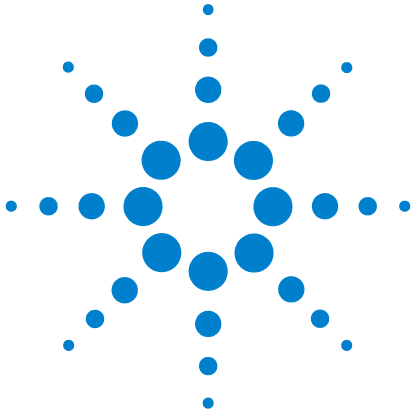

Agilent E2941B
Soft Touch Midbus Probe

User Guide

Agilent Technologies

Notices

Trademarks

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Installation Guides

You can find the installation guides for different components of the product on the product CD. Agilent recommends you to do not switch on the instrument before you have understood all the applicable installation instructions and have met all the installation prerequisites.

Where to find more information

You can find more information about Protocol Analyzer from the following link:

http://www.agilent.com/find/spt

You can also look for search a local contact for assistance on the following link:

http://www.http/agilent/find/assist

Footprint design integration information for the midbus probe can be found in the PCI Express Logic Analyzer Probing Design Guide (publication number 5989-1172EN)

You can donload this guide from

http://www.agilent.com/find/E2960_series

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Indicates warning or caution. If you see this symbol on a product, you must refer to the manuals for specific Warning or Caution information to avoid personal injury or damage to the product.

Frame or chassis ground terminal. Typically connects to the equipment's metal frame.

Indicates hazardous voltages and potential for electrical shock.

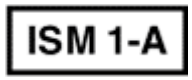
Indicates that antistatic precautions should be taken.

Indicates hot surface. Please do not touch.

Indicates laser radiation turned on.

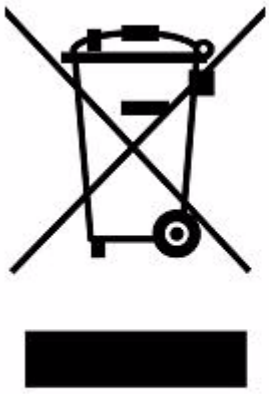
Safety requirements for electrical equipment for measurement, control, and laboratory use CAN/CSA C22.2 No. 1010.1 (1993) UL 3101, 3111 (First Editions) This equipment has also been evaluated to IEC 61010 edition 1 including amendments 1 and 2.

Notice for European Community: This product complies with the relevant European legal Directives: EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC.



This is the symbol for an Industrial, Scientific, and Medical Group 1 Class A product.

Environmental Information



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Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as a "Monitoring and Control instrumentation" product.

Do not dispose in domestic household waste.

To return unwanted products, contact your local Agilent office, or see www.agilent.com/environment/product/ for more information.

Contents

1
Introduction

This chapter introduces you to Agilent's soft touch Midbus Probe. It provides an overview of its components and describes their usage.

About Soft Touch Midbus Probe

The E2941B Soft Touch Midbus Probes increases the flexibility of the protocol analyzer by enabling a direct connection to the circuit board using a standard midbus footprint.

With the E2941B Soft Touch Midbus Probe, you can analyze high- speed ASI and PCI Express chip- to- chip communications without interfering with the signals. The Soft Touch Probe uses micro spring- pin technology to provide a reliable connection to the signal pads without the need for special cleaning or special surface finishes.

The E2941B is the midbus probe for PCI Express applications and supports Spread Spectrum Clocking (SSC) with the external reference clock. If E2941B is used in the context of ASI, the external clock cable need not to be connected because ASI does not support SSC.

Figure 1 Soft touch Midbus probe

Feature List for Soft Touch Midbus Probe:

- It supports PCI Express x1, x2, x4, x8.
- It supports ASI x1, x2, x4, x8.
- It supports x16 configurations by combining two E2941B (see Hardware Setup for x16 with External Reference Clock).
- It works on Agilent Soft Touch Technology.
- It does not require a connector.
- It reduces electrical load.
- It eases routing of board traces.
- It is user friendly.

- It can be tightened manually.
- It is very reliable in probing.
- It runs smoothly in case of passive probing.
- It adjusts to uneven board surfaces.

Connecting Midbus Probe

With the Soft Touch Midbus Probe it is possible to connect the Protocol Analyzer to a device under test (DUT) without worrying about any available slot (see Figure 2). The midbus probe can be connected to the standard footprint integrated on the individual board under test. It can be used to analyze links on a board from one chip to the other. The footprint must be implemented in the design phase of the board.

