



DFT-s-OFDM Module B

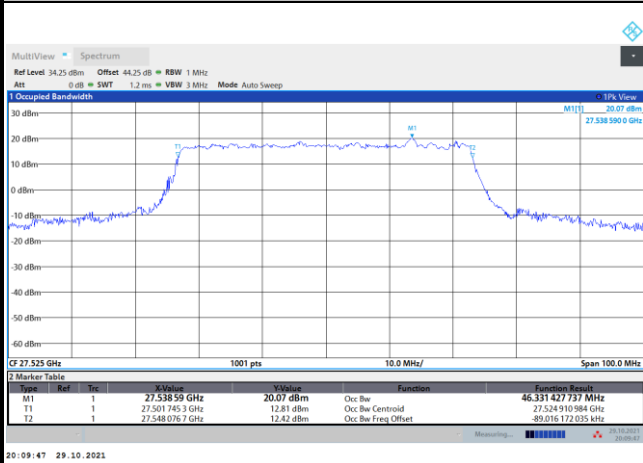
NR Band n261																													
<p><b>Lowest Channel / 200MHz / 64QAM</b></p> <table border="1"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>FValue</th> <th>YValue</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>27.588 41 GHz</td> <td>11.28 dBm</td> <td>Occ BW</td> <td>192.007 718 118 MHz</td> </tr> <tr> <td>T1</td> <td>1</td> <td></td> <td>27.503 66 GHz</td> <td>6.51 dBm</td> <td>Occ BW Centroid</td> <td>27.599 664 095 GHz</td> </tr> <tr> <td>T2</td> <td>1</td> <td></td> <td>27.695 658 GHz</td> <td>7.23 dBm</td> <td>Occ BW Freq Offset</td> <td>-335.904 835 281 kHz</td> </tr> </tbody> </table>	Type	Ref	Trc	FValue	YValue	Function	Function Result	M1	1		27.588 41 GHz	11.28 dBm	Occ BW	192.007 718 118 MHz	T1	1		27.503 66 GHz	6.51 dBm	Occ BW Centroid	27.599 664 095 GHz	T2	1		27.695 658 GHz	7.23 dBm	Occ BW Freq Offset	-335.904 835 281 kHz	<p>intentionally blank</p>
Type	Ref	Trc	FValue	YValue	Function	Function Result																							
M1	1		27.588 41 GHz	11.28 dBm	Occ BW	192.007 718 118 MHz																							
T1	1		27.503 66 GHz	6.51 dBm	Occ BW Centroid	27.599 664 095 GHz																							
T2	1		27.695 658 GHz	7.23 dBm	Occ BW Freq Offset	-335.904 835 281 kHz																							
<p><b>Middle Channel / 200MHz / 64QAM</b></p> <table border="1"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>FValue</th> <th>YValue</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>27.931 79 GHz</td> <td>10.67 dBm</td> <td>Occ BW</td> <td>189.806 615 179 MHz</td> </tr> <tr> <td>T1</td> <td>1</td> <td></td> <td>27.828 658 GHz</td> <td>7.64 dBm</td> <td>Occ BW Centroid</td> <td>27.933 531 658 GHz</td> </tr> <tr> <td>T2</td> <td>1</td> <td></td> <td>28.018 475 GHz</td> <td>7.81 dBm</td> <td>Occ BW Freq Offset</td> <td>-1.428 541 911 MHz</td> </tr> </tbody> </table>	Type	Ref	Trc	FValue	YValue	Function	Function Result	M1	1		27.931 79 GHz	10.67 dBm	Occ BW	189.806 615 179 MHz	T1	1		27.828 658 GHz	7.64 dBm	Occ BW Centroid	27.933 531 658 GHz	T2	1		28.018 475 GHz	7.81 dBm	Occ BW Freq Offset	-1.428 541 911 MHz	<p>intentionally blank</p>
Type	Ref	Trc	FValue	YValue	Function	Function Result																							
M1	1		27.931 79 GHz	10.67 dBm	Occ BW	189.806 615 179 MHz																							
T1	1		27.828 658 GHz	7.64 dBm	Occ BW Centroid	27.933 531 658 GHz																							
T2	1		28.018 475 GHz	7.81 dBm	Occ BW Freq Offset	-1.428 541 911 MHz																							
<p><b>Highest Channel / 200MHz / 64QAM</b></p> <table border="1"> <thead> <tr> <th>Type</th> <th>Ref</th> <th>Trc</th> <th>FValue</th> <th>YValue</th> <th>Function</th> <th>Function Result</th> </tr> </thead> <tbody> <tr> <td>M1</td> <td>1</td> <td></td> <td>28.316 33 GHz</td> <td>11.14 dBm</td> <td>Occ BW</td> <td>189.561 343 088 MHz</td> </tr> <tr> <td>T1</td> <td>1</td> <td></td> <td>28.154 103 GHz</td> <td>5.24 dBm</td> <td>Occ BW Centroid</td> <td>28.248 883 317 GHz</td> </tr> <tr> <td>T2</td> <td>1</td> <td></td> <td>28.343 654 GHz</td> <td>6.30 dBm</td> <td>Occ BW Freq Offset</td> <td>-3.136 682 714 MHz</td> </tr> </tbody> </table>	Type	Ref	Trc	FValue	YValue	Function	Function Result	M1	1		28.316 33 GHz	11.14 dBm	Occ BW	189.561 343 088 MHz	T1	1		28.154 103 GHz	5.24 dBm	Occ BW Centroid	28.248 883 317 GHz	T2	1		28.343 654 GHz	6.30 dBm	Occ BW Freq Offset	-3.136 682 714 MHz	<p>intentionally blank</p>
Type	Ref	Trc	FValue	YValue	Function	Function Result																							
M1	1		28.316 33 GHz	11.14 dBm	Occ BW	189.561 343 088 MHz																							
T1	1		28.154 103 GHz	5.24 dBm	Occ BW Centroid	28.248 883 317 GHz																							
T2	1		28.343 654 GHz	6.30 dBm	Occ BW Freq Offset	-3.136 682 714 MHz																							



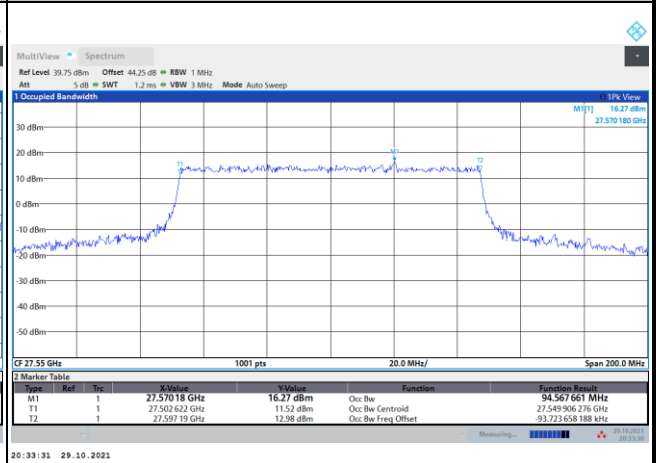
CP-OFDM Module B

NR Band n261

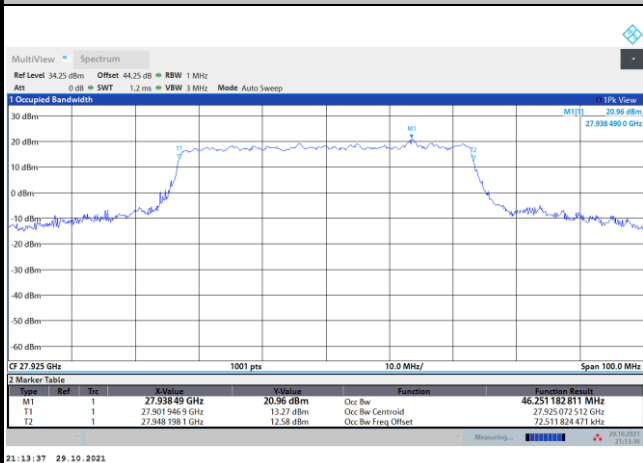
Lowest Channel / 50MHz / QPSK



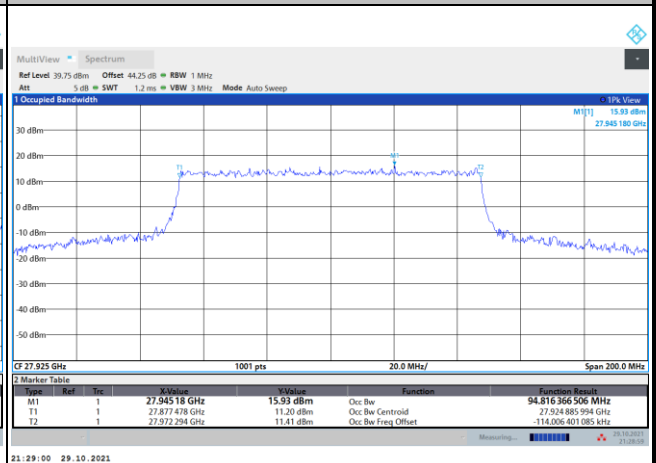
Lowest Channel / 100MHz / QPSK



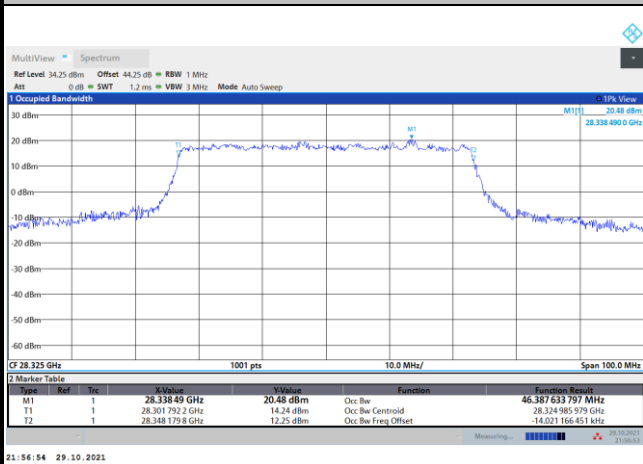
Middle Channel / 50MHz / QPSK



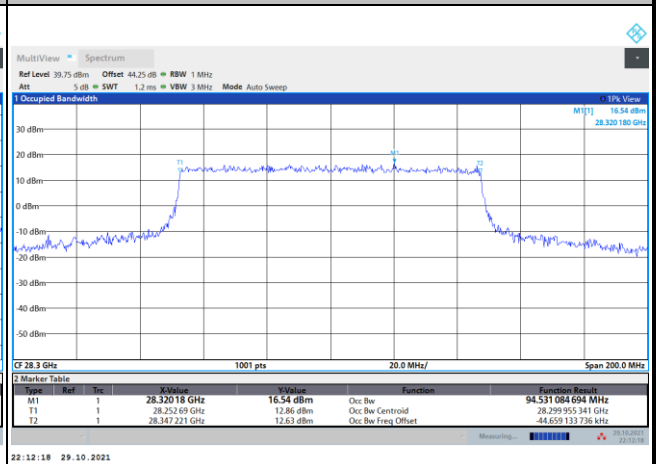
Middle Channel / 100MHz / QPSK



Highest Channel / 50MHz / QPSK



Highest Channel / 100MHz / QPSK

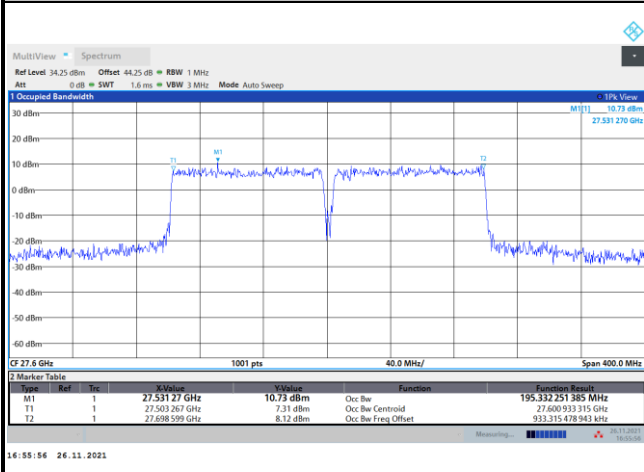




CP-OFDM Module B

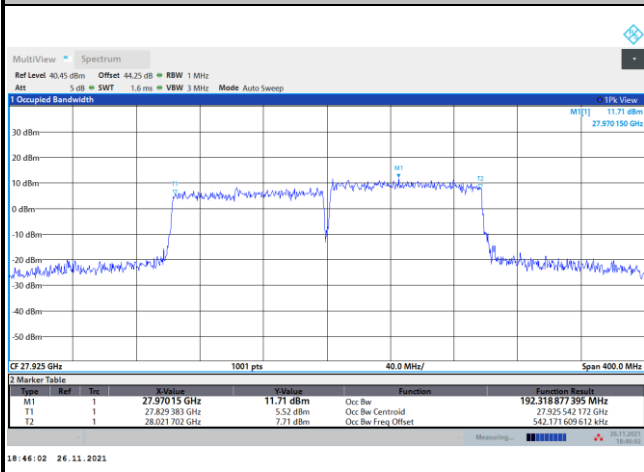
NR Band n261

Lowest Channel / 200MHz / QPSK



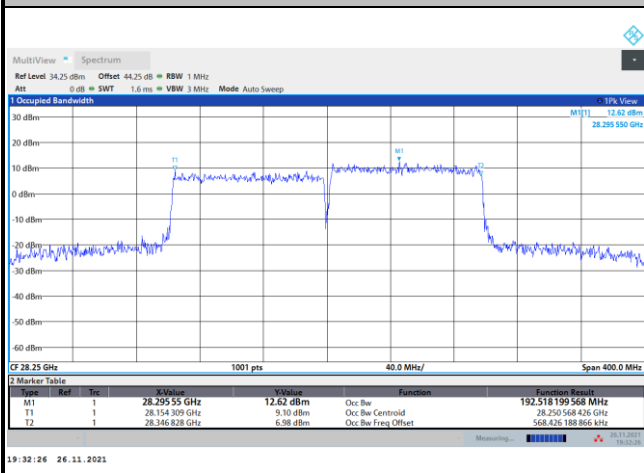
intentionally blank

Middle Channel / 200MHz / QPSK



intentionally blank

Highest Channel / 200MHz / QPSK



intentionally blank



### Radiated Out of Band Emissions

Mode			DFT-s-OFDM Module B NR Band n261 : BE (dBm) 1 RB								
BW			50MHz			100MHz			200MHz		
Limit (dBm)			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Low CH	0~10%OB	≤-5	-15.54	-16.35	-6.73	-7.90	-6.42	-11.57	-8.54	-7.63	-5.34
	>10%OB	≤-13	-20.14	-21.30	-15.84	-25.53	-26.73	-28.62	-13.43	-32.70	-13.81
High CH	0~10%OB	≤-5	-17.08	-19.43	-7.56	-6.10	-7.72	-12.04	-5.76	-5.15	-7.86
	>10%OB	≤-13	-21.75	-23.01	-17.23	-31.22	-32.94	-34.17	-13.14	-16.12	-15.77
Result			Compliance								

Mode			CP-OFDM Module B NR Band n261 : BE (dBm) 1 RB		
BW			50MHz	100MHz	200MHz
Limit (dBm)			QPSK	QPSK	QPSK
Low CH	0~10%OB	≤-5	-5.50	-8.43	-8.64
	>10%OB	≤-13	-14.65	-26.68	-16.32
High CH	0~10%OB	≤-5	-20.40	-9.84	-8.30
	>10%OB	≤-13	-23.54	-24.74	-16.47
Result			Compliance		

Mode			DFT-s-OFDM Module B NR Band n261 : BE (dBm) Full RB								
BW			50MHz			100MHz			200MHz		
Limit (dBm)			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Low CH	0~10%OB	≤-5	-12.94	-15.21	-14.55	-16.00	-17.07	-21.45	-15.69	-13.63	-19.60
	>10%OB	≤-13	-21.08	-22.29	-25.22	-21.96	-25.11	-27.65	-23.87	-25.10	-23.60
High CH	0~10%OB	≤-5	-12.08	-14.38	-15.57	-18.72	-22.00	-25.49	-19.05	-19.73	-18.77
	>10%OB	≤-13	-18.65	-22.27	-25.50	-22.07	-25.78	-29.24	-32.60	-24.11	-25.57
Result			Compliance								

