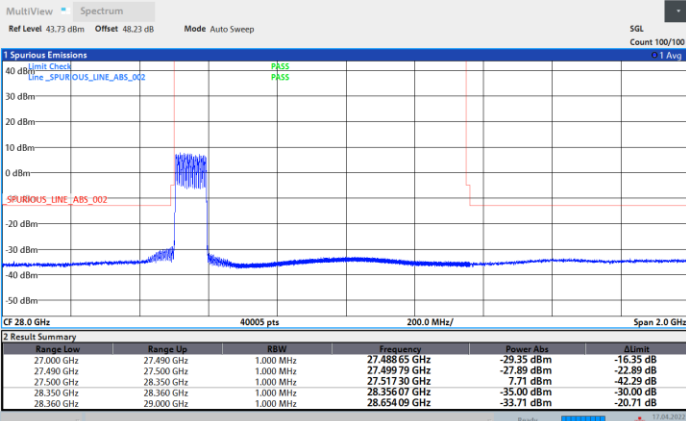




DFT-s-OFDM Module 1

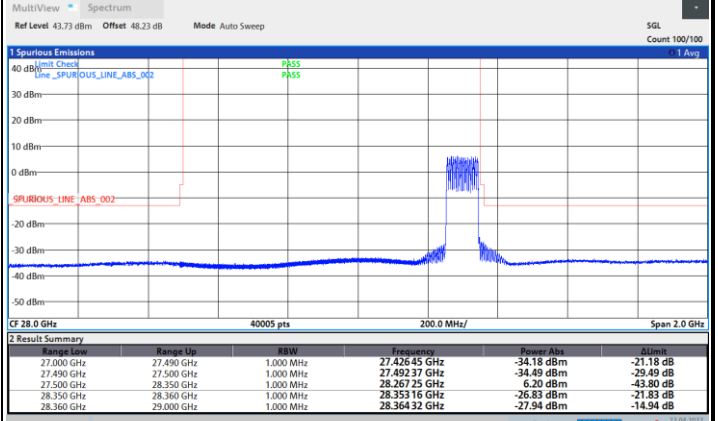
NR Band n261 / 100MHz / 16QAM

Lowest Band Edge / Full RB



22:19:51 17.04.2022

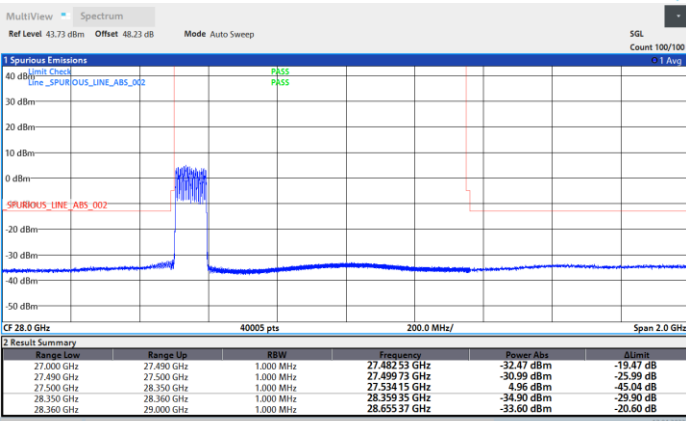
Highest Band Edge / Full RB



21:08:34 22.04.2022

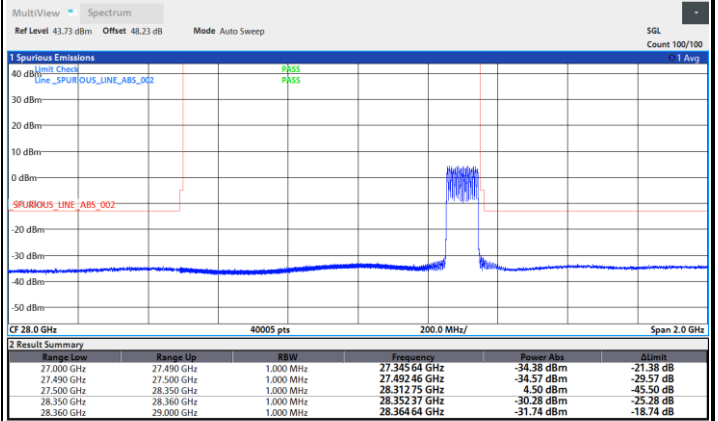
NR Band n261 / 100MHz / 64QAM

Lowest Band Edge / Full RB



22:20:43 17.04.2022

Highest Band Edge / Full RB



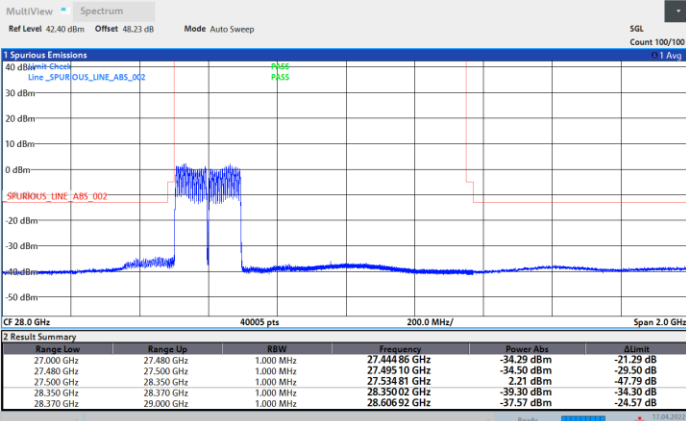
21:12:39 22.04.2022



DFT-s-OFDM Module 1

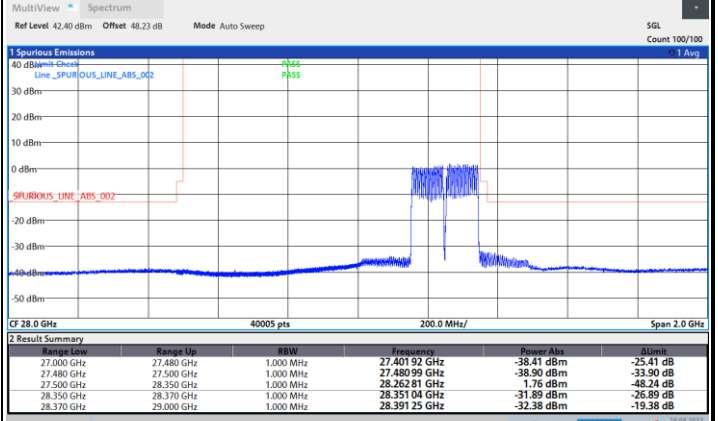
NR Band n261 / 200MHz / BPSK

Lowest Band Edge / Full RB



22:49:30 17.04.2022

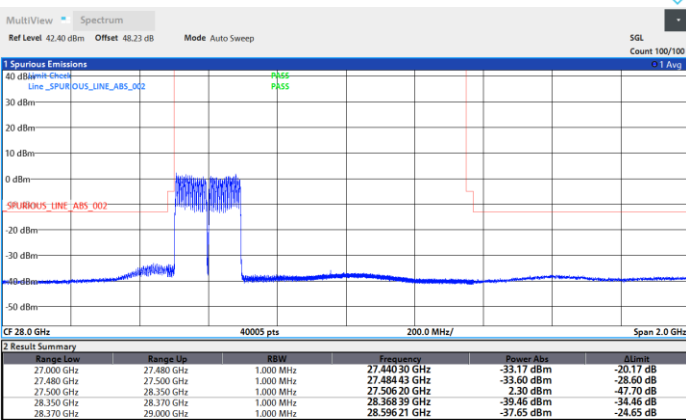
Highest Band Edge / Full RB



23:36:02 18.04.2022

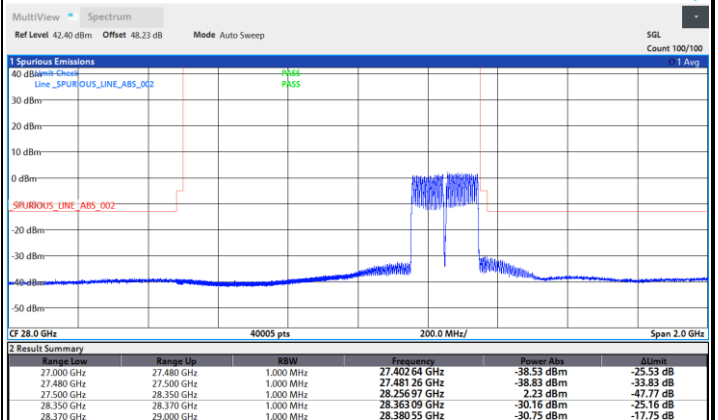
NR Band n261 / 200MHz / QPSK

Lowest Band Edge / Full RB



22:46:48 17.04.2022

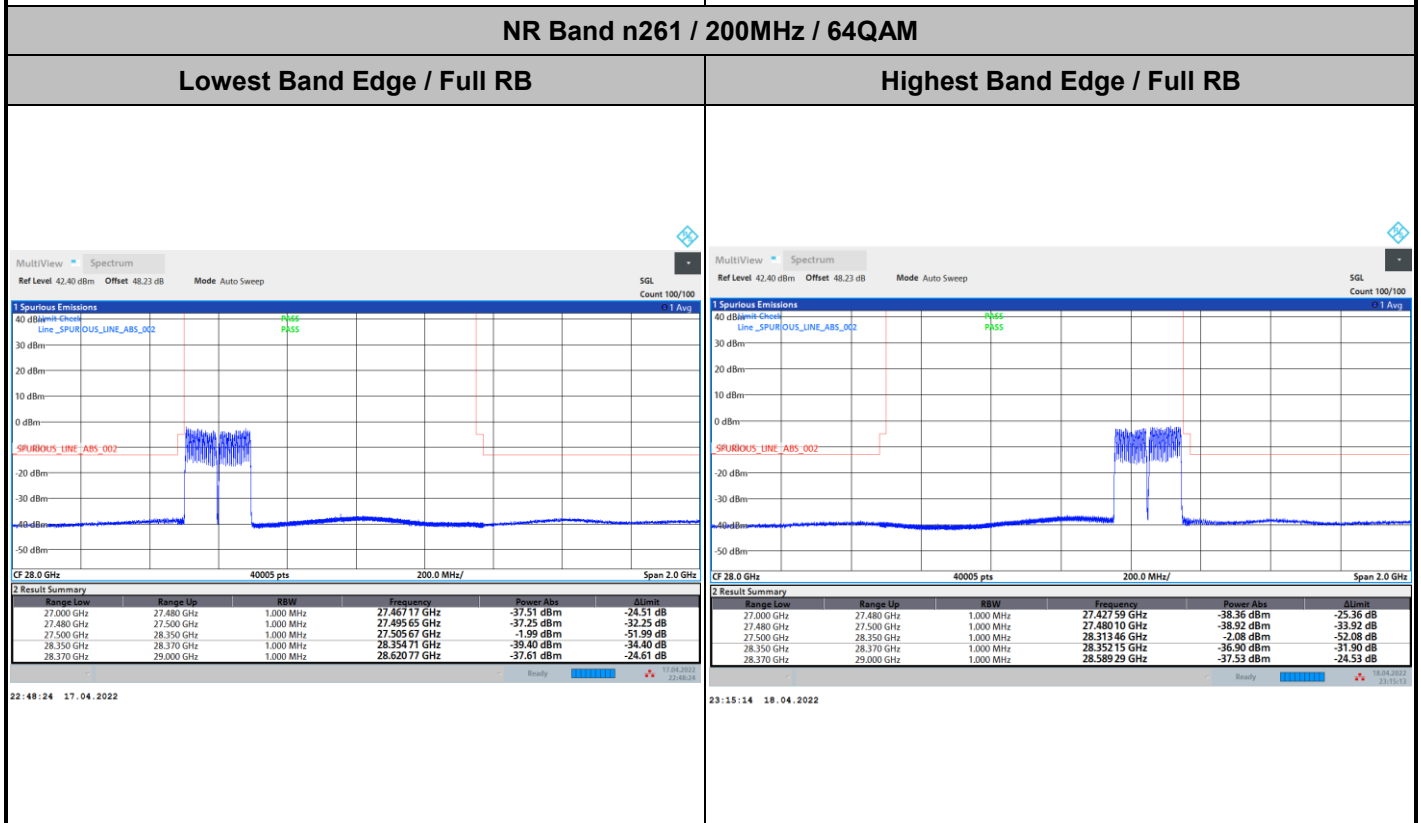
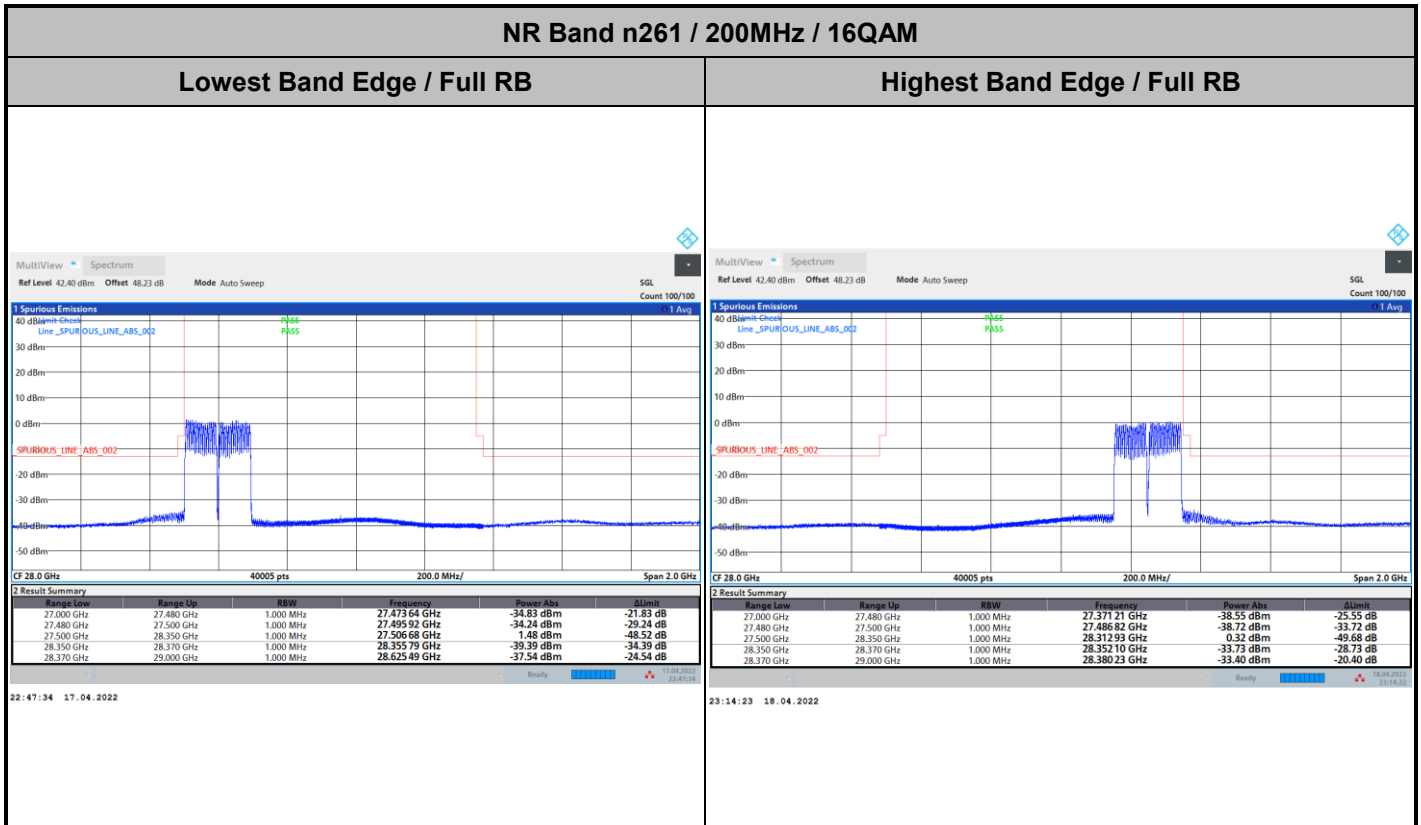
Highest Band Edge / Full RB



