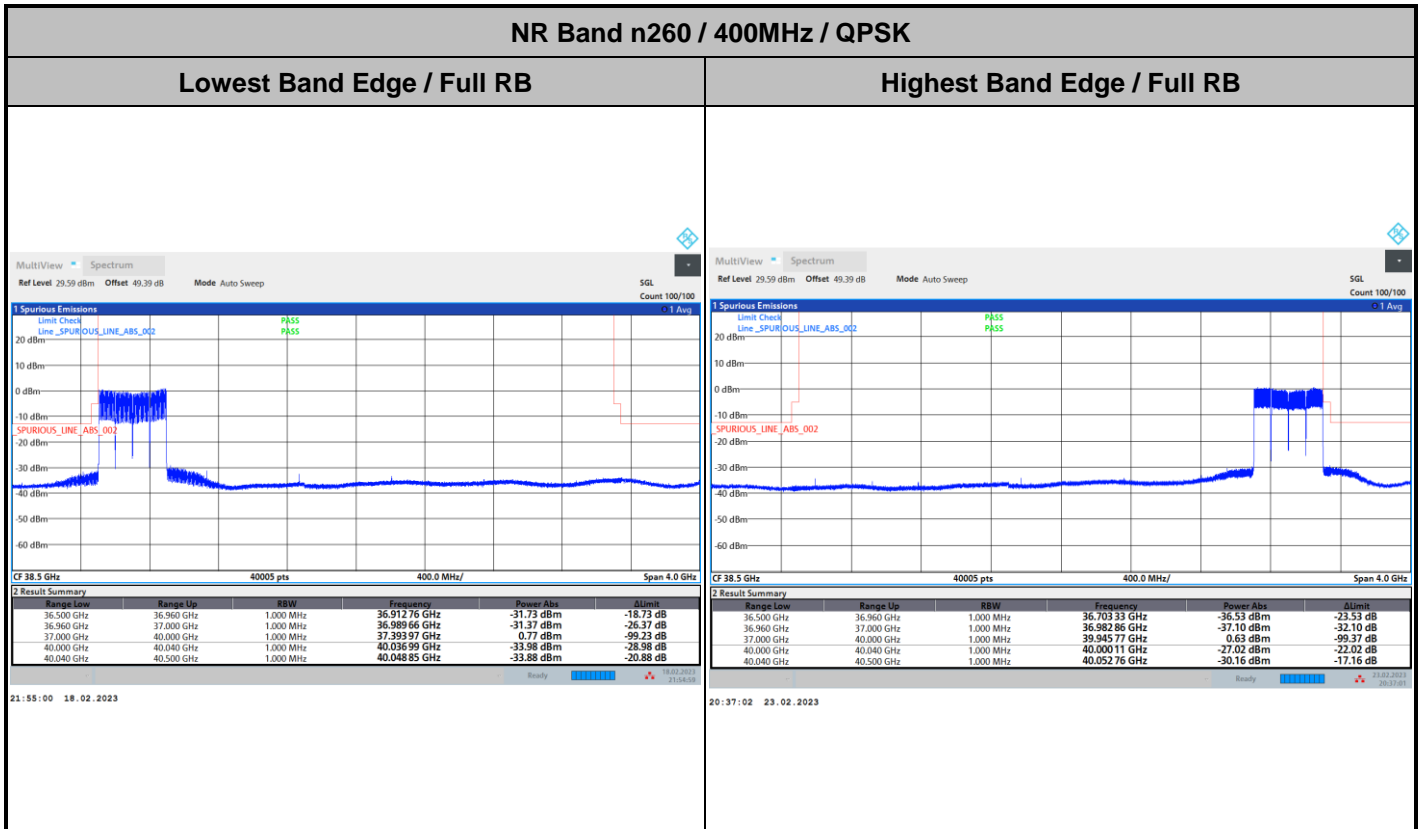




CP-OFDM Module 1

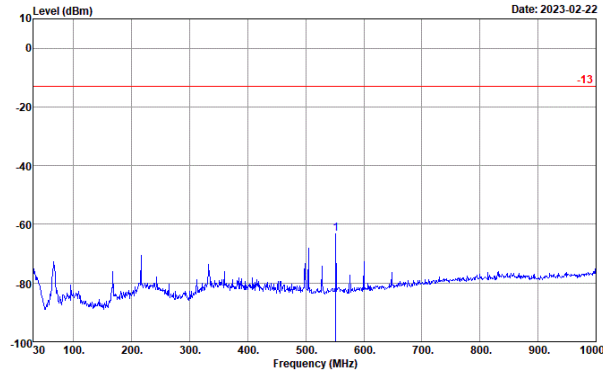




# Spurious Emission

## NR Band n260 (30MHz-1GHz)

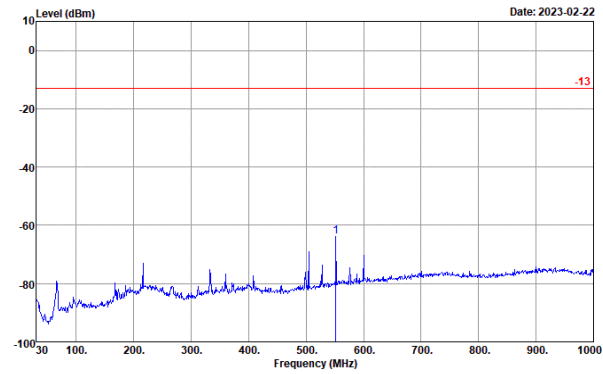
### Horizontal



Site : 03CH10-HY  
 Condition : -13 EIRP\_WO HORIZONTAL  
 Project : 190614-10  
 : M1

