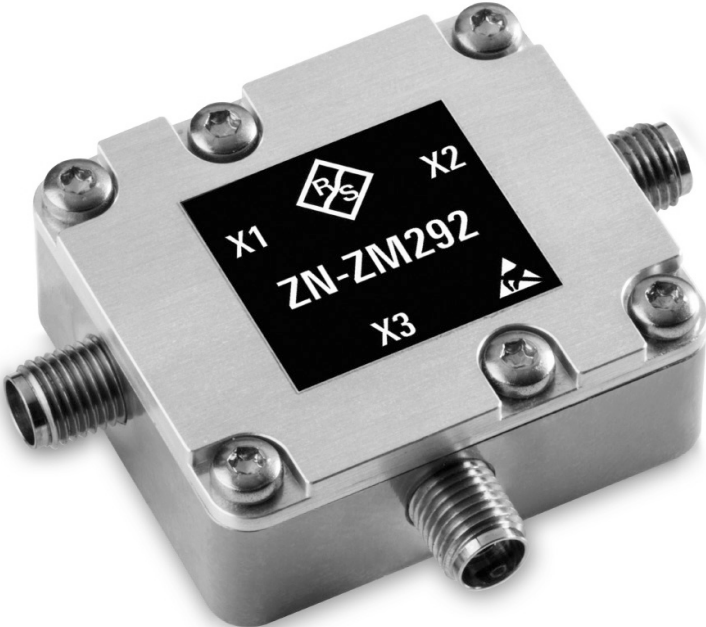


R&S® ZN-ZM292 Calibration Mixer Specifications



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Definitions

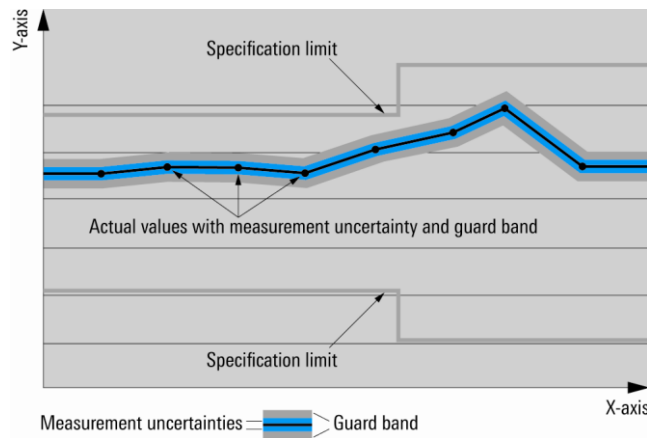
General

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 $<$, \leq , $>$, \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.



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 indicated as follows: "parameter: value".

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 Mcps (million chips per second), whereas bit rates and symbol rates are specified in Gbps (billion bits per second), Mbps (million bits per second), kbps (thousand bits per second), Msps (million symbols per second) or ksps (thousand symbols per second), and sample rates are specified in Msample/s (million samples per second). Mcps, Mbps, Msps, kbps, ksps and Msample/s are not SI units.

Specifications

Mechanical data

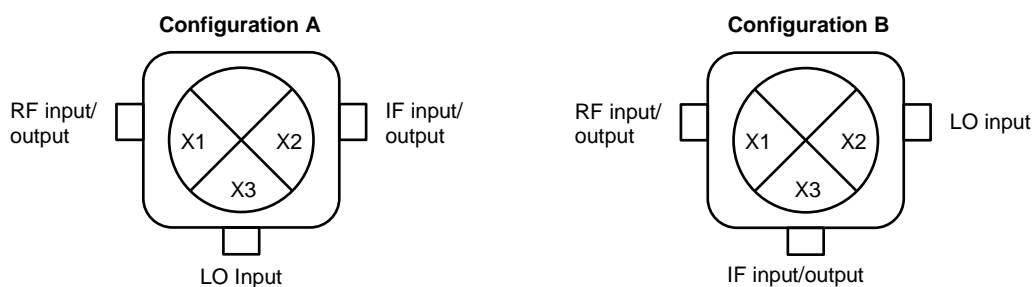
Connector type	any port	2.92 mm, female
Inner conductor material		Au-plated age-hardened CuBe alloy
Outer conductor material		stainless steel

