



**ROHDE & SCHWARZ**

Test and Measurement  
Division

## Release Notes

# Firmware Release 4.40 (XP)

with Service Pack 2

**for R&S FSP Spectrum Analyzers**

with order number: **1164.4391.xx**

### New Features:

- Configurable Spectrum Emission Mask measurement available in analyzer mode.
- ACP measurement: User definable standards.
- ACP measurement: New standards for E-UTRA / LTE.
- External Reference: New "Fall Back to Internal" mode EXT [INT].
- TOI Measurement: New TOI Marker search function added.
- Additional Overload indication OVTRC.
- TRAC:IQ sub system: New remote command TRAC:IQ:DATA:FORMAT.
- Auto Login Password changed for user instrument to "123456".
- General Setup: Baudrate 19200 for serial COM interface is now selectable.
- Harmonic Measurement: Additional remote command available to get the used resolution bandwidth settings.
- HP emulation: Additional and modified functions.
- Support for Power Sensor NRP-Z28, NRP-Z92 and NRP-Z98.
- FSP-B10 additionally supports SMBV100a, SMA100a and SMB (TTL mode).
- Support for new 3GPP HSPA+ Application Firmware R&S FS-K73+.

Release Note Revision: 7

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## History

Date	Rel Note Rev	Changes
December 09, 2008	1	First revision for V4.40
December 17, 2008	2	GPIB Commands of HP Models removed.
January 15, 2009	3	Support for Power Sensor NRP-Z28, NRP-Z92 and NRP-Z98 and support for R&S SMBV100a and R&S SMA100a added.
January 23, 2009	4	Save/Recall dependencies added, additional fixed problem entries, known problems added, SEM standard file list corrected.
February 13, 2009	5	SEM measurement: Missing command description added, known problem with SEM measurement added.
February 24, 2009	6	Problems eliminated with Service Pack 1 added.
April 27, 2009	7	Problems eliminated with Service Pack 2 added.

# General Topics

## Firmware Update

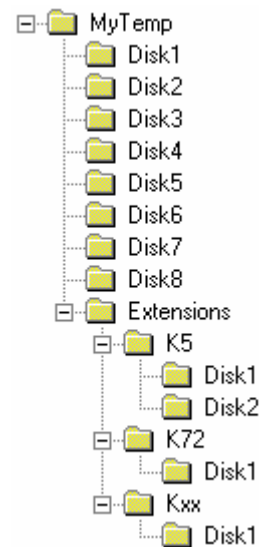
Since basic firmware version V4.20 a ZIP file with basic system firmware and the newest available applications is provided. This ZIP file is available in the instruments FIRMWARE section of the Service Board on GLORIS.

### Preparing installation via USB stick or LAN:

- Download the update set ZIP file.
- Extract the contents of the ZIP file to a temporary folder, e.g. C:\MyTemp.  
Other files (e.g. release notes) shall not be stored in these directories. These files would be copied on harddisk and may cause a disk full problem on drive E:.
- Now copy the content of the temporary folder including all sub folders to a USB stick.
- The USB stick is now ready to for performing the update.

Following extension's sub folder are used for the instrument's applications:

- K5
- K30
- K40
- K72 (includes K73)
- K76 (includes K77)
- K82 (includes K83)
- K84 (includes K85)
- K90
- K92 (includes K93)



### Performing the firmware update on the instrument

A new method to install the base system and all required applications is available, if the installed base system firmware is V4.10 or newer. For updating to version 4.10 or newer first update the bases system only to get the new update manager. Then update the base system and all applications using the new update manager.

**Base System Update from version < 4.10 to 4.10 or newer:**

Skip this step, if the installed base system firmware is V4.10 or newer. The firmware update process is performed in the following steps:

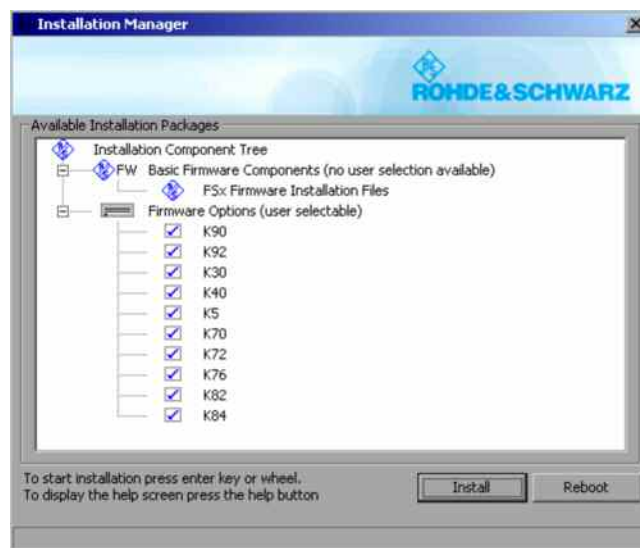
- Switch the instrument on and wait until the Analyzer has resumed operation.
- Use the SETUP | NEXT | FIRMWARE UPDATE | UPDATE PATH softkey to specify any path for the location of the disk directory (e.g. F:\MyTemp).
- Press SETUP → NEXT → FIRMWARE UPDATE
- Confirm the query "Do you really want to update the firmware?" with OK.
- Confirm the copy process.
- The instrument will perform several automatic shutdowns, until the new base system firmware is installed properly.

**Do not switch the instrument off until the update process has been finished completely.**

**Complete Update with update manager:**

- Use the SETUP | NEXT | FIRMWARE UPDATE | UPDATE PATH softkey to specify any path for the location of the disk directory (e.g. F:\MyTemp).
- Press SETUP → NEXT → FIRMWARE UPDATE
- Confirm the query "Do you really want to update the firmware?" with OK

The *Installation Manager* will terminate the analyzer application, search for available application update set and will show a selection list.



- Deselect applications, not to be installed and start the installation process with INSTALL.
- REBOOT will abort the update and restart the analyzer application without any changes.
- The instrument will perform several automatic shutdowns, until the new firmware and all applications are installed properly.

**Do not switch the instrument off until the update process has been finished completely.**

After a successful firmware update it is necessary to execute the instrument's self alignment process by pressing CAL and softkey CAL TOTAL.

## Known problems during firmware update

### Firmware update with FSP-B20 (flash disk):

At the final step of the setup, backup files are stored for the 'Analyzer Firmware Backup' (option during the start-up of the instrument). This backup is only available for analyzers equipped with hard discs. Therefore an error message "Add folder icon failed" occurs twice if the FSP-B20 is installed.

Workaround: Accept that message via the 'OK' button twice. The firmware update will continue without any problem! This problem is solved with version 3.50 or later.

### Downgrade of version V3.60 (or later) to versions below V3.60 (only if FS-K40 or FSP-K90 is installed):

#### 1<sup>st</sup> solution

Before downgrading version V3.60 (or later) to a version below V3.60 and FS-K40 or FSP-K90 is installed on the instrument, the following directories have to be removed (e.g. with FILE - FILE MANAGER) **before** starting the downgrade:

*D:\R\_S.FW\Update\Extensions\K40 and*

*D:\R\_S.FW\Update\Extensions\K90*

After deleting those directories the FS-K40 or FSP-K90 which are compatible to the downgraded base system version needs to be installed as well.

Without deleting both directories the downgrade version of FS-K40 or FSP-K90 will be deleted during the installation procedure due to version conflicts.

#### 2<sup>nd</sup> solution

A second possibility is to downgrade the base system, FS-K40 and FSP-K90 during the **same** installation step. Use the feature to answer YES when the message box 'Do you want to install an option firmware' appears, and insert the discs of the compatible downgrade option, or change the UPDATE PATH to another directory where the option update disk set is located. With this solution no manual deletion of directories is necessary.

## Firmware installation of the R&S FS-K7 FM demodulator, R&S FS-K8 BLUETOOTH Analyzer software and R&S FS-K9 power sensor measurement

The R&S FS-K7, R&S FS-K8 and R&S FS-K9 application software packages are included in the basic instrument firmware. It therefore needs no separate firmware update procedure.

### Enabling these options via option key code entry

This section can be skipped if the option key was entered once.

For activation of these application software packages a license key for validation must be entered. The license key is printed either on a label on the rear panel of the R&S FSP or delivered as a part of the software package.

The key sequence for entering the license key for every option is:

SETUP - GENERAL SETUP – OPTIONS - INSTALL OPTION

Use the numeric keypad to input the option key number and press ENTER.

- On a successful validation the message 'option key valid' will appear.
- If the validation failed, the option software is not installed.

## Compatibility to other Firmware Option Packages

The following firmware option packages are available with their own disks and they must be installed separately. Please refer to their release notes.

R&S FSP V4.40 SP2 is compatible to the following firmware option releases:

R&S FS-K5	R&S FS-K30	R&S FS-K40	R&S FS-K72 FS-K73 FS-K74	R&S FS-K76 FS-K77	R&S FS-K82 FS-K83	R&S FS-K84 FS-K85	R&S FSP-K90	R&S FSP-K93
4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40

### Hint:

Applications with the version number 3.xx / 4.xx are only compatible with basic firmware 3.yy / 4.yy (see table above).

Do not install application firmware with versions 1.xx or 2.xx on an R&S FSP with basic firmware 3.yy or 4.yy!

## New Functions in Version 4.40

- Configurable Spectrum Emission Mask measurement available in analyzer mode.
- ACP measurement: User definable standards.
- ACP measurement: New standards for E-UTRA / LTE
- External Reference: New "Fall Back to Internal" mode EXT [INT].
- TOI Measurement: New TOI marker search function added (TOI MKR CALC/SRCH).
- Additional Overload indication OVTRC.
- TRAC:IQ sub system: New remote command TRAC:IQ:DATA:FORMAT.
- Auto Login Password changed for user instrument to "123456"  
It is now possible to enter the password after remote desktop connection by the front panel.
- General Setup: Baudrate 19200 for the serial COM interface is now selectable.
- Harmonic Measurement: Additional remote command to get the used resolution bandwidth settings (CALCulate1:MARKer1:FUNCTion:HARMonics:BANDwidth[:LIST]?)
- HP emulation:
  - command OL expanded
  - no difference between local and remote sweep points
- HP emulation for 8560E, 8561E, 8562E, 8563E, 8564E, 8565E
  - Spurious Measurement: threshold line is take into account for calculating of resolution bandwidth and noise level, message box "RBW/VBW coupling adjusted" suppressed
  - Harmonic Measurement: modified algorithm for finding harmonics
  - Phase Noise Measurement: some minor adjustments
  - Support of 4 markers
  - Corrections of RBW calculation if FFT-Filter is switched on
  - Command MKNOISE, MKTRACK: correction of return value
  - Sweep time adjusted for gated sweep (command GATE)

- **HP emulation for 8566A/B, 8568A/B**
  - Support of 4 markers
- **HP emulation for 8591E, 8594E**
  - sweep time adjusted for gated sweep (command GATE)
- **FS-K9: Support for Power Sensor NRP-Z28, NRP-Z57, NRP-Z92 and NRP-Z98.**
- **FSP-B10: Support for SMBV100a, SMA100a and SMB (TTL mode).**
- **Support for new 3GPP HSPA+ Application Firmware R&S FS-K73+.**

## Modified Functions

The version numbers in brackets indicate the version in which the function was modified.

### 1. (V3.00) Hardcopy screen comment changed to one comment, not one per screen

### 2. (V3.30) Change to SMR setting files for external generator control:

This change enables significant improvements in frequency settling with logarithmic frequency step sizes.

### 3. (V3.40) Active transducer and adjust reference level procedure:

If transducers are active and the adjust reference level procedure (in measurements like ACP, occupied bandwidth, signal statistics, etc.) is invoked, the *REFLVL ADJ AUTO/MANUAL* of the SETUP|TRANSDUCER menu is set to AUTO thus the best dynamic performance is obtained.

### 4. (V3.60) Marker peak list in continuous sweep mode

In continuous sweep mode the marker peak list is not any longer executing a single sweep and then peak list search, but the peak list will immediately work on the current trace. This allows peak list functionality on averaged or max holded traces in continuous sweep mode. The single sweep mode is unchanged.

### 5. (V3.60) RS232 serial remote control

Since version 3.60 the instrument goes in remote mode rather than in local mode when a command is send through the RS232 remote interface. This means the display disappears and the LOCAL softkey appears as when the GPIB bus is used. To change between local and remote mode the commands @LOC and @REM can be send to the instrument.

### 6. (V3.70) Harmonic measurement

The mixer level within the harmonic measurement is changed to -10 dBm.

The value update in the lower screen happens during the sweep and not only at sweep end.

### 7. (V3.80) Modifications to HP commands

- Command IP resets format to O3
- Reading a trace with TRA; TRB or TRC is possible even if trace is blank
- Great changes of span (e.g. from 2GHz to 100KHz) will not lost signal when marker track is on.

### 8. (V3.90) CCDF measurement result table extended by 0.01% value.

### 9. (V3.90) New marker functions AUTO MAX PEAK and AUTO MIN PEAK.

### 10. (V3.90) HP emulation: HP Models 71100C, 71200C and 71209A are using 800 sweep points

### 11. (V4.00) Additional number of sweep points 201, 401, 801 and 1601.

### 12. (V4.00) HP emulation: Additional models 8568A\_DC and 8568B\_DC using DC coupling.

### 13. (V4.00) HP emulation: GENERAL SETTINGS - GPIB menu extended by IF GAIN NORM / PULS

### 14. (V4.00) New spurious emissions measurement LIST EVALUATION.

### 15. (V4.00) FS-K7: The THD Unit is selectable (dB / %) in the AM signal / AF spectrum result.

### 16. (V4.00) New function MARKER FILE EXPORT.



**17. (V4.00) Signal Track: Enhanced sensitivity in marker tracking function.**

The marker is now set to the signal peak after very single sweep. In previous versions, this only happened if the difference between signal peak and center frequency exceeded 20 % of the Resolution Bandwidth.

