Agilent Technologies
PXI Express 12-bit Wideband IF Digitizer

M9202A

Service Guide

Anticipate ___Accelerate ___Achieve

Agilent Technologies

Notices

Manual Part Number

M9202-90013

Edition

07 November 2012

Sales and Technical Support

To contact Agilent for sales and technical support, refer to the "support" links on the following Agilent web resources:

- http://www-.agilent.com/find/embedded
- www.agilent.com/find/assist (worldwide contact information for repair and service)

Information on preventing damage to your Agilent equipment can be found at www.agilent.com/find/tips.

Regulatory Compliance

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. To review the Declaration of Conformity, go to http://regulations.corporate.agilent.com/DoC/search.htm.

Warranty

Technology Licenses

Restricted Rights Legend

Safety Notices

The following safety precautions should be observed before using this product and any associated instrumentation.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product.

WARNING

If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

The types of product users are:

- **Responsible body** is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring operators are adequately trained.

- **Operators** use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

- **Maintenance personnel** perform routine procedures on the product to keep it operating properly (for example, setting the line voltage or replacing consumable materials). Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

- **Service personnel** are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Agilent products are designed for use with electrical signals that are rated Measurement Category I and Measurement Category II, as described in the International Electrotechnical Commission (IEC) Standard IEC 60664. Most measurement, control, and data I/O signals are Measurement Category I and must not be directly connected to mains voltage or to voltage sources with high transient over-voltages. Measurement Category II connections require protection for high transient over-voltages often

associated with local AC mains connections. Assume all measurement, control, and data I/O connections are for connection to Category I sources unless otherwise marked or described in the user documentation.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30V RMS, 42.4V peak, or 60VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before: connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

The instrument and accessories must be used in accordance with its specifications and operating instructions, or the safety of the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories, as defined in the specifications and operating information, and as shown on the instrument or test fixture panels, or switching card.

When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.

Chassis connections must only be used as shield connections for measuring circuits, NOT as safety earth ground connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.

Caution and Warning 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.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits – including the power transformer, test leads, and input jacks – must be purchased from Agilent. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Agilent to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call an Agilent office for information.

Cleaning Precautions:

WARNING

To prevent electrical shock, disconnect the Agilent Technologies instrument from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally. To clean the connectors, use alcohol in a well-ventilated area. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate prior to energizing the instrument.

Front and Rear Panel Symbols:

The CE mark is a registered trademark of the European Community.

N10149 The C-Tick mark is a registered trademark of the Australian Spectrum Management Agency.

ICES/NMB-001
ISM GRP.1 CLASS A
This symbol indicates product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001). It also identifies the product is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).

South Korean Class A EMC Declaration. this equipment is Class A suitable for professional use and is for use in elect-tomagnetic environments outside of the home.
A 급 기기 (업 무용 방송통신기자재)
이 기기는 업무용 (A 급) 전자파적합기 기로서 판 매자 또는 사 용자는 이 점을 주
의하시기 바라 며 , 가정외의 지역에서 사용하는 것을 목적으 로 합니다 .

This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).

This symbol on an instrument means caution, risk of danger. You should refer to the operating instructions located in the user documen-tation in all cases where the symbol is marked on the instrument.

This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.

This symbol indicates the instrument is sensitive to electro-static discharge (ESD). ESD can damage the highly sensitive components in your instrument. ESD damage is most likely to occur as the module is being installed or when cables are connected or disconnected. Protect the circuits from ESD damage by wearing a grounding strap that provides a high resistance path to ground. Alternatively, ground yourself to discharge any built-up static charge by touching the outer shell of any grounded instrument chassis before touching the port connectors.

This symbol denotes a hot surface. The side cover of the module will be hot after use and should be allowed to cool for several minutes.

Table of Contents

Service Guide Introduction

This document is intended for the use of Agilent Service Centers and by self-maintaining customers.

Contents

- **Section 1 - Getting Started:** This section provides the standard procedure for reception and installation of the module (software and hardware) as a prerequisite for conducting the following tests.
- **Section 2 - Module Test Procedure:** Details the automated N7800 TME test procedures which will determine if the module is function correctly and within specification.
- **Section 3 - Service Operations:** Provides information on replacement parts and module core replacement procedure.
- **Appendix - Reference:** Provides a brief technical overview of the module.

Related Documentation

In addition to this Service Guide, other documentation for the M9202A includes:
- **Startup Guide:** Provides instructions to unpack, inspect, install and verify operation of the module. The key elements from this Startup Guide are duplicated in the Getting Started section of this document.
- **Data Sheet :** Provides product overview and detailed specifications for the digitizer.
- **User Guide and Soft Front Panel (SFP) help system :** An HTML Help (.chm) based system which provides information on the complete range of modular digitizer products, and information on the use of the Soft Front Panel applications and other utilities.
- **IVI Driver reference (help system) :** An HTML Help system covering the MD1 IVI-C and IVI-COM driver in detail, intended as a programmers reference.
- **LabVIEW Driver reference (help system) :** An HTML Help system covering the use of the supplied Lab-VIEW driver package. A useful reference for programmers.

All of the product documentation listed above is included on the CD shipped with your module. If you have previously run the product software installer on your PC you may access the documentation directly from the Windows Start Menu, *Start > All Programs > Agilent > MD1 >*, except for the IVI help which is located at *Start > All Programs > Agilent IVI Drivers > AgMD1 Digitizer >*.

To find the very latest editions of the user documentation, go to the product website www.agilent.com/find/m9202a and download the required files

Specifications

For full specifications of the M9202A please refer to the product Data sheet (5990-6461EN) , which may be downloaded from the link shown above.

