



# **Mentor® Embedded Sourcery™ Probe Professional Hardware Manual**

Version 2.3.4

February 2015

Document Revision 1
---------------------

---

**© 2011-2015 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 HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

**U.S. GOVERNMENT LICENSE RIGHTS:** The software and documentation were developed entirely at private expense and are commercial computer software and commercial computer software documentation within the meaning of the applicable acquisition regulations. Accordingly, pursuant to FAR 48 CFR 12.212 and DFARS 48 CFR 227.7202, use, duplication and disclosure by or for the U.S. Government or a U.S. Government subcontractor is subject solely to the terms and conditions set forth in the license agreement provided with the software, except for provisions which are contrary to applicable mandatory federal laws.

**TRADEMARKS:** The trademarks, logos and service marks ("Marks") used herein are the property of Mentor Graphics Corporation or other parties. No one is permitted to use these Marks without the prior written consent of Mentor Graphics or the owner of the Mark, as applicable. 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](http://www.mentor.com/trademarks).

The registered trademark Linux<sup>®</sup> is used pursuant to a sublicense from LMI, the exclusive licensee of Linus Torvalds, owner of the mark on a world-wide basis.

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](http://www.mentor.com)  
SupportNet: [supportnet.mentor.com/](http://supportnet.mentor.com/)

Send Feedback on Documentation: [supportnet.mentor.com/doc\\_feedback\\_form](http://supportnet.mentor.com/doc_feedback_form)

## Revision History

---

Revision	Changes	Date
0	Initial release.	Sept 2012
1	Added missing Mentor trademarks.	Feb 2015

## Revision History

---

# Table of Contents

---

## Chapter 1

<b>Introduction to Mentor Embedded Sourcery Probe Professional .....</b>	<b>7</b>
Related Documentation .....	7
About Sourcery Probe Professional .....	8
Supplied Components .....	8
Product Highlights .....	9
The Debugging Environment .....	10
Sourcery Probe Professional Benefits .....	10
Environmental Information .....	10
Product Disposal .....	12
Operating Requirements .....	12
Operating Conditions .....	12
Standard Electrostatic Precautions .....	12
Electrical Requirements .....	13
Target Power Requirements .....	13
Connecting the Power Supply Cable .....	14
Target System Requirements .....	15
Cycling Power to the System .....	15

## Chapter 2

<b>Connecting to a Network .....</b>	<b>17</b>
Connecting the Probe to the Network .....	17
Connecting to a Twisted Pair Interface .....	17
Configuring the Probe Network Settings .....	18
Testing Network Communication .....	19
Verifying Communication .....	19
Accessing Sourcery Probe Professional Remotely .....	19

## Chapter 3

<b>Connecting to the Target System .....</b>	<b>21</b>
Debug Port Connector Information .....	21
Connecting the Probe Tip Directly to a Debug Port Connector .....	22
Connecting the Probe Tip to a JTAG Header Using the Extension Cable .....	24
Connecting the Probe to a JTAG Header Using a Target Adapter Module .....	25
Connecting to the Target System Serial Port .....	26
Connecting the Target Serial Port .....	26
Configuring the Target Serial Port .....	27
Restoring the Target Serial Port to the Default Settings .....	28

## Chapter 4

<b>Using Sourcery Probe Professional .....</b>	<b>29</b>
Sourcery Probe Console .....	29

Accessing the Sourcery Probe Console via USB .....	29
Accessing the Sourcery Probe Console Using Telnet. ....	31
Debugging using Sourcery Probe Professional .....	32
Starting Sourcery Probe Professional .....	32
<b>Chapter 5</b>	
<b>Hardware Specifications .....</b>	<b>35</b>
LEDs on Sourcery Probe Professional. ....	35
Heartbeat Indicator .....	35
Run/Pause Indicator .....	36
Target Power Indicator .....	36
Active Indicator .....	36
Measure Indicator .....	36
RJ-45 Ethernet Connector with Link and Activity Indicators .....	36
Sourcery Probe Professional Status Indicators .....	37
Host Connectors on Sourcery Probe Professional .....	38
Target Connectors on the Sourcery Probe Professional .....	39
Sourcery Probe Professional Specifications .....	40
Electrical Characteristics .....	41
Physical Considerations .....	41
<b>Appendix A</b>	
<b>Debug Connector Information. ....</b>	<b>43</b>
Debug Connector and Probe Tip .....	43
<b>Appendix B</b>	
<b>Network Administration .....</b>	<b>49</b>
Sourcery Probe Professional Network Ports .....	49
Using netparam to Configure the Sourcery Probe Professional .....	49
Configuring a Dynamic IP Address .....	50
Configuring a Static IP Address .....	50
Static Routing .....	51
Specify a Default Gateway or Static Route Table (Optional). ....	52
Entering Static Routes. ....	53
Step-by-Step Guide to Configuring a Static IP. ....	55
<b>Appendix C</b>	
<b>Troubleshooting .....</b>	<b>59</b>
Troubleshooting Communications Problems. ....	59
Verify Network Communication .....	60
View Network Connections .....	60
Troubleshooting Power Problems .....	61
Troubleshooting Overheating Problems .....	61
<b>Embedded Software and Hardware License Agreement</b>	

# Chapter 1

## Introduction to Mentor Embedded Sourcery Probe Professional

---

Mentor Embedded Sourcery Probe Professional (Sourcery Probe Professional) is a tool that helps you develop and debug embedded software.

<b>Related Documentation</b> .....	<b>7</b>
<b>About Sourcery Probe Professional</b> .....	<b>8</b>
<b>Product Highlights</b> .....	<b>9</b>
<b>Environmental Information</b> .....	<b>10</b>
<b>Operating Requirements</b> .....	<b>12</b>
<b>Connecting the Power Supply Cable</b> .....	<b>14</b>
<b>Target System Requirements</b> .....	<b>15</b>
<b>Cycling Power to the System</b> .....	<b>15</b>

---

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

---

## Related Documentation

---

This manual describes the procedures for unpacking the probe, connecting the external power supply, setting up Ethernet communication, and connecting the probe to your target system.

- See the *Sourcery CodeBench Getting Started Guide* for details on installing and configuring your debugger.
- To update the firmware version of the Sourcery Probe Professional, 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.

## About Sourcery Probe Professional

The probe uses advanced emulation technology to provide control of and visibility into your target system. Combined with a host debugger, the probe speeds the debugging process by letting you interactively control and examine the state of your target system.

Sourcery Probe Professional is composed of two parts:

- The Ethernet probe

The probe is shown in [Figure 1-1](#). It provides visibility into and control of your target system using a JTAG interface. It connects to your host computer through a 10BaseT, 100BaseT, or 1000BaseT Ethernet link.

- A target system JTAG probe tip

A probe tip, shown in [Figure 1-1](#), is designed to provide a physical and electrical interface to the target system processor that you want to gain visibility into.

**Figure 1-1. Sourcery Probe Professional with ARM JTAG Probe Tip**



## Supplied Components

Before you use the Sourcery Probe Professional, verify that these components are present:

- The external power supply with US cord and adapters (3) EUR, UK, AUST.



- One ADAP, MOD JCK/RS232, Female (9pin D).
- One ADAP, MODJCK/RS232, Male (9pin D).
- One Debug Probe Tip.
- One cable Ethernet, straight, 6ft.
- One cable, USB 2.0 A-M to B-M, 1.2 m.
- One RJ11 cable, 7ft.
- One flexible probe tip extension cable.
- One cable, assy, 50 pin, flat ribbon 18 in. (Standard debug port probe tip cable assembly).

## Product Highlights

---

The Sourcery Probe Professional probe has these features:

- Supports ARM®, MIPS®, and PowerPC™ processors (via different probe tips).
- Supports all CPU core speeds.
- Lets you control and debug software running in-target, with minimal intrusion into target system operation.
- Lets you debug code in cache, ROM, RAM, and flash memory.
- Provides high performance:
  - Split-second single-step execution.
  - The probe is capable of JTAG download speeds greater than 1 MB per second from the host to the target system.

---

### Note



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

---

- Supports 10/100/1000BaseT Ethernet network connection.
- Supports telnet access to your target system's serial port, enabling you to interact with your target system's serial port over the network.
- Supports both big and little endian byte-order.
- Automatically supports target system signal levels from 1.2V to 3.3V.
- Includes the following software debug capabilities:
  - Control instruction execution.

- Display and modify target system memory.
- Examine and modify any processor registers.
- Run to breakpoints in ROM, RAM, or flash memory.
- Single-step through source and assembly language code views.
- Step into, over, or out of functions.

## The Debugging Environment

The Sourcery™ CodeBench debugger is integrated with Sourcery Probe Professional to give you control over the emulation functions and your target. They communicate via an Ethernet connection.

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 Professional Benefits

Sourcery Probe Professional provides these key benefits:

- Visibility

The probe enables you to observe registers and the current state of target system 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.

## Environmental Information

---

All components used in the probe are RoHS compliant.

The China RoHS HST table describes the hazardous materials that may be contained in the different components of the probe device. [Figure 1-2](#) shows the table.

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 Graphics									
As of May 18, 2010									
产品名称 Part Number and Name	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 Hexavalent Chromium (Cr+6)	多溴联苯 Polychlorinated biphenyls (PBB)	多溴二苯醚 Polychlorinated diphenyl ethers (PBDE)	中国 RoHS 标志	中国<<电子信息产品污染防治管理办法>>注 China RoHS Comment	是否符合欧盟 RoHS 指令 EU RoHS Compliant
246271-058 JTAG for PPC COP	0	0	0	0	0	0	10	**1	Yes
246272-058 JTAG for PPC DPL	0	0	0	0	0	0	10	**1	Yes
246273-058 JTAG for ARM	0	0	0	0	0	0	10	**1	Yes
246274-058 JTAG for MIPS	0	0	0	0	0	0	10	**1	Yes
246279-058 JTAG for ARM	0	0	0	0	0	0	10	**1	Yes
246280-058 JTAG for PPC	0	0	0	0	0	0	10	**1	Yes
246281-058 JTAG for MIPS	0	0	0	0	0	0	10	**1	Yes

## Product Disposal

To ensure the correct disposal of the Sourcery Probe Professional development hardware, Mentor Graphics® provides you with the means for disposal. When you determine that the product requires disposal, contact [embedded\\_support@mentor.com](mailto:embedded_support@mentor.com) for instructions. Include the following information:

- Part number
- Quantity
- Contact details
- Collection address

## Operating Requirements

---

Before setting up the system, prepare the operating environment.

