



Intel[®] Pentium[®] M Processor with Intel[®] E7501 Development Kit

User's Manual

April 2003

Order Number: 273879-001



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Revision History

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

About This Manual

1

This manual describes how to set up and use the evaluation board and other components included in your Intel[®] Pentium[®] M processor and Intel[®] E7501 Chipset 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.

[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.)
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).
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



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://www.intel.com/platforms/applied/eiacomm/reference_configs.htm

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 is a partial lists of the available collateral. For the full lists contact your local Intel representative.

Table 1. Related Documents

Document Title	Order Number
<i>Mobile Intel® Pentium® M Processor Datasheet</i>	252612
<i>Intel® Pentium® M Processor Specification Update</i>	252665
<i>Intel® Pentium® M Processor and Intel® E7501 Chipset Platform Design Guide</i>	273871
<i>Intel® Pentium® M Processor for Embedded Applications Thermal Design Guide</i>	273885
<i>Intel® E7501 Chipset Memory Controller Hub (MCH)</i>	251927
<i>E7501 Chipset MCH IBIS Model - NDA</i>	
<i>Intel® E7501 Chipset Memory Controller Hub (MCH) Specification Update</i>	251928
<i>Intel® 82870P2 PCI/PCI-X 64-bit Hub 2 (P64H2) Datasheet</i>	290732
<i>Intel® 82870P2 PCI/PCI-X 64-bit Hub 2 (P64H2) Specification Update</i>	290735
<i>Intel® 82801CA I/O Controller Hub 3 (ICH3-S) Datasheet</i>	290733
<i>Intel® 82801CA I/O Controller Hub 3 (ICH3-S) Specification Update</i>	290739
<i>Intel® 82802AB/82802AC Firmware Hub (FWH)</i>	290658
<i>Intel® E7500/D7501/E7505 Chipset Thermal Design Guide</i>	298647
<i>CK-408B Clock Synthesizer/Driver Specification, Revision 1.1</i>	11123
<i>ITP700 Debug Port Design Guide</i>	249679

Getting Started

2

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

2.1 Overview

The development kit contains a baseboard with an Intel Pentium M processor with 1 Mbyte L2 cache, Intel E7501 chipset, and other system board components and peripheral connectors. Also included in the kit are a hard drive, power supply, and 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 Intel Pentium M processor with 1 Mbytes of L2 cache.
- Supports 400 MHz Processor System Bus (PSB) at 3.2 Gbytes/s.

Intel® E7501 Chipset

- RGE7501MC Memory Controller Hub (MCH).
- Two Intel® 82870P2 PCI/PCI-X 64-bit Hubs 2 (P64H2).
 - Connected to MCH through a 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 through an 8-bit Hub Interface 1.5 (HI 1.5) at 266 Mbytes/s.
 - Built-in MAC.
 - 8 Mbit Intel® 82802AC Firmware Hub (FWH).
 - PCI 32-bit/33 MHz.
 - Two IDE controllers supporting Ultra ATA-100/66/33 IDE protocol (only one connector is provided on the evaluation board).

Memory Support

- Single or Dual channel DDR-200 memory interface with a maximum throughput of 3.2 Gbytes/s.
- Registered/ECC memory only.
- Two to four DDR-200 DIMMs.
- 256 Mbytes to 4 Gbytes total 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 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 American Megatrends* (FWH installed on board).

- One Intel Pentium M processor with 1 Mbytes L2 cache at 1.6 GHz with 400 MHz PSB (installed on board).
- One fansink thermal solution and metal attachment bracket.
- One MCH heatsink and attachment clip.
- Two 256 Mbyte DIMMs, registered with ECC.
- IDE hard disk drive pre-loaded with Linux* Red Hat* software.
- 80-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:
 - 38 screws: 6/32-inch (diameter) x 7/16-inch (length).
 - 19 female-female standoffs: 6/32-inch (diameter) x 5/8-inch (length).
 - 19 lock washers: size 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 AMIBIOS8* for the Intel® Pentium® M Processor with Intel® E7501 Development Kit

The evaluation board is pre-installed and licensed with a copy of AMIBIOS8* from American Megatrends*.

2.5 Before You Begin

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

Table 2. Additional Hardware

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.
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.
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](#) for locations of connectors, jumpers, and other board components, and [Figure 8](#) 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 may 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-inch hex wrench for installation.
4. **Check jumper settings.** Verify that the following jumpers are set in their default state (see [Table 3](#)). Refer to [Section 4.5](#) for detailed descriptions of all jumpers. [Table 3](#) presents the jumper settings.

Table 3. Jumper Settings

Jumper	Function	Default Setting
JP1	Safe Mode	Open
JP2	Top Swap	Open
JP4	CMOS Clear	Open
JP7	ICH3-S No Reboot	Open
JP19	SCSI Reset	Short 1-2
J27	FWH Header	Open
J4	VID[3-5] VID Select	Open
J6	VID[0-2] VID Select	Open
J15	Video Reset	Short 1-2
J28	VID Jumper/CPU	Open
JP14	Ethernet Reset	Short 1-2
JP24, JP25, JP26	PCI-X Slot 1, Bus A Mode	All open
JP28, JP29	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
JP38	SMBus 0 VSBY5	Open
JP39	SMBus 1 VCC3	Open
JP40	SMBus 2 VCC3	Open
JP41	SMBus 3 VCC3	Open
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:
 - One Intel Pentium M processor in socket U2.
 - BIOS FWH in socket U69.
 - Battery in 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 have been damaged, contact your Intel field sales representative or local distributor for assistance.

6. **Install fansinks:** It is necessary for the processor to have a thermal solution to keep it within the correct operating temperature. Install the included heatsink on the processor (U2). The processor heatsink installation instructions are as follows:
 - a. Remove heatsink from its package and separate the fansink portion from the heatsink back plate (see [Figure 1](#)).
 - b. Examine the base of the heatsink, where contact with the processor die is made. If there is a white Thermal Interface Material (TIM) on the surface, it will need to be removed in order for the thermal solution to meet its thermal performance requirements.
 - c. To remove the TIM: first, wipe the surface with Isopropyl alcohol. Then, take a razor blade and scrape off the TIM. The razor blade should be held at a relatively shallow angle so as not to scratch the surface of the heatsink. Clean the surface with alcohol again until the TIM is completely removed.
 - d. Take the heatsink back plate and place the clear/white gasket over the back plate pins so that the adhesive side of the gasket is against the back plate (see [Figure 1](#)).
 - e. Place back plate on the underside of the board so that the pins protrude through the holes in the PCB around the processor.
 - f. Thermal grease (TIM) needs to be applied to the processor before the heatsink is installed. Clean the die of the processor with alcohol before the TIM is applied to it. This ensures that the surface of the die is clean.
 - g. Apply approximately 0.05 cc of thermal grease on the center of the die. A tube of thermal grease is included in the kit. There is enough grease for multiple applications.
 - h. Check the base of the heatsink to ensure that it is clean and free of any TIM material or other residue. If it is not, clean it with alcohol.
 - i. Place the heatsink over the pins of the heatsink back plate. Slide the heatsink so that the back plate pins are locked in place by the heatsink. The base of the heatsink should be directly over the processor die.
 - j. Turn the heatsink clockwise until it contacts the die. Turn the heatsink ¼ turn to tighten it. The heat sink should be snug but not tight.

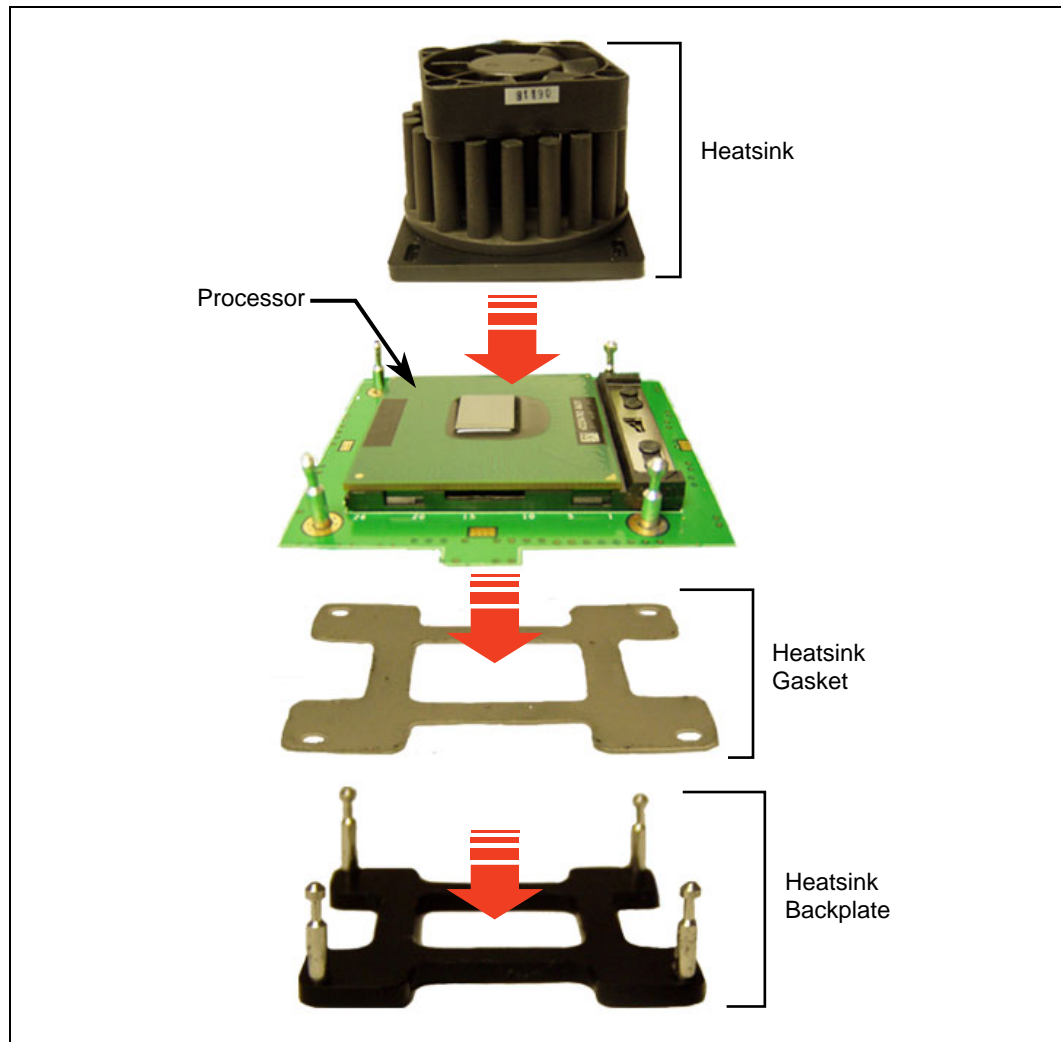
Caution: Over tightening the heat sink could cause excessive pressure on the die and damage the processor.

- k. Connect the 3-pin fansink power connector to connector J52 on the evaluation board.

Note: It is very important to clean the processor die and base of the heat sink and apply new thermal grease every time that the heat sink is removed.

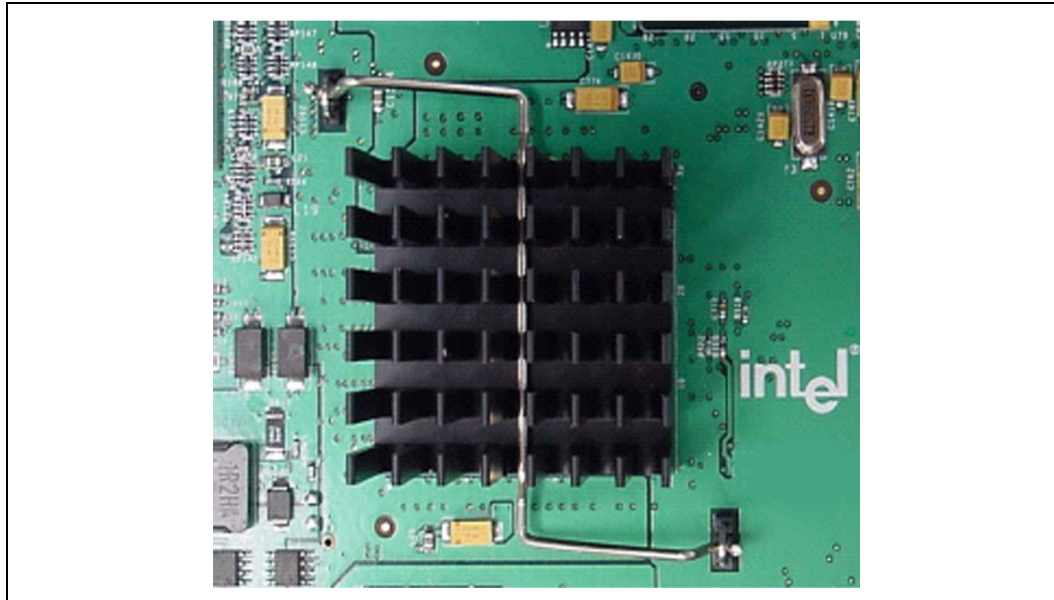
[Figure 1](#) shows the processor assembly components.

Figure 1. Processor Assembly Components



7. **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 2](#) for a picture of the installed MCH heatsink.

Figure 2. Installed MCH Heatsink



8. **Install memory.** Your kit includes two 256-Mbyte DIMMs. 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.

9. **Install board on stand.** A board/component stand is provided in your kit. Refer to [Figure 3](#) and [Figure 4](#) for placement of components on the assembled stand.

Figure 3. Assembled Board/Component Stand, Front View

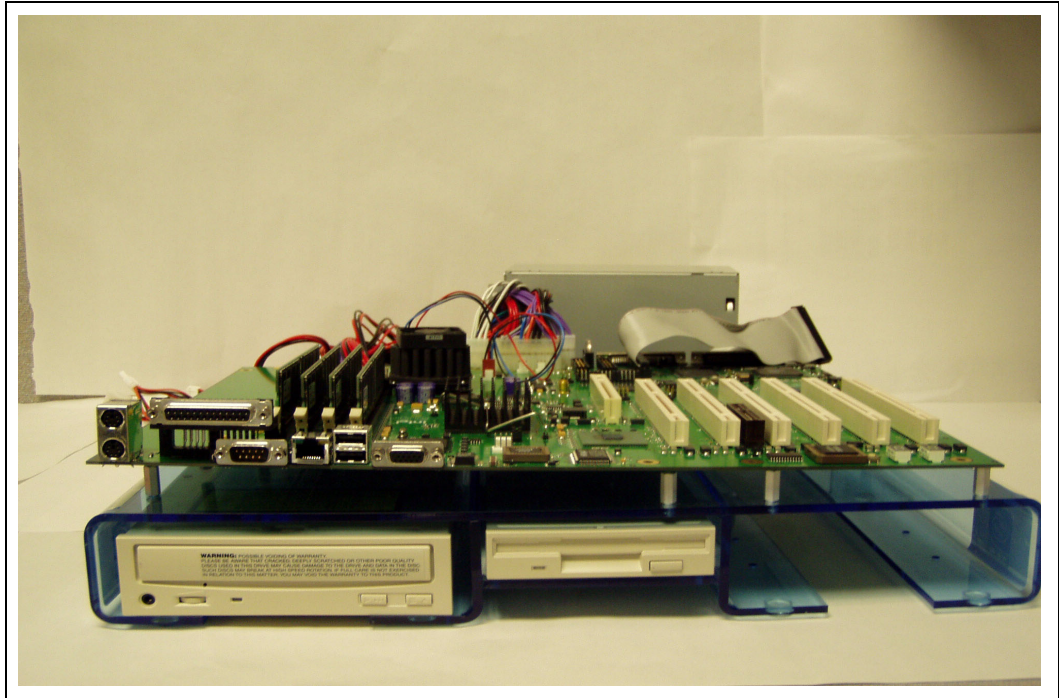
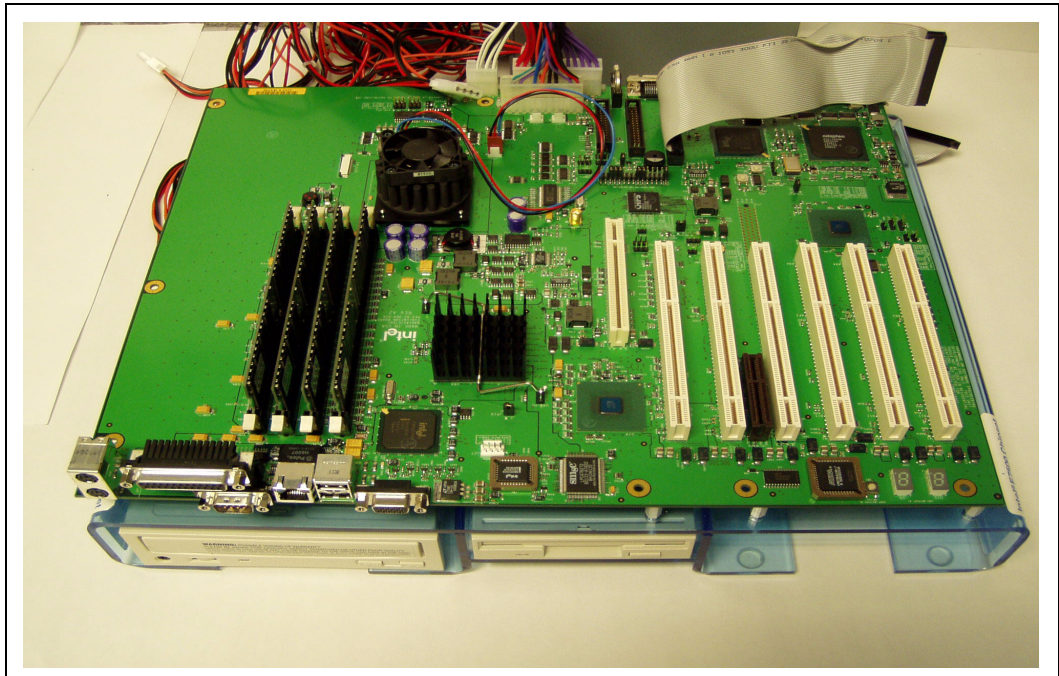


Figure 4. Assembled Board/Component Stand, Top View



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

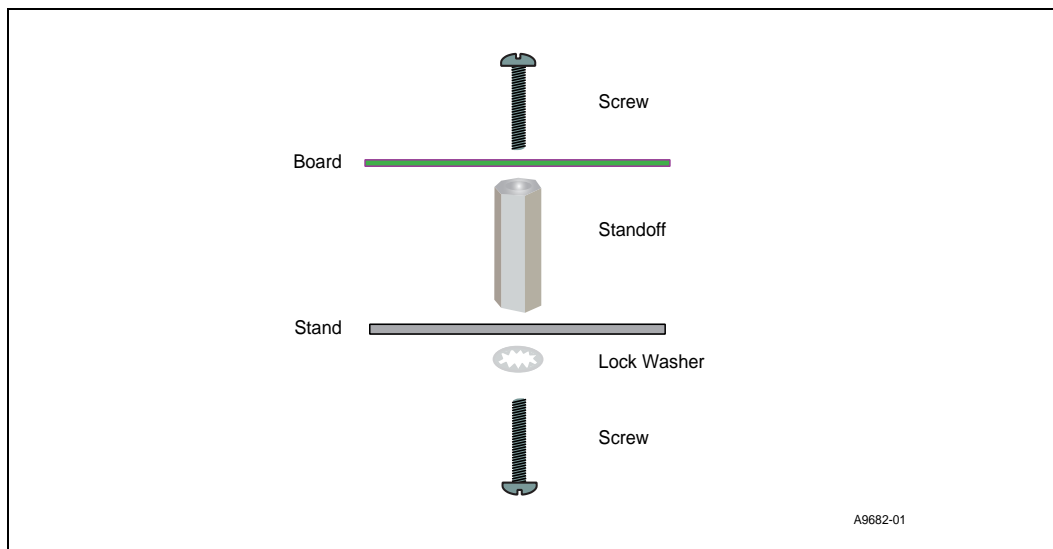
- 38 screws.
- 19 female-female standoffs.
- 19 lock washers.

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

See [Figure 5](#) 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.

- Fit a lock washer on one screw and insert it through the bottom of the top shelf of the stand.
- Using a hex wrench, screw the standoff onto the screw from the top of the shelf. Repeat for all holes in the shelf.
- 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.
- 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 1](#) shows one completely assembled processor assembly (rear), and one partially assembled (front).
- Insert remaining screws into the standoffs from the top of the board.

Figure 5. Mounting Hardware Installation Order



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.

For a correct boot-up of the system, 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 [Figure 3](#) and [Figure 4](#). 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 top connector is for the mouse, and the bottom is for the keyboard. Alternatively, you may 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 (i.e., the hub, switch, or 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 fansink on the processor is operating. If not, turn off the power immediately and verify that the fansink is connected to the board correctly (see [Step 6](#)). If the fansink is not operating, contact your Intel field sales representative or local distributor.

2.7 Configuring the BIOS

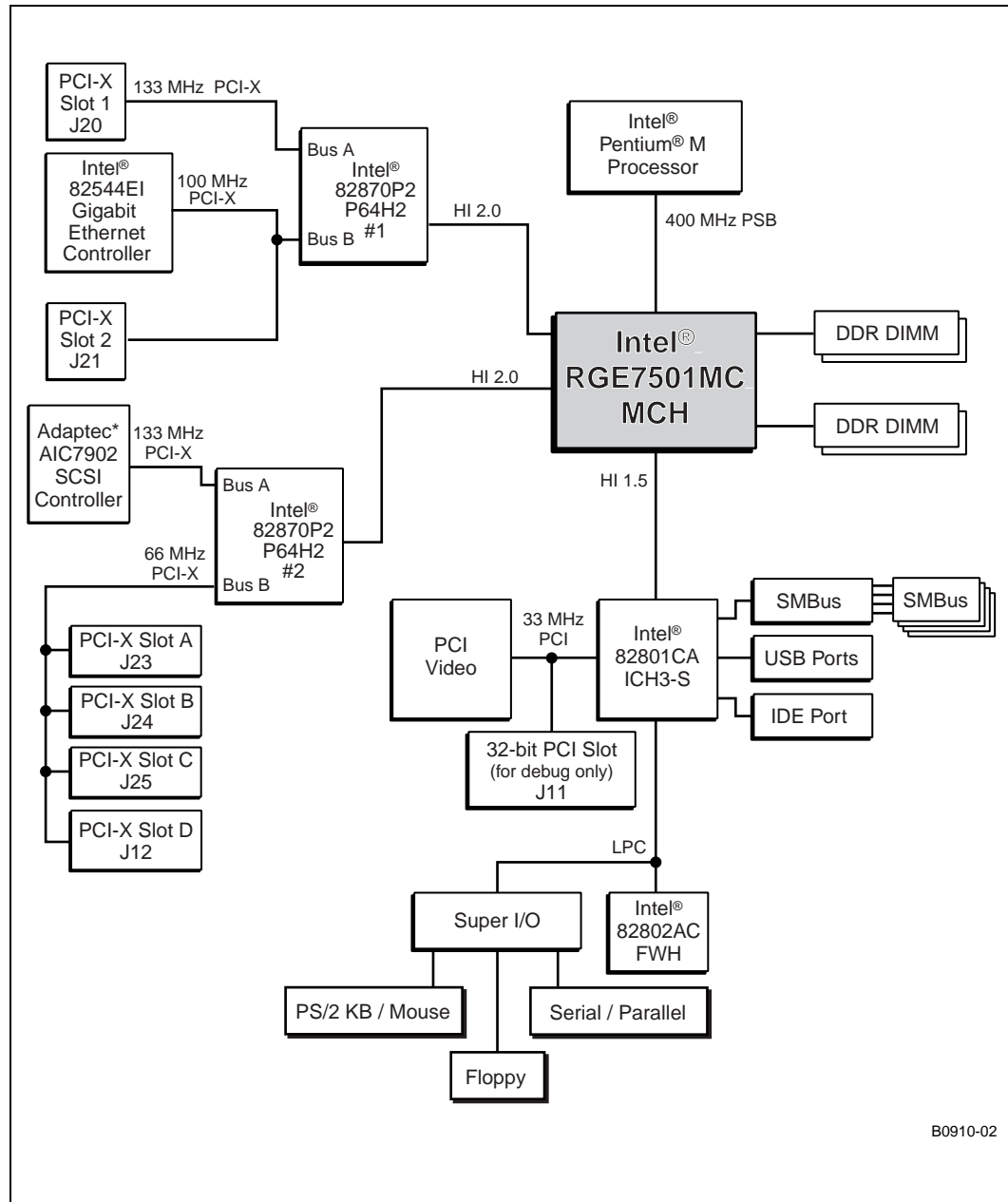
An AMIBIOS* is pre-loaded on the evaluation board. You may need to make changes to the BIOS to enable hard disks, floppy disks and other supported features. You can use the Setup program to modify BIOS settings and control the special features of the system. Setup options are configured through a menu-driven user interface. On first boot-up of the system, you may want to use the BIOS setup program to verify the date/time and boot device. BIOS updates may periodically be posted to the Intel Developer web site at <http://developer.intel.com/design/intarch>. Pressing the Delete key during boot causes the system to enter into the BIOS setup program.

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 may be expected to meet their specified performance requirements. Operation outside the functional limit may degrade system performance and cause reliability problems.

The development kit is shipped with fansink thermal solutions to be installed on the processor, 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® Pentium® M processor and Intel® E7501 Chipset Scalable Performance Board Development Kit is designed to support the Intel Pentium M processor. The architecture of the chipset provides the performance and feature set required for uni-processor based servers in the entry-level, mid-range, front-end and general-purpose server market segments. The Hub Interface 2.0 (HI 2.0), is designed into the Intel 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 MT/s transfer rate for data transfers, delivering 3.2 Gbytes/s. The Intel E7501 chipset MCH architecture supports single or dual channel DDR with a maximum memory bandwidth of a 3.2 Gbytes/s through a 144-bit wide, 200 MHz DDR SDRAM memory interface.

In addition to these performance features, the Intel 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 the Intel® x4 Single Device Data Correction (x4SDDC) ECC 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® Pentium® M Processor

The Intel Pentium M processor is a high performance, lower voltage processor with several micro-architectural enhancements over existing Intel mobile processors. Some key features of the Intel Pentium M processor micro-architecture include Dynamic Execution, data pre-fetch logic, 400 MHz source-synchronous PSB, on-die 1 Mbyte second level (L2) cache with Advanced Transfer Cache Architecture, Streaming SIMD Extensions 2 (SSE2), and Intel® SpeedStep® technology.

The PSB uses a source-synchronous transfer of address and data to improve performance and enables addressing at 2X the system bus frequency and data transfers at 4X the system bus frequency of 100 MHz. This allows the 400 MHz system bus support to transfer data at 3.2 Gbytes/s.

The Intel Pentium M processor includes the advanced micro-architecture features described in the following sections:

3.3.1.1 Architectural Features

- On-die primary 32 Kbyte instruction cache and 32 Kbyte write-back data cache.
- On-die 1 Mbyte L2 cache.
- Supports Streaming SIMD Extensions 2 (SSE2).
- Assisted Gunning Transceiver Logic (AGTL+) bus driver technology.
- Enhanced Intel® SpeedStep® technology to enable real-time dynamic switching between multiple voltage and frequency points.
- Supports host bus Dynamic Bus Inversion (DINV).
- BPRI# control to disable address/control buffers.

3.3.1.2 Packaging/Power

- 478-pin Micro-FCPGA packages.
- VCC-CORE: 1.484 V (highest frequency mode) to 0.956 V (lowest frequency mode).
- VCCA (1.8 V).
- VCCP (1.05 V).

3.3.1.3 Enhanced Intel® SpeedStep® Technology

The Intel Pentium M processor features Enhanced Intel® SpeedStep® technology. Unlike current implementations of Enhanced Intel SpeedStep® technology, this technology may enable the processor to switch between multiple frequency and voltage points instead of two. This may enable superior performance with optimal power savings. Switching between states may be software controlled, unlike current implementations where the GHI# pin is used to toggle between two states. Following are the key features of Enhanced Intel® SpeedStep® technology:

- Multiple voltage/frequency operating points provide optimal performance at the lowest power. A subset of available operating points may be selectable to provide maximum flexibility.
- Voltage/Frequency selection may be software controlled by writing to processor MSRs (Model Specific Registers) thus eliminating chipset dependency.
 - When the target frequency is higher than the current frequency, V_{CC} is ramped up by placing a new value on the VID pins and the PLL then locks to the new frequency.
 - When the target frequency is lower than the current frequency, the PLL locks to the new frequency and then the V_{CC} is changed through the VID pin mechanism.
 - Software transitions are accepted at any time. When a previous transition is in progress, the new transition is deferred until its completion.
- The processor may control voltage ramp rates internally to ensure glitch-free transitions.
- Low transition latency and large number of transitions possible per second.
 - Processor core (including L2 cache) is unavailable for up to 10 μ s during the frequency transition.
 - The bus protocol (BNR# mechanism) is used to block snooping during the transition.
- No bus master arbiter disable required prior to transition and no processor cache flush necessary.

