

# Keysight Technologies

## N9330B Handheld Cable and Antenna Tester

25 MHz to 4.0 GHz

Technical Overview



## Ensure the Reliability of Your Cable and Antenna System

Your perfect solution for testing cables and antennas in today's communication networks

### Key measurements:

#### Frequency domain

- Return loss vs. frequency
- VSWR vs. frequency
- Cable loss test

#### Distance to fault (DTF)

- Return loss vs. distance
- VSWR vs. distance
- Fault location

#### High accuracy power measurement

- Support Keysight U2000 series USB power sensor

Today, the increasing range of wireless applications provides end users on the move with faster and more diverse services.

Broadband mobile data and telephony are now becoming ubiquitous, with coverage in most urban and many rural areas.

The number of base stations (BTS) needing fast, efficient installation continues to grow. Moreover, the vast numbers of existing installed base stations need periodic maintenance and, from time to time, trouble shooting and repair.

Whether you do your own maintenance test or rely on third-party contractors, you need well-maintained antenna networks and cables to ensure:

- Better voice and data quality
- Fewer dropped calls
- Less dropped links

An efficient and effective cable and antenna tester is an essential basic test tool for network engineers and technicians for wireless network installation and maintenance.

- New site installation and deployment
- Routine maintenance
- Trouble shooting

Verify performance and trouble-shoot base station cable and antenna systems: test wide band or narrow band from 25 MHz to 4 GHz.



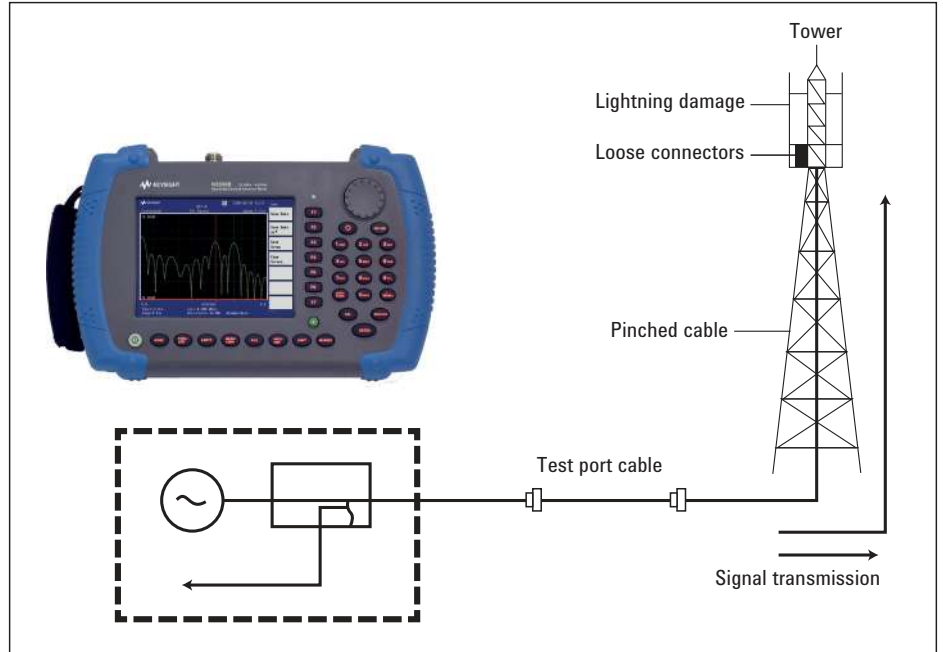
Easy to use and convenient to carry to any site



## Ensure the Reliability of Your Cable and Antenna System (continued)

### N9330B applications:

- **Wireless service providers:**  
Base station cable & antenna system I&M
- **Aerospace and defense:**  
Radio and radar cable and antenna system I&M
- **Broadcasting and radio links:**  
Cable and antenna system I&M
- Utilities, emergency and security services
- Contractors for all the above



### Early identification of potential problems

Deteriorating cable and antenna conditions, such as a loose or corroded connector, a pinched or restricted cable, or damaged lightning arrestors cause measurable RF impedance changes. Slight changes in VSWR, power loss and antenna bandwidth drift are early indications of system deterioration.

