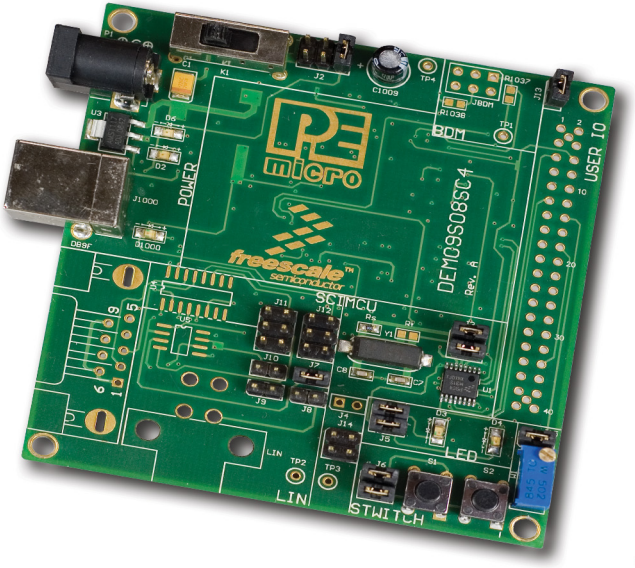
DEMO9S08SC4 User Manual



DEMO9S08SC4UM
Rev. 1.00
June 2009

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1 INTRODUCTION

1.1 Overview

The DEMO9S08SC4 is a low-cost development system designed for demonstrating, evaluating, and debugging the Freescale MC9S08SC4 microcontroller. P&E's Embedded Multilink circuitry on the DEMO9S08SC4 board allows the processor on the DEMO9S08SC4 to be debugged and programmed via USB from the PC. In addition, the demo board can be powered using the USB bus.

1.2 Package Contents

The DEMO9S08SC4 package includes the following items:

- DEMO9S08SC4 Demo board
- USB Cable
- Freescale Warranty Card

1.3 Supported Devices

The DEMO9S08SC4 supports the MC9S08SC4CTG device.

1.4 Recommended Materials On DEMO9S08SC4 Resources CD

- DEMO9S08SC4 Embedded Multilink hardware interface driver
- DEMO9S08SC4 User Manual (this document)
- DEMO9S08SC4 Demo Board Schematics
- DEMO9S08SC4 Component Breakdown List
- Embedded Multilink Toolkit Applications
- Links to P&E Evaluation Software

- Links to Freescale documentation, P&E Discussion Forums, and DEMO9S08SC4 FAQs.

1.5 Handling Precautions

Take care to handle the package contents, including the DEMO9S08SC4 board, in a manner such as to prevent electrostatic discharge.

2 HARDWARE FEATURES

The DEMO9S08SC4 is a demonstration and development system for Freescale's MC9S08SC4 microcontroller. Application development is quick and easy using P&E's Embedded Multilink circuitry and the included software tools and examples. An optional BDM port is provided to allow use of an external BDM interface such as P&E's Cyclone PRO automated programmer or USB Multilink. The USB Multilink is functionally comparable to the DEMO9S08SC4's Embedded Multilink circuitry.

Note: The DEMO board's onboard Embedded Multilink circuitry is intended to function with the onboard processor and any daughter cards that may be included. It cannot be used to communicate with other devices.

2.1 DEMO9S08SC4 Board Features

- On-board Logic Analyzer
- On-board Virtual Serial Port
- P&E's Embedded Multilink circuitry populated on the bottom
- RS-232 Serial Port w/ DB9-F Connector (not populated)
- SCI signals connected to P&E's Embedded Multilink through jumpers
- ON/OFF Power Switch w/ LED indicator
- A 12VDC power supply input barrel connector
- Power Input Selection Jumpers for selecting the input voltage source:
  - Power Input from Embedded Multilink to LDO regulator
  - Power Input from DC Power Jack to LDO regulator, regulated VDD output at 5.0V
  - Power Input from MCU_PORT connector

- External Crystal Circuitry Layout
- LIN PHY with Molex connector (PHY and connector not populated)
- 40-Pin MCU I/O pass-through connector (not populated)
- User Features:
  - 2 User LED's w/ Enable
  - 2 User Push Buttons w/ Enable
  - 5K Ohm POT w/ Enable
- Option Jumpers:
  - COM_SEL to choose SCI connection to LIN PHY or RS232 or PEMICRO virtual COM port
  - INPUT_EN for two input channels to Embedded Multilink
- Specifications:
  - Board Size 3.2 x 2.9
  - Power Input:
  - USB Cable: 5VDC, 500mA max
  - DC Power Jack: 2.1mm barrel connector, 12VDC Center Positive

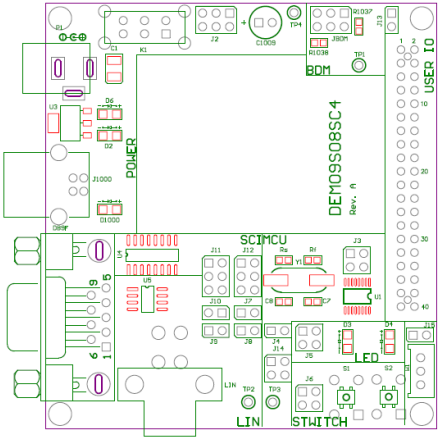


Figure 2-1: DEMO9S08SC4 Top Component Placement

2.2 On-Board Logic Analyzer

The DEMO9S08SC4 board has a built-in 2-channel logic analyzer which may be used to display captured data in real-time on a host PC. The logic analyzer channels (IN0/IN1) are connected to the PTA1 and PTB5 signals on the DEMO9S08SC4 board by default via the J14 jumpers. The channels may be connected to any of the processor pins by wire jumpers (not included).

