9102 and 9103

Handheld Spectrum Analyzers

AEROFLEX
A passion for performance.

Highlights

- Covering all applications in a frequency range up to 7.5 GHz
- Supporting radiation measurements at base stations and broadcast transmitters
- Ideal for cable and antenna test and mobile service and repair
- Applicable for commissioning, installation, maintenance and manufacturing
- Allows external reference connection for highest frequency accuracy

The 9102 and 9103 handheld spectrum analyzers provide RF engineers and service technicians with the excellent performance of a workbench analyzer, but with a handheld form factor and at a competitive price.

One Instrument For All Your Needs

- Installation troubleshooting, repair and maintenance.
- Acceptance and installation troubleshooting of antenna and cable installations.
- Assessment and verification of electromagnetic radiation to verify measures against EMI.
- Production test and alignment of the output of RF modules.
- Field measurements and verification of base station emissions.
- Used to detect and locate faulty mobile phone parts and components.

Typical measurements with the 9102 or 9103 handheld spectrum analyzer include transmitter testing, alignment of modulators and measuring switch breakthrough. Additional options such as a tracking generator, the 9160 VSWR/DTF bridge and the 9130 VSWR/DTF reflection measurement option expand the capabilities of the 9102 and 9103. This full-featured analyzer is fully controllable via the front panel or by remote control from a PC.

For base station installation or maintenance engineers, the 9102 and 9103 offer the full scope of common performance measurements of BTS antenna systems: return loss (reflection), tower-mounted amplifier (transmission) and distance to fault measurement with a standard resolution of 501 points in one lightweight device.

Measurement results and instrument settings can easily be transferred to a PC for presentation or post-processing. This rugged portable instrument is suitable for indoor and outdoor use, and with its excellent technical data and extensive feature set meets many application needs.

The 9100 Series - Companions With a Rugged Design For Field and Lab Applications

We have tested the 9102 and 9103 handheld spectrum analyzers according to all relevant and applicable standards for bench and portable field measurement equipment against RF radiation, conduction, static discharge (EN 55022, IEC 61000-4) and shock steadiness (EN 60068).

Comprehensive Feature Set In- Single-Button Measurement

With its clear and easy operation, the 9102 and 9103 Handheld Spectrum Analyzers present all measurement functions required to quickly and precisely resolve measurement tasks. The user-friendly interface with intuitive soft keys enhances operational efficiency.

Frequencies are Increasing - Needn't Break the Budget

The wide frequency range from 100 kHz to 4 GHz (standard delivery) enables testing of RF systems and modules such as modern wireless local oscillators.

This frequency coverage also captures the higher harmonics from amplifier or oscillator modules, plus any spurious signals that can mix and break through into the pass-band. With the complete coverage of carrier, IF stages and audio frequencies, the 9102 and 9103 provide the performance needed.

The frequency range of the 9103 spectrum analyzer also covers the frequency range between 5 and 6 GHz. This band serves new broadband wireless access technologies such as WiMAX and Wireless LAN; commercial and military radio services in the C band are located here as well. The 7.5 GHz frequency range is also available in the 9102 equipped with the optional 9151 frequency extension 7.5 GHz.

Manual or Automatic Control Made Simple

Controlling the 9102 or 9103 with a PC is easy and convenient via built-in RS-232 interface or ethernet port. All functions of the spectrum analyzer can be controlled via the industrial standard remote control SCPI command set.

Convenience

No time is wasted in setting up the instrument or hand-copying settings from one instrument to the other. The 9100 data exchange software, which comes with the 9100 series instruments, supports enhanced manage and transfer functions.

Channel systems, limit templates, settings and correction tables can be easily set up and maintained on a PC. Building new limit templates and correcting tables is child's play, using the PC's mouse.

A live trace can be continuously downloaded from the instrument using optional software. An easy export to standard graphic formats such as BMP and JPG supports the need for quick documentation of measurement data. Likewise, stored traces can be uploaded to set the unit to the previous measurement settings.

Easy-to-Read Screen Facilitates Signal Tracing

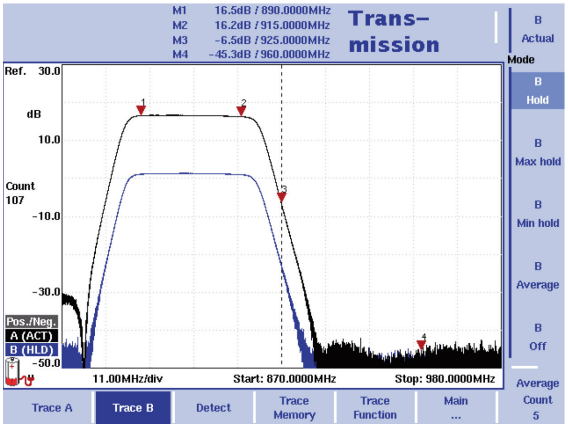
The high-resolution colour VGA display (640 x 480 pixels) is excellent for finding misleading spurs or aligning modulators. Multiple colours facilitate the comparison of measurement traces on the screen. The extra bright 6.5" TFT display has a superb 140° viewing angle and thanks to its high luminous intensity, is ideally suited for outdoor applications. 501 measuring points in a trace allow the comprehensive evaluation of a complex frequency spectrum at a glance.

