Agilent
PNA Microwave
Network Analyzers
for Pulsed-RF Measurements

Configuration Guide

E8362B 10 MHz to 20 GHz
E8363B 10 MHz to 40 GHz
E8364B 10 MHz to 50 GHz
E8361A 10 MHz to 67 GHz

Please note: This document does not contain Agilent’s most up-to-date PNA network analyzer portfolio. This document is available for reference only for customers using Agilent’s legacy network analyzers. To view the current Agilent PNA Microwave Network Analyzers for Pulsed-RF Measurements Configuration Guide click here.
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

Pulsed S-parameter Test Sets

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z5623A H81</td>
<td>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.</td>
<td>2 – 20 GHz</td>
</tr>
<tr>
<td>Z5623A H83</td>
<td>Contains two pin-diode switches to modulate the network analyzer’s internal source for forward and reverse measurements.</td>
<td>2 – 20 GHz</td>
</tr>
<tr>
<td>Z5623A H84</td>
<td>Contains two pin-diode switch to modulate the network analyzer’s internal source for forward and reverse measurements.</td>
<td>20 – 40 GHz</td>
</tr>
<tr>
<td>Z5623A H85</td>
<td>Contains one pin-diode switch to modulate the network analyzer’s internal source for forward measurements.</td>
<td>20 – 40 GHz</td>
</tr>
<tr>
<td>Z5623A H86</td>
<td>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.</td>
<td>2 – 40 GHz</td>
</tr>
</tbody>
</table>

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.

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

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 5988-7989EN available on the Web www.agilent.com/find/pna

2. Requires a pulsed-RF test S-parameter 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)**

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.

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Web Resource

For additional literature and product information visit the microwave PNA Series Web site:
www.agilent.com/find/pna

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