

R&S®SZM Frequency Multiplier Manual



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Version 02

ROHDE & SCHWARZ

Make ideas real



This manual describes the following R&S®SZM models and their options:

- Frequency Multiplier 50 GHz to 75 GHz R&S®SZM75, 1443.5004.02
- Frequency Multiplier 60 GHz to 90 GHz R&S®SZM90, 1443.5104.02
- Frequency Multiplier 75 GHz to 110 GHz R&S®SZM110, 1443.5204.02
- Frequency Multiplier 90 GHz to 140 GHz R&S®SZM140, 1443.5304.02
- Frequency Multiplier 110 GHz to 170 GHz R&S®SZM170, 1443.5404.02

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

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1 Safety information (multilingual)

This option or accessory is designed for a specific Rohde & Schwarz product. Multilingual safety information is delivered with the product. Follow the provided installation instructions.

Esta opción o este accesorio están diseñados para un producto Rohde & Schwarz concreto. El producto va acompañado de información de seguridad en varios idiomas. Siga las instrucciones de instalación puestas a disposición.

Diese Option oder dieses Zubehör ist für ein bestimmtes Rohde & Schwarz Produkt vorgesehen. Mit dem Produkt werden mehrsprachige Sicherheitsinformationen geliefert. Befolgen Sie die mitgelieferten Installationsanweisungen.

Cette option ou cet accessoire est conçu pour un produit Rohde & Schwarz spécifique. Des informations de sécurité multilingues sont fournies avec le produit. Suivez les instructions d'installation fournies.

Questa funzione opzionale o accessoria è progettata per un prodotto Rohde & Schwarz specifico. Con il prodotto sono fornite informazioni sulla sicurezza in formato multilingue. Seguire le istruzioni di installazione allegate.

Esta(e) opção ou acessório foi concebida(o) para um produto específico da Rohde & Schwarz. Serão fornecidas informações de segurança multilingues com o produto. Siga as instruções de instalação fornecidas.

Αυτή η προαιρετική επιλογή ή εξάρτημα έχει σχεδιαστεί για συγκεκριμένο προϊόν Rohde & Schwarz. Μαζί με το προϊόν παρέχονται πληροφορίες ασφαλείας σε πολλές γλώσσες. Ακολουθήστε τις παρεχόμενες οδηγίες εγκατάστασης.

Din l-għażla jew aċċessorju huma mfassla għal prodott Rohde & Schwarz speċifiku. L-informazzjoni multilingwi dwar is-sikurezza hija pprovduta mal-prodott. Segwi l-istruzzjonijiet ipprovduti għall-installazzjoni.

Deze optie of dit accessoire is ontwikkeld voor een specifiek product van Rohde & Schwarz. Het product wordt geleverd met veiligheidsinformatie in meerdere talen. Volg de meegeleverde installatie-instructies.

Denne mulighed eller tilbehørsdel er designet til et specifikt Rohde & Schwarz produkt. En flersproget sikkerhedsanvisning leveres sammen med produktet. Følg de medfølgende installationsanvisninger.

Detta tillval eller tillbehör är avsett för en särskild produkt från Rohde & Schwarz. Säkerhetsinformation på flera språk medföljer produkten. Följ de medföljande installationsanvisningarna.

Tämä vaihtoehto tai lisävaruste on suunniteltu tietyille Rohde & Schwarz -yrityksen tuotteelle. Tuotteen mukana on toimitettu monikieliset turvallisuusohjeet. Noudata annettuja asennusohjeita.

Dette alternativet eller ekstrautstyret er utformet for et spesifikt Rohde & Schwarz produkt. Flerspråklig sikkerhetsinformasjon leveres med produktet. Overhold installasjonsveiledningen som følger med.

See valik või lisaseade on mõeldud konkreetsele Rohde & Schwarz tootele. Tooteaga on kaasas mitmekeelne ohutusteave. Järgige kaasasolevaid paigaldusjuhiseid.

Šī opcija vai piederums ir izstrādāts īpaši Rohde & Schwarz produktam. Produktam pievienota drošības informācija vairākās valodās. Ievērojiet sniegtos uzstādīšanas norādījumus.

Ši parinktis ar priedas skirti konkrečiam Rohde & Schwarz gaminiui. Su gaminiu pateikiama saugos informacijos keliomis kalbomis. Laikykitės pateikiamų montavimo nurodymų.

Þessi auka- eða fylgibúnaður er hannaður fyrir tiltekna Rohde & Schwarz vöru. Öryggisupplýsingar á mörgum tungumálum fylgja með vörunni. Fylgið meðfylgjandi uppsetningarleiðbeiningum.

