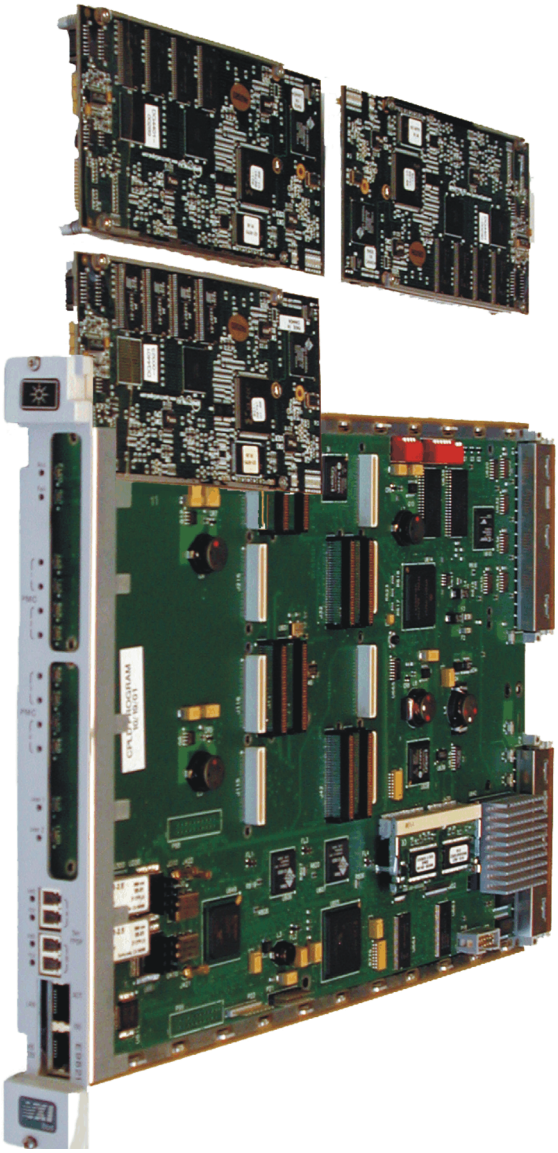
Agilent E9821A
Signal Processing Module for the E3238 System
Installation and Service Guide



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Notices

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CAUTION

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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.

Contents

1
Module Description

Hardware Description

The Agilent E9821A Signal Processor is a single-slot register-based C-size VXIbus module. The Agilent E9821A can be a VXIbus master or slave and is used to control other VXI measurement modules and to process measurement data from those modules.

The Agilent E9821A provides four enhanced PCI Mezzanine Card (ePMC) plug-in sites. The standard PMC bus architecture is enhanced with a series of high speed data links between each ePMC site and the main board. These data links support simultaneous data transfer between sites at rates greater than 200Mbytes/sec. Typical ePMC cards are dual-processor DSP cards and single-processor/RAM cards.

The Agilent E9821A interfaces to other VXI modules via:

- VXIbus
- Local bus
- Serial FPDP (Front Panel Data Port) fiber optic interface

The Agilent E9821A can interface to a host computer via the:

- VXI backplane/Slot 0 controller
- 100 BaseT LAN
- RS-232
- Serial FPDP

The measurement personality of the Agilent E9821A is defined by an application program that executes on the MPC855T CPU, the main processor in the module. This program is downloaded from a host computer to the module either over the LAN or VXIbus. The typical application program loop sets up one or more VXI measurement modules, initiates a measurement, transfers data to the DSP ePMC cards for processing and, finally, transfers measurement results to the host.

Front Panel Connections

Figure 1 shows the module's front panel features.

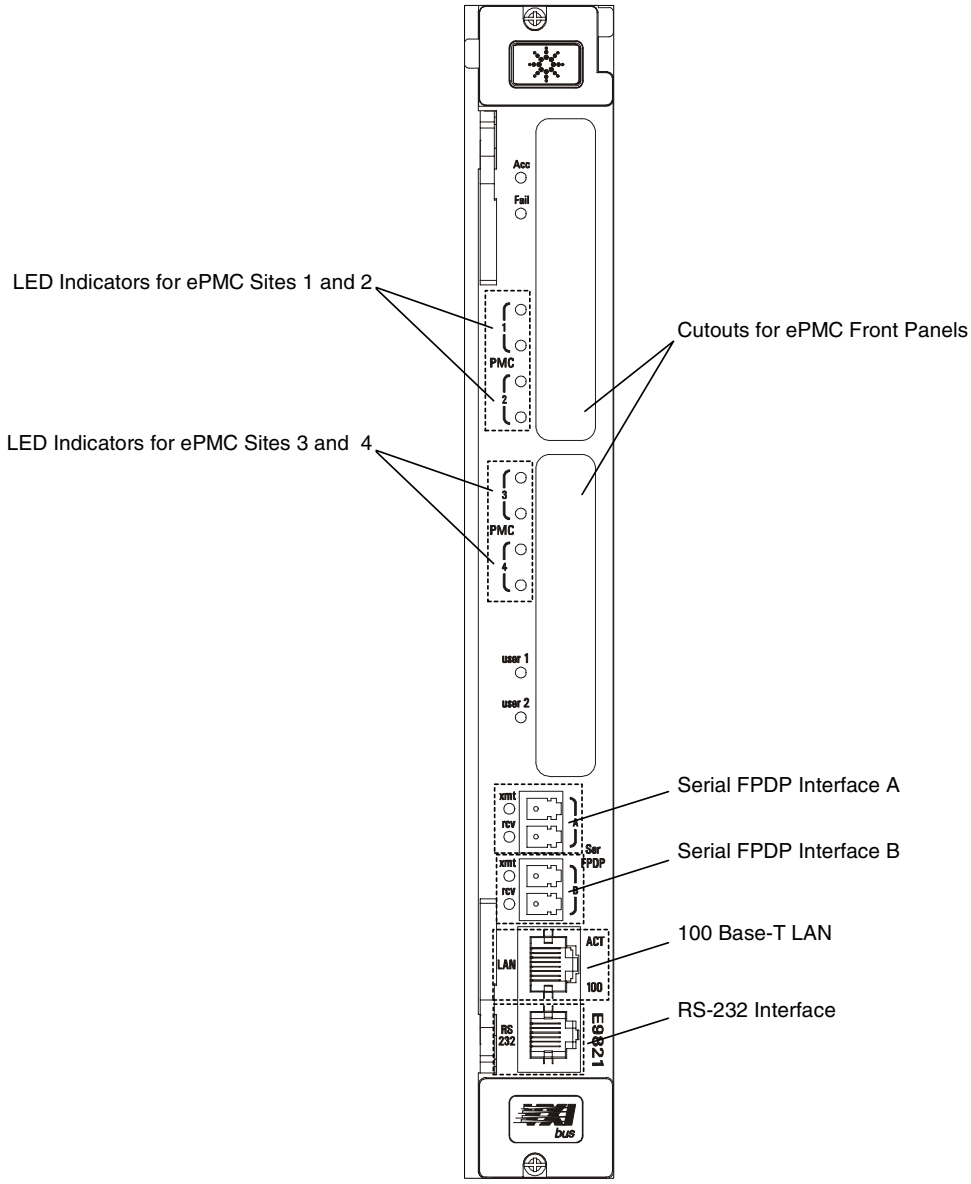


Figure 1 E9821A Front Panel Features

Block Diagram Description

The following describes the E9821A's operation at the block-diagram level.

Figure 2 shows the simplified block diagram.

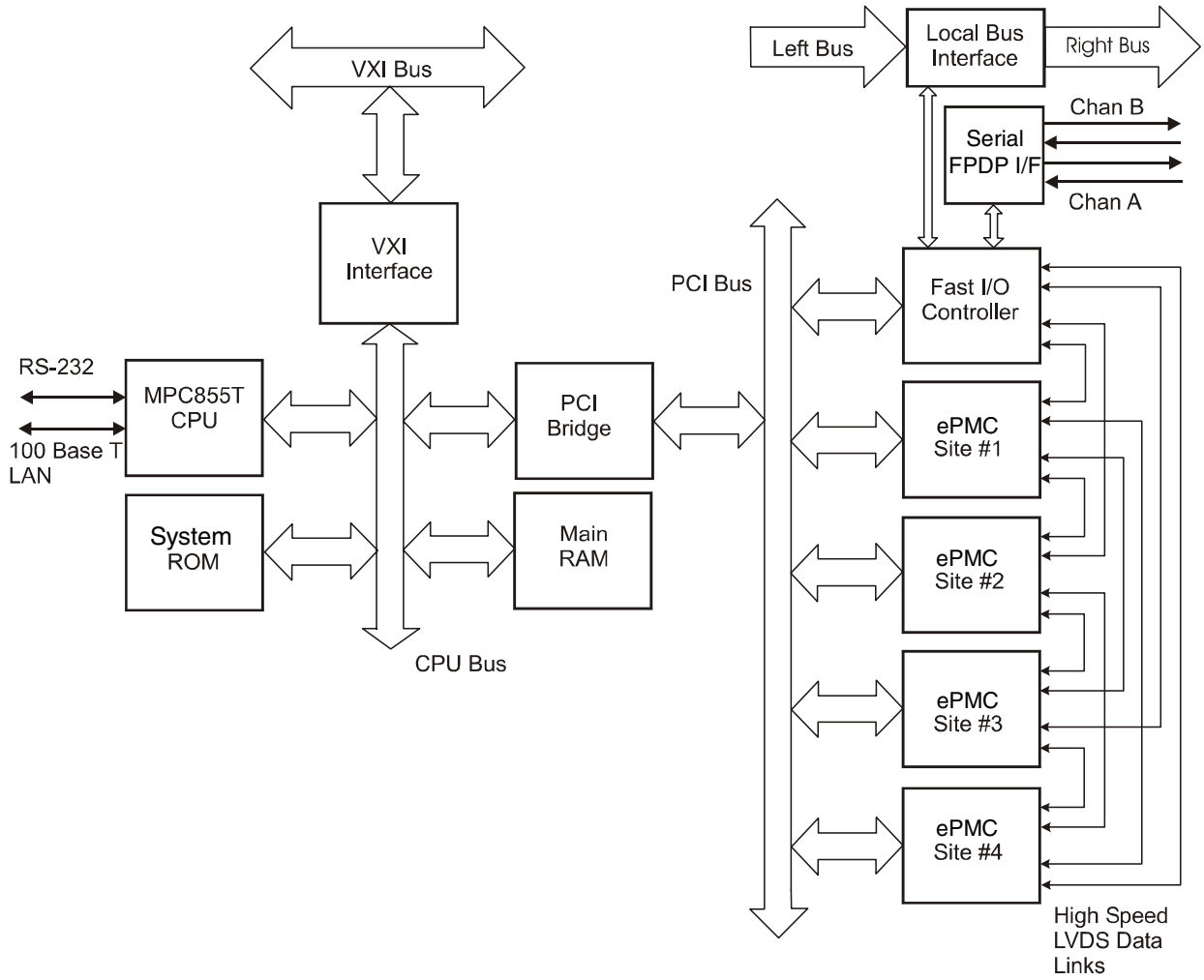


Figure 2 Simplified Block Diagram

VXI Interface

The VXI interface controls all the activities of the module that relate to the VXI/VME bus. The Agilent E9821A Module can act as a Bus Master, as well as a Slave. While the module can communicate with VXI message based modules, it is not message based itself and implements only a subset of the VXI commander/servant hierarchy.

CPU and Main RAM

The CPU (Central Processing Unit) is an MPC855T, clocked at 50 Mhz. Its main RAM consists of 64 MBytes of SDRAM. The MPC855T implements a 100BaseT Ethernet interface and an RS-232 interface. Both interfaces are connected to front panel connections.

System ROM

The System ROM is a flash EPROM that contains the VXWorks based Signal Processor Operating System, code for the field programmable gate arrays and the boot sequence for the module.

PCI Bus

The main CPU connects to an internal PCI bus through a QSpanII PCI bridge IC. The PCI bus is 32 bits wide and runs at 33 MHz. In addition to the main CPU, there can be up to five other PCI devices on the bus. including:

- Fast I/O Controller
- ePMC sites 1,2,3 and 4

These are described in subsequent sections.

FAST I/O Controller

The FAST I/O Controller controls the movement of data between the serial FPDP channels, the VXI Local bus, and the LVDS data ports that are connected to the four ePMC sites.

Serial FPDP

The Serial FPDP (Front Panel Data Port) interface consists of two full duplex fiber optic channels conforming to the draft standard VITA 17.1. They usually receive data from an E1438B/E1439B analog-to-digital converter or transmit data to a compatible interface in a host computer or to other E9821A Modules. The interface is designed to transfer data at speeds above the 200 Mbyte/sec. data rate of the E1438/9B.

