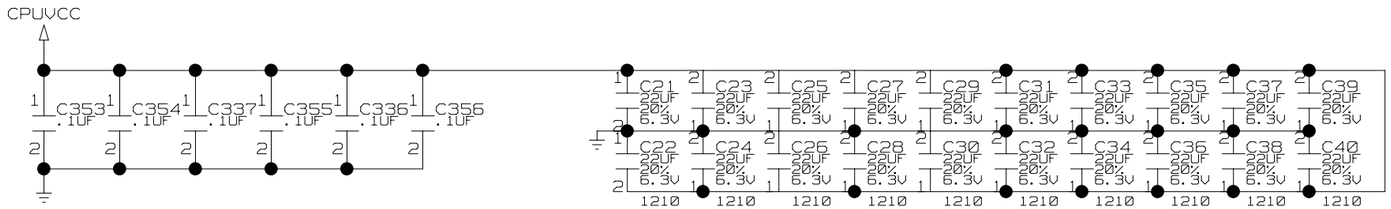
PROCESSOR 0

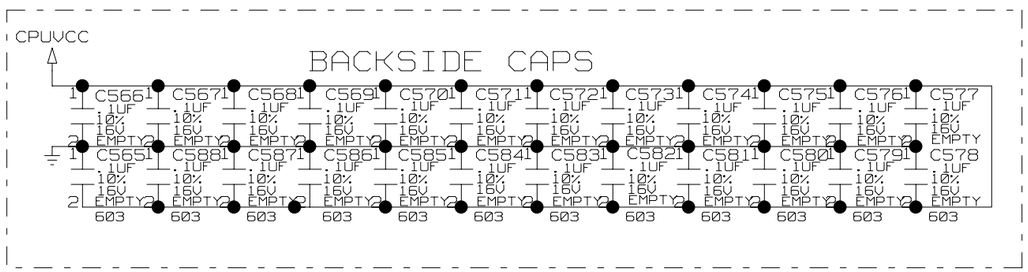






PROCESSOR 1





XEON PROCESSOR 0/1 DECOUPLING

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE	REV
		9	

ITP

J13
ITP32B_TAP

CPU_BPM0_N
CPU_BPM1_N
CPU_BPM2_N
CPU_BPM3_N
CPU_BPM4_N
CPU_BPM5_N
ITP_TCK_P
ITP_BCLK0
ITP_BCLK1

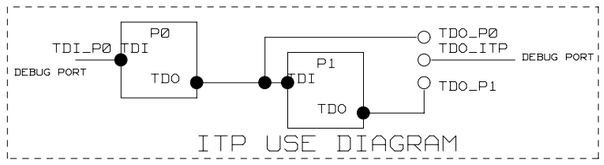
DBR_RESET_N
ITP_TDI_P0
ITP_TMS_P
ITP_TRST_N
ITP_TCK_P
STPPWR

JP3
1X3HDR
ITP_TDO_P1
ITP_TDO_P0
ITP_TDI_P1
1 - 2 = P0 ONLY
2 - 3 = P1 + P2

FSB_CPURST_N
R125
FSB_ITPRST_N
PLACE NEXT TO MCH

CONN

ITP USE DIAGRAM



VREF CIRCUITS FOR GTL+

CPUVCC

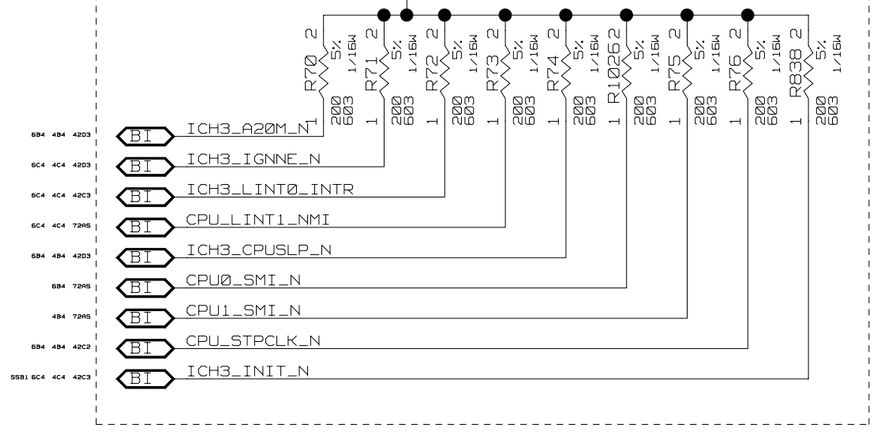
R62 49.9 1%
R61 84.5 1%
R63 0
C67 1.0UF 10% 16V 805
CPU0_GTL_VREF1

R65 49.9 1% 1/16W
R64 84.5 1%
R60 0
C66 1.0UF 10% 16V 805
CPU0_GTL_VREF2

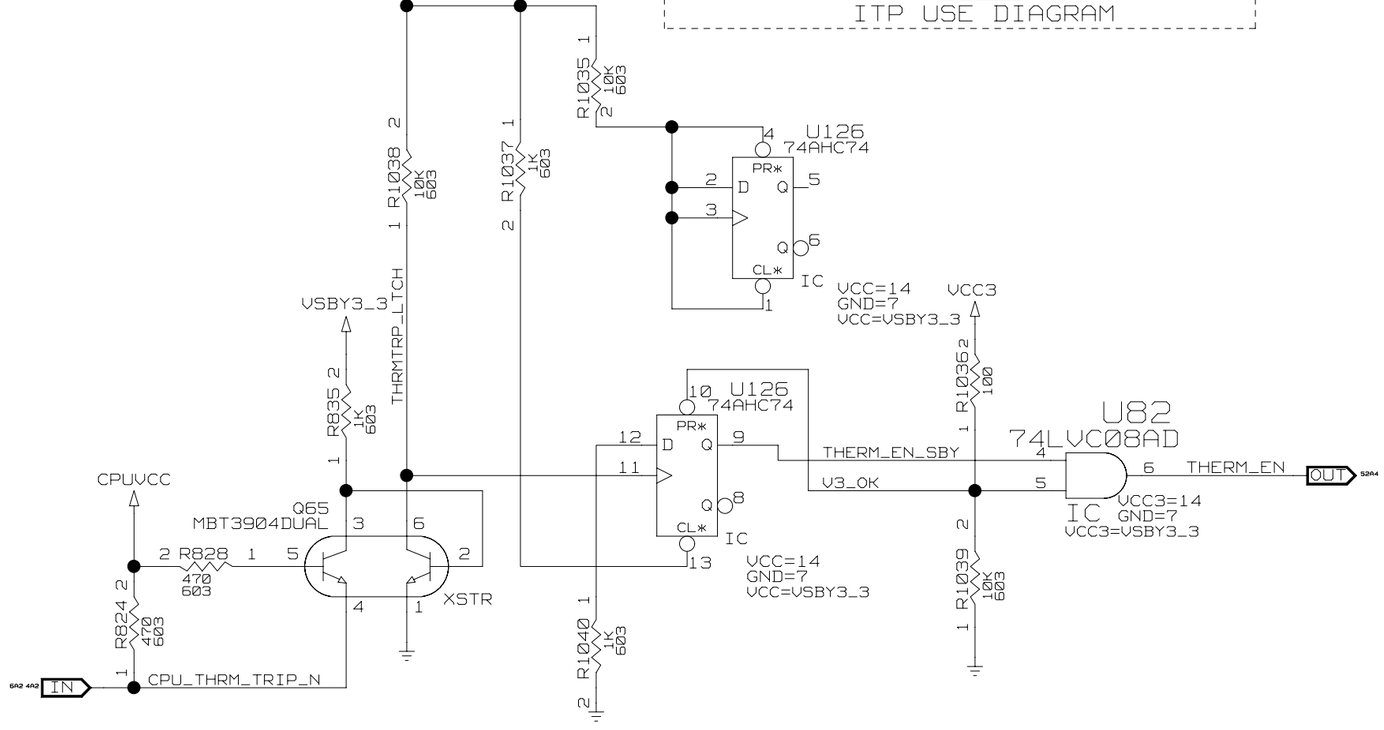
R69 49.9 1% 1/16W
R68 84.5 1%
R89 0
C68 1.0UF 10% 16V 805
CPU1_GTL_VREF1

R67 49.9 1% 1/16W
R66 84.5 1%
R254 0
C65 1.0UF 10% 16V 805
CPU1_GTL_VREF2

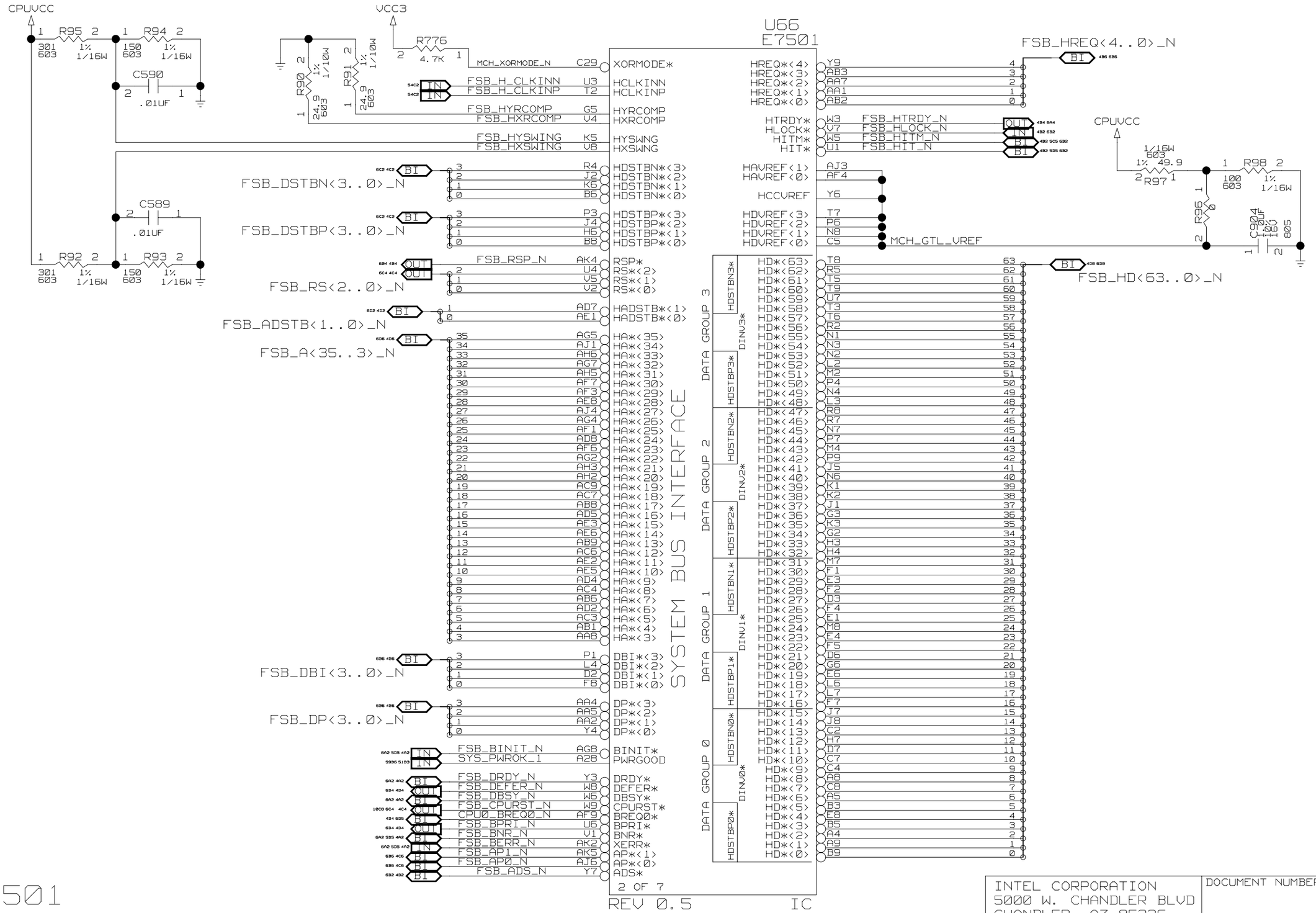
PLACE THESE RESISTORS NEAR J18 (PROCESSOR 0)



THERMTRIP LATCH LOGIC



INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 10	REV


CPUVCC
R95 301 603 1% 1/16W
R94 150 603 1% 1/16W
C590 .01UF
R92 301 603 1% 1/16W
R93 150 603 1% 1/16W
C589 .01UF
VCC3
R776 4.7K
R90 24.9 603 1% 1/10W
R91 24.9 603 1% 1/10W
MCH_XORMODE_N
FSB_H_CLKINN
FSB_H_CLKINP
FSB_HYRCOMP
FSB_HXRCOMP
FSB_HYSWING
FSB_HXSWING
FSB_DSTBN<3..0>_N
FSB_DSTBP<3..0>_N
FSB_RSP_N
FSB_RS<2..0>_N
FSB_ADSTB<1..0>_N
FSB_A<35..3>_N
FSB_DBI<3..0>_N
FSB_DP<3..0>_N
FSB_BINIT_N
SYS_PWROK_1
FSB_DRDY_N
FSB_DEFER_N
FSB_DBSY_N
FSB_CPURST_N
CPU0_BREQ0_N
FSB_BPRI_N
FSB_BNR_N
FSB_BERR_N
FSB_AP1_N
FSB_AP0_N
FSB_ADS_N
XORMODE* C29
HCLKINN U3
HCLKINP T2
HYRCOMP G5
HXRCOMP V4
HYSWNG K5
HXSWNG V8
HDSTBN*<3> R4
HDSTBN*<2> J2
HDSTBN*<1> K6
HDSTBN*<0> B6
HDSTBP*<3> P3
HDSTBP*<2> J4
HDSTBP*<1> H6
HDSTBP*<0> B8
RSP* AK4
RS*<2> U4
RS*<1> U5
RS*<0> V2
HADSTB*<1> AD7
HADSTB*<0> AE1
HA*<35> AG5
HA*<34> AJ1
HA*<33> AH6
HA*<32> AG7
HA*<31> AH5
HA*<30> AF7
HA*<29> AF3
HA*<28> AE6
HA*<27> AJ4
HA*<26> AG4
HA*<25> AF1
HA*<24> AD8
HA*<23> AF6
HA*<22> AG2
HA*<21> AH3
HA*<20> AH2
HA*<19> AC9
HA*<18> AC7
HA*<17> AB8
HA*<16> AD5
HA*<15> AE3
HA*<14> AE6
HA*<13> AB9
HA*<12> AC6
HA*<11> AE2
HA*<10> AE5
HA*<9> AD4
HA*<8> AC4
HA*<7> AB6
HA*<6> AD2
HA*<5> AC1
HA*<4> AB1
HA*<3> AA8
DBI*<3> P1
DBI*<2> L4
DBI*<1> D2
DBI*<0> F8
DP*<3> AA4
DP*<2> AA5
DP*<1> AA2
DP*<0> Y4
BINIT* AG8
PWRGOOD A28
DRDY* Y3
DEFER* W8
DBSY* W6
CPURST* W9
BREQ0* AF9
BPRI* U6
BNR* V1
XERR* AK2
AP*<1> AK5
AP*<0> AJ6
ADS* Y7
2 OF 7
REV 0.5
IC
SYSTEM BUS INTERFACE
U66
E7501
HREQ*<4> Y9
HREQ*<3> AB3
HREQ*<2> AA7
HREQ*<1> AA1
HREQ*<0> AB2
FSB_HREQ<4..0>_N
HTRDY* W3
HLOCK* V7
HITM* W5
HIT* U1
FSB_HTRDY_N
FSB_HLOCK_N
FSB_HITM_N
FSB_HIT_N
HAVREF<1> AJ3
HAVREF<0> AF4
HCCVREF Y6
HDVREF<3> T7
HDVREF<2> P6
HDVREF<1> N8
HDVREF<0> C5
MCH_GTL_VREF
CPUVCC
R97 49.9 1% 1/16W 603
R98 100 1% 1/16W 603
R96 0
C594 .01UF 16V 805
FSB_HD<63..0>_N
DATA GROUP 3
DATA GROUP 2
DATA GROUP 1
DATA GROUP 0
HDSTBN3* HDSTBP3* DINV3*
HDSTBN2* HDSTBP2* DINV2*
HDSTBN1* HDSTBP1* DINV1*
HDSTBN0* HDSTBP0* DINV0*
HD*<63> T8
HD*<62> R5
HD*<61> T5
HD*<60> T9
HD*<59> U7
HD*<58> T3
HD*<57> T6
HD*<56> R2
HD*<55> N1
HD*<54> N3
HD*<53> N2
HD*<52> L2
HD*<51> M2
HD*<50> P4
HD*<49> N4
HD*<48> L3
HD*<47> R8
HD*<46> R7
HD*<45> N7
HD*<44> P7
HD*<43> M4
HD*<42> P9
HD*<41> J5
HD*<40> N6
HD*<39> K1
HD*<38> K2
HD*<37> J1
HD*<36> G3
HD*<35> K3
HD*<34> G2
HD*<33> H3
HD*<32> H4
HD*<31> M7
HD*<30> F1
HD*<29> E3
HD*<28> F2
HD*<27> D3
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HD*<25> E1
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E7501
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CHANDLER, AZ 85226
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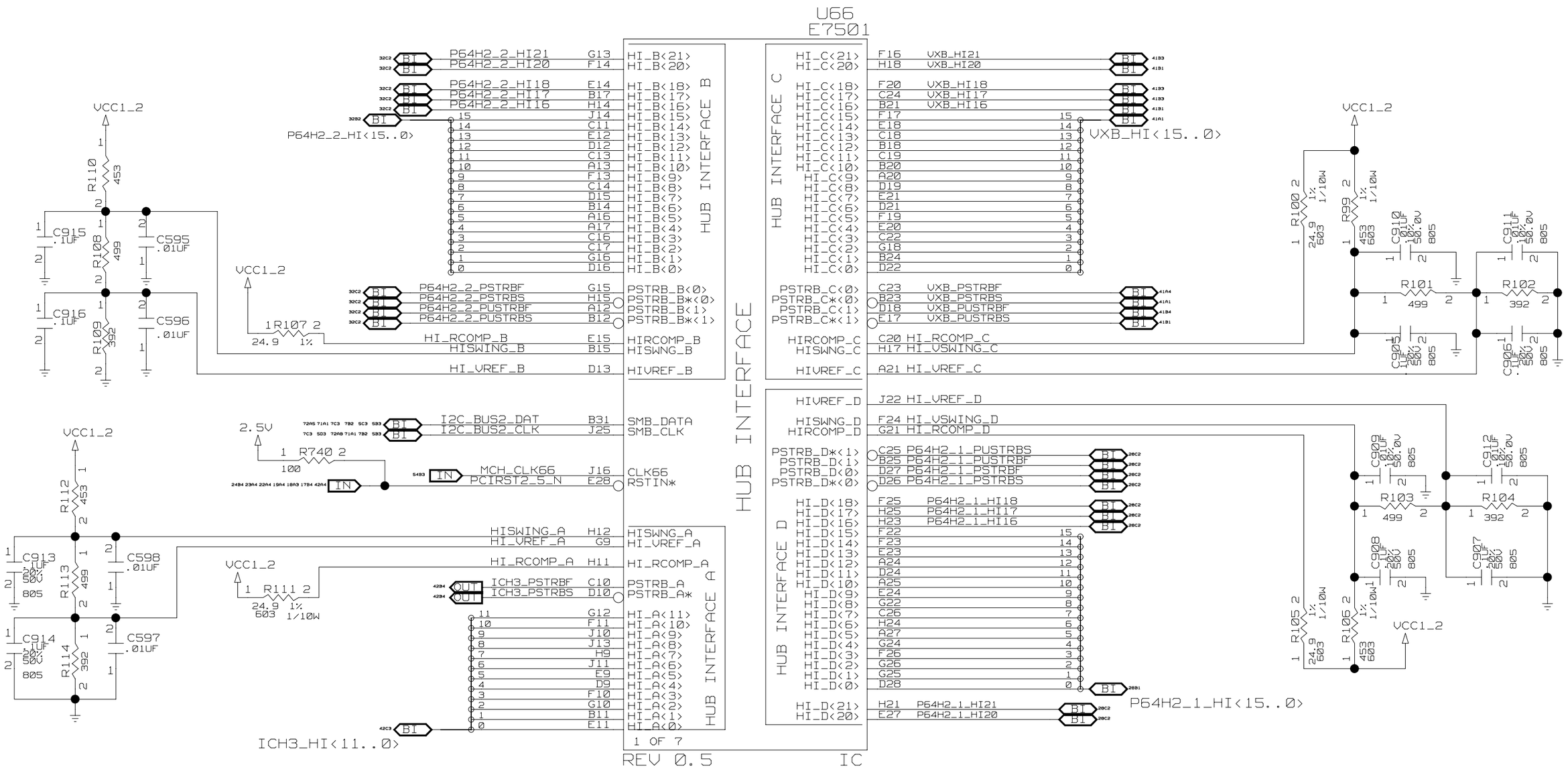

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U66
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MCH DDR A

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RAS_A*	AN24	DDRA_RAS_N_R	
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MA_A<8>	AK29	DDRA_MA8_R	
MA_A<7>	AL29	DDRA_MA7_R	
MA_A<6>	AL28	DDRA_MA6_R	
MA_A<5>	AH28	DDRA_MA5_R	
MA_A<4>	AG27	DDRA_MA4_R	
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BA_A<0>	AL31	DDRA_BA0_R	
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CS_A*<0>	AE13	DDRA_CS0_N_R	
N/C1	AM22	DDRA_RCV_EN_IN	
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DDRCVOH_A	AK17		
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CKE_A	AE19		
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CMDCLK_A3*	AE24		
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CMDCLK_A1	AJ25	DDRA_CMDCLK1	
CMDCLK_A1*	AH25	DDRA_CMDCLK1_N	
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RESERVED1	AK27		

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R161 E7501=NOPOP

R841 E7500=47 OHM E7501=49.9 OHM

R115 E7500= 6.98 E7501=NOPOP

R524 E7500= 6.98 E7501=NOPOP

R521 E7500= 13K E7501= 49.9

R212 E7500= NOPOP E7501= 24.9

C778 E7500= 0.1UF E7501= NOPOP

R3157 E7500= NOPOP E7501= 49.9 OHM

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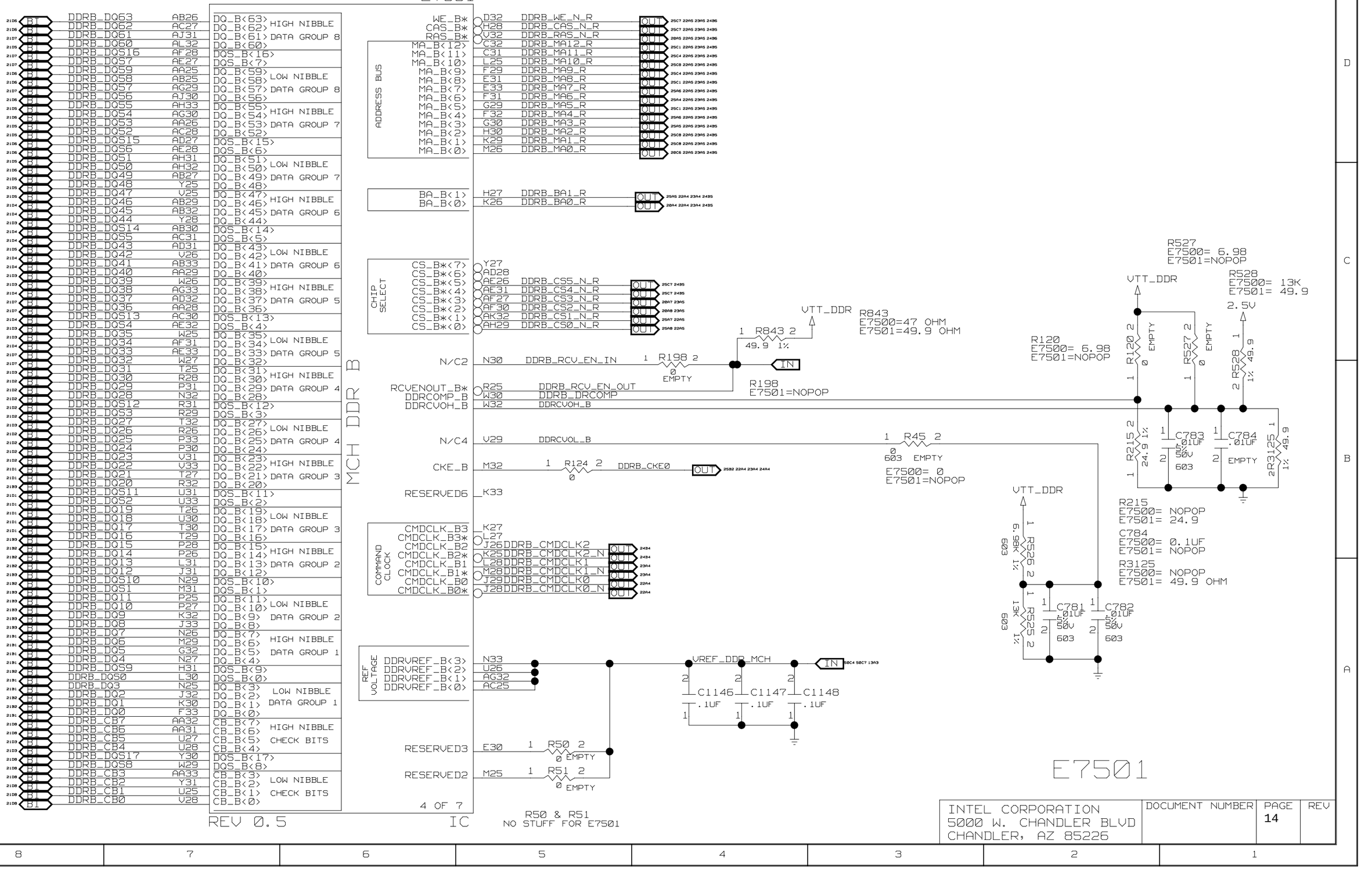
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LOW NIBBLE DATA GROUP 1
HIGH NIBBLE CHECK BITS
LOW NIBBLE CHECK BITS
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REV 0.5
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RAS_B* V32 DDRB_RAS_N_R
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R843 2 49.9 1% 1
VTT_DDR
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E7501=49.9 OHM
IN
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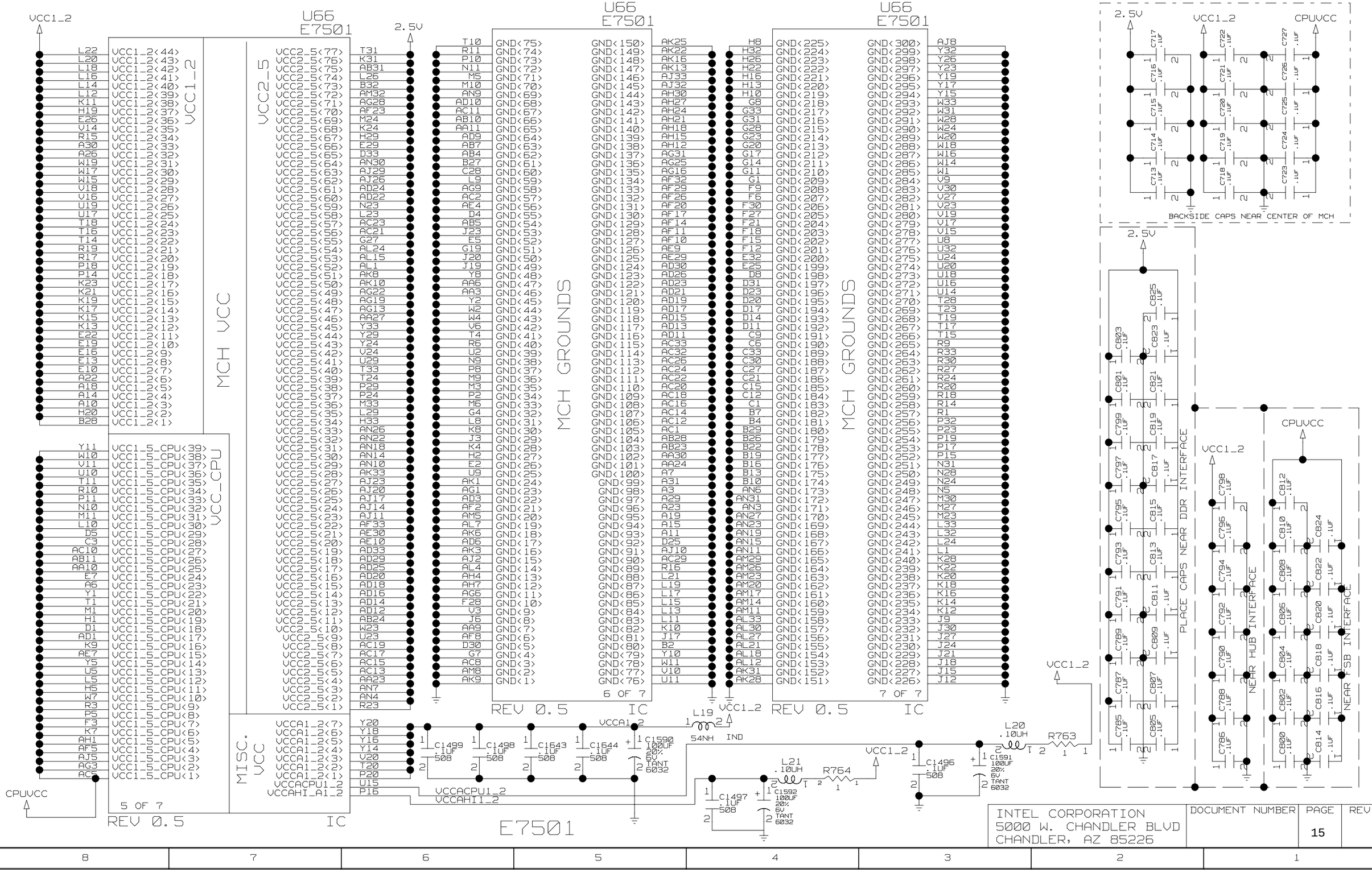
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VCC1_2
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C794 .1UF
C792 .1UF
C790 .1UF
C788 .1UF
C786 .1UF
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C812 .1UF
C810 .1UF
C808 .1UF
C806 .1UF
C804 .1UF
C802 .1UF
C800 .1UF
C824 .1UF
C822 .1UF
C820 .1UF
C818 .1UF
C816 .1UF
C814 .1UF
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C1643 .1UF 508
C1644 .1UF 508
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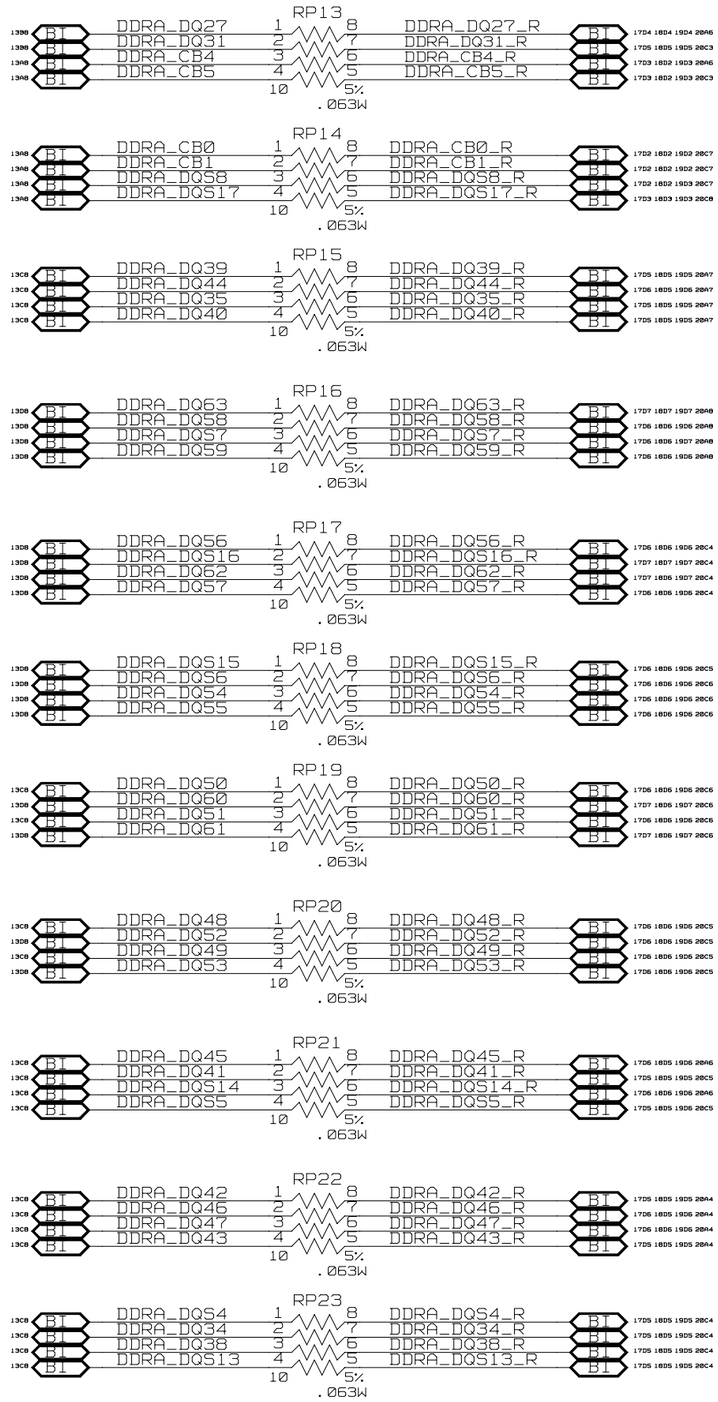
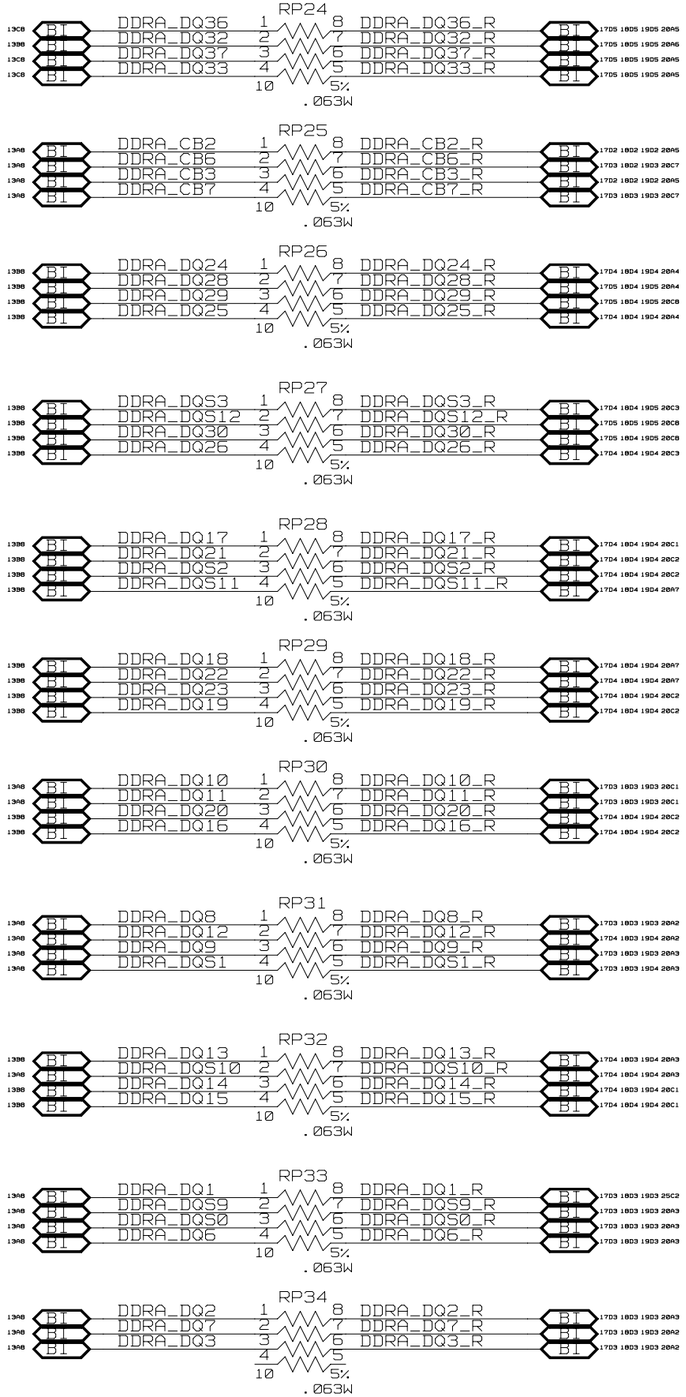
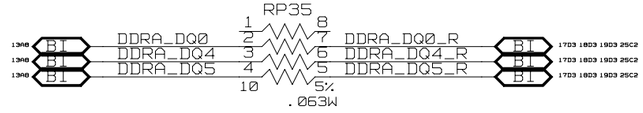
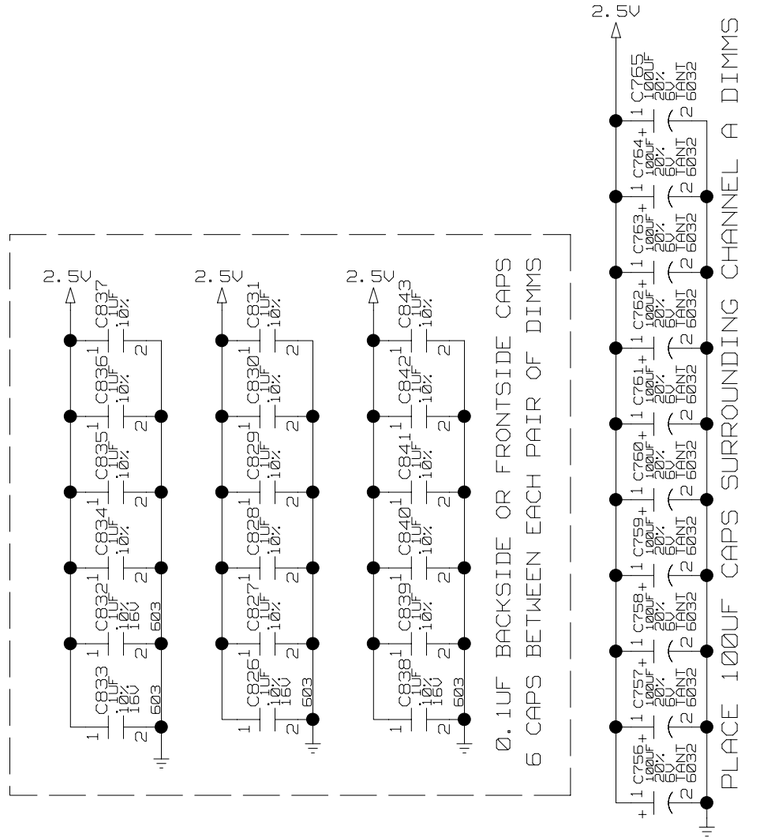




PLACE NEAR DIMM A-1





CAD NOTE:
ALL CAPS SHOULD HAVE DIRECT CONNECTION TO 2.5V PLANE AND 2 VIAS TO GND.