Distance-To-Fault testing uses frequency domain reflectometry (FDR) techniques that readily detects and locates these slight changes in RF impedance. With routine DTF testing as part of a preventative maintenance plan, you can find and fix these problems before the system fails and repairs become costly. The Keysight Technologies, Inc. N9330B provides fast startup time, so technicians are ready to test in seconds.

It's small size and light weight make it easy to handle and it stands up to rough field use and all weather conditions.

Fast measurement speed means your technicians can evaluate one of the trouble spots in a matter of minutes.

N9330B speeds up installation of cables and antennas at new site, too.

Whatever your tasks, speed is important, with N9330B you can test more sites per day.

And USB data storage lets you save all of the results for post-test analysis.

You will find the Keysight N9330B tester useful and reliable, in rugged field environments for rapid installation of a new cellular network infrastructure, 2-way radio communication system or any type of communication system.

## Ensure the Reliability of Your Cable and Antenna System (Continued)

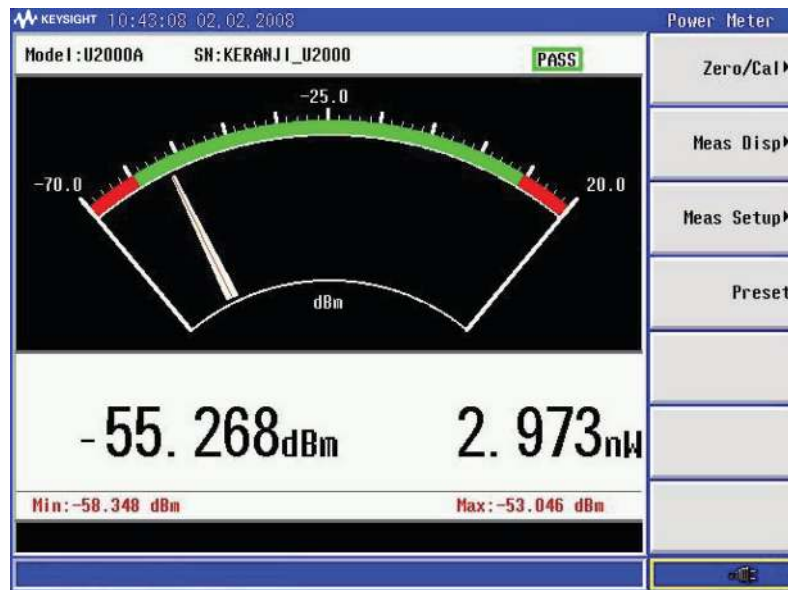


The N9330B supports U2000 series USB power sensor for high accuracy power measurement.

### High accuracy power measurement (option PWM)

The N9330B now supports high-accuracy, USB plug-and-play power measurements when connected to an Keysight U2000 series USB power sensor. Make true average power measurements for all signal types with wide dynamic range up to 18 GHz with just the push of a button. The Keysight U2000 USB sensors require no external power supplies and with internal zeroing eliminate the need for external calibration. Without the need for additional boxes, the user can easily set up, calibrate and control the power meter/sensor via the analyzer's USB port.

The N9330B can collect, display and save the power meter results. The analyzer also provides Pass/Fail testing with user set upper and lower limits and a Pass/Fail indicator. Test results are shown in dBm and W when making absolute measurements and in dB and percentage when measurements are relative. Two display modes are available: Meter or the Chart mode to log power measurements over time.



Meter mode



## Easier Operation

### Powerful functions:

- Smart and fast electronic calibrator
- Powerful post analysis PC software

### N9330B optimized usability:

- Long battery life
- Modern USB connectivity
- Sunlight-viewable LCD
- Multi-language UI
- Rugged design for field use



Well organized front-panel with more hard buttons and function keys for faster access to essential test functions.

### A fast job, well done

A busy technician needs fast tester setup, quick calibration, and a straightforward, repeatable test procedure.

