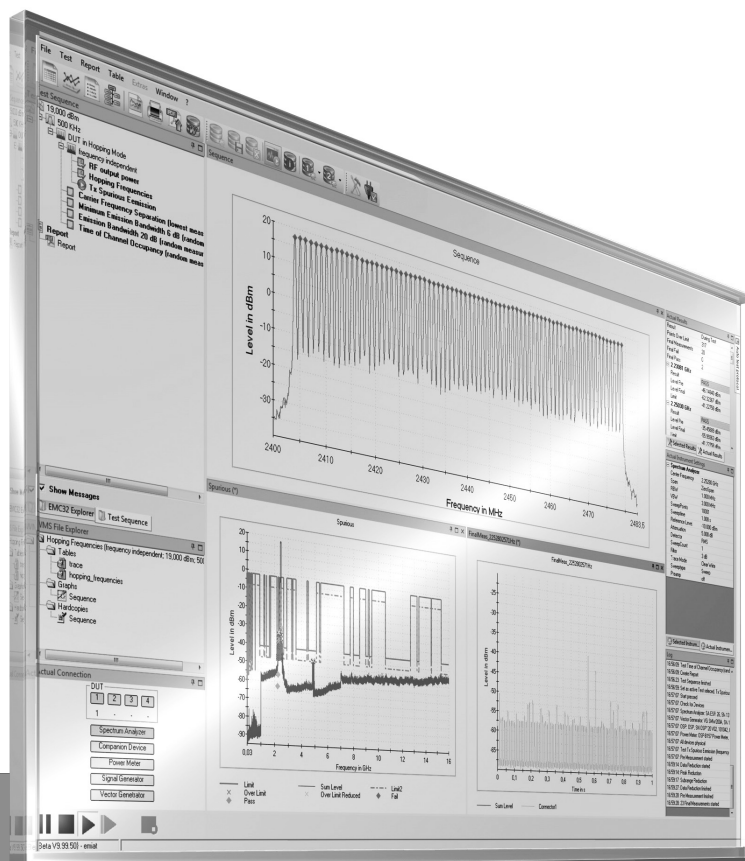# R&S®WMS32
WIRELESS MEASUREMENT SYSTEM SOFTWARE

Specifications

Specifications
Version 09.00

ROHDE&SCHWARZ

Make ideas real

CONTENTS

General

All standards mentioned in this document refer to the latest release version of the standard at the date of order.

Software version

The following specifications are valid for software from version 11 of R&S®WMS32 in combination with required hardware components for R&S®TS8997 and are identical with R&S®EMC32 from version 11.

System requirements [1]

Operating system	Windows 10 (64 bit)
CPU	Intel® Core models or compatible models with a core speed > 2.4 GHz
Free RAM	≥ 16 Gbyte
Free hard disk space	≥ 512 Gbyte, usage of SDD recommended
Graphics resolution	≥ 1280 × 1024 pixel, 65536 colors (higher resolution strongly recommended)
Installation	administrator access privileges during installation
Network	100 Mbit LAN interface
NI-VISA driver	Version 17.0 or later, optional NI GPIB interface cards: NI only, compatible GPIB cards from other manufactures are not supported
Software update	The integrated software update manager requires internet access for querying the Rohde & Schwarz website on updates and important messages.
R&S®TS8997	The system is optimized for the following instruments: R&S®FSW, R&S®FSVA3000, R&S®FSV3000, R&S®FSV, R&S®ESW, R&S®ESR, R&S®SMB100A, R&S®SMW200A, R&S®SMBV100B, R&S®OSP150 with R&S®OSP-B157W8 PLUS.
Open source acknowledgement	The R&S®WMS32 wireless measurement system software contains open source software packages. Copies of the respective licenses are included in the R&S®WMS32 wireless measurement software open source acknowledgement. Please refer to the download area at www.rohde-schwarz.com/software/emc32/.

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[1] If the PC does not meet these requirements, the performance of the software may be impaired.

Options for the R&S®TS8997 test system with R&S®WMS32

R&S®WMS32-WB
(part of R&S®OSP-B157W8 PLUS, R&S®TS8997 basic software option)

Standards	additional options required for the following standards	• ETSI EN 300328 • ETSI EN 301893 • FCC §15.407(a), (b) [2], (e), (g), (h) • FCC §15.247(a), (b), (c), (d) [2], (e), (f)
Covered test cases	• integrated calibration concept • flexible report generator (HTML, RTF, PDF) • various capabilities for EUT monitoring and EUT stimulation • connectivity of system devices • EUT specific or application specific test storage and data management • software operates like a virtual instrument	
Supported devices	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	• R&S®FSW • R&S®FSVA3000 • R&S®FSV3000 • R&S®ESW • R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	• R&S®SMW200A with required options • R&S®SMM100A with required options • R&S®SMBV100B with required options
Required R&S®WMS32 licenses	any combination of: R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K06, R&S®WMS32-K07, R&S®WMS32-K502, R&S®WMS32-K222	

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[2] For radiated measurements, R&S®EMC32-EB, R&S®EMC32-K10 and R&S®EMC32-K10A options are additionally required for automated testing. R&S®WMS32-K-WL and/or R&S®WMS32-K-BT options are additionally recommended for DUT automation.