Markers Assist in Precise Reading of Signals

Six markers allow for exact reading of complex signals. The transmitter performance can be checked, spurious signals can be detected and sideband levels can be established, using the markers with their flexibility and clear on-screen display. By pressing delta marker, second and third harmonic levels can easily be checked. Power level and frequency are displayed in relation to a reference point.

Pass/Fail Verdict with Limit Templates

Limit templates simplify assessment of complex displayed signals and allow users to decide whether the signal passes or fails. These templates can contain up to 30 segments. Simultaneously, it can be established if the signal exceeds an upper and/or lower limit or not.



Measuring the amplifier characteristics with the 9150 Tracking Generator Option

High-Precision Frequency Measurement

The integrated frequency counter expands the range of applications to high-precision frequency measurements, required for many tasks, such as mobile phone repair. These can now be performed with the 9102 and the 9103. For high-precision frequency measurements, users no longer need to utilize expensive spectrum analyzers or additional frequency counters. The precision can be increased even further by connecting an external frequency reference.

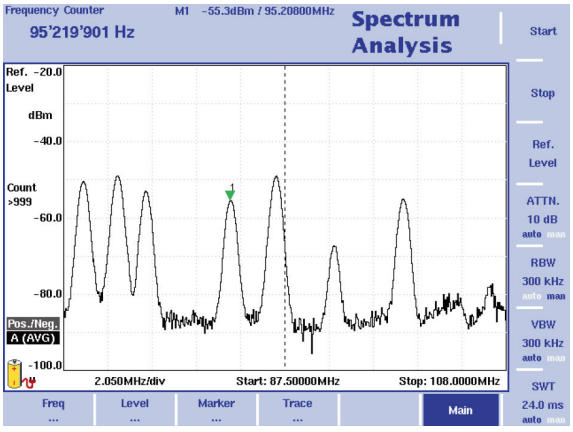
Meets Future Requirements

With the multi port, the 9102 and the 9103 are designed to meet future requirements. The analyzers automatically detect external options designed for this highly flexible spectrum analyzer, provide access to special measurement functions and apply the corresponding correction values.

Get More Out of Digitally Modulated Signals Through Channel Power Measurement Functions

The 9102 and 9103 offer channel power, adjacent channel power ratio (ACPR) and occupied bandwidth (OBW) measurement capabilities. ACPR enables measurements of the leakage power from a modulated communication channel into an adjacent channel.

The occupied bandwidth measurement represents the part of the transmitted power that lies in a specified bandwidth.



Checking the exact frequency with the built-in frequency counter

This measurement function can supply useful qualitative information about the used bandwidth, e.g. give useful insight into transmitter operation.

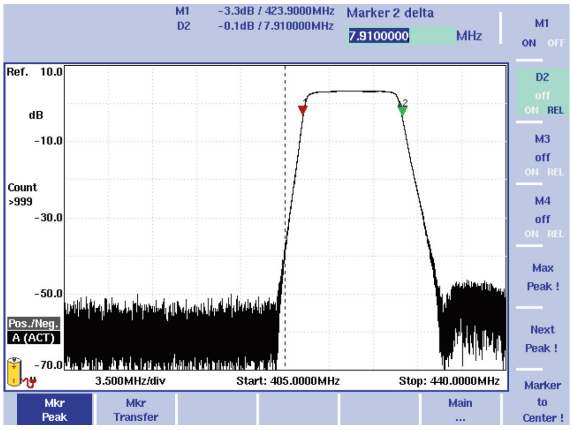
This single-button function allows rapid measurement delivering information on the characteristics of the specified communication channel. All significant values are displayed at a glance.

Additionally, channel power measurement, ACPR and OBW are implemented into the spectrum analysis mode. In contrast to the single-button operation, a user can set measuring range, resolution and sweep time freely according to individual needs. In this way, measurements can easily be set up when predefined communication systems cannot be used.

Accurate Measurements in Different RF Environments

When performing amplitude measurements with a spectrum analyzer, it is necessary to correct any effects that alter the signal of interest between the device under test (DUT) and the analyzer. External devices such as cables, amplifiers, antennas and additional attenuators can influence the signal level. In the instrument software, built-in amplitude correction is realized. The external device compensation function takes a list of frequency and amplitude pairs.

Connected linearly, these points offset the input signal accordingly. It is easy to set up this correction table using the 9100 data exchange software.



