S O C
M A C H I N E S

P1 Development Kit Quick Start Guide
Release Notes Version: 1.12
For PCB Revision 1.0b

Thank you for purchasing the P1 Development Kit V1.12. Before you begin using the P1 read the following startup procedure and cautions.

The P1 is a dual processor embedded DSP for video processing. The P1 has two processors - a 400MHz Blackfin and 16MHz AVR - each processor it's own RS-232 serial port and each processor comes pre-loaded with its own Boot Monitor.   Complete source code is included for both boot monitors. The Blackfin boot monitor supports the download of Intel Hex files created by the Analog Devices elfloader.exe utility. The AVR is programmed via the included 10pin ISP cable. The included ISP610 adapter converts the 6pin P1 AVR ISP programming port to a 10pin ISP port. The included JTAG814 adapter converts the P1 8pin JTAG port to an Analog Devices compatible 14pin JTAG port. The Blackfin processor is an ADSP-BF532 Rev 0.3 silicon part that boots from Atmel SPI Flash devices – the P1 comes with one 512Kx8 Flash device installed.

The P1 Boot Monitors are under upgraded regularly – check the SOC Machines web site for new software updates.

WARNING:
1. **Do not attach or detach the programming cable while the unit is powered – always remove power from the unit first. Remove the programming cable before shutting the PC off or rebooting the PC – leaving the cable attached may result in erasure of the AVR Flash memory.**
2. **The P1 requires regulated DC between 4.2 to 6VDC – do not exceed this range – damage to the onboard LDO regulator may result. Many low cost wall mount DC power adapters exceed their rated output under light load.**
3. **The Blackfin and AVR processors share common signals. Carefully review the schematics and documentation before changing any of these signals in software.**

Revision 0.87/0.65 Boot Monitor
The CD includes complete source code for the AVR and Blackfin boot monitors. The AVR Boot Monitor was developed using ImageCraft ICCAVR Version 7.02 and is available as a time limited free trail from the ImageCraft web site. The Blackfin Boot Monitor was developed using Analog Devices VisualDSP++ V3.5. Analog Devices provides a free 90day VisualDSP++ V4.0 evaluation license. Project files and complete source code is included for both processors and development environments. The Project files allow you to rapidly load and compile the boot applications.

Hardware Setup

The Blackfin serial port (J2) is set to 115,200 baud, 8 data bits, one stop bit and no parity with XON/XOFF flow control enabled. The AVR serial port (J1) is set to 38,400 baud, 8 data bits, one stop bit, no parity and no flow control.

1. Remove the P1 from the anti-static bag and place on a non-conducting surface. The P1 is pre-loaded with a boot monitor for each processor. For the moment leave the ISP-6 programming adapter unattached. Connect a DC power source between 5-6VDC - the P1 has a reverse polarity protection diode. The power supply must not exceed 6.5VDC or damage to the LDO regulator may occur – the power plug is center pin positive.
2. The P1 requires two custom serial cables (not supplied). The AVR serial port connector (J2) is located next to the DC power jack. The Blackfin serial port connector is located next to the 25pin AVR I/O port connector.
3. Start Hyperterminal (or equivalent program), set the baud rate 38,400 for the AVR and 115,200 with XON/XOFF flow enabled for the Blackfin.
4. Plug in DC power. The unit should power-up with the RED and GREEN leds flashing twice then the GREEN Led flashing continuously. Both processors output a sign-on message on each serial channel and then wait for commands.
5. The AVR boots from internal Flash. The AVR sets the Blackfin boot mode to 3 (see Analog Devices Engineer-to-Engineer Note 240) and resets the processor. The P1 boots from external SPI Flash.
6. The P1 boot monitor includes functions for set/change memory, downloading and uploading IntelHex32 files and exercising various daughter cards.
7. The AVR boot monitor provides similar functions.

Software Setup

P1 Software Development tools are available from several sources. Open source C compilers are available for both processors. Professional software development tools are available from ImageCraft and Analog Devices (both firms offer free trial periods).   The Blackfin and AVR boot monitors were developed using VisualDSP++ 3.5 and ICCAVR 7.02 respectively – project files for both environments are included on the CD. If you are new to Blackfin programming you should download the VisualDSP++ V4.0 Windows IDE tools and try recompiling the P1 Boot Monitor source code using the included project file. VisualDSP is a powerful IDE that greatly simplifies Blackfin development. The Blackfin is a powerful and sophisticated processor - the Blackfin Boot Monitor configures most of the Blackfin control registers and sets up the on chip peripherals for general use.
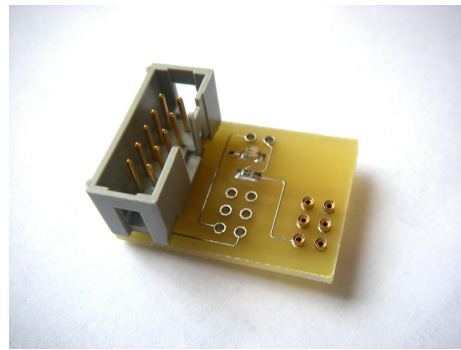
Re-Programming P1 Flash

The P1 has two flash – 16K internal AVR flash and 512Kx8 external SPI flash. The Blackfin boots from SPI flash so to change the Blackfin Boot Monitor the external SPI flash must be reprogrammed. AVR Flash is reprogrammed using the parallel port ISP10+ISP610 programming adapters .   SPI Flash ca be re-programmed either by the Blackfin via the serial port or AVR via the AVR serial port. Hex files for the AVR and Blackfin Boot Monitors is included on the CD (AVR – P1_Monitor.hex, Blackfin - P1_ldr.hex). If you accidentally erase the SPI Flash the AVR can be used to reprogram it.