LVDS Data Links

The LVDS (low voltage differential signal) Data Links connect the I/O controller to the corresponding LVDS data ports on the four ePMC card sites. The ports are designed to transfer data at speeds above the 200 Mbyte/sec. data rate of the E1438/9B. There are 20 independent LVDS links providing full bidirectional interconnect between the five nodes of the system.

Local Bus (LBUS)

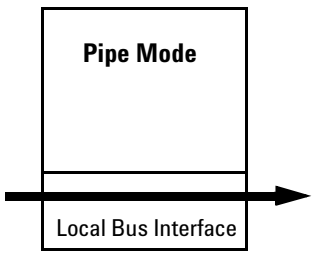
The local bus allows data to be transferred within the VXI measurement system between adjacent modules using the P2 connector on the VXI backplane. The data is transferred between adjacent modules from left to right only. The local bus can be very fast, since it does not require any bus arbitration. All local bus functions are controlled by the E9821A's High Speed I/O Controller.

In the Agilent E9821A Module, the local bus controller performs the following operations.

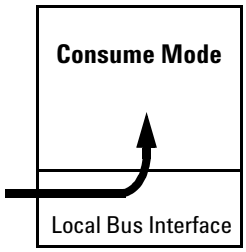
- Reads the incoming data from the VXI module on the left and formats it into words either 8,16,24 or 32 bits wide.
- Routes the formatted data to the Fast I/O controller, which then routes it to the programmed destination.
- Routes the data from the VXI module on the left to the module on the right when in pass-through (pipe) mode.

The local bus operates in the following three basic modes:

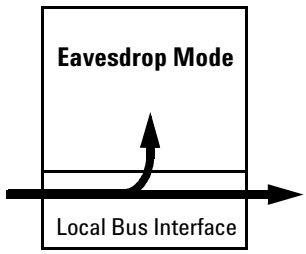
- **Pass-through/Pipe Mode (P)** - Data received from the VXI module on the left is sent on through to the module on the right.



- **Consume Mode (C)** - Data from the VXI module on the left is received (Consumed) by the E9821A. The data is not sent on.



- **Eavesdrop Mode (E)** - Data from the VXI module on the left is received by the E9821A and it is also sent on to the module on the right.



ePMC sites

The E9821A module's main board provides four enhanced PMC sites that allow PMC (PCI Mezzanine Card) boards to be plugged into the E9821A. PMC cards are typically used to add processing and/or I/O functionality to the E9821A. Standard PMC cards connect to the E9821A's internal PCI bus. The E9821A also supports enhanced PMC (ePMC) cards. "Enhanced" refers to the addition of 8 LVDS ports that allow high speed data to be transferred between other ePMC cards or the Fast I/O controller without burdening the PCI bus.

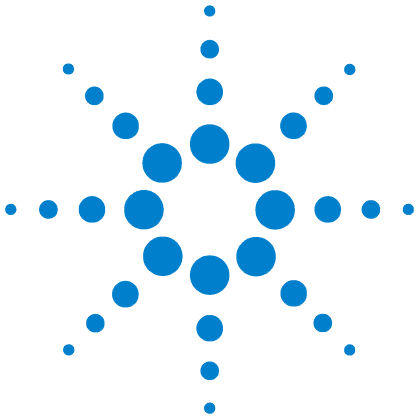
The sites are numbered as illustrated on page 35.

RS-232 Port

The E9821A's front panel RS-232 port can be used as a control port or a terminal I/O port.

When used as a control port the E9821A can control external devices such as tuners and handoff receivers.

When used as a terminal port, you can access a target shell program to set certain parameters and query the status of the E9821A operating system and application program. A downloaded application program can also print information out to this terminal.



2
Installing, Storing and Shipping the Module

Inspecting the Agilent E9821A Module

The Agilent E9821A Signal Processing Module for the E3238 System was carefully inspected both mechanically and electrically before shipment. It should be free of marks or scratches, and it should meet its published specifications upon receipt.

NOTE The Agilent E9821A does not require periodic calibration or performance testing.

CAUTION To protect circuits from static discharge, observe anti-static techniques whenever disassembling/assembling or handling the Agilent E9821A and ePMC modules.

If the module was damaged in transit, do the following:

- Save all packing materials.
- File a claim with the carrier.
- Call your Agilent Technologies sales and service office.

Setting the Agilent E9821A Module's Configuration Switches

This section describes how to check and set the module's logical address and RS-232 baud rate.

NOTE The factory defaults are a logical address of 128 and the RS-232 control port enabled (terminal I/O disabled). Normally, you should not need to change these settings. However, if the logical address of 128 conflicts with that of another module, or if you need to change the RS-232 setting, use the instructions in this section to make those changes.

Setting the Logical Address Switch

The module's logical address is the decimal equivalent of the binary value of the switches set to '1' on the logical address switch block (see Figure 3). For example, if the third switch (decimal 4) and fifth switch (decimal 16) are set, the module's logical address is the decimal equivalent of the binary 0001 0100 or 20. The factory default setting is 1000 0000 (128), as shown in Figure 3. Use a small screwdriver, or similar tool, and change the setting, if needed.

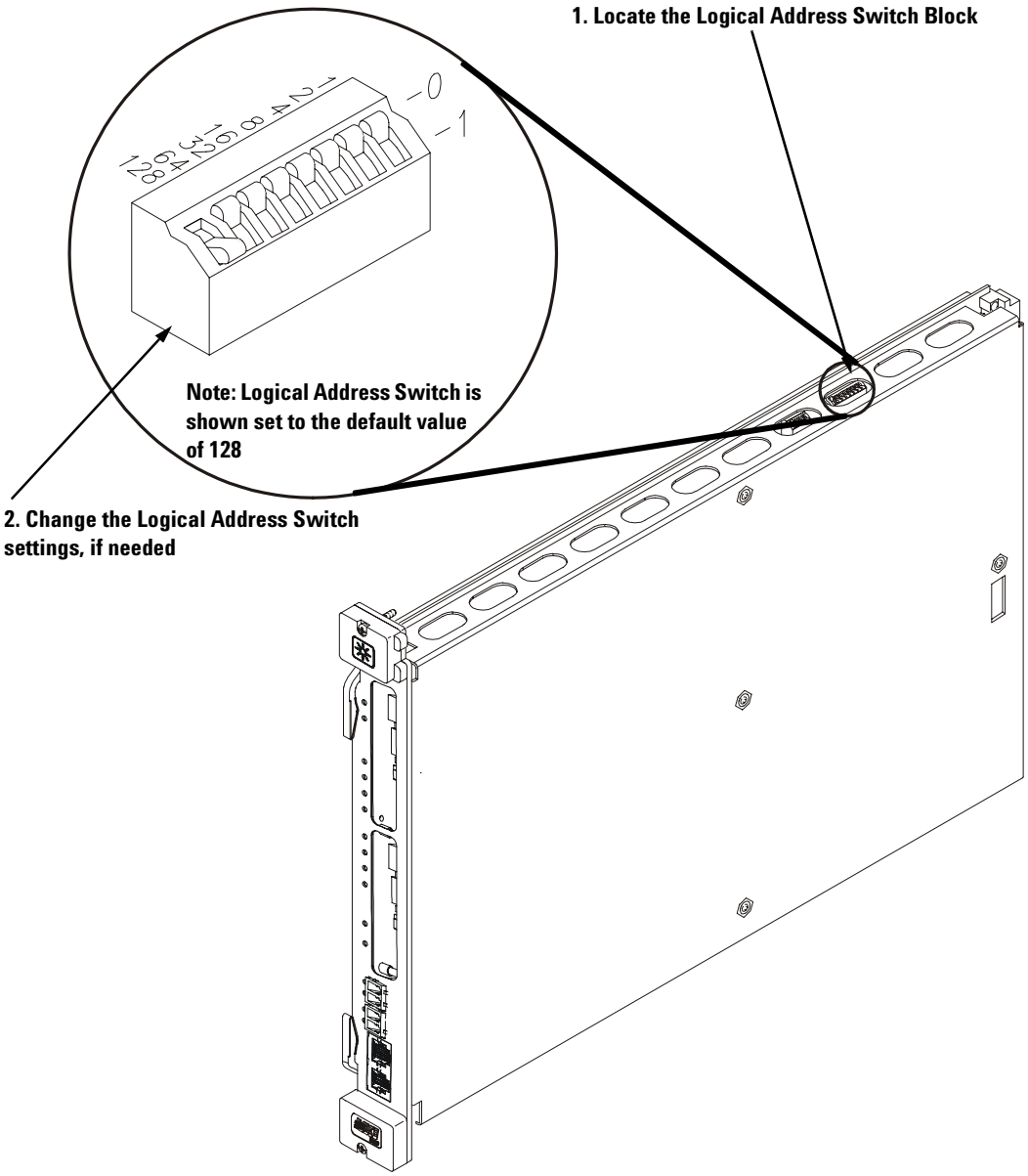


Figure 3 Setting the Logical Address Switches

RS-232 Port

The E9821A's front panel RS-232 can be used as a control port or a terminal I/O port.

When used as a control port the E9821A can control external devices such as tuners and handoff receivers.

NOTE Target shell access (discussed below) and print capability are disabled when the RS-232 port is used as a control port.

When used as a terminal port, you can access a target shell program to set certain parameters and query the status of the E9821A operating system and application program (refer to "Using the RS-232 Target Shell to Verify the Agilent E9821A Operation" on page 24 for an example). A downloaded application program can also print information out to this terminal.

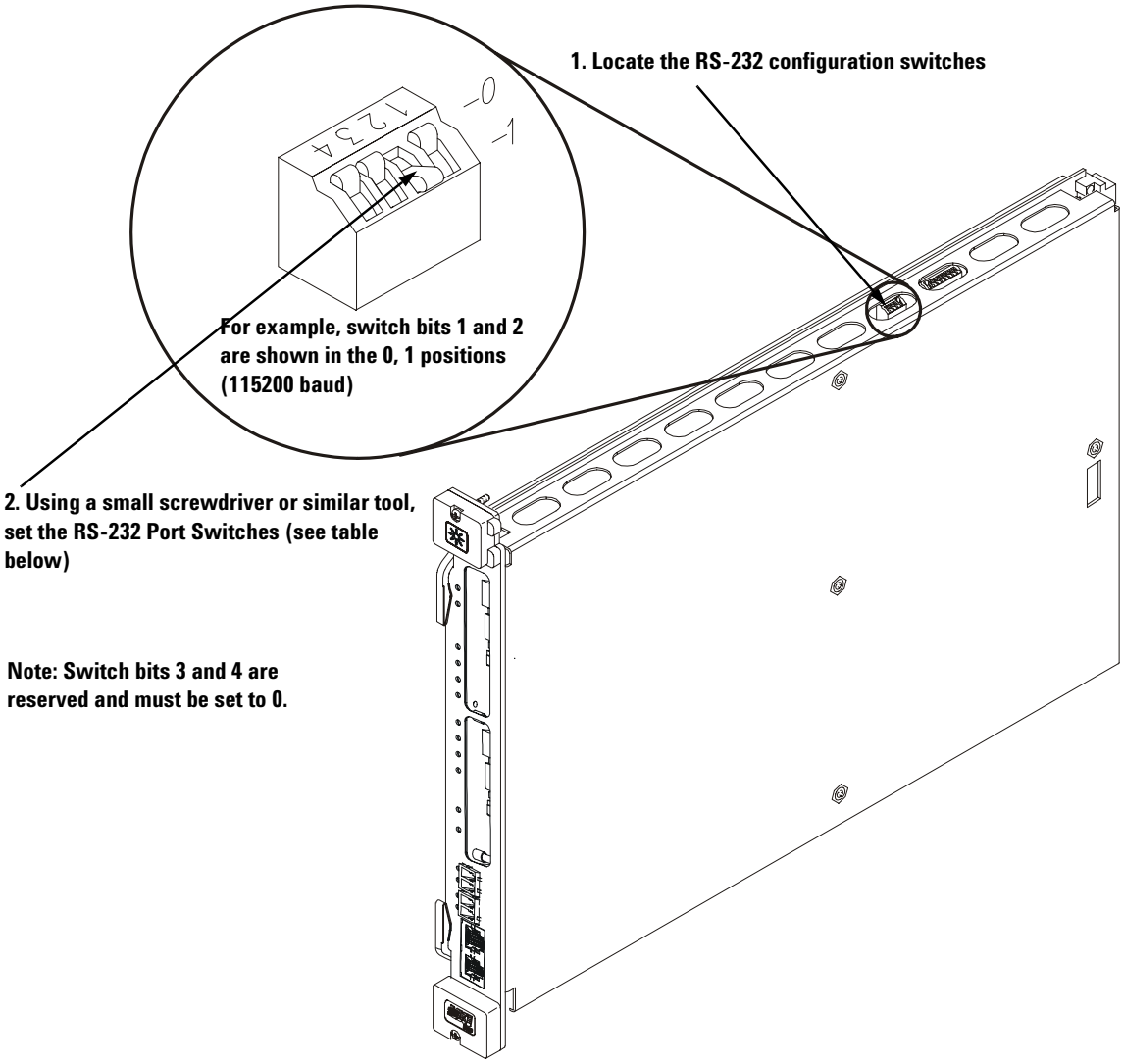
Changing the RS-232 Port Setting

The table in Figure 4 shows the supported baud rates. When the baud rate is set of 'off' (factory default setting), the terminal I/O is disabled and the control port is enabled.

