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R&S®TS712x Shielded RF Test Chambers

Reliable RF tests on devices with a radio interface

Applications

- Use in production, service, R&D, and quality assurance
- Tests on mobile phones and devices with other radio interfaces such as Bluetooth®, WiMAX, WLAN, ISM, and RFID

Characteristics

- High shielding effectiveness
- Low reflection due to use of absorbent material
- Integrated RF connectors and filter feedthroughs
- Pneumatically supported opening and closing
- Rugged design for long service life

Application-specific versions

- Narrow and wide versions
- Automatically and manually operated version

Options

- Antenna couplers, e.g. for GSM/CDMA2000®/WCDMA, WLAN, Bluetooth®, and ISM
- Elevated cover, e.g. for integrating CCD cameras and keyboard stimulators
- USB feedthrough filter

ROHDE&SCHWARZ

Product spectrum

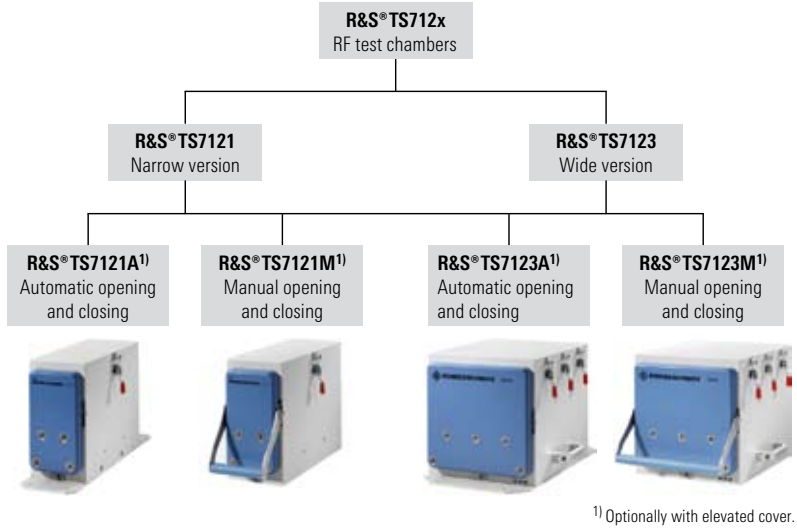
The use of shielded RF chambers is a prequisite for reliably testing radio interfaces. This is the only way to ensure that the DUTs are not affected by other test systems, which would distort the measurement results, and prevents the radio interface test from affecting other external instruments or test systems.

The different versions of the RF test chambers from Rohde & Schwarz provide an optimal selection to meet requirements in service, development, and production.

The R&S®TS712x product family has been designed for automated tests on radio interfaces. It can be expanded to perform other measurements as required for the final testing of devices.
Rohde & Schwarz also offers manually operated RF chambers such as the R&S®CMU-Z10/-Z11 (antenna coupler with shielding cover) and the R&S®TS7110 shielded RF test fixture.

Featuring a variety of options, the modular R&S®TS7110 shielded RF test fixture stands out for its wide range of applications, from module tests to complex final tests of devices with a radio interface.

Product spectrum for various areas of application



1) Optionally with elevated cover.

R&S®TS712x product family

The manual R&S®CMU-Z10/-Z11, on the other hand, has primarily been designed for RF tests on radio interfaces in quality assurance and service.

The R&S®TS712x product family

The R&S®TS712x family of RF test chambers has been designed to meet the re-quirements of automatic production lines. These include long service life, rugged design, and automatic opening and closing of the RF chamber. Featuring high shielding effectiveness over a wide frequency range, the RF test chambers perform tests on modules and devices with a radio interface in accordance with a wide variety of standards such as ISM, GSM/CDMA2000®/WCDMA, WLAN, Bluetooth®, Zigbee, and WiMAX.

The R&S®TS712x product family includes two base models that differ mainly in width. Plus, an automatic and a manual version of each model is available, indicated by the letters A and M in the type designation.

The automatic R&S®TS712xA RF test chamber is mainly used in production. The R&S®TS712xM manual version is particularly suited for applications in service, quality assurance, and development.

The automatic and manual versions R&S®TS712xA and R&S®TS712xM of the RF test chambers have the same basic design, ensuring the same test functionality for both versions in development, production, and service.

