

RPG SHM – Full band Subharmonic Mixer

Specifications



Radiometer Physics
A Rohde & Schwarz Company

Definitions

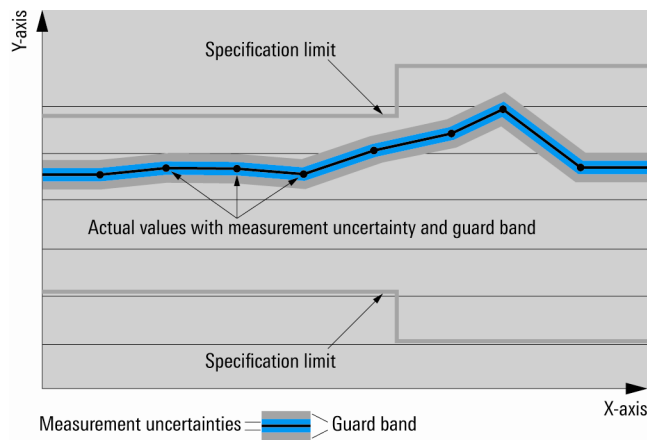
General

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.



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 Radiometer Physics 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 indicated as follows: “parameter: value”.

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

General information

The RPG Subharmonic Mixers (SHM) are available for the frequency bands:

- 75 GHz to 110 GHz (SHM 75-110)
- 90 GHz to 140 GHz (SHM 90-140)
- 110 GHz to 170 GHz (SHM 110-170)
- 140 GHz to 220 GHz (SHM 140-220)
- 170 GHz to 260 GHz (SHM 170-260)
- 220 GHz to 330 GHz (SHM 220-330)
- 325 GHz to 500 GHz (SHM 325-500)

Specifications

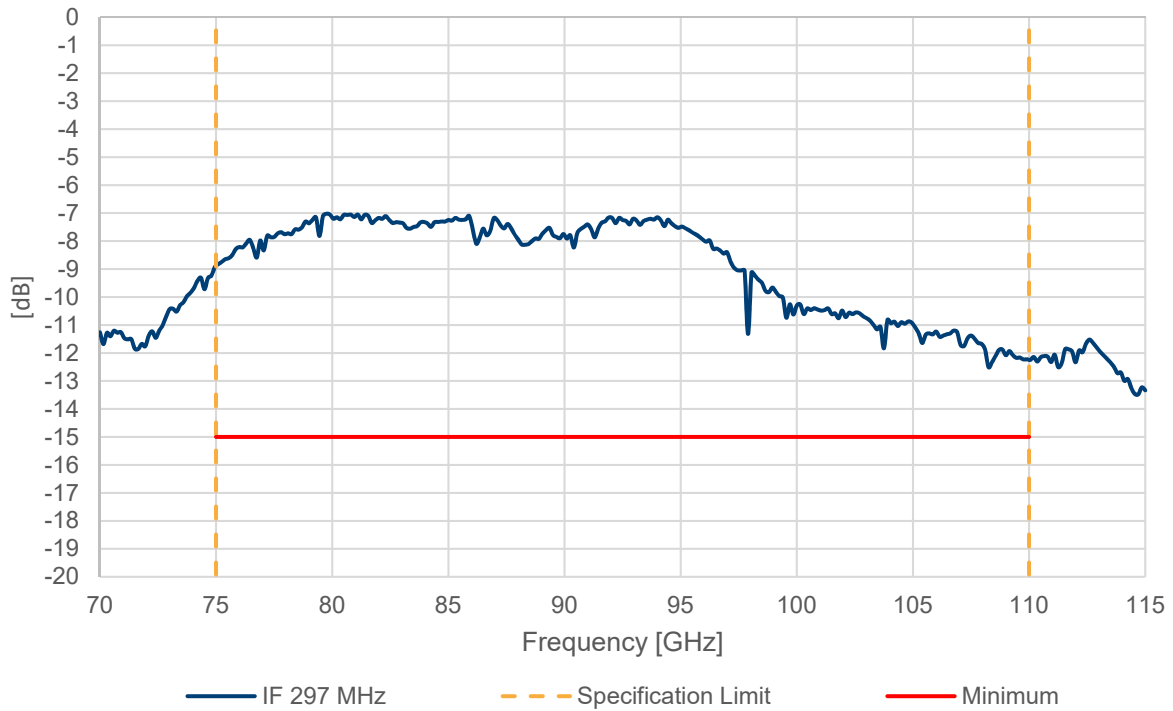
Test Port

RF-Input		
RF-Frequency range [GHz]	SHM 75-110	75 - 110
	SHM 90-140	90 - 140
	SHM 110-170	110 - 170
	SHM 140-220	140 - 220
	SHM 170-260	170 - 260
	SHM 220-330	220 - 330
	SHM 325-500	325 - 500
RF-Waveguide designator	SHM 75-110	WM-2540 (WR-10)
	SHM 90-140	WM-2032 (WR-8)
	SHM 110-170	WM-1651 (WR-6.5)
	SHM 140-220	WM-1295 (WR-5.1)
	SHM 170-260	WM-1092 (WR-4.3)
	SHM 220-330	WM-864 (WR-3.4)
	SHM 325-500	WR-2.2
RF-Connector type	SHM 75-110	RPG standard waveguide flange (compatible with UG-387/U-M)
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	RPG precision waveguide flange (compatible with UG-387/U-M)
	SHM 325-500	
LO-Input		
LO-Waveguide designator	SHM 75-110	WR-20
	SHM 90-140	WR-15
	SHM 110-170	WR-13
	SHM 140-220	WM-2540 (WR-10)
	SHM 170-260	WM-2032 (WR-8)
	SHM 220-330	WM-1651 (WR-6.5)
	SHM 325-500	WM-1092 (WR-4.3)
LO-Frequency range [GHz]	SHM 75-110	37.5 - 55
	SHM 90-140	45 - 70
	SHM 110-170	55 - 85
	SHM 140-220	70 - 110
	SHM 170-260	85 - 130
	SHM 220-330	110 - 165
	SHM 325-500	162.5 - 250
LO-Connector type	SHM 75-110	RPG standard waveguide flange (compatible with UG-387/U-M)
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	
LO-Input power (typ.) [dBm]	SHM 75-110	+ 10
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	

