FCC RADIO TEST REPORT

FCC ID	:	**IHDT56XL1**
Equipment	:	**Mobile 5G MOD**
Brand Name	:	**Motorola**
Model Name	:	**MD1005G**
Applicant	:	**Motorola Mobility LLC** **222 W,Merchandise Mart Plaza, Chicago IL 60654 USA**
Manufacturer	:	**Motorola Mobility LLC** **222 W,Merchandise Mart Plaza, Chicago IL 60654 USA**
Standard	:	**FCC 47 CFR Part 2, and 30**

The product was received on Mar. 25, 2019 and testing was started from Apr. 10, 2018 and completed on Apr. 17, 2019. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures ANSI C63.26-2015 and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Jones Tsai

Approved by: Jones Tsai

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FG930415-07D	01	Initial issue of report	Apr. 23, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Limit	Result (PASS/FAIL)	Remark
-	§2.1046 §30.202	EIRP Measurement	+43dBm	Not Required	-
-	§2.1049	Occupied Bandwidth	Not Applicable	Not Required	-
3.4	§2.1053 §30.203	Radiated Spurious Emission	-5dBm/MHz -13dBm/MHz	Pass	-
-	§2.1055	Frequency Stability for Temperature & Voltage	Within the band	Not Required	-
Remark: This is a variant report by changing mobile phone. All the test cases were performed on original report which can be referred to Sporton Report Number FG890514A and FG890514-01A. Based on the original report, only Radiated Spurious Emission tests were verified.					

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: William Chen

Report Producer: Yung Hsu

1 General Description

1.1 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Mobile 5G MOD
Brand Name	Motorola
Model Name	MD1005G
FCC ID	IHDT56XL1
EUT supports Radios application	LTE/5G NR
HW Version	PVT
SW Version	PPZ29.239-3
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories	
USB Cable 1	Brand Name : Motorola
	Model Name : SC18C46623

Supported Unit Used in Test Configuration and System	
AC Adapter 1	Brand Name : Motorola
	Model Name : SC-22
	Manufacturer : Chenyang
AC Adapter 2	Brand Name : Motorola
	Model Name : SC-51
	Manufacturer : Salom
Mobile Phone	Brand Name : Motorola
	FCC ID : IHDT56XJ1

1.2 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Device Category in Part 30	Mobile station
Tx Frequency	NR band n261: 27.5GHz ~ 28.35GHz NR band n260: 37GHz ~ 40GHz
Rx Frequency	NR band n261: 27.5GHz ~ 28.35GHz NR band n260: 37GHz ~ 40GHz
Support Bandwidth	NR band n261: 50 MHz and 100 MHz
Maximum Number of contiguous CC	4
Maximum Aggregated Bandwidth	400MHz
Antenna Info	NR 1x4 patch array antenna for each module
Type of Modulation	CP-OFDM: QPSK / 16QAM / 64QAM DFT-s-OFDM: Not supported

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH10-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No. : TW0007

1.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR Part 2, 30
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

EUT has total 4 millimeter wave antenna modules and up to 2 beams operation for each module.

EUT is configured to radiate at rated maximum EIRP with both 2 beams ON mode at the same time.

Any antenna module cannot transmit simultaneously with the other antenna modules.

Preliminary EIRP test was performed for all beam configurations in the anechoic chamber at the manufacturer's facility, the all preliminary test results and test details are illustrated in "IHDT56XL1_OpDes_detailed reference for the simulation report", and the worst beam-pairs were identified.

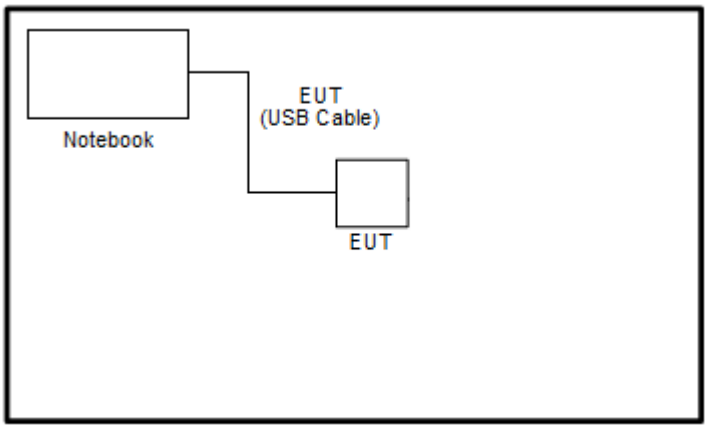
The NR radio operation is controlled via software tool QRCT v4.0.

2.1 Test Mode

For radiated measurement, the pre-scan is performed to find the worst cases EUT position.

Test Items	Band	Bandwidth (MHz)			Modulation			RB #			Test Channel		
		50	100	400	QPSK	16QAM	64QAM	1	-	Full	L	M	H
Spurious Emission	n261	Worst Case											V
Remark	1. The mark "**v** " means that this configuration is chosen for testing 2. The device is investigated from 30MHz to 100GHz of fundamental signal for radiated spurious emission test under different RB size and modulations in exploratory test. Subsequently, only the worst case emissions are reported. 3. All the radiated test cases were performed with built-in battery.												

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	N/A	N/A	N/A	N/A

2.4 Measurement Results Explanation Example

According to ANSI C63.26-2015 Section 5.2.7

EIRP (dBm) = E(dBuV/m) + 20log (D) -104.8.

where D is the measurement distance (in the far field region) in m.

E (dBuV/m) = Spectrum Reading Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + 107

Hence, the spectrum analyzer *Offset* is derived including RF cable loss and antenna factor.

Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

The conversion loss of RF mixer is also included by the mixer table of spectrum analyzer when measurement frequency is above 40GHz.