R&S®WMS32-PK19 (R&S®TS8997 software package for ETSI EN 300328, ETSI EN 301893, FCC §15.407 and §15.247 test cases with 12 months SLA)

Standards		- ETSI EN 300328 - ETSI EN 301893 - ETSI EN 302502 - ETSI EN 300220-2 - FCC §15.407(a), (b) [2], (e), (g), (h) - FCC §15.247(a), (b), (c), (d) [2], (e), (f)
Key features	- highly automated - supports synchronous multiport power tests - high resolution measurement mode with spectrum analyzer and power meter for DFS - coverage of all test cases in line with ETSI EN 300328 and ETSI EN 301893	
Covered test cases	§15.407(a): output power and power spectral density, supports PM-G method in line with KDB 789033 §15.407(b): out-of-band and spurious emissions [2] §15.407(e): occupied bandwidth, supports 6 dB/20 dB/26 dB and 99 % §15.407(g): frequency stability §15.407(h): TPC and DFS, automated, radar signal type 1 to 6 − channel availability check − DFS threshold detection − channel closing transmission time − channel move time − non-occupancy period − detection bandwidth §15.247(a): determination of hopping frequency and separation §15.247(a): occupied bandwidth §15.247(b)(c): output power §15.247(d): spurious and out-of-band emissions [2] §15.247(e): power spectral density §15.247(f): time of channel occupancy - carrier frequency accuracy - transmit power control (TPC) - power density - RF output power - duty cycle - TX sequence - TX gap - medium utilization factor (MU) - dwell time - minimum frequency occupation - hopping sequence (frequency hoppers only) - frequency separation (frequency hoppers only) - occupied channel bandwidth - transmitter unwanted emissions in the out-of-band domain - transmitter unwanted emissions in the spurious domain - receiver spurious emissions - adaptivity 2.4 GHz band - receiver blocking	
DUT	2.4 GHz and 5 GHz ISM band and U-NII devices such as: - IEEE 802.11 wireless LANs, e.g. Wi-Fi® - microbroadcasting - IEEE 802.15 PANs, e.g. Bluetooth®, Zigbee - remote controls for various toys, garage door openers	
Consists of	R&S®WMS32-MU, R&S®WMS32-WB, R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K06, R&S®WMS32-K06E, R&S®WMS32-K07, R&S®WMS32-K09, R&S®WMS32-K11, R&S®WMS32-K14, R&S®WMS32-K84, R&S®WMS32-K222, R&S®WMS32-K502, R&S®SWS-300328, R&S®SWS-301893, R&S®SWS-302502, R&S®SWS-300222, R&S®SWS-15407, R&S®SWS-15407E, R&S®SWS-15247	
Service level agreement (SLA)	SLA basic level; offers 12 months free software upgrades and updates, technical support, access to the online ticketing system, technical support during business hours, verification on Rohde & Schwarz reference system	

Supported devices [4]	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	• R&S®FSW [3] • R&S®FSVA3000 • R&S®FSV3000 • R&S®ESW [4] • R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	• R&S®SMW200A with required options • R&S®SMM100A with required options • R&S®SMBV100B with required options

R&S®WMS32-PK18 (R&S®TS8997 software package for ETSI EN 300328, ETSI EN 301893 test cases with 12 months SLA)

Standards		• ETSI EN 300328 • ETSI EN 301893
Key features	• highly automated • supports synchronous multiport power tests • coverage of all test cases in line with ETSI EN 300328 and ETSI EN 301893	
Covered test cases	• carrier frequency accuracy • transmit power control (TPC) • power density • RF output power • duty cycle • TX sequence • TX gap • medium utilization factor (MU) • dwell time • minimum frequency occupation • hopping sequence (frequency hoppers only) • frequency separation (frequency hoppers only) • occupied channel bandwidth • transmitter unwanted emissions in the out-of-band domain • transmitter unwanted emissions in the spurious domain • receiver spurious emissions • adaptivity 2.4 GHz band • receiver blocking	
DUT	2.4 GHz and 5 GHz ISM band devices such as: • IEEE 802.11 wireless LANs, e.g. Wi-Fi® • microbroadcasting • IEEE 802.15 PANs, e.g. Bluetooth®, Zigbee • remote controls for various toys, garage door openers	
Consists of	R&S®WMS32-WB, R&S®WMS32-K02, R&S®WMS32-K05, R&S®SWS-300328, R&S®SWS-301893	
Service level agreement (SLA)	SLA basic level; offers 12 months free software upgrades and updates, technical support, access to the online ticketing system, technical support during business hours, verification on Rohde & Schwarz reference system	
Supported devices	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	• R&S®FSW • R&S®FSVA3000 • R&S®FSV3000 • R&S®ESW • R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	• R&S®SMW200A with required options • R&S®SMM100A with required options • R&S®SMBV100B with required options

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[3] For FCC measurements, R&S®FSW-B8 or R&S®ESW-B8 option is recommended.