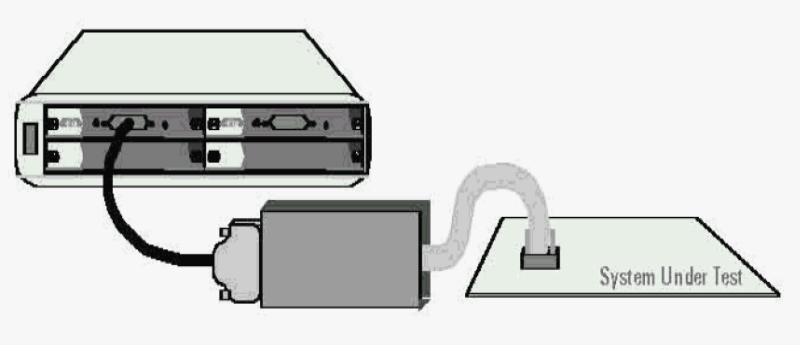


Figure 2 MidBus Probe Connection

Literature General and detailed information of PCI Express can be obtained from Intel http://www.intel.com/technology and the PCI- SIG web site http://www.pcisig.com.

Information on Advanced Switching Interconnect (ASI) can be obtained from http://www.asi- sig.org.

System Overview

Figure 3 displays E2941B Midbus Probe with the reference clock cable that is supplied along with the it.

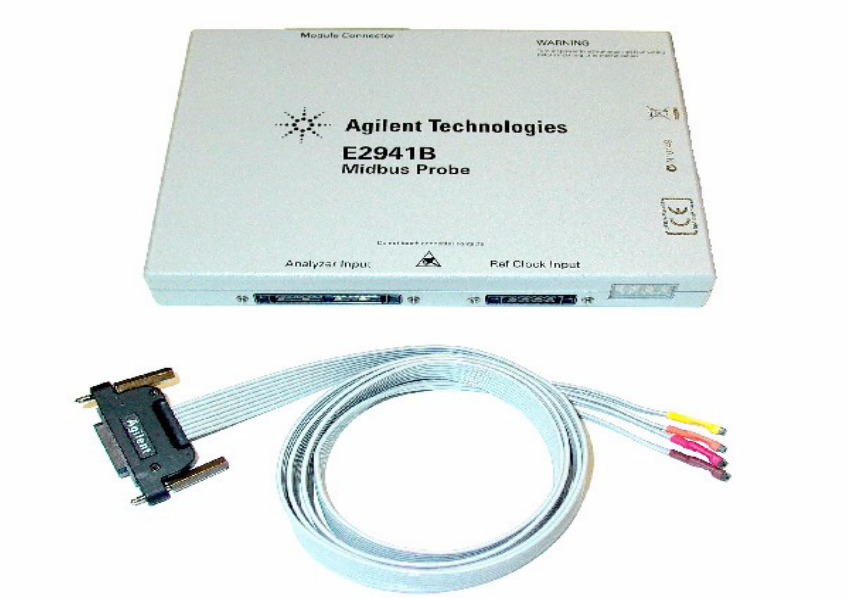


Figure 3 E2941B MidBus Probe with Reference clock cable

In addition to the above, a N4221A Midbus connector cable set is required (see Figure 4). It must be ordered separately as it is not delivered along with the MidBus Probe.

N4221A

Midbus connector cable set using soft touch technology (comes with set of 5 retention modules and loopback board for probe self- test)

Figure 4 Midbus connector cable

Device Under Test Electrical Requirements

See the *Agilent PCI Express Logic Analyzer Probing Design Guide* for detailed information on preparing your PCI Express system for measurements. Take the differences listed under *"Midbus probes" on page 1- 6* into account depending on the probing environment for the Midbus Probe is PCI Express or ASI.

Reference clock (PCI Express only)

Each DUT should provide a means of delivering a reference clock for each PCI Express reference clock domain. Depending on the system, PCI express may use a fixed clock- rate or a spread spectrum clock (SSC).

The user can use any one from two Clock modes:

- **Internal Clock mode:** Select *Internal Clock* mode if no SSC is being used and the data rate is in the range of 2.5 GB/s +/- 50 ppm. Note that in this mode there is no input clock.
- **External Clock mode:** Select *External Clock* mode if SSC is being used or if the data rate is in the range of 2.5 GB/s +/- 300 ppm (+0% / - 0.5% if using SSC). The clock rate is between 100 MHz +/- 300 ppm (+0% / - 0.5% if using SSC)

The selection internal/external can be made in the hardware setup window (in the configuration tab) of the protocol analyzer software. Operating in "internal clock" mode the clock is generated from the protocol analyzer hardware and no external clock cable is required.