Example :

Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 40.1 + 2.2 + 107 + 20log(1) – 104.8

= 44.5 (dB)

2.5 Far Field Condition for Frequency above 18GHz

Horn Antenna	Frequency (GHz)	Antenna Dimension A (mm)	Wavelength (λ) (m)	Far field R (m) >= $2A^2/\lambda$	Measurement Distance (D) (m)	Distance Factor 20log(D) (dB)
BBHA 9170	18	60	0.0167	0.43	1	0.00
	40	60	0.0075	0.96		
QWH-UPRR00	40	48	0.0075	0.61	1	0.00
	60	48	0.0050	0.92		
QWH-EPRR00	60	31	0.0050	0.38	1	0.00
	90	31	0.0033	0.58		
QWH-FPRR00	90	21	0.0033	0.26	1	0.00
	140	21	0.0021	0.41		

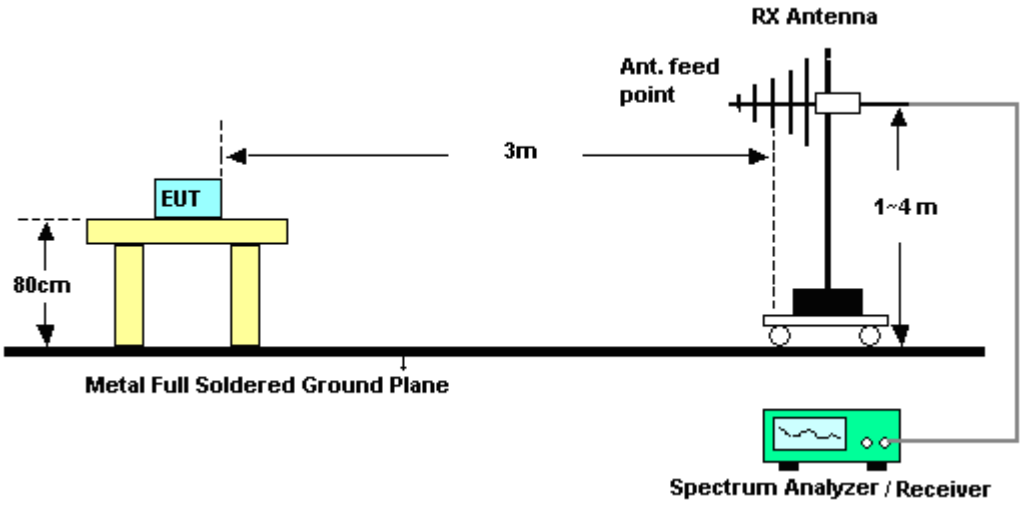
3 Radiated Test Items

3.1 Measuring Instruments

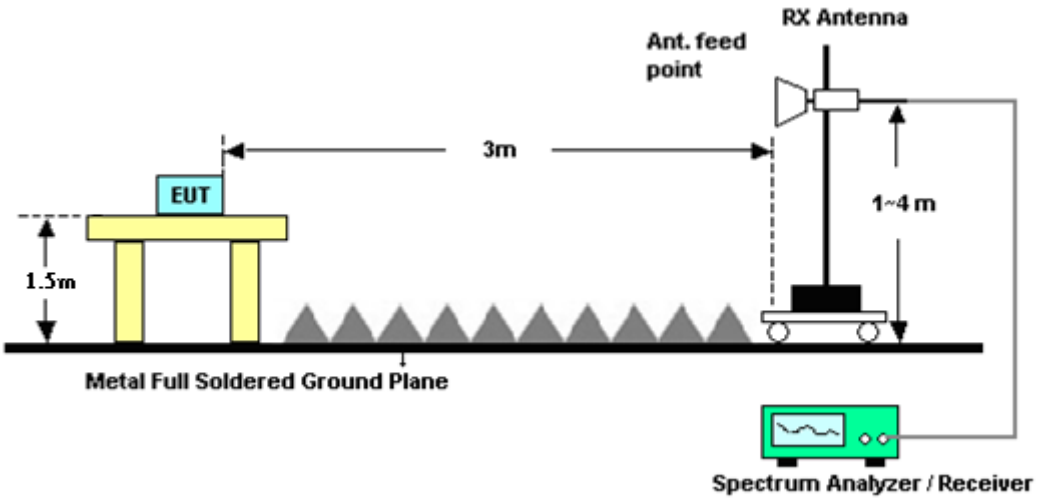
See list of measuring instruments of this test report.

3.2 Test Setup

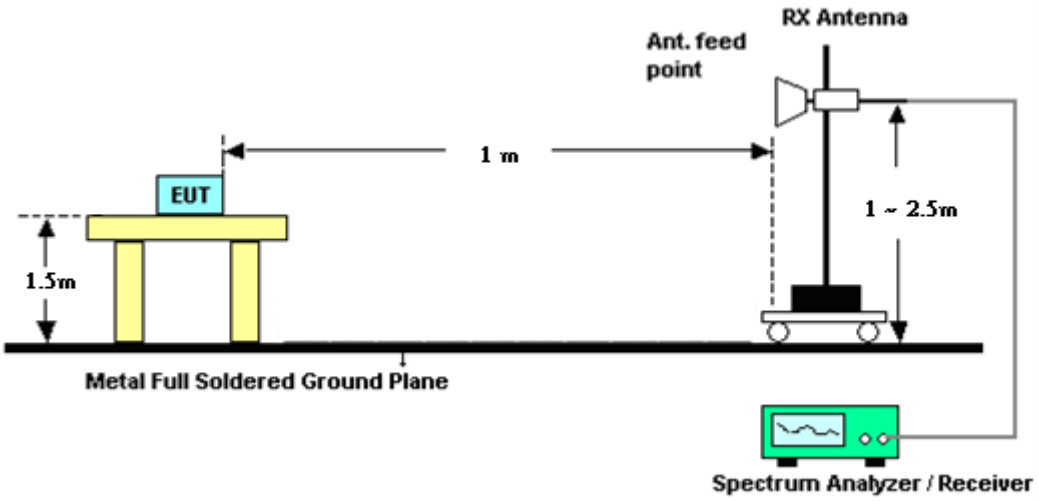
For radiated emissions from 30MHz to 1GHz



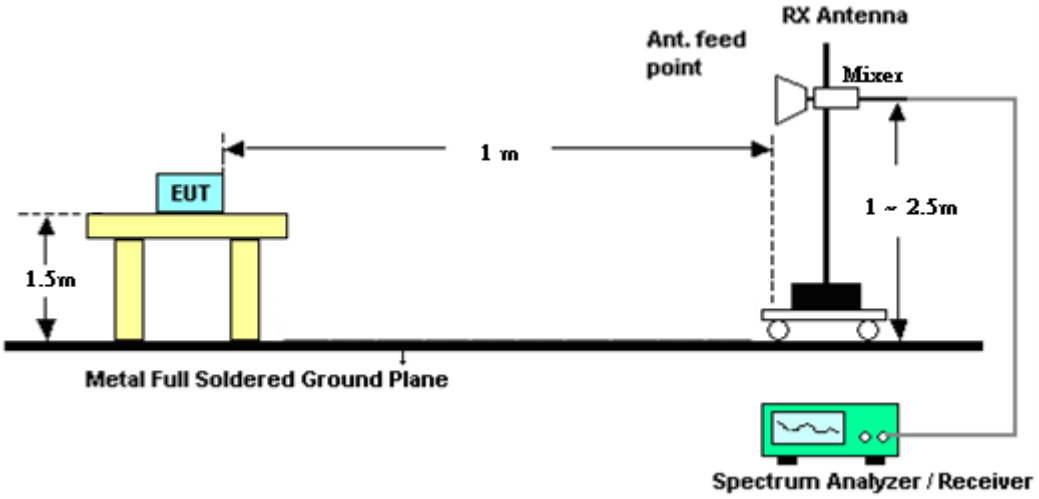
For radiated emissions 1GHz to 18GHz



For radiated emissions above 18GHz



For radiated emissions above 40GHz



3.3 Test Result of Radiated Test

Please refer to Appendix A.

