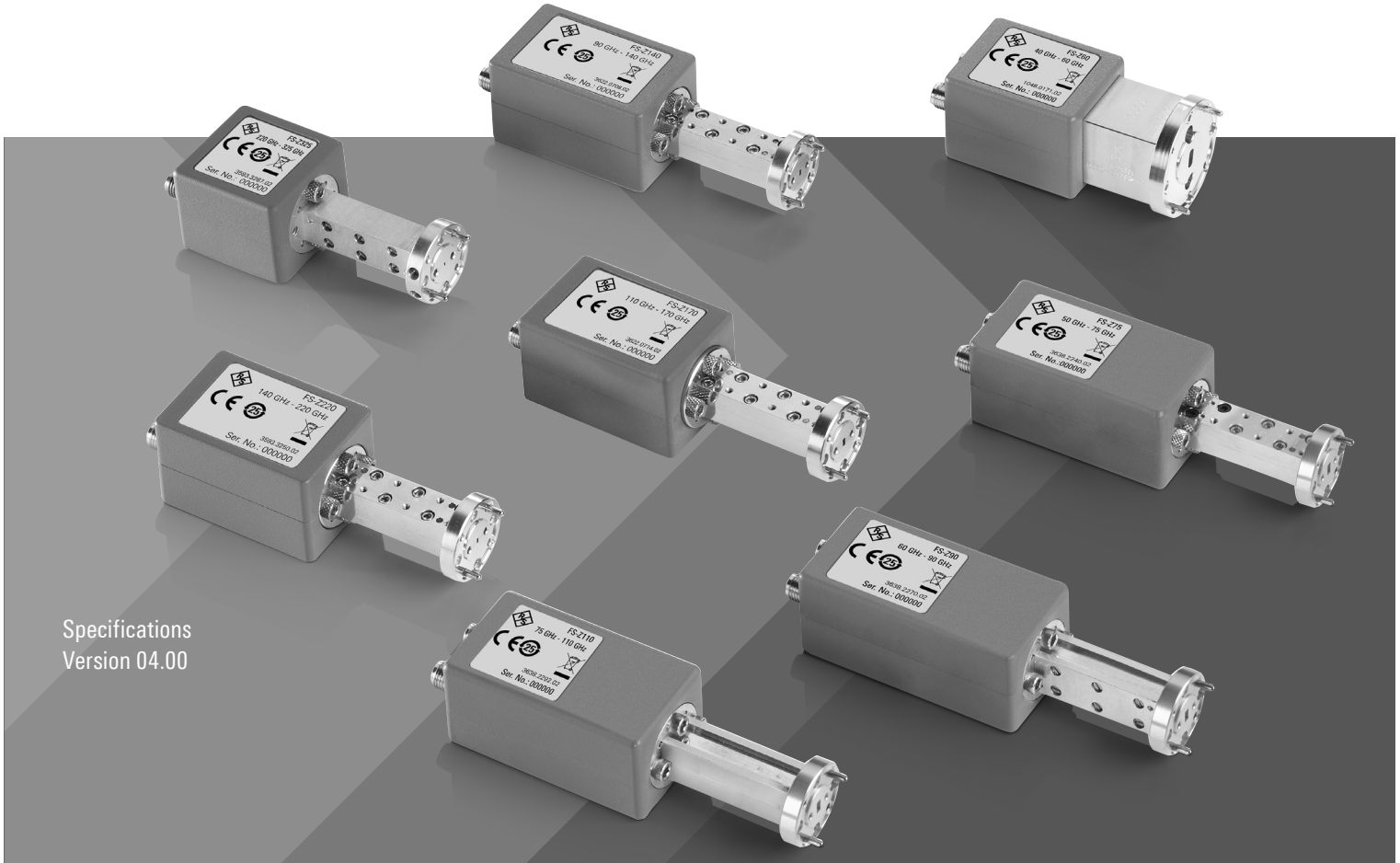
R&S®FS-Zxxx
HARMONIC MIXERS

Specifications



Specifications
Version 04.00

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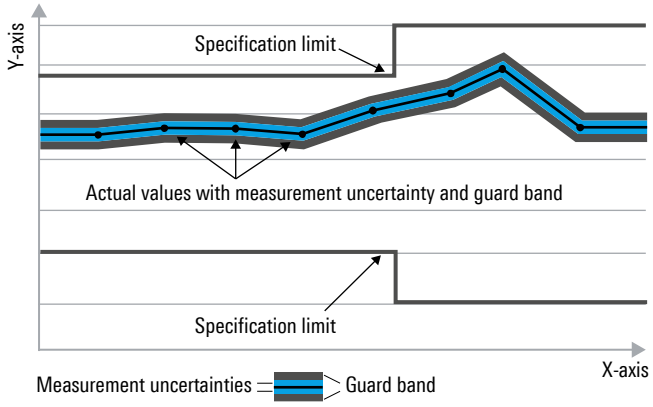
CONTENTS

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 <, ≤, >, ≥, ±, 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.