The DEMO9S08SC4 Logic Analyzer Utility, included in the Embedded Multilink Toolkit on the accompanying CD-ROM, displays the logic analyzer signals on a PC.

2.3 On-Board Virtual Serial Port

The DEMO9S08SC4 board has a built-in virtual serial port which may be connected to the SC4 processor's SCI RXD/TXD. This allows certain PC applications to be able to connect in a serial fashion to the microcontroller without the actual use of serial port hardware.

The Terminal Window Utility, included in the Embedded Multilink Toolkit on the accompanying CD-ROM, is a generic serial port utility which works with the virtual serial port or actual serial port hardware.

3 SYSTEM SETUP

3.1 Overview

P&E's Embedded Multilink driver is required to operate the DEMO9S08SC4 using a PC. The Embedded Multilink driver should be installed with the CodeWarrior Development Studio software or from the DEMO9S08SC4 Resources in the CD-ROM before the PC is connected to the DEMO9S08SC4.

3.2 Operating System Requirements

The following are the resources required to run the CodeWarrior Development Studio and the DEMO9S08SC4:

- A PC-compatible system running Windows 2000, Windows XP, or Windows Vista
- 128MB of available system RAM, and 1GB of available hard disk

space

- A CD-ROM drive for software installation
- A USB port

3.3 Software Setup

3.3.1 Installing CodeWarrior Development Studio

To install the CodeWarrior Development Studio, insert the CodeWarrior CD into your computer's CD-ROM drive. A start-up window will automatically appear. Select CodeWarrior Installation and follow the on-screen instructions.

3.3.2 Installing P&E Resources

Use the DEMO9S08SC4 Resources CD-ROM to access and install P&E resources for the DEMO9S08SC4. These materials are not required for operation. The support materials contained on the DEMO9S08SC4 Resources CD-ROM are listed in **Section 1.4 - Recommended Materials On DEMO9S08SC4 Resources CD**.

3.4 Quick Startup

Only a few steps are required to get the DEMO9S08SC4 up and running:

Step 1. If you do not have CodeWarrior Development Studio version 6.0 installed on your computer, please install it using the accompanying CD-ROM. Additional information regarding CodeWarrior can be found at www.freescale.com.

Step 2. Remove the DEMO9S08SC4 demonstration board from its anti-static pouch.

Step 3. Connect the USB cable from your computer to the DEMO9S08SC4 demonstration board. Depending on your operating system, you may need to follow steps to install the USB driver from the DEMO9S08SC4 Resources CD-ROM. Once the USB cable is connected properly the green USB LED on the DEMO9S08SC4 should illuminate.

Step 4. Turn on the DEMO9S08SC4 power switch (K1). The red Power LED should illuminate.

Step 5. [Will be updated with Quick Start Guide code operations]

Step 6. [Will be updated with DEMO code] Optionally, you may run the Logic Analyzer Application available in the Embedded Multilink toolkit on the CD. This PC-based application graphs the IN0 and IN1 signals on the DEMO9S08SC4 board. If both J14 jumpers are installed, IN0 shows PTA1 and IN1 shows PTB5. Push button S1 and turn the potentiometer to change these signals. This application may also be found at:

http://www.pemicro.com/fixedlinks/DEMOQEtoolkit.html.

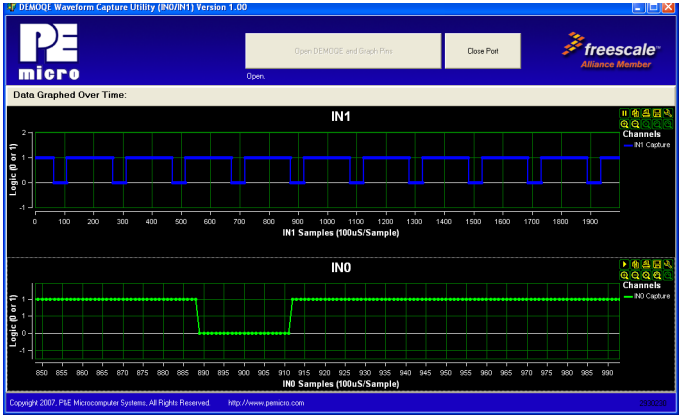


Figure 3-1: Logic Analyzer Application

3.5 Hardware Setup

3.5.1 First-Time Connection

The DEMO9S08SC4 may be connected to a PC through a USB port. Connection steps are listed below in typical order:

1. Install the required software, as described in the previous section.
2. Make sure jumpers 1&2 for PWR_SEL (J2) are installed.
3. Plug the USB cable A-M connector into a free USB port of the PC.
4. Plug the USB cable B-M connector into the USB connector on the DEMO9S08SC4 board.
5. The operating system will recognize P&E's Embedded Multilink cir-

cuitry and P&E's USB to Serial circuitry. Depending on the operating system, you may see the "Found New Hardware Wizard" dialog, helping you to install software for "PEMicro USB Multilink (i0). On Windows XP (SP2), the following dialog will appear:



Figure 3-2: Found New Hardware Wizard Dialog (1 of 4)

Select the "Install the software automatically (Recommended)" option and click the "Next" button.