R&S®CMU200 radio communication tester with automatic R&S®TS7121A RF test chamber

Applications

The R&S®TS712x RF test chambers ideally complement the Rohde&Schwarz product family. For example, they can be used to test mobile phones together with the R&S®CMU200 universal radio communication tester, to test tire pressure sensors together with the R&S®FSP/R&S®FSL spectrum analyzers, and to test routers together with the R&S®PTW70 WLAN protocol tester.

R&S®TS7121

The narrow version of the RF test chamber (R&S®TS7121) has a width of 155 mm and is particularly suitable for testing small DUTs, e.g. mobile phones.

In conjunction with the R&S®CMU200 universal radio communication tester or other test equipment as well as suitable antenna couplers for GSM, CDMA2000®, and WCDMA, you can perform bit error ratio (BER), frame error ratio (FER), RF power, and audio tests on mobile phones.

In addition, you can perform RF testing of other smaller devices with radio interfaces such as PDAs, remote keyless entry, cordless phones, RFID modules, WLAN and Bluetooth® sticks that operate in the GPS, ISM, WLAN, HomeRF, WiMAX, and Bluetooth® bands, for example.

Tests

Options	Type of test	Typical manufacturing error(s)
Antenna coupler ISM, GSM, CDMA2000®, WCDMA, Bluetooth® as well as WLAN[1]	**Transmitter test**	
	RF power measurement	• Antenna mounted incorrectly or antenna defective
	Receiver test	
	GSM and WCDMA BER measurement	• Pickup of external RFI due to incorrectly mounted or missing shielding material • Antenna mounted incorrectly or antenna defective
	CDMA2000® FER measurement	
	WLAN PER measurement	
	ISM devices, radio strength signal indicator (RSSI), receiver sensitivity, BER measurement	
	Signaling test	
	Call setup and handover with mobile phones	• Incorrect or no RF adjustment, faulty device software
Feedthrough filters • Filter connector (NF)[1] • USB filter connector • Pneumatic feedthroughs[2] • Fiber-optic link feedthrough[2]	Voltage measurement	• Mounting errors, short circuits
	Current measurement	
	Control of the DUT	• Malfunctions of modules
	Interface test (USB, FireWire, LAN, video, etc)	• Short circuits, faulty connections
Audio set[2]	Audio test	• Loudspeaker or microphone defective or incorrectly mounted
Elevated cover	Optical inspection[2] (display test, camera test, LED test)	• Connection to display defective, short circuits, mounting errors
	For integrating pneumatic fingers[2], keypad or touchscreen test[1]	• Single key defective, connection defective, short circuits

[1] Included in standard version.
[2] Customer-specific adaptation.

R&S®TS7123

The wide version of the R&S®TS7123 RF test chamber has a width of 330 mm and handles tests on devices with up to double-height DIN slots and is thus ideal for automotive applications. This model is suitable for testing car radios, navigation systems, and infotainment systems.

The wide RF chamber also provides room for integrating subsystems to simulate special ambient conditions.

Rohde&Schwarz offers, among other things, a pressure chamber for testing pressure sensors, which are used in tire pressure monitoring (TPMS). Thus, you can perform tests on the radio interfaces and also check that the tire pressure sensors work properly under a wide range of typical pressure conditions as occur in car tires.

Another application consists of functional tests on WLAN terminals such as access points (AP) or stations (STA) in quality labs by performing packet error ratio (PER) measurements using the R&S®PTW70 WLAN protocol tester.

By using the R&S®CMW270 WiMAX communication tester, a suitable antenna coupler, and the R&S®TS712x test chambers, you can easily and reproducibly perform functional tests of WiMAX mobile stations.

Typical tests via the air interface are the measurement of the emitted RF power on the transmitter end and the packet error ratio measurement on the receiver end.

Elevated covers are available for both RF test chamber models, allowing the integration of additional test equipment above the DUT.

R&S®TS7810 RF test system and R&S®TS7123A RF test chamber with pressure chamber

R&S®PTW70 WLAN protocol tester with R&S®TS7123M

R&S®CMW270 WiMAX communication tester with R&S®TS7123M

Mechanical design

The RF test chambers were designed with high shielding effectiveness and sturdy construction in mind. To meet these requirements without diminishing manufacturing efficiency, the three-dimensional structure of the RF chamber is milled from an aluminum block.

