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Willtek 8501

GSM Air Interface Test Module



getting started manual
version 1.00

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Ordering information This guide is issued as part of the **8501 GSM Air Interface Test Module**. The ordering number for a published guide is M 295 008. The ordering number for the product is M 100 801.

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About This Guide

This section contains the following basic information:

- ["Related information"](#) on page vi
- ["Technical assistance"](#) on page vii
- ["Conventions"](#) on page viii

Related information

Use this guide in conjunction with the following information:

Doc. no. M 290 008: Willtek 8501 GSM Air Interface Test
Module - user's guide

Technical assistance

If you need assistance or have questions related to the use of this product or call one of Willtek's technical assistance centers. You can also contact Willtek by e-mail at customer.support@willtek.com.

Table 1 Technical assistance centers

Region	Phone number	Fax number
UK	+44 (0) 20 8408 5720	+44 (0) 20 8397 6286
Europe, Middle East, Asia, Africa	+49 (0) 89 996 41 386 +49 (0) 89 996 41 227	+49 (0) 89 996 41 440
Americas	+1 317 595 2021 +1 866 WILLTEK	+1 317 595 2023

Conventions

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

Table 2 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 <code>typeface</code> .	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 <code><typeface></code> .	Type the new <code><hostname></code> .
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 3 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 4 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 5 Safety definitions



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

About This Guide
Conventions

Safety Information

This chapter provides the safety notes for the 8501 GSM Air Interface Test Module. Topics discussed in this chapter include the following:

- ["Safety notes" on page xii](#)
- ["Declaration of EEC Conformity" on page xiii](#)

Safety notes

The 8501 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.



Maintenance and repair is only allowed for specially trained service technicians. Opening the instrument without permission causes loss of warranty.

Declaration of EEC Conformity

Manufacturer	Willtek Communications GmbH Gutenbergstraße 2-4 85737 Ismaning Germany
Product designation	Willtek 8501 GSM Air Interface Test Module

The designated products conform to the following European directives:

EMC Directive	89/336/EEC
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The conformity of these products to the above directives is demonstrated by application of the following standards:

RES (Radio Equipment and Systems)	ETS 300 342-1 ed. 2 (1977-06)
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EMC (ElectroMagnetic Compatibility)	EMC for European digital cellular telecommunications system (GSM 900 MHz and DCS 1800 MHz)
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Safety	EN 61010, Part 1
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Date of issue:	Chessington 2000-08-04 Chase Communications Limited
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This declaration is not a guarantee of features. Please pay attention to the safety instructions in the product documentation.

Overview



1

This chapter provides a general description of the 8501 GSM Air Interface Test Module. Topics discussed in this chapter include the following:

- "Features and capabilities" on page 4
- "Specifications" on page 4
- "Control Connector Pinout" on page 7
- "Accessory Requirements" on page 8
- "Ordering Information" on page 8
- "MAX-502 Accessory Kit" on page 9
- "MAX-503 Accessory Kit" on page 9

About the 8501 GSM Air Interface Test Module

The 8501 is a test instrument for measuring the link between a base station and a mobile phone. It simulates a mobile phone at the antenna connector as well as on the audio and data ports. Through the separate serial trace port all layer 1 and 3 information is visible. By manipulating the reporting, the network can be forced to hand over registration or calls to the target base station.

The hardware design and the protocol stack of the GSM mobile station is tried and tested in over 25 different GSM mobile phone types. Therefore the 8501 is most appropriate to evaluate a network as a "normal" subscriber would, though each 8501 is individually calibrated due to precise measurement results.

The 8501 is usable in the field as an individual device together with a laptop for Go/NoGo checks of base stations and their correct configuration within the network. The 8501 is easy to integrate into system solutions. The robust oblong housing resists shocks, heat, frost and up to 90% humidity. Different fixings enable mounting in all positions. The industry standard SMA antenna connector ensures optimal intercabling within systems. There are no problems with batteries or battery simulators due to the direct power supply with a wide input voltage range.

The 8501 is fully remote controlled by the data port via standard AT commands (see *ETSI GSM 7.05, 7.07*). A dedicated trace port provides an online view into the communication between the mobile station and the base station. This view is not limited to voice calls, it also includes data calls and SMS transmissions. The trace port permits manipulation of the behavior of the phone such as band selection, speech selection (FR, FR/EFR), base station selection and forced handover.

Measurements of the neighboring cells are not limited to the strongest 6 base stations, all base stations in the list (up to 32) are concurrently reported. The RX Qual can even be measured in idle mode. A further feature of the 8501 is channel scanning. The whole

frequency spectrum can be scanned or a list of free-definable channels can be chosen. This allows monitoring exactly the required channels.

