

# 9101

## Handheld Spectrum Analyzer

**AEROFLEX**  
A passion for performance.



The 9101 Handheld Spectrum Analyzer provides RF engineers with the excellent performance of a workbench analyzer in a handheld form, at a competitive price.

### Highlights

- Covering all applications in a frequency range up to 4 GHz
- Ideal for mobile phone repair, basic testing in R&D labs, alignment testing for manufacturing and measurement of base station emissions in the field



### One Instrument For All Your Needs

- Used in mobile phone repair to detect and locate faulty mobile phone parts and components
- Used in R&D labs to assess the electromagnetic radiation and to verify measures against EMI
- Used in manufacturing to check and align the output of RF modules or units
- Used in the field to measure and verify base station emissions
- Used for installation troubleshooting, repair and maintenance e.g. in wireless local loop and modern 2.4 GHz Wi-Fi systems

Typical measurements include transmitter testing, alignment of modulators and measuring switch breakthrough. The analyzer is fully controllable via front panel or by remote control from a PC.

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 usage and with its excellent technical data and extensive feature set, meets many application needs.

### Comprehensive Feature Set In One-Button Measurement

With its clear and easy-to-use operation, the 9101 Handheld Spectrum Analyzer presents all the measurement functions required to quickly and precisely resolve measurement tasks. The user-friendly interface with logical softkeys enhances operation.

## Frequencies Are Increasing ...Needn't Break The Budget

The wide frequency range from 100 kHz to 4 GHz enables testing in 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. Its complete coverage of carrier, IF stages and audio frequencies gives the performance needed when other analyzers run out of bandwidth.

## Manual Or Automatic Control Made Simple

Controlling the 9101 from a PC is easy and convenient with the built-in RS-232 interface and Ethernet port. All functions of the spectrum analyzer can be controlled via the industrial standard remote control SCPI command set.



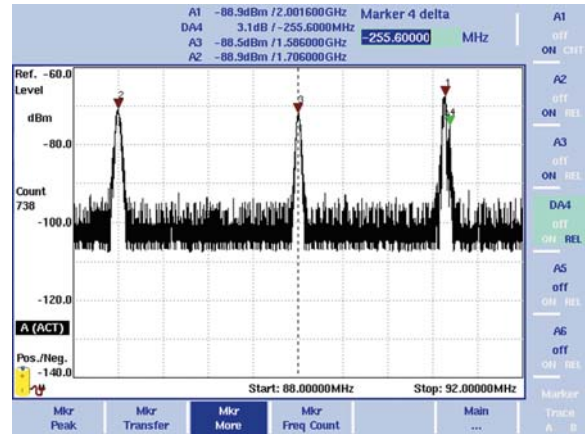
## Convenience

No time is wasted in setting up the instrument or copying settings from one instrument to the other by hand. The 9100 Data Exchange Software, which comes with the 9101, supports enhanced manage and transfer functions.

Channel systems, limit templates, settings and correction tables can easily be set up and maintained on a PC. The act of building new limit templates and correction tables is child's play, using the PC's mouse. A live trace can be downloaded from the instrument at all times. 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.

## 9132 RMS Detector Option

The 9132 RMS Detector helps to get more out of digitally modulated signals. It adds high precision to the 9101's channel power measurements. Broadband and narrowband signals can be measured alike with superb 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.



## Easy-to-read Screens Make All the Difference in Finding Signals

The high-resolution colour VGA display (640 x 480 pixels) is great 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 provides fast updates.

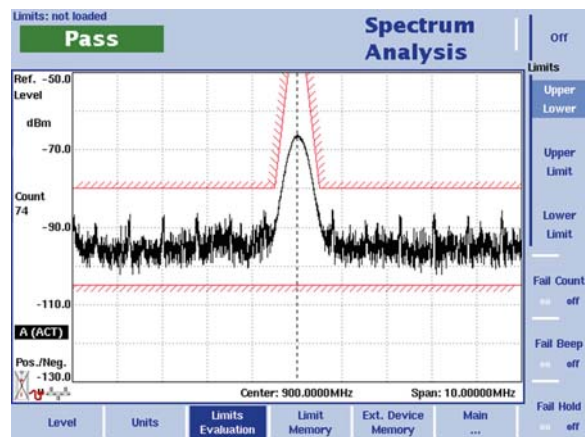
## Markers Help In Accurately Reading Signals

Up to four 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 four 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 lines simplify assessment of complex displayed signals, give users the ability to decide whether the signal passes or fails. These limit templates can be set up with 30 segments. At the same time it can be tested whether the signal exceeds an upper and/or lower limit.



