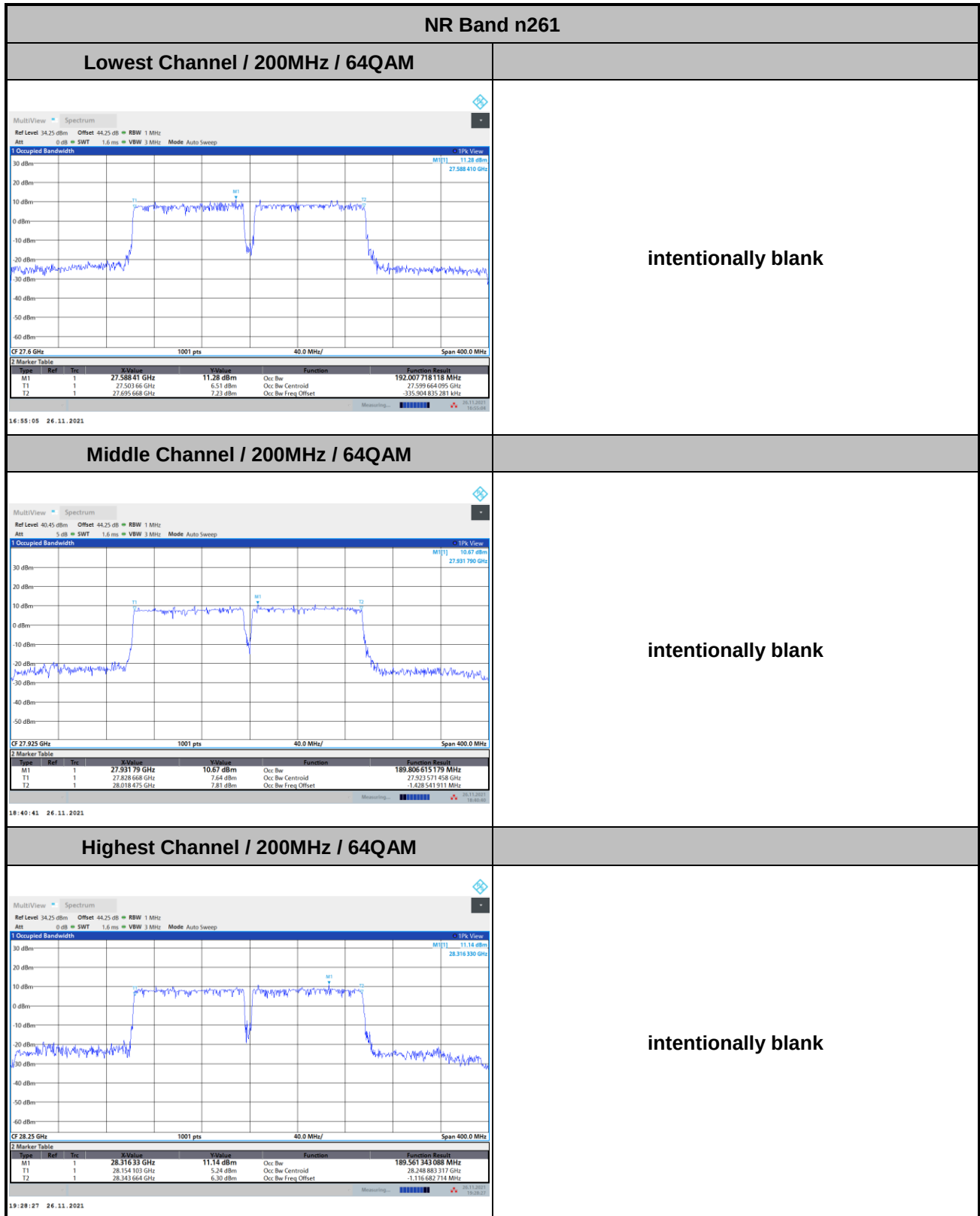




## DFT-s-OFDM Module B

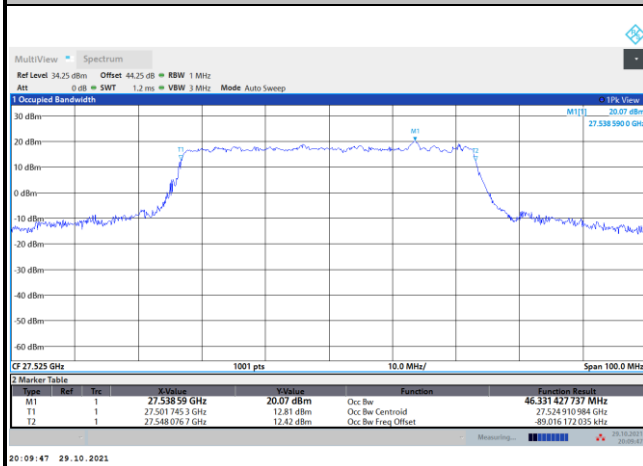




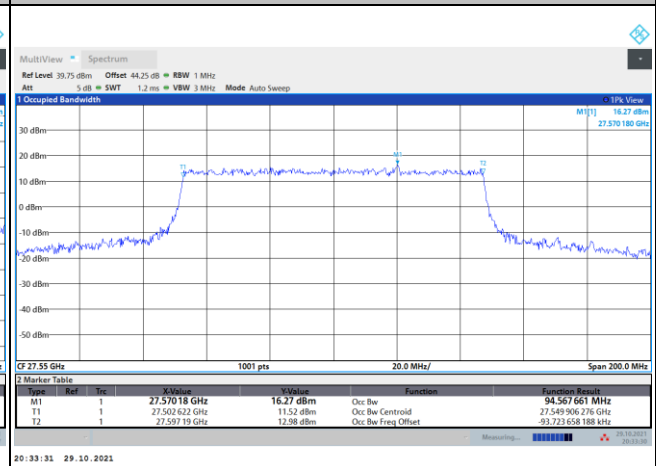
## CP-OFDM Module B

## NR Band n261

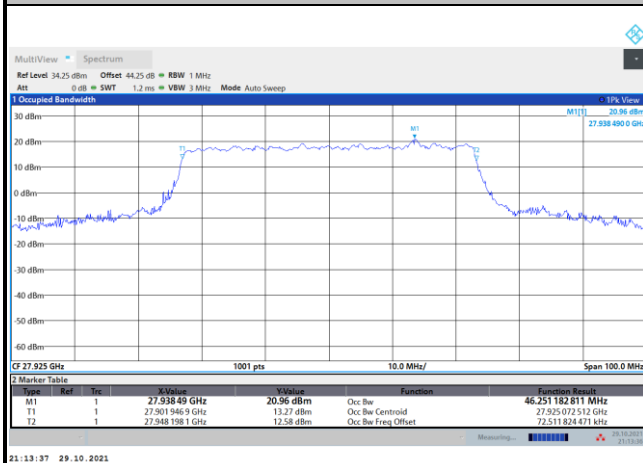
## Lowest Channel / 50MHz / QPSK



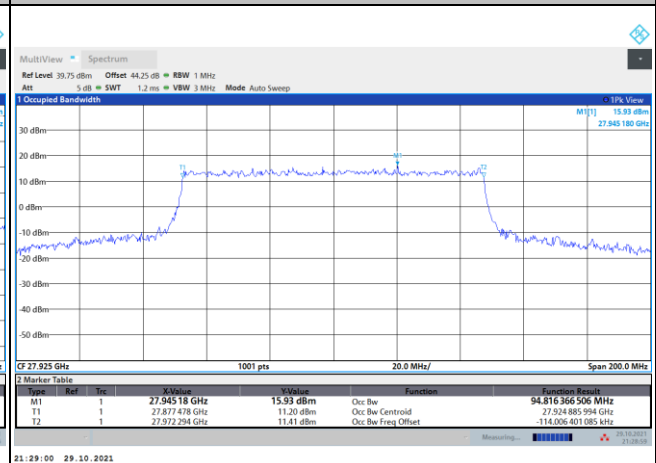
## Lowest Channel / 100MHz / QPSK



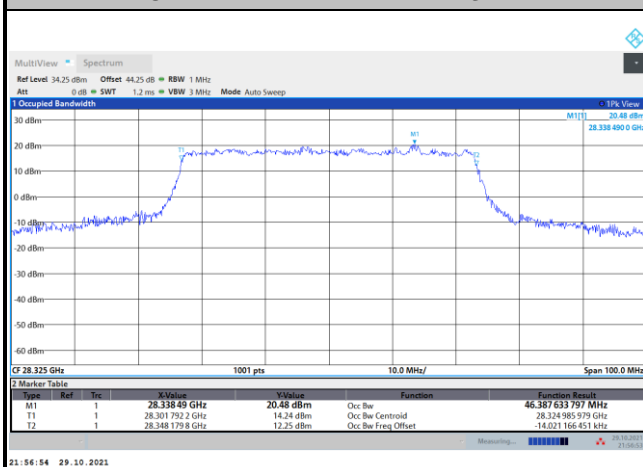
## Middle Channel / 50MHz / QPSK



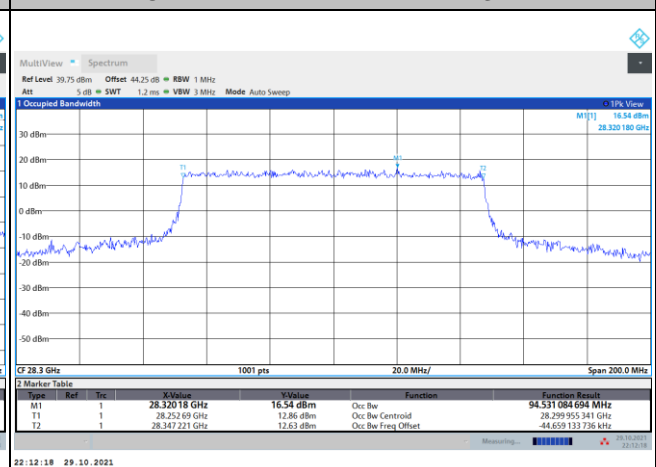
## Middle Channel / 100MHz / QPSK

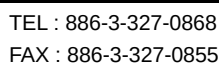


## Highest Channel / 50MHz / QPSK



## Highest Channel / 100MHz / QPSK





## 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                                       |        |        |

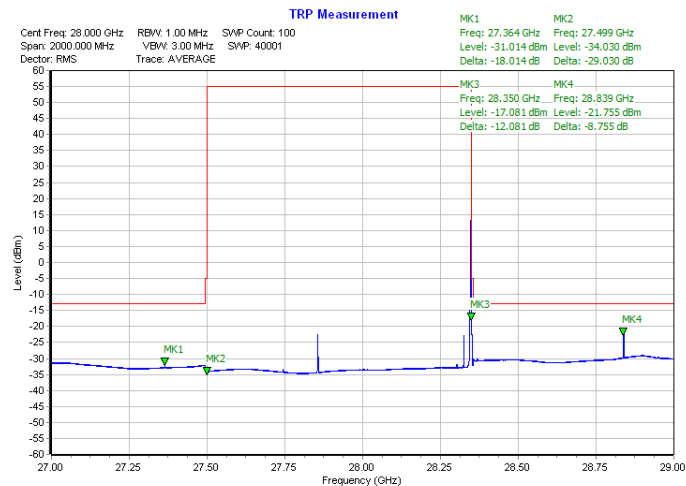
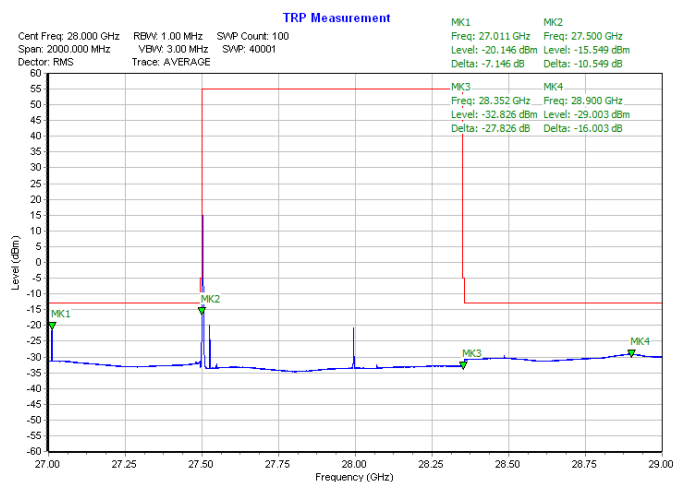