Typical measurements tasks: cut-off frequencies in the pass-band

Easy adjustment to different impedance situations

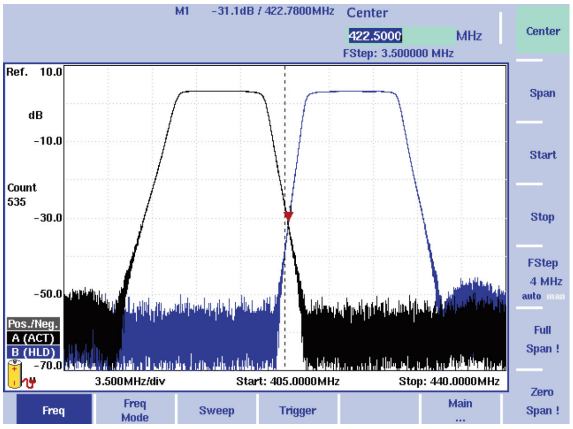
While an impedance of 50 Ω is most common in most RF environments, cable TV systems apply 75 Ω. The 9102 and the 9103 support this standard as well. When switching between impedances, the corresponding correction table is automatically loaded to ensure correct measurements. An optional matching pad is available to correctly terminate the cable.

AM and FM Demodulation

The presence of audio signals can be checked by demodulation of AM or FM signals using zero span mode or demodulation at the marker position and listening via the built-in loudspeaker.

Digital Signal Processing with Reloadable Digital IF

RF signals are digitally processed by microprocessor and field-programmable gate arrays (FPGA) to ensure both superb accuracy and repeatability as well as flexibility for future requirements.



Isolation between receive and transmit stages

Small and Portable

With its minimal footprint, the 9100 series is suitable for usage both on the bench and in the field. The low weight makes these spectrum analyzers highly portable instruments in the lab and supports mobile applications in the field that seemed impossible before.

The Aeroflex 1500 battery charger can recharge additional battery modules outside the 9100. The batteries are easy to exchange, preparing the instrument for many additional hours of independent operation in the field.

7.5 GHz – Standard in the 9103, Optional in the 9102

While the 9102 can be optionally equipped with 7.5 GHz frequency extension, 7.5 GHz is standard with the 9103. This frequency range is used by new broadband wireless standards like C band uplink and downlink for satellite services.. All spectrum analyzer measurement functions, such as channel power, OBW and EMF are also available in the extended frequency range.

Existing 9102 instruments can be upgraded to the extended frequency range

The 9102 can be fitted with the 9151 frequency extension 7.5 GHz or the tracking generator option. The 9103 handheld spectrum analyzer allows measurements up to 7.5 GHz and can also hold an additional tracking generator.

9132 RMS Detector Option

The 9132 RMS detector helps to analyze digitally modulated signals better. It adds high precision to the channel power measurements of the 9102 and the 9103. Broadband and narrowband signals can be measured alike with great accuracy, as the new detector is capable of analyzing signals that are similar to noise on the spectrum display. Such signals are smoothed and displayed with the precise RMS level.

Tracking Option

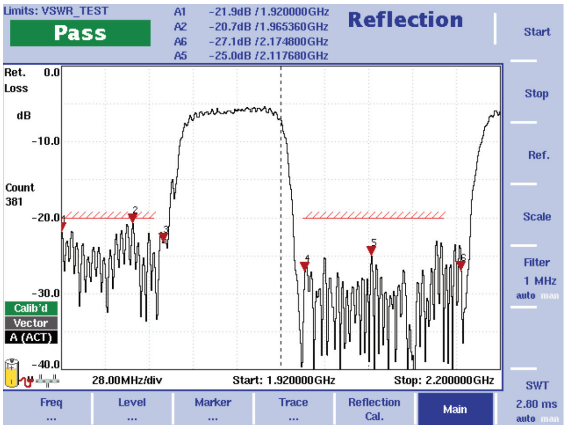
The tracking generator with its output frequency range from 1 MHz to 4 GHz expands the application range of the 9102 and 9103 hand-held spectrum analyzers into areas like Distance-to-Fault (DTF) and reflection measurements (VSWR). The level of the tracking generator is adjustable from –10 to –30 dBm, which allows adaptation of the output signal to the demands of passive and active devices under test. (Note: the tracking generator is not available for the 9102 with the 9151 frequency extension 7.5 GHz installed.)

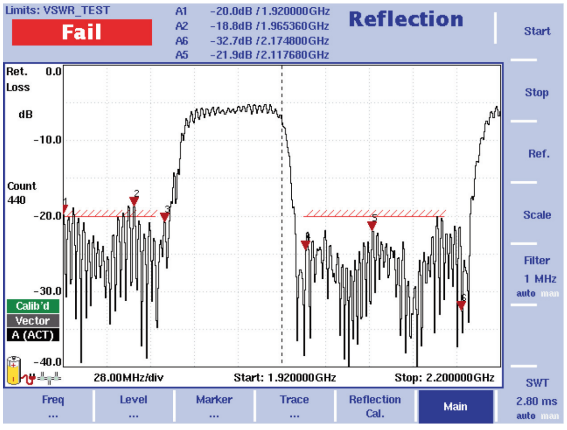
9162 Insertion Power Sensor

Whenever high power levels up to 50 W have to be measured, the 9102 or the 9103 with the 9162 insertion power sensor is the right solution. A wide frequency range allows to analyze critical applications like the output power of base stations, radios and other transmitters that can now be monitored easily. The power sensor menu shows the forward and reverse power in one view. Measurements are optimised for CW, GSM, UMTS, CDMA and DVB-T signals.

