5. APPENDIX A - CALIBRATION CERTIFICATES.

The attached Calibration certificates represent the Harmonic Downconverters used in this testing.

ROHDE&SCHWARZ

CALIBRATION CERTIFICATE

Kalibrierschein

DAkkS Deutsche Akkreditierungsstelle D-K-15195-01-00

Certificate Number
Zertifikatsnummer

0001A300618455

General Data

Item Gegenstand	FS-Z60 HARMONIC MIXER 40-60GHZ		
Manufacturer Hersteller	ROHDE & SCHWARZ		
Type Typ	FS-Z60		
Material Number Materialnummer	1048.0171.02	**Serial Number** Seriennummer	100977
Order Number Bestellnummer	8800010960 10, 5011119893	**Asset Number** Inventarnummer	E1311
Customer Auftraggeber	Nokia of America Corp Mountain Ave 600 07974-0636 Murray Hill US		

Performance

Place and Date of Calibration Ort und Datum der Kalibrierung	87700 Memmingen, Rohde-und-Schwarz-Str. 1 2021-10-06
Statement of Compliance (Incoming) Konformitätsaussage (Anlieferung)	All measured values are within the data sheet specifications.
Statement of Compliance (Outgoing) Konformitätsaussage (Auslieferung)	All measured values are within the data sheet specifications.
Customers due Interval Kalibrierintervall des Kunden	
Extent of Calibration Document Umfang des Kalibrierdokuments	3 Certificate 6 Outgoing Results 6 Incoming Results

Date of Issue Ausstellungsdatum	**Approval of the certificate by** Freigabe des Kalibrierscheins durch	
2021-10-08	Dr. Gerhard Rösel	Johannes Negele
	Laboratory management Labormanagement	**Person responsible** Bearbeiter

Calibration Mark
Kalibrierzeichen

300618455
D-K-15195-01-00
2021-10

Member of Deutscher Kalibrierdienst
Mitglied im Deutschen Kalibrierdienst

DKD

This calibration certificate documents the metrological traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The user is obliged to have the object recalibrated at appropriate intervals. This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates with the full name of the approval responsible person are valid without signature.

Dieser Kalibrierschein dokumentiert die metrologische Rückführbarkeit auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European cooperation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
Dieser Kalibrierschein darf nur vollständig weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine sind bei Nennung des für die Freigabe Verantwortlichen in Klarschrift auch ohne Unterschrift gültig.

Calibration Procedure

The measuring object is an RF harmonic mixer, which converts an RF signal at one frequency into a signal at another frequency (here: IF). The conversion loss was measured using a vector network analyzer. The RF output power as well as the IF input power of the corresponding ports of the VNA were traced back to a power sensor. The conversion loss is defined as the ratio of the power at the IF frequency to the power at the RF frequency with a given LO power. (IF: Intermediate frequency; LO: Local Oscillator)
The traceability is represented in the table Working Standards used.

Working Standards used

Item	Type	Serial Number	Calibration Certificate Number	Cal. Due
Therm.Power Sensor DC-40GHz	NRP-Z55	130179	585760 D-K-15195-01-00 2021-01	2023-01-31
Thermal Power Sensor	NRP67T	100977	515392 D-K-15195-01-01 2019-07	2022-07-31
Vector Network Analyzer 4 Port	ZVA67	101175	0023 D-K-15195-01-00 2021-03	2022-03-31

Remarks

Environmental Conditions			
Ambient Temperature	(23 ± 1) °C	**Relative Humidity**	20%-60%

Comments on Measurement Results

The measurement results in the test report stated below have been tested for compliance with the given specifications and marked if necessary. The associated uncertainty of measurement has been taken into account, if not otherwise stated.
Measurement results that are not covered by the DAkkS accreditation are marked with [1].
Ref.: ILAC G8:09/2019 'Guidelines on Decision Rules and Statements of Conformity'.

The expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor k = 2.
It was determined in accordance with EA-4/02 M:2013. The true value is located in the corresponding interval with a probability of 95 %.

In addition to the calibration results, the calibration certificate includes functional measurements that might have an influence on the measurement uncertainty of the calibration results. The functional measurement results are marked and are not intended to be used to support the further dissemination of metrological traceability. They are intended to verify the requirements on the measurement object according to manufacturer specifications and technical standards.

Outgoing Results

Designation:	**HARMONIC MIXER**
Type:	**FS-Z60**
Material No.:	**1048.0171.02**
Serial No.:	**100977**
Certificate No.:	**0001A300618455**
Referring to Test Documentation:	**5038.8581.01-PB-02.00**

Test Department:	**3MME3**
Name:	**Johannes Negele**
Date:	**2021-10-06**

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Software used for measurement 3

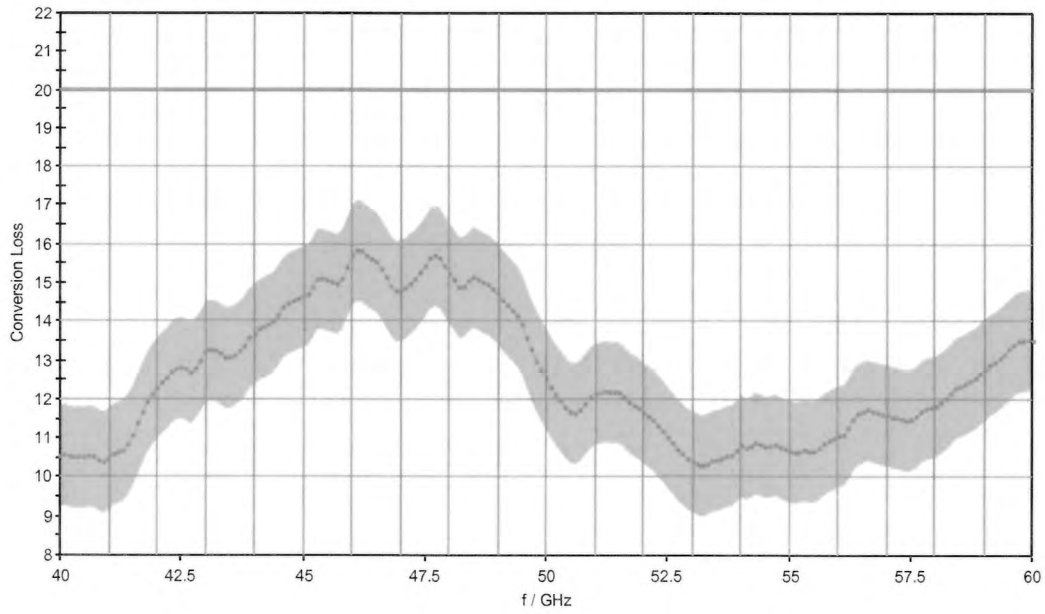
1. Conversion Loss (4. Harmonic) 4
1.1 Conversion Loss (IF = 404.4 MHz) 4
1.2 Conversion Loss (IF = 729 MHz) 4
1.3 Conversion Loss (IF = 1330 MHz) 5
1.4 Continuity response within 1 GHz 5

Software used for measurement			
Item	**Type**	**Version**	**Remark**
Suite	Setup	V12.10.02	Test Management Software G5
Test Program (7012.8706.00_)	Component	V01.05	

1. Conversion Loss (4. Harmonic)

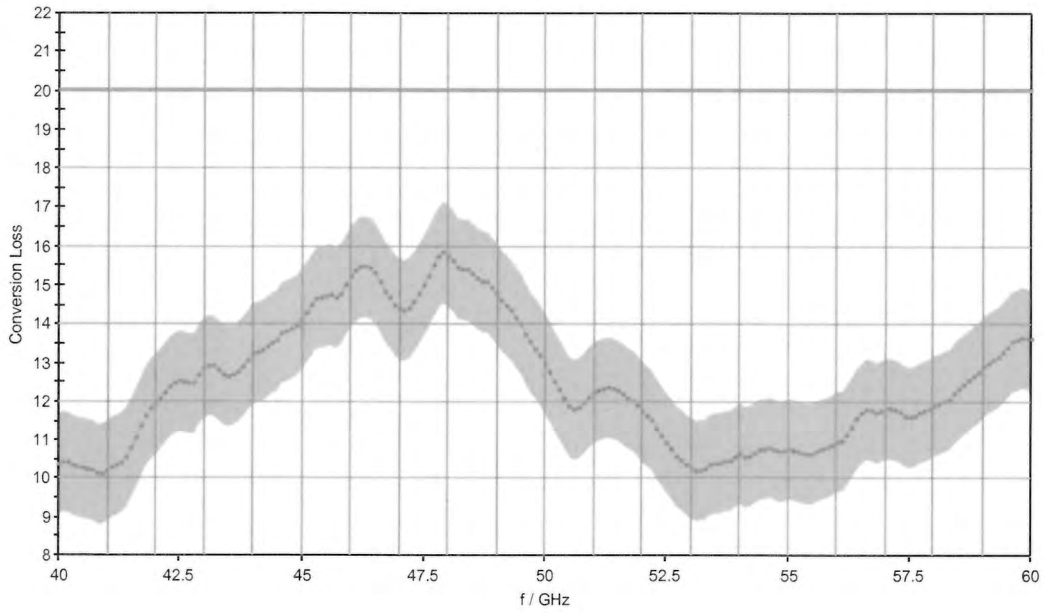
1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 4. Harmonic