R&S®WMS32-PK20 (R&S®TS8997 software package for general options)

Consists of	R&S®WMS32-K09, R&S®WMS32-K11, R&S®WMS32-K84, R&S®WMS32-MU, R&S®WMS32-RAD

R&S®WMS32-K02 (R&S®TS8997 software option for ETSI EN 300328)

Standard		ETSI EN 300328
Key features	- highly automated - supports synchronous multiport power tests - coverage of all test cases in line with ETSI EN 301893	
Covered test cases	- RF output power - duty cycle - TX sequence - TX gap - medium utilization factor (MU) - dwell time - minimum frequency occupation - hopping sequence (frequency hoppers only) - frequency separation (frequency hoppers only) - occupied channel bandwidth - transmitter unwanted emissions in the out-of-band domain - transmitter unwanted emissions in the spurious domain - receiver spurious emissions - adaptivity 2.4 GHz band - receiver blocking	
DUT	2.4 GHz ISM band devices such as: - IEEE 802.11 wireless LANs, e.g. Wi-Fi® - microbroadcasting	
Supported devices	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	- R&S®FSW - R&S®FSVA3000 - R&S®FSV3000 - R&S®ESW - R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	- R&S®SMW200A with required options - R&S®SMM100A with required options - R&S®SMBV100B with required options
Required R&S®WMS32 license	R&S®WMS32-WB	
Includes	R&S®SWS-300328 valid for 12 months	

R&S®WMS32-K05 (R&S®TS8997 software option for ETSI EN 301893)

Standard		ETSI EN 301893
Key features	- highly automated - supports synchronous multiport power tests - coverage of all test cases in line with ETSI EN 301893	
Covered test cases	- carrier frequency accuracy - RF output power - transmit power control (TPC) - power density - occupied channel bandwidth - transmitter unwanted emissions in the out-of-band domain - transmitter unwanted emissions in the spurious domain - receiver spurious emissions - adaptivity 5 GHz band - receiver blocking/dynamic frequency selection (DFS)	
DUT	5 GHz ISM band devices such as: - IEEE 802.11 wireless LANs, e.g. Wi-Fi® - microbroadcasting	
Supported devices [4]	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	- R&S®FSW - R&S®FSVA3000 - R&S®FSV3000 - R&S®ESW - R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	- R&S®SMW200A with required options - R&S®SMM100A with required options - R&S®SMBV100B with required options
Required R&S®WMS32 license	R&S®WMS32-WB	
Includes	R&S®SWS-30189 valid for 12 months	

R&S®WMS32-K05E (R&S®TS8997 software option for ETSI EN 303687)

Standard		ETSI EN 303 687
Key features	- highly automated - supports synchronous multiport power tests - coverage of all test cases in line with ETSI EN 303 687	
Covered test cases	- RF output power - power spectral density - occupied channel bandwidth - nominal center frequency - transmitter unwanted emissions within the 6 GHz band - transmitter unwanted emissions outside the 6 GHz band - receiver spurious emissions - receiver blocking - receiver selectivity - channel access mechanism	
DUT	6 GHz ISM band devices such as: IEEE 802.11ax wireless LANs, e.g. Wi-Fi 6E	
Supported devices	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	- R&S®FSW - R&S®FSVA3000 - R&S®FSV3000 - R&S®ESW - R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	- R&S®SMW200A with required options - R&S®SMM100A with required options
Required R&S®WMS32 license	R&S®WMS32-WB	
Includes	R&S®SWS-303687 valid for 12 months	

R&S®WMS32-K502 (R&S®TS8997 software option for ETSI EN 302502)

Standard		ETSI EN 302502
Key features	- highly automated - supports synchronous multiport power tests - coverage of all test cases in line with ETSI EN 302502	
Covered test cases	- frequency error [4] - transmitter RF output power, EIRP, TPC and EIRP spectral density [5] - transmitter unwanted emissions [6] - receiver spurious emissions [7] - dynamic frequency selection - receiver blocking	
DUT	high performance broadband fixed wireless access systems (BFWA) including equipment which is used in wireless local area networks intended to operate in the 5.8 GHz band (5725 MHz to 5875 MHz)	
Supported devices	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	- R&S®FSW - R&S®FSVA3000 - R&S®FSV3000 - R&S®ESW - R&S®ESR
	analog signal generators	R&S®SMB100A [8] with required options
	vector signal generators	- R&S®SMW200A with required options - R&S®SMM100A with required options - R&S®SMBV100B with required options
Required R&S®WMS32 license	R&S®WMS32-WB	
Includes	R&S®SWS-302502, valid for 12 months	

[4] The frequency error measurement is implemented starting the search for the frequency boundaries of the signal from outside the expected occupied bandwidth of the signal. This increases the robustness of the test procedure in case of DUTs with poor spectral flatness.

[5] For spectral density test case the measurement functionality of Rohde & Schwarz signal and spectrum analyzers is used which yields equivalent results.

[6] The test case of transmitter unwanted emissions outside the band is evaluated in two steps: premeasurement with a peak detector to detect all potential frequencies that might exceed the limit. For each detected frequency, software gating is applied to subsequent zero span measurements in postprocessing (using the RBW defined for the requirement). This implementation achieves equivalent results to the described procedure in the standard assuming that the wanted in-band signal and the unwanted emissions occur at the same time. The user needs to select a transmission repetition time, which equals or exceeds the corresponding value of the DUT.

[7] In line with ETSI EN 302502, this test is only applicable to DUTs with standby or idle mode. The test procedure is identical to test case: transmitter unwanted emissions.

[8] Operating frequency range: up to 6125 MHz.