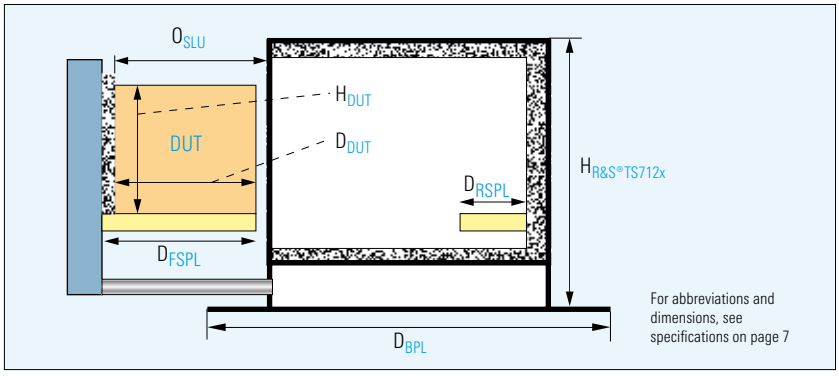
The R&S®TS7121x shielded RF test chambers consist of the milled base, a slide-in unit, and the cover of the RF chamber.

The lower compartment of the base accommodates the guide rails and, in the case of the automatic versions, also the pneumatic system including the pressure regulators and valves. The valves and the feedback sensors are controlled via a 24 V connector.

Interior view of the R&S®TS7121 with antenna coupler

The actual RF chamber is located above the pneumatic chamber. On the RF chamber rear panel, four RF feedthroughs are provided for connecting antenna couplers or DUT RF interfaces. Customer-specific antenna couplers or antenna couplers from Rohde&Schwarz can be attached as required to the side panels or to the rear panel of the RF chamber.

Rear view of the R&S®TS7121 and R&S®TS7123 with exchangeable connector plate and RF connectors



Side view of the R&S®TS7121x RF test chambers

Of special interest is the exchangeable connector plate at the rear of the RF test chamber with two lead-through filters. The D-Sub filter connectors make it possible to feed electrical signals to the DUT or to the internal test and control circuitry.

The exchangeable connector plate allows you to add application-specific feedthroughs without having to modify the RF test chamber.

The interior of the RF chamber may optionally be lined with absorbent material, which attenuates high-frequency electromagnetic waves and thus ensures reproducible and stable measurements. The absorbent material also works in the low-frequency audio range, where it effectively reduces ambient sound.

The RF chamber is sealed by means of a cover milled from a solid aluminum block. The cover is fastened in place with easy-to-lock tension levers.

The DUT is slid into the RF chamber through the chamber front window on the slide-in unit by pneumatic or manual control. The front supporting plate is located at the interior of the slide-in unit. On this plate, you can mount the application-specific DUT mount or a mechanical mount for an exchangeable DUT mount or DUT holder.

When the slide-in unit is closed, the front supporting plate is guided by means of two centering pins, which ensures reproducible positioning of the DUT.

Options

Elevated cover

The optional elevated covers provide sufficient room for the integration of further test equipment such as CCD cameras or keyboard stimulators above the DUT. For the integration of additional test equipment, you can use the brackets on both sides of the RF test chambers.

R&S®TS7123M with elevated cover and brackets for additional test equipment

Antenna couplers

Antenna couplers for all important mobile radio standards as well as for WLAN b/g, ISM, and Bluetooth® antenna couplers are currently available. The couplers can be attached to the side panels or rear supporting plate of the RF chamber. Customer-specific antenna couplers can also be integrated.

When several RF test chambers are used, each chamber should be calibrated to correct even the smallest production tolerances in the measurements – be it for the antenna couplers, the RF cables, or the absorbent material.

R&S®TS-F2x-G GSM/CDMA2000®/WCDMA antenna coupler

Feedthrough filter

By using the R&S®TS-F21FU2 and R&S®TS-F23FU2 options, you can feed USB 1.1 and USB 2.0 signals to the RF test chamber for controlling the DUT and the test equipment in the RF chamber.

Customer-specific fiber-optic link and pneumatic feedthroughs are also configurable on request.

