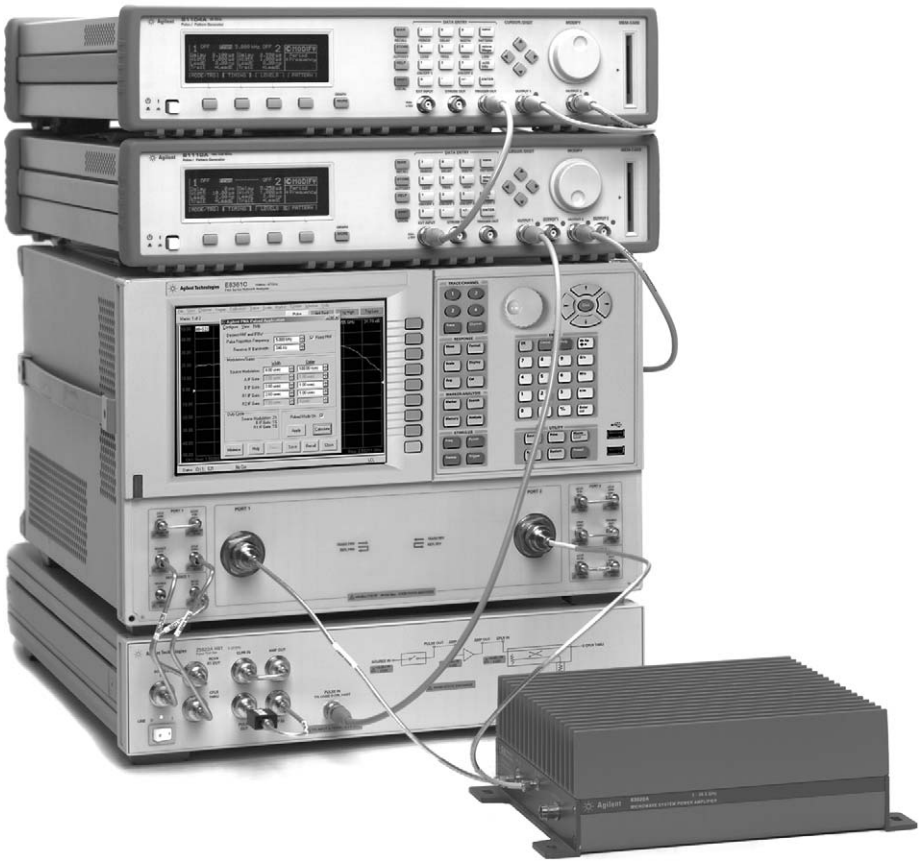
Agilent PNA Microwave Network Analyzers for Pulsed-RF Measurements

Configuration Guide

E8362C 10 MHz to 20 GHz
E8363C 10 MHz to 40 GHz
E8364C 10 MHz to 50 GHz
E8361C 10 MHz to 67 GHz



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Ordering Guide for Pulsed Measurements with the PNA Series

The following is a configuration guide for using the Agilent microwave PNA Series network analyzers in a pulsed S-parameter configuration. This guide is specifically for pulsed-RF measurements, and is intended to serve as a supplement to the PNA Series configuration guide. Both guides are available on the Agilent PNA Series Web site: **www.agilent.com/find/pna**

PNA Series Network Analyzers

Model Number	Frequency Range
E8362/3/4C	10 MHz – 20/40/50 GHz
E8361C	10 MHz – 67 GHz

Recommended PNA options[1] for pulsed S-parameter measurements

E836xC-H08	Option H08 – Pulsed RF measurement capability Option H08 provides software for controlling the PNA and external pulse generators, for calculating the proper IF bandwidths for spectral nulling when using narrowband detection, and for profiling pulses in the time domain (magnitude and phase). Option H08 can be ordered alone, but Option H11 is needed for point-in-pulse and pulse-profile measurements.
E836xC-H11	Option H11 – IF access Option H11 provides IF switches that act as receiver gates, and are used for point-in-pulse and pulse-profile measurements. Option H08 is required to enable use of the gates. Option H11 also provides other hardware for use in antenna measurements (external IF inputs, and RF and LO outputs). Option H11 also requires options 014, 080, 081, and UNL.

Pulsed S-parameter Test Sets

Model Number	Description	Frequency Range
Z5623A H81	Contains a pin-diode switch to modulate the network analyzer's internal source, an amplifier, and a directional coupler to provide a pulsed-RF reference to the analyzer. This test set provides pulsed measurements in the forward direction and CW measurements in the reverse direction.	2 – 20 GHz
Z5623A H83	Contains two pin-diode switches to modulate the network analyzer's internal source for forward and reverse measurements.	2 – 20 GHz
Z5623A H84	Contains two pin-diode switch to modulate the network analyzer's internal source for forward and reverse measurements.	20 – 40 GHz
Z5623A H85	Contains one pin-diode switch to modulate the network analyzer's internal source for forward measurements.	20 – 40 GHz
Z5623A H86	Contains one pin-diode switches to modulate the network analyzer's internal source for forward measurements. Also contains a band switch to select 2-20 GHz or 20-40 GHz bands.	2 – 40 GHz

Note: Pulsed biasing can be achieved with or without the use of a pulsed-RF S-parameter test set. A proper pulsed-bias source must be used. Contact your local Agilent Sales Representative for additional pulsed-RF S-parameter test set configurations.

Pulse Generators

Pulse generators are required to provide the baseband pulse signals used for timing to the pulsed-RF S-parameter test-set and the PNA. At least one of the pulse generators in the system must have a 10 MHz reference to lock to the PNA. The pulse generator output modules must also be able to drive the PNA IF gates (1 kΩ impedance) with TTL-level signals. The Agilent 81110A pulse/pattern generator must be ordered with the associated number of 81111A output modules depending on the measurement configuration.

