# R&S®FSH Handheld Spectrum Analyzer
# Release Notes
# Firmware Version V3.20

**These Release Notes are for following models of R&S®FSH Handheld Spectrum Analyzer:**

**R&S®FSH Handheld Spectrum Analyzer4,** order nos. 1309.6000.04, 1309.6000.14, 1309.6000.24
**R&S®FSH Handheld Spectrum Analyzer8,** order nos. 1309.6000.08, 1309.6000.18, 1309.6000.28
**R&S®FSH Handheld Spectrum Analyzer13,** order nos. 1309.6000.13, 1309.6000.23
**R&S®FSH Handheld Spectrum Analyzer20,** order nos. 1309.6000.20, 1309.6000.30

Test and Measurement
Release Notes

PAD-T-M: 3574.3288.02/02.00/CI/1/EN/

ROHDE & SCHWARZ

# Table of Contents

# 1 Current Version and History

## 1.1 New Functions

The following table lists the new functions and indicates the version in which the new function was introduced:

**New Functions of Firmware V3.20:**

| Version | Function |
|---------|----------|
| V3.20 | Support for saving dataset in csv format (in Spectrum Analyzer mode only) |
| V3.20 | SCPI command to read out memory trace |
| V3.20 | SCPI command to check status of FSH-Z114 |

**New Functions of earlier Firmware versions:**

| Version | Function |
|---------|----------|
| V3.10 | Support of waveguide calibration and DTF measurements with waveguides |
| V3.10 | AM/FM demodulation in Maps and Spectrogram applications |
| V3.00 | Support for R&S® ZN-Z103 |
| V3.00 | SCPI command to retrieve IQ data |
| V3.00 | EMF Analysis Option<br>Quick Scan mode (scan for signals above a threshold line)<br>Spectrum: check acquisition settings validity with a connected instrument (live edit) |
| V3.00 | Spectrum Analyzer: FFT based SEM & ACLR for NB-IoT : |
| V2.90 | EMF Analysis Application (R&S®FSH-K105) added:<br>New Option to perform EMF Analysis together with R&S®InstrumentView |
| V2.81 | Support of 256 QAM Modulation for LTE |
| V2.81 | FDD LTE NB-IoT BTS Application (R&S®FSH-K56) added:<br>New Option Narrowband IoT for FDD LTE Basestation Test |
| V2.80 | Support of HE400 antenna |
| V2.80 | Support of optical power sensor UPM100 from ODM Inc. |
| V2.80 | Display S21 & S11 or S21 & S22 measurements in one screen |
| V2.80 | Support of Declassification procedures according to DoD 5220.22-M<br>(see Instrument Security Procedures for more details) |
| V2.80 | Added switch to force either sweep mode or FFT mode |
| V2.71 | Support of FSH-K14 for long time recording |
| V2.71 | Measuring the frame offset based on 1sec pulse in LTE SEM |
| V2.71 | Unit dBuV in FSH-K15, FSH-K16 and FSH-K17 |
| V2.71 | Frequency Offset in Network Analyzer mode |
| V2.70 | FSH-K15 extended to 72 hours of recording |
| V2.70 | Support FSH-Z14 with USB-Adapter FSH-Z144 |
| V2.70 | Added tone feature to the spectrogram and spectrum analyzer. |
| V2.70 | Support for new USB power sensors R&S®NRPxxS/SNseries |
| V2.61 | CW source operation was added to the tracking generator configuration in Network Analyzer mode. This is helpful for applications where a CW signal is needed for stimulating a DUT or for emulating an interfering signal. |
| V2.61 | In Network Analyzer and DTF mode the tracking generator output power can be set directly in dBm (instead of using the parameter TG Att). |

