



ROHDE & SCHWARZ

Test and Measurement
Division

Release Notes

Wireless LAN Test

Application Firmware R&S FSP-K90

Release 4.50

for R&S FSP Analyzer Firmware V4.50

New Features:

- Setting FFT Start Offset provided to allow improved EVM results.

Release Note Revision: 1

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Contents

History	3
General Topics	3
Compatibility of the R&S FSP-K90 Wireless LAN Application Firmware with other Firmware Releases	3
Firmware Update of the R&S FSP-K90 Wireless LAN Application Firmware	4
Enabling the Application Firmware via License Key Code Entry	4
New Functions in version 4.50	4
Modified Functions.....	5
Improvements with option R&S FSP-K90 Wireless LAN Application Firmware ...	6
Known issues with option R&S FSP-K90 Wireless LAN Application Firmware ...	7
Manual Operation and IEC/IEEE Bus.....	7
IEC/IEEE Bus only	7
Modifications to the Operating Manual	8
Modified Chapters for manual operation	8
Spectrum Emission Mask	8
Modified Chapters for remote operation.....	10
MMEMory Subsystem	10
SENSE Subsystem.....	11
TRACe Subsystem	12
Appendix: Contact to our hotline.....	15

History

Date	Rel Note Rev	Changes
19 November 2009	1	First revision for Wireless LAN Application Firmware 4.50

General Topics

Compatibility of the R&S FSP-K90 Wireless LAN Application Firmware with other Firmware Releases

The following table shows the compatible versions of the basic analyzer firmware and the Wireless LAN Application Firmware:

Table of compatible versions:

R&S FSP-K90 Application Firmware	R&S FSP Basic Firmware
4.50	4.50
4.40	4.40
4.30	4.30
4.20	4.20
4.10	4.10
4.00	4.00
3.90	3.90
3.80	3.80
3.70	3.70
3.60	3.60
3.50	3.50
3.42	3.40
3.40	3.40
3.30	3.30
3.28	3.20
-	3.10

Firmware Update of the R&S FSP-K90 Wireless LAN Application Firmware

Since basic firmware version 4.2x a ZIP file with the update sets of the basic system firmware and all available applications is provided. This ZIP file is available in the R&S FSP FIRMWARE section of the Service Board on GLORIS.

Please follow the steps described in the instrument's basic firmware release note to perform a complete firmware update.

Enabling the Application Firmware via License Key Code Entry

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

After installing the application firmware package a license key for validation must be entered. The license key is printed either on a label on the rear panel of the instrument or delivered as a part of the R&S FSP-K90 Wireless LAN application firmware package.

The key sequence for entering the license key is:

SETUP - GENERAL SETUP – OPTIONS - INSTALL OPTION

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

- On a successful validation the message 'option key valid' will appear. The instrument will perform an automatic reboot.
- If the validation failed, the application firmware is not installed.
The most probable reason will be that the instrument is not equipped with the correct basic firmware version. Therefore a messagebox will appear asking for installation of the correct basic firmware version.
If the application firmware package was not installed prior to entering the license key code, a message will appear asking for installation of the application firmware package.
In any case please make sure that the correct basic firmware version and the application firmware package is installed prior to entering the license key code.

New Functions in version 4.50

1. Setting FFT Start Offset provided to allow improved EVM results.

Modified Functions

The behaviour of the following functions changed compared to earlier versions [the number in brackets indicates the firmware version that introduced the individual change]:

1. [V3.28] The number of sweeps for the Spectrum ACPR and Spectrum Mask measurements can now be specified.
2. [V3.28] All limit values and limit results in the table of results are now available via SCPI.
3. [V3.28] Continuous measurements resume if an auto-level measurement is initiated during a continuous measurement.
4. [V3.28] Reference level and Attenuation settings are now displayed after a manual auto-level measurement has been run.
5. [V3.30] Highlighting of analyzed bursts in Magnitude Capture Buffer display.
6. [V3.30] Import/Export of Raw IQ data provided.
7. [V3.30] EVM and Gain Imbalance values can now be obtained in percent or dB via remote control.
8. [V3.30] Limit values in table of results can now be modified. Note this feature is only available when no measurement is running.
9. [V3.42] Gating support for Spectrum Mask and Spectrum ACP measurements.
10. [V3.42] IF Power trigger disabled for Spectrum Mask (ETSI) measurement.
11. [V3.42] List mode results accessible from frequency sweep measurements.
12. [V3.42] Gate lines only displayed when valid.
13. [V3.42] Single auto-level sequence can now be activated via SCPI (CONFIGure:POWer:AUTO ONCE).
14. [V3.42] SCPI status register STATus:QUESTionable:SYNC is provided.
15. [V3.42] Phase and Frequency Error Vs Preamble measurement are provided.
16. [V3.42] Advanced settings for attenuator control available.
17. [V3.70] Bursts with analysis problems now highlighted in Magnitude capture buffer.
18. [V3.70] Sweep time for auto-level can now be configured.
19. [V3.70] The sweep time used by the auto level routine can now be configured between 1ms and 1s.
20. [V3.70] The number of analyzed bursts is available via SCPI (FETCh:BURSt:COUNT?)
21. [V3.70] The number of symbols in each analyzed burst is available via SCPI (FETCh:SYMBol:COUNT?)
22. [V3.80] Electronic attenuator: When the electronic attenuator is switched off with the INPut1:EATT:STATe OFF command then the electronic attenuators automatic state is also switched off.
23. [V3.80] Recalculation of results after data capture supported by pressing the REFRESH hot-key.
24. [V3.80] A SUPPORT soft-key has been provided to allow detailed information about the FSP-K90 option to be saved to file.
25. [V3.90] SCPI support for selecting between phase and frequency for Preamble results.
26. [V3.90] Corrected average burst power in appending mode.

- 27. [V4.10] Spectrum Emission Mask measurement for all standards, SEM settings can be loaded from XML files.
- 28. [V4.20] Trace data now available via remote control in binary format for all traces.
- 29. [V4.30] Support for Application Recovery.
- 30. [V4.50] Setting FFT Start Offset provided to allow improved EVM results..

Improvements with option R&S FSP-K90 Wireless LAN Application Firmware

None

Known issues with option R&S FSP-K90 Wireless LAN Application Firmware

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

Manual Operation and IEC/IEEE Bus

1. (K90 V3.80) External attenuation not correctly applied to Spectrum ACP results

The external attenuation is incorrectly applied to the relative channel power results in the Spectrum ACP (Relative) measurement. The external attenuation is correctly applied to the Spectrum ACP (Absolute) measurement results.

2. (K90 V3.50) Soft front panel

The setting parameter does not update when the numeric keys are pressed on the soft front panel. Pressing return to enter the value shows that the keystrokes have been received and the parameter updates correctly.

IEC/IEEE Bus only

1. (K90 V3.28) Selecting screen A/B

For selecting screen A or B, DISPLAY:<WINDow[1|2]>:SElect command does not work correctly.

Workaround: Instead of this command, an alias command is provided, which is:
DISPLAY:<WINDow[1|2]>:SSElect.

2. (K90 V3.28) Selecting K90 using INSTRument:NSElect

Selection FS-K90 as the active option using the INSTRument:NSElect 16 command does not work

Workaround: Instead of this command use the alternative command which is:
INSTRument:SElect WLAN

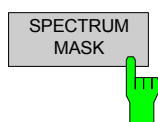
Modifications to the Operating Manual

The R&S FSP-K90 analyzer functions are included in a separate manual set. Please refer to the following order numbers:

- 1300.6798.42-03 (English)

Modified Chapters for manual operation

Spectrum Emission Mask



The Spectrum Emission Mask measurement results are selected by pressing the *SPECTRUM* softkey in the main measurement softkey menu followed by the *SPECTRUM MASK* softkey.



Fig. 2-21 Spectrum Emission Mask Results

The Spectrum Mask results display shows power against frequency. The span of the results is related to the specified sample rate. A limit line representing the spectrum mask specified for the selected standard is displayed and an overall pass/fail status is displayed for the obtained results against this limit line. If the *Sweep Count (Mask/ACP)* parameter in the General Settings view is set to any value other than 1 then the measurement is performed over the specified number of sweeps. When the measurement is performed over multiple sweeps a max hold trace is displayed as well as an average trace.

The Spectrum Emission Mask measurement can be configured from the SEM settings view:

The *SEM SETTINGS* softkey brings up the SEM Settings view.

Spectrum Emission Mask Settings

SEM according to: IEEE

File Name: IEEE_SEM.xml

Power Class: Auto

Reference Power: RMS

TX Channel

Bandwidth: 18 MHz

RBW: 100 kHz

SEM Configuration

Start Freq	Stop Freq	RBW	VBW	Detector	Start Limit	Stop Limit	Evaluate
9 MHz	11 MHz	100 kHz	30 kHz	RMS	0	dB - 20	dB Yes
11 MHz	20 MHz	100 kHz	30 kHz	RMS	- 20	dB - 28	dB Yes
20 MHz	30 MHz	100 kHz	30 kHz	RMS	- 28	dB - 40	dB Yes
30 MHz	50 MHz	100 kHz	30 kHz	RMS	- 40	dB - 40	dB Yes

