Agilent Modular Instrumentation

New PXI Vector Signal Analyzer
Technical Presentation

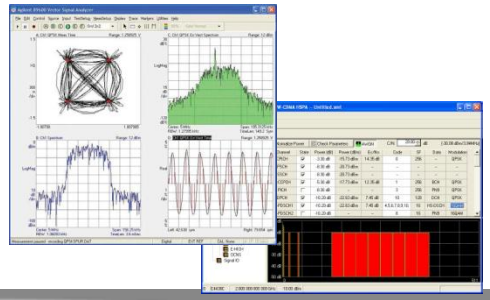
PXI Microwave Vector Signal Analyzer

- Product Overview
- Software
- Demo
- Supplemental Information
  - Performance data
  - Applications
  - Software / SFPs
  - Field Cal
  - Module Level Operation

Modular Product Summary

Introducing a broad and powerful modular product offering

- Providing of a comprehensive set of PXI products
- Leading the industry in adoption of AXIe standard
- Adopting PCIe as a standard controller I/O interface
- Delivering the software needed for effective modular solutions, that will work in any development environment
- Bring its wide measurement expertise to modular form factors



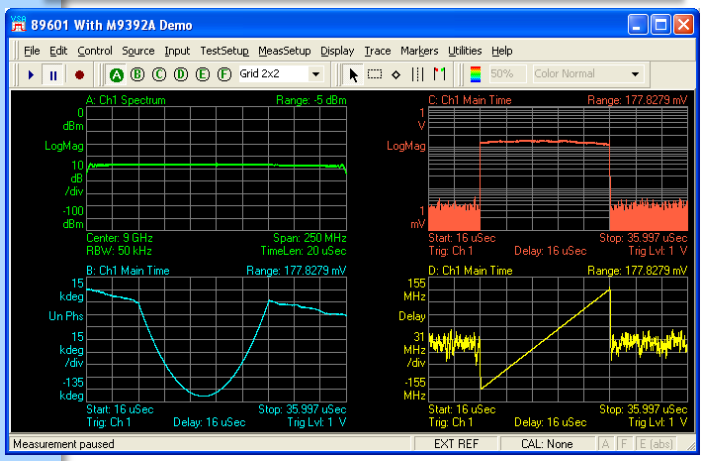
M9392A PXI Microwave Vector Signal Analyzer

First Single-Vendor PXI Microwave Vector Signal Analyzer

- **Modular RF Design:**
  - 4 or 5 module (7 or 8 slot) PXI Vector Signal Analyzer
  - 50 MHz to 26.5 GHz
  - Frequency Range and Capability to Optimize Cost
  - Combine with PXI uWave switches to create Test System
- **Integration to Agilent Measurement Science Software:**
  - 89600 VSA Program for Modulation Analysis
- **Wide Bandwidth (250 MHz):**
  - Measure Broadband Communications and Radar Signals
- **Reduce test time for lower cost of test**
  - PCIe Data Bus for 1 GB/S transfer Rate
- **Flexible**
  - Easy integration to: Visual Basic, C++, C#, LabView, LabWindows, Matlab, and VEE -- with examples

M9392A Includes:

- M9202A PXIe IF Digitizer
- M9302A PXI LO
- M9360A PXI Attenuator/Preselector
- M9361A PXI Downconverter
- M9351A PXI Downconverter (Option)



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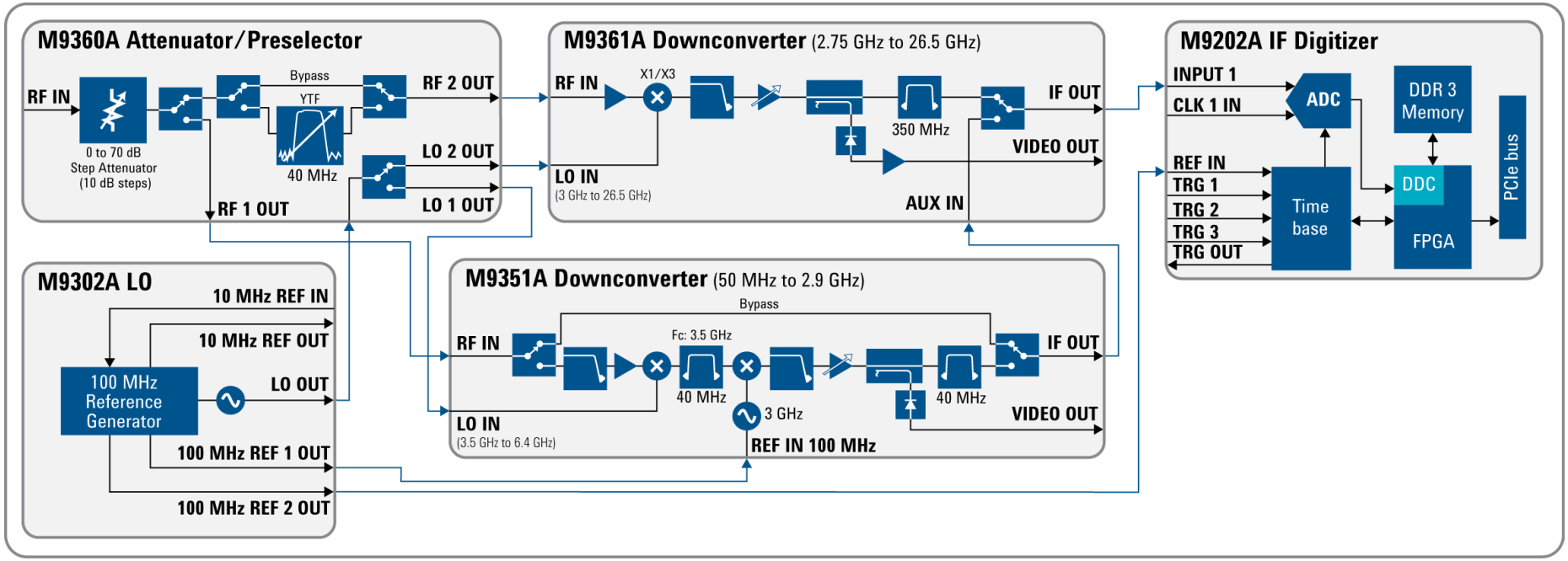
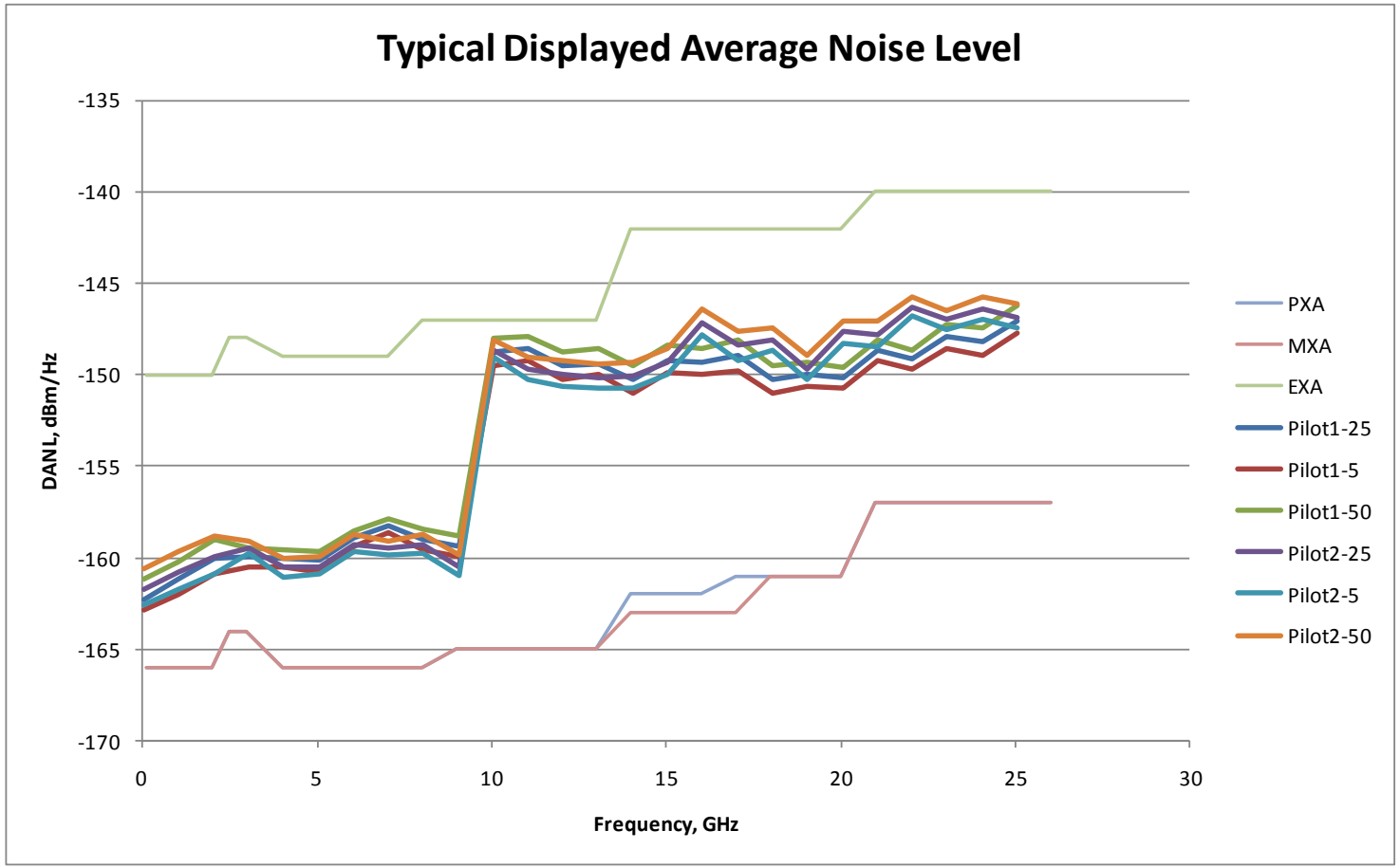
M9392A Block Diagram

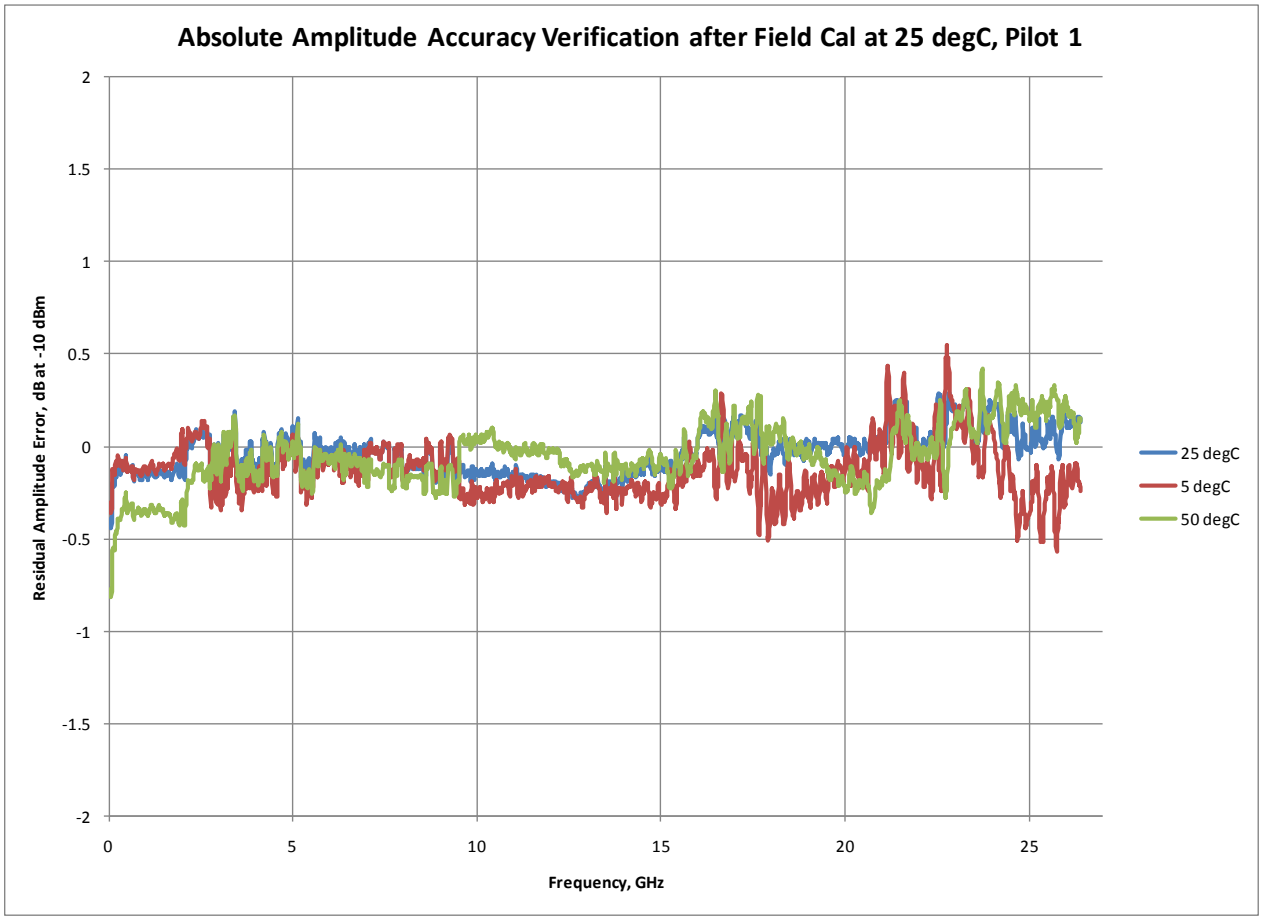


Displayed Average Noise Performance



Measurement data is for two units, on a lab benchtop during development, and is not intended to represent guaranteed performance.

Observed Power Accuracy



Measurement data is for one unit, on a lab benchtop during development, and is not intended to represent guaranteed performance.

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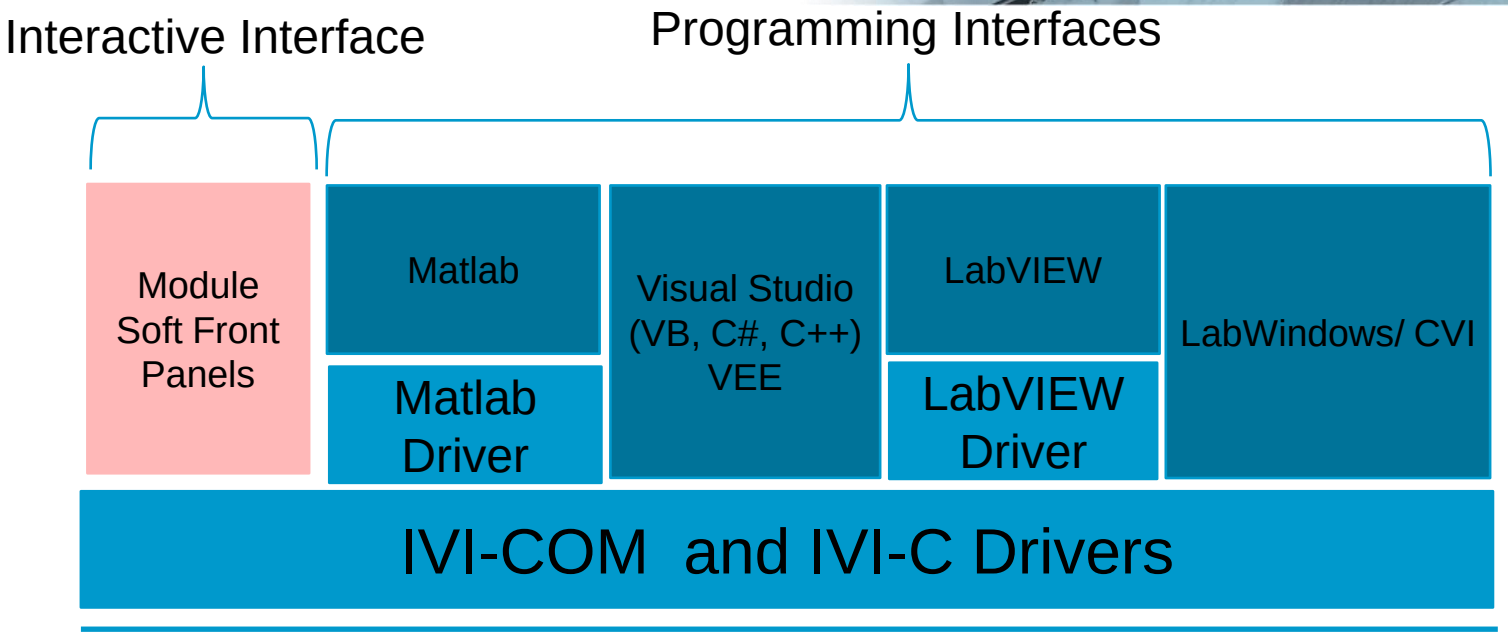
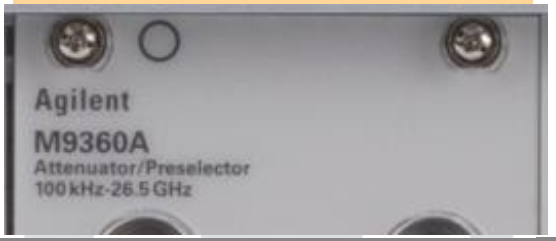
Typical Module Software Structure