	Freq	Level	Over	Limit
	MHz	dBm	dB	Line
1	551.86	-63.31	-50.31	-13.00

### Vertical



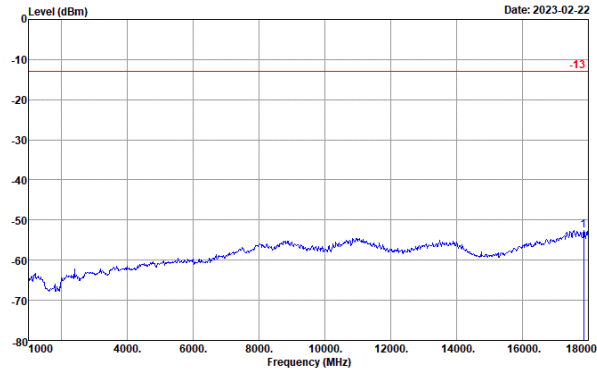
Site : 03CH10-HY  
 Condition : -13 EIRP\_WO VERTICAL  
 Project : 190614-10  
 : M1

	Freq	Level	Over	Limit
	MHz	dBm	dB	Line
1	551.86	-63.70	-50.70	-13.00



NR Band n260 (1GHz-18GHz)

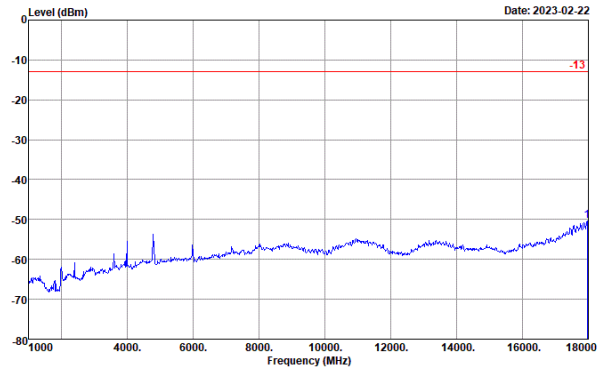
Horizontal



Site : 03CH10-HY  
 Condition : -13 EIRP\_WO HORIZONTAL  
 Project : I90614-10  
 : M1

Freq	Level	Over	Limit
MHz	dBm	dB	dBm
1 17864.00	-52.55	-39.55	-13.00

Vertical



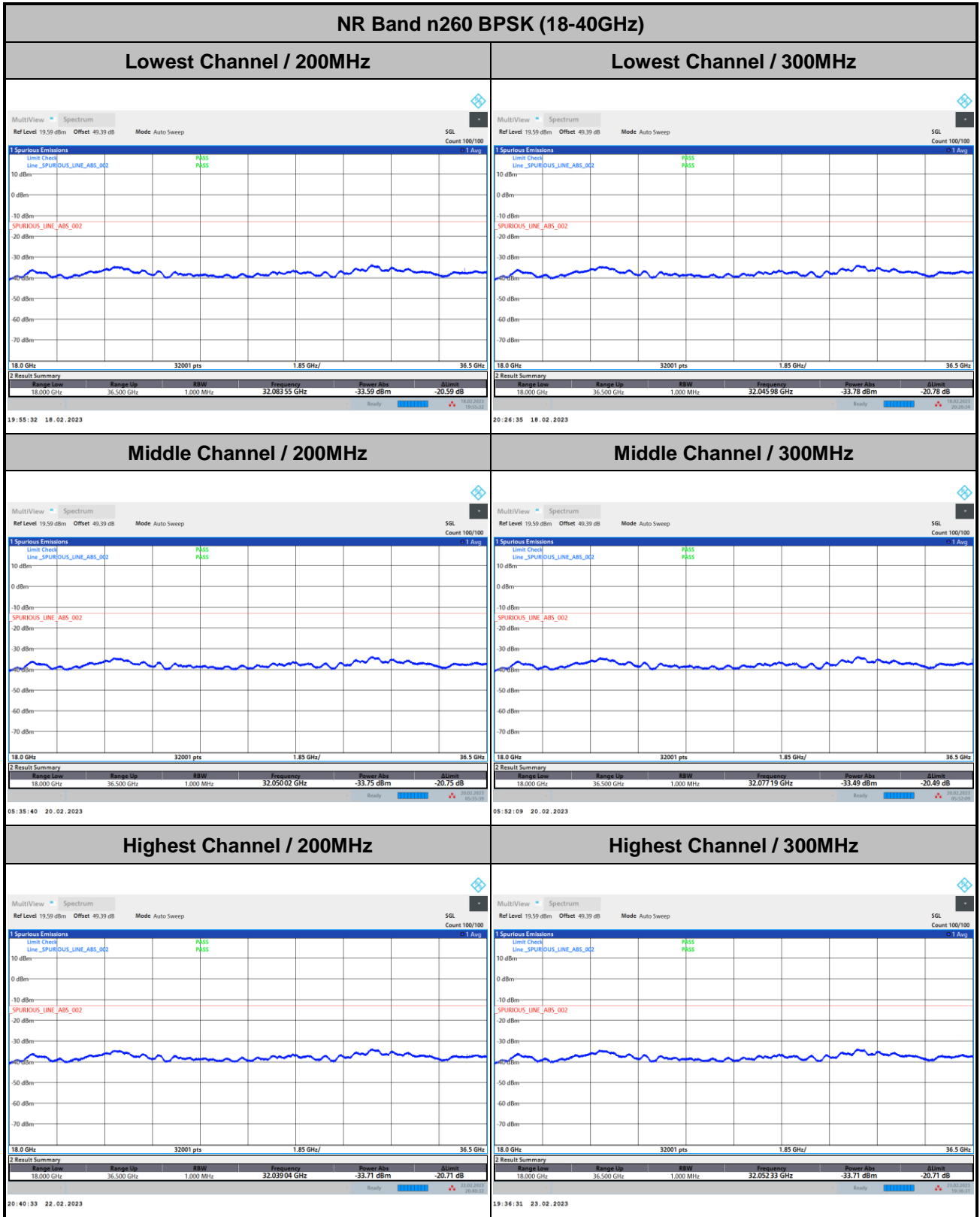
Site : 03CH10-HY  
 Condition : -13 EIRP\_WO VERTICAL  
 Project : I90614-10  
 : M1

Freq	Level	Over	Limit
MHz	dBm	dB	dBm
1 17966.00	-50.33	-37.33	-13.00



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.



