

Threat Simulator System

- Z2098B-171-408: 40 GHz RF Multi-source Rack with 8x N5193A Agile Signal Sources
- Z2098B-172-408: 40 GHz 8 Port Calibration System (for Z2098B-171-408)

System Description

Keysight's threat simulator is a fully integrated system. A single rack provides 8 sources. Addition of a second identical rack expands the system to 16 sources. All sources are aligned in amplitude, phase and time using the Z2098B-172-408 calibration system.



New Technology

New technology and instrument capabilities can provide significant improvements in signal generation. Multiple racks can be configured to scale from 8 sources to 16 sources. All sources are calibrated for amplitude, phase and time using the Z2098B-171-408 40 GHz CAL Rack for use with the RF multi-source rack.

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Simulation Capability (Z2098B-171-408)

The Keysight threat simulator provides complete measurement capability for:

- Best in class RF Vector sources
- Thermal stabilization to reduce phase and amplitude variation due to environmental changes
- Each source is capable of simulating multiple emitters
- Creation of overlapping pulses is supported using multiple channels

Calibration Methods (Z2098B-172-408)

The Keysight calibration system provides calibration and verification of the threat simulator by aligning amplitude, phase and time between the source rack and the System Under Test (SUT).

- User guided calibrations for all measurement types
- Non-intrusive in-situ phase and amplitude calibration and verification across multiple channels
- Extremely fast amplitude/phase and time calibration
- Verification software provided to validate calibration
- Vector de-embedding to extend calibrations to your test interface
- After calibration, data is uploaded to non-volatile correction tables in the sources.
- In-situ calibration verifications for amplitude and phase whenever desired without disconnecting SUT
- Only a single dimensional calibration is required to achieve the same results as the two-dimensional calibration on other systems
- Acquisition of a full two dimensional calibration if desired

Mean Time To Repair (MTTR)

- The use of Commercial Off The Shelf (COTS) equipment dramatically reduces the MTTR.
- Typical MTTR for a single source failure is 30 minutes plus the time required to re-calibrate the system.

Z2098B-171-408: Rack, Rear **Z2098B-172-408: Rear Right image (below)**



Threat Simulator System Hardware: Z2098B-171-408

Part Number/Options	Description	Qty
N5193A	UXG Agile Signal Generator	8
N5193A-540	Frequency range, 10 MHz to 40 GHz	8
Various	Source Rack, 38U, 79.3 in [2.014m] height and associated hardware	1
JL253A	HPE-Aruba 2920-24G - switch - 24 ports - managed - rack-mountable	1
J9150D	HPE-Aruba Optical Transceiver Module, 10GBe SFP+ LC, Short Range, up to 300 meters	1
Z2098B-242	External Combiner, 2-way, to 40 GHz	6
Z2098B-244	External Combiner, 4-way, to 40 GHz	2
Z2098-60371	Thermal Intake Controller	8
Z2098-60394	3U Thermal Intake Control Assembly	8
Z2098-60403	Assy, DC Power Distribution	1
Z2098-60408	Assy, 1 GHz Wideband Distribution, 8-way, DC Powered	1
Z2098-60434	Assy, MW Distribution, RACK, 9-way, DC Powered	1
E1135-80050	Power Distribution Unit	1

Calibration System Hardware: Z2098B-172-408

Part Number/Options	Description	Qty
M9807A-200	PXI VNA, 9 kHz to 44 GHz, 2-port, 1 slot	4
M9019A	PXIe 18-slot chassis	1
N4692D opt-FOF	ECal module, 10 MHz to 40 GHz, 2.92 mm, 2-port	1
N4692D opt-MOF	ECal module, 10 MHz to 40 GHz, 2.92 mm, 2-port	1
85540A	40 GHz ambient temperature CalPod	8
85556A	1x12 Fan Out Cable Splitter (includes 85556-60002 CalPod splitter drive cable)	1
85523B	CalPod Controller	1
U2022XA	USB Wideband Power Sensor (50 MHz - 40 GHz)	1
DSOS054A	Oscilloscope - Infiniium S Series 500 MHz 4 channel	1
Z2098B-104	Quad Biased Detector, 1-40 GHz	1
E1135-80050	Power Distribution Unit	1
KS8400A	Test Automation Platform	1
KS83100A	System Level Calibration (SLC) Software	1
Various	CAL Rack, 38U, 79.3 in (2.014m) height and associated hardware	1

