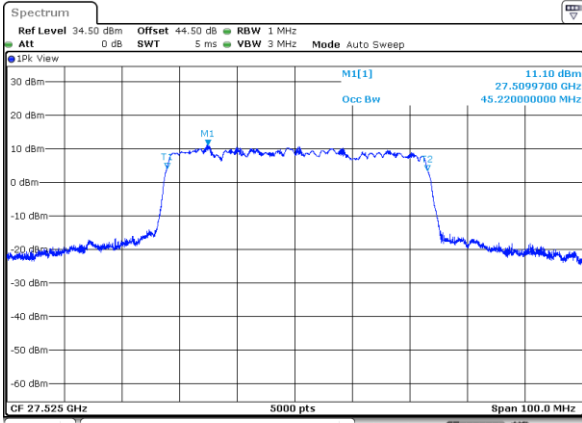




CP-OFDM Module 1

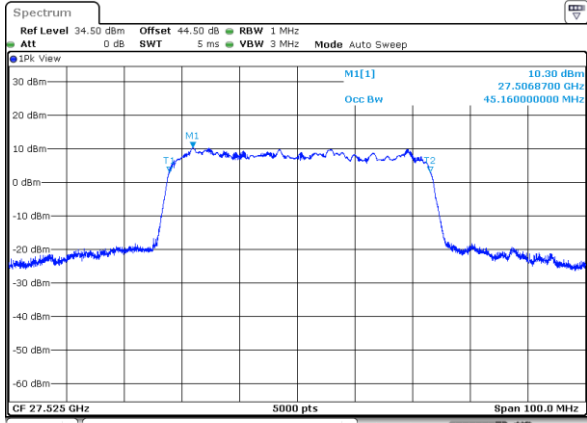
NR Band n261

Lowest Channel / 50MHz / QPSK



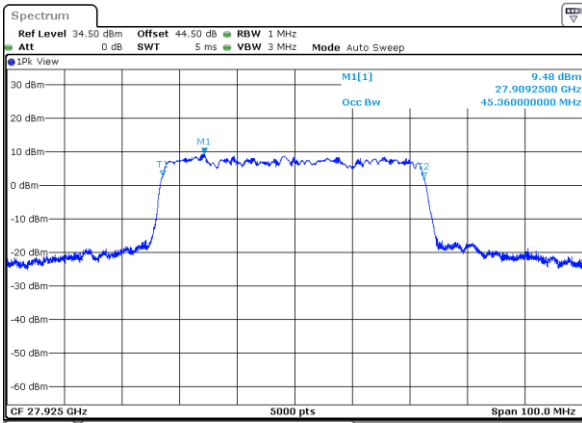
Date: 9 JUL 2020 21:42:02

Lowest Channel / 50MHz / 16 QAM



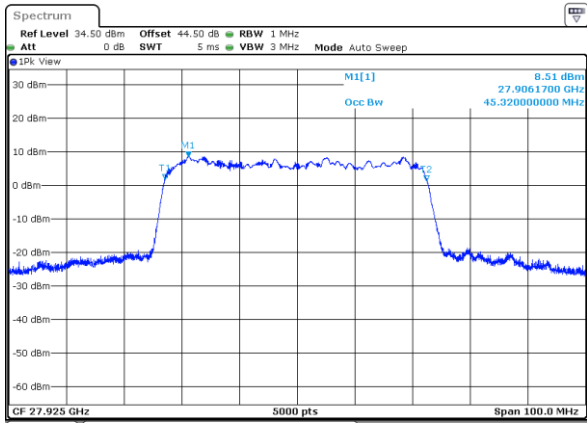
Date: 9 JUL 2020 21:40:35

Middle Channel / 50MHz / QPSK



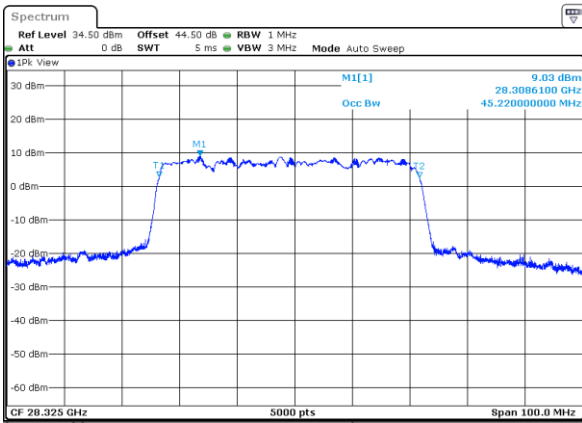
Date: 9 JUL 2020 22:27:43

Middle Channel / 50MHz / 16 QAM



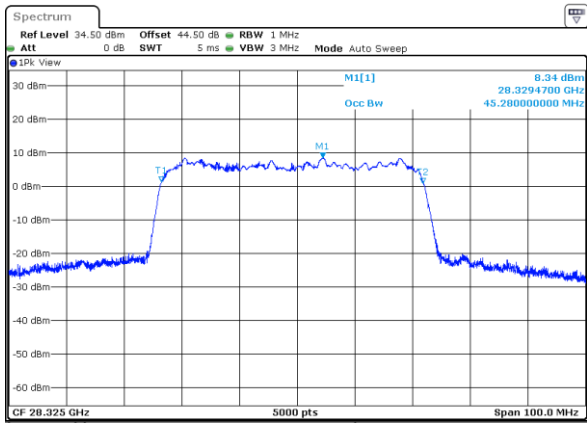
Date: 9 JUL 2020 22:36:15

Highest Channel / 50MHz / QPSK



Date: 9 JUL 2020 23:12:01

Highest Channel / 50MHz / 16 QAM



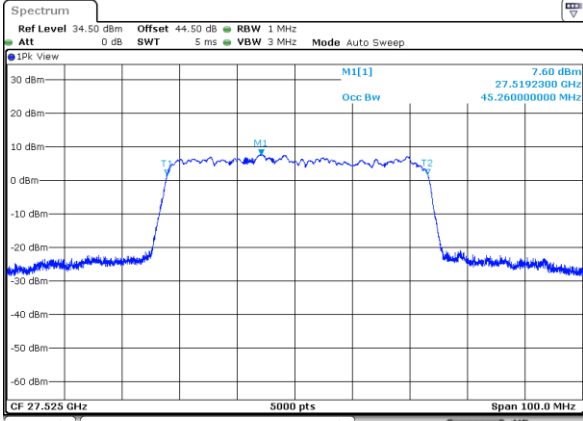
Date: 9 JUL 2020 23:10:30



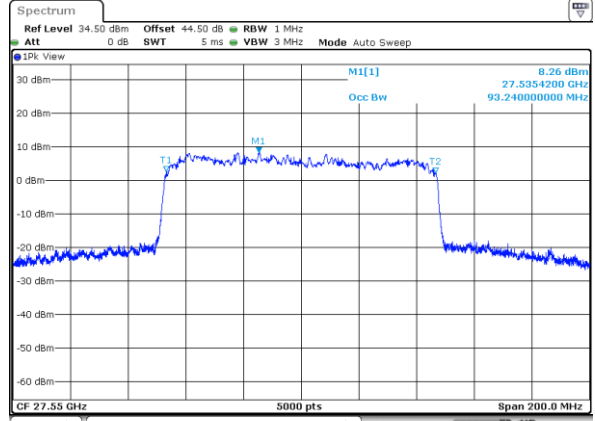
CP-OFDM Module 1

NR Band n261

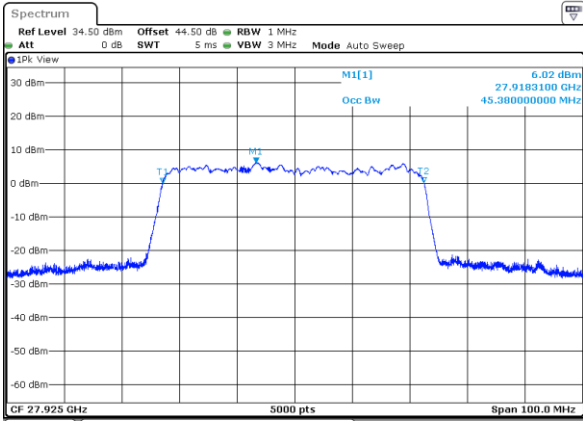
Lowest Channel / 50MHz / 64QAM



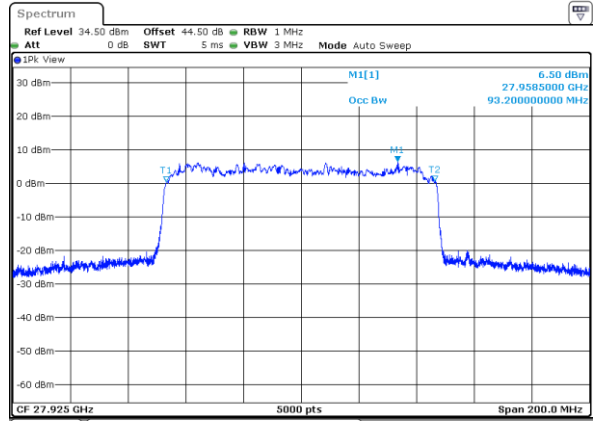
Lowest Channel / 100MHz / QPSK



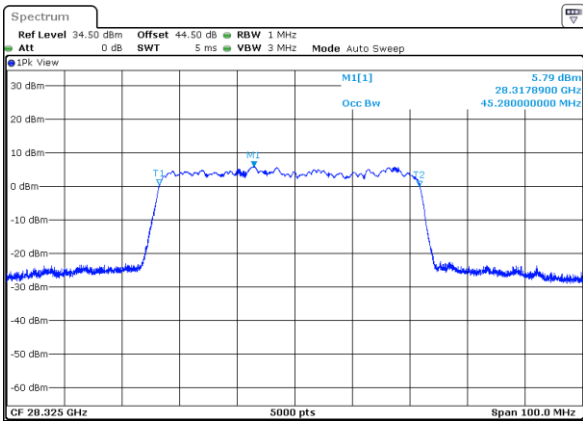
Middle Channel / 50MHz / 64QAM



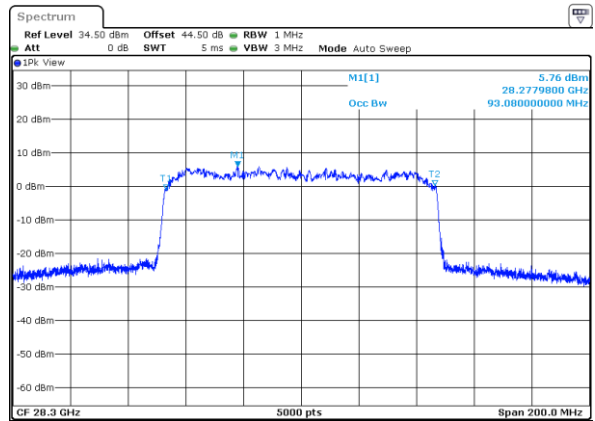
Middle Channel / 100MHz / QPSK



Highest Channel / 50MHz / 64QAM



Highest Channel / 100MHz / QPSK

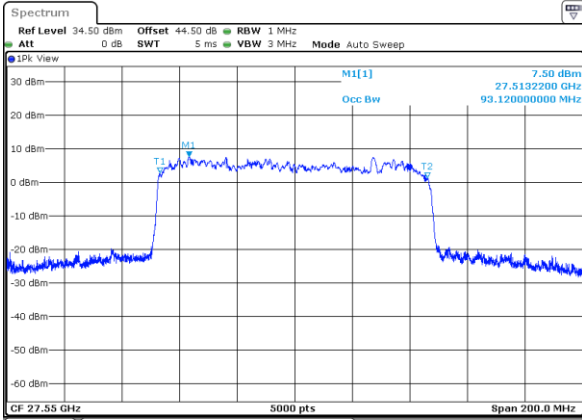




CP-OFDM Module 1

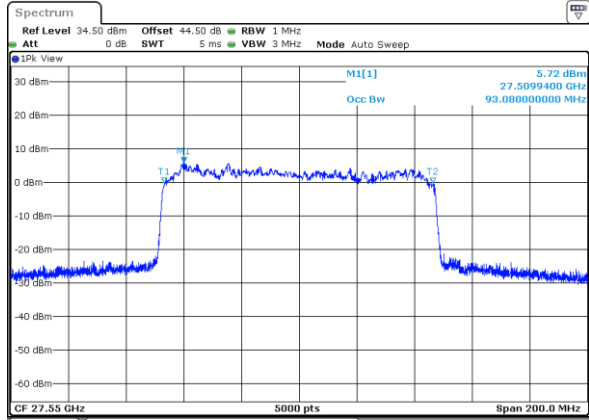
NR Band n261

Lowest Channel / 100MHz / 16QAM



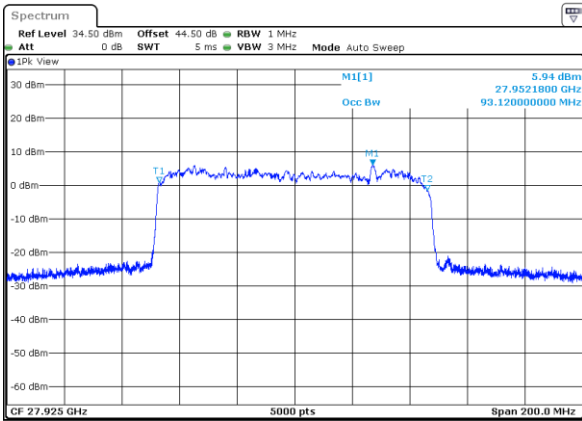
Date: 9 JUL 2020 21:55:39

Lowest Channel / 100MHz / 64QAM



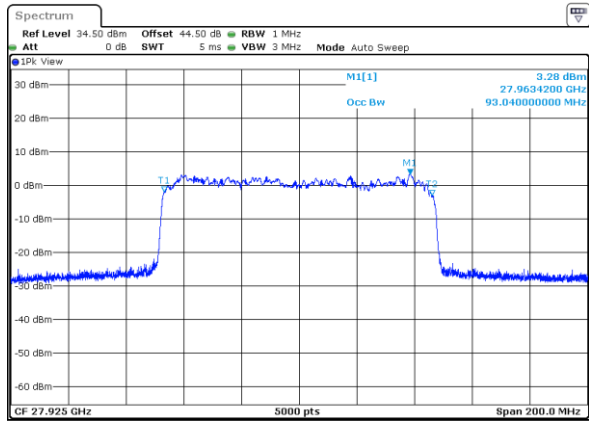
Date: 9 JUL 2020 21:54:32

Middle Channel / 100MHz / 16QAM



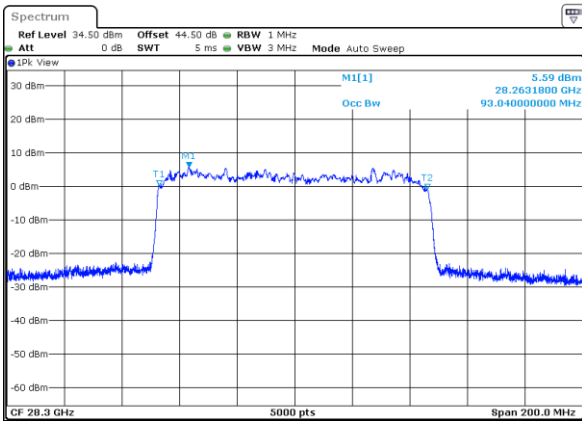
Date: 9 JUL 2020 22:52:48

Middle Channel / 100MHz / 64QAM



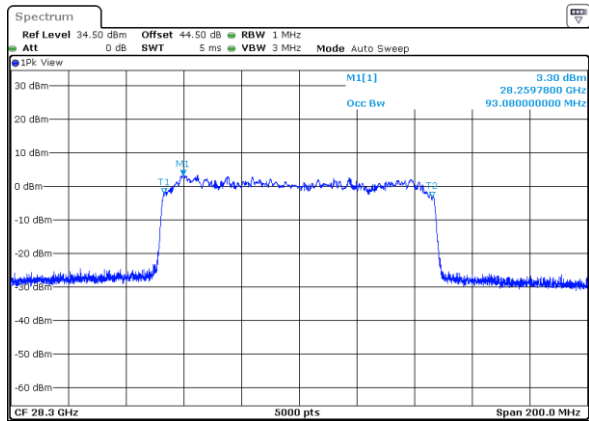
Date: 9 JUL 2020 22:54:32

Highest Channel / 100MHz / 16QAM



Date: 9 JUL 2020 23:23:33

Highest Channel / 100MHz / 64QAM



Date: 9 JUL 2020 23:22:04



Radiated Out of Band Emissions

Mode			CP-OFDM Module 0 NR Band n261 : BE (dBm) 1 RB					
BW			50MHz			100MHz		
Limit (dBm)			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Low CH	0~10%OB	≤ -5	-19.45	-20.45	-21.89	-21.11	-21.33	-24.08
	>10%OB	≤ -13	-32.57	-32.79	-33.76	-33.30	-33.20	-34.40
High CH	0~10%OB	≤ -5	-29.20	-30.55	-32.60	-27.75	-29.78	-30.48
	>10%OB	≤ -13	-35.13	-35.04	-35.12	-35.01	-35.02	-35.02
Result			Compliance					

Mode			CP-OFDM Module 1 NR Band n261 : BE (dBm) 1 RB					
BW			50MHz			100MHz		
Limit (dBm)			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Low CH	0~10%OB	≤ -5	-24.86	-26.64	-27.40	-21.44	-23.20	-24.68
	>10%OB	≤ -13	-33.80	-34.24	-34.41	-33.79	-34.09	-34.62
High CH	0~10%OB	≤ -5	-29.81	-30.57	-31.65	-26.24	-28.36	-29.76
	>10%OB	≤ -13	-35.02	-35.00	-35.03	-35.06	-34.92	-35.06
Result			Compliance					



Radiated Out of Band Emissions

Mode			CP-OFDM Module 0 NR Band n261 : BE (dBm) Full RB					
BW			50MHz			100MHz		
Limit (dBm)			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Low CH	0~10%OB	≤ -5	-25.86	-27.74	-31.26	-28.33	-30.90	-33.01
	>10%OB	≤ -13	-26.77	-28.68	-32.41	-29.14	-31.08	-33.41
High CH	0~10%OB	≤ -5	-31.79	-33.06	-34.64	-32.71	-34.00	-34.98
	>10%OB	≤ -13	-32.28	-33.99	-35.11	-33.68	-34.72	-35.02
Result			Compliance					