## DFT-s-OFDM Module B

## NR Band n261 / 50MHz / QPSK

## Lowest Band Edge / 1 RB

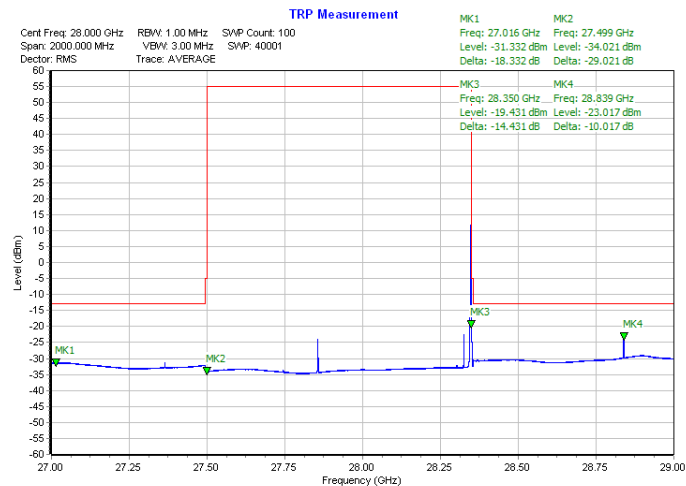
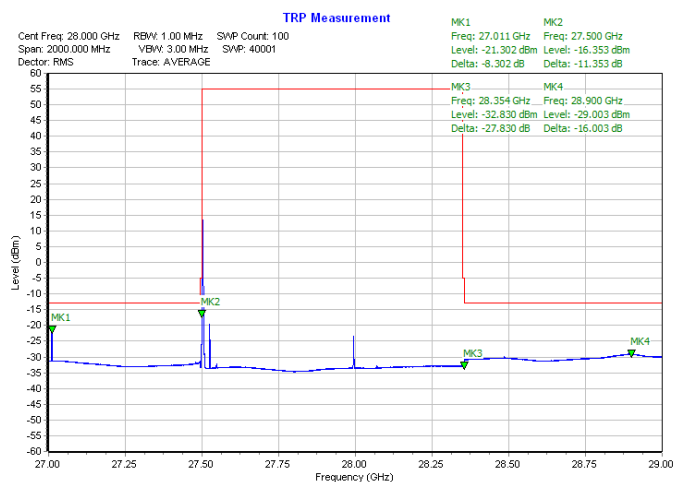
## Highest Band Edge / 1 RB