Section 1 - Getting Started

The following section contains information which has been taken from the product Startup Guide, it is however included here for convenience as it forms a prerequisite for the subsequent testing procedures.

The following sections outline a sequence for the installation of the module which must be observed, that sequence being:

Step 1: Unpack and Inspect the Module

> **CAUTION** The module is shipped in materials which prevent damage from static. The module should only be removed from the packaging in an anti-static area ensuring that correct anti-static precautions are taken. Store all modules in anti-static envelopes when not in use.

Inspect for damage

After unpacking the module, carefully inspect it for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by the warranty.

Information on preventing damage to your Agilent equipment can be found at www.agilent.com/find/tips.

> **CAUTION** To avoid damage when handling a module, do not touch exposed connector pins.

ESD Precautions
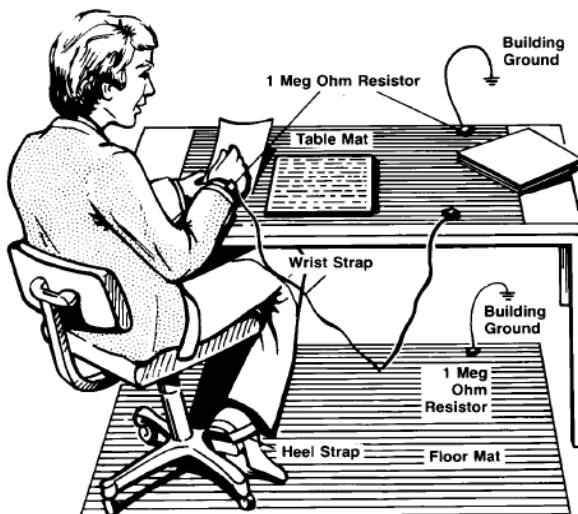
Electrostatic discharge (ESD) can damage or destroy electronic components. Use a static-safe work station to perform all work on electronic assemblies. The figure (left) shows a static-safe work station using two types of ESD protection: conductive table-mat and wrist-strap combination, and conductive floor-mat and heel-strap combination. Both types, when used together, provide a significant level of ESD protection. Of the two, only the table-mat and wrist-strap combination provides adequate ESD protection when used alone. To ensure user safety, the static-safe accessories must provide at least 1 MΩ of isolation from ground.

Figure 1 - A typical ESD workstation

Step 2: Install the Software

System Requirements

Item	Requirements		
Operating system	**Windows XP SP3**	**Windows Vista® SP1 and SP2, Windows 7®** (32 or 64-bit), All versions.	**Linux** (Not supported by N7800 TME software)
Processor speed	600 MHz or higher required 800 MHz recommended	1 GHz 32-bit (x86), 1 GHz 64-bit (x64), no support for Itanium64	-
Available memory	256 MB minimum,(1 GB or greater recommended	1 GB minimum	-
Available disk space [1]	1.5 GB available hard disk space, includes: • 1 GB available for Microsoft .NET Framework 3.5 SP1 [2] • 100 MB for Agilent IO Libraries Suite		-
Video	Super VGA (800x600) 256 colors or more	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)	-
Browser	Microsoft Internet Explorer 6.0 or higher	Microsoft Internet Explorer 7.0 or higher	-

1 Note: Because of the installation procedure, less disk space may be required for operation than is required for installation. The amount of space listed above is required for installation.

2 Note: .NET Framework Runtime Components are installed by default with Windows Vista. Therefore, you may not need this amount of available disk space.

Item	Module & Chassis Requirements
Chassis	PXIe chassis
PXI System / Host Controller	A remote PC Host or PXI Express embedded controller is required
Embedded Controller	An embedded PC host controller must meet the following requirements: • PXIe System Controller (in PXIe chassis) • Utilize a 2x8, 4x4, 1x8, or 1x4 PXIe System slot link configuration • Run one of the above operating systems
Remote Controller	Agilent M9021A PXIe System Interface x8 with one of the following PC interface options: • Agilent M9045A PCIe ExpressCard Adaptor x1, with cable (for laptops) • Agilent M9047A PCIe Desktop Adaptor x8, with cable (for desktop PCs) Or an equivalent remote controller connected to a PC running one of the above operating systems.

Power up the Controller

If you are using a remote controller, power up the host computer.

If you are using an embedded controller, complete the following steps:

1. Install the embedded controller module into the compatible chassis (Agilent M9018A chassis recommended).
2. Connect peripherals (mouse, keyboard, monitor).
3. Power up the chassis.

Install the Software

The   module software is located on the Agilent MD1 High-Speed Digitizer Software and Product Information CD CD (M9210-90007) and the Agilent IO Library Suite CD (E2904-60003). This software is also available for download at the Agilent website www.agilent.com/find/PXI-Digitizers

> **NOTE** Administrator privileges will be needed for software and hardware installation. This includes the case of first-time installation of a module in a different crate slot.

This installation includes the following:

- Agilent IO Library Suite (IOLS), which includes the Agilent Connection Expert. This software must be installed first.

  > **NOTE** Version 16.2 (or newer) of the Agilent IO Libraries Suite is required.

- Soft Front Panel (SFP), device drivers (IVI-C, IVI-COM, and LabVIEW G) for all modules.

1. From the Agilent IOLS CD (E2904-60003) browser launch the installer.
2. Follow the installer prompts to install the IO Library Suite.
3. From the Agilent MD1 High-Speed Digitizer Software and Product Information CD CD (M9210-90007) launch the installer.
4. Follow the installer prompts to install all software and documentation.
5. After installation is complete, re-start the chassis and the host PC if you are using a remote controller.