Measurement range

Impedance		50 Ω
Frequency range	X1	10 GHz to 40 GHz
	X2	10 GHz to 40 GHz
	X3	0.1 GHz to 30 GHz
Input power	LO	15 dBm
	RF	< -5 dBm
	IF	< -5 dBm
Maximum input power	any port	0.15 W

Port configuration

The mixer may be operated as a downconverter or an upconverter. In upconversion, the IF is the input and the output signal is $RF = IF + LO$. In downconversion, the RF is the input and the output signal is $IF = RF - LO$. The recommended port assignment to achieve lowest conversion loss depends on the required frequency ranges of the RF, IF and LO signals.

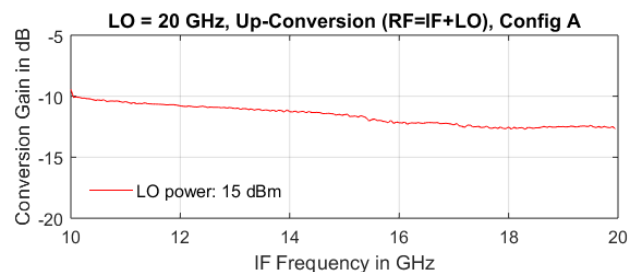
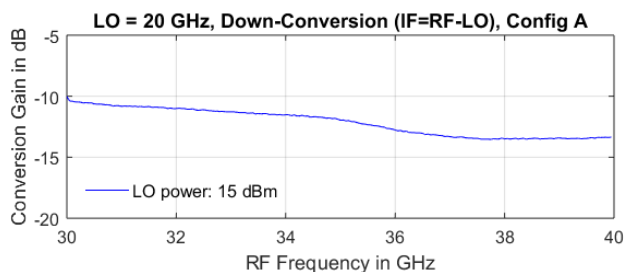
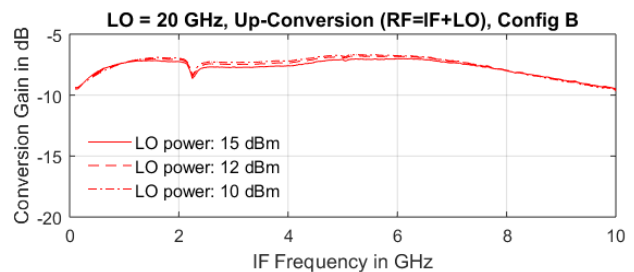
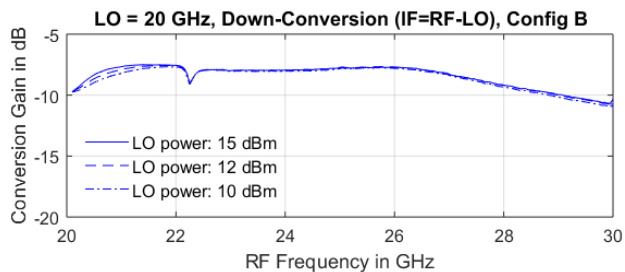
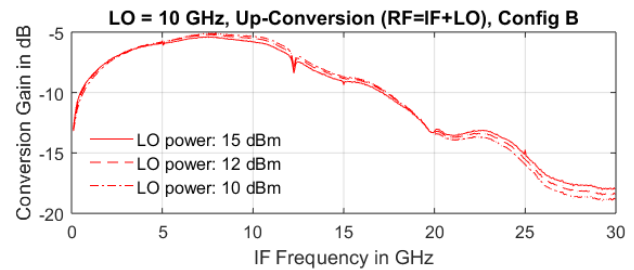
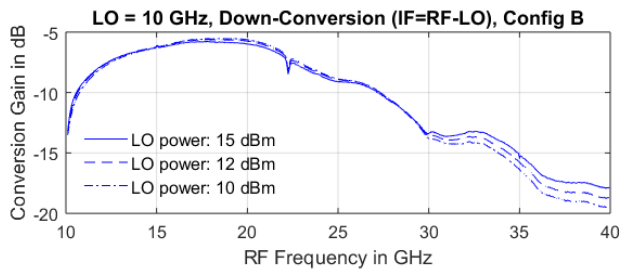
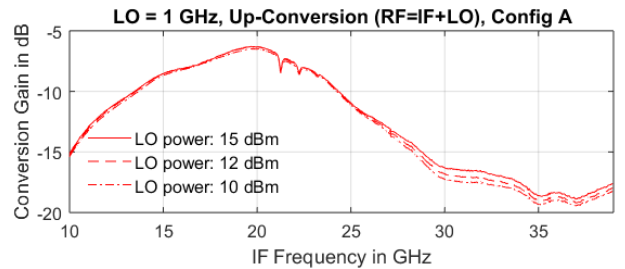
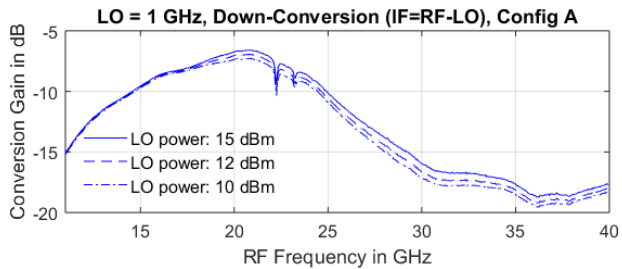


