

Calibration Certificate

Certificate Number **20-1068331**

Kalibrierschein

Zertifikatsnummer

Unit Data

Item
Gegenstand **TC-RSE60 RECEIVE UNIT 41 TO 60 GHZ**

Manufacturer
Hersteller **ROHDE & SCHWARZ**

Type
Typ **TC-RSE60**

Material Number **1538.5700.02** **Serial Number** **100723**
Materialnummer Seriennummer

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber

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.

Order Number
Bestellnummer

Date of Receipt **2020-12-18**
Eingangdatum

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung

Memmingen, 2020-12-18

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.

Extent of Calibration Documents
Umfang des Kalibrierdokuments

**2 Pages Calibration Certificate
4 Pages Outgoing Results**

Ref.No. 20-1068331

Cal. 2020-12-18	Custom. Due Date
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 ROHDE & SCHWARZ

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

2020-12-18

Steigmüller

Detlef Köntopp

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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
Thermal Power Sensor Vector Network Analyzer 4 Port	NRP67T ZVA67	101002	599749 D-K-15195-01-00 2021-05	2024-05-31
		101213	596184 D-K-15195-01-00 2021-04	2023-04-30

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 G8:09/2019 Guidelines on Decision Rules and Statements of Conformity	

Notes
Anmerkungen

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

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.
FL or FT	Factory 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

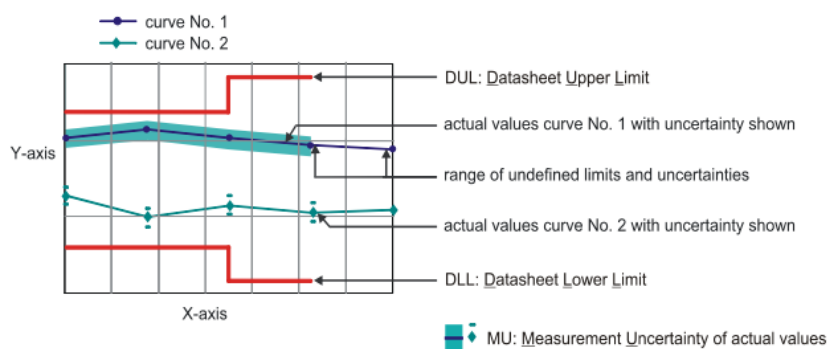


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1 Conversion Loss

Measurement uncertainty is not used as a guardband, since calibration is a characterization.

FLL: Factory Lower Limit.

FUL: Factory Upper Limit.

Frequency /GHz	Act. / dB	FLL / dB	FUL / dB	MU / dB
40	-95.2	-200	-42	1
41	-24.1	-200	-5	1
42	-12.7	-200	-5	1
43	-11.1	-25	-5	1
44	-14.2	-25	-5	1
45	-15.1	-25	-5	1
46	-16.2	-25	-5	1
47	-14.8	-25	-5	1
48	-16.3	-25	-5	1
49	-15.5	-25	-5	1
50	-14.5	-25	-5	1
51	-14.0	-25	-5	1
52	-11.2	-25	-5	1
53	-14.1	-25	-5	1
54	-13.9	-25	-5	1
55	-13.1	-25	-5	1
56	-14.3	-25	-5	1
57	-14.4	-25	-5	1
58	-14.0	-25	-5	1
59	-14.3	-25	-5	1
60	-14.9	-25	-5	1

Calibration Certificate

Certificate Number **20-1068517**

Kalibrierschein

Zertifikatsnummer

Unit Data

Item
Gegenstand **TC-RSE90 RECEIVE UNIT 60 TO 90 GHZ**

Manufacturer
Hersteller **ROHDE & SCHWARZ**

Type
Typ **TC-RSE90**

Material Number **1538.5717.03** **Serial Number** **100760**
Materialnummer Seriennummer

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber

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.

Order Number
Bestellnummer

Date of Receipt **2020-12-21**
Eingangdatum

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung

Memmingen, 2020-12-21

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.

