

R&S®FSVA3000 / R&S®FSV3000

Signal & Spectrum Analyzer

Service Manual



1346573302
Version 01

ROHDE & SCHWARZ
Make ideas real



This manual applies to the following R&S®FSV3000 and R&S®FSVA3000 models with firmware version 1.10 and higher:

- R&S®FSV3004 (1330.5000K04)
- R&S®FSV3007 (1330.5000K07)
- R&S®FSV3013 (1330.5000K13)
- R&S®FSV3030 (1330.5000K30)
- R&S®FSV3044 (1330.5000K43)
- R&S®FSVA3004 (1330.5000K05)
- R&S®FSVA3007 (1330.5000K08)
- R&S®FSVA3013 (1330.5000K14)
- R&S®FSVA3030 (1330.5000K31)
- R&S®FSVA3044 (1330.5000K44)

In addition to the base unit, the following options are described:

- R&S®FSV3-B3, Audio Demodulator (1330.3765.02)
- R&S®FSV3-B4, OCXO frequency reference (1330.3794.02)
- R&S®FSV3-B5, Additional Interfaces (1330.3365.02/1330.3407.02)
- R&S®FSV3-B6, 10Gbit/s LAN interface (1330.3913.02)
- R&S®FSV3-B10, External generator control (1330.3859.02)
- R&S®FSV3-B11, YIG preselector bypass (1330.3865.02)
- R&S®FSV3-B21, Connections ext. mixers (1330.4010.02)
- R&S®FSV3-B24, Preamplifier (1330.4049.XX)
- R&S®FSV3-B25, Electronic attenuator (1330.4078.02)
- R&S®FSV3-B114, enhanced computing power (1330.4910.02)
- R&S®FSV3-B200, 200 MHz analysis bandwidth (1330.4132.02)
- R&S®FSV3-B400, 400 MHz analysis bandwidth (1330.7154.02)
- R&S®FSV3-B710, Enhanced performance (1346.4950.XX)
- R&S®FSV3-B1000, 1000 MHz analysis bandwidth (1346.3699.02)

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Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol, e.g. R&S®FSV3000 is indicated as R&S FSV3000, R&S®FSVA3000 is indicated as R&S FSVA3000. R&S®FSVA/FSV refers to both the R&S FSV3000 and the R&S FSVA3000.

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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 chapters.

Intended use

The product is intended for the development, production and verification of electronic components and devices in industrial, administrative, and laboratory environments. Use the product only for its designated purpose. Observe the operating conditions and performance limits stated in the data sheet.

Target audience

Users: trained customer

Maintenance personnel: electrically trained customer maintenance persons

Service personnel: qualified employees

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 Chapter [Chapter 1.1, "Safety Instructions"](#), on page 5. The same information is provided in many languages as printed "Safety Instructions". The printed "Safety Instructions" 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 data sheet, manuals and the printed "Safety Instructions". If you are unsure about the appropriate use, contact Rohde & Schwarz customer service.

Using the product requires specialists 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.

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 dam-

aged or broken, stop using the product. Contact Rohde & Schwarz customer service at <http://www.customersupport.rohde-schwarz.com>.

Lifting and carrying the product

The product is heavy. Do not move or carry the product by yourself. A single person can only carry a maximum of 18 kg safely depending on age, gender and physical condition. Look up the maximum weight in the data sheet. Use the product handles to move or carry the product. Do not lift by the accessories mounted on the product. Accessories are not designed to carry the weight of the product.

To move the product safely, you can use lifting or transporting equipment such as lift trucks and forklifts. Follow the instructions provided by the equipment manufacturer.

Choosing the operating site

Only use the product indoors. The product casing is not waterproof. Water that enters can electrically connect the casing with live parts, which can lead to electric shock, serious personal injury or death if you touch the casing. If Rohde & Schwarz provides accessories designed for your product, e.g. a carrying bag, you can use the product outdoors.

Unless otherwise specified, you can operate the product up to an altitude of 2000 m above sea level. The product is suitable for pollution degree 2 environments where nonconductive contamination can occur. For more information on environmental conditions such as ambient temperature and humidity, see the data sheet.

Setting up the product

Always place the product on a stable, flat and level surface with the bottom of the product facing down. If the product is designed for different positions, secure the product so that it cannot fall over.

If the product has foldable feet, always fold the feet completely in or out to ensure stability. The feet can collapse if they are not folded out completely or if the product is moved without lifting it. The foldable feet are designed to carry the weight of the product, but not an extra load.

If stacking is possible, keep in mind that a stack of products can fall over and cause injury.

If you mount products in a rack, ensure that the rack has sufficient load capacity and stability. Observe the specifications of the rack manufacturer. Always install the products from the bottom shelf to the top shelf so that the rack stands securely. Secure the product so that it cannot fall off the rack.

Connecting to power

The product is an overvoltage category II product. Connect the product to a fixed installation used to supply energy-consuming equipment such as household appliances and similar loads. Keep in mind that electrically powered products have risks, such as electric shock, fire, personal injury or even death.

Take the following measures for your safety:

- Before switching on the product, ensure that the voltage and frequency indicated on the product match the available power source. If the power adapter does not adjust automatically, set the correct value and check the rating of the fuse.
- If a product has an exchangeable fuse, its type and characteristics are indicated next to the fuse holder. Before changing the fuse, switch off the instrument and disconnect it from the power source. How to change the fuse is described in the product documentation.
- Only use the power cable delivered with the product. It complies with country-specific safety requirements. Only insert the plug into an outlet with protective conductor terminal.
- Only use intact cables and route them carefully so that they cannot be damaged. Check the power cables regularly to ensure that they are undamaged. Also ensure that nobody can trip over loose cables.
- If the product needs an external power supply, use the power supply that is delivered with the product or that is recommended in the product documentation or a power supply that conforms to the country-specific regulations.
- Only connect the product to a power source with a fuse protection of maximum 20 A.
- Ensure that you can disconnect the product from the power source at any time. Pull the power plug to disconnect the product. The power plug must be easily accessible. If the product is integrated into a system that does not meet these requirements, provide an easily accessible circuit breaker at the system level.

Connecting headphones

Take the following measures to prevent hearing damage. Before using headphones, check the volume and reduce it if necessary. If you monitor varying signal levels, take off the headphones and wait until the signal has settled. Then adjust the volume.

Cleaning the product

Use a dry, lint-free cloth to clean the product. When cleaning, keep in mind that the casing is not waterproof. Do not use liquid cleaning agents.

Meaning of safety labels

Safety labels on the product warn against potential hazards.

	Potential hazard Read the product documentation to avoid personal injury or product damage.
	Heavy product Be careful when lifting, moving or carrying the product. Carrying the product requires a sufficient number of persons or transport equipment.
	Electrical hazard Indicates live parts. Risk of electric shock, fire, personal injury or even death.

	Hot surface Do not touch. Risk of skin burns. Risk of fire.
	Protective conductor terminal Connect this terminal to a grounded external conductor or to protective ground. This connection protects you against electric shock if an electric problem occurs.
	Warning: laser beam The product contains a laser.
	Avoid exposure to direct or reflected laser beam.

1.2 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.

WARNING

Potentially hazardous situation. Could result in death or serious injury if not avoided.

CAUTION

Potentially hazardous situation. Could result in minor or moderate injury if not avoided.

NOTICE

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

1.3 Korea Certification Class A



이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

2 Introduction

The purpose of R&S FSVA/FSV Signal and Spectrum Analyzer service manual is to locate a fault quickly and ensure a successful performance test and maintenance.

2.1 Abbreviations

EEPROM	Electrically erasable programmable read only memory
ESD	Electrostatic sensitive devices
RF-cable	High-Frequency cable
HW	Hardware
IP address	Internet protocol address
LAN	Local Area Network
MB	Main board
PC	Personal computer
SW	Software
RF	Radio frequency
UCS	Universal calibration system
USB	Universal serial bus

2.2 Necessary Documents

Table 2-1: Related documentations to R&S FSVA/FSV

No.	Description	Material no.
1	R&S FSV3000 / R&S FSVA3000 Signal & Spectrum Analyzer user manual (actual delivered user manual)	1178.8520.02
2	R&S FSV3000 Signal & Spectrum Analyzer data sheet	https://www.rohde-schwarz.com/de/broschuere-datenblatt/fsv3000/
3	R&S FSVA3000 Signal & Spectrum Analyzer data sheet	https://www.rohde-schwarz.com/de/broschuere-datenblatt/fsva3000/
4	Basic Safety Instructions	1171.1788.99

3 Performance Test

3.1 Test Equipment

The following instruments and accessories are used for the performance test.

