

# Agilent Technologies' TS-50 RF Shielded Test Fixtures

## Test Fixture Solutions for Mobile Phones and RF/Wireless Devices

- Fast, Easy Development of Phone Test Fixtures
- Use in Production Test, Quality Assurance, or Design Verification
- Works with Agilent Test Equipment as Well as Other Manufacturers' RF or Mobile Phone Testers



Test Bit Error Ratio PASSED  
Measured value: 0.000000000000  
Minimum: 0.000000000000  
Maximum: 3.000000000000

Test Phase Freq Errors PASSED

Index	Result	Minimum	Maximum
(0)	39.1000000000	100.0000000000	100.0000000000
(1)	4.37805176000	0.000000000000	20.0000000000
(2)	1.63146973000	0.000000000000	10.0000000000



**Agilent Technologies**

Innovating the HP Way

# Introducing Agilent Technologies' TS-50 Family of RF Shielded Test Fixtures.

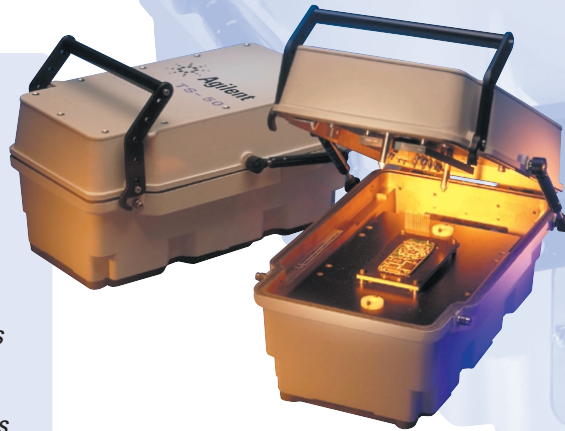
## RF Test Fixtures — "Home-Made" Hassles Or...

*Developing a test fixture for radio frequency (RF) devices — such as mobile phones and other wireless devices — can be an expensive, tedious, and time-consuming task. Besides designing and installing a test system, now you must develop a complete, high-quality fixture as well! Sometimes your best option is to design a fixture and hire out the implementation. Sometimes, it is best to adapt or modify an existing fixture — but even then, there usually is not enough time to thoroughly test and qualify the design. Hence, final designs may not be robust, so reliability issues may show up in production.*

*Is there an answer?*

**There is.**

*Now you can create complete, high-quality RF/mobile phone test fixtures — and do it in a matter of days, not weeks or months. Introducing the TS-50 family of RF/Mobile Phone Test Fixtures.*



### ...A "Head-Start" with Pre-Built Kits

The Agilent TS-50 Family of RF/Mobile Phone Test Fixtures are kits containing key components and options to create reliable, high-quality fixtures for mobile phones, phone printed circuit boards (PCBs), and other RF devices. For phones, you need only add connections, such as the phone's system connector, battery connections, and RF/antenna. For PCBs, you need to create a probe plate and probes for your specific board. The TS-50 family leaves out nothing essential. You can get the following capabilities:

- Rugged RF-shielded enclosure with secure closing/latching mechanism
- Optional adjustable "nest" to hold the phone
- Enclosure with board-press mechanism for probing printed circuit boards under test
- Optional fixture electronics board to filter signals and provide level-shifted RS-232 or user-specified connections to the tested phone or phone PCB
- Optional cables (standard D-sub) to connect the TS-50 to your test system
- Optional audio capability, including speaker and microphone pick-ups, as well as signal amplification and shielding

### For Many Test Systems

The Agilent TS-50 Family of RF/Mobile Phone Test Fixtures is highly versatile and adaptable. They are designed to work optimally with Agilent test equipment — e.g., the RF Test Sets and the TS-5500 Cellular Phone Functional Test Platforms — a complete mobile phone offering used by leading cellular phone manufacturers. However, they will also work with other manufacturer's RF or mobile phone testers. This gives you the widest flexibility possible, allowing you to use virtually any make or model of test system on the market — including, most likely, the one you have!

### Fast Fixture Development

Using the Agilent TS-50, you can create a custom fixture for testing virtually any assembled phone, RF device, or phone PCB. For fast prototype phone testing, you start with the RF enclosure and the phone quick-nest option. The quick-nest option is robust enough for use in manual production lines. Then, to quickly complete the fixture nest for final test, simply connect the phone's system connector to the fixture connectors. The RF connection from the phone feeds through the fixture to the RF test equipment. To add optional audio capability, attach the speaker and microphone to the quick-nest and position them under the phone. For testing phone PCB's, start with the RF enclosure with the board-press mechanism. For both assembled-phone and phone PCBs, the shielded RF enclosure and routing of test signals are done for you.