R&S®WMS32-K06 (R&S®TS8997 software option for FCC §15.407 5 GHz for U-NII-1/2A/2C/3 including DFS test cases)

Standard		FCC §15.407 5 GHz (a), (b) [2], (e), (g), (h) for U-NII-1/2A/2C/3
Key features	- highly automated - supports synchronous multiport power tests - high resolution measurement mode with spectrum analyzer and power meter for DFS	
Covered test cases	§15.407(a): output power and power spectral density, supports PM-G method in line with KDB 789033 §15.407(b): out-of-band and spurious emissions [2] §15.407(e): occupied bandwidth, supports 6 dB/20 dB/26 dB and 99 % §15.407(g): frequency stability §15.407(h): TPC and DFS, automated, radar signal type 1 to 6 − channel availability check − DFS threshold detection − channel closing transmission time − channel move time − non-occupancy period − detection bandwidth	
DUT	U-NII devices such as: - IEEE 802.11 wireless LANs, e.g. Wi-Fi® - cordless phones - microbroadcasting	
Supported devices	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	- R&S®FSW [4] - R&S®FSVA3000 - R&S®FSV3000 - R&S®ESW [4] - R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	- R&S®SMW200A with required options - R&S®SMM100A with required options - R&S®SMBV100B with required options
Required R&S®WMS32 license	R&S®WMS32-WB	
Includes	R&S®SWS-15407 valid for 12 months	

R&S®WMS32-K06E (R&S®TS8997 software option for FCC §15.407 Wi-Fi 6E for U-NII-5/6/7/8)

Standard		FCC §15.407 Wi-Fi 6E for U-NII-5/6/7/8
Key features	- highly automated - supports synchronous multiport power tests - high resolution measurement mode with spectrum analyzer and power meter	
Covered test cases	- RF output power - power spectral density (SA-1/SA-2/ SA-3) - emission bandwidth (26 dB) - occupied channel bandwidth (99 %) - frequency stability - in-band emissions - transmitter spurious emissions - emissions in restricted frequency bands (R&S®WMS32-K14 required) - contention based protocol [9]	
DUT	U-NII-5/6/7/8 devices such as: IEEE 802.11 wireless LANs, e.g. Wi-Fi 6E	
Supported devices	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	- R&S®FSW [4] - R&S®FSVA3000 - R&S®FSV3000 - R&S®ESW [4] - R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	- R&S®SMW200A with required options - R&S®SMM100A with required options
Required R&S®WMS32 license	R&S®WMS32-WB, WMS32-K14	
Includes	R&S®SWS-15407E valid for 12 months	

R&S®WMS32-K07 (R&S®TS8997 software option for FCC §15.247 test cases)

Standard		FCC §15.247(a), (b), (c), (d) [2], (e), (f)
Key features	- highly automated - supporting synchronous multiport power tests	
Covered test cases	§15.247(a): determination of hopping frequency and separation §15.247(a): occupied bandwidth §15.247(b), (c): output power §15.247(d): spurious and out-of-band emissions [2] §15.247(e): power spectral density §15.247(f): time of channel occupancy	
DUT	intentional radiators devices such as: - IEEE 802.11 wireless LANs, e.g. Wi-Fi® - IEEE 802.15 PANs, e.g. Bluetooth®, Zigbee - remote controls for various toys, garage door openers	
Supported devices	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
		- R&S®FSW [4] - R&S®FSVA3000 - R&S®FSV3000 - R&S®ESW [4] - R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	- R&S®SMW200A with required options - R&S®SMM100A with required options - R&S®SMBV100B with required options
Required R&S®WMS32 license	R&S®WMS32-WB	
Includes	R&S®SWS-15247 valid for 12 months	

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[9] Contention based protocol is implemented using a single DUT port (also in case of multiport devices).

R&S®WMS32-K222 (R&S®TS8997 software option for ETSI EN 300220-2)

Standard		ETSI EN 300220-2
Key features	- highly automated - supports synchronous multiport power tests - coverage of selected test cases in line with ETSI EN 300220-2	
Covered test cases	- operating frequency [10] - unwanted emissions in the spurious domain - effective radiated power [11] - maximum ERP power spectral density - transmitter out-of-band emissions [12] - occupied bandwidth - adjacent channel power [13] - RX sensitivity - blocking [13] - clear channel assessment threshold [14] - polite spectrum access timing parameters [15] - adaptive frequency agility [15]	
DUT	- short range devices (SRD) operating in the harmonized frequencies: K, L, M, N, P, Q cover equipment intended for fixed, mobile or nomadic use, including: - standalone radio equipment - plug-in radio devices intended for use with or within a variety of host systems - plug-in radio devices intended for use within combined equipment	
Supported devices	power measurement	R&S®OSP150 with R&S®OSP-B157W8 PLUS
	frequency extension	R&S®OSP220 with R&S®OSP-B157WX
	spectrum analyzers and test receivers	- R&S®FSW - R&S®FSVA3000 - R&S®FSV3000 - R&S®ESW - R&S®ESR
	analog signal generators	R&S®SMB100A with required options
	vector signal generators	- R&S®SMW200A with required options - R&S®SMM100A with required options - R&S®SMBV100B with required options
Required R&S®WMS32 license	R&S®WMS32-WB	
Includes	R&S®SWS-300222 valid for 12 months	

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[10] Implemented by manufacturer declaration as required by the standard.

[11] The implementation in R&S®WMS32 with the default configuration assumes that the DUT is using constant envelope modulation. In case the DUT is using non-constant envelope modulation, an R&S®WMS-K09 option is required in order to change the detector to peak as required by the standard.

[12] The implementation in R&S®WMS32 with the default configuration assumes that the DUT is generating D-M2a or D-M3 test signals. In case the DUT is generating a D-M2 test signal, an R&S®WMS-K09 option is required in order to change the trace mode from maximum hold to linear average as allowed by the standard.

[13] Only implemented for DUT of categories 2 and 3.

[14] Alternative to duty cycle requirements in the EU wide harmonized bands of interest (863 MHz to 870 MHz).

[15] Applies only to DUTs with AFA.

