EMI MEASUREMENT APPLICATION FOR SIGNAL AND SPECTRUM ANALYZERS

Detecting and eliminating electromagnetic interference

R&S®FSW-K54 R&S®FSV3-K54 R&S®FPL1-K54 R&S®FSV-K54



Product Brochure Version 02.00

ROHDE&SCHWARZ

Make ideas real



AT A GLANCE

The EMI measurement application (K54 option) adds EMI precompliance measurement functions to the following spectrum analyzers: R&S[®]FSW, R&S[®]FSVA3000, R&S[®]FSV3000, R&S[®]FPL1000 and R&S[®]FSVR. It is the ideal EMI analysis extension for product development and a smooth certification process. Typical application fields include commercial, automotive, avionics and military product development (CISPR, EN, FCC, DO-160 and MIL-STD-461 standards).

ROHDE & SCHWARZ

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(s)

150.0 kH

File

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Power

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Ref Level 87.00 dBuy

16 dB • SWT 2 s (~4.6 s)

The EMI-specific measurement bandwidths and CISPR detectors provided by the K54 option allow the use of standard EMI measurement methods to measure emission levels. Limit lines allow simple identification of critical levels and related frequencies. The K54 option provides a library of limit lines for common product standards - so they do not have to be created individually – as well as functions for in-depth signal analysis.

The K54 option supports automated analysis of large frequency ranges. This is particularly helpful when using detectors with long measuring times, such as a quasi-peak detector (measuring time ≥ 1 s).

The K54 option sweeps the user-defined frequency range with a fast detector, usually a peak detector, and only measures automatically detected critical frequencies with a slow detector. The results are compiled in a table for a guick and easy overview. The results can also be exported in a customizable layout with the trace and other details in a PDF or Microsoft Word document.¹⁾

The K54 option can also be combined with R&S®ELEKTRA EMC test software for even more convenient measurements.²⁾

¹⁾ Supported by the R&S°FSW, R&S°FSVA3000, R&S°FSV3000 and R&S°FPL1000. ²⁾ Supported by the R&S°FSW, R&S°FSVA3000, R&S°FSV3000, R&S°FPL1000 and R&S®FSV

KEY FACTS

- ► EMI detectors
- ► EMI measurement bandwidths
- ► Limit line library
- Measurement automation
- ► Report generation ¹⁾

7 8 9 GHz w 4 5 6

Marker Demod

LISN Config

EMI Confia

■+■+ □-Overview

30.0 MHz

R&S[®]FPL1007 spectrum analyzer with R&S[®]FPL1-K54 EMI measurement application.

BENEFITS

Conclusive results ▶ page 4

Repeatable and fast measurement thanks to automated test sequences ► page 5

In-depth signal analysis ▶ page 6

Fast and efficient ▶ page 7

CONCLUSIVE RESULTS

REPEATABLE AND FAST MEASUREMENT THANKS TO AUTOMATED TEST SEQUENCES

Key features

- ► EMI detectors: guasi-peak, CISPR-average, RMS-average (CISPR 16-1-1).
- ► EMI bandwidth (6 dB)
- 200 Hz, 9 kHz, 120 kHz and 1 MHz (CISPR 16-1-1)
- 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz and 1 MHz (MIL-STD-461 and DO-160)
- Selection of one or more transducer factors to compensate for antenna factors or cable attenuation.

Key features

- ► Pretesting: sweeping of set frequency range with one or more fast detectors, e.g. peak or average
- Identification of critical frequencies: automatic detection of peaks and limit deviations as well as tabular overview of frequencies found
- ► Final measurement of identified frequencies: automatic final measurement using detectors that require a longer measuring time, e.g. quasi-peak, and final evaluation based on the set limit line

Measurement automation - example from R&S®FPL1000

Two detectors are used for the sweep: positive peak (yellow curve) and average (blue curve). PASS/FAIL information is given based on the defined limits (red lines). The identified maximum values (auto peak search) are automatically measured using the relevant CISPR detectors (quasi-peak and CISPR-average) and listed in the result table. The final PASS/FAIL status is clearly indicated. R&S®FPL1000 applies the correction values (transducer factor) of the used LISN to the measurement results.



Selection of two transducer factors (artificial mains network/LISN and related cabling).

Name		Unit	Compatible	Active [*]	New
ENV CABLE		dBµV	yes		
- ENV216		dBμV	yes		Edit
ENV4200		dBμV	yes		Сору
ENV432		dBμV	yes		Delete
ENY		dBµV	yes		
ENY21		dBμV	yes		
ENY41		dBμV	yes	Adjust	Ref Level
ENY81		dBμV	yes	Auto	o Manual
Comment:	2-Line-LISN ENV216				
View Filter	O Show Compatible	SI	how All		



Mode Auto FFT			TDF	EMI
	• 1F	k Clrw 🔾	2Av ClrwLin	Res BW
	10 MHz	M9[2]	38.90 dBµV	CISPR
			781.338 kHz	
		M1[1]	50.23 dBµV	Res BW
			582.450 kHz	MIL
				Auto Peak
				Search
				Bandwidth
				Config
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				Marker
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	والمتلفظ والمستحدث والمحارث والمراد والمراج	الديناير وبالسالة سينه		coming
-			20.0 MU	LISN
\$ 			30.0 MHz	1 Config
Line News	A Line it	Einen	Decula	
5015 Voltage Mains OP	-7.20 dB	Fina 		EMI
5015 Voltage Mains OP	-7.11 dB	56.75	dBuV	Config
55015 Voltage Mains QP	-8.98 dB	49.12	dBuV	
55015 Voltage Mains QP	-10.23 dB	45.77	dBµV	
5015 Voltage Mains AV	0.27 dB	54.12	2 dBµV	
55015 Voltage Mains AV	-2.41 dB	43.59	dBμV	
55015 Voltage Mains AV	-3.02 dB	45.03	dBμV	Overview
	C 00 JD	20.42		

