



# FCC RF Test Report

**APPLICANT** : Xiaomi Communications Co., Ltd.  
**EQUIPMENT** : Mobile Phone  
**BRAND NAME** : Xiaomi  
**MODEL NAME** : M2102K1G  
**FCC ID** : 2AFZZK1G  
**STANDARD** : 47 CFR Part 2, 22, 27  
**CLASSIFICATION** : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Dec. 30, 2020 and completely tested on Feb. 01, 2021. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Reviewed by: Jason Jia / Supervisor

Approved by: James Huang / Manager



**Sporton International (Kunshan) Inc.**

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300  
People's Republic of China**



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## SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(5)	Effective Radiated Power (5G NR n5)	ERP < 7 Watt		
	§27.50(h)(2)	Equivalent Isotropic Radiated Power (5G NR n7, n41)	EIRP < 2Watt		
	§27.50(j)(3)	Equivalent Isotropic Radiated Power (5G NR n77, n78)	EIRP < 1Watt		
3.5	§27.50(j)(4)	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §27.53(l)(2)	Conducted Band Edge Measurement (5G NR n5) (5G NR n77, n78)	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
	§27.53(m)(4)	Conducted Band Edge Measurement (5G NR n7, n41)	§27.53(m)(4)		
3.8	§2.1051 §22.917(a) §27.53(l)(2)	Conducted Spurious Emission (5G NR n5) (5G NR n77, n78)	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
	§2.1051 §27.53(m)(4)	Conducted Spurious Emission (5G NR n7, n41)	< 55+10log <sub>10</sub> (P[Watts])		
3.9	§2.1055 §22.355	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22	PASS	-
	§27.54		Within Authorized Band		
4.4	§2.1053 §22.917(a) §27.53(l)(2)	Radiated Spurious Emission (5G NR n5) (5G NR n77, n78)	< 43+10log <sub>10</sub> (P[Watts])	PASS	Under limit 15.96 dB at 7632.000 MHz
	§2.1053 §27.53(m)(4)	Radiated Spurious Emission (5G NR n7, n41)	< 55+10log <sub>10</sub> (P[Watts])		

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



# 1 General Description

## 1.1 Applicant

Xiaomi Communications Co., Ltd.

#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

## 1.2 Manufacturer

Xiaomi Communications Co., Ltd.

#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	Xiaomi
Model Name	M2102K1G
FCC ID	2AFZZK1G
EUT supports Radios application	GSM/WCDMA/LTE/5G NR WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 2.4GHz 802.11ax HE20/HE40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/VHT160 WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160 WLAN 6GHz 802.11ax HE20/HE40/HE80/HE160 Bluetooth BR / EDR / LE NFC / GNSS / WPT
IMEI Code	Conducted : N/A Radiation : 861487050008132/861487050008140
HW Version	P2
SW Version	MIUI12
EUT Stage	Identical Prototype

**Remark:**

Only 5G NR bands are tested in this report, all the other RF bands are tested in the other reports separately.

### 1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
<b>Tx Frequency</b>	5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n77: 3700 MHz ~ 3980MHz 5G NR n78: 3700 MHz ~ 3800 MHz
<b>Rx Frequency</b>	5G NR n5 : 869 MHz ~ 894 MHz 5G NR n7 : 2620 MHz ~ 2690 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n77: 3700 MHz ~ 3980MHz 5G NR n78: 3700 MHz ~ 3800 MHz
<b>Bandwidth</b>	n5, n7: 5MHz / 10MHz / 15MHz / 20MHz n41 : 20MHz / 30MHz / 40MHz / 50MHz / 60MHz / 80MHz / 90MHz / 100MHz n77, n78 : 20MHz / 30MHz / 40MHz / 50MHz / 60MHz / 70MHz / 80MHz / 90MHz / 100MHz
<b>SCS</b>	n5, n7: 15kHz n41, n77, n78: 30kHz
<b>Antenna Gain</b>	<b>Ant. 1:</b> 5G NR n5: -3.37 dBi <b>Ant. 6:</b> 5G NR n7: -2.97 dBi <b>Ant. 9:</b> 5G NR n41: -2.63 dBi 5G NR n77: -1.18 dBi 5G NR n78: -1.18 dBi
<b>Type of Modulation</b>	CP-OFDM: QPSK / 16QAM / 64QAM / 256QAM DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM

**Remark:**

1. 5G NR n77 supports HPUE.
2. 5G NR n41/n77 support UL MIMO mode, and only supports CP-OFDM modulation in UL MIMO mode.
3. The maximum ERP/EIRP is calculated from max output power and max antenna gain, only the maximum ERP/EIRP is shown in the report.
4. 5G NR supports SA and NSA mode (refer to the Operation Description). According to the maximum power, perform all test for conducted items of SA mode, and NSA mode verify the worst of SA mode, only record the SA conducted test data in the report.
5. For EN-DC mode and SA mode, the different modes match with different antenna combination. Pre-scanned harmonic for RSE testing, we choice worse case of antenna combination to full test.
6. The EN-DC mode combination could be referred to the product spec.
7. For 5G NR n41/n77 supports another type of Power Amplifier, so we have assessed maximum power of the Antenna combination to verify for conducted test items.



### 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

### 1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

5G NR n5		PI/2 BPSK / QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)
20	834.0 ~ 839.0	19M4G7D	0.0933	19M3W7D	0.0774
Frequency Tolerance (ppm)		0.0095			

5G NR n7		PI/2 BPSK / QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
20	2510.0 ~ 2560.0	19M4G7D	0.1726	19M3W7D	0.1377
Frequency Tolerance (ppm)		0.0022			

5G NR n41 Ant. 2 for PA		PI/2 BPSK / QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
100	2546.01 ~ 2640.00	97M3G7D	0.2070	97M3W7D	0.1718
Frequency Tolerance (ppm)		0.0026			

5G NR n41 Ant. 3 for PA		PI/2 BPSK / QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
100	2546.01 ~ 2640.00	96M5G7D	0.2070	96M9W7D	0.1718
Frequency Tolerance (ppm)		0.0026			

5G NR n41_UL MIMO		QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
100	2546.01 ~ 2640.00	97M7G7D	0.1778	97M3W7D	0.1607
Frequency Tolerance (ppm)		0.0038			



5G NR n77 Ant. 4 for PA		PI/2 BPSK / QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
100	3750.0 ~ 3930.0	97M9G7D	0.4018	98M3W7D	0.3013
Frequency Tolerance (ppm)		0.0023			

5G NR n77 Ant. 8 for PA		PI/2 BPSK / QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
100	3750.0 ~ 3930.0	98M1G7D	0.4018	98M1W7D	0.3013
Frequency Tolerance (ppm)		0.0024			

5G NR n77_UL MIMO		QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
100	3750.0 ~ 3930.0	97M5G7D	0.4276	97M7W7D	0.4121
Frequency Tolerance (ppm)		0.0030			

5G NR n78		PI/2 BPSK / QPSK		16QAM / 64QAM / 256QAM	
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
100	3750.0 ~ 3750.0	98M1G7D	0.4018	98M3W7D	0.3013
Frequency Tolerance (ppm)		0.0024			

Note:

1. 5G NR Band n77 overlaps the entire frequency range of Band n78. Therefore, the test results provided in this report covers Band n77 as well as Band n78.
2. Based on engineering evaluation, only the maximum bandwidth and the worst modulation test results are shown in the report.



### 1.7 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

<b>Test Firm</b>	Sporton International (Kunshan) Inc.		
<b>Test Site Location</b>	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Designation No.</b>	<b>FCC Test Firm Registration No.</b>
	03CH04-KS TH01-KS	CN1257	314309

### 1.8 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24a

### 1.9 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2, 22, 27
- ♦ ANSI C63.26-2015
- ♦ FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01

**Remark:**

All test items were verified and recorded according to the standards and without any deviation during the test.

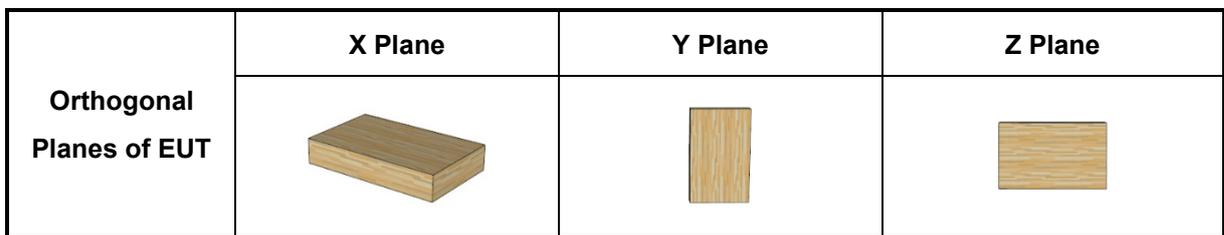
## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

Antenna port conducted and radiated test items are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.

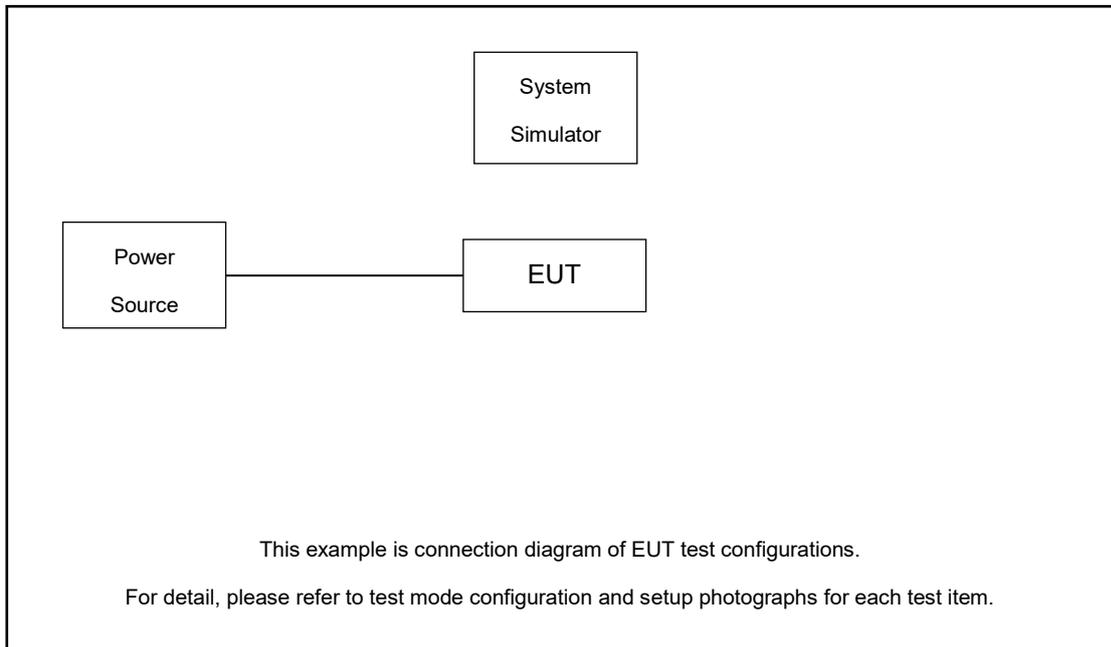


Test Items	5G NR	Bandwidth (MHz)						Modulation					RB #		Test Channel			
		5	10	15	20	30-90	100	PI/2 BPSK	QPSK	16QAM	64QAM	256 QAM	1	Full	L	M	H	
Max. Output Power	n5	v	v	v	v	-	-	v	v	v	v	v	v	v	v	v	v	v
	n7	v	v	v	v	-	-	v	v	v	v	v	v	v	v	v	v	v
	n41	-	-	-	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	n77	-	-	-	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	n78	-	-	-	v	v	v	v	v	v	v	v	v	v	v	v	v	v
Peak-to-Average Ratio	n5				v	-	-	v	v	v	v	v		v		v		
	n7				v	-	-	v	v	v	v	v		v		v		
	n41	-	-	-			v	v	v	v	v	v		v		v		
	n77	-	-	-			v	v	v	v	v	v		v		v		
26dB and 99% Bandwidth	n5				v	-	-		v	v				v		v		
	n7				v	-	-		v	v				v		v		
	n41	-	-	-			v		v	v				v		v		
	n77	-	-	-			v		v	v				v		v		
Conducted Band Edge	n5	v	v	v	v	-	-	v	v	v	v	v	v	v	v	v		v
	n7	v	v	v	v	-	-	v	v	v	v	v	v	v	v	v		v
	n41	-	-	-	v	v	v	v	v	v	v	v	v	v	v	v		v
	n77	-	-	-	v	v	v	v	v	v	v	v	v	v	v	v		v