Mode			CP-OFDM Module B NR Band n261 : BE (dBm) Full RB		
BW			50MHz	100MHz	200MHz
Limit (dBm)			QPSK	QPSK	QPSK
Low CH	0~10%OB	≤-5	-14.77	-16.63	-16.85
	>10%OB	≤-13	-20.17	-21.85	-23.60
High CH	0~10%OB	≤-5	-13.61	-17.28	-12.44
	>10%OB	≤-13	-18.93	-21.64	-21.23
Result			Compliance		

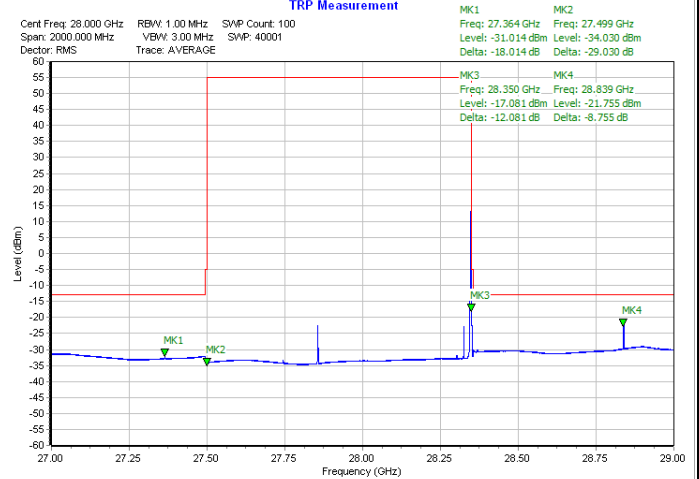
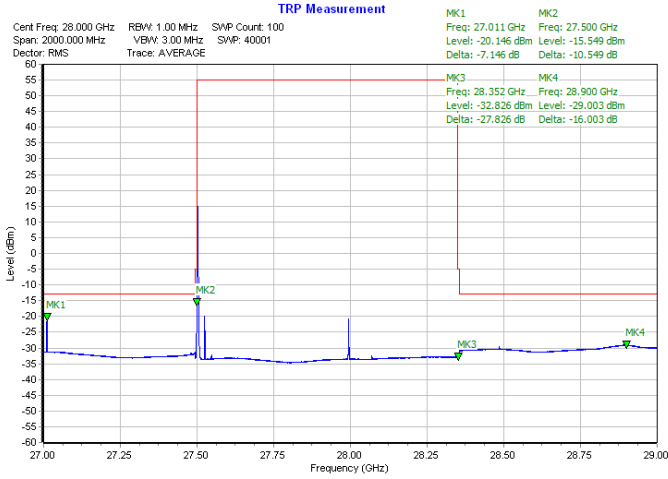


DFT-s-OFDM Module B

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / 1 RB

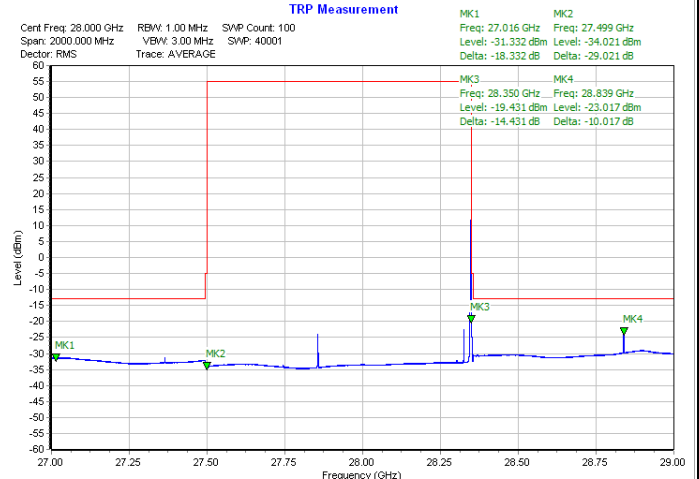
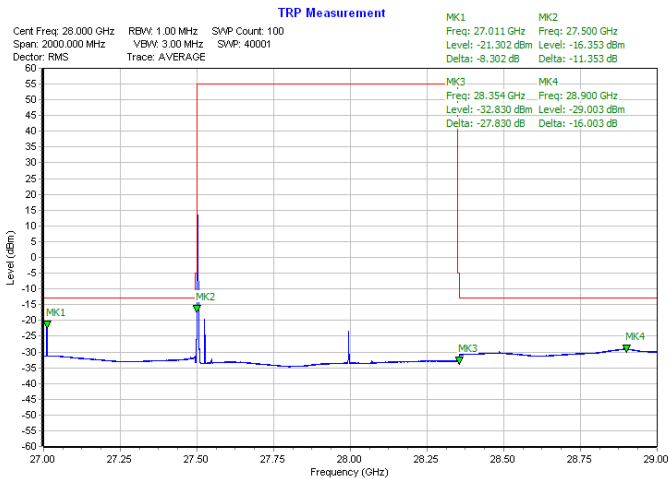
Highest Band Edge / 1 RB



NR Band n261 / 50MHz / 16QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB

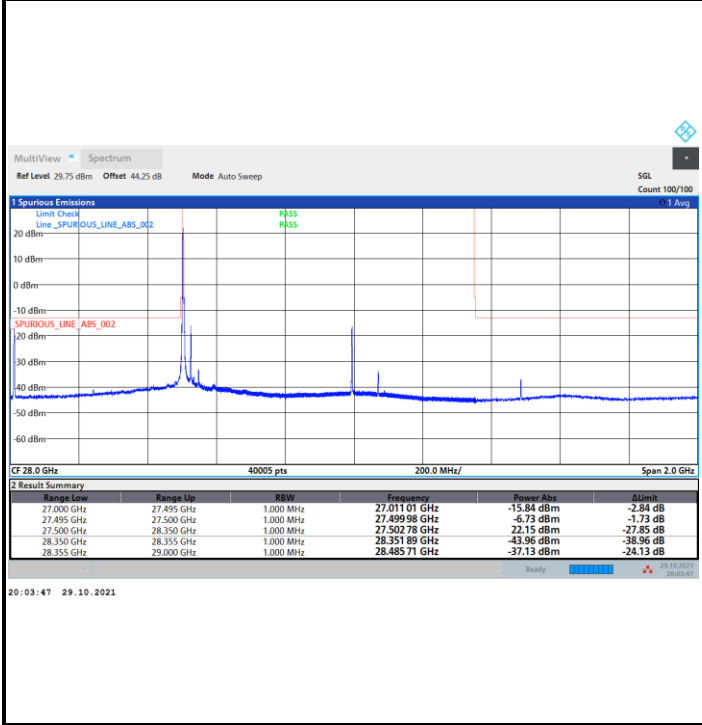




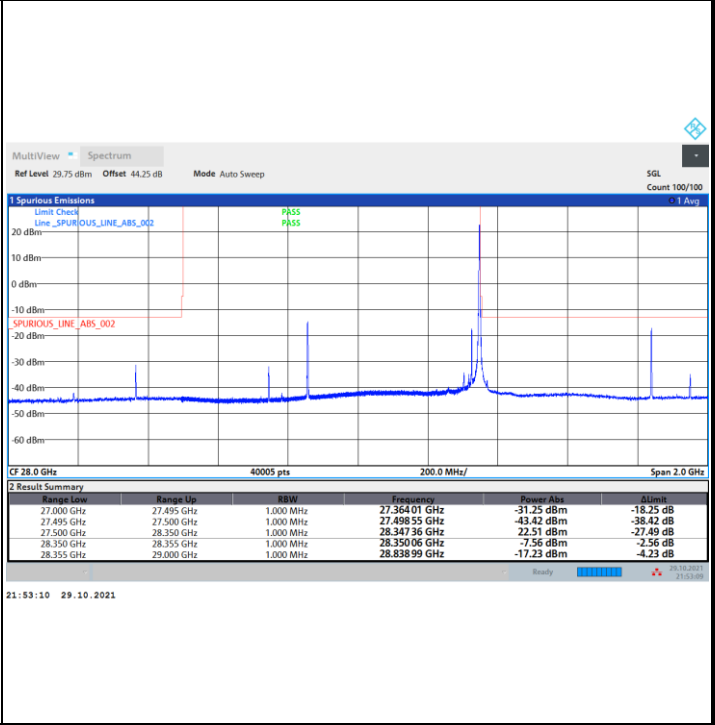
DFT-s-OFDM Module B

NR Band n261 / 50MHz / 64QAM

Lowest Band Edge / 1 RB

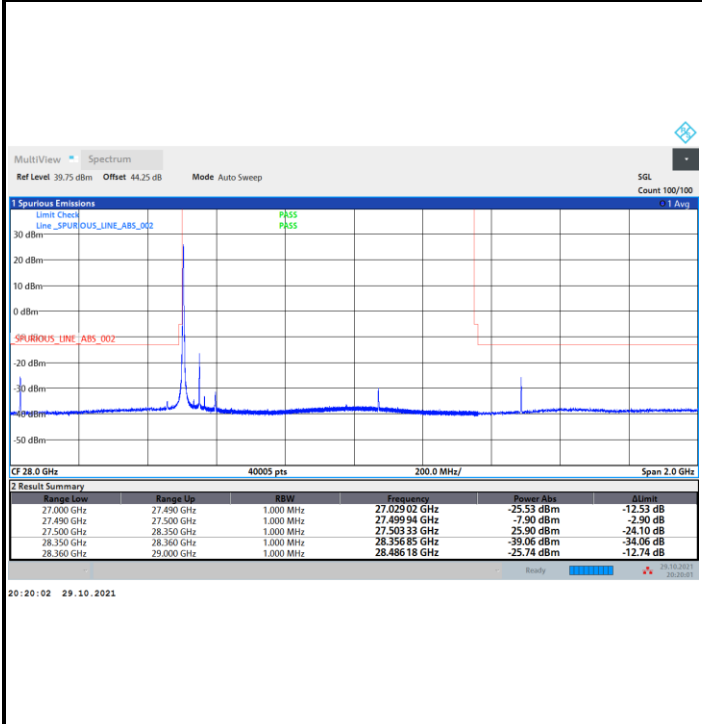


Highest Band Edge / 1 RB

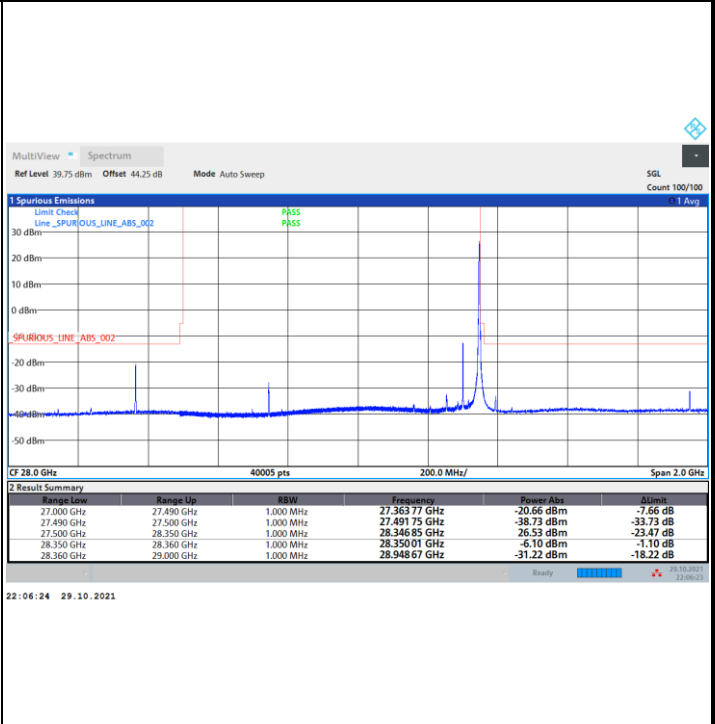


NR Band n261 / 100MHz / QPSK

Lowest Band Edge / 1 RB



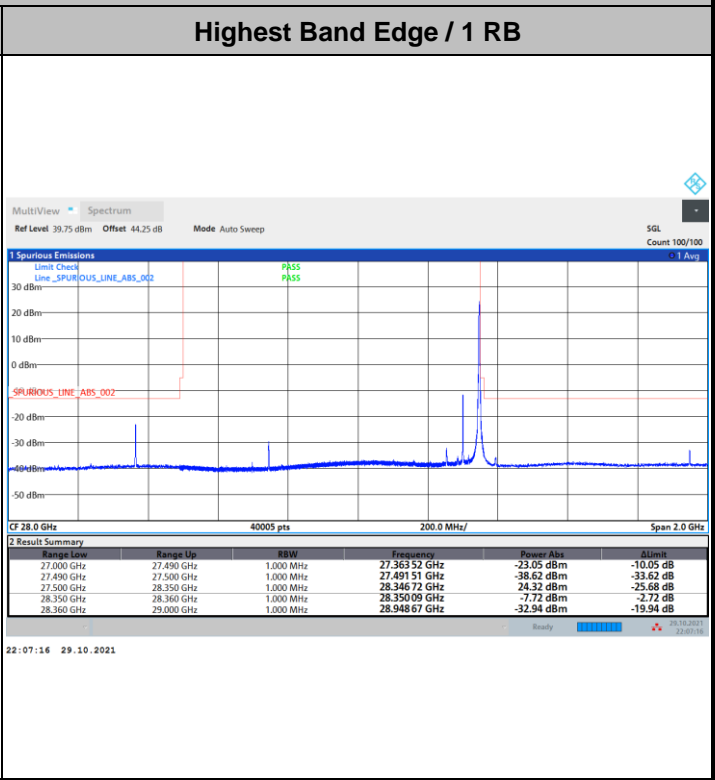
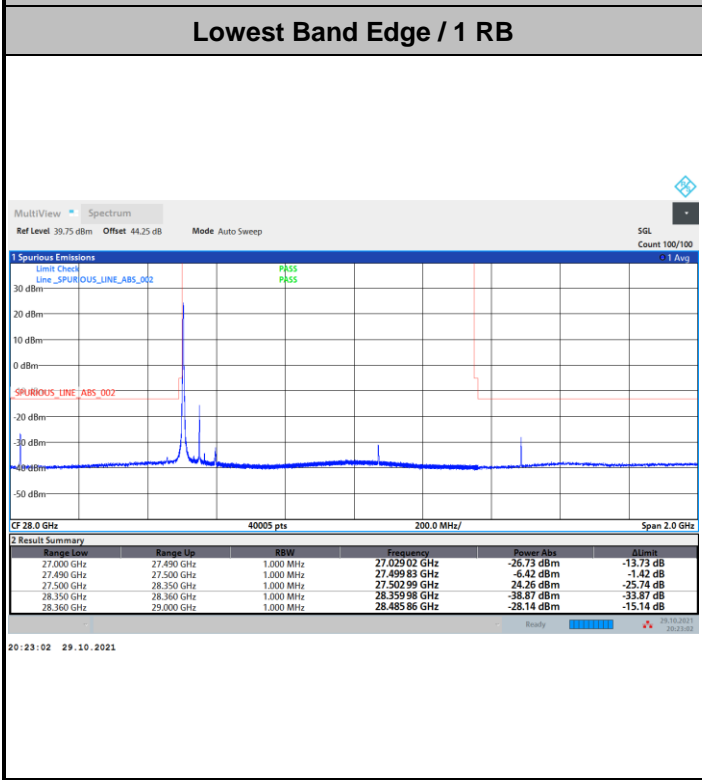
Highest Band Edge / 1 RB