IN-DEPTH SIGNAL ANALYSIS

FAST AND EFFICIENT

Key features

- ► Up to 200001 sweep points for high frequency resolution even with large span/small measurement bandwidths
- Zero span measurement for analyzing the signal behavior over time of selected frequencies with standard and EMI detectors and bandwidths
- ► AM and FM demodulation with audio output to identify ambient interferers, for example during open area testing (except for R&S[®]FSW; additional option required)

Key features

- ► Limit lines: more than 170 EMI limit lines based on the latest versions of common EMI standards (CISPR/EN, FCC, MIL-STD-461 and DO-160) for fast and accurate configuration of measurement setups
- Logarithmic frequency scale: simple comparison of traces and limit lines with definitions used in standards and results displayed by EMI-specific measuring instruments
- LISN are physically separated)
- or Microsoft Word)
- ¹⁾ Except for R&S°FSW; additional option required.
- ²⁾ Supported by the R&S[®]FSW, R&S[®]FSVA3000, R&S[®]FSV3000 and R&S[®]FPL1000.

Limit line selection – example from R&S[®]FPL1000

Limit line selection for electric tools up to 700 W and definition of visibility and trace assignment

Limit Lines	Display Lines			
lame			- Unit (20
EN 55014	Voltage Mains I-C	ooking 100V QP	dBµV	
- EN 55014	Voltage Mains I-C	ooking AV	dBµV	
— EN 55014	Voltage Mains I-C	ooking QP	dBµV	
— EN 55014	Voltage Mains QP	,	dBµV	
- EN 55014	Voltage Mains To	ols +1000W AV	dBµV	
— EN 55014	Voltage Mains To	ols +1000W QP	dBµV	
— EN 55014	Voltage Mains To	ols -700W AV	dBµV	
EN 55014	Voltage Mains To	ols -700W QP	dBµV	
- EN 55014	Voltage Mains To	ols 700-1000W AV	dBµV	
- EN 55014	Voltage Mains To	ols 700-1000W QP	dBµV	
-EN 55015	Induced Current L	AS 2m QP	dBµV	
- EN 55015	Voltage Control A	V	dBµV	
MHz Jame:	EN	1001 55014 Voltage Main	pts Tools -700W AV	
omment:	CIS	SPR 14:2016 Edition 6	Table 6 (CISPR/F/681/	FL
iew Filter			 [5
			Ereg Span	-

Zero span measurement - example from R&S®FPL1000

The signal is analyzed over time at 580 kHz. The repetition rate of the interference is 50 Hz (20 ms).



► Line impedance stabilization network (LISN) remote control¹: simplified test execution by controlling connected Rohde&Schwarz LISNs via the spectrum analyzer's user interface (especially helpful when the spectrum analyzer and

► Report generation²: output of measurement results with user-defined details and layouts at the push of a button (PDF



INTEGRATION IN R&S®ELEKTRA EMC TEST SOFTWARE

R&S®ELEKTRA EMC test software is a complete solution that controls EMC test systems. The base option for EMI measurements is the R&S®ELEMI-E essential EMI test software. R&S[®]ELEMI-E helps users define, perform, evaluate and archive EMI measurements in line with current EMI standards. Users can guickly generate correct and reproducible results.

R&S®ELEMI-E can be used with the R&S®FSW, R&S[®]FSVA3000, R&S[®]FSV3000, R&S[®]FPL1000 and R&S[®]FSV spectrum analyzers with the K54 option.

For more information, see the R&S®ELEMI-E essential EMI test software product brochure (PD 3607.6021.12) and the R&S[®]ELEKTRA EMC test software product brochure (PD 5216.3695.12).

TYPICAL USE CASES

CONDUCTED VOLTAGE MEASUREMENTS

An LISN supplies the EUT (defined network impedance and isolation from the network) and decouples the disturbance voltage for measurement. The disturbance voltage is measured using a spectrum analyzer with the K54 option and a configured transducer factor matching the LISN. Support is also available for other measurement setups, such as those using a voltage sensor or measuring data transmission lines.



CONDUCTED CURRENT/POWER MEASUREMENTS

An LISN supplies the EUT (defined network impedance and isolation from the network). The unused measuring output of the LISN is terminated with 50 Ω . The disturbance current/disturbance power measurement uses a current probe/ absorbing clamp. A spectrum analyzer - with the K54 option and a configured transducer factor matching the transducer - measures the disturbance current/disturbance power. Support is also available for other measurement setups, such as those measuring data transmission cables.



RADIATED MEASUREMENTS

Radiated measurements for a quantitative assessment of the measurement results are typically performed with an antenna in a defined measurement environment and at a defined distance between the EUT and the antenna. The disturbance field strength is determined using a spectrum analyzer with the K54 option and a transducer factor matching the antenna. When measuring with GTEM waveguides, R&S®ELEKTRA EMC test software enables a comparison of the measurement results with standardized limit lines. Field probes are normally used for locating disturbance sources.



