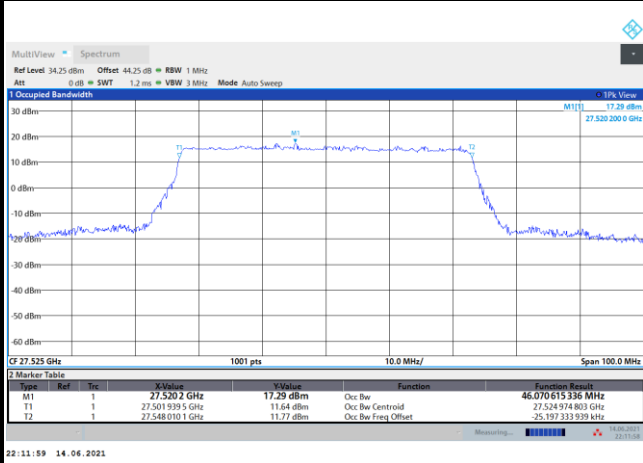




DFT-s-OFDM Module B

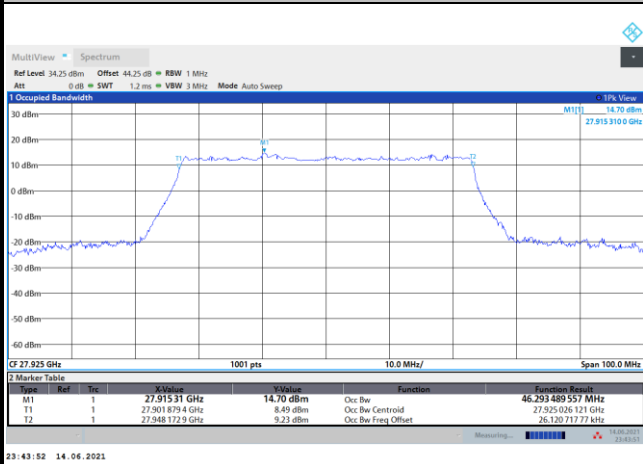
NR Band n261

Lowest Channel / 50MHz / 64QAM



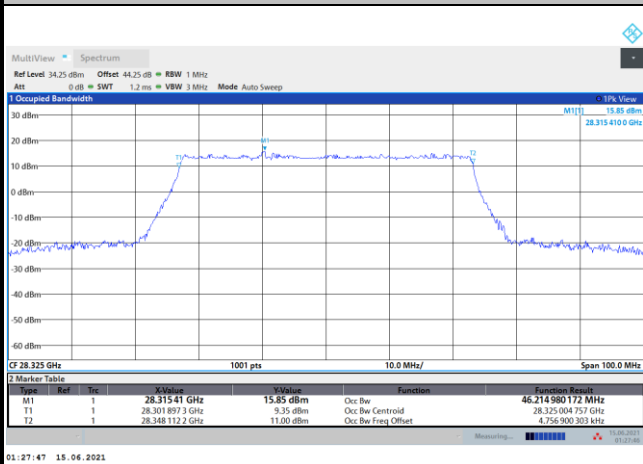
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Middle Channel / 50MHz / 64QAM



intentionally blank

Highest Channel / 50MHz / 64QAM



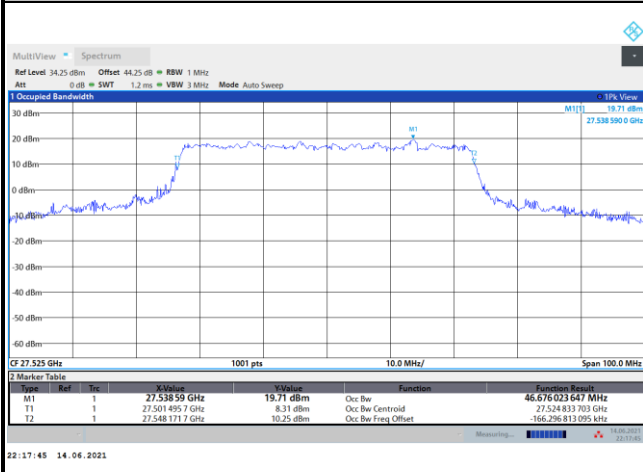
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CP-OFDM Module B

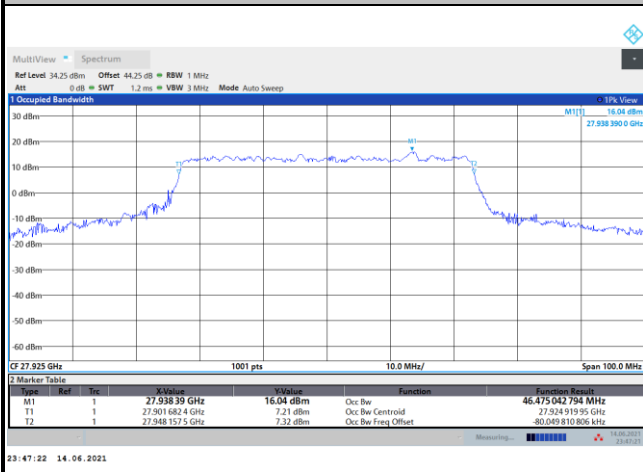
NR Band n261

Lowest Channel / 50MHz / QPSK



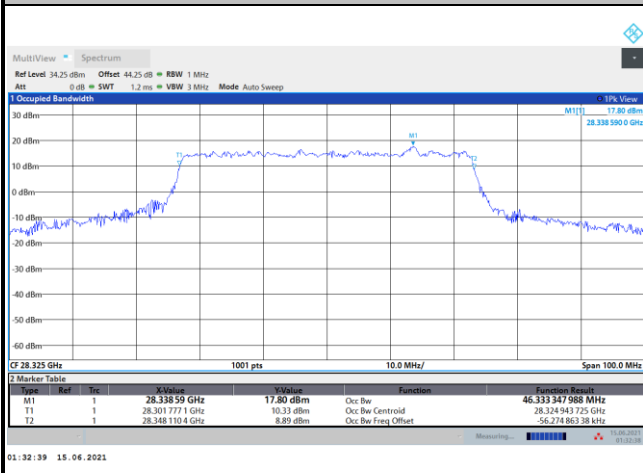
intentionally blank

Middle Channel / 50MHz / QPSK



intentionally blank

Highest Channel / 50MHz / QPSK



intentionally blank



**Radiated Out of Band Emissions**

Mode			DFT-s-OFDM Module B NR Band n261 : BE (dBm) 1 RB		
BW			50MHz		
Limit (dBm)			QPSK	16QAM	64QAM
Low CH	0~10%OB	≤ -5	-16.07	-15.93	-7.57
	>10%OB	≤ -13	-21.06	-22.43	-17.26
High CH	0~10%OB	≤ -5	-6.61	-6.43	-8.67
	>10%OB	≤ -13	-17.47	-18.29	-21.24
Result			Compliance		

Mode			CP-OFDM Module B NR Band n261 : BE (dBm) 1 RB		
BW			50MHz		
Limit (dBm)			QPSK		
Low CH	0~10%OB	≤ -5	-6.13		
	>10%OB	≤ -13	-15.84		
High CH	0~10%OB	≤ -5	-7.48		
	>10%OB	≤ -13	-19.47		
Result			Compliance		

Mode			DFT-s-OFDM Module B NR Band n261 : BE (dBm) Full RB		
BW			50MHz		
Limit (dBm)			QPSK	16QAM	64QAM
Low CH	0~10%OB	≤ -5	-10.42	-14.73	-16.54
	>10%OB	≤ -13	-14.41	-17.64	-24.73
High CH	0~10%OB	≤ -5	-14.65	-17.04	-19.46
	>10%OB	≤ -13	-20.28	-23.18	-28.41
Result			Compliance		

Mode			CP-OFDM Module B NR Band n261 : BE (dBm) Full RB		
BW			50MHz		
Limit (dBm)			QPSK		
Low CH	0~10%OB	≤ -5	-11.86		
	>10%OB	≤ -13	-14.30		
High CH	0~10%OB	≤ -5	-15.60		
	>10%OB	≤ -13	-20.09		
Result			Compliance		

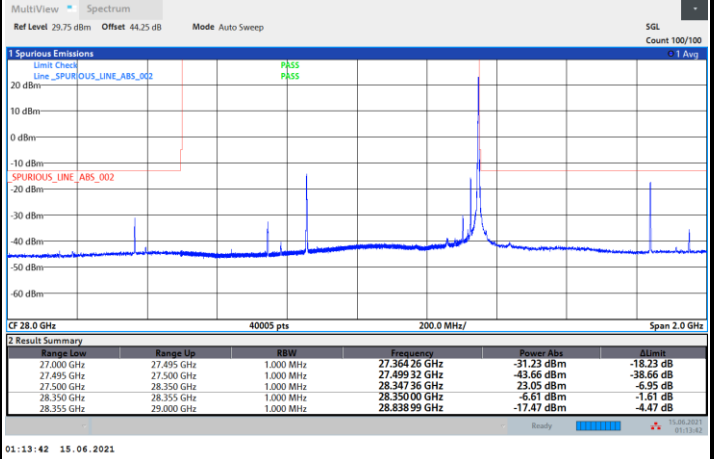
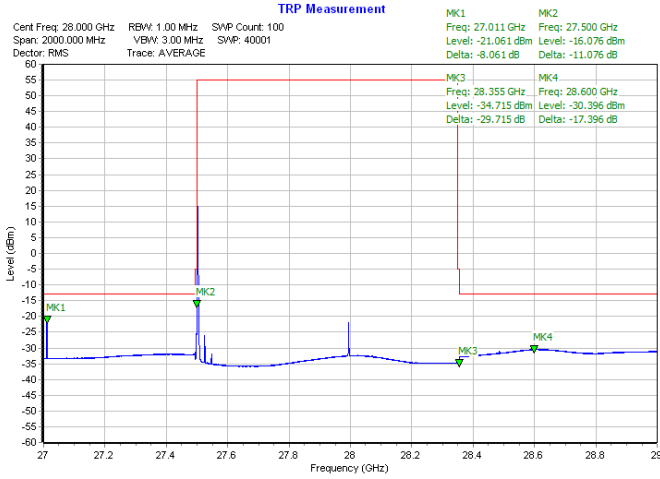


DFT-s-OFDM Module B

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / 1 RB

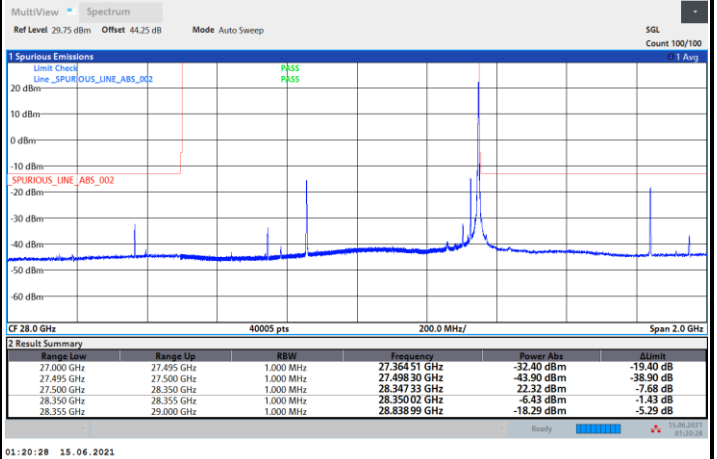
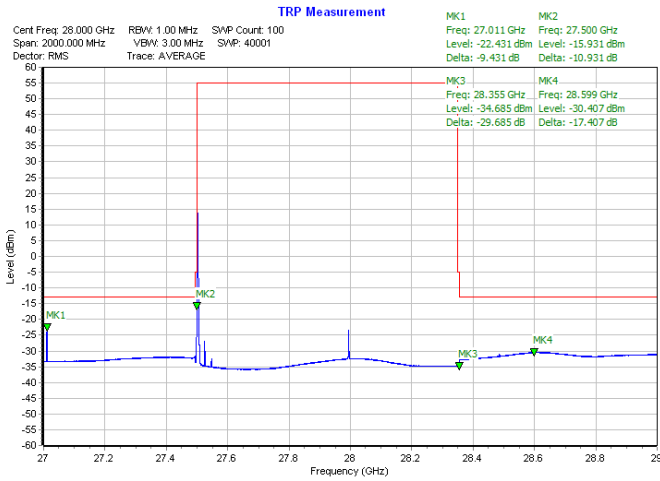
Highest Band Edge / 1 RB



NR Band n261 / 50MHz / 16QAM

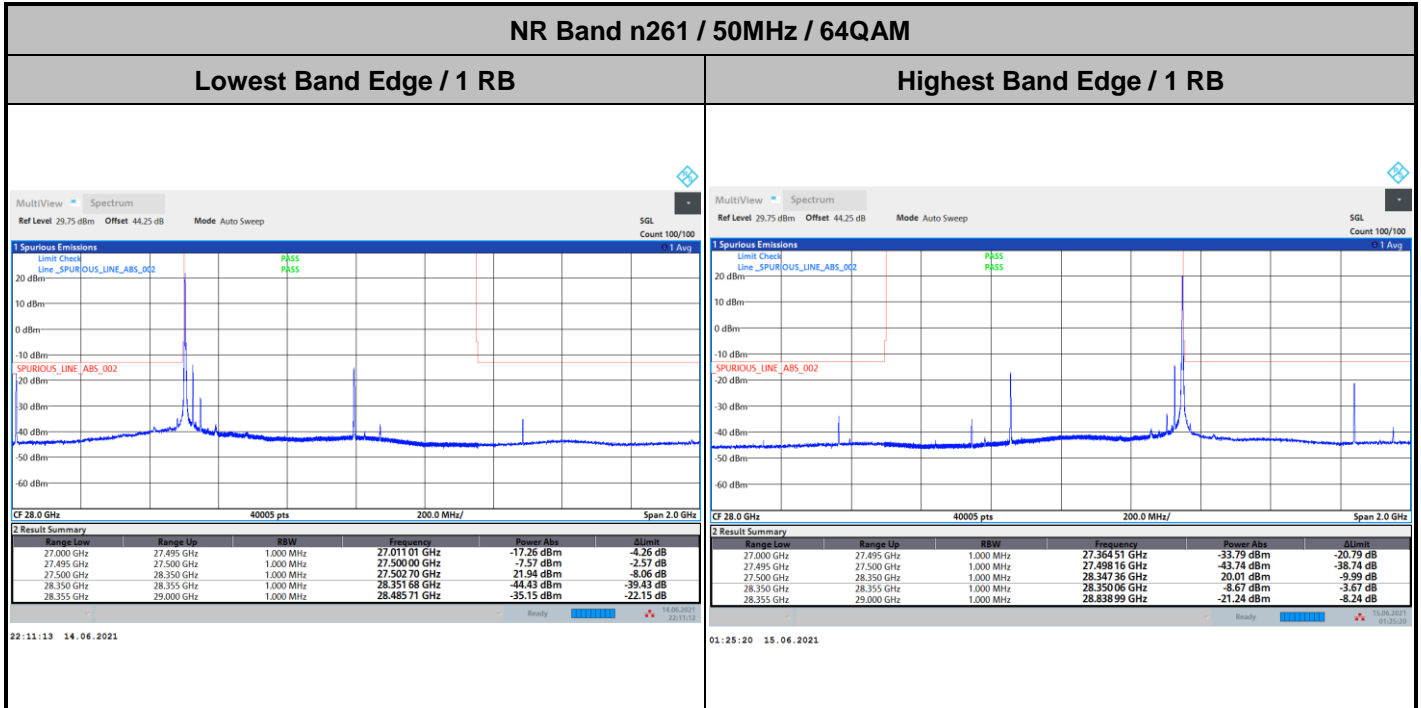
Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB

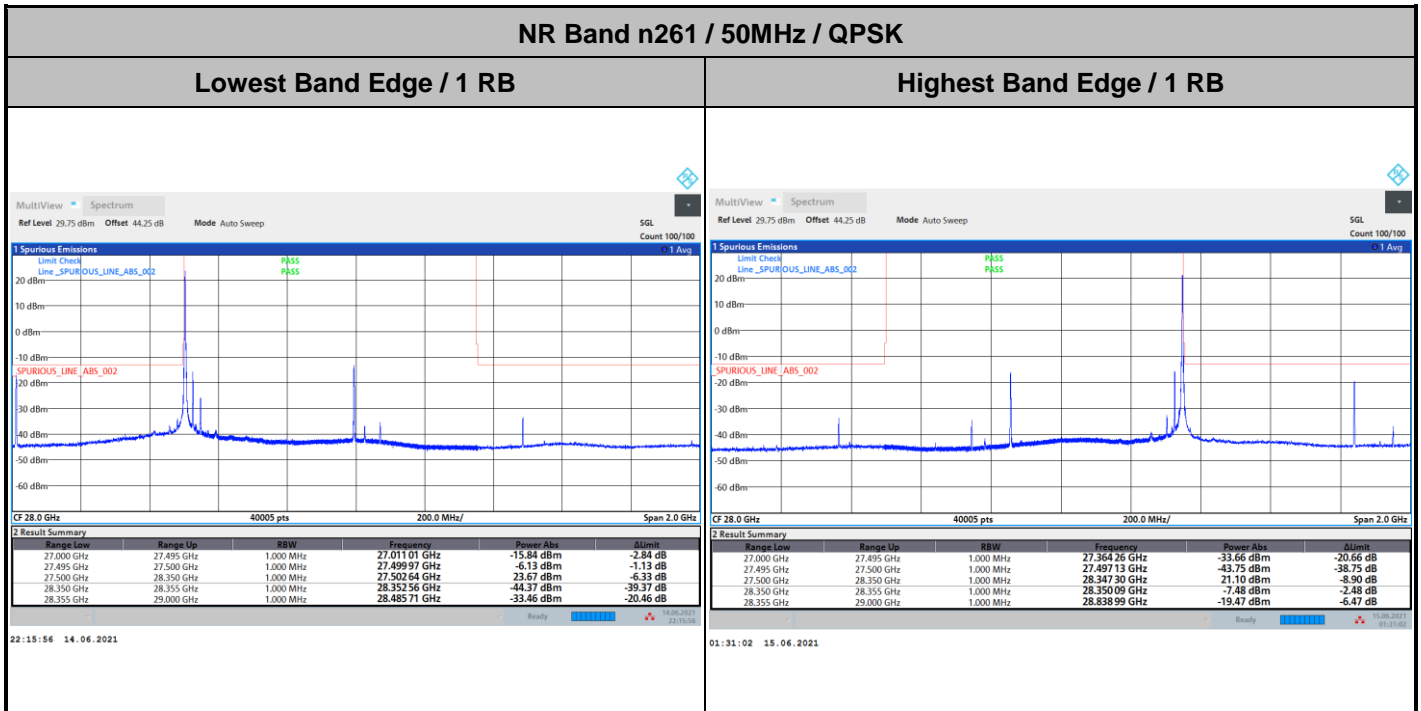




DFT-s-OFDM Module B



CP-OFDM Module B

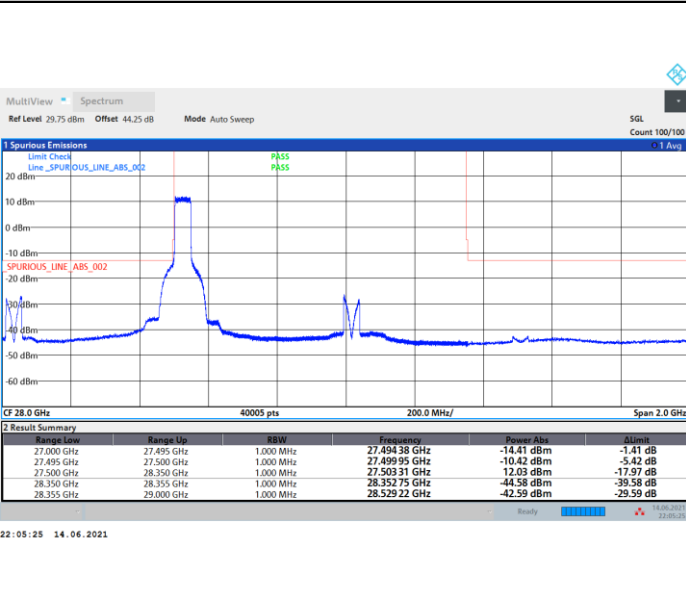




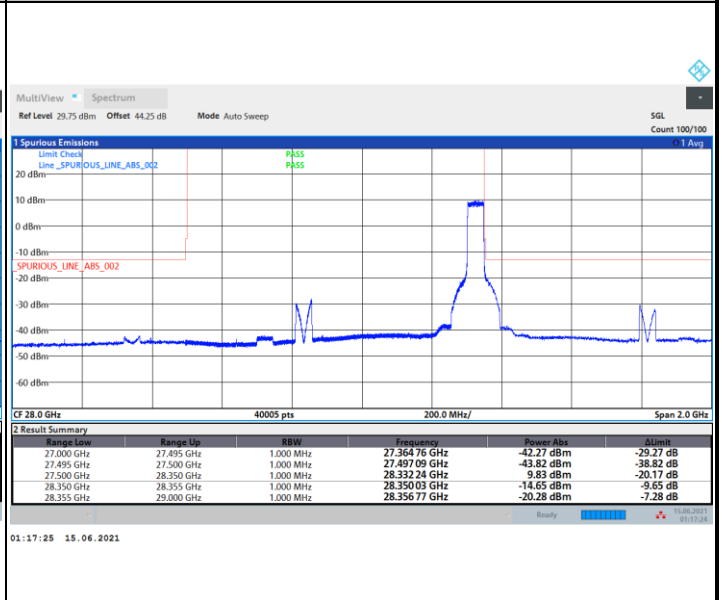
DFT-s-OFDM Module B

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / Full RB

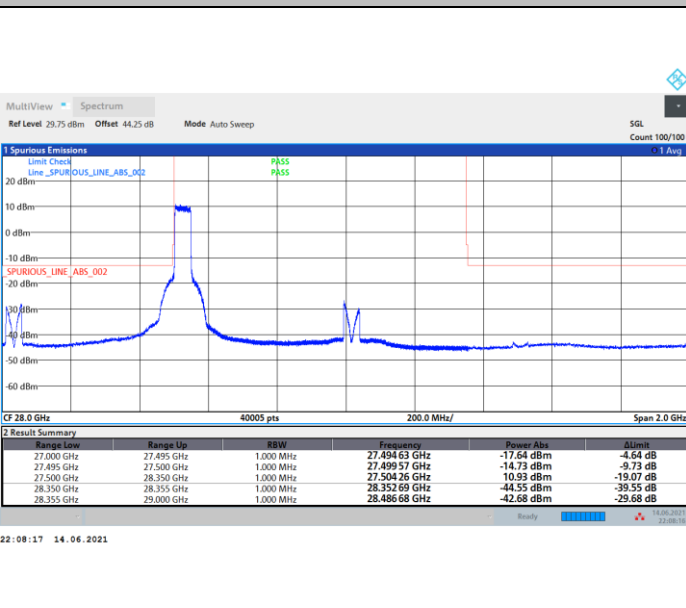


Highest Band Edge / Full RB

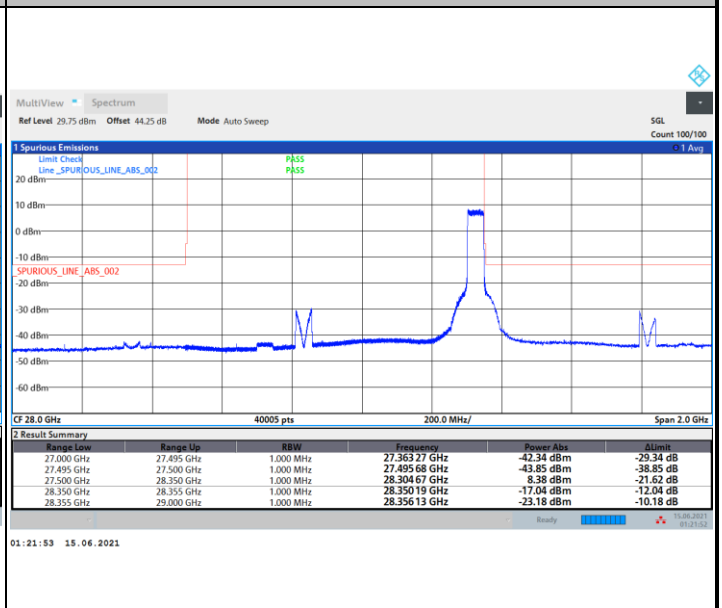


NR Band n261 / 50MHz / 16QAM

Lowest Band Edge / Full RB

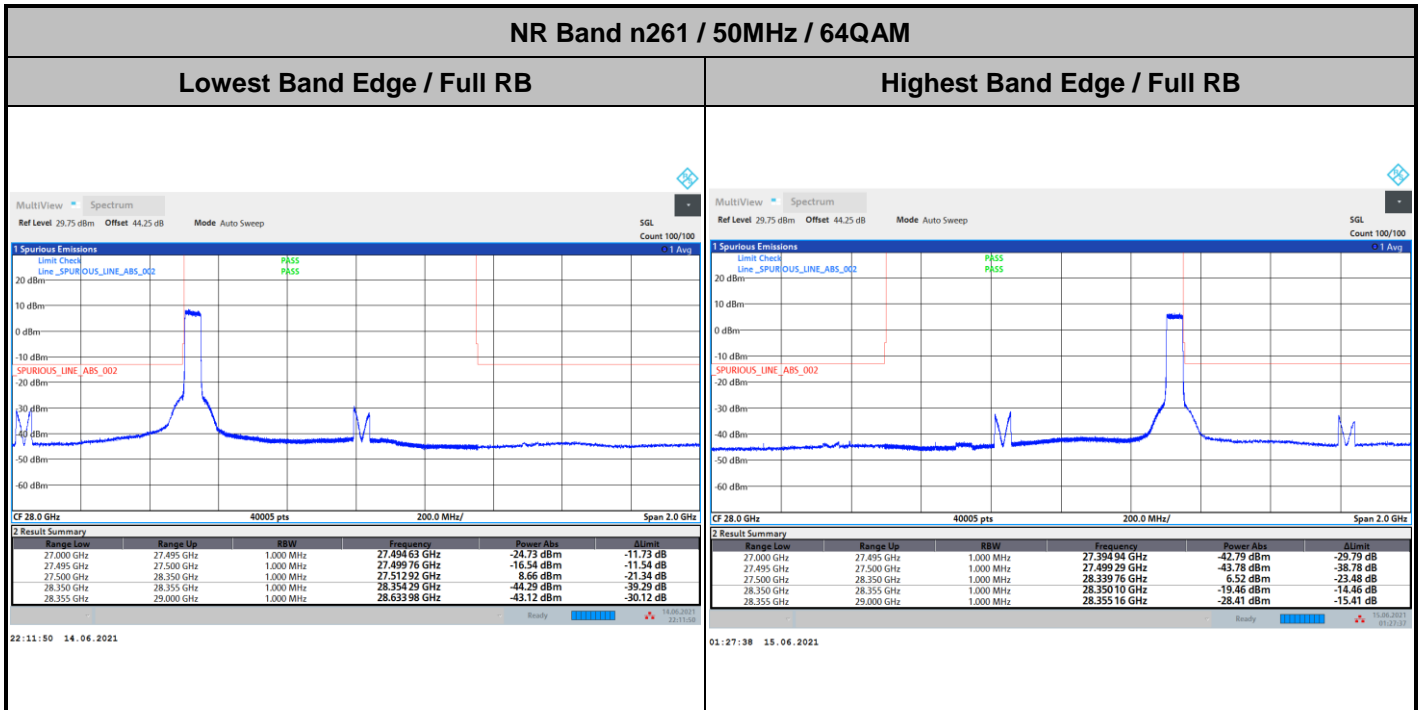


Highest Band Edge / Full RB

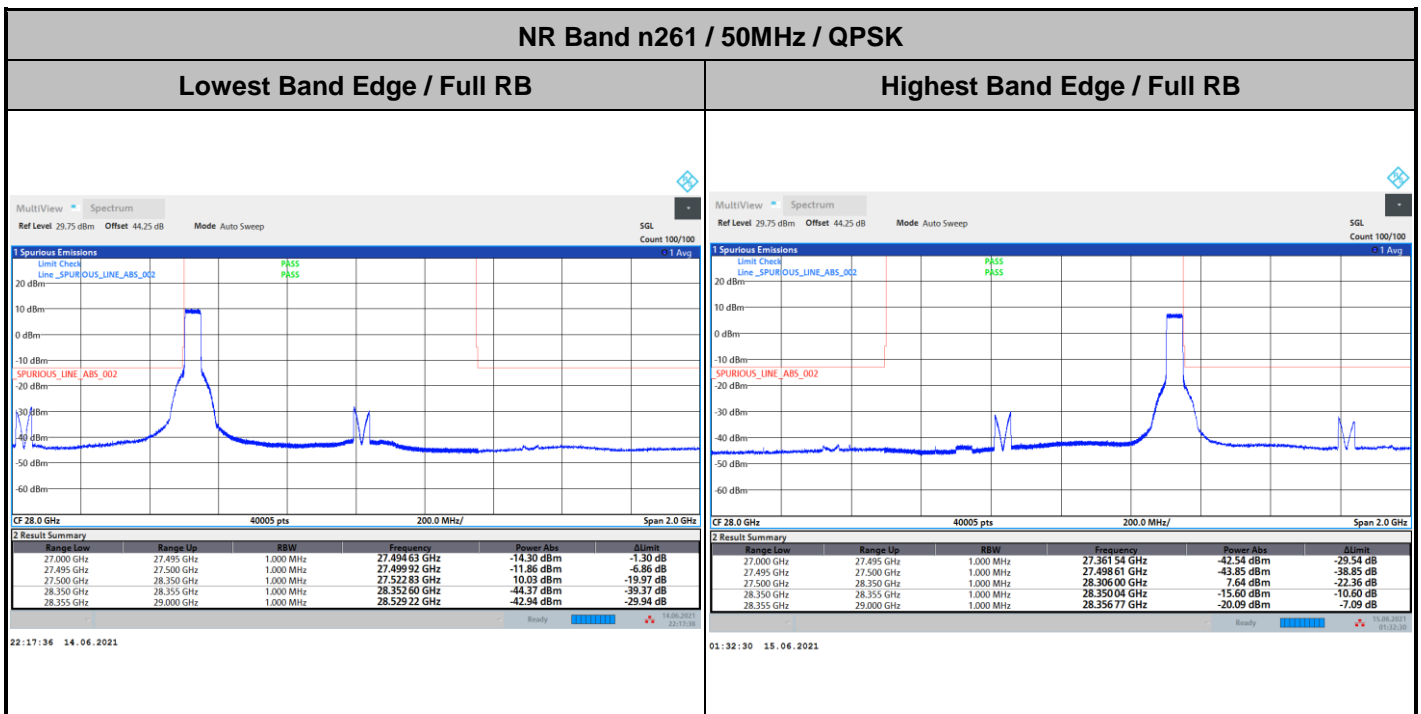




DFT-s-OFDM Module B



CP-OFDM Module B





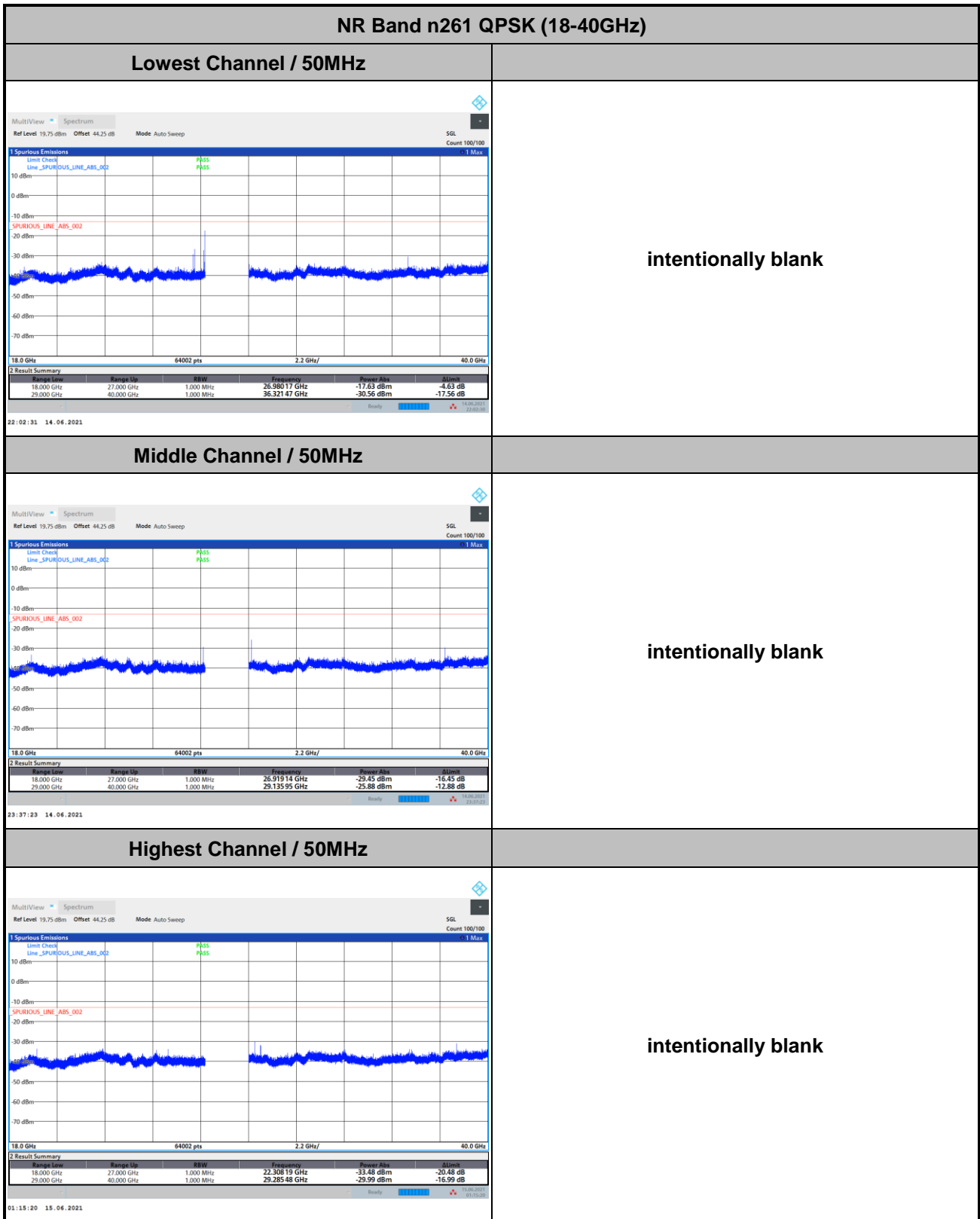
## **Spurious Emission**





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

DFT-s-OFDM Module B



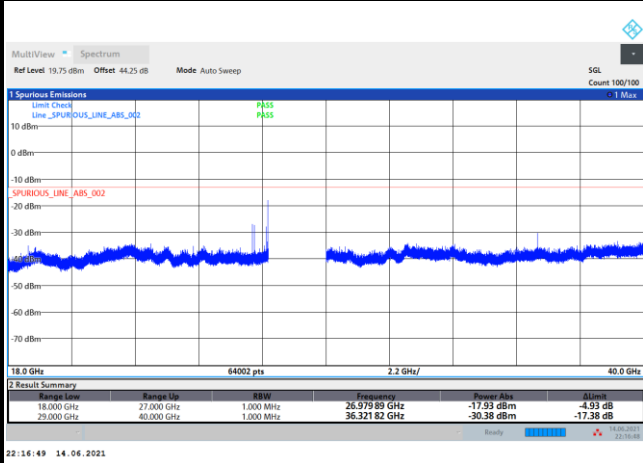
Remark: In band and out of band frequencies that has reported in previous results are omitted.