DDR CHANNEL A SERIES TERMINATION

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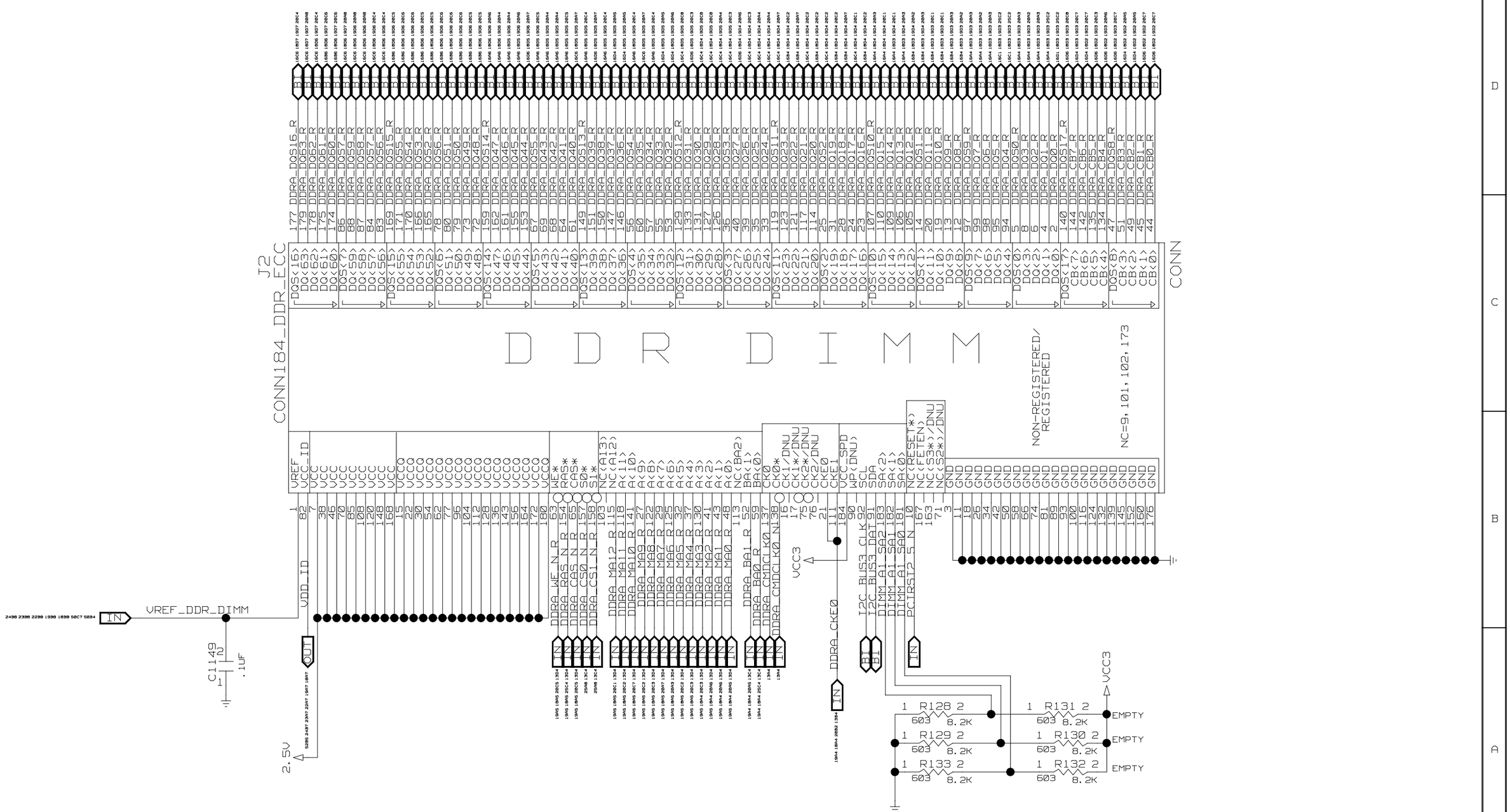
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I2C_BUS3_DAT
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R129 2
R133 2
R131 2
R130 2
R132 2
8.2K
EMPTY
PLACE DIMM A-1 CLOSEST TO MCH
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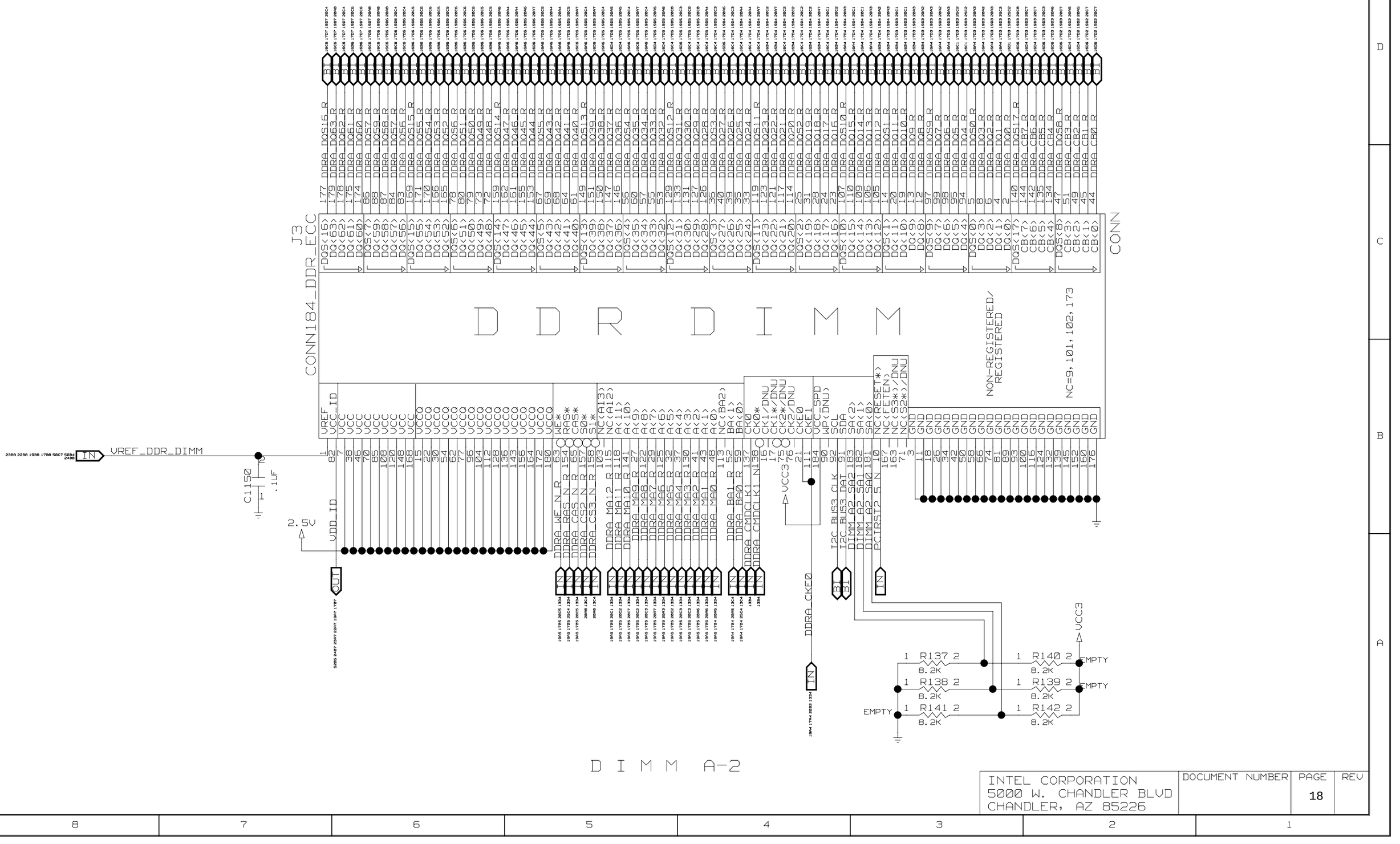

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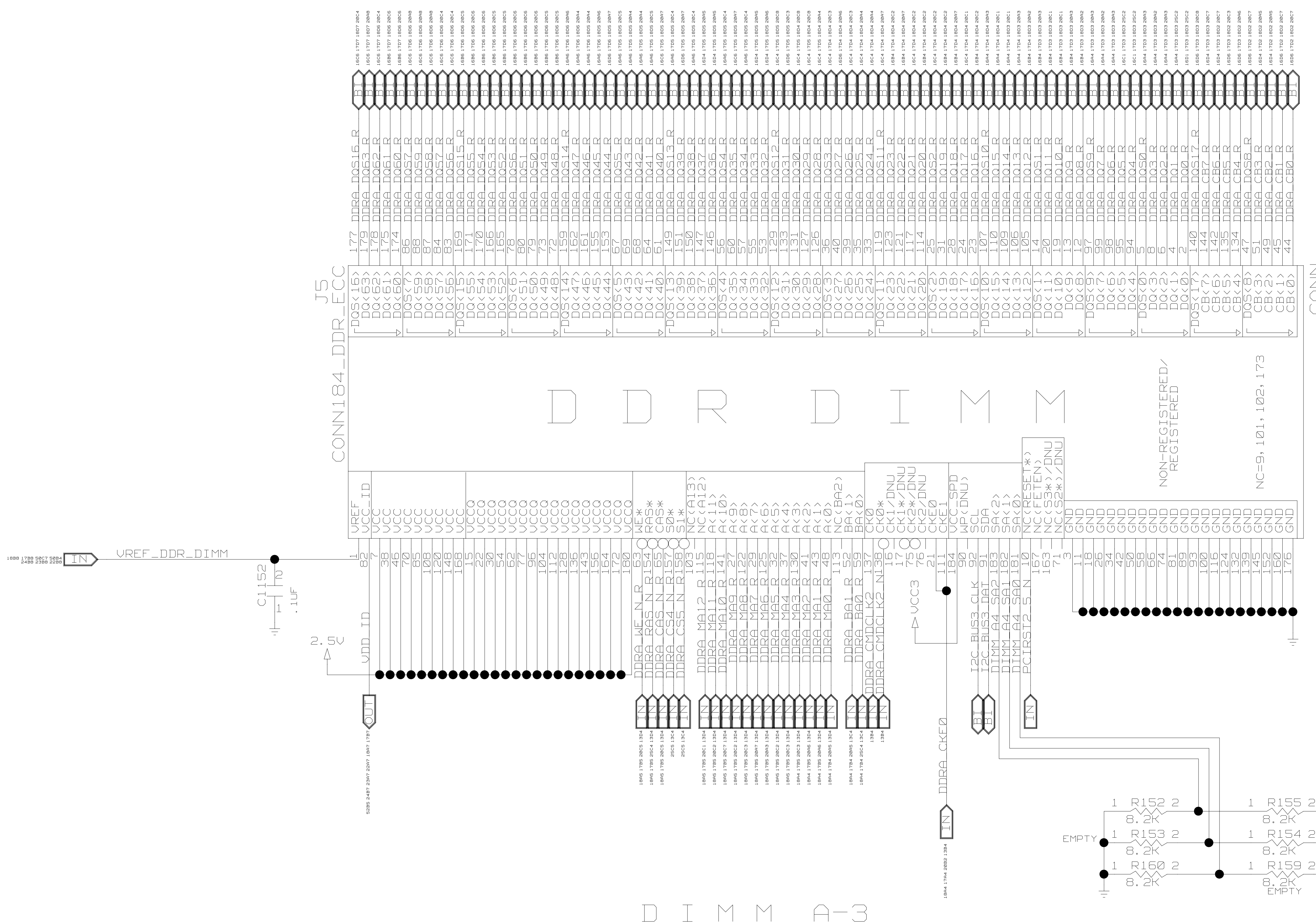

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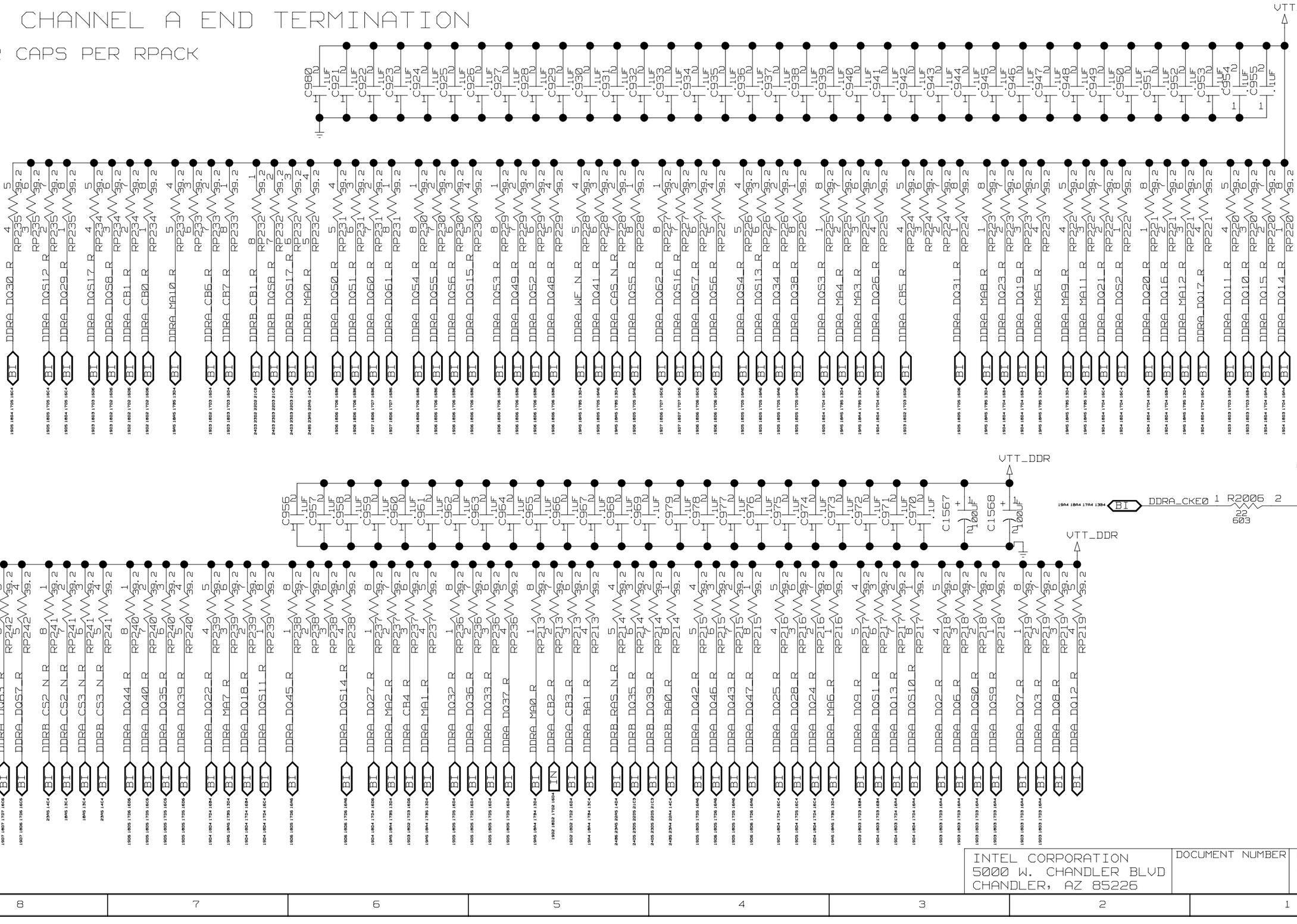
DDR CHANNEL A END TERMINATION

2 CAPS PER RPACK



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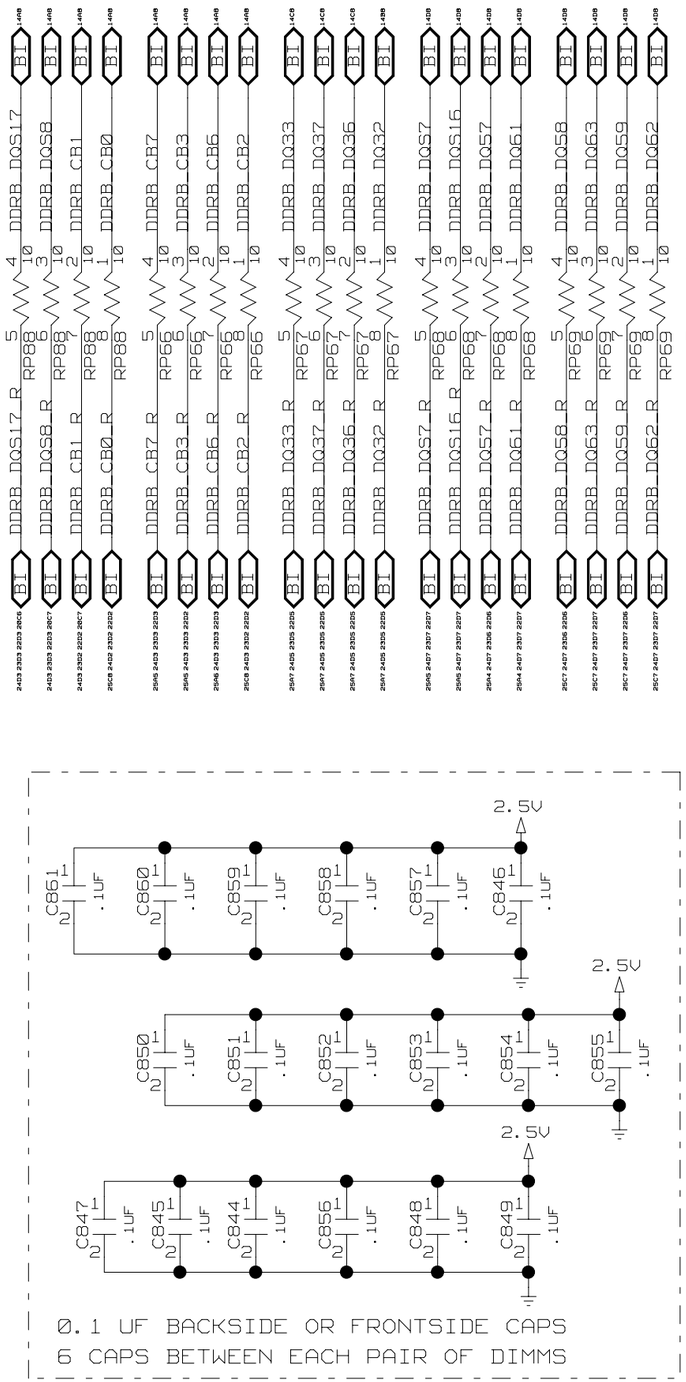
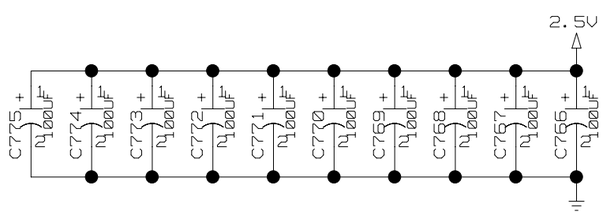
DDR CHANNEL B SERIES TERMINATION
PLACE NEAR D I M M B-1



Ø.1 UF BACKSIDE OR FRONTSIDE CAPS
6 CAPS BETWEEN EACH PAIR OF DIMMS



PLACE 100UF CAPS SURROUNDING CHAN B DIMMS

CAD NOTE: ALL CAPS SHOULD HAVE
DIRECT ATTACHMENT TO 2.5V PLANE,
AND 2 VIAS TO GND

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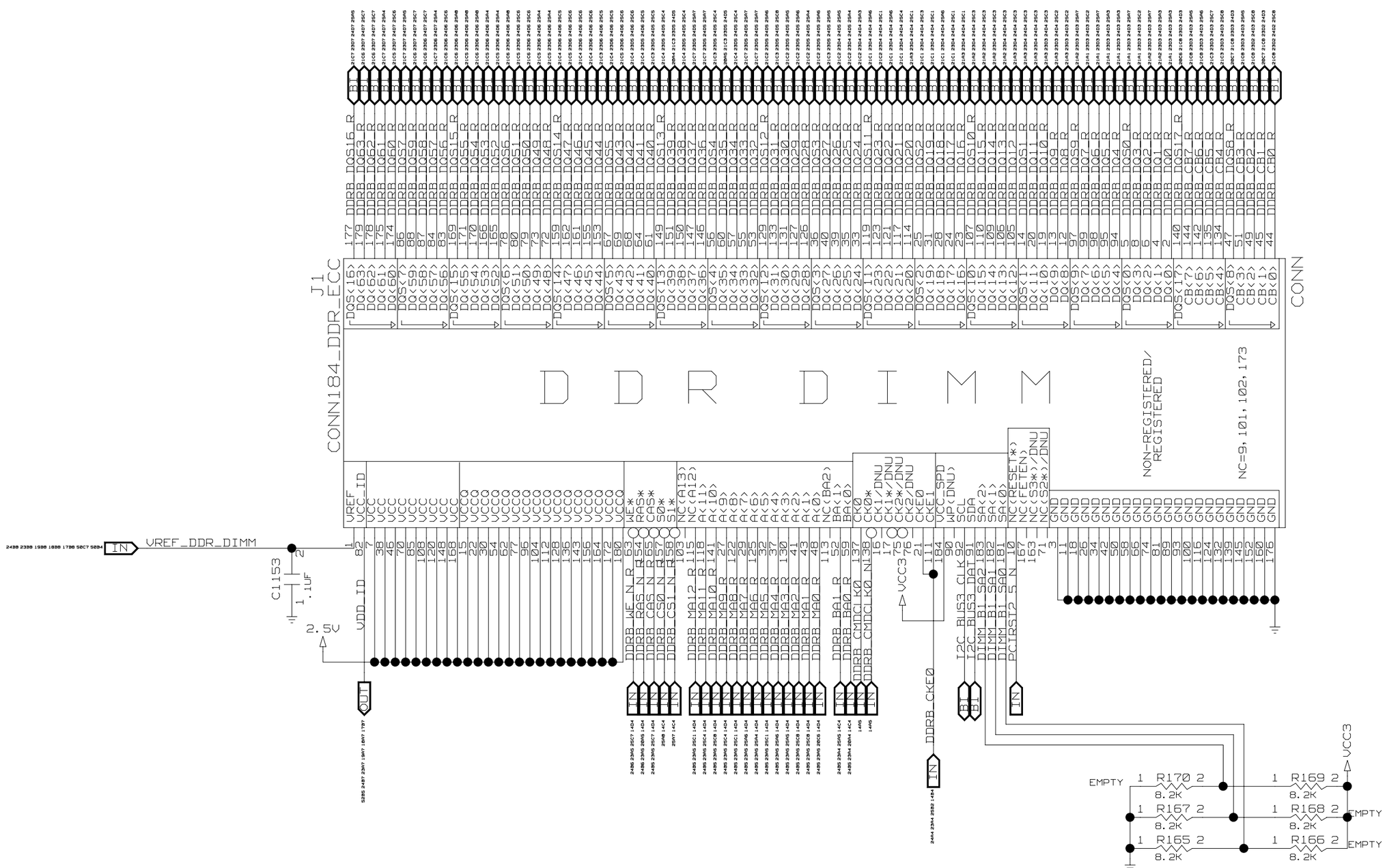

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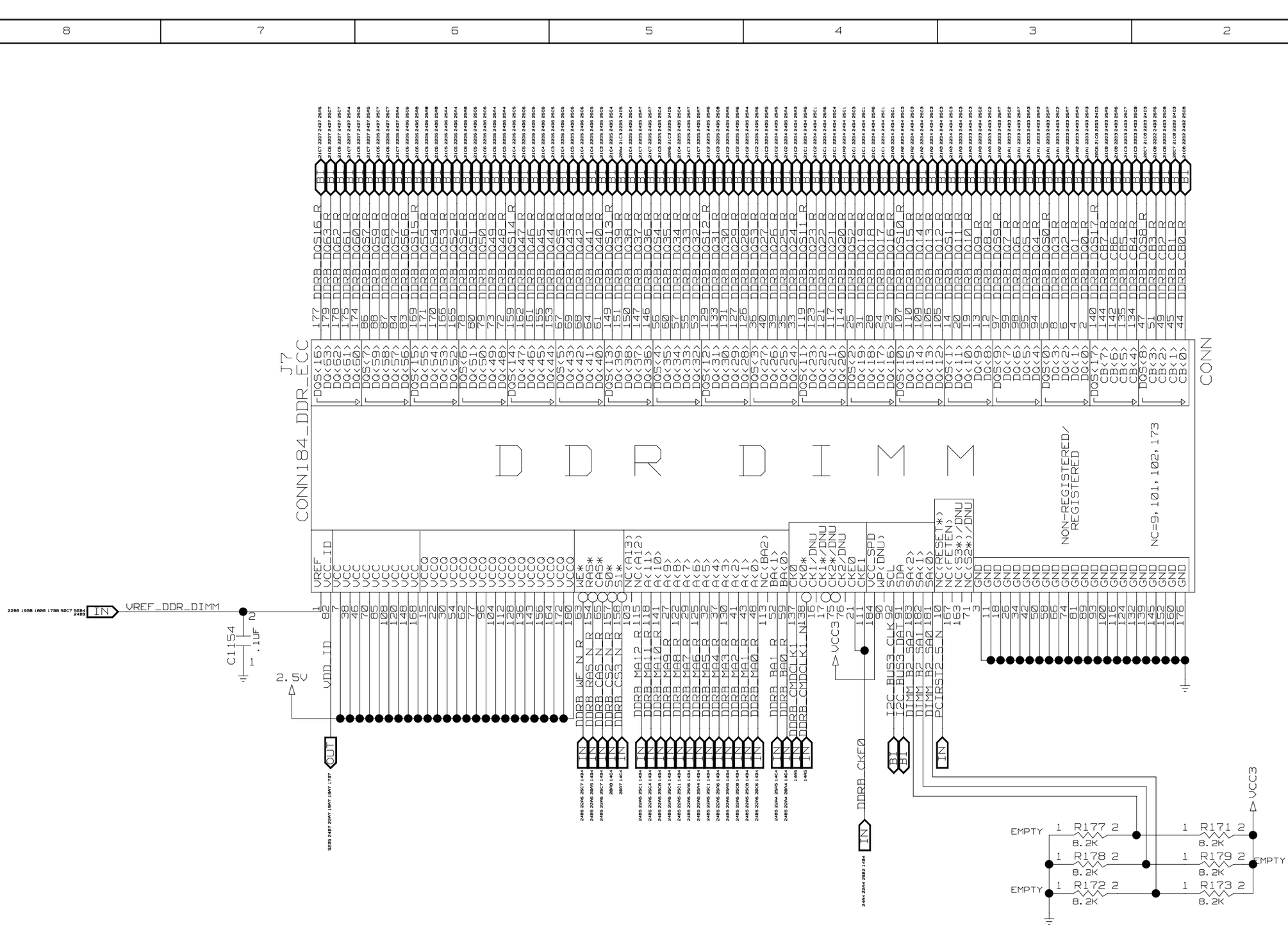
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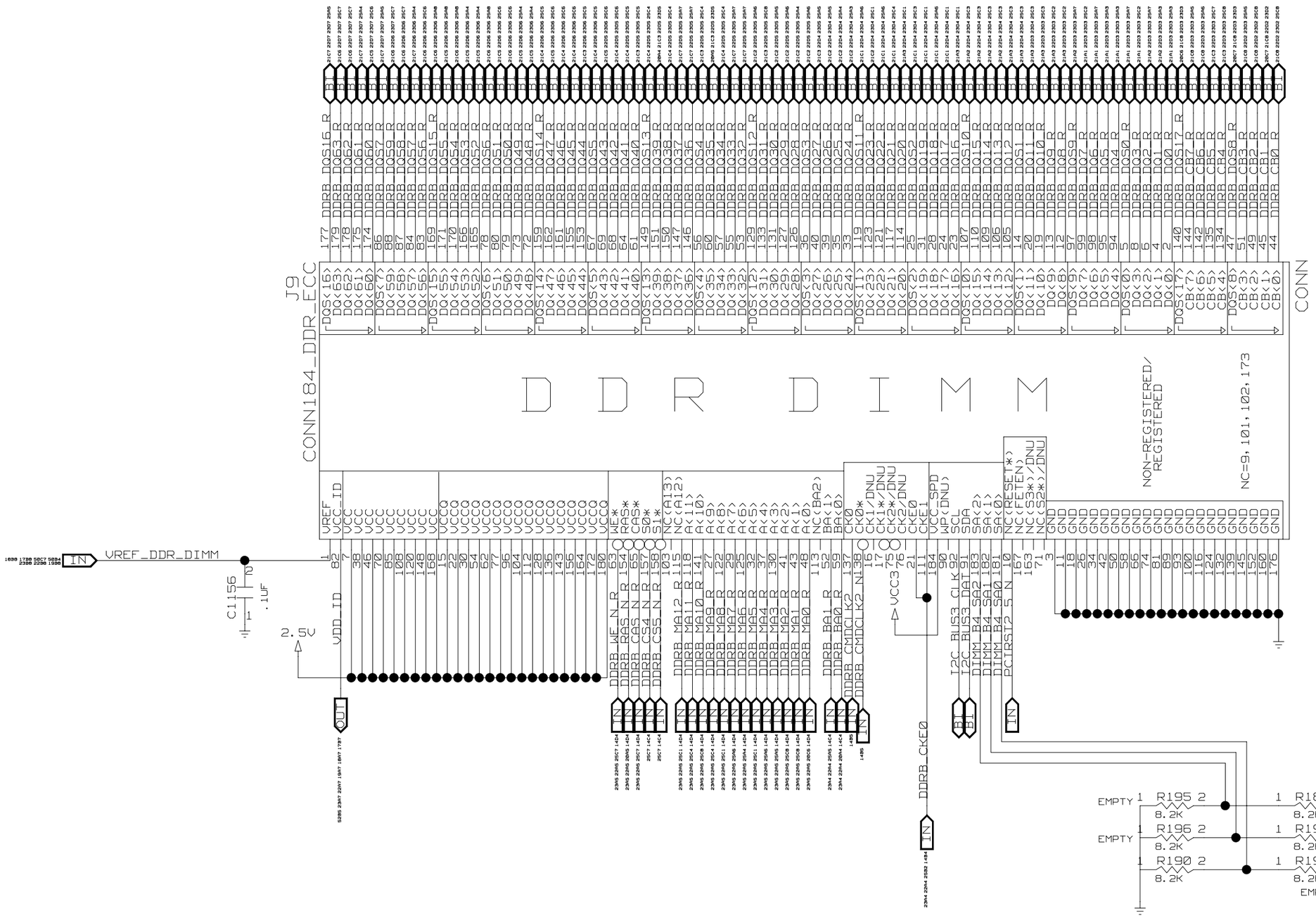


DIMM B-3

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 24	REV

DDR CHANNEL B END TERMINATION 2 CAPS PER RPACK

VTT_DDR

.1UF 1% C1040 C1012 C1013 C1011 C1010 C1009 C1008 C1007 C1006 C1005 C1004 C1003 C1002 C1001 C1000 C999 C998 C997 C996 C995 C994 C993 C992 C991 C990 C989 C988 C987 C986 C985 C984 C983 C982 C981 C1014 C1015

RP255 RP255 RP255 RP255 RP256 RP256 RP256 RP256 RP257 RP257 RP257 RP257 RP258 RP258 RP258 RP258 RP259 RP259 RP259 RP259 RP260 RP260 RP260 RP260 RP261 RP261 RP261 RP261 RP262 RP262 RP262 RP262 RP263 RP263 RP263 RP263 RP264 RP264 RP264 RP264 RP265 RP265 RP265 RP265 RP266 RP266 RP266 RP266 RP267 RP267 RP267 RP267 RP268 RP268 RP268 RP268 RP269 RP269 RP269 RP269 RP270 RP270 RP270 RP270 RP271 RP271 RP271 RP271