Test sequence control with R&S®ELEKTRA



Automated FMI measurement with R&S®FI FMI-F





Equipment under test

SIGNAL AND SPECTRUM ANALYZERS

The EMI measurement application provides CISPR detectors, CISPR and MIL-STD-461 bandwidths, a limit line and transducer factor library, measurement automation, a logarithmic frequency scale, 200 001 sweep points and remote control of Rohde & Schwarz LISNs. The application is available for the following signal and spectrum analyzers.

	R&S®FSW	R&S®FSVA3000	R&S®FSV3000	R&S [®] FPL1000	R&S [®] FSVR
EMI option name	R&S [®] FSW-K54	R&S [®] FSV3-K54	R&S [®] FSV3-K54	R&S [®] FPL1-K54	R&S [®] FSV-K54
CISPR calibration option	R&S [®] FSW-K54CAL	R&S [®] FSV3-K54C	R&S [®] FSV3-K54C	-	-
Lowest frequency	2 Hz	2 Hz	10 Hz	5 kHz	10 Hz
Highest frequency (depending on model)	85 GHz	44 GHz	44 GHz	26.5 GHz	40 GHz
Real-time spectrum	up to 800 MHz	-	-	-	up to 40 MHz
Tracking generator	external generator control	external generator control	external generator control	•	-
DC operation	-	-	-	•	-
Battery operation	-	-	-	•	-
Report generation	•	•	•	•	-
R&S®ELEKTRA support	•	•	•	•	-

Note: the specified data may require special models or options.

ORDERING INFORMATION

Designation	Туре	Order No.		
Signal and spectrum analyzers				
R&S [®] FSW signal and spectrum analyzer				
EMI measurement application	R&S [®] FSW-K54	1313.1400.02		
Recommended extras				
CISPR calibration (ex factory only)	R&S [®] FSW-K54CAL	1331.5932.02		
RF preamplifier	R&S [®] FSW-B24	1313.0832.13/.26/.43/.49/.51/.66/.67		
External generator control	R&S [®] FSW-B10	1313.1622.02		
R&S®FSVA3000 and R&S®FSV3000 signal and spectrum analyzers				
EMI measurement application	R&S [®] FSV3-K54	1330.5068.02		
Recommended extras				
CISPR calibration (ex factory only)	R&S [®] FSV3-K54C	1346.3624.02		
Additional interfaces for LISN control	R&S [®] FSV3-B5	1330.3820.02		
AM/FM demodulation audio output; includes speaker, jack for headphones and volume control	R&S®FSV3-B3	1330.3765.02		





R&S[®]FSVA3000





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Machilicentel R.W. Spinschaler 100 7100	
	A 4 (9)

R&S[®]FPL100



R&S[®]FSVR

control of external signal generators via LAN for use as racking generators
&S®FSVR signal and spectrum analyzer
MI measurement application
ecommended extras
dditional interfaces, for LISN control
M/FM demodulation audio output; ncludes speaker, jack for headphones and volume control
F preamplifier (up to 7.5 GHz)
F preamplifier (above 7.5 GHz)
&S [®] FPL1000 signal and spectrum analyzer
MI measurement application
ecommended extras
dditional interfaces for LISN control and AF output
F preamplifier (up to 3 GHz/7.5 GHz)
F preamplifier (up to 14 GHz)
F preamplifier (up to 26.5 GHz)
nternal generator
C power supply
ithium-ion battery pack
xtensions
ystem software ¹⁾
ssential EMI test software
icense dongle
ables for control of Rohde & Schwarz LISNs
control cable, R&S°FSW/FSVA3000/FSV3000/FSVR/FSVA/FSV to R&S°EN
Length: 3 m
Length: 10 m
ontrol cable, R&S [®] FPL1000 to R&S [®] ENV216/ENV432/ENV420
Length: 3 m
Length: 10 m

Designation RF preamplifier

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¹⁾ Supports R&S°FSW, R&S°FSVA3000, R&S°FSV3000, R&S°FSV and R&S°FPL1000.

Listed here: ordering information of the K54 option and recommended extensions for EMI applications. For ordering information of the signal and spectrum analyzer base units, see the base unit data sheet.

Your local Rohde&Schwarz expert will help you find the best solution for your requirements. To find your nearest Rohde&Schwarz representative, visit www.sales.rohde-schwarz.com

For detailed specifications, see PD 3608.3949.22 and www.rohde-schwarz.com.

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R&S®FSW

Туре	Order No.
R&S [®] FSV3-B24	1330.4049.07/.13/.30/.44
R&S°FSV3-B10	1330.3859.02
R&S®FSV-K54	1310.0425.02
R&S°FSV-B5	1310.9539.02
R&S®FSV-B3	1310.9516.02
R&S [®] FSV-B22	1310.9600.02
R&S®FSV-B24	1310.9616.13/.30/.40
R&S°FPL1-K54	1323.1783.02
R&S®FPL1-B5	1323.1883.02
R&S®FPL1-B22	1323.1719.02
R&S [®] FPL1-B22	1323.1702.02
R&S®FPL1-B22	1323.1777.02
R&S [®] FPL1-B9	1323.1925.03/.07
R&S [®] FPL1-B30	1323.1877.02
R&S [®] FPL1-B31	1323.1725.02
R&S®ELEMI-E	5601.0030.02
R&S®EMCPC	5601.0018.02
V216/ENV432/ENV4200	
R&S®EZ-29	1326.6470.03
K&S°EZ-29	1326.64/0.10
R&S°EZ-21	1107.2087.03
R&S®EZ-21	1107.2087.10