To change the default RS-232 port setting, use the procedure shown in Figure 4. When terminal I/O is enabled, the data format is 1 start bit, 8 data bits, 0 parity bits and 1 stop bit.

NOTE If you intend to use the RS-232 Target Shell to verify E9821A operation, the RS-232 port must be set to 9600 baud with terminal I/O enabled (bit 1 = 0, bit 2 = 0).

NOTE Switches 3 and 4 are reserved and both should be set to 0–the factory setting.



Switch Bit Position		
Bit 2	**Bit 1**	**Description**
0	0	9600 baud, terminal I/O enabled, control port disabled
0	1	38400 baud, terminal I/O enabled, control port disabled
1	0	115200 baud, terminal I/O enabled, control port disabled
1	1	Off, terminal I/O port disabled, control port enabled

Figure 4 Setting the RS-232 Port Switches

Installing the Agilent E9821A Module

The following installation procedure installs the Agilent E9821A Module into a VXIbus Mainframe.

Tools Required

A #1 pozidrive or flatblade screwdriver.

Step 1: Set up your VXIbus Mainframe

The module should operate in any C-Size VXIbus Mainframe that provides sufficient cooling and power supply current for the E9821A. See Chapter 4, “Specifications” for E9821A VXI power requirements. Make sure the mainframe is setup correctly and operating. See the appropriate mainframe manual.

Step 2: Select the Slot Location for the Agilent E9821A Module

If using the Local Bus (LBUS), select a slot in the mainframe immediately to the right of any module that uses the Local Bus to send data to the E9821A. Otherwise, any slot other than slot 0 is appropriate. For proper Local Bus operation, data must flow from left to right. Correct positioning of the E9821A is critical for proper operation of the Local Bus. VXI modules are keyed to prevent installation of non-compatible modules in adjacent slots.

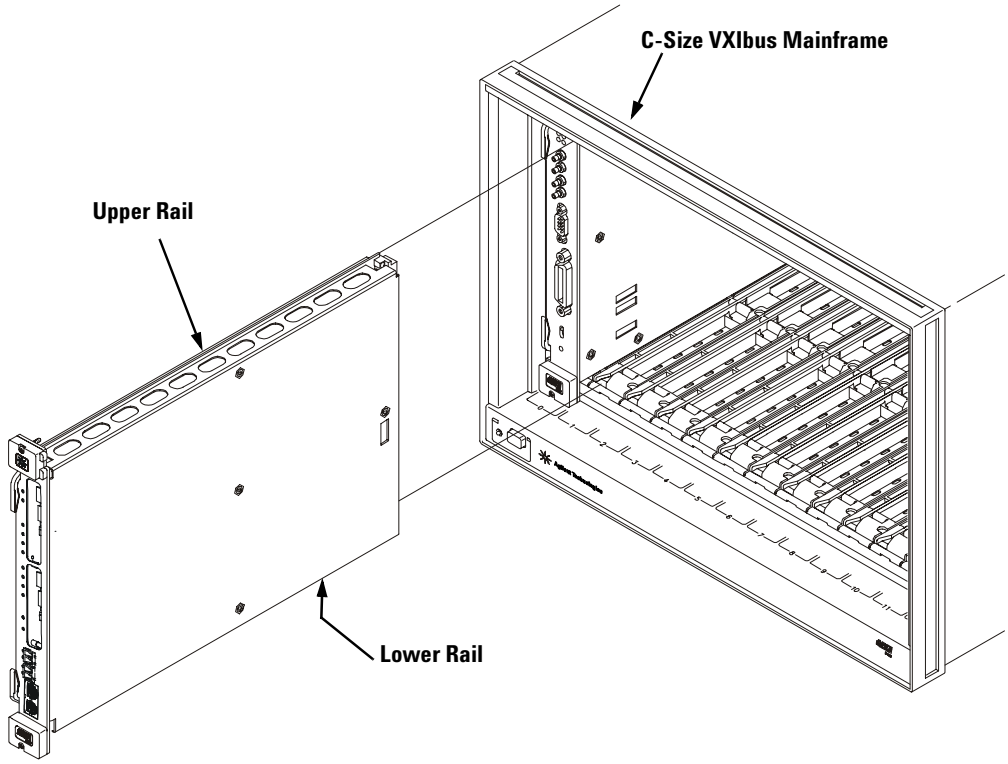
CAUTION The E9821A may be damaged by incompatible interface circuitry in modules that are installed on either side of it. Be sure to install only ECL-compatible modules next to the E9821A. The Local Bus specification for the E9821A Digital Signal Processor is ECL on both the left and right sides.

Step 3: Install the Agilent E9821A Module

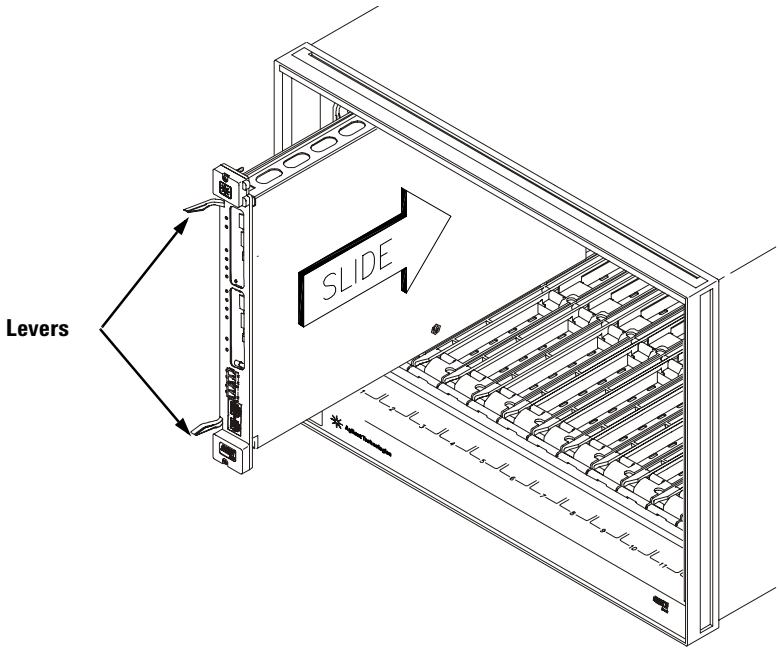
Figure 5 and Figure 6 show how to install the module into a VXIbus Mainframe.

CAUTION Before installing the Agilent E9821A Module in the VXI mainframe, be sure to turn the mainframe power switch to Standby or remove power from the mainframe.

1. Align the module's upper and lower rails to the rail guides in a mainframe slot



2. With its levers extended, slide the module into the mainframe until it stops



Continued on next page

Figure 5 Installing the Module into the Mainframe

3. Push the levers inward to lock the module into the mainframe. Using a #1 pozidrive or flathead screwdriver, tighten both retainer screws

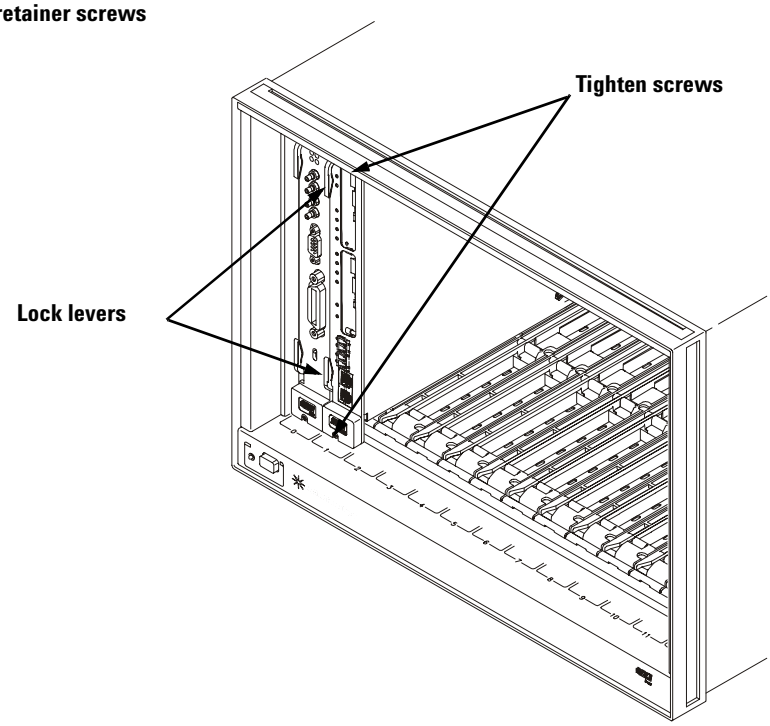


Figure 6 Installing the Module into the Mainframe (Cont.)

Transporting the Agilent E9821A Module

- Package the module using the original factory packaging or packaging identical to the factory packaging.

  Containers and materials identical to those used in factory packaging are available through Agilent Technologies offices.
- In any correspondence, refer to the module by model number and full serial number.
- If returning the module to Agilent Technologies for service, attach a tag describing the following:
  - The problem or the type of service required
  - Return address
  - Model number
  - Full serial number

  Mark the container FRAGILE to ensure careful handling.
- If necessary to package the module in a container other than original packaging, observe the following (use of other packaging is not recommended):
  - Wrap the module in heavy paper or anti-static plastic.
  - Protect the front panel with cardboard.
  - Use a double-wall carton made of at least 350-pound test material.
  - Cushion the module to prevent damage.

CAUTION Do not use styrene pellets of any shape as packing material for the module. The pellets do not adequately cushion the module and do not prevent the module from shifting in the carton. In addition, the pellets create static electricity that can damage electronic components.

Storing the Agilent E9821A Module

Store the module in a clean, dry, and static free environment.

For other requirements, see storage and transport restrictions in the *Agilent E9821A Signal Processing Module for the E3238 System Technical Specifications*.

Using the RS-232 Target Shell to Verify the Agilent E9821A Operation

The RS-232 target shell may be accessed by a data terminal or a workstation running a terminal emulator. This section describes the use of Hyperterminal, a utility provided with Microsoft®* Windows® systems. Follow these steps to configure and connect your PC to access the RS-232 target shell:

1. Set the E9821A RS-232 port to 9600 baud and enable terminal I/O.
2. Connect the E9821A RS-232 port to the PC.
3. Configure the Hyperterminal.
4. Apply power to the mainframe.
5. Run the built-in self-test.
6. Return the E9821A RS-232 setting to factory default.

Step 1. Set the E9821A RS-232 Port to 9600 Baud and Enable Terminal I/O

CAUTION The E9821A must be removed from the VXI mainframe to access the RS-232 configuration switches. Always **REMOVE POWER FROM THE VXI MAINFRAME** before removing any VXI module.

The factory default setting for the RS-232 port is terminal I/O disabled and the control port is enabled.

To use the RS-232 Target Shell, the RS-232 port must be set to 9600 baud with terminal I/O enabled (bit 1 = 0, bit 2 = 0). To change the default RS-232 port setting, use the procedure shown in Figure 4 on page 18.

Step 2. Connect the E9821A RS-232 Port to the PC

The E9821A includes an RS-232 cable kit consisting of an RJ-11 cable and an RJ-11 to DB9 adapter (E8130-68702). Attach the adapter to an available COM port connector on your PC. Connect one end of the RJ-11 cable to the adapter. Connect the other end of the cable to the RS-232 port on the front panel of the E9821A (see Figure 1 on page 7).

*Microsoft ®, Windows®, and Windows® are U.S. registered trademarks of the Microsoft Corporation

Step 3. Configure Hyperterminal

The following procedure is specific to Windows 2000:

Start->Program->Accessories->Communication->Hyperterminal.