| V2.61 | In Network Analyzer and DTF mode a new parameter "tracking generator offset" was added to take external attenuators/amplifiers into account when setting the output power. |
|---|---|
| V2.61 | New SCPI command added for the LTE options: FETCh:SUMMary:TAE |
| V2.60 | new measurement application: R&S®FSH-K17 Indoor mapping |
| V2.60 | new measurement application: R&S®FSH-K29 Pulse Measurements with Power Sensor (using the NRP-Z81, NRP-Z85 or NRP-Z86 power sensors). This feature is supported for instruments starting at serial number 105000. Instruments with serial numbers < 121000 require an R&S®FSH-Z129 adapter cable. |
| V2.60 | Internal periodic trigger with selectable trigger cycle frequency added for instruments with serial # > 121000 to support spectrum measurements on pulsed signals (like e.g. TD-LTE). |
| V2.60 | Frequency counter resolution is now selectable between 0.1 Hz (low) and 0.1 mHz (high) |
| V2.60 | Limit lines in VSWR and Cable Loss measurement are now supported |
| V2.60 | Limit lines can now be selected during Wizard execution |
| V2.60 | R&S HL300 antenna transducer file added |
| V2.60 | R&S ZCAN calibration data file added |
| V2.60 | OBW was added to the Result Summary in the CDMA2000 and 1xEVDO measurement applications |
| V2.51 | 3GPP WCDMA BTS Application (R&S®FSH-K44): Enabled the automatic scrambling code selection if the antenna diversity is set to Over-The-Air |
| V2.50 | LTE FDD Downlink Application (R&S®FSH-K50) and LTE TDD Downlink Application (R&S®FSH-K51): Added Carrier Aggregation measurement for measuring two or three carriers |
| V2.50 | Power Meter Application: Added Channel Power Meter measurement for performing power measurements without a power sensor |
| V2.50 | Support of power sensor R&S®NRP-Z52 |
| V2.50 | 3GPP WCDMA BTS Application (R&S®FSH-K44): <br><br>Added Tx diversity for measuring CPICH power and frequency error of two antennas <br><br>Carrier frequency error can be measured either of a single slot or for all slots of one frame at one go <br><br>Added possibility to analyze the entire frame without performing a channel search |
| V2.50 | Occupied Bandwidth added to the Result Summary display in the LTE FDD, LTE TDD and WCDMA Application |
| V2.50 | Network Analyzer: Enabled zero span measurements |

## 1.2  Modified Functions

There are no modifications in Firmware V3.20.

**Modified Functions of earlier Firmware versions:**

| since | Function |
|---|---|
| V3.10 | Supports ZN-Z103 calibration up to 6 GHz |
| V3.10 | Added SCPI support to acquire compass information |
| V3.00 | Support of limit lines for the DTF measurement |
| V3.00 | Compass: Update World Magnetic Model coefficients to 2015-2020 |
| V2.81 | TD-LTE & FDD LTE: Resource Allocation display: <br>axis labelling starts now with zero |
| V2.80 | Removed the limitation to 3 points for triangulation |
| V2.80 | MIMO configuration per carrier within LTE Carrier aggregation |
| V2.71 | Decrease minimum sweep time for Zero span to 100 us |

| V2.70 | New setting for manually defining the amplitude range in Pulse Peak Power Measurement |
|---|---|
| V2.70 | Increased max number of channels in channel table to 1000000 |
| V2.70 | Added LTE channel table 66 |
| V2.70 | Spectrogram Viewer (long time recording) in FSH4View improvements |
| V2.70 | FSH4View now supports saving all traces from spectrogram file to CSV |
| V2.70 | Added "+" and "-" to the alpha numeric keyboard (SMS mode) |
| V2.70 | Optimized synthesizer setup table for frequency of 160 MHz |
| V2.61 | The minimum measurement time in Pulse Peak Power measurements was adjusted to better reflect the capabilities of the power sensor. |
| V2.61 | Optimized synthesizer setup table for FSH13/20 for frequencies 1.2 GHz and 6.981 GHz |
| V2.60 | An indicator "(IA)" was added to the title bar in Interference Analyzer measurement mode |
| V2.51 | 3GPP WCDMA BTS Application (R&S®FSH-K44): The default span in the Spectrum Overview display is now 5 MHz |
| V2.50 | Optimized synthesizer setup table |

## 1.3  Improvements

The following tables list the improvements and indicate since which version these improvements are available:

**Improvements in Firmware V3.20:**

| Version | Function |
|---|---|
| V3.20 | Improved spur performance |

**Improvements of earlier Firmware versions:**

| since | Function |
|---|---|
| V3.10 | Added "Waiting for Trigger" indication |
| V3.10 | Enabled support for Rosenberger cables |
| V3.10 | Improved Japanese translations for antenna settings |
| V3.10 | Improved Spur performance |
| V3.10 | Improved power level in zero span measurements with large RBW and small VBW |
| V3.00 | NB-IoT Standalone - Offset frequency display corrected |
| V2.90 | Extended support for additional HE400 antenna variants |
| V2.80 | Extension of carrier aggregation to 5 carriers |
| V2.80 | Extended support for LTE band 65 (FSH8 only) |
| V2.80 | Digital Demodulation: Improvements on isotropic antenna handling |
| V2.80 | Improved trigger offset and marker display accuracy |
| V2.80 | Improvements on gated trigger for small RBWs |
| V2.71 | Increase maximum Reference Level from 30dB to 50dB in Network Analyzer mode |
| V2.70 | Power Meter: Different improvements |
| V2.70 | Receiver mode: Added coupling between RBW and Sweep Time. |
| V2.70 | 1xEVDO: power of data and the preamble is aligned |
| V2.70 | Added the missing red dot displayed before label SWT in parameter view on setting manual Sweep time |
| V2.70 | Make use of manual range when Spectrogram coupled to Spectrum |

| V2.70 | Network Analyzer: Unit Menu options fixed for Magnitude + Phase measurement format |
|---|---|
| V2.70 | Spectrogram: Settings improvements with spectrogram playback |
| V2.70 | Spectrogram: Threshold selection improvements |
| V2.70 | Network Analyzer: Fix on the switching frequency of the high/low band coupler |
| V2.70 | FSH4View: Frequency Count accuracy included in report generator |
| V2.70 | Transducer problem after shutdown and reboot is fixed |
| V2.70 | Wizard hang issue after loading an invalid dataset is fixed |
| V2.61 | 1xEVDO measurements: Depending on the channel combination in the input signal the pilot power showed higher results than the RF channel total power. |
| V2.61 | The synchronization algorithm for WCDMA signals was improved. |
| V2.61 | WCDMA measurements: The SCPI command that returns the value for CPICH power of antenna 2 was corrected. |
| V2.61 | Dependent on the hardware revision of the FSH-Z18 power sensor the FSH-Z18 was not recognized reliably. This has been fixed. |
| V2.61 | Some Japanese and Chinese language translation improvements were applied. |
| V2.60 | Channel numbers in LTE channel tables corrected. Channel tables for missing LTE and GSM frequency bands added. |
| V2.60 | Channel Power Meter: the RF attenuation was not touched when automatically adjusting the measurement range |
| V2.60 | Communication errors with GPS receiver R&S FSH-Z240 after it was linked to an R&S PR100 |
| V2.60 | Misleading messages during Easy 1-Port calibration were removed. |
| V2.60 | User Preferences: new setting "Use Instrument Calibration Data" added. If set to ON, the current calibration data in Network Analyzer mode will be maintained when loading a dataset. If set to OFF, the calibration data stored in the dataset will be loaded (default behaviour). |
| V2.60 | The SCPI command SWE:POIN? for Spectrum Analyzer and DTF was not working |
| V2.60 | WCDMA channel detection needed improvement with special channel configurations |
| V2.60 | SCPI commands for WCDMA Analysis Length and Carrier Frequency Error Meas Range were missing |
| V2.60 | The power indicator in the interferer search map display sometimes showed different values to spectrum or receiver mode. |
| V2.60 | Receiver Mode sometimes locks up when activating AM Marker Demodulation |
| V2.60 | FSH4View: the Marker values were not correctly aligned for Digital Modulation applications when 1 marker is disabled |
| V2.60 | FSH4View: the Preamp status in a dataset was not displayed |
| V2.60 | FSH4View: GPS Position menu in Maps application didn't work |
| V2.60 | FSH4View: invisible traces cannot be set to visible anymore |
| V2.60 | FSH4View: With active MaxHold function inactive scrambling codes were not displayed in the scrambling code search overview |
| V2.51 | 3GPP WCDMA BTS Application (R&S®FSH-K44): The state of the antenna diversity setting was lost with active Over-The-Air measurement when switching between the Result Summary and Spectrum Overview display. This has been fixed. Increased the number of decimal digits when querying the carrier frequency error using Remote Control |

## 1.4  Known Issues

There are no known issues in this release.