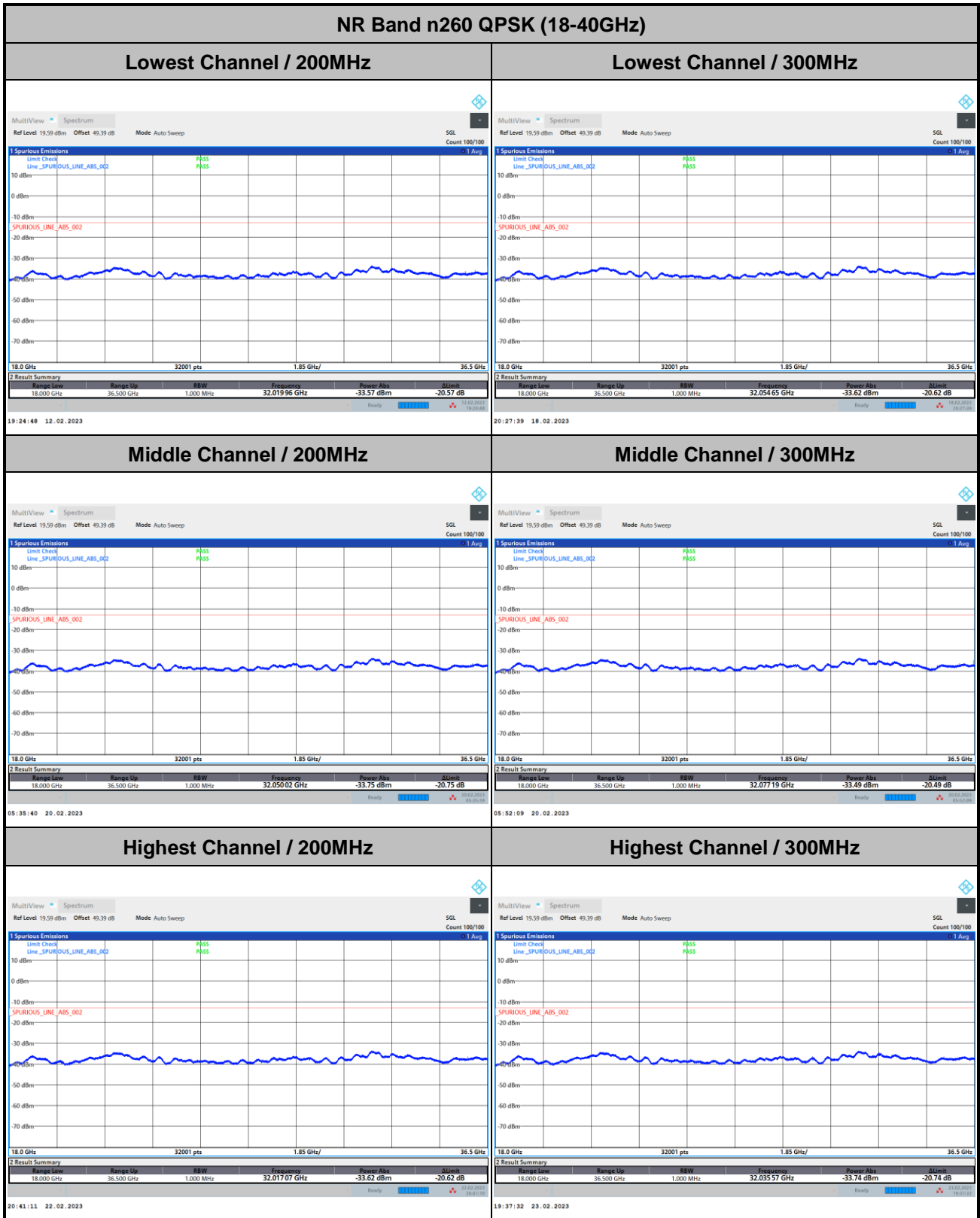
DFT-s-OFDM Module 1

NR Band n260 BPSK (18-40GHz)	
<p><b>Lowest Channel / 400MHz</b></p> <p>intentionally blank</p>	
<p><b>Middle Channel / 400MHz</b></p> <p>intentionally blank</p>	
<p><b>Highest Channel / 400MHz</b></p> <p>intentionally blank</p>	