Measurement Complete

SPECTRUM WLAN AUTO LVL RUN SGL RUN CONT REFRESH SCREEN A

GATING ON OFF

GATE SETTINGS

SEM SETTINGS

IMPORT

EXPORT

SUPPORT

Fig. 2-22 ACP Settings view

IEC/IEEE-bus command: SENS:POW:SEM USER|IEEE|ETSI
SENS:POW:SEM:CLASS

SEM according to

SEM according to: IEEE

File Name: IEEE_SEM.xml

Power Class: Auto

Reference Power: RMS

SEM according to specifies how the Spectrum Emission Mask settings and limits are applied. This parameter provides the following settings:

ETSI – Settings and limits are as specified in the standard

IEEE – Settings and limits are as specified in the standard

User – Settings and limits are configured via an XML file

File Name

SEM according to	IEEE
File Name	IEEE_SEM.xml
Power Class	Auto
Reference Power	RMS

When **User** settings are specified, *File Name* shows the name of the loaded XML file. Clicking the arrow switches to the File Manager to locate an XML file, and automatically selects *SEM According To: User*.

When using TTA/ETSI/IEEE standards, *File Name* reflects the name of the built-in configuration.

SEM Configuration

The SEM configuration shows the settings and limits applied over specified frequency ranges around the TX channel. The settings displayed are dependent on the selected *Link Direction* and *Power Class*

SEM Configuration									
Start Freq	Stop Freq	RBW	VBW	Detector	Start Limit		Stop Limit		Evaluate
9 MHz	11 MHz	100 kHz	30 kHz	RMS	0	dB	- 20	dB	Yes
11 MHz	20 MHz	100 kHz	30 kHz	RMS	- 20	dB	- 28	dB	Yes
20 MHz	30 MHz	100 kHz	30 kHz	RMS	- 28	dB	- 40	dB	Yes
30 MHz	50 MHz	100 kHz	30 kHz	RMS	- 40	dB	- 40	dB	Yes

Fig. 2-23 SEM Configuration

Modified Chapters for remote operation

MMEMory Subsystem

COMMAND	PARAMETERS	UNIT	COMMENT
:MMEMory			
:LOAD			
:IQ			
:STATE	1,<file_name>		
:SEM			
:STATE	1,<file_name>		
:STORe			
:IQ			
:STATE	1,<file_name>		

MMEMory:LOAD:IQ:STATe

The remote control command is used to load IQ data from the specified .iqw file.

Example: "MMEM:LOAD:IQ:STAT 1, 'D:\USER\DATA.iqw'" ' Loads IQ data from
' the specified file.

Characteristics: *RST value: -
SCPI: Device Specific

MMEMory:LOAD:SEM:STATe

The remote control command is used to load a K91 spectrum emission mask setup from an xml file.

Example: "MMEM:LOAD:SEM:STAT 1, 'D:\USER\ETSI_SEM.xml'"

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

MMEMory:STORe:IQ:STATe

The remote control command is used to save IQ data to the specified .iqw file.

Example: "MMEM:STOR:IQ:STAT 1, 'D:\USER\DATA.iqw'" ' Stores IQ data to the
' specified file.

Characteristics: *RST value: -
SCPI: Device Specific

SENSe Subsystem**[SENSe:]DEMod:FFT:OFFSet**

This command specifies the FFT start offset. The values which can be specified are as follows:

- AUTO - The FFT start offset is automatically chosen to minimize the intersymbol interference.
- GIcenter - Guard Interval Center: The FFT start offset is placed to the center of the guard interval

Example: "SENS:DEM:FFT:OFFS?" Reads the fft start offset value

Characteristics: *RST value: AUTO
SCPI: device specific

[SENSe:]POWer:SEM:CLASs

This command sets the Spectrum Emission Mask (SEM) power class index. The index represents the power classes to be applied. The index is directly related to the entries displayed in the power class drop down combo box, within the SEM settings configuration page.

Example: "POW:SEM:CLASs 0" ' set SEM power class to automatic

Characteristics: *RST value: 0
SCPI: device-specific

[SENSe:]POWer:SEM

This command sets the Spectrum Emission Mask (SEM) measurement type. This is either IEEE, ETSI Spectrum mask or a user defined file

Example: "POW:SEM ETSI" sets the SEM ETSI measurement type

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

TRACe Subsystem

The TRACe subsystem controls access to the instrument's internal trace memory.