23:13:21 18.04.2022



DFT-s-OFDM Module 1

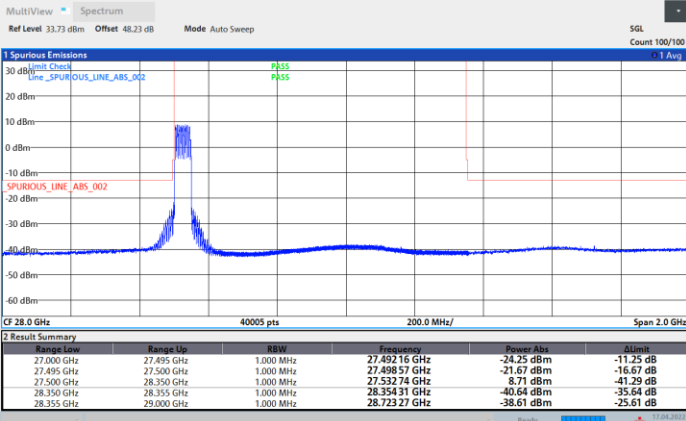




CP-OFDM Module 1

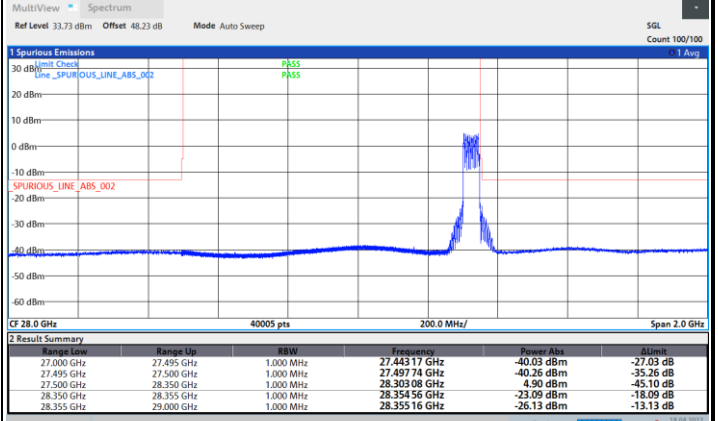
NR Band n261 / 50MHz / QPSK

Lowest Band Edge / Full RB



22:04:02 17.04.2022

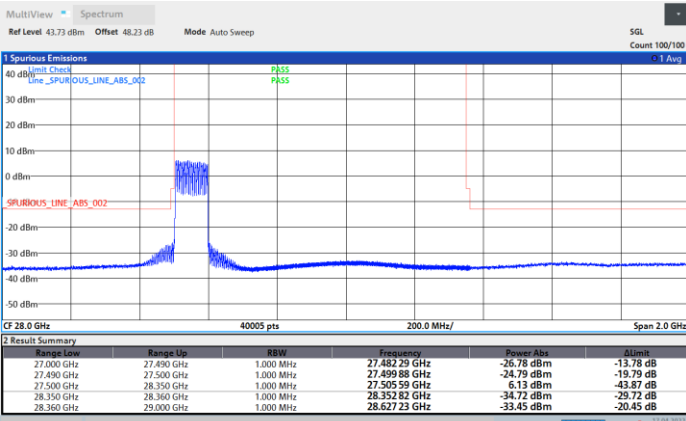
Highest Band Edge / Full RB



21:29:58 18.04.2022

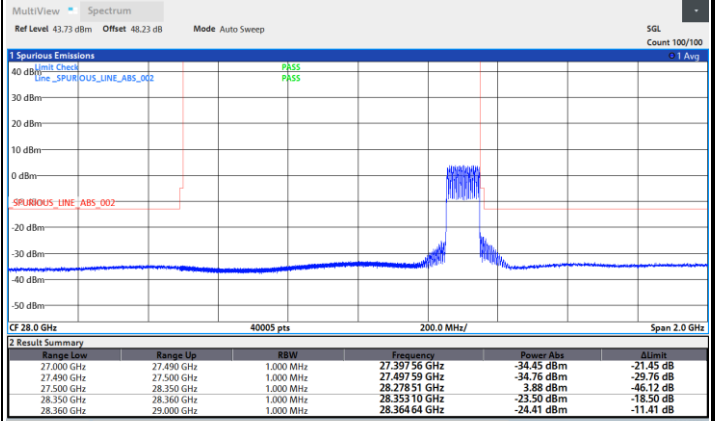
NR Band n261 / 100MHz / QPSK

Lowest Band Edge / Full RB



22:28:23 17.04.2022

Highest Band Edge / Full RB



22:29:43 18.04.2022

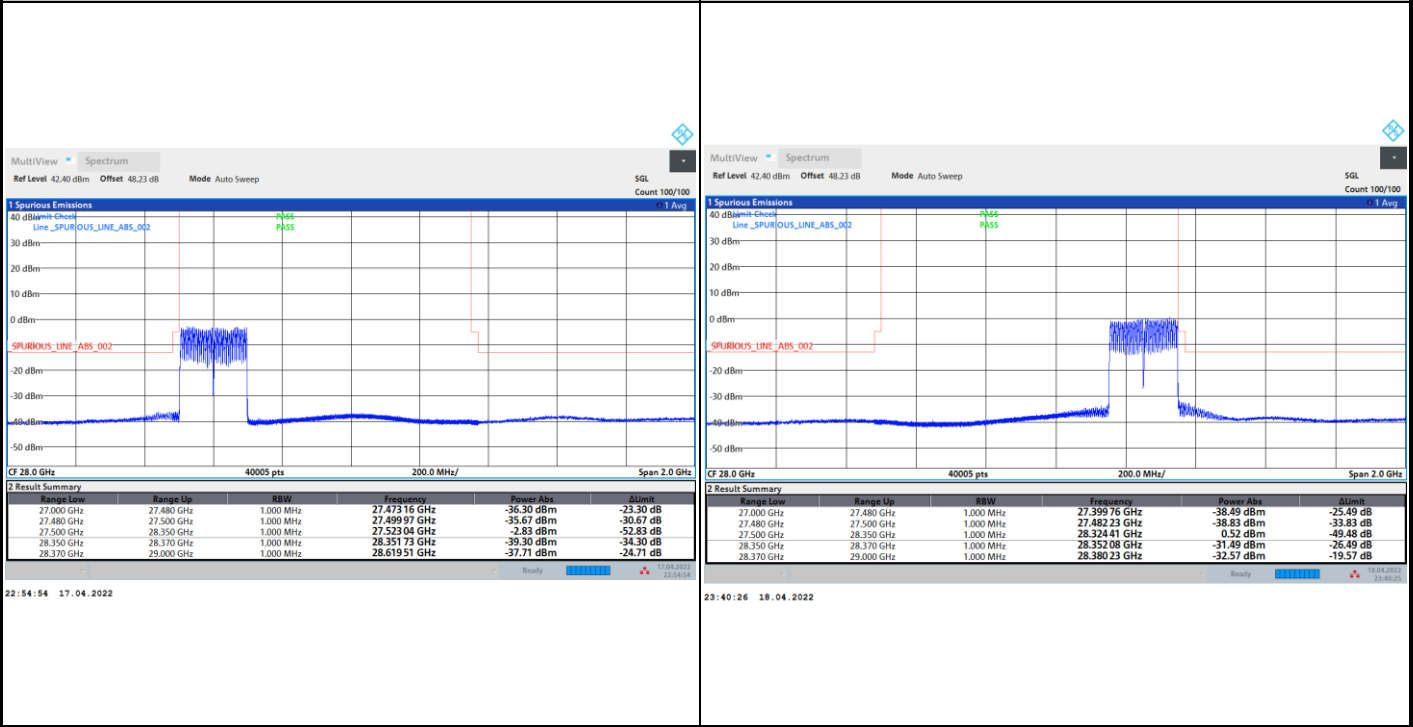


CP-OFDM Module 1

NR Band n261 / 200MHz / QPSK

Lowest Band Edge / Full RB

Highest Band Edge / Full RB

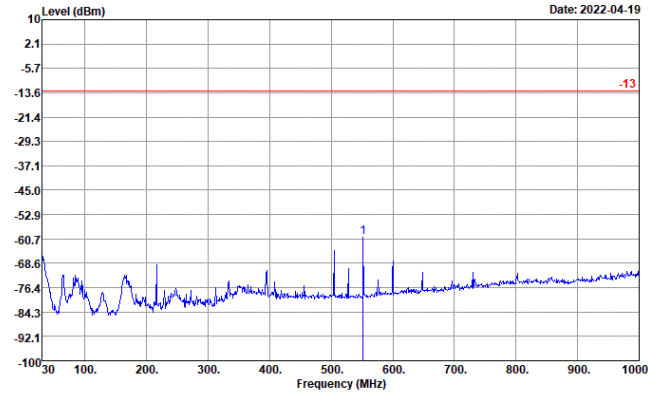




Spurious Emission

NR Band n261 (30MHz-1GHz)