CP-OFDM Module B

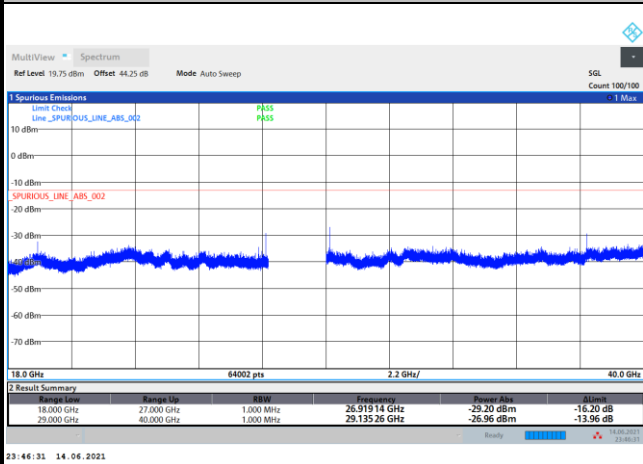
NR Band n261 QPSK (18-40GHz)

Lowest Channel / 50MHz



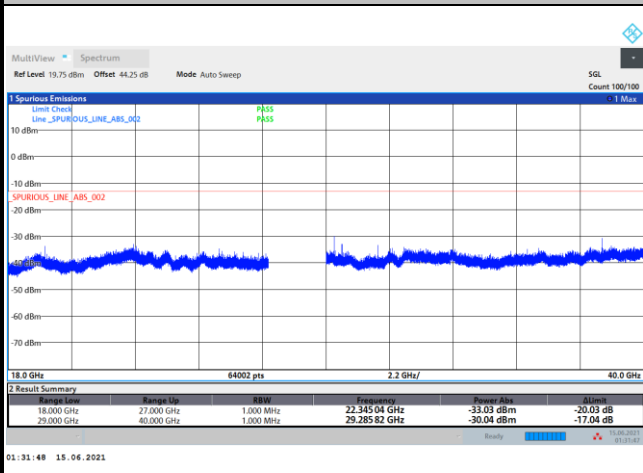
intentionally blank

Middle Channel / 50MHz



intentionally blank

Highest Channel / 50MHz



intentionally blank

Remark: In band and out of band frequencies that has reported in previous results are omitted.



## NR Band n261 Module B Beam H+V

### Occupied Bandwidth

Mode	DFT-s-OFDM Module B NR Band n261 : 99%OBW(MHz)		
BW	50MHz		
Mod.	QPSK	16QAM	64QAM
Lowest CH	46.19	46.26	46.15
Middle CH	46.22	46.38	46.31
Highest CH	46.09	46.23	46.17

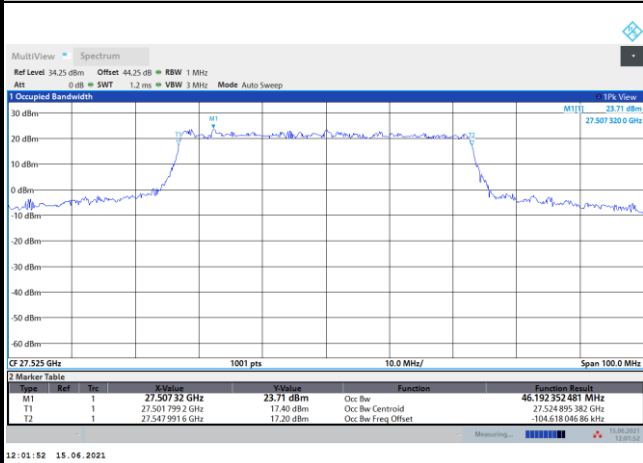
Mode	CP-OFDM Module B NR Band n261 : 99%OBW(MHz)
BW	50MHz
Mod.	QPSK
Lowest CH	47.65
Middle CH	46.90
Highest CH	46.49



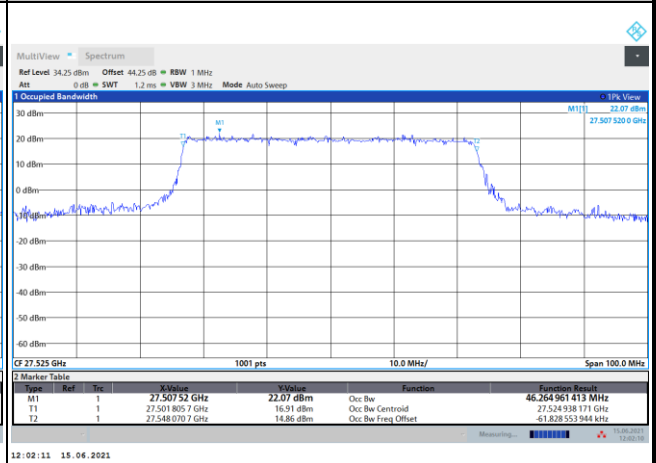
DFT-s-OFDM Module B

NR Band n261

Lowest Channel / 50MHz / QPSK



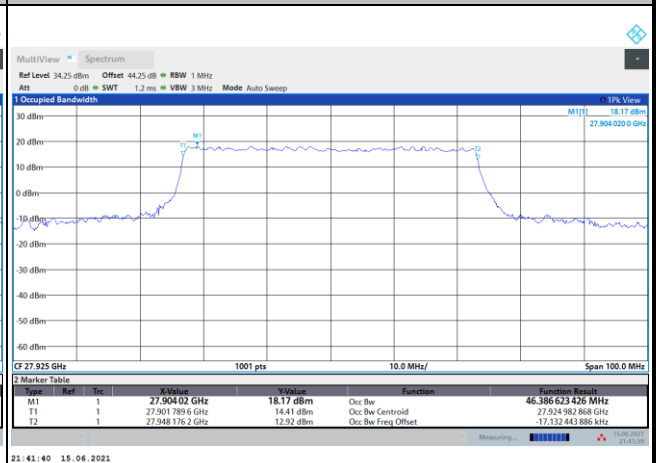
Lowest Channel / 50MHz / 16QAM



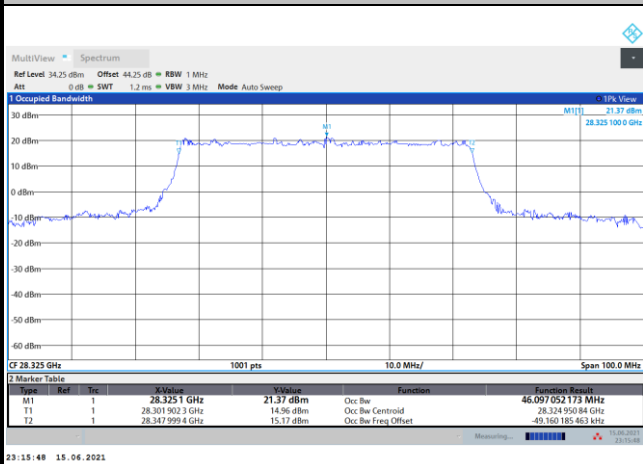
Middle Channel / 50MHz / QPSK



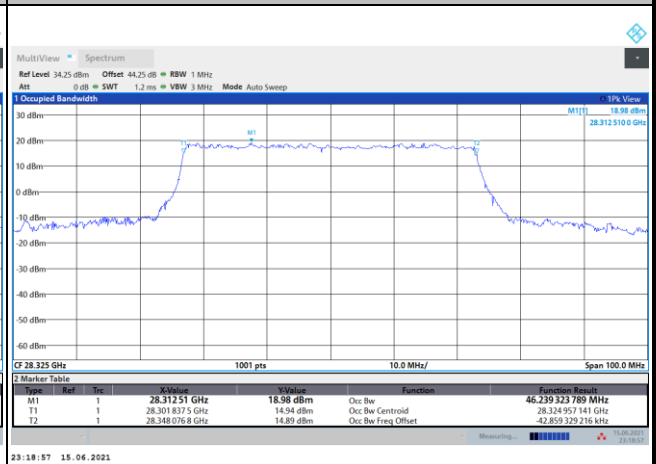
Middle Channel / 50MHz / 16QAM



Highest Channel / 50MHz / QPSK



Highest Channel / 50MHz / 16QAM

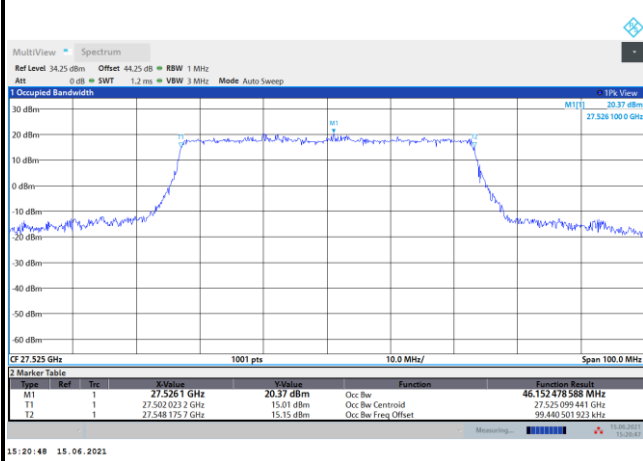




DFT-s-OFDM Module B

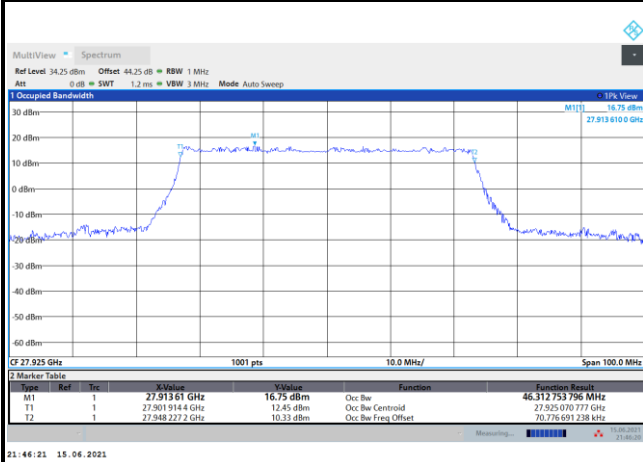
NR Band n261

Lowest Channel / 50MHz / 64QAM



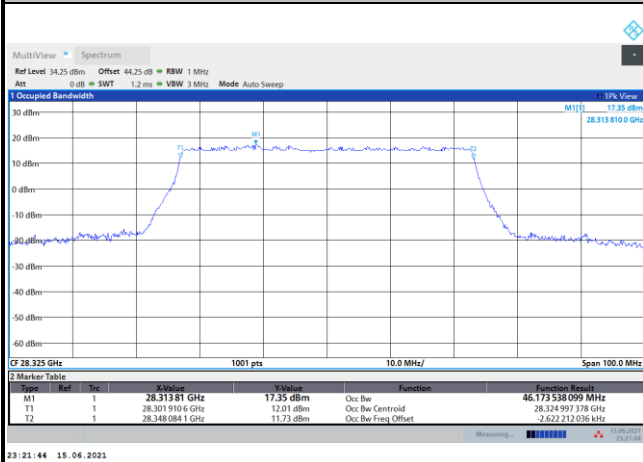
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Middle Channel / 50MHz / 64QAM



intentionally blank

Highest Channel / 50MHz / 64QAM



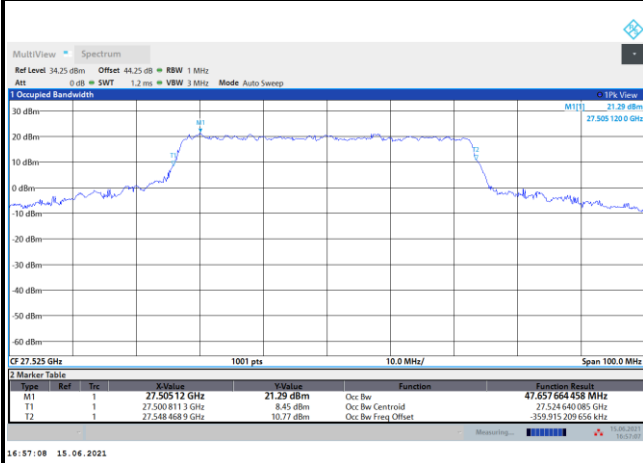
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CP-OFDM Module B

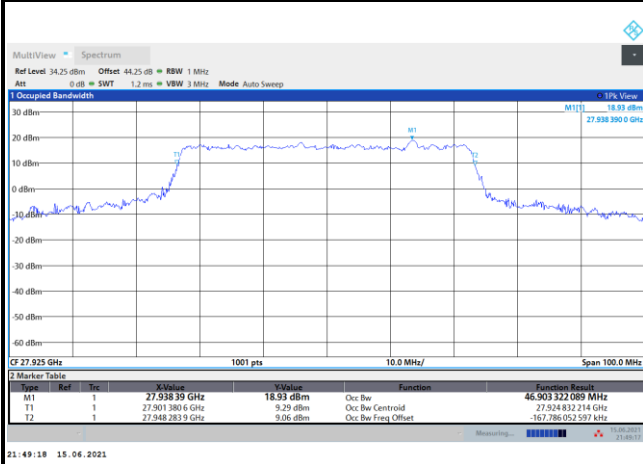
NR Band n261

Lowest Channel / 50MHz / QPSK



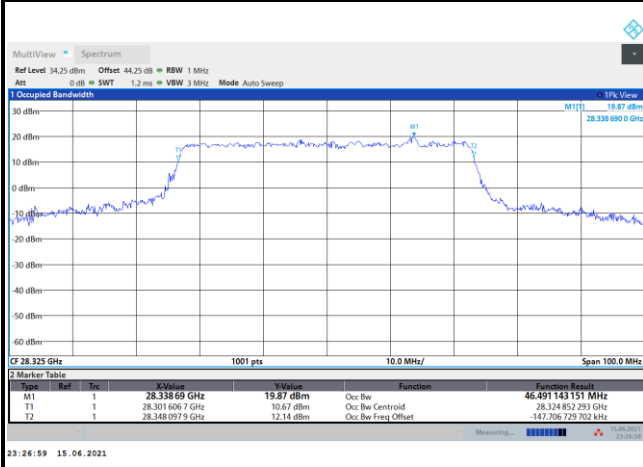
intentionally blank

Middle Channel / 50MHz / QPSK



intentionally blank

Highest Channel / 50MHz / QPSK



intentionally blank

## Radiated Out of Band Emissions

Mode			DFT-s-OFDM Module B NR Band n261 : BE (dBm) 1 RB		
BW			50MHz		
Limit (dBm)			QPSK	16QAM	64QAM
Low CH	0~10%OB	$\leq -5$	-14.63	-14.75	-18.42
	>10%OB	$\leq -13$	-21.53	-22.72	-24.50
High CH	0~10%OB	$\leq -5$	-14.95	-17.52	-6.54
	>10%OB	$\leq -13$	-21.53	-23.60	-19.11
Result			Compliance		

Mode			CP-OFDM Module B NR Band n261 : BE (dBm) 1 RB		
BW			50MHz		
Limit (dBm)			QPSK		
Low CH	0~10%OB	$\leq -5$	-15.14		
	>10%OB	$\leq -13$	-22.70		
High CH	0~10%OB	$\leq -5$	-18.58		
	>10%OB	$\leq -13$	-23.49		
Result			Compliance		

Mode			DFT-s-OFDM Module B NR Band n261 : BE (dBm) Full RB		
BW			50MHz		
Limit (dBm)			QPSK	16QAM	64QAM
Low CH	0~10%OB	$\leq -5$	-19.85	-12.04	-14.84
	>10%OB	$\leq -13$	-19.86	-14.96	-21.65
High CH	0~10%OB	$\leq -5$	-11.58	-14.60	-17.10
	>10%OB	$\leq -13$	-17.32	-20.58	-27.08
Result			Compliance		

Mode			CP-OFDM Module B NR Band n261 : BE (dBm) Full RB		
BW			50MHz		
Limit (dBm)			QPSK		
Low CH	0~10%OB	$\leq -5$	-21.20		
	>10%OB	$\leq -13$	-21.08		
High CH	0~10%OB	$\leq -5$	-13.49		
	>10%OB	$\leq -13$	-17.91		
Result			Compliance		