**18. (V4.00SP1) Support for CPU board 1091.2895.****19. (V4.10) Improved Firmware Update.****20. (V4.10) New enhancement label to indicate filter type.**

3DB	Gauss filter 3dB
6DB	EMI filter 6dB
FFT	FFT filter
CHN	Channel filter
RRC	RRC filter

**21. (V4.10) Gated statistics measurements APD, CCDF.****22. (V4.10) FS-K8 Enhanced Data Rate (EDR) supported.****23. (V4.10) Support for Power Sensor NRP-Z81.****24. (V4.10) GPIB: Basic remote control of the signal generator which is connected to the additional FSP-B10 GPIB Interface.****25. (V4.10) GPIB: New commands available**

:[SENSe<1 2>:]CORRection:TRANsducer:ACTive?	returns active transducer
:CALCulate<1 2>:LIMit<1...8>:ACTive?	returns active limit line(s).

**26. (V4.10) Trigger Line for video trigger now also visible outside of the trigger menu.****27. (V4.10) HP emulation: The OL command returns the mixer level in byte 23.****28. (V4.10) HP emulation: The commands MKPK NH | NL | NR and KSK do not perform a sweep start when marker is already switched on.****29. (V4.10) HP emulation: The commands SNGLS and CONTS are setting the command complete bit (bit 4) in STB.****30. (V4.10) HP emulation: New softkey SETUP - GENERAL SETUP - GPIB - SWEEP REP ON/OFF".****31. (V4.10) HP emulation: New commands: VARDEF, CTA, ADD, SUB, MPY, DIV.****32. (V4.10) HP emulation: New command NORMLIZE for tracking generator.****33. (V4.10) HP emulation: The command LF performs a reset.****34. (V4.10) LXI Class C support.****35. (V4.10) Support for FSP-K93.****36. (V4.20) Easy access to Windows XP Start menu.****37. (V4.20) Required sweeptime reduced for video bandwidth < resolution bandwidth.****38. (V4.20) ASCII Export function for Marker Peak List.****39. (V4.20) Adjustable marker position knob stepsize.****40. (V4.20) New trace average function Power.****41. (V4.20) HP emulation: Personality Spurious supported.****42. (V4.20) HP emulation: Personality Phase Noise supported.****43. (V4.20) FSP-B10: Upper frequency limit of SMF100A is now 43.5 GHz.****44. (V4.20) The Aquisition Time (for FFT filter) is now readable with remote command "SENS:SWE:TIME?".****45. (V4.20 SP1) FSP-B10: Support for SMA100, SMB100 (1/2/3/6GHz), SMF (22/43GHz) SMJ (3/6GHz).**

- 46. (V4.20 SP1) FSP-B10: Support for SMF100a - TTL mode.**
- 47. (V4.20 SP1) FSU-B21 with Order Number 1157.1126.03 supported.**
- 48. (V4.20 SP1) For local lockout the alias remote command SYSTem:KLOCK ON | OFF is provided.**
- 49. (V4.30) International keyboard driver package supported (German, Spanish, French, Italian and Portuguese).**
- 50. (V4.30) New dialogs available for file/path selection (e.g. for Trace Export, Firmware Update Path).**
- 51. (V4.30) ACP: Extended upper limits for Channel Bandwidth (5GHz) and Channel Spacing (20GHz).**
- 52. (V4.30) ACP: Overlapping Adjacent Channels allowed now for parallel measurements.**

It is now possible to configure overlapping adjacent channels. Based on a common carrier channel setting, it is now possible to measure with two slightly different ADJ channel settings with one measurement.

Example: TX Channel / TX Bandwidth (common for both measurement A and B)  
ADJ used for measurement A  
ALT1 used for measurement A

ALT2 used as ADJ for measurement B  
ALT3 used as ALT1 for measurement B
- 53. (V4.30) ACP Measurement: Result output format changed for number of ADJ channels > 3.**
- 54. (V4.30) Additional soft keys available to change the LAN configuration.**
- 55. (V4.30) Save dialog reports a warning, if no item to save is selected.**
- 56. (V4.30) The increment behaviour of the step keys for parameter SWEEP POINTS is changed.**

The behaviour of the knob wheel still has the highest possible resolution.
- 57. (V4.30) Dummy Video Bandwidth 0 Hz returned for active FFT filter.**
- 58. (V4.30) Availability changed for Spurious Measurement.**

The Spurious Measurement is not available if the ACP measurement is active.
- 59. (V4.30) HP emulation: Additional remote commands are supported.**

The following commands are supported: ML, MEAS, SUM, LIMIPURGE, EDITLIML, LIMIREL, SDEL, SADD, LIMF, LIMU, LIML, LIMM, LIMD, LIMTFL, LIMTSL, SDON, EDITDONE, LIMISAV, LIMIRCL, LIMITEST, LIMIFAIL
- 60. (V4.30) HP emulation: A new softkey COUPLING FSP/HP is now available to change the Span/RBW and RBW/VBW default coupling.**
- 61. (V4.30) HP emulation: The default for Sweep Repeat is now OFF for 856x and 859x.**
- 62. (V4.30) FSU-B9: The number of sweep points allowed in analyzer mode is now supported in NETWORK mode, too.**
- 63. (V4.30) FS-K7: Deemphasis is now additionally supported for active Weighting AF Filter CCTT and CCIR.**
- 64. (V4.30) Support for new option 3GPP HSPA+ Application Firmware R&S FS-K74+.**
- 65. (V4.30) Application Setup Recovery restores previous settings after application exit.**
- 66. (V4.40) Configurable Spectrum Emission Mask measurement available in analyzer mode.**
- 67. (V4.40) ACP measurement: User definable standards available.**
- 68. (V4.40) ACP measurement: New standards for E-UTRA / LTE.**
- 69. (V4.40) External Reference: New "Fall Back to Internal" mode EXT [INT].**
- 70. (V4.40) TOI Measurement: New TOI marker search function added (TOI MKR CALC/SRCH).**

- 71. (V4.40) **Additional overload indication OVTRC.**
- 72. (V4.40) **TRAC:IQ sub system: New remote command TRAC:IQ:DATA:FORMAT.**
- 73. (V4.40) **Auto Login Password changed for user instrument to "123456".**  
It is now possible to enter the password after remote desktop connection by the front panel.
- 74. (V4.40) **General Setup: Baudrate 19200 for the serial COM interface is now selectable.**
- 75. (V4.40) **Harmonic Measurement: Additional remote command to get the used resolution bandwidth settings:**  
**CALCulate1:MARKer1:FUNCtion:HARMonics:BANDwidth[:LIST]?**
- 76. (V4.41) **FS-K9: Support for Power Sensor NRP-Z28, NRP-Z92 and NRP-Z98.**
- 77. (V4.40) **FSP-B10: Support for SMBV100a, SMA100a and SMB (TTL mode).**
- 78. (V4.40) **Support for FS-K73+.**
- 79. (V4.40) **HP emulation**
  - command OL expanded
  - no difference between local and remote sweep points
- 80. (V4.40) **HP emulation for 8560E, 8561E, 8562E, 8563E, 8564E, 8565E**
  - Spurious Measurement: threshold line is take into account for calculating of resolution bandwidth and noise level, message box "RBW/VBW coupling adjusted" suppressed
  - Harmonic Measurement: modified algorithm for finding harmonics
  - Phase Noise Measurement: some minor adjustments
  - Support of 4 markers
  - Corrections of RBW calculation if FFT-Filter is switched on
  - Command MKNOISE, MKTRACK: correction of return value
  - Sweep time adjusted for gated sweep (command GATE)
- 81. (V4.40) **HP emulation for 8566A/B, 8568A/B**
  - Support of 4 markers
- 82. (V4.40) **HP emulation for 8591E, 8594E**
  - sweep time adjusted for gated sweep (command GATE)

## Problems eliminated

The version numbers in brackets indicate the version in which the problem was observed for the first time.

- 1. (V4.20) **Analyzer application slows down after several thousand PRESETs or \*RST commands.**
- 2. (V4.30) **The instrument crashes if the dialog SETUP – GENERAL SETUP – OPTIONS – FW EXTENSION is left by ESC/CANCEL without a file name being entered.**
- 3. (V4.30) **ACP Power Mode MAX HOLD is set to it's default after the selection of C/N measurement.**
- 4. (V4.20) **Signal Statistics: Changing sweep mode to SINGLE SWEEP is ignored for other measurement modes, e.g. ACP, C/N or C/N0.**
- 5. (V4.30) **Signal Statistics: Gated Statistics with more than one active trace does not work.**  
The measurement is internally restarted if the the required number of samples for all traces is not reached. As a result in single sweep mode the measurement does not terminated.
- 6. (V4.30) **Spurious Emissions: TRANSDUCER function REF LVL ADJ AUTO is not taken into account for spurious emissions measurement.**  
The transducer function REF LVL ADJ AUTO is not supported for spurious emissions measurement. As a result the allowed reference level range is not adjusted if the function REF LVL ADJ is set to AUTO and a transducer is activated in the related sweep range.

**7. (V4.30) The remote command ":DISP:FORM:SPL" generates an error message "Invalid separator".**

Only the long form of the command ":DISPLAY:FORMAT SPLIT" is correctly handled.

**8. (V4.30) Signal Track loses signal during manual reduction of span.**

**9. (V4.30) Softkey CONTINUE SGL SWEEP indicates wrong sweep state if the sweep is restarted.**

**10. (V4.30) FSU-B9, FSP-B10: Normalization fails if the number of sweep points is changed.**

The normalization does not work, if the number of sweep points is changed after performing the source calibration. APX is correctly indicated but the interpolation of the source calibration data fails.

Workaround: Redo a source calibration with the new number of sweep points.

**11. (V4.30) FSP-B10: A level error of 0.5 dB is visible when changing bandwidth from 1MHz to 100 kHz.**

The required increased sweep time for normalization with external tracking generator is not taken into account.

## Problems eliminated with Service Pack 1

Service Pack 1 fixes the following problems. The version numbers in brackets indicate the version in which the problem was observed for the first time.

**1. (V4.40) Gated Statistic Measurements (APD, CCDF) with a number of samples > 100 000 do not work.**

Wrong I/Q samples may be taken into account if the gate function is activated and the number of samples is above 100 000.

**2. (V4.30) The behaviour of a pressed Knob Wheel in K91/K93 dialogs is corrected.**

**3. (V4.40) ACP measurement: The ACP measurement does not work, if a Spectrum Emission Mask measurement was active before.**

The ACP measurement results are not visible and not valid in that situation.

**4. (V4.40) SEM measurement: A Minimum Peak of -400 dB is displayed.**

This problem is caused by a rounding problem concerning measurement results, selected sweep points and graphical resolution.

## Problems eliminated with Service Pack 2

Service Pack 2 fixes the following problems. All previous service packs are included.

**1. (V4.40) FS-K8: EDR Carrier Frequency Stability and Modulation Accuracy**

The calculation of the initial frequency error has been adjusted to the CBT implementation to minimize differences between both devices. Therefore transition bits of the GFSK header are no longer evaluated.

**2. (V4.40) The system crashes after shutdown (with ALT F4) and restart of the analyzer application**

**3. (V4.40) Remote command "STAT:QUES?" returns a wrong CAL state.**

The instrument returns the wrong status value for bit 8 (CALibration), if the display is switched off (done by default or after sending the remote command SYST:DISP:UPD OFF).

## Known Problems

This chapter includes firmware problems related to the basic instrument firmware.

For problems related to option packages R&S FS-Kxx please refer to the corresponding release notes of the individual option package.

The version numbers in brackets indicate the version in which the problem was observed for the first time.

**1. (V4.40) Function SGL SWEEP – DISP OFF does not activate the display at sweep end.**

**2. (V4.40) SEM Measurement: It is not possible to generate a save set while the measurement is running.**

**Work around:** Stop the measurement before using SAVE/RECALL.

## Modifications to the Operating Manual

The order numbers for the current manual sets are

- 1164.4556.11-05 (German) and
- 1164.4556.12-05 (English).

The corresponding PDF-Files are separately available on the service board.

The firmware options FS-Kxx come with their own operating manual and release notes. Please refer to the corresponding release notes for more information on changes to these packages.

## Last minute changes to the operating manual

### Manual Operation

#### Displays in the Diagram Area – Status displays (Quickstart Manual)

- OVTRC** Indicates a temporary overload condition of the input mixer or IF signal path while the trace is measured with Max Hold, Min Hold or Average (Overload Trace). OVLD and IFOVL overlaps this indication.
- Restart the measurement.

#### Basic Settings - Instrument Drives Usage

The instrument's harddisk is divided in 3 (or 2) logical drives:

- C:** Contains the operating system Windows XP, printer driver, network driver,...

**Other user programs, applications, driver should be stored/installed on drive C:.**

- D:** Contains instrument's firmware and related data sets (limit lines, transducer,...)  
D:\user\config is the default location for customer's instrument settings  
D:\R\_S\instr\temp is the default directory for hardcopy files.

**Other user data should be stored on drive D:.**

- E:** Backup storage location for Windows XP. Here a copy of the operating system is saved. This drive is used to restore Windows XP using "Analyzer Firmware Backup" function on Power On. A copy of the currently installed update sets are located on this drive, too. This drive is not available on instruments with option B18 Removable Harddisk

**No additional data should be stored on this drive.**

#### Basic Settings - International Keyboard Support

Since firmware version 4.3x following international keyboard drivers are supported.