Step 3: Install the Module

CAUTION PXI hardware does not support "hot-swap" operation. Before installing the module into the chassis, power off the chassis to prevent damage to the module.

4 The module can be installed in any PXIe slot marked with a peripheral slot compatibility image (a circle containing the slot number).

7^H The module can also be installed in any hybrid PXIe slot marked with a peripheral slot compatibility image (the letter "H" and a solid circle containing the slot number).

1. Make sure the chassis is connected to the main supply, but power switch is in the Off (Standby) position.
2. If the chassis has multiple fan speed settings, ensure that the fans are set to automatic. Do not set the fan speed to low or turn it off.
3. Position the chassis so that there is ample space between the chassis fan intake and exhaust vents.
4. If using a remote controller, install the System Interface Card in the slot identified by the triangle symbol: ⚠1
5. Install the module into the appropriate slot of the chassis by placing the module card edges into the front module guides (top and bottom), Ensure that the ejector handle is pushed down and slide it to the rear.
6. When resistance is felt, latch the module by pulling up on the ejector handle.
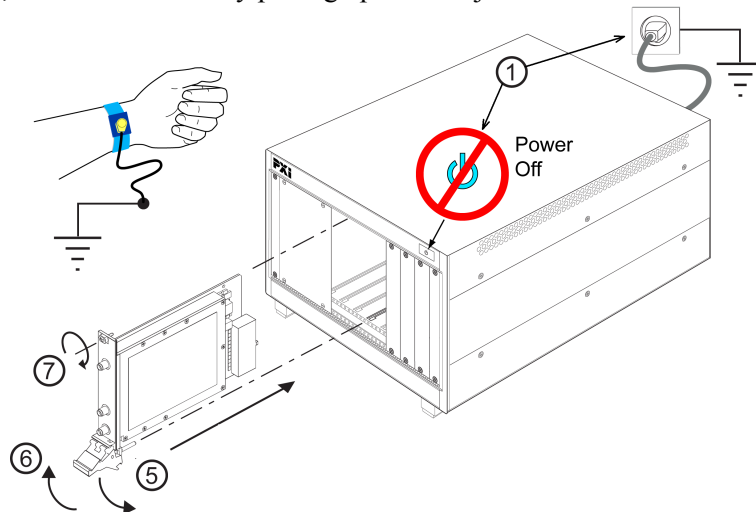

Figure 2 - Installing a module into a PXI chassis

7. Tighten the screws on the module front panel. Performance may suffer if the screws are not tightened.
8. Verify that the chassis fans are operable and free of dust and other contaminants that may restrict airflow.
9. Install all chassis covers and filler panels after installing the module. Missing filler panels may disrupt necessary air circulation in the chassis.
10. Plug in and power up the PXI chassis. (If you are using a remote controller, reboot the host PC.)
11. Check the status LED on the module front panel, It should be orange or red when the power is applied, If not-there is a problem with either the module or the chassis.
12. Follow the New Hardware Wizard's instructions to install the driver.
13. Reboot the system.

Section 2 - Performance Verification and Adjustment

Performance Verification for the is performed using the Agilent Test Management Environment (N7800 TME) software.

If it is not already installed on your PC, download and install the Agilent N7800A Test Management Environment Software from the TME website: http://calsw.tm.agilent.com/ Refer to the 'Readme' and Help documents on that page.

The specific application for testing the M9202Ais N7871A Calibration Application for IF Digitizers, which may also be found on the TME webpage.

If you have already installed the N7800A software, the documentation will have been installed to your PC, and may be found as follows:

- Open the ***'Start Menu'*** > ***'All Programs'*** > ***'Agilent Test Management Environment'***
- Chose one of the documents:
  - ***'Help for the Agilent N7871A IF Digitizer Calibration Application'***, or
  - ***'Readme for the Agilent N7871A IF Digitizer Calibration Application'***

Or if you have not yet installed the software, it may be found on the web page listed above.

If the module <u>passes</u> the test:

The module may be returned to the user. Please follow your internal 'No Fault Found' procedure.

If the module <u>fails</u> the test

There is only one adjustment available on the M9202A via the N7871A utility, this is 'AC Gain Accuracy'. If the failure is related to 'AC Gain Accuracy' it may be possible to adjust this parameter and retest the module. Please refer to the N7871A Help for further information.

If the failure is not related to 'AC Gain Accuracy', or the module continues to fail the test after adjustment then module must be replaced using the 'Core Replacement' procedure. Refer to to Section 3 of this document.

Section 3 - Service Procedures

This section lists the replacement parts available for the M9202A PXI Express 12-bit Wideband IF Digitizer, and details the procedure used to replace a faulty unit.

Replacement Parts

The following replacement parts are available for the M9202A PXI Express 12-bit Wideband IF Digitizer.

Agilent Part Number	Description
M9202-68501	PXI Express 12-bit Wideband IF Digitizer replacement core assembly, new exchange unit.
M9202-69501	PXI Express 12-bit Wideband IF Digitizer replacement core assembly, refurbished exchange unit.

Figure 3 -   Table of replacement parts

Module Core Replacement

Ordering a core replacement module

1. Contact Agilent (see www.agilent.com/find/assist).
2. Order a replacement core kit for your module (refer to the parts list in this section).
3. When you receive the replacement core kit, it will comprise:
   - An Entitlement Certificate.
   - Replacement module, with a Calibration certificate.
   - A 'Defective Return' sticker and return instructions.

