MICRON

PC/104 format Single Board PC

User Manual

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CONTENTS

INTRODUCTION

COMPANY PROFILE

Blue Chip Technology is a leading specialist PC product manufacturer in Europe, providing innovation with quality design and manufacturing from a single source.

Based in the North West of England, our purpose built complex contains both advanced research and development facilities, and manufacturing facilities.

Specialising in the provision of industrial computing and electronic solutions for a wide range of UK and European organisations, Blue Chip Technology has one of the UK's largest portfolios of industrial PCs, peripherals and data acquisition cards. This extensive range of products, coupled with our experience and expertise, enables Blue Chip Technology to offer an industrial processing solution for any application. This is one of the products from our portfolio, providing you with a cost effective product development and volume production tool.

A unique customisation and specialised system integration service is also available, delivering innovative solutions to customers problems. The company's success and reputation in this area has led to a number of large design and manufacturing projects for major companies.

British Standards Institute approval (BS EN 9001) means that all of Blue Chip Technology's design and manufacturing procedures are strictly controlled, ensuring the highest levels of quality, reliability and performance.

Blue Chip Technology are committed to the single European market, and continue to invest in the latest technology and skills to provide high performance computer and electronic solutions for a world-wide customer base.

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RELATED PUBLICATIONS

The following publications will provide useful information related to the Standard Personal Computer and can be used in conjunction with this manual.

- IBM Personal Computer AT Technical Reference, 1502494, IBM, 1984.
- IBM Personal System/2 and Personal Computer BIOS Interface Technical Reference, 15F0306, IBM, 1987.
- The Programmers PC Sourcebook, Microsoft
- The Winn L. Rosch Hardware Bible, Brady

TRADEMARKS

PRECAUTIONS

Certain precautions are necessary when designing with, handling, and using circuit boards. ***It is imperative that precautions are taken at all stages to avoid Electro-static discharges, which will damage boards. Those boards fitted with an on-board lithium battery must be handled carefully to avoid maltreatment of the battery that could create a hazard.***

ELECTRO-STATIC DISCHARGES

The devices on this card can be totally destroyed by static electricity. Also bear in mind that the damage caused by static electricity may be partial and not immediately obvious. This could have an effect on your product's reliability and warranty. Ensure that you take necessary static precautions, ideally you should wear an approved wrist strap or if that is not possible, touch a suitable ground to discharge any static build up. This should be repeated if the handling is for any length of time.

When carrying the board around, please place it into the anti-static bag in which it came. This will prevent any static electricity build up. Do not use black anti-static bags because these tend to be conductive and will discharge any on-board battery.

ON-BOARD BATTERY

This applies to boards fitted with a Lithium battery (most single board computer boards). If the battery is mistreated in any way there is a very real possibility of fire, explosion, and harm. Great care should be taken with this type of battery. Under NO circumstances should it be:

- short-circuited
- exposed to temperatures in excess of 100 ºC or burnt
- immersed in water
- unsoldered
- recharged
- disassembled

Expired batteries remain hazardous and must be disposed of in a safe manner.

BIOS & CMOS RAM

Please be aware that on single board computer products, it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

ELECTROMAGNETIC COMPATIBILITY

This product meets the requirements of the European EMC Directive (89/336/EEC) and is eligible to bear the CE mark.

It has been assessed operating in a Blue Chip Technology housing. However, because the board can be installed in a wide variety of chassis, certain conditions have to be applied to ensure that the compatibility is maintained. Subject to those conditions, it meets the requirements for an industrial environment (ITE Class A product).

- The board must be installed in a computer system chassis that provides screening suitable for an industrial environment.
- Any recommendations made by the computer system manufacturer/supplier must be complied with regarding earthing and the installation of boards.
- Any metal back plate must be securely screwed to the chassis of the computer to ensure good metal-to-metal (i.e. earth) contact.
- Connector bodies must be securely connected to the enclosure.
- The external cabling to boards causes most EMC problems. It is imperative that any external cabling to the board is totally screened, and that the screen of the cable connects to the metal end bracket of the board or the enclosure and hence to earth. It is recommended that round, screened cables with a braided wire screen are used in preference to those with a foil screen and drain wire. Use metal connector shells that connect around the full circumference of the cable screen: they are far superior to those that earth the screen by a simple "pig-tail".
- The keyboard and mouse will play an important part in the compatibility of the processor card since they are ports into the board. Similarly, they will affect the compatibility of the complete system. Fully compatible peripherals must be used otherwise the complete system could be degraded. They may radiate or behave as if keys/buttons are pressed when subject to interference. Under these circumstances it may be beneficial to add a ferrite clamp on the leads as close as possible to the connector. A suitable type is the Chomerics type H8FE-1004-AS.
- USB cables should be high quality screened types.
- Ensure that the screens of any external cables are bonded to a good RF earth at the remote end of the cable.

Failure to observe these recommendations may invalidate the EMC compliance.

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

USER GUIDE

MANUAL ORGANISATION

This manual describes in detail the Blue Chip Technology MICRON Single Board processor card.

We have tried to include as much information as possible but we have not duplicated information that is provided in the standard IBM Technical References, unless it proved to be necessary to aid in the understanding of the MICRON.

The manual is sectioned as follows:

Overview, listing the board's features and specification;
Layout, showing where the various items are located;
Installation, and associated issues;
Using the board, including the peripherals;
Troubleshooting guide;
Connector Pin-Out details.

We strongly recommend that you study this manual carefully before attempting to interface with MICRON or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance. ***IT IS PARTICULARLY IMPORTANT THAT YOU READ THE SECTION 'PRECAUTIONS' BEFORE HANDLING THE BOARD.***

If you have any suggestions or find any errors concerning this manual and want to inform us of these, please contact our Technical Services department with the relevant details.

OVERVIEW

The Blue Chip Technology MICRON Single Board PC integrates the latest advances in low power processor, memory, and I/O technologies to provide an ideal platform for embedded applications. The MICRON complies with the PC/104*Plus* standard providing ISA and PCI bus interfaces on a single card.

The board is available with CPU build options operating at 200 and 250MHz. The memory interface supports up to 256MB of 3.3V PC100 SDRAM, in a standard 144-pin SO-DIMM socket.

The MICRON utilises Trident CyberBlade i7 and VIA VT82C686B chipset to integrate many peripherals. These include: VGA, UDMA IDE interface, ATA solid state disk, floppy disk interface, USB support, serial ports, parallel port, real-time clock, keyboard and mouse (PS/2) controller. Three GPIO (general purpose input-output) pins plus one output are available, and a serial AC'97 audio interface. Due to the high level of integration, most off-board facilities are available in multifunction connectors.