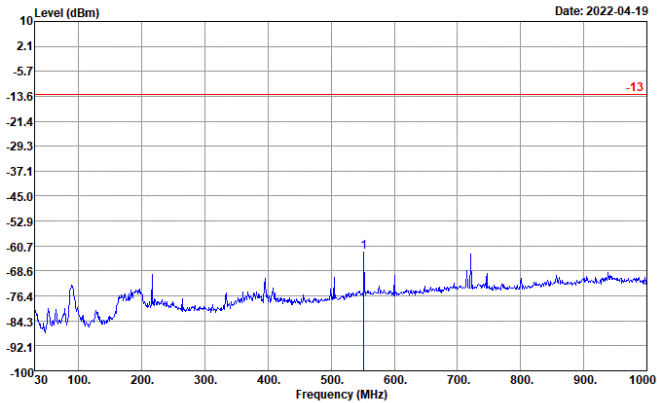
Horizontal



Site : 03CH19-HY
 Condition : -13 ERP EIRP_20210305 HORIZONTAL
 Project : 1D2414
 : n261 M1

1	Freq MHz	Level dBm	Over Limit dB	Limit Line dBm	Read Level dBm
1	551.86	-60.25	-47.25	-13.00	-60.49

Vertical



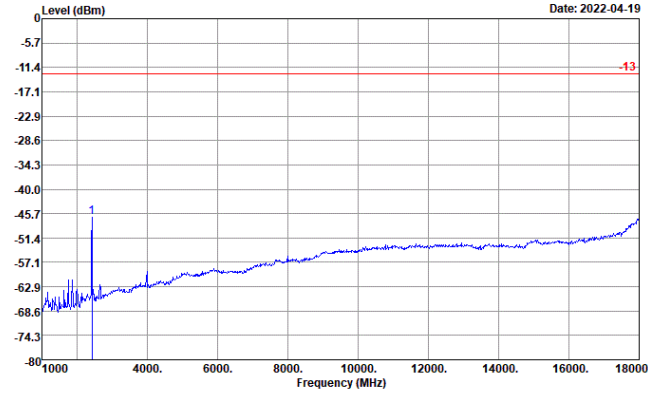
Site : 03CH19-HY
 Condition : -13 ERP EIRP_20210305 VERTICAL
 Project : 1D2414
 : n261 M1

1	Freq MHz	Level dBm	Over Limit dB	Limit Line dBm	Read Level dBm
1	551.86	-62.76	-49.76	-13.00	-66.79



NR Band n261 (1GHz-18GHz)

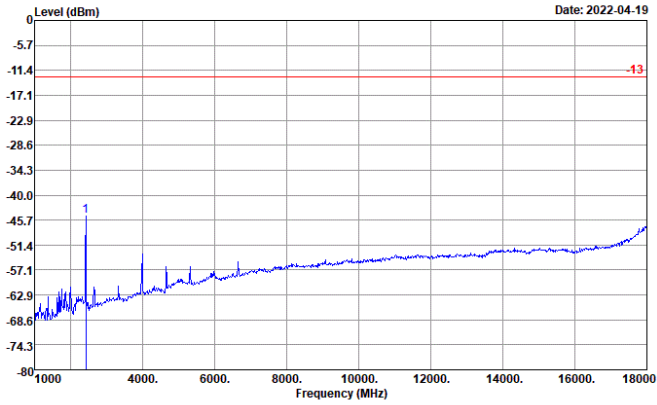
Horizontal



Site : 03CH19-HY
 Condition : -13 ERP EIRP_20210305 HORIZONTAL
 Project : 1D2414
 : n261 M1

Over	Limit	Read			
Freq	Level	Limit	Line	Level	
MHz	dBm	dB	dBm	dBm	
1	2428.00	-46.52	-33.52	-13.00	-57.59

Vertical



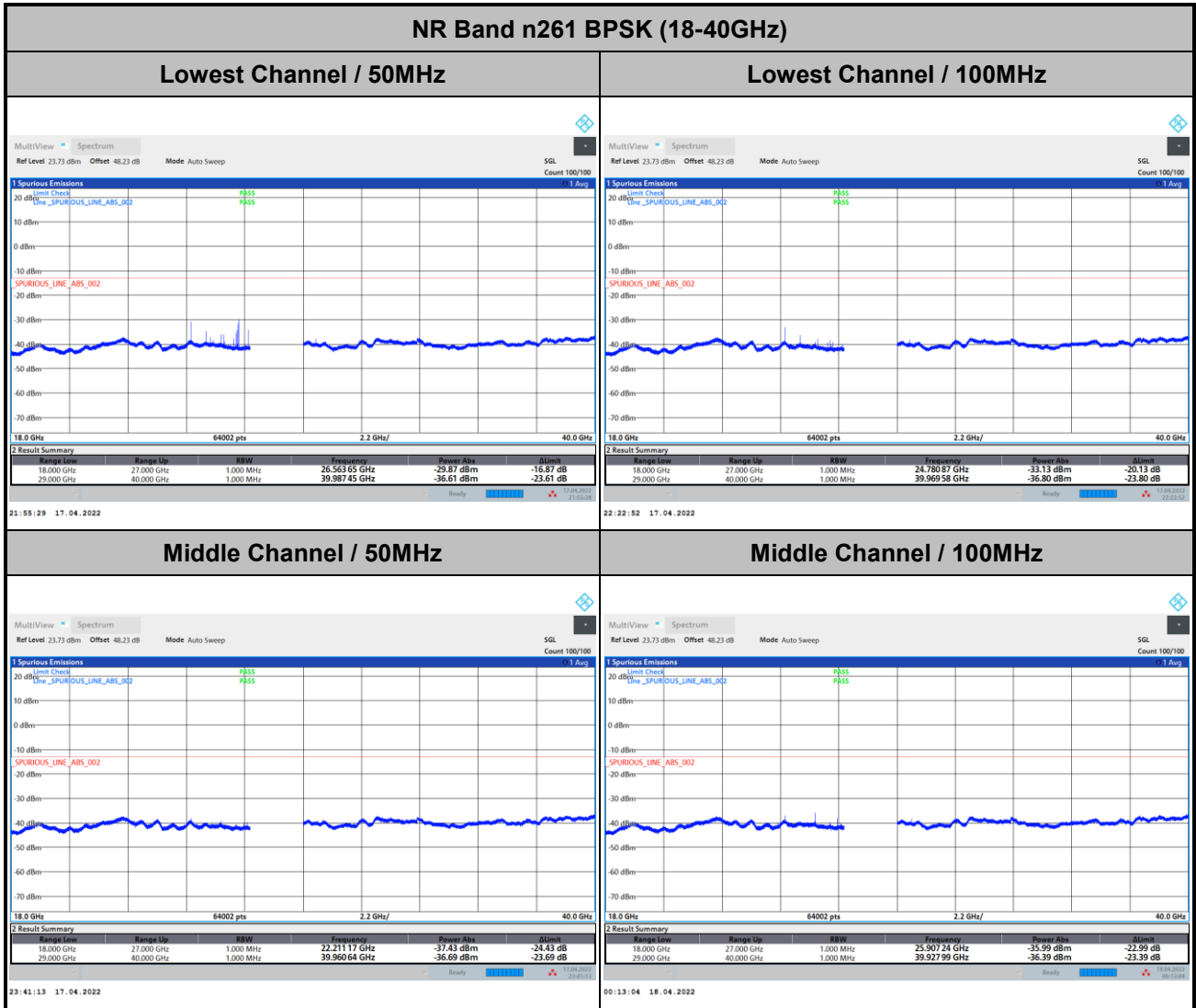
Site : 03CH19-HY
 Condition : -13 ERP EIRP_20210305 VERTICAL
 Project : 1D2414
 : n261 M1

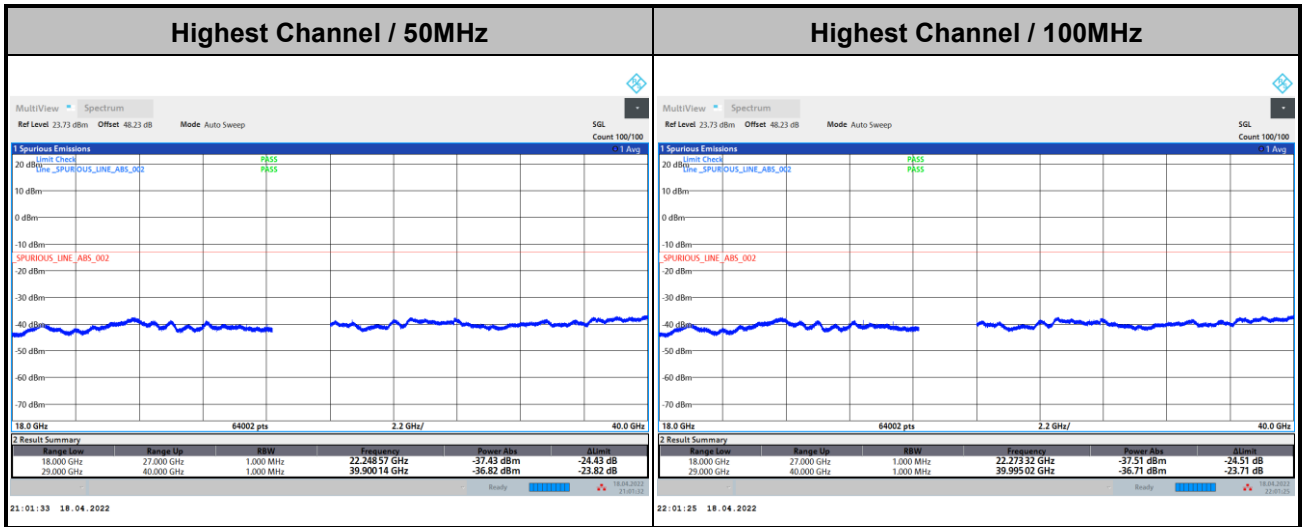
Over	Limit	Read			
Freq	Level	Limit	Line	Level	
MHz	dBm	dB	dBm	dBm	
1	2428.00	-44.70	-31.70	-13.00	-55.40



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

DFT-s-OFDM Module 1





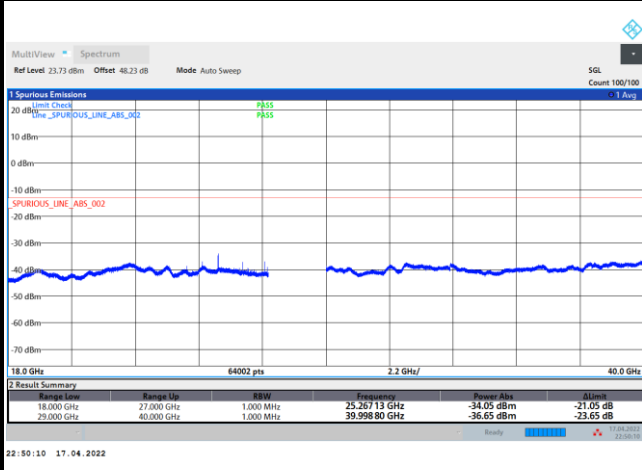
Remark: In band and out of band frequencies are omitted.



DFT-s-OFDM Module 1

NR Band n261 BPSK (18-40GHz)

Lowest Channel / 200MHz



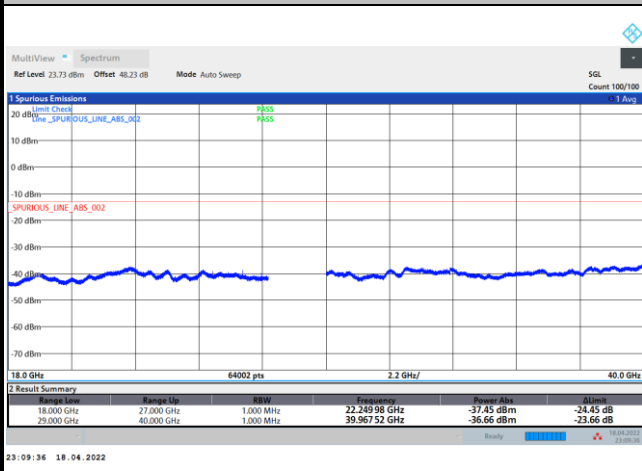
intentionally blank

Middle Channel / 200MHz



intentionally blank

Highest Channel / 200MHz



intentionally blank

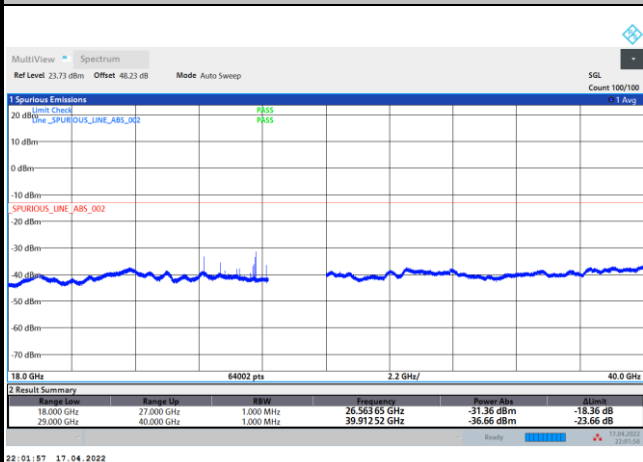
Remark: In band and out of band frequencies are omitted.