### Fast, Safe Semi-Automatic Test

Semi-automatic (that is, human-loaded) testing of mobile phones and PCBs is fast and easy with Agilent TS-50 fixtures. To use a fixture, the test operator simply opens the lid, connects the phone to the cable(s), places the phone in the quick-nest, closes the lid, and the system software senses a micro-switch closure and starts automatically. That is all there is to it. After the test is complete, the operator removes the phone and inserts the next one. When doing phone PCB test, the operator closes the lid, automatically pushing the probe pins into the appropriate junctures on the PCB. Pneumatics are not needed — mechanical action alone creates stable, reliable connections.

### Low Maintenance

The Agilent TS-50 fixture's rugged design and reliable mechanisms minimize your test (and production) downtime. This solid fixture has a proven track record, since it is based on Agilent's custom fixture designs for the last few years. Only a few mechanical parts must be replaced on a regular basis (the exact maintenance cycle is dependent on the phone connector). A loop-back cable, provided with the Agilent TS-50, allows for maintenance and diagnostics tests from the tester through the internal circuitry and back to the test system.

### Fixture Re-use — A Huge Savings

The Agilent TS-50 fixture can be reconfigured and used with new products — a major cost savings. Now you don't have to design a completely new test fixture for every new phone! You need only add new cables to the phone and re-adjust or change the phone quick-nest. For a new PCB, you can re-use the board fixture by creating a new probe plate with pins, similar to the process for in-circuit board testers. This reusability also means savings on fixtures for prototypes in the design verification or pilot production phase.

### Compact, Lightweight

The Agilent TS-50 fixture is small in size: 300 mm (11.81 in) wide, 450 mm (17.7 in) deep, 275 mm high. Two fixtures can be placed side-by-side in front of a standard 19 in. (482.6 mm) rack. Inside, the fixture has space to test phones or other RF devices as large as 45 mm (1.77 in.) deep, 90 mm (3.54 in.) wide, and 300 mm (11.81 in.) long. The fixture weighs approximately 20 lbs. fully assembled, so is easily transportable without a rack or cart.

### Agilent's Worldwide Service and Support

Like all Agilent test systems and equipment, the TS-50 Family of RF/Mobile Phone Test Fixtures enjoys the world-renowned service and support that are an Agilent trademark — around the globe. Support (including repair) is faster and more economical than with home-made or "one-of-a-kind" devices. Agilent's service and support can help ensure maximum uptime for your entire system.

*Agilent's TS-50 fixtures are designed to work with Agilent 892x and 8960 series test sets, Agilent TS-5500 cellular phone functional test platforms (right), and with any other RF or mobile phone testers*

### A Word to Agilent's TS-5500 Users...

In addition to its own features, the TS-50 family provides the following benefits to users of the Agilent TS-5500 Family of Cellular Phone Functional Test Platforms:

- Two fixtures can sit on a work surface in front of a two-up Agilent TS-5500 system, providing extremely efficient use of floor space
- Cables connecting the TS-50 directly to the Agilent TS-5500 test system are available
- Overall system self-test, including fixture, is provided with the Agilent TS-5530
- The Agilent TS-5500 operator interface and RF path calibration defaults to this fixture
- The Agilent TS-5500 test system has software and hardware that interfaces to the E8705B and E8706B PCB



# TS-50 Family of RF Enclosures

## RF Enclosure - E8704B

The TS-50 model E8704B is simply the RF-shielded enclosure that could be used in testing many RF devices, including phones. This RF-shielded enclosure could easily be adapted for many different test systems and TS-50 options added.

### Includes:

- Enclosure Shell
- Rear Cover Plate with one 25 pin D-Sub Connector and one N-type RF Connector
- One Blank Rear Cover Plate
- Nest Base Plate

### Options:

- Opt. 005 RF Absorber Nest Environment to Eliminate Standing Wave and Reflections
- Opt. 002 Audio Components Kit
- Opt. 003 Quick-Nest Kit for assembled phones

## Final Test Fixture - E8705B

The TS-50 model E8705B is the RF-shielded enclosure that should be used in testing assembled phones. Options necessary for nesting, signal routing, audio connections and cabling to the TS-5500 test systems are available.

