R&S®TSME6
Ultracompact Drive Test Scanner
Getting Started

4900002702
Version 09

ROHDE&SCHWARZ
Make ideas real

This manual applies to the following R&S®TSME6 models and options:

- R&S®TSME6 (4900.0004.02)

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4900.0027.02 | Version 09 | R&S®TSME6

Throughout this manual, R&S® is indicated as R&S.

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1 Safety and regulatory information

The product documentation helps you use the product safely and efficiently. Follow the instructions provided here and in the following sections.

Intended use

The R&S TSME6 is intended for efficient drive and walk tests with a maximum degree of freedom and upgradeability. With the ultracompact design and multiband and multitechnology support for simultaneous measurements, the scanner fulfills all requirements for a state-of-the-art measurement tool.

Observe the operating conditions and performance limits stated in the specifications document.

Where do I find safety information?

Safety information is part of the product documentation. It warns you of potential dangers and gives instructions on how to prevent personal injury or damage caused by dangerous situations. Safety information is provided as follows:

- In Section 1.1, "Safety instructions", on page 5. The same information is provided in many languages in printed format. The printed "Safety Instructions" for "DC-Powered Products for Mobile Use" (document number 1171.2049.99) are delivered with the product.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

1.1 Safety instructions

Products from the Rohde & Schwarz group of companies are manufactured according to the highest technical standards. To use the products safely, follow the instructions provided here and in the product documentation. Keep the product documentation nearby and offer it to other users.

Use the product only for its intended use and within its performance limits. Intended use and limits are described in the product documentation such as the specifications document, manuals and the printed "Safety Instructions" document. If you are unsure about the appropriate use, contact Rohde & Schwarz customer support.

Using the product requires skilled persons or specially trained personnel. These users also need sound knowledge of at least one of the languages in which the user interfaces and the product documentation are available.

Reconfigure or adjust the product only as described in the product documentation or the specifications document. Any other modifications can affect safety and are not permitted.

Never open the casing of the product. Only service personnel authorized by Rohde & Schwarz are allowed to repair the product. If any part of the product is damaged or broken, stop using the product. Contact Rohde & Schwarz customer support at https://www.rohde-schwarz.com/support.

Connecting the product

Before connecting the interfaces or measuring inputs of the product to other products or electrical circuits, make sure that the other products or electrical circuits provide special protection against electric shock. This protection principle is referred to as SELV (safety extra-low voltage) and is based on a low voltage level and increased insulation. Exceptions are indicated by a measurement category on the product and given in the specifications document.

Operating the product

The product is intended for mobile use. The maximum weight of the product is provided in the specifications document.

Observe the ambient conditions stated in the specifications document. Examples of ambient conditions are altitude, operating temperature and climatic loads.

The protection class indicates how resistant a product is to the ingress of solids and water. The protection class is noted in the specifications document. If the protection class is at least IP67, the product is dustproof and waterproof. If the second number of the protection class is lower than 7, the product casing is not waterproof.

When operating the product on a mobile platform, such as a vehicle, aircraft or drone, make sure that the product is properly secured. Refer to the instructions provided by the manufacturer of the mobile platform. If stacking is possible, secure the whole stack of products so that they cannot fall over and cause injury.

Due to their exposed location, mobile communications systems are at risk of damage from lightning. Lightning also poses a risk to persons nearby. When the risk of lightning is present, remove antennas from exposed locations, e.g. vehicle roofs. Do not operate the product until the lightning risk has passed.

Connecting to power

The product runs on DC voltage. For the specifications of the supply voltage for the product, refer to the specifications document. Only connect the product to a power source that provides a protection against electric shock.

Take the following measures for your safety:

- If you connect the product to an external power supply, use one recommended in the product documentation.
- If you connect the product to a battery, observe the safety information delivered with the battery.
- Before switching on the product, ensure that the voltage and polarity indicated on the product match the available power source.
- Only use intact cables and route them carefully so that they cannot be damaged. Also ensure that nobody can trip over loose cables.

Meaning of safety labels

Safety labels on the product and its accessories warn against potential hazards.

	Potential hazard Read the product documentation to avoid personal injury or product damage.

	DC - direct current Connect to a DC power supply of the specified voltage range.

1.2 Labels on the product

Labels on the casing inform about:

- Personal safety, see "Meaning of safety labels" on page 7
- Product and environment safety, see "Labels regarding product and environment safety" on page 8.
- Identification of the product, see bottom label of the R&S TSME6.

Labels regarding product and environment safety

	Labeling in line with EN 50419 for disposal of electrical and electronic equipment after the product has come to the end of its life.

1.3 Korea certification class B

이 기기는 가정용(B급) 전자파 적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

2 Welcome

2.1 Documentation overview

This section provides an overview of the R&S TSME6 user documentation. Unless specified otherwise, you find the documents at:

www.rohde-schwarz.com/manual/tsmx

2.1.1 Getting started manual

Introduces the R&S TSME6 and describes how to set up and start working with the product. Includes basic operations, typical measurement examples, and general information, e.g. safety instructions, etc. A printed version is delivered with the instrument.

2.1.2 User manuals and help

The user manual contains the description of all instrument modes and functions. It also provides information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual.

The user manual is also available for download or for immediate display on the Internet.

2.1.3 Videos

Find various videos on Rohde & Schwarz products and test and measurement topics on YouTube: https://www.youtube.com/@Rohde-Schwarz

2.1.4 Printed safety instructions

Provides safety information in many languages. The printed document is delivered with the product.

2.1.5 Product brochures

The brochure provides an overview of the instrument and deals with the specific characteristics and contains the technical specifications of the R&S TSME6. It also lists the firmware applications and their order numbers, and optional accessories.

See www.rohde-schwarz.com/brochure-datasheet/tsmx

2.1.6 Open source acknowledgment (OSA)

The R&S TSMx Device Manager is part of the R&S TSME Tools and uses several valuable open source software packages. An open source acknowledgment document provides verbatim license texts of the used open source software.

After the installation of the R&S TSME Tools, the OSA is available in the directory `C:\Program Files\Rohde-Schwarz\TSME Tools\doc`.

2.1.7 Application notes, application cards, white papers, etc.

These documents deal with special applications or background information on particular topics.

See www.rohde-schwarz.com/application/tsmx

2.2 Key features

The R&S TSME6 sets standards in RF performance and usability. Outstanding key features are:

- Support of frequency range 350 MHz to 6.0 GHz, integrated multi GNSS
- Support of the following technologies: GSM, WCDMA, CDMA2000, EVDO, WiMAX, LTE FDD/TDD, TETRA, P25, RF power scan, CW, NB-IoT/Cat NB1, C-V2X LTE, LTE-M, 5G NR (incl. RedCap, FrMCS)
- Scan of all technologies in all bands at the same time at highest rates including SIB/Layer 3 demodulation
- Easy software upgrade for new features or technologies and backward compatibility to R&S TSME

- Compact and lightweight design with customized mechanical concept for cascading
- Low power consumption
- Support of LTE 2x2 MIMO and 4x4 MIMO
- Network synchronization measurements in 5G NR
- Support of 5G NR millimeterwave measurements with additional down-converter R&S TSME30DC / 44DC and R&S TSMS53DC (17 GHz to 53 GHz)

For a detailed specification, refer to the specifications document.