Service that adds value

- ► Worldwide
- Local and personalized
- Customized and flexible
- Uncompromising quality
- Long-term dependability

Rohde & Schwarz

The Rohde&Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test&measurement, technology systems and networks&cybersecurity. Founded more than 85 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Sustainable product design

- Environmental compatibility and eco-footprint
- Energy efficiency and low emissions
- ► Longevity and optimized total cost of ownership



Rohde & Schwarz training

www.training.rohde-schwarz.com

Rohde & Schwarz customer support

www.rohde-schwarz.com/support



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EMI MEASUREMENT APPLICATION FOR SIGNAL AND SPECTRUM ANALYZERS

Specifications

R&S[®]FSW-K54 R&S[®]FSV3-K54 R&S[®]FPL1-K54 R&S[®]FSV-K54



Data Sheet Version 01.05

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Definitions

General

Product data applies under the following conditions:

- · Three hours storage at ambient temperature followed by 30 minutes warm-up operation
- Specified environmental conditions met
- · Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as $\langle, \leq, \rangle, \geq, \pm$, or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



Non-traceable specifications with limits (n. trc.)

Represent product performance that is specified and tested as described under "Specifications with limits" above. However, product performance in this case cannot be warranted due to the lack of measuring equipment traceable to national metrology standards. In this case, measurements are referenced to standards used in the Rohde & Schwarz laboratories.

Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with <, > or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

Nominal values (nom.)

Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

Uncertainties

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are designated with the format "parameter: value".

Non-traceable specifications with limits, typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

In line with the 3GPP/3GPP2 standard, chip rates are specified in million chips per second (Mcps), whereas bit rates and symbol rates are specified in billion bits per second (Gbps), million bits per second (Mbps), thousand bits per second (kbps), million symbols per second (Msps) or thousand symbols per second (ksps), and sample rates are specified in million samples per second (Msample/s). Gbps, Mcps, Mbps, Msps, ksps and Msample/s are not SI units.

Specifications

The specifications of the R&S[®]Fxx-K54 EMI measurement application are based on the data sheet specifications of the corresponding signal and spectrum analyzer.

Supported base units

Designation	Specification documents
R&S [®] FSW	PD 5215.6749.22
R&S [®] FSVA3000	PD 5216.1211.22
R&S [®] FSV3000	PD 5216.1334.22
R&S [®] FSVR	PD 5214.3381.22
R&S [®] FSVA	PD 3607.2790.22
R&S [®] FSV	PD 3606.7982.22
R&S [®] FPL1000	PD 5214.6974.22

EMI measurements

Frequency

Frequency axis	
Scaling	linear, logarithmic

Resolution bandwidths

EMI filters				
Bandwidths (-6 dB)	10 Hz, 100 Hz, 200 Hz, 1 kHz, 9 kHz,			
	10 kHz, 100 kHz, 120 kHz, 1 MHz			
Bandwidth uncertainty	< 3 %, nominal			
Shape factor 60 dB:6 dB	< 4, nominal			

Level

Level display				
Number of traces	selectable, displayed in parallel	1 to 6		
Trace detectors		individually selectable for each trace		
Standard detectors		maximum peak, minimum peak, auto peak (normal), sample, RMS, average		
EMI detectors		quasi-peak, RMS average, CISPR average ¹		
Measurement marker detector	configurable detectors for final measurement	maximum peak, average, quasi-peak, RMS average, CISPR average		

¹ R&S®FPL1000, R&S®FSV3000, R&S®FSVA3000: EMI detectors are not available in combination with minimum peak, auto peak, sample trace detectors.