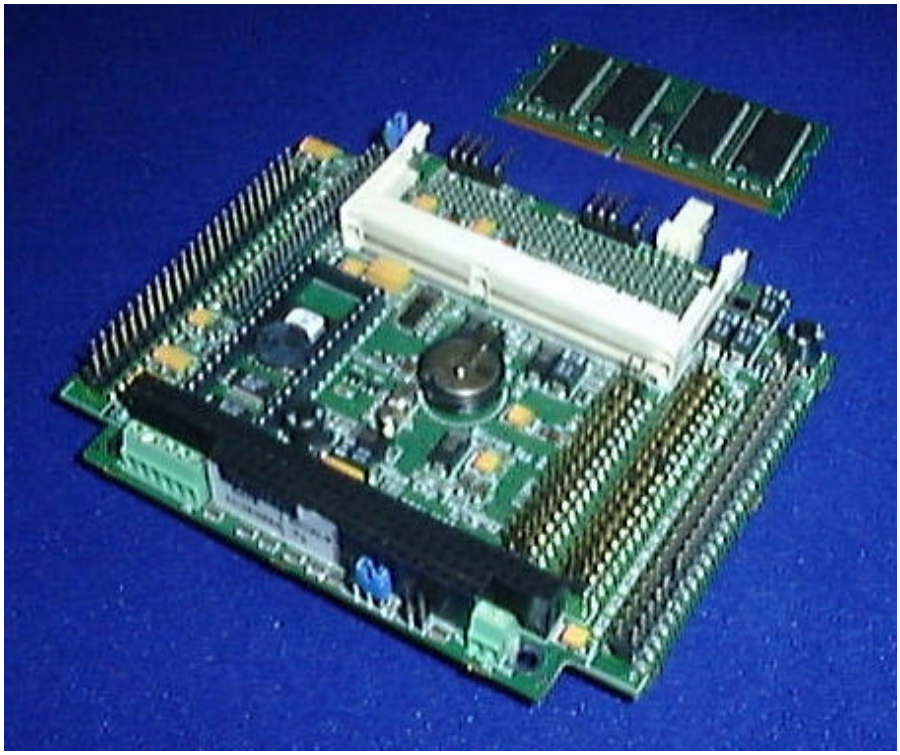
The MICRON will also drive up to two external PC/104, four PC/104*Plus* expansion modules and built-in 10/100 base-T LAN connection. The LAN connection requires an external isolation transformer-socket. Facilities are provided for connection to an LCD panel if required.

An optional board, the MICRON CONNECT, is available to provide standard VGA, UTP, Keyboard, Mouse and USB connections, enabling an easy product development route. An audio codec is included on the board.

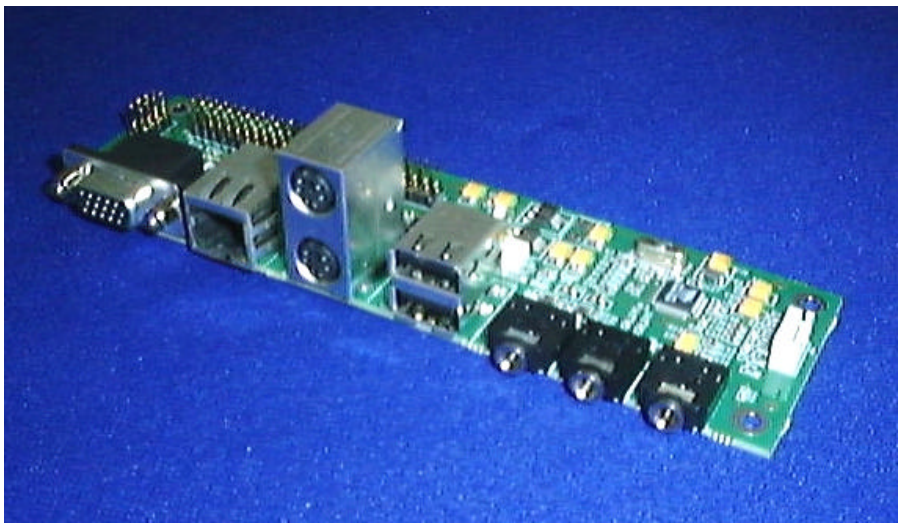
An optional cable is also available to provide the serial ports, parallel port and standard utilities (Reset, Power switches, HD LED, speaker and External SMI) at standard format connectors.

A full set of software drivers and utilities are available to allow advanced operating systems such as Windows™ 9x, ME, NT, and 2000 to take full advantage of all the hardware capabilities.

MICRON Processor Board



MICRON CONNECT Development Board



BOARD LEVEL FEATURES

- 200/250 MHz CPU operation (equivalent to a Pentium Rating of PR266/366)
- 100MHz FSB
- 5V-only operation. Note that LCD panels or plug-in PCBs may require 12V supplies.
- On-board 3.3/2.0V CPU voltage regulators
- Trident CyberBlade i7 and VIA VT 82686B chipset.
- One SO-DIMM socket for up to 256MByte of PC100 SDRAM
- Built-in CRT/LCD graphics controller
- PCI and ISA expansion busses via PC/104 and PC/104*Plus* connectors
- Dual floppy interface.
- PCI UDMA IDE interface for two devices.
- EPP/ECP bi-directional parallel interface.
- PCI 100/10 base-T Ethernet LAN controller.
- Dual USB ports.
- Stereo sound (SoundBlaster™ compatible) available.
- Dual RS232 serial ports. IRDA port setup option on the second serial port.
- Real-time clock with on-board battery
- PS/2 mouse and keyboard controller
- Plug-in ATA Flash module.
- Drive for 2 ISA and 4 PCI modules
- Four General Purpose I/O signals.
- 128byte user EEPROM available.
- Watchdog facility.

CPU

The MICRON single board PC comes with Pentium-class Rise Technology iDragon mP6 Processors running at 2.0/3.3Volts. On-board voltage regulator circuits provide the required voltages for the processor from the incoming 5 volt power supply. This device gives a high performance/ power ratio.

The processor maintains full backward compatibility with the 8086, 80286, i386™ and Intel486™ processors. It supports both read and write burst mode bus cycles, and includes separate on-chip code and data caches which employ a write-back policy. Also integrated into the processor is an advanced numeric co-processor which significantly increases the speed of floating point operations, whilst maintaining backward compatibility with Intel486™ math co-processor and complying with ANSI/IEEE standard 754-1985.

CHIP SET

The MICRON board uses the Trident CyberBlade i7 and VIA VT82C686B chipset. This is well known and widely used in the general purpose PC marketplace. It offers a high level of integration of standard functions, and with the latest iteration, UDMA-100 gives a high performance solution.

SYSTEM MEMORY

The MICRON single board PC is fitted with one 144-pin 3.3V SDRAM SO-DIMM memory socket. This supports SO-DIMM SDRAM modules up to 256 MB in size. The Front-Side Bus, which is fixed at 100MHz requires PC100 speed memory, or faster. There are no jumper settings required for the memory size, this is automatically detected by the system BIOS through the SPD/SMBus.

Only 14 address lines are available from the chipset for the bank, row and column addresses. Some 256Mbit technology SO-DIMMs require 15 address lines to achieve 256Mbytes and will not be fully addressable.

ECC memory is not supported.

BUS EXPANSION FACILITIES

The MICRON is designed for use in an embedded application and provides for expansion cards with PC/104 and PC/104*Plus* stacked connectors. This board has to be mounted at the 'top' of a stack. This is to allow cable access and because the PC/104*Plus* connector is not available on the upper side, being obstructed by the memory.

USER EEPROM

The EEPROM on the MICRON unit is a NM93C46 serially programmed device. It comprises 128 bytes of user programmable memory, organised as 64 x 16 bit words. The EEPROM does not have to be completely erased before writing to a single location. Software functions are provided to use the facility.