Answer the New Connection Wizard as follows:

- *Name:* E9821A
- *Connect using:* COM1
- *Bits per second:* 9600
- *Data Bits:* 8
- *Parity:* none
- *Stop Bits:* 1
- *Flow Control:* None

Step 4. Apply Power to the VXI Mainframe

As the E9821A powers-up, it displays boot information on the terminal display. Much of this information is operating system details that can be ignored. Information about the module will be displayed near the end of the boot up similar to the following:

```
              VxWorks

Copyright 1984-1998  Wind River Systems, Inc.

            CPU: Agilent E9821 CPU - PowerPC 855
        VxWorks: 5.4.2
    BSP version: A.00.00
  Creation date: Mar 29 2002
            WDB: Ready.

->
************************************************************
************************************************************

Model: E9821A
Serial Number: US00000101
CPU: MPC855T @ 50MHz
Main RAM: 64 MBytes
Main Board Rev: A4
Firmware Revision: A.00.00

I/O Controller detected
Device detected in ePMC site 1: ePMC-MEM1, hwRev 2.X, fwRev 2.11
Device detected in ePMC site 2: ePMC-PPC1, hwRev 2.X, fwRev 2.11
Device detected in ePMC site 3: ePMC-PPC1, hwRev 2.X, fwRev 2.11
No device detected in ePMC site 4
FPGA1 datecode: 02040810
FPGA2 datecode: 02041117
FPGA3 datecode: 02030716

IP Address: 172.16.3.1

************************************************************
************************************************************
Ready
```

The specific devices detected in the mezzanine sites should match the physical configuration of the cards in the E9821A.

Step 5. Run Built-In Self-Test

At the terminal prompt, invoke self-test by typing:

```
bist
```

Typical self-test results are shown below.

```
-> bist

################ E9821 Self Test Rev 1.0 ################


***************** PCI Discovery *****************

DEVICE FOUND in site 2 is a Dual G4 Processor
DEVICE FOUND in site 2 is a Motorola MPC107 PCI Bridge
DEVICE FOUND in site 1 is a Single G4 Processor with extended memory
DEVICE FOUND in site 1 is a Motorola MPC107 PCI Bridge
DEVICE FOUND in site 0 is a High Speed IO Processor
DEVICE FOUND in site 0 is a Tundra QSPAN2
DEVICE FOUND in site 3 is a Dual G4 Processor
DEVICE FOUND in site 3 is a Motorola MPC107 PCI Bridge

PASS PCI Discovery Test

************** End of PCI Discovery **************

**************** Solano Link Test ****************

Initializing Test...
Initialization complete.

G4 Processor found in site 2
G4 Processor found in site 3
G4 Processor found in site 1

FOUND LINK from  2b0 to 0b3
FOUND LINK from  3b0 to 0b0
FOUND LINK from  1b0 to 0b2
FOUND LINK from  2a2 to 0a3
FOUND LINK from  3a2 to 0a0
FOUND LINK from  1a2 to 0a2
FOUND LINK from  3b2 to 2a1
FOUND LINK from  1b1 to 2a3
FOUND LINK from  1b3 to 3a1
FOUND LINK from  3a0 to 2b3
FOUND LINK from  1a3 to 2b1
FOUND LINK from  1a1 to 3b3
GOOD channelized DMA link test from High Speed IO Processor to site 2
```

Continued on next page

Continued

```
GOOD channelized DMA link test from High Speed IO Processor to site 3
GOOD channelized DMA link test from High Speed IO Processor to site 1
GOOD channelized DMA link test from site 2 to site 3
GOOD channelized DMA link test from site 2 to site 1
GOOD channelized DMA link test from site 3 to site 1
Solano links NOT tested (unpopulated links):
  0b1 to 4b0
  1a0 to 4b3
  2a0 to 4b2
  3a3 to 4b1
  0a1 to 4a2
  1b2 to 4a1
  2b2 to 4a0
  3b1 to 4a3

************** Solano Test Results **************

PCI bus found G4 Processor in site 1
PCI bus found G4 Processor in site 2
PCI bus found G4 Processor in site 3
SOLANO FOUND G4 Processor in site 1
SOLANO FOUND G4 Processor in site 2
SOLANO FOUND G4 Processor in site 3

PASS Solano Link Test

************* End of Solano Link Test ************

*************** High Speed IO Processor Test ***************

Found High Speed IO Processor
Performing High Speed IO Processor memory test...
High Speed IO Processor memory test complete.

PASS High Speed IO Processor Test

************ End High Speed IO Processor Test *************

PASS E9821 Self Test

################## End Self Test ##################

value = 0 = 0x0
->
```

3
Servicing the Module

Removing the Agilent E9821A Module

The following procedure removes the Agilent E9821A Module from a VXIbus Mainframe.

Tools Required

A #1 pozidrive or flathead screwdriver.

Removal Procedure

CAUTION Always **REMOVE POWER FROM THE VXI MAINFRAME** before installing or removing any VXI module.

Figure 7 and Figure 8 show how to remove the module.

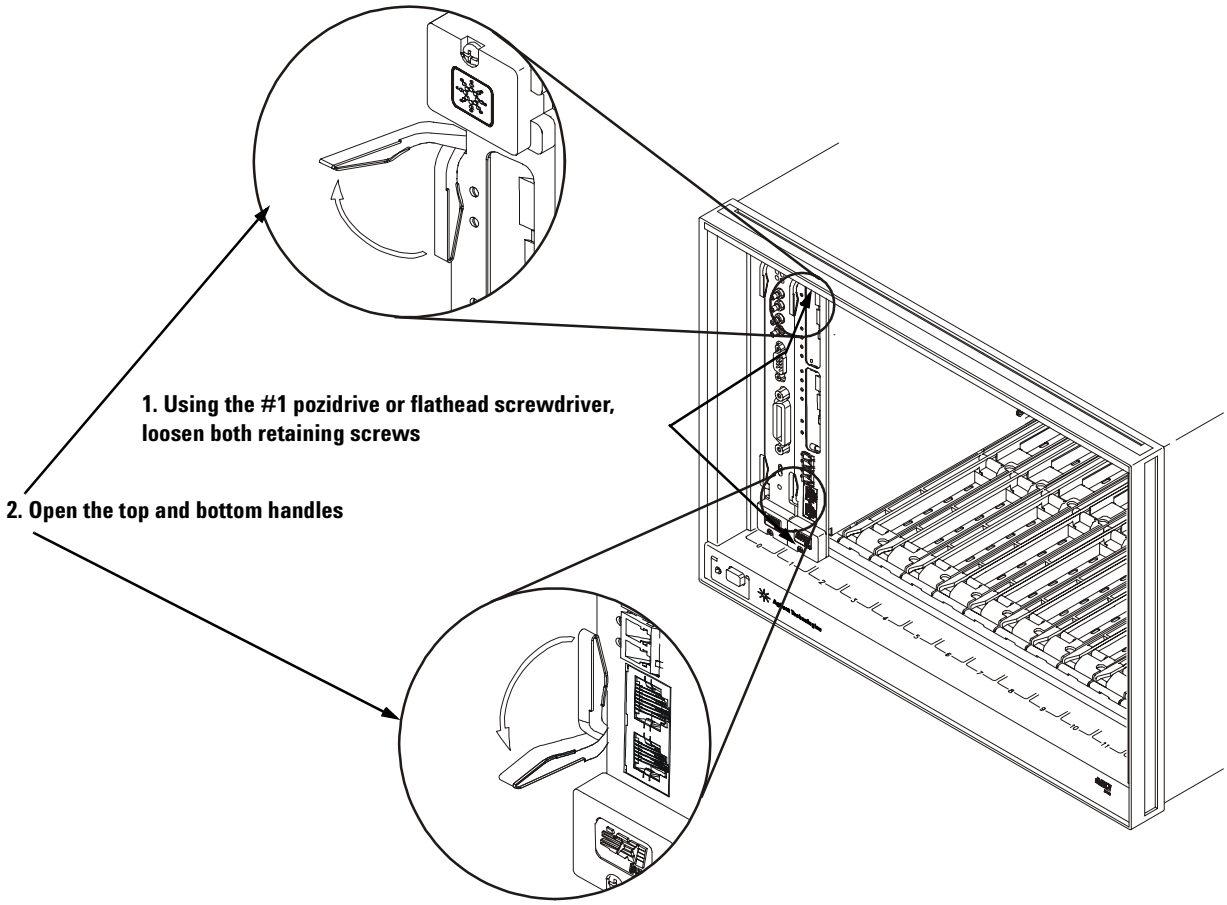


Figure 7 Removing the Module

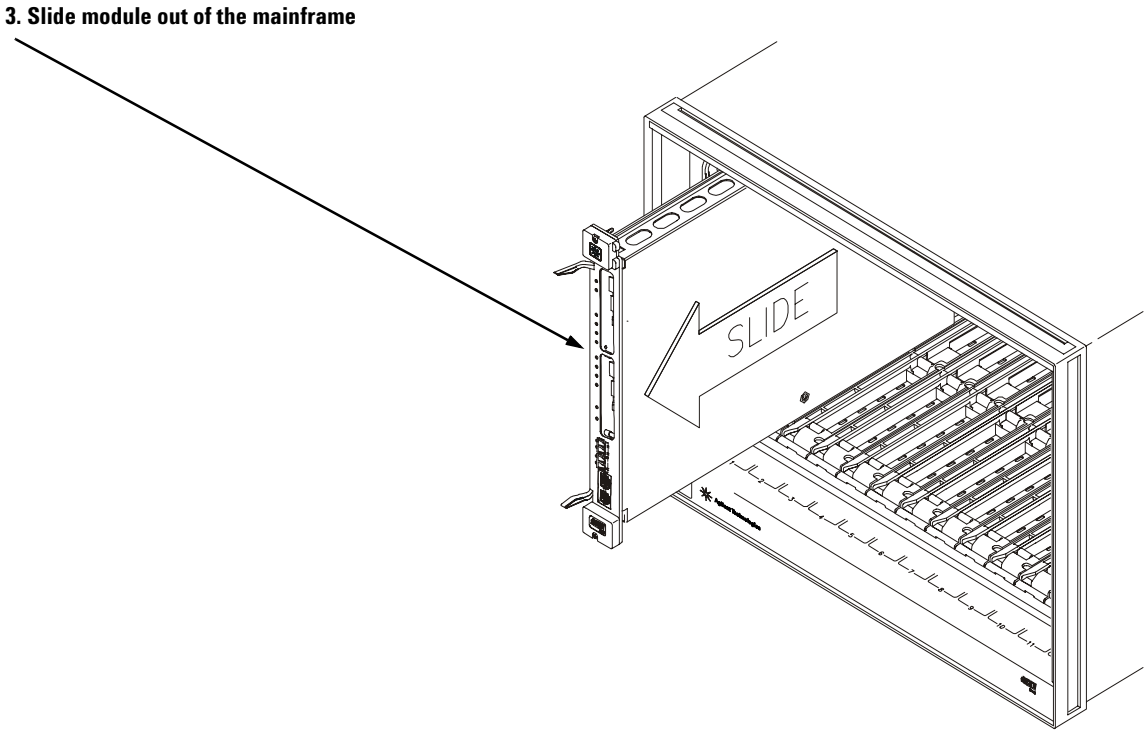


Figure 8 Removing the Module (Cont.)

Installing/Removing Plug-In Cards

The Agilent E9821A Module uses ePMC and Loopback cards. The following procedure shows how to install these cards. The steps involved are listed below and described in detail on the following pages.

CAUTION Always **REMOVE POWER FROM THE VXI MAINFRAME** before installing or removing any VXI module.

1. Remove the module from the VXIbus Mainframe.
2. Remove the module's top cover.
3. Remove the main PC board from the bottom cover (necessary for installing ePMC cards only).
4. Install the ePMC cards.
5. Install the loopback cards.
6. Reassemble the main PC board into the bottom cover.
7. Reassemble the top cover.
8. Reinstall the module into the VXIbus Mainframe (see "Installing the Agilent E9821A Module" on page 19.

CAUTION Due to power and cooling considerations, the number of installed G4 ePMC cards is limited. Configurations other than those listed on page 44 may exceed power and cooling limitations.

Tools Required

- T10 Torx Driver
- T8 Torx Driver

Step 1. Remove the Module from the VXIbus Mainframe

See "Removing the Agilent E9821A Module" on page 30 to remove the module from the mainframe.

CAUTION The E9821A module and its plug-in cards are static sensitive. Use the appropriate precautions when removing, handling, and installing to avoid damage.

Step 2. Remove the Module's Top Cover

Figure 9 shows how to remove the top cover of the Agilent E9821A Module.