3.4 Radiated Spurious Emission Measurement

3.4.1 Description of Radiated Spurious Emission Measurement

The spectrum is scanned from 30 MHz up to 100GHz.

The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be −13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm/MHz or lower.

3.4.2 Test Procedures

1. Set EUT at maximum output power..
2. Select lowest, middle, and highest channels for each band and different modulation.
3. Measure and record the power level from the spectrum analyzer.
4. Set frequency would like to be investigated.
5. Set Detector = RMS
6. Set Trace mode = trace average
7. Set Sweep time = auto couple
8. Set sweep points ≥ 2 x Span/RBW
9. Set sweep count 100 and wait until the trace to be stabilized
10. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
11. For measurement from 30MHz to 18GHz,
    An antenna was substituted in place of the EUT and was driven by a signal generator.
    Tune the output power of signal generator to the same emission level with EUT maximum spurious emission. Take record of output power and repeat for another polarization.
12. For measurement above 18GHz, the test result is calculated according to
    ANSI C63.26-2015 Section 5.2.7 and 5.7.3 and 5.7.4
    EIRP (dBm) = E(dBuV/m) + 20log (D) -104.8.
    where D is the measurement distance (in the far field region) in m.
    E (dBuV/m) = Spectrum Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + 107
    That is, set the spectrum offset including sum of
    Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8
13. The conversion loss of RF mixer is also included in conversion loss table of the spectrum analyzer when measurement frequency is above 40GHz.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Oct. 23, 2018	Apr. 10, 2019~ Apr. 17, 2019	Oct. 22, 2019	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	37059&01	30MHz~1GHz	Oct. 13, 2018	Apr. 10, 2019~ Apr. 17, 2019	Oct. 12, 2019	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Oct. 02, 2018	Apr. 10, 2019~ Apr. 17, 2019	Oct. 01, 2019	Radiation (03CH10-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 251	18GHz ~ 40GHz	Nov. 20, 2018	Apr. 10, 2019~ Apr. 17, 2019	Nov. 19, 2019	Radiation (03CH10-HY)
Hygrometer	TECPEL	DTM-303B	TP140320	N/A	Nov. 05, 2018	Apr. 10, 2019~ Apr. 17, 2019	Nov. 04, 2019	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY53270078	1GHz~26.5GHz	Oct. 28, 2018	Apr. 10, 2019~ Apr. 17, 2019	Oct. 27, 2019	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz ~ 44GHz	Nov. 02, 2018	Apr. 10, 2019~ Apr. 17, 2019	Nov. 01, 2019	Radiation (03CH10-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	103738	9kHz~30GHz	May 22, 2018	Apr. 10, 2019~ Apr. 17, 2019	May 21, 2019	Thermal (TH02-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	Apr. 10, 2019~ Apr. 17, 2019	N/A	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Apr. 10, 2019~ Apr. 17, 2019	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Apr. 10, 2019~ Apr. 17, 2019	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	Apr. 10, 2019~ Apr. 17, 2019	N/A	Radiation (03CH10-HY)
*Mixer	Rohde & Schwarz	FS-Z60	100986	40 ~ 60 GHz	Oct. 31, 2018	Apr. 10, 2019~ Apr. 17, 2019	Oct. 30, 2021	Radiation (03CH10-HY)
*Mixer	Rohde & Schwarz	FS-Z90	101811	60 ~ 90 GHz	Jul. 16, 2018	Apr. 10, 2019~ Apr. 17, 2019	Jul. 16, 2021	Radiation (03CH10-HY)
*Mixer	Rohde & Schwarz	FS-Z140	101128	90 ~ 140 GHz	Sep. 03, 2018	Apr. 10, 2019~ Apr. 17, 2019	Sep. 02, 2021	Radiation (03CH10-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 14, 2018	Apr. 10, 2019~ Apr. 17, 2019	Jun. 13, 2019	Thermal (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 19, 2018	Apr. 10, 2019~ Apr. 17, 2019	Jul. 18, 2019	Thermal (TH02-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 02, 2018	Apr. 10, 2019~ Apr. 17, 2019	Oct. 01, 2019	Thermal (TH02-HY)
Standard Horn Antenna	Quinstar	QWH-UPRR00	923600007	40 ~ 60 GHz	Aug. 17, 2018	Apr. 10, 2019~ Apr. 17, 2019	Aug. 16, 2021	Radiation (03CH10-HY)
Standard Horn Antenna	Quinstar	QWH-EPRR00	784600034	60 ~ 90 GHz	Aug. 17, 2018	Apr. 10, 2019~ Apr. 17, 2019	Aug. 16, 2021	Radiation (03CH10-HY)
Standard Horn Antenna	Quinstar	QWH-FPRR00	923800008	90 ~ 140 GHz	Aug. 17, 2018	Apr. 10, 2019~ Apr. 17, 2019	Aug. 16, 2021	Radiation (03CH10-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2017	Apr. 10, 2019~ Apr. 17, 2019	Nov. 22, 2019	Radiation (03CH10-HY)

Note: (*) Equipment manufacturer's Calibration Certificate.