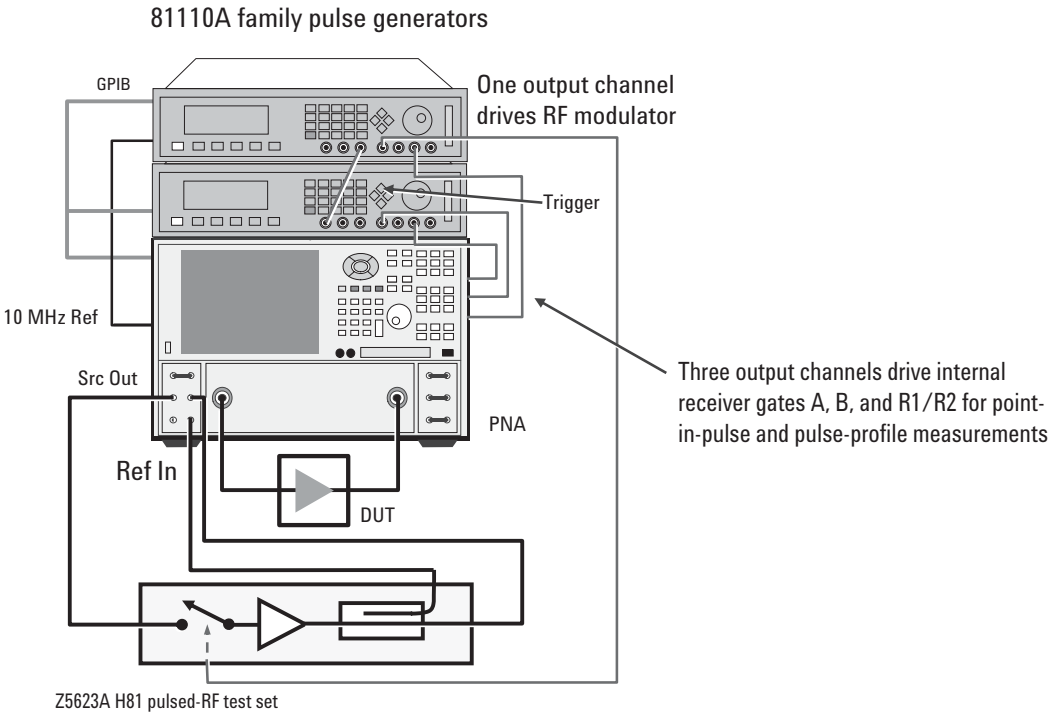
Model Number	Number of output modules required	Description of module usage (i.e. what the output module would drive)	Pulsed measurements available (w-point-in-pulse)
81104/110A	–	80/165 MHz single- or dual-channel pulse/pattern generator	–
81105/111A	2	RF modulation; B receiver gating	S21 with ungated reference
	3	RF modulation; A and B receiver gating	S11, S21 with ungated reference
	3	RF modulation; R1 and B receiver gating	S21 with gated reference
	4	RF modulation; R1, A and B receiver gating	S11, S21 with gated reference
	5[2]	RF modulation; R1, R2, A and B receiver gating	S11, S21, S12, S22 with gated references

Note: Gated reference means that the reference receiver measurement delay and width can be set independent of the measurement receivers' delay and width. A gated reference can be applied to a CW or pulsed-RF signal. Ungated reference means that no gating is applied to the reference receivers, which might have a CW or pulsed-RF signal.

1. For option details refer to the PNA Series Microwave Network Analyzers Configuration Guide, literature number 5989-7606EN available on the Web **www.agilent.com/find/pna**
2. Requires a pulsed-RF test S-perameter set with forward and reverse RF modulators.

Measurement Configuration Example

The figure below shows a pulsed solution with IF gating providing point-in-pulse capability for the 'A', 'B', and 'R1' measurement receivers. The test set configuration provides pulsed RF in the forward direction and a CW (non-pulsed) signal in the reverse direction. This configuration also supplies a pulsed signal to the R1 reference receiver. Three outputs of the pulse generators are connected to the receiver (A, B, and R1) gate drive BNC connectors on the rear panel of the PNA. One output is connected to the test set to drive the modulator. The 10 MHz reference of one of the pulse generators and the PNA are locked together by connecting cables to the BNC connectors. The PNA controls each pulse generator via GPIB.



Pulse Measurement Option Description

Pulsed-RF measurement capability – Option H08

Provides software to set up and control pulsed-RF measurements with point-in-pulse and pulse-profile capability. The software sets the coefficients of the PNA's digital-IF filter to null out unwanted spectral components, enables the IF gates provided with IF access (Option H11), and controls the Agilent 81110A family of pulse generators. The software can be run on the PNA or an external computer, and a ".dll" file containing the IF-filter algorithm is included for automated pulsed-RF testing.

IF access – Option H11 (requires options 014, 080, 081, UNL)[1]

Provides hardware to enable antenna, point-in-pulse, and pulse-profile measurements, as well as broadband millimeter-wave measurements to 110 GHz, and banded millimeter-wave measurements to 325 GHz. For each of the microwave PNA's measurement receivers, IF gates (enabled with pulsed-RF measurement capability Option H08) and external IF inputs are added. In addition, access to the PNA's internal RF and LO sources is provided for remote-mixing applications. For basic antenna measurements, only Option H11 is necessary. Pulsed- antenna applications also require the pulsed-measurement capability (Option H08). Millimeter-wave measurements also require an N5260A millimeter-wave test set controller.

1. For option details refer to the PNA Series Microwave Network Analyzers Configuration Guide, literature number 5989-7606EN, available on the Web **www.agilent.com/find/pna**

Web Resource

For additional literature and product informationvisit the microwave PNA Series Web site:
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