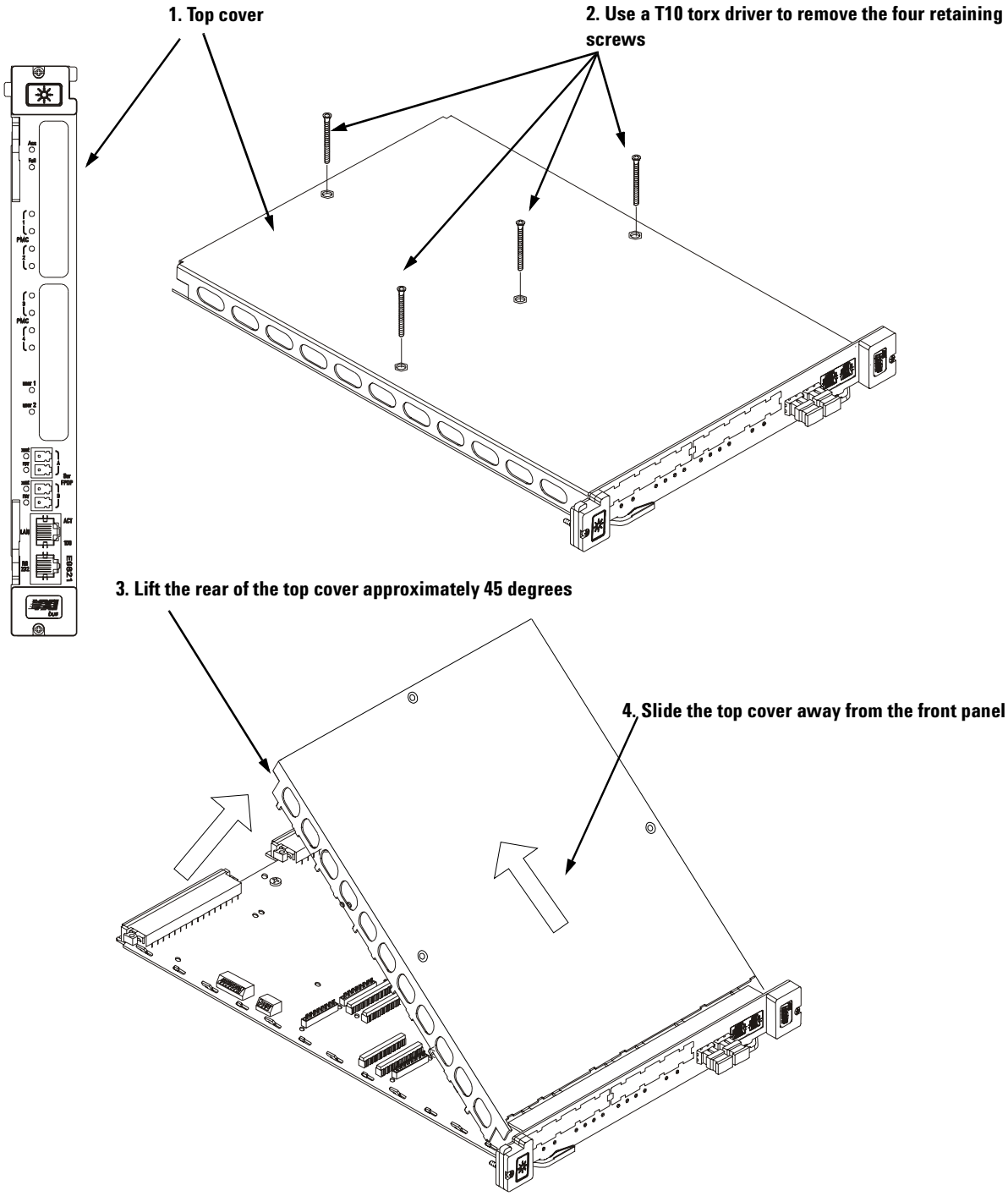


Figure 9 Removing the Top Cover

Step 3. Remove the Main PC Board from the Bottom Cover

NOTE This step is necessary only if you are installing ePMC cards. You do not need to remove the bottom cover to install loopback cards. If you are not installing an ePMC card, skip ahead to step 5.

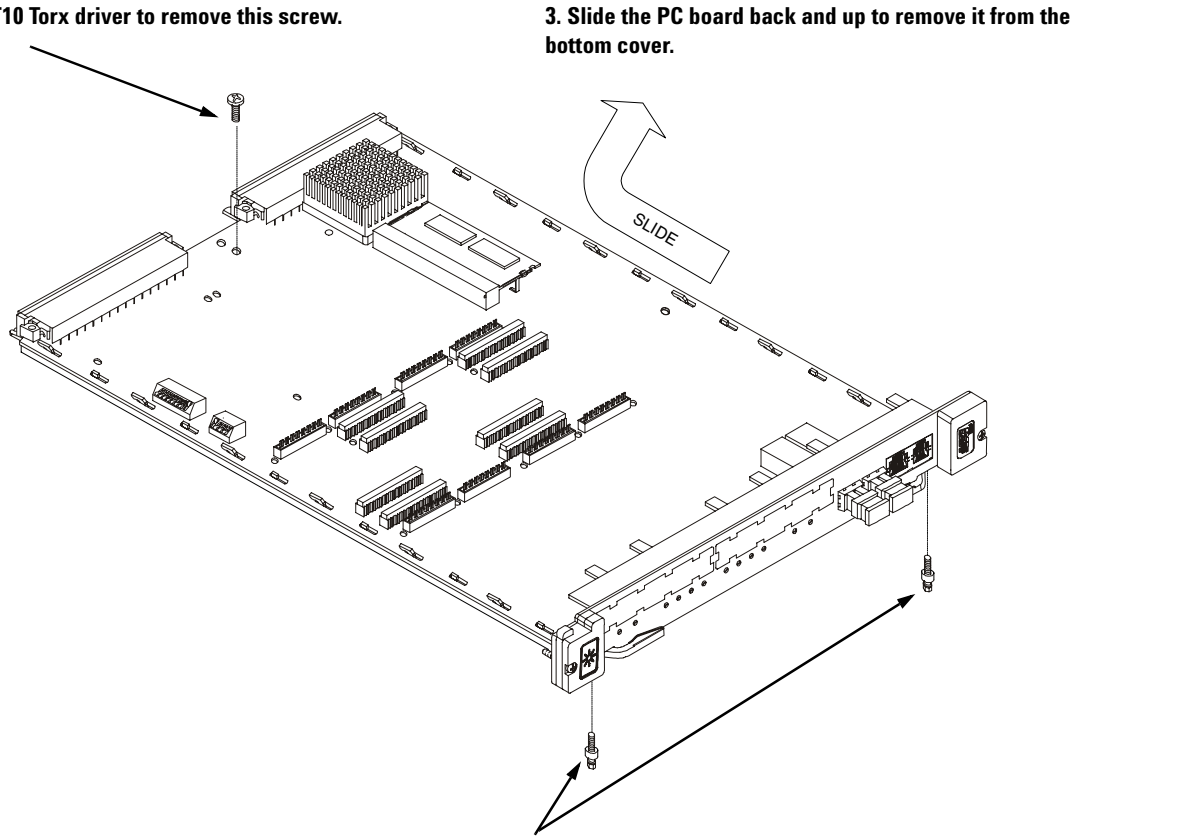


Figure 10 Removing the PC board from the bottom cover

Step 4. Install the ePMC Cards

Figure 11 shows the location and how to install the ePMC cards. To minimize current load and maximize cooling, load ePMC sites in this order: Site 1, 3, 2, 4. Refer to Chapter 4, “Specifications” for power requirment details.

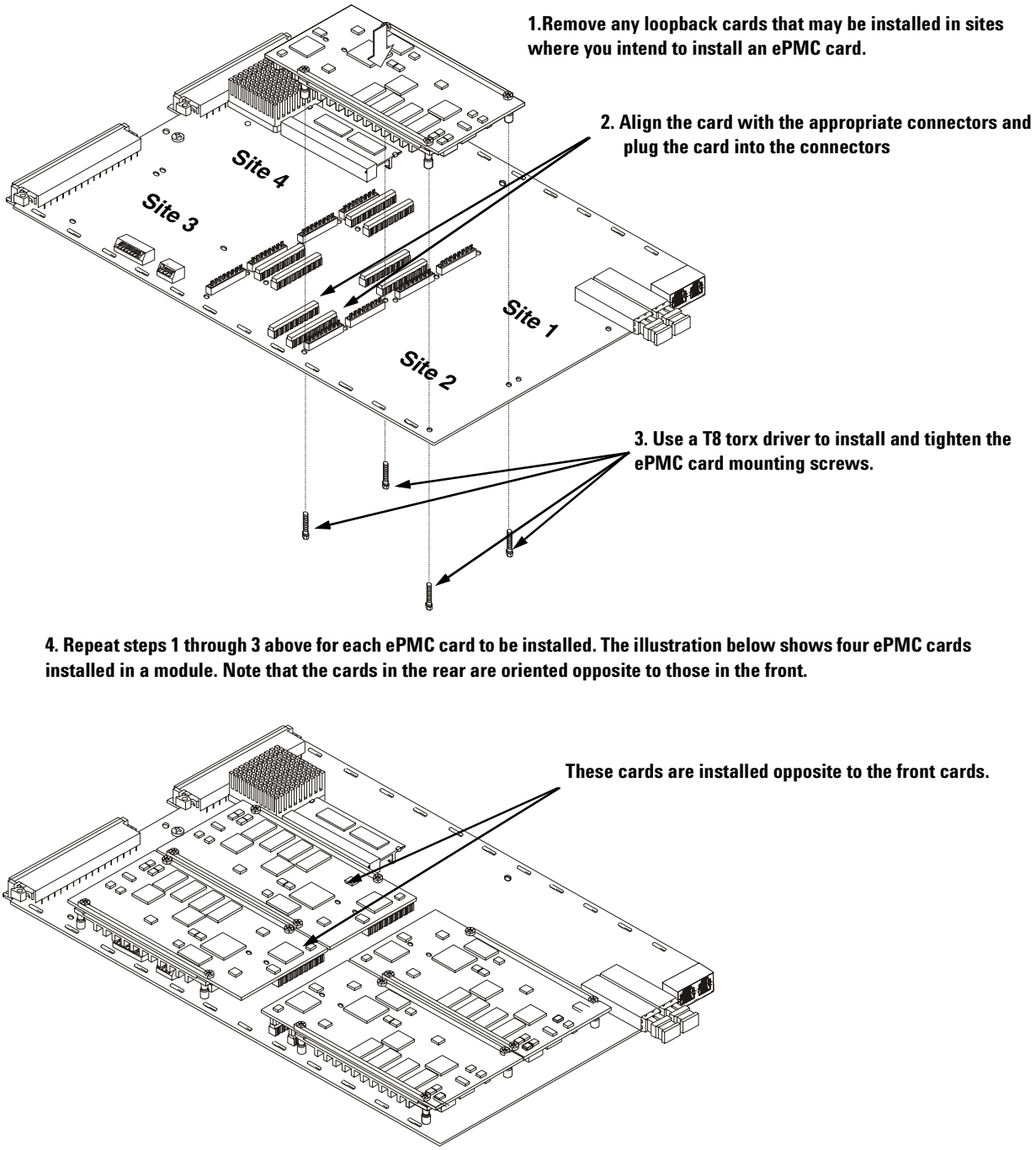


Figure 11 Installing the ePMC Cards

Step 5. Install the Loopback Cards

The Loopback Cards can be installed without removing the main PC board from the bottom cover.

Loopback cards must be installed in any empty sites (i.e., any sites not having an ePMC card installed.

NOTE Installing loopback cards in the empty site keeps the module from drawing excessive current–it is important to install loopback cards in every empty site. The module is shipped with three loopback cards (the loopback card part number is E9821-66505).

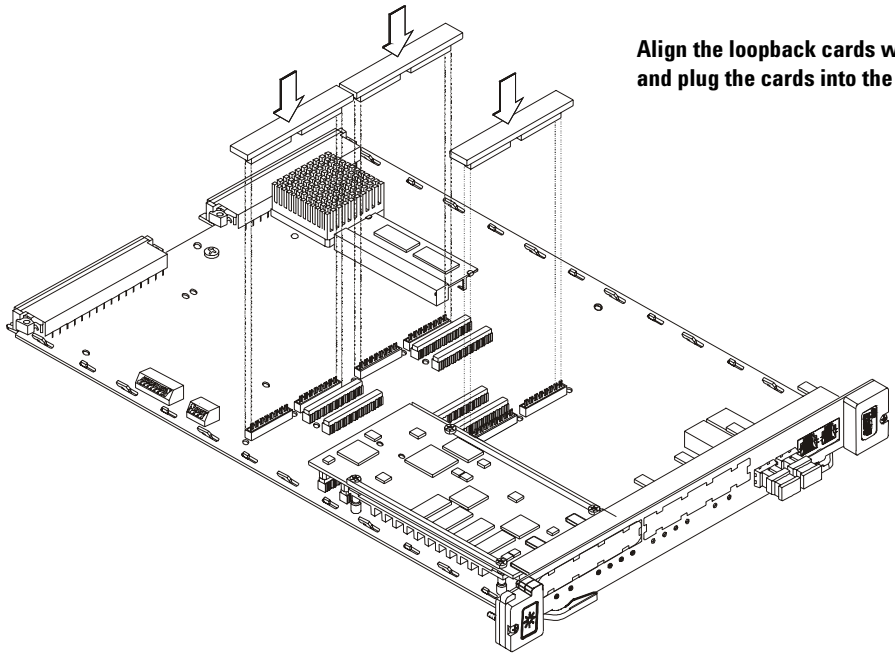


Figure 12 Installing the Loopback Cards

Step 6. Install the Memory Card

Figure shows how to replace the Memory Card.