DFT-s-OFDM Module 1

NR Band n261 QPSK (18-40GHz)

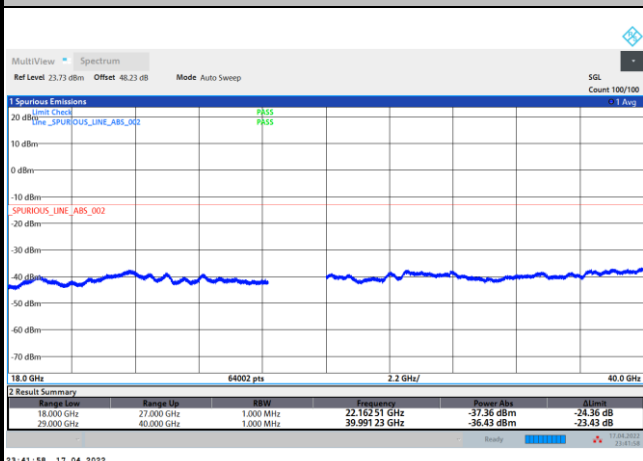
Lowest Channel / 50MHz



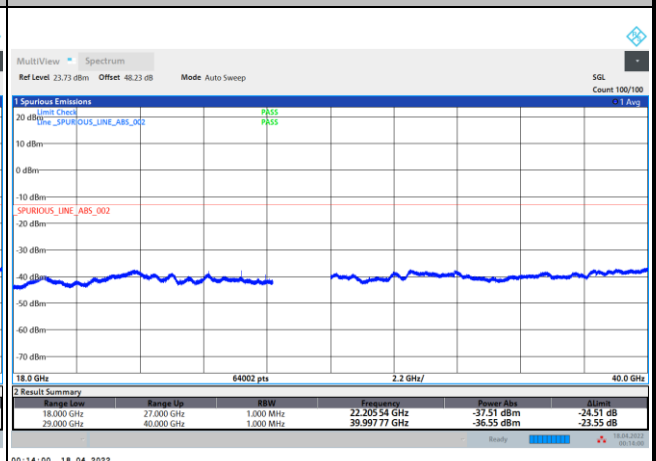
Lowest Channel / 100MHz



Middle Channel / 50MHz



Middle Channel / 100MHz



Highest Channel / 50MHz



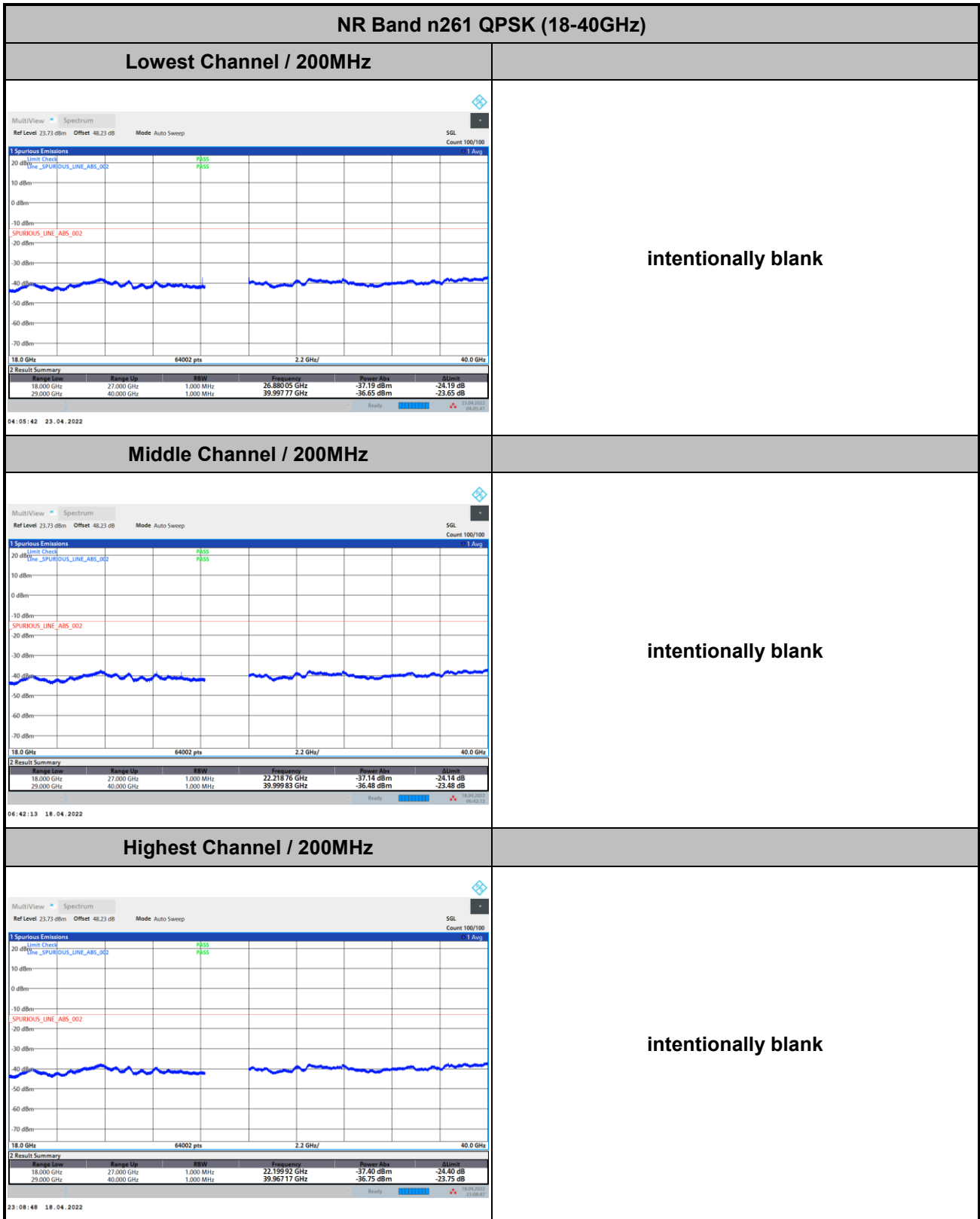
Highest Channel / 100MHz



Remark: In band and out of band frequencies are omitted.



DFT-s-OFDM Module 1



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intentionally blank

intentionally blank

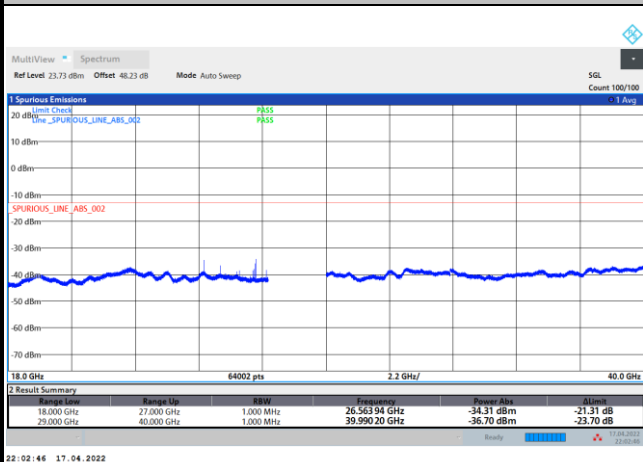
Remark: In band and out of band frequencies are omitted.



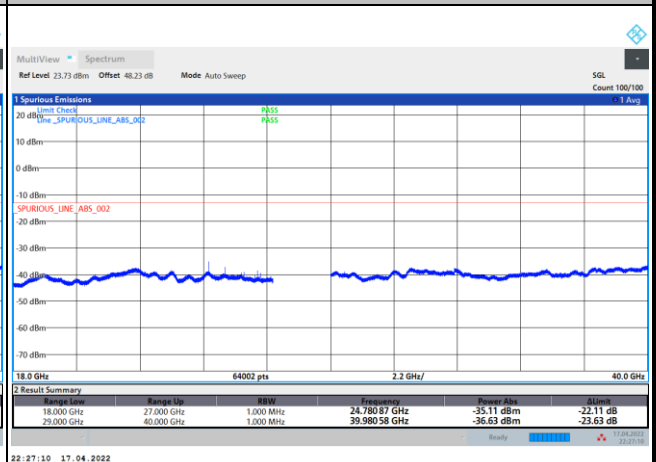
CP-OFDM Module 1

NR Band n261 QPSK (18-40GHz)

Lowest Channel / 50MHz



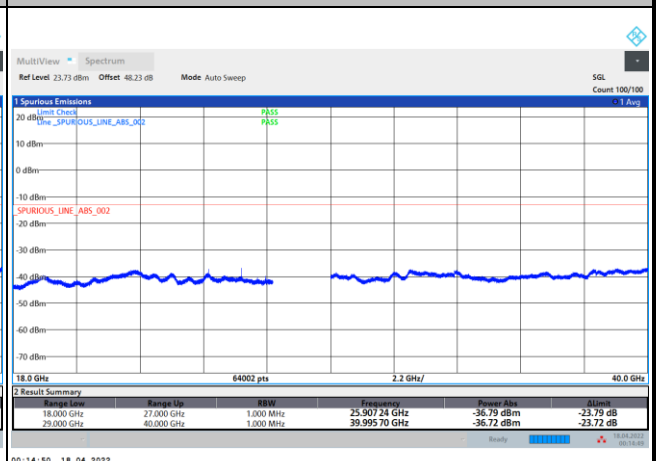
Lowest Channel / 100MHz



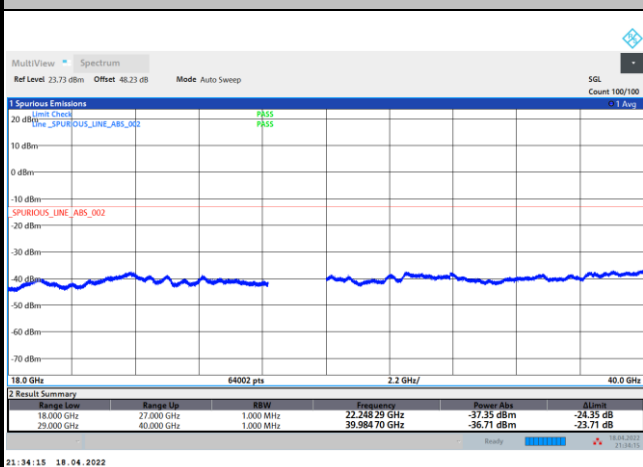
Middle Channel / 50MHz



Middle Channel / 100MHz



Highest Channel / 50MHz



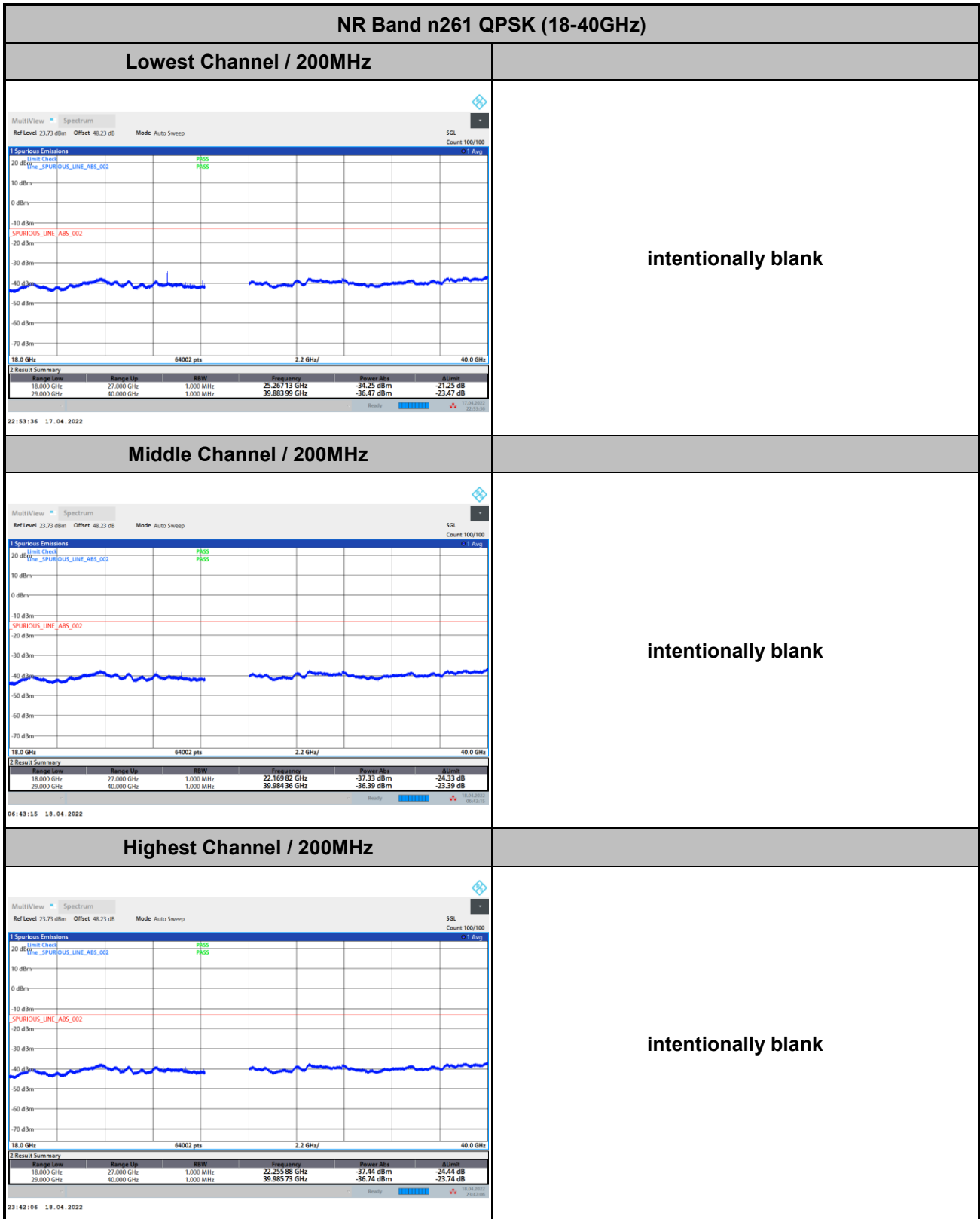
Highest Channel / 100MHz



Remark: In band and out of band frequencies are omitted.