- Improved thermal throttling.
 - When the on-die thermal sensor indicates that the die temperature is too high, the processor may automatically perform a transition to a lower frequency/voltage specified in a software programmable MSR.
 - The processor waits for a time period (target value is 1 ms). When the die temperature is down to acceptable levels an up transition to the previous frequency/voltage point occurs.
 - An interrupt is generated for the up and down throttling transitions enabling better system level thermal management.

3.3.2 Intel® E7501 Chipset

The Intel® E7501 chipset consists of three major components: the Intel RGE7501MC Memory Controller Hub (MCH), the Intel 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 through 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:

- Platform System Bus Features:
 - Supports single Intel Pentium M processor at 100 MHz (x4 transfers).
 - Supports PSB peak bandwidth of 3.2 Gbytes/s (100 MHz).
 - Supports Intel Pentium M processor 32-bit system bus addressing model.
 - 12 deep in-order queue, two deep defer queue.
- Platform Memory Bus Features:
 - Single or dual channel DDR memory support.
 - 144-bit wide, DDR-200 memory interface with memory peak bandwidth of 3.2 Gbytes/s in dual channel.
 - Supports x72, ECC, registered DDR-200 using 128-Mb, 256-Mb and 512-Mb DRAMs.
 - Supports a maximum of 4 Gbytes of memory.
 - Error correction:
 - Dual Channel supports Single 4-bit Error Correct, Double 4-bit Error Detect (S4EC/D4ED) using Intel® x4 Single Device Data Correction (x4 SDDC).
 - Single Channel supports Single bit Error Correct, Double bit Error Detect (SEC/DED) using Intel x4 Single Device Data Correction (x4 SDDC).
 - Supports up to 32 simultaneous open pages.
- Platform I/O Features:

- Provides three Hub Interface 2.0 Connections for Intel P64H2 devices (Hub Interfaces B, C and D):
 - 1.066 Gbytes/s point-to-point connection per connection for I/O bridges with ECC protection for up to 3.2 Gbytes/s bandwidth when all three Hubs are used.
 - 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.
- Provides Hub Interface 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.
- Platform Power Management Features:
 - Supports C0, C1, C2, S0, S1, and S5 power states. (Does not support C3, C4, S2, S3 and S4 states).

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

The Intel® 82801CA ICH3-S provides the legacy I/O subsystem for Intel 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 Intel 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-S.

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 through 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 1.1 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 mouse, and the bottom connector is for the keyboard.

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 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 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 implemented directly on the evaluation board.

3.3.7 In-Target Probe (ITP)

The evaluation board contains an In-Target Probe (ITP) connector for an ITPFlex. You must use an ITP700 Flex, which is specific to the Intel Pentium M processor. Other ITPs will not work and if installed could damage the platform and/or the ITP.

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 Pentium M processor and Intel E7501 Chipset Scalable Performance Board Development Kit. For more information on these clocks, see the *Intel® Pentium M Processor and Intel® E7501 Chipset Platform Design Guide*. Table 4 presents the system clocks.

Table 4. System Clocks

Clock Name	Clock Speed
CPU	100 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 Pentium M processor and Intel E7501 Chipset 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 3 V lithium coin cell battery is included on the evaluation board.



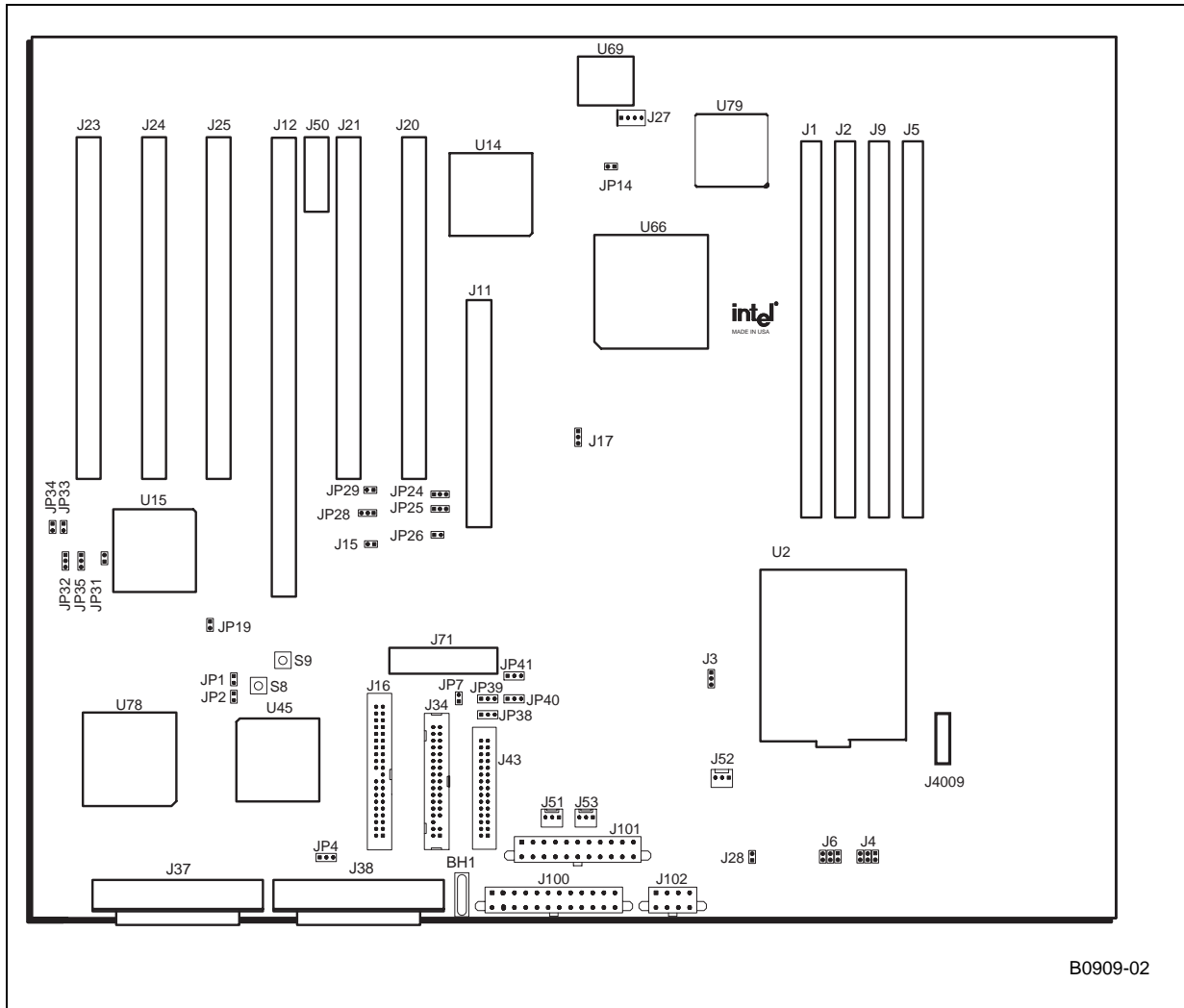
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Hardware Reference

4

This section provides reference information on the hardware, including locations of evaluation board components, connector pinout information, and jumper settings. Figure 7 shows the board layout diagram.

Figure 7. Board Layout Diagram



B0909-02

4.1 Chipset Components

Table 5 presents 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 presents 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 (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 presents 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

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

4.2.2 64-Bit PCI-X Connectors

Table 8 presents the 64-bit 3.3 V PCI-X connector pinout for J20, J21, J23, J24, J26, and J12.

Table 8. 64-bit 3.3 V 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

Table 8. 64-bit 3.3 V 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
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
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 Processor Socket

The processor socket (U2) is keyed so that it fits into the socket in one particular orientation. The socket is released by twisting the cam lever.

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

4.2.4 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.

4.2.5 Battery

A type 2032 3 V lithium coin cell battery is used in socket BH1 on the evaluation kit. 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 9 lists the connector reference designators that correspond to the connectors on the board.

Table 9. 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	CPU Fan Connector
J71	BMC Connector
J70	Debug Connector

4.3.1 WTX Power Connectors

The tables in this section present the signals assigned to the three WTX power connectors.

Table 10 presents the WTM main power connector (J100).

Table 10. WTX Main Power Connector (J100) (Sheet 1 of 2)

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	



Table 10. WTX Main Power Connector (J100) (Sheet 2 of 2)

Pin	Signal Name	Function
17	3.3V _{AUX}	
18	com.	Ground
19	com.	Ground
20	com.	Ground
21	com.	Ground
22	5V _{SB}	
23	5V	
24	5V	

Table 11 presents the WTX additional power connector (J101).

Table 11. 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 ² C clk	Clock signal for I ² C 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	3.3V _{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 ² C data	Data signal for I ² C interface
20	FanM	Signal indicating fan speed/status in power supply
21	PS-on	Signal to enable/disable power supply
22	Reserved	

Table 12 presents the WTX 12 V_{DIG} VRM/D2D output power connector (J102).

Table 12. WTX 12 V_{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 13 presents 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 13. 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 14 presents the signals assigned to the IDE connector.

Table 14. 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 15 presents the signals assigned to the floppy drive connector.

Table 15. Floppy Drive Connector Pinout (J34)

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
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 ITP700 Flex Connector

See [Section 3.3.7](#) and ITP documentation for information on the In-Target Probe (ITP), connector J4009.

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 want to place your evaluation board in a chassis, refer to [Table 16](#) for the pinout of the front panel connector.

Table 16. 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 ² C bus 0 clock
15	5V standby voltage	30	I ² C bus 0 data

4.3.7 Fan Connectors

There are two 12 V fan connectors on the evaluation board. Use connector J52 for the CPU fansink. If you install another 12 V 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 (J71) 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 four DIMM slots for DDR SDRAM. Table 17 presents the DDR SDRAM slot designator and corresponding description.

Table 17. DDR SDRAM Slots

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

The four DIMM slots run parallel on two channels. For dual channel operation 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 2 on Channels A and B) first, and they must contain memory of exactly the same type and size. You would next populate slots J2 and J1. 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.

For single channel operation you must populate channel A only, starting at the outermost DIMM slot furthest from the MCH (U66). For example, you must populate slot J5 (DIMM 2 Channel A) first. You would next populate slot J2. You may use DIMMs of 128 Mbytes through 2 Gbytes. All DIMMs must be ECC registered memory. Channel B is left un-populated.

Note: This platform will only support a maximum of 4 Gbytes.

4.5 Jumpers

The evaluation board has a number of jumpers that control various functions of the system. Table 18 presents the descriptions of the jumpers and their settings.

Table 18. 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	Safe Mode Boot: 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	Top-Block Swap mode: Open (default): Normal mode. Shorted: The ICH3-S supports a Top-Block Swap mode, wherein the ICH3-S 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 (ICH3-S) Datasheet (order number 290733) for more information.
JP4	CMOS Clear	CMOS Clear: Short 1-2 (default): Normal mode. Short 2-3: To clear all CMOS settings, power down, short pins 2-3, power on for several seconds, power off, move the jumper back to 1-2, and boot the system.
JP7	ICH3-S No Reboot	TCO Timer Enable/Disable: Open (default): Normal TCO timer reboot functionality: reboot after second timeout. Short: Disables TCO timer system reboot feature.
J27	FWH Header	FWH Write Protect: Open (default): All blocks write enabled. Short 1-2: Top block write protected. Short 3-4: Blocks 2-8 write protected. Short 1-2 and 3-4: All blocks write protected.
J4	VID (3:5)	VID (3:5) Select: Open (default): VID (3:5) Short 3-6: VID3 = 0, Open 3-6: VID3 = 1 Short 2-5: VID4 = 0, Open 2-5: VID4 = 1 Short 1-4: VID5 = 0, Open 1-4: VID5 = 1 See Section 4.5.1 for VID table.
J6	VID (0:2)	VID (0:2) Select: Open (default): VID (0:2) Short 3-6: VID0 = 0, Open 3-6: VID0 = 1 Short 2-5: VID1 = 0, Open 2-5: VID1 = 1 Short 1-4: VID2 = 0, Open 1-4: VID2 = 1 See Section 4.5.1 for VID table.
J15	Video Reset	On-board Video Enable/Disable: Short 1-2 (default): Enables on-board video Open 1-2: Disables the on-board video

Table 18. Jumpers (Sheet 2 of 2)

Reference Designator	Functional Description	Settings				
JP19	SCSI Reset	On-board SCSI Enable/Disable: Short 1-2 (default): Enables on-board SCSI Open 1-2: Disables the on-board SCSI				
J28	VID/CPU	CPU VID Override: Open 1-2 (default): VIDs are read from CPU Short 1-2: Ignore CPU VID, use J4 and J6 VID selection				
JP14	Ethernet Reset	On-board Ethernet Enable/Disable: Short 1-2 (default): Enables on-board Ethernet Open 1-2: Holds the on-board Ethernet in reset				
JP24, JP25, JP26	PCI-X Slot 1, Bus A Mode	JP24	JP25	JP26	Mode	MHz
		1-2	Open	Open	PCI-X	133 (Default)
		2-3	Open	Open	PCI-X	100
		2-3	1-2	Open	PCI-X	66
		2-3	2-3	Open	PCI	66
2-3	2-3	Short	PCI	33		
JP28, JP29	PCI-X Slot 2, Bus B Mode	JP28	JP29		Mode	MHz
		Open	Open		PCI-X	100 (Default)
		1-2	Open		PCI-X	66
		2-3	Open		PCI	66
		2-3	Short		PCI	33
JP31, JP32, JP35	SCSI PCI/PCI-X Mode	JP31	JP32	JP35	Mode	MHz
		Open	1-2	Open	PCI-X	133 (Default)
		Open	2-3	Open	PCI-X	100
		Open	2-3	1-2	PCI-X	66
		Open	2-3	2-3	PCI	66
		Short	2-3	2-3	PCI	33
JP33, JP34	PCI-X Slots A:D Mode	JP33	JP34		Mode	MHz
		Open	Open		PCI-X	66 (Default)
		Open	Short		PCI	66
		Short	Short		PCI	33
JP38	SMBus 0 VSBY5	These headers are used to connect to the SMBus. See Section 4.5.2 for pinouts.				
JP39	SMBus 1 VCC3					
JP40	SMBus 2 VCC3					
JP41	SMBus 3 VCC3					
J71	BMC Connector	Short (Default): 5-6, 7-8, 9-10, 17-18, 19-20, 29-30				

4.5.1 Voltage Identification for the Intel® Pentium® M Processor

There are six voltage identification pins on the Intel® Pentium® M processor. These signals are used to support automatic selection of V_{CC_CORE} voltages and are needed to cleanly support voltage specification variations on current and future processors. VID[5:0] is presented and defined in [Table 19](#).

Table 19. VID vs. V_{CC_CORE} Voltage

VID						V _{CC_CORE} V	VID						V _{CC_CORE} V
5	4	3	2	1			5	4	3	2	1		
0	0	0	0	0	0	1.708	1	0	0	0	0	0	1.196
0	0	0	0	0	1	1.692	1	0	0	0	0	1	1.180
0	0	0	0	1	0	1.676	1	0	0	0	1	0	1.164
0	0	0	0	1	1	1.660	1	0	0	0	1	1	1.148
0	0	0	1	0	0	1.644	1	0	0	1	0	0	1.132
0	0	0	1	0	1	1.628	1	0	0	1	0	1	1.116
0	0	0	1	1	0	1.612	1	0	0	1	1	0	1.100
0	0	0	1	1	1	1.596	1	0	0	1	1	1	1.084
0	0	1	0	0	0	1.580	1	0	1	0	0	0	1.068
0	0	1	0	0	1	1.564	1	0	1	0	0	1	1.052
0	0	1	0	1	0	1.548	1	0	1	0	1	0	1.036
0	0	1	0	1	1	1.532	1	0	1	0	1	1	1.020
0	0	1	1	0	0	1.516	1	0	1	1	0	0	1.004
0	0	1	1	0	1	1.500	1	0	1	1	0	1	0.988
0	0	1	1	1	0	1.484	1	0	1	1	1	0	0.972
0	0	1	1	1	1	1.468	1	0	1	1	1	1	0.956
0	1	0	0	0	0	1.452	1	1	0	0	0	0	0.940
0	1	0	0	0	1	1.436	1	1	0	0	0	1	0.924
0	1	0	0	1	0	1.420	1	1	0	0	1	0	0.908
0	1	0	0	1	1	1.404	1	1	0	0	1	1	0.892
0	1	0	1	0	0	1.388	1	1	0	1	0	0	0.876
0	1	0	1	0	1	1.372	1	1	0	1	0	1	0.860
0	1	0	1	1	0	1.356	1	1	0	1	1	0	0.844
0	1	0	1	1	1	1.340	1	1	0	1	1	1	0.828
0	1	1	0	0	0	1.324	1	1	1	0	0	0	0.812
0	1	1	0	0	1	1.308	1	1	1	0	0	1	0.796
0	1	1	0	1	0	1.292	1	1	1	0	1	0	0.780
0	1	1	0	1	1	1.276	1	1	1	0	1	1	0.764
0	1	1	1	0	0	1.260	1	1	1	1	0	0	0.748
0	1	1	1	0	1	1.244	1	1	1	1	0	1	0.732
0	1	1	1	1	0	1.228	1	1	1	1	1	0	0.716
0	1	1	1	1	1	1.212	1	1	1	1	1	1	0.700

4.5.2 SMBus Headers

The SMBus headers are used to connect the SMBuses. Refer to the following tables for pinout information.

Table 20 presents the SMBus 0 VSBY5 (JP38) pinout description.

Table 20. SMBus 0 VSBY5 (JP38) Pinout Description

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

Table 21 presents the SMBus 1 VCC3 (JP39) pinout description.

Table 21. SMBus 1 VCC3 (JP39) Pinout Description

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

Table 22 presents the SMBus 2 VCC3 (JP40) pinout description.

Table 22. SMBus 2 VCC3 (JP40) Pinout Description

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

Table 23 presents the SMBus 3 VCC3 (JP41) pinout description.

Table 23. SMBus 3 VCC3 (JP41) Pinout Description

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

4.6 Buttons

The evaluation board has power and reset buttons. Table 24 presents the switch reference designation and corresponding button description.

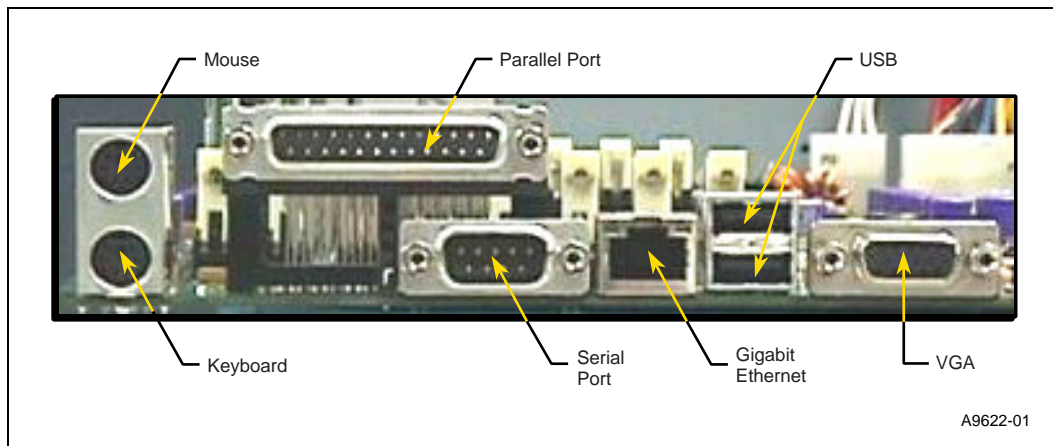
Table 24. Buttons

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 shows the peripheral connectors.

Figure 8. Peripheral Connectors



4.7.1 Dual Stacked USB Connector

Table 25 presents 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 presents the signals assigned to the PS/2-style keyboard and mouse connectors. The mouse port is on the top, and the keyboard 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 presents the signals assigned to the VGA port.

Table 27. VGA Port Signals

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
13	Horizontal Sync
14	Vertical Sync
15	DDC Clock

4.7.4 Parallel Port

Table 28 presents 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 presents 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 presents 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 -



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Bill of Materials

A

This appendix lists the latest bill of materials as of this printing. To obtain the latest version of the bill of materials, contact your local Intel representative. [Table 31](#) presents the Bill of Materials.

Table 31. Bill of Materials (Sheet 1 of 18)

Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
12	J15,J28,JP1,JP2,JP7,JP14,JP19,JP26,JP29,JP31,JP33,JP34	1X2HDR_TH-102276-001	102276-001	Foxconn Electronics, Inc.	HB1902G
10	JP4,JP24,JP25,JP28,JP32,JP35,JP38,JP39,JP40,JP41	CONN,HDR,1 X 3,PLG,VT,0.1,062ST,KP 0.23>	102276-003	Foxconn Electronics, Inc.	HB1903G
3	J51,J52,J53	1X3HDR_TH1MT-201581-103	201581-103	Wieson Electronics, Inc.	2366C888-001
1	J27	1X4HDR_TH-201558-001	201558-001	Tyco	640456-4
1	J43	2X15HDR_2MT-201418-030	201418-030	Foxconn Electronics, Inc.	HL17156
1	J34	2X17HDR5_TH-732440-001	732440-001	Molex Connector Corporation	87556-3411
1	J16	2X20HDR20_TH-201418-040	201418-040	Foxconn Electronics, Inc.	HL09207-D2
1	J50	2X30RCPT_2MH-201082-563,E	201082-563	Tyco	650090-6
2	J4,J6	2X3HDR_TH-102291-003	102291-003	Tyco	146224-1
2	J37,J38	4X17SCSIRA_TH-717126-001	717126-001	Tyco	787190-7
1	U54	IC,VLSI,VIDEO,M69000,BGA,256	INT-M69000	Asilant Technologies	M69000
1	U113	74ACT04_SOIC-100604-183-VCC=VSA	100604-183	Fairchild Semiconductor Corp.	74ACT04SCX
1	U126	74AHC74_SOIC-100713-184-VCC=VSA	100713-184	Texas Instruments	SN74AHC74DR
4	U121,U122,U123,U124	74CBT3306_SSOP-VCC=VSBY5_0	A76238-001	Texas Instruments	SN74CBT3306
1	U68	74HCT125_SOIC-100624-181-VCC=VA	100624-181	Philips Semiconductor	74HCT125D-T
1	U125	IC,LOG,MULTIPLEX,SOT,74HCT4052D,NI	INT-74HCT4052	Phillips Semiconductor	74HCT4052
1	U57	IC,LOG,GATES,SOIC,74LVC00A,NAND	INT-74LVC00AD-T	Phillips Semiconductor	74LVC00AD-T
1	U82	74LVC08AD_SOIC-100608-361	100608-361	Philips Semiconductor	74LVC08AD-T
1	U72	74LVC14_SOIC-676292-101	676292-101	Philips Semiconductor	74LVC14AD-T

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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
1	U79	IC,ASIC,CORDOVA,A0,4 16 BGA	A49604-001	Intel Corp.	82544EI
1	U78	IC,VLSI,SCSI,AIC7902,B GA,456	A52801-001	ADAPTEC	AIC-7902
1	U101	AT93C46A_66_SOIC-109868-001-VCA	109868-001	Atmel	AT93C46-10SC-2.7
1	U2	Intel® Pentium® M Socket uFCPGA 478 pin	INT-1473124-1	Tyco	1473124-1
1	BH1	BAT ACC,HOLDR,THM,CR20 32	A26460-002	Chia Tse Terminal Industry Co., Ltd.	B7566BP5R
33	C50,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%	602078-001	Kemet Corp.	T491B106M01 6AS7454
1	C712	CAP-P_3216-2.2,20%,6V,3216	INT-T491A22M00 6QAS	Kemet Corp.	T491A22M006 QAS
17	C710,C711,C1390,C1391, C1392, C1393,C1394,C1395, C1396,C1397, C1435,C1436, C1437,C1438,C1439, C1440, C1566	CAP-P_3216-4.7,20%,10V,3216	202244-027	Vishay	293D475X001 0A2W
19	C760,C761,C762,C763, C764,C765,C766,C767, C768,C769,C770,C771, C1567,C1568,C1569,C1570, C1590,C1591,C1592	CAP-P_6032-100,20%,6V,6032	INT-T491C10700 6AS	Kemet Corp.	T491C107006 AS
1	C776	CAP-P_6032-22,20%,16V,6032	202244-005	AVX/Kyocera	TAJC226M016 R
2	C656,C657	CAP-P_7260-1000UF,20%,4V,TANT	A76806-001	Kemet	T510E108M00 4AS
15	C13,C15,C17,C19,C21,C24, C26,C28, C30,C32,C33,C35, C36,C38,C87	CAP-P_7343-150,10%,6.3V,7343	INT-T520V157M0 06AS	Kemet	T520V157M00 6AS
4	C530,C531,C532,C533	CAPS,AL-P,E/X,180.000 uF,4.000V,+/- 20%>	699013-004	Panasonic	EEFUE0G181 R
4	C1555,C1556,C1557,C1558	CAP-P_7343-180,20%,4V,7343	INT-EEFUE0G18 1R	Panasonic	EEFUE0G181 R
14	C681,C682,C686,C687, C690,C691, C694,C695, C1400,C1401,C1402, C1403, C1543,C1544	CAP-P_7343-22.0,20%,16V,7343	622070-001	Vishay	893D226X001 6D2W
2	C658,C659	CAP-P_7343-330UF,20%,10V,7343	202244-020	AVX Ceramic Corp.	TAJE337M010 SNJ

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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
2	C1479,C1577	CAP-P_RDL-270,20%,16V,RDL	628955-009	Sanyo Video Components	16SP270M+C3
4	C1481,C1482,C1483,C1484	CAP-P_RDL-820UF,20%,4V	628955-006	United/Nippon Chemicon	4FP820MAE5
4	C702,C703,C704,C705	CAPN_1206-10.0UF,10%,6.3V	108426-120	A V X Ceramic Corp.	12066D106MA T4A
4	C2,C4,C6,C8	CAPN_1206-10UF,10%,6.3V,1206	679195-003	TDK Corporation Of America	C3216X7R0J1 06KTB08N
27	C46,C48,C51,C52,C66,C67, C68,C69, C70,C71,C74,C75, C445,C446,C447,C448, C449,C450, C897,C898, C899, C900,C901,C902, C903,C4059,C4061	CAPN_1210-10UF,20%,16V,1210	202170-007	TDK Corporation Of America	C3225Y5V1C1 06ZT0S9N
23	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,20%,20%,6.3V	644066-008	TDK Corporation Of America	C3225X5R0J2 26MT009N
4	C1496,C1497,C1499,C1643, C1498,C1644	CAPN_508-.1UF,10%,16V,508	677317-001	TDK Corporation Of America	C1220X7R1C1 04KT009N
28	C1, C3, C5, C7, C589, C590, C595, C596, C597, C598, C613, C614, C620, C621, C777, C783, C1450, C1530, C1607, C1608, C1609, C1610, C1611, C1612, C1619, C1620, C1621, C1622	CAPN_603-.01UF,10%,50V,603	603269-020	Murata Elec. North America	GRM39X7R10 3K050AJ
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,20%,50V,603	602431-025	A V X Ceramic Corp.	06035C103MA T4A
63	C59,C61,C88,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,5%,50V,603	626747-046	A V X Ceramic Corp.	06035C103JA T4A



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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
3	C617,C1372,C1373	CAPN_603-.047UF,5%,16V,603	602433-014	A V X Ceramic Corp.	0603YC473JA T4A
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,&20%,80%,25V	202341-002	TDK Corporation Of America	C1608Y5V1E1 04ZT009N
345	C45,C49,C60,C65,C297, C298,C299,C300,C305, C306,C307,C308,C309, C310,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,C615,C616, C833,C838,C839,C840, C841,C842,C843,C845, C846,C847,C850,C851, C852,C853,C854,C855, 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,	CAPN_603-.1UF,10%,16V,0603	602433-002	TDK Corporation Of America	C1608X7R1C1 04KT009T



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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
345	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, 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,C1152, C1153,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,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	Reference Designation Continued			
2	C1243,C1564	CAPN_603- .22UF,&20%,80%,16V	202341-009	TDK Corporation Of America	C1608Y5V1C2 24ZT009N
7	C62,C63,C64,C1377,C1502, C1641,C1642	CAPN_603- 1.0UF,10%,10V,603	202341-008	A V X Ceramic Corp.	0603ZG105ZT 4A