Extent of Calibration Documents
Umfang des Kalibrierdokuments

**2 Pages Calibration Certificate
4 Pages Outgoing Results**

Ref.No. 20-1068517

Cal.	Custom. Due Date
2020-12-21	

 ROHDE & SCHWARZ

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

2020-12-21

Steigmüller

Detlef Köntopp

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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
Thermal Power Sensor	NRP67T	101404	0001A300657531	2023-07-31
Thermal Waveguide Power Sensor	NRP90TWG	100747	0001A300658908	2023-07-31
Frequency Converter	ZC90	101130	0001-300646303	2023-05-31
Vector Network Analyzer 4 Port	ZVA67	101213	596184 D-K-15195-01-00 2021-04	2023-04-30

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 G8:09/2019 Guidelines on Decision Rules and Statements of Conformity	

Notes
Anmerkungen

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

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.
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{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.
FL or FT	Factory 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

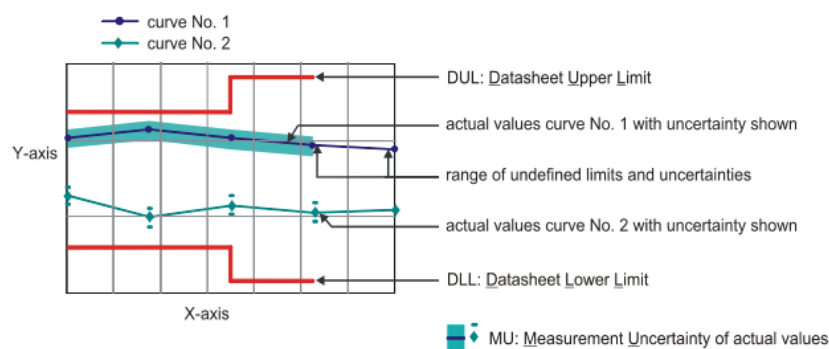


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1 Conversion Loss

Measurement uncertainty is not used as a guardband, since calibration is a characterization.

FLL: Factory Lower Limit.

FUL: Factory Upper Limit.

Frequency /GHz	Act. / dB	FLL / dB	FUL / dB	MU / dB
60	-19.4	-20	10	2
61	-15.4	-20	10	2
62	-10.8	-20	10	2
63	-8.3	-20	10	2
64	-7.5	-20	10	2
65	-6.7	-20	10	2
66	-7.8	-15	10	2
67	-9.5	-15	10	2
68	-7.1	-15	10	2
69	-5.8	-15	10	2
70	-7.5	-15	10	2
71	-8.4	-15	10	2
72	-7.0	-15	10	2
73	-6.2	-15	10	2
74	-7.8	-15	10	2
75	-7.2	-15	10	2
76	-4.7	-15	10	2
77	-4.2	-15	10	2
78	-4.2	-15	10	2
79	-2.7	-15	10	2
80	-1.9	-15	10	2
81	-1.4	-15	10	2
82	-0.6	-15	10	2
83	-0.5	-15	10	2
84	-0.4	-15	10	2
85	-0.9	-15	10	2
86	-1.7	-15	10	2
87	-3.2	-15	10	2
88	-3.5	-15	10	2
89	-3.9	-15	10	2
90	-5.8	-15	10	2

Calibration Certificate

Certificate Number **20-1068534**

Kalibrierschein

Zertifikatsnummer

Unit Data

Item
Gegenstand **TC-RSE140 RECEIVE UNIT 90 TO 140GHZ**

Manufacturer
Hersteller **ROHDE & SCHWARZ**

Type
Typ **TC-RSE140**

Material Number **1538.5723.02** **Serial Number** **101250**
Materialnummer Seriennummer

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber

Order Number
Bestellnummer

Date of Receipt **2021-06-16**
Eingangdatum

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung

Scope of Calibration
Umfang der Kalibrierung

Statement of Compliance (Incoming)
Konformitätsaussage (Anlieferung)

Statement of Compliance (Outgoing)
Konformitätsaussage (Auslieferung)

Extent of Calibration Documents
Umfang des Kalibrierdokuments

Memmingen, 2021-06-16

Standard Calibration

New device

All measured values are within the data sheet specifications.

2 Pages Calibration Certificate
5 Pages Outgoing Results

Ref.No. 20-1068534

Cal.	Custom. Due Date
2021-06-16	

 ROHDE & SCHWARZ

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.