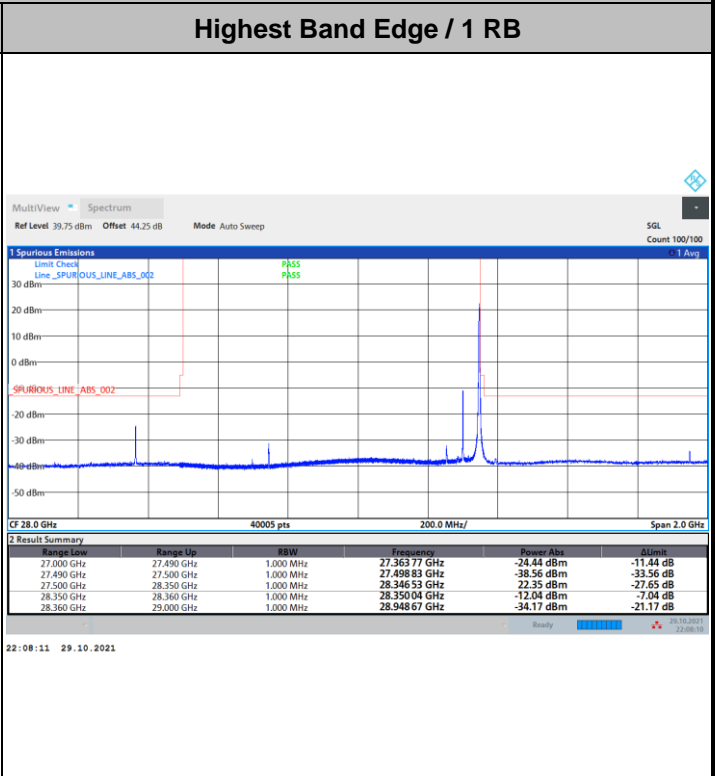
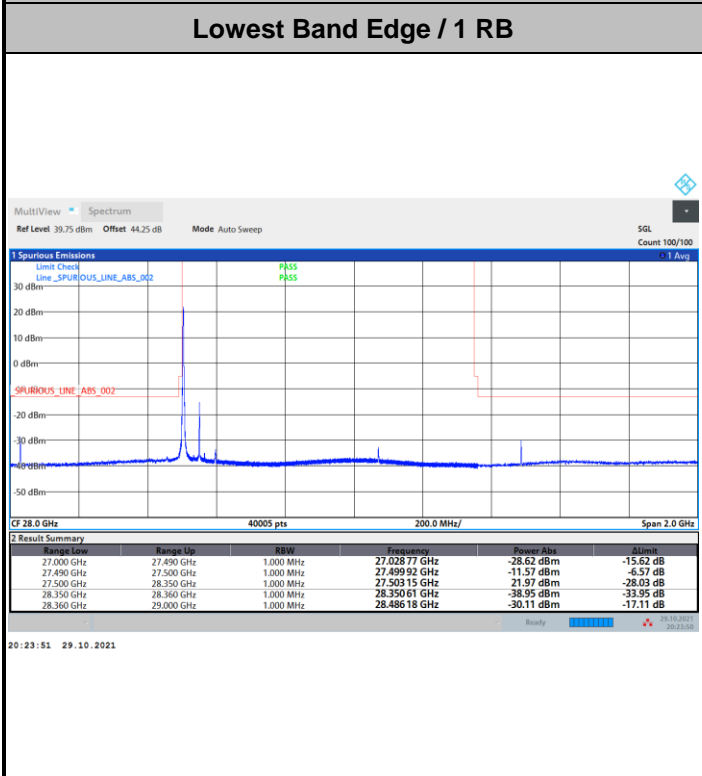