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



DFT-s-OFDM Module 1



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



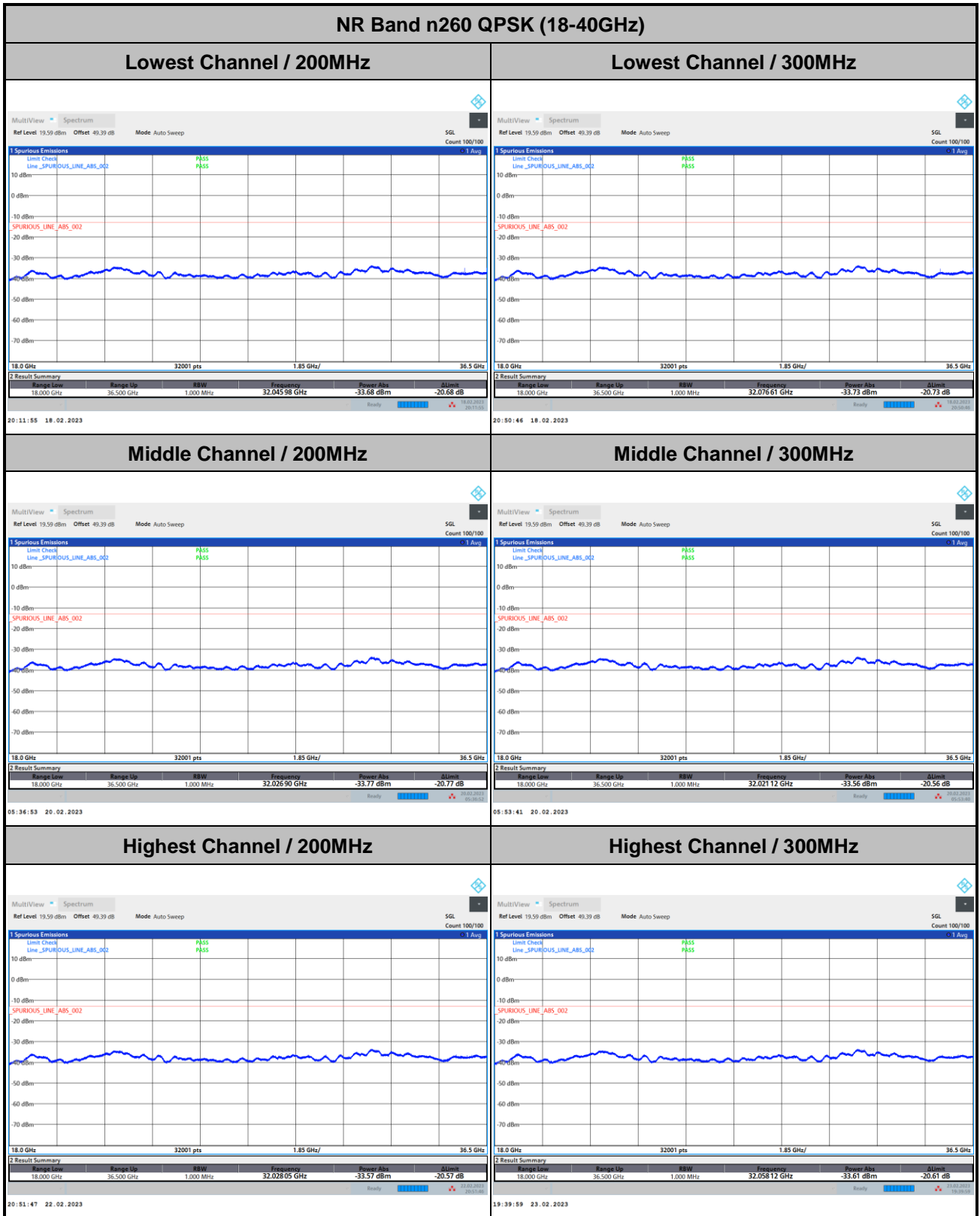
DFT-s-OFDM Module 1

NR Band n260 QPSK (18-40GHz)	
Lowest Channel / 400MHz	
<p>intentionally blank</p>	
Middle Channel / 400MHz	
<p>intentionally blank</p>	
Highest Channel / 400MHz	
<p>intentionally blank</p>	

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



CP-OFDM Module 1



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





CP-OFDM Module 1

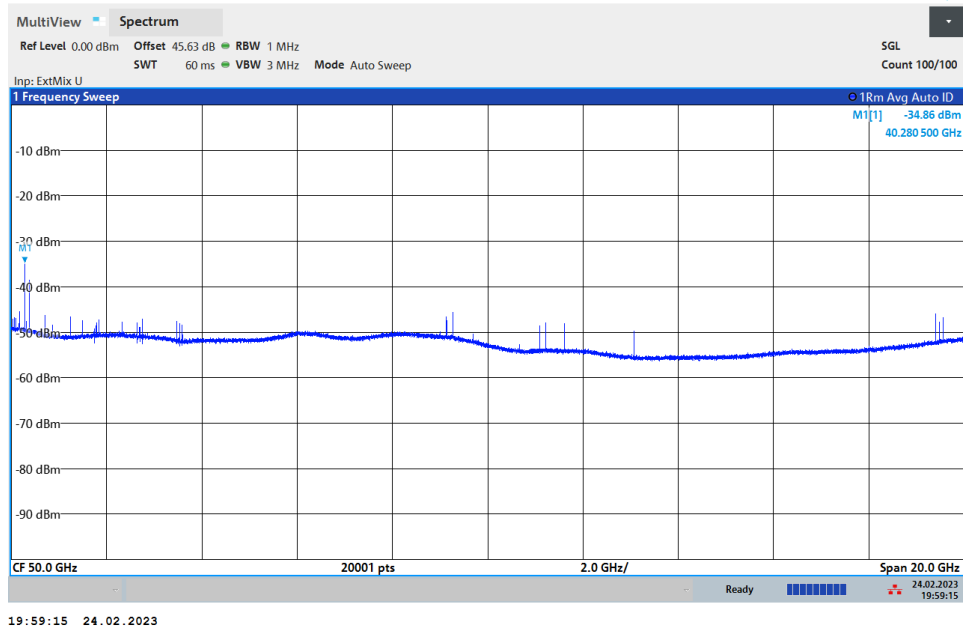
NR Band n260 QPSK (18-40GHz)	
<p><b>Lowest Channel / 400MHz</b></p> <p>intentionally blank</p>	
<p><b>Middle Channel / 400MHz</b></p> <p>intentionally blank</p>	
<p><b>Highest Channel / 400MHz</b></p> <p>intentionally blank</p>	