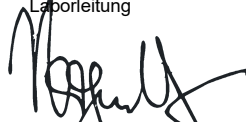
Dieser Kalibrierschein dokumentiert, dass der genannte Gegenstand nach festgelegten Vorgaben geprüft und gemessen wurde. Die Messwerte lagen im Regelfall mit einer Wahrscheinlichkeit von annähernd 95% im zugeordneten Werteintervall (Erweiterte Messunsicherheit mit $k = 2$). Die Kalibrierung erfolgte 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

2021-06-16

Head of Laboratory
Laborleitung


Steigmüller

Person Responsible
Bearbeiter


Detlef Köntopp

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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
Thermal Power Sensor	NRP67T	101404	0001A300657531	2023-07-31
Millimeter-Submillimeter Power	PM5	451V	100002 D-K-15195-01-00 2021-03	2024-03-31
Frequency Converter	ZC140	100830	0001-300652674	2023-07-31
Vector Network Analyzer 4 Port	ZVA67	101213	596184 D-K-15195-01-00 2021-04	2023-04-30

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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.
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MUL or MUV	Measurement Uncertainty Upper Value.
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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

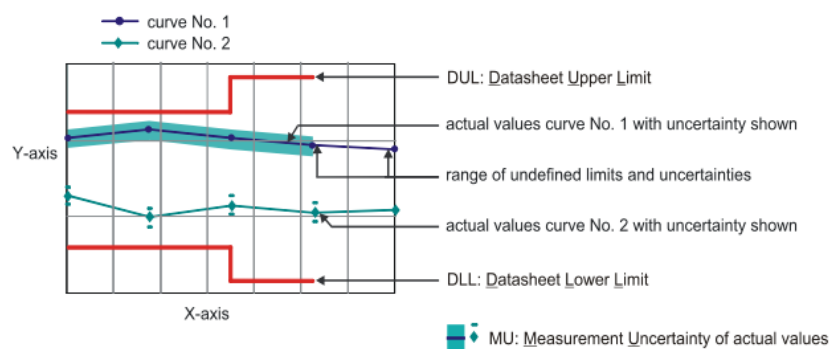


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1	Conversion Loss.....	4
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1 Conversion Loss

Non-traceable measurements with factory limits (n.trc.) Represent product performance that is indicated and tested as described above. However, it cannot be warranted due to the lack of measuring equipment that is traceable to national metrology laboratories. In this case measurements are referenced to standards of the R&S laboratories.

Measurement uncertainty is not used as a guardband, since calibration is a characterization.

FLL: Factory Lower Limit.

FUL: Factory Upper Limit.

Frequency /GHz	Act. / dB	FLL / dB	FUL / dB	MU / dB	
90	-11.2	-20	0	2	
91	-10.4	-20	0	2	
92	-10.3	-20	0	2	
93	-10.7	-20	0	2	
94	-12.0	-20	0	2	
95	-12.4	-20	0	2	
96	-13.1	-20	0	2	
97	-12.0	-20	0	2	
98	-13.1	-20	0	2	
99	-12.6	-20	0	2	
100	-12.9	-20	0	2	
101	-12.5	-20	0	2	
102	-12.6	-20	0	2	
103	-12.8	-20	0	2	
104	-12.9	-20	0	2	
105	-12.6	-20	0	2	
106	-12.6	-20	0	2	
107	-12.5	-20	0	2	
108	-11.5	-20	0	2	
109	-11.7	-20	0	2	
110	-10.3	-20	0	2	
111	-10.2	-20	0	2	n.trc.
112	-11.4	-20	0	2	n.trc.
113	-11.1	-20	0	2	n.trc.
114	-11.3	-20	0	2	n.trc.
115	-10.7	-20	0	2	n.trc.
116	-10.6	-20	0	2	n.trc.
117	-11.7	-20	0	2	n.trc.
118	-12.4	-20	0	2	n.trc.
119	-12.0	-20	0	2	n.trc.
120	-11.6	-20	0	2	n.trc.
121	-11.5	-20	0	2	n.trc.
122	-11.5	-20	0	2	n.trc.
123	-11.5	-20	0	2	n.trc.
124	-12.3	-20	0	2	n.trc.
125	-12.7	-20	0	2	n.trc.
126	-11.6	-20	0	2	n.trc.
127	-10.8	-20	0	2	n.trc.
128	-11.0	-20	0	2	n.trc.
129	-11.2	-20	0	2	n.trc.
130	-10.9	-20	0	2	n.trc.
131	-9.9	-20	0	2	n.trc.
132	-10.3	-20	0	2	n.trc.
133	-10.1	-20	0	2	n.trc.
134	-9.8	-20	0	2	n.trc.