Electrical data

Parameter	LO	RF	IF	Port configuration	Specification	Typical
Conversion loss	1 GHz	11 GHz to 40 GHz	10 GHz to 39 GHz	A	< 26 dB	see plots
	10 GHz	10.1 GHz to 40 GHz	0.1 GHz to 30 GHz	B	< 26 dB	
	20 GHz	20.1 GHz to 30 GHz	0.1 GHz to 10 GHz	B	< 18 dB	
	20 GHz	30 GHz to 40 GHz	10 GHz to 20 GHz	A	< 20 dB	
Isolation IF – RF	1 GHz	11 GHz to 40 GHz	10 GHz to 39 GHz	A	> 15 dB	
	10 GHz	10.1 GHz to 40 GHz	0.1 GHz to 30 GHz	B	> 13 dB	
	20 GHz	20.1 GHz to 30 GHz	0.1 GHz to 10 GHz	B	> 13 dB	
	20 GHz	30 GHz to 40 GHz	10 GHz to 20 GHz	A	> 17 dB	
Isolation LO – RF LO – IF	0.1 GHz to 40 GHz	0.1 GHz to 40 GHz	0.1 GHz to 40 GHz	A	> 13 dB	
	0.1 GHz to 40 GHz	0.1 GHz to 40 GHz	0.1 GHz to 40 GHz		> 13 dB	
Isolation LO – RF LO – IF	0.1 GHz to 40 GHz	0.1 GHz to 40 GHz	0.1 GHz to 40 GHz	B	> 13 dB	
	0.1 GHz to 40 GHz	0.1 GHz to 40 GHz	0.1 GHz to 40 GHz		> 13 dB	

Parameter	LO	RF	IF	Port configuration	Nominal
Input 1 dB gain compression	1 GHz to 20 GHz	10 GHz to 40 GHz	0.1 GHz to 40 GHz	A and B	3 dBm
Conversion loss reciprocity ¹	1 GHz to 20 GHz	10 GHz to 40 GHz	0.1 GHz to 40 GHz	A and B	< 2 dB
Group delay reciprocity ¹	1 GHz to 20 GHz	10 GHz to 40 GHz	0.1 GHz to 40 GHz	A and B	< 50 ps
Return loss	see plots				