DDRB_MA10_R DDRB_CB2_R DDRB_CB0_R DDRB_MA1_R DDRB_DQ31_R DDRB_MA2_R DDRB_CB4_R DDRB_CB5_R DDRB_DQ59_R DDRB_DQ58_R DDRB_DQ63_R DDRB_DQ62_R DDRB_WE_N_R DDRB_CAS_N_R DDRB_CS4_N_R DDRB_CS5_N_R DDRB_DQ47_R DDRB_DQ43_R DDRB_DQ46_R DDRB_DQ42_R DDRB_DQ56_R DDRB_DQ60_R DDRB_DQ51_R DDRB_DQ50_R DDRB_DQ45_R DDRB_DQ41_R DDRB_DQS14_R DDRB_DQ55_R DDRA_CS4_N_R DDRA_CS5_N_R DDRB_DQ44_R DDRB_DQ40_R DDRA_RAS_N_R DDRA_BA0_R DDRB_DQS4_R DDRB_DQ34_R DDRB_DQS13_R DDRB_DQ38_R DDRB_MA9_R DDRB_MA11_R DDRB_DQ21_R DDRB_DQS2_R DDRB_DQ14_R DDRB_DQ15_R DDRB_DQ10_R DDRB_DQ11_R DDRB_DQS10_R DDRB_DQ13_R DDRB_DQS1_R DDRB_DQ12_R DDRB_DQ7_R DDRB_DQ3_R DDRB_DQ8_R DDRB_DQ9_R DDRA_DQ0_R DDRA_DQ4_R DDRA_DQ5_R DDRA_DQ1_R DDRB_DQ20_R DDRB_DQ16_R DDRB_MA12_R DDRB_DQ17_R DDRB_MA8_R DDRB_DQ19_R DDRB_DQ23_R DDRB_MA5_R

BI

VTT_DDR

.1UF 1% C1017 C1016 C1018 C1019 C1020 C1021 C1022 C1023 C1024 C1025 C1026 C1027 C1028 C1029 C1030 C1031 C1032 C1033 C1034 C1035 C1036 C1037 C1038 C1039

100UF 20% C1570 C1569

RP253 RP253 RP253 RP253 RP252 RP252 RP252 RP252 RP251 RP251 RP251 RP251 RP250 RP250 RP250 RP250 RP249 RP249 RP249 RP249 RP248 RP248 RP248 RP248 RP243 RP243 RP243 RP243 RP244 RP244 RP244 RP244 RP245 RP245 RP245 RP245 RP246 RP246 RP246 RP246 RP247 RP247 RP247 RP247

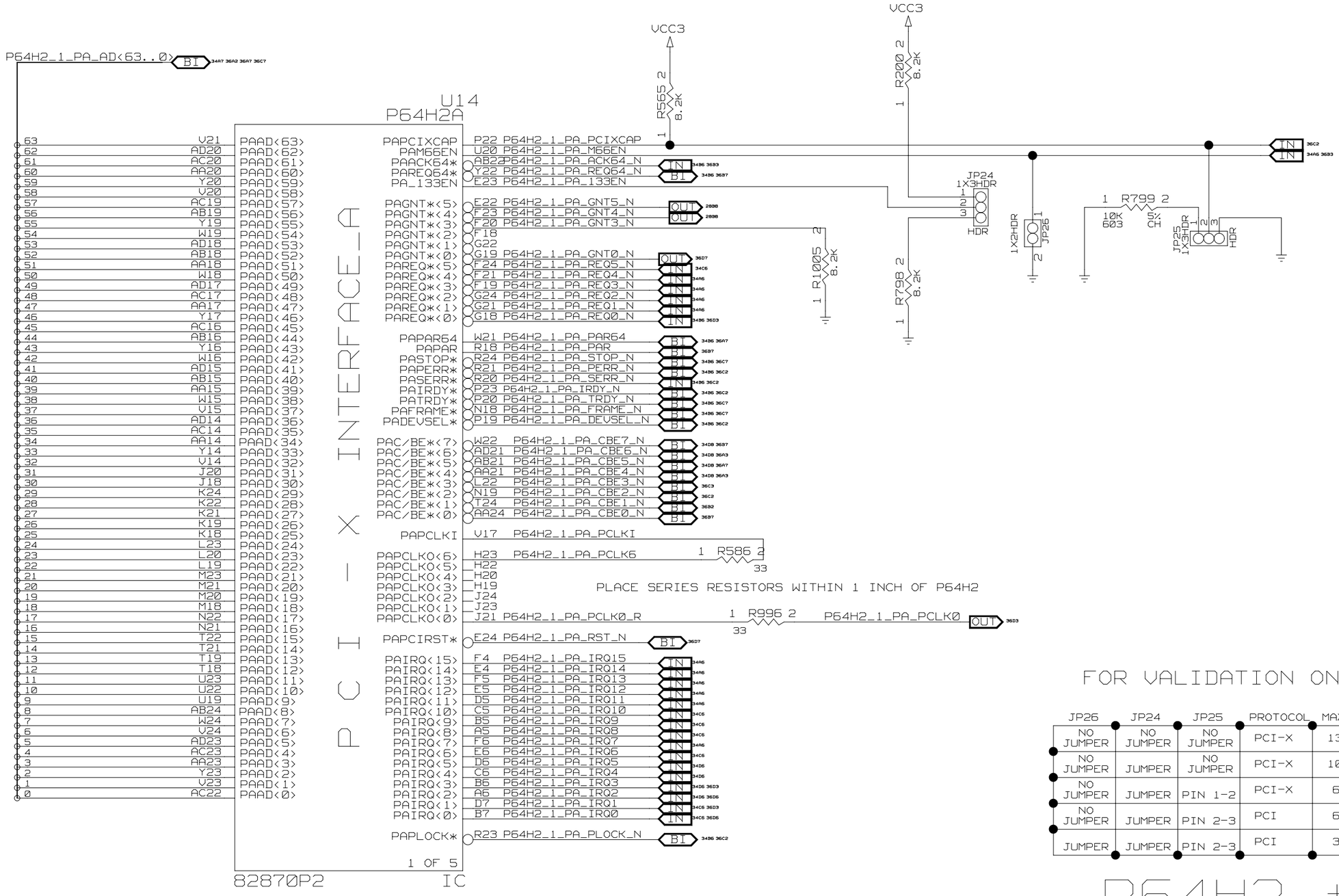
DDRB_DQS15_R DDRB_DQ54_R DDRB_DQ55_R DDRB_DQ56_R DDRA_CS0_N_R DDRA_CS1_N_R DDRB_CS1_N_R DDRB_DQ33_R DDRB_DQ37_R DDRB_DQ36_R DDRB_DQ32_R DDRB_DQ6_R DDRB_DQ2_R DDRB_DQ59_R DDRB_DQS0_R DDRB_DQS11_R DDRB_DQ18_R DDRB_MA7_R DDRB_DQ22_R DDRB_DQ29_R DDRB_DQS3_R DDRB_DQS12_R DDRB_MA4_R DDRB_CB6_R DDRB_CB3_R DDRB_BA1_R DDRB_CB7_R DDRB_DQ27_R DDRB_DQ30_R DDRB_DQ26_R DDRB_MA3_R DDRB_DQS7_R DDRB_DQS16_R DDRB_DQ57_R DDRB_DQ61_R DDRB_DQ48_R DDRB_DQ52_R DDRB_DQ49_R DDRB_DQ53_R DDRB_DQ25_R DDRB_MA6_R DDRB_DQ28_R DDRB_DQ24_R DDRB_DQ1_R DDRB_DQ5_R DDRB_DQ4_R DDRB_DQ0_R

BI

VTT_DDR

2484 2304 2204 1484 BI DDRB_CKE0 1 R2008 2 22 603

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 25	REV



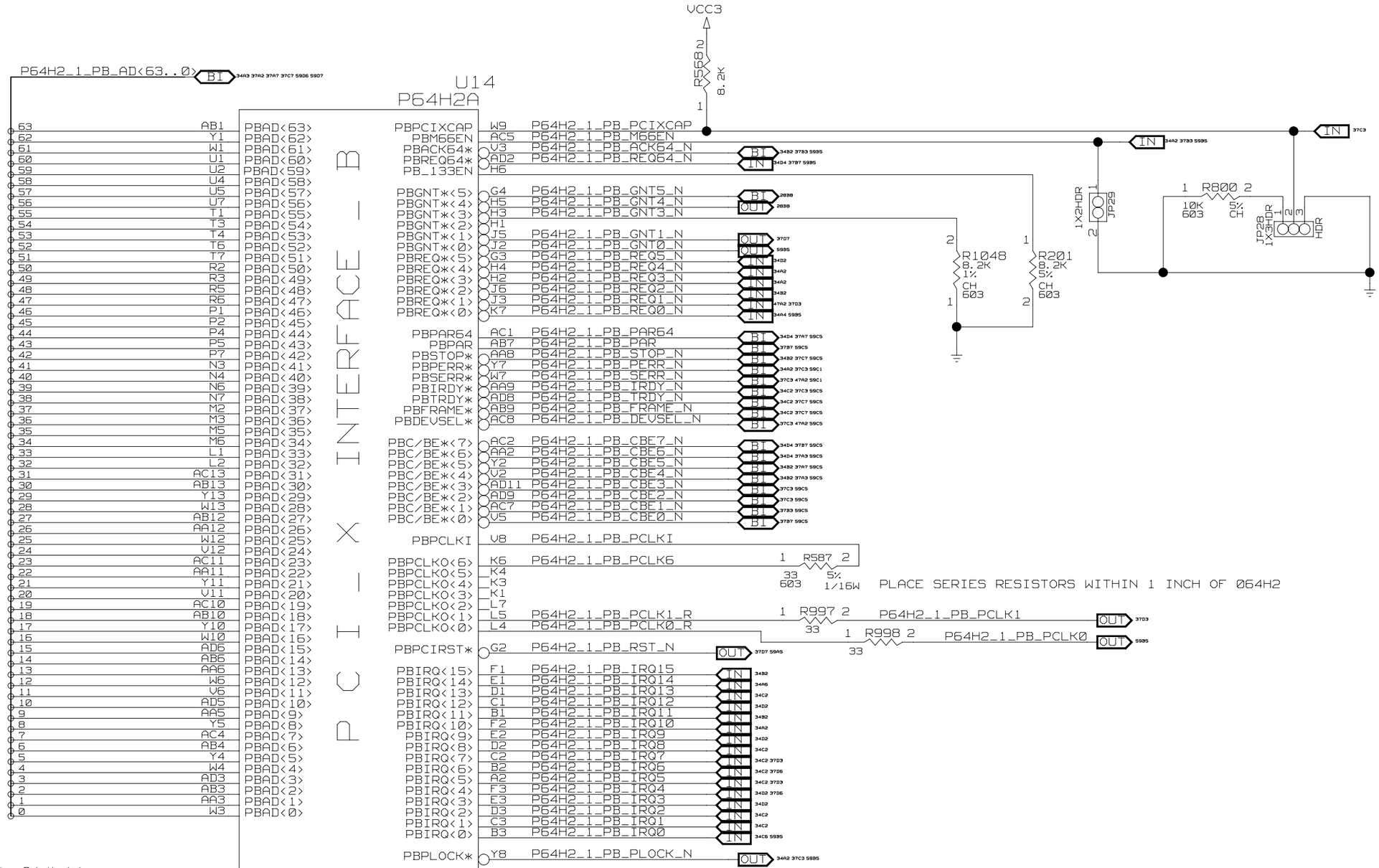
FOR VALIDATION ONLY

JP26	JP24	JP25	PROTOCOL	MAX FREQ
NO JUMPER	NO JUMPER	NO JUMPER	PCI-X	133MHZ
NO JUMPER	JUMPER	NO JUMPER	PCI-X	100MHZ
NO JUMPER	JUMPER	PIN 1-2	PCI-X	66MHZ
NO JUMPER	JUMPER	PIN 2-3	PCI	66MHZ
JUMPER	JUMPER	PIN 2-3	PCI	33MHZ

P64H2 #1

133MHZ SLOT1

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE	REV
		26	



FOR VALIDATION ONLY

JP29	JP28	PROTOCOL	MAX FREQ
NO JUMPER	NO JUMPER	PCI-X	100MHZ
NO JUMPER	PIN 1-2	PCI-X	66MHZ
NO JUMPER	PIN 2-3	PCI	66MHZ
JUMPER	PIN 2-3	PCI	33MHZ

P64H2 #1
100MHZ PCI-X SLOT AND LAN CONTROLLER

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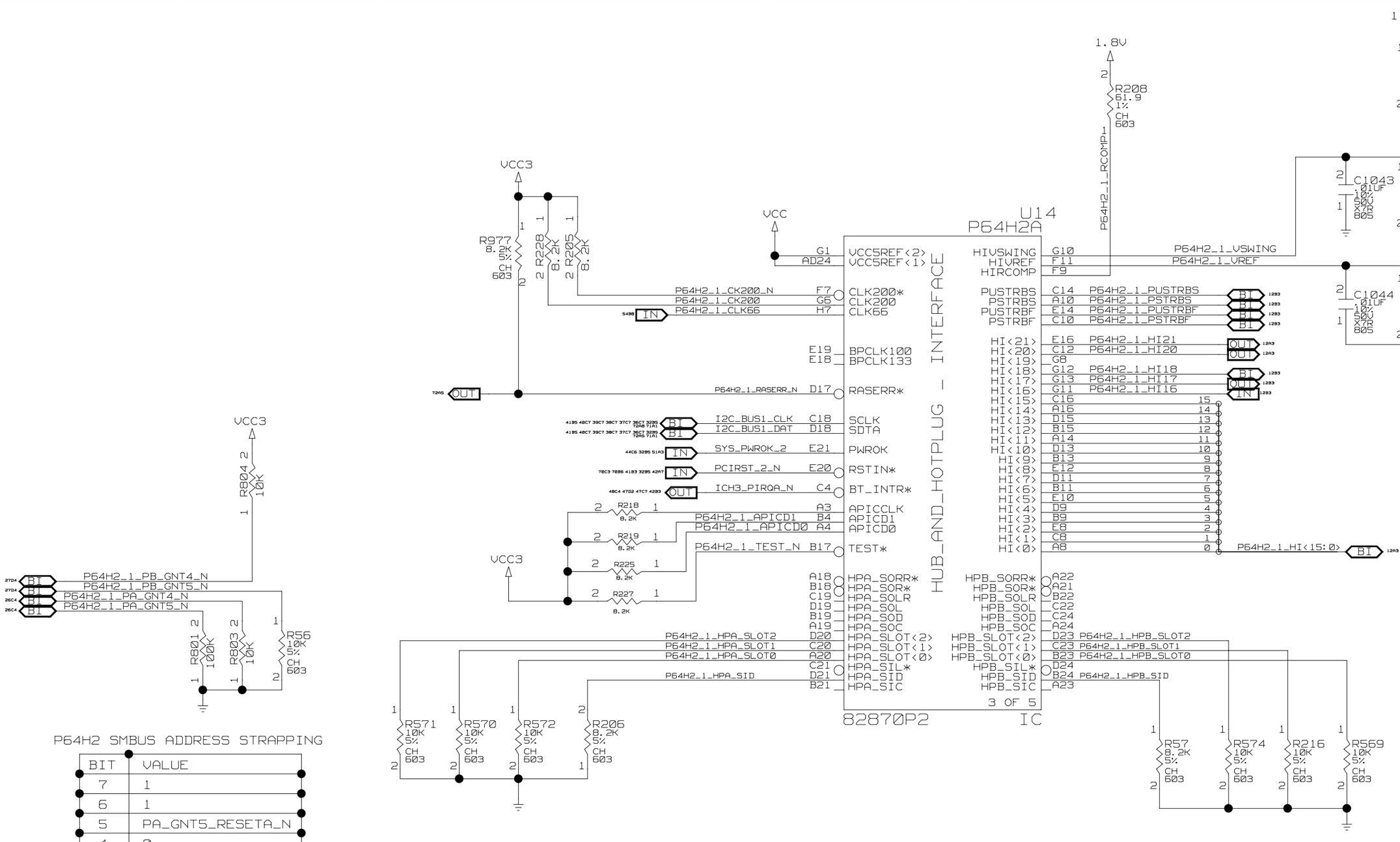


P64H2 SMBUS ADDRESS STRAPPING

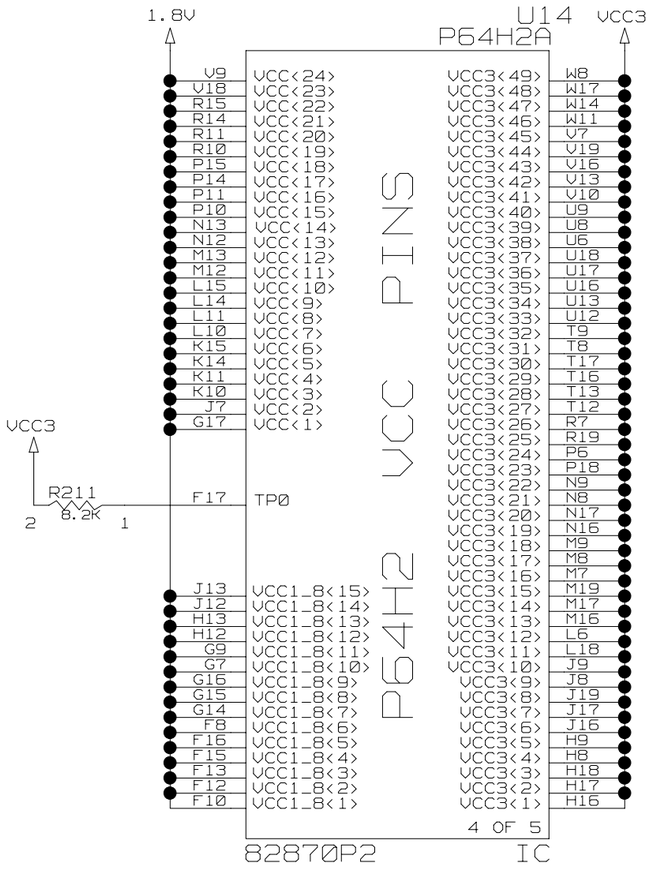
BIT	VALUE
7	1
6	1
5	PA_GNT5_RESETA_N
4	0
3	PA_GNT4_BUSENB_N
2	PB_GNT5_RESETA_N
1	PB_GNT4_BUSENB_N

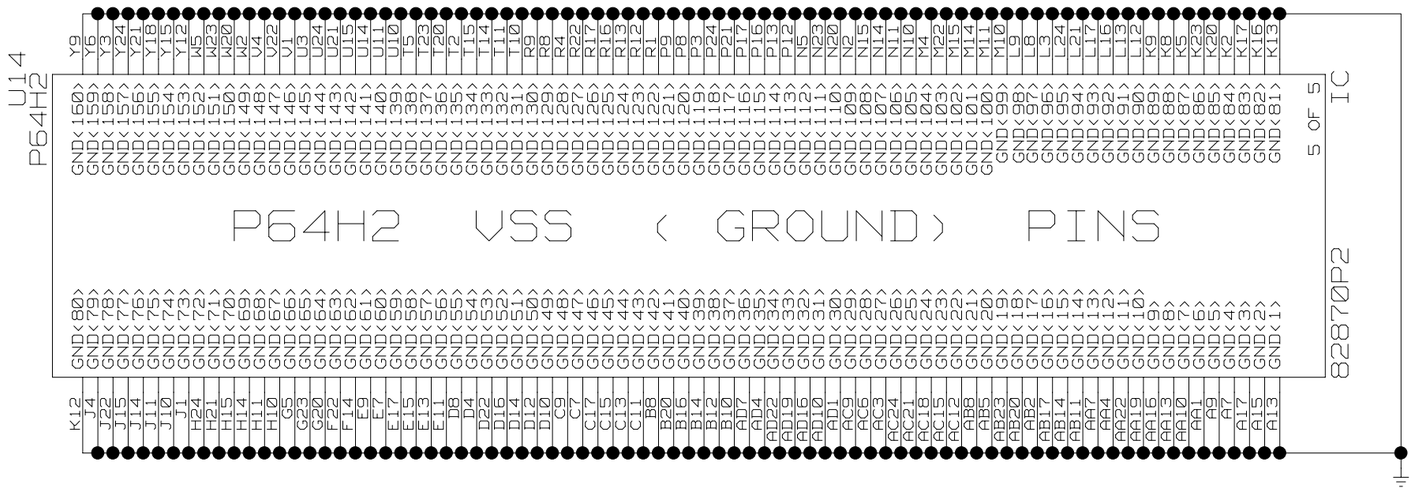
P64H2 #1 SMBUS ADDRESS = C2H

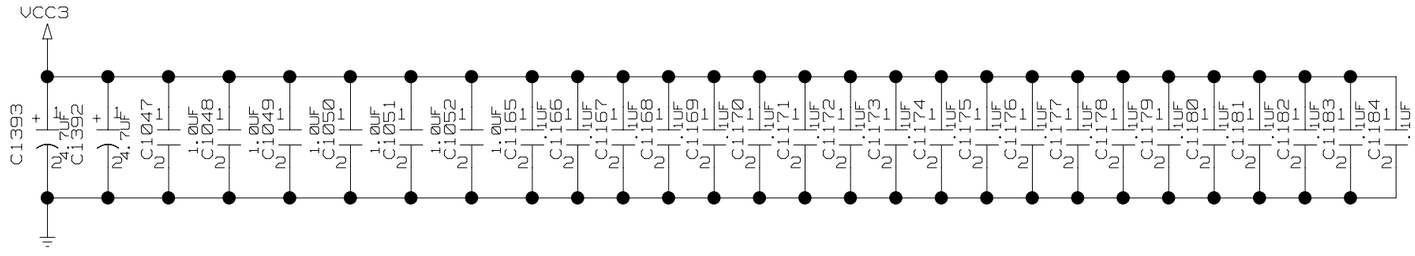
P64H2 #1

HUB LINK

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 28	REV



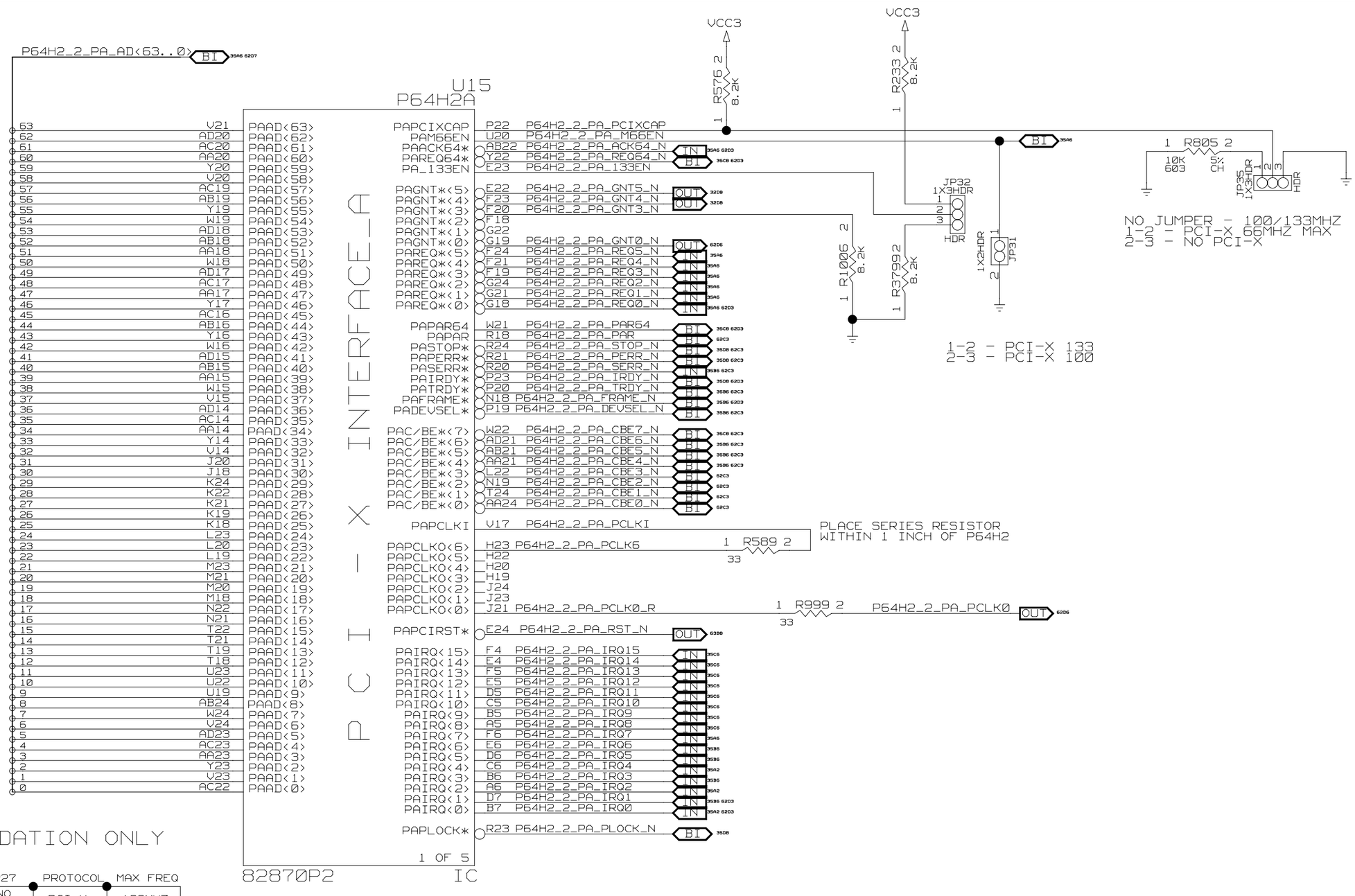




P64H2 #1

POWER AND DECOUPLING

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 29	REV



FOR VALIDATION ONLY

JP31	JP32	JP27	PROTOCOL	MAX FREQ
NO JUMPER	NO JUMPER	NO JUMPER	PCI-X	133MHZ
NO JUMPER	JUMPER	NO JUMPER	PCI-X	100MHZ
NO JUMPER	JUMPER	PIN 1-2	PCI-X	66MHZ
NO JUMPER	JUMPER	PIN 2-3	PCI	66MHZ
JUMPER	JUMPER	PIN 2-3	PCI	33MHZ

P64H2 #2

SCSI CONTROLLER

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P64H2_2_PB_AD<63..0> BI

U15
P64H2A

63	AB1	PBAD<63>	PBPCIXCAP	W9	P64H2_2_PB_PCIXCAP	
62	Y1	PBAD<62>	PBM66EN	AC5	P64H2_2_PB_M66EN	
61	W1	PBAD<61>	PBACK64*	V3	P64H2_2_PB_ACK64_N	BI
60	U1	PBAD<60>	PBREQ64*	AD2	P64H2_2_PB_REQ64_N	IN
59	U2	PBAD<59>	PB_133EN	H6	P64H2_2_PB_133EN	
58	U4	PBAD<58>				
57	U5	PBAD<57>	PBGNT*<5>	G4	P64H2_2_PB_GNT5_N	OUT
56	U7	PBAD<56>	PBGNT*<4>	H5	P64H2_2_PB_GNT4_N	OUT
55	T1	PBAD<55>	PBGNT*<3>	H3	P64H2_2_PB_GNT3_N	
54	T3	PBAD<54>	PBGNT*<2>	H1	P64H2_2_PB_GNT2_N	OUT
53	T4	PBAD<53>	PBGNT*<1>	J5	P64H2_2_PB_GNT1_N	OUT
52	T6	PBAD<52>	PBGNT*<0>	J2	P64H2_2_PB_GNT0_N	OUT
51	T7	PBAD<51>	PBREQ*<5>	G3	P64H2_2_PB_REQ5_N	IN
50	R2	PBAD<50>	PBREQ*<4>	H4	P64H2_2_PB_REQ4_N	IN
49	R3	PBAD<49>	PBREQ*<3>	H2	P64H2_2_PB_REQ3_N	IN
48	R5	PBAD<48>	PBREQ*<2>	J6	P64H2_2_PB_REQ2_N	IN
47	R6	PBAD<47>	PBREQ*<1>	J3	P64H2_2_PB_REQ1_N	IN
46	P1	PBAD<46>	PBREQ*<0>	K7	P64H2_2_PB_REQ0_N	IN
45	P2	PBAD<45>				
44	P4	PBAD<44>	PBPAR64	AC1	P64H2_2_PB_PAR64	BI
43	P5	PBAD<43>	PBPAR	AB7	P64H2_2_PB_PAR	BI
42	P7	PBAD<42>	PBSTOP*	AA8	P64H2_2_PB_STOP_N	BI
41	N3	PBAD<41>	PBPERR*	Y7	P64H2_2_PB_PERR_N	BI
40	N4	PBAD<40>	PBSERR*	W7	P64H2_2_PB_SERR_N	IN
39	N6	PBAD<39>	PBIRDY*	AA9	P64H2_2_PB_IRDY_N	BI
38	N7	PBAD<38>	PBTRDY*	AD8	P64H2_2_PB_TRDY_N	BI
37	M2	PBAD<37>	PBFRAME*	AB9	P64H2_2_PB_FRAME_N	BI
36	M3	PBAD<36>	PBDEVSEL*	AC8	P64H2_2_PB_DEVSEL_N	BI
35	M5	PBAD<35>				
34	M6	PBAD<34>	PBC/BE*<7>	AC2	P64H2_2_PB_CBE7_N	BI
33	L1	PBAD<33>	PBC/BE*<6>	AA2	P64H2_2_PB_CBE6_N	BI
32	L2	PBAD<32>	PBC/BE*<5>	Y2	P64H2_2_PB_CBE5_N	BI
31	AC13	PBAD<31>	PBC/BE*<4>	V2	P64H2_2_PB_CBE4_N	BI
30	AB13	PBAD<30>	PBC/BE*<3>	AD11	P64H2_2_PB_CBE3_N	BI
29	Y13	PBAD<29>	PBC/BE*<2>	AD9	P64H2_2_PB_CBE2_N	BI
28	W13	PBAD<28>	PBC/BE*<1>	AC7	P64H2_2_PB_CBE1_N	BI
27	AB12	PBAD<27>	PBC/BE*<0>	V5	P64H2_2_PB_CBE0_N	BI
26	AA12	PBAD<26>				
25	W12	PBAD<25>	PBPCLKI	V8	P64H2_2_PB_PCLKI	
24	V12	PBAD<24>				
23	AC11	PBAD<23>	PBPCLKO<6>	K6	P64H2_2_PB_PCLK6	
22	AA11	PBAD<22>	PBPCLKO<5>	K4		
21	Y11	PBAD<21>	PBPCLKO<4>	K3		
20	V11	PBAD<20>	PBPCLKO<3>	K1	P64H2_2_PB_PCLK3_R	
19	AC10	PBAD<19>	PBPCLKO<2>	L7	P64H2_2_PB_PCLK2_R	
18	AB10	PBAD<18>	PBPCLKO<1>	L5	P64H2_2_PB_PCLK1_R	
17	Y10	PBAD<17>	PBPCLKO<0>	L4	P64H2_2_PB_PCLK0_R	
16	W10	PBAD<16>				
15	AD6	PBAD<15>	PBPCIRST*	G2	P64H2_2_PB_RST_N	BI
14	AB6	PBAD<14>				
13	AA6	PBAD<13>	PBIRQ<15>	F1	P64H2_2_PB_IRQ15	IN
12	W6	PBAD<12>	PBIRQ<14>	E1	P64H2_2_PB_IRQ14	IN
11	V6	PBAD<11>	PBIRQ<13>	D1	P64H2_2_PB_IRQ13	IN
10	AD5	PBAD<10>	PBIRQ<12>	C1	P64H2_2_PB_IRQ12	IN
9	AA5	PBAD<9>	PBIRQ<11>	B1	P64H2_2_PB_IRQ11	IN
8	Y5	PBAD<8>	PBIRQ<10>	F2	P64H2_2_PB_IRQ10	IN
7	AC4	PBAD<7>	PBIRQ<9>	E2	P64H2_2_PB_IRQ9	IN
6	AB4	PBAD<6>	PBIRQ<8>	D2	P64H2_2_PB_IRQ8	IN
5	Y4	PBAD<5>	PBIRQ<7>	C2	P64H2_2_PB_IRQ7	IN
4	W4	PBAD<4>	PBIRQ<6>	B2	P64H2_2_PB_IRQ6	IN
3	AD3	PBAD<3>	PBIRQ<5>	A2	P64H2_2_PB_IRQ5	IN
2	AB3	PBAD<2>	PBIRQ<4>	F3	P64H2_2_PB_IRQ4	IN
1	AA3	PBAD<1>	PBIRQ<3>	E3	P64H2_2_PB_IRQ3	IN
0	W3	PBAD<0>	PBIRQ<2>	D3	P64H2_2_PB_IRQ2	IN
			PBIRQ<1>	C3	P64H2_2_PB_IRQ1	IN
			PBIRQ<0>	B3	P64H2_2_PB_IRQ0	IN
			PBPLOCK*	Y8	P64H2_2_PB_PLOCK_N	OUT

2 OF 5

82870P2 IC

VCC3

R578 2 8.2K 1

R1042 2 8.2K 1

R236 2 8.2K 1

JP33 1X2HDR HDR 1 2

JP34 1X2HDR HDR 1 2

R2015 10K 5% CH 603 1 2

P64H2_2_PB_PCLK6 1 R588 2 33

PLACE SERIES RESISTORS WITHIN 1 INCH OF P64H2

1 R1000 2 33 P64H2_2_PB_PCLK3 OUT

1 R1001 2 33 P64H2_2_PB_PCLK2 OUT

1 R1002 2 33 P64H2_2_PB_PCLK1 OUT

1 R1003 2 33 P64H2_2_PB_PCLK0 OUT

FOR VALIDATION ONLY

JP33	JP34	SLOT A-D PROTOCOL	SLOT A-D MAX FREQ
NO JUMPER	NO JUMPER	PCI-X	66MHZ
NO JUMPER	JUMPER	PCI	66MHZ
JUMPER	JUMPER	PCI	33MHZ