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
1	Signal generator	R&S FSVA3004/R&S FSV3004, R&S FSVA3007/R&S FSV3007, R&S FSVA3013/R&S FSV3013: 10 Hz to 13.5 GHz R&S FSVA3030/R&S FSV3030: 10 Hz to 30 GHz R&S FSVA3044/R&S FSV3044: 10 Hz to 43.5 GHz	R&S SMA100B (40/50/67 GHz) or R&S SMF or R&S SMB100A	1419.8888K02 1167.0000K02 1405.6002.02	Reference frequency uncertainty, Display linearity, Immunity to interference, Frequency response
2	Signal generator	R&S FSVA3004/R&S FSV3004, R&S FSVA3007/R&S FSV3007, R&S FSVA3013/R&S FSV3013: 10 MHz to 15 GHz R&S FSVA3030/R&S FSV3030: 10 MHz to 30 GHz R&S FSVA3044/R&S FSV3044: 10 MHz to 40 GHz	R&S SMA100B (40 GHz) or R&S SMF or R&S SMB100A	1419.8888K02 1167.0000K02 1405.6002.02	Nonlinearities
3	Power splitter 2-resistor design	DC to 3.6 GHz equivalent output SWR DC to 3.6 GHz < 1.1 level imbalance ≤ 0.1 dB	Weinschel Model 1870A		Frequency response

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
4	Power splitter 2-resistor design	R&S FSVA3004/R&S FSV3004, R&S FSVA3007/R&S FSV3007: DC to 8 GHz R&S FSVA3044/R&S FSV3044: DC to 14 GHz R&S FSVA3030/R&S FSV3030: DC to 30 GHz R&S FSVA3044/R&S FSV3044: DC to 44 GHz level imbalance DC to 26.5 GHz: ≤ 0.3 dB 26.5 GHz to 43.5 GHz: ≤ 0.5 dB equivalent output SWR DC to 26.5 GHz: ≤ 1.3 26.5 GHz to 43.5 GHz: ≤ 1.7	Weinschel Model 1534 Anritsu V241 R&S	3566.5562.00 1337.0003.02	Frequency response Third order intercept
5	50-Ohm termination	Frequency Range from DC to the maximum Frequency of the R&S FSVA3000/R&S FSV3000	Anritsu 28S50		Noise display
6	Power meter	Power meter user interface	R&S NRP R&S NRX	1143.8500.02 1424.7005.02	Frequency response
7	Power sensor	R&S FSVA3004/R&S FSV3004, R&S FSVA3007/R&S FSV3007: 9 kHz to 7.5 GHz	R&S NRP-18A	1424.6815K02	Frequency response
8	Power sensor	R&S FSVA3004/R&S FSV3004, R&S FSVA3007/R&S FSV3007, R&S FSVA3013/R&S FSV3013: 10 MHz to 18 GHz R&S FSVA3030/R&S FSV3030: 10 MHz to 30 GHz R&S FSVA3044/R&S FSV3044: 10 MHz to 43.5 GHz	R&S NRP18A R&S NRP18S R&S NRP33S R&S NRP50S	1424.6815K02 1419.0029K02 1419.0064K02 5037.5743.00	Frequency response
9	Step attenuator	variable attenuation 0 dB to 80 dB, 1-dB steps attenuation uncertainty < 0.1 dB ($f = 128$ MHz)	R&S RSC	1313.8004.04	Nonlinearity of displayed level
10	Fixed Attenuator (2 units)	fixed attenuation 10 dB	Anritsu 43KC-10		Nonlinearities

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
11	Network analyzer	R&S FSVA3004/R&S FSV3004, R&S FSVA3007/R&S FSV3007: 10 MHz to 7.5 GHz R&S FSVA3013/R&S FSV3013: 10 MHz to 14 GHz R&S FSVA3030/R&S FSV3030: 10 MHz to 30 GHz R&S FSVA3044/R&S FSV3044: 10 MHz to 40 GHz	R&S ZNB40		VSWR
12	Voltmeter	2 Hz to 30 MHz	Keysight 34465A	5017.3174.00	B3, B5, Probe Power
13	50Ω termination	BNC, 50 Ω ± 0.1 %	RAD 50	0844.9352.02	frequency response
16	Phase noise Standard 1 GHz or 640 MHz	< -105 dBc/Hz @ 100 Hz < -130 dBc/Hz @ 1 kHz < -140 dBc/Hz @ 10 kHz < -150 dBc/Hz @ 100 kHz < -150 dBc/Hz @ 1 MHz	R&S SMA100B SPREF R&S FSU-B5	1419.8888K02	Phase noise
100	Lowpass filter set	9 MHz, -30 dB@18 MHz 21 MHz, -30dB@42 MHz 106 MHz, -30dB@212 MHz 274 MHz, -30 dB@548 MHz 450 MHz, -30 dB@900 MHz 1 GHz, -30 dB@1,4 GHz 1.75 GHz, -30dB@3 GHz 3.5 GHz, -30dB@7 GHz			2nd order harmonic distortion
104	Active Probe	RTO Probes	All RT-Zxxx Probes suitable		B71 Probe Detection

3.2 Performance Test Instructions - Instrument

The following sections describe the performance test sequences in detail.

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Definitions

R&S FSVA3000 models are abbreviated as R&S FSVA.

R&S FSV3000 models are abbreviated as R&S FSV.

Options are named R&S FSV3-Kxx, R&S FSV3-Bxx or R&S FSV3-Uxx for both R&S FSVA and R&S FSV.

The maximum frequency of the R&S FSVA/FSV is denoted by $f_{\max}$. The table below shows the maximum frequencies for the different models:

R&S FSVA3004, R&S FSV3004	$f_{\max} = 4 \text{ GHz}$
R&S FSVA3007, R&S FSV3007	$f_{\max} = 7.5 \text{ GHz}$
R&S FSVA3013, R&S FSVA3013	$f_{\max} = 13.6 \text{ GHz}$
R&S FSVA3030, R&S FSV3030	$f_{\max} = 30.0 \text{ GHz}$
R&S FSVA3044, R&S FSV3044	$f_{\max} = 44 \text{ GHz}$

All test instructions for R&S FSV3004, R&S FSV3007, R&S FSV3013, R&S FSV3030, R&S FSV3044 apply also for R&S FSVA3004, R&S FSVA3007, R&S FSVA3013, R&S FSVA3030, R&S FSVA3044.

3.2.1 Basic Tests

Run selftest

1. [**PRESET**]
2. [***TST?**]

3.2.2 Checking the Reference Frequency Uncertainty

Test equipment Signal generator (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 1):

Frequency	e.g., 1000 MHz
Level	-20 dBm
Frequency uncertainty	$< 1 \times 10^{-9}$

If the frequency uncertainty of the test transmitter is insufficient, the transmitter can be set to the correct frequency with the aid of the frequency counter prior to the measurement.

Test setup ► Connect the RF output of the signal generator to the RF input of the R&S FSVA/FSV.

Signal generator settings Frequency: 1000 MHz
Level: -20 dBm

R&S FSVA/FSV settings

1. [**PRESET**]
2. [**SETUP** : REFERENCE INT]
 - Switch to the internal reference source.
3. [**FREQ** : CENTER : **1 GHz**]
4. [**SPAN** : **1 MHz**]
5. [**BW** : RES BW MANUAL : **300 kHz**]
6. [**AMPT** : REF Level : **-8 dBm**]



Before the following measurement, the R&S FSVA/FSV must be on for at least 10 minutes with the internal reference, so that the reference oscillator is warmed up.

Measurement

Switch marker frequency count:

- [**MKR** : SIGNAL COUNT]

Set the appropriate resolution:

- [**MKR** : **NEXT** : CNT RESOL 1 Hz]

Model without R&S FSV3-B4	1 GHz $\pm$ 1 kHz (corresponds to 1E-6)
Model with R&S FSV3-B4	1 GHz $\pm$ 100 Hz (corresponds 1E-7)

3.2.3 Checking Immunity to Interference

Test equipment Signal generator (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 1).

1. Connect the RF output of the signal generator to the RF input.
2. Connect the 10 MHz reference output of the signal generator to the Ref In 1 input of the R&S FSVA/FSV.

R&S FSVA/FSV settings

1. [**PRESET**]
2. [**SETUP** : REFERENCE EXT]
 - Switch to the external reference source at Ref In 1 input
 - Set the reference frequency to 10 MHz
 - Set the loop bandwidth to 0.3 Hz
3. [**AMPT** : RF ATTEN MANUAL : **0 dB**]

4. [**AMPT** : REF Level : **-30 dB**]
5. [**SPAN** : **5 MHz**]
6. [**BW** : RES BW MANUAL : **100 kHz**]
7. [**SENS** : SWE : OPT SPE]

3.2.3.1 Second IF Image Frequency Rejection

Signal generator settings	Frequency: $f_{IN} + 2 \times 732 \text{ MHz}$ Level: adjust the output level of signal generator for an RF-Input level of $P_{IN} = 5 \text{ dBm} \pm 3 \text{ dB}$
Additional R&S FSVA/FSV settings	[FREQ : CENTER : $\{f_{IN}\}$]
Test frequencies	R&S FSVA3004/R&S FSV3004, R&S FSVA3007/R&S FSV3007: $f_{IN} = 1 \text{ GHz}$ R&S FSVA3013/R&S FSV3013, R&S FSVA3030/R&S FSV3030, R&S FSVA3044/R&S FSV3044: $f_{IN} = 1 \text{ GHz}, f_{IN} = 8 \text{ GHz}$
Measurement	► Set marker to peak of signal [MKR ⇒: PEAK]
Evaluation	The image frequency rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}): Image frequency rejection = $P_{IN} - L_{dis}$

3.2.3.2 Third IF Image Frequency Rejection

Signal generator settings	Frequency: $f_{in} + 2 \times 92 \text{ MHz}$ Level: adjust the output level of signal generator for an RF-Input level of $P_{IN} = 6 \text{ dBm} \pm 3 \text{ dB}$
Additional R&S FSVA/FSV settings	[FREQ : CENTER : $\{f_{in}\}$]
Test frequencies	R&S FSVA3004/R&S FSV3004, R&S FSVA3007/R&S FSV3007:

$f_{in} = 63 \text{ MHz}, 100 \text{ MHz}, 900 \text{ MHz}, 1100 \text{ MHz}$

R&S FSVA3013/R&S FSV3013,
R&S FSVA3030/R&S FSV3030,
R&S FSVA3044/R&S FSV3044:
Additional 7990 MHz

Measurement ► Set marker to peak of signal

- [**MKR** ⇒: PEAK]

Evaluation The image frequency rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