6. Windows will install the driver files to your system. At the end of the installation, the following dialog box will appear:

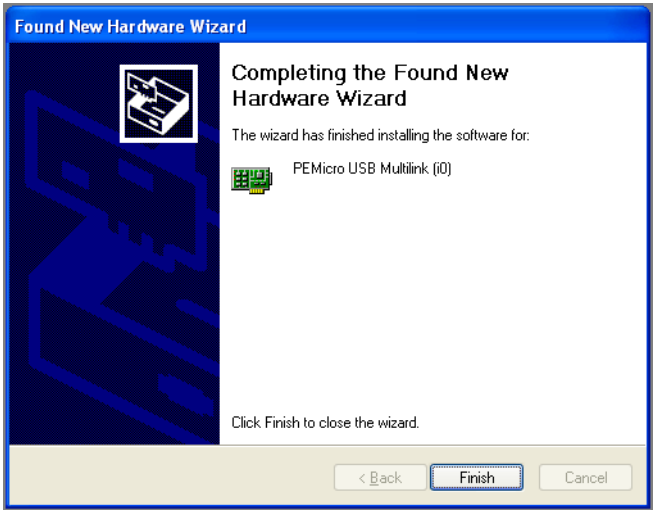


Figure 3-3: Found New Hardware Wizard Dialog (2 of 4)

Click the “Finish” button to exit the current “Found New Hardware Wizard”.

7. Depending on the operating system, you may see the “Found New Hardware Wizard” dialog again, helping you to install software for “PEMicro USB Serial Port (i1). On Windows XP (SP2), the following dialog will appear:

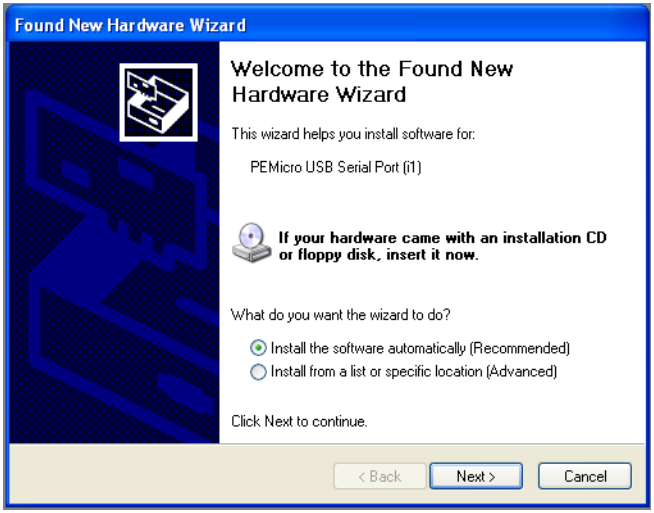


Figure 3-4: Found New Hardware Wizard Dialog (3 of 4)

Select the “Install the software automatically (Recommended)” option and click the “Next” button.

8. Windows will install the driver files to your system. At the end of the installation, the following dialog box will appear:

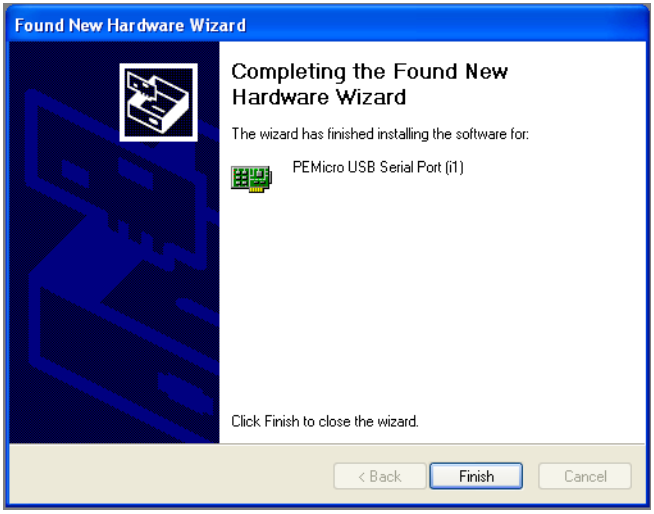


Figure 3-5: Found New Hardware Wizard Dialog (4 of 4)

Click the “Finish” button to exit the “Found New Hardware Wizard”.

If the DEMO9S08SC4 hardware interface driver is now properly installed on your system, the green USB LED on the DEMO9S08SC4 board should be illuminated. In addition, if you turn on the system power of the DEMO9S08SC4 you will see the red Power LED illuminate.

4 OPERATING MODES

4.1 Overview

The DEMO9S08SC4’s Embedded Multilink circuitry, featured hardware components, and optional external BDM header make it a versatile development tool. Below are some of the featured operating modes of the DEMO9S08SC4.

4.2 Debug Mode

A host communicates with the DEMO9S08SC4 through the Embedded Multilink circuitry. Either the CodeWarrior Development Studio or P&E’s HCS08 software tools will work with the DEMO9S08SC4. Please refer to

Section 7 - DEMO9S08SC4 CODE DEVELOPMENT SOFTWARE for more information.

4.3 Run Mode

The DEMO9S08SC4's rich component list empowers it to perform a variety of tasks. Once an application is developed, debugged, and programmed properly into the SC4 internal flash memory, it can run with or without connecting to a host.

