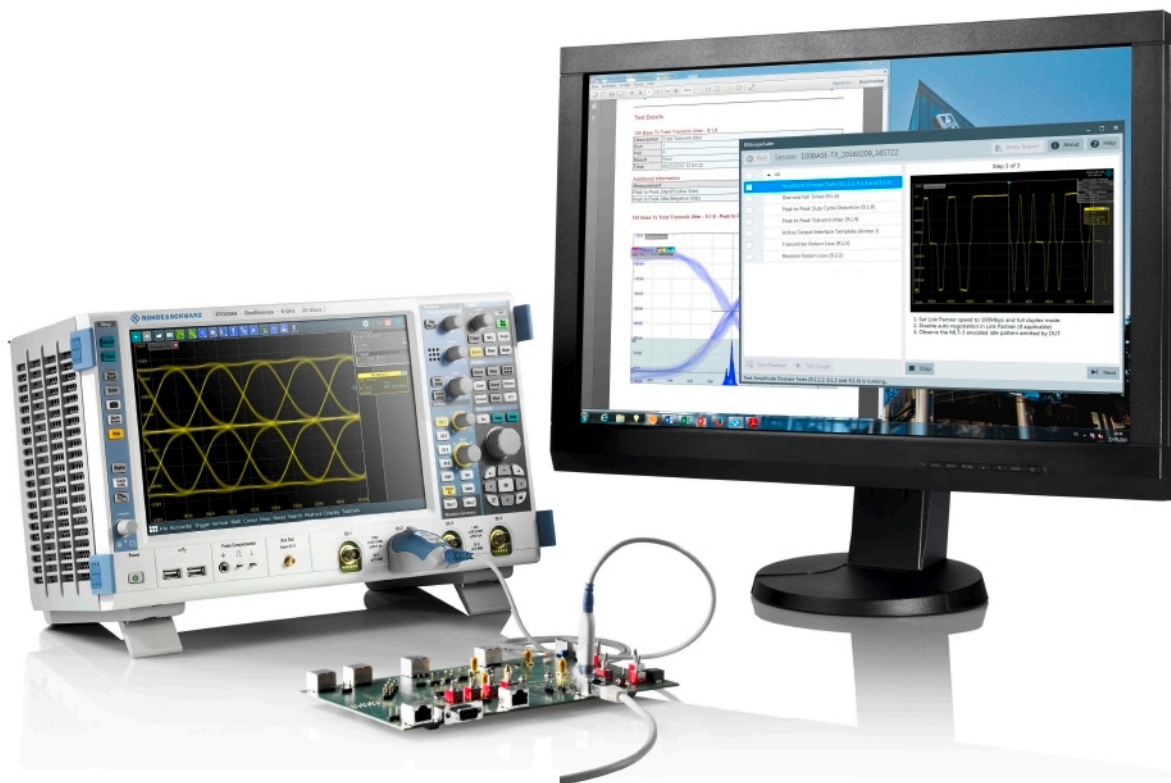


# R&S<sup>®</sup> RT-ZF2 Ethernet Compliance Test Fixture Set Manual



1317555102  
Version 09

**ROHDE & SCHWARZ**  
Make ideas real



This manual describes the R&S RT-ZF2 Ethernet Compliance Test Fixture Set (1317.5522.02).

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Mühlhofstr. 15, 81671 München, Germany

Phone: +49 89 41 29 - 0

Email: [info@rohde-schwarz.com](mailto:info@rohde-schwarz.com)

Internet: [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

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1317.5551.02 | Version 09 | R&S®RT-ZF2

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol, e.g. R&S®RT-ZF2 is indicated as R&S RT-ZF2.

# 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.

## 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.

## Installation

Connect only Ethernet devices with RJ-45 interface that are designed according to 100BASE-T1 IEEE Std 802.3bw™-2015 (Amendment to IEEE Std 802.3™-2015), 1000BASE-T1 (IEEE Std 802.3bp™-2016).

## Disposal



In line with EN 50419, the product cannot be disposed of in the normal household waste. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.

Rohde & Schwarz has developed a disposal concept for the ecofriendly disposal or recycling of waste material. Rohde & Schwarz fully assumes its obligation as a producer to take back and dispose of electrical and electronic waste. Contact your local service representative to dispose of the product.

## 2 Product Description

The R&S RT-ZF2 Ethernet compliance test fixture set is a product for automated compliance testing of various Ethernet standards.