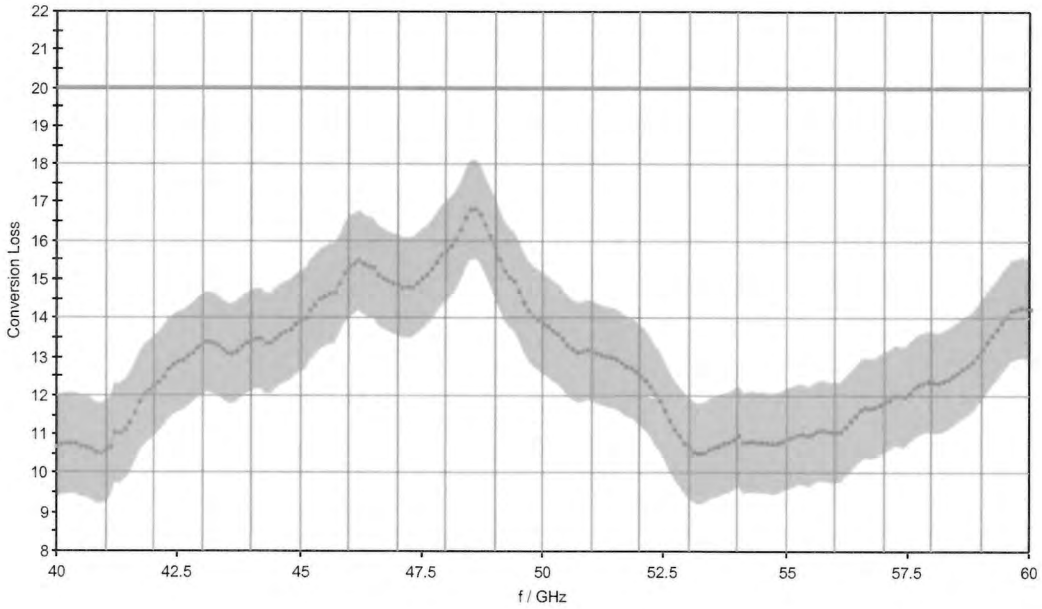
1.2 Conversion Loss (IF = 729 MHz)

IF = 729 MHz, 4. Harmonic



1.3 Conversion Loss (IF = 1330 MHz)

IF = 1330 MHz, 4. Harmonic



1.4 Continuity response within 1 GHz

Continuity response within any 1 GHz Band, 4. Harmonic

	DUL /dB	Continuity /dB
max. at IF = 404.4 MHz:	6.0	2.35
max. at IF = 729 MHz:	6.0	2.12
max. at IF = 1330 MHz:	6.0	2.48

Incoming Results

Designation:	**HARMONIC MIXER**
Type:	**FS-Z60**
Material No.:	**1048.0171.02**
Serial No.:	**100977**
Certificate No.:	**0001A300618455**
Referring to Test Documentation:	**5038.8581.01-PB-02.00**

Test Department:	**3MME3**
Name:	**Johannes Negele**
Date:	**2021-10-06**

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Software used for measurement **3**

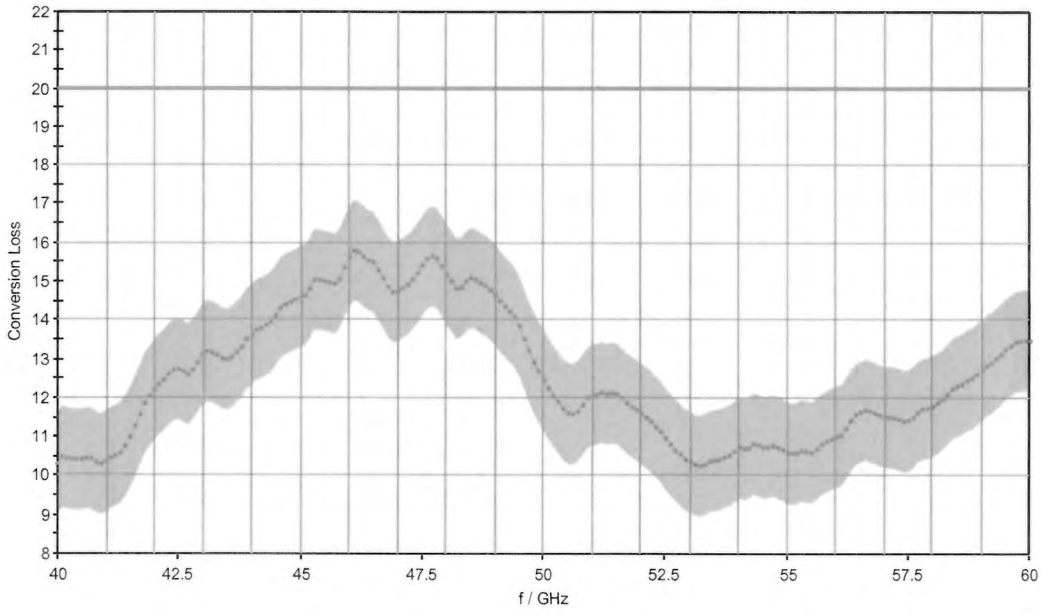
1. Conversion Loss (4. Harmonic) **4**
1.1 Conversion Loss (IF = 404.4 MHz) 4
1.2 Conversion Loss (IF = 729 MHz) 4
1.3 Conversion Loss (IF = 1330 MHz) 5
1.4 Continuity response within 1 GHz 5

Software used for measurement			
Item	**Type**	**Version**	**Remark**
Suite	Setup	V12.10.02	Test Management Software G5
Test Program (7012.8706.00_)	Component	V01.05	

1. Conversion Loss (4. Harmonic)

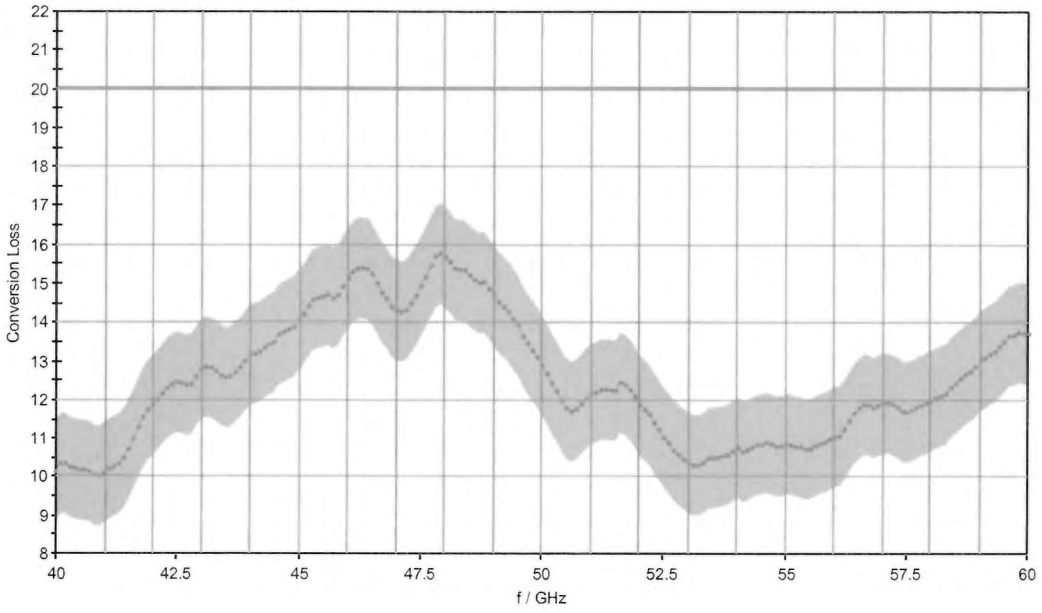
1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 4. Harmonic