3 Preparing for use

Here, you can find basic information about setting up the product for the first time.

3.1 Unpacking and checking

1. Unpack the product carefully.
2. Retain the original packing material. Use it when transporting or shipping the product later.
3. Using the delivery notes, check the equipment for completeness.
4. Check the equipment for damage.

   If the delivery is incomplete or equipment is damaged, contact Rohde & Schwarz.

Accessory list

The R&S TSME6 comes with the following accessories:

- Printed getting started manual
- LAN cable
- GPS antenna
- 12 V DC power supply cable (cigarette lighter cable)
- 4 connecting screws

3.2 Setting up indoors

3.2.1 Placing the product on a bench top

If you want to set up the R&S TSME6 on a benchtop or prepare the R&S TSME6 for mobile use, proceed as follows.

To place the product on a bench top

1. Place the R&S TSME6 on a stable, flat and level surface.
2. If you want to stack R&S TSMx, proceed as described in the R&S TSME6 user manual.
3. If you want to stack the R&S TSME6 together with other products:
   a) Follow the instructions given for the other products.
   b) Place the R&S TSME6 on top.

3.2.2 Mounting the product in a rack

To mount the product in a rack

1. Use an adapter kit to prepare the product for rack mounting.
   a) Order the rack adapter kit designed for the product. For the order number, see specifications document.
   b) Mount the adapter kit. Follow the assembly instructions provided with the adapter kit.
2. Lift the product to shelf height. If the rack is high, use a safe climbing aid when placing on upper shelves.
3. Grip the product by the handles. Slide the product onto the shelf until the rack brackets fit closely to the rack.
4. Tighten all screws on the rack brackets with a tightening torque of 1.2 Nm to secure the product in the rack.

Rackmounting

The R&S TSME6 can be installed in a 19-inch rack using a rack adapter kit for one to four R&S TSME6s (option R&S TSME6-Z2, order number 4900.1030.02). The installation instructions are part of the adapter kit.

Figure 3-1: Rackmounting of 2 R&S TSME6s

Figure 3-2: Rackmounting of 2 R&S TSME6s (reverse orientation of R&S TSME6s)

Figure 3-3: Rackmounting of 4 R&S TSME6s

Figure 3-4: Rackmounting of 4 R&S TSME6s (reverse orientation of R&S TSME6s)

3.2.3 Vibration-proofed stacking

3.2.3.1 Cascading R&S TSMA6/6B and R&S TSME6

To connect R&S TSMA6/6B and R&S TSME6

1. Screw the connecting elements (order no. 4900.0804.00) on the top of the R&S TSMA6/6B.

- Torque: 0.66 Nm ± 0.05 Nm
- Secure with liquid plastic

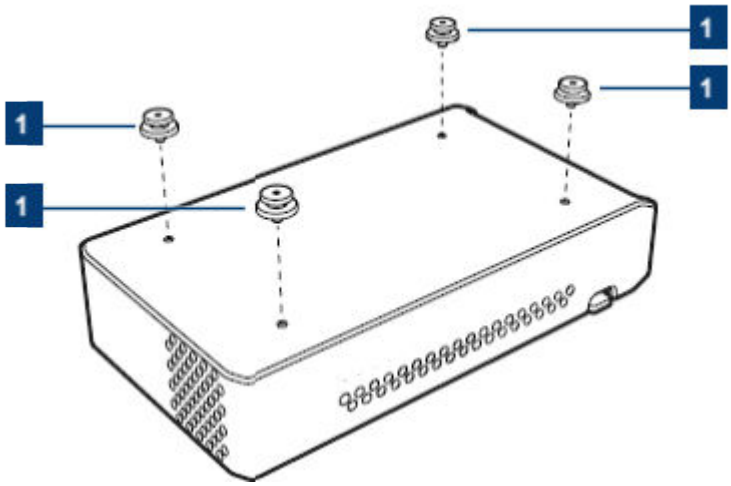


Figure 3-5: Connecting elements

1 = Connecting elements (order no.4900.0804.00)

2. **Notice**: An insufficient airflow can cause the instrument to overheat, which disturbs the operation and even cause damage. Make sure that all fan openings are unobstructed and that the airflow perforations are unimpeded, particularly when you install the instrument in a rack or packed in a backpack. Keep clear the following surrounding spaces to the instrument:
   - Front pane: minimum 2 cm
   - Left/right panes: minimum 1 cm

   Align the connecting elements with the holes on the bottom of an R&S TSME6.

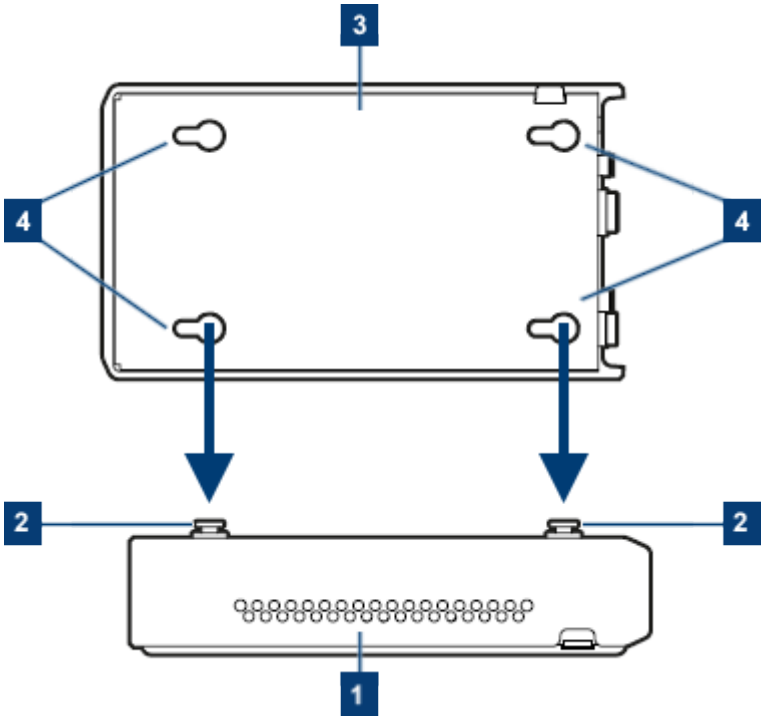


Figure 3-6: Aligning R&S TSMA6/6B and R&S TSME6

1 = R&S TSMA6/6B
2 = Connecting screws
3 = R&S TSME6
4 = Holes on the bottom pane of R&S TSME6