WATCHDOG FACILITY

MICRON includes a watchdog timer circuit, which may be used to monitor software or processor hardware failure. The time-out period of the watchdog is fixed and the timer is enabled or disabled by using a software interrupt.

GENERAL PURPOSE DIGITAL INPUT/OUTPUT

MICRON provides three LVTTL-compatible programmable digital input/output lines and one output. BIOS functions are available to control this facility, which must be enabled in the BIOS setup.

SPECIFICATION

MICRON Power Requirement	+5 V ± 5%	Required for processor operation.
	+12 V ± 5%	Not required for board operation.
	-12 V ± 5%	Not required for board operation.
	+3.3 V ± 5%	Not required for board operation.
	$+5V_{STBY}$	Required for board operation – may be linked from +5V
		Note that those supply rails that are not required for operation of the MICRON may be required by other plug-in boards or LCDs.

5-Volt Power Consumption	1.7 A typical, 2.0 A peak	250 MHz CPU, 128 MB SDRAM
	1.6 A typical, 1.9 A peak	200 MHz CPU, 128 MB SDRAM
	1.6 A typical, 1.8 A peak	200 MHz CPU, 64 MB SDRAM

Temperature	Non-Operating	-40 ºC to +70 ºC
	Operating	+0 ºC to +55 ºC
	(Heatsinks and airflow may be required for the higher limits)	

EMC	Emissions	EN 55022 (A)
	Immunity	EN 55024

MTBF	Calculated	>100,000 Hrs

Dimensions	Board only	96 x 106 mm – making use of the allowed connector space in PC/104 {large memory modules, overhanging connectors and a large heatsink may increase these dimensions.}

Temperature Limits	mP6	85ºC case
	686B	85ºC case
	82559ER	85ºC case
	EL7564	70ºC ambient (no airflow)
	Ci7	70ºC ambient
	ICS9248	115ºC case 70ºC ambient

Power Consumption figures given are for typical configurations.

This information is provided only as a guide to calculating approximate total system power usage when additional resources are added.

BOARD LAYOUT

TOP SURFACE OF THE PCB

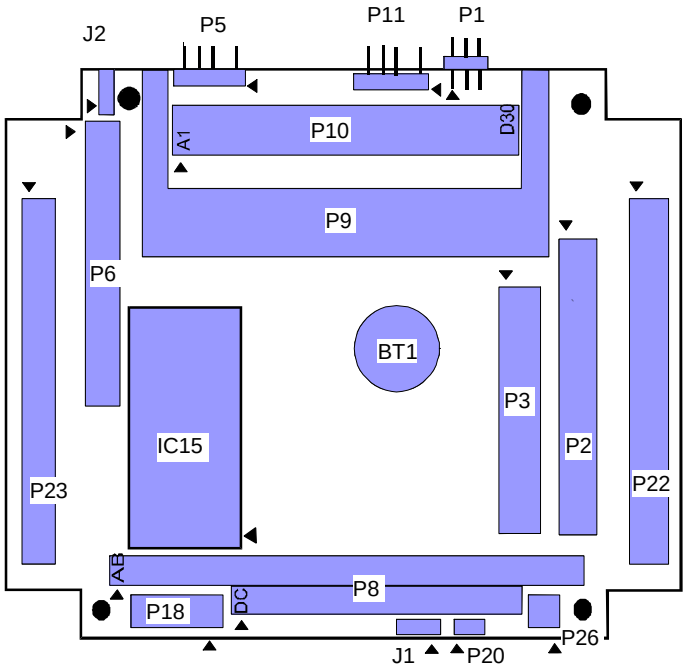


Figure 1. MICRON PCB - Top View Showing Connector Positions.
Pin 1 of each connector is indicated by an arrow.

Connectors

Ident	Description	Ident	Description
BT1	12mm Battery holder for RTC	P8	PC/104 connectors
IC15	Socket for ATA Disk (Flash)	P9	SODIMM connector
J1	CMOS/RTC clear	P10	PC/104*Plus* connector (below PCB)
J2	Panel supply voltage	P11	IRDA connector
P1	5V fan connector	P18	Power supply terminals
P2	Primary EIDE connector	P20	Remote 10K Thermistor
P3	Floppy disk connector	P22	Serial, Parallel, Utilities
P5	Panel Vee connector	P23	VGA, PS/2, LAN, USB, etc.
P6	LCD panel connector	P26	+/-12V pass-through

See the section "Micron Connectors " for details of individual signals on the connectors.

LOWER SURFACE OF THE PCB

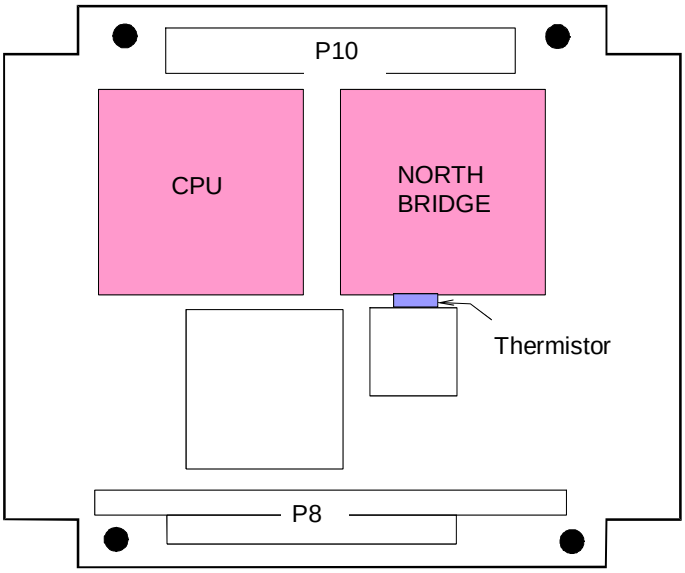


Figure 2. MICRON PCB - Underside View
Showing Hot Devices and Temperature Sensor.

Connectors

Ident	Description
P8	PC/104 connectors (both surfaces)
P10	PC/104*Plus* connector

See the section "Micron Connectors" for details of individual signals on the connectors.

