



Malta™ Developer's Kit - Getting Started

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1 Introduction

This document describes how to get started with the MIPS Malta™ Board and Development Kit.

1.1 Overview of the Malta Development Platform

The Malta platform provides a standard platform for software development with MIPS32® and MIPS64® processors. The platform is composed of two parts: the Malta Motherboard, which holds the CPU-independent parts of the circuitry, and one or more CoreLV or CoreFPGA Core boards, which hold the MIPS CPU plus its System Controller and fast SDRAM memory.

A large number of standard peripheral interfaces are present on the Malta Motherboard, including Ethernet, RS-232 serial ports, USB, IDE/Compact Flash, Floppy disk, and PS/2 keyboard and mouse. These are provided to allow the quickest possible up-and-running time, while 4 PCI slots and the Audio/Modem Riser connector allow for attachment of your own specific devices.

To show the operation of the board as a CPU system, the package also includes the MIPS YAMON™ ROM Monitor, which allows you to communicate with and control the board. All source code for this monitor is included in the package.

The layout of the Malta board is shown in [Figure 1](#) on [page 9](#).

1.2 Package Contents

The Malta Development Kit contains the following items:

- This document
- Malta Board
- Core Card or CPU Card (type depends on exact configuration ordered)
- 32 MByte (or larger) 3.3V unbuffered PC100 SDRAM module
- Serial cable for connection to host PC or workstation
- Parallel male-male conversion Parallel cable for parallel port download to Flash
- Developers Kit CD-ROM

1.3 Additional Required Hardware (Not Supplied)

In addition to the basic Malta hardware, you will need:

- Suitable standard ATX cabinet with power supply. For a power supply with standby capabilities a minimum current of 720 mA is required (1A/1.5A peak recommended) for the 5V standby voltage.

1.4 Optional Hardware

The following items may also be useful, depending on your application:

- Ethernet cable
- USB cable
- PS2 Keyboard / mouse
- IDE cable (40-pin ribbon cable)
- IDE hard disk
- Type I or II CompactFlash module (supporting True IDE Mode)
- Floppy cable (34-pin ribbon cable, 7 wires twisted, PC-style)
- Floppy drive

For in-depth debugging, the following are useful:

- HP High-Density Adapter Cables for interface to on-board logic analyzer connectors
- PCI probe board if you want to be able to monitor activity on the internal PCI bus (e.g., FuturePlus FS2000)
- Standard Parallel Port Download cable for extending the parallel male-male conversion cable
- Standard 10 pin header to DB9 converter cable for tty2

If you want to change the SDRAM module for any reason, be sure to check the specifications in the User's Manual for your Core card, including the CAS latency.

1.5 Recommended Software Tools

A terminal program for communicating with the board via its serial ports will be required. Any workstation or PC program should work, although performance can vary. MIPS recommends "Procomm Plus32" from Datastorm Technologies for use on a PC.

MIPS works with the leading embedded software and toolchain vendors for support of the Malta board. Refer to the "Software / Tools" section of the MIPS website (<http://www.mips.com>) for more information.

Upgrades to the YAMON monitor can also be found at this location.

2 Getting Started

After you have unpacked the kit, check to make sure that you have all the items listed in [Section 1.2, "Package Contents"](#) on page 3. If any items are missing, contact MIPS Technologies.

2.1 Fitting the Core Card

If the Core card has not been mounted on the Malta board, begin by fitting it on the 2, 200-way connectors (J3-J4). It is aligned and supported with the help of a mounting pillar on each corner. One of the corner mounting pillars is off-set to prevent incorrect insertion.

- Check that any socketed crystals on the Core card are securely in their sockets.
- Fit the SDRAM module provided in the DIMM socket on the Core card.
- Mount the Core card. Avoid bending the Malta board.
- Refer to the appropriate Core Card User's Manual to check that the jumper settings are correct.

2.2 Jumper Settings

By default, none of the jumpers on the Malta board are fitted.