9168 GPS Receiver Option

The 9168 GPS receiver option allows to obtain precise measurements together with current GPS-derived coordinates. It is simple and requires only one command to link positional coordinates with the measurements of the 9102 and 9103 handheld spectrum analyzers. The option utilizes the multi port and the RS-232 interface of the instrument. The current position, speed and altitude can be displayed on the screen in different formats. The 9168 GPS receiver option also makes it easy to prove the location where a measurement trace has been taken, which can be important when performing reflection or EMF measurements in the field.



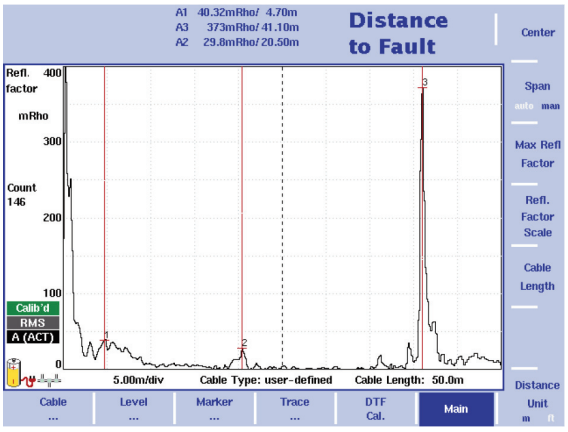


Using Limit Lines, the antenna system can be approved with one view focusing on the return loss in the uplink and downlink.

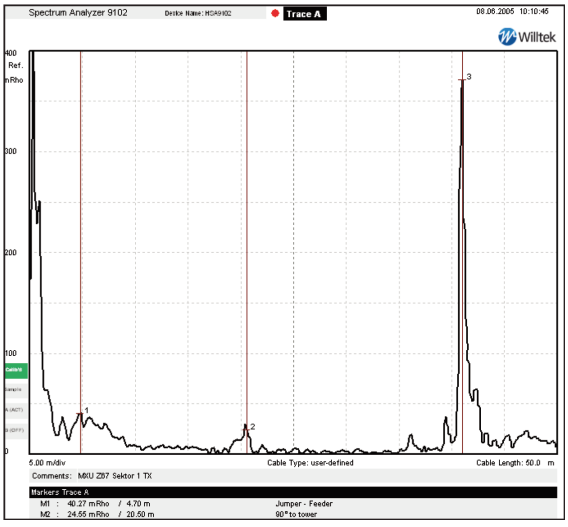
The 9130 VSWR/DTF reflection measurement option, in conjunction with the 9160 VSWR/DTF Bridge, turns the 9102 or 9103 into a full-featured reflection test set.

Today's complex antenna installations include tower mounted amplifiers, cross polarised antennas and long cable feeds. Measuring the antenna impedance match is the state-of-the-art method to analyze the antenna system performance. With the 9102 or 9103 and the 9130 VSWR/DTF reflection measurement option, measurement technicians are ready for all the test challenges involved between 1 MHz and 4 GHz.

All relevant functional parameters are available on a glance with the reflection measurement mode. With the limit line capability results can easily be compared with the limits specified by the network operator. Depending on user preference, the device displays the measured value either as a return loss or in other custom units such as standing wave ratio (VSWR), reflection coefficient (rho) or reflected power ratio.



Precise detection and location of even smallest cable faults on site with the DTF mode.



Easy and time-saving documentation of the installer's work quality in the office with the 9100 Data Exchange Software.

Vector Analysis For Accurate Reflection Measurements

Modern antenna systems for professional applications are characterised by a low reflection and a good match. The high performance is validated for field acceptance and maintenance using precise instruments. The 9130 VSWR/DTF reflection measurement option provides high precision because it performs vector measurements on the reflected wave. This type of measurement offers advanced accuracy and highly reliable results even at low reflected signal levels beyond –20 dB of return loss.

DTF Measurements For Cable Performance Testing

Antenna installations are never complete without distance-to-fault (DTF) measurements. The 9130 VSWR/DTF reflection measurement option provides this type of test, based on FDR (Frequency Domain Reflectometry) technology. This system option supports a detailed analysis of the antenna feeder cable with a total length of up to 1000 m (3280 ft). Worn-out connectors, cable kinks, water ingress or other cable related problems can be easily detected and located. The high measurement resolution of 501 points ensures quick and efficient troubleshooting by detecting even small reflections; these result in a displayed distance to fault.

Prepared For All Cable Types

Aeroflex provides predefined cable parameter files for most known coaxial cables used for installations. They can easily be uploaded to the 9100; the parameters for rare cable types can be determined with the instrument. The user decides whether he wants to set the measurement range manually or automatically.