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.17

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.48

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.00

Uncertainty of Radiated Emission Measurement (40 GHz ~ 100 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.80

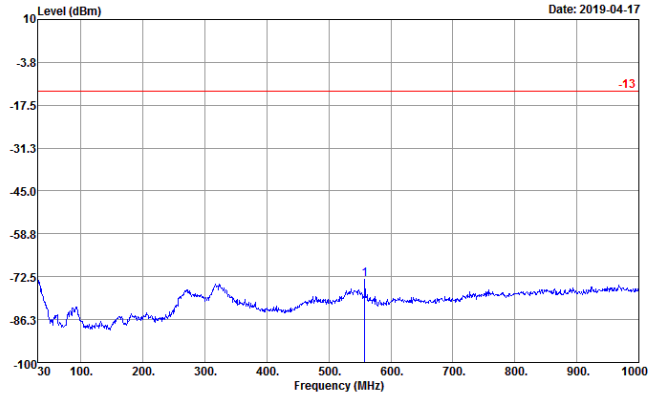
Spurious Emission

There is no significant spurious emission signal found for frequency started from 9kHz up to 18GHz.

Only the noise floor is reported.

NR Band n261 (30MHz-18GHz)

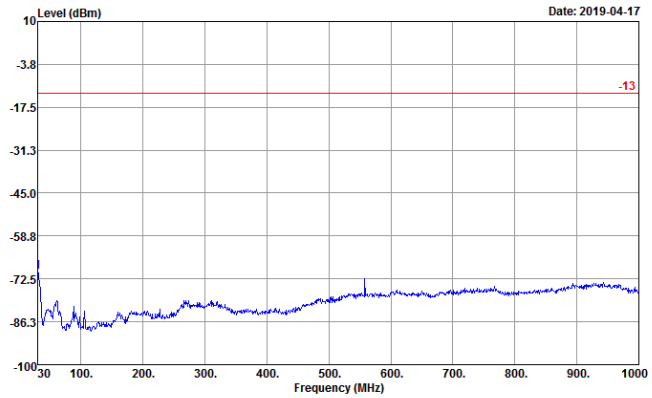
Horizontal



Site : 03CH10-HY
Condition : -13 EIRP_WO HORIZONTAL
Project : 930415-07

	Freq	Level	Over Limit	Limit Line	Read Level
	MHz	dBm	dB	dBm	dBm
1	557.68	-73.24	-60.24	-13.00	-74.34

Vertical

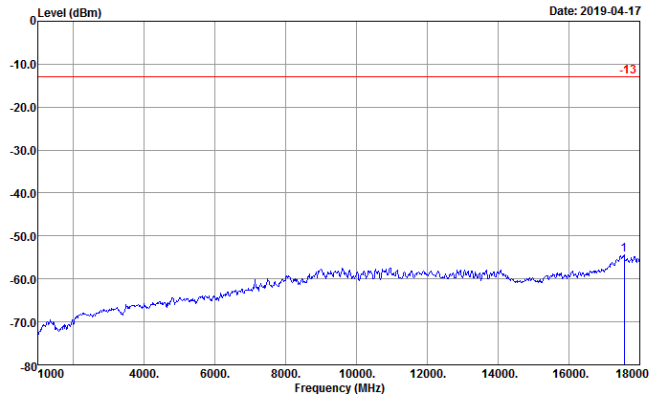


Site : 03CH10-HY
Condition : -13 EIRP_WO VERTICAL
Project : 930415-07

	Freq	Level	Over Limit	Limit Line	Read Level
	MHz	dBm	dB	dBm	dBm
1	30.00	-70.17	-57.17	-13.00	-68.41

NR Band n261 (1GHz-18GHz)

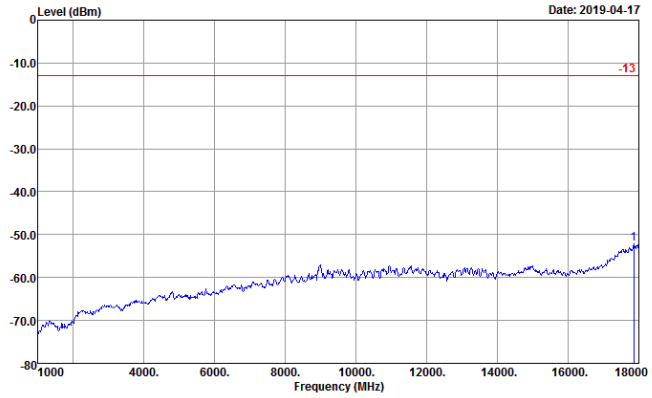
Horizontal



Site : 03CH10-HY
Condition : -13 EIRP_WO HORIZONTAL
Project : 930415-07

	Freq	Level	Over Limit	Limit Line	Read Level
	MHz	dBm	dB	dBm	dBm
1	17558.00	-54.33	-41.33	-13.00	-64.50

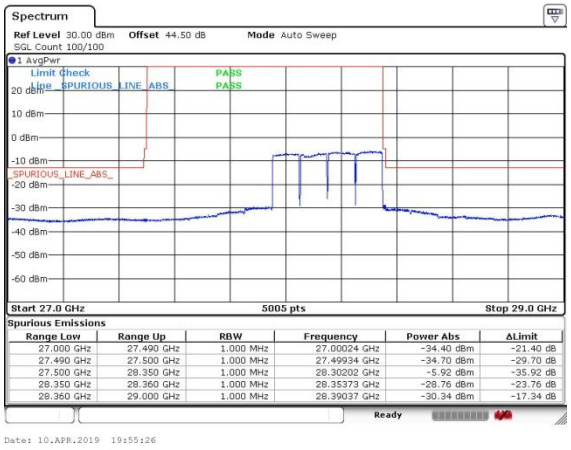
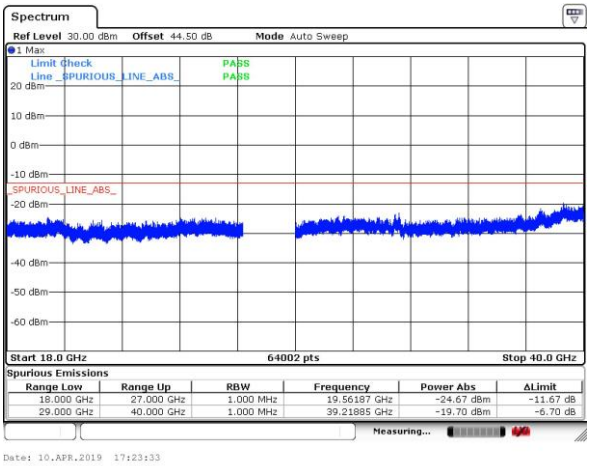
Vertical



Site : 03CH10-HY
Condition : -13 EIRP_WO VERTICAL
Project : 930415-07

	Freq	Level	Over Limit	Limit Line	Read Level
	MHz	dBm	dB	dBm	dBm
1	17864.00	-52.25	-39.25	-13.00	-65.17