If a Compact Flash module is used as "Master", remember to fit JP3 (2 pins), which sets the Compact Flash module as Master IDE drive on the secondary IDE bus.

2.3 DIP Switch Settings

Set the DIP switches in the positions shown in [Table 1](#).

A switch is considered ON if any of the following are true:

- It is in the position marked "ON" on the switch body.
- It is in the position marked "CLOSED" or not in the "OPEN" position as marked on the switch body.

Table 1 Settings of DIP Switches

Ref	Setting	Notes
S2	All OFF	These switches have no defined function and may be used for any purpose by the user.
S5	All OFF	Refer to the Malta User's Manual for the functionality of these switches. Used to set the endianness of the board.

2.4 Wiring It Up

- Connect the power supply (not included) to J8 on the board. Note that some ATX power supplies are unable to maintain power when the load is very weak. If the “3V3” or “5V” LED turns off without cause or never turns on, check the power supply. A dummy load can be added to 5V to solve the problem, but the best solution is to get a good power supply.
- Connect the included serial cable between the left (tty0) connector of J6 and the host. The cable has the following pin wiring:
 - pin 2 to pin 3 (RXD to TXD)
 - pin 3 to pin 2 (TXD to RXD)
 - pin 4 to pin 6 (DTR to DSR)
 - pin 5 to pin 5 (GND to GND)
 - pin 6 to pin 4 (DSR to DTR)
 - pin 7 to pin 8 (RTS to CTS)
 - pin 8 to pin 7 (CTS to RTS)
- Configure the serial port and/or the terminal program on the host. The supplied PROM monitor, YAMON, by default signs on using 38.4 Kbaud, 8 bits/char, no parity, 1 stop bit, and RTS/CTS hardware flow control.

2.5 Power-up Sequence

When you connect the power supply and switch it on, the board is powered up. Check that the green “ATX ON”, “3V3”, “5V”, and “STBY” LEDs are on, indicating good power.

NOTE: With some ATX supplies, Malta draws so little current that the supply is not stable. This is technically a deviation from the ATX spec.

NOTE: The board is brought into “stand-by” mode by pressing the switch marked “ON/NMI” (S4) for more than four seconds. The “ATX ON” LED is lit when in “stand-by” mode. Press “ON/NMI” to bring up the board again.

The green “FPGA” LED should be on, indicating that the board’s FPGA has booted.

The red “RST” LED should be off. If it is lit, it indicates that something is holding the board in reset.

When the CPU initially boots, YAMON signs-on using the tty0 serial port (the left one) with information about the board’s configuration, for example, board revision, SDRAM size, etc.

You should now arrive at YAMON’s prompt line. Simultaneously, you should see the word “YAMON” on the ASCII LED display. If you do not see this, check the YAMON User’s Manual for the meaning of the displayed messages.

Yamon’s `help` command lists the available commands, and `help <command name>` gives more detailed information about a specific command.

The board's default mode is little endian. You can change to big-endian using S5-2,

3 Developer's Kit CD-ROM

Malta is delivered with a CD-ROM that contains source code and documentation. This may be used on both UNIX and DOS platforms, though only UNIX directory conventions (“/”) are used in this document. Note that the CD-ROM also includes files for other boards.

3.1 Installing the Developer's Kit CD-ROM

Use the following steps to install the Developer's Kit CD-ROM contents on your workstation/PC:

- Mount the CD-ROM in the CD-ROM drive.
- Copy the entire CD-ROM contents to a suitable location in your file system.

3.2 Accessing CD-ROM Documentation

Using a Web browser, open the `index.html` file in the `www` directory. This HTML file contains links to all the document files.

The root directory of the Developer's Kit CD-ROM contains the directories and files listed in [Table 2](#).