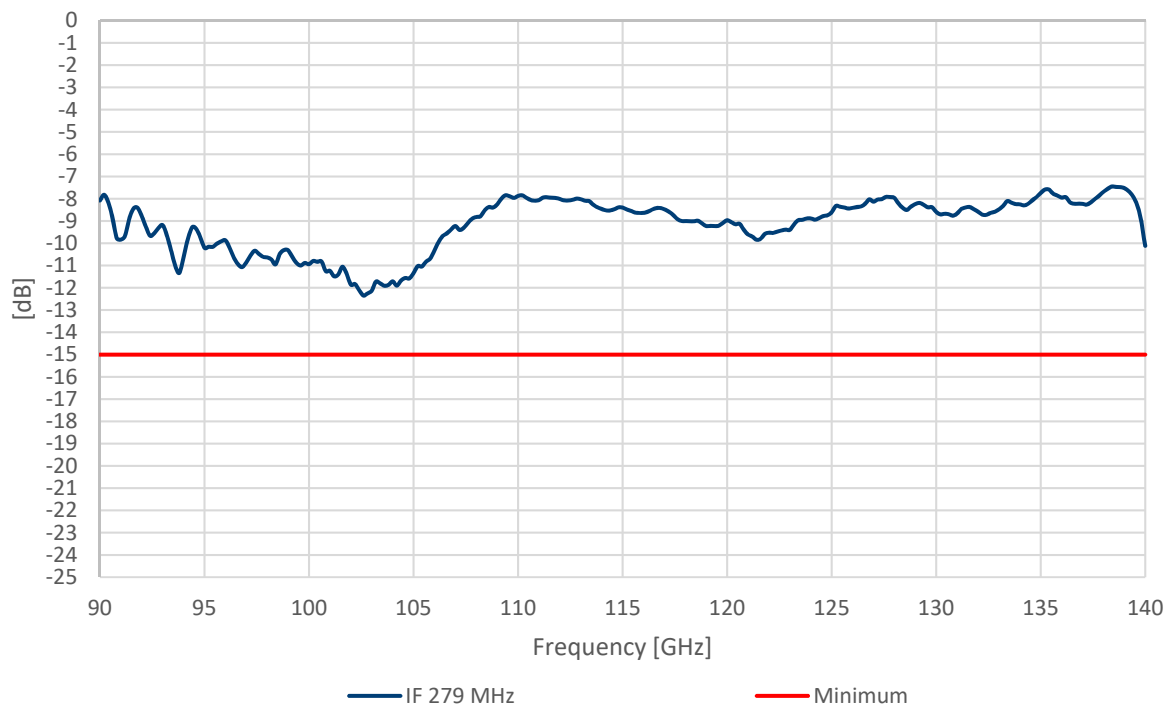
IF-Output		
IF-Output port	SHM 75-110	PC-2.92 (female)
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	
IF-Frequency range (typ.) [GHz]	SHM 75-110	DC to 15
	SHM 90-140	DC to 18
	SHM 110-170	DC to 18
	SHM 140-220	DC to 18
	SHM 170-260	n. a.
	SHM 220-330	DC to 18
	SHM 325-500	DC to 18
P1dB (typ.) [dBm]	SHM 75-110	- 5
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	

Absolut Maximum Ratings

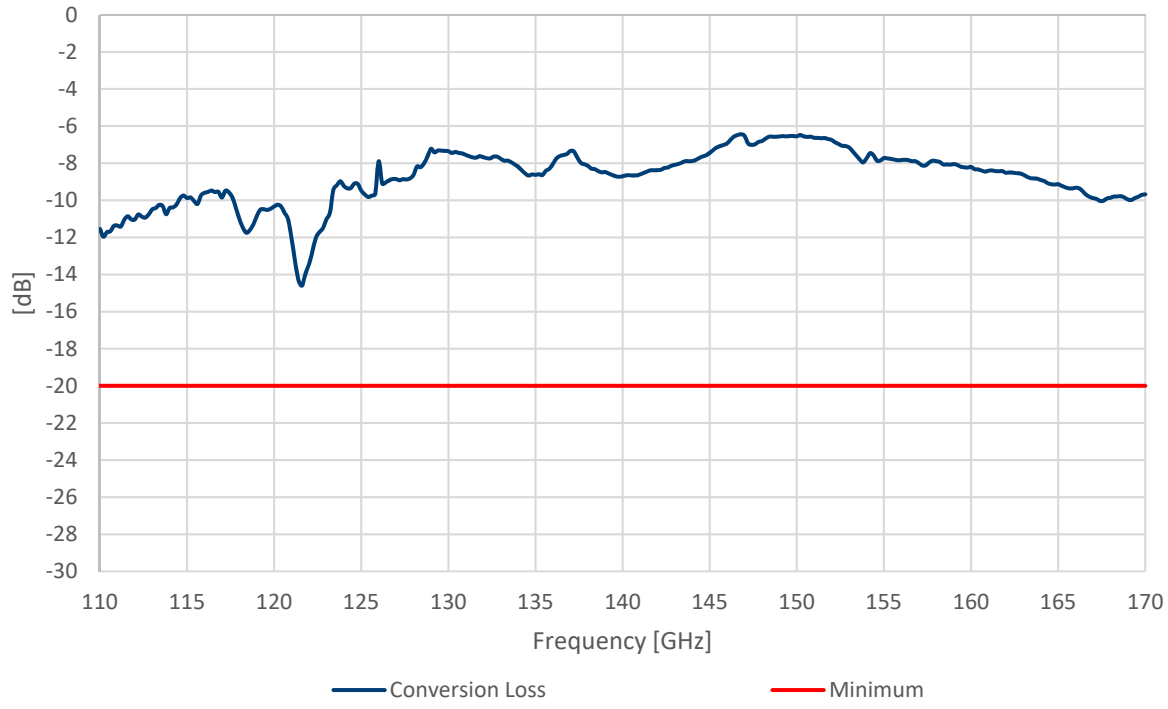
RF-Input power [dBm]	SHM 75-110	+ 10
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	
LO-Input power [dBm]	SHM 75-110	+ 15
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
Case temperature [°C]	SHM 75-110	+ 45
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	