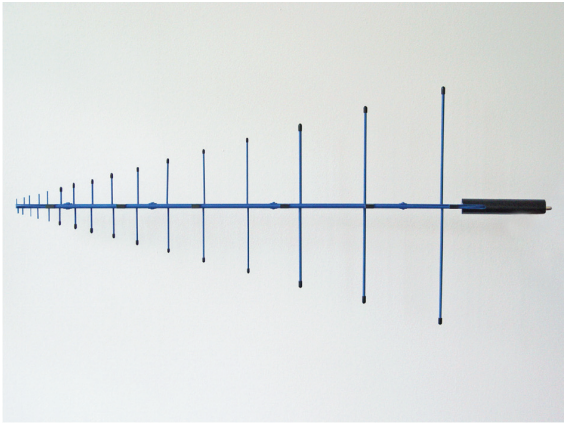
One Port Cable Loss Measurement

Measuring cable loss is easy only as long as both ends of a cable are accessible. However, for cables which are either reeled or already installed, this does not apply. The one port cable loss measurement mode helps to test from one end of the cable while the other end is either shorted or left open. After defining the applicable frequency range for the measurement, the average attenuation can be read from the result field, while the screen shows the frequency response of the cable.

9160 VSWR/DTF Bridge – Just Plug and Go

A measurement bridge is the necessary tool for reflection measurements. Aeroflex offer a measurement bridge tailor made for the 9102 and 9103 handheld spectrum analyzers: The 9160 VSWR/DTF Bridge covers the frequency range up to 4 GHz and fits perfectly to the RF connectors of the 9102 and 9103. High directivity is the basis for the precision achieved in the return loss measurement. The 9102 and 9103 both provide supply voltage through its multi port. Just plug in the bridge and it is ready for a full set of new features.

Radiation Measurements with the 9131 EMF Measurement Option



A directional antenna is the perfect fit for emission measurements

Immission measurements are easy to perform with the Isotropic Antenna

Radiation from base stations and broadcast stations can be measured easily with the 9102 or 9103 and the 9131 EMF measurement option. The 9100 takes measurements of the electromagnetic field over a user-definable frequency range and displays the field strength (in V/m) or the power flux density (in W/m²).

The option also allows selecting one of two additional filters (9 and 120 kHz resolution bandwidth) which are typically used for radiation measurements.

Radiation emission

With these measurements, operators of cellular networks and broadcast stations fulfil a requirement from the regulator; many countries stipulate a proof that the radiation of the installed transmitter is within specified limits. A directional antenna helps to measure the emitted radiation.

Only the 9102 or 9103 handheld spectrum analyzer equipped with the 9131 EMF measurement option and the directional antenna is required to perform emission measurements in accordance to the ICNIRP standard. The combination provides a handheld solution that is easy to carry, easy to read even at daylight, and easy to convert into a system for other test requirements such as antenna system measurements.

… And Immission

Engineering offices and regulatory bodies are interested in the radiation exposure in a particular place. The 9102 or 9103 with the 9131 EMF measurement option and an appropriate antenna measures electromagnetic waves omni-directionally. The overall field strength of the desired frequency range is displayed. The lightweight, hand-portable spectrum analyzer eases measurements in the field, and the user enjoys the clear reading from the bright display.

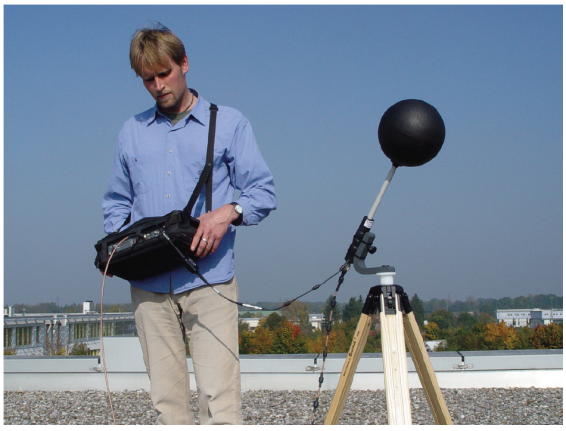
Cyclic measurements of the interference are possible with the integrated support for remote control. Two interfaces – an RS-232 and a LAN connector – offer choices for controlling the instruments over a modem or a local network.

Aeroflex offers two antennas for immission measurements: the 9170 biconical antenna and the 9171 isotropic antenna. Both support measurements in all directions, but use different ways to accomplish the goal.

By manually turning the dipole antenna element of the 9170 biconical antenna, the same antenna pair can be used to take measurements in different directions. This helps to keep variations in the results to a minimum. The 9102 and 9103 handheld spectrum analyzers support consecutive measurements in three axes and calculates the resulting field strength.

The 9171 isotropic antenna includes six antenna elements. The 9102 or 9103 measures the signal from each pair of antenna elements consecutively; it switches the elements via the multi port of the 9102 or 9103. The analyzer detects the antenna type automatically and loads a set of specific calibration values from the antenna into the 9102 or 9103, which provides even higher accuracy of the measurement results.