## NR Band n261 / 50MHz / 16QAM

## Lowest Band Edge / 1 RB

## Highest Band Edge / 1 RB

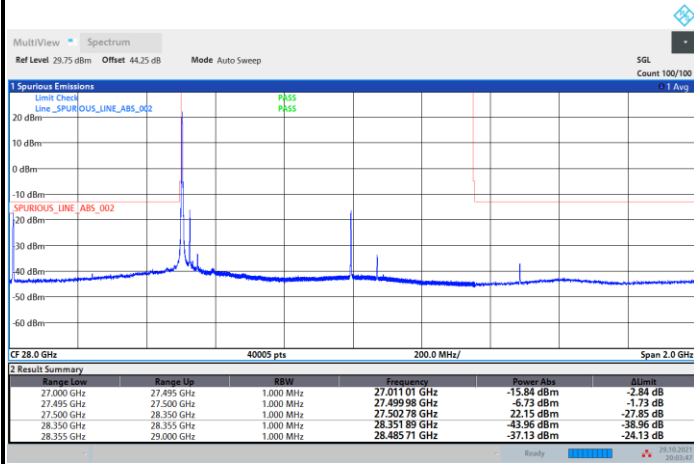




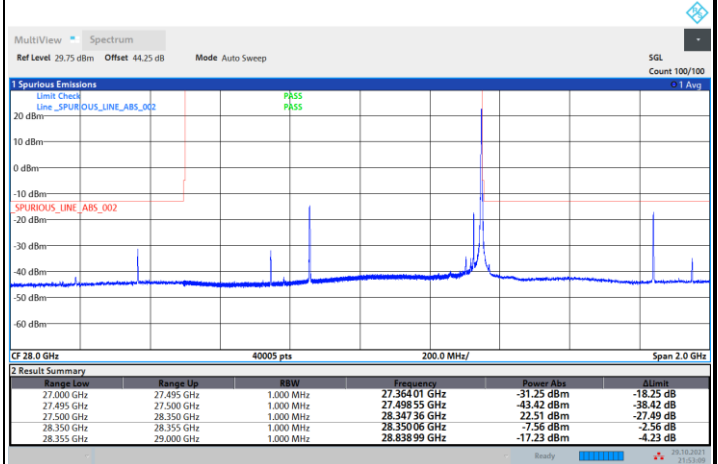
## DFT-s-OFDM Module B

## NR Band n261 / 50MHz / 64QAM

## Lowest Band Edge / 1 RB

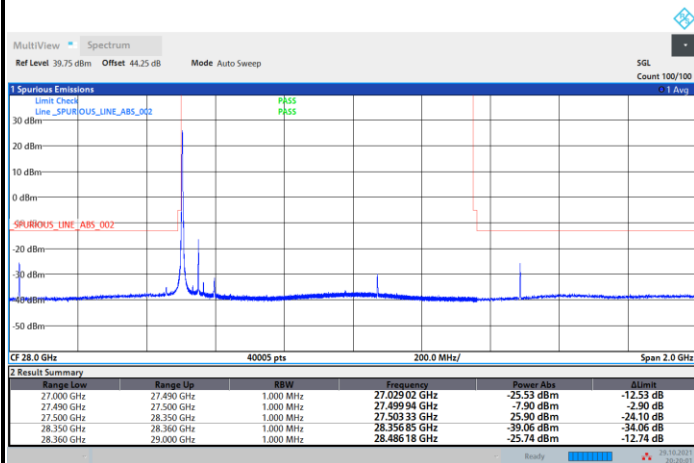


## Highest Band Edge / 1 RB

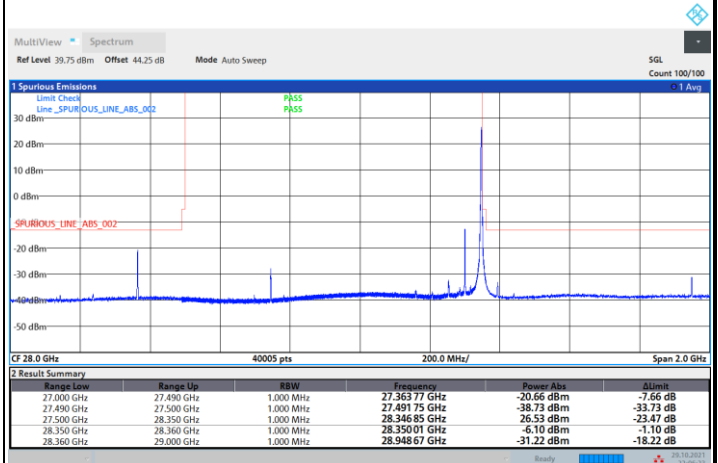


## NR Band n261 / 100MHz / QPSK

## Lowest Band Edge / 1 RB



## Highest Band Edge / 1 RB

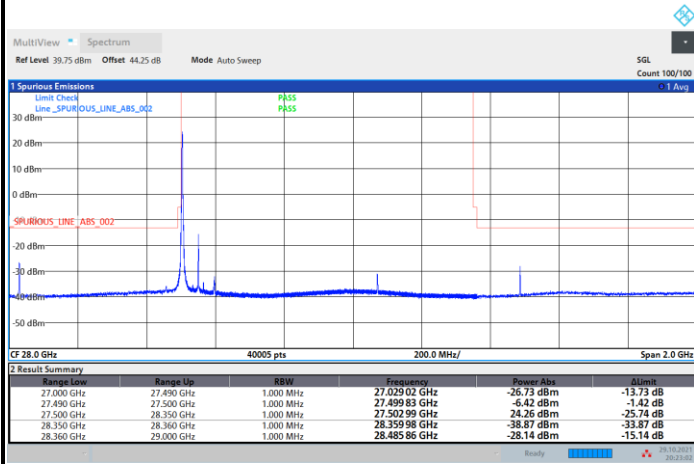




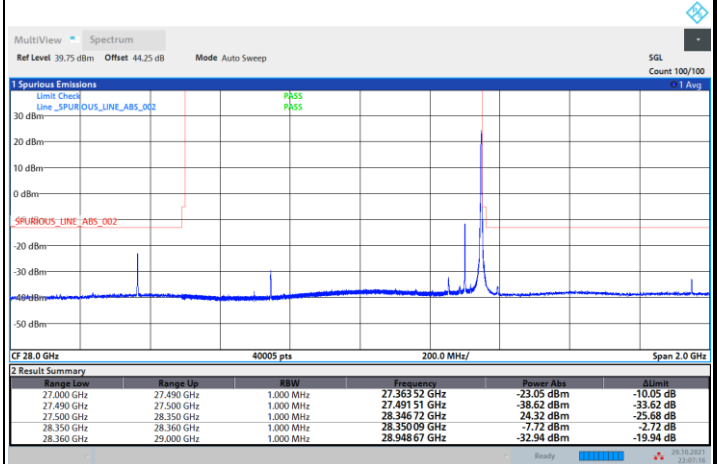
## DFT-s-OFDM Module B

## NR Band n261 / 100MHz / 16QAM

## Lowest Band Edge / 1 RB

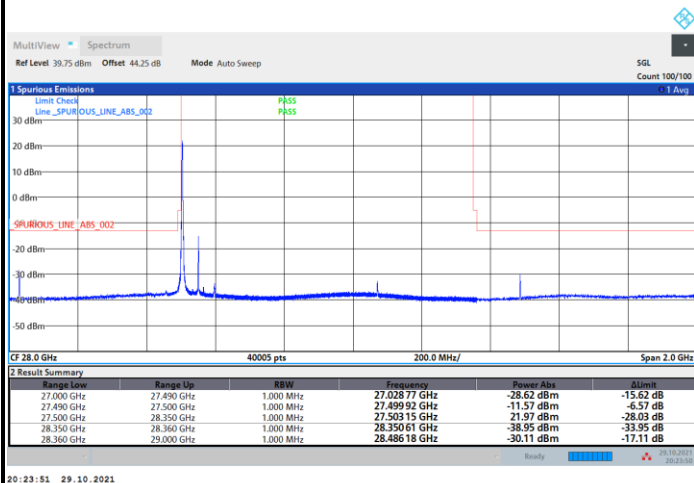


## Highest Band Edge / 1 RB

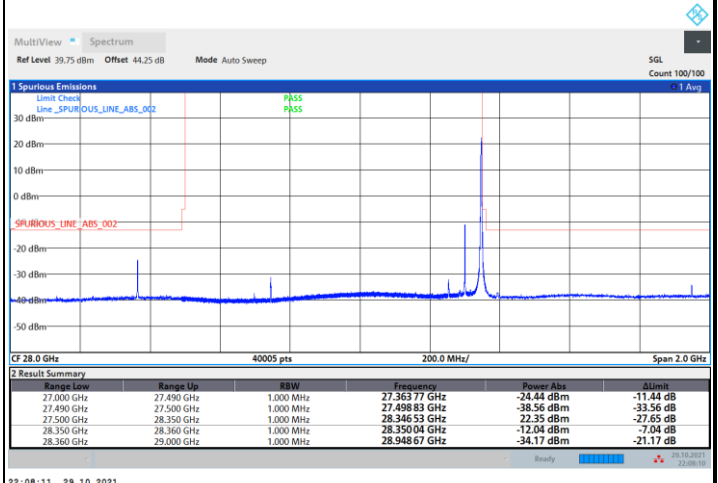


## NR Band n261 / 100MHz / 64QAM

## Lowest Band Edge / 1 RB



## Highest Band Edge / 1 RB

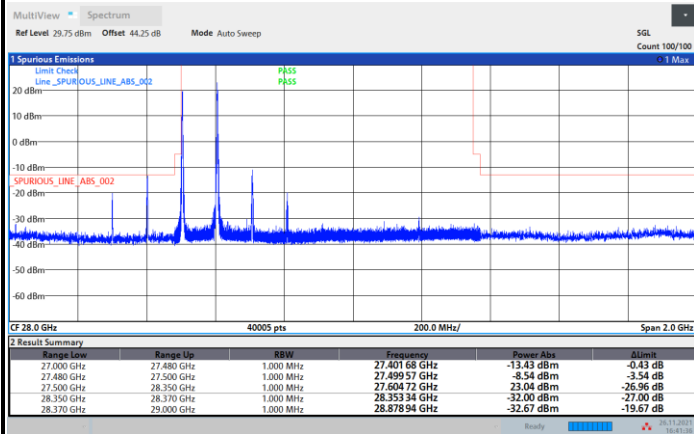




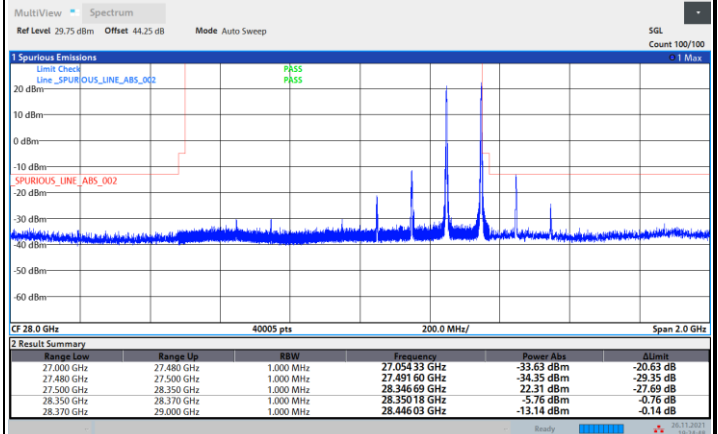
## DFT-s-OFDM Module B

## NR Band n261 / 200MHz / QPSK

## Lowest Band Edge / 1 RB

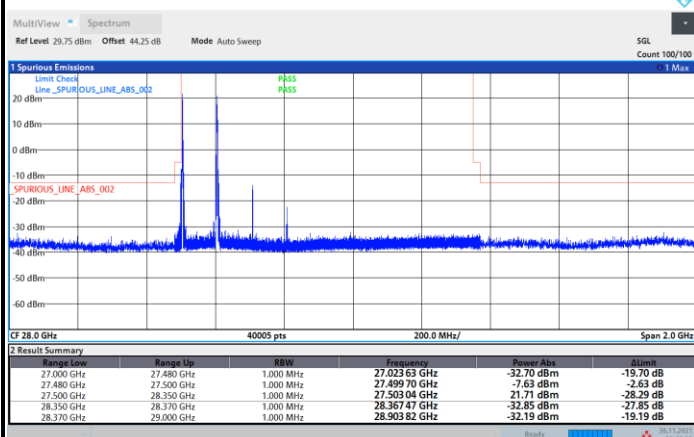


## Highest Band Edge / 1 RB

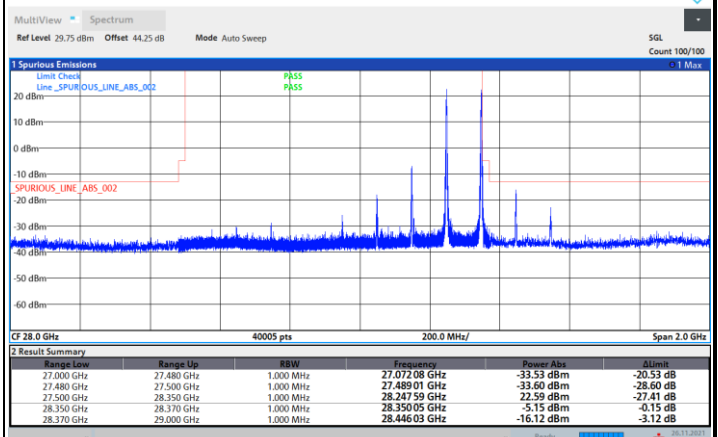


## NR Band n261 / 200MHz / 16QAM

## Lowest Band Edge / 1 RB



## Highest Band Edge / 1 RB

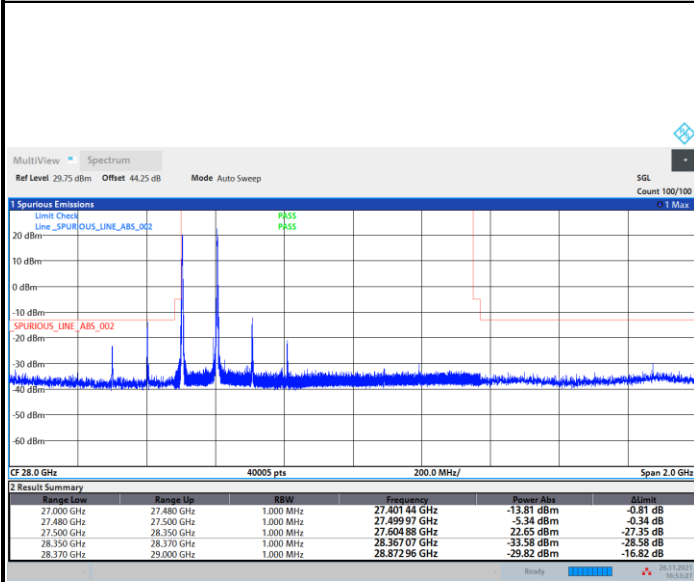




## DFT-s-OFDM Module B

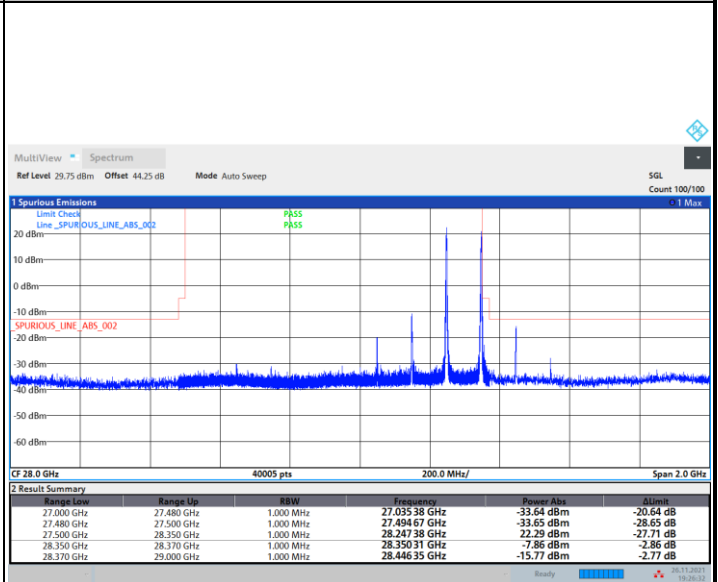
## NR Band n261 / 200MHz / 64QAM

## Lowest Band Edge / 1 RB



14:53:28 26.11.2021