## 1.5 Modifications to the Documentation

You can download the latest manual from the R&S®FSH Handheld Spectrum Analyzer FSH product web page at http://www.rohde-schwarz.com/manual/fsh.

# 2 Firmware Update

New firmware versions usually contain new features, improvements of existing functionality, bug fixes etc. When a new firmware version is available, it is recommended to replace the old firmware with the new one.

**R&S®InstrumentView**

Firmware release V3.20 corresponds to R&S®InstrumentView V2.3.1, which is available on the Rohde & Schwarz web page as a separate update package.

Although older versions of R&S®InstrumentView might be able to communicate with firmware release V3.20, an update of R&S®InstrumentView is highly recommended, as older R&S®InstrumentView versions might not support all functions included in the new firmware release.

FSH4View (a predecessor of InstrumentView) might still be able to communicate with firmware release V3.20, but might not support all functions included in the new firmware release.

**Updating the firmware**

The latest firmware version is available for download on the internet:

http://www.rohde-schwarz.com/firmware/fsh

The installation can be done via SD-Card or via USB-Stick

Before you update the firmware, you should make a backup of the data that you have stored on the R&S®Spectrum Rider FPH (datasets, screenshots, transducer factors etc.). You can make a backup with the tools available in the R&S®InstrumentView software package. The firmware update itself does not delete or modify that data, but it is recommended to perform a factory reset after the firmware update to update predefined limit lines, channel tables etc. The factory reset, however, does delete user data.

## 2.1  Preparing the Installation via SD-Card

In order to update the device after downloading the FSH4_V3_20.EXE installation file, an SD memory card is required, e.g. R&S HA-Z231 (1 GB), order # 1309.6217.00, or R&S HA-Z232 (2 GB), order # 1309.6223.00. Please make sure that your PC is equipped with an SD card reader.

**Preparing the installation files**

Insert an SD card into the SD card reader and wait until Windows® has identified the SD card as a new volume (e.g. D:)

Copy FSH4_V3_20.EXE into the root directory of the SD card, e.g. D:\

Execute FSH4_V3_20.EXE. The self-extracting .ZIP file will be unpacked.

The SD card should now contain the following files:
bootloader_SA_V3_20.bin
osimage_SA_V3_20.bin
updater_SA_V3_20.bin
splashscreen_SA.bmp
FSH4_V3_20.EXE

**Note:**

Please make sure that only one file of each type is present on the SD card. The update mechanism will reject the card if it detects two versions of the same file type (e.g. bootloader_SA_V1_01 and bootloader_SA_V3_20) in the root directory and abort the update later on.

**Prepare the instrument**

Switch the instrument OFF.

Connect the R&S FSH to AC mains via its power adapter.

**Note:**

The instrument firmware will refuse to perform the update if the instrument runs on battery.

Insert the SD card into the SD card slot at the right side of the instrument.

Continue with "Performing the Firmware Update on the Instrument" in Section 6.2.3.

## 2.2 Preparing the installation via USB (instruments with serial numbers above 105000)

In order to update the device after downloading the FSH4_V3_20.EXE installation file, a USB stick is required.

**Preparing the installation files**

Insert a USB stick into the USB slot and wait until windows has identified the USB stick as a new volume (e.g. D:)

Copy FSH4_V3_20.EXE into the root directory of the USB stick, e.g. D:\

Execute FSH4_V3_20.EXE. The self-extracting .ZIP file will be unpacked.

The SD card should now contain the following files:
bootloader_SA_V3_20.bin
osimage_SA_V3_20.bin
updater_SA_V3_20.bin
splashscreen_SA.bmp

FSH4_V3_20.EXE

**Note:**

Please make sure that only one file of each type is present on the SD card. The update mechanism will reject the card if it detects two versions of the same file type (e.g. bootloader_SA_V1_01 and bootloader_SA_V3_20) in the root directory and abort the update later on.
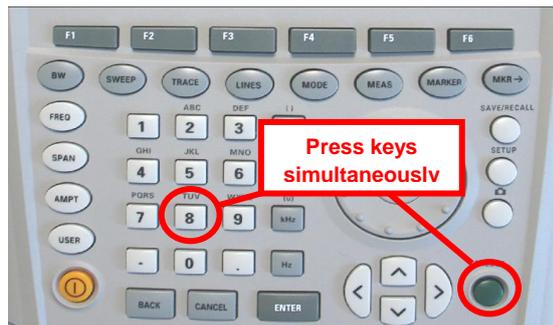
**Prepare the instrument**

Switch the instrument OFF.