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

The RMS power measurement capability offers Channel Power, Adjacent Channel Power Ratio (ACPR) and the Occupied Bandwidth (OBW). 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. This measurement function can give useful qualitative information about the used bandwidth, e.g. give useful insight into transmitter operation.

This one-button function allows rapid measurement and information about the behaviour of the specified communication channel. All significant values are displayed at a glance. Additionally, the channel power measurement, ACPR and OBW are implemented into the "Spectrum Analyzer Mode". In contrast to the one-key operation an experienced user can set the measuring range, the resolution and the sweep time freely according to individual needs. This way, besides defined communication systems, measurements are easily set up when pre-defined communication systems cannot be used.

### Accurate Measurements In Different RF Environments

When making accurate amplitude measurements with a spectrum analyzer, it is required that any effects that alter the signal of interest between the device under test (DUT) and the analyzer be corrected while measuring. External devices like cables, amplifier, antenna and additional attenuator can influence the signal level. In the instrument software, the built-in amplitude correction is realised. The "External Device Compensation" function takes a list of frequency and amplitude pairs. Connected linearly, these points offset the input signal accordingly. This correction table can be set up easily with the new "9100 Data Exchange Software".

### Easy Adjustment onto Different Impedance Situations

Besides the 50 ohm world, the 75 ohm impedance is common in cable TV. The instrument software supports this standard too. When switching between impedances the suitable correction table will be automatically loaded to assure correct measurement.

### AM and FM Demodulation

The presence of audio signals can be checked by demodulation of AM or FM signals using Zero Span mode and listening via the built-in loudspeaker.

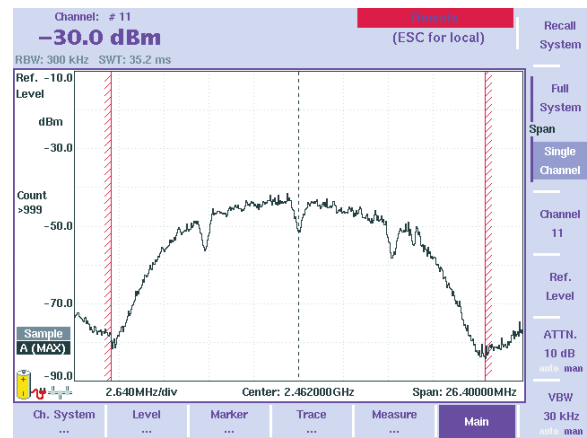
### Digital Signal Processing with Reloadable Digital IF

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.

### Small and Portable

With its minimal footprint, the 9101 is suitable for usage both on the bench and in the field. The low weight makes it a highly portable instrument in the lab and supports mobile applications in the field that seemed impossible before.

With the Aeroflex 1500 Battery Charger, additional battery modules can be recharged outside of the 9101. The batteries are easy to exchange, preparing the instrument for many hours of independent operation in the field.



## SPECIFICATIONS

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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

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#### FREQUENCY RANGE

##### Measurement Range

100 kHz to 4 GHz

##### Resolution

1 kHz

#### REFERENCE FREQUENCY

##### Temperature Stability

±2 ppm

##### Aging

±1.5 ppm/year

##### Frequency Uncertainty

±1.5 ppm

#### FREQUENCY COUNTER

##### Resolution

1 Hz, 10 Hz, 100 Hz

##### Min. Required Input Level

-90 dBm

#### FREQUENCY SPAN

##### Setting Range

0 Hz, 10 kHz to 4 GHz

#### SWEEP TIME

##### Span >100 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

( $f = 2$  GHz,  $\Delta f = 100$  kHz,  $RBW = 10$  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, μW

##### Measurement Range

##### In Automatic mode

Average noise floor to 20 dBm

##### DISPLAYED AVERAGE NOISE LEVEL (DANL)

(RBW = 100 Hz, attenuation = 0 dB)