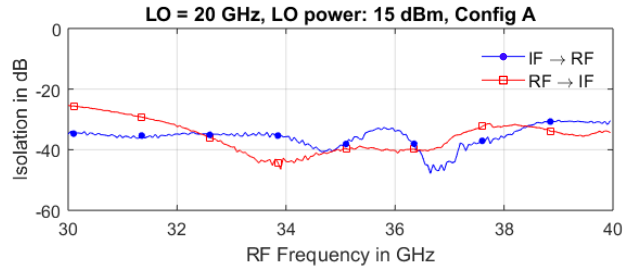
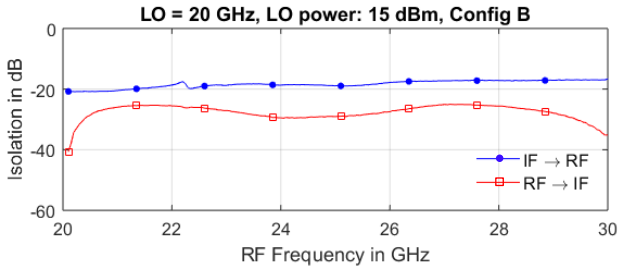
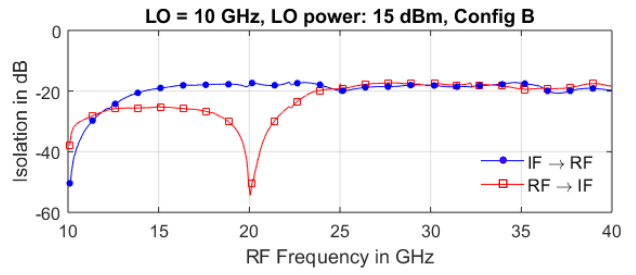
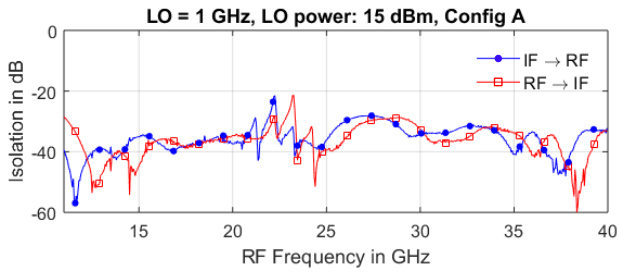
Conversion loss versus frequency



Conversion loss in upconversion (left) and downconversion (right) versus frequency for the R&S[®]ZN-ZM292

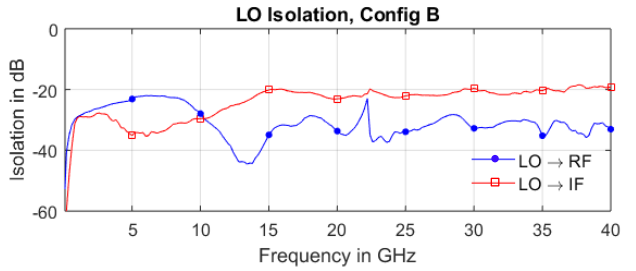
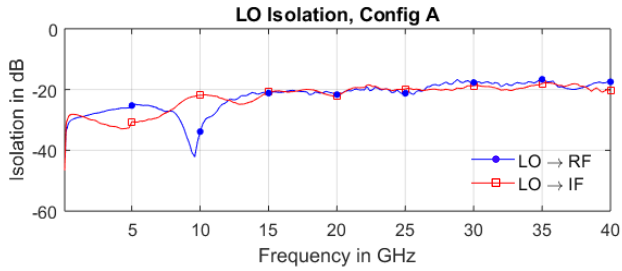
¹ Conversion loss reciprocity and group delay reciprocity are defined as the difference in conversion loss and group delay when operating the mixer in upconversion and downconversion (at a fixed LO frequency), respectively.