General information

The R&S®FS-Zxxx harmonic mixers are available for the following frequency bands:

- 40 GHz to 60 GHz (R&S®FS-Z60)
- 50 GHz to 75 GHz (R&S®FS-Z75)
- 60 GHz to 90 GHz (R&S®FS-Z90)
- 75 GHz to 110 GHz (R&S®FS-Z110)
- 90 GHz to 140 GHz (R&S®FS-Z140)
- 110 GHz to 170 GHz (R&S®FS-Z170)
- 140 GHz to 220 GHz (R&S®FS-Z220)
- 220 GHz to 325 GHz (R&S®FS-Z325)

Specifications

Test port

Frequency range	R&S®FS-Z60	40 GHz to 60 GHz
	R&S®FS-Z75	50 GHz to 75 GHz
	R&S®FS-Z90	60 GHz to 90 GHz
	R&S®FS-Z110	75 GHz to 110 GHz
	R&S®FS-Z140	90 GHz to 140 GHz
	R&S®FS-Z170	110 GHz to 170 GHz
	R&S®FS-Z220	140 GHz to 220 GHz
	R&S®FS-Z325	220 GHz to 325 GHz
Harmonic number	R&S®FS-Z60	4th
	R&S®FS-Z75	6th
	R&S®FS-Z90	6th
	R&S®FS-Z110	8th
	R&S®FS-Z140	10th
	R&S®FS-Z170	10th and 12th
	R&S®FS-Z220	16th
	R&S®FS-Z325	20th and 22nd
P1dB	R&S®FS-Z60	+0 dBm (typ.)
	R&S®FS-Z75	–5 dBm (typ.)
	R&S®FS-Z90	–6 dBm (typ.)
	R&S®FS-Z110	–6 dBm (typ.)
	R&S®FS-Z140	–3 dBm (typ.)
	R&S®FS-Z170	–3 dBm (typ.)
	R&S®FS-Z220	–3 dBm (typ.)
	R&S®FS-Z325	–5 dBm (typ.)
Temperatur drift (0 °C to +55 °C)	R&S®FS-Z60	< 1 dB (typ.)
	R&S®FS-Z75	
	R&S®FS-Z90	
	R&S®FS-Z110	
	R&S®FS-Z140	
	R&S®FS-Z170	
	R&S®FS-Z220	
	R&S®FS-Z325	
Conversion loss	R&S®FS-Z60	+13 dB (typ.)
	R&S®FS-Z75	+18 dB (typ.)
	R&S®FS-Z90	+18 dB (typ.)
	R&S®FS-Z110	+22 dB (typ.)
	R&S®FS-Z140	+26 dB (typ.)
	R&S®FS-Z170	+26 dB (typ.)
	R&S®FS-Z220	+32 dB (typ.)
	R&S®FS-Z325	+38 dB (typ.)

RF input

Waveguide designator	R&S®FS-Z60	WR-19
	R&S®FS-Z75	WR-15
	R&S®FS-Z90	WR-12
	R&S®FS-Z110	WM-2540 (WR-10)
	R&S®FS-Z140	WM-2032 (WR-8)
	R&S®FS-Z170	WM-1651 (WR-6.5)
	R&S®FS-Z220	WM-1295 (WR-5.1)
	R&S®FS-Z325	WM-864 (WR-3.4)
Connector type (anti cocking flange)	R&S®FS-Z60	Rohde & Schwarz precision waveguide flange (compatible with UG-383)
	R&S®FS-Z75	Rohde & Schwarz precision waveguide flange (compatible with UG-387/U-M and IEEE 1785.2)
	R&S®FS-Z90	
	R&S®FS-Z110	
	R&S®FS-Z140	
	R&S®FS-Z170	
	R&S®FS-Z220	
	R&S®FS-Z325	
VSWR	R&S®FS-Z60	1.3 : 1 (typ.)
	R&S®FS-Z75	1.4 : 1 (typ.)
	R&S®FS-Z90	1.4 : 1 (typ.)
	R&S®FS-Z110	1.4 : 1 (typ.)
	R&S®FS-Z140	1.5 : 1 (typ.)
	R&S®FS-Z170	1.6 : 1 (typ.)
	R&S®FS-Z220	1.7 : 1 (typ.)
	R&S®FS-Z325	3 : 1 (typ.)