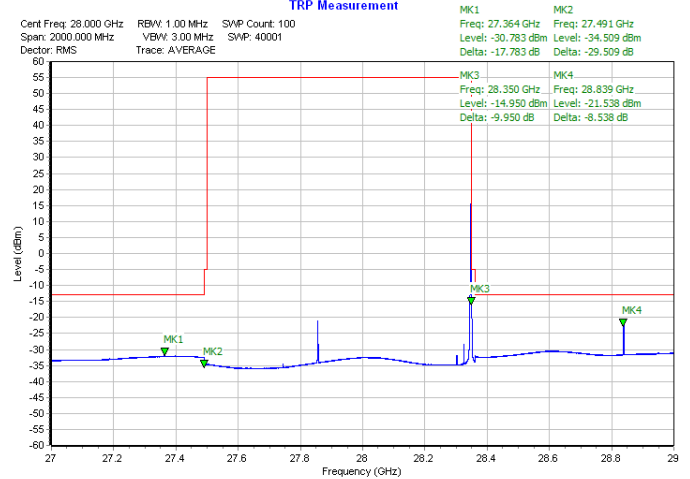
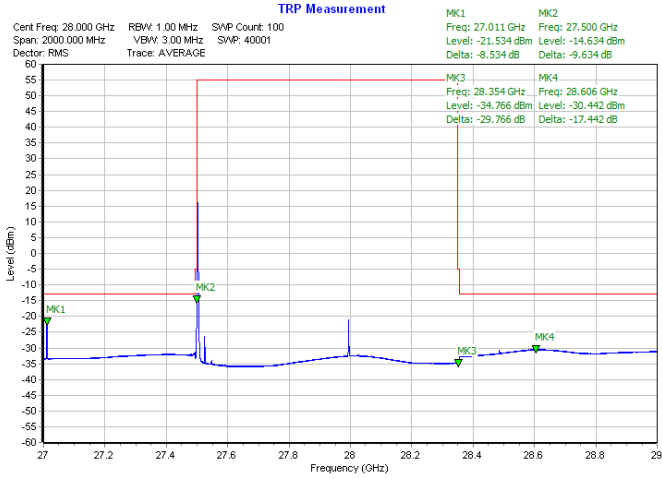


DFT-s-OFDM Module B

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / 1 RB

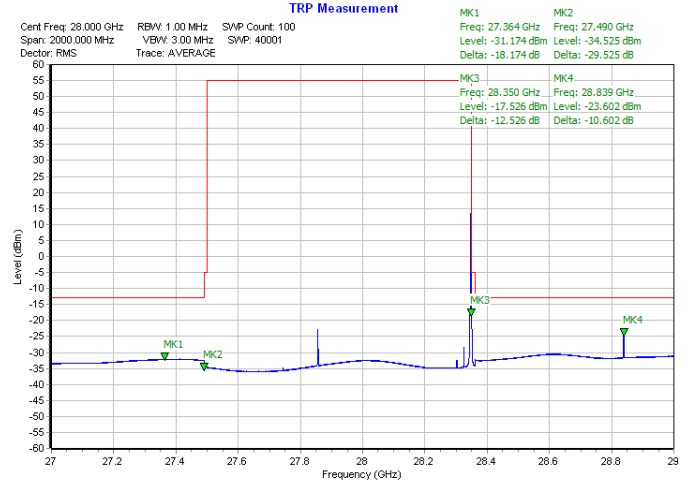
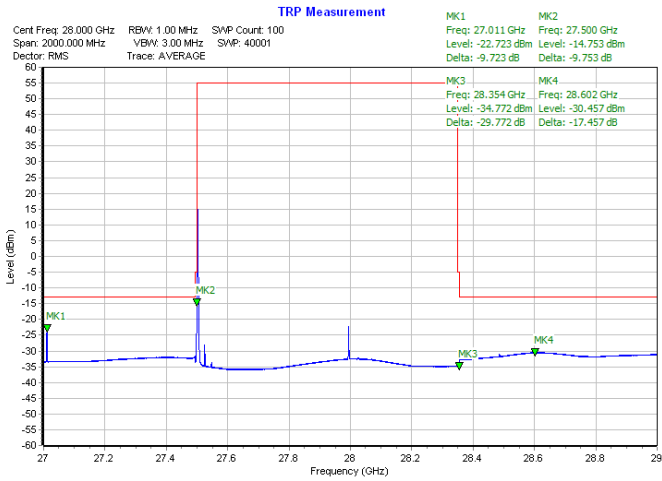
Highest Band Edge / 1 RB



NR Band n261 / 50MHz / 16QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB





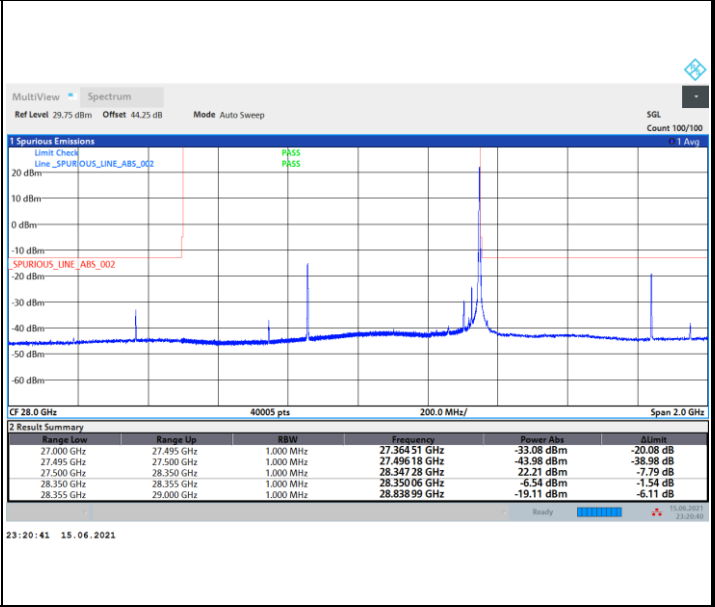
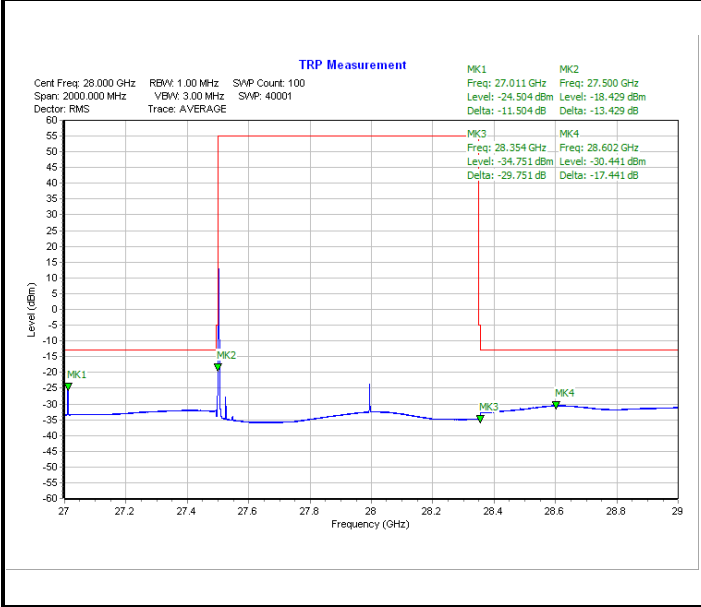


DFT-s-OFDM Module B

NR Band n261 / 50MHz / 64QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB

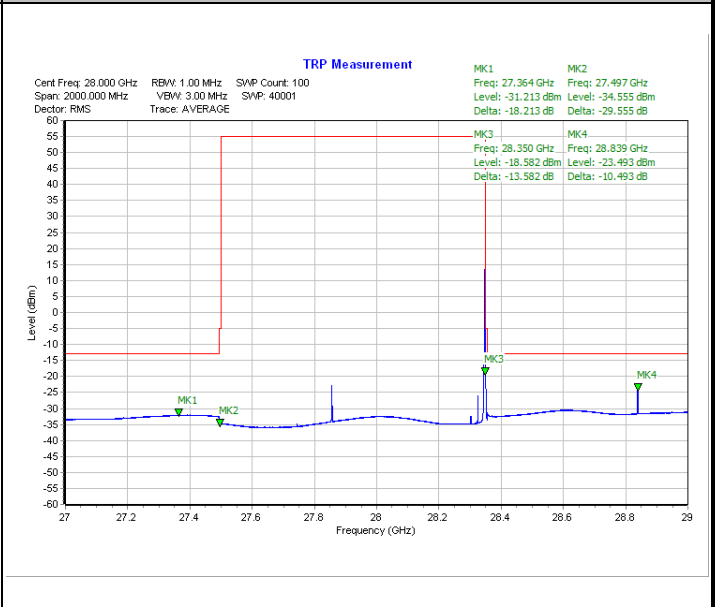
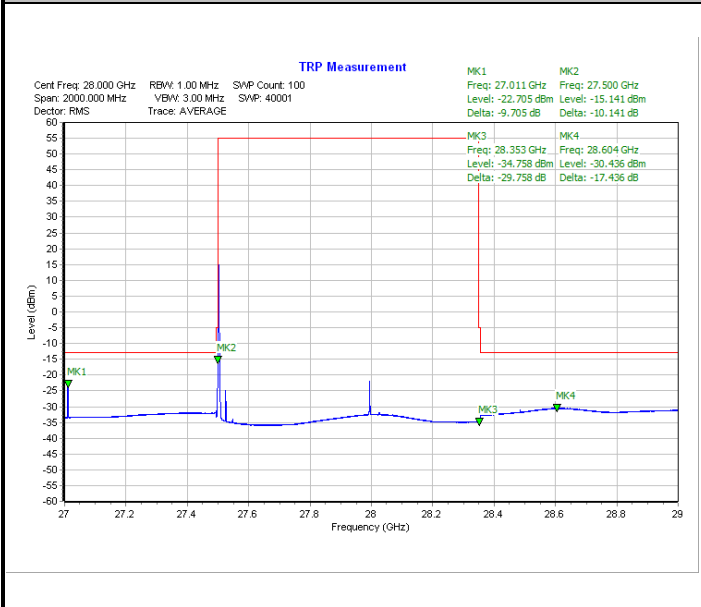


CP-OFDM Module B

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



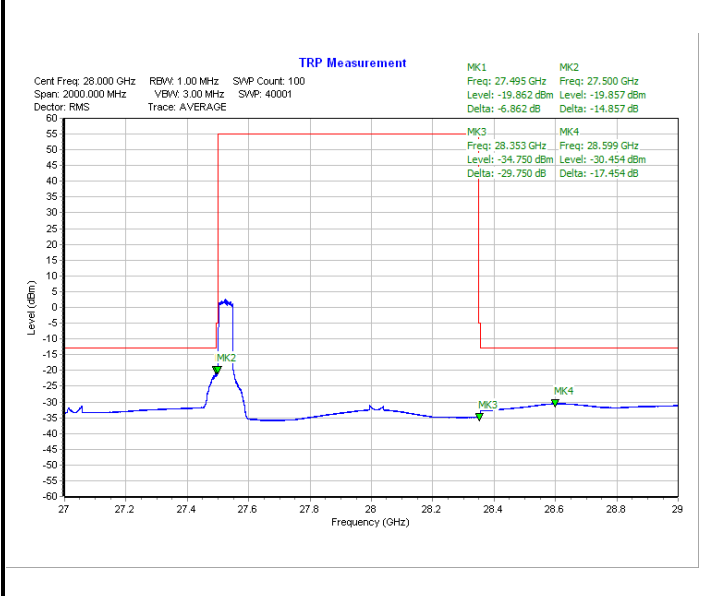


DFT-s-OFDM Module B

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / Full RB

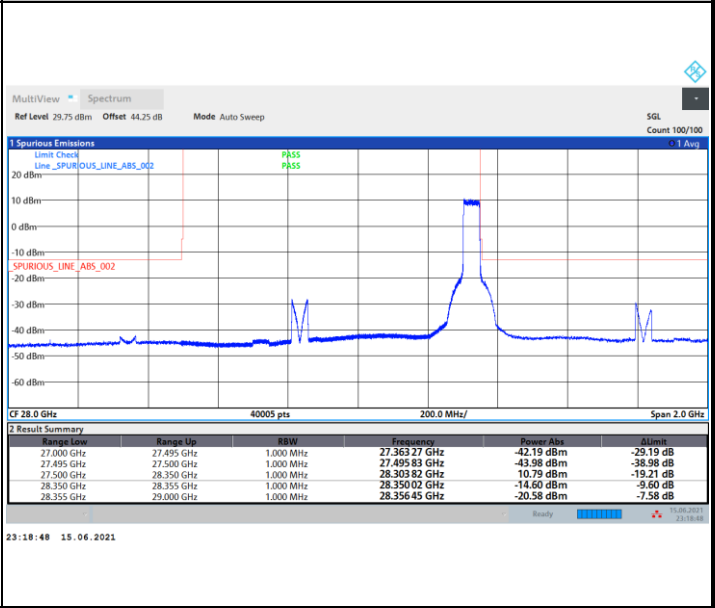
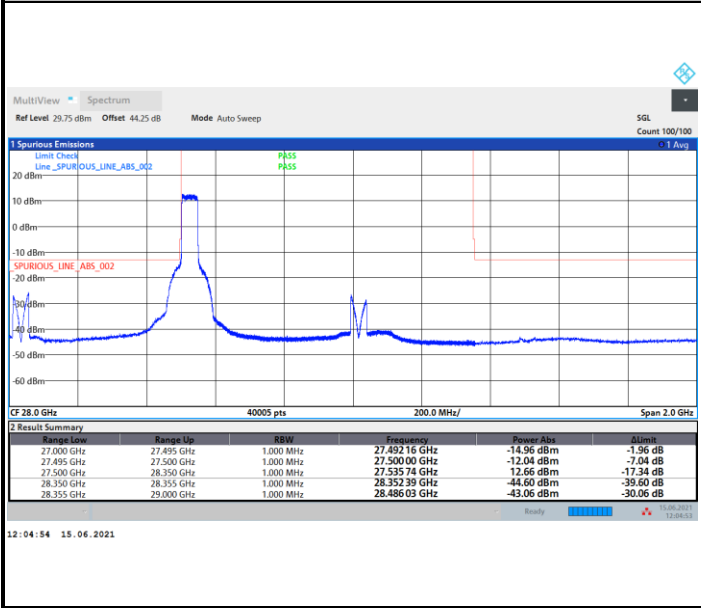
Highest Band Edge / Full RB



