Agilent E2941A Soft Touch Midbus Probe for PCI Express

User Manual

Agilent Technologies

Important Notice

Manual Part Number

E2941-91010

Revision

Revision 1.1, September 2004

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Herrenberger Str. 130

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Warranty

Technology Licenses

Restricted Rights Legend

Safety Notices

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Specific Cautions

Do not use the Soft Touch Probe for any other purposes or in any other way than described in this manual.

Warning

To avoid electrical shock turn off power before connecting or disconnecting any cable.

Safety Symbols on the E2941A:

Indicates that antistatic precautions should be taken.

This product complies with the relevant legal directives.

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Introduction

The E2941A Soft Touch Midbus Probe increases the flexibility of the E2960 Series Protocol Analyzer by enabling a direct connection to the circuit board using a standard midbus footprint. This approach simplifies the validation of high-speed digital designs that are tight on space or that require minimal disruption of signal routing.

With the E2941A Soft Touch Midbus Probe for PCI Express, engineers are able to analyze a high speed PCI Express chip to-chip communication without interfering with the signals. The soft touch probe utilizes micro spring-pin technology to provide a reliable connection to the signal pads without the need for special cleaning or special surface finishes.
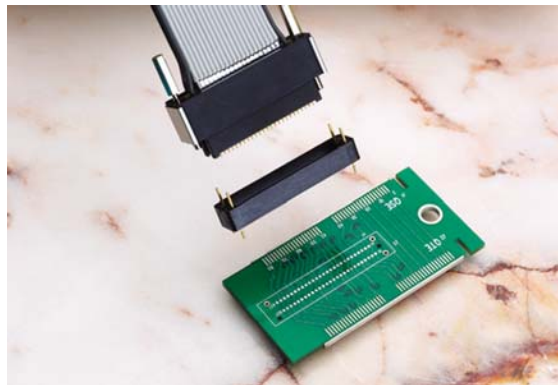
Key Features of the Soft Touch Midbus Probe

- Supports PCI Express x1, x2, x4, x8
- Agilent Soft Touch Technology
- No slot connector required
- Reduced electrical load
- Eases routing of board traces

- Ease of use

- can be tightened manually

- Very reliable probing

- Passive probing runs cool

- Adjusts to uneven board surfaces

With the E2941A Soft Touch Midbus Probe it is possible to connect the Protocol Analyzer to a device under test without any available slot. 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.
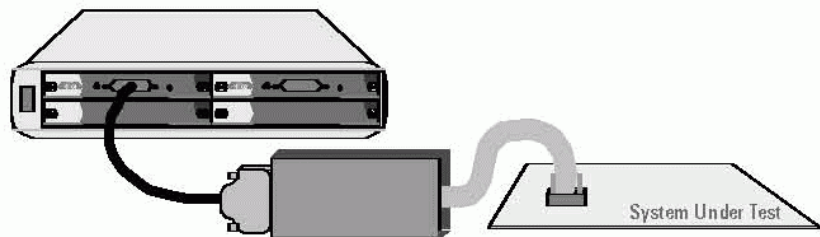
Literature   General and detailed information of PCI Express can be obtained from Intel http://www.intel.com/technology and the PCI-SIG web site http://www.pcisig.com.

Information on how to integrate the required footprint into your design can be found in the guide *PCI Express Logic Analyzer Probing Design Guide for Agilent Technologies.* You can download this guide from *http://www.agilent.com/find/E2960_series.*

For any information regarding your Agilent E2960 Series Protocol Exerciser and Protocol Analyzer please refer to the documentation coming with the product.

Updated Product Information   For updated product information please visit also http://www.agilent.com/find/E2960_series

System Overview

The following equipment is supplied with the midbus probe as shown below:

E2941A Midbus Probe

Reference clock cable

The required N4221A must be ordered separately and will be delivered separately.

N4221A

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

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 1-5* into account when working with the E2941A Midbus Probe.

Reference clock

Each system must provide means of delivering a reference clock (for each PCI Express reference clock domain) for specific cases:

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

Midbus probes

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

If used with the E2941A Midbus Probe please take the following differences into your account:

- The probing of the E2941A 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 E2941A, only one link at a time that is always link 1 can be probed.
- The list in chapter 2.1 changes to:
  - upstream and downstream of one x8 or one x4 or one x1 link.
- There is no x16 analyzer possibility with the E2941A.

- Table 8 on page 4-22 shows the typical x8 setup. Table 9 and the following tables contain multiple links. The E2941A only observes downstream / upstream link 1 of these links.

Setting Up the Midbus Probe

NOTE The E2941A Midbus Probe can only be used with the Agilent Technologies Serial Protocol Tester XC platform.

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 for PCI Express.

