



# Agilent Multi Channel RF Test System Overview

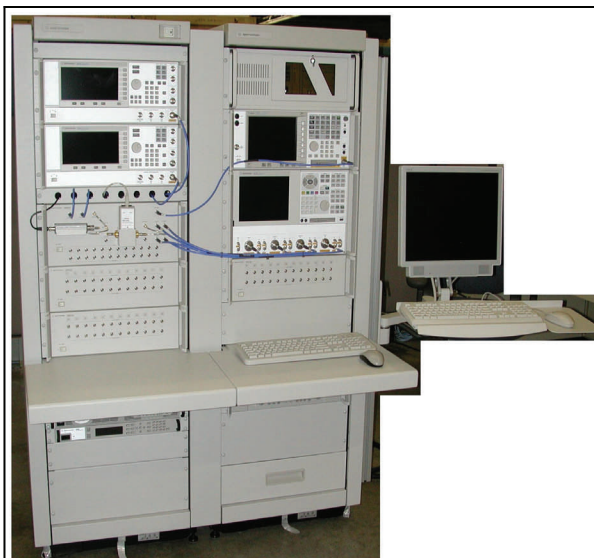
Custom System Capabilities from Agilent Technologies

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## System Benefits

The Z2090B-4xx RF Test System (RTS) is a flexible test platform that enables manufacturers to automate the testing of a wide variety of Devices-Under-Test (DUT). The system enables customers to realize the following benefits:

- Significant increase in test speed and throughput
- Standardized measurement and test methods with frequency coverage up to 20GHz
- Flexible test software environment for both manufacturing or development testing
- Easily reconfigurable to adapt to many different types of DUT's
- Scalable architecture that can be configured for up to 48 Input/Output ports
- High accuracy measurements to the DUT measurement ports



The Z2090B-4xx RF Test System is a highly flexible solution that enables high-throughput standardized automated measurements and test plans

## System Overview

The Z2090B-4xx RTS is a high-performance, highly flexible multi-port stimulus/response measurement system. It has the capability to test RF performance of RF modules and units. The primary functions of the system are:

- **Frequency Response Tests.** These measurements are accomplished using a high-performance Agilent 4-port Vector Network Analyzer (VNA) with frequency coverage from 300 KHz to 20 GHz. The VNA provides both swept frequency and swept power stimulus in addition to the capability to receive these signals after they have been routed through the module under test. The routing of these signals is accomplished through the modular automated switch matrix.
- **Spectral Response Tests.** These measurements are performed using of a pair of high-performance Agilent microwave Signal Generators (PSG) with frequency coverage from 250 KHz to 20 GHz. These stimulus signals are automatically routed through the automated switch matrix to the DUT RF inputs. The DUT RF outputs are routed through the automated switch matrix to a high-performance Agilent microwave Spectrum Analyzer (PSA) with frequency coverage from 3 Hz to 26.5 GHz frequency range.
- **Automated Switch Matrix.** The RTS utilizes two types of switch matrixes. The switch matrix architecture provides scalability and flexibility for the RTS. The configuration of the RTS can be optimized depending on the types of DUT's that will be tested on a given system.

The Test Equipment Switch Matrix (TESM) routes the test equipment ports to and from the Radio Frequency Distribution (RFD) Switch Matrixes. The RFD Matrixes are each designed in a modular fashion to support 12 inputs and 12 outputs. Each TESM can support up to four RFD's resulting in an overall input/



## System Overview (continued)

output interface port count of 12, 24, 36, or 48 input and output ports. This architecture is designed to accommodate multiple DUT configurations ranging from small port-count modules up to complex multi-port modules, boards, or units.

The minimum configuration of the RTS is one TESM and one RFD. Additional RFD's can be added to the system at a later time in order to expand the capability of the system.

- DC Voltage and Current Tests.** These tests are accomplished using automated system DC power supplies in conjunction with a general purpose DC switch control and Digital Multi-meter (DMM) unit. This control unit can be controlled either locally or from the remote PC workstation to apply DC voltage from the power supplies to the RF under test. The control unit also measures voltage and current on multiple DC lines to perform voltage and current tests.

