AEROFLEX

9100 Handheld Spectrum Analyzer Series

Getting Started Manual

AG295004
Issue 1

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Getting Started Manual

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Printed in the UK

Document no. AG295004

Issue 1

18 September 2013

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Ordering information This guide is issued as part of the **9100 Series**. The ordering number depends on the model as follows:

Table 1 User guides for the 9100 series

Ordering number	User guide
AG290004	9101 Handheld Spectrum Analyzer
AG290204	9102 Handheld Spectrum Analyzer
AG290304	9103 Handheld Spectrum Analyzer

Table 2 shows the order numbers for the 9100 Handheld Spectrum Analyzer product packages. For details on the scope of delivery for the individual editions please refer to 'Scope of delivery' on page 10.

Table 2 Ordering information

Order number	Description
AG100411	9101 Handheld Spectrum Analyzer Bench Edition
AG248800	9101 Handheld Spectrum Analyzer Field Edition
AG100412	9102 Handheld Spectrum Analyzer Bench Edition
AG248806	9102 Handheld Spectrum Analyzer Field Edition
AG248801	9102 Handheld Spectrum Analyzer Tracking Edition
AG248802	9102 Handheld Spectrum Analyzer VSWR/DTF Edition
AG100403	9103 Handheld Spectrum Analyzer Bench Edition
AG248813	9103 Handheld Spectrum Analyzer Field Edition
AG248814	9103 Handheld Spectrum Analyzer Tracking Edition
AG248815	9103 Handheld Spectrum Analyzer VSWR/DTF Edition

Table of contents

About this guide

This section contains the following information:

Purpose and scope

The purpose of this guide is to help you successfully use the 9100 Handheld Spectrum Analyzer's features and capabilities. This guide includes task-based instructions that describe how to install and use the instrument. Additionally, this guide provides a description of Aeroflex's warranty, services, and repair information, including terms and conditions of the sofware licensing agreement.

Assumptions

This guide is intended for novice and intermediate users who want to use the 9100 Handheld Spectrum Analyzer effectively and efficiently. We are assuming that you have basic computer experience and are familiar with basic radio frequency test concepts and terminology.

Related information

Use this guide in conjunction with the following information:

Doc. no. AG290004: 9101 Handheld Spectrum Analyzer — user guide

Doc. no. AG290204: 9102 Handheld Spectrum Analyzer — user guide

Doc. no. AG290304: 9103 Handheld Spectrum Analyzer — user guide

Technical assistance

If you need assistance or have questions related to the use of this product, call Aeroflex's technical support. Contact numbers are given at the end of this document.

Conventions

This guide uses naming conventions and symbols, as described in the following tables.

Table 1 Typographical conventions

Description	Example
User interface actions appear in this **typeface**.	On the Status bar, click **Start**.
Buttons or switches that you press on a unit appear in this **TYPEFACE**.	Press the **ON** switch.
Code and output messages appear in this `typeface`.	`All results okay`
Text you must type exactly as shown appears in this **`typeface`**.	Type: **`a:\set.exe`** in the dialog box.
Variables appear in this **<typeface>**.	Type the new **<hostname>**.
Book references appear in this **typeface**.	Refer to **Newton's Telecom Dictionary**
A vertical bar | means "or": only one option can appear in a single command.	`platform [a|b|e]`
Square brackets [] indicate an optional argument.	`login [platform name]`
Slanted brackets < > group required arguments.	<password>

Table 2 Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press **Ctrl+s**
A comma indicates consecutive keystrokes.	Press **Alt+f,s**
A slanted bracket indicates choosing a submenu from menu.	On the menu bar, click **Start > Program Files**.

Table 3 Symbol conventions

This symbol represents a general hazard.

This symbol represents a risk of electrical shock.

NOTE

This symbol represents a Note indicating related information or tip.

Table 4 Safety definitions

WARNING

Information to prevent personal injury.

CAUTION

Information to prevent damage to the equipment.

Safety notes

This chapter provides safety notes for the 9100 Handheld Spectrum Analyzer. Topics discussed in this chapter include:

Precautions

These terms have specific meanings in this manual:

WARNING	Information to prevent personal injury.
CAUTION	Information to prevent damage to the equipment.
Note	Important general information.

Symbols used on this product

The meaning of hazard symbols appearing on the equipment and in the documentation is as follows:

Symbol	Nature of hazard
	Refer to the operating manual when this symbol is marked on the instrument. Familiarize yourself with the nature of the hazard and the actions that may have to be taken.
	Dangerous voltage

General conditions of use

This product is designed and tested to comply with the requirements of BS EN 61010-1 'Safety requirements for electrical equipment for measurement, control and laboratory use', for Class I portable equipment and is for use in a pollution degree 2 environment. The equipment is designed to operate from an installation category II supply.