## 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 to 40 °C (32° to 104 °F).
- Maximum relative humidity: 5% to 95% relative humidity, noncondensing.

## 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 probe and the target system, when connecting/disconnecting the probe and the target system, and when removing the cover of the instrument.

We recommend using the following precautions:

- Use wrist straps or heel bands with a  $1M\Omega$  resistor connected to ground.
- On the work surface and floor, use static conductive mats with a  $1M\Omega$  resistor connected to ground.

- Keep high static-producing items, like non-ESD-approved plastics, tape and packaging foam away from the probe and the target system.

**Note**

Consider the above precautions as the minimum requirements for a static controlled environment.

## Electrical Requirements

The probe is powered from the external power supply provided with your unit. It can use line voltages of 100-240 VAC (50/60 Hz). The probe tip draws less than 50uA from the target system.

We recommend that you use a surge protector between the power supply and AC power.

## Target Power Requirements


Several configurations are possible for providing power to the target system. The preferred configuration is for all target DC power supplies to use a 3-wire AC input with an earth (safety) ground and with the earth ground isolated from the DC return.

Table 1-1 shows various AC/DC configurations and the results of using each.

**Table 1-1. Target System Device Power Supply Configuration**

	AC Input	Isolation	Result
Preferred configuration	3-wire system with earth (safety) wire	AC earth is isolated from DC return. Target system DC is fully isolated and is floating.	Normal operation
Acceptable configuration	2-wire system with no earth (safety) wire	AC return is isolated from DC return. Target system DC is fully isolated and is floating.	Normal operation
Acceptable configuration	3-wire system with earth (safety) wire	AC return is tied to DC return. Target system DC is not isolated and is floating.	Configuration may result in unstable operation of DC signals.

**Table 1-1. Target System Device Power Supply Configuration**

	AC Input	Isolation	Result
Prohibited configuration 	2-wire system with no earth (safety) wire	AC return is tied to DC return. Target system DC is not isolated and is not floating	Configuration may result in unstable operation of DC signals and AC hum. A safety hazard may result from power supply or target system failure where DC voltage is connected to AC return.

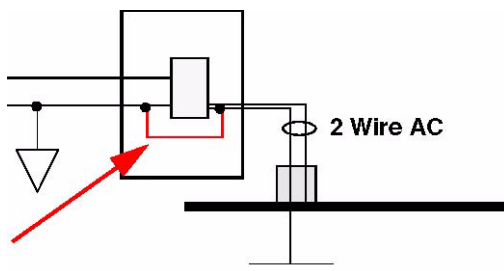
**Caution**



Do not use 2-wire AC input with the AC neutral tied to the DC return (Figure 1.3) on any power supply in the system. A failure in a power supply or target system where DC voltage becomes connected to AC neutral can result in personal injury and damage to the equipment.

The arrow in [Figure 1-3](#) shows the prohibited target power supply connection.

**Figure 1-3. Prohibited Target Power Supply Connection**



**Caution**



Good grounding practices must be observed when connecting digital grounds to earth ground because ground loops can induce sufficient currents to cause irregular operation of the combined system. Under no circumstances should the third wire prong on any power cord be removed or disconnected.

## Connecting the Power Supply Cable

Connect the power supply DC cable connector to the POWER connector on the probe.

[Figure 1-4](#) shows the power supply DC cable connected to the POWER connector on the probe.

### Caution



Use only the power supply that is provided with the probe. Although other power supplies might look similar, they can damage the probe if the supply specifications differ from the required specifications.

---

**Figure 1-4. Sourcery Probe Professional with Power Cable Attached**



## Target System Requirements

---

The probe automatically supports target system signal levels from 1.2V to 3.3V.

### Note



In the case of PowerPC targets with a  $\overline{QACK}$  signal, the  $\overline{QACK}$  signal must be pulled low for the probe to properly stop and restart the target. The probe pulls this signal low through the probe tip.

---

## Cycling Power to the System

---

When you need to apply or cycle power to the probe, connect or disconnect the power cable from the power source or from the probe. After you connect the probe to your target system, use the following sequence for applying or removing the power.

### Procedure

**To turn the power on:**

1. Apply power to the probe.
2. Apply power to the target system.

**To turn the power off:**

1. Remove power from the target system.
2. Remove power from the probe.



## Chapter 2

# Connecting to a Network

---

This chapter explains how to connect the probe to an existing Ethernet network. The probe is an Ethernet host device that can be configured for TCP/IP using either DHCP to acquire its IP configuration (the default method), or using a static IP configuration.

<b>Connecting the Probe to the Network</b> .....	<b>17</b>
<b>Testing Network Communication</b> .....	<b>19</b>
<b>Accessing Sourcery Probe Professional Remotely</b> .....	<b>19</b>

---

### Caution



Sourcery Probe Professional contains components that are subject to damage from electrostatic discharge. Always use proper anti-static protection measures when you use, handle, or transport the probe, or connect to or disconnect from a target system as specified in [Standard Electrostatic Precautions](#).

---

## Connecting the Probe to the Network

---

The probe's default operation is to acquire its network configuration automatically using DHCP, and optionally, attempt to register its hostname with a name server. The factory assigned host name is FSLxxyyzz where xxyyzz is the last three octets of the Ethernet MAC address provided on a label on the bottom side of the probe. For example, if the probe's Ethernet MAC address is 00:04:9f:00:77:31, the host name is FSL007731.

As shipped, the probe acquires its network configuration automatically using DHCP. If the network has a DHCP server, then it is best to leave the probe configured to use it. If you cannot use DHCP, then you must configure the probe for your network using static IP address resolution. See [Using netparam to Configure the Sourcery Probe Professional](#) for details on configuring the probe to use a static IP address.

The Sourcery CodeBench debugger can automatically find probes on the local subnet. However, if the probe is on a different subnet than your computer, for example if it is in the downstairs lab, then you may have to know the probe's IP address. You can find this using the Sourcery Probe console. See [Sourcery Probe Console](#).

## Connecting to a Twisted Pair Interface

You can connect the probe directly to a network using twisted pair (10/100/1000BaseT) cables.

## Procedure

1. Plug one end of the supplied RJ-45 cable (p/n 600-75499) into the RJ-45 connector of the probe, shown in [Figure 2-1](#).

**Figure 2-1. Sourcery Probe Professional with RJ-45 Cable Attached**



2. Connect the other end of the RJ-45 cable into the RJ-45 connector of your twisted pair network or host computer.

## Restrictions and Limitations

- When you configure the debugger for the hardware connection, you must provide the IP address or hostname of the probe. The Sourcery CodeBench debugger can automatically find probes that are on a local subnet, but you must specify the address or hostname if the debugger and probe are on different subnets.
- Depending on the type and complexity of your network, your network administrator might need to update network server tables so the network accesses the probe correctly. Updating network server tables requires both a detailed knowledge of Ethernet address resolution and network routing with write access permission to the server tables. See [Network Administration](#) for more information on managing your network.

## Related Topics

[Accessing the Sourcery Probe Console Using Telnet](#)

[Using netparam to Configure the Sourcery Probe Professional](#)

## Configuring the Probe Network Settings

To manually configure the network settings of the probe for your network, use the Sourcery Probe Console to access the built-in setup utility, `netparam`.

The `netparam` utility lets you select and modify network parameters that are saved in probe memory. Use `netparam` to configure the probe to match your network address resolution and routing protocols, as described in [Using netparam to Configure the Sourcery Probe Professional](#).

If the probe is able to communicate with hosts on other subnets, you will need to configure the probe for one of the following routing options:

- Default gateways
- Static routing tables

## Testing Network Communication

---

You can use the **ping** command to ensure the probe can communicate with the host.

### Note



You can find the IP address of your probe using the [Sourcery Probe Console](#).

---

## Verifying Communication

At a host command prompt, type:

```
ping hostname | ip_address
```

where *hostname* is the name and *ip\_address* is the IP address assigned to the Ethernet probe.

If no output is displayed on the screen, verify:

- The physical connections are tight.
- The probe address and netmask in the `hosts` file match those in probe flash.
- The netmask used for the probe and for the Ethernet Network Interface Card (NIC) are appropriate to the class of the IP address.

## Accessing Sourcery Probe Professional Remotely

---

You can remotely access the internal setup utility and the Target Serial port of the probe after you connect the probe to your network.

If the host computer is not physically located near Sourcery Probe Professional, remote access is useful when you need to do the following:

- Reconfigure communications (See [Using netparam to Configure the Sourcery Probe Professional](#))
- Use the serial port of your target system (See [Connecting to the Target System Serial Port](#))
- Reset the probe through your Ethernet connection

# Chapter 3

## Connecting to the Target System

---

This section explains how to connect a probe to the target system.

<b>Debug Port Connector Information</b> .....	<b>21</b>
<b>Connecting to the Target System Serial Port</b> .....	<b>26</b>

---

### Caution



The probe contains components subject to damage from electrostatic discharge. Always use appropriate anti-static protection measures when you use, handle, or transport the probe, or connect to or disconnect from a target system. These protective measures include static-free bench pads and grounded wrist straps.

---

## Debug Port Connector Information

---

Sourcery Probe Professional offers debugging capabilities without modifying any target system code or any special I/O port in the target system for communication with a monitor. Target system connections for PowerPC/COP, MIPS/EJTAG, ARM® EmbeddedICE, and CoreSight can be made using the JTAG port.

You can connect the probe to the target system in any of the following ways:

- Connect to the JTAG header on the target system directly with the probe tip. See [“Connecting the Probe Tip Directly to a Debug Port Connector”](#) on page 22.
- Connect to the JTAG header on the target system using a flexible extension cable that is provided with the probe. Use it when more clearance is required. See [“Connecting the Probe Tip to a JTAG Header Using the Extension Cable”](#) on page 24.
- Connect to the target system JTAG signals using a Target Adapter Module (TAM). Use it when the target system debug connector differs from the probe tip connector. See [“Connecting the Probe to a JTAG Header Using a Target Adapter Module”](#) on page 25.

---

### Caution



Failure to connect the probe tip connector to the target system might damage the probe or target system. Verify all connections before applying power.