Insert the USB stick into the USB slot of the instrument.

## 2.3   Performing the Firmware Update on the Instrument

The firmware update process is performed by the following steps:

1.   Press the keys PRESET and 8 on the numeric keypad simultaneously.



2.   Switch the instrument on and keep PRESET and 8 pressed for at least 5 seconds after the startup screen has appeared on the screen.
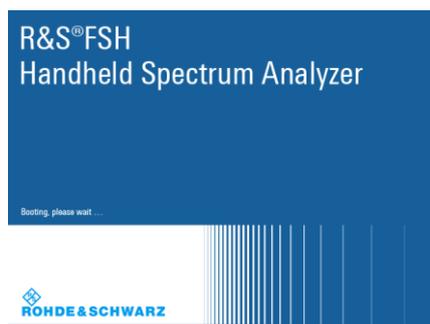


3.   Release the keys PRESET and 8.

The FSH will continue its boot process and after a couple of seconds the following information will appear on the screen:

_____

Instrument Firmware Update

Searching for firmware update (updater_*.bin)
…Found \USB\updater _SA_V3_20.bin

…OK
Checking updater_SA_V3_20.bin: … OK

_____

Update instrument to software version V3.20
Press [ENTER] to update the firmware.
Press [CANCEL] to abort firmware updating.

_____

**Note:**

If the AC mains connection is missing at the start of the firmware update process, the following message will appear at the bottom of the screen in step 3:

_____

Instrument not powered by the power adapter. Please connect power adapter.
Press [ENTER] to retry.
Press [CANCEL] to abort firmware updating.

_____

In this case check the power supply connection.
Continue the update process with step 4.

4.  Press ENTER to start the firmware update process.

    The instrument will perform the firmware update. This will take about 5 minutes. The progress of the update will be displayed in a sequence of messages on the screen.

    **Warning:**

    Do not switch the instrument off during the update process in order to avoid data corruption of the internal flash memory!

5.  As soon as the firmware update is completed, the R&S FSH will display the following message at the bottom of the screen:

_____

Firmware updating is successfully completed.
Please switch off the instrument.

_____

Switch the instrument off and on again. The FSH will boot with the new firmware version.

6.  After the boot process is completed, press SETUP – INSTRUMENT SETUP.
    Select "RESET TO FACTORY SETTINGS" by moving the cursor down the list
    with the cursor keys or the rotary knob. Confirm the selection with ENTER, and re-
    confirm with YES when prompted.
    Please be patient: the subsequent reset and reboot process will take about a
    minute to complete.

    **Note:**

    Restoring the factory settings is necessary to update the pre-installed channel
    tables, cable models and transducer factors. If this step is omitted, bug fixes and
    updates to these pre-installed files will not be installed.

7.  For instrument models .14, .18, .24 and .28 perform a self alignment according to
    chapter 6.2.4, if the instrument was equipped with firmware version 1.10 or below.

## 2.4  Performing the Self Alignment on the Instrument

This section is relevant for R&S FSH4.14, R&S FSH8.18, R&S FSH4.24 and
R&S FSH8.28 when being updated from firmware versions below V2.00.

In Network operating mode the instrument models R&S FSH4.14, R&S FSH8.18, R&S
FSH4.24 and R&S FSH8.28 support a default set of calibration data, the so-called
factory calibration. This dataset is used whenever the instrument displays "fcal" in the
title bar.

Instruments equipped with firmware versions below V2.00 need an update of this
dataset, as V3.20 uses improved algorithms which need more data in order to obtain
optimum results.

The self alignment procedure requires a calibration standard R&S FSH-Z28 (order #
1300.7810.03), which is suitable for R&S FSH8 and R&S FSH4 instruments, or at least
a calibration standard R&S FSH-Z29 (order # 1300.7510.03) for R&S FSH4
instruments. In addition a RF cable with two N connectors is required in order to
provide a through connection between measurement port 1 and port 2.