Equipment should be protected from the ingress of liquids and precipitation such as rain, snow, etc. When moving the equipment from a cold to a hot environment, it is important to allow the temperature of the equipment to stabilize before it is connected to the supply to avoid condensation forming. The equipment must only be operated within the environmental conditions specified in the data sheet, otherwise the protection provided by the equipment may be impaired.

This product is not approved for use in hazardous atmospheres or safety-critical applications.

WARNING

Suitability for use

This equipment has been designed and manufactured by Aeroflex to perform measurements on RF systems. If the equipment is not used in a manner specified by Aeroflex, or if it is damaged, the protection provided by the equipment may be impaired.

Aeroflex has no control over the use of this equipment and cannot be held responsible for events arising from its use other than for its intended purpose.

The safety of any system incorporating this equipment is the responsibility of the assembler of the system.

WARNING

Electrical hazards (AC supply voltage)

This equipment conforms with IEC Safety Class I, meaning that it is provided with a protective grounding lead. To maintain this protection the supply lead must always be connected to the source of supply via a socket with a grounded contact.

Be aware that the supply filter contains capacitors that may remain charged after the equipment is disconnected from the supply. Although the stored energy is within the approved safety requirements, a slight shock may be felt if the plug pins are touched immediately after removal.

WARNING

Ventilation

Before switching on the instrument, ensure that ventilation slots are not restricted, or obstructed with loose material.

Provide clearance of at least 3 cm (1 in) between all sides of the instrument and adjacent surfaces. A failure to provide adequate clearances increases internal temperatures, possibly reducing the reliability of the equipment and degrading its performance, or even causing a fire.

Safety advice for the battery module

Do not crush. Do not heat or incinerate. Do not short-circuit. Do not dismantle. Do not immerse in any liquid, the battery may vent or rupture. Do not charge below 0°C (32°F) nor above 45°C (110°F).

External power supply

The external power supply of the 9100 Handheld Spectrum Analyzer is a safety class I equipment as defined in EN 60950.

Do not try to open the power supply. There are no serviceable parts inside. If the power supply is defective you can obtain a new one from Aeroflex (order number AG860224).

Use the supplied power cord or an appropriate replacement.

Do not replace the power cord with an inadequately rated cord.

The power cord set must be an appropriately rated and approved cord-set in accordance with the regulations of the country it is used in.

Power supply ratings

Before powering on, ensure that the operating voltage that is permitted for the instrument is the same as your power source. The external power supply adjusts itself automatically to the applied (permissible) line voltage.

Input voltage range: 100–240 VAC.

Input current: 1.5 A

Frequency range: 50–60 Hz.

Operating temperature: 0–60 °C

Storage temperature: -20–85 °C

Humidity: 93% RH max, non-condensing

Do not interrupt the protective conductor
Risk of electric shock

Any interruption of the protective conductor to the external power supply may result in electric shock.

Do not attempt to service this product yourself
Risk of electric shock

Opening or removing covers of the external power supply may expose you to dangerous high voltage points and other hazards. Refer all servicing to qualified service personnel.

Safety class

The 9100 Handheld Spectrum Analyzer is built and tested in line with DIN 57411 part 1 (protective measures for electronic test equipment). The instrument complies with safety class I; it left the factory in a perfectly safe condition for operation.

During maintenance and repair

Maintenance and repair is only allowed to specially trained service technicians. Opening a unit without permission causes loss of warranty.

Live parts can be exposed when you open covers or remove components from the external power supply. Connecting parts can also be live.

Capacitors in the power supply can still be charged, even though the instrument has been separated from all voltage sources.

Only use fuses with identical specifications to the replaced ones. You should never patch fuses or short the fuse holder.

Additional cautions

To ensure safe handling and avoid injuries, observe the following:

CAUTION

The maximum input power level at the **RF IN** connector is 1 W. Higher input levels may result in serious damage to the instrument.

CAUTION

Operate the instrument within the temperature range from 0°C (32°F) to 45°C (110°F) only. Operation outside this range will lead to invalid results.

CAUTION

Only use a 50 Ω N-type connector to connect to the **RF IN** port of the 9100 Handheld Spectrum Analyzer. Use of any other connector may result in damage to the instrument.

Battery module usage

The battery module is for use with the 9100 Handheld Spectrum Analyzer Series and the 2300 Stabilock Series only. Aeroflex does not accept any liability for damage to the battery or other equipment if the battery module is used with other electric or electronic equipment.

This product is designed for indoor use. Exposure to water may damage the instrument, so protect it against moisture when using it outdoors.

Declarations of EU Conformity

All Aeroflex Ltd products are in compliance with appropriate Directives for CE marking utilizing standards as published in the Official Journal of the European Union; Reference: Safety standard EN 61010-1 and EMC standard EN 61326-1.