R&S®TS-F2x-B2 Bluetooth® and WLAN b/g antenna coupler

R&S®TS-F23FU2 exchangeable connector plate of the R&S®TS7123 with USB feedthrough

The R&S®TS7121 and R&S®TS7123 shielded RF test chambers are fully configured, so that you can, in conjunction with an antenna coupler, quickly implement a variety of applications in service, development, and series production. The long-standing experience of Rohde&Schwarz in the fields of RF technology and series production of equipment will be of major help in attaining your goal even faster.

Specifications

RF test chambers	R&S®TS7121	R&S®TS7123
RF shielding effectiveness[1]		
300 MHz to 14 GHz	typ. >35 dB	typ. >40 dB
500 MHz to 3 GHz	typ. >70 dB	typ. >60 dB
1 GHz to 2.5 GHz, 2.5 GHz to 4 GHz	typ. >75 dB, typ. >60 dB	typ. >60 dB, typ. >50 dB
Interfaces		
Compressed air (grease-free)	4 bar to 8 bar (automatic version only)	
Control of pneumatic system	25-contact, D-Sub (m), 24 V	
Exchangeable connector plate with feedthrough filter	80 mm × 90 mm 3.15 in × 3.54 in	143 mm × 120 mm 5.63 in × 4.72 in
1 × 25, 1 × 9-contact, and D-Sub feedthrough filter	3 MHz (3 dB) cut-off frequency, 100 V (1 A) DC voltage, 100 V (0.3 A) AC voltage	
Temperature ranges		
Operating temperature range	+10 °C to +40 °C	
Storage temperature range	–20 °C to +60 °C	
Relative humidity		
Operation	90 % r.h. non-condensating at +10 °C to +30 °C or 75 % r.h. non-condensating at +10 °C to +40 °C	
Storage	90 % r.h. non-condensating at up to +60 °C	
Dimensions (W × H × D)		
Outer dimensions (slide-in unit closed)[2]		
Automatic version (with base plate)	155 mm × 305 mm × 428 (600) mm 6.10 in × 12.00 in × 16.85 (23.62) in	330 mm × 347 mm × 428 (600) mm 12.99 in × 13.66 in × 16.85 (23.62) in
Manual version with handle	155 mm × 305 mm × 498 mm 6.10 in × 12.00 in × 19.61 in	330 mm × 347 mm × 498 mm 12.99 in × 13.66 in × 19.61 in
Additional depth with slide-in unit fully extended	+210 mm +8.27 in	+248 mm + 9.76 in
Inner dimensions including absorbent material	87 mm × 130 mm × 354 mm 3.43 in × 5.12 in × 13.94 in	250 mm × 170 mm × 345 mm 9.84 in × 6.69 in × 13.58 in
Max. DUT dimensions including absorbent material	80 mm × 130 mm × 193 mm 3.15 in × 5.12 in × 7.60 in	245 mm × 165 mm × 228 mm 9.65 in × 6.50 in × 8.98 in
Base plate (BPL)[3] of the automatic version (W × D)	155 mm × 600 mm 6.10 in × 23.62 in	330 mm × 600 mm 12.99 in × 23.62 in
Front supporting plate, (including absorbent material) $(W \times D)_{FSPL}$[3]	80 mm × 200 (193) mm 3.15 in × 7.87 (7.60) in	245 mm × 255 (237) mm 9.65 in × 10.04 (9.33) in
Rear supporting plate, (including absorbent material) $(W \times D)_{RSPL}$[3]	80 mm ×175 (149) mm 3.15 in × 6.89 (5.87) in	245 mm × 129 (100) mm 9.65 in × 5.08 (3.94) in
Max. opening of the slide-in unit (including absorbent material) O_{SLU}[3]	209 (195) mm 8.23 (7.68) in	242 (228) mm 9.53 (8.98) in
Weight (with absorbent material, without antenna)	approx. 25 kg, 55.12 lb	approx. 35 kg, 77.16 lb
Shipping weight	approx. 30 kg, 66.14 lb	approx. 45 kg, 99.21 lb
Options[4]		
Antenna coupler	coupling coefficient typ. 10 dB to 20 dB[5]	
GSM/CDMA2000®/WCDMA	770 MHz to 1000 MHz, 1700 MHz to 2200 MHz	
Bluetooth®/WLAN (b, g)	2.4 GHz	
ISM	315 MHz, 433 MHz to 434 MHz, 850 MHz to 950 MHz	
Absorber		
Thickness	26 mm 1.02 in	29 mm 1.14 in
Return loss	up to 1 GHz: <2 dB; 1 GHz to 2 GHz: 10 dB to 20 dB, from 2 GHz >20 dB	
Proportion of shielding effectiveness	up to 1 GHz: approx. 5 dB; 0.8 GHz to 2 GHz: approx. 10 dB; from 2 GHz: approx. 15 dB	
Feedthrough filter for USB up to 2.0	yes	yes