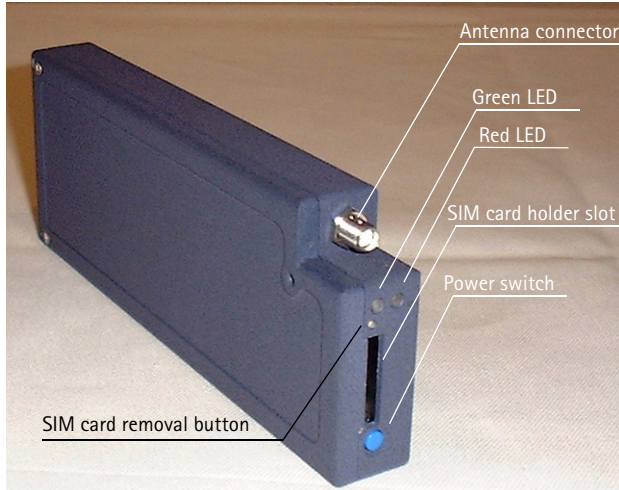


Figure 1 Front view of the 8501 GSM Air Interface Test Module



Figure 2 Rear view of the 8501 GSM Air Interface Test Module

Features and capabilities

The key applications of the 8501 GSM Air Interface Test Module are:

- Go/NoGo checks of base stations
- Testing base station configuration within a network
- Network coverage measurements with a laptop
- Remote controlled calls

The main features of the 8501 include:

- Robust housing and easy mounting
- Industry standard SMA antenna connector
- 5.5 V to 16 V DC power supply
- Separate RS-232 data and trace ports
- Full RS-232 control including power on/off
- Internal or external SIM
- RX Qual report in idle mode
- Free-definable channel scanning

Specifications

Basic RF Data	
Frequency range	890 MHz to 960 MHz 1710 MHz to 1880 MHz
Channel range	1 to 124, 512 to 885
Impedance	50 Ω
RF connector	SMA female

Basic RF Data	
Communication system	GSM 900/1800
TX level	5 dBm to 33 dBm (GSM 900) 0 dBm to 30 dBm (GSM 1800)
TX level accuracy	1 dB
RX sensitivity	< -110 dBm
RX level accuracy	1 dB (-104 dBm to -47 dBm)

Basic AF Data	
Loudspeaker output	60 Ω , balanced
Microphone input	20 k Ω , balanced

Control Interface	
Control connector	36-pin Mini D Ribbon female (see the connector pinout on page 7)
Data port	RS-232, 19200 bps
Trace port	RS-232, 9600 bps
Power supply	5.5 V _{DC} to 16 V _{DC}

System Functions	
Band select	GSM 900, GSM 1800, dual band
Voice select	Full rate (FR) or FR/EFR
Forcing	Location update on given channel, handover by RX report manipulation
Serving cell report	RX Qual/RX Lev (idle and call mode)
Neighboring cells measured	≤ 6 in a cell ≤ 32 in idle mode

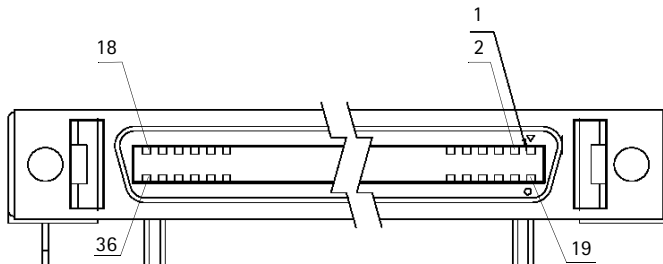
Environmental Conditions	
Specification temperature range	+5°C to +45°C
Operation temperature range	-10°C to +55°C
Relative humidity	< 90%
Shock	25 g
Dimensions	158 (162) ^a × 60 × 20 mm
Weight	290 g

a. with control connector

Control Connector Pinout

Pin	Signal	Pin	Signal
1	Reserved	19	V_DC
2	Reserved	20	GND
3	MIC+	21	V_DC
4	SPKR+	22	GND
5	MIC-	23	Remote_On/Off
6	SPKR-	24	
7		25	
8	GND1 (Trace)	26	GND2 (Data)
9	TXD1 (Trace)	27	RTS2 (Data)
10	CTS2 (Data)	28	TXD2 (Data)
11	ON/OFF	29	RXD1 (Trace)
12	RXD2 (Data)	30	Reserved
13	SIM_CLOCK	31	SIM_VCC
14	SIM_RESET	32	SIM_I/O
15	Reserved	33	Reserved
16	Reserved	34	EQUIPMENT_STATUS (Red LED)
17	Reserved	35	Reserved
18	NETWORK_STATUS (Green LED)	36	Reserved

.050" Mini D Ribbon, 36-pin (SCSI, IEEE-1284)



Accessory Requirements

Device	Requirement
PC or laptop	Windows 95, 98 or NT 4.0 operating system 2 unused RS-232 (COM) ports for MAX-502 3 unused RS-232 (COM) ports for MAX-503
Power supply	5.5 V _{DC} to 16 V _{DC} or an unused keyboard/mouse PS/2 connector

Ordering Information

Product	Description	Order No.
8501	GSM Air Interface Test Module and Getting Started Guide	M 100 801
MAX-502	Accessory Kit for 8501	M 248 600
MAX-503	Accessory Kit for 8501 incl. GPS receiver	M 248 601

For the contents of the MAX-502 and MAX-503 Accessory Kits see the following tables.