Image frequency rejection = $P_{IN} - L_{dis}$

3.2.3.3 First IF Rejection

Signal generator settings

- 1st IF Frequency (IF1 = 8796 MHz and 8892 MHz)
- Level: adjust the output level of signal generator for an RF-Input level of $P_{IN} = 6 \text{ dBm} \pm 3 \text{ dB}$

Additional R&S FSVA/FSV settings

- [**FREQ** : CENTER : { f_{IN} }]

Test frequencies R&S FSVA3004/R&S FSV3004:

$f_{IN} = 3000 \text{ MHz}, 3990 \text{ MHz}, \text{generator at } 8796 \text{ MHz}$

$f_{IN} = 3000 \text{ MHz}, 3990 \text{ MHz}, \text{generator at } 8892 \text{ MHz}$

R&S FSVA3007/R&S FSV3007,
R&S FSVA3013/R&S FSV3013,
R&S FSVA3030/R&S FSV3030,
R&S FSVA3044/R&S FSV3044:

$f_{IN} = 3000 \text{ to } 7490 \text{ MHz in } 1000 \text{ MHz Steps, generator at } 8796 \text{ MHz}$

$f_{IN} = 3000 \text{ to } 7490 \text{ MHz in } 1000 \text{ MHz Steps, generator at } 8892 \text{ MHz}$

Measurement ► Set marker to peak of signal

- [**MKR** ⇒: PEAK]

Evaluation The IF rejection is the difference between the input level of the generator signal and the level reading of marker 1 (L_{dis}):

$$\text{IF rejection} = P_{\text{IN}} - L_{\text{dis}}$$

3.2.3.4 Second IF Rejection

Additional signal generator settings	- Frequency 732 MHz - Level: adjust the output level of the signal generator for an RF-Input level of $P_{\text{IN}} = 0 \text{ dBm} \pm 3 \text{ dB}$
Additional R&S FSVA/FSV settings	[FREQ : CENTER : {f_{in}}]
Test frequencies	1100 MHz, 3500 MHz, R&S FSVA3007/R&S FSV3007: additional at 7.49 GHz R&S FSVA3013/R&S FSV3013: additional at 7.49 GHz, 9 GHz, 12 GHz R&S FSVA3030/R&S FSV3030: additional at 7.49 GHz, 9 GHz, 12 GHz, 25 GHz R&S FSVA3044/R&S FSV3044: additional at 7.49 GHz, 9 GHz, 12 GHz, 25 GHz, 38 GHz
Measurement	► Set marker to peak of signal [MKR ⇒: PEAK]
Evaluation	The IF rejection is the difference between the input level of the generator signal and the level reading of marker 1 (L_{dis}): $\text{IF rejection} = P_{\text{IN}} - L_{\text{dis}}$

3.2.3.5 Third IF Rejection

Additional signal generator settings	Frequency: 92 MHz Level: adjust the output level of signal generator for an RF-Input level of $P_{\text{IN}} = 0 \text{ dBm} \pm 3 \text{ dB}$
Additional R&S FSVA/FSV settings	[FREQ : CENTER : {f_{in}}]
Test frequencies	R&S FSVA3007/R&S FSV3007: additional at 7.49 GHz R&S FSVA3013/R&S FSV3013: additional at 7.49 GHz, 9 GHz, 12 GHz R&S FSVA3030/R&S FSV3030: additional at 7.49 GHz, 9 GHz, 12 GHz, 25 GHz R&S FSVA3044/R&S FSV3044: additional at 7.49 GHz, 9 GHz, 12 GHz, 25 GHz, 38 GHz
Measurement	► Set marker to peak of signal [MKR ⇒: PEAK]

Evaluation The IF rejection is the difference between the input level of the generator signal and the level reading of marker 1 (L_{dis}):

$$\text{IF rejection} = P_{IN} - L_{dis}$$

3.2.4 Checking Nonlinearities

3.2.4.1 Third-Order Intercept Point (TOI)

- | | |
|---|--|
| Test equipment | <ul style="list-style-type: none"> Two signal generators (see Chapter 3.1, "Test Equipment", on page 10, item 1 and 2) Power splitter/combiner (see Chapter 3.1, "Test Equipment", on page 10, item 4) |
| Test setup | <ol style="list-style-type: none"> 1. Connect the RF outputs of the signal generators to the inputs of the combiner. 2. Connect output of the combiner to the RF input of the R&S FSVA/FSV. 3. Synchronize the signal generators by means of the external reference functions. 4. Connect the 10 MHz reference output of the signal generator 1 to the Ref In 1 input of the R&S FSVA/FSV. |
| Signal generator settings (both generators) | <p>Frequency:</p> <p>generator 1 $f_{g1} = f_{in} - 500 \text{ kHz}$</p> <p>generator 2 $f_{g2} = f_{in} + 500 \text{ kHz}$</p> <p>Adjust the output level of the signal generators for an input level at the R&S FSVA/FSV of</p> <ul style="list-style-type: none"> • -20 dBm ± 1 dB for $f \leq 30 \text{ MHz}$ • -15 dBm ± 1 dB for $f > 30 \text{ MHz}$ • ± 1 dB level difference of the two tones <p>► Switch off the ALC of the generators to reduce the interference between the generators.</p> |
| R&S FSVA/FSV settings | <ol style="list-style-type: none"> 1. [PRESET] 2. [SETUP : REFERENCE EXT] <ul style="list-style-type: none"> • Switch to the external reference source at Ref In 1 input • Set the reference frequency to 10 MHz • Set the loop bandwidth to 0.3 Hz 3. [AMPT : RF ATTEN MANUAL : 0 dB] 4. [AMPT : -5 dBm] 5. [SPAN : 4 MHz] |

6. [**BW** : RES BW MANUAL : **10 kHz**] for $f \geq 7.5$ GHz: 3 kHz
7. [**SWEEP** : SWEEP TYPE : FFT]
8. [**SWEEP** : SWEEP CONFIG : 30001]
9. [**SWEEP** : SWEEP TIME : 10 ms] for $f \geq 7.5$ GHz: 50 ms, $f \geq 22$ GHz: 100 ms]
10. [**TRACE** : TRACE 1 : DETECTOR : RMS]
11. [**FREQ** : CENTER : $\{f_{in}\}$]

Test frequencies $f_{in} = 11$ MHz, 20 MHz, 50 MHz, 100 MHz, 200 MHz to 2000 MHz in 200 MHz steps, 2000 MHz to 3750 MHz in 250 MHz steps
 R&S FSVA3004/R&S FSV3004:
 additional 3990 MHz

R&S FSVA3007/R&S FSV3007:
 additional 4000 MHz to 7000 MHz in 500 MHz steps, 7490 MHz

R&S FSVA3013/R&S FSV3013:
 additional 4000 MHz to 7000 MHz in 500 MHz steps, 7490 MHz

R&S FSVA3030/R&S FSV3030:
 additional 4000 MHz to 7000 MHz in 500 MHz steps, 7490 MHz, 8 GHz to 29 GHz in 1 GHz steps, 29.9 GHz
 additional 16 GHz to 20 GHz in 50 MHz steps

R&S FSVA3044/R&S FSV3044:
 additional 4000 MHz to 7000 MHz in 500 MHz steps, 7490 MHz, 8 GHz to 39 GHz in 1 GHz steps, 39.9 GHz

Measurement [**MKR FCTN** : TOI]

Evaluation The third order intercept point (T.O.I) referred to the input signal is displayed in the marker field by the reading [TOI].

3.2.5 Checking IF Filters

Test equipment	Signal generator (see Chapter 3.1, "Test Equipment" , on page 10, item 1): Frequency: 64 MHz Level: ≥ 0 dBm
Test setup	1. Connect the RF output of the signal generator to the RF input of the R&S FSVA/FSV. 2. Connect the 10 MHz reference output of the signal generator to the Ref In 1 input of the R&S FSVA/FSV.

3.2.5.1 Checking the Bandwidth Switching Level Uncertainty

Reference measurement (RBW 10 kHz)

Signal generator settings	Frequency: 64 MHz Level: -20 dBm
R&S FSVA/FSV settings	1. [PRESET] 2. [SETUP : REFERENCE EXT] • Switch to the external reference source at Ref In 1 input • Set the reference frequency to 10 MHz • Set the loop bandwidth to 0.3 Hz 3. [AMPT : -10 dBm] 4. [AMPT : RF ATTEN MANUAL: 10 dB] 5. [FREQ : CENTER : 64 MHz] 6. [SPAN : 0 kHz] 7. [BW : RBW MANUAL : 10 kHz] 8. [BW : SWEEP TIME MANUAL : 10 ms] 9. [TRACE : DETECTOR : RMS] 10. [MEAS : Time Domain Power]
Reference measurement	Read out the time domain mean power RMS.
	Checking the level uncertainty
R&S FSVA/FSV settings	• [BW : RBW MANUAL : {RBW} ENTER]
Measurement	► Read out the time domain mean power RMS.

Test points	Check the following resolution filters:						
	RBW	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
	SW-Time	300 ms	100 ms	30 ms	10 ms	10 ms	10 ms
Evaluation	Calculate the level difference regarding the reference measurement.						

3.2.6 Checking Spurious Response

Test equipment 50 Ω termination (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 5).

Test setup ► Terminate the RF input of the R&S FSVA/FSV with 50 Ω .

