R&S®FS-Z60/-Z75/ -Z90/-Z110 Harmonic Mixers

for the R&S®FSP/FSU/ FSQ/FSUP

75 Years of Driving Innovation

ROHDE&SCHWARZ

Test & Measurement

Data Sheet | 03.00

R&S®FS-Z60/-Z75/ -Z90/-Z110 Harmonic Mixers

At a glance

The R&S®FS-Z60/-Z75/-Z90/-Z110 harmonic mixers extend the frequency range of the R&S®FSU/FSQ/FSP spectrum and signal analyzers as well as of the R&S®FSUP signal source analyzer up to 110 GHz.

The mixers additionally feature the following:
- Low conversion loss
- High 1 dB compression point
- High LO frequency range
- No biasing required
- Conversion loss data provided in file format

Covered waveguide bands:
- R&S®FS-Z60: 40 GHz to 60 GHz (U band)
- R&S®FS-Z75: 50 GHz to 75 GHz (V band)
- R&S®FS-Z90: 60 GHz to 90 GHz (E band)
- R&S®FS-Z110: 75 GHz to 110 GHz (W band)

Due to their double-diode design, the mixers are operated without any additional biasing. No frequency-dependent adjustment of bias current is needed – an invaluable feature for automated measurements.

The frequency-dependent conversion loss is calibrated over the entire frequency range. The large number of frequency points included in the resulting conversion loss table provides high level accuracy during measurements. The conversion loss table comes in file format with each mixer and can be loaded directly into the analyzer, which makes mixer configuration very easy.

The following instrument models support the harmonic mixers (R&S®FSx-B21 option required):
- R&S®FSP40
- R&S®FSU26/43/46/50/67
- R&S®FSQ26/40
- R&S®FSUP26/50

Characteristics

High sensitivity

The low conversion loss yields high sensitivity, which is the basis for measuring signals even at very low levels.

High large-signal immunity

With a typical 1 dB compression point of +6 dBm and low conversion loss, the mixers feature a very wide dynamic range. Therefore, measurements of low-level signals can easily be performed even in the presence of high-level signals.

Straightforward spectrum display

The high LO frequency range and the low order of harmonics used significantly reduce the number of unwanted mixing products. In addition, the analyzer firmware provides algorithms to identify and suppress remaining unwanted mixing products.

Specifications

	R&S®FS-Z60	R&S®FS-Z75	R&S®FS-Z90	R&S®FS-Z110
Frequency range	40 GHz to 60 GHz	50 GHz to 75 GHz	60 GHz to 90 GHz	75 GHz to 110 GHz
Level				
Maximum CW RF input level (LO level < max. permissible LO level)	+16 dBm	+16 dBm	+16 dBm	0 dBm
1 dB compression	+4 dBm nominal	+6 dBm nominal	+6 dBm nominal	+4 dBm nominal
Conversion loss with the R&S®FSP, R&S®FSU or R&S®FSUP, LO level set between +15.5 dBm and +17 dBm				
4th LO harmonic selected, 40 GHz ≤ fRF ≤ 60 GHz 6th LO harmonic selected, 40 GHz ≤ fRF ≤ 60 GHz	≤25 dB, typ. 23 dB ≤30 dB, typ. 28 dB	–	–	–
6th LO harmonic selected, 50 GHz ≤ fRF ≤ 75 GHz	–	≤34 dB, typ. 25 dB	–	–
6th LO harmonic selected, 60 GHz ≤ fRF ≤ 90 GHz	–	–	≤37.5 dB, typ. 34 dB	–
8th LO harmonic selected, 75 GHz ≤ fRF < 95 GHz 8th LO harmonic selected, 95 GHz ≤ fRF ≤ 110 GHz 10th LO harmonic selected, 85 GHz ≤ fRF ≤ 110 GHz	–	–	–	≤25 dB, typ. 23 dB ≤33 dB, typ. 31 dB ≤35 dB, typ. 33 dB
Displayed average noise level				
RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, log. scaling, trace average, sweep count = 20, mean marker, normalized to 1 Hz RBW	≤–140 dBm typ. ≤–145 dBm	≤–137 dBm typ. ≤–128 dBm	≤–124 dBm typ. ≤–128 dBm	≤–135 dBm typ. ≤–140 dBm
Measurement uncertainty with the R&S®FSP, R&S®FSU or R&S®FSUP, LO level set between +15.5 dBm and +17 dBm				
Level uncertainty at calibrated frequency points 95 % confidence level	<3.0 dB (+25 °C) <4.5 dB (+5 °C to +40 °C)			
Frequency response	<5.0 dB, within any 5 GHz band	<5.0 dB, within any 5 GHz band	<5.0 dB, within any 5 GHz band	<6.0 dB, within any 1 GHz band
Temperature drift (max.) +5 °C to +40 °C –20 °C to +60 °C	 <1.5 dB <2.5 dB			
Connectors				
RF input				
Connector	WR19, UG-383/ U-M flange (modified)	WR15, UG-385/ U flange	WR12, UG-387/ U flange	WR10, UG-387/ U-M flange
VSWR	<3.5:1, typ. 2.5:1	<3.5:1, typ. 2.2:1	<3.6:1, typ. 2.5:1	<1.5:1, typ. 1.4:1
LO input				
Connector	SMA connector	SMA connector	SMA connector	SMA connector
IF output				
Connector	–	–	–	SMA connector
LO input				
Frequency range	9.9 GHz to 14.9 GHz	8.3 GHz to 12.4 GHz	7.4 GHz to 14.9 GHz	9.3 GHz to 13.7 GHz
Maximum rated LO level (RF input level < max. permissible CW RF input level)	+19 dBm	+19 dBm	+19 dBm	+18 dBm
IF output				
Frequency range	400 MHz to 800 MHz nominal			