---

**Table 3-1. Probe Tips**

	Product Model		
	ARM	PA or PPC	MIPS
<b>Probe Tip Debug Connector</b>	ARM-20	COP-16	MIPS-14
<b>TAM Accessories<sup>1</sup></b>	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.

“[Debug Connector Information](#)” on page 43 describes the debug port connector specifications.

## Connecting the Probe Tip Directly to a Debug Port Connector

If your target system has a standard debug port connector, you can directly connect the probe tip of the probe directly to the target system debug port connector.

### Procedure

1. Turn off the power to the target system and the probe.
2. Verify all the pins of the probe tip are properly aligned with the debug port connector on the target system. Use mechanical keying and the label on the probe tip as a guide. The PowerPC probe tip is shown in [Figure 3-1](#) (ARM and MIPS probe tips are similar).

**Figure 3-1. Sourcery Probe Professional PPC JTAG/COP Probe Tip**



3. Connect the probe tip 50-pin ribbon cable to the RUN CONTROL connector on the probe as shown in [Figure 3-2](#).

---

**i** **Tip:** If you have a PowerPC probe tip that is labeled “PA JTAG Probe Tip”, this works exactly the same as the “PPC JTAG Probe Tip” shown above. The only difference is the label on the hardware.

---



**Figure 3-2. Sourcery Probe Professional with PPC-JTAG Probe Tip**



4. Gently (but firmly) press the probe tip onto the target system debug port header. Make sure that you properly align the multi-pin socket connector with the multi-pin header on your target system.

---

**Note**



Ensure that pin 1 of the probe tip is connected to the pin 1 of the header. Do not force -- If the connectors are aligned correctly, they will engage smoothly. Use counter pressure behind the debug connector to avoid bending and potentially damaging the board.

---

## Connecting the Probe Tip to a JTAG Header Using the Extension Cable

Use the supplied flexible probe tip extension cable to connect the Sourcery Probe Professional to your target system if there is not enough clearance for the standard probe tip to fit onto the target system JTAG header.

### Procedure

1. Turn off the power to the target system and the probe.
2. Attach the multi-pin header end of the flexible probe tip extension cable to the JTAG socket of the probe tip as shown in [Figure 3-3](#).



**Figure 3-3. Flexible Probe Tip Extension Cable Attached to JTAG/COP Header**



The red stripe on the cable identifies pin 1. The pin assignment of the cable is identical to that of the probe tip socket.

3. Connect the other end of the flexible probe tip extension cable to the debug port header on your target system.

## Connecting the Probe to a JTAG Header Using a Target Adapter Module

Use a Target Adapter Module (sold separately) if your target provides a different type of debug connector than the probe tip.

### Procedure

1. Turn off power to the target system and the probe.
2. Attach the TAM to the probe tip.

3. Plug the TAM into your target board's debug connector.



## Connecting to the Target System Serial Port

---

Many target system boards have a built-in serial port. A console interface connection to the serial port of the target system lets you query and configure the state of your target system.

### Connecting the Target Serial Port

The probe provides a serial port that can be configured to access the serial port of the target system. This is useful if you need to access the serial port of a remotely located target system over Ethernet from the host system. An RJ-25 cable (P/N 600-76822) is also provided with the probe to connect to the serial port of your target system.

To connect the probe to the target system serial port, perform the following steps.

#### Procedure

1. Connect one end of the RJ-25 cable, and the appropriate adapter, to the serial port on your target system board.

2. Connect the other end of the RJ-25 cable to the probe RJ-25 serial connector, labeled TARGET SERIAL.

## Configuring the Target Serial Port

The Sourcery Probe Professional target serial port can be configured from the default settings.

[Table 3-2](#) shows the default settings of the Sourcery Probe Professional target serial port.

**Table 3-2. Sourcery Probe Professional Target Serial Port Default Settings**

For this option	Select
Baud rate	9600
Data bits	data8
Stop bits	stop1
Parity	no parity
Hardware flow control	nortscts
XON/XOFF flow control	noxon
Target echo feature	echo

If the probe target serial port settings do not match the serial port settings of your target system, perform the following steps.

### Procedure

1. Make sure network communications have already been configured correctly. For more information, see [Connecting the Probe to the Network](#).
2. Connect to the probe internal setup utility. For example, from a command shell, type `telnet probe_ip_address 1082`. For more information, see [Accessing the Sourcery Probe Console Using Telnet](#).
3. When the `core>` prompt appears on the terminal, use the `tgatty` command to configure the probe target serial port. To get a listing of options, type `help tgatty`:

```
core> tgatty baud_rate data_bits stop_bits parity
hardware_flow_control xon_off_flow_control echo_state
```

For example:

```
core> tgatty 19200 data8 stop2 noparity nortscts noxon echo
```

4. Verify the target serial port configuration:

```
core> tgatty
```

## Related Topics

[Accessing the Sourcery Probe Console Using Telnet](#)

[Connecting the Probe to the Network](#)

# Restoring the Target Serial Port to the Default Settings

To restore the default settings for the target serial port, perform the steps provided in this section.

## Procedure

1. Make sure network communications have already been configured correctly. For more information, see [Connecting the Probe to the Network](#).
2. Connect to the Ethernet TAP probe internal setup utility. For example, from a command shell, type `telnet probe_ip_address 1082`. For more information, see [Accessing the Sourcery Probe Console Using Telnet](#).
3. When the `core>` prompt appears on the terminal, use the **tgty** command to reset the target serial port to the default settings:

```
tgty default
```

## Related Topics

[Accessing the Sourcery Probe Console Using Telnet](#)

# Chapter 4

## Using Sourcery Probe Professional

---

This section provides instructions for accessing the Sourcery Probe console and provides system startup procedures.

<b>Sourcery Probe Console .....</b>	<b>29</b>
<b>Debugging using Sourcery Probe Professional .....</b>	<b>32</b>
<b>Starting Sourcery Probe Professional .....</b>	<b>32</b>

## Sourcery Probe Console

---

There are two ways you can access the Sourcery Probe console: USB and telnet. The following sections describe how to use both access methods.

## Accessing the Sourcery Probe Console via USB

This section provides the steps required to establish serial communication with the probe, which is required for some configuration procedures.

### Procedure


1. Connect one end of the USB cable (P/N 600-76787) to a USB port on your host computer.
2. Connect the other end of the USB cable to the USB connector of the probe, labeled *CONFIG*, shown in [Figure 4-1](#).



**Figure 4-1. Sourcery Probe Professional with USB Cable Attached**



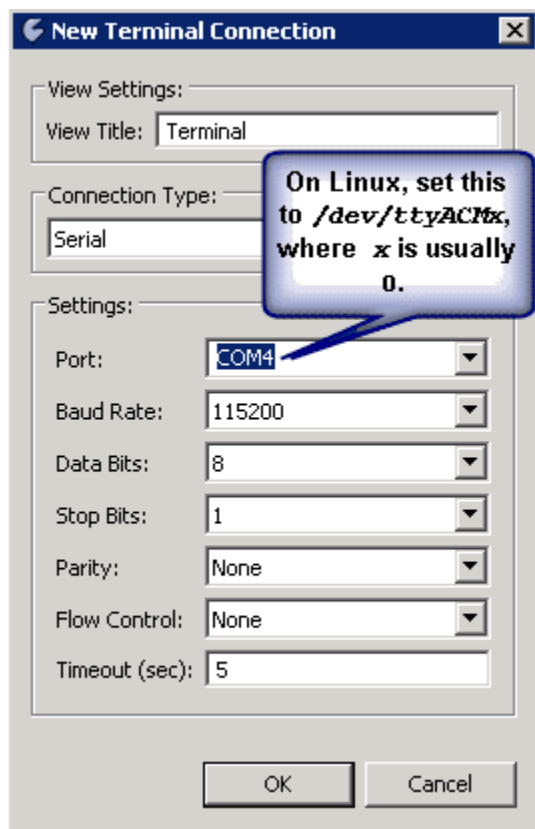
3. In Windows, you might need a driver before you can access the CONFIG port. The driver is installed automatically. If you find that drivers are not automatically installed:
  - a. Click the Windows **Start** button and type **device** into the search box.
  - b. Click **Device Manager** in the search results to launch it.

If the probe registered, but failed to find drivers, there will be two USB devices listed in the Device Manager screen with problems (  ). Right-click the USB device and select the option to install or update the drivers. Select the option to search Microsoft Update for a driver.

4. Identify the serial port device assigned to the probe.
  - o In Windows® XP, select **Start > Settings > Control Panel > Administrative Tools > Computer Management > Device Manager > Ports** and then select **USB serial port** from the ports list.
  - o On Windows 7, select **Start > Control Panel > Hardware and Sound > Device Manager > Ports (COM & LPT)**.
  - o On Linux®, the device file is located at: `/dev/ttyUSB0`.

5. Set up your terminal or terminal communication software (for example, Sourcery CodeBench Terminal View) as shown in Figure 4-2.

**Figure 4-2. Terminal View**



6. Turn on power to the probe. If the power is already on, push the reset button.
7. When prompted, press **Enter**. A boot screen will appear. Follow the instructions in the boot screen,
8. Once you are connected to the probe, the login banner is displayed and the `core>` command-line prompt appears. Type **help** for a list of the core commands.

## Accessing the Sourcery Probe Console Using Telnet

You can use telnet to connect to the Sourcery Probe Professional Target configuration console remotely over Ethernet.

### Procedure

1. Start a telnet session and connect to the Configuration console for the probe. You can use the Terminal view in Sourcery CodeBench to do this. To open the Terminal view,

from Sourcery CodeBench select **Window > Show Views > Other**. From the Show View dialog box, Select **Terminal > Terminal** and click **OK**.

```
telnet {hostname | ip_address}
```

Use the host name or IP address of the probe. For static IP, the *host* name must be the same one you entered into the hosts database file. The Configuration port number of the probe is 23.

The login banner is displayed, followed by the `core>` command-line prompt.

## Results

You should now have access to the configuration console for your target system.

## Related Topics

[Using netparam to Configure the Sourcery Probe Professional](#)

[Sourcery Probe Professional Network Ports](#)

# Debugging using Sourcery Probe Professional

---

This section explains how to start debugging with the probe.

Before you begin to debug with the probe, ensure the following:

- The probe is connected to your network.
- The probe is connected to the target system.
- The debugger software is installed.
- The software is configured to communicate with the probe.