R&S FSVA/FSV settings

1. [**PRESET**]
2. [**AMPT : RF ATTEN MANUAL : 0 dB**]
3. [**AMPT : -50 dBm**]

R&S FSVA/FSV model dependent settings

R&S FSVA3004/R&S FSV3004:

1. [**FREQ : START : 1 MHz**]
2. [**FREQ : STOP : 4000 MHz**]
3. [**BW : RES BW MANUAL : 200 Hz**]

R&S FSVA3007/R&S FSV3007:

1. [**FREQ : START : 1 MHz**]
2. [**FREQ : STOP : 7500 MHz**]
3. [**BW : RES BW MANUAL : 200 Hz**]

R&S FSVA3013/R&S FSV3013:

1. [**FREQ : START : 1 MHz**]
2. [**FREQ : STOP : 7500 MHz**]
3. [**BW : RES BW MANUAL : 200 Hz**]
1. [**FREQ : START : 7.5 GHz**]
2. [**FREQ : STOP : 13.6 GHz**]
3. [**BW : RES BW MANUAL : 1 kHz**]
4. [**BW : VIDEO BW MANUAL : 500 Hz**]

R&S FSVA3030/R&S FSV3030:

1. [**FREQ** : START : **1 MHz**]
2. [**FREQ** : STOP : **7500 MHz**]
3. [**BW** : RES BW MANUAL : **200 Hz**]

1. [**FREQ** : START : **7.5 GHz**]
2. [**FREQ** : STOP : **25 GHz**]
3. [**BW** : RES BW MANUAL : **1 kHz**]
4. [**BW** : VIDEO BW MANUAL : **500 Hz**]

1. [**FREQ** : START : **25 GHz**]
2. [**FREQ** : STOP : **30 GHz**]
3. [**BW** : RES BW MANUAL : **100 Hz**]
4. [**BW** : VIDEO BW MANUAL : **50 Hz**]

R&S FSVA3044/R&S FSV3044:

1. [**FREQ** : START : **1 MHz**]
2. [**FREQ** : STOP : **7500 MHz**]
3. [**BW** : RES BW MANUAL : **200 Hz**]

1. [**FREQ** : START : **7.5 GHz**]
2. [**FREQ** : STOP : **25 GHz**]
3. [**BW** : RES BW MANUAL : **1 kHz**]
4. [**BW** : VIDEO BW MANUAL : **500 Hz**]

1. [**FREQ** : START : **25 GHz**]
2. [**FREQ** : STOP : **40 GHz**]
3. [**BW** : RES BW MANUAL : **100 Hz**]
4. [**BW** : VIDEO BW MANUAL : **50 Hz**]

1. [**FREQ** : START : **40 GHz**]
2. [**FREQ** : STOP : **44 GHz**]
3. [**BW** : RES BW MANUAL : **50 Hz**]
4. [**BW** : VIDEO BW MANUAL : **20 Hz**]

Measurement For each frequency range, start a sweep and set the marker to peak.

Limits Limits see datasheet.

3.2.7 Checking the Noise Display (DANL)

Note for R&S FSVA3000: With option FSV3-B710 installed, other limits shall be used. Refer to [Chapter 3.2.13, "Performance Test PN and DANL for Option Enhanced Performance R&S FSV3-B710"](#), on page 38.

Test equipment 50 Ω termination (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 5).

Test setup ► Terminate the RF input of the R&S FSVA/FSV with 50 Ω .

R&S FSVA/FSV settings

1. [**PRESET**]
2. [**AMPT** : RF ATTEN MANUAL : **0 dB**]
3. [**AMPT** : **-60 dBm**]
4. [**INPUT** : COUPLING : DC]
5. [**SPAN** : 0 Hz]
6. [**TRACE 1** : AVERAGE]
7. [**TRACE 1** : SWEEP COUNT : {SWPCNT} **ENTER**]
8. [**FREQ** : CENTER { f_n }]
9. [**BW** : RBW MANUAL : {RBW}]
10. [**BW** : VBW MANUAL : **1 Hz**]
11. [**BW** : SWEEP TIME MANUAL : **100 ms**]

Measurement Read out the mean marker and correct the measurement value by $-10 \times \log(\text{RBW} / 1 \text{ Hz})$:

- RBW = 1 Hz corresponds with 0 dB correction
- RBW = 10 Hz corresponds with -10 dB correction
- RBW = 100 Hz corresponds with -20 dB correction
- RBW = 1 kHz corresponds with -30 dB correction

Test frequencies f_n = 10 Hz with RBW = 1 Hz; SWPCNT = 10

f_n = 30 Hz, 90 Hz with RBW = 10 Hz; SWPCNT = 10

f_n = 300 Hz, 980 Hz with RBW = 100 Hz; SWPCNT = 10

f_n = 9.8 kHz, 98 kHz, 998 kHz, 9.8 MHz, 29 MHz with RBW = 1 kHz; SWPCNT = 1

R&S FSVA3004/R&S FSV3004:

additional f_n = 99 MHz to 3599 MHz in 500 MHz steps, 3999 MHz,
with RBW = 1 kHz, SWPCNT = 1

R&S FSVA3007/R&S FSV3007:

additional f_n = 99 MHz to 7099 MHz, in 500 MHz steps, 7499 MHz,
with RBW = 1 kHz, SWPCNT = 1

R&S FSVA3013/R&S FSV3013:

additional f_n = 99 MHz to 7099 MHz, in 500 MHz steps, 7499 MHz,
 f_n = 7501 MHz, 8 GHz to 13.5 GHz, in 500 MHz steps, 13.6 GHz
with RBW = 1 kHz, SWPCNT = 1

R&S FSVA3030/R&S FSV3030:

additional f_n = 99 MHz to 7099 MHz, in 500 MHz steps, 7499 MHz,
 f_n = 7501 MHz, 8 GHz to 30 GHz, in 500 MHz steps
with RBW = 1 kHz, SWPCNT = 1

R&S FSVA3044/R&S FSV3044:

additional f_n = 99 MHz to 7099 MHz, in 500 MHz steps, 7499 MHz,
 f_n = 7501 MHz, 8 GHz to 44 GHz, in 500 MHz steps
with RBW = 1 kHz, SWPCNT = 1

Test limits

Note that the statistical fluctuation of the measurement value for f_n = 10 Hz is about 18 dB (due to RBW = 1 Hz and SWPCNT = 10 which equals a total measuring time of 1 s). At the expense of longer total measuring time lower fluctuations would be achievable: about 7 dB @ 10 s, 5 dB @ 30 s and 4 dB @ 60 s.

Instruments with option R&S FSV3-B24

Repeat the measurement for

- [AMPT : PREAMP : {function}]

R&S FSVA3004/R&S FSV3004,

R&S FSVA3007/R&S FSV3007,

R&S FSVA3013/R&S FSV3013,

R&S FSVA3030/R&S FSV3030:

function = 30 dB

R&S FSVA3044/R&S FSV3044: function = ON

fn = 50 MHz, 99 MHz to 3999 MHz in 100 MHz steps

with RBW = 1 kHz, SWPCNT = 1

R&S FSVA3007/R&S FSV3007:

additional 4099 MHz to 7499 MHz in 100 MHz steps

R&S FSVA3013/R&S FSV3013:

additional 7501 MHz, 8 GHz to 13 GHz in 500 MHz steps, 13.6 GHz

R&S FSVA3030/R&S FSV3030:

additional 7501 MHz, 8 GHz to 30 GHz in 500 MHz steps

R&S FSVA3044/R&S FSV3044:

additional 7501 MHz, 8 GHz to 44 GHz in 500 MHz steps

Instruments with option R&S FSV3-B11

Repeat the measurement for

- [INPUT : INPUT SOURCE CONFIG : YIG-PRESELECTOR : OFF]

R&S FSVA3013/R&S FSV3013: 7501 MHz, 8 GHz to 13 GHz in 500 MHz steps

R&S FSVA3030/R&S FSV3030: 7501 MHz, 8 GHz to 30 GHz in 500 MHz steps

R&S FSVA3044/R&S FSV3044: 7501 MHz, 8 GHz to 44 GHz in 500 MHz steps

3.2.8 Checking the Level Uncertainty and the Frequency Response

Test equipment Signal Generator (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 1):

Frequency range 100 kHz to max. frequency of the R&S FSVA/FSV or 43.5 GHz

Power meter (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 6):

Power Sensor (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 7):

Frequency range 9 kHz to 7 GHz

Power range -30 dBm to 0 dBm

Cal factor uncertainty	1 MHz to 3.6 GHz	< 1.6 %
	3.6 GHz to 7 GHz	< 2 %
VSWR	1 MHz to 7 GHz	< 1.15
	50 MHz to 128 MHz	< 1.10

Power Sensor (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 8):

Power range	-30 dBm to 0 dBm	
Cal factor uncertainty	50 MHz to 128 MHz	< 1.6 %
	3.6 GHz to 8 GHz	< 2 %
	8 GHz to 22 GHz	< 2.5 %
	22 GHz to 26.5 GHz	< 3 %
	26.5 GHz to 44 GHz	< 3.5 %
VSWR	50 MHz to 128 MHz	< 1.15
	3.6 GHz to 8 GHz	< 1.15
	8 GHz to 22 GHz	< 1.25
	22 GHz to 26.5 GHz	< 1.35
	26.5 GHz to 44 GHz	< 1.30

Power Splitter (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 3):

Frequency range	DC to 3.6 GHz	
Level imbalance	10 MHz to 3.6 GHz	< 0.1 dB
Equivalent output VSWR	10 MHz to 3.6 GHz	≤ 1.1

Power Splitter (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 4):