DFT-s-OFDM Module B

NR Band n261 / 100MHz / 16QAM



NR Band n261 / 100MHz / 64QAM

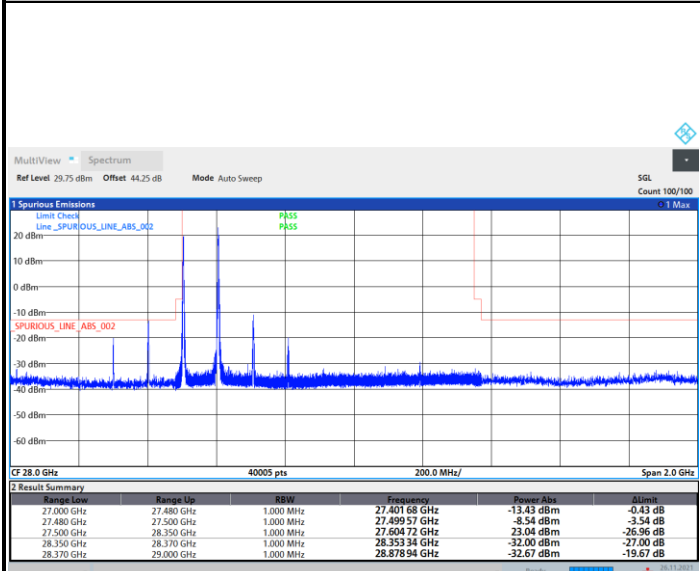




DFT-s-OFDM Module B

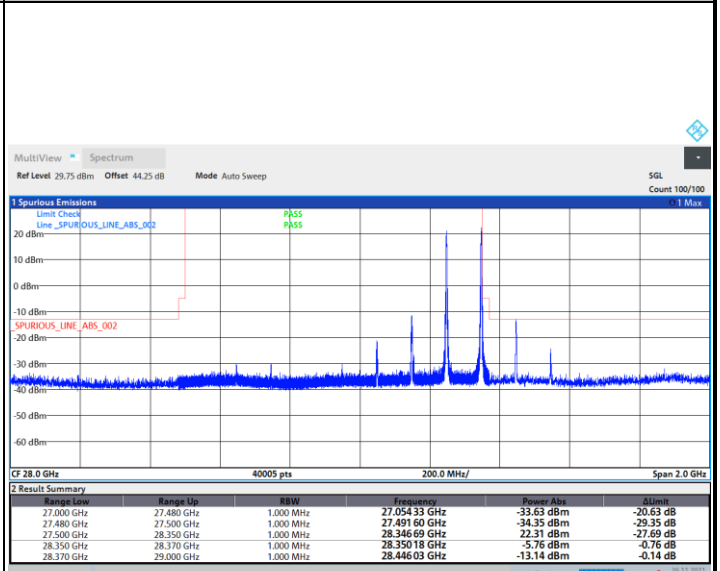
NR Band n261 / 200MHz / QPSK

Lowest Band Edge / 1 RB



16:41:37 26.11.2021

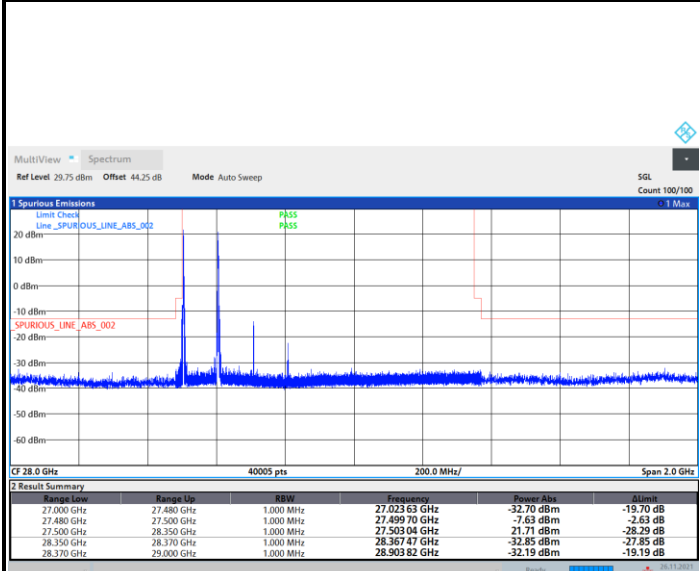
Highest Band Edge / 1 RB



19:24:48 26.11.2021

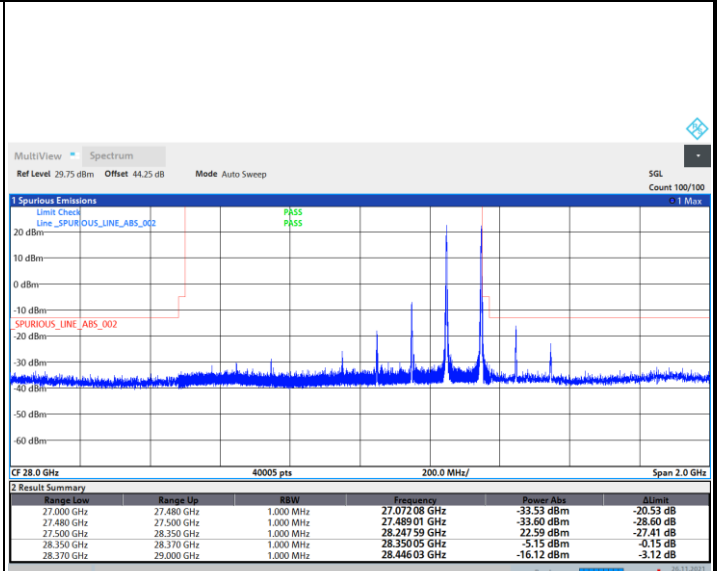
NR Band n261 / 200MHz / 16QAM

Lowest Band Edge / 1 RB



16:46:55 26.11.2021

Highest Band Edge / 1 RB

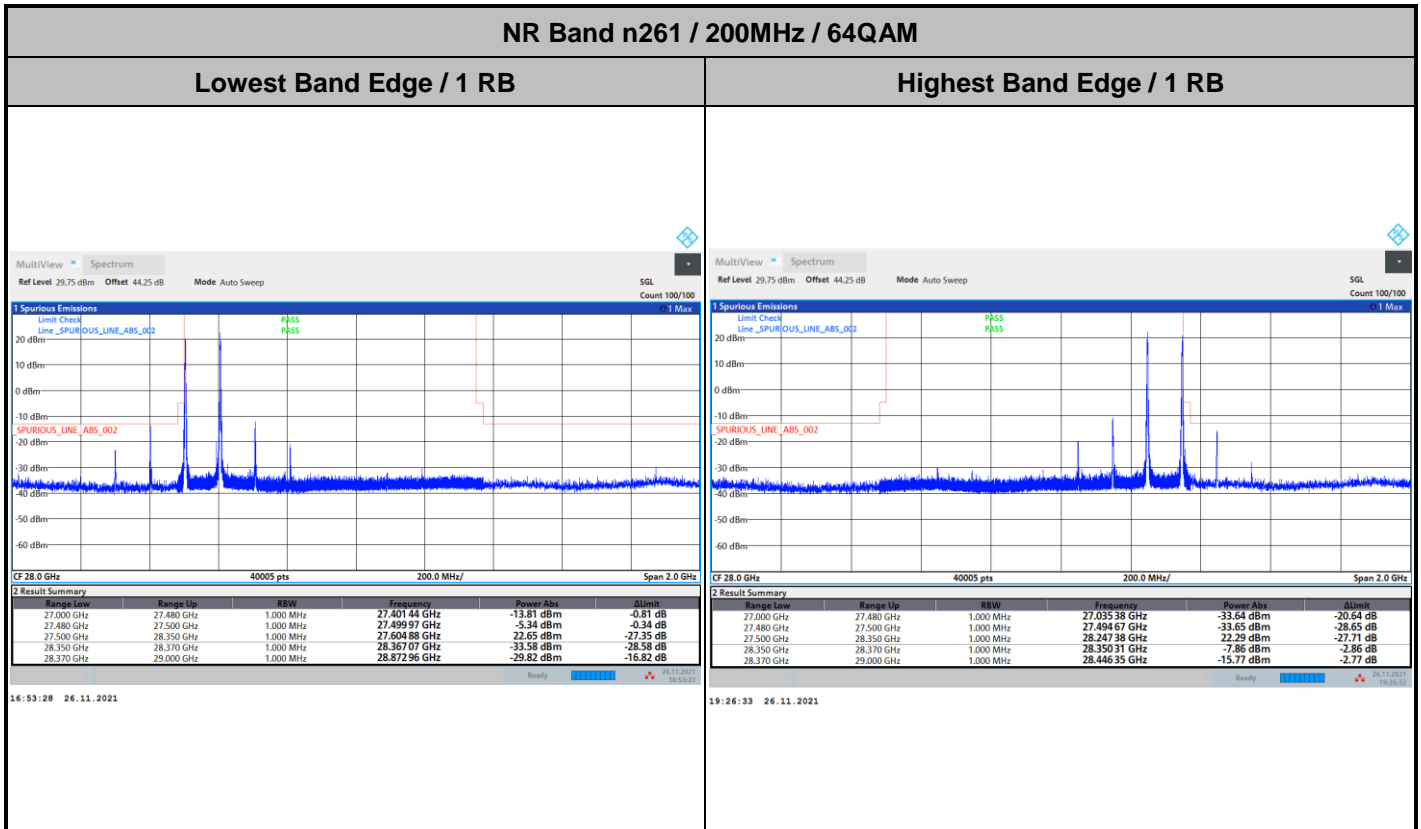


19:25:42 26.11.2021





DFT-s-OFDM Module B

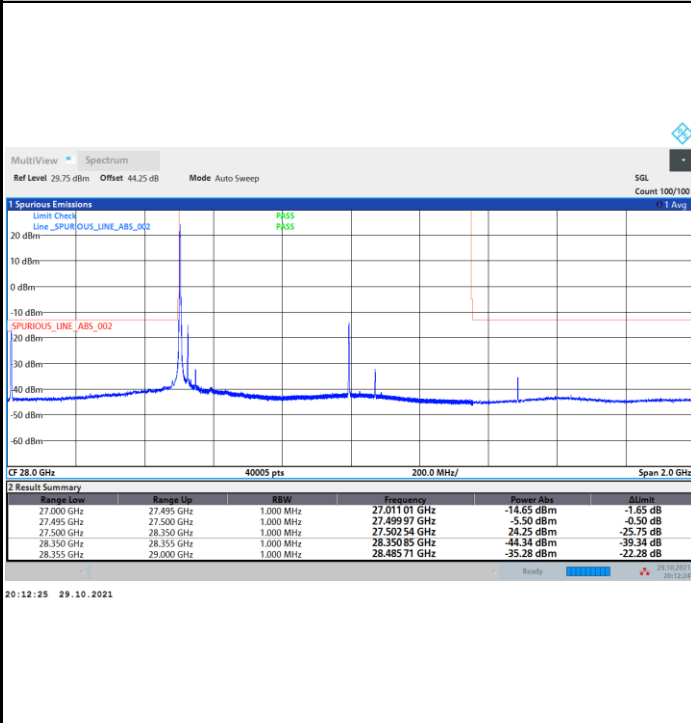




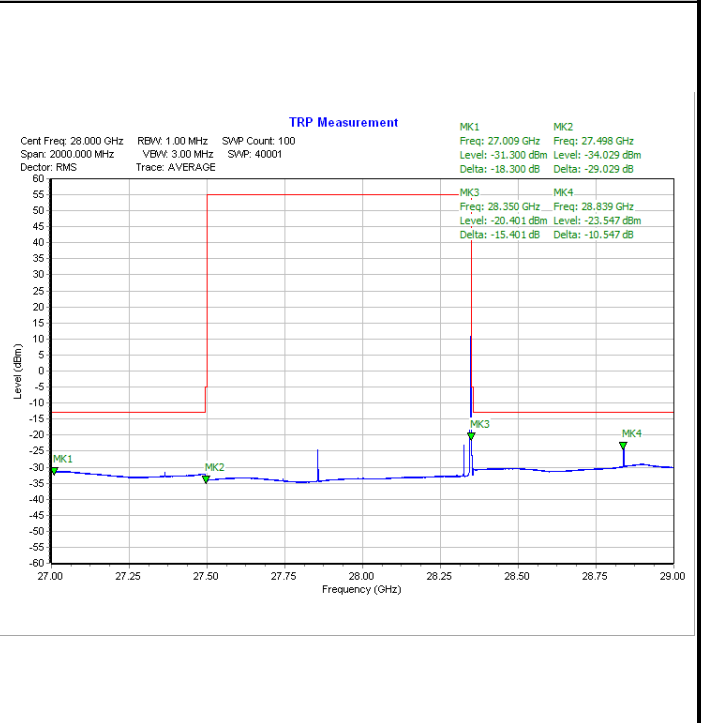
CP-OFDM Module B

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / 1 RB



Highest Band Edge / 1 RB

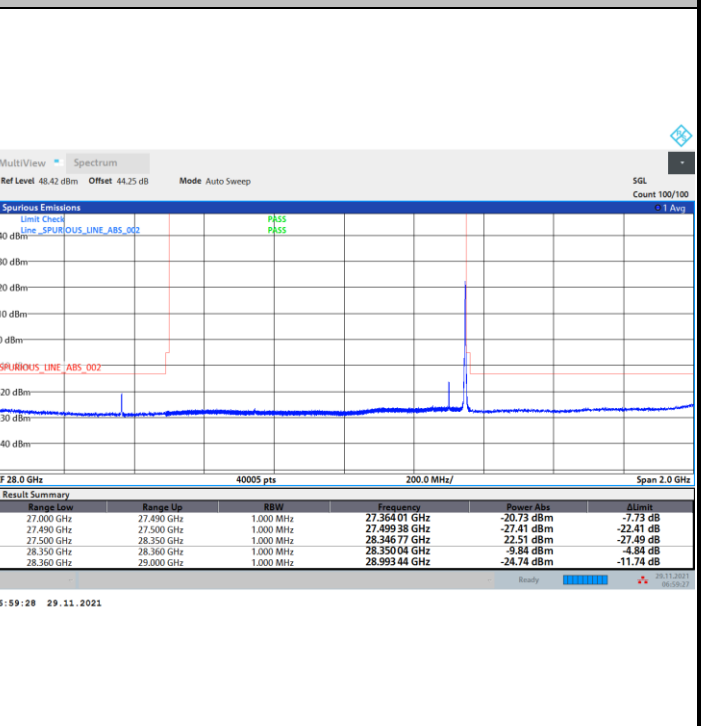


NR Band n261 / 100MHz / QPSK

Lowest Band Edge / 1 RB

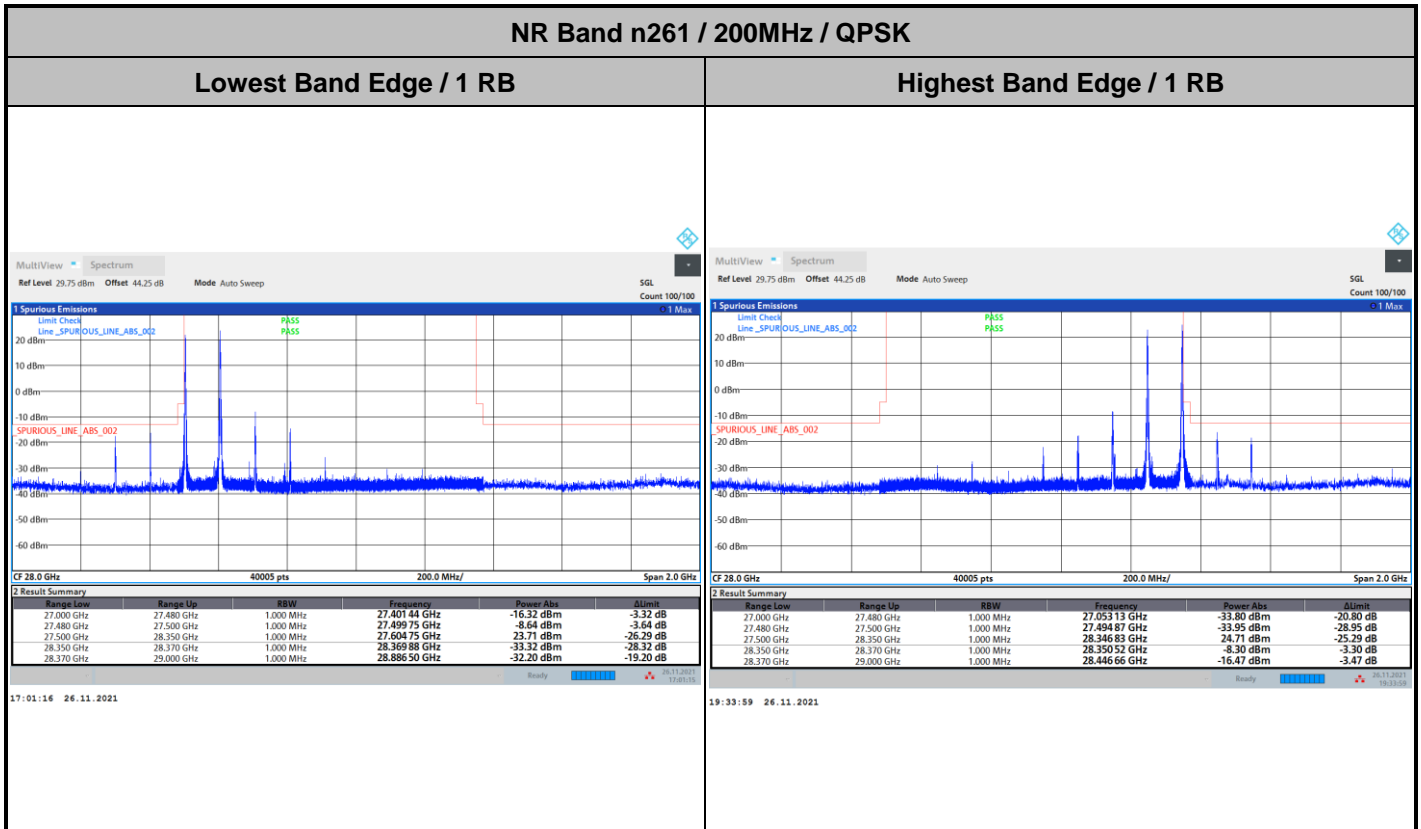


Highest Band Edge / 1 RB





CP-OFDM Module B



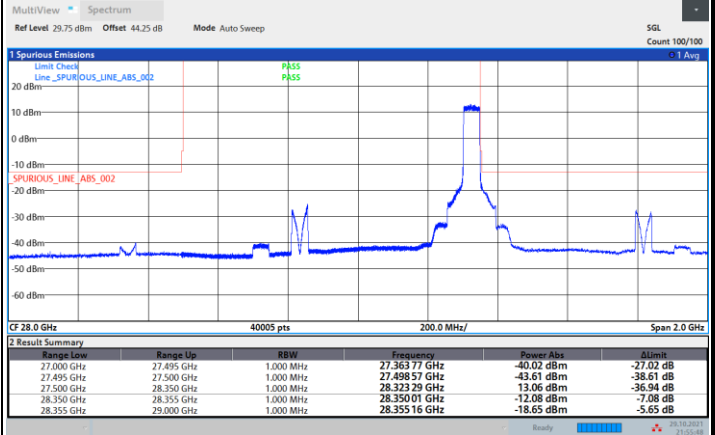
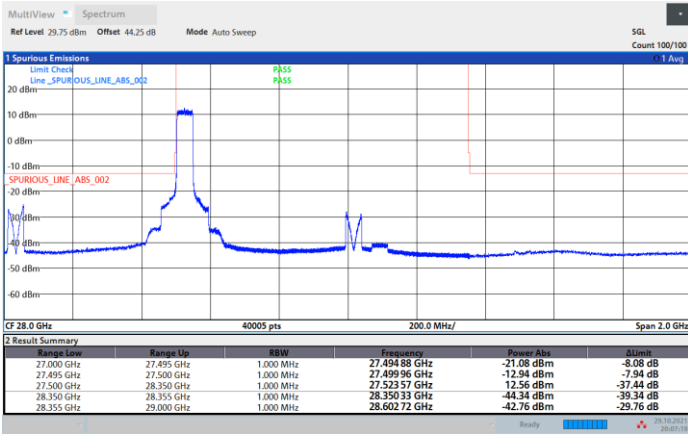


DFT-s-OFDM Module B

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / Full RB

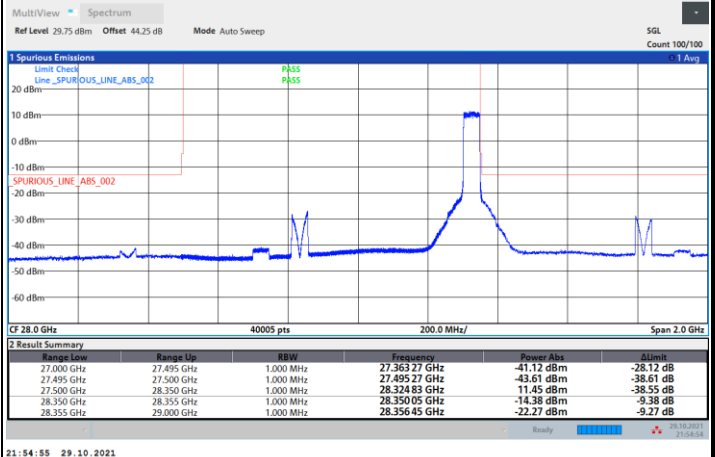
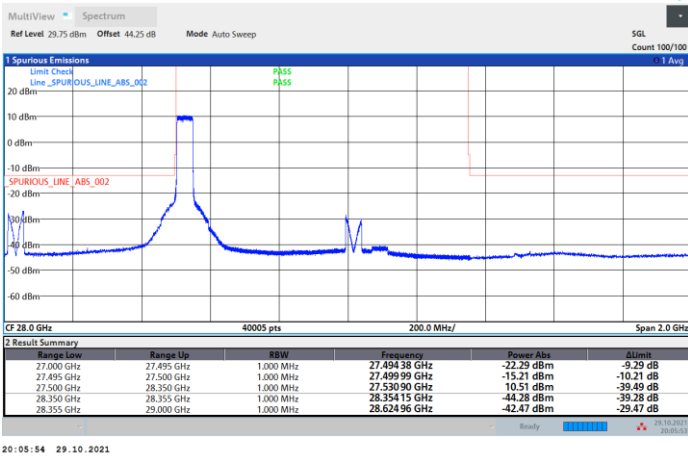
Highest Band Edge / Full RB



NR Band n261 / 50MHz / 16QAM

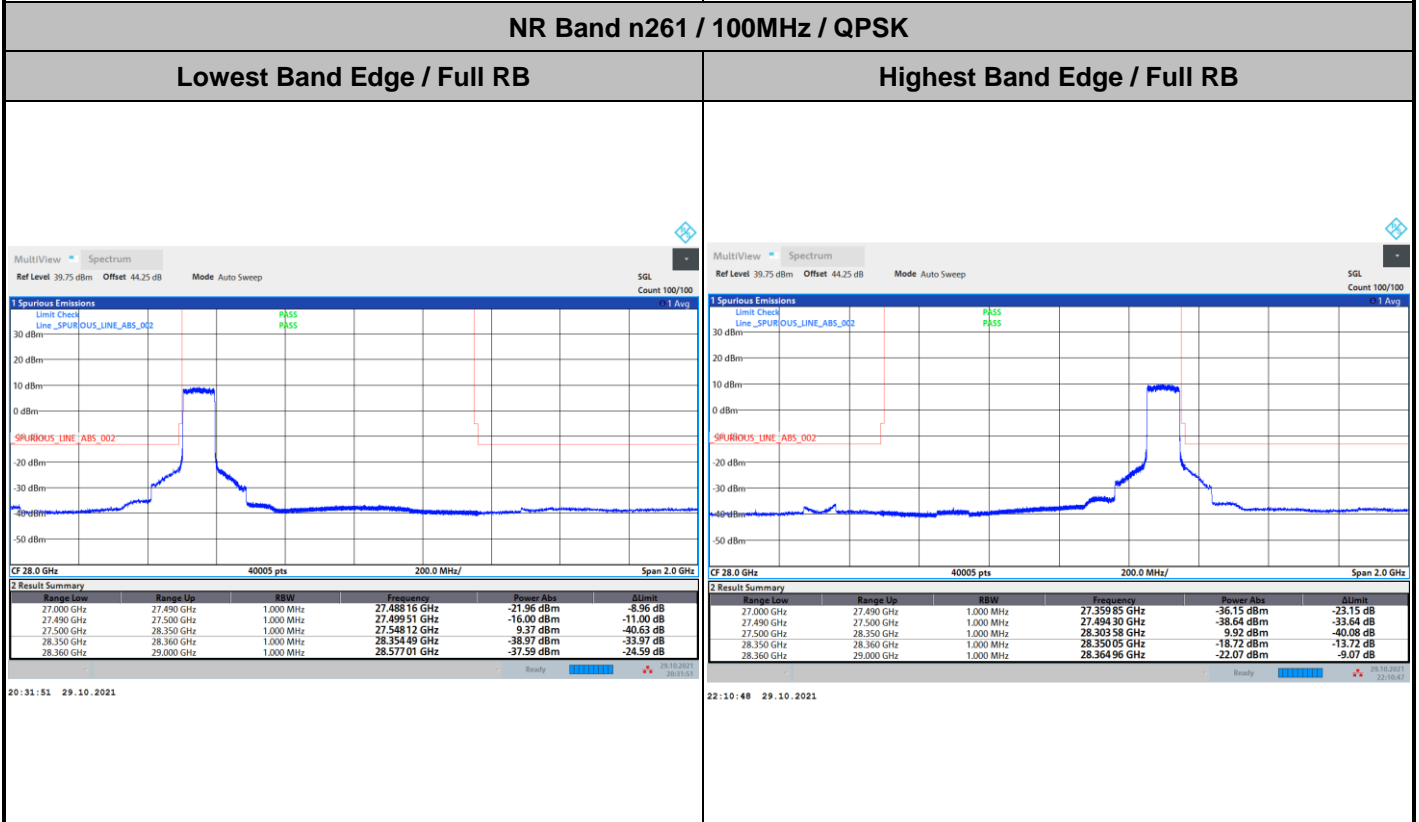
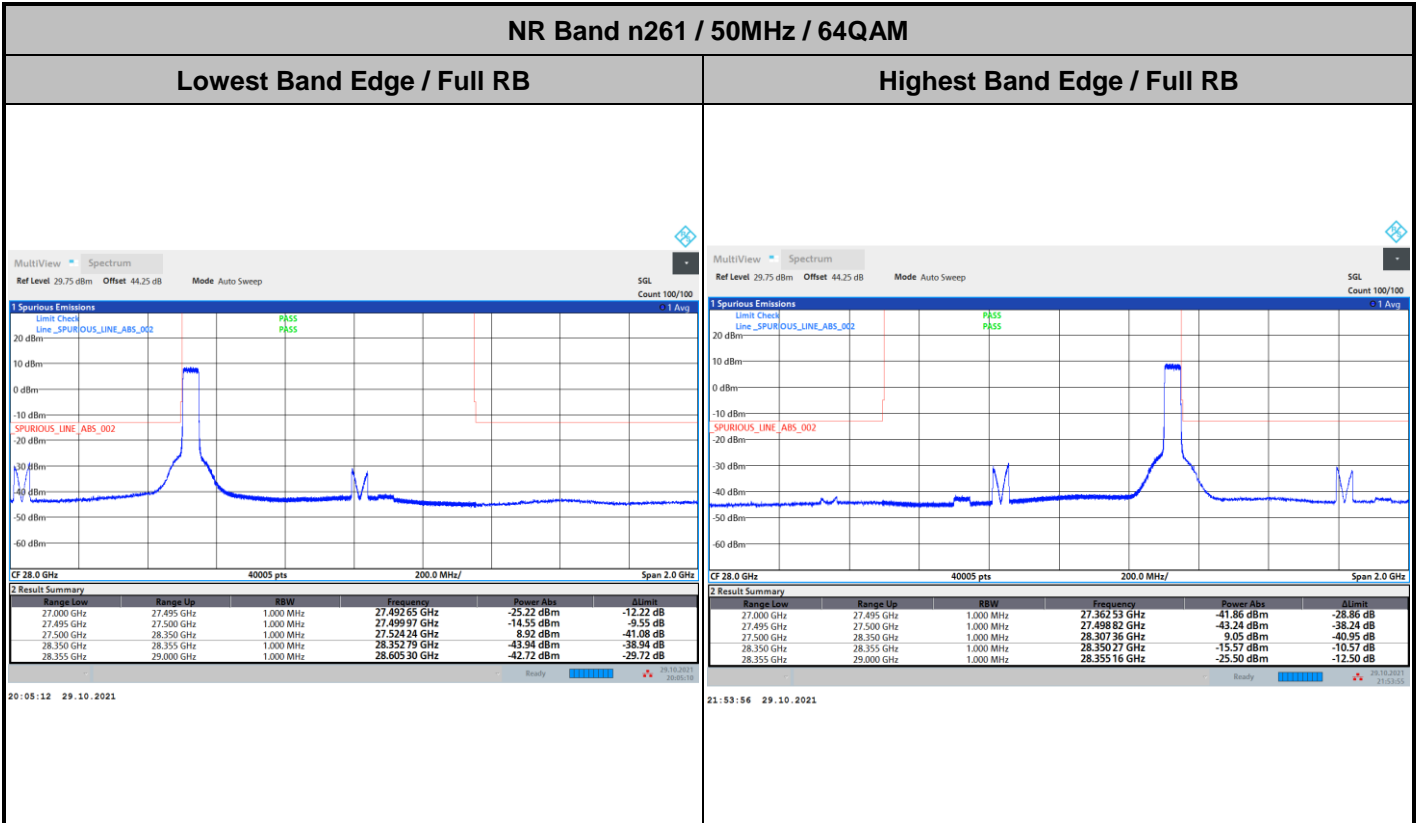
Lowest Band Edge / Full RB