Local oscillator input (LO IN)

LO frequency range [GHz]	R&S®FS-Z60	8.60 GHz to 15.40 GHz
	R&S®FS-Z75	8.00 GHz to 12.84 GHz
	R&S®FS-Z90	7.44 GHz to 15.34 GHz
	R&S®FS-Z110	7.75 GHz to 13.99 GHz
	R&S®FS-Z140	9.00 GHz to 14.00 GHz
	R&S®FS-Z170	9.047 GHz to 16.87 GHz
	R&S®FS-Z220	8.72 GHz to 13.72 GHz
	R&S®FS-Z325	9.935 GHz to 16.18 GHz
Connector type	R&S®FS-Z60	SMA connector (female)
	R&S®FS-Z75	2.92 mm (female, compatible with SMA)
	R&S®FS-Z90	
	R&S®FS-Z110	
	R&S®FS-Z140	SMA connector (female)
	R&S®FS-Z170	
	R&S®FS-Z220	
	R&S®FS-Z325	2.92 mm (female, compatible with SMA)
LO input power	R&S®FS-Z60	+13.0 dBm (typ.)
	R&S®FS-Z75	+14.0 dBm (typ.)
	R&S®FS-Z90	+14.0 dBm (typ.)
	R&S®FS-Z110	+15.5 dBm (typ.)
	R&S®FS-Z140	+14.0 dBm (typ.)
	R&S®FS-Z170	+15.5 dBm (typ.)
	R&S®FS-Z220	+13.0 dBm (typ.)
	R&S®FS-Z325	+16.0 dBm (typ.)

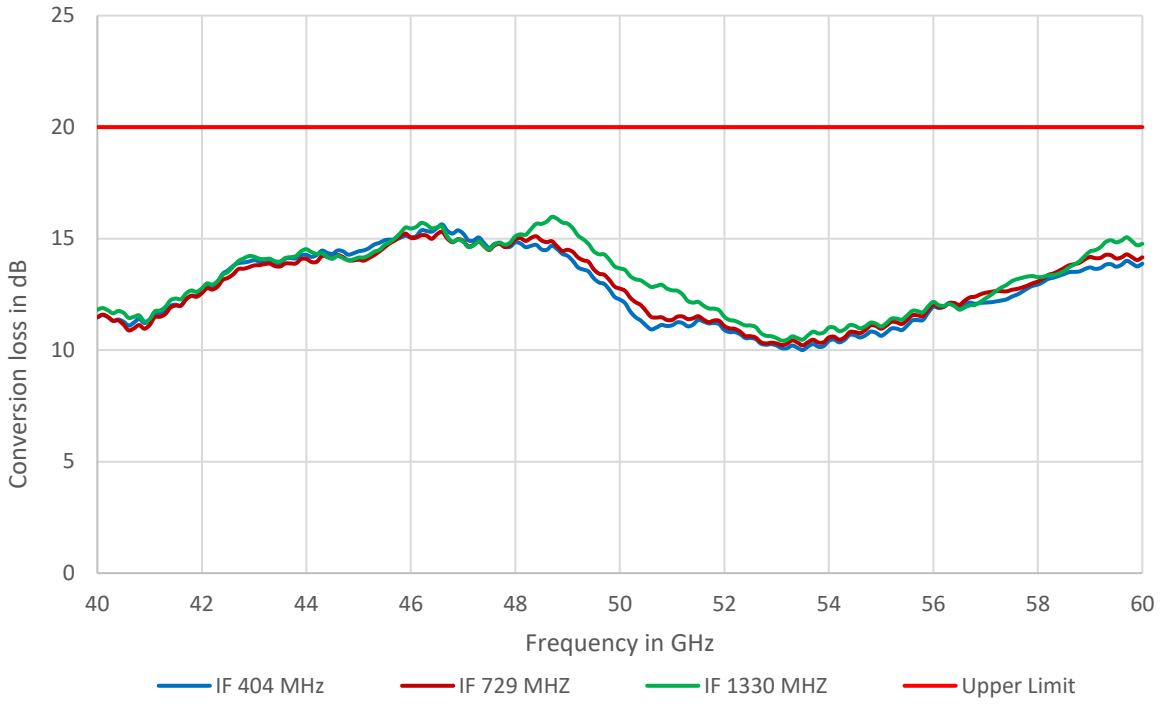
Intermediate frequency output (IF OUT)

Connector type	R&S®FS-Z60	SMA connector (female)
	R&S®FS-Z75	2.92 mm (female, compatible with SMA)
	R&S®FS-Z90	
	R&S®FS-Z110	
	R&S®FS-Z140	SMA connector (female)
	R&S®FS-Z170	
	R&S®FS-Z220	
	R&S®FS-Z325	2.92 mm (female, compatible with SMA)
Frequency range	R&S®FS-Z60	5 MHz to 2000 MHz
	R&S®FS-Z75	5 MHz to 6000 MHz
	R&S®FS-Z90	
	R&S®FS-Z110	
	R&S®FS-Z140	5 MHz to 2000 MHz
	R&S®FS-Z170	
	R&S®FS-Z220	
	R&S®FS-Z325	