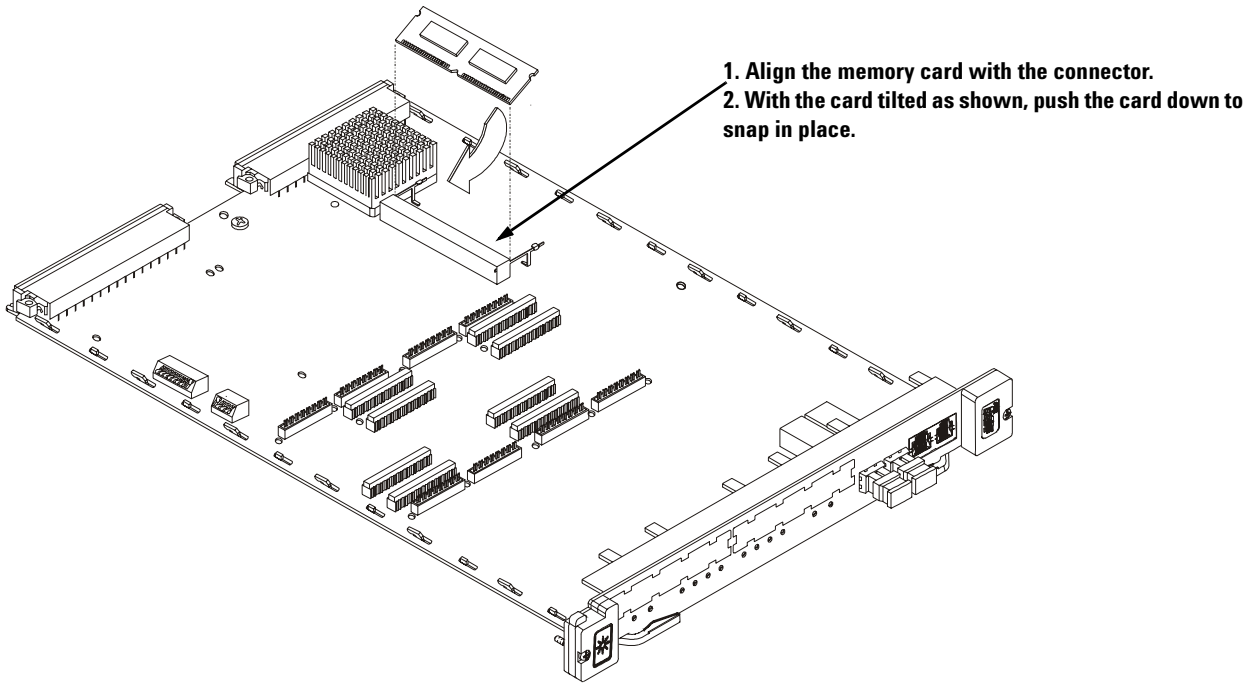


Figure 13 Installing the Memory Card

Step 7. Reassemble the Main PC Board into the Bottom Cover

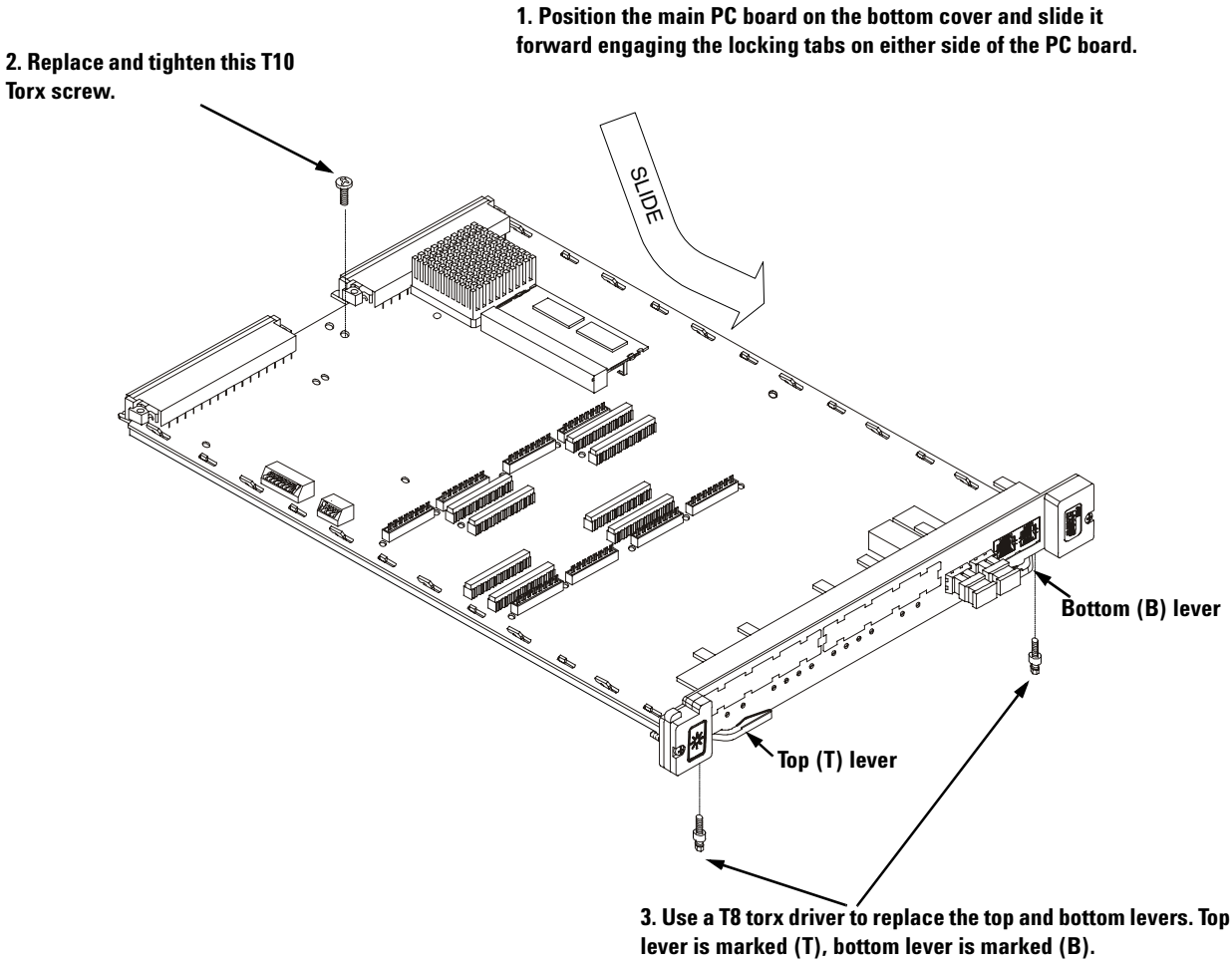


Figure 14 Reassembling the Main PC Board into the Bottom Cover

Step 8. Install the Top Cover

Figure 15 shows how to install the top cover.

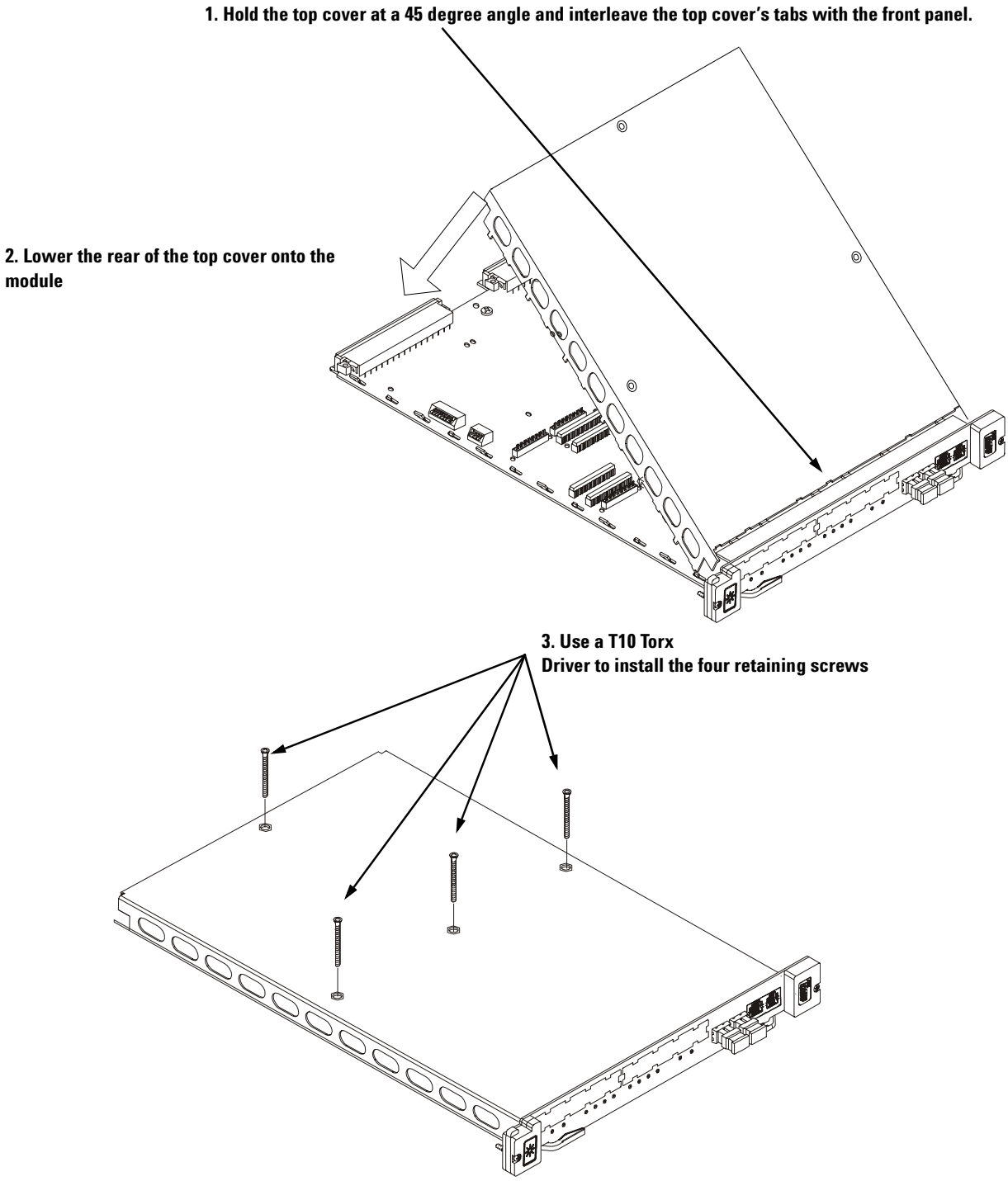


Figure 15 Installing the Top Cover

Step 9. Reinstall the Module into the VXIbus Mainframe

To reinstall the module, see “Installing the Agilent E9821A Module" on page 19.

4 Specifications

General Characteristics

VXI Standard Information	• Conforms to VXI revision 1.4. • C-size, single slot width. • VXI Device type code: 725 (hex 2D5) • Register based: A16/A24, D16/D32 Master A16, D16/D32 Slave • Interrupter/Handler • Local Bus capability
VXI Cooling Requirements	
10°C internal rise (Maximum Ambient of 50 °C):	
• With 4 ePMC plug-in cards:	6.6 liters/second, 1.1 mm H_2O
• With 3 ePMC plug-in cards:	5.8 liters/second, 0.8 mm H_2O
• With 2 ePMC plug-in cards:	4.3 liters/second, 0.4 mm H_2O
• With 1 ePMC plug-in card:	2.8 liters/second, 0.2 mm H_2O
15°C internal rise (Maximum Ambient of 45 °C):	
• With 4 ePMC plug-in cards:	4.4 liters/second, 0.5 mm H_2O
• With 3 ePMC plug-in cards:	3.9 liters/second, 0.3 mm H_2O
• With 2 ePMC plug-in cards:	2.9 liters/second, 0.2 mm H_2O
• With 1 ePMC plug-in card:	1.8 liters/second, 0.1 mm H_2O
Serial Front Panel Data Port (FPDP) fiber optic interface.	• Two rates: 2.500 Gbit rate for 247 MByte/s data rate, or 1.0625 Gbit rate for 104 MBytes/s data rate. • Dual LC Connector receptacle. • Multi-mode fiber, 850µm wavelength. • 100 meter maximum fiber length. • Optical receiver can be configured for cascading of several modules, or, for flow control. • Bit error rate < 1×10^{-14} (typical). • Compatible with Agilent E1438B/ E1439B. • Class 1 devices per FDA/CDRH and IEC-825-1

VXI Power Information - Serial Numbers US43140000 and Above

NOTE

The power distribution system for this product was redesigned for serial numbers US43140000 and up. To calculate current draw for these modules in a particular configuration, add the current draw of the Agilent E9821A main board for each supply, then add the current draw for each installed PMC. For serial numbers US43139999 and below, use the information in the subsequent section on page 47.