4.4 External BDM Mode

The DEMO9S08SC4 has an optional BDM header for debugging and programming the on-board SC4 device using an external BDM hardware tool, such as P&E's USB Multilink or Cyclone PRO. Please refer to **Section 8 - TRANSITIONING TO YOUR OWN TARGET** for more information. A user can take advantage of this mode to develop a target-specific SC4 system and compare it with the DEMO9S08SC4 when necessary.

5 EMBEDDED MULTILINK TOOLKIT PC APPLICATIONS

P&E provides several Windows PC-based applications which work with the DEMO9S08SC4 board. These applications are collectively referred to as the Embedded Multilink Toolkit. The following applications are included in the toolkit:

5.1 DEMO9S08SC4 Logic Analyzer Application

The DEMO9S08SC4 board has a built-in two-channel logic analyzer. This analyzer allows the IN0 and IN1 signals to be captured by the PC and displayed for the user. The IN0 and IN1 signals may be connected to any of the MCU signals which the user would like to view. By default, they are connected to the PTA1 and PTB5 pins of the MCU by jumper J14. At the time of this release, the logic analyzer runs at a capture rate of 10khz.

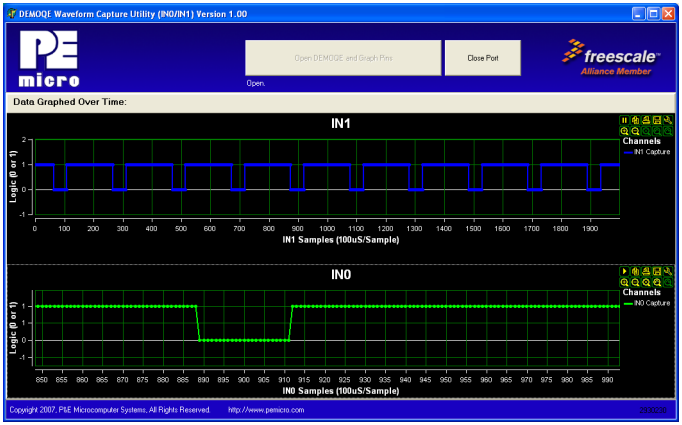


Figure 5-1: Logic Analyzer Application

This PC-based application is used to display the logic analyzer data on the PC. The logic analyzer data is displayed in real-time and each waveform may be paused, zoomed, and printed.

This PC-based application is included on the CD-ROM that accompanies the DEMO9S08SC4, and may also be found at:

http://www.pemicro.com/fixedlinks/DEMOQEtoolkit.html.

5.2 DEMO9S08SC4 Terminal Application

This PC-based application acts as a standard serial port terminal application on the PC. It works with standard serial ports as well as the virtual serial port on the DEMO9S08SC4 board. The application includes settings to adjust the COM port number, baud rate, parity, and number of data bits. There is a button to take a file on the PC and transmit it out of the serial port. There are also delays which are automatically inserted in the transmission output to prevent overruns. It is recommended that these defaults not be changed.

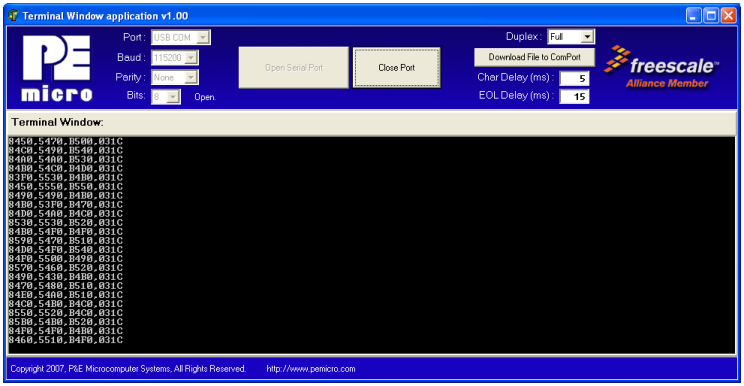


Figure 5-2: DEMO9S08SC4 Terminal Application

The terminal window may be set for full duplex or half duplex. In full duplex mode, only received characters are displayed in the terminal window. In half duplex mode, both transmitted and received characters are displayed.

This PC-based application is included on the CD-ROM that accompanies the DEMO9S08SC4, and may also be found at:

http://www.pemicro.com/fixedlinks/DEMOQEtoolkit.html.

5.3 DEMO9S08SC4 Unsecure Application

This application allows secure HCS08 microcontrollers to be unsecured. The Unsecure application will erase a secure device to make it unsecure. This application works with the DEMO9S08SC4 board as well as other user hardware connected to the PC via the USB Multilink or Cyclone PRO hardware interfaces.

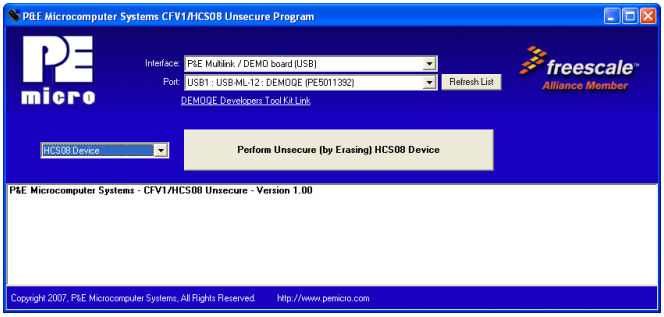


Figure 5-3: DEMO9S08SC4 Unsecure Application

This PC-based application is included on the CD-ROM that accompanies the DEMO9S08SC4, and may also be found at:

http://www.pemicro.com/fixedlinks/DEMOQEtoolkit.html.

