Table of Contents

1 Introduction

1.1 PicoJTAG Overview

Micromint USA's picoJTAG is a low-cost debugger for ARM microcontrollers. It combines JTAG debugging with a RS-232 Virtual COM port allowing software developers to connect a debugger and serial port to a computer with a single USB cable. The picoJTAG can also provide power to targets that are capable of accepting power on the 20-pin JTAG connector. Drivers are provided for IAR, Keil and GNU toolchains supporting ARM Cortex M targets. Third party FDTI debugger drivers can be used to support other targets.

1.2 PicoJTAG Features

- USB2.0 (high-speed, 480Mbits/sec)
- RS-232 Virtual COM Port
- Based on the FT2232H
- Plugs directly into Arm's standard 20-pin JTAG connector
- Capable of supplying power to targets JTAG connector

NEXT: Getting Started

PREVIOUS: Table of Contents

2 Getting Started

2.1 IDE Support

Micromint's picoJTAG software includes plugins and drivers to integrate with popular IDEs used for ARM software development. Please download the software from the Accessories Documentation Wiki.

- IAR Embedded Workbench for ARM (ewarm)
- Keil MDK
- GNU Toolchain (gcc) for ARM - using OpenOCD

The IAR and Keil plugins were developed by CooCox. The GCC driver comes from the OpenOCD Project. You can also use some other drivers that support FTDI debuggers. To install the drivers execute the autorun utility on the CD.

Figure 2.1: picoJTAG Disk Main Menu

2.2 IAR Plugin

After installing the IAR plugin, follow these steps to configure your project to use it.

1. On the IAR EWARM menu go to "Project", "Options", "Debugger" and on the "Setup" tab select the RDI driver. If your target requires an IAR macro file for initialization, specify it on the "Setup macro" area. The examples directory of the CD includes an example initialization macro for LPC1769 processors.

Figure 2.2: IAR Debugger Setup Options

2. Go to the "Download" tab and select the "Use flash loader(s)" option so code is loaded to flash at the start of the debugging session. To guarantee the integrity of the download your should also select the "Verify download" option.

Figure 2.3: IAR Debugger Download Options

3. Go to the "RDI" section of the "Debugger" area and specify the location where you installed the RDI driver.

Figure 2.4: IAR Debugger RDI Options
4. On the IAR EWARM menu go to "RDI", "Configure" and select the device target and options.

Figure 2.5: IAR RDI Configuration

2.3 Keil MDK Plugin

After installing the Keil plugin, follow these steps to configure your project to use it.

1. On the Keil uVision IDE menu go to "Project", "Options" and on the "Debug" tab select the CooCox Debugger.

Figure 2.6: Keil Debugger Setup

2. Click on the "Settings" button next to the debugger listbox and select the picoJTAG adapter.

Figure 2.7: Keil Debugger Configuration

2.4 GNU Toolchain using OpenOCD

To use the picoJTAG with the GDB debugger you need to copy the OpenOCD files to your hard disk and start the OpenOCD service. OpenOCD requires a processor configuration file. The examples directory of the CD includes examples for TI LM3S and NXP LPC1769 processors.

Figure 2.8: Loading OpenOCD
The GDB debugger can be used from the command line or from the Eclipse IDE.

2.5 Flash Programmer

CooCox CoFlash is a stand-alone Cortex M Flash Programming software for PCs running Microsoft Windows. It can be downloaded from the following website: http://www.coocox.org/CoFlash_Programmer.htm

Follow these steps to program a Cortex M microcontroller using CoFlash and the picoJTAG:

- 1. Open the CoFlash programmer

Figure 2.9: Flash Programmer

- 2. Select picoJTAG as the Adpater
- 3. Select the microcontroller being used
- 4. Select the Command tab
- 5. Browse for the binary or elf file
- 6. Verify that the sector offset and sectors are properly selected. See below figures for further details

Figure 2.10: CoFlash Programmer set-up for Eagle SBC with bootloader

Figure 2.11: CoFlash Programmer set-up for Eagle SBC without bootlader

Figure 2.2: CoFlash Programmer set-up for Lincoln SBC

- 7. Click on the Program button

NEXT: Connectors and Jumpers

PREVIOUS: Introduction

3 Connectors and Jumpers

The following image shows where the connectors and jumpers are located on the picoJTAG.

3.1 Power and USB Connector

The picoJTAG is powered from the USB port of a computer through the J2 micro USB connector. The typical current draw of the picoJTAG is 85 mA.

3.2 JTAG Connector

The JTAG connector (J1) plugs directly into a standard 20-pin ARM JTAG connector. Some target boards allow power on pin 19 of the JTAG connector. Placing a jumper on JP1 will apply +5V from the computers USB port to pin 19 of the JTAG connector. Please be sure that the target board does not draw more than 400 mA. Figure 3.1 shows the pin out for the JTAG connector and figure 3.2 shows the pin out for JP1.

Figure 3.1: JTAG connector pin out

Figure 3.2: JP1 pin out

3.3 Virtual COM Port (COM1)

The second channel of the FT2223H is configured as a virtual COM port and is level shifted to RS-232 levels. COM1 can be accessed through a 2x5 pin berg header. Please see figure 3.3 for the pin out of COM1 (J3). The picoJTAG's COM1 supports software handshaking (XON/XOFF) and is considered to be Data Communication Equipment(DCE). To communicate to Data Terminal Equipment (DTE) a straight through cable is needed. To simplify interfacing to devices using hardware handshaking, a loopback is implemented on the modem control signals, from RTS to CTS and from DTR to CD and DSR. Note that the loopbacks do not provide flow control so software handshaking should be used when proper flow control is desired.

Figure 3.3: COM1 connector pin out

NEXT: Mechanical and Electrical Characteristics

PREVIOUS: Getting Started

4 Mechanical and Electrical Characteristics

4.1 Absolute Maximum Ratings

Operating Temperature		**Maximum Voltage/Current**	
Commercial	0ºC to +70ºC	Voltage on J2	+5.5 VDC Regulated
Storage Temperature	-50ºC to +125ºC	Voltage out J1 pin 19	+5V VDC Regulated
		Current available at J1 pin 19	400 mA

4.2 Mechanical Dimensions

DIM	Inches	Millimeters	DIM	Inches	Millimeters	DIM	Inches	Millimeters
A	1.3	33.02	**B**	0.65	16.51	**C**	1.5	38.1
D	0.355	9.02	**E**	0.315	8.0	**F**	0.679	17.25

picoJTAG Mechanical Dimensions

NEXT: References

PREVIOUS: Connectors and Jumpers

5 References

This section outlines material that may be useful for further reading.

5.1 Documents

1149.1-2001 - IEEE Standard Test Access Port and Boundary Scan Architecture
http://standards.ieee.org/findstds/standard/1149.1-2001.html
This specification describes circuitry that may be built into an integrated circuit to assist in the test, maintenance, and support of assembled printed circuit boards. An interface and instruction set are defined to assist with testing of assembled printed circuit boards.

5.2 Useful Web Links

Open On-Chip Debugger
http://openocd.berlios.de/web/
Free and open software on-chip debugging, in-system programming and boundary-scan testing.

PREVIOUS: Mechanical and Electrical Characteristics