Test Items	5G NR	Bandwidth (MHz)						Modulation					RB #		Test Channel		
		5	10	15	20	30-90	100	PI/2 BPSK	QPSK	16QAM	64QAM	256 QAM	1	Full	L	M	H
Conducted Spurious Emission	n2	v	v	v	v	-	-		v				v		v	v	v
	n5	v	v	v	v	-	-		v				v		v	v	v
	n41	-	-	-	v	v	v		v				v		v	v	v
	n77	-	-	-	v	v	v		v				v		v	v	v
Frequency Stability	n5				v	-	-		v				v			v	
	n7				v	-	-		v				v			v	
	n41	-	-	-			v		v				v			v	
	n77	-	-	-			v		v				v			v	
E.R.P / E.I.R.P	n5	v	v	v	v	-	-	v	v	v	v	v	v	v	v	v	v
	n7	v	v	v	v	-	-	v	v	v	v	v	v	v	v	v	v
	n41	-	-	-	v	v	v	v	v	v	v	v	v	v	v	v	v
	n77	-	-	-	v	v	v	v	v	v	v	v	v	v	v	v	v
Radiated Spurious Emission	n5	Worst Case														v	
	n7	Worst Case														v	
	n41	Worst Case														v	
	n77	Worst Case														v	
Note	<ol style="list-style-type: none"> <li>The mark "v" means that this configuration is chosen for testing</li> <li>The mark "-" means that this bandwidth is not supported.</li> <li>The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.</li> <li>All modulations (BPSK/QPSK/16QAM/64QAM/256QAM) have been tested, and only the worst test results are shown in the report .</li> <li>All test items are based on engineering evaluation.</li> </ol>																

## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	DC Power Supply	GW	GPS-3030D	N/A	N/A	Unshielded, 1.8 m
2.	LTE Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m
3.	NR Base Station	Anritsu	MT8000A	N/A	N/A	Unshielded, 1.8 m

## 2.4 Measurement Results Explanation Example

### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss.

*Offset = RF cable loss.*

Following shows an offset computation example with cable loss 4.6 dB.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)}. \\ &= 4.6 \text{ (dB)} \end{aligned}$$



### 2.5 Frequency List of Low/Middle/High Channels

5G NR n5 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	166800	167300	167800
	Frequency	834	836.5	839
15	Channel	166300	167300	168300
	Frequency	831.5	836.5	841.5
10	Channel	165800	167300	168800
	Frequency	829	836.5	844
5	Channel	165300	167300	169300
	Frequency	826.5	836.5	846.5

5G NR n7 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	502000	507000	512000
	Frequency	2510	2535	2560
15	Channel	501500	507000	512500
	Frequency	2507.5	2535	2562.5
10	Channel	501000	507000	513000
	Frequency	2505	2535	2565
5	Channel	500500	507000	513500
	Frequency	2502.5	2535	2567.5



5G NR n41 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
100	Channel	509202	518598	528000
	Frequency	2546.01	2592.99	2640
90	Channel	508200	518598	528996
	Frequency	2541	2592.99	2644.98
80	Channel	507204	518598	529998
	Frequency	2536.02	2592.99	2649.99
60	Channel	505200	518598	531996
	Frequency	2526	2592.99	2659.98
50	Channel	504204	518598	532998
	Frequency	2521.02	2592.99	2664.99
40	Channel	503202	518598	534000
	Frequency	2516.01	2592.99	2670
30	Channel	502200	518598	534996
	Frequency	2511	2592.99	2674.98
20	Channel	501204	518598	535998
	Frequency	2506.02	2592.99	2679.99



5G NR n77 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
100	Channel	650000	656000	662000
	Frequency	3750	3840	3930
90	Channel	649668	656000	662334
	Frequency	3745.02	3840	3935.01
80	Channel	649334	656000	662668
	Frequency	3740.01	3840	3940.02
70	Channel	649000	656000	663000
	Frequency	3735	3840	3945
60	Channel	648668	656000	663334
	Frequency	3730.02	3840	3950.01
50	Channel	648334	656000	663668
	Frequency	3725.01	3840	3955.02
40	Channel	648000	656000	664000
	Frequency	3720	3840	3960
30	Channel	647668	656000	664334
	Frequency	3715.02	3840	3965.01
20	Channel	647334	656000	664668
	Frequency	3710.01	3840	3970.02



5G NR n78 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
100	Channel	650000		
	Frequency	3750		
90	Channel	649668	650000	650334
	Frequency	3745.02	3750	3755.01
80	Channel	649334	650000	650668
	Frequency	3740.01	3750	3760.02
70	Channel	649000	650000	651000
	Frequency	3735	3750	3765
60	Channel	648668	650000	651334
	Frequency	3730.02	3750	3770.01
50	Channel	648334	650000	651668
	Frequency	3725.01	3750	3775.02
40	Channel	648000	650000	652000
	Frequency	3720	3750	3780
30	Channel	647668	650000	652334
	Frequency	3715.02	3750	3785.01
20	Channel	647334	650000	652668
	Frequency	3710.01	3750	3790.02

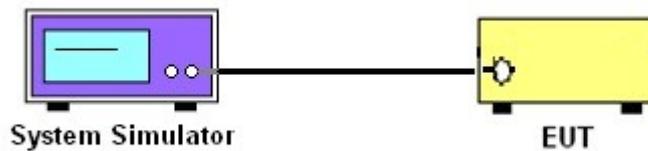
### 3 Conducted Test Items

#### 3.1 Measuring Instruments

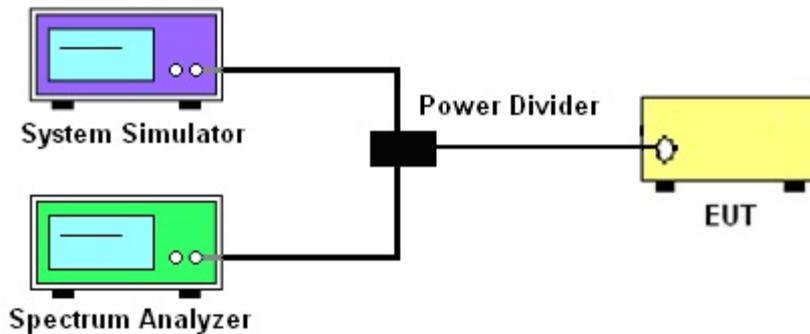
See list of measuring instruments of this test report.

#### 3.2 Test Setup

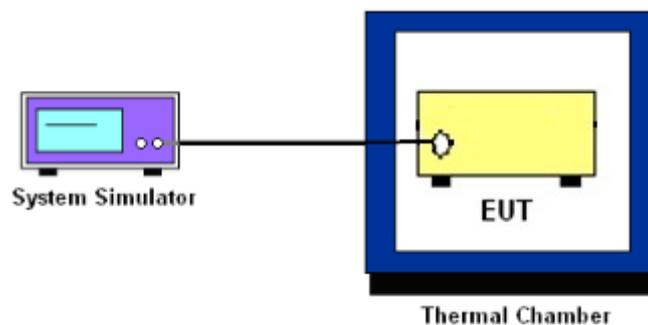
##### 3.2.1 Conducted Output Power



##### 3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



##### 3.2.3 Frequency Stability



### 3.3 Test Result of Conducted Test

Please refer to Appendix A.



### 3.4 Conducted Output Power and ERP/EIRP

#### 3.4.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for 5G NR n5.

The EIRP of mobile transmitters must not exceed 2 Watts for 5G NR n7 and n41.

The EIRP of mobile transmitters must not exceed 1 Watts for 5G NR n77 and n78.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$ ,  $ERP = EIRP - 2.15$ , where

$P_T$  = transmitter output power in dBm

$G_T$  = gain of the transmitting antenna in dBi

$L_C$  = signal attenuation in the connecting cable between the transmitter and antenna in dB

#### 3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.



### 3.5 Peak-to-Average Ratio

#### 3.5.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

#### 3.5.2 Test Procedures

##### For Band n5/n7:

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

##### For Band n41/n77:

1. The testing follows ANSI C63.26 Section 5.2.6 (PAPR).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set EUT in maximum power output.
4. Set the RBW = 1MHz, VBW = 3MHz, Detector = Peak, Trace mode = max hold, Set span  $\geq 2 \times$  OBW in spectrum analyzer.
5. Set the RBW = 1MHz, VBW = 3MHz, Detector = power averaging, Trace mode = max hold, Set span  $\geq 2 \times$  OBW in spectrum analyzer.
6. Add  $[10 \log (1/\text{duty cycle})]$  to the measured maximum power level to compute the average power during continuous transmission.
7.  $\text{PAPR (dB)} = P_{Pk} \text{ (dBm)} - P_{Avg} \text{ (dBm)}$

where

PAPR peak-to-average power ratio, in dB

$P_{Pk}$  measured peak power level, in dBm

$P_{Avg}$  measured average power level, in dBm

8. Record the deviation as Peak to Average Ratio.



## 3.6 Occupied Bandwidth

### 3.6.1 Description of Occupied Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

### 3.6.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace.  
(this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.



### 3.7 Conducted Band Edge

#### 3.7.1 Description of Conducted Band Edge Measurement

22.917(a)

For operations in the 824 – 849 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power P(Watts) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53(m)(4)

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

27.53(l)(2)

For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed  $-13$  dBm/MHz. Compliance with this paragraph is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz.



### 3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW  $\geq$  1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.

Example:

The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)} = -13\text{dBm}.$$

9. For 5G NR n7/n41, the other 40 dB, and 55 dB have additionally applied same calculation above.



### 3.8 Conducted Spurious Emission

#### 3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

For 5G NR n7/n41:

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least  $55 + 10 \log (P)$  dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10<sup>th</sup> harmonic.

#### 3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
7. Set spectrum analyzer with RMS detector.
8. Taking the record of maximum spurious emission.
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
10. The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)]$  (dB)  
 $= [30 + 10\log(P)]$  (dBm) -  $[43 + 10\log(P)]$  (dB)  
 $= -13$ dBm.
11. For 5G NR n7/n38/n41  
The limit line is derived from  $55 + 10\log(P)$ dB below the transmitter power P(Watts)  
 $= P(W) - [55 + 10\log(P)]$  (dB)  
 $= [30 + 10\log(P)]$  (dBm) -  $[55 + 10\log(P)]$  (dB)  
 $= -25$ dBm.