- Measurement Software & Test Data Storage.** The RTS provides a flexible test development environment. The system contains a library of 14 standardized measurements. A unique Test Plan is separately developed for each UUT.

As tests are performed by the RTS, data is stored on the PC workstation and can be used for verification, troubleshooting, reporting, or data archiving for each module tested.

The primary purpose of the RTS is to provide a standardized hardware and software platform for manufacturing test. However, the architecture of the system does not preclude a user from using test software and measurement methods that are different from those provided with the system; provided that that the tests are within the capabilities of test equipment in the system. A user can use different test software products on the system provided that they are supported by the RTS PC workstation and operating system.

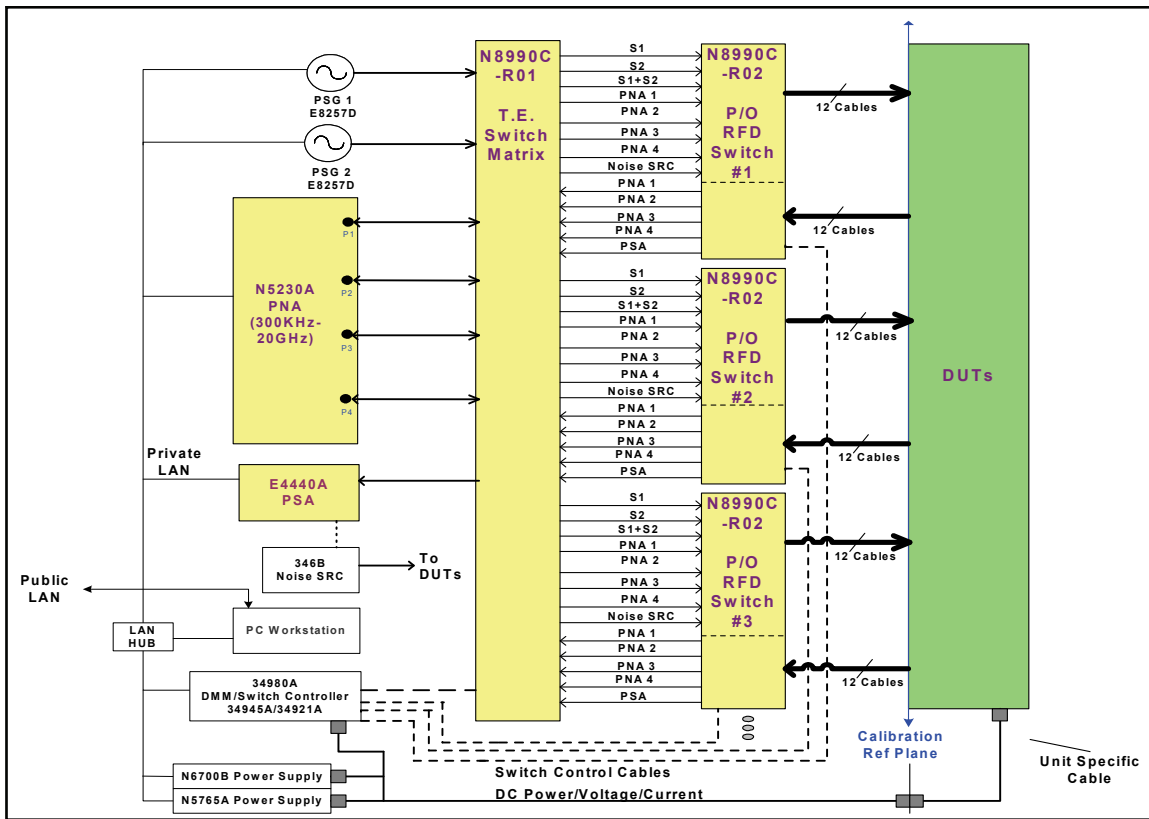


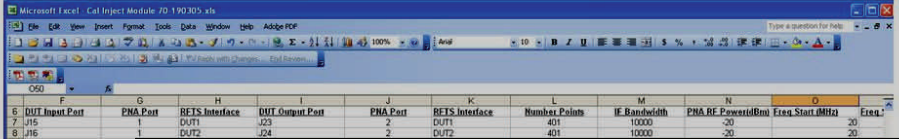
Figure 2- RTS enables fully automated testing and calibration

