ABN 43 064 478 842

231 osborne avenue clayton south, vic 3169
PO box 1548, clayton south, vic 3169
t 03 9265 7400 f 03 9558 0875
freecall 1800 680 680
www.tmgtestequipment.com.au

Test & Measurement

- sales
- rentals
- calibration
- repair
- disposal

Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

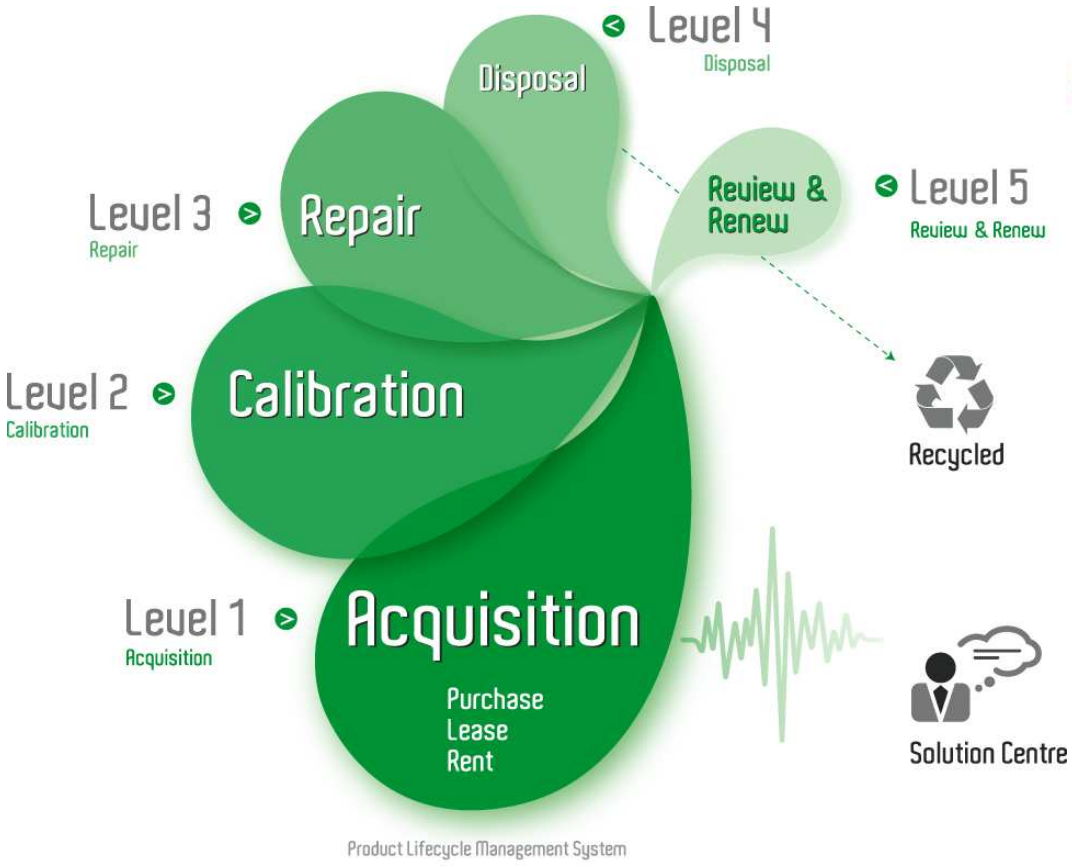
TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