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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
3	C619,C1584,C1585	CAPN_603-10.0PF,5%,50V,603	108425-064	A V X Ceramic Corp.	06035A100JAT4A
37	C73,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	CAPN_603-1000PF,10%,50V,603	602431-026	TDK Corporation Of America	C1608X7R1H102KT009A
6	C43,C57,C1602,C1603,C1604,C1605	CAPN_603-1000PF,5%,50V,603	626747-035	A V X Ceramic Corp.	06035C102JAT4A
13	C90,C93,C94,C632,C633,C634,C639,C640,C641,C1505,C1559,C1562,C1565	CAPN_603-100PF,5%,50V,603	603275-120	Murata Elec. North America	GRM39C0G101J050AJ
1	C1626	CAPN_603-1500PF,10%,25V,603	INT-06033C152KAT2A	A V X Ceramic Corp.	06033C152KAT2A
1	C618	CAPN_603-15PF,5%,50V,603	603275-110	TDK Corporation Of America	C1608C0G1H150JT009A
19	C83,C84,C1244,C1245,C1246,C1247,C1248,C1249,C1250,C1251,C1252,C1253,C1254,C1255,C1256,C1257,C1258,C1259,C1260	CAPN_603-180PF,10%,50V,603	603275-023	Kemet	C0603C180K5GAC9045
8	C1261,C1262,C1263,C1264,C1265,C1266,C1267,C1268	CAPN_603-220PF,10%,50V,603	602431-004	A V X Ceramic Corp.	06035C221KAT4A
2	C1270,C1271	CAPN_603-22PF,5%,50V,603	603275-112	A V X Ceramic Corp.	06035A220JAT4A
7	C40,C41,C42,C44,C47,C645,C1563	CAPN_603-330PF,10%,50V,603	602433-009	A V X Ceramic Corp.	06035C331KAT4A
8	C628,C629,C1240,C1241,C1448,C1451,C1452,C1453	CAPN_603-470PF,5%,50V,603	108425-065	Murata Elec. North America	GRM39C0G471J050AJ
4	C1593,C1594,C1595,C1596	CAPN_603-47PF,10%,50V,603	603275-015	AVXCeramicsCorp	06035A470KAT4A
5	C622,C623,C624,C644,C1561	CAPN_603-47PF,5%,50V,603	603275-116	TDK Corporation Of America	C1608C0G1H470JT009A
3	C1532,C1533,C1534	CAPN_603-56PF,5%,50V,603	603275-117	A V X Ceramic Corp.	06035A560JAT4
15	C11,C12,C14,C16,C18,C20,C22,C23,C25,C27,C29,C31,C34,C37,C39	CAPN_612-2.2PF,10%,6.0V,612	INT-06126D225KAT2A	A V X Ceramic Corp.	06126D225KAT2A
4	C909,C910,C911,C912	CAPN_805-.01UF,10%,50.0V,805	108426-054	TDK Corporation Of America	C2012X7R1H103KT009N
4	C1043,C1044,C1055,C1056	CAPN_805-.01UF,10%,50V,805	108426-037	A V X Ceramic Corp.	08055C103KAT4A
6	C454,C1129,C1130,C1131,C1132,C1133	CAPN_805-.1UF,10%,50V,805	108426-052	TDK Corporation Of America	C2012X7R1H104KT009N

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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
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,20%,50V,805	108427-050	TDK Corporation Of America	C2012X7R1H104MT0S9N
2	C1127,C1128	CAPN_805-.47UF,10%,16V,805	644066-002	TDK Corporation Of America	C2012X7R1C474KT0S9N
37	C78,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,10%,16V,805	644066-006	Murata Elec. North America	GRM40X7R105K016AK
2	C58,C76	CAPN_805-1UF,10%,16V,805	602818-001	TDK Corporation Of America	C2012Y5V1C105ZT009N
1	J10	CON2XUSB_TH-642575-001	642575-001	Foxconn Electronics, Inc.	UB1112C-D1
4	J1,J2,J5,J9	CONN,CEDG,184P,DIMM,VT,0.05,062ST	A13373-001	FCI	55635-23302
1	J4009	CONN,MISC,28 P,FFC,RA,0.5MM, SMT	700000-827	Molex	52435-2891
1	J101	CONN22_WTX_TH-A84969-001	A84969-001	Molex	39-29-9222
1	J100	CONN24_WTX_MAIN_TH-650520-012	650520-012	Molex	39-29-9242
1	J102	CONN8_WTX_DIG_TH-650520-008	650520-008	Molex	39-29-9082
1	J71	HDR,2X15,SMT,0.100 PITCH	INT-1-146134-4	Tyco	1-146134-4
0	No Pop	CONN_SMA_TH-CONN_SMA	INT-1053354-1	AMP	1053354-1
1	J11	CONPCI_TH-201082-060	201082-060	Foxconn Electronics, Inc.	EH06011-PC-W
1	J29	CONVGAEDGE_TH-648546-003	648546-003	Foxconn Electronics, Inc.	DZ11A36-R9
1	Y2	CRYSTAL_SM-630770-003	630770-003	Raltron Electronics Corp.	630770-003

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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
1	Y3	XTAL,HC49S,25.0000,MHZ,20,PF,0.005%,SM	630770-011	Raltron Electronic Corp.	630770-011
4	CR4,CR7,CR26,CR79	DIODE_SM-201375-601	201375-601	Semiconductor Components Industries	MBRS130T3
1	CR45	DIODE_SOT23-101350-601	101350-601	ON Semiconductor	MMBD914LT1
1	CR8	IC,DS,DIO,SOD123,1N4148W,GP	201593-002	GE	1N4148W
5	CR3,CR5,CR6,CR78,CR80	DIODE_SOT23-693508-001	693508-001	Central Semiconductor Corp.	CMPSH-3
2	CR46,CR47	DIODPAK_DPAK-201473-601	201473-601	Semiconductor Components Industries LLC	MBRD320T4
3	CR1,CR2,CR72	DIOSOT23C_SOT23C-BAV70LT1	666290-201	Philips Semiconductor	BAV70
5	CR49,CR50,CR51,CR52,CR53	DIOSOT23S_SOT23S-202178-001	202178-001	Philips Semiconductor	BAT54S
6	U93,U94,U95,U96,U97,U98	DS2119M_SSOP-714435-001	714435-001	Dallas Semiconductor Corp.	DS2119ME T&R
1	J31	DSUB25TALL_B_TH-3MT-DSUB	201591-005	Foxconn Electronics, Inc.	DM11356-R1
1	J35	DSUB9_TH-2MT-302921-001	302921-001	Foxconn Electronics, Inc.	DT10126-R9
1	U66	ASSY,IC,CHIPSETS,RG,N/A,82861,A,3,QC47	INT-RGE7501MC	Intel Corp.	RGE7501MC
1	U8	EPM7064_PLCC-644134-201	644134-201	Altera Corp.	EPM7064LC44-7
1	FB17	FBPAK4L_SM-657300-001	657300-001	TDK Corporation Of America	ACA3216M4-120-TL
2	FB4,FB5	FERRITE_SM-651080-003	651080-003	Murata Elec. North America	BLM21P300SP T1
7	FB6,FB7,FB8,FB9,FB10,FB30,FB31	FER-BEAD,0805,600.0mOHM,2.0 A,	514797-002	Murata	BLM31A700S
5	FB13,FB14,FB15,FB16,FB18	FERR_BD_SM-651080-002	651080-002	Murata Elec. North America	BLM31P500SP T1
6	FB1,FB2,FB3,FB27,FB28,FB29	FERR_BD_SM-693286-001	693286-001	Murata Elec. North America	BLM11P600SP T1
2	RT3,RT4	POLYSWITCH,SMT,2.600A	201469-007	Raychem Corporation	SMD260-2
1	U69	FWH_8M_PLCC-723644-016	723644-016	Intel Corp.(AMIBIOS8*)	N82802 AC 8 SB48
1	U61	GD75232S_SSOP-621111-103	621111-103	Texas Instruments	GD75232DBR
1	U65	XFMR LAN,1000 BASE T,SMT,24 Pins,SINGLE	727575-001	Pulse	H5007
1	U45	ASSY,IC,CHIPSETS,FW,N/A,82801CA,B,2,360>	A42352-006	Intel Corp.	FW82801CA

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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
1	U60	IC,CLK_GEN,56,SSOP,G NRTR,PLL	A77540-001	ICS	ICS932S203AF
2	L20,L21	INDUCTOR_SM-201005-501	201005-501	Murata Elec. North America	LQG21NR10K10T2
4	L7,L8,L12,L22	CHOKE,COIL,PWR,1.00 UH,	INT-ETQP6F1R2HFA	Panasonic Industrial Inc.	ETQP6F1R2HFA
2	L2,L3	INDCT,4.70 uH,30.000 mA,10.00%,0805	INT-IHLP-5050CE-03-0.47-20	Vishay	IHLP-5050CE-03-0.47-20
1	L1	INDCT,3.30 uH,6.40 A,15.00%,0.01500OHM,>	A53541-001	Coilcraft	DO3316P-332
1	L19	INDCT,54.00 nH,920.000 mA,10.00%,1206	202280-013	Murata Elec. North America	LQH31HN54N K01
1	L18	IND,1.5UH,13.4MA,+/- 20.00%	INT-UP4-1R5	Coiltronics	UP4-1R5
2	U9,U10	LED_DISPLAY_10P_TH-717483-001	717483-001	Hewlett Packard Comp.	HEWLETT - HDSP-7803
2	CR9,CR68	LED_SM-716805-001	716805-001	Stanley Electric Sales Of America	PG1112H-CR
3	CR10,CR17,CR81	LED_SM-716805-002	716805-002	Stanley Electric Sales Of America	AA1112H-TR
1	U103	IC,AMPL,DUAL,LOW PWR,	A77105-001	National Semiconductor	LM2904
1	U56	LPC47B27_PQFP-724051-001	724051-001	Standard Microsystems Corp.	LPC47B272 or LPC47B272QFP
1	U84	IC,LIN,SOT-223,LT1118CS8-2,SW	A81932-001	Linear Technology	LT1118CS8
1	U119	IC,LIN,DDPAK,LT1587,V REG	648469-104	Linear Technology	LT1587CM-1.5
1	U18	IC,LIN,SOT23,LT1761ES5-1,VREG	A70750-001	Linear Technology	LT1761ES5-1.8
1	U83	IC,LIN,DPAK,LT1764EQ,VREG	A96048-001	Linear Technology	LT1764EQ
1	U59	IC,PWR,TRPL SPLY,LT1326CMS8	A81957-001	Linear Technology	LTC1326CMS8
2	U44,U115	IC,PWR,LT1735CS	A81937-001	Linear Technology	LTC1735CS-1
1	U1	IC,LIN,SSOP,LTC1929-PG,SWITCHING	INT-LTC1929CG-PG	Linear Technology	LTC1929CG-PG
6	Q32,Q33,Q60,Q65,U12,U3008	MBT3904DUAL_SOT-710127-001	710127-001	Semiconductor Components Industries LLC	MBT3904DW1 T1
1	Q20	MGSF1N02LT1_SOT23-673755-001	673755-001	Semiconductor Components Industries LLC	MGSF1N02LT1

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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
1	U5	MOSFETN_8P_SOIC	INT-SI4966-DY	Vishay	SI4966-DY
2	Q43,Q44	IC,MOSFET,SOIC-8,30V,N-CHNL	A76939-001	Fairchild Semiconductor	FDS6690S
12	Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q49,Q50	IC,DS,FET N,SO8,FDS7760A	A66300-001	Fairchild Semiconductor	FDS7760A
4	Q11,Q22,Q26,Q27	MOSFETN_SOIC	INT-IFR7811A	International Rectifier	IFR7811A
4	Q21,Q23,Q24,Q25	IC,DS,FET N,SO8,FDS7764A	A69975-001	Fairchild Semiconductor	FDS7764A
1	U11	IC,LIN,TEMP SENSE,QSOP,NE1617A	A28220-002	Phillips Semiconductor	NE1617A
3	Q41,Q48,Q67	NPN_SOT23-108969-001	108969-001	Philips Semiconductor	PMBT3904
1	U76	OSC,XTAL,SMT,50-200MHZ,3.4VDC	657744-031	NEL Frequency Controls	SJ-A2920-80.000M
2	U14,U15	P64H2A_BGA-82870P2	A42008-004	Intel Corp.	82870P2
6	J12,J20,J21,J23,J24,J25	PCI_X_3V_TH-201082-292	201082-292	Tyco	145168-2
1	J40	PS2STACK_TH-201377-001	201377-001	Tyco	84405-1
1	Q68	IC,DS,PNP XSTR,SOT223,PZT751T1	INT-PZT751T1	Semiconductor Components Industries	PZT751T1
3	U3,U16,U17	QS3384_SOIC	INT-IDTQS3384	IDT	IDTQS3384
1	U104	FAN5066_SOIC-A77094-001	A77094-001	Fairchild Semiconductor	FAN5066
1	R454	RESN_1206-4.02,5%,1206	INT-CRCW12064R02J	Vishay	CRCW12064R02J
0	R427,R428	RESN_1206-4.7,5%,1206,E	108424-129	Vishay	CRCW12064R7JRT5
1	R39	RES D,0603,15.80 KOHM,1.00%,1/16W	202286-671	AVX Ceramics Corp.	CR10-1582F-K
1	R814	RESN_2010-.01,1%,2010	628314-004	IRC	LR2010-01-R010-F
1	R457	RESN_4527-0.005,5%,4527	INT-WSL2512R005JR86	Vishay	WSL2512R005JR86

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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
42	R96,R117,R122,R124,R137, R138,R139,R141,R143, R271,R272,R433,R434, R435,R436,R458,R648, R673,R674,R675,R676, R768,R770,R771,R815, R920,R923,R924,R925, R926,R927,R928,R956, R957,R963,R976,R2001, R2002,R2003,R2005,R3348, R3379	RESN_603-0,0,603	108506-004	A V X Ceramic Corp.	CJ10-000-K
4	R125,R126,R127,R134	RESN_603-0,5%,603	INT- CRCW06030 00ZT	Vishay	CRCW060300 0ZT
5	R34,R35,R474,R763,R764	RESN_603-1,5%,603	202285-623	KOA Speer Electronics	RM73B1JTDD 1R0J
2	R692,R695	RESN_603- 1.05K,1%,603	INT- CRCW06031 R053FRT5	Vishay	CRCW06031R 053FRT5
1	R5	RESN_603- 1.2K,5%,603,E	202285-051	AVX Ceramic Corp.	CR10-122J-K
5	R119,R421,R460,R817,R303	RESN_603-10,5%,603	202285-001	Rohm Electronics	MCR03EZ\$J#1 00
8	R144,R174,R199,R204, R1007,R1008,R1009,R1010	RESN_603- 10.0K,5%,603	656727-010	KOA Speer Electronics	RM73B1JTDC 103J
1	R98	RESN_603-100,1%,603	202286-097	Rohm Electronics	MCR03EZ\$F# 1000
14	R273,R279,R331,R338, R344,R350,R404,R430, R472,R679,R740,R759, R1020,R1036	RESN_603-100,5%,603	202285-025	AVX Ceramic Corp.	CR10-101J-K
2	R653,R801	RESN_603-100K,5%,603	202285-097	Rohm Electronics	MCR03EZ\$J#1 04
0	R930,R931	RESN_603- 10K,.1%,603,E	202286-289	AVX Ceramic Corp.	CR10-1002F-K
7	R16,R22,R27,R368,R748, R749,R1044	RESN_603-10K,1%,603	202286-289	AVX Ceramic Corp.	CR10-1002F-K
63	R46,R48,R49,R56,R59,R63, R64,R75,R80,R81,R82,R216, R226,R229,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,R580, R646,R747,R752,R765, R766,R790,R792,R793, R794,R799,R800,R803, R804,R805,R934,R1021, R1035, R1039,R2015	RESN_603-10K,5%,603	202285-073	AVX Ceramic Corp.	CR10-103J-K



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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
2	R376,R377	RESN_603-10M,5%,603	202285-145	Rohm Electronics	MCR03EZ\$J#106
0	R522,R525	RESN_603-13K,1%,603,E	202286-300	Rohm Electronics	MCR03EZ\$F#1302
3	R93,R94,R135	RESN_603-150,1%,603	202286-114	A V X Ceramic Corp.	CR10-1500F-K
0	R52,R53	RESN_603-154.0K,1%,603	INT-CR10-1543F	A V X Ceramic Corp.	CR10-1543F
1	R19	RESN_603-17.4K,1%,603	202286-312	Rohm Electronics	MCR03EZ\$F#1742
1	R374	RESN_603-18.2,1%,603	202286-693	A V X Ceramic Corp.	CR10-18R2F-K
8	R1,R23,R26,R452,R693,R694,R936,R948	RESN_603-1K,1%,603	202286-193	Rohm Electronics	MCR03EZ\$F#1001
54	R147,R181,R184,R214,R217,R220,R221,R222,R223,R230,R231,R234,R235,R237,R238,R239,R242,R244,R245,R246,R247,R379,R380,R383,R466,R467,R483,R488,R491,R497,R520,R532,R559,R562,R652,R659,R662,R688,R689,R700,R709,R773,R774,R900,R908,R909,R910,R937,R938,R960,R1019,R1037,R1040, R1047	RESN_603-1K,5%,603	202285-049	A V X Ceramic Corp.	CR06J102TR
4	R121,R429,R455,R813	RESN_603-1M,5%,603	202285-121	Rohm Electronics	MCR03EZ\$J#105
4	R398,R399,R400,R401	RESN_603-2.2K,5%,603	202285-057	Rohm Electronics	MCR03EZ\$J#222
1	R658	RESN_603-2.49K,1%,603	202286-231	Rohm Electronics	MCR03EZ\$F#2491
2	R560,R678	RESN_603-2.7K,5%,603	202285-059	Rohm Electronics	MCR03EZ\$J#272
9	R70,R71,R72,R73,R74,R76,R149, R838,R1026	RESN_603-200,5%,603,E	202285-032	Rohm Electronics	MCR03EZ\$J#201
1	R1017	RESN_603-20K,1%,603	202286-318	AVX Ceramic Corp.	CR10-2002F-K
3	R702,R708,R1016	RESN_603-20K,5%,603	202285-080	Rohm Electronics	MCR03EZ\$J#203
4	R551,R552,R899,R958	RESN_603-22,5%,603	202285-009	Rohm Electronics	MCR03EZ\$J#220
2	R55,R83	RESN_603-22.6,1%,603	202286-035	KOA Speer Electronics	RK73H1JTDD22R6F
1	R40	RESN_603-220,5%,603	202285-033	AVX Ceramic Corp.	CR10-221J-K
1	R36	RESN_603-10K,.5%,603	INT-RN73-1JLTE-1002-B25	KOA Speer Electronics	RN73-1JLTE-1002-B25



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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
10	R90,R91,R100,R105,R107, R111,R212,R215,R660,R664	RESN_603-24.9,1%,603	202286-039	AVX Ceramic Corp.	AVX-CR10-24R9F
1	R25	RESN_603-26.7K,1%,603	202286-330	AVX Ceramic Corp.	CR10-2672F-K
3	R6,R8,R116	RESN_603-27.4,1%,603	202286-043	AVX Ceramic Corp.	CR10-27R4F-K
1	R2	RESN_603-2K,1%,603	202286-222	AVX Ceramic Corp.	CR10-2001F-K
5	R136,R492,R512,R661,R663	RESN_603-300,5%,603	202285-036	AVX Ceramic Corp.	CR10-301J-K
2	R92,R95	RESN_603-301,1%,603	202286-143	AVX Ceramic Corp.	CR10-3010F-K
29	R255,R387,R397,R540, R541,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_603-33,5%,603	202285-013	Rohm Electronics	MCR03EZ\$J#330
8	R224,R256,R266,R735, R828,R935,R1038,R3217	RESN_603-330,5%,603	202285-037	Rohm Electronics	MCR03EZ\$J#331
3	R18,R209,R259	RESN_603-332,1%,603	202286-147	AVX Ceramic Corp.	CR10-3320F-K
4	R393,R394,R459,R816	RESN_603-33K,5%,603	202285-085	Rohm Electronics	MCR03EZ\$J#333
2	R2006,R2008	RESN_603-39,5%,603	202285-015	AVX Ceramic Corp.	CR10-390J-K
4	R102,R104,R109,R114	RESN_603-392,1%,603	202286-154	AVX Ceramic Corp.	CR10-3920F-K
2	R750,R751	RESN_603-4.7,5%,603	202285-617	AVX Ceramic Corp.	CR10-4R7J-K
37	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, R1018,R1032,R1033, R2000,R2011	RESN_603-4.7K,5%,603	202285-065	Rohm Electronics	MCR03EZ\$J#472
1	R681	RESN_603-4.99K,1%,603	202286-260	AVX Ceramic Corp.	CR10-4991F-K
2	R202,R818	RESN_603-402,1%,603	INT-CRCW0603402FRT5	Vishay	CRCW0603402FRT5
1	R14	RESN_603-412,1%,603	202286-156	AVX Ceramic Corp.	CR10-4120F-K
5	R894,R895,R896,R897,R898	RESN_603-43,5%,603	202285-016	AVX Ceramic Corp.	CR10-430J-K
4	R99,R106,R110,R112	RESN_603-453,1%,603	202286-157	AVX Ceramic Corp.	CR10-4530F-K
4	R85,R484,R493,R511	RESN_603-470,5%,603	202285-041	Rohm Electronics	MCR03EZ\$J#471
1	R536	RESN_603-475,1%,603	202286-162	Rohm Electronics	MCR03EZ\$F#4750



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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
21	R97,R521,R528,R545, R546, R549,R550,R665,R666, R667,R668,R669,R670, R671,R672,R753,R754, R841,R843,R3125,R3157	RESN_603-49.9,1%,603	202286-068	Rohm Electronics	MCR03EZ\$F# 49R9
4	R101,R103,R108,R113	RESN_603-499,1%,603	202286-164	AVX Ceramic Corp.	CR10-4990F-K
12	R270,R275,R965,R966, R967,R968,R969,R970, R971,R972,R973,R974	RESN_603-5.6K,5%,603	202285-067	Rohm Electronics	MCR03EZ\$J#5 62
2	R1012,R1013	RESN_603-51,5%,603	202285-018	AVX Ceramic Corp.	CR10-510J-K
1	R473	RESN_603-510,5%,603	202285-042	Rohm Electronics	MCR03EZ\$J#5 11
4	R7,R9,R77,R78	RESN_603-54.9,1%,603	INT- RK73H1JT54 R9F	KOA Speer Electronics	RK73H1JT54R 9F
6	R43,R87,R261,R509,R510, R824	RESN_603-56,5%,603	202285-019	AVX Ceramic Corp.	CR10-560J-K
1	R529	RESN_603- 6.04K,1%,603	202286-268	Rohm Electronics	MCR03EZ\$F# 6041
0	R523,R524,R526,R527	RESN_603- 6.98K,1%,603,E	202286-613	Panasonic	ERJ3EKF6981 A
2	R208,R258	RESN_603-61.9,1%,603	202286-077	Rohm Electronics	MCR03EZ\$F# 61R9
1	R15	RESN_603-619,1%,603	202286-173	AVX Ceramic Corp.	CR10-6190F-K
0	R396	RESN_603-68,5%,603,E	202285-021	AVX Ceramic Corp.	CR10-680J-K
3	R54,R89,R939	RESN_603-680,5%,603	202285-045	AVX Ceramic Corp.	CR10-681J-K
1	R13	RESN_603-681,1%,603	202286-177	AVX Ceramic Corp.	CR10-6810F-K
2	R392,R395	RESN_603-68K,5%,603	202285-093	Rohm Electronics	MCR03EZ\$J#6 83
0	R115,R120	RESN_603-7,1%,603,E	INT- CRCW06036 R98RT5	Vishay	CRCW06036R 98RT5
3	R461,R462,R463	RESN_603-75,1%,603	202286-085	AVX Ceramic Corp.	CR10-75R0F- K
4	R28,R32,R210,R260	RESN_603-750,1%,603	202286-181	Rohm Electronics	MCR03EZ\$F# 7500
1	R356	RESN_603-78.7,1%,603	202286-618	Panasonic	ERJ3EKF78R7 A
1	R424	RESN_603- 8.06K,1%,603	202286-280	Rohm Electronics	MCR03EZ\$F# 8061
5	R932,R933,R978,R1048, R1053	RESN_603-8.2K,1%,603	603394-003	KOA Speer Electronics	RK73H1JTDD 8201F

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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
76	R57,R128,R129,R133,R146, R152,R153,R159,R165, R167,R169,R189,R191, R196,R200,R201,R205, R206,R211,R218,R219,R225, R227,R228,R233,R240, R241,R243,R262,R263, R264,R265,R268,R359, R360,R362,R565,R568, R576,R581,R582,R798, R806,R807,R808,R809, R812,R977,R1005,R1006, R1022,R1043,R1050, R1051,R3079,R3148,R3401, R3402,R3403,R3404,R3799, R4000,R4001,R4002,R4003, R4004,R4005,R4006, R4007,R4008,R4009,R4010, R4011,R236,R578,R1042	RESN_603-8.2K,5%,603	202285-071	Rohm Electronics	MCR03EZ\$J#8 22
2	R453,R819	RESN_603-806,1%,603	202286-634	Vishay	CRCW060380 60FRT5
1	R358	RESN_603-825,1%,603	202286-185	Rohm Electronics	MCR03EZ\$F# 8250
1	R12	RESN_805-10K,1%,805	201599-325	Vishay	CRCW080510 02FRT5
1	R33	RESN_805-220,5%,805	201645-033	Vishay	CRCW080522 1JRT5
8	R500,R501,R502,R503, R504,R505,R506,R507	RESN_805-330,5%,805	201645-037	Rohm Electronics	MCR10&ZH\$J* 331
5	R41,R42,R86,R425,R426	RESN_SM-.002,1%,1W	712487-006	Vishay	WSL2512R002 FR86
1	J39	RJ45_JACK_TH-514215- 005	514215-005	Tyco	406549-4
2	RP205,RP282	RPAK4C-4R_SM- 1.0K,5%,A1206	202474-049	KOA Speer Electronics	CNK1J4TDD1 02J
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- 10,5%,A1206	202474-001	KOA Speer Electronics	CNK1J4TDD1 00J
2	RP1,RP2	RPAK4C-4R_SM- 100,5%,A1206	202474-025	Rohm Electronics	MNR14\$OABJ 101
1	RP197	RPAK4C-4R_SM- 10K,5%,A1206	202474-073	KOA Speer Electronics	CNK1J4TDD1 03J
5	RP206,RP208,RP211,RP212, RP283	RPAK4C-4R_SM- 2.7K,5%,A1206	202474-059	KOA Speer Electronics	CNK1J4TDD2 72J



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Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
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	RPAK4C-4R_SM-33.0,1%,A1206_	INT-CN1J4T33R0F	KOA Speer Electronics	CN1J4T33R0F
3	RP207,RP209,RP210	RPAK4C-4R_SM-33,5%,A1206	202474-013	KOA Speer Electronics	CNK1J4TDD330J
2	RP288,RP289	RPAK4C-4R_SM-4.7K,5%,A1206	202474-065	KOA Speer Electronics	CNK1J4TDD472J
4	RP119,RP144,RP196,RP204	RPAK4C-4R_SM-5.6K,5%,A1206	202474-067	KOA Speer Electronics	CNK1J4TDD562J
1	RP277	RPAK4C-4R_SM-680,5%,A1206	202474-512	KOA Speer Electronics	CNK1J4TDD681J
1	RP279	RPAK4C-4R_SM-75,5%,A1206	202474-022	Rohm Electronics	MNR14\$OABJ750
70	RP9,RP10,RP120,RP121,RP122,RP123,RP124,RP125,RP126,RP127,RP128,RP129,RP130,RP131,RP132,RP133,RP134,RP135,RP136,RP137,RP138,RP140,RP141,RP142,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,5%,A1206	202474-071	KOA Speer Electronics	CNK1J4TDD822J
1	U4	SGLE O/P SYNCH BUCK SWITCH REG	INT-SC1470ITSTR	Semtech	SC1470ITSTR



Table 31. Bill of Materials (Sheet 17 of 18)

Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
1	U3003	ULTRA FAST HYSTERETIC CO	A75476-001	Semtech	SC1476ITSTR
1	CR14	SCHOTTKY_SM-POWER RECTIFIER	INT-MBRM140T3	ON Semiconductor	MBRM140T3
1	CR74	SCHOTTKY_SM-SOD-123 PACKAGE	INT-MBR0530IT1	ON Semiconductor	MBR0530IT1
2	CR11,CR18	SCHOTTKY_SM-41.0(kb)	INT-MBR130LTR-3000	International Rectifier	MBR130LTR-3000
4	CR12,CR13,CR16,CR3008	SCHOTTKY_SM-SOD-123 PACKAGE	INT-MBR0530	International Rectifier	MBR0530
1	SP1	SPKR_TH-201826-001	201826-001	Challenge Electronics	DBX-05A
3	S8,S9,SW1	SWSPST_PB_SM_SM-672681-002	672681-002	E-Switch	TL3304AF160 QJ
2	RT1,RT2	THERMISTOR_1812-657448-002	657448-002	Littelfuse Inc.	1812L260MR
1	RT5	THERMISTOR_1812-657448-003	657448-003	Raychem Corporation	MINISMDC110-2
2	U70,U71	TLV431A_SM-704239-001	704239-001	Semtech Corporation	SC431LC5SK-1TR
1	Y1	XTAL4P_SM-619601-001	619601-001	Raltron Electronics Corp.	619601-001
1	C1600	CAP-P 6032-4.7,20%,16v,6032	108620-033	Vishay	293D475X001 6C2W
1	C53	CAPN_603-.047UF,20%,16X,603	603395-004	AVX Ceramic Corp.	0603YC473MA T2A
0	C54	CAP_603-4700PF,20%,50V,603	602431-021	AVX Ceramic Corp.	06035C472MA T4A
4	R232,R257,R357,R361	RESN_603-261,1%,603	INT-CRCW06032 61FRT5	Vishay	CRCW060326 1FRT5
4	R65,R88,R148,R150	RESN_805-0,1A,805	108506-002	Vishay	CRCW080500 00ZRT5
1	R84	RESN_603-150.0,5%,603	202285-029	AVX Ceramic Corp.	CR10-151J
1	R38	RESN_603-39.2,1%,603	202286-633	AVX Ceramic Corp.	CR10-39R2F
1	XU69	32-POSITION PLCC SOCKET	INT-822472-3	AMP	822472-3
1	XU8	44-POSITION PLCC SOCKET	INT-822472-4	AMP	822472-4
2	R267,R835	RESN_603-1.3K,1%,603	202286-204	AVX Ceramic Corp.	CR10-1301F-K
2	C55,C56	CAPN_1206-4.7UF,10%,10V,1206	644066-005	AVX Ceramic Corp.	1206ZD475KA T4P
1	U64	IC,EEPROM,SOIC,2.000 MHZ,512X8	729345-001	Atmel	AT93C66-10SC-2.7
1	R423	RES D,0603,16200.000OHM,1.00%,1/16W	202286-309	Rohm Electronics	MCR03EZ\$F# 1622



Table 31. Bill of Materials (Sheet 18 of 18)

Qty	Reference	Description	Intel Part #	Manufacturer	Manufacturer P/N
1	R37	RES_603-11.0K,.1%,603	INT-RN73-1JLTE-1102-B25	KOA Speer Electronics	RN73-1JLTE-1102-B25
2	U66-H1,U66-H2	CONN,MISC,2 P,HEADER,ANCHOR HOO	A13494-002	Foxconn Electronics, Inc.	HB96030-K
1	R2012	RESN_603-470,1%,603	INT-CR10-4700F	KOA Speer Electronics	CR10-4700F
2	R2013,R2014	RESN_603-220,5%,603	INT-CR10-2200F	KOA Speer Electronics	CR10-2200F
2	C72,C91	CAPN_603-1UF,20%,6.3V	602433-013	Murata	GRM39X5R10 5M6.3AJ
1	C80	CAP-P_7343-330UF,10%,4V,7343	INT-4TPD330M	Sanyo	4TPD330M
1	R31	RESN_603-8.25K,1%,603	202286-281	AVX Ceramics Corp.	CR10-8251F-K

Schematics

B

Schematics are provided for the following items listed below. Schematics are available from your local Intel representative.