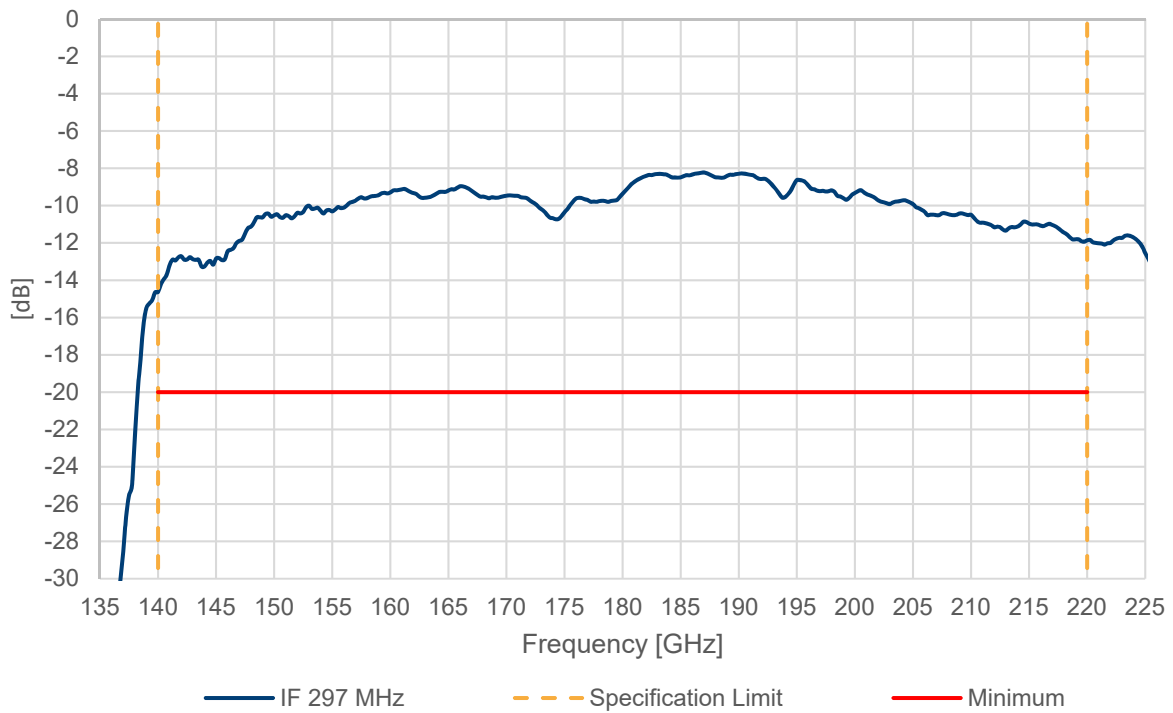
Typ. Figure 1: SHM 75-110 Conversion Loss (SSB) between 70 GHz and 115 GHz



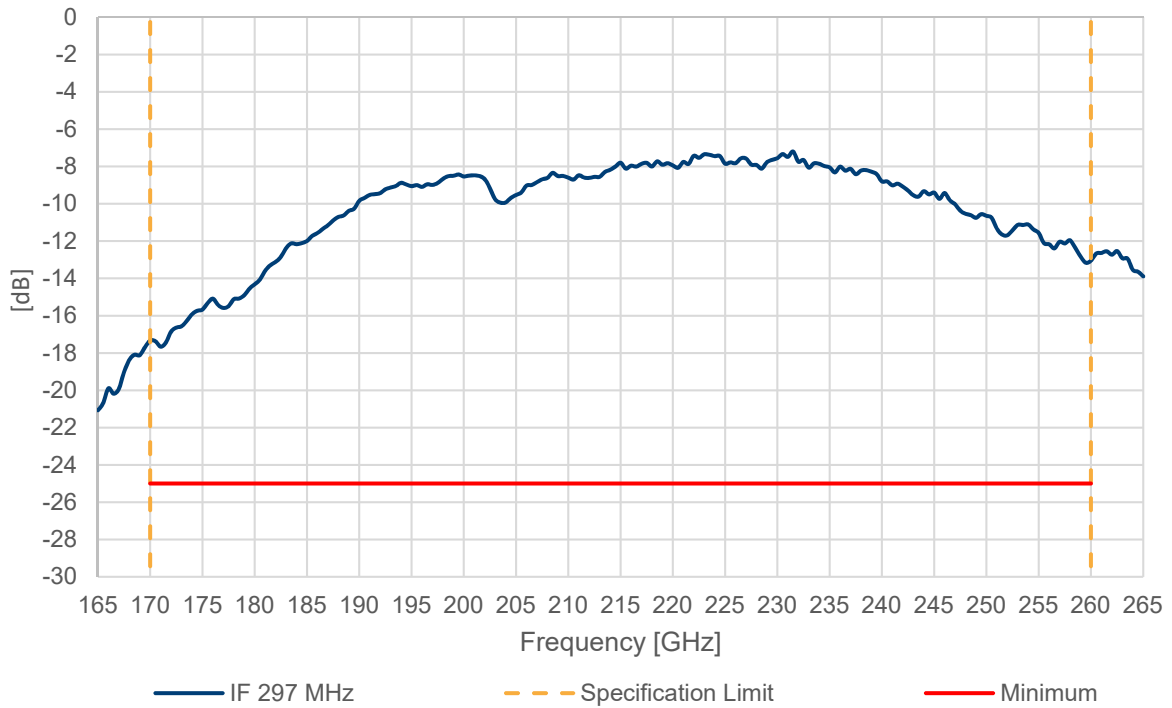
Typ. Figure 2: SHM 90-140 Conversion Loss (SSB) between 90 GHz and 140 GHz