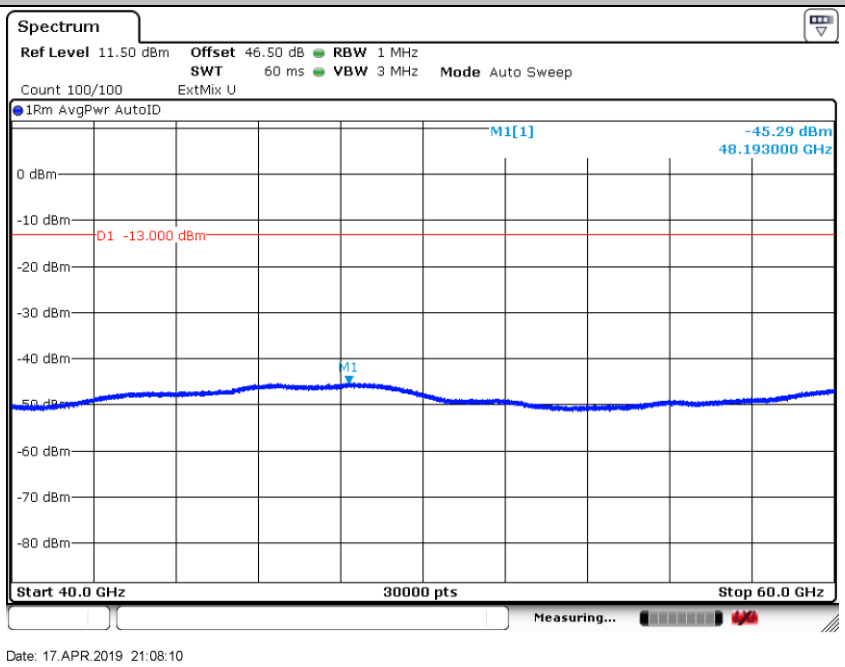
Spurious emission between 18GHz to 40GHz worst case plot is reported as following.

NR Band n261 QPSK (18-40GHz)	
Highest Band Edge / 400MHz	**Highest Channel / 400MHz**
	

There is no significant spurious emission signal found for frequency started from 40GHz up to 100GHz.

Only the noise floor is reported.

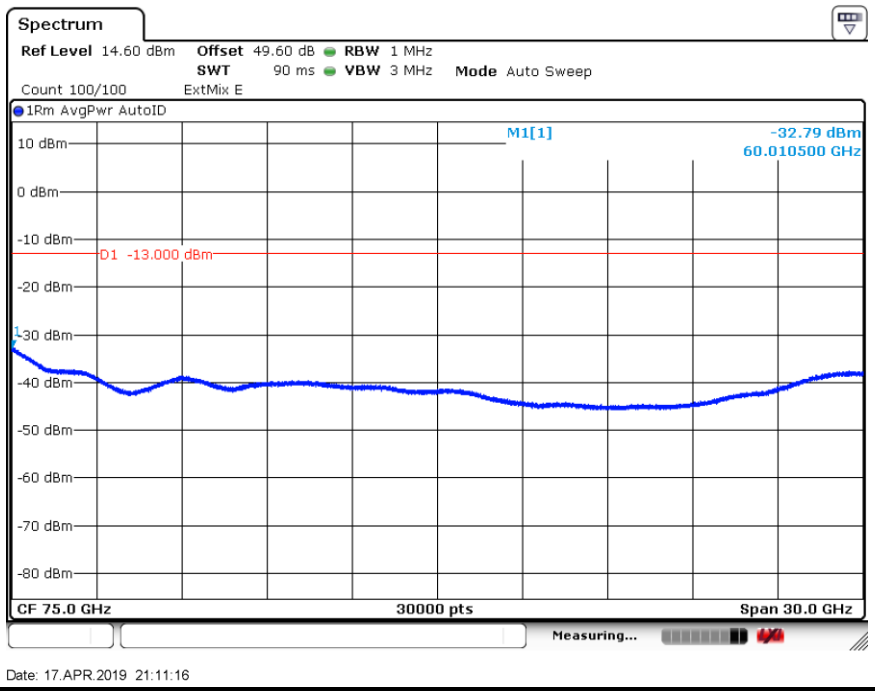
NR Band n261
(40GHz-60GHz)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 42.1 + 2.2 + 107 + 20log(1) – 104.8 = 46.5 (dB)

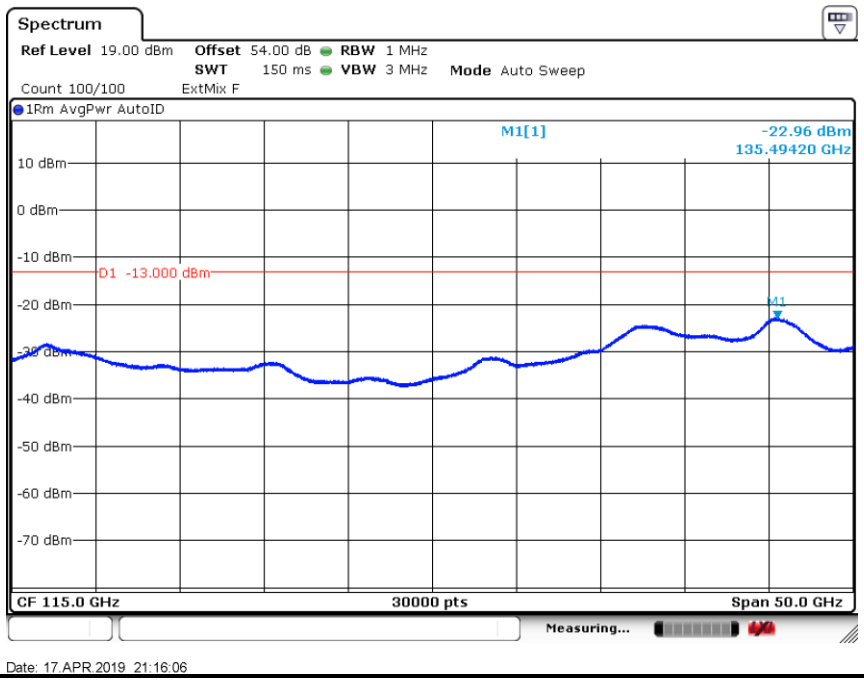
NR Band n261
(60GHz-90GHz)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 45.2 + 2.2 + 107 + 20log(1) – 104.8 = 49.6 (dB)

