

# RPG SHM – Full band Subharmonic Mixer

## Specifications



**Radiometer Physics**  
A Rohde & Schwarz Company

# Definitions

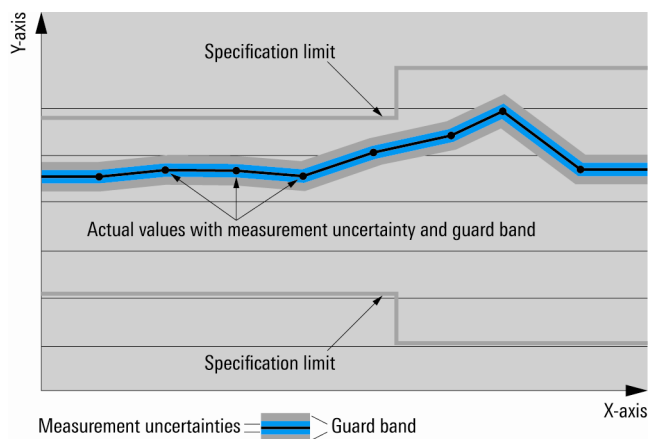
## General

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

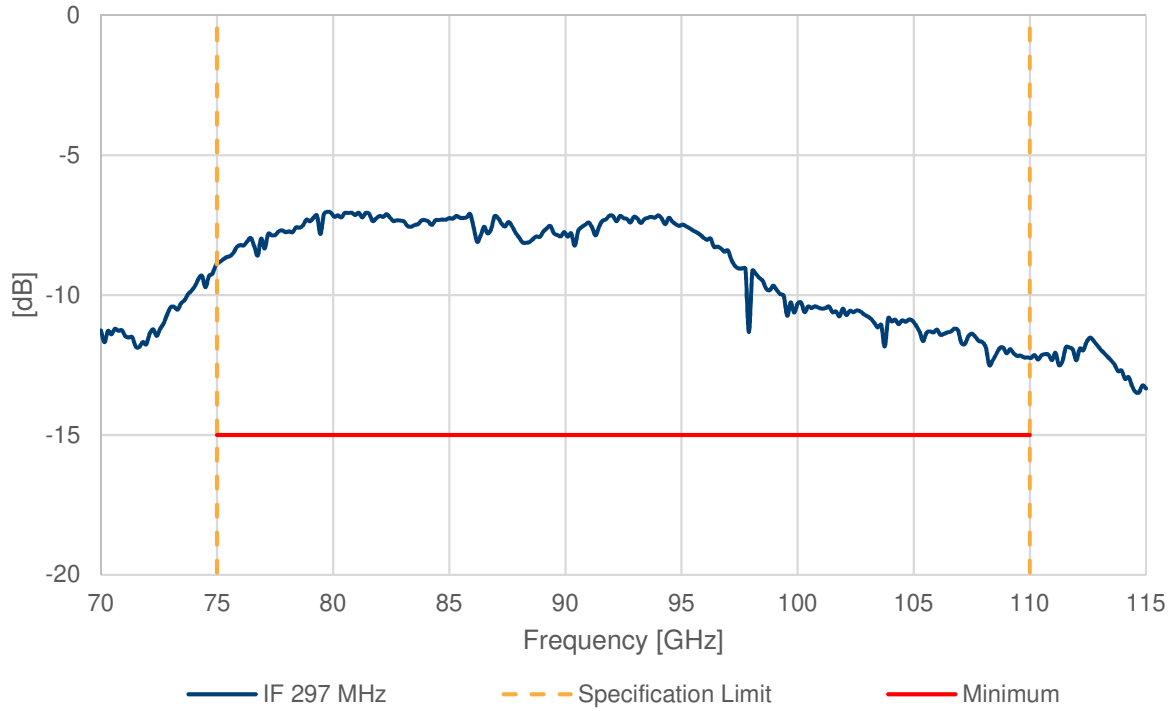
## Test Port

RF-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	WM-570 (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-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 [dBm]	SHM 75-110	typ. +10
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	

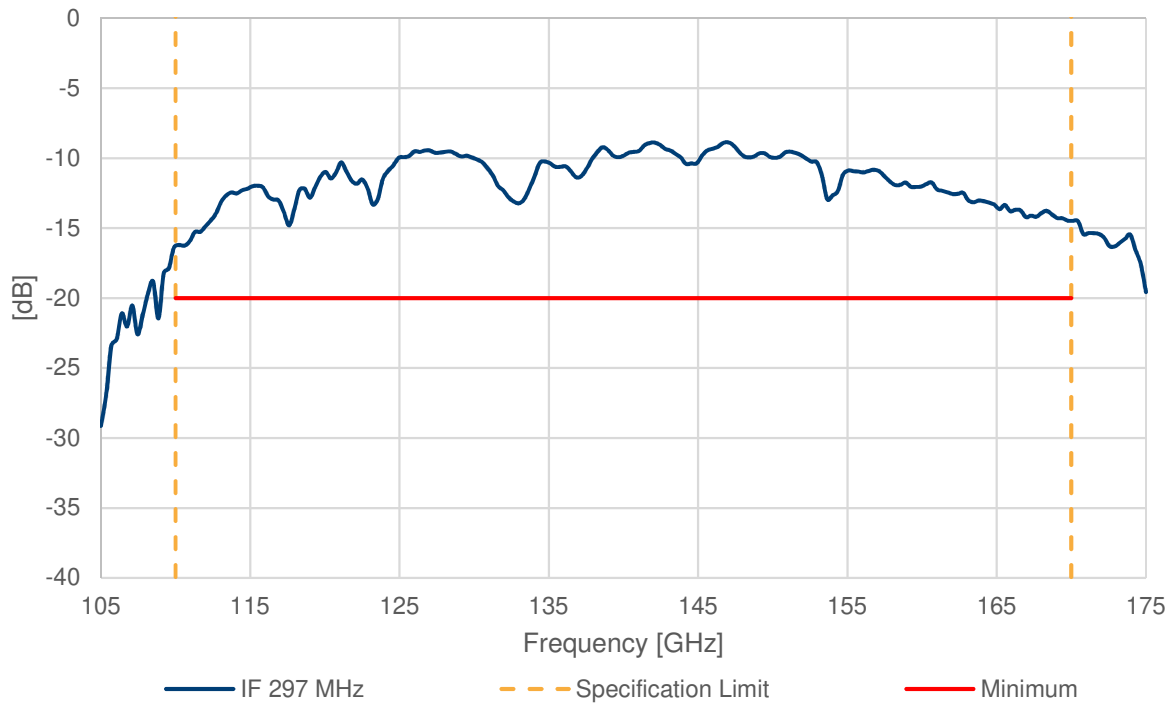
IF-Output port	SHM 75-110	PC-2.92 (female)
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	
IF-Frequency range [GHz]	SHM 75-110	typ. DC to 18
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	
P1dB [dBm]	SHM 75-110	typ. -5
	SHM 90-140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

