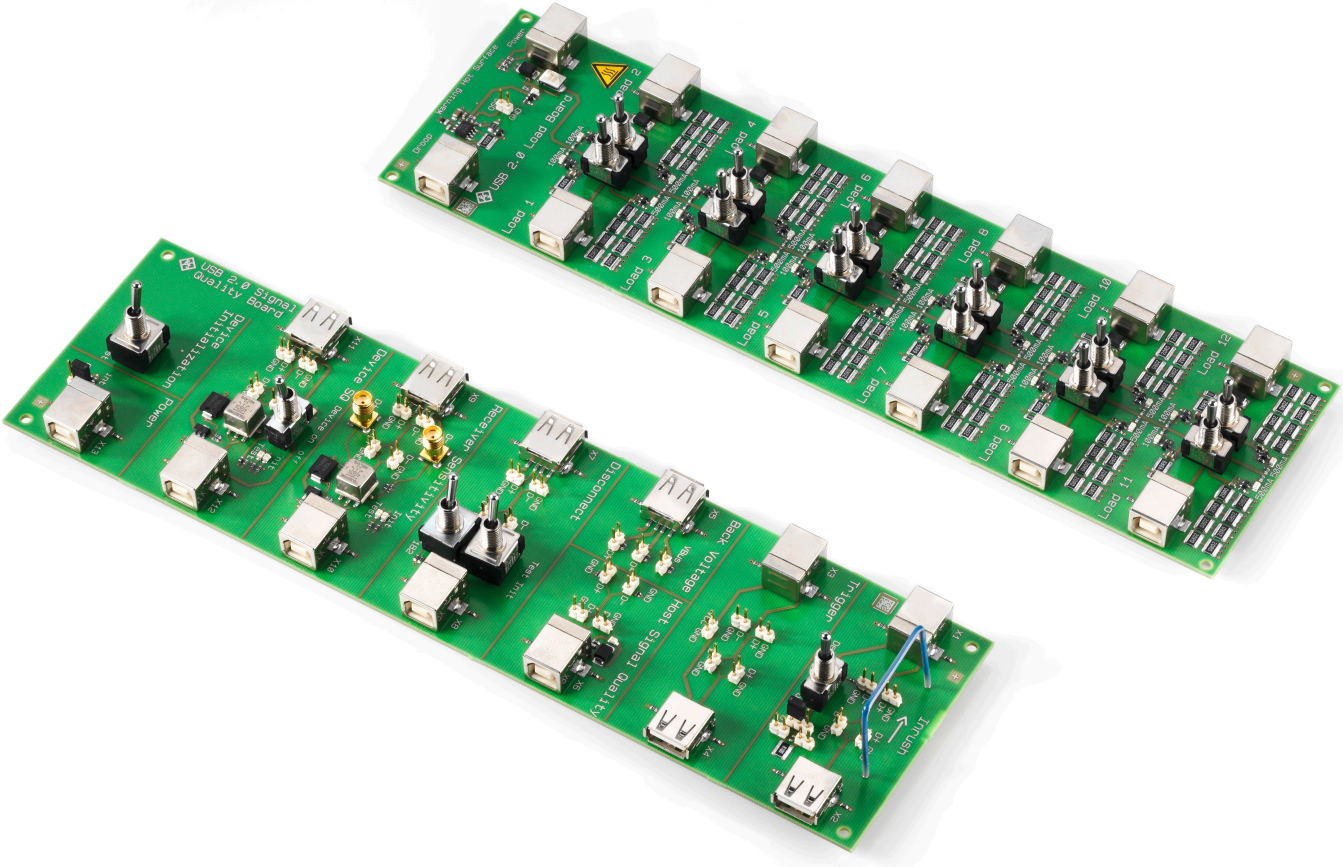


R&S[®] RT-ZF1 USB 2.0 Compliance Test Fixture Set Manual



This manual describes the R&S RT-ZF1 USB 2.0 Compliance Test Fixture Set (1317.3420.02).

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Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol, e.g. R&S®RT-ZF1 is indicated as R&S RT-ZF1.

1 Safety Information

The product documentation helps you to use the product safely and efficiently. Keep the product documentation nearby and offer it to other users.

Safety information warns you about the potential dangers and gives instructions how to prevent personal injuries or damage caused by dangerous situations. Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

Intended use

The equipment under test (EUT) is a signal quality test and development board, indented to be used at laboratory or test and measurement areas. These areas are used for analysis, testing and servicing and where equipment is operated by trained personnel (EN 61326-1, 3.9).