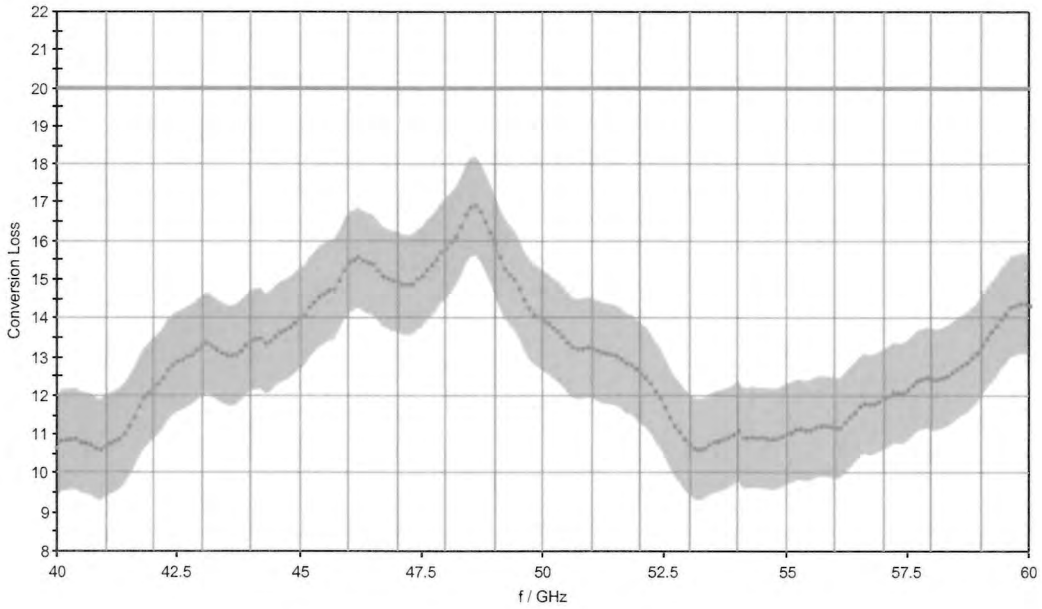
1.2 Conversion Loss (IF = 729 MHz)

IF = 729 MHz, 4. Harmonic



1.3 Conversion Loss (IF = 1330 MHz)

IF = 1330 MHz, 4. Harmonic



1.4 Continuity response within 1 GHz

Continuity response within any 1 GHz Band, 4. Harmonic

	DUL /dB	Continuity /dB
max. at IF = 404.4 MHz:	6.0	2.36
max. at IF = 729 MHz:	6.0	2.14
max. at IF = 1330 MHz:	6.0	2.49

ROHDE&SCHWARZ

Calibration Certificate

Certificate Number 0001-300618370

Kalibrierschein

Zertifikatsnummer

Unit Data

Item / Gegenstand: **FS-Z90 HARMONIC MIXER 60-90GHZ**

Manufacturer / Hersteller: **ROHDE & SCHWARZ**

Type / Typ: **FS-Z90**

Material Number / Materialnummer: **1048.0371.02**

Serial Number / Seriennummer: **101719**

Asset Number / Inventarnummer: **E1312**

Order Data

Customer / Auftraggeber:

Nokia of America Corp
Mountain Ave 600
07974-0636 Murray Hill
US

Order Number / Bestellnummer: **8800010956 10, 5011119875**

Date of Receipt / Eingangsdatum: **2021-09-27**

Performance

Place and Date of Calibration / Ort und Datum der Kalibrierung: **Werk Memmingen, 2021-09-28**

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

Statement of Compliance (Incoming) / Konformitätsaussage (Anlieferung): **All measured values are within the data sheet specifications.**

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

Extent of Calibration Documents / Umfang des Kalibrierdokuments:

3 Pages Calibration Certificate
6 Pages Outgoing Results
6 Pages Incoming 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 and are conformant with EN ISO/IEC 17025, ANSI/NCSL Z540.1-1994 and ANSI/NCSL Z540.3-2006. The applied quality system is certified to EN ISO 9001.
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 und entsprechen EN ISO/IEC 17025, ANSI/NCSL Z540.1-1994 und ANSI/NCSL Z540.3-2006.
Das angewandte Qualitätsmanagement-System ist zertifiziert nach EN ISO 9001.
Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden.
Kalibrierscheine ohne Signifizierungen sind ungültig.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

Rohde & Schwarz Messgerätebau GmbH

Date of Issue / Ausstellungsdatum	**Head of Laboratory** / Laborleitung	**Person Responsible** / Bearbeiter
2021-09-30	Steigmüller	Johannes Negele

Rohde & Schwarz Messgerätebau GmbH · Postfach 1652 D-87686 Memmingen · Rohde-und-Schwarz-Str. 1 D-87700 Memmingen
Telefon national: 08331/10-80; international: 0049 8331/10-80; Fax: 08331/10-811 24
Geschäftsführer: Jürgen Steigmüller · Aufsichtsratsvorsitzender: Johann Kraus
Sitz der Gesellschaft: München · Registereintrag: Amtsgericht München HRB 1059

Calibration Method
Kalibrieranweisung

See first page of Outgoing Results

Relative Humidity **20%-60%**
Relative Luftfeuchte

Ambient Temperature **(23 $^{+1}_{-1}$) °C**
Umgebungstemperatur

Working standards used (having a significant effect on the accuracy)
Verwendete Gebrauchsnormale (mit signifikantem Einfluss auf die Genauigkeit)

Item Gegenstand	Type Typ	Serial Number Seriennummer	Calibration Certificate Number Kalibrierscheinnummer	Cal. Due Kalibr. bis
Therm.Power Sensor DC-44GHz	NRP-Z55	140170	0023 D-K-15195-01-00 2020-12	2022-02-28
Thermal Waveguide Power Sensor	NRP90TWG	910001	100022 D-K-15195-01-00 2020-10	2021-10-31
Vector Network Analyzer 4 Port	ZVA67	101175	0023 D-K-15195-01-00 2021-03	2022-03-31

Conformity statements take the measurement uncertainties into account.
Die Konformitätsaussagen berücksichtigen die Messunsicherheiten.

Notes
Anmerkungen

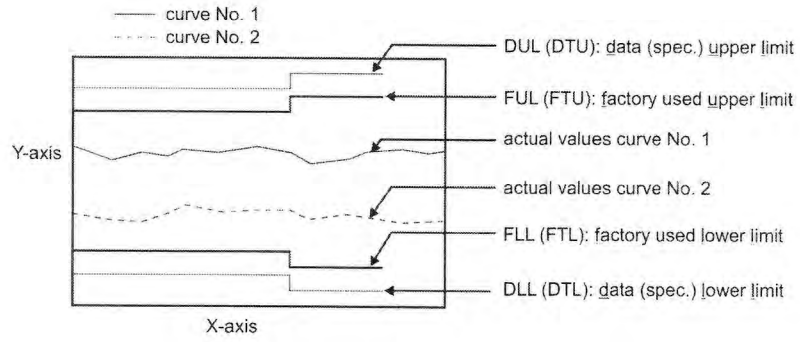
Installed options are included in calibration. Depending on installed options, numbers of pages of the record are not consecutive.

