



Agilent Technologies N5161A/62A/81A/82A/83A MXG Signal Generators

Notice: This document contains references to Agilent. Please note that Agilent's Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.

Installation Guide



Agilent Technologies

Notices

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

1 Safety Information

Warnings, Cautions, and Notes	1
General Safety Considerations	1
Instrument Markings	2

2 Getting Started

Checking the Shipment	4
Signal Generator Physical Characteristics	4
Meeting Environmental and Electrical Requirements	5
Environment	5
Ventilation	5
Line Setting Requirements	5
Connecting the AC Power Cord	6
Configuring the MXG ATE	7
Accessing the MXG (ATE) Web-Enabled Page	8
Modifying the Configuration	10
Configuring the Display (N5181A/82A/83A Only)	11
Configuring for Remote Control	12
LAN Configuration	12
GPIB Configuration	13
Ordering Accessories	14
Proper Use and Cleaning	16
Cleaning Suggestions	16
Returning a Signal Generator to Agilent Technologies	16
Contacting Agilent	16

3 Operation Verification

Running Self Test	18
Self Test Failure	19
Frequency Range and Accuracy Check	20
Frequency Counter Procedure (N5161A/62A ¹ /81A/82A)	21
Spectrum Analyzer Procedure (N5161A/62A ¹ /81A/82A/83A)	22
Troubleshooting Problems with the Frequency Accuracy Check	23
Checking the Output Power	23
N5161A/81A Test Procedure	24
N5162A/82A Test Procedure	25
N5183A Test Procedure	27
Troubleshooting Problems with the Output Power Check	29

Contents

4 Regulatory Information

Certification 31

Assistance..... 31

Compliance 31

Documentation Overview

Installation Guide

- Safety Information
- Receiving the Instrument
- Environmental & Electrical Requirements
- Basic Setup
- Accessories
- Operation Verification
- Regulatory Information

User's Guide

- Signal Generator Overview
- Setting Preferences & Enabling Options
- Basic Operation
- Optimizing Performance
- Using Analog Modulation (Option UNT Only)
- Using Pulse Modulation (Option UNU Only)
- Basic Digital Operation - No BBG Option Installed
- Basic Digital Operation (Option 651/652/654)
- Adding Real-Time Noise to a Signal (Option 403)
- Real-Time Phase Noise Impairments (Option 432)
- Custom Digital Modulation (Option 431)
- Multitone and Two-Tone Waveform Generator (Option 430)
- Working in a Secure Environment
- Troubleshooting

Programming Guide

- Getting Started with Remote Operation
- Using IO Interfaces
- Programming Examples
- Programming the Status Register System
- Creating and Downloading Files
- Creating and Downloading User-Data Files

SCPI Reference

- SCPI Basics
- Basic Function Commands
- LXI System Commands
- System Commands
- Analog Modulation Commands
- Arb Commands
- Real-Time Commands
- N5161A/62A/81A/82A SCPI Command Compatibility
- N5183A SCPI Command Compatibility

Service Guide

- Troubleshooting
- Replaceable Parts
- Assembly Replacement
- Post-Repair Procedures
- Safety and Regulatory Information
- Instrument History

Key Help^a

- Key function description
- Related SCPI commands

^aPress the **Help** hardkey, and then the key for which you wish help.

1 Safety Information

- [Warnings, Cautions, and Notes](#) on page 1
- [General Safety Considerations](#) on page 1
- [Instrument Markings](#) on page 2

Warnings, Cautions, and Notes

The documentation for this product uses the following safety notations. Familiarize yourself with each notation and its meaning before operating the signal generator.

WARNING *Warning* denotes a hazard. It calls attention to a condition or situation that could result in personal injury or loss of life. Do not proceed beyond a warning until you fully understand the indicated conditions or situations.

CAUTION *Caution* calls attention to a condition or situation that could result in damage to or destruction of the signal generator, or in the loss of a user's settings or data. Do not proceed beyond a caution until you fully understand the indicated conditions.

NOTE *Note* calls the user's attention to an important point or special information in the text.

General Safety Considerations

WARNING If the signal generator is not used as specified, the protection provided by the equipment could be impaired. The signal generator must be used in a normal condition only, in which all means for protection are intact.

WARNING Personal injury may result if the signal generator covers are removed. There are no operator serviceable parts inside. To avoid electrical shock, refer servicing to qualified personnel.

Instrument Markings

The signal generator has the following markings. Familiarize yourself with each marking and its meaning before operating the signal generator.



The instruction manual symbol. The product is marked with this symbol when it is necessary for you to refer to instructions in the manual.



The CE mark is a registered trademark of the European Community. If this symbol is accompanied by a year, it is the year when the design was proven.



The CSA mark is a registered trademark of the Canadian Standards Association International.



The C-Tick Mark is a trademark registered to the Australian Spectrum Management Agency. This indicates compliance with all Australian EMC regulatory information.



This is the symbol of an Industrial Scientific and Medical Group 1 Class A Product. (CISPER 11, Clause 4)



This symbol marks the on position of the power line switch.



This symbol marks the standby position of the power line switch.



This symbol indicates that the input power required is AC.



This symbol indicates conformance to the standard specifications^a.

ICES/NMB-001

This is a marking to indicate product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001)



South Korean Class A EMC Declaration
A 급 기기 (업무용 방송통신기자재)

이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라 며 , 가정외의 지역에서 사용하는 것을 목적으로 합니다 .

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.



DO NOT THROW BATTERIES AWAY BUT
COLLECT AS SMALL CHEMICAL WASTE

This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).

a. LXI Class B Compliance testing using IEEE 1588-2008 not available at release.

2 Getting Started

CAUTION To avoid damaging or degrading the performance of the MXG, do not exceed 33 dBm (2W) *maximum* of reverse power levels at the RF input. See also *Tips for Preventing Signal Generator Damage* on www.agilent.com.

NOTE Software Updates

Is your product software up-to-date? Periodically, Agilent releases software updates to fix known defects and incorporate product enhancements. To search for software updates for your product, go to the Agilent Technical Support website at www.agilent.com/find/TechSupport.

NOTE For the N5161A/62A, the softkey menus and features mentioned in this chapter are only available through the Web-Enabled MXG or through SCPI commands. Refer to “[Accessing the MXG \(ATE\) Web-Enabled Page](#)” on [page 8](#) and to the *SCPI Command Reference*.

The MXG ATE blank front panel models, N5161A and N5162A signal generators, are part of the MXG instrument family and unless otherwise indicated, all references to the MXG are inclusive of the MXG ATE instruments.

Full LXI-B feature implementation is only available on instruments with firmware \geq A.01.50. A license may be required to enable this feature and to download firmware versions \geq A.01.50. For information on new firmware releases, go to <http://www.agilent.com/find/upgradeassistant>.

- [Checking the Shipment](#) on page 4
- [Signal Generator Physical Characteristics](#) on page 4
- [Meeting Environmental and Electrical Requirements](#) on page 5
- [Configuring the MXG ATE](#) on page 7
- [Configuring the Display \(N5181A/82A/83A Only\)](#) on page 11
- [Configuring for Remote Control](#) on page 12
- [Ordering Accessories](#) on page 14
- [Proper Use and Cleaning](#) on page 16
- [Returning a Signal Generator to Agilent Technologies](#) on page 16
- [Contacting Agilent](#) on page 16

Checking the Shipment

1. Inspect the shipping container for damage.
Signs of damage can include a dented or torn shipping container or cushioning material that indicates signs of unusual stress or compacting.
2. Carefully remove the contents from the shipping container and verify that your order is complete.
The following items are included with each signal generator:
 - Installation Guide
 - documentation CD-ROM (CD-ROM contents are also available in hardcopy format)
 - three-prong AC power cord specific to geographic location
3. Verify that the options you ordered are included with the shipment by checking the serial number label on the rear of the signal generator and the packing literature included with the shipment.
4. The N5183A signal generator is shipped with the adapter options as shown in the following table.