Operating site

Only use the product indoors, and keep it dry. The product has no casing and is sensitive to moisture and humidity.

The product is suitable for pollution degree 2 environments where nonconductive contamination can occur. For more information on environmental conditions such as ambient temperature, see the specifications.

Safety instructions

Connect only USB interfaces to the boards.



Hot surface. The load board gets hot during testing. Do not touch. Risk of skin burns. Risk of fire.

Electromagnetic emissions

The EUT is considered as a test probe, EN 61326-2-1, clause 5.2.4.101, note 1. Therefore normal operation may increase emissions and/or reduce immunity in certain applications.

Operation in type 3 (controlled) electromagnetic environments EN 61326-1, table 3 is recommended.

The EUT is an EN 55011 class A equipment. Class A equipment is intended for use in an industrial environment. There may be potential difficulties in ensuring

electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.

ESD and EMI impact

The product is sensitive to electrostatic discharge (ESD) because of open modules. Protect the work area against electrostatic discharge to avoid damage to electronic components. Always work at a static-approved workstation.

Electromagnetic interference (EMI) can affect the measurement results. To avoid any impact, use only USB cables shorter 3 m.

2 Product Description

The R&S RT-ZF1 USB 2.0 compliance test fixture set is a product for automatic testing of USB 2.0 compliance (high-speed) as well as USB 1.1 (full-speed) and USB 1.0 (low-speed). It is used in combination with the R&S RTO/R&S RTP oscilloscopes, with the R&S RTO/R&S RTP-K21 USB 2.0 compliance test option (1317.4103.02)/(1337.8685.02) and the R&S ScopeSuite software.

For data, see the "R&S RT-ZFxx Oscilloscope Test Fixtures - Specifications" at www.rohde-schwarz.com/brochure-datasheet/rto.

2.1 Deliveries

The R&S RT-ZF1 comprises two test boards and accessories:

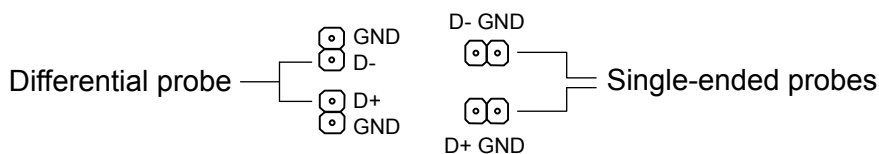
- Load board (1317.5300.02)
- Signal quality board (1317.5200.02)
- Accessories, see table [Table 2-1](#)
- Carrying case
- Manual

Table 2-1: Supplied accessories

Item	Quantity	Order number
USB cable type A to type B, length 20 cm	2	3589.2124.00
USB cable type A to type B, length 1.3 m	2	0041.9177.00
USB Adapter, type A to mini	1	3589.2147.00
USB adapter, type A to micro-B	1	3589.2130.00
SMA cable, length 1 m, to connect the signal generator	2	1142.5889.00

2.2 Oscilloscope Connections

The following oscilloscope configuration is suitable for high-speed, full and low speed tests. For most tests, you can use either a differential probe or two single-ended active probes. The signal quality board is designed for comfortable connection of both probe types.

**Figure 2-1: Connectors for differential and single-end probes**

CH1	Single-ended probe connected to D+ (RT-ZS30)
CH2	Differential probe connected to D+ and D- (RT-ZD30)
CH3	Single-ended probe connected to D- (RT-ZS30)
CH4	Inrush measurements

The test-specific connections are explained in the R&S ScopeSuite's test wizard.

2.3 Signal Quality Board

The signal quality board has several labeled sections designed for specific signal quality testing. The connectors and their purpose are shown on [Figure 2-2](#).

