ROHDE&SCHWARZ

# Calibration Certificate
Kalibrierschein

**Certificate Number 24-0110-101467-01**
Zertifikatsnummer

## Unit Data

**Item**
Gegenstand
**Harmonic Mixer, 75 GHz to 110 GHz**

**Manufacturer**
Hersteller
**ROHDE & SCHWARZ**

**Type**
Typ
**R&S® FS-Z110**

**Material Number**
Materialnummer
**1048.0471.02**

**Serial Number**
Seriennummer
**101467**

**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, 2017-01-12**

**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
**2017-01-13**

**Head of Laboratory**
Laborleitung
Ceru

**Person Responsible**
Bearbeiter
Heinze



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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

**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**<br>Gegenstand | **Type**<br>Typ | **Serial Number**<br>Seriennummer | **Calibration Certificate Number**<br>Kalibrierscheinnummer | **Cal. Due**<br>Kalibr. bis |
|---|---|---|---|---|
| Vector Network Analyzer | R&S® ZVA67 | 101097 | 10-300319061 | 2017-08-06 |
| Powersensor | R&S® NRP-Z55 | 140093 | 20-541556 | 2017-05-12 |
| Powersensor | R&S® NRP-Z58 | 101064 | 20-611527 | 2017-07-22 |
| Calibration kit | WR10 | W10001 | RPG-PAQA-TN-2014-005 | 2017-05-23 |

**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'.

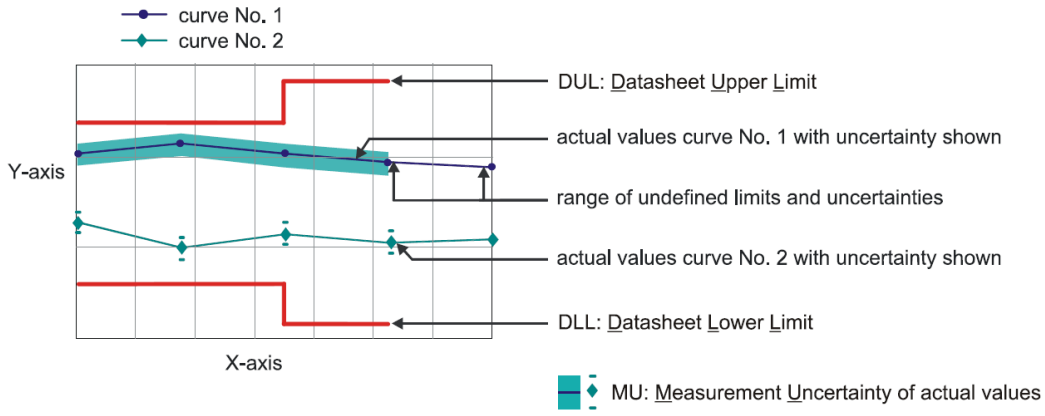
**Notes**
Anmerkungen

# 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. |
| {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. |
| DL or DT | Data Limit for symmetrical tolerance limits |
| DLL | Datasheet Lower Limit |
| DUL | Datasheet Upper Limit |
| MU | Measurement Uncertainty |
| MLL or MLV | Measurement Uncertainty Lower Value |
| MUL or MUV | Measurement Uncertainty Upper Value |
| Nom. | Nominal Value |
| Dev. | Deviation |
| MErr. | Measurement Error |
| Act. | Actual Value |
| UGB | Uncertainty Guard Band: Measuring uncertainty violates the data (spec.) limit. |
| UGB1 | Measurement results marked as UGB1 show conformity with a probability of >50 %and <95 %. |
| UGB2 | Measurement results marked as UGB2 show non-conformity with a probability of >50 %and <95 %. |
| DU | Datasheet Uncertainty |