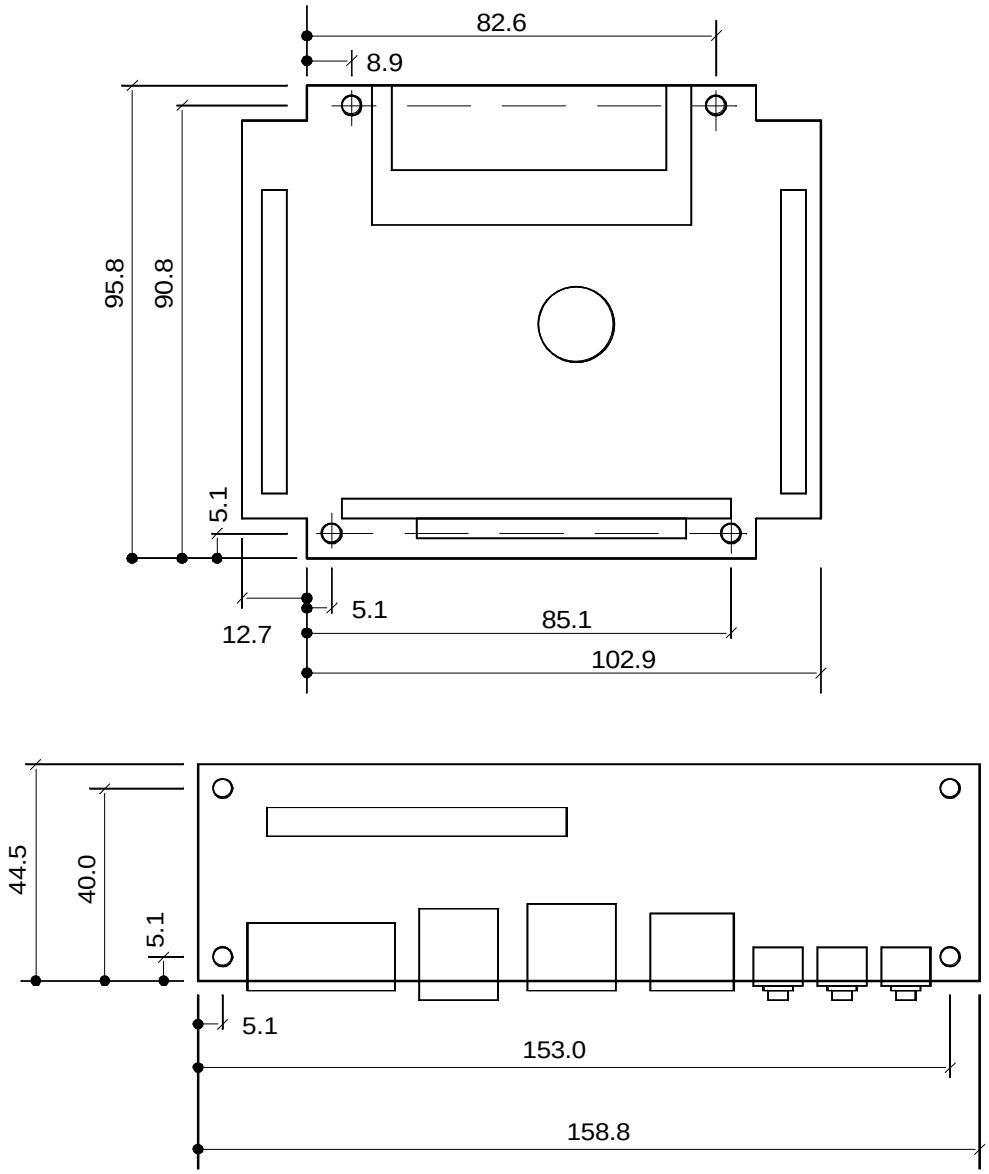
INSTALLATION

MOUNTING

The PC104 specification details 4 mounting holes of 1/8" diameter. Because of the size of the standard SO-DIMM two of these are partially obscured by the socket for the SDRAM. Small headed fixings are best here, preferably plastic to avoid any possible short circuits.

Care should be taken on the underside of the board to not cause any mechanical damage to the components adjacent to the mounting holes.

The MICRON CPU has to be installed at the top of a PC/104*Plus* stack because of its' interconnect restrictions. It is also difficult to mount any PC/104 boards on top of MICRON because of the two obscured mounting holes not being available to take standard pillars.



COOLING

Efficient cooling is essential for long and reliable operation of any electronic equipment. The CPU and the Trident CyberBlade i7 IC (commonly termed the 'North Bridge') do get hot in normal operation, and in an elevated ambient temperature will require additional cooling. Cooling requirements will vary with application, desired operating temperature, CPU load, memory size and board orientation.

Mounting the PCB vertically will aid natural convection and create a chimney effect. Passive heatsinks are available for the CPU and the Trident CyberBlade i7 IC. In addition, a 5-Volt fan connector is provided on the board edge. A fan, whilst not always desirable, will provide a high degree of cooling even for a relatively slow airflow.

Further options that may be considered are sinking heat to the chassis or enclosure, and in extreme situations the use of a heatpipe.

A thermistor is available to monitor the temperature of the two hottest devices on the board. A connector is also provided for the user to connect a second thermistor. The thermistor should be a Negative Temperature Coefficient type of nominally 10K resistance at 25ºC, with a ß=3988. Software to monitor the thermistor is available for download on the Via website (see the section Loading Operating Systems and Drivers).

When designing an enclosure, bear in mind that the greater the volume of air that can flow through the enclosure, the greater the cooling effect and the lower the temperature rise above the ambient air temperature. However, the volume produced by any fan will vary with the pressure against which it has to work. The resistance to airflow (the back-pressure on the fan) will depend upon the enclosure, the mounting and restrictions. Therefore, when mounting and cabling the board, it is essential that the free circulation of the cooling airflow is not impeded.

The calculation of airflow through an enclosure is not straightforward, and depends on many factors. The method of meeting the cooling requirements will be specific for each system. Consequently, the system builder is responsible for ensuring adequate cooling. However, interpreting airflow volumes is not intuitive. As an aid to selecting suitable cooling, the following example is offered. A 60 mm axial fan (such as a Papst type 612NGH) blowing over the board can supply up to 46 m^3/hour when unrestricted. Restrictions to the airflow will reduce this volume.

CABLING

Careless routing of connecting cables can affect the cooling dramatically. It will also have a bearing on EMC. Lengths should be limited to the necessary minimum.

Connections may be made to the MICRON board directly, using custom cables to suit the application. Alternatively, connections may be made via the optional MICRON I/O cable, or the optional MICRON CONNECT board. The MICRON I/O cable and the MICRON CONNECT board provide a 'translation' of the MICRON board connections to industry-standard connections. Cables are available to connect the MICRON to the MICRON CONNECT board, and for breaking out to standard connectors, UDMA disks and floppy disks. The actual cabling required will vary for each application, with some functions not being required.

Please note that to achieve higher IDE throughput than UDMA33 requires the use of a special 80-conductor IDE cable. Using a standard 40-conductor IDE cable will force the interface to work at a lower speed.

All applications will require a power connection. The MICRON board requires only a +5V supply for stand-alone operation. However, other plug-in boards or LCDs may require other supplies. MICRON provides facilities to route the power through the interconnections to these other items. See the Connector Pin-Out section for details of the power connections.

Power wiring should be of an adequate gauge for the PC/104 stack to ensure that the voltage does not fall below the watchdog trip point (nominally 4.75V at the watchdog). Note that two terminals are provided for each of the +5V and 0V connections to reduce the impedance when supplying a stack of cards. The current limit per terminal is 6A, but it is not envisaged that a PC/104 stack would be constructed requiring so much

current. As a rule-of-thumb it is recommended to keep to below 3A per terminal.

An ATX power supply may be used, in which case a 5V standby supply line would be available. This should be connected to $5V_{STBY}$ terminal. The ATX PSU may be switched on and off by the power switch on the Utilities connector controlling the PSU PSON# line.

If a 5V standby supply is not available, the terminal should be linked to +5V supply. The Ethernet controller and much of the power-sequencing blocks in the chipset are powered from this terminal.

Take care to identify cables, and be aware that some connectors could be transposed.