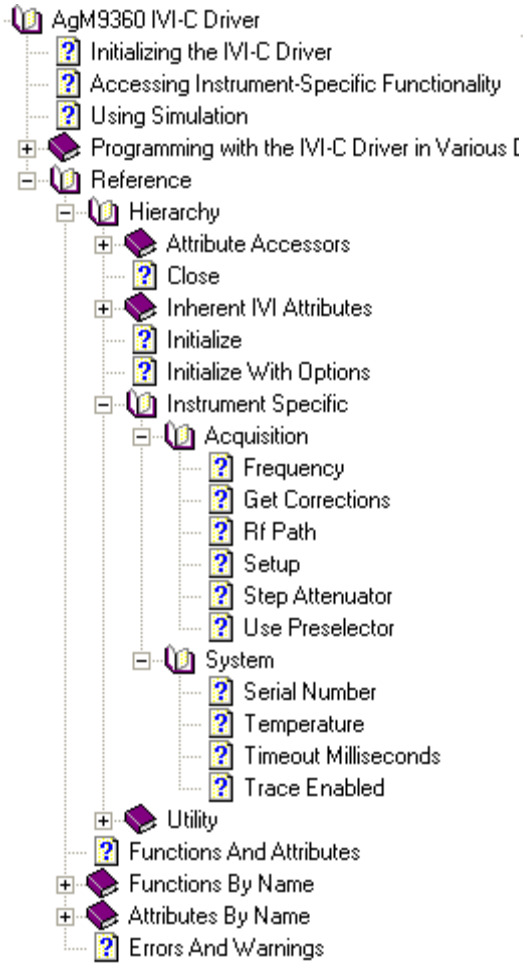


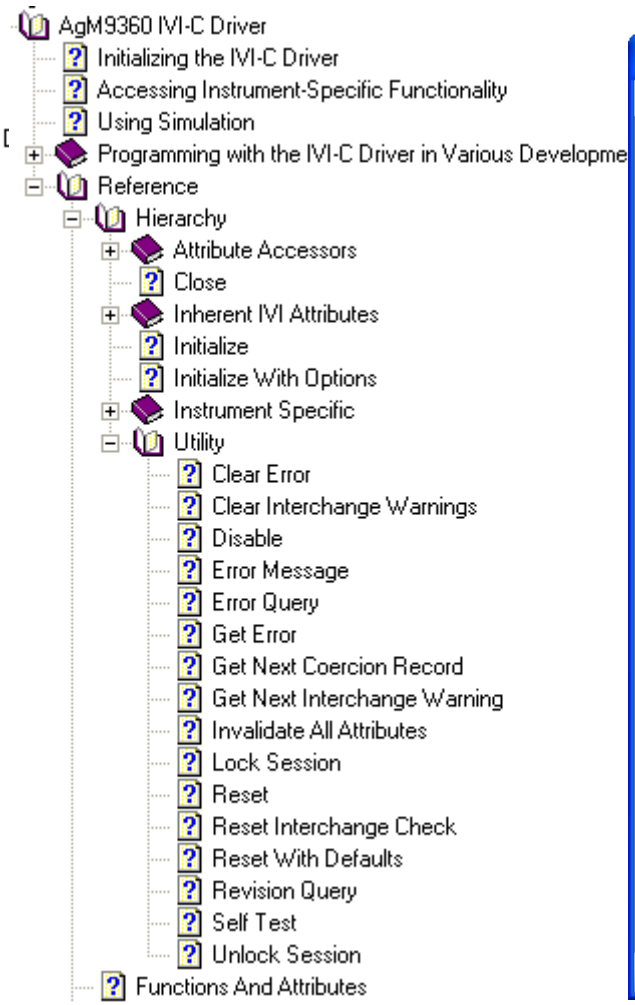
M9360A.dll

Agilent I/O Libraries (AgVisa32.dll) Release 16



Typical Module Programming
API and Soft Front Panel





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M9392A Signal Analyzer Software Overview

Interactive Interfaces

Programming Interfaces

M9392A Soft Front Panel

89601A VSA Program

Matlab

Matlab Driver

Visual Studio (VB.Net, C#, C/C++)

VEE

LabVIEW

LabVIEW Driver

LabWindows/ CVI

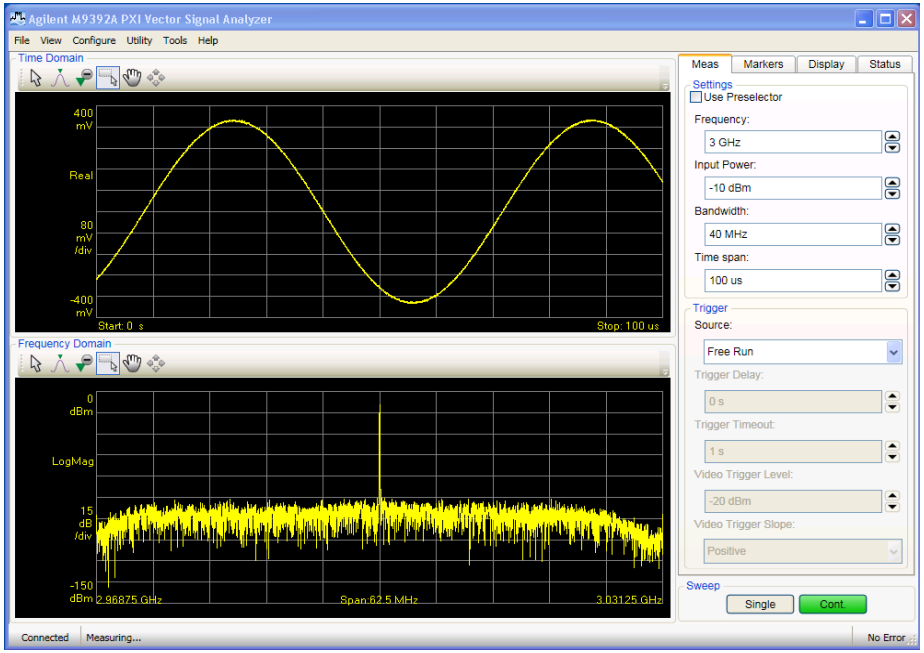
IVI-COM and IVI-C Drivers

VSA "Instrument" Library
M9392A.dll

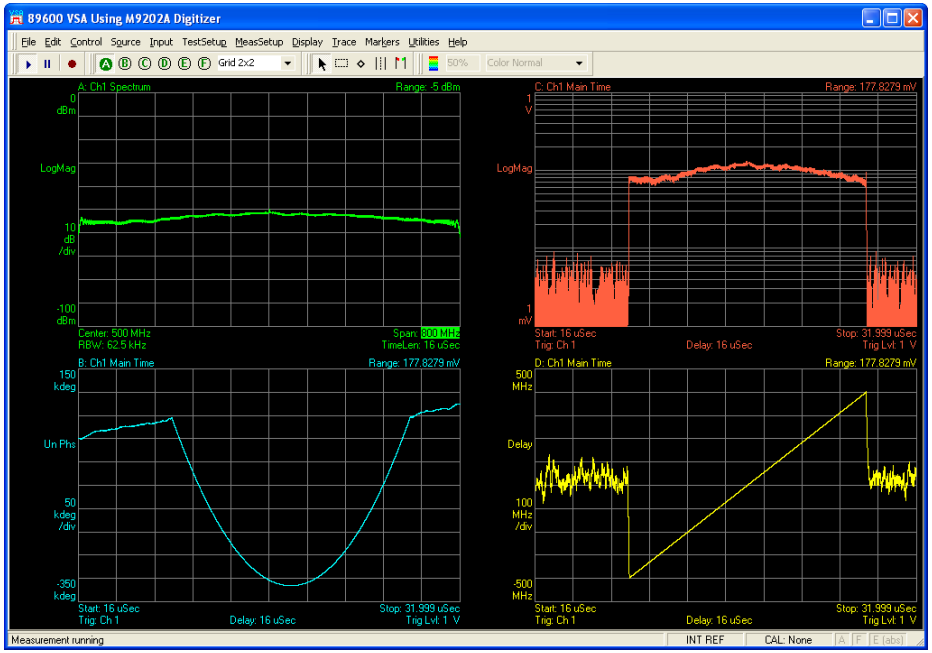
M9202A.dll M9302A.dll M9360A.dll M9361A.dll M9351A.dll

Agilent I/O Libraries (AgVisa32.dll) Release 16

M9392A User Interface Programs



M9392A
Soft Front Panel



89600A VSA Measuring 800 MHz
Radar Chirp

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89600 VSA Software Automation

89600A (v12.0):

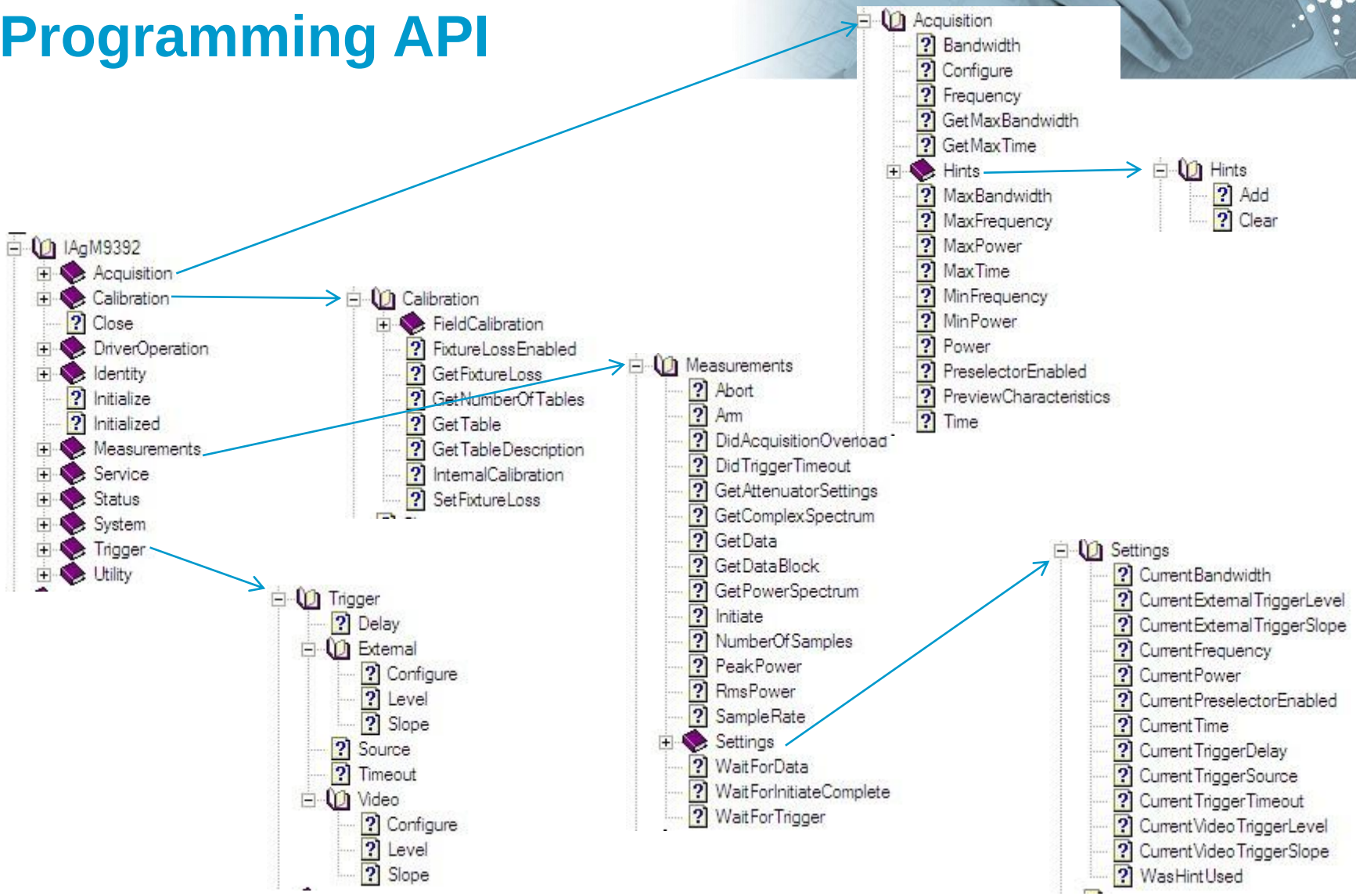
- COM API

89600B (v13.0):

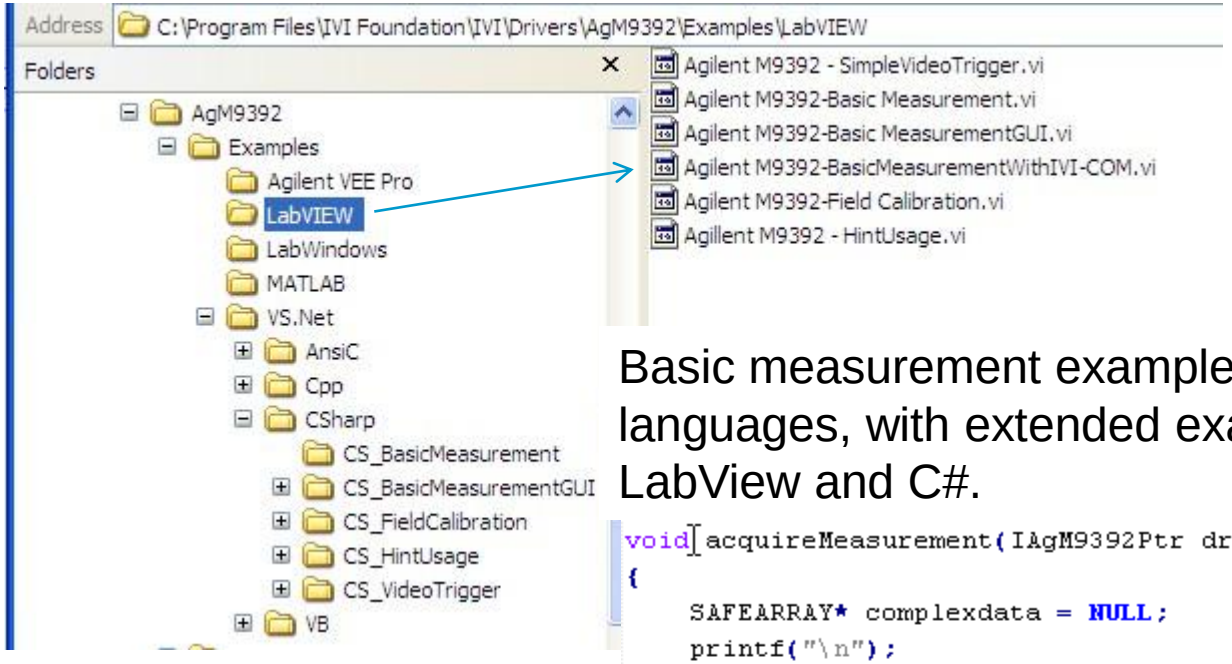
- Backwards-compatible COM API
  - Compatible with ≤ v12.0 only
  - Exception: LTE ≤ v13.0 only
- SCPI programming (≥ v13.0)
- .NET programming interface
- New macro languages
  - C # and Visual Basic.NET
  - Internal editor or Visual Studio

```
Option Explicit
' This is a demonstration of a complete measurement
'
' This routine creates, sets up, starts a measurement, reads
' frequency and voltage data, dumps the data to the debug screen,
' and exits the application.
'
' One would not normally combine all these steps into one routine.
' In particular, the creation of the 89600 app would normally be done
' only once at main form load time and kept around until the VB app
' is done.
Private Declare Sub Sleep Lib "kernel32" (ByVal dwMilliseconds As Long)

Public Sub MeasDemo()
    Dim oApp As AgtVsaVector.Application
    Dim oMeas As AgtVsaVector.Measurement
    Dim oDisp As AgtVsaVector.Display
    Dim vTime As Variant
    Dim vArrX As Variant    ' Will be filled with an array of doubles
    Dim vArrY As Variant    ' Will be filled with an array of doubles
    Dim bMeasDone As Boolean
    Dim bCreated As Boolean
    Dim i As Long

    ' First, try getting a reference to an already running 89600 VSA
    bCreated = False
    On Error Resume Next
    Set oApp = GetObject(, "AgtVsaVector.Application")
    If oApp Is Nothing Then
        ' There is no running 89600 VSA, try to create a new one
        Set oApp = CreateObject("AgtVsaVector.Application")
        bCreated = True
    End If
    On Error GoTo 0

    If oApp Is Nothing Then
        MsgBox "Unable to create 89600 VSA object", vbCritical
        Exit Sub
    End If

    ' Make it visable
    oApp.Visible = True
```

M9392A Signal Analyzer Programming API



Examples in many different programming languages



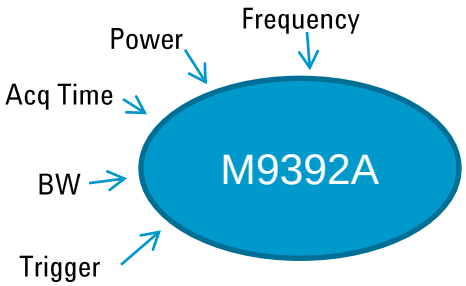
Basic measurement examples in all supported languages, with extended examples in LabView and C#.

```
void acquireMeasurement(IAgM9392Ptr driver, int timeout)
{
    SAFEARRAY* complexdata = NULL;
    printf("\n");
    printf("Initiate measurement...\n");
    driver->Measurements->Initiate();
    driver->Measurements->WaitForInitiateComplete(timeout);
    printf("Arming...\n");
    driver->Measurements->Arm();

    driver->Measurements->WaitForData(timeout);

    printf("RMS Power = %lf dBm.\n", driver->Measurements->RmsPower);
    printf("Peak Power = %lf dBm.\n", driver->Measurements->PeakPower);
```

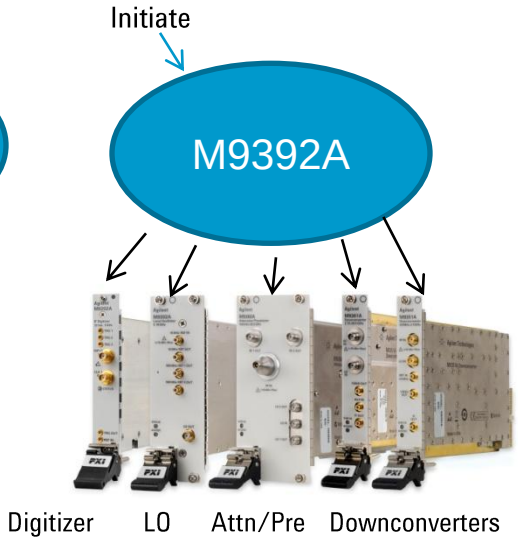
Sample Programs included with the driver installation