Replacing the defective module

CAUTION   Before opening a packaged module, ensure that all necessary ESD precautions are observed.

1. Write down the serial number of the defective module (shown on the side cover plate). This serial number will be assigned later to the replacement module later in this procedure.

Figure 4 -   Module serial number

2. Remove the plate containing the serial number from the defective module, by removing the 2 screws shown using a Torx™ T8 screwdriver.
3. Remove the serial number plate from the replacement module, also using a Torx™ T8 screwdriver.

Figure 5 - Exchanging the serial number plates

4. Attach the plate from the defective module to the replacement module, tightening the screws to **0.5 Nm**. Note that the kit contains 2 extra screws which may be used if the original ones have been lost or damaged.
5. Attach the plate from the replacement module to the defective module, tightening to **0.5 Nm**.
6. Install the replacement module into the chassis (see "Section 1 - Getting Started" on page 7)
7. Power-up the chassis. (If you are using a remote controller, also power-up the computer).
8. Install the required Utilities. If you have already installed the following items on your computer, you may skip to step 9.
   a. **The MD1 Digitizer Instrument Driver** (release 10.0 or higher) is required to perform this operation, please install it from the Product CD (M9210-90007) or download it from the Agilent website at: www.agilent.com/find/drivers and search for 'MD1'.
   b. **The Agilent Licence Manager (ALM)** application is also required to perform the assignment of the serial number. Download and install ALM from www.agilent.com/find/licensemanager. Instructions on the installation & use may also be found from that web page.
   c. Navigate to the folder `c:\program files(x86)\Agilent/MD1/bin/`, and run the file named "`CdfCore.msi`". Follow the on-screen instructions, select a 'complete' installation, and wait for the installer to finish.

9. Run the Agilent Licence Manager utility:
   a. From the windows *Start Menu > All Programs > Agilent Licence Manager > Agilent Licence Manager*. The ALM window will appear. Note that you may or may not have licenses already listed depending on whether you have used the utility before.
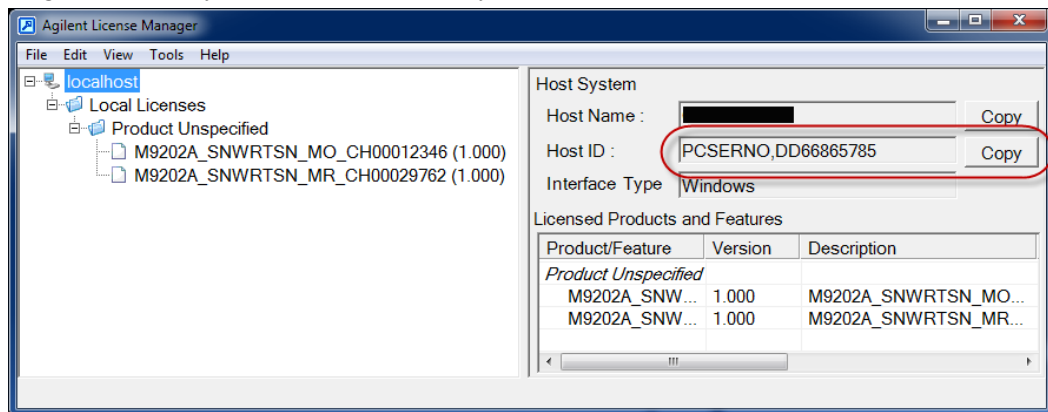

Figure 6 - The Agilent Licence Manager

    b. On the right of the item 'Host ID', Press the 'Copy' button.

10. Run the MD1 Serial Number utility:
    a. Navigate to the folder `c:\program files(x86)\Agilent\MD1\bin\`, and run the file named "`MD1Serial.exe`"
    b. A dialog window will open asking for the Host ID. Paste the previously copied ID into this window and press 'OK'
    c. Select the replacement module (serial number starting '41xxxxxxxx')

> **NOTE** If a message is displayed at this point saying "No core replacement modules found" please check that the module is correctly installed, and that the serial number starts with '41xxxxxxxx'. For assistance contact support at: acqiris_support@agilent.com

    d. Enter the serial number of the defective unit that you have written down in step 1), and press return.

11. Use the Agilent Software Manager to obtain a new license:
    a. Access the Agilent Software Manager at: www.agilent.com/find/softwaremanager. If you have already registered here, please log in as a 'Returning User'. Otherwise complete the registration process by clicking on the 'Register' option.
    b. The first screen will appear as shown below. Again, it may or may not have any licenses listed depending on whether you have already used this procedure.
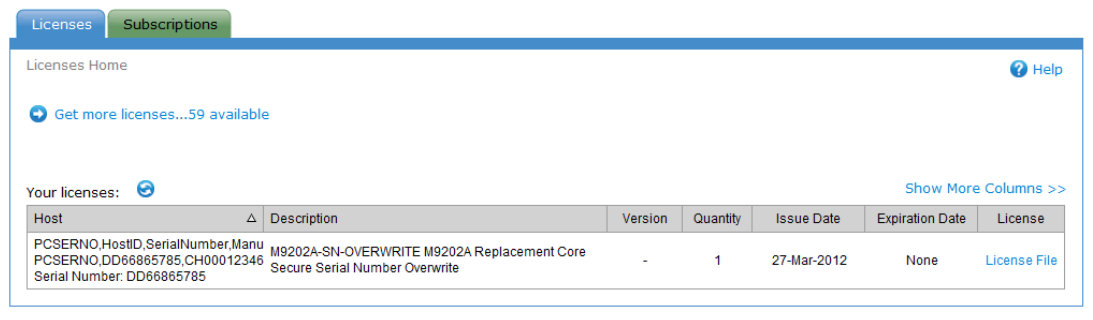

Figure 7 - Agilent Software manager - 'Your licenses'

    c. Click on the 'Get a license' or 'Get more licenses' link.
    d. If you have already registered an Entitlement Certificate which still has available licenses, you will be shown a list of the available licenses. You may jump to step f).