- System Block Diagram
- Processor Socket
- MCH Pullups
- Thermal Monitors
- Processor Decoupling
- ITP, Processor Pullups
- MCH System Bus
- MCH Hub Interface
- MCH DDR Interface
- MCH Power/Ground
- DDR A Series Resistors
- DDR A DIMMs
- DDR A Termination
- DDR B Series Resistors
- DDR B DIMMs
- DDR B Termination
- Intel® P64H2 #1
- P64H2 #2
- P64H2 #1 PCI Pullups
- P64H2 #2 PCI Pullups
- PCI-X Slot 1A
- PCI-X Slot 1B
- PCI-X Slots 2A, 2B, 2C
- PCI-X Slot 2D and VXB Connector
- Intel® ICH3
- USB and IDE Connectors
- 32-Bit PCI Slot (Debug)
- PCI Video
- 2.5 V and VTT_DDR Power Regulation
- 1.8 V Power Regulation

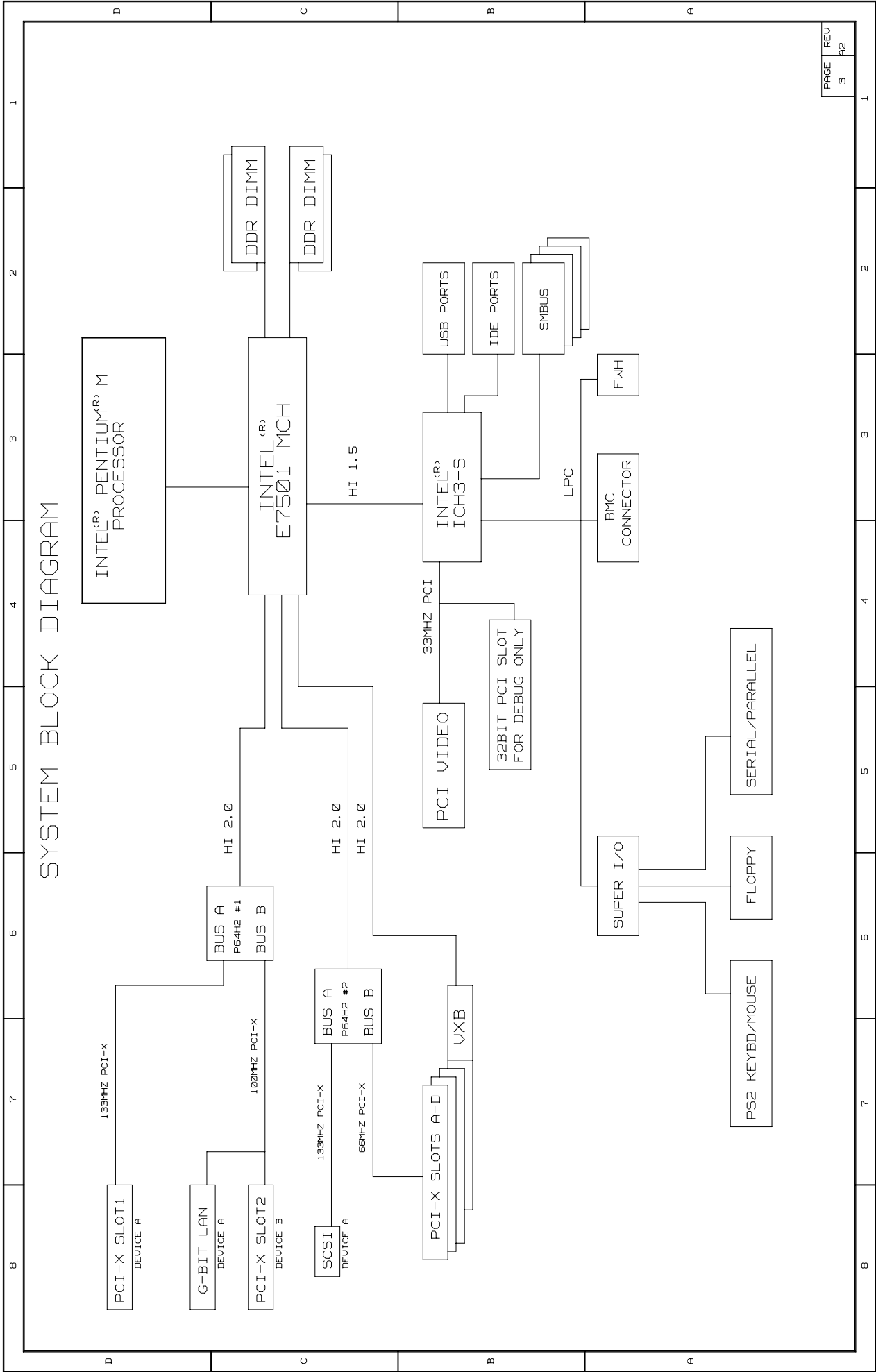


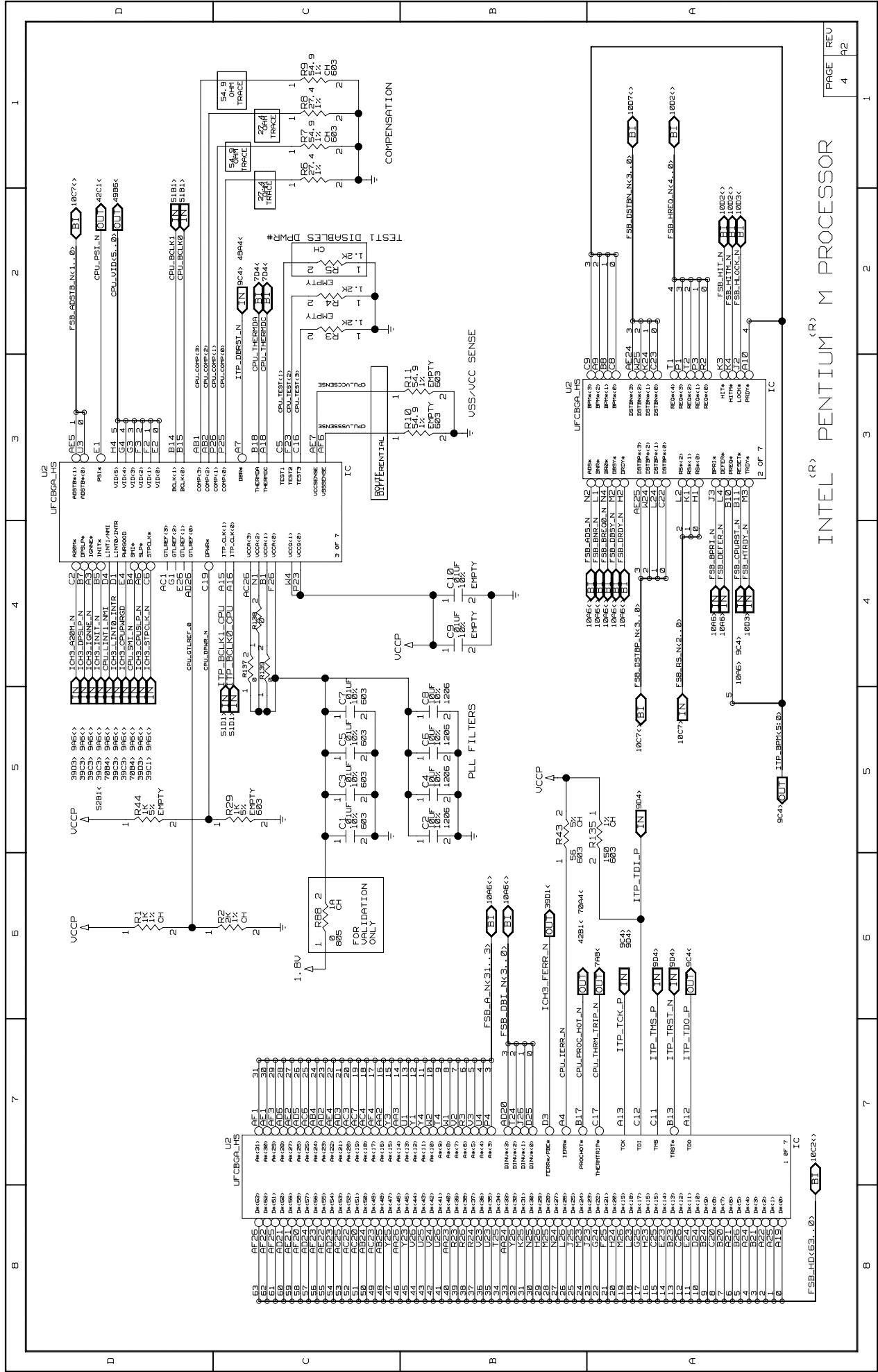
- Power Connector and Power OK Circuit
- CPUVCC Regulator
- CK-408B
- FWH, LPC Connector (Debug)
- SIO, Legacy I/O
- 1.2 V Regulation
- LAN Controller and Connector
- SCSI Controller, Connectors and Termination
- Mounting Holes
- VCCP Regulation
- SMBus Mux Logic
- Front Panel and BMC Connectors
- Spare Gates
- Port 80

8		7		6		5		4		3		2		1					
												REVISIONS							
												REV	DESCRIPTION	DFT	DATE	CHK	DATE	APVD	DATE
<p>INTEL^(R) PENTIUM^(R) M PROCESSOR / INTEL^(R) E7501 CHIPSET PLATFORM REFERENCE SCHEMATICS</p> <p>REV A2</p>																			
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												BOM RELEASE DATE		PB NUMBER					
												SIGNATURE		DATE		5000 W CHANDLER BLVD CHANDLER, AZ 85226			
												DRN BY				intel CORPORATION			
												CHK BY				TITLE			
												ENGR							
												APVD						PAGE REV	
												APVD						1/81 A2	
								3		2		1							

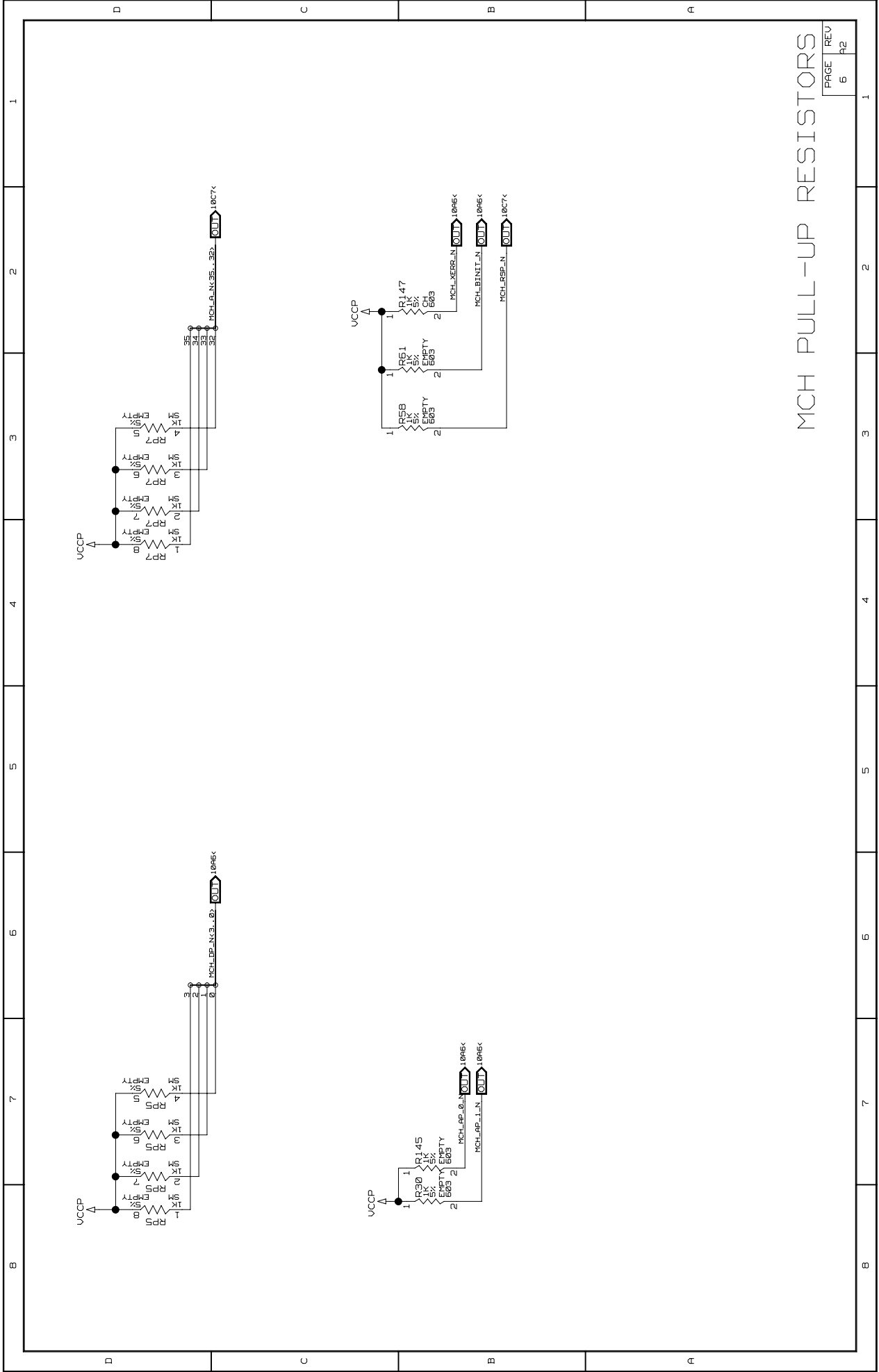
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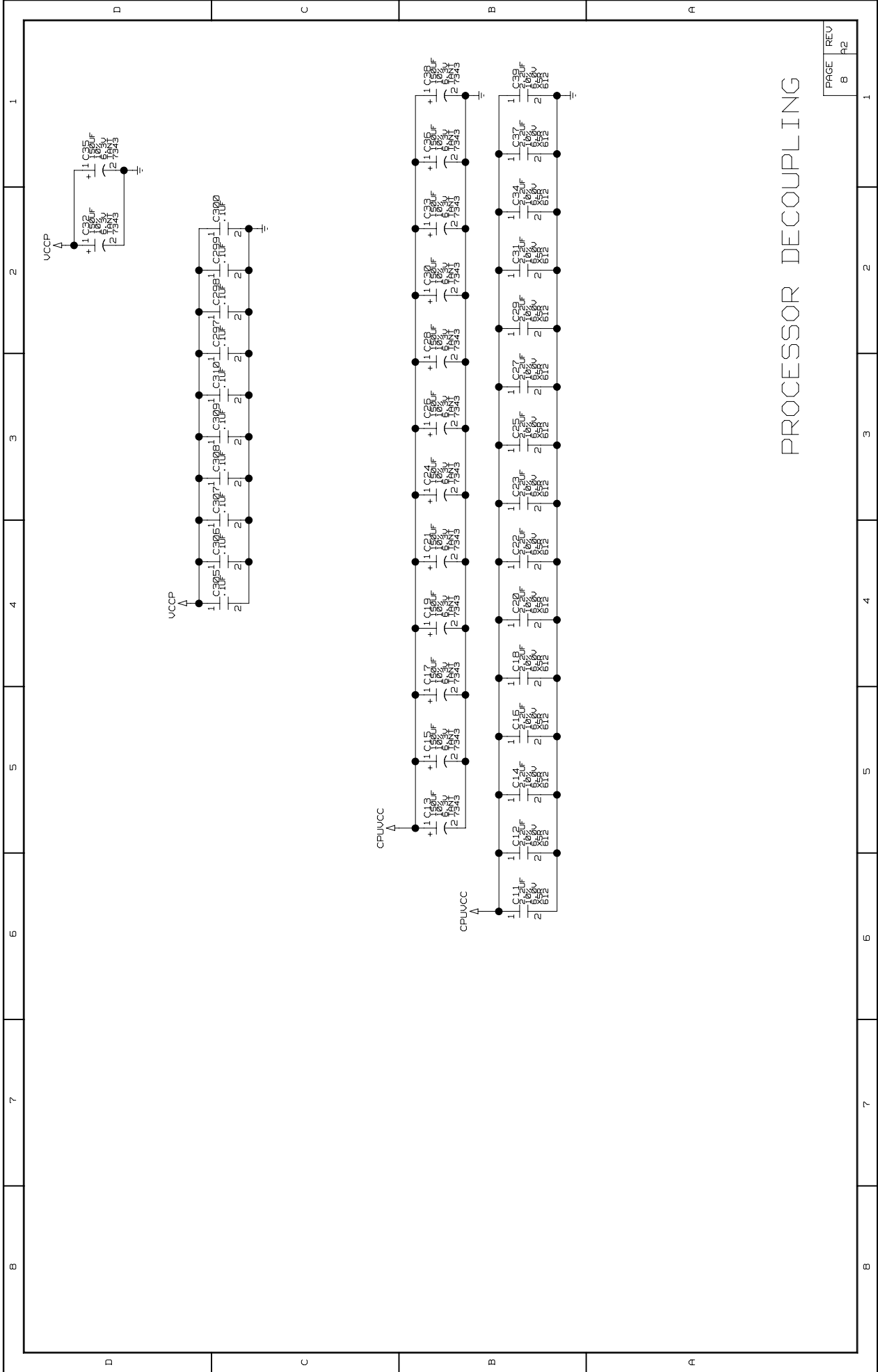