## Highest Band Edge / 1 RB



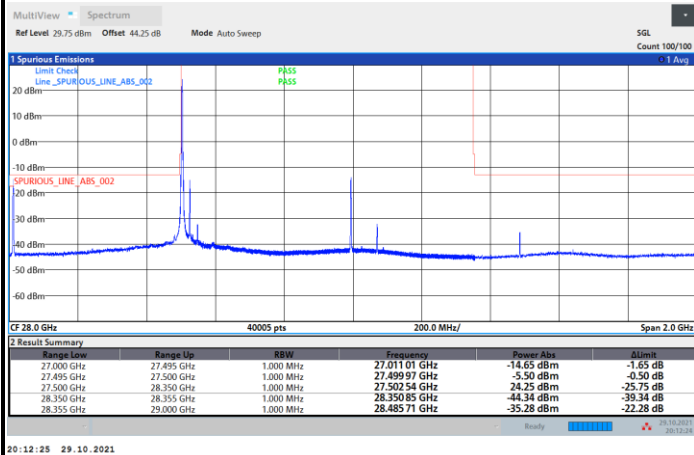
19:26:33 26.11.2021



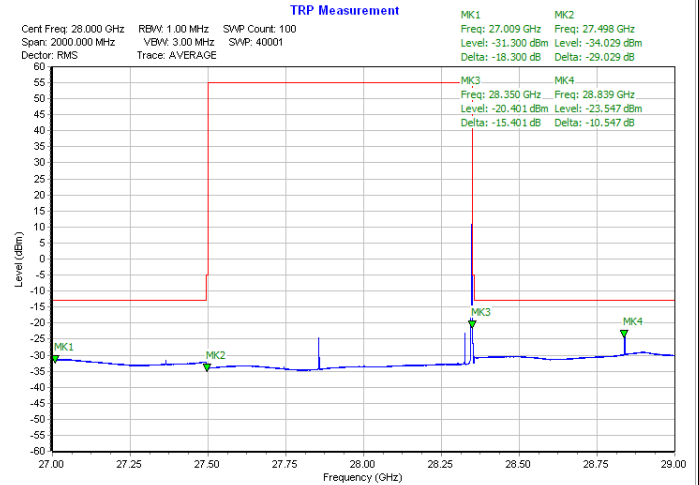
## CP-OFDM Module B

## NR Band n261 / 50MHz / QPSK

## Lowest Band Edge / 1 RB

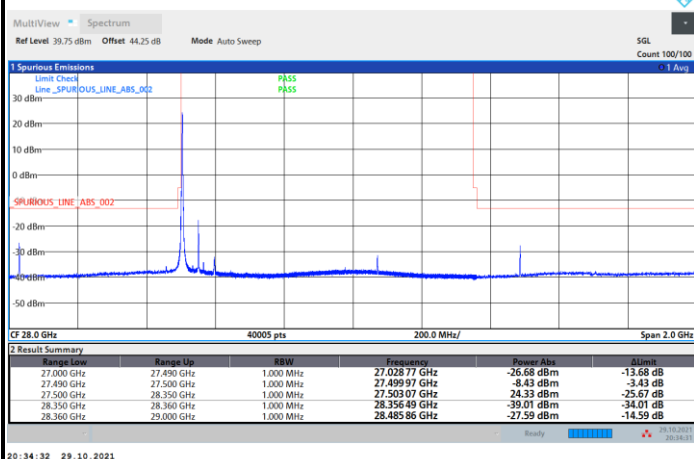


## Highest Band Edge / 1 RB

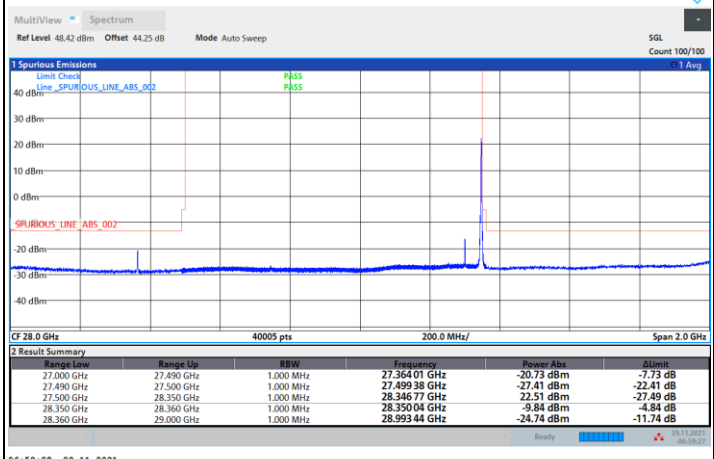


## NR Band n261 / 100MHz / QPSK

## Lowest Band Edge / 1 RB



## Highest Band Edge / 1 RB

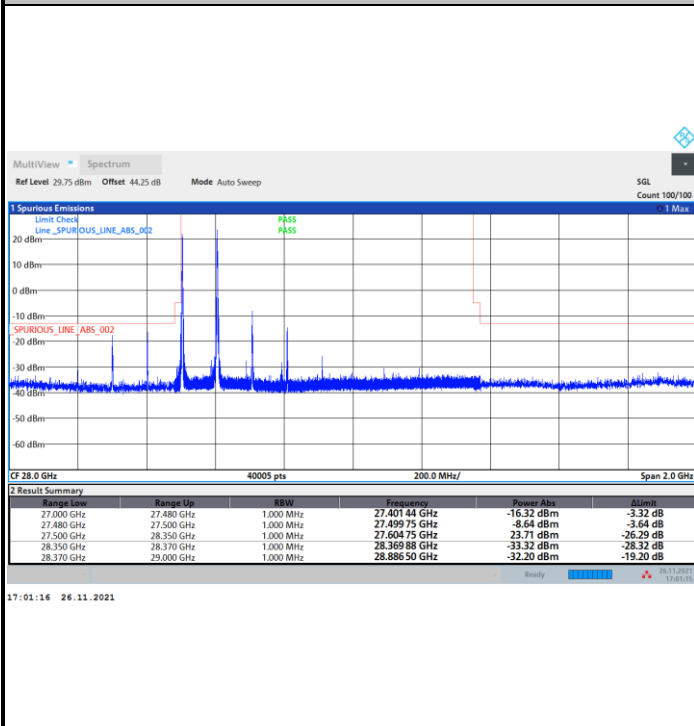




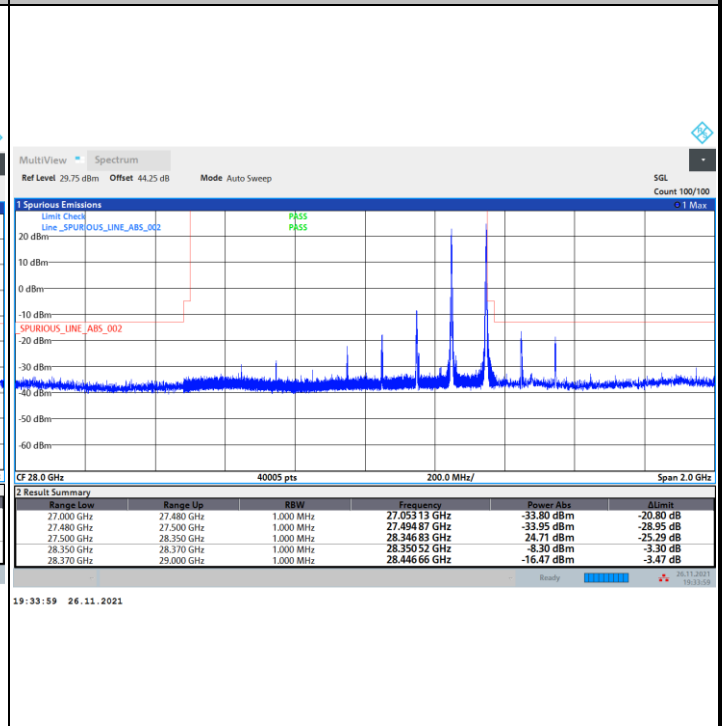
## CP-OFDM Module B

## NR Band n261 / 200MHz / QPSK

## Lowest Band Edge / 1 RB



## Highest Band Edge / 1 RB

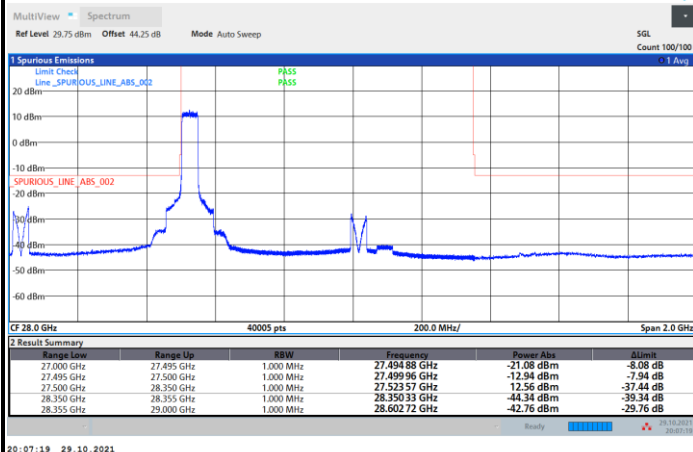




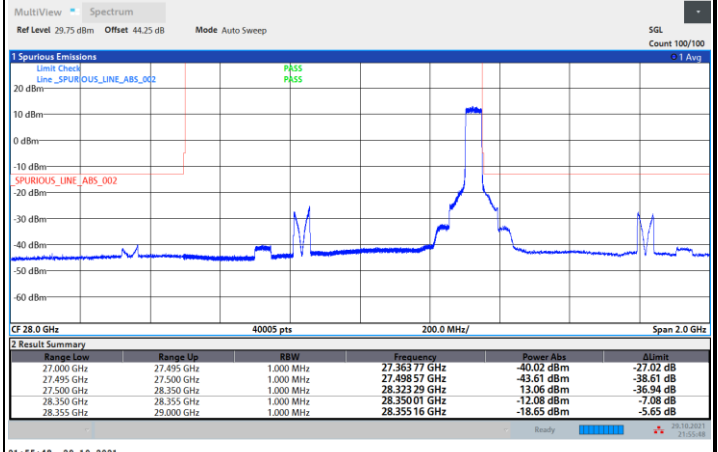
## DFT-s-OFDM Module B

## NR Band n261 / 50MHz / QPSK

## Lowest Band Edge / Full RB

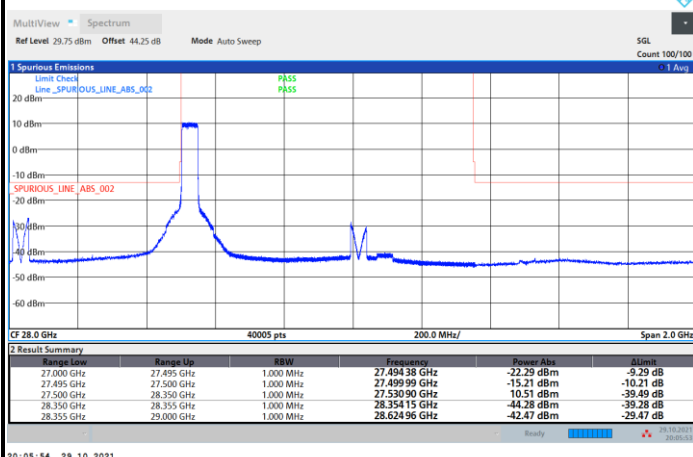


## Highest Band Edge / Full RB

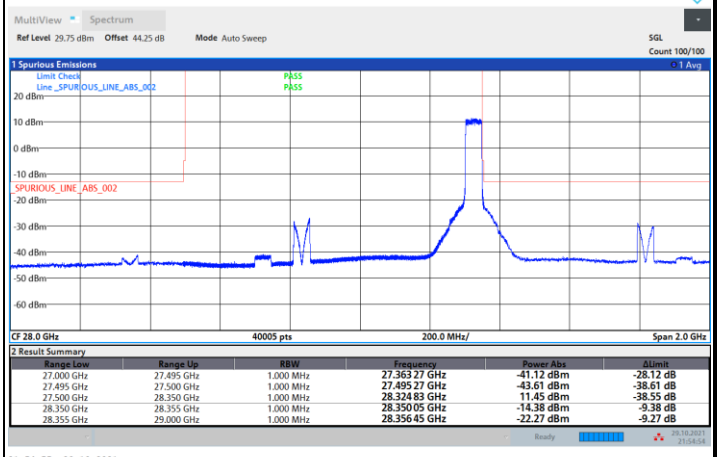


## NR Band n261 / 50MHz / 16QAM

## Lowest Band Edge / Full RB



## Highest Band Edge / Full RB

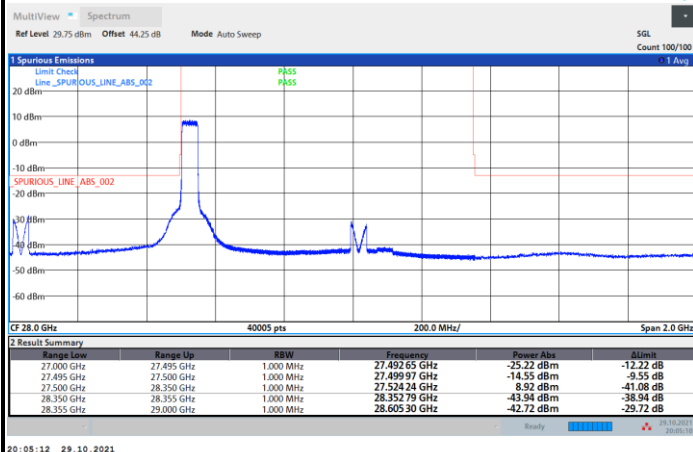




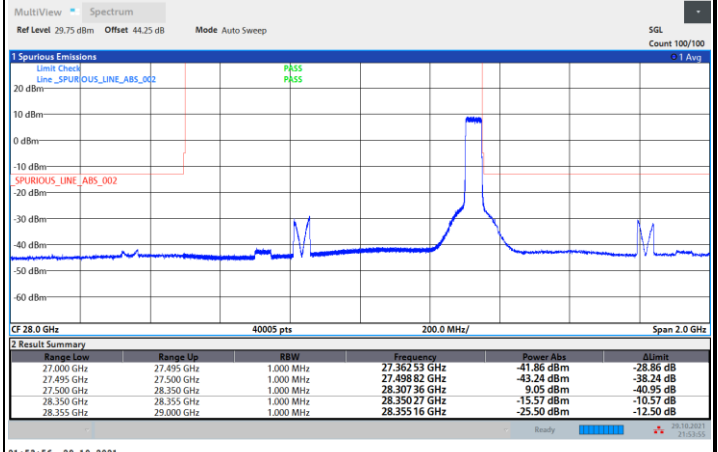
## DFT-s-OFDM Module B

## NR Band n261 / 50MHz / 64QAM

## Lowest Band Edge / Full RB

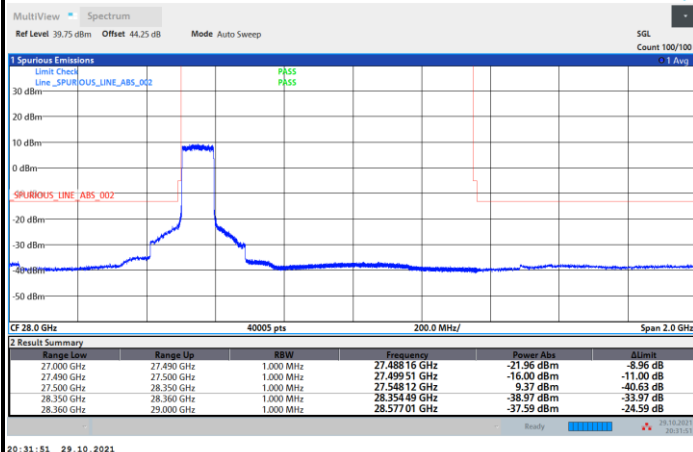


## Highest Band Edge / Full RB

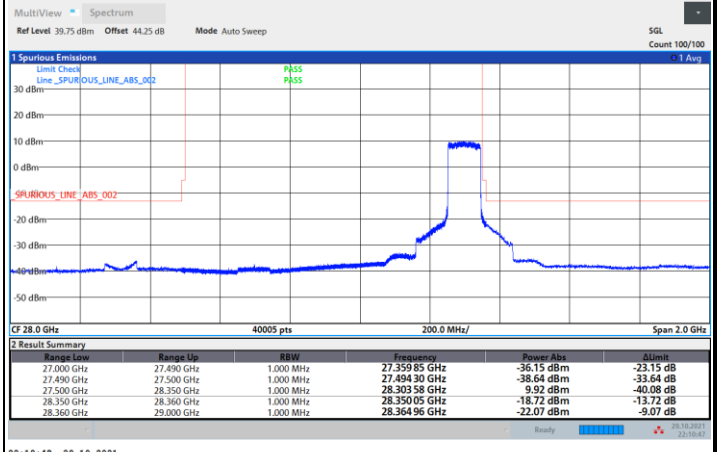


## NR Band n261 / 100MHz / QPSK

## Lowest Band Edge / Full RB



## Highest Band Edge / Full RB

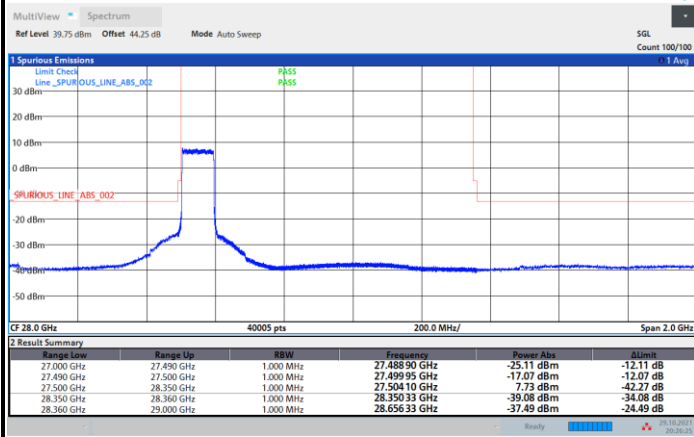