Table 2 Developer's Kit CD-ROM Root Directories

Directory/File	Contents
<code>docs/</code>	All documentation in PDF format.
<code>yamon/</code>	<ul style="list-style-type: none"> • Compressed archive of all source files for the YAMON monitor. See the YAMON Reference Manual for details. • Binary version for downloading into Flash, should you accidentally erase it. See the YAMON User's Manual for details on how to do this. • Sample application for the Malta board, which can be built and run from YAMON. See the included README file. Note that no tools are supplied.
<code>linux/</code>	This directory contains both a complete kernel source tree plus pre-compiled kernel and binary “Userland” to allow you to boot Linux on the Malta board. Refer to the README file for instructions on how to install and run Linux. Direct support for this Linux installation is not available from MIPS Technologies Inc. - any problems should be addressed in the usual manner to the Linux open source community mailing lists etc.
<code>www/</code>	Index file to all documentation. Use the <code>index.html</code> file in this directory as a starting point.
<code>rel_note.txt</code>	Release and revision information for the CD-ROM.

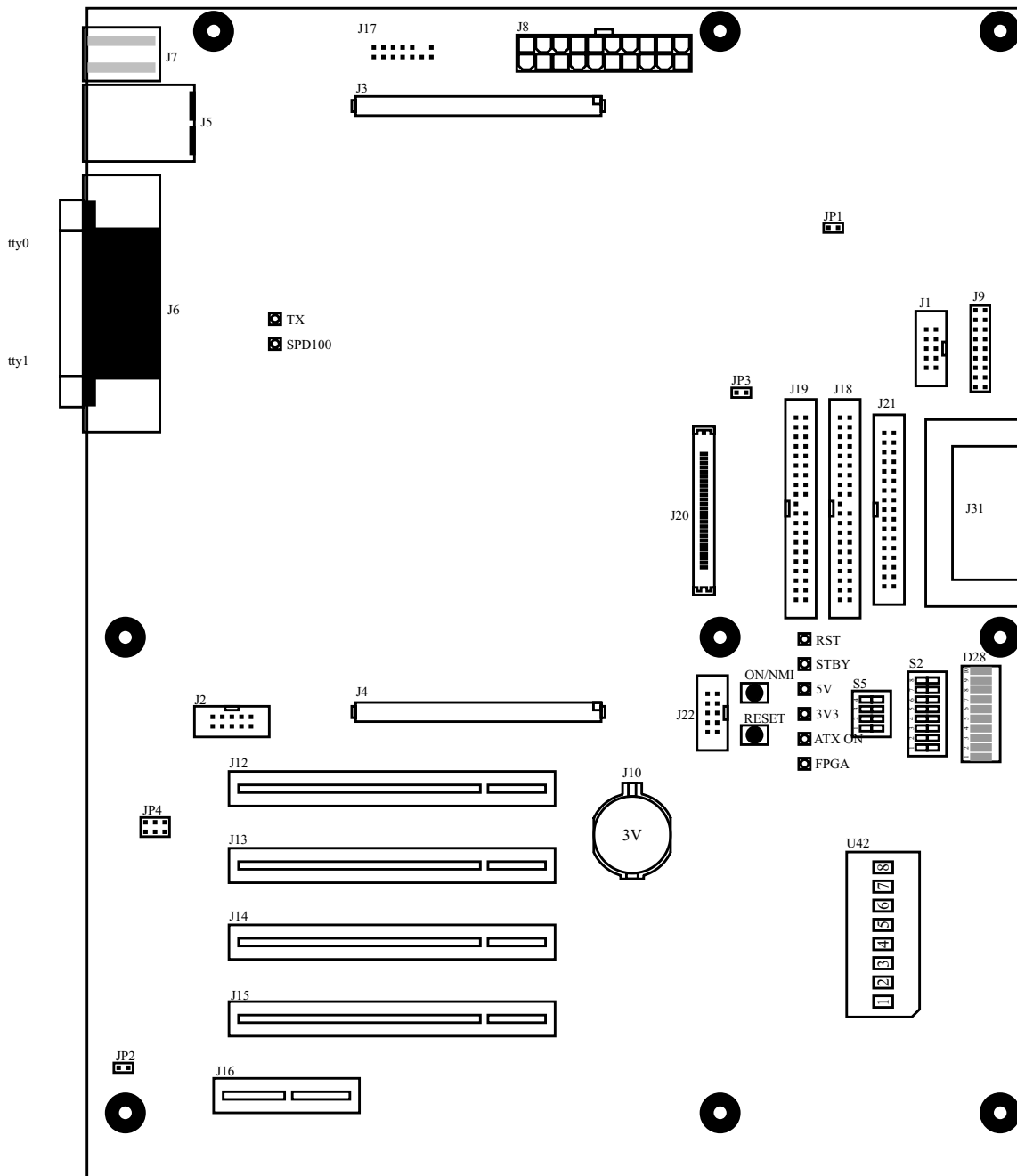
The following documents are found in the `docs` directory - but note that these are only as up-to-date as the CD-ROM itself. Refer to the Support pages on the MIPS Web site (<http://www.mips.com>) for updates. [Table 3](#)