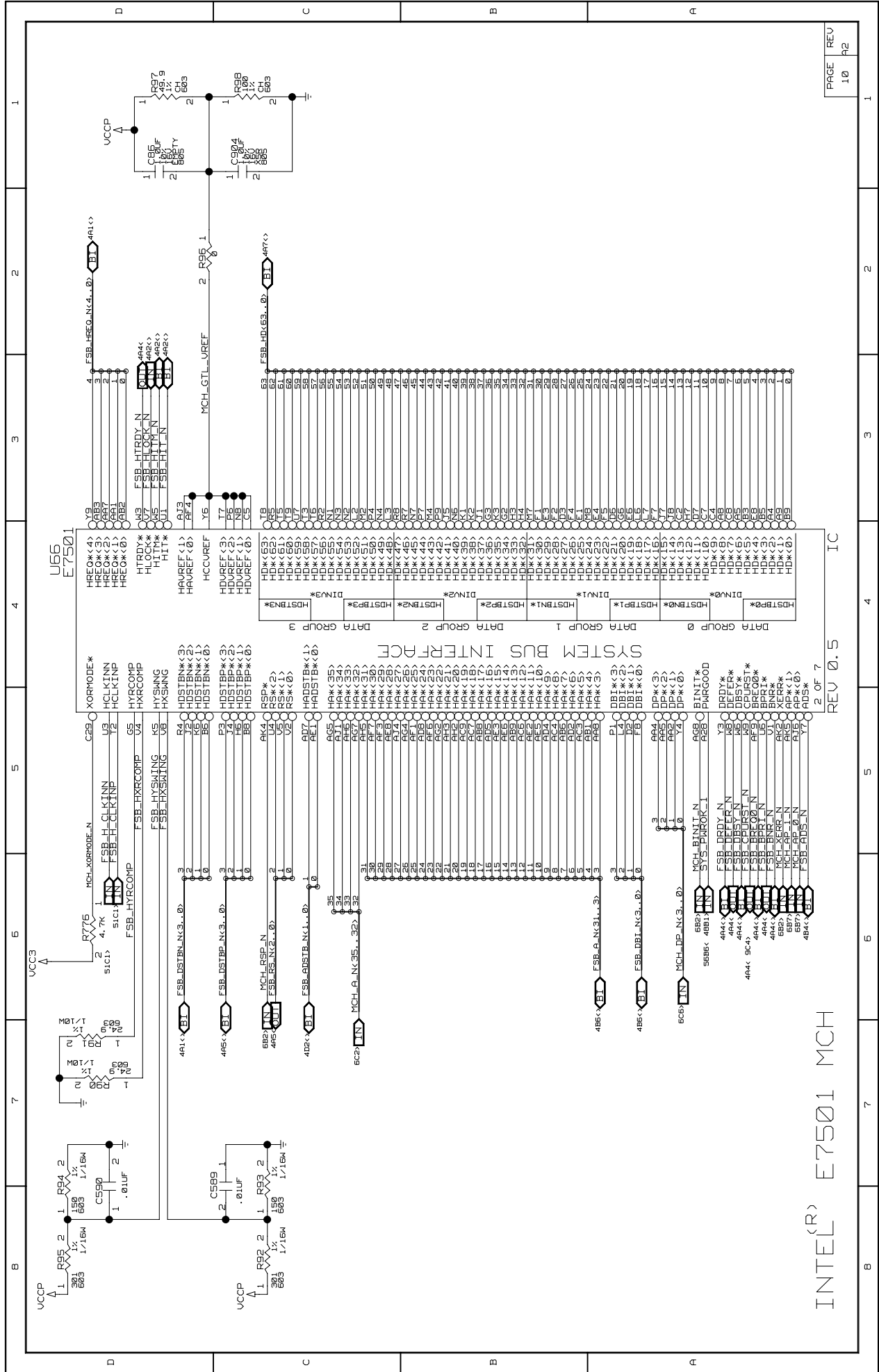
INTEL PENTIUM (R) M PROCESSOR



MCH PULL-UP RESISTORS



PROCESSOR DECOUPLING

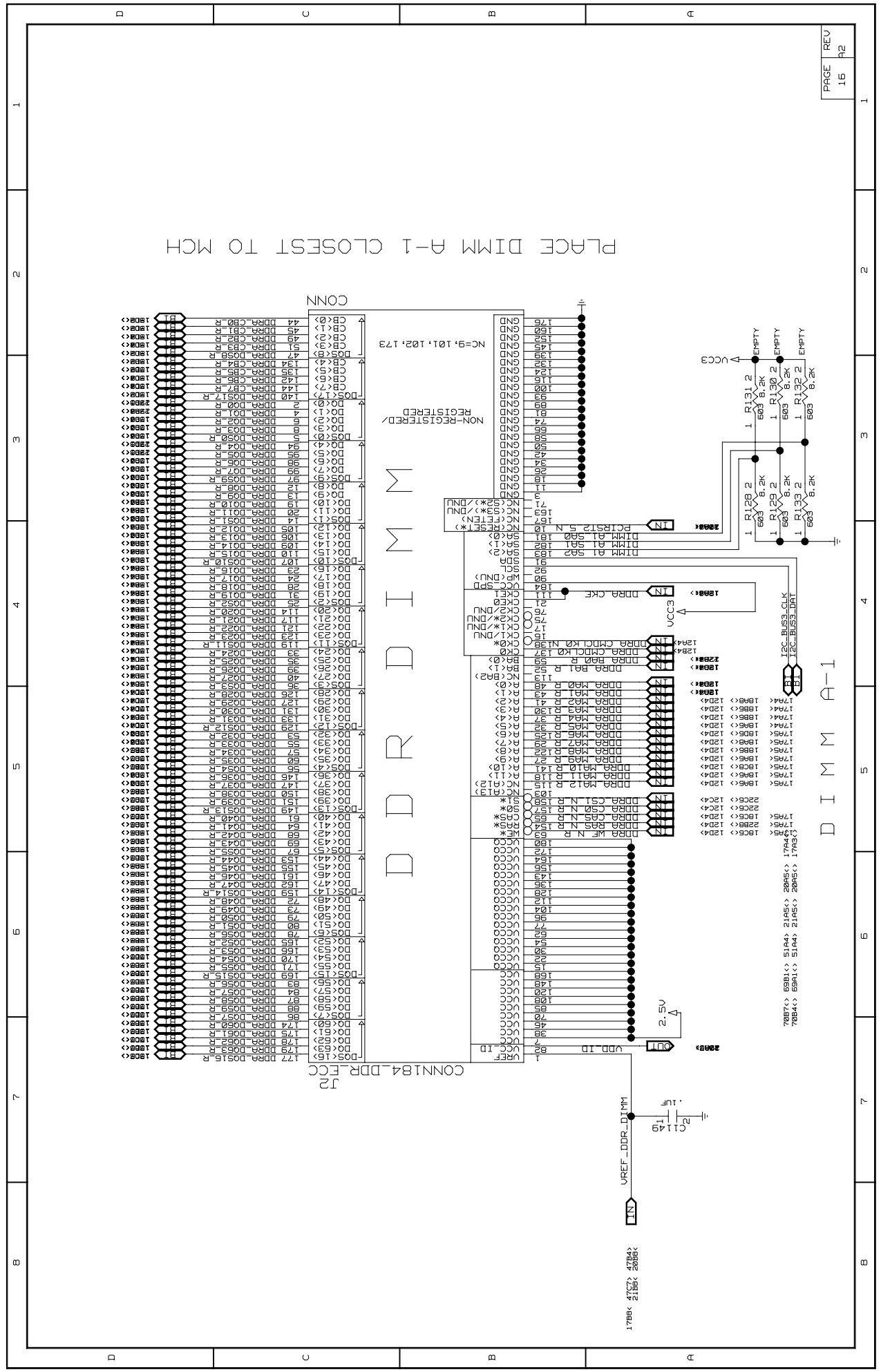


INTEL(R) E7501 MCH

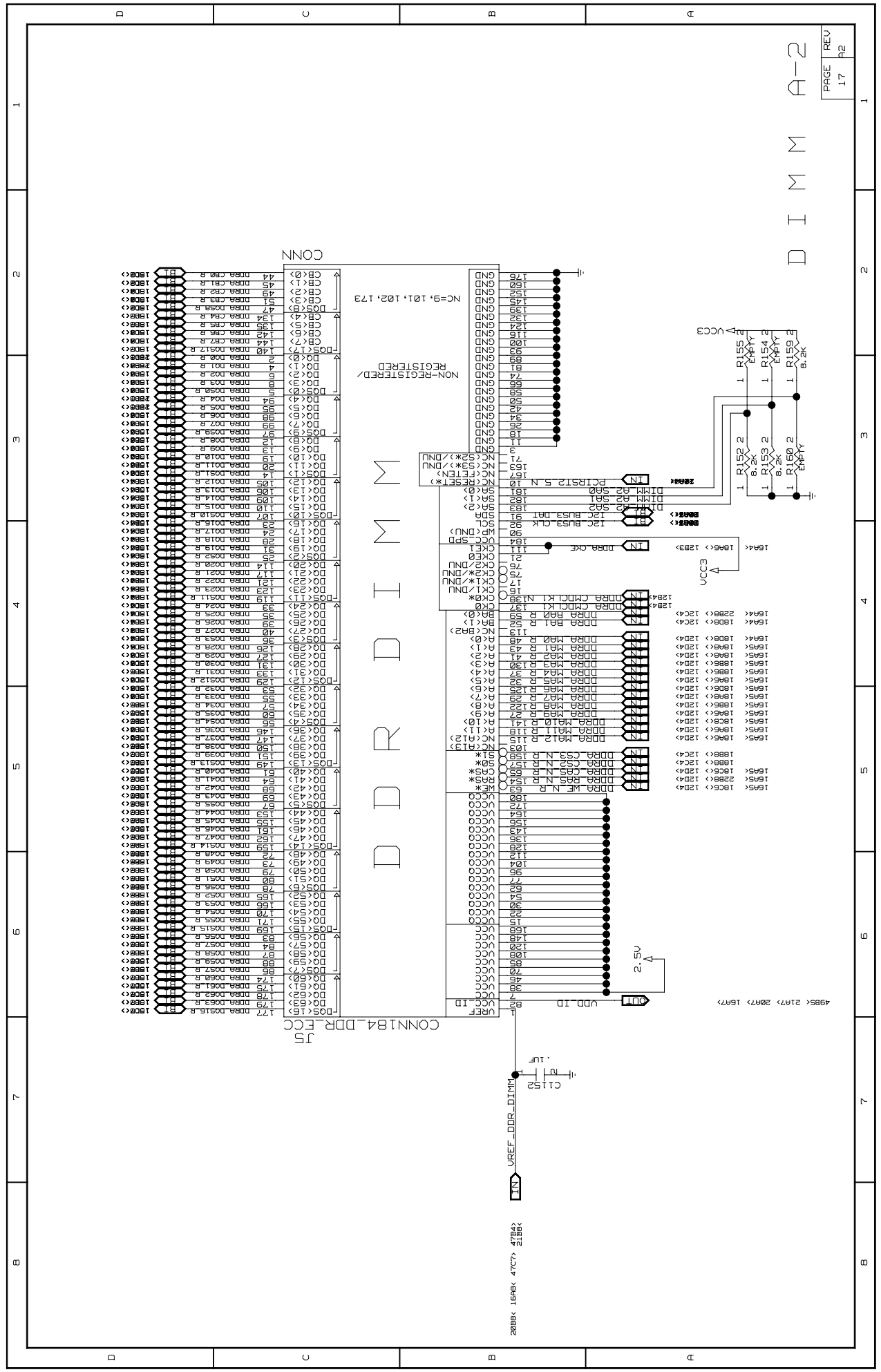
REV 0.5

IC

PLACE DIMM A-1 CLOSEST TO MCH



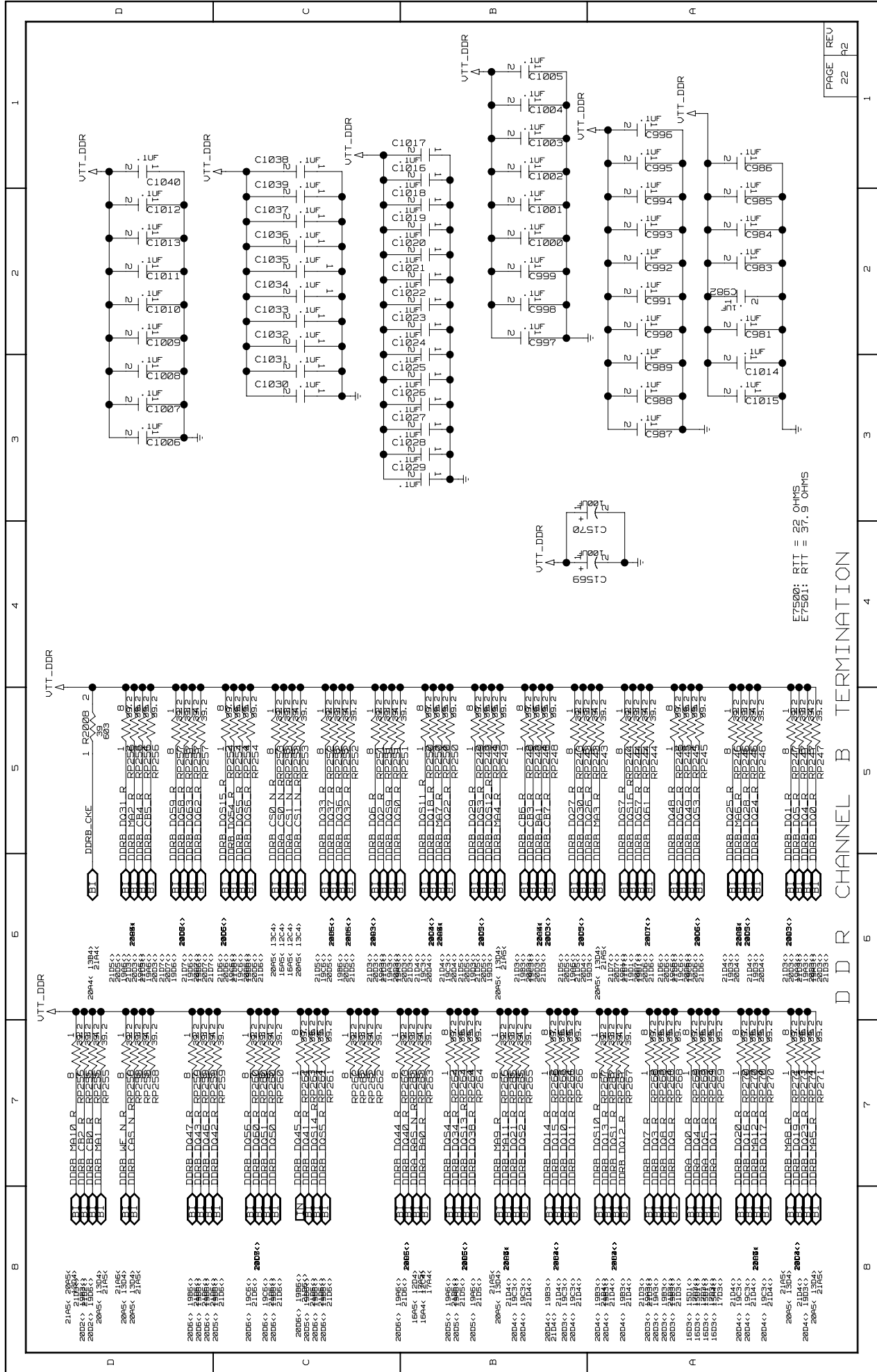
D I M M A - 2



NC=9,10T,10Z,17Z
NON-REGISTERED

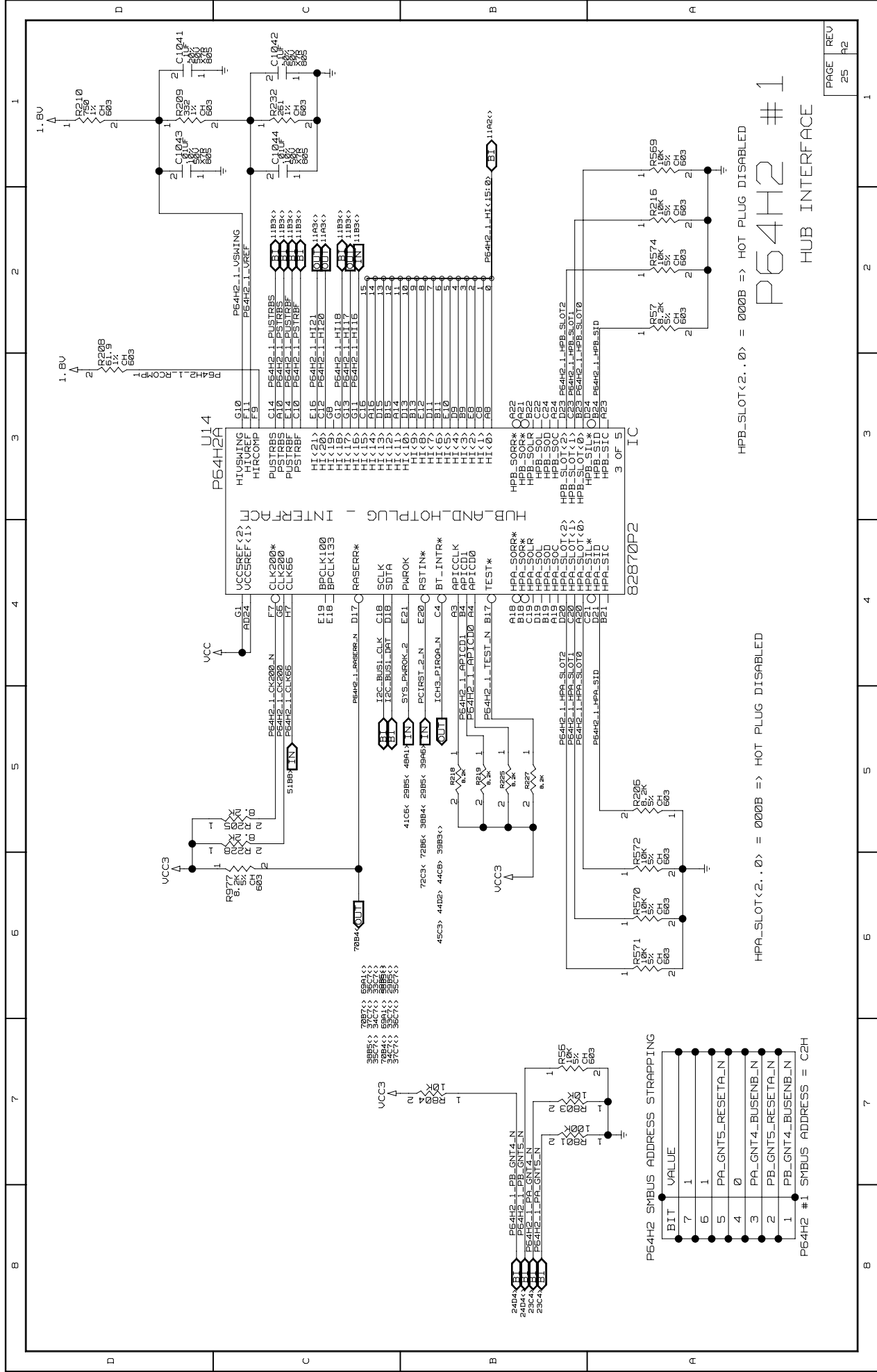
CONN

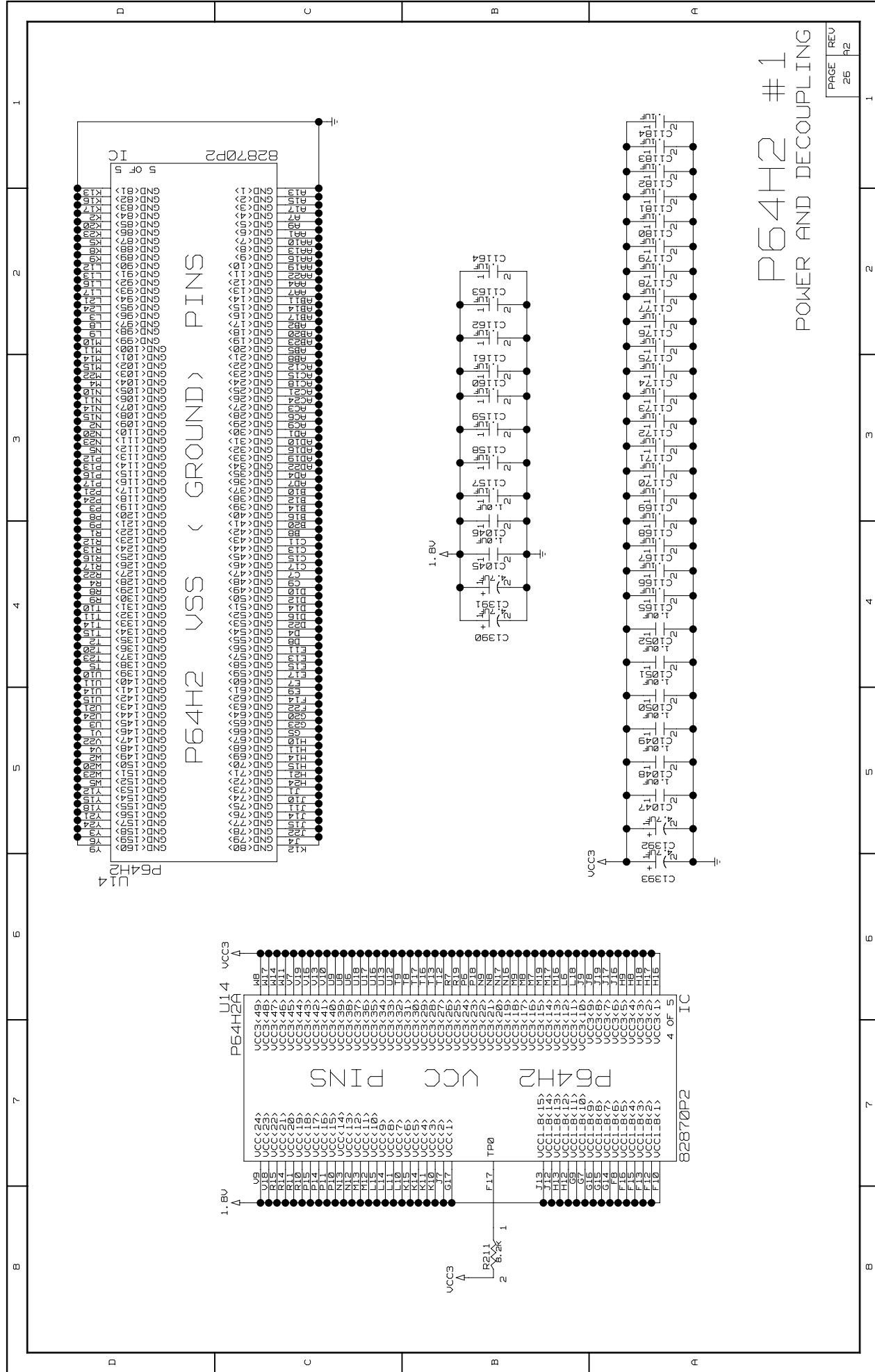
CONN184_DDR_ECC
J5



DDR CHANNEL B TERMINATION

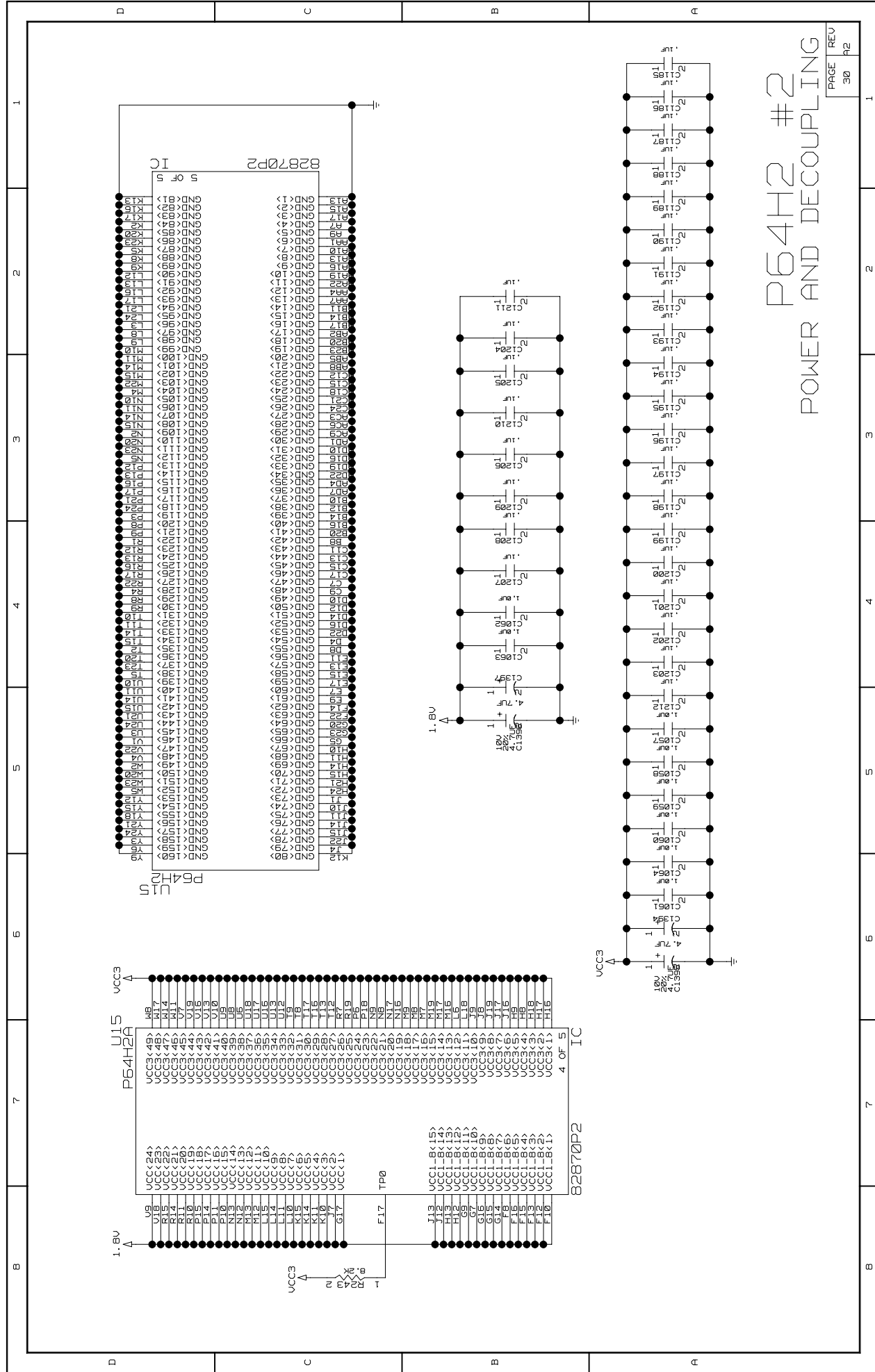
E:7500: RTT = 52.0 OHMS
E:7501: RTT = 37.9 OHMS