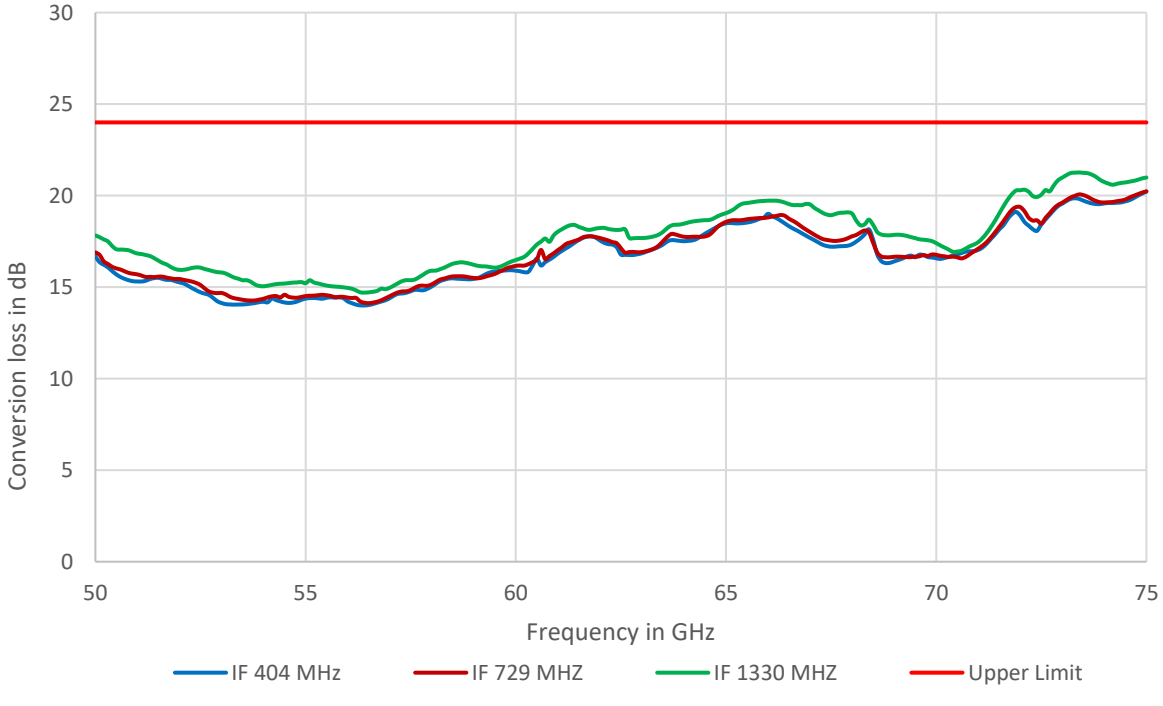
Absolute maximum ratings

RF input power	R&S®FS-Z60	+23 dBm
	R&S®FS-Z75	+10 dBm
	R&S®FS-Z90	
	R&S®FS-Z110	
	R&S®FS-Z140	
	R&S®FS-Z170	
	R&S®FS-Z220	
	R&S®FS-Z325	
LO input power	R&S®FS-Z60	+17 dBm
	R&S®FS-Z75	
	R&S®FS-Z90	
	R&S®FS-Z110	
	R&S®FS-Z140	
	R&S®FS-Z170	
	R&S®FS-Z220	
	R&S®FS-Z325	
Case temperature	R&S®FS-Z60	+45 °C
	R&S®FS-Z75	
	R&S®FS-Z90	
	R&S®FS-Z110	
	R&S®FS-Z140	
	R&S®FS-Z170	
	R&S®FS-Z220	
	R&S®FS-Z325	

