



Mentor® Embedded Sourcery Probe Personal Hardware Manual

Version 2.2.3

November 2011

**© 2011 Mentor Graphics Corporation
All rights reserved.**

This document contains information that is proprietary to Mentor Graphics Corporation. The original recipient of this document may duplicate this document in whole or in part for internal business purposes only, provided that this entire notice appears in all copies. In duplicating any part of this document, the recipient agrees to make every reasonable effort to prevent the unauthorized use and distribution of the proprietary information.

This document is for information and instruction purposes. Mentor Graphics reserves the right to make changes in specifications and other information contained in this publication without prior notice, and the reader should, in all cases, consult Mentor Graphics to determine whether any changes have been made.

The terms and conditions governing the sale and licensing of Mentor Graphics products are set forth in written agreements between Mentor Graphics and its customers. No representation or other affirmation of fact contained in this publication shall be deemed to be a warranty or give rise to any liability of Mentor Graphics whatsoever.

MENTOR GRAPHICS MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THIS MATERIAL INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

MENTOR GRAPHICS SHALL NOT BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES WHATSOEVER (INCLUDING BUT NOT LIMITED TO LOST PROFITS) ARISING OUT OF OR RELATED TO THIS PUBLICATION OR THE INFORMATION CONTAINED IN IT, EVEN IF MENTOR GRAPHICS CORPORATION HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

RESTRICTED RIGHTS LEGEND 03/97

U.S. Government Restricted Rights. The SOFTWARE and documentation have been developed entirely at private expense and are commercial computer software provided with restricted rights. Use, duplication or disclosure by the U.S. Government or a U.S. Government subcontractor is subject to the restrictions set forth in the license agreement provided with the software pursuant to DFARS 227.7202-3(a) or as set forth in subparagraph (c)(1) and (2) of the Commercial Computer Software - Restricted Rights clause at FAR 52.227-19, as applicable.

Contractor/manufacturer is:

Mentor Graphics Corporation

8005 S.W. Boeckman Road, Wilsonville, Oregon 97070-7777.

Telephone: 503.685.7000

Toll-Free Telephone: 800.592.2210

Website: www.mentor.com

SupportNet: supportnet.mentor.com/

Send Feedback on Documentation: supportnet.mentor.com/doc_feedback_form

TRADEMARKS: The trademarks, logos and service marks ("Marks") used herein are the property of Mentor Graphics Corporation or other third parties. No one is permitted to use these Marks without the prior written consent of Mentor Graphics or the respective third-party owner. The use herein of a third-party Mark is not an attempt to indicate Mentor Graphics as a source of a product, but is intended to indicate a product from, or associated with, a particular third party. A current list of Mentor Graphics' trademarks may be viewed at: www.mentor.com/trademarks.

Table of Contents

Chapter 1

Introduction	5
Related Documentation	5
About Sourcery Probe Personal	5
Product Highlights	6
The Debugging Environment	7
Environmental Information	8
Product Disposal	10
Operating Requirements	10
Operating Conditions	10
Standard Electrostatic Precautions	10
Electrical Requirements	11
Target Requirements	11
Cycling Power to the System	12

Chapter 2

Connecting to the Target and Host Computer	13
Connecting to a Windows 7 PC	13
Configuring the Windows 7 Network Adapter to Use a Static IP Address	14
Connecting to a Windows XP/SP3 PC	16
Installing the USB Driver Software	16
Configuring the Windows XP Network Adapter to Use a Static IP Address	17
Connecting to a Linux PC	20
Changing the IP Address of the Probe (Optional)	22
Sourcery Probe Console	23
Configuring the USB Serial Interface	23
Sourcery Probe Personal Console Menu	24
Connecting to the Sourcery Probe Console from Sourcery CodeBench	26
Debug Port Connector Information	27
Connecting the Probe to the Target	28
Probe Configuration Settings	29

Chapter 3

Hardware Specifications	31
Connectors and LEDs	31
USB Connector	32
Debug Port Connector	32
Electrical Characteristics	33
Physical Considerations	33

Hardware Warranty and Servicing	35
---------------------------------------	----

Embedded Software and Hardware License Agreement

Chapter 1

Introduction

Related Documentation	5
About Sourcery Probe Personal	5
Environmental Information	8
Operating Requirements	10
Cycling Power to the System	12

Mentor Embedded Sourcery Probe Personal (Sourcery Probe Personal) is a cost-effective tool that helps you develop and debug a number of processors and microcontrollers.

i **Tip:** If you have a probe that is labeled Mentor Embedded USB-JTAG Probe, this works exactly the same as the Sourcery Probe Personal. The only difference is the label on the hardware. Follow the instructions in this manual for Sourcery Probe Personal.

Related Documentation

This manual describes the procedures for unpacking the probe, setting up USB communications, and connecting the probe to your target system.

- To learn how to set up the communication parameters and update the probe firmware image on ARM and MIPS models of the Sourcery Probe Personal, refer to the *Appendix A - Probe Settings and Updates* section of the *Mentor Embedded Sourcery Probe User's Manual*. **NOTE:** This information is only relevant if you are using an ARM or MIPS target. If you have a powerPC target, ignore these procedures.
- For details on installing and configuring your debugger, see the *Sourcery CodeBench Getting Started* manual.

About Sourcery Probe Personal

Sourcery Probe Personal uses advanced emulation technology to provide control of and visibility into your target system. Combined with the debugger software, the probe ([Figure 1-1](#)) speeds the debugging process by letting you interactively control and examine the state of your target system.

Figure 1-1. Sourcery Probe Personal with USB 2.0 Cable



Product Highlights

Sourcery Probe Personal has these features:

- Different product models are available for the following: PowerPC™ processors, ARM® processors, and MIPS® processors.
- Supports Windows® 7 and Windows® XP SP3.
- ARM and MIPS models require a Linux kernel version 2.6.24 or newer. Example Linux operating systems that meet this requirement are Ubuntu 8.04, Fedora 9, and RHEL 6. Newer versions of these operating systems should also work.
- The PowerPC model supports the following Linux builds: Red Hat® Linux® version 8.0 or 9.0, Fedora™ Core 3 or Core 4, and Mandrake® Linux® 10.0.
- Supports all CPU core speeds.
- Provides control and debug software running in-target, with minimal intrusion into target operation.
- Allows debug code in cache, ROM, RAM, and flash memory.
- Provides high performance:
 - Split-second single-step execution.
 - Capable of download speeds greater than 12 MB per minute from host to target.

Note



The actual download speed depends on the target processor, the debug port's clock frequency, the network speed, and the debugger.

- Supports one USB 2.0 connection.
- Supports both big and little endian byte-order.

- Automatically supports target signal levels from 1.8V to 3.3V.
- Software debug capabilities including:
 - Controlling instruction execution.
 - Displaying and modifying target memory.
 - Examining and modifying any processor registers.
 - Running to breakpoints in ROM, RAM, or flash memory.
 - Single-stepping through source and assembly language code views.
 - Single-stepping into, over, or out of functions.

The Debugging Environment

The Sourcery CodeBench debugger has been integrated with Sourcery Probe Personal to give you control over the emulation functions and your target. They communicate via a high speed USB2 port.

The probe contains the hardware and software needed to control the processor's Debug Support Unit (DSU) via the interface. It performs debug services like memory test, single stepping, and breakpoint management.

The debugger implements high-level debug functions by sending debug service requests to the probe over the communication link. It then formats and displays the data or status information that is returned from the probe.

Sourcery Probe Personal Benefits

The probe provides these key benefits:

- **Visibility:**
The probe enables you to observe registers and the current state of target memory. You can halt program execution at predefined points and examine the data for a particular program state.
- **Control:**
You can control the state of the target system by downloading code, manually modifying processor registers and memory, single-stepping through the code, or setting breakpoints.

Target Connections

The probe connects to your target through the standard debug port for the processor family. Each probe supports a single target connection. The probes are available in the versions show in [Table 2-1](#).

For additional details see [Connecting to the Target and Host Computer](#).

Environmental Information

All components used in the probe are RoHS compliant. The China RoHS HST table describes the hazardous materials that can be contained in the different components of the probe device. To view this table, see [Figure 1-2](#).

Figure 1-2. China RoHS HST Table

中国<<电子信息产品污染防治管理办法>> China RoHS									
Mentor									
As of May 18, 2010									
产品名称中	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚	China EUP	中国<<电子信息产品污染防治管理办法>>注	是否符合欧盟RoHS指令
Part Number and Name	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr+6)	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)		China RoHS Comment	Outermost Packing Material
246271-058 JTAG for PRC COP	0	0	0	0	0	0	10	**1	CFB
246272-058 JTAG for PRC DPI	0	0	0	0	0	0	10	**1	CFB
246273-058 JTAG for ARM	0	0	0	0	0	0	10	**1	CFB
246274-058 JTAG for MIPS	0	0	0	0	0	0	10	**1	CFB
246279-058 JTAG for ARM	0	0	0	0	0	0	10	**1	CFB
246280-058 JTAG for PRC	0	0	0	0	0	0	10	**1	CFB
246281-058 JTAG for MIPS	0	0	0	0	0	0	10	**1	CFB

Product Disposal

To ensure the correct disposal of Sourcery Probe Personal development hardware, Mentor Graphics provides you with the means for disposal. When you determine that the product requires disposal, contact embedded_support@mentor.com for instructions. Include the following information:

- Part number
- Quantity
- Contact details
- Collection address

Operating Requirements

Before setting up your system, ensure the operating environment is prepared.