Basic Control Sequence

1) Set settings

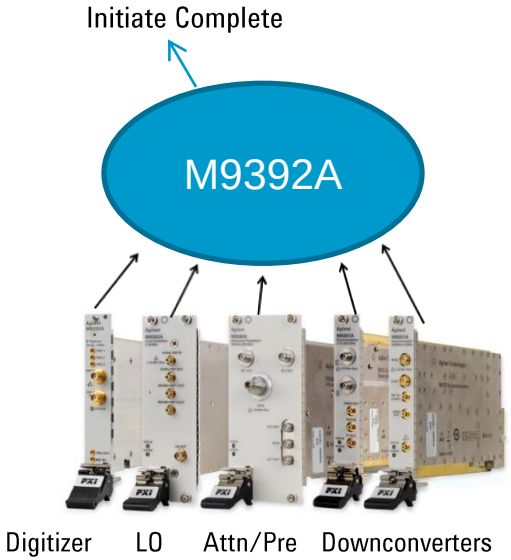


2) Initiate HW Changes



Setup DUT and other HW

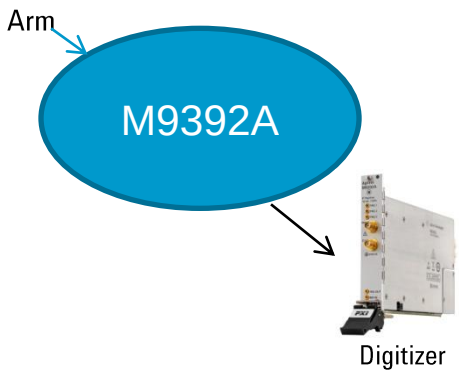
3) Wait for Initiate Complete



Basic Control Sequence

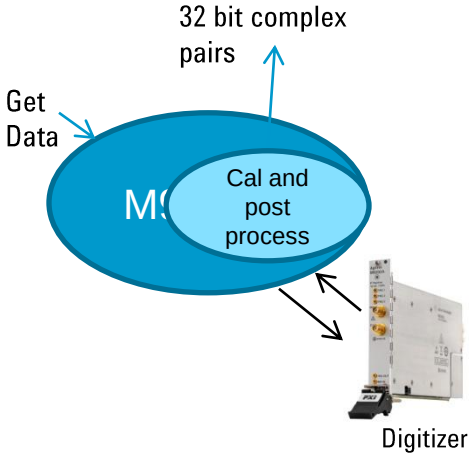
4) Arm

Wait for DUT and other HW

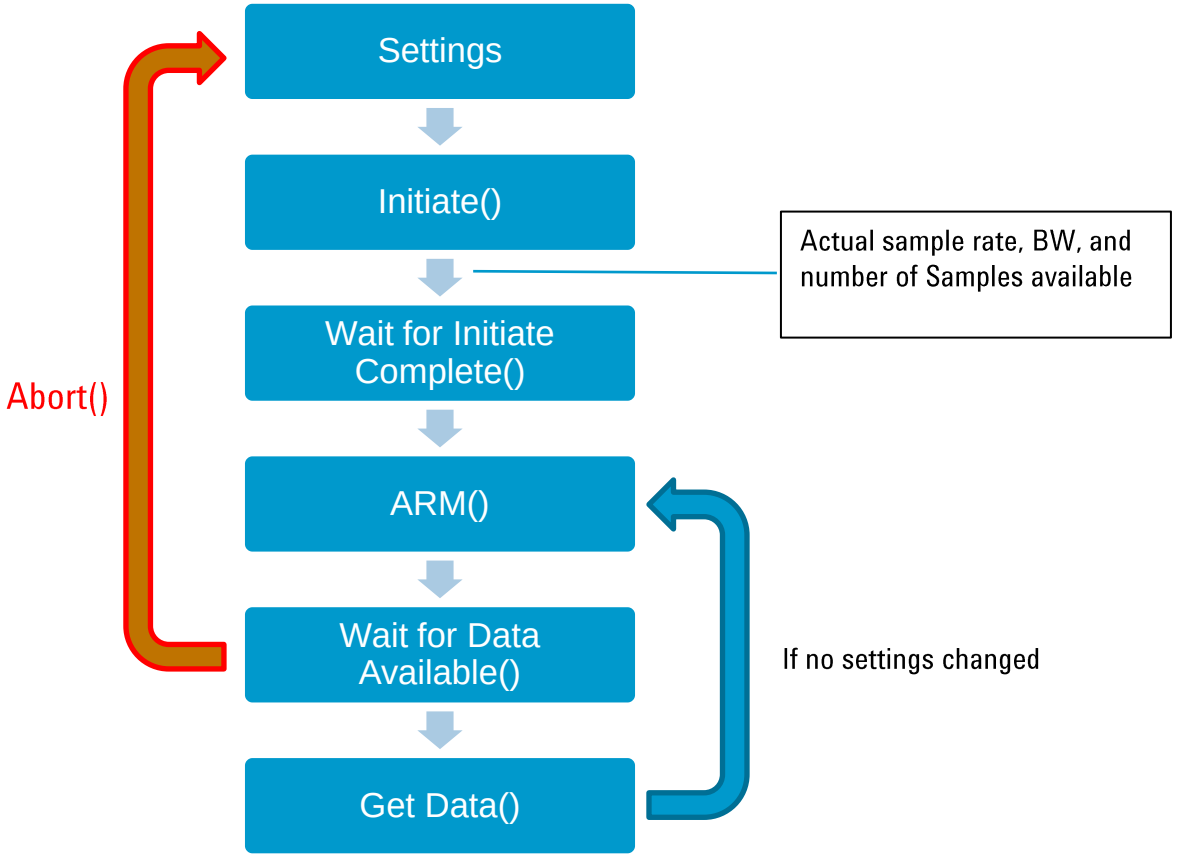


Trigger happens, Data is acquired

5) Get Data



Advanced Control Sequence for ATE



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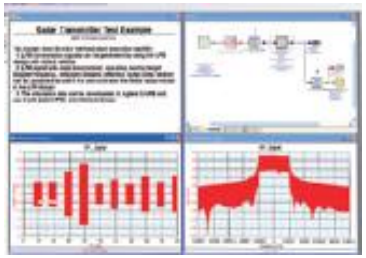
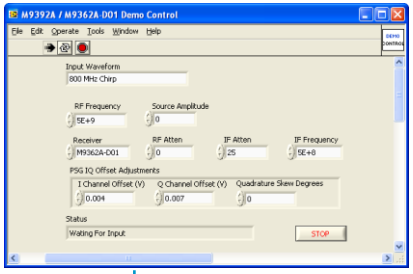
M9392A / M9362A-D01 Demo Setup

SystemVue
Radar Model Library

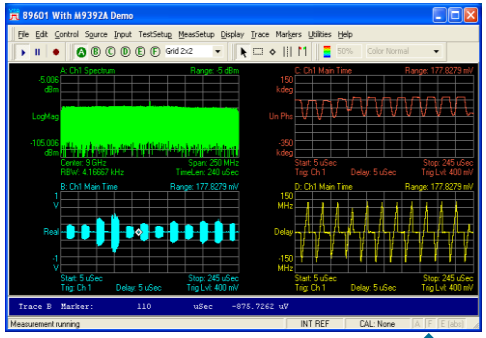


LabVIEW
Automation Program

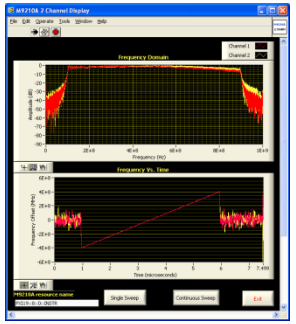


COM

89601A VSA Software



M9210A 2 Channel
Software



IVI-C
LabVIEW

SCPI/LAN

IVI-C
LabVIEW

IVI-COM

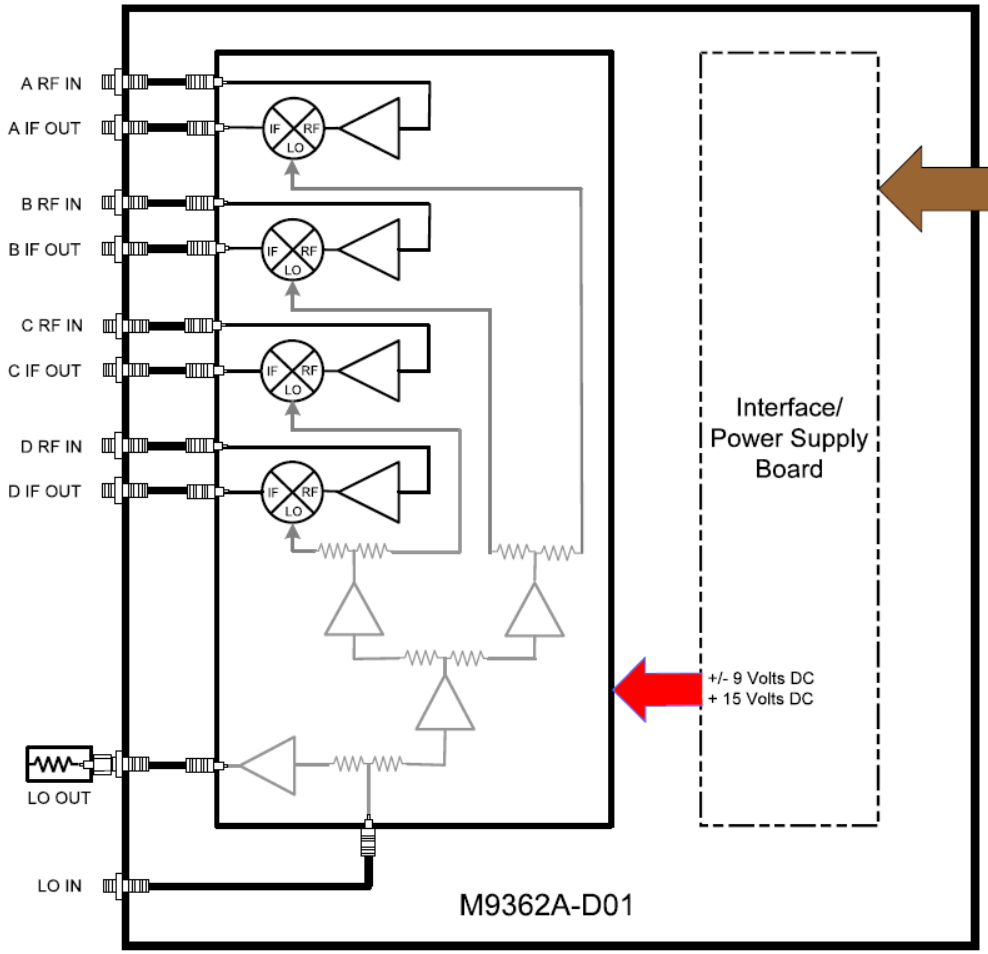
IVI-C
LabVIEW

Arbitrary Waveform Generator

Signal Generator

PXI Microwave Vector Signal
Analyzer

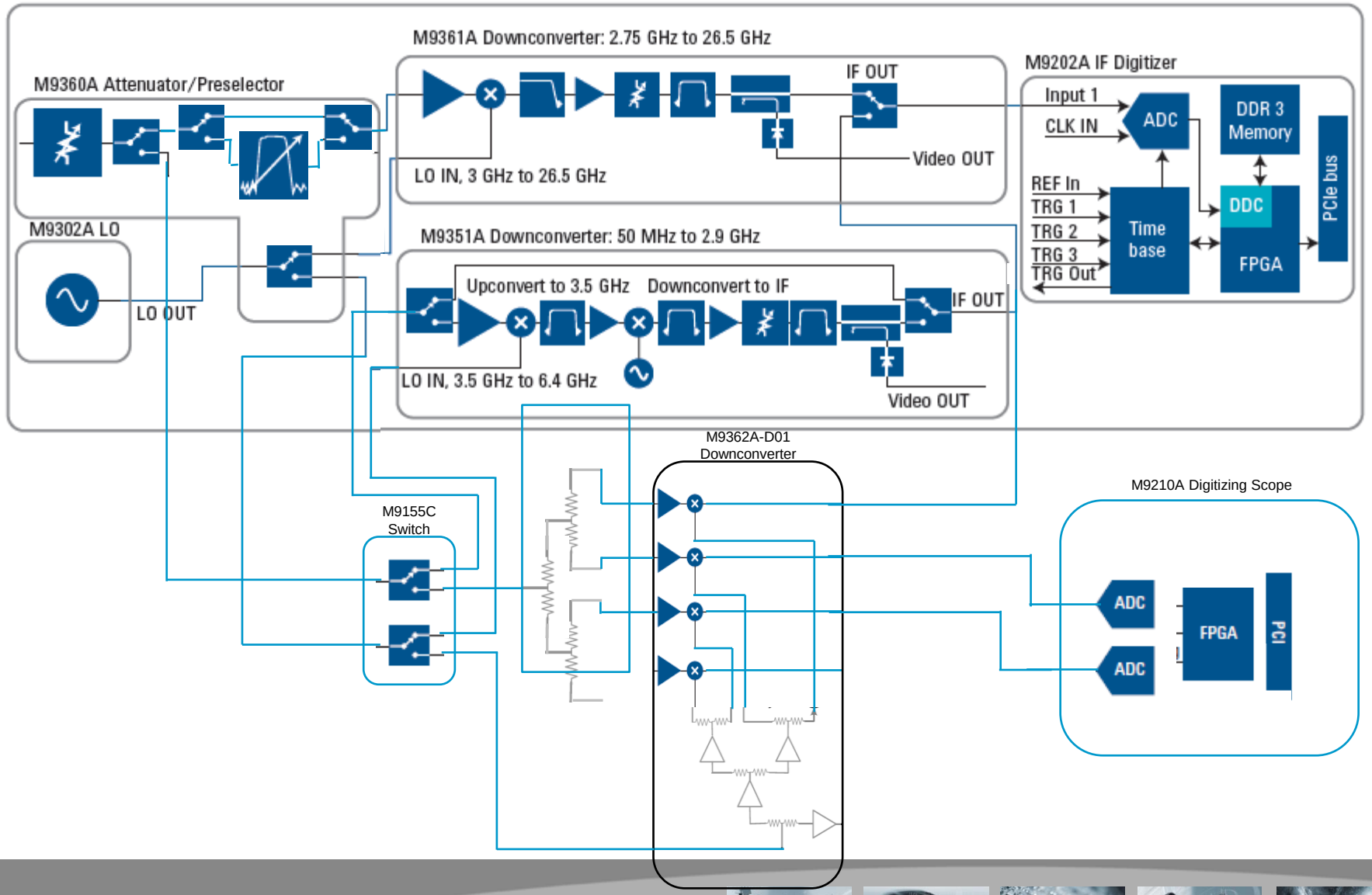
M9362A-D01 Downconverter Hardware Overview



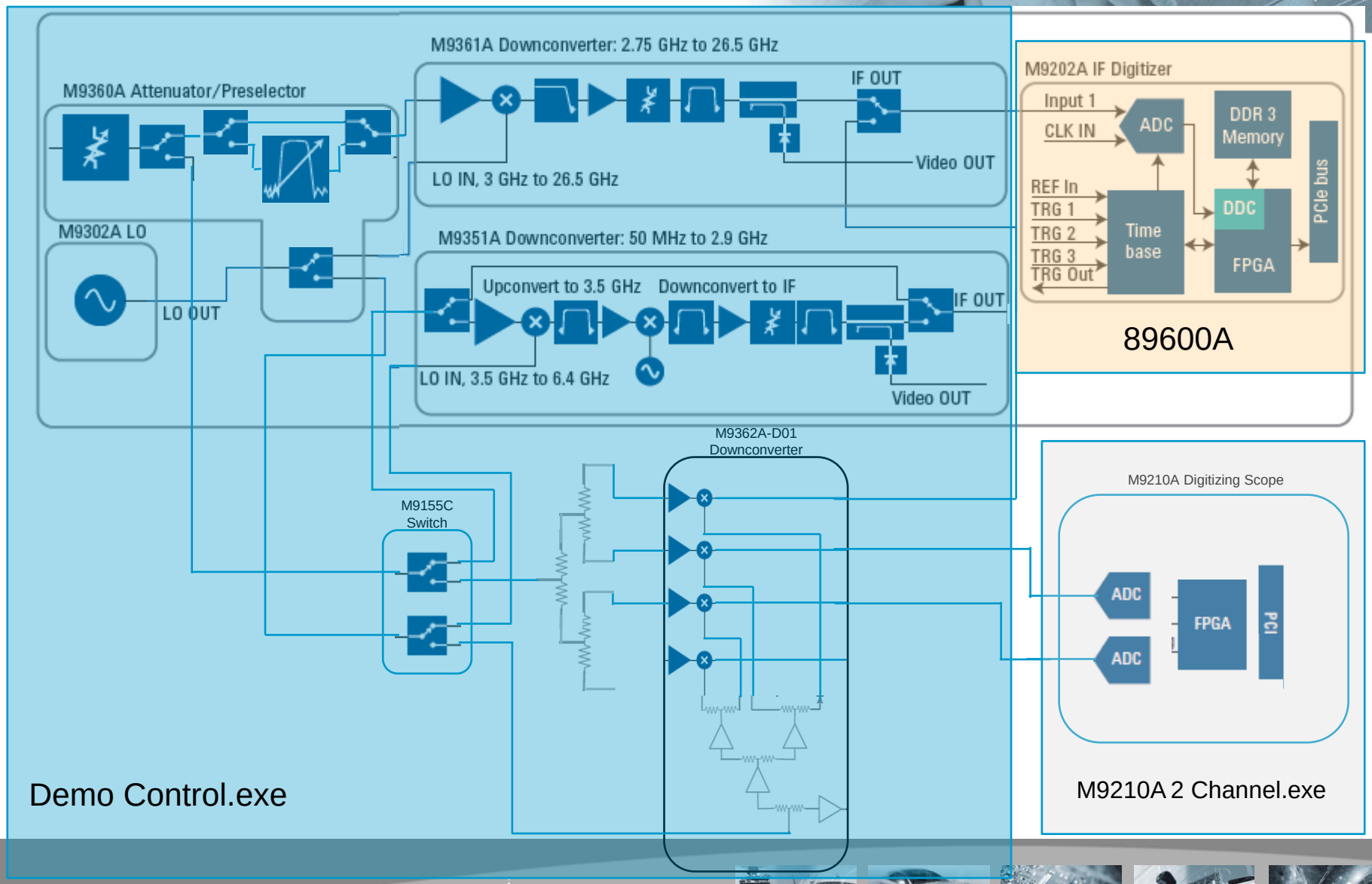
Port	Frequency Range
RF Port	0.01 to 26.5 GHz
LO Port	0.01 to 26.5 GHz
IF Port	0.007 to 20 MHz 0.007 to 1.5 GHz (without jumper, Max BW)

RF Input Power Damage Levels:	
RF Port	+18 dBm
LO Port	+5 dBm
Optimum LO Power	0 dBm (±1 dB)
RF Input @ 0.1 dB Typical Compression:	
A- D Receiver	–10 dBm
IF Output Level[1]	
Ports A- D	–10 dBm

Combined M9392A / M9362A-D01 Demo



M9392A / M9362A-D01 Demo Software Control

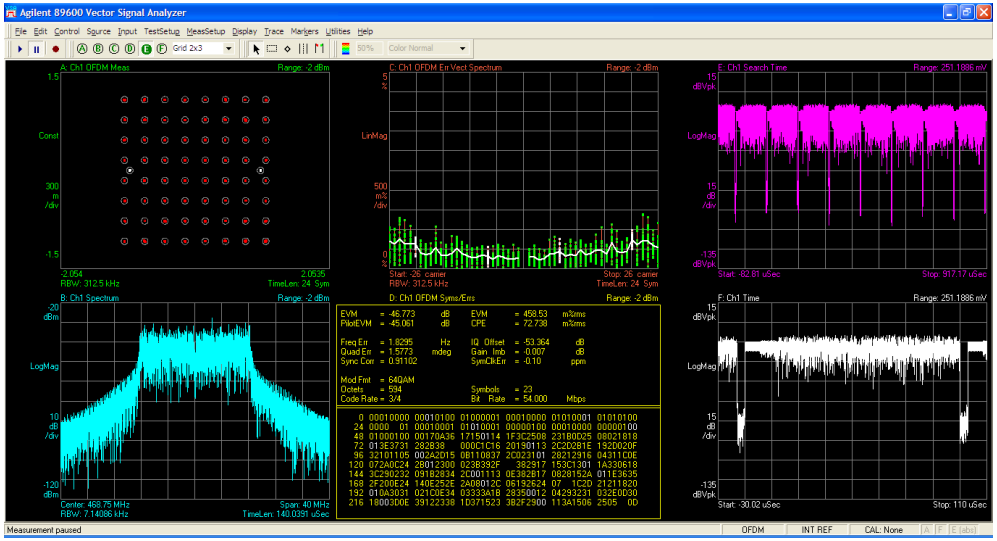


Running VSA with M9202A Digitizer

89601A can be run with just the M9202A Digitizer using the M9392A role, providing Decimated, Zoomed IQ Data

Range of Operation:

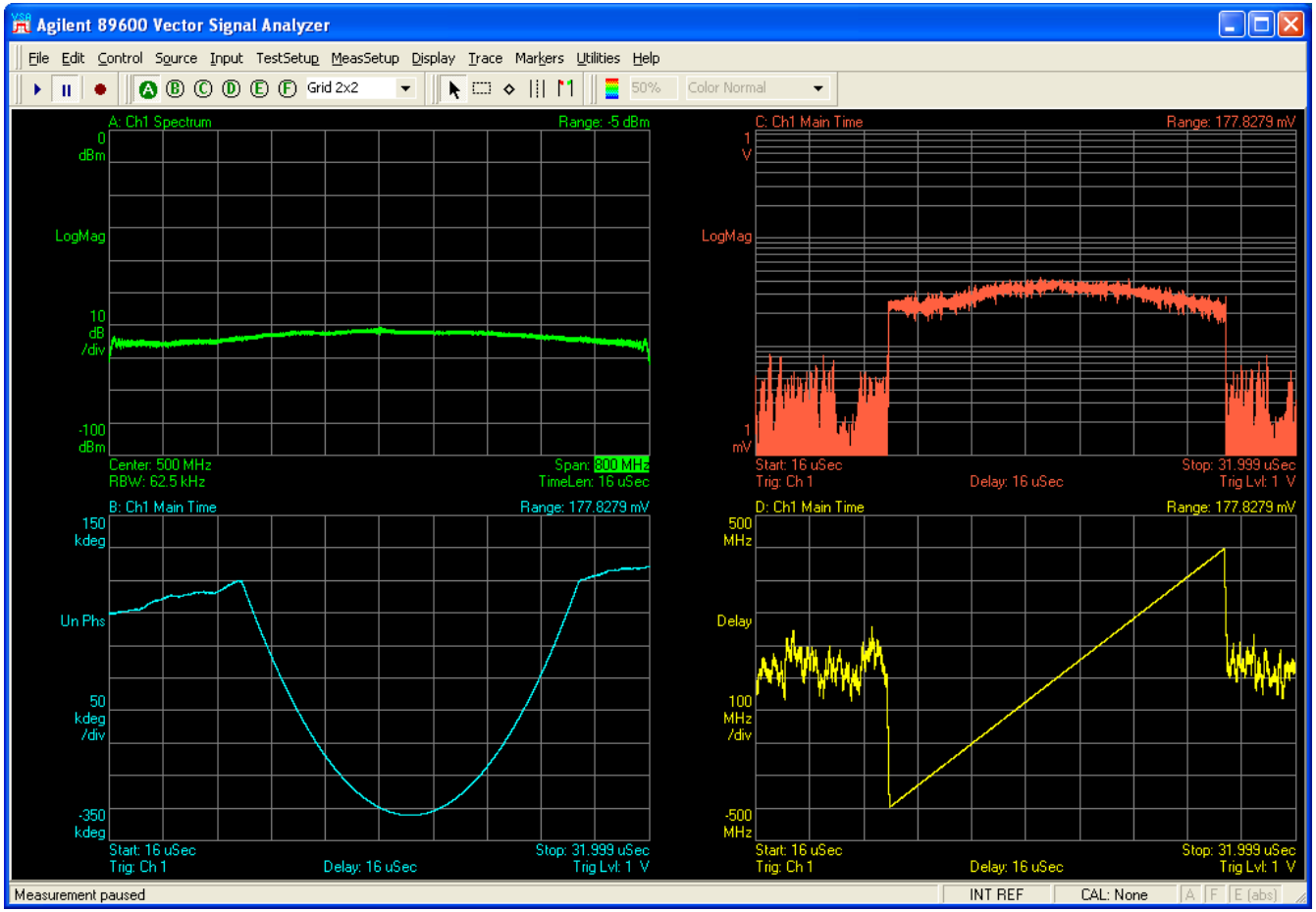
- Maximum BW 800 MHz
- Minimum BW 1 MHz
- Frequency Range from 50 MHz to 1 GHz



Connection Procedure:

- Open M9392A SFP selecting M9202A digitizer only
- Save Connection as M92902A
- Open 89601A
- Select M9392 hardware and press “configure hardware” button
- Change Connection Name to M92902A
- Restart 89601A

M9362A-D01 Demo Signal
800 MHZ BW FM Linear Chirp



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Demodulation Performance

Modulation Type	Best Case EVM @ 3 GHz
40 MHz 802.11n, 64 QAM OFDM	-40 dB
20 MHz 802.11g, 64 QAM OFDM	-45 dB
EDGE	0.18 %
QAM 256, 3 MHz	0.66 %
QAM 32, 3 MHz	0.18 %

Measurement data is for one unit, on a lab benchtop during development, and is not intended to represent guaranteed performance.

M9392A LO and IF Frequencies

Path	BW	IF Freq	LO Equation
uWave Fundamental, 3 to 9.75 GHz, no preselector	250MHz	468.75 MHz BW <= 50 MHz 500 MHz otherwise	LO = RF + IF
uWave 3rd Harm, 9.75 to 26.5 GHz	250MHz	468.75 MHz BW <= 50 MHz 500 MHz otherwise	LO = (RF + IF) / 3
RF Preselected	40MHz	492.1875 MHz BW < =10 MHz, 500 MHz otherwise	LO = (RF + 3.0 GHz + IF)
RF Straight-through	400 MHz or distance to band edge.	Same as RF Freq, 100 MHz to 625 MHz	No LO used
Preselected uWave Fundamental, 3 to 9.75 GHz,	40 MHz	468.75 MHz BW	LO = RF + IF
Preselected uWave 3rd Harm, 9.75 to 26.5 GHz	40 MHz	468.75 MHz BW	LO = (RF + IF) / 3

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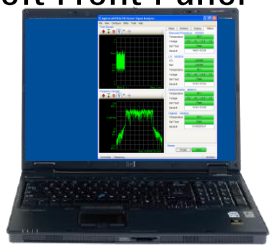
Ways to Use M9392A

Soft Front Panel



M9392A

PSG

Power Meter and Sensor

✓Debug
✓Calibrate
✓Learn

89601/System Vue

✓Benchtop Analysis
✓Demodulation

System Control App

✓ATE

Small Footprint SA

✓Field Repair

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For the advanced user: Hints

ShiftIFFrequency	For spur dodging, specify IF shift in Hz. Causes a non-fpga (aka slow) IF frequency correction.
SwitchHighLowSideMixing	For images and spurs, change from high side to low side mixing
PreferUWaveDownconverter	For overlapping configurations, prefer the uWave converter (2.75 to 2.9 GHz)
PreferRFDownconverter	For overlapping configurations, prefer the RF converter (2.75 to 2.9 GHz)
PreferDirectPath	For overlapping configurations prefer the Direct path over the RF Downconverter (125 to 625 MHz)
OffsetIFAtten	Offset the IF attenuation by some amount in dB.
ForceFrontEndAttenTo	Force the Front End Attenuation to specified value, in dB.
IgnoreReceiverBandwidth	When choosing a receiver, allow BW requests greater than HW can pass (for system characterization)
ShiftPreselectorCenterFrequency	Shift the preselector center frequency if the YIG filter is active, to correct for drift.
ADCDitherLevel	Set a variable ADC Dither Level from 2.19 to 40 dB from full scale (6 dB default)

For example, to ask the M9392 to shift the IF frequency +3.4 MHz next measurement:

```
M9392.Acquistioin.Hints.Add(AgM9392HintTypeShiftIfFrequency, 3.4e6)
```

Hints are erased every Initiate(), so they don't leak. You can query to see if a hint was used.

When to use the Soft Front Panel

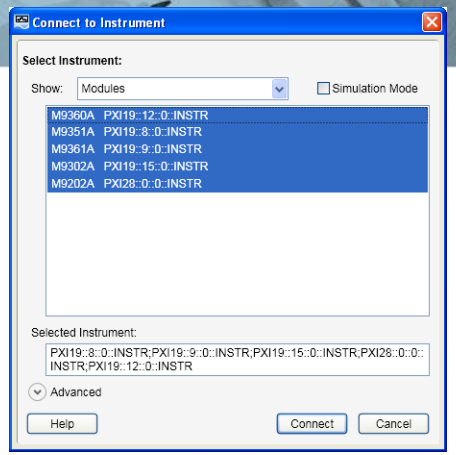
- When running for the first time – check out the hardware
- To save a particular configuration in the IVI store, so can use a name for the VISA string.
- To do a Field Cal
- When something is broken, and you want to figure out which module or cable is the problem.

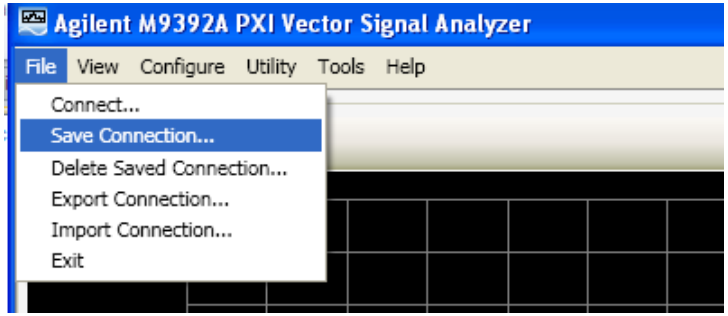
Setting up 89601A Connection: Setting up from M9392A SFP

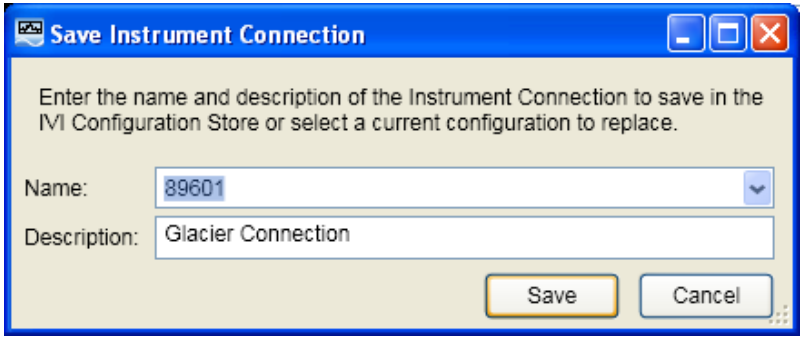
Steps to Connect M9392A to 89601A VSA Software:

1. Open M9392A Soft Front Panel and connect with the PXI modules
2. Select File | Save Connection from the M9392A SFP
3. Save Connection Name as “89601”
4. Exit M9392A Soft Front Panel

- Note: These steps do not need to be repeated unless the configuration of M9392A modules is changed



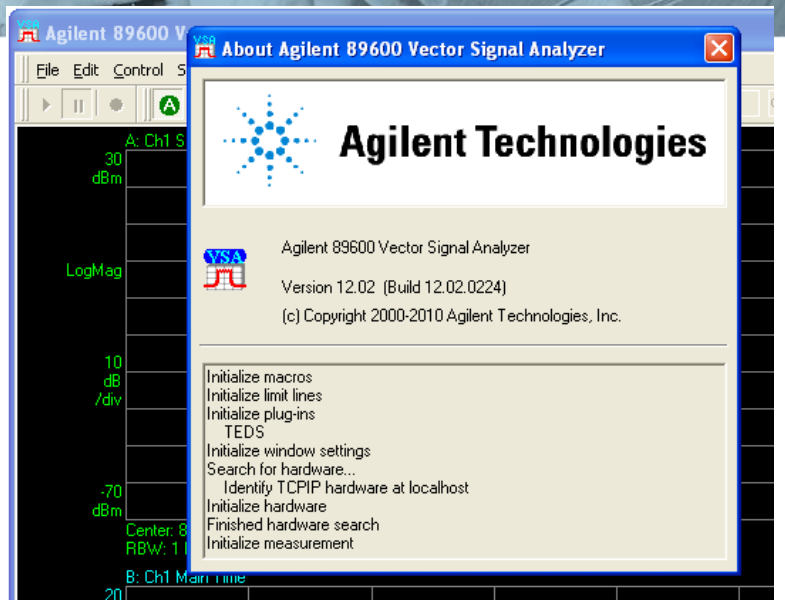


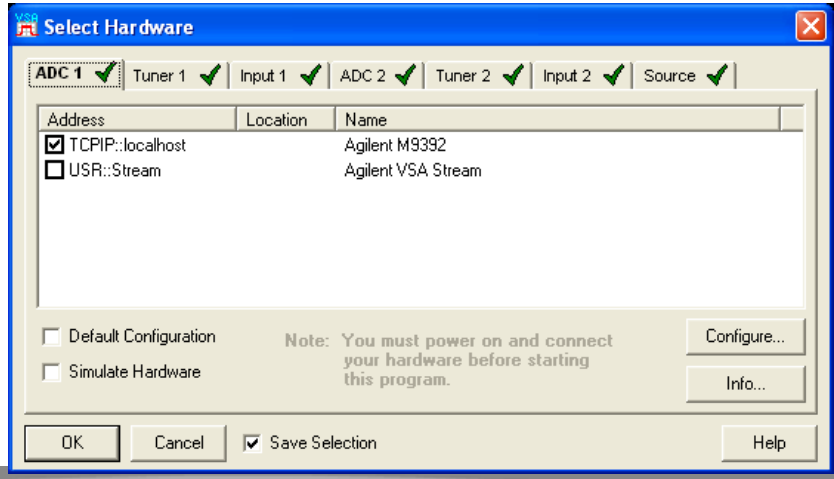


Setting up 89601A Connection: Configuring 89601A VSA

Steps to Connect M9392A to 89601A VSA Software:

1. Start 89601A VSA Software
2. During initialization you should see a message “Identify TCPIP Hardware at localhost” *and* not see an error after this line. This process will take about 30 seconds
3. If the M9392 is not already selected as the hardware choice, select Utility | Hardware from the 89601A menu and then select the TCPIP::localhost Agilent M9392 resource from the ADC1 tab and then press OK
4. The M9392A will then initialize (~30 seconds)



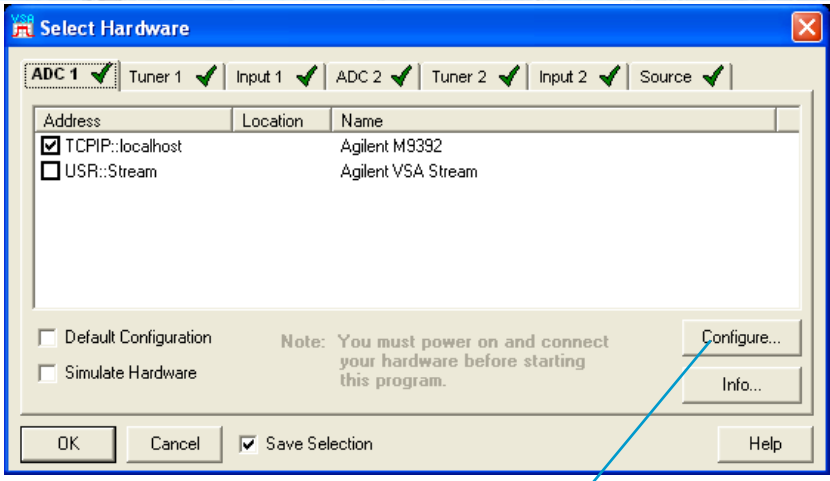


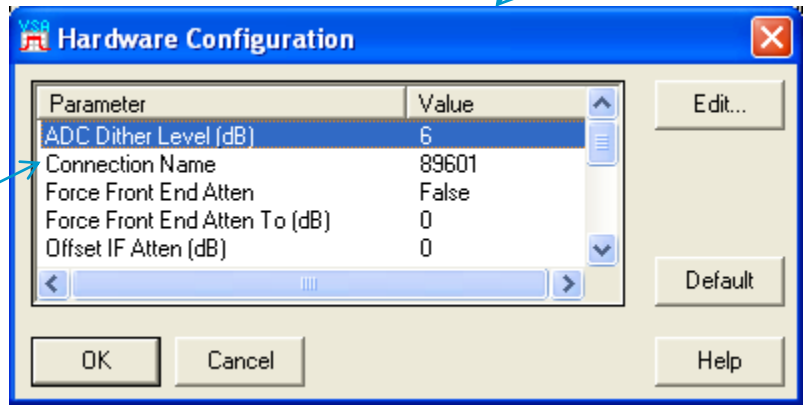
Configuring 89601A VSA: Configuring Hardware

The M9392A Hints can be modified through the 89601A VSA Configure Hardware menu:

1. Select Utility | Hardware from the 89601A menu
2. Select M9392 hardware
3. Press Configure… button
4. Select Hardware option and press Edit…
5. Set new value for hardware option
6. Exit and restart 89601A VSA Software

- Note: You can save several connection names from the M9392A soft front panel and use this configuration to switch between them



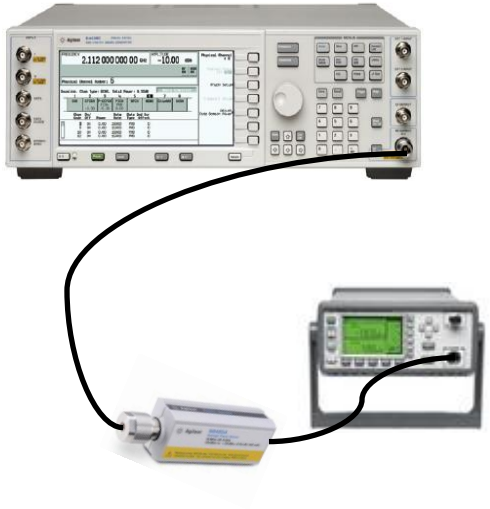


PXI Microwave Vector Signal Analyzer

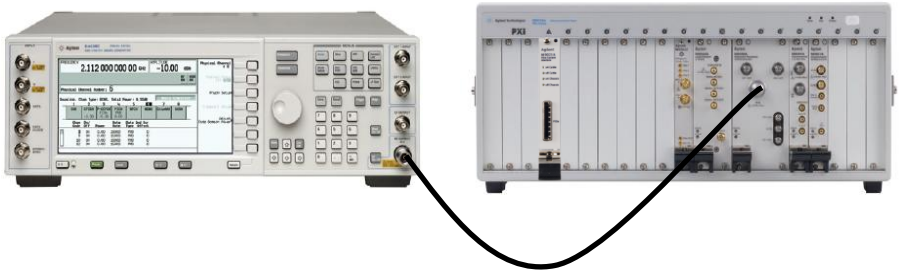
- Product Overview
- Software
- Demo
- Supplemental Information
  - Performance data
  - Applications
  - Software / SFPs
  - Field Cal
  - Module Level Operation

Field Calibration From Soft Front Panel

1) Cal the Source



2) Cal the M9392A



Perform a Field Calibration:

- When first delivered
- When cables changed
- When modules pulled for repair
- When reconfigured
- Every 3 months
- Major environmental change

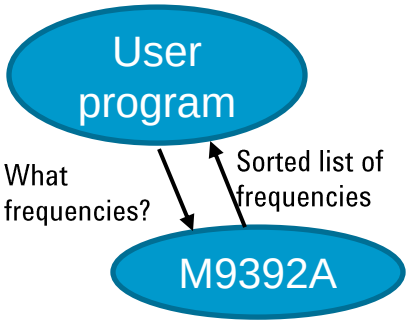
Field Calibration Internal Operation

1. Asks M9392A what frequencies to cal.

2. User calibrates the source. Maybe measure source output, maybe calibrate splitter.

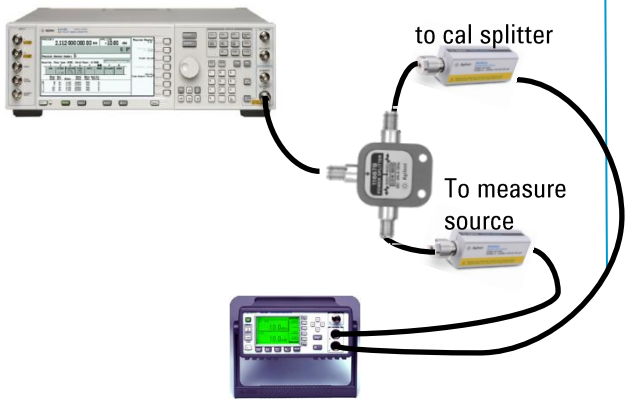
3. Tune source, tell M9392A to measure what it needs.