Measurement with 9170 Biconical Antenna



Measurement with the handheld spectrum analyzer and the 9171 Isotropic Antenna

SPECIFICATIONS

Specifications valid after 30 minutes warm-up time at ambient temperature, specified environmental conditions and typical measurement range, within a period of one year after calibration.

FREQUENCY

Frequency Range

Measurement Range

9102 (Basic Instrument)

100 kHz to 4 GHz

9103, 9102 with 9151

100 kHz to 7.5 GHz

Resolution

1 kHz

REFERENCE FREQUENCY

Temperature Stability

±2 ppm

Aging

±1.5 ppm

Frequency Uncertainty

±1.5 ppm

FREQUENCY COUNTER

Resolution

1 Hz, 10 Hz, 100 Hz

Min. Required Input Level

–90 dBm

FREQUENCY SPAN

Setting Range

9102 (Basic Instrument)

0 Hz, 10 kHz to 4 GHz

9103, 9102 with 9151

0 Hz, 10 kHz to 7.5 GHz

SWEEP TIME

Span > 10 kHz

1 ms to 250 s

Span = 0 Hz

1 ms to 250 s

RESOLUTION BANDWIDTH (RBW)

RBW Selection

Manual or automatic

RBW (–3 dB) Range

100 Hz to 1 MHz

Steps

1, 3, 10

VIDEO BANDWIDTH (VBW)

VBW Selection

Manual or automatic

VBW Range (–3 dB)

10 Hz to 1 MHz

Steps

1, 3, 10

SSB NOISE

9102 (Basic Instrument)

f = 2 GHz, Δf = 100 kHz,	*< –80 dBc/Hz*
RBW = 10 kHz, VBW = 1 kHz	*typ. < –83 dBc/Hz*

9103, 9102 with 9151

f = 5.7 GHz, Δf = 100 kHz,	*< –80 dBc/Hz*
RBW = 10 kHz, VBW = 1 kHz	*typ. < –83 dBc/Hz*

AMPLITUDE

Maximum Safe DC Voltage at RF in

±50 V

Maximum Safe Input Power

30 dBm

Display Units

dBm, dBμV, dBmV, dBV, dB, V, mV, μV, mW, W

MEASUREMENT RANGE

In Automatic Mode

Average noise floor to 20 dBm

DISPLAYED AVERAGE NOISE LEVEL (DANL)

(RBW = 100 Hz, attenuation = 0 dB)

9102 (Basic Instrument)

10 MHz to 1 GHz	*< –127 dBm, typ. –130 dBm*
1 GHz to 4 GHz	*< –130 dBm, typ. –135 dBm*

9103, 9102 with 9151

10 MHz to 5 GHz	*< –120 dBm,typ. < –123 dBm*
5 to 7.5 GHz	*< –118 dBm, typ. < –120 dBm*

INPUT ATTENUATION

User-defined by direct entry or step keys. 0 dB only selectable by direct entry to protect the first mixer.

Setting Range

(0) 10 to 50 dB

Attenuation Steps

10 dB

DYNAMIC RANGE

Range

> 70 dB

Max. Measurable Input Level

20 dBm(attenuation = 40 dB)

9102 (Basic Instrument)

Min. Measurable Input Level

–130 dBm

9103, 9102 with 9151

Min. Measurable Input Level (<4 GHz)

–119 dBm

Min. Measurable Input Level (4 GHz to 7 GHz)

–120 dBm

Min. Measurable Input Level (7 GHz to 7.5 GHz, Attenuation = 0 dB)

–112 dBm

LEVEL ACCURACY

(Input Attenuation = 10 dB, Ambient Temperature from +20°C to +26°C)

10 MHz to 3.6 GHz	±1 dB
3.6 GHz to 7.5 GHz	±1.5 dB, typ. ±1 dB

RF INPUT MATCH

(input attenuation = 10 dB)

VSWR 9102 (basic instrument),

10 MHz to 4 GHz	< 1.6	typ. < 1.5

9103 and 9102 with 9151

100 MHz to 4 GHz	< 1.6,	typ. < 1.3
4 GHz to 6 GHz	< 2.0,	typ. < 1.6
6 GHz to 7.5 GHz	< 2.3,	typ. < 2.0

REFERENCE LEVEL

Reference Level Setting By Keyboard Entry or Step Keys

Setting Range

–100 to +30 dBm

Resolution

0.1 dB

SPURIOUS RESPONSE OF 9102 (BASIC INSTRUMENT)

Image Rejection (f = 1 GHz)

> 80 dB

Spurious Level

< –90 dBm

(attenuation = 0 dB)

LO Leakage

< –77 dBm

(attenuation = 10 dB)

Intermodulation-Free Range

> 63 dB

(input level –30 dBm, f1 = 990 MHz, f2 = 992 MHz)