Operating Conditions

The following operating conditions must exist in order to operate this equipment safely:

- Indoor use only.
- No exposure to liquids and moisture.
- Dry environment.
- Environmental Rating: IPX0.
- Altitude up to 2000 m.
- Operational temperature range: 0 °C to 40 °C (32° to 104 °F).
- Maximum relative humidity 80% for temperatures up to 31 °C decreasing linearly to 50% relative humidity at 40 °C.

Standard Electrostatic Precautions

This instrument contains static-sensitive components that are subject to damage from electrostatic discharge (ESD). Use standard ESD precautions when transporting, handling, or using the instrument and the target, when connecting/disconnecting the instrument and the target, and when removing the cover of the instrument.

We recommend the following precautions:

- Use wrist straps or heel bands with a 1 M Ω resistor connected to ground.

- On the work surface and floor, use static conductive mats with a $1\text{ M}\Omega$ resistor connected to ground.
- Keep high static-producing items like non-ESD-approved plastics, tape and packaging foam away from the instrument and the target.

Note

Consider these precautions as *minimum* requirements for a static-controlled environment.

Electrical Requirements

The probe is powered through the USB cable and does not use an external power supply. The probe is designed to be plugged directly into a host computer, but also can work with self-powered hubs. Bus-powered hubs might not be able to provide sufficient power for the probe, which requires 200 mA. If insufficient power is available, your host operating system will indicate this failure and the probe will go into a low power suspend mode. If your hub is not able to provide sufficient power, connect the probe directly to your host PC, or purchase a self-powered USB hub.

Target Requirements

The probe automatically supports target signal levels from 1.8V to 3.3V.

Note

For additional requirements about your debug connector type, see the *Mentor Embedded Probe Target Connections* application note.

Cycling Power to the System

When you need to apply or cycle power to the Sourcery Probe, connect or disconnect the power cable from the power source or from the probe. After you have connected the probe to your target system, perform the following steps to apply or remove the power.

Procedure

To turn the power on, perform these steps:

1. Turn on the Sourcery Probe power.
2. Turn on the target system power.

To turn the power off, perform these steps:

1. Turn off the target system power.
2. Turn off the Sourcery Probe power.

Chapter 2

Connecting to the Target and Host Computer

Note



You should install the Sourcery CodeBench software before attempting to install or use the Sourcery Probe.

Connecting to a Windows 7 PC	13
Connecting to a Windows XP/SP3 PC	16
Connecting to a Linux PC	20
Changing the IP Address of the Probe (Optional)	22
Sourcery Probe Console	23
Debug Port Connector Information	27
Connecting the Probe to the Target	28

This section explains how to connect a Sourcery Probe Personal to both your host computer and to the target.

Caution



Sourcery Probe Personal contains components that are subject to damage from electrostatic discharge. Whenever you are using, handling, or transporting the probe, or connecting to or disconnecting from a target system, always use proper anti-static protection measures, as specified in [Standard Electrostatic Precautions](#).

Connecting to a Windows 7 PC

To connect Sourcery Probe Personal to your Windows 7 computer and configure it, perform the following steps:

1. Connect one end of your USB 2.0 cable to a USB port on your host computer. Connect the other end of the cable to your probe.

The first time you connect the USB cable to your host computer, you might get a New Hardware Detected dialog box. If you have already installed the debugger software, then Windows should be able to automatically install the right USB driver. This will happen

again the first time you use each different USB port on your computer for a Mentor Embedded Sourcery Probe Personal connection.

2. Click the **New Hardware Detected** dialog box. The Driver Software Installation dialog box appears.

It is important to note the warning in this dialog box stating that the process of installing the device drivers can require some time to complete.

3. When the installation is complete, click **Close**.

Note



New probes are configured for Local Link mode, which means the probe will assign itself an address in the range 169.254.xxx.yyy. You may want to check what value the probe picked using the Sourcery Probe Console, but in practice you can probably just pick any number from 1-254 for each of xxx and yyy. If the PC reports that the address you chose is already in use, then just try another value for xxx or yyy.

If the probe has been configured to use a static IP address, then you must configure the PC network adapter to use a unique address within the range set in the probe. See [Configuring the Windows 7 Network Adapter to Use a Static IP Address](#) for details.

If the probe's IP address is unknown, you can find it by using the [Sourcery Probe Personal Console Menu](#).

Configuring the Windows 7 Network Adapter to Use a Static IP Address

To configure the PC network adapter to use an unique static IP address, perform the following steps.

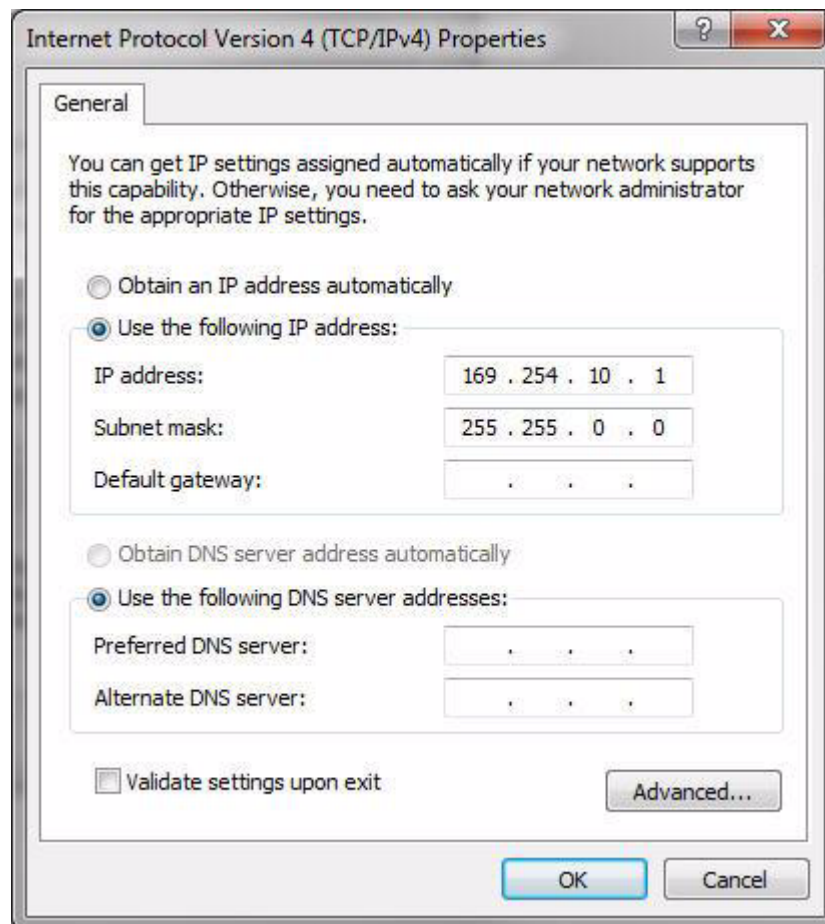
Procedure

1. Open **Computer**.
2. Right-click **Network** on the bottom of the left pane and choose **Properties**.
3. Select **Change adapter settings** from the left pane to see all the network adapters available on your computer.
4. Right-click the **Local Area Connection** associated with Mentor Embedded USB JTAG and choose **Properties**.
5. Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**. The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box appears.
6. Select **Use the following IP address**.

7. Enter the IP address. See the note above for information on choosing one.

The Subnet mask should always be 255.255.0.0 when using IP addresses in the local link range. If you set the probe and PC to IP addresses in a different range, then the subnet mask would typically be 255.255.255.0 (on both probe and PC) and the Gateway field should remain blank.

Figure 2-1. IP Properties Dialog



8. Click **OK** to accept these changes.
9. Click **Close** to close the Properties dialog box for the connection.

Results

Windows 7 auto-configures after the drivers are installed and the connection is made.

Related Topics

[Changing the IP Address of the Probe \(Optional\)](#)

Connecting to a Windows XP/SP3 PC

There are two steps to set up the ARM and MIPS models on Windows XP:

- Install the USB drivers. See [Installing the USB Driver Software](#).
- Set the Windows network adapter to use a static IP address. See [Configuring the Windows XP Network Adapter to Use a Static IP Address](#).

Sourcery Probe Personal for PowerPC installs a custom USB driver which does not use TCP/IP communication. This section does not apply to those models.

Note



XP Service Pack 3 is required when using Sourcery Probe Personal with Windows XP.

Installing the USB Driver Software

This section provides the steps required to install the drivers for your probe.

1. Connect the USB cable to your probe and to your PC. After a few seconds, the Found New Hardware Wizard appears. Install the USB drivers.
 - If a warning similar to the following appears, click **Continue Anyway**.