Table 2-1 Adapters Shipped by Option

Option	Description	Quantity	Part Number
520	Standard adapter, 3.5 mm (f) - 3.5 mm (f)	1	5061-5311
520 with 1ED	Standard adapter, type-N (m) - 3.5 mm (f)	1	1250-1744
532/540	Standard adapter set		
	Adapter-coaxial straight 2.92 mm jack 2.40 mm jack 50 ohm 40 GHz	1	1250-3782
	2.4 mm (f) - 2.92 mm (f)	1	33311-82005

See also, [“Ordering Accessories” on page 14](#).

Signal Generator Physical Characteristics

- Height: 10.16 cm (4 in)
- Width: 42.55 cm (16.75 in)
- Depth: 48.90 cm (19.25 in)
- Weight (N5161A): 10.66 kg (23.5 lb)
- Weight (N5162A): 12.47 kg (27.5 lb)
- Weight (N5181A): 10.66 kg (23.5 lb)
- Weight (N5182A): 12.47 kg (27.5 lb)
- Weight (N5183A): 13.8 kg (30.0 lb)

Meeting Environmental and Electrical Requirements

CAUTION To avoid the loss of data, GPIB settings, or current user instrument states that have not been permanently saved to non-volatile memory, the MXG should always be powered down either via the MXG's front panel power button or the appropriate SCPI command. MXG's installed in rack systems and powered down with the system rack power switch rather than the MXG's front panel switch display a Error -310 due to the MXG not being powered down correctly.

Environment

- indoor use
- altitudes < 15,000 feet (4,572 meters)
- 0 to 55°C temperature, unless otherwise specified
- relative humidity - type tested at 95%, +40°C (non-condensing)

CAUTION This product is designed for use in INSTALLATION CATEGORY II and POLLUTION DEGREE 2, per IEC 61010 Second Edition and 664, respectively.

Ventilation

Ventilation holes are located on the rear panel and all four sides of the signal generator cover. To ensure proper air flow through the signal generator, do not allow these holes to be obstructed.

Line Setting Requirements

CAUTION The signal generator has autoranging line voltage input; ensure that the supply voltage is within the specified range.

Voltage:	100/120 volts nominal 220/240 volts nominal
Frequency:	for 100/120 volts: 50/60/400 Hz nominal ¹ for 220/240 volts: 50/60 Hz nominal
Power:	250 watts maximum

¹For instruments with s/n prefix < xx4742 the frequency should be marked 50/60 Hz, unless otherwise labeled.

Connecting the AC Power Cord

This is a Safety Class 1 Product provided with a protective earth ground incorporated into the power cord. The front panel switch is only a standby switch; it is not a line switch. The AC power cord is the disconnecting device that disconnects the signal generator mains circuits from the mains supply. Alternatively, an external switch or circuit breaker, readily identifiable and easily reached by the operator, may be used as a disconnecting device.

WARNING The mains plug shall be inserted only in a socket outlet provided with a protective earth contact. Always use the three-prong AC power cord supplied with the signal generator. Personal injury can occur if there is any interruption of the protective conductor inside or outside of the signal generator. Intentional interruption is prohibited.

CAUTION The mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Inadequate earth grounding can damage the signal generator. Always use the three-prong AC power cord supplied with the signal generator.

Connect the AC power cord as follows:

1. Ensure that the power cord is not damaged.
2. Install the signal generator so that one of the following items is readily identifiable and easily reached by the operator: AC power cord, alternative switch, or circuit breaker.
3. Insert the mains plug into a socket outlet provided with a protective earth grounding.

Configuring the MXG ATE

NOTE For the N5161A/62A the softkey menus and features mentioned in this guide are only available through the Web-Enabled MXG or through SCPI commands. Refer to [Accessing the MXG \(ATE\) Web-Enabled Page](#), the *Programming Guide*, and to the *SCPI Command Reference*.

The MXG ATE N5161A and N5162A, are blank front panel versions of the N5181A and N5182A.

Since the MXG ATE N5161A and N5162A, have no front panel softkeys similar the N5181A and N5182A signal generators, in order to access the features mentioned in this installation guide, two options remain available:

1. SCPI commands (refer to the *SCPI Command Reference*) or
2. The instrument's Web-Enabled page¹.

¹The SCPI commands and Web-Enabled steps are available for the N5181A and N5182A, too.

Accessing the MXG (ATE) Web-Enabled Page¹

Access the instrument's Web-Enabled page by entering its hostname or IP address into the address field of an internet browser. Refer to [Figure 2-1 on page 9](#) and to the *Programming Guide*.

NOTE The following example for accessing the MXG ATE instrument's Web-Enabled uses the instrument's predetermined default hostname that the MXG ATE ships with (e.g. a-*<instrument model number>-<last 5 digits of the instrument serial number>*). The instrument's IP address will also work.

The procedure that follows assumes the signal generator is running firmware A.01.20 or later.

MXG Web-Enabled SCPI command capability is not available for versions of Internet Explorer ≥ 7.0 . (The SCPI Telnet softkey is inactive for these versions.) To use the Telnet SCPI, refer to [Figure 2-1 on page 9](#).

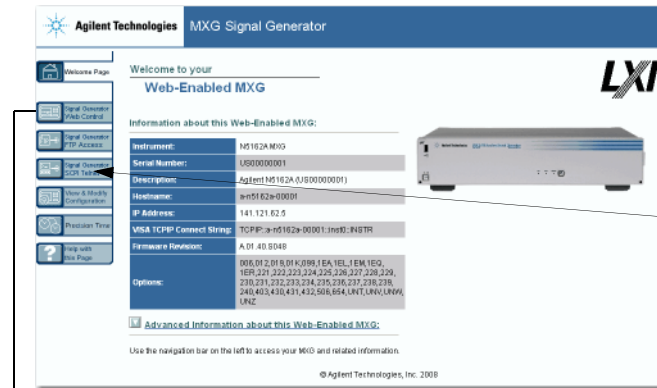
For MXG ATEs, press the front panel LAN Preset key and wait for the front panel green LAN indicator light to stop blinking. It is possible the hostname may have been changed from its default value. The MXG ATE hostname is not changed by pressing the LAN Reset key. For information on using the MXG's USB port to query its IP address, refer to the Agilent Connectivity Guide (E2094-90009) or to the LAN Connectivity FAQs for details on using the instrument over LAN.

For more information on LAN Connectivity, refer to the Agilent Connectivity Guide (E2094-90009), or the signal generator's Programming Guide, or to the LAN Connectivity FAQs for details on using the instrument over LAN.

1. Open an internet browser.
2. Enter the MXG ATE's hostname (or IP address) as the URL in the browser:
a-<instrument model number>-<last 5 digits of the instrument serial number>**
3. Click **Signal Generator Web Control** from the menu on the left side of the web page to access the front panel Web-Enabled MXG.

¹The Web-Enabled MXG ATE web page is titled: "Web-Enabled MXG", since the MXG ATE is part of the MXG signal generator family.