### Includes:

- Enclosure Shell
- Fixture Electronics Board for Routing Phone Signals, Level-Shifting and Filtering Signals
- Rear Cover Plate with one 9-pin, one 15-pin, one 25-pin D-Sub Connectors and one N-type RF Connector
- RF Absorber Nest Environment to Eliminate Standing Wave and Reflections

### Options:

- Opt. 002 Audio Components Kit
- Opt. 003 Quick-Nest Kit for assembled phones
- Opt. 030/050 Cables to TS-5500 Systems

## Board Test Fixture - E8706B

The TS-50 model E8706B is the RF-shielded enclosure used in testing wireless/RF PC boards, including phone PC boards. A board press mechanism is the base for holding the PC board. Options are available for probe plate kits, signal routing and cabling to the TS-5500 test systems.

### Includes:

- Enclosure Shell
- Board Press Mechanism
- Rear Cover Plate with Connectors and one N-type RF Connector

### Options:

- Opt. 001 Fixture Electronics Board for Routing Phone Signals, Level-Shifting and Filtering Signals
- Opt. 030/050 Cables to TS-5500 Systems



## Completing the Fixtures

A complete test fixture must be created from the TS-50 fixtures, since they are RF-shielded enclosures plus various kits and components. Complete fixture solutions can be provided by Agilent's custom systems teams, your test engineering team or a third party vendor.

### Completing the RF Enclosure-Only (E8704B) or the Final Test Fixture (E8705B) Products

#### The test developer must provide:

- Phone Connections including System Connector, Level-shifting, RF, Phone Power, SIMM
- Audio Testing including: Speaker, Mic, Cables (optional kit)
- Absorption Materials, specifically RF and Audio (optional kit on E8704B)
- Nesting to physically hold the device-under-test and make electrical connections (optional kit)
- Characterization of the RF Path, Acoustics, Serial/Digital Lines
- Device-specific electronics, e.g. RF/antenna coupler, switching
- Cabling to the test system (optional cables for connecting the E8705B with the TS-5500 test system)

### Completing the Board Test Fixture (E8706B)

- Probe Plate, probes, guide pins and gasketing for specific board-under-test
- Phone Connections including System Connector, Level-shifting, RF, Board Power, SIMM
- Device-Specific Electronics, e.g. Capacitor for Voltage Sag
- Connections to Test System, e.g. Shielded RF Cables
- RF Path Characterization

## Characteristics

Typical RF Shielding	E8704B	E8705B	E8706B
600 MHz-2.5 GHz (dB)	>50 dB	>65 dB	>45 dB
800 MHz-1.0 GHz (dB)	>60 dB	>65 dB	>60 dB
1.7 GHz-2.0 GHz (dB)	>50 dB	>65 dB	>50 dB

**E8704B** was tested without options or cables.

**E8705B** was tested with RF Absorber and Fixture Electronics Board Options installed and TS-5530 cables attached.

**E8706B** was tested with Board Press and Fixture Electronics Board Options installed and TS-5530 cables attached.

#### Exterior Dimensions for all Fixtures

300 mm (11.81 in.) wide  
450 mm (17.70 in.) long  
275 mm (10.83 in.) high

#### Working Space Dimensions

##### E8704B with no Options:

390 mm long x 185 mm wide x 180 mm high

##### E8704B with RF Absorber:

310 mm long x 175 mm wide x 85 mm high

##### E8705B:

310 mm long x 175 mm wide x 85 mm high

##### E8706B:

325.9 mm long (12.8") x 215.84 mm wide (8.49")  
for single-sided PC boards, double-sided boards will be slightly less

#### Weight

##### Including Standard Options

**E8704B** 16 lbs. (7.26 kg)

**E8705B** 27 lbs. (12.25 kg)

**E8706B** 20 lbs. (9.07 kg)

#### Connectors

**RF:** N-type (External) to SMA (Internal to Fixture)

**Data:** RF-filtered 25-Pin D-Sub

**Power:** RF-filtered 15-Pin D-Sub (E8705B and E8706B)

**Serial:** RF-filtered 9-Pin D-Sub (E8705B and E8706B)

## Optional Audio

- Source and measurement pairs used for fixture speaker, microphone, phone interface connector, and miscellaneous purposes
- All connections made through data connectors mentioned above

## Choosing the Best TS-50 Configuration

To decide on the test fixture configuration to best suit your needs, consider the following:

- **Final assembled phone or board-level test?**

Choose final test or board test fixture

Decide on nesting option or custom nesting for assembled phone

- **Besides the RF enclosure, any additional RF shielding and testing needed?**

Consider RF Absorber Environment

- **Audio or acoustic tests required?**

Consider Audio Components Kit

- **Choose I/O resources (RF, power, digital, RS-232) required for phone test:**

Connectors to plug into phone

Crimp tools to attach connector to TS-50 fixture/phone cable

- **Map the I/O required to the tester resources**

- **Choose type of cables to the tester:**

Cables to Agilent TS-5500 (available option)

Build custom cables to other testers

## Customization

For special customization requirements, you can start with the Agilent TS-50 RF enclosure and design the cabling, nest and other electronics. Agilent can provide design and implementation services to tailor the fixture enclosure to meet your needs.