## Absolut Maximum Ratings

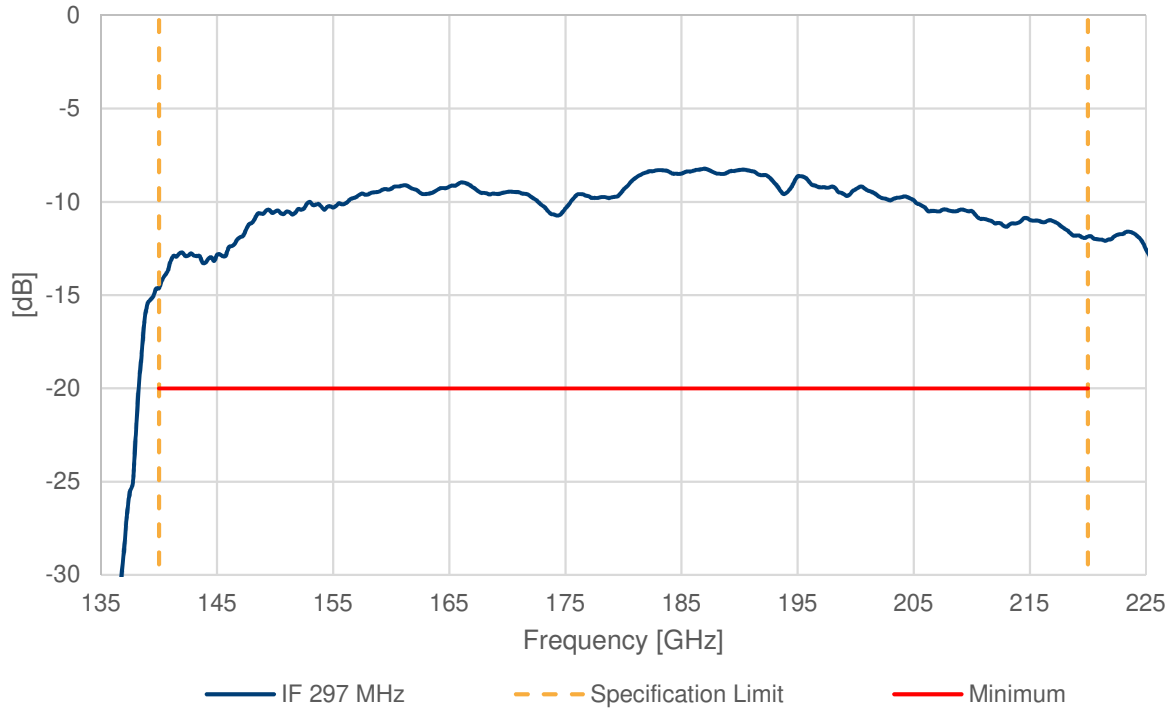
RF-Input power [dBm]	SHM 75-110	+ 10
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	
LO-Input power [dBm]	SHM 75-110	+ 15
	SHM 90-140	
	SHM 110-170	
	SHM 140-220	
	SHM 170-260	
	SHM 220-330	
	SHM 325-500	
Case temperature [°C]	SHM 75-110	+ 45
	SHM 90-140	
	SHM 110-170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



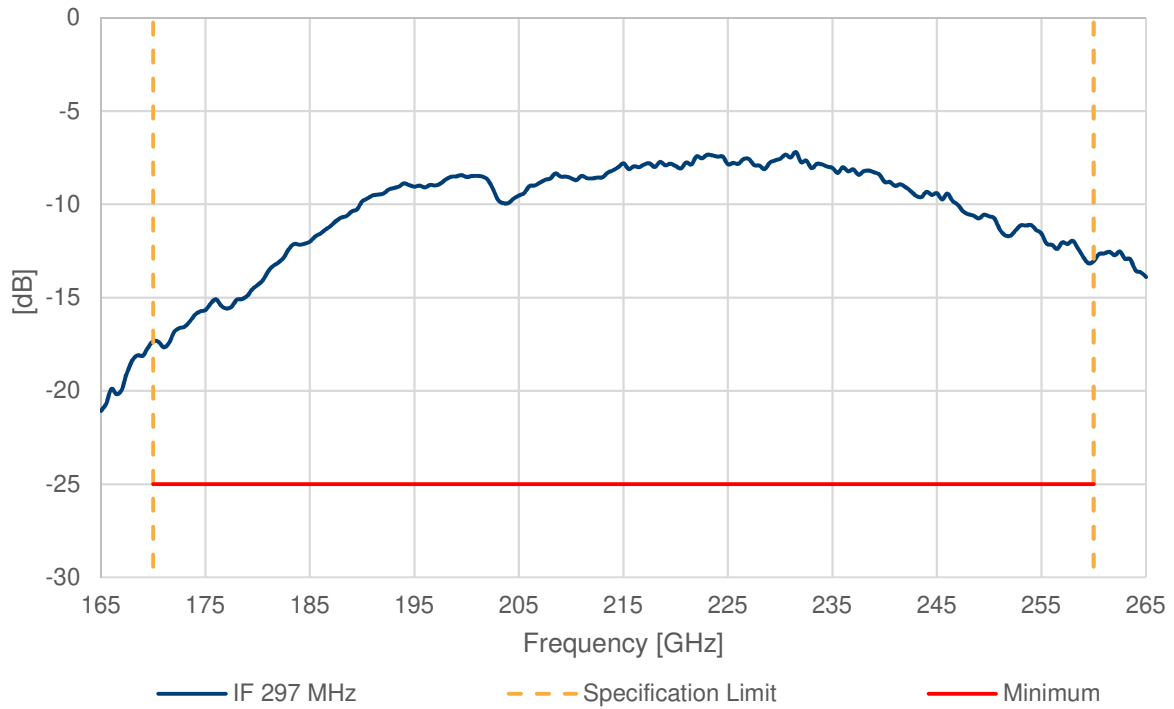
Typ. Figure 1: SHM 75-110 Conversion Loss (SSB) between 70 GHz and 115 GHz