EMC ISSUES

The enclosure in which the board is mounted will have a significant effect on the electro-magnetic compatibility of the final system. For best effect it should be electrically conducting and provide a complete screen around the electronics. Apertures should be kept to a minimum and as small as possible. For ventilation purposes, many small holes are far more preferable to a few large holes.

It is the maximum dimension of an aperture that governs the lowest frequency that can pass through the enclosure (either in or out). This is irrespective of the width of the aperture. Even a narrow gap between two sections of an enclosure can leak radio interference. Large apertures will significantly reduce the electro-magnetic compatibility of the system.

The major contributor to EMC problems will be cables entering and leaving the enclosure. To minimise these effects ensure that any external cables are fully screened, and that the screen is electrically connected to the chassis. Full wire-screened cables are much more effective than those with a foil screen and drain wire. Use metal connector shells/covers, and do not allow the external screen to pass into the enclosure.

USING THE BOARD

BIOS SETTINGS

The board contains a custom implementation of the Phoenix BIOS 4, Revision 6.1 to suit the specific hardware features.

Certain combinations of BIOS settings may prevent the MICRON from working correctly. If problems or lock-ups are experienced on boot-up, clear the CMOS memory and restart. The default settings will usually work in most instances. The CMOS memory is cleared using the jumper block J1. To clear the CMOS, switch off the power to the board, then move the jumper at J1 to the "Clear CMOS" position for a few seconds, and then return it to its original position. The power may then be restored.

Press the keyboard <F2> key during the boot-up operation to enter the BIOS set-up screen. Various information is available on the set-up and interpretation of the BIOS in the following files:

User Manual

BIOS-Setup

BIOS-POST

JUMPERS

Only two jumper blocks are used on the board: one to clear the CMOS memory, and the other to select the LCD panel supply voltage. This latter jumper may be ignored if a LCD panel is not fitted. No other jumpers are available, all other features are controlled from BIOS setup or operating system options.

Care should be taken to set the LCD voltage selector to the appropriate voltage if using an LCD panel.

Please bear in mind that the board will not function if the CMOS clear is left in the "Clear" position.

LOADING OPERATING SYSTEMS & DRIVERS

Some operating systems provide in-built support for the chipset used on this board. It is variously known as Trident CyberBlade i7 (8420B) and VIA Technologies VT686[B] with Rise mP6 CPU, Intel 82559ER Ethernet controller and VT1611 audio codec when used with the MICRON CONNECT option.

A CD-ROM is supplied with each board, containing some common operating system drivers. Bear in mind that suppliers continually update their drivers, so it is always a good idea to check on the Internet for later ones. The following websites are good starting points:

www.via.com.tw
www.viatech.com
www.intel.com

Note:- When installing Windows 2000 it has been found to fail if this operation is attempted with the on-board audio enabled. Disable the audio using Setup, complete the installation, and then enable it. Windows will see the Multimedia Audio Device on the next boot and prompt for the drivers.

PROGRAMMING THE BOARD

The board includes an EEPROM, a Watchdog and General Purpose I/O, all of which are accessible by using a special BIOS function.

The EEPROM and the General Purpose I/O are not available together. One or the other is first enabled in the BIOS set-up program, and then controlled by software using the software interrupt INT 50h.

USER EEPROM

The EEPROM on the MICRON unit is a NM93C46 serially programmed device. It comprises 128 bytes of user programmable memory, organised as 64 x 16 bit words. The EEPROM does not have to be completely erased before writing to a single location.

Before it can be used, the EEPROM must be enabled within the BIOS. The BIOS provides two functions to simplify user access to the EEPROM memory, available through a software interrupt (INT 50h):

Write to Single EEPROM Location

Calling Registers:	AH = 03 BL = Location (0 – 63) DX = Write data (16-bit value)
Perform INT 50h	
Return Registers:	AH = 00, and Carry flag is clear if successful AH = 02, and Carry flag is set if function valid but disabled AH = FF, and Carry flag set if function failed

READ Single EEPROM Location

Calling Registers:	AH = 04 BL = Location (0 – 63)
Perform INT 50h	
Return Registers:	DX = EEPROM Data AH = 00, and Carry flag is clear if successful AH = 02, and Carry flag is set if function valid but disabled AH = FF, and Carry flag set if function failed

Please note that the pins driving this device are shared with the general-purpose I/O lines. It is therefore not possible to use the EEPROM and GPIO lines simultaneously.

WATCHDOG FACILITY

MICRON includes a watchdog timer circuit, which may be used to monitor software or processor hardware failure. The time-out period of the watchdog is fixed at 1200 milliseconds (± 60%). The timer is enabled or disabled by using the software interrupt at INT 50h.

The following code demonstrates the control of the watchdog timer.

Enable/Disable Watchdog

Calling Registers:	AH = 05 AL = 01 to enable, 00 to disable

Perform INT 50h.

Return Registers: AH = 00, and Carry flag is clear if successful
AH = 02, and Carry flag is set if function valid but disabled
AH = FF, and Carry flag set if function failed

Refresh Watchdog

Calling Registers: AH = 06

Perform INT 50h

Return Registers: Carry flag clear

GENERAL PURPOSE I/O LINES

MICRON provides four LVTTL-compatible programmable digital input/output lines. Before the lines can be used, the GPIO function has to be enabled within the BIOS Set-up program. Once enabled, BIOS functions are available to control this facility.

As inputs, the lines are non-inverting, and are pulled high by on-board resistors. Excepting GPIO2, the default settings for all lines are as inputs. GPIO2 can only operate as an output and it defaults to a high state. The direction control and data may be handled using the software interrupt function (INT 50h):-

Set User IO Line Control

Calling Registers: AH = 17 (hex)
DL (bits 2-0) = IO Line Mask (0=input, 1=output)

Perform INT 50h

Return Registers: Carry Flag is clear, and AH=00 if successful
Carry flag is set, and AH=02 if not enabled in BIOS setup.

Write User IO Lines

Calling Registers: AH = 16 (hex)
DL (bits 2-0) = IO Line data

Perform INT 50h

Return Registers: Carry Flag is clear, and AH=00 if successful
Carry flag is set, and AH=02 if not enabled in BIOS setup.

Read User IO Lines

Calling Registers: AH = 15 (hex)

Perform INT 50h

Return Registers: DL (bits 2-0) = IO Line data (bits 7-3 = 0)
Carry Flag is clear, and AH=00 if successful
Carry flag is set, and AH=02 if not enabled in BIOS setup.

Please note that the pins driving the User EEPROM are shared with the general-purpose I/O lines. It is therefore not possible to use both functions simultaneously.

ACCESSING SOFTWARE 'INT 50H' FUNCTIONS

Most high level languages allow access to software interrupts through a particular function call. The user loads a particular function code into the AH register followed by a specific set of parameters in the other registers before executing the interrupt.