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



NR Band n260

(40GHz-60GHz)

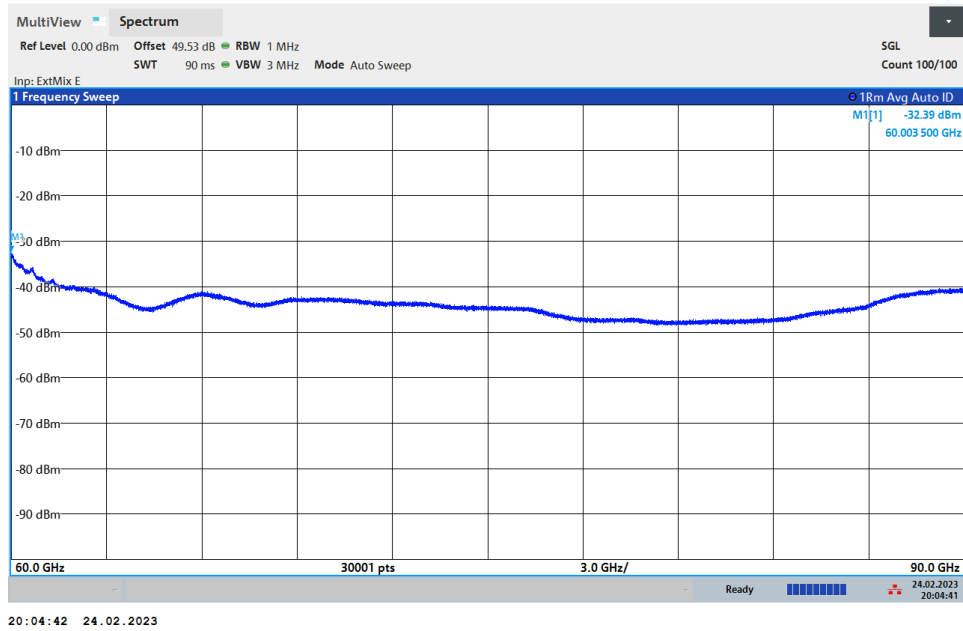


$$\begin{aligned} \text{Offset} &= \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8 \\ &= 43 + 0.43 + 107 + 20\log(1) - 104.8 = 45.63 \text{ (dB)} \end{aligned}$$



NR Band n260

(60GHz-90GHz)

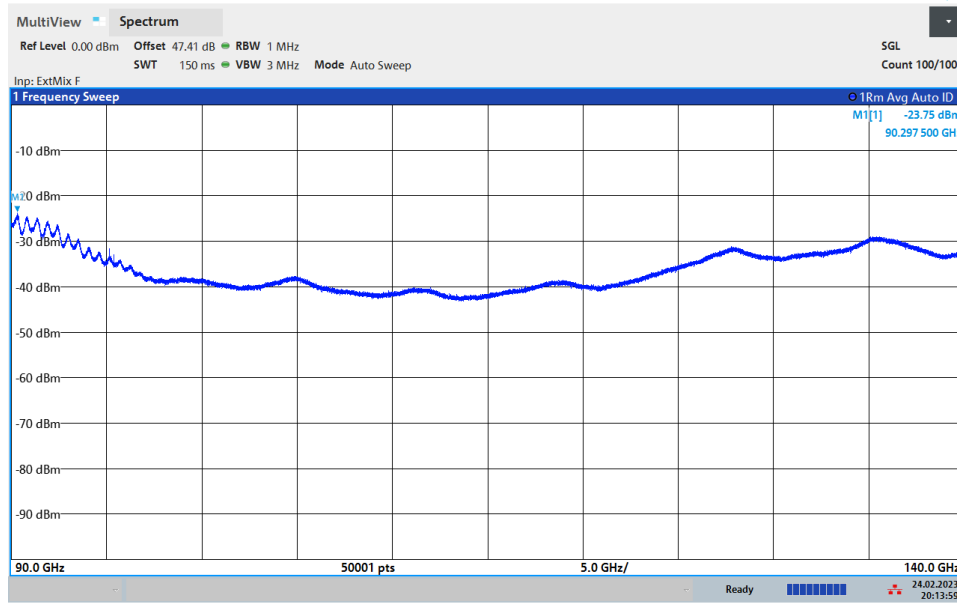


$$\text{Offset} = \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8$$
$$= 46.9 + 0.43 + 107 + 20\log(1) - 104.8 = 49.53 \text{ (dB)}$$



NR Band n260

(90GHz-140GHz)