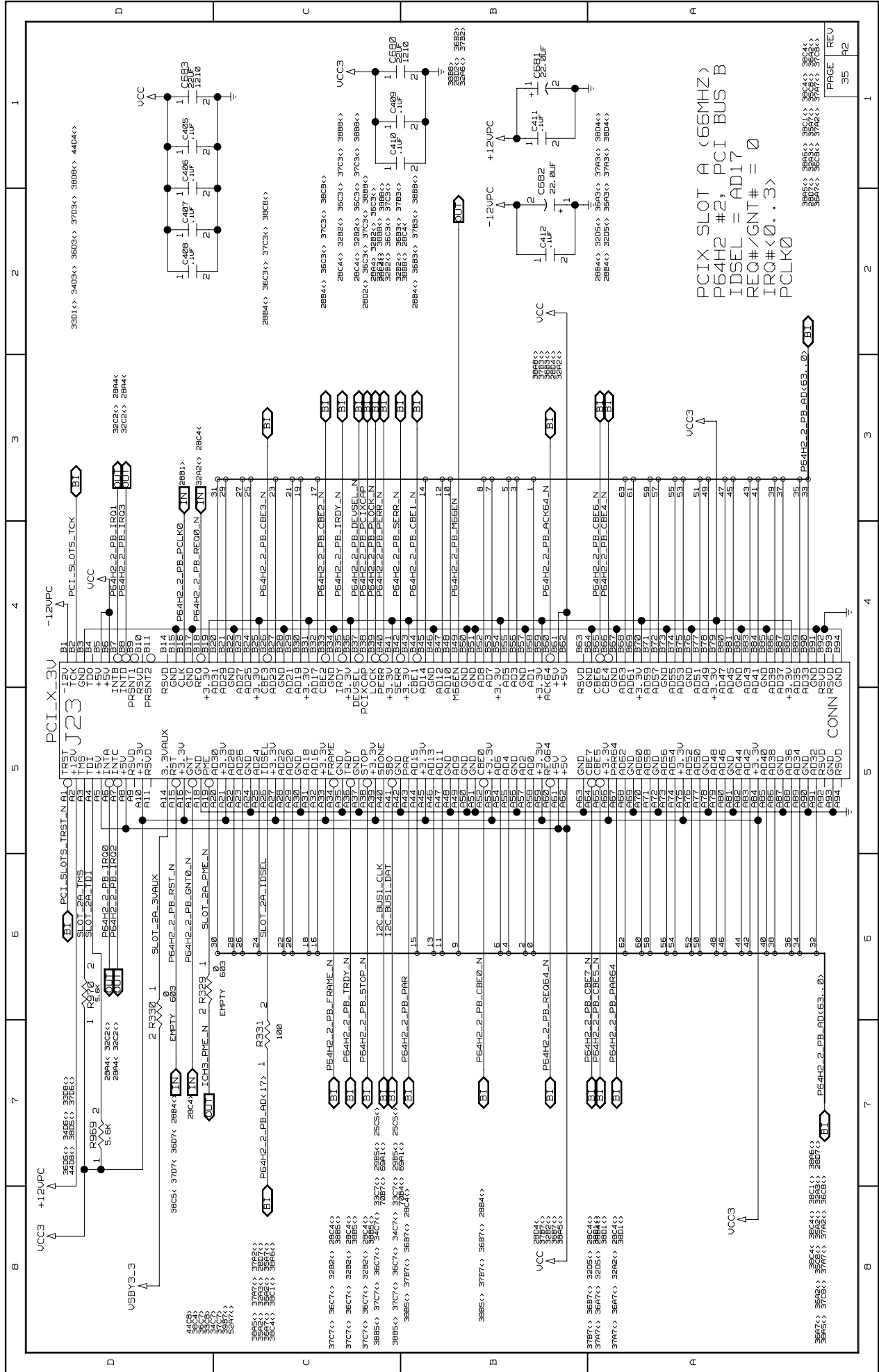


P64H2 #1

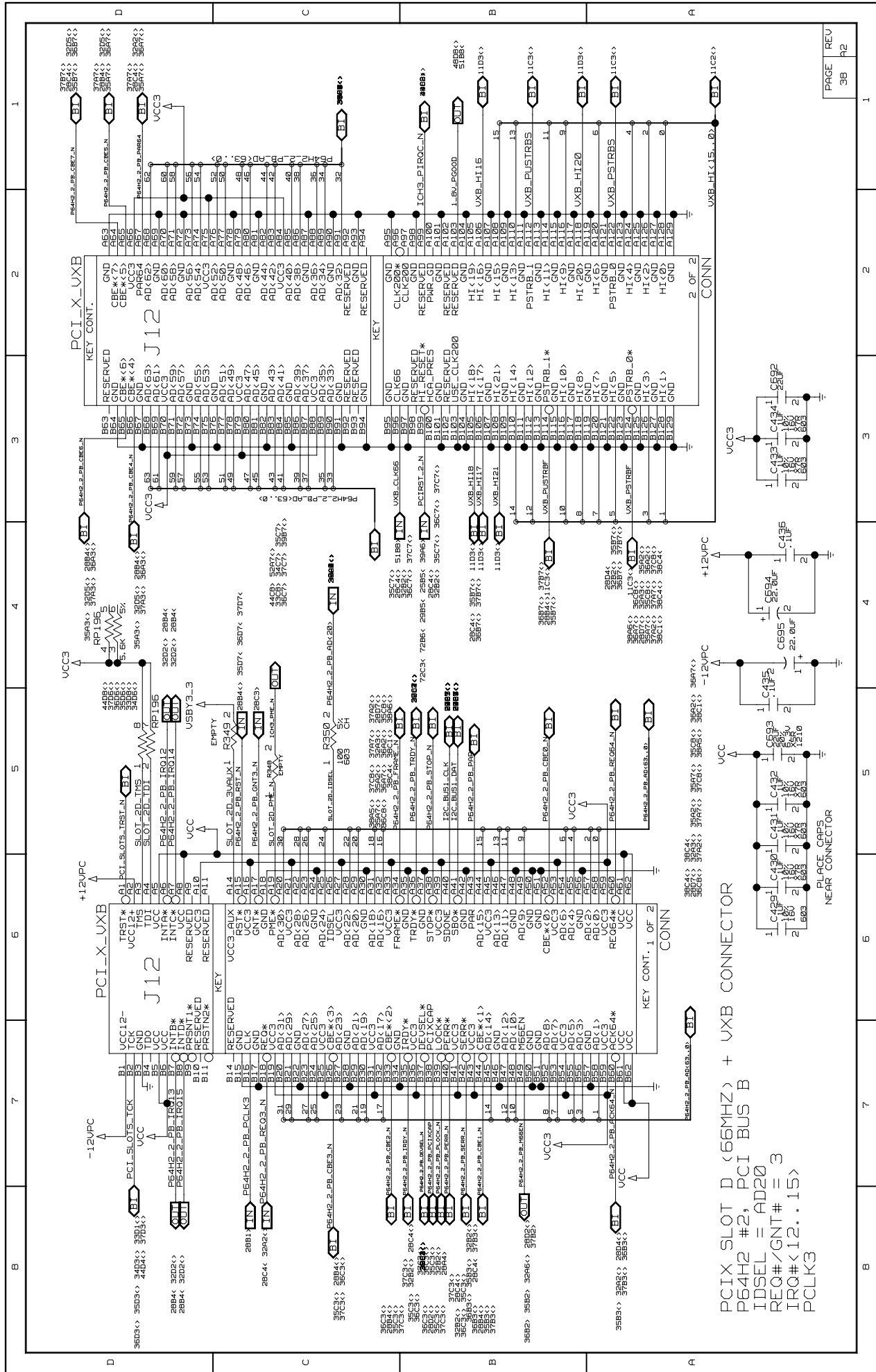
POWER AND DECOUPLING



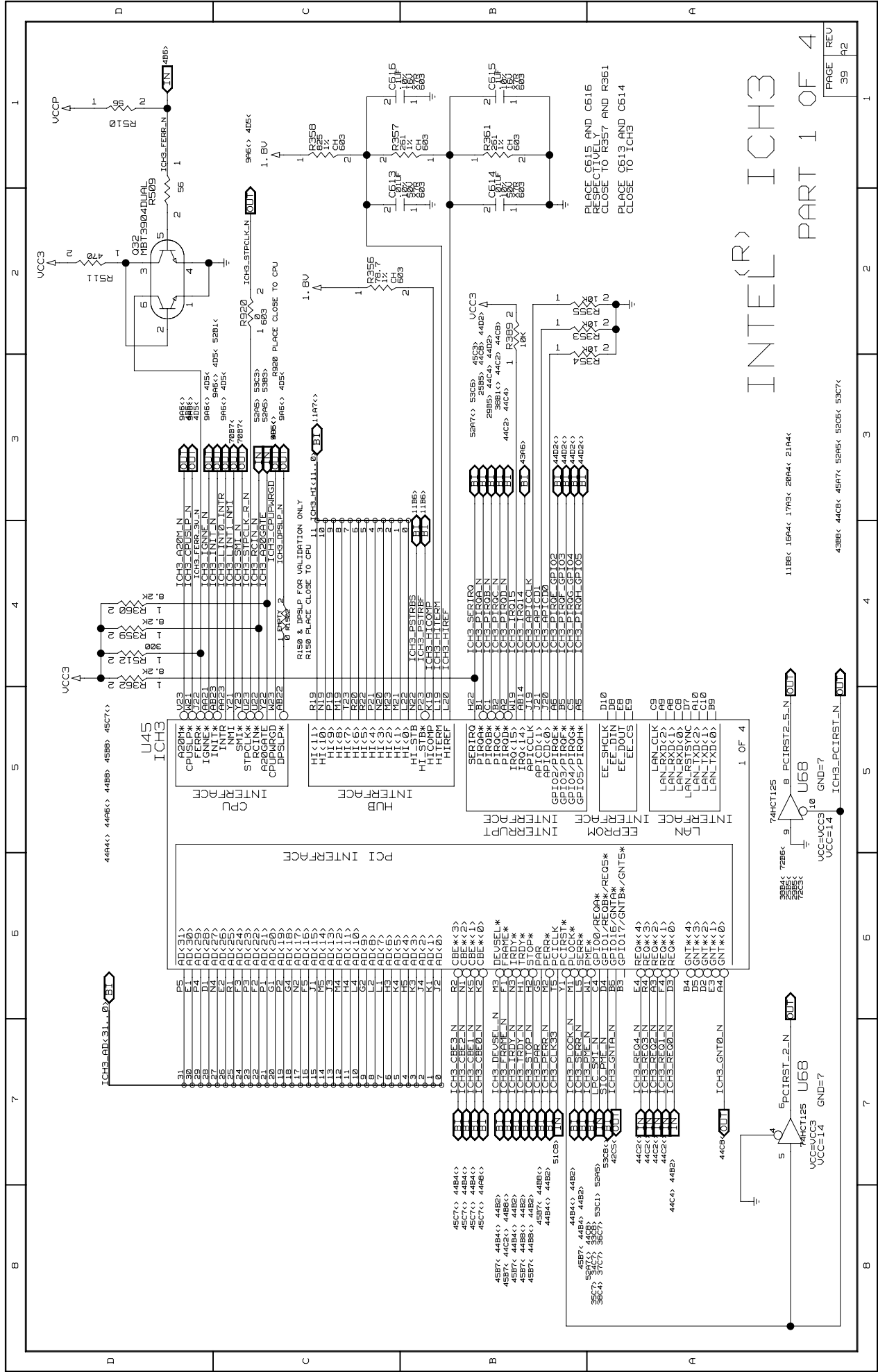
P64H2 #2 POWER AND DECOUPLING



PCIX SLOT A (66MHZ)
P64H2 #2, PCI BUS B
IDSEL = AD17
REQ#/GNT# = 0
IRQ#(0..3)
PCLK0



PCI X SLOT D (66MHZ) + USB CONNECTOR
P64H2 #2, PCI BUS B
IDSEL = AD20
REQ#/GNT# = 3
IRQ# < 12..15 >
PCLK3



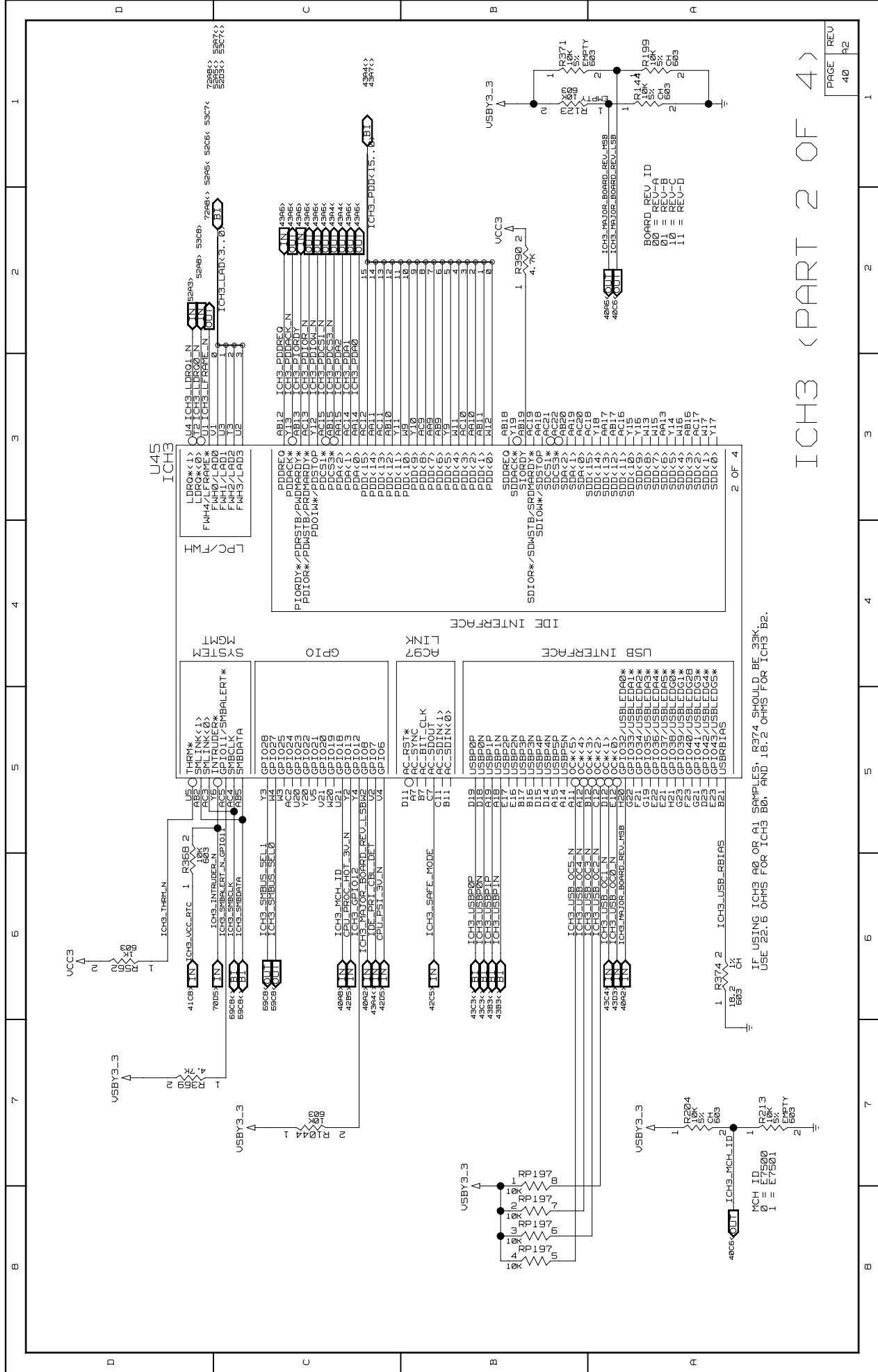
INTEL® ICH3
PART 1 OF 4

1188< 16A4< 17A3< 20A4< 21A4<
438B< 44C< 45A7< 52A5< 53C7<

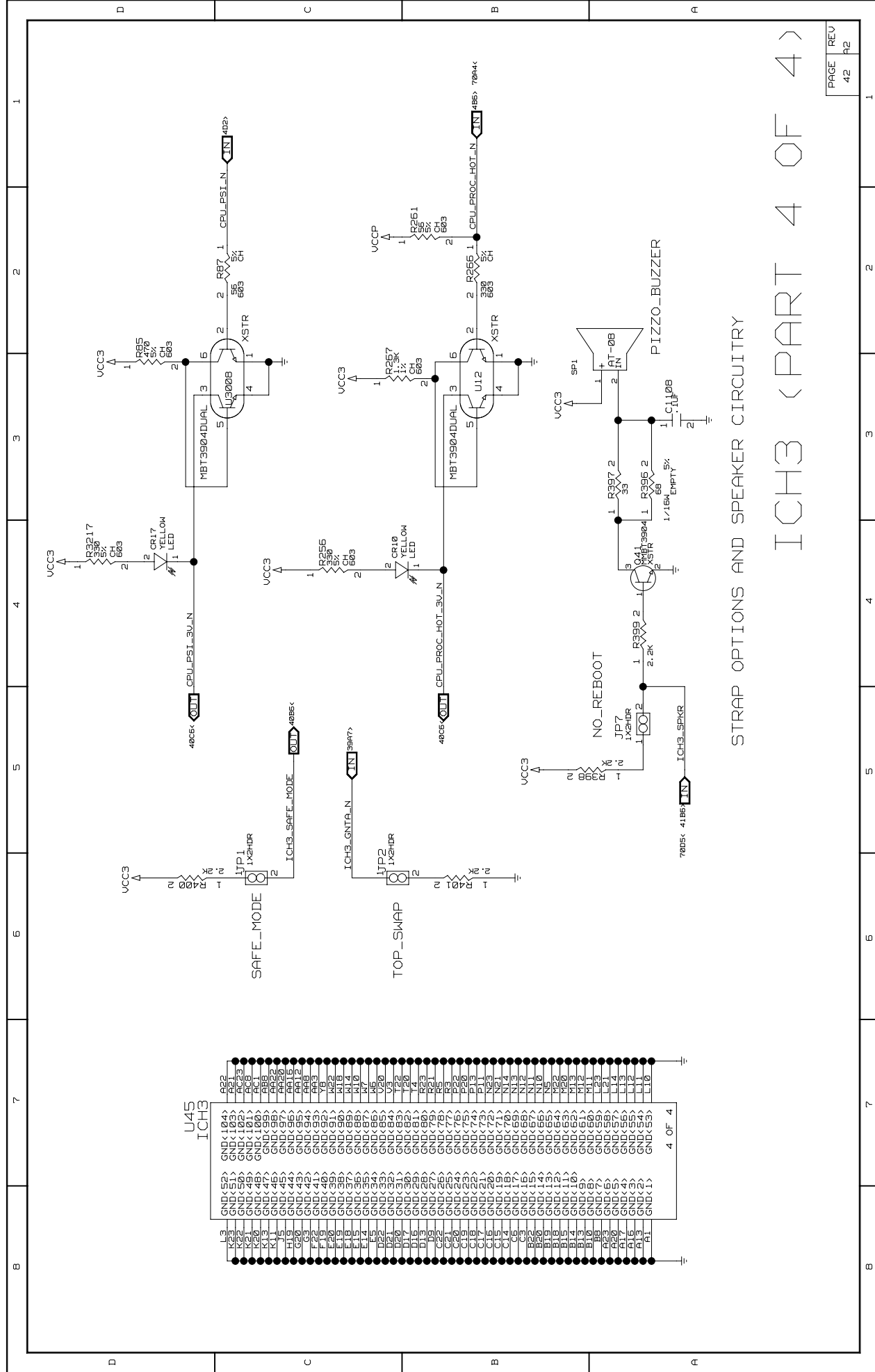
74HCT125
U509
U503
GND=7
VCC=VCC3
VCC=14
ICH3_PCRST#_N

74HCT125
U509
U503
GND=7
VCC=VCC3
VCC=14

PLACE C615 AND C616
RESPECTIVELY
CLOSE TO R357 AND R361
CLOSE TO ICH3



ICH3 (PART 2 OF 4)



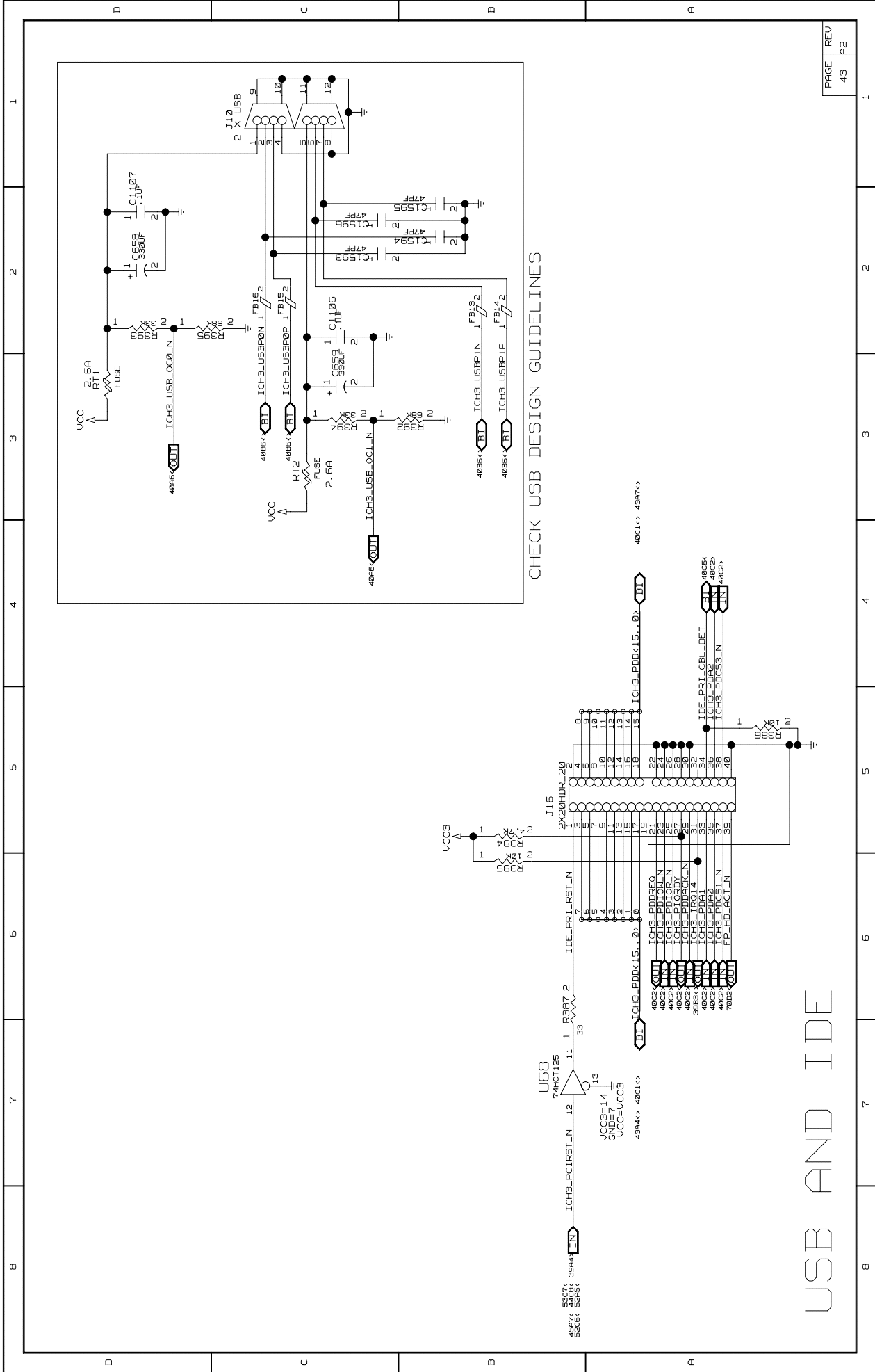
U45 ICH3

1	K29	A22	GND<104>
2	K28	A21	GND<103>
3	K27	A20	GND<102>
4	K26	A19	GND<101>
5	K25	A18	GND<100>
6	K24	A17	GND<99>
7	K23	A16	GND<98>
8	K22	A15	GND<97>
9	K21	A14	GND<96>
10	K20	A13	GND<95>
11	K19	A12	GND<94>
12	K18	A11	GND<93>
13	K17	A10	GND<92>
14	K16	A9	GND<91>
15	K15	A8	GND<90>
16	K14	A7	GND<89>
17	K13	A6	GND<88>
18	K12	A5	GND<87>
19	K11	A4	GND<86>
20	K10	A3	GND<85>
21	K9	A2	GND<84>
22	K8	A1	GND<83>
23	K7	V3	GND<82>
24	K6	V2	GND<81>
25	K5	V1	GND<80>
26	K4	V0	GND<79>
27	K3	R21	GND<78>
28	K2	R20	GND<77>
29	K1	R19	GND<76>
30	U1	R18	GND<75>
31	U2	R17	GND<74>
32	U3	R16	GND<73>
33	U4	R15	GND<72>
34	U5	R14	GND<71>
35	U6	R13	GND<70>
36	U7	R12	GND<69>
37	U8	R11	GND<68>
38	U9	R10	GND<67>
39	U10	R9	GND<66>
40	U11	R8	GND<65>
41	U12	R7	GND<64>
42	U13	R6	GND<63>
43	U14	R5	GND<62>
44	U15	R4	GND<61>
45	U16	R3	GND<60>
46	U17	R2	GND<59>
47	U18	R1	GND<58>
48	U19	U1	GND<57>
49	U20	U2	GND<56>
50	U21	U3	GND<55>
51	U22	U4	GND<54>
52	U23	U5	GND<53>
53	U24	U6	GND<52>
54	U25	U7	GND<51>
55	U26	U8	GND<50>
56	U27	U9	GND<49>
57	U28	U10	GND<48>
58	U29	U11	GND<47>
59	U30	U12	GND<46>
60	U31	U13	GND<45>
61	U32	U14	GND<44>
62	U33	U15	GND<43>
63	U34	U16	GND<42>
64	U35	U17	GND<41>
65	U36	U18	GND<40>
66	U37	U19	GND<39>
67	U38	U20	GND<38>
68	U39	U21	GND<37>
69	U40	U22	GND<36>
70	U41	U23	GND<35>
71	U42	U24	GND<34>
72	U43	U25	GND<33>
73	U44	U26	GND<32>
74	U45	U27	GND<31>
75	U46	U28	GND<30>
76	U47	U29	GND<29>
77	U48	U30	GND<28>
78	U49	U31	GND<27>
79	U50	U32	GND<26>
80	U51	U33	GND<25>
81	U52	U34	GND<24>
82	U53	U35	GND<23>
83	U54	U36	GND<22>
84	U55	U37	GND<21>
85	U56	U38	GND<20>
86	U57	U39	GND<19>
87	U58	U40	GND<18>
88	U59	U41	GND<17>
89	U60	U42	GND<16>
90	U61	U43	GND<15>
91	U62	U44	GND<14>
92	U63	U45	GND<13>
93	U64	U46	GND<12>
94	U65	U47	GND<11>
95	U66	U48	GND<10>
96	U67	U49	GND<9>
97	U68	U50	GND<8>
98	U69	U51	GND<7>
99	U70	U52	GND<6>
100	U71	U53	GND<5>
101	U72	U54	GND<4>
102	U73	U55	GND<3>
103	U74	U56	GND<2>
104	U75	U57	GND<1>
105	U76	U58	GND<0>

4 OF 4

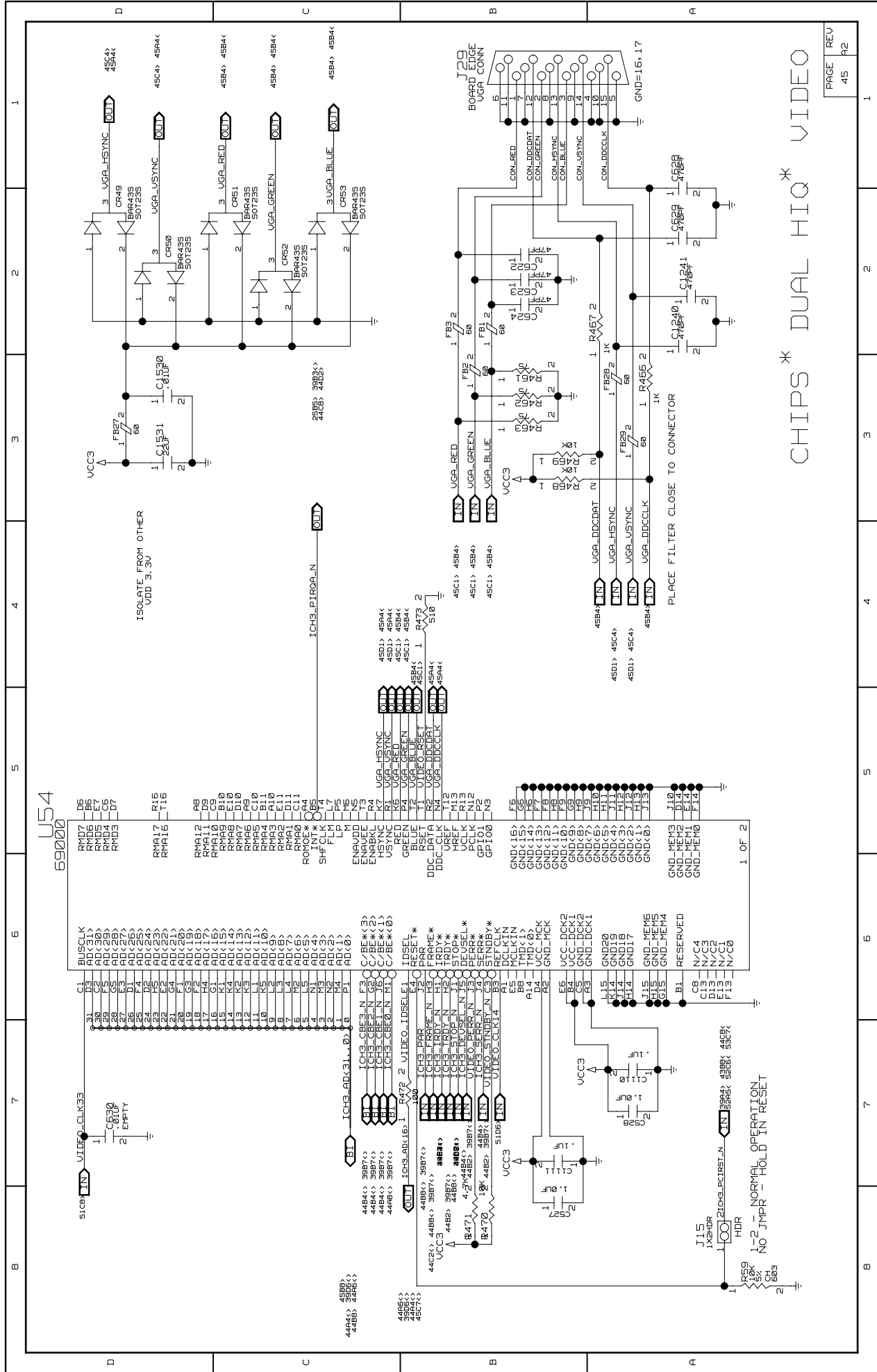
STRAP OPTIONS AND SPEAKER CIRCUITRY

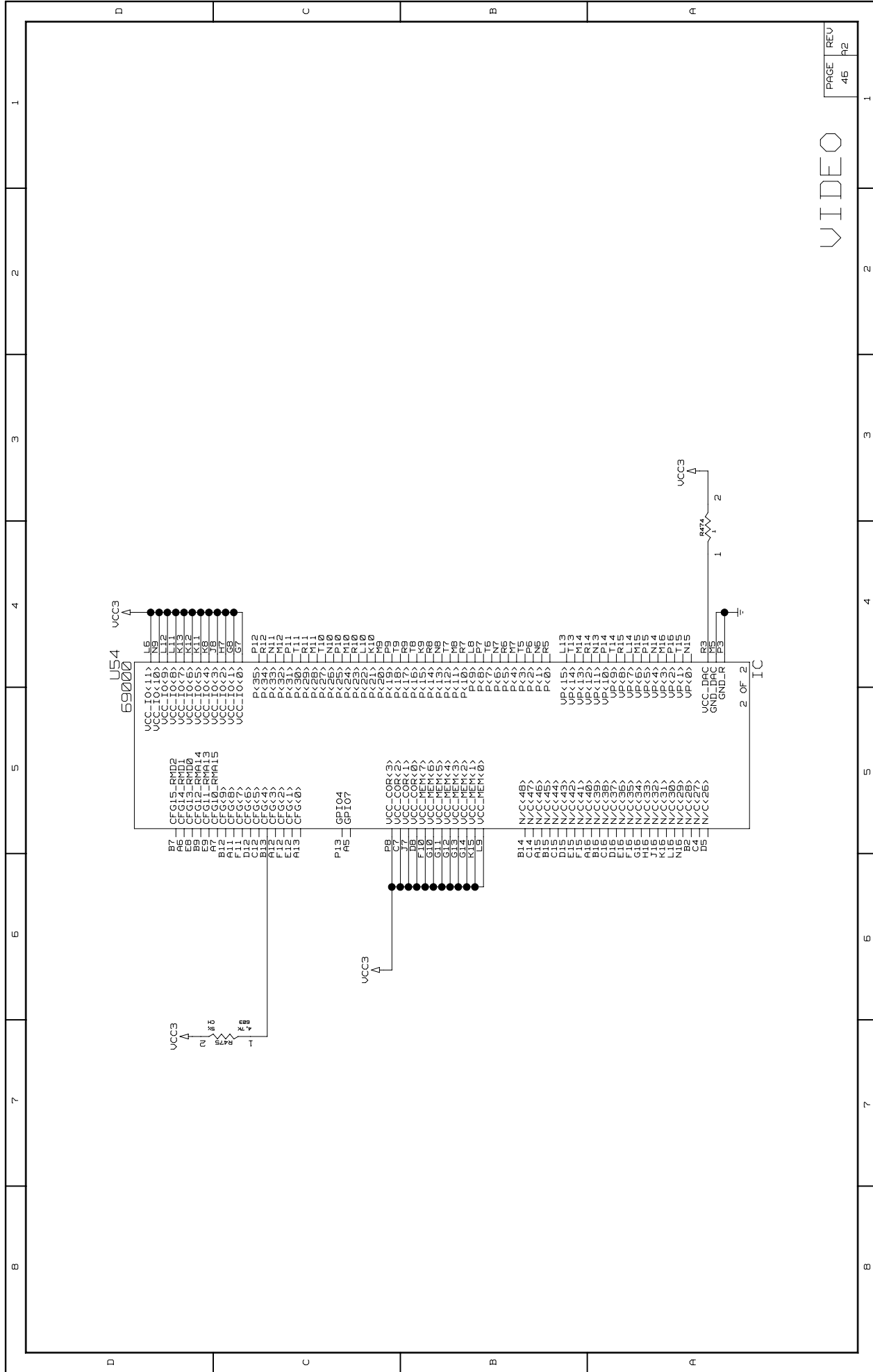
ICH3 (PART 4 OF 4)