Copies of the EC declarations of conformity for the 9100 Hand-held Spectrum Analyzer are available on request from Aeroflex Ltd.

Overview

1

This chapter provides a general description of the 9100 Handheld Spectrum Analyzer. Topics discussed in this chapter include the following:

About the 9100 Handheld Spectrum Analyzer

The 9100 Handheld Spectrum Analyzer is a lightweight, full-featured spectrum analyzer for many applications:

- Used for installation troubleshooting, repair and maintenance e.g. in wireless local loop and modern 2.4 GHz Wi-Fi systems.
- Used for acceptance and installation troubleshooting of antenna and cable installations.
- 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 of RF modules.
- Used in the field to measure and verify base station emissions.

Typical measurements with the 9100 Handheld Spectrum Analyzer include transmitter testing, alignment of modulators and measuring switch breakthrough. Measurement results and instrument settings can easily be transferred to a PC for presentation or post-processing.

Within the 9100 Handheld Spectrum Analyzer Series, Aeroflex offers the 9102 and 9103 Handheld Spectrum Analyzers, whose capabilities can be expanded towards a scalar network analyzer by additional options such as a Tracking Generator, the 9160 VSWR/DTF Bridge and the 9130 VSWR/DTF Reflection Measurement Option. For base station installation or maintenance engineers, the 9102 and 9103 offer the full scope of common performance measurements of the BTS antenna systems: return loss (reflection), tower-mounted amplifier (transmission) and distance to fault measurement with a standard resolution of 500 points (min. 0.05 m) in one lightweight device. For the 9102 and 9103 the 9131 EMF measurement option is available also. In combination with the appropriate antenna, the 9102 and 9103 both provide you with a handheld and easy-to-use solution for EMF measurements.

Features and capabilities

Frequency range from 100 kHz to 4 GHz (up to 7.5 GHz with the 9103, or with the 9102 and the 9151 Frequency Extension 7.5 GHz)

Digital IF for accurate measurements

Auto mode for basic parameters

Four markers, up to three delta markers

Large and bright display

Small footprint, large front

Lightweight, high battery power

Remote control via RS-232 or LAN

Environmental conditions

For instrument only.

MIL-PRF28800F Class 2

Operating temperature: 0 to +45 °C

Storage temperature: –10 to +50 °C

Rel. humidity (non-condensing): <80%

For external power supply environmental conditions, see 'Power supply ratings' on page xvi.

Options

The following options and accessories are available:

Table 5 Options and accessories for the 9100 Handheld Spectrum Analyzer Series

Order number	Description
AG248804	9102 Tracking Generator Upgrade
AG897261	9130 VSWR/DTF Reflection Measurement Option (9102 and 9103)
AG897274	9131 EMF Measurement Option (9102, 9103)
AG897275	9132 RMS Detector Option (9102, 9103)
AG248966	9160 VSWR/DTF Bridge (9102 and 9103)
AG248811	9168 GPS Receiver Option (9102, 9103)
AG248812	9151 Frequency Extension 7.5 GHz (option to the 9102)
AG205012	9100 Battery module (rechargeable, Ah)
AG204097	1500 battery charger
AG241015	9100 outdoor backpack
AG241013	9100 soft carrying bag
AG248328	9100 power supply
AG860389	9100 12 V car adapter
AG867037	9100 safety lock
AG897137	9100 Data Exchange Software
AG860388	9100 serial communication cable

Table 5 Options and accessories for the 9100 Handheld Spectrum Analyzer Series

Order number	Description
AG248640	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)
AG248971	1207 Inductive Probe Frequency range 4 MHz to 6 GHz
AG860368	9170 Biconical Antenna (9102, 9103)
AG860369	9171 Isotropic Antenna (9102, 9103)
AG860264	Antenna, 400 MHz band (TNC)
AG860261	Antenna, 900 MHz band (TNC)
AG860262	Antenna, 1800 MHz band (TNC)
AG860260	Antenna, 1880 MHz band (BNC)
AG860146	Antenna, 2400 MHz band (TNC)
AG886097	Adapter N (male) to BNC (female)
AG886098	Adapter N (male) to TNC (female)
AG886205	Matching pad N 50 Ω to N 75 Ω
AG886204	Matching pad N 50 Ω to F 75 Ω
AG874061	Attenuator 18 GHz, 6 dB
AG860548	Calibration set open/short/load, type DIN 7/16 inch male (9102)
AG860549	Calibration set open/short/load, type N male (9102, 9103)
AG860396	Composite cable 10 m for 9171 (9102, 9103)
AG860256	Antenna tripod (9102, 9103)
AG860395	Bag for antenna tripod (9102, 9103)

Physical description

The user-accessible parts of the 9100 Handheld Spectrum Analyzer can be broken down into several sections:

- Front panel with large screen, softkeys, numerical, cursor, and function keys.
- Connectors accessible from the top and the left-hand side of the instrument.
- On/off switch, power supply connector and battery shelf.
- Handle, which can be turned in steps to serve as a stand, allowing the instrument to be operated at an angle.