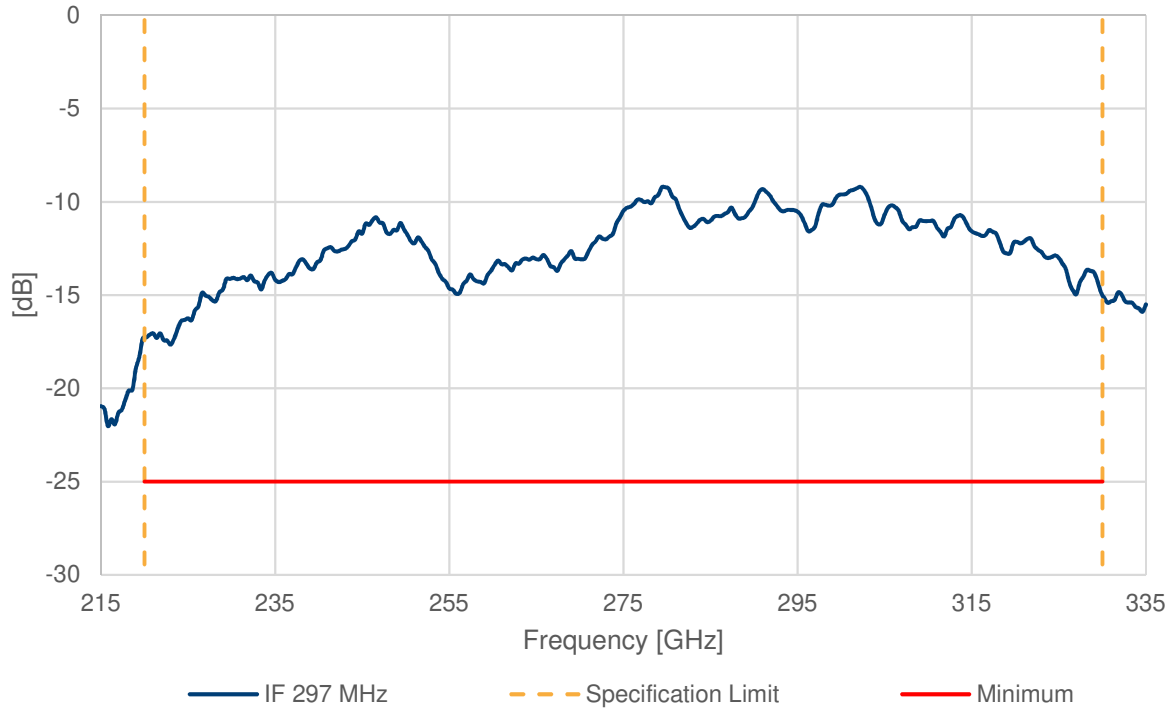
Typ. Figure 2: SHM 110-170 Conversion Loss (SSB) between 105 GHz and 175 GHz



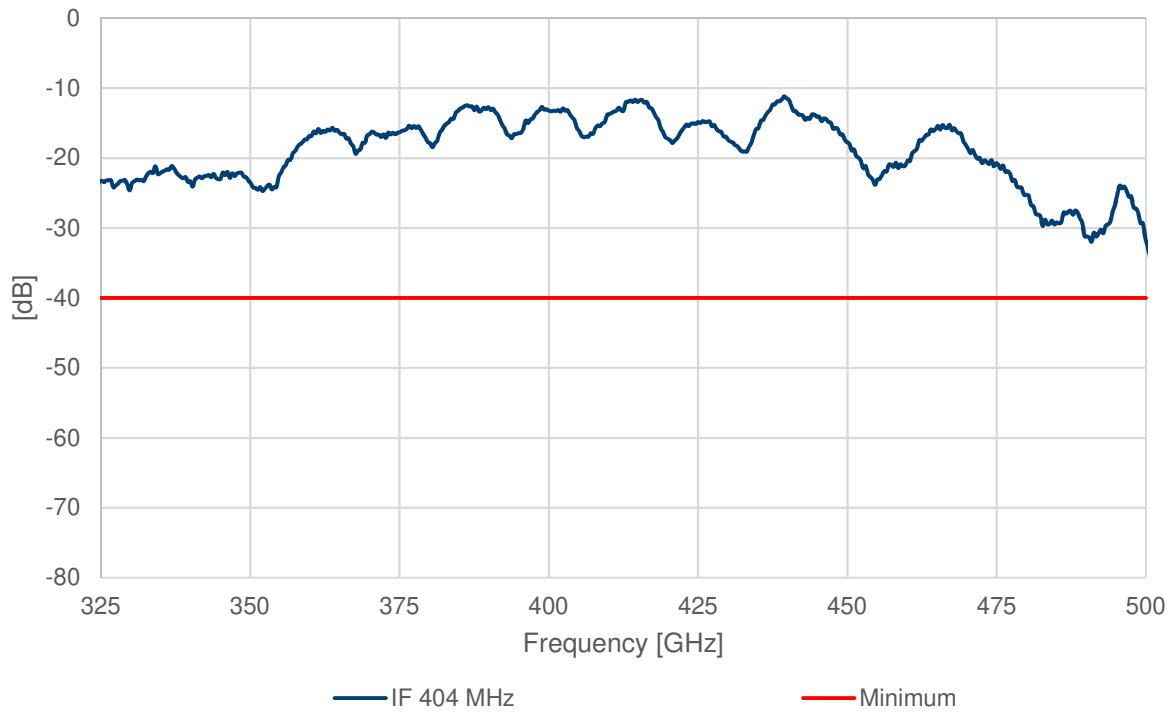
Typ. Figure 3: SHM 140-220 Conversion Loss (SSB) between 135 GHz and 225 GHz