## Starting Sourcery Probe Professional

---

This section provides the steps required to prepare for debugging with the probe.

## Prerequisites

The debugger software is installed.

## Procedure

1. Apply power to the probe.
2. Apply power to the target system.



**Note**



The probes can require some time to establish the network connection, especially when using DHCP. The heartbeat LED blinks green when the probe is ready for use. For information on the LED indicators, see [LEDs on Sourcery Probe Professional](#).

---

3. Start the debugger.
4. Configure the debugger for the probe connection. Refer to [the Sourcery CodeBench debugger documentation](#) for information on how to perform the configuration.

You are now ready to begin your debug session. Refer to the debugger documentation for information on using the debugger.



# Chapter 5

## Hardware Specifications

---

This section provides hardware specifications for the Sourcery Probe Professional.

### LEDs on Sourcery Probe Professional

---

The Sourcery Probe Professional device has a number of indicator LEDs

[Figure 5-1](#) shows the various LEDs of the probe.

**Figure 5-1. Sourcery Probe Professional — Top View**



### Heartbeat Indicator

The Heartbeat LED (labeled HEARTBEAT) indicates the status of communication between the probe and the network:

- The LED is red until the probe boot code starts running.
- The LED flashes orange (1Hz) during configuration of the network interface.
- The LED flashes green (1Hz) after the network interface is successfully configured and the probe is ready for use. During firmware updates, the LED flashes green at a higher frequency (5Hz).



**Note**

Do not remove power, unplug the network, or press the reset button during firmware updates.

---

- The LED is unlit if the probe is not powered on.
- The LED flashes red if the probe is overheating.

## Run/Pause Indicator

The status LED (labeled RUN/PAUSE) indicates the state of the target:

- The LED is initially unlit and remains so until the debugger connects to the probe.
- The LED is green when the target is in run mode.
- The LED is red when the target is in pause mode.
- The LED is orange when the target is in mixed mode.

## Target Power Indicator

The target power LED (labeled TARGET POWER) indicates whether the probe detects target power.

- The LED is green when target power is detected.
- The LED is unlit when no target power is detected.

## Active Indicator

The active LED (labeled ACTIVE) is unused at this time.

## Measure Indicator

The measure LED (labeled MEASURE) is unused at this time.

## RJ-45 Ethernet Connector with Link and Activity Indicators

The Sourcery Probe Professional interface consists of an RJ-45 connector and a built-in twisted pair MAU that connects directly to 10/100/1000BaseT twisted pair networks.

See [Connecting the Probe to the Network](#) for more information on connecting to a network.

The probe link and activity indicators are integrated into the RJ-45 probe connector:

- The yellow indicator is turned on when the probe is connected to any network, and flickers when data is being transferred across the network.
- The green indicator is turned on when the probe is connected to a 1000BaseT network and flickers when data is being transferred across the network.

## Sourcery Probe Professional Status Indicators

The probe uses LEDs to indicate its status.

If you encounter problems related to Ethernet communication, consult the status indicator information in [Table 5-1](#).

**Table 5-1. Sourcery Probe Professional Status Indicators**

LED	Location	Activity	Description
HEARTBEAT	Top	Off	Probe is not powered on.
		Solid Red	Probe is executing the BootLoader or has failed to boot.
		Orange heartbeat	Probe Operating System running and network interface is initializing.
		Green heartbeat	Probe Operating System running and network interface successfully configured.
		Red heartbeat	Probe is overheating. Remove airflow obstructions, and contact Customer Support if the problem persists.
RUN/PAUSE	Top	Off	Debugger is not connected to probe.
		Solid red	Probe is in pause mode.
		Solid green	Probe is in run mode.
		Solid orange	Probe is in mixed mode.
TARGET POWER	Top	Off	Target system power is not detected.
		Solid green	Target system power is detected.
ACTIVE	Top	Off	
MEASURE	Top	Off	

**Table 5-1. Sourcery Probe Professional Status Indicators (cont.)**

LED	Location	Activity	Description
ACTIVITY	Ethernet Connector	Off	Ethernet is not transmitting or receiving data.
		Green heartbeat	Ethernet is transmitting or receiving.
LINK	Ethernet Connector	Off	Ethernet is not linked.
		Solid Orange	Ethernet is linked.

## Host Connectors on Sourcery Probe Professional

The Sourcery Probe Professional device has a number of connectors.

Figure 5-2 shows the host connectors of the probe.

**Figure 5-2. Sourcery Probe Professional — Host End View**



### Reset Button

The reset button is used to reboot the probe.

### Power Connector

The Power connector on the probe is used to connect the DC power supply cable.

### RJ-45 Ethernet Connector

Use the Ethernet connector on the probe to connect to an 10/100/1000BaseT Ethernet.

## Config USB Connector

The Config USB port on the probe acts as a virtual serial device that supports RS-232 communication protocol at 115200 baud. The Config USB port is used for configuring network communication, entering routing tables, and diagnostics.

# Target Connectors on the Sourcery Probe Professional

The Sourcery Probe Professional device has a number of connectors.

Figure 5-3 shows the target connectors of the probe.

**Figure 5-3. Sourcery Probe Professional — Target End View**



## RJ-25 Target Serial Connector


The probe provides a target serial port that can be configured to access your target's serial port. This is useful if your host computer is not near the target and you need to access your target's serial port remotely over your network.

Table 5-2 shows the pinout definition of the target serial port.

**Table 5-2. Pinout Definitions for Target Serial Port**

Pin	Signal
1	Ready to Send (RTS)
2	Ground
3	Receive Data (RxD)
4	Transmit Data (TxD)
5	Ground
6	Clear to Send (CTS)

**Note**

 Pin 1 is located on the right side when you view the RJ-11 socket with the locking tab on the bottom.

---


## Run Control Probe Tip Cable Connector

The probe tip ribbon cable is connected to the 50-pin connector on the probe.

## Debug Port Connector

The debug port socket is on the end of the probe tip and is used to connect the probe to a debug port header on your target system.

**Note**

 Ensure that Pin 1 of the probe tip is connected to the Pin 1 of the header.

---

## Sourcery Probe Professional Specifications

---

This section details the specifications of the Sourcery Probe Professional device.

The dimensions of the probe are shown in [Figure 5-4](#).

**Figure 5-4. Sourcery Probe Professional Dimensions**





## Electrical Characteristics

The probe affects the load on only those signals that are connected to the debug port connector. Loading depends on the method used to connect the probe to the target system.

The probe affects the target processor and target electrical characteristics. Caution should be taken in designing the target to accommodate the small signal delays associated with an in-circuit emulator or other test equipment.

The probe automatically supports target signal levels from 1.2V to 3.3V.

### Note



A probe tip draws less than 50  $\mu$  A from the target to detect target power.

## Physical Considerations

This section details the physical characteristics of the Sourcery Probe Professional device.

[Table 5-3](#) shows the physical characteristics of the probe.

**Table 5-3. Sourcery Probe Professional - Physical Characteristics**

Physical Characteristic	Description	Value
<b>Power Consumption</b>		
	Probe power consumption from external power supply	5A @ 12V maximum
	Probe power consumption from target	Less than 50 $\mu$ A to detect target power
<b>Environmental Requirements</b>		
	Operating temperature	0 to 40 °C (32 to 104 °F)
	Storage temperature	-40 to 70 °C (-40 to 158 °F)
	Humidity	5% to 95% relative humidity, non-condensing
<b>Physical Size</b>		
	Probe dimensions	8.473" x 6.2" x 2.661" (21.52 cm x 15.74 cm x 6.75 cm)
	Run Control probe tip enclosure dimensions (excluding connector)	approx. 2.25" x 1.75" x 0.625" (5.72 cm x 4.44 cm x 1.59 cm)

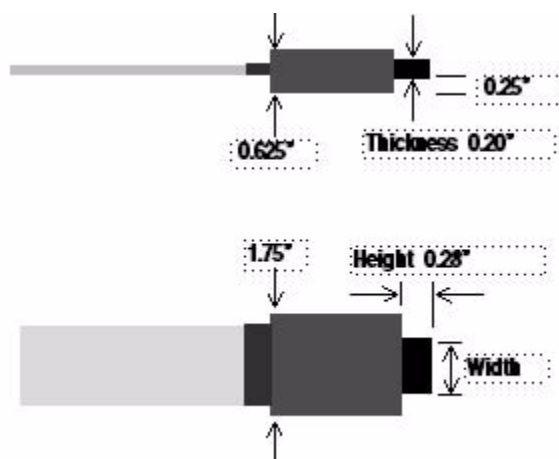
**Table 5-3. Sourcery Probe Professional - Physical Characteristics (cont.)**

Physical Characteristic	Description	Value
<b>Run Control Target Socket Dimensions<sup>1</sup></b>		
	Height (out of probe tip enclosure; above board)	0.28" (0.71 cm)
	Thickness	0.20" (0.51 cm)
	Pin-to-pin spacing	0.1" (0.25 cm)
	JTAG/COP width	0.8" (2.0 cm)
	Black and gray cable	approximately 16.0" x 1.25" x 0.126" (40.64 cm x 3.18 cm x 0.32 cm)

1. Figure 5-5 shows the target connector dimensions.

Figure 5-5 shows the target connector dimensions.

**Figure 5-5. Target Connector Dimensions**



# Appendix A

## Debug Connector Information

---

This Appendix provides details on the debug connector of the Sourcery Probe Professional device.

### Debug Connector and Probe Tip

---

The debug connector depends on the probe tip that is installed. There are three different kinds: ARM, MIPS, and PPC/COP.

---

**i** **Tip:** If you have a PowerPC probe tip that is labeled “PA JTAG Probe Tip”, this works exactly the same as the “PPC JTAG Probe Tip”. The only difference is the label on the hardware.

---

Refer to the *Mentor Embedded Sourcery Probe Target Connection* application note for information about pin assignments for the various debug connectors:

If you have a SupportNet account, you can access the application note here:

<http://supportnet.mentor.com/reference/appnotes/library/10891.pdf>.

If you have a CodeSourcery Portal account, you can find the application note here:

<https://sourcery.mentor.com/GNUToolchain/kbentry247>.

**Table A-1** lists the signal names, direction, pin numbers, descriptions, drive capabilities, and operational requirements.