If that is not the case please refer to the Protocol Exerciser and Analyzer for PCI Express 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
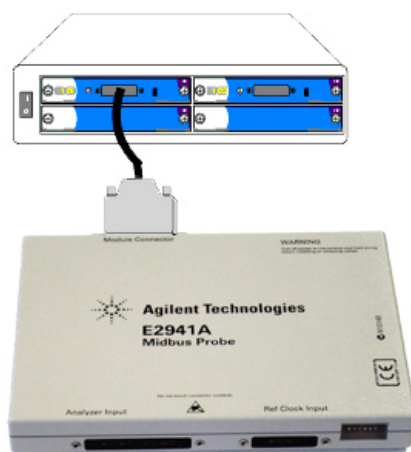
NOTE The probe board is powered from the I/O module.

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.

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.

To connect the Midbus Cable to the device under test

Information on designing hardware to be used with the midbus cable set may be found in the *Agilent PCI Express Logic Analyzer ProbingDesign Guide*.
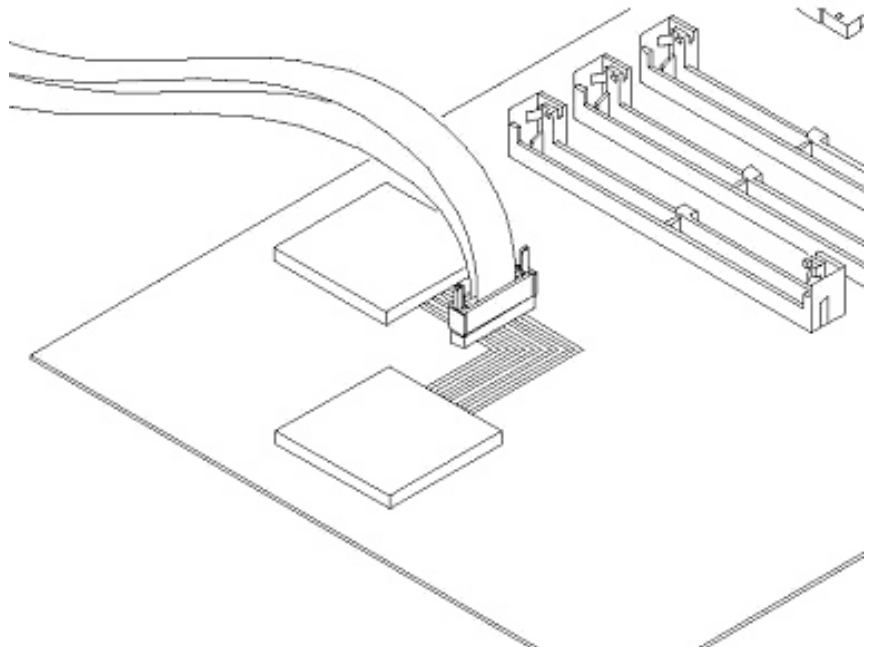
Plug the N4221A Midbus connector cable into the Analyzer Input of the Midbus Probe, and fasten the screws tightly.

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

To connect the reference clock

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

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".

Specification

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)	$450\ mV_{ppdiff}$	$1600\ mV_{ppdiff}$
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	$800\ mV_{ppdiff}$	$2000\ mV_{ppdiff}$
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

Polution degree   2

Agilent Technologies	**DECLARATION OF CONFORMITY** According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014	CE

Manufacturer's Name: Agilent Technologies International sarl
Manufacturer's Address: Rue de la Gare 29
CH - 1110 Morges
Switzerland

Declares under sole responsibility that the product as originally delivered

Series Name:	E2960 series	Serial Protocol Test Platform
System Numbers:	E2960A-A01/ -A04/ -A08	Protocol Analyzer for PCI Express x1/ x4/ x8
	E2960A-E01/ -E04/ -E08	Protocol Exerciser for PCI Express x1/ x4/ x8
	E2960A-C01/ -C04/ -C08	Protocol Analyzer/Exerciser for PCI Express x1/ x4/ x8
	and variations	

System Modules:	E7912A	2-slot Chassis
	E7900A	4-slot Chassis
	E2938A	Probe Board for PCI Express x1
	E2939A	Probe Board for PCI Express x4
	E2968A	Probe Board for PCI Express x8
	E2941A	Soft Touch Midbus Probe for PCI Express
	N5305A	8*2.5G Serial I/O Module

complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- The Low Voltage Directive 73/23/EEC, amended by 93/68/EEC
- The EMC Directive 89/336/EEC, amended by 93/68/EEC

and conforms with the following product standards:

EMC (Technical Construction File)	Against:	EMC test specification EN 55011:1998 (Group 1, Class A)
	As detailed in	Electromagnetic Compatibility (EMC) Certificate of Compliance No. 03-088
	Assessed by:	CETECOM GmbH, D-45219 Essen