Hints
Hinweise

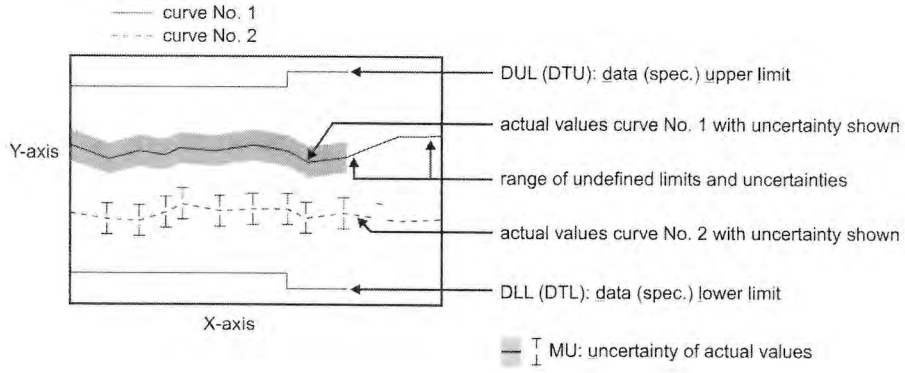
factory used limit = data specification - uncertainty of actual value

DL or DT: Data Limit for symmetrical tolerance limits
FL or FT: Factory Limit for symmetrical tolerance limits

1. In case uncertainties are part of the appendix



2. In case uncertainties are part of the respective graphic



Outgoing Results

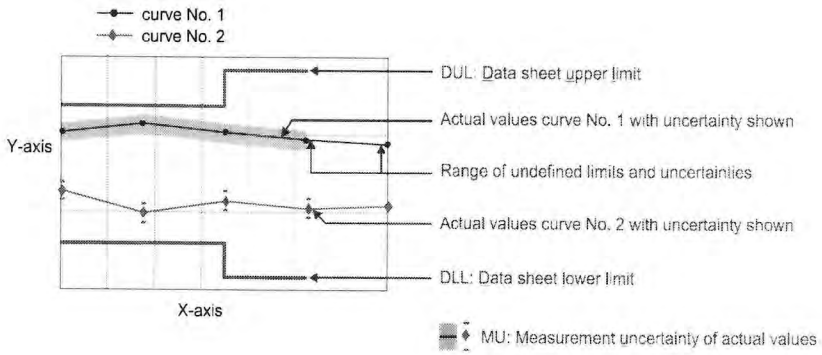
Designation:	**HARMONIC MIXER**
Type:	**FS-Z90**
Material No.:	**1048.0371.02**
Serial No.:	**101719**
Certificate No.:	**0001-300618370**
Referring to Test Documentation:	**5038.8323.01-PB-01.04**

Test Department:	**3MME3**
Name:	**Johannes Negele**
Date:	**2021-09-28**

The following abbreviations may be used in this document

{a}	No measurement uncertainty stated because the errors always add together. So it is sure that a measurement result evaluated as "PASS" is pass.
{b}	The measurement uncertainty depends on the measurement result. The stated measurement uncertainty is valid for the close area around the specification. Measurement results outside the close area have a higher measurement uncertainty but are within the specification.
{c}	Functional test, therefore no measurement uncertainty is stated.
{d}	Typical value, refer to performance test.
{e}	The measurement uncertainty is taken into account when setting the measuring system.
{f}	Verification of specified requirements. Technical operation that consist of the determination of one or more characteristics to a specified procedure.
DL or DT	Data Limit for symmetrical tolerance limits
DLL	Datasheet Lower Limit
DUL	Datasheet Upper Limit
MU	Symmetrical Measurement Uncertainty
MLL or MLV	Measurement Uncertainty Lower Value
MUL or MUV	Measurement Uncertainty Upper Value
Nom.	Nominal Value
Dev.	Deviation
Act.	Actual Value
UGB	Uncertainty Guard Band: Measuring uncertainty violates the data (spec.) limit.
UGB1	A compliance statement may be possible where a confidence level of less than 95 % is acceptable.
UGB2	A non-compliance statement may be possible where a confidence level of less than 95 % is acceptable.
DU	Datasheet Uncertainty

Explanation of charts



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Software used for measurement **4**

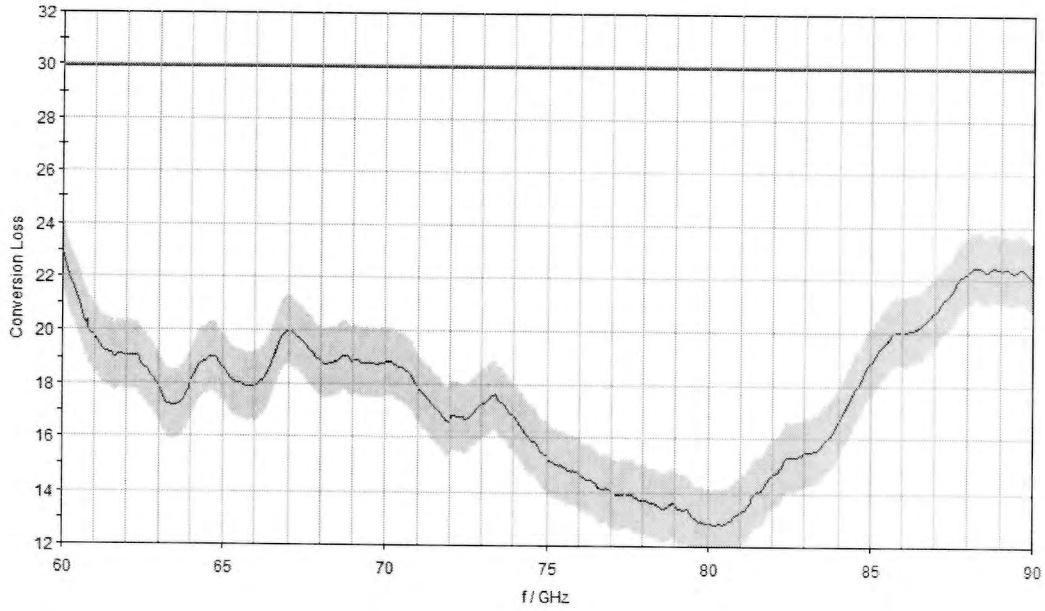
1. Conversion Loss (6. Harmonic) **5**
1.1 Conversion Loss (IF = 404.4 MHz) 5
1.2 Conversion Loss (IF = 729 MHz) 5
1.3 Conversion Loss (IF = 1330 MHz) 6
1.4 Continuity response within 1 GHz 6

Software used for measurement			
Item	**Type**	**Version**	**Remark**
Suite	Setup	V12.10.02	Test Management Software G5
Test Program (7012.8706.00_)	Component	V01.05	

1. Conversion Loss (6. Harmonic)

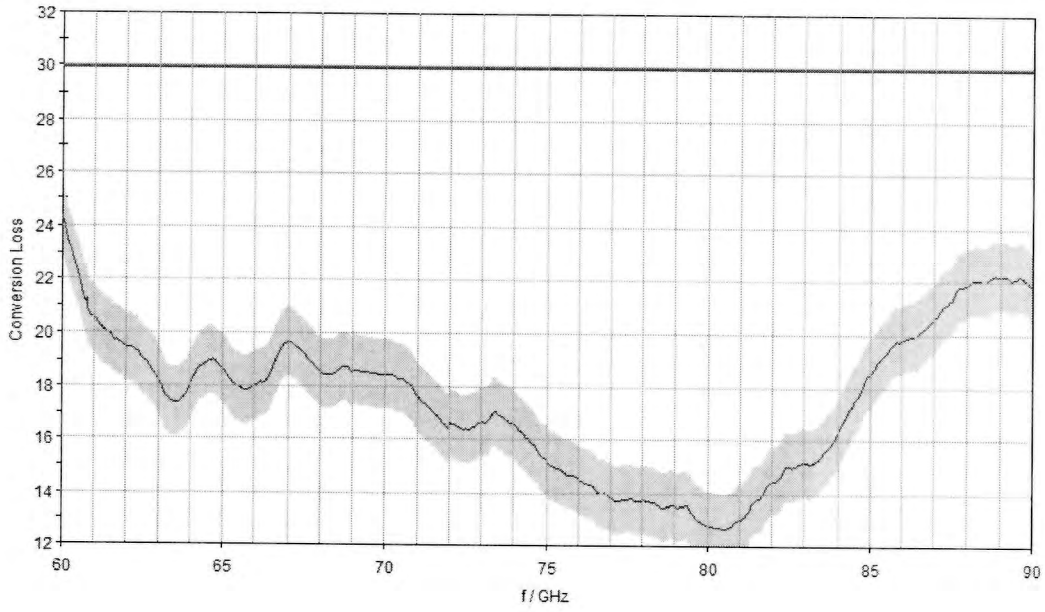
1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 6. Harmonic