P64H2 #2

66-MHZ SLOTS 2A-D

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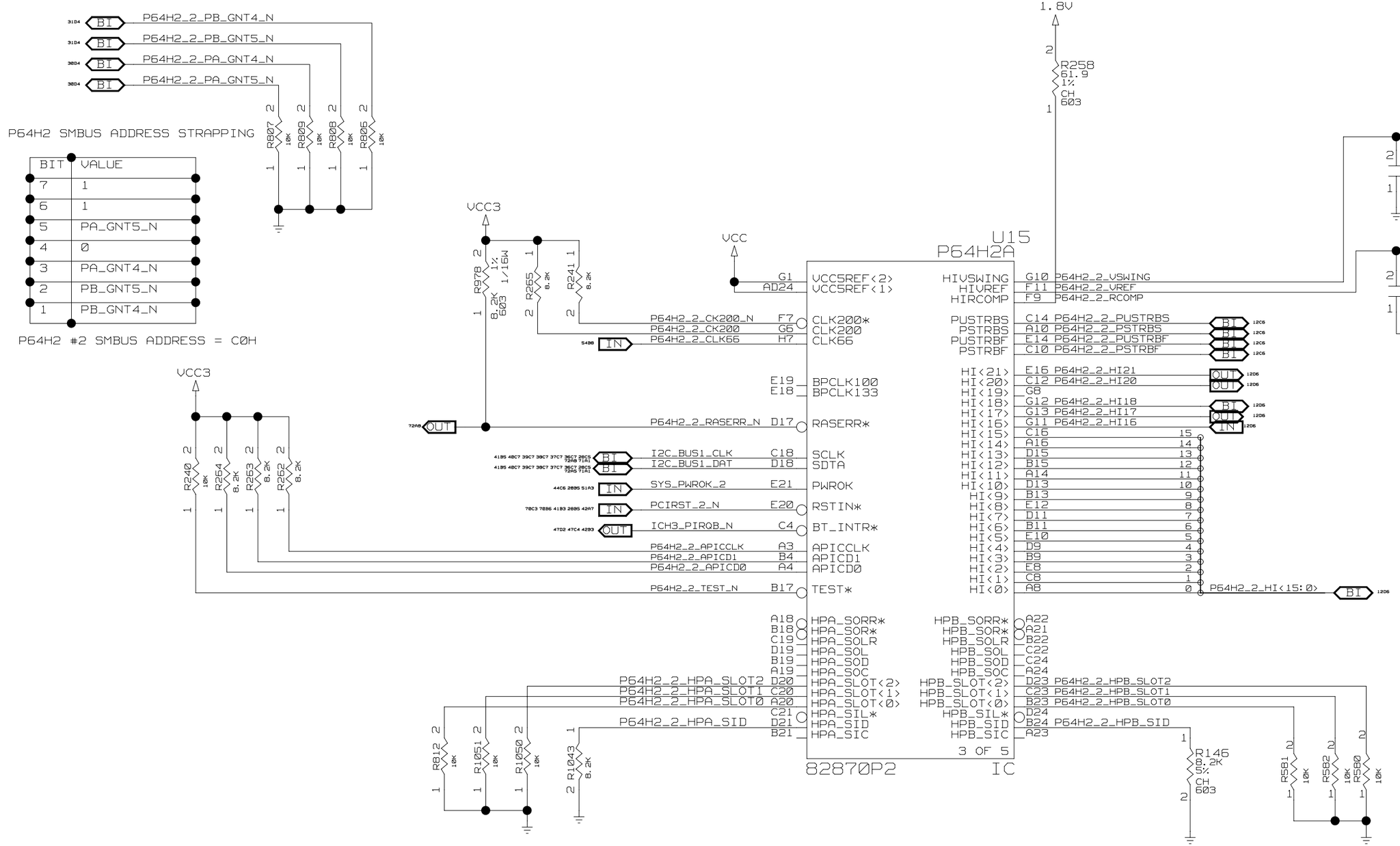
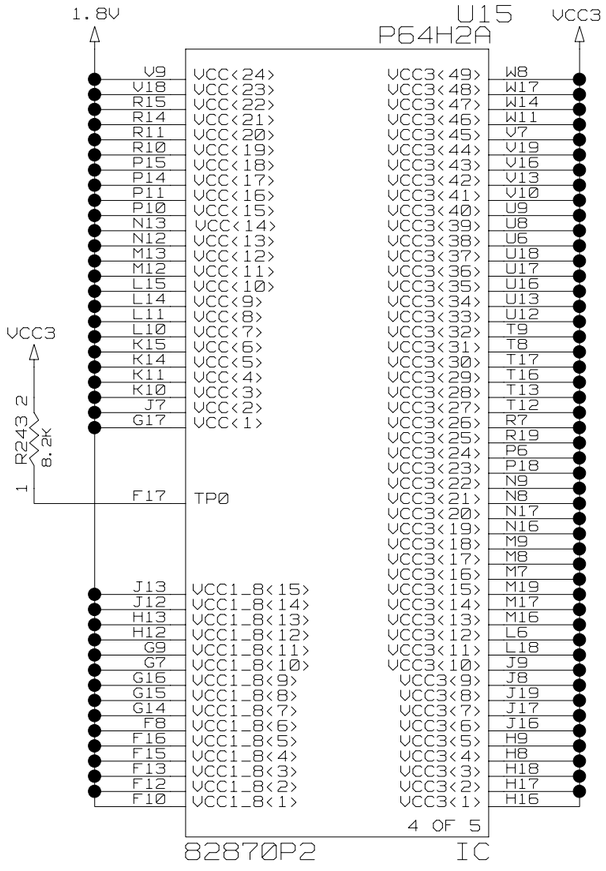
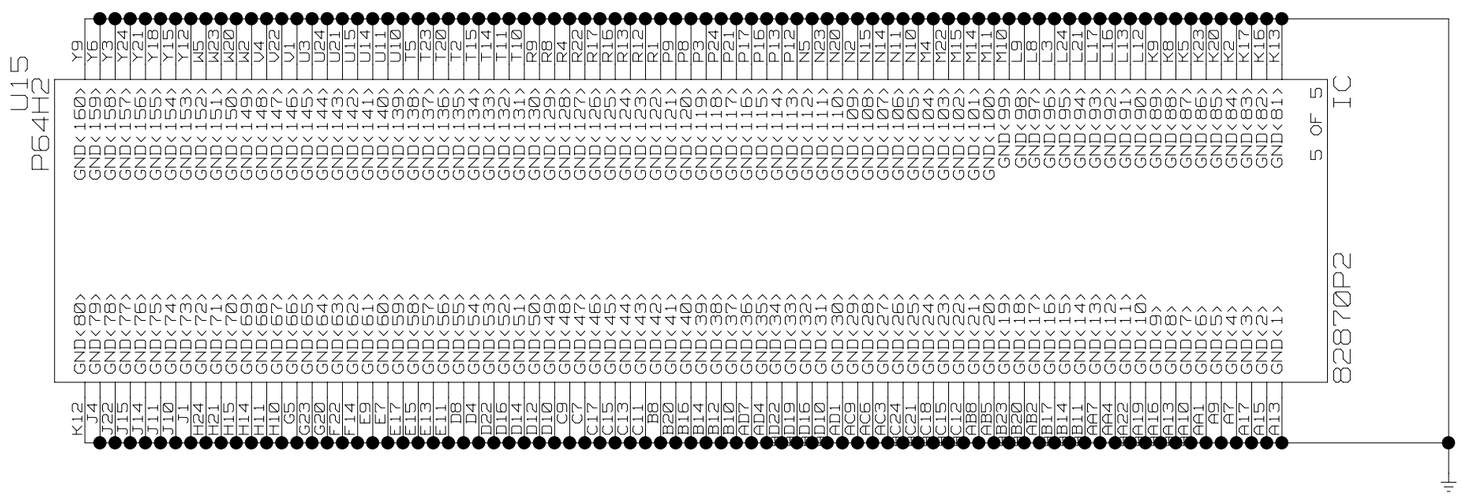
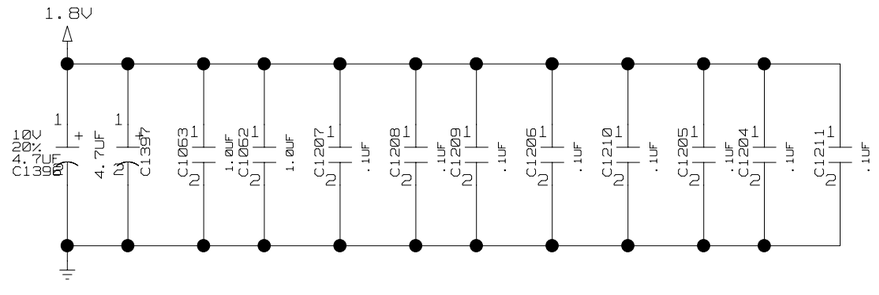


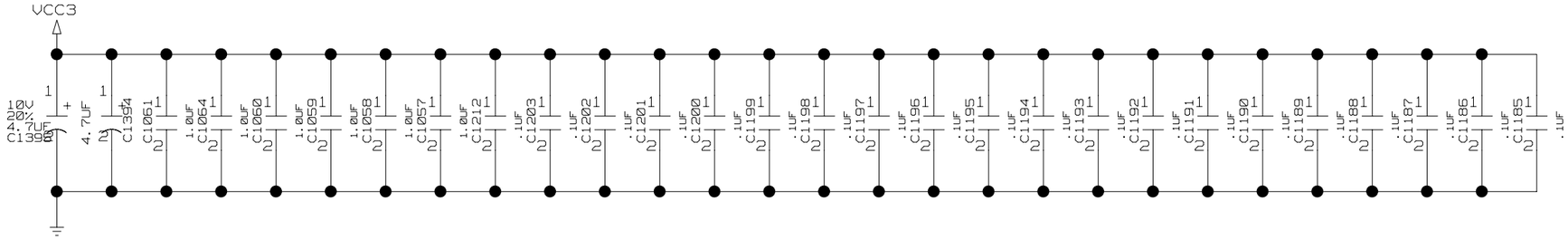
P64H2 #2
HUB LINK

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE	REV
		32	





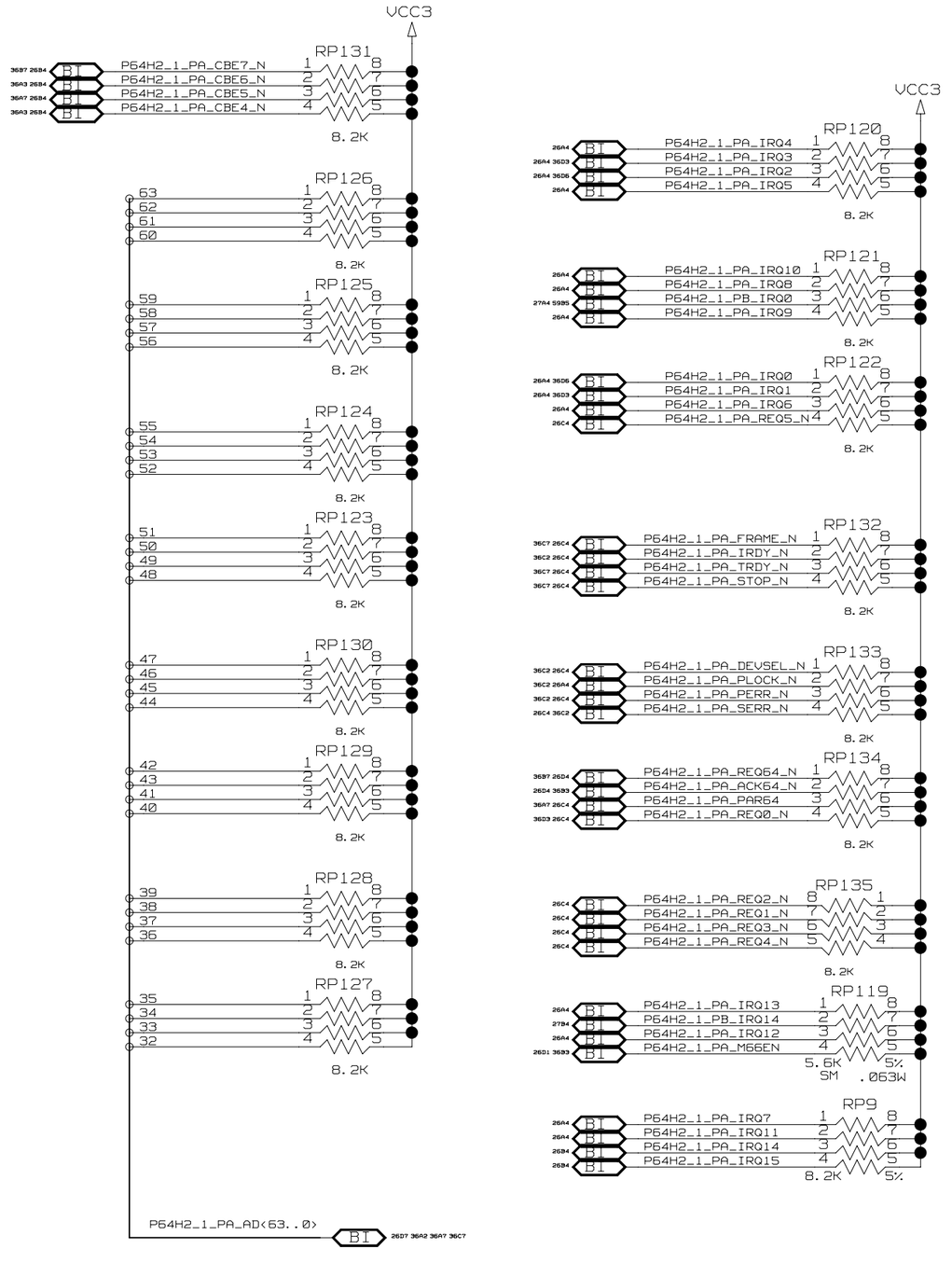




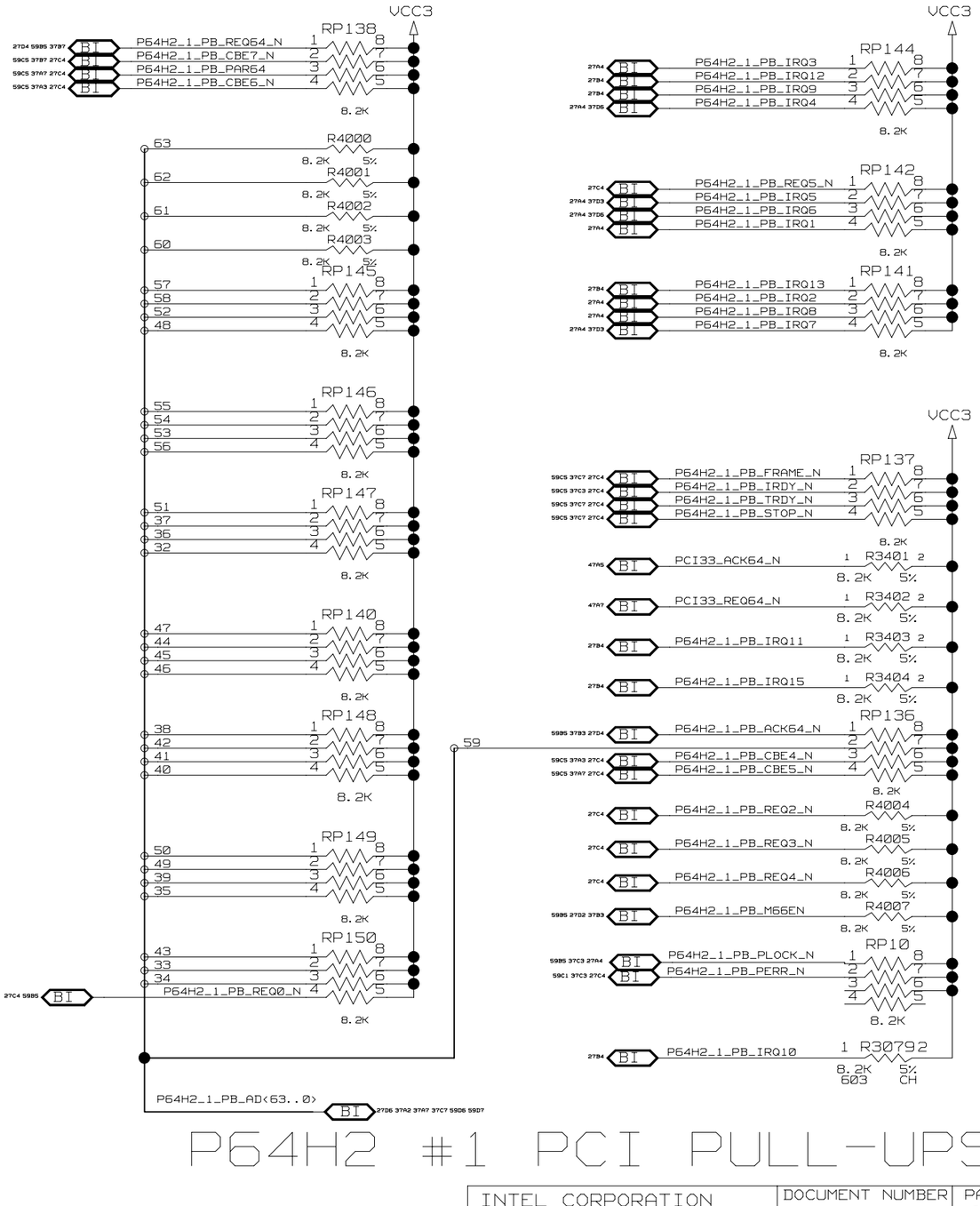
P64H2 #2
POWER AND DECOUPLING

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 33	REV

P64H2 #1 PCI BUS A PULL-UPS



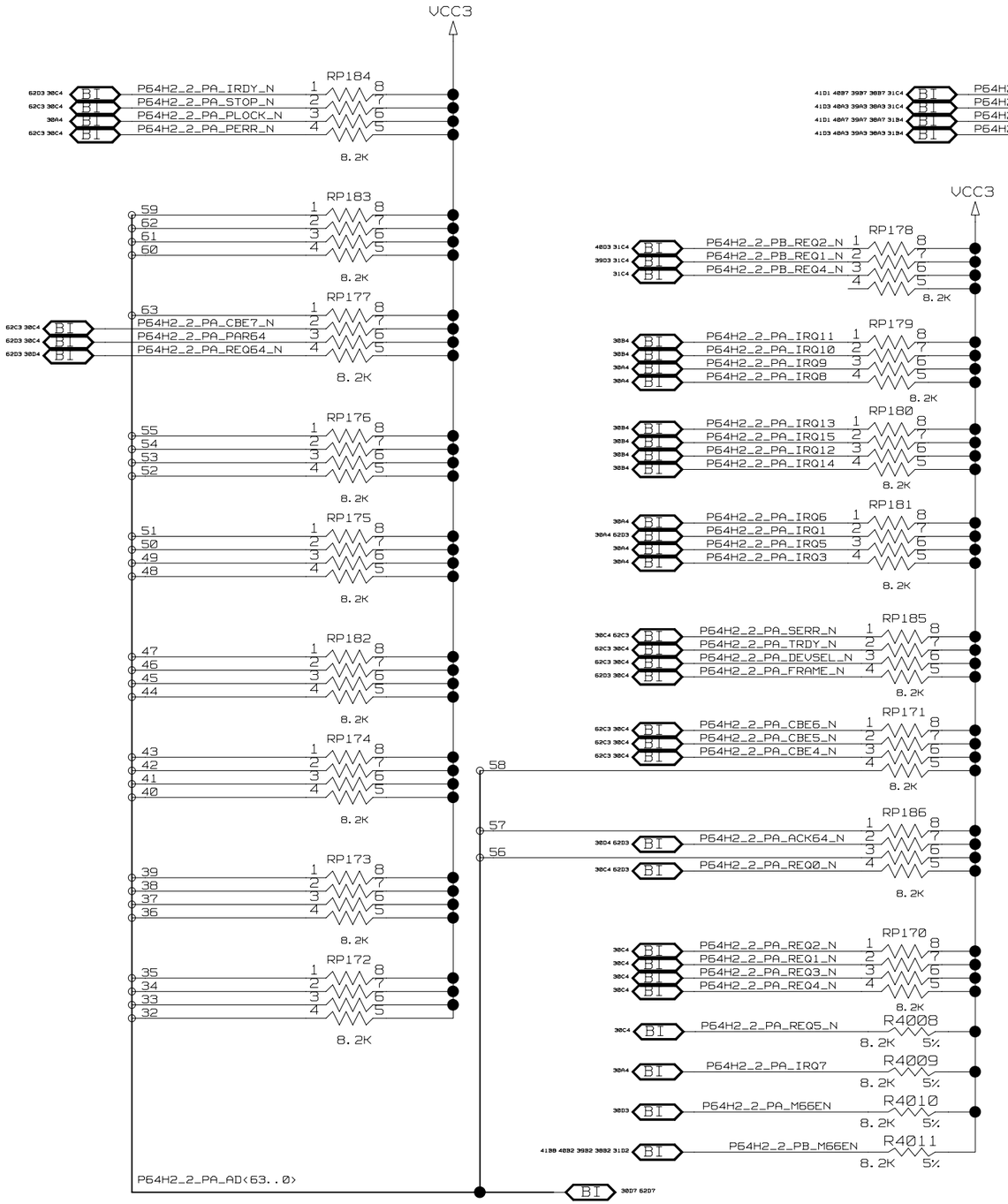
P64H2 #1 PCI BUS B PULL-UPS



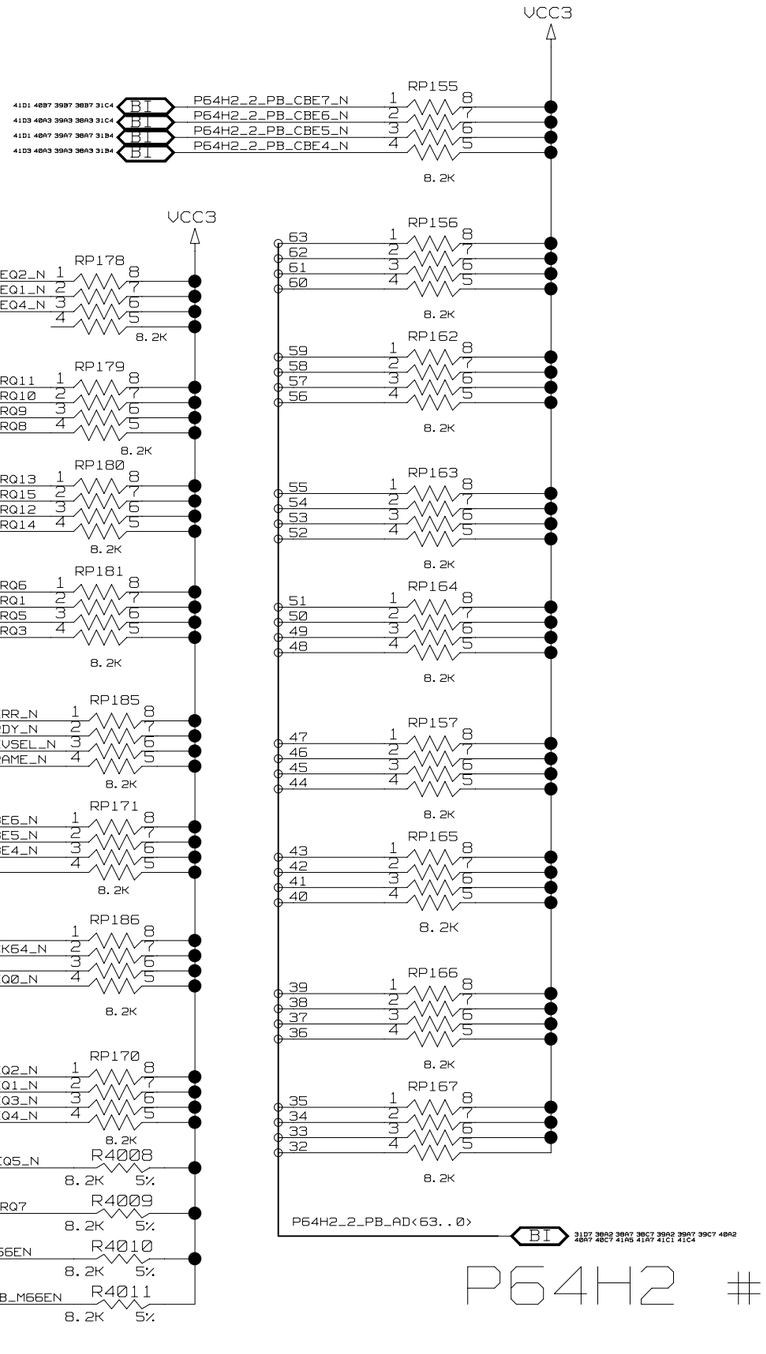
P64H2 #1 PCI PULL-UPS

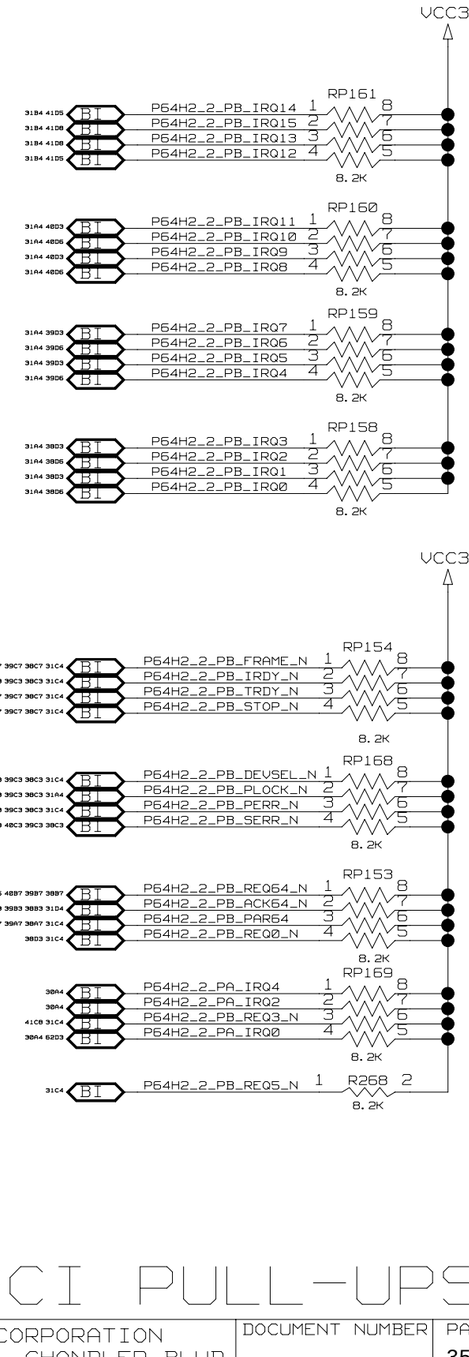
INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 34	REV

P64H2 #2 PCI BUS A PULL-UPS



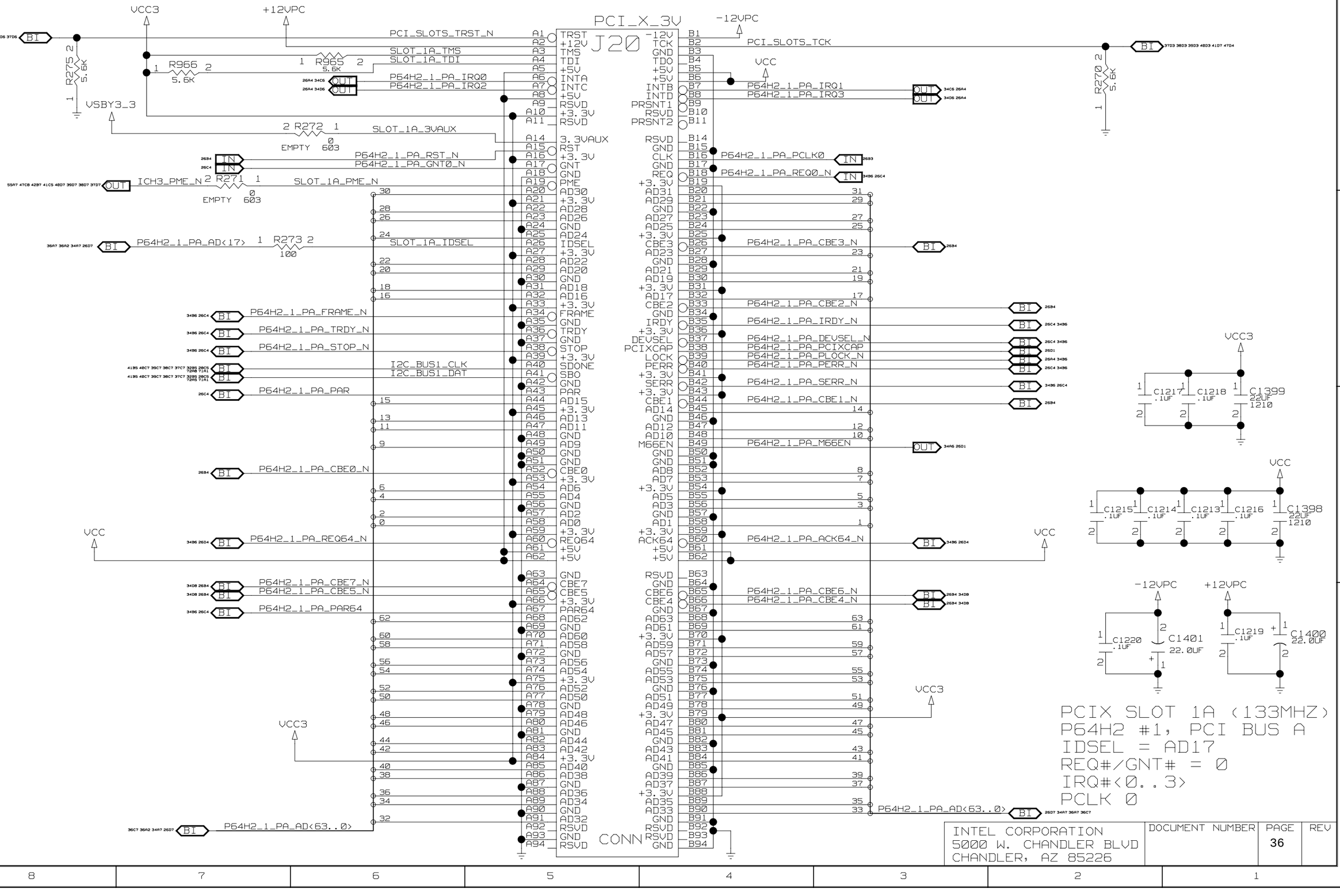
P64H2 #2 PCI BUS B PULL-UPS





P64H2 #2 PCI PULL-UPS

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 35	REV


PCI_X_3V
J20
CONN
PCI_SLOTS_TRST_N
SLOT_1A_TMS
SLOT_1A_TDI
P64H2_1_PA_IRQ0
P64H2_1_PA_IRQ2
SLOT_1A_3VAUX
P64H2_1_PA_RST_N
P64H2_1_PA_GNT0_N
ICH3_PME_N
SLOT_1A_PME_N
P64H2_1_PA_AD<17>
SLOT_1A_IDSEL
P64H2_1_PA_FRAME_N
P64H2_1_PA_TRDY_N
P64H2_1_PA_STOP_N
I2C_BUS1_CLK
I2C_BUS1_DAT
P64H2_1_PA_PAR
P64H2_1_PA_CBE0_N
P64H2_1_PA_REQ64_N
P64H2_1_PA_CBE7_N
P64H2_1_PA_CBE5_N
P64H2_1_PA_PAR64
P64H2_1_PA_AD<63..0>
PCI_SLOTS_TCK
P64H2_1_PA_IRQ1
P64H2_1_PA_IRQ3
P64H2_1_PA_PCLK0
P64H2_1_PA_REQ0_N
P64H2_1_PA_CBE3_N
P64H2_1_PA_CBE2_N
P64H2_1_PA_IRDY_N
P64H2_1_PA_DEVSEL_N
P64H2_1_PA_PCIXCAP
P64H2_1_PA_PLOCK_N
P64H2_1_PA_PERR_N
P64H2_1_PA_SERR_N
P64H2_1_PA_CBE1_N
P64H2_1_PA_M66EN
P64H2_1_PA_ACK64_N
P64H2_1_PA_CBE6_N
P64H2_1_PA_CBE4_N
P64H2_1_PA_AD<63..0>
VCC3
+12VPC
-12VPC
VCC
VSBY3_3
R275 5.6K
R966 5.6K
R965 5.6K
R272 0 EMPTY 603
R271 0 EMPTY 603
R273 100
R270 5.6K
C1217 .1UF
C1218 .1UF
C1399 22UF 1210
C1215 .1UF
C1214 .1UF
C1213 .1UF
C1216 .1UF
C1398 22UF 1210
C1220 .1UF
C1401 22.0UF
C1219 .1UF
C1400 22.0UF
PCIX SLOT 1A (133MHZ)
P64H2 #1, PCI BUS A
IDSEL = AD17
REQ#/GNT# = 0
IRQ#<0..3>
PCLK 0
INTEL CORPORATION
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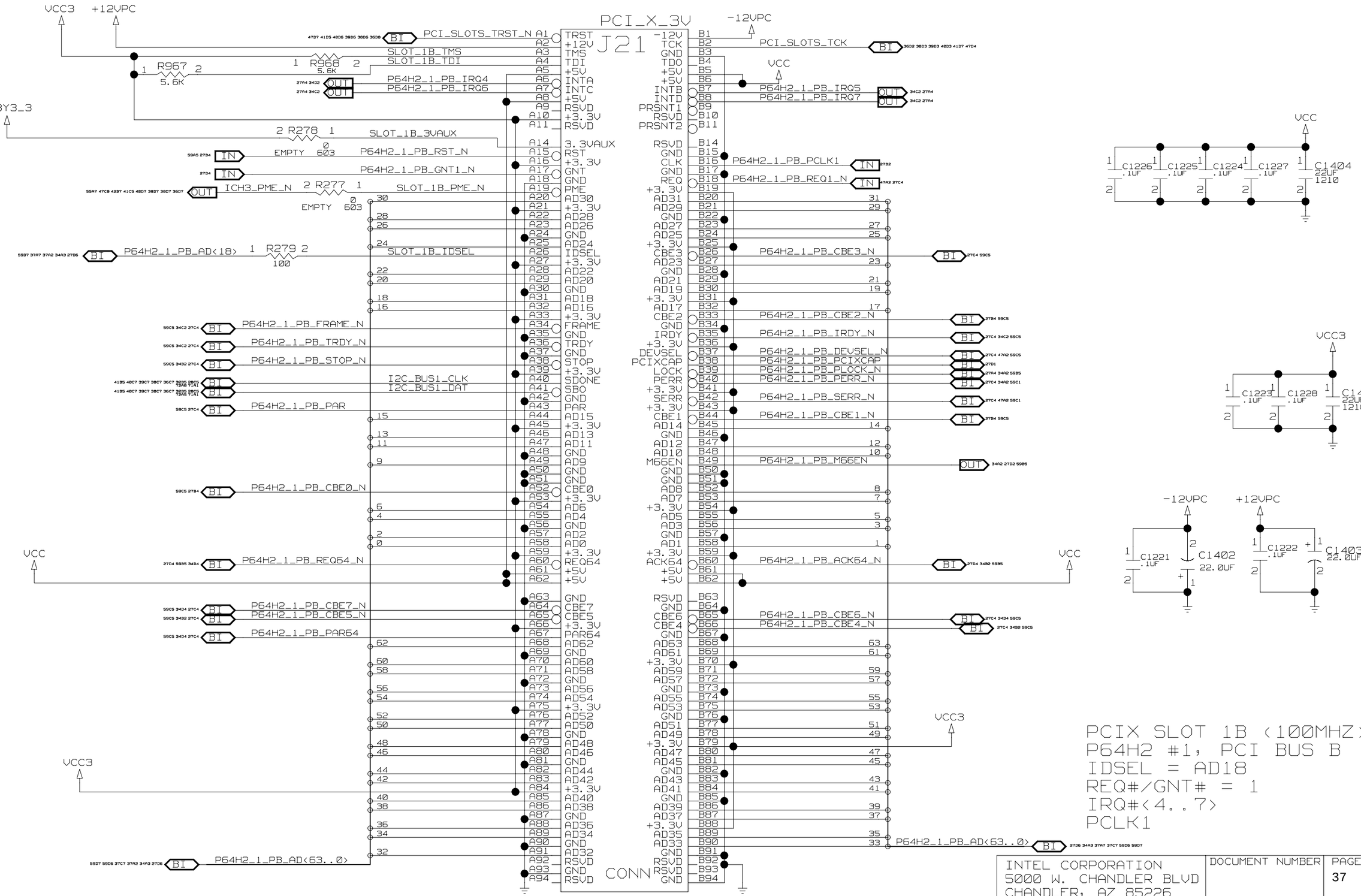
PCI_X_3V
J21
CONN
PCI_SLOTS_TRST_N
PCI_SLOTS_TCK
SLOT_1B_TMS
SLOT_1B_TDI
P64H2_1_PB_IRQ4
P64H2_1_PB_IRQ5
P64H2_1_PB_IRQ6
P64H2_1_PB_IRQ7
SLOT_1B_3VAUX
P64H2_1_PB_RST_N
P64H2_1_PB_GNT1_N
ICH3_PME_N
SLOT_1B_PME_N
P64H2_1_PB_AD<18>
SLOT_1B_IDSEL
P64H2_1_PB_PCLK1
P64H2_1_PB_REQ1_N
P64H2_1_PB_CBE3_N
P64H2_1_PB_CBE2_N
P64H2_1_PB_IRDY_N
P64H2_1_PB_DEVSEL_N
P64H2_1_PB_PCIXCAP
P64H2_1_PB_PLOCK_N
P64H2_1_PB_PERR_N
P64H2_1_PB_SERR_N
P64H2_1_PB_CBE1_N
P64H2_1_PB_M66EN
P64H2_1_PB_ACK64_N
P64H2_1_PB_CBE6_N
P64H2_1_PB_CBE4_N
P64H2_1_PB_AD<63..0>
P64H2_1_PB_FRAME_N
P64H2_1_PB_TRDY_N
P64H2_1_PB_STOP_N
I2C_BUS1_CLK
I2C_BUS1_DAT
P64H2_1_PB_PAR
P64H2_1_PB_CBE0_N
P64H2_1_PB_REQ64_N
P64H2_1_PB_CBE7_N
P64H2_1_PB_CBE5_N
P64H2_1_PB_PAR64
P64H2_1_PB_AD<63..0>
R967 5.6K
R968 5.6K
R278 0 EMPTY 603
R277 0 EMPTY 603
R279 100
C1226 .1UF
C1225 .1UF
C1224 .1UF
C1227 .1UF
C1404 22UF 1210
C1223 .1UF
C1228 .1UF
C1405 22UF 1210
C1221 .1UF
C1402 22.0UF
C1222 .1UF
C1403 22.0UF
VCC
VCC3
VSBY3_3
+12VPC
-12VPC
PCIX SLOT 1B (100MHZ)
P64H2 #1, PCI BUS B
IDSEL = AD18
REQ#/GNT# = 1
IRQ#<4..7>
PCLK1
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PCIX SLOT 2A (66MHZ)
P64H2 #2, PCI BUS B
IDSEL = AD17
REQ#/GNT# = 0
IRQ#<0..3>
PCLK0