The 9100 Handheld Spectrum Analyzer is delivered with the 9100 Data Exchange software, which can also be ordered separately (order number AG897137).

Further information

For full details refer to the relevant 9100 Handheld Spectrum Analyzer data sheet at www.aeroflex.com.

Installation

2

This chapter describes how to set up the 9100 Handheld Spectrum Analyzer. The topics discussed in this chapter are:

Scope of delivery

The following table provides an overview of the different items included in the delivery for the individual editions of the 9100 Handheld Spectrum Analyzer.

	9101, 9102, 9103 Bench Edition	9101, 9102, 9103 Field Edition	9102, 9103 Tracking Edition	9102, 9103 VSWR/DTF Edition
Power supply with line cord	✓	✓	✓	✓
Dummy battery module	✓	-	-	-
High-capacity battery module	-	✓	✓	✓
Getting Started manual	✓	✓	✓	✓
Null modem cable	✓	✓	✓	✓
Built-in tracking generator	-	-	✓	✓

Before first-time use

The Field Edition, the Tracking Edition and VSWR/DTF Edition are delivered with a high-capacity rechargeable battery module, which must be charged before first-time use. For more information, see section 'Installing and maintaining the battery' on page 12.

Using the handle

Carrying the instrument

The 9100 Handheld Spectrum Analyzer can be carried easily by its handle. The handle should be kept in the upright position for transport to ensure that it is safely carried. To put the handle back in the upright position, press the button and turn the handle.

Positioning the instrument

The 9100 Handheld Spectrum Analyzer can be used in different positions: the upright position and two tilt positions. The first tilt position is recommended when using the instrument on a work-bench. The second tilt position is useful when standing while operating the instrument.

– Put the instrument upright. With the handle in parallel with the instrument body, this takes up the least footprint. The connectors and the power switch are easily accessible from the top.

– The instrument can also be operated in a slanted position.

1 Press the button on the handle and turn the handle back a little bit.

2 Release the button and continue turning the handle back. The button locks in the first tilt position.

3 Repeat steps 1 and 2 if you want to lock the handle in the second (and final) tilt position.

4 Position the instrument on the handle.

Installing and maintaining the battery

The Field Edition, the Tracking Edition and the VSWR/DTF Edition are delivered with a high-capacity rechargeable battery module. This battery must be charged before first-time use. Allow six hours to charge while the instrument is connected to an external power supply and switched off.

The battery charge status is indicated with a symbol on the screen. See the user guide for detailed information on this symbol.

The battery can be recharged simply by connecting the DC power supply and turning the instrument off. A completely discharged battery takes about six hours to charge. While operating the 9100 Handheld Spectrum Analyzer, you can view the battery charge status on the display, at the bottom left.

Please refer also to section 'Battery status LED' on page 22.

If the instrument is switched on, the battery takes about three times as long to charge compared to when the instrument is switched off. After eight hours of continuous charging, the battery charger is switched off automatically to ensure that the battery is not damaged by excessively long charging periods, although the battery may not be fully charged at this time. Therefore Aeroflex recommends charging the battery only while the 9100 Handheld Spectrum Analyzer is switched off.

NOTE

Disconnecting the mains cable from the power source resets the eight-hour maximum charging period. In order to make sure that the battery is fully charged when the instrument is switched off, unplug the mains cable first and plug it in again.

A completely discharged battery is not recharged if the power supply is connected while the instrument is operating. Therefore it is advisable to switch off the instrument before connecting the power supply to the 9100 Handheld Spectrum Analyzer.

WARNING

Safety advice for the battery module

Do not crush. Do not heat or incinerate. Do not short-circuit. Do not dismantle. Do not immerse in any liquid, the battery may vent or rupture. Do not charge below 0°C (32°F) nor above 45°C (110°F).

Battery module replacement

To replace the battery module, use genuine Aeroflex spare parts only. For the ordering number please refer to page 5.

The battery module compartment is situated on the back panel of the instrument. Replace the battery module as follows:

1 Switch off the 9100 Handheld Spectrum Analyzer.

2 Remove the battery module by pushing the black rubber clasp downwards and pulling the battery module out of the compartment.
Do not try to open the battery module.

3 Line up the new battery module with the connectors to the bottom and pointing towards the compartment.

4 Gently slide the battery module into the compartment until it locks completely.

5 Fully charge the new battery.

For optimum performance and lifetime, follow the advice below:

– Before first-time use, charge the battery completely while the 9100 Handheld Spectrum Analyzer is switched off. This takes about six hours.
– If you do not use the battery module for months, fully charge the battery and remove it from the instrument. Check the battery twice a year and recharge it if necessary.
– Do not store the battery module above 45°C (110°F) or below 0°C (32°F).
– Do not touch the battery contacts with your fingers; keep the contacts clean.
– Do not drop the battery module; it may crack.