Tá an rogha nó an oiriúint seo ceaptha le haghaidh táirge Rohde & Schwarz sonrach. Cuirtear eolas sábháilteachta ilteangach ar fáil leis an táirge. Lean na treoracha suiteála a thugtar.

Эта опция или принадлежность предназначена для конкретного продукта Rohde & Schwarz. В комплект поставки продукта входят инструкции по технике безопасности на нескольких языках. Соблюдайте прилагаемые инструкции по установке.

Ця опція або приладдя призначені для конкретного виробу Rohde & Schwarz. Інструкції з техніки безпеки кількома мовами постачаються разом із виробом. Дотримуйтеся наданих інструкцій зі встановлення.

Ta opcja lub akcesorium jest przeznaczona do określonego produktu Rohde & Schwarz. Dostarczany produkt zawiera informacje w wielu językach dotyczące bezpieczeństwa. Należy postępować zgodnie z dostarczonymi instrukcjami instalacji.

Tato varianta nebo příslušenství je určeno pro konkrétní produkt Rohde & Schwarz. S produktem jsou dodávány vícejazyčné bezpečnostní informace. Řiďte se příloženými pokyny k instalaci.

Táto verzia alebo príslušenstvo je navrhnutá pre špecifický výrobok Rohde & Schwarz. S výrobkom sa dodávajú viacjazyčné bezpečnostné pokyny. Riadte sa dodanými pokynmi na inštaláciu.

Ta možnost ali dodatek je zasnovan za določen izdelek podjetja Rohde & Schwarz. Izdelku so priložena varnostna navodila v več jezikih. Upoštevajte priložena navodila za namestitvev.

Ezt a beállítást vagy tartozékot egy adott Rohde & Schwarz termékhez tervezték. A termékhez többnyelvű biztonsági információkat mellékelünk. Kövesse a mellékelt szerelési utasításokat.

Тази опция или аксесоар са проектирани за специфичен продукт на Rohde & Schwarz. Многоезикова информация за безопасност се доставя с продукта. Следвайте предоставените инструкции за монтаж.

Ova opcija ili oprema namijenjena je za određeni proizvod tvrtke Rohde & Schwarz. Uz proizvod su dostavljene sigurnosne napomene na više jezika. Pratite isporučene upute za ugradnju.

Ova opcija ili pribor je dizajniran za određeni Rohde & Schwarz proizvod. Proizvodu su priložene sigurnosne informacije na više jezika. Slijedite priložena uputstva za instalaciju.

Ova opcija ili dodatni pribor je projektovan za određeni Rohde & Schwarz proizvod. Bezbednosne informacije na više jezika se isporučuju uz proizvod. Sledite dostavljena uputstva za instalaciju.

Această opțiune sau acest accesoriu a fost conceput pentru un produs specific Rohde & Schwarz. Informațiile multilingve privind siguranța sunt livrate împreună cu produsul. Urmați instrucțiunile de instalare furnizate.

Ky opsion ose aksesori është krijuar për një produkt specifik Rohde & Schwarz. Bashkë me produktin jepen edhe informacionet e sigurisë në shumë gjuhë. Ndiqni udhëzimet e dhëna të instalimit.

Оваа опција или додаток се наменети за одреден производ на Rohde & Schwarz. Со производот се испорачани повеќејазични безбедносни упатства. Следете ги дадените упатства за инсталација.

Bu opsiyon veya aksesuar, belirli bir Rohde & Schwarz ürünü için tasarlanmıştır. Çok dilli güvenlik uyarıları ürünle birlikte teslim edilir. Size sağlanan kurulum talimatlarına uyun.

Şu opsiya ýa-da esbap Rohde & Schwarz anyk önüm üçin niýetlenilen. Dürli dil-däki howpsuzlyk barada maglumat önüm bilen bile üpjün edilyär. Üpjün edilen gurnama ugrukdymalaryny ýerine ýetiriň.

इस विकल्प या एक्सेसरी को एक विशेष Rohde & Schwarz उत्पाद के लिए डिज़ाइन किया गया है. उत्पाद के साथ बहुभाषी सुरक्षा जानकारी दी जाती है. प्रदान किए गए इंस्टालेशन अनुदेशों का पालन करें.

本选项或附件专门设计用于特定的 Rohde & Schwarz 产品。产品随附多种语言版本的安全资讯。谨遵文件中的安装说明。

本オプションアクセサリは、特定の Rohde & Schwarz 製品向けに設計されています。多言語で記載された安全情報が製品に付属します。付属のインストール手順に従ってください。

이 옵션 또는 액세서리는 특정 Rohde & Schwarz 제품용으로 설계되었습니다. 제품과 함께 다국어로 작성된 안전 정보가 제공됩니다. 함께 제공된 설치 지침을 따르십시오.