NR Band n261
(90GHz-140GHz)



Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8

= 49.6 + 2.2 + 107 + 20log(1) – 104.8 = 54.0 (dB)

Appendix B. R&S Mixer Certificate

Radiometer Physics
A Rohde & Schwarz Company

Calibration Certificate
Kalibrierschein

Certificate Number 24-0060-100986-01
Zertifikatsnummer

Unit Data

Item
Gegenstand: **Harmonic Mixer, 40 GHz to 60 GHz**

Manufacturer
Hersteller: **RPG**

Type
Typ: **RPG FS-Z60**

Material Number
Materialnummer: **1048.0171.02**

Serial Number
Seriennummer: **100986**

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber

Order Number
Bestellnummer

Date of Receipt
Eingangsdatum

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung: **Meckenheim, 2018-10-31**

Scope of Calibration
Umfang der Kalibrierung: **Standard Calibration**

Statement of Compliance (Incoming)
Konformitätsaussage (Anlieferung): **New device**

Statement of Compliance (Outgoing)
Konformitätsaussage (Auslieferung): **All measured values are within the data sheet specifications.**

Extend of Calibration Documents
Umfang des Kalibrierdokuments: **2 pages Calibration Certificate**
5 pages Outgoing Results

This calibration certificate documents, that the named item is tested and measured against defined specifications. Measurement results are located usually in the corresponding interval with a probability of approx. 95% (coverage factor k = 2). Calibration is performed with test equipment and standards directly or indirectly traceable by means of approved calibration techniques to the PTB/DKD or other national/international standards, which realize the physical units of measurement according to the International System of Units (SI). In all cases where no standards are available, measurements are referenced to standards of the R&S laboratories. Principles and methods of calibration correspond with EN ISO/IEC 17025. This calibration certificate may not be reproduced other than in full. Calibration certificates without signatures are not valid. The user is obliged to have the object recalibrated at appropriate intervals.

Dieser Kalibrierschein dokumentiert, dass der genannte Gegenstand nach festgelegten Vorgaben geprüft und gemessen wurde. Die Messwerte lagen im Regelfall mit einer Wahrscheinlichkeit von annähernd 95% im zugeordneten Werteintervall (Erweiterte Messunsicherheit mit k = 2). Die Kalibrierung erfolgte mit Messmitteln und Normalen, die direkt oder indirekt durch Ableitung mittels anerkannter Kalibriertechniken rückgeführt sind auf Normale der PTB/DKD oder anderer nationaler/internationaler Standards zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Wenn keine Normale existieren, erfolgt die Rückführung auf Bezugsnormale der R&S-Laboratorien. Grundsätze und Verfahren der Kalibrierung beziehen sich auf EN ISO/IEC 17025. Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Kalibrierscheine ohne Unterschriften sind ungültig. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

Radiometer Physics GmbH; Meckenheim

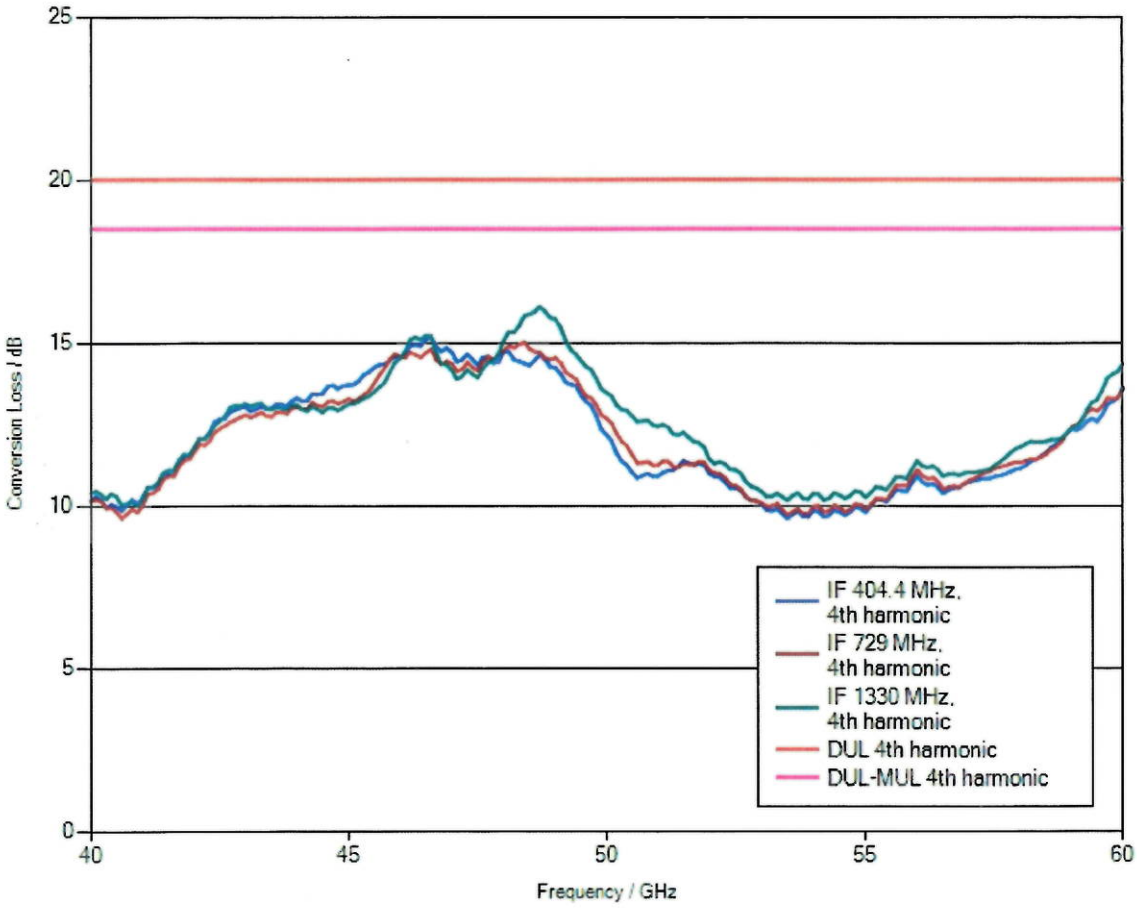
Date of Issue Ausstellungsdatum	Head of Laboratory Laborleitung	Person Responsible Bearbeiter
2018-11-05	Schulze	Heinze

Radiometer Physics GmbH • Werner-von-Siemens-Str. 4 • 53340 Meckenheim • Telephone national: 02225/99981-0 international: 0049 2225-99981-0
Fax: 02225/99981-99 • Managing Director: Achim Walber, Dr. Thomas Rose • Company's Place of Business: Meckenheim
Commercial Register No.: Bonn, HRB 10291 • VAT Identification No.: DE 123 377 395

1.2 Conversion loss

LO level +13 dBm nominal
Bias 0 A

Measurement uncertainty: 1.5 dB



Note: Numeric calibration data can be found attached to the PDF file of the calibration certificate. Click the "paper clip" symbol to display the file.