# TS-50 Configurations and Options

Option	Description	E8704B	E8705B	E8706B
<b>Option 001</b>	Fixture Electronics Board	N/A	Included	Optional
<b>Option 002</b>	Audio Test Components Kit	Optional	Optional	N/A
<b>Option 003</b>	Quick Nest Kit	Optional	Optional	N/A
<b>Option 005</b>	RF Absorber Nest	Optional	Included	N/A
<b>Option 006</b>	Blank Rear Plate	Optional	Optional	Optional

Option	Description	E8704B	E8705B	E8706B
<b>Options 030/050</b>	Cables for TS-5500/TS-5530	N/A	Optional	Optional
<b>Option S01</b>	Fixture Service Kit (Includes spare gas cylinders, D-Sub connectors, EMI gasket and service manual.)	Optional	Optional	Optional

Model/Option	Description
<b>E8704B:</b> <b>TS-50 RF-Shielded Enclosure</b>	(RF-Shielded Enclosure with RF connector and 25-pin filtered connector in replaceable rear plate. Additional blank rear plate supplied.)
<b>Option 002</b>	Audio Test Components Kit (Includes speaker and microphone pick-ups.)
<b>Option 003</b>	Quick-Nest Kit (A kit to create a mobile phone nest that can be reconfigured with hand tools to fit most phones.)
<b>Option 005</b>	RF Absorber Nest Environment (Inner box environment designed to improve isolation and create a resonance-free cavity, ideal for over-the-air testing.)
<b>Option 006</b>	Additional Blank Rear Plate
<b>Option 0BN</b>	Assembly/Service Manual

Model/Option	Description
<b>E8705B:</b> <b>TS-50 RF Final Fixture Kit</b>	(Consists of RF-shielded enclosure, RF Absorber Nest environment, Fixture Electronics Board for filtering and level shifting and rear plate with standard connectors.)
<b>Option 002</b>	Audio Test Adapter Kit (Includes speaker and microphone pick-ups.)
<b>Option 003</b>	Quick-Nest Kit (A kit to create a mobile phone nest that can be reconfigured with hand tools to fit most phones.)
<b>Option 006</b>	Additional Blank Rear Plate
<b>Option 030</b>	Cables for TS-5530
<b>Option 050</b>	Cables for TS-5550
<b>Option 0BN</b>	Assembly/Service Manual



**Option 005**  
RF Absorber Nest

**Option 003**  
Quick-Nest Kit

Model/Option	Description
<b>E8706B:</b> <b>TS-50 RF Board Test Fixture Kit</b>	(RF-Shielded Enclosure, board compression mechanism, and rear plate with standard connectors.)
<b>Option 001</b>	Fixture Electronics Board (Includes PC Board for routing signals, filtering and level shifting.)
<b>Option 006</b>	Additional Blank Rear Plate
<b>Option 030</b>	Cables for TS-5530
<b>Option 050</b>	Cables for TS-5550
<b>Option 0BN</b>	Assembly/Service Manual

Quantity discounts are available.



Third Party Customization  
Hard-Tooled Nest  
(Pneumatics Supported)

Interfacing to the Electronics

A complete test fixture electronics solution can be created using a general purpose 12-Bit digital card to control the line and internal resources in the fixtures. The TS-5500 digital I/O and software library can also be used as an interface to the electronics for the fixtures.

For additional technical information on the TS-50 family of fixtures, go to [www.agilent.com](http://www.agilent.com) and click on **Products** then **Test and Measurements**.



Standard E8705B  
Rear Plate

A blank rear plate cover is shipped with the fixture and can be customized for any interface including:

- Air
- Power
- Analog
- RF
- Digital
- Etc.

## **Agilent Technologies' Test and Measurement Support, Services, and Assistance**

Agilent Technologies aims to maximize the value you receive, while minimizing your risk. We strive to ensure you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

### **Our Promise**

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost, upon request. Many self-help tools are available.

### **Your Advantage**

Your Advantage means Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of our products.

### **For more assistance**

with your test & measurement needs go to [www.agilent.com/find/assist](http://www.agilent.com/find/assist).

Or contact the test and measurement experts at Agilent Technologies (During normal business hours)

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Printed in USA 06/00

5968-6858E



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