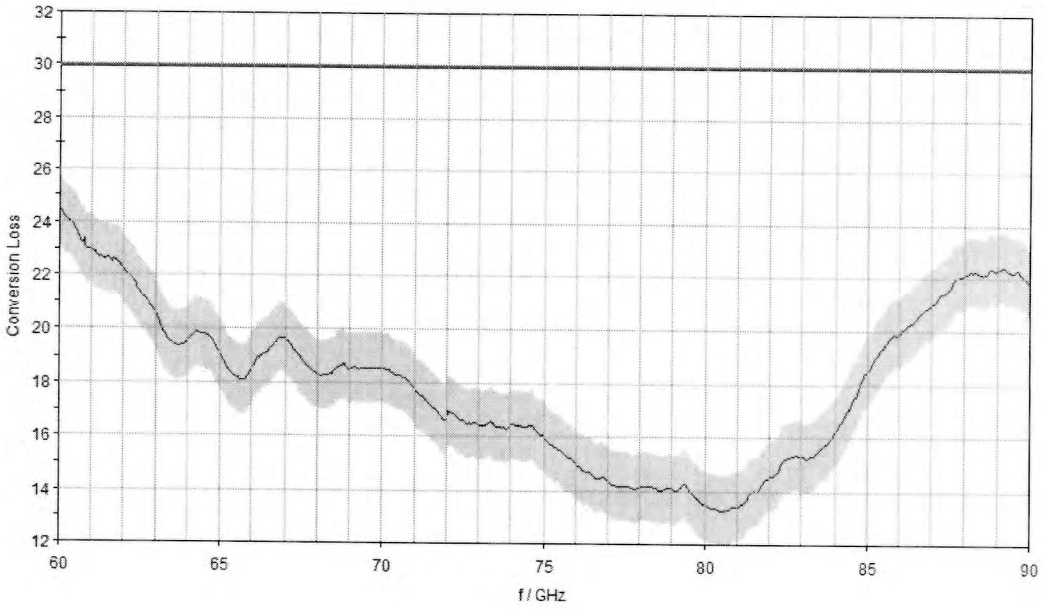
1.2 Conversion Loss (IF = 729 MHz)

IF = 729 MHz, 6. Harmonic



1.3 Conversion Loss (IF = 1330 MHz)

IF = 1330 MHz, 6. Harmonic



1.4 Continuity response within 1 GHz

Continuity response within any 1 GHz Band, 6. Harmonic

	DUL /dB	Continuity /dB
max. at IF = 404.4 MHz:	6.0	3.15
max. at IF = 729 MHz:	6.0	3.76
max. at IF = 1330 MHz:	6.0	2.32

Incoming Results

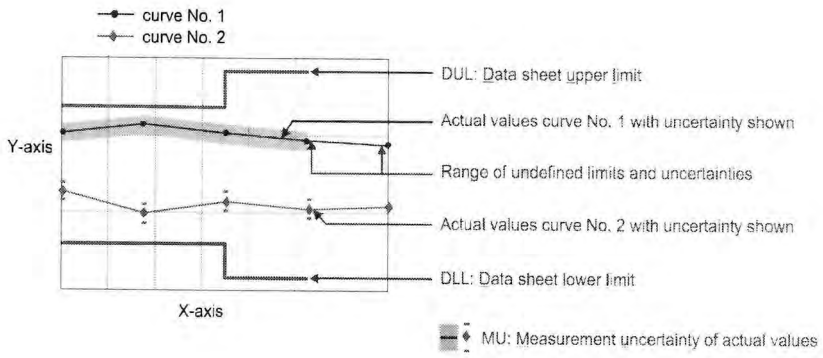
Designation:	**HARMONIC MIXER**
Type:	**FS-Z90**
Material No.:	**1048.0371.02**
Serial No.:	**101719**
Certificate No.:	**0001-300618370**
Referring to Test Documentation:	**5038.8323.01-PB-01.04**

Test Department:	**3MME3**
Name:	**Johannes Negele**
Date:	**2021-09-28**

The following abbreviations may be used in this document

{a}	No measurement uncertainty stated because the errors always add together. So it is sure that a measurement result evaluated as "PASS" is pass.
{b}	The measurement uncertainty depends on the measurement result. The stated measurement uncertainty is valid for the close area around the specification. Measurement results outside the close area have a higher measurement uncertainty but are within the specification.
{c}	Functional test, therefore no measurement uncertainty is stated.
{d}	Typical value, refer to performance test.
{e}	The measurement uncertainty is taken into account when setting the measuring system.
{f}	Verification of specified requirements. Technical operation that consist of the determination of one or more characteristics to a specified procedure.
DL or DT	Data Limit for symmetrical tolerance limits
DLL	Datasheet Lower Limit
DUL	Datasheet Upper Limit
MU	Symmetrical Measurement Uncertainty
MLL or MLV	Measurement Uncertainty Lower Value
MUL or MUV	Measurement Uncertainty Upper Value
Nom.	Nominal Value
Dev.	Deviation
Act.	Actual Value
UGB	Uncertainty Guard Band: Measuring uncertainty violates the data (spec.) limit.
UGB1	A compliance statement may be possible where a confidence level of less than 95 % is acceptable.
UGB2	A non-compliance statement may be possible where a confidence level of less than 95 % is acceptable.
DU	Datasheet Uncertainty

Explanation of charts



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Software used for measurement **4**

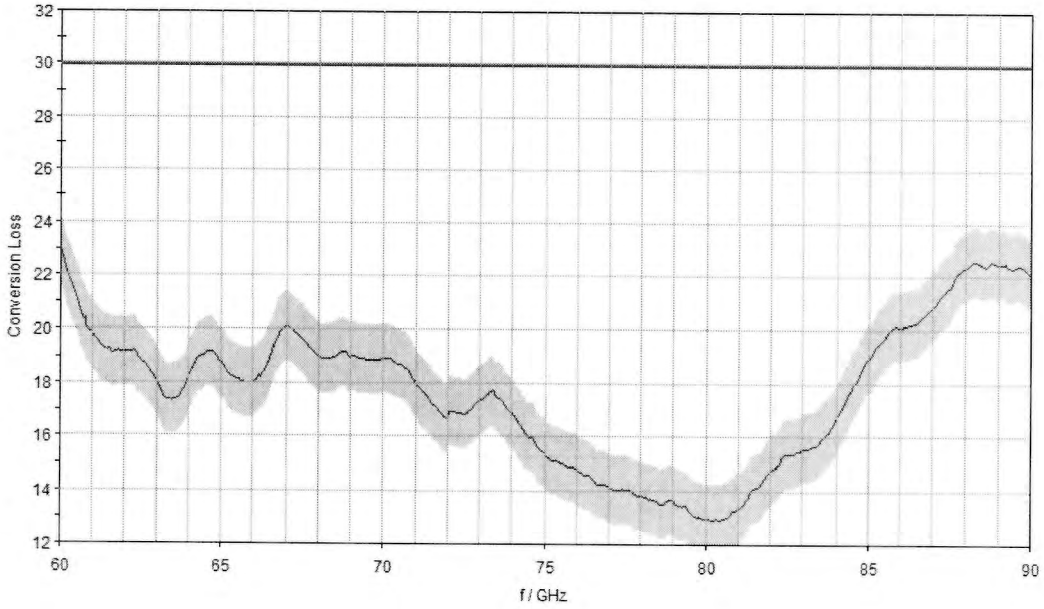
1. Conversion Loss (6. Harmonic) **5**
1.1 Conversion Loss (IF = 404.4 MHz) 5
1.2 Conversion Loss (IF = 729 MHz) 5
1.3 Conversion Loss (IF = 1330 MHz) 6
1.4 Continuity response within 1 GHz 6

Software used for measurement			
Item	**Type**	**Version**	**Remark**
Suite	Setup	V12.10.02	Test Management Software G5
Test Program (7012.8706.00_)	Component	V01.05	

1. Conversion Loss (6. Harmonic)

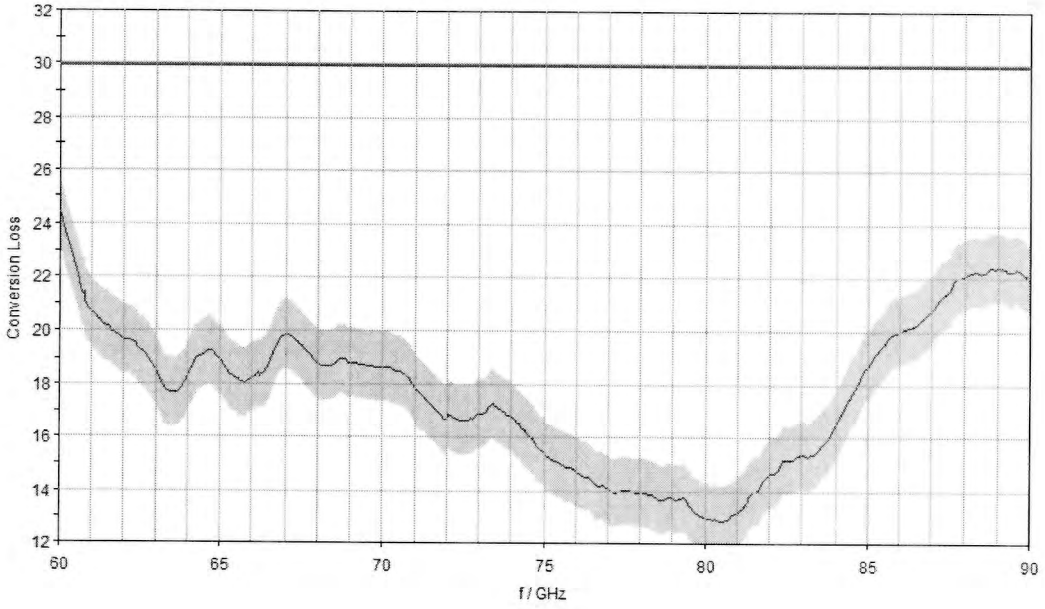
1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 6. Harmonic