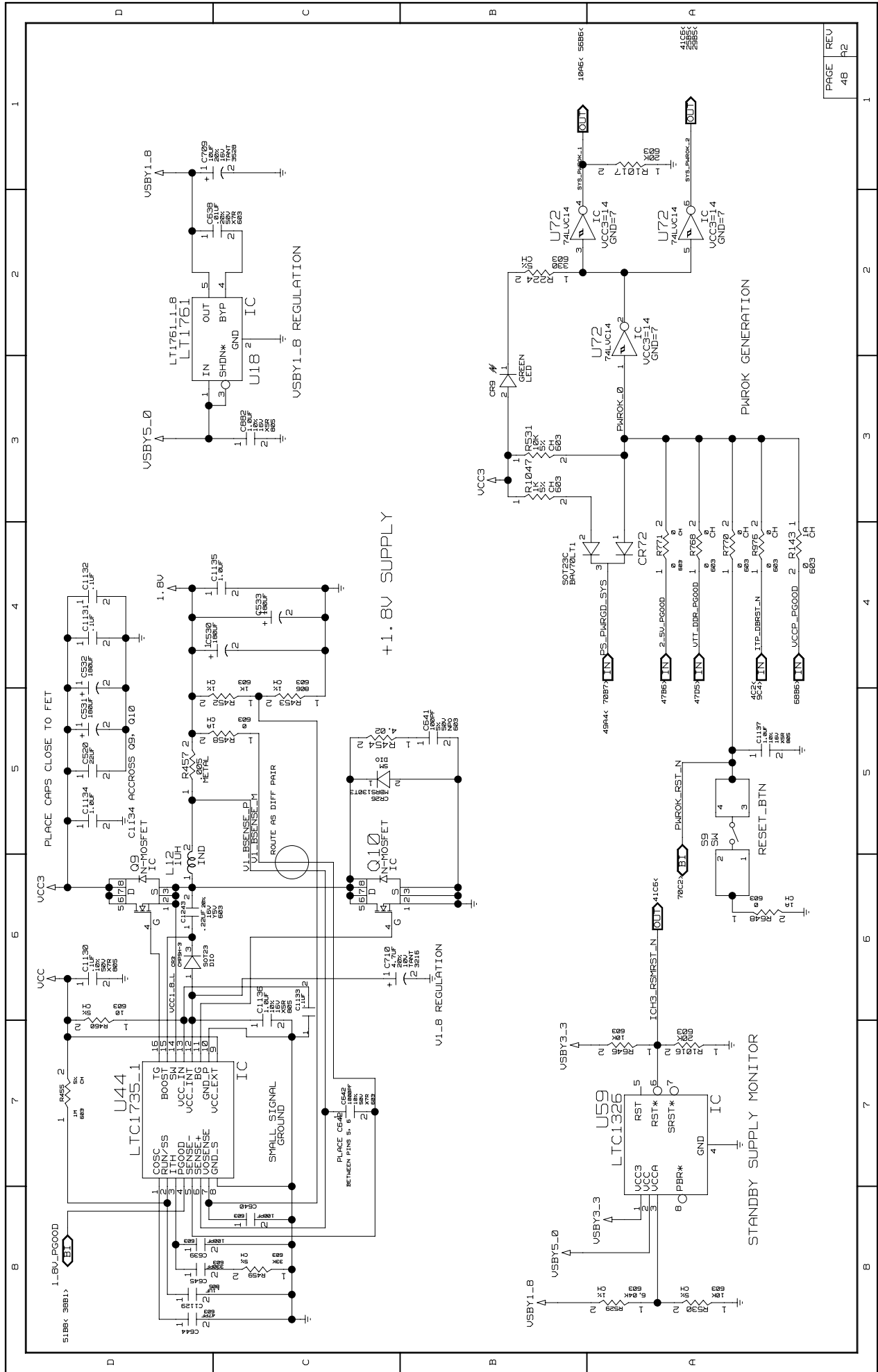
USB AND IDE

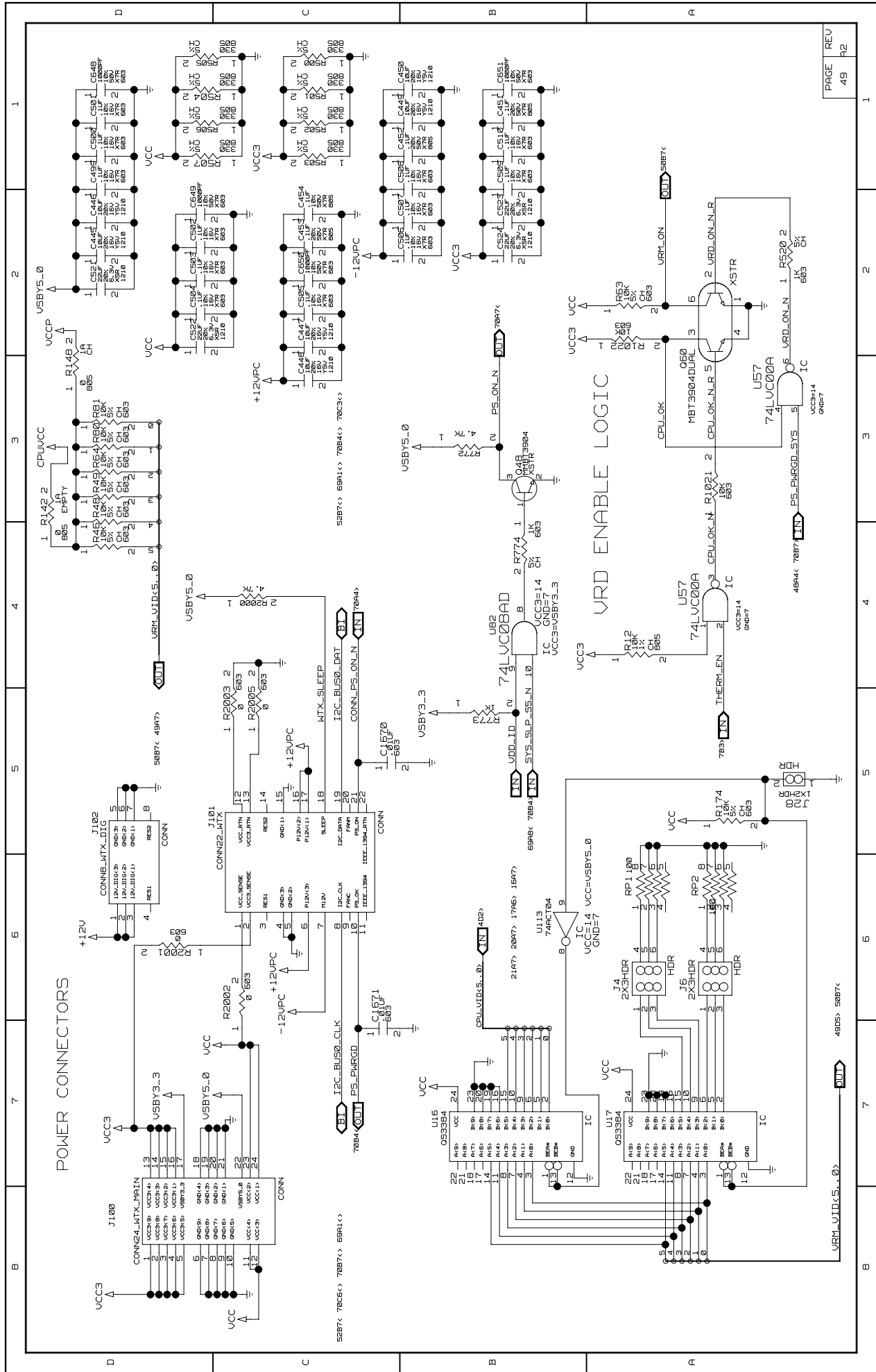
CHECK USB DESIGN GUIDELINES

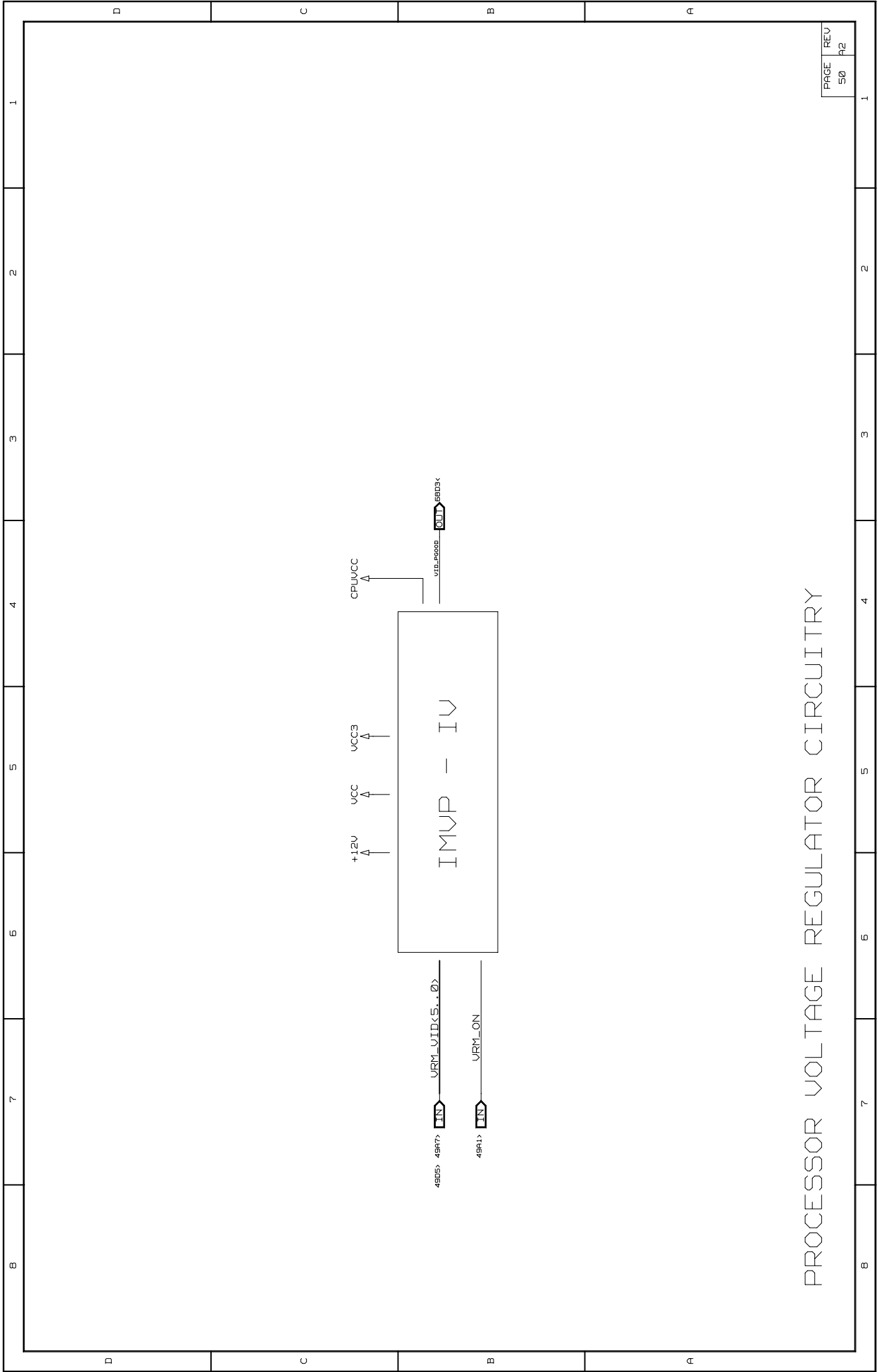




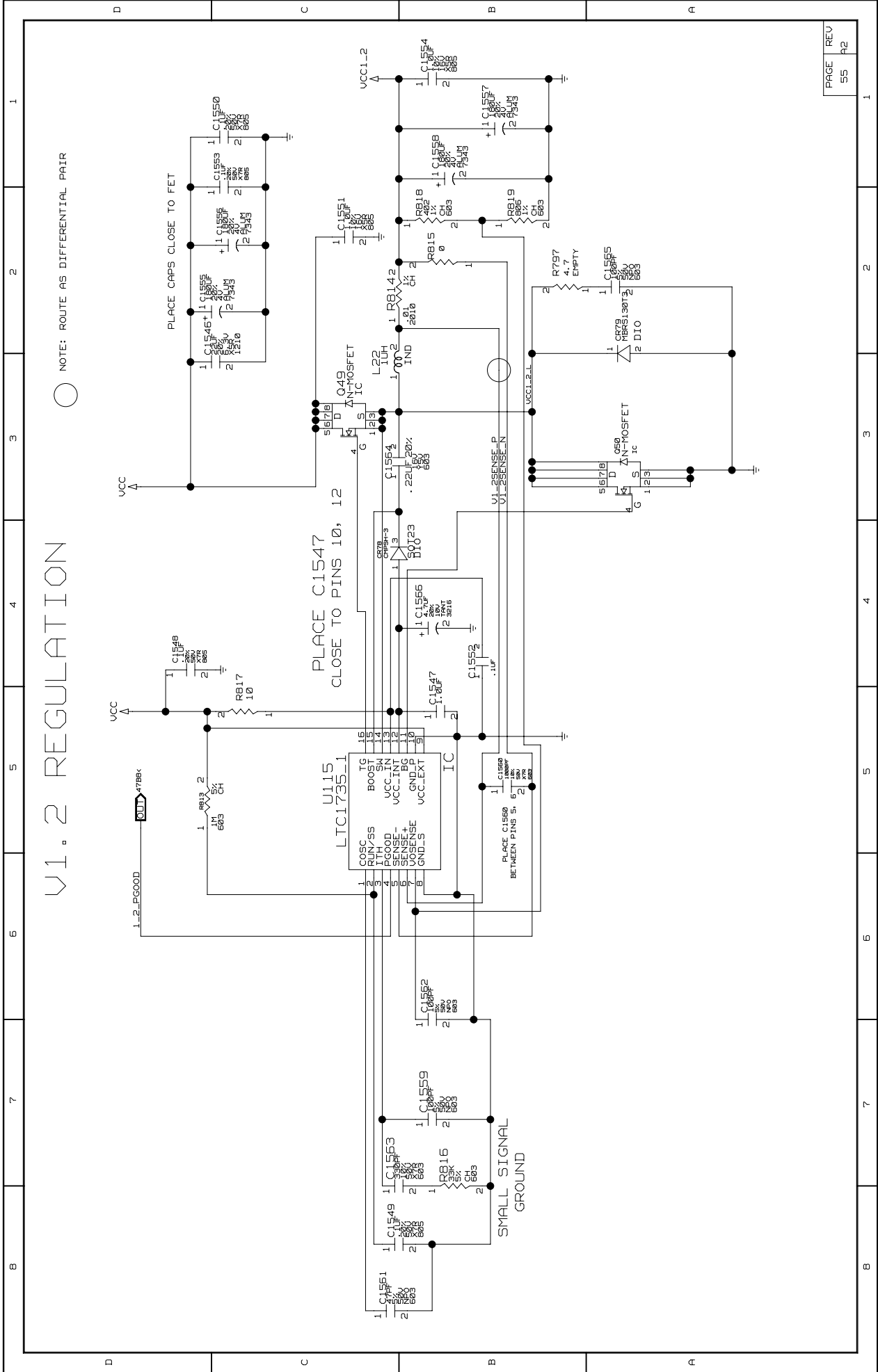
VIDEO







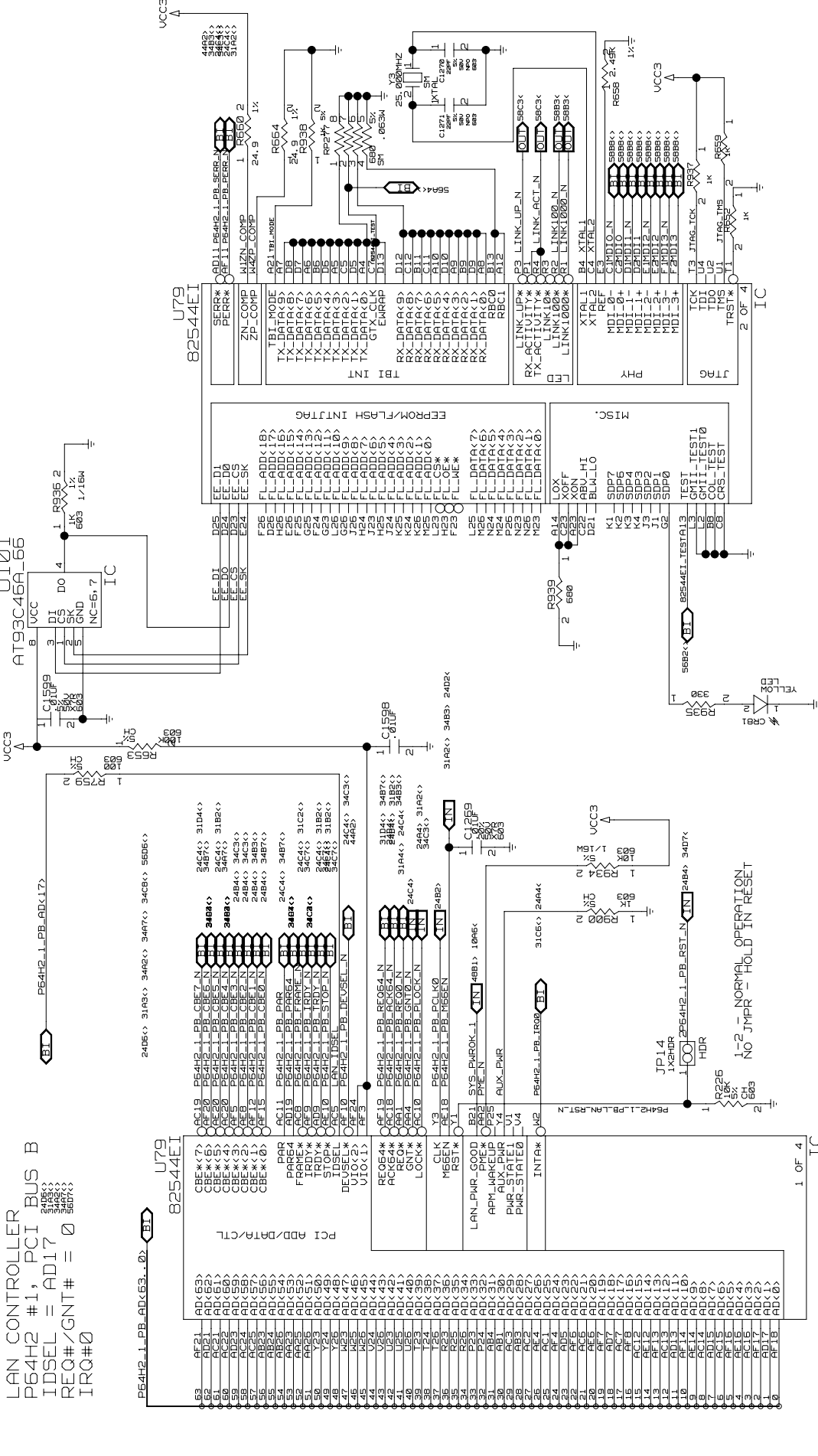
PROCESSOR VOLTAGE REGULATOR CIRCUITRY

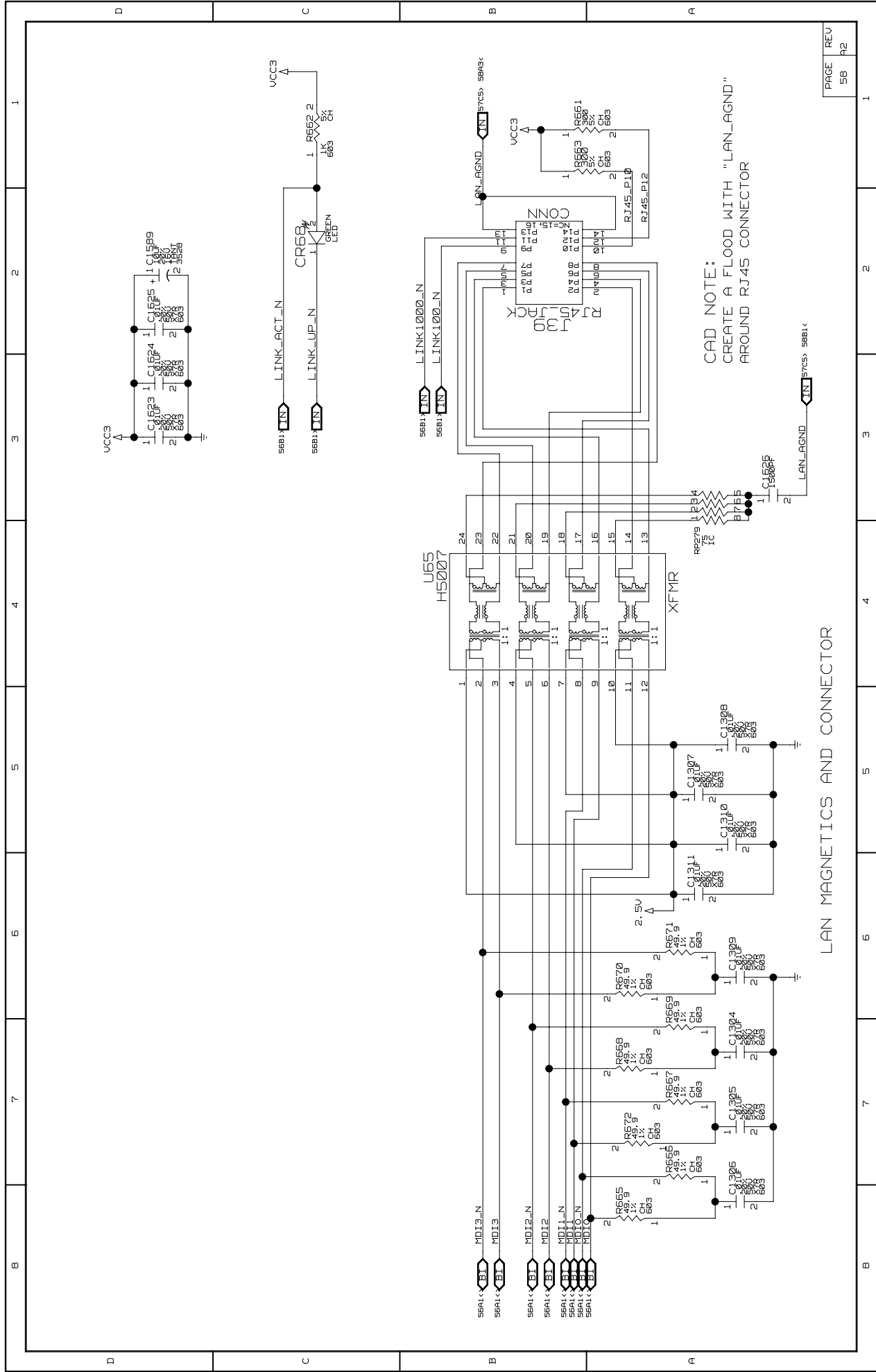


INTEL(R) 82544EI GIGABIT LAN CONTROLLER

LAN CONTROLLER
 P64H2 #1, PCI BUS B
 IDSEL = AD17
 REQ#/GNT# = 0
 IRQ#0

U101
 AT93C46A-66

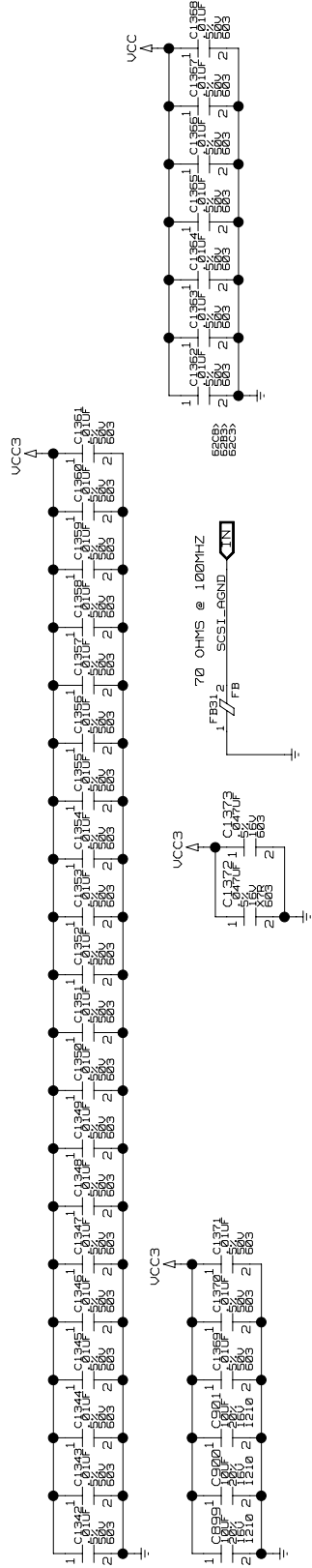




LAN MAGNETICS AND CONNECTOR

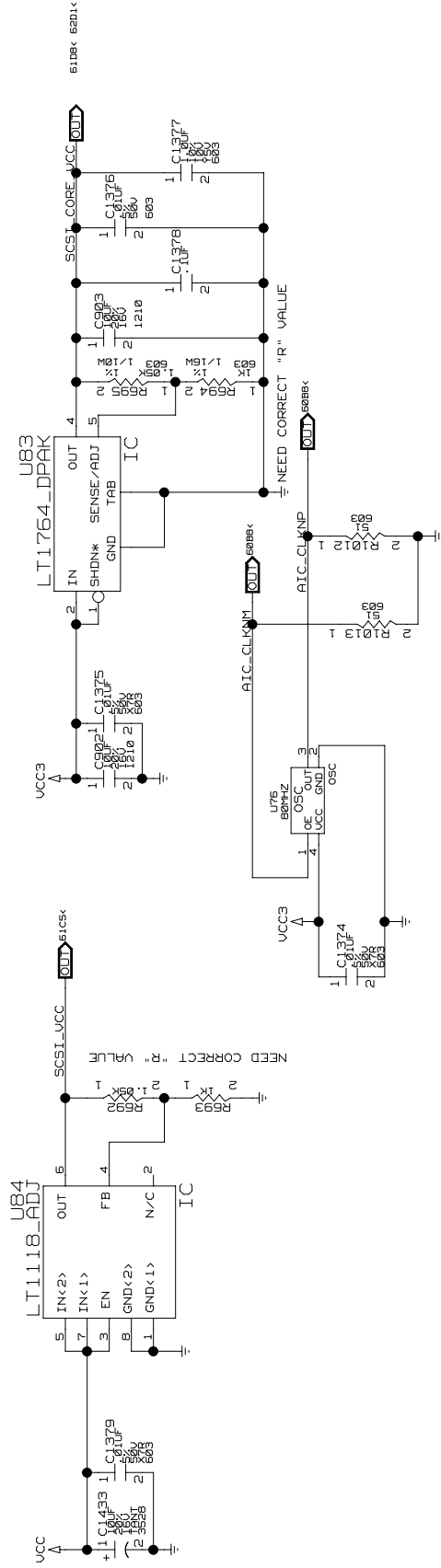
CAD NOTE:
CREATE A FLOOD WITH "LAN_LAGND"
AROUND RJ45 CONNECTOR

AIC - 7902 SCSI DECOUPLING RECOMMENDATION FOR POWER SUPPLIES

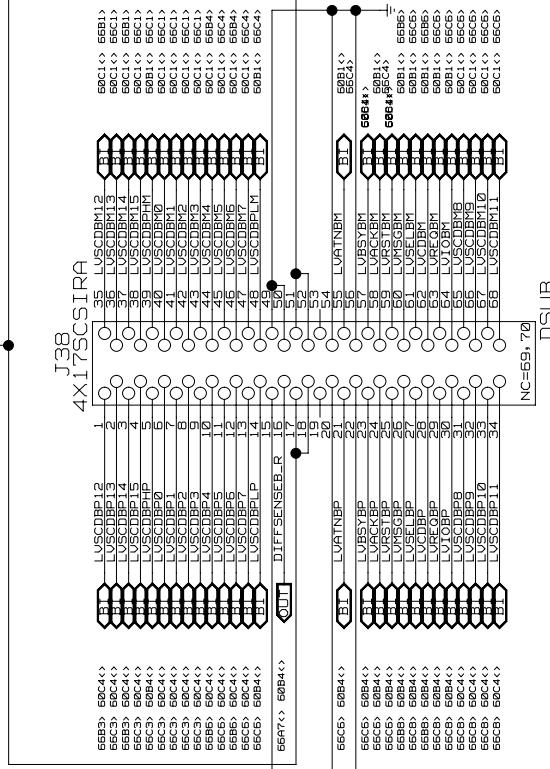
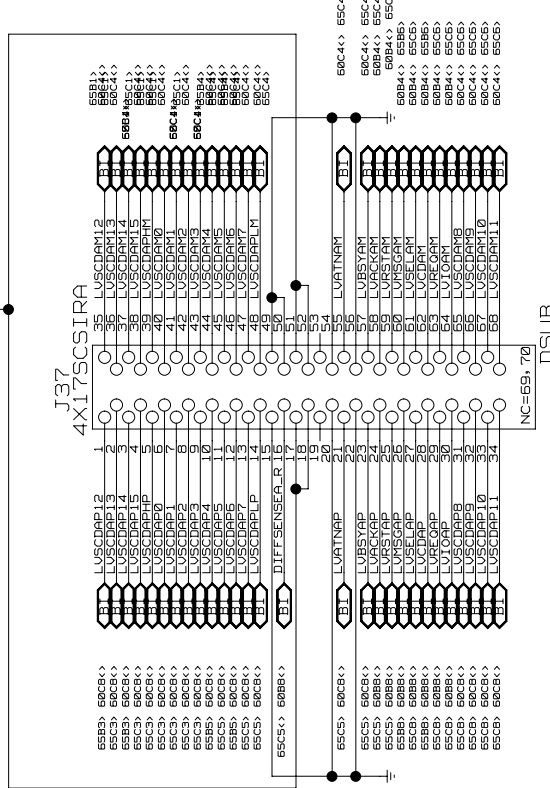
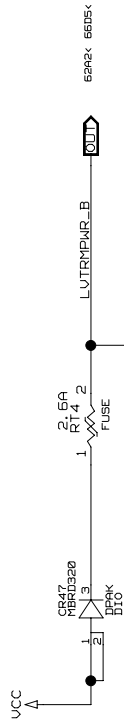
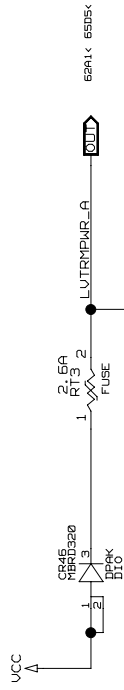