PCI_X_3V

J23

CONN

VCC3 +12VPC -12VPC VCC VSBY3_3

R969 5.6K
R970 5.6K
R330 0 EMPTY 603
R329 0 EMPTY 603
R331 100

SLOT_2A_TMS
SLOT_2A_TDI
P64H2_2_PB_IRQ0
P64H2_2_PB_IRQ2
SLOT_2A_3VAUX
P64H2_2_PB_RST_N
P64H2_2_PB_GNT0_N
ICH3_PME_N
SLOT_2A_PME_N
P64H2_2_PB_AD<17>
SLOT_2A_IDSEL
P64H2_2_PB_FRAME_N
P64H2_2_PB_TRDY_N
P64H2_2_PB_STOP_N
I2C_BUS1_CLK
I2C_BUS1_DAT
P64H2_2_PB_PAR
P64H2_2_PB_CBE0_N
P64H2_2_PB_REQ64_N
P64H2_2_PB_CBE7_N
P64H2_2_PB_CBE5_N
P64H2_2_PB_PAR64
P64H2_2_PB_AD<63..0>

A1	TRST	B1	-12V	PCI_SLOTS_TRST_N			
A2	+12V	B2	TCK	PCI_SLOTS_TCK			
A3	TMS	B3	GND				
A4	TDI	B4	TDO				
A5	+5V	B5	+5V				
A6	INTA	B6	+5V				
A7	INTC	B7	INTB	P64H2_2_PB_IRQ1			
A8	+5V	B8	INTD	P64H2_2_PB_IRQ3			
A9	RSVD	B9	PRSNT1				
A10	+3.3V	B10	RSVD				
A11	RSVD	B11	PRSNT2				
A14	3.3VAUX	B14	RSVD				
A15	RST	B15	GND				
A16	+3.3V	B16	CLK	P64H2_2_PB_PCLK0			
A17	GNT	B17	GND				
A18	GND	B18	REQ	P64H2_2_PB_REQ0_N			
A19	PME	B19	+3.3V				
A20	AD30	B20	AD31		31		
A21	+3.3V	B21	AD29		29		
A22	AD28	B22	GND				
A23	AD26	B23	AD27		27		
A24	GND	B24	AD25		25		
A25	AD24	B25	+3.3V				
A26	IDSEL	B26	CBE3	P64H2_2_PB_CBE3_N			
A27	+3.3V	B27	AD23		23		
A28	AD22	B28	GND				
A29	AD20	B29	AD21		21		
A30	GND	B30	AD19		19		
A31	AD18	B31	+3.3V				
A32	AD16	B32	AD17		17		
A33	+3.3V	B33	CBE2	P64H2_2_PB_CBE2_N			
A34	FRAME	B34	GND				
A35	GND	B35	IRDY	P64H2_2_PB_IRDY_N			
A36	TRDY	B36	+3.3V				
A37	GND	B37	DEVSEL	P64H2_2_PB_DEVSEL_N			
A38	STOP	B38	PCIXCAP	P64H2_2_PB_PCIXCAP			
A39	+3.3V	B39	LOCK	P64H2_2_PB_PLOCK_N			
A40	SDONE	B40	PERR	P64H2_2_PB_PERR_N			
A41	SBO	B41	+3.3V				
A42	GND	B42	SERR	P64H2_2_PB_SERR_N			
A43	PAR	B43	+3.3V				
A44	AD15	B44	CBE1	P64H2_2_PB_CBE1_N			
A45	+3.3V	B45	AD14		14		
A46	AD13	B46	GND				
A47	AD11	B47	AD12		12		
A48	GND	B48	AD10		10		
A49	AD9	B49	M66EN	P64H2_2_PB_M66EN			
A50	GND	B50	GND				
A51	GND	B51	GND				
A52	CBE0	B52	AD8		8		
A53	+3.3V	B53	AD7		7		
A54	AD6	B54	+3.3V				
A55	AD4	B55	AD5		5		
A56	GND	B56	AD3		3		
A57	AD2	B57	GND				
A58	AD0	B58	AD1		1		
A59	+3.3V	B59	+3.3V				
A60	REQ64	B60	ACK64	P64H2_2_PB_ACK64_N			
A61	+5V	B61	+5V				
A62	+5V	B62	+5V				
A63	GND	B63	RSVD				
A64	CBE7	B64	GND				
A65	CBE5	B65	CBE6	P64H2_2_PB_CBE6_N			
A66	+3.3V	B66	CBE4	P64H2_2_PB_CBE4_N			
A67	PAR64	B67	GND				
A68	AD62	B68	AD63		63		
A69	GND	B69	AD61		61		
A70	AD60	B70	+3.3V				
A71	AD58	B71	AD59		59		
A72	GND	B72	AD57		57		
A73	AD56	B73	GND				
A74	AD54	B74	AD55		55		
A75	+3.3V	B75	AD53		53		
A76	AD52	B76	GND				
A77	AD50	B78	AD51		51		
A78	GND	B78	AD49		49		
A79	AD48	B79	+3.3V				
A80	AD46	B80	AD47		47		
A81	GND	B81	AD45		45		
A82	AD44	B82	GND				
A83	AD42	B83	AD43		43		
A84	+3.3V	B84	AD41		41		
A85	AD40	B85	GND				
A86	AD38	B86	AD39		39		
A87	GND	B87	AD37		37		
A88	AD36	B88	+3.3V				
A89	AD34	B89	AD35		35		
A90	GND	B90	AD33		33		
A91	AD32	B91	GND				
A92	RSVD	B92	RSVD				
A93	GND	B93	RSVD				
A94	RSVD	B94	GND				

C408 .1UF C407 .1UF C406 .1UF C405 .1UF C683 22UF 1210

C410 .1UF C409 .1UF C680 22UF 1210

C412 .1UF C682 22.0UF C411 .1UF C681 22.0UF

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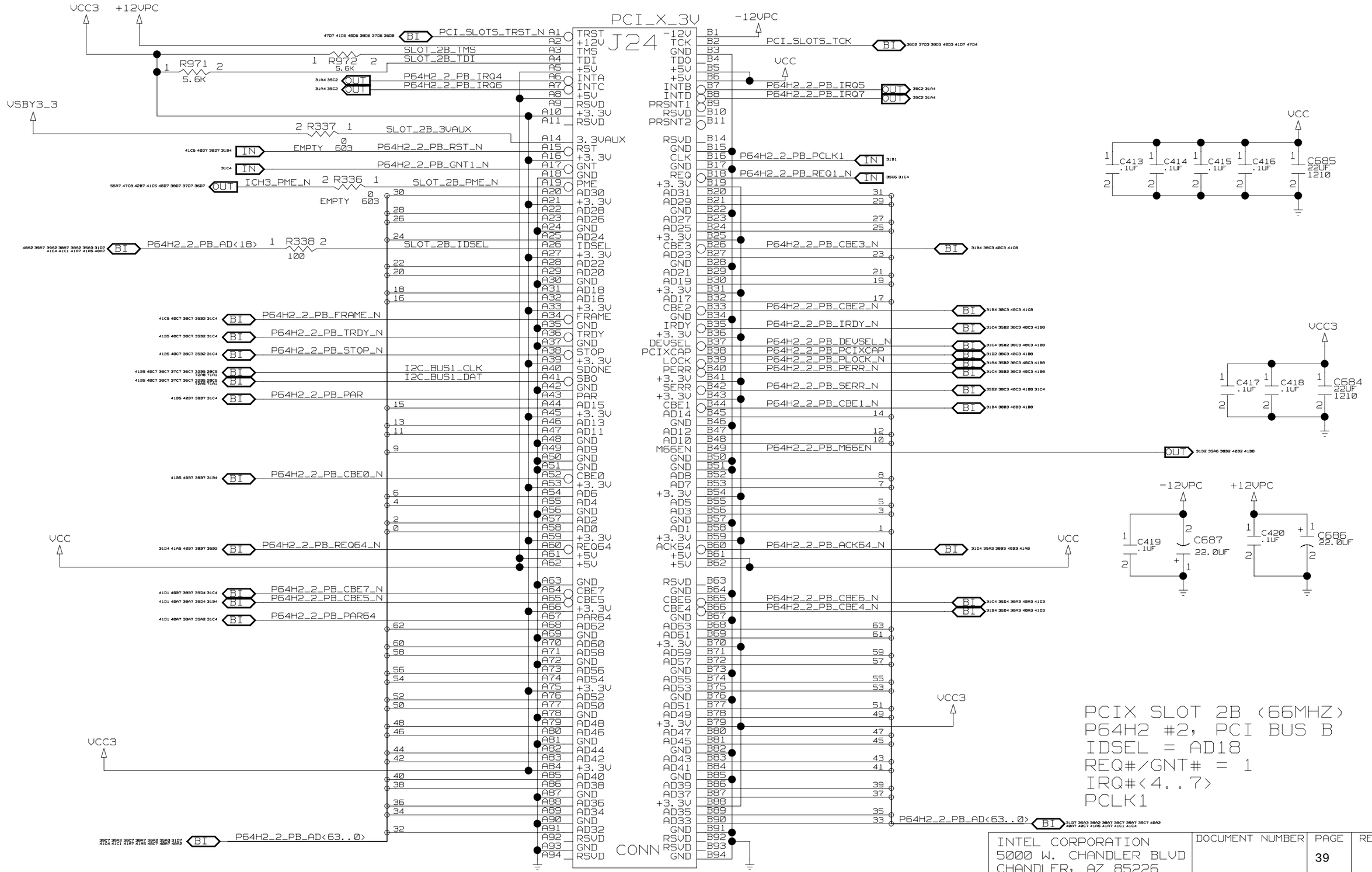

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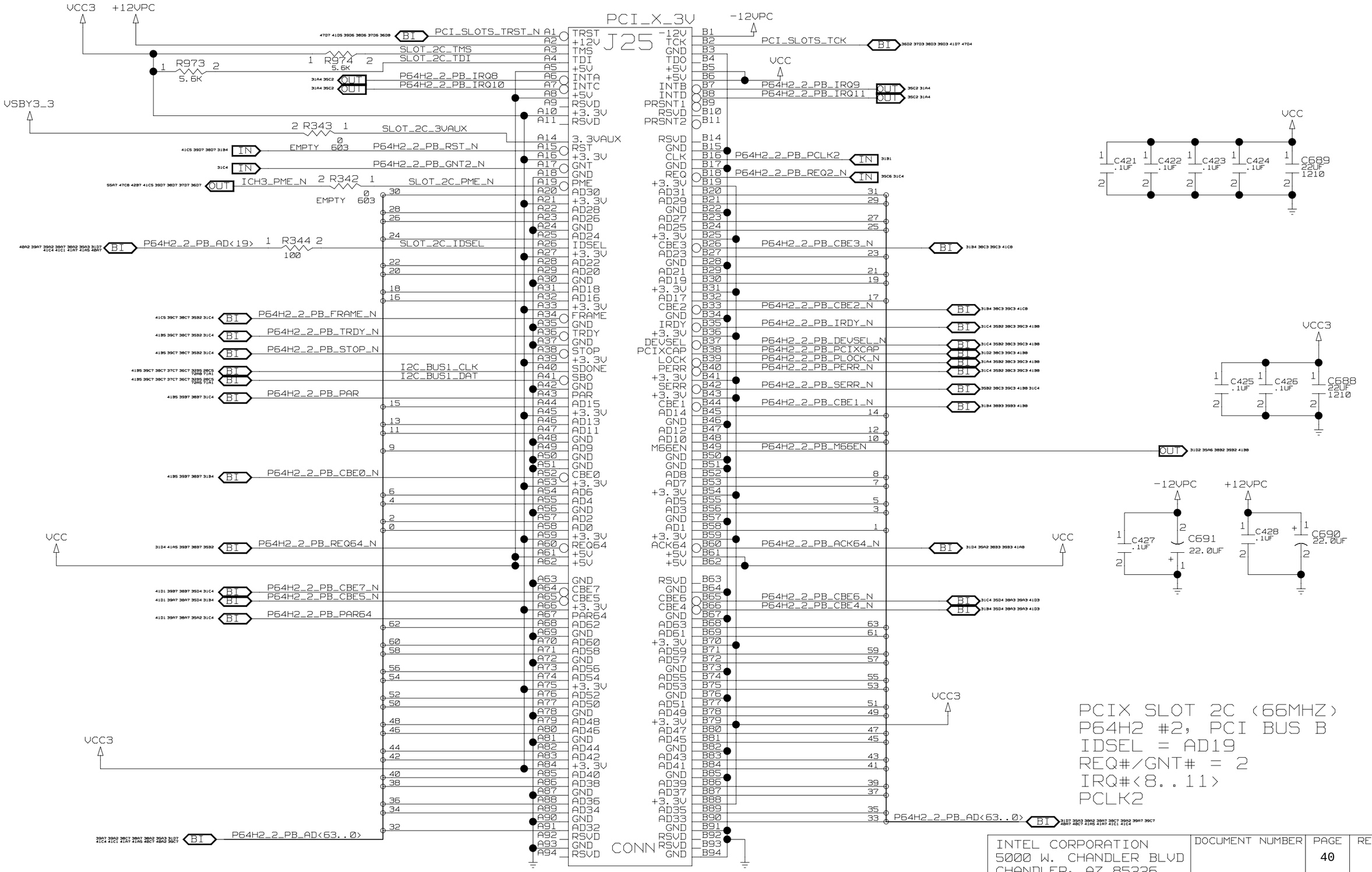
PCI_X_3V
J25
CONN
VCC3
+12VPC
-12VPC
VCC
VSBY3_3
PCI_SLOTS_TRST_N
PCI_SLOTS_TCK
SLOT_2C_TMS
SLOT_2C_TDI
P64H2_2_PB_IRQ8
P64H2_2_PB_IRQ10
P64H2_2_PB_IRQ9
P64H2_2_PB_IRQ11
SLOT_2C_3VAUX
P64H2_2_PB_RST_N
P64H2_2_PB_GNT2_N
ICH3_PME_N
SLOT_2C_PME_N
P64H2_2_PB_AD<19>
SLOT_2C_IDSEL
P64H2_2_PB_FRAME_N
P64H2_2_PB_TRDY_N
P64H2_2_PB_STOP_N
I2C_BUS1_CLK
I2C_BUS1_DAT
P64H2_2_PB_PAR
P64H2_2_PB_CBE0_N
P64H2_2_PB_REQ64_N
P64H2_2_PB_CBE7_N
P64H2_2_PB_CBE5_N
P64H2_2_PB_PAR64
P64H2_2_PB_AD<63..0>
P64H2_2_PB_PCLK2
P64H2_2_PB_REQ2_N
P64H2_2_PB_CBE3_N
P64H2_2_PB_CBE2_N
P64H2_2_PB_IRDY_N
P64H2_2_PB_DEVSEL_N
P64H2_2_PB_PCIXCAP
P64H2_2_PB_PLOCK_N
P64H2_2_PB_PERR_N
P64H2_2_PB_SERR_N
P64H2_2_PB_CBE1_N
P64H2_2_PB_M66EN
P64H2_2_PB_ACK64_N
P64H2_2_PB_CBE6_N
P64H2_2_PB_CBE4_N
R973 5.6K
R974 5.6K
R343 0
R342 0
R344 100
C421 .1UF
C422 .1UF
C423 .1UF
C424 .1UF
C689 22UF 1210
C425 .1UF
C426 .1UF
C688 22UF 1210
C427 .1UF
C691 22.0UF
C428 .1UF
C690 22.0UF
PCIX SLOT 2C (66MHZ)
P64H2 #2, PCI BUS B
IDSEL = AD19
REQ#/GNT# = 2
IRQ#<8..11>
PCLK2
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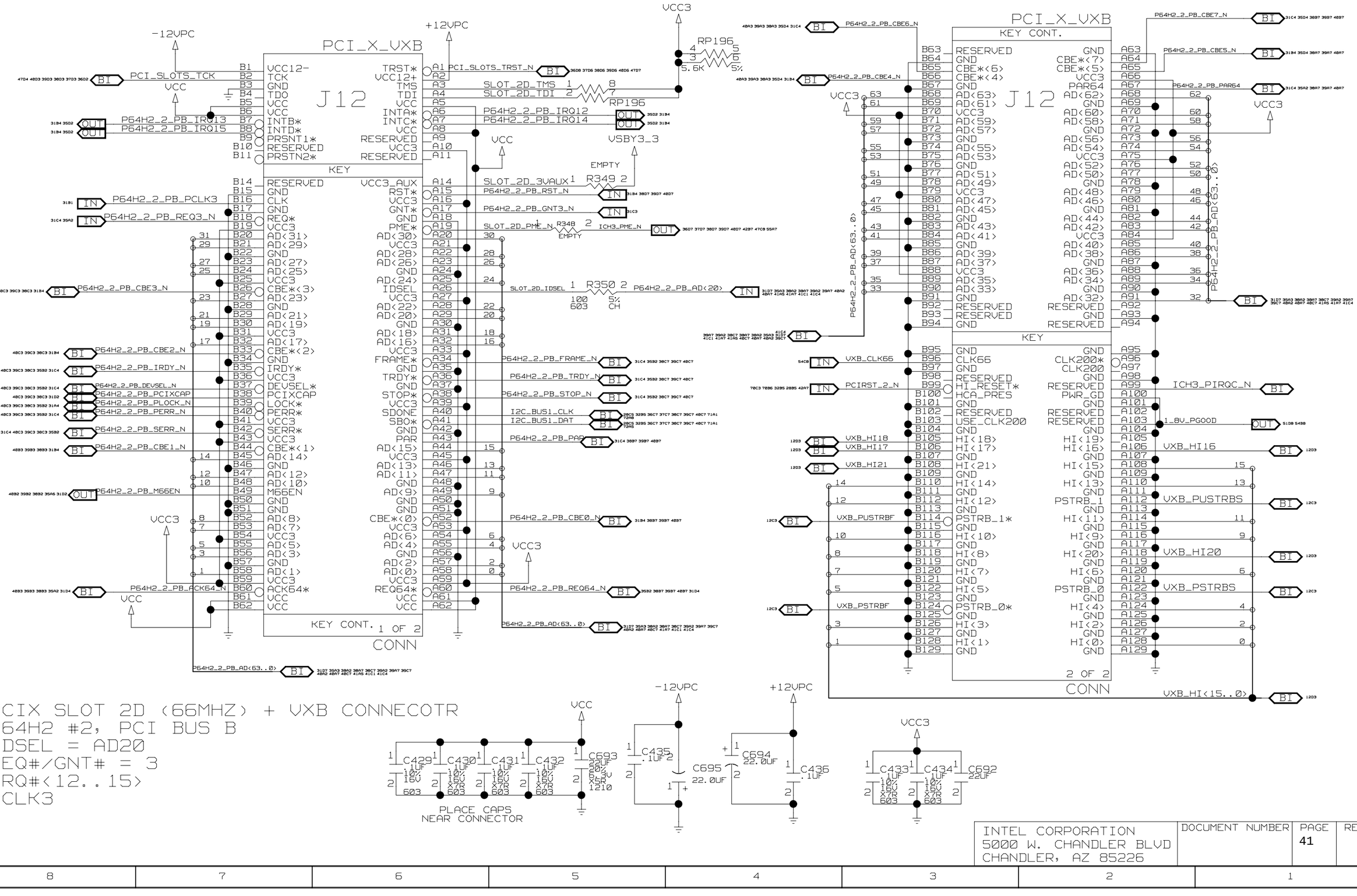
PCI_X_VXB
J12
KEY
KEY CONT. 1 OF 2
CONN
PCI_X_VXB
KEY CONT.
KEY
2 OF 2
CONN
-12VPC
+12VPC
VCC
VCC3
VSBY3_3
PCI_SLOTS_TCK
PCI_SLOTS_TRST_N
SLOT_2D_TMS
SLOT_2D_TDI
P64H2_2_PB_IRQ12
P64H2_2_PB_IRQ14
P64H2_2_PB_IRQ13
P64H2_2_PB_IRQ15
P64H2_2_PB_PCLK3
P64H2_2_PB_REQ3_N
P64H2_2_PB_RST_N
P64H2_2_PB_GNT3_N
SLOT_2D_PME_N
SLOT_2D_3VAUX
SLOT_2D_IDSEL
P64H2_2_PB_AD<20>
P64H2_2_PB_CBE3_N
P64H2_2_PB_CBE2_N
P64H2_2_PB_IRDY_N
P64H2_2_PB_DEVSEL_N
P64H2_2_PB_PCIXCAP
P64H2_2_PB_PLOCK_N
P64H2_2_PB_PERR_N
P64H2_2_PB_SERR_N
P64H2_2_PB_CBE1_N
P64H2_2_PB_M66EN
P64H2_2_PB_ACK64_N
P64H2_2_PB_FRAME_N
P64H2_2_PB_TRDY_N
P64H2_2_PB_STOP_N
I2C_BUS1_CLK
I2C_BUS1_DAT
P64H2_2_PB_PAR
P64H2_2_PB_CBE0_N
P64H2_2_PB_REQ64_N
P64H2_2_PB_AD<63..0>
P64H2_2_PB_CBE6_N
P64H2_2_PB_CBE4_N
P64H2_2_PB_CBE7_N
P64H2_2_PB_CBE5_N
P64H2_2_PB_PAR64
VXB_CLK66
PCIRST_2_N
VXB_HI18
VXB_HI17
VXB_HI21
VXB_PUSTRBF
VXB_PSTRBF
ICH3_PIRQC_N
1_8V_PGOOD
VXB_HI16
VXB_PUSTRBS
VXB_HI20
VXB_PSTRBS
VXB_HI<15..0>
RP196
5.6K
R349
R348
R350
EMPTY
100
603
CH
PCIX SLOT 2D (66MHZ) + VXB CONNECOTR
P64H2 #2, PCI BUS B
IDSEL = AD20
REQ#/GNT# = 3
IRQ#<12..15>
PCLK3
PLACE CAPS
NEAR CONNECTOR
C429
C430
C431
C432
C693
C435
C695
C694
C436
C433
C434
C692
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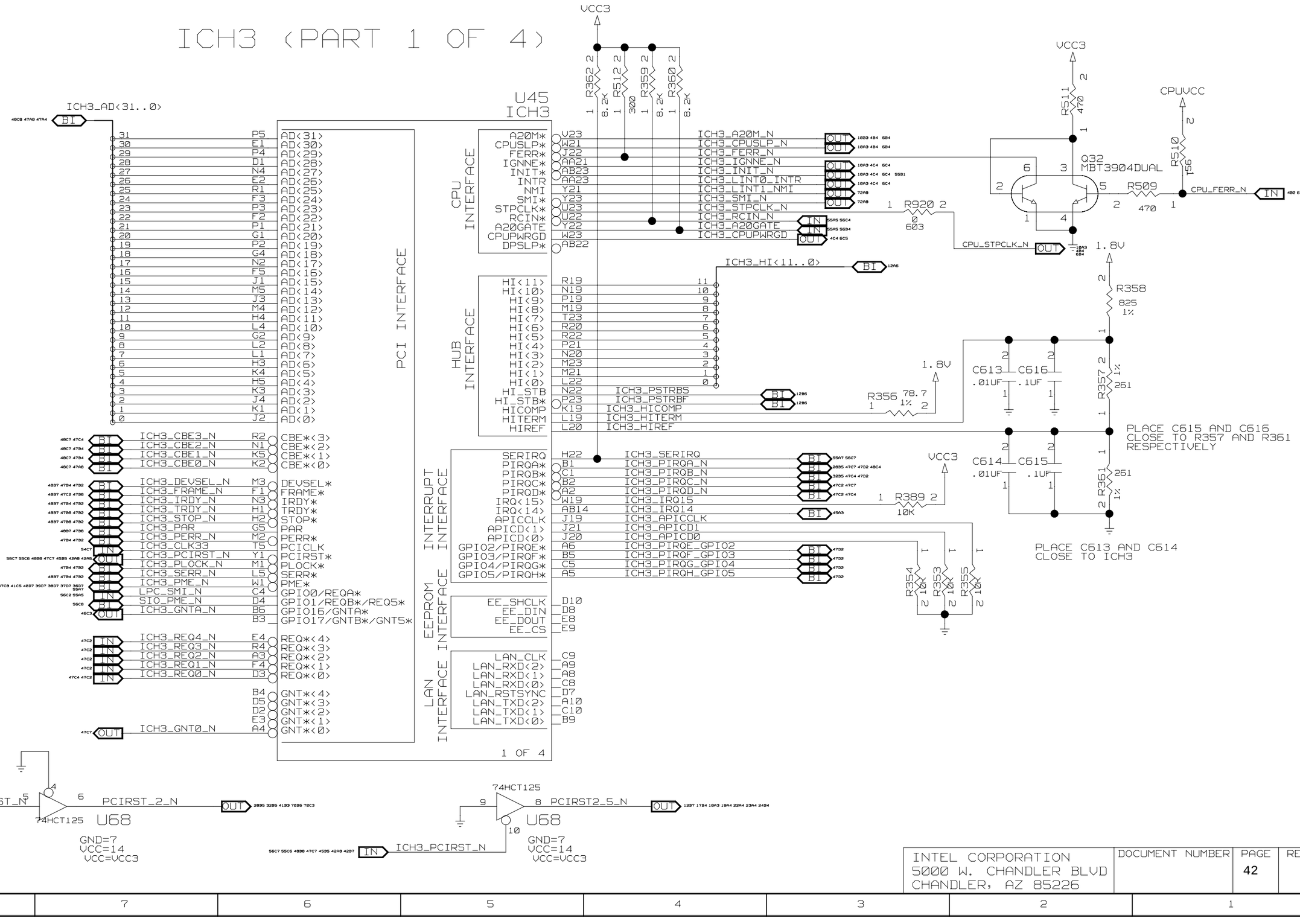

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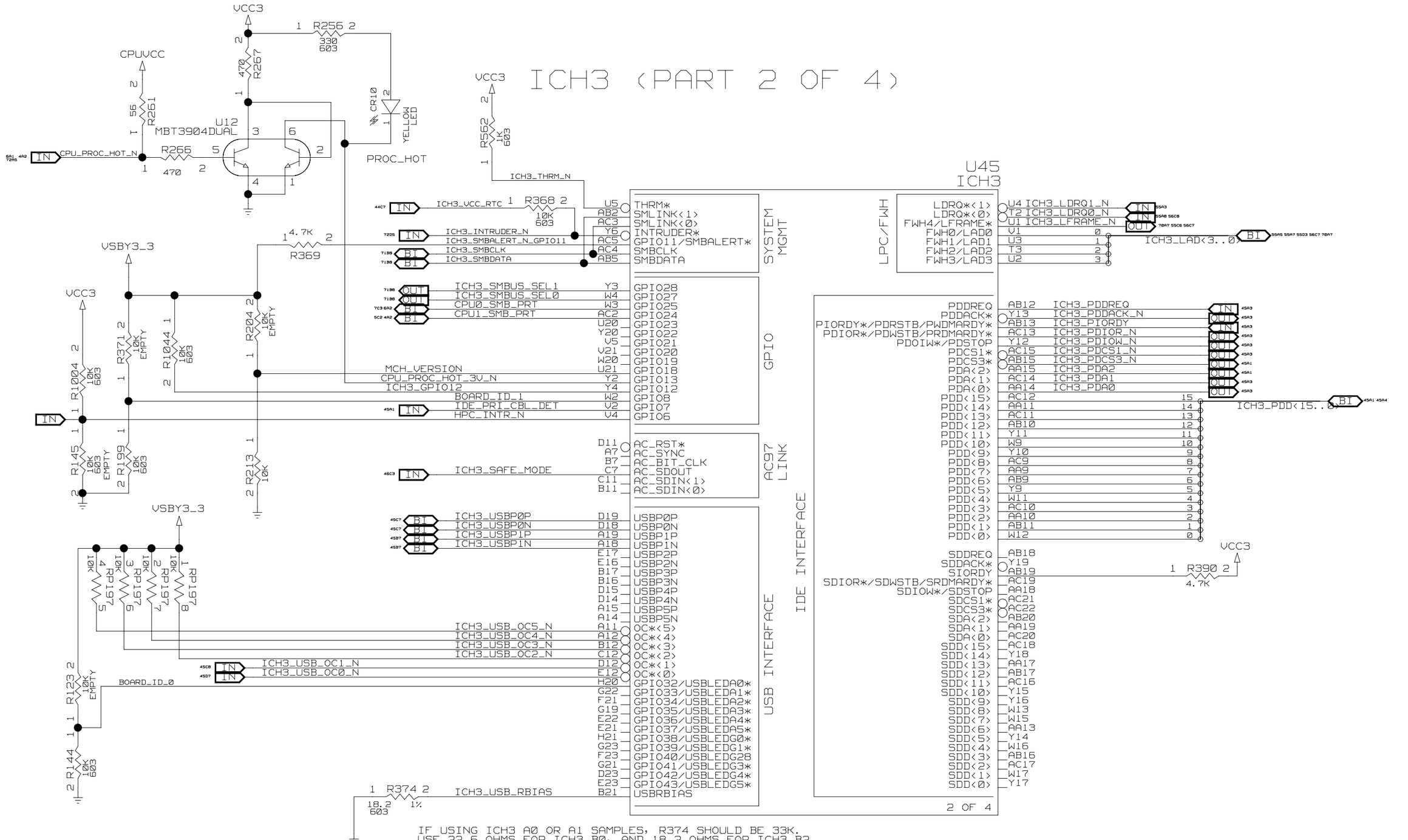

IF USING ICH3 A0 OR A1 SAMPLES, R374 SHOULD BE 33K.
USE 22.6 OHMS FOR ICH3 B0, AND 18.2 OHMS FOR ICH3 B2.