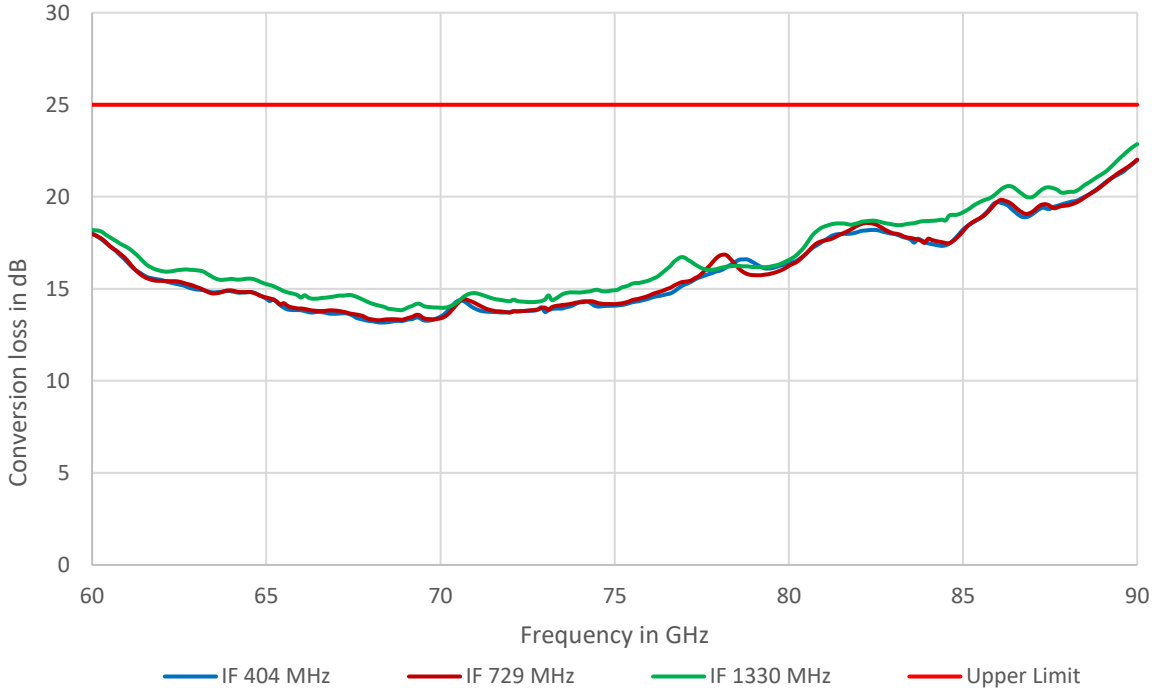
Conversion loss figures



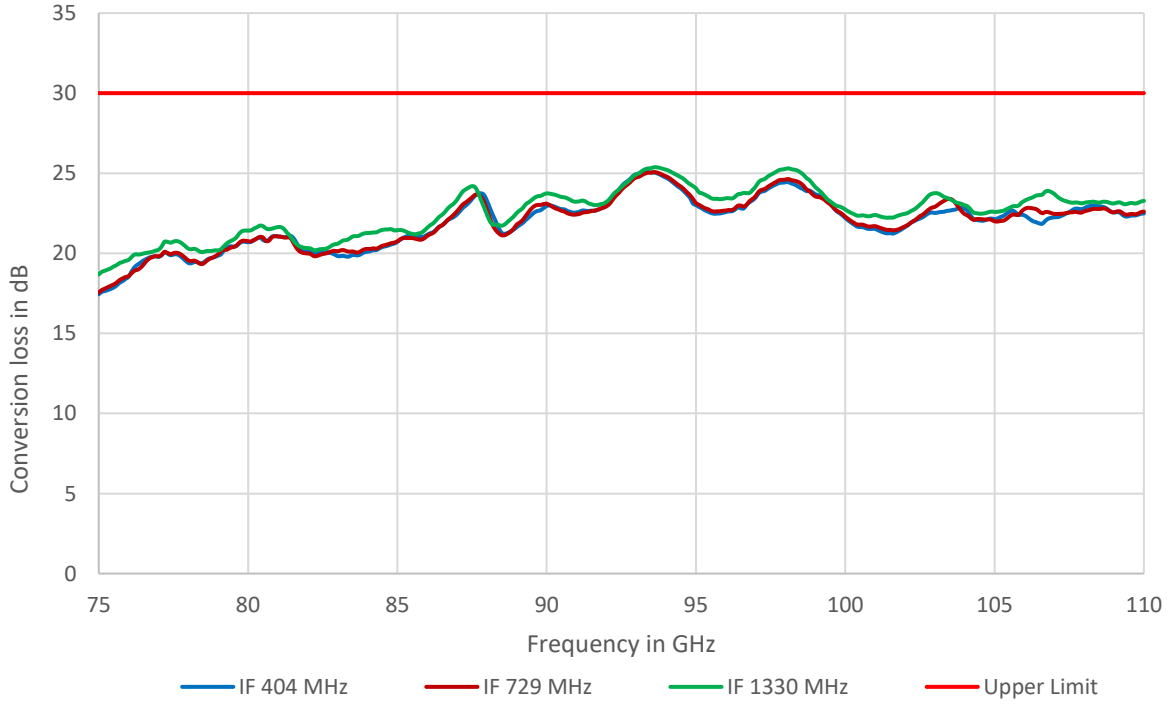
R&S®FS-Z60 conversion loss (typ. figure)