135	-9.7	-20	0	2	n.trc.
136	-9.1	-20	0	2	n.trc.
137	-9.0	-20	0	2	n.trc.
138	-9.1	-20	0	2	n.trc.
139	-9.1	-20	0	2	n.trc.
140	-10.4	-20	0	2	n.trc.

Calibration Certificate

Certificate Number **20-1068558**

Kalibrierschein

Zertifikatsnummer

Unit Data

Item
Gegenstand **TC-RSE200 RECEIVE UNIT 140 - 200GHZ**

Manufacturer
Hersteller **ROHDE & SCHWARZ**

Type
Typ **TC-RSE200**

Material Number **1538.5730.02** **Serial Number** **100760**
Materialnummer Seriennummer

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber

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.

Order Number
Bestellnummer

Date of Receipt **2021-05-18**
Eingangdatum

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung

Memmingen, 2021-05-18

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.

Extent of Calibration Documents
Umfang des Kalibrierdokuments

**2 Pages Calibration Certificate
5 Pages Outgoing Results**

Ref.No. 20-1068558

Cal.	Custom. Due Date
2021-05-18	

 **ROHDE & SCHWARZ**

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

2021-05-18

Steigmüller

Detlef Köntopp

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ver9815/MB0707

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
Thermal Power Sensor	NRP67T	101404	0001A300657531	2023-07-31
Millimeter-Submillimeter Power	PM5	451V	100002 D-K-15195-01-00 2021-03	2024-03-31
Frequency Converter	ZC220	101435	20-1024543	2023-01-31
Vector Network Analyzer 4 Port	ZVA67	101213	596184 D-K-15195-01-00 2021-04	2023-04-30

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 G8:09/2019 Guidelines on Decision Rules and Statements of Conformity	

Notes
Anmerkungen

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

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.
FL or FT	Factory 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

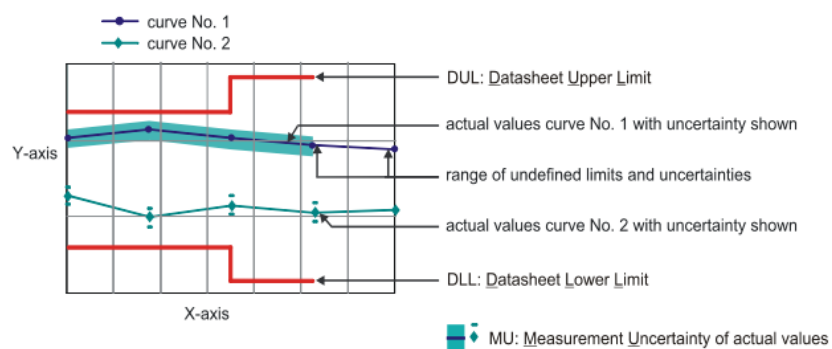


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1	Conversion Loss.....	4
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1 Conversion Loss

Non-traceable measurements with factory limits (n.trc.) Represent product performance that is indicated and tested as described above. However, it cannot be warranted due to the lack of measuring equipment that is traceable to national metrology laboratories. In this case measurements are referenced to standards of the R&S laboratories.

Measurement uncertainty is not used as a guardband, since calibration is a characterization.

FLL: Factory Lower Limit.

FUL: Factory Upper Limit.

