

# R&S®RT-ZFxx

## Oscilloscope Test Fixtures

# Specifications

### R&S®RT-ZF1 USB 2.0 compliance test fixture set

The USB 2.0 compliance test fixture set contains a signal quality board and a load board for testing USB 2.0 (high speed), USB 1.1 (full speed) and USB 1.0 (low speed). It is used in combination with the R&S®RTO oscilloscope, the R&S®RTO-K21 option and the R&S®ScopeSuite software.

General data		
Temperature loading	operating temperature range	0 °C to +45 °C
	storage temperature range	-40 °C to +70 °C
Power supply		5.0 V DC ± 0.25 V via USB

### R&S®RT-ZF2 Ethernet compliance test fixture set

The Ethernet compliance test fixture set contains the test fixture board and a network analyzer calibration board for testing the physical layer of the Ethernet standards 10BASE-T, 100BASE-TX, 1000BASE-T and 10GBASE-T. It is used in combination with the R&S®RTO oscilloscope, the R&S®RTO-K22 option and the R&S®ScopeSuite software.

General data		
Temperature loading	operating temperature range	0 °C to +45 °C
	storage temperature range	-40 °C to +70 °C
Dimensions (W × H × L)	test fixture board	approx. 235 mm × 28 mm × 140 mm (9.3 in × 1.1 in × 5.5 in)
	calibration board	approx. 27 mm × 17 mm × 140 mm (1.1 in × 0.7 in × 5.5 in)

### R&S®RT-ZF2C Ethernet 1000BASE-T jitter test cable

The Ethernet 1000BASE-T jitter test cable contains the jitter test channel in line with IEEE 802.3-2008 chapter 40.6.1.1.1 for testing the transmitter timing jitter of the Ethernet standard 1000BASE-T with the required poor signal to echo ratio. It is used in combination with the R&S®RTO oscilloscope, the R&S®RTO-K22 option, the R&S®ScopeSuite software and the R&S®RT-ZF2 Ethernet compliance test fixture set.

General data		
Temperature loading	operating temperature range	0 °C to +45 °C
	storage temperature range	-40 °C to +70 °C
Dimensions of the cable reel	∅ × H	approx. 450 mm × 120 mm (17.7 in × 4.7 in)

## R&S®RT-ZF3 frequency converter (100BASE-T1)

The frequency converter is intended to be used in combination with the BroadR-Reach®/100BASE-T1 compliance tests (R&S®RTO-K24), the R&S®RTO oscilloscope and the R&S®ScopeSuite software. It converts the BroadR-Reach® transmitter clock frequency of 66 2/3 MHz to the 10 MHz frequency clock used for the reference clock synchronization of measurement instruments.

General data		
Temperature loading	operating temperature range	+5 °C to +40 °C
	storage temperature range	–40 °C to +70 °C
Dimensions	W x H x L	approx. 54 mm x 22 mm x 140 mm (2.1 in x 0.7 in x 5.5 in)
Input	voltage range (at 50 Ω)	0.7 mV to 12 V
	expected frequency	66.666667 MHz
	frequency range	61 MHz to 69 MHz
	connector	1 SMA (50 Ω, female)
Output	voltage (at 50 Ω)	4.25 V ± 0.25 V
	frequency	input frequency/6.6667; resulting in 10 MHz at the expected input frequency of 66.666667 MHz
	connectors	2 BNC (50 Ω, female)

## R&S®RT-ZF4 10BASE-Te energy efficient Ethernet test fixture

The 10BASE-Te energy efficient Ethernet test fixture is intended to be used in combination with the energy efficient Ethernet compliance tests (R&S®RTO-K86), the R&S®RTO oscilloscope and the R&S®ScopeSuite software. It implements resistive and inductive loads with or without a twisted pair model in line with IEEE standard 802.3az.

General data		
Temperature loading	operating temperature range	+5 °C to +40 °C
	storage temperature range	–40 °C to +70 °C
Dimensions	W x H x L	approx. 75 mm x 26 mm x 140 mm (3.0 in x 1.0 in x 5.5 in)

## R&S®RT-ZF5 Ethernet probing fixture

The Ethernet probing fixture is intended to be used as a general means of probing an Ethernet signal. Full duplex connections can be probed on separated directions.

General data		
Temperature loading	operating temperature range	+5 °C to +40 °C
	storage temperature range	–40 °C to +70 °C
Dimensions	W x H x L	approx. 140 mm x 22 mm x 160 mm (5.5 in x 0.9 in x 6.3 in)
Sections	directional probe	separation of forward and reverse direction of a full duplex signal; input and output: RJ-45; coupled: 4 SMA (50 Ω, female) per lane
	load and probe	100 Ω termination and probe pins input: RJ-45
	DUT and link partner	line tab with probe pins; input and output: RJ-45
Directional probe section	mainline loss (< 300 MHz)	1.5 dB (meas.)
	coupling (< 300 MHz)	15.5 dB (meas.)
	directivity (< 300 MHz)	26 dB (meas.)