Note



The hardware name (Mentor Embedded USB JTAG Probe) shown in the warning message is the correct driver name for the Sourcery Probe Personal.

2. Set the XP network adaptor to use a static IP address. See [Configuring the Windows XP Network Adapter to Use a Static IP Address](#).

Configuring the Windows XP Network Adapter to Use a Static IP Address

The Sourcery Probe Personal models for ARM and MIPS use remote RNDIS for TCP/IP communication to Windows over USB. If you are using Windows XP, the probe and PC automatically negotiate their IP addresses, so no manual setup is required. However, because this negotiation can take an extended time to complete, XP might report the network has limited or no connectivity. To avoid this, you can set the Windows Network Adapter to use static IP addresses. In general you can leave the probe configured for Local Link (automatic) mode, but we recommend that you set the PC to a compatible static IP address.

Note



There will be a 30 second delay for network connection if you are using Windows XP instead of Windows 7. You can avoid this delay by setting a static IP address on the XP network adapter properties. Additionally, Windows XP shows an exclamation mark (!) on the network icon in the tray area indicating limited or no connectivity. You can ignore this indication.

Prerequisites

Before setting the XP network adapter static IP address, you must pick a suitable address. The address must be unique, but within the same range as the probe's address. New probes are configured for Local Link mode, which means the probe will assign itself an address in the range 169.254.xxx.yyy. You may want to check what value the probe picked using the [Sourcery Probe Console](#), but in practice you can probably just pick any number from 1-254 for each of xxx and yyy. If the PC reports that the address you chose is already in use, then just try another value for xxx or yyy.

However, if the probe was reconfigured to use a static IP address, then you must use pick an address within the range set in the probe. If the probe's IP address is unknown, you can find it by using the [Sourcery Probe Personal Console Menu](#).



Tip: If you do not know the probe's IP address, you can either use the Discovery dialog box in Sourcery CodeBench, or you can run the `mep_update` console application to find the probe and quit instead of proceeding with the update.

The `mep_update` utility is in the `...\mep\bin` directory within the Sourcery CodeBench installation.

Example 2-1. mep_update Console Output

```
MEP Update Ver 0.1.0 Copyright 2010 Mentor Graphics Inc.  
  
Scanning for visible Probes...
```

Model:	Serial #:	IP Addr:	UnitName:
0: MESP-Personal / ARM	07380004	169.254.156.36	
1: MESP-Pro / MIPS	FSL016F52	134.86.178.205	FSL016F52
	Hostname:	sj178dy205.my_network_name	

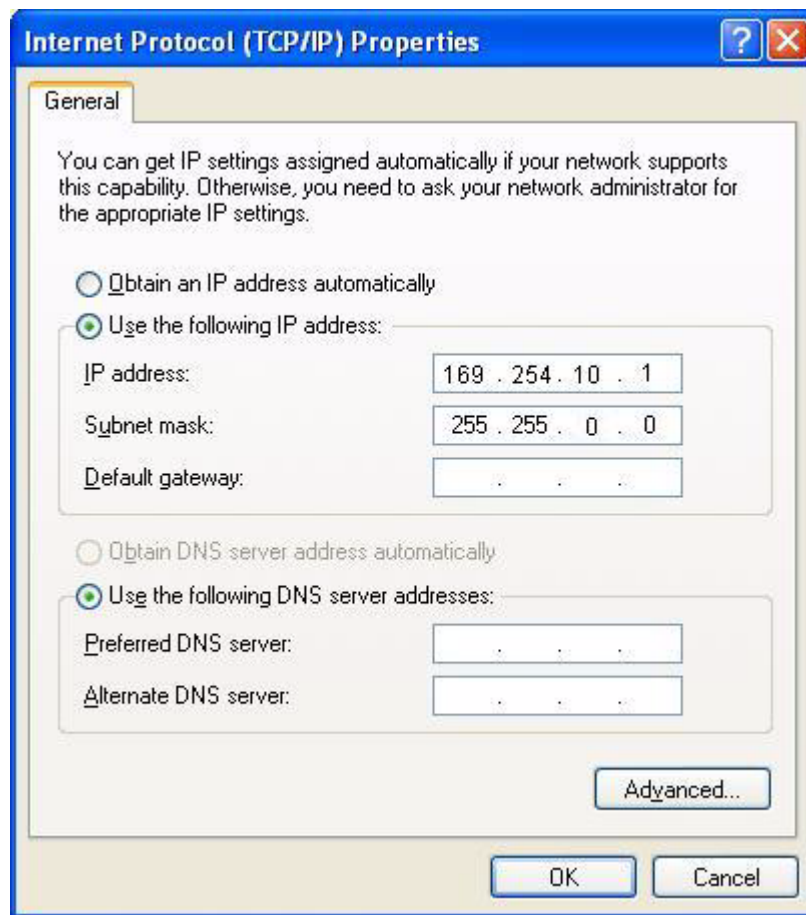
Select a Probe 0..6, q> q

Procedure

1. On your desktop, right-click **My Network Places** and click **Properties**.
2. Right-click the network connection associated with Sourcery Probe Personal. Note that the Local Area Connection number will differ from one computer to another and from one USB port to another.
3. Click **Properties** in the dropdown menu.
4. In the connection's properties dialog box, click **Internet Protocol (TCP/IP)**. Then, click the **Properties** button.
5. Choose **Use the following IP address**.
6. Select the static IP address option for the network adapter and enter the address chosen above, as shown in [Figure 2-2](#).

The Subnet mask should always be 255.255.0.0 when using IP addresses in the local link range. If you set the probe and PC to IP addresses in a different range, then the subnet mask would typically be 255.255.255.0 (on both probe and PC) and the Gateway field should remain blank.

Figure 2-2. IP Properties Dialog



7. Click **OK** to accept these changes.
8. Click **OK** to close the Properties dialog box for the connection.
9. Close **My Network Places**.
10. If you know the IP address of the probe, you should be able to ping the probe over USB using its IP address (for example, 169.254.85.218). The first time you ping, it can require some time to establish the connection.

```
ping 169.254.85.218
```

Related Topics

[Sourcery Probe Console](#)

[Changing the IP Address of the Probe \(Optional\)](#)

Connecting to a Linux PC

The ARM and MIPS models of the Sourcery Probe Personal support remote CDC Ethernet for TCP/IP communication over USB. This section describes how to configure the probe and Linux for use with USB.

Because the Sourcery Probe Personal models for PowerPC do not use TCP/IP communication, this section does not apply to those models.

Note



Although this setup description is valid for Ubuntu 10.04 LTS, the same steps are likely to work with many distributions. A quick Internet search on static IP setup for your Linux distribution should help resolve discrepancies.

Known Issues

The Linux kernel can assign different network interface names when you add or remove network interfaces.

Prerequisites

Before setting the PC's network adapter static IP address, you must pick a suitable address. The address must be unique, but within the same range as the probe's address. New probes are configured for Local Link mode, which means the probe will assign itself an address in the range 169.254.xxx.yyy. You may want to check what value the probe picked using the [Sourcery Probe Console](#), but in practice you can probably just pick any number from 1-254 for each of xxx and yyy. If the PC reports that the address you chose is already in use, then just try another value for xxx or yyy.

However, if the probe was reconfigured to use a static IP address, then you must use pick an address within the range set in the probe. If the probe's IP address is unknown, you can find it by using the [Sourcery Probe Personal Console Menu](#).

Procedure

1. **Determine your interface name.**

Note



The Linux kernel can assign different network interface names when you add or remove network interfaces. If you discover your interface name has changed, revisit this document section and go through the setup instructions again to adjust your configuration. Be sure to remove any previous manual setup you configured for your probe.

- a. Look at your current network device settings with your probe unplugged. You should see your normal wired or wireless network setup with its current IP address listed. Use the *ifconfig* command to show your current network interfaces and settings.

```
$ ifconfig
eth1      <snip>
lo        <snip>
```

- b. Plug in Sourcery Probe Personal and repeat the *ifconfig* command. Note the new Ethernet device listing and also that it does not have an IP address assigned. In this example the new device is **eth2**:

```
$ ifconfig
eth1      <snip>
eth2      Link encap:Ethernet  HWaddr 00:80:cf:88:88:88
           inet6 addr: fe80::280:cfff:fe88:8888/64 Scope:Link
           UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
           RX packets:0 errors:0 dropped:0 overruns:0 frame:0
           TX packets:10 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:0 (0.0 B)  TX bytes:1836 (1.8 KB)

lo        <snip>
```

2. Permanently add a static IP setting for your probe:

- a. Edit a Linux network configuration file:

```
$ sudo vi /etc/network/interfaces
```

NOTE: You can substitute your favorite editor in place of *vi*.

This file likely has these settings to start with:

```
auto lo
iface lo inet loopback
```

- b. Below the current settings in your file, add the following settings using your probe's adapter name. In this example, the adapter name is *eth2*.

The complete file should look like the following:

```
auto lo
iface lo inet loopback
auto eth2
iface eth2 inet static
address 169.254.10.1
netmask 255.255.0.0
broadcast 169.254.255.255
```

- c. Save the file.