Keysight N9330B gives you:

- Fast startup time
- Auto calibration
- Test set-up recall
- USB memory stick support
- USB connectivity for PC software
- More direct-access hard keys
- Rapid cursor control and marker movement using scroll knob
- Easy data storage
- Customized, unmistakably named data files and auto-sequential file naming
- Comprehensive results saved in an easy-to-use format
- Auto pass/fail test comparisons



'T-combo' open/short/50 Ω load

The Keysight N9330B is easy to use, so it minimizes the need for training. Technicians will get up to speed fast – and get their work done quickly.

The optimum combination of hardkeys and softkeys provides an intuitive interface for all measurements.

The most-used functions are conveniently selectable, via large, front-panel keys.

The front-panel knob provides a simple scroll function, allowing rapid cursor movement to access data points across scan displays, or data entries.



N9330B-203 Electronic calibrator



## Easier Operation (Continued)

### Smart, fast calibration

At the start of any new test setup, a three-step calibration is necessary, using an open, a short, and a calibrated test load.

The most accurate calibration method is to use mechanical calibration standards, an optional special 'T-combo' open/short/load, makes it easy for use in the field.

For fast and automatic calibration, you can choose the N9330B-203 electronic calibrator. Simply connect the electronic calibrator and press a key to run the electronic calibration.

### Use sensible archive file names related to each site tested

The N9330B lets you choose meaningful names for your stored data: names that you customize and relate to your site.

You no longer have to tolerate anonymous file names with no linkage to your site. It is easy to recognise and recall archived data files without the need for cross-referencing.

And you can use sequential file names as you store successive files.

### Powerful PC based post analysis software

Effective cable and antenna testing is more than just the measurements.

Keysight provides a powerful PC based post-analysis tool. This software tool, standard with every Keysight N9330B, provides trace analysis, trace comparison, customized reports and data file management.

The USB connection makes it fast and easy to transfer the measurement data to the PC for analysis.

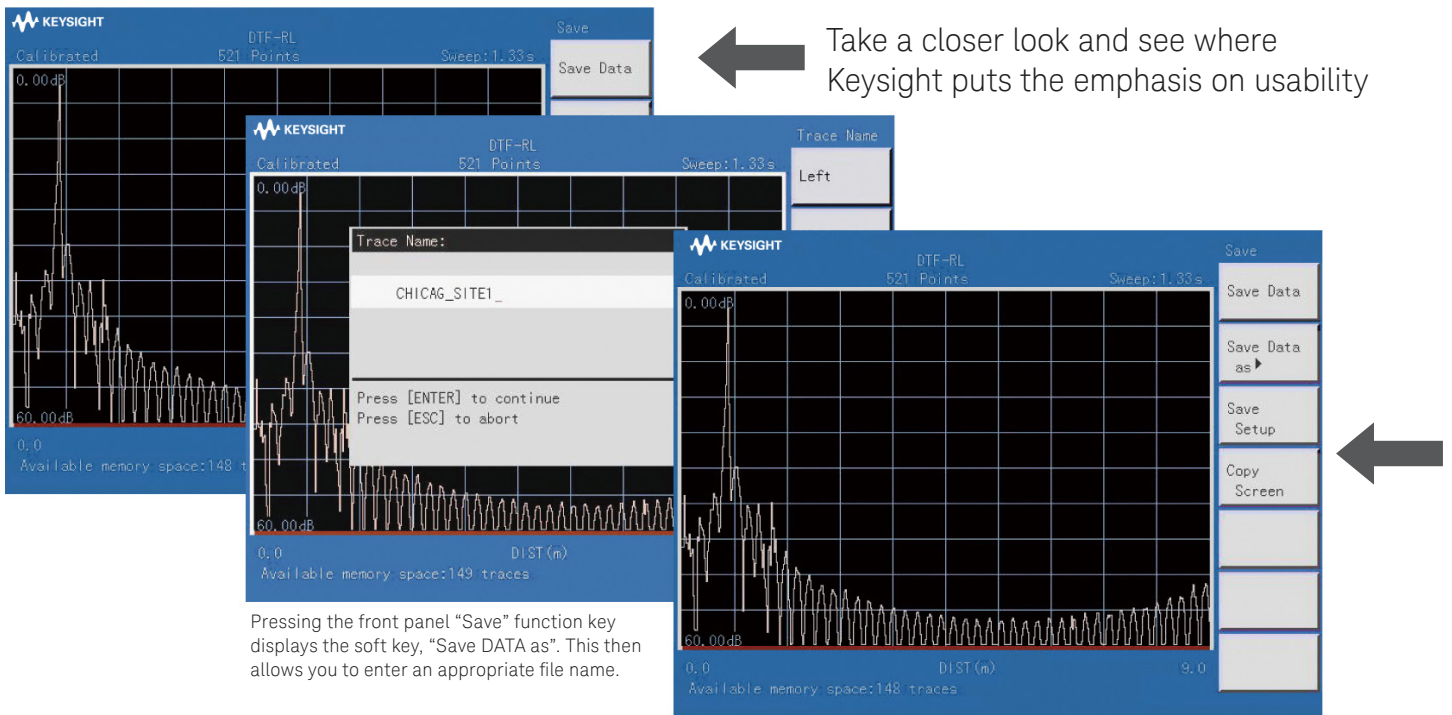
## Easier Operation (Continued)