4. Save

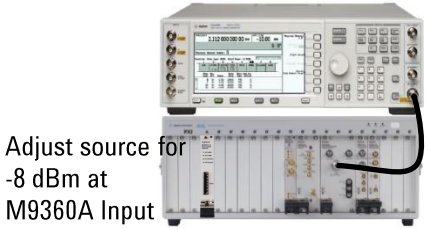


Good Accuracy

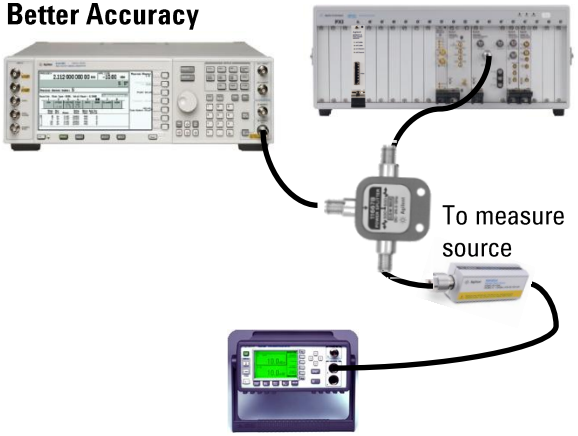
Better Accuracy



Good Accuracy



Better Accuracy



What is Calibrated?

- Power accuracy for CW tone at specified input level
- IF Power level for optimal dynamic range.

Not Calibrated:

- IF Flatness
- Preselector filter placement

Layered over the module level calibrations:

- Module level calibrations provide the offset calibration if an attenuator is set to a different level.
- The temperature compensation is applied as a module level correction, and trickles up to the field calibration.

Fixture Compensation Data

- User can specify with SetFixtureLoss(loss_table), where the loss table is a set of frequency(Hz), Loss(dB) pairs.
- Modest fixture loss (2-3 dB) can be included in Field Cal
- Expect that advanced users will do their own.

PXI Microwave Vector Signal Analyzer

- Product Overview
- Software
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  - Applications
  - Software / SFPs
  - Field Cal
  - Module Level Operation

M9392A Signal Analyzer PXI Modules

- **Digitizer: M9202A**
  - Digital IF operation, Programming, Soft Front Panel
- **Microwave Downconverter: M9361A**
  - Block Diagram, Soft Front Panel (SFP) and programming example in Lab Windows CVI
- **RF Downconverter: M9351A**
  - Block Diagram, SFP and programming example in LabVIEW
- **Attenuator/Preselector: M9360A**
  - Block Diagram, SFP and programming example in Visual Studio C++
- **LO Module: M9302A**
  - Block Diagram, SFP and programming example in Visual Studio C#

M9202A PXIe Wideband IF Digitizer

New M9202A PXIe wideband IF Digitizer with on-board processing

Key features:

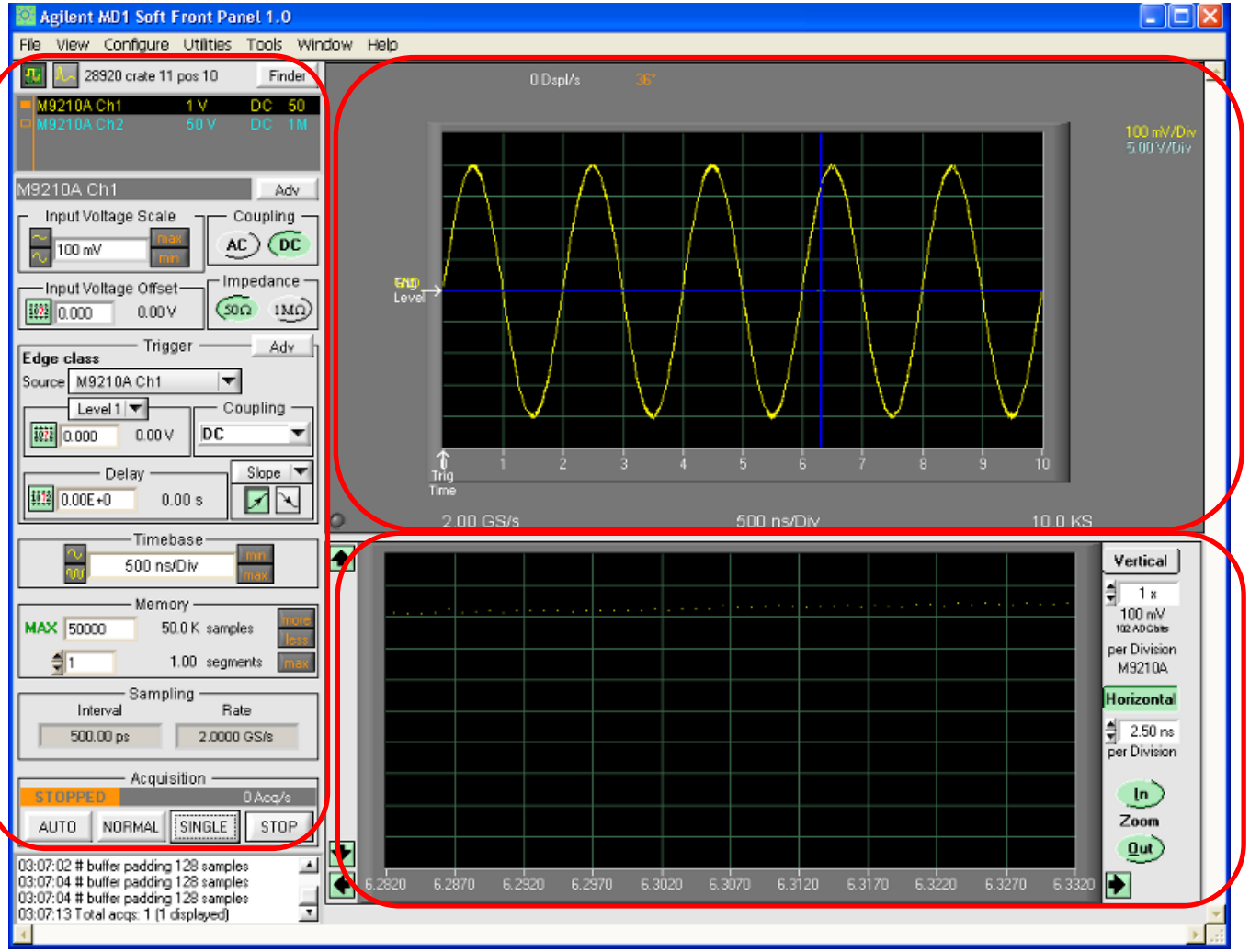
- 1 channel, 12-bit, 2 GS/s
- 1 GHz analog bandwidth
- AC-coupled 50 Ω input
- Dither function
- +4/-2 dBm full scale (dither disabled/enabled)
- DDC algorithm to improve SNR and reduce data upload time
- 512 MB memory
- PCIe x4 connectivity (Gen 1 = 1 GB/s data throughput)
- Soft Front Panel GUI
- Designed to particularly fit in M9392A uWave Vector Signal Analyzer

Digitizer Programming API

- Hierarchy
  - Attribute Accessors
    - GetAttributeViBoolean
    - GetAttributeViInt32
    - GetAttributeViInt64
    - GetAttributeViReal64
    - GetAttributeViSession
    - GetAttributeViString
    - SetAttributeViBoolean
    - SetAttributeViInt32
    - SetAttributeViInt64
    - SetAttributeViReal64
    - SetAttributeViSession
    - SetAttributeViString
  - Calibration
    - Self Calibrate
  - Channel
    - Channel Count
    - Channel Enabled
    - Filter
      - Input Filter Bypass
      - Input Filter Max Frequency
    - Input Connector Selection
    - Input Impedance
    - Time Interleaved Channel List
    - Vertical Coupling
    - Vertical Offset
    - Vertical Range
  - Close
  - Configuration
    - Acquisition
      - Configure Acquisition Record
      - Configure Sample Mode
    - Channel
  - Acquisition
  - Channel
    - Configure Channel
    - Get Channel Name
  - Reference Oscillator
    - Configure Reference Oscillator Outpu
  - Trigger
    - Configure Edge Trigger Source
    - Configure Multi Trigger
    - Configure Trigger Modifier
    - Configure TV Trigger Source
    - Get Trigger Source Name
  - Inherent IVI Attributes
    - Advanced Session Information
      - Driver Setup
      - I/O Resource Descriptor
      - Logical Name
    - Driver Capabilities
      - Class Group Capabilities
      - Supported Instrument Models
    - Driver Identification
      - Specific Driver Class Spec Major Vers
      - Specific Driver Class Spec Minor Vers
      - Specific Driver Description
      - Specific Driver Prefix
      - Specific Driver Revision
      - Specific Driver Vendor
    - Instrument Identification
      - Instrument Firmware Revision
      - Instrument Manufacturer
      - Instrument Model
    - User Options
      - Cache
      - Interchange Check
  - User Options
    - Cache
    - Interchange Check
    - Query Instrument Status
    - Range Check
    - Record Value Coercions
    - Simulate
  - Initialize
  - Initialize With Options
  - Instrument Specific
    - Acquisition
      - Acquisition Auto Arm Enabled
      - Acquisition Configure Record
      - Acquisition Dither Enabled
      - Acquisition Dither Range
      - Acquisition Number Of Averages
      - Acquisition Reference Channel
      - Acquisition Start Time
      - Acquisition Time Per Record
      - Mode
    - Calibration
      - Calibration Cal Required
      - Calibration Cancel
      - Calibration Load Cal
      - Calibration Save Cal
      - Calibration Self Calibrate
    - Channel
      - Channel Active Inputs
      - Channel Connector Name
      - Channel Converters Per Channel
      - Channel Input Frequency Max
      - Channel Probe Attenuation
      - DigitalDownconversion
      - Measurement
    - DigitalDownconversion
      - Digital Downconversion Configure
      - Digital Downconversion Data Ban
      - Digital Downconversion Double D
      - Digital Downconversion Flip Band
      - Digital Downconversion Frequenc
      - Digital Downconversion Trigger B
    - Measurement
      - Measurement Fetch Waveform M
      - Measurement Read Waveform M
      - Measurement Waveform Type
    - ControlIO
      - Control IO Signal A
      - Control IO Signal B
      - Control IO Signal C
    - InstrumentInfo
      - Instrument Info Aq Drv Version
      - Instrument Info AqIO Version
      - Instrument Info Bus Number
      - Instrument Info Cpld Firmware Rev
      - Instrument Info Crate Number
      - Instrument Info Device ID
      - Instrument Info Eeprom Common Sect
      - Instrument Info Eeprom Digitizer Sectic
      - Instrument Info Has High Res Sample
      - Instrument Info Nbr External Triggers
      - Instrument Info Nbr Internal Triggers
      - Instrument Info Nbr Modules In Instrun
      - Instrument Info NbrADC Bits
      - Instrument Info Options
      - Instrument Info Serial Number
      - Instrument Info Slot Number
    - ReferenceLevel
    - System

Agilent MD1 SFP for High-Speed Digitizers

Control panel



Acquired waveform display

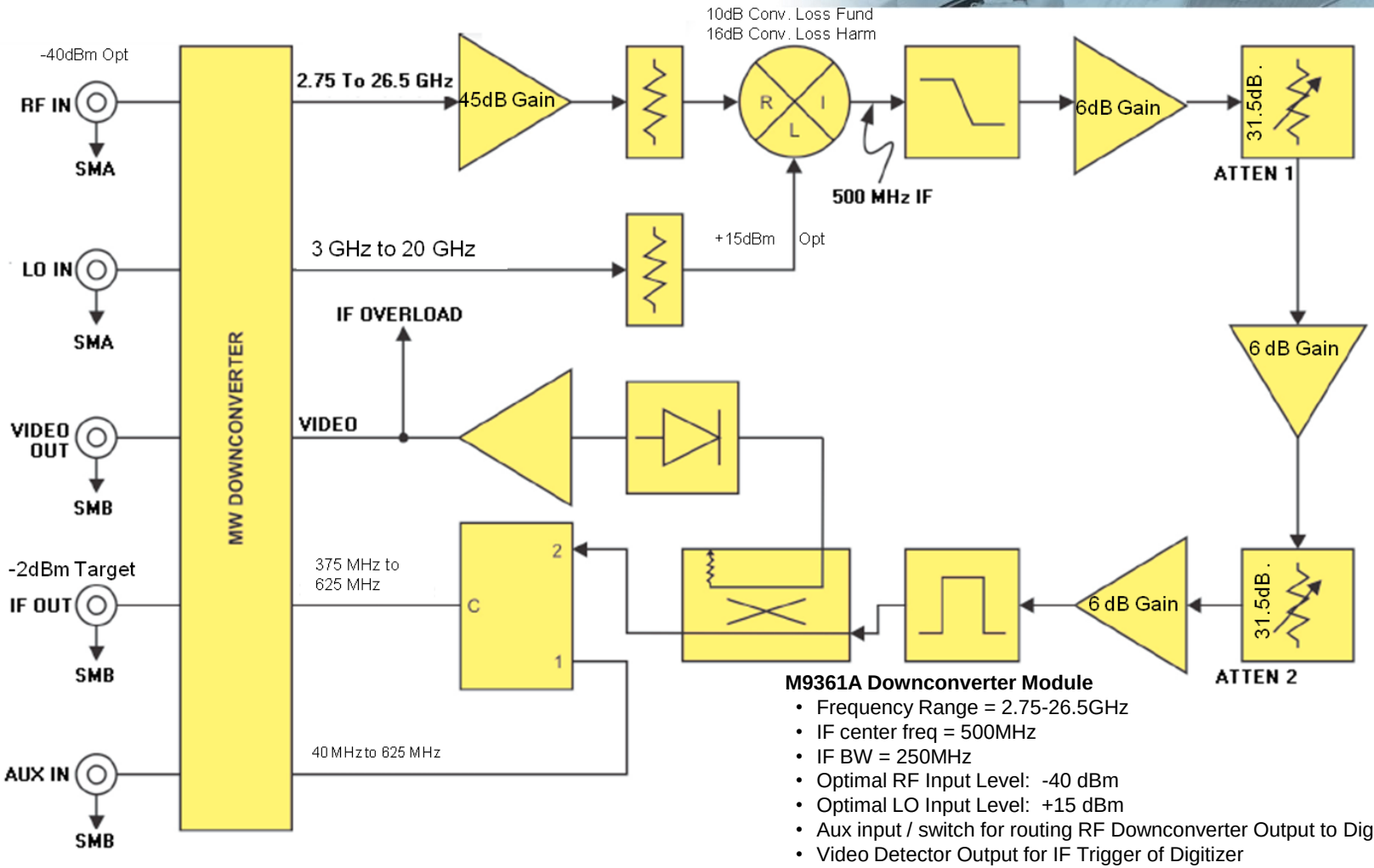
Zoom on Acquired waveform

M9361A Downconverter
2.75 GHz to 26.5 GHz

Key Features:

- Frequency Range = 2.75-26.5GHz
- IF center freq = 500 MHz
- IF BW = 250 MHz
- Detector output for video triggering
- Pre-amp enables very low signal measurements
- Built-in calibration simplifies system power budget calculations by providing a constant output power

