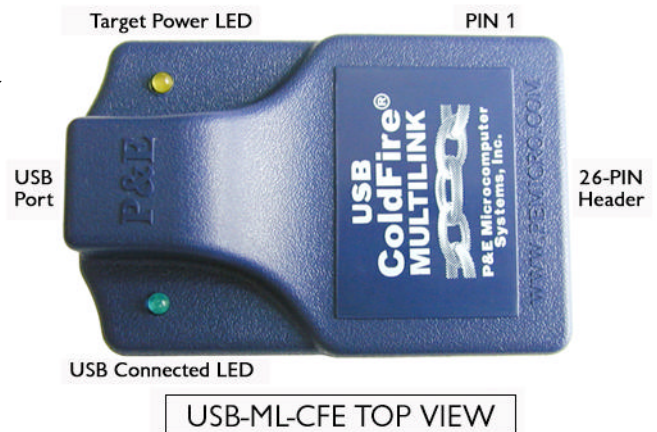


USB-ML-CFE, ColdFire® Multilink Rev C

Technical Summary

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1. Introduction
2. Usage Of The ColdFire Multilink Interface
3. Installation On Windows XP/2000/2003/Vista
4. Computers Running Windows 98SE
5. Using A USB Hub
6. Connecting To The Target
7. Startup Reset Sequence
8. Interface Libraries
9. Firmware Updates
10. Clocked/Asynchronous Jumper



1.0 Introduction

P&E's USB COLDFIRE MULTILINK Interface provides access to the Background Debug Mode (BDM) on Freescale ColdFire processors. It is the hardware interface between the USB port on a Windows 98SE, Windows 2000, Windows XP, Windows 2003, or Windows Vista PC and the standard 26-pin "Berg" debug connector on the target. By using the USB ColdFire Multilink, the user can take advantage of the background debug mode to halt normal processor execution and use a PC to control the processor. The user can then directly control the target's execution, read/write registers and memory values, debug code on the processor, and program internal or external FLASH memory devices. The pin-out of the connector as specified by Freescale is shown below. *Please note that you may choose to have a signal on Pin 25, although P&E does not (P&E derives power from Pin 9).

NC	1	**	2	BKPT
GND	3	**	4	DSCLK
GND	5	**	6	NC
RESET	7	**	8	DSI
VCC	9	**	10	DSO
GND	11	**	12	PST3
PST2	13	**	14	PST1
PST0	15	**	16	DDATA3
DDATA2	17	**	18	DDATA1
DDATA0	19	**	20	GND
NC	21	**	22	NC
GND	23	**	24	CLK
NC*	25	**	26	TEA



2.0 Usage Of The USB ColdFire Multilink Interface

The USB COLDFIRE MULTILINK can communicate with a ColdFire processor.

The Multilink interface will work with targets whose processor power supply is in the range of 1.8V to 5.25V. The Multilink interface derives its power from the USB port and as such draws less than 5mA from the target.

The USB ColdFire Multilink has a female Type B USB connector. Use a Type A to Type B USB extension cable to connect the interface to the PC.

The USB ColdFire Multilink is a high-power USB device. If a USB HUB is used, it must be a self-powered hub (i.e., with a power supply). By default, the USB protocol used is 2.0.

There are two LEDs located on top of the USB ColdFire Multilink interface. The Blue LED indicates that the Multilink interface is powered and running. The Yellow LED indicates that target power has been detected.

3.0 Driver Installation On Windows XP/2000/2003/Vista

Before connecting the USB ColdFire Multilink to the PC, the appropriate drivers need to be installed on the PC. The drivers are automatically installed when installing any of P&E's ColdFire development packages built after June 1, 2005. A copy of the driver installation program may also be downloaded from the "downloads" section of P&E's online "Support Center" located at <http://www.pemicro.com>.

When the cable is plugged in, the operating system should indicate that it has found a driver for the attached "P&E USB Device." Follow the instructions in the "Found New Hardware Wizard" dialog to have Windows automatically install the driver.

If you connected the Multilink interface prior to installing the drivers, Windows will not have been able to find the appropriate driver and may have disabled the device. If you unplug and reconnect the device, Windows will automatically disable it even if you have installed the drivers. To force Windows to try and load the driver again, perform the following steps while the USB ColdFire Multilink interface is plugged into the computer:

- 1.) Open the Control Panel (Start Button->Settings->Control Panel)
- 2.) Double-click the "System" icon
- 3.) Select the "Hardware" tab
- 4.) Click the "Device Manager" button
- 5.) The "P&E ColdFire Multilink" device will be shown with an exclamation mark next to it.
Double-click this device.
- 6.) Click the "Reinstall Driver..." button and follow the dialog instructions to have Windows automatically install the driver.