NOTE This clock can be a dedicated clock, where appropriate terminators must be provided on the board. Alternately, the signals may be a tap off on existing clock, since the probes are designed not to load the signals significantly.

Using Midbus probe

To use a midbus probe, you must route signals to a set of pads on the circuit board. See the *Agilent PCI Express Logic Analyzer Probing Design Guide*.

The guide provides system designers a mechanical and electrical solution space for Logic Analyzer Interface placement for the PCI Express bus.

If using Logic analyzer with the Midbus Probe please take the following differences into account:

- The probing of the Midbus Probe is limited to one link at a time.
- The measured link can be x1, x4 or x8. There cannot be two x4 instead of one x8.
- The PCI Express Logic Analyzer Probing Guide refers to multi- link probing. This is not correct for the E2941B, only one link at a time that is always link 1 can be probed
- Agilent's x16 Analyzer utilizes two E2941B to handle both upstream and downstream.
- Link configuration support changes to:

–upstream and downstream of one x8 or one x4 or one x1 link.

- In *Agilent PCI Express Logic Analyzer Probing Design Guide,* Table 6 shows the typical x8 (bi- directional) setup. Table 7 and the following tables contain multiple links. The E2941B only observes downstream / upstream link 1 of these links.

2
Setting Up the Midbus Probe

This chapter takes you through the procedure for setting up and connecting Agilent's soft touch Midbus Probe with device under test.

NOTE The E2941B Midbus Probe can only be used with the Agilent Technologies System Protocol Tester.

Before setting up the midbus probe, you should have already setup the platform and installed and configured the appropriate software for the Agilent Protocol Analyzer.

If that is not the case please refer to the System Protocol Tester Installation Guide first.

WARNING **In order to avoid electrical shock turn off power before connecting or disconnecting any cable.**

How to connect the Midbus Probe to the I/O Module

Figure 5 shows the connection between the Midbus Probe and I/O module. To link them up, you will need to connect the midbus Probe with the I/O module using the black cable that comes with the I/O module, and fasten the screws tightly.

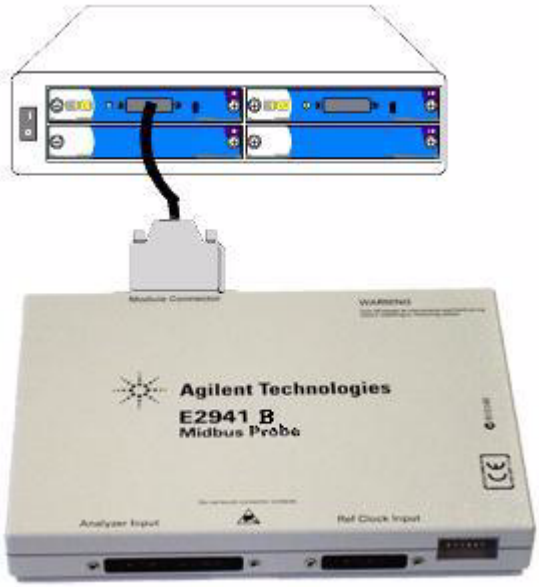


Figure 5 Connection between the Midbus Probe and I/O module

NOTE The probe board is powered from the I/O module.

NOTE The open application and the low level of test signals make the test system sensitive against electro-magnetic radiation. In order to prevent from irregular test results we recommend operating the test system in a low-level electro-magnetic radiation environment.

Connecting the Midbus Cable to the device under test

Information on designing hardware to be used with the midbus cable set may be found in Agilent PCI Express Logic Analyzer ProbingDesign Guide.