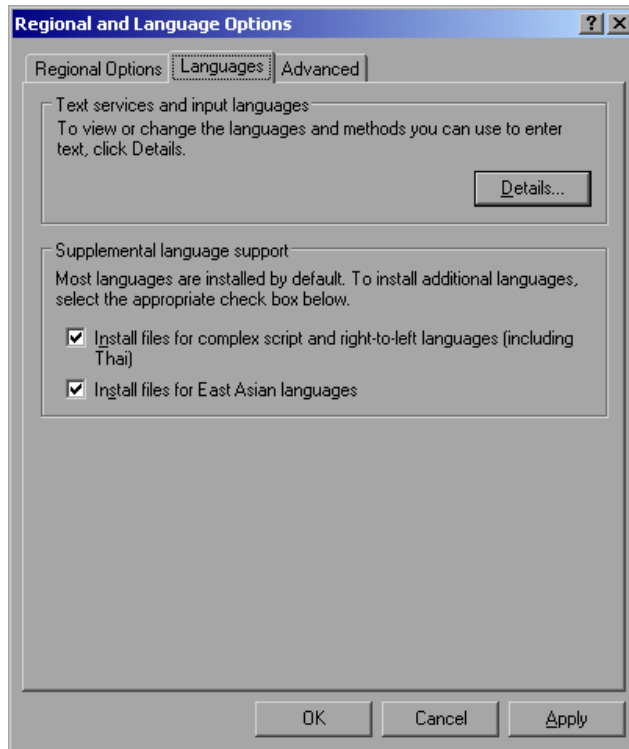
- **French Keyboards**
- **German Keyboards**
- **Italian Keyboards**
- **Portuguese Keyboards**
- **Spanish Keyboards**

These drivers are pre installed if the instrument is shipped with version 4.3x or later. A separate installer file is available on the instrument's download area.

To change the keyboard driver language proceed with the following steps:

- 1) Start Windows Explorer
- 2) Start the installation procedure with double click onto the file **FsxInternationalKeyboards.msi**.
- 3) Reboot the analyzer.
- 4) Now open the windows start menu by pressing the windows key or <CTRL> <ESC>.

- 5) Select *Settings* - *Control Panel* - *Regional and Language Options* - *Languages*.

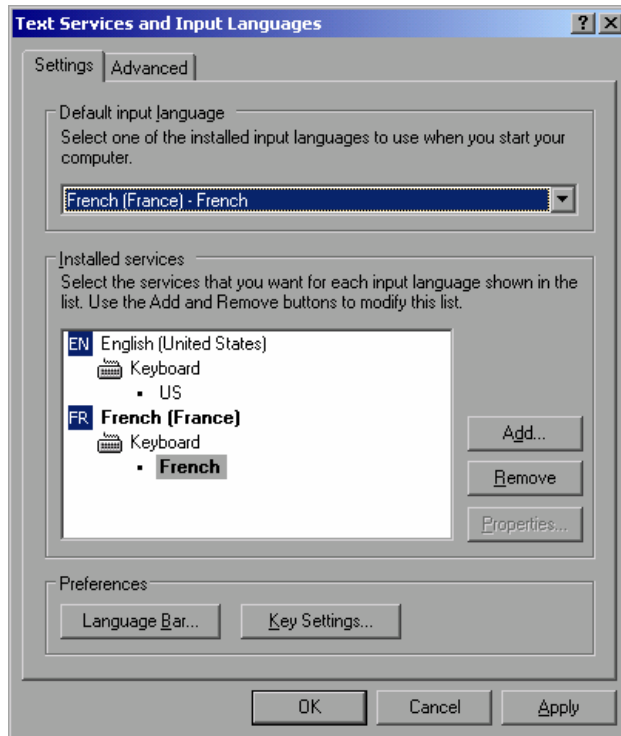


- 6) Select *Details*.



- 7) Select *Add*, choose one of the available input languages and confirm with OK and the dialog will be close.

- 8) Now change the *Default input language* as needed and close all open dialogs with OK.



- 9) Reboot the analyzer.

## Basic Settings - File and Path Selection using front panel keys

Since firmware version 4.3x the analyzer base system firmware supports new dialogs to select a folder and/or a file, e.g. for trace export.

The following section describes the usage of the instrument's front panel keys using TRACE EXPORT as an example.



*TRACE - NEXT - ASCII FILE EXPORT* opens the dialog.

*File name* has the focus and it is now possible to edit the filename using numerical keys, CURSOR LEFT/RIGHT and BACK.

The drive to be used is checked in following order:

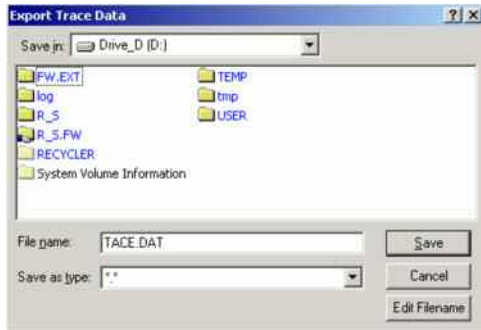
- Connected USB memory stick  
if not available then
- Drive A:  
if not available or no floppy disk inserted then
- Drive D:

**Note:** Path and filename are reset to default values with PRESET.



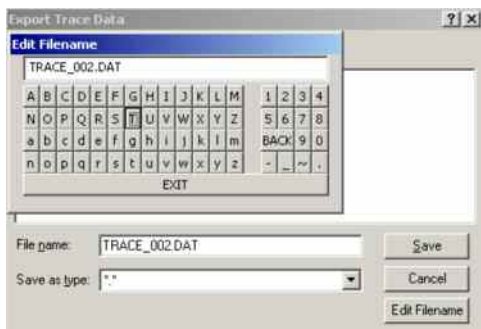


To *change the drive* use the rotary knob until *Save in* gets the focus and press CURSOR RIGHT. Now use CURSOR UP/DOWN to select the drive and press ENTER key or the rotary knob.



To *select a sub folder* or to *select a file* use the rotary knob until the file/sub folder list gets the focus. A selection frame is visible in that case.

Now use CURSOR UP/DOWN to select a folder and press ENTER key or the rotary knob to change the path or select a file to overwrite this file with the new data.



To enter alpha numeric characters for the file name use the rotary knob to set the focus on *edit filename* and press ENTER key or the rotary knob.

## Saving and Recalling Data Sets – FILE Key

### Overview

The FILE key calls the following functions:

- Storage/loading functions for storing (SAVE) instrument settings such as instrument configurations (measurement/display settings, etc.) and measurement results from working memory to permanent storage media, or to load (RECALL) stored data into working memory.
- Functions for management of storage media (FILE MANAGER). Included are among others functions for listing files, formatting storage media, copying, and deleting/renaming files.

The R&S FSP is capable of internally storing complete instrument settings with instrument configurations and measurement data in the form of data sets. The respective data are stored on the internal hard disk or, if selected, on a memory stick or on a floppy. The hard disk and floppy disk drives have the following names:

floppy disk A:

hard disk D: (hard disk C: is reserved for instrument software)

USB memory stick

### Important note:

It is possible to load data sets stored with another instrument of the same analyzer family. But the following restrictions as to be kept in mind:

- The frequency range of the loading instrument must include the range of the instrument used to store the data set.

#### Example:

A FSP 40 can load a data set, saved with a FSP 30 but a FSP 7 can not load a data set saved with a FSP 30. A FSP with a frequency range of at least 30 GHz is required here.

- An instrument with an additional option can load a data set saved with an instrument without this option but not the other way round.

#### Example:

A FSP 7 with option B9 can load a data set, saved with a FSP 7 without this option but not the other way round.

## Menu MEAS - NEXT

**TOI MKR CALC SRCH** The TOI measurement is based on positioning the markers 3 and 4 onto the position of the calculated intermodulation products. The accuracy of these frequency calculations depend on the precision of the two carrier frequencies found with peak search. Softkey TOI MKR CALC SRCH allows to switch between the calculated marker position (CALC) and performing a local peak search near the expected frequencies (SRCH) instead of the faster position calculation. As default the faster CALC method is used.

### Remote command:

```
CALCulate<1|2>:MARKer:FUNCtion:TOI:MARKer CALCulate | SEARCH
```

## Menu MEAS – Channel and Adjacent-Channel Power Measurement

CHAN PWR ACP ↓	CP/ACP STANDARD
	SELECT USER STD
	SAVE AS USER STD
	DELETE USER STD

### CP/ACP STANDARD

ACP STANDARD	
√NONE	↑
E-UTRA/LTE Square	
E-UTRA/LTE Square/RRC	
W-CDMA 4.096 FWD	
W-CDMA 4.096 REV	
W-CDMA 3GPP FWD	
W-CDMA 3GPP REV	
CDMA IS95A FWD	
CDMA IS95A REV	
CDMA IS95C Class 0 FWD	
CDMA IS95C Class 0 REV	
CDMA J-STD008 FWD	
CDMA J-STD008 REV	
CDMA IS95C Class 1 FWD	
CDMA IS95C Class 1 REV	
CDMA 2000 DS	
CDMA 2000 MC1	
CDMA 2000 MC3	
TD-SCDMA	
WLAN 802.11A	
WLAN 802.11B	
WIMAX	
WIBRO	
USER()	
NADC IS136	
TETRA	↓

Since firmware version 4.4x it is possible to define individual ACP User Standards. This user define ACP standard can be activated by entry USER in the standard selection list. The related configuration file is display in brackets. To change to another user define standard use softkey SELECT USER STD.

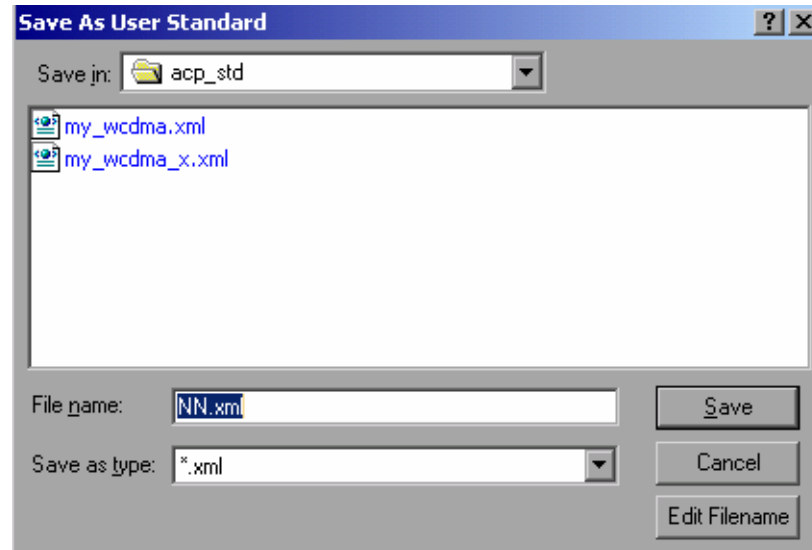
#### Remote command:

```
CALCulate<1|2>:MARKer:FUNCTION:POWER:PRESET
                        <standard> | '<file_name>'
```

## SAVE AS USER STD

Since version 4.4x the current ACP configuration setting can be stored in a file as an user defined ACP standard. The data set is stored on the instruments harddisk in XML file format.

Softkey SAVE AS USER STD opens a file dialog to store the user standard configuration.



List of related parameters:

- Number of Adjacent Channels
- Channel Bandwidth of TX, ADJ and ALT channels
- Channel Spacings
- Resolution Bandwidth, Video Bandwidth
- ACP Limit State and ACP Limits
- Sweeptime, Sweeptime Coupling
- Detector
- Trace Mode (Clr/Write,..)

**Note:** The ACP User Standard is not supported for Fast ACP and for Multi Carrier ACP Measurements.

**Remote command:**

```
: [SENSe<1|2>:] POWER:ACHannel:FILTER:...
...ALPHa:ALL 0...1
...ALPHa:Channel<1 to 12> 0...1
...ALPHa:ACHannel 0...1
...ALPHa:ALTErnate<1 to 11> 0...1
...STATE:ALL ON | OFF
...STATE:CHANnel<1 to 12> ON | OFF
...STATE:ACHannel ON | OFF
...STATE:ALTErnate<1 to 11> ON | OFF

CALCulate<1|2>:MARKer:FUNCTION:POWER:...
...STANDARD:CATALOG?
...STANDARD:DELETE '<user_std>'
...STANDARD:SAVE '<user_std>'
...PRESET <standard> | '<user_std>'
```

DELETE USER STD      The softkey DELETE USER STD opens a dialog to delete an ACP User Standard.

**Remote command:**

```
CALCulate<1|2>:MARKer:FUNCTION:POWer:...
...:STANDARD:DELeTe '<user_std>'
```

SELECT USER STD      The softkey SELECT USER STD activates the selected ACP user standard. Once selected, the entry USER in the CP/ACP STANDARD selection list activates this standard as well. The related filename is listed in brackets.

**Remote command:**

```
CALCulate<1|2>:MARKer:FUNCTION:POWer:PRESET
<standard> | '<user_std>'
```

CP/ACP CONFIG ↓	WEIGHTING FILTER ↓	WEIGHT TX ON OFF
		WEIGHT TX ALPHA
		WEIGHT ADJ ON OFF
		WEIGHT ADJ ALPHA
	ADJ REFLVL OFFSET	

WEIGHT TX ON OFF	Some of the digital standards specify weighting filter to be taken into account. In that case the required filter is implicitly activated by the selection of the ACP standard.
WEIGHT TX ALPHA	Since version 4.4x, the weighing filter parameters can be manually controlled for NORMAL ACP, if no predefined standard is selected (standard NONE or USER). For FAST ACP and for Multi Carrier ACP the related softkeys are not available, too.
WEIGHT ADJ ON OFF	
WEIGHT ADJ ALPHA	Softkey <i>WEIGHT TX ON/OFF</i> activates/deactivates the weighing filter for TX channel. <i>WEIGHT TX ALPHA</i> defines the rolloff factor of the weighing filter. Most of the standards require identical settings for all channels. The softkeys <i>WEIGHT ADJ ON/OFF</i> and <i>WEIGHT ADJ ALPHA</i> define the weighing filter setting for all adjacent channels.