Typ. Figure 4: SHM 170-260 Conversion Loss (SSB) between 165 GHz and 265 GHz



**Typ. Figure 5: SHM 220-330 Conversion Loss (SSB) between 215 GHz and 335 GHz**



**Typ. Figure 6: SHM 325-500 Conversion Loss (SSB) between 325 GHz and 500 GHz**



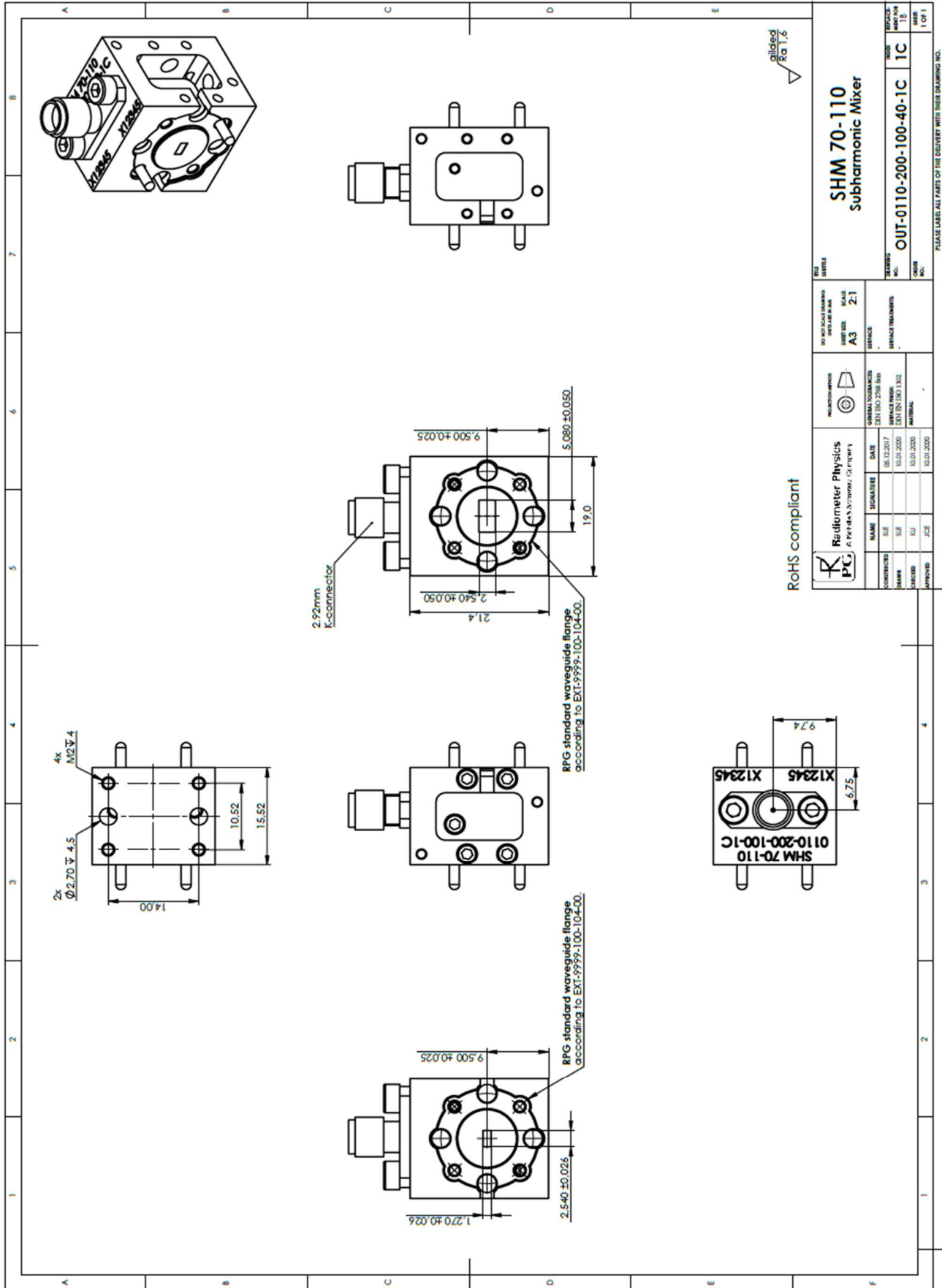
## General data

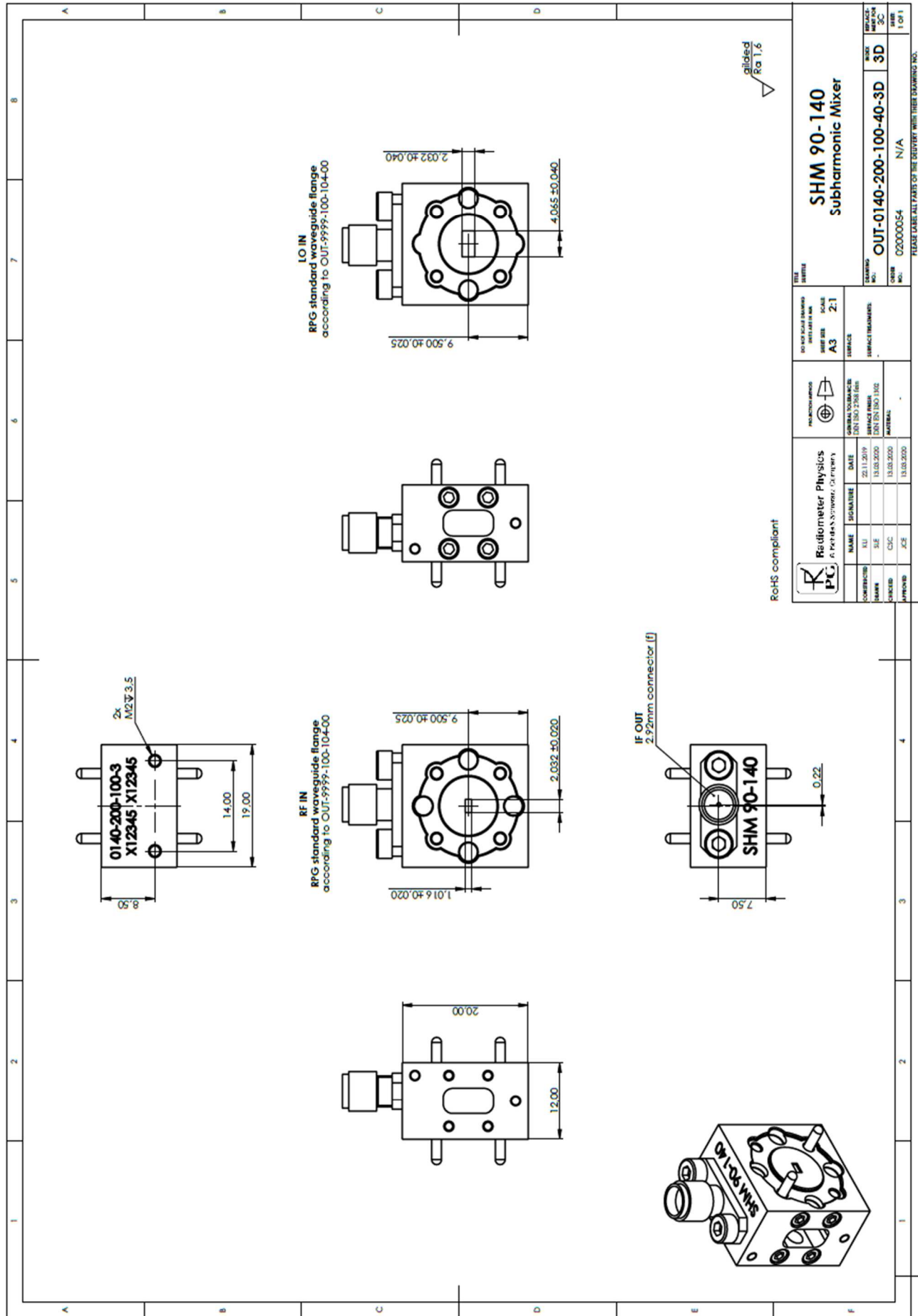
Temperature loading	operating temperature range	+18 °C to +28 °C
	permissible temperature range	+5 °C to +40 °C
	storage temperature range	-40 °C to +70 °C
Damp heat		in line with IEC 60068-2-1 and IEC 60068-2-2 +40 °C at 80 % rel. humidity, in line with IEC 60068-2-30
Mechanical resistance	vibration, 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