5.4 DEMO9S08SC4 Serial Grapher Application

This PC-based application is a more generalized version of the accelerometer demo application. It may be used with the microcontroller based serial accelerometer application or customer microcontroller code which transmits data in the correct format. The serial graphing utility allows incoming data on the PC serial port, or one of P&E's virtual serial ports, to be automatically graphed in time or displayed upon a series of bar graphs. The virtual serial port exists on several of P&E's embedded USB multilink designs including the DEMO9S08SC4 board.

This PC-based application is included on the CD-ROM that accompanies the DEMO9S08SC4 and may also be found at:

http://www.pemicro.com/fixedlinks/DEMOQEtoolkit.html.

All data to be displayed must be in hexadecimal format. The data can be accepted and displayed either as incoming byte values ($00-$FF) or word values ($0000-$FFFF). The data format indicates whether the data is byte or word data. The graphical components automatically size their range depending upon the incoming data.

5.4.1 Visual Components

The Bar Graph has four separate bars A, B, C, and D. On each bar a

percentage value is displayed which indicates the current value relative to the full range. A byte value of $7F (max is $FF) would show up as approximately 50% as would a word value of $7FFF (max is $FFFF). As can be seen in the data formatting section, all four bars must be written at the same time. The bars are shown here:

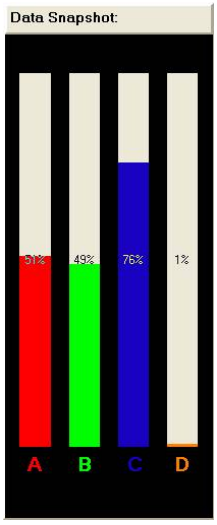


Figure 5-4: Serial Grapher Bar Graph

The graphing component shows four waveforms X, Y, Z, and W. The magnitude axis either has a range of $00-$FF (if byte values are incoming on the serial port) or $0000-$FFFF (if word values are incoming). Each new set of values which comes through the serial port is added to the far right side of the graph and the rest of the data values move to the left. The vertical axis displays the incoming data as the magnitude of each waveform, and the horizontal axis displays the number of samples. The graph has a limited size, so older samples will eventually fall off the left part of the graph. As can be seen in **Section 5.4.2 - Data Format**, each incoming data command affecting the graphing component must have new data for all four waveforms. An example graph is shown here:

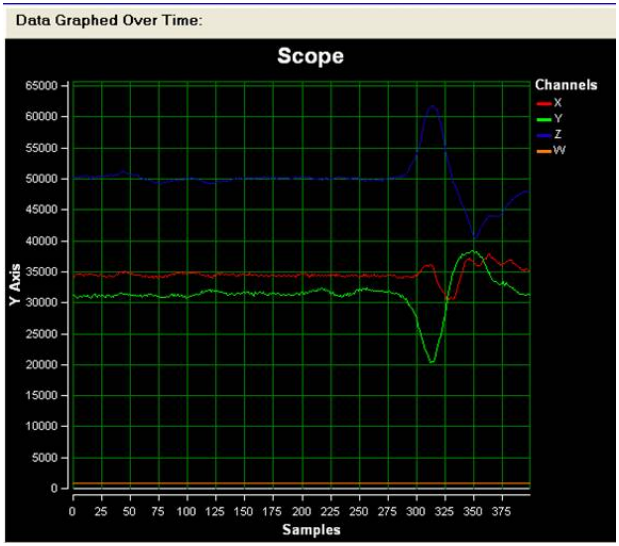


Figure 5-5: Serial Grapher Graphing Component

5.4.2 Data Format

The data format is broken into two sections depending upon whether the incoming data is in byte format or word format.

5.4.2.1 Byte Formatted Data

There are two commands which may be accepted. Both commands must end in the special characters #$0D and #$0A which are CR (carriage return) and LF (line feed). The accepted commands are:

WnnZnnYnnXnn

The nn values are 00-FF and correspond in order to the data displayed on the following graph lines : W, Z, Y, X.

AnnBnnCnnDnn

The nn values are 00-FF and correspond in order to the data displayed on the following bar graphs lines : A, B, C, D.

5.4.2.2 Word Formatted Data

There are three commands which may be accepted. All commands must end

in the special characters #$0D and #$0A which are CR (carriage return) and LF (line feed). The accepted commands are:

nnnn,nnnn,nnnn,nnnn

The nnnn values are 0000-FFFF and correspond in order to the data displayed on both the graph and bar graphs as follows: X/A, Y/B, Z/C, W/D.

nnnn:nnnn:nnnn:nnnn

The nnnn values are 0000-FFFF and correspond in order to the data displayed the graphing component as follows: X, Y, Z, W.

nnnn=nnnn=nnnn=nnnn

The nnnn values are 0000-FFFF and correspond in order to the data displayed on the bar graph component as follows: A, B, C, D.

6 JUMPER SETTINGS

6.1 System Power

The SC4 processor may obtain its power from either the on-board regulator or through MCU_PORT J1. The on-board regulator regulates the output to 5V. Power input is achieved by using J2 and J13 headers.

6.1.1 J2 - VDD Source Selection Jumper VDD_SELECT



Select the Embedded Multilink Circuitry USB to supply

microcontroller VDD. This is the default setting.