Frequency /GHz	Act. / dB	FLL / dB	FUL / dB	MU / dB	
138	-2.0	-25.0	20	2	n.trc.
139	0.6	-25.0	20	2	n.trc.
140	-16.9	-25.0	20	2	n.trc.
141	7.0	-25.0	20	2	n.trc.
142	10.9	-25.0	20	2	n.trc.
143	10.8	-25.0	20	2	n.trc.
144	11.8	-25.0	20	2	n.trc.
145	11.1	-25.0	20	2	n.trc.
146	10.0	-25.0	20	2	n.trc.
147	12.0	-25.0	20	2	n.trc.
148	12.2	-25.0	20	2	n.trc.
149	13.1	-25.0	20	2	n.trc.
150	13.3	-25.0	20	2	n.trc.
151	12.0	-25.0	20	2	n.trc.
152	12.9	-25.0	20	2	n.trc.
153	12.6	-25.0	20	2	n.trc.
154	12.7	-25.0	20	2	n.trc.
155	12.7	-25.0	20	2	n.trc.
156	12.7	-25.0	20	2	n.trc.
157	12.9	-25.0	20	2	n.trc.
158	13.2	-25.0	20	2	n.trc.
159	13.1	-25.0	20	2	n.trc.
160	13.5	-25.0	20	2	n.trc.
161	13.4	-25.0	20	2	n.trc.
162	13.1	-25.0	20	2	n.trc.
163	12.7	-25.0	20	2	n.trc.
164	12.6	-25.0	20	2	n.trc.
165	12.9	-25.0	20	2	n.trc.
166	12.4	-25.0	20	2	n.trc.
167	12.5	-25.0	20	2	n.trc.
168	12.6	-25.0	20	2	n.trc.
169	12.5	-25.0	20	2	n.trc.
170	12.0	-25.0	20	2	n.trc.
171	11.7	-25.0	20	2	n.trc.
172	11.2	-25.0	20	2	n.trc.
173	11.0	-25.0	20	2	n.trc.
174	11.4	-25.0	20	2	n.trc.
175	12.3	-25.0	20	2	n.trc.
176	12.7	-25.0	20	2	n.trc.
177	13.0	-25.0	20	2	n.trc.
178	13.2	-25.0	20	2	n.trc.
179	13.2	-25.0	20	2	n.trc.
180	13.6	-25.0	20	2	n.trc.
181	13.9	-25.0	20	2	n.trc.
182	13.9	-25.0	20	2	n.trc.
183	13.7	-25.0	20	2	n.trc.
184	13.2	-25.0	20	2	n.trc.
185	12.8	-25.0	20	2	n.trc.
186	12.1	-25.0	20	2	n.trc.

187	12.4	-25.0	20	2	n.trc.
188	12.6	-25.0	20	2	n.trc.
189	13.0	-25.0	20	2	n.trc.
190	13.1	-25.0	20	2	n.trc.
191	13.2	-25.0	20	2	n.trc.
192	12.3	-25.0	20	2	n.trc.
193	12.3	-25.0	20	2	n.trc.
194	12.6	-25.0	20	2	n.trc.
195	12.4	-25.0	20	2	n.trc.
196	12.2	-25.0	20	2	n.trc.
197	11.9	-25.0	20	2	n.trc.
198	11.3	-25.0	20	2	n.trc.
199	10.8	-25.0	20	2	n.trc.
200	9.8	-25.0	15	2	n.trc.
201	9.5	-25.0	15	2	n.trc.
202	9.4	-25.0	15	2	n.trc.
203	9.9	-25.0	15	2	n.trc.
204	10.3	-25.0	15	2	n.trc.
205	10.1	-25.0	15	2	n.trc.
206	10.1	-25.0	15	2	n.trc.
207	10.7	-25.0	15	2	n.trc.
208	10.7	-25.0	15	2	n.trc.
209	10.3	-25.0	15	2	n.trc.
210	9.7	-25.0	15	2	n.trc.
211	9.5	-25.0	15	2	n.trc.
212	9.4	-25.0	15	2	n.trc.
213	9.4	-25.0	15	2	n.trc.
214	9.4	-25.0	15	2	n.trc.
215	9.4	-25.0	15	2	n.trc.
216	9.2	-25.0	15	2	n.trc.
217	9.5	-25.0	15	2	n.trc.
218	9.7	-25.0	15	2	n.trc.
219	9.4	-25.0	15	2	n.trc.
220	8.9	-25.0	15	2	n.trc.

Calibration Certificate

Certificate Number **20-1069069**

Kalibrierschein

Zertifikatsnummer

Unit Data

Item
Gegenstand **TC-MX325 MULTIPLIER 220 TO 325 GHZ**

Manufacturer
Hersteller **ROHDE & SCHWARZ**

Type
Typ **TC-MX200**

Material Number **1538.5946.02** **Serial Number** **100748**
Materialnummer Seriennummer

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber

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Order Number
Bestellnummer

Date of Receipt **2021-12-17**
Eingangdatum

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung

Memmingen, 2021-12-17

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.