Mode			CP-OFDM Module 1 NR Band n261 : BE (dBm) Full RB					
BW			50MHz			100MHz		
Limit (dBm)			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Low CH	0~10%OB	≤ -5	-27.04	-29.27	-31.60	-28.75	-30.36	-32.12
	>10%OB	≤ -13	-27.95	-30.07	-32.18	-29.40	-30.38	-32.95
High CH	0~10%OB	≤ -5	-29.39	-31.06	-33.05	-31.54	-32.81	-34.26
	>10%OB	≤ -13	-30.76	-32.33	-34.00	-32.52	-33.72	-35.06
Result			Compliance					

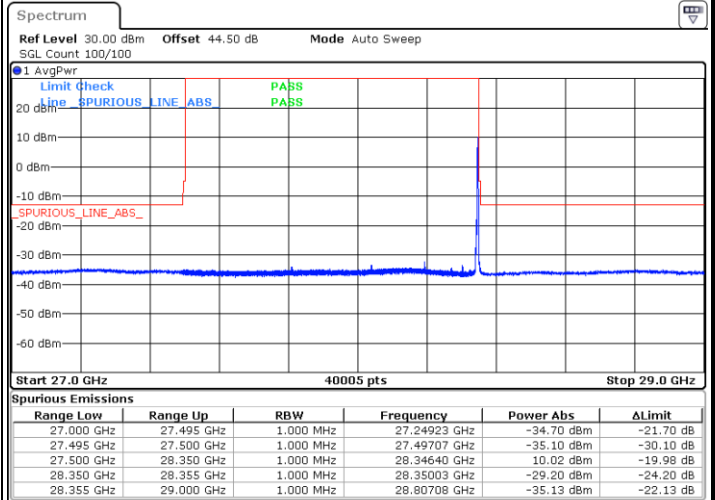
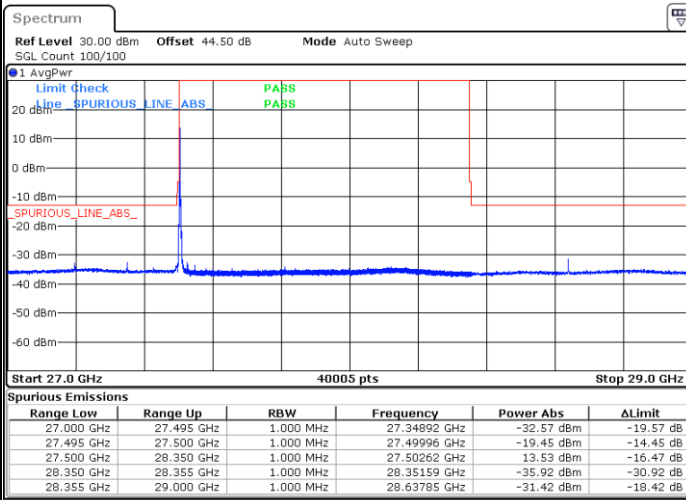


CP-OFDM Module 0

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



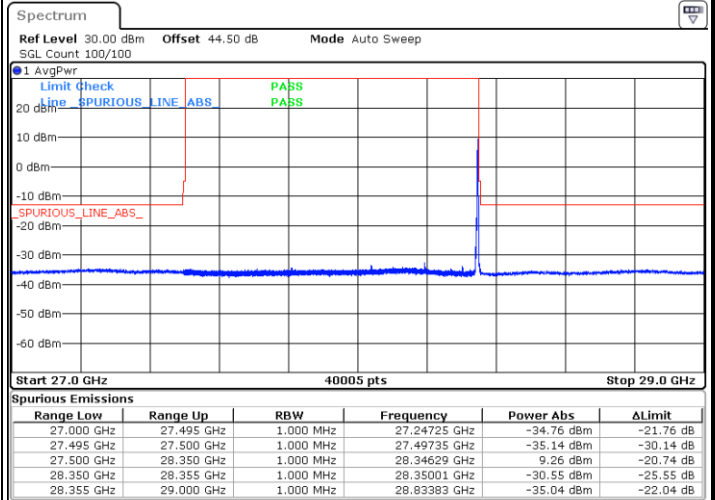
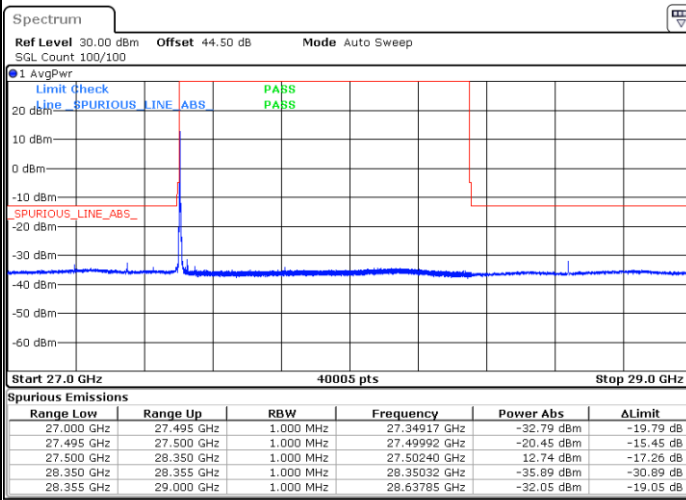
Date: 10.JUL.2020 11:34:16

Date: 10.JUL.2020 20:44:32

NR Band n261 / 50MHz / 16QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



Date: 10.JUL.2020 11:32:37

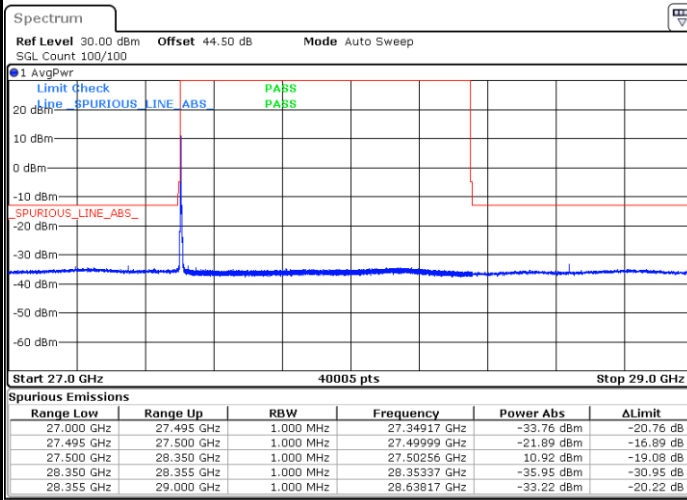
Date: 10.JUL.2020 20:45:10



CP-OFDM Module 0

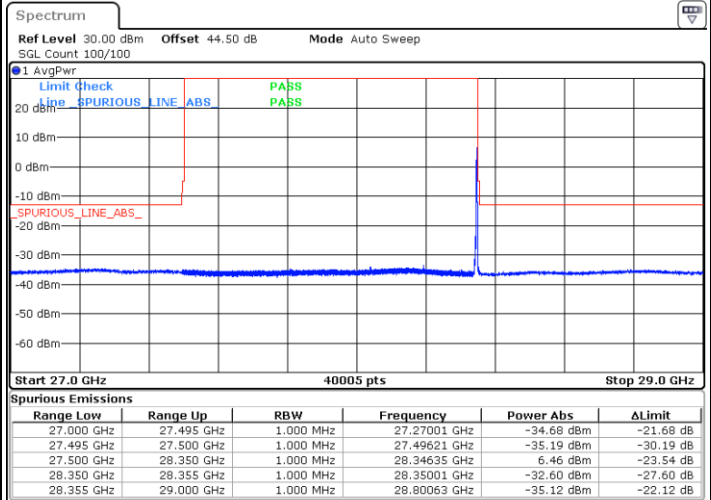
NR Band n261 / 50MHz / 64QAM

Lowest Band Edge / 1 RB



Date: 10. JUL. 2020 11:31:12

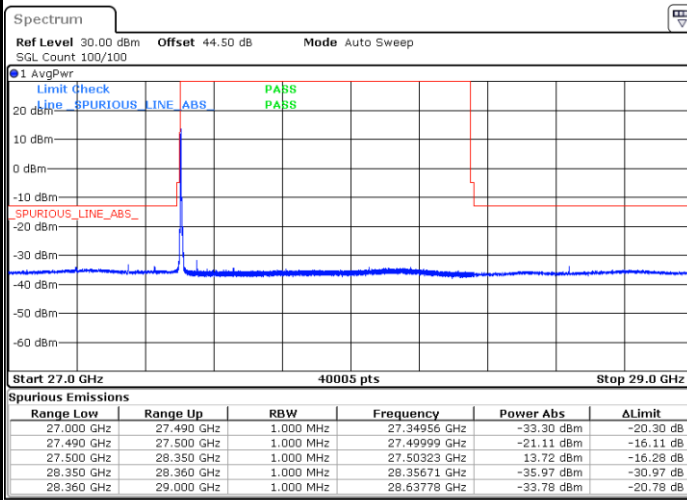
Highest Band Edge / 1 RB



Date: 10. JUL. 2020 20:46:21

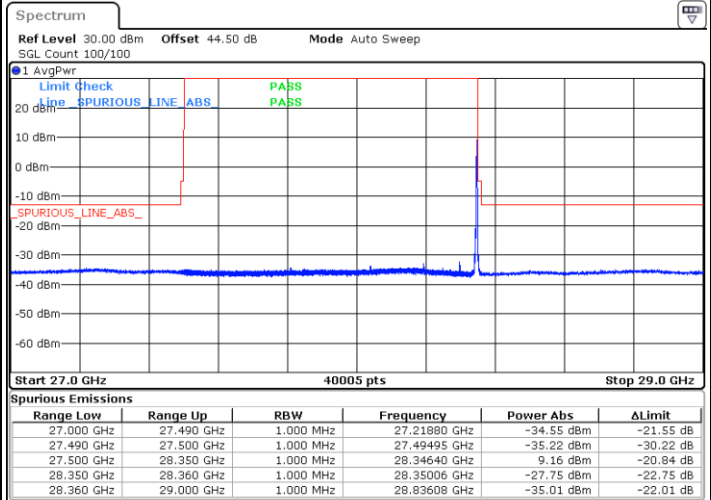
NR Band n261 / 100MHz / QPSK

Lowest Band Edge / 1 RB



Date: 10. JUL. 2020 14:21:59

Highest Band Edge / 1 RB



Date: 10. JUL. 2020 21:03:27

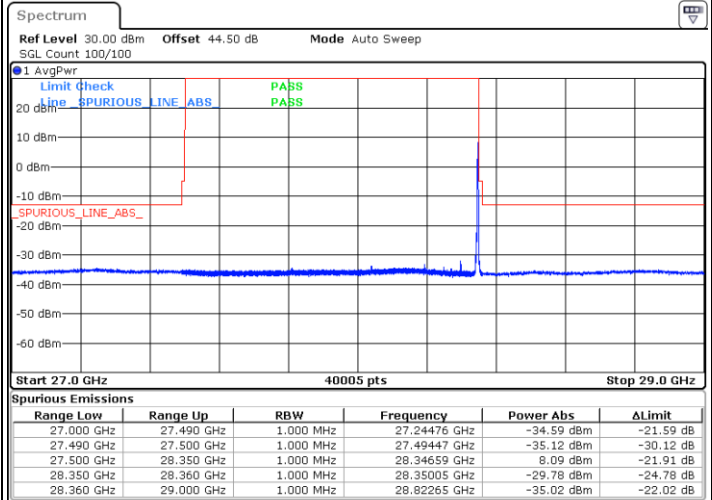
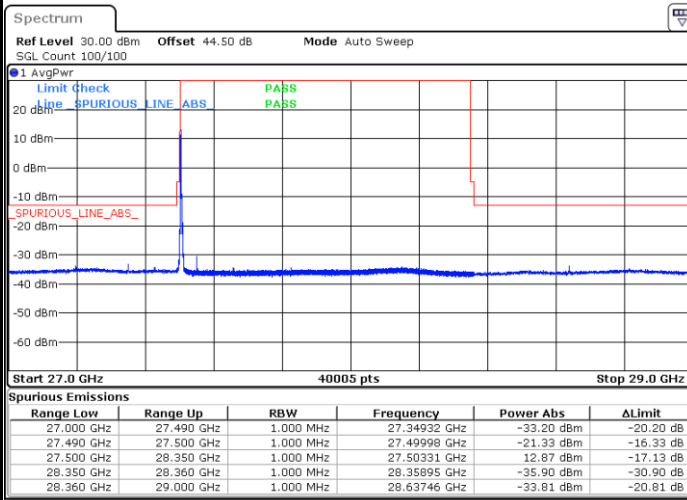


CP-OFDM Module 0

NR Band n261 / 100MHz / 16QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



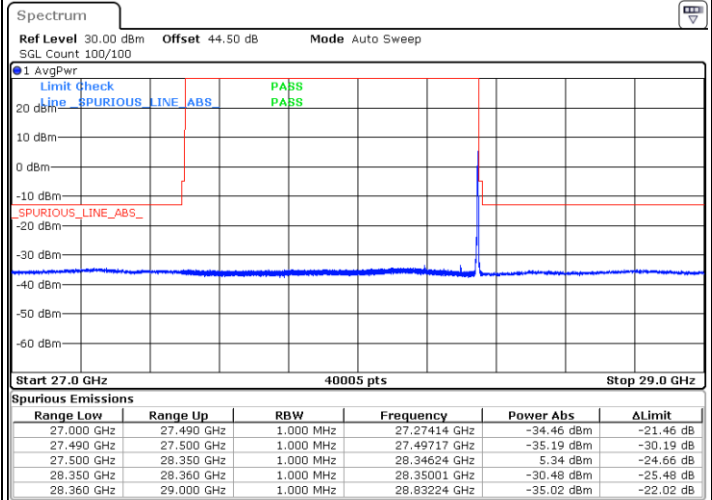
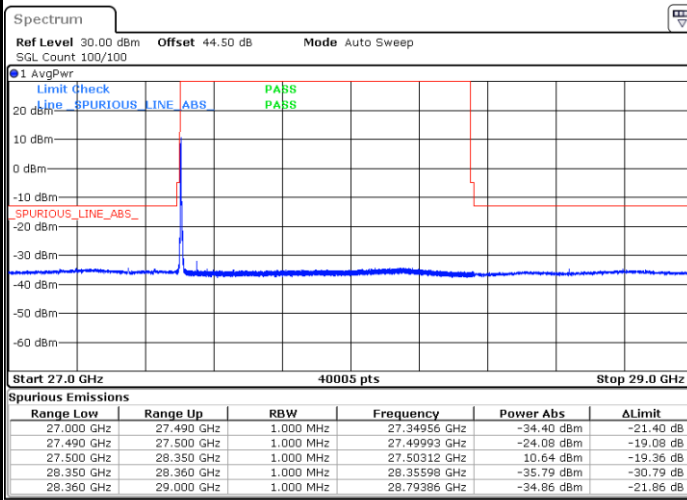
Date: 10. JUL. 2020 14:20:40

Date: 10. JUL. 2020 21:04:17

NR Band n261 / 100MHz / 64QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



Date: 10. JUL. 2020 14:18:49

Date: 10. JUL. 2020 21:05:16

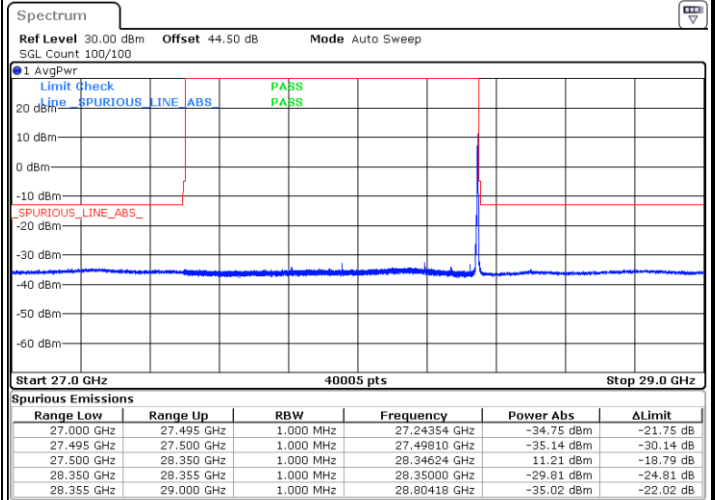
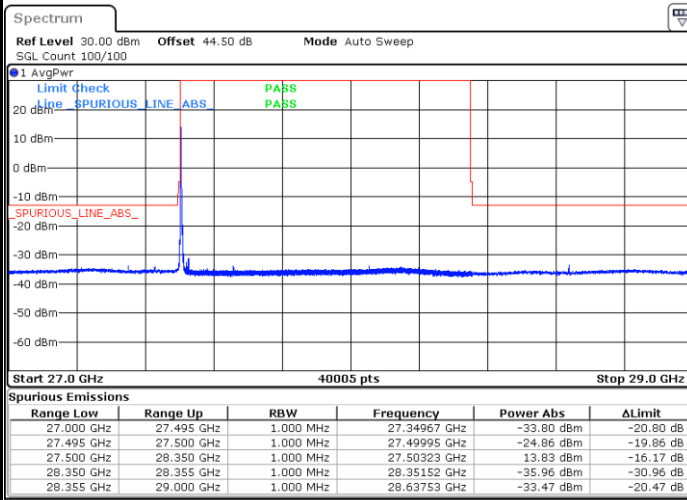