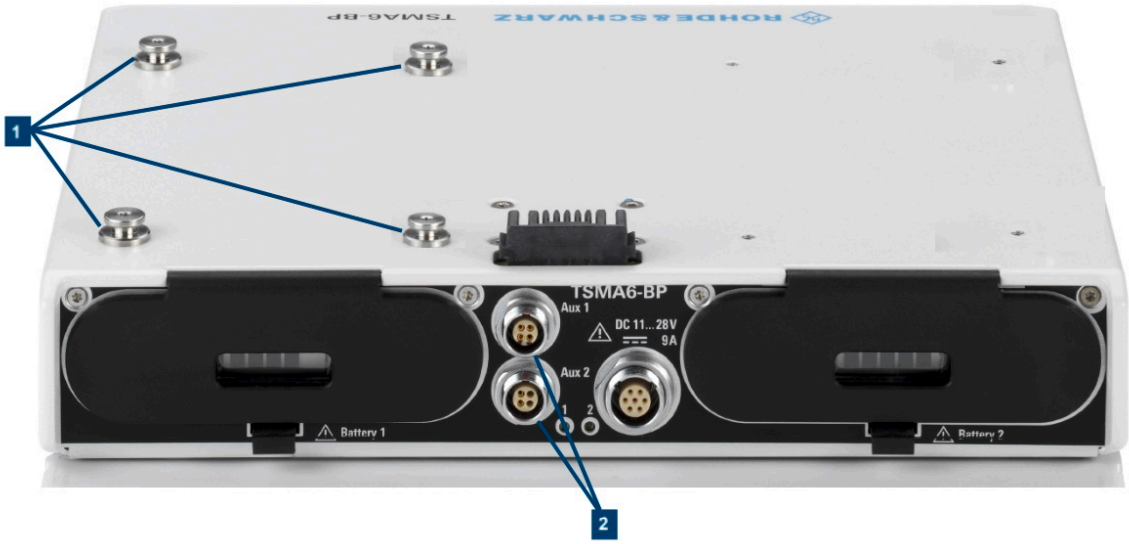
3. Press the R&S TSME6 down.

3.2.3.2 Connecting R&S TSMA6/6B-BP with R&S TSME6 and R&S TSMExxDC

The following steps are valid for R&S TSME6 and downconverter R&S TSMExxDC.

For the cabling of the instruments, the accessory cables R&S TSMA6-BPPT or R&S TSMA6-BP2T are necessary.

1. Screw the collar screws (1) on the top of the R&S TSMA6/6B-BP with a Torx 8 screw driver.
   - Torque: 0.66 Nm ± 0.05 Nm



1 = Collar screws for connecting R&S TSME6
2 = Aux 1 / Aux 2 (auxiliary power out for connecting R&S TSME6/R&S TSMExxDC via power cable R&S TSME-ZYC)

2. Align the collar screws with the snap-in holes on the bottom of an R&S TSME6/R&S TSMExxDC.

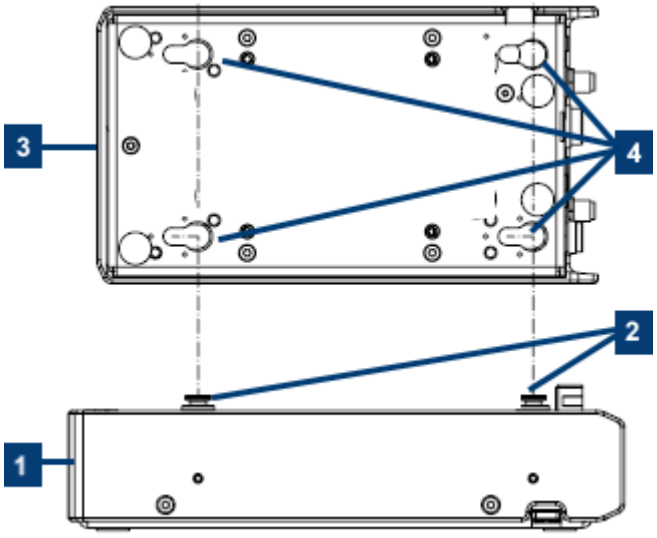


Figure 3-7: Example: Aligning R&S TSMA6/6B-BP and R&S TSME6

1 = R&S TSMA6/6B-BP
2 = Collar screws
3 = R&S TSME6/R&S TSMExxDC
4 = Snap-in holes on the bottom pane of R&S TSME6/R&S TSMExxDC

3. Press the instrument down.

4. Move the R&S TSME6 / R&S TSMExxDC to the back side, until you hear a click when the collar screws lock into place.

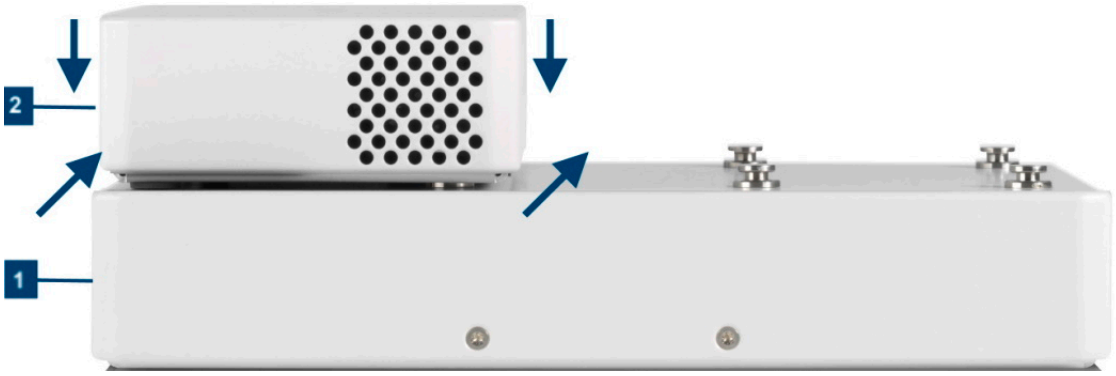


Figure 3-8: Connected R&S TSME6/TSMExxDC and R&S TSMA6/6B-BP

1 = R&S TSMA6/6B-BP
2 = R&S TSME6/R&S TSMExxDC

5. Connect the power cable R&S TSMA6-BPPT resp. R&S TSMA6-BP2T from AUX1 resp. AUX2 to DC IN of R&S TSME6/R&STSMExxDC.

3.3 Considerations for test setup

Electromagnetic interference (EMI) can affect the measurement results.