Isolation versus frequency



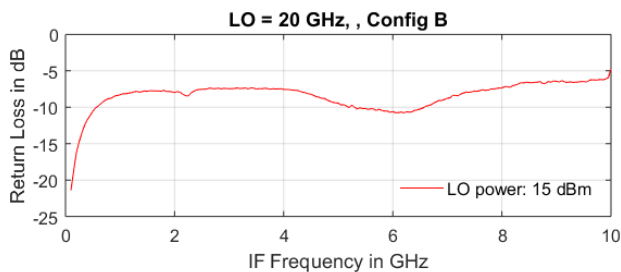
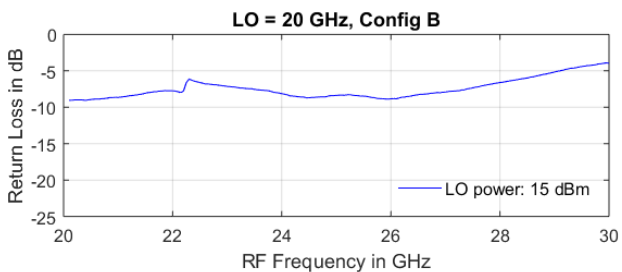
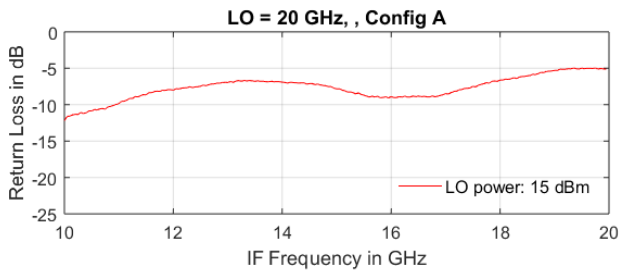
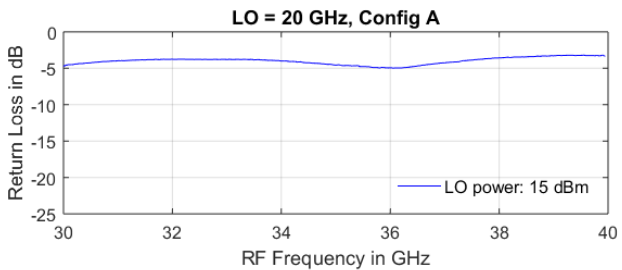
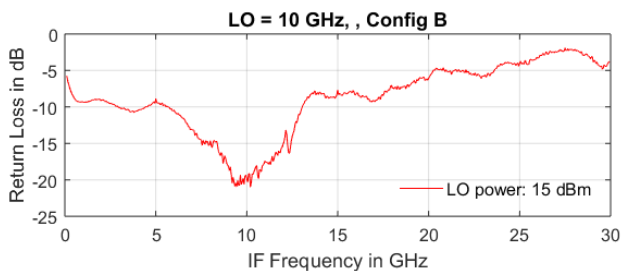
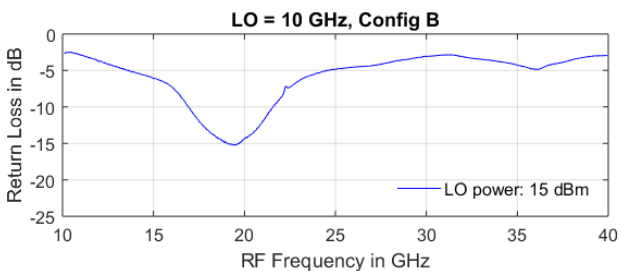
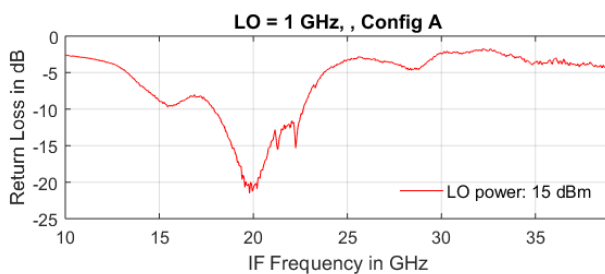
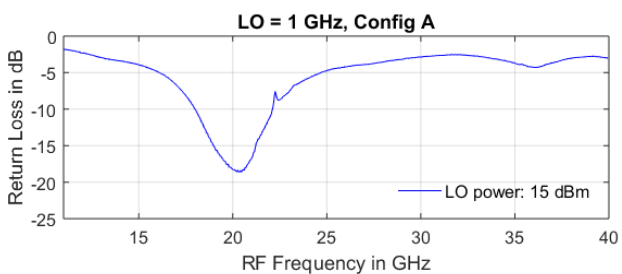
Isolation in upconversion (blue) and downconversion (red) versus frequency for the R&S[®]ZN-ZM292