## 3.9 Frequency Stability

### 3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency.

### 3.9.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to  $-30^{\circ}\text{C}$  and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  step up to  $50^{\circ}\text{C}$ . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

### 3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at  $20\pm 5^{\circ}\text{C}$  and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

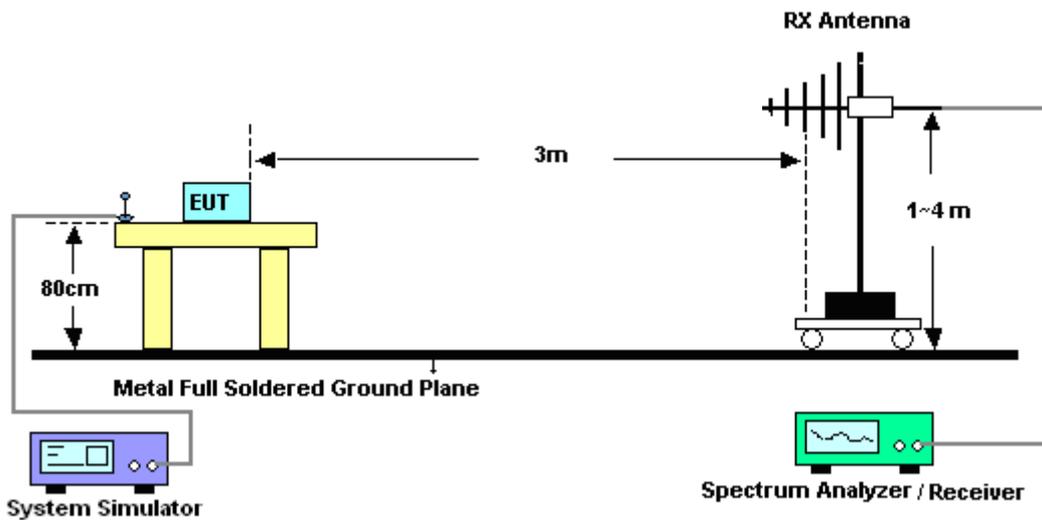
## 4 Radiated Test Items

### 4.1 Measuring Instruments

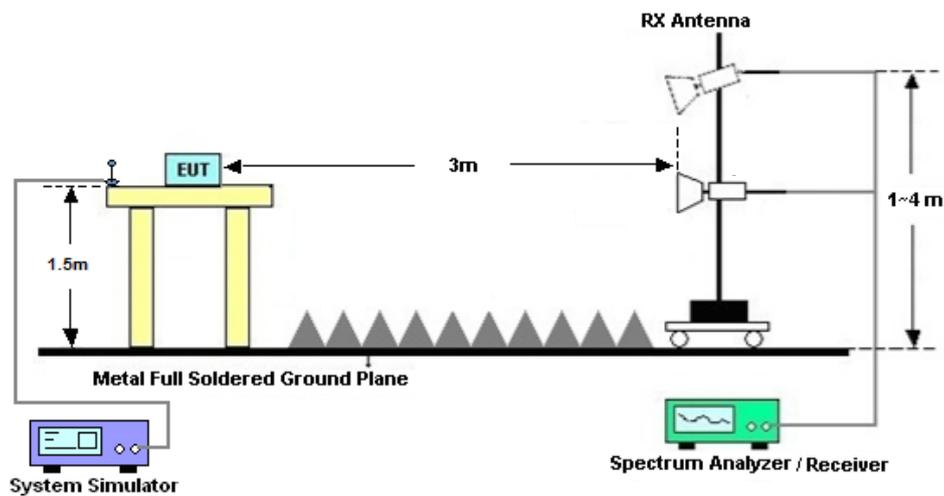
See list of measuring instruments of this test report.

### 4.2 Test Setup

#### 4.2.1 For radiated test from 30MHz to 1GHz



#### 4.2.2 For radiated test above 1GHz



### 4.3 Test Result of Radiated Test

Please refer to Appendix B.



## 4.4 Radiated Spurious Emission

### 4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

For 5G NR n7/n41

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $55 + 10 \log (P)$  dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10.  $EIRP (dBm) = S.G. Power - Tx Cable Loss + Tx Antenna Gain$
11.  $ERP (dBm) = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)] (dB)$   
 $= [30 + 10\log(P)] (dBm) - [43 + 10\log(P)] (dB)$   
 $= -13dBm.$

13. For 5G NR n7/n41:

The limit line is derived from  $55 + 10\log(P)$ dB below the transmitter power P(Watts)The limit line is derived from  $55 + 10\log(P)$ dB below the transmitter power P(Watts)



## 5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Nov. 01, 2020	Jan. 05, 2021~ Feb. 01, 2021	Oct. 31, 2021	Conducted (TH01-KS)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 03, 2020	Jan. 05, 2021~ Feb. 01, 2021	Jul. 02, 2021	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 15, 2020	Jan. 08, 2021	Apr. 14, 2021	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Jun. 08, 2020	Jan. 08, 2021	Jun. 07, 2021	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1356	1GHz~18GHz	Apr. 20, 2020	Jan. 08, 2021	Apr. 19, 2021	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Jan. 06, 2021	Jan. 08, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 06, 2021	Jan. 08, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40G GA	060728	18~40GHz	Jan. 07, 2021	Jan. 08, 2021	Jan. 06, 2022	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00 101800-30-1 QP	2025788	1Ghz-18Ghz	Jan. 06, 2021	Jan. 08, 2021	Jan.05, 2022	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 14, 2020	Jan. 08, 2021	Oct. 13, 2021	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jan. 08, 2021	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jan. 08, 2021	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jan. 08, 2021	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required



## 6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.3dB
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.8dB
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### Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.8dB
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## Appendix A. Test Results of Conducted Test

### Conducted Output Power(Average power and EIRP)

5G NR n5 SA:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	ERP		
								L	M	H
Channel				166800	167300	167800				
Frequency (MHz)				834	836.5	839				
20	PI/2 BPSK	1	1	25.16	25.13	25.12	-3.37	0.0920	0.0914	0.0912
20	PI/2 BPSK	1	53	25.18	25.22	25.16		0.0925	0.0933	0.0920
20	PI/2 BPSK	1	104	24.92	24.82	24.63		0.0871	0.0851	0.0815
20	PI/2 BPSK	50	0	24.62	24.77	24.65	-3.37	0.0813	0.0841	0.0818
20	PI/2 BPSK	50	28	25.06	25.11	25.11	-3.37	0.0899	0.0910	0.0910
20	PI/2 BPSK	50	56	24.58	24.55	24.44	-3.37	0.0805	0.0800	0.0780
20	PI/2 BPSK	100	0	24.56	24.68	24.58		0.0802	0.0824	0.0805
20	QPSK	1	1	25.13	25.21	25.06	-3.37	0.0914	0.0931	0.0899
20	QPSK	1	53	24.96	24.93	25.16		0.0879	0.0873	0.0920
20	QPSK	1	104	24.86	24.58	24.69		0.0859	0.0805	0.0826
20	QPSK	50	0	24.12	24.21	24.16	-3.37	0.0724	0.0740	0.0731
20	QPSK	50	28	25.12	25.13	25.03	-3.37	0.0912	0.0914	0.0893
20	QPSK	50	56	23.25	23.06	23.93	-3.37	0.0593	0.0568	0.0693
20	QPSK	100	0	24.13	24.16	23.76		0.0726	0.0731	0.0667
20	16QAM	1	1	23.72	24.41	23.86	-3.37	0.0661	0.0774	0.0682
20	64QAM	1	1	22.78	22.95	22.52	-3.37	0.0532	0.0553	0.0501
20	256QAM	1	1	20.65	20.56	20.72	-3.37	0.0326	0.0319	0.0331
Channel				166300	167300	168300	Gain	L	M	H
Frequency (MHz)				831.5	836.5	841.5				
15	QPSK	1	1	24.96	25.11	24.86	-3.37	0.0879	0.0910	0.0859
15	16QAM	1	1	23.65	23.82	23.63	-3.37	0.0650	0.0676	0.0647
Channel				165800	167300	168800	Gain	L	M	H
Frequency (MHz)				829	836.5	844				
10	QPSK	1	1	24.92	24.96	24.85	-3.37	0.0871	0.0879	0.0857
10	16QAM	1	1	23.58	23.65	23.88	-3.37	0.0640	0.0650	0.0685
Channel				165300	167300	169300	Gain	L	M	H
Frequency (MHz)				826.5	836.5	846.5				
5	QPSK	1	1	25.12	25.12	24.86	-3.37	0.0912	0.0912	0.0859
5	16QAM	1	1	24.13	23.85	23.82	-3.37	0.0726	0.0681	0.0676



5G NR n7 SA:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	EIRP		
								L	M	H
Channel				502000	507000	512000				
Frequency (MHz)				2510	2535	2560				
20	PI/2 BPSK	1	1	25.11	24.93	24.86	-2.97	0.1637	0.1570	0.1545
20	PI/2 BPSK	1	53	25.01	25.02	25.06		0.1600	0.1603	0.1618
20	PI/2 BPSK	1	104	25.16	24.92	24.44		0.1656	0.1567	0.1403
20	PI/2 BPSK	50	0	24.83	24.66	24.83	-2.97	0.1535	0.1476	0.1535
20	PI/2 BPSK	50	28	25.21	24.93	25.22	-2.97	0.1675	0.1570	0.1679
20	PI/2 BPSK	50	56	24.79	24.77	24.96	-2.97	0.1521	0.1514	0.1581
20	PI/2 BPSK	100	0	24.73	24.83	24.96		0.1500	0.1535	0.1581
20	QPSK	1	1	25.33	25.32	25.34	-2.97	0.1722	0.1718	0.1726
20	QPSK	1	53	24.87	24.96	24.95		0.1549	0.1581	0.1578
20	QPSK	1	104	24.73	25.12	25.05		0.1500	0.1641	0.1614
20	QPSK	50	0	24.16	24.35	24.32	-2.97	0.1315	0.1374	0.1365
20	QPSK	50	28	25.32	24.86	25.02	-2.97	0.1718	0.1545	0.1603
20	QPSK	50	56	24.39	24.23	24.44	-2.97	0.1387	0.1337	0.1403
20	QPSK	100	0	24.29	24.21	24.41		0.1355	0.1330	0.1393
20	16QAM	1	1	23.43	24.36	24.32	-2.97	0.1112	0.1377	0.1365
20	64QAM	1	1	22.78	22.68	22.86	-2.97	0.0957	0.0935	0.0975
20	256QAM	1	1	20.52	20.86	20.78	-2.97	0.0569	0.0615	0.0604
Channel				501500	507000	512500	Gain	L	M	H
Frequency (MHz)				2507.5	2535	2562.5				
15	QPSK	1	1	24.89	24.78	24.92	-2.97	0.1556	0.1517	0.1567
15	16QAM	1	1	23.31	24.12	24.15	-2.97	0.1081	0.1303	0.1312
Channel				501000	507000	513000	Gain	L	M	H
Frequency (MHz)				2505	2535	2565				
10	QPSK	1	1	24.22	24.56	24.87	-2.97	0.1334	0.1442	0.1549
10	16QAM	1	1	23.21	24.12	24.13	-2.97	0.1057	0.1303	0.1306
Channel				500500	507000	513500	Gain	L	M	H
Frequency (MHz)				2502.5	2535	2567.5				
5	QPSK	1	1	24.86	24.23	24.76	-2.97	0.1545	0.1337	0.1510
5	16QAM	1	1	23.22	24.13	23.82	-2.97	0.1059	0.1306	0.1216



5G NR n41 SA:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	EIRP		
								L	M	H
Channel				509202	518598	528000				
Frequency (MHz)				2546.01	2592.99	2640				
100	PI/2 BPSK	1	1	25.51	25.37	25.36	-2.63	0.1941	0.1879	0.1875
100	PI/2 BPSK	1	137	25.65	24.85	25.20		0.2004	0.1667	0.1809
100	PI/2 BPSK	1	271	24.98	25.27	24.93		0.1718	0.1837	0.1698
100	PI/2 BPSK	135	0	25.26	25.11	25.01	-2.63	0.1832	0.1770	0.1730
100	PI/2 BPSK	135	69	25.40	24.88	25.33		0.1892	0.1679	0.1862
100	PI/2 BPSK	135	138	24.80	24.40	25.02		0.1648	0.1503	0.1734
100	PI/2 BPSK	270	0	24.88	24.85	25.10	-2.63	0.1679	0.1667	0.1766
100	QPSK	1	1	25.69	25.67	25.49	-2.63	0.2023	0.2014	0.1932
100	QPSK	1	137	25.52	24.99	25.66		0.1945	0.1722	0.2009
100	QPSK	1	271	24.67	25.11	25.02		0.1600	0.1770	0.1734
100	QPSK	135	0	24.78	24.66	24.49	-2.63	0.1641	0.1596	0.1535
100	QPSK	135	69	25.79	25.06	25.55		0.2070	0.1750	0.1959
100	QPSK	135	138	24.21	24.37	24.45		0.1439	0.1493	0.1521
100	QPSK	270	0	24.13	24.55	24.08	-2.63	0.1414	0.1556	0.1396
100	16QAM	1	1	24.58	24.98	24.45	-2.63	0.1567	0.1718	0.1521
100	64QAM	1	1	23.22	22.85	24.02	-2.63	0.1146	0.1052	0.1377
100	256QAM	1	1	20.95	21.44	20.43	-2.63	0.0679	0.0760	0.0603
Channel				508200	518598	528996	Gain	L	M	H
Frequency (MHz)				2541	2592.99	2644.98				
90	QPSK	1	1	25.36	25.27	25.15	-2.63	0.1875	0.1837	0.1786
90	16QAM	1	1	24.17	24.32	24.34	-2.63	0.1426	0.1476	0.1483
Channel				507204	518598	529998	Gain	L	M	H
Frequency (MHz)				2536.02	2592.99	2649.99				
80	QPSK	1	1	25.32	25.38	25.21	-2.63	0.1858	0.1884	0.1811
80	16QAM	1	1	24.10	24.39	24.26	-2.63	0.1403	0.1500	0.1455
Channel				505200	518598	531996	Gain	L	M	H
Frequency (MHz)				2526	2592.99	2659.98				
60	QPSK	1	1	25.63	25.50	25.38	-2.63	0.1995	0.1936	0.1884
60	16QAM	1	1	24.03	24.32	24.28	-2.63	0.1380	0.1476	0.1462
Channel				504204	518598	532998	Gain	L	M	H
Frequency (MHz)				2521.02	2592.99	2664.99				
50	QPSK	1	1	25.45	25.38	25.47	-2.63	0.1914	0.1884	0.1923
50	16QAM	1	1	24.17	24.18	24.32	-2.63	0.1426	0.1429	0.1476
Channel				503202	518598	534000	Gain	L	M	H
Frequency (MHz)				2516.01	2592.99	2670				
40	QPSK	1	1	25.73	25.47	25.48	-2.63	0.2042	0.1923	0.1928
40	16QAM	1	1	24.03	24.19	24.31	-2.63	0.1380	0.1432	0.1472
Channel				502200	518598	534996	Gain	L	M	H
Frequency (MHz)				2511	2592.99	2674.98				
30	QPSK	1	1	25.66	25.37	25.44	-2.63	0.2009	0.1879	0.1910
30	16QAM	1	1	24.03	24.07	24.32	-2.63	0.1380	0.1393	0.1476
Channel				501204	518598	535998	Gain	L	M	H
Frequency (MHz)				2506.02	2592.99	2679.99				
20	QPSK	1	1	25.59	25.08	25.42	-2.63	0.1977	0.1758	0.1901
20	16QAM	1	1	24.21	24.06	24.22	-2.63	0.1439	0.1390	0.1442