CP-OFDM Module 1

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



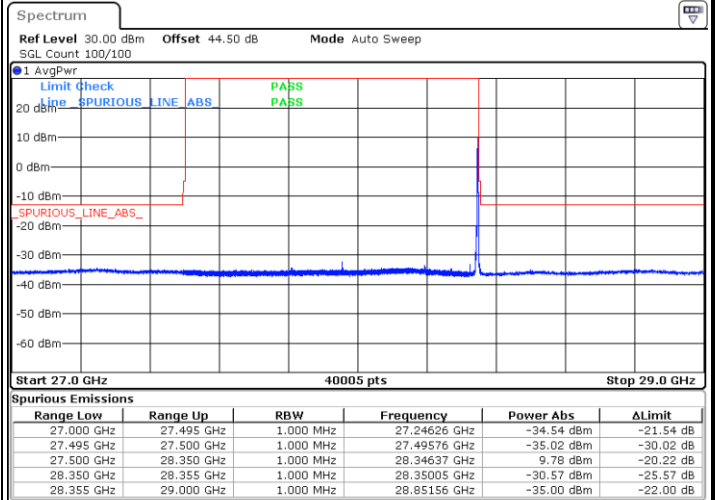
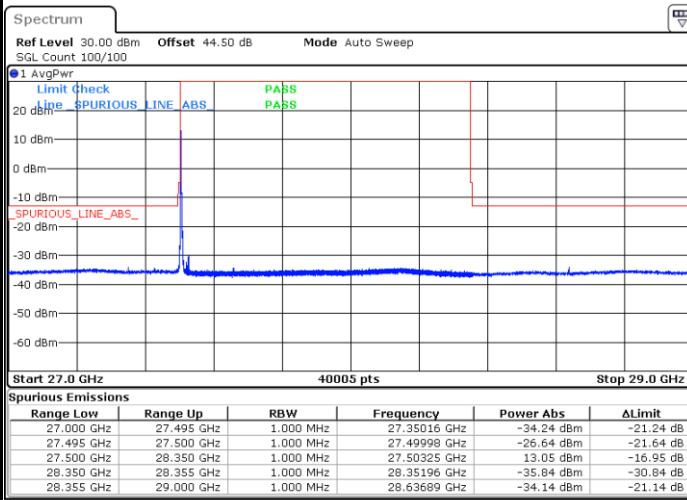
Date: 9.JUL.2020 21:31:00

Date: 9.JUL.2020 23:13:29

NR Band n261 / 50MHz / 16QAM

Lowest Band Edge / 1 RB

Highest Band Edge / 1 RB



Date: 9.JUL.2020 21:36:08

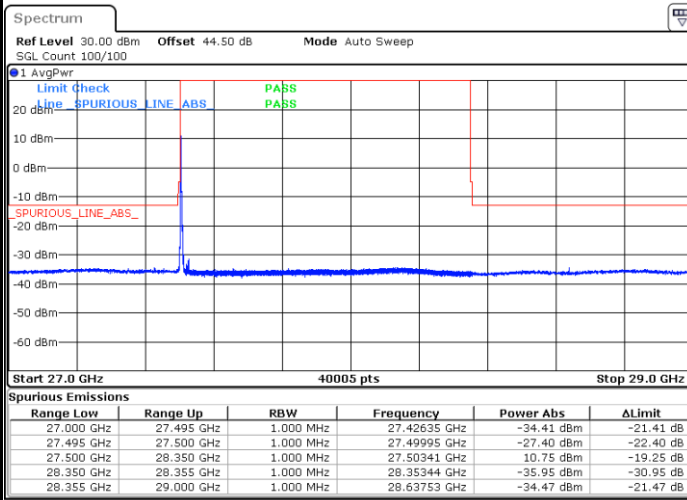
Date: 9.JUL.2020 23:14:20



CP-OFDM Module 1

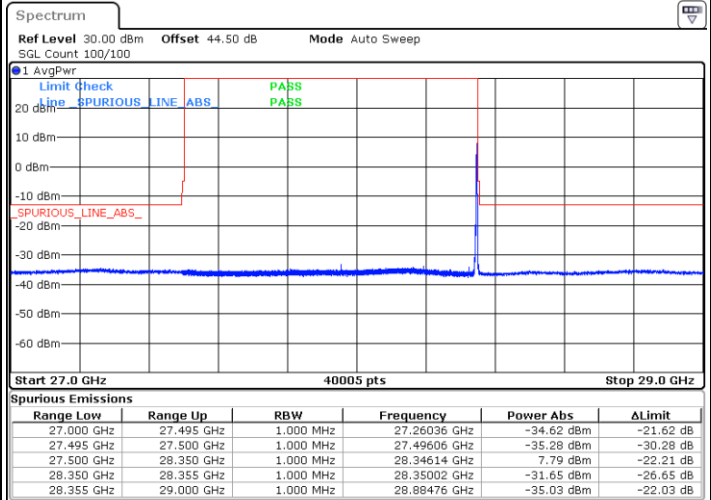
NR Band n261 / 50MHz / 64QAM

Lowest Band Edge / 1 RB



Date: 9.JUL.2020 21:37:43

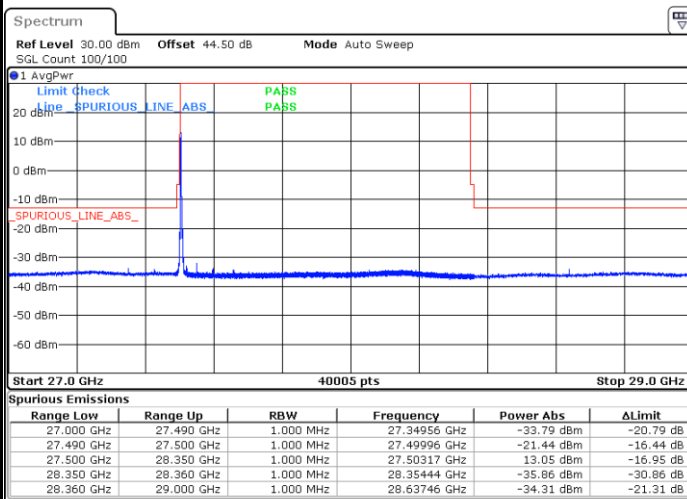
Highest Band Edge / 1 RB



Date: 9.JUL.2020 23:15:02

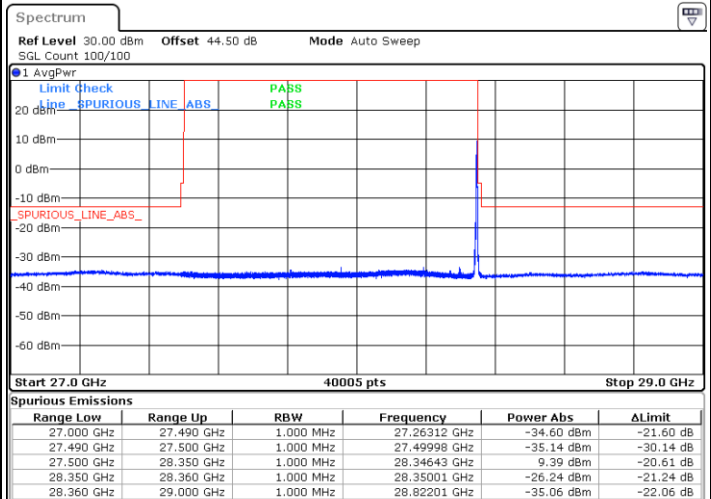
NR Band n261 / 100MHz / QPSK

Lowest Band Edge / 1 RB



Date: 9.JUL.2020 21:51:26

Highest Band Edge / 1 RB



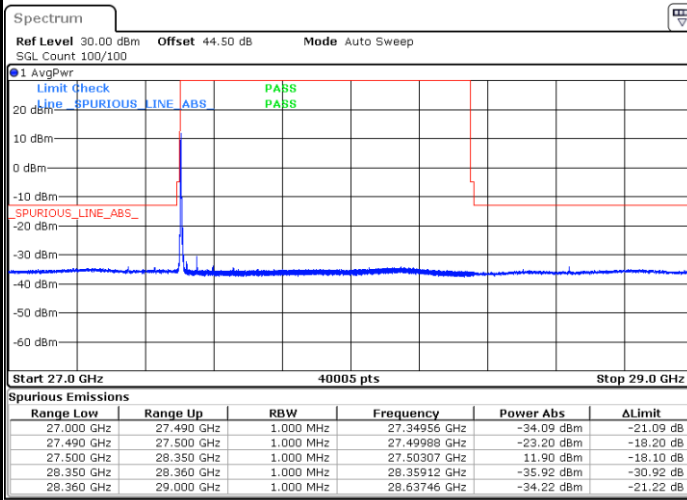
Date: 9.JUL.2020 23:26:14



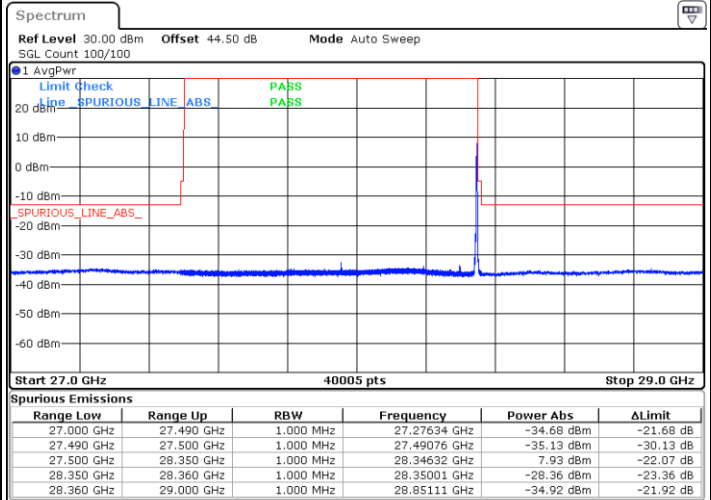
CP-OFDM Module 1

NR Band n261 / 100MHz / 16QAM

Lowest Band Edge / 1 RB

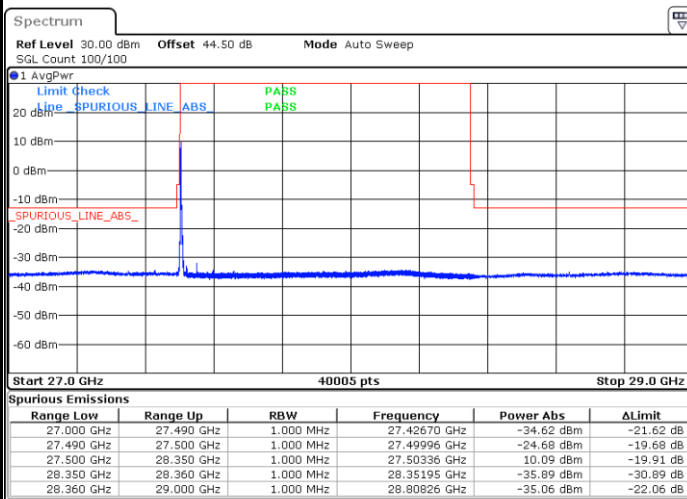


Highest Band Edge / 1 RB

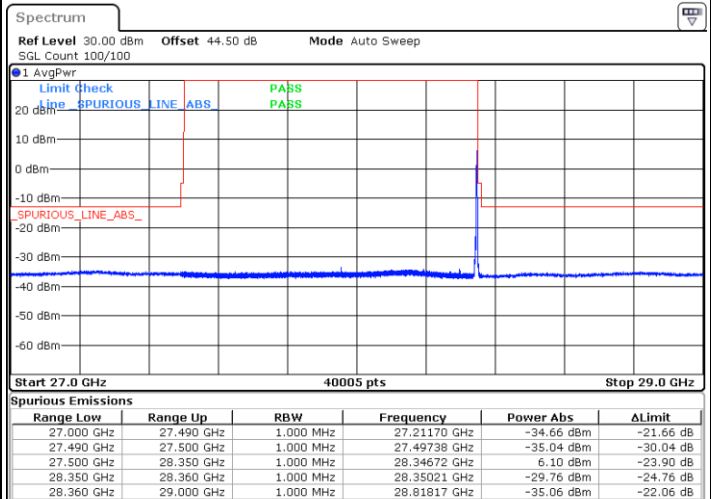


NR Band n261 / 100MHz / 64QAM

Lowest Band Edge / 1 RB



Highest Band Edge / 1 RB

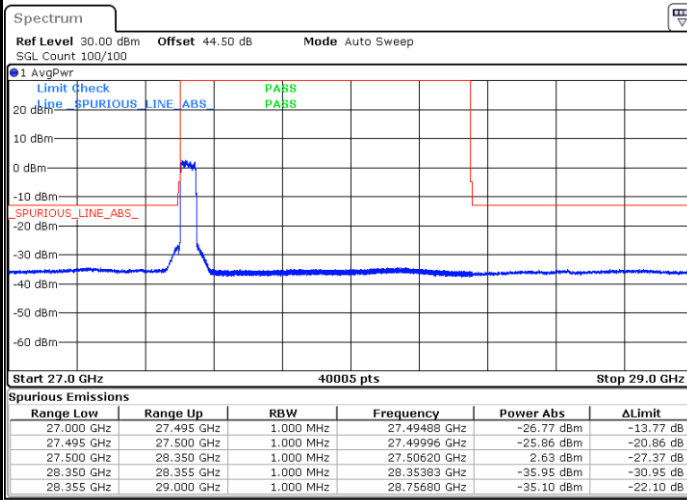




CP-OFDM Module 0

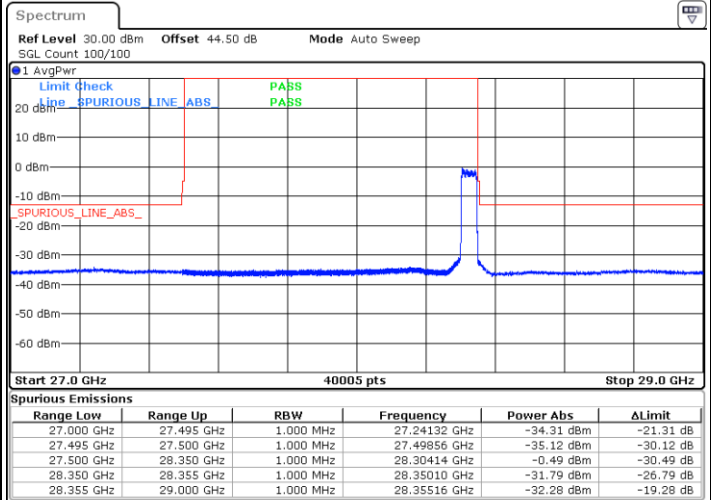
NR Band n261 / 50MHz / QPSK

Lowest Band Edge / Full RB



Date: 10. JUL. 2020 11:22:41

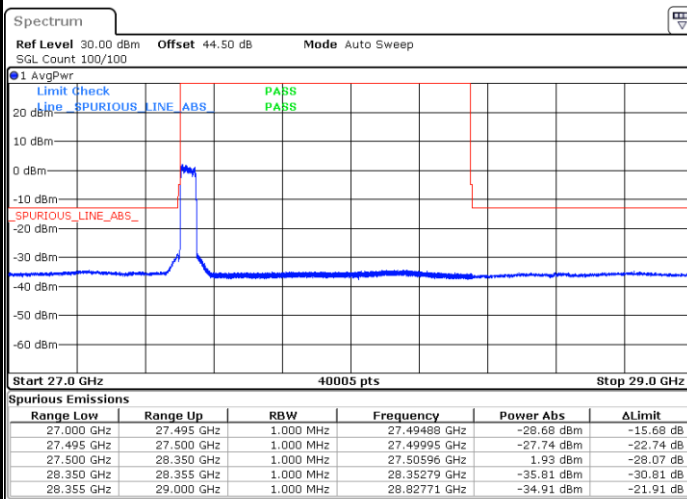
Highest Band Edge / Full RB



Date: 10. JUL. 2020 20:43:23

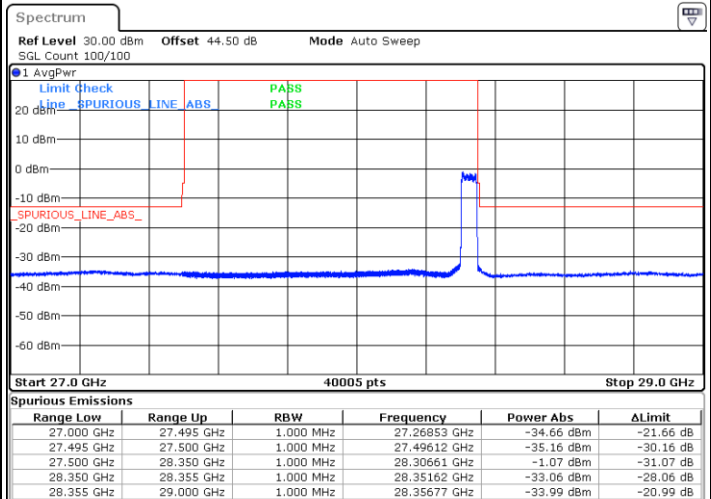
NR Band n261 / 50MHz / 16QAM

Lowest Band Edge / Full RB



Date: 10. JUL. 2020 11:27:15

Highest Band Edge / Full RB

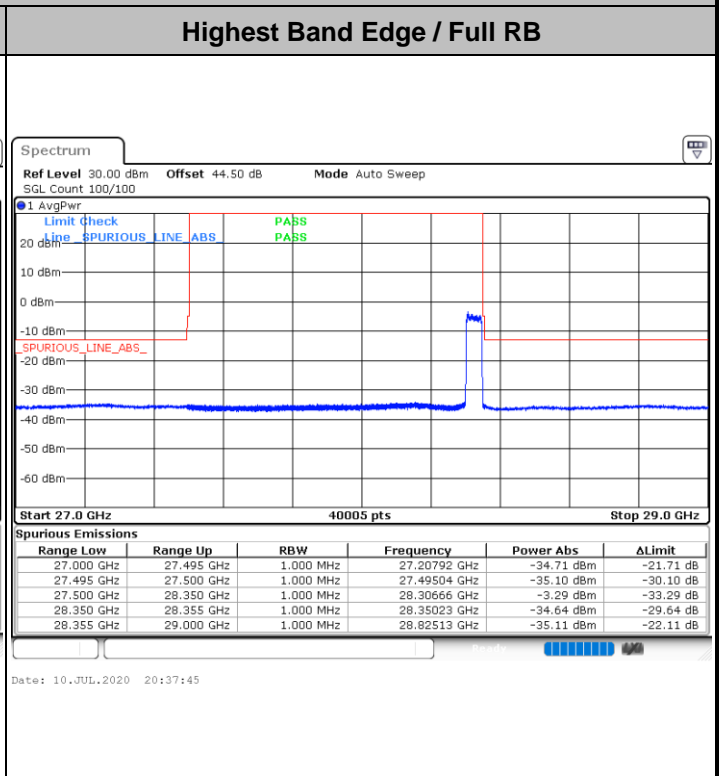
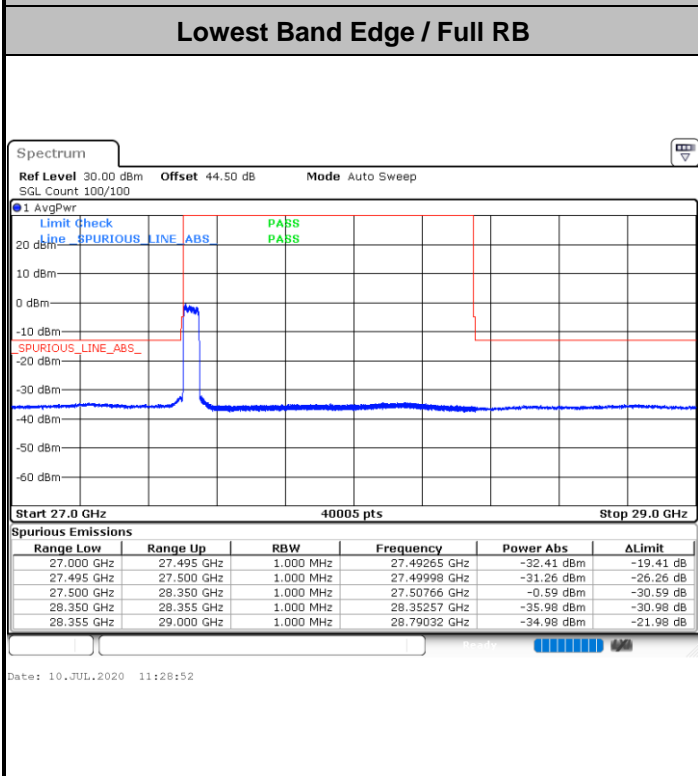