Extent of Calibration Documents
Umfang des Kalibrierdokuments

**2 Pages Calibration Certificate
6 Pages Outgoing Results**

Ref.No. 20-1069069

Cal. 2021-12-17	Custom. Due Date
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 ROHDE & SCHWARZ

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Rohde & Schwarz Messgerätebau GmbH

Date of Issue
Ausstellungsdatum

Head of Laboratory
Laborleitung

Person Responsible
Bearbeiter

2021-12-17

Steigmüller

Detlef Köntopp

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ver9815/MB0707

Calibration Method
Kalibrieranweisung

See first page of Outgoing Results

Relative Humidity
Relative Luftfeuchte

20%-60%

Ambient Temperature
Umgebungstemperatur

(23⁺¹₋₁) °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
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Frequency Converter	ZC220	101435	20-1024543	2023-01-31
Vector Network Analyzer 4 Port	ZVA67	101213	596184 D-K-15195-01-00 2021-04	2023-04-30

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Ref.: ILAC G8:09/2019 Guidelines on Decision Rules and Statements of Conformity	

Notes
Anmerkungen

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

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Explanation of charts

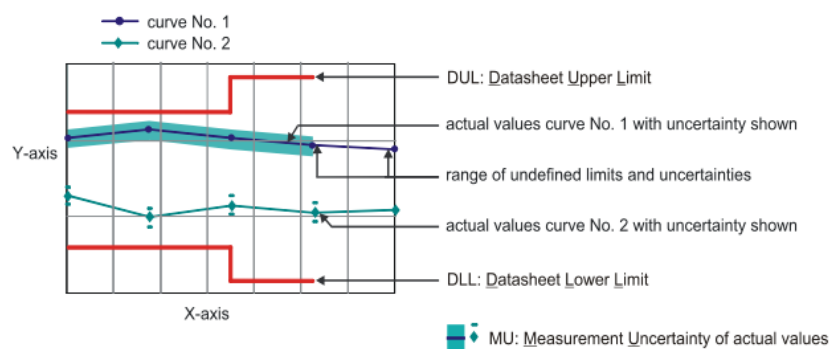


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1	Conversion Loss.....	4
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1 Conversion Loss

Non-traceable measurements with factory limits (n.trc.) Represent product performance that is indicated and tested as described above. However, it cannot be warranted due to the lack of measuring equipment that is traceable to national metrology laboratories. In this case measurements are referenced to standards of the R&S laboratories.

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220	6.3	0.0	20.0	2	n.trc.
221	7.0	0.0	20.0	2	n.trc.
222	6.9	0.0	20.0	2	n.trc.
223	7.9	0.0	20.0	2	n.trc.
224	8.5	0.0	20.0	2	n.trc.
225	9.4	0.0	20.0	2	n.trc.
226	9.8	0.0	20.0	2	n.trc.
227	10.6	0.0	20.0	2	n.trc.
228	11.6	0.0	20.0	2	n.trc.
229	11.5	0.0	20.0	2	n.trc.
230	12.3	0.0	20.0	2	n.trc.
231	12.2	0.0	20.0	2	n.trc.
232	11.8	0.0	20.0	2	n.trc.
233	10.8	0.0	20.0	2	n.trc.
234	10.0	0.0	20.0	2	n.trc.
235	10.4	0.0	20.0	2	n.trc.
236	10.1	0.0	20.0	2	n.trc.
237	11.2	0.0	20.0	2	n.trc.
238	11.5	0.0	20.0	2	n.trc.
239	12.7	0.0	20.0	2	n.trc.
240	13.4	0.0	20.0	2	n.trc.
241	13.4	0.0	20.0	2	n.trc.
242	13.3	0.0	20.0	2	n.trc.
243	13.9	0.0	20.0	2	n.trc.
244	13.2	0.0	20.0	2	n.trc.
245	13.3	0.0	20.0	2	n.trc.
246	13.4	0.0	20.0	2	n.trc.
247	13.8	0.0	20.0	2	n.trc.
248	13.6	0.0	20.0	2	n.trc.
249	13.4	0.0	20.0	2	n.trc.
250	13.0	0.0	20.0	2	n.trc.
251	12.5	0.0	20.0	2	n.trc.
252	12.3	0.0	20.0	2	n.trc.
253	11.9	0.0	20.0	2	n.trc.
254	11.2	0.0	20.0	2	n.trc.
255	10.8	0.0	20.0	2	n.trc.
256	10.7	0.0	20.0	2	n.trc.
257	10.5	0.0	20.0	2	n.trc.
258	10.7	0.0	20.0	2	n.trc.
259	10.5	0.0	20.0	2	n.trc.
260	10.3	0.0	20.0	2	n.trc.
261	10.2	0.0	20.0	2	n.trc.
262	10.7	0.0	20.0	2	n.trc.
263	11.7	0.0	20.0	2	n.trc.
264	12.1	0.0	20.0	2	n.trc.
265	12.2	0.0	20.0	2	n.trc.
266	12.3	0.0	20.0	2	n.trc.
267	12.3	0.0	20.0	2	n.trc.
268	12.0	0.0	20.0	2	n.trc.