Highest Band Edge / Full RB





DFT-s-OFDM Module B

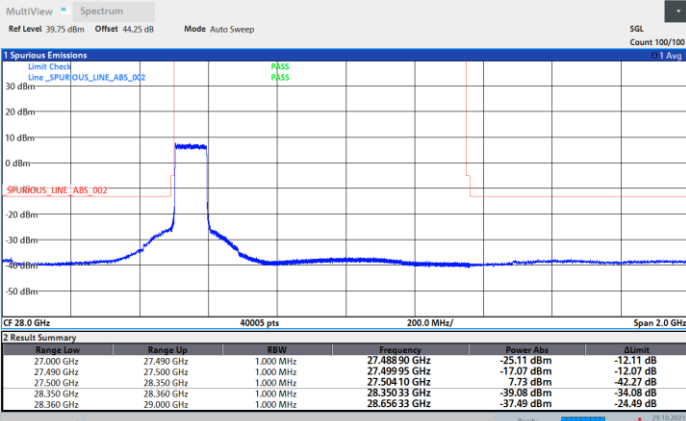




DFT-s-OFDM Module B

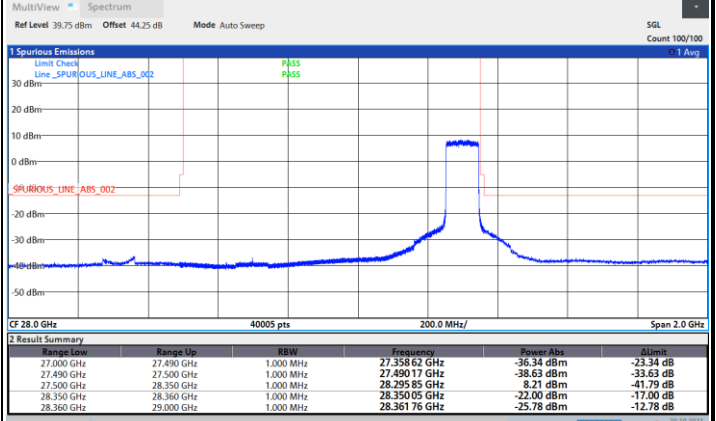
NR Band n261 / 100MHz / 16QAM

Lowest Band Edge / Full RB



20:26:26 29.10.2021

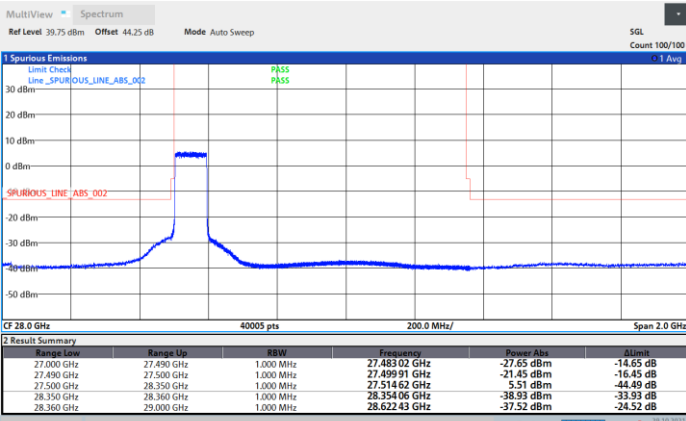
Highest Band Edge / Full RB



22:09:38 29.10.2021

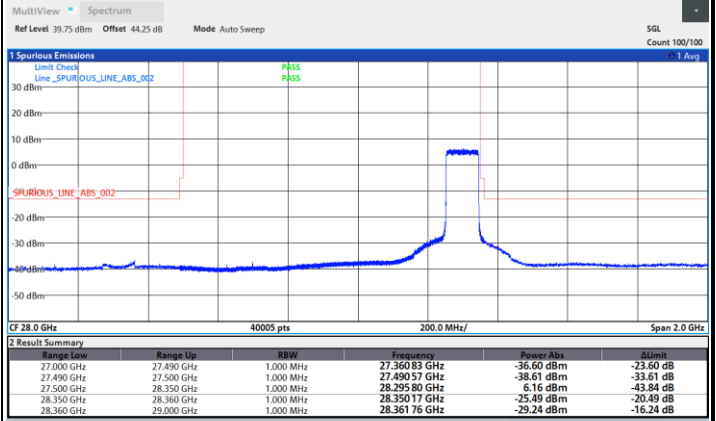
NR Band n261 / 100MHz / 64QAM

Lowest Band Edge / Full RB



20:24:40 29.10.2021

Highest Band Edge / Full RB



22:08:52 29.10.2021

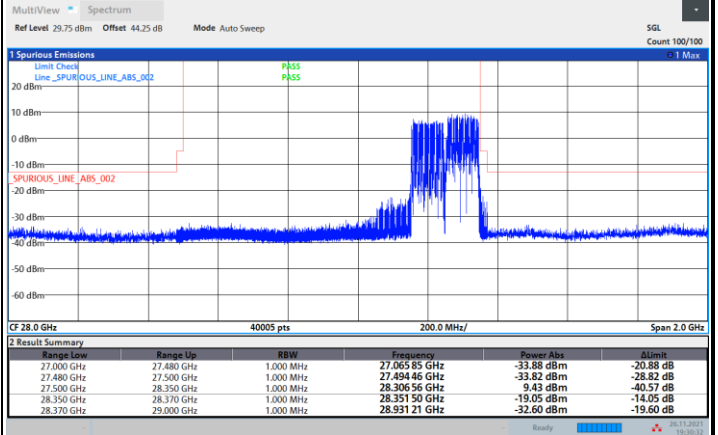
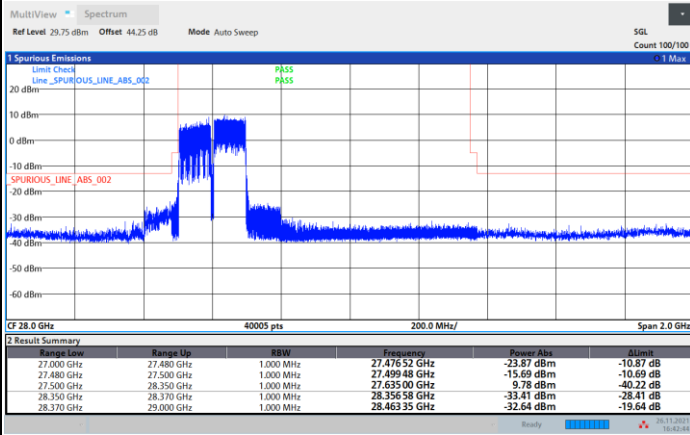


DFT-s-OFDM Module B

NR Band n261 / 200MHz / QPSK

Lowest Band Edge / Full RB

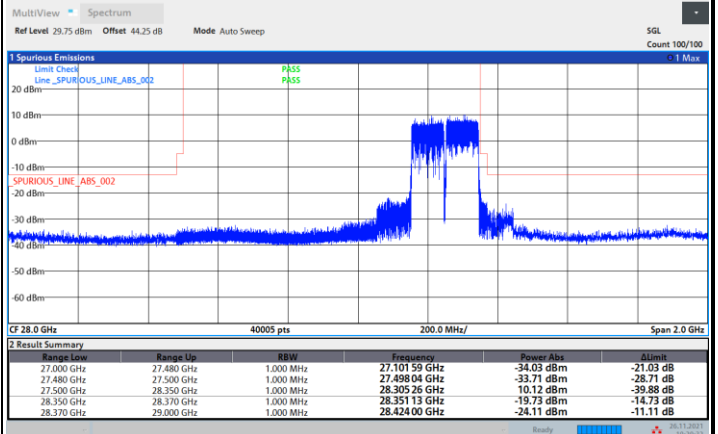
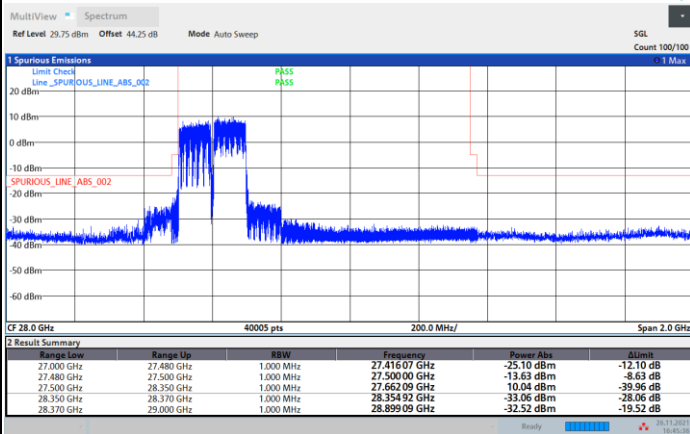
Highest Band Edge / Full RB



NR Band n261 / 200MHz / 16QAM

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



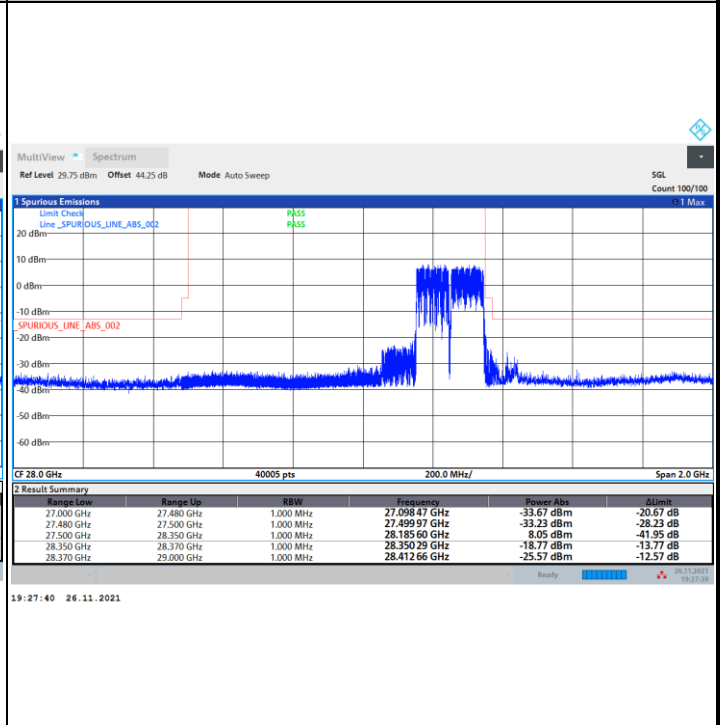
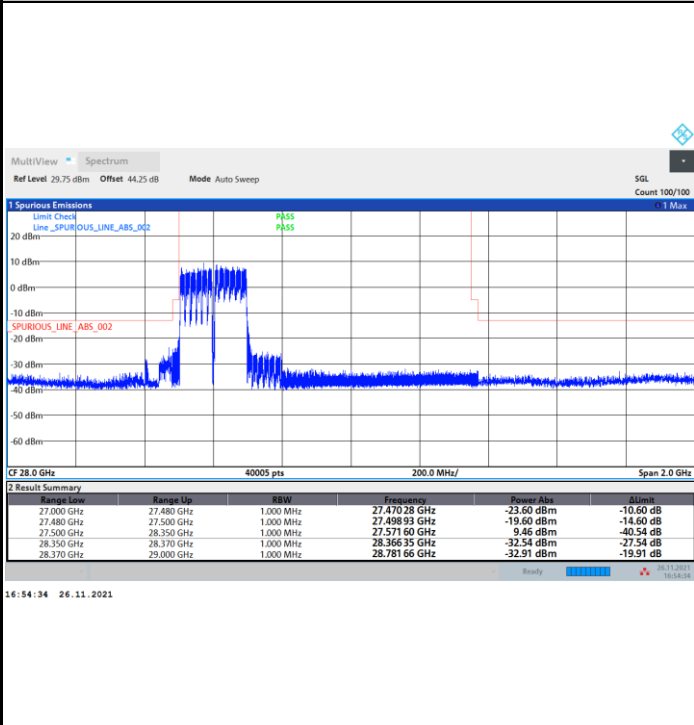