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ROHDE&SCHWARZ

Calibration Certificate
Kalibrierschein

Certificate Number 24-0090-101811-01
Zertifikatsnummer

Unit Data

Item
Gegenstand
Harmonic Mixer, 60 GHz to 90 GHz

Manufacturer
Hersteller
ROHDE & SCHWARZ

Type
Typ
R&S® FS-Z90

Material Number
Materialnummer
1048.0371.02

Serial Number
Seriennummer
101811

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber

Order Number
Bestellnummer

Date of Receipt
Eingangsdatum

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung
Meckenheim, 2018-07-16

Scope of Calibration
Umfang der Kalibrierung
Standard Calibration

Statement of Compliance (Incoming)
Konformitätsaussage (Anlieferung)
New device

Statement of Compliance (Outgoing)
Konformitätsaussage (Auslieferung)
All measured values are <u>within the data sheet specifications.</u>

Extend of Calibration Documents
Umfang des Kalibrierdokuments
2 pages Calibration Certificate
5 pages Outgoing Results

This calibration certificate documents, that the named item is tested and measured against defined specifications. Measurement results are located usually in the corresponding interval with a probability of approx. 95% (coverage factor k = 2). Calibration is performed with test equipment and standards directly or indirectly traceable by means of approved calibration techniques to the PTB/DKD or other national/international standards, which realize the physical units of measurement according to the International System of Units (SI). In all cases where no standards are available, measurements are referenced to standards of the R&S laboratories. Principles and methods of calibration correspond with EN ISO/IEC 17025. This calibration certificate may not be reproduced other than in full. Calibration certificates without signatures are not valid. The user is obliged to have the object recalibrated at appropriate intervals.

Dieser Kalibrierschein dokumentiert, dass der genannte Gegenstand nach festgelegten Vorgaben geprüft und gemessen wurde. Die Messwerte lagen im Regelfall mit einer Wahrscheinlichkeit von annähernd 95% im zugeordneten Werteintervall (Erweiterte Messunsicherheit mit k = 2). Die Kalibrierung erfolgte mit Messmitteln und Normalen, die direkt oder indirekt durch Ableitung mittels anerkannter Kalibriertechniken rückgeführt sind auf Normale der PTB/DKD oder anderer nationaler/internationaler Standards zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Wenn keine Normale existieren, erfolgt die Rückführung auf Bezugsnormale der R&S-Laboratorien. Grundsätze und Verfahren der Kalibrierung beziehen sich auf EN ISO/IEC 17025. Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Kalibrierscheine ohne Unterschriften sind ungültig. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

Radiometer Physics GmbH; Meckenheim

Date of Issue
Ausstellungsdatum
2018-07-19

Head of Laboratory
Laborleitung
Ceru

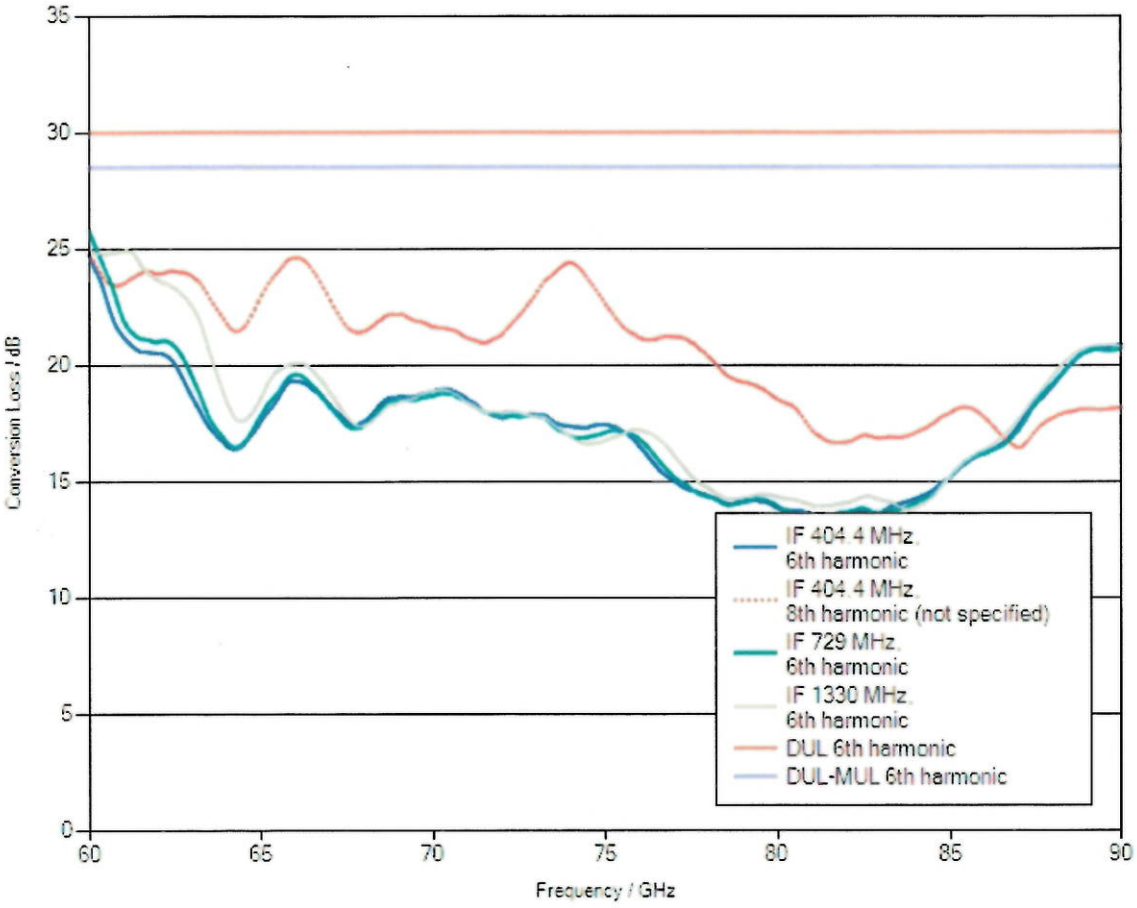
Person Responsible
Bearbeiter
Grossmindorf