Table 3 Documentation on CD-ROM

Document title	Document number	Description
Malta™ Getting Started	MD00051	This document
Malta™ User's Manual	MD00048	User's Manual for the Malta board
Malta™ Schematics	MD00049	Schematics of the Malta board
Malta™ Board Errata / Functional Change Sheet	MD00050	Errata for Malta
CoreLV™ User's Manual	MD00007	User's Manual for the CoreLV board
CoreLV™ Schematics	MD00023	Schematics of the CoreLV board
CoreLV™ Board Errata / Functional Change Sheet	MD00034	Errata for the CoreLV board
CPU Card (with QED RM5261 Processor) User's Manual	MD00006	User's Manual for the RM5261 CPU Card
CPU Card (with QED RM5261 Processor) Schematics	MD00022	Schematics of the RM5261 CPU Card
CPU Card (with QED RM5261 Processor) Errata / Functional Change Sheet	MD00038	Errata for the RM5261 CPU Card
CoreLV 20Kc™ User's Manual	MD00057	User's Manual for the 20Kc CoreLV board
CoreLV 20Kc™ Schematics	MD00066	Schematics for the 20Kc CoreLV board
CoreLV 20Kc™ Errata / Functional Change Sheet	MD00219	Errata for the 20Kc CoreLV board
Malta™ Developer's Kit - Getting Started with Windows(R) CE.NET™	MD00141	Basic startup instructions for running Windows CE on Malta
YAMON™ User's Manual	MD00008	User documentation for YAMON monitor
YAMON™ Reference Manual	MD00009	Implementation details for YAMON monitor. This document is intended for the customer wishing to modify and recompile the YAMON monitor.
YAMON™ Errata Sheet	MD00032	Errata for YAMON monitor

For detailed documentation on MIPS32™ and MIPS64™ CPU cores, contact MIPS Technologies.

Figure 1 Malta Board Layout



4 Support

MIPS Technologies provides support for the Malta product, **except** the Linux installation, through the following channels:

- Developer pages at <http://www.mips.com>. This should be your first call???, in looking for the answer to any problems or queries you may have. There may be updated versions of the documents available on the site.
- E-mail hotline. Send an E-mail with your name and company details, plus full details of the hardware and software you have (include revision numbers, serial numbers, and as much other information as possible) to: support@mips.com. Remember to include all the details about the problem you are having, such as status of LEDs, the ASCII LED display, and what has been output on the serial port (tty0).

5 Regulatory and Integration Information

5.1 EMC

Malta has been designed with EMC requirements in mind but is not tested to any national standards. The user of Malta is solely responsible for the EMC testing and approval of any derived product.

Under the European EMC Directive (89/336/EEC) and harmonized standards adopted under this Directive for information technology equipment (ITE), Malta is designed and intended to be marketed as an ITE component or module and not as an ITE apparatus or "printing wiring board assembly" subject to EMC technical standards and the Declaration of Conformity procedures. The user should be fully aware that any product designed using Malta for sale within the European Economic Area (EEA) is solely responsible for meeting all current EMC regulations.