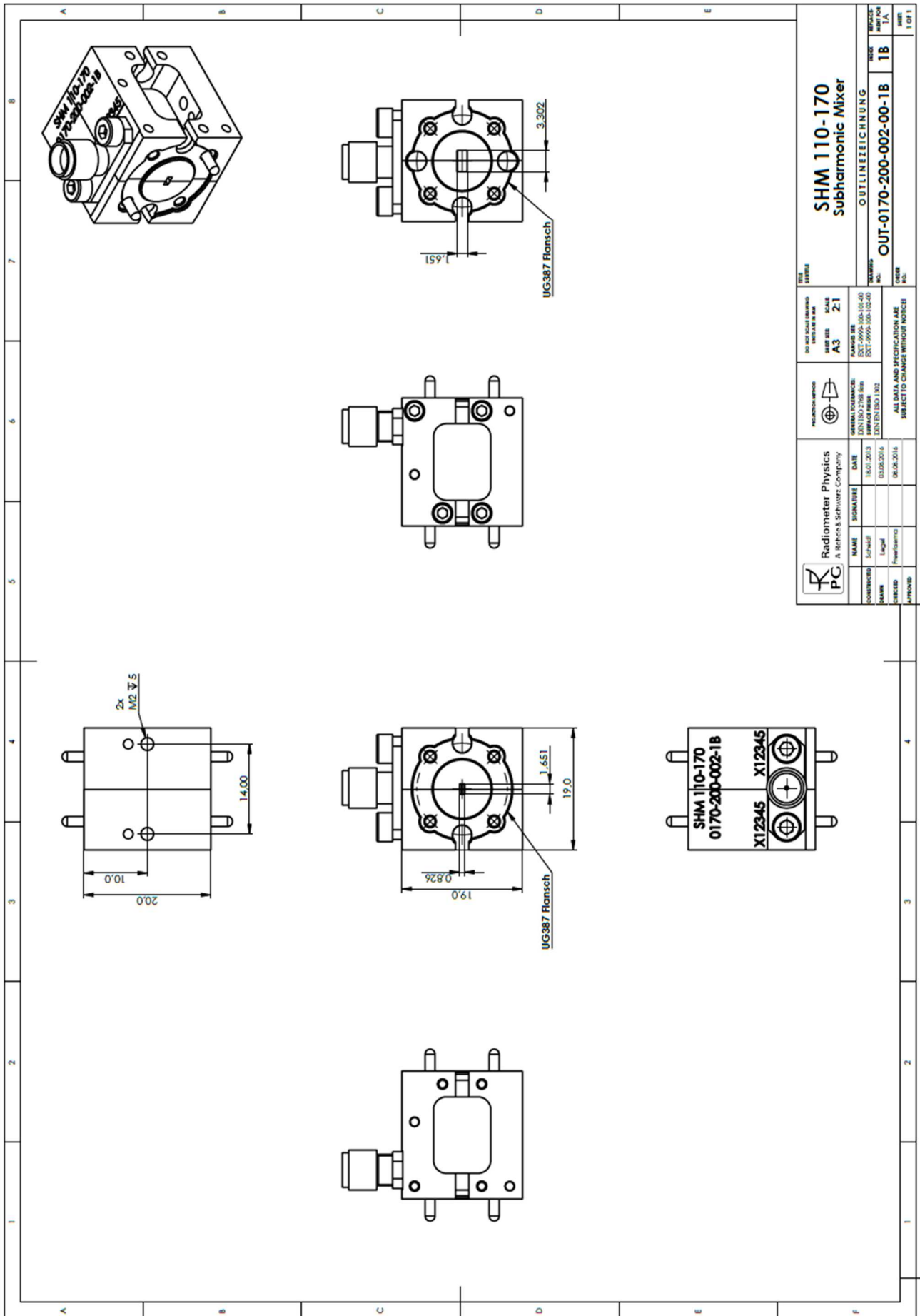
## Ordering information

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

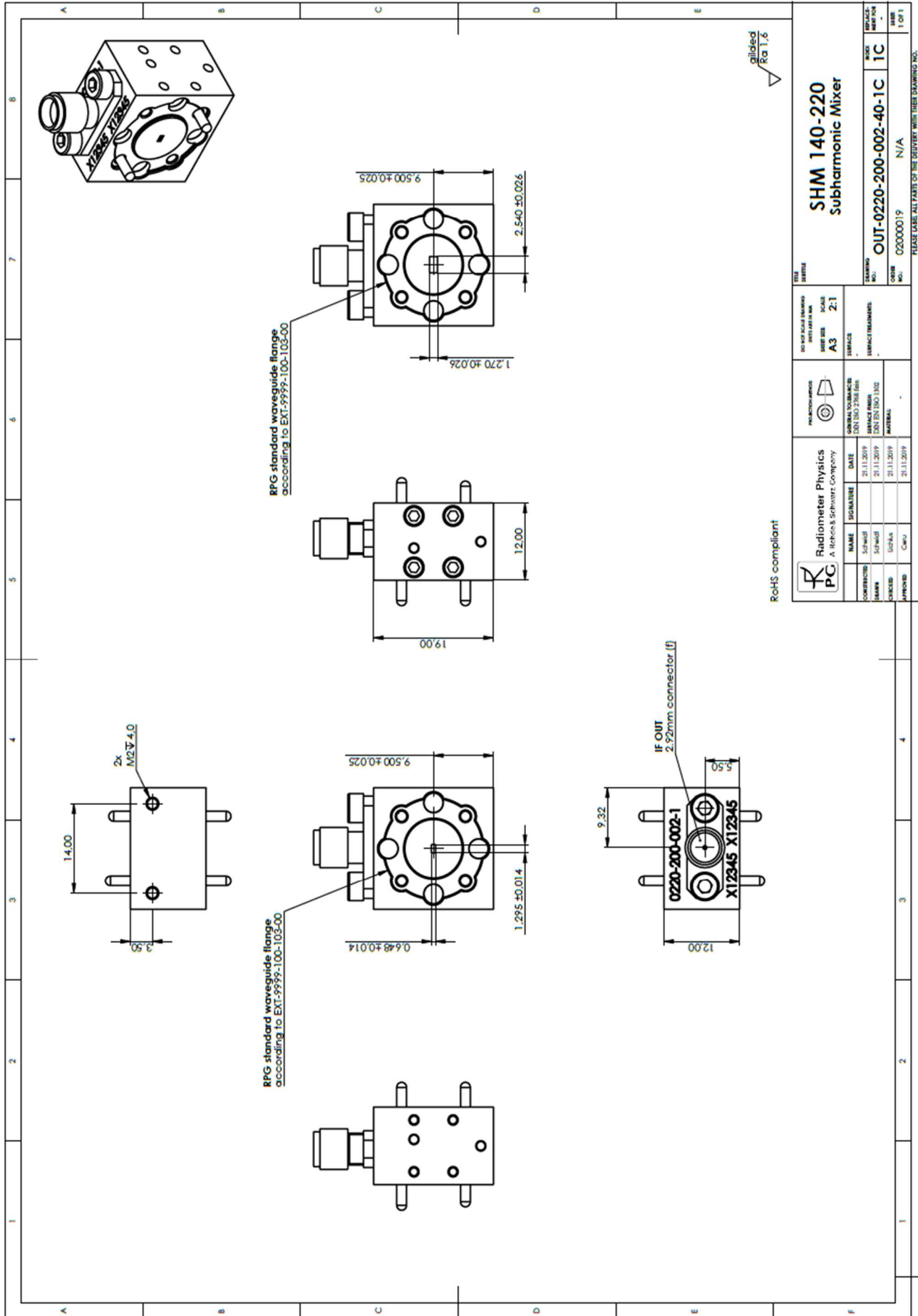
Outline Drawing





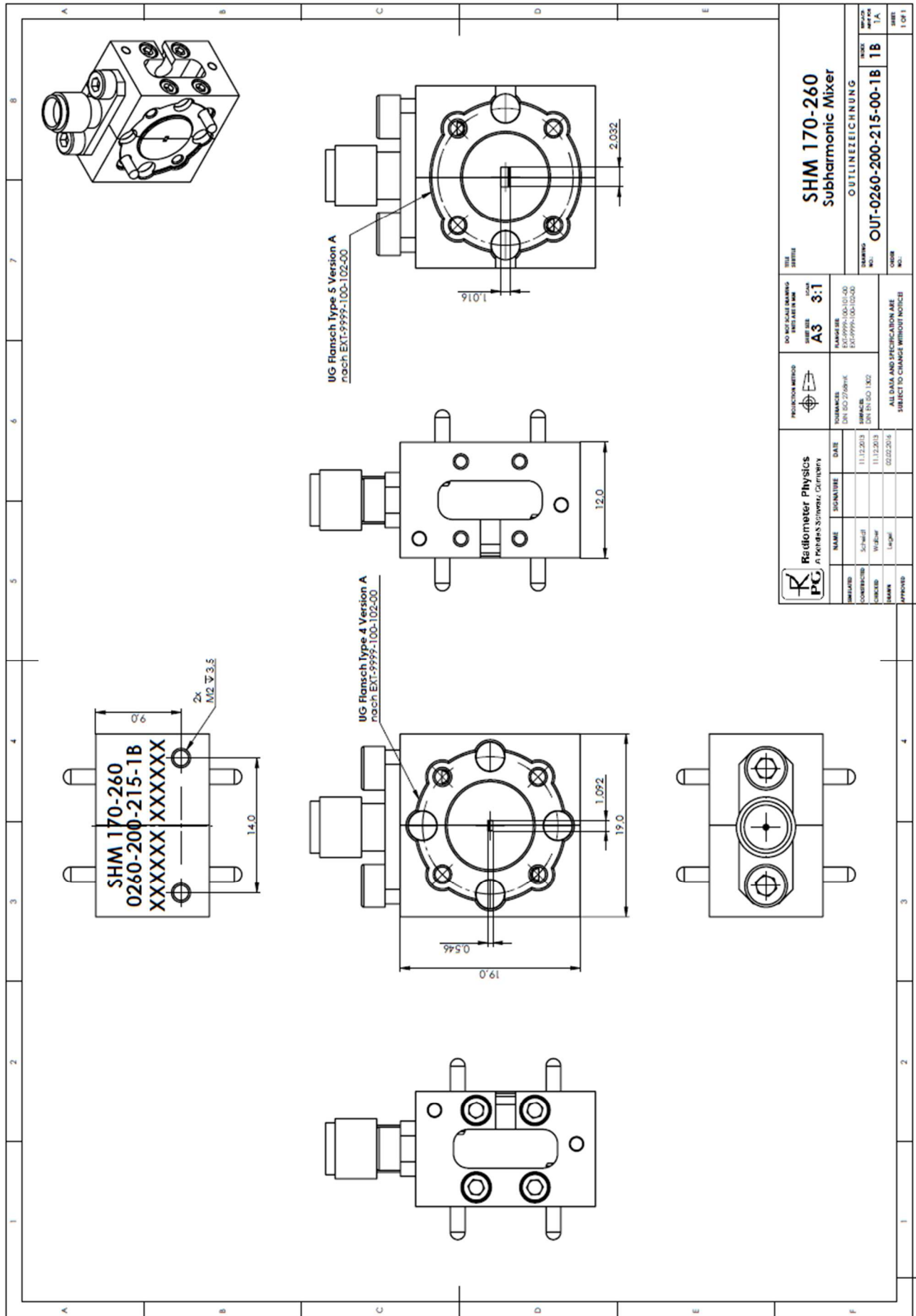


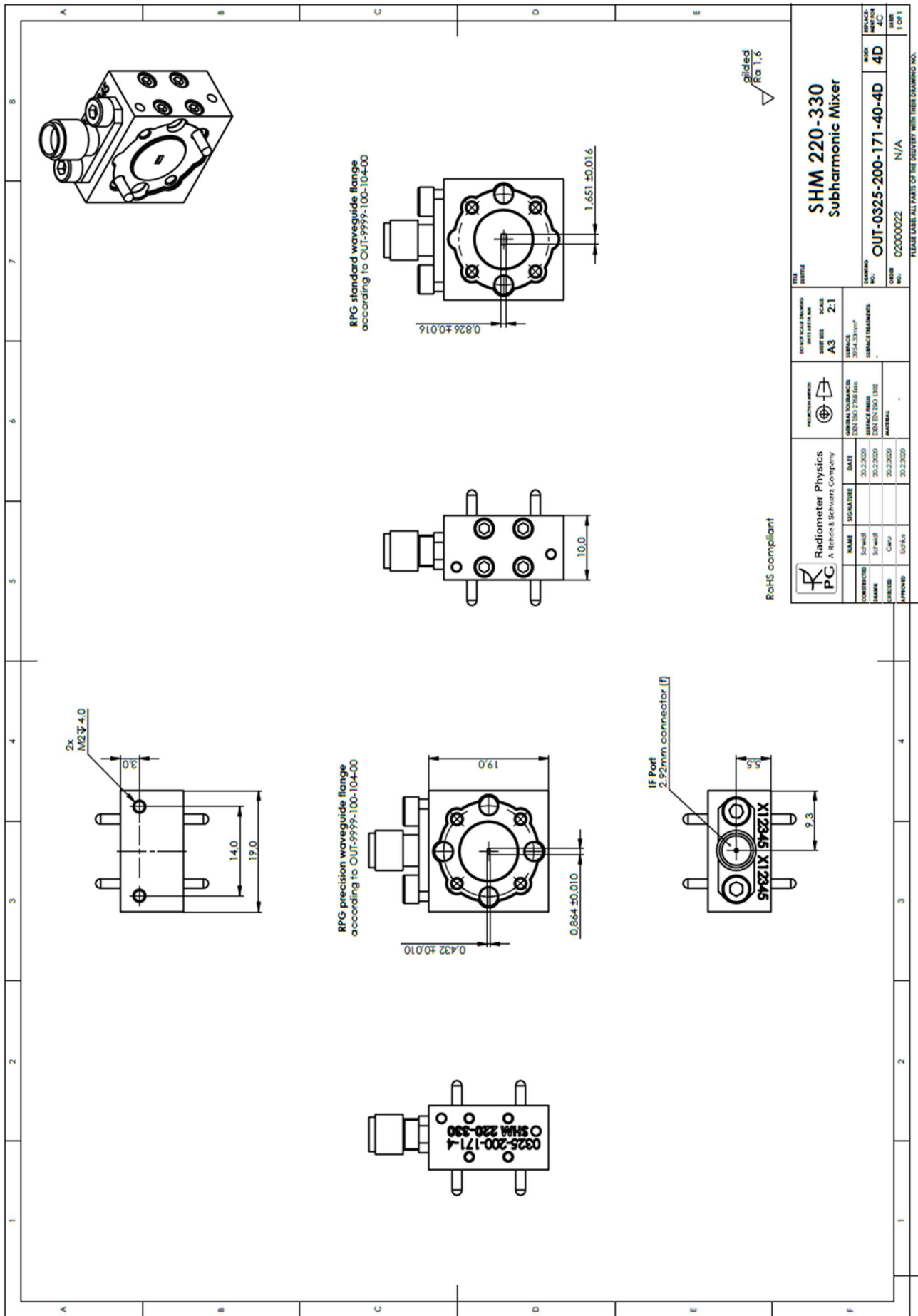
		<b>Radiometer Physics</b> A. Reichen & Schweiz Company		NAME: <input type="text"/> SIGNATURE: <input type="text"/> DATE: <input type="text"/> COMMENTS: <input type="text"/> DRAWN: <input type="text"/> CHECKED: <input type="text"/> APPROVED: <input type="text"/>		GENERAL TOLERANCES: DEN ISO 2768 mS DEN ISO 13715 DEN EN ISO 1302		PROJEKTNUMMER: <input type="text"/> ZEICHENNUMMER: <input type="text"/>		DRAWING SCALE: <b>Z1</b> DRAWING CODE: <b>A3</b> DRAWING DATE: <input type="text"/> DRAWING NUMBER: <input type="text"/>		PART NUMBER: <b>SHM 110-170</b> SUBPART NUMBER: <b>0170-200-002-1B</b> ORDER NUMBER: <b>OUT-0170-200-002-00-1B</b> ORDER PART NUMBER: <b>1B</b> ORDER PART NUMBER: <b>1A</b> ORDER PART NUMBER: <b>1B</b> ORDER PART NUMBER: <b>1A</b>		TITLE: <b>SHM 110-170</b> SUBTITLE: <b>Subharmonic Mixer</b> OUTLINEZEICHNUNG		SHEET NUMBER: <b>1</b> OF <b>1</b>	
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RoHS compliant