DFT-s-OFDM Module B

NR Band n261 / 200MHz / 64QAM

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



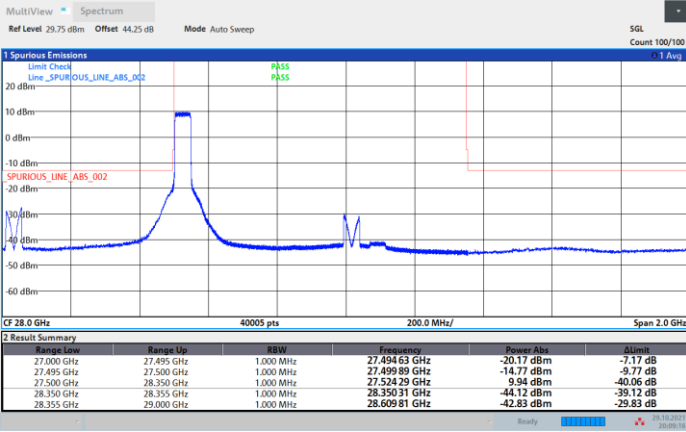




CP-OFDM Module B

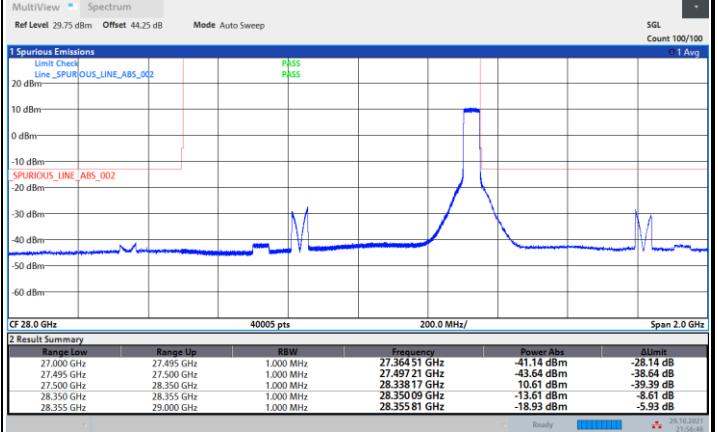
NR Band n261 / 50MHz / QPSK

Lowest Band Edge / Full RB



20:09:16 29.10.2021

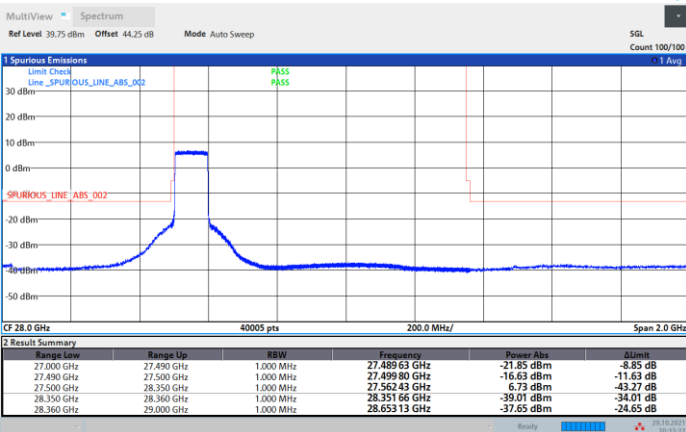
Highest Band Edge / Full RB



21:56:46 29.10.2021

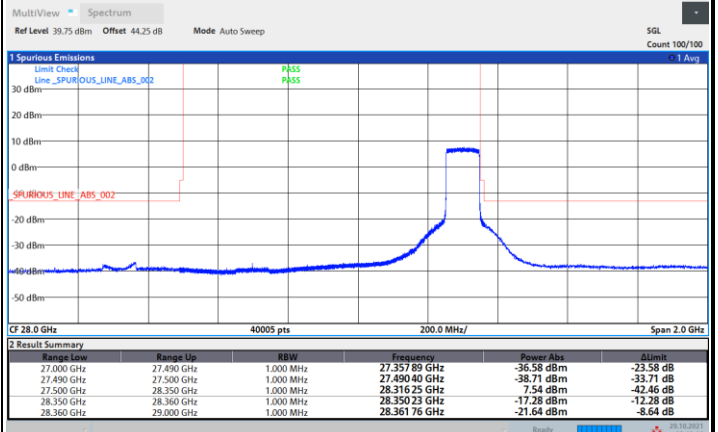
NR Band n261 / 100MHz / QPSK

Lowest Band Edge / Full RB



20:33:23 29.10.2021

Highest Band Edge / Full RB



22:12:11 29.10.2021

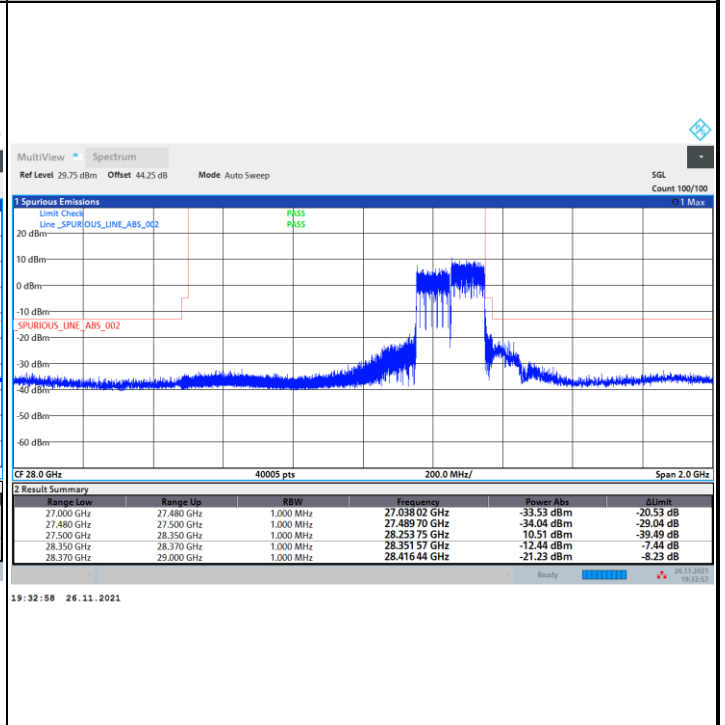
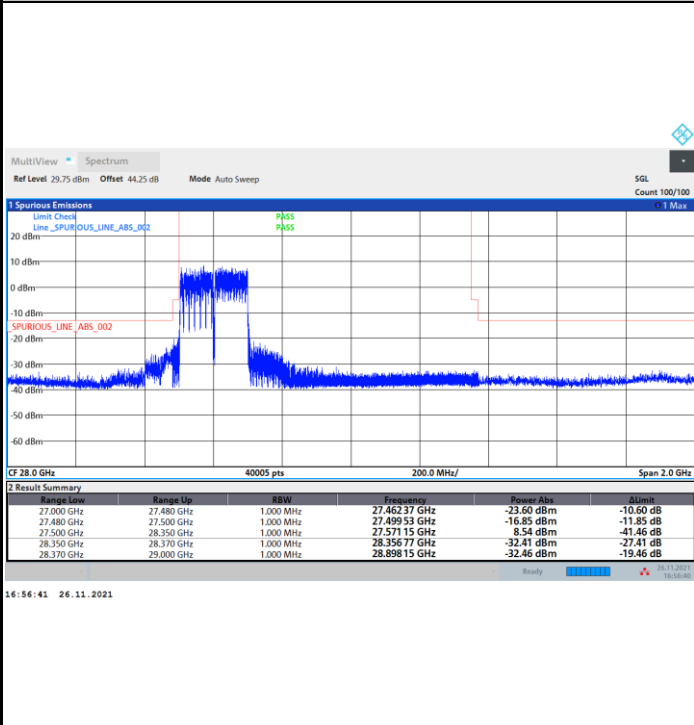


CP-OFDM Module B

NR Band n261 / 200MHz / QPSK

Lowest Band Edge / Full RB

Highest Band Edge / Full RB

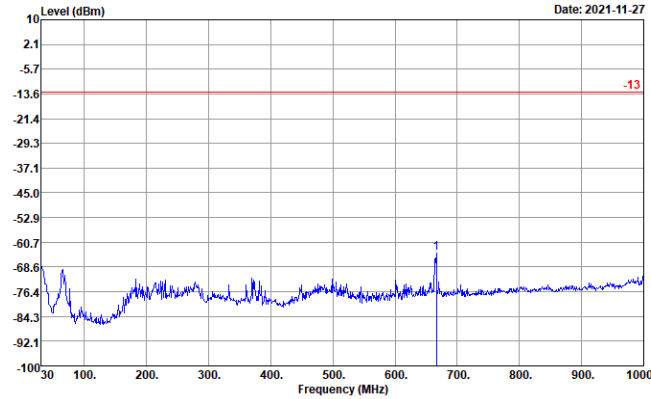




# Spurious Emission

## NR Band n261 (30MHz-1GHz)

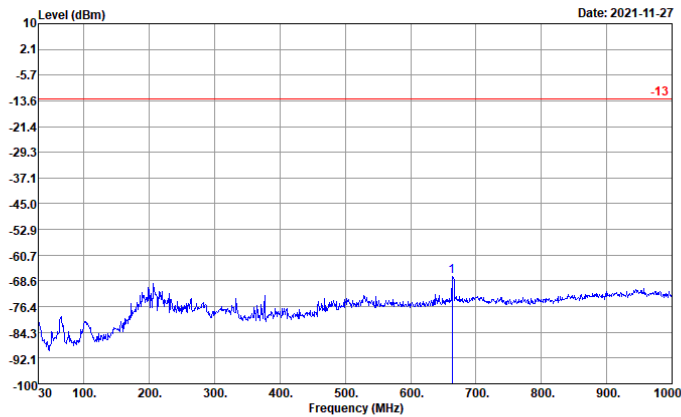
### Horizontal



Site : 03CH19-HY  
 Condition : -13 ERP EIRP\_20210305 HORIZONTAL  
 Project : 161608-03  
 : n261 MB

Over	Limit	Read			
Freq	Level	Limit	Line	Level	
MHz	dBm	dB	dBm	dBm	
1	666.32	-64.08	-51.08	-13.00	-66.78

### Vertical



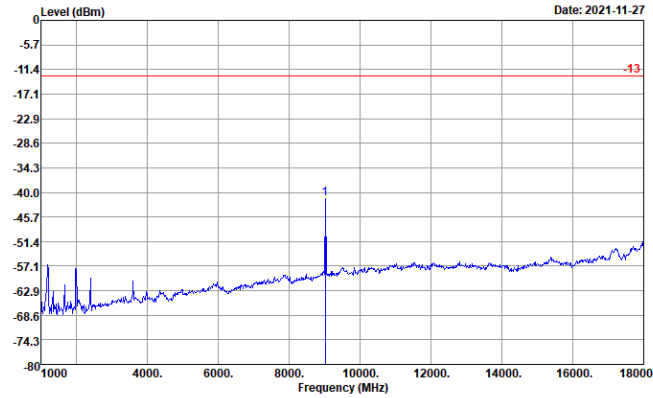
Site : 03CH19-HY  
 Condition : -13 ERP EIRP\_20210305 VERTICAL  
 Project : 161608-03  
 : n261 MB

Over	Limit	Read			
Freq	Level	Limit	Line	Level	
MHz	dBm	dB	dBm	dBm	
1	663.41	-67.18	-54.18	-13.00	-72.33



NR Band n261 (1GHz-18GHz)

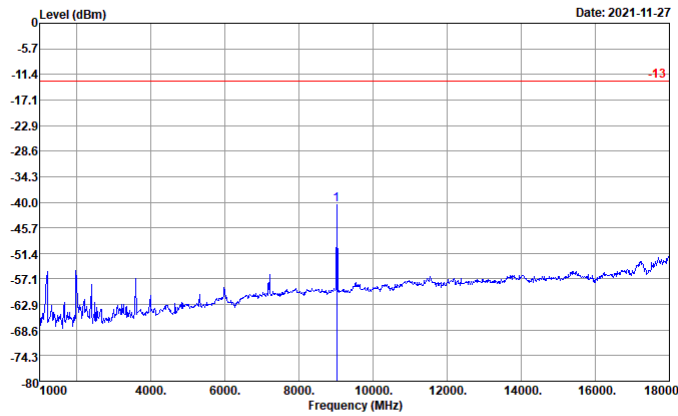
Horizontal



Site : 03CH19-HY  
 Condition : -13 ERP EIRP\_20210305 HORIZONTAL  
 Project : 161608-03  
 : n261 MB

Freq	Level	Over	Limit	Read	
MHz	dBm	dB	dBm	dBm	
1	9024.00	-41.44	-28.44	-13.00	-67.32

Vertical



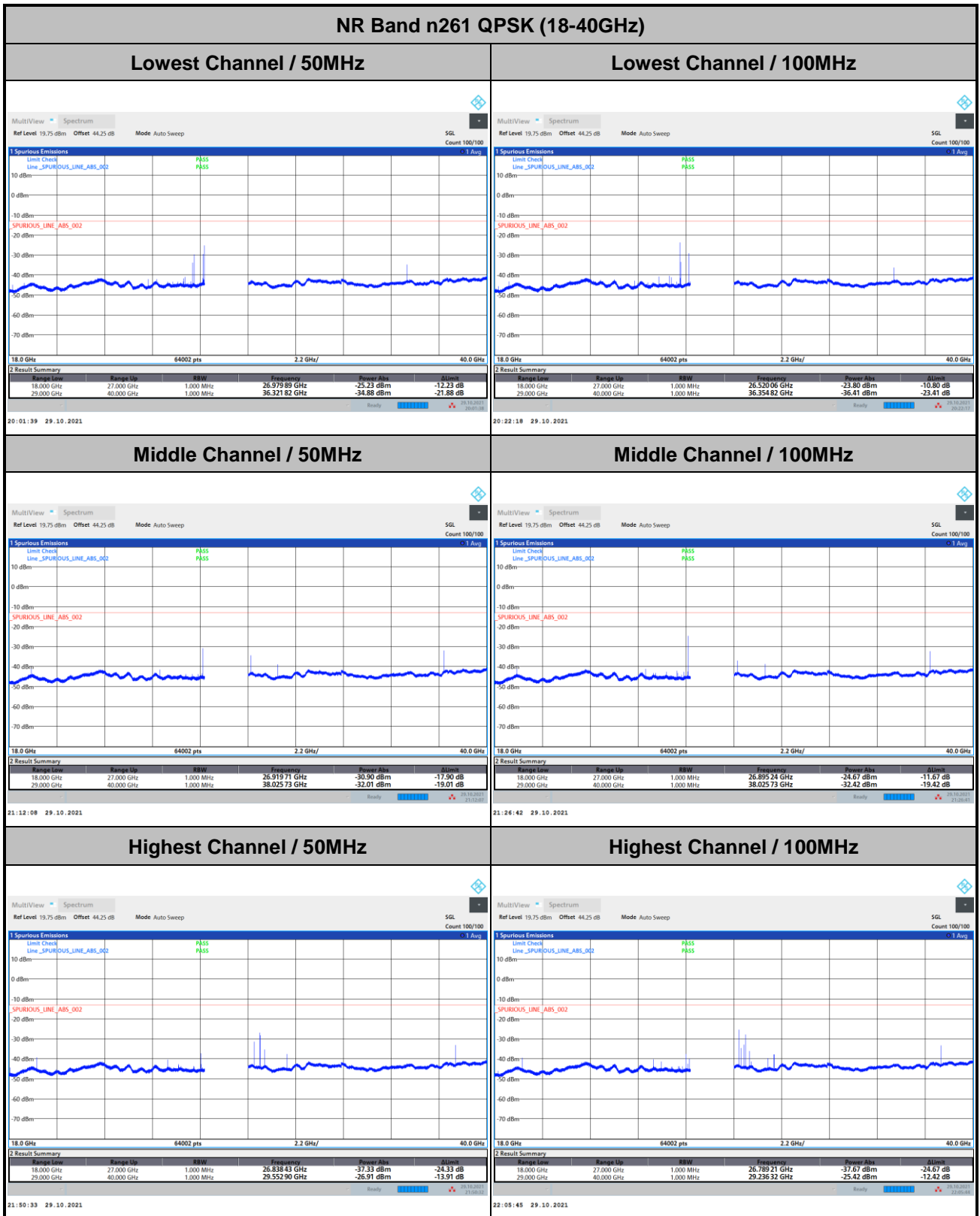
Site : 03CH19-HY  
 Condition : -13 ERP EIRP\_20210305 VERTICAL  
 Project : 161608-03  
 : n261 MB

Freq	Level	Over	Limit	Read	
MHz	dBm	dB	dBm	dBm	
1	9024.00	-40.56	-27.56	-13.00	-65.78