To adjust the weighing filter settings of a predefined standard:

- Select the predefined standard (*CP/ACP STANDARD*)
- Use *SAVE AS USER STD* to create an own user standard
- Select this user standard (*CP/ACP STANDARD USER*) with the specified name
- Change the weighing filter configuration
- Save the user standard again with *SAVE AS USER STD*

**Note:** Changing the TX channel filter parameter will additionally adjust the ADJ channel settings as long as the current settings for TX and ADJ channels are identical. As most of the digital standards require identical settings for all channels it is therefore required to configure the TX channel weighing filter parameter only. Change the ADJ weighing filter settings first, if different settings are required for TX and ADJ channels.

#### Remote command:

```
: [SENSe<1|2>:] POWer:ACHannel:FILTeR:...
...ALPHa:ALL 0...1
...ALPHa:Channel<1 to 12> 0...1
...ALPHa:ACHannel 0...1
...ALPHa:ALTErnate<1 to 11> 0...1
...STATe:ALL ON | OFF
...STATe: CHANnel<1 to 12> ON | OFF
...STATe: ACHannel ON | OFF
...STATe: ALTErnate<1 to 11> ON | OFF
```

## ADJ REFLVL OFFSET

This parameter allows to modify the ADJUST REF LEVEL function for user standards. ADJ REFLVL OFFSET defines an additional level offset to the measured mean power to be taken into account for the analyzer's reference level setting.

To adjust this value for of a predefined standard:

- Select the predefine standard (*CP/ACP STANDARD*)
- Use SAVE AS USER STD to create an own user standard
- Select this user standard (*CP/ACP STANDARD USER*) with the specified name
- Change the offset
- Save the user standard again with SAVE AS USER STD

**Remote command:**

```
: [SENSe<1|2>:] POWer:ACHannel:PRESet:RLEVel:OFFSet  
0...100dB
```

**Menu MEAS – SIGNAL STATISTICS - SCALING**

MEAS	SIGNAL STATISTICS	SCALING ↓	MEAN POWER POSITION
------	-------------------	-----------	---------------------

## MEAN POWER POSITION

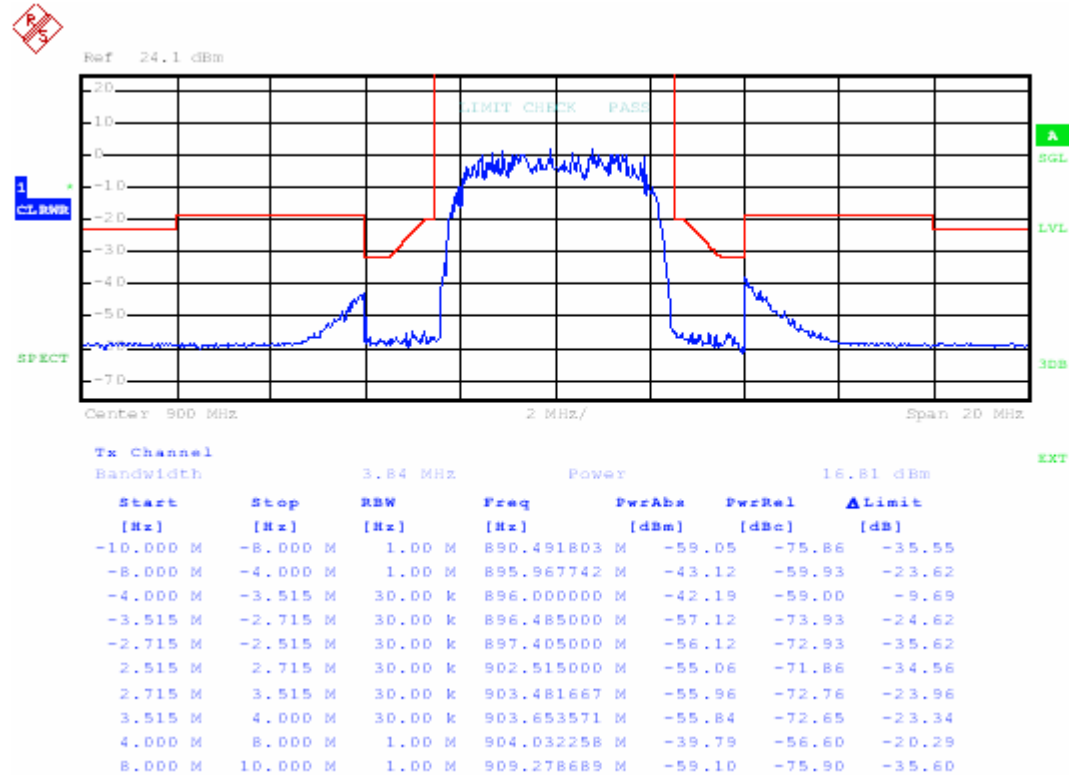
The softkey MEAN POWER position defines the relative X position of the mean power value for the CCDF measurement . The default position is 0% (left corner of the grid). This softkey is only available if the CCDF measurement is switched on.

**Remote command:**

```
:CALCulate:STATistics:SCALE:X:MPOSITION <numeric_value>
```

## Spectrum Emission Mask Measurement

The Spectrum Emission Mask (SEM) measurement defines a measurement that monitors compliance with a spectral mask. The SEM measurement of the base unit allows a flexible definition of all parameters in the SEM measurement. The analyzer performs measurements in predefined frequency ranges with settings that can be specified individually for each of these ranges.



For this purpose, the SWEEP LIST settings or the current device settings are used. Up to 20 subranges can be defined (they need not directly follow one another) across which the analyzer sweeps in subsequent order. However, the measurement ranges must not overlap. The measurement parameters can be selected independently from each other in every subrange (*SWEEP LIST* menu, *EDIT SWEEP LIST*).

In the Spectrum Emission Mask, as in the Spurious Emissions measurement, a range defines a segment, for which you can define the following parameters separately: start and stop frequency, RBW, VBW, sweep time, reference level, attenuator settings, and limit values. Via the sweep list, you define the ranges and their settings (for details on settings refer to the *SWEEP LIST* softkey).

The following rules apply to ranges:

The minimum span of a range is 10 Hz.

- The individual ranges must not overlap (but need not directly follow one another).
- The maximum number of ranges is 20.
- A minimum of three ranges is mandatory.
- The reference range cannot be deleted (it is marked in with "Ref").

The frequency range where measurements are actually performed is set by the start and stop frequency parameters of the analyzer; these parameters are independent of the sweep ranges. It is thus possible to define sweep ranges for a measurement task that can be stored and reloaded and to quickly and easily set the frequency range to be actually measured by means of two parameters; complex editing in the sweep table is not necessary.



## Provided XML files for the Spectrum Emission Mask measurement

You can change the settings manually or via XML files. The XML files offer a quick way to change the configuration. A set of ready-made XML files for different standards is already provided. For details see Table 1: Provided XML files. You can also create and use your own XML files (for details see [“Format description of Spectrum Emission Mask XML files”](#) on page 27). All XML files are stored under *D:\r\_s\instr\sem\_std*. Use the *LOAD STANDARD* softkey for quick access to the available XML files.

Table 1: Provided XML files

Path	XML file name	Displayed standard characteristics*
D:\r_s\instr\sem_std\cdma2000\DL	default0.xml	cdma2000 BC0 DL
	default1.xml	cdma2000 BC1 DL
D:\r_s\instr\sem_std\cdma2000\UL	default0.xml	cdma2000 BC0 UL
	default1.xml	cdma2000 BC1 UL
D:\r_s\instr\sem_std\EUTRA-LTE\DL\CategoryA	BW_01_4_MHz_CFhigher1GHz.xml	LTE Cat A > 1GHz DL
	BW_01_4_MHz_CFflower1GHz.xml	LTE Cat A < 1GHz DL
	BW_03_0_MHz_CFhigher1GHz.xml	LTE Cat A > 1GHz DL
	BW_03_0_MHz_CFflower1GHz.xml	LTE Cat A < 1GHz DL
	BW_05_0_MHz_CFhigher1GHz.xml	LTE Cat A > 1GHz DL
	BW_05_0_MHz_CFflower1GHz.xml	LTE Cat A < 1GHz DL
	BW_10_0_MHz_CFhigher1GHz.xml	LTE Cat A > 1GHz DL
	BW_10_0_MHz_CFflower1GHz.xml	LTE Cat A < 1GHz DL
	BW_15_0_MHz_CFhigher1GHz.xml	LTE Cat A > 1GHz DL
	BW_15_0_MHz_CFflower1GHz.xml	LTE Cat A < 1GHz DL
	BW_20_0_MHz_CFhigher1GHz.xml	LTE Cat A > 1GHz DL
	BW_20_0_MHz_CFflower1GHz.xml	LTE Cat A < 1GHz DL
D:\r_s\instr\sem_std\EUTRA-LTE\DL\CategoryB	BW_01_4_MHz_CFhigher1GHz.xml	LTE Cat B > 1GHz DL
	BW_01_4_MHz_CFflower1GHz.xml	LTE Cat B < 1GHz DL
	BW_03_0_MHz_CFhigher1GHz.xml	LTE Cat B > 1GHz DL
	BW_03_0_MHz_CFflower1GHz.xml	LTE Cat B < 1GHz DL
	BW_05_0_MHz_CFhigher1GHz.xml	LTE Cat B > 1GHz DL
	BW_05_0_MHz_CFflower1GHz.xml	LTE Cat B < 1GHz DL
	BW_10_0_MHz_CFhigher1GHz.xml	LTE Cat B > 1GHz DL
	BW_10_0_MHz_CFflower1GHz.xml	LTE Cat B < 1GHz DL
	BW_15_0_MHz_CFhigher1GHz.xml	LTE Cat B > 1GHz DL
	BW_15_0_MHz_CFflower1GHz.xml	LTE Cat B < 1GHz DL
	BW_20_0_MHz_CFhigher1GHz.xml	LTE Cat B > 1GHz DL
	BW_20_0_MHz_CFflower1GHz.xml	LTE Cat B < 1GHz DL
D:\r_s\instr\sem_std\EUTRA-LTE\UL\Standard	BW_05_0_MHz.xml	LTE UL
	BW_10_0_MHz.xml	LTE UL
	BW_15_0_MHz.xml	LTE UL
	BW_20_0_MHz.xml	LTE UL

Path	XML file name	Displayed standard characteristics*
D:\r_s\instr\sem_std\WCDMA\3GPP\DL	PowerClass_31_39.xml	W-CDMA 3GPP (31,39)dBm DL
	PowerClass_39_43.xml	W-CDMA 3GPP (39,43)dBm DL
	PowerClass_43_INF.xml	W-CDMA 3GPP (43,INF)dBm DL
	PowerClass_negINF_31.xml	W-CDMA 3GPP (-INF,31)dBm DL
D:\r_s\instr\sem_std\WCDMA\3GPP\UL	3GPP_UL.xml	W-CDMA 3GPP_UL
D:\r_s\instr\sem_std\WIBRO\DL	PowerClass_29_40.xml	
	PowerClass_40_INF.xml	
	PowerClass_negINF_29.xml	
D:\r_s\instr\sem_std\WIBRO\UL	PowerClass_23_INF.xml	
	PowerClass_negINF_23.xml	
D:\R_S\instr\sem_std\WIMAX\DL\ETSI\...MHz (1.75 MHz, 2.00 MHz, 3.50 MHz, 7.00 MHz, 14.00 MHz, 28.00 MHz)	System_Type_E.xml	
	System_Type_F.xml	
	System_Type_G.xml	
D:\R_S\instr\sem_std\WIMAX\DL\IEEE	10MHz.xml	
	20MHz.xml	
D:\R_S\instr\sem_std\WIMAX\UL\ETSI\...MHz (1.75 MHz, 2.00 MHz, 3.50 MHz, 7.00 MHz, 14.00 MHz, 28.00 MHz)	System_Type_E.xml	
	System_Type_F.xml	
	System_Type_G.xml	
D:\R_S\instr\sem_std\WIMAX\UL\IEEE	10MHz.xml	
	20MHz.xml	
D:\R_S\instr\sem_std\WLAN\802_11_TURBO	ETSI.xml	
	IEEE.xml	
D:\R_S\instr\sem_std\WLAN\802_11a	ETSI.xml	
	IEEE.xml	
D:\R_S\instr\sem_std\WLAN\802_11b	IEEE.xml	
D:\R_S\instr\sem_std\WLAN\802_11j_10MHz	ETSI.xml	
	IEEE.xml	
D:\R_S\instr\sem_std\WLAN\802_11j_20MHz	ETSI.xml	
	IEEE.xml	

\*Used abbreviations:

BC: band class

UL: uplink

DL: downlink

TTA: Telecommunications Technology Association

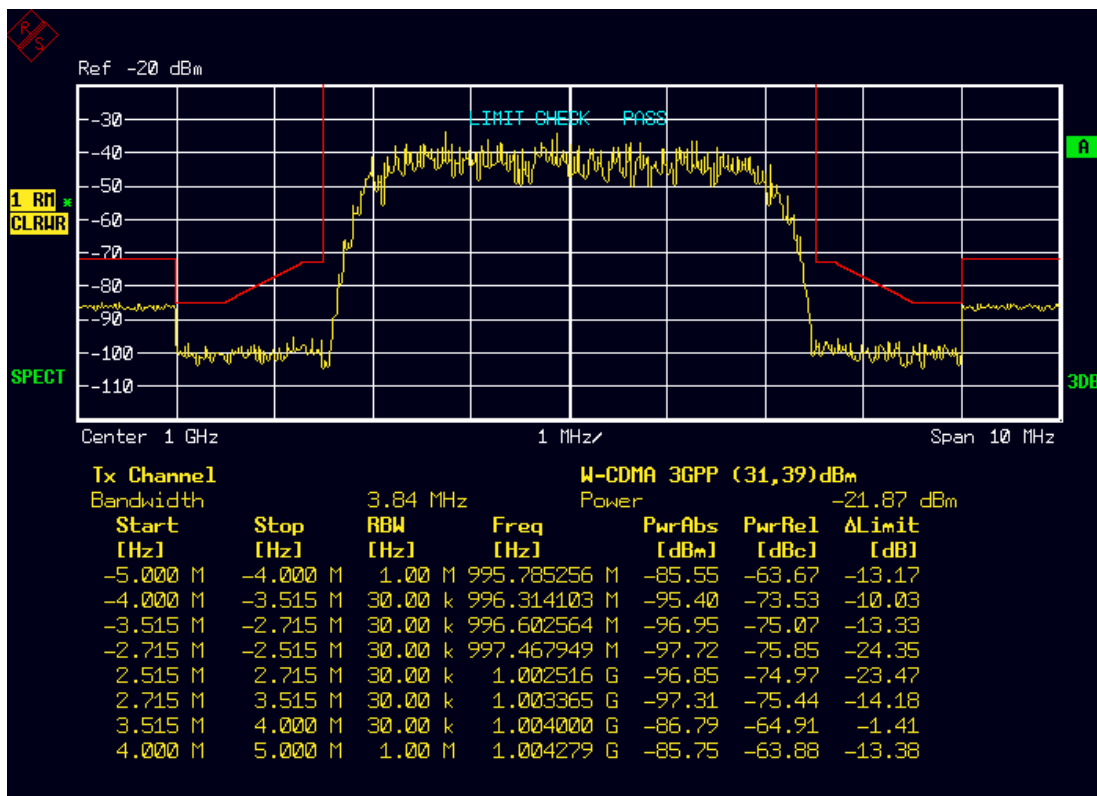
## Format description of Spectrum Emission Mask XML files

The files for importing range settings are in XML format and therefore obey the rules of the XML standard. Below, the child nodes, attributes, and structure defined for the data import is described. Build your own XML files according to these conventions because the instrument can only interpret XML files of a known structure. For example files look in the `D:\r_s\instr\sem_std` folder.

**Note:** *It is mandatory to follow the structure exactly as shown below or else the analyzer is not able to interpret the XML file and error messages are shown on the screen. For this reason is it recommended to make a copy of an existing file and edit the copy of the file. The default files can be found in the `D:\r_s\instr\sem_std` folder.*

Basically, the file consists of three elements that can be defined.

- The first element of the structure is the BaseFormat element. It carries information about basic settings. In this element only the ReferencePower child node has any effects on the measurement itself. The other attributes and child nodes are used to display information about the Spectrum Emission Mask Standard on the measurement screen. The child nodes and attributes of this element are shown in Table 2 [Attributes and child nodes of the BaseFormat element](#).



In the example above (`PowerClass_31_39.xml` under `D:\r_s\instr\sem_std\WCDMA\3GPP`), these attributes are defined as follows:

Standard="W-CDMA 3GPP"

LinkDirection="DL"

PowerClass="(31,39)dBm"

- The second element is the PowerClass element, which is embedded in the BaseFormat element. It carries settings information about the power classes. The child nodes and attributes of this element are shown in Table 3 [Attributes and child nodes of the PowerClass element](#).

- The third element is the Range element, which in turn is embedded in the PowerClass element. It carries the settings information of the range. There have to be at least three defined ranges: one reference range and at least one range to either side of the reference range. The maximum number of ranges is twenty. Note that there are two Limit nodes to be defined: one that gives the limit in absolute values and one in relative values. Make sure units for the Start and Stop nodes are identical for each Limit node. For details refer to the SWEEP LIST softkey and the corresponding parameter description. The child nodes and attributes of this element are shown in Table 4 [Attributes and child nodes of the Range element \(normal ranges\)](#).

The following tables show the child nodes and attributes of each element and show if a child node or attribute is mandatory for the analyzer to interpret the file or not. Since the hierarchy of the XML can not be seen in the tables, either view one of the default files already stored on the analyzer in the *D:\r\_sl\instr\sem\_std* directory or check the structure as shown below.

Below, a basic example of the structure of the file is shown, containing all mandatory attributes and child nodes. Note that the PowerClass element and the range element are themselves elements of the Base Format element and are to be inserted where noted. The separation is done here simply for reasons of a better overview. Also, no example values are given here to allow a quick reference to the tables above. Italic font shows the placeholders for the values.

- The Base Format element is structured as follows:  

```
<RS_SEM_ACP_FileFormat Version="1.0.0.0" Date="2008-02-28T15:21:39Z">
  <Name>Standard</Name>
  <Instrument>
    <Type>Instrument Type</Type>
    <Application>Application</Application>
  </Instrument>
  <LinkDirection Name="Name">
    <ReferencePower>
      <Method>Method</Method>
    </ReferencePower>
    <PowerClass Index="n">
      <!-- For contents of the PowerClass node see
Table 3 Attributes and child nodes of the PowerClass element -->
      <!-- Define up to four PowerClass nodes -->
    </PowerClass>
  </LinkDirection>
</RS_SEM_ACP_File>
```

- The PowerClass element is structured as follows:  

```

<PowerClass Index="n">
    <StartPower Unit="dBm" InclusiveFlag="true" Value="StartPowerValue"/>
    <StopPower Unit="dBm" InclusiveFlag="false" Value="StopPowerValue"/>
    <DefaultLimitFailMode>Limit Fail Mode</DefaultLimitFailMode>
    <Range Index="n">
        <!-- For contents of the Range node see Table 4 Attributes and
        child nodes of the Range element (normal ranges) -->
        <!-- Define up to twenty Range nodes -->
    </Range>
    ...
</PowerClass>

```
- The Range element is structured as follows:  

```

<Range Index="n">
    <Name="Name">
        <ChannelType>Channel Type</Channel Type>
        <WeightingFilter>
            <Type>FilterType</Type>
            <RollOffFactor>Factor</RollOffFactor>
            <Bandwidth>Bandwidth</Bandwidth>
        </WeightingFilter>
        <FrequencyRange>
            <Start>RangeStart</Start>
            <Stop>RangeStop</Stop>
        </FrequencyRange>
        <Limit>
            <Start Unit="Unit" Value="Value"/>
            <Stop Unit="Unit" Value="Value"/>
        </Limit>
        <Limit>
            <Start Unit="Unit" Value="Value"/>
            <Stop Unit="Unit" Value="Value"/>
        </Limit>
        <RBW Bandwidth="Bandwidth" Type="FilterType"/>
        <VBW Bandwidth="Bandwidth"/>
        <Detector>Detector</Detector>
        <Sweep Mode="SweepMode" Time="SweepTime"/>
    </Name>
</Range>

```

```

    <Amplitude>
      <ReferenceLevel Unit="dBm" Value="Value"/>
      <RFAttenuation Mode="Auto" Unit="dB" Value="Value"/>
      <Preamplifier State="State"/>
    </Amplitude>
  </Range>

```

Table 2: Attributes and child nodes of the BaseFormat element

Child Node	Attribute	Value	Parameter Description	Mandatory
	FileFormatVersion	1.0.0.0		Yes
	Date	"YYYY-MM-DD HH:MM:SS"	Date in ISO 8601 format	No
Name		<string>	Name of the standard	Yes
Instrument	Type	FSP	Name of the instrument	No
	Application	SA	Name of the application	No
LinkDirection	Name	Downlink   Uplink   None		Yes
	ShortName	DL   UL		No
ReferencePower				Yes
Method	TX Channel Power   TX Channel Peak Power			Yes
ReferenceChannel	<string>			No

Table 3: Attributes and child nodes of the PowerClass element

Child Node	Attribute	Value	Parameter Description	Mandatory
	Index	0	Only index 0 is currently supported, others are ignored	Yes
StartPower	Value	<power in dBm>	The start power must equal the stop power of the previous power class. The StartPower value of the first range is -200	Yes
	Unit	dBm		Yes
	InclusiveFlag	"true"		Yes
StopPower	Value	<power in dBm>	The stop power must equal the start power of the next power class. The StopPower value of the last range is 200	Yes
	Unit	dBm		Yes
	InclusiveFlag	"false"		Yes
DefaultLimitFailMode		Absolute   Relative   Absolute and Relative   Absolute or Relative		Yes

Table 4: Attributes and child nodes of the Range element (normal ranges)

Child Node	Attribute	Value	Parameter Description	Mandatory
ChannelType	Index	0...19	Indexes are continous and have to start with 0	Yes
	Name	<string>	Name of the range	Only if ReferenceChannel contains a name and the range is the reference range
	ShortName	<string>	Short name of the range	No
	WeightingFilter	TX   Adjacent		Yes
	Type	RRC   CFILter	Type of the weighting filter	Only if ReferencePower method is "TX Channel Power" and the range is the reference range"
RollOffFactor		0...1	Excess bandwidth of the filter	Yes
Bandwidth		<Bandwidth in Hz>	Filter bandwidth	Only if the filter type is RRC
FrequencyRange				Yes
Start		<frequency in Hz>	Start value of the range	Yes
Stop		<frequency in Hz>	Stop value of the range	Yes
Limit			A Range must contain exactly two limit nodes; one of the limit nodes has to have a relative unit (e.g. dBc), the other one must have an absolute unit (e.g. dBm)	Yes
Start	Value	<numeric_value>	Power limit at start frequency	Yes
	Unit	dBm/Hz   dBm   dBc   dBr   dB	Sets the unit of the start value	Yes
Stop	Value	<numeric_value>	Power limit at stop frequency	Yes
	Unit	dBm/Hz   dBm   dBc   dBr   dB	Sets the unit of the stop value	Yes
LimitFailMode		Absolute   Relative   Absolute and Relative   Absolute or Relative		No (if quoted, it has to be equal to DefaultLimitFailMode)
RBW	Bandwidth	<bandwidth in Hz>		Yes
	Type	NORM   PULS   CFIL   RRC		No
VBW	Bandwidth	<bandwidth in Hz>		Yes
Detector		NEG   POS   SAMP   RMS   AVER		No (if quoted, it has to be equal in all ranges)
Sweep	Mode	Manual   Auto		Yes
	Time	<time in sec>		No
Amplitude				No
ReferenceLevel	Value	<power in dBm>		Yes, if the ReferenceLevel child node is used
	Unit	dBm		Yes, if the ReferenceLevel node is used
RF Attenuation	Mode	Manual   Auto		Yes, if the ReferenceLevel child node is used

Child Node	Attribute	Value	Parameter Description	Mandatory
Preamplifier		ON   OFF		Yes

## ASCII file export format (Spectrum Emission Mask)

The first part of the file lists information about the spectrum analyzer and the general setup.

File contents	Description
RefType; CPOWER;	Reference range settings
TxBandwidth;9540000;Hz	
Filter State; ON;	
Alpha;0.22;	
PeaksPerRange;1;	evaluation list information
Values;4;	
0;-22500000;-9270000;1000000;2986455000;-74.762840270996094;	information about each peak:
-10.576210021972656;-45.762840270996094;PASS;	<range number>;
1;-9270000;-4770000;100000;2991405000;-100.17695617675781;	<start frequency>;
-35.990325927734375;-1.490325927734375;PASS	<stop frequency>;
3;4770000;9270000;100000;3005445000;-100.17695617675781;	<resolution bandwidth of range>;
-35.990325927734375;-1.490325927734375;PASS;	<frequency of peak>;
4;9270000;22500000;1000000;3018225000;-74.762840270996094;	<absolute power in dBm of peak>;
-10.576210021972656;-45.762840270996094;PASS;	<relative power in dBc of peak (related to the channel power)>;
	<distance to the limit line in dB (positive value means above the limit)>;
	<limit fail (pass = 0, fail =1)>;



## Menu MEAS – SPECTRUM EMISSION

SPECTRUM EMISSION ↓	SPEC EM ON   OFF	SPEC EMD ON OFF	
	SWEEP LIST ↓	EDIT SWEEP	
		INS BEFORE RANGE	
		INS AFTER RANGE	
		DELETE RANGE	
		NEXT RANGES	
		PREVIOUS RANGES	
		REFERENCE RANGE ↓	POW REF CHAN PEAK
			TX BANDWIDTH
			RRC FILT ON   OFF
			ALPHA BT
		MEAS START STOP	
	LIST EVAL ↓	LIST EVAL ON   OFF	
		PAGE UP	
		PAGE DOWN	
	LOAD STANDARD		
	RESTORE STANDARDS		
	MEAS START STOP		

SPEC EM ON | OFF The SPEC EM ON | OFF softkey switches the Spectrum Emission Mask measurement on or off according to the current configuration.

**Remote command:**

SENS:SWE:MODE ESP | AUTO  
:INIT:ESP

SWEEP LIST ↓ Opens a submenu to edit the sweep list and displays the SWEEP LIST dialog box. After a preset, the sweep list contains a set of default ranges and parameters. For each range, you can change the parameters listed below. To insert or delete ranges, use the INS BEFORE RANGE, INS AFTER RANGE softkeys.