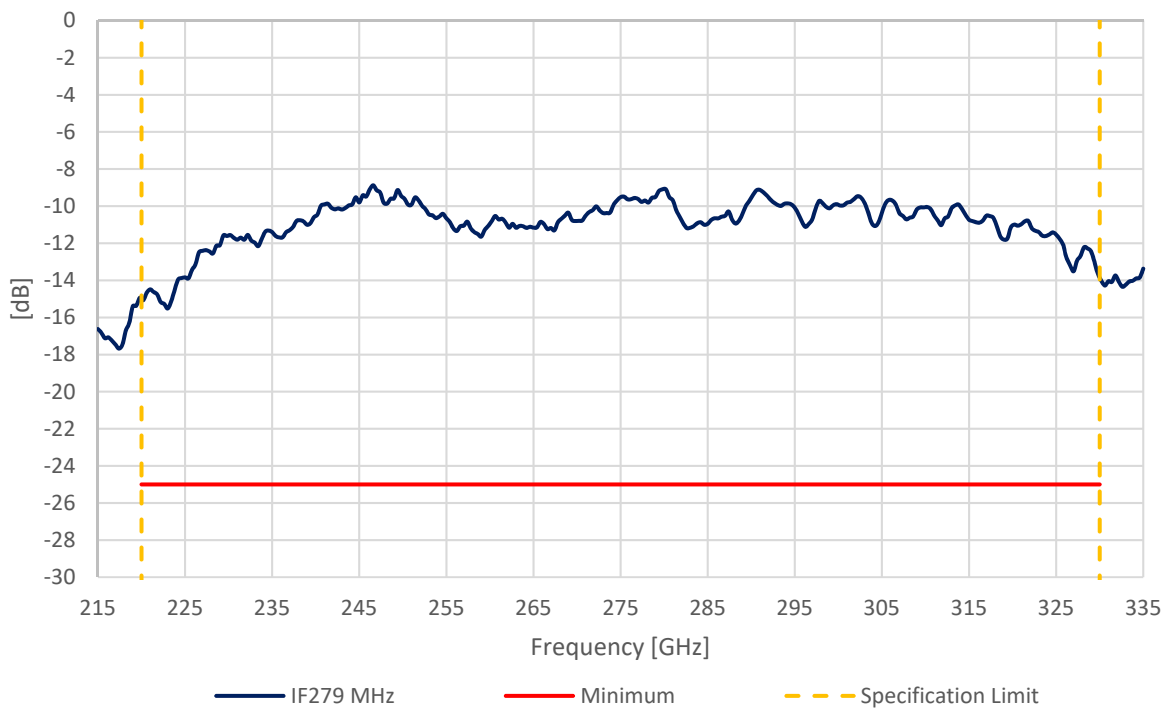
Typ. Figure 3: SHM 110-170 Conversion Loss (SSB) between 105 GHz and 175 GHz



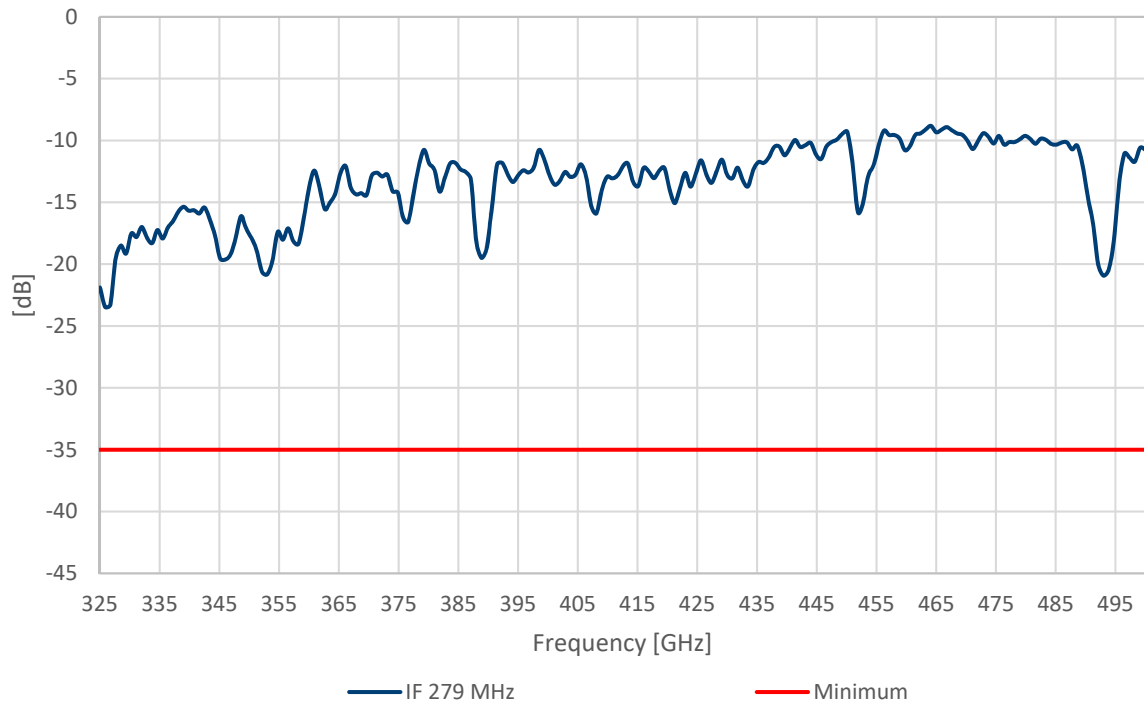
Typ. Figure 4: SHM 140-220 Conversion Loss (SSB) between 135 GHz and 225 GHz