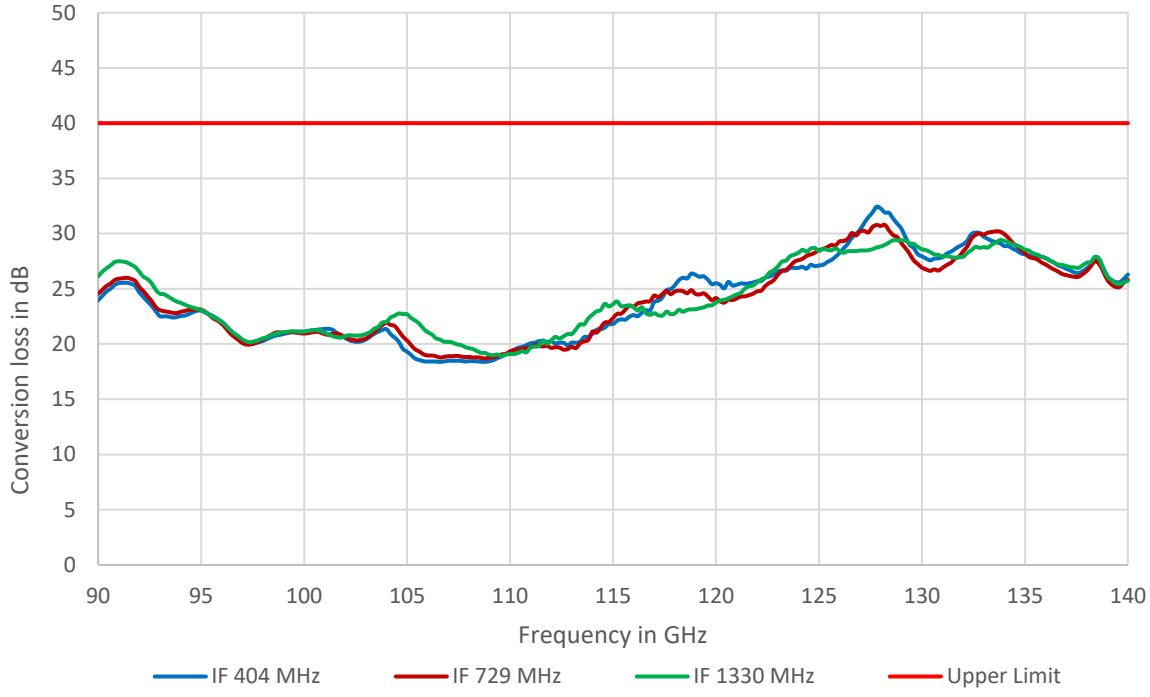
R&S®FS-Z75 conversion loss (typ. figure)



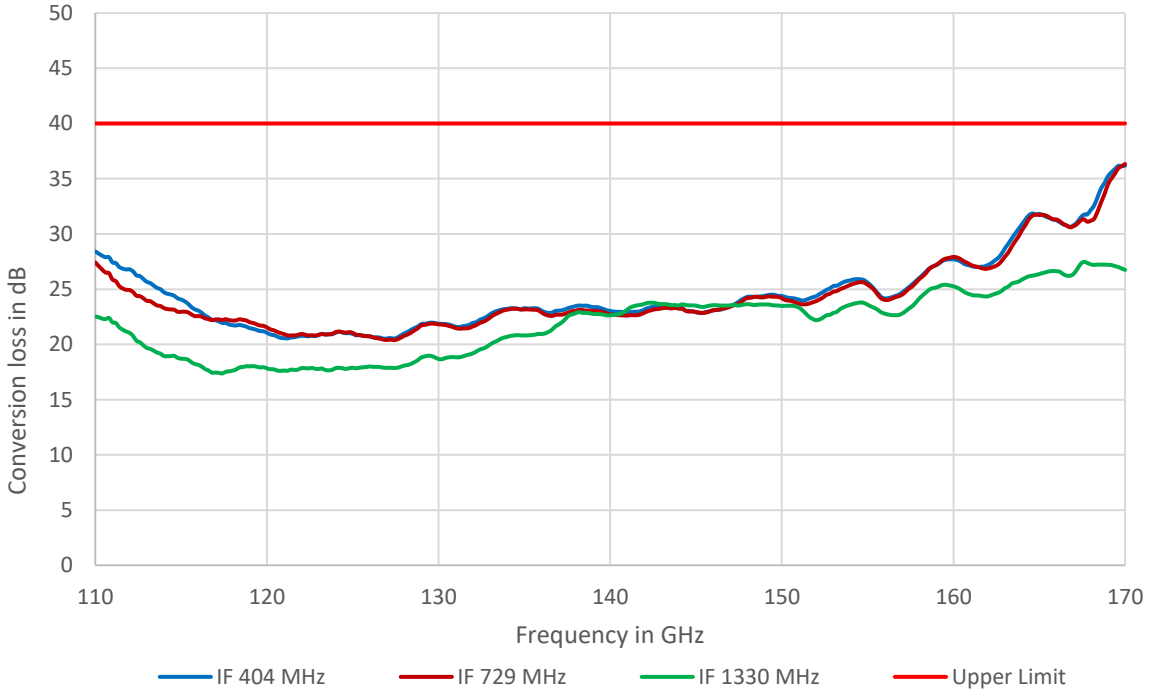
R&S®FS-Z90 conversion loss (typ. figure)