EMI measurements

Limit lines CISPR/EN, FCC, MIL-STD-461 and DO-160 more than 170 lines Limit assignment Iimit line individually selectable for each trace Iimit line individually selectable for each trace Measurement results more than 170 lines Iimit line individually selectable for each trace Measurement results to detect the highest signal levels Ito detect the highest signal levels Detectors separately selectable for pretest and final measurement Ito detect the highest signal level at the frequencies identified in the pretest Detectors with bint line deta of signal level to limit line deta of signal level to limit line Detection criteria for peak list with limit line deta of signal level to limit line deta of signal level, level detta Detection sequence manual automatic measurement measurement Maximum number of frequencies (markers) supported manual automatic measurement at marker position automatic automatic Result at marker frequency obtained with final measurement detector default level measured at marker frequency with limit line, additionally level at o limit line limit check result Limit check result representation color coding green yelow level masser level withill - margin yelow	Number of sweep points	range	101 to 200 001			
Predefined limit lines CISPR/EN, FCC, MIL-STD-461 and DO-160 more than 170 lines Limit assignment limit line individually selectable for each trace limit line individually selectable for each trace Measurement sequence pretest to detect the highest signal levels identified in the pretest Detectors separately selectable for pretest and final measurement to verify the signal level at the frequencies identified in the pretest Detectors without limit line signal level deta of signal level to limit line Detection criteria for peak list without limit line deta of signal level to limit line Maximum number of frequencies (markers) supported across all traces 16 Frequency selection manual automatic auto marker peak search Assimum number of frequencies (markers) supported obtained with final measurement detector default evel measured at marker frequency obtained with final measurement detector default color coding limit check result limit check result green below limit - margin yellow below limit - margin red above limit line, limit check result Output R&S*FEVN and R&S*FEVN and R&S*FEVNand R&S*FEVN and R&S*FEVN and R&S*FEVNand R&S*FEVN and R	Limit lines					
Limit assignment limit line invivually selectable for each trace Measurement results pretest to detect the highest signal level to verify the signal level at the frequencies identified in the pretest and final measurement Detection criteria for peak list without limit line signal level signal level at the frequencies identified signal level to limit line Detection criteria for peak list without limit line signal level deta to isgnal level to limit line Maximum number of frequencies (markers) supported across all traces 16 Frequency selection automatic automatic automatic automatic Result at marker frequency obtained with final measurement detector default level measured at marker position automatic Result table contents frequency, signal level to limit line, limit check results Limit check result color coding green below limit - margin within limit - margin AMFM demodulation during final measurement AlsS*FSVA and R&S*FSV-3000 R&S*FSV-330 R&S*FSVR, R&S*FSVA and R&S*FSVA and R&S*FSV-3000 R&S*FSVA3000 and R&S*FSVA3000 and R&S*FSVA3000 and R&S*FSVA and R&S*FSVA and R&S*FSVA3000, R&S*FSVA and R&S*FSVA3000 and R&S*FSVA3000 and R&S*FSVA3000 and R&S*FSVA and R&S*FSVA RSVA22, R&S*FSVA3000 and R&S*FSVA3000 and R&S*FSVA and R&S*FSVA R&S*FSVA3000 and R&S*FSVA3000 and R&S*FSVA and R&S*FSVA	Predefined limit lines	CISPR/EN, FCC, MIL-STD-461 and DO-160	more than 170 lines			
Measurement results pretest to detect the highest signal levels to verify the signal level at the frequencies identified in the pretest Detectors separately selectable for pretest and final measurement Pretest signal level Detection criteria for peak list without limit line with limit line signal level Maximum number of frequencies (markers) supported across all traces 16 Frequency selection manual measurement at marker position automatic automatic Result at marker frequency obtained with final measurement detector default level measured at marker position automatic level measured at marker frequency with limit line, additionally Result table contents frequency, signal level to limit line, limit check results limit line, green below limit – margin within limit – margin Vellow within limit final measurement model above limit R&S*FSVR AM/FM demodulation during final measurement signal sevel to limit line, mass*FSVR, R&S*FSVA and R&S*FSV3000 R&S*FSV-B30 R&S*FSV-B30 R&S*FSVA and R&S*FSV none (included in base unit) R&S*FSV-B30 R&S*FSVA and R&S*FSVA and R&S*FSVA Reporting internal speaker, phone jack none (included in base, unit) R&S*FSVA and R&S*FSVA and R&S*FSVA and R&S	Limit assignment		limit line individually selectable for each trace			
Measurement sequence pretest final measurement to detert the highest signal levels to verify the signal level at the frequencies identified in the pretest Detectors separately selectable for pretest and final measurement Pretest without limit line signal level Detection criteria for peak list without limit line signal level Detection criteria for peak list without limit line delta of signal level Detection criteria for peak list without limit line delta of signal level Detection criteria for peak list without limit line delta of signal level, level delta Final measurement manual measurement at marker position Maximum number of frequencies across all traces 16 Frequency selection manual measurement detector default level measured at marker frequency obtained with final measurement detector default level measured at marker frequency. with limit line, additionally delta of signal level to limit line, limit check result Limit check result representation color coding red above limit Quero within limit - margin red above limit margin </td <td>Measurement results</td> <td></td> <td></td>	Measurement results					
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Detectors separately selectable for pretest and final measurement Pretest		final measurement	to verify the signal level at the frequencies identified in the pretest			