R&S®WMS32-INA (R&S®TS8997 software option for normalized measurements)

Key features	normalized measurement option for the R&S®TS8997 test system enables non-conducted measurements in an RF-shielded box [16]

Enables normalized measurements for the following standards and test cases [17]	• ETSI EN 301893
	  − RF output power
	  − power spectral density
	  − occupied channel bandwidth
	  − carrier frequency
	  − transmit power control (TPC)
	  − receiver blocking
	  − adaptivity
	  − dynamic frequency selection (DFS)
	• ETSI EN 303687
	  − RF output power
	  − power spectral density
	  − occupied channel bandwidth
	  − nominal center frequency
	  − receiver blocking
	  − receiver selectivity
	  − channel access mechanism

Required R&S®WMS licenses	R&S®WMS32-WB and R&S®WMS32-K05 and/or R&S®WMS32-K05E
Additional required system hardware	R&S®TS7124, R&S®OSP-B157WN
Includes	R&S®SWS-INA valid for 12 months

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[16] The normalized measurement approach is only intended for DUTs with a single transmit and receive antenna. The use of R&S®CMW270/ R&S®CMW500 as a companion device is not supported for normalized measurements. Furthermore, test cases in the out-of-band/spurious domain are not supported (e.g. TX spurious emission, RX spurious emission, etc.) since the normalization is only performed on the active DUT channel. The maximum EIRP of the DUT needs to be assessed for the different channel, bandwidth and power combinations prior to performing the corresponding normalized measurements with this option.

[17] Only the drafts of ETSI EN 301893 and ETSI EN 303687 allow to perform normalized measurements currently.

R&S®WMS32-K09 (R&S®TS8997 software option: expert mode)

Key features	expert mode option of the R&S®TS8997 test system enables editing and changes for test settings and limits in the templates for R&S®WMS32 options

Enables additional settings for test cases	• §15.407(a): output power and power spectral density, supports PM-G method in line with KDB 789033
	• §15.407(b): out-of-band and spurious emissions [2]
	• §15.407(e): occupied bandwidth, supports 6 dB/20 dB/26 dB and 99 %
	• §15.407(g): frequency stability
	• §15.407(h): TPC and DFS, automated, radar signal type 1 to 6
	  − channel availability check
	  − DFS threshold detection
	  − channel closing transmission time
	  − channel move time
	  − non-occupancy period
	  − detection bandwidth
	• §15.247(a): determination of hopping frequency and separation
	• §15.247(a): occupied bandwidth
	• §15.247(b), (c): output power
	• §15.247(d): spurious and out-of-band emissions [2]
	• §15.247(e): power spectral density
	• §15.247(f): time of channel occupancy
	• carrier frequency accuracy
	• transmit power control (TPC)
	• power density
	• RF output power
	• duty cycle
	• TX sequence
	• TX gap
	• medium utilization factor (MU)
	• dwell time
	• minimum frequency occupation
	• hopping sequence (frequency hoppers only)
	• frequency separation (frequency hoppers only)
	• occupied channel bandwidth
	• transmitter unwanted emissions in the out-of-band domain
	• transmitter unwanted emissions in the spurious domain
	• receiver spurious emissions
	• adaptivity 2.4 GHz band
	• receiver blocking

Required R&S®WMS licenses	R&S®WMS32-WB and any of: R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K06, R&S®WMS32-K07

R&S®WMS32-K11 (R&S®TS8997 software option: generic driver)

Key features	R&S®WMS32 option for controlling power supplies within the running WMS test sequence
Required R&S®WMS licenses	R&S®WMS32-WB and any of: R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K06, R&S®WMS32-K07

R&S®WMS32-K14 (R&S®TS8997 software option: emission measurements in restricted bands for FCC §15.407 and FCC§15.247)

Key features	R&S®WMS32 option for automated conducted measurements in line with FCC §15.205, restricted bands of operation using FCC §15.209 limits and detector settings in line with FCC §15.35
Required R&S®WMS licenses	R&S®WMS32-WB and any of: R&S®WMS32-K06, R&S®WMS32-K07

R&S®WMS32-K84 (R&S®TS8997 software option: report interface to text processing applications)

Key features	R&S®TS8997 software option for report interface to text processing apps, accommodates different requirements for wireless measurement standards; The report settings dialog is used to configure the test report. Besides RTF, HTML and PDF format, there is also the option to use Microsoft Word .dotx templates.
Required R&S®WMS32 licenses	R&S®WMS32-WB and any of: R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K06, R&S®WMS32-K07

R&S®WMS32-MU (R&S®TS8997 software option: measurement uncertainty calculation)

Key features	R&S®TS8997 software option for calculation and reporting of measurement uncertainty (MU)
Required R&S®WMS licenses	R&S®WMS32-WB and any of: R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K06, R&S®WMS32-K07

R&S®WMS32-RAD (R&S®TS8997 software auxiliary option for radiated measurements)

Key features	auxiliary option for determination of maximum in-band emission of the DUT by controlling of the mast and turn table; position data are used automatically by the relevant test cases
Required R&S®WMS licenses	R&S®WMS32-WB and any of: R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K06, R&S®WMS32-K07
Remark	For complete out-of-band radiated measurement, R&S®EMC32-EB, R&S®EMC32-K10 and R&S®EMC32-K10A are additionally required for automated testing. R&S®WMS-K-BT and R&S®WMS-K-WL is additionally recommended for DUT automation