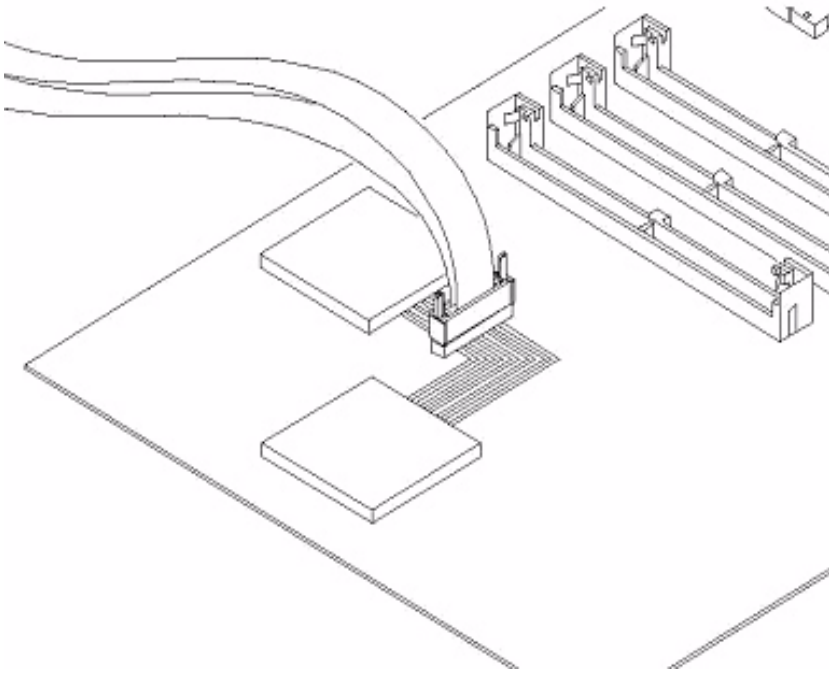


Figure 6 Probe card connected with DUT

As shown in Figure 6, plug the N4221A Midbus connector cable into the Analyzer Input of the Midbus Probe, and fasten the screws tightly.

Plug the other end into the retention located on your device under test and fasten the screws tightly.

To connect the reference clock (PCI Express only)

In order to setup the required reference clock signal, connect the cable to the Ref Clock Input connector (see Figure 7) on the front of the analysis probe.

Figure 7 Reference Clock Connector

The midbus probe only uses Reference Clock Input 1, which is the yellow marked cable.

Midbus Probe Display Codes

When the module is ready for use, it displays its number followed by an "m".

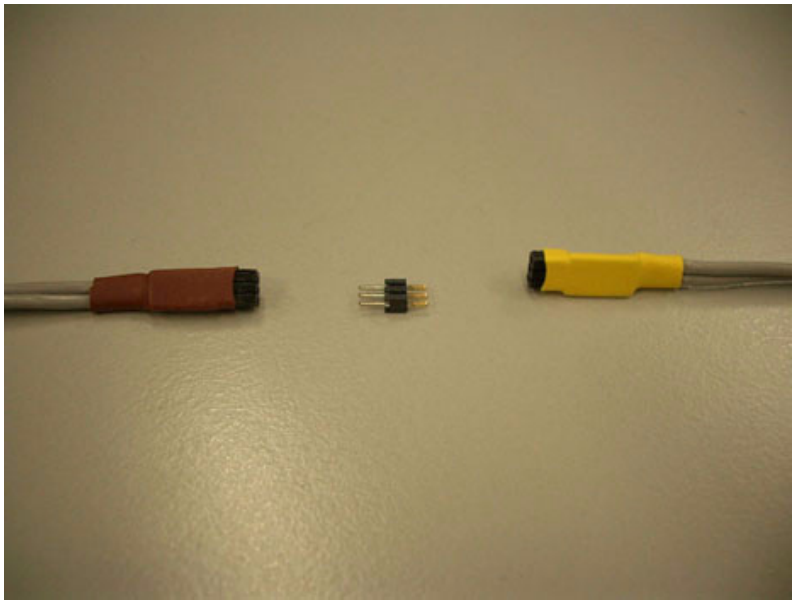
Hardware Setup for x16 with External Reference Clock

For x16 hardware setup two E2941B mid bus probes are required. One probe will handle upstream traffic, and the other will handle downstream. In case of using external clock, both mid bus probes need to be connected to an external clock signal. Since most systems and interposer board just provide one clock connector, E2941B provides a clock redistribution feature using the brown cable of the clock adapter.

NOTE E2941A does not provide this feature

Steps to connect external clock for two E2941B.

- For each E2941B an independent clock cable is required.
- Connect the yellow end of one of the clock cables to the system clock
- Connect the brown end of this cable to the yellow end of the clock cable of the the other E2941B
- Use a TMS- 103- 02- S- S connector to connect the cables