Pretest Detection criteria for peak list without limit line signal level Detection sequence with limit line delta of signal level to limit line Preadersement	Detectors	separately selectable for pretest and fina measurement				
Detection criteria for peak list without limit line signal level With limit line delta of signal level to limit line Detection sequence highest to lowest signal level, level delta Francessurement across all traces 16 Maximum number of frequencies across all traces 16 Frequency selection manual measurement at marker position Result at marker frequency obtained with final measurement detector automatic default level measured at marker frequency obtained with final measurement detector default level measured at marker frequency with limit line, additionally delta of signal level to limit line Result table contents frequency, signal level, delta to limit line, limit check results limit check results Limit check result representation color coding green below limit – margin yellow within limit ine assurement output above limit detas figure level, delta to limit line, limit check results Required options R&S*FSVR, R&S*FSVA and R&S*FSV and R&S*FSV-B3 R&S*FSV-B3 R&S*FSV-B3 Reastriptif internal speaker, phone jack	Pretest					
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Maximum number of frequencies (markers) supported across all traces 16 Frequency selection manual measurement at marker position automatic automatic automatic Result at marker frequency obtained with final measurement detector default default level measured at marker frequency with limit line, additionally delta of signal level to limit line Result table contents frequency, signal level, delta to limit line, limit check results limit check result Limit check result representation color coding green below limit – margin yellow within limit need above limit margin Yellow internal speaker, phone jack Required options R&S*FSW none (included in base unit) R&S*FSVR, R&S*FSV and R&S*FSV R&S*FSV-83 R&S*FSPL1000 R&S*FSV, R&S*FSVA3000 and Reporting instrument families supporting report Availability instrument families supporting report Resort file formats pDF, DOC LISN control Supported LISN models Supported LISN models R&S*FSVA300 a	Final measurement					
Frequency selection manual automatic measurement at marker position automatic Result at marker frequency obtained with final measurement detector default level measured at marker frequency default Result table obtained with limit line, additionally delta of signal level to limit line frequency, signal level, delta to limit line, limit check results Limit check result representation color coding green below limit – margin red AM/FM demodulation during final measurement color coding R&S [®] FSW none (included in base unit) Required options R&S [®] FSW none (included in base unit) Resoft ferments instrument families supporting report generation R&S [®] FSV3000 Reporting instrument families supporting report generation R&S [®] FSVA3000 and R&S [®] FSV3000, R&S [®] FSV33000, R&S [®] FSV3300, R&S [®] FSV3000, R&S [®] FSV33000, R&S [®] FSV3300, R&S [®] FSV3000, R&S [®] FSV33000, R&S [®] FSV33000, R&S [®] FSV3000, R&S [®] FSV33000, R&S [®] FSV33000, R&S [®] FSV33000, R&S [®] FSV33000, R&S [®] FSV33000, R&S [®] FSV33000, R&S [®] FSV33000, R&S [®] FSV3000, R&S [®] FSV33000, R&S [®] FSV33000, R&S [®]	Maximum number of frequencies (markers) supported	across all traces	16			
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with limit line, additionally delta of signal level to limit line Result table contents frequency, signal level, delta to limit line, limit check results Limit check result representation color coding		default	level measured at marker frequency			
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Limit check result representation color coding green below limit – margin yellow within limit – margin red above limit AM/FM demodulation during final measurement internal speaker, phone jack Output internal speaker, phone jack Required options R&S®FSVA 3000 and R&S®FSV3000 R&S®FSVR, R&S®FSVA and R&S®FSV-B3 R&S®FSVR, R&S®FSVA and R&S®FSV-B3 Reporting Availability instrument families supporting report ResoPFSVR, R&S®FSVA and R&S®FSV3000, R&S®FSV3000 and Report elements spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control Supported LISN models Res®FSW, R&S®FSV3000 and R&S®FSV3000 R&S®ESH3-Z5, R&S®ESH2-Z5, R&S®ESH2-Z5, R&S®ESH3-Z5 Required options R&S®FSVA3000 and R&S®FSV3000 R&S®FSVA, R&S®FSVA and R&S®FSV3000 R&S®FSV3-B5	Result table	contents	frequency, signal level, delta to limit line,			
Limit check result representation color coding green below limit – margin yellow within limit – margin yellow AM/FM demodulation during final measurement above limit Output internal speaker, phone jack Required options R&S®FSVA R&S®FSVA, R&S®FSVA and R&S®FSV R&S®FSV-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 R&S®FPL1000 R&S®FSV-B3 R&S®FPL1000 R&S®FSVA3000 and R&S®FSV Reporting instrument families supporting report Availability instrument families supporting report generation R&S®FSVA3000, R&S®FSVA3000 and Report file formats pDF, DOC LISN control Supported LISN models Supported LISN models R&S®FSV3000 and R&S®FSV3000 R&S®FSVA3000 and R&S®FSVA and R&S®FSV3000 R&S®FSV4.35 Required options R&S®FSVA3000 and R&S®FSVA and R&S®FSV3.85			limit check results			
green below limit - margin yellow within limit - margin red above limit AM/FM demodulation during final measurement internal speaker, phone jack Required options R&S®FSW Required options R&S®FSVA3000 and R&S®FSV3000 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV3-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 Reporting	Limit check result representation	color coding				
yellow within limit – margin red above limit AM/FM demodulation during final measurement internal speaker, phone jack Output internal speaker, phone jack Required options R&S®FSW none (included in base unit) R&S®FSVA3000 and R&S®FSV3000 R&S®FSV-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 Reporting R&S®FFL1000 Availability instrument families supporting report generation R&S®FSVA3000 and R&S®FSV3000, R&S®FSV3000, R&S®FSV3000, R&S®FPL1000 Report elements spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control Supported LISN models Supported LISN models R&S®FSW Required options R&S®FSW R&S®FSVA3000 and R&S®FSV3000 R&S®FSV3.B5 Required options R&S®FSW		green	below limit – margin			