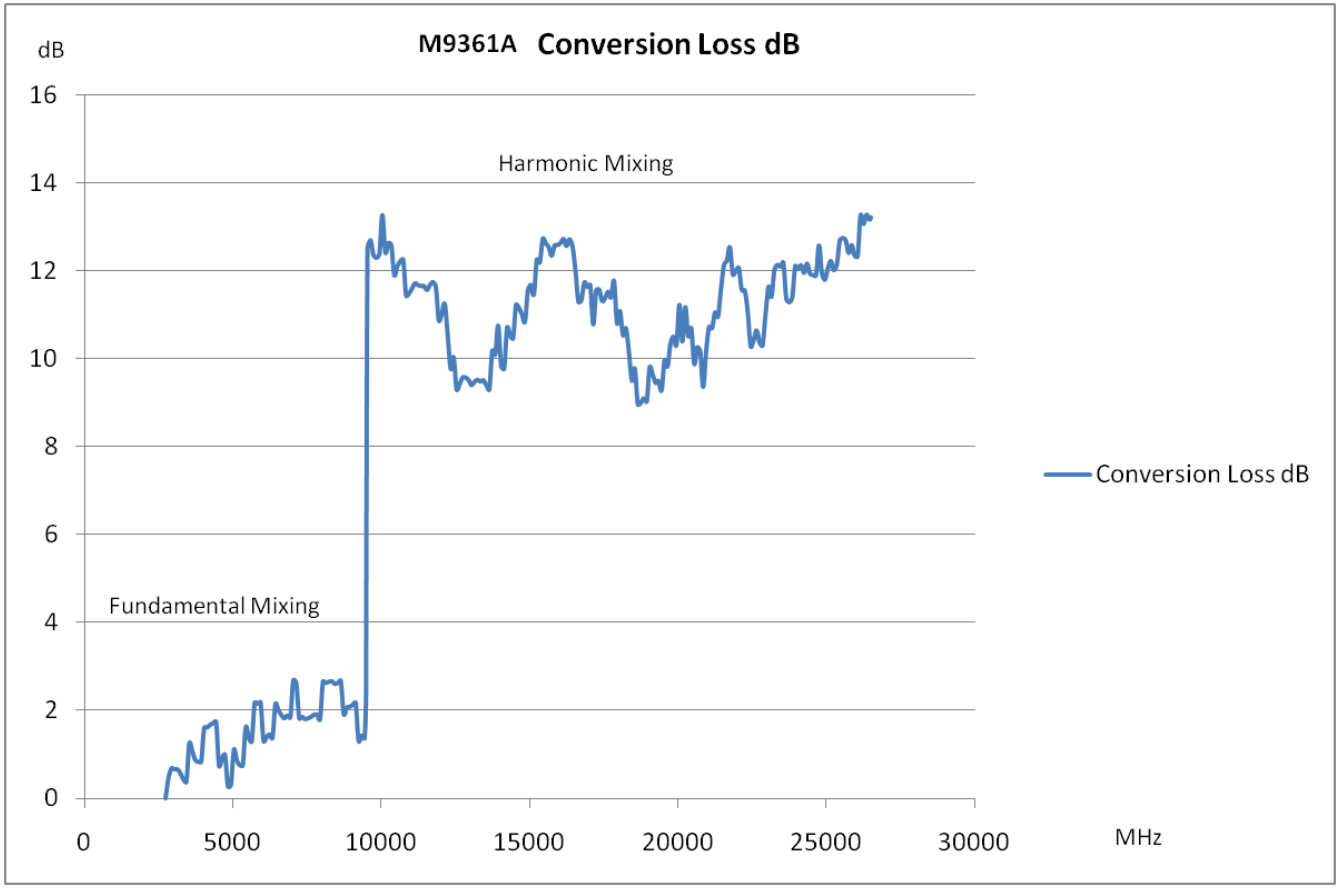
M9361A uW Downconverter Module



M9361A Downconverter Module

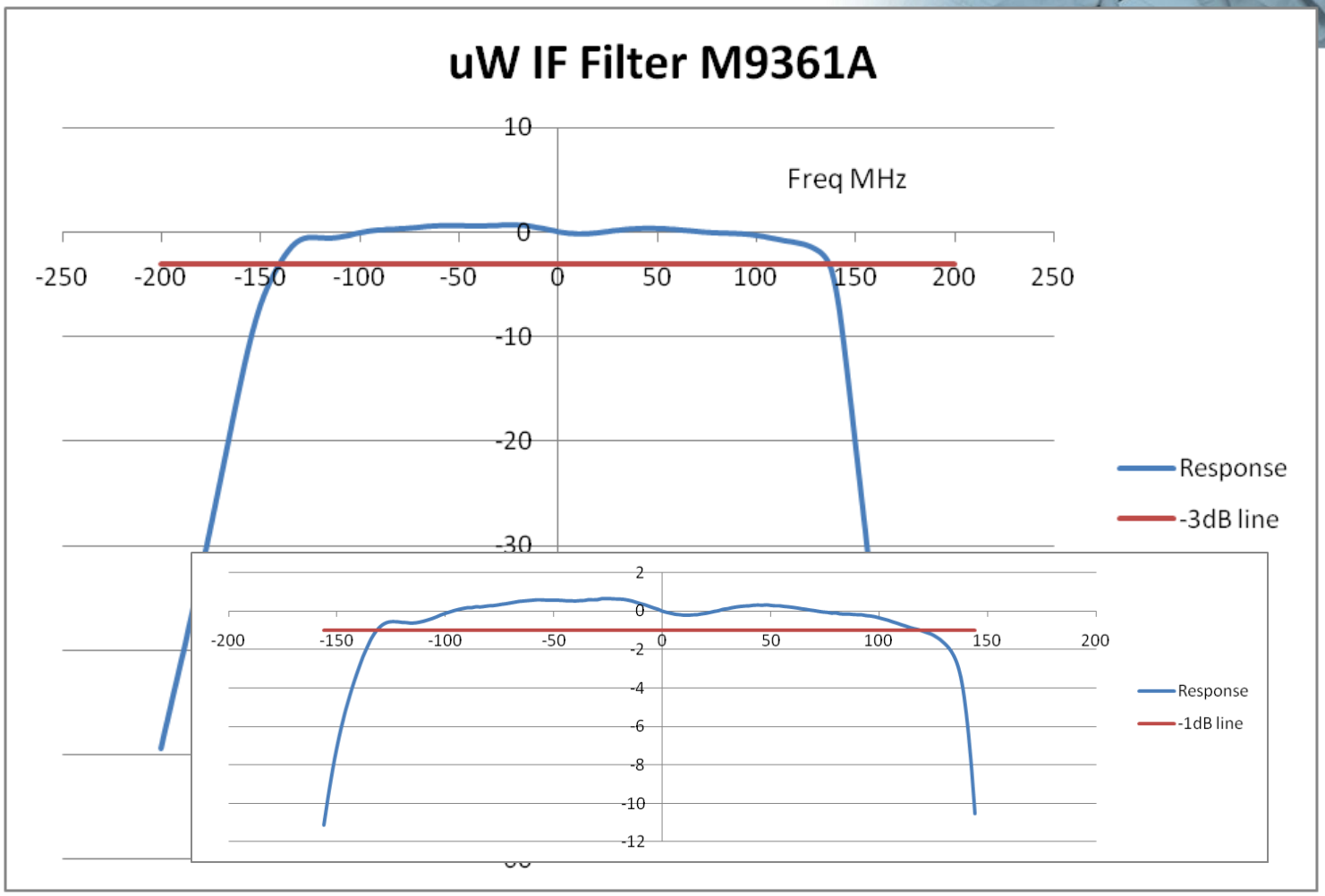
- Frequency Range = 2.75-26.5GHz
- IF center freq = 500MHz
- IF BW = 250MHz
- Optimal RF Input Level: -40 dBm
- Optimal LO Input Level: +15 dBm
- Aux input / switch for routing RF Downconverter Output to Digitizer
- Video Detector Output for IF Trigger of Digitizer
- DANL: ~-160 dBm/Hz fundamental Conversion
  ~-146 dBm/Hz Third Harmonic Conversion

Conversion Gain Plot: Fundamental and Third Harmonic Mixing



Measurement data is for one unit, on a lab benchtop during development, and is not intended to represent guaranteed performance.

M9361A IF Filter Bandwidth Plot



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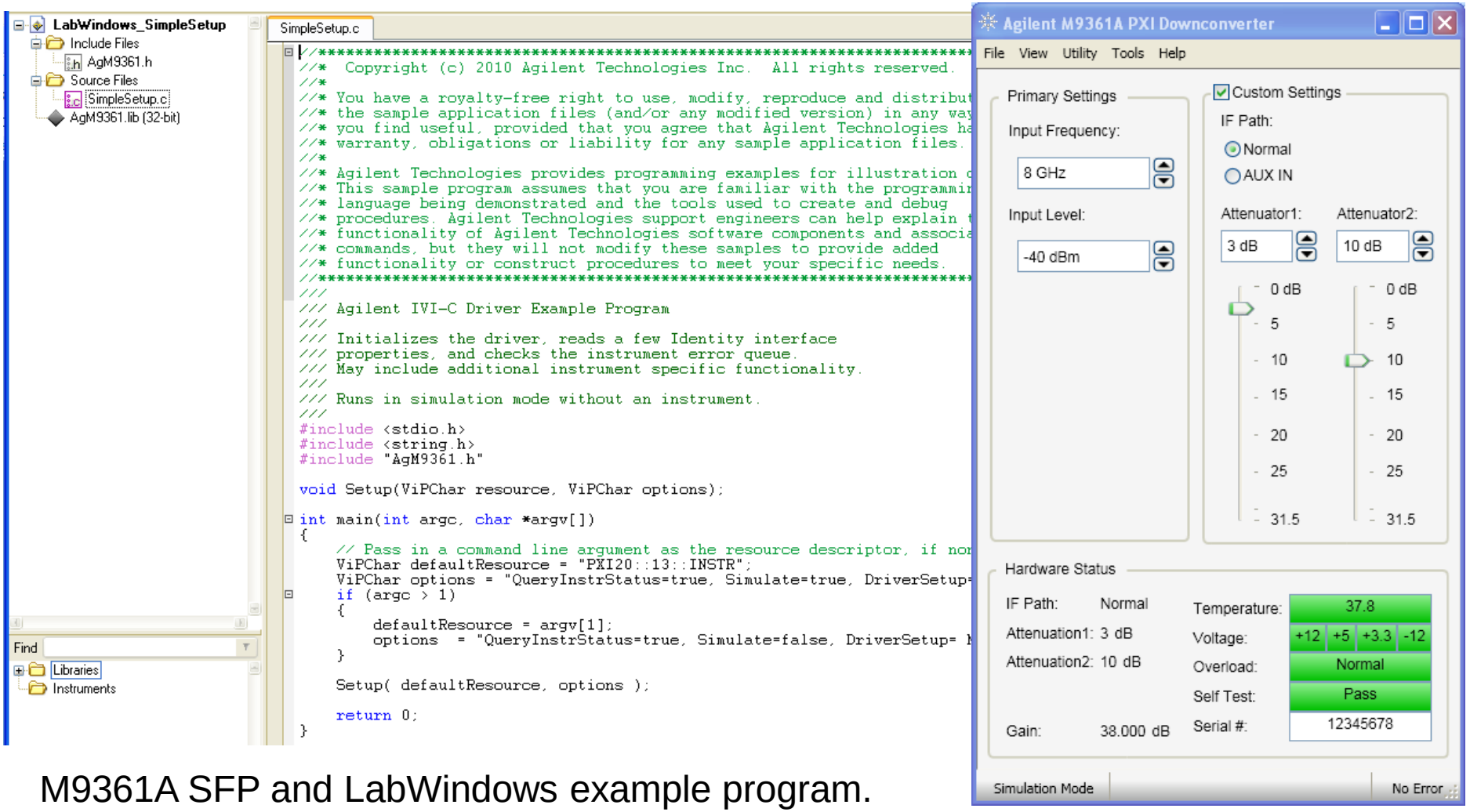
M9361A uW Downconverter Module



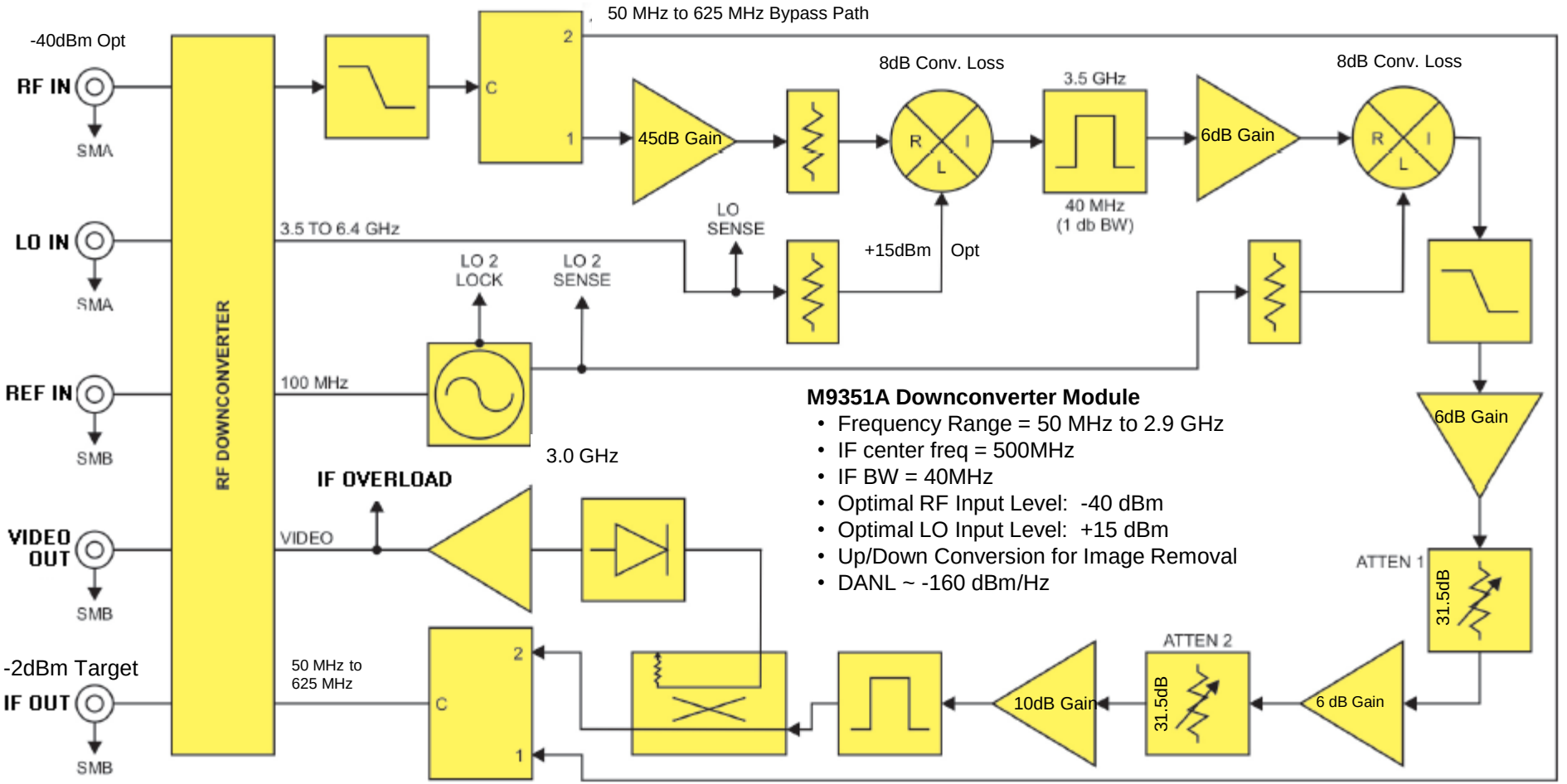
M9361A SFP and LabWindows example program.

M9351A Downconverter: 50MHz to 2.9 GHz

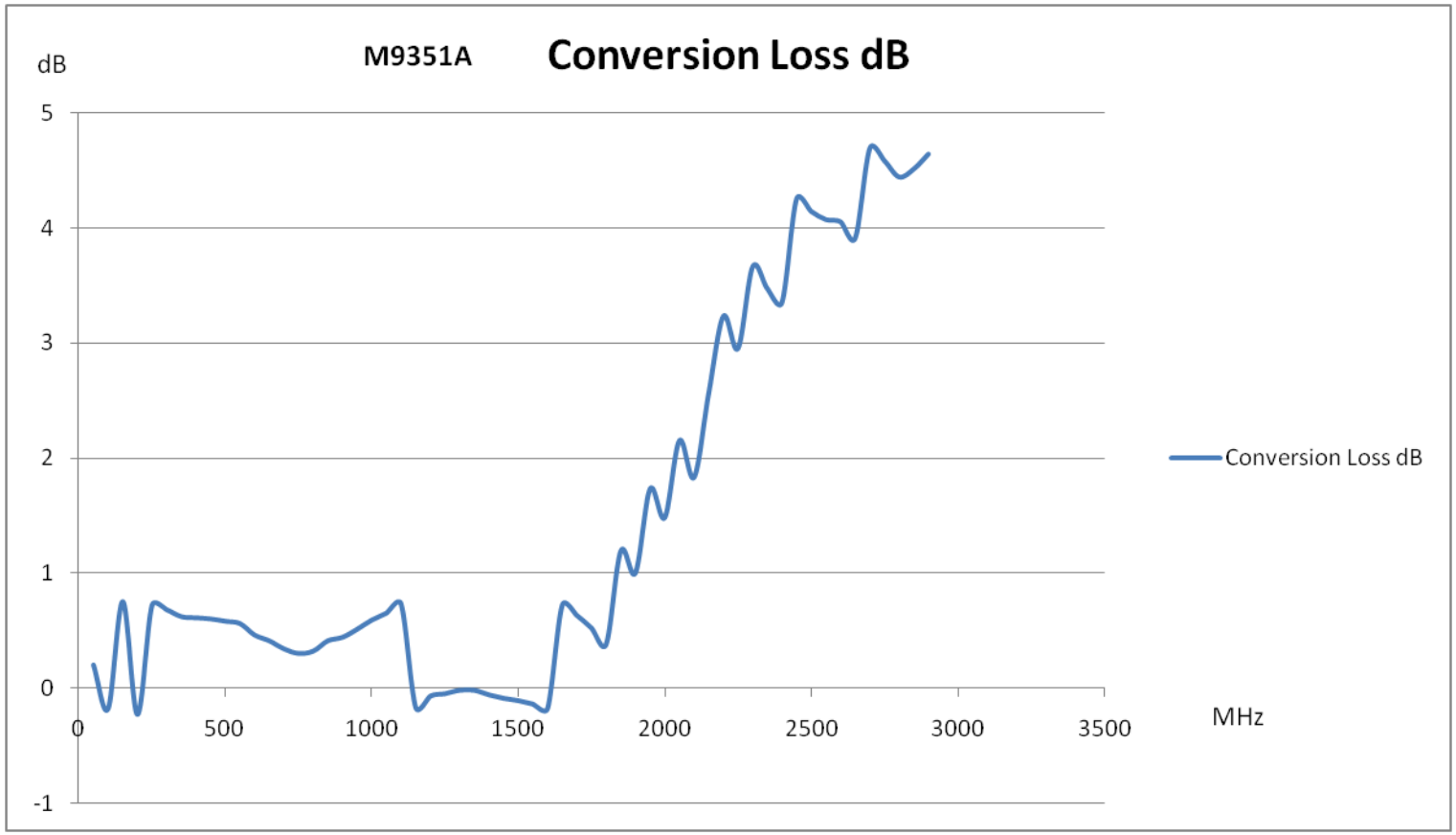
Key Features:

- Frequency Range = 50 MHz to 2.9 GHz
- IF center freq = 500 MHz
- IF BW = 40 MHz
- Pre-amp enables very low signal measurements
- Built-in calibration simplifies system power budget calculations by providing a constant output power