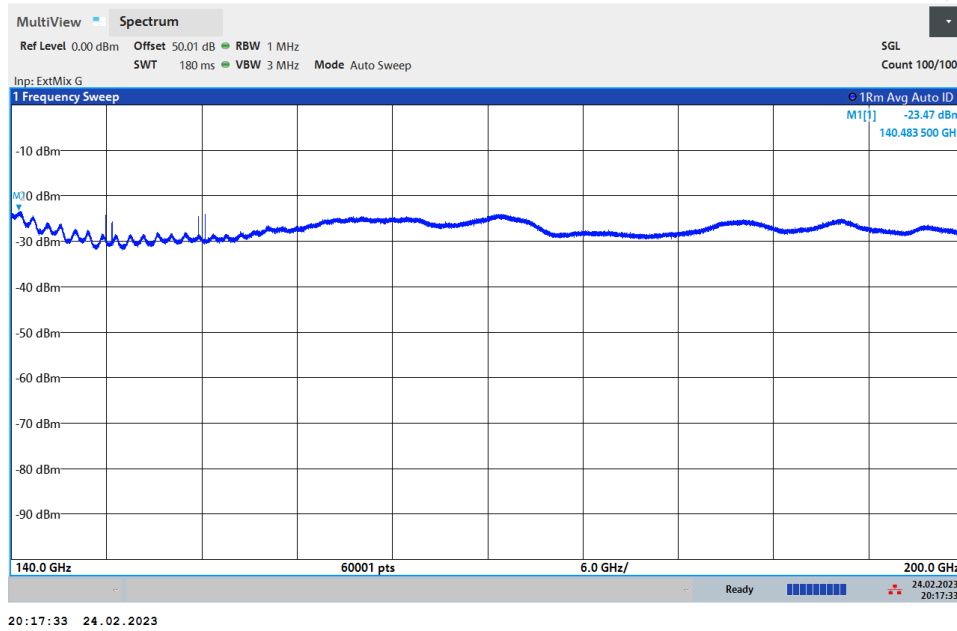
20:14:00 24.02.2023

$$\begin{aligned} \text{Offset} &= \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8 \\ &= 50.8 + 0.43 + 107 + 20\log(0.5) - 104.8 = 47.41 \text{ (dB)} \end{aligned}$$



NR Band n260

(140GHz-200GHz)



$$\begin{aligned} \text{Offset} &= \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8 \\ &= 53.4 + 0.43 + 107 + 20\log(0.5) - 104.8 = 50.01 \text{ (dB)} \end{aligned}$$



Frequency Stability

Test Conditions		NR Band n260 / Middle Channel			Limit
Temperature (°C)	Voltage (Volt)	CW tone			Note 2.
		Frequency (GHz)	Deviation (kHz)	Deviation (ppm)	Result
50	Normal Voltage	38.449992	8.000	0.208	PASS
40	Normal Voltage	38.449971	29.000	0.753	
30	Normal Voltage	38.449986	14.000	0.364	
20(Ref.)	Normal Voltage	38.45	0.000	0.000	
10	Normal Voltage	38.449991	9.000	0.234	
0	Normal Voltage	38.4500629	-62.900	1.634	
-10	Normal Voltage	38.4501389	-138.900	3.608	
-20	Normal Voltage	38.4501798	-179.800	4.670	
-30	Normal Voltage	38.4502208	-220.800	5.735	
20	Maximum Voltage	38.449987	13.000	0.338	
20	Normal Voltage	38.449998	2.000	0.052	
20	Battery End Point	38.45002	-20.000	0.519	

Note:

1. Normal Voltage =3.85 V. ; Battery End Point (BEP) =3.4 V. ; Maximum Voltage =4.4 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*



**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.*

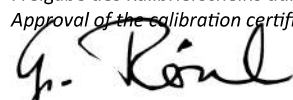
*The user is obliged to have the object recalibrated at appropriate intervals.*

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 Kalibrierscheines 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  
**Page** 3 / 3

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 <sup>1</sup>.

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

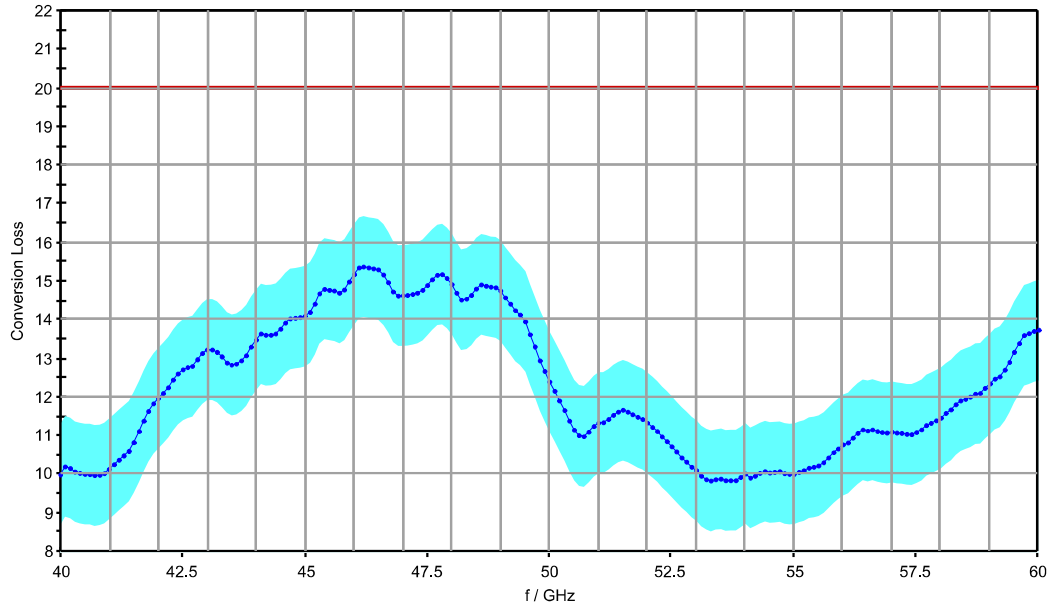
Software used for measurement .....	3
<b>1. Conversion Loss (4. Harmonic) .....</b>	<b>4</b>
1.1 Conversion Loss (IF = 404.4 MHz) .....	4
1.2 Conversion Loss (IF = 729 MHz) .....	4
1.3 Conversion Loss (IF = 1330 MHz) .....	5
1.4 Continuity response within 1 GHz .....	5