CP-OFDM Module 1



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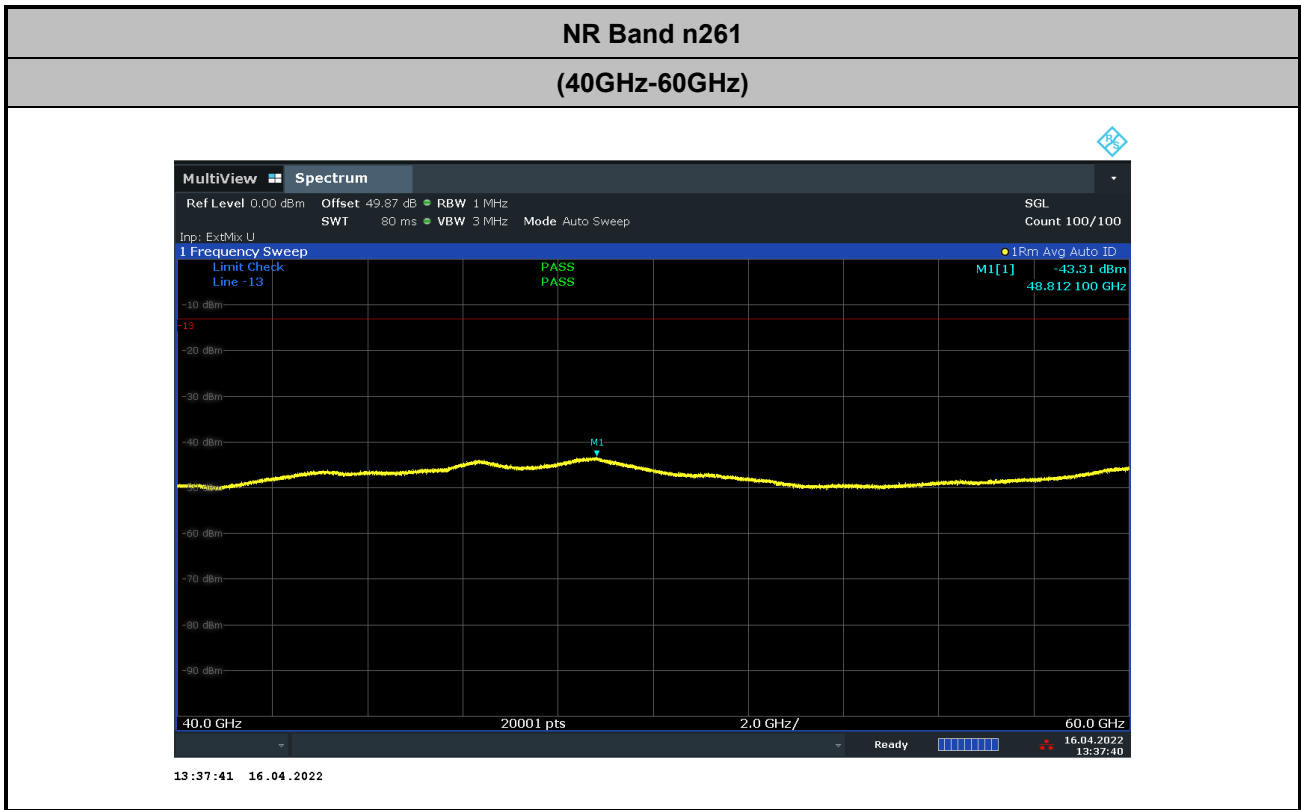
intentionally blank

intentionally blank

Remark: In band and out of band frequencies are omitted.



There is no significant spurious emission signal found for frequency started from 40GHz up to 100GHz.
Only the noise floor is reported.

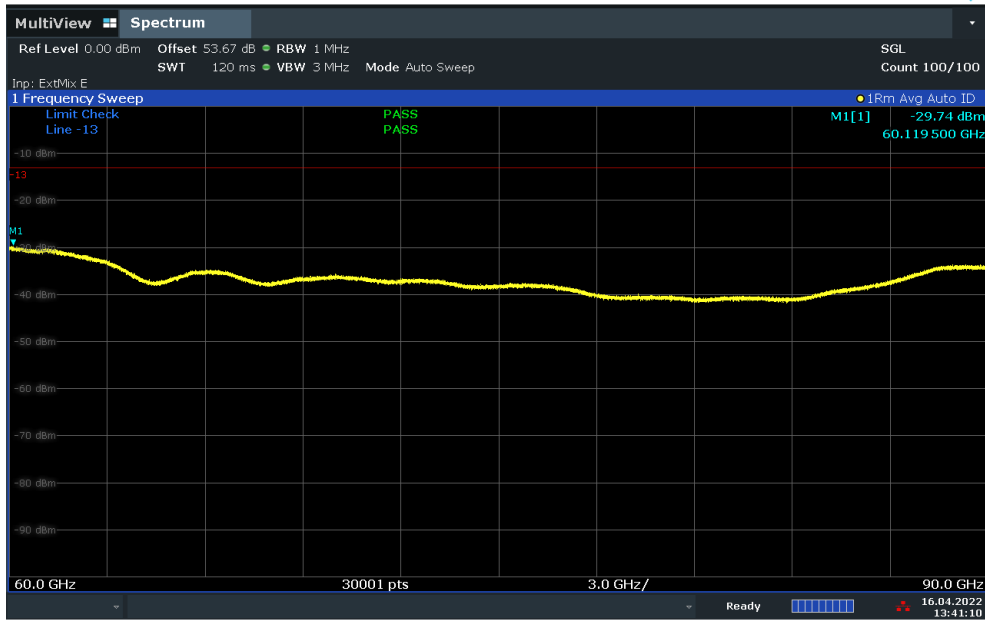


$$\text{Offset} = \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8 + \text{Duty Factor}$$
$$= 43.1 + 0.54 + 107 + 20\log(1) - 104.8 + 4.03 = 49.87 \text{ (dB)}$$



NR Band n261

(60GHz-90GHz)

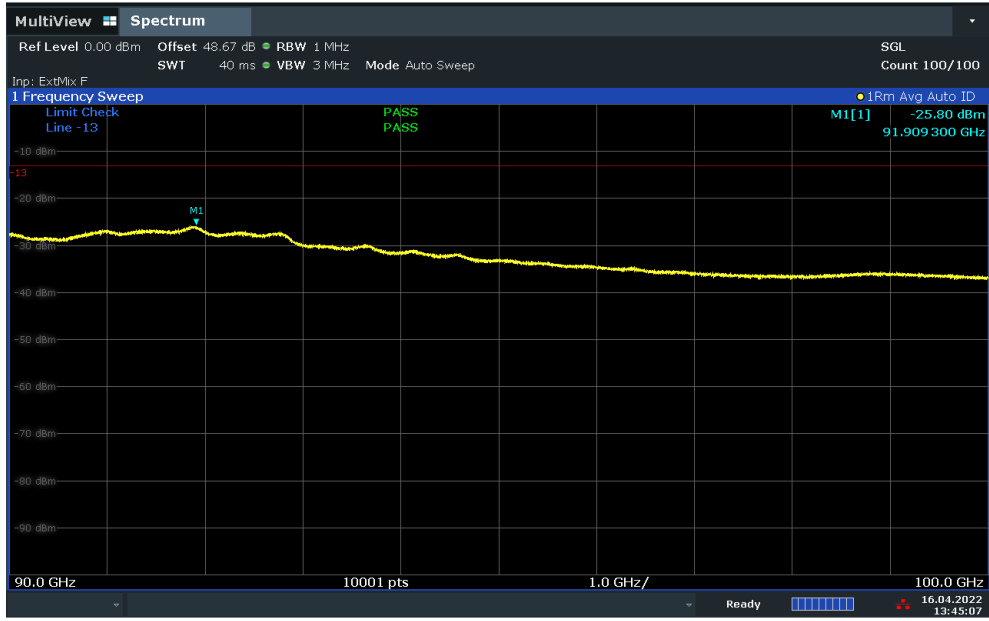


Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8 + Duty Factor
 = 46.9 + 0.54 + 107 + 20log(1) – 104.8 + 4.03 = 53.67 (dB)



NR Band n261

(90GHz-100GHz)



13:45:07 16.04.2022

Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20log (D) – 104.8 + Duty Factor
 = 47.92 + 0.54 + 107 + 20log(0.5) – 104.8 + 4.03 = 48.67 (dB)



Frequency Stability

Test Conditions		NR Band n261 / Middle Channel			Limit
Temperature (°C)	Voltage (Volt)	CW tone			Note 2.
		Frequency (GHz)	Deviation (kHz)	Deviation (ppm)	Result
50	Normal Voltage	27.92485	150.000	5.372	PASS
40	Normal Voltage	27.92485	150.000	5.372	
30	Normal Voltage	27.9249	100.000	3.581	
20(Ref.)	Normal Voltage	27.925	0.000	0.000	
10	Normal Voltage	27.92495	50.000	1.791	
0	Normal Voltage	27.92505	-50.000	1.791	
-10	Normal Voltage	27.9251	-100.000	3.581	
-20	Normal Voltage	27.92515	-150.000	5.372	
-30	Normal Voltage	27.9252	-200.000	7.162	
20	Maximum Voltage	27.92495	50.000	1.791	
20	Normal Voltage	27.92495	50.000	1.791	
20	Battery End Point	27.92505	-50.000	1.791	

Note:

1. Normal Voltage =3.85 V. ; Battery End Point (BEP) =3.30 V. ; Maximum Voltage =4.25 V.
2. The frequency fundamental emissions stay within the operation band.



Appendix B. R&S Mixer and Horn Antenna Calibration Reports

akkreditiert durch die / *accredited by the*

Deutsche Akkreditierungsstelle GmbH

als Kalibrierlaboratorium im / *as calibration laboratory in the*



Deutsche
Akkreditierungsstelle
D-K-15195-01-00

Deutschen Kalibrierdienst



Kalibrierschein
Calibration certificate

Kalibrierzeichen
Calibration mark

593876
D-K- 15195-01-00
2021-04

Gegenstand
Object **FS-Z60 HARMONIC MIXER 40-60GHZ**

Hersteller
Manufacturer **ROHDE & SCHWARZ**

Typ
Type **FS-Z60**

Fabrikat/Serien-Nr.
Serial number **100986**

Auftraggeber
Customer **Sporton International Inc.**

**6F., Sec. 1, Hsin Tai Wu Rd., No. 106
221 New Taipei City
TW**

Auftragsnummer
Order No. **311002157**

Anzahl der Seiten des Kalibrierscheines
Number of pages of the certificate **3 Certificate
5 Outgoing Results
5 Incoming Results**

Datum der Kalibrierung
Date of calibration **2021-04-09**

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).

Die DAkKS ist Unterzeichner der multilateralen Übereinkommen der European co-operation 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.

This calibration certificate documents the 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.

Dieser Kalibrierschein darf nur vollständig und unverändert 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.

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.