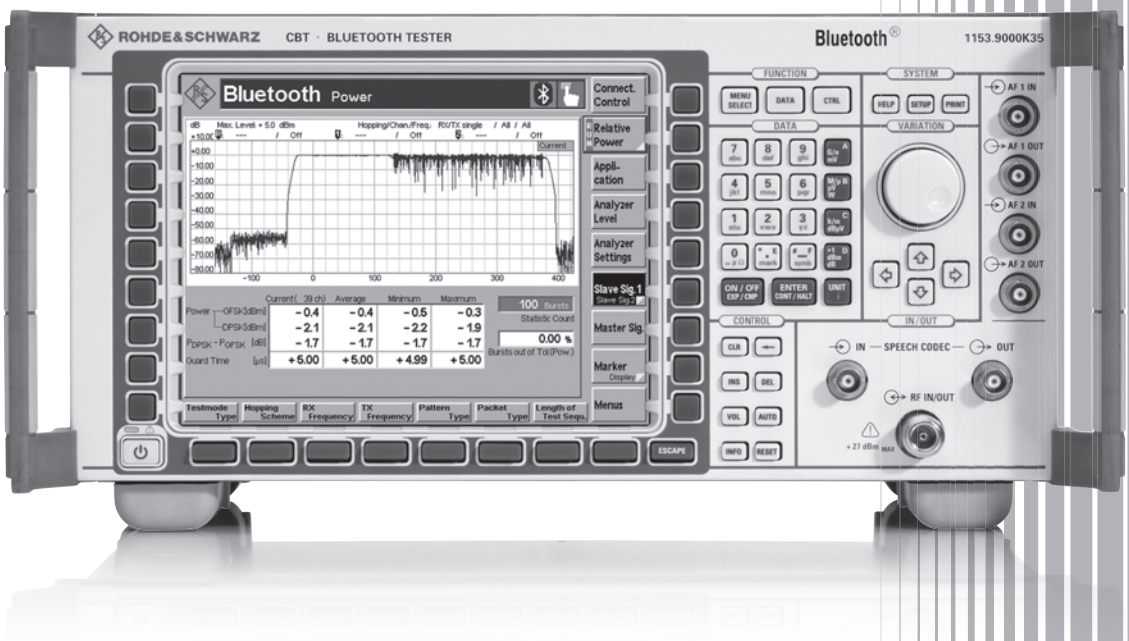
If you click on the "Click-to-Call" logo below, you can all us for FREE!

TMG Corporate Website **TMG Products Website**

Click-to-Call
TMG Now



R&S®CBT/R&S®CBT32
Bluetooth® Tester
Specifications



7 Years of Driving Innovation

ROHDE&SCHWARZ

CONTENTS

Specifications apply under the following conditions: Data without tolerance limits is not binding.

In line with the Bluetooth® Core Specification, bit rates are specified in Mbps (million bits per second).

Mbps is not an SI unit.

The specifications for the R&S®CBT/R&S®CBT32 refer to a fully equipped unit with all applicable options installed.

Unit specifications

Standards		Bluetooth® Core Specification Version 2.1+EDR: test mode supported Radio Frequency Test Specification V1.2/V2.0/V2.0+EDR/V2.1+EDR Bluetooth® Low Energy Specification

TCXO time base

Max. frequency drift	in temperature range +5 °C to +45 °C	$\pm 1 \times 10^{-6}$
Max. aging		$\pm 1 \times 10^{-6}$/year

Reference frequency input

Synchronization input		BNC connector REF IN
Frequency	sinewave	10 MHz
	squarewave (TTL level)	10 MHz
Max. frequency variation		$\pm 5 \times 10^{-6}$
Input voltage range		0.5 V to 2 V, rms
Impedance		50 Ω

RF generator

RF channel definition	Bluetooth® menu	2402 MHz + k × 1 MHz, k = 0 to 93
	Bluetooth® LE menu	2404 + k × 2 MHz, k = 0 to 10 2406 + k × 2 MHz, k = 11 to 36 channel 37 = 2402 MHz channel 38 = 2426 MHz channel 39 = 2480 MHz

Frequency range	RF menu	2398 MHz to 2499 MHz
	Bluetooth® menu	2402 MHz to 2495 MHz
	Bluetooth® LE menu	2402 MHz to 2480 MHz

Frequency resolution	channel spacing in line with standard	1 MHz

Frequency offset range		±250 kHz

Frequency offset resolution		1 kHz

Frequency uncertainty	RF menu	±5 Hz + drift of time base
	Bluetooth® and Bluetooth® LE menu	±100 Hz + drift of time base

Hopping scheme	modes in line with Bluetooth® standard	Europe (except France), USA France RX/TX single frequency reduced hopping
	Bluetooth® Low Energy	no hopping and no signaling

Output level range		
RF IN/OUT	for basic rate packets and for Bluetooth® Low Energy packets	–90 dBm to +0 dBm
	for EDR packets (2-DHx, 3-DHx)	–90 dBm to –3 dBm

Output level uncertainty	in temperature range +20 °C to +35 °C	
RF IN/OUT	output level < –10 dBm	< 1.0 dB
	output level ≥ –10 dBm	< 1.5 dB
	in temperature range +5 °C to +45 °C	
	output level < –10 dBm	< 1.5 dB
	output level ≥ –10 dBm	< 2.0 dB