## R&S®RT-ZF6 frequency converter (1000BASE-T1)

The frequency converter is intended to be used in combination with the 1000BASE-T1 compliance tests (R&S®RTO-K87), the R&S®RTO oscilloscope and the R&S®ScopeSuite software. It converts the 1000BASE-T1 transmitter clock frequency of 125 MHz to the 10 MHz frequency clock used for the reference clock synchronization of measurement instruments.

General data		
Temperature loading	operating temperature range	+5 °C to +40 °C
	storage temperature range	-40 °C to +70 °C
Dimensions	W x H x L	approx. 54 mm x 22 mm x 140 mm (2.1 in x 0.7 in x 5.5 in)
Input	voltage range (at 50 Ω)	7 mV to 12 V
	expected frequency	125 MHz
	frequency range	122 MHz to 128 MHz
	connector	1 SMA (50 Ω, female)
Output	voltage (at 50 Ω)	4 V ± 0.25 V
	frequency	input frequency/12.5; resulting in 10 MHz at the expected input frequency of 125 MHz
	connectors	2 BNC (50 Ω, female)

## R&S®RT-ZF7 automotive Ethernet trigger and decode fixture

The automotive Ethernet trigger and decode fixture is intended to be used for probing an automotive Ethernet signal (e.g. 100BASE-T1 or 1000BASE-T1). Full duplex connections can be probed on separated directions. The package contains two R&S®RT-ZF7A SMA adapters and four SMA adapters (50 Ω, male to male). The fixture is used in combination with the R&S®RTO and R&S®RTP oscilloscopes and automotive Ethernet options (R&S®RTO-K57 and R&S®RTP-K57).

General data		
Temperature loading	operating temperature range	+5 °C to +40 °C
	storage temperature range	-40 °C to +70 °C
Altitude		up to 4600 m above sea level
Dimensions	W x H x L	approx. 54 mm x 15 mm x 73 mm (2.1 in x 0.6 in x 2.9 in)
Connection	through	differential SMA (50 Ω, female)
	directional probe	separation of forward and reverse direction of a full duplex signal; differential SMA (50 Ω, female) for each direction
Directional probe section	mainline loss (5 MHz to 1 GHz)	< 2 dB (meas.)
	coupling (5 MHz to 1 GHz)	15.5 dB to 16.5 dB (meas.)
	directivity (5 MHz to 1 GHz)	> 26 dB (meas.)

## R&S®RT-ZF7A SMA adapter

The SMA adapter connects differential wires to differential SMA plugs. The main intended use case is to connect a twisted pair automotive Ethernet cable to SMA.

General data		
Temperature loading	operating temperature range	+5 °C to +40 °C; +23 °C for compliance tests
	storage temperature range	-40 °C to +70 °C
Altitude		up to 4600 m above sea level
Dimensions	W x H x L	approx. 38 mm x 8 mm x 42 mm (1.5 in x 0.3 in x 1.7 in)
Connections	solder pads	differential signal, 2 x ground
	SMA	differential SMA (50 Ω, female)
Compliance		complies with the adapter specification of the OPEN Alliance Automotive Ethernet ECU Test Specification (version 2.0, at +23 °C; meas.)

## R&S®RT-ZF8 automotive Ethernet compliance fixture

The automotive Ethernet compliance fixture provides fixtures for testing the physical layer of automotive Ethernet standards 100BASE-T1 and 1000BASE-T1 signals for compliance. The package contains two SMA terminations (50 Ω, male). The fixture is used in combination with the R&S®RTO and R&S®RTP oscilloscopes, the R&S®ScopeSuite software and automotive Ethernet options (R&S®RTO-K24, R&S®RTP-K24, R&S®RTO-K87, R&S®RTP-K87).