MAX-502 Accessory Kit

Quantity	Description
1	8501 User's Guide
1	RF antenna
1	Right-angle adapter (SMA)
2	9-pin Sub D – 9-pin Sub D cable
1	25-pin Sub D – 36-pin Mini D Ribbon cable
1	PS/2 adapter cable for power supply
1	Adapter box
1	Demo software on a 3.5" floppy disk

MAX-503 Accessory Kit

Quantity	Description
1	8501 User's Guide
1	RF antenna
1	Right-angle adapter (SMA)
3	9-pin Sub D – 9-pin Sub D cable
1	25-pin Sub D – 36-pin Mini D Ribbon cable
1	PS/2 adapter cable for power supply
1	Adapter box (incl. integrated GPS module)
1	Demo software on a 3.5" floppy disk

Chapter 1 Overview
MAX-503 Accessory Kit

Getting Started



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

- ["Connecting the 8501" on page 12](#)
- ["Start-Up" on page 13](#)
- ["Operation" on page 14](#)

Connecting the 8501

For a direct connection of the 8501 to a PC or a laptop computer use the MAX-502 or the MAX-503 Accessory Kit (see Figure 3 below).

To connect the test module with the adapter box, proceed as follows:

- 1 Mount the rectangle SMA connector on the test module antenna socket.
- 2 Mount the RF antenna on the SMA connector.
- 3 Connect the control cable to the control connector of the test module.
- 4 Connect the control cable to the corresponding connector of the adapter box.
- 5 Connect the data port of the adapter box to the serial connector of your PC (e.g. COM1) by using the serial extension cable.
- 6 Connect the trace port of the adapter box to the serial connector of your PC (e.g. COM2) by using the serial extension cable.
- 7 Connect your power supply (not part of the accessory kit) to the power supply connector of the adapter box. For portable operation you can use the power supply cable and connect it to your PS/2 mouse or keyboard connector.
- 8 Connect your headset to the adapter box by plugging its connector into the headset connector of the adapter box.

The following items only apply to the MAX-503 Accessory Kit:

- 9 Connect the GPS serial port of the adapter box to the serial connector of your PC (e.g. COM3) by using the serial extension cable.

- 10 Connect a GPS magnetic mount antenna (not part of the accessory kit) to the adapter box. Use preferably Trimble GPS, hard mount or rooftop antenna.

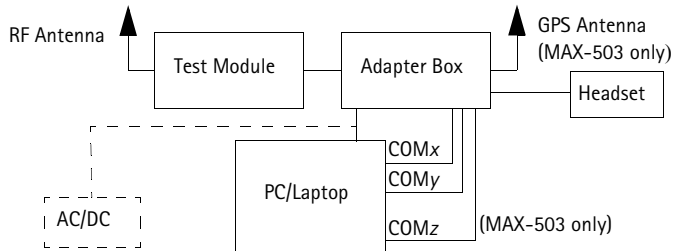


Figure 3 Interconnection of the test module with the adapter box

Start-Up

To start up the 8501 (see figures 1 and 2 on page 3), proceed as follows:

- 1 Press the SIM card removal button next to the slot for the SIM card holder with a pointed object, e.g. a pencil, to loose the card holder. Insert the card holder with the SIM card into the slot until it engages.
- 2 Press the power switch for at least 1 second to turn the test module on. The red LED starts to flash.

Operation

The green and red LEDs on the front panel of the 8501 indicate the network and equipment status respectively according to the table below.

		Red LED state (equipment status)			
		Off	On	Flash slow	Flash fast
Green LED state (network status)	Off	No power	No coverage	No/Invalid SMS	SMS waiting – no coverage
	On	n/a	In call	n/a	SMS waiting – in call
	Flash slow	n/a	Idle	n/a	SMS waiting – idle
	Flash fast	n/a	Incoming call	n/a	SMS waiting – incoming call

Publication History

Revision	Changes
0008-100-A	First edition.
0102-100-B	New accessory kits.
0104-100-A	New accessory requirements.
0111-100-A	Manual Ident No. changed, product name changed from MAM-8501 to GSM Air Interface Test Module 8501.
0210-100-A	Company name and product order code changed.
0410-100-A	Software changes from version 1.20 to 3.00. For further details please refer to the Online Help delivered with the Software. Formatting and structure adjusted.

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Willtek Worldwide Offices

West Europe/Middle East/Africa

Willtek Communications GmbH
Gutenbergstr. 2 – 4
85737 Ismaning
Germany

info@willtek.com

Willtek Communications SARL
Aéroport – Bâtiment Aéronef
Rue de Copenhague – BP 9001
95728 Roissy CDG Cédex
France

willtek.fr@willtek.com

Willtek Communications Ltd.
Roebuck Place, Roebuck Road
Chessington
Surrey KT9 1EU
United Kingdom

willtek.uk@willtek.com

North America/Latin America

Willtek Communications Inc.
7369 Shadeland Station Way, Suite 200
Indianapolis, IN 46256
USA

willtek.us@willtek.com
willtek.cala@willtek.com

Asia Pacific

Willtek Communications
22, Malacca Street
#09-00, Royal Brothers Building
Raffles Place
Singapore 048980

willtek.ap@willtek.com