Output level resolution		0.1 dB

Generator RF output level repeatability	typical values after 1 h warm-up time at constant ambient temperature	< 0.03 dB

VSWR		
RF IN/OUT		< 1.5

Attenuation of harmonics	f_0 = 2398 MHz to 2499 MHz, up to 7 GHz	
RF IN/OUT		> 30 dB

Attenuation of nonharmonics		> 50 dB

GFSK modulation		
GFSK bit rate	DHx packet types	1 Mbps, B × T = 0.5
Modulation index	11110000 pattern frequency deviation 160 kHz	0.32
Modulation index range	frequency deviation 100 kHz to 220 kHz	0.20 to 0.44
Modulation index resolution		0.01
Modulation index uncertainty	11110000 pattern frequency deviation 160 kHz in temperature range +20 °C to +35 °C	±1 %

DPSK modulation		
π/4DQPSK bit rate	2-DHx packet types	2 Mbps
8DPSK bit rate	3-DHx packet types	3 Mbps
Symbol rate		1 Msps
Modulation uncertainty	DEVM	≤ 5 %, rms

GFSK modulation Bluetooth® Low Energy		
GFSK bit rate	RF_PHY_Test_Ref, ADV_IND, ADV_NONCONN_IND and DATA packet types	1 Mbps, B × T = 0.5
Modulation index	11110000 pattern frequency deviation 250 kHz	0.50
Modulation index range	frequency deviation 200 kHz to 300 kHz	0.40 to 0.60
Modulation index resolution		0.01
Modulation index uncertainty	11110000 pattern frequency deviation 250 kHz in temperature range +20 °C to +35 °C	±1 %

Dirty TX (basic rate)		
Frequency offset range		±250 kHz
Frequency offset resolution		1 kHz
Frequency offset uncertainty		±5 Hz + drift of time base
Modulation index range		0.20 to 0.44
Modulation index resolution		0.01
Modulation index uncertainty	11110000 pattern in temperature range +20 °C to +35 °C	±1 %
Symbol time error range		±20 ppm
Symbol time error resolution		1 ppm

Symbol time error uncertainty		same as time base
Drift mode	drift is dependent on packet type:	ON/OFF
	DH1: frequency modulation with ±25 kHz deviation and 1600 Hz sinewave modulation frequency	
	DH3: frequency modulation with ±40 kHz deviation and 500 Hz sinewave modulation frequency	
	DH5: frequency modulation with ±40 kHz deviation and 300 Hz sinewave modulation frequency	
	successive packets have alternating start phases of 0°/180°	
Drift resolution		N/A
Drift uncertainty (FM deviation)		±5 kHz

Dirty TX (EDR)		
Frequency offset range		±250 kHz
Frequency offset resolution		1 kHz
Frequency offset uncertainty		±5 Hz + drift of time base
Symbol time error range		±20 ppm
Symbol time error resolution		1 ppm
Symbol time error uncertainty		same as time base
Drift mode	frequency modulation with ±10 kHz deviation and sinewave modulation period of 100 µs; successive packets have alternating start phases of 0°/180°	ON/OFF
Drift resolution		N/A
Drift uncertainty (FM deviation)		±0.5 kHz

Dirty TX (Bluetooth® Low Energy)		
Frequency offset range		±250 kHz
Frequency offset resolution		1 kHz
Frequency offset uncertainty		±5 Hz + drift of time base
Modulation index range		0.40 to 0.60
Modulation index resolution		0.01
Modulation index uncertainty	11110000 pattern in temperature range +20 °C to +35 °C	±1 %
Symbol time error range		± 50 ppm
Symbol time error resolution		1 ppm
Symbol time error uncertainty		same as time base
Drift mode	frequency modulation with ±50 kHz deviation and sinewave modulation period of 1600 µs (625 Hz); successive packets have alternating start phases of 0°/180°	ON/OFF
Drift resolution		N/A
Drift uncertainty (FM deviation)		±5 kHz

Note: Both the basic rate and EDR dirty transmitter, with the Specification Table setting, are in line with the Bluetooth® Radio Frequency Test Specification V1.2/V2.0+EDR/V2.1+EDR, supporting both single-slot and multi-slot ACL packets.

