GSM/EDGE Application Firmware R&S FS-K5 for R&S FSP and R&S FSU

The solution for easy and fast GSM and EDGE measurements

- GSM/EDGE push-button measurements
- Fast modulation spectrum routine
- Easy to use
- Accurate carrier power measurement
- Multislot capability
- Enhanced timing accuracy with 8 samples/symbol

ROHDE&SCHWARZ

Characteristics

The Application Firmware R&S FS-K5 allows the user to perform the most important GSM and EDGE transmitter measurements at the push of a button:

- Phase/frequency error (GSM)
- Modulation accuracy (EDGE) including 95:th percentile, origin offset suppression, EVM and frequency error
- Power versus time incl. carrier power
- Carrier power
- Modulation spectrum
- Transient spectrum
- Spurious emissions

Only the carrier frequency and the external attenuator have to be set manually.

The Application Firmware R&S FS-K5 can be installed in all models of the R&S FSP and R&S FSU spectrum analyzer families:

R&S FSU 3 20 Hz to 3.6 GHz	R&S FSP 3 9 kHz to 3 GHz	Covers the basic TX frequency range
R&S FSU 8 20 Hz to 8 GHz	R&S FSP 7 9 kHz to 7 GHz	Adds harmonics measurement capability
–	R&S FSP 13 9 kHz to 13 GHz	Covers the entire spurious emissions frequency range
R&S FSU 26 20 Hz to 26 GHz	R&S FSP 30 9 kHz to 30 GHz	Adds microwave link frequency ranges

The application firmware can be used throughout the total frequency range of the basic spectrum analyzer. This covers all GSM bands of interest such as GSM 900, GSM 1800, GSM 1900, R-GSM, GSM 450 and even IF frequencies used in transmitters and receivers.

Features and benefits

R&D, development
The R&S FSP is the ideal development tool with easy-to-use GSM measurement functions in a cost-effective analyzer. The workhorse for every engineer, especially in mobile development. The R&S FSU provides the dynamic range required in base station development, verification and production testing.

Low measurement uncertainty for high confidence
<0.5 dB total level uncertainty and <0.7° phase error for GSM

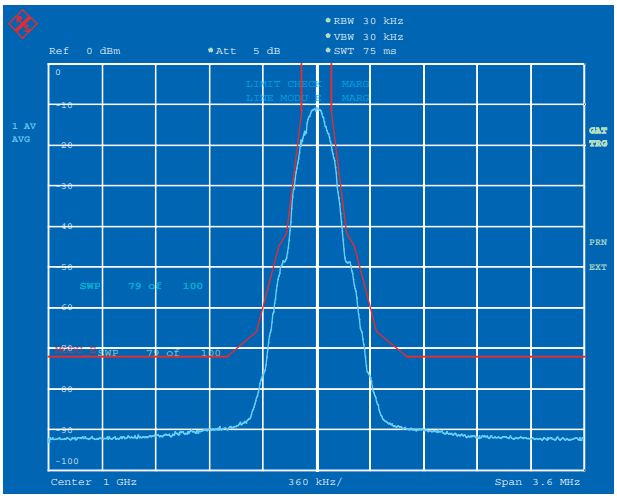
Designed for speed
Fast modulation spectrum routine for frequency list mode:
± 1.8 MHz/200 bursts in <25 seconds, 1 active slot
± 1.8 MHz/200 bursts in <8 seconds, 8 active slots

Really portable – usable anywhere
- Lightweight, <11 kg with R&S FSP 3
- Comprehensive documentation and storage of results and hard copies on internal hard disk, subsequent printing or transfer to a PC – even via LAN/Ethernet
- Optional DC power supply and battery pack for R&S FSP

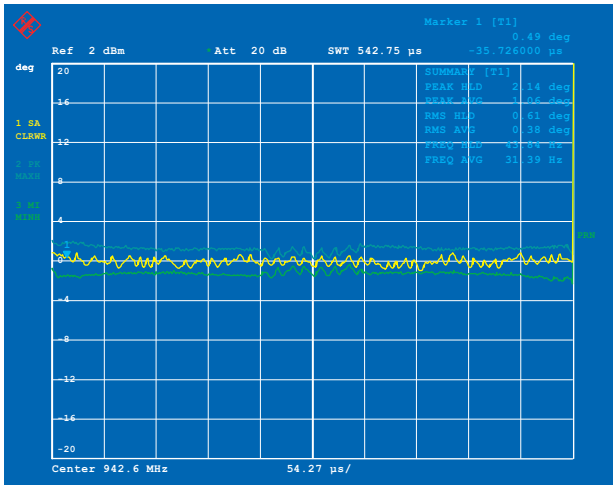
Trigger functions to meet many demands
- Simplified test setup, no trigger from device under test necessary
- IF power trigger for gated measurements with selectable trigger level
  - R&S FSU: –50 dBm to –10 dBm
  - R&S FSP: –30 dBm to –10 dBm (10 MHz bandwidth)
- RF power trigger with enhanced sensitivity for R&S FSP: option R&S FSP-B6 (–50 dBm to –10 dBm)