---

#### Note



To ensure proper and stable operation between the probe and the target system, the JTAG and debug I/O signals must meet the requirements listed in **Table A-1**.

---

**Table A-1. Sourcery Probe Professional for JTAG/COP Signal Descriptions**

ARM	MIPS	PowerPC	Signal Direction	Electrical Specification	Requirement
TCK	TCK	TCK	From probe connector	50mA driver	Must be wired to the target processor. The probe drives the TCK output with up to 50mA. Keep the TCK trace run as short as possible and maintain a "two signal width" spacing from any other parallel dynamic signal trace.
RTCK	-	-	From Target	17PF	Wired to the target processor. RTCK is an output from the target processor and an input to the probe. The RTCK trace run should be kept short and maintain a "two signal width" spacing from any other parallel dynamic signal trace. If not used, it should be grounded or pulled up with a 10K resistor. This is not connected on MIPS or PowerPC probe tips.
TMS	TMS	TMS	From probe connector	50mA driver	Must be wired to the target processor. The probe drives the TMS output with up to 50mA. Keep the TMS as short as possible and maintain a "two signal width" spacing from any other parallel dynamic signal trace. TMS should have a parallel termination option at the processor.

**Table A-1. Sourcery Probe Professional for JTAG/COP Signal Descriptions**

ARM	MIPS	PowerPC	Signal Direction	Electrical Specification	Requirement
TDI	TDI	TDI	From probe connector	50mA driver	Must be wired to the target processor. The probe drives the TDI output with up to 50mA. The TDI trace should be kept short and maintain a "two signal width" spacing from any other parallel dynamic signal trace. TDI should have a parallel termination option at the processor.
TDO	TDO	TDO	From target	17pF load	Must be wired to the target processor. TDO is an output from the target processor and an input to the probe. The TDO trace run should be kept short and maintain a "two signal width" spacing from any other parallel dynamic signal trace. TDO should have a series termination resistor located near the target processor.

**Table A-1. Sourcery Probe Professional for JTAG/COP Signal Descriptions**

ARM	MIPS	PowerPC	Signal Direction	Electrical Specification	Requirement
nTRST	TRST*	$\overline{\text{TRST}}$	From probe connector	50mA driver <sup>1</sup>	Must be wired to the target processor. The probe drives the TRST output with up to 50mA. To gain control of the processor, the probe negates $\overline{\text{TRST}}$ approximately 250 milliseconds before negation of $\overline{\text{HRST}}$ . This allows the probe to issue COP commands through the JTAG/COP interface and gain control of the processor upon negation of $\overline{\text{HRST}}$ . The $\overline{\text{TRST}}$ trace run should be kept short and maintain a "two signal width" spacing from any other parallel dynamic signal trace.
nSRST	RST*	$\overline{\text{SRST}}$	Bi-directional	Open-drain. 100Ohm to ground when asserted by probe, 22pF load when not asserted. <sup>1</sup>	Can be wired to the target processor. During reset, the probe drives SRST to ground through a 100Ohm resistor.
-	-	$\overline{\text{HRST}}$	Bi-directional	Open-drain. 100Ohm to ground when asserted by probe, 22pF load when not asserted. <sup>1</sup>	Must be wired to the target processor. During reset, the probe drives $\overline{\text{HRST}}$ to ground through a 100Ohm resistor.
DBGRQ	DINT	$\overline{\text{CKSI}}$	From probe connector	50mA driver	Need not be wired to the target. ARM and PowerPC probes do not currently use this signal. The DINT signal may be asserted on some MIPS targets to force entry to debug mode, but is not normally used.

**Table A-1. Sourcery Probe Professional for JTAG/COP Signal Descriptions**

ARM	MIPS	PowerPC	Signal Direction	Electrical Specification	Requirement
DBGACK	-	$\overline{\text{CKSO}}$	From target	17pF Load <sup>2</sup>	Wired to the target processor. The probe senses CKSO to determine if the processor halted execution in a checkstop state.
-	-	HALTED	From target	17pF load	Should be wired to the PowerPC HALTED signal on those processors which support it. This is not connected on ARM or MIPS probe tips.
-	-	$\overline{\text{QACK}}$	From probe connector	100Ohm pull-down	Can be wired to the target processor. QACK is an input to most PowerPC processors and must remain low while the probe is connected to the target. The probe connects this signal internally to the JTAG/COP GND pin (16) through a 100Ohm resistor.
VREF	VREF	TGT PWR	From target	2MOhm pull-down, plus 0.01uF load.	Must be wired to the target. The probe uses this signal to determine if power is applied to the target. This signal is also used as a voltage reference for the signals driven by the probe ( $\overline{\text{CKSI}}$ , $\overline{\text{TRST}}$ , TCK, TMS, TDI). TGT PWR (pin 6) should be connected to target Vcc through a 1KOhm pull-up resistor.

1. 4.7KOhm pull-up to buffered TGT PWR.





# Appendix B

## Network Administration

---

This Appendix describes how to set up the Sourcery Probe Professional communication parameters.

**Sourcery Probe Professional Network Ports..... 49**

**Using netparam to Configure the Sourcery Probe Professional ..... 49**

Sourcery Probe Professional is an Ethernet host device that can be configured for TCP/IP either using DHCP to acquire its IP configuration (the default method) or using a static IP configuration.

## Sourcery Probe Professional Network Ports

---

Software communicates with the probe through various network ports. In the case where the probe and host software are on the same network, it is not necessary to be aware of these ports. However, in the case of a probe located on a protected network, an administrator must provide access to these ports if you want to connect to the probe from another network.

[Table B-1](#) shows the ports used by the probe and provides a brief description of each port.

**Table B-1. Sourcery Probe Professional Network Ports**

Port Number	Description
23	Telnet access to configuration console
1082	Telnet access to target serial port
1087	Used for system firmware updates and by the PowerPC debugger to initialize the probe
19119	Used by ARM and MIPS debuggers for probe configuration
41474	Used by the PowerPC debugger to control the probe
51410	Used by ARM and MIPS debuggers to control the probe
53099	Used by the PowerPC debugger to check probe status

## Using netparam to Configure the Sourcery Probe Professional

---

Use the `netparam` command to select the network parameters:

- Address resolution protocol
- Static address resolution data
- Static routing tables

---

**Caution**

netparam writes its settings into non-volatile flash memory on the probe. Each time you enter a netparam command, wait for the `core>` prompt to re-appear before entering the next command.

---

## Configuring a Dynamic IP Address

To configure a dynamic IP address, perform these steps.

### Procedure

1. Connect to the probe internal setup utility. For example, from a command shell, type `telnet probe_ip_address`. For more information, see [Using netparam to Configure the Sourcery Probe Professional](#).
2. At the `core>` prompt, use `netparam` to specify the protocol appropriate to your network:

```
netparam bootconfig dhcp[:hostname]
```

DHCP is the default setting. If you specify a hostname for the probe, the probe will attempt to register the host name with the DHCP server, that will then update any name servers on the network.

## Configuring a Static IP Address

This section covers the set up of a static IP address for the Sourcery Probe Professional.

If you are unfamiliar with IP address concepts, refer to the section [Step-by-Step Guide to Configuring a Static IP](#).

---

**Note**

Because this is a proven method to add a probe to a TCP/IP network, we recommend using it if you have any network communication problems.

---

To enter the IP and optional netmask in flash, perform the following steps.

### Procedure

1. Ask your network administrator to assign an unused IP (Internet Protocol) address and host name to the probe.

2. Enter the name/address pair into the `hosts` database file. Windows hosts files are typically located in the `%system_root%\system32\drivers\etc\` directory.

**Figure B-1. Probe Entries in a `hosts` File for a Windows Host Environment**

Internet Address (IP)	Assigned Host Name	Comment
↓	↓	↓
128.9.230.61	my_tap	#Sourcery Probe Professional 1
128.9.230.62	hayduke	#Sourcery Probe Professional 2

#### Note



You should create or update the `hosts` file on the network server or on each local workstation that requires access to the probe.

---

3. At the `core>` prompt, use `netparam` to set and store the IP address and netmask (subnetting only) in the probe flash EPROM.

```
netparam static_ip_address nnn.nnn.nnn.nnn
[ : mmm.mmm.mmm.mmm ]
```

Where `nnn.nnn.nnn.nnn` represents the IP address and `mmm.mmm.mmm.mmm` represents the subnet mask.

## Static Routing

The simplest networks consist of one or more subnets. Routers forward network traffic from one point on the network to another across these subnets.

If the probe uses DHCP to automatically acquire its network settings, it is most likely that a default gateway setting was acquired and the probe will be accessible on other subnets.

However, when using a static IP configuration or where the DHCP configuration is incomplete, you might need to provide additional routing information, including:

- Store a default gateway in flash memory
- Load static routing tables into flash memory

## Specify a Default Gateway or Static Route Table (Optional)

If you are using a static IP configuration, or your DHCP configuration does not specify a default gateway, you can manually enter the IP address of the default gateway to use. This gateway must be accessible on your local subnet.

### To Specify a Default Gateway

A default gateway entry must specify the IP address of the first gateway that network traffic from the probe crosses. Failing to specify gateway information can cause problems with the probe's discovery feature. This gateway must be aware of the network's complete route table. Use the following netparam syntax:

```
netparam add_route 0.0.0.0 gateway_ip 1
```

For *gateway\_ip*, provide the IP address of the router or gateway in dot notation. The default value is *0.0.0.0*.

### Changing an Existing Route Entry

Before entering static routes, make a map of all gateway paths between the probe, as a starting point, and each workstation that must have access to it.

---

#### Note



If you enter static routes in the probe, they are not updated automatically. You must update these routes if changes in the network topology affect the static routes.

---

To change an existing routing entry, perform the following steps.

#### Procedure

1. At the `core>` prompt, delete the existing routing entry:

```
netparam delete_route host_ip
```

2. Enter the new route:

```
netparam add_route host_ip gateway_ip hop_#
```

---

#### Note



*host\_ip* can identify an individual workstation or a network serving multiple hosts. The *gateway\_ip* is the first gateway the probe traffic crosses when communicating with the destination workstation. The *hop\_#* is the decimal number of gateways between the probe and the destination workstation.


---

## Entering Static Routes

Before entering static routes, make a map of all gateway paths between the probe, as a starting point, and each workstation must have access to it.