RF analyzer

VSWR		
RF IN/OUT	2398 MHz to 2499 MHz	< 1.5

RF channel definition	Bluetooth® menu	2402 MHz + k × 1 MHz, k = 0 to 93
	Bluetooth® LE menu	2404 + k × 2 MHz, k = 0 to 10 2406 + k × 2 MHz, k = 11 to 36 channel 37 = 2402 MHz channel 38 = 2426 MHz channel 39 = 2480 MHz

Frequency range	RF menu	2398 MHz to 2499 MHz
	Bluetooth® menu	2402 MHz to 2495 MHz
	Bluetooth® LE menu	2402 MHz to 2480 MHz

Frequency resolution	channel spacing in line with standard	1 MHz

Frequency uncertainty		±5 Hz + drift of time base

Hopping scheme	modes in line with Bluetooth® standard	Europe (except France), USA France RX/TX single frequency reduced hopping
	Bluetooth® Low Energy	no hopping and no signaling

Power meter (frequency-selective) and power versus time

Measurement bandwidth	filter definition: passband	
	Bluetooth® and Bluetooth® LE menu	
	filter bandwidth → wide	2.0 MHz
	filter bandwidth → narrow	1.3 MHz
	RF menu	10 Hz to 1 MHz in 1/2/3/5 steps

Level range		
RF IN/OUT	continuous power peak envelope power [1] (PEP)	–40 dBm to +22 dBm +26 dBm (400 mW)

Level uncertainty	in temperature range +20 °C to +35 °C	
RF IN/OUT	Bluetooth® and Bluetooth® LE menu	
	from full scale down to –25 dB	< 1.0 dB
	RF menu	
	input level –40 dBm to +22 dBm	< 1.0 dB

Level uncertainty	in temperature range +5 °C to +45 °C	
RF IN/OUT	Bluetooth® and Bluetooth® LE menu	
	from full scale down to –25 dB	< 1.5 dB
	RF menu	
	input level –40 dBm to +22 dBm	< 1.5 dB

Level resolution	in manual mode	0.1 dB
	in remote control mode	0.01 dB

Reference level for full dynamic range	GFSK signal	
RF IN/OUT	continuous power peak envelope power [1] (PEP)	–25 dBm to +22 dBm +26 dBm (400 mW)

[1] Mean value of power versus time must be equal to or less than permissible continuous power.

Dynamic range	filter bandwidth → wide	> 55 dB, rms

RF level measurement repeatability	typical values after 1 h warm-up time at constant ambient temperature	< 0.03 dB

Modulation analyzer

Measurement bandwidth	filter definition: passband	
	filter bandwidth → wide	2.0 MHz
	filter bandwidth → narrow	1.3 MHz

Level range		
RF IN/OUT	GFSK signal	from full-scale setting down to –25 dB

Level range		
RF IN/OUT	DPSK signal	from full-scale setting down to –25 dB

Total measurement range for frequency offset and frequency deviation (GFSK)	Bluetooth® menu frequency offset < maximum deviation	–250 kHz to +250 kHz
	Bluetooth® LE menu frequency offset < maximum deviation	–350 kHz to +350 kHz

Nominal measurement range for DPSK signals	filter bandwidth → wide	–75 kHz to +75 kHz

Frequency offset uncertainty in preamble (GFSK)	Bluetooth® menu for deviation ≤ 160 kHz	≤ 2 kHz
	Bluetooth® LE menu for deviation ≤ 250 kHz	≤ 2 kHz

Frequency stability uncertainty (DPSK)	for $\omega_i \leq 75$ kHz, for deviation ≤ 160 kHz	≤ 2 kHz

Frequency deviation uncertainty in payload (GFSK)	for modulation index 0.22 to 0.42 filter bandwidth → narrow	≤ 1.3 %
	Bluetooth® LE menu for extended modulation index 0.42 to 0.60 filter bandwidth → narrow	≤ 1.3 %

Frequency deviation uncertainty in payload (DPSK)	PRBS pattern in temperature range +20 °C to +35 °C	
	DEVM	≤ 3 %, rms
	DEVM	≤ 8 %, peak

Uncertainty of frequency drift measurement (GFSK)	measured in burst related to frequency offset in preamble	
	10101010 pattern	≤ 2 kHz

Relative frequency drift uncertainty (GFSK)	referenced to frequency offset value in preamble	
	10101010 pattern	≤ 1 kHz