本選配或配件專門設計用於特定的 Rohde & Schwarz 產品。產品隨附多種語言版本的安全資訊。遵守文件中的安裝說明。

Tùy chọn hoặc phụ kiện này dành riêng cho một sản phẩm Rohde & Schwarz cụ thể. Thông tin an toàn đa ngôn ngữ được cung cấp kèm theo sản phẩm. Thực hiện theo hướng dẫn lắp đặt kèm theo.

ตัวเลือกหรืออุปกรณ์เสริมนี้ออกแบบมาสำหรับผลิตภัณฑ์ Rohde & Schwarz โดยเฉพาะ โดยจะมีการจัดส่งข้อมูลด้านความปลอดภัยหลายภาษามาให้พร้อมกับผลิตภัณฑ์ ปฏิบัติตามคำแนะนำในการติดตั้งที่ให้ไว้

Pilihan atau aksesori ini direka bentuk untuk produk Rohde & Schwarz yang tertentu. Maklumat keselamatan berbilang bahasa disertakan bersama produk. Ikut arahan pemasangan yang diberikan.

Opsi atau aksesori ini dirancang untuk produk Rohde & Schwarz tertentu. Informasi keamanan dalam beberapa bahasa juga disertakan bersama produk. Ikuti petunjuk pemasangan yang disediakan.

Esta opción o este accesorio están diseñados para un producto Rohde & Schwarz en concreto. El producto va acompañado de información de seguridad en varios idiomas. Siga las instrucciones de instalación proporcionadas con el producto.

Esta opção ou acessório foi desenvolvido para um produto Rohde & Schwarz específico. Informações de segurança em vários idiomas acompanham o produto. Siga as instruções de instalação disponibilizadas.

אפשרות זו או האביזר מיועדים למוצר ספציפי של Rohde & Schwarz. מידע רב-לשוני בנושא בטיחות מצורף למוצר. יש לפעול בהתאם להנחיות ההתקנה המצורפות.

تم تصميم هذا الخيار أو الملحق لمنتج معين من منتجات Rohde & Schwarz. يتم تزويد معلومات السلامة متعددة اللغات مع المنتج. اتبع تعليمات التركيب الموضحة.

این قابلیت یا وسیله جانبی منحصراً برای محصول به خصوص Rohde & Schwarz طراحی شده است. اطلاعات ایمنی چندزبانه همراه این دستگاه ارائه شده است. دستور العمل‌های نصب ارائه شده را دنبال کنید.

اس اختیار یا حصے کو مخصوص Rohde & Schwarz پروڈکٹ کے لئے تیار کیا گیا ہے۔ پروڈکٹ کے ساتھ کثیر السانی زبانوں میں تحفظ کی معلومات فراہم کی جاتی ہیں۔ فراہم کردہ تنصیب کی ہدایات پر عمل کریں۔

2 About the R&S SZM

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

Intended use

The R&S SZM is a frequency multiplier, intended for use primarily with the analog signal generator R&S SMA100B.

The product is intended for industrial use, for example for production and conformance testing, maintenance and engineering laboratories. Use the product only for its designated purpose. Observe the operating conditions and performance limits stated in the data sheet before using the R&S SZM with any signal generator.

Target audience

This document targets at all users, including technicians, operators, administrators and maintenance personnel. The required skills and experience of the users depend on the test setup and application of the product.

Safety information in the documentation

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



The documentation helps you use the R&S SZM safely and efficiently. Keep the documentation nearby and offer it to other users.

2.1 Labels on R&S SZM

Labels on the casing inform about:

- Product and environment safety, see [Table 2-1](#)
- Identification information, see [Rear panel, page 26](#)
- Serial number, barcode and installed options are listed on the bottom plate of the R&S SZM.

Table 2-1: Labels regarding R&S SZM 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 service life. For more information, see " Disposing of electrical and electronic equipment " on page 30.
	Take care when handling electrostatic sensitive devices.

2.2 Warning messages in the documentation

A warning message points out a risk or danger that you need to be aware of. The signal word indicates the severity of the safety hazard and how likely it will occur if you do not follow the safety precautions.

NOTICE

Potential risks of damage. Could result in damage to the supported product or to other property.

2.3 Korea certification class B



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

3 Documentation overview

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

www.rohde-schwarz.com/manual/szm

3.1 Manual

This manual introduces the R&S SZM and describes how to set up and work with the product. It also provides information on maintenance, storage and disposal. A printed version is delivered with the product.

For information on how to configure and use the R&S SZM in setups with a Rohde & Schwarz signal generator, see the user manual of the signal generator.