The self alignment is performed by the following steps:

1.  Switch the instrument on

2.  Select Network operation by pressing MODE – NETWORK.

3.  Make sure that the instrument runs for at least 30 minutes at room temperature.

4.  Press the keys SETUP – INSTRUMENT SETUP. Place the cursor on the menu
    entry "Self Alignment" by scrolling the menu bar down with the rotary knob and
    press ENTER.

    The instrument will prompt you to confirm that the factory calibration data will be
    overwritten.

5.  Press softkey YES.

The self alignment procedure will start and prompt you to connect the calibration standards and the through connection to port 1 and 2 in the sequence.

6. Follow the instructions until the instrument reports "Self Alignment Done!".

7. Press softkey EXIT to return to the measurement screen.

# 3  Firmware Options

You can equip the R&S®FSH Handheld Spectrum Analyzer FPH with optional functionality or firmware options like the analog demodulation application or the receiver application. These firmware options expand the functionality of the R&S®Spectrum Rider FPH with new measurement functions settings etc.

This section can be skipped if the option keys were already entered once. Option keys are not affected by a firmware update.

To activate application software packages, you must enter a license key for validation. The license key is in the device certificate or delivered as a part of the software package. The process is performed in the following steps:

Press the SETUP key.

Press the softkey INSTALLED OPTIONS.

Use the rotary knob or the cursor keys to select the INSTALL OPTION… menu item and confirm the entry with the ENTER key.

Enter the key code ( 32 digit number) for the option with the numeric keys and confirm with the ENTER key.

If the correct key code is entered, the R&S FSH displays "Installation successful", and the option is marked as "Installed" in the option list (example: Remote Control (K40)).

If an invalid key code is entered, the R&S FSH displays "Invalid key code!". The correct key code can then be entered.
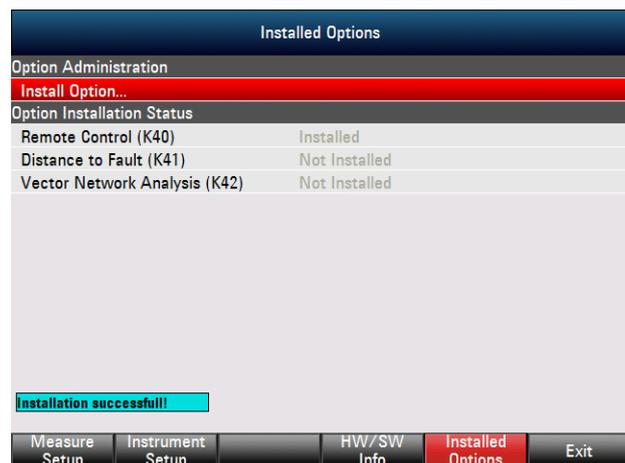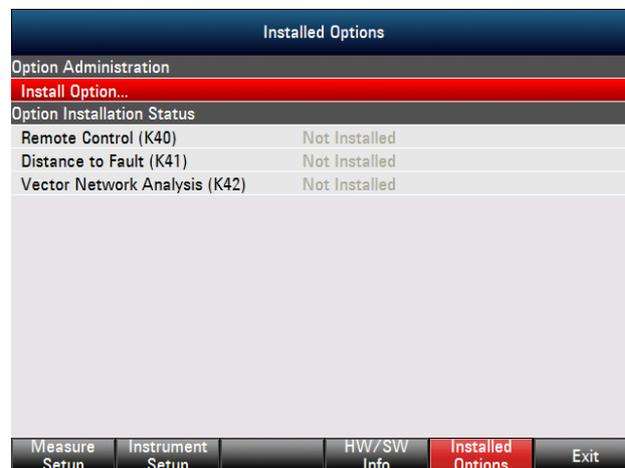
# 4  Customer Support

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

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

**Up-to-date information and upgrades**

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

**Europe, Africa, Middle East**
Phone +49 89 4129 12345
customersupport@rohde-schwarz.com

**North America**
Phone 1-888-TEST-RSA (1-888-837-8772)
customer.support@rsa.rohde-schwarz.com

**Latin America**
Phone +1-410-910-7988
customersupport.la@rohde-schwarz.com

**Asia/Pacific**
Phone +65 65 13 04 88
customersupport.asia@rohde-schwarz.com

**China**
Phone +86-800-810-8828 / +86-400-650-5896
customersupport.china@rohde-schwarz.com