Frequency drift uncertainty (DPSK)	for $\omega_o \leq 10$ kHz	≤ 1 kHz

Frequency resolution (GFSK)	in manual mode	1 kHz
	in remote control mode	1 Hz

Frequency resolution (DPSK)	in manual mode	100 Hz
	in remote control mode	1 Hz

Packet timing measurement

Range		±20 µs
Resolution		0.25 µs
Uncertainty		≤ 0.25 µs + resolution

Guard time measurement

Resolution		0.01 µs
Uncertainty		≤ 0.05 µs

Speech codec

Speech decoder output	SPEECH CODEC OUT	BNC connector
Output impedance		< 10 Ω
Maximum output current		20 mA, peak
Full range output level		1 V, peak

Speech coder input	SPEECH CODEC IN	BNC connector
Input impedance		100 kΩ
Full range input level	high voltage range	1.4 V, peak
	low voltage range	0.1 V, peak

R&S®CBT-B41 audio generator/analyzer option

AF generator

Output impedance		< 4 Ω

Maximum output current		20 mA, peak

AF sinewave generator	AF 1 OUT, AF 2 OUT	BNC connector
Frequency range		20 Hz to 20 kHz
Frequency uncertainty		same as time base + half resolution, see base unit specifications
Frequency resolution		0.1 Hz
Output level range		10 µV to 5 V
Output level resolution	at level < 10 mV	10 µV
	at level ≥ 10 mV	0.1 %
Output level uncertainty	at level ≥ 1 mV and frequency ≤ 10 kHz	≤ 1.5 % + resolution
THD+N [2]	at level ≥ 100 mV into load ≥ 600 Ω	≤ 0.05 %

AF analyzer

Input impedance		1 MΩ || 100 pF

AF voltmeter	AF 1 IN, AF 2 IN	BNC connector
Frequency range		50 Hz to 20 kHz
Level range		50 µV to 30 V
Level resolution	at level < 1 mV	1 µV
	at level ≥ 1 mV	0.1 %
Level uncertainty	at 1 mV ≤ level ≤ 2 V	< 1.5 % + resolution
	at 2 V < level ≤ 20 V	< 2.0 % + resolution

[2] Measurement bandwidth 21.9 kHz.

THD+N meter		
Measurement bandwidth		21 kHz
Frequency range		100 Hz to 10 kHz
Level range		10 mV to 30 V
Resolution		0.01 % THD+N
Inherent distortion	at 100 mV ≤ level ≤ 20 V	< 0.05 % THD+N
Uncertainty	at 100 mV ≤ level ≤ 2 V	< 1 % + inherent resolution
	at 2 V < level ≤ 20 V	< 2 % + inherent resolution

R&S®CBT-B42 digital audio interface

S/P-DIF	S/P-DIF IN, S/P-DIF OUT	in line with IEC 60958-3
Sampling rate		48 kHz

Inputs and outputs (rear panel)

Remote control interfaces		
IEC/IEEE bus	IEC 60625-2 (IEEE 488.2)	24-pin Amphenol connector
Serial interface COM 1	RS-232-C (COM)	9-pin D-Sub connector

Printer interface LPT	parallel (Centronics compatible)	25-pin D-Sub connector

Keyboard		USB connector

Analog monitor (VGA)		15-pin D-Sub connector

Trigger output	RF menu	
	test trigger	BNC connector TRIG OUT
	Bluetooth® menu	
	burst trigger	BNC connector TRIG OUT

External reference REF IN	10 MHz	BNC connector

General data

Operating temperature range		+5 °C to +45 °C, in line with EN 60068-2-1 and -2
Storage temperature range		–25 °C to +60 °C, in line with EN 60068-2-1 and -2
Humidity	+40 °C, non-condensing	80 % relative humidity, in line with EN 60068-2-78

Electromagnetic compatibility		in line with EMC Directive 89/336/EEC, applied standard: EN 61326 (immunity for industrial environment; class A emissions)
Note: The instrument complies with the emission requirements stipulated by EN 55011 class A. This means that the instrument is suitable for use in industrial environments. In line with EN 61000-6-4, operation in residential, commercial and business areas or in small-size companies is not covered. Thus, the instrument may not be operated in residential, commercial and business areas or in small-size companies, unless additional measures are taken to ensure that EN 61000-6-3 is complied with.		