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ICH3 (PART 3 OF 4)

S8 SW

R735 330

ICH3_PWRBTN_N

RTCRST_PD

CMOS_CLEAR

R383 1K

1X3HDR JP4

RTCRST_PU

C1080 1.0UF

R382 10K

VSBY3_3

SOT23C

CR1

R380 1K

V_BAT

BH1 3PCOIN

C617 .047UF

C1078 1.0UF

PLACE CLOSE TO ICH3

ICH3_VBIAS

R376 10M

R377 10M

Y1

ICH3_RTCX2

ICH3_RTCX1

C618 15PF

C619 10.0PF

R381 10K

VSBY3_3

ICH3_CLK14 J23 CLK14

ICH3_CLK48 F20 CLK48

ICH3_CLK66 T19 CLK66

ICH3_SLP_S5_N AA5 SLP_S3*

AA2 SLP_S5*

SYS_PWROK_2 AA6 PWROK

ICH3_PWRBTN_N AB1 PWRBTN*

ICH3_RI_N AA1 RI*

ICH3_RSMRST_N AA7 RSMRST*

AB4 SUS_STAT*/LPCPD*

ICH3_SUSCLK AA4 SUSCLK

ICH3_VRMPWRGD V19 VGATE/VRMPWRGD

Y5 LAN_RST*

R375 10K

ICH3_LAN_RST_N

ICH3_VCC_RTC AB6 VCCRTC

ICH3_RTCRST_N Y7 RTCRST*

ICH3_RTCX1 AC7 RTCX1

ICH3_RTCX2 AC6 RTCX2

AB7 VBIAS

ICH3_SPKR H23 SPKR

ICH3_DPSLPVR AB21 DPRSLPVR

ICH3_TP0 AB3 TP0

R747 10K

R378 10K

VSBY3_3

VSBY5_0

W8 V5REF<2>

E6 V5REF<1>

W5 V5REF_SUS<2>

C13 V5REF_SUS<1>

VCC

R379 1K

CR2

SOT23C

C1079 1.0UF

C2 N/C<5>

T1 N/C<4>

D6 N/C<3>

T21 N/C<2>

E7 N/C<1>

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U45 ICH3

VCC3<15> U6

VCC3<14> T6

VCC3<13> R6

VCC3<12> M10

VCC3<11> J6

VCC3<10> H6

VCC3<9> G6

VCC3<8> F6

VCC3<7> V18

VCC3<6> V17

VCC3<5> V16

VCC3<4> V15

VCC3<3> P12

VCC3<2> H18

VCC3<1> G18

VCC3

C1096 .1UF

C1097 .1UF

C1098 .1UF

C1099 .1UF

C1100 .1UF

C1101 .1UF

VCC1_8<12> T18

VCC1_8<11> R18

VCC1_8<10> M14

VCC1_8<9> J18

VCC1_8<8> V14

VCC1_8<7> V10

VCC1_8<6> P18

VCC1_8<5> P6

VCC1_8<4> K18

VCC1_8<3> K6

VCC1_8<2> E11

VCC1_8<1> U19

1.8V

C1091 .1UF

C1093 .1UF

C1094 .1UF

C1095 .1UF

VCCSUS3_3<6> K14

VCCSUS3_3<5> F18

VCCSUS3_3<4> F17

VCCSUS3_3<3> V9

VCCSUS3_3<2> V8

VCCSUS3_3<1> E10

VCCLAN3_3<2> F10

VCCLAN3_3<1> F9

VSBY3_3

C1089 .1UF

C1090 .1UF

VCCSUS1_8<10> B23

VCCSUS1_8<9> C23

VCCSUS1_8<8> F16

VCCSUS1_8<7> F15

VCCSUS1_8<6> V7

VCCSUS1_8<5> V6

VCCSUS1_8<4> P10

VCCSUS1_8<3> K12

VCCSUS1_8<2> F14

VCCSUS1_8<1> E13

VSBY1_8

C1085 .1UF

C1086 .1UF

VCCLAN1_8<3> K10

VCCLAN1_8<2> F8

VCCLAN1_8<1> F7

V_CPU_IO<3> V22

V_CPU_IO<2> U18

V_CPU_IO<1> P14

CPUVCC

C1081 .1UF

VCC3

1.8V

R2014 220 603

Q58 PZT751 XSTR

R2013 220 603

Q57 MMBT3904 XSTR

R2012 470 603

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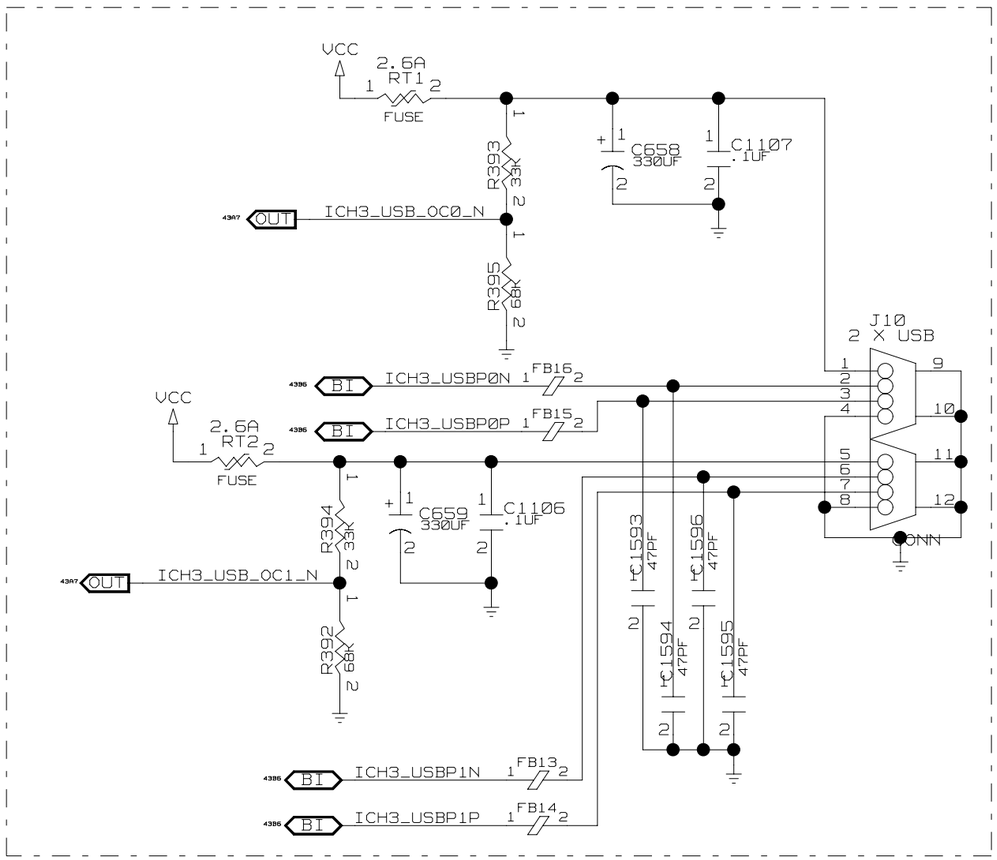

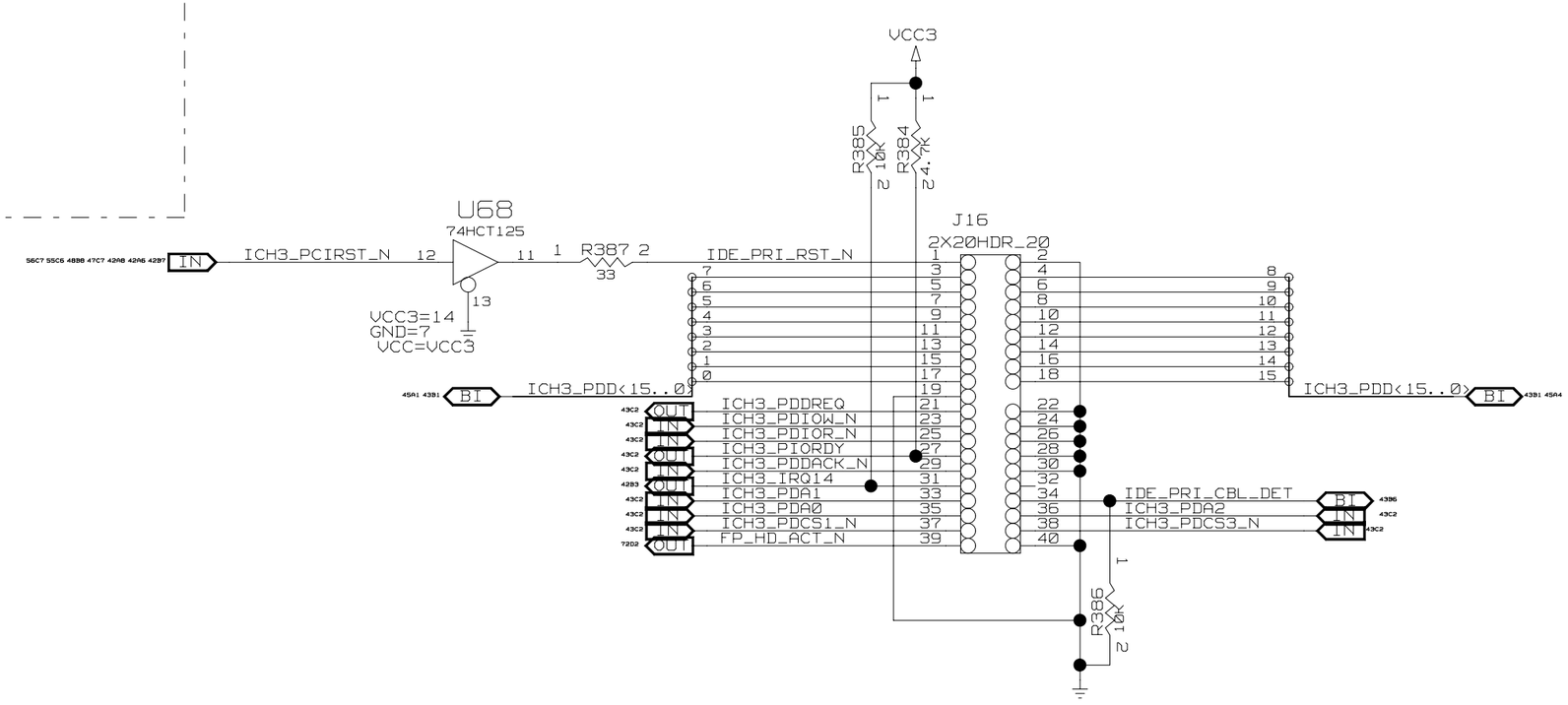

USB AND IDE

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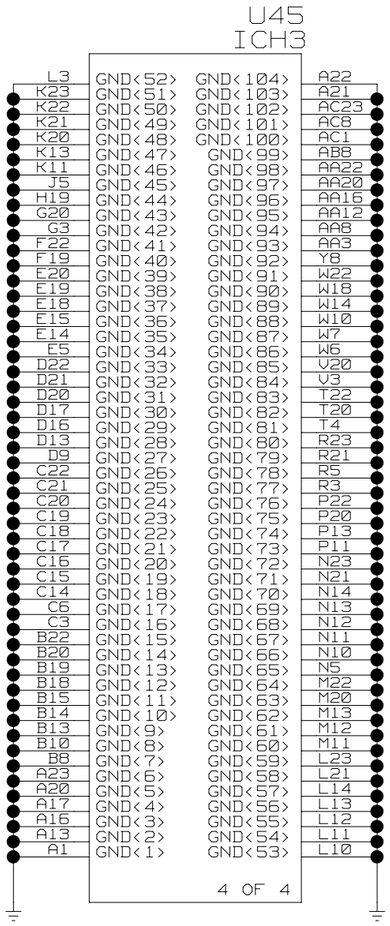
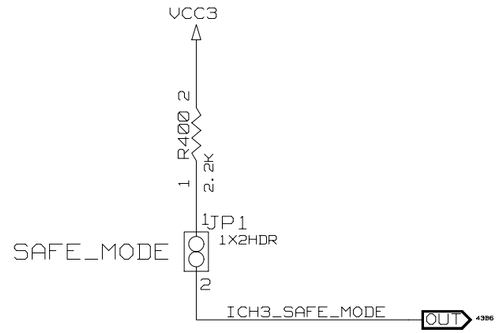
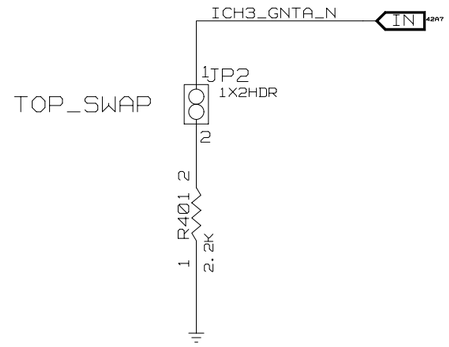
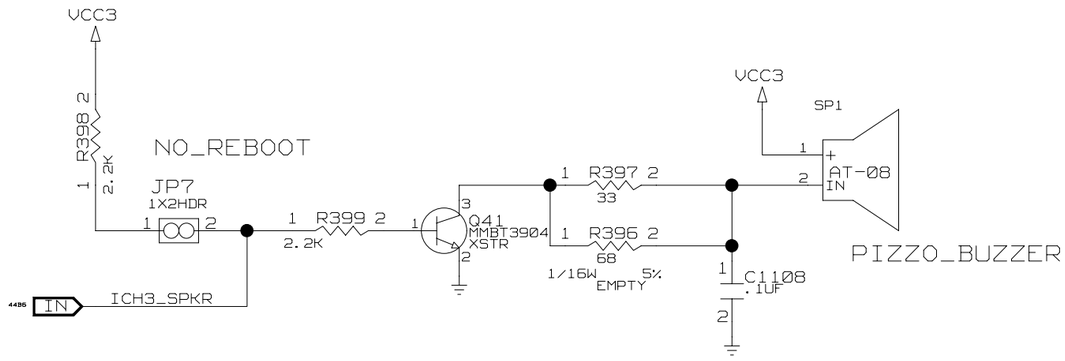
ICH3 (PART 4 OF 4)





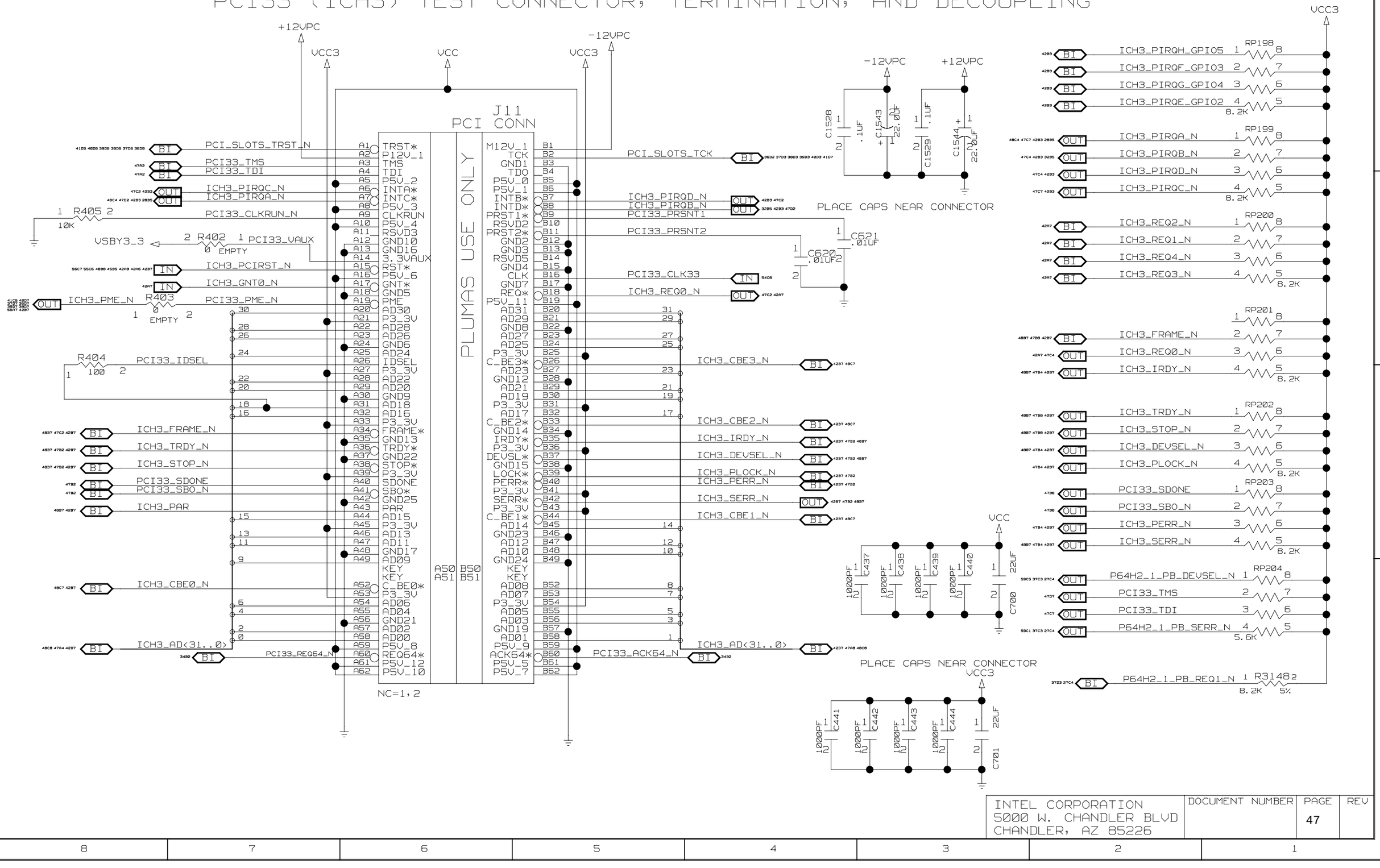




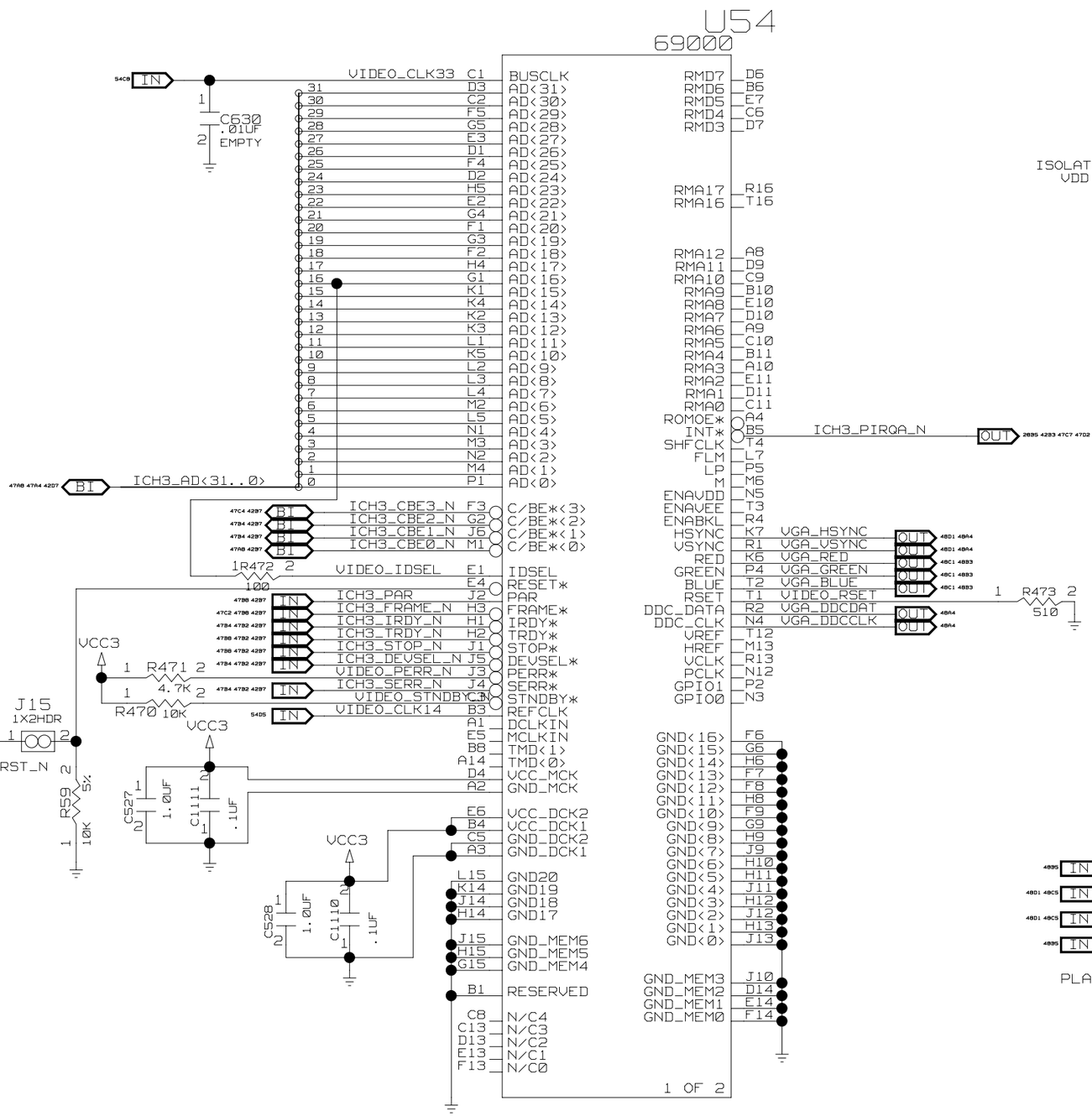
STRAP OPTIONS AND SPEAKER CIRCUITRY

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE	REV
		46	

PCI33 (ICH3) TEST CONNECTOR, TERMINATION, AND DECOUPLING

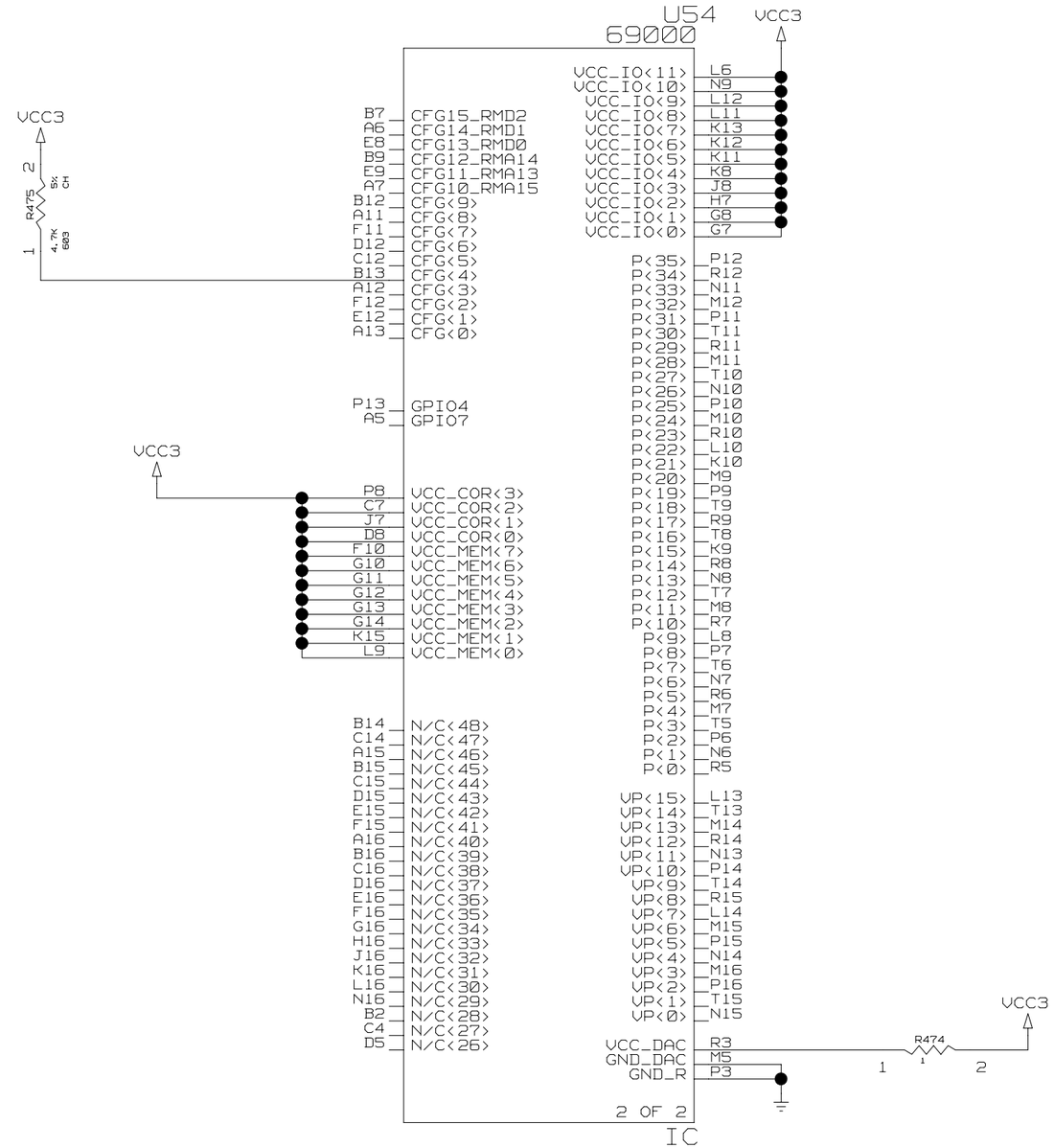


INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 47	REV



DUAL HIQ VIDEO

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE	REV
		48	



VIDEO

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 49	REV

DDR VTT (1.25V)

DDR 2.5V

PLACE CAPS CLSOE TO HIGH-SIDE FETS

C1112 ACROSS Q1, Q2
C1113 ACROSS Q5, Q6
C1114 ACROSS Q3, Q4
C1115 ACROSS Q7, Q8

ROUTE AS DIFF PAIR

ROUTE AS DIFF PAIR
ORIGINATING NEAR DIMMS

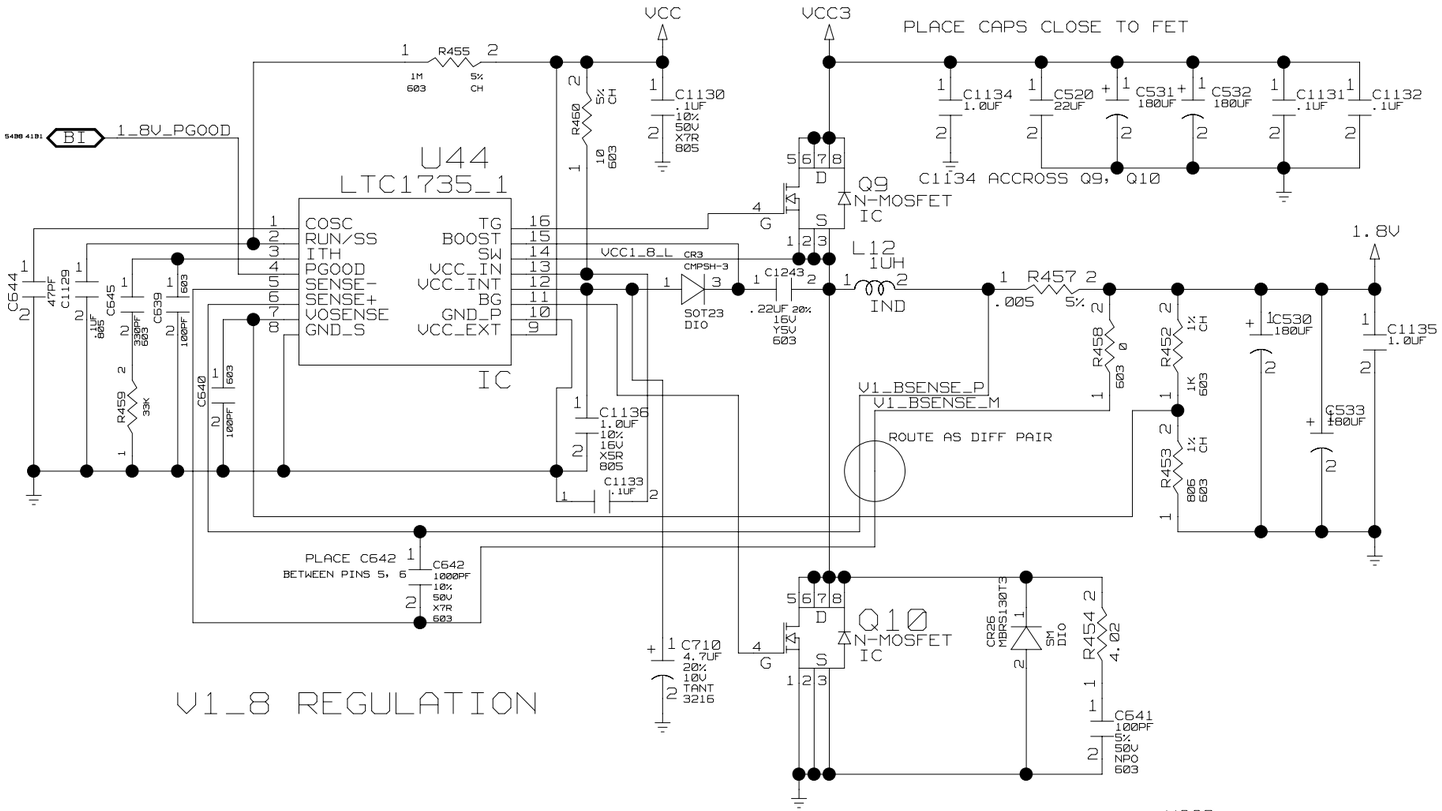
PLACE BETWEEN VR PINS 13, 14

PLACE C1124 BETWEEN VR PINS 20, 21

PLACE C1576 BETWEEN VR PINS 2,3

SMALL SIGNAL GROUND

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 50	REV



INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 51	REV

POWER CONNECTORS

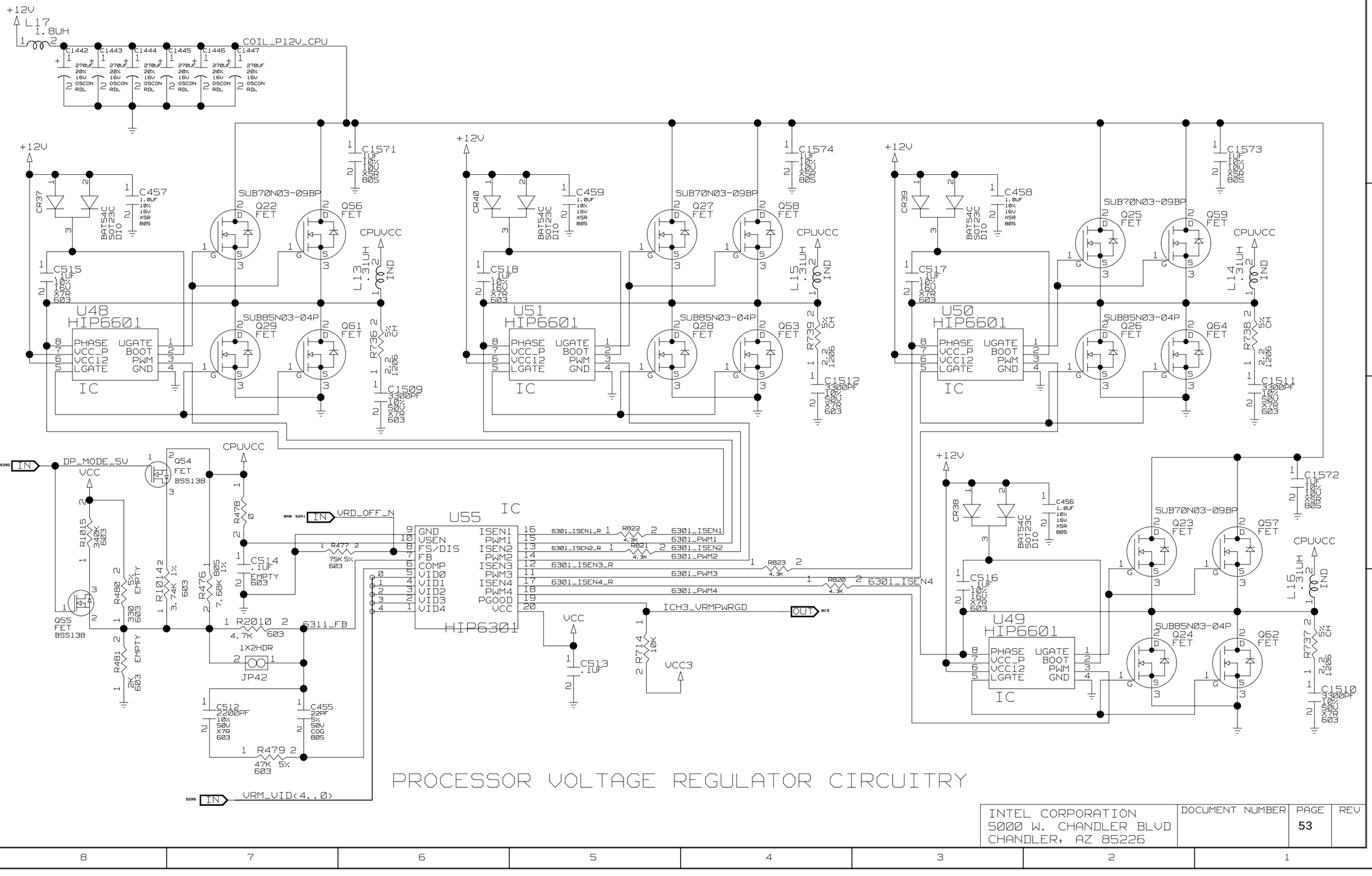
VRD ENABLE LOGIC

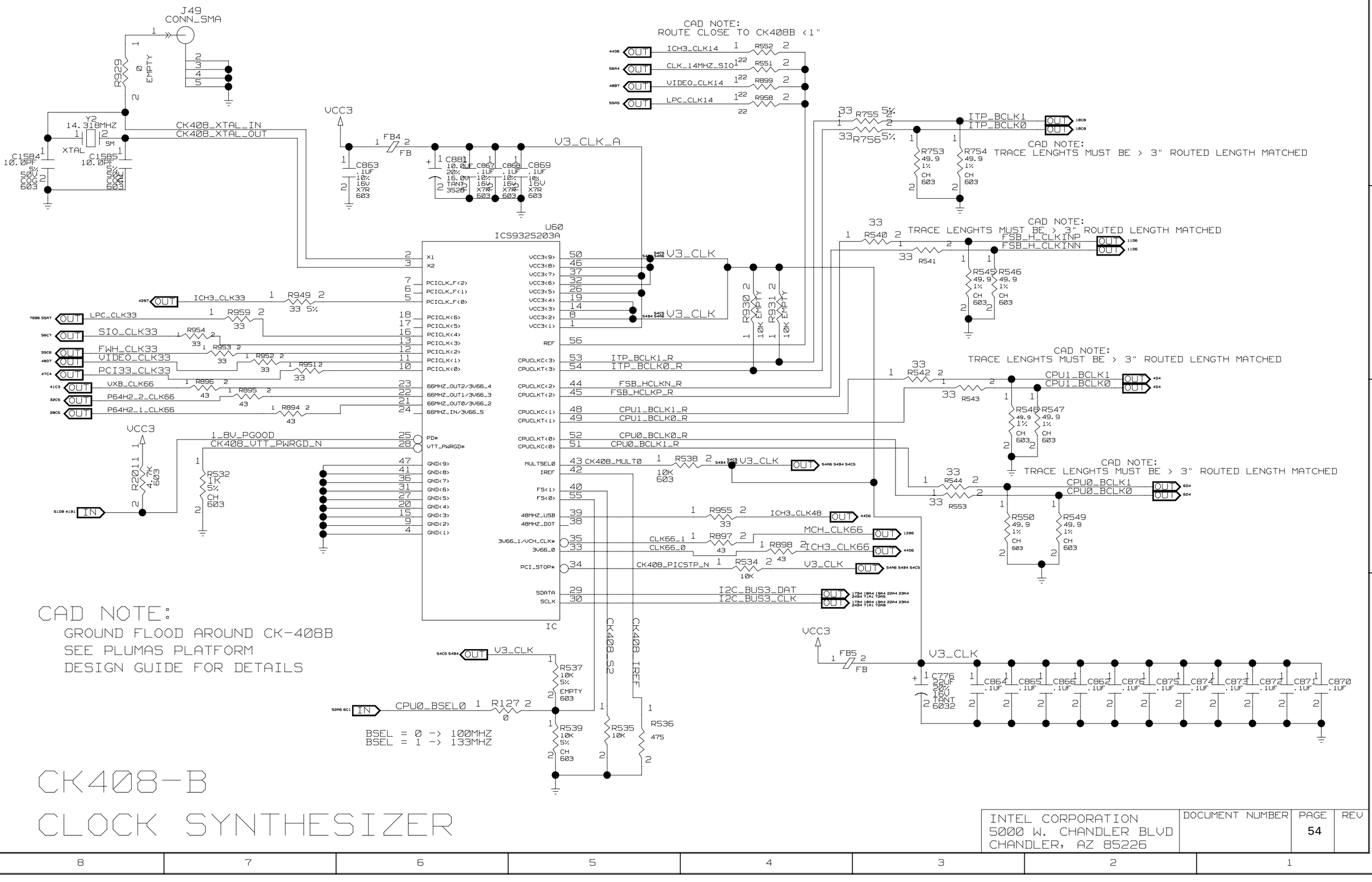
VID OVERRIDE
FOR VALIDATION ONLY

J28 INSTALLED = VID FROM J36

ENSURE J36 SET PROPERLY
BEFORE INSTALLING J28

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 52	REV


+12V
L17
1.8UH
COIL_P12V_CPU
C1442
C1443
C1444
C1445
C1446
C1447
270UF 20% 16V OSCON RDL
C1571
C1574
C1573
C1572
C457
C459
C458
CR37
CR40
CR39
CR38
BAT54C SOT23C DIO
1.0UF 10% 16V X5R 805
SUB70N03-09BP
Q22 FET
Q56 FET
Q27 FET
Q58 FET
Q25 FET
Q59 FET
Q23 FET
Q57 FET
CPUVCC
L13 .31UH IND
L15 .31UH IND
L14 .31UH IND
L16 .31UH IND
C515
C518
C517
C516
1UF 10% 16V X7R 603
U48
HIP6601
U51
U50
U49
PHASE
UGATE
VCC_P
BOOT
VCC12
PWM
LGATE
GND
IC
SUB85N03-04P
Q29 FET
Q61 FET
Q28 FET
Q63 FET
Q26 FET
Q64 FET
Q24 FET
Q62 FET
R736 2 5% CH
R739 2 5% CH
R738 2 5% CH
R737 2 5% CH
2.2 1206
C1500 3300PF 10% 50V X7R 603
C1512 3300PF 10% 50V X7R 603
C1511 3300PF 10% 50V X7R 603
C1510 3300PF 10% 50V X7R 603
DP_MODE_5V
VCC
Q54 FET BSS138
Q55 FET BSS138
R1015 340K 603
R1014 3.74K 1% 603
R480 330 5% EMPTY 603
R481 2K EMPTY 603
R475 7.68K 805 1%
R478 0
R477 75K 5% 603
C514 .1UF EMPTY 603
VRD_OFF_N
U55
HIP6301
GND
VSEN
FS/DIS
FB
COMP
VID0
VID1
VID2
VID3
VID4
ISEN1
PWM1
ISEN2
PWM2
ISEN3
PWM3
ISEN4
PWM4
PGOOD
VCC
6301_ISEN1_R
6301_ISEN2_R
6301_ISEN3_R
6301_ISEN4_R
R822 4.3K
R821 4.3K
R823 4.3K
R820 4.3K
6301_ISEN1
6301_ISEN2
6301_ISEN4
6301_PWM1
6301_PWM2
6301_PWM3
6301_PWM4
ICH3_VRMPWRGD
OUT
R2010 4.7K 603
6311_FB
1X2HDR
JP42
C512 2200PF 10% 50V X7R 603
C455 22PF 5% 50V COG 805
R479 47K 5% 603
C513 .1UF
R714 10K
VCC3
VRM_VID<4..0>
C456 1.0UF 10% 16V X5R 805
C516 1UF 10% 16V X7R 603
PROCESSOR VOLTAGE REGULATOR CIRCUITRY
INTEL CORPORATION
5000 W. CHANDLER BLVD
CHANDLER, AZ 85226
DOCUMENT NUMBER
PAGE
53
REV