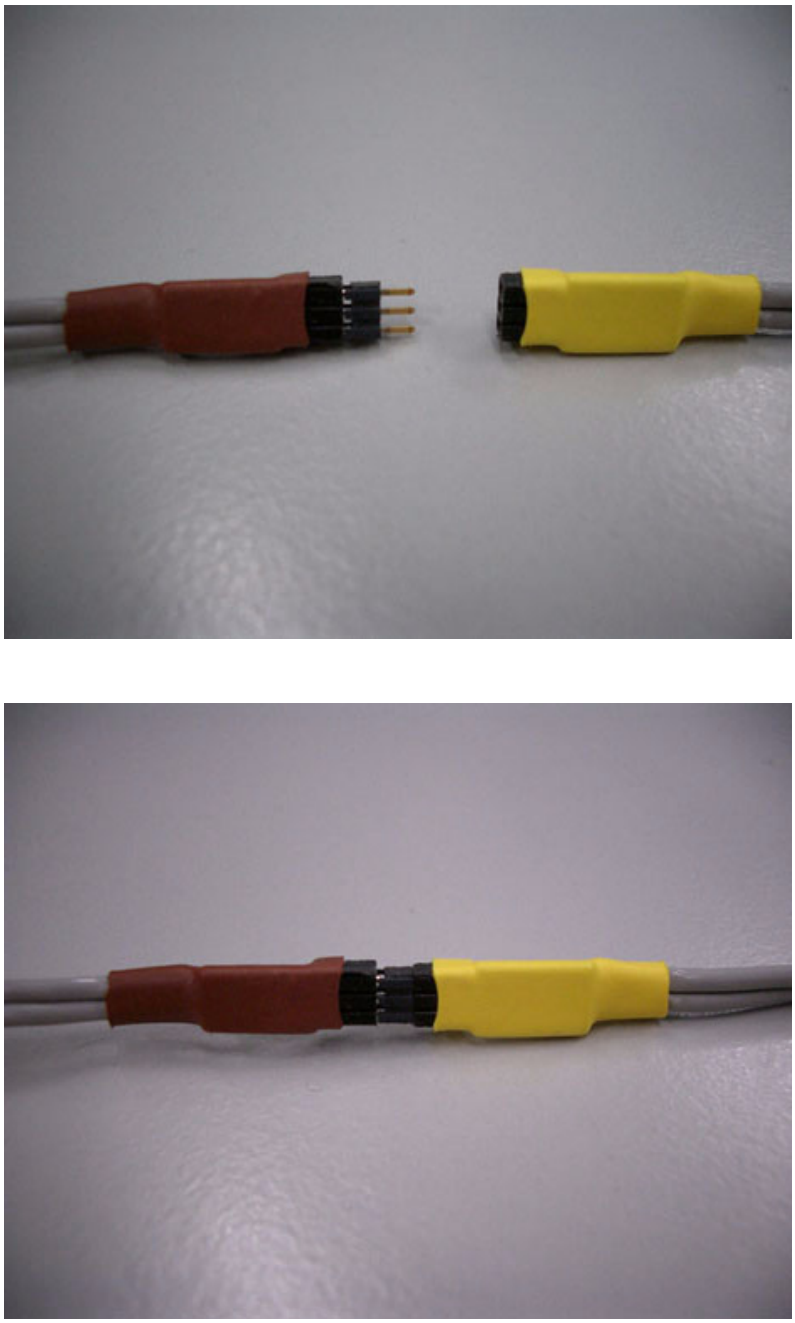


Figure 8 Connecting two E2941B

As shown Figure 8, x16 configurations can be easily setup by connecting the brown clock cable end of one mid bus probe to the yellow clock input cable of the other mid bus probe.

3
Specification

This chapter describes the specifications for Device Under Test (DUT) and recommends operating conditions for the Soft Touch Probe Card.

CAUTION The ratings below specify the values measured directly on the device under test (DUT). It includes the impedence and inductance of Agilent's probe cable solutions.

Absolute Maximum Ratings

Amplitude Data signal:2 V_{ppdiff}

Amplitude Ref CLK:5 V_{ppdiff}

Recommended Operating Conditions

All specifications are valid at room temperature.

Table 1 Data Signals

Parameter	Min.	Max.
Amplitude (at eye width of 0.85 UI)	170 mV_{ppdiff}	1600 mVppdiff
Frequency	2.5 GHz-50 ppm 1) 2.5 GHz-300 ppm 2)	2.5 GHz+50 ppm [1)] 2.5 GHz +300 ppm [2]

Table 2 Ref. CLK

Parameter	Min.	Max.
Amplitude	800 mVppdiff	2000 mVppdiff
DC-Offset	0 mV	500 mV
Frequency	100 MHz-50 ppm [1)] 100 MHz-300 ppm [2)]	100 MHz+50 ppm [1)] 100 MHz+300 ppm [2)]

[1)] When Analyzer is operated in internal CLK Mode

[2)] When Analyzer is operated in external CLK Mode

Environmental Characteristics

Temperature

Operating: +5° to +55° C

Storage: - 40° to +70° C

Installation category

II

Pollution Degree

2

Index

C

D

F

M

N

R

S

X

Index

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E2941-91011