NR Band n261 / 50MHz / 16QAM

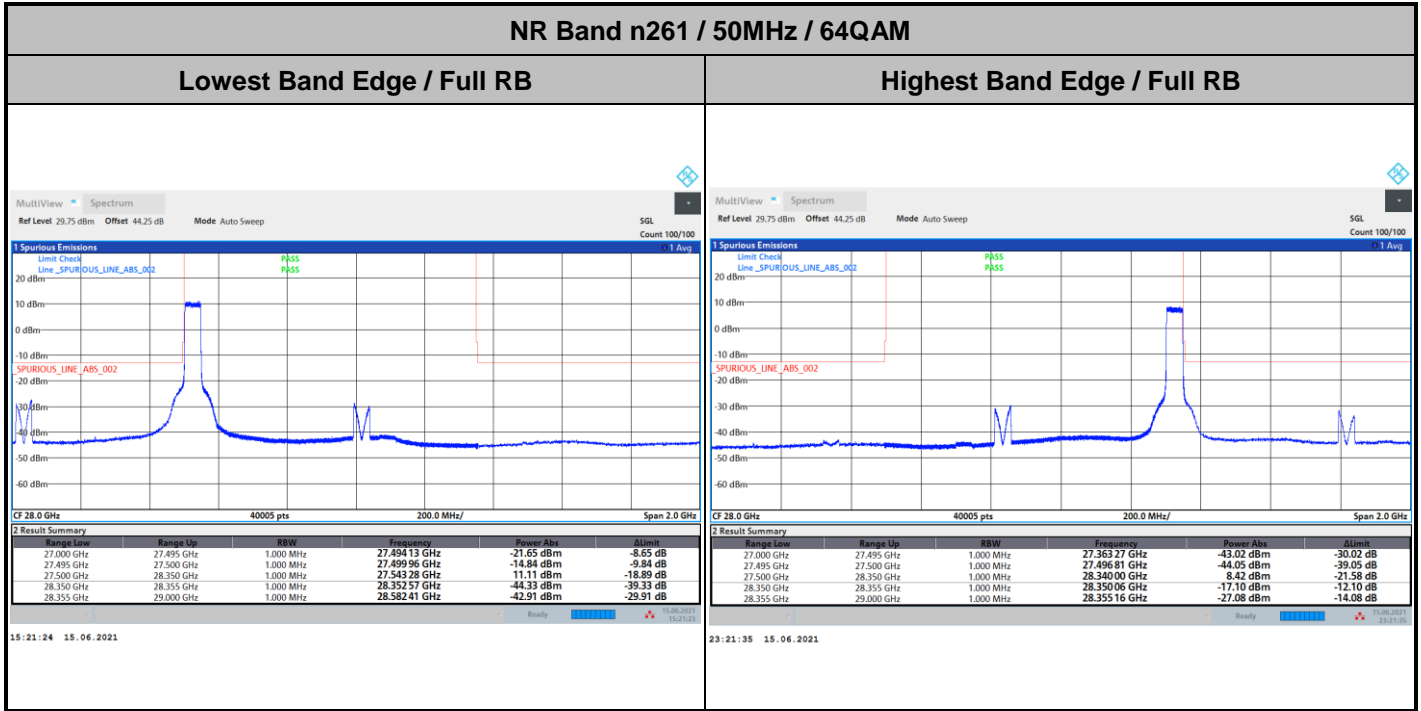
Lowest Band Edge / Full RB

Highest Band Edge / Full RB

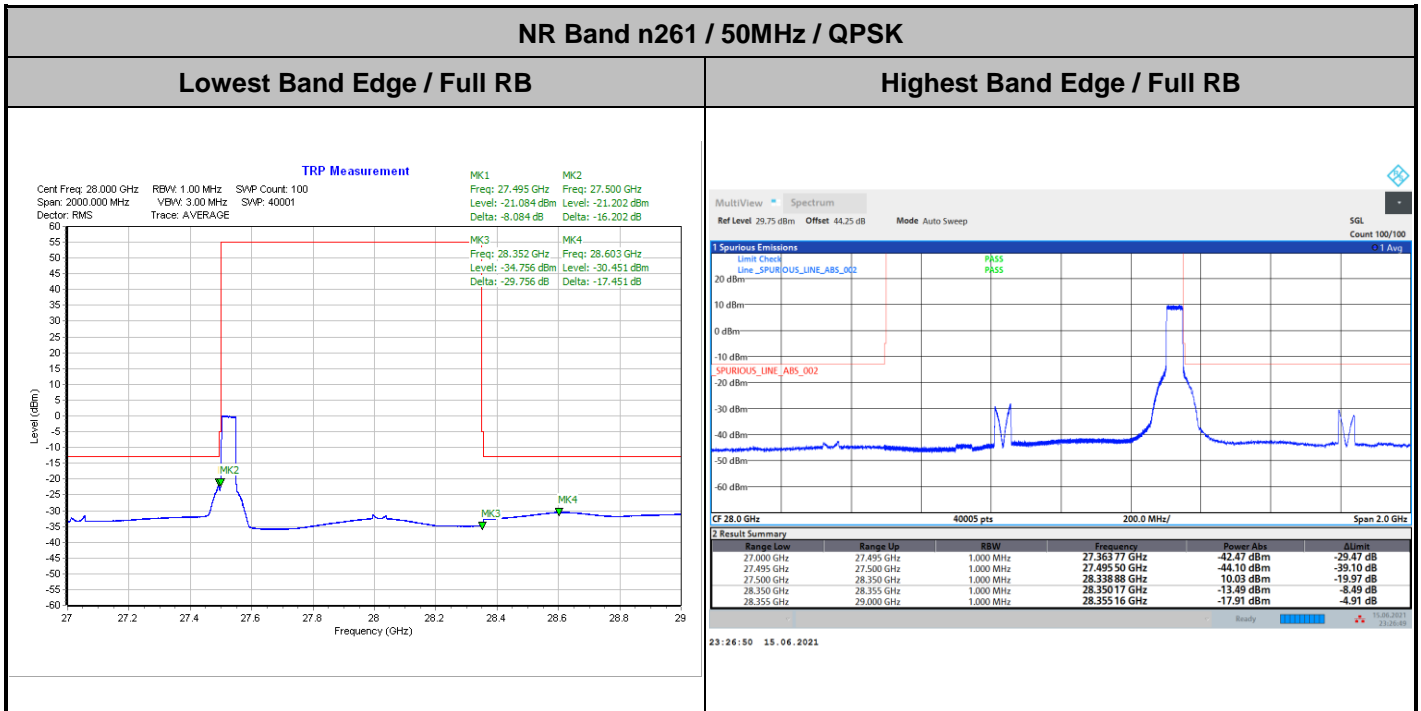




DFT-s-OFDM Module B



CP-OFDM Module B



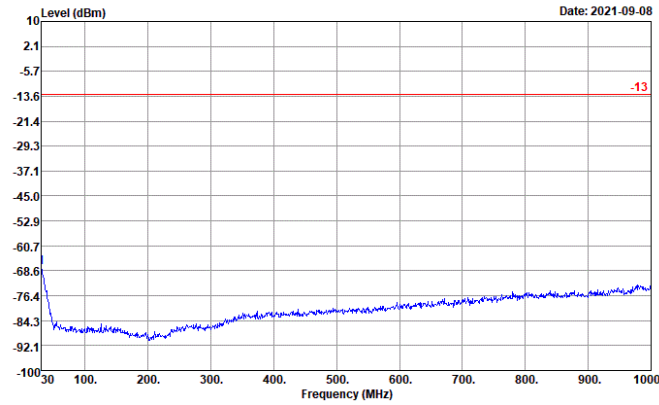


# Spurious Emission

There is no significant spurious emission signal found for frequency started from 30MHz up to 18GHz.

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

### Horizontal

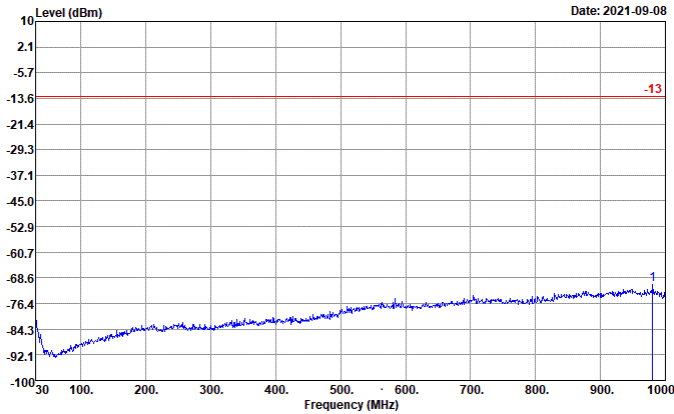


Site : 03CH19-HY  
 Condition : -13 ERP EIRP\_20210305 HORIZONTAL

: n261

Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark	
MHz	dBm	dB	dBm	dBm	dB	dB	dB	cm	deg		
1	30.00	-67.55	-54.55	-13.00	-79.26	47.44	0.00	35.73	---	---	Peak

### Vertical



Site : 03CH19-HY  
 Condition : -13 ERP EIRP\_20210305 VERTICAL

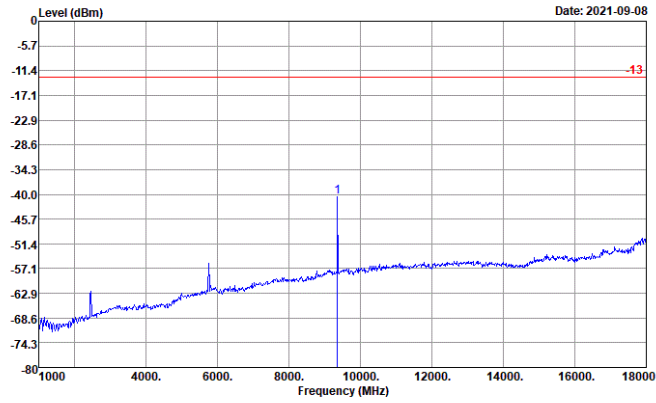
: n261

Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark	
MHz	dBm	dB	dBm	dBm	dB	dB	dB	cm	deg		
1	980.60	-70.58	-57.58	-13.00	-80.01	42.47	0.00	33.04	---	---	Peak



NR Band n261 (1GHz-18GHz)

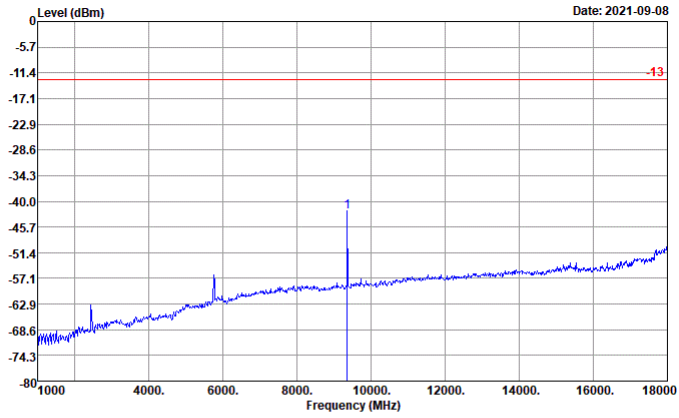
Horizontal



Site : 03CH19-HY  
 Condition : -13 ERP EIRP\_20210305 HORIZONTAL

: n261											
1	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBm	dB	dBm	dBm	dB	dB	dB	cm	deg	
1	9364.00	-40.55	-27.55	-13.00	-66.88	67.65	0.00	41.32	---	---	Peak

Vertical



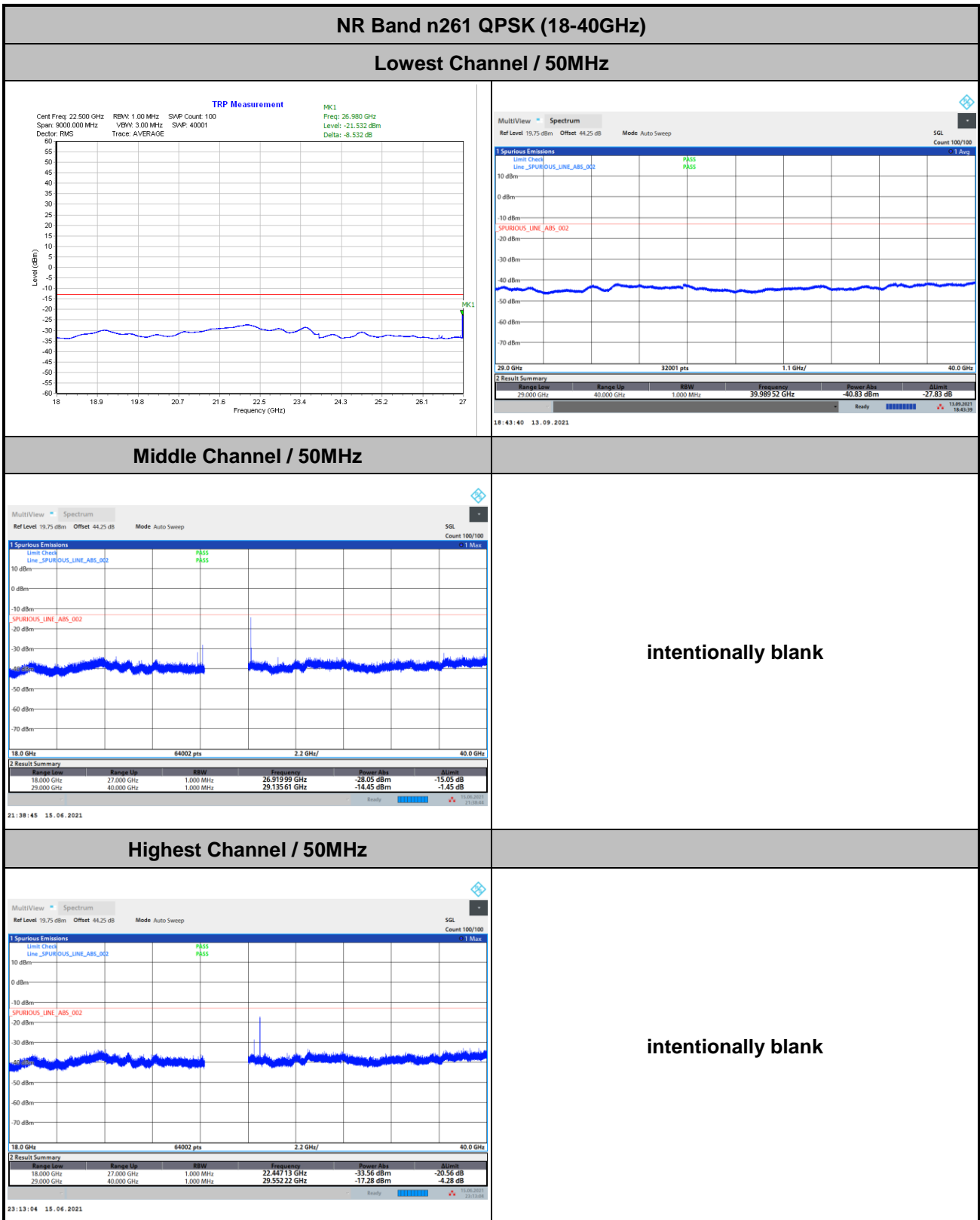
Site : 03CH19-HY  
 Condition : -13 ERP EIRP\_20210305 VERTICAL

: n261											
1	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBm	dB	dBm	dBm	dB	dB	dB	cm	deg	
1	9364.00	-42.33	-29.33	-13.00	-67.72	66.71	0.00	41.32	---	---	Peak



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

DFT-s-OFDM Module B



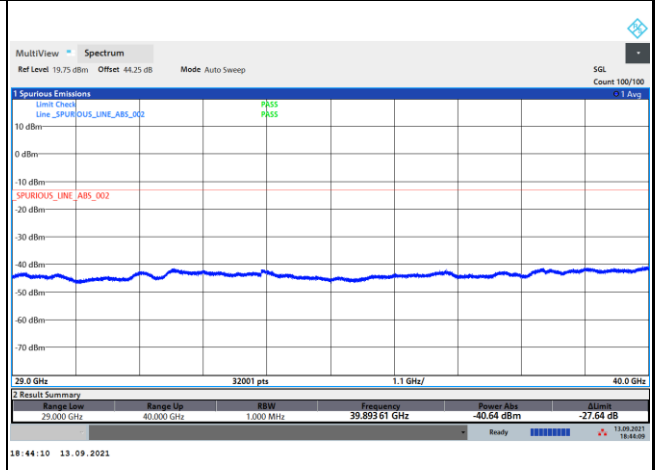
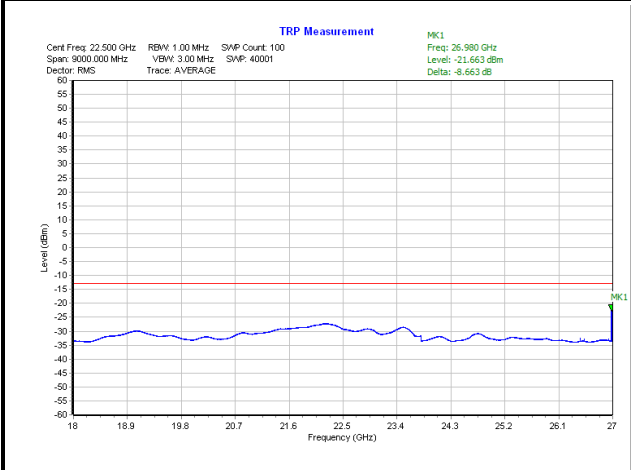
Remark: In band and out of band frequencies that has reported in previous results are omitted.



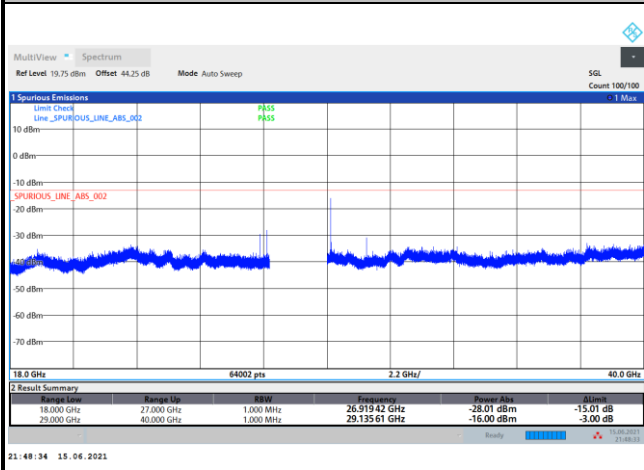
CP-OFDM Module B

NR Band n261 QPSK (18-40GHz)