Otherwise you must register a new Entitlement Certificate. Select that option on the web page and a window will appear as shown below. Refer to your Entitlement Certificate (supplied with the replacement module) and enter the *Order Number* and *Certificate Number*, then press 'Continue'.
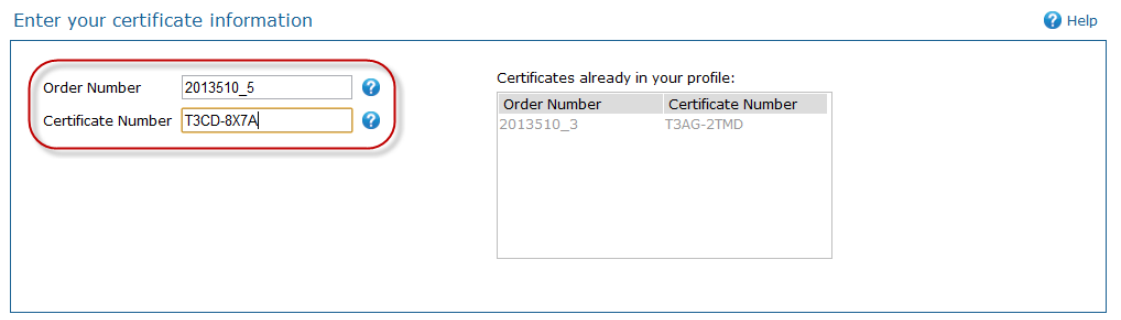

Figure 8 - Agilent Software Manager - Registering a new certificate

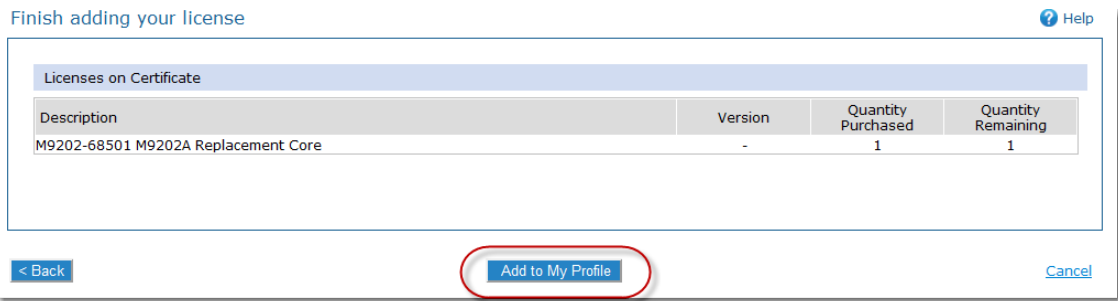e. A confirmation will screen will appear, as shown below. Press the 'Add to My Profile' button.

Figure 9 -   Agilent Software Manager - 'Add to My Profile'

f. A list of the available licenses will now be shown, If you wish to use one of theses press 'Continue'. Alternatively you may select 'Add another certificate' at this stage if desired.
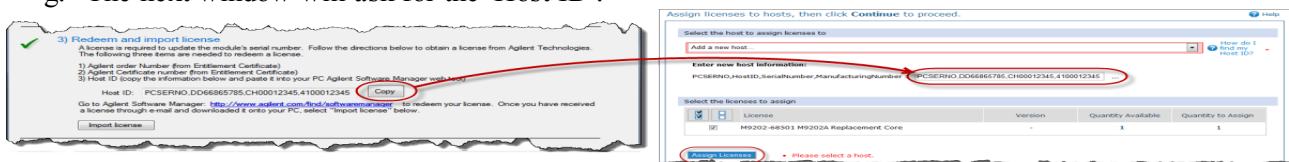
g. The next window will ask for the 'Host ID'.

Figure 10 -   Copying the Host ID

> NOTE   Note that you must copy the Host ID from the MD1 Serial Number Utility each time you make a new transfer, as the ID contains the serial numbers being transferred.

h. From the list select the license that you wish to use, and press the 'Assign Licenses' button. The following screen will appear:
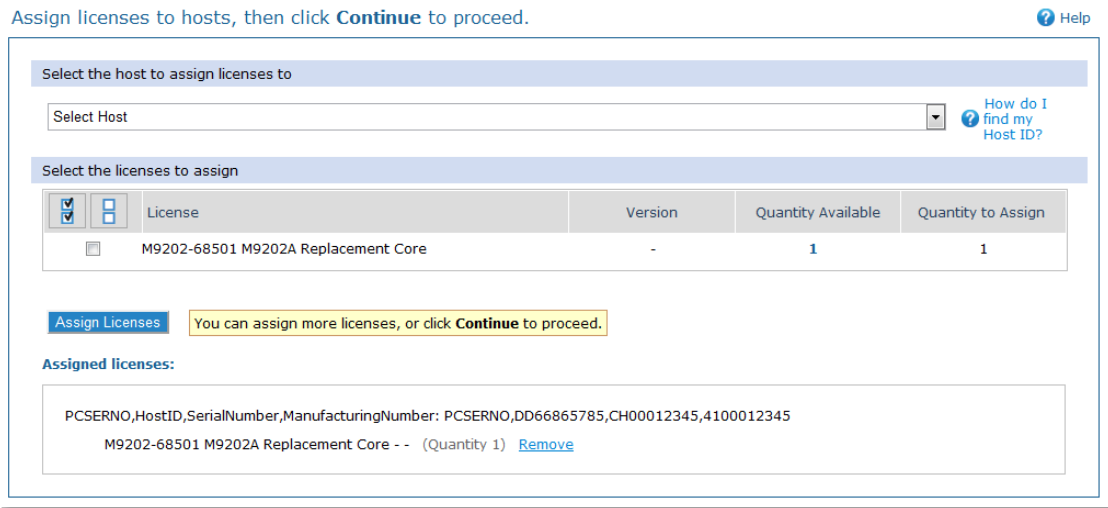