Radiometer Physics GmbH • Werner-von-Siemens-Str. 4 • 53340 Meckenheim • Telephone national: 02225/99981-0 international: 0049 2225-99981-0
Fax: 02225/99981-99 • Managing Director: Achim Walber, Dr. Thomas Rose • Company's Place of Business: Meckenheim
Commercial Register No.: Bonn, HRB 10291 • VAT Identification No.: DE 123 377 395

1.2 Conversion loss

LO level +14 dBm nominal
Bias 0 A

Measurement uncertainty: 1.5 dB



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Radiometer Physics
A Rohde & Schwarz Company

Calibration Certificate
Kalibrierschein

Certificate Number 24-0140-101128-01
Zertifikatsnummer

Unit Data

Item
Gegenstand: **Harmonic Mixer, 90 GHz to 140 GHz**

Manufacturer
Hersteller: **RPG**

Type
Typ: **RPG FS-Z140**

Material Number
Materialnummer: **3622.0708.02**

Serial Number
Seriennummer: **101128**

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber

Order Number
Bestellnummer

Date of Receipt
Eingangsdatum

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung: **Meckenheim, 2018-09-03**

Scope of Calibration
Umfang der Kalibrierung: **Standard Calibration**

Statement of Compliance (Incoming)
Konformitätsaussage (Anlieferung): **New device**

Statement of Compliance (Outgoing)
Konformitätsaussage (Auslieferung): **All measured values are within the data sheet specifications.**

Extend of Calibration Documents
Umfang des Kalibrierdokuments: **2 pages Calibration Certificate**
5 pages Outgoing Results

This calibration certificate documents, that the named item is tested and measured against defined specifications. Measurement results are located usually in the corresponding interval with a probability of approx. 95% (coverage factor k = 2). Calibration is performed with test equipment and standards directly or indirectly traceable by means of approved calibration techniques to the PTB/DKD or other national/international standards, which realize the physical units of measurement according to the International System of Units (SI). In all cases where no standards are available, measurements are referenced to standards of the R&S laboratories. Principles and methods of calibration correspond with EN ISO/IEC 17025. This calibration certificate may not be reproduced other than in full. Calibration certificates without signatures are not valid. The user is obliged to have the object recalibrated at appropriate intervals.

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Radiometer Physics GmbH; Meckenheim

Date of Issue Ausstellungsdatum	Head of Laboratory Laborleitung	Person Responsible Bearbeiter
2018-09-06	Schulze	C. Dick Dick

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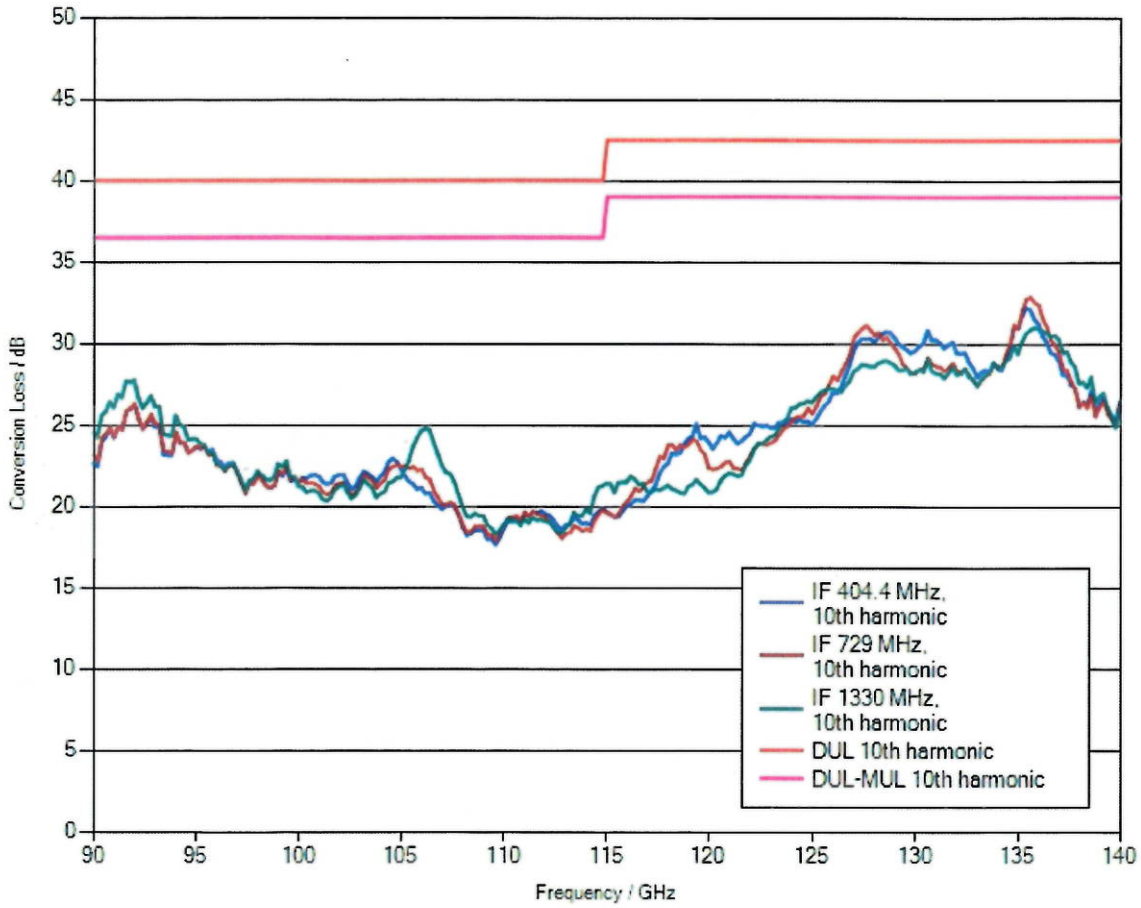
Commercial Register No.: Bonn, HRB 10291 • VAT Identification No.: DE 123 377 395

1.2 Conversion loss

LO level +14 dBm nominal
Bias 0 A

Measurement uncertainty: 3.5 dB



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