R&S®WMS32-K-WL (R&S®TS8997 software auxiliary option for using R&S®CMW270/R&S®CMW500 as a companion device for WLAN technologies)

Key features	auxiliary option for using R&S®CMW270/R&S®CMW500 as a companion device in receiver test cases for DUTs with supported WLAN technologies
Required R&S®WMS licenses	R&S®WMS32-WB and any of: R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K06, R&S®WMS32-K07

R&S®WMS32-K-BT (R&S®TS8997 software auxiliary option for using R&S®CMW270/R&S®CMW500 as a companion device for Bluetooth® technologies)

Key features	auxiliary option for using R&S®CMW270/R&S®CMW500 as a companion device in receiver blocking test cases for DUTs with supported Bluetooth® Classic and Bluetooth® Low Energy technologies
Required R&S®WMS licenses	R&S®WMS32-WB and any of: R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K06, R&S®WMS32-K07

R&S®WMS32-K-W7 (R&S®TS8997 software auxiliary option for using CMX500 as a companion device for WLAN technologies)

Key features	auxiliary option for using CMX500 as a companion device in receiver test cases for DUTs with supported WLAN technologies
Required R&S®WMS licenses	R&S®WMS32-WB and any of: R&S®WMS32-K02, R&S®WMS32-K05, R&S®WMS32-K05E, R&S®WMS32-K06, R&S®WMS32-K06E, R&S®WMS32-K07

Service level agreement (SLA) options

R&S®SWS-300328 (R&S®TS8997 SLA option for test cases in line with ETSI EN 300328)

Standard	ETSI EN 300328	
Key features	24/7 problem reporting: access to Rohde & Schwarz Support Center - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades	
Covered services	- The customer can submit a support request via the Rohde & Schwarz internet portal around the clock from anywhere in the world. The status of the request can be checked at any time - The support request will be received by the Rohde & Schwarz support team during business hours. A qualified service technician will handle it within the response time defined by the customer's service package. Depending on the type of problem, the technician will initiate additional measures to find a solution - Software updates maintain and optimize the performance of the product/system. - Software upgrades include the implementation of changes in line with the relevant specification or standard	
Supported test cases	- power control - duty cycle, TX sequence, TX gap - medium utilization (MU) factor - carrier frequency - spectrum power density - dwell time, frequency occupation, hopping sequence (only frequency hoppers) - frequency separation (only frequency hoppers) - occupied bandwidth - adaptivity test - receiver blocking test - transmitter unwanted emissions in the out-of-band range - transmitter unwanted emissions in the spurious range - receiver spurious emissions	
Requires	R&S®WMS32-WB and R&S®WMS32-K02	
Period of validity	12 months	

R&S®SWS-301893 (R&S®TS8997 SLA option for test cases in line with ETSI EN 301893)

Standard		ETSI EN 301893
Key features	24/7 problem reporting: access to Rohde & Schwarz Support Center - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades	
Covered services	- The customer can submit a support request via the Rohde & Schwarz internet portal around the clock from anywhere in the world. The status of the request can be checked at any time - The support request will be received by the Rohde & Schwarz support team during business hours. A qualified service technician will handle it within the response time defined by the customer's service package. Depending on the type of problem, the technician will initiate additional measures to find a solution - Software updates maintain and optimize the performance of the product/system. - Software upgrades include the implementation of changes in line with the relevant specification or standard	
Supported test cases	- power control - duty cycle, TX sequence, TX gap - medium utilization (MU) factor - carrier frequency - spectrum power density - dwell time, frequency occupation, hopping sequence (only frequency hoppers) - frequency separation (only frequency hoppers) - occupied bandwidth - adaptivity test - dynamic frequency selection (DFS) test - receiver blocking test - transmitter unwanted emissions in the out-of-band range - transmitter unwanted emissions in the spurious range - receiver spurious emissions	
Requires		R&S®WMS32-WB and R&S®WMS32-K05
Period of validity		12 months

R&S®SWS-303687 (R&S®TS8997 SLA option for test cases in line with ETSI EN 303687)

Standard		ETSI EN 303687
Key features	24/7 problem reporting: access to Rohde & Schwarz Support Center - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades	
Covered services	- The customer can submit a support request via the Rohde & Schwarz internet portal around the clock from anywhere in the world. The status of the request can be checked at any time - The support request will be received by the Rohde & Schwarz support team during business hours. A qualified service technician will handle it within the response time defined by the customer's service package. Depending on the type of problem, the technician will initiate additional measures to find a solution - Software updates maintain and optimize the performance of the product/system. - Software upgrades include the implementation of changes in line with the relevant specification or standard	
Supported test cases	- RF output power - power spectral density - occupied channel bandwidth - nominal center frequency - receiver spurious emissions - transmitter unwanted emissions within the 6 GHz band - transmitter unwanted emissions outside the 6 GHz band - receiver blocking - receiver selectivity - channel access mechanism	
Requires		R&S®WMS32-WB and R&S®WMS32-K05E
Period of validity		12 months

R&S®SWS-302502 (R&S®TS8997 SLA option for test cases in line with ETSI EN 302502)