Dispose of the battery module safely

Do not simply throw the battery module away. Dispose of the battery in accordance with national or regional regulations.

Operation

3

This chapter describes the functionality of the instrument. Topics discussed in this chapter are:

Connecting the 9100 Handheld Spectrum Analyzer

The instruments in the 9100 Handheld Spectrum Analyzer Series offer different connectors for a variety of applications. The following section describes the connectors available and provides information on technical data and application purposes. The connectors available on the top of the instrument differ between the 9101 and the 9102 or 9103. The connectors available on the left-hand side are identical.

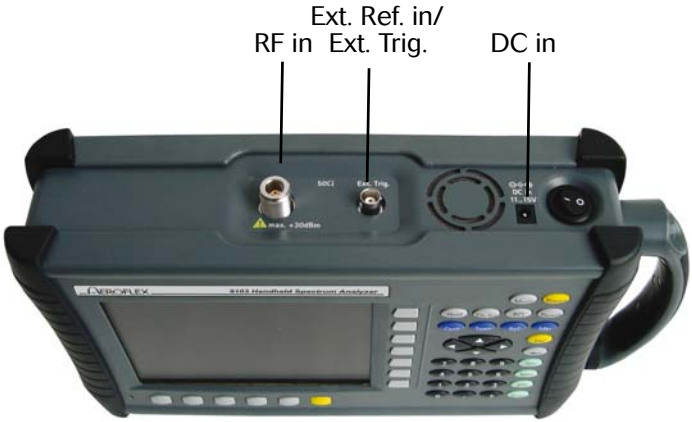


Figure 1 Connectors on the top of the 9101

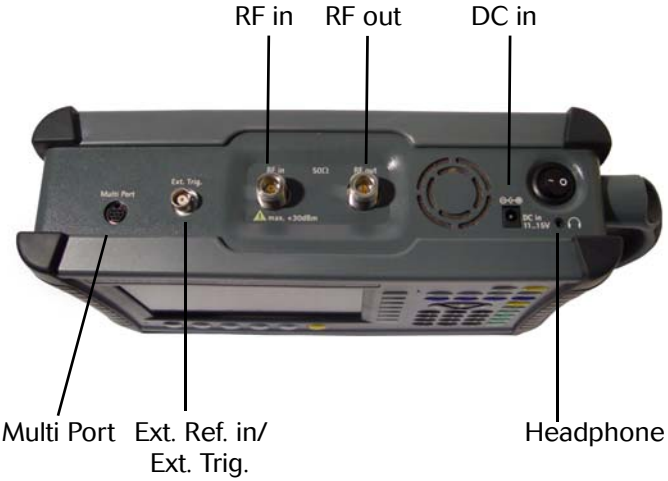


Figure 2 Connectors on the top of the 9102 and 9103

DC IN connector

The 9100 Handheld Spectrum Analyzer can be operated either from the internal battery or from an external DC source such as the power supply which is delivered with the 9100, or a car battery. The DC voltage must be in the range from 11 to 15 V.

In addition, the battery is loaded when an external DC source is connected. The instrument should be switched off before connecting the DC source.

Apply the source to the **DC IN** connector on the top of the 9100.

RF IN connector

RF IN is a 50 Ω N-type connector (female).

If you have a 50 Ω shielded RF cable with an N-type connector (male) to connect to the unit under test, simply screw the connector tightly to the instrument.

If you have a 50 Ω shielded RF cable with a BNC connector (male), use an N to BNC adapter to connect the cable to the 9100. Aeroflex offers an appropriate adapter; see section 'Options' on page 5.

RF OUT connector

RF OUT is a 50 Ω N-type connector (male).

This connector caters for example for tracking generator measurments. See the 9100 user guide for a detailed description of the measurement functions for which this connector is used.

NOTE

This connector is available on the 9102 Handheld Spectrum Analyzer for serial numbers 0404001 and higher, and on the 9103 Handheld Spectrum Analyzer..

CAUTION

The maximum allowable input level at the **RF IN** connector is 1 W. Higher levels at this port can damage the instrument!

CAUTION

Only use a 50 Ω N-type connector to connect to the **RF IN** port of the 9100. Use of any other connector may result in damage to the instrument.

Take care of proper termination

Use of cables and sources with an impedance other than 50 Ω results in inaccurate measurements.

EXT. REF. IN/ EXT. TRIG. connector

Can either be used as an input for an external time base (reference clock) or as an input for an external trigger signal for the spectrum analyzer sweep (for example, an external device that triggers the measurement by sending an impulse can be connected). Only one of the two signal types can be connected at any one time.