If you have purchased one of P&E's software development packages prior to June 1, 2005, contact P&E to obtain the latest version which supports the USB ColdFire Multilink interface (software support for the

cable is separate from Windows USB driver support). If you are using third-party software, make sure you have a version which supports the USB ColdFire Multilink interface.

4.0 Computers Running Windows 98SE

The USB ColdFire Multilink is supported under Windows 98 Second Edition. The driver installation is similar to that of XP/2000/2003/Vista. The USB ColdFire Multilink should work with Windows ME but is not tested by P&E.

5.0 Using A USB Hub

The USB ColdFire Multilink is classified as a high-power USB device which is powered from the USB bus. A high-power device requires that if a USB hub is used, it must be a self powered hub. This means that it has a separate power supply from which it derives its operating power (as opposed to deriving its power from the PC). It must be able to supply 500mA per port (a high power USB device may derive up to 500mA from the port). P&E has made a powered hub available as an accessory which has been tested with the USB ColdFire Multilink. Details may be found at <http://www.pemicro.com>.

6.0 Connecting To The Target



The following is the proper connection sequence to connect the PC to the target system via the USB ColdFire Multilink interface:

- 1) Make sure the target power is OFF and the USB ColdFire Multilink is not connected to either the target or the PC
- 2) Connect the Multilink to the target by plugging the female 26-pin connector into the target's 26-pin male connector. Make sure that the unit is plugged into the target with the proper orientation. PIN 1 is shown in the diagram above.
- 3) Connect the Multilink to the PC via a USB extension cable. The Blue LED on the Multilink should illuminate.



- 4) Turn the target power on. The Yellow LED on the Multilink should illuminate.

Before disconnecting the setup, turn the target power off.

7.0 Startup Reset Sequence

When P&E software starts up by default, it will attempt to drive the processor into background mode via a reset. This is accomplished by first driving the BKPT, DSI, and DSCLK signals low. The reset signal on Pin-7 of the BDM header is then driven low for 20+ msec and released. At this point, if the processor has correctly entered background mode, the PST0 (Pin-15), PST1 (Pin-14), PST2 (Pin-13) and PST3 (Pin-12) lines should all be driven high by the processor. Subsequently the user should see activity (changing signals) on the DSI, DSO, and DSCLK signals. The activity on the DSCLK and DSI lines is generated by the PC and the activity on the DSO line is generated by the processor.

If you get the message “Cannot enter background mode,” this indicates that PST3/2/1/0 did not all go high. You should check your hardware with a scope, logic analyzer or logic probe. Make sure there is power and clock to the ColdFire and then check the startup sequence given above.

8.0 Interface Libraries

P&E produces a set of interface libraries which allows the user to directly control the USB ColdFire Multilink from any Windows Development Environment which can interact with a DLL. The interface libraries come with examples for controlling the Multilink interface from Microsoft Visual C as well as Borland Delphi. Details of the libraries for the ColdFire (UNITCFZ) may be found at <http://www.pemicro.com>.

P&E offers a Linux version of the UNITCFZ drivers as well. Contact P&E for more details.

9.0 Firmware Updates

The latest version of the firmware for the Multilink interface is included in P&E software development kits. When the debugger or programmer is run, if it detects that the Multilink interface firmware needs to be updated, it will ask the user’s permission to do this. If permission is granted, the update occurs automatically.

10.0 Clocked/Asynchronous Jumper

There is a jumper inside the unit which selects the default as to whether communications with the target ColdFire processor should be synchronous to the PSTCLK signal (clocked) or not. The default jumper position (pins 2+3 close to the USB connector) selects synchronous communications. This is required by some devices (such as the 5272) which do not have on-chip synchronization circuitry. Communications can be set to be asynchronous to the PSTCLK (pins 1+2), in which case the PSTCLK signal will be terminated to ground with a 50 Ohm load to decrease EMI. The jumper should only be changed while the USB-ML-CF unit is not powered. Asynchronous mode may be useful (most ColdFire devices support it) in cases where the PSTCLK frequency is very high or the amount of noise emission (EMI) is a consideration.

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