269	12.1	0.0	20.0	2	n.trc.
270	11.8	0.0	20.0	2	n.trc.
271	11.5	0.0	20.0	2	n.trc.
272	11.7	0.0	20.0	2	n.trc.
273	11.7	0.0	20.0	2	n.trc.
274	11.9	0.0	20.0	2	n.trc.
275	11.8	0.0	20.0	2	n.trc.
276	12.0	0.0	20.0	2	n.trc.
277	11.8	0.0	20.0	2	n.trc.
278	12.2	0.0	20.0	2	n.trc.
279	12.0	0.0	20.0	2	n.trc.
280	12.0	0.0	20.0	2	n.trc.
281	11.9	0.0	20.0	2	n.trc.
282	12.0	0.0	20.0	2	n.trc.
283	11.7	0.0	20.0	2	n.trc.
284	11.8	0.0	20.0	2	n.trc.
285	11.6	0.0	20.0	2	n.trc.
286	11.6	0.0	20.0	2	n.trc.
287	11.7	0.0	20.0	2	n.trc.
288	11.5	0.0	20.0	2	n.trc.
289	12.0	0.0	20.0	2	n.trc.
290	12.1	0.0	20.0	2	n.trc.
291	12.4	0.0	20.0	2	n.trc.
292	12.5	0.0	20.0	2	n.trc.
293	12.5	0.0	20.0	2	n.trc.
294	12.2	0.0	20.0	2	n.trc.
295	12.0	0.0	20.0	2	n.trc.
296	11.8	0.0	20.0	2	n.trc.
297	11.8	0.0	20.0	2	n.trc.
298	11.8	0.0	20.0	2	n.trc.
299	11.6	0.0	20.0	2	n.trc.
300	11.7	0.0	20.0	2	n.trc.
301	11.5	0.0	20.0	2	n.trc.
302	11.5	0.0	20.0	2	n.trc.
303	11.5	0.0	20.0	2	n.trc.
304	11.6	0.0	20.0	2	n.trc.
305	11.6	0.0	20.0	2	n.trc.
306	11.7	0.0	20.0	2	n.trc.
307	11.3	0.0	20.0	2	n.trc.
308	11.2	0.0	20.0	2	n.trc.
309	11.1	0.0	20.0	2	n.trc.
310	10.7	0.0	20.0	2	n.trc.
311	10.2	0.0	20.0	2	n.trc.
312	10.3	0.0	20.0	2	n.trc.
313	10.2	0.0	20.0	2	n.trc.
314	10.1	0.0	20.0	2	n.trc.
315	9.9	0.0	20.0	2	n.trc.
316	10.1	0.0	20.0	2	n.trc.
317	10.1	0.0	20.0	2	n.trc.
318	9.7	0.0	20.0	2	n.trc.
319	9.6	0.0	20.0	2	n.trc.
320	9.3	0.0	20.0	2	n.trc.
321	9.4	0.0	20.0	2	n.trc.
322	9.0	0.0	20.0	2	n.trc.
323	8.9	0.0	20.0	2	n.trc.
324	8.6	0.0	20.0	2	n.trc.
325	8.1	0.0	20.0	2	n.trc.
326	8.5	0.0	20.0	2	n.trc.
327	8.3	0.0	20.0	2	n.trc.
328	7.2	0.0	20.0	2	n.trc.
329	6.2	0.0	20.0	2	n.trc.
330	6.0	0.0	20.0	2	n.trc.
331	5.2	0.0	20.0	2	n.trc.

332	4.9	0.0	20.0	2	n.trc.
333	4.0	0.0	20.0	2	n.trc.
334	5.2	0.0	20.0	2	n.trc.
335	6.3	0.0	20.0	2	n.trc.
336	6.1	0.0	20.0	2	n.trc.
337	5.8	0.0	20.0	2	n.trc.
338	5.8	0.0	20.0	2	n.trc.
339	5.7	0.0	20.0	2	n.trc.
340	4.4	0.0	20.0	2	n.trc.