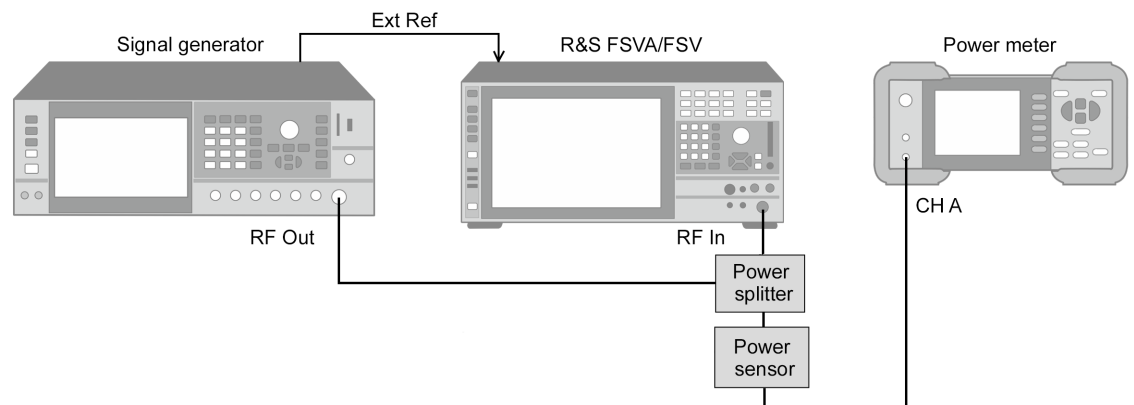
Frequency range	R&S FSVA3004/R&S FSV3004:	DC to 4 GHz
	R&S FSVA3007/R&S FSV3007:	DC to 8 GHz
	R&S FSVA3013/R&S FSV3013:	DC to 13.6 GHz
	R&S FSVA3030/R&S FSV3030:	DC to 30 GHz
	R&S FSVA3044/R&S FSV3044:	DC to 44 GHz
Level imbalance	3.6 GHz to 7 GHz	≤ 0.3 dB
	7 GHz to 22 GHz	≤ 0.4 dB
	22 GHz to 26.5 GHz	≤ 0.5 dB
	26.5 GHz to 44 GHz	≤ 0.8 dB
Equivalent output VSWR	3.6 GHz to 7 GHz	≤ 1.3
	7 GHz to 22 GHz	≤ 1.4
	22 GHz to 26.5 GHz	≤ 1.5
	26.5 GHz to 44 GHz	≤ 2

Test setup

If a power splitter with higher-level imbalance is used, correction of the measured frequency response is recommended.

Test setup

- Standardize the power meter and power sensor (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 6, 7, 8)
- Set the power meter frequency to the generator frequency.
- Use Power Splitter/Combiner (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 3) and connect equipment as shown below
- Connect the power splitter directly to the R&S FSV RF input
- Connect the 10 MHz reference output of the signal generator to the Ref In 1 input of the R&S FSVA/FSV.



Throughout the remaining steps set the Power Meter Cal Factor as appropriate!

3.2.8.1 Absolute Level Uncertainty at 64 MHz

Signal generator
and power meter
settings

- Frequency 64 MHz
- Adjust the level at the RF input of the R&S FSVA/FSV to -10 dBm $\pm$ 1 dB

R&S FSVA/FSV
settings

1. [**PRESET**]
2. [**SETUP** : REFERENCE EXT]
 - Switch to the external reference source at Ref In 1 input
 - Set the reference frequency to 10 MHz
 - Set the loop bandwidth to 0.3 Hz
3. [**AMPT** : RF INPUT : {coupling}]
4. [**AMPT** : RF ATTEN MANUAL : { a_{FSV} }]
5. [**AMPT** : -10 dBm]

6. [**SPAN** : 0 Hz]
7. [**SWEEP** : SWEEP TIME : 10 ms]
8. [**BW** : RES BW MANUAL : 10 kHz]
9. [**TRACE** : DETECTOR : RMS]
10. [**FREQ** : CENTER : 64 MHz]
11. [**MEAS** : TIME DOMAIN POWER : RMS]

Measurement	Perform the measurement with $a_{FSV} = 10$ dB and coupling = AC. Read out the time domain power marker and the power meter level indication.
Evaluation	The difference between the signal levels measured with the power meter and the R&S FSVA/FSV reflects the absolute level uncertainty of the R&S FSVA/FSV. It can be calculated as: $\Delta Ref / dB = L_{FSV} - L_{power\ meter}$

Instruments with option R&S FSV3-B25

Repeat the measurement for:

1. [**AMPT** : AMPLITUDE CONFIG : ELECTRONIC ATTENUATION : STATE : ON]
2. [**AMPT** : AMPLITUDE CONFIG : ELECTRONIC ATTENUATION : MODE: MANUAL]
3. [**AMPT** : AMPLITUDE CONFIG : ELECTRONIC ATTENUATION : VALUE :
{ ae_{FSV} }]
 $a_{FSV} = 10$ dB, coupling = AC
 - $ae_{FSV} = 10$ dB, coupling = AC
 - $ae_{FSV} = 20$ dB, coupling = AC,

3.2.8.2 Frequency Response

Signal generator, power meter and R&S FSVA/FSV settings	See absolute level uncertainty at 64 MHz.
Reference measurement	► Perform a reference measurement at 64 MHz for each measurement with the parameters described below and record the level error $\Delta Ref / dB$. (Test limit: 0.3 dB) The test result of this reference measurement shall be displayed in the factory test report.
Signal generator and power meter settings	Set the signal generator and the power meter to the test frequency. Adjust the level at the RF input of the R&S FSVA/FSV to -10 dBm ± 3 dBm.

R&S FSVA/FSV settings	• [FREQ : CENTER : {f_{fresp}}]
Measurement	1. Perform the measurement for the following test settings (RF attenuations a_{FSV}, couplings) and test frequencies f_{fresp}. 2. Read out the time domain power marker from the R&S FSVA/FSV (L_{FSV}) 3. Read the level indication from power meter ($L_{\text{power meter}}$)
Evaluation	The frequency response is determined by: $\text{freq. response / dB} = L_{\text{FSV}} - L_{\text{power meter}} - \Delta\text{Ref / dB}$
Test settings and frequencies	• $a_{\text{FSV}} = 10 \text{ dB}$, coupling = DC $f_{\text{fresp}} = 10 \text{ MHz}$, 50 MHz, 100 MHz to 4000 MHz in 100 MHz steps R&S FSVA3007/R&S FSV3007: additional 4100 MHz to 7500 MHz in 100 MHz steps R&S FSVA3013/R&S FSV3013: additional 4100 MHz to 7400 MHz in 100 MHz steps, 7499 MHz, 7501 MHz, 7.75 GHz to 13.5 GHz in 250 MHz steps, 13.6 GHz R&S FSVA3030/R&S FSV3030: additional 4100 MHz to 7400 MHz in 100 MHz steps, 7499 MHz, 7501 MHz, 7.75 GHz to 30 GHz in 250 MHz steps R&S FSVA3044/R&S FSV3044: additional 4100 MHz to 7400 MHz in 100 MHz steps, 7499 MHz, 7501 MHz, 7.75 GHz to 43.5 GHz in 250 MHz steps • $a_{\text{FSV}} = 10 \text{ dB}$, coupling = AC • $a_{\text{FSV}} = 0 \text{ dB}$, coupling = AC • $a_{\text{FSV}} = 5 \text{ dB}$, coupling = AC • $a_{\text{FSV}} = 20 \text{ dB}$, coupling = DC • $a_{\text{FSV}} = 40 \text{ dB}$, coupling = DC $f_{\text{fresp}} = 10 \text{ MHz}$, 50 MHz, 100 MHz, 200 MHz, 500 MHz to 4000 MHz in 500 MHz steps R&S FSVA3007/R&S FSV3007: additional 4500 MHz to 7500 MHz in 500 MHz steps R&S FSVA3013/R&S FSV3013: additional 4500 MHz to 7000 MHz in 500 MHz steps, 7499 MHz, 7501 MHz, 8 GHz to 13.5 GHz in 500 MHz steps, 13.6 GHz R&S FSVA3030/R&S FSV3030: additional 4500 MHz to 7000 MHz in 500 MHz steps, 7499 MHz,

7501 MHz, 8 GHz to 30 GHz in 500 MHz steps

R&S FSVA3044/R&S FSV3044:

additional 4500 MHz to 7000 MHz in 500 MHz steps, 7499 MHz,
7501 MHz, 8 GHz to 43.5 GHz in 500 MHz steps

Instruments with option R&S FSV3-B11

Repeat the measurement for:

► [INPUT : INPUT SOURCE CONFIG : YIG-PRESELECTOR : OFF]

- $a_{FSV} = 10 \text{ dB}$, coupling = AC

R&S FSVA3013/R&S FSV3013:

$f_{fresp} = 7501 \text{ MHz}$, 8 GHz to 13.5 GHz in 500 MHz steps, 13.6 GHz

R&S FSVA3030/R&S FSV3030:

$f_{fresp} = 7501 \text{ MHz}$, 8 GHz to 30 GHz in 500 MHz steps

R&S FSVA3044/R&S FSV3044:

$f_{fresp} = 7501 \text{ MHz}$, 8 GHz to 43.5 GHz in 500 MHz steps

Instruments with option R&S FSV3-B24

Repeat the measurements for:

1. [AMPT : PREAMP : {function}]
2. [AMPT : REF LEVEL : {ref_lv}]

$f_{fresp} = 10 \text{ MHz}$, 50 MHz, 100 MHz to 4000 MHz in 100 MHz steps

R&S FSVA3007/R&S FSV3007:

additional 4100 MHz to 7500 MHz in 100 MHz steps

R&S FSVA3013/R&S FSV3013:

additional 4100 MHz to 7400 MHz in 100 MHz steps, 7499 MHz,
7501 MHz, 7.75 GHz to 13.5 GHz in 250 MHz steps, 13.6 GHz

R&S FSVA3030/R&S FSV3030:

additional 4100 MHz to 7400 MHz in 100 MHz steps, 7499 MHz,
7501 MHz, 7.75 GHz to 30 GHz in 250 MHz steps

R&S FSVA3044/R&S FSV3044:

additional 4100 MHz to 7400 MHz in 100 MHz steps, 7499 MHz,

7501 MHz, 7.75 GHz to 43.5 GHz in 250 MHz steps

- R&S FSVA3004/R&S FSV3004,
R&S FSVA3007/R&S FSV3007,
R&S FSVA3013/R&S FSV3013,
R&S FSVA3030/R&S FSV3030:
function = 30 dB

R&S FSVA3044/R&S FSV3044:

function = ON

a_{FSV} = 10 dB, coupling = DC,

ref_lvl = -25 dBm

Set the signal generator to the test frequency.