It is used in combination with:

- R&S RTO/RTO6/RTP oscilloscope
- 10BASE-T, 100BASE-TX, 1000BASE-T tests: R&S RTO-K22 (1329.7460.02), R&S RTP-K22 (1337.8691.02)
- 10GBASE-T: R&S RTO-K23 (1320.6261.02), R&S RTP-K23 (1337.8704.02)
- 100BASE-T1: R&S RTO-K24 (1329.7483.02), R&S RTP-K24 (1800.6531.02)
- 2.5/5GBASE-T: R&S RTO-K25 (1333.0496.02), R&S RTP-K25 (1337.8710.02)
- 1000BASE-T1: R&S RTO-K87 (1337.8591.02), R&S RTP-K87 (1800.6554.02)
- R&S ScopeSuite software

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

### 2.1 Deliveries

The R&S RT-ZF2 delivery package contains the following items:

- R&S RT-ZF2 test boards:
  - Ethernet test board (1317.5539.02)
  - Calibration board (1317.5539.02)
- Accessories, see [Table 2-1](#)
- Manual

**Table 2-1: Supplied accessories**

| Item                | Quantity | Order number |
|---------------------|----------|--------------|
| Ethernet cable CAT6 | 1        | 3033.9264.00 |
| SMA terminations    | 3        | 0249.7823.00 |
| Carrying case       | 1        |              |
| Manual              | 1        |              |

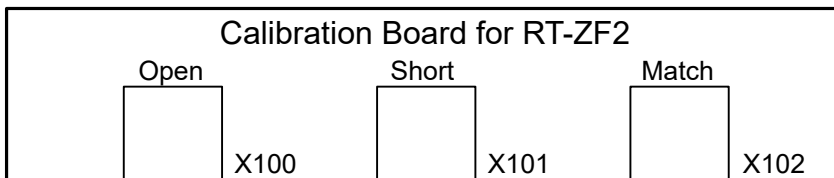
The following optional accessories are available:

**Table 2-2: Optional accessories**

| Item   | Type        | Order number |
|--|-------------|--------------|
| Gigabit Ethernet Jitter Cable for 1000BASE-T jitter slave mode test<br>103 m cable with specific sections of different impedance that cause signal distortions | R&S RT-ZF2C | 1317.5639.02 |

## 2.2 Calibration Board

The calibration board is required in return loss measurements. It is used to calibrate the vector network analyzer for the measurement.



**Figure 2-1: Ethernet calibration board**

## 2.3 Ethernet Test Board

The Ethernet test board has several labeled sections designed for specific test cases. You can cut the board at the section limits and use each section as a separate board.