SPURIOUS RESPONSE OF 9103 AND 9102 WITH 9151

Image Rejection (f = 6.7 GHz)

> 60 dB

Spurious Level (100 kHz to 3 GHz)

< –86 dBm

Spurious Level (3 GHz to 7.5 GHz, attenuation = 0 dB)

< –80 dBm

LO Leakage (f = 7.7 GHz)

< –57 dBm

(attenuation = 10 dB)

FUNCTIONS

DETECTOR & SWEEP

Detector Types

Pos./neg. peak, pos. peak,
neg. peak, sample, (RMS optional)

Sweep Processing

Actual, average, max. hold,
min. hold

TRACE

Max. Displayed Traces

2

Trace Points

2 x 501[1]

Trace Functions

A + B →A, A – B →A,

Copy a>b, copy b>a

Trace A

Colour selectable (default is black)

Trace B

Colour selectable (default is blue)

[1] Two independent traces are available (min. hold, max. hold at the same time)

MARKER

Max. Markers

6

Delta Markers

5

Marker Functions

max. peak, next peak

Transfer Functions

M → centre frequency

M → ref. level

M → f step

LIMIT CHECK

Max. no. of Limit Templates

99

Limit Functions

upper, lower, upper and lower

Max. no. of limit Segments

30

SUPPORTED MEASUREMENT MODES

Spectrum analysis

Channel power

Signal generator (option)

Transmission (option)

Reflection (option)

Distance to fault (option)

Cable loss (option)

EMC (option)

POWER MEASUREMENT

Max. no. of Channel Systems

99

Measurement Functions

Channel Power, ACPR, OBW

Default Systems

GSM, WCDMA, DECT, WLAN

DEMODULATION

Min. Input Level

–50 dBm

AM/FM

on marker/permanent/on multi marker

KEYBOARD

Key Type

silicon click

Parameters Shortcut Keys

Cent, Span, Ref

Quick Setting Keys

Preset, Hold/Run, Clr Trc, RCL/Store, PARAM, MODE, MKR

GENERAL

DISPLAY (TFT)

Size

6.5"

Resolution

640 x 480

Colours

256

Brightness

300 cd

Measurement Result Points

2 x 501[1]

POWER SUPPLY

DC Voltage, External

11 to 15 V / max. 28 W

Internal Battery

Li–Ion

Operating Time

min. 2.0 h, battery fully charged, full brightness, TG on

MEMORY

Type

Flash disk

Capacity (Setups and Traces)

257

DIMENSIONS (W X H X D)

9102

355 x 190 x 91 [mm]

14.0 x 7.5 x 3.6 [inch]

9103

355 x 190 x 104 [mm]

14.0 x 7.5 x 4.1 [inch]

[1] Two independent traces are available (min. hold, max. hold at the same time)

WEIGHT

With Battery

9102

3.2 kg (7 lbs)

9103

3.6 kg (8 lbs)

Power Supply Only

0.32 kg (0.7 lbs)

ENVIRONMENTAL CONDITIONS

(Unless Otherwise Specified)

MIL-PRF28800F class 2

Operating Temperature

0 to +45°C

Storage Temperature

–10 to +50°C

Rel. Humidity (Non-Condensing)

80%

CONNECTORS

RF IN

Connector Type

N (female)

Impedance

50 Ω

MULTI PORT

Connector

7-pin ODU

DC Voltage

10 V, 300 mA

Short-Circuit Protected

Active

Switched Control Bus

I^2C

DC IN

Connector

2.1 mm dia. barrel jack socket

Max. Current

3 A

HEADPHONE

Headphones Output

3.5 mm mini jack

Loud Speaker

SERIAL INTERFACE

For software updates and remote control

Connector

DB-9 (male)

Speed

57.6 kbit/s

Required cable

Null modem cable

LAN (TCP/IP)