1) With integrated absorbent material by complying with the maintenance intervals.
2) Without connectors on rear panel (>20 mm (> 0.79 in)), without lateral clamping levers (2 mm (0.08 in) × 30 mm (1.81 in)).
3) For assignment, see figure on page 5.
4) Feedthrough filter for fiber-optic link and compressed air on request.
5) Depending on the DUT.

RF test chambers	R&S®TS7121	R&S®TS7123
Elevated cover (optional with absorbent material)	yes	yes
Outer dimensions (including side handle)	155 (188) mm × 185 mm × 400 mm 6.10 (7.40) in × 7.28 in × 15.75 in	330 (359) mm × 185 mm × 400 mm 12.99 (14.13) in × 7.28 in × 15.75 in
Inner dimensions without absorbent material	128 mm × 170 mm × 373 mm 5.04 in × 6.69 in × 14.69 in	297 mm × 170 mm × 367 mm 11.69 in × 6.69 in × 14.45 in
Inner dimensions including absorbent material	76 mm × 144 mm × 321 mm 2.99 in × 5.67 in × 12.64 in	239 mm × 141 mm × 309 mm 9.41 in × 5.55 in × 12.17 in
Effective additional inner height (including absorbent material)	179 (153) mm 7.05 (6.02) in	179 (150) mm 7.05 (5.91) in

Ordering information

Designation	Type	Order No.	R&S®TS7121	R&S®TS7123
Shielded RF Test Chamber, narrow version (without absorbent material)				
Automatic version[1]	R&S®TS7121A	1152.5700.02	X	
Manual version with handle	R&S®TS7121M	1152.5800.02	X	
Shielded RF Test Chamber, wide version (without absorbent material)				
Automatic version[1]	R&S®TS7123A	1152.5600.02		X
Manual version with handle	R&S®TS7123M	1152.5400.02		X
Options				
GSM, CDMA2000®, WCDMA and Bluetooth® Antenna Coupler **with** absorbent material for R&S®TS7121	R&S®TS-F21AGB	1506.9000.02	X	
GSM, CDMA2000®, WCDMA Antenna Coupler **with** absorbent material for R&S®TS7123	R&S®TS-F23A-G	1506.9017.02		X
GSM, CDMA2000®, WCDMA Antenna Coupler **without** absorbent material	R&S®TS-F2x-G	1506.9017.04	X	X
Bluetooth® Coupler with bracket	R&S®TS-F2x-B2	1506.9046.02	X	X
ISM Wideband Antenna (315 MHz, 434 MHz, 850 MHz to 950 MHz)	R&S®TS-F21x-I4	1506.9030.02	X	X
Absorber Kit for R&S®TS7121 (with adhesive)	R&S®TS-F21ABS	1506.9100.02	X	
Absorber Kit for R&S®TS7123 (with adhesive)	R&S®TS-F23ABS	1506.9117.02		X
USB 2.0 Feedthrough Filter with exchangeable connector plate for R&S®TS7121	R&S®TS-F21FU2	1506.9181.02	X	
USB 2.0 Feedthrough Filter with exchangeable connector plate for R&S®TS7123	R&S®TS-F23FU2	1506.9198.02		X
Elevated Cover for R&S®TS7121	R&S®TS-F21EC1	1506.9052.02	X	
Elevated Cover for R&S®TS7123	R&S®TS-F23EC1	1506.9069.02		X
Absorber Kit for R&S®TS-F21EC1	R&S®TS-F21AB1	1506.9130.02	X	
Absorber Kit for R&S®TS-F23EC1	R&S®TS-F23AB1	1506.9146.02		X

[1] Use only in protected environment, risk of bodily injury through automatic opening and closing of RF chamber (see safety sheet included with R&S®TS712x documentation).

Certified Quality System ISO 9001 DQS REG. NO 1954 QM

Certified Environmental System ISO 14001 DQS REG. NO 1954 UM

More information at
www.rohde-schwarz.com
(search term: TS7121, TS7123)

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