5G NR n41\_UL MIMO SA:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	EIRP		
								L	M	H
Channel				509202	518598	528000	0.38	0.1778	0.1742	0.1722
Frequency (MHz)				2546.01	2592.99	2640				
100	QPSK	1	1	22.12	22.03	21.98	0.38	0.1479	0.1585	0.1589
100	QPSK	1	271	21.32	21.62	21.63				
100	QPSK	137	68	21.82	21.52	21.58				
100	QPSK	1	0	20.36	20.44	20.36	0.38	0.1186	0.1208	0.1186
100	QPSK	1	272	19.98	20.11	20.21				
100	QPSK	273	0	20.13	20.21	20.06				
100	16QAM	1	1	21.68	21.53	21.55	0.38	0.1607	0.1552	0.1560
100	64QAM	1	1	20.32	20.12	20.03	0.38	0.1175	0.1122	0.1099
100	256QAM	1	1	16.92	17.06	16.96	0.38	0.0537	0.0555	0.0542
Channel				508200	518598	528996	Gain	L	M	H
Frequency (MHz)				2541	2592.99	2644.98				
90	QPSK	1	1	21.86	21.79	21.88	0.38	0.1675	0.1648	0.1683
90	16QAM	1	1	21.52	21.32	21.25	0.38	0.1549	0.1479	0.1455
Channel				507204	518598	529998	Gain	L	M	H
Frequency (MHz)				2536.02	2592.99	2649.99				
80	QPSK	1	1	21.86	21.52	21.62	0.38	0.1675	0.1549	0.1585
80	16QAM	1	1	21.36	21.06	21.13	0.38	0.1493	0.1393	0.1416
Channel				505200	518598	531996	Gain	L	M	H
Frequency (MHz)				2526	2592.99	2659.98				
60	QPSK	1	1	21.82	21.87	21.95	0.38	0.1660	0.1679	0.1710
60	16QAM	1	1	21.63	21.31	21.23	0.38	0.1589	0.1476	0.1449
Channel				504204	518598	532998	Gain	L	M	H
Frequency (MHz)				2521.02	2592.99	2664.99				
50	QPSK	1	1	21.88	21.86	21.92	0.38	0.1683	0.1675	0.1698
50	16QAM	1	1	21.53	21.22	21.26	0.38	0.1552	0.1445	0.1459
Channel				503202	518598	534000	Gain	L	M	H
Frequency (MHz)				2516.01	2592.99	2670				
40	QPSK	1	1	21.89	21.88	21.93	0.38	0.1687	0.1683	0.1702
40	16QAM	1	1	21.44	21.44	21.26	0.38	0.1521	0.1521	0.1459
Channel				502200	518598	534996	Gain	L	M	H
Frequency (MHz)				2511	2592.99	2674.98				
30	QPSK	1	1	21.95	21.86	21.96	0.38	0.1710	0.1675	0.1714
30	16QAM	1	1	21.52	21.23	21.26	0.38	0.1549	0.1449	0.1459
Channel				501204	518598	535998	Gain	L	M	H
Frequency (MHz)				2506.02	2592.99	2679.99				
20	QPSK	1	1	21.89	21.78	21.86	0.38	0.1687	0.1644	0.1675
20	16QAM	1	1	21.36	21.23	21.26	0.38	0.1493	0.1449	0.1459

Note: MIMO Gain= MaxGain+10log(N), N=2



5G NR n77 SA:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	EIRP		
								L	M	H
Channel				650000	656000	662000				
Frequency (MHz)				3750	3840	3930				
100	PI/2 BPSK	1	1	26.95	26.49	26.91	-1.18	0.3776	0.3396	0.3741
100	PI/2 BPSK	1	137	27.05	26.75	26.72		0.3864	0.3606	0.3581
100	PI/2 BPSK	1	271	27.03	27.11	26.89		0.3846	0.3917	0.3724
100	PI/2 BPSK	135	0	26.53	26.67	26.07	-1.18	0.3428	0.3540	0.3083
100	PI/2 BPSK	135	69	26.69	26.84	26.95		0.3556	0.3681	0.3776
100	PI/2 BPSK	135	138	26.28	26.47	26.31		0.3236	0.3381	0.3258
100	PI/2 BPSK	270	0	26.30	26.41	26.21	-1.18	0.3251	0.3334	0.3184
100	QPSK	1	1	27.22	27.16	27.19	-1.18	0.4018	0.3963	0.3990
100	QPSK	1	137	26.86	26.93	27.06		0.3698	0.3758	0.3873
100	QPSK	1	271	26.83	26.91	27.12		0.3673	0.3741	0.3926
100	QPSK	135	0	25.98	26.17	26.05	-1.18	0.3020	0.3155	0.3069
100	QPSK	135	69	27.07	27.06	27.14		0.3882	0.3873	0.3945
100	QPSK	135	138	25.95	26.36	26.05		0.2999	0.3296	0.3069
100	QPSK	270	0	25.65	26.28	25.72	-1.18	0.2799	0.3236	0.2844
100	16QAM	1	1	25.55	25.97	25.61	-1.18	0.2735	0.3013	0.2773
100	64QAM	1	1	24.48	24.35	24.51	-1.18	0.2138	0.2075	0.2153
100	256QAM	1	1	22.11	22.44	22.10	-1.18	0.1239	0.1337	0.1236
Channel				649668	656000	662334	Gain	L	M	H
Frequency (MHz)				3745.02	3840	3935.01				
90	QPSK	1	1	26.55	26.49	26.58	-1.18	0.3443	0.3396	0.3467
90	PI/2 BPSK	1	1	25.29	25.42	25.36	-1.18	0.2576	0.2655	0.2618
Channel				649334	656000	662668	Gain	L	M	H
Frequency (MHz)				3740.01	3840	3940.02				
80	QPSK	1	1	26.62	26.47	26.82	-1.18	0.3499	0.3381	0.3664
80	16QAM	1	1	25.17	25.28	25.72	-1.18	0.2506	0.2570	0.2844
Channel				649000	656000	663000	Gain	L	M	H
Frequency (MHz)				3735	3840	3945				
70	QPSK	1	1	26.58	26.49	26.47	-1.18	0.3467	0.3396	0.3381
70	16QAM	1	1	25.32	25.26	25.39	-1.18	0.2594	0.2559	0.2636
Channel				648668	656000	663334	Gain	L	M	H
Frequency (MHz)				3730.02	3840	3950.01				
60	QPSK	1	1	26.63	26.45	26.64	-1.18	0.3508	0.3365	0.3516
60	16QAM	1	1	25.15	25.30	25.57	-1.18	0.2495	0.2582	0.2748
Channel				648334	656000	663666	Gain	L	M	H
Frequency (MHz)				3725.01	3840	3954.99				
50	QPSK	1	1	26.59	26.53	26.41	-1.18	0.3475	0.3428	0.3334
50	16QAM	1	1	25.12	25.26	25.17	-1.18	0.2477	0.2559	0.2506
Channel				648000	656000	664000	Gain	L	M	H
Frequency (MHz)				3720	3840	3960				
40	QPSK	1	1	26.51	26.39	26.35	-1.18	0.3412	0.3319	0.3289
40	16QAM	1	1	25.31	25.19	25.42	-1.18	0.2588	0.2518	0.2655
Channel				647668	656000	664334	Gain	L	M	H
Frequency (MHz)				3715.02	3840	3965.01				
30	QPSK	1	1	26.80	26.98	27.06	-1.18	0.3648	0.3802	0.3873
30	16QAM	1	1	25.17	25.10	25.50	-1.18	0.2506	0.2466	0.2704
Channel				647334	656000	664668	Gain	L	M	H
Frequency (MHz)				3710.01	3840	3970.02				
20	QPSK	1	1	27.02	27.04	26.99	-1.18	0.3837	0.3855	0.3811
20	16QAM	1	1	25.27	25.12	25.42	-1.18	0.2564	0.2477	0.2655



5G NR n77\_UL MIMO SA:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Gain	EIRP		
								L	M	H
Channel				650000	656000	662000				
Frequency (MHz)				3750	3840	3930				
100	QPSK	1	1	24.35	24.33	24.48	1.83	0.4150	0.4130	0.4276
100	QPSK	1	271	24.22	24.22	24.41		0.4027	0.4027	0.4207
100	QPSK	137	68	24.13	24.23	24.32		0.3945	0.4036	0.4121
100	QPSK	1	0	23.52	23.69	23.65	1.83	0.3428	0.3565	0.3532
100	QPSK	1	272	23.68	23.83	23.92		0.3556	0.3681	0.3758
100	QPSK	273	0	24.13	24.21	24.23		0.3945	0.4018	0.4036
100	16QAM	1	1	24.22	24.25	24.32	1.83	0.4027	0.4055	0.4121
100	64QAM	1	1	23.53	23.63	23.59	1.83	0.3436	0.3516	0.3483
100	256QAM	1	1	20.36	20.63	20.55	1.83	0.1656	0.1762	0.1730
Channel				649668	656000	662334	Gain	L	M	H
Frequency (MHz)				3745.02	3840	3935.01				
90	QPSK	1	1	24.01	24.11	24.09	1.83	0.3837	0.3926	0.3908
90	16QAM	1	1	23.87	23.74	23.79	1.83	0.3715	0.3606	0.3648
Channel				649334	656000	662668	Gain	L	M	H
Frequency (MHz)				3740.01	3840	3940.02				
80	QPSK	1	1	24.03	24.21	24.06	1.83	0.3855	0.4018	0.3882
80	16QAM	1	1	23.93	24.12	23.98	1.83	0.3767	0.3936	0.3811
Channel				649000	656000	663000	Gain	L	M	H
Frequency (MHz)				3735	3840	3945				
70	QPSK	1	1	24.06	24.11	24.03	1.83	0.3882	0.3926	0.3855
70	16QAM	1	1	23.89	23.78	23.99	1.83	0.3882	0.3926	0.3855
Channel				648668	656000	663334	Gain	L	M	H
Frequency (MHz)				3730.02	3840	3950.01				
60	QPSK	1	1	24.06	24.23	24.03	1.83	0.3882	0.4036	0.3855
60	16QAM	1	1	23.95	24.12	23.95	1.83	0.3784	0.3936	0.3784
Channel				648334	656000	663668	Gain	L	M	H
Frequency (MHz)				3725.01	3840	3955.02				
50	QPSK	1	1	24.10	24.16	24.08	1.83	0.3917	0.3972	0.3899
50	16QAM	1	1	23.92	23.88	23.94	1.83	0.3758	0.3724	0.3776
Channel				648000	656000	664000	Gain	L	M	H
Frequency (MHz)				3720	3840	3960				
40	QPSK	1	1	24.22	24.12	24.19	1.83	0.4027	0.3936	0.3999
40	16QAM	1	1	24.01	24.02	23.98	1.83	0.3837	0.3846	0.3811
Channel				647668	656000	664334	Gain	L	M	H
Frequency (MHz)				3715.02	3840	3965.01				
30	QPSK	1	1	24.26	24.24	24.20	1.83	0.4064	0.4046	0.4009
30	16QAM	1	1	24.11	24.05	24.03	1.83	0.3926	0.3873	0.3855
Channel				647334	656000	664668	Gain	L	M	H
Frequency (MHz)				3710.01	3840	3970.02				
20	QPSK	1	1	24.22	24.15	24.06	1.83	0.4027	0.3963	0.3882
20	16QAM	1	1	24.15	24.12	24.01	1.83	0.3963	0.3936	0.3837