Datum der Ausstellung
Date of issue Freigabe des Kalibrierscheins durch
Approval of the calibration certificate by

2021-04-09



Dr. Gerhard Rösel
Leiter des Kalibrierlaboratoriums
Head of the calibration laboratory



Johannes Negele
Bearbeiter
Person in charge

Object FS-Z60 HARMONIC MIXER 40-60GHZ
Type FS-Z60 **Serial No.** 100986
Date 2021-04-09 **Material No.** 1048.0171.02
Page 2 / 3

593876
D-K- 15195-01-00
2021-04



Place of Calibration

87700 Memmingen, Rohde-und-Schwarz-Str. 1

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.

Calibration Method **See first page of Outgoing Results**

Statement of Compliance

Incoming: All measured values are within the data sheet specifications.

Outgoing: All measured values are within the data sheet specifications.

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
Vect. Netw. Analyzer 4PORT	ZVA67	101175	0023 D-K-15195-01-00 2021-03	2022-03-31

Object FS-Z60 HARMONIC MIXER 40-60GHZ
Type FS-Z60 **Serial No.** 100986
Date 2021-04-09 **Material No.** 1048.0171.02
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593876
D-K- 15195-01-00
2021-04



Measurement Uncertainty

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 %.

Environmental Conditions

Ambient Temperature $(23 \pm 1) ^\circ\text{C}$ Relative Humidity 20%-60%

Ancillary Functional Measurements

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.

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. 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'.

Outgoing Results

Designation: HARMONIC MIXER
Type: FS-Z60
Material No.: 1048.0171.02
Serial No.: 100986
Certificate No.: 593876 D-K-15195-01-00 2021-04
Referring to Test Documentation: 5038.8581.01-PB-02.00

Test Department: 3MME3
Name: Johannes Negele
Date: 2021-04-09

Table of contents

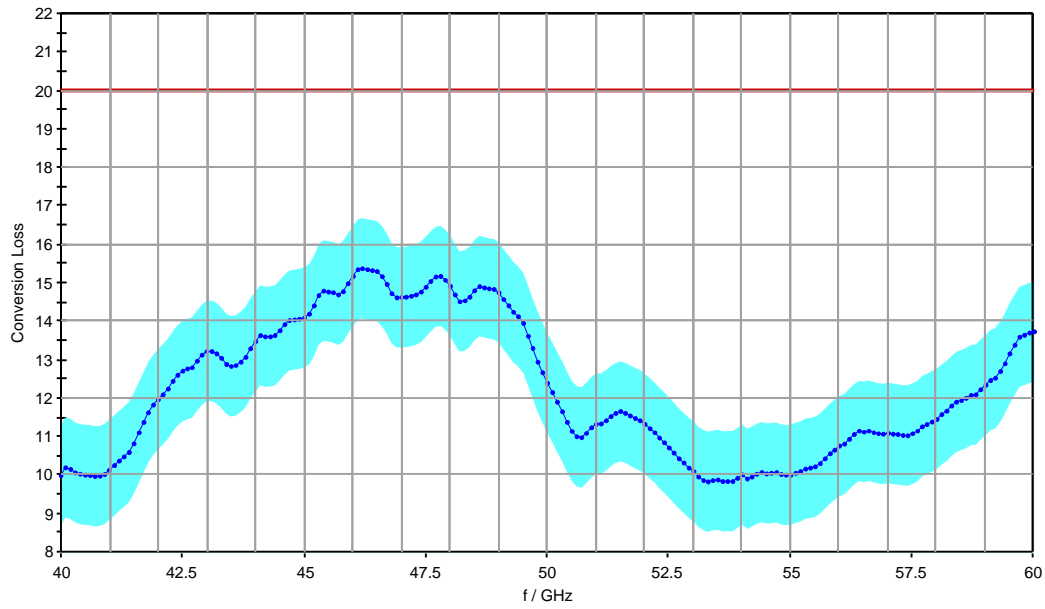
Software used for measurement	3
1. Conversion Loss (4. Harmonic)	4
1.1 Conversion Loss (IF = 404.4 MHz)	4
1.2 Conversion Loss (IF = 729 MHz)	4
1.3 Conversion Loss (IF = 1330 MHz)	5
1.4 Continuity response within 1 GHz	5

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)

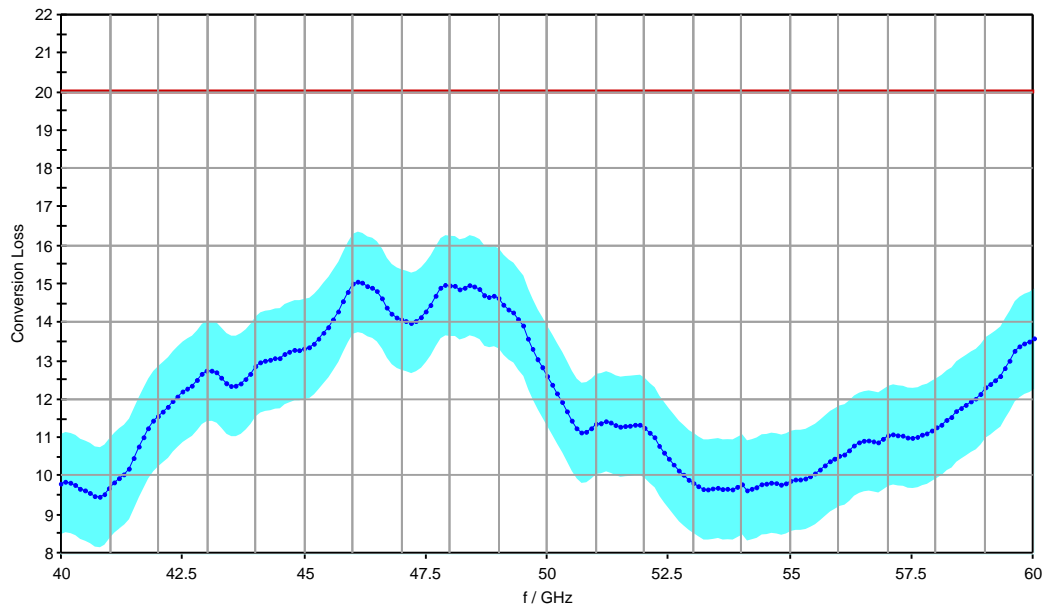
1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 4. Harmonic



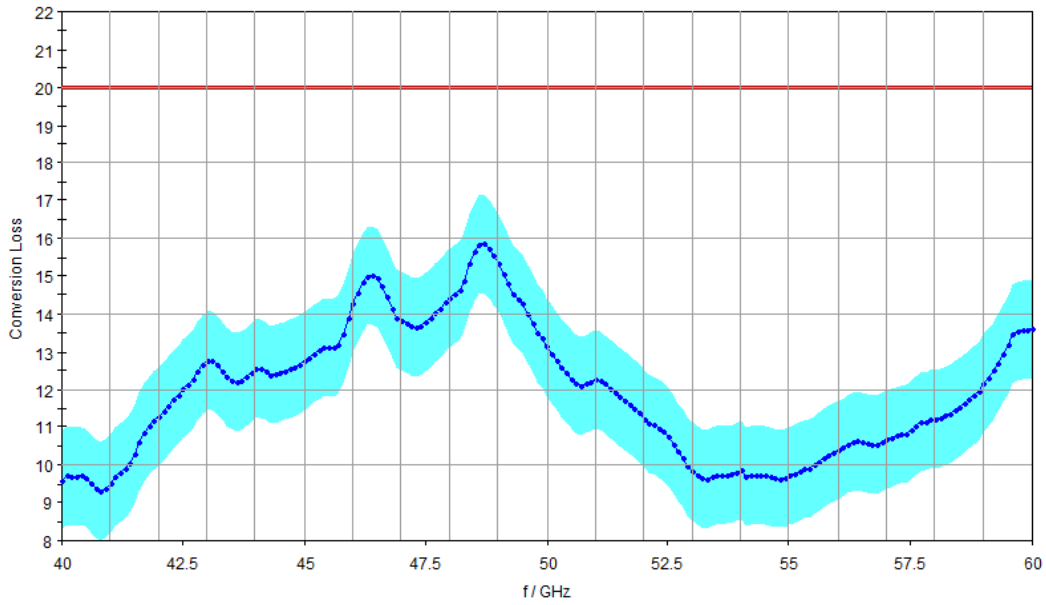
1.2 Conversion Loss (IF = 729 MHz)

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	2.80
max. at IF = 729 MHz:	6.0	2.47
max. at IF = 1330 MHz:	6.0	2.22

Incoming Results

Designation: HARMONIC MIXER
Type: FS-Z60
Material No.: 1048.0171.02
Serial No.: 100986
Certificate No.: 593876 D-K-15195-01-00 2021-04
Referring to Test Documentation: 5038.8581.01-PB-02.00

Test Department: 3MME3
Name: Johannes Negele
Date: 2021-04-09

Incoming Results



Table of contents

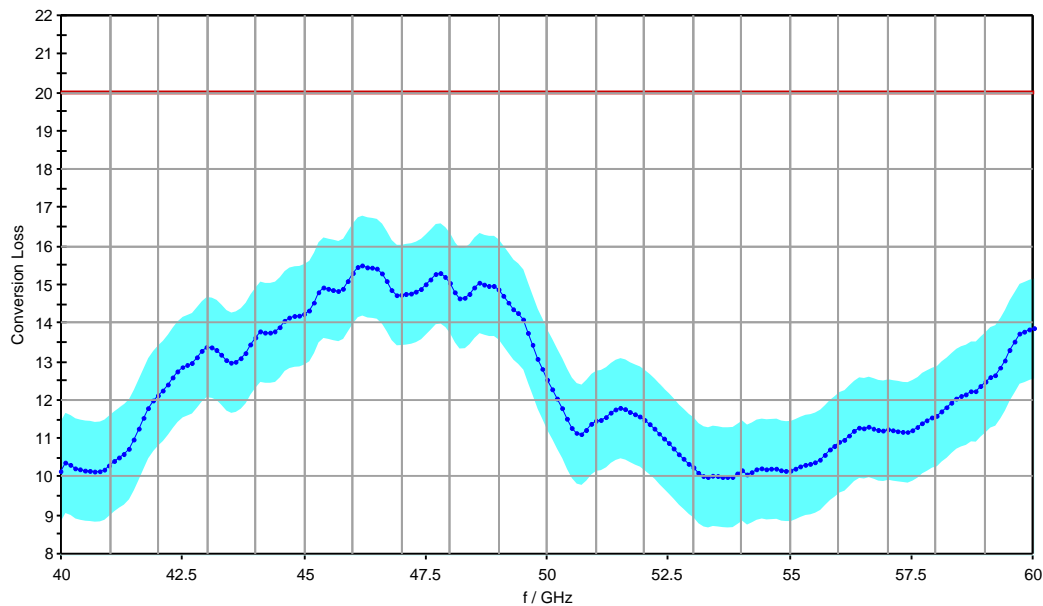
Software used for measurement	3
1. Conversion Loss (4. Harmonic)	4
1.1 Conversion Loss (IF = 404.4 MHz)	4
1.2 Conversion Loss (IF = 729 MHz)	4
1.3 Conversion Loss (IF = 1330 MHz)	5
1.4 Continuity response within 1 GHz	5

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)

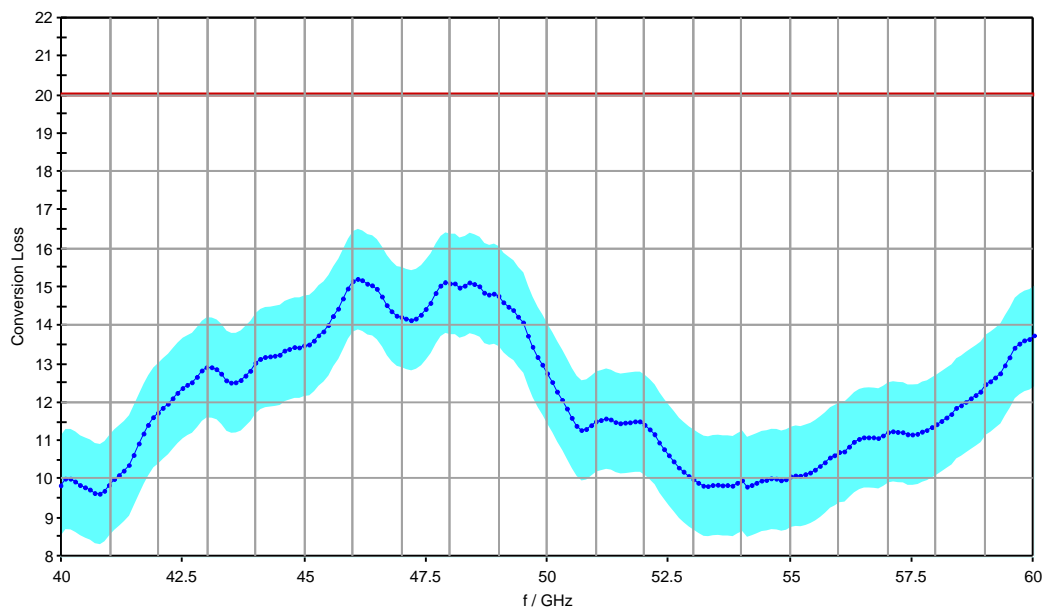
1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 4. Harmonic