Note



This example uses an address in the Local Link IP range. If your probe was configured to use a static IP address, the same procedure applies, but you must pick an IP address for the network adapter that is compatible with that of the probe.

- d. Use the following command to cause Linux to load the changed network setup:

```
$ sudo ifup eth2
```

- e. Verify the interface with the following command. It should show the IP address you associated with it:

```
$ ifconfig eth2
eth2      Link encap:Ethernet  HWaddr 00:80:cf:88:88:88
          inet addr:169.254.10.1  Bcast:169.254.255.255
          Mask:255.255.0.0
          inet6 addr: fe80::280:cfff:fe88:8888/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:4  errors:0  dropped:0  overruns:0  frame:0
          TX packets:60  errors:0  dropped:0  overruns:0  carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:280 (280.0 B)  TX bytes:10556 (10.5 KB)
```

Alternatively, you can also set up a temporary static IP. If you want to use a temporary IP setting rather than editing system files, use the following command instead:

```
$sudo ifconfig eth2 169.254.10.1 netmask 255.255.0.0 up
```

3. Run `mep_update` to find the IP address of the probe, then quit and use `ping` to test communication with it.

Related Topics

[Sourcery Probe Console](#)

[Connecting to the Sourcery Probe Console from Sourcery CodeBench](#)

[Changing the IP Address of the Probe \(Optional\)](#)

Changing the IP Address of the Probe (Optional)

This section provides the steps required if you need to set the IP address of the probe.


Setting the probe to use a static IP address is not generally recommended. If you do need to, or want to, then it is a good idea to place a label on the probe showing its IP address.

Prerequisites

To configure the probe to use a static IP, use the probe's console to configure the probe's settings. The console is accessible via the Terminal view in Sourcery CodeBench, or a terminal program such as Hyperterm. See [Sourcery Probe Console](#) for the proper serial port settings.

Procedure

1. Connect to the virtual serial port console using the Terminal view in Sourcery CodeBench. See [Connecting to the Sourcery Probe Console from Sourcery CodeBench](#) for the steps required to make this connection.
2. When the terminal is connected to the virtual serial port, press <ESC> to enter the setup menu and choose **USB/Net settings** from the menu. See [Sourcery Probe Console](#) for details on the settings to use.
3. Disable Local Link mode, and enter a static IP address and subnet mask for the probe.
4. After you successfully update the probe:
 - a. First, quit the terminal emulator program.
 - b. Then, unplug the probe from your PC.


 **Tip:** After setting a static IP address for the probe, remember that the network adapter on the PC must be changed to a unique address within the same range.

Related Topics

[Sourcery Probe Console](#)

Sourcery Probe Console

Access the Sourcery Probe console via a virtual serial port using the Terminal view in Sourcery CodeBench or another terminal emulator.


 **Note** PowerPC models of Sourcery Probe Personal do not support the Sourcery Probe console.

Configuring the USB Serial Interface

Perform the steps in this section to configure the USB serial interface to communicate with your probe.

Procedure

1. Plug in the probe USB cable.
2. After plugging in the probe's USB cable, Windows automatically registers the port as COMX, where X is the next available number. Linux registers it as `/dev/ttyACMX`, where X is the next available number.

 **Tip:** `/dev/ttyACM0` is the typical device name created by the OS, but if other USB serial devices are active at connection time, the number portion (0) may increase.

3. Connect to the probe with a terminal emulator. You can use the emulator that comes with Sourcery CodeBench. See [Connecting to the Sourcery Probe Console from Sourcery CodeBench](#).
4. After connecting, press the `<esc>` key in the terminal emulator. This brings up the Sourcery Probe Personal Console Menu.
5. In this menu, you can replay (option 5), the bootup log. This log shows you the currently assigned IP address.

 **Caution** Always close the terminal program or the Terminal view in Sourcery CodeBench before you unplug the probe.

The serial port settings for Sourcery Probe Personal are as follows. See [Figure 2-4](#) for an example.

- Port: COMX (**NOTE:** for Linux it is `/dev/ttyACMX`)
- Baud: 115200
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow control: none

Related Topics

[Connecting to the Sourcery Probe Console from Sourcery CodeBench](#)

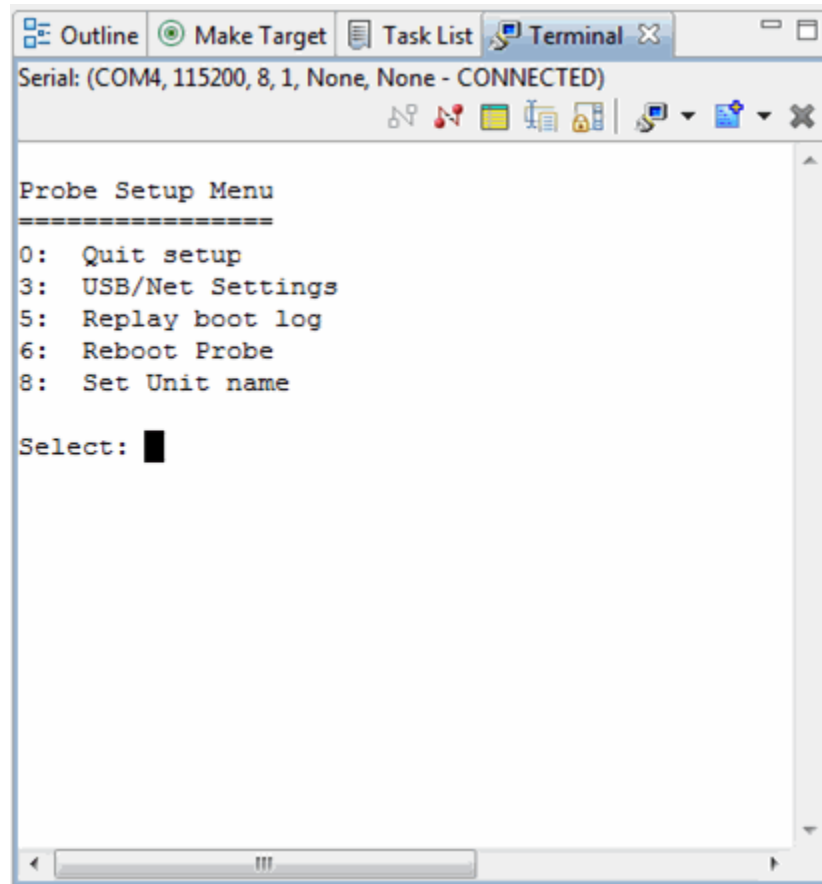
Sourcery Probe Personal Console Menu

The Sourcery Probe Personal Console Menu ([Figure 2-3](#)) provides you with several options including:

- Choose Replay boot log to view the probe configuration information.
- Choose USB/Net settings to set local link mode, or to enter a static IP address.
- Set a recognizable name for the unit, which will be displayed by the probe discovery feature of the CodeBench debugger.

You can access this menu once you have established a connection between your probe and a terminal emulator.

Figure 2-3. Console Menu



Related Topics

[Configuring the USB Serial Interface](#)

[Connecting to the Sourcery Probe Console from Sourcery CodeBench](#)

Connecting to the Sourcery Probe Console from Sourcery CodeBench

You can use the Terminal view in Sourcery CodeBench to connect to the virtual serial port console for your probe.

Prerequisites

- Your probe must be connected to your computer.
- Sourcery CodeBench must be installed and running.

Procedure


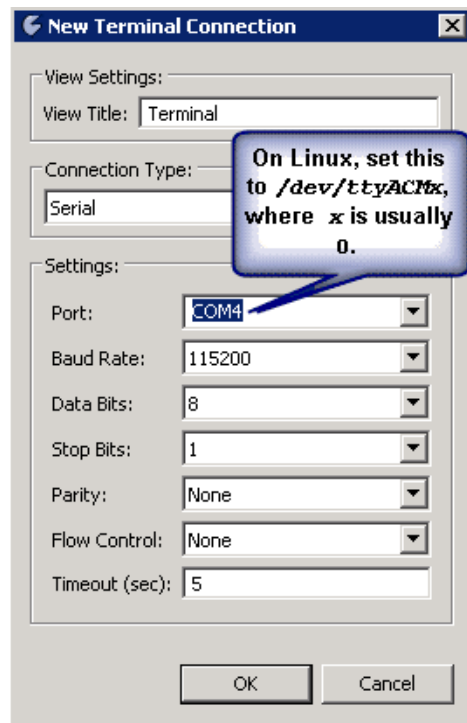
1. From Sourcery CodeBench, select **Window > Show Views > Other**. This opens the Show Views dialog box. Select **Terminal > Terminal** and click **OK**. This opens the Terminal view.
2. From the Terminal view, click **New Terminal Connection** . This opens the New Terminal Connection dialog box.

Figure 2-4. New Terminal Connection Dialog Box



3. Set up the connection to use the settings defined in [Sourcery Probe Console](#). Note that the specific COM port number may vary between computers and between USB ports.

i **Tip:** On Linux, `/dev/ttyACM0` is the typically device name created by the OS, but if other USB serial devices are active at connection time, the number portion (0) may increase.