To suppress electromagnetic radiation during operation:

- Use high-quality shielded cables, for example, double-shielded RF and LAN cables.
- Always terminate open cable ends.
- Ensure that connected external devices comply with EMC regulations.

Signal input and output levels

Information on signal levels is provided in the specifications document. Keep the signal levels within the specified ranges to avoid damage to the product and connected devices.

Electromagnetic compatibility classes

The electromagnetic compatibility (EMC) class indicates where you can operate the product. The EMC class of the product is given in the specifications document.

- Class B equipment is suitable for use in:
  - Residential environments
  - Environments that are directly connected to a low-voltage supply network that supplies residential buildings
- Class A equipment is intended for use in industrial environments. It can cause radio disturbances in residential environments due to possible conducted and radiated disturbances. It is therefore not suitable for class B environments.
  If class A equipment causes radio disturbances, take appropriate measures to eliminate them.

3.4 Connecting to power

This section describes how to connect the R&S TSME6 to a power supply unit.

3.4.1 Connecting to a vehicle DC power supply via a cigarette lighter

The R&S TSME6 is delivered with a 12 V DC power supply cable with a cigarette lighter connector.

1. Check the rating of the vehicle DC power supply.
2. Connect the 4-pin connector to DC IN.
3. Connect the cigarette lighter adapter to the 12 V outlet of the vehicle.

3.4.2 Connecting to the vehicle power supply via a terminal

1. Demount the cigarette lighter adapter from the cable.
2. Connect the open ends of the cable to the DC power supply.
   Ensure that the polarity is correct (see Figure 3-9).

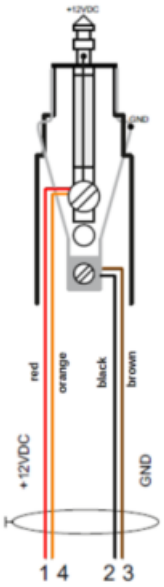


Figure 3-9: Supplied power cable with cigarette lighter adapter

+12 V DC = red/orange cabling
GND = black/brown cabling

3.4.3 Connecting to an AC power supply

If you operate the product with an external power supply, you can use it indoors only in pollution degree 2 environments where nonconductive contamination can occur. Suitable AC power supplies are listed in the specifications document. They differ in the output power:

- R&S TSMA6-Z1 has an output power of 105 W and is suitable for multiple R&S TSMx products.

1. Ensure that the required ratings listed in the specifications document are matched.
2. Connect the round connector to DC IN.
3. Insert the AC power plug into a power outlet with ground contact.

3.5 Putting into operation

This section describes the basic steps to be taken when setting up the R&S TSME6 for the first time.

EMI suppression

Electromagnetic interference (EMI) may affect the measurement results.

To suppress generated electromagnetic interference (EMI):

- Use only double-shielded cables for RF and GPS connection when not using the standard accessory.
- Always terminate open cable ends.
- DC-based lab networks are not allowed to be used for power supply.
- LAN cable length to the next PC or switch must be < 30m.
- Note the EMC classification in the specifications document.

3.5.1 Setting up the LAN connection to the host PC

To control and run measurements with the R&S TSME6, a host PC or notebook with LAN interface is required.

The R&S TSME6 is equipped with a network interface and can be connected to an Ethernet LAN (local area network). The interface can be used to connect the R&S TSME6 to a host PC.

Network connection

The product is designed for operation in secure networks. Consult your local system administrator or IT department to comply with the network security policies of your organization before connecting the product to the network.

Follow these recommendations to minimize security risks:

- Only connect the product to a dedicated network segment.
- Use a firewall to ensure that the product is not accessible from the internet itself. Configure the firewall only as described in Section 3.5.1.2, "Firewall configuration", on page 28.
- Rohde & Schwarz publishes firmware (or software) updates for your product on the internet. Install compatible updates that fix security issues or critical vulnerabilities as soon as possible.

How to connect multiple R&S TSME6s to a single host PC (for example for LTE MIMO setups) is described in the R&S TSME6 user manual.

The following scenarios are possible.

- Connection between PC and multiple R&S TSME6 using static IP addresses.
- Connection between PC and multiple R&S TSME6 using dynamical generated IP addresses (**Auto-IP**).

Modes

- **"Full auto-IP" mode**
  IP addresses are automatically generated on PC and multiple R&S TSME6 if the following conditions are met:
  – A PC network interface is configured to obtain an IP address automatically
  – The IP address stored in multiple R&S TSME6 is not in the range 169.254.0.1 – 169.254.255.254 (inclusive).
  Note: It is the IP address set by the R&S TSMx Device Manager.
- **"Partial auto-IP" mode**
  An IP address is automatically generated on a PC and a static IP address is used on R&S TSME6 if the following conditions are met:
  – A PC network interface is configured to obtain an IP address automatically
  – The IP address stored in R&S TSME6 is in the range 169.254.0.1 – 169.254.255.254 (inclusive).
  Note: It is the IP address set by the R&S TSMx Device Manager.
- **"Static IP" mode**
  The IP address is manually set on the PC and a static IP is used on R&S TSME6 if the following conditions are met:
  – PC LAN interface is configured to use a user-defined IP address, not in the range 169.254.0.1 – 169.254.255.254 (inclusive).

Recommendations/Limitations of modes

- **"Full auto-IP" mode**
  – Only 1 PC and 1 or more R&S TSME6 scanners per LAN interface, either connected directly or via a L2 switch. (Do not use this mode when more than 1 PC is physically connected to the same subnetwork, e.g. via the switch.)

  - The PC's LAN interface must not receive an IP from a DHCP server. (The IP address generated for PC must match the following pattern: `169.254.X.Y.`)
  - Configure all R&S TSME6 scanners on the same LAN interface with stored IP addresses not in the range 169.254.1.0 – 169.254.254.255 (inclusive) to prevent conflicts.
    Note: R&S TSME6 scanners with stored IP addresses in ranges 169.254.0.1 – 169.254.0.255 (inclusive) or 169.254.255.0 – 169.254.255.254 (inclusive) are effectively operating in "partial auto-IP" mode.
  - Depending on the software accessing the R&S TSME6 scanners, it is mandatory to configure the stored IP addresses in all R&S TSME6 scanners to be unique.
    Example: R&S TSMx Device Manager does not have this requirement, ROMES / R&S NESTOR have such requirements depending on the use made internally of the stored IP address as unique identifier.