Lowest Channel / 50MHz

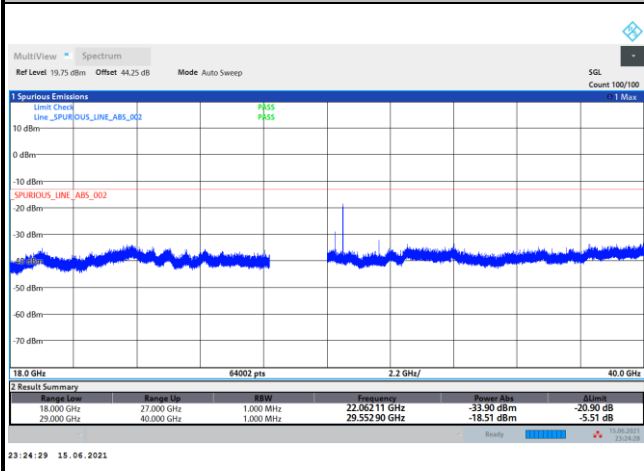


Middle Channel / 50MHz



intentionally blank

Highest Channel / 50MHz

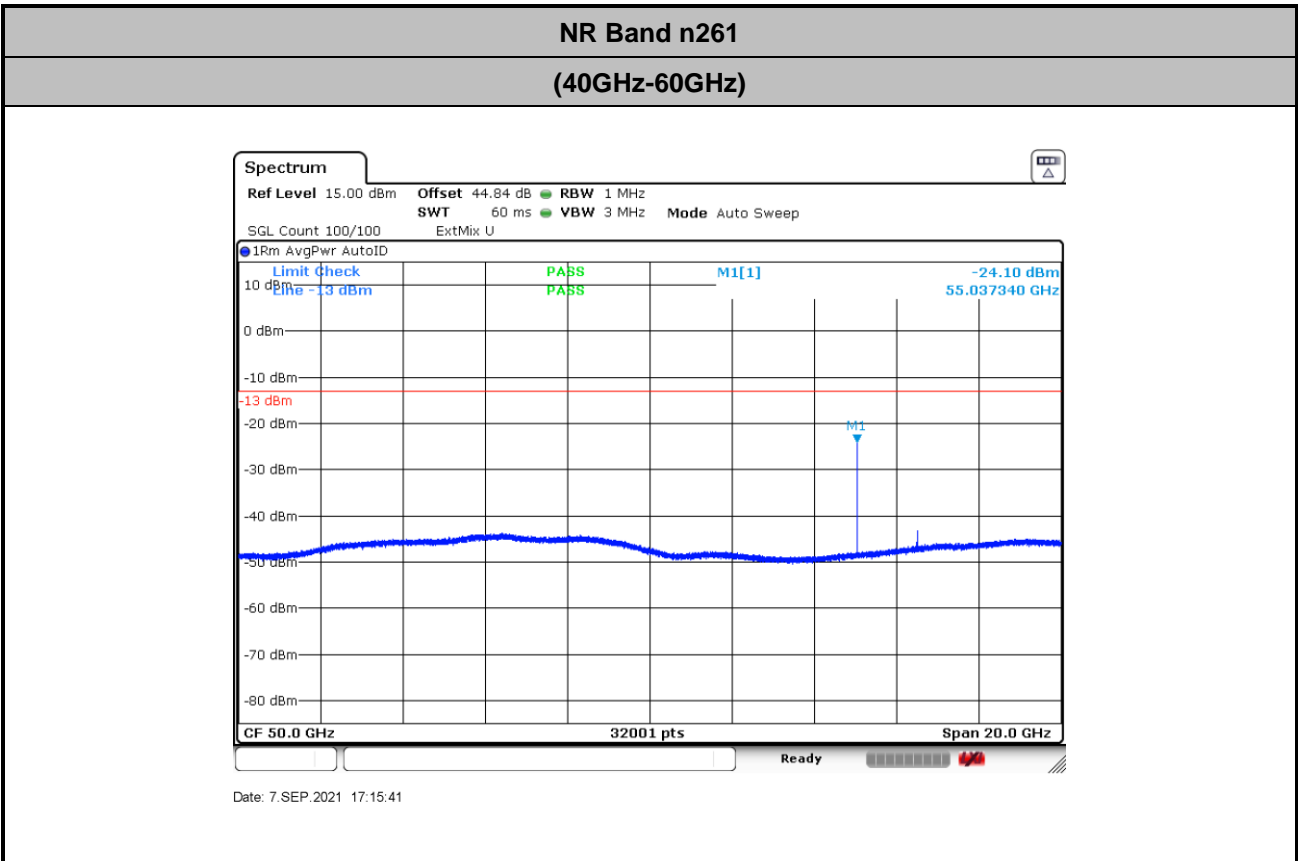


intentionally blank

Remark: In band and out of band frequencies that has reported in previous results are omitted.



There is no significant spurious emission signal found for frequency started from 40GHz up to 100GHz.



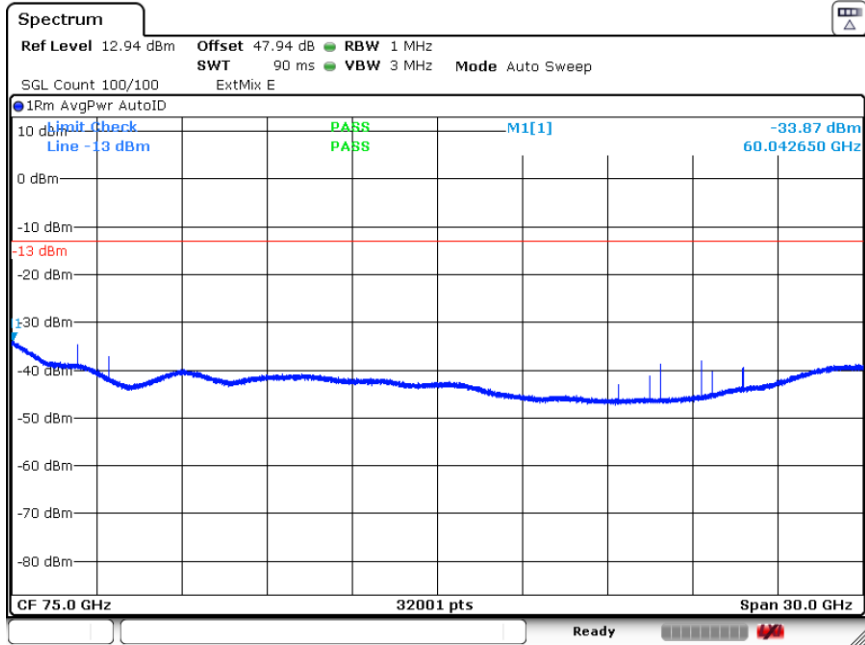
Note:  $Offset = Antenna\ Factor\ (dB/m) + Cable\ Loss\ (dB) + 107 + 20\log(D) - 104.8$   
 $= 42.3 + 0.34 + 107 + 20\log(1) - 104.8 = 44.84\ (dB)$





NR Band n261

(60GHz-90GHz)



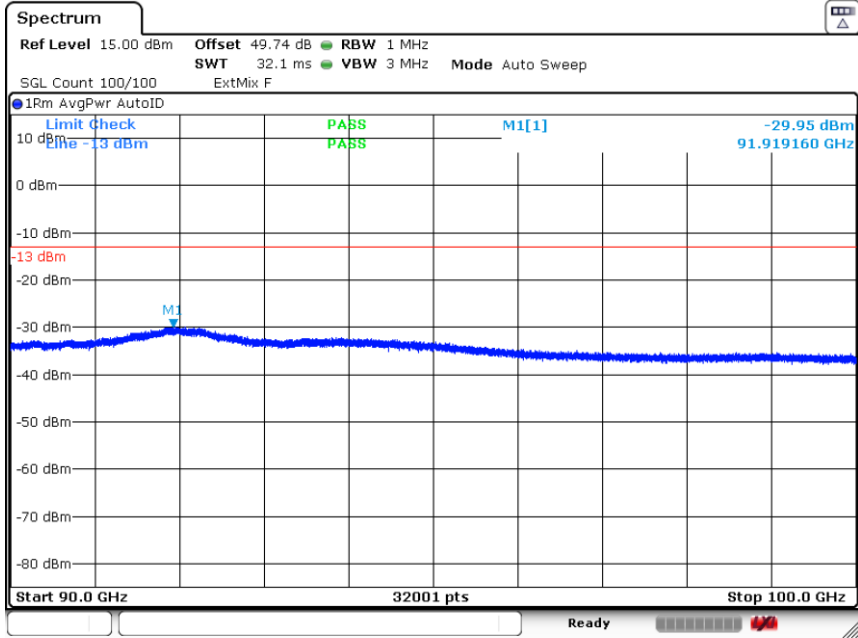
Date: 7.SEP.2021 17:09:51

Note:  $Offset = Antenna\ Factor\ (dB/m) + Cable\ Loss\ (dB) + 107 + 20\log(D) - 104.8$   
 $= 45.4 + 0.34 + 107 + 20\log(1) - 104.8 = 47.94\ (dB)$



NR Band n261

(90GHz-100GHz)



Date: 7.SEP.2021 16:44:35

Note:  $Offset = Antenna\ Factor\ (dB/m) + Cable\ Loss\ (dB) + 107 + 20\log(D) - 104.8$   
 $= 47.2 + 0.34 + 107 + 20\log(1) - 104.8 = 49.74\ (dB)$



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	27.925006	6.000	0.215	Pass
40	Normal Voltage	27.925006	6.000	0.215	
30	Normal Voltage	27.925007	5.000	0.179	
20(Ref.)	Normal Voltage	27.925012	0.000	0.000	
10	Normal Voltage	27.925035	-23.000	0.824	
0	Normal Voltage	27.925017	-5.000	0.179	
-10	Normal Voltage	27.925035	-23.000	0.824	
-20	Normal Voltage	27.925016	-4.000	0.143	
-30	Normal Voltage	27.925011	1.000	0.036	
20	Maximum Voltage	27.925012	0.000	0.000	
20	Normal Voltage	27.925006	6.000	0.215	
20	Battery End Point	27.925009	3.000	0.107	

Note:

1. Normal Voltage = 3.86V. ; Battery End Point (BEP) = 3.6 V. ; Maximum Voltage =4.45 V
2. The frequency fundamental emissions stay within the operation band.

————THE END————



## **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

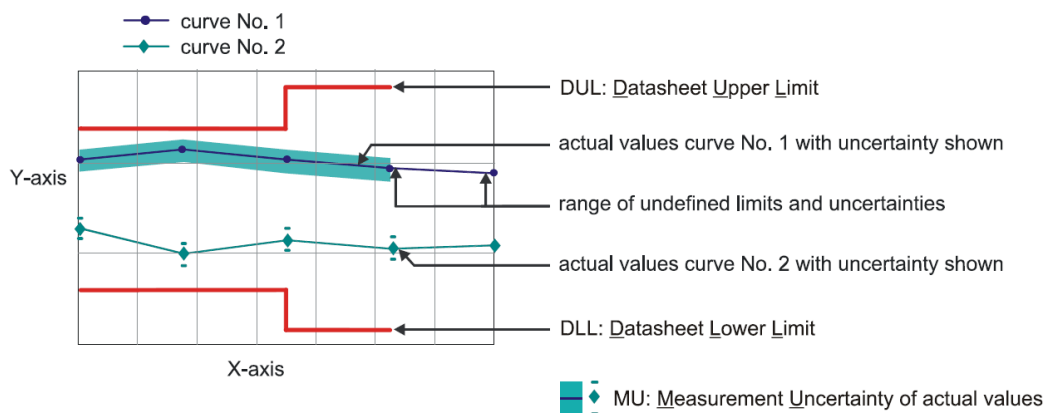
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is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

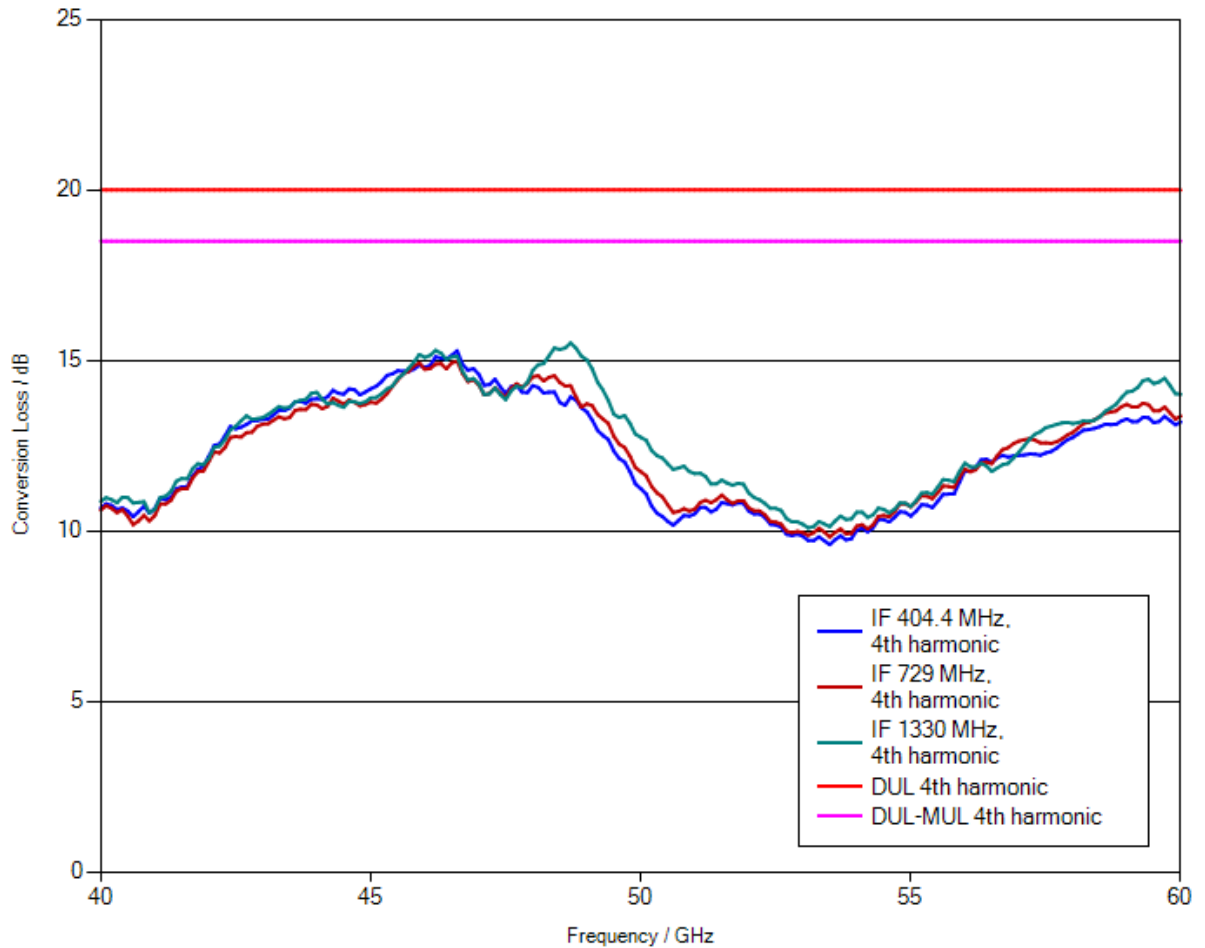
**Remark**



### 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  
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 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

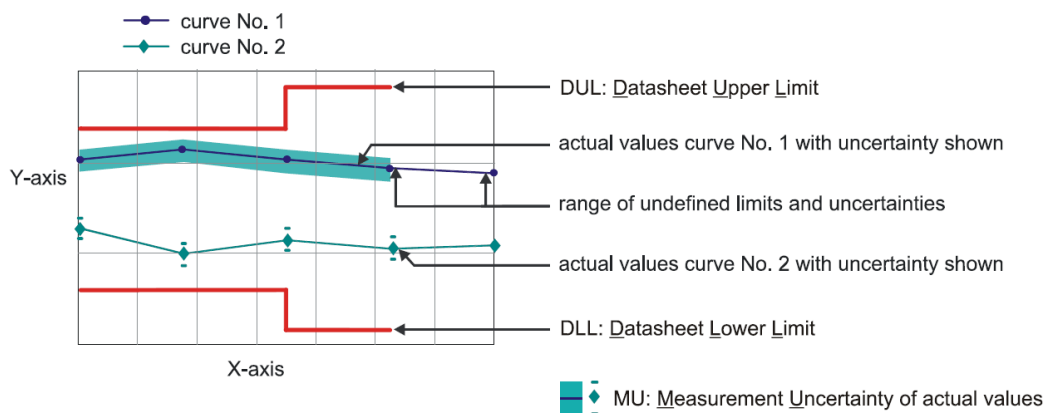
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is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