Typ. Figure 5: SHM 170-260 Conversion Loss (SSB) between 165 GHz and 265 GHz



Typ. Figure 6: SHM 220-330 Conversion Loss (SSB) between 215 GHz and 335 GHz



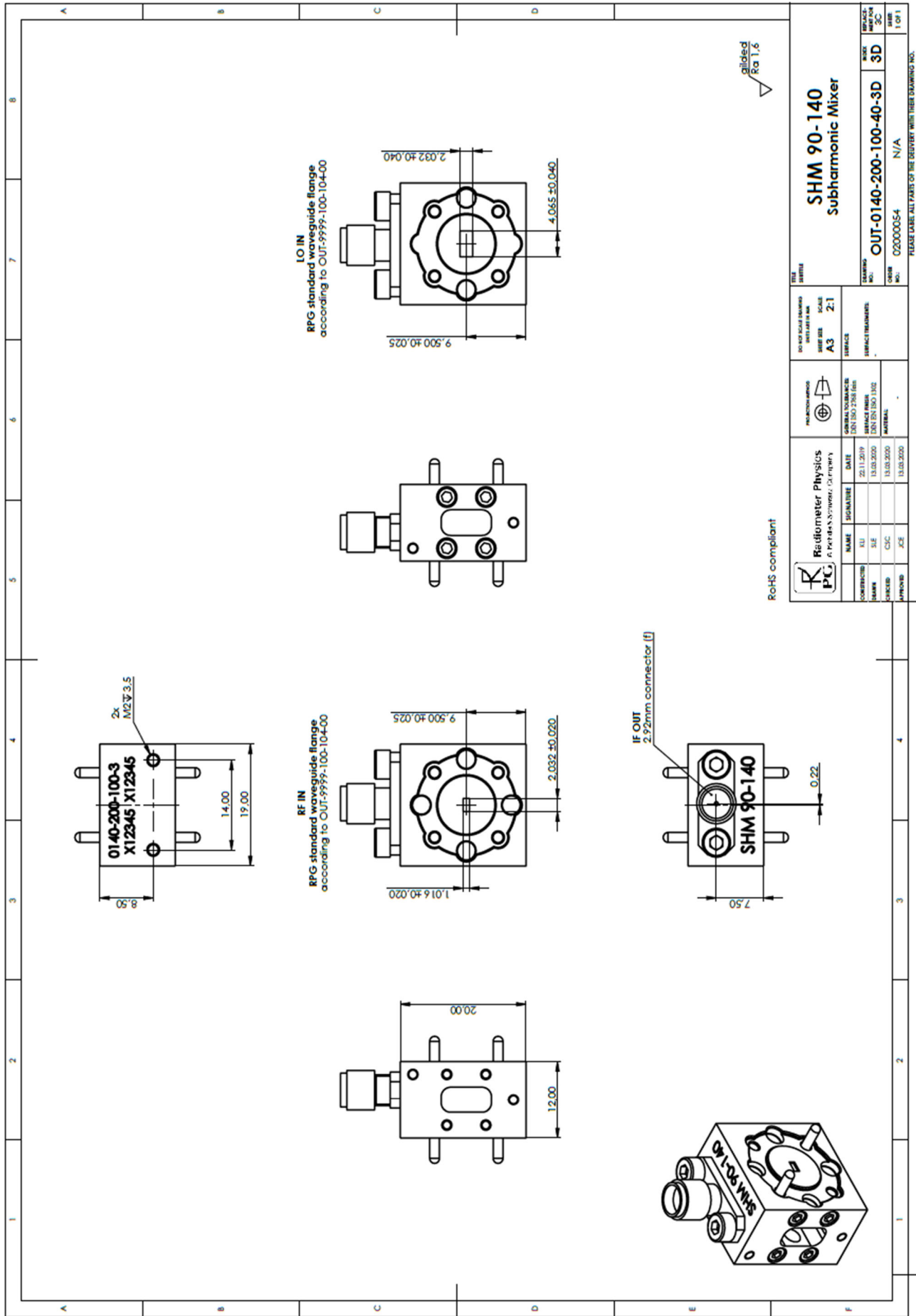
Typ. Figure 7: SHM 325-500 Conversion Loss (SSB) between 325 GHz and 500 GHz

General data

Temperature loading	operating temperature range	+18 °C to +28 °C
	permissible temperature range	+5 °C to +40 °C
	storage temperature range	-40 °C to +70 °C
Damp heat		in line with IEC 60068-2-1 and IEC 60068-2-2 +40 °C at 80 % rel. humidity, in line with IEC 60068-2-30
Mechanical resistance	vibration, sinusoidal	5 Hz to 150 Hz, in line with IEC 60068-2-6
	vibration, random	10 Hz to 300 Hz, in line with IEC 60068-2-64
	shock	40 g shock spectrum, in line with MIL-STD-810, method 516, procedure I
Operation	permissible altitude	3000 m above sea level
Weight		70 gram
Shipping weight		100 gram