Figure 11 -   Agilent Software Manager - Assign licenses

i. Press 'Continue', and the follow the instructions on the next 2 screens, finally select the option 'Request Licenses'. The final screen should provide confirmation, as shown below:
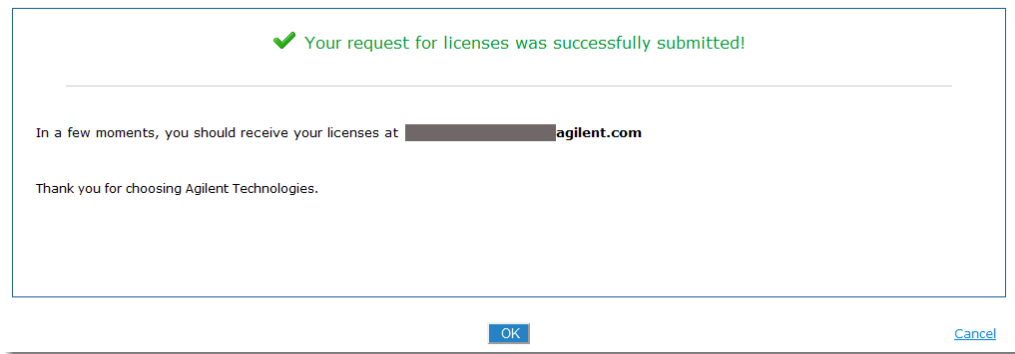
Figure 12 - Agilent Software Manager - Request successful

j. You will receive an email (usually within one minute) with your new license file. When you have this file copy it to any location on your computer.

12. The MD1 Serial Number Utility should still be open. In point *3) Redeem and import license*, press the 'Import Licence' button. You will be asked for the location of the license file that you saved in previously. After loading the license file, you should see an installation notification similar to the one shown below:
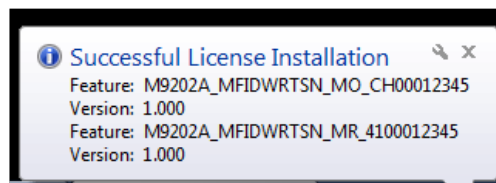

Figure 13 - Successful License Installation

13. The completed form should look similar to the example below, with a green tick against steps 1, 2 & 3.
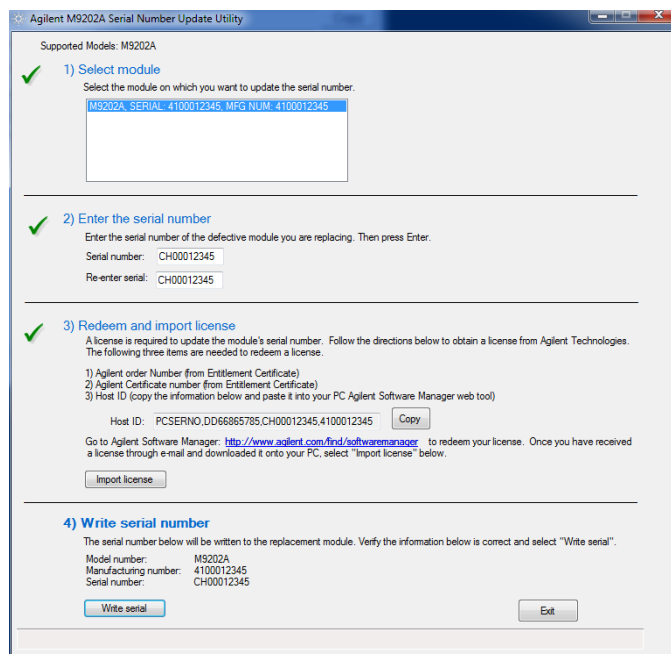

Figure 14 - M9202A Serial Number Update Utility

14. Check that the details are correct, and the press the 'Write serial' button.

15. At this point the core replacement has been completed, but the module will only have the base options installed. The utility will generate an email which must be sent to Agilent support (acqiris_support@agilent.com).

Restoring the original instrument options

A module which has been replaced with a new core will only have the base level of options installed initially. Since it is not possible to read these options from the defective module to transfer them directly, they must be restored with the following procedure.

1. In the previous step the MD1 Serial Number Update Utilty will have generated an email to Agilent support and requested that you send it. If for any reason this was not sent, you may send an email manually. It must contain the follwing information:
   - The serial number of the defective module ('USxxxxxxxx')
   - The serial number of the core replacement module ('41xxxxxxxx')
   - The name and email address (if different) of the owner of the module.
2. Once the correct options have been checked against your original (and any upgrade) order, Agilent support staff will generate and send by email a new options file, along with the necessary tools and instructions to perform the restoration.