4. Click **OK** to connect to the console.
5. After connecting, press the **<ESC>** key in the Terminal window. This brings up the [Sourcery Probe Personal Console Menu](#).


Related Topics

[Sourcery Probe Console](#)

Debug Port Connector Information

The Sourcery Probe Personal series supports a wide variety of processors that use either PowerPC/COP, PowerPC/DPI, MIPS/EJTAG, ARM® EmbeddedICE, or CoreSight JTAG debug interfaces.

See the *Mentor Embedded Sourcery Probe Target Connections* application note for details on the debug port connectors and adapter modules for supporting alternate debug connectors.

Caution  Failure to properly connect the probe to the target can damage the probe or target. Verify all connections before applying power.

If your target system has a debug port header that is compatible with the probe, you can directly connect the probe to the target debug port header. Ensure that pin 1 of the probe's gray ribbon cable connector lines up with pin 1 on the target's debug port header. Otherwise, you may need an adapter module to make the connection.

Table 2-1. Debug Connectors

	Product Model			
	ARM	COP	DPI	MIPS
Debug Connector Type	ARM20	COP16	DPI10	MIPS14
TAM Accessories ¹	TAM-ARM20-ARM14 TAM-ARM20-TI14 TAM-ARM20-TI20 TAM-ARM20-CTX10J TAM-ARM20-CTX20J	-	-	TAM-MIPS14-MIPSJ12

1. TAM accessories are sold separately. Consult the *Mentor Embedded Sourcery Probe Target Connections* application note to determine TAM part numbers.

Connecting the Probe to the Target

To connect the probe connector to the target debug port header, perform the steps provided in this section.

Prerequisites

- The debugger software must be installed before you attempt to connect the probe to the PC for the first time. This ensures the required USB drivers are available when the first connection is established. See [Connecting to the Target and Host Computer](#).

Procedure

1. Remove power from your target.
2. Unplug the USB cable from the probe.
3. Ensure that pin 1 of the probe's gray ribbon cable connector lines up with pin 1 on the target's debug port header.

Note



Pin 1 is clearly marked on the probe's gray ribbon cable by a red line down one side of the cable and a small triangle in the plastic socket.

Figure 2-5. Sourcery Probe Personal



Note



There are many different standard debug connectors. Target Adapter Modules are available with certain probe models to support alternate debug connector types. (See [Table 2-1](#).) It is very important to check the debug connector details of your target board when selecting the right adapter module. See the *Mentor Embedded Sourcery Probe Personal Target Connections* application note.

4. Gently (but firmly) press the probe connector onto the target debug port header.
5. Reconnect the USB cable to the probe.
6. Apply power to your target.

Probe Configuration Settings

Probe configuration settings like JTAG clock frequency must be adapted to meet the requirements of the target hardware. Refer to the *Mentor Embedded Sourcery Probe User's Manual* for information on how to configure the probe settings.

Note



Due to variations in the design of target systems, it is not possible to guarantee that all systems can be operated at the maximum debug port clock rates. These variations include circuit impedances, trace lengths, and signal terminations. You might need to select a lower clock rate to get reliable operation.

Chapter 3

Hardware Specifications

Connectors and LEDs	31
Electrical Characteristics	33
Physical Considerations	33

This section provides hardware specifications for the Sourcery Probe Personal.

Connectors and LEDs

Figure 3-1 and Figure 3-2 show the various LEDs and connectors of the probe device.

Figure 3-1. Sourcery Probe Personal - Top View



Figure 3-2. Sourcery Probe Personal - End View Showing USB Connector



These topics explain the various LEDs and connectors on the probe device:

- [Run/Pause Indicator](#)
- [Transmit/Receive Indicator \(TX/RX\)](#)
- [USB Connector](#)
- [Debug Port Connector](#)

Run/Pause Indicator

The probe hardware has a status LED labeled *Run/Pause*. It indicates the state of execution on the target device:

- The LED is initially unlit and remains so until the debugger is connected to the probe.
- The LED is green when the target is running.
- The LED is red when the target is paused.
- The LED is orange when the target has some processor cores running while others are paused.

Transmit/Receive Indicator

The transmit/receive (labeled TX/RX) LED indicates the state of the USB interface:

- The LED flashes red when the probe is booting up.
- The LED flashes green when the probe is ready for use.
- The LED flashes orange when data is being transferred to or from the host.
- The LED is off if the probe is disabled or disconnected.

Note



When the probe is powered on, it can perform a brief self-test that displays a test pattern on both LEDs. When the self-test completes, it reverts to the behavior described in this section.

USB Connector

The USB interface consists of a mini-USB connector that connects directly to the provided USB cable.

Debug Port Connector

The debug connector consists of a 5.5 inch ribbon cable with the appropriate debug connector attached. The ribbon cable has a red stripe down one side to indicate the location of pin 1.

Note



There are many different standard debug connectors. Target Adapter Modules are available to support alternate debug connector types. It is very important to check the debug connector details of your target board when selecting the right adapter module. See the *Mentor Embedded Sourcery Probe Target Connection* application note and [Table 2-1](#).

Electrical Characteristics

The probe has a minimal effect on the target processor and target electrical characteristics. Use care to design the target to accommodate the small signal delays associated with in-circuit emulators or other test equipment.

The probe automatically supports target signal levels from 1.8V to 3.3V.

Physical Considerations

Although the probe was designed to be small, it might not physically fit in all target systems.

Contact SupportNet if you have special considerations that require review.

Table 3-1 shows the physical characteristics of the probe.

Table 3-1. Sourcery Probe Personal Physical Characteristics

Current Consumption	
Sourcery Probe Personal current consumption from USB cable	< 200 mA
Sourcery Probe Personal current consumption from target	< 50 μ A
Physical dimensions	
Sourcery Probe Personal dimensions	5.375" x 3.25" x 1.250" (13.63 cm x 8.26 cm x 3.175 cm)
Target connector ribbon length	5" +/- 0.5" (12.7 +/- 1.25 cm)

Table 3-1. Sourcery Probe Personal Physical Characteristics (cont.)

Current Consumption	
Target connector dimensions:	-
Height	0.38" (0.97 cm)
Depth	0.20" (0.51 cm)
JTAG/COP width	0.98" (2.49 cm)
DPI width	0.68" (1.72 cm)
ARM® JTAG width	1.18" (3.00 cm)
MIPS	0.88" (2.24 cm)
TAM MIPS14-J12	L x W x H:
• MIPS-14: 14 pin header HTST-107-04-L-D- RA	
• J-12: 12 pin female socket SSW-106-02-S-D-RA	1.0"x0.36" x 0.5"
TAM ARM20-ARM14	0.6"x0.20"x 0.5"
• ARM20: 20 pin header Part# HTST-110-04-L-D_RA	
• ARM14: 14pin female socket Part#ASP-141004-01	1.3x0.36"x0.5"
TAM ARM20-TX14	
• ARM20: 20 pin header Part# HTST-110-04-L-D_RA	0.72" x0.26"x0.6"
• TX14: 14pin socket ASP-141004-01	
TAM ARM20-TX20	1.3"x0.36"x0.5"
• ARM20: 20 pin header Part# HTST-110-04-L-D_RA	
• TX20: ASP-145056-01	0.72" x0.26"x0.6"
dpi-10	
• 10 pin header	1.3"x0.36"x0.5"
cop-16	
• 16pin header	0.5"x0.2"x0.45"
	0.5" x 0.3" x0.45"
	0.8"x0.3"x 0.45"

Chapter 4

Hardware Warranty and Servicing

Sourcery Probe Personal Hardware Warranty	35
Cleaning the Probe.....	35

This chapter provides you with the hardware warranty and service information on the Sourcery Probe Personal device.

Sourcery Probe Personal Hardware Warranty

Sourcery Probe Personal hardware is sold with Mentor Graphics' standard 90-day warranty against defects in materials or workmanship. The warranty period is 90 days starting on the 15th day after delivery or upon installation, whichever occurs first. The customer must notify Mentor Graphics in writing of any nonconformity within the warranty period. If the probe fails within the 90-day warranty period, Mentor Graphics will replace the unit at no charge.

Note



There are no user-serviceable parts on the probe. Contact Mentor Graphics technical support (supportnet.mentor.com) for assistance if damage or defects are suspected.

Cleaning the Probe

Keep the probe clean and free from dust. This section describes the steps required to clean this device.

Procedure

1. Remove the power supply connection.
2. Use a dry, non-abrasive cloth to wipe outer surfaces of the chassis and cables.

Embedded Software and Hardware License Agreement

The latest version of the Embedded Software and Hardware License Agreement is available on-line at:
www.mentor.com/eshla

IMPORTANT INFORMATION

USE OF PRODUCTS IS SUBJECT TO LICENSE RESTRICTIONS. CAREFULLY READ THIS LICENSE AGREEMENT BEFORE USING THE PRODUCTS. USE OF PRODUCTS INDICATES YOUR COMPLETE AND UNCONDITIONAL ACCEPTANCE OF THE TERMS AND CONDITIONS SET FORTH IN THIS AGREEMENT. ANY ADDITIONAL OR DIFFERENT PURCHASE ORDER TERMS AND CONDITIONS SHALL NOT APPLY.