### Store data and setup configuration

When you take the tester out into the field, and have a large number of sites and installations to check, you need sufficient storage capacity for previous, historic data. The internal memory stores up to 200 traces, and you can save screen images.

For fast instrument set up, you can store up to 15 stored configurations in the internal memory.

If you need even more, simply use a USB memory stick for external storage of configurations, traces and screen images.



Pressing the front panel "Save" function key displays the soft key, "Save DATA as". This then allows you to enter an appropriate file name.

Subsequently, press the "Save DATA" soft key, each new file name automatically increments, as in example: CHICAG\_SITE2, CHICAG\_SITE3,...

## N9330B Handheld Cable and Antenna Tester



1. Test port, with connector protection cap.
2. Modern USB connectivity for both remote control and memory stick. Support high accuracy power measurement with Keysight U2000 USB power sensor.
3. Rapid marker positioning to measurement points using the fast-scroll rotary control.
4. The protective soft carrying case with its ergonomic design provides further protection for the Keysight N9330B.
5. Robust, comfortable, quick-grab hand strap.
6. The 6.5" transfective LCD gives sharp and clear display of results even working in direct sunlight with the high resolution of 640 x 480 pixels.
7. Easy access to most common tests and settings using keypad.
8. Easy results comparison fast recall of stored data.



## Keysight Reliable Field Use



Testing in the field means working in remote locations and out in the open: Sometimes carrying test equipment up towers, or possibly working in small, cramped buildings with no direct access to AC power on site.

You may have to test:

- Under temperature extremes
- In bright sunlight or in the dark
- In poor weather conditions

None of these is the best operating environment for precision electronic test equipment.

Keysight designed the N9330B cable and antenna tester.

### See traces clearly indoors and outdoors

As with all the newest Keysight portable field equipment, operating under challenging bright sunlight or other difficult natural lighting conditions is not a problem. The bright new 6.5" TFT display with resolution of 640 x 480 pixels provides a superior, bright and clear trace for indoor and outdoor use.



Outstanding display technology provides superior performance under the most demanding lighting conditions.

### Back-lit keys for night use

The new back-lit keys in the N9330B make it easy to see the keys clearly, even in the dark. The user can adjust the brightness of the keys and the duration of the key light, making it easy to use in light or dark, day or night.

### Carry-case options provide safe, comfortable transport

The soft carrying case provides added protection. A convenient shoulder strap leaves hands free for carrying other tools and equipment, or for safe climbing of access towers and gangways.

For further protection of the tester when storing or transporting it in more harsh environments, an optional hard transit case is available.

The tester itself has a strong hand strap for a sure grip when carried without the case.



## Low-cost, with Keysight worldwide support

### Superior battery performance

Based on customer inputs, Keysight understands that good battery life is essential for remote, on-site testing.

There is often no convenient conventional AC power line connection available at remote BTS or antenna sites.

Keysight N9330B incorporates advanced battery pack technology with intelligent charging technology, to provide you with up to four hours of continuous use.