Certified Environmental System ISO 14001 REG. NO 1954

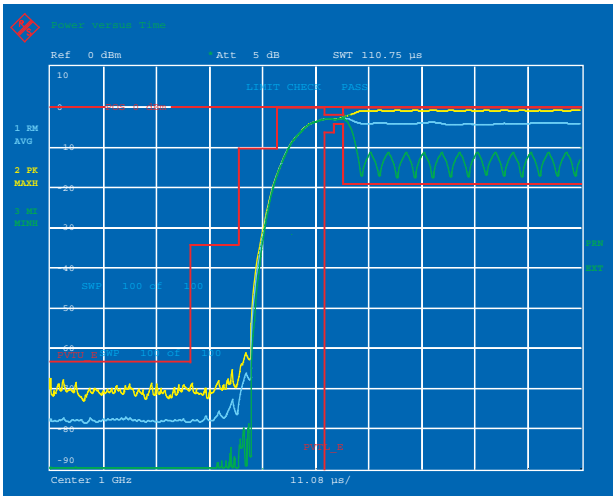
Certified Quality System ISO 9001 DQS REG. NO 1954



Modulation spectrum measurement in frequency sweep mode



Phase/frequency error measurement: peak as well as average values over 200 bursts are indicated for RMS phase error and peak phase error



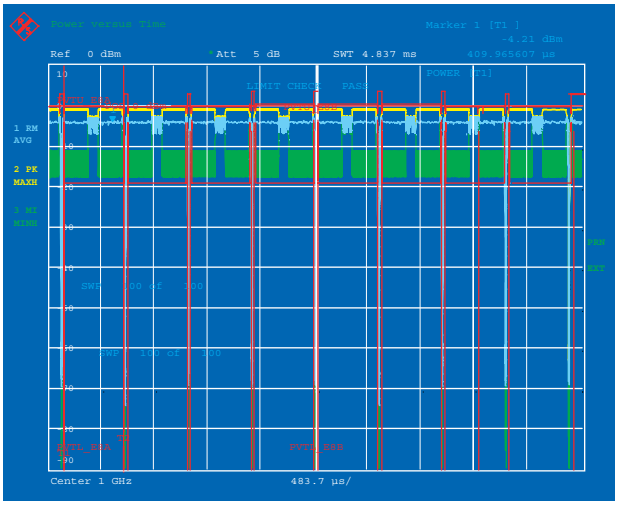
Power-versus-time measurement: details of burst can be zoomed – rising edge, falling edge, high resolution display of top of burst

MODULATION SPECTRUM LIST

Frequency:	1.00000 GHz			Status:	PASSED
Ext Atten:	0.0	dB		No of Bursts:	100
Ref Pwr :	-11.96	dBm at RBW:	30 kHz	RBW: 30 kHz VBW:	30 kHz

Offset Freq [kHz]	+Offset [dB]	+Limit [dB]	-Offset [dB]	-Limit [dB]	Status
100	-7.7	0.5	-7.4	0.5	PASSED
200	-36.5	-30.0	-36.2	-30.0	PASSED
250	-40.5	-33.0	-39.9	-33.0	PASSED
400	-70.4	-54.0	-70.1	-54.0	PASSED
600	-77.6	-60.0	-77.8	-60.0	PASSED
800	-81.0	-60.0	-81.4	-60.0	PASSED
1000	-83.3	-60.0	-83.1	-60.0	PASSED
1200	-84.3	-60.0	-84.4	-60.0	PASSED
1400	-85.0	-60.0	-85.0	-60.0	PASSED
1600	-85.1	-60.0	-85.3	-60.0	PASSED
1800	-85.4	-60.0	-85.5	-60.0	PASSED

Modulation spectrum measurement in list mode using a dedicated routine for fast measurements also when averaging over a large number of bursts



Multislot power-versus-time measurement: up to 8 active slots can be measured

Specifications

Specifications apply under the following conditions: 15 minutes warmup time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and total calibration performed.
Data designated "nominal" apply to design parameters and are not tested.
The specifications below apply to the R&S FSPx (FSP3/7/13/30), R&S FSUx (FSU3/8/26) equipped with R&S FS-K5. They are based on the data sheet specifications of the Spectrum Analyzers R&S FSP and R&S FSU and are not checked separately. Level measurement uncertainties given with a tolerance are measurement uncertainties with a confidence level of 95%. Data without tolerances are typical values at 900 MHz.
The specified level measurement errors do not take into account systematic errors due to the reduced S/N ratio.