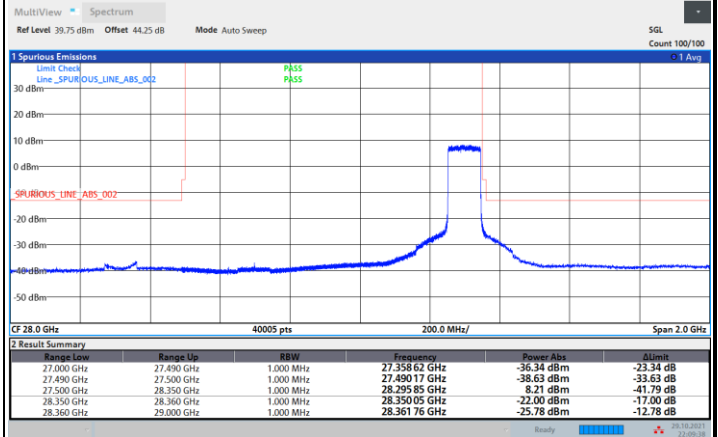
## DFT-s-OFDM Module B

## NR Band n261 / 100MHz / 16QAM

## Lowest Band Edge / Full RB

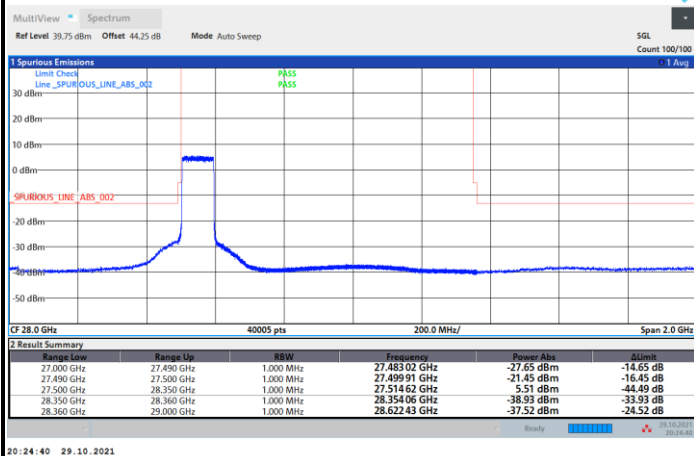


## Highest Band Edge / Full RB

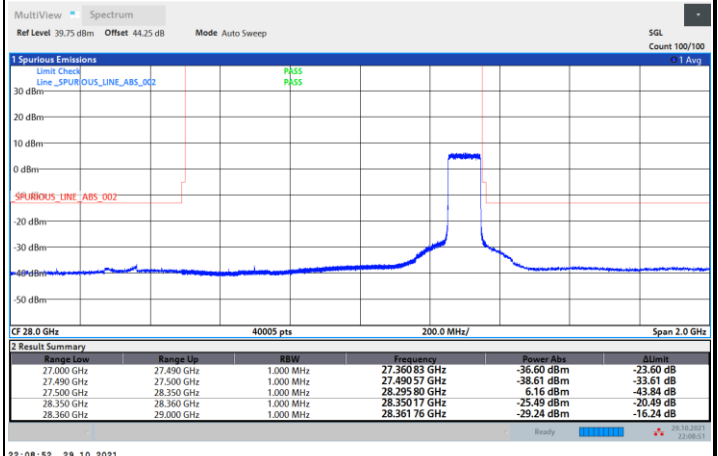


## NR Band n261 / 100MHz / 64QAM

## Lowest Band Edge / Full RB



## Highest Band Edge / Full RB

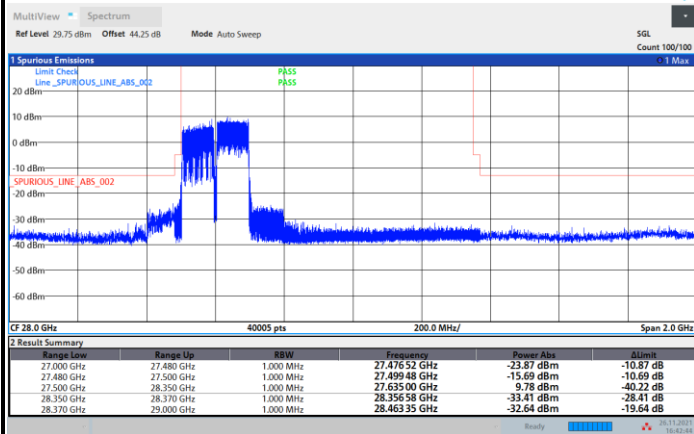




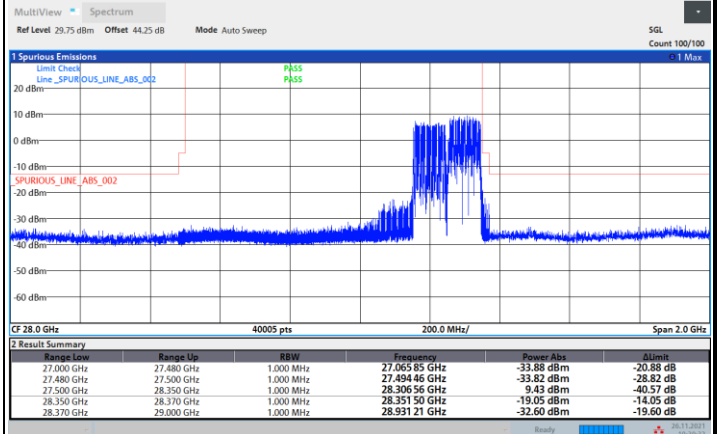
## DFT-s-OFDM Module B

## NR Band n261 / 200MHz / QPSK

## Lowest Band Edge / Full RB

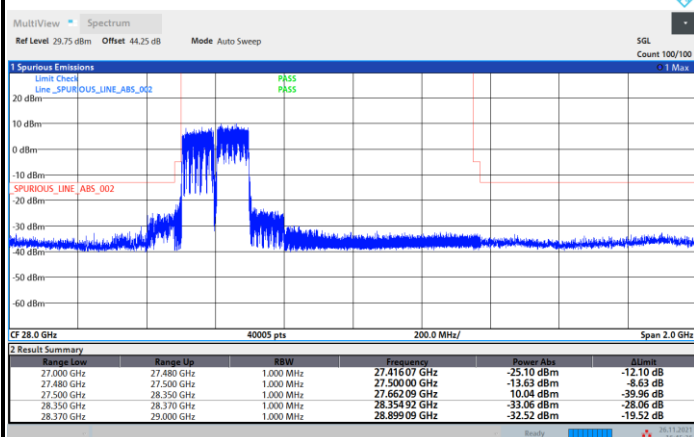


## Highest Band Edge / Full RB

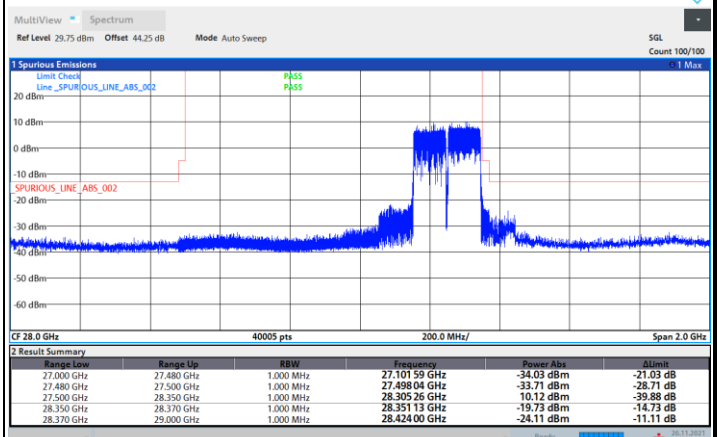


## NR Band n261 / 200MHz / 16QAM

## Lowest Band Edge / Full RB



## Highest Band Edge / Full RB



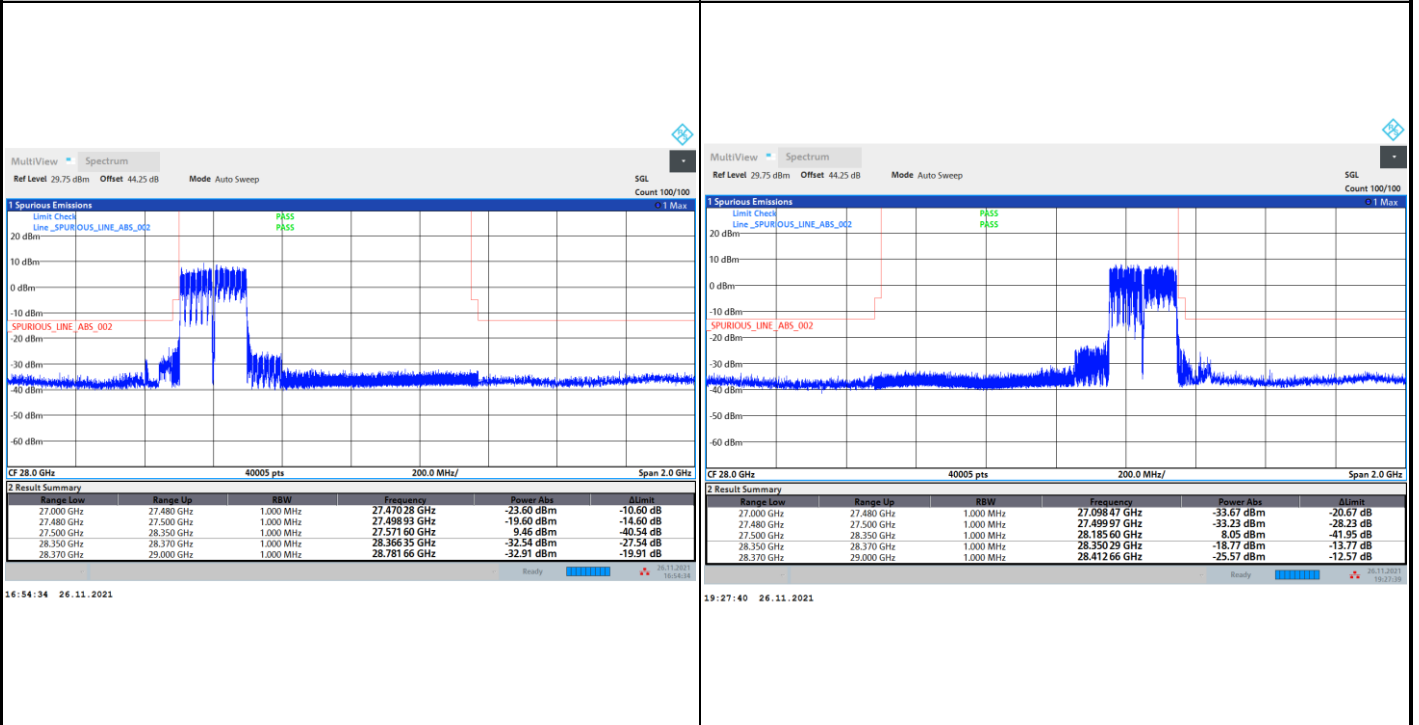


## DFT-s-OFDM Module B

## NR Band n261 / 200MHz / 64QAM

## Lowest Band Edge / Full RB

## Highest Band Edge / Full RB

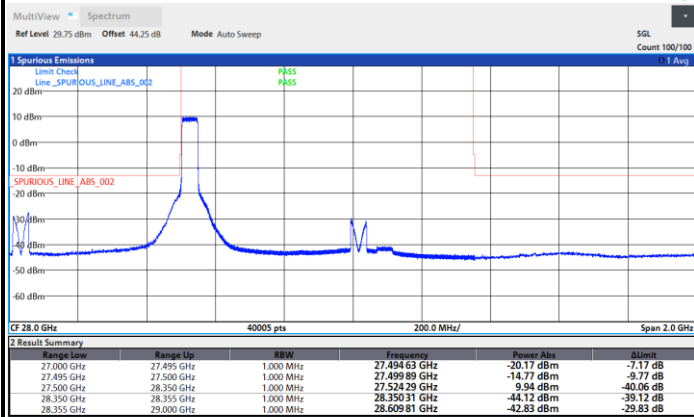




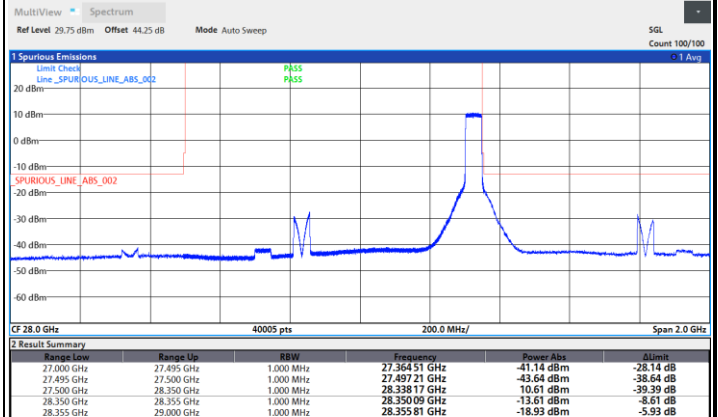
## CP-OFDM Module B

## NR Band n261 / 50MHz / QPSK

## Lowest Band Edge / Full RB

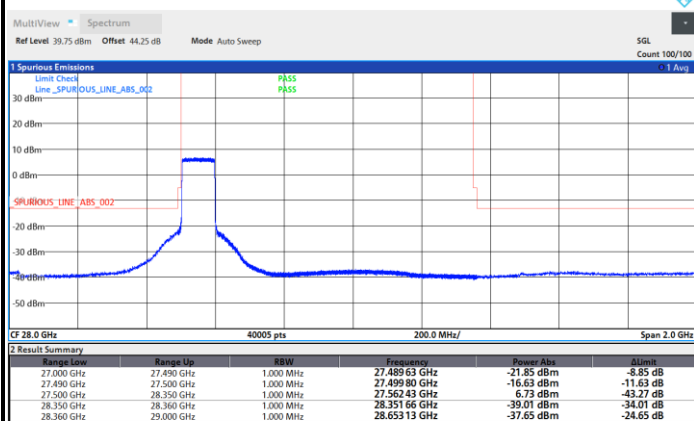


## Highest Band Edge / Full RB

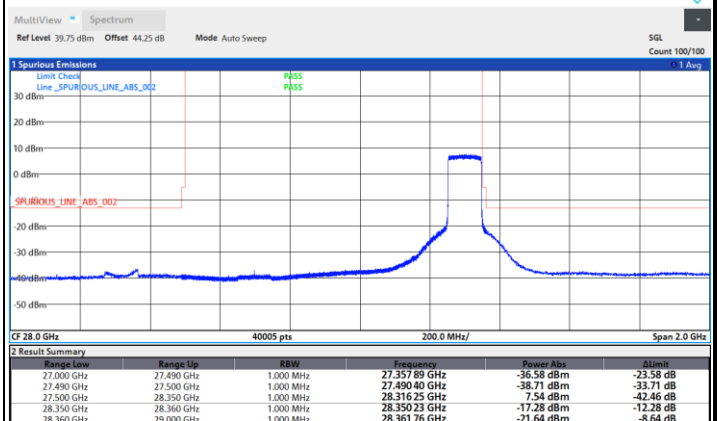


## NR Band n261 / 100MHz / QPSK

## Lowest Band Edge / Full RB



## Highest Band Edge / Full RB



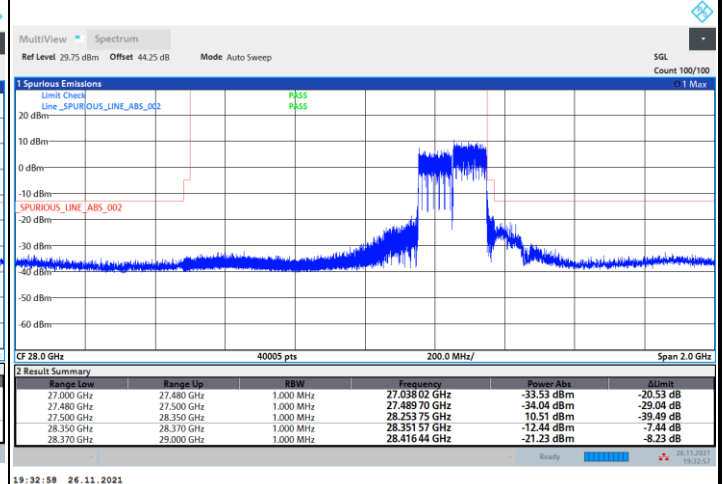
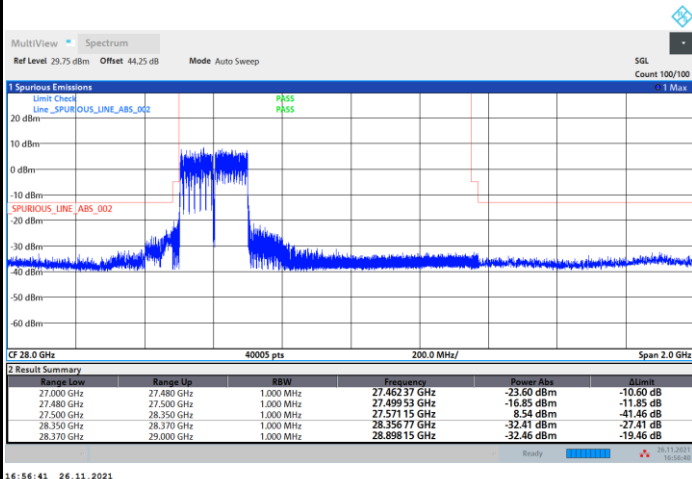