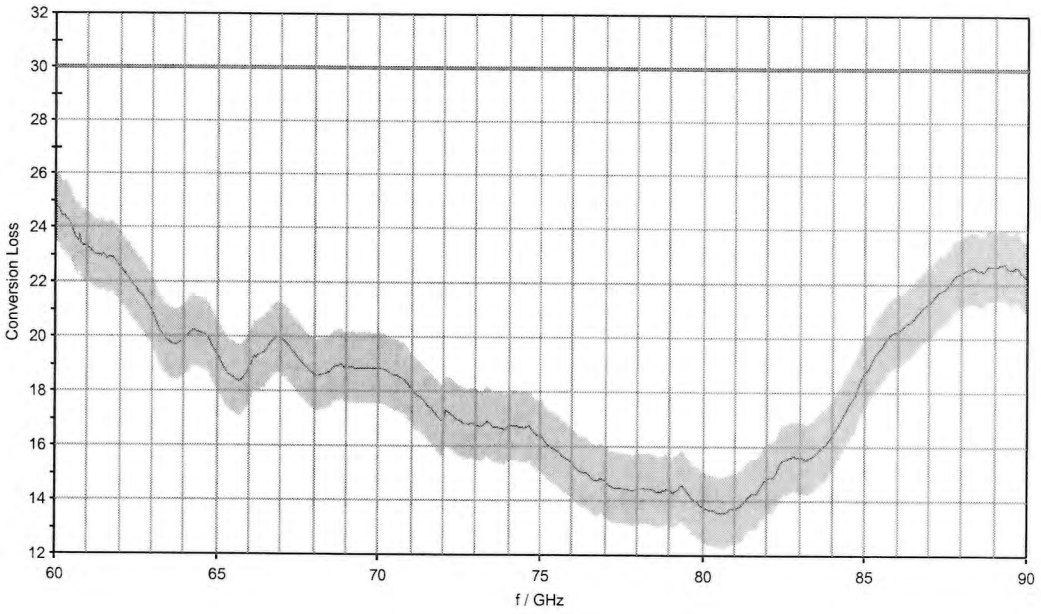
1.2 Conversion Loss (IF = 729 MHz)

IF = 729 MHz, 6. Harmonic



1.3 Conversion Loss (IF = 1330 MHz)

IF = 1330 MHz, 6. Harmonic



1.4 Continuity response within 1 GHz

Continuity response within any 1 GHz Band, 6. Harmonic

	DUL /dB	Continuity /dB
max. at IF = 404.4 MHz:	6.0	3.20
max. at IF = 729 MHz:	6.0	3.75
max. at IF = 1330 MHz:	6.0	2.33

Radiometer Physics
A Rohde & Schwarz Company

Calibration Certificate
Kalibrierschein

Certificate Number 24-0140-101008-02
Zertifikatsnummer

Unit Data

Item
Gegenstand
Harmonic Mixer, 90 GHz to 140 GHz

Manufacturer
Hersteller
RPG Radiometer-Physics GmbH

Type
Typ
RPG FS-Z140

Material Number
Materialnummer
3622.0708.02

Serial Number
Seriennummer
101008

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber
Nokia of America Corp
Mountain Ave 600
UNION
07974-0636 Murray Hill
US

Order Number
Bestellnummer
8800011537

Date of Receipt
Eingangsdatum
2021-10-06

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung
Meckenheim, 2021-10-07

Scope of Calibration
Umfang der Kalibrierung
Standard Calibration

Statement of Compliance (Incoming)
Konformitätsaussage (Anlieferung)
Defective

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
4 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.

RPG Radiometer-Physics GmbH; Meckenheim

Date of Issue
Ausstellungsdatum
2021-10-29

Head of Laboratory
Laborleitung
Schulze

Person Responsible
Bearbeiter
Gottbehuet

RPG 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 ● Company's Place of Business: Meckenheim
Commercial Register No.: Bonn, HRB 10291 ● VAT Identification No.: DE 123 377 395

Calibration Method
Kalibrieranweisung

RPG-PAQA-TN-2014-002

Relative Humidity **20 % - 80 %**
Relative Luftfeuchte

Ambient Temperature
Umgebungstemperatur

(23 $^{+7}_{-3}$) °C

Working standards used (having a significant effect on the accuracy)
Verwendete Gebrauchsnormale (mit signifikantem Einfluss auf die Genauigkeit)

Item Gegenstand	**Type** Typ	**Serial Number** Seriennummer	**Calibration Certificate Number** Kalibrierscheinnummer	**Cal. Due** Kalibr. bis
Vector Network Analyzer	R&S® ZVA40	100103	582870_D-K-15195-01-00_2021-01	2024-01-04
Powersensor	R&S® NRP-Z55	140093	601310_D-K-15195-01-00_2021-05	2023-05-28

UGB1 **A compliance statement may be possible where a confidence level of less than 95 % is acceptable.**
Die Bestätigung der Konformität ist möglich, sofern ein Grad des Vertrauens von weniger als 95 % akzeptabel ist.

UGB2 **A non-compliance statement may be possible where a confidence level of less than 95 % is acceptable.**
Die Bestätigung der Nicht-Konformität ist möglich, sofern ein Grad des Vertrauens von weniger als 95 % akzeptabel ist.

Ref.: ILAC-G8:03/2009 'Guidelines on the Reporting of Compliance with Specification'.

Notes
Anmerkungen

If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is actually put into operation.

Outgoing Results

The following abbreviations may be used in this document

{a}	No measurement uncertainty stated because the errors always add together. So it is sure that a measurement result evaluated as "PASS" is pass.
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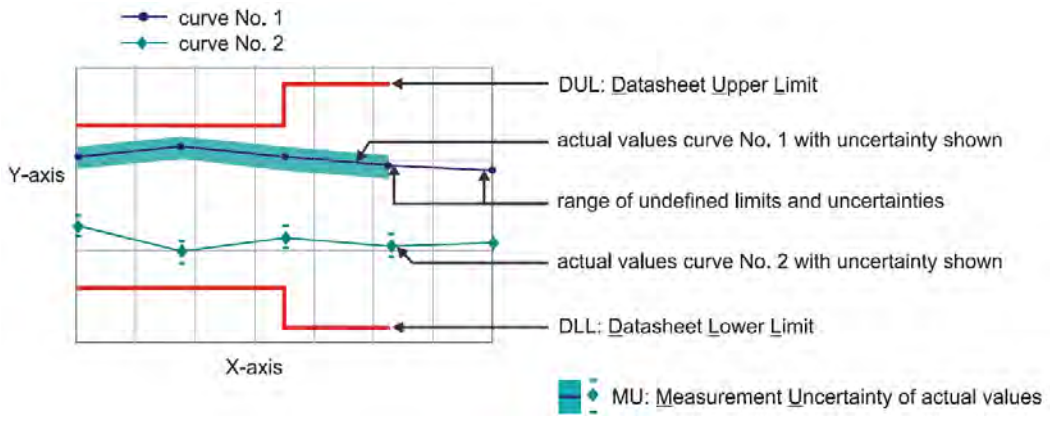
DU	Datasheet Uncertainty