EMBEDDED SOFTWARE AND HARDWARE LICENSE AGREEMENT ("Agreement")

This is a legal agreement concerning the use of Products (as defined in Section 1) between the company acquiring the license ("Customer"), and the Mentor Graphics entity that issued the corresponding quotation or, if no quotation was issued, the applicable local Mentor Graphics entity ("Mentor Graphics"). Except for license agreements related to the subject matter of this license agreement which are physically signed by Customer and an authorized representative of Mentor Graphics, this Agreement and the applicable quotation contain the parties' entire understanding relating to the subject matter and supersede all prior or contemporaneous agreements. If Customer does not agree to these terms and conditions, promptly return or, if received electronically, certify destruction of Products and all accompanying items within five days after receipt of Products and receive a full refund of any license fee paid.

1. **DEFINITIONS.** These terms shall have the following meanings: "Customer's Product" means the end-user product identified in the applicable quotation which is developed solely by Customer; "Development Location" means the location where Software may be used as authorized in writing by Mentor Graphics; "Development Tools" means the software that may be used by Customer for building, editing, compiling, debugging or prototyping Customer's Product; "Embedded Software" means software that is embeddable; "End-User" means Customer's customer; "Executable Code" means a compiled program translated into a machine readable format that can be loaded into memory and run by a certain processor; "Hardware" means a physically tangible electro-mechanical system or sub-system and associated documentation; "Linkable Object Code" means linkable code resulting from the translation, processing, or compiling of Source Code by a computer into machine readable format; "Processor Unit" means the specific microprocessor to be used with Embedded Software and implemented in Customer's Product; "Products" means Software and/or Hardware; "Software" means software programs, Embedded Software and/or Development Tools, including any updates, modifications, revisions, copies, documentation and design data that are licensed under this Agreement; and "Source Code" means software in a form in which the program logic is readily understandable by a human being.
2. **ORDERS, FEES AND PAYMENT.**
 - 2.1. To the extent Customer (or if agreed by Mentor Graphics, Customer's appointed third party buying agent) places and Mentor Graphics accepts purchase orders pursuant to this Agreement ("Order(s)"), each Order will constitute a contract between Customer and Mentor Graphics, which shall be governed solely and exclusively by the terms and conditions of this Agreement, any applicable addenda and the applicable quotation, whether or not these documents are referenced on the Order. Any additional or conflicting terms and conditions appearing on an Order will not be effective unless agreed in writing by an authorized representative of Customer and Mentor Graphics.
 - 2.2. Amounts invoiced will be paid, in the currency specified on the applicable invoice, within 30 days from the date of such invoice. Any past due invoices will be subject to the imposition of interest charges in the amount of one and one-half percent per month or the applicable legal rate currently in effect, whichever is lower. Prices do not include freight, insurance, customs duties, taxes or other similar charges, which Mentor Graphics will invoice separately. Unless provided with a certificate of exemption, Mentor Graphics will invoice Customer for all applicable taxes. Customer will make all payments free and clear of, and without reduction for, any withholding or other taxes; any such taxes imposed on payments by Customer hereunder will be Customer's sole responsibility. If Customer appoints a third party to place purchase orders and/or make payments on Customer's behalf, Customer shall be liable for payment under such Orders in the event of default by the third party.
 - 2.3. All products are delivered FCA factory (Incoterms 2000), freight prepaid and invoiced to Customer, except Software delivered electronically, which shall be deemed delivered when made available to Customer for download. Mentor Graphics retains a security interest in all Products delivered under this Agreement, to secure payment of the purchase price of such Products, and Customer agrees to sign any documents that Mentor Graphics determines to be necessary or convenient for use in filing or perfecting such security interest. Mentor Graphics' delivery of Software by electronic means is subject to Customer's provision of both a primary and an alternate e-mail address.
3. **GRANT OF LICENSE.**
 - 3.1. All Products constitute or contain copyright, trade secret, proprietary and confidential information of Mentor Graphics or its licensors, who maintain exclusive title to all Software and retain all rights not expressly granted by this Agreement. As

set forth in the applicable quotation, Mentor Graphics grants to Customer, subject to payment of applicable license fees, a nontransferable, nonexclusive license to use Software as set forth in the applicable subsection(s) in Section 3.2 below. The limited licenses granted under this Agreement shall continue until expiration or termination in accordance with Section 13 below, whichever occurs first. **Mentor Graphics does NOT grant Customer any right to (a) sublicense or (b) use Software beyond the scope of this Section without first signing a separate agreement with Mentor Graphics for such purpose.**

3.2. License Type. The license type shall be identified in the applicable quotation.

- 3.2.1. **Development License:** Customer may modify, compile, assemble and convert the applicable Embedded Software Source Code into Linkable Object Code and/or Executable Code form for the Processor Unit(s), Customer's Product(s) and at the Development Location(s) identified in the quotation, provided such Development Location(s) is located within the United States.
- 3.2.2. **End-User Product License:** In addition to the rights granted under Section 3.2.1, Customer may incorporate or embed an Executable Code version of the Embedded Software into unlimited copies of Customer's Product(s), using the Processor Unit(s), and at the Development Location(s) identified in the quotation, provided such Development Location(s) is located within the United States. Customer may manufacture, brand and distribute such Customer's Product(s) worldwide to its End-Users.
- 3.2.3. **Internal Tool License:** Customer may use the Development Tools solely: (a) for internal business purposes and (b) on the specified number of computer work stations and sites. Development Tools are licensed on a per-seat basis and shall not be distributed to others or delivered in Customer's Product(s).
- 3.2.4. **Evaluation License:** Mentor Graphics may from time to time, at its sole discretion, lend Software to Customer. For each loan, Mentor Graphics will identify in writing the quantity and description of Software loaned, the authorized location and the term of the loan. Mentor Graphics will grant to Customer a temporary license to use the loaned Software solely for Customer's non-production internal evaluation. Customer shall return to Mentor Graphics or delete and destroy loaned Software on or before the expiration of the loan term. Customer will sign a certification of such deletion or destruction if requested by Mentor Graphics.

3.3. Mentor Graphics' standard policies and programs, which vary depending on Products, license fees paid or services purchased, apply to the following: (a) relocation of Products; (b) use of Products, which may be limited, for example, to execution of a single session by a single user on the authorized hardware or for a restricted period of time (such limitations may be technically implemented through the use of authorization codes or similar devices); and (c) support services provided, including eligibility to receive telephone support, updates, modifications, and revisions. For the avoidance of doubt, if Customer requests any change or enhancement to Products, or provides Product feedback, whether in the course of receiving support or consulting services, evaluating Products, performing beta testing or otherwise, any inventions, product improvements, modifications or developments made by Mentor Graphics (at Mentor Graphics' sole discretion) will be the exclusive property of Mentor Graphics.

4. **BETA CODE.**

- 4.1. Portions or all of certain Software may contain code for experimental testing and evaluation ("Beta Code"), which may not be used without Mentor Graphics' explicit authorization. Upon Mentor Graphics' authorization, Mentor Graphics grants to Customer a temporary, nontransferable, nonexclusive license for experimental use to test and evaluate the Beta Code without charge for a limited period of time specified by Mentor Graphics. This grant and Customer's use of the Beta Code shall not be construed as marketing or offering to sell a license to the Beta Code, which Mentor Graphics may choose not to release commercially in any form.
- 4.2. If Mentor Graphics authorizes Customer to use the Beta Code, Customer agrees to evaluate and test the Beta Code under normal conditions as directed by Mentor Graphics. Customer will contact Mentor Graphics periodically during Customer's use of the Beta Code to discuss any malfunctions or suggested improvements. Upon completion of Customer's evaluation and testing, Customer will send to Mentor Graphics a written evaluation of the Beta Code, including its strengths, weaknesses and recommended improvements.
- 4.3. Customer agrees to maintain the Beta Code in confidence and shall restrict access to the Beta Code, including the methods and concepts utilized therein, solely to those employees and Customer location(s) authorized by Mentor Graphics to perform beta testing. Customer agrees that any written evaluations and all inventions, product improvements, modifications or developments that Mentor Graphics conceived or made during or subsequent to this Agreement, including those based partly or wholly on Customer's feedback, will be the exclusive property of Mentor Graphics. Mentor Graphics will have exclusive rights, title and interest in all such property. The provisions of this Subsection 4.3 shall survive the termination of this Agreement.