- **"Partial auto-IP" mode**
  Use this mode only for specific cases. The preferred modes are "full auto-IP" or "static IP".
  - 1 or more PCs and 1 or more R&S TSME6 scanners per LAN interface, either connected directly or via a L2 switch
  - Each of the PC's LAN interface physically connected to the subnetwork must not receive an IP from a DHCP server. (The IP address generated for PC must match the following pattern: `169.254.X.Y.`)
  - Configure all R&S TSME6 scanners on the same LAN interface with stored IP addresses in the ranges 169.254.0.1 – 169.254.0.255 (inclusive) or 169.254.255.0 – 169.254.255.254 (inclusive), and use unique IP addresses.
    These ranges are important to prevent conflicts with IP addresses dynamically generated for the PC LAN interfaces.
    Note: If a R&S TSME6 is shared with 2 or more PCs, and its stored IP address is not in the defined range above, it leads in rare cases to IP conflicts. It is therefore recommended to respect this rule.
- **"Static IP" mode**
  - 1 or more PCs and 1 or more R&S TSME6 scanners, either connected directly or via a L2 switch.
  - Other network devices are permitted, as long as all IP addresses used are unique.

This section describes how to configure the LAN interface for a single R&S TSME6. It includes the following topics:

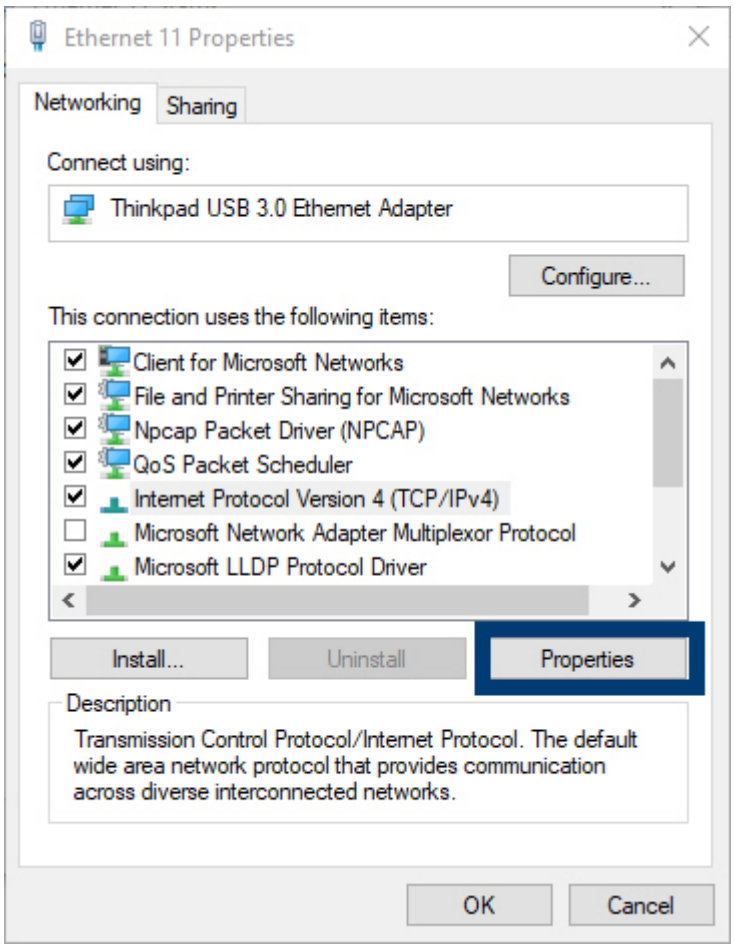
- Configuring the LAN interface on the host PC 25
- Firewall configuration 28
- Connecting the R&S TSME6 to the host PC 29

3.5.1.1 Configuring the LAN interface on the host PC

Each R&S TSME6 has the default IP address **192.168.0.2**. It is recommended that you define the fixed IP address **192.168.0.1** to the host PC or configure the host PC to obtain an IP address automatically ("Auto-IP").

To control the R&S TSME6 from the host PC, the LAN interface of the host PC must be configured as follows:

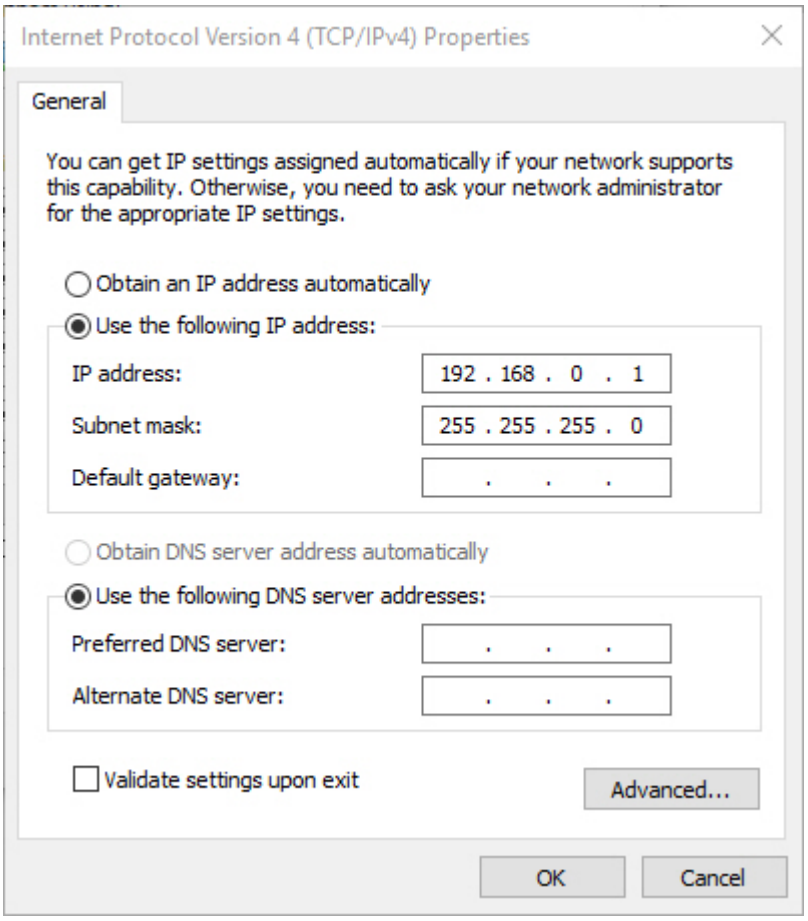
1. Press the "Windows" key or the [CTRL + ESC] key combination on your keyboard to access the Windows "Start" menu.
2. Type "Control Panel" and select this application.
3. Select "Control Panel > Network and Internet > Network and Sharing Center".
4. Select "Change adapter settings".
5. Double-click the LAN interface with which the R&S TSME6 is connected.
   The items used by the LAN connection are displayed.
6. Select the entry named "Internet Protocol Version 4 (TCP/IPv4)".



7. Select the "Properties" button.
8. Configure the following TCP/IP settings:
   a) Use any "Auto-IP" mode.
      Select "Obtain an IP address automatically".