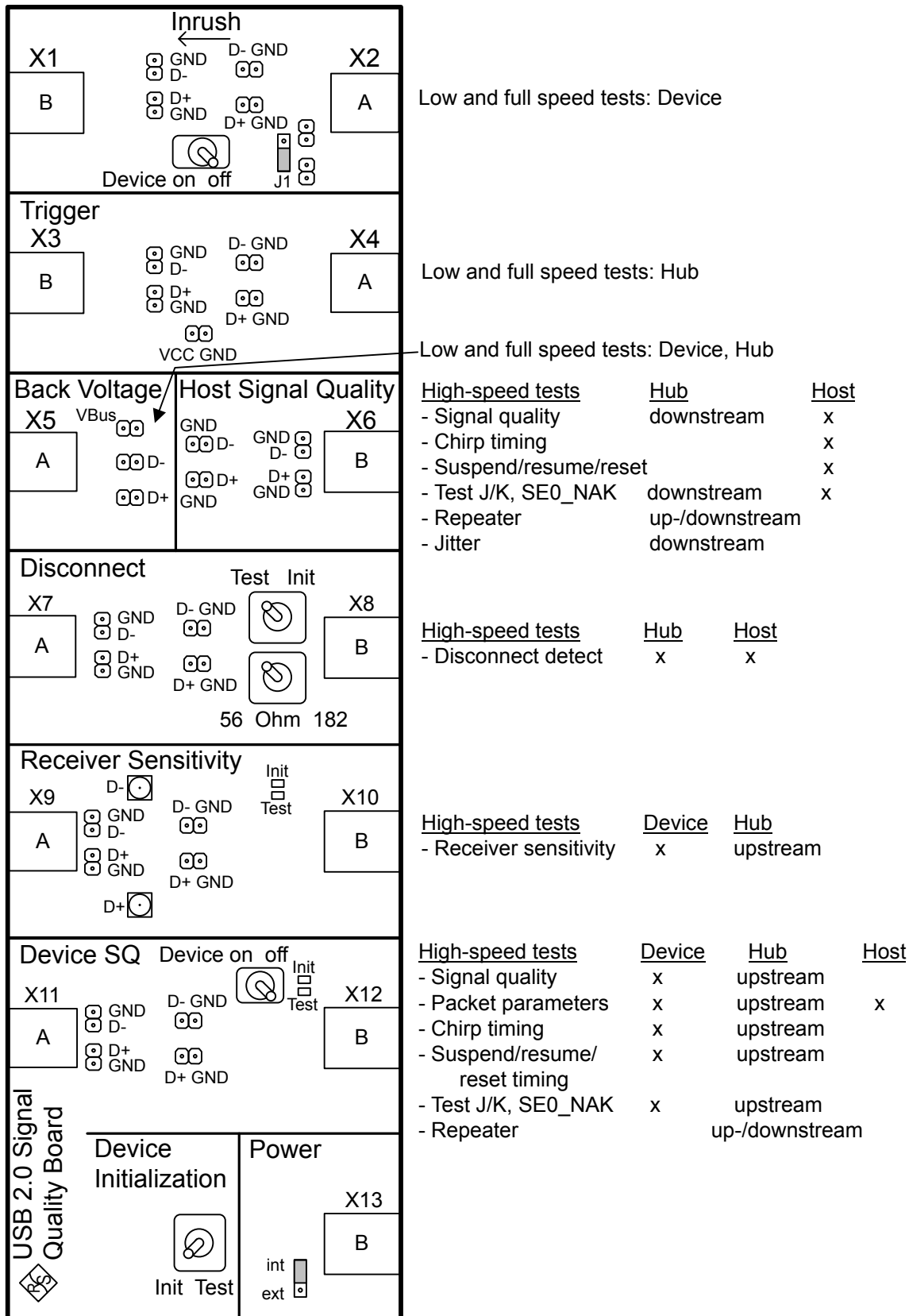


Figure 2-2: Signal quality board

Device Initialization switch

The device initialization switch at the bottom of the board is relevant for device high speed signal quality and device high speed receiver sensitivity tests. The current switch position - init or test - is indicated by LEDs in the relevant test sections.

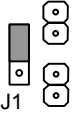
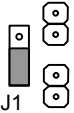
Power jumper

An external power supply is only required for testing DUTs that need more than 420 mA supply current. For tests using additional power supply, set the jumper in the "Power" section to "ext".

For all devices that need less than 420 mA supply current, the VBUS power from the host is sufficient, and the jumper position is "int".

J1 jumper

The J1 jumper switches the inrush current measurement between current measurement and voltage measurement. It is located in the "Inrush" section, the upper section of the board.

	<p>Upper position: A measuring resistance of 0.1 Ω is active. You can measure the voltage using a differential probe and calculate the current consumption.</p>
	<p>Lower position: The measuring resistance is shorted-out. To measure the current consumption, you need a current probe.</p>

SMA connectors

To perform hi-speed device and hub receiver sensitivity tests, a waveform generator is required. The SMA connectors for the generator connection are located in the "Receiver Sensitivity" section of the board.

2.4 Load Board

The load board has 12 USB type B connectors for load testing and a section for clocked droop testing.