M9351A RF Downconverter Module

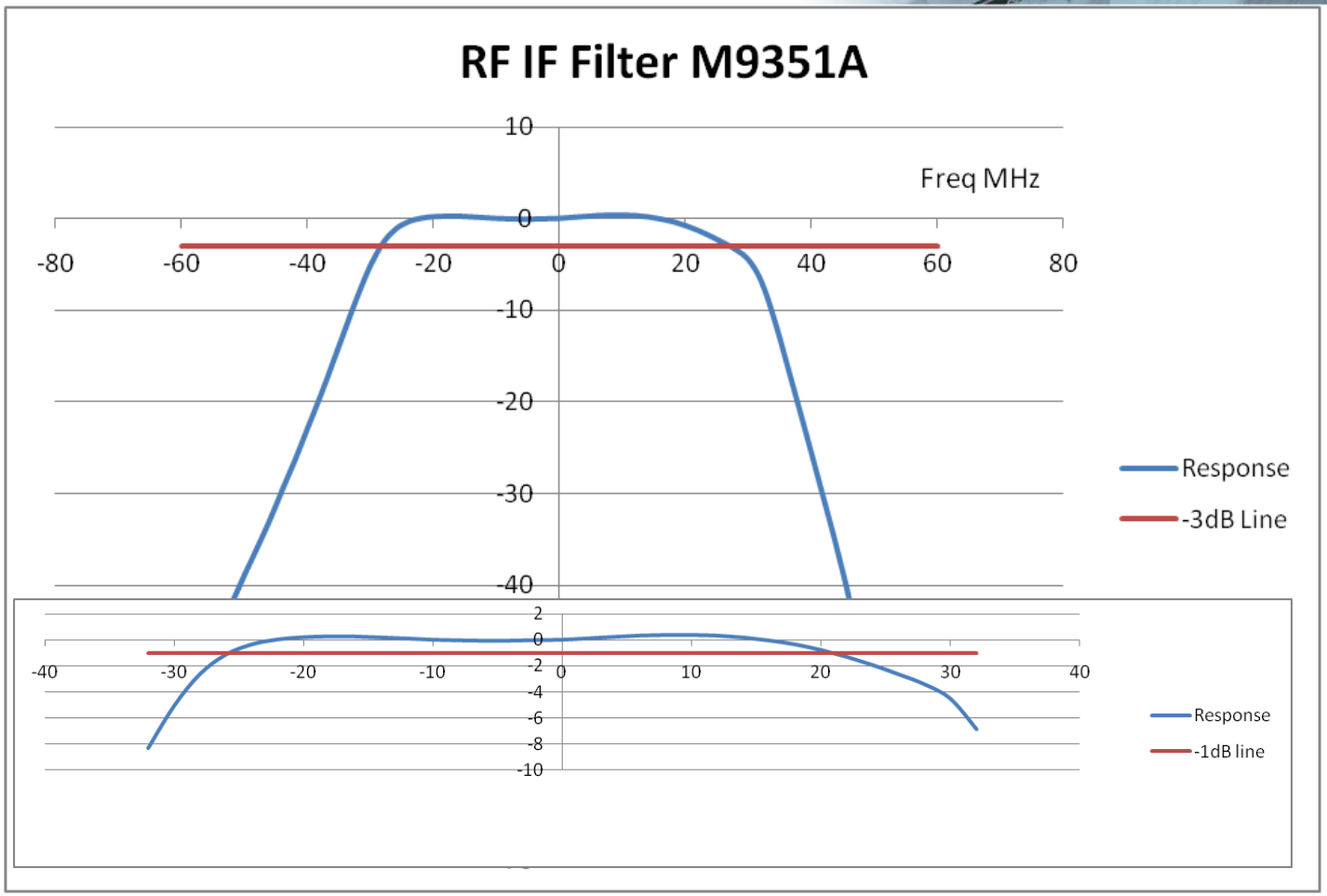


Conversion Gain Plot



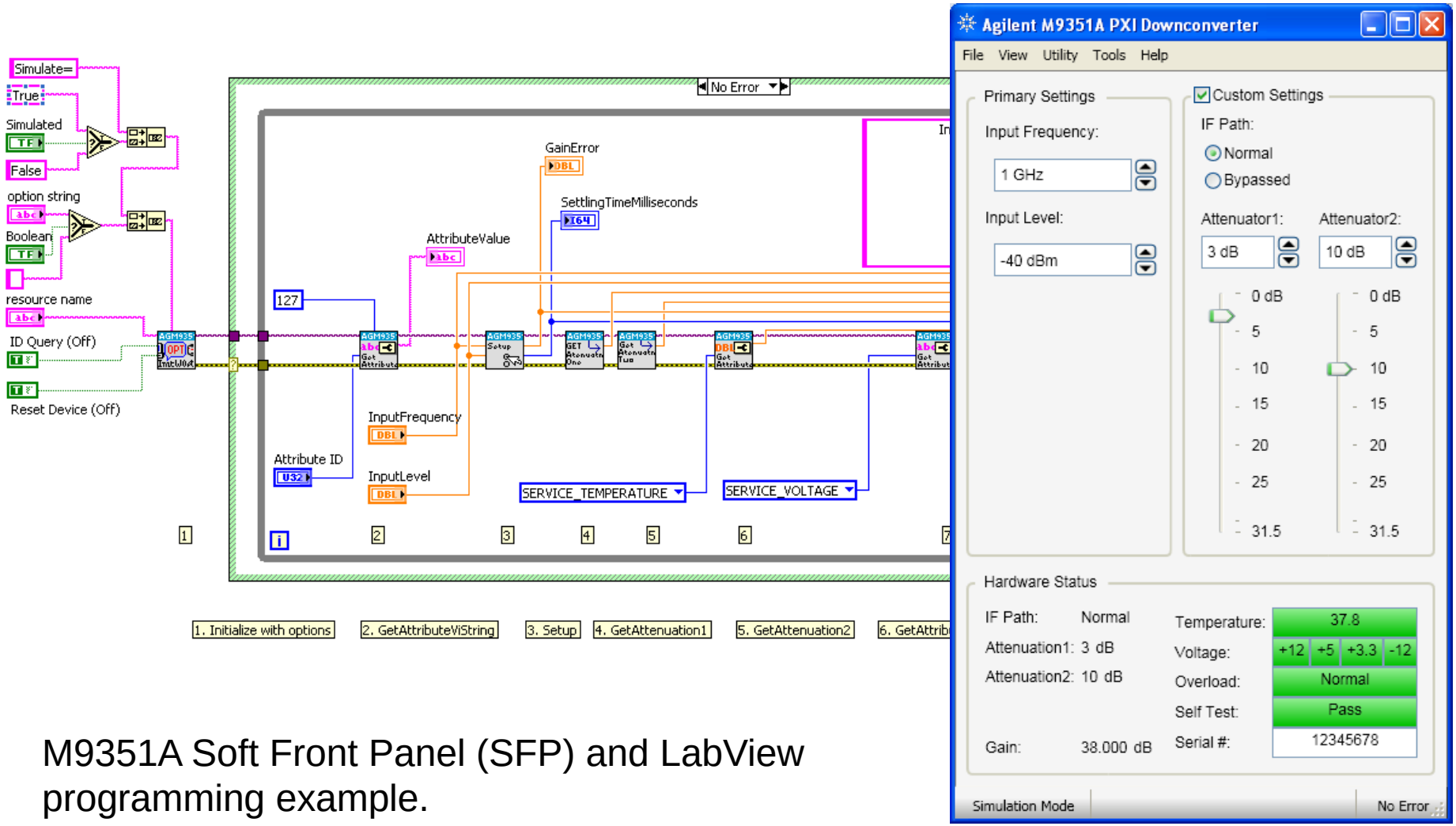
Measurement data is for one unit, on a lab benchtop during development, and is not intended to represent guaranteed performance.

M9351A IF Filter Bandwidth Plot



Measurement data is for one unit, on a lab benchtop during development, and is not intended to represent guaranteed performance.

M9351A RF Downconverter Module



M9351A Soft Front Panel (SFP) and LabView programming example.

M9360A Attenuator / Preselector: 100 kHz to 26.5 GHz

Key Features:

- YIG Tuned Filter Path BW 40MHz, 3-26.5GHz
- Through path 100 kHz-26.5GHz
- 70dB step attenuator
- Switches for signal routing to RF and µWave downconverters

M9360A Attenuator / Preselector Module

M9360 Simple Setup.cpp | Source Control Explorer

(Global Scope)

```
// This exmaple shows two different ways to setup the M9360A preselector module.
//
// The simple and straightforward way is to use AgM9360.RFInput.Configure() method.
// All the settings will be done automatically according to the parameters given to
// the method. It returns insertion loss and settling time. Insertion loss is
// calculated for the settings using calibration data. Settling time tells how long
// it takes for the module's internal state to settle. The user needs to wait
// at least that much time before making a measurement. See SingleShotSetup() below
// for the details.
//
// The other way is to configure all the settings manually. The sequence shown below
// is equivalent of what is done inside AgM9360.RFInput.Configure() method. The user
// would prefer this approach if finer control of the preselector is required (e.g.
// turn off calibration or override the attenuator settings). See StepByStepSetup()
// below for the details.

#include "stdafx.h"
#include <string.h>

#include "Preselector.h"

int _tmain(int argc, char* argv[])
{
    ::CoInitialize( NULL );

    // Pass in a command line argument as the resource descriptor, if none, will default
    char* defaultResource = "PXI20::13::INSTR";
    char* options = "QueryInstrStatus=true, Simulate=true, DriverSetup= Model=, Trace=false
    if (argc > 1)
    {
        defaultResource = argv[1];
        options  = "QueryInstrStatus=true, Simulate=false, DriverSetup= Model=, Trace=false
    }

    Preselector module( defaultResource, options );

    // Input parameters
    double inputFrequency = 5.0e+9; // in Hz
    double inputPower = -10;        // in dBm
```

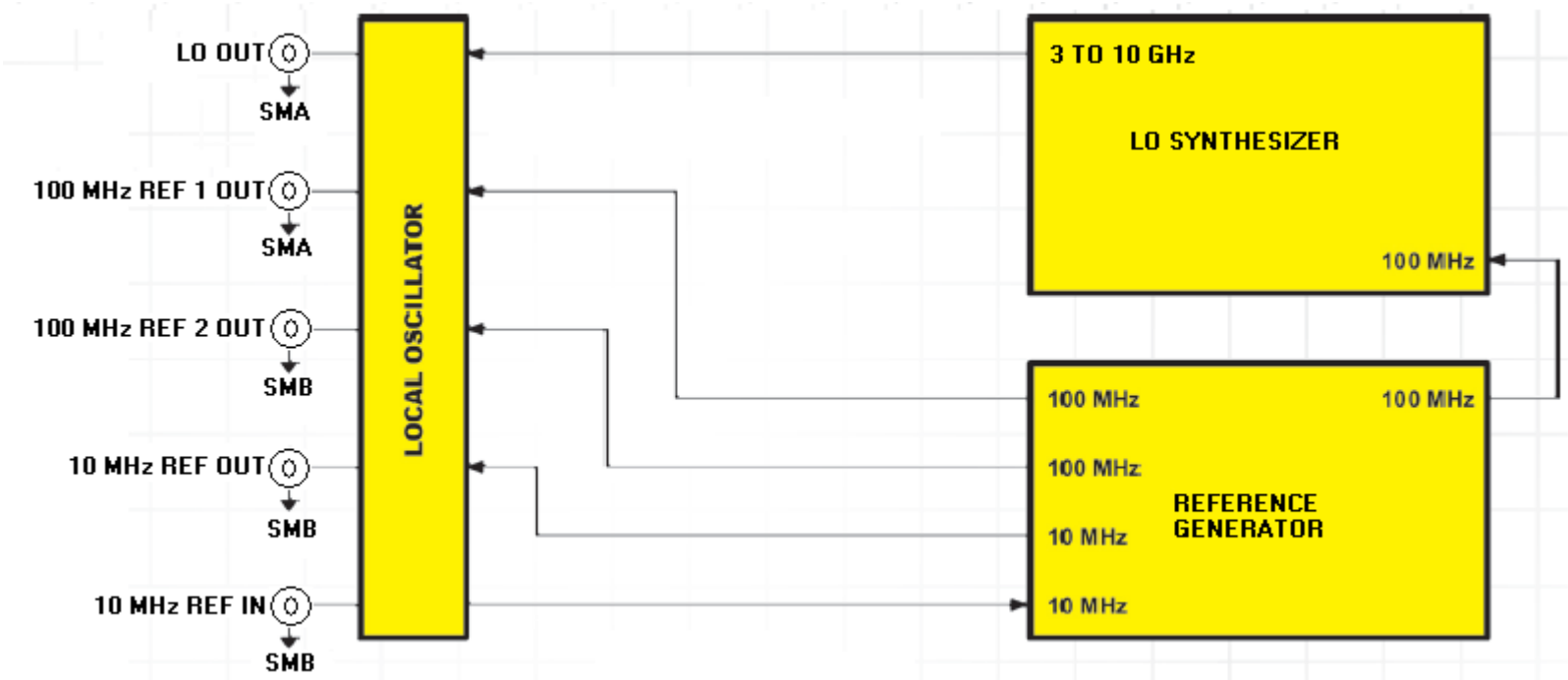
M9360A SFP with C++ .NET programming example

M9302A Local Oscillator: 3 to 10 GHz

Key Features:

- Supplies LO to downconverters
- Supplies 100 MHz reference to digitizer for sampling clock generation
- Output Level 0 dBm
- 1 mS switching time
- 0.1 Hz tuning resolution

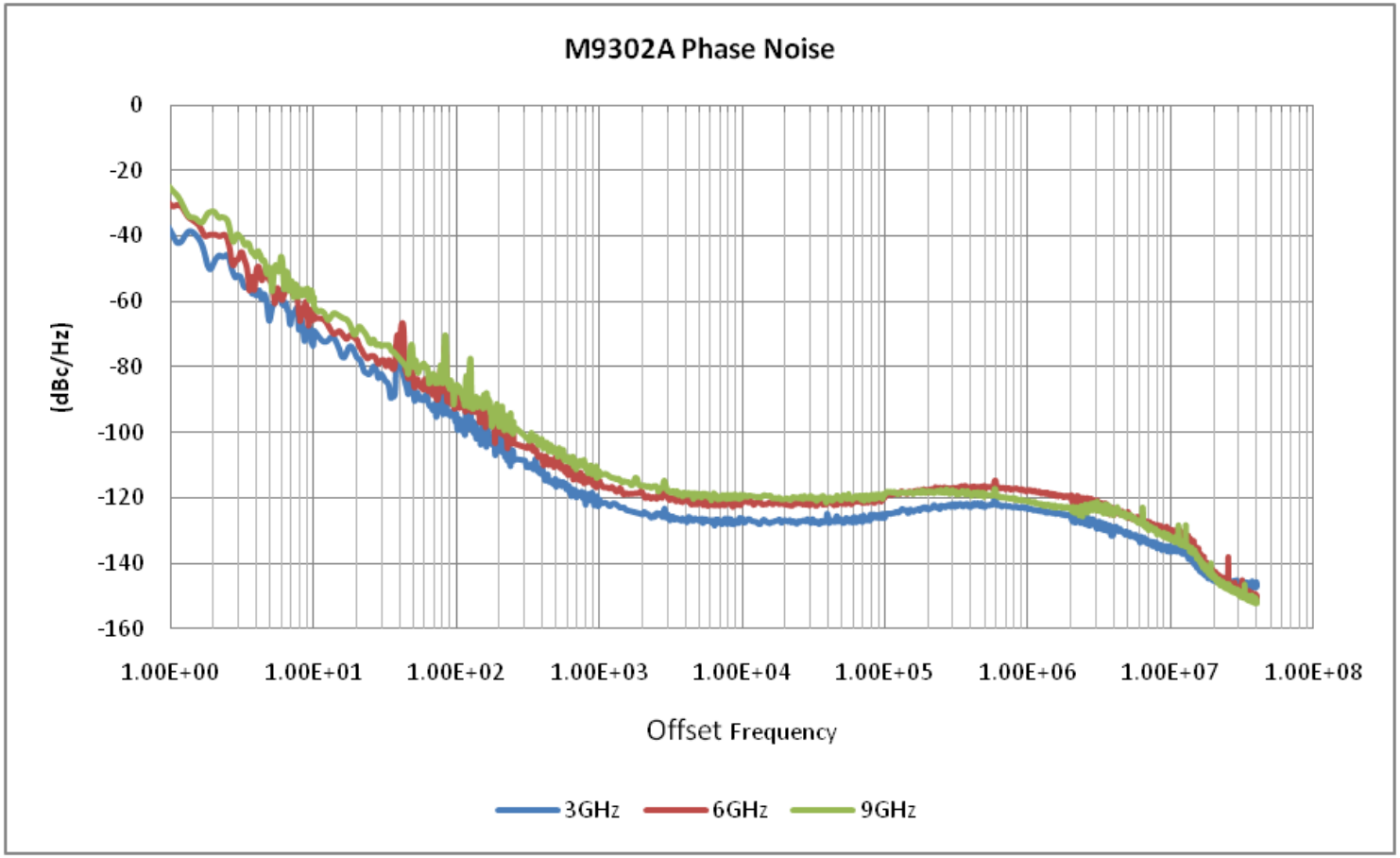
M9302A LO Module



M9302A LO Module

- 3 to 10 GHz, + 15 dBm Output
- Supplies LO to downconverters
- Supplies 100MHz reference to digitizer for sample clock generation

Phase Noise Plot: 3 GHz, 6 GHz, 9 GHz



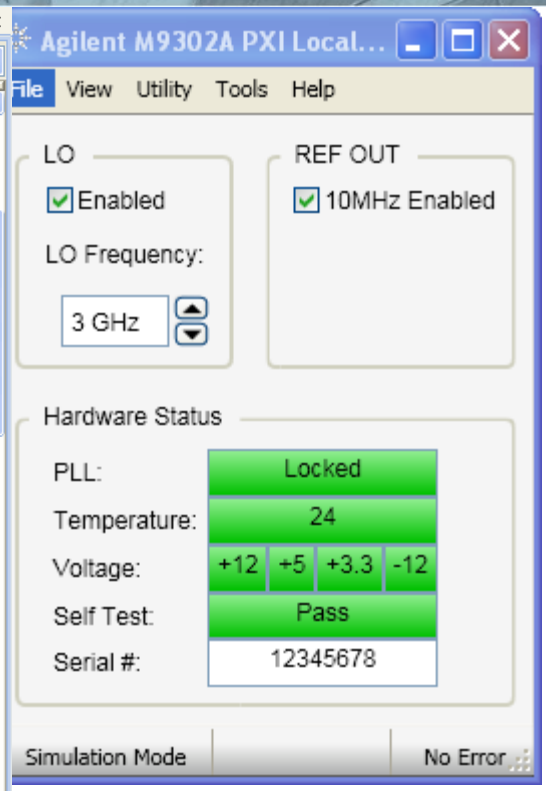
Measurement data is for one unit, on a lab benchtop during development, and is not intended to represent guaranteed performance.

M9302A LO Module

CS_SimpleSetup.cs | Source Control Explorer

CS_SimpleSetup.App | Main(string[] args)

```
using System;
using AgM9302Lib;

namespace CS_SimpleSetup
{
    /// <summary>
    ///
    /// Agilent IVI-C Driver Example Program
    ///
    /// Initializes the driver, reads a few Identity interface
    /// properties, and initiates instrument specific functionality.
    ///
    /// Runs in simulation mode without an instrument.
    ///
    /// Requires a COM reference to the driver's type library.
    ///
    /// </summary>

    public class App
    {
        [STAThread]
        public static void Main(string[] args)
        {
            Console.WriteLine("CS_SimpleSetup");
            Console.WriteLine();

            // Pass in a command line argument as the resource descriptor, if none, will default
            string resource = "PXI2O::13::INSTR";
            string options = "QueryInstrStatus=true, Simulate=true, DriverSetup= Model=, Trace=false";
            if (args.Length > 0)
            {
                resource = args[0];
                options = "QueryInstrStatus=true, Simulate=false, DriverSetup= Model=, Trace=false";
            }

            AgM9302 driver = null;

            try
```



M9302A SFP with C# .NET programming example.