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AM/FM demodulation during final measurement internal speaker, phone jack Output R&S®FSW none (included in base unit) Required options R&S®FSVA3000 and R&S®FSV3000 R&S®FSV3-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 R&S®FPL1000 R&S®FSV-B3 Reporting R&S®FPL1000 Availability instrument families supporting report generation Report elements spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control Supported LISN models Required options R&S®FSV3000 and R&S®FSV3000 R&S®FSV43000 and R&S®FSV3000 R&S®ENV420, R&S®ENV432, R&S®ENV432, R&S®ENV420, R&S®ENV432, R&S®ENV420, R&S®ENV432, R&S®ENV420, R&		red	above limit			
Output internal speaker, phone jack Required options R&S®FSW none (included in base unit) R&S®FSVA3000 and R&S®FSV3000 R&S®FSV-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 R&S®FFL1000 R&S®FSV-B3 Reporting mstrument families supporting report Availability instrument families supporting report generation R&S®FSV3000, R&S®FSV3000 and Report elements spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control spectrum display, marker table, R&S®ENV432, R&S®ENV432, R&S®ENV432, R&S®ENV432, R&S®ENV432, R&S®ENV432, R&S®ENV432, R&S®ENV432, R&S®ENV432, R&S®ESH3-25 Required options R&S®FSVA and R&S®FSV3000 R&S®ESV3000 R&S®FSVA, R&S®FSVA and R&S®FSVA and R&S®FSV-B5 R&S®FSV-B5	AM/FM demodulation during final meas	urement				
Required options R&S®FSW none (included in base unit) R&S®FSVA3000 and R&S®FSV3000 R&S®FSV3-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 R&S®FPL1000 R&S®FSV-B3 Reporting R&S®FPL1000 Availability instrument families supporting report generation Report elements spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control supported LISN models Supported LISN models R&S®FSW Required options R&S®FSVA3000 and R&S®FSV3000 R&S®FSVR, R&S®FSVA3000 and R&S®FSV3 R&S®ESH3-Z5 Required options R&S®FSVA3000 and R&S®FSV3000 R&S®FSVR, R&S®FSVA and R&S®FSV3000 R&S®FSV-B5	Output		internal speaker, phone jack			
R&S®FSVA3000 and R&S®FSV3000 R&S®FSV3-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B3 Reporting R&S®FPL1000 R&S®FSV-B3 Availability instrument families supporting report generation R&S®FSW, R&S®FSVA3000 and R&S®FSV3000, R&S®FPL1000 Report elements spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control Supported LISN models Required options R&S®FSW Res®FSVA3000 and R&S®FSV3000 R&S®ESH2-Z5, R&S®ESH3-Z5 Required options R&S®FSVA and R&S®FSV3000 R&S®FSV3-B5 R&S®FSVR, R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B5	Required options	R&S [®] FSW	none (included in base unit)			
R&S®FSVR, R&S®FSVA and R&S®FSVR&S®FSV-B3ReportingR&S®FPL1000R&S®FPL1-B5Availabilityinstrument families supporting report generationR&S®FSW, R&S®FSVA3000 and R&S®FSV3000, R&S®FPL1000Report elementsspectrum display, marker table, list of measured frequenciesReport file formatsPDF, DOCLISN controlSupported LISN modelsSupported LISN modelsR&S®FSW R&S®FSVA3000 and R&S®FSV4200, R&S®ESH2-Z5, R&S®ESH3-Z5Required optionsR&S®FSVA3000 and R&S®FSV3000 R&S®FSVA3000 and R&S®FSV3-B5Res®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B5R&S®FSV-B5		R&S [®] FSVA3000 and R&S [®] FSV3000	R&S [®] FSV3-B3			
R&S®FPL1000 R&S®FPL1-B5 Reporting Availability instrument families supporting report generation R&S®FSW, R&S®FSVA3000 and R&S®FPL1000 Report elements generation R&S®FSV3000, R&S®FPL1000 Report file formats spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control PUF, DOC Supported LISN models R&S®ENV216, R&S®ENV432, R&S®ESH2-Z5, R&S®ESH2-Z5, R&S®ESH3-Z5 Required options R&S®FSVA3000 and R&S®FSV3000 R&S®FSVA3000 and R&S®FSV3000 R&S®FSV3-B5 R&S®FSVR, R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B5		R&S [®] FSVR, R&S [®] FSVA and R&S [®] FSV	R&S [®] FSV-B3			
Reporting Availability instrument families supporting report generation R&S®FSW, R&S®FSVA3000 and R&S®FPL1000 Report elements spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control PUF, DOC Supported LISN models R&S®ENV216, R&S®ENV432, R&S®ENV432, R&S®ENV432, R&S®ENV4200, R&S®ESH2-Z5, R&S®ESH3-Z5 Required options R&S®FSVA3000 and R&S®FSV3000 R&S®FSVA3000 and R&S®FSV3000 R&S®FSV3-B5 R&S®FSVR, R&S®FSVA and R&S®FSV-B5 R&S®FSV-B5		R&S [®] FPL1000	R&S [®] FPL1-B5			
Availability instrument families supporting report generation R&S®FSW, R&S®FSVA3000 and R&S®FPL1000 Report elements spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control PDF, DOC Supported LISN models R&S®FSVA3000, R&S®ENV432, R&S®ENV432, R&S®ENV432, R&S®ENV4200, R&S®ESH2-Z5, R&S®ESH3-Z5 Required options R&S®FSVA3000 and R&S®FSV3000 R&S®FSVR, R&S®FSVA and R&S®FSV-B5	Reporting					
Report elements spectrum display, marker table, list of measured frequencies Report file formats PDF, DOC LISN control PDF, DOC Supported LISN models R&S®ENV216, R&S®ENV432, R&S®ENV4200, R&S®ESH2-Z5, R&S®ESH3-Z5 Required options R&S®FSW Ress®FSVA3000 and R&S®FSV3000 R&S®FSV3-B5 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B5	Availability	instrument families supporting report generation	R&S [®] FSW, R&S [®] FSVA3000 and R&S [®] FSV3000, R&S [®] FPL1000			
Report file formats PDF, DOC LISN control Supported LISN models R&S®ENV216, R&S®ENV432, R&S®ENV432, R&S®ENV4200, R&S®ESH2-Z5, R&S®ESH3-Z5 Required options R&S®FSW none (included in base unit) R&S®FSVA3000 and R&S®FSV3000 R&S®FSV3-B5 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B5	Report elements		spectrum display, marker table, list of measured frequencies			
LISN control Supported LISN models Required options R&S®FSW R&S®FSV3000 and R&S®FSV3000 R&S®FSV-B5	Report file formats		PDF, DOC			
Supported LISN models R&S®ENV216, R&S®ENV432, R&S®ENV4200, R&S®ESH2-Z5, R&S®ESH3-Z5 Required options R&S®FSW Ress®FSVA3000 and R&S®FSV3000 R&S®FSV3-B5 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B5	LISN control					
Required options R&S®FSW none (included in base unit) R&S®FSVA3000 and R&S®FSV3000 R&S®FSV3-B5 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B5	Supported LISN models		R&S [®] ENV216, R&S [®] ENV432, R&S [®] ENV4200, R&S [®] ESH2-Z5, B&S [®] ESH3-Z5			
R&S®FSVA3000 and R&S®FSV3000 R&S®FSV3000 R&S®FSVR, R&S®FSVA and R&S®FSV R&S®FSV-B5	Bequired options	R&S®FSW	none (included in base unit)			
R&S [®] FSVR, R&S [®] FSVA and R&S [®] FSV R&S [®] FSV-B5		B&S [®] ESVA3000 and B&S [®] ESV3000	R&S [®] FSV3-B5			
		B&S [®] ESVB_B&S [®] ES\/A and B&S [®] ES\/	B&S [®] ESV-B5			
B&S [®] FPL1000 B&S [®] FPL1-B5		B&S [®] FPL1000	R&S [®] FPL1-B5			