Explanation of charts



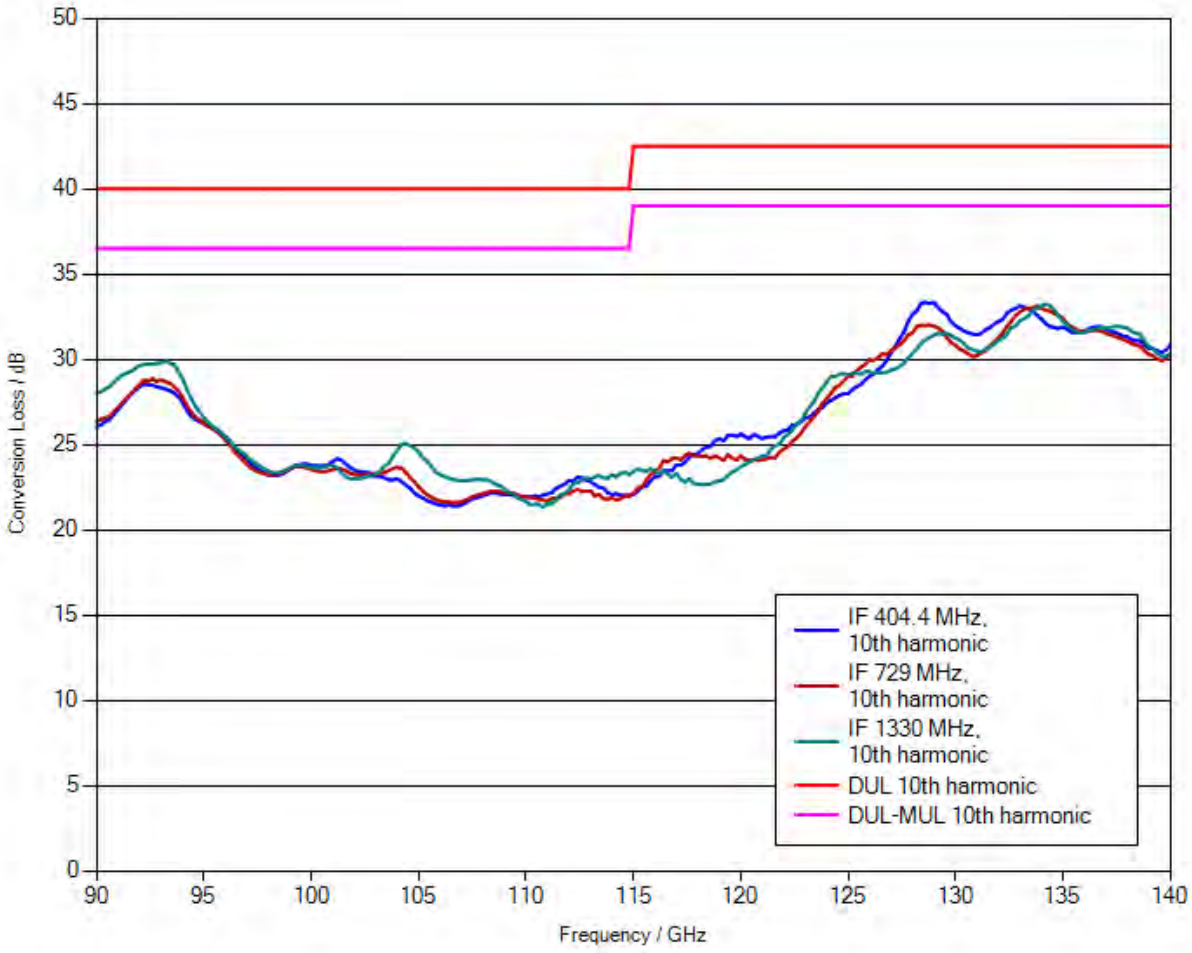
Software used for measurement

Item Type	Version	Remark
Measurement Studio Professional Edition	2013	
MixerCertification	7_15	

1.1 Conversion loss

LO level +14 dBm nominal
Bias 0 A

Measurement uncertainty: 3.5 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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1.2 Frequency response within 1 GHz

	DUL	Actual (worst case)	Evaluation
IF = 404.4 MHz, 10th harmonic	6 dB	1.87 dB	PASS
IF = 729 MHz, 10th harmonic	6 dB	1.56 dB	PASS
IF = 1330 MHz, 10th harmonic	6 dB	2.06 dB	PASS

Radiometer Physics
A Rohde & Schwarz Company

Calibration Certificate
Kalibrierschein

Certificate Number 24-0220-100960-02
Zertifikatsnummer

Unit Data

Item Gegenstand: **Harmonic Mixer, 140 GHz to 220 GHz**

Manufacturer Hersteller: **RPG Radiometer-Physics GmbH**

Type Typ: **RPG FS-Z220**

Material Number Materialnummer: **3593.3250.02**

Serial Number Seriennummer: **100960**

Asset Number Inventarnummer:

Order Data

Customer Auftraggeber:
Nokia of America Corp
NOKIMURRNJ12
Mountain Ave 600, UNION
07974-0636 Murray Hill USA

Order Number Bestellnummer: **8800011223**

Date of Receipt Eingangsdatum: **2021-09-28**

Performance

Place and Date of Calibration Ort und Datum der Kalibrierung: **Meckenheim, 2021-09-29**

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

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

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
4 pages Outgoing Results
3 pages Incoming Results

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RPG Radiometer-Physics GmbH; Meckenheim

Date of Issue Ausstellungsdatum: **2021-09-29**

Head of Laboratory Laborleitung: Schulze

Person Responsible Bearbeiter: Gottbehüt

RPG 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 • Company's Place of Business: Meckenheim
Commercial Register No.: Bonn, HRB 10291 • VAT Identification No.: DE 123 377 395

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RPG-PAQA-TN-2014-002

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Ambient Temperature
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Powersensor	R&S® NRP-Z55	140093	601310_D-K-15195-01-00_2021-05	2023-05-28

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Outgoing Results

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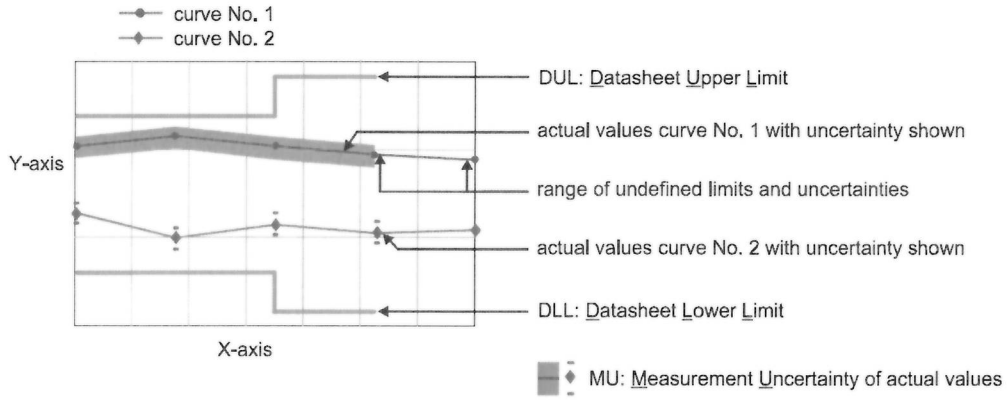
Explanation of charts