1.2 Conversion Loss (IF = 729 MHz)

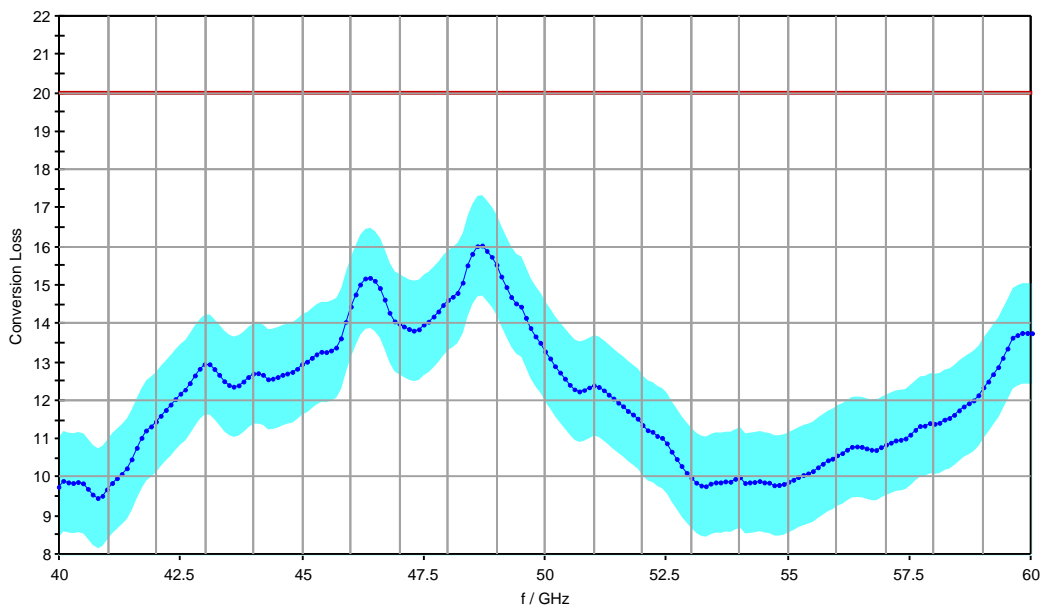
IF = 729 MHz, 4. Harmonic



Incoming Results

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	2.81
max. at IF = 729 MHz:	6.0	2.48
max. at IF = 1330 MHz:	6.0	2.24





CALIBRATION CERTIFICATE



Kalibrierschein

Certificate Number
Zertifikatsnummer

0001A300623436

General 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	101811
Order Number Bestellnummer	8800012961 10, 516816,0	Asset Number Inventarnummer	
Customer Auftraggeber	Sporton International Inc. 6F., Sec. 1, Hsin Tai Wu Rd., No. 106 221 New Taipei City TW		
Performance			
Place and Date of Calibration Ort und Datum der Kalibrierung	87700 Memmingen, Rohde-und-Schwarz-Str. 1 2021-11-16		
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	2021-11-16		
Approval of the certificate by Freigabe des Kalibrierscheins durch	Dr. Gerhard Rösel Johannes Negele		
	 		
	Laboratory management Labormanagement	Person responsible Bearbeiter	

Calibration Mark Kalibrierzeichen

300623436
D-K- 15195-01-00
2021-11

Member of Deutscher Kalibrierdienst
Mitglied im Deutschen Kalibrierdienst



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.



Material No 1048.0371.02 **Serial No** 101811 **Certificate Number** 0001A300623436
Page 2/3

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-44GHz	NRP-Z55	140170	0023 D-K-15195-01-00 2020-12	2022-02-28
Thermal Waveguide Power Sensor	NRP90TWG	910001	0001A300621305	2022-10-31
Vector Network Analyzer 4 Port	ZVA67	101175	0023 D-K-15195-01-00 2021-03	2022-03-31

Remarks



Material No 1048.0371.02 **Serial No** 101811 **Certificate** 0001A300623436
Page 3/3 **Number**

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

Comments on Measurement Results
<p>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 '.</p> <p>Ref.: ILAC G8:09/2019 'Guidelines on Decision Rules and Statements of Conformity'.</p> <p>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 %.</p> <p>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.</p>

Outgoing Results

Designation:	HARMONIC MIXER
Type:	FS-Z90
Material No.:	1048.0371.02
Serial No.:	101811
Certificate No.:	0001A300623436
Referring to Test Documentation:	5038.8323.01-PB-02.00

Test Department:	3MM-P
Name:	Johannes Negele
Date:	2021-11-16



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

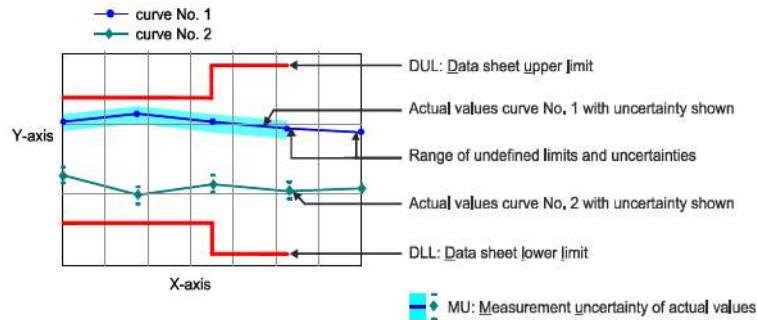


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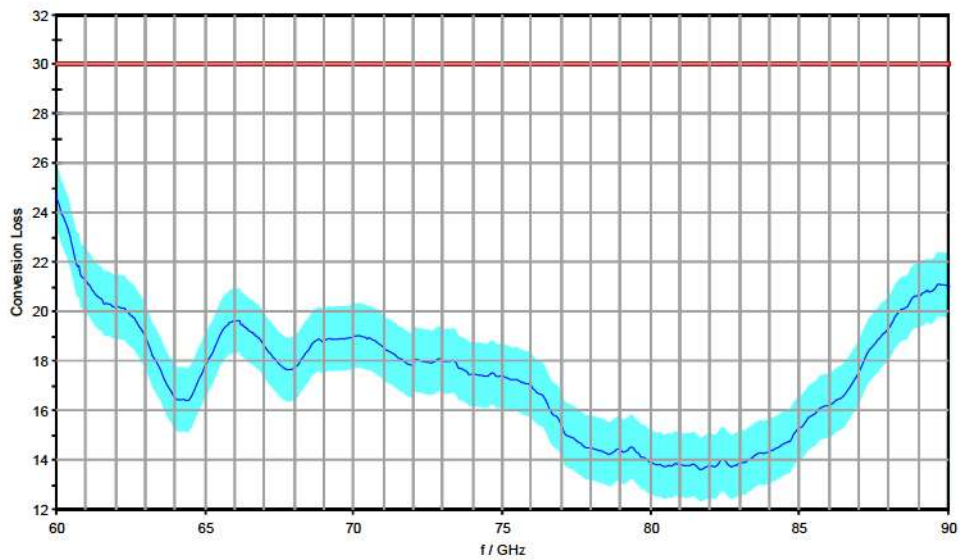
Software used for measurement	4
1. Conversion Loss (6. Harmonic)	5
1.1 Conversion Loss (IF = 404.4 MHz)	5
1.2 Conversion Loss (IF = 729 MHz)	5
1.3 Conversion Loss (IF = 1330 MHz)	6
1.4 Continuity response within 1 GHz	6

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)

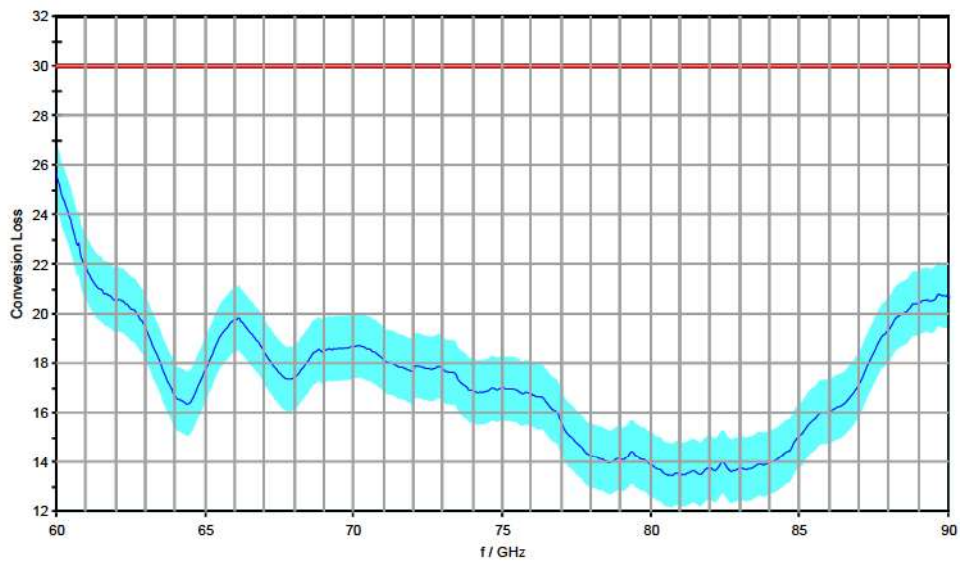
1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 6. Harmonic



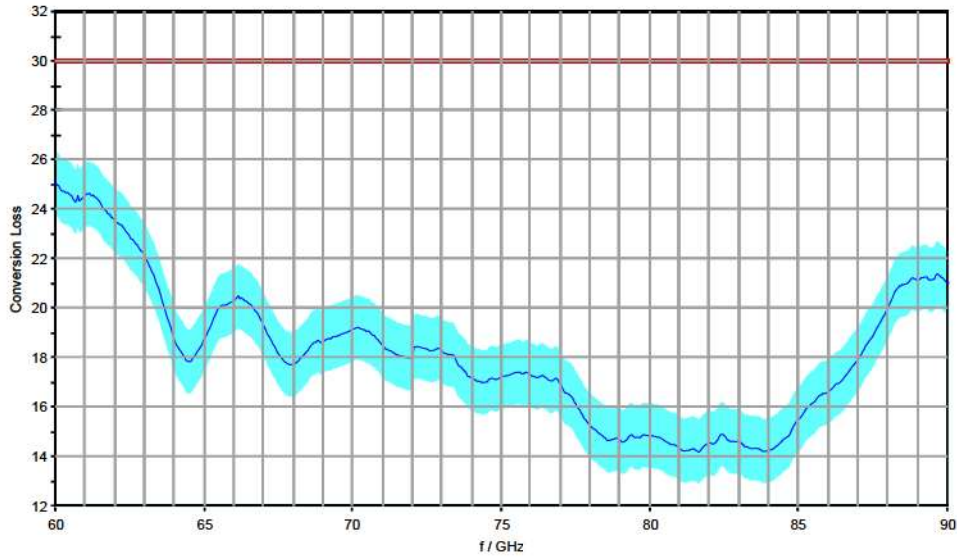
1.2 Conversion Loss (IF = 729 MHz)

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	3.46
max. at IF = 729 MHz:	6.0	3.80
max. at IF = 1330 MHz:	6.0	3.42

Incoming Results

Designation:	HARMONIC MIXER
Type:	FS-Z90
Material No.:	1048.0371.02
Serial No.:	101811
Certificate No.:	0001A300623436
Referring to Test Documentation:	5038.8323.01-PB-02.00

Test Department:	3MM-P
Name:	Michael Haupt
Date:	2021-11-16



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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 - UGB2 A non-compliance statement may be possible where a confidence level of less than 95 % is acceptable.
 - DU Datasheet Uncertainty

Explanation of charts

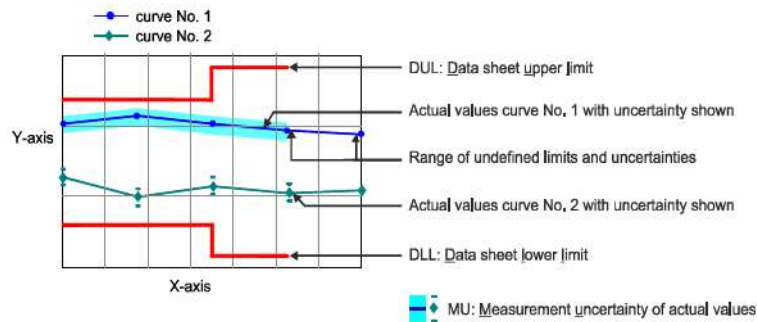


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1.1 Conversion Loss (IF = 404.4 MHz)	5
1.2 Conversion Loss (IF = 729 MHz)	5
1.3 Conversion Loss (IF = 1330 MHz)	6
1.4 Continuity response within 1 GHz	6