Figure 2-1 Web-Enabled MXG ATE¹



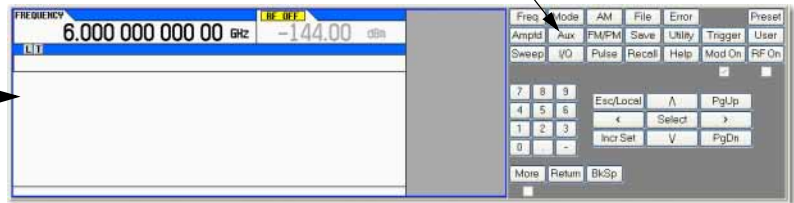
The Agilent MXG ATE supports LXI Class B* functionality. For more information on the LXI standards, refer to <http://www.lxistandard.org/home>.

*LXI Class B Compliance testing using IEEE 1588-2008 not available at release.

If the SCPI Telnet softkey is not active, to display the SCPI Telnet box:

- 1) On the PC, click **Start > Run**
- 2) In the dialogue box type: Telnet xxx.xxxx.xxx.xx
[IP address of MXG] 5024 [This is the port number for connecting to the MXG]
Note: Telnet port 5023 is available for backwards compatibility (i.e. for firmware versions <A.01.50).

To operate the signal generator, click the keys.



Note:

If you do *not* see this window, check to see if the window is hidden behind your browser window or your web browser settings are set to block pop-ups. To use this feature, you need to set your web browser to allow pop-ups for your instrument's IP address.

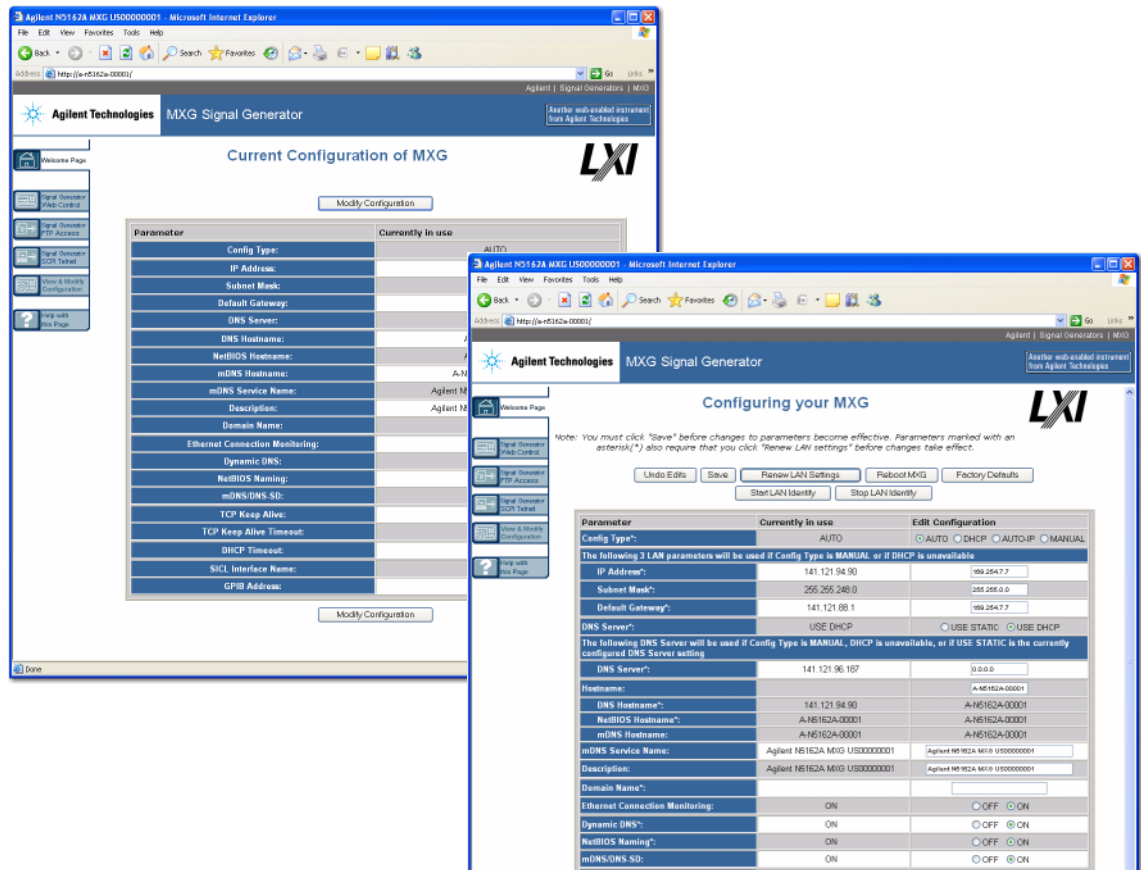
Remote SCPI commands requires the Telnet feature on the computer. The Telnet feature is available from a variety of sources. Some software updates can block (break) this Telnet connection (e.g. Internet Explorer 7). When using Internet Explorer as a browser, only versions <Internet Explorer 7 enable the Web-Enabled MXG SCPI feature.

Modifying the Configuration

NOTE Use Help with this Page for assistance with the Web-Enabled interface.

1. From the welcome page of the Web-Enabled interface, click View & Modify Configuration to show the instrument's currently assigned IP address and other parameters.
2. Enter the new settings and click Save.
3. Click Renew LAN Settings to cause the new settings to take effect.

Figure 2-2 View & Modify Configuration

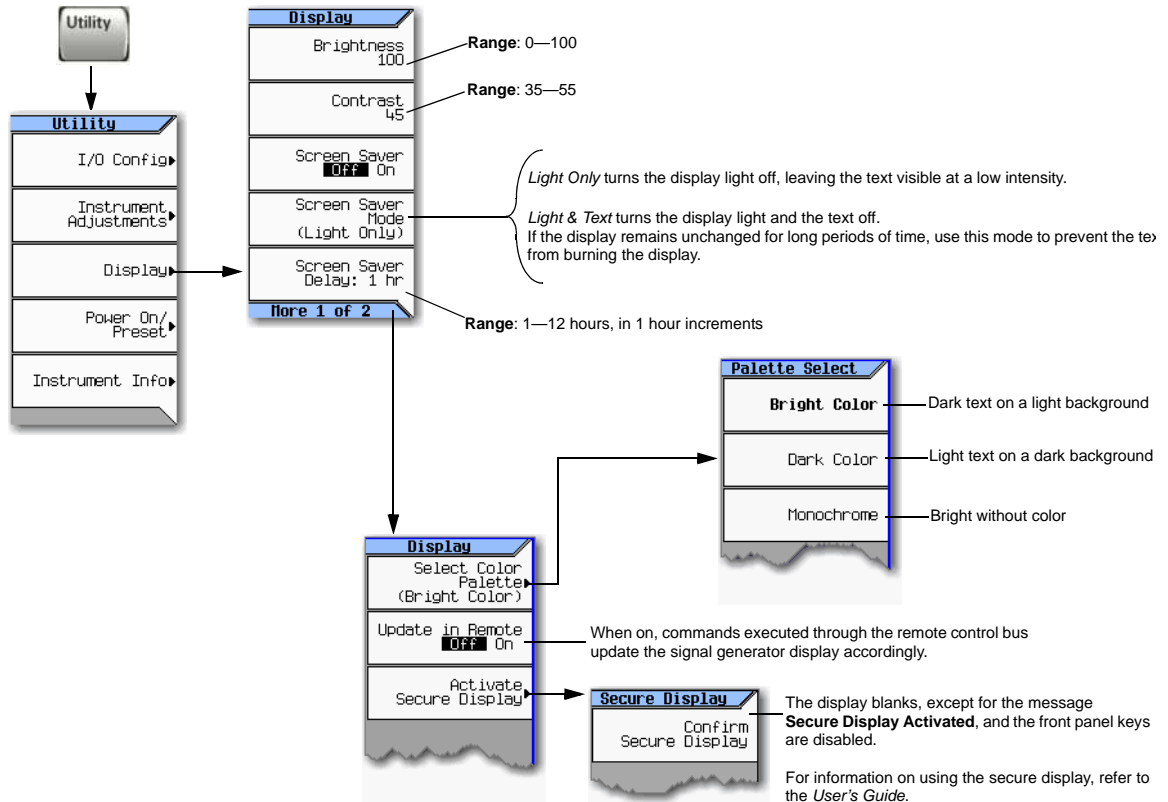


Configuring the Display (N5181A/82A/83A Only)¹

Screen saver settings are persistent states; they are unaffected by preset or a power cycle.