Adjust the level at the RF input of the R&S®FSVA/FSV to -36 dBm $\pm$ 1 dB at 10 MHz

and to -32 $\pm$ 3 dBm at all other frequencies.

- R&S FSVA3004/R&S FSV3004,
R&S FSVA3007/R&S FSV3007,
R&S FSVA3013/R&S FSV3013,
R&S FSVA3030/R&S FSV3030:
function = 15 dB
 a_{FSV} = 10 dB, coupling = DC,
ref_lvl = -15 dBm
Set the signal generator to the test frequency .
Adjust the level at the RF input of the R&S FSVA/FSV to -22 $\pm$ 3 dBm.

Instruments with option R&S FSV3-B25

Check the level uncertainty for:

1. [AMPT : AMPLITUDE CONFIG : ELECTRONIC ATTENUATION : STATE : ON]
2. [AMPT : AMPLITUDE CONFIG : ELECTRONIC ATTENUATION : MODE: MANUAL]
3. [AMPT : AMPLITUDE CONFIG : ELECTRONIC ATTENUATION : VALUE :
{ a_{FSV} }]

a_{FSV} = 10 dB, coupling = DC

- a_{FSV} = 10 dB
ffresp = 10 MHz, 50 MHz, 250 MHz to 4000 MHz in 250 MHz steps

R&S FSVA3007/R&S FSV3007,
R&S FSVA3013/R&S FSV3013,

R&S FSVA3030/R&S FSV3030,
R&S FSVA3044/R&S FSV3044:
additional 4250 MHz to 7250 MHz in 250 MHz steps, 7499 MHz

- $a_{\text{FSV}} = 20 \text{ dB}$
 $f_{\text{resp}} = 10 \text{ MHz}, 50 \text{ MHz}, 500 \text{ MHz to } 4000 \text{ MHz in } 500 \text{ MHz steps}$

R&S FSVA3007/R&S FSV3007,
R&S FSVA3013/R&S FSV3013,
R&S FSVA3030/R&S FSV3030,
R&S FSVA3044/R&S FSV3044:
additional 4500 MHz to 7000 MHz in 500 MHz steps, 7499 MHz

3.2.9 Checking the RF Attenuator Uncertainty

Signal generator settings	• Frequency: 64 MHz • Adjust the level at the RF input of the R&S FSVA/FSV to $-10 \text{ dBm} \pm 1 \text{ dB}$
R&S FSVA/FSV settings	1. [PRESET] 2. [SETUP : REFERENCE EXT] • Switch to the external reference source at Ref In 1 input • Set the reference frequency to 10 MHz • Set the loop bandwidth to 0.3 Hz 3. [FREQ : CENTER : 64 MHz] 4. [SPAN : 0 Hz] 5. [BW : RES BW MANUAL : 1 kHz] 6. [SWEEP : SWEEP TIME MANUAL : 10 ms] 7. [TRACE : DETECTOR : AVERAGE] 8. [AMPT : RF ATTEN MANUAL : 10 dB] 9. [AMPT : 10 dBm]
Reference measurement	► Read out the signal level by using: [MEAS : TIME DOMAIN POWER : MEAN]
R&S FSVA/FSV settings	1. [AMPT : RF INPUT : {coupling}] 2. [AMPT : RF ATTEN MANUAL : { a_{FSV} }] 3. [AMPT : {reference level}] 4. [SWEEP : SWEEP TIME MANUAL : {swt}] 5. [MEAS : TIME DOMAIN POWER : MEAN]

- Measurement** Perform the measurement with coupling = AC
- Read out the time domain power marker and the power meter level indication.
- See table below for values of a_{FSV} , reference level and swt.
- Evaluation** Check the deviation from the power sensor reading with respect to the reference measurement.

a_{FSV}	0 dB	5 dB	15 dB	20 dB	25 dB	30 dB	40 dB	50 dB	60 dB	70 dB
reference level	0 dBm	5 dBm	15 dBm	20 dBm	25 dBm	30 dBm	30 dBm	30 dBm	30 dBm	30 dBm
swt	10 ms	10 ms	10 ms	10 ms	10 ms	25 ms	25 ms	25 ms	25 ms	50 ms

3.2.10 Checking the Nonlinearity of the Displayed Level

- Test equipment** Signal generator (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 1):
- Frequency 128 MHz
- Maximum level ≥ 10 dBm
- Step attenuator (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 9):
- Frequency 128 MHz
- Attenuation 0 dB to 90 dB in 1 dB steps
- Attenuation uncertainty < 0.1 dB
- Test setup**
1. Connect the RF output of the signal generator to the RF input of the step attenuator.
 2. Connect the RF output of the step attenuator to the RF input of the R&S FSVA/FSV.
 3. Connect the reference output of the signal generator to the Ref In 1 input of the R&S FSVA/FSV.
- Signal generator settings** Frequency: 128.1 MHz
- Level: +10 dBm ± 2 dB
- R&S FSVA/FSV settings**
1. [**PRESET**]
 2. [**SETUP** : REFERENCE EXT]
 - Switch to the external reference source at Ref In 1 input
 - Set the reference frequency to 10 MHz
 - Set the loop bandwidth to 0.3 Hz
 3. [**AMPT** : RF ATTEN MANUAL : **10 dB**]

4. [**AMPT** : 0 dBm]
5. [**FREQ** : CENTER : 128.1 MHz]
6. [**SPAN** : 0 Hz]
7. [**TRACE** : DETECTOR : AVERAGE]
8. [**BW** : RES BW MANUAL : 1 kHz]
9. [**SWEEP** : SWEEP TIME MANUAL : {sweep time}]
10. [**MEAS** : TIME DOMAIN POWER : MEAN]

Wait 0.5 seconds to ensure that there is no thermal drift. See table below for values of sweep time [Table 3-1](#).

Reference measurement	- Set the external step attenuator to 20 dB - Read out the mean marker value L_{Ref} (about 10 dB below the reference level)
Measurement	- Set the external step attenuator to $\{a_{ATT}\}$ See equation below for values of a_{ATT}. - Read out the mean marker value L_{FSV}
Evaluation	► The difference between the level reading of the R&S FSVA/FSV and the input signal of the R&S FSVA/FSV depending on the test level can be calculated as: $\Delta L = L_{FSV} - L_{Ref} - \text{test level}$ at which the attenuator is set to: $a_{ATT} = 10 \text{ dB} - \text{test level}$
Test levels	0 dB to -70 dB in 2 dB steps R&S FSVA: additional -75 dB and -80 dB



A frequency between 5 MHz and 1 GHz may be used. It is recommended to use correction values for the uncertainty of the attenuator (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 9).

Table 3-1: Values of sweep time

a_{ATT}	10 dB to 50 dB	50 dB to 80 dB
Sweep time	200 ms	600 ms

3.2.11 Checking the Phase Noise

Test equipment	Signal generator / phase noise standard (see Chapter 3.1, "Test Equipment" , on page 10, item 16):
Test setup	Connect the RF output of the signal generator to the RF input of the R&S FSVA/FSV.

2. Connect the Reference output of the signal generator to the Ref In 1 input of the R&S FSVA/FSV.

Signal generator settings

1. Frequency: 1000 MHz
2. Level: Adjust the output level of the signal generator for a RF-Input level of $P_{IN} = 0 \text{ dBm} \pm 1 \text{ dB}$ at the R&S FSVA/FSV

R&S FSVA/FSV settings

1. [**PRESET**]
2. [**SETUP** : REFERENCE EXT]
 - Switch to the external reference source at Ref In 1 input
 - Set the reference frequency to 10 MHz
 - Set the loop bandwidth to 0.3 Hz
3. [**FREQ** : CENTER : **1000 MHz**]
4. [**AMPT** : ATTEN MANUAL : **20 dB**]
5. [**AMPT** : **20 dBm**]
- [**SPAN** : **2.2 MHz**]
Measure the level of the input signal by
- [**MKR TO** : Peak]
- Adjust the instrument settings according to the table below, starting with the offset 1 MHz and setup the phase noise
1. [**SPAN** : {span}]
2. [**TRACE1** : DETECTOR : RMS]
3. [**BW** : RES BW MANUAL : {RBW}]
4. [**SWEEP** : SWEEP CONFIG : OPTIMIZATION : SPEED]
5. [**SWEEP** : SWEEP CONFIG : SWEEP TYPE : FFT]
6. [**AMPT** : ATTEN MANUAL: **0 dB**]
7. [**AMPT** : **0 dBm**]
8. [**MKR FCTN** : PHASE NOISE]
9. [**MKR** : {Offset}]
- Adjust the instrument settings for the other offset frequencies and change the delta marker frequency
1. [**SPAN** : {span}]
2. [**MKR** : {Offset}]

Evaluation The phase noise measurement result is displayed in the marker field by the reading 'PHNOISE 2'. For test limits refer to data sheet.