To maximize useful instrument test time when on site, each tester incorporates smart power management to help conserve battery power.

The long-life lithium-ion batteries in the N9330B have no 'memory', which is an important improvement over earlier battery types.

When extended operation is necessary, you simply switch batteries which only takes seconds.

Earlier battery technology used in some portable testers allowed only limited tester operating time before needing recharging.

### Worldwide service support

Of course, when you buy an Keysight tester, you are confident that should you need it you have the best worldwide support.



The Keysight N9330B Cable and Antenna Tester – The newest in Keysight's lineup of low cost handheld instruments.



## N9330B Handheld Cable and Antenna Tester Specifications

<b>Test functions</b>	
	Return loss
	SWR
	Cable loss
	Distance-to-fault (DTF)
<b>Frequency range</b>	
	25 MHz to 4.0 GHz
<b>Frequency resolution</b>	
	100 KHz
<b>Output power</b>	
	0 to -20 dBm
<b>Measurement speed</b>	
	< 2 second/screen (full span, 521 data point) (CW sweep mode) (3.0 ms/data point, typically)
<b>Number of data points</b>	
	(Maximum): 521 (Selectable 521, 261, 131)
<b>Return loss</b>	
Range	0.00 to 60.00 dB
Accuracy	$A = 20 \times \log_{10} (1.1 + 10^{-(D-RL)/20} + 0.016^{(-RL/20)} \times 10 + 10^{(-3+RL/20)})$
D	Directivity of calibrator
RL	Return loss value of DUT
Resolution	0.01 dB
<b>SWR</b>	
Range	1.00 to 65.00
Accuracy	Same as RL
Resolution	0.01
<b>Cable loss</b>	
Range	0.00 to 30.00 dB
Resolution	0.01 dB
<b>Measurement accuracy</b>	
	> 42 dB corrected directivity after mechanical calibration
	> 38 dB corrected directivity after electronic calibration
<b>Distance-to-fault</b>	
Vertical range	Return loss: 0.00 to 60.00 dB
	SWR 1.00 to 65.00
<b>Range</b>	
	Number of data points - 1) x resolution
	Number of data points = 521, 261, or 131
<b>Resolution</b>	
	Resolution (meter) = $(1.5 \times 10^{-8}) \times (Vp)/(f2-f1)$ Hz
	Where Vp is the cable's relative propagation velocity
	Where f2 is the stop frequency and f1 is start frequency
<b>Markers</b>	
	6
<b>User storage: Internal user flash memory</b>	
Instrument setup storage	Up to 15
Trace data storage	Up to 200 traces
Screen images storage	10 screens
	Support USB memory stick for instrument setup, trace data and screen image storage
<b>General</b>	
Display	6.5" 640 x 480 transfective color LCD with adjustable backlight