# 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

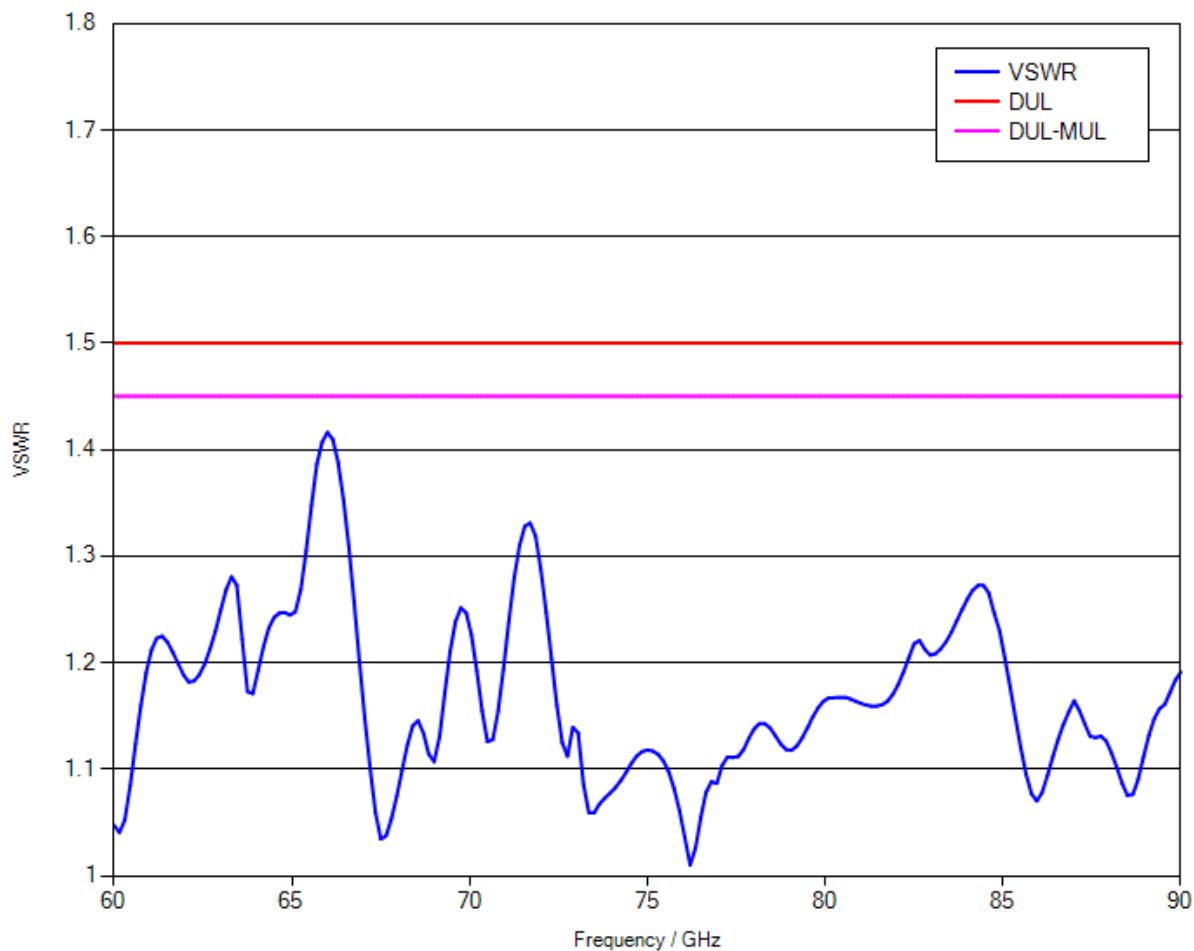
**Version**

2013  
7\_09

**Remark**

### 1.1 RF Input – VSWR

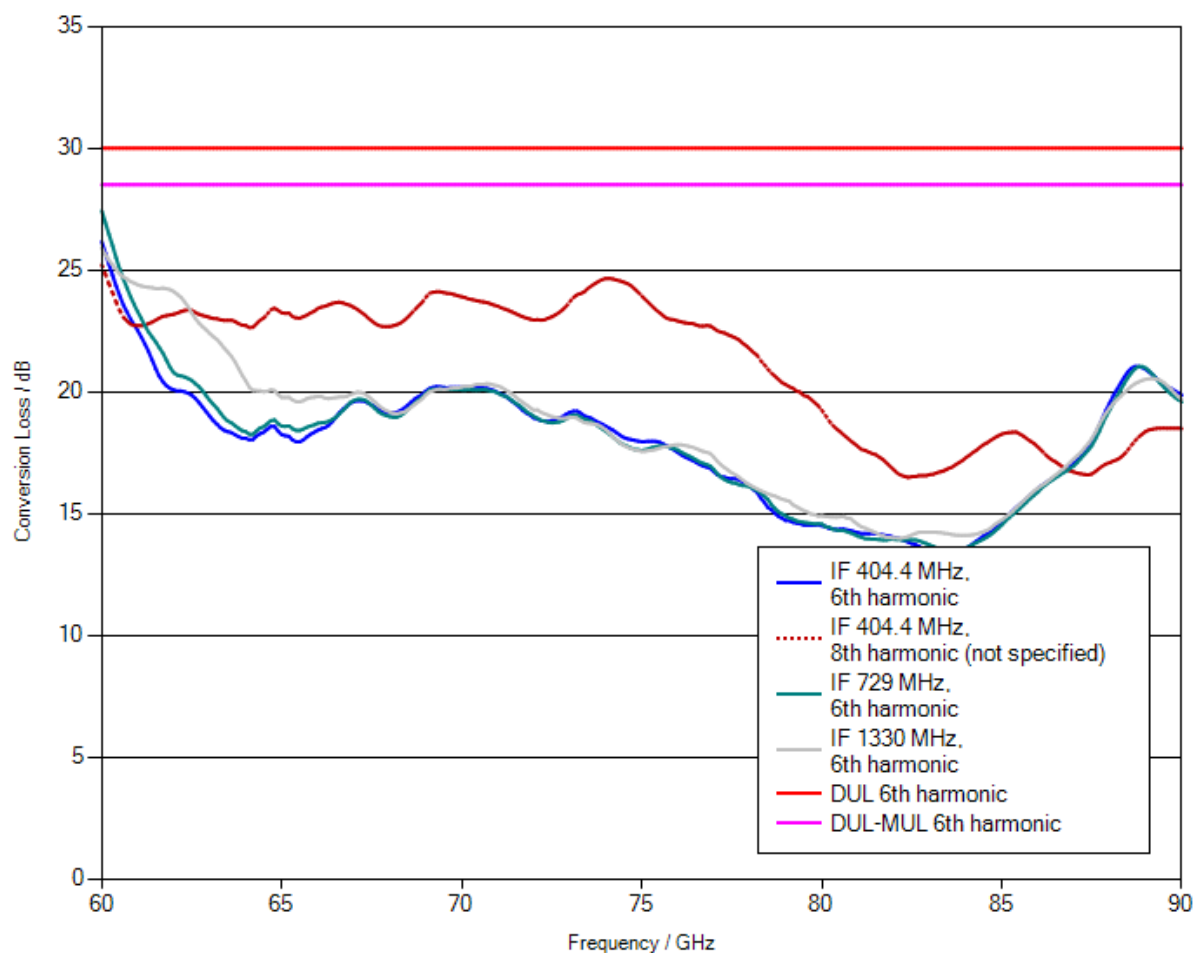
Measurement uncertainty: 0.05 (VSWR)



## 1.2 Conversion loss

LO level +14 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.



### 1.3 Frequency response within 1 GHz

	DUL	Actual (worst case)	Evaluation
IF = 404.4 MHz, 6th harmonic	6 dB	3.42 dB	PASS
IF = 404.4 MHz, 8th harmonic	not specified	2.49 dB	not specified
IF = 729 MHz, 6th harmonic	6 dB	3.85 dB	PASS
IF = 1330 MHz, 6th harmonic	6 dB	2.01 dB	PASS



# Calibration Certificate

**Certificate Number 24-0140-101128-02**

Kalibrierschein

Zertifikatsnummer

## Unit Data

**Item** Harmonic Mixer, 90 GHz to 140 GHz  
Gegenstand

**Manufacturer** RPG Radiometer-Physics GmbH  
Hersteller

**Type** RPG FS-Z140  
Typ

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

**Asset Number**  
Inventarnummer

This calibration certificate documents, that the named item is tested and measured against defined specifications. Measurement results are located usually in the corresponding interval with a probability of approx. 95% (coverage factor  $k = 2$ ). Calibration is performed with test equipment and standards directly or indirectly traceable by means of approved calibration techniques to the PTB/DKD or other national/international standards, which realize the physical units of measurement according to the International System of Units (SI). In all cases where no standards are available, measurements are referenced to standards of the R&S laboratories. Principles and methods of calibration correspond with EN ISO/IEC 17025. This calibration certificate may not be reproduced other than in full. Calibration certificates without signatures are not valid. The user is obliged to have the object recalibrated at appropriate intervals.

## Order Data

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

**Order Number** 8800003072  
Bestellnummer

**Date of Receipt** 2020-10-06  
Eingangsdatum

Dieser Kalibrierschein dokumentiert, dass der genannte Gegenstand nach festgelegten Vorgaben geprüft und gemessen wurde. Die Messwerte lagen im Regelfall mit einer Wahrscheinlichkeit von annähernd 95% im zugeordneten Werteintervall (Erweiterte Messunsicherheit mit  $k = 2$ ). Die Kalibrierung erfolgte mit Messmitteln und Normalen, die direkt oder indirekt durch Ableitung mittels anerkannter Kalibriertechniken rückgeführt sind auf Normale der PTB/DKD oder anderer nationaler/internationaler Standards zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Wenn keine Normale existieren, erfolgt die Rückführung auf Bezugsnormale der R&S-Laboratorien. Grundsätze und Verfahren der Kalibrierung beziehen sich auf EN ISO/IEC 17025. Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Kalibrierscheine ohne Unterschriften sind ungültig. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

## Performance

**Place and Date of Calibration**  
Ort und Datum der Kalibrierung

**Meckenheim, 2020-10-26**

**Scope of Calibration**  
Umfang der Kalibrierung

**Standard Calibration**

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

**Defective.**

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

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

**Extend of Calibration Documents**  
Umfang des Kalibrierdokuments

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

## RPG Radiometer-Physics GmbH; Meckenheim

**Date of Issue**  
Ausstellungsdatum

**2020-10-27**

**Head of Laboratory**  
Laborleitung

Schulze

**Person Responsible**  
Bearbeiter

Gottbehüt

**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	140093	509916_D-K-15195-01-01_2019-05	2021-05-22

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

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

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

#### Notes

Anmerkungen

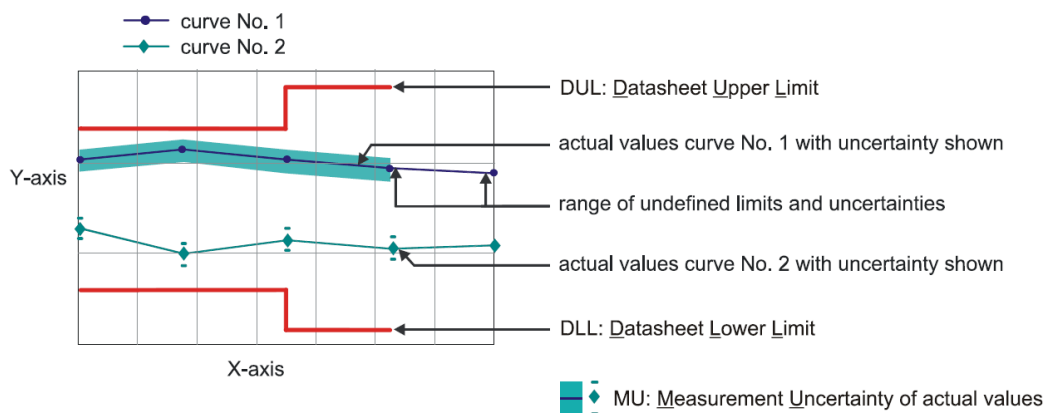
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is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

# Outgoing Results

## The following abbreviations may be used in this document

- {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

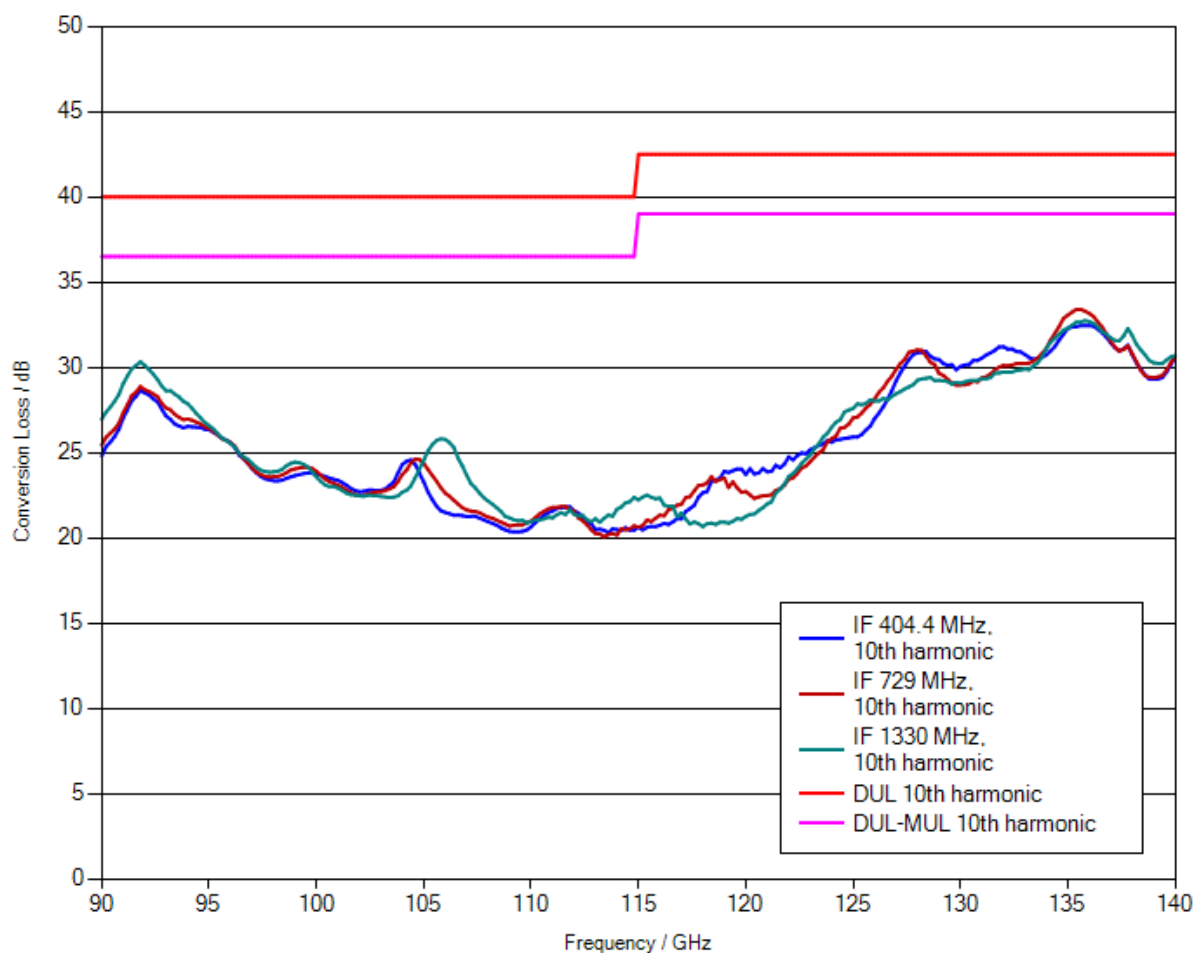


**Software used for measurement****Item Type**Measurement Studio Professional Edition  
MixerCertification**Version**2013  
7\_14**Remark**

## 1.1 Conversion loss

LO level +14 dBm nominal  
Bias 0 A

Measurement uncertainty: 3.5 dB



**Note:** Numeric calibration data can be found attached to the PDF file of the calibration certificate. Click the “paper clip” symbol to display the file.

The file has been renamed for safety reasons.

When downloading the file onto your PC, please delete the “.file” extension and unzip the data.

## 1.2 Frequency response within 1 GHz

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



# Calibration Certificate

**Certificate Number 24-0220-101008-02**

Kalibrierschein

Zertifikatsnummer

## Unit Data

**Item** Harmonic Mixer, 140 GHz to 220 GHz  
Gegenstand

**Manufacturer** RPG Radiometer-Physics GmbH  
Hersteller

**Type** RPG FS-Z220  
Typ

**Material Number** 3593.3250.02    **Serial Number** 101008  
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** 4703008458  
Bestellnummer

**Date of Receipt** 2019-04-03  
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, 2019-04-04**

**Scope of Calibration**  
Umfang der Kalibrierung

**Standard Calibration**

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

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

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

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

**Extend of Calibration Documents**  
Umfang des Kalibrierdokuments

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

## Radiometer Physics GmbH; Meckenheim

**Date of Issue**  
Ausstellungsdatum

**2019-04-04**

**Head of Laboratory**  
Laborleitung

Schulze

**Person Responsible**  
Bearbeiter

Gottbehuet

**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

**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

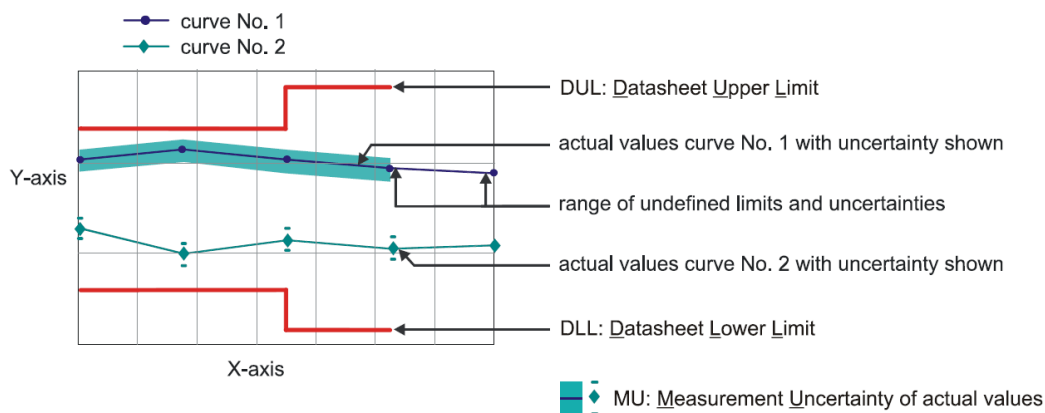
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is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