For software updates and remote control

Connector

RJ-45

Speed

10 Mbit/s

External Trigger

External Trigger Input

LVTTL/LVCMOS 0 to 3 V

Connector

BNC

EXTERNAL TIME REFERENCE

Ref. Frequency Input

5 MHz, 10 MHz, 13 MHz

Ref. Frequency Offset

< 10 ppm

Input level

> 0 dBm

Connector

BNC

OPTIONS

TRACKING GENERATOR

Output Frequency Range

1 MHz to 4 GHz

Output Level Setting Range

1 MHz to 4 GHz

–10 to –30 dBm adjustable in 1 dB steps

Output Level Uncertainty

1 MHz to 4 GHz < ±2 dB

Harmonics at –10 dBm

1 MHz to 4 GHz < –20 dBc

Spurious Level offset at –10 dBm

1 MHz to 10 MHz < –63 dBc

SSB – Phase Noise

Δf = 100 kHz < –73 dBc/Hz

Frequency Stability

According to reference frequency

Connector Type N, Female

Output impedance 50 Ω

9160 VSWR/DTF BRIDGE

Frequency Range

1 MHz to 4 GHz

Directivity

10 MHz to 3 GHz, typ. 35 dB

Insertion Loss

10 MHz to 3 GHz

RF in to DUT

< typ.11 dB

RF Out to DUT

< typ. 9 dB

Impedance

50 Ω

Weight

410 g

Connectors

N-type

Maximum Input Power

+20 dBm

9130 VSWR/DTF REFLECTION MEASUREMENT OPTION

Return Loss Measurement Range

70 dB

Reflection Measurement Units

dB, VSWR, mRho

Reflection Measurement

Vector, scalar

DTF Sweep Setting

Automatic or manual

DTF Resolution

501 points

DTF Max. Cable Length

1000 m, depending on cable attenuation

9131 EMF MEASUREMENT OPTION

Frequency Range

100 kHz to 7.5 GHz

Measurement Range

1 mV/m to 200 V/m

Measurement Units

dBV/m, V/m, dBm/m², W/m²

RBW (–6 dB) Range

9 kHz, 120 kHz

9162 INSERTION POWER SENSOR

Frequency Range

70 MHz to 2.7 GHz

Measurement Range

20 mW to 50 W

Measurement Units

mW, W, dBm

Directivity

> 25 dB

Insertion Loss

< 1 dB

Signal Types

CW, GSM, UMTS, CDMA, DVB-T, TETRA

STANDARD DELIVERY

Power supply (90 to 240 V, 50 to 60 Hz)

Getting started manual

User's guide on CD

9100 Data Exchange Software (1 license)

Cross-link Ethernet communication cable

ORDERING INFORMATION

Product Packages

9102 Handheld Spectrum Analyzer Bench Edition	M 100 412
9102 Handheld Spectrum Analyzer Field Edition	M 248 806
9102 Handheld Spectrum Analyzer Tracking Edition	M 248 801
9102 Handheld Spectrum Analyzer VSWR/DTF Edition	M 248 802
9103 Handheld Spectrum Analyzer Bench Edition	M 100 403
9103 Handheld Spectrum Analyzer Field Edition	M 248 813
9103 Handheld Spectrum Analyzer Tracking Edition	M 248 814
9103 Handheld Spectrum Analyzer VSWR/DTF Edition	M 248 815

Options

9130 VSWR/DTF Reflection Measurement Option	M 897 261
9131 EMF Measurement Option	M 897 274
9132 RMS Detector Option	M 897 275
9151 Frequency Extension 7.5 GHz (option to the 9102)	M 248 812
9160 VSWR/DTF Bridge	M 248 966
9162 Insertion Power Sensor	M 248 968
9168 GPS Receiver Option	M 248 811
9102 Tracking Generator Upgrade	M 248 804
9151 Frequency Extension7.5 GHz Upgrade for the 9102 (re-calibration necessary)	M 248 812

Accessories

9100 Battery module, 7.2 Ah	M 205 012
9100 Outdoor backpack	M 241 015
9100 Soft carrying bag	M 241 013
1500 Battery charger	M 204 097
9100 Power supply	M 248 328
9100 12 V car adapter	M 860 389
9100 Safety lock	M 867 037
9100 Data Exchange Software	M 897 137
9100 Serial communication cable	M 860 388
1205 RF Probe 20 dB Frequency range 100 kHz to 4 GHz RF attenuation (nominal at 50 Ω) 20 dB including adapter N (male), BNC (female)	M 248 640
1207 Inductive Probe Frequency range 4 MHz to 6 GHz 30 dB amplifier	M 248 971
9170 Biconical Antenna	M 860 368
9171 Isotropic Antenna	M 248 809
Antenna 400 MHz band (TNC)	M 860 264
Antenna 900 MHz band (TNC)	M 860 261
Antenna 1800 MHz band (TNC)	M 860 262
Antenna 1880 MHz band (BNC)	M 860 260
Antenna 2400 MHz band (TNC)	M 860 146
Triband Antenna	M 860 573
2.4, 5.3, 5.8 GHz; N-type connector Adapter N – TNC	M 886 098
Adapter N – BNC	M 886 097
Adapter N (f) - 7/16 (m)	M 886 334
Adapter N (m) - 7/16 (f)	M 886 332
Adapter N (m) - 7/16 (m)	M 886 333
Adapter N (f) - 7/16 (f)	M 886 331
Matching pad N 50 Ω to N 75 Ω	M 886 205
Matching pad N 50 Ω to F 75 Ω	M 886 204
Attenuator 18 GHz, 6 dB	M 874 061
Calibration Set Open/Short/Load, Type DIN 7/16 inch male	M 860 548
Calibration Set Open/Short/Load, Type N male	M 860 549
Composite Cable 10 m for 9171	M 860 396
Antenna Tripod	M 860 256
Bag for Antenna Tripod Related products	M 860 395
9101 Handheld Spectrum Analyzer Bench Edition	M 100 411
9101 Handheld Spectrum Analyzer Field Edition	M 248 800

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Our passion for performance is defined by three attributes represented by the icons pictured above: solution-minded, performance-driven and customer-focused.

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