CalPod/Coupler Module In-Situ Calibration and Verification Concept

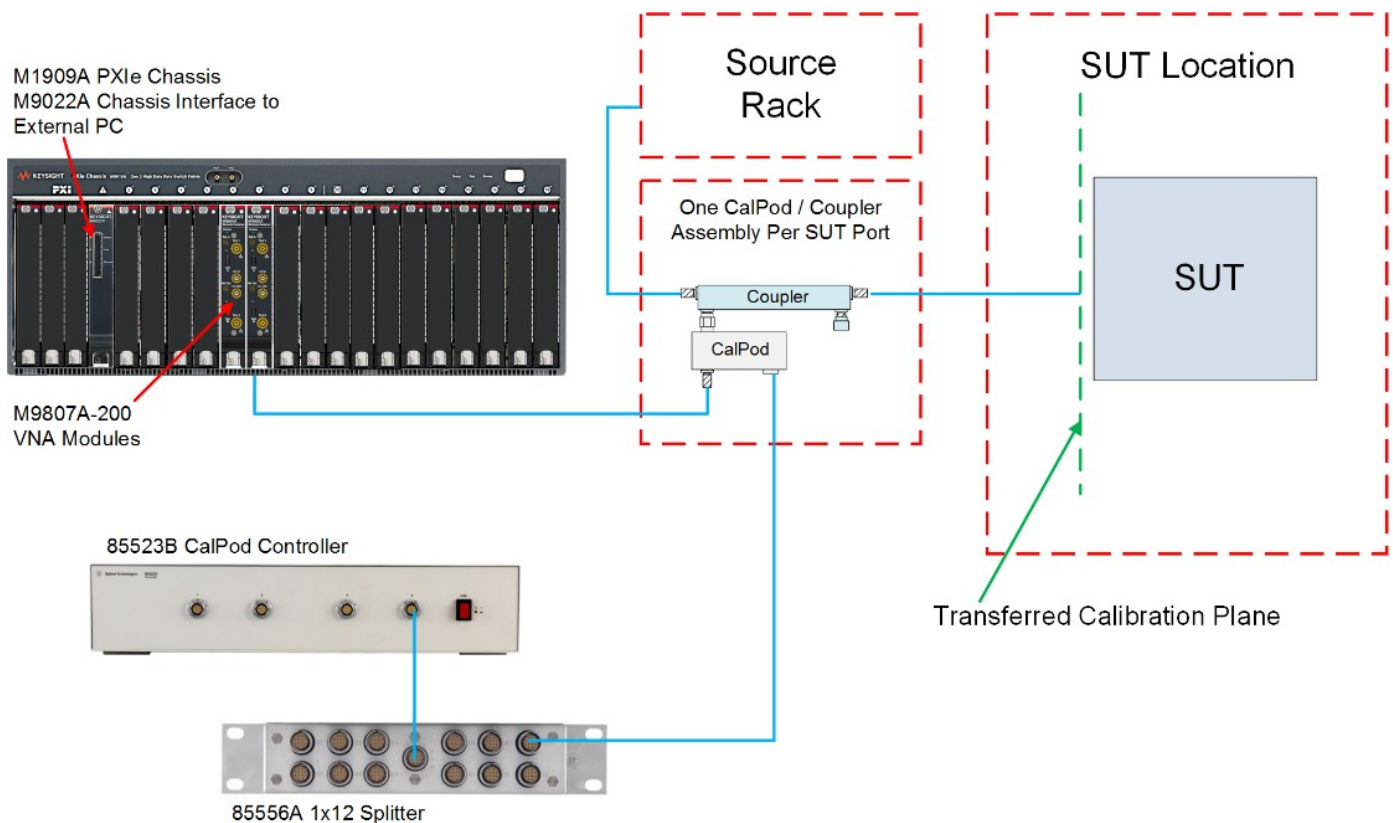
CalPods provide a way to quickly and easily refresh a network analyzer calibration, at the push of a button and without removing the SUT or re-connecting standards. This capability is used to enhance the accuracy of the source calibration.

The VNA is used to monitor the coupled source signal close to the SUT. Using CalPods, the VNA calibration can be refreshed as needed prior to a source rack amplitude and phase calibration to provide the best possible performance.

With the CalPods in place near the SUT inputs, the entire source calibration can be calibrated or verified while the SUT remains attached to the source.

Support to initialize the CalPods and characterize the couplers is provided by the System Level Calibration (SLC) software included with the Z2098B-172-408 calibration rack.

Calibration connections to the SUT



System Software

The system comes with Windows 10 Pro, 64 bit™ operating system, Keysight I/O libraries, Keysight TAP, TAP-SLC plug-in, system specific calibration sequences and Thermal Control Utility.