COMMAND	PARAMETERS	UNIT	COMMENT
TRACe			
[:DATA]	TRACE1 TRACE2 TRACE3 TRACE4 TRACE5 TRACE6 LIST		Query only
:IQ			
:DATA:	<numeric_value>,<numeric_value>		Query only
:MEMory?			Query only
:SRATe	<numeric_value>	Hz	Query only

TRACE[:DATA]

This command returns all the measured data that relates to the currently selected measurement type. All results are returned in ASCII format. The returned data is particular to the currently selected measurement type and is specified below. DISPlay:FORMat is not supported with this command.

IQ Measurements

Currently, there are a number of measurements that can be performed in IQ mode. No data will be returned for any of the following measurements, should it be requested, until such time as a measurement belonging to the IQ group has been previously run.

Running a frequency sweep measurement for example, Spectrum Mask, will not generate results for this measurement group.

Constellation vs Symbol

This measurement represents I and Q data. Data will be returned as a repeating array of interleaved I and Q data in groups of selected carriers, until all the data is exhausted.

Each I and Q point will be returned in floating point format. TRACE1 is used for this measurement results.

If "All Carriers" is selected, it will return 52 per of I and Q data per symbol.

If "Pilots Only" is selected, it will return 4 per of I and Q per symbol in the following order: Carrier -21, Carrier -7, Carrier 7, Carrier 21.

If a single carrier is selected, it will return 1 per of I and Q data per symbol.

Supported data formats (FORMat:DATA): ASCII|REAL

Constellation vs Carrier

This measurement represents I and Q data. Data will be returned as a repeating array of interleaved I and Q data in groups of 53 channels including the channel 0, until all the data is exhausted.

Each I and Q point will be returned in floating point format. TRACE1 is used for this measurement results.

Supported data formats (FORMat:DATA): ASCi|REAL

EVM vs Carrier

Two trace types are provided with this measurement. There is an average EVM value for each of the 53 channels or a repeating group of EVM values for each channel. The number of repeating groups will correspond to the number of fully analyzed trains.

Each EVM value will be returned as a floating point number, expressed in units of dBm.

TRACE1 – Average EVM values per channel

TRACE2 – All EVM values per channel for each full train of the capture period

Supported data formats (FORMat:DATA): ASCi|REAL

EVM vs Symbol

Three traces types are available with this measurement. The basic trace types show either the minimum, mean or maximum EVM value, as measured over the complete capture period.

The number of repeating groups that are returned will be equal to the number of measured symbols.

Each EVM value will be returned as a floating point number, expressed in units of dBm.

TRACE1 – Minimum EVM values

TRACE2 – Mean EVM values

TRACE3 – Maximum EVM values

Supported data formats (FORMat:DATA): ASCi|REAL

Error Vs Preamble

Three traces types are available with this measurement. The basic trace types show either the minimum, mean or maximum frequency or phase value as measured over the preamble part of the burst.

Supported data formats (FORMat:DATA): ASCi|REAL

Frequency Sweep Measurements

Currently, there is only one measurement that is performed in frequency sweep mode. This is the Spectrum Mask measurement. No data will be returned for this measurement, should it be requested, until such time as a measurement has been previously run.

Running an IQ measurement will not generate results for this measurement.

Supported data formats (FORMat:DATA): ASCi|REAL

Spectrum Mask

Result data will be returned as 625 trace points in floating point format. These trace points are obtained directly from the base system via the measurement API and the quantity is therefore a fixed value. Only an array of Y data will be returned.

TRACE1 – Clear write values

TRACE2 – Max hold values

LIST – Spectrum Emission Mask (SEM) summary results.

SEM summary results format:

1 st Value	-Index into table of results (1 – 50)
2 nd Value	-Start frequency band (Hz)
3 rd Value	-Stop frequency band (Hz)
4 th Value	-RBW (Hz)
5 th Value	-limit fail frequency (Hz)
6 th Value	-Power absolute (dBm)
7 th Value	-Power relative (dBc)
8 th Value	-Limit distance (dB)
9 th Value	-Failure flag (1 = fail, 0 = pass)

Supported data formats (FORMat:DATA): ASCii|REAL

Spectrum ACPR

Result data will be returned as 625 trace points in floating point format. These trace points are obtained directly from the base system via the measurement API and the quantity is therefore a fixed value. Only an array of Y data will be returned. TRACE1 is used for this measurement results.

Supported data formats (FORMat:DATA): ASCii|REAL

Example: “TRAC? TRACE2” The measurement data for the selected graph is returned.

Characteristics: *RST value: -
SCPI: Conforming

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

East Asia

Monday to Friday (except Singaporean public holidays)

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

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Fax + 65 6 846 1090

E-mail Customersupport.asia@rohde-schwarz.com

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