---

**Note**

 When you enter static routes into the probe, static routes are not updated automatically. You must update these routes if changes in network topology affect the static routes.

---

To enter a static route or default gateway, perform the following steps.

### Procedure


1. At the `core>` prompt, use the `netparam` command to enter the first host/gateway pair:

```
netparam add_route host_ip gateway_ip hop_#
```

**NOTE:** Wait for the `core>` prompt between each `netparam` entry.

---

**Note**

 *host\_ip* can identify an individual host or a network serving multiple hosts. The *gateway\_ip* is the first gateway the probe crosses when communicating with the destination host. The *hop\_#* is the decimal number of gateways between the probe and the destination host.

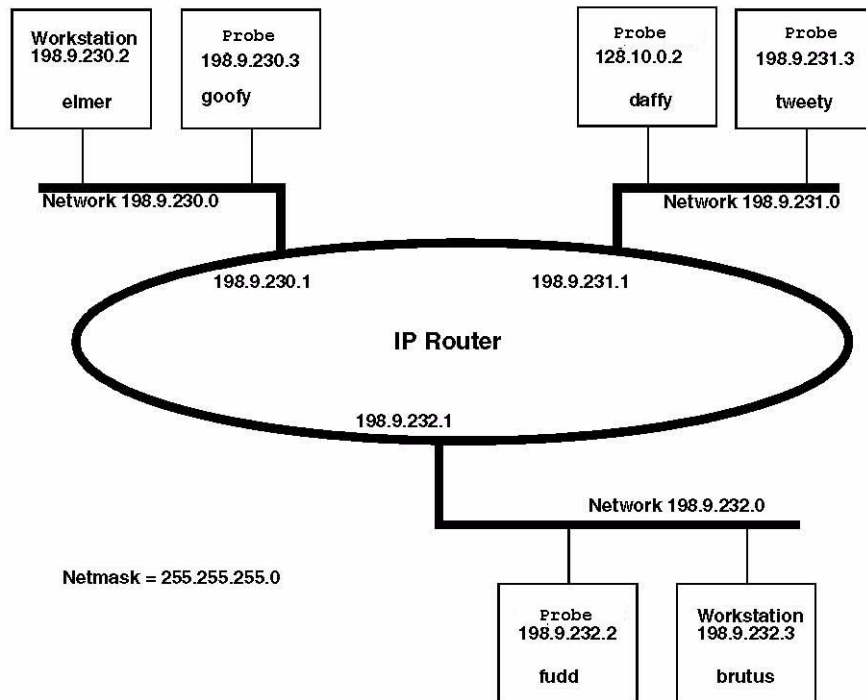
---

2. Add routes until all destination hosts or networks are defined.
3. When the `core>` prompt returns, reset the probe by cycling power, or by entering the `reset` command.

Figure B-2 shows three class “C” networks joined together by a single IP router, making each probe accessible from three workstations (elmer, tweety, and brutus).

**Figure B-2. Example Network with 1 Router**

**Figure E.1 Three Class C Networks Connected by a Single Router**



No static routing information is required to make a probe accessible from a workstation local to it on a network. For example, the probe `goofy` on network `198.9.230.0` communicates directly with workstation `elmer`.

When static routing is used, a routing entry is required on a probe for each workstation on a non-local network that accesses it. The probe `goofy` requires two entries, one for workstation `tweety` on network `198.9.231.0` and one for workstation `brutus` on network `198.9.232.0`.

Each static route entry is made using a `netparam` command and consists of a *network address* and a *host address*. The `netparam` commands for the static route entries for probe `goofy` are:

```
netparam add_route 198.9.231.0 198.9.230.1 1
netparam add_route 198.9.232.0 198.9.230.1 1
```

Each of the three probe hosts must have a static route entry for each remote workstation that accesses it.

To delete a static route, use the `netparam` command:

```
core> netparam delete_route 1
SIOCADDRT: Network is unreachable
core> netparam
ethernet_address      = 00:04:9F:00:FF:80
bootconfig            = static:MEGJ
static_ip_address     = 192.168.0.201:255.255.255.0
static_dns_server     = 0.0.0.0
```

```
static_hosts          = <none>
static_routes         = destination      gateway      metric
                      -----
                      default          134.86.179.254  1

core> netparam delete_route default
core> netparam
ethernet_address      = 00:04:9F:00:FF:80
bootconfig            = static:MEGJ
static_ip_address     = 192.168.0.201:255.255.255.0
static_dns_server     = 0.0.0.0
static_hosts          = <none>
static_routes         = <none>
core>
```

## Step-by-Step Guide to Configuring a Static IP

This section provides the steps required to assign a static IP address and host name to the probe.

### Prerequisites

- You must have write permissions to the network database or the assistance of your network system administrator.

### Procedure

1. Use a terminal emulator to log into the USB serial port of your probe. After login, you'll be presented with a `core>` prompt.

From this prompt, use the `netparam` command to review the current network settings. The following example shows a DHCP (default) output:

```
core> netparam
ethernet_address      = 00:04:9F:00:FF:65
bootconfig            = dhcp:FSL00FF65 (134.86.178.206)
static_ip_address     = <none>
static_dns_server     = <none>
static_hosts          = <none>
static_routes         = <none>
```

2. Use the `ping` command to verify that the static IP address assigned to you by your network administrator is not currently in use by someone else as shown in the following example:

```
H:\>ping 134.86.178.63
Pinging 134.86.178.63 with 32 bytes of data:
Reply from 134.86.178.187: Destination host unreachable.
```

3. Gather the other network settings you require.

Use the `ipconfig` command to display the information on a Windows machine that is on the same physical subnet as the probe you are configuring. The `ipconfig` command



enumerates the network adapters on your system. You must determine which adapter information is for the physical network to which your probe is connected.

```
H:\>ipconfig /all
```

Ethernet adapter Local Area Connection:

```
Connection-specific DNS Suffix . : sje.mentorg.com
Description . . . . . : Intel(R) 82567LM Gigabit Network
Connection
Physical Address. . . . . : 00-24-E8-91-37-2E
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . :
fe80::e589:cc9d:86f9:1835%12(Preferred)
IPv4 Address. . . . . : 134.86.178.186(Preferred)
Subnet Mask . . . . . : 255.255.254.0
Lease Obtained. . . . . : Thursday, September 30, 2010 11:33:29
AM
Lease Expires . . . . . : Tuesday, October 05, 2010 5:27:44 PM
Default Gateway . . . . . : 134.86.179.254
DHCP Server . . . . . : 134.86.188.34
DHCPv6 IAID . . . . . : 251667688
DHCPv6 Client DUID. . . . . : 00-01-00-01-13-CE-A5-3A-00-24-E8-91-
37-2E
DNS Servers . . . . . : 134.86.188.38
134.86.188.11
134.86.188.57
Primary WINS Server . . . . . : 147.34.97.74
Secondary WINS Server . . . . . : 134.86.188.34
NetBIOS over Tcpip. . . . . : Enabled
```

4. Use the netparam command to make the settings in the probe as shown here:

```
core> netparam static_ip_address <static ip>:<subnet mask>
core> netparam add_route default <gateway> 1
core> netparam static_dns_server <dns server ip>
core> netparam bootconfig static
```

---


### Caution



The netparam utility copies its settings into non-volatile memory on the probe. Follow these rules while using netparam utility:

---

- Each time you enter a netparam command, wait for the core> prompt to reappear before entering the next command. The prompt indicates that the parameter change has been logged.

 **Note** The add\_route entry is required if you want to access your probe from outside the subnet the probe is connected to. The static\_dns\_server entry is required if you wish to access the probe via a symbolic hostname. The hostname is constructed from the bottom three fields of the MAC address (no colons) preceded by FSL. Your network name server must support DDNS protocols for this to work. If you find that the auto discovery feature in CodeBench or the command line tool does not list your probe, please make sure these two settings are set correctly for your network.

---

- When you have finished entering all settings, type **reset** at the core> prompt. When the probe restarts, it uses the new netparam parameters.

```
core> reset
```

## Results

- The reset command reboots the probe and once it returns you to the core> prompt, you can review the settings:

```
core> netparam
ethernet_address      = 00:04:9F:00:FF:65
bootconfig            = static:FSL00FF65
static_ip_address     = 134.86.178.63:255.255.254.0
static_dns_server     = 134.86.188.11
static_hosts          = <none>
static_routes         =
  destination         gateway         metric
  -----
  default              134.86.179.254    1
```



# Appendix C

## Troubleshooting

---

This Appendix provides Sourcery Probe Professional troubleshooting information.

<b>Troubleshooting Communications Problems .....</b>	<b>59</b>
<b>Troubleshooting Power Problems .....</b>	<b>61</b>
<b>Troubleshooting Overheating Problems .....</b>	<b>61</b>

## Troubleshooting Communications Problems

---

This section explains how to troubleshoot communication problems between the debugger and the probe.

If the debugger is unable to communicate with Sourcery Probe Professional:

- Check the cable and connections between the network cable and the probe.  
The probe connects directly to networks that use twisted pair (10/100/ 1000BaseT) cables.
- Ensure communication is configured correctly for your network.
- Ensure the probe is receiving power.  
See [Sourcery Probe Professional Status Indicators](#) for a description of the status LEDs.
- Ensure the probe is running the operating system software by checking the Heartbeat LED.  
See [Sourcery Probe Professional Status Indicators](#) for a description of the status LEDs.
- Use the communication troubleshooting utilities of the probe to verify that it is recognized on your network, or to help diagnose problems connecting to your network.  
To troubleshoot communication, see [Verify Network Communication](#).
- Ensure the debugger is set up correctly for Ethernet communication with the probe.

If all the settings are correct and the debugger cannot communicate with the probe, visit SupportNet (<http://supportnet.mentor.com/>) for assistance.

## Verify Network Communication

If you want to verify the probe is up and running on your network, enter the `ping` command at the `core>` prompt of the probe to determine if it can communicate with your computer.

To verify network communication, perform the following steps.

### Procedure

1. Connect to the probe internal setup utility (See [Using netparam to Configure the Sourcery Probe Professional](#)).
2. Verify communication by entering this command at the `core>` prompt:

```
ping ipaddress | hostname
```

For example, to ping a hostname named *my\_pc* at IP address *128.9.230.61*, enter the command:

```
ping 128.9.230.61
```

or —

```
ping my_pc
```

#### Note



When you establish communication, you must ping the IP address used during the setup process, because the Sourcery Probe Professional might not automatically recognize the hostname. To ping a hostname, the probe internal host table must first be updated.