	Standard	**Limit**
EMC	IEC 61326:1997+A1:1998+A2:2000 / EN 61326:1997+A1:1998+A2:2001	
	CISPR 11:1997+A1:1999 / EN 55011:1998+A1:1999	Group 1 Class A
	IEC 61000-4-2:2001 / EN 61000-4-2:1995+A1:1998+A2:2001	4 kV CD, 8 kV AD
	IEC 61000-4-3:2002 / EN 61000-4-3:2002	3 V/m, 80-1000 MHz
	IEC 61000-4-4:2001 / EN 61000-4-4:1995+A1:2001+A2:2001	0.5 kV signal lines, 1 kV power lines
	IEC 61000-4-5:2001 / EN 61000-4-5:1995+A1:2001	0.5 kV line-line, 1 kV line-ground
	IEC 61000-4-6:1995+A1:2000 / EN 61000-4-6:1996+A1:2001	3 V, 0.15-80 MHz
	IEC 61000-4-8:2001 / EN 61000-4-8:1993+A1:2001	30A/m
	IEC 61000-4-11:1994+A1:2000 / EN 61000-4-11:1994+A1:2001	1 cycle/100%
	Canada: ICES-001:1998	
	Australia/New Zealand: AS/NZS 2064.1	
Safety	IEC 61010-1:2001 / EN 61010-1:2001	
	Canada: CSA C22.2 No. 1010.1:1992	
	USA: UL 3111-1:1994	

Supplementary Information:

The products were tested in a typical configuration with Agilent Technologies test systems.

This DoC applies to above-listed products placed on the EU market after:

2004-August-01
Date

Hans-Martin Fischer
Name
Product Regulations Representative PMD, DVS
Agilent Technologies
Title

For further information, please contact your local Agilent Technologies sales office, agent or distributor.

Template:A5971-5302-1, Rev. B.00   DoC-E2960-C.doc   Revision: C

EMC Regulatory Instruction - Site Attenuation Requirement

Introduction

All EMC relevant products must comply with the local requirements, internationally with the CISPR 11, in the European Union with the EMC Directive 89/336/EEC including 93/68/EEC, in Canada with the ICES/NMB-001, in Australia with the AS/NZS 2064.1.
For the Serial Protocol Test Systems, the derived standards as well as the classes are noted in the Declaration of Conformity in this Guide.

EU-Conformity from a Competent Body

For products that do not fulfill the requirements the EU EMC Directive (§ 10.2) requires a Technical Construction File (TCF) with a Declaration of Conformity or a Certificate issued by a Competent Body (CB). For the Site Attenuation Requirements and the methods stated herein a review by a CB is mandatory.

Technical Rational

The systems concerned meet all requirements with the exception of Radiated Emissions of CISPR11 class A or the corresponding local standard. The measurement environment with specified high-speed test data traffic through open connections causes radiated electromagnetic emission above the required limits.

In order to meet the requirements appropriate preventive measures for the site must be considered and established before the systems will be switched on for its intended application. The methods described herein are sufficient to keep the system within the required limits of the standard.

Site Attenuation:

This document describes the methods for Site Attenuation to meet the requirements of Class A.

Product: E2960 Series - Serial Protocol Test Systems
Required Target Site Attenuation: **17 dB**

Installation Instruction

If your site received permission from a local (PTT) agency to exceed the levels of radiation, this exceeded level has to be considered. In case of e.g. +10 dB, subtract this ratio from the Required Target Site Attenuation.

Based on the location where the system is to be installed, obtain the Available Site Attenuation. The calculating method is described in the section *Calculating Method*. Preventive measures might be necessary by optimization of the equipment and/or additional walls to be installed.

Revision: A   Issue Date: 2003-September-22

EMC Regulatory Instruction - Site Attenuation Requirement

Note: **After installation of the preventive measures the available Site Attenuation must be calculated** .

The available Site Attenuation must be higher than the Required Target Site Attenuation value!
If not, additional measures as a shielded Cabin with specified shielding performance must be considered.
Other shielding methods as conductive wallpaper, metal walls etc. require an approval test ("in situ") by a local (PTT) agency. Appropriate arrangements have to be organized.
Install the system as described in the Installation Guide.

The product installation will then meet the requirements for radiation levels of Class A of CISPR 11 or the corresponding local standard.

Calculating Method

To obtain the **Required Target Site Attenuation** at the customer site:

1. Available Site Attenuation:

$$A = n * W + X$$

A = Available Site Attenuation in dB
n = number of concrete walls within distance D
W = 10 dB (attenuation of a concrete wall without openings)
X = attenuation reached by distance between equipment and exterior Wall plus 30 m to estate border

2. Attenuation X

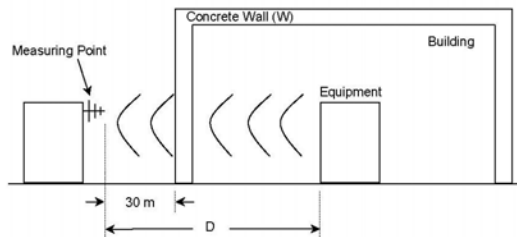$$X = 20 * \log (D/30)$$

D = real estate border distance in m

Figure 1: Site attenuation calculation

Calculation for this product:

Req. Target Site Attenuation in dB	Walls/n	X in dB	D in m
17	0	17	212
17	1	7	67
17	2	-3	21

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