CAUTION

The input for the external trigger signal is designed for TTL input levels only. Higher levels at this port can damage the instrument!

Multi Port

In order to provide for external adapters, amplifiers and accessories, the instrument has a multifunction connector. The Multi Port enables the instrument to trigger a measurement onto an external signal. Furthermore, it can be used to read data stored in external devices (for example, calibration data).

NOTE

This connector is available on the 9102 Handheld Spectrum Analyzer for serial numbers 0404001 and higher.

Headphone jack

In addition to the build-in loudspeaker the instrument also has a standard 3.5 mm headphone jack. When you connect headphones to the instrument the loudspeaker is automatically disabled.

NOTE

This connector is available on the 9102 Handheld Spectrum Analyzer for serial numbers 0404001 and higher.

Figure 3 Connectors on the left-hand side of the instrument

SERIAL (RS-232) connector

This 9-pin sub-D connector on the left-hand side of the 9100 Handheld Spectrum Analyzer can be used to control the 9100 remotely via serial interface (RS-232). The command set and the responses conform to the SCPI standard and are explained in the user guide.

The RS-232 connector can also be used to load and store results and settings and to update the operating software in conjunction with the 9100 Data Exchange Software. See the user guide for more details.

To connect the 9100 to a controlling PC over RS-232, use a null modem (PC to PC) cable.

LAN connector

The 9100 Handheld Spectrum Analyzer can also be controlled via local area network (LAN), using a TCP/IP connection. This high-speed connection can also be used to transfer traces to a PC or to update the system software.

The IP address can be set up in the system configuration menu or via RS-232. The 9100 can be operated in networks using 100 Mbps, but is capable of transmitting and receiving at 10 Mbps only.

Setting up the IP address, the command set to control the 9100 and the responses from the 9100 Handheld Spectrum Analyzer are explained in the full user guide.

Connect the instrument to the LAN with a standard LAN cable with RJ-45 connectors. Alternatively, connect the 9100 to a PC directly using a cross patch cable; this cable is included in the deliverables.

Powering the unit

The 9100 Handheld Spectrum Analyzer is switched on and off using the power switch located at the top of the instrument. It takes a couple of seconds for the instrument to load and start its software.

NOTE

The warm-up time for precision measurements is 30 minutes.

NOTE

Please wait a few seconds between switching the instrument off and on again. It will not start otherwise.

Using the front panel

Overview The front panel is divided into different sections as follows:

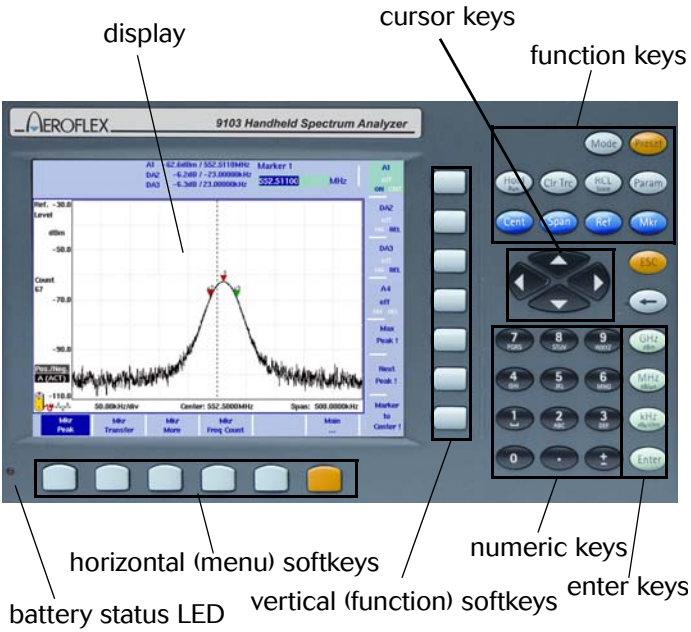


Figure 4 Front panel elements

Battery status LED This LED has different states:

- The LED lights green when the instrument is being operated from its battery and no external power is supplied.
- The LED lights yellow when the battery is connected to an external power supply and being charged.
- The LED is off when charging is complete, the battery is fully charged or when there is no battery in the 9100's battery compartment.

– When the LED is flashing yellow quickly and permanently, there is a problem with the battery or the charger. Please report this problem to an Aeroflex service center.

For more information about the battery, see section 'Installing and maintaining the battery' on page 12.