---

## View Network Connections

If you want to check your network configuration and activity, use the `netstat` command. This command displays all the network statistics on active connections, including their current status, connected hosts, and running programs. You can also see information about the routing table and get statistics on your network interfaces.

To run the `netstat` command, perform these steps.

### Procedure

1. Connect to the internal setup utility of the probe.
2. At the `core>` prompt, enter the `netstat` command using this syntax:

```
netstat -s
```

The output of this command shows whether data is being sent or received over the network.

## Troubleshooting Power Problems

---

If the probe behaves erratically, check the connections to the external power supply.

### Solution

The LED labeled HEARTBEAT indicates whether the probe is receiving power. If this LED is not lit, check the connections to the external power supply.

## Troubleshooting Overheating Problems

---

The following problems indicate the cause of overheating of the Sourcery Probe Professional:

- Excessive fan noise:

The probes have cooling fans that keep critical components from overheating. These fans generally run quietly, but will run faster and louder if the probe is getting too hot.

- Red heartbeat LED:

The probe monitors the temperature of several key components, and will change the color of the heartbeat LED to red if these components get close to overheating.

- Unexpected shutdown or reset:

If the probe detects that components are reaching their maximum rated operating temperature, it will automatically go into an overtemperature shutdown. When this occurs, the probe will power off all components (including LEDs, USB, Serial, and network), and run the fans at maximum speed until the system cools off.

If you encounter any of these problems, follow these steps to resolve it:

### Solution

1. Check for air flow obstructions. The probe has air vents on both sides that must be kept clear of obstructions and dust. If any of these air vents are blocked, the probe cannot adequately cool itself.
2. Check the ambient temperature. The probe is designed to operate at ambient temperatures up to 40 degrees Celsius. If the ambient temperature exceeds 40 degrees Celsius, the probe can overheat.

#### Note



Do not position the probe near the heat exhausts of other hardware or equipment. Doing so will cause the probe to use air that is warmer than ambient room temperature.

---

3. Check that the fans are clean and spinning smoothly. Checking the fans will require opening the probe case, and this should only be done after contacting technical support.





# 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](http://www.mentor.com/eshla)

## IMPORTANT INFORMATION

**USE OF ALL PRODUCTS IS SUBJECT TO LICENSE RESTRICTIONS. CAREFULLY READ THIS LICENSE AGREEMENT BEFORE USING THE PRODUCTS. USE OF PRODUCTS INDICATES CUSTOMER'S 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 Products ("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, in the case of Products received electronically, certify destruction of Products and all accompanying items within five days after receipt of such Products and receive a full refund of any license fee paid.

1. **Definitions.** As used in this Agreement and any applicable quotation, supplement, attachment and/or addendum ("Addenda"), these terms shall have the following meanings:
  - 1.1. "Customer's Product" means Customer's end-user product identified by a unique SKU (including any Related SKUs) in an applicable Addenda that is developed, manufactured, branded and shipped solely by Customer or an authorized manufacturer or subcontractor on behalf of Customer to end-users or consumers;
  - 1.2. "Developer" means a unique user, as identified by a unique user identification number, with access to Embedded Software at an authorized Development Location. A unique user is an individual who works directly with the embedded software in source code form, or creates, modifies or compiles software that ultimately links to the Embedded Software in Object Code form and is embedded into Customer's Product at the point of manufacture;
  - 1.3. "Development Location" means the location where Products may be used as authorized in the applicable Addenda;
  - 1.4. "Development Tools" means the software that may be used by Customer for building, editing, compiling, debugging or prototyping Customer's Product;
  - 1.5. "Embedded Software" means Software that is embeddable;
  - 1.6. "End-User" means Customer's customer;
  - 1.7. "Executable Code" means a compiled program translated into a machine-readable format that can be loaded into memory and run by a certain processor;
  - 1.8. "Hardware" means a physically tangible electro-mechanical system or sub-system and associated documentation;
  - 1.9. "Linkable Object Code" or "Object Code" means linkable code resulting from the translation, processing, or compiling of Source Code by a computer into machine-readable format;
  - 1.10. "Mentor Embedded Linux" or "MEL" means Mentor Graphics' tools, source code, and recipes for building Linux systems;
  - 1.11. "Open Source Software" or "OSS" means software subject to an open source license which requires as a condition for redistribution of such software, including modifications thereto, that the: (i) redistribution be in source code form or be made available in source code form; (ii) redistributed software be licensed to allow the making of derivative works; or (iii) redistribution be at no charge;
  - 1.12. "Processor" means the specific microprocessor to be used with Software and implemented in Customer's Product;
  - 1.13. "Products" means Software, Term-Licensed Products and/or Hardware;
  - 1.14. "Proprietary Components" means the components of the Products that are owned and/or licensed by Mentor Graphics and are not subject to an Open Source Software license, as more fully set forth in the product documentation provided with the Products;

- 1.15. “Redistributable Components” means those components that are intended to be incorporated or linked into Customer’s Linkable Object Code developed with the Software, as more fully set forth in the documentation provided with the Products;
- 1.16. “Related SKU” means two or more Customer Products identified by logically-related SKUs, where there is no difference or change in the electrical hardware or software content between such Customer Products;
- 1.17. “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;
- 1.18. “Source Code” means software in a form in which the program logic is readily understandable by a human being;
- 1.19. “Sourcery CodeBench Software” means Mentor Graphics’ Development Tool for C/C++ embedded application development;
- 1.20. “Sourcery VSIPL++” is Software providing C++ classes and functions for writing embedded signal processing applications designed to run on one or more processors;
- 1.21. “Stock Keeping Unit” or “SKU” is a unique number or code used to identify each distinct product, item or service available for purchase;
- 1.22. “Subsidiary” means any corporation more than 50% owned by Customer, excluding Mentor Graphics competitors. Customer agrees to fulfill the obligations of such Subsidiary in the event of default. To the extent Mentor Graphics authorizes any Subsidiary’s use of Products under this Agreement, Customer agrees to ensure such Subsidiary’s compliance with the terms of this Agreement and will be liable for any breach by a Subsidiary; and
- 1.23. “Term-Licensed Products” means Products licensed to Customer for a limited time period (“Term”).

## 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 and any applicable Addenda, 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. All invoices will be sent electronically to Customer on the date stated on the invoice unless otherwise specified in an Addendum. 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 state separately in the applicable invoice(s). Unless timely provided with a valid certificate of exemption or other evidence that items are not taxable, Mentor Graphics will invoice Customer for all applicable taxes including, but not limited to, VAT, GST, sales tax, consumption tax and service tax. 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 Orders placed by such third party in the event of default.
- 2.3. All Products are delivered FCA factory (Incoterms 2010), freight prepaid and invoiced to Customer, except Software delivered electronically, which shall be deemed delivered when made available to Customer for download. 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. The Products installed, downloaded, or otherwise acquired by Customer under this Agreement constitute or contain copyrighted, 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. Mentor Graphics grants to Customer, subject to payment of applicable license fees, a nontransferable, nonexclusive license to use Software as described in the applicable Addenda. The limited licenses granted under the applicable Addenda shall continue until the expiration date of Term-Licensed Products or termination in accordance with Section 12 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 or Addenda with Mentor Graphics for such purpose.**
- 3.2. License Type. The license type shall be identified in the applicable Addenda.
  - 3.2.1. Development License: During the Term, if any, Customer may modify, compile, assemble and convert the applicable Embedded Software Source Code into Linkable Object Code and/or Executable Code form by the number of Developers specified, for the Processor(s), Customer’s Product(s) and at the Development Location(s) identified in the applicable Addenda.

- 3.2.2. End-User Product License: During the Term, if any, and unless otherwise specified in the applicable Addenda, Customer may incorporate or embed an Executable Code version of the Embedded Software into the specified number of copies of Customer's Product(s), using the Processor Unit(s), and at the Development Location(s) identified in the applicable Addenda. Customer may manufacture, brand and distribute such Customer's Product(s) worldwide to its End-Users.
- 3.2.3. Internal Tool License: During the Term, if any, 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 or floating basis, as specified in the applicable Addenda, and shall not be distributed to others or delivered in Customer's Product(s) unless specifically authorized in an applicable Addenda.
- 3.2.4. Sourcery CodeBench Professional Edition License: During the Term specified in the applicable Addenda, Customer may (a) install and use the Proprietary Components of the Software (i) if the license is a node-locked license, by a single user who uses the Software on up to two machines provided that only one copy of the Software is in use at any one time, or (ii) if the license is a floating license, by the authorized number of concurrent users on one or more machines provided that only the authorized number of copies of the Software are in use at any one time, and (b) distribute the Redistributable Components of the Software in Executable Code form only and only as part of Customer's Object Code developed with the Software that provides substantially different functionality than the Redistributable Component(s) alone.
- 3.2.5. Sourcery CodeBench Standard Edition License: During the Term specified in the applicable Addenda, Customer may (a) install and use the Proprietary Components of the Software by a single user who uses the Software on up to two machines provided that only one copy of the Software is in use at any one time, and (b) distribute the Redistributable Component(s) of the Software in Executable Code form only and only as part of Customer's Object Code developed with the Software that provides substantially different functionality than the Redistributable Component(s) alone.
- 3.2.6. Sourcery CodeBench Personal Edition License: During the Term specified in the applicable Addenda, Customer may (a) install and use the Proprietary Components of the Software by a single user who uses the Software on one machine, and (b) distribute the Redistributable Component(s) of the Software in Executable Code form only and only as part of Customer Object Code developed with the Software that provides substantially different functionality than the Redistributable Component(s) alone.
- 3.2.7. Sourcery CodeBench Academic Edition License: During the Term specified in the applicable Addenda, Customer may (a) install and use the Proprietary Components of the Software for non-commercial, academic purposes only by a single user who uses the Software on one machine, and (b) distribute the Redistributable Component(s) of the Software in Executable Code form only and only as part of Customer Object Code developed with the Software that provides substantially different functionality than the Redistributable Component(s) alone.
- 3.3. Mentor Graphics may from time to time, in its sole discretion, lend Products 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 internal evaluation in a non-production environment. 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.