Electrical safety		IEC 61010-1, EN 61010-1, UL 3111-1, CAN/CSA-C22.2 No. 1010.1

Mechanical resistance	non-operating mode	
Vibration	sinusoidal	in line with EN 60068-2-6, EN 61010-1, MIL-T-28800 D class 5, 5 Hz to 150 Hz, max. 2 g at 55 Hz, 55 Hz to 150 Hz, 0.5 g const.
	random	in line with EN 60068-2-64, 10 Hz to 300 Hz, acceleration 1.2 g rms
Shock		in line with EN 60068-2-27, MIL-STD-810D, 40 g shock spectrum

Power supply		power factor correction, in line with EN 61000-3-2
Input		100 V to 240 V ± 10 % (AC), max. 220 VA, 47 Hz to 63 Hz
Power consumption	R&S®CBT	approx. 60 W
	R&S®CBT32	approx. 50 W

Display	not included in the R&S®CBT32	21 cm TFT color display (8.4")
Resolution		640 × 480 pixels (VGA resolution)
Pixel failure rate		$< 2 \times 10^{-5}$

Dimensions (W × H × D)	R&S®CBT	411 mm × 193 mm × 317 mm (16.2 in × 7.6 in × 12.5 in) (7/8 × 19"; 4 height units)
	R&S®CBT32	465 mm × 93 mm × 417 mm (18.3 in × 3.7 in × 16.4 in) (19"; 2 height units)

Weight	R&S®CBT	approx. 7 kg (15.4 lb)
	R&S®CBT32	approx. 6 kg (13.2 lb)

Ordering information

Designation	Type	Order No.
Bluetooth® Tester with display, 4 HU	R&S®CBT	1153.9000.35
Bluetooth® Tester without display, 19", 2 HU, for remote control	R&S®CBT32	1153.9000.32
Hardware option for R&S®CBT: Dual-Channel Audio Generator and Analyzer	R&S®CBT-B41	1170.3406.05
Hardware option for R&S®CBT32: Dual-Channel Audio Generator and Analyzer	R&S®CBT-B41	1170.3406.02
Hardware option for R&S®CBT/CBT32: Digital Audio Interface (S/P-DIF; R&S®CBT-B41 required)	R&S®CBT-B42	1170.3706.03
Software option for R&S®CBT/CBT32: A2DP Stereo Profile and SBC Codec (R&S®CBT-B41 required)	R&S®CBT-K52	1170.4002.02
Software option for R&S®CBT/CBT32: Handsfree and Headset Profiles	R&S®CBT-K54	1170.3806.02
Software option for R&S®CBT/CBT32: Enhanced Data Rate (EDR)	R&S®CBT-K55	1170.3206.02
Software option for the R&S®CBT/CBT32: Bluetooth® Low Energy Option (Low Energy Non-Signaling Measurements)	R&S®CBT-K57	1170.4102.02
19" Adapter, 2 HU, for R&S®CBT32	R&S®ZZA-211	1096.3260.00
19" Adapter, 4 HU, for R&S®CBT	R&S®ZZA-S03	1105.6756.00
Documentation of Calibration Values	R&S®DCV-1	0240.2187.08
Antenna Coupler for mobile phones	R&S®CMU-Z10	1150.0801.10
RF Shielded Cover, extension for R&S®CMU-Z10	R&S®CMU-Z11	1150.1008.02
Bluetooth® Antenna, extension for R&S®CMU-Z10	R&S®CMU-Z12	1150.1043.02

Service you can rely on

- Worldwide
- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

About Rohde&Schwarz

Rohde&Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established 75 years ago, Rohde&Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Regional contact

Europe, Africa, Middle East
+49 1805 12 42 42* or +49 89 4129 137 74
customersupport@rohde-schwarz.com
North America
1 888 TEST RSA (1 888 837 87 72)
customer.support@rsa.rohde-schwarz.com
Latin America
+1 410 910 79 88
customersupport.la@rohde-schwarz.com
Asia/Pacific
+65 65 13 04 88
customersupport.asia@rohde-schwarz.com

Certified Quality System
ISO 9001

Certified Environmental System
ISO 14001

For product brochure,
see PD 0758.1287.12
and www.rohde-schwarz.com

Rohde&Schwarz GmbH&Co. KG
Mühldorfstraße 15 | 81671 München
Phone +49 89 41 290 | Fax +49 89 41 29 121 64

www.rohde-schwarz.com

PD 0758.1287.22 | Version 06.00 | April 2009 | R&S®CBT/R&S®CBT32
Subject to change

*0.14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.