CK408-B

CLOCK SYNTHESIZER

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 54	REV

FWH CIRCUITRY

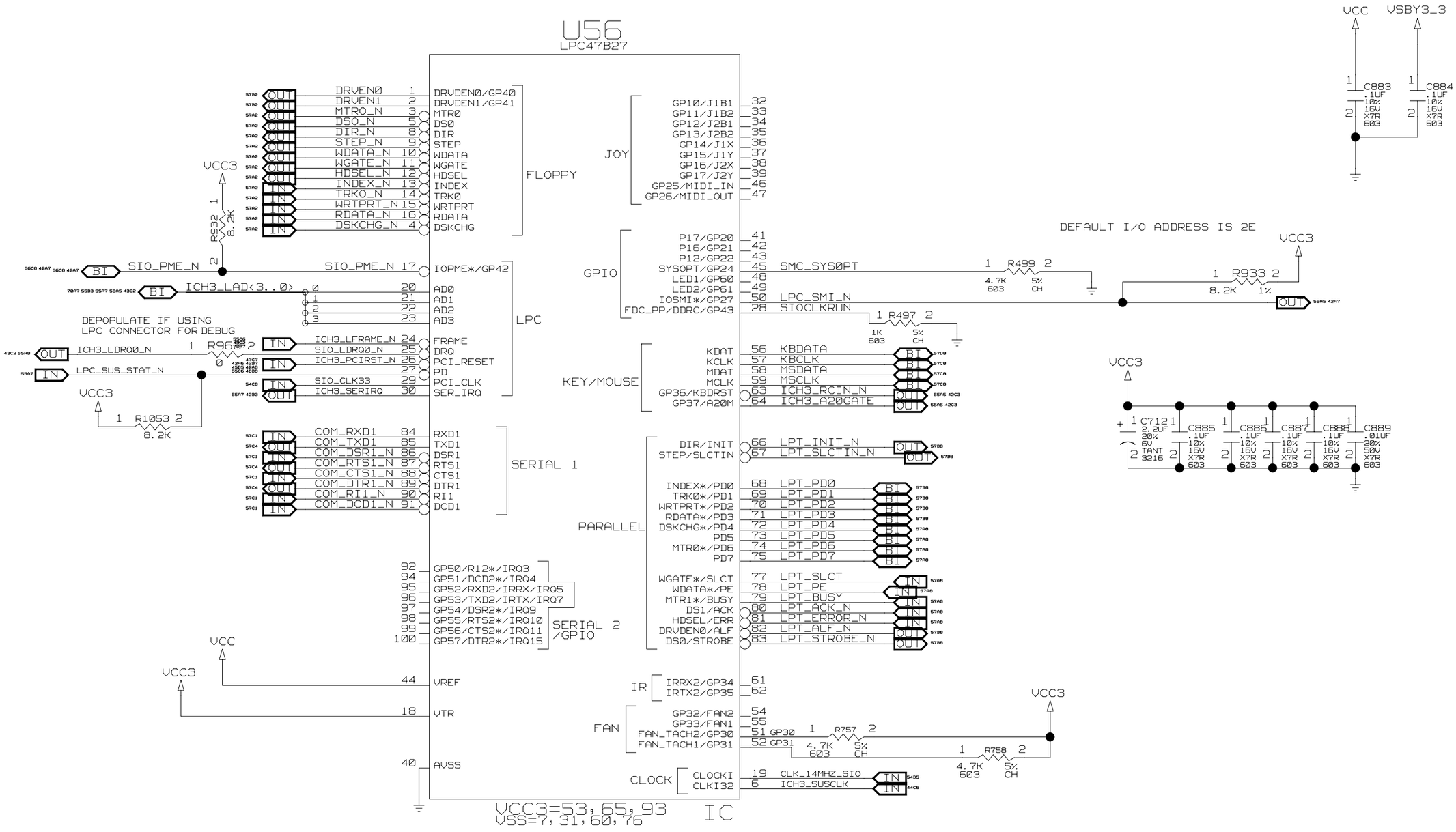
WP JUMPER SETTING	
1 - 2	BIOS WRITE PROTECT
3 - 4	LOCK ENABLE
NO JUMPER	WRITE ENABLE

DECOUPLING

C711 4.7UF 20% 10V TANT 3216 PLACE NEAR PIN 1
C893 .1UF 10% 16V X7R 603 PLACE NEAR PIN 1
C894 .1UF 10% 16V X7R 603 PLACE NEAR PIN 25
C895 .1UF 10% 16V X7R 603 PLACE NEAR PIN 32

N/C TSOP ONLY
1, 3, 4, 5, 6, 8, 13, 14

INTEL CORPORATION	DOCUMENT NUMBER	PAGE	REV
5000 W. CHANDLER BLVD CHANDLER, AZ 85226		55	



SIO CIRCUITRY

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 56	REV

LEGACY I/O

MOUSE & KEYBOARD

VCC
RT5 THRMSTR 1.10
V5_KB_RT
FB18 FB
V5_KB
C1450 .01UF 10% X7R 603
C1449 1000PF 10% X7R 603
RP283 2.7K 5% .063W
KBDATA
KBCLK
MSDATA
MSCLK
FB17
CON_KBDATA
CON_KBCLK
CON_MSDATA
CON_MSCLK
C1448 C1451 C1452 C1453 470PF 5% 50V COG 603

J40
PS2 STACK
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16 P17
CONN

KYBD AND MOUSE
SWAPPED TO PC STANDARD

PARALLEL PORT

CR45 MMBD914LT1 SOT23 DIO
LPT_V5_0
RP211 RP208 RP212 RP206 2.7K 5% .063W IC SM
R560 2.7K 5% CH 603

LPT_STROBE_N
LPT_ALF_N
LPT_PD0
LPT_PD1
LPT_INIT_N
LPT_PD2
LPT_SLCTIN_N
LPT_PD3
LPT_ERROR_N
LPT_PD4
LPT_PD5
LPT_PD6
LPT_PD7
LPT_ACK_N
LPT_BUSY
LPT_PE
LPT_SLCT
RP209 RP210 RP207 33 5%

LPT_STROBE_N_R
LPT_ALF_N_R
LPT_PD0_R
LPT_PD1_R
LPT_INIT_N_R
LPT_PD2_R
LPT_SELECTIN_N_R
LPT_PD3_R
LPT_PD4_R
LPT_PD5_R
LPT_PD6_R
LTP_PD7_R

C1245 C1250 C1244 C1257 C1258 C1247 C1259 C1253 C1254 C1251 C1250 C1255 C1256 C1249 C1248 C1252 180PF

J31
TALL DSUB 25
I47

J35
2 ROW
DSUB
SERIAL PORT

U61
GD75232S
SER_DCD SER_DSR SER_RXD SER_CTS SER_RI COM_RTS1_N COM_TXD1 COM_DTR1_N
RA1 RA2 RA3 RA4 RA5 DA1 DA2 DA3 VDD+
RY1 RY2 RY3 RY4 RY5 DY1 DY2 DY3 VDD-
COM_DCD1_N COM_DSR1_N COM_RXD1 COM_CTS1_N COM_RI1_N SER_RTS SER_TXD SER_DTR
+12VPC -12VPC
NOTE DIRECTION IC
VCC=20 GND=11

C1265 C1267 C1263 C1261 C1266 C1268 C1264 C1262 220PF

FLOPPY CONNECTOR

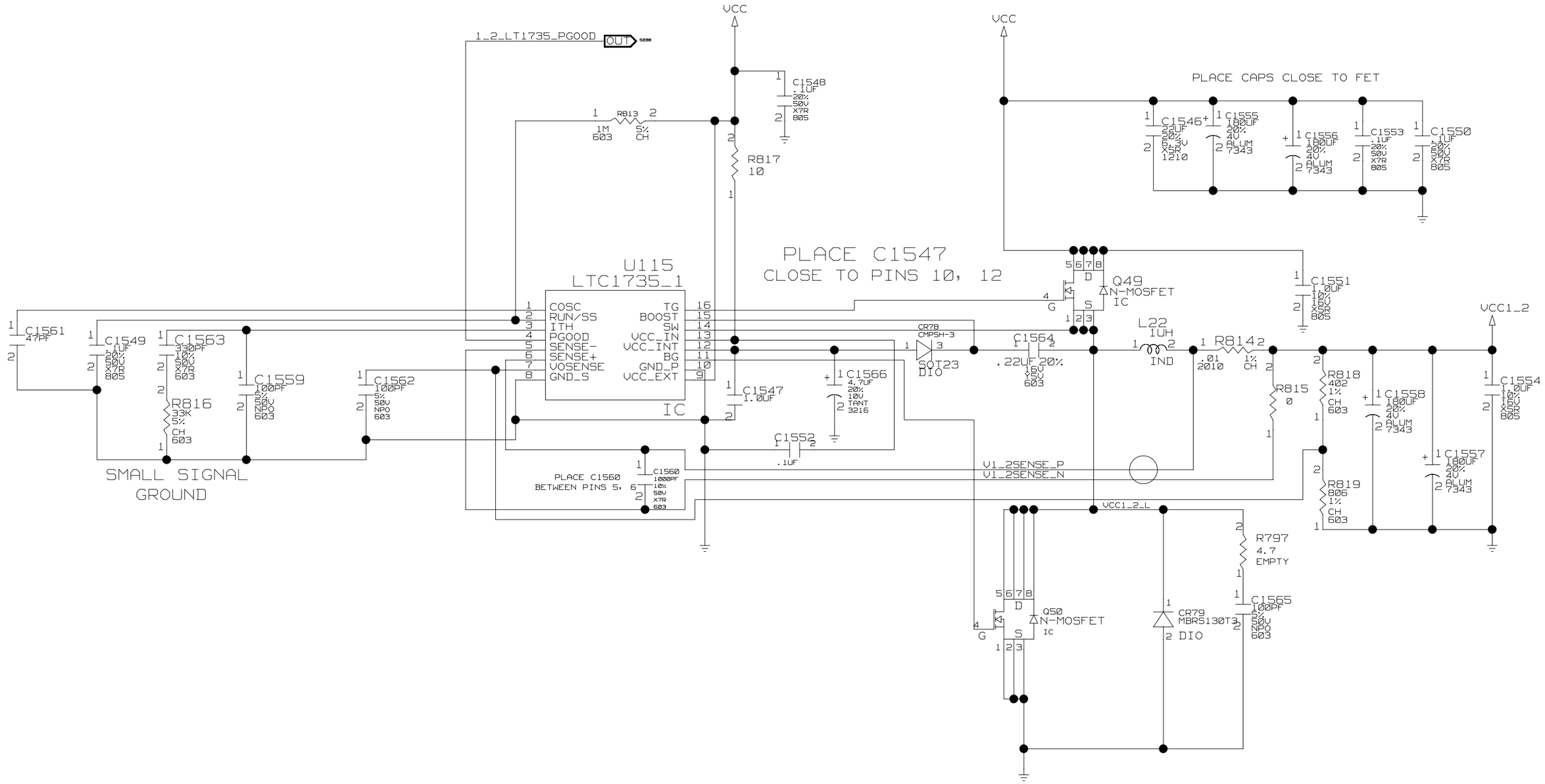
J34
2X17HDR_5
HDR
DRVEN0 DRVEN1 INDEX_N MTR0_N DS0_N DIR_N STEP_N WDATA_N WGATE_N TRK0_N WRTPRT_N RDATA_N HDSEL_N DSKCHG_N

RP205 1K 5%
R559 1K 603 5% CH
VCC

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 57	REV

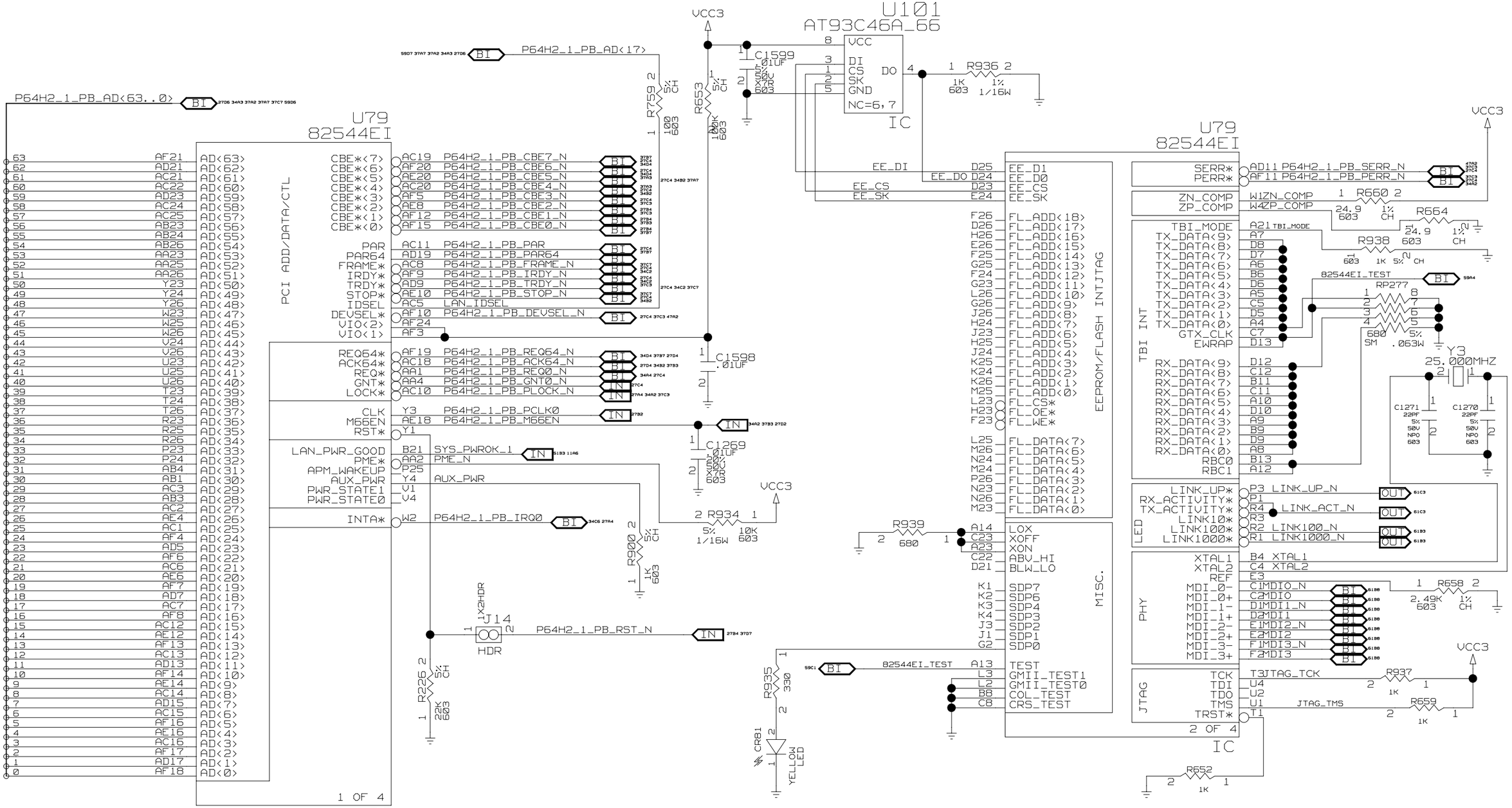
V1.2 REGULATION

NOTE: ROUTE AS DIFFERENTIAL PAIR



INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 58	REV

82544EI GIGABIT LAN CONTROLLER



INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE	REV
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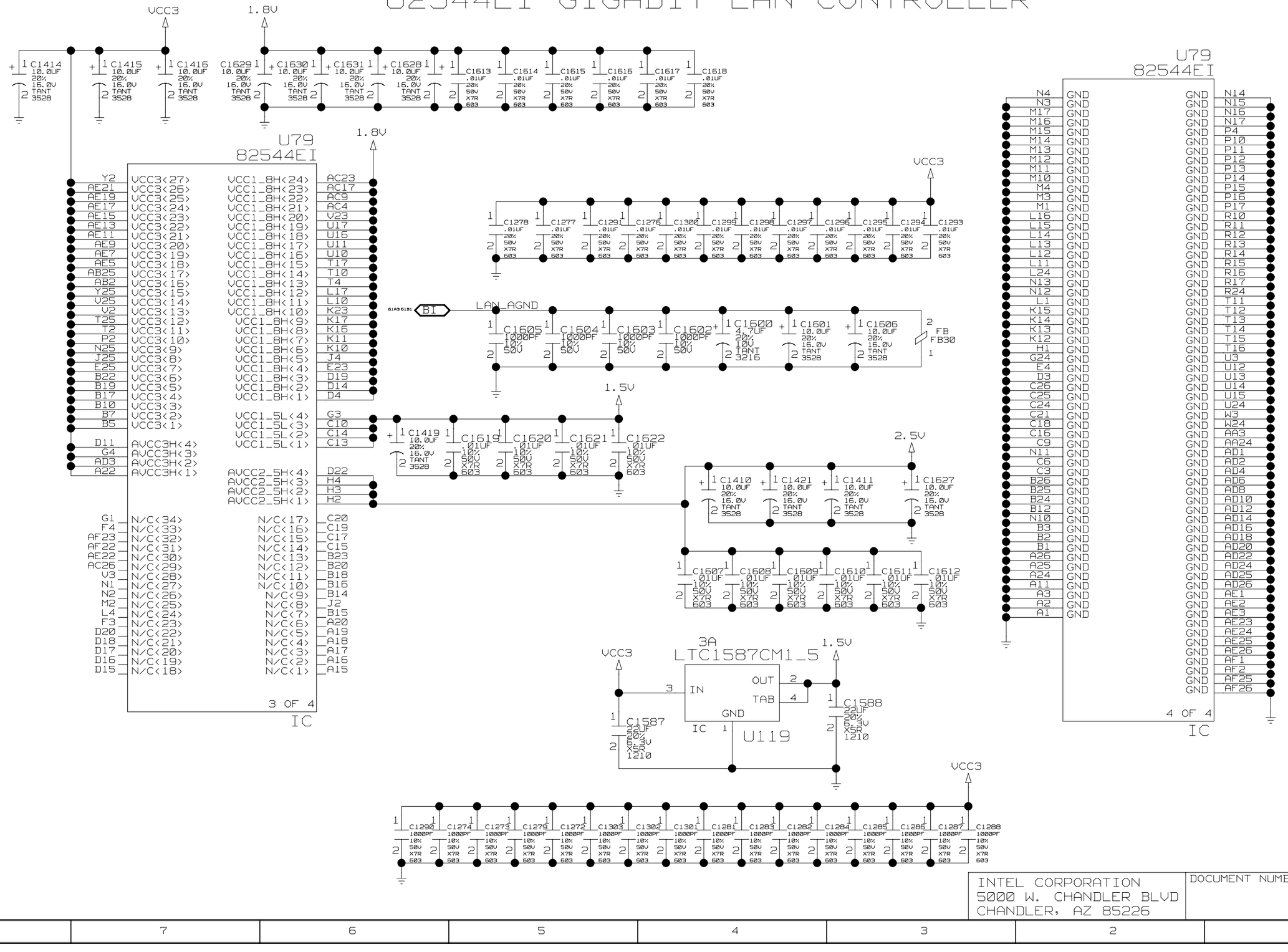
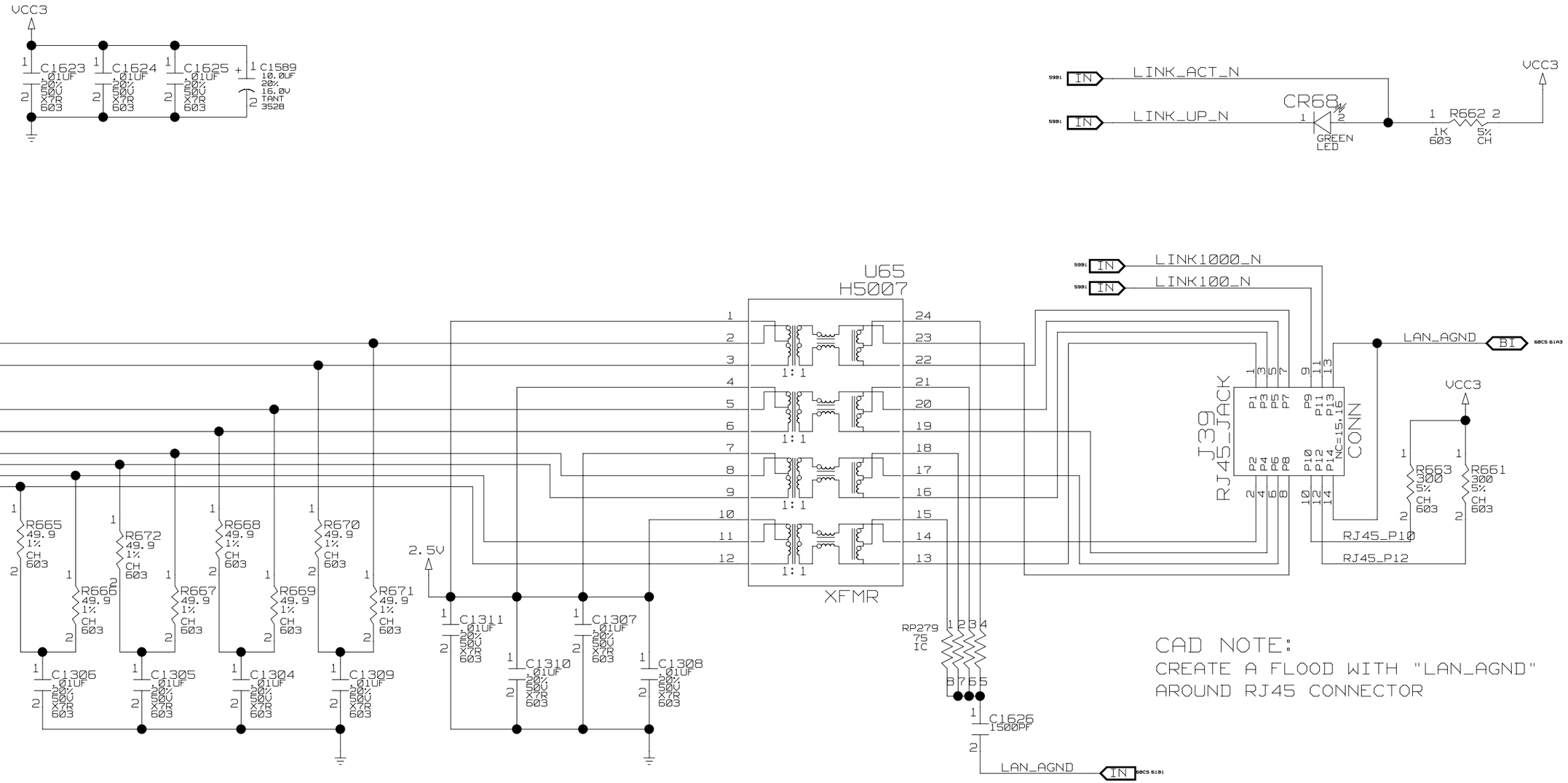
82544EI GIGABIT LAN CONTROLLER



INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 60	REV



LAN EEPROM, MAGNETICS AND CONNECTOR

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 61	REV

SCSI CONTROLLER

U78
AIC_7902A

R673 2 0 — OUT — P64H2_2_PA_AD<17>
R679 2 100 — IN — P64H2_2_PA_GNT0_N
R676 2 0 — T4 TCK
R674 2 0 — U4 TMS
R675 2 0 — P4 TDI

BI — P64H2_2_PA_AD<63..0>

63	AC17	AD<63>
62	AD17	AD<62>
61	AE17	AD<61>
60	AF17	AD<60>
59	AC18	AD<59>
58	AD18	AD<58>
57	AE18	AD<57>
56	AC19	AD<56>
55	AD19	AD<55>
54	AE19	AD<54>
53	AC20	AD<53>
52	AD20	AD<52>
51	AE20	AD<51>
50	AF20	AD<50>
49	AC21	AD<49>
48	AD21	AD<48>
47	AE21	AD<47>
46	AC22	AD<46>
45	AD22	AD<45>
44	AE22	AD<44>
43	AD23	AD<43>
42	AE23	AD<42>
41	AF23	AD<41>
40	AD24	AD<40>
39	AF24	AD<39>
38	AE24	AD<38>
37	AF26	AD<37>
36	AF25	AD<36>
35	AE26	AD<35>
34	AE25	AD<34>
33	AD26	AD<33>
32	AD25	AD<32>
31	AC2	AD<31>
30	AD2	AD<30>
29	AE2	AD<29>
28	AC3	AD<28>
27	AD3	AD<27>
26	AE3	AD<26>
25	AF3	AD<25>
24	AC4	AD<24>
23	AF4	AD<23>
22	AC5	AD<22>
21	AD5	AD<21>
20	AE5	AD<20>
19	AF5	AD<19>
18	AC6	AD<18>
17	AD6	AD<17>
16	AE6	AD<16>
15	AC10	AD<15>
14	AD10	AD<14>
13	AE10	AD<13>
12	AC11	AD<12>
11	AD11	AD<11>
10	AE11	AD<10>
9	AF11	AD<9>
8	AC12	AD<8>
7	AE12	AD<7>
6	AC13	AD<6>
5	AD13	AD<5>
4	AE13	AD<4>
3	AF13	AD<3>
2	AC14	AD<2>
1	AD14	AD<1>
0	AE14	AD<0>

NEED TO ASSIGN IDSEL

T1	PCLK	P64H2_2_PA_PCLK0
R3	TRST*	
AE1	GNT*	P64H2_2_PA_GNT0_N
AE4	IDSEL	
T4	TCK	
U4	TMS	
P4	TDI	
P2	RSVD1	
R2	RSVD2	
V4	RSVD3	
U3	TEST10	

SAME AS AIC7902

1 OF 6

IC

AB3	INTA*	P64H2_2_PA_IRQ0
AB2	INTB*	P64H2_2_PA_IRQ1
AF1	PREQ*	P64H2_2_PA_REQ0_N
R4	TDO	
AC15	ACK64*	P64H2_2_PA_ACK64_N
AD15	REQ64*	P64H2_2_PA_REQ64_N
AF16	PAR64	P64H2_2_PA_PAR64
AD7	FRAME*	P64H2_2_PA_FRAME_N
AE7	IRDY*	P64H2_2_PA_IRDY_N
AD9	PAR	P64H2_2_PA_PAR
AD8	DEVSEL*	P64H2_2_PA_DEVSEL_N
AC8	TRDY*	P64H2_2_PA_TRDY_N
AE8	STOP*	P64H2_2_PA_STOP_N
AF8	PERR*	P64H2_2_PA_PERR_N
AC9	SERR*	P64H2_2_PA_SERR_N
AE15	CBE*<7>	P64H2_2_PA_CBE7_N
AC16	CBE*<6>	P64H2_2_PA_CBE6_N
AD16	CBE*<5>	P64H2_2_PA_CBE5_N
AE16	CBE*<4>	P64H2_2_PA_CBE4_N
AD4	CBE*<3>	P64H2_2_PA_CBE3_N
AC7	CBE*<2>	P64H2_2_PA_CBE2_N
AE9	CBE*<1>	P64H2_2_PA_CBE1_N
AD12	CBE*<0>	P64H2_2_PA_CBE0_N
P24	ROMOE*	
AC26	SEECS	SCSI_SEECS
T23	MWE*	
N23	ROMCS*	
AB24	BRDWE	
AB23	BRDOE*	
N24	MA<18>	
N25	MA<17>	
T24	MA<16>	
T25	MA<15>	
R25	MA<14>	
R24	MA<13>	
T26	MA<12>	
P25	MA<11>	
P23	MA<10>	
P26	MA<9>	
R23	MA<8>	
U23	MA<7>	
U24	MA<6>	
U25	MA<5>	
U26	MA<4>	
V23	MA<3>	
V24	MA<2>	
V25	MA<1>	
W23	MA<0>	
AA23	MD<7>	
Y26	MD<6>	
Y25	MD<5>	
Y24	MD<4>	
Y23	MD<3>	
W26	MD<2>	
W25	MD<1>	
W24	MD<0>	
AC25	SEECK	SCSI_SEECK
AC24	SEEDO	SCSI_SEEDO
AC23	SEEDI	SCSI_SEEDI
W4	RSVD4	
Y4	TEST2	AIC7902_TEST2 — BI
AA24	RSVD8	
AA25	RSVD7	
AB26	RSVD6	
AB25	RSVD5	

SEE ADAPTEC* AIC-7902 DESIGN-IN HANDBOOK FOR INFORMATION REGARDING SEEPROM IMPLIMENTATION

3.3 VOLT PART ONLY

U64
AT93C46A_66

DI 3, CS 1, SK 2, DO 4, NC6 6
VCC=8, GND=5, N/C=7, VCC=VCC3
IC

SCSI_SEECS — R677 1K 5% EMPTY

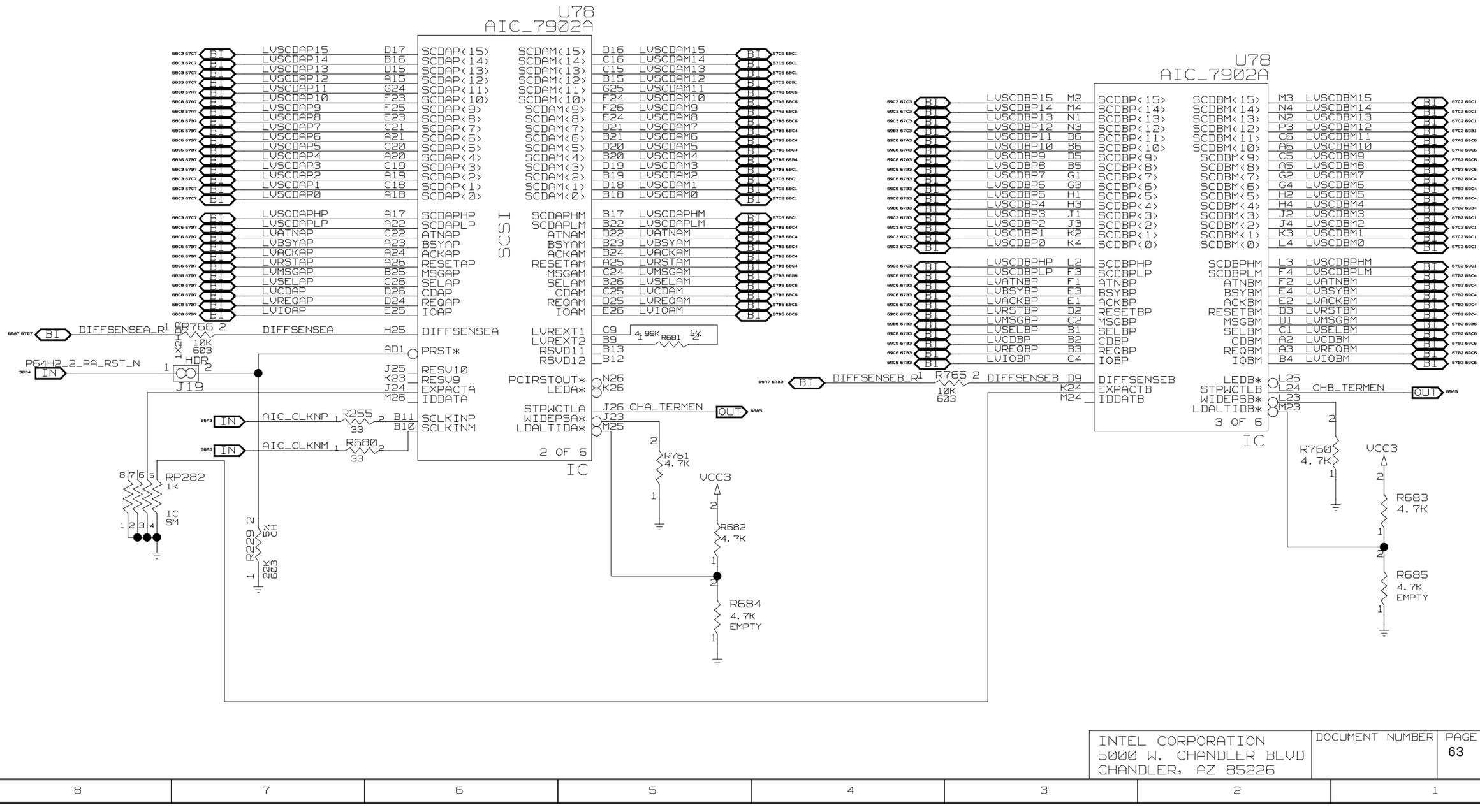
R678 2.7K 603 5% CH

VCC3 — C1312 .01UF

*Other names and brands may be claimed as the property of others.