General data		
Temperature loading	operating temperature range	+5 °C to +40 °C; +23 °C for compliance tests
	storage temperature range	−40 °C to +70 °C
Altitude		up to 4600 m above sea level
Dimensions	W × H × L	approx. 128 mm × 20 mm × 123 mm (5.0 in × 0.8 in × 4.8 in)
Sections	general purpose SMA adapter	solder pads (differential signal, 2 × ground) to differential SMA (50 Ω, female); complies with the adapter specification of the OPEN Alliance Automotive Ethernet ECU Test Specification (version 2.0, at +23 °C; meas.)
	return loss (single ended)	solder pads (differential signal, 2 × ground) to single ended SMA (50 Ω, female)
	common mode emission	solder pads (differential data, 2 × ground) to single ended SMA (50 Ω, female)
	distortion test (SMA output)	differential SMA (50 Ω, female) for signal input, disturber input and measurement output (to oscilloscope)
	common mode emission (SMA)	differential SMA (50 Ω, female) to single ended SMA (50 Ω, female)
	distortion test (probe output)	differential SMA (50 Ω, female) for signal input and disturber input; measurement output via probing pins

## R&S®RT-ZF20 probe deskew and calibration test fixture

The probe deskew and calibration test fixture is used to deskew any combination of Rohde & Schwarz probes. It can be used with any Rohde & Schwarz oscilloscope.

Step voltage swing	large loop	4.5 V (meas.)
	small loop	2.5 V (meas.)
Step current swing	large loop	900 mA (meas.)
	small loop	240 mA (meas.)
Step rise time (10 % to 90 %)	large loop	290 ns (meas.)
	small loop	80 ns (meas.)
Step fall time (20 % to 80 %)	large loop	40 ns (meas.)
	small loop	4 ns (meas.)

General data		
Temperature loading	operating temperature range	0 °C to +50 °C
	storage temperature range	−40 °C to +70 °C
Altitude	operation	up to 3000 m
	transport	up to 4600 m
EMC		in line with EMC Directive 2014/30/EC
Power supply		5.0 V DC ± 0.25 V via USB
Dimensions		
Probe deskew and calibration test fixture	W × H × L	approx. 78 mm × 36 mm × 124 mm (3.1 in × 1.4 in × 4.9 in)
Large loop current probe	cutout (W × L)	approx. 28 mm × 28 mm (1.1 in × 1.1 in)
	core diameter	≥ 20 mm (0.79 in)
Small loop current probe	cutout (W × L)	approx. 9.5 mm × 14.5 mm (0.37 in × 0.57 in)
	core diameter	≥ 5 mm (0.20 in)
Voltage probe connectors (both loops)	pin diameter	0.64 mm (0.025 in) square pins and ø 2 mm (0.078 in) clamp-on connectors
	pin distance	2.54 mm (0.10 in) and 5.12 mm (0.20 in)

## R&S®RT-ZF30 probe test fixture

The probe test fixture is used to deskew any combination of Rohde & Schwarz high bandwidth probes.

<b>Electrical data</b>		
Impedance		50 Ω
Frequency		DC to 32 GHz (meas.)
Return loss	DC to 15 GHz	≥ 20 dB (meas.)
	15 GHz to 32 GHz	≥ 12 dB (meas.)
Insertion loss	DC to 10 GHz	≤ 1.5 dB (meas.)
	10 GHz to 32 GHz	≤ 3 dB (meas.)
<b>Mechanical data</b>		
Mating cycles	RPC-2.92	≥ 500 (meas.)
<b>Interfaces</b>		
Connectors	1	RPC-2.92
	2	RPC-2.92
<b>RoHS</b>		in line with EN 50581

## Ordering information

<b>Designation</b>	<b>Type</b>	<b>Order No.</b>
USB 2.0 compliance test fixture set, incl. signal quality board; load board; 1.3 m USB 2.0 A to B cable (2); 20 cm USB 2.0 A to B cable (2); USB A to mini adapter; USB A to micro B adapter; 1.0 m SMA cable (2); carrying case; operating manual	R&S®RT-ZF1	1317.3420.02
Ethernet compliance test fixture set, incl. test fixture board; calibration board; 250 mm S/FTP Ethernet cable, SMA termination (3); carrying case; operating manual	R&S®RT-ZF2	1317.5522.02
Ethernet 1000BASE-T jitter test cable	R&S®RT-ZF2C	1317.5639.02
Frequency converter (100BASE-T1)	R&S®RT-ZF3	5025.0670.02
10BASE-Te energy efficient Ethernet test fixture	R&S®RT-ZF4	1333.0880.02
Ethernet probing fixture	R&S®RT-ZF5	1333.0896.02
Frequency converter (1000BASE-T1)	R&S®RT-ZF6	1337.8579.02
Automotive Ethernet trigger and decode fixture	R&S®RT-ZF7	1801.3688.02
SMA adapter	R&S®RT-ZF7A	1801.4126.02
Automotive Ethernet compliance fixture	R&S®RT-ZF8	1801.3694.02
Probe deskew and calibration test fixture, incl. test board; 1.3 m USB 2.0 A to B cable; carrying case; operating manual	R&S®RT-ZF20	1800.0004.02
Probe test fixture, incl. SMA adapter (m/m)	R&S®RT-ZF30	1333.2099.02





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R&S®RT-ZFxx Oscilloscope Test Fixtures

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