3.2 Data sheet and brochure

The data sheet contains the technical specifications of the R&S SZM. It also lists the options and their order numbers.

The brochure provides an overview of the instrument and deals with the specific characteristics.

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

4 Welcome to the R&S SZM

New fields of application, such as vehicle distance radar or 5G and especially 6G, are creating a steadily growing market for applications high above 50 GHz.

The R&S SZM frequency multipliers expand the range of microwave systems implemented in a compact one-box solution, exceeding the upper frequency limits of classical microwave signal generators by far. You can operate the R&S SZM with the analog RF and microwave signal generator R&S SMA100B via USB. Connecting the R&S SZM to the R&S SMA100B via USB requires the option R&S SMAB-K554.

Key features

The R&S SZM Frequency Multiplier features:

- Frequency up-conversion, e.g., for vehicle distance radar or short-range communications
- USB plug & play like solution fully controlled by the analog signal generator R&S SMA100B
- mm-wave and μ m-wave frequencies from 75 GHz to 170 GHz
- Standard and high output power options (depending on the model)
- Installable options, depending on the basic R&S SZM and its configuration:

Internally installed:

- Mechanically controlled attenuator
- 1 or 2 electronically controlled attenuators
- High output power
- Isolator

Externally installed:

- Waveguide to waveguide adapter (TPA: test port adapter)

For details on possible configurations, see the data sheet. A short overview of available options is provided in [Table 4-1](#).

- Small size, easy usage and operation

Information on updates and extensions

R&S SZM Firmware and software updates as well as the release notes describing any improvements and modifications are provided on the internet at the download site of Rohde & Schwarz: www.rohde-schwarz.com/product/szm

In addition to the R&S SZM base instrument, the following options are available. For the specification of the R&S SZM, its options, order numbers and possible configurations, see the data sheet.

Table 4-1: Available options for the R&S SZM (short overview)

Frequency band and range (GHz)	R&S SZM75	R&S SZM90	R&S SZM110	R&S SZM140	R&S SZM170
	50-75	60-90	75-110	90-140	110-170
Mechanically controlled attenuator	R&S SZM-B75M	R&S SZM-B90M	R&S SZM-B110M	R&S SZM-B140M	R&S SZM-B170M
Electronically controlled attenuator	R&S SZM-B75E	R&S SZM-B90E	R&S SZM-B110E		
High power	R&S SZM-B75H	R&S SZM-B90H			
Test port adapter	R&S SZM-B75T	R&S SZM-B90T	R&S SZM-B110T	R&S SZM-B140T	R&S SZM-B170T
Isolator	R&S SZM-B75I	R&S SZM-B90I	R&S SZM-B110I	R&S SZM-B140I	R&S SZM-B170I

5 Preparing for use

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

5.1 Unpacking and checking

1. Unpack the R&S SZM carefully.
2. Retain the original packing material. Use it when transporting or shipping the R&S SZM 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.

5.2 Choosing the operating site

Specific operating conditions ensure proper operation and avoid damage to the R&S SZM and connected devices. For information on environmental conditions such as ambient temperature and humidity, see the data sheet.

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 data sheet.

- 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.

5.3 Setting up the R&S SZM

The R&S SZM is used exclusively in test setups with a signal generator, e.g. the R&S SMA100B.

To place the R&S SZM on a bench top

1. Place the R&S SZM on a stable, flat and level surface. Ensure that the surface can support the weight of the R&S SZM. For information on the weight, see the data sheet.
2. The top surface is not designed for stacking. If you want to stack the R&S SZM together with other products:
 - a) Follow the instructions given for the other products.
 - b) Place the R&S SZM on top.
3. **NOTICE!** Overheating can damage the product.
Prevent overheating as follows:
 - Keep a minimum distance of 3 cm between the fan openings at the side panels of the R&S SZM and any object in the vicinity.
 - Do not place the R&S SZM next to heat-generating equipment such as radiators or other instruments.
4. The R&S SZM provides 4 adjustable feet, which you can mount on all sides of the instrument. Adjust the screws of the feet to align the instrument horizontally, that is parallel to the benchtop.