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

DFT-s-OFDM Module B



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



DFT-s-OFDM Module B

NR Band n261 QPSK (18-40GHz)																			
<p><b>Lowest Channel / 200MHz</b></p> <table border="1"> <thead> <tr> <th>Range Low</th> <th>Range Up</th> <th>RBW</th> <th>Frequency</th> <th>Power Abs</th> <th>Δlim</th> </tr> </thead> <tbody> <tr> <td>18,000 GHz</td> <td>27,000 GHz</td> <td>1,000 MHz</td> <td>22,028 36 GHz</td> <td>-30.49 dBm</td> <td>-17.49 dB</td> </tr> <tr> <td>29,000 GHz</td> <td>40,000 GHz</td> <td>1,000 MHz</td> <td>32,163 26 GHz</td> <td>-28.66 dBm</td> <td>-15.66 dB</td> </tr> </tbody> </table>	Range Low	Range Up	RBW	Frequency	Power Abs	Δlim	18,000 GHz	27,000 GHz	1,000 MHz	22,028 36 GHz	-30.49 dBm	-17.49 dB	29,000 GHz	40,000 GHz	1,000 MHz	32,163 26 GHz	-28.66 dBm	-15.66 dB	<p>intentionally blank</p>
Range Low	Range Up	RBW	Frequency	Power Abs	Δlim														
18,000 GHz	27,000 GHz	1,000 MHz	22,028 36 GHz	-30.49 dBm	-17.49 dB														
29,000 GHz	40,000 GHz	1,000 MHz	32,163 26 GHz	-28.66 dBm	-15.66 dB														
<p><b>Middle Channel / 200MHz</b></p> <table border="1"> <thead> <tr> <th>Range Low</th> <th>Range Up</th> <th>RBW</th> <th>Frequency</th> <th>Power Abs</th> <th>Δlim</th> </tr> </thead> <tbody> <tr> <td>18,000 GHz</td> <td>27,000 GHz</td> <td>1,000 MHz</td> <td>22,075 33 GHz</td> <td>-30.36 dBm</td> <td>-17.36 dB</td> </tr> <tr> <td>29,000 GHz</td> <td>40,000 GHz</td> <td>1,000 MHz</td> <td>32,117 54 GHz</td> <td>-30.00 dBm</td> <td>-17.00 dB</td> </tr> </tbody> </table>	Range Low	Range Up	RBW	Frequency	Power Abs	Δlim	18,000 GHz	27,000 GHz	1,000 MHz	22,075 33 GHz	-30.36 dBm	-17.36 dB	29,000 GHz	40,000 GHz	1,000 MHz	32,117 54 GHz	-30.00 dBm	-17.00 dB	<p>intentionally blank</p>
Range Low	Range Up	RBW	Frequency	Power Abs	Δlim														
18,000 GHz	27,000 GHz	1,000 MHz	22,075 33 GHz	-30.36 dBm	-17.36 dB														
29,000 GHz	40,000 GHz	1,000 MHz	32,117 54 GHz	-30.00 dBm	-17.00 dB														
<p><b>Highest Channel / 200MHz</b></p> <table border="1"> <thead> <tr> <th>Range Low</th> <th>Range Up</th> <th>RBW</th> <th>Frequency</th> <th>Power Abs</th> <th>Δlim</th> </tr> </thead> <tbody> <tr> <td>18,000 GHz</td> <td>27,000 GHz</td> <td>1,000 MHz</td> <td>22,143 67 GHz</td> <td>-30.55 dBm</td> <td>-17.55 dB</td> </tr> <tr> <td>29,000 GHz</td> <td>40,000 GHz</td> <td>1,000 MHz</td> <td>32,140 57 GHz</td> <td>-29.97 dBm</td> <td>-16.97 dB</td> </tr> </tbody> </table>	Range Low	Range Up	RBW	Frequency	Power Abs	Δlim	18,000 GHz	27,000 GHz	1,000 MHz	22,143 67 GHz	-30.55 dBm	-17.55 dB	29,000 GHz	40,000 GHz	1,000 MHz	32,140 57 GHz	-29.97 dBm	-16.97 dB	<p>intentionally blank</p>
Range Low	Range Up	RBW	Frequency	Power Abs	Δlim														
18,000 GHz	27,000 GHz	1,000 MHz	22,143 67 GHz	-30.55 dBm	-17.55 dB														
29,000 GHz	40,000 GHz	1,000 MHz	32,140 57 GHz	-29.97 dBm	-16.97 dB														

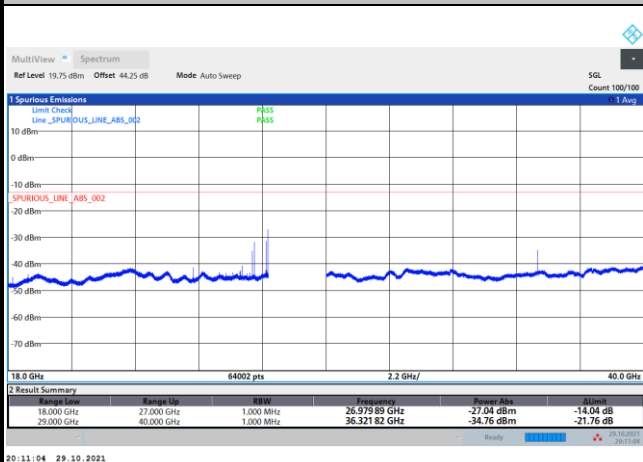
Remark: In band and out of band frequencies are omitted.



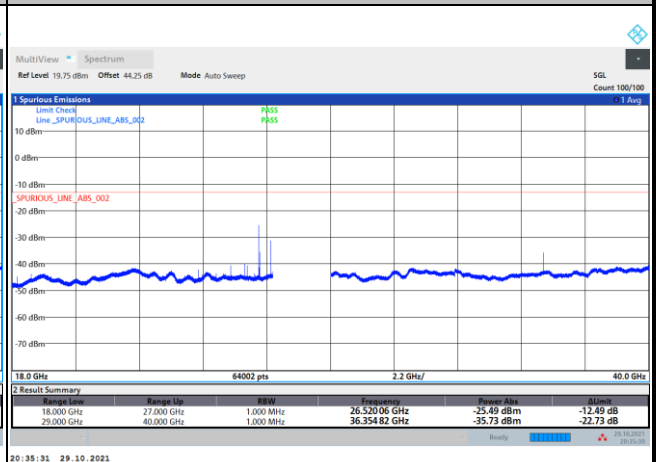
CP-OFDM Module B

NR Band n261 QPSK (18-40GHz)

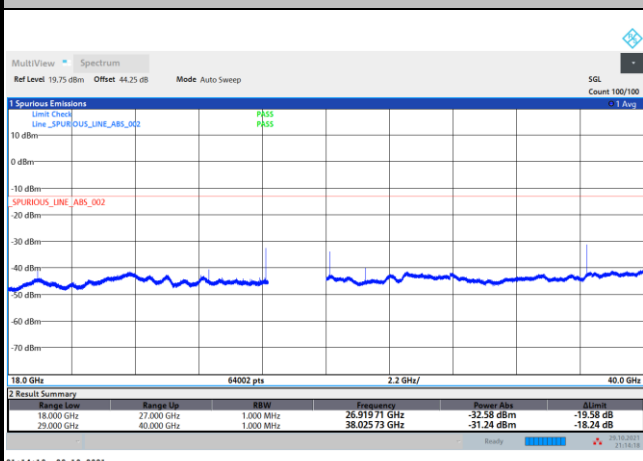
Lowest Channel / 50MHz



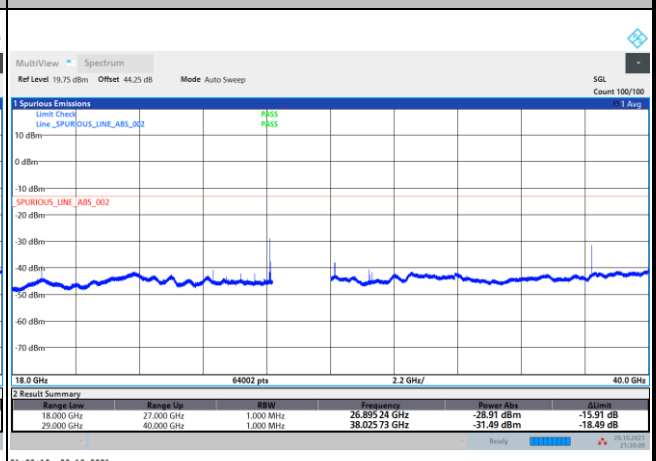
Lowest Channel / 100MHz



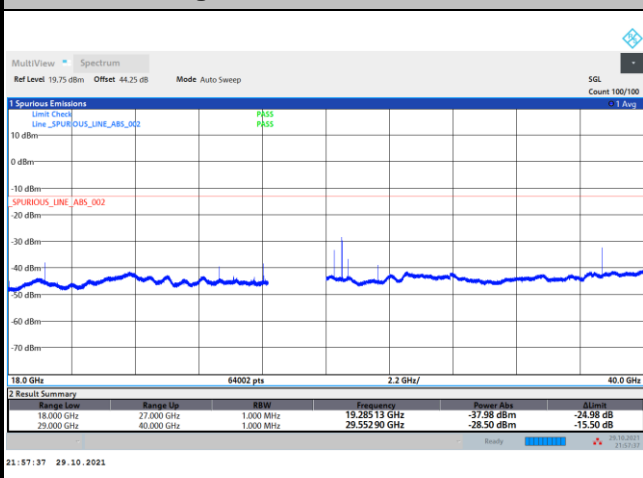
Middle Channel / 50MHz



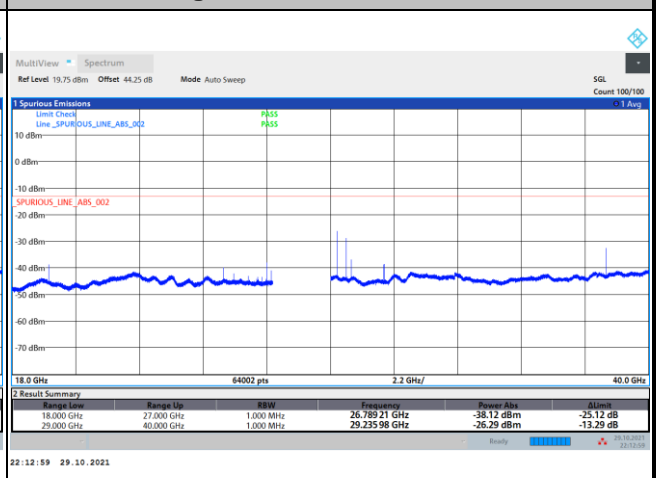
Middle Channel / 100MHz



Highest Channel / 50MHz



Highest Channel / 100MHz



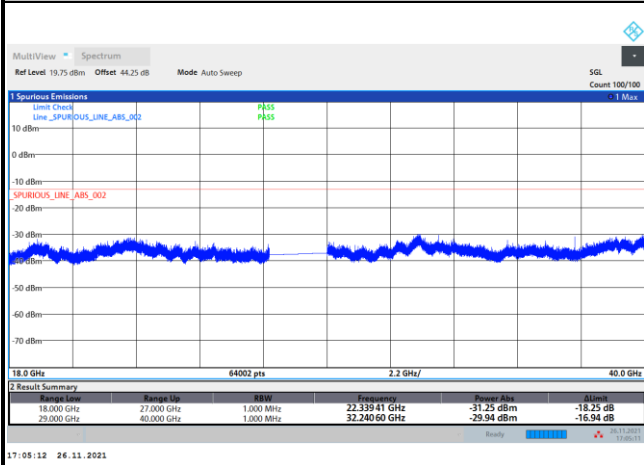
Remark: In band and out of band frequencies are omitted.



CP-OFDM Module B

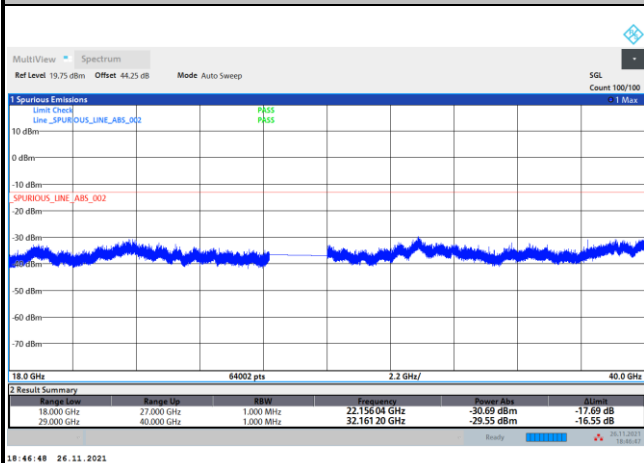
NR Band n261 QPSK (18-40GHz)

Lowest Channel / 200MHz



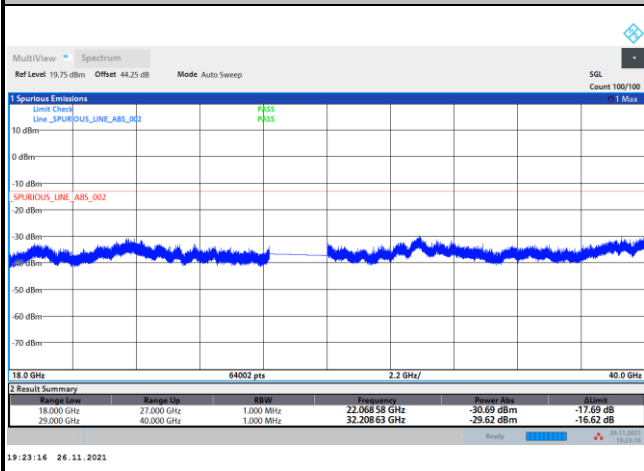
intentionally blank

Middle Channel / 200MHz



intentionally blank

Highest Channel / 200MHz



intentionally blank

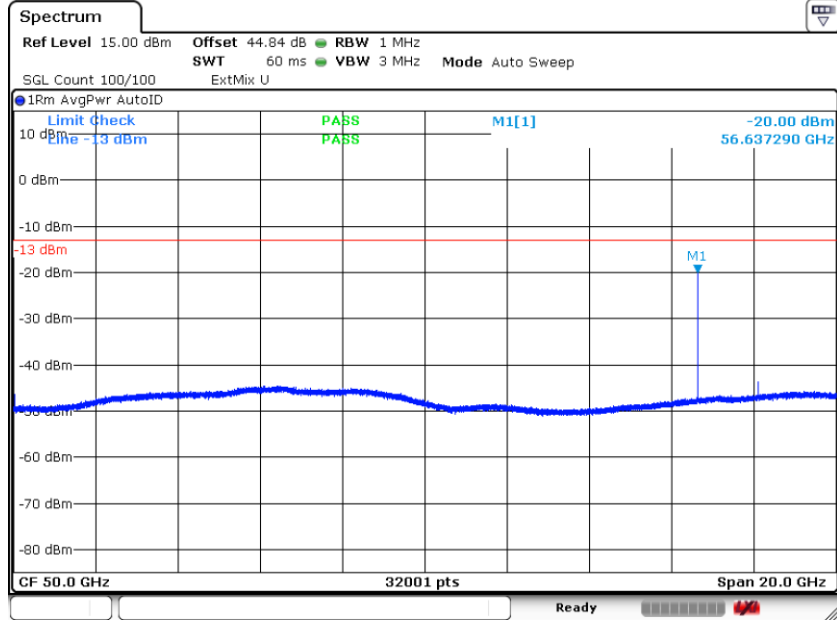
Remark: In band and out of band frequencies are omitted.





NR Band n261

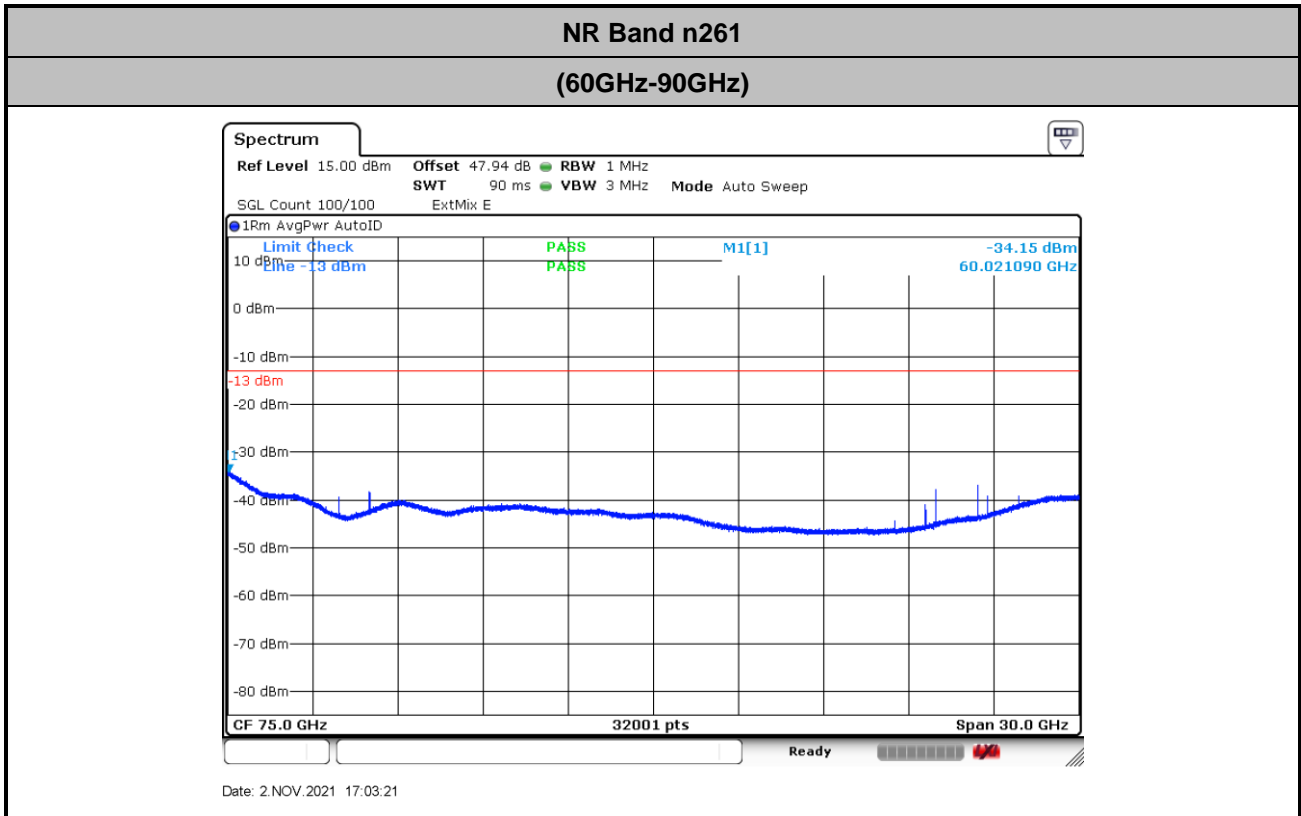
(40GHz-60GHz)