## N9330B Handheld Cable and Antenna Tester Specifications (continued)

<b>Input and output ports</b>	
RF test port	Type N, female, 50 $\Omega$
Maximum input without damage	+25 dBm, $\pm$ 50 VDC
USB master	1 x A plug v1.1 protocol
USB slave	1 x B plug v1.1 protocol
<b>Electromagnetic compatibility</b>	
IEC 61326-1:1997+A1	1998/EN 61326-1:1997+A1:1998
CISPR 11:1990/EN 55011	1991 Group 1 Class A
IEC 61000-4-2:1995+A1	1998/EN 61000-4-2:1995 (ESD 4kV CD, 8 kV AD)
IEC 61000-4-3	1995/EN 61000-4-3:1995 (3 V/m, 80% AM)
IEC 61000-4-4	1995/EN 61000-4-4:1995 (EFT 0.5 kV line-line, 1 kV line-earth)
IEC 61000-4-5	1995/EN 61000-4-5:1995 (Surge 0.5 kV line-line, 1 kV line-earth)
IEC 61000-4-6	1996/EN 61000-4-6:1996 (3 V, 0.15 to 80 MHz, 80% AM, power line)
IEC 61000-4-11	1994/EN 61000-4-11:1994 (Dips 1 cycle, 100%)
Canada	ICES-001:1998
Australia/New Zealand	AS/NZS 2064.1
<b>Safety</b>	
IEC 61010-1	2001/EN61010-1:2001, CSA C22.2 No.61010-1:2004, UL61010-1:2004
<b>Temperature</b>	
Operating temperature range	-10 $^{\circ}$ C to +50 $^{\circ}$ C (using battery)
	0 $^{\circ}$ C to +40 $^{\circ}$ C (using AC-DC adapter)
Battery charging temperature range	0 $^{\circ}$ C to +50 $^{\circ}$ C
Storage temperature range	-40 $^{\circ}$ C to +70 $^{\circ}$ C
Battery storage temperature range	-20 $^{\circ}$ C to +70 $^{\circ}$ C
<b>Environmental</b>	
	According to Keysight Environmental Test Manual class OE, except temperature
<b>Power supply</b>	
External DC Input	+11 to +25 V DC, 40 W min.
Internal battery	Rechargeable lithium-ion battery. 4 hours operating time
<b>Dimensions</b>	
Size (W x H x D)	317 mm x 207 mm x 69 mm (12.5 in x 8.1 in x 2.7 in)
Weight	Net weight: 2.6 kg (5.73 lbs)
	Weight with battery: 2.9 kg (6.39 lbs)

## N9330B Handheld Cable and Antenna Tester Specifications (Continued)

### N9330B handheld cable and antenna tester



Soft carrying case



Hard transit case



Rechargeable battery



Phase-stable extension cable



Automotive 12 V DC adaptor



Electronic calibrator



T-combo' open/short/50 Ω load



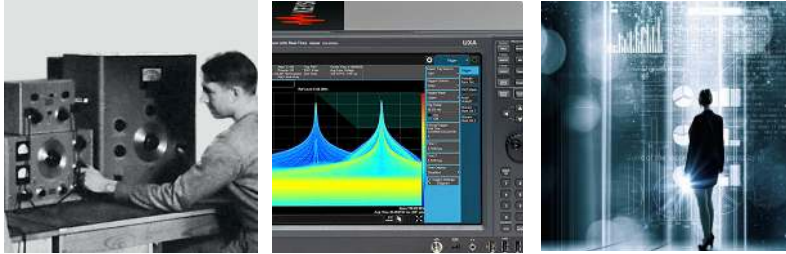
## Ordering Information

Model	Description	Connectors
N9330B	25 MHz to 4 GHz handheld cable and antenna tester Accessories supplied as standard with the tester: <ul style="list-style-type: none"> <li>– Soft carrying case</li> <li>– Rechargeable battery</li> <li>– AC-DC adaptor with power cord</li> <li>– USB cable</li> <li>– Quick-start tutorial</li> <li>– Documentation CD (also includes measurement analysis PC software)</li> </ul>	
<b>Options</b>		
201	Precision mechanical short/open/50 $\Omega$ load, DC to 4 GHz	N-type (male)
202	Precision mechanical short/open/50 $\Omega$ load, DC to 4 GHz	7/16 DIN (male)
203	Electronic calibrator	N-type (male)
301	Phase-stable extension cable 1.5 m	Type-N (male) to type-N (female)
302	Phase-stable extension cable 1.5 m	Type-N (male) to 7/16 DIN (female)
303	Connector adaptor	Type-N (male) to 7/16 DIN (female)
BAT	Spare battery pack	
BCG	External battery charger	
1DN	Automotive 12 V DC charger	
1TC	Hard transit case	
ADP	Spare AC-DC adaptor	
ABA	Hard copy English User Guide	
AB2	Hard copy Chinese User Guide	
PWM	Power monitoring (USB power sensor not included)	
<b>Calibration</b>		
<b>Select Keysight calibration plan</b>		
R-50C-011-3	3-year calibration assurance plan (return to Keysight): Priority calibration service covering all calibration costs for 3 years; 15% cheaper than buying stand-alone calibrations.	
R-50C-011-5	5-year calibration assurance plan (return to Keysight): Priority calibration service covering all calibration costs for 5 years; 20% cheaper than buying stand-alone calibrations.	

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