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

# 1. Conversion Loss (4. Harmonic)

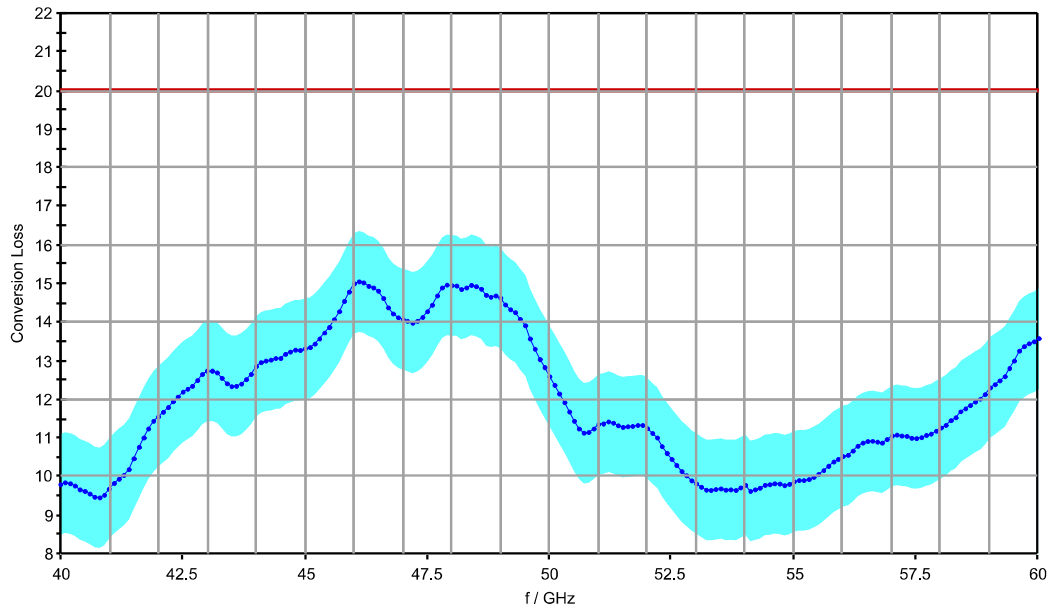
## 1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 4. Harmonic



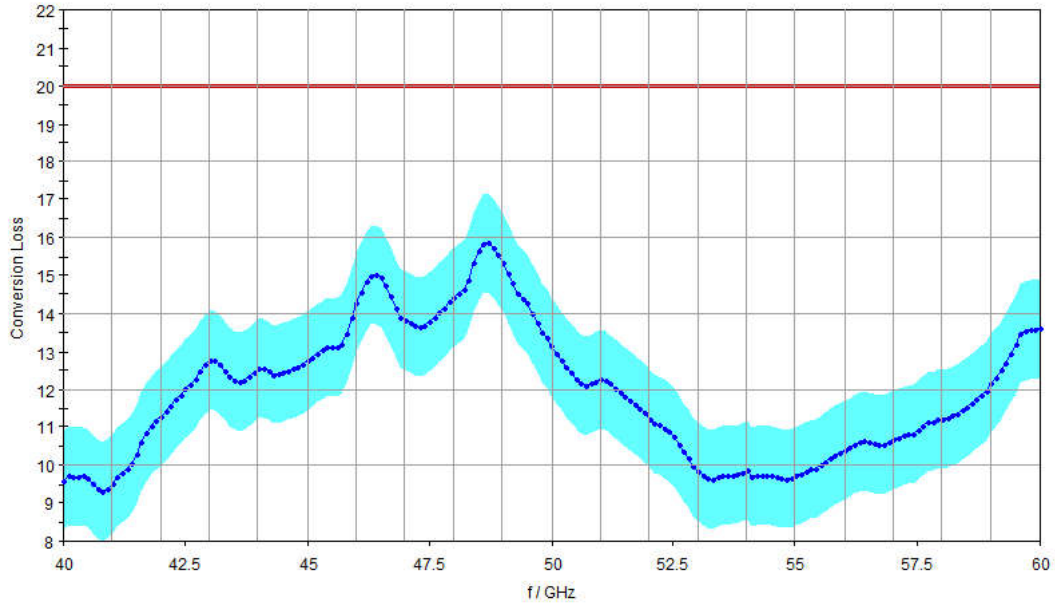
## 1.2 Conversion Loss (IF = 729 MHz)

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

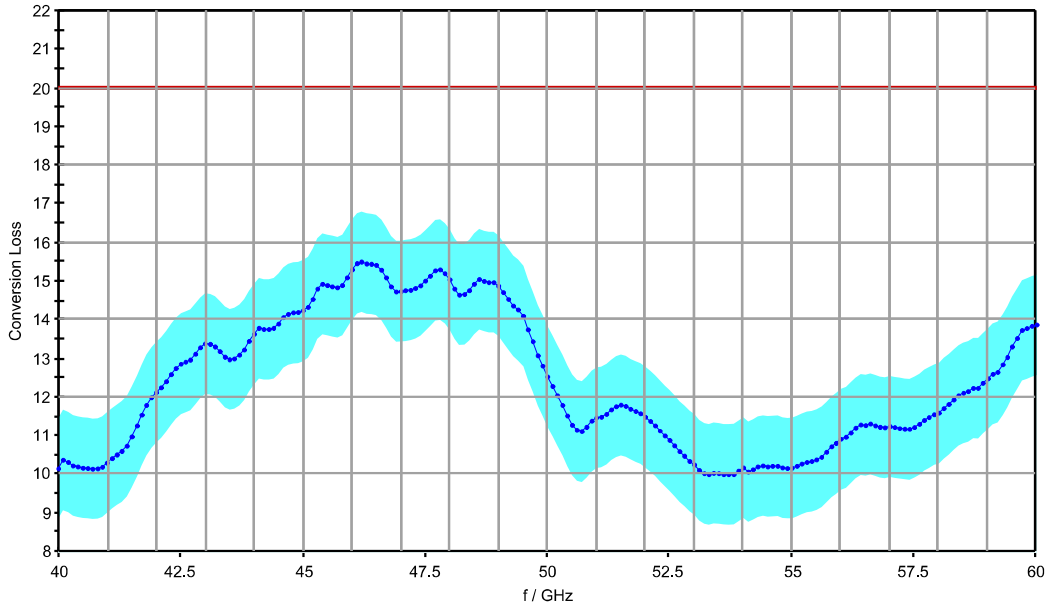
Software used for measurement .....	3
1. Conversion Loss (4. Harmonic) .....	4
1.1 Conversion Loss (IF = 404.4 MHz) .....	4
1.2 Conversion Loss (IF = 729 MHz) .....	4
1.3 Conversion Loss (IF = 1330 MHz) .....	5
1.4 Continuity response within 1 GHz .....	5