Ordering information

Listed here: ordering information of the -K54 option and recommended extensions for EMI measurement applications. For ordering information of the signal and spectrum analyzer base units, see the data sheet of the base unit.

Designation	Туре	Order No.			
R&S [®] FSW signal and spectrum analyzer					
EMI measurement application	R&S [®] FSW-K54	1313.1400.02			
Recommended extras					
CISPR calibration (ex factory only)	R&S [®] FSW-K54CAL	1331.5932.02			
RF preamplifier	R&S [®] FSW-B24	1313.0832.13/.26/.43/.49/.51/			
fe fe -		.66/.67			
External generator control	R&S [®] FSW-B10	1313.1622.02			
R&S [®] FSVA3000 and R&S [®] FSV3000 signal and spectrum	analyzers				
EMI measurement application	R&S [®] FSV3-K54	1330.5068.02			
Recommended extras	-				
CISPR calibration (ex factory only)	R&S [®] FSV3-K54C	1346.3624.02			
Additional interfaces for LISN control	R&S [®] FSV3-B5	1330.3820.02			
AM/FM demodulation audio output; includes speaker,	R&S [®] FSV3-B3	1330.3765.02			
jack for headphones and volume control					
RF preamplifier	R&S [®] FSV3-B24	1330.4049.07/.13/.30/.44			
Control of external signal generators via LAN,	R&S [®] FSV3-B10	1330.3859.02			
for use as tracking generator					
R&S [®] FSVR signal and spectrum analyzer					
EMI measurement application	R&S [®] FSV-K54	1310.0425.02			
Recommended extras					
Additional interfaces for LISN control	R&S [®] FSV-B5	1310.9539.02			
AM/FM demodulation audio output; includes speaker,	R&S [®] FSV-B3	1310.9516.02			
jack for headphones and volume control					
RF preamplifier (up to 7.5 GHz)	R&S [®] FSV-B22	1310.9600.02			
RF preamplifier (above 7.5 GHz)	R&S [®] FSV-B24	1310.9616.13/.30/.40			
R&S [®] FSVA and R&S [®] FSV signal and spectrum analyzer					
EMI measurement application	R&S [®] FSV-K54	1310.0425.02			
Recommended extras					
CISPR calibration	R&S [®] FSV-K54CAL	1329.0237.02			
Additional interfaces for LISN control	R&S®FSV-B5	1310.9539.02			
AM/FM demodulation audio output; includes speaker,	R&S®FSV-B3	1310.9516.02			
Jack for headphones and volume control					
RF preamplifier (up to 7.5 GHz)	R&S [®] FSV-B22	1310.9600.02			
RF preamplifier (above 7.5 GHz)	R&S [®] FSV-B24	1310.9616.13/.30/.40			
I racking generator		1310.9545.02			
DC power supply		1329.0243.02			
Lithum-ion battery pack	R&S°FSV-B32	1321.3750.04			
FAU measurement application		1000 1700 00			
Performended extrac	NAS FFLI-NJ4	1323.1763.02			
Additional interfaces for LISN control and AE output		1222 1882 02			
BE preamplifier (up to 3 GHz / 7 5 GHz)		1323.1710.02			
BE preamplifier (up to 14 GHz)	R&S®EPI 1-B22	1323.1713.02			
BE preamplifier (up to 26.5 GHz)	B&S®EPI 1-B22	1323 1777 02			
Internal generator	R&S®EPI 1-B9	1323 1925 03/ 07			
DC power supply	B&S [®] FPI 1-B30	1323 1877 02			
Lithium-ion battery pack	B&S®EPI 1-B31	1323 1725 02			
System software ²		1020.1720.02			
Essential FMI test software	B&S [®] ELEMI-E	5601 0030 02			
License dongle	R&S [®] EMCPC	5601.0018.02			
Cables for control of Rohde & Schwarz LISNs					
Control cable. R&S [®] FSW/FSVA3000/FSV3000/FSVR/FSVA/FSV to R&S [®] ENV216/ENV432/ENV4200					
Length: 3 m	R&S [®] EZ-29	1326.6470.03			
Length: 10 m	R&S [®] EZ-29	1326.6470.10			
Control cable, R&S [®] FPL1000 to R&S [®] ENV216/ENV432/ENV4200					
Length: 3 m	R&S [®] EZ-21	1107.2087.03			
Length: 10 m	R&S [®] EZ-21	1107.2087.10			

² Supports R&S[®]FSW, R&S[®]FSVA3000, R&S[®]FSV3000, R&S[®]FSV and R&S[®]FPL1000.

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