Display

The 6.5 inch display is divided into the following sections (see Figure 5):

– Marker field
– Input field
– Status section
– Results area
– Softkey descriptions

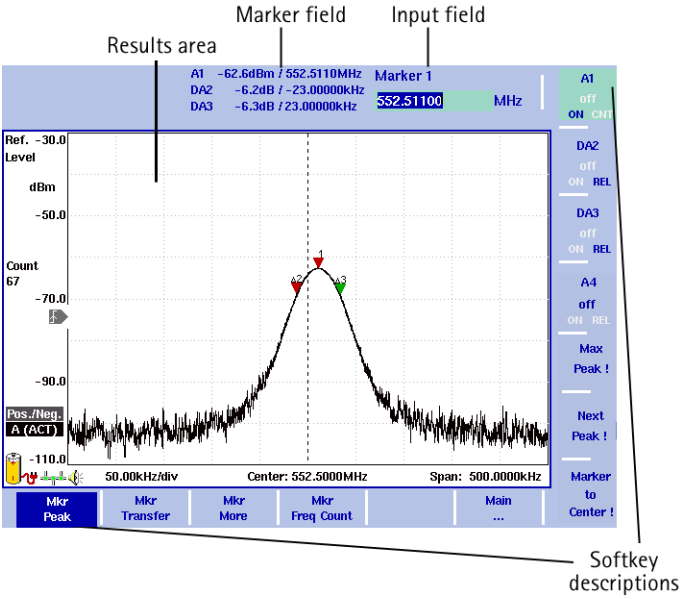
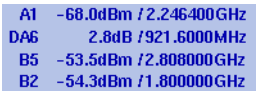


Figure 5 Display sections

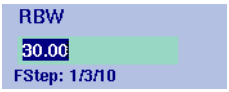
Results area The results area utilizes most of the screen and provides you with the measurement results. A grid of ten vertical and eight horizontal rows eases readability of the results from the axes. There may be one or two graphs, depending on the number of traces selected.

Marker field



If any of the markers is active, the marker field is displayed, showing the measurement values at the marker positions. Up to four markers are displayed with their level and frequency values. A marker can be switched from absolute to relative values; the values are then shown relative to those of marker 1.

Input field



The input field allows you to enter numbers or text, depending on the selected function. The meaning of the input value is expressed by the header line. Values or text are entered using the numeric keys; the input field is closed with one of the green enter keys (see page 26).

Softkey descriptions

The softkey descriptions indicate the assignment of a function to a softkey. At the bottom side, they are aligned with the horizontal softkeys and with the vertical softkeys at the right-hand side. See below for more information about the softkeys.

Status section The status section provides you with more information about the present 9100 status and the measurement conditions. This includes information about:

- the battery status
- the network link (if available)
- trace settings
- Hold mode (if active)

Keypad

The front panel carries a large number of keys, giving you direct access to functions and menus and allowing you to enter test parameters such as the center frequency. The keypad is divided into the following sections:

Function keys

The function keys have specific assigned functions which do not change. The function keys are described in more detail in the user's guide.

Cursor keys

In an input field, the up and down cursor keys are used to increase or decrease the current value. The left and right cursor keys move the cursor position by one digit or character.

If a marker field is active, the up and down cursor keys move the marker by half a division up or down, respectively. The left and right cursor keys move the marker pixelwise.

Immediate reaction

Any change of an input parameter with the cursor keys has immediate effect. With direct feedback to the screen, you can easily adjust parameters to the optimum values with a trial-and-error approach.

Numeric keys

The numeric keys allow you to enter a value. On some input fields, you can enter text instead, as on a mobile phone.

Invalid entries

If you enter an invalid number or string, the 9100 beeps and corrects the entry to the closest valid value.

Enter keys Any input of numerical or alphanumerical entries must be closed or can be affected by one of the enter keys. The meaning of the keys is as follows:

Table 6 Enter keys

Key	Function
GHz/dBm 	In frequency input fields, closes the entry by applying the unit GHz (giga-hertz). In power input fields, assigns the unit dBm to the entered value.

Table 6 Enter keys

Key	Function
MHz/dB/µs 	In frequency input fields, closes the entry by applying the unit MHz (mega-hertz). In power input fields, assigns the unit dB to the entered value. In time parameter input fields, assigns the unit µs (microsecond) to the value.
kHz/dBµV/ms 	In frequency input fields, closes the entry by applying the unit kHz (kilo-hertz). In power input fields, assigns the unit dBµV to the entered value. In time parameter input fields, assigns the unit ms (millisecond) to the value.
Enter 	Confirms an entry without a unit or with the units hertz or seconds.

Escape key

If pressed while an input field is open, the **ESCAPE** key closes this input field without changing the previous value.

In a menu the **ESCAPE** key also leads to the main menu.

Backspace key

Deletes the last-entered alphanumerical (back-space).

When an input field is entered, all digits are marked. By pressing the backspace key, the entire entry is deleted.

Softkeys The functions of the softkeys change with description on the screen as given next to the respective key.

Horizontal (menu) softkeys

The horizontal softkeys provide access to the various menus. The active menu is highlighted; the functions and parameters within a menu are offered on the vertical softkeys.