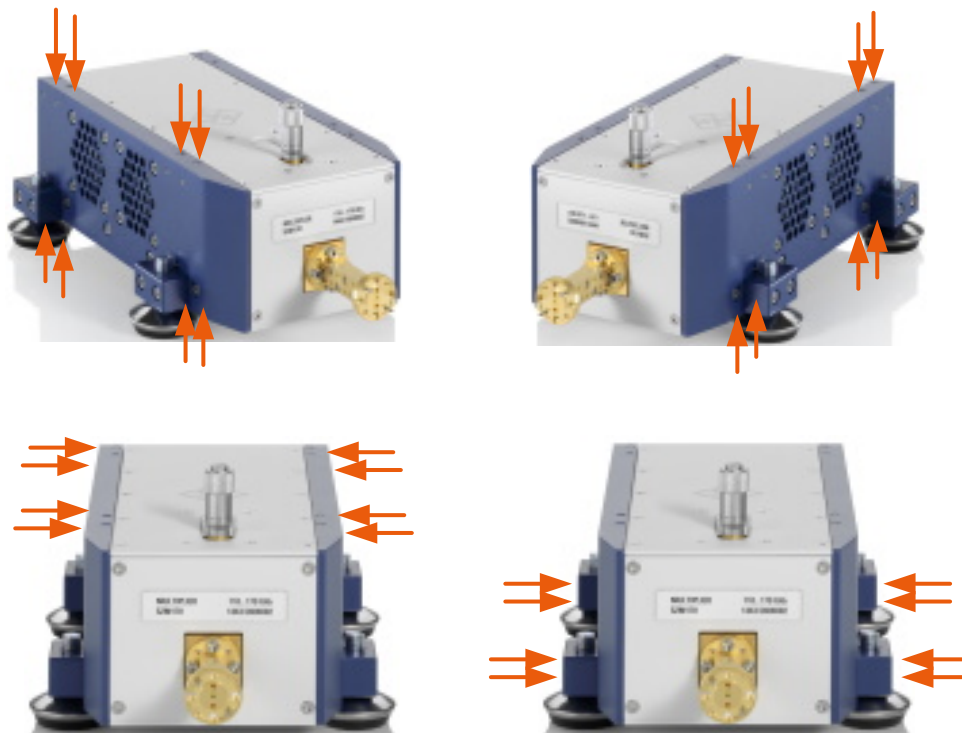


Figure 5-1: Positions for mounting the adjustable feet

Connect the R&S SZM to the other devices in the test setup as described in [Chapter 5.10, "Completing the test setup"](#), on page 21.

5.4 Considerations for test setup

Cable selection and electromagnetic interference (EMI)

Electromagnetic interference (EMI) can affect the measurement results.

To suppress electromagnetic radiation during operation:

- Use high-quality shielded cables for the following connector types:
 - SMA: RF cables that match this connector type.
See [Chapter 5.8, "Connecting to RF In"](#), on page 20.
 - USB: double-shielded USB cables. The length of passive USB cables must not exceed 1 m.
See [Chapter 5.7, "Connecting to USB"](#), on page 19
- 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 data sheet and on the instrument. Keep the signal levels within the specified ranges to avoid damage to the R&S SZM and connected devices.

Preventing electrostatic discharge (ESD)

Electrostatic discharge is most likely to occur when you connect or disconnect a DUT.

- ▶ **NOTICE!** Electrostatic discharge can damage the electronic components of the product and the device under test (DUT).

Ground yourself to prevent electrostatic discharge damage:

- a) Use a wrist strap and cord to connect yourself to ground.
- b) Use a conductive floor mat and heel strap combination.

5.5 Connecting to power

The power supply connector is located on the rear panel of the R&S SZM.

Only use the DC power cable and the DC power supply delivered with the R&S SZM. For information on the power supply, see the data sheet.

1. Connect the DC power cable to the socket of the power supply connector.
2. Connect the other end of the DC power cable to the DC power supply.

If the power switch is on, the R&S SZM starts automatically when you connect the DC power supply. On the rear panel of the R&S SZM, the "Power" LED switches to green. [Table 5-1](#) provides an overview on power states.

Table 5-1: Overview power states

LED	Position of power switch	Power state
● gray	[0]	Power Off
● green	[1]	Power On

Required ratings of the DC input level and maximum current are listed next to the socket and in the data sheet.

5.6 Switching on or off

The power switch is located on the rear panel of the R&S SZM.

Once connected to power, if the power switch is on, the R&S SZM starts automatically. If the R&S SZM is switched off but connected to power, you can switch on the R&S SZM manually.

To switch on the R&S SZM

The R&S SZM is off, but connected to power. The "Power" LED is gray. See [Table 5-1](#).

- ▶ On the rear panel of the R&S SZM, set the "Power" switch to position [I]. See [Chapter 6.2.2, "Main power switch"](#), on page 27.
The "Power" LED changes to green. The R&S SZM starts.

To switch off the R&S SZM

The R&S SZM is switched on.

- ▶ On the rear panel of the R&S SZM, set the "Power" switch to position [0]. See [Chapter 6.2.2, "Main power switch"](#), on page 27.
The "Power" LED changes to gray.