SWEEP LIST					
	RANGE 1	RANGE 2 Ref	RANGE 3	RANGE 4	RANGE 5
Range Start	-250 MHz	-2.52 MHz	2.52 MHz		
Range Stop	-2.52 MHz	2.52 MHz	250 MHz		
Filter Type	NORMAL	NORMAL	NORMAL		
RBW	30 kHz	30 kHz	30 kHz		
VBW	10 MHz	10 MHz	10 MHz		
Sweep time mode	AUTO	AUTO	AUTO		
Sweep time	270 ms	10 ms	270 ms		
REF-Level	-10 dBm	-10 dBm	-10 dBm		
RF-Att. mode	AUTO	AUTO	AUTO		
RF-Attenuator	15 dB	15 dB	15 dB		
PRE-AMP	OFF	OFF	OFF		
Transd. factor	<NONE>	<NONE>	<NONE>		
Limit check	ON	ON	ON		
Limit	-13 dBm	-13 dBm	-13 dBm		
Abs Limit Start	-13 dBm	-13 dBm	-13 dBm		
Abs Limit Stop	-13 dBm	-13 dBm	-13 dBm		
Rel Limit Start	-50 dBc	-50 dBc	-50 dBc		
Rel Limit Stop	-50 dBc	-50 dBc	-50 dBc		

## EDIT SWEEP

In the *SWEEP LIST* table, the individual sweep ranges are set.

Range Start: Start frequency of the range (relative to Center Frequency = Carrier Frequency)

**Remote command:**

"ESP:RANG1:STAR 100000000"

Range Stop: Stop frequency of the range (relative to Center Frequency = Carrier Frequency)

**Remote command:**

"ESP:RANG3:STOP 100000000"

Filter Type: NORMAL (3dB), EMI(6dB), CHANNEL, RRC

**Remote command:**

"ESP:RANG1:FILT:TYPE RRC"

RBW: Resolution filter bandwidth

**Remote command:**

"ESP:RANG2:BAND:RES 5000"

VBW: Video filter bandwidth; not applicable for CHANNEL and RRC filters.

**Remote command:**

"ESP:RANG1:BAND:VID 5000000"

Sweep Time Mode: AUTO, MANUAL

Remote: "ESP:RANG3:SWE:TIME:AUTO OFF|ON"

Sweep Time: Sweep time; if *AUTO* is indicated for the sweep time mode, the automatically calculated sweep time is displayed. If the cell is edited, the associated sweep time mode is automatically set to *MANUAL*.

**Remote command:**

"ESP:RANG1:SWE:TIME 1"

REF-Level: Reference level in dBmThe upper edge of the displayed screen area is the value of the maximum reference level, corrected by the associated transducer factor.

**Remote command:**

"ESP:RANG2:RLEV 0"

RF-Attenuator-Mode: AUTO, MANUAL

**Remote command:**

"ESP:RANG2:INP:ATT:AUTO OFF|ON"

RF-Attenuator:	RF Attenuator, if <i>AUTO</i> is indicated for the RF Attenuator Mode, the automatically calculated attenuation is displayed. If the cell is edited, the associated attenuator mode is automatically set to <i>MANUAL</i> .
	<b>Remote command:</b> "ESP:RANG3:INP:ATT 10"
PRE-AMP:	ON, OFF preamplifier selection (option B25, if available)
	<b>Remote command:</b> "ESP:RANG3:INP:GAIN:STATe ON"
Transd. factor:	NONE or factor (enter via selection list)
	<b>Remote command:</b> "ESP:RANG1:TRAN 'test' "
Limit check:	<p><b>ABSOLUTE:</b> Checks only the absolute limits defined</p> <p><b>RELATIVE:</b> Checks only the relative limits. Relative limits are defined as relative to the measured power in the reference range.</p> <p><b>ABS and REL:</b> Combines the absolute and relative limit. The limit check fails when both limits are violated.</p> <p><b>ABS or REL:</b> Combines the absolute and relative limit. The limit check fails when one of the limits is violated.</p> <p><b>Remote command:</b> ESP:RANG3:LIM:STAT ABS   REL   AND   OR</p>
Abs Limit Start:	Sets an absolute limit value at the start frequency of the range [dBm].
	<b>Remote command:</b> "ESP:RANG1:LIM:ABS:STAR 10"
Abs Limit Stop:	Sets an absolute limit value at the stop frequency of the range [dBm].
	<b>Remote command:</b> "ESP:RANG1:LIM:ABS:STOP 20"
Rel Limit Start:	Sets an relative limit value at the start frequency of the range [dBc].
	<b>Remote command:</b> "ESP:RANG1:LIM:REL:STAR -20"
Rel Limit Stop:	Sets an relative limit value at the stop frequency of the range [dBc].
	<b>Remote command:</b> "ESP:RANG1:LIM:REL:STOP -20"

INS BEFORE RANGE	<p>The INS BEFORE RANGE softkey inserts a range in front of the marked line.</p> <p><b>Remote command:</b> SENS:ESP:RANGe&lt;1..20&gt;:INSert AFter   BEFore</p>
INS AFTER RANGE	<p>The INS AFTER RANGE softkey inserts a range following the marked line.</p> <p><b>Remote command:</b> SENS:ESP:RANGe&lt;1..20&gt;:INSert AFter   BEFore</p>
DELETE RANGE	<p>The DELETE RANGE softkey deletes the current range. All higher ranges are set back by one.</p> <p><b>Remote command:</b> :SENS:ESP:RANG&lt;1...20&gt;:DEL</p>
NEXT RANGES	<p>The NEXT RANGES softkey activates the displays of the next higher subranges, i.e. 6 to 10, 11 to 15 or 16 to 20.</p> <p><b>Remote command: --</b></p>
PREVIOUS RANGES	<p>The PREVIOUS RANGES softkey activates the displays of the next lower subranges, i.e. 1 to 5, 6 to 10 or 11 to 15.</p> <p><b>Remote command: --</b></p>
REFERENCE RANGE	<p>Opens a menu to define additional parameter for the reference power measurement.</p>

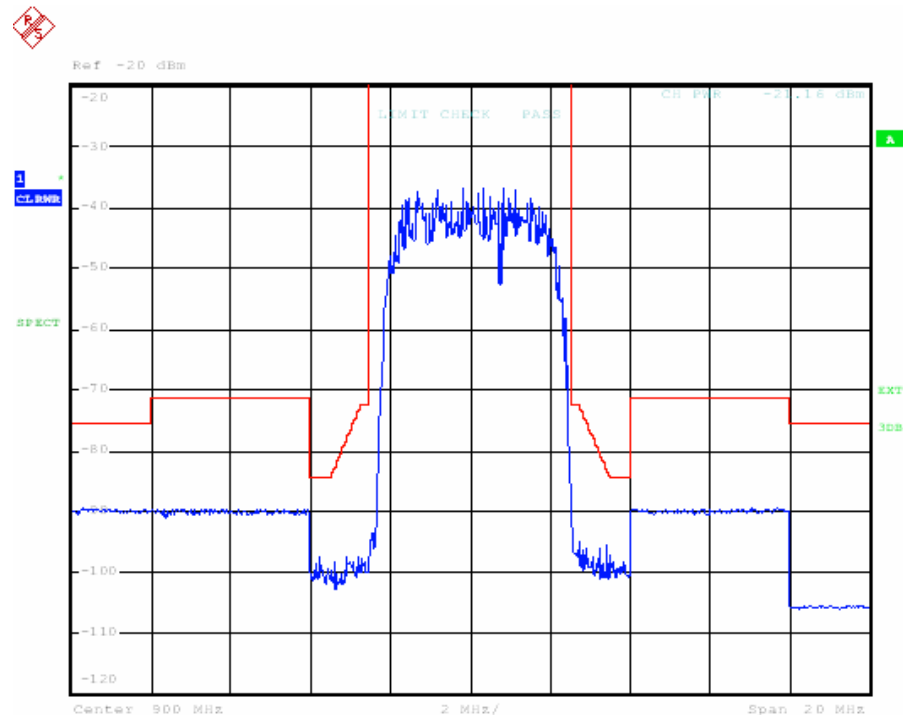
## LIST EVAL ON | OFF

The *LIST EVAL ON | OFF* softkey activates or deactivates the Spectrum Emission Mask *LIST EVALUATION*. The peak search evaluation is automatically done during measurement and the results are displayed in a table in the lower part of the screen. *LIST EVAL* is switched on as default for SEM.

Following results are listed:

- frequency range
- frequency of the absolute peak power in this range in dBm
- frequency of the relative peak power in this range in dBc
- level delta to the limit with margin in dB
- limit check state (by color change and an asterisk at the end of the line if failed)

The trace, the limit line, the limit check result and the channel power (of the reference range) is displayed in full screen if the *LIST EVALUATION* is switched off.

**Remote command:**

CALC:ESP:PSE:AUTO ON | OFF

## LOAD STANDARD

The softkey *LOAD STANDARD* opens a dialog to select an XML file which includes the desired standard specification. For details on the provided XML files refer to "Provided XML files for the Spectrum Emission Mask measurement".

**Remote command:**

SENS:ESP:PRES 'xml\_file'

RESTORE STANDARDS It is possible to recall the delivery state of the XML files with RESTORE STANDARDS.

**Remote command:**

SENS:ESP:PRES:REST

MEAS START | STOP Starts or stops the Spectrum Emission Mask. In single sweep the measurement is automatically stopped at the end of the measurement.

**Remote command:**

INIT:ESP

## Reference Range settings

	REFERENCE RANGE ↓	POW REF CHAN PEAK
		TX BANDWIDTH
		RRC FILT ON   OFF
		ALPHA BT

POW REF  
CHAN | PEAK

The softkey POW REF CHAN | PEAK selects the type of power measurement in the reference range:

PEAK: Measures the highest peak within the reference range.

CHAN: Measures the channel power within the reference range (integral bandwidth method).

**Remote command:**

:SENS:ESP:RTYP PEAK | CPOWer

TX BANDWIDTH

Defines the bandwidth used for measuring the channel power:

Allowed range: 20 Hz ...span of reference range.

**Remote command: --**

:SENSe:ESpectrum:BWID numeric\_value

RRC FILT ON | OFF

Activates or deactivates the use of a RRC filter.

**Remote command:**

:SENS:ESP:FILT:RRC:STAT ON | OFF

ALPHA BT

Sets the alpha value of the RRC filter if the RRC filter is switched on.

**Remote command: --**

:SENS:ESP:FILT:RRC:ALPH 0...1

## Menu SETUP

SETUP	REFERENCE FREQUENCY ↓	REFERENCE INTERNAL
		REFERENCE EXTERNAL
		EXT [INT]
		REFERENCE FREQUENCY

REFERENCE  
INTERNAL

The REFERENCE INTERNAL / REFERENCE EXTERNAL softkeys switch between the internal and external reference. If the external reference is selected, the frequency of the external reference is adjustable (see softkey REFERENCE FREQUENCY). The reference settings are not changed if a preset occurs to maintain the specific setup of a test system.

REFERENCE  
EXTERNALEXT [INT]  
(EXTERNAL)

The softkey REFERENCE EXT [INT] allows a fall back position, if the external reference signal fails. When this function is activated, the external reference signal is used. But if an unlock is detected due to a missing external reference signal, the instrument's reference signal source is automatically changed to use the internal reference.

Note: This function does not automatically switch back to external reference if the external reference signal is available again. Switch to REFERENCE EXTERNAL and back to REFERENCE EXT [INT] in that case. The current internal selection (EXTERNAL/INTERNAL) is displayed in the lower part of the softkey.

**Remote command:**

```
[SENS<1|2>:]ROSCillator:SOURce INTernal | EXTernal | EAUTO
[SENS<1|2>:]ROSCillator:SOURce:EAUTO?
```

REFERENCE  
FREQUENCY

REFERENCE FREQUENCY defines the frequency of the external reference. It is adjustable between 1 MHz and 20 MHz. The default value is 10 MHz. The reference frequency settings are not changed if a preset occurs to maintain the specific setup of a test system.

**Remote command:**

```
[SENS<1|2>:]ROSCillator:EXTernal:FREQuency 1MHz ... 20MHz
```



## Menu SETUP – GENERAL SETUP – OPTIONS

SETUP	GENERAL SETUP ↓	OPTIONS ↓	INSTALL OPTION
			REMOVE OPTION
			INSTALL FW EXT
			SCROLL OPTIONS

## INSTALL FW EXT

Softkey INSTALL FW EXT opens a dialog to select and start a Firmware Extension Installer MSI File. This softkey is only visible if an application requires an extension of the Windows XP environment.

Due to the installer package size it is not allowed to install these FW Extension Pages on instruments with option FSP-B18 - Removable Harddisk and therefore this softkey is not available in that case.

**Note:** A message window will pop up when an option key code is enter for an application requiring a certain FW Extension Package. After installation of the FW Extension Package the option key has to be entered a second time.

## SCROLL OPTIONS

Softkey SCROLL OPTIONS toggles between two pages if the number of installed options exceeds the maximum number of lines of the Firmware Options dialog.

**Remote command:** -

## Remote Operation

**:CALCulate<1|2>:ESpectrum:PSEarch | PEAKsearch:AUTO ON | OFF**

This command activates or deactivates the list evaluation of the Spectrum Emission Mask measurement.

**Example:** "CALC:ESP:PSE:AUTO OFF" ' Deactivates the list evaluation

**Characteristics:** \*RST value: ON  
SCPI: device-specific

**:CALCulate<1|2>:ESpectrum:PSEarch | PEAKsearch:MARGIN -200dB ... +200dB**

This command sets the margin used for the limit check/peak search of the Spectrum Emission Mask measurement.