### Explanation of charts

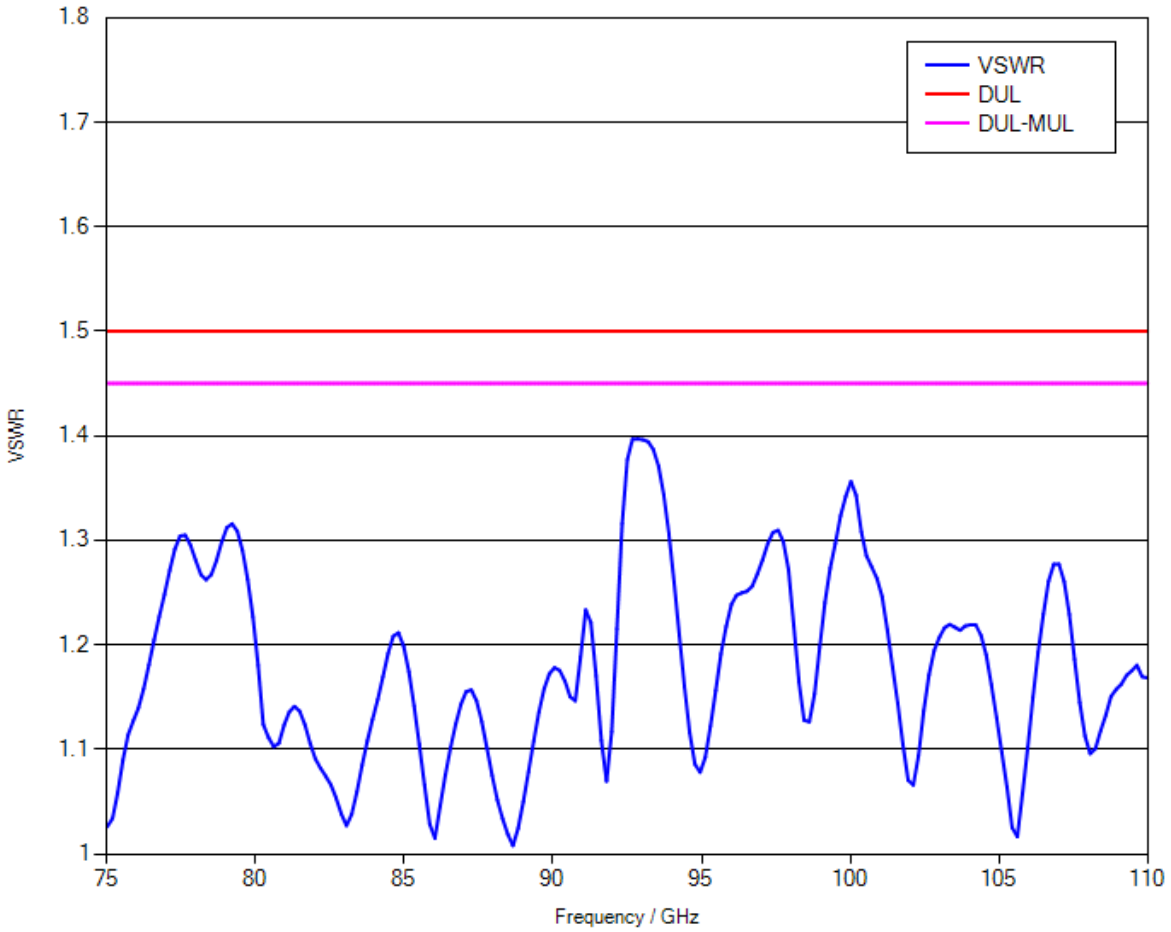


**Software used for measurement**

| Item Type | Version | Remark |
|---|---|---|
| Measurement Studio Professional Edition | 2013 | |
| MixerCertification | 7_04 | |

