ROHDE&SCHWARZ

Test and Measurement
Division

Release Notes

EUTRA/LTE Analysis

Application Firmware

R&S FSQ-K100/-K101/-K104/-K105

Release 4.70

for R&S FSQ, FSG Analyzer Firmware V4.7x

New Features:

- **TDD enhanced test model support and special subframe analysis**
- **Synchronization without P-/S-SYNC**
- **PDCCH for demodulation setup**
- **Boosting estimation**
- **IF power trigger support**

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Contents

History

Date	Rel Note Rev	Changes
04 May 2011	1	First revision for EUTRA/LTE Analysis Firmware 4.70.

General Topics

Compatibility of the R&S FSQ-K100/-K101/-K104/-K105 EUTRA/LTE Application Firmware with other Firmware Releases

The following table shows the compatible versions of the basic analyzer firmware and the EUTRA/LTE Application Firmware:

Table of compatible versions:

R&S FSQ-K100 Application Firmware	R &S FSQ-K100/K104 Application Firmware	R &S FSQ-K100/K101/ K104/K105 Application Firmware	R&S FSQ Basic Firmware	R&S FSG Basic Firmware
-	-	4.70	4.75	4.79
-	-	4.61 SP1	4.65 SP3	4.69 SP3
-	-	4.61	4.65 SP1	4.69 SP1
-	-	4.60	4.65	4.69
-	4.51	-	4.55 SP2	4.59 SP1
4.50 SP2	-	-	4.55 SP1	4.59
4.50 SP1	-	-	4.55	-
4.50	-	-	4.55	-

Firmware Update of the R&S FSQ-K100/-K101/-K104/-K105 EUTRA/LTE Application Firmware

Since basic firmware version 4.5x 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 instruments FIRMWARE section, e.g. R&S FSQ of the Service Board on GLORIS.

Please follow the steps described in the instrument's basic firmware release notes 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 FSQ-K100/-K101/-K104/-K105 EUTRA/LTE 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.

Note any combination of K100, K101, K104 and K105 keycodes may be used.

System Memory Requirements

For FSQ- K100/-K101/-K104/-K105 Application Firmware, an installed system memory of 512 MByte is essential. The FSQ- K100/-K101/-K104/-K105 will generate an error message during activation, if available system memory does not meet the requirements. This may happen for if other options are activated before starting the FSQ-K100/-K104.

For instruments, shipped with 256MByte system memory, a memory extension FSQ-B512, order number 1157.1590.02, is available.

A reboot of the instrument after using other options will allow FSQ- K100/-K101/-K104/-K105 to be activated without memory extension.

The system memory size can be easily checked by pressing SETUP – SYSTEM INFO – STATISTICS, item "Memory size". This item is available since version 3.25 of the base system firmware.

New Functionality in Version 4.70

General

- **IF power trigger**

  Added IF power trigger mode and IF power trigger level setting in General Settings dialog.

K100/K102/K104 (downlink)

- **TDD enhanced test model support**

  Support for TDD Enhanced Test-Models. Added PHICH TDD m_i=1 (E-TM) setting for support of special TDD E-TM definition 36.141 V9.0.0, 6.1.2.6: "*For frame structure type 2 the factor m_i shall not be set as per TS36.211, Table 6.9-1, but instead shall be set to m_i=1 for all transmitted subframes.*".

- **TDD special subframe analysis**

  Support for TDD special subframe analysis. Added "Conf. of Special Subframe" setting.

- **Data capture settings**

  New "Data Capture Settings" in General Settings dialog:
  - "Capture Time setting": Capture Time specifies the time (and therefore the amount of data) to be captured in a single measurement sweep.
  - "Overall Frame Count": If enabled, the number of frames to analyze can be set. The LTE software captures and analyzes data until the required number of frames are analyzed.
  - If "Auto Acc. Ro Standard" is enabled, the LTE software automatically analyzes as many LTE frames as required by the 3GPP EVM definition (i.e. averaging over at least 10 subframes).
  - For compatibility to old versions, use the following settings: "Overall Frame Count" enabled, "No of Frames to Analyze" is set to 1 and "Auto Acc. To Standard" is disabled.

- **Removal of legacy setting parameters**

  In Advanced Demodulation Settings dialog, the following settings are removed: "P-/S-SYNC Repetition Period", "PRS Initialization" and "Fast Forward (N_c)". These settings were introduced to support very early versions of the 3GPP LTE standard and are no longer required.

- **P-/S-SYNC Tx antenna setting**

  With this setting it is specified on which Tx antenna the P-/S-SYNC is transmitted. It is now possible to synchronize on LTE signals which do not contain any P-/S-SYNC.

  With the P-/S-SYNC Tx Antenna setting the synchronization method is implicitly selected. If there is no synchronization signal available, the Reference Signal is used for synchronization.

  NOTE: For the Reference Signal based synchronization, no auto Cell ID detection is supported.

- **PHICH N_g parameter**

  Added N_g parameter for PHICH.

- **PDSCH subframe configuration detection**

  The type of subframe configuration detection is defined.