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 62	REV

SCSI CONTROLLER



INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 63	REV

SCSI CONTROLLER

U78
AIC_7902A

6501 6681 IN — SCSI_CORE_VCC

C1425 10.0UF 20% 16.0V TANT 3528
C1317 .01UF

AF21	VCC1_8<20>	GND<72>	AB22
AF18	VCC1_8<19>	GND<71>	AB21
AF15	VCC1_8<18>	GND<70>	AB18
AF12	VCC1_8<17>	GND<69>	AB17
AF9	VCC1_8<16>	GND<68>	AB14
AF6	VCC1_8<15>	GND<67>	AB13
AA26	VCC1_8<14>	GND<66>	AB10
AA1	VCC1_8<13>	GND<65>	AB9
W1	VCC1_8<12>	GND<64>	AB6
V26	VCC1_8<11>	GND<63>	AB5
R26	VCC1_8<10>	GND<62>	AA22
R1	VCC1_8<9>	GND<61>	AA5
M1	VCC1_8<8>	GND<60>	V22
L26	VCC1_8<7>	GND<59>	V5
L1	VCC1_8<6>	GND<58>	U22
K25	VCC1_8<5>	GND<57>	U5
D14	VCC1_8<4>	GND<56>	T16
C17	VCC1_8<3>	GND<55>	T15
A14	VCC1_8<2>	GND<54>	T14
A7	VCC1_8<1>	GND<53>	T13
		GND<52>	T12
		GND<51>	T11
		GND<50>	R16
		GND<49>	R15
		GND<48>	R14
		GND<47>	R13
		GND<46>	R12
		GND<45>	R11
		GND<44>	P22
		GND<43>	P16
		GND<42>	P15
		GND<41>	P14
		GND<40>	P13
		GND<39>	P12
		GND<38>	P11
		GND<37>	P5
		GND<36>	N22
		GND<35>	N16
		GND<34>	N15
		GND<33>	N14
		GND<32>	N13
		GND<31>	N12
		GND<30>	N11
		GND<29>	N5
		GND<28>	M16
		GND<27>	M15
		GND<26>	M14
		GND<25>	M13
		GND<24>	M12
		GND<23>	M11
		GND<22>	L16
		GND<21>	L15
		GND<20>	L14
		GND<19>	L13
		GND<18>	L12
		GND<17>	L11
		GND<16>	K22
		GND<15>	K5
		GND<14>	J22
		GND<13>	J5
		GND<12>	F22
		GND<11>	F5
		GND<10>	E22
		GND<9>	E21
		GND<8>	E18
		GND<7>	E17
		GND<6>	E14
		GND<5>	E13
		GND<4>	E10
		GND<3>	E9
		GND<2>	E6
		GND<1>	E5

POWERS/GROUNDS

6 OF 6
IC

5C0 6685 IN — SCSI_VCC

C898 10UF 20% 16V X5R 1210
C1324 .1UF
C1321 .01UF 5% 50V X7R 603
C1323 .1UF
C1314 .01UF
C1424 10.0UF 20% 16.0V TANT 3528

C897 10UF 20% 16V X5R 1210
C1319 .1UF
C1322 .01UF 5% 50V X7R 603
C1320 .1UF
C1315 .01UF
C1423 10.0UF 20% 16.0V TANT 3528

U78
AIC_7902A

H22	SVCCA25<5>
G22	SVCCA25<4>
E20	SVCCA25<3>
E19	SVCCA25<2>
E16	SVCCA25<1>
E15	SVCCA25<0>
M5	SVCCB25<5>
L5	SVCCB25<4>
H5	SVCCB25<3>
G5	SVCCB25<2>
E8	SVCCB25<1>
E7	SVCCB25<0>
G26	SVCC1_8<3>
D4	SVCC1_8<2>
C23	SVCC1_8<1>
C3	SVCC1_8<0>
K1	SVCC33<5>
H26	SVCC33<4>
D23	SVCC33<3>
A16	SVCC33<2>
A4	SVCC33<1>
A1	SVCC33<0>
AF22	VCC3<16>
AF19	VCC3<15>
AF14	VCC3<14>
AF10	VCC3<13>
AF7	VCC3<12>
AF2	VCC3<11>
Y22	VCC3<10>
W22	VCC3<9>
T22	VCC3<8>
T5	VCC3<7>
R22	VCC3<6>
R5	VCC3<5>
M22	VCC3<4>
L22	VCC3<3>
E12	VCC3<2>
E11	VCC3<1>

POWERS/GROUNDS

4 OF 6
IC

C1316 .01UF
C1422 10.0UF 20% 16.0V TANT 3528

VCC3 — C1425 10.0UF 20% 16.0V TANT 3528
C1313 .01UF

VCC3 — C1427 10.0UF 20% 16.0V TANT 3528
C1318 .01UF

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SCSI CONTROLLER

U78
AIC_7902A

W2 PXAGND1
Y2 PXAGND2
V1 PCAGND1
V2 PCAGND2
AA3 PZGND
AB1 PAGUARDG

C14 AGND<5>
C13 AGND<4>
C12 AGND<3>
B14 AGND<2>
A13 AGND<1>
C11 AGND<0>

C10 STAGARDG
D10 SRAGARDG

OUT 66C3 65C4 65C3 65B3 SCSI_AGND

SCSI POWER/GND AND TEST

PXVCC18 P1
PXAVCC18 Y1
PXAVCC331 U1
PXAVCC332 U2
PCAVCC331 T2
PCAVCC332 T3
PZV33 AA2
PAGUARDV AC1

VCC3

AVCC18<3> D7
AVCC18<2> C7
AVCC18<1> B7
AVCC18<0> A8

AVCC33<4> A10
AVCC33<3> A9
AVCC33<2> B8
AVCC33<1> A12
AVCC33<0> A11

STAGARDV C8
SRAGARDV D8

TERMPWRA H23 AIC7902_TERMPWRA
TERMPWRB D12 AIC7902_TERMPWRB

VIO<9> AB20
VIO<8> AB19
VIO<7> AB16
VIO<6> AB15
VIO<5> AB12
VIO<4> AB11
VIO<3> AB8
VIO<2> AB7
VIO<1> Y5
VIO<0> W5

BI 65A7 AIC7902_TEST9 Y3 TEST9
W3 TEST8
V3 TEST7
D13 TEST6
D11 TEST5
G23 TEST4

TEST3 H24 AIC7902_TEST3 BI 65A7
TEST1 AA4 AIC7902_TEST1 BI 65A7
TEST0 AB4 AIC7902_TEST0 BI 65A7

5 OF 6
IC

SCSI_CORE_VCC IN 65B1 64D8

C1335 .01UF 5% 50V X7R 603
C1428 10.0UF 20% 16.0V TANT 3528

SCSI_CORE_VCCA_PX
C1333 .01UF 5% 50V X7R 603
FB6 FB
C1429 10.0UF 20% 16.0V TANT 3528
VCC3

OUT 65C7 65C4 65B3 66C3 SCSI_AGND

SCSI_V3_3A_PX
C1334 .01UF 5% 50V X7R 603
C1330 .01UF 5% 50V X7R 603
C1329 .01UF 5% 50V X7R 603
FB9 FB
C1430 10.0UF 20% 16.0V TANT 3528

OUT 65C7 65B5 65C3 66C3 SCSI_AGND

SCSI_CORE_VCCA
C1331 .01UF 5% 50V X7R 603
C1328 .01UF 5% 50V X7R 603
FB10 FB
C1431 10.0UF 20% 16.0V TANT 3528
VCC3

OUT 65C7 65C4 65C3 65B3 66C3 SCSI_AGND

SCSI_V3_3A_0
C1332 .01UF 5% 50V X7R 603
C1327 .01UF 5% 50V X7R 603
FB8 FB
C1432 10.0UF 20% 16.0V TANT 3528
VCC3

OUT 66C3 65C7 65C4 65C3 65B3 SCSI_AGND

SCSI_V3_3A_1
C1325 .01UF 5% 50V X7R 603
C1326 .01UF 5% 50V X7R 603
FB7 FB

OUT 66C3 65C7 65C4 65C3 65B3 SCSI_AGND

C1340 1000PF 10% 50V X7R 603

C1339 1000PF 10% 50V X7R 603

LVTRMPWR_B R689 1K 603 IN 67D2 69D5

R1007 10K
R1009 10K
U71 1.24V
DIO NC=1,2

R1008 10K
R1010 10K
U70 1.24V
DIO NC=1,2

LVTRMPWR_A R688 1K 603 5% 1/16W IN 5705 68D5

VCC3

BI 65B5 AIC7902_TEST3 R1011 4.7K 603

RP280 4.7K IC
BI 65B7 AIC7902_TEST9
BI 62A3 AIC7902_TEST2
BI 65B5 AIC7902_TEST1
BI 65B5 AIC7902_TEST0

NOPOP RP280 AND R1011 FOR
AIC7902 A-2 AND LATER STEPPINGS

VCC3

C1336 .01UF 5% 50V X7R 603
C1337 .01UF 5% 50V X7R 603
C1338 .01UF 5% 50V X7R 603
C1341 .1UF

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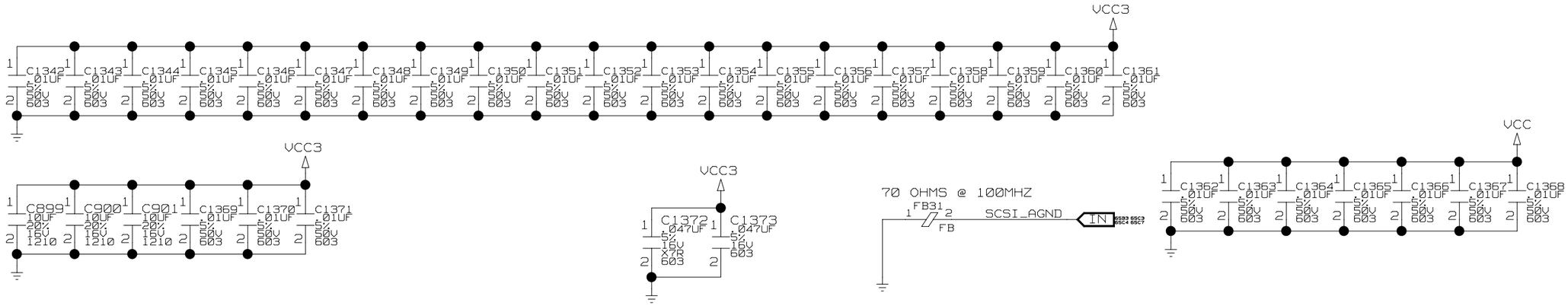
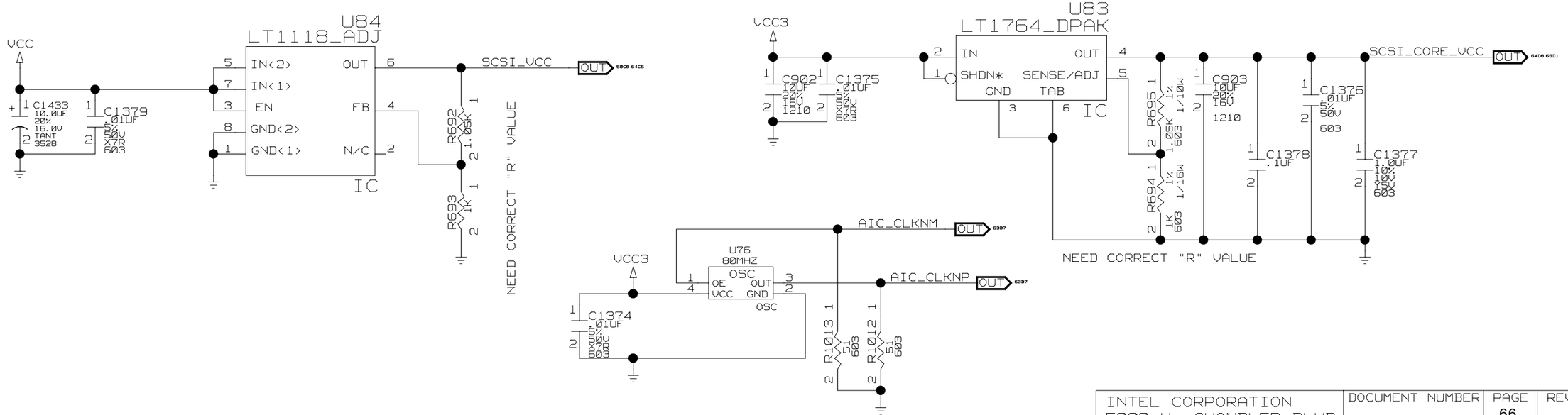
AIC - 7902 SCSI DECOUPLING RECOMMENDATION FOR POWER SUPPLIES



ISOLATE DIGITAL & ANALOG GROUND

VOLTAGE REGULATORS AND SCSI CLOCK



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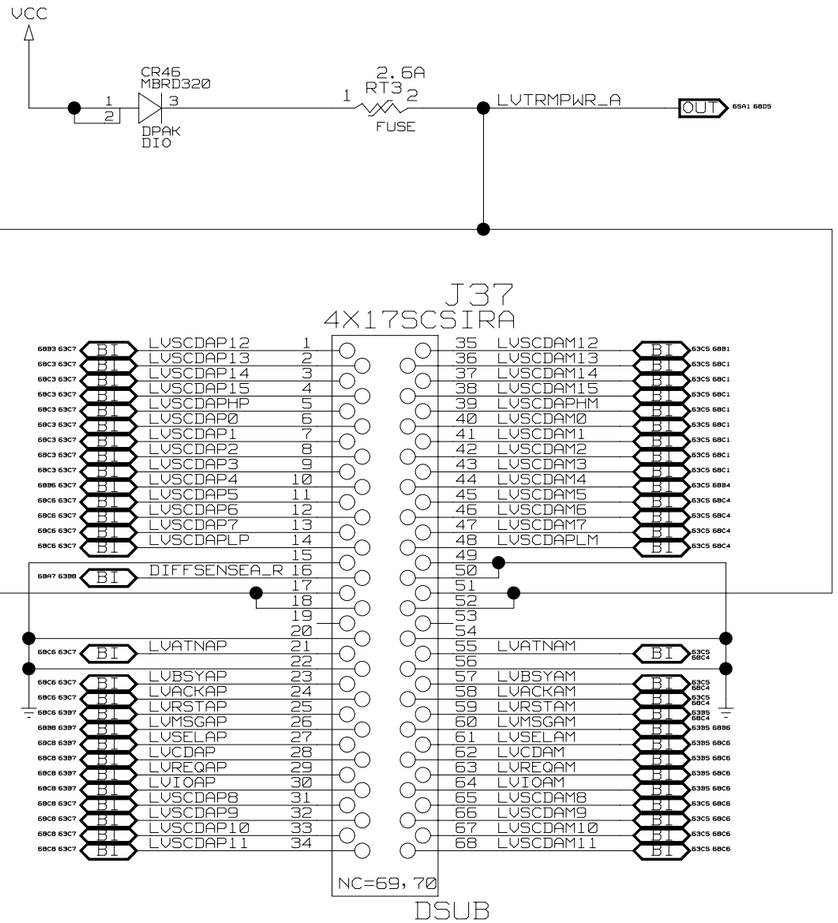
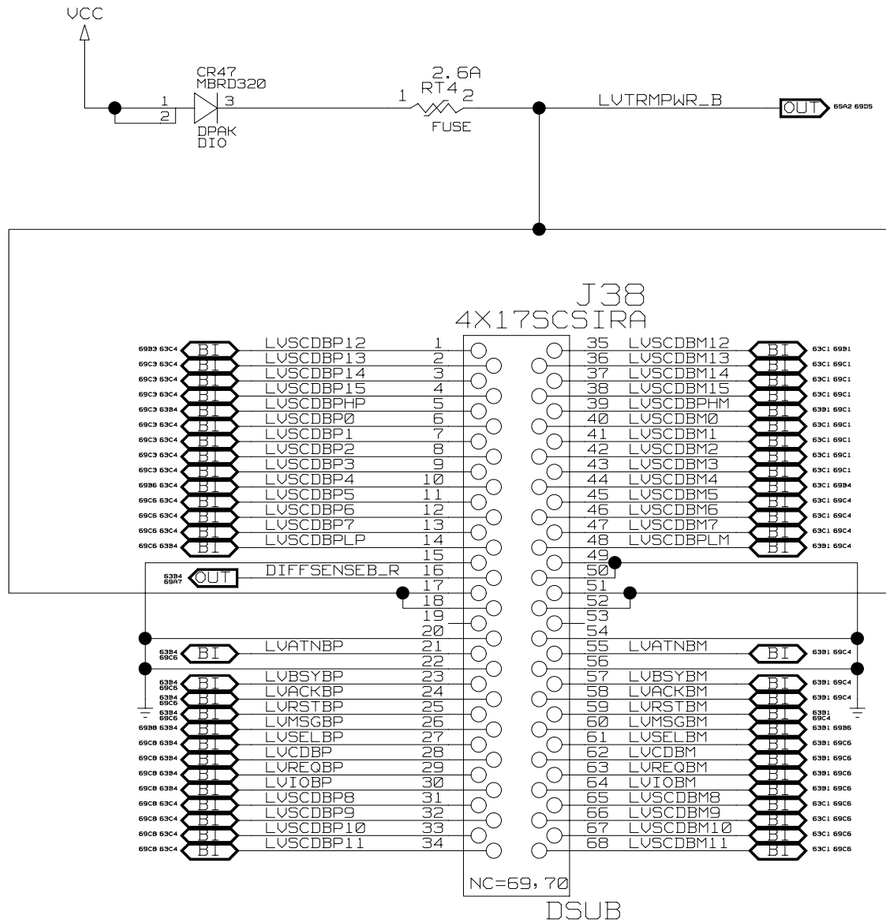
SCSI CONNECTORS A AND B





INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE	REV
		67	

LVD/SE TERMINATION FOR SCSI CHANNEL A

40 MIL

LVTRMPWR_A — IN (6705 65A1)

C1380 .1UF

C1434 10.0UF 20% 16.0V TANT 3528

R697 2 4.7K 603 5% 1/16W

U93 DS2119M

DIFFSENSE — TPWR1 28, TPWR2 27

LVSELAP	25	RP<9>	RN<9>	26 LVSELAM
LVREQAP	23	RP<8>	RN<8>	24 LVREQAM
LVSCDAP8	20	RP<7>	RN<7>	21 LVSCDAM8
LVSCDAP10	18	RP<6>	RN<6>	19 LVSCDAM10
LVSCDAP11	11	RP<5>	RN<5>	12 LVSCDAM11
LVSCDAP9	9	RP<4>	RN<4>	10 LVSCDAM9
LVIOAP	7	RP<3>	RN<3>	8 LVIOAM
LVCDAP	4	RP<2>	RN<2>	5 LVCDAM
LVMSGAP	2	RP<1>	RN<1>	3 LVMSGAM

DIFF_CAP 17

HS_GND 22, HS_GND 6, GND 14, ISO 13, MSTR/SLV 15, VREF 1

IC

20 MIL

C1435 4.7UF 20% 10V 3216

C1381 .1UF

20 MIL

U94 DS2119M

DIFFSENSE — TPWR1 28, TPWR2 27

LVSCDAP5	25	RP<9>	RN<9>	26 LVSCDAM5
LVSCDAP7	23	RP<8>	RN<8>	24 LVSCDAM7
LVATNAP	20	RP<7>	RN<7>	21 LVATNAM
LVBSYAP	18	RP<6>	RN<6>	19 LVBSYAM
LVRSTAP	11	RP<5>	RN<5>	12 LVRSTAM
LVACKAP	9	RP<4>	RN<4>	10 LVACKAM
LVSCDAPLP	7	RP<3>	RN<3>	8 LVSCDAPLM
LVSCDAP6	4	RP<2>	RN<2>	5 LVSCDAM6
LVSCDAP4	2	RP<1>	RN<1>	3 LVSCDAM4

R702 20K

C1384 .1UF

DIFF_CAP 17

HS_GND 22, HS_GND 6, GND 14, ISO 13, MSTR/SLV 15, VREF 1

IC

20 MIL

C1436 4.7UF 20% 10V 3216

C1382 .1UF

20 MIL

U95 DS2119M

DIFFSENSE — TPWR1 28, TPWR2 27

LVSCDAP13	25	RP<9>	RN<9>	26 LVSCDAM13
LVSCDAP15	23	RP<8>	RN<8>	24 LVSCDAM15
LVSCDAP0	20	RP<7>	RN<7>	21 LVSCDAM0
LVSCDAP2	18	RP<6>	RN<6>	19 LVSCDAM2
LVSCDAP3	11	RP<5>	RN<5>	12 LVSCDAM3
LVSCDAP1	9	RP<4>	RN<4>	10 LVSCDAM1
LVSCDAPHP	7	RP<3>	RN<3>	8 LVSCDAPHM
LVSCDAP14	4	RP<2>	RN<2>	5 LVSCDAM14
LVSCDAP12	2	RP<1>	RN<1>	3 LVSCDAM12

DIFF_CAP 17

HS_GND 22, HS_GND 6, GND 14, ISO 13, MSTR/SLV 15, VREF 1

IC

20 MIL

C1437 4.7UF 20% 10V 3216

C1383 .1UF

20 MIL

DIFFSENSEA_R — BI (6787 6386)

CHA_TERMEN — IN (6385)

R700 1K

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LVD/SE TERMINATION FOR SCSI CHANNEL B

40 MIL

LVTRMPWR_B IN 67D2 65A2

C1388 .1UF

C1441 10.0UF 20% 16.0V TANT 3528

R704 2 4.7K 603 5% 1/16W

U96 DS2119M

DIFFSENSE 16 — TPWR1 28 — TPWR2 27

LVSELBP	25	RP<9>	RN<9>	26	LVSELBM
LVREQBP	23	RP<8>	RN<8>	24	LVREQBM
LVSCDBP8	20	RP<7>	RN<7>	21	LVSCDBM8
LVSCDBP10	18	RP<6>	RN<6>	19	LVSCDBM10
LVSCDBP11	11	RP<5>	RN<5>	12	LVSCDBM11
LVSCDBP9	9	RP<4>	RN<4>	10	LVSCDBM9
LVIOBP	7	RP<3>	RN<3>	8	LVIOBM
LVCDBP	4	RP<2>	RN<2>	5	LVCDBM
LVMSGBP	2	RP<1>	RN<1>	3	LVMSGBM

DIFF_CAP 17

HS_GND 22 — HS_GND 6 — GND 14 — ISO 13 — MSTR/SLV 15 — VREF 1

IC

20 MIL

C1440 4.7UF 20% 10V 3216 — C1387 .1UF — 20 MIL

U97 DS2119M

DIFFSENSE 16 — TPWR1 28 — TPWR2 27

LVSCDBP5	25	RP<9>	RN<9>	26	LVSCDBM5
LVSCDBP7	23	RP<8>	RN<8>	24	LVSCDBM7
LVATNBP	20	RP<7>	RN<7>	21	LVATNBM
LVBSYBP	18	RP<6>	RN<6>	19	LVBSYBM
LVRSTBP	11	RP<5>	RN<5>	12	LVRSTBM
LVACKBP	9	RP<4>	RN<4>	10	LVACKBM
LVSCDBPLP	7	RP<3>	RN<3>	8	LVSCDBPHM
LVSCDBP6	4	RP<2>	RN<2>	5	LVSCDBM6
LVSCDBP4	2	RP<1>	RN<1>	3	LVSCDBM4

DIFF_CAP 17

R708 2 — 20K — 1

HS_GND 22 — HS_GND 6 — GND 14 — ISO 13 — MSTR/SLV 15 — VREF 1

C1389 .1UF

IC

20 MIL

C1439 4.7UF 20% 10V 3216 — C1386 .1UF — 20 MIL

U98 DS2119M

DIFFSENSE 16 — TPWR1 28 — TPWR2 27

LVSCDBP13	25	RP<9>	RN<9>	26	LVSCDBM13
LVSCDBP15	23	RP<8>	RN<8>	24	LVSCDBM15
LVSCDBP0	20	RP<7>	RN<7>	21	LVSCDBM0
LVSCDBP2	18	RP<6>	RN<6>	19	LVSCDBM2
LVSCDBP3	11	RP<5>	RN<5>	12	LVSCDBM3
LVSCDBP1	9	RP<4>	RN<4>	10	LVSCDBM1
LVSCDBPHP	7	RP<3>	RN<3>	8	LVSCDBPHM
LVSCDBP14	4	RP<2>	RN<2>	5	LVSCDBM14
LVSCDBP12	2	RP<1>	RN<1>	3	LVSCDBM12

DIFF_CAP 17

HS_GND 22 — HS_GND 6 — GND 14 — ISO 13 — MSTR/SLV 15 — VREF 1

IC

20 MIL

C1438 4.7UF 20% 10V 3216 — C1385 .1UF — 20 MIL

DIFFSENSEB_R BI 6783 6384

CHB_TERMEN IN 63D1

R709 1K 1 2

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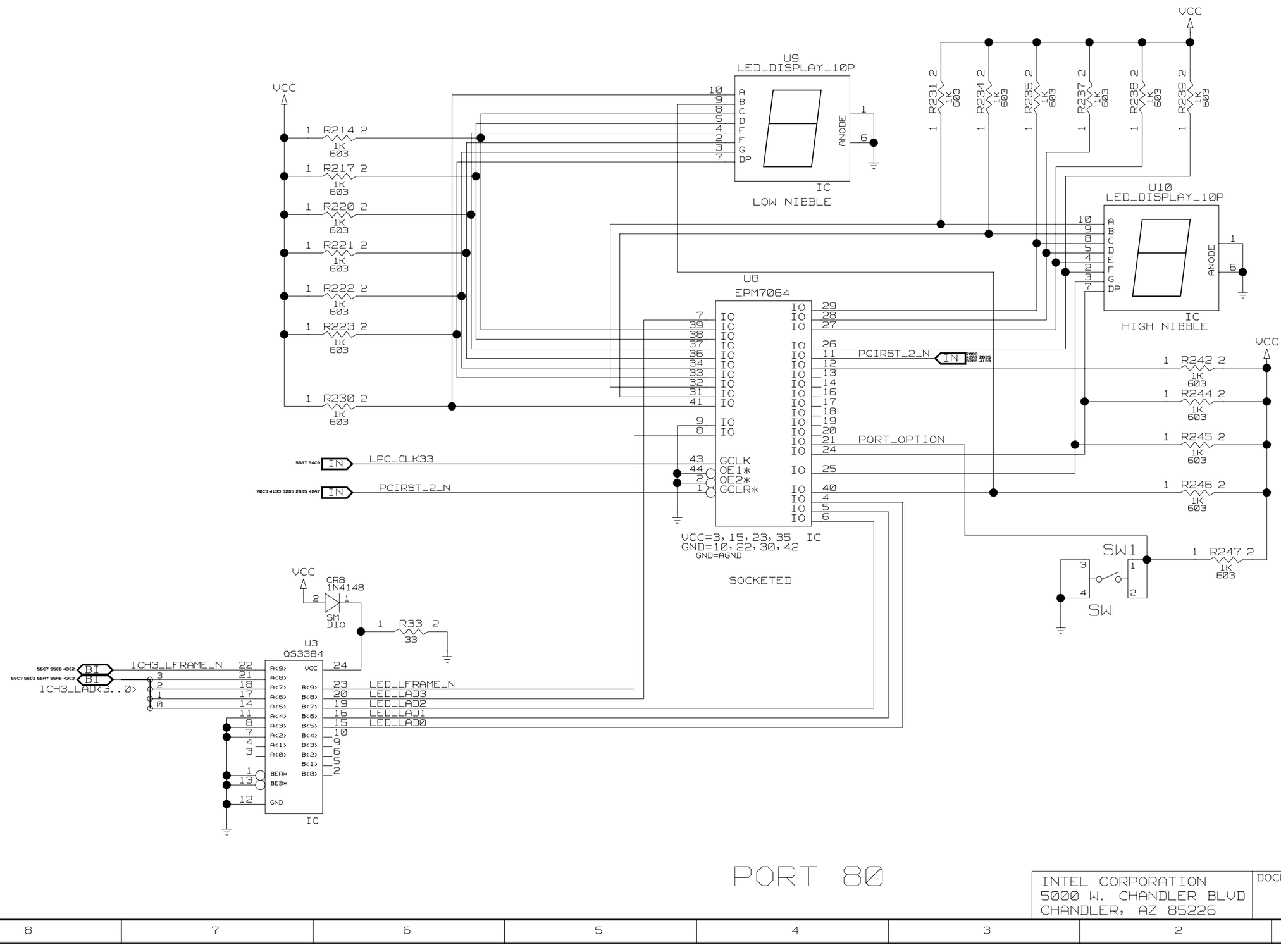
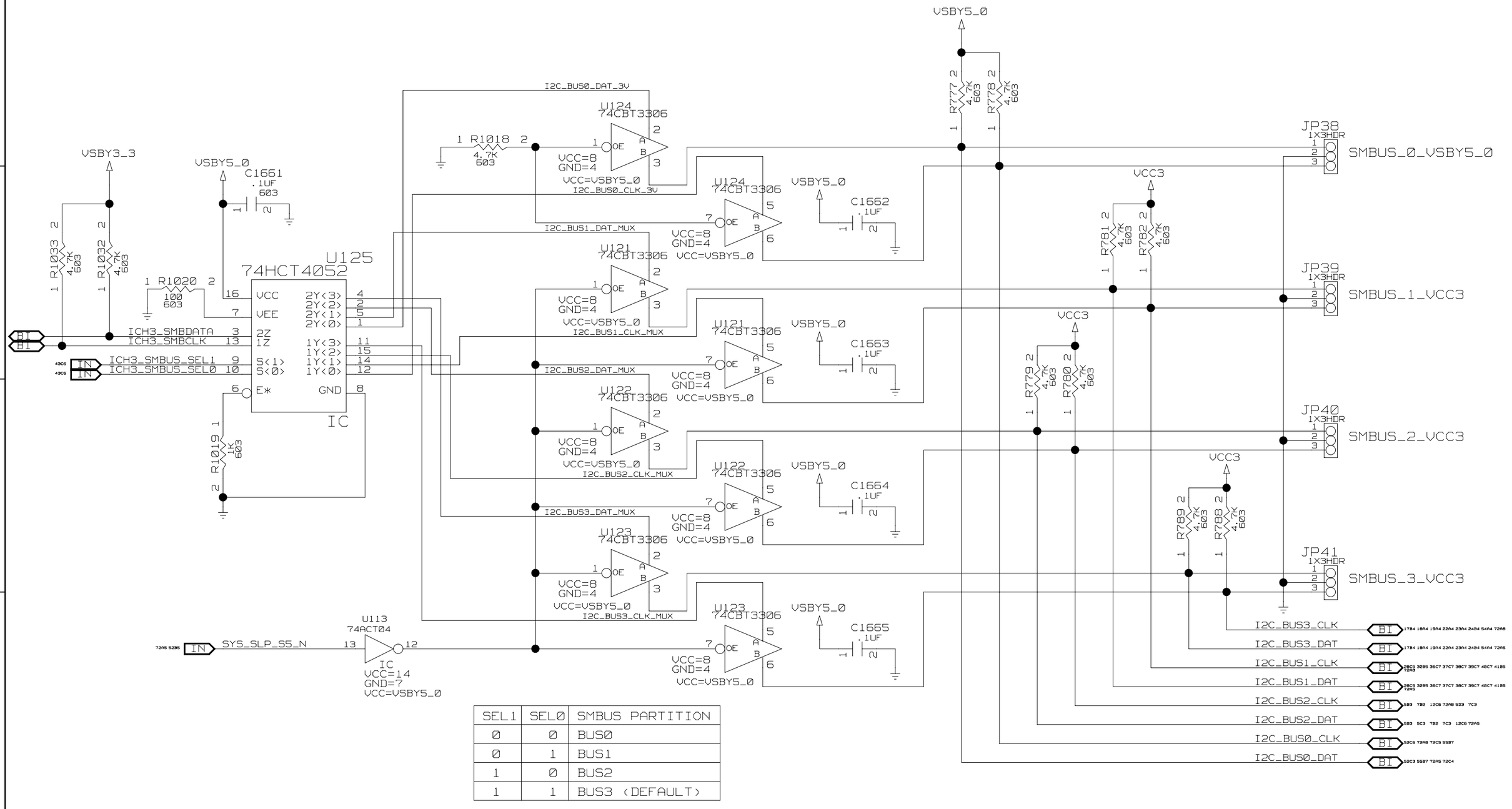


PORT 80

INTEL CORPORATION 5000 W. CHANDLER BLVD CHANDLER, AZ 85226	DOCUMENT NUMBER	PAGE 70	REV



SEL1	SEL0	SMBUS PARTITION
0	0	BUS0
0	1	BUS1
1	0	BUS2
1	1	BUS3 (DEFAULT)

SMBUS MULTIPLEX

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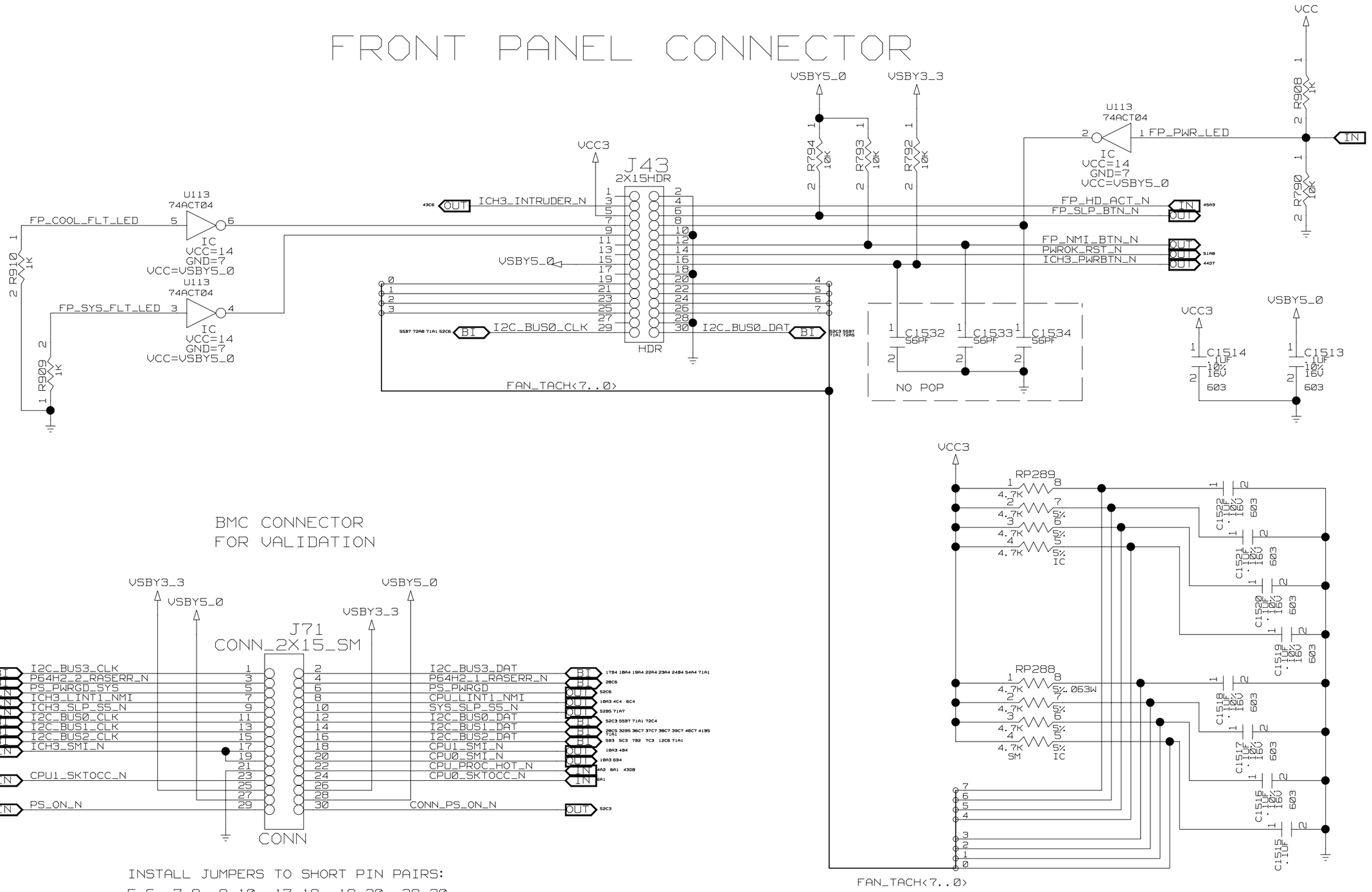
FRONT PANEL CONNECTOR



BMC CONNECTOR FOR VALIDATION

INSTALL JUMPERS TO SHORT PIN PAIRS:
5-6, 7-8, 9-10, 17-18, 19-20, 29-30

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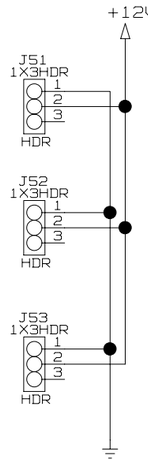
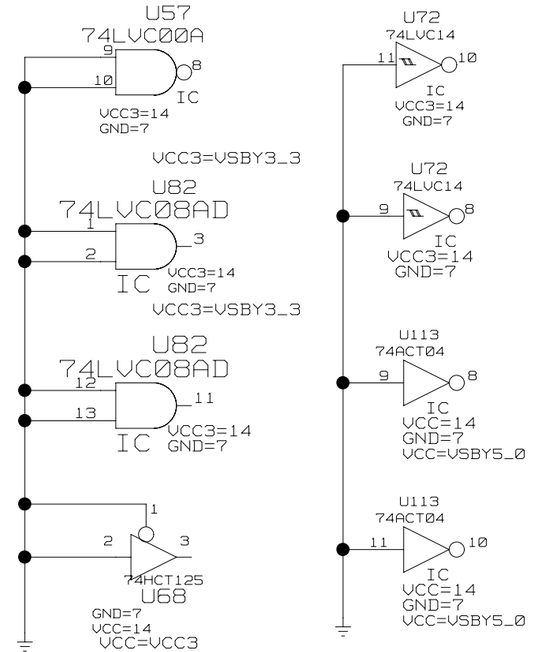
FAN HEADERS



SPARE GATES



MOUNTING HOLES

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