LO isolation versus frequency



LO isolation versus frequency for the R&S[®]ZN-ZM292

Return loss versus frequency

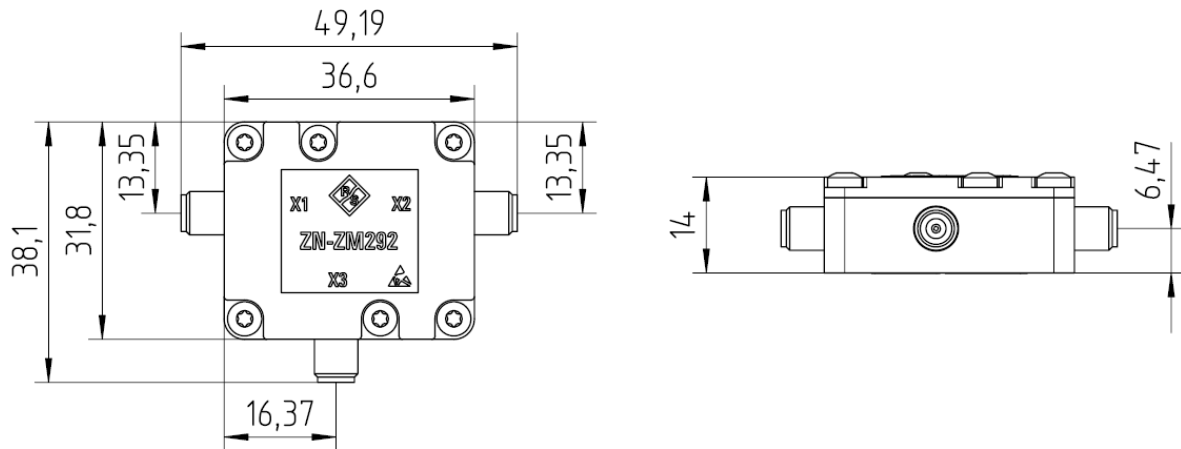


Return loss of RF port (left) and IF port (right) versus frequency for the R&S®ZN-ZM292

General data

Temperature loading	in line with IEC 60068-2-1 and IEC 60068-2-2	
	operating temperature range	+18 °C to +28 °C
	permissible temperature range	+5 °C to +40 °C
	storage temperature range	-20 °C to +60 °C
Recommended calibration interval	1 year	
Dimensions (W x H x D)	see figure below	49.2 mm x 38.1 mm x 14 mm (1.97 in x 1.5 in x 0.55 in)
Weight	model .02	20 g (0.04 lb)
Shipping weight	model .02	1.52 kg (3.35 lb)

Dimensions (in mm)



Front and side view of the R&S®ZN-ZM292

Ordering information

Designation	Type	Order No.
Calibration mixer, 40 GHz, 2.92 mm (female)	R&S®ZN-ZM292	1339.3800.02
Calibration mixer, 40 GHz, 2.92 mm (female), delivery without wooden storage box	R&S®ZN-ZM292	1339.3800.03

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