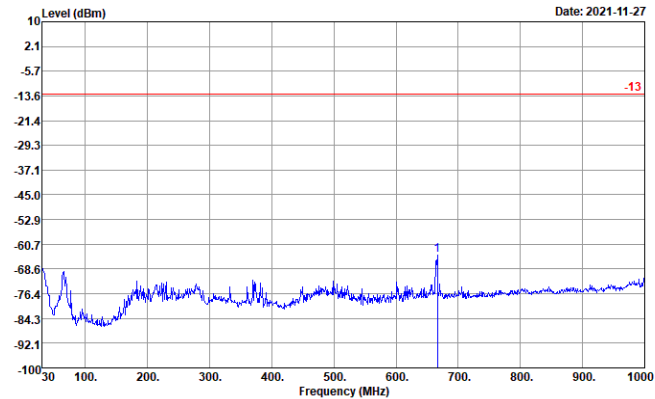
## CP-OFDM Module B

## NR Band n261 / 200MHz / QPSK

## Lowest Band Edge / Full RB

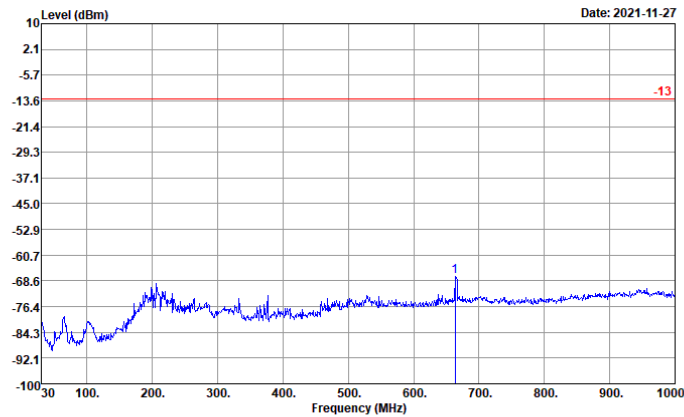
## Highest Band Edge / Full RB



**Spurious Emission****NR Band n261 (30MHz-1GHz)****Horizontal**

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

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

**Vertical**

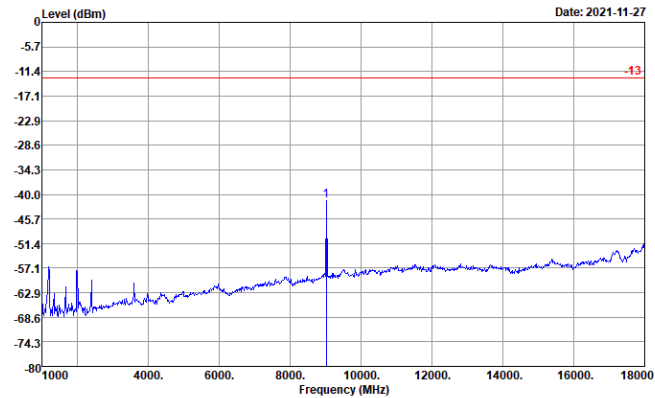
Site : 03CH19-HY  
Condition : -13 ERP EIRP\_20210305 VERTICAL  
Project : 161608-03  
          : n261 MB

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



## NR Band n261 (1GHz-18GHz)

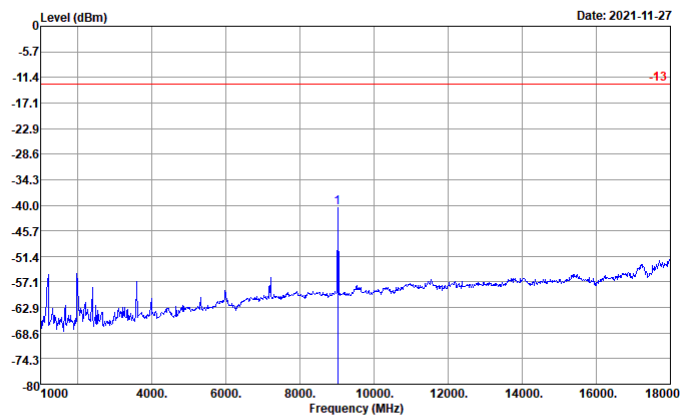
## Horizontal



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

|   | Freq    | Level  | Over<br>Limit | Limit<br>Line | Read<br>Level |
|---|---------|--------|---------------|---------------|---------------|
|   | MHz     | dBm    | dB            | dBm           | dBm           |
| 1 | 9024.00 | -41.44 | -28.44        | -13.00        | -67.32        |

## Vertical



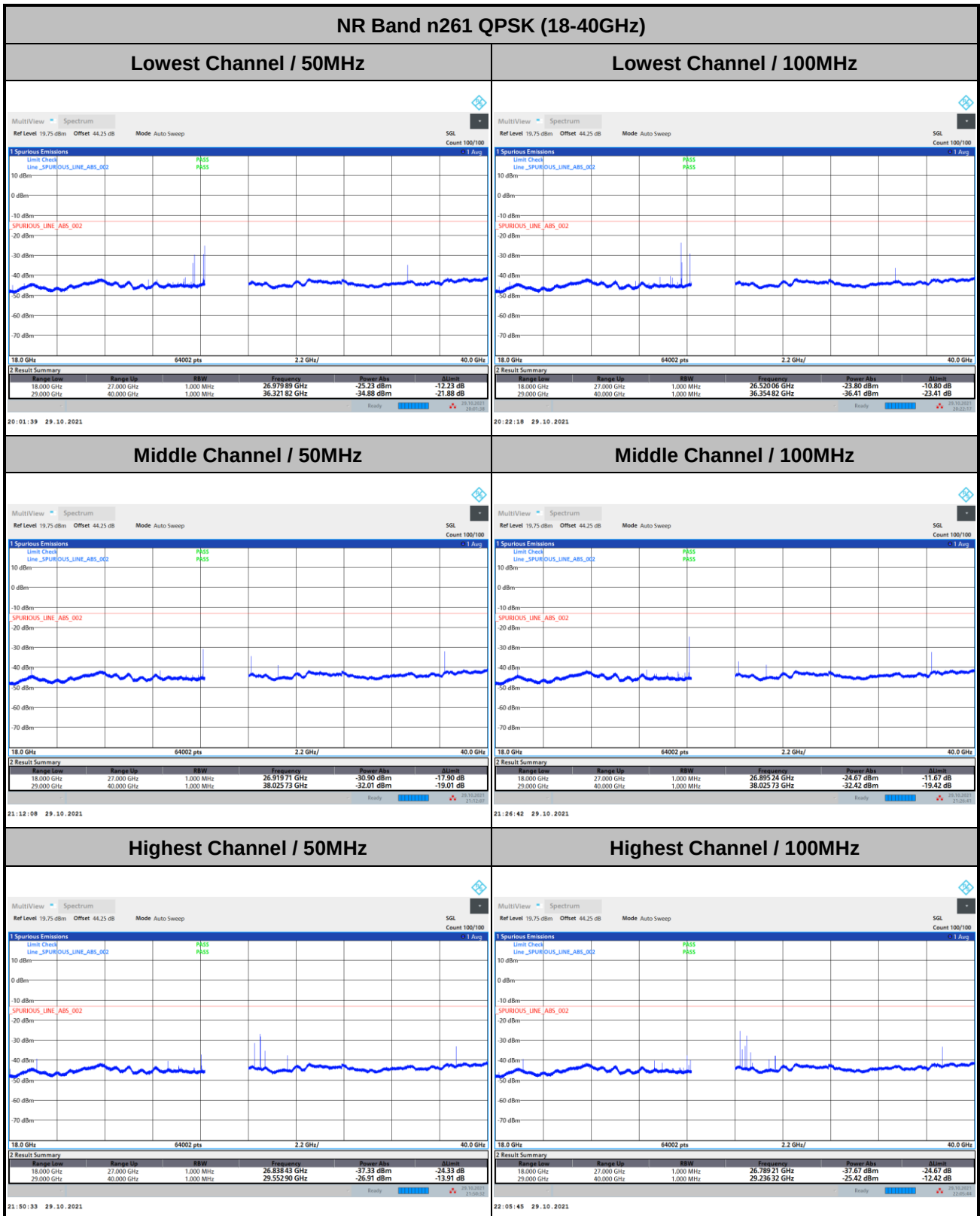
Site : 03CH19-HY  
Condition : -13 ERP EIRP\_20210305 VERTICAL  
Project : 161608-03  
: n261 MB

|   | Freq    | Level  | Over Limit | Limit Line | Read Level |
|---|---------|--------|------------|------------|------------|
|   | 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.