Select the MCU_PORT_VDD to supply microcontroller VDD. This setting also allows power to be supplied to the target connected to the MCU PORT. Please note that J13 must be installed to use this option.



Select the REG_VDD to supply microcontroller VDD.

Figure 6-1: VDD_SELECT Option Header (J2)



Figure 6-2: MCU_PORT and MCU_PORT_VDD Option Header (J13)

6.2 RS232/LIN Communications

The DEMO9S08SC4 integrates an RS232 transceiver (not populated) and a

LIN PHY driver (not populated) for the microcontroller SCI signals. The DEMO9S08SC4 also integrates the SCI signal into the Embedded Multilink circuitry. A user can communicate with the microcontroller SCI module via the on-board DB9 connector (not populated), the Molex 4-position LIN connector, or the Embedded Multilink circuitry.

There are two jumpers associated with SCI communication selection.

6.2.1 J12 - SCI RXD Signal Selection Jumper RXD_EN



Connects the microcontroller PTB0/RXD signal to the RS232 transceiver



Connects the microcontroller PTB0/RXD signal to the LIN transceiver



Connects the microcontroller PTB0/RXD signal to the Embedded Multilink SCI circuitry. This is the default setting.

Figure 6-3: SCI RXD Signal Selection Jumper RXD_EN (J12)

6.2.2 J11 - SCI TXD Signal Selection Jumper TXD_EN)



Connects the microcontroller PTB1/TXD signal to the RS232 transceiver.



Connects the microcontroller PTB1/TXD signal to the LIN transceiver



Connects the microcontroller PTB1/TXD signal to the Embedded Multilink SCI circuitry. This is the default setting.

Figure 6-4: SCI TXD Signal Selection Jumper TXD_EN (J11)

6.2.3 LIN Jumper Settings

J7 – LIN Enable

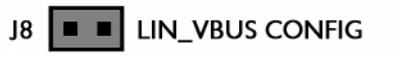


Jumper ON : Enables the LIN transceiver

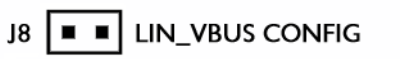


Jumper OFF : Disables the LIN transceiver

J8 – LIN VBUS Configuration

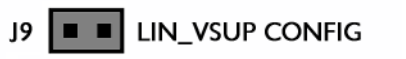


Jumper ON : LIN VBUS is connected to 12V

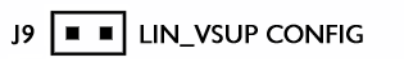


Jumper OFF : LIN VBUS is not connected to 12V

J9 – LIN VSUP Configuration



Jumper ON : LIN VSUP is connected to 12V



Jumper OFF : LIN VSUP is not connected to 12V

J10 – LIN Master Selection



Jumper ON : LIN is configured as a master node



Jumper OFF : LIN is configured as a slave node

6.3 LED Display Port

The DEMO9S08SC4 Board has 2 LEDs connected to signals PTA0 and

PTB4. They can be enabled or disabled by installing or removing the corresponding jumper, J5, in the LED_ENABLE header.

6.3.1 J5 - LED Display Enable Port LED_ENABLE



Enables all LED outputs. This is the default setting.

Figure 6-5: LED Display Enable Header LED_ENABLE (J5)

6.4 Input Switches

The DEMO9S08SC4 has an option to connect two signals, PTA1 and PTB5, to the Embedded Multilink for signal processing. The two signals are connected or disconnected to IN0 or IN1 correspondingly, via jumpers P&E INPUT_EN (J14).

The DEMO9S08SC4 has 2 switches that are connected to signals PTA2 and PTB2 respectively, and are enabled or disabled by the 4 corresponding jumpers KEY_ENABLE (J16).

6.4.1 J14 - P&E's Logic Analyzer Inputs IN0/IN1

The logic analyzer inputs are marked on one side of the J14 jumper. The inputs allow P&E's PC-based logic analyzer application to display these signals in real-time.



By installing both jumpers, the logic analyzer pins IN0 and IN1 will be connected to PTA1 and PTB5 respectively.



By removing these jumpers IN0 and IN1 will be unconnected. The user may connect these signals, via wires, to any other signals on the

processor which they wish to view on the PC.

Figure 6-6: Jumper Settings for Input Signals to P&E's Embedded Multilink, P&E INPUT_EN (J14)

6.4.2 J6 - Light Touch Switch Enable Jumper KEY_ENABLE



Enables the corresponding switch. Each jumper may be individually installed or removed. By default, all jumpers are installed to enable all the switches.

Figure 6-7: Jumper Settings for Light Touch Switches KEY_ENABLE (J6)

6.5 Analog Input Potentiometer

The DEMO9S08SC4 provides an easy access 5Kohm potentiometer whose output may be connected to PTA3, enabled or disabled by J15, POT_EN.

6.5.1 J15 - Potentiometer Output Selection Jumpers POT_EN



Selects the potentiometer output connection. By default it is connected.

Figure 6-8: Potentiometer Output Selection Jumpers POT_EN (J15)

6.6 External Crystal Circuitry Jumper Enable

The DEMO9S08SC4 provides external crystal circuitry. A user may use jumper J3, CLOCK_EN, to enable the external crystal circuitry.

6.6.1 J3 - External Crystal Circuitry Enable Jumpers CLOCK_EN



Enables or disables the external crystal circuitry. Both positions must

be installed to enable use of crystal circuitry.