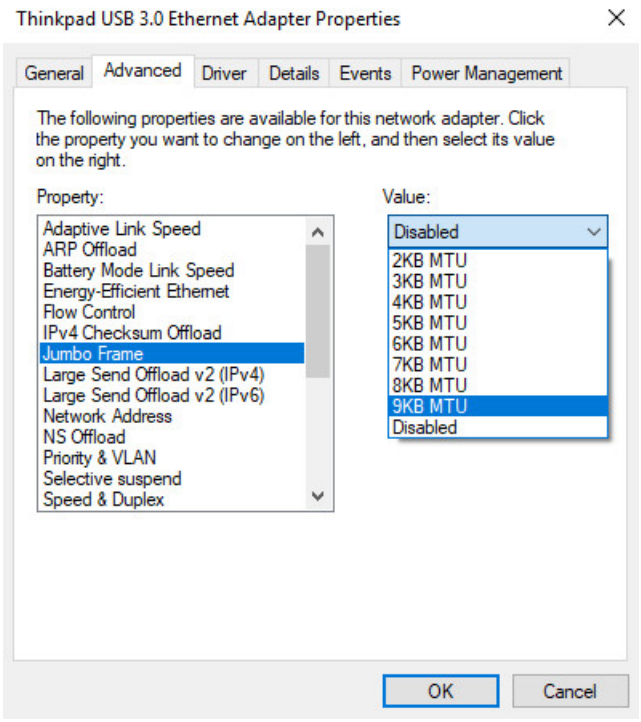
b) Use "Static IP" mode.

- Select "Use the following IP address" (fixed IP, no dynamic range)
- IP address: **192.168.0.1** (recommended)
- Subnet mask: 255.255.255.0
- No Default Gateway



9. Enable the use of 9-kB-jumbo frames:
   a) Return to the "Local Area Connection Properties" dialog box.
   b) Select the entry for the LAN adapter and then "Properties".

c) Switch to the "Advanced" tab.



d) Select the "Jumbo Frames" property and the "Value":"9014 Bytes".
Note: Sometimes, this setting causes problems in Windows, but it is an important prerequisite for correct operation of the R&S TSME6.
See R&S TSME6 user manual, chapter troubleshooting for help.

10. Close the control panel, reboot the host PC and check if you can establish the connection (see R&S TSME6 user manual, chapter troubleshooting for help).

If your firewall is active, make sure that it is configured as described in Section 3.5.1.2, "Firewall configuration", on page 28.

3.5.1.2 Firewall configuration

The firewall can be turned off on the LAN interface or on with all the mandatory configurations.

If your firewall is active, make sure that your program is allowed to communicate through the firewall. The following ports must be available:

- RxPort (R&S TSME6->PC): Port 17476
- TxPort (PC->R&S TSME6): Port 5140 and 16962

Also, the following parameters must be configured to decide if a specific program is allowed to pass the firewall.

- Multicast IP address for R&S TSME: *224.17.4.76*
- Multicast Address for R&S TSME6: *239.192.1.7*
- IP-Address of R&S TSME6 has to be allowed as well: *192.168.0.2* (example)
  Note: In "full auto-IP" mode, the IP address generated for the R&S TSME6 has to be allowed.
- Allow UDP Protocol
- Allow Multicast Protocol
- Allow executed application (ROMES, R&S NESTOR, R&S TSMx Device Manager as examples)
- Allow Network-Interface R&S TSME are connected to
- Allow network profile active on Network-IF R&S TSME is connected to

Even if all these parameters are set properly, this rule can be overwritten in Windows Firewall by a blocking rule. Furthermore on the first execution of a program, windows ask the user to decide on which network profiles communication through the firewall shall be allowed. If it is set correctly by the user, the firewall is in a good state.

3.5.1.3 Connecting the R&S TSME6 to the host PC

The R&S TSME6 has a built-in 1000BASE-T (802.3ab), 1 Gbit/s Ethernet interface. The host PC must have a separate 1 Gbit network interface card with an independent LAN connection.

Dedicated LAN adapter and IP address for host PC

It is important for the host PC to have its own dedicated LAN adapter for the connection to one or more R&S TSME6s (or a switch), rather than being integrated in a regular office network.

If multiple R&S TSME6s are connected to one host PC, the following rules are valid.

- Using "static IP" or "partial auto-IP" mode, it is important to define unique IP addresses for each instrument using the R&S TSMx Device Manager (see R&S TSME6 user manual, chapter Configuring the R&S TSME6).
- Using "full auto-IP" mode, it is recommended to define unique IP addresses for each instrument, but depending on the software run, it may not be mandatory.

► Connect the supplied LAN cable to the LAN connector on the rear panel of the R&S TSME6, and to the host PC.

Windows 10 automatically detects the network connection and all devices in the same subnet when the R&S TSME6 is switched on.

3.5.2 Connecting external devices

The SMA connector is sensitive to mechanical stress. Use the following handling precautions.

- Always use a torque wrench and mount the cable end with 60 Ncm to 90 Ncm.
- Do not stack adapters directly at the SMA connector. If you need to use adapters (e.g: SMA to N), then always use a specific adapter cable (order no. 4900.1700.00).

The following external devices are required for standard operation.

- Connect the instrument to the power supply as described in Section 3.4, "Connecting to power", on page 20.
- Connect the PC or notebook LAN port to the LAN port of the R&S TSME6 as described in Section 3.5.1, "Setting up the LAN connection to the host PC", on page 22.

- Connect the (optional) antenna's SMA connector to the RF IN connector.
  NOTICE: Do not overload the input power at the RF input connector, otherwise the input stage could be severely damaged. For maximum allowed values, see the specifications document.
- Connect the GPS antenna to the GPS ANT connector of the instrument for time synchronization to a GPS signal (3 V, max. 25 mA for active antenna). To ensure time synchronization of the R&S TSME6, it is required to have a GPS antenna connected.
  NOTE: A missing GPS antenna will lead over time to the point that signals cannot be detected anymore. We recommend connecting a GPS antenna at least once per month.
- Connect the R&S TSME30DC / R&S TSME44DC / R&S TSMS53DC according to the measurement setup description in R&S TSME30DC / R&S TSME44DC / R&S TSMS53DC Ultracompact Downconverters manual.

Depending on the intended use, the respective valid regulations regarding lightning protection of the antennas and regarding vehicle installation must be observed during installation.

3.5.3 Connecting a Kensington lock

The R&S TSME6 provides a connector for a Kensington lock, which can be used to secure a mobile device against theft. The connector is on the side panel of the instrument.

Figure 3-10: Connector for a Kensington lock on theR&S TSME6

3.5.4 Enabling untethered dead reckoning

To enable untethered dead reckoning with the integrated receiver of the R&S TSME6, proceed as follows:

1. Mount the R&S TSME6 scanner fixed to the frame of a car.
   The rear panel of the R&S TSME6 must point in the driving direction.