- Please make sure not to measure on a spurious signal.
- At 100 Hz offset the measurement is performed at 95 Hz to avoid interference with the line frequency (f.e. in Europe).
- With option R&S FSV3-B710 installed, other limits shall be used. Refer to [Chapter 3.2.13, "Performance Test PN and DANL for Option Enhanced Performance R&S FSV3-B710"](#), on page 38.

Settings for phase noise measurement				
Offset	Span	RBW	Sweep Time	Reference level
1 MHz, 100 kHz	2.2 MHz	10 kHz	0.5 s	= signal level
10 kHz	22 kHz	1 kHz	1 s	= signal level
95 Hz / 1 kHz	2.2 kHz	5 Hz	5 s	= signal level

3.2.12 Checking the Return Loss at the RF Input

Test equipment Network analyzer (see [Chapter 3.1, "Test Equipment"](#), on page 10, item 11).

Test setup

1. Connect the test port of the network analyzer to the RF input 1 of the R&S FSVA/FSV.
2. Connect the 10 MHz reference output of the network analyzer to the Ref In 1 input of the R&S FSVA/FSV.

R&S FSVA/FSV settings

1. [**PRESET**]
2. [**SETUP : REFERENCE EXT**]
 - Switch to the external reference source at Ref In 1 input
 - Set the reference frequency to 10 MHz
 - Set the loop bandwidth to 0.3 Hz
3. [**AMPT : RF INPUT : {coupling}**]
4. [**AMPT : RF ATTEN MANUAL : {a_{FSV}}**]
5. [**SPAN : 0 Hz**]
6. [**FREQ : CENTER : {f_{S11}}**]

Network analyser settings

- Level at test port = - 10 dBm
- Center frequency = f_{S11}
- Number of points = 1
- Calibration step size ≤ 100 MHz

Measurement	- For RF attenuation ≤ 10 dB the R&S®FSVA/FSV has to be set to the test frequency in zero span. For attenuation > 10 dB the influence of the frequency setting of the R&S FSVA/FSV can be neglected, the measurement may be done with any frequency setting of the R&S FSVA/FSV and a normal frequency sweep of the network analyzer (e.g. number of points = 401). - Determine S_{11} of the R&S FSVA/FSV input for each pair of a_{FSV} and coupling at all listed frequencies f_{S11}.
Test settings and frequencies	$a_{FSV} = 5$ dB, coupling = DC, $a_{FSV} = 10$ dB, coupling = DC, $a_{FSV} = 20$ dB, coupling = DC, $a_{FSV} = 40$ dB, coupling = DC, $a_{FSV} = 10$ dB, coupling = AC $f_{S11} = 10$ MHz, 50 MHz, 100 MHz to 4000 MHz in 100 MHz steps R&S FSVA3007/R&S FSV3007: additional 4100 MHz to 7500 MHz in 100 MHz steps R&S FSVA3013/R&S FSV3013: additional 4100 MHz to 7400 MHz in 100 MHz steps, 7499 MHz, 7501 MHz, 7.6 GHz to 13.6 GHz in 100 MHz steps R&S FSVA3030/R&S FSV3030: additional 4100 MHz to 7400 MHz in 100 MHz steps, 7499 MHz, 7501 MHz, 7.6 GHz to 30 GHz in 100 MHz steps R&S FSVA3044/R&S FSV3044: additional 4100 MHz to 7400 MHz in 100 MHz steps, 7499 MHz, 7501 MHz, 7.6 GHz to 40 GHz in 100 MHz steps
Evaluation	- Present the S_{11} values in the VSWR format. - For test limits refer to the data sheet.

3.2.13 Performance Test PN and DANL for Option Enhanced Performance R&S FSV3-B710

The option “Enhanced Performance” (R&S FSV3-B710) is available for both R&S FSV3000 and R&S FSVA3000:

- R&S FSV3000: B710 mod. 04, 07, 13, 30 or 43:
 - Frontend Var. 04 (unchanged)
 - The final performance test for instruments with B710 has tighter limits and additional proofs
- R&S FSVA3000: B710 mod. 05, 08, 14, 31 or 44:

This option includes two changes with respect to the R&S FSVA3000 without B710:

 - Frontend mod. 05 is implemented, instead of mod. 04
 - The final performance test for instruments with B710 has tighter limits and additional proofs.

These limits are different from the limits for B710 for FSV3000.

With the option “Enhanced Performance” (R&S FSV3-B710) installed, the following changes to the test procedure for PN and DANL shall apply. All other tests stay unchanged (eg PN at 25 and 40 GHz).

Phase Noise at 1 GHz: New test limits:

This test is based on the test „Checking the Phase Noise“. New limits: Please refer to the R&S FSVA3000 and R&S FSV3000 data sheets.

Table 3-2: New values for Sweep time:

Settings for phase noise measurement				
Offset	Span	RBW	Sweep Time	Reference level
1 MHz, 100 kHz	2.2 MHz	10 kHz	1 s	= signal level
10 kHz	22 kHz	1 kHz	5 s	= signal level
95 Hz / 1 kHz	2.2 kHz	5 Hz	30 s	= signal level

DANL: New test limits (R&S FSVA3000 only)

This test is based on the test „Checking the Noise Display (DANL)“. New limits: Please refer to the R&S FSVA3000 data sheet. Do not apply these limits to the R&S FSVA3000 test.

3.2.14 Performance Test Option LO/IF ports for external mixers R&S FSV3-B21

3.2.14.1 Checking the Output Level LO_{out}

Test equipment	• Power Meter (Section "Messmittelliste Test Equipment", item 6) • Power sensor (section "Measurement Equipment", item 8) Frequency range 8.0 GHz to 16.5 GHz Max. input power P_{max} = +23 dBm RSS ≤ 2.5% referred to measured power Impedance Z = 50 Ω
Power meter settings	Connect power sensor to the power meter and execute function 'ZERO' when there is no signal applied to the power sensor.
R&S FSVA/FSV settings	1. [PRESET] 2. [SENS:MIX:STAT ON] 3. [SENS:MIX:HARM:BAND U] 4. [SENS:MIX:HARM TYPE EVEN] 5. [SENS:MIX:RFOV:STAT ON] 6. [FREQ:CENT 50.00 GHz] 7. [FREQ:SPAN 0 HZ] Select LO-Power: ► [SENS:MIX:LOP {PLO}] for PLO = 13,0dBm, 15,5dBm and 17,0dBm Bias current set to zero: ► [SENS:MIX:BIAS 0.0] Measurement of upper sideband resulting LO-frequency $f_{LO} = (f_{Center} - 732,0 \text{ MHz}) / 4$ ► [FREQ:CENTER {f_{Center}}]
Test setup	Connect power sensor to the output 'LO _{out} / IF _{in} '
Measurement	Determine level of the LO-signal L_{LO,meas} To achieve higher uncertainty the frequency response of the power sensor must be compensated. For compensation frequency use f_{LO}.

Test limits	Test limit according to datasheet: +20 °C to +30 °C: ± 1.5 dB +0 °C to +50 °C: ± 3 dB
Test frequencies	In Service $F_{\text{center}} = 33.532 \text{ GHz}, 34.732 \text{ GHz}, 36.732 \text{ GHz to } 64.732 \text{ GHz in } 2 \text{ GHz Steps}$ The resulting LO frequencies are: $f_{\text{LO}} = 8.2 \text{ GHz}, 8.5 \text{ GHz}, 9.0 \text{ GHz to } 16.0 \text{ GHz}$

3.2.14.2 Checking the Input IF_{in} (3-Port-Mixers) in Sweep Mode

R&S FSVA/FSV settings	1. [PRESET] 2. [SENS:MIX: STAT ON] 3. [SENS:MIX:HARM:BAND U] 4. [SENS:MIX:HARM TYPE EVEN] 5. [FREQ:CENT 50.00 GHz] 6. [SENS:FREQ: SPAN 0 MHz] 7. [SENS:BAND: RES 30 KHz] 8. [DET:FUNC RMS] Bias current set to zero: ► [SENS:MIX:BIAS 0.0] Select 3-port case: ► [SENS:MIX:PORT 3] Conversion Loss set to 0dB ► [SENS:MIX:LOSS 0.0]
Signal generator settings	• Frequency: 732,0 MHz • Input Level DUT: -25 dBm +/- 0,1 dB
Test setup	Connect the generator to the connector IF_{in} .
Measurement	Time Domain RMS • Read out the marker Test limit according to datasheet.
Test limits	Test limit according to datasheet: +20 °C to +30 °C: ± 1 dB

+0 °C to +50 °C: ± 3 dB

3.2.14.3 Checking the Input IF_{in} (3-Port-Mixers) in IQ Mode

R&S FSVA/FSV
settings

1. [**PRESET**]
2. [**SENS:MIX: STAT ON**]
3. [**SENS:MIX:HARM:BAND U**]
4. [**SENS:MIX:HARM TYPE EVEN**]
5. [**FREQ:CENT 50.00 GHz**]

Bias current set to zero:

► [**SENS:MIX:BIAS 0.0**]

Select 3-port case:

► [**SENS:MIX:PORT 3**]

Conversion Loss set to 0dB

► [**SENS:MIX:LOSS 0.0**]

Open IQ Analyzer

1. [**INST:CRE:NEW IQ, 'IQ Analyzer'**]
2. [**LAY:REPL:WIND '1',FREQ**]

R&S FSV settings
for R&S FSV3-B40
ABW=40MHZ

IQ Analyzer settings

1. [**TRAC:IQ:WBAN:STAT OFF**]*
2. [**TRAC:IQ:WBAN:MBW 40000000**]*
* This commands must be used if a HW Option R&S FSV3-B200, R&S FSV3-B400, R&S FSV3-B600 or R&S FSV3-B1000 is fitted.
3. [**TRAC:IQ:SRAT 64000000**]
4. [**SENS:SWE:TIME 0.002**]
5. [**SENS:IQ:BWID:RES 239625**]
6. [**SENS:WIND1:DET1:FUNC RMS**]

R&S FSV settings
for R&S FSV3-B400
ABW=400MHZ

IQ Analyzer settings

1. [**TRAC:IQ:WBAN:STAT OFF**]*
2. [**TRAC:IQ:WBAN:MBW 400000000**]*
* This commands must be used if a HW Option R&S FSV3-B600 or R&S FSV3-B1000 is fitted.