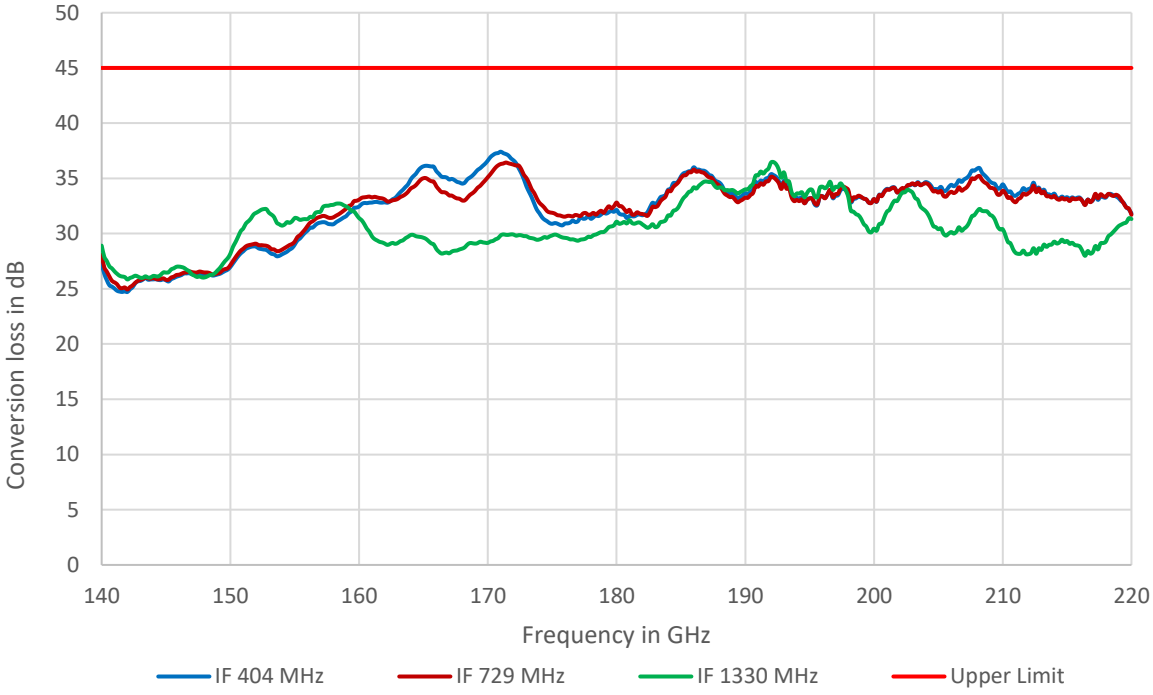
R&S®FS-Z110 conversion loss (typ. figure)



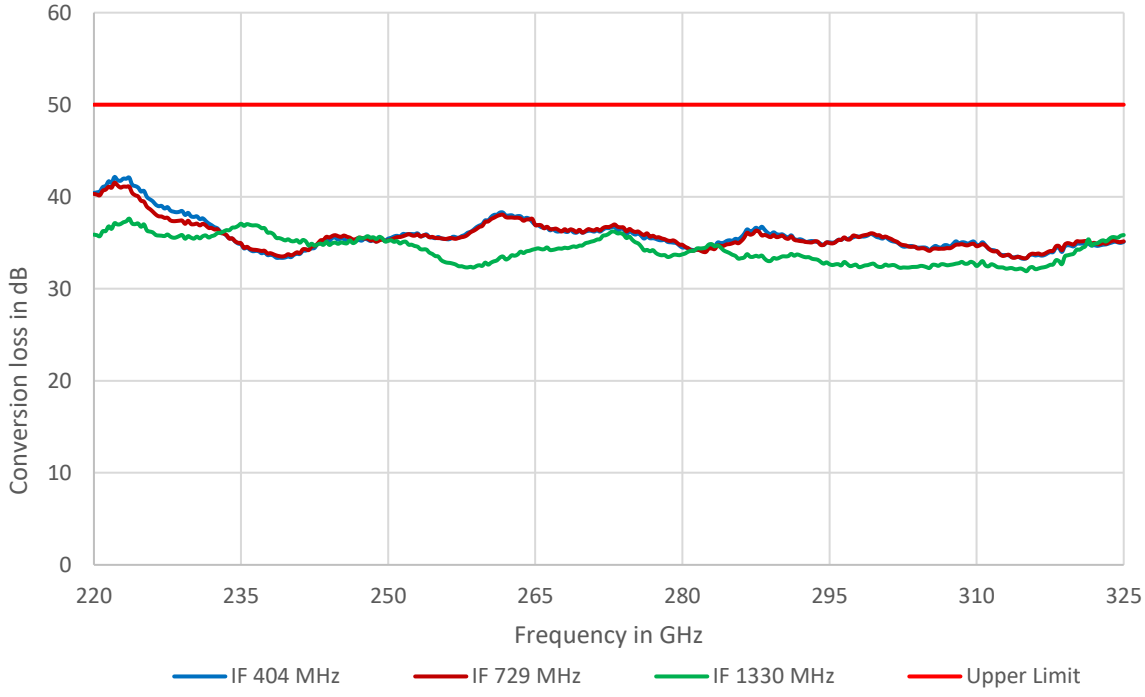
R&S®FS-Z140 conversion loss (typ. figure)



R&S®FS-Z170 conversion loss (typ. figure)



R&S®FS-Z220 conversion loss (typ. figure)



R&S®FS-Z325 conversion loss (typ. figure)