Figure 6-9: External Crystal Circuitry Enable Jumper CLOCK_EN (J3)

6.7 Jumper J4 For VDD And MCU_VDD

The DEMO9S08SC4 provides a jumper on the bottom of the board to connect VDD to MCU_VDD. By default, it is not populated and is shorted with zero-ohm resistor JR3 in parallel. A user may take off this zero-ohm resistor and install a corresponding jumper.

7 DEMO9S08SC4 CODE DEVELOPMENT SOFTWARE

The DEMO9S08SC4 includes P&E's Embedded Multilink circuitry, so no external hardware BDM tool is needed to debug and program the DEMO9S08SC4. A user only needs to connect the DEMO9S08SC4 to their PC to start developing code for it.

The DEMO9S08SC4 package comes with a special edition of Freescale's CodeWarrior studio. In addition, P&E's evaluation software for HCS08 is available online at www.pemicro.com. A user may use either CodeWarrior or P&E software tools to develop code for the DEMO9S08SC4.

7.1 Using CodeWarrior With The DEMO9S08SC4

The CodeWarrior studio supports Freescale's HCS08 devices. It offers C, C++, and assembly-level support, and provides debugging capabilities based on P&E's debug and programming technologies.

A programming or debug session with the project-based CodeWarrior IDE may be launched by double-clicking on the project name (the format is projectname.mcp) from your file storage. Its tutorials, FAQs, and quick start guides are easy to follow and will allow you use pre-built templates to begin creating a new project in a short time.

7.2 Using P&E Software With The DEMO9S08SC4

P&E offers software tools for Freescale's HCS08 devices that can be used to develop code for the DEMO9S08SC4 board. P&E offers an integrated development environment, which combines a command-line assembler, in-circuit debugger, and flash memory programmer. The assembler includes

features such as a full string replacement macro, conditional assembly, include files, and more. The debugger supports both assembly and C source-level debugging. The programmer can program/reprogram both internal and external flash devices in-circuit.

8 TRANSITIONING TO YOUR OWN TARGET

Once you have finished working with the DEMO9S08SC4 and are ready to build your own target, you will need a hardware tool to allow you to develop using your own board. P&E's USB Multilink and P&E's Cyclone PRO offer two effective solutions, depending on your needs. Both work with Freescale's CodeWarrior as well as P&E software, and both provide a seamless transition to working with your own hardware.

The USB Multilink is a development tool that is functionally comparable to the Embedded Multilink circuitry on the DEMO9S08SC4. It will enable you to debug your code and program it onto your target. The Cyclone PRO is a more versatile and robust development tool with advanced features and production capabilities.

More information is available below to assist you in choosing the appropriate development tool for your needs.

8.1 Hardware Solutions At A Glance

The USB Multilink offers an affordable and compact solution for your development needs, and allows debugging and programming to be accomplished simply and efficiently. Those doing rapid development will find the USB Multilink easy to use and fully capable of fast-paced debugging and programming.

The Cyclone PRO is a more complete solution designed for both development and production. The Cyclone PRO features automated power switching, multiple communications interfaces (including USB, Ethernet, and Serial), stand-alone programming functionality, and many other advanced capabilities.

Below is an overview of the features and intended use of the USB Multilink and Cyclone PRO.

8.1.1 USB Multilink Key Features

- Direct user control of target's execution
- Programming and debugging capabilities
- Read/write registers and memory values
- Compact and lightweight
- Communication via USB 2.0
- Supported by P&E software and Freescale's CodeWarrior

8.1.2 Cyclone PRO Key Features

- Advanced programming and debugging capabilities, including:
  - PC-Controlled and User-Controlled Stand-Alone Operation
  - Interactive Programming via Host PC
  - In-Circuit Debugging, Programming, and Testing
- Compatible with Freescale's ColdFireV1, HCS08, RS08, and HC(S)12(X) microcontroller families
- Communication via USB, Serial, and Ethernet Ports
- Multiple image storage
- LCD screen menu interface
- Supported by P&E software and Freescale's CodeWarrior

8.2 Working With P&E's USB Multilink



Figure 8-1: P&E's USB Multilink (USB-ML-12 shown)

8.2.1 Product Features & Implementation

P&E's USB Multilink Interface (USB-ML-12) connects your target to your PC and allows the PC access to the Background Debug Mode (BDM) on Freescale's ColdFireV1, HCS08, RS08, and HC(S)12(X) microcontrollers. It connects between a USB port on a Windows 2000/XP/Vista machine and a standard 6-pin debug connector on the target.

By using the USB Multilink Interface, 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 USB Multilink enables you to debug, program, and test your code on your board.

8.2.2 Software

The USB Multilink Interface works with Codewarrior as well as P&E's in-circuit debugger and flash programmer to allow debug and flash programming of the target processor. P&E's USB Multilink Development Packages come with the USB Multilink Interface, as well as flash programming software, in-circuit debugging software, Windows IDE, and register file editor.

8.3 Working With P&E's Cyclone PRO



Figure 8-2: P&E's Cyclone PRO

8.3.1 Product Features & Implementation

P&E's Cyclone PRO is an extremely flexible tool designed for debugging, testing, and in-circuit flash programming of Freescale's ColdFireV1, HC08,

HCS08, RS08, and HC(S)12(X) microcontrollers. The Cyclone PRO connects your target to the PC via USB, Ethernet, or Serial Port and enables you to debug your code, program, and test it on your board. After development is complete the Cyclone PRO can be used as a production tool on your manufacturing floor.