NOTE   Since the options must be checked an generated by Agilent support personnel there may be a delay of up to 2 working days before you receive this email. If you have not received any email after this time, please contact Agilent support at acqiris_support@agilent.com.

Return the defective module

1. Review the warranty information supplied with your product.
2. Take the supplied Defect label and fill out the details, including the Fault Description from the TME Test Report, and stick it onto the defective module.
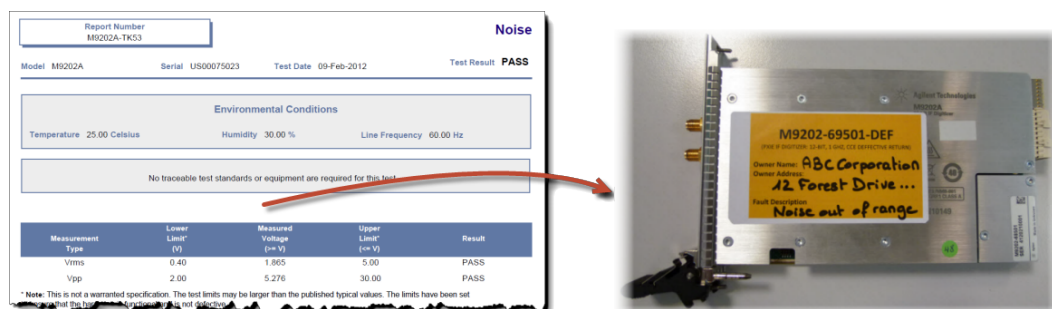

Figure 15 -   Completing the 'Defective Return' label

3. Include with the module a printed copy of the TME test results (Failure).
4. Pack the module in its original ESD bag and packing carton. If the original carton is not available use bubble wrap and place the unit in a sealed container. Mark the carton as 'Fragile'.
5. On the shipping label, write 'Attention Repair Department' and the RMA number.

NOTE   In any correspondence always include the product model and serial numbers.

Appendix - M9202A Reference Information

This section is intended to provide general information, links to specifications and information on the M9202A PXI Express 12-bit Wideband IF Digitizer.

M9202A Overview

The M9202A is a one-slot 3U PXIe Wideband IF Digitizer running at 2 GS/s, with up to 1 GHz instantaneous analog bandwidth and providing a large 512 MB DDR3 memory. The M9202A features a Xilinx Virtex-6 FPGA that can implement different functions depending on which firmware option is chosen.

The -BAS option provides basic digitizer functionality allowing capture of a signal, storing of data in the memory and/or transferring it via PXIe for example. The -DDC option, in addition to basic digitizer functionality, implements a Digital Down-Conversion (DDC) algorithm in the 300 MHz to 700 MHz band, improving the analog performance - the Spurious Free Dynamic Range (SFDR) or Signal-to-Noise Ratio (SNR) and reducing data upload time.

Key Features:
- 2 GS/s sampling rate
- Up to 1 GHz bandwidth
- SFDR = 60 dBc (typ.) in basic digitizer mode
- SFDR = 84 dBc (typ.) after digital down-conversion (with DDC option)
- AC-coupled 50 Ω input impedance
- +4 dBm full scale range (dither disabled)
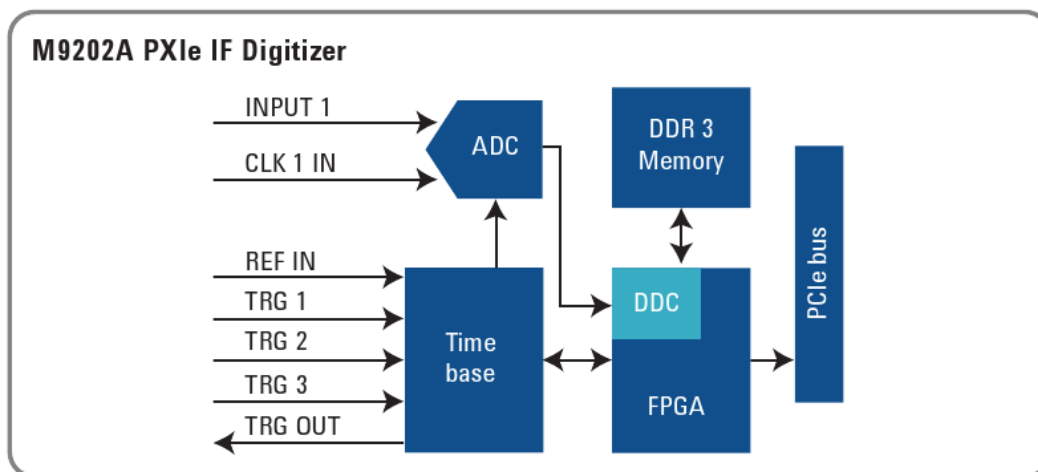- 512 MB DDR3 Memory

Simplified Block Diagram

Figure 16 -   M9202A Simplified block diagram

Front-end and ADC

The M9202A features a single channel ADC which digitizes the 50 Ω AC-coupled analog input at a fixed sampling rate of 2 GS/s. The ADC also accepts an external clock input which may be selected by the user.

External Clock (CLK IN)

The External Clock may be used, it must be continuously present if selected for the digitizer to operate correctly. The input is 50 Ω, AC coupled.

Parameter	Value
Frequency	1 GHz
Minimum Amplitude	0.5 Vp.p into 50 Ω
Maximum Signal Power	+7 dBm (1.4 Vp.p into 50 Ω)
Threshold	0 V

Timebase block

The timebase block accepts the multiple trigger inputs as well as providing one user-selectable trigger output and an External Reference input. A crystal-controlled timebase is used to clock the ADC system of the digitizers, with accuracy guaranteed to be better than 2 ppm . The digitizers also measure the time from the trigger point to the first sample point. Thus the trigger event can be positioned accurately to the sampled signal.