To disconnect from power

The R&S SZM is switched off.

- ▶ Disconnect the DC power cable from the socket of the power supply connector.

5.7 Connecting to USB

The "USB" connector is located on the rear panel of the R&S SZM.

- ▶ Connect the USB cable to the "USB" connector of the R&S SZM.

5.8 Connecting to RF In

The "RF In" connector is a 2.92 mm female connector. The connector is located on the rear panel of the R&S SZM.

Use an RF cable that matches the connector. See "[Cable selection and electromagnetic interference \(EMI\)](#)" on page 17.

To connect the RF cable with the connector

1. **NOTICE!** Excessive reverse power at the RF connector can damage the instrument.

Make sure that the signal power is within the limits as given in the data sheet.

2. **NOTICE!** DC voltage at the RF connector can damage the instrument. Never apply DC voltage to the RF input connectors.

Make sure that the values are within the DC limits given in the data sheet.

3. If your test setup has a DC component at the RF input, insert a DC blocker.
4. Align the connector of the cable with the "RF In" connector of the R&S SZM.
5. Carefully join the connectors so the pin of the device connector fits in the socket of the cable connector.

6. **NOTICE!** Excessive tightening can damage the connectors.

Torque the nut to the specified limit using a calibrated torque wrench. Hold the opposite connector part stationary with a spanner.

For applicable torque values, see the "Handling" chapter of the application note 1MA99:

<https://www.rohde-schwarz.com/appnote/1MA99>

5.9 Connecting to the DUT

The R&S SZM can be equipped with an optional test port adapter for the supported frequency band. The test port adapter is the interface to the DUT that provides the output of the multiplied RF frequency.

Completing the test setup

1. Optionally, but recommended: if the DUT has the required holes, insert additional alignment pins into the holes above and below the waveguide cross-section.
See also [Figure 6-2](#).
2. Align the connector of the DUT with the waveguide flange of the test port adapter on the R&S SZM.
3. Carefully join the connectors that the alignment pins of both connectors fit into the holes of the other connector.
4. **NOTICE!** Excessive tightening can damage the connectors.
Screw the nuts of the flange using the hex ball driver provided with the delivery.

5.10 Completing the test setup

The frequency multiplier R&S SZM operates properly only when connected to a signal generator that meets the requirements of the R&S SZM in terms of input power and input frequency range, e.g. a R&S SMA100B. The R&S SMA100B offers the advantage of controlling the R&S SZM via USB. This setup functions like a "one-box" solution. For using the control function via USB, the R&S SMAB-K554 multiplier control option must be installed on the R&S SMA100B.

To complete the R&S SZM test setup with a R&S SMA100B

1. Switch on the signal generator.
2. Switch on the R&S SZM.
Consider the warm-up time for the R&S SZM according to the data sheet to fulfill all specifications.
See also [Chapter 5.6, "Switching on or off"](#), on page 19.
3. Set up the control connection (USB) with the signal generator.
 - a) Connect the R&S SZM to the signal generator via the USB connector.
See also [Chapter 5.7, "Connecting to USB"](#), on page 19.
 - b) For information on how to establish the control connection, see the documentation of the signal generator.

Completing the test setup

A Rohde & Schwarz signal generator recognizes the R&S SZM automatically, and immediately turns off the RF output signal to protect the frequency multiplier from a high input level. The generator reads all parameters for identification and the calibration table of the frequency multiplier.

4. Connect the RF output of the signal generator to "RF In" of the R&S SZM. See also [Chapter 5.8, "Connecting to RF In"](#), on page 20.
5. Connect the R&S SZM to the DUT, e.g. by using the optional test port adapter. See also [Chapter 5.9, "Connecting to the DUT"](#), on page 20.

6. Switch on the RF output of the signal generator.

The power according to the data sheet is output, which is necessary for the proper function of the frequency multiplier.

The output power of the R&S SMA100B signal generator is not the power shown at the top right of its display. This power display distinguishes whether the frequency multiplier has no optional attenuator or is equipped with a mechanically or electronically controlled attenuator.

7. If necessary, compensate cable losses of the cable between the signal generator and the R&S SZM.

Consider cable losses between the signal generator and the DUT. These losses can be entered in a separate menu and considered accordingly.

The test setup is ready for operation.