Ordering information

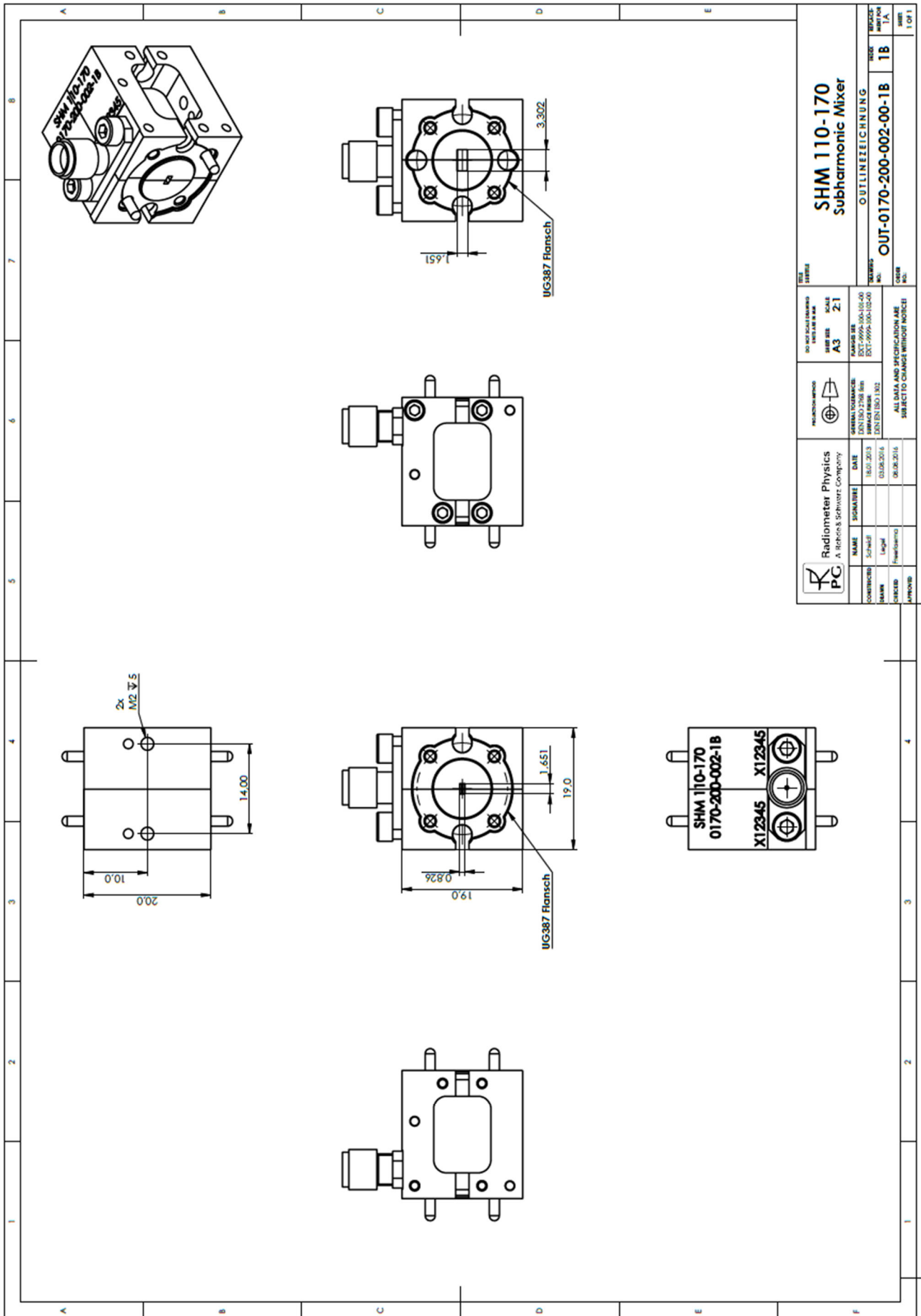
Designation	RPG-Order No.
Subharmonic Mixer 75-110 GHz	02000051
Subharmonic Mixer 90-140 GHz	02000054
Subharmonic Mixer 110-170 GHz	02000038
Subharmonic Mixer 140-220 GHz	02000019
Subharmonic Mixer 170-260 GHz	02000025
Subharmonic Mixer 220-330 GHz	02000022
Subharmonic Mixer 325-500 GHz	02000055