For example, in C :-

```
#include <stdio.h>
#include <dos.h>

#define MICRON 0x50

void main(void)
{
    union REGS regs;
    regs.x.ax = 0x0400;                 /* read eeprom data */
    regs.x.bx = 0x31;                   /* from address 0x31 */
    int86(MICRON, &regs, &regs);
    printf("EEPROM Address 0x31 contains %x\n",regs.x.dx);
}
```

and similarly in Quick Basic

```
'Read EEPROM Data via interrupt 50 call
$include:'QB.BI'

DIM INARY%(7), OUTARY%(7)
CONST AX=0,BX=1,CX=2,DX=3,BP=4,SI=5,DI=6,FL=7

INARY%(AX) = &H0400                     ' Read e2 data
INARY%(BX) = &H31                       ' address &H31
CALL INT86OLD(&H50,INARY%(),OUTARY%())  ' Call the Int50h service
PRINT "EEPROM ADDRESS &H31 CONTAINS: ";OUTARY%(DX)
```

Note that only the functions listed in the sections above are valid. On return, the contents of register AH may contain a value indicating the status:

AH = 00h	-	Function successful, Carry flag cleared
AH = 01h	-	Function invalid, Carry flag set
AH = 02h	-	Function valid but disabled, Carry flag set
AH = 03h	-	Function failed, Carry flag set

MAINTENANCE

The only regular maintenance required is to ensure that the cooling airflow remains unrestricted. Generally the enclosure design and the wiring layout will ensure that the cooling is stable. However, bear in mind that any air filters may become clogged thereby reducing the cooling.

After a period of time, it may be necessary to replace the on-board battery, if it cannot maintain the CMOS memory.

REPLACING THE ON-BOARD BATTERY

Before attempting to replace the battery, please read the precautions detailed in the introductory section. Remember that even discharged batteries can present a real personnel hazard if mistreated.

The battery is held in place by the spring-clip on the top of the plastic carrier. To remove the battery, insert a non-conductive tool, or fingernail under the battery to lift it above the lip of the holder against the retaining spring. Then slide the battery out.

Replacing the battery is the reverse procedure, ensuring that the new battery is placed with the positive face up (visible).

TROUBLESHOOTING GUIDE

This is not intended as an extensive faultfinding procedure, rather it is intended to indicate the more likely causes of failure with this product. Ensure that the power is switched off before making any hardware changes. Bear in mind that it is possible to set combinations of parameters within the BIOS that will prevent proper operation of the board. See the BIOS section for details. If in doubt, set default values or clear the CMOS memory and start again. Default values will generally provide a working but limited system.

SYMPTOM	**Fail to boot**
Possible Cause	Power supply incorrect
Action	Check +5V supply
Possible Cause	Check that the 5Vstandby terminal is connected
Action	Link to +5V if not powered from an ATX 5Vstandby supply
Possible Cause	CMOS memory corrupt/invalid
Action	Power off, set CMOS clear jumper to 'Clear', then return jumper to operational position
Possible Cause	CMOS Clear jumper in wrong position
Action	Set to operational position, NOT 'Clear'
Possible Cause	Extended System Configuration Data (ESCD) memory corrupt/invalid
Action	Use BIOS Setup to clear and re-write the ESCD memory
Possible Cause	Memory not fully seated in socket
Action	Remove and refit memory
Possible Cause	Add-in board requires other voltage rails (MICRON requires only 5V)
Action	Check power requirements of expansion board, and power supplies
SYMPTOM	**Time and Date incorrect, loss of CMOS memory contents**
Possible Cause	Flat or displaced battery
Action	Power off, replace battery (ensure correct orientation), reset CMOS values
SYMPTOM	**No display on monitor**
Possible Cause	Incorrect BIOS setting, LCD display selected rather than Monitor or Both
Action	Clear CMOS memory, reset correct values
SYMPTOM	**User EEPROM contents corrupt or inaccessible**
Possible Cause	EEPROM not enabled within BIOS Set-up
Action	Enable EEPROM within BIOS
SYMPTOM	**Incorrect operation of GPIO or inaccessible**
Possible Cause	GPIO not enable within BIOS Set-up
Action	Enable GPIO in BIOS
SYMPTOM	**System crashes during intensive operation or after prolonged use**
Possible Cause	Inadequate cooling allowing CPU/chipset to overheat
Action	Improve heatsink and / or cooling airflow
SYMPTOM	**Solid-state Disk Unreliable**
Possible Cause	Solid-state Disk chip not fully seated, or pin damaged.
Action	Check alignment and seating of chip

MICRON CONNECTORS

POWER CONNECTIONS

POWER SUPPLY INPUT TERMINALS

P18 - Screw Terminals

Terminal	Description
1	$+5V_{STBY}$
2	+5V
3	+5V
4	0V
5	0V
6	PSON#

Note: The terminal $5V_{STBY}$ must be connected to a +5V supply. Link to +5V if no Standby power available.

12V POWER INPUT TERMINALS FOR ADD-ON BOARDS

P26 - Screw Terminals

Terminal	Description
1	-12V
2	+12V

Note: Neither of these supplies are required for operation of the MICRON board, the terminals provide power to other PCBs.

5V OUTPUT CONNECTOR TO FAN

P1 - Connector: Molex 0.1" KK 3-way pin header
Mating Connector: Molex 0.1" KK 3-way plug

Pin	Function
1	0V
2	+5V Output
3	Tacho Sense Input

BATTERY HOLDER

Battery type CR1220 (35mAh standard).

Fit battery with the positive terminal visible on top.

JUMPERS

CMOS CLEAR

J1 Jumper

Link	Operation
1-2	Normal
2-3	Clear CMOS

LCD PANEL SUPPLY VOLTAGE

J2 Jumper

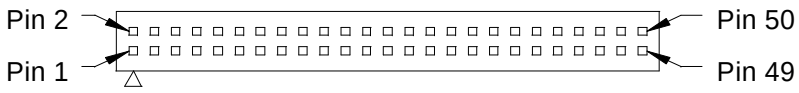
Link	Operation
1-2	3V3
2-3	5V

INPUT/OUTPUT CONNECTORS

COMBINED VGA, KEYBOARD, MOUSE, ETHERNET, USB, GPIO, AUDIO CONNECTOR

P23 - Connector: 50-way 0.1" pitch pin header
Mating Connector: 50-way 0.1" pitch IDC socket

Combination connector P23 may optionally connect to the "MICRON CONNECT" I/O board. A cable is available for this purpose.



View on Connecting Pins

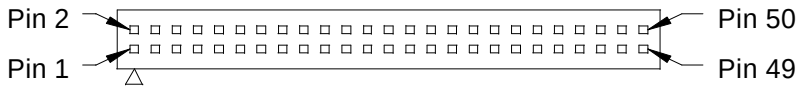
Signal	Pin	Pin	Signal	Function
Digital Ground	1	2	DDC Data	VGA
DDC Clock	3	4	DDC +5V	
Vertical Sync	5	6	Horizontal Sync	
Analogue BLUE	7	8	Analogue Ground	
Analogue GREEN	9	10	Analogue Ground	
Analogue RED	11	12	Analogue Ground	
Link Active LED+	13	14	Link Active LED-	Ethernet
Tx Data+	15	16	Centre-tap Tx Winding	
Tx Data-	17	18	Ground	
Rx Data+	19	20	Centre-tap Rx Winding	
Rx Data-	21	22	100 Mb Operation LED+	
100 Mb Operation LED-	23	24	+5V	Mouse & Keyboard
Keyboard Data	25	26	Keyboard Clock	
Mouse Data	27	28	Mouse Clock	
Ground	29	30	USB0 Data-	USB
+5V	31	32	USB0 Data+	
USB1 Data-	33	34	Ground	
USB1 Data+	35	36	GPIO line 0	General Purpose IO
GPIO line 2	37	38	GPIO line 1	
GPIO line 3	39	40	Ground	
Reset	41	42	Data IN	AC97 Audio
Ground	43	44	Data OUT	
Ground	45	46	Clock	
Ground	47	48	Sync	
KEY	49	50	Audio +5V	

Resettable thermal fuses protect all 5V supplies.