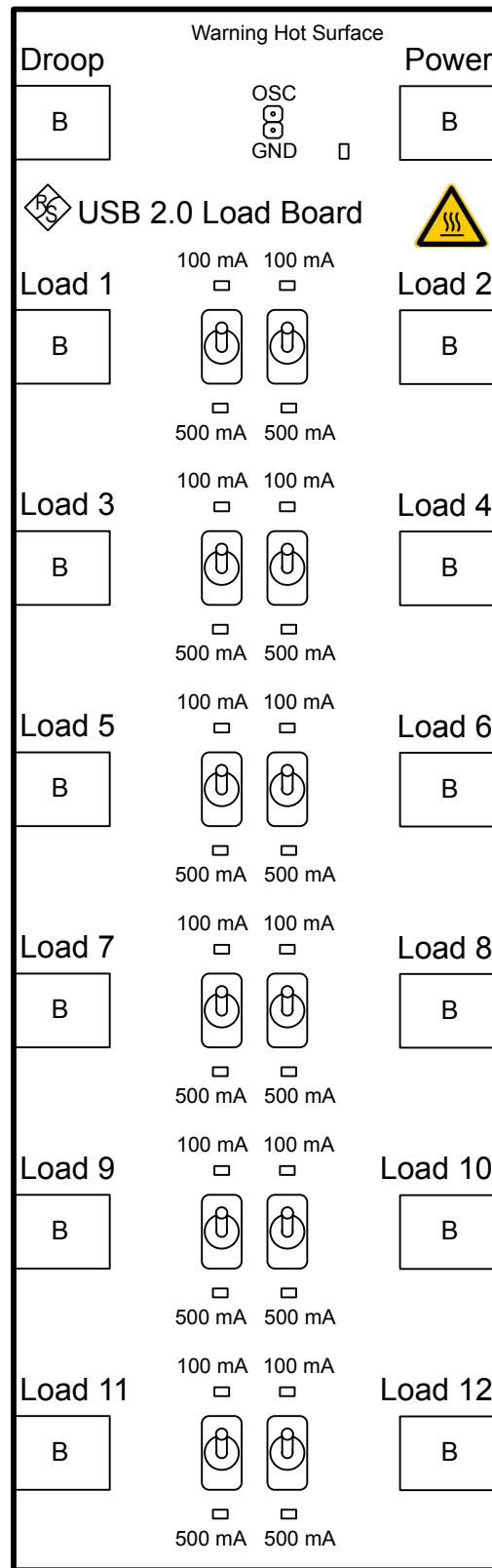


Figure 2-3: Load board

⚠ CAUTION**Risk of burning caused by hot load board**

The load board gets hot during testing. To avoid injuries:

- Do not touch the board when a test is running.
- After finishing the tests, set all switches to their middle position and wait at least 5 min until the module cools down.
- Touch the board only at switches and edges. Do not touch the surface of the board.

3 Connecting the Board

The appropriate DUT and probe connection depends on the test case. The R&S ScopeSuite software provides a step-by-step guide that shows the required setup for each test case.

The test preparation and measurements of the test cases are described in the "R&S®RTO-K21, R&S®RTP-K21 USB 2.0 Compliance Tests, Test Procedures" manual.

4 Test Equipment

For USB 2.0 compliance tests, the following test equipment is recommended:

- R&S RTP, or R&S RTO oscilloscope with 4 channels and at least 2 GHz bandwidth. For full speed and low speed compliance tests, a 4-channel R&S RTO with less than 2 GHz bandwidth is sufficient.
- R&S RT-ZF1 USB 2.0 compliance test fixture set, which consists of the load board and the signal quality board.
- Probes:
 - 2x single-ended active probes with at least 2 GHz bandwidth
 - 1x differential active probe with at least 2 GHz bandwidth

- Tabor WX2182B / Tabor WX2182C arbitrary waveform generator for automatic receiver sensitivity tests.
For manual receiver sensitivity tests, any AWG with at least 1.44 Gsample/s can be used.
- R&S ScopeSuite software, which can be installed on a computer or directly on the R&S RTO/R&S RTP.
- R&S RTO/R&S RTP-K21 USB 2.0 compliance test option (required option, installed on the R&S RTO/R&S RTP)
- Make sure that you use the latest version of the USBHSET tool. To find downloads, search for *USBHSET* on the following websites:
 - USB 3.0 host: www.usb.org/developers/tools/
 - USB 2.0 host: www.usb.org/developers/tools/usb20_tools/Regularly check the USB-IF website compliance.usb.org/index.asp?Update-File=Electrical&Format=Standard for USB-IF compliance updates.