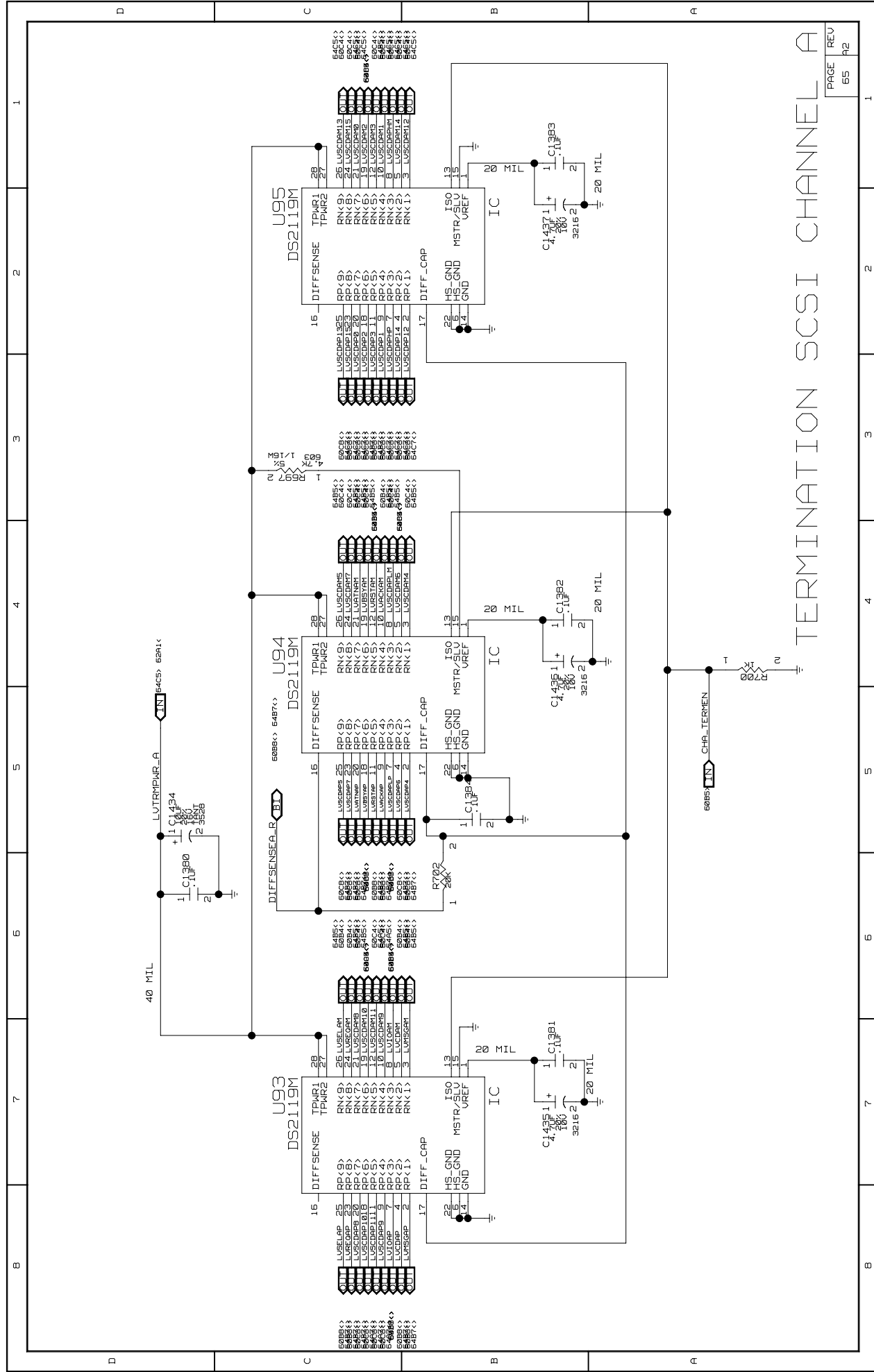
ISOLATE DIGITAL & ANALOG GROUND

VOLTAGE REGULATORS AND SCSI CLOCK

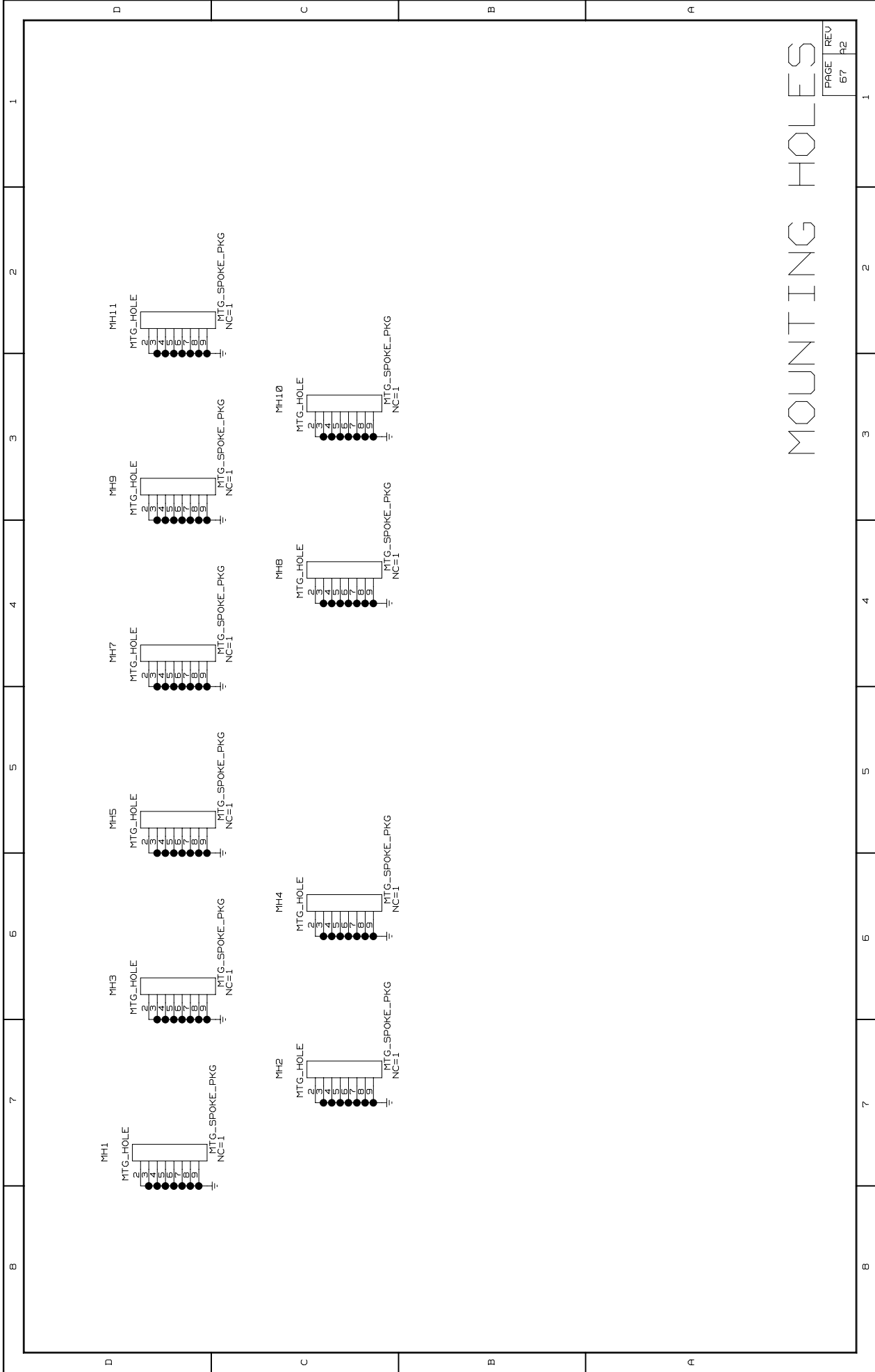


SCSI CONNECTORS A AND B

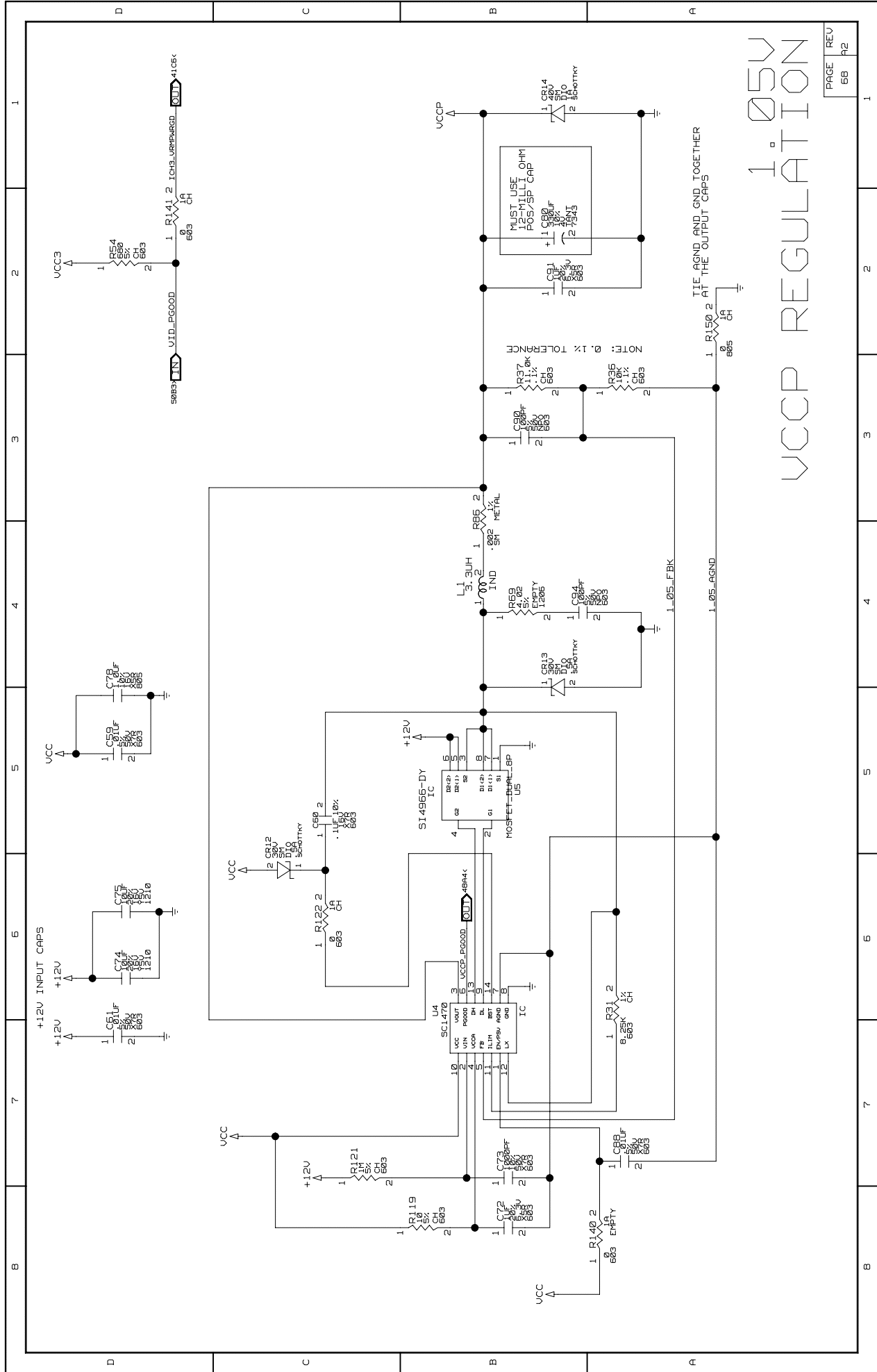


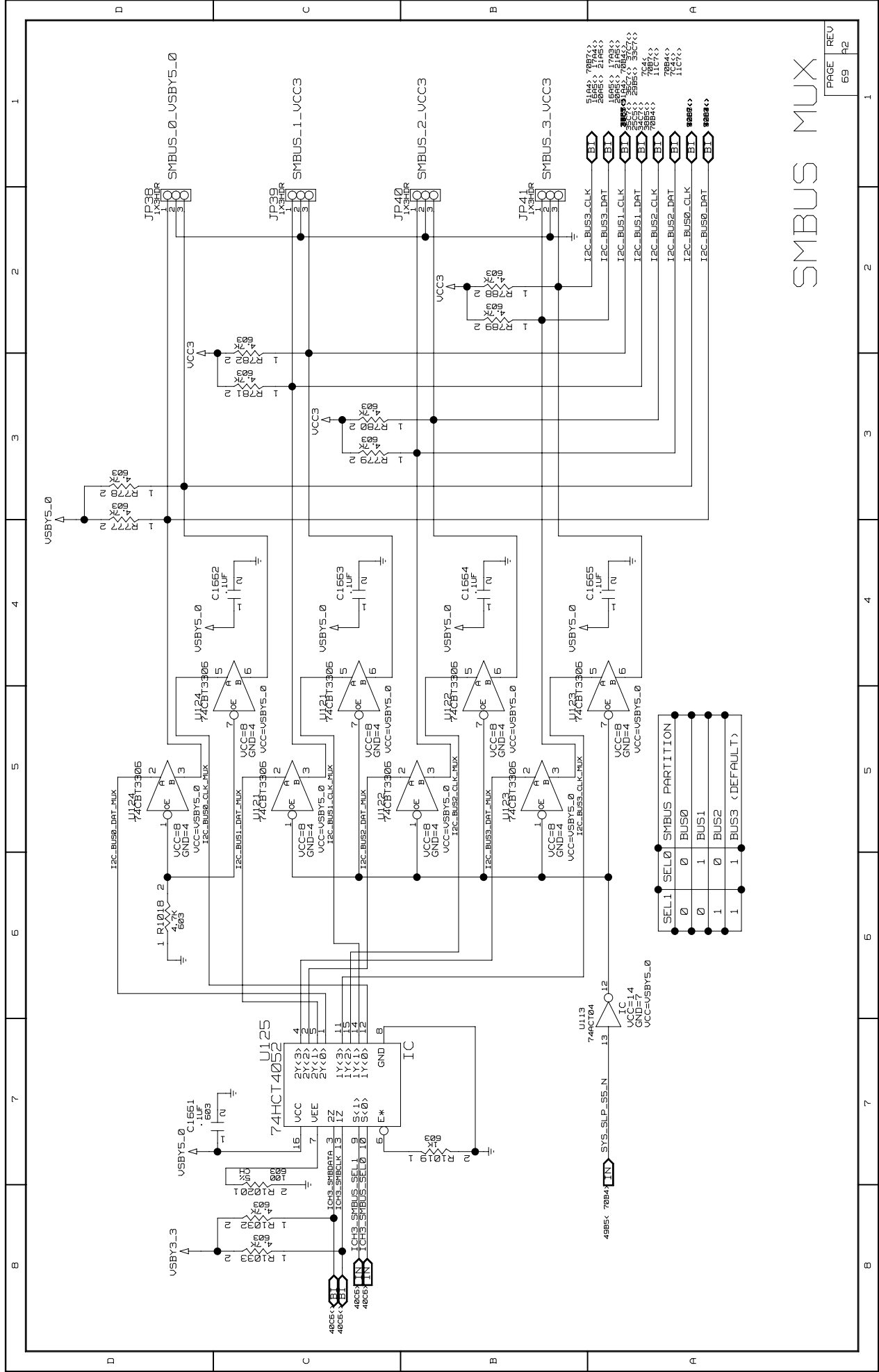


TERMINATION SCSI CHANNEL A

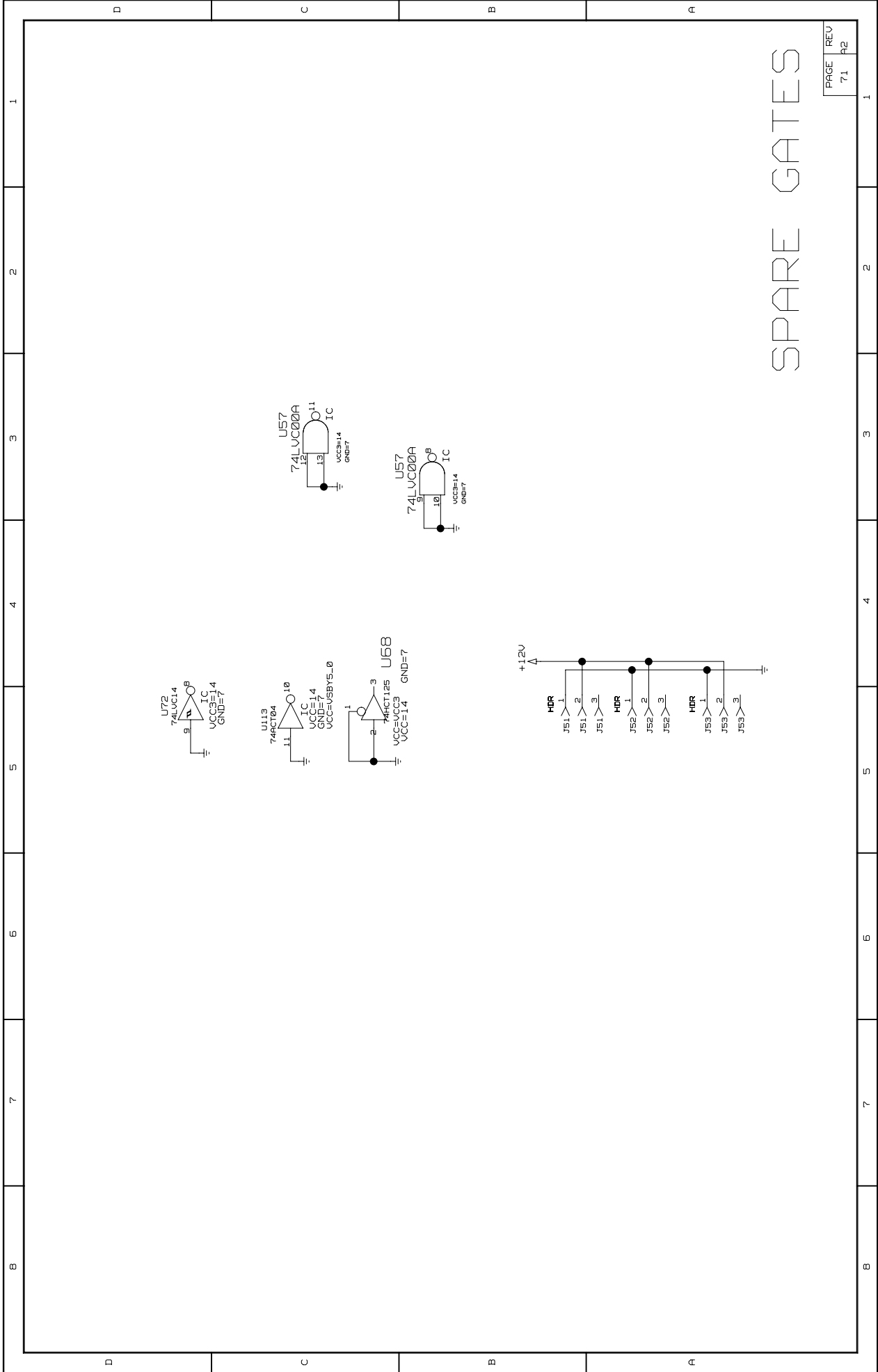


MOUNTING HOLES

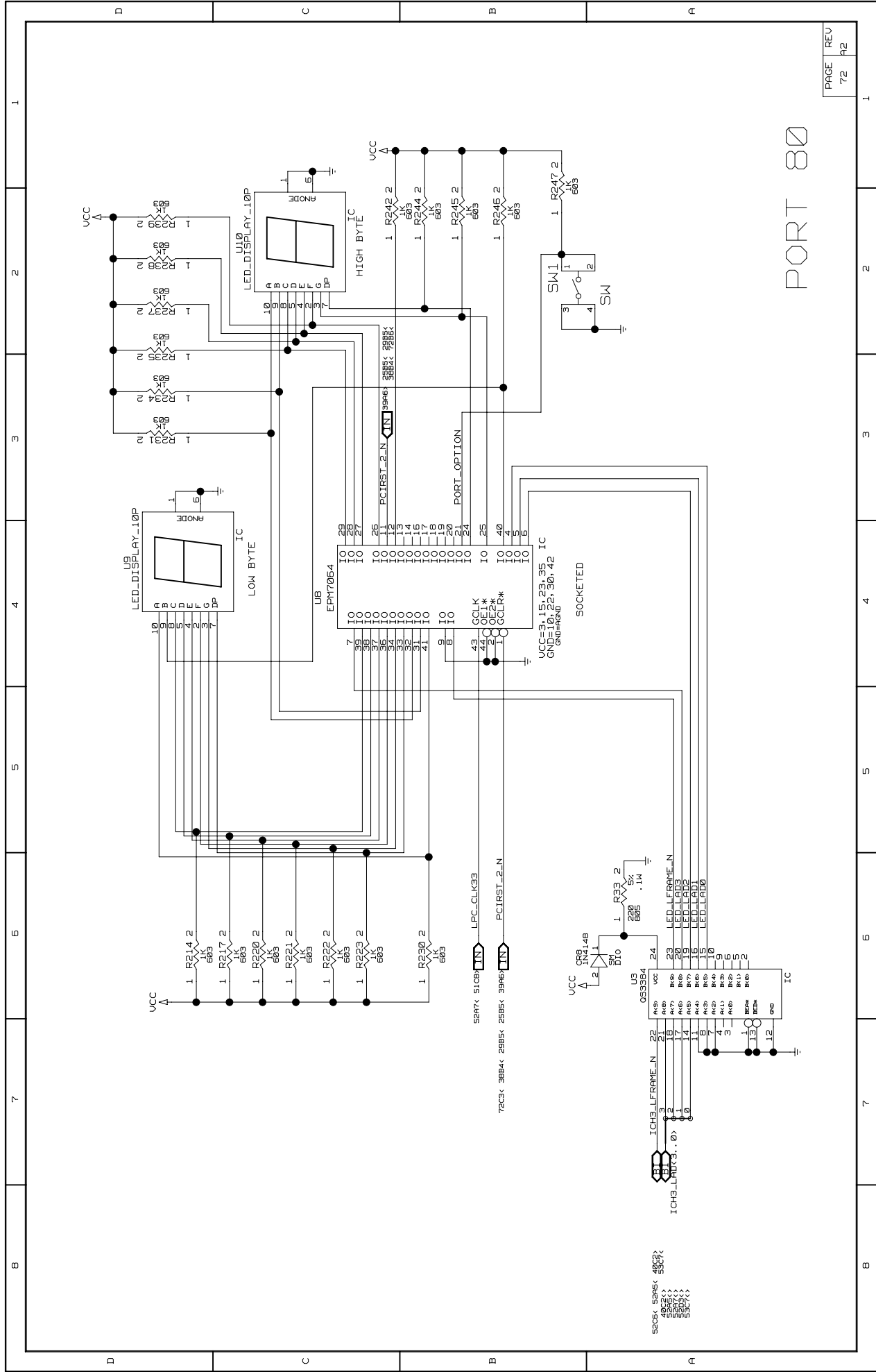




SMBUS MUX



SPARE GATES



PORT 80

D	B	7	6	5	4	3	2	1
D	B	7	6	5	4	3	2	1
C	B	7	6	5	4	3	2	1
C	B	7	6	5	4	3	2	1
B	B	7	6	5	4	3	2	1
B	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
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A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1
A	B	7	6	5	4	3	2	1

D	1	2	3	4	5	6	7
D	2	3	4	5	6	7	B
C	3	4	5	6	7	8	C
B	4	5	6	7	8	9	B
A	5	6	7	8	9	10	A
A	6	7	8	9	10	11	A

*** UNIT 1 Cross-Reference ***
 --- For the entire unit ---
 BHL BRLT_HLR_DP_4189

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D	C	B	A
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D		C		B		A	
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R168 RESEN 4850	R680 RESEN 4980	R681 RESEN 4981	R682 RESEN 4982	R683 RESEN 4983	R684 RESEN 4984	R685 RESEN 4985	R686 RESEN 4986
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R170 RESEN 4852	R694 RESEN 4994	R695 RESEN 4995	R696 RESEN 4996	R697 RESEN 4997	R698 RESEN 4998	R699 RESEN 4999	R700 RESEN 5000
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R176 RESEN 4858	R736 RESEN 5036	R737 RESEN 5037	R738 RESEN 5038	R739 RESEN 5039	R740 RESEN 5040	R741 RESEN 5041	R742 RESEN 5042
R177 RESEN 4859	R743 RESEN 5043	R744 RESEN 5044	R745 RESEN 5045	R746 RESEN 5046	R747 RESEN 5047	R748 RESEN 5048	R749 RESEN 5049
R178 RESEN 4860	R750 RESEN 5050	R751 RESEN 5051	R752 RESEN 5052	R753 RESEN 5053	R754 RESEN 5054	R755 RESEN 5055	R756 RESEN 5056
R179 RESEN 4861	R757 RESEN 5057	R758 RESEN 5058	R759 RESEN 5059	R760 RESEN 5060	R761 RESEN 5061	R762 RESEN 5062	R763 RESEN 5063
R180 RESEN 4862	R764 RESEN 5064	R765 RESEN 5065	R766 RESEN 5066	R767 RESEN 5067	R768 RESEN 5068	R769 RESEN 5069	R770 RESEN 5070
R181 RESEN 4863	R771 RESEN 5071	R772 RESEN 5072	R773 RESEN 5073	R774 RESEN 5074	R775 RESEN 5075	R776 RESEN 5076	R777 RESEN 5077
R182 RESEN 4864	R778 RESEN 5078	R779 RESEN 5079	R780 RESEN 5080	R781 RESEN 5081	R782 RESEN 5082	R783 RESEN 5083	R784 RESEN 5084
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R185 RESEN 4867	R799 RESEN 5099	R800 RESEN 5100	R801 RESEN 5101	R802 RESEN 5102	R803 RESEN 5103	R804 RESEN 5104	R805 RESEN 5105
R186 RESEN 4868	R806 RESEN 5106	R807 RESEN 5107	R808 RESEN 5108	R809 RESEN 5109	R810 RESEN 5110	R811 RESEN 5111	R812 RESEN 5112
R187 RESEN 4869	R813 RESEN 5113	R814 RESEN 5114	R815 RESEN 5115	R816 RESEN 5116	R817 RESEN 5117	R818 RESEN 5118	R819 RESEN 5119
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R197 RESEN 4879	R883 RESEN 5183	R884 RESEN 5184	R885 RESEN 5185	R886 RESEN 5186	R887 RESEN 5187	R888 RESEN 5188	R889 RESEN 5189
R198 RESEN 4880	R890 RESEN 5190	R891 RESEN 5191	R892 RESEN 5192	R893 RESEN 5193	R894 RESEN 5194	R895 RESEN 5195	R896 RESEN 5196
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R205 RESEN 4887	R939 RESEN 5239	R940 RESEN 5240	R941 RESEN 5241	R942 RESEN 5242	R943 RESEN 5243	R944 RESEN 5244	R945 RESEN 5245
R206 RESEN 4888	R946 RESEN 5246	R947 RESEN 5247	R948 RESEN 5248	R949 RESEN 5249	R950 RESEN 5250	R951 RESEN 5251	R952 RESEN 5252
R207 RESEN 4889	R953 RESEN 5253	R954 RESEN 5254	R955 RESEN 5255	R956 RESEN 5256	R957 RESEN 5257	R958 RESEN 5258	R959 RESEN 5259
R208 RESEN 4890	R960 RESEN 5260	R961 RESEN 5261	R962 RESEN 5262	R963 RESEN 5263	R964 RESEN 5264	R965 RESEN 5265	R966 RESEN 5266
R209 RESEN 4891	R967 RESEN 5267	R968 RESEN 5268	R969 RESEN 5269	R970 RESEN 5270	R971 RESEN 5271	R972 RESEN 5272	R973 RESEN 5273
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R213 RESEN 4895	R995 RESEN 5295	R996 RESEN 5296	R997 RESEN 5297	R998 RESEN 5298	R999 RESEN 5299	R1000 RESEN 5300	R1001 RESEN 5301
R214 RESEN 4896	R1002 RESEN 5302	R1003 RESEN 5303	R1004 RESEN 5304	R1005 RESEN 5305	R1006 RESEN 5306	R1007 RESEN 5307	R1008 RESEN 5308
R215 RESEN 4897	R1009 RESEN 5309	R1010 RESEN 5310	R1011 RESEN 5311	R1012 RESEN 5312	R1013 RESEN 5313	R1014 RESEN 5314	R1015 RESEN 5315
R216 RESEN 4898	R1016 RESEN 5316	R1017 RESEN 5317	R1018 RESEN 5318	R1019 RESEN 5319	R1020 RESEN 5320	R1021 RESEN 5321	R1022 RESEN 5322
R217 RESEN 4899	R1023 RESEN 5323	R1024 RESEN 5324	R1025 RESEN 5325	R1026 RESEN 5326	R1027 RESEN 5327	R1028 RESEN 5328	R1029 RESEN 5329
R218 RESEN 4900	R1030 RESEN 5330	R1031 RESEN 5331	R1032 RESEN 5332	R1033 RESEN 5333	R1034 RESEN 5334	R1035 RESEN 5335	R1036 RESEN 5336
R219 RESEN 4901	R1037 RESEN 5337	R1038 RESEN 5338	R1039 RESEN 5339	R1040 RESEN 5340	R1041 RESEN 5341	R1042 RESEN 5342	R1043 RESEN 5343
R220 RESEN 4902	R1044 RESEN 5344	R1045 RESEN 5345	R1046 RESEN 5346	R1047 RESEN 5347	R1048 RESEN 5348	R1049 RESEN 5349	R1050 RESEN 5350
R221 RESEN 4903	R1051 RESEN 5351	R1052 RESEN 5352	R1053 RESEN 5353	R1054 RESEN 5354	R1055 RESEN 5355	R1056 RESEN 5356	R1057 RESEN 5357
R222 RESEN 4904	R1058 RESEN 5358	R1059 RESEN 5359	R1060 RESEN 5360	R1061 RESEN 5361	R1062 RESEN 5362	R1063 RESEN 5363	R1064 RESEN 5364
R223 RESEN 4905	R1065 RESEN 5365	R1066 RESEN 5366	R1067 RESEN 5367	R1068 RESEN 5368	R1069 RESEN 5369	R1070 RESEN 5370	R1071 RESEN 5371
R224 RESEN 4906	R1072 RESEN 5372	R1073 RESEN 5373	R1074 RESEN 5374	R1075 RESEN			