Note: MIMO Gain= MaxGain+10log(N), N=2



## 5G NR n5 SA

### Peak-to-Average Ratio

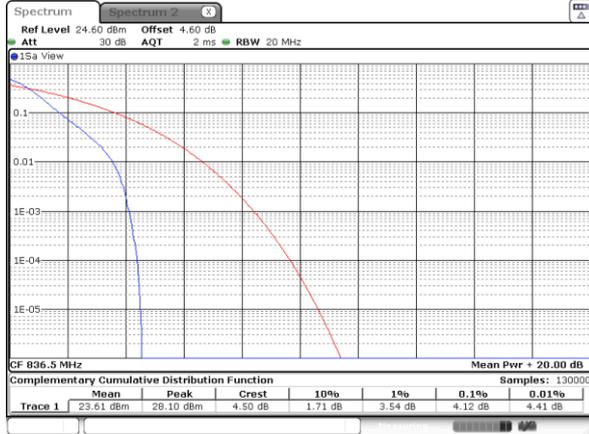
Mode	FR1 n5 / 20MHz / DFT-S OFDM				
Mod.	PI/2 BPSK	QPSK	16QAM	64QAM	Limit: 13dB
RB Size	Full RB	Full RB	Full RB	Full RB	Result
Middle CH	4.12	5.54	6.55	6.78	PASS
Mod.	256QAM				Limit: 13dB
RB Size	Full RB				Result
Middle CH	6.64				PASS



FR1 n5 / 20MHz / DFT-S OFDM

Middle Channel / Full RB

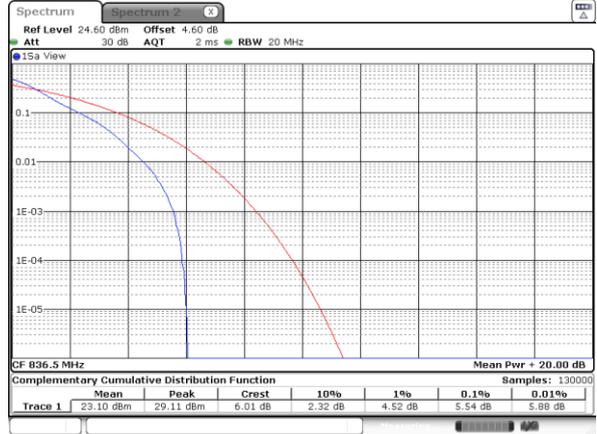
PI/2 BPSK



Date: 12 JAN 2021 16:41:19

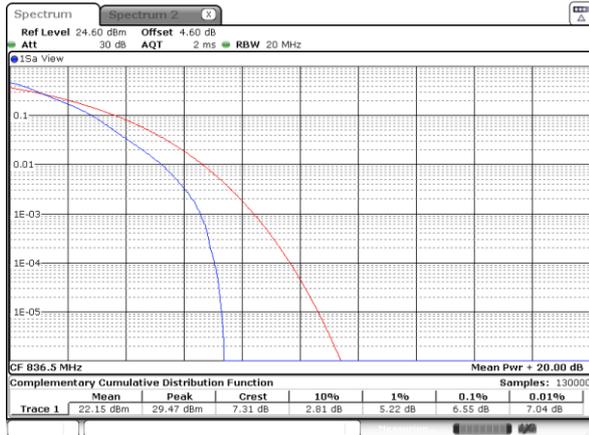
Middle Channel / Full RB

QPSK



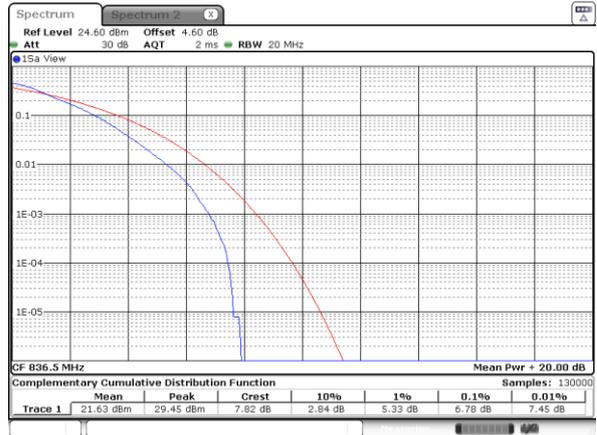
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16QAM



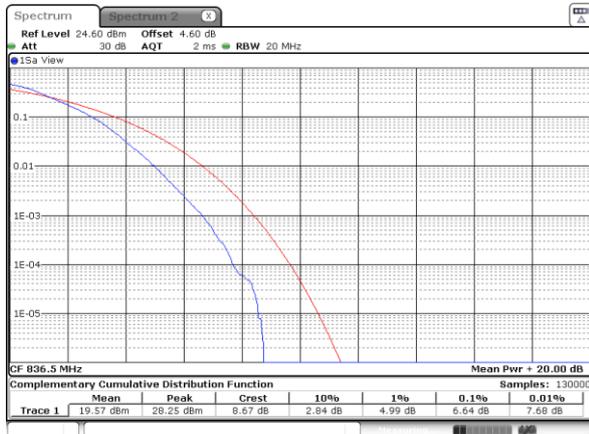
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64QAM



Date: 12 JAN 2021 16:42:14

256QAM

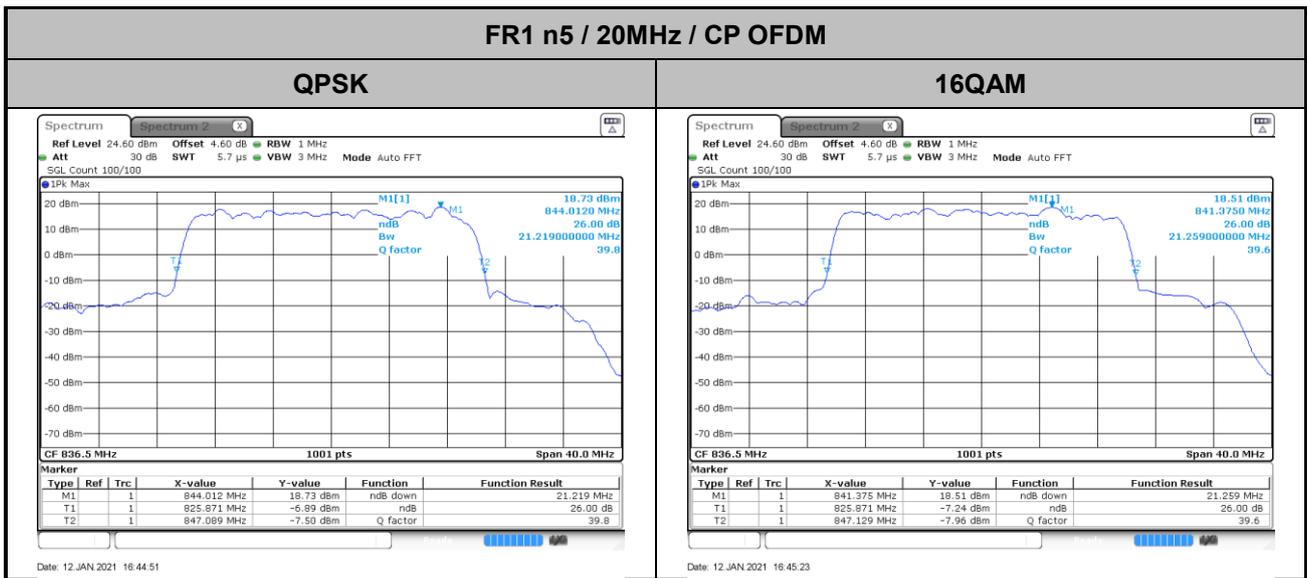


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## 26dB Bandwidth

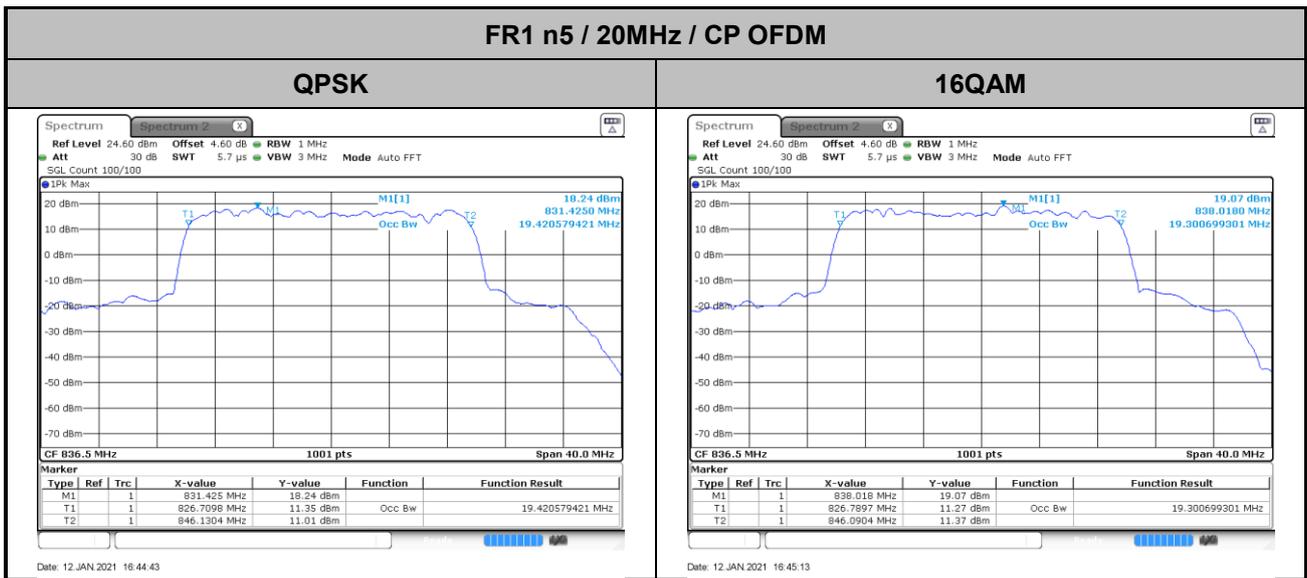
Mode	FR1 n5: 26dB BW(MHz) / CP OFDM	
BW	20MHz	
Mod.	QPSK	16QAM
Middle CH	21.219	21.259





# Occupied Bandwidth

Mode	FR1 n5 : 99%OBW(MHz) / CP OFDM	
BW	20MHz	
Mod.	QPSK	16QAM
Middle CH	19.42	19.30