COMBINED SERIAL PORTS 1 & 2, PARALLEL PORT, UTILITIES CONNECTOR

P22 - Connector: 50-way 0.1" pitch pin header
Mating Connector: 50-way 0.1" pitch IDC socket

A cable is available as an option, which separates the functions at this combination connector (P22) to standard connectors (serials and parallel).



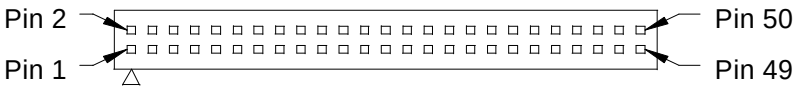
View on Connecting Pins

Signal	Pin	Pin	Signal	Function
Ground	1	2	RI	Serial COM1
DTR	3	4	CTS	
TXD	5	6	RTS	
RXD	7	8	DSR	
DCD	9	10	DCD	Serial COM2
DSR	11	12	RXD	
RTS	13	14	TXD	
CTS	15	16	DTR	
RI	17	18	Ground	
Ground	19	20	D0	Parallel LPT1
D1	21	22	D2	
D3	23	24	D4	
D5	25	26	D6	
D7	27	28	Ground	
Data Strobe#	29	30	Auto Feed#	
Printer Error#	31	32	INIT#	
Select In#	33	34	ACK#	
Ground	35	36	Busy	
PE	37	38	Select	
Ground	39	40	**KEY**	
Speaker -	41	42	Speaker +	Utilities
HD Activity LED Cathode	43	44	HD Activity LED Anode	
Reset Switch (to Ground)	45	46	Ground	
Power Switch (to Ground)	47	48	Ground	
External SMI (to Ground)	49	50	External +3V (to Ground)	

External SMI: External Systems Management Interrupt. Pull to ground to interrupt.

LCD PANEL CONNECTOR

P6 - Connector: 50-way 2mm pitch pin header
Mating Connector: 50-way 2mm pitch IDC or crimp socket



View on Connecting Pins

Signal	Pin	Pin	Signal
Panel Supply – see J2	1	2	Vertical SYNC
Switched 12V	3	4	Ground
Switched Vee – from P5	5	6	Horizontal SYNC
Switched version of Pin1	7	8	Ground
Switched version of Pin1	9	10	Enable Backlight
Shift Clock	11	12	Ground
Line Pulse	13	14	N/C
Display Enable	15	16	Ground
First Line Marker	17	18	Ground
Data D0	19	20	Ground
Data D1	21	22	Data D23
Data D2	23	24	Ground
Data D3	25	26	Data D22
Data D4	27	28	Ground
Data D5	29	30	Data D21
Data D6	31	32	Ground
Data D7	33	34	Data D20
Data D8	35	36	Ground
Data D9	37	38	Data D19
Data D10	39	40	Ground
Data D11	41	42	Data D18
Data D12	43	44	Ground
Data D13	45	46	Data D17
Data D14	47	48	Ground
Data D15	49	50	Data D16

See the document "LCD Connectivity" for details on individual LCD Panel types.

PANEL VEE GENERATOR CONNECTOR

P5 - Connector: 5-way 0.1” pitch right-angled pin header
Mating Connector: 5-way SIL 0.1” socket

Pin	Signal
1	5V
2	**KEY**
3	EN
4	Vee IN
5	0V

The 5V output is NOT protected. Link 3 and 4 to pass the "Enable" signal to the LCD connector.

IRDA INTERFACE

P11 - Connector: 5-way 0.1” pitch right-angled pin header
Mating Connector: 5-way SIL 0.1” socket

Pin	Signal
1	5V
2	**KEY**
3	IR RX
4	0V
5	IR TX

The 5V output is NOT protected.

FLOPPY DISK HEADER

P3 - Connector: 34-way 0.1" pitch header
Mating Connector: 34-way 0.1" pitch IDC socket
Standard Pin Out

PRIMARY IDE HEADER

P2 - Connector: 40-way 0.1" pitch header
Mating Connector: 40-way 0.1" pitch IDC socket
Standard Pin Out.

ATA FLASH DISK SOCKET

IC15 - Connector: 32-pin 0.1" x 0.6" DIL socket
Mating Connector: ATA Flash Disk IC
Standard Pin Out.

REMOTE THERMISTOR FOR TEMPERATURE SENSE

P20 - Connector: 2-way 0.1” pin header
Mating Connector: 2-way 0.1” socket

An external NTC thermistor (10 Kohm at 25ºC, ß= 3988) may be connected here. (Pin 2 is 0V)

SODIMM SOCKET

P9 - Connector: JEDEC standard
Standard Pin Out.

PC/104 CONNECTOR

P8 - Connector: 104-pin PC/104 standard plug/socket
Standard Pin Out.

*PC/104*PLUS *CONNECTOR*

P10 - Connector: 120-pin PC/104*Plus* standard plug
Standard Pin Out.

MICRON I/O CABLE

This cable is available as an optional extra. It breaks out the cable from the Combined Serial, Parallel and Utilities ports to standard connections.

PARALLEL

Connector: 25-way D-type socket
Standard Pin Out.

SERIAL 1

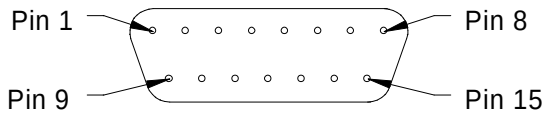
Connector: 9-way D-type plug
Standard Pin Out.

SERIAL 2

Connector: 9-way D-type plug
Standard Pin Out.

UTILITIES

Connector: 15-way D-type plug
Mating Connector: 15-way D-type socket



View on Connecting Pins

Signal	Pin	Pin	Signal
Speaker -	1	9	Speaker +
HD Activity LED Cathode	2	10	HD Activity LED Anode
Reset Switch (to Ground)	3	11	Ground
Power Switch (to Ground)	4	12	Ground
External SMI (to Ground)	5	13	External +3V Battery
N/C	6	14	N/C
N/C	7	15	N/C
N/C	8		

MICRON CONNECT

The MICRON CONNECT board is an optional board producing standard connectors for a number of the input/output functions of the MICRON board. It is generally employed as a development tool prior to application-specific enclosure and interconnecting cable design work. There is no requirement to use the CONNECT board, other than for analogue audio signals. The required signals may be taken from the connector on the MICRON board itself.