Figure 3-11: Orientation of the R&S TSME6

   a) Ensure fixed attachment of the R&S TSME6.

b) Place the antenna near by the R&S TSME6. If you place the GNSS antenna at a significant distance from the receiver, introduced position offsets affect the accuracy of the navigation solution.

2. Power on the R&S TSME6.
3. In the control software, activate "Dead Reckoning".
4. Wait until the control software reports a "3D fix" (time varies depending on the configured GNSS).
5. To calibrate the instrument, perform the following driving procedures in a safe environment.
   a) 720 degrees right turn.
   b) 720 degrees left turn.
   c) Drive a straight line with a velocity exceeding 40 km/h.

   Note: Whenever the instrument is switched off, repeat the calibration procedure for the next usage of dead reckoning.

After finishing the calibration, the used control reports a fix state "GPS+DR" or "3D+DR". If satellite reception is lost, the fix state changes to "DR only".

If you use "DR only", the accuracy of the reported position decreases over time. If the accuracy falls below a certain threshold, the receiver reports the state "No Fix".

3.6 Connecting R&S TSME6 scanner with R&S TSMA6/6B-BP

To power R&S TSMEx devices (scanner, down converter), the following accessory cables are necessary.

- R&S TSMA6-BPPT (single R&S TSMETSMEx power cable, order no. 4900.1730.02)
- R&S TSMA6-BP2T (dual R&S TSMETSMEx power cable, order no. 4901.0566.02)

3.7 Switching on or off R&S TSME6

To switch on the device

1. Use the supplied power cable to connect the power supply to the instrument.
2. After you have connected the power cable, the R&S TSME6 is powered on.

After booting, the instrument switches to the idle mode and is ready to be accessed by an application.

To shut down the device

When you press the On/Off key on the rear panel of the R&S TSME6 to switch it off, the instrument changes to standby mode. In standby mode, the program execution on the instrument is stopped immediately, but the instrument is still under power connection.

Do not switch off the instrument while a connection to the application is being established, otherwise the application does not close properly. As a result, the software could crash and must be shut down from the Windows Task manager.

Removing the power supply

If you remove the power supply and reconnect it later, the instrument automatically boots when power returns.

4 Instrument tour

4.1 Front panel view

The front panel of the R&S TSME6 does not provide any connectors or control elements for operation.

Behind the right side of the rear panel (with the ventilation openings), 4 status LEDs are located. These LEDs display the following states:

- LEDs ON: R&S TSME6 ready for operation, RF-PLLs initialized correctly
- LEDs OFF: R&S TSME6 is off or RF-PLLs initialized not correctly

If the fans are off (temperature on the controller board < 60° C), the LEDs are partially covered by the fan blades.

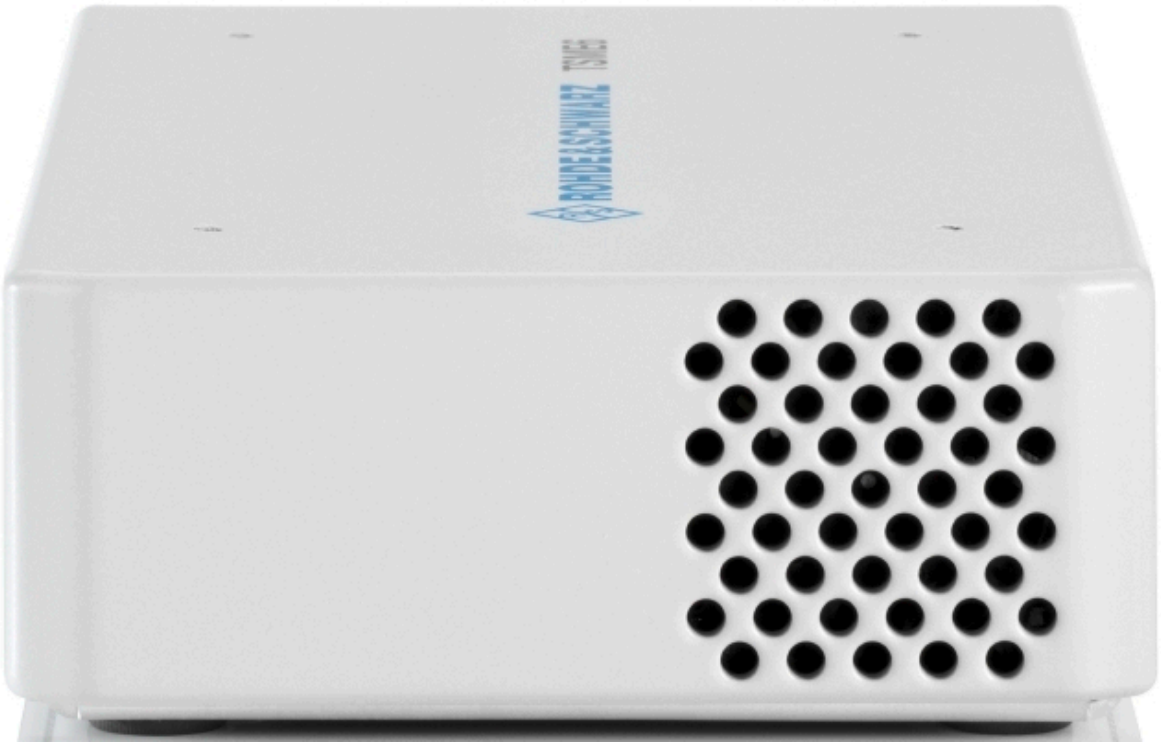


Figure 4-1: R&S TSME6 - front panel

4.2 Rear panel view

This figure shows the rear panel view of the R&S TSME6. The individual elements are described in more detail in the subsequent sections.