Date: 10. JUL. 2020 20:38:29

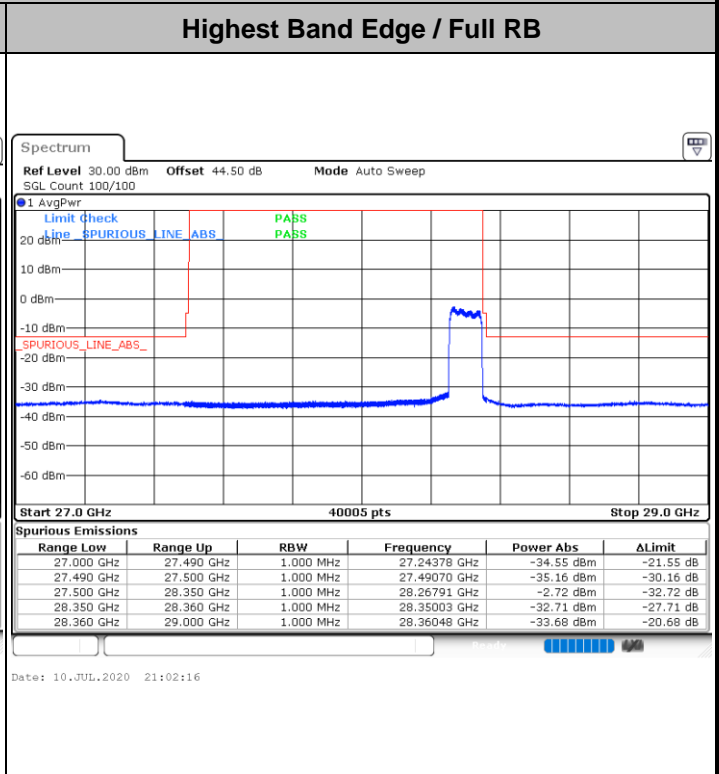
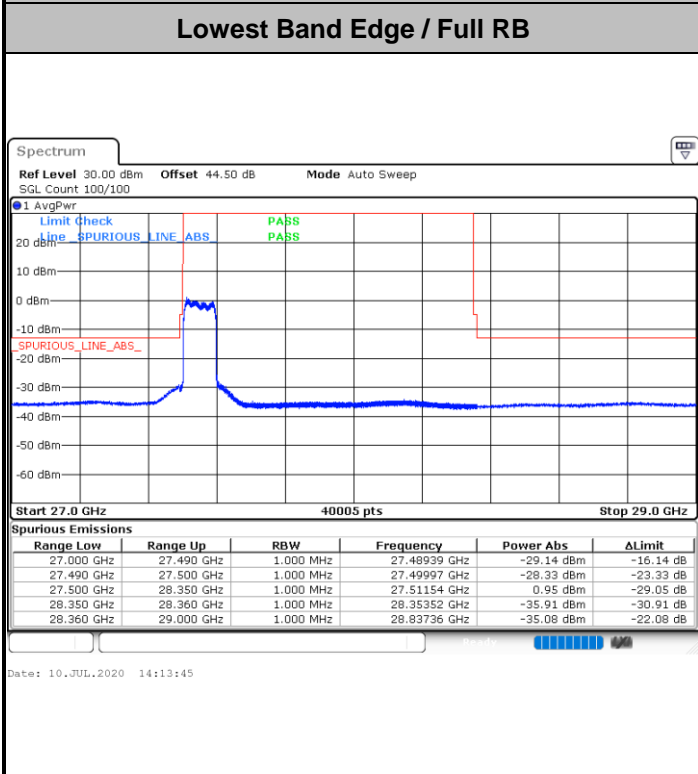


CP-OFDM Module 0

NR Band n261 / 50MHz / 64QAM



NR Band n261 / 100MHz / QPSK

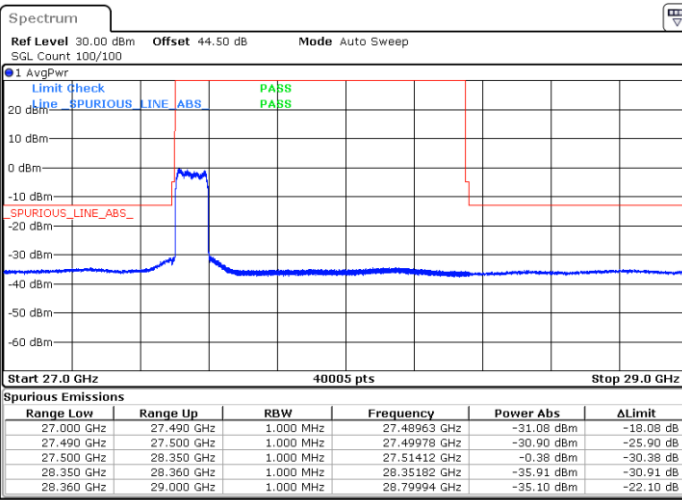




CP-OFDM Module 0

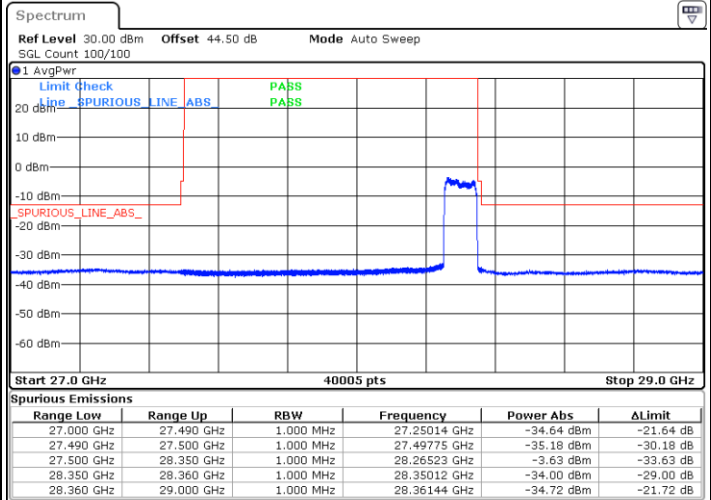
NR Band n261 / 100MHz / 16QAM

Lowest Band Edge / Full RB



Date: 10.JUL.2020 14:15:14

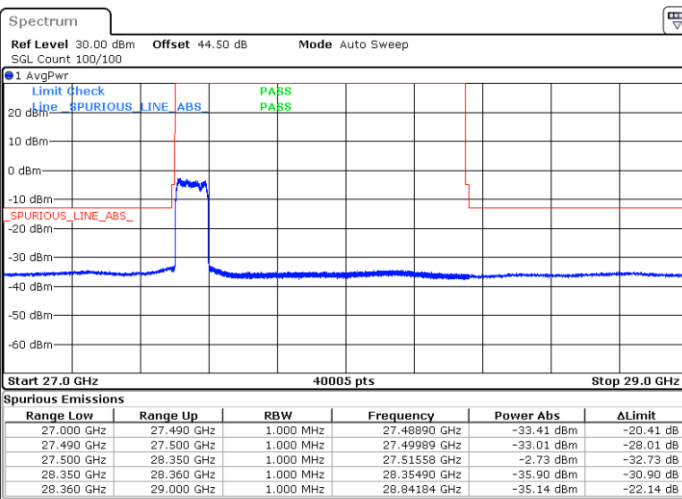
Highest Band Edge / Full RB



Date: 10.JUL.2020 21:00:29

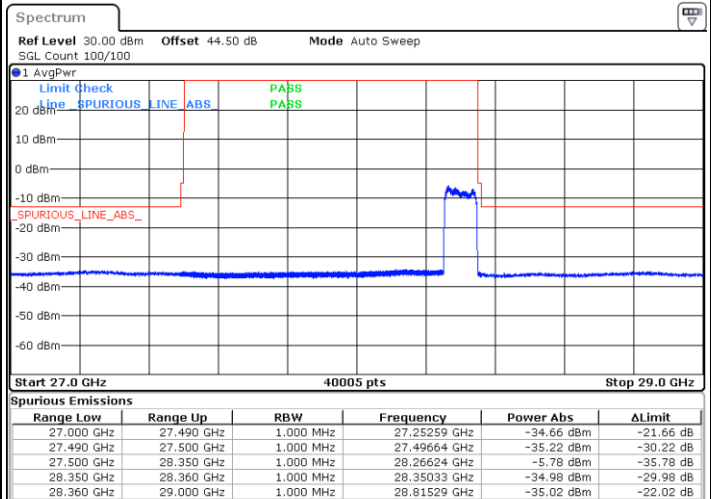
NR Band n261 / 100MHz / 64QAM

Lowest Band Edge / Full RB



Date: 10.JUL.2020 14:17:16

Highest Band Edge / Full RB



Date: 10.JUL.2020 20:58:46

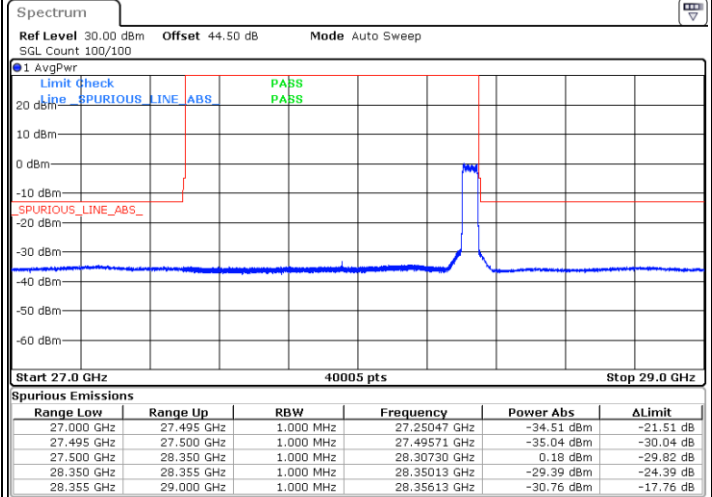
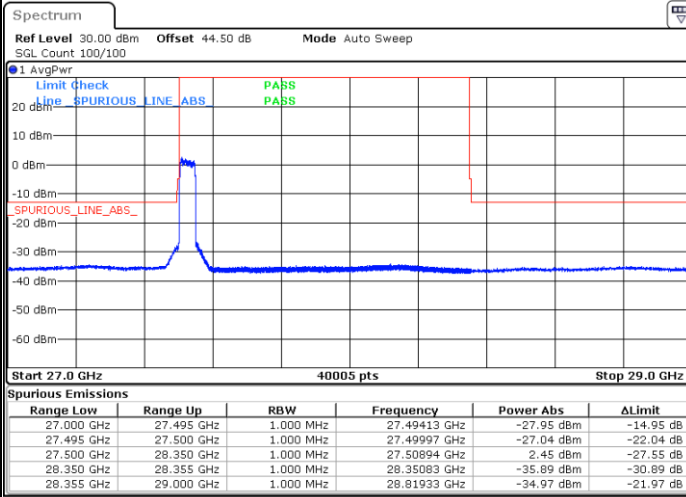


CP-OFDM Module 1

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



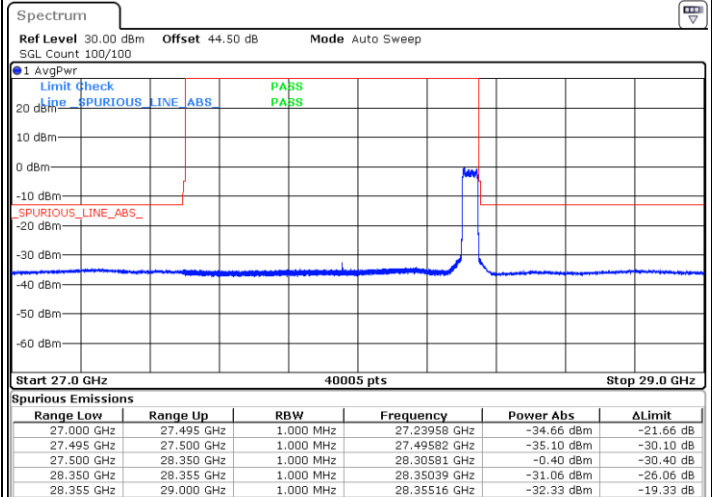
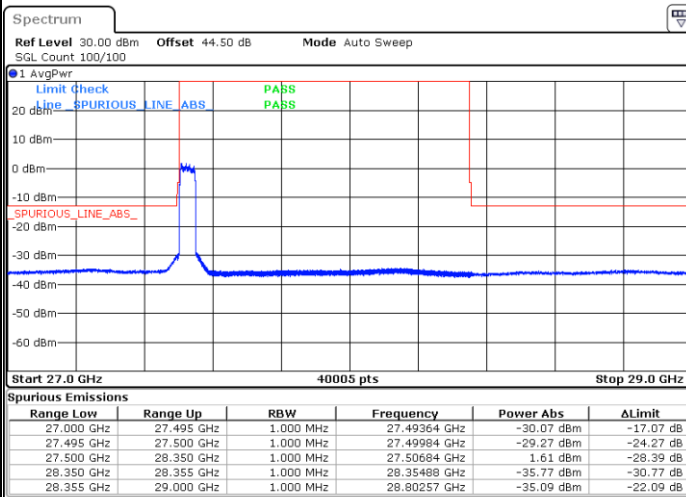
Date: 9.JUL.2020 21:42:41

Date: 9.JUL.2020 23:12:43

NR Band n261 / 50MHz / 16QAM

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



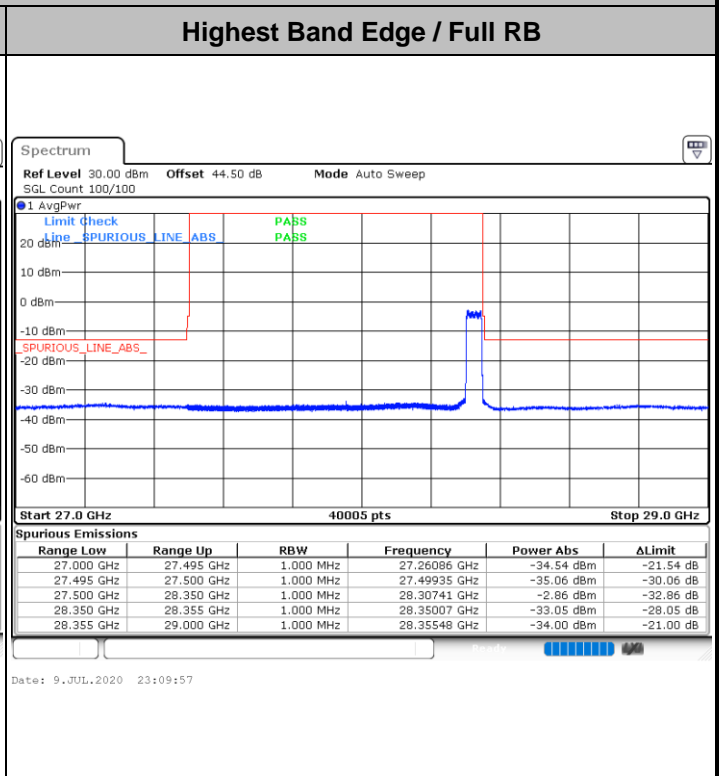
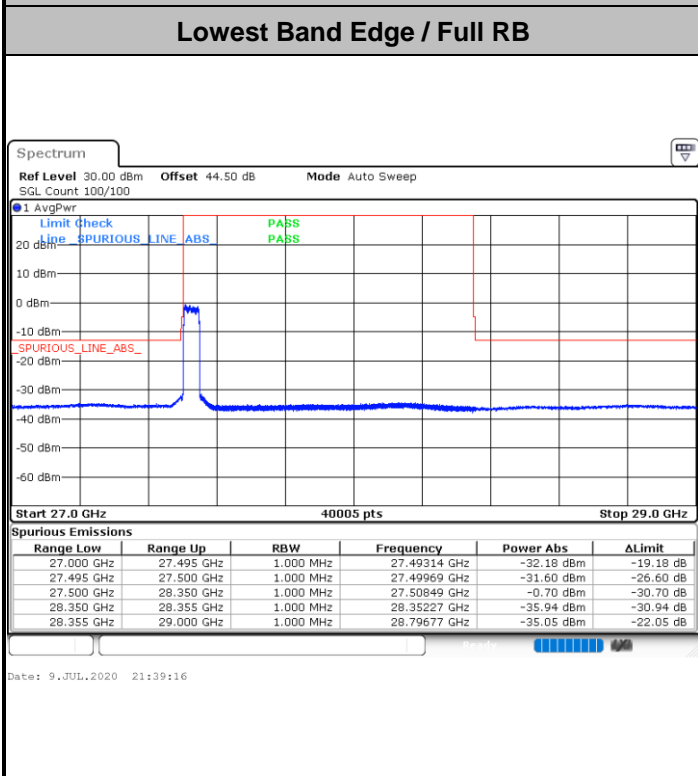
Date: 9.JUL.2020 21:40:11