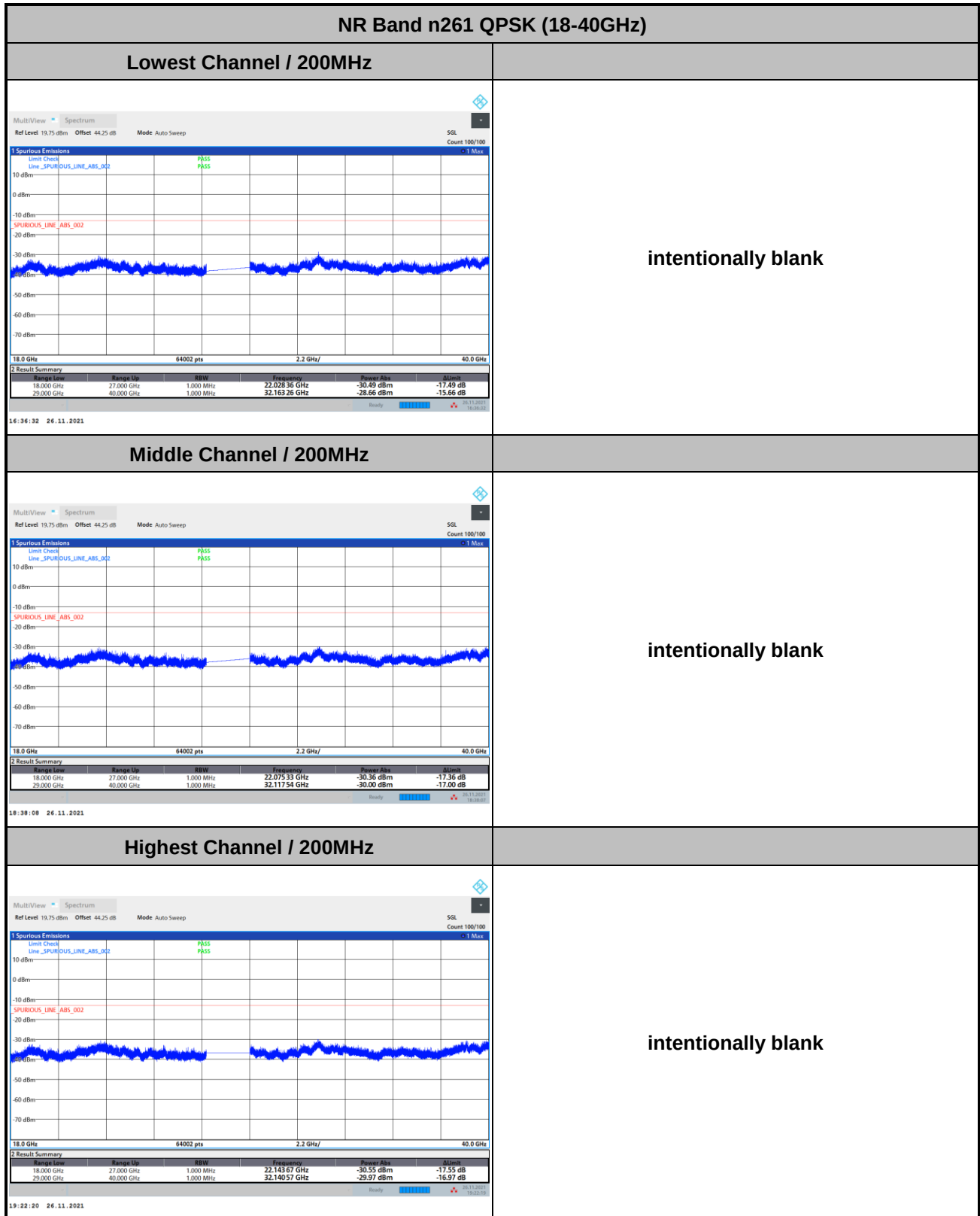
### DFT-s-OFDM Module B



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



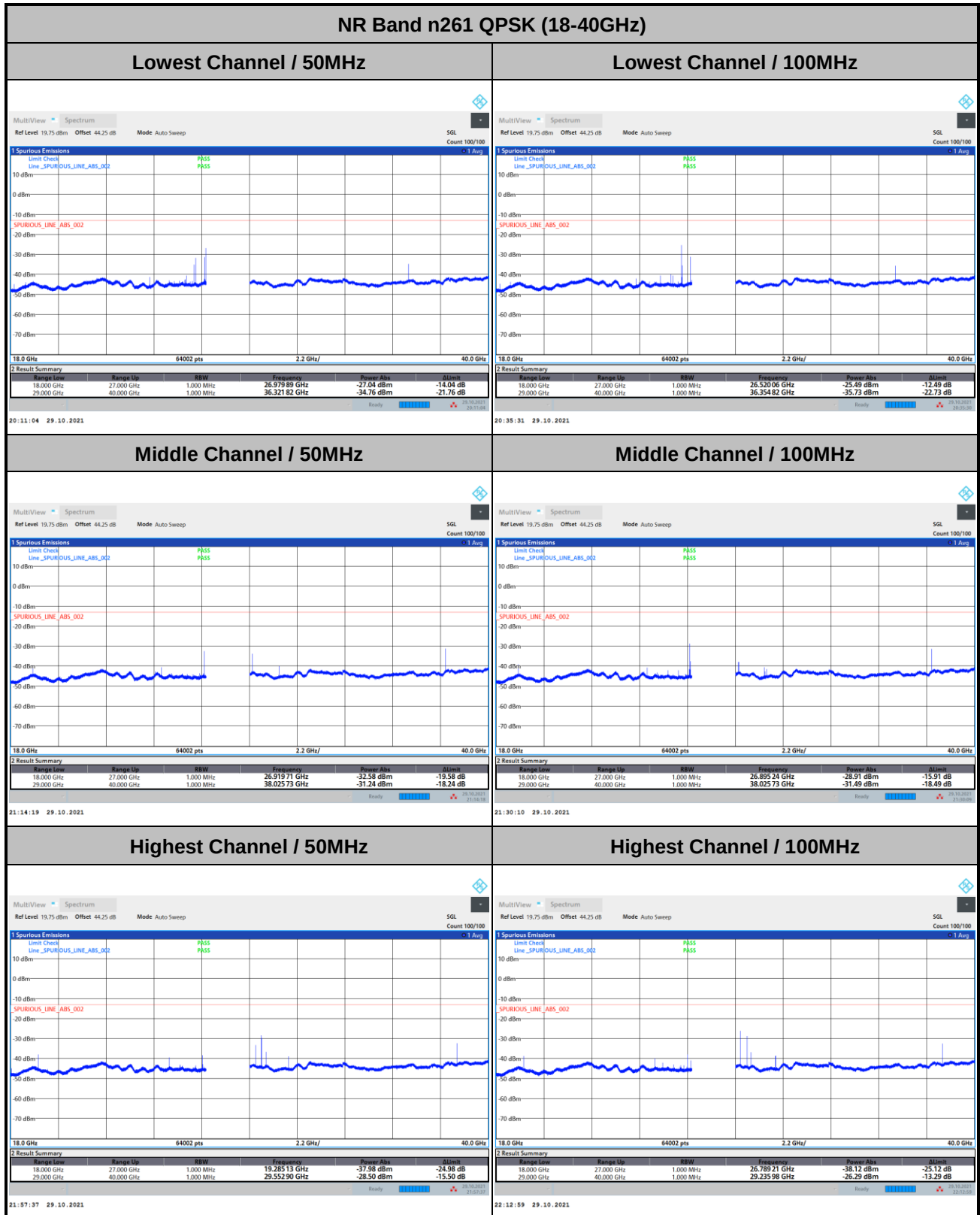
## DFT-s-OFDM Module B



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



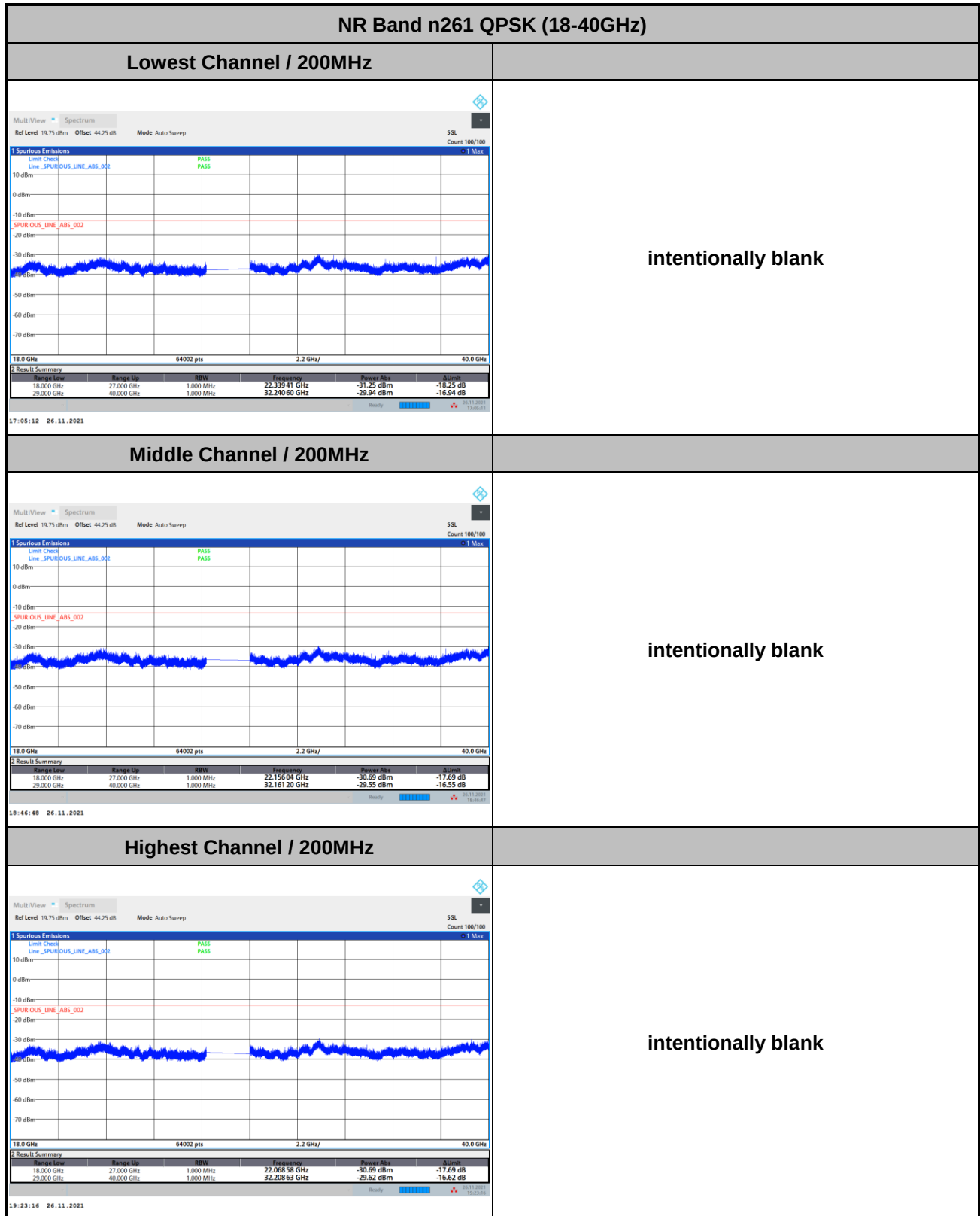
## CP-OFDM Module B



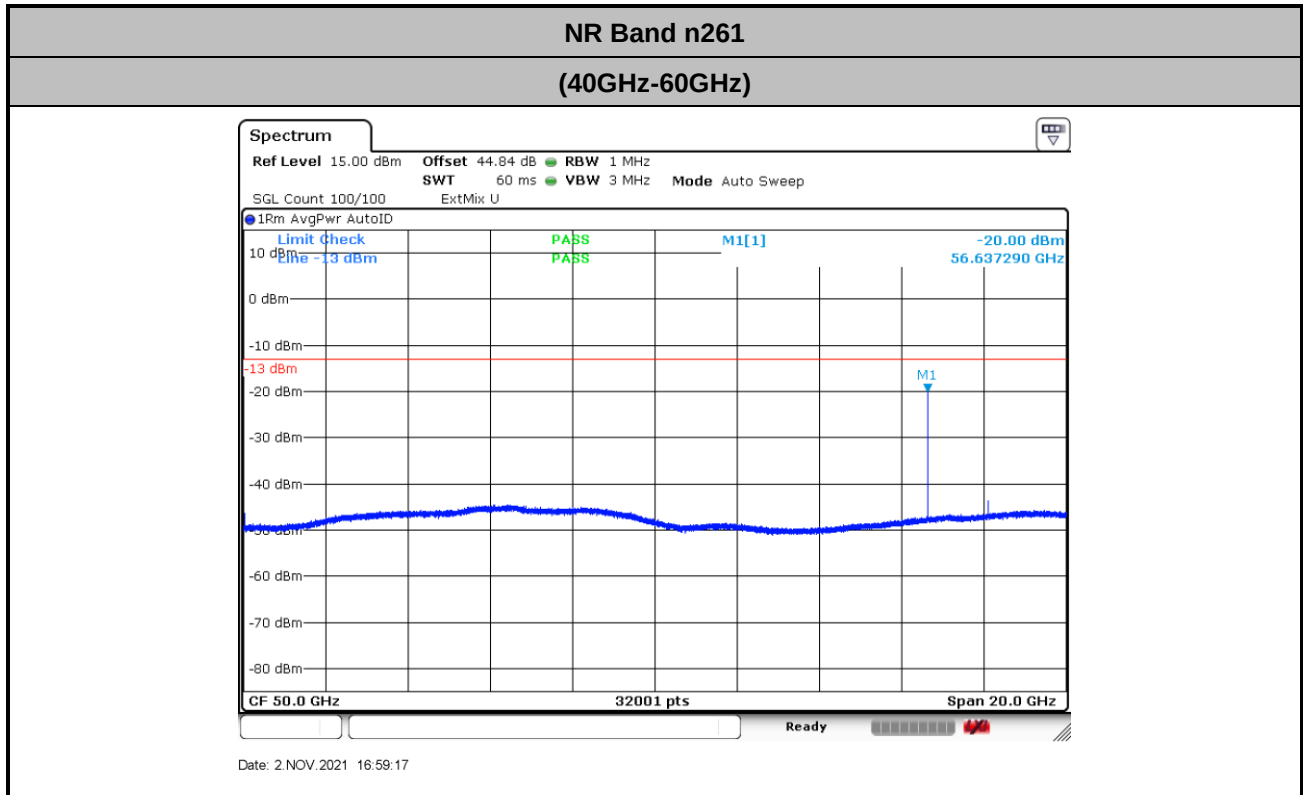
Remark: In band and out of band frequencies are omitted.