To complete the R&S SZM test setup with a third-party signal generator

1. Switch on the signal generator.
Make sure that the RF output of the signal generator is OFF.
2. Switch on the R&S SZM.
Consider the warm-up time for the R&S SZM according to the data sheet to fulfill all specifications.
See also [Chapter 5.6, "Switching on or off"](#), on page 19.
3. Connect the RF output of the signal generator to "RF In" of the R&S SZM.
4. Connect the R&S SZM to the DUT, e.g. by using the optional test port adapter.
5. Set the RF output signal of the signal generator.
 - a) Set the RF output power of the signal generator to the value mentioned in the data sheet under "input power".
Consider cable losses between the signal generator and the DUT. If necessary, adjust the RF output power of the signal generator accordingly.

Completing the test setup

b) Set the frequency multiplying factor on the signal generator.

Note: You can set the RF output power of the R&S SZM only when the mechanically controlled attenuator option is installed. It is not possible to adjust the R&S SZM output power if no attenuator or the electronically controlled attenuator option is installed.

- R&S SZM with the mechanically controlled attenuator option:
You can find the setting values of the micrometer screw of the mechanically controlled attenuator option for a specific R&S SZM output power and frequency on a USB flash drive delivered with the option.
See [Chapter 6.1.1, "Output power adjustment screw"](#), on page 24.
- R&S SZM without the mechanically controlled attenuator option:
Measure the output level of the R&S SZM at the desired frequency. For level correction add external devices, e.g. attenuators, to your test setup.

6. Switch on the RF output of the signal generator.

The test setup is ready for operation.

6 Instrument tour

This chapter provides an overview of the control elements and connectors of the R&S SZM.

The meanings of the labels on the R&S SZM are described in [Chapter 2.1, "Labels on R&S SZM"](#), on page 10.

6.1 Front and top panel

This section provides an overview of the front and top panel elements of the R&S SZM.



Figure 6-1: R&S SZM front and top panel

- 1 = Output power adjustment screw
- 2 = Test port adapter (waveguide flange)


6.1.1 Output power adjustment screw



Most R&S SZM models can be equipped with a mechanically or electronically controlled attenuator (see data sheet for details). For the mechanically controlled attenuator, a micrometer screw is located on top of the casing. Using the screw you can modify the signal output power manually, depending on the current frequency. The scale on the screw is based on calibration data and supports you in adjusting the signal level.

Turning the screw clockwise reduces the output power, while turning the screw counter-clockwise increases the output power.

If the screw is turned out to the top position, maximum power is provided at the output of the R&S SZM. If the screw is turned in to the bottom position, minimum power is provided at the output of the R&S SZM.

 If you accidentally unscrew the knob completely, simply screw it on again. The power calibration remains valid.

6.1.2 Test port adapter (waveguide flange)

You can connect the DUT directly to the R&S SZM. To protect this output from mechanical damage, we recommend the use of a test port adapter (TPA). This TPA is optional available for all R&S SZM models.

The precision waveguide flange of the test port adapter is equipped with two alignment pins and two holes that receive the alignment pins of the device under test (DUT). You can use the two holes in the middle of the flange for additional pins to increase the accuracy and stability of the connection.

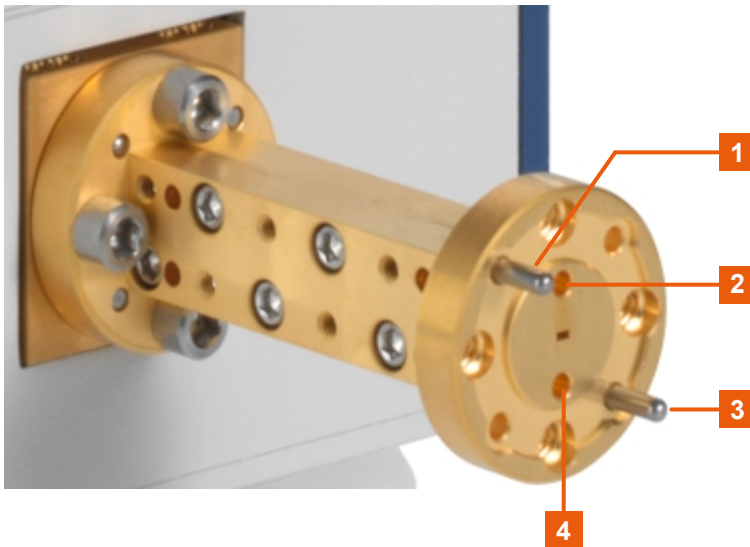


Figure 6-2: Assignment of the test port adapter

1, 3 = Alignment pin
2, 4 = Hole for IEEE alignment pin

The test port adapters are similar in design for all frequency bands. Refer to the data sheet for more details on the type of waveguide.

Connect the DUT to this test port adapter.

i A DUT with thin pins reduces the alignment and stability. If possible, use two additional pins above and below the waveguide cross-section to compensate for the reduced alignment.