Standard		ETSI EN 302502
Key features	24/7 problem reporting: access to Rohde & Schwarz Support Center - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades	
Covered services	- The customer can submit a support request via the Rohde & Schwarz internet portal around the clock from anywhere in the world. The status of the request can be checked at any time - The support request will be received by the Rohde & Schwarz support team during business hours. A qualified service technician will handle it within the response time defined by the customer's service package. Depending on the type of problem, the technician will initiate additional measures to find a solution - Software updates maintain and optimize the performance of the product/system. - Software upgrades include the implementation of changes in line with the relevant specification or standard	
Supported test cases	- frequency error - transmitter RF output power, EIRP, TPC and EIRP spectral density - transmitter unwanted emissions - receiver spurious - dynamic frequency selection (DFS) - receiver blocking	
Requires	R&S®WMS32-WB and R&S®WMS32-K502	
Period of validity	12 months	

R&S®SWS-15247 (R&S®TS8997 SLA option for test cases in line with FCC §15.247)

Standard		FCC §15.247(a), (b), (c), (d) [2], (e), (f)
Key features	24/7 problem reporting: access to Rohde & Schwarz Support Center - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades	
Covered services	- The customer can submit a support request via the Rohde & Schwarz internet portal around the clock from anywhere in the world. The status of the request can be checked at any time - The support request will be received by the Rohde & Schwarz support team during business hours. A qualified service technician will handle it within the response time defined by the customer's service package. Depending on the type of problem, the technician will initiate additional measures to find a solution - Software updates maintain and optimize the performance of the product/system. - Software upgrades include the implementation of changes in line with the relevant specification or standard	
Supported test cases	§15.247(a): determination of hopping frequency and separation §15.247(a): occupied bandwidth §15.247(b), (c): output power §15.247(d): spurious and out-of-band emissions §15.247(e): power spectral density §15.247(f): time of channel occupancy	
Requires	R&S®WMS32-WB and R&S®WMS32-K07	

R&S®SWS-15407 (R&S®TS8997 SLA option for test cases in line with FCC §15.407 for U-NII-1/2A/2C/3)

Standard		FCC §15.407(a), (b) [2], (e), (g), (h) for U-NII-1/2A/2C/3
Key features	24/7 problem reporting: access to Rohde & Schwarz Support Center - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades	
Covered services	- The customer can submit a support request via the Rohde & Schwarz internet portal around the clock from anywhere in the world. The status of the request can be checked at any time - The support request will be received by the Rohde & Schwarz support team during business hours. A qualified service technician will handle it within the response time defined by the customer's service package. Depending on the type of problem, the technician will initiate additional measures to find a solution - Software updates maintain and optimize the performance of the product/system - Software upgrades include the implementation of changes in line with the relevant specification or standard	
Supported test cases	§15.407(a): output power and power spectral density, supports PM-G method in line with KDB 789033 §15.407(b): out-of-band and spurious emissions [2] §15.407(e): occupied bandwidth, supports 6 dB/20 dB/26 dB and 99 % §15.407(g): frequency stability §15.407(h): TPC and DFS, no VSA needed, automated, radar signal type 1 to 6 - channel availability check - DFS threshold detection - channel closing transmission time - channel move time - non-occupancy period - detection bandwidth	
Requires	R&S®WMS32-WB and R&S®WMS32-K06	

R&S®SWS-15407E (R&S®TS8997 SLA option for test cases in line with FCC §15.407 for Wi-Fi 6E U-NII-5/6/7/8 bands)

Standards		FCC §15.407 for U-NII-5/6/7/8
Key features	24/7 problem reporting: access to Rohde & Schwarz Support Center - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades	
Covered services	- The customer can submit a support request via the Rohde & Schwarz internet portal around the clock from anywhere in the world. The status of the request can be checked at any time. - The support request will be received by the Rohde & Schwarz support team during business hours. A qualified service technician will handle it within the response time defined by the customer's service package. Depending on the type of problem, the technician will initiate additional measures to find a solution. - Software updates maintain and optimize the performance of the product/system. - Software upgrades include the implementation of changes in line with the relevant specification or standard.	
Supported test cases	- RF output power - power spectral density (SA-1/SA-2/ SA-3) - emission bandwidth (26 dB) - occupied channel bandwidth (99 %) - frequency stability, in-band emissions - transmitter spurious emissions - emissions in restricted frequency bands (R&S®WMS32-K14 required) - contention based protocol	
Requires	R&S®WMS32-WB and R&S®WMS32-K06E, R&S®WMS32-K14	
Period of validity	12 months	

R&S®SWS-300222 (R&S®TS8997 SLA option for test cases in line with ETSI EN 300220-2)

Standard		ETSI EN 300220-2
Key features	24/7 problem reporting: access to Rohde & Schwarz Support Center - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades	
Covered services	- The customer can submit a support request via the Rohde & Schwarz internet portal around the clock from anywhere in the world. The status of the request can be checked at any time - The support request will be received by the Rohde & Schwarz support team during business hours. A qualified service technician will handle it within the response time defined by the customer's service package. Depending on the type of problem, the technician will initiate additional measures to find a solution - Software updates maintain and optimize the performance of the product/system - Software upgrades include the implementation of changes in line with the relevant specification or standard	
Supported test cases	- operating frequency - unwanted emissions in the spurious domain - effective radiated power - maximum ERP power spectral density - occupied bandwidth - transmitter out-of-band emissions - adjacent channel power - receiver sensitivity - blocking - clear channel assessment threshold - polite spectrum access timing parameters - adaptive frequency agility	
Requires	R&S®WMS32-WB and R&S®WMS32-K222	
Period of validity	12 months	

R&S®SWS-INA (R&S®TS8997 SLA option for normalized measurements)