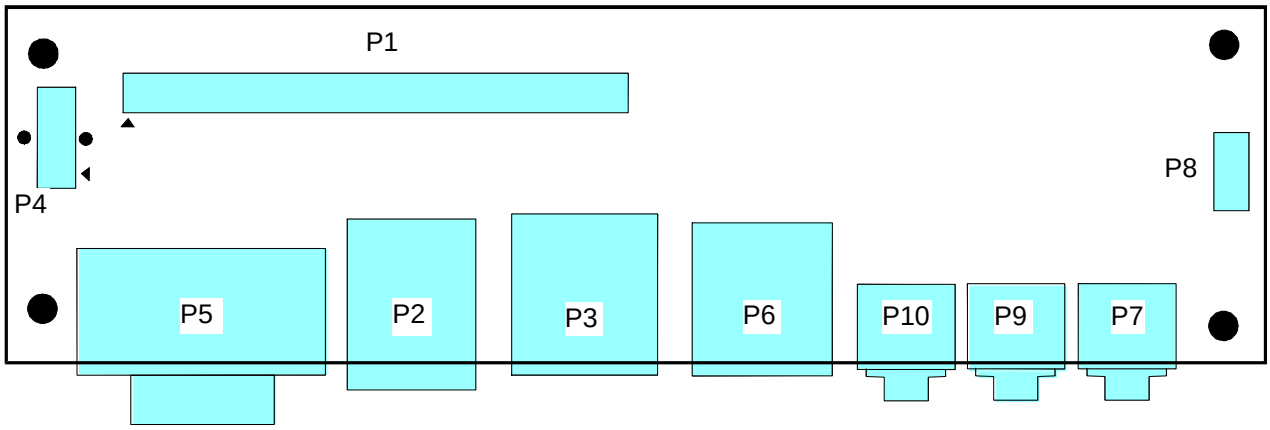


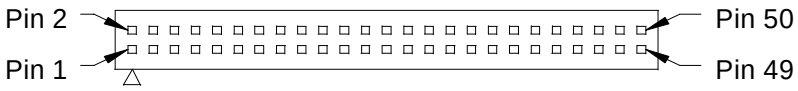
Figure 3. MICRON CONNECT PCB - Top View

Connectors

Ident	Description
P1	Multi-function Connection to MICRON
P2	10/100 Ethernet connector
P3	Keyboard & Mouse connectors
P4	GPIO header with tie-wrap holes
P5	VGA high density 15 pin
P6	Dual USB connector
P7	Audio "Microphone In" Jack-socket
P8	CD Audio In
P9	Audio "Line In" Jack-socket
P10	Audio "Line Out" Jack-socket

MULTI-FUNCTION INTERCONNECT

P1 - Connector: 50-way 0.1" pitch pin header
Mating Connector: 50-way 0.1" pitch IDC socket



View on Connecting Pins

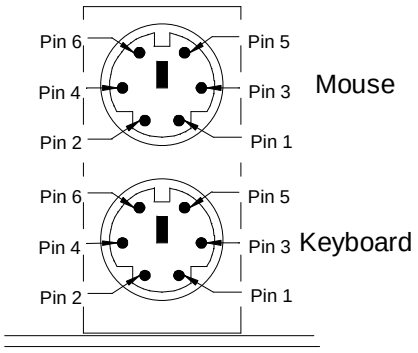
Signal	Pin	Pin	Signal	Function
Digital Ground	1	2	DDC Data	VGA
DDC Clock	3	4	DDC +5V	
Vertical Sync	5	6	Horizontal Sync	
Analogue BLUE	7	8	Analogue Ground	
Analogue GREEN	9	10	Analogue Ground	
Analogue RED	11	12	Analogue Ground	
LED0+	13	14	LED LINK	Ethernet
Tx Data+	15	16	Centre-tap TX Winding	
Tx Data-	17	18	Ground	
Rx Data+	19	20	Centre-tap Rx Winding	
Rx Data-	21	22	LED1+	
LED100	23	24	+5V	Mouse & Keyboard
Keyboard Data	25	26	Keyboard Clock	
Mouse Data	27	28	Mouse Clock	
Ground	29	30	USB0 Data-	USB
+5V	31	32	USB0 Data+	
USB1 Data-	33	34	Ground	
USB1 Data+	35	36	GPIO0	General Purpose IO
GPIO2	37	38	GPIO1	
GPIO3	39	40	Ground	
Reset	41	42	Data IN	AC97 Audio
Ground	43	44	Data OUT	
Ground	45	46	Clock	
Ground	47	48	Sync	
KEY	49	50	Audio +5V	

KEYBOARD & MOUSE

P3 - Connector: PS/2 6-pin mini-DIN socket.
Mating Connector: PS/2 keyboard or mouse connector.

Note that whilst the lower socket includes both mouse and keyboard signals, the signal pin-out is compatible with a standard PS/2 keyboard.

Pin	Lower	Upper
1	Keyboard Data	Mouse Data
2	Mouse Data	N/C
3	Ground	Ground
4	+5V	+5V
5	Keyboard Clock	Mouse Clock
6	Mouse Clock	N/C



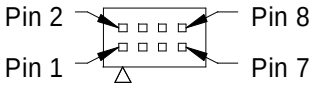
View on Connecting Sockets

Issue 1 Micron Connect had upper and lower sockets reversed

GENERAL PURPOSE I/O

P4 - Connector: 8-way 0.1" pin header
Mating Connector: 8-way 0.1" crimp and shell

Signal	Pin	Pin	Signal
GPIO line 0	1	2	GPIO Ground
GPIO line 1	3	4	GPIO Ground
GPIO line 2	5	6	GPIO Ground
GPIO line 3	7	8	GPIO Ground

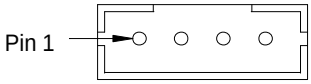


View on Connecting Pins

CD-ROM AUDIO INPUT

P8 - Connector: JST 2mm 4-way boxed pin header B 4B-PH-K/Tactpro WD.03/2
Mating Connector: JST PHR4 & SPH crimps

Pin	Signal
1	CD Right Channel
2	CD Ground
3	CD Left Channel
4	CD Ground



View on Connecting Pins

ETHERNET CONNECTOR

P2 - Connector: RJ-45 8-pin socket.
Mating Connector: RJ-45 8-pin plug.
Standard Pin Out.

VGA CONNECTOR

P5 - Connector: High-density 15-pin D-type socket.
Mating Connector: High-density 15-pin D-type plug.
Standard Pin Out.

DUAL USB CONNECTOR

P6 - Connector: TACT 402-008-001-102
Mating Connectors: Series A USB connector
Standard Pin out.

AUDIO MICROPHONE INPUT

P7 - Connector: 3.5mm Jack-socket
Mating Connector: 3.5mm Jack-plug
Tip is microphone input.

AUDIO LINE INPUT

P9 - Connector: 3.5mm Jack-socket
Mating Connector: 3.5mm Jack-plug
Tip is right channel.

AUDIO LINE OUTPUT

P10 - Connector: 3.5mm Jack-socket
Mating Connector: 3.5mm Jack-plug
Tip is right channel.

STANDARD CONNECTORS

The attached guide is a general reference point for the following standard pin-outs.

Standard Pin Out

AMENDMENT HISTORY

Issue Level	Issue Date	Author	Amendment Details
0.1	13/09/01	TGH	First Draft Issue
1.0	19/10/01	KDL/EGW	Released
1.1	27/02/02	KDL	Up-Issued
1.2	29/04/02	KDL	Up-Issued
1.3	28/11/02	TGH	Micron Connect Iss 2 changes