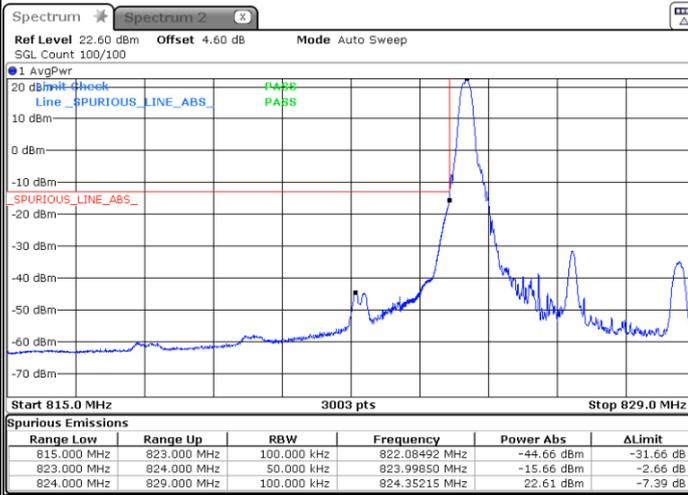


# Conducted Band Edge

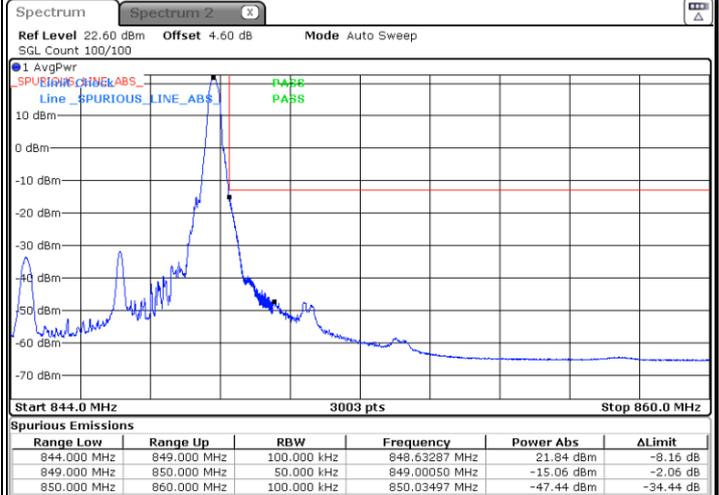
FR1 n5 / 5MHz / DFT-S OFDM / PI/2 BPSK

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX



Date: 12 JAN 2021 14:31:08



Date: 12 JAN 2021 14:42:53

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 14:16:49



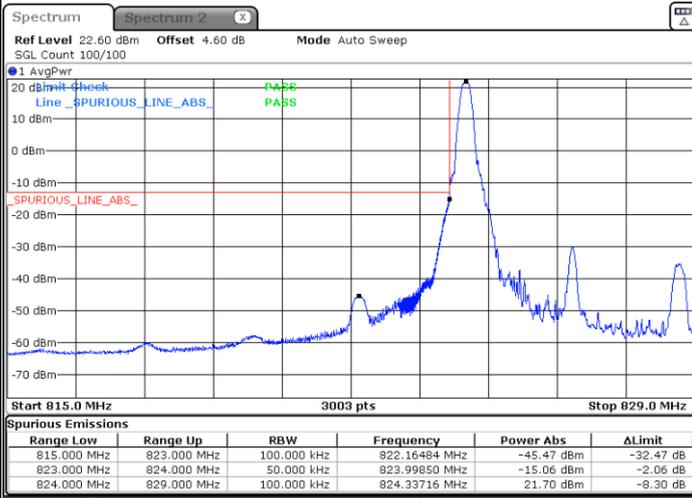
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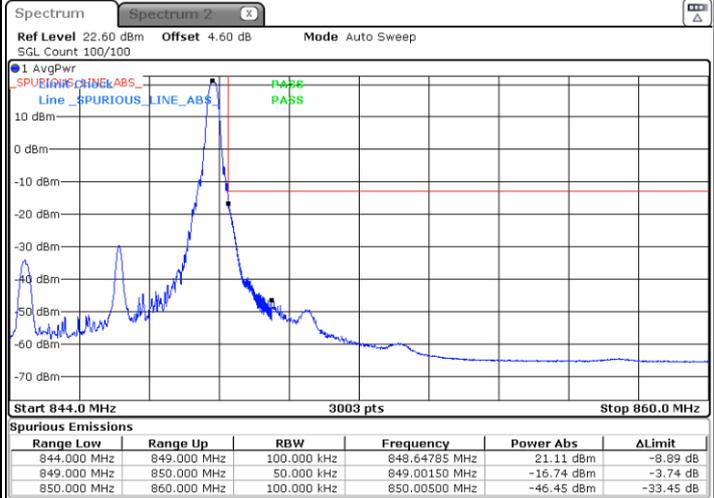
FR1 n5 / 5MHz / DFT-S OFDM / QPSK

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX



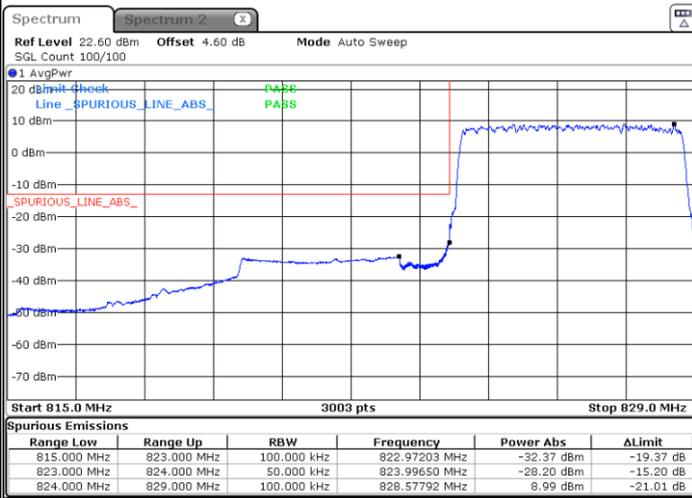
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Date: 12 JAN 2021 14:44:15

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 14:17:50



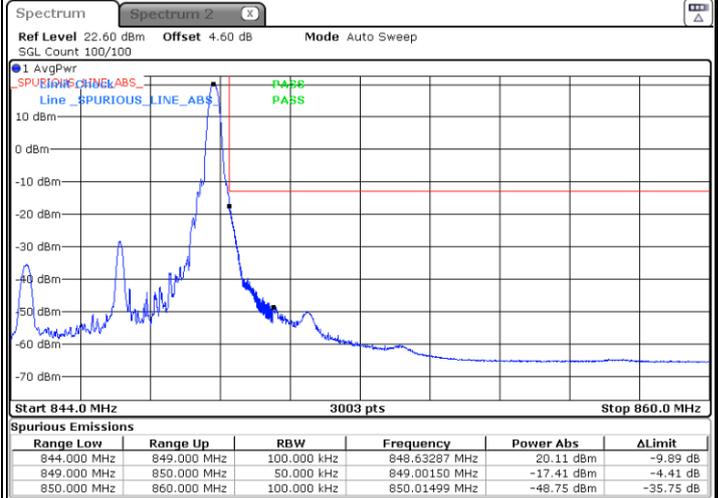
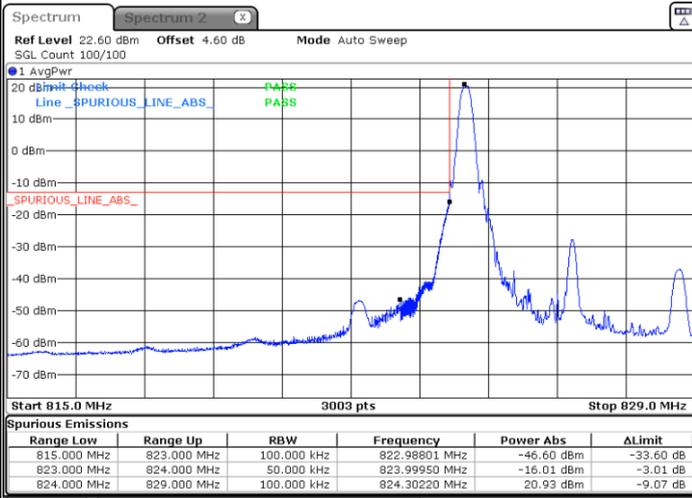
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FR1 n5 / 5MHz / DFT-S OFDM / 16Q

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

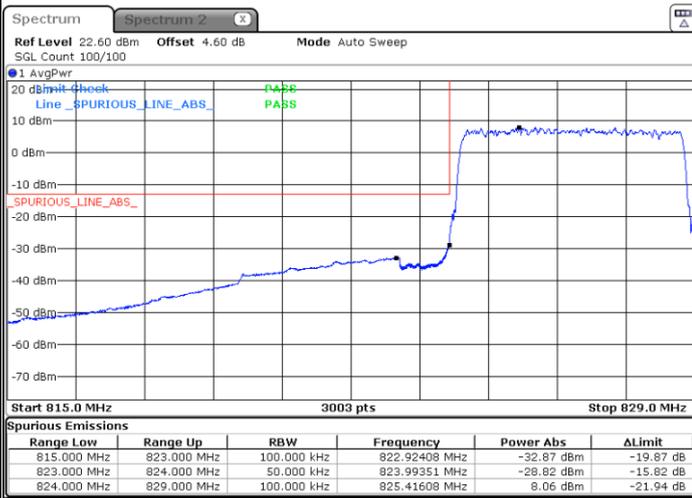


Date: 12 JAN 2021 14:25:39

Date: 12 JAN 2021 14:45:26

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 14:18:36

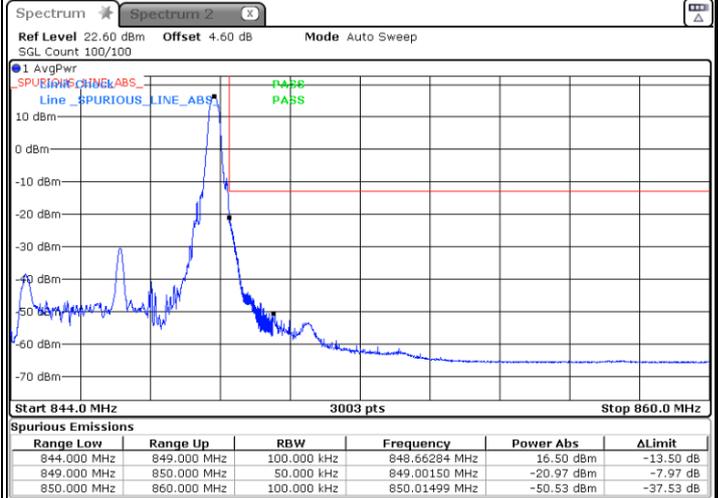
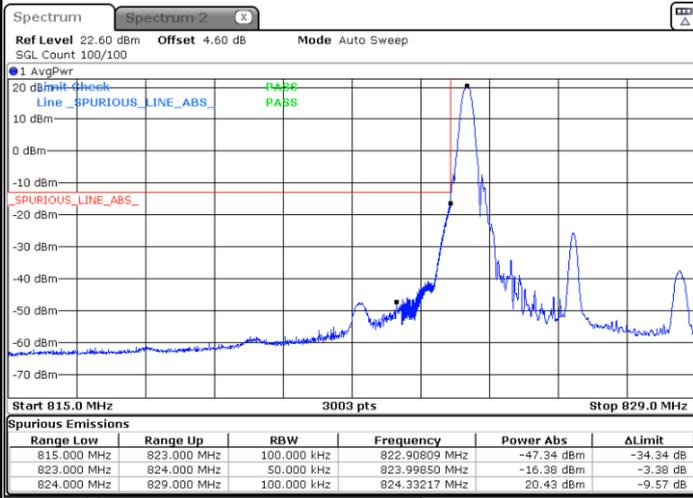
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FR1 n5/ 5MHz / DFT-S OFDM / 64Q