Use the arrow keys, numeric keypad, or front panel knob to adjust numeric values.

Figure 2-3 Display Softkeys



For details on a key, press **Help** and then the desired key.

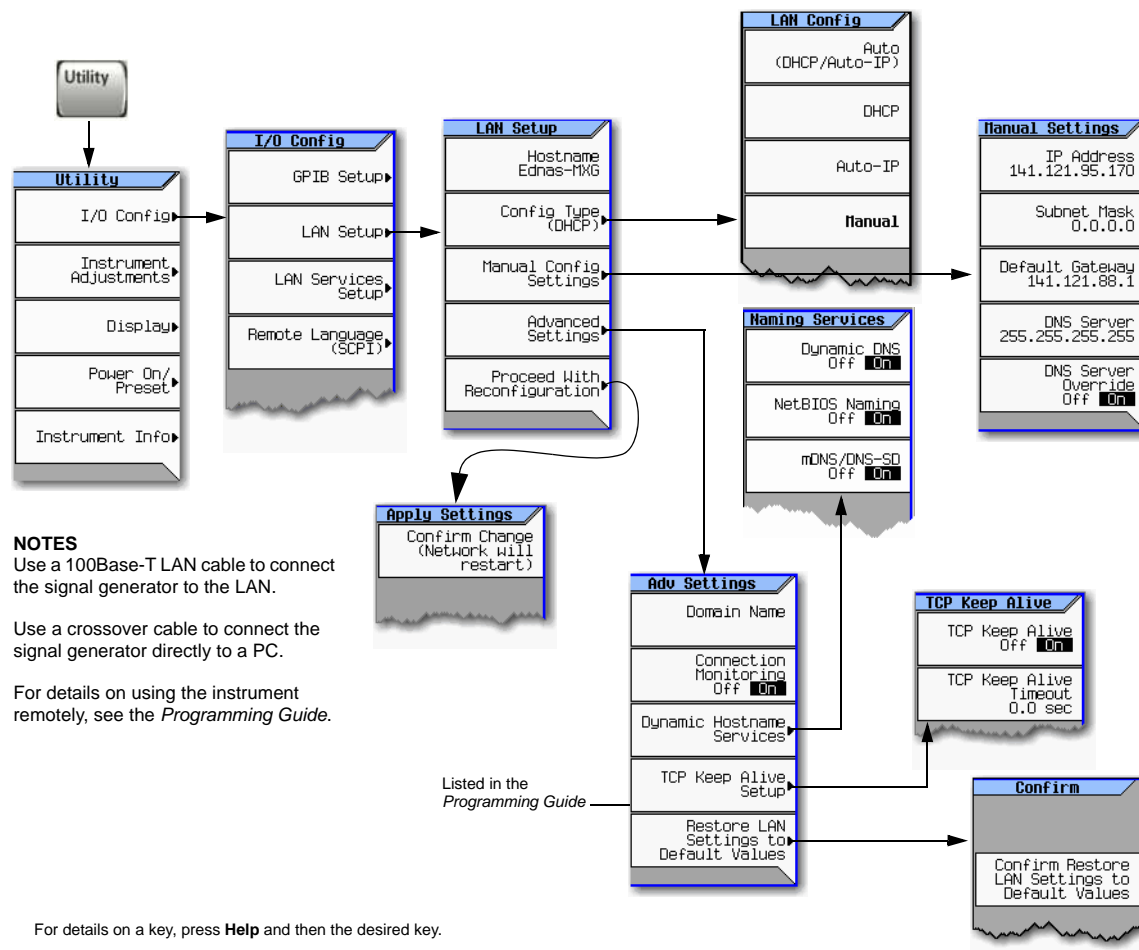
NOTE With both brightness and contrast set to minimum, the display may be too dark to see the softkeys. If this happens, use [Figure 2-3](#) to locate the brightness and contrast softkeys and adjust their values so that you can see the display.

¹For the N5161A/62A the softkey menus and features mentioned in this guide are only available through the Web-Enabled MXG or through SCPI commands. Refer to the “Configuring the MXG ATE” on page 7, the *Installation Guide*, the *Programming Guide*, and to the *SCPI Command Reference*.

Configuring for Remote Control¹

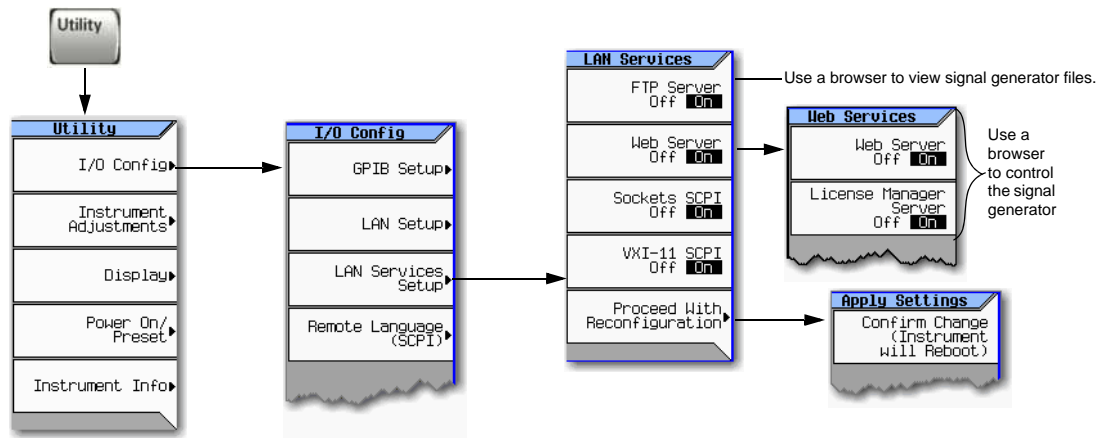
LAN Configuration

Configuring the LAN Interface

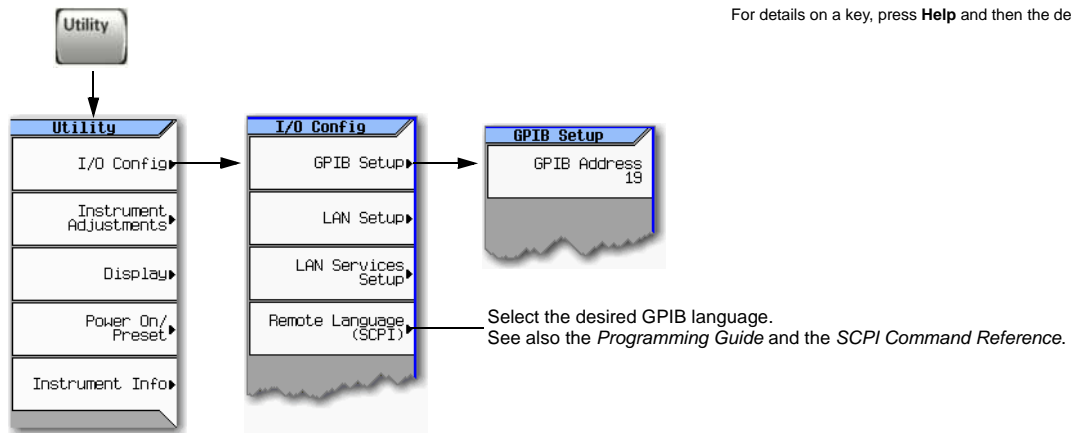


¹For the N5161A/62A these softkey menus and features are only available through the Web-Enabled MXG ATE or through SCPI commands. Refer to “Configuring the MXG ATE” on page 7, to the *Programming Guide*, and to the *SCPI Command Reference*.