Date: 9.JUL.2020 23:11:10

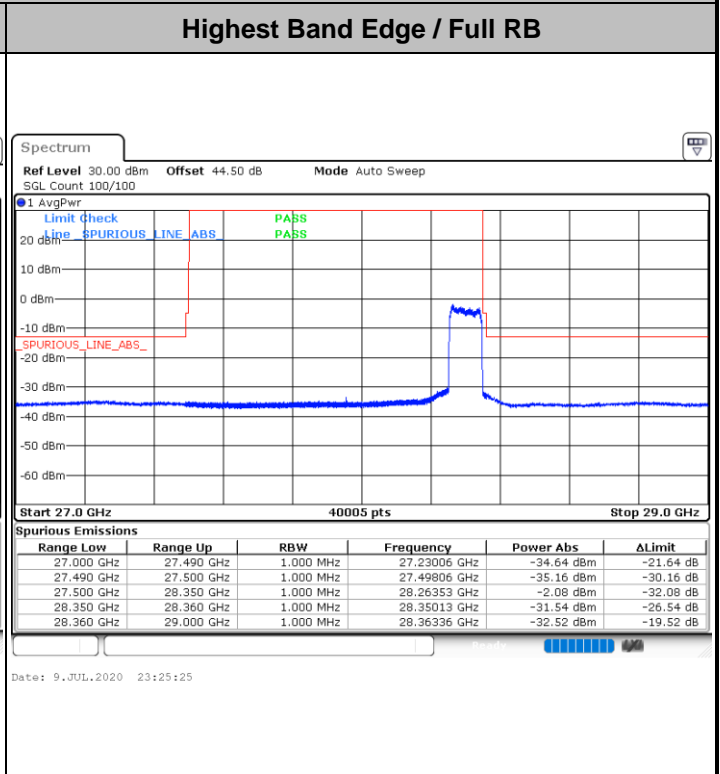
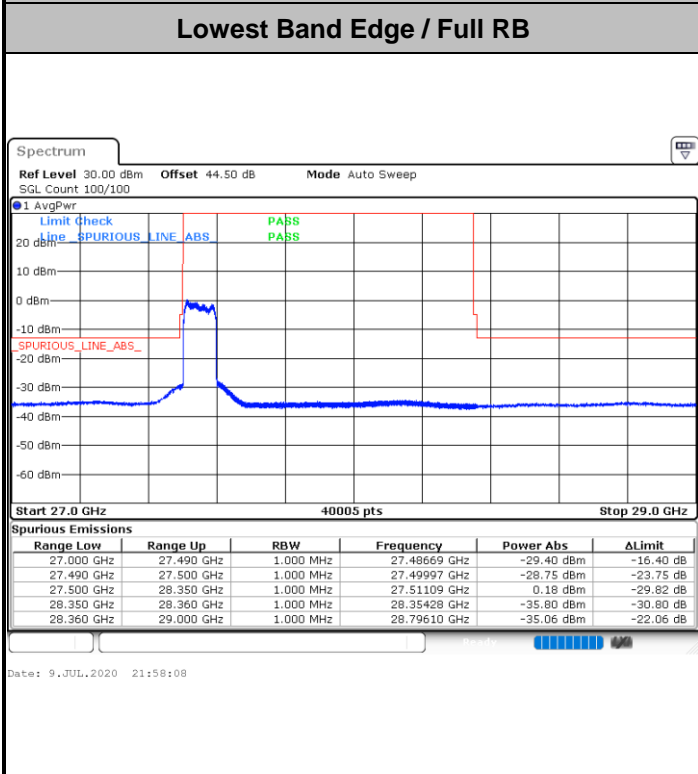


CP-OFDM Module 1

NR Band n261 / 50MHz / 64QAM



NR Band n261 / 100MHz / QPSK



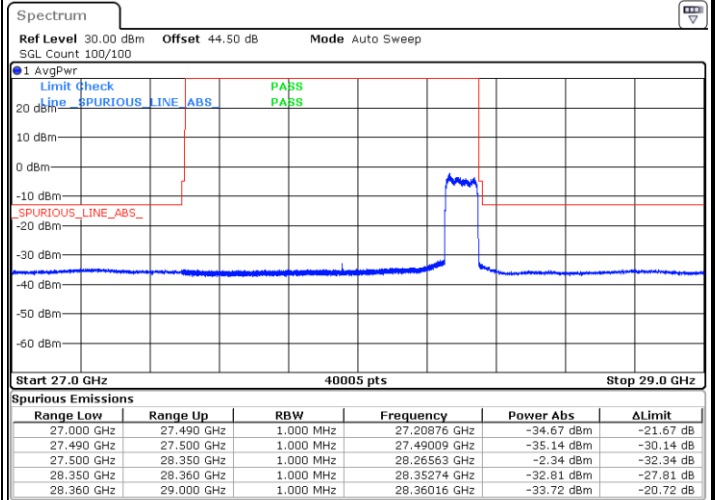
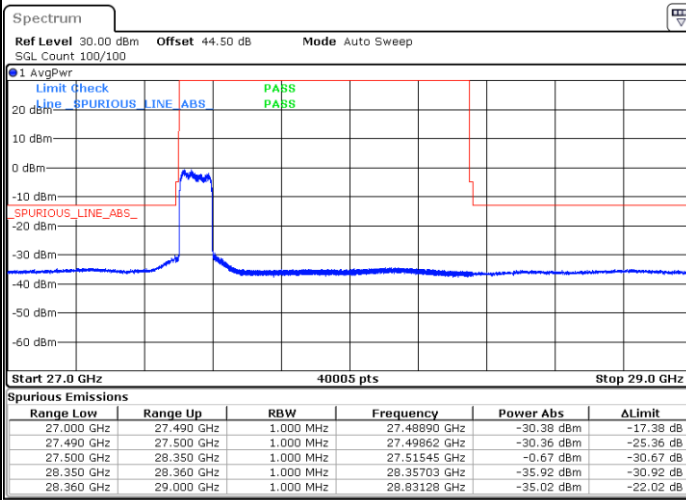


CP-OFDM Module 1

NR Band n261 / 100MHz / 16QAM

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



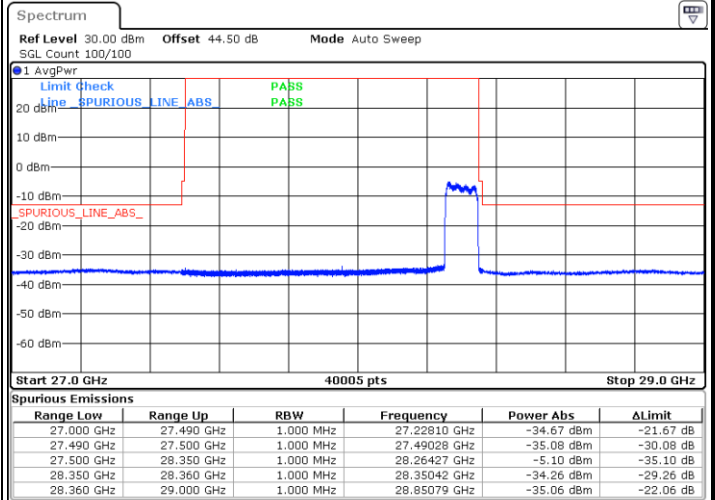
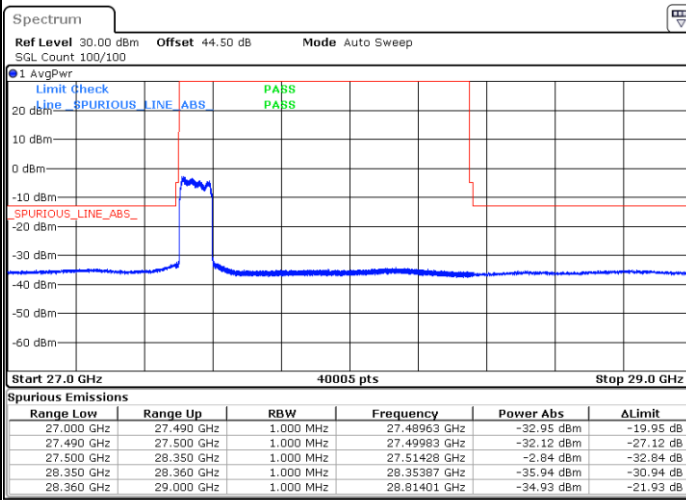
Date: 9.JUL.2020 21:56:15

Date: 9.JUL.2020 23:24:08

NR Band n261 / 100MHz / 64QAM

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 9.JUL.2020 21:54:47

Date: 9.JUL.2020 23:22:41

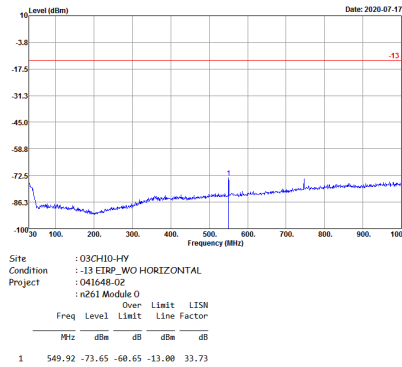


Spurious Emission

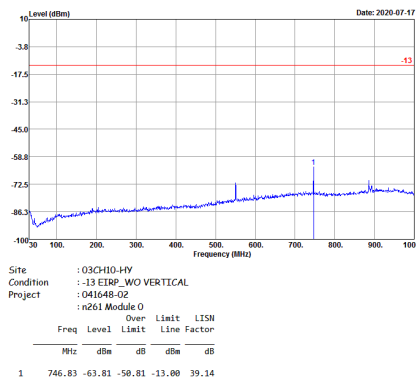
There is no significant spurious emission signal found for frequency started from 9kHz up to 18GHz. Only the noise floor is reported.

NR Band n261 (30MHz-1GHz)

Horizontal



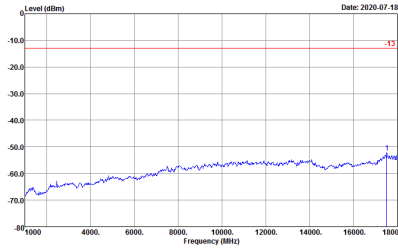
Vertical





NR Band n261 (1GHz-18GHz)

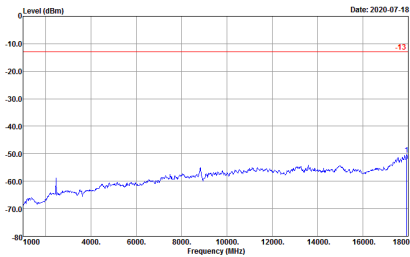
Horizontal



Site : 03CH10-HY
 Condition : -13 EIRP_WO HORIZONTAL
 Project : 041648-02
 : n261 Module 0

Freq	Level	Over	Limit	L15M	
MHz	dBm	dB	dBm	dB	
1	17524.00	-52.19	-39.19	-13.00	72.64

Vertical



Site : 03CH10-HY
 Condition : -13 EIRP_WO VERTICAL
 Project : 041648-02
 : n261 Module 0

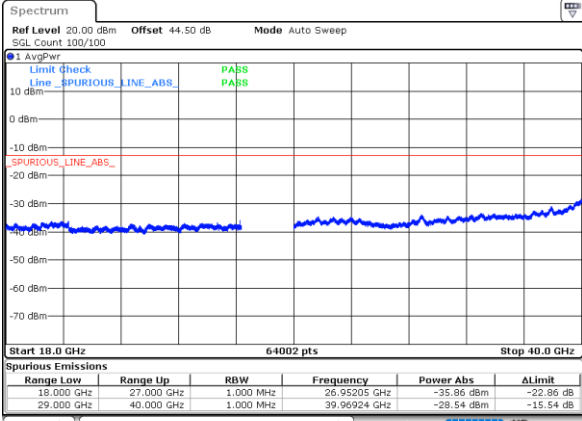
Freq	Level	Over	Limit	L15M	
MHz	dBm	dB	dBm	dB	
1	17932.00	-50.40	-37.40	-13.00	75.56



CP-OFDM Module 0

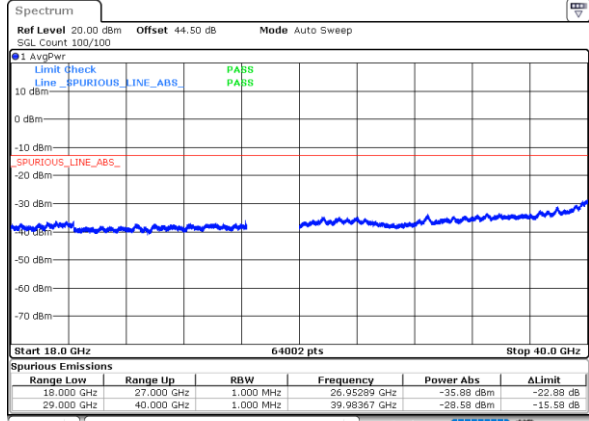
NR Band n261 QPSK (18-40GHz)

Lowest Channel / 50MHz



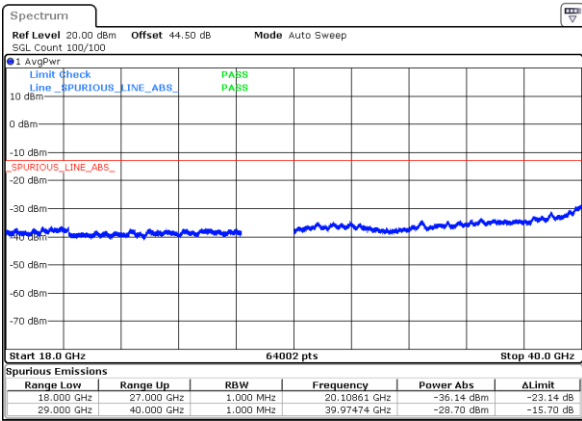
Date: 10_JUL_2020 11:35:07

Lowest Channel / 100MHz



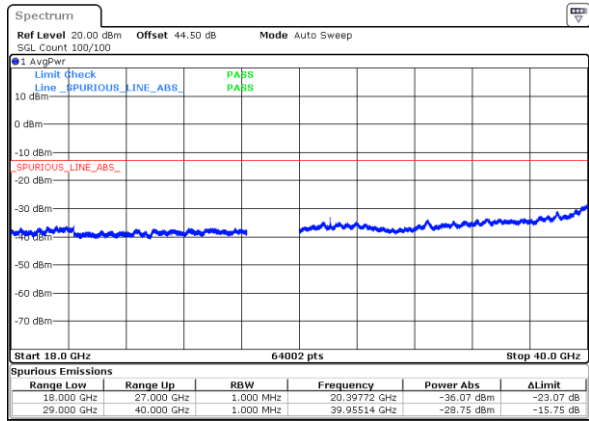
Date: 10_JUL_2020 14:24:11

Middle Channel / 50MHz



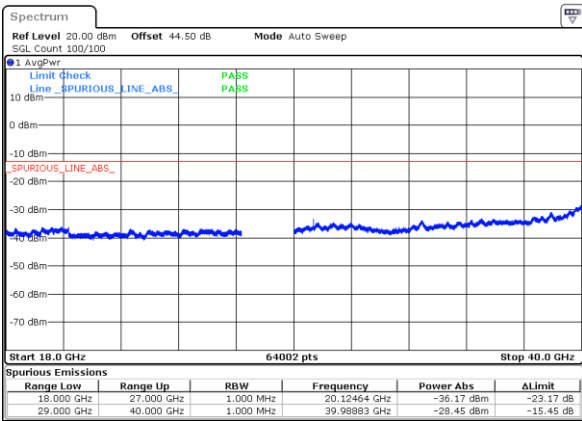
Date: 10_JUL_2020 17:08:54

Middle Channel / 100MHz



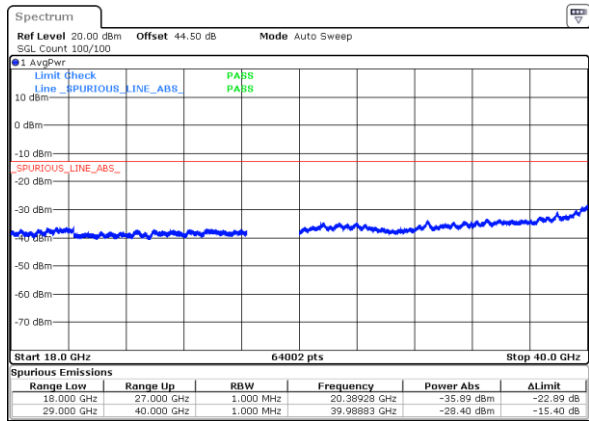
Date: 10_JUL_2020 17:38:57

Highest Channel / 50MHz



Date: 10_JUL_2020 20:35:26

Highest Channel / 100MHz



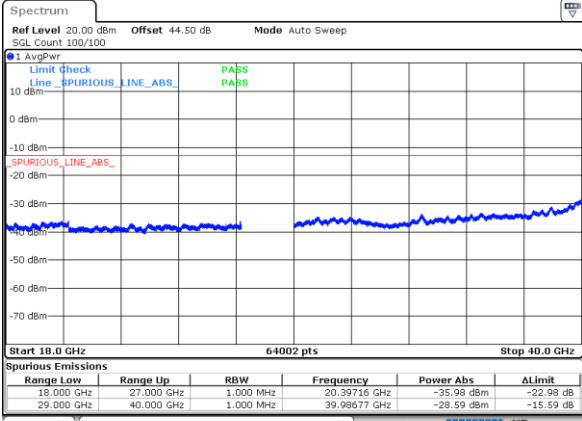
Date: 10_JUL_2020 20:55:58



CP-OFDM Module 1

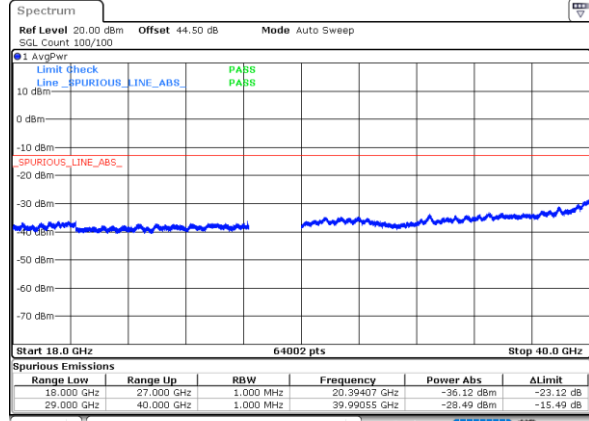
NR Band n261 QPSK (18-40GHz)