## 1.1 RF Input – VSWR

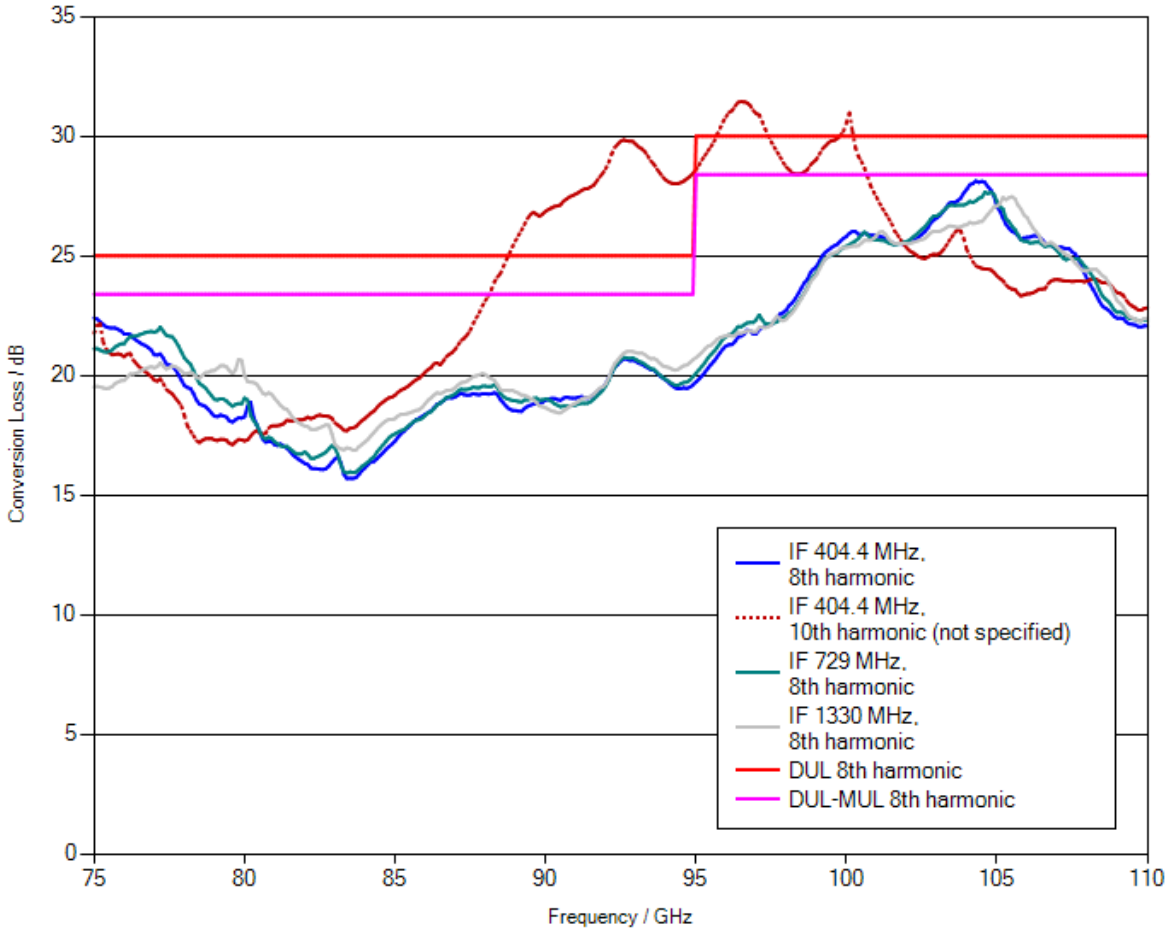
Measurement uncertainty: 0.05 (VSWR)



## 1.2 Conversion loss

LO level +15.5 dBm nominal
Bias 0 A

Measurement uncertainty: 1.6 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.**

**The file has been renamed for safety reasons.**
**When downloading the file onto your PC, please delete the ".file" extension and unzip the data.**

## 1.3 Frequency response within 1 GHz

| | DUL | Actual (worst case) | Evaluation |
|---|---|---|---|
| IF = 404.4 MHz, 8th harmonic | 6 dB | 2.26 dB | PASS |
| IF = 404.4 MHz, 10th harmonic | not specified | 3.78 dB | not specified |
| IF = 729 MHz, 8th harmonic | 6 dB | 2.06 dB | PASS |
| IF = 1330 MHz, 8th harmonic | 6 dB | 2.08 dB | PASS |