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

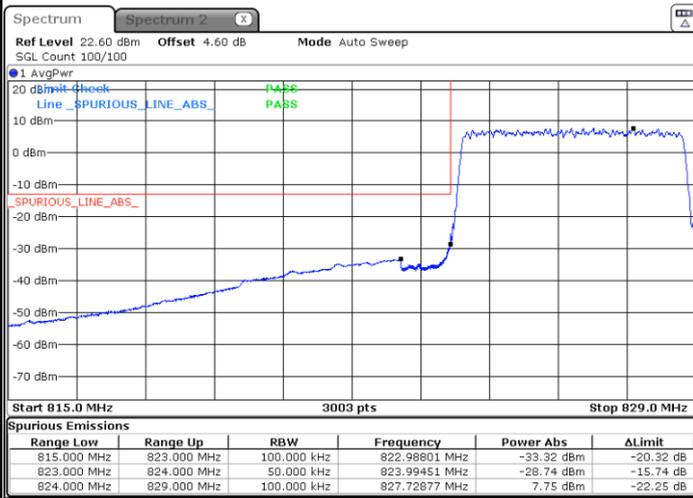


Date: 12 JAN 2021 14:24:53

Date: 12 JAN 2021 15:02:24

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 14:19:35

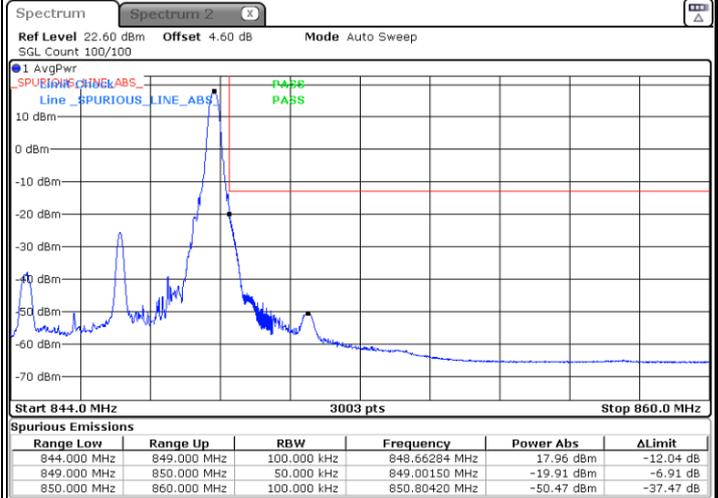
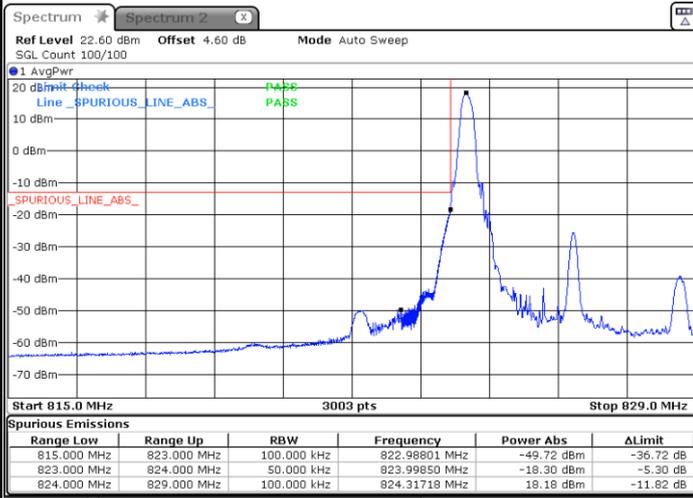
Date: 12 JAN 2021 15:04:20



FR1 n5 / 5MHz / DFT-S OFDM / 256Q

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

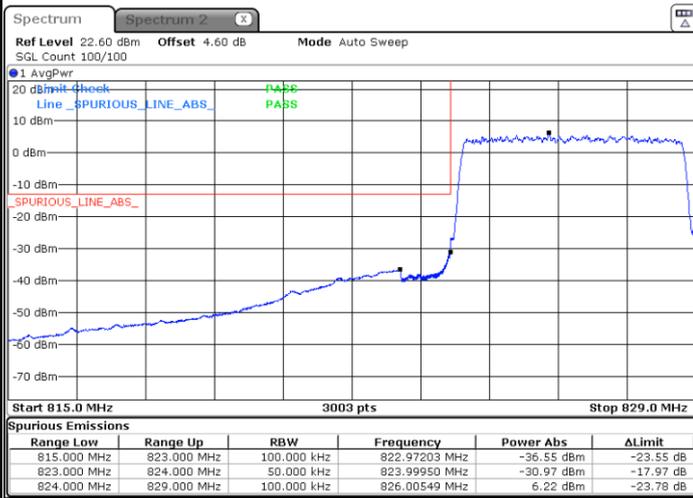


Date: 12 JAN 2021 14:24:06

Date: 12 JAN 2021 15:10:16

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 14:21:54

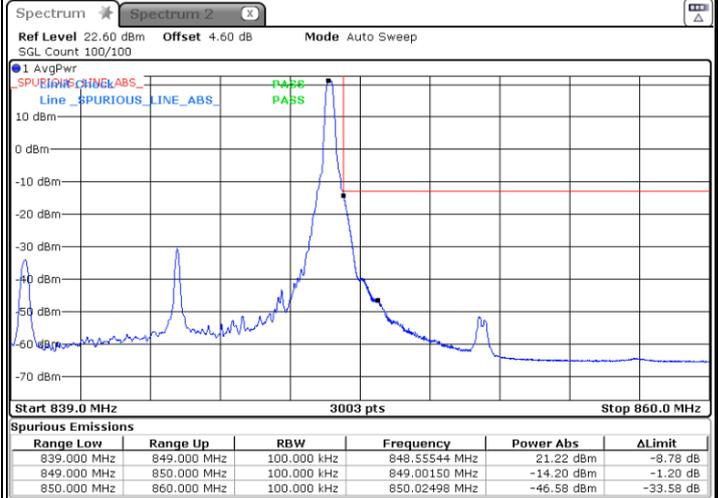
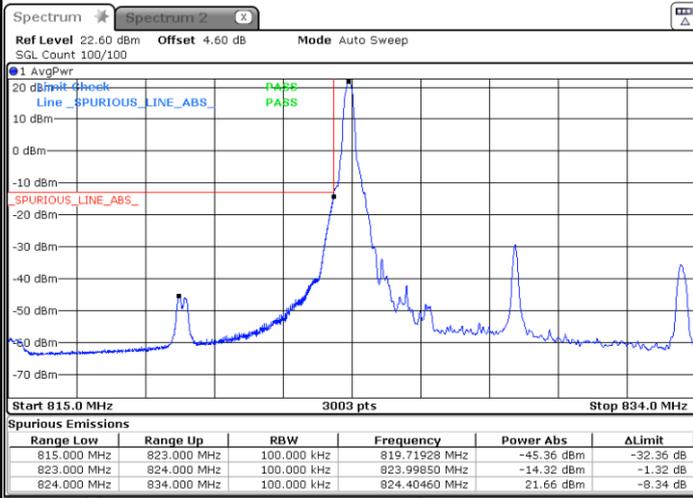
Date: 12 JAN 2021 15:09:01



FR1 n5 / 10MHz / DFT-s-OFDM / PI/2 BPSK

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

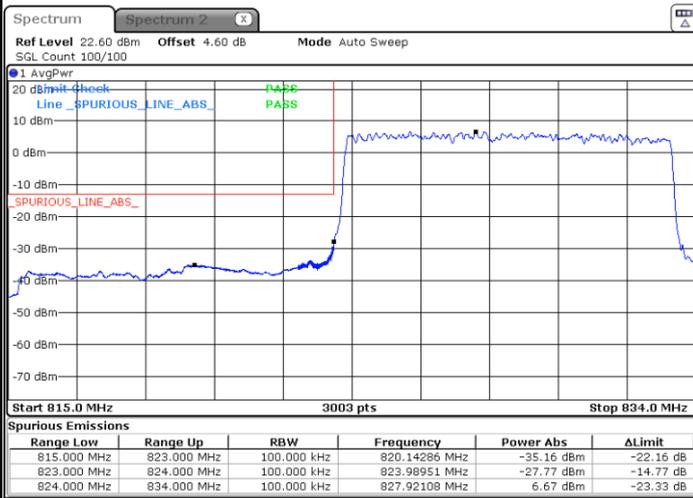


Date: 12 JAN 2021 15:28:36

Date: 12 JAN 2021 15:38:50

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 15:26:53

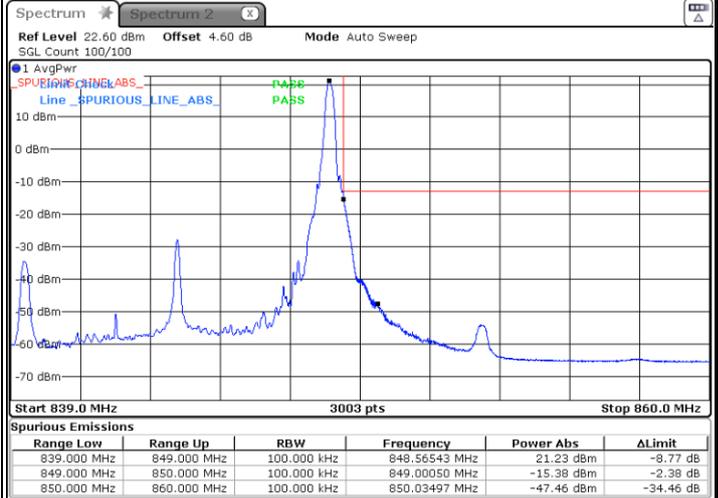
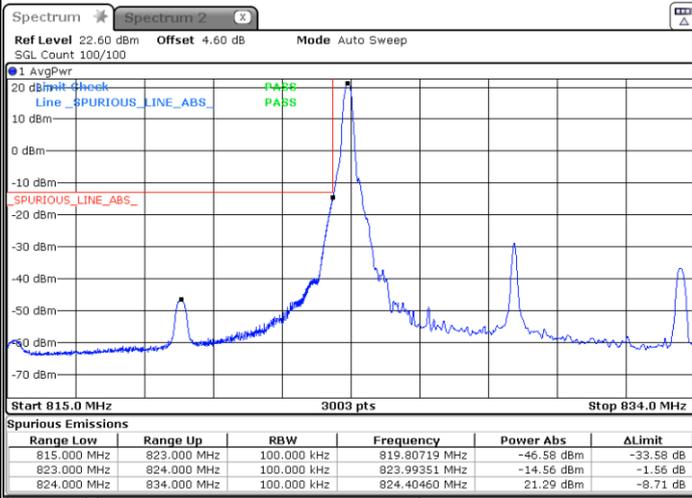
Date: 12 JAN 2021 15:45:36