3. [**TRAC**:IQ:SRAT 512000000]
4. [**SENS**:SWE:TIME 0.002]
5. [**SENS**:IQ:BWID:RES 1917000]
6. [**SENS**:WIND1:DET1:FUNC RMS]

R&S FSV settings
for R&S FSV3-B600
ABW=600MHZ

Perform this Measurement only, if no HW-option R&S FSV3-B1000 is fitted.

IQ Analyzer settings

1. [**TRAC**:IQ:WBAN:STAT ON]
2. [**TRAC**:IQ:SRAT 1024000000]
3. [**SENS**:SWE:TIME 0.002]
4. [**SENS**:IQ:BWID:RES 7688000]
5. [**SENS**:WIND1:DET1:FUNC RMS]

R&S FSV settings for
R&S FSV3-B1000
ABW=1000MHZ

1. [**TRAC**:IQ:WBAN:STAT ON]
2. [**TRAC**:IQ:SRAT 2048000000]
3. [**SENS**:SWE:TIME 0.002]
4. [**SENS**:IQ:BWID:RES 7688000]
5. [**SENS**:WIND1:DET1:FUNC RMS]

Signal generator
settings

1. Test Frequencies:
 - 732,0 MHz for ABW = 40 MHz
 - 768,0 MHz for ABW = 400 MHz
 - 1536,0 MHz for ABW > 400 MHz
2. Input Level DUT: -25 dBm +/- 0,1 dB

Test setup

Connect the generator to the connector IF_{in}.

Measurement

1. [**CALC**1:MARK1:STAT ON]
 2. [**CALC**1:MARK1:X 500000000000]
- Read out the marker.
Test limit according to datasheet.

Test limits

Test limit according to datasheet:

+20 °C to +30 °C: ± 1 dB

+0 °C to +50 °C: ± 3 dB

3.2.14.4 Checking the Bias Supply

Test equipment	Multimeter (section "Messmittelliste Test Equipment", item 15)
R&S FSVA/FSV settings	1. [PRESET] 2. [SENS : MIX : STAT ON] 3. [SPAN : ZERO SPAN] Bias current {I_{bias}} setting: ► [SENS : MIX:BIAS {I_{bias}}] Bias {I_{bias}}: - 10 mA, 0 mA, + 10 mA
Test setup	Connect the DC current meter between cable conductor and ground of LO _{out} / IF _{in} .
Measurement	Read out the current.
Test limits	Bias {I_{bias}}: • - 10 mA (±2mA), • 0 mA (±1mA), • + 10 mA (±2mA)

3.2.15 Performance Test PN and DANL for Option Enhanced Performance R&S FSV3-B710

The option "Enhanced Performance" (R&S FSV3-B710) is available for both R&S FSV3000 and R&S FSVA3000:

- R&S FSV3000: B710 mod. 04, 07, 13, 30 or 43:
 - Frontend Var. 04 (unchanged).
 - The final performance test for instruments with B710 has tighter limits and additional proofs.
- R&S FSVA3000: B710 mod. 05, 08, 14, 31 or 44:

This option includes two changes with respect to the R&S FSVA3000 without B710:

 - Frontend mod. 05 is implemented, instead of mod. 04.
 - The final performance test for instruments with B710 has tighter limits and additional proofs. These limits are different from the limits for B710 for R&S FSV3000.

With the option "Enhanced Performance" (R&S FSV3-B710) installed, the following changes to the test procedure for PN and DANL shall apply. All other tests stay unchanged (eg PN at 25 and 40 GHz).

3.2.15.1 Phase Noise at 1 GHz: New Test Limits

This test is based on the test „Checking the Phase Noise“. New limits: Please refer to the R&S FSV3000 / R&S FSVA3000 data sheet.

Table 3-3: New values for Sweep time:

Settings for phase noise measurement				
Offset	Span	RBW	Sweep Time	Reference level
1 MHz, 100 kHz	2.2 MHz	10 kHz	1 s	= signal
10 kHz	22 kHz	1 kHz	5 s	= signal level
95 Hz/ 1 kHz	2.2 kHz	5 Hz	30 s	= signal level

3.2.15.2 DANL: New Test Limits (R&S FSVA3000 only)

This test is based on the test „Checking the Noise Display (DANL)“. New limits: Please refer to the R&S FSVA3000 data sheet. Do not apply these limits to the R&S FSV3000 test.

3.2.16 Health and Utilization Monitoring Service

Writing service data information:

Actions in manufactory, after test 2

When test 2 is successfully completed, the service information shall be written into the instrument. The below mentioned SCPI cmds and service functions are available with R&S FSV3000 / R&S FSVA3000 FW 1.50 and higher.

1. Set the service information by using the following SCPI commands (see menu SETUP : Service + Support : R&S support).

Last service date:	DIAGnostic:SERvice:DATE 'yyyy-mm-dd'
	Date format is yyyy-mm-dd; this value is set by R&S only, use the date of the calibration certificate.
Last calibration Date:	DIAGnostic:SERvice:CALibration:DATE 'yyyy-mm-dd'
	use the date of the calibration certificate
Recommended calibration interval:	DIAGnostic:SERvice:CALibration:INTERval 'P1Y0M'
Reset next calibration due:	DIAGnostic:SERvice:CALibration:DUE ''

2. Query: Set an “?” after the command.

Hints

- The last service date is set by R&S service and/or R&S manufactory only. The last calibration date is set whenever a calibration certificate is created.

Note: Only in case of self maintainers (who run their own calibration), the last service date and the last calibration date may be different. In R&S manufactory and R&S service, both dates will be the same.

- The next calibration due date can only be set manually by the customer himself due to ISO17025.

The data can be manually checked in the menu „Setup“ (Hardkey) -> “Service + Support” (Softkey) -> Tab “R&S Support“:

Last Service Date:	2019-05-05	Recommended Calibration Interval:	1 Year
Last Calibration Date:	2019-05-05	Next Calibration Due:	2021-10-21

Here, it is also possible to manually enter the service data.

4 Maintenance, Transport, Storage and Disposal

Maintenance, transport, storage and disposal are described in R&S FSVA3000 / R&S FSV3000 Signal and Spectrum Analyzer user manual.

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, or follow this QR code:



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

6 Installing Options

This section contains information on installing options on the R&S FSVA/FSV. A list of all available hardware and software options is provided in the data sheet and on the Internet www.rohde-schwarz.com.

For retrofitting, note the mounting instructions enclosed with the options.

WARNING

Shock hazard

Before opening the housing, ensure that the instrument is switched off and disconnected from the power supply by removing the plug from the AC and DC power connector. Read all safety instructions at the beginning of this manual carefully!



Risk of electrostatic discharge

Protect the operational site against electrostatic discharge to avoid damage to electronic components of the modules. For details, refer to the safety instructions at the beginning of this manual.

When installing hardware options, note the following:

1. Turn off the instrument.
2. Disconnect the power supply cables.
3. Unscrew the corresponding part of the rear panel.
4. Plug in the option and fix it using the screws you removed before.
5. Turn on the R&S FSVA/FSV.
6. Install additional software, if supplied, according to the installation instructions supplied with the option.
7. If the installed option requires an adjustment, proceed also as described in the included installation instructions.

7 Firmware Update

This chapter contains information on installing/updating the firmware on R&S FSVA/FSV.

For information on updating firmware, refer to the release notes. The most recent version is provided on our Internet site at www.rohde-schwarz.com.

To perform a firmware update

1. Copy the setup file to any storage medium accessible for the instrument. This may be the internal hard disk, an external storage medium (USB memory stick, CD-ROM with external drive) or a network connection (LAN, GPIB bus).
2. Double-click the setup file and follow the instructions of the setup wizard.

8 Documents

8.1 Available Power Cables

Rohde & Schwarz provides power cables with different properties, to be used in different countries.

Table 8-1: List of power cables available

Stock No.	Earthed-contact connector	Recommended for
DS 0006.7013.00	BS1363: 1967' 10 A 250 V complying with IEC 83: 1975 standard B2	Great Britain
DS 0006.7020.00	Type 12 , 10 A 250 V complying with SEV-regulation 1011.1059, standard sheet S 24 507	Switzerland
DS 0006.7036.00	Type 498/13 10 A 250 V complying with US-regulation UL 498, or with IEC 83	USA/Canada
DS 0041.4752.00	GB2099 , GB1002 10 A 250 V approvals CCC	China
DS 0041.6232.00	JIS C 8303 7A 125V AC approvals PSE (JET)	Japan
DS 0006.7107.00	Type SAA3 10 A, 250 V complying with AS C112-1964 Ap.	Australia
DS 0025.2365.00	DIN 49 441, 10 A, 250 V, straight approvals VDE, ÖVE, CEBEC, KEMA, S, D, N, FI, LCIE, IMQ, UCIEE	Europe (except Switzerland)
DS 0086.4400.00	DIN 49 441, 10 A, 250 V, angular approvals VDE, ÖVE, CEBEC, KEMA, S, D, N, FI, LCIE, IMQ, UCIEE	

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