		<b>PC</b> A. Rehmschmitt Company	
GENERAL COMPLIANCE EN 15021:2008 Rev. 1 EN 15021:2009 EN 15021:2012	GENERAL COMPLIANCE EN 15021:2008 Rev. 1 EN 15021:2009 EN 15021:2012	NAME SIGNATURE DATE	DATE 21.11.2019 21.11.2019 21.11.2019
PRODUCT GROUP NAME VALUE A3 2.1	SURFACE IMPACT TREATMENT	APPROVED CHECKED DESIGNED CONTRACTOR	DATE 21.11.2019 21.11.2019 21.11.2019
TITLE <b>SHM 140-220</b> Subharmonic Mixer		DRAWING NO. OUT-0220-200-002-40-1C	
ORDER NO. 020000019		N/A	
PLEASE LABEL ALL PARTS OF THE DELIVERY WITH THEIR DRAWING NO.		SHEET NO. 1C	
1 OF 1		1 OF 1	

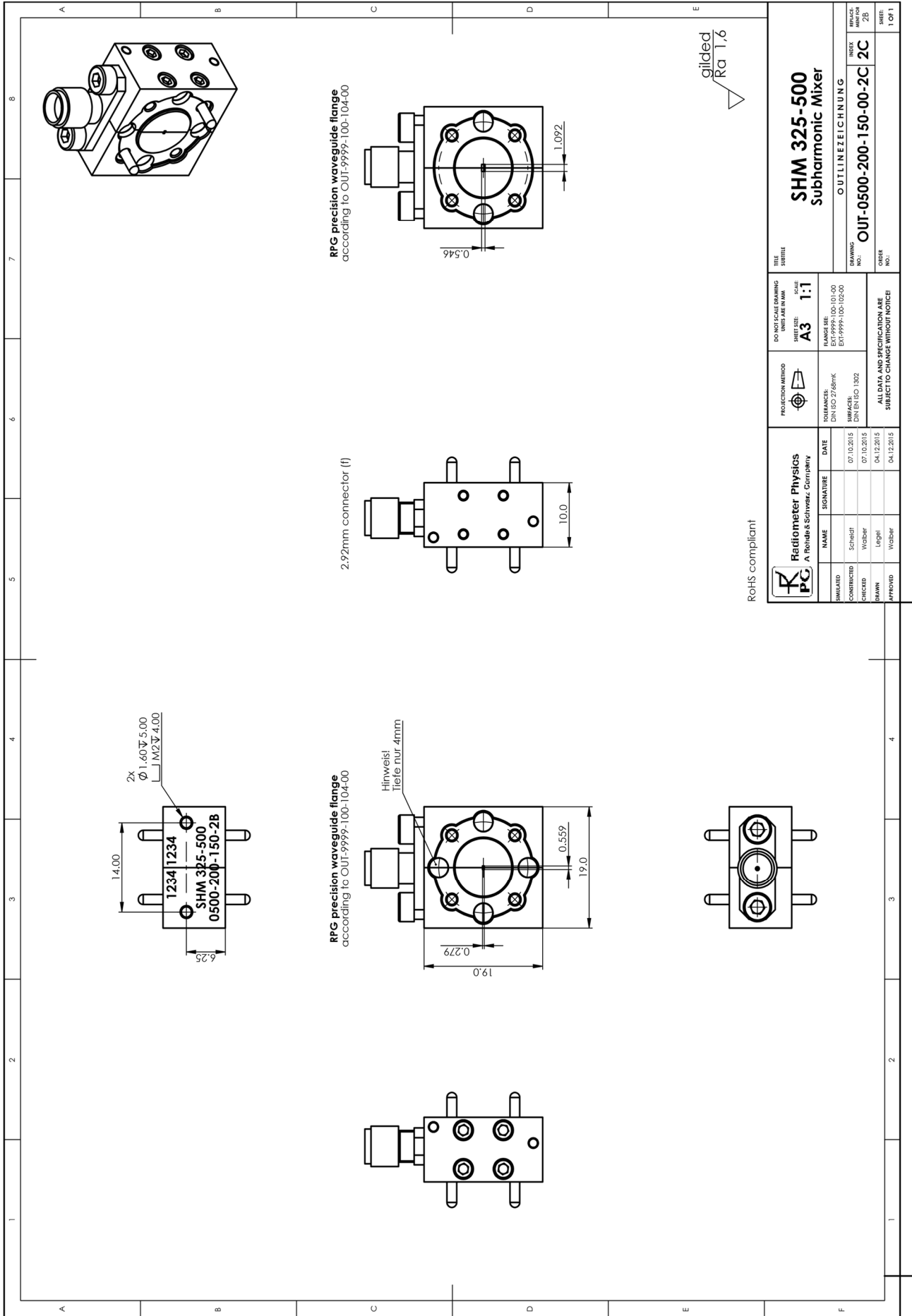




RoHS compliant

<b>Radiometer Physics</b> A. Rohm & Schwarz Company		DATE: 20.12.2020 DRAWN: S.F. Müller CHECKED: C. Müller APPROVED: U. Müller	
GENERAL COMPLIANCE: EN ISO 9001:2015 EN ISO 14001:2015 EN ISO 13801:2012	PRODUCT GROUP: 	SURFACE FINISH: A3	SCALE: 2:1
NAME: S.F. Müller CONTRACT: S.F. Müller ORDER: S.F. Müller PART NO.: S.F. Müller		DATE: 20.12.2020 DRAWN: S.F. Müller CHECKED: C. Müller APPROVED: U. Müller	
SHM 220-330 Subharmonic Mixer		OUT-0325-200-171-40-4D N/A	
PART NO.: 020000022		REV. NO.: 4D DATE: 1.09.1	

PLEASE CHECK ALL PAGES OF THE DRAWING WITH THESE DRAWING NO.



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		<b>Radometer Physics</b> A. Rüdiger & Söhne, Germany		PRODUCTION METRIC 		DO NOT SCALE DRAWING UNIT: ARE IN MM SCALE: <b>A3 1:1</b>		TITLE PARTIELL	
APPROVED Wobler	DRAWN Legel	CHECKED Wobler	DESIGNED Scheidt	NAME Wobler	SIGNATURE	DATE 04.12.2015	RANGES: DIN ISO 2768mK SURFACES: DIN EN ISO 1302	RANGE: EXT-9999-100-101-00 EXT-9999-100-102-00	ORDER NO.: <b>OUT-0500-200-150-00-2C</b>
ALL DATA AND SPECIFICATION ARE SUBJECT TO CHANGE WITHOUT NOTICE!				SHM 325-500 Subharmonic Mixer		O U T L I N E Z E I C H N U N G		DRAWING NO.: <b>2C</b> SHEET: 1 OF 1	