Trigger Sources

The trigger source can be a signal applied to one of the External Trigger Inputs. These inputs provide fully functional trigger circuits with selectable level and slope. The external trigger circuit has diode protection against overload. A ±5 V limit on trigger signals should be respected, although somewhat higher voltages for short time periods will not damage the unit.The M9202A has a fixed 50 Ω termination impedance with DC coupling.

External Reference (REF IN)

For applications that require greater timing precision and long-term stability than is obtainable from the internal clock, a 100 MHz Reference signal can be used. The External Reference is nominally at 100 MHz. However, frequencies in a range will be accepted.
If your input is not at exactly 100 MHz, you must remember to compensate for the difference in your application since the digitizer and the driver have no way to know about such deviations.

Parameter	Value	Tolerance
Nominal Frequency	100 MHz	±100 KHz
Minimum Amplitude	0.5 Vp.p into 50 Ω	
Maximum Power	3 dBm	
Maximum Voltage	±10 Vdc	

If synchronization between several digitizers is required, the reference signal should be applied to all of them.

FPGA and Memory

The core data processing is performed in a Xilinx Virtex-6 FPGA, allowing different functionalities to be implemented in firmware. 512 MB of DDR3 memory is installed, and this is used for acquisition storage holding a maximum of 256 M samples.

DDC option

Where installed as an option the FPGA also performs Digital Down Conversion, such that the digitizer may function as the Intermediate Frequency (IF) digitization element in a digital receiver.

M9202A Front Panel Features

Front Panel Connectors

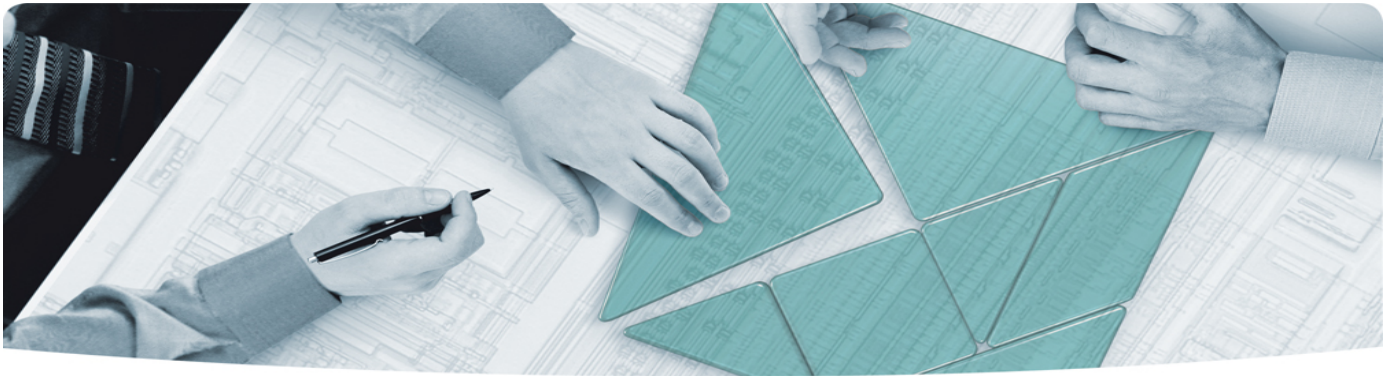| Connector	Description
TRG 1	This MMCX female connector is a 50 Ω terminated input for an external trigger signal. The trigger signal range is ± 5 V
TRG 2	This MMCX female connector is a 50 Ω terminated input for an external trigger signal. The trigger signal range is ± 5 V.
TRG 3	This MMCX female connector is a 50 Ω terminated input for an external trigger signal. The trigger signal range is ± 5 V.
INPUT 1	This SMA female connector is the analog signal input. This input is AC-coupled and 50 Ω terminated. The input full scale range is 1 V (+4 dBm). Frequency range: 30 MHz to 1 GHz.
CLK 1 IN	This SMA female connector is the external clock signal input. This input is AC-coupled and 50 Ω terminated. The recommended signal level is 1 V pk-pk (+4 dBm). The clock signal frequency should be half of the desired sampling frequency.
TRG OUT	This MMCX female connector features a trigger signal output.
REF IN	This MMCX female connector is the clock external reference input (100 MHz). This input is AC-coupled and 50 Ω terminated. The recommended signal level is 1 V pkpk (+4 dBm).

Front Panel LED

| LED	Description	
STATUS	⚪ (off)	Power is not present or the module has a fault.
	🟢 (green)	Indicates that the trigger is armed and waiting for a valid trigger to occur.
	🔴 (red)	Indicates that a trigger has occurred, and the acquisition is complete.
	🟡 (yellow)	The power-on state immediately after power is applied. Also identifies the module associated with the current channel in the Soft Front Panel when the 'Identify' function is used.

List of Figures

The Modular Tangram

The four-sided geometric symbol that appears in Agilent modular product literature is called a tangram. The goal of this seven-piece puzzle is to create shapes—from simple to complex. As with a tangram, the possibilities may seem infinite as you begin to create a new test system. With a set of clearly defined elements— hardware, software—Agilent can help you create the system you need, from simple to complex.
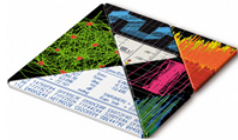
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