5. **RESTRICTIONS ON USE.**

- 5.1. Customer may copy Software only as reasonably necessary to support the authorized use, including archival and backup purposes. Each copy must include all notices and legends embedded in Software and affixed to its medium and container as received from Mentor Graphics. All copies shall remain the property of Mentor Graphics or its licensors. Except where embedded in Executable Code form in Customer's Product, Customer shall maintain a record of the number and location of all copies of Software, including copies merged with other software and products, and shall make those records available to Mentor Graphics upon request. Customer shall not make Products available in any form to any person other than

Customer's employees and on-site contractors, excluding Mentor Graphics competitors, whose job performance requires access and who are under obligations of confidentiality. Customer shall take appropriate action to protect the confidentiality of Products and ensure that any person permitted access does not disclose or use them except as permitted by this Agreement. Customer shall give Mentor Graphics immediate written notice of any unauthorized disclosure or use of the Products as soon as Customer learns or becomes aware of such unauthorized disclosure or use. Customer acknowledges that the Products provided hereunder may contain Source Code which is proprietary and its confidentiality is of the highest importance and value to Mentor Graphics. Customer acknowledges that Mentor Graphics may be seriously harmed if such Source Code is disclosed in violation of this Agreement. Except as otherwise permitted for purposes of interoperability as specified by applicable and mandatory local law, Customer shall not reverse-assemble, reverse-compile, reverse-engineer or in any way derive any Source Code from Products that are not provided in Source Code form. Except as embedded in Executable Code in Customer's Product and distributed in the ordinary course of business, in no event shall Customer provide Products to Mentor Graphics competitors. Log files, data files, rule files and script files generated by or for the Development Tools (collectively "Files") constitute and/or include confidential information of Mentor Graphics. Customer may share Files with third parties, excluding Mentor Graphics competitors, provided that the confidentiality of such Files is protected by written agreement at least as well as Customer protects other information of a similar nature or importance, but in any case with at least reasonable care. Under no circumstances shall Customer use Products or allow their use for the purpose of developing, enhancing or marketing any product that is in any way competitive with Products, or disclose to any third party the results of, or information pertaining to, any benchmark.

5.2. Customer may not relocate, sublicense, assign or otherwise transfer this Agreement, or the licenses, rights and duties under it, whether by operation of law or otherwise ("Attempted Transfer"), without Mentor Graphics' prior written consent and payment of Mentor Graphics' then-current applicable relocation and/or transfer fees. Any Attempted Transfer without Mentor Graphics' prior written consent shall be a material breach of this Agreement and may, at Mentor Graphics' option, result in the immediate termination of the Agreement and/or the licenses granted under this Agreement.

5.3. The provisions of this Section 5 shall survive the termination of this Agreement.

6. **SUPPORT SERVICES.** To the extent Customer purchases support services, Mentor Graphics will provide Customer updates and technical support for the Development Location for which support is ordered in accordance with Mentor Graphics' then current End-User Software Support Terms located at <http://supportnet.mentor.com/about/legal/>.

7. **THIRD PARTY AND OPEN SOURCE SOFTWARE.**

7.1. Some Products may contain code distributed under a third party license agreement. Please see the applicable Product documentation for further details. Mentor Graphics warrants that Products containing code subject to a third party license agreement do not require: (a) disclosure or distribution in Source Code form; (b) licensing for the purpose of making derivative works; or (c) redistribution at no charge, as a condition for use, modification and/or distribution of such code. MENTOR GRAPHICS' ENTIRE LIABILITY AND CUSTOMER'S EXCLUSIVE REMEDY WITH RESPECT TO THE FOREGOING LIMITED WARRANTY UNDER THIS SECTION 7 SHALL BE, AT MENTOR GRAPHICS' OPTION, EITHER (A) TERMINATION OF THIS LICENSE AND REFUND OF THE LICENSE FEE RECEIVED FROM CUSTOMER UPON RETURN OF PRODUCT TO MENTOR GRAPHICS OR (B) MODIFICATION OR REPLACEMENT OF PRODUCT THAT DOES NOT MEET THIS LIMITED WARRANTY, PROVIDED CUSTOMER HAS OTHERWISE COMPLIED WITH THIS AGREEMENT.

7.2. If Customer uses open source software in conjunction with Products, Customer will ensure that Customer's use does not: (a) impose, or purport to impose, obligations upon Mentor Graphics with respect to Products or (b) grant, or purport to grant, to any third party any rights to or immunities under Mentor Graphics' proprietary and other rights in Products. For purposes of this Agreement, open source software means software available for use, modification and distribution that is licensed under terms that require the licensee to make the licensee's modifications to the open source software or any software that the licensee "combines" with the open source software freely available to others in Source Code form. Customer may not combine Products with software licensed under the GNU General Public License ("GPL") in any manner that could cause, or could be interpreted or asserted to cause, the Software or any modifications to the Software to become subject to the terms of the GPL. The provisions of this Section 7 shall survive the termination of this Agreement.

8. **LIMITED WARRANTY.**

8.1. Mentor Graphics warrants that during the warranty period its standard, generally supported Software, when properly installed, and other Products will substantially conform to the functional specifications set forth in the applicable user manual and/or specification. Mentor Graphics does not warrant that Products will meet Customer's requirements or that operation of Products will be uninterrupted or error free. The warranty period is 90 days starting on the 15th day after delivery or upon installation, whichever first occurs. Customer must notify Mentor Graphics in writing of any nonconformity within the warranty period. For the avoidance of doubt, this warranty applies only to the initial shipment of Products under the applicable Order and does not renew or reset, by way of example, with the delivery of (a) Software updates or (b) authorization codes. This warranty shall not be valid if Software has been subject to misuse, unauthorized modification or improper installation. In addition, all third party software is subject to the manufacturer's original warranty as described in the manufacturer's license agreement, and is not included in this warranty. Such third party products are identified with an asterisk in the applicable quotation. MENTOR GRAPHICS' ENTIRE LIABILITY AND CUSTOMER'S EXCLUSIVE REMEDY SHALL BE, AT MENTOR GRAPHICS' OPTION, EITHER (A) REFUND OF THE PRICE PAID UPON RETURN OF PRODUCT TO MENTOR GRAPHICS OR (B) MODIFICATION OR REPLACEMENT OF PRODUCT THAT DOES NOT MEET THIS LIMITED WARRANTY, PROVIDED CUSTOMER HAS OTHERWISE COMPLIED WITH THIS AGREEMENT. MENTOR GRAPHICS MAKES NO WARRANTIES

WITH RESPECT TO: (A) SERVICES; (B) PRODUCTS WHICH ARE LICENSED AT NO COST; OR (C) BETA CODE; ALL OF WHICH ARE PROVIDED "AS IS."

8.2. THE WARRANTIES SET FORTH IN THIS SECTION 8 ARE EXCLUSIVE TO CUSTOMER AND DO NOT APPLY TO ANY END-USER. NEITHER MENTOR GRAPHICS NOR ITS LICENSORS MAKE ANY OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, WITH RESPECT TO PRODUCTS OR OTHER MATERIAL PROVIDED UNDER THIS AGREEMENT. MENTOR GRAPHICS AND ITS LICENSORS SPECIFICALLY DISCLAIM ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF INTELLECTUAL PROPERTY.

9. **LIMITATION OF LIABILITY.** EXCEPT WHERE THIS EXCLUSION OR RESTRICTION OF LIABILITY WOULD BE VOID OR INEFFECTIVE UNDER APPLICABLE LAW, IN NO EVENT SHALL MENTOR GRAPHICS OR ITS LICENSORS BE LIABLE FOR INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS) WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY, EVEN IF MENTOR GRAPHICS OR ITS LICENSORS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL MENTOR GRAPHICS' OR ITS LICENSORS' LIABILITY UNDER THIS AGREEMENT EXCEED THE AMOUNT RECEIVED FROM CUSTOMER FOR THE PRODUCT OR SERVICE GIVING RISE TO THE CLAIM. IN THE CASE WHERE NO AMOUNT WAS PAID, MENTOR GRAPHICS AND ITS LICENSORS SHALL HAVE NO LIABILITY FOR ANY DAMAGES WHATSOEVER. THE PROVISIONS OF THIS SECTION 9 SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.

10. **HAZARDOUS APPLICATIONS.**

10.1. Customer acknowledges that Mentor Graphics is licensing Products to Customer for the purpose of reducing the design and implementation time that would otherwise have been required in making Customer's designs. Customer agrees that Mentor Graphics has no control over Customer's testing or the specific applications and use that Customer will make of Products. Mentor Graphics Products are not specifically designed for use in the operation of nuclear facilities, aircraft navigation or communications systems, air traffic control, life support systems, medical devices or other equipment in which the failure of Mentor Graphics Products could lead to death, personal injury, or severe physical or environmental damage ("Hazardous Applications").

10.2. CUSTOMER ACKNOWLEDGES IT IS SOLELY RESPONSIBLE FOR TESTING PRODUCTS USED IN HAZARDOUS APPLICATIONS AND SHALL BE SOLELY LIABLE FOR ANY DAMAGES RESULTING FROM SUCH USE. NEITHER MENTOR GRAPHICS NOR ITS LICENSORS SHALL BE LIABLE FOR ANY DAMAGES RESULTING FROM OR IN CONNECTION WITH THE USE OF PRODUCTS IN ANY HAZARDOUS APPLICATION. THE PROVISIONS OF THIS SECTION 10 SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.