General data

Temperature loading	operating temperature range	0 °C to +55 °C
	permissible temperature range	0 °C to +55 °C
	storage temperature range	–40 °C to +70 °C
		in line with IEC 60068-2-1 and IEC 60068-2-2
Damp heat		+40 °C at 95 % relative humidity, in line with IEC 60068-2-30
Dimensions (W × H × D)	R&S®FS-Z60	27.0 mm × 24.2 mm × 67.7 mm (1.06 in × 0.95 in × 2.67 in)
	R&S®FS-Z75	27.0 mm × 22.0 mm × 101.7 mm (1.06 in × 0.87 in × 4.00 in)
	R&S®FS-Z90	27.0 mm × 22.0 mm × 97.5 mm (1.06 in × 0.87 in × 3.84 in)
	R&S®FS-Z110	27.0 mm × 22.0 mm × 95.5 mm (1.06 in × 0.87 in × 3.76 in)
	R&S®FS-Z140	27.0 mm × 24.2 mm × 91.1 mm (1.06 in × 0.95 in × 3.59 in)
	R&S®FS-Z170	27.0 mm × 24.2 mm × 89.1 mm (1.06 in × 0.95 in × 3.51 in)
	R&S®FS-Z220	27.0 mm × 24.2 mm × 88.0 mm (1.06 in × 0.95 in × 3.46 in)
	R&S®FS-Z325	28.5 mm × 23.3 mm × 75.5 mm (1.12 in × 0.92 in × 2.97 in)
Weight		approx. 190 g (meas.) approx. 0.45 lb (meas.)

Ordering information

Designation	Type	Order No.
Harmonic mixers		
40 GHz to 60 GHz	R&S®FS-Z60	1048.0171.02
50 GHz to 75 GHz	R&S®FS-Z75	3638.2240.02
60 GHz to 90 GHz	R&S®FS-Z90	3638.2270.02
75 GHz to 110 GHz	R&S®FS-Z110	3638.2292.02
90 GHz to 140 GHz	R&S®FS-Z140	3622.0708.02
110 GHz to 170 GHz	R&S®FS-Z170	3622.0714.02
140 GHz to 220 GHz	R&S®FS-Z220	3593.3250.02
220 GHz to 325 GHz	R&S®FS-Z325	3593.3267.02
Recommended extras		
Cables		
Cable extension	R&S®HA-Z5M	1350.6660.02
Waveguide power splitters/combiners [1]		
50 GHz to 75 GHz	WPS 50-75	3656.9408.02
60 GHz to 90 GHz	WPS 60-90	3656.9489.02
Waveguide fixed attenuators [1]		
Waveguide tunable attenuators [1]		
60 GHz to 90 GHz	WTA 60-90	3624.4475.02
110 GHz to 170 GHz	WTA 110-170	3660.9667.02
140 GHz to 220 GHz	WTA 140-220	3593.3996.02
220 GHz to 325 GHz	WTA 220-330	3593.4005.02
260 GHz to 400 GHz	WTA 260-400	3665.7356.02
Waveguide to coaxial adapters [1]		
50 GHz to 75 GHz		
WR15 to 1 mm (f)	WCA75	3626.1044.02
WR15 to 1 mm (m)	WCA75	3626.1044.03
60 GHz to 90 GHz		
WR12 to 1 mm (f)	WCA90	3626.1050.02
WR12 to 1 mm (m)	WCA90	3626.1050.03
75 GHz to 110 GHz		
WR10 to 1 mm (f)	WCA110	3626.1067.02
WR10 to 1 mm (m)	WCA110	3626.1067.03
Waveguide Faraday isolators [1]		
50 GHz to 75 GHz	WFI 50-75	3660.4865.02
75 GHz to 110 GHz	WFI 75-110	3660.5384.02
Accredited calibration, for R&S®FS-Z60, R&S®FS-Z75, R&S®FS-Z90, R&S®FS-Z110	R&S®ACAFS-Z90	3598.1340.03
Analyzers LO/IF ports		
LO/IF connections for external mixers, for R&S®FSW26/43/67	R&S®FSW-B21	1313.1100.28
LO/IF connections for external mixers, for R&S®FSW85	R&S®FSW-B21	1313.1100.86
LO/IF connections for external mixers, for R&S®FSWP26/50	R&S®FSWP-B21	1325.3848.02
LO/IF connections for external mixers, for R&S®FSVA3030/3044, R&S®FSV3030/3044	R&S®FSV3-B21	1330.4010.02

[1] For details refer to: www.radiometer-physics.de/products/mmwave-and-terahertz-products/passive-waveguide-components

Warranty and service

Warranty		
Base unit		1 years
All other items		1 year
Service options		
	Service plans	**On demand**
Calibration	up to five years [2]	pay per calibration
Warranty and repair	up to five years [2]	standard price repair
Contact your Rohde & Schwarz sales office for further details.		

[2] For extended periods, contact your Rohde & Schwarz sales office.

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PD 3683.7360.22 | Version 04.00 | March 2026 (jr)
R&S®FS-Zxxx Harmonic Mixers
Data without tolerance limits is not binding | Subject to change