FR1 n5 / 10MHz / DFT-s-OFDM / QPSK

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

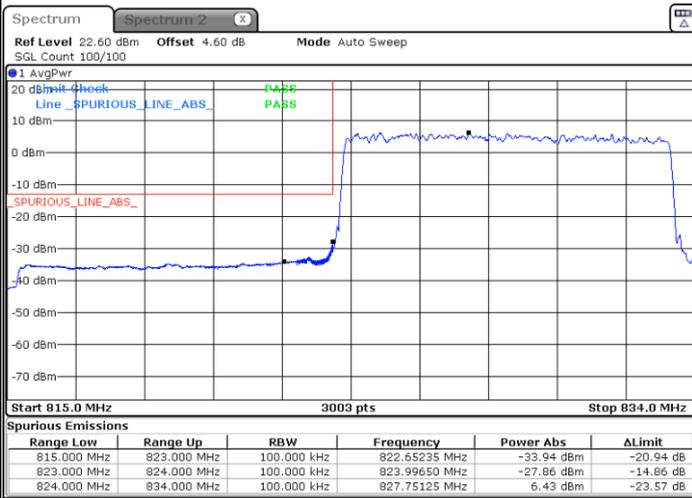


Date: 12 JAN 2021 15:18:16

Date: 12 JAN 2021 15:40:35

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 15:16:05

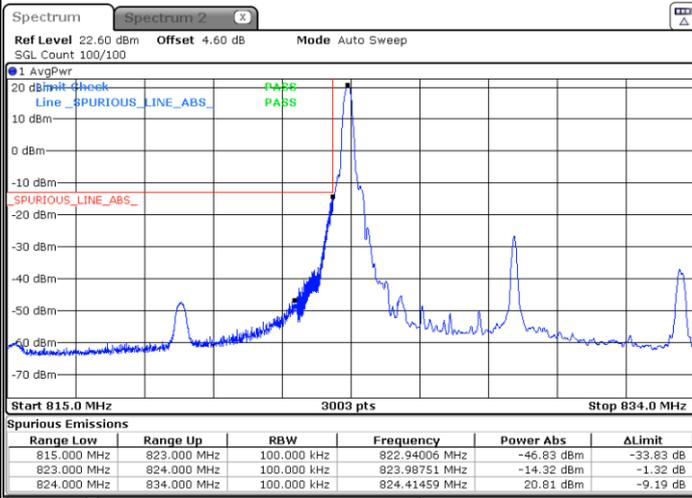
Date: 12 JAN 2021 15:44:52



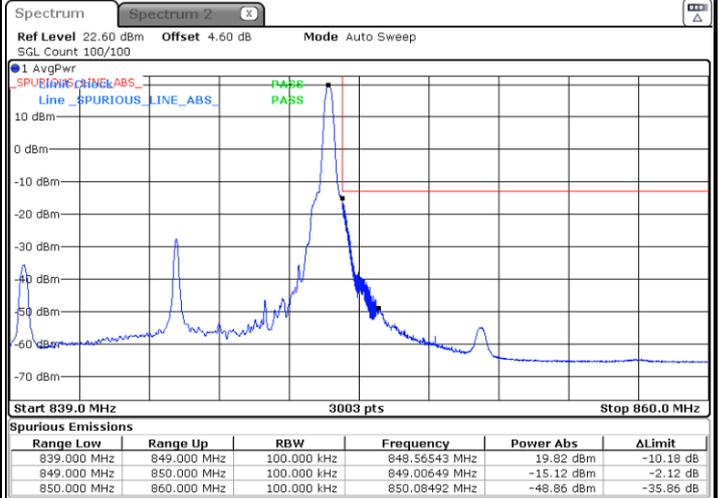
FR1 n5/ 10MHz / DFT-s-OFDM / 16QAM

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX



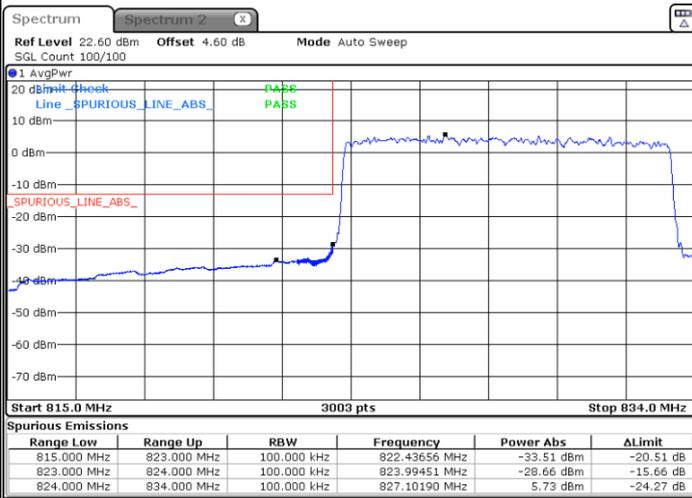
Date: 12 JAN 2021 15:19:06



Date: 12 JAN 2021 15:41:19

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 15:14:36



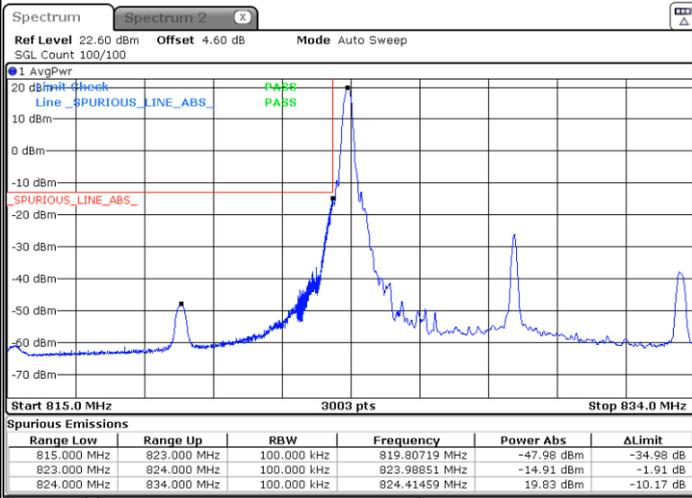
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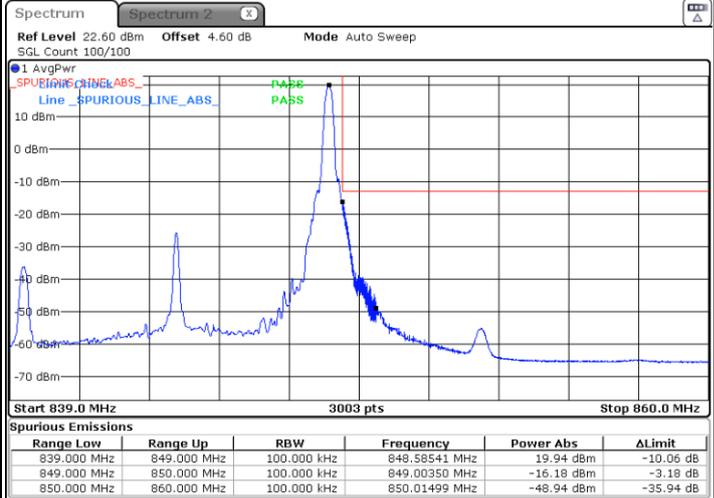
FR1 n5 / 10MHz / DFT-s-OFDM / 64QAM

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX



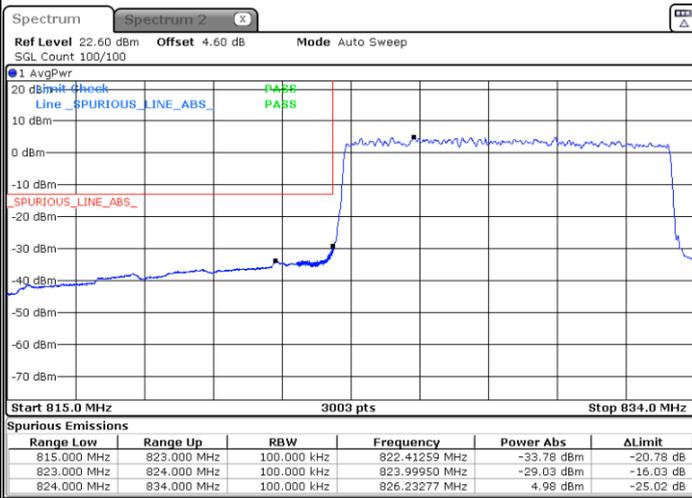
Date: 12 JAN 2021 15:19:49



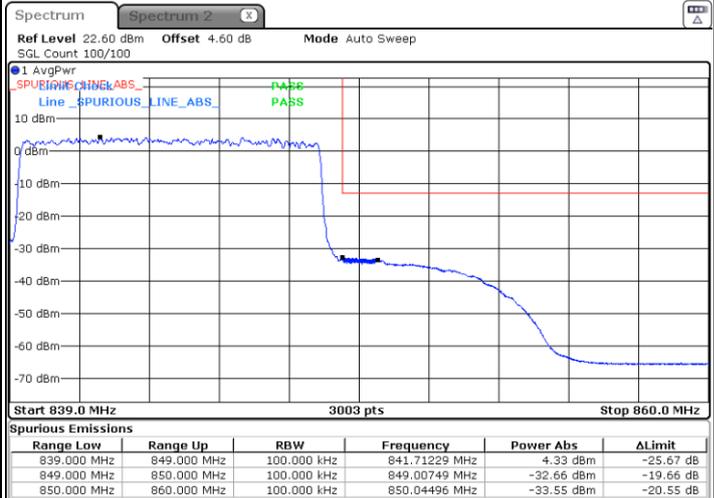
Date: 12 JAN 2021 15:42:03

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 15:13:49



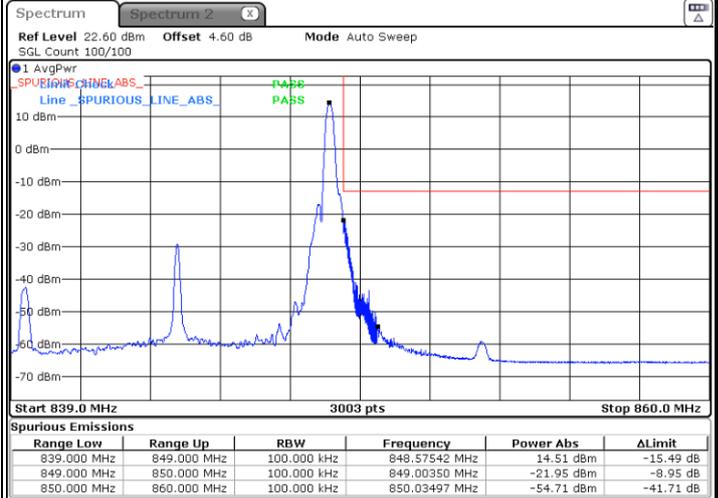
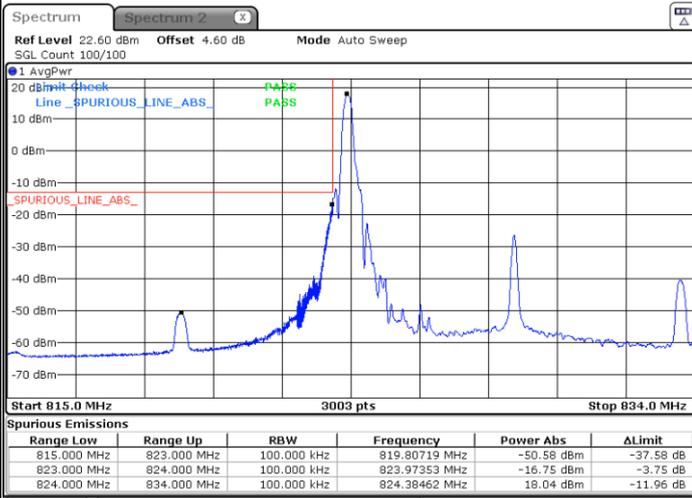
Date: 12 JAN 2021 15:43:23



FR1 n5 / 10MHz / DFT-s-OFDM / 256QAM

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

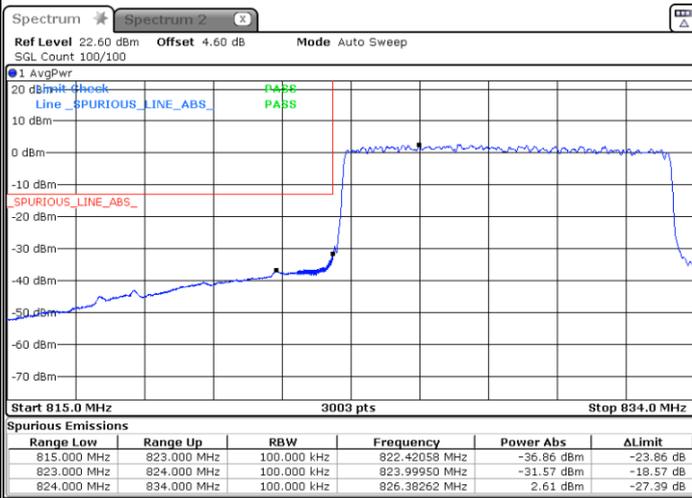


Date: 12 JAN 2021 15:20:29

Date: 12 JAN 2021 15:49:26

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 15:13:09

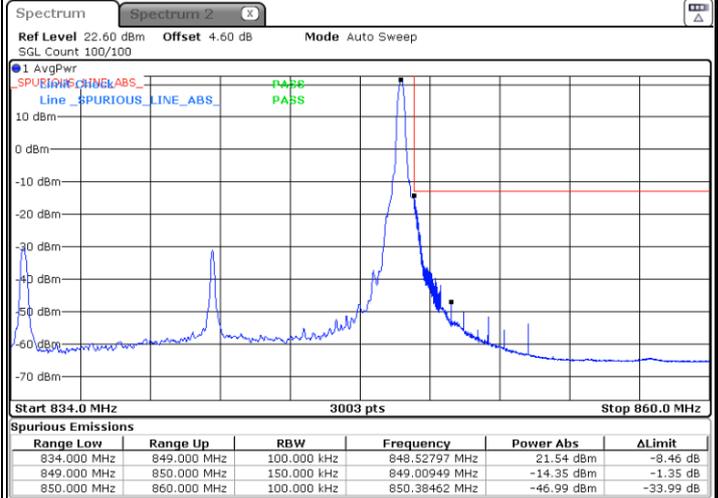