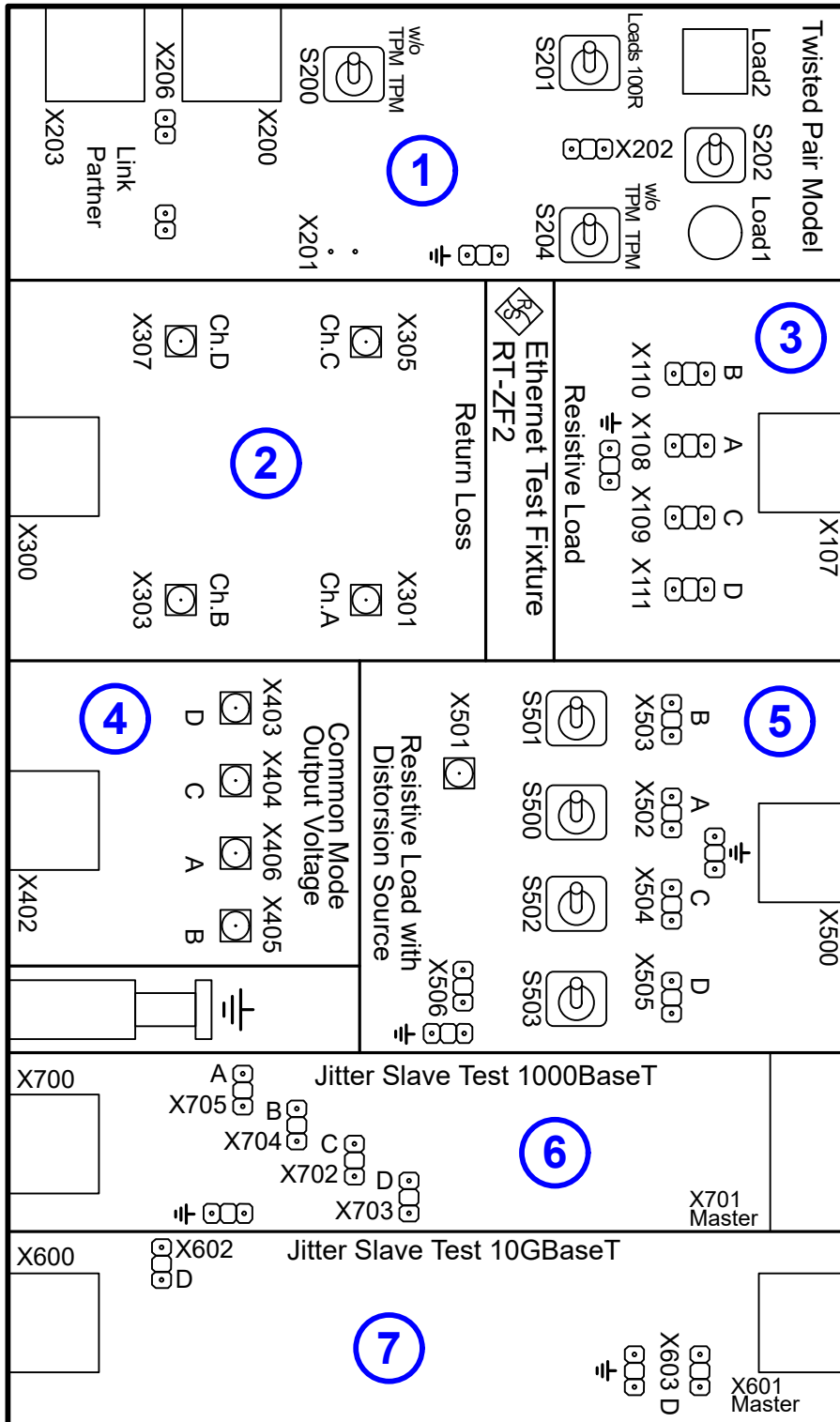


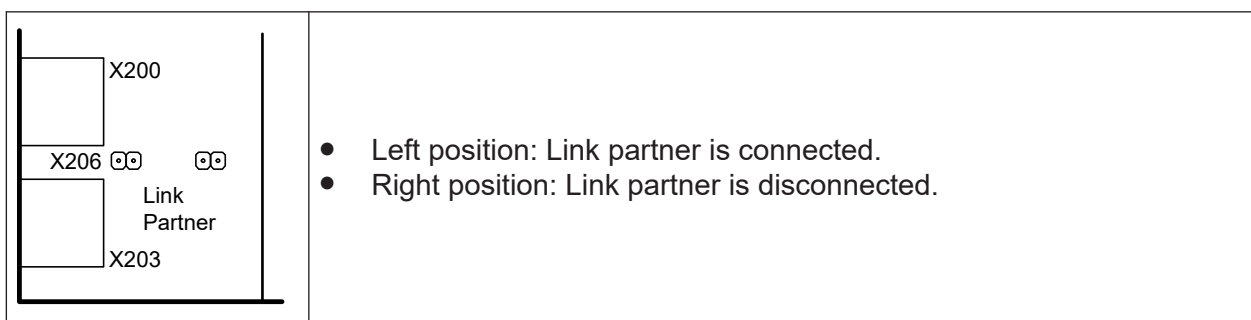
Figure 2-2: Ethernet test board

- 1 = Twisted Pair Model
- 2 = Return Loss
- 3 = Resistive Load

- 4 = Common Mode Output Voltage
- 5 = Resistive Load with Distortion Source
- 6 = Jitter Slave Test 1000BASE-T
- 7 = Jitter Slave Test 10GBASE-T

### X206 jumper

The X206 jumper switches the link partner on or off. It is used in 10BASE-T test cases.



## 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, R&S®RTP Ethernet Compliance Tests, Test Procedures Manual".

## 4 Test equipment

For Ethernet compliance tests, the following test equipment is needed:

- The free-of-charge R&S ScopeSuite software, which can be installed on a computer or directly on the oscilloscope.
- **10/100/1000BASE-T Ethernet compliance tests:**
  - R&S RTO / R&S RTO6 /R&S RTP oscilloscope with at least 600 MHz bandwidth
  - Differential probe with at least 1 GHz bandwidth
  - R&S RTO / R&S RTO6 /R&S RTP-K22 10/100/1000BASE-T Ethernet compliance test option (required option, installed on the oscilloscope)
  - R&S RT-ZF2 Ethernet test fixture set
  - For energy-efficient Ethernet tests, in addition:  
R&S RT-ZF5 Ethernet test fixture set for 100/1000BASE-T EEE tests  
R&S RT-ZF4 test fixture for 10BASE-Te tests
- **2.5GBASE-T Ethernet compliance tests:**
  - R&S RTO / R&S RTO6 /R&S RTP oscilloscope with at least 600 MHz bandwidth  
For precise power spectral density and power level measurements up to 1 GHz, it is recommended to use an oscilloscope and a differential probe with 1 GHz bandwidth each.
  - Differential probe with at least 1GHz bandwidth
  - R&S RTO / R&S RTO6 /R&S RTP-K23 GBASE-T Ethernet compliance test option (required option, installed on the R&S RTO/RTO6/RTP)
  - R&S RT-ZF2 Ethernet test fixture set
- **5GBASE-T Ethernet compliance tests:**
  - R&S RTO / R&S RTO6 /R&S RTP oscilloscope with at least 1 GHz bandwidth  
For precise power spectral density and power level measurements up to 1.5 GHz, it is recommended to use an oscilloscope and a differential probe with 1.5 GHz bandwidth each.
  - Differential probe with at least 1.5 GHz bandwidth
  - R&S RTO / R&S RTO6 /R&S RTP-K23 GBASE-T Ethernet compliance test option (required option, installed on the R&S RTO/RTO6/RTP)
  - R&S RT-ZF2 Ethernet test fixture set



- **10GBASE-T Ethernet compliance tests:**
  - R&S RTO / R&S RTO6 /R&S RTP oscilloscope with at least 2 GHz bandwidth  
For precise power spectral density and power level measurements up to 3 GHz, it is recommended to use an oscilloscope and a differential probe with 3 GHz bandwidth each.
  - Differential probe with at least 3 GHz bandwidth
  - R&S RTO / R&S RTO6 /R&S RTP-K23 GBASE-T Ethernet compliance test option (required option, installed on the R&S RTO/RTO6/RTP)
  - R&S RT-ZF2 Ethernet test fixture set
- **100BASE-T1 compliance tests:**
  - R&S RTO / R&S RTO6 /R&S RTP oscilloscope with at least 600 MHz bandwidth
  - Differential probe with 1 GHz bandwidth
  - R&S RTO / R&S RTO6 /R&S RTP-K24 100BASE-T1 compliance test option (required option, installed on the R&S RTO/RTO6/RTP)
  - R&S RT-ZF2 Ethernet test fixture set
  - R&S RT-ZF3 frequency converter for transmitter distortion tests
- **1000BASE-T1 compliance tests:**
  - R&S RTO / R&S RTO6 /R&S RTP oscilloscope with at least 2 GHz bandwidth
  - Differential probe with 2 GHz bandwidth
  - R&S RTO / R&S RTO6 /R&S RTP-K87 1000BASE-T1 compliance test option (required option, installed on the R&S RTO/RTO6/RTP)
  - R&S RT-ZF2 Ethernet test fixture set
  - R&S RT-ZF6 frequency converter for transmitter distortion tests
- **MGBASE-T1 compliance tests:**
  - R&S RTO / R&S RTO6 /R&S RTP oscilloscope, with a bandwidth of:
    - for 2.5 GBASE-T1 tests: at least 3.5 GHz
    - for 5 GBASE-T1 tests: at least 7 GHz
    - for 10 GBASE-T1 tests: at least 14 GHz
  - 2 BNC/SMA cables
  - R&S RTO / R&S RTO6 /R&S RTP-K88 MGBASE-T1 compliance test option (required option, installed on the R&S RTO/RTO6/RTP)
- **10BASE-T1 compliance tests:**

- R&S RTO / R&S RTO6 /R&S RTP oscilloscope
- Optional Differential probe with 1 GHz bandwidth
- R&S RTO / R&S RTO6 /R&S RTP-K89 10BASE-T1 compliance test option (required option, installed on the R&S RTO/RTO6/RTP)
- R&S RTO-B6/R&S RTP-B6/Tabor WX2182B/Tabor WX2182C arbitrary waveform generator for automatic disturber tests. For some disturber tests, also HMF2550 can be used.
- R&S ZNB/ZNC/ZND/ZVL vector network analyzer for automatic return loss measurements. For manual measurements, also other AWGs and VNAs can be used.

## 5 Contacting customer support

### Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

### Contact information

Contact our customer support center at [www.rohde-schwarz.com/support](http://www.rohde-schwarz.com/support), or follow this QR code:



*Figure 5-1: QR code to the Rohde & Schwarz support page*