Enabling LAN Services: Browser, Sockets, and VXI-11



GPIO Configuration



NOTES

USB is also available. It is not shown in the menu because it requires no configuration.

For details on using the instrument remotely, see the *Programming Guide*.

Ordering Accessories

You can purchase accessories or documentation at: <http://www.agilent.com/find/mxg>

If you do not have access to the Internet, please contact your Agilent field engineer.

See also, “Contacting Agilent” on page 16.

Description ^a	Part Number	Part Number ^b
Rack Mount Kit	N5161A-1CM N5162A-1CM N5181A-1CM N5182A-1CM N5183A-1CM	5063-9212 5063-9212 5063-9212 5063-9212 5063-9212
Rack Mount Kit with Handles	N5161A-1CP N5162A-1CPN N5181A-1CP N5182A-1CP N5183A-1CP	5063-9219 5063-9219 5063-9219 5063-9219 5063-9219
Rack Slide Kit	N5161A-1CR N5162A-1CR N5181A-1CR N5182A-1CR N5183A-1CR	E4406-60115 E4406-60115 E4406-60115 E4406-60115 E4406-60115
Service Kit (front panel RF connector)	N5181A-800 N5182A-800 N5183A-802 N5183A-805	N5181AK-800N 5182AK-800N5 183AK-802 N5183AK-805
Service Kit (rear panel RF connector)	N5161A-801N N5162A-801 N5181A-801 N5182A-801 N5183A-803 N5183A-804 N5183A-806	N5161AK-801N 5162AK-801N5 181AK-801 N5182AK-801N 5183AK-803 N5183AK-804 N5183AK-806
Front Handle Kit	5063-9227	n/c
Data Sheet (N5161A/81A) ^c	5989-5311EN	n/c
Data Sheet (N5162A/82A) ^c	5989-5261EN	n/c
Data Sheet (N5183A) ^c	5989-7572EN	n/c
Installation Guide ^c	N5180-90002	n/c
User's Guide ^c	N5180-90003	n/c
SCPI Reference ^c	N5180-90004	n/c

Description ^a	Part Number	Part Number ^b
Programming Guide ^c	N5180-90005	n/c
Service Guide ^c	N5180-90006	n/c
Document Set ^c : <ul style="list-style-type: none"> • Data Sheet • User's Guide • Programming Guide • SCPI Reference 	N5180-90001	n/c
Documentation CD-ROM ^c : <i>PDF files:</i> <ul style="list-style-type: none"> • Documentation Set • Installation Guide • Service Guide <i>Text files:</i> <ul style="list-style-type: none"> • error messages • programming examples 	N5180-90007	n/c

^aFor a description of the contents of each guide and reference, see [page vii](#).

^bThese part numbers or options can be ordered after you have received the instrument (i.e. post shipment).

^cAlways refer to www.agilent.com for the most up-to-date documentation.

Proper Use and Cleaning

The signal generator cover protects against physical contact with internal assemblies that contain hazardous voltages, but does not protect internal assemblies against contact with liquids. To avoid damage and personal injury, ensure that liquids are positioned away from the signal generator.

WARNING Personal injury may result if the signal generator is not used as specified. Unspecified use impairs the protection provided by the equipment. The signal generator must be used with all means for protection intact.

Cleaning Suggestions

WARNING Electrical shock may result if the signal generator is not disconnected from the mains supply before cleaning. Do not attempt to clean internally.

Cleaning connectors with alcohol shall only be done with the instruments power cord removed, and in a well-ventilated room. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate prior to energizing the instrument.

To ensure good connections, regularly clean the instrument's front and rear panel connectors with alcohol.

To prevent dust build-up that could potentially obstruct ventilation, periodically clean the instrument's cover. Use a dry cloth or a cloth slightly dampened with water to clean the external case parts.

Returning a Signal Generator to Agilent Technologies

1. Gather as much information as possible about the signal generator's problem.
2. Contact Agilent using the phone number that is specific to your geographic location. These phone numbers are listed on the Internet at <http://www.agilent.com/find/assist>. If you do not have access to the Internet, contact your Agilent field engineer.

After you provide information about the signal generator and its condition, you will receive information about where to ship your signal generator for repair.

3. Ship the signal generator in the original factory packaging materials, if available, or use similar packaging to properly protect the signal generator.

Contacting Agilent

Assistance with test and measurements needs, information on finding a local Agilent office, and information on purchasing accessories and documentation are available on the Internet at: <http://www.agilent.com/find/assist>

If you do not have access to the Internet, please contact your Agilent field engineer.

NOTE In correspondence or telephone conversation, refer to the signal generator by its model number and full serial number. With this information, the Agilent representative can determine if your unit is still within its warranty period.

3 Operation Verification

CAUTION To avoid damaging or degrading the performance of the MXG, do not exceed 33 dBm (2W) *maximum* of reverse power levels at the RF input. See also *Tips for Preventing Signal Generator Damage* on www.agilent.com.

NOTE For the N5161A/62A the softkey menus and features mentioned in this chapter are only available through the Web-Enabled MXG or through SCPI commands. Refer to [“Accessing the MXG \(ATE\) Web-Enabled Page” on page 8](#) and to the *SCPI Command Reference*.

The MXG ATE blank front panel models, N5161A and N5162A signal generators, are part of the MXG instrument family and unless otherwise indicated, all references to the MXG are inclusive of the MXG ATE instruments.

For the instrument to meet performance specifications allow a warm up period of 45 minutes within an operational temperature range of 0 to 55 °C. For more information, refer to the MXG signal generator *Data Sheet*.

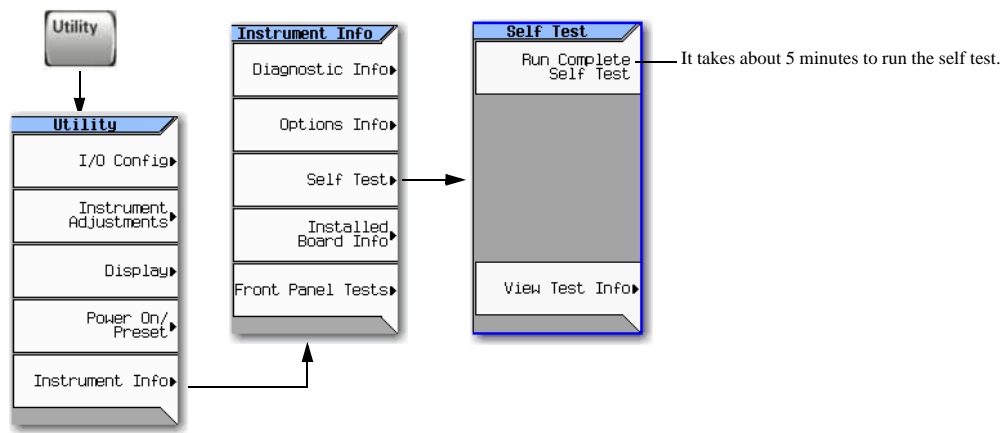
Operation verification is a series of tests used to confirm that the signal generator is operating properly, or to diagnose problems. Operation verification does not verify performance to instrument specifications.