##### 10 MHz to 1 GHz

<-127 dBm, typ. -130 dBm

##### 1 GHz to 4 GHz

<-130 dBm, typ. -135 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)

##### Min. Measurable Input Level

-130 dBm

#### LEVEL ACCURACY

(Input Attenuation = 10 dB, ambient temperature from +20°C to +26°C)

##### 10 MHz to 3.6 GHz

±1 dB

##### RF Input Match

(Input Attenuation = 10 dB, 10 MHz to 4 GHz)

##### VSWR

<1.6, typ. <1.5

##### Return Loss

<-12 dB, typ. <-14 dB

#### REFERENCE LEVEL

Reference level setting by keyboard entry or step keys

##### Setting Range

-100 to +30 dBm

##### Resolution

0.1 dB

#### SPURIOUS RESPONSE

##### Image Rejection ( $f = 1$ GHz)

>80 dB

##### Spurious Level (attenuation = 0 dB)

<-90 dBm

##### LO Breakthrough (attenuation = 10 dB)

<-77 dBm

## Intermodulation-Free Range

>63 dB

(Input level -30 dBm, f1 = 990 MHz, f2 = 992 MHz)

## FUNCTIONS

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### DETECTOR AND 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<sup>1</sup>

#### 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)

<sup>1</sup>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

### 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

## GENERAL

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### Display (TFT)

Size 6.5"

### Resolution

640 x 480

### Colours

256

### Brightness

300 cd

### Measurement Result Points

2 x 501<sup>1</sup>

<sup>1</sup>Two independent traces are available (min. hold, max. hold at the same time)

### POWER SUPPLY

#### DC Voltage, External

11 to 15 V / max. 28 W

#### Internal Battery

Li-Ion

#### Operating Time (battery fully charged, full brightness)

2.1 h

### MEMORY

#### Type

Flash disk

#### Capacity (set-ups and traces)

257

### DIMENSIONS

#### W x H x D

355 x 190 x 85 mm (14 x 7.5 x 3.3")

### WEIGHT

#### With battery

3.0 kg (6.6 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

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### RF IN

#### Connector

Type N (female)

#### Impedance

50 Ω

### DC In

#### Connector

2.1 mm dia. barrel jack socket

#### Max. Current

3 A

## 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

## STANDARD DELIVERY

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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

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### Product Packages

9101 Handheld Spectrum Analyzer  
Bench Edition AG 100 411

9101 Handheld Spectrum Analyzer  
Field Edition AG 248 800

### Options and Accessories

9132 RMS Detector Option AG 897 275

9100 Battery module, 7.2 Ah AG 205 012

9100 Outdoor backpack AG 241 015

9100 Soft carrying bag AG 241 013

1500 Battery charger AG 204 097

9100 Power supply AG 248 328

9100 12 V car adapter AG 860 389

9100 Safety lock AG 867 037

9100 Data Exchange Software AG 897 137

9100 Serial communication cable AG 860 388

9100 Cross-link Ethernet communication cable AG 880 629

1205 RF Probe 20 dB AG 248 640

Frequency range 100 kHz to 4 GHz  
RF attenuation (nominal at 50 Ω) 20 dB  
including adapter N (male), BNC (female)

Antenna 900 MHz band (TNC) AG 860 261

Antenna 1800 MHz band (TNC) AG 860 262

Antenna 1880 MHz band (BNC) AG 860 260

Antenna 2400 MHz band (TNC) AG 860 146

Adapter N – TNC AG 886 098

Adapter N – BNC AG 886 097

Matching pad N 50 Ω to N 75 Ω AG 886 205

Matching pad N 50 Ω to F 75 Ω AG 886 204

Attenuator 18 GHz, 6 dB AG 874 061

### Related products

9102 Handheld Spectrum Analyzer  
Bench Edition AG 100 412

9102 Handheld Spectrum Analyzer  
Field Edition AG 248 806

9102 Handheld Spectrum Analyzer  
Tracking Edition AG 248 801

Note: Specifications, terms and conditions are subject to change without prior notice.

For the very latest specifications visit [www.aeroflex.com](http://www.aeroflex.com)

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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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