Lowest Channel / 50MHz



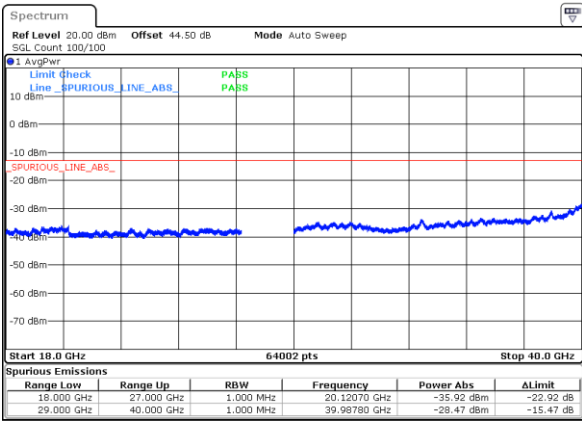
Date: 9_JUL_2020 21:33:20

Lowest Channel / 100MHz



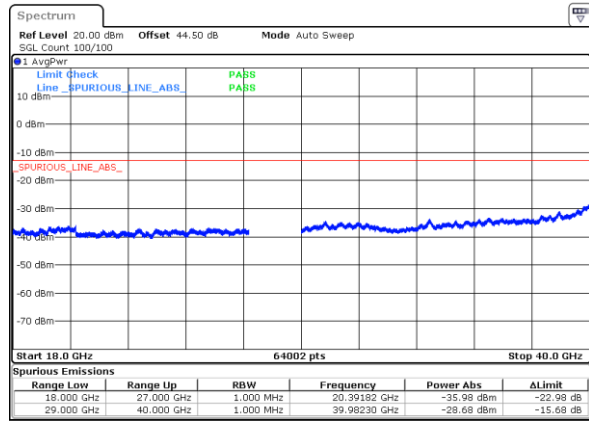
Date: 9_JUL_2020 21:48:37

Middle Channel / 50MHz



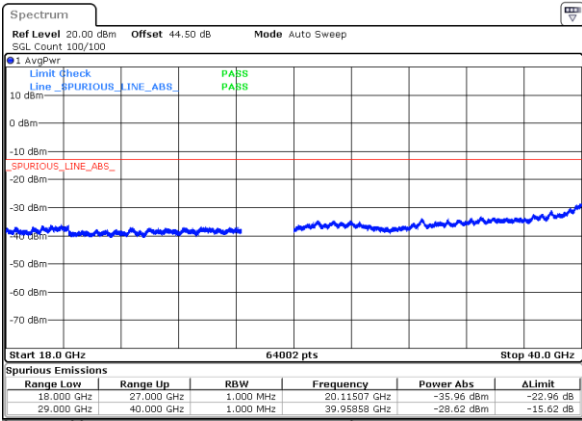
Date: 9_JUL_2020 22:28:52

Middle Channel / 100MHz



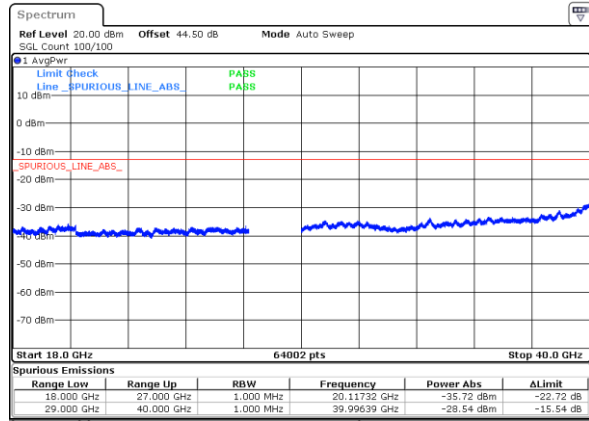
Date: 9_JUL_2020 22:50:22

Highest Channel / 50MHz



Date: 9_JUL_2020 23:07:07

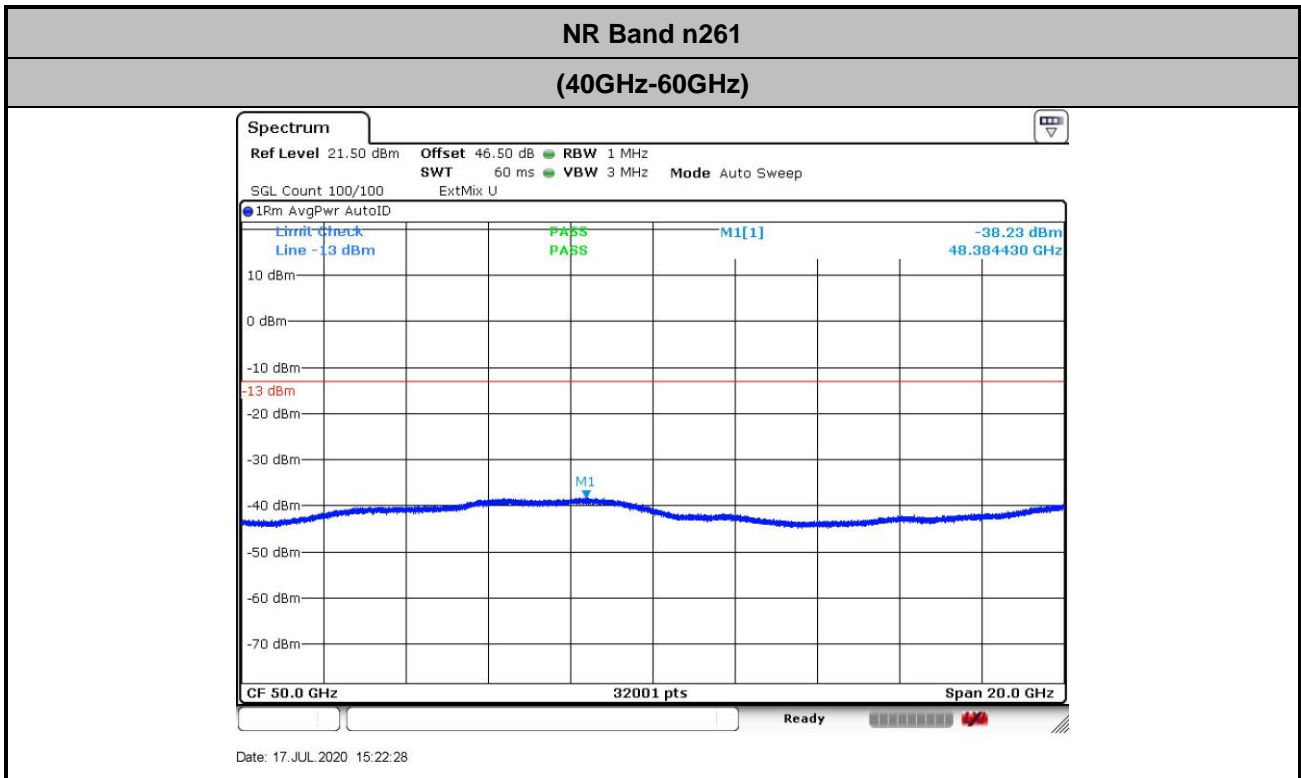
Highest Channel / 100MHz



Date: 9_JUL_2020 23:20:12

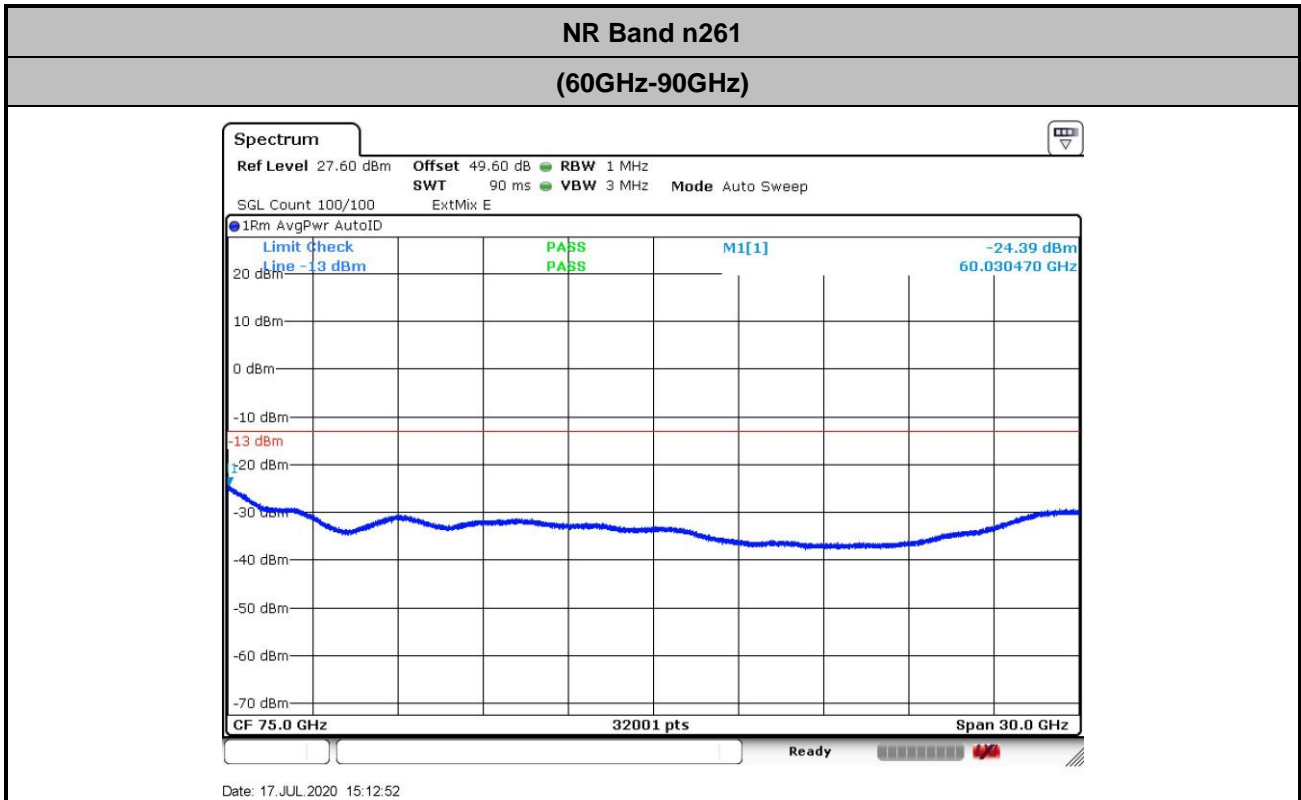


There is no significant spurious emission signal found for frequency started from 40GHz up to 100GHz. Only the noise floor is reported.



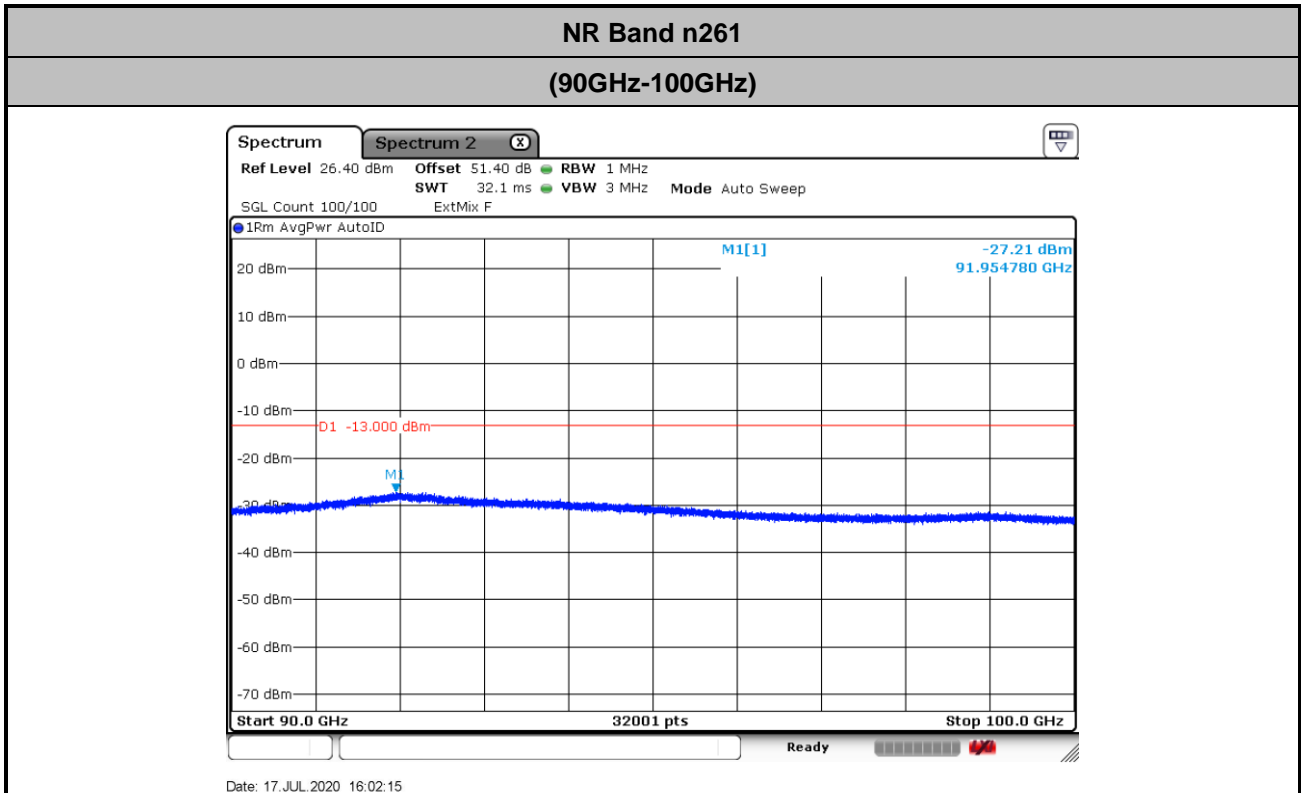
$$\text{Offset} = \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8$$

$$= 42.1 + 2.2 + 107 + 20\log(1) - 104.8 = 46.5 \text{ (dB)}$$



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

$$= 47.2 + 2.2 + 107 + 20\log(1) - 104.8 = 49.6 \text{ (dB)}$$



$$\begin{aligned} \text{Offset} &= \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8 \\ &= 49.0 + 2.2 + 107 + 20\log(1) - 104.8 = 51.4 \text{ (dB)} \end{aligned}$$



Appendix C. R&S Mixer Certificate



Calibration Certificate

Certificate Number 24-0140-101128-01

Kalibrierschein

Zertifikatsnummer

Unit Data

Item Harmonic Mixer, 90 GHz to 140 GHz
Gegenstand

Manufacturer RPG
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
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, 2018-09-03

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

2018-09-06

Head of Laboratory
Laborleitung

Schulze

Person Responsible
Bearbeiter

Dick

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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⁺⁷₋₃) °C

Working standards used (having a significant effect on the accuracy) Verwendete Gebrauchsnormale (mit signifikantem Einfluss auf die Genauigkeit)				
Item Gegenstand	Type Typ	Serial Number Seriennummer	Calibration Certificate Number Kalibrierscheinnummer	Cal. Due Kalibr. bis
Vector Network Analyzer	R&S® 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

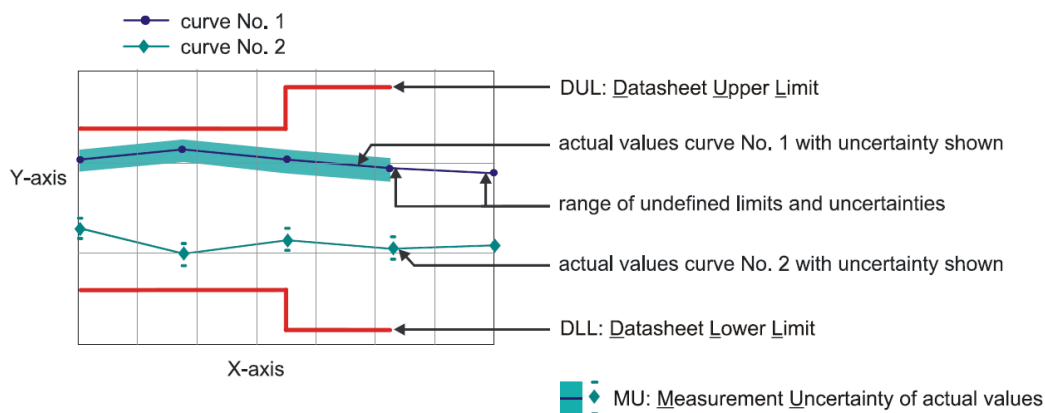
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is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