Perform operation verification when you initially set up the signal generator, after a minor repair (refer to the *Service Guide* for details), or when the integrity of the signal generator is in question.

- [Running Self Test](#) on page 18
- [Frequency Range and Accuracy Check](#) on page 20
- [Checking the Output Power](#) on page 23

Running Self Test¹

Self Test is a series of internal tests of signal generator functions. If this test fails, refer to “Self Test Failure” on page 19 for further instructions.



Use the following procedure to run self test:

1. Disconnect all external cables, including GPIB, LAN, and USB cables.
2. Preset the signal generator: Press **Preset > Utility > Instrument Info > Self Test**.

The following message appears:

- The current status of the self-test is: Incomplete. Not all tests have been run.

3. Press **Run Complete Self Test**.

An activity bar displays on the screen indicating the test progress.

If you press **Abort** while self-test is running, the following message displays:

- The current status of the self-test is: Incomplete. Not all tests have been run.

When self-test completes, one of the following messages displays:

- The current status of the self-test is: Passed
- The current status of the self-test is: Failure. One or more tests have failed.

1. For the N5161A/62A these softkey menus and features are only available through the Web-Enabled MXG ATE or through SCPI commands. Refer to “Configuring the MXG ATE” on page 7, to the *Programming Guide*, and to the *SCPI Command Reference*.

System diagnostics indicate this test as the root failure: xxx

If the signal generator fails only one test, the title of the failed test displays. If the signal generator fails more than one test, the test number of the most significant failure (root failure) displays.

NOTE The root failure is the error to report to Agilent Support. Refer to [“Contacting Agilent” on page 16](#).

Self Test Failure¹

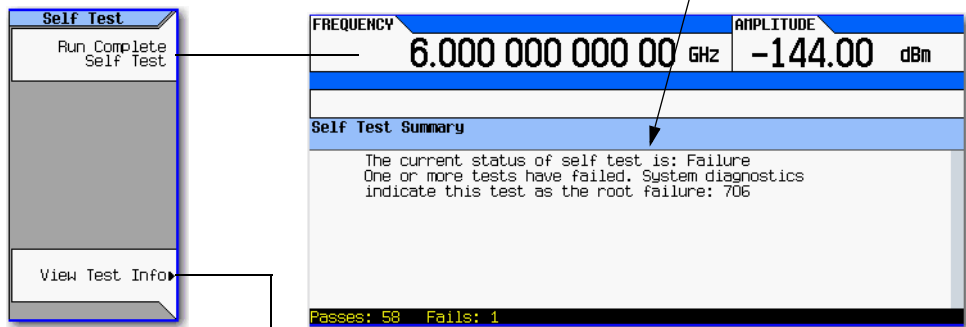
1. Confirm that all external cables, including GPIB, LAN, and USB cables, are disconnected from the signal generator and repeat the self-test.
2. If the self-test continues to fail, the signal generator requires service. If you are unable to service the signal generator, send it to an Agilent service center for repair. Include a detailed description of the most significant failure (root failure) and any displayed error messages.

See [“Viewing Test Results” on page 19](#) for information about viewing detailed self test results.

See [“Returning a Signal Generator to Agilent Technologies” on page 16](#) for return instructions.

Viewing Test Results

Utility > Instrument Info >
Self Test



If Self Test fails, the summary indicates the most significant failure (root failure).

This information is *supplemental*. Please disregard unless Agilent specifically requests this information.

¹For the N5161A/62A these softkey menus and features are only available through the Web-Enabled MXG ATE or through SCPI commands. Refer to [“Configuring the MXG ATE” on page 7](#), to the *Programming Guide*, and to the *SCPI Command Reference*.

Frequency Range and Accuracy Check

The frequency range is tested by determining the frequency accuracy relative to the timebase at the frequency limits of the signal generator. This test can be performed with either a frequency counter or a spectrum analyzer.

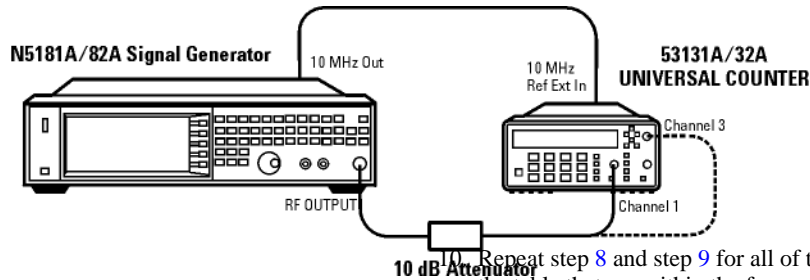
Table 3-1 Recommended Equipment for Checking N5161A/62A/81A/82A/83A Frequency Range and Accuracy

Test Equipment	Recommended Model		
Frequency Counter	N5161A/62A/81A/82A: Agilent 53131A or 53132A with Option 010 and 050 or 124		
Spectrum Analyzer	N5161A/62A/81A/82A	N5183A Option 520	N5183A Option 532/540
E4440A	Y	Y	--
E4443A	Y	--	--
E4445A	Y	--	--
E4446A	Y	Y	Y
E4447A	Y	Y	Y
E4448A	Y	Y	Y

Frequency Counter Procedure (N5161A¹/62A¹/81A/82A)

Test Setup

1. Connect the equipment as shown.



2. Preset the signal generator: Press **Preset**.
3. Turn modulation off: Press the **Mod On/Off** so that the MOD On/Off LED turns off.
4. Set the amplitude:
Press **Amplitude** and enter 0 dBm.
5. Turn RF on: Press **RF On/Off** so that the RF On/Off LED lights.
6. Verify that the frequency counter is locked to the 10 MHz external reference frequency (± 1 Hz).
7. For maximum accuracy, set the gate time on the frequency counter to >5 seconds.
(Press **Gate & ExtArm** twice and use the arrow keys to set the value.)
8. Set the frequency: Press **Frequency** and set the signal generator to the first frequency listed in [Table 3-2](#).
9. Confirm that the measured frequency is within the limits listed.

NOTE For frequencies <200 MHz, use Channel 3 on the frequency counter
(press **Freq Ratio** until CH3 : displays).

Table 3-2 Frequency Accuracy Limits

Frequency (MHz)	Limit (Hz)
0.1 MHz ^a	± 2
200 MHz	± 2
300 MHz	± 2
500 MHz	± 2
1000 MHz	± 2
2000 MHz	± 2
3100 MHz	± 2
6000 MHz	± 2

a. N5181A/82A with s/n prefix: < MY4740, measure at 0.25MHz.

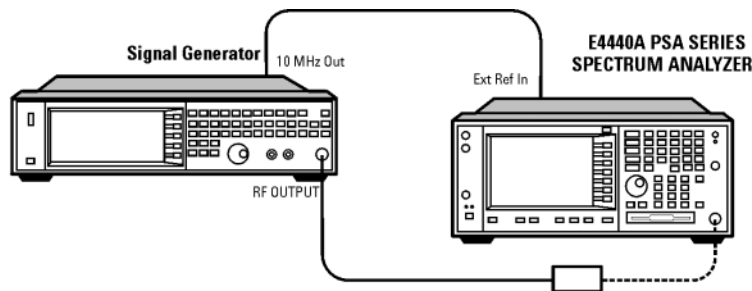
1. For the N5161A/62A these softkey menus and features are only available through the Web-Enabled MXG or through SCPI commands. Refer to [“Configuring the MXG ATE” on page 7](#), to the *Programming Guide*, and to the *SCPI Command Reference*.