Incoming Results

Material Number 1048.0371.02 Serial Number 101811

Certificate Number 0001A300623436
(Incoming)

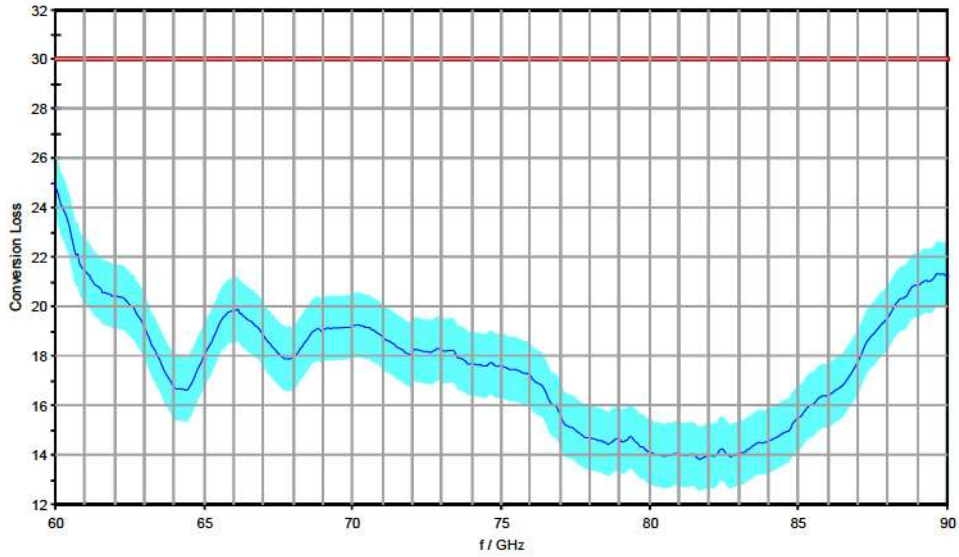
Software used for measurement			
Item	Type	Version	Remark
Suite	Setup	V12.10.02	Test Management Software G5
Test Program (7012.8706.00_)	Component	V01.05	

Incoming Results

1. Conversion Loss (6. Harmonic)

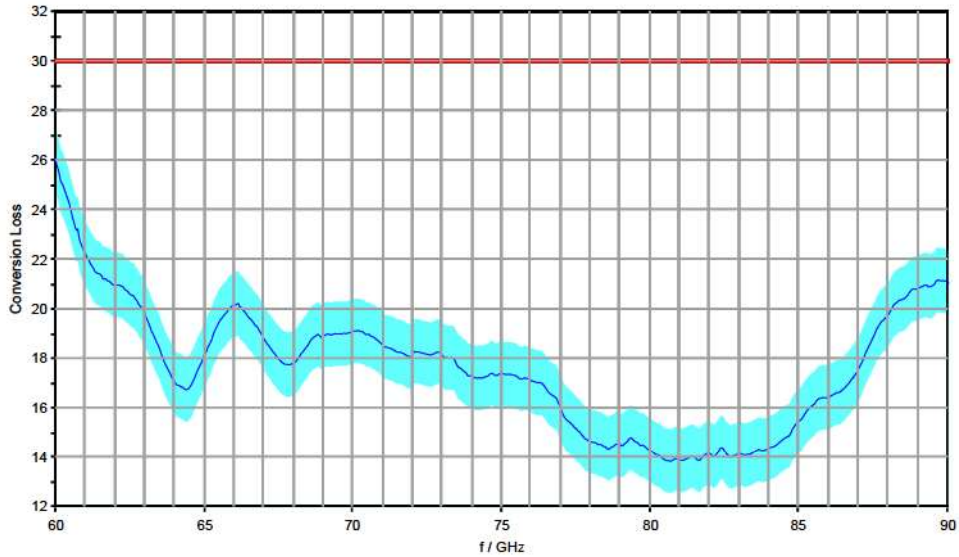
1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 6. Harmonic



1.2 Conversion Loss (IF = 729 MHz)

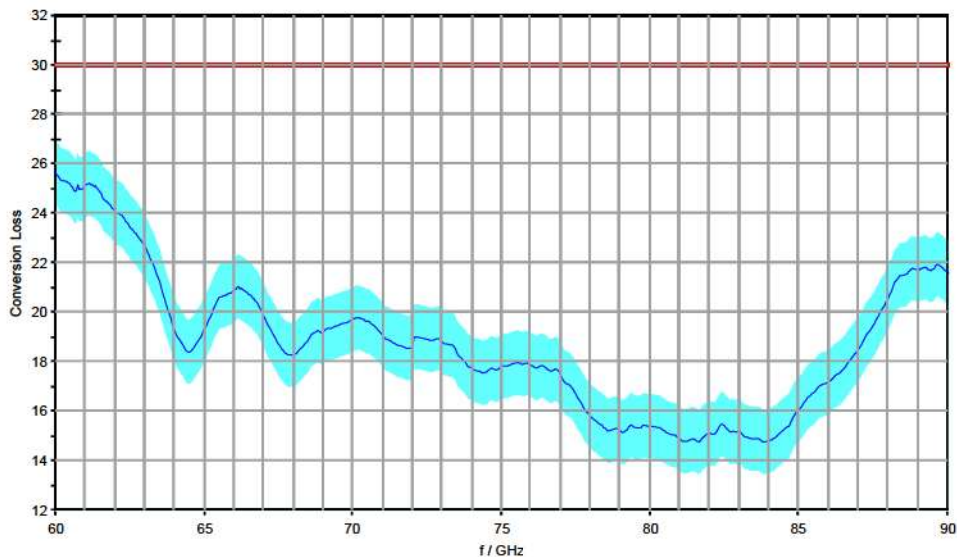
IF = 729 MHz, 6. Harmonic



Incoming Results

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	3.45
max. at IF = 729 MHz:	6.0	3.81
max. at IF = 1330 MHz:	6.0	3.41

Incoming Results



Calibration Certificate

Certificate Number 24-0140-101128-02

Kalibrierschein

Zertifikatsnummer

Unit Data

Item Harmonic Mixer, 90 GHz to 140 GHz
Gegenstand

Manufacturer RPG Radiometer-Physics GmbH
Hersteller

Type RPG FS-Z140
Typ

Material Number 3622.0708.02 **Serial Number** 101128
Materialnummer Seriennummer

Asset Number
Inventarnummer

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.

Order Data

Customer Sporton International Inc.
Auftraggeber
No. 106 6F., Sec. 1, Hsin Tai Wu Rd., Xizhi Dist., 000000 NEW TAIPEI CITY-000000 221- TAIWAN

Order Number 8800003072
Bestellnummer

Date of Receipt 2020-10-06
Eingangsdatum

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.

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung

Meckenheim, 2020-10-26

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**

RPG Radiometer-Physics GmbH; Meckenheim

Date of Issue
Ausstellungsdatum

2020-10-27

Head of Laboratory
Laborleitung

Schulze

Person Responsible
Bearbeiter

Gottbehüt

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	0001-300467129	2021-06-13
Powersensor	R&S® NRP-Z55	140093	509916_D-K-15195-01-01_2019-05	2021-05-22

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

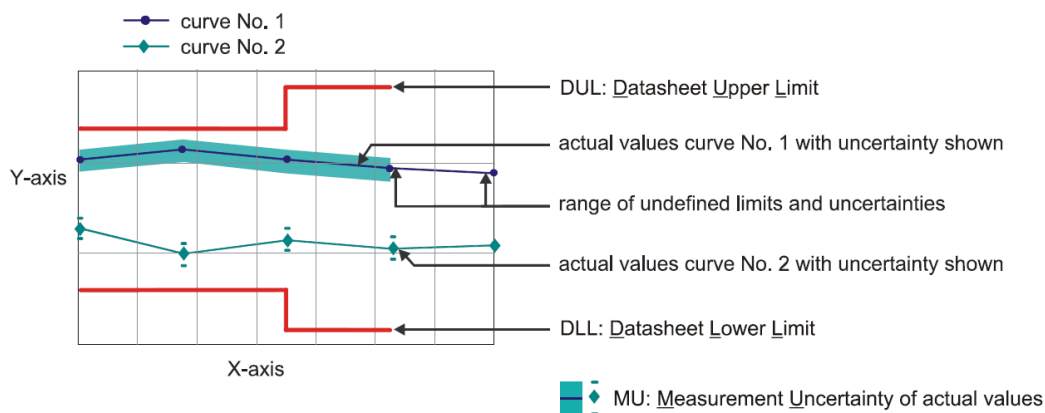
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is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

Outgoing Results

The following abbreviations may be used in this document

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- 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

Measurement Studio Professional Edition
MixerCertification

Version

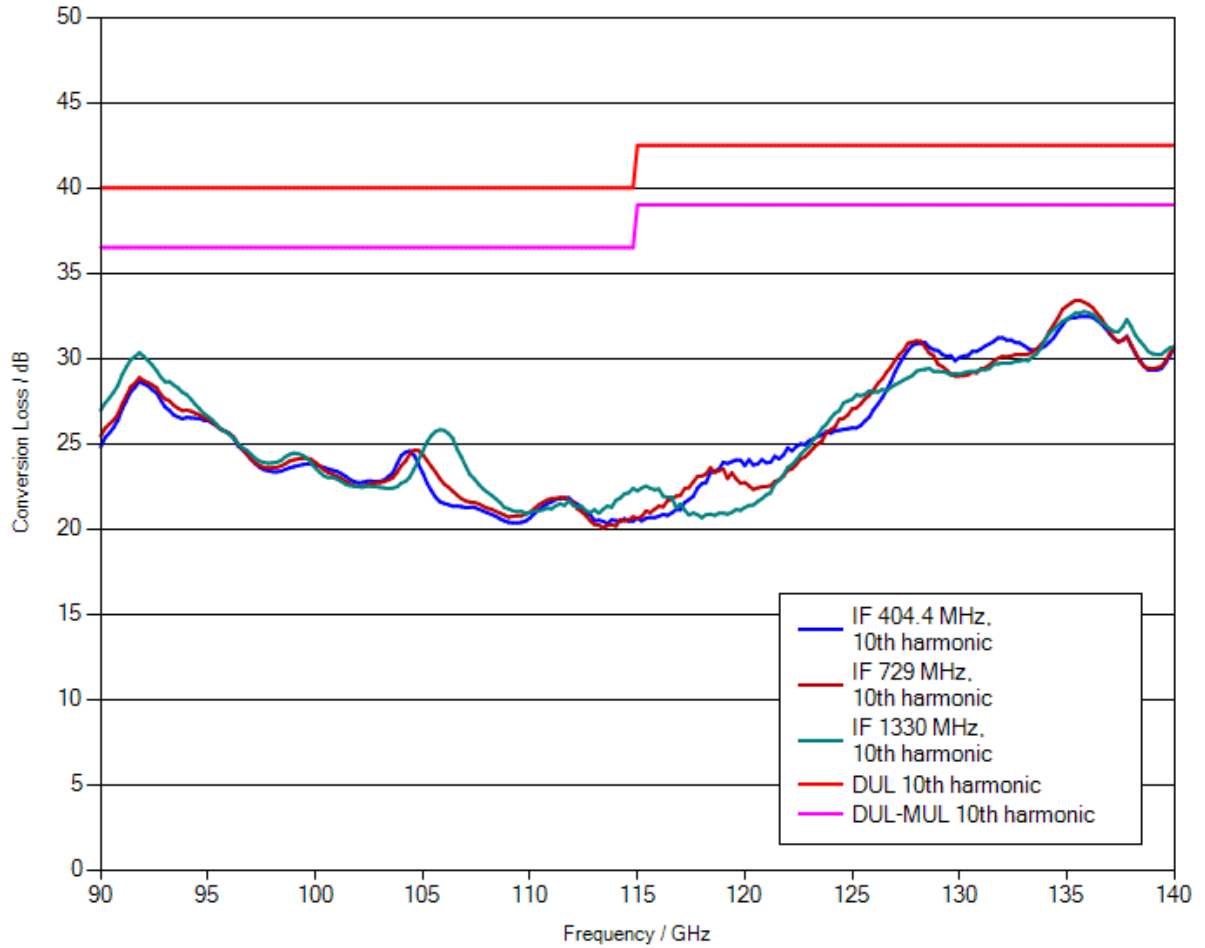
2013
7_14

Remark

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.

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

1.2 Frequency response within 1 GHz

	DUL	Actual (worst case)	Evaluation
IF = 404.4 MHz, 10th harmonic	6 dB	2.1 dB	PASS
IF = 729 MHz, 10th harmonic	6 dB	1.96 dB	PASS
IF = 1330 MHz, 10th harmonic	6 dB	2.13 dB	PASS