Under the Part 15 Rules of the Federal Communications Commission (FCC), Malta is designed and intended to be marketed as a subassembly and not as part of a digital device system subject to FCC technical standards. Any user product marketed with the Malta subassembly may be subject to FCC technical standards for which the user alone is responsible.

Under the Industry Canada (IC) standards for digital apparatus set forth in ICES-003, Issue 3, Malta is designed and intended to be marketed as a digital device subassembly and not as part of a system subject to IC technical standards. Any product designed and marketed using the Malta subassembly may be subject to IC technical standards for which the user alone is responsible.

Warning

This board generates, uses, and can radiate radio frequency energy and, if not installed properly, may cause interference to radio communications. It has not been tested for compliance with the limits for Class A digital devices pursuant to FCC, European or Canadian standards, which are designed to provide reasonable protection against such interference. Operation of this product in a residential area is likely to cause interference, in which case the user, at his/her own expense, will be required to correct the interference.

5.2 Safety

Malta is designed to comply with the following safety standards when correctly installed in a chassis that is compatible with such standards:

- IEC 950 2nd Edition, including Amendments 1, 2, 3 and 4
- EN 60950 including Amendments 1, 2, 3 and 4 including National Differences
- UL 1950 Third Edition
- CSA C22.2, Third Edition
-

6 Installation Safety Instructions

Caution

Follow these guidelines to meet safety requirements when installing Malta.

Read and adhere to all of these instructions and the instructions supplied with the chassis and power supply. If the instructions for these components are inconsistent with these instructions contact the vendor's technical support to find out how you can ensure that your system meets safety requirements. If you do not follow these instructions and the instructions provided by the chassis and power supply vendors, you increase the safety risk and possibility of non-compliance with regional laws and workplace safety standards.

6.1 Ensure Chassis and Accessory

Make sure that the chassis, power supply, added subassembly and internal- or external wiring, are certified or otherwise in compliance for the region(s) where the end-product will be used. Marks on the product are proof of compliance and are as follows:

6.1.1 Europe

The CE marking signifies compliance with all relevant European requirements. If the chassis and power supply does not bear the CE marking, obtain a vendor's Declaration of Conformity to the appropriate standards required by European Low Voltage Directive (73/23/EEC). Other directives, such as the Machinery Directive (93/44/EEC) and Radio and Telecommunications Terminal Equipment Directive (99/5/EC), might also apply depending on the type of product. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8-A current limiting circuit or a maximum 5A fuse or positive temperature coefficient (PTC) resistor.

6.1.2 United States

A certification or listing mark by a Nationally Recognized Testing Laboratory (NRTL) such as UL, CSA or ETL signifies compliance with safety requirements. External wiring must be NRTL Listed or Recognized as suitable for the intended use. Internal wiring must be NRTL Listed or Recognized and rated for applicable voltages and temperatures.

6.1.3 Canada

A nationally recognized certification mark such as CSA or cUL signifies compliance with Canadian safety requirements. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8-A current limiting circuit or a maximum 5A fuse or positive temperature coefficient (PTC) resistor.

7 References

1. MIPS Malta™ User's Manual
MIPS document: MD00048
2. MIPS Malta™ Schematics
MIPS Document: MD00049
3. MIPS YAMON™ User's Manual
MIPS Document: MD00008
4. MIPS YAMON™ Reference Manual
MIPS Document: MD00009
5. MIPS CoreFPGA™ 4 User's Manual
MIPS Document: MD00569

8 Revision History

Change bars (vertical lines) in the margins of this document indicate significant changes in the document since its last release. Change bars are removed for changes that are more than one revision old.

Revision	Date	Description
01.00	2000/08/30	Initial release
01.01	2000/11/15	Added J31 to layout diagram
01.02	2001/01/17	Layout updated. Power Supply notes added.
01.03	2001/01/25	Layout changed again.
01.04	2001/08/03	Added more precise description of tty0 location. Removed references to Atlas documents. New legal text
01.05	2002/01/30	Added information on software tools
01.06	2002/11/19	Added information on extra documentation on CDROM.
01.07	2007/07/12	Updated document with Template nB1.03.

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