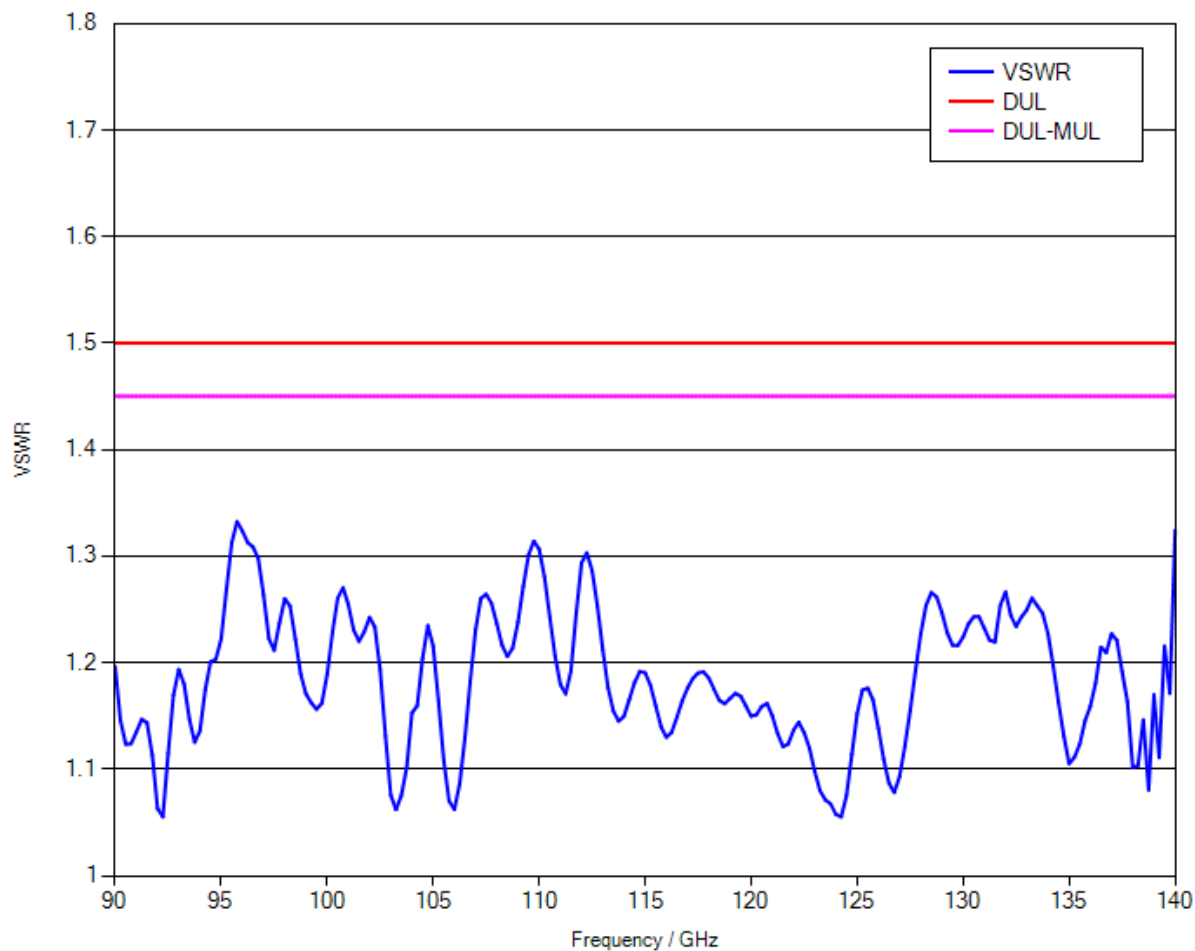
Explanation of charts



Software used for measurement**Item Type**Measurement Studio Professional Edition
MixerCertification**Version**2013
7_09**Remark**

1.1 RF Input – VSWR

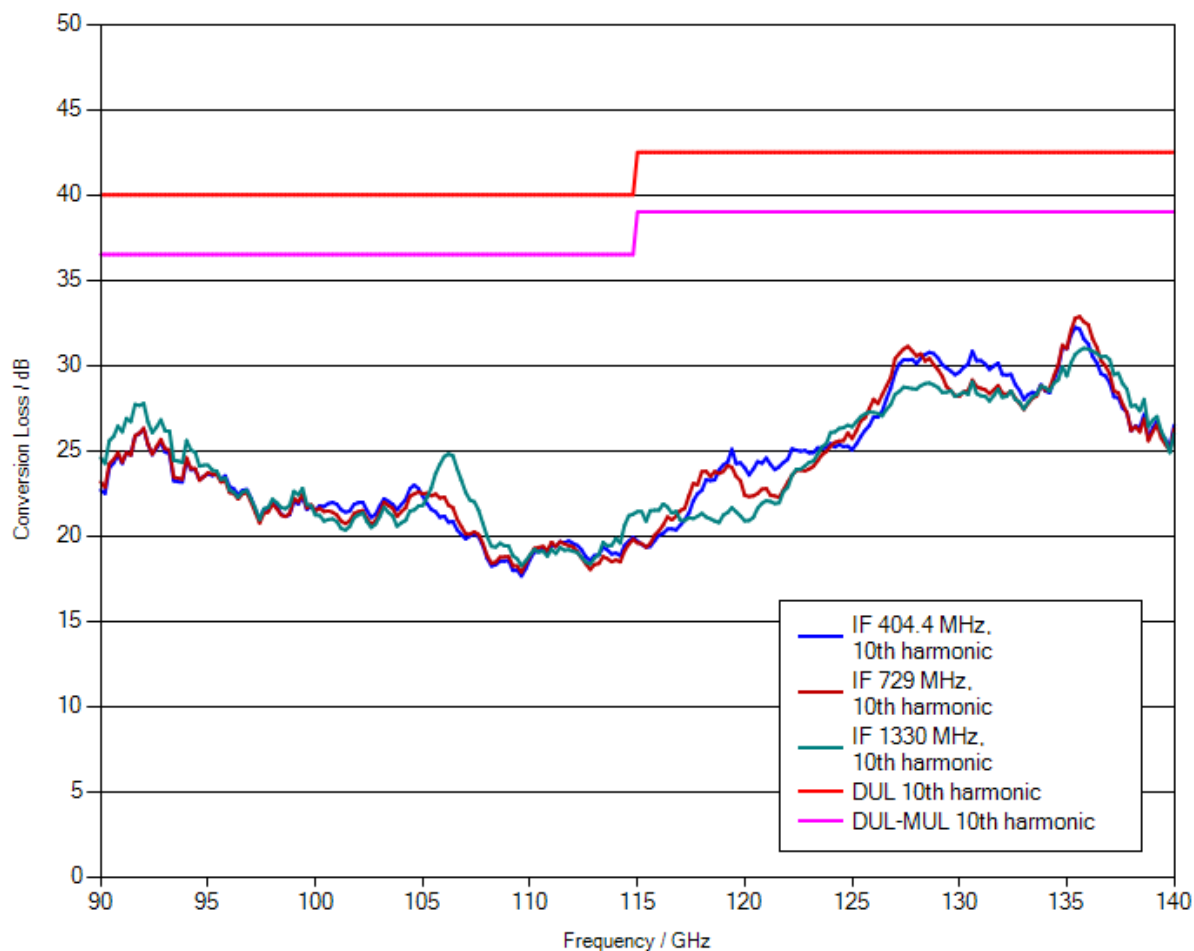
Measurement uncertainty: 0.05 (VSWR)



1.2 Conversion loss

LO level +14 dBm nominal
Bias 0 A

Measurement uncertainty: 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.

1.3 Frequency response within 1 GHz

	DUL	Actual (worst case)	Evaluation
IF = 404.4 MHz, 10th harmonic	6 dB	2.8 dB	PASS
IF = 729 MHz, 10th harmonic	6 dB	2.75 dB	PASS
IF = 1330 MHz, 10th harmonic	6 dB	2.62 dB	PASS



Calibration Certificate

Certificate Number 24-0220-101014-01

Kalibrierschein

Zertifikatsnummer

Unit Data

Item Harmonic Mixer, 140 GHz to 220 GHz
Gegenstand

Manufacturer RPG
Hersteller

Type RPG FS-Z220
Typ

Material Number 3593.3250.02 **Serial Number** 101014
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, 2018-08-27

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

2018-08-28

Head of Laboratory
Laborleitung

Schulze

Person Responsible
Bearbeiter

Heinze

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Vers2010-05-05/
RPG2014-02-28

Calibration Method
Kalibrieranweisung

RPG-PAQA-TN-2014-002

Relative Humidity 20 % - 80 %
Relative Luftfeuchte

Ambient Temperature
Umgebungstemperatur

(23⁺⁷₋₃) °C

Working standards used (having a significant effect on the accuracy) Verwendete Gebrauchsnormale (mit signifikantem Einfluss auf die Genauigkeit)				
Item Gegenstand	Type Typ	Serial Number Seriennummer	Calibration Certificate Number Kalibrierscheinnummer	Cal. Due Kalibr. bis
Vector Network Analyzer	R&S® 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

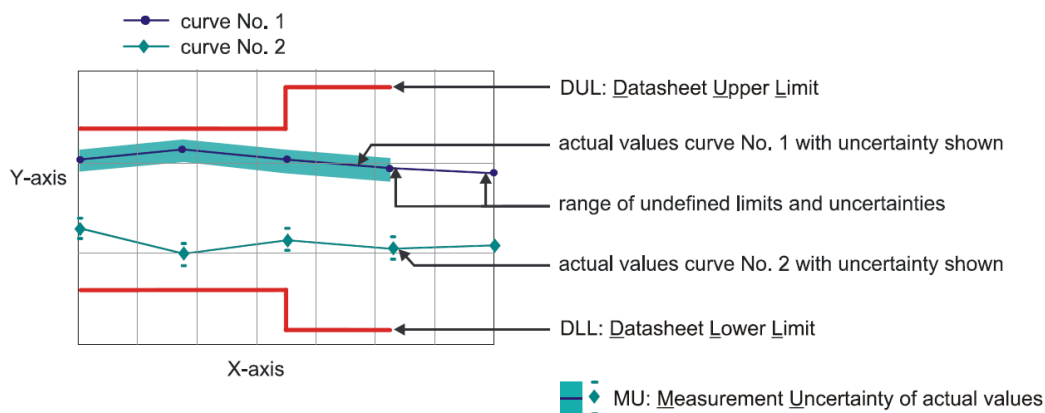
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is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

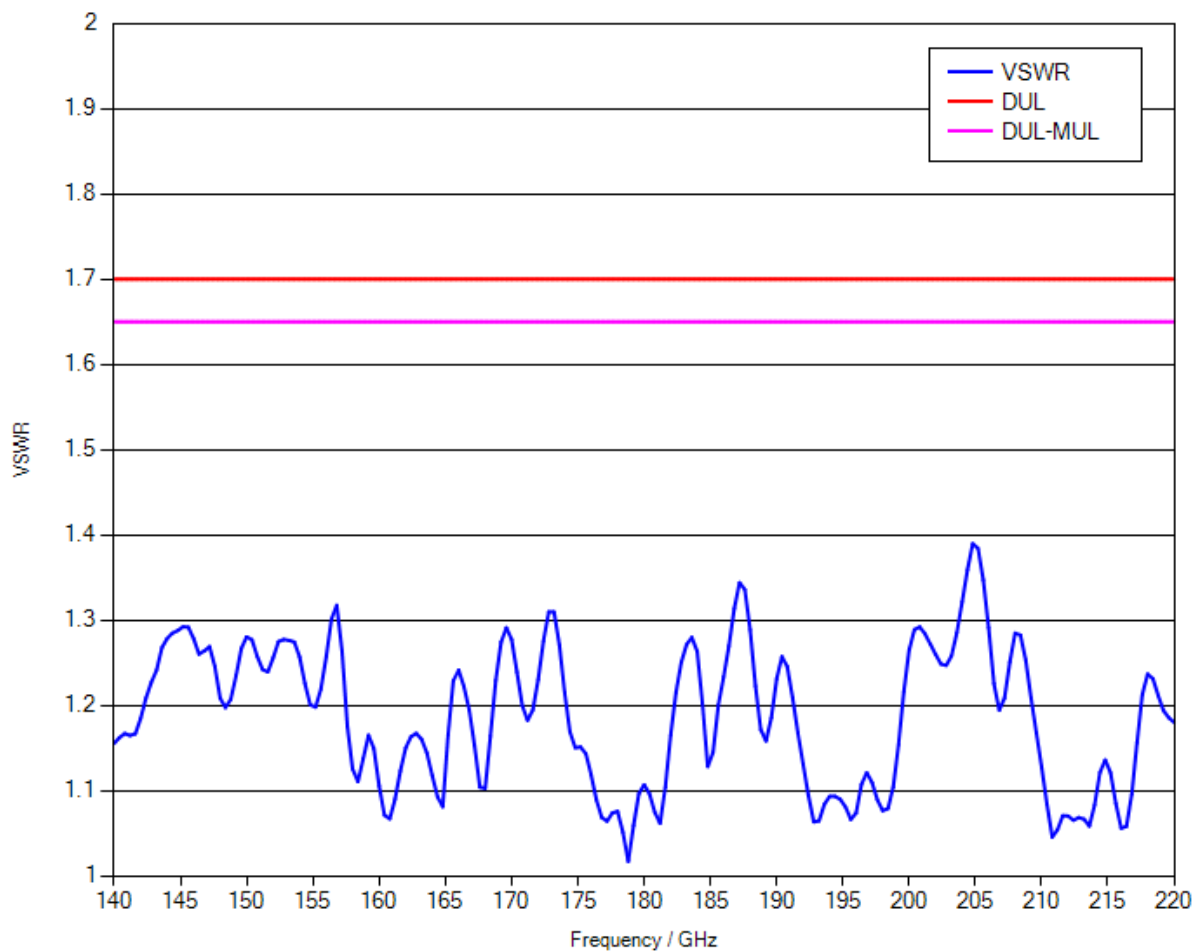
Version

2013
7_09

Remark

1.1 RF Input – VSWR

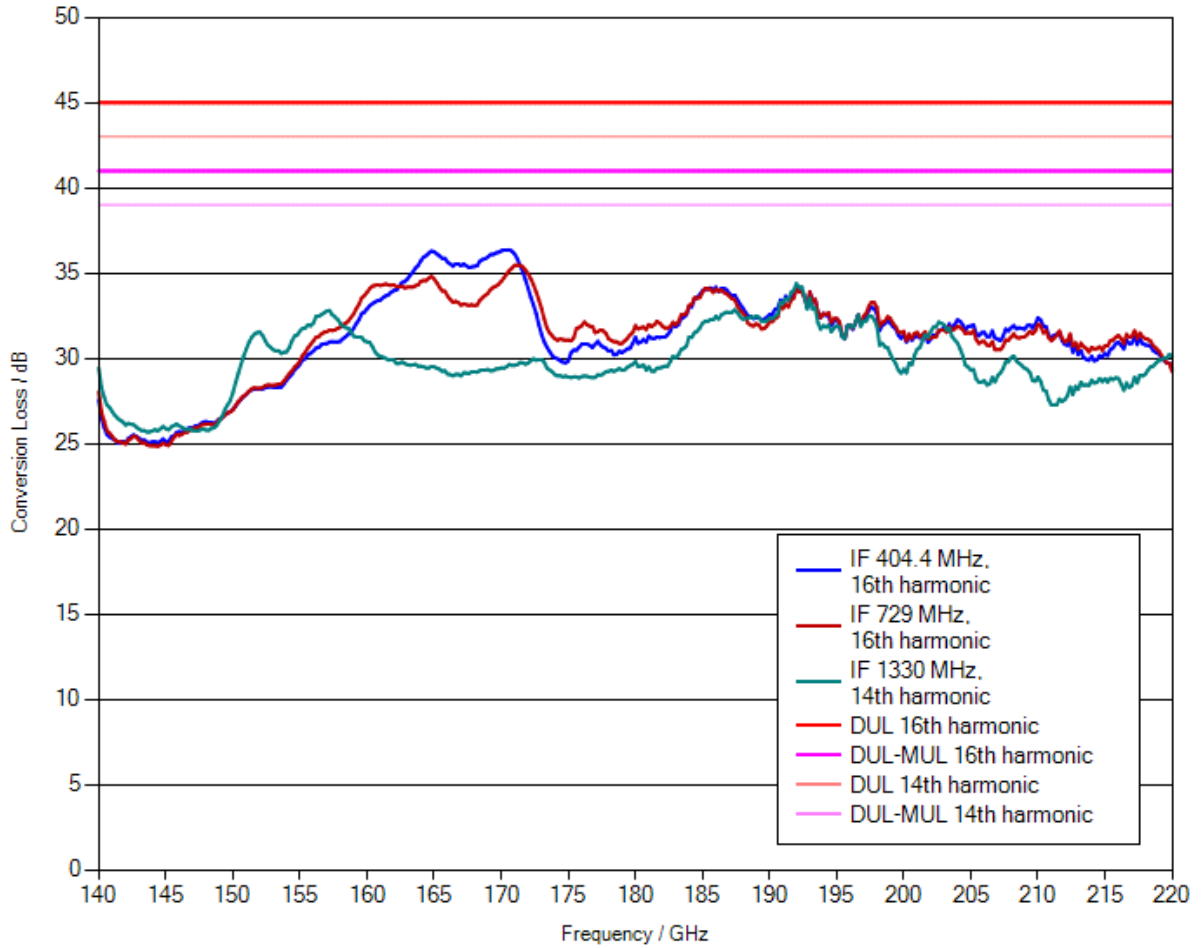
Measurement uncertainty: 0.05 (VSWR)



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	2.71 dB	PASS
IF = 729 MHz, 16th harmonic	6 dB	2.61 dB	PASS
IF = 1330 MHz, 14th harmonic	6 dB	2.61 dB	PASS



Calibration Certificate

Certificate Number **24-0060-100986-01**

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** 100986
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, 2018-10-31

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

2018-11-05

Head of Laboratory
Laborleitung

Schulze

Person Responsible
Bearbeiter

Heinze

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Vers2010-05-05/
RPG2014-02-28

Calibration Method
Kalibrieranweisung

RPG-PAQA-TN-2014-002

Relative Humidity 20 % - 80 %
Relative Luftfeuchte

Ambient Temperature
Umgebungstemperatur

(23 ⁺⁷/₋₃) °C

Working standards used (having a significant effect on the accuracy) Verwendete Gebrauchsnormale (mit signifikantem Einfluss auf die Genauigkeit)				
Item Gegenstand	Type Typ	Serial Number Seriennummer	Calibration Certificate Number Kalibrierscheinnummer	Cal. Due Kalibr. bis
Vector Network Analyzer	R&S® ZVA67	101097	20-300432406	2020-07-21
Powersensor	R&S® NRP-Z55	140093	20-300426315	2019-05-17
Powersensor	R&S® NRP-Z57	101423	20-541799	2019-04-27
Calibration Kit	WR19	U10001	24-0060-U10001-01	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

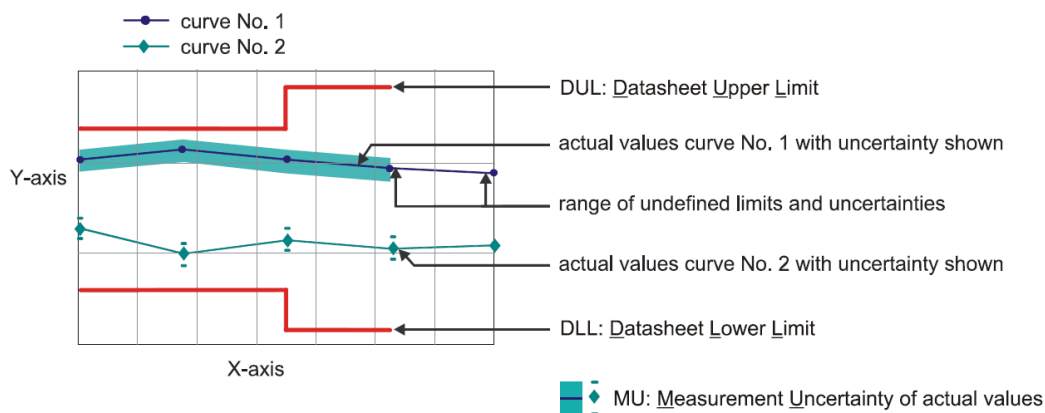
If the new product is stored under the climate conditions as specified in the data sheet upon delivery, the product's accuracy is not significantly affected within 12 month after its calibration in our factory. In this case, the recommended calibration interval starts on the date when the product is 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.
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- DL or DT Data Limit for symmetrical tolerance limits
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- Nom. Nominal Value
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- 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