11. **INDEMNIFICATION.** CUSTOMER AGREES TO INDEMNIFY AND HOLD HARMLESS MENTOR GRAPHICS AND ITS LICENSORS FROM ANY CLAIMS, LOSS, COST, DAMAGE, EXPENSE OR LIABILITY, INCLUDING ATTORNEYS' FEES, ARISING OUT OF OR IN CONNECTION WITH THE USE OF PRODUCTS AS DESCRIBED IN SECTION 10. THE PROVISIONS OF THIS SECTION 11 SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.

12. **INFRINGEMENT.**

12.1. Mentor Graphics will defend or settle, at its option and expense, any action brought against Customer in the United States, Canada, Japan, or member state of the European Union which alleges that any standard, generally supported Product infringes a patent or copyright or misappropriates a trade secret in such jurisdiction. Mentor Graphics will pay any costs and damages finally awarded against Customer that are attributable to the action. Customer understands and agrees that as conditions to Mentor Graphics' obligations under this section Customer must: (a) notify Mentor Graphics promptly in writing of the action; (b) provide Mentor Graphics all reasonable information and assistance to settle or defend the action; and (c) grant Mentor Graphics sole authority and control of the defense or settlement of the action.

12.2. If a claim is made under Subsection 12.1 Mentor Graphics may, at its option and expense, either: (a) replace or modify the Product so that it becomes non-infringing; (b) procure for Customer the right to continue using the Product; or (c) require the return of the Product and refund to Customer any fees paid, less a reasonable allowance for use.

12.3. Mentor Graphics has no liability to Customer if the claim is based upon: (a) the combination of the Product with any product not furnished by Mentor Graphics; (b) the modification of the Product other than by Mentor Graphics or as directed by Mentor Graphics; (c) the continued use of the infringing Product when Mentor Graphics has provided Customer with a current unaltered release of a non-infringing Product in accordance with Subsection 12.2(a); (d) the use of Product as part of an infringing process; (e) a product that Customer makes, uses, or sells; (f) any Beta Code or loaned Product; (g) any third party software provided by Mentor Graphics' licensors who do not provide such indemnification to Mentor Graphics' customers including but not limited to any SNMP Research software (SNMPv1/v2/v3); or (h) infringement by Customer that is deemed willful. In the case of (h), Customer shall reimburse Mentor Graphics for its reasonable attorney fees and other costs related to the action.

12.4. THIS SECTION 12 IS SUBJECT TO SECTION 9 ABOVE AND STATES THE ENTIRE LIABILITY OF MENTOR GRAPHICS AND ITS LICENSORS AND CUSTOMER'S SOLE AND EXCLUSIVE REMEDY WITH RESPECT TO ANY ALLEGED PATENT OR COPYRIGHT INFRINGEMENT OR TRADE SECRET MISAPPROPRIATION BY ANY PRODUCT LICENSED UNDER THIS AGREEMENT.

13. TERMINATION AND EFFECT OF TERMINATION.

- 13.1. **Termination for Breach.** This Agreement shall remain in effect until terminated in accordance with its terms. Upon written notice, Mentor Graphics may immediately terminate this Agreement and/or the licenses granted under this Agreement, and Customer will immediately discontinue use and distribution of Products if Customer: (a) exceeds the scope of the license granted or otherwise fails to comply with the licensing and/or confidentiality provisions of this Agreement or (b) becomes insolvent, files a bankruptcy petition, institutes proceedings for liquidation or winding up or enters into an agreement to assign its assets for the benefit of creditors. For any other material breach of any provision of this Agreement, Mentor Graphics may terminate this Agreement and/or any license to Software granted under this Agreement at any time upon 30 days written notice to Customer if Customer fails to cure the breach within the 30 day notice period. Termination of this Agreement or any license granted hereunder will not affect Customer's obligation to pay for Products shipped or licenses granted prior to the termination.
- 13.2. **Effect of Termination.** Upon termination of this Agreement, the rights and obligations of the parties shall cease except as expressly set forth in this Agreement. Upon termination, Customer will discontinue use and/or distribution of Products, and either return to Mentor Graphics or destroy Products in Customer's possession, including all copies and documentation, and certify in writing to Mentor Graphics within ten business days of the termination date that Customer no longer possesses any Products or copies of Products in any form. Upon termination for Customer's breach, an End-User may continue its use and/or distribution of Customer's Product so long as (a) the End-User was licensed according to the terms of this Agreement and (b) such End-User is not in breach of its agreement nor a party to Customer's breach.
14. **EXPORT.** Products are subject to regulation by local laws and United States government agencies, which prohibit export or diversion of certain Products, information about the Products, and direct or indirect products thereof to certain countries and certain persons. Regardless of any disclosure Customer makes to Mentor Graphics of an ultimate destination of the Products or material provided under this Agreement, or direct or indirect products thereof, Customer warrants that it and its End-Users will not export in any manner, either directly or indirectly, any such Product or material, or direct or indirect product thereof, without first obtaining all necessary approval from appropriate local and U.S. Government agencies. Customer acknowledges that the regulation of product export is in continuous modification by local governments and/or the United States Congress and administrative agencies. Customer agrees to complete all documents and to meet all requirements arising out of such modifications.
15. **U.S. GOVERNMENT LICENSE RIGHTS.** Software was developed entirely at private expense. All Software is commercial computer software within the meaning of the applicable acquisition regulations. Accordingly, pursuant to US FAR 48 CFR 12.212 and DFAR 48 CFR 227.7202, use, duplication and disclosure of the Software by or for the U.S. Government or a U.S. Government subcontractor is subject solely to the terms and conditions set forth in this Agreement, except for provisions which are contrary to applicable mandatory federal laws.
16. **THIRD PARTY BENEFICIARY.** For any Software licensed under this Agreement and provided by Customer to End-Users, Mentor Graphics or the applicable licensor is a third party beneficiary of the agreement between Customer and End-User. Mentor Graphics Corporation, Mentor Graphics (Ireland) Limited, and other licensors may be third party beneficiaries of this Agreement with the right to enforce the obligations set forth herein.
17. **REVIEW OF LICENSE USAGE.** Customer will monitor the access to and use of Products. With prior written notice and during Customer's normal business hours, an internationally recognized accounting firm chosen by Mentor Graphics, shall have the right to review Customer's records, accounts and sublicensing documents deemed relevant by the internationally recognized accounting firm to confirm Customer's compliance with the terms of this Agreement or U.S. or other local export laws. Such review may include FLEXlm or FLEXnet (or successor product) report log files that Customer shall capture and provide at Mentor Graphics' request. Customer shall make records available in electronic format and shall fully cooperate with data gathering to support the license review. Mentor Graphics shall bear the expense of any such review unless a material non-compliance is revealed. Mentor Graphics shall treat as confidential information all Customer information gained as a result of any request or review and shall only use or disclose such information as required by law or to enforce its rights under this Agreement. Such license review shall be at Mentor Graphics' expense unless it reveals a material underpayment of fees of five percent or more, in which case Customer shall reimburse Mentor Graphics for the costs of such license review. Customer shall promptly pay any such fees. If the license review reveals that Customer has made an overpayment, Mentor Graphics has the option to either provide the Customer with a refund or credit the amount overpaid to Customer's next payment. The provisions of this Section 17 shall survive the termination of this Agreement.
18. **CONTROLLING LAW, JURISDICTION AND DISPUTE RESOLUTION.** The owners of the Mentor Graphics intellectual property rights licensed under this Agreement are located in Ireland and the United States. To promote consistency around the world, disputes shall be resolved as follows: This Agreement shall be governed by and construed under the laws of the State of Oregon, USA, excluding choice of law rules, if Customer is located in North or South America, and the laws of Ireland if Customer is located outside of North or South America. All disputes arising out of or in relation to this Agreement shall be submitted to the exclusive jurisdiction of Portland, Oregon when the laws of Oregon apply, or Dublin, Ireland when the laws of Ireland apply. Notwithstanding the foregoing, all disputes in Asia (except for Japan) arising out of or in relation to this Agreement shall be resolved by arbitration in Singapore before a single arbitrator to be appointed by the chairman of the Singapore International Arbitration Centre ("SIAC") to be conducted in the English language, in accordance with the Arbitration Rules of the SIAC in effect at the time of the dispute, which rules are deemed to be incorporated by reference in this section. This section shall not restrict Mentor Graphics' right to bring an action against Customer in the jurisdiction where Customer's place of business is located. The United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement.

19. **SEVERABILITY.** If any provision of this Agreement is held by a court of competent jurisdiction to be void, invalid, unenforceable or illegal, such provision shall be severed from this Agreement and the remaining provisions will remain in full force and effect.
20. **MISCELLANEOUS.** This Agreement contains the parties' entire understanding relating to its subject matter and supersedes all prior or contemporaneous agreements, including but not limited to any purchase order terms and conditions. This Agreement may only be modified in writing by authorized representatives of the parties. Waiver of terms or excuse of breach must be in writing and shall not constitute subsequent consent, waiver or excuse.

Rev. 091110, Part No. 242358