Vertical (function) softkeys

The vertical softkeys allow you to change the settings of the 9100.

Changing center frequency, span, or reference level

These functions are easily accessible from the main menu.

1 Push the respective function softkey on the vertical softkey bar.

2 Enter a new value.

3 Close the input field by pushing one of the enter keys.

The change takes effect immediately.

Changing RBW, VBW, sweep time, or attenuation

These parameters are accessible from the main menu. They can be changed automatically by the 9100 with a change of any of the other parameters, or can be adjusted manually.

In the main menu, the vertically aligned keys for resolution bandwidth (RBW), video bandwidth (VBW), sweep time, and attenuation indicate whether the parameter is in auto(matic) or manual mode: The current setting is highlighted.

Switching to automatic mode

To change the setting from manual to automatic, proceed as follows:

1 Push the function softkey once.
The function softkey is activated. This is indicated by highlighting the softkey.

2 Push the same function softkey for a second time.
The highlighting of “manual” disappears and “auto” is highlighted instead. Next time you change any of the other values, the parameter in automatic mode is changed by the instrument for best results and visibility.

Switching to manual mode

When the function softkey is set to automatic, you may want to adjust the parameter manually. Or you may want to adjust another parameter without the function in question being changed automatically. Both can be achieved by setting the function softkey to manual mode.

You can switch to manual mode

– either by selecting the function softkey and then entering a new input value,
– or by selecting the function softkey and pushing it again to change from auto to manual mode.

Maintaining the instrument

The 9100 Handheld Spectrum Analyzer is a measurement device. As with all such instruments, the 9100 should be calibrated on a regular basis to ensure its accuracy. Aeroflex recommends calibration of the 9100 Handheld Spectrum Analyzer at yearly intervals.

Cleaning

Before starting any cleaning, switch off the instrument and disconnect it from the supply by removing the power cord.

Case exterior: use a soft cloth moistened with water to clean the case; do not use aerosol or liquid solvent cleaners.

LCD: take care not to scratch the LCD during use or when cleaning. Clean the LCD by wiping a slightly damp, soft, lint-free cloth gently over the surface. If this does not remove finger marks, dampen the cloth sparingly with isopropyl alcohol.l

WARNING

Isopropyl alcohol is flammable.

Troubleshooting

4

This chapter provides a general description of the 9100 Hand-held Spectrum Analyzer. Topics discussed in this chapter include:

Recharging problems with the 9102B

If a 9102B (serial number 0604001 and higher) is completely discharged, it is possible that the 9102B does not automatically recharge the battery while connected to an external power supply.

In such a case, to reset the 'safety power-off switch', please carry out the following steps:

1 Switch off the 9102B.

2 Remove the power connector from the 9102B.

3 Remove the battery.

4 Wait a few seconds.

5 Insert the battery again.

6 Re-connect the power connector and provide external power.
The LED on the front shows that the battery is charged again.

Handling system errors

Should an error or problem occur that prevents you from controlling the instrument and thus requires the instrument software to be set up again, the 9100 offers the Setup Application Software menu. This menu provides you with access to the instrument without starting the instrument software and enables you to perform a software update.

Often, restoring the system to its default state can restore normal behavior.

Chapter 13 "Updating the Instrument Software" of the user guide contains a detailed description of the processes involved in updating the instrument's software via the Setup Application Software menu.

Software licence and warranty

A

This appendix describes the conditions for using the software.

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Repair

B

This chapter describes how to return the equipment to Aeroflex.

Equipment return instructions

Please contact your local service center for Aeroflex products via telephone or web site for return or reference authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

- Owner's name, address, and telephone number.
- Serial number, product type, and model.
- Warranty status. (If you are unsure of the warranty status of your instrument, include a copy of the invoice or delivery note.)
- Detailed description of the problem or service requested.
- Name and telephone number of the person to contact regarding questions about the repair.
- Return authorization (RA) number (US customers), or reference number (European customers).

If possible, return the equipment using the original shipping container and material. Additional Aeroflex shipping containers are available from Aeroflex on request. If the original container is not available, the unit should be carefully packed so that it will not

be damaged in transit. Aeroflex is not liable for any damage that may occur during shipping. The customer should clearly mark the Aeroflex-issued RA or reference number on the outside of the package and ship it prepaid and insured to Aeroflex.

Publication history

Revision	Changes
0503-100-A	First version.
0506-500-A	Added new options and a new Product Package for the 9102. Added new feature information for the 9102. Updated LED status information. Updated Willtek address information for UK.
0512-500-A	Added new options and accessories. Updated Willtek address information for France.
0602-600-A	B series of 9101 and 9102.
0709-700-A	New series, 9103 added.
1007-800-A	New series, new layout.
Issue 1	Safety update revision at Stevenage.

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April 2013