  With this new setting it is possible to measure TDD E-TMs without the requirement of a 20 ms trigger signal.

- **Boosting estimation**

  The boosting of the synchronization signals, control channels and PDSCH is estimated and set automatically based on the analyzed signal.

- **Auto detection of PRB symbol offset**

  The Control Region for PDCCH (PRB Symbol Offset) setting is now auto detected based on the PCFICH. Note that for correct demodulation of a 3GPP conform PCFICH signal, the Scrambling of Coded Bits has to be enabled.

- **UE ID/N_RNTI setting**

  Each allocation can be assigned an individual N_RNTI or allocations can be combined by using the same N_RNTI value. In this case, the allocation measurement results are the combined results from all allocations with the same N_RNTI. This makes it possible to configure users having distributed allocations and get the correct descrambled bit stream for this user.

- **PDSCH symbol data setting**

  The way the PDSCH reference symbol data is determined can be chosen with the PDSCH symbol data setting. In addition to the default symbol detection, the mode “All 0 (E-TM)” can be selected. In this mode the PDSCH reference data for EVM calculation are set to a fixed value of zero in accordance with the test model definition.

- **Offset RB in Allocation Summary replaced by Rel. Power/dB**

  In the Allocation Summary table, the column "Offset RB" is replaced by a “Rel. Power/dB” column. The Offset RB values can still be queried from the PDSCH Subframe Configuration table using the remote control interface. The new relative power values show the manually set/estimated boosting value for each subframe and for each allocation.

K101/K105 (uplink)

- **Adaptations to 36.211 V8.7.0**

  PUSCH frequency hopping and Sounding Reference Signal according to 36.211 V8.7.0.

- **Codeword scrambling**

  Codeword scrambling is now implemented for each physical channel. With the UE ID/n_RNTI setting, the radio network temporary identifier (RNTI) of the UE is specified.

- **PUCCH bit stream result**

  The PUCCH bit stream measurement result is added to the Bitstream list.

- **EVM DMRS PUSCH QPSK/16QAM and EVM PUCCH/DMRS PUCCH**

  Added EVM DMRS PUSCH QPSK/16QAM and EVM PUCCH/DMRS PUCCH to the Result Summary table. Removed EVM PUSCH 64QAM entry from the Result Summary table since there are no limits defined in 36.101 for 64-QAM modulation.

- **Data capture settings**

  New “Data Capture Settings” in General Settings dialog:
  - “Overall Frame Count”: If enabled, the number of frames to analyze can be set. The LTE software captures and analyzes data until the required number of frames are analyzed.
  - If “Auto Acc. to Standard” is enabled, the LTE software automatically analyzes as many LTE frames as required by the 3GPP EVM definitions.
  - For compatibility to old versions, use the following settings: “Overall Frame Count” enabled, “No of Frames to Analyze” is set to 1 and “Auto Acc. To Standard” is disabled.

- **Suppressed interference synchronization**

  Added a Suppressed Interference Synchronization mode in Uplink Demodulation Settings. By enabling this new synchronization mode it is possible to synchronize on signals containing more than one UE. Note that auto demodulation is not supported in this synchronization mode.

- **Increased allowed range for PUCCH Number of RBs**

Improvements

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

1. [V4.50] Corrected 'Channel Flatness' and 'Channel Flatness Difference' measurement results.

2. [V4.61] Corrected ‘multicarrier filter’ state change applied in continuous mode.

3. [V4.50] Corrected 'CONF:LTE:UL:BW'-invalid deactivation of auto demodulation.

Known Issues with Option R&S FSQ-K100/-K101/-K104/-K105 EUTRA/LTE Application Firmware

The version numbers in brackets indicate the version in which the issue was observed for the first time. Unless otherwise stated all listed issues apply to the FSQ-K100.

Manual Operation and IEC/IEEE Bus

1. (K10x V4.50) Memory usage.

Performing combinations of calibration, activating and using the other options and activating and using FSQ-K10x on an instrument may lead to the FSQ-K10x option no longer being able to be activated due to insufficient memory.

Workaround: Ensure no other applications are running. Restarting the firmware after performing calibration also improves memory usage. Using Preset also releases memory.

2. (K101/K105 V4.50) An overload may occur in auto level mode with UL signals over a limited range (-40 ,-30 dB) for frequency sweep measurements.

IEC/IEEE Bus only

1. (K100 V4.50 SP2) INITiate:IMMediate:CONTinuous OFF command should not be used to terminate a continuous measurement sequence.

Do not use the INITiate:IMMediate:CONTinous OFF command when an continuous measurement sequence is running as it may not fully abort the measurement sequence and further measurements will not be possible until after a Preset.

Workaround: Use ABORt to terminate a continuous measurement sequence.