**Example:** "CALC:ESP:PSE:MARG 10" ' sets the margin to 10 dB

**Characteristics:** \*RST value: 6 dB  
SCPI: device-specific

**:CALCulate<1|2>:MARKer<1 to 4>:FUNCTION:HARMonics:BANDwidth[:LIST]?**

This command returns the resolution bandwidth values used by the harmonic measurement. A separate value for every harmonic frequency is automatically calculated. It is possible to query the calculated values with this command.

The function is independent of the marker selection, i.e. the suffix <1|2> or <1 to 4> of CALCulate or MARKer is irrelevant.

**Example:** "CALC:MARK:FUNC:HARM:BAND?" ' Returns the used bandwidth values of the harmonics measurement.

**Characteristics:** \*RST value: -  
SCPI: device-specific

This command is an event and therefore has no \*RST value and no query.

**:CALCulate<1|2>:MARKer<1 to 4>:FUNCTION:POWER:STANDARD:CATALOG?**

This command returns all predefined ACP standards and all user standards. The numeric suffixes at MARKer are irrelevant for this command.

**Example:** ":CALC:MARK:FUNC:POW:STAN:CAT?" 'get all available ACP standards

**Features:** \*RST value: -  
SCPI: device-specific

**:CALCulate<1|2>:MARKer<1 to 4>:FUNCTION:POWER:STANDARD:DELETE <name>**

This command removes the ACP user standard <name>. It is possible to remove predefined ACP standards. The numeric suffixes at MARKer are irrelevant for this command.

**Example:** ":CALC:MARK:FUNC:POW:SEL ACP" ' activate ACP measurement  
":CALC:MARK:FUNC:POW:PRES FW3G" ' use WCDMA 3GPP as basis  
":CALC:LIM:ACP:ACH:REL -60,-60" ' change ACP limit to -60dBc

```
":CALC:MARK:FUNC:POW:STAN:SAVE 'my_acp_std'" 'save as ACP USER
' standard my_acp_std

":CALC:MARK:FUNC:POW:STAN:DEL 'my_acp_std'" 'delete the user
standard my_acp_std
```

**Features:** \*RST value: OFF  
SCPI: device-specific

#### **:CALCulate<1|2>:MARKer<1 to 4>:FUNCTION:POWER:STANDARD:SAVE <file\_name>**

This command saves the current ACP settings as an ACP user standard. The numeric suffixes at MARKer are irrelevant for this command.

**Example:**

```
":CALC:MARK:FUNC:POW:SEL ACP" 'activate ACP
' measurement
":CALC:MARK:FUNC:POW:PRES FW3G" 'use WCDMA 3GPP
as basis
":CALC:LIM:ACP:ACH:REL -60,-60" 'change ACP limit to
-60dBc
":CALC:MARK:FUNC:POW:STAN:SAVE 'my_acp_std'" 'save as ACP user
' standard my_acp_std
```

**Features:** \*RST value: -  
SCPI: device-specific

#### **:CALCulate<1|2>:MARKer<1 to 4>:FUNCTION:POWER:PRESeS NADC | TETRA | PDC | PHS | CDPD | FWCDma | RWCDma | F8CDma | R8CDma | F19Cdma | R19Cdma | FW3Gppcdma | RW3Gppcdma | D2CDma | S2CDma | M2CDma | FIS95A | RIS95A | FIS95C0 | RIS95C0 | FJ008 | RJ008 | FIS95C1 | RIS95C1 | TCDma | NONE | AWLan | BWLan | WIMax | WIBro | EUTRa | REUTra | 'string'**

Meaning of the CDMA standard abbreviations:

FIS95A, F8CDma	CDMA IS95A forward
RIS95A, R8CDma	CDMA IS95A reverse
FJ008, F19CDma	CDMA J-STD008 forward
RJ008, R19CDma	CDMA J-STD008 reverse
FIS95C0	CDMA IS95C Class 0 forward
RIS95C0	CDMA IS95C Class 0 reverse
FIS95C1	CDMA IS95C Class 1 forward
RIS95C1	CDMA IS95C Class 1 reverse
FWCDma	W-CDMA 4.096 MHz forward
RWCDma	W-CDMA 4.096 MHz reverse
FW3Gppcdma	W-CDMA 3.84 MHz forward
RW3Gppcdma	W-CDMA 3.84 MHz reverse
D2CDma	CDMA 2000 direct sequence

S2CDma	CDMA 2000 MC1 multi carrier with 1 carrier
M2CDma	CDMA 2000 MC3 multi carrier with 3 carriers
TCDMa	TD-SCDMA
AWLan	WLAN 802.11a
BWLan	WLAN 802.11b
WIMax	WiMAX (Worldwide Interoperability for Microwave Access) IEEE 802.16-2004/Cor1-2005
WIBro	WiMAX WiBro (Wireless Broadband) IEEE 802.16-2004/Cor1-2005
EUTRa	E-UTRA/LTE Square Use this standard setting to measure the assumed adjacent channel carrier configuration: "E-UTRA of same BW". In this mode, on all channels a square filter is applied.
REUTra	E-UTRA/LTE Square/RRC Use this standard setting to measure the assumed adjacent channel carrier configuration: "1.28, 3.84, 7.68 Mcps UTRA". In this mode, on the Tx channel a square filter is applied and on all adjacent/alternate channels an RRC filter is applied.
'string'	User defined standard 'string' is the file name used to create a user defined standard saved with SAVE AS USER STD.

#### :CALCulate<1|2>:MARKer<1 to 4>:FUNCTION:TOI:MARKer CALCulate | SEARCh

This command controls the positioning of the intercept markers 3 and 4 for TOI measurement, based on the two carrier signals.

CALCulate: Calculates the intermodulation product frequencies.

SEARCh: Performs a local peak search near the expected intermodulation product frequencies.

**Example:** CALC:MARK:FUNC:TOI:MARK SEAR" ' selects TOI marker search mode

**Features:** \*RST value: CALC  
SCPI: device-specific

#### :CALCulate<1|2>:STATistics:X:MPOStion 0 ... 100

This command defines the relative X position of the mean power value for the CCDF measurement. The default position is 0% (left corner of the grid). This function is only available if the statistics measurement function CCDF is switched on.

**Example:** CALC:STAT:X:MPOS 10.0 ' set the mean power position to 10%

**Features:** \*RST value: 0  
SCPI: device-specific

## :INITiate<1|2>:ESpectrum

This command starts a Spectrum Emission Mask measurement. The measurement can be stopped in continuous sweep mode with "ABORT".

<b>Example:</b>	"SENS:SWE:MODE ESP"	' activates the SEM measurement
	"INIT:CONT OFF"	' Set to Single Sweep
	"INIT:ESP"	' Starts a SEM measurement

**Characteristics:** \*RST value: -  
SCPI: device-specific

**: [SENSe<1|2>:]ESpectrum:BWIDth** numeric\_value

This command defines the bandwidth used for measuring the channel power in the Spectrum Emission Mask measurement. Allowed range: 20 Hz ...span of reference range.

The numeric suffix at SENSE<1|2> is irrelevant.

**Example:**       ":SENS:ESP:BWIDT 3.84MHz"       'sets the channel bandwidth to 3.84MHz

<b>Features:</b>	*RST value:	3.84 MHz
	SCPI:	device-specific

**:[SENSe<1|2>:]ESpectrum:FILTer:RRC[:STATe] ON | OFF**

This command activates or deactivates the use of a RRC filter for measuring the channel power in the Spectrum Emission Mask measurement.

The numeric suffix at SENSE<1|2> is irrelevant.

**Example:**           ":SENS:ESP:FILT ON"                   'RRC filter switched on

```

Features:      *RST value:  ON
                  SCPI:       device-specific

```

## : [SENSe&lt;1|2&gt;]: ESpectrum: FILTer: RRC: ALPHa 0...1

This command sets the alpha value of the RRC filter for measuring the channel power in the Spectrum Emission Mask measurement if the RRC filter is switched on.

The numeric suffix at SENSE<1|2> is irrelevant.

**Example:**           ":SENS:ESP:FILT ON"                   'RRC filter switched on

**Features:**      \*RST value:    0.22  
                     SCPI:            device-specific

```
:[SENSe<1|2>:]ESpectrum:PRESet[:STANdard] 'xml_file'
```

This command selects the specified XML file under `D:\r_sl\instr\sem_std`. If the file is stored in a subdirectory, include the relative path.

The query returns information about the selected standard, the power class and the link direction. If no standard has been selected, the query returns "".

This command is an event and therefore has no \*RST value and no query.

The numeric suffix at SENSE<1|2> is irrelevant.

**Example:** "SENS:ESP:PRES "WCDMA\3GPP\DL\PowerClass\_31\_39.xml"

' Selects the *PowerClass\_31\_39.xml* XML file

' in the *folder D:\R S\instr\sem\_std\WCDMA\3GPP\DL.*

```
ESP:PRES?           ' Returns 'W-CDMA 3GPP (31,39)dBm DL'
```

**Features:**      \*RST value:    -  
                      SCPI:                device-specific

#### **:[SENSe<1|2>:]ESpectrum:PRESet:REStore**

This command copies the XML files from the D:\R\_S\FW\instr\sem\_backup folder to the D:\R\_S\instr\sem\_std folder. Files of the same name are overwritten.

This command is an event and therefore has no \*RST value and no query.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:**            "SENS:ESP:PRESet:RESt"            ' Restores the originally provided XML files.

**Features:**      \*RST value:    -  
                      SCPI:                device-specific

#### **:[SENSe<1|2>:]ESpectrum:RANGe<1...20>:BANDwidth[:RESolution] <numeric\_value>**

This command selects the resolution bandwidth (RBW) of a range in the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:**            ":LIST:RANG2:BAND 10E3"            ' sets the RBW to 10 KHz

**Features:**      \*RST value:    10 kHz  
                      SCPI:                device-specific

#### **:[SENSe<1|2>:]ESpectrum:RANGe<1...20>:BANDwidth:VIDeo <numeric\_value>**

This command selects the video bandwidth (VBW) of a range in the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:**            ":LIST:RANG2:BAND:VIDeo 100E3" 'sets the VBW to 100 KHz

**Features:**      \*RST value:    30 kHz  
                      SCPI:                device-specific

#### **:[SENSe<1|2>:]ESpectrum:RANGe<1...20>:COUNT?**

This command indicates the number of defined ranges of the Spectrum Emission Mask measurement.

The numeric suffixes <1|2> at SENSe and <1 to 20> at RANGe are irrelevant for this command.

**Example:**            ":LIST:RANG:COUN?"            ' Indicates the number of ranges

**Features:**      \*RST value:    OFF  
                      SCPI:                device-specific

#### **:[SENSe<1|2>:]ESpectrum:RANGe<1...20>:DELete**

This command deletes a range of the Spectrum Emission Mask measurement configuration.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:**            ":LIST:RANG2:DEL"            ' deletes range 2

**Features:**      \*RST value:    --  
                      SCPI:                device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1...20>:FILTer:TYPE NORMAL | CFILter | RRC | PULSe**

This command sets the filter in the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:**           ":LIST:RANG2:FILT:TYPE RRC"       ' RRC filter

**Features:**        \*RST value:    NORMAL  
                  SCPI:            device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1...20>[:FREQuency]:STARt <numeric\_value>**

This command sets the relative start frequency of a range in the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:**           ":LIST:RANG2:STAR -2.52MHz"       ' start frequency of range 2 to -2.52 MHz

**Features:**        \*RST value:    --  
                  SCPI:            device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1...20>[:FREQuency]:STOP <numeric\_value>**

This command sets the relative stop frequency of a range in the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:**           ":LIST:RANG2:STOP 2.52MHz"       ' stop frequency of range 2 to +2.52MHz

**Features:**        \*RST value:    --  
                  SCPI:            device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1...20>:INPut:ATTenuation <numeric\_value>**

This command defines the RF attenuation of a range in the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:**           ":LIST:RANG2:INP:ATT 30db"       ' RF attenuation of range 2 to 30 dB

**Features:**        \*RST value:    -  
                  SCPI:            device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1...20>:INPut:ATTenuation:AUTO ON | OFF**

This command switches the attenuation mode of a range in the Spectrum Emission Mask measurement to AUTO (ON) or MANUAL (OFF).

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:**           ":LIST:RANG2:INP:ATT:AUTO ON"       ' attenuation mode is AUTO for range 2

**Features:**        \*RST value:    ON  
                  SCPI:            device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1...20>:INPut:GAIN:STATe ON | OFF**

This command switches the preamplifier of a range in the Spectrum Emission Mask measurement on or off.

The numeric suffix at SENSE<1|2> is irrelevant.

**Example:** " :LIST:RANG2:INP:GAIN:STAT ON" ' activates the preamplifier for range 2

**Features:** \*RST value: OFF  
SCPI: device-specific

**: [SENSe<1|2>:]ESpectrum:RANGe<1..20>:LIMit:ABSolute:STARt <numeric\_value>**

This command defines the absolute limit at the start frequency of the range for the Spectrum Emission Mask measurement.

The numeric suffix at SENSE<1|2> is irrelevant.

**Example:** "LIST:RANG5:LIM:ABS:START -40" 'Abs limit at Startfreq. in Range 5 is -40dBm

**Characteristics:** \*RST value: -13dBm  
SCPI: device-specific

**: [SENSe<1|2>:]ESpectrum:RANGe<1..20>:LIMit:ABSolute:STOP** <numeric value>

This command defines the absolute limit at the stop frequency of the range for the Spectrum Emission Mask measurement.