To maximize cooling effectiveness, load ePMC sites in the following order: 1, 3, 2, 4. See page 35 for the site map.

CAUTION

Power consumption for this product is highly dependent on the software algorithm being used. Unless otherwise specified, anticipated worst-case values are given. When typical values are listed, compliance with current limits is guaranteed when Agilent-configured hardware and software are used, but not when customer-created software is used. Consult factory for details.

VXI Power Requriements

Serial Numbers US43140000 and Above	Static Current	Dynamic Current
E9821A main board power consumption (no PMCs):		
+5 V:	477 mA	600 mA
-5.2 V:	540 mA	143 mA
-2 V:	130 mA	120 mA
+12 V:	0 A	0 A
-12 V:	0 A	0 A
+24 V:	0 A	54 mA
-24 V:	473 mA	540 mA
+5 Standby V:	0 A	0 A
Each option-100, dual-G4 processor card:		
+5 V:	2.98 A	300 mA
-5.2 V:	0 A	0 A
-2 V:	0 A	0 A
+12 V:	0 A	0 A
-12 V:	0 A	0 A
+24 V:	195 mA	47.3 mA
-24 V:	0 A	0 A
+5 Standby V:	0 A	0 A
Each option-110, single-G4 processor card with RAM:		
+5 V:	1.67 A	150 mA
-5.2 V:	0 A	0 A
-2 V:	0 A	0 A
+12 V:	0 A	0 A
-12 V:	0 A	0 A
+24 V:	195 mA	47.3 mA
-24 V:	0 A	0 A
+5 Standby V:	0 A	0 A
Each option-200, multi-channel DDC card:		
+5 V:	1.00 A (typical) 2.00 A (worst case)	0 A*
-5.2 V:	0 A	0 A
-2 V:	0 A	0 A
+12 V:	0 A	0 A
-12 V:	0 A	0 A
+24 V:	140 mA	0 A*
-24 V:	0 A	0 A
+5 Standby V:	0 A	0 A

* Negligible compared to G4 processor PMCs. Assume zero.

VXI Power Requirements – Serial Numbers US43140000 and Above (continued)

Static Current Formula (for each VXI supply):

Main Board Static Current Draw
+ Static Current Draw for each Option Card
= Total Static Current Draw

Total static current draw for each supply must be less than the main board limits at right

Main Board Static Current Limits

VXI Supply	Static Current Limit
+5V	10.5 A
-5.2V	6.0 A
2V	3.0 A
+12V	1.5 A
-12V	1.5 A
+24V	1.5 A
-24V	1.5 A
+5 Standby V	Not Used

Above limits are valid for Agilent mainframes only and are based on a limit of 1.5 Amps per pin. Check with your mainframe manufacturer for current-per-pin limits.

Dynamic Current Formula (for each VXI supply):

Main Board Dynamic Current Draw
+ Dynamic Current Draw for Each Option Card
= Total Dynamic Current Draw

Dynamic Current Limits

Dynamic current limits are mainframe dependent. Check the specifications for your mainframe

Example Current Calculations Serial Numbers US43140000 and Above

An E9821A is to be configured with three option-100 and one option-200 PMCs.

VXI Supply	Main Board Amps	Option 100 Amps	Option 100 Qty	Option 200 Amps	Option 200 Qty	Total Amps	Limit
+5 V:	0.48	2.98	3	1.00	1	10.42	10.5
-5.2 V	0.54	0.00	3	0.00	1	0.54	6.0
-2 V:	0.13	0.00	3	0.00	1	0.13	3.0
+12 V:	0.00	0.00	3	0.00	1	0.00	1.5
-12 V:	0.00	0.00	3	0.00	1	0.00	1.5
+24 V:	0.00	0.20	3	0.14	1	0.74	1.5
-24 V:	0.47	0.00	3	0.00	1	0.47	1.5

The total current of the main board and PMCs is less than the maximum limit.

Examples of allowable configurations serial numbers US43140000 and above:

- No more than three option-100 ePMCs may be installed.
- Three option-100 and one option-200 ePMCs.*
- Three option-200 and one option-100 ePMCs.
- Four option-110 ePMCs.
- Two option-100 and two option 110 ePMCs maybe installed

* Typical current values used for this example. This applies only when Agilent-supplied software is used.

VXI Power Information - Serial Numbers US43139999 and Below

NOTE

The power distribution system for this product was redesigned for serial numbers US43140000 and up. For serial numbers above this number, use the information in the previous section

To mimimize current load and maximize cooling, load ePMC sites in the following order: 1, 3, 2, 4. See page 35 for the site map.

CAUTION

For serial numbers US43139999 and below, the current draw of a given PMC is site-dependent. It is very important to use the information for each PMC for each site when calculating total current draw for the module. The PMC plwer distribution for these older-revision boards is decribed as follows:

- All sites power the PMC +5V directly from the VXI +5V supply.
- Sites 1, 2 use the VXI +24V to power the PMC +3.3V via a DC-DC converters.
- Site 3 uses the VXI +12V to power the PMC +3.3V via DC-DC converter.
- Site 4 uses the VXI +5V to power the PMC +3.3V via a DC-DC converter.

CAUTION

Power consumption for this product is highly dependent on the software algorithm being used. Unless otherwise specified, anticipated worst-case values are given. When typical values are listed, compliance with current limits is guaranteed when Agilent-configured hardware and software are used, but not when customer-created software is used. Consult factory for details.

VXI Power Requirements

Serial Numbers US43139999 and Below		Static Current	Dynamic Current
E9821A main board power consumption (no PMCs):			
	+5V:	2.85 A	600 mA
	-5.2V:	540 mA	143 mA
	-2V:	130 mA	120 mA
	+12V:	0 A	0 A
	-12V:	0 A	0 A
	+24V:	0 A	54 mA
	-24V:	0 A	0 A
	+5 Standby V:	0 A	0 A
Each Option-100, dual-G4 processor card:			
Installed in site 1 or 2	+5V:	2.98 A	300 mA
	-5.2V:	0 A	0 A
	-2V:	0 A	0 A
	+12V:	0 A	0 A
	-12V:	0 A	0 A
	+24V:	195 mA	47.3 mA
	-24V:	0 A	0 A
	+5 Standby V	0 A	0 A
Installed in site 3	+5V:	2.98 A	300 mA
	-5.2V:	0 A	0 A
	-2V:	0 A	0 A
	+12V:	390 mA	94.6 mA
	-12V:	0 A	0 A
	+24V:	0 A	0 A
	-24V:	0 A	0 A
	+5 Standby V	0 A	0 A
Installed in site 4	+5V:	3.92 A	527 mA
	-5.2V:	0 A	0 A
	-2V:	0 A	0 A
	+12V:	0 A	0 A
	-12V:	0 A	0 A
	+24V:	0 A	0 A
	-24V:	0 A	0 A
	+5 Standby V	0 A	0 A

VXI Power Requirements

Serial Numbers US43139999 and Below (continued)		Static Current	Dynamic Current
Each option-110, single-G4 processor card with extended RAM:			
Installed in site 1 or 2	+5V:	1.67 A	150 mA
	-5.2V:	0 A	0 A
	-2V:	0 A	0 A
	+12V:	0 A	0 A
	-12V:	0 A	0 A
	+24V:	195 mA	47.3 mA
	-24V:	0 A	0 A
	+5 Standby V:	0 A	0 A
Installed in site 3	+5V:	1.67 A	150 mA
	-5.2V:	0 A	0 A
	-2V:	0 A	0 A
	+12V:	390 mA	94.6 mA
	-12V:	0 A	0 A
	+24V:	0 A	0 A
	-24V:	0 A	0 A
	+5 Standby V:	0 A	0 A
Installed in site 4	+5V:	2.61 A	377 mA
	-5.2V:	0 A	0 A
	-2V:	0 A	0 A
	+12V:	0 A	0 A
	-12V:	0 A	0 A
	+24V:	0 A	0 A
	-24V:	0 A	0 A
	+5 Standby V:	0 A	0 A

VXI Power Requirements

Serial Numbers US43139999 and Below (continued)		Static Current	Dynamic Current
Each option-200, multichannel digital downconverter card:			
Installed in site 1 or 2	+5V:	1.00 A (typical) 2.00 A (worst case)	0 A*
	-5.2V:	0 A	0 A
	-2V:	0 A	0 A
	+12V:	0 A	0 A
	-12V:	0 A	0 A
	+24V:	140 mA	0 A*
	-24V:	0 A	0 A
	+5 Standby V:	0 A	0 A
Installed in site 3	+5V:	1.00 A (typical) 2.00 A (worst case)	0 A*
	-5.2V:	0 A	0 A
	-2V:	0 A	0 A
	+12V:	280 mA	0 A*
	-12V:	0 A	0 A
	+24V:	0 A	0 A
	-24V:	0 A	0 A
	+5 Standby V:	0 A	0 A
Installed in site 4	+5V:	1.67 A (typical) 2.67 A (worst case)	0 A*
	-5.2V:	0 A	0 A
	-2V:	0 A	0 A
	+12V:	0 A	0 A
	-12V:	0 A	0 A
	+24V:	0 A	0 A
	-24V:	0 A	0 A
	+5 Standby V:	0 A	0 A

* Negligible compared to G4 processor PMCs. Assume zero.

VXI Power Requirements – Serial Numbers US43139999 and Below (continued)

Static Current Formula (for each VXI supply):

Main Board Static Current Draw
+ Static Current Draw for each Option Card
= Total Static Current Draw

Total static current draw for each supply must be less than the main board limits at right

Main Board Static Current Limits

VXI Supply	Static Current Limit
+5V	10.5 A
-5.2V	6.0 A
2V	3.0 A
+12V	1.5 A
-12V	1.5 A
+24V	1.5 A
-24V	1.5 A
+5 Standby V	Not Used

Above limits are valid for Agilent mainframes only and are based on a limit of 1.5 Amps per pin. Check with your mainframe manufacturer for current-per-pin limits.

Dynamic Current Formula (for each VXI supply):

Main Board Dynamic Current Draw
+ Dynamic Current Draw for Each Option Card
= Total Dynamic Current Draw

Dynamic Current Limits

Dynamic current limits are mainframe dependent. Check the specifications for your mainframe

Example Current Calculations With Serial Numbers US43139999 and Below

An E9821A is configured with one option-100 PMC in site 2 and three option-200 PMCs in sites 1, 3, and 4.

VXI Supply	Main Board Amps	Site 1 Amps*	Site 2 Amps	Site 3 Amps*	Site 4 Amps*	Total Amps	Limit
+5 V:	2.85	1.00	2.98	1.00	1.67	9.50	10.5
-5.2 V	0.54	0	0	0	0	0.54	6.0
-2 V:	0.13	0	0	0	0	0.13	3.0
+12 V:	0	0	0	0.28	0	0.28	1.5
-12 V:	0	0	0	0	0	0.00	1.5
+24 V:	0	0.14	0.20	0	0	0.34	1.5
-24 V:	0	0	0	0	0	0.00	1.5

The total current of the main board and PMCs is less than the maximum limit.

Examples of allowable configurations for units with serial numbers US43139999 and below:

- As many as (no more than) two option-100 ePMCs may be installed in sites 1, 2, or 3.
- Two option-100 ePMCs in sites 2 and 3 and and one option-200 ePMC in site 1.*
- Three option-200 ePMCs in sites 1, 3, and 4 and one option-100 ePMC in site 2 (see example above).*
- Four option-110 ePMCs.

* Typical current values used for this example. This applies only when Agilent-supplied software is used.

Performance Benchmarks

This information is provided as supplemental, non-warranted characteristics.

- VXI* bus continuous data transfer rate: 11 MB/second
- Local Bus† data transfer rate: 66 MB/second
- Serial FPDP data transfer rate: 200 MB/second
- Solano‡ high-speed link data transfer rate: 213 MB/second

* The VXI bus is a conventional shared bus used by the system controller to manage the system modules and to pass data between modules. See page 8.