## CP-OFDM Module B

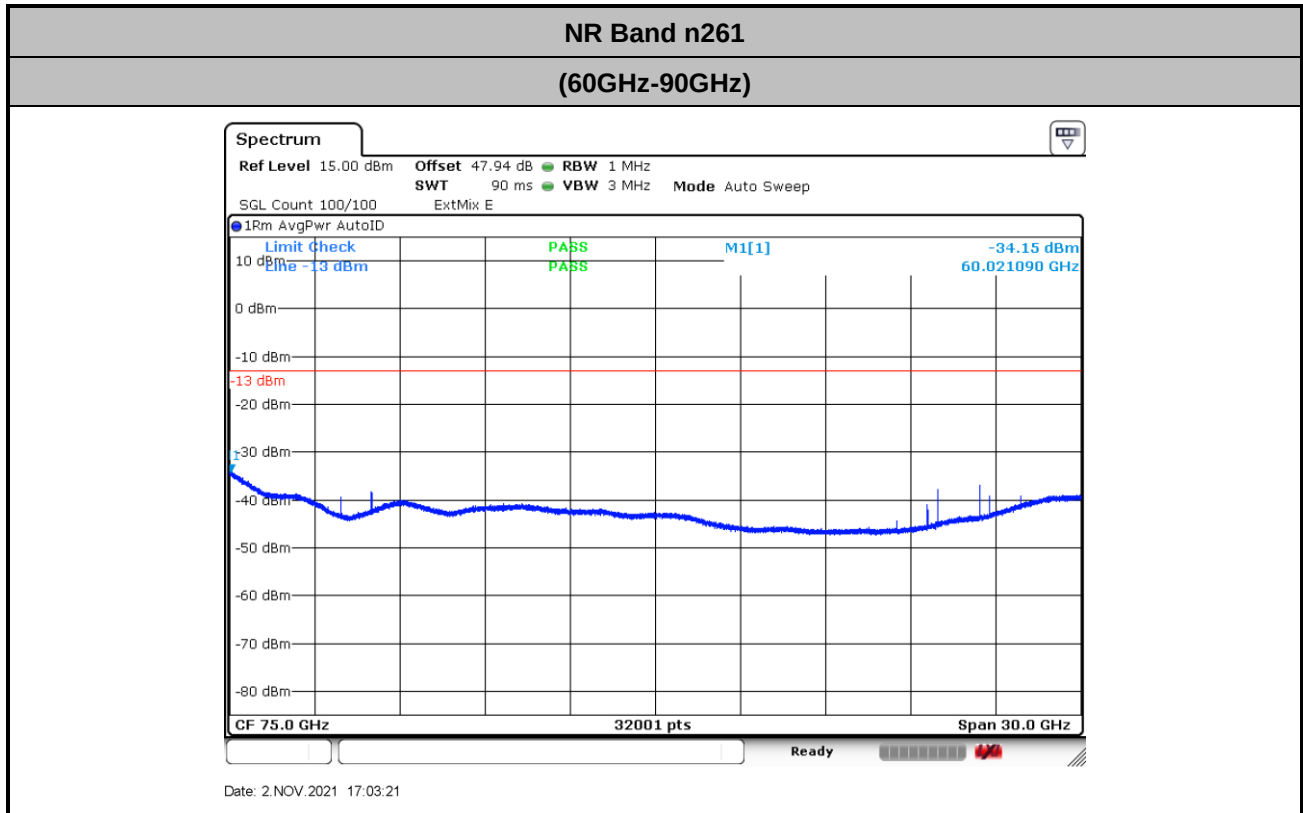


Remark: In band and out of band frequencies are omitted.



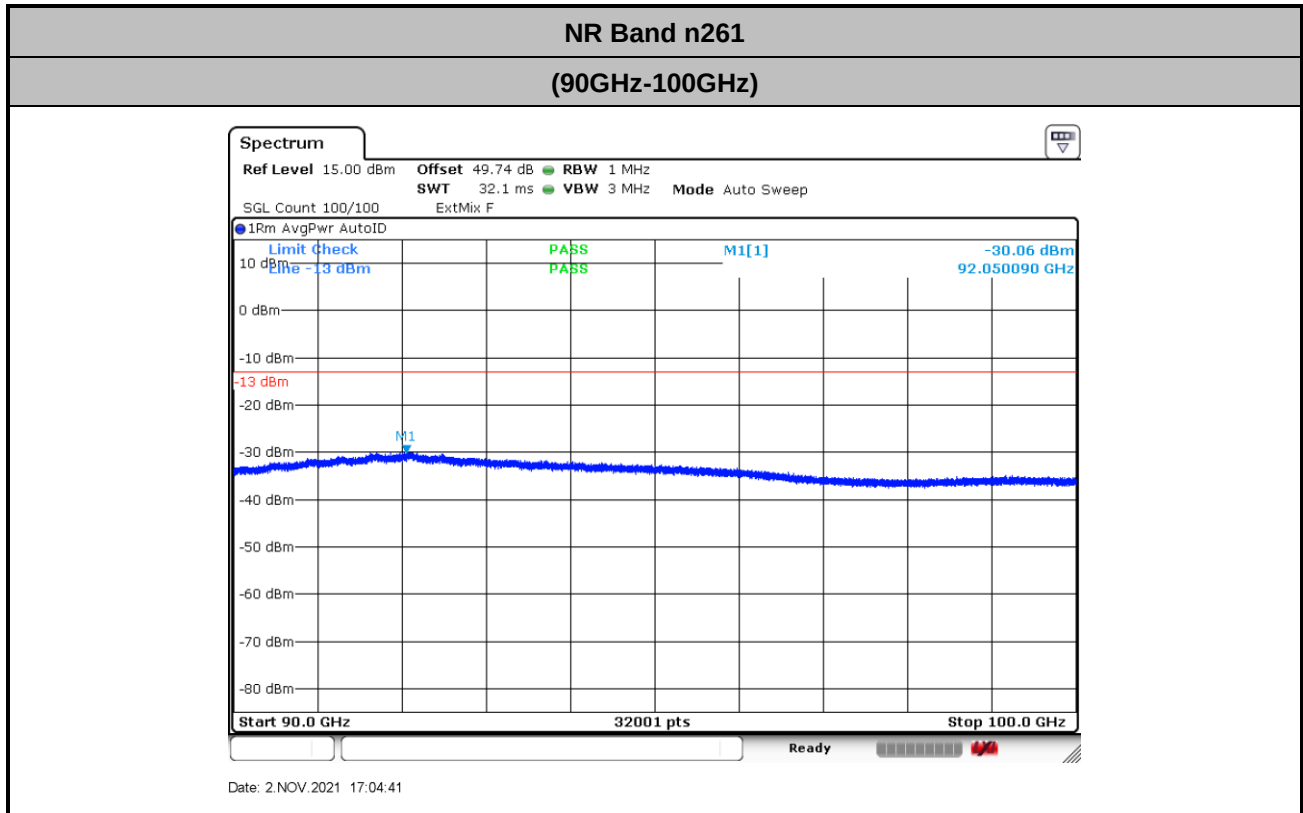
$$\text{Offset} = \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8$$

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



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

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



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

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

## 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

Kalibrierschein

Certificate Number 24-0060-101033-01

Zertifikatsnummer

## Unit Data

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

**Manufacturer**  
Hersteller  
**RPG**

**Type**  
Typ  
**RPG FS-Z60**

**Material Number**  
Materialnummer  
**1048.0171.02**

**Serial Number**  
Seriennummer  
**101033**

**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**

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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<br>Gegenstand      | Type<br>Typ  | Serial Number<br>Seriennummer | Calibration Certificate Number<br>Kalibrierscheinnummer | Cal. Due<br>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

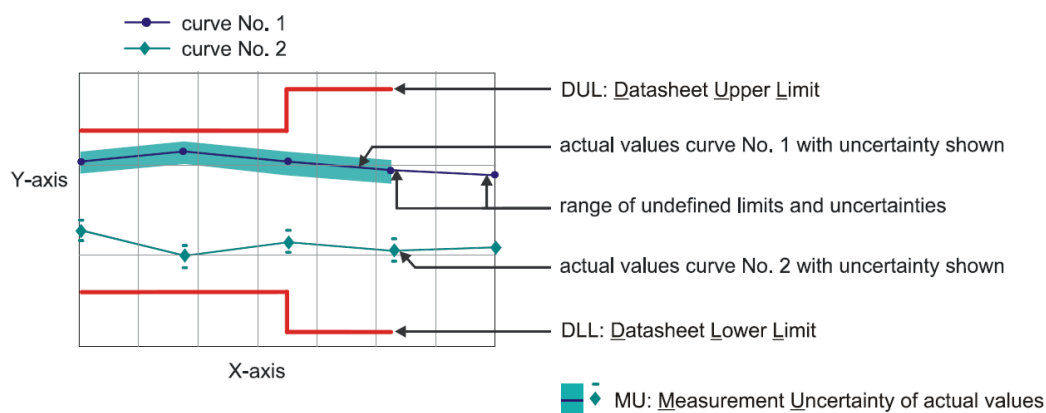
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is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

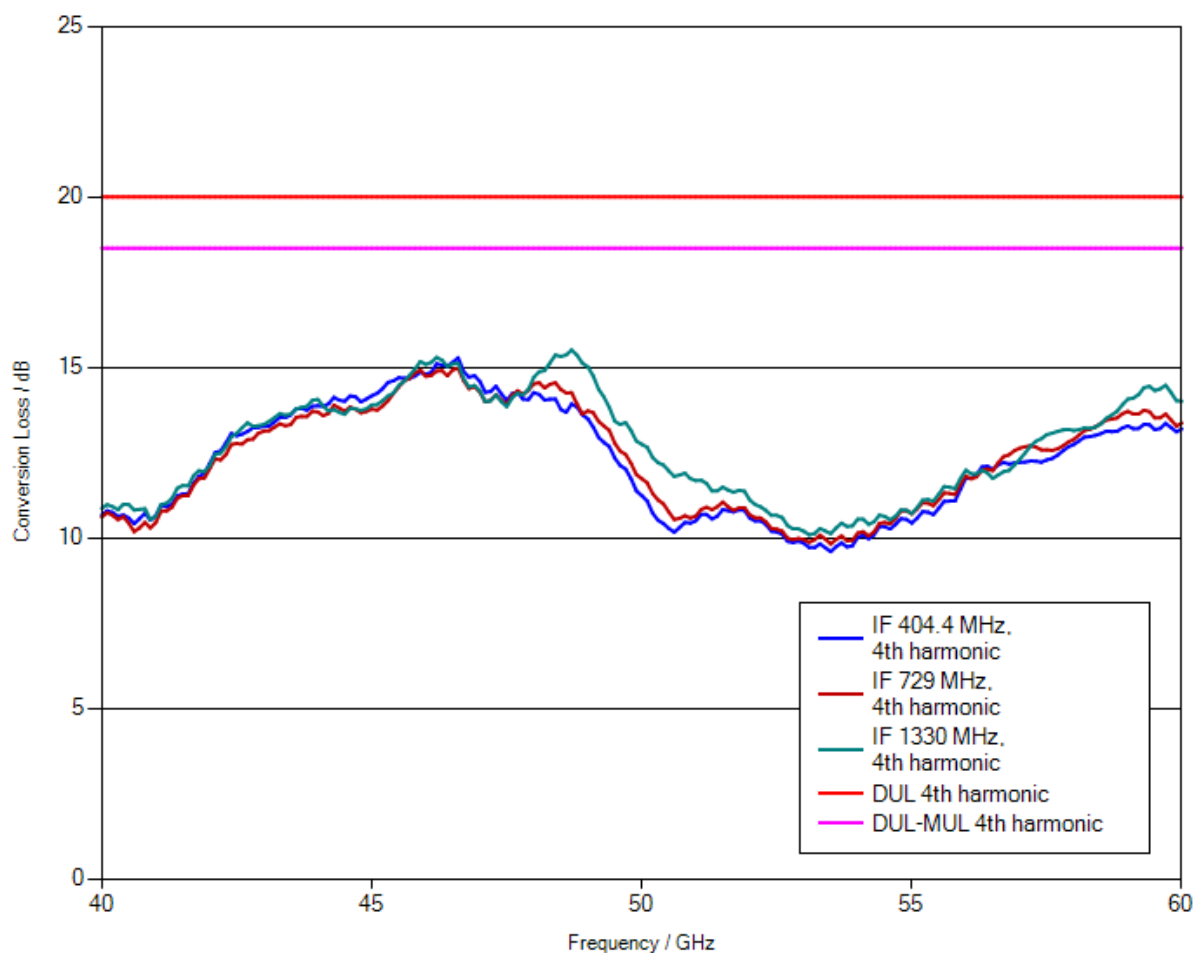


**Software used for measurement****Item Type**Measurement Studio Professional Edition  
MixerCertification**Version**2013  
7\_13**Remark**

## 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<br>(worst case) | Evaluation |
|---------------------------------|------|------------------------|------------|
| IF = 404.4 MHz,<br>4th harmonic | 4 dB | 2.16 dB                | PASS       |
| IF = 729 MHz,<br>4th harmonic   | 4 dB | 2.04 dB                | PASS       |
| IF = 1330 MHz,<br>4th harmonic  | 4 dB | 2.19 dB                | PASS       |

# Calibration Certificate

Kalibrierschein

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

Zertifikatsnummer

## Unit Data

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

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

**Type**  
Typ **R&S® FS-Z90**

**Material Number**  
Materialnummer **1048.0371.02** **Serial Number**  
Seriennummer **101867**

**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<br>Gegenstand      | Type<br>Typ  | Serial Number<br>Seriennummer | Calibration Certificate Number<br>Kalibrierscheinnummer | Cal. Due<br>Kalibr. bis |
|-------------------------|--------------|-------------------------------|---------------------------------------------------------|-------------------------|
| Vector Network Analyzer | R&S® ZVA67   | 101097                        | 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.**  
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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.