4 Channel Downconverter & M9210A Digitizer

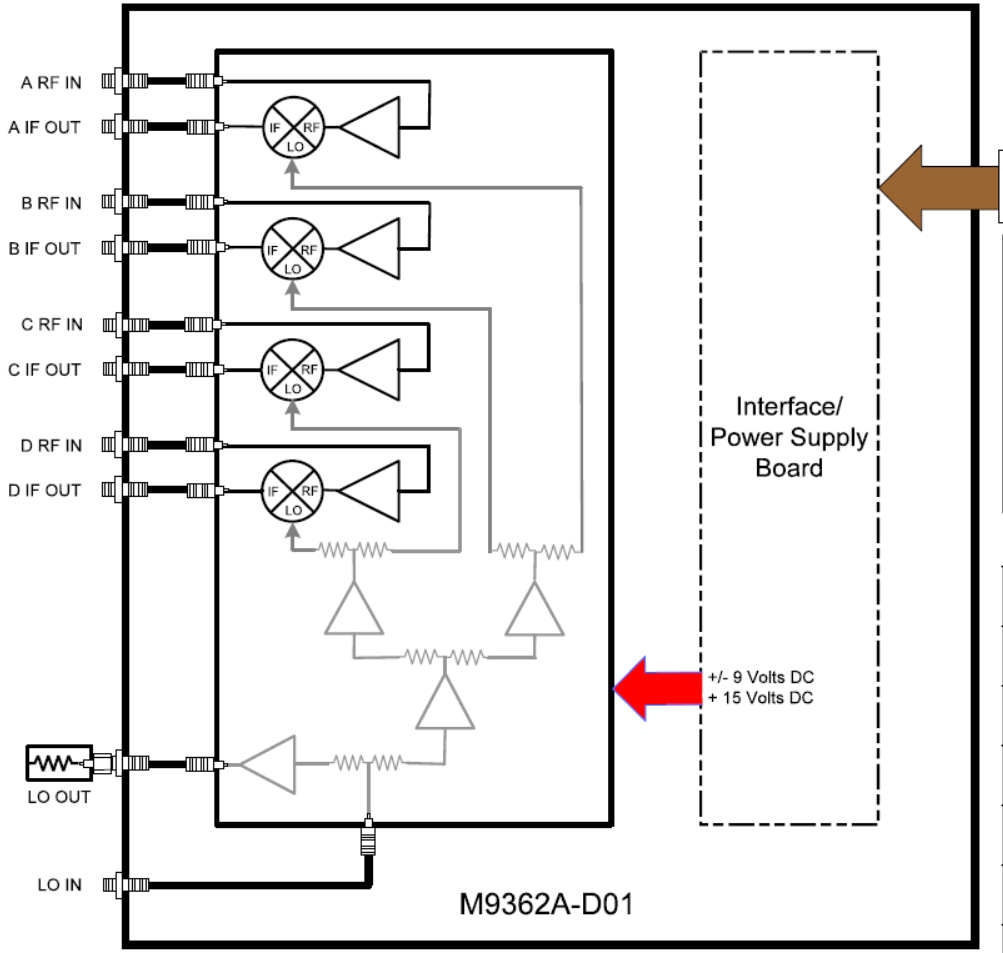
M9362A-D01 Downconverter

- Same downconverter module as N5280A box instrument
- 4-channel synchronous downconversion
- Can be combined with digitizer modules, LO, and/or external attenuation to form a multi-channel receiver

M9362AD01

4-channel, 1.5 GHz instantaneous bandwidth
10 MHz – 26.5 GHz input

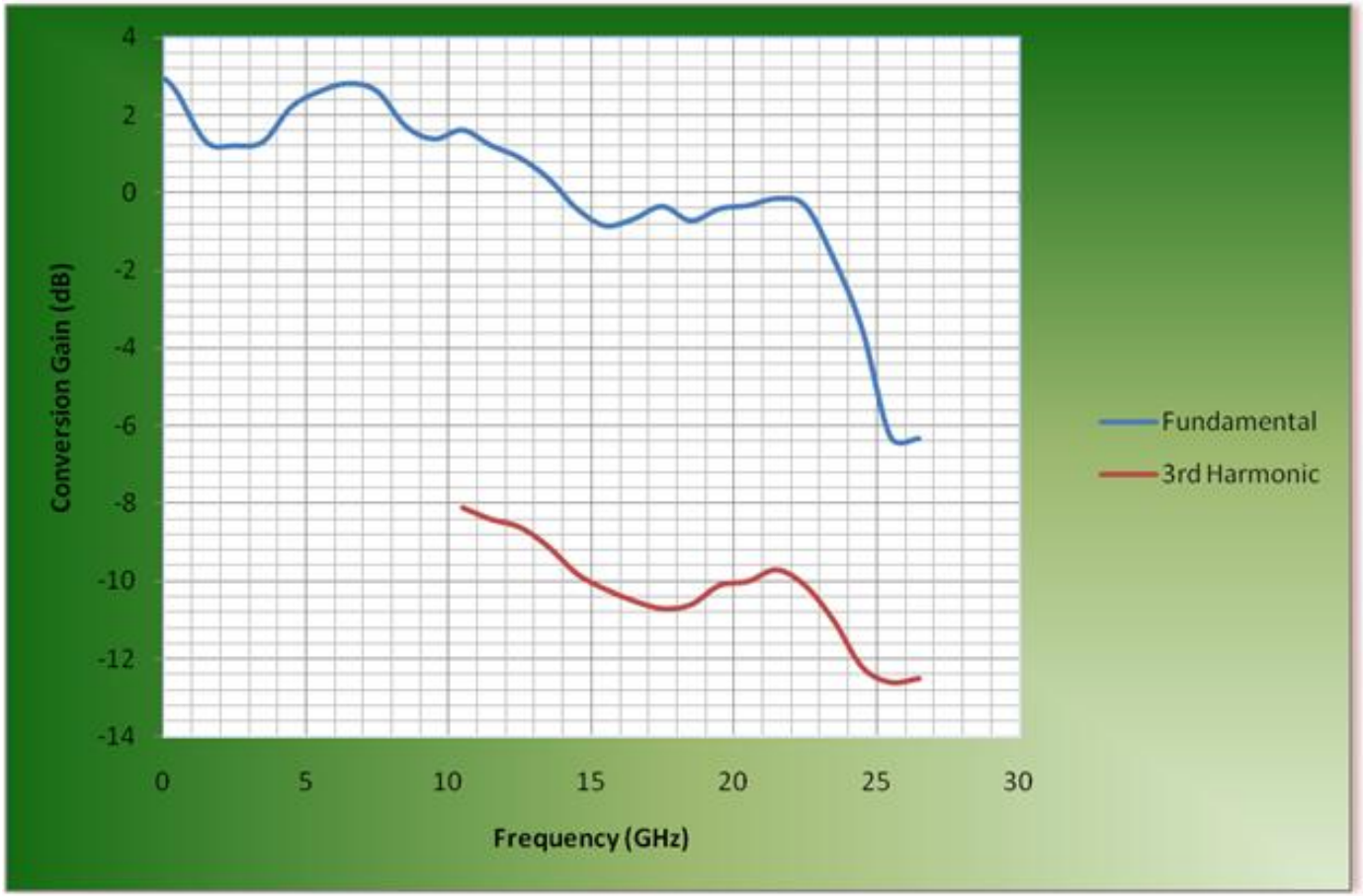
M9362A-D01 Downconverter block diagram



Port	Frequency Range
RF Port	0.01 to 26.5 GHz
LO Port	0.01 to 26.5 GHz
IF Port	0.007 to 1.5 GHz

RF Input Power Damage Levels:	
RF Port	+18 dBm
LO Port	+5 dBm
Optimum LO Power	0 dBm (±1 dB)
RF Input @ 0.1 dB Typical Compression:	
A- D Receiver	–10 dBm
IF Output Level[1]	
Ports A- D	–10 dBm

Conversion Gain Plots with Fundamental (MXG or PSG to 26.5 GHz) and Third Harmonic (LO Module)



M9210A PXI-H High-Speed Digitizing Scope

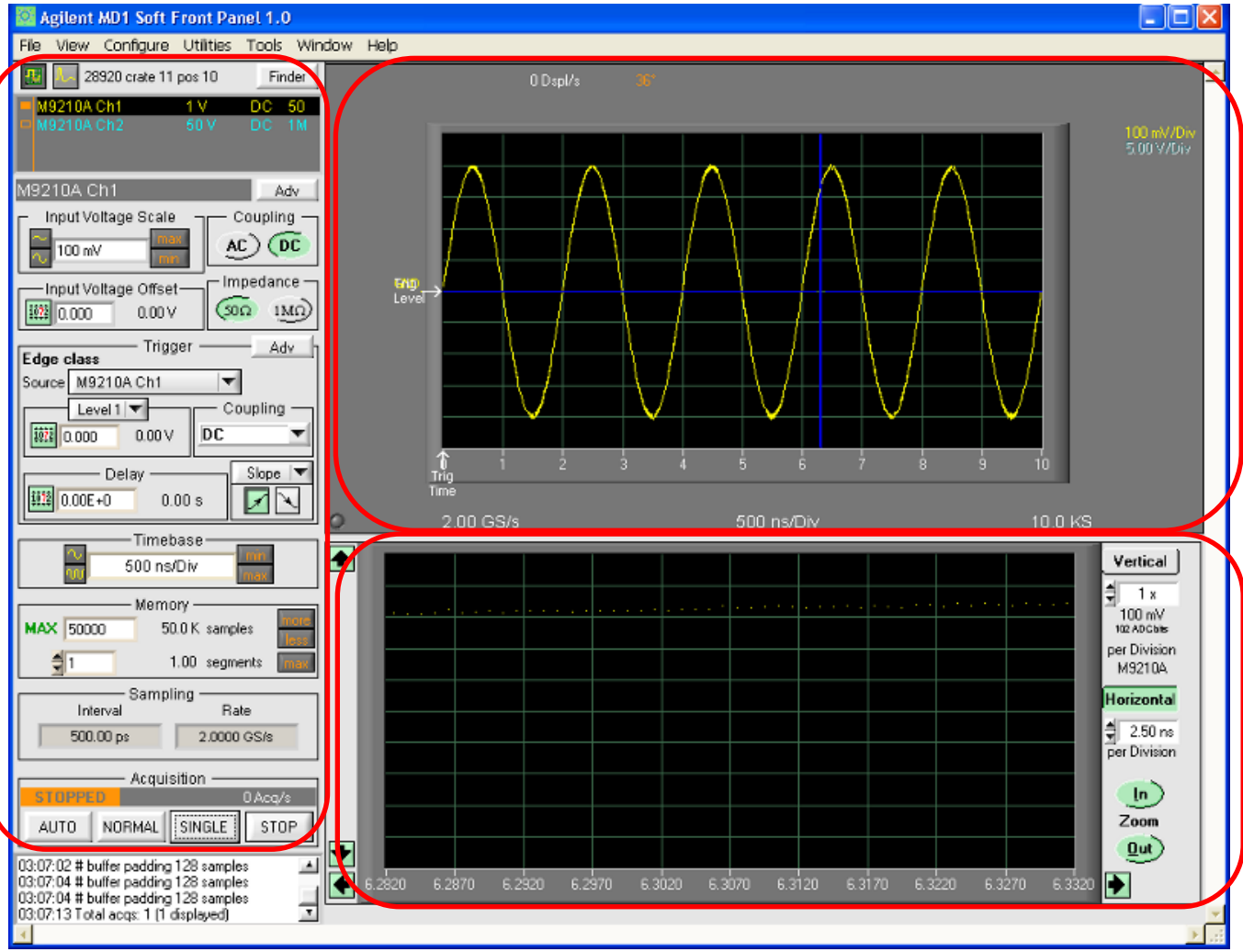
Single slot 3U PXI Hybrid dual-channel 10-bit, 2-4 GS/s Digitizing Scope

Key features:

- 2 channels, 10-bit resolution, 2-4 GS/s
- Scope-like features:
  - Selectable 50Ω/1MΩ input
  - Selectable AC/DC coupling
  - Different trigger functions
  - …
- 1.4 GHz in 50Ω and 300 MHz in 1MΩ Bandwidth
- Acquisition memory up to 256 MSamples/channel
- Multiple modules synchronization through front-panel connector
- Soft Front Panel GUI with scope-like measurements:
  - RMS, min/max, etc…

Agilent MD1 SFP for High-Speed Digitizers

Control panel



Acquired waveform display

Zoom on Acquired waveform

PXI High-Speed Digitizers Comparison

	M9210A	M9211A	M9202A
Type	Digitizing Scope	UWB IF Digitizer	Wideband IF Digitizer
Channels	2	1	1
Max. Sampling Rate	2-4 GS/s	4 GS/s	2 GS/s
Resolution	10-bit	10-bit	12-bit
Bandwidth 50 Ω 1 MΩ	1.4 GHz 300 MHz (min)	3 GHz N/A	1 GHz N/A
Input Impedance	Selectable 50 Ω/1 MΩ	50 Ω	50 Ω
Analog performance	SFDR = ~-57dBc @100 MHz -43dBc @ 400 MHz ENOB = 7.1 @ 10 MHz 6.5@ 400 MHz	SFDR = ~-53dBc @100 MHz -46dBc @ 400 MHz ENOB = 7.3 @ 10 MHz 6.8 @ 400 MHz	SFDR = -65dBc @ 500MHz NSD = -144 dBm/Hz (TBC) ENOB = 9.2 @500 MHz
Memory	512 kS standard 64 MS or 512 MS options	512 kS standard 64 MS or 512 MS options	256 MS
Input coupling	Selectable AC/DC	DC	AC (30 MHz)
On-board processing	N/A	N/A	Virtex-6 FPGA with DDC algorithm
Back-plane	PXI-H	PXI-H	PXIe
Others	Multi-module sync with ASBus system (Up to 3 modules)	Multi-module sync with ASBus system (Up to 3 Modules)	Especially designed to fit in M9392A uW VSA

PXI Switches

Agilent DC to 26.5 GHz PXI uW Switch Modules

Key Features:

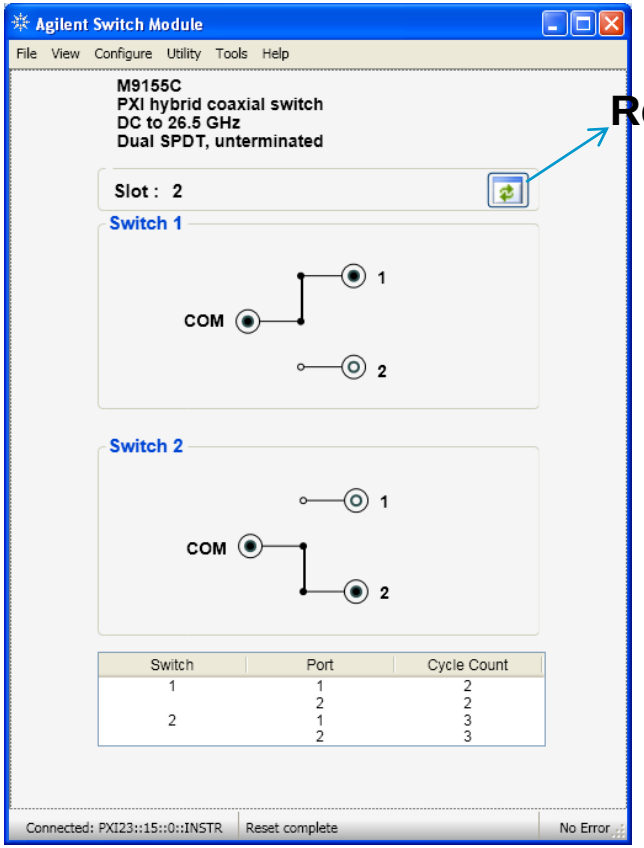
- A readily scaled integrated switching solution to satisfy your unique application platform needs
- Guaranteed 0.03 dB insertion loss repeatability throughout the operating life of up to 5 million cycles, to reduce downtime for recalibration, improve testing efficiency and hence, maximizing throughput
- Unmatched isolation of >60 dB at 26.5 GHz, maximizing measurement accuracy and system flexibility
- Soft front panel is available for each switch module to ease the troubleshooting of your PXI systems

RF Switches

M9155C	PXI Hybrid Dual SPDT Coaxial Switch, DC to 26.5 GHz, Unterminated
M9156C	PXI Hybrid Dual Transfer Coaxial Switch, DC to 26.5 GHz
M9157C	PXI Hybrid Single SP6T Coaxial Switch, DC to 26.5 GHz, Terminated

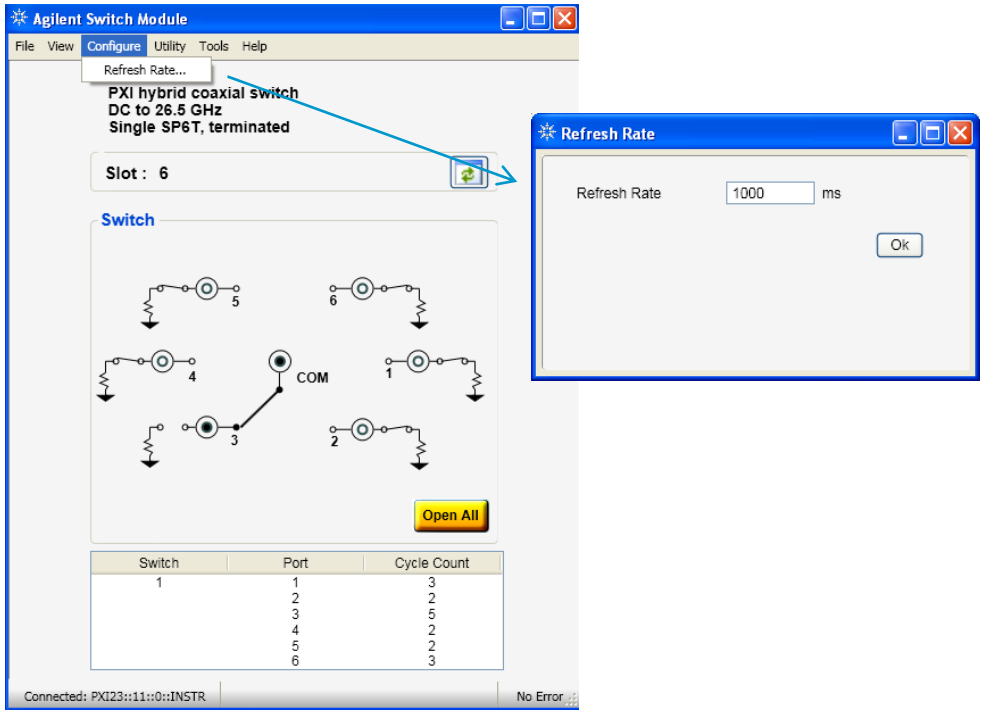
Soft Front Panel

Soft front panel is available to ease your troubleshooting and switch monitoring.



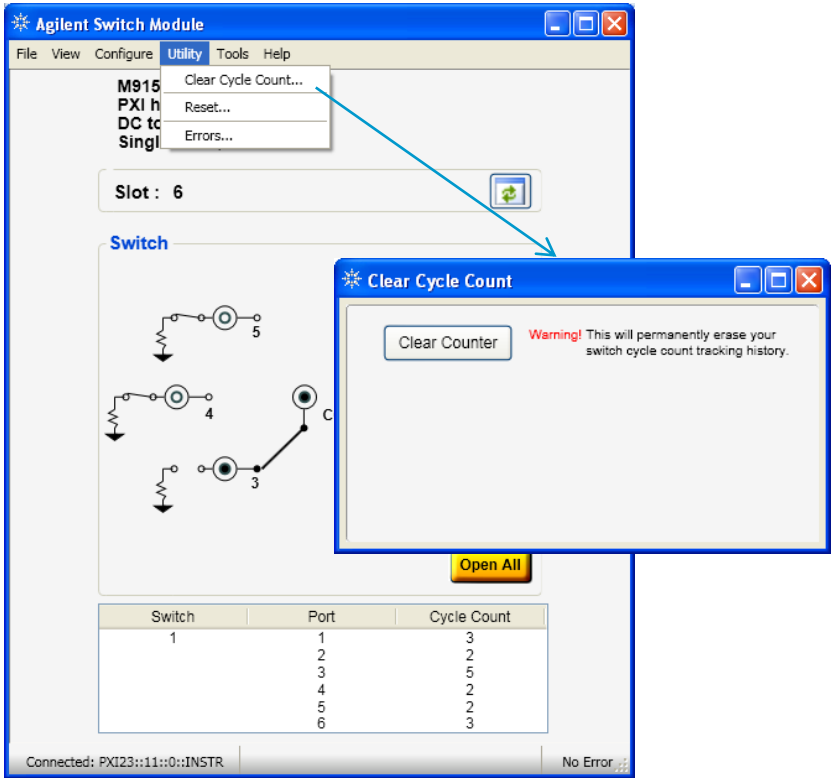
Refresh

Cycle count



Soft Front Panel

Clear counter



Firmware Update

firmware update will be made downloadable from a.com drivers library