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)

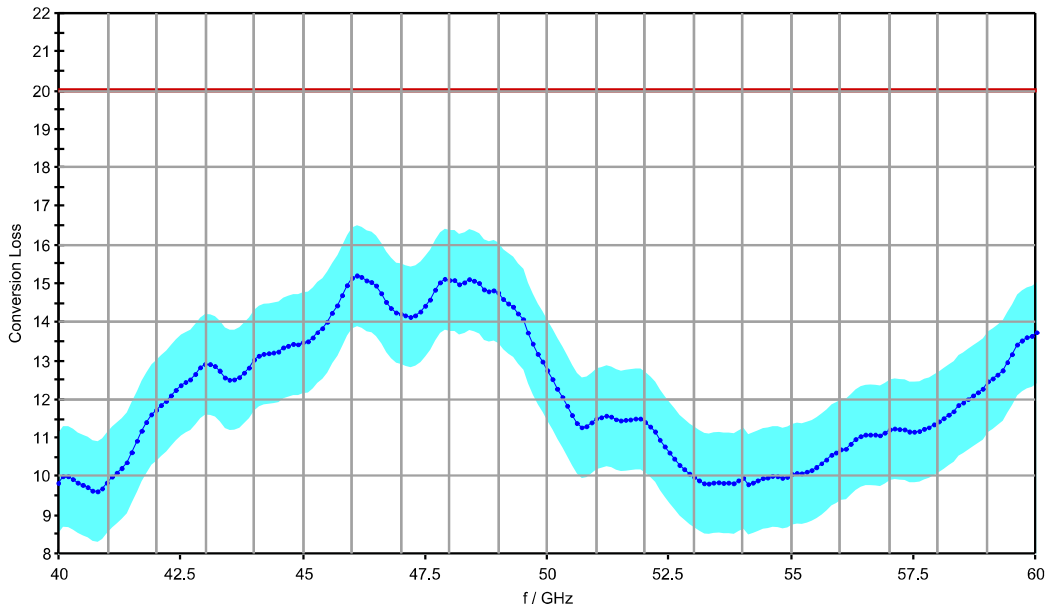
### 1.1 Conversion Loss (IF = 404.4 MHz)

IF = 404.4 MHz, 4. Harmonic



### 1.2 Conversion Loss (IF = 729 MHz)

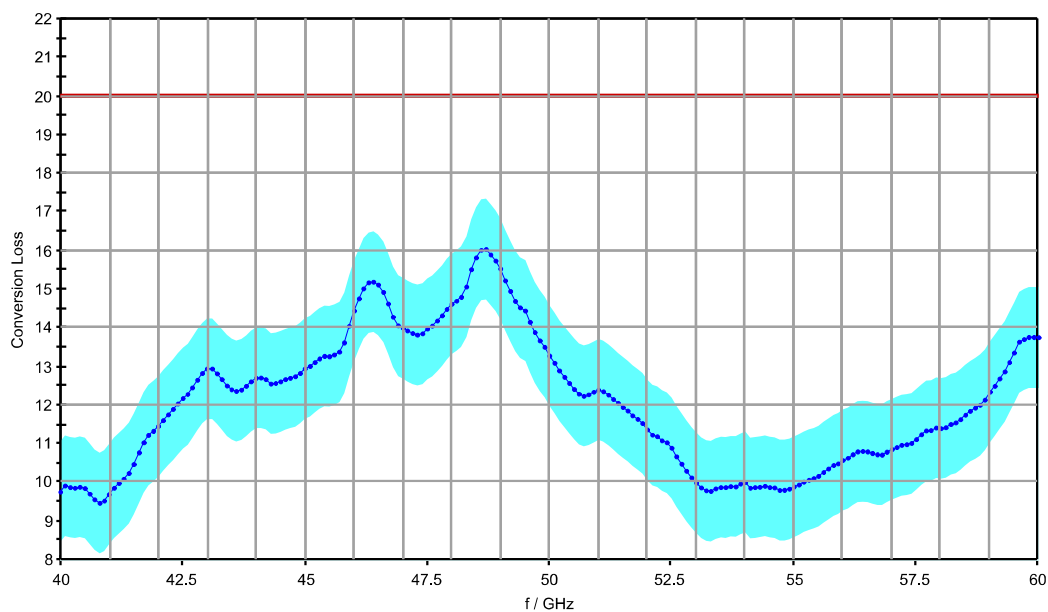
IF = 729 MHz, 4. Harmonic



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

Incoming Results