† The Local Bus is a high-performance data bus on the VXI backplane used to transfer data between VXI modules one way (left-to-right) only. See page 8.

‡ The Solano high-speed links are part of the E9821A main board design. They are used to pass data between the ePMC sites. See LVDS Data Links on page 8 and page 10.

Electrical Specifications

This product has no parametric specifications. In manufacturing, functional tests are performed to verify the proper operation of all processors, memory, plug-in cards, and data interfaces.

Regulatory and Standards Compliance

Item	Regulatory Specs
Safety	EN 61010-1 (1993) (EEA) Conforms with USA's CDRH Radiation Standard 21 CFR Chapter 1, Subchapter J.
Radiated Emissions	ICES-001 (Canada) AS/NZS 2064 (Australia/New Zealand) EN 61326-1 (EEA) (requires RF connector shields, part number E1400-80920)
Immunity	EN 61326-1 (EEA), in an EMC controlled environment.
Environmental Operating Conditions	Temperature Range: Operating: 0 to +50 °C Storage: -40 to +70 °C (See note below) Humidity Range: Operating: 15 to 95%RH up to 40° C Maximum Operating Altitude: 4600m Above 2300m derate operating temperature by -3.6 °C per 1000m

NOTE **After being stored at extremely cold temperatures, the instrument must be stabilized at or above 0C before applying power.**

Abbreviations and Definitions

- AS/NZS = Standards Australia/Standards New Zealand
- CDRH = Center for Devices and Radiological Health
- DSP = Digital Signal Processor
- DUT = Device Under Test
- EEA = European Economic Area
- EMC = Electro Magnetic Compatibility
- EN = European Norm
- ePMC = Enhanced PMC
- FDA = Food and Drug Administration
- FIFO = First In, First Out
- FPDP = Front Panel Data Port
- ICES = Interference-Causing Equipment Standard
- IEC = International Electrotechnical Commission
- LAN = Local Area Network
- PCI = Peripheral Component Interconnect
- PMC = PCI Mezzanine Card
- VME = VersaModule Eurocard bus
- VXI = VME eXtensions for Instrumentation

Safety Summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies, Inc. assumes no liability for the customer's failure to comply with these requirements.

WARNING **DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE**
Do not operate the instrument in the presence of flammable gases or flames.

WARNING **DO NOT REMOVE THE INSTRUMENT COVER**
Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified service personnel. Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

Safety Symbols and Instrument Markings

Symbols and markings in manuals and on instruments alert you to potential risks, provide information about conditions, and comply with international regulations. Table 1 defines the symbols and markings you may find in a manual or on an instrument.

Table 1 Safety symbols and instrument markings

Safety symbols	
	Warning: risk of electric shock.
	Warning: hot surface
	Caution: refer to accompanying documents.

Table 1 Safety symbols and instrument markings (continued)

Safety symbols	
	Laser radiation symbol: marked on products that have a laser output.
	Alternating current.
	Both direct and alternating current.
	Three-phase alternating current.
	Earth (ground) terminal
	Protective earth (ground) terminal
	Frame or chassis terminal
	Terminal is at earth potential. Used for measurement and control circuits designed to be operated with one terminal at earth potential.
	Terminal for neutral conductor on permanently installed equipment.
	Terminal for line conductor on permanently installed equipment.
	Standby (supply); units with this symbol are not completely disconnected from ac mains when this switch is off. To completely disconnect the unit from ac mains, either disconnect the power cord, or have a qualified electrician install an external switch.
Instrument markings	
	The CE mark is a registered trademark of the European Community. If it is accompanied by a year, it indicates the year the design was proven.
	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework regulations under the terms of the Radio Communications Act of 1992.
1SM1-A	This text indicates that the instrument is an Industrial Scientific and Medical Group 1 Class A product.

Service and Support

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel. Contact your customer engineer through your local Agilent Technologies Service Center.

Agilent on the Web

You can find information about technical and professional services, product support, and equipment repair and service on the Web:

http://www.agilent.com/contacts/English/noscript.html

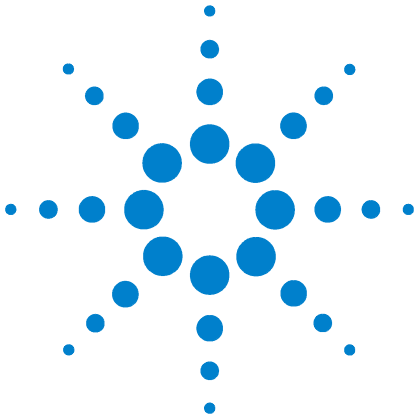
Double-click the link to **Test & Measurement**. Select your country from the drop-down menus. The Web page that appears next has contact information specific for your country.

Agilent by Phone

If you do not have access to the Internet, call one of the numbers in Table 2.

Table 2 Agilent Call Centers and Regional Headquarters

United States and Canada:	Test and Measurement Call Center (800) 452 4844 (toll-free in US)
Europe:	(41 22) 780 8111
Japan:	Measurement Assistance Center (81) 0426 56 7832
Latin America:	305 269 7548
Asia-Pacific:	(85 22) 599 7777



5
Replaceable Parts

Service, Calibration and Exchange Modules

The Agilent E9821A must be returned to Agilent Technologies for service or calibration.

Exchange E9821A modules are available and are shipped WITHOUT ePMC cards so you must remove the ePMC cards from the original module before exchange. Memory modules ARE included on the exchange modules and should NOT be removed from the original module.

For information on upgrading your module or replacing parts, contact your local Agilent Technologies sales and service office. See the Technical Specifications or the Agilent Technologies web site (http://www.agilent.com) for a list of office locations and addresses.

Ordering Information

To order parts in the U.S., call Agilent Technologies Parts Direct Ordering at (877) 447-PART or go to https://www.parts.agilent.com/. Outside the U.S., please contact your local Agilent Technologies parts center.

Exchange Modules

The following modules are available on an exchange basis from Agilent Technologies.

Table 3 Exchange Modules

Part Number	Description
E9821-66501 (product)	New exchange board assembly
E9821-69501	Refurbished E9821-66501 board assembly
E9821-66202 (opt. 100)	New exchange module for the dual G4 ePMC card assembly
E9821-69202	Refurbished dual G4 ePMC card assembly
E9821-66203 (opt. 110)	New Exchange module for the single G4 ePMC card assembly with memory
E9821-69203	Refurbished single G4 ePMC card assembly with memory

Fiber Optic Cables

The following fiber optic cables are available from Agilent Technologies.

Table 4 Replacement Fiber Optic Cables

Agilent Model Number	Agilent Part Number	Description
E9044A	1005-1011	Multi-mode 62.5/125 LC/LC, Duplex, 16-inch
E9045A	1005-1009	Multi-mode 62.5/125 LC/LC, Simplex, 16-inch
E9046A	1005-1010	Multi-mode 62.5/125 LC/LC, Duplex, 40-inch
E9047A	1005-1012	Multi-mode 62.5/125 LC/LC, Simplex, 40-inch

Miscellaneous Parts

Table 5 Miscellaneous Parts

Agilent Part Number	Description
E8130-68702	RS232 Adapter + Cable
1818-8527	64MB memory (SYNC-DIMM 8MX64)
E9821-66505	Loop back boards

6
Laser Safety and Fiber Optic Cable and Connector Handling

Laser Hazard Awareness and User Safety Guidelines

Test System Laser Hazard Information

The following provides general hazard information for all persons either using or working near an active lightwave test system or active laser sources.

NOTE The Agilent Technologies E9821A FPDP interfaces use semiconductor (diode) Class 1 laser source emitters. A Class 1 laser is considered safe based upon current medical knowledge.

User Safety Guidelines

The following provides minimum user safety guidelines that should be followed whenever operating or working near lasers:

WARNING **Each test system installation and application is unique and may require additional laser/test system safety procedures, as determined by each using site facility and organization. Ensure that all site safety requirements are followed when using the test system.**

1 BEFORE APPLYING POWER TO THE TEST SYSTEM ensure that all laser source fiber-optic interconnect/jumper cable connectors are either connected or covered with dust caps.

WARNING **NEVER LOOK TOWARD OR DIRECTLY INTO THE TRANSMITTING END OF A FIBER-OPTIC CABLE OR CONNECTOR that is connected to an active test system or active laser source of any type.**

2 NEVER ATTEMPT TO CLEAN A FIBER-OPTIC CONNECTOR that is connected to an active test system or active laser source.

Additional Guidelines for Laser Safety and Hazard Assessment

Additional information and guidelines for laser safety and hazard assessment can be obtained from the following sources:

- OSHA Directives, Pub 8-1.7, Guidelines for Laser Safety and Hazard Assessment, Occupational Safety and Health Administration (OSHA), US Department of Labor. This document can be obtained at no cost to the user by down-loading it via the Internet at http://www.osha-slc.gov/OshDoc/Directive_data/PUB-8-1_7.html
- American National Standards Institute (ANSI): ANSI Z136 Laser Safety Standards, ANSI Z136.1-1999: American National Standard for the Safe Use of Lasers, ANSI Z136.2-1988: American National Standard for the Safe Use of Optical Fiber Communications Systems Utilizing Laser Diode and LED Sources can be purchased by contacting the Laser Institute of America at 407-380-1553 or via the Internet at http://www.laserinstitute.org/

Fiber Optics Information

The following information explains the correct use of fiber-optic cables and connectors, and selecting the correct connectors.

Connectors Used

The fiber-optic cables cable ends require “LC” connectors.

Handling Fiber-Optic Cables and Associated Connectors

Fiber-optic interconnect cables and associated connectors used by the Agilent E9821A Module can be easily damaged by incorrect handling or use. Micro-cracks in the glass fiber wall caused by tight bending or excessive stress, minute physical damage to a connector ferrule or glass fiber endface caused by improper cleaning, and by dust and dirt particles deposited on the glass fiber endface can cause degradation of the transmitted lightwave signal.

Connector Damage and Dirt

The most common connector concerns are endface damage, and the presence of dirt and dust on the connector ferrule and fiber endface.

Poor connections can be due to dirty or damaged connectors without the user ever being aware that there is a connector problem. Dirty or damaged connector ferrules and endfaces are not immediately obvious to the naked eye, and can be easily overlooked.

An awareness of potential connector damage and good cleaning practices can ensure that optimum connector performance is maintained. With glass-to-glass interfaces, any damage to a ferrule or fiber endface or stray dust particles or body oil from a finger on the endface can have a significant negative effect on connector performance.

Connector Care Guidelines

Use the following guidelines to achieve the best possible performance when making measurements on your fiber-optic test system:

- Keep connectors covered when not in use.
- Always use dry connections.
- Never use metal or sharp objects to clean the connector and never scrape the connector.
- Avoid matching gel and oils. While these often work well on first insertion, they attract dirt and dust. The oil or gel grabs and holds grit that is then ground into the fiber endface.
- Never use a gel for long-term connections or to improve the performance of a damaged connector. The gel can mask the extent of damage and cause inaccurate measurements. Continued use of a damaged fiber can also transfer damage to the test fixture or DUT.
- When inserting a fiber-optic cable into a connector or adapter, gently insert it in as straight a line as possible. Make sure the fiber end does not touch the outside of the mating connector or adapter. Tipping and inserting at an angle can scrape material off the inside of the connector, or even break the inside ferrule of connectors made with ceramic material.

All connectors should be treated like the high-quality lens of a good camera. The weak link in instrument reliability is often the inappropriate use and care of the connector.

Cleaning Connectors

Do the following:

1. Apply pure isopropyl alcohol (Agilent P/N 8500-5344) to a clean lint-free cotton swab (Agilent P/N 8520-0023), small foam swab (Agilent P/N 9300-1223), or lens paper.
2. Clean the ferrules and other parts of the connector while avoiding the end of the fiber.
3. Apply isopropyl alcohol to a new clean lint-free cotton swab or lens paper.
4. Clean the fiber end with the swab or lens paper.

CAUTION Do not scrub during this initial cleaning because grit can be caught in the swab and become a gouging element.

5. Blow across the connector end face from a distance of 6 to 8 inches using filtered, dry, compressed air. Aim the compressed air at a shallow angle to the fiber end face. Nitrogen gas or non-residue compressed dust remover (Agilent P/N 8500-5262) can also be used.

CAUTION Do not shake, tip, or invert compressed air canisters. This releases particles from the can into the air. Refer to the instructions on the compressed air canister.

6. As soon as the connector is dry, connect or cover it for later use.

If the performance after the initial cleaning seems poor, try cleaning the connector again. Often a second cleaning will restore proper performance. The second cleaning should be more arduous, with a scrubbing action.

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