Measurement	Specification		Test specification and permissible measurement uncertainty to I-ETS 300 609-1
	R&S FSP3/7/13/30	**R&S FSU3/8/26**	
Phase/frequency error (GMSK modulation)			11.10.1 13.1
Phase error, floor (S/N >40 dB)			
RMS	<0.7°	<0.5°	
Peak	<2°	<1°	
Phase error, uncertainty (S/N >40 dB)			
RMS	<0.2°		<1.5°
Peak	<0.7°		<5°
Frequency error uncertainty (S/N >40 dB)	<1.5 Hz + error of reference frequency		±10 Hz
Modulation accuracy (3π/8 shifted 8PSK modulation)			
EVM, residual (S/N >40 dB)			
RMS	<0.5%	<0.25%	
Peak	<1.5%	<1%	
95:th percentile	<1.5%	<1%	
Resolution	0.03%	0.03%	
Frequency error uncertainty (S/N >40 dB)	<1 Hz + error of reference frequency		
Origin offset suppression (S/N >40 dB)			
Measurement range	–20 dBc to –50 dBc		
Mean carrier power			11.10.1 13.3
Absolute level uncertainty (–50 dBm to +30 dBm, 10 MHz to 3 GHz)	0.5 dB	0.3 dB	1 dB
Relative level uncertainty (from 0 dB to –50 dB from reference level)	0.2 dB	0.1 dB	0.7 dB
Power versus time			11.10.1 13.3
Uncertainty of reference	0.5 dB	0.3 dB	1 dB
Relative uncertainty	0.2 dB (0 dB to –50 dB from reference) 0.5 dB (–50 dB to –70 dB from reference)		0.7 dB
Internal symbol timing uncertainty	70 ns		¼ bit
Dynamic range (RBW = 600 kHz)	70 dB (with trace average) 60 dB (with peak hold)	76 dB (with trace average) 66 dB (with peak hold)	
Spectrum due to modulation			11.10.1 13.4
Level measurement uncertainty			
Absolute (–50 dBm to +30 dBm, 10 MHz to 3 GHz)	0.5 dB	0.3 dB	1 dB
Relative[1]			
Δf ≤0.1 MHz	0.2 dB	0.1 dB	0.5 dB
0.1 MHz <Δf ≤1.8 MHz (0 dBc to –70 dBc)	0.2 dB	0.1 dB	0.7 dB
1.8 MHz <Δf ≤6 MHz	0.5 dB	0.5 dB	1.5 dB
Δf ≥6 MHz	0.5 dB	0.5 dB	2 dB
Dynamic range (carrier power = 30 dBm)			
Frequency offset			
200 kHz	65 dB	74 dB	
400 kHz	67 dB	78 dB	
600 kHz	68 dB	80 dB	
1200 kHz	72 dB	87 dB	
1800 kHz	76 dB	88 dB	
1.8 MHz to 6 MHz (RBW = 100 kHz)	76 dB to 84 dB	83 dB to 85 dB	
>6 MHz (RBW = 100 kHz)	84 dB	85 dB	

Measurement	Specification		Test specification and permissible measurement uncertainty to I-ETS 300 609-1
	R&S FSP3/7/13/30	**R&S FSU3/8/26**	
Spectrum due to transients			11.10.1 13.4
Level measurement uncertainty			
Absolute (–50 dBm to +30 dBm, 10 MHz to 3 GHz)	0.5 dB	0.3 dB	1.5 dB
Relative[1)]			
0 dB to 50 dB from reference level	0.2 dB	0.2 dB	0.7 dB
>50 dB from reference level	0.5 dB	0.5 dB	1.5 dB
Dynamic range with 30 dBm mean carrier power			
Frequency offset			
400 kHz	62 dB	72 dB	
600 kHz	64 dB	75 dB	
1200 kHz	68 dB	82 dB	
1800 kHz	71 dB	84 dB	

1) Does not include the level uncertainty due to R&S FSP inherent noise.

Ordering information

Order designation	Type	Order No.
GSM/EDGE Application Firmware for Spectrum Analyzers R&S FSP and R&S FSU	R&S FS-K5	1141.1496.02
Recommended extras and options[1)]		
Electronic Attenuator for R&S FSP3/7, 0 dB to 30 dB, 5 dB steps, 20 dB preamplifier (not for R&S FSP13/30)	R&S FSP-B25	1129.7746.02
Electronic Attenuator for R&S FSU3/8/26, 20 dB preamplifier	R&S FSU-B25	1144.9298.02
TV Trigger and Adjustable RF Power Trigger	R&S FSP-B6	1129.8594.02

1) For further options and recommended extras see R&S FSPx data sheet (PD 0757.5137) and R&S FSUx data sheet (PD 0757.6504).