Date: 2.NOV.2021 16:59:17

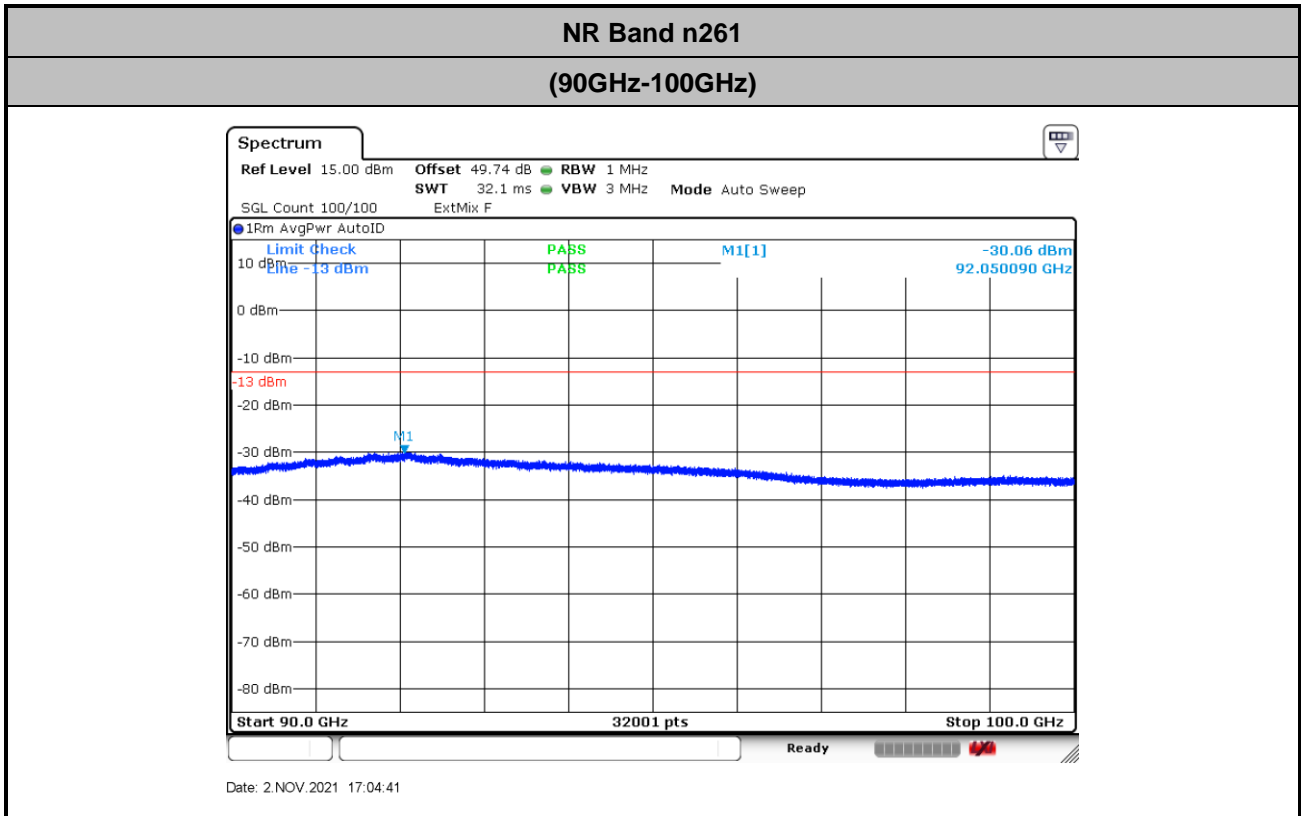
$$Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20\log(D) - 104.8$$

$$= 42.3 + 0.34 + 107 + 20\log(1) - 104.8 = 44.84 (dB)$$



$$Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20\log(D) - 104.8$$

$$= 45.4 + 0.34 + 107 + 20\log(1) - 104.8 = 47.94 (dB)$$



$$Offset = Antenna Factor (dB/m) + Cable Loss (dB) + 107 + 20\log(D) - 104.8$$

$$= 47.2 + 0.34 + 107 + 20\log(1) - 104.8 = 49.74 (dB)$$



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	27.92703218	0.000	0.000	Pass
40	Normal Voltage	27.92703217	0.014	0.001	
30	Normal Voltage	27.92703215	0.029	0.001	
20(Ref.)	Normal Voltage	27.92703218	0.000	0.000	
10	Normal Voltage	27.92703214	0.043	0.002	
0	Normal Voltage	27.92703213	0.058	0.002	
-10	Normal Voltage	27.92703211	0.072	0.003	
-20	Normal Voltage	27.9270321	0.087	0.003	
-30	Normal Voltage	27.92703208	0.101	0.004	
20	Maximum Voltage	27.92703215	0.029	0.001	
20	Normal Voltage	27.92703215	0.029	0.001	
20	Battery End Point	27.92703214	0.043	0.002	

Note:

1. Normal Voltage =3.85 V. ; Battery End Point (BEP) =3.60 V. ; Maximum Voltage =4.40 V.
2. The frequency fundamental emissions stay within the operation band.



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



# Calibration Certificate

**Certificate Number 24-0060-101033-01**

Kalibrierschein

Zertifikatsnummer

## Unit Data

**Item** Harmonic Mixer, 40 GHz to 60 GHz  
Gegenstand

**Manufacturer** RPG  
Hersteller

**Type** RPG FS-Z60  
Typ

**Material Number** 1048.0171.02     **Serial Number** 101033  
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**  
Auftraggeber

**Order Number**  
Bestellnummer

**Date of Receipt**  
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, 2020-03-17**

**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.**

**Extend of Calibration Documents**  
Umfang des Kalibrierdokuments

**2 pages Calibration Certificate  
4 pages Outgoing Results**

## Radiometer Physics GmbH; Meckenheim

**Date of Issue**  
Ausstellungsdatum

**2020-03-20**

**Head of Laboratory**  
Laborleitung

Schulze

**Person Responsible**  
Bearbeiter

Heinze

**Page (Seite) 1/2**  
Vers2010-05-05/  
RPG2014-02-28

Calibration Method  
Kalibrieranweisung

RPG-PAQA-TN-2014-002

Relative Humidity 20 % - 80 %  
Relative Luftfeuchte

Ambient Temperature  
Umgebungstemperatur

(23<sup>+7</sup><sub>-3</sub>) °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	140091	509915_D-K-15195-01-01_2019-05	2020-05-22
Powersensor	R&S® NRP-Z57	101423	508173_D-K-15195-01-01_2019-05	2020-05-07

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

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

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

#### Notes

Anmerkungen

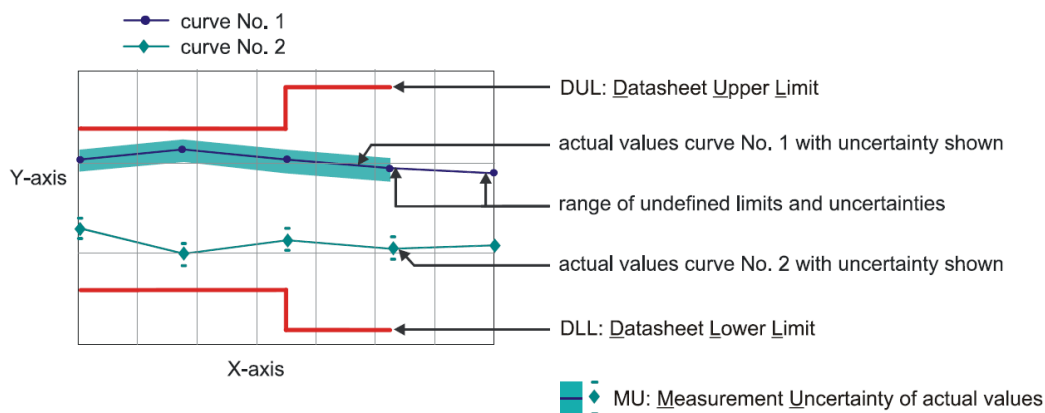
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is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

# Outgoing Results

## The following abbreviations may be used in this document

{a}	No measurement uncertainty stated because the errors always add together. So it is sure that a measurement result evaluated as "PASS" is pass.
{b}	The measurement uncertainty depends on the measurement result. The stated measurement uncertainty is valid for the close area around the specification. Measurement results outside the close area have a higher measurement uncertainty but are within the specification.
{c}	Functional test, therefore no measurement uncertainty is stated.
{d}	Typical value, refer to performance test.
{e}	The measurement uncertainty is taken into account when setting the measuring system.
DL or DT	Data Limit for symmetrical tolerance limits
DLL	Datasheet Lower Limit
DUL	Datasheet Upper Limit
MU	Measurement Uncertainty
MLL or MLV	Measurement Uncertainty Lower Value
MUL or MUV	Measurement Uncertainty Upper Value
Nom.	Nominal Value
Dev.	Deviation
MErr.	Measurement Error
Act.	Actual Value
UGB	Uncertainty Guard Band: Measuring uncertainty violates the data (spec.) limit.
UGB1	Measurement results marked as UGB1 show conformity with a probability of >50 %and <95 %.
UGB2	Measurement results marked as UGB2 show non-conformity with a probability of >50 %and <95 %.
DU	Datasheet Uncertainty

## Explanation of charts





**Software used for measurement**

**Item Type**

Measurement Studio Professional Edition  
MixerCertification

**Version**

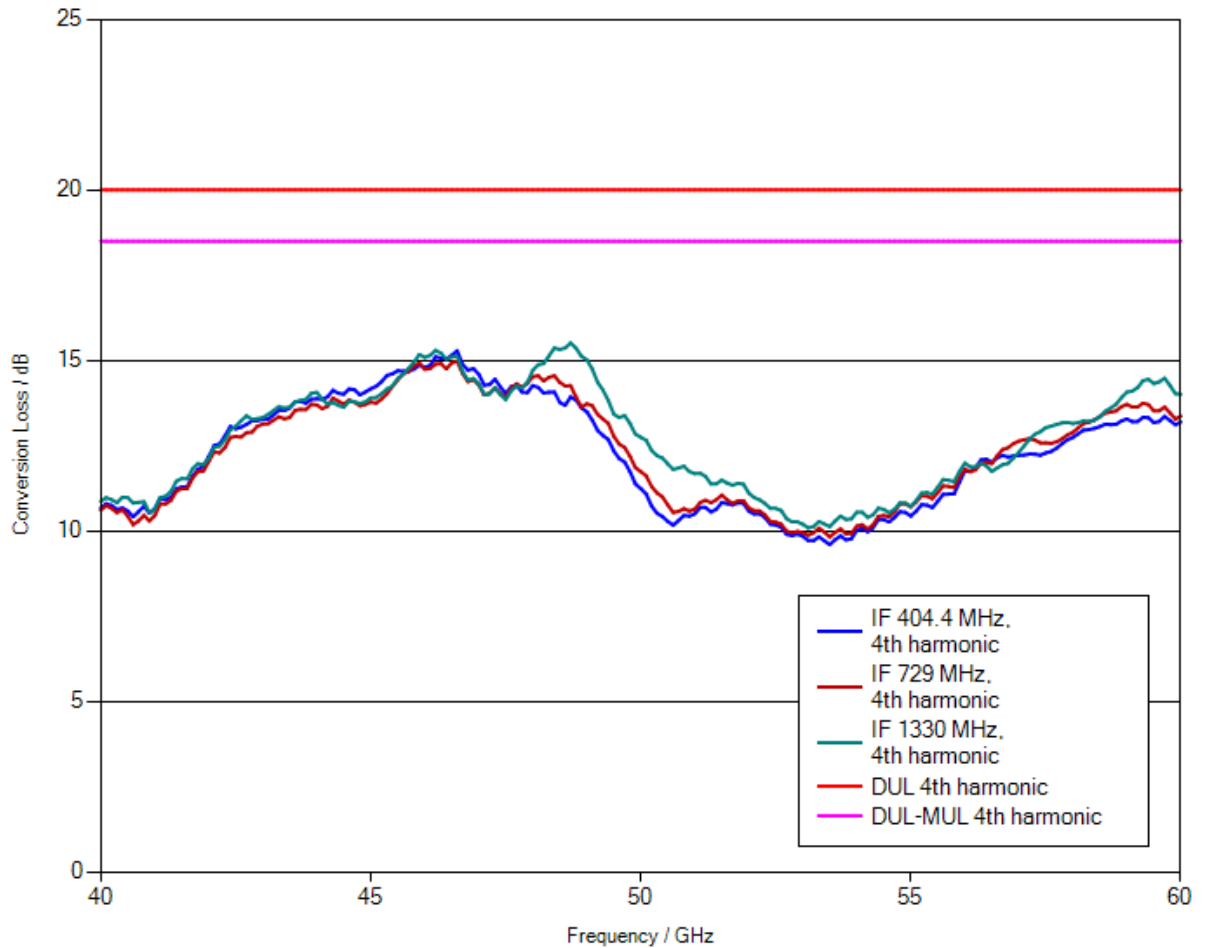
2013  
7\_13

**Remark**

### 1.1 Conversion loss

LO level                    +13 dBm nominal  
Bias                        0 A

Measurement uncertainty:    1.5 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, 4th harmonic	4 dB	2.16 dB	PASS
IF = 729 MHz, 4th harmonic	4 dB	2.04 dB	PASS
IF = 1330 MHz, 4th harmonic	4 dB	2.19 dB	PASS

# Calibration Certificate

Kalibrierschein

Certificate Number **24-0090-101867-01**

Zertifikatsnummer

## Unit Data

**Item** Harmonic Mixer, 60 GHz to 90 GHz  
Gegenstand

**Manufacturer** ROHDE & SCHWARZ  
Hersteller

**Type** R&S® FS-Z90  
Typ

**Material Number** 1048.0371.02    **Serial Number** 101867  
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**  
Auftraggeber

**Order Number**  
Bestellnummer

**Date of Receipt**  
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, 2019-01-10**

**Scope of Calibration**  
Umfang der Kalibrierung

**Standard Calibration**

**Statement of Compliance (Incoming)**  
Konformitätsaussage (Anlieferung)

**New device**

**Statement of Compliance (Outgoing)**  
Konformitätsaussage (Auslieferung)

**All measured values are within the data sheet specifications.**

**Extend of Calibration Documents**  
Umfang des Kalibrierdokuments

**2 pages Calibration Certificate  
5 pages Outgoing Results**

## Radiometer Physics GmbH; Meckenheim

**Date of Issue**  
Ausstellungsdatum

**2019-01-11**

**Head of Laboratory**  
Laborleitung

Schulze

**Person Responsible**  
Bearbeiter

Heinze

**Page (Seite) 1/2**  
Vers2010-05-05/  
RPG2014-02-28

Calibration Method  
Kalibrieranweisung

RPG-PAQA-TN-2014-002

Relative Humidity 20 % - 80 %  
Relative Luftfeuchte

Ambient Temperature  
Umgebungstemperatur

(23 <sup>+7</sup>/<sub>-3</sub>) °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® ZVA67	101097	20-300432406	2020-07-21
Powersensor	R&S® NRP-Z55	140093	20-300426315	2019-05-17
Powersensor	R&S® NRP-Z58	101063	0001-300474490	2019-08-06
Calibration kit	WR12	E10001	RPG-PAQA-TN-2014-005	2019-02-01

**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.