Modified Functionality

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

1. **[V4.50 SP1] Spectrum Mask and ACLR channel bandwidth (2.5MHz, User) restrictions implemented.**
2. **[V4.50 SP1] Markers automatically position themselves on valid data.**
3. **[V4.50 SP1] Marker zoom support for Capture Memory.**
4. **[V4.50 SP1] 'Frame Start Offset' measurement result available.**
5. **[V4.50 SP1] 'Freq Err Vs Symbol' Measurement support for the 'All' Subframe Selection.**
6. **[V4.50 SP1] Spectrum Power RB measurement results displayed as hybrid histogram/trace.**
7. **[V4.50 SP1] A 'Nan' is returned via SCPI or a blank entry is displayed when the dB result is not finite i.e. dB equivalent for EVM = 0%.**
8. **[V4.50 SP1] A 'Nan' is returned via SCPI or a blank entry is displayed for every dB results when any dB result in the set (mean, minimum, maximum) is not finite.**
9. **[V4.50 SP1] Disabled 'Auto Demodulation' setting on any PDSCH Subframe Configuration modification.**
10. **[V4.50 SP1] Modified Allocation Summary measurement results to append a single EVM result for All Allocation Ids and All RBs.**
11. **[V4.50 SP2] LTE Measurements support for the 'Optimal, Pilot and Payload' Channel Estimation algorithm.**
12. **[V4.51] LTE Data can now be recalled when the LTE option is not active.**
13. **[V4.51] Cleared Previous result summary results after an analysis error.**
14. **[V4.51] Modified RF Input Power measurements (Power Spectrum, Power vs. RB, Allocation Summary Power, List: Power and List: OSTP) and Capture Buffer to include the effect of the Ext Attenuation.**
15. **[V4.51] Modified Ref Level to include the effect of the Ext Attenuation.**
16. **[V4.51] Corrected Physical Layer Cell Identity settings now used for measurements, previously 'Auto' always used.**
17. **[V4.51] Corrected PHICH Modulation (Allocation Summary measurement) reporting.**
18. **[V4.51] SCPI :CONFigure:LTE:DL:PLCI:PLID and :CONFigure:LTE:DL:PLCI:CIDGroup DEFault setting now enables AutoID.**
19. **[V4.51] 'Auto Level' disabled if related parameters modified.**
20. **[V4.51] Disabled 'Auto' for Physical Layer Cell Identity if related parameters 'Cell Id' 'Cell Identity Group' or 'Identity' modified.**
21. **[V4.51] Modified Marker X-axis setting popup and Marker X-axis display report to use same unit scaling.**
22. **[V4.51] Ensured 'Demod Settings' changes whilst in Continuous measurement mode are used for the next analysis.**
23. **[V4.51] Corrected continuous measurement of 1.4MHz bandwidths signals; previously analysis and results reporting would stop being updated after a small number of measurement.**
24. **[V4.51] Corrected SCPI ACLR measurement 'Rel. Power of upper adjacent channel' result.**
25. **[V4.51] Corrected 'DISPLAY LIST' update on next measurement after selection from Spectrum Mask or ACLR measurements.**
26. **[V4.60] Support for Uplink (K101, K105)**

27. [V4.60] The definition of the MIMO physical channel power boosting has changed compared to the FSQ-K100, FSQ-K104 V4.51 release. The EPRE is now defined on a per antenna port basis as specified in R1-101470s.

28. [V4.60] Channel BW 'User' is not an option when a standard Resource Block setting is selected.

29. [V4.60] Corrected Allocation Summary SCPI modulation results.

30. [V4.60] Unsupported SCPI Fornat Data option 'PACKED' removed.

31. [V4.60] A Measurement group can be selected without forcing a default measurement on the currently selected screen.

32. [V4.60] Modifying RF or EL Attenuation will disable Auto-Level.

33. [V4.61] Support for downlink multicarrier filter.

34. [V4.70] IF power trigger

35. [V4.70] TDD enhanced test model support

36. [V4.70] Data capture settings

37. [V4.70] P-/S-SYNC Tx antenna setting

38. [V4.70] PHICH N_g parameter

39. [V4.70] PDSCH subframe configuration detection

40. [V4.70] Boosting estimation

41. [V4.70] Auto detection of PRB symbol offset

42. [V4.70] UE ID/N_RNTI setting

43. [V4.70] PDSCH symbol data setting

44. [V4.70] Offset RB in Allocation Summary replaced by Rel. Power/dB

45. [V4.70] Uplink Adaptations to 36.211 V8.7.0

46. [V4.70] Uplink Codeword scrambling

47. [V4.70] PUCCH bit stream result

48. [V4.70] EVM DMRS PUSCH QPSK/16QAM and EVM PUCCH/DMRS PUCCH

49. [V4.70] Suppressed interference synchronization

50. [V4.70] Increased allowed range for PUCCH Number of RBs

Modifications to the Operating Manual

The R&S FSQ-K100/-K101/-K104/-K105 EUTRA/LTE Measurement Application functions are included in two separate manual sets. Please refer to the following order numbers:

- 1173.0620.42-03- (English) K100 / K104 EUTRA/LTE Downlink
- 1173.1210.12-01- (English) K101 / K105 EUTRA/LTE Uplink

Modified Chapters

No change

Customer Support

Technical support – where and when you need it

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

Up-to-date information and upgrades

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

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