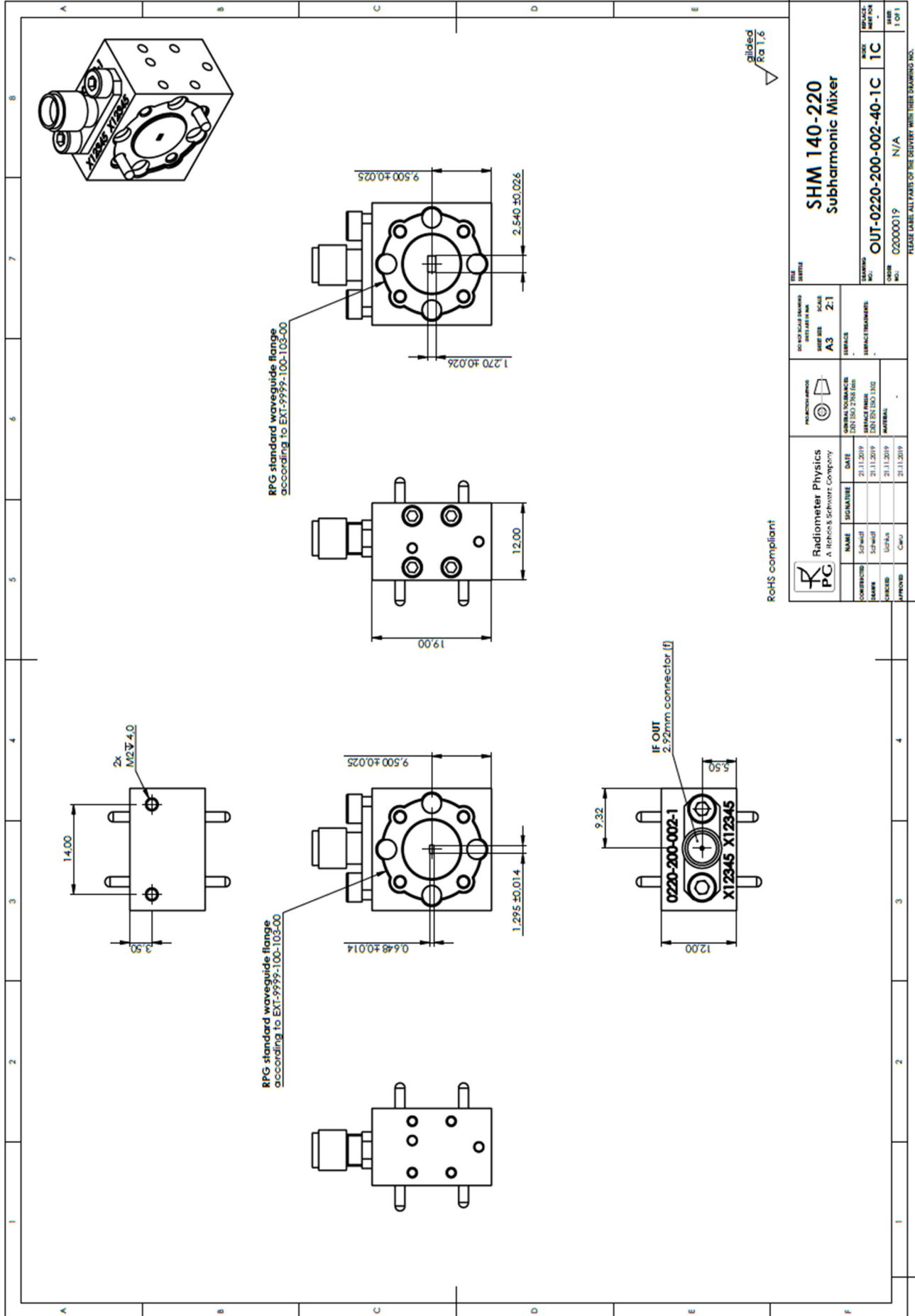
finished
Ra 1,6

RoHS compliant

		RoHS compliant	
	Radometer Physics c/o Perdas Schwaibler, Germany	GENERAL DIMENSIONS UNIT: mm SCALE: 2:1 SURFACE:	TITLE: SHM 90-140 SUBTITLE: Subharmonic Mixer
NAME: RZJ SIGNATURE:	DATE: 22.11.2019	GENERAL DIMENSIONS UNIT: mm SCALE: 2:1 SURFACE:	DRAWING NO.: OUT-0140-200-100-40-3D REV: 3D DATE: 11.08.2020
CHECKED: SLE DATE: 13.03.2020	DATE: 13.03.2020	CONTACT PERSONNEL:	ORDER NO.: 020000054 N/A
DRAWN: CMC DATE: 13.03.2020	DATE: 13.03.2020	MATERIALS:	PLEASE DATE ALL PARTS OF THE DELIVERY WITH THIS DRAWING NO.
APPROVED: JCE DATE: 13.03.2020	DATE: 13.03.2020	MATERIALS:	DRAWING NO.: 020000054 REV: 3D DATE: 11.08.2020



 Radiometer Physics A. Reichen & Schwarz Company		NAME: Schall Title: Ingenieur Name: Reichen & Schwarz Title: Ingenieur	DATE: 08.02.2016 DATE: 03.08.2016 DATE: 08.08.2016	SERIAL TOLERANCES: DIN ISO 2768 Sm DIN ISO 13715 DIN EN ISO 1302	PROJECTION: 	DRAWING NO.: 0170-200-002-00-00 PART NO.: 0170-200-002-00-00 PART NO.: 0170-200-002-00-00	SCALE: Z1 PART NO.: AS	SIZE: 1:1 SHEETS: 1	SHM 110-170 Subharmonic Mixer OUTLINEZEICHNUNG	ORDER NO.: OUT-0170-200-002-00-1B PART NO.: 1B PART NO.: 1A	SHEET: 1 OF 1
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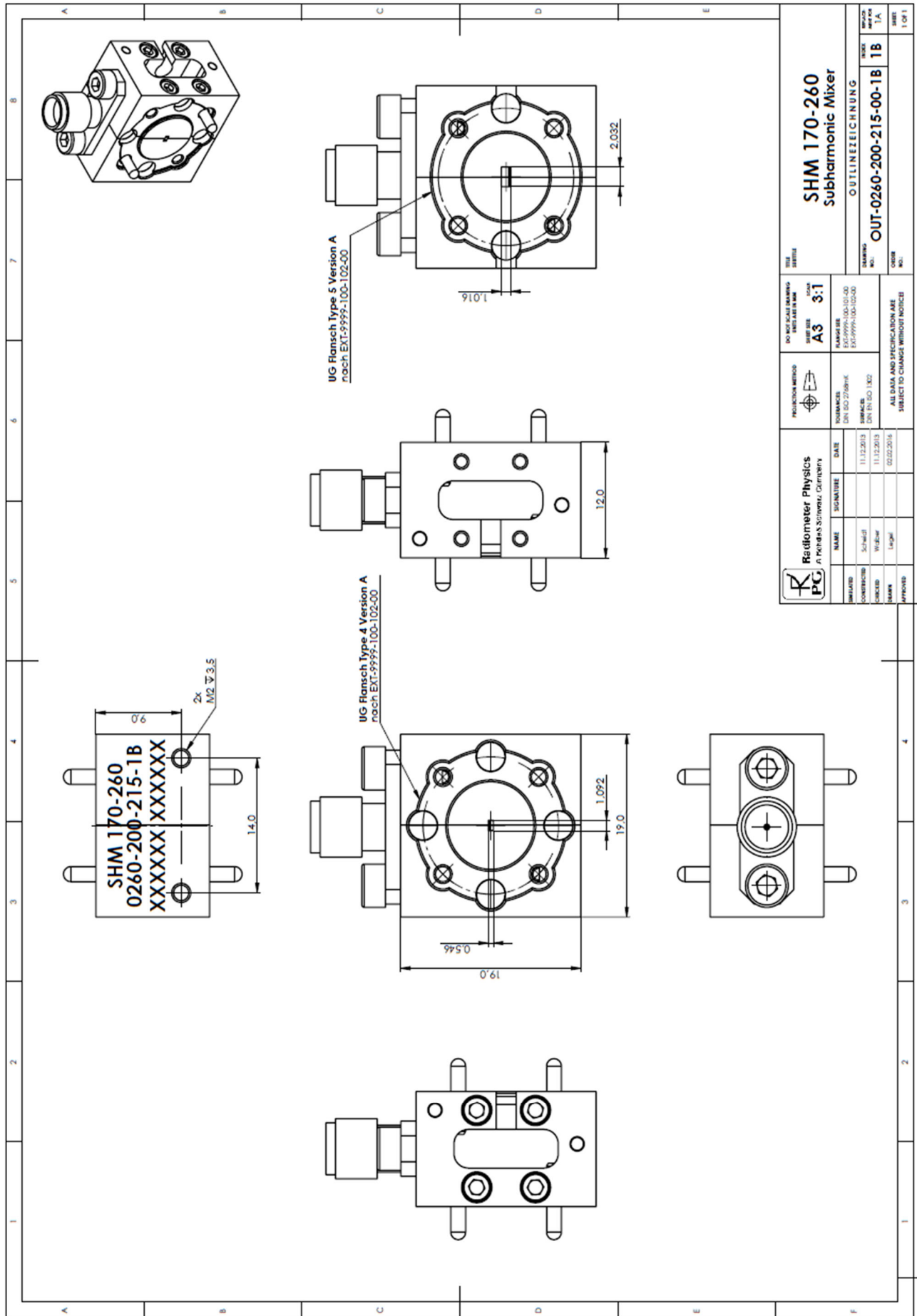


