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Bluetooth® Tester R&S® CBT

Specifications



ROHDE & SCHWARZ

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Unit specifications

Standards		Bluetooth Core Specification Version 1.1 Version 2.0+EDR: test mode supported RF Test Specification V1.2/V2.0/V2.0+EDR
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Timebase TCXO

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 squarewave (TTL level)	10 MHz 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 x 1 MHz, k = 0 to 93
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Frequency range		
	RF menu	2398 MHz to 2499 MHz
	Bluetooth menu	2402 MHz to 2495 MHz

Frequency resolution	channel spacing in line with standard	1 MHz
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Frequency offset range		± 250 kHz
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Frequency offset resolution		1 kHz
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Frequency uncertainty		
	RF menu	± 5 Hz + drift of timebase
	Bluetooth menu	± 100 Hz + drift of timebase

Hopping scheme	modes in line with standard	Europe (except France), USA France RX/TX single frequency reduced hopping
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Output level range		
RF IN/OUT	for basic rate packets for EDR packets (2-DHx, 3-DHx)	-90 dBm to +0 dBm -90 dBm to -3 dBm

Output level uncertainty	in temperature range +20 °C to 35 °C	
RF IN/OUT	output level < -10 dBm output level \geq -10 dBm	<1.0 dB <1.5 dB

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

Output level resolution		0.1 dB
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Generator RF output level repeatability	typical values after 1 h warm-up time at constant ambient temperature	<0.03
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VSWR		
RF IN/OUT		<1.5

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

Attenuation of nonharmonics		>50 dB
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GFSK modulation		
GFSK bit rate	DHx packet types	1 Mbps, B x 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	±5 %

DPSK modulation		
$\pi/4$ -DQPSK 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

Dirty TX (basic rate)	in line with Bluetooth RF Test Specification V1.2/V2.0/V2.0+EDR, supporting both single slot and multislot	
Frequency offset range		±250 kHz
Frequency offset resolution		1 kHz
Frequency offset uncertainty		±5 Hz + drift of timebase
Modulation index range		0.20 to 0.44
Modulation index resolution		0.01
Modulation index uncertainty		±5 %
Symbol time error range		±20 ppm
Symbol time error resolution		1 ppm
Symbol time error uncertainty		same as timebase
Drift mode		on/off
Drift uncertainty		±5 kHz

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RF analyzer

VSWR		
RF IN/OUT	2398 MHz to 2499 MHz	<1.5
RF channel definition	Bluetooth menu	2402 MHz + k x 1 MHz, k = 0 to 93
Frequency range		
	RF menu	2398 MHz to 2499 MHz
	Bluetooth menu	2402 MHz to 2495 MHz
Frequency resolution	channel spacing in line with standard	1 MHz
Frequency uncertainty		±5 Hz + drift of timebase
Hopping scheme	modes in line with standard	Europe (except France), USA France RX/TX single frequency reduced hopping

Power meter (frequency-selective) and power versus time

Measurement bandwidth	filter definition: passband	
	Bluetooth menu <i>Filter Bandwidth</i> → wide <i>Filter Bandwidth</i> → narrow	2.0 MHz 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 (300 mW)
Level uncertainty	in temperature range +20 °C to +35 °C	
RF IN/OUT	Bluetooth menu from full scale down to -25 dB RF menu input level -40 dBm to +22 dBm	<1.0 dB <1.0 dB
Level uncertainty	in temperature range +5 °C to +45 °C	
RF IN/OUT	Bluetooth menu from full scale down to -25 dB RF menu input level -40 dBm to +22 dBm	<1.5 dB <1.5 dB
Level resolution	in manual mode in remote control mode	0.1 dB 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 (300 mW)
Dynamic range	<i>Filter Bandwidth</i> → wide	>55 dB, rms
RF level measurement repeatability	typical values after 1 h warm-up time at constant ambient temperature	<0.03 dB

¹ Mean value of power vs time must be equal to or less than allowed continuous power.

Modulation analyzer

Measurement bandwidth	filter definition: passband	
	<i>Filter Bandwidth</i> → wide	2.0 MHz
	<i>Filter Bandwidth</i> → narrow	1.3 MHz
Level range		
RF IN/OUT		from full scale down to -25 dB
Total measurement range for frequency offset and frequency deviation (GFSK)		-250 kHz to +250 kHz
Nominal measurement range for DPSK signals	<i>Filter Bandwidth</i> → wide	-75 kHz to +75 kHz
Frequency offset uncertainty in preamble (GFSK)	for deviation ≤160 kHz	≤2 kHz
Frequency stability uncertainty (DPSK)	for ω_c ≤75 kHz, for deviation ≤160 kHz	≤5 kHz
Frequency deviation uncertainty in payload (GFSK)	for deviation ≤200 kHz	
	11110000 pattern	≤2 %
	10101010 pattern	≤4 %
Frequency deviation uncertainty in payload (DPSK)	PRBS pattern	
	DEVM	≤3 %, rms
	DEVM	≤8 %, peak
Frequency drift uncertainty (GFSK)	measured in burst related to frequency offset value in preamble	
	10101010 pattern maximum	≤2 kHz
	typical	≤1 kHz
Frequency drift uncertainty (DPSK)	for ω_c ≤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

Timing measurement

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

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Speech codec

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

Speech coder input	AF IN	BNC connector
Input impedance		100 k Ω
Full range input level	low sensitivity high sensitivity	1.4 V, peak 0.1 V, peak

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
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Keyboard		USB connector
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Analog monitor (VGA)		15-pin D-Sub connector
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Trigger output	RF menu test trigger	BNC connector TRIG. OUT
	Bluetooth menu burst trigger	BNC connector TRIG. OUT

General specifications

Operating temperature range		+5 °C to +45 °C, meets EN60068-2-1 and -2
Storage temperature range		-25 °C to +60 °C, meets EN60068-2-1 and -2
Humidity	+40 °C, non-condensing	80 % relative humidity, meets EN 60068-2-78

Electromagnetic compatibility		meets EMC Directive 89/336/EEC, applied standard: EN 61326 (immunity for industrial environment; class B emissions)
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Electrical safety		IEC 61010-1, EN 61010-1, UL3111-1, CAN/CSA-C22.2 No. 1010.1
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Mechanical resistance	non-operating mode	
Vibration	sinusoidal	meets 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.
Vibration	random	meets EN 60068-2-64, 10 Hz to 300 Hz, acceleration 1.2 g rms
Shock		meets EN 60068-2-27, MIL-STD-810D, 40 g shock spectrum

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Power supply		power factor correction, meets EN61000-3-2
Input		100 V to 240 V $\pm 10\%$ (AC), max. 220 VA, 50 Hz to 60 Hz -5% to $+10\%$
Power consumption	R&S CBT R&S CBT32	approx. 60 W approx. 50 W

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

Dimensions	W x H x D	
	R&S CBT	411 mm x 193 mm x 317 mm (7/8 x 19"; 4 height units)
	R&S CBT32	465 mm x 93 mm x 417 mm (19"; 2 height units)

Weight	R&S CBT R&S CBT32	approx. 7 kg approx. 6 kg
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Specifications are valid under the following conditions:

Data without tolerance limits is not binding.

In compliance with the Bluetooth core specification, bit rates are specified in Mbps (million bits per second).

Mbps is not an SI unit.

Mspis is the abbreviation of million symbols per second.

Mspis is not an SI unit.

Some data will be only relevant for units that are equipped with the R&S CBT-B55 option.



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