Dismounting the test port adapter

If the R&S SZM is equipped with the optional test port adapter (TPA), you can dismount the TPA using a hex ball driver (accessory). Without the TPA, the calibration is no more valid (e.g. R&S SZM output power). Take this into account when connecting the DUT directly to the R&S SZM without the TPA in between.

6.2 Rear panel

This section provides an overview of the rear panel elements of the R&S SZM.

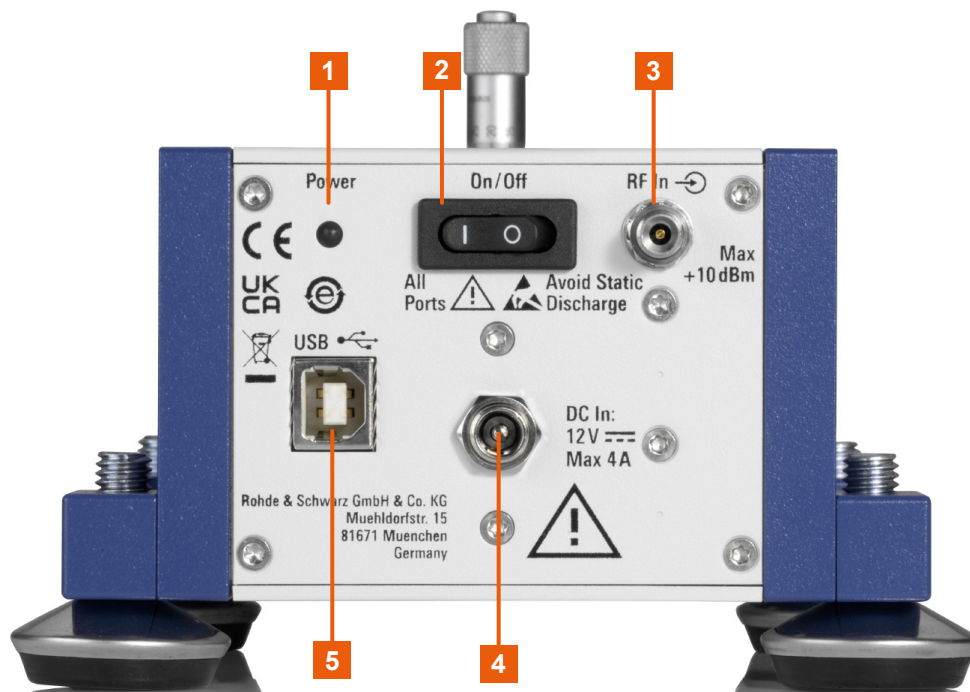


Figure 6-3: R&S SZM rear panel

- 1 = Power LED
- 2 = Main power switch
- 3 = RF In connector
- 4 = Power supply connector
- 5 = USB connector

6.2.1 Power LED

Status LED to indicate the power state, see [Table 5-1](#).

6.2.2 Main power switch

The main power switch is located on the rear panel of the instrument.

- Position 1: The R&S SZM is switched on.
- Position O: The R&S SZM is switched off.

For details, refer to [Chapter 5.5, "Connecting to power"](#), on page 18.

6.2.3 RF In connector

2.92 mm coaxial connector with an impedance of 50 Ω for RF signal input.

Connect the signal generator or any other device providing the RF input signal to the "RF In" connector on the R&S SZM. Use a cable equipped with an appropriate connector.

Do not overload the input. The value for maximum input power is indicated next to the "RF In" connector or see the data sheet. See also [Chapter 5.4, "Considerations for test setup"](#), on page 17.

How to: [Chapter 5.8, "Connecting to RF In"](#), on page 20.

6.2.4 Power supply connector

Main power supply connector for the external DC power supply. Use only the DC power adapter provided with the R&S SZM to connect the instrument to an AC power supply. The supported voltage is indicated on the instrument, next to the connector.

How to: [Chapter 5.5, "Connecting to power"](#), on page 18.

6.2.5 USB connector

Type-B USB 2.0 input connector for control functions by the signal generator.

How to: [Chapter 5.7, "Connecting to USB"](#), on page 19.

7 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 R&S SZM in a vehicle or using transporting equipment, make sure that the R&S SZM is properly secured. Only use items intended for securing objects.

Transport altitude

Unless otherwise specified in the data sheet, the maximum transport altitude without pressure compensation is 4500 m above sea level.

8 Maintenance, storage and disposal

The product does not require regular maintenance. It only requires occasional cleaning. It is however advisable to check the nominal data from time to time.

8.1 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.

8.2 Storage

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

8.3 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 8-1: 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.

9 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 9-1: QR code to the Rohde & Schwarz support page

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