	R&S®FS-Z60	R&S®FS-Z75	R&S®FS-Z90	R&S®FS-Z110
General data				
Operating temperature range	+5 °C to +40 °C			
Permissible temperature range	–20 °C to +60 °C			
Storage temperature range	–40 °C to +70 °C			
Climatic loading	+40 °C at 95% relative humidity (DIN EN 60068-2-30: 2000-02)			
Dimensions in mm (W × H × D) Dimensions in inches (W × H × D)	28.6 × 33.8 × 63.5 1.13 × 1.33 × 2.5	20.0 × 29.5 × 60.0 0.79 × 1.16 × 2.36	20.0 × 29.5 × 60.0 0.79 × 1.16 × 2.36	27.1 × 24.1 × 95.0 1.07 × 0.95 × 3.74
Weight	170 g 0.37 lb	150 g 0.33 lb	150 g 0.33 lb	180 g 0.4 lb
Accessories supplied				
Operating manual, disk with calibrated conversion loss data, carrying case				

Specifications apply under the following conditions: "Typical values" are designated with the abbreviation "typ."
These values are verified during the final test but are not assured by Rohde&Schwarz. "Nominal values" are design parameters that are not assured by Rohde&Schwarz. These values are verified during product development but are not specifically tested during production.

Rohde&Schwarz equipment is designed for reliable operation up to an altitude of 3000 m above sea level and for transport without damage up to an altitude of 4500 m above sea level.

Ordering information

Designation	Type	Order No.
Harmonic Mixer 40 GHz to 60 GHz	R&S®FS-Z60	1089.0799.02
Harmonic Mixer 50 GHz to 75 GHz	R&S®FS-Z75	1089.0847.02
Harmonic Mixer 60 GHz to 90 GHz	R&S®FS-Z90	1089.0899.02
Harmonic Mixer 75 GHz to 110 GHz	R&S®FS-Z110	1089.0947.04
Required option: LO/IF ports for external mixers		
For R&S®FSP40	R&S®FSP-B21	1155.1758.03
For R&S®FSU26/43/46/50/67 and R&S®FSQ26/40	R&S®FSU-B21	1157.1090.03
For R&S®FSUP26/50	R&S®FSUP-B21	1157.1090.04

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Rohde&Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established 75 years ago, Rohde&Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

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Certified Quality System
ISO 9001
DQS REG. NO 1954 QM

Certified Environmental System
ISO 14001
DQS REG. NO 1954 UM

More information at
www.rohde-schwarz.com
(search term: FS-Z60/-Z75/-Z90/
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*0.14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.