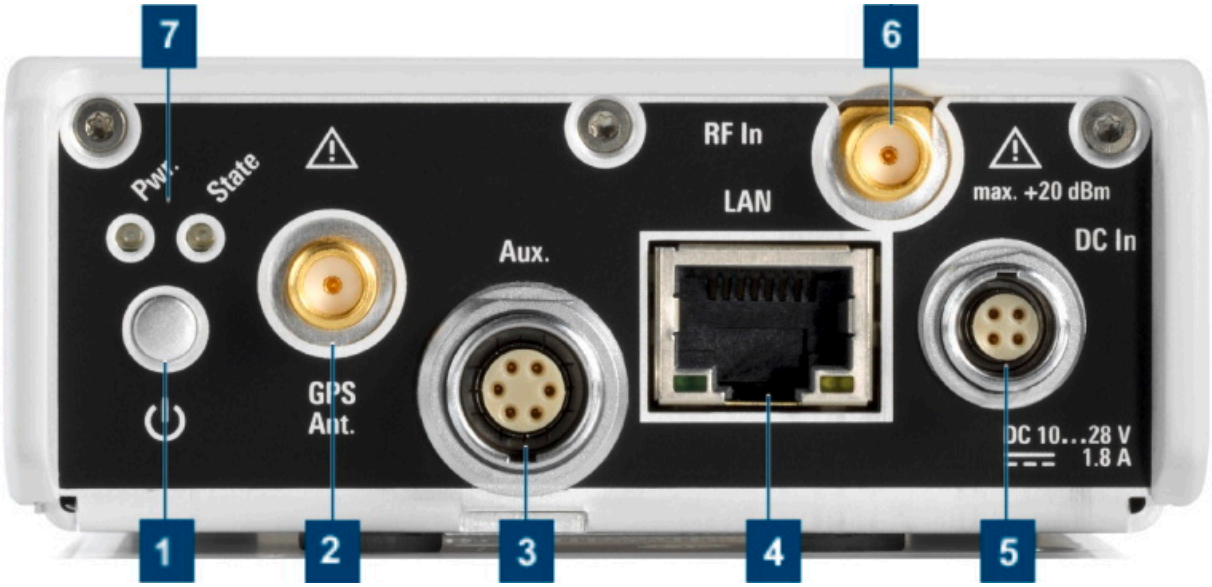


Figure 4-2: R&S TSME6 - rear panel

1 = "Power ON/OFF" on page 37
2 = "GPS antenna connector" on page 37
3 = "AUX connector" on page 38
4 = "LAN connector with LEDs" on page 38
5 = "DC IN connector" on page 39
6 = "RF IN connector (50 Ω)" on page 39
7 = "Pwr./State LEDs" on page 39

Power ON/OFF

The On/Off key switches the device on and off if power is supplied via the DC IN connector. For details, see Section 3.7, "Switching on or off R&S TSME6", on page 34.

GPS antenna connector

An SMA connector is provided for the supplied external active GPS antenna (antenna power: 3 V, max. 25 mA).

The behavior of the integrated multi-GNSS (GPS / BeiDou / Galileo / GLONASS) receiver depends on "Product Change Index" of the controller board of the device.

- PCI of controller board < 06.00 (u-blox NEO-M8U): R&S TSMA6, R&S TSMA6B, R&S TSME6
  The integrated multi-GNSS receiver uses three satellite systems in parallel. It offers an accuracy improvement of 30 % to 50 % by using a second constellation of satellites.

The following combinations are allowed:

– GPS only
– GPS / GLONASS / Galileo
– GPS / BeiDou

- PCI of controller board ≥ 06.00 (u-blox NEO-M9V): R&S TSME6 (new), R&S TSMA6B (new)
  The integrated multi-GNSS receiver uses all four satellite systems in parallel.

The R&S TSME6 can perform untethered dead reckoning in tunnels to provide position information even if no satellites are available. The untethered dead reckoning is performed in the device itself by built-in electronic gyroscopes.

For enabling untethered dead reckoning, see Section 3.5.4, "Enabling untethered dead reckoning", on page 32.

AUX connector

The AUX connector can be used to connect additional devices. It can be a signal generator that provides an external reference frequency for the R&S TSME6, or a synchronization cable for multiple R&S TSME6 connected to one host PC.

LAN connector with LEDs

The LAN connector provides a high-speed Gigabit Ethernet interface with an RJ-45 connector using IPv4. It is required to connect the R&S TSME6 to a host PC.

The LEDs on the LAN connector indicate the status of the connection to the host PC. LED 1 is on the left side of the connector, LED 2 is on the right.

Table 4-1: LAN LED 1 states and their meaning

LED state	Description
Green, blinking	LAN sending or receiving, or identifying connected device

Table 4-2: LAN LED 2 states and their meaning

LED state	Description
Off	No connection
Yellow	Physical connection established
Yellow, blinking	Identifying connected device

DC IN connector

The DC IN connector is required for the DC power supply (10-28 V, max. 1.8 A). For details, see Section 3.4, "Connecting to power", on page 20.

RF IN connector (50 Ω)

The optional multi-band RF antenna (700 MHz to 2.6 GHz) or the device providing the RF signal is connected to the instrument's RF input. The used cable needs an appropriate connector (SMA female, 50 Ω input impedance).

Do not overload the allowed maximum input of 20 dBm. Non-compliance destroys the input mixer.

Pwr./State LEDs

Table 4-3: POWER and STATE LED states and their meaning

STATE LED	POWER LED	Meaning
Off	Off	No power supply connected at DC IN Power supply is off Power supply < 10 V
Off	Yellow	Standby
Off	Green, blinking (2 Hz)	FGPA configuration in progress
Red (up to 5 seconds during startup)	Green	FPGA configuration finished, preparing for start
Off	Green	R&S TSME6 ready, not connected
Green	Green	Connected
Green, blinking rapidly	Green	Measuring
Green, blinking 2 Hz	Green	Instrument is identified by the software
Red, blinking 2 Hz	Green	Temperature warning (controller board temperature = 75° C to 80° C)
Red (continuous)	Green	Temperature error (controller board temperature above 80° C)

*The fans are temperature-controlled and below a temperature of 60° C on the controller board, the fans are in status OFF.

5 Transporting

Packing

Use the original packaging material. It consists of antistatic wrap for electrostatic protection and packing material designed for the product.

If you do not have the original packaging, use similar materials that provide the same level of protection. You can also contact your local Rohde & Schwarz service center for advice.

Securing

When moving the product in a vehicle or using transporting equipment, make sure that the product is properly secured. Only use items intended for securing objects.

Transport altitude

The maximum transport altitude without pressure compensation is 4500 m above sea level.

6 Maintenance, storage and disposal

We advise to check the nominal data from time to time.

6.1 Cleaning

Do not use any liquids for cleaning. Cleaning agents, solvents (thinners, acetone), acids and bases can damage the front panel labeling, plastic parts and display.

6.2 Storage

Protect the product against dust. Ensure that the environmental conditions, e.g. temperature range and climatic load, meet the values specified in the specifications document.

6.3 Disposal

Rohde & Schwarz is committed to making careful, ecologically sound use of natural resources and minimizing the environmental footprint of our products. Help us by disposing of waste in a way that causes minimum environmental impact.

Disposing of electrical and electronic equipment

A product that is labeled as follows cannot be disposed of in normal household waste after it has come to the end of its life. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.

Figure 6-1: Labeling in line with EU directive WEEE

Rohde & Schwarz has developed a disposal concept for the eco-friendly disposal or recycling of waste material. As a manufacturer, Rohde & Schwarz completely

fulfills its obligation to take back and dispose of electrical and electronic waste. Contact your local service representative to dispose of the product.

7 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, or follow this QR code:

Figure 7-1: QR code to the Rohde & Schwarz support page

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