AVR Flash Programming

To program the AVR Flash remove power from the P1, attach the ISP10 Programming Adapter to the ISP610 adapter and then connect the ISP610 to the P1 connector (J10 – below DC Power Jack) as shown in the picture and apply power.   Do not connect the ISP10+ISP610 to the P1 while the P1 is powered – the P1 maybe damaged.
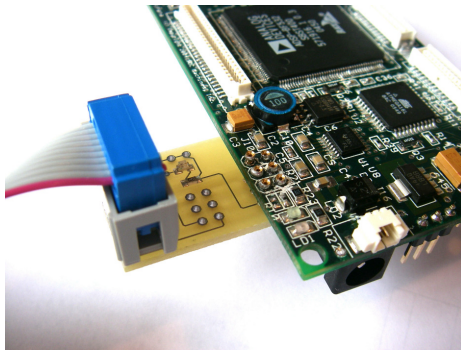
ISP10 Connector and ISP610   ISP610 Adapter

Using PonyProg2000, ImageCraft AVR7 IDE or isprog.exe download the new program to the AVR Flash. Note that the AVR controls the Blackfin boot process – this process must be preserved by new AVR programs if the Blackfin is to boot properly.
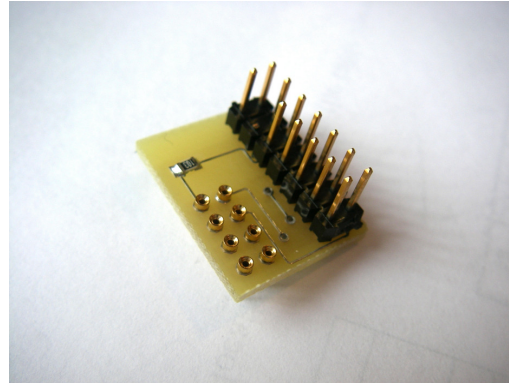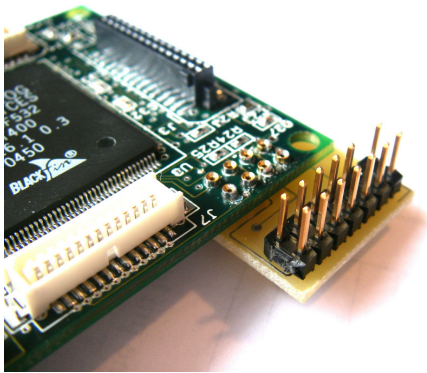
Blackfin Flash Programming

Blackfin SPI Flash can be programmed either by the Blackfin processor or by the AVR processor using each processors serial port.

The Blackfin programs SPI Flash using a two step process - download a new program to SDRAM via the Blackfin serial port then move the program image to Serial Flash using the "M" (MOVE) command. The Blackfin Boot Monitor interprets both IntelHex16 and IntelHex32 files directly.

Alternatively the SPI flash can be programmed via the AVR serial port. The AVR Boot Monitor programs the SPI flash by converting IntelHex32 files to Atmel Serial Flash programming commands. Use the included utility sfprog.exe to manage the Intel file download process. The AVR can be used to program blank or accidentally erased SPI flash if the Blackfin does not boot properly.

Included with the P1 development kit is a JTAG814 adapter. The JTAG814 converts the P1 Blackfin 8pin JTAG port to an Analog Devices compatible 14pin JTAG port. Using the JTAG10 parallel port adapter (not included) or a similar JTAG adapter GNU tools or a VisualDSP emulator it is possible to load Blackfin programs directly into Blackfin memory independent of the SPI flash. The JTAG814 adapter and how it is attached to the P1 is shown on the next page.

Programming Caution
The AVR and Blackfin processors are both connected to the two Atmel SPI Serial Flash devices using shared MOSI/MISO/SCK lines. To access Serial Flash either the Blackfin or AVR acts as a SPI Master – the other processor must release the SPI lines at this time. During a Mode 3 boot the Blackfin becomes SPI Master and attempts to boot from the SPI Flash. The current version of the Blackfin Boot Monitor leaves the Blackfin as SPI Master following the boot. For the AVR to access SPI Flash it resets the Blackfin which forces the Blackfin to release the SPI lines. In a future release of the Boot Monitors a protocol will resolve access to the SPI Flash during run time – for the moment the Blackfin must be reset– once the AVR is finished accessing the SPI Flash it restarts the Blackfin using Boot Mode 3.

Limited Warranty
The P1 is warranted against defects in materials and workmanship for a period of one year from the date of purchase from SOC Machines, or from an authorized dealer. The P1 is sensitive to static discharge – please be careful and try not to blow it up.

FCC Part 15Statement
NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.