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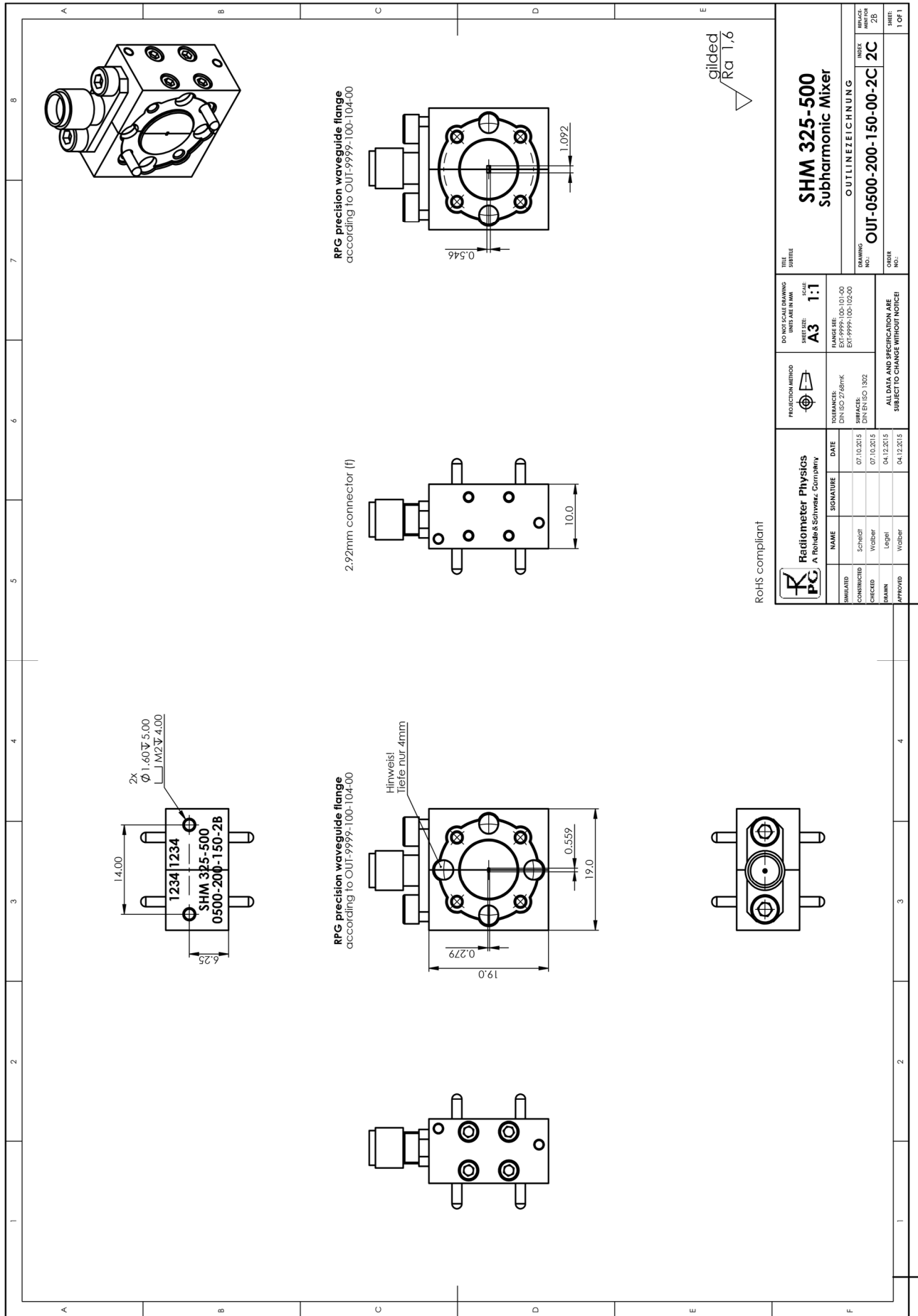
RoHS compliant

Radiometer Physics A Rohde & Schwarz Company		DATE 21.11.2019	NAME S. Schmitt	SIGNATURE [Signature]	DATE 21.11.2019	GENERAL TOURNAMENTS DIN EN ISO 9001 DIN EN ISO 14001 DIN EN ISO 13002	MATERIAL -	SURFACE -	IMPACT TREATMENT -	SCALE 1:1	PART NO. 02000019	ORDER NO. N/A	DRAWING NO. OUT-0220-200-002-40-1C	SHEET NO. 1 OF 1
TITLE SHM 140-220 Subharmonic Mixer		DO NOT SCALE DIMENSIONS UNLESS SPECIFIED OTHERWISE UNLESS OTHERWISE SPECIFIED		TOLERANCES HOLE SIZE A3	SURFACE 2:1	REFERENCE EXT-9999-100-103-00		REFERENCE EXT-9999-100-103-00		REFERENCE EXT-9999-100-103-00		REFERENCE EXT-9999-100-103-00		

PLEASE CAREFULLY CHECK ALL PARTS OF THE DELIVERY WITH THESE DIMENSIONS.



Rohde & Schwarz A Rohde & Schwarz Company		NAME: SCHMIDT WÜRTH LEUP DATE: 11.12.2013 02.02.2016	PROJECTION METHOD: STANDARDS: DIN ISO 2768mk DIN EN ISO 1302	NO. OF SCALE MARKING: SHEET SIZE: A3 SCALE: 3:1	TITLE: SHM 170-260 Subharmonic Mixer
APPROVED:	CHECKED:	CONFIRMED:	DATE:	NAME:	SHEET NO.: 1B
ALL DATA AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE					TOTAL SHEETS: 1/1



RoHS compliant

		Radiometer Physics A. Rüdiger & Söhne, Germany		DO NOT SCALE DRAWING REFERENCE FRAME: A3 SCALE: 1:1		TITLE: SHM 325-500 SUBTITLE: Subharmonic Mixer	
PROJECTION METHOD: 1st Angle		TOLERANCES: DIN ISO 2768mS SURFACES: DIN EN ISO 1302		RANGE: EX-9999-100-101-00 EX-9999-100-102-00		OUTLINEZEICHNUNG DRAWING NO.: OUT-0500-200-150-00-2C PART NO.: 2B	
NAME: Schiefel DATE: 07.10.2015		NAME: Legel DATE: 07.10.2015		NAME: Wobler DATE: 04.12.2015		OTHER:	
CHECKED: Wobler		APPROVED: Wobler		ALL DATA AND SPECIFICATION ARE SUBJECT TO CHANGE WITHOUT NOTICE!		SHEET: 1 OF 1	