Spectrum Analyzer Procedure

(N5161A¹/62A¹/81A/82A/83A)

Test Setup

1. Connect the equipment as shown.



2. Verify that the spectrum analyzer is locked to the 10 MHz external reference frequency.
3. Align the spectrum analyzer:
Press **System** > **Alignment** > **Align All Now**.
4. Preset the signal generator: Press **Preset**.
5. Turn modulation off: Press the **Mod On/Off** so that the MOD On/Off LED turns off.
6. Set the amplitude:
Press **Amplitude** and enter 0 dBm.
7. Turn RF on: Press **RF On/Off** so that the RF On/Off LED lights.
8. Set the frequency: Press **Frequency** and set the signal generator to the first frequency listed in [Table 3-3](#).
9. Confirm that the measured frequency is within the limits listed in the table.

10. Repeat steps 8 and 9 for all of the frequencies in the table that are within the frequency range of your signal generator.

Table 3-3 Frequency Accuracy Limits

Frequency (MHz)	Limit (Hz) N5161A/62A/81A/82A	Limit (Hz) N5183A
0.1 MHz ^a	±2	±2
200 MHz	±2	±2
300 MHz	±2	±2
500 MHz	±2	±2
1000 MHz	±2	±2
2000 MHz	±2	±2
3100 MHz	±2	±2
6000 MHz	±2	±4
10 GHz	--	±4
20 GHz	--	±8
32 GHz/40 GHz	--	±16

¹For the N5161A/62A these softkey menus and features are only available through the Web-Enabled MXG or through SCPI commands. Refer to [“Configuring the MXG ATE” on page 7](#), to the *Programming Guide*, and to the *SCPI Command Reference*.

a.N5181A/82A with s/n prefix: < MY4740, measure at 0.25 MHz

Troubleshooting Problems with the Frequency Accuracy Check

- Verify the cables are connected correctly.
- If you are using a frequency counter, verify that you are using the correct channel for the frequencies you are measuring.
- If you are using a spectrum analyzer, verify that the spectrum analyzer is set to external reference.

Checking the Output Power

This test verifies that the CW output power from the signal generator is within defined limits. The following table lists the preferred equipment for this test.

Test Equipment	Recommended Model
Power Meter	Agilent E4418B or E4419A/B E-Series
Power Sensor, Input: Type-N (m)	Agilent E9304A (N5161A/62A/81A/82A/83A) Agilent 8485A (N5183A Option 520) Agilent 8487A (N5183A Option 532/540)

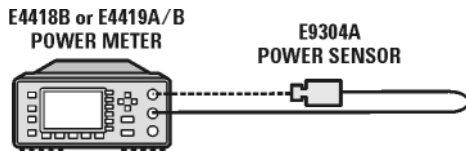
- [N5161A/81A Test Procedure](#) on page 24
- [N5162A/82A Test Procedure](#) on page 25
- [N5183A Test Procedure](#) on page 27

If this test fails, refer to “[Troubleshooting Problems with the Output Power Check](#)” on page 29 for further instructions.

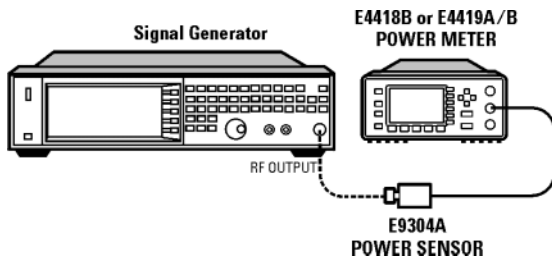
N5161A¹/81A Test Procedure

Test Setup

1. Zero and calibrate the power sensor to the power meter:



2. Connect the equipment as shown:



3. Preset the signal generator: Press **Preset**.
4. Turn RF on: Press **RF On/Off** so that the RF On/Off LED lights.
5. Turn modulation off: Press **Mod On/Off** so that the Mod On/Off LED turns off.
6. Set the frequency: Press **Frequency** and enter the first frequency value listed in [Table 3-8](#).
7. Set the amplitude: Press **Amplitude** and enter the amplitude value for that frequency.
8. Configure the power meter for the measurement.
 - a. Press the **Frequency Cal Fac** button on the power meter.
 - b. Select a power meter channel (if applicable).

- c. Use the arrow keys to enter the frequency at which to measure the power.

9. Measure the output power level.

10. Repeat steps 6 through 9 to measure power at each of the 15 frequencies listed in [Table 3-8](#).

11. Confirm that the measured power levels are within the limits listed in the table.

NOTE Limit values are due to power meter uncertainty.

Table 3-4 Levelled Output Power Limits

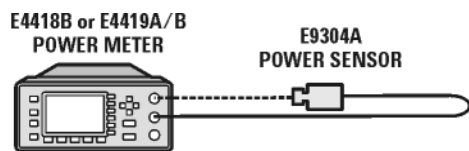
N5161A/81A Output Power		
Frequency	Amplitude (dBm)	Limits (dB)
125 MHz	7	±2
275 MHz	7	±2
338 MHz	7	±2
425 MHz	7	±2
538 MHz	7	±2
675 MHz	7	±2
850 MHz	7	±2
1075 MHz	7	±2
1350 MHz	7	±2
1700 MHz	7	±2
2150 MHz	7	±2
2700 MHz	7	±2
3400 MHz	7	±2
4300 MHz	7	±2
5400 MHz	7	±2

1. For the N5161A/62A these softkey menus and features are only available through the Web-Enabled MXG or through SCPI commands. Refer to the *Programming Guide* or to the *SCPI Command Reference*.

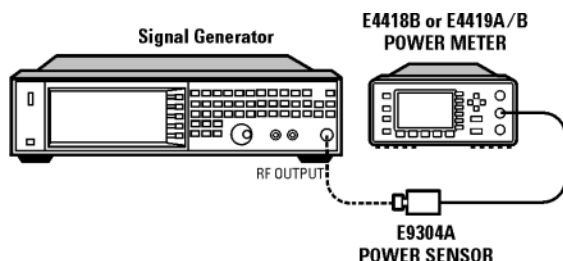
N5162A¹/82A Test Procedure

Test Setup

1. Zero and calibrate the power sensor to the power meter:



2. Connect the equipment as shown below:



3. Preset the signal generator: Press **Preset**.
4. Turn RF on: Press **RF On/Off** so that the RF On/Off LED lights.
5. Turn modulation off:
Press **Mod On/Off** so that the Mod On/Off LED turns off.

Without Modulation

6. Set the signal generator frequency to the first value listed in [Table 3-6](#):
Press **Frequency > 125 > MHz**.
7. Set the amplitude to 7 dBm:

Press **Amplitude > 7 > dBm**.

8. Configure the power meter as follows:
 - a. On the power meter, press the **Frequency Cal Fac** button.
 - b. If applicable, select a power meter channel.
 - c. Use the arrow keys to enter the frequency at which to measure the power.
9. Measure the output power level.
10. Repeat steps 6 through 9 for the remaining frequencies in the table, and confirm that the power level at each point is within limits.

Table 3-5

N5162A/82A Output Power without Modulation		
Frequency (MHz)	Amplitude (dBm)	Limits (dB)
250	7	±2
338	7	±2
425	7	±2
538	7	±2
675	7	±2
850	7	±2
1075	7	±2
1350	7	±2
1700	7	±2
2150	7	±2
2700	7	±2
3400	7	±2
4300	7	±2
5400	7	±2

With Modulation

11. Preset the signal generator: Press **Preset**.

1. For the N5161A/62A these softkey menus and features are only available through the Web-Enabled MXG or through SCPI commands. Refer to the *Programming Guide* or to the *SCPI Command Reference*.