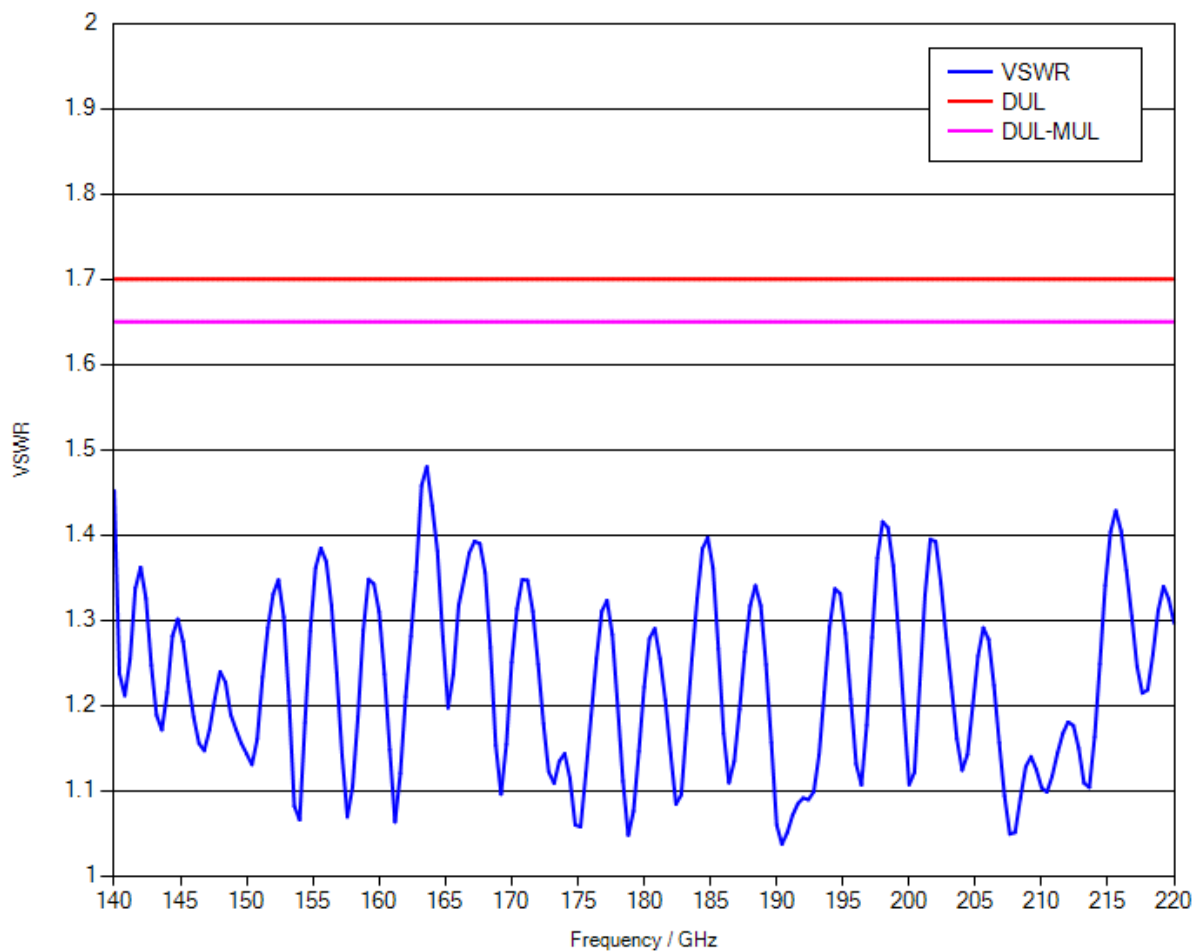
**Version**

2013  
7\_12

**Remark**

### 1.1 RF Input – VSWR

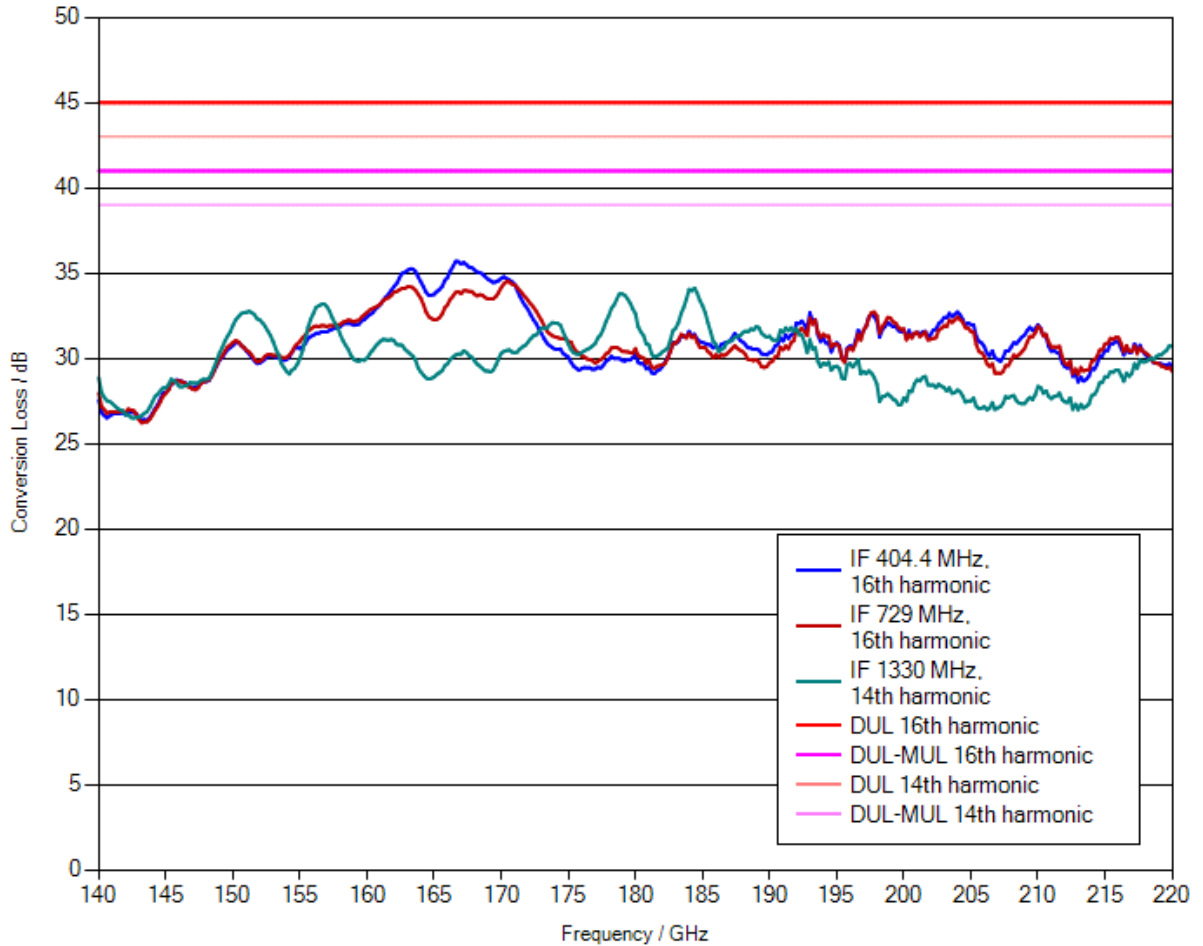
Measurement uncertainty: 0.05 (VSWR)



## 1.2 Conversion loss

LO level +13 dBm nominal  
 Bias 0 A

Measurement uncertainty: 4 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.

### 1.3 Frequency response within 1 GHz

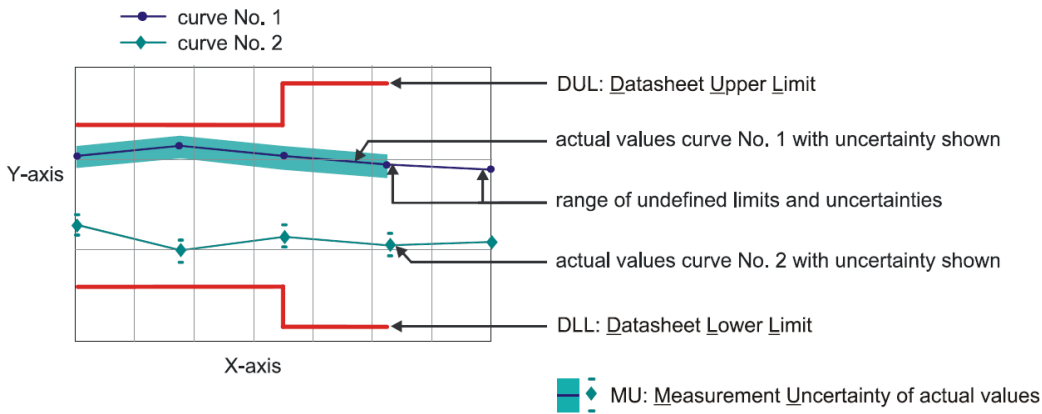
	DUL	Actual (worst case)	Evaluation
IF = 404.4 MHz, 16th harmonic	6 dB	1.83 dB	PASS
IF = 729 MHz, 16th harmonic	6 dB	1.88 dB	PASS
IF = 1330 MHz, 14th harmonic	6 dB	2.64 dB	PASS

# 1 Incoming Results

The following abbreviations may be used in this document

- {a) No measurement uncertainty stated because the errors always add together.  
So it is sure that a measurement result evaluated as "PASS" is pass.
- {b) The measurement uncertainty depends on the measurement result. The stated measurement uncertainty is valid for the close area around the specification. Measurement results outside the close area have a higher measurement uncertainty but are within the specification.
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- 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

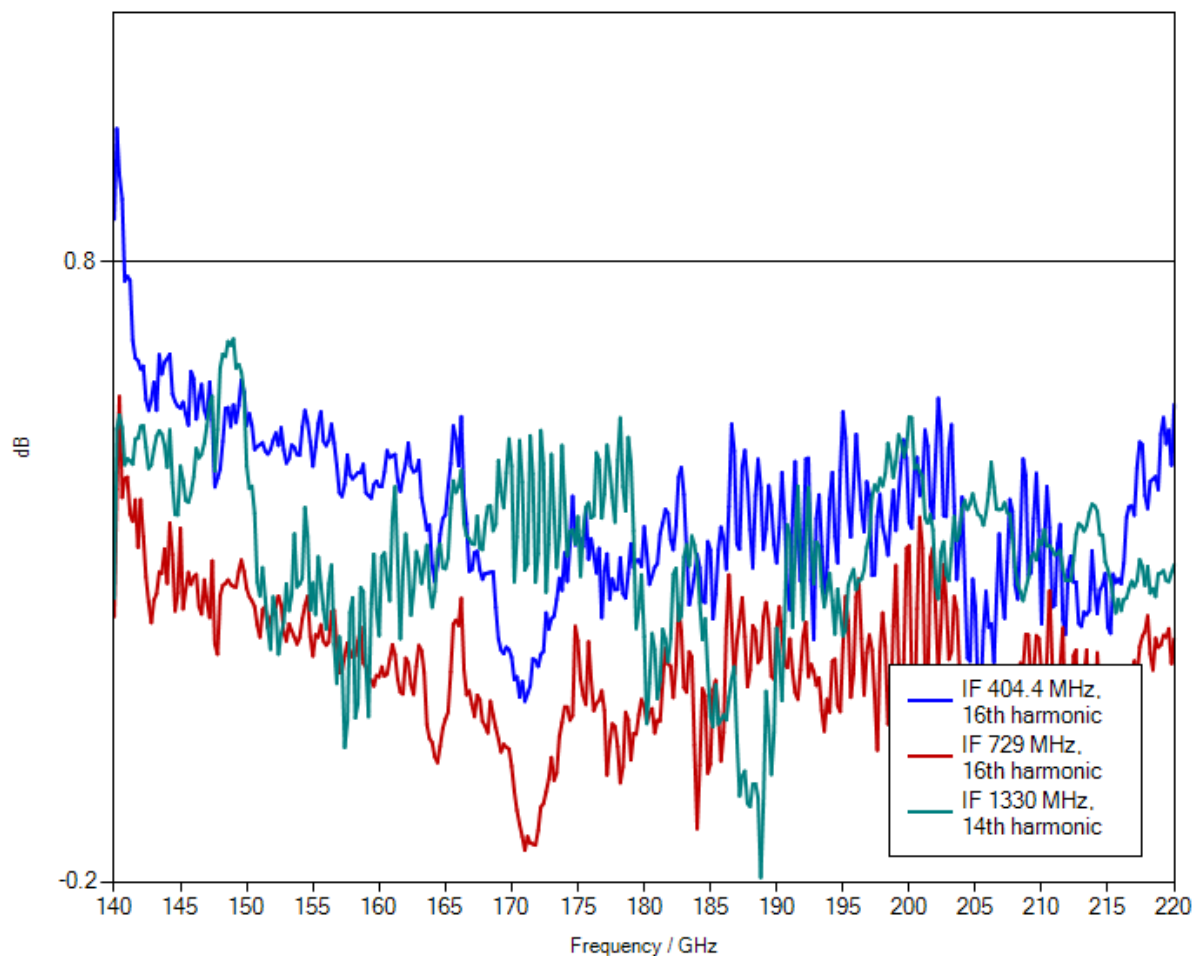


**Software used for measurement**

<b>Item Type</b>	<b>Version</b>	<b>Remark</b>
Measurement Studio Professional Edition	2013	
MixerCertification	7_12	



### 1.1 Deviation between actual and previous conversion loss



Incoming Report



# Calibration certificate

ISO 17025  
ACCREDITED LABORATORY



Accreditation certificate No. № BY/112 02.5.0.0065 of 09.01.2015

Certificate number 25-18 Date when calibrated 08/17/2018 Page 1 of 2

**Item calibrated**

Antenna QWH-UPRR00 # 923600007

Description of measurement standard / measuring instrument / identification

**Customer**

Sporton International Inc.  
No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District,  
TaoYuan City 333, Taiwan, R.O.C.

Name of the customer, address

**Method of calibration**

GOST 20271.1, MK KL 8.2-16

Name of the method / identification

*All measurements are traceable to the SI units which are realized by national measurement standards of NMI and state standards of RF. This certificate shall not be reproduced, except in full. Any publication extracts from the calibration certificate requires written permission of the issuing calibration laboratory of microwave measuring equipment.*

**Authorising signature**



M. Svirid/ Technical manager

Name and position

**Date of issue** 08/17/2018

# Calibration Certificate

Certificate number **25-18**

Page 2 of 2

## Calibration is performed by using

#	Measuring equipment	Serial number
1	Wattmeter M 568	164
2	Wattmeter M 546	163
3	Signal generator G4-186	5
4	Signal generator G4-161	3
5	Voltmeter V7-34	0067787
6	Frequency meter RCH3-72	931200
7	Horn antenna P6-133	15005

## Calibration conditions

Temperature: 22.5 °C.

Humidity: 44.0 %.

Pressure: 99.9 kPa.

## Calibration results are given in the Measuring report # 25-18.

#	Parameter	Specifications required	Specifications tested and measured
1	Frequency range	40 – 60 GHz	Corresponds (Table 1)
2	Waveguide Interface	WR-19	Corresponds
3	Antenna Gain	24 dB	Corresponds (Table 1)
4	Antenna Factor	42 dB/m	Corresponds (Table 1)

**Signature of the person who has performed calibration**

  
M. Kasperovich/ Engineer  
Name and function

**Calibration Laboratory of  
Microwave Measuring Equipment**

Accreditation certificate

No. BY/112 02.5.0.0065

Address: 6, P. Brovki str., Minsk  
220027, Belarus

Phone/Fax: +375 17 2938496



Technical Manager

\_\_\_\_\_ M. Svirid

August 17, 2018

**MEASURING REPORT # 25-18**

August 17, 2018

Customer:	Sporton International Inc. No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.
Item calibrated:	<b>Antenna QWH-UPRR00 # 923600007</b>
Method of calibration:	GOST 20271.1, MK KL 8.2-16
Number of samples:	One
Delivery date of the sample:	07/20/2018
Date of calibration:	From 07/23/2018 to 08/17/2018

## MEASURING CONDITIONS

Temperature: 22.5 °C	Humidity: 44 %	Pressure: 99.9 kPa
----------------------	----------------	--------------------

## MEASURING EQUIPMENT

#	Measuring equipment	Serial number
1	Wattmeter M 568	164
2	Wattmeter M 546	163
3	Signal generator G4-186	5
4	Signal generator G4-161	3
5	Voltmeter V7-34	0067787
6	Frequency meter RCH3-72	931200
7	Horn antenna P6-133	15005

## MEASURING RESULTS

Distance between the testing and generating antennas was 2 m.

Table 1

Frequency, GHz	40	50	60
Input power, mW	10.0	10.0	10.0
Power density of electromagnetic field, W/m <sup>2</sup>	0.049	0.067	0.072
Maximum level of measured power, μW	36.56	37.07	31.98
<b>Gain, dB</b>	22.2	22.8	23.5
Antenna factor, dB/m	40.0	41.4	42.3
Expanded uncertainty, dB	2.1	2.1	2.1

Engineer



M. Kasperovich

Quality Manager



A. Kostrikin

This Measuring report issued in duplicate and sent to:

1. Sporton International INC.

Address: No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District, TaoYuan City 333, Taiwan, R.O.C.

2. Calibration Laboratory of Microwave Measuring Equipment

Duplication of Measuring report (complete or partial) must be authorized by the laboratory.



ISO 17025  
ACCREDITED LABORATORY



## Calibration certificate



Accreditation certificate No. № BY/112 02.5.0.0065 of 09.01.2015

Certificate number 28-18 Date when calibrated 08/17/2018 Page 1 of 2

### Item

calibrated

**Antenna QWH-EPRR00 # 784600034**

Description of measurement standard / measuring instrument / identification

Customer

Sporton International Inc.

No. 52, HwaYa 1st Road, HwaYa Technology Park, Kwei-Shan District,  
TaoYuan City 333, Taiwan, R.O.C.

Name of the customer, address

Method of  
calibration

GOST 20271.1, MK KL 8.2-16

Name of the method / identification

*All measurements are traceable to the SI units which are realized by national measurement standards of NMI and state standards of RF. This certificate shall not be reproduced, except in full. Any publication extracts from the calibration certificate requires written permission of the issuing calibration laboratory of microwave measuring equipment.*

Authorising  
signature



M. Svirid/ Technical manager

Name and position

Date of issue 08/17/2018