Source Capabilities

- High dynamic range agile power attenuator with fast pulse modulation
- AM, FM and phase modulation with wideband and narrowband chirps
- Spectral purity (low harmonics) (see URL for data sheet below)
- Low Broadband noise (see URL for data sheet below)
- Very low absolute phase noise for both sources (see URL for data sheet below)
- Multiple user configurable markers and external triggers for synchronization with external events
- Source control using PDWs streamed into system via 10Gb/s optical LAN
- Individual sources in system are fed via 1000BaseT LAN
- Phase synchronization between N5194A and N5193As

Calibrations

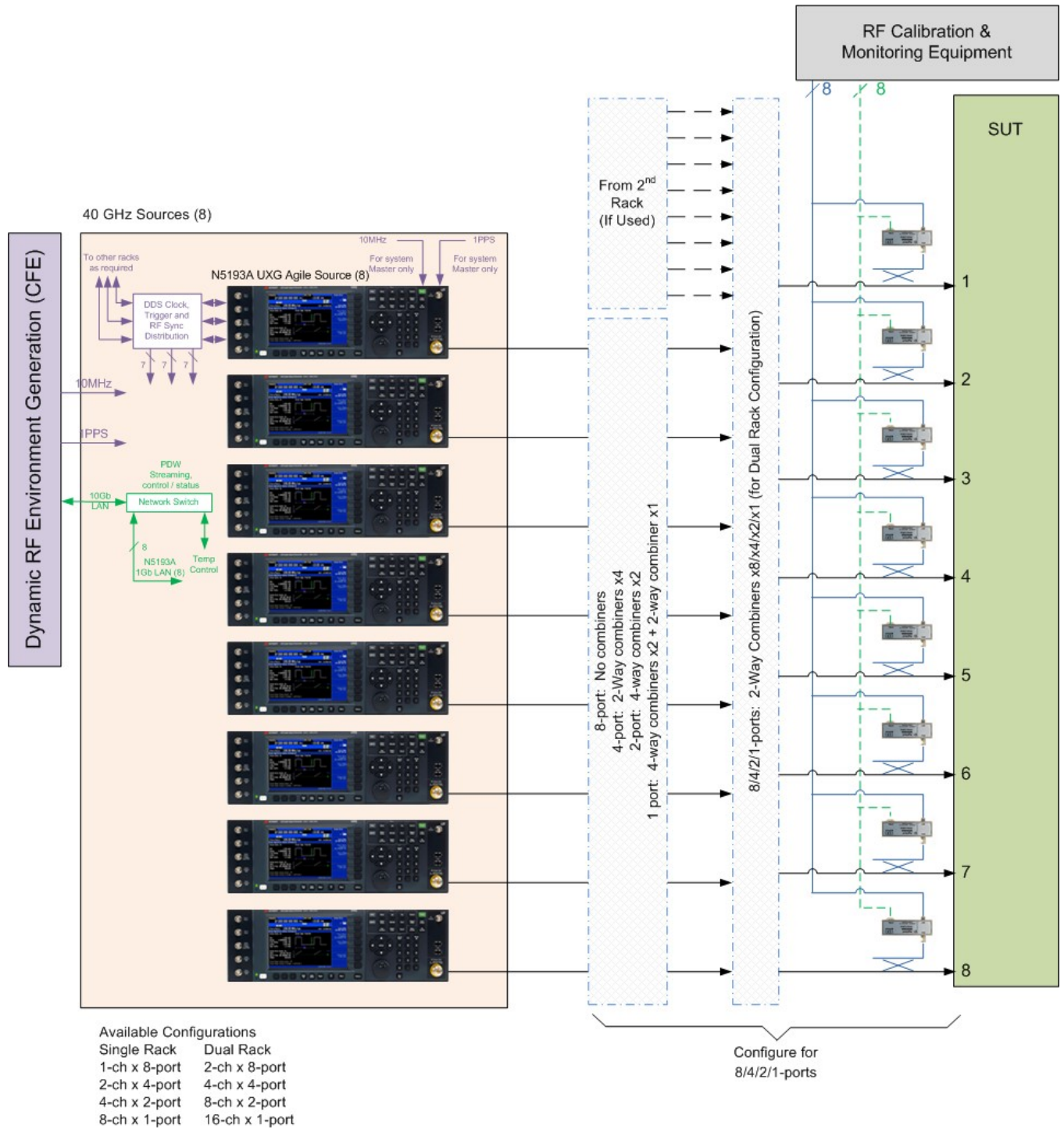
- Exceptional phase, source match and amplitude accuracy. See M9804A-200 data sheet: <https://literature.cdn.keysight.com/litweb/pdf/5992-3596EN.pdf?id=3026596>
- NIST traceable calibration using electronic calibration modules (Ecal) and power sensors.
- Refreshable calibration of measurements at the SUT interface using CalPod® modules. This process compensates for changes in the cable between the network analyzer and the CalPod®.
- Excellent power level accuracy¹: 0.25 dB RMS.
- Excellent phase accuracy¹: 2.5 deg RMS.
- Excellent time accuracy^{1,2}: 0.3 ns RMS.

Related Literature

<i>N5193A UXG Agile Vector Adapter</i> , Data Sheet	5992-0092EN
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1. Nominal Initial Accuracy after calibration, both on and between calibration points
2. Baseband oscilloscope with detector based calibration

Key Equipment Elements of the Threat Simulator and Connections to the Calibration System



Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