The numeric suffix at SENSE<1|2> is irrelevant.

**Example:** "LIST:RANG5:LIM:ABS:STOP -40" 'Abs Limit at Stop Freq. in Range 5 is -40dBm

**Characteristics:** \*RST value: -13dBm  
SCPI: device-specific

```
:[SENSe<1|2>]:[ESpectrum:RANGe<1..20>:INsert AFTer | BEFore
```

This command inserts a new range before or after the specified range. The range numbers are updated accordingly. The numeric suffix at RANGE<1...20> specify the range.

The numeric suffix at SENSE<1|2> is irrelevant.

<b>Example:</b>	"ESP:RANG3:INS BEF"	' Inserts a new range before Range 3
	"ESP:RANG1:INS AFT"	' Inserts a new range after Range 1

**Characteristics:** \*RST value: -  
SCPI: device-specific

**: [SENSe<1|2>:]ESpectrum:RANGe<1..20>:LIMit:RELative:STARt <numeric value>**

This command defines the absolute limit at the start frequency of the range for the Spectrum Emission Mask measurement.

The numeric suffix at SENSE<1|2> is irrelevant.

**Example:** "LIST:RANG5:LIM:ABS:START -40" ' Abs limit at Startfreq. in Range 5 is -40dBm

**Characteristics:** \*RST value: -13dBm  
SCPI: device-specific



**:[SENSe<1|2>]ESpectrum:RANGe<1..20>:LIMit:RELative:STOP** <numeric\_value>

This command defines the absolute limit at the stop frequency of the range for the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:** "LIST:RANG5:LIM:ABS:STOP -40" 'Abs Limit at Stop Freq. in Range 5 is -40dBm

**Characteristics:** \*RST value: -13dBm  
SCPI: device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1..20>:LIMit:STATe** ABSolute | RELative | AND | OR

This command sets the type of limit check for all ranges of Spectrum Emission Mask measurement.

ABSolute: Checks only the absolute limits defined

RELative: Checks only the relative limits. Relative limits are defined as relative to the measured power in the reference range.

AND: Combines the absolute and relative limit. The limit check fails when both limits are violated.

OR: Combines the absolute and relative limit. The limit check fails when one of the limits is violated.

The numeric suffixes at SENSe<1|2> and the numeric suffix at RANGe<1..20> are irrelevant.

**Example:** "LIST:RANG5:LIM -40" 'limit in range 5 is -40dBm  
"LIST:RANG7:LIM -20" 'limit in range 7 is -20dBm  
"LIST:RANG:LIM:STAT ON" 'activates limit checking

**Characteristics:** \*RST value: OFF  
SCPI: device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1...20>:RLEVel** <numeric\_value>

This command defines the reference level of a range in the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:** ":LIST:RANG2:RLEV -30" 'sets the reference level in range 2 to -30 dBm

**Features:** \*RST value: -  
SCPI: device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1...20>:SWEep:TIME** <numeric\_value>

This command defines the sweep duration of a range in the Spectrum Emission Mask measurement.

**Example:** ":LIST:RANG2:SWE:TIME 1MS" 'sets the sweep time in range 2 to 1 ms

**Features:** \*RST value: --  
SCPI: device-specific

**:[SENSe<1|2>]ESpectrum:RANGe<1...20>:SWEep:TIME:AUTO** ON | OFF

This command controls the automatic coupling of the sweep duration on the frequency span and the bandwidth settings in a Spectrum Emission Mask measurement range.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:** `":LIST:RANG2:SWE:TIME:AUTO ON"` 'activates the coupling of frequency range and bandwidths in range 2

**Features:** \*RST value: ON  
SCPI: device-specific

#### **:[SENSe<1|2>:]ESpectrum:RANGe<1...20>:TRANsducer <string>**

This command sets the transducer factor for a range in the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:** `":LIST:RANG2:TRAN ON 'fac_1'"` 'sets the transducer factor fac\_1 in range 2

**Features:** \*RST value: --  
SCPI: device-specific

#### **:[SENSe<1|2>:]ESpectrum:RRANge?**

This command returns the number of the reference range of the Spectrum Emission Mask measurement.

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:** `":SENS:ESP:RRAN?"`

**Features:** \*RST value: -  
SCPI: device-specific

#### **:[SENSe<1|2>:]ESpectrum:RTYPE PEAK | CPOWer**

This command sets selects the type of power measurement in the reference range:

PEAK: Measures the highest peak within the reference range.

CHAN: Measures the channel power within the reference range (integral bandwidth method).

The numeric suffix at SENSe<1|2> is irrelevant.

**Example:** `":SENS:ESP:RTYP PEAK"` ' selects highest peak

**Features:** \*RST value: CPOW  
SCPI: device-specific

#### **:[SENSe<1|2>:]POWER:ACHannel:FILTer:ALPHA:ALL 0...1**

This command sets the rolloff factor of the RRC weighting filter for the TX channel, the adjacent channel and all alternate channels as well. It is only available if *Fast ACP* is not active and no predefined standard is selected. The query command is not supported..

**Example:** `":SENS:POW:ACH:FILT:ALPH:ALL 0.26'"` 'sets Alpha to 0.26

**Features:** \*RST value: 0.26  
SCPI: device-specific

#### **:[SENSe<1|2>:]POWER:ACHannel:FILTer:ALPHA:CHANnel<1 to 12> 0...1**

This command sets the rolloff factor of the RRC weighting filter for the TX channel. It is only available if *Fast ACP* is not active and no predefined standard is selected.

**Example:** `":SENS:POW:ACH:FILT:ALPH:CHAN 0.26'"` 'sets Alpha to 0.26

**Features:** \*RST value: 0.22  
SCPI: device-specific

**:[SENSe<1|2>:]POWER:ACHannel:FILTer:ALPHa:ACHannel 0...1**

This command sets the rolloff factor of the RRC weighting filter for the adjacent channel. It is only available if *Fast ACP* is not active and no predefine standard is selected.

**Note:** This command changes the setting for the alternate channels as well.

**Example:** " :SENS:POW:ACH:FILT:ALPH:ACH 0.26 " 'sets Alpha to 0.26

**Features:** \*RST value: 0.22  
SCPI: device-specific

**:[SENSe<1|2>:]POWER:ACHannel:FILTer:ALPHa:ALTErnate<1 to 11> 0...1**

This command sets the rolloff factor of the RRC weighting filter for the alternate channels. It is only available if *Fast ACP* is not active and no predefine standard is selected.

**Note:** This command changes the setting for the adjacent channel as well. The numeric suffixes at ALTErnate are irrelevant for this command. This might be changed in future releases.

**Example:** " :SENS:POW:ACH:FILT:ALPH:ALT 0.26 " 'sets Alpha to 0.26

**Features:** \*RST value: 0.22  
SCPI: device-specific

**:[SENSe<1|2>:]POWER:ACHannel:FILTer:STATe:ALL ON | OFF**

This command switches the weighing filter state for TX channel, adjacent channel and all alternate channels on or off. It is only available if *Fast ACP* is not active and no predefine standard is selected.

**Example:** " :SENS:POW:ACH:FILT:STAT:ALL ON " 'activates weighting filters for all channels

**Features:** \*RST value: OFF  
SCPI: device-specific

**:[SENSe<1|2>:]POWER:ACHannel:FILTer:STATe:CHANnel<1 to 12> ON | OFF**

This command switches the weighing filter state for the TX channel on or off. It is only available if *Fast ACP* is not active and no predefine standard is selected.

**Note:** This command changes the setting for the TX channel. The numeric suffix at CHANnel is ignored.

**Example:** " :SENS:POW:ACH:FILT:STAT:CHAN ON " 'activates the weighting filter

**Features:** \*RST value: OFF  
SCPI: device-specific

**:[SENSe<1|2>:]POWER:ACHannel:FILTer:STATe:ACHannel ON | OFF**

This command switches the weighing filter state for the adjacent channel on or off. It is only available if *Fast ACP* is not active and no predefine standard is selected.

**Note:** This command changes the setting for the alternate channels as well. This might be changed in future releases.

**Example:** " :SENS:POW:ACH:FILT:STAT:ACH ON " 'activates the weighting filter

**Features:** \*RST value: OFF  
SCPI: device-specific

**:[SENSe<1|2>:]POWER:ACHannel:FILTer:STATe: ALTeRnate<1 to 11> ON | OFF**

This command switches the weighing filter state for the alternate channel on or off. It is only available if *Fast ACP* is not active and no predefined standard is selected.

**Note:** This command changes the setting for all alternate channels and for the adjacent channel as well. The numeric suffixes at *ALTeRnate* are irrelevant for this command. This might be changed in future releases.

**Example:** " :SENS:POW:ACH:FILT:STAT:ALT ON" 'activates weighing filter

**Features:** \*RST value: OFF  
SCPI: device-specific

**:[SENSe<1|2>:]POWER:ACHannel:PRESet:RLEVel:OFFSet 0 ... 100 dB**

This command allows to modify the ADJUST REF LEVEL function for user standards. It defines an additional level offset to be taken into account for the analyzer's reference level setting. It is only available if *Fast ACP* is not active and no predefined standard is selected.

**Example:** " :SENS:POW:ACH:PRESet:RLEV:OFFS 10dB" ' set the level adjust offset to 10dB

**Features:** \*RST value: 0 dB  
SCPI: device-specific

**:[SENSe<1|2>:]ROSCillator:SOURce INTernal | EXTeRnal | EAUTo**

This command controls selection of the reference oscillator. If the external reference oscillator is selected (EXT | EAUT), the reference signal must be connected to the rear panel of the instrument. The reference settings are not changed if a preset occurs to maintain the specific setup of a test system.

INTernal: The internal reference signal is used.

EXTeRnal: The external reference signal is used

EAUTo: The external reference signal is used, but the instrument automatically switches back to internal reference, if the external reference signal gets lost.

The command SENS:ROSC:SOUR:EAUT? returns the current internal selection (EXT or INT).

Note: As soon as the external reference signal is reestablished you have to change the external reference source to *EXTeRnal* and back to *EAUTo* again.

**Example:** "SENS:ROSC:SOUR EXT" ' activates external reference

**Characteristics:** \*RST value: -  
SCPI: device-specific

**:[SENSe<1|2>:]ROSCillator:SOURce:EAUTO?**

This command returns the current selection of the reference signal (internal / external) if the external reference source EXT [INT] is used. The query returns

"INT": The instrument switched back to internal reference.

"EXT": The external reference signal is used

The command is only available, if SENS:ROSC:SOUR EAUT is selected.

**Example:** "SENS:ROSC:EAUT?" ' returns the current state of the reference signal  
' selection

**Characteristics:** \*RST value: -  
SCPI: device-specific

**:[SENSe<1|2>:]SWEep:MODE ESpectrum AUTO | LIST | ESpectrum**

This command controls the sweep continuation.

**AUTO:** Free running sweep

**LIST:** Activates the Spurious Emissions measurement. The sweep list is defined using the SENS:LIST:RANGE commands.

**ESpectrum:** Activates the Spectrum Emission Mask measurement. The sweep list is defined using the SENS:ESP:RANGE commands.

**Example:** "SENS:SWE:MODE LIST" ' activates the spurious emissions measurement

**Characteristics:** \*RST value: AUTO  
SCPI: device-specific

## R&S FS-K7 Extensions

### Operating Manual "FM Measurement Demodulator R&S FS-K7":

- 1141.1821.42-06 (English).      and
- 1141.1821.41-06 (German)

The corresponding PDF-Files are separately available on the service board.

### Last minute changes to the operating manual

None.

## R&S FS-K8 Extensions

### Operating Manual "Application Firmware for Bluetooth Measurements R&S FS-K8":

- 1157.2597.42-03 (English).      and
- 1157.2597.41-03 (German)

The corresponding PDF-Files are separately available on the service board.

### Last minute changes to the R&S FS-K8 operating manual

None.

## R&S FS-K9 Extensions

In addition to the normal function of *MEAS->REF* and *REFERENCE VALUE* softkeys the unit of the power sensor display is changed from the absolute unit dBm or Watt to the relative unit dB or %. Use the *UNIT/SCALE* key if absolute units are required again.

### Software Manual "Measurements with Power Sensors, Application Firmware R&S FS-K9":

- 1157.3029.42-04 (English).      and
- 1157.3029.44-04 (German)

The corresponding PDF-Files are separately available on the service board.

### Last minute changes to the R&S FS-K9 operating manual

None.

## Appendix: Contact to our hotline

Any questions or ideas concerning the instrument are welcome by our hotline:

### USA & Canada

Monday to Friday (except US public holidays)

8:00 AM – 8:00 PM Eastern Standard Time (EST)

Tel. from USA 888-test-rsa (888-837-8772) (opt 2)

From outside USA +1 410 910 7800 (opt 2)

Fax +1 410 910 7801

E-mail [Customer.Support@rsa.rohde-schwarz.com](mailto:Customer.Support@rsa.rohde-schwarz.com)

### East Asia

Monday to Friday (except Singaporean public holidays)

8:30 AM – 6:00 PM Singapore Time (SGT)

Tel. +65 6 513 0488

Fax + 65 6 846 1090

E-mail [Customersupport.asia@rohde-schwarz.com](mailto:Customersupport.asia@rohde-schwarz.com)

### Rest of the World

Monday to Friday (except German public holidays)

08:00 – 17:00 Central European Time (CET)

Tel. from Europe +49 (0) 180 512 42 42

From outside Europe +49 89 4129 13776

Fax +49 (0) 89 41 29 637 78

E-mail [CustomerSupport@rohde-schwarz.com](mailto:CustomerSupport@rohde-schwarz.com)