#### **4. Beta Code.**

- 4.1. Portions or all of certain Products 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 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 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, authorized manufacturers or authorized 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 Products 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.
- 5.2. 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 Software (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.
- 5.3. Customer may not assign this Agreement or the rights and duties under it, or relocate, sublicense or otherwise transfer the Products, whether by operation of law or otherwise ("Attempted Transfer"), without Mentor Graphics' prior written consent, which shall not be unreasonably withheld, 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. The terms of this Agreement, including without limitation the licensing and assignment provisions, shall be binding upon Customer's permitted successors in interest and assigns.
- 5.4. Notwithstanding any provision in an OSS license agreement applicable to a component of the Sourcery CodeBench Software that permits the redistribution of such component to a third party in Source Code or binary form, Customer may not use any Mentor Graphics trademark, whether registered or unregistered, in connection with such distribution, and may not recompile the Open Source Software components with the --with-pkgversion or --with-bugurl configuration options that embed Mentor Graphics' trademarks in the resulting binary.
- 5.5. The provisions of this Section 5 shall survive the termination of this Agreement.

## 6. Support Services.

- 6.1. Except as described in Sections 6.2, 6.3 and 6.4 below, and unless otherwise specified in any applicable Addenda to this Agreement, to the extent Customer purchases support services, Mentor Graphics will provide Customer updates and technical support for the number of Developers at the Development Location(s) for which support is purchased in accordance with Mentor Graphics' then-current End-User Software Support Terms located at <http://supportnet.mentor.com/about/legal/>.
- 6.2. To the extent Customer purchases support services for Sourcery CodeBench Software, support will be provided solely in accordance with the provisions of this Section 6.2. Mentor Graphics shall provide updates and technical support to Customer as described herein only on the condition that Customer uses the Executable Code form of the Sourcery CodeBench Software for internal use only and/or distributes the Redistributable Components in Executable Code form only (except as provided in a separate redistribution agreement with Mentor Graphics or as required by the applicable Open Source license). Any other distribution by Customer of the Sourcery CodeBench Software (or any component thereof) in any form, including distribution permitted by the applicable Open Source license, shall automatically terminate any remaining support term. Subject to the foregoing and the payment of support fees, Mentor Graphics will provide Customer updates and technical support for the number of Developers at the Development Location(s) for which support is purchased in accordance with Mentor Graphics' then-current Sourcery CodeBench Software Support Terms located at <http://www.mentor.com/codebench-support-legal>.
- 6.3. To the extent Customer purchases support services for Sourcery VSIPL++, Mentor Graphics will provide Customer updates and technical support for the number of Developers at the Development Location(s) for which support is purchased solely in accordance with Mentor Graphics' then-current Sourcery VSIPL++ Support Terms located at <http://www.mentor.com/vsipl-support-legal>.
- 6.4. To the extent Customer purchases support services for Mentor Embedded Linux, Mentor Graphics will provide Customer updates and technical support for the number of Developers at the Development Location(s) for which support is purchased solely in accordance with Mentor Graphics' then-current Mentor Embedded Linux Support Terms located at <http://www.mentor.com/mel-support-legal>.



7. **Third Party and Open Source Software.** Products may contain Open Source Software or code distributed under a proprietary third party license agreement. Please see applicable Products documentation, including but not limited to license notice files, header files or source code for further details. Please see the applicable Open Source Software license(s) for additional rights and obligations governing your use and distribution of Open Source Software. Customer agrees that it shall not subject any Product provided by Mentor Graphics under this Agreement to any Open Source Software license that does not otherwise apply to such Product. In the event of conflict between the terms of this Agreement, any Addenda and an applicable OSS or proprietary third party agreement, the OSS or proprietary third party agreement will control solely with respect to the OSS or proprietary third party software component. 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 Products, when properly installed, 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 an Order and does not renew or reset, for example, with the delivery of (a) Software updates or (b) authorization codes. This warranty shall not be valid if Products have been subject to misuse, unauthorized modification or improper installation. 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 THE PRODUCTS TO MENTOR GRAPHICS OR (B) MODIFICATION OR REPLACEMENT OF THE PRODUCTS THAT DO NOT MEET THIS LIMITED WARRANTY, PROVIDED CUSTOMER HAS OTHERWISE COMPLIED WITH THIS AGREEMENT. MENTOR GRAPHICS MAKES NO WARRANTIES WITH RESPECT TO: (A) SERVICES; OR (B) PRODUCTS PROVIDED AT NO CHARGE, WHICH ARE PROVIDED "AS IS" UNLESS OTHERWISE AGREED IN WRITING.
- 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, AND EXCEPT FOR EITHER PARTY'S BREACH OF ITS CONFIDENTIALITY OBLIGATIONS, CUSTOMER'S BREACH OF LICENSING TERMS OR CUSTOMER'S OBLIGATIONS UNDER SECTION 10, IN NO EVENT SHALL: (A) EITHER PARTY OR ITS RESPECTIVE 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 SUCH PARTY OR ITS LICENSORS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES; AND (B) EITHER PARTY OR ITS RESPECTIVE LICENSORS' LIABILITY UNDER THIS AGREEMENT, INCLUDING, FOR THE AVOIDANCE OF DOUBT, LIABILITY FOR ATTORNEYS' FEES OR COSTS, EXCEED THE GREATER OF THE FEES PAID OR OWING TO MENTOR GRAPHICS FOR THE PRODUCT OR SERVICE GIVING RISE TO THE CLAIM OR \$500,000 (FIVE HUNDRED THOUSAND U.S. DOLLARS). NOTWITHSTANDING THE FOREGOING, 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 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 applications 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 APPLICATIONS.
- 10.3. CUSTOMER AGREES TO INDEMNIFY AND HOLD HARMLESS MENTOR GRAPHICS AND ITS LICENSORS FROM ANY CLAIMS, LOSS, COST, DAMAGE, EXPENSE OR LIABILITY, INCLUDING REASONABLE ATTORNEYS' FEES, ARISING OUT OF OR IN CONNECTION WITH THE USE OF PRODUCTS AS DESCRIBED IN SECTION 10.1.
- 10.4. THE PROVISIONS OF THIS SECTION 10 SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.
11. **Infringement.**

- 11.1. 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 acquired by Customer hereunder 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.
  - 11.2. If a claim is made under Subsection 11.1 Mentor Graphics may, at its option and expense, and in addition to its obligations under Section 11.1, either (a) replace or modify the Product so that it becomes noninfringing; or (b) procure for Customer the right to continue using the Product. If Mentor Graphics determines that neither of those alternatives is financially practical or otherwise reasonably available, Mentor Graphics may require the return of the Product and refund to Customer any purchase price or license fee(s) paid.
  - 11.3. 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, where the Product itself is not infringing; (b) the modification of the Product other than by Mentor Graphics or as directed by Mentor Graphics, where the unmodified Product would not infringe; (c) the use of the infringing Product when Mentor Graphics has provided Customer with a current unaltered release of a non-infringing Product of substantially similar functionality in accordance with Subsection 11.2(a); (d) the use of the Product as part of an infringing process; (e) a product that Customer makes, uses, or sells, where the Product itself is not infringing; (f) any Product provided at no charge; (g) any software provided by Mentor Graphics' licensors who do not provide such indemnification to Mentor Graphics' customers; (h) Open Source Software, except to the extent that the infringement is directly caused by Mentor Graphics' modifications to such Open Source Software; or (i) infringement by Customer that is deemed willful. In the case of (i), Customer shall reimburse Mentor Graphics for its reasonable attorneys' fees and other costs related to the action.
  - 11.4. THIS SECTION 11 IS SUBJECT TO SECTION 9 ABOVE AND STATES: (A) THE ENTIRE LIABILITY OF MENTOR GRAPHICS AND ITS LICENSORS AND (B) CUSTOMER'S SOLE AND EXCLUSIVE REMEDY, WITH RESPECT TO ANY ALLEGED PATENT OR COPYRIGHT INFRINGEMENT OR TRADE SECRET MISAPPROPRIATION BY ANY PRODUCT PROVIDED UNDER THIS AGREEMENT.
12. **Termination and Effect of Termination.** If a Software license was provided for limited term use, such license will automatically terminate at the end of the authorized Term.
- 12.1. Termination for Breach. This Agreement shall remain in effect until terminated in accordance with its terms. Mentor Graphics may terminate this Agreement and/or any licenses granted under this Agreement, and Customer will immediately discontinue use and distribution of Products, if Customer (a) commits any material breach of any provision of this Agreement and fails to cure such breach upon 30-days prior written notice; 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. 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, which amounts shall be payable immediately upon the date of termination. For the avoidance of doubt, nothing in this Section 12 shall be construed to prevent Mentor Graphics from seeking immediate injunctive relief in the event of any threatened or actual breach of Customer's obligations hereunder.
  - 12.2. 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 or expiration of the Term, Customer will discontinue use and/or distribution of Products, and shall return Hardware and either return to Mentor Graphics or destroy Software 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 of the affected Products or copies of Software in any form, except to the extent an Open Source Software license conflicts with this Section 12.2 and permits Customer's continued use of any Open Source Software portion or component of a Product. 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, if applicable to such End-User, and (b) such End-User is not in breach of its agreement, if applicable, nor a party to Customer's breach.
13. **Export.** The Products provided hereunder 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. Customer agrees that it will not export Products in any manner without first obtaining all necessary approval from appropriate local and United States 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.
14. **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.
15. **Third Party Beneficiary.** For any Products 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.

16. **Review of License Usage.** Customer will monitor the access to and use of Software. With prior written notice, during Customer's normal business hours, and no more frequently than once per calendar year, Mentor Graphics may engage an internationally recognized accounting firm to review Customer's software monitoring system, 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 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 16 shall survive the termination of this Agreement.
17. **Controlling Law, Jurisdiction and Dispute Resolution.** This Agreement shall be governed by and construed under the laws of the State of California, USA, excluding choice of law rules. All disputes arising out of or in relation to this Agreement shall be submitted to the exclusive jurisdiction of the state and federal courts of California, USA. Nothing in this section shall restrict Mentor Graphics' right to bring an action (including for example a motion for injunctive relief) against Customer or its Subsidiary in the jurisdiction where Customer's or its Subsidiary's place of business is located. The United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement.
18. **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.
19. **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, signed by an authorized representative of each party. Waiver of terms or excuse of breach must be in writing and shall not constitute subsequent consent, waiver or excuse.