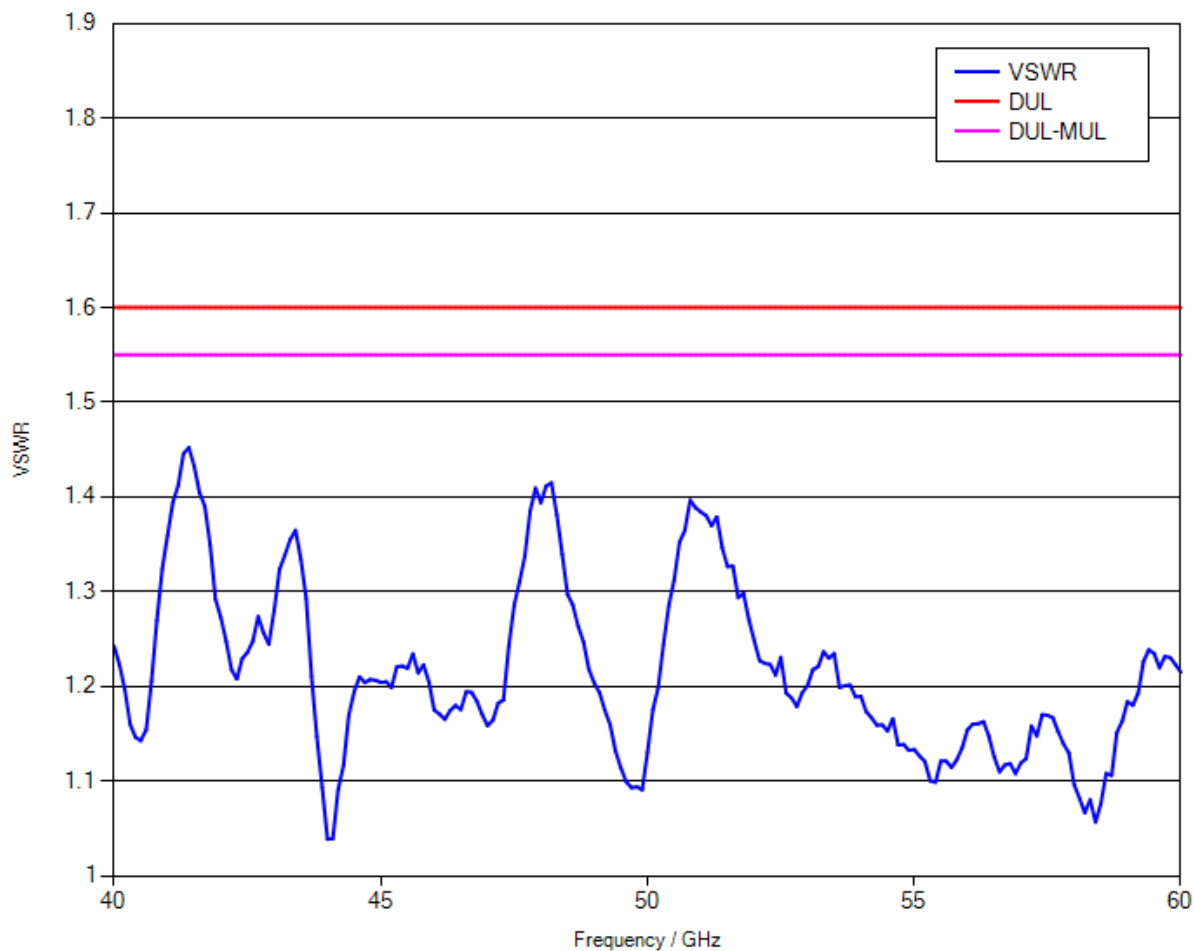
Version

2013
7_09

Remark

1.1 RF Input – VSWR

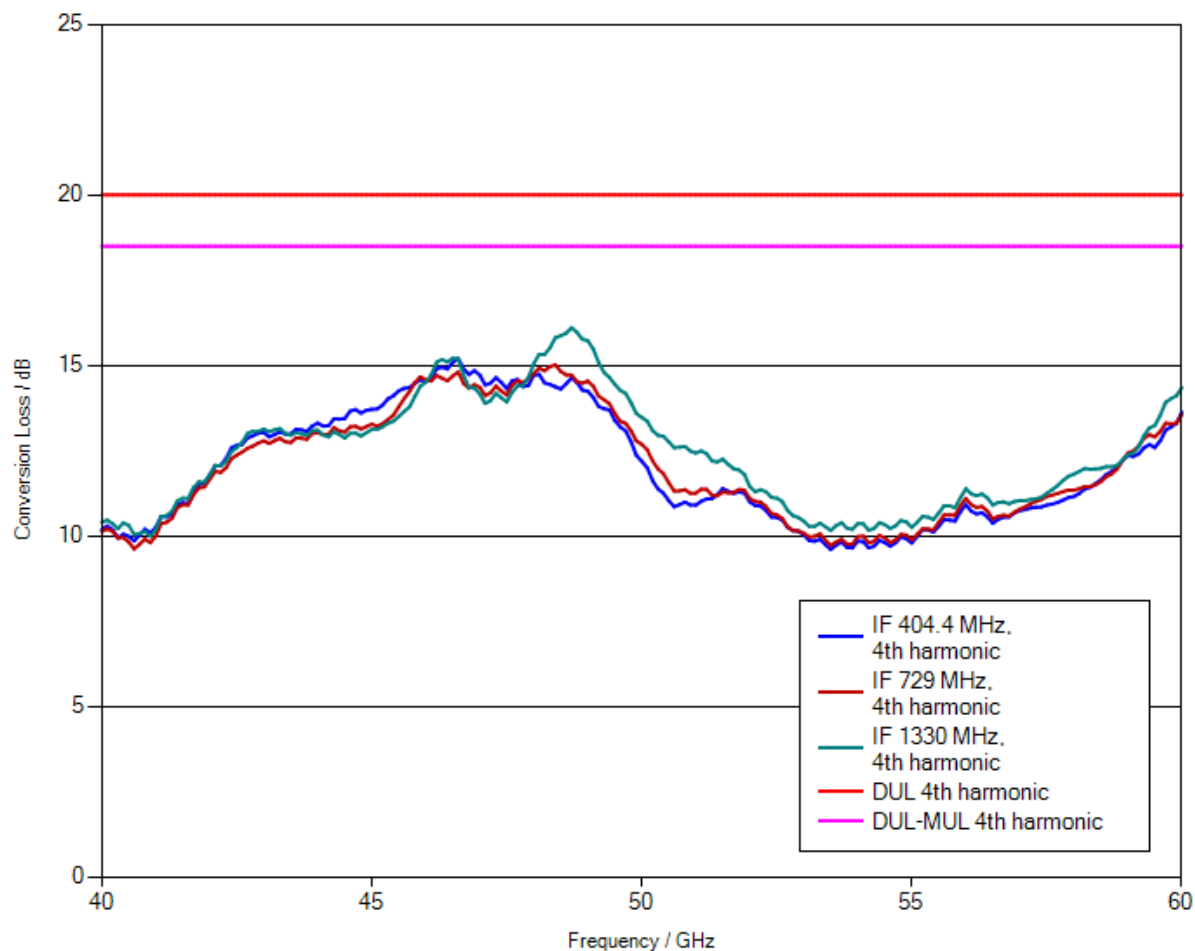
Measurement uncertainty: 0.05 (VSWR)



1.2 Conversion loss

LO level +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.

1.3 Frequency response within 1 GHz

	DUL	Actual (worst case)	Evaluation
IF = 404.4 MHz, 4th harmonic	4 dB	2.32 dB	PASS
IF = 729 MHz, 4th harmonic	4 dB	1.99 dB	PASS
IF = 1330 MHz, 4th harmonic	4 dB	2.14 dB	PASS

Calibration Certificate
 Kalibrierschein

Certificate Number 24-0090-101811-01
 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 **101811**

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

Performance

 Place and Date of Calibration
Ort und Datum der Kalibrierung

 Scope of Calibration
Umfang der Kalibrierung

 Statement of Compliance
(Incoming)
Konformitätsaussage
(Anlieferung)

 Statement of Compliance
(Outgoing)
Konformitätsaussage
(Auslieferung)

 Extend of Calibration Documents
Umfang des Kalibrierdokuments

Meckenheim, 2018-07-16
Standard Calibration
New device
All measured values are within the data sheet specifications.
2 pages Calibration Certificate
5 pages Outgoing Results

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 Wertintervall (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.

Radiometer Physics GmbH; Meckenheim

 Date of Issue
Ausstellungsdatum

2018-07-19

 Head of Laboratory
Laborleitung

Ceru

 Person Responsible
Bearbeiter

Grossmindorf

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

Material Number 1048.0371.02

Serial Number 101811

Certificate Number 24-0090-101811-01

Calibration Method
Kalibrieranweisung

RPG-PAQA-TN-2014-002

Relative Humidity 20 % - 80 %
Relative LuftfeuchteAmbient Temperature
Umgebungstemperatur(23 ⁺⁷₋₃) °CWorking 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	20-611482	2018-07-21
Calibration kit	WR12	E10001	RPG-PAQA-TN-2014-005	2019-02-01

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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

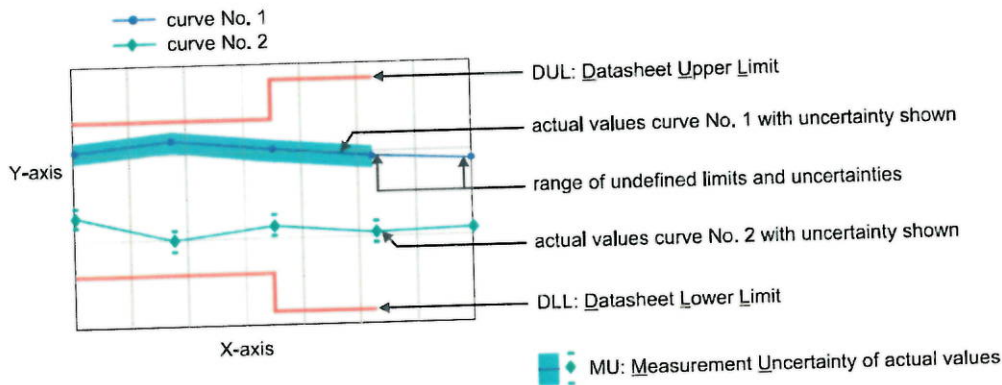
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- DU Datasheet Uncertainty

Explanation of charts



Software used for measurement

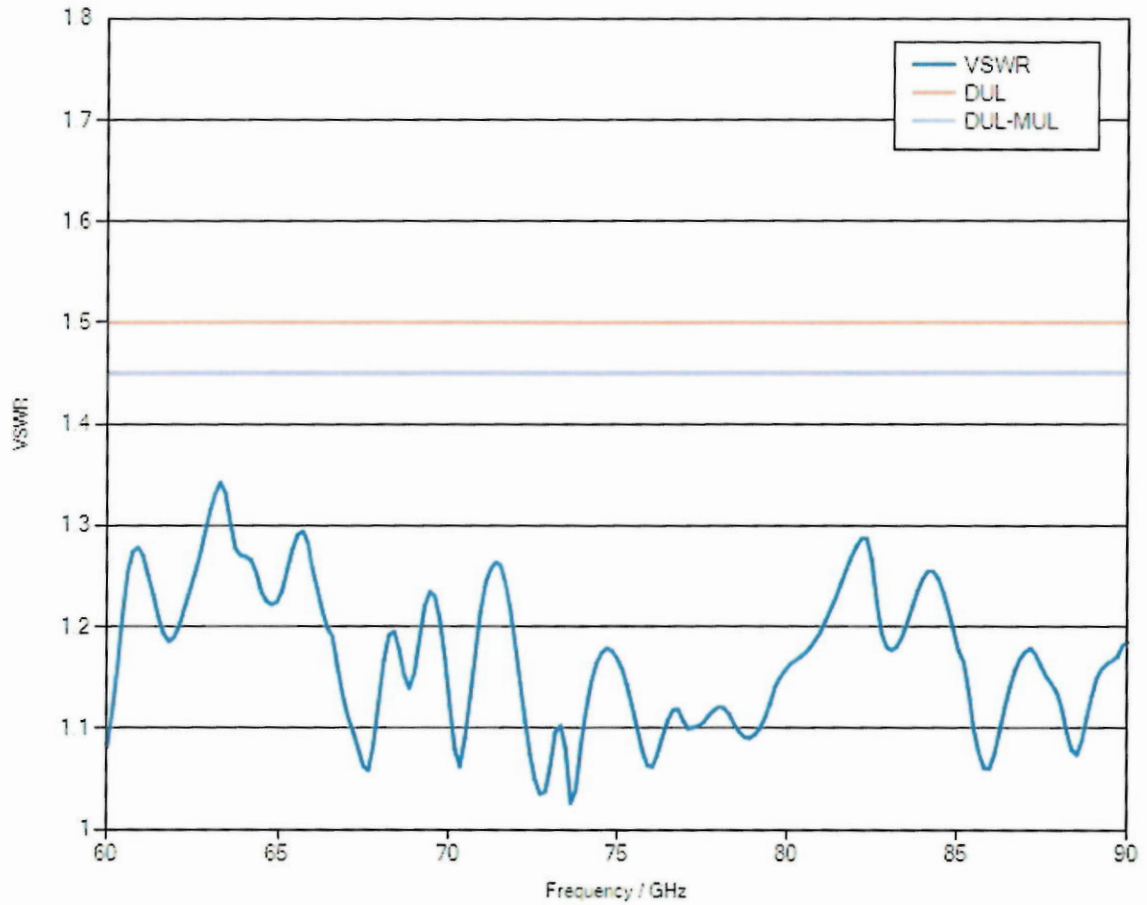
Item Type
Measurement Studio Professional Edition
MixerCertification

Version
2013
7_08

Remark

1.1 RF Input – VSWR

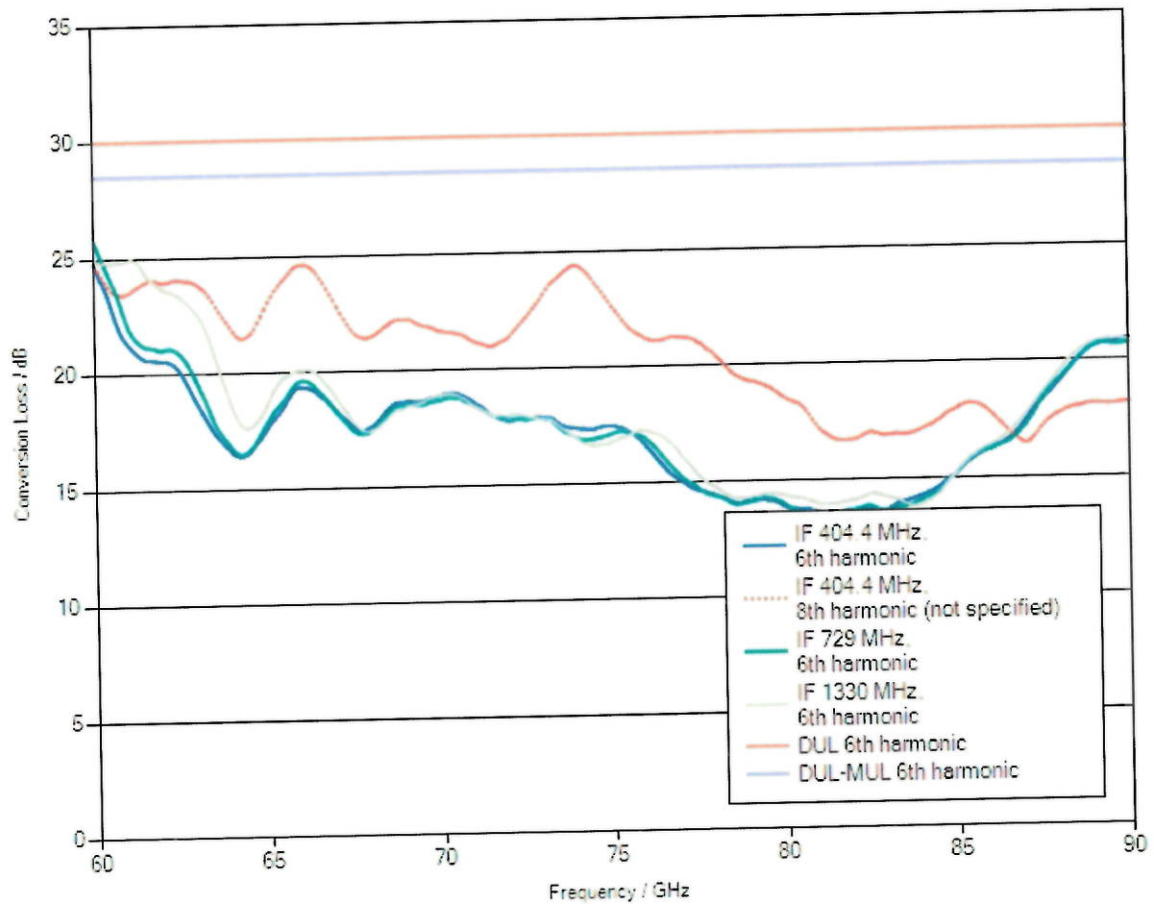
Measurement uncertainty: 0.05 (VSWR)



1.2 Conversion loss

LO level +14 dBm nominal
Bias 0 A

Measurement uncertainty: 1.5 dB



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1.3 Frequency response within 1 GHz

	DUL	Actual (worst case)	Evaluation
IF = 404.4 MHz, 6th harmonic	6 dB	3.29 dB	PASS
IF = 404.4 MHz, 8th harmonic	not specified	2.25 dB	not specified
IF = 729 MHz, 6th harmonic	6 dB	3.47 dB	PASS
IF = 1330 MHz, 6th harmonic	6 dB	3.84 dB	PASS