For production, the Cyclone PRO may be operated interactively via Windows-based programming applications as well as under batch or .dll commands from a PC. Once loaded with data by a PC it can be disconnected and operated manually in a stand-alone mode via the LCD menu and control buttons. The Cyclone PRO has over 3Mbytes of non-volatile memory, which allows the onboard storage of multiple programming images. When connected to a PC for programming or loading it can communicate via the ethernet, USB, or serial interfaces.

8.3.2 Software

The Cyclone PRO comes with intuitive configuration software and interactive programming software, as well as easy to use automated control software. The Cyclone PRO also functions as a full-featured debug interface, and is supported by Freescale's CodeWarrior as well as development software from P&E.

P&E's Cyclone PRO is also available bundled with additional software as part of various Development Packages. In addition to the Cyclone PRO, these Development Packages include in-circuit debugging software, flash programming software, a Windows IDE, and register file editor.

9 TROUBLESHOOTING

9.1 DEMO9S08SC4 Is Undetected

Q: The connection assistant indicates that my DEMO9S08SC4 is undetected even though I have connected the hardware to my USB port. What should I do?

A: The connection assistant, which displays in either Codewarrior or P&E's development software, is a dialog which allows the user to connect to the DEMO9S08SC4 hardware. If this dialog indicates that the DEMO9S08SC4 hardware is not connected to the PC, the first step is to make sure that the DEMO9S08SC4 hardware is connected to the PC via a USB 2.0 high-speed

cable. If it is connected, unplug and then plug in the USB cable on the DEMO9S08SC4 board and click refresh in the connection assistant. If the hardware still does not show up, try the following remedies:

(A) Re-Enable the USB driver

If you connected the DEMO9S08SC4 interface prior to installing P&E's Embedded Multilink drivers, Windows will not have been able to find the appropriate driver and may have disabled the device. The DEMO9S08SC4 board shows up in Window's device manager as a "P&E Multilink," since it contains P&E's Embedded Multilink circuitry. If you unplug and then plug in the device, Windows will automatically disable it even if you have installed the drivers. To force windows to try to load the driver again, perform the following steps while the DEMO9S08SC4 interface is connected to 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 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.

(B) Re-Install the USB driver

If the Multilink device does not show up in the device manager, use the driver installation utility located in the DEMO9S08SC4 Resources CD-ROM. After driver installation, unplug the DEMO9S08SC4 from the PC and reboot the PC. When the reboot has completed, connect the interface to the PC with the USB 2.0 cable. Run the software again to see if the interface is now detected.

If you have an error attempting to install the drivers, please view the installation troubleshooting FAQ on P&E's website at:

http://www.pemicro.com/faqs/faq_view.cfm?id=89.

(C) Test for installation of the USB driver files

To test the driver installation, use the driver test utility in the DEMO9S08SC4 Resources CD-ROM to make sure all files were properly installed. This may give some indication of what the problem is.

(D) Using a USB Hub

The DEMO9S08SC4 is a high-power USB device. If a USB Hub is used, it must be a self-powered hub (i.e., with its own power supply). If the Hub is not self-powered the DEMO9S08SC4 will not work. In general, USB ports located directly on the PC are high-power (self-powered) ports.

9.2 CodeWarrior Installation Fails (WinDriver Error)

Q: When I try to install the Codewarrior or P&E software, installation fails with this message: “There are currently 2 open applications using WinDriver. Please close all applications and press Retry. To reload WinDriver, press Cancel and reboot.“ How do I solve this?

A: Some software applications on your PC are connected to the Windriver system driver which manages P&E's USB connections. This system driver needs to be disabled for the installation to continue. Directions to disable Windriver are as follows:

In Windows Explorer, right-click on My Computer and select Properties from the drop-down menu.

1. Select the Hardware tab.
2. Click on the Device Manager button.
3. Select the "System Devices" in the Device Manager window.
4. Expand the tree index (+) for System Devices.
5. At the bottom of the System Devices list you should see the Win-Driver item.
6. Right-click on WinDriver and select Disable from the drop-down menu.
7. Click Yes/OK when the confirmation dialog appears.

WinDriver is now disabled and you should be able to complete the installation. After the installation finishes, you should re-enable the WinDriver system driver using the following steps:

In Windows Explorer, right-click on My Computer and select Properties from the drop-down menu.

1. Select the Hardware tab.
2. Click on the Device Manager button.
3. Select the "System Devices" in the Device Manager window.

4. Expand the tree index (+) for System Devices.
5. At the bottom of the System Devices list, you should see a WinDriver item.
6. Right-click on WinDriver and select Enable from the drop-down menu.

Reboot your PC after the installation finishes.

If you are unable to disable the WinDriver system driver in the above fashion, you can delete the file c:\windows\system32\windrvr6.sys and then reboot your machine. You should then re-run the installer and complete the procedure. Reboot your machine after the installation has finished.

DEMO9S08SC4UM
Rev. 1.00
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Freescale Controller Continuum

68HC08/S08/RS08/(S)12(X) ColdFire® V1 ColdFire® V2/V3/V4 PowerPC® Nexus® ARM®



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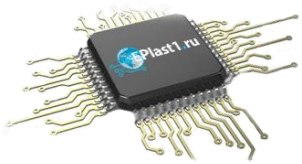
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