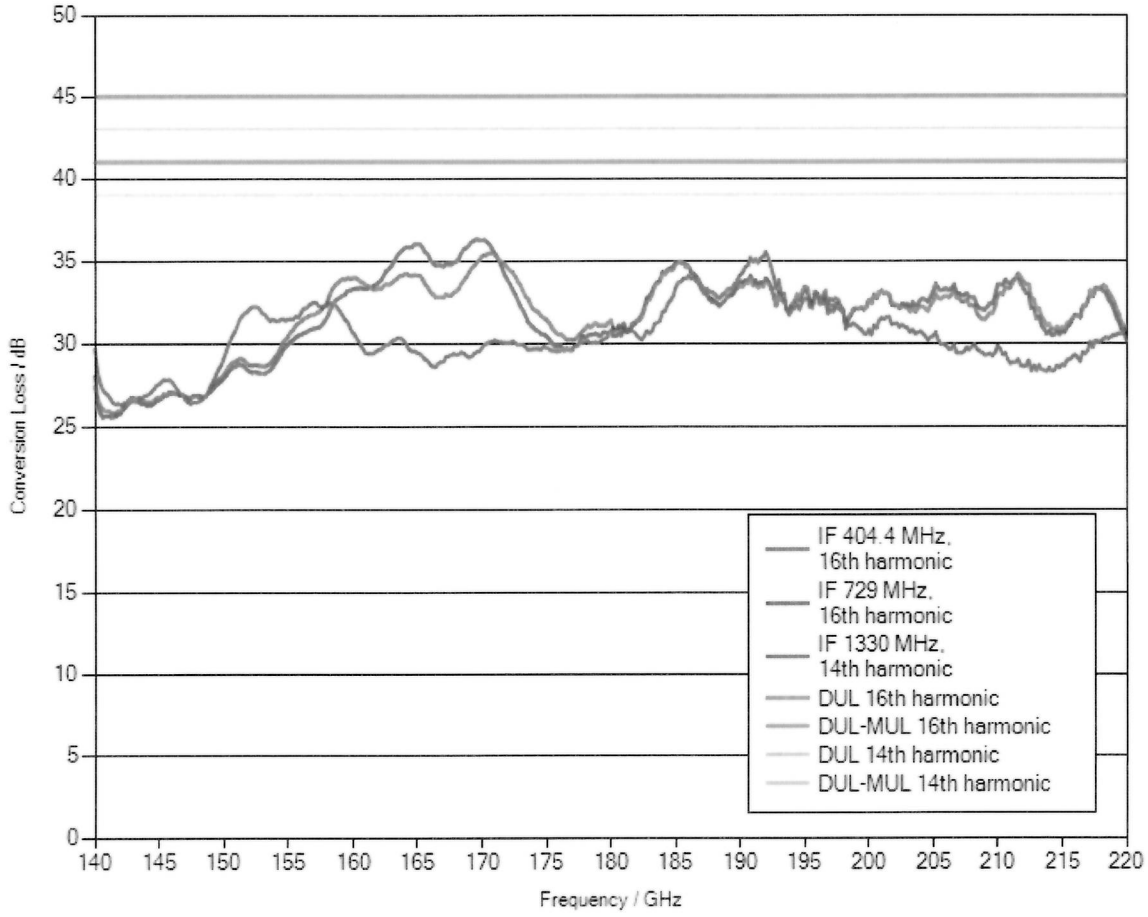
Software used for measurement

Item Type	Version	Remark
Measurement Studio Professional Edition	2013	
MixerCertification	7_15	

1.1 Conversion loss

LO level +13 dBm nominal
Bias 0 A

Measurement uncertainty: 4 dB



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1.2 Frequency response within 1 GHz

	DUL	Actual (worst case)	Evaluation
IF = 404.4 MHz, 16th harmonic	6 dB	1.98 dB	PASS
IF = 729 MHz, 16th harmonic	6 dB	2.12 dB	PASS
IF = 1330 MHz, 14th harmonic	6 dB	2.82 dB	PASS

1 Incoming Results

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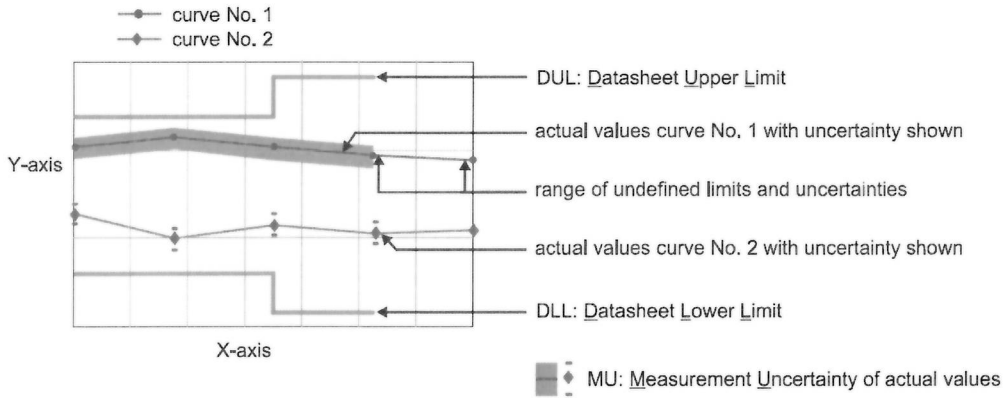
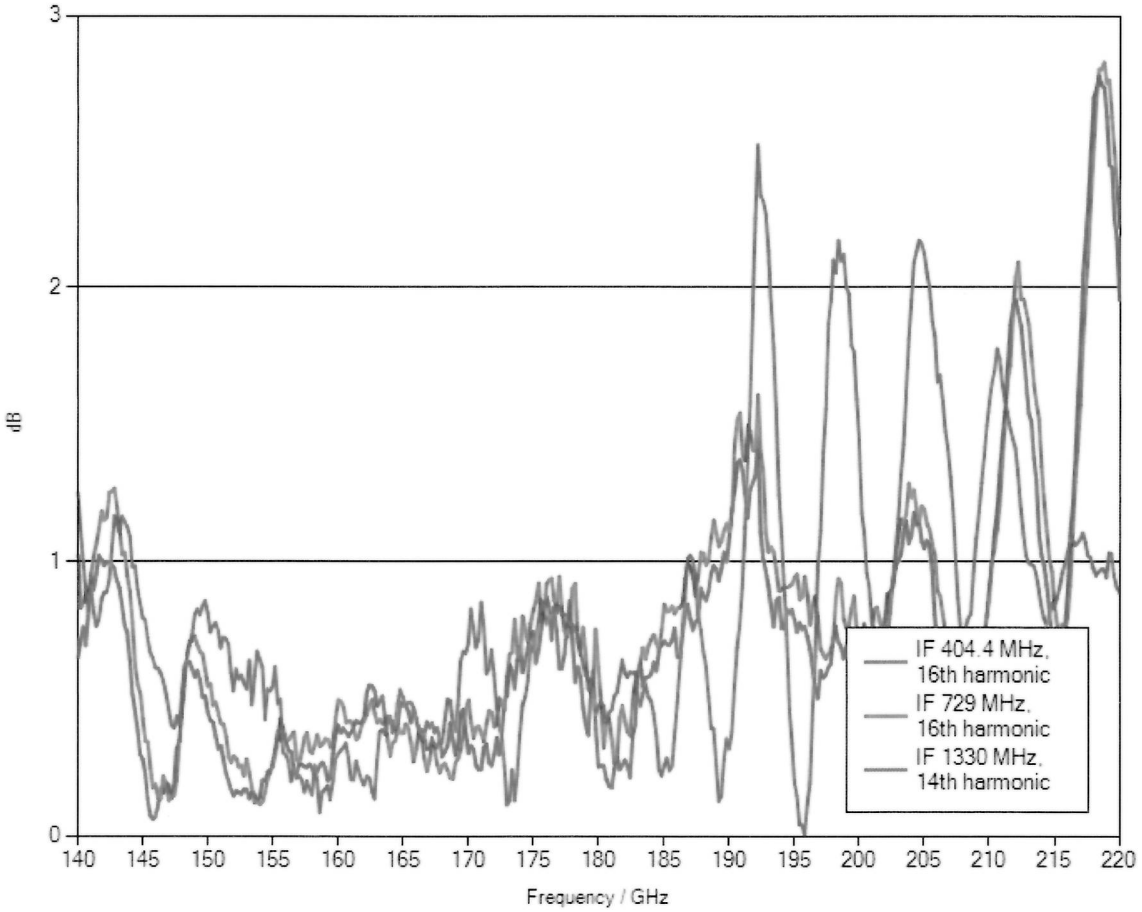


Software used for measurement

Item Type	Version	Remark
Measurement Studio Professional Edition	2013	
MixerCertification	7_15	

1.1 Deviation between actual and previous conversion loss



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Werner-von-Siemens-Str. 4
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Telefon 02225-99981-0
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RPG Radiometer Physics GmbH, Werner-von-Siemens-Str. 4, D-53340
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Riedbachstr. 37
87700 Memmingen

Ansprechpartner: Frank Marvin Gottbehüt
Abteilung: 1RP-E

Telefon 02225-99981-0
Fax 02225-99981-99
mm-wave-service@radiometer-physics.de

Meckenheim, 2021-09-29

Servicebericht

Allgemeine Daten			
Bauteilbezeichnung	FS-Z220		
RMA Nummer	6655	**Artikelnr. /Materialnr.**	3593.3250.02
Eingangsdatum	2021-09-28	**Seriennummer (SN)**	100960

Die folgenden Arbeiten wurden am Gerät durchgeführt:

☒	Überprüfung	☐	Nachrüstung
☐	Reparatur	☐	Umrüstung
☒	Kalibrierung	☐	Austausch
☐	Justierung	☒	Gerät gereinigt
☐	Sonderkalibrierung	☐	Elektrischer Sicherheitstest
☐	Performance Check	☒	Sonstiges (Siehe Bericht)

Bericht:

Virenscan durchgeführt, keine Bedrohung ermittelt.

2021-09-29	**Frank Marvin Gottbehüt**	**Unterschrift**
Datum	**Name**	