Key features	24/7 problem reporting: access to Rohde & Schwarz Support Center - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades
Covered services	- The customer can submit a support request via the Rohde & Schwarz internet portal around the clock from anywhere in the world. The status of the request can be checked at any time - The support request will be received by the Rohde & Schwarz support team during business hours. A qualified service technician will handle it within the response time defined by the customer's service package. Depending on the type of problem, the technician will initiate additional measures to find a solution - Software updates maintain and optimize the performance of the product/system - Software upgrades include the implementation of changes in line with the relevant specification or standard
Supported test cases	- ETSI EN 301893 - ETSI EN 303687
Requires	R&S®WMS32-WB and R&S®WMS32-INA
Period of validity	12 months

R&S®SWS-UPDATE (R&S®TS8997 SLA option for one-time license update)

Key features	24/7 problem reporting: access to Rohde & Schwarz Support Desk - overview of requests - technical support and response times during business hours - maintenance releases (software updates) - software upgrades
Covered services	re-entry of SLA service in case of SLA interruption longer than six months
Required R&S®WMS32 licenses	any combination of: R&S®SWS-300328, R&S®SWS-301893, R&S®SWS-15407, R&S®SWS-15247, R&S®SWS-302502, R&S®SWS-300222

Ordering information

Designation	Type	Order No.
R&S®WMS32 options		
R&S®TS8997 software option basic license for R&S®WMS32 [18]	R&S®WMS32-WB	1527.1267.02
R&S®TS8997 software option for ETSI EN 300328	R&S®WMS32-K02	1527.1409.05
R&S®TS8997 software option for ETSI EN 301893	R&S®WMS32-K05	1527.1438.05
R&S®TS8997 software option for ETSI EN 303687	R&S®WMS32-K05E	1537.0386.05
R&S®TS8997 software option for ETSI EN 302502	R&S®WMS32-K502	1537.0505.05
R&S®TS8997 software option for ETSI EN 300220-2	R&S®WMS32-K222	1537.0228.05
Test cases for 5 GHz with DFS in line with FCC §15.407 5 GHz (U-NII-1/2A/2C/3), for R&S®TS8997	R&S®WMS32-K06	1527.1309.05
Test cases for 5 GHz with DFS in line with FCC §15.407 Wi-Fi 6E (U-NII-5/6/7/8), for R&S®TS8997	R&S®WMS32-K06E	1537.0211.05
Test cases for 2.4 GHz and 5.8 GHz in line with FCC §15.247, for R&S®TS8997	R&S®WMS32-K07	1527.1315.05
R&S®TS8997 software option for automated conducted measurements in line with FCC §15.205, restricted bands of operation and using FCC §15.209 limits and detector settings in line with FCC §15.35	R&S®WMS32-K14	1529.7756.05
R&S®TS8997 software option for normalized measurements	R&S®WMS32-INA	1537.0105.05
R&S®TS8997 software option expert mode	R&S®WMS32-K09	1527.1380.05
R&S®TS8997 software option generic driver	R&S®WMS32-K11	1527.1296.05
R&S®TS8997 software option report interface	R&S®WMS32-K84	1531.4973.05
R&S®TS8997 software option measurement uncertainty	R&S®WMS32-MU	1531.4967.05
R&S®TS8997 software auxiliary option for radiated measurements	R&S®WMS32-RAD	1531.5011.05
R&S®TS8997 software auxiliary option for using R&S®CMW270/R&S®CMW500 as a companion device for WLAN technologies	R&S®WMS32-K-WL	1531.5157.05
R&S®TS8997 software auxiliary option for using R&S®CMW270/R&S®CMW500 as a companion device for Bluetooth® technologies	R&S®WMS32-K-BT	1531.5163.05
R&S®TS8997 software auxiliary option for using CMX500 as a companion device for WLAN technologies	R&S®WMS32-K-W7	1537.0163.05
Software license package for ETSI EN 300328, EN 301893, SLA basic	R&S®WMS32-PK18	1531.4996.02
Software license package for ETSI EN 300328, EN 301893, FCC §15.407, FCC §15.247, SLA basic and additional options	R&S®WMS32-PK19	1531.4980.02
R&S®WMS32-PK20 (R&S®TS8997 software package for general options)	R&S®WMS32-PK20	1531.5411.05
Service level agreement options		
R&S®TS8997 SLA option for test cases in line with ETSI EN 300328	R&S®SWS-300328	1527.1150.05
R&S®TS8997 SLA option for test cases in line with ETSI EN 301893	R&S®SWS-301893	1527.1244.05
R&S®TS8997 SLA option for test cases in line with ETSI EN 303687	R&S®SWS-303687	1529.0116.05
R&S®TS8997 SLA option for test cases in line with ETSI EN 302502	R&S®SWS-302502	1537.0111.05
R&S®TS8997 SLA option for test cases in line with FCC §15.247	R&S®SWS-15247	1527.1250.05
R&S®TS8997 SLA option for test cases in line with FCC §15.407 (U-NII-1/2A/2C/3)	R&S®SWS-15407	1527.1273.05
R&S®TS8997 SLA option for test cases in line with ETSI EN 300220-2	R&S®SWS-300222	1537.0228.05
R&S®TS8997 SLA option for test cases in line with FCC §15.407 (U-NII-5/6/7/8)	R&S®SWS-15407E	1537.0292.05
R&S®TS8997 SLA option for normalized measurements	R&S®SWS-INA	1537.0686.05
R&S®TS8997 SLA option for one-time license update	R&S®SWS-UPDATE	1537.0670.05

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Rohde & Schwarz

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