## Measurement Software

The automated measurement software environment of the RTS consists of three primary functions:

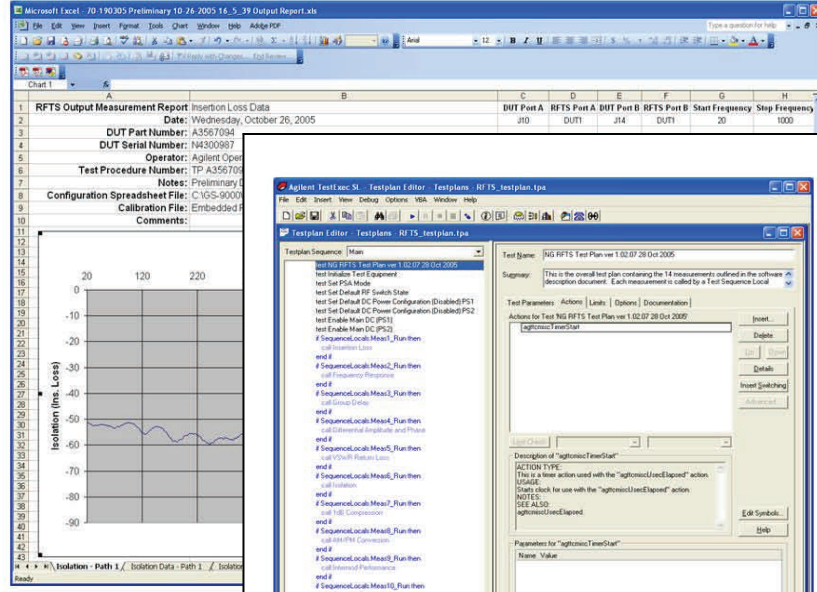
- UUT Test Plan configuration and output spreadsheet using Excel
- Main Control GUI
- Agilent Test Exec SL Test Executive

### Test Plan Configuration using Excel®



DUT	PNA	BETS	DUT	PNA	BETS	Number Points	IF Bandwidth	PNA RF Power(dBm)	Eq. Start (MHz)	Eq. End (MHz)
J16	1	DUT1	J23	2	DUT1	401	10000	-20	20	20
J16	1	DUT2	J24	2	DUT2	401	10000	-20	20	20

### Data Sheet Output in Excel® Format



DUT Part A	RFTS Part A	DUT Part B	RFTS Part B	Start Frequency	Stop Frequency
J10	DUT1	J14	DUT1	20	1000

### Agilent Test Exec SL Test Executive

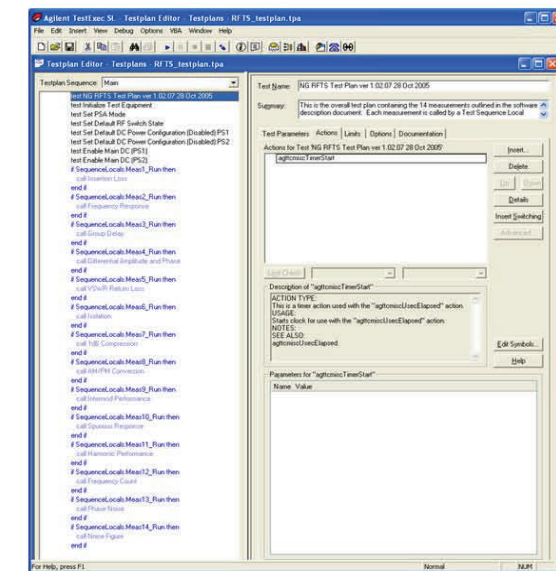


Figure 3– A flexible RTS test software environment

## Measurement Software (Continued)

The RTS provides 14 standardized measurements. These measurements provide consistency and repeatability across different DUT's and projects. New measurements can easily be defined and added to the system and used within the test software environment of the system. Each unique DUT test plan is developed by combining the necessary sequence and parameters for each required set of measurements for the particular DUT. The RTS is capable of performing the following automated measurements:

- Amplitude
- Phase
- Group Delay
- Return Loss
- Isolation
- IdB Compression
- AM to PM Conversion
- Intermods
- Spurious
- Harmonics
- Noise Power Ratio
- Frequency
- Phase Noise
- Noise Figure

The RTS enables normalization/calibration out to the DUT ports. Provisions have been provided in the system to able the connection of test stimulus through the automated switch matrix and then back through the switch matrix for measurement on either the VNA or the PSA. The normalization/calibration measurements are then utilized in the DUT test plans to provide corrected accurate measurements at the DUT ports.

## System Building Blocks

- **Test Equipment Switch Matrix (TESM) and RF Distribution (RFD) Switch Matrix Units:** These switch matrixes are the key enabling building

blocks for the test automation capabilities of the RTS. The units are designed to meet the unique hardware and measurements design requirements of the RTS. These switch matrixes are a result of Agilent's world-class experience in designing and delivering high-performance RF & microwave test systems. The units are controlled using the Agilent 34980A controller.

- **DMM and RF Switch Controller:** The Agilent 34980A DMM and Switch Control Unit serves as the system measurement DMM and switch matrix control unit. The 34980A switches and controls the TESM and RFD Switch Units using the 34945A controller card. This unit also performs all DMM measurements. This control unit receives control commands and return status to the PC workstation through a LAN interface.
- **PSG Signal Generators:** The stimulus subsystem consists of two Agilent E8257D microwave signal generators. The two signal generators provide CW and swept sine wave RF stimulus to the TESM. The TESM passes each signal through as well as combines the signals for two tone measurements in the RTS. The PSGs are also capable of generating AM/FM/PM and pulse modulated signals.
- **PNA Vector Network Analyzer:** The Agilent N5230A 4-port PNA Vector Network Analyzer is used to perform stimulus/response measurements within the RTS. This unit is capable of swept frequency or power measurements. This unit also interfaces to the Ecal (Electronic Calibration) modules via a USB interface and is used for path calibration.
- **PSA Spectrum Analyzer:** The Agilent E4440A PSA series spectrum analyzer is used to make frequency domain measurements. This unit also performs phase noise and noise figure measurements utilizing internal measurement personalities.
- **346B Noise Generator:** The 346B Noise Generator is used as a noise stimulus in conjunction with the E4440A PSA to perform noise figure measurements. This module connects into the TESM for distribution and provides calibrated noise output with 15dB ENR. The noise output is distributed to the RF UUT via the matrix switches. This module operates up to an 18 GHz frequency range.

## Ordering Configurations

The RTS can be ordered in several turn-key configurations. The systems consist of all the necessary hardware, software, procurement, manufacturing, integration, project management, and delivery services for the standard system. Upon installation completion, the systems are ready to be used for DUT test plan development and execution.

The following turn-key configurations are available:

- Z2090B-400; 36 -port RF Test System
- Z2090B-401; 24 -port RF Test System
- Z2090B-402; 12 -port RF Test System

Configurations of RTS's can also be quoted as a 48-port system with four (4) RFD's. Upgrade kits can also be quoted to add RFD's to existing systems where there is a desire for expansion.

### Application Assistance

Agilent's application experts are available to help optimize the system, taking full advantage of the system capability for your unique application. Operator training is also available to help you get the system into service quickly.

If your application goes beyond the standard system offering described above, Agilent program managers and engineering professionals can help define and implement unique functionality. They ensure that your custom system requirements are implemented successfully.

### Warranty & Support

Agilent provides a 1-year return-to-Agilent warranty on custom systems. Warranty extensions and custom repair strategies are available to meet your specific requirements.

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully.

Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product.

Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

### Our Promise

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

### Your Advantage

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services.

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