12. Select the factory-supplied waveform
SINE_TEST_WFM:
 - a. Press **Mode > Dual ARB > Select Waveform**.
 - b. Highlight the SINE_TEST_WFM waveform.
 - c. Press **Select Waveform**.
13. Turn the arbitrary waveform player on: Press the **ARB** softkey to highlight **On**.
14. Set the frequency to the first value listed in [Table 3-6](#):
Press **Frequency > 125 > MHz**.
15. Set the amplitude to 7 dBm:
Press **Amplitude > 7 > dBm**.
16. Configure the power meter as follows:
 - a. On the power meter, press the **Frequency Cal Fac** button.
 - b. Select a power meter channel (if applicable).
 - c. Use the arrow keys to enter the frequency at which to measure the power.
17. Measure the output power.
18. Repeat steps [14](#) through [17](#) for the remaining frequencies listed in [Table 3-6](#), and confirm that the power level at each point is within limits.

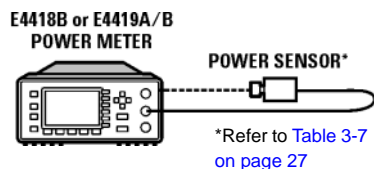
Table 3-6

N5162A/82A Output Power with Modulation		
Frequency (MHz)	Amplitude (dBm)	Limits (dB)
250	7	±2
323	7	±2
512	7	±2
814	7	±2
1275	7	±2
2025	7	±2
2750	7	±2
3750	7	±2
5250	7	±2

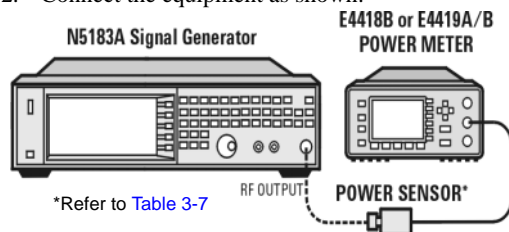
N5183A Test Procedure

Test Setup

1. Zero and calibrate the power sensor to the power meter:



2. Connect the equipment as shown:



3. Preset the signal generator: Press Preset.
4. Turn RF on: Press RF On/Off so that the RF On/Off LED lights.
5. Turn modulation off: Press Mod On/Off so that the Mod On/Off LED turns off.
6. Set the frequency: Press Frequency and enter the first frequency value listed in Table 3-8.
7. Set the amplitude: Press Amplitude and enter the amplitude value for that frequency.
8. Configure the power meter for the measurement.
 - a. Press the Frequency Cal Fac button on the power meter.
 - b. Select a power meter channel (if applicable).
 - c. Use the arrow keys to enter the frequency at which to measure the power.
9. Measure the output power level.
10. Repeat steps 6 through 9 to measure power at each of the 15 frequencies listed in Table 3-8.
11. Confirm that the measured power levels are within the limits listed in the table.

Table 3-7 Power Sensors by Frequency and Options

N5183A	Frequency	Power Sensor
Option 520/540	< 5GHz	E9304A
Option 520	≥ 5GHz	8485A
Option 540	≥ 5GHz	8487A

Table 3-8 Levelled Output Power Limits

N5183A Output Power					
Frequency	Amplitude (dBm) Standard Power		Amplitude (dBm) Option 1EA		Limits ^a ^b (dB)
	520	532/ 540	520	532/ 540	
200 MHz	11	7	15	14	±2
300 MHz	11	7	15	14	±2
500 MHz	11	7	15	14	±2
800 MHz	11	7	15	14	±2
1.0 GHz	11	7	15	14	±2
2.0 GHz	11	7	15	14	±2
3.1 GHz	11	7	15	14	±2
5.0 GHz	11	7	18	15	±2
10 GHz	11	7	18	15	±2
20 GHz	11	7	18	13	±2
31.8 GHz (Option 532)	--	7	--	13	±2
40 GHz (Option 540)	--	7	--	12	±2

a. Limit values are due to power meter uncertainty.

b. For questions around measurement uncertainty, refer to the *Data Sheet*.

Troubleshooting Problems with the Output Power Check

- Verify that you are using the appropriate power sensor.
- Normally, power sensor calibration factors are automatically downloaded to the power meter when the power meter turns on. If this does not occur, manually enter the correct calibration factors for the power sensor you are using.
- Verify that the power sensor is properly calibrated to the power meter.

4 Regulatory Information

Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products. For assistance, contact Agilent Technologies (see [page 16](#)).

Compliance

This product(s) complies with applicable Safety and EMC regulations and directives. A copy of the manufacturer's Declaration of Conformity for this product(s) can be obtained by contacting your local Agilent Technologies sales representative.

EMC: Complies with the essential requirements of the European EMC Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

- IEC/EN 61326-1
- CISPR Pub 11 Group 1, class A
- AS/NZS CISPR 11
- ICES/NMB-001

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme à la norme NMB-001 du Canada.

South Korean Class A EMC declaration: This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

A 급 기기 (업무용 방송통신기자재) 이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

SAFETY: Complies with the essential requirements of the European Low Voltage Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

- IEC/EN 61010-1
- Canada: CSA C22.2 No. 61010-1
- USA: UL std no. 61010-1

Acoustic statement: (European Machinery Directive)

Acoustic noise emission

LpA <70 dB

Operator position

Normal operation mode per ISO 7779

To find a current **Declaration of Conformity** for a specific Keysight product, go to:

<http://www.keysight.com/go/conformity>

A**AC**

- power cord, connecting, 6
- symbol, 2

accessories, 14

address, GPIB, 13

Agilent, contacting, 16

alcohol, cleaning with, 16

altitude requirements, 5

Australian Communications Authority (C-tick) mark, 2

auto-IP, 12

B

brightness adjustment, 11

C

Canadian

Standards Association (CSA) mark, 2

cautions, 1

certification, 31

checking the shipment, 4

cleaning suggestions, 16

contrast adjustment, 11

D

DHCP, 12

dimensions, signal generator, 4

display adjustment, 11

documentation, list of, vii

documentation, ordering, 14

E

European Community (CE) trademark, 2

F

frequency accuracy check, 20

frequency range and accuracy check, 20

FTP server, 13

G

GPIB address, setting, 13

H

hostname, setting, 12

humidity requirements, 5

I

ICES symbol, 2

IEC Publication 61010, 31

inspection, shipping container, 4

instrument warm up, 17

interface, GPIB, 13

interface, LAN, 12

IP address, setting, 12

ISM1-A symbol, 2

L

LAN configuration, 12

line setting requirements, 5

LXI standard specifications symbol, 2

M

manuals, ordering, 14

MXG ATE

configuring, 7

web-enabled, 7

web-enabled, accessing, 8, 10

O

operation verification, 17

operation, remote, 12

output power, checking, 23

P

power

checking, 23

connecting, 6

disconnecting, 6

line cord, 6

requirements, 5

symbol, 2

programming, 12

R

regulatory information, 31

remote operation, 12

requirements, 5

returning a signal generator, 16

S

safety information, 1

SCPI, enabling, 13

self test, 18

server, enabling, 13

service, Agilent sales and service offices, 16

shipping container, inspection, 4

shipping requirements, 16

sockets, enabling, 13

standby symbol, 2

T

temperature requirements, 5

troubleshooting output power, 23

Index

V

ventilation requirements, [5](#)
verification, operation, [17](#)
voltage requirements, [5](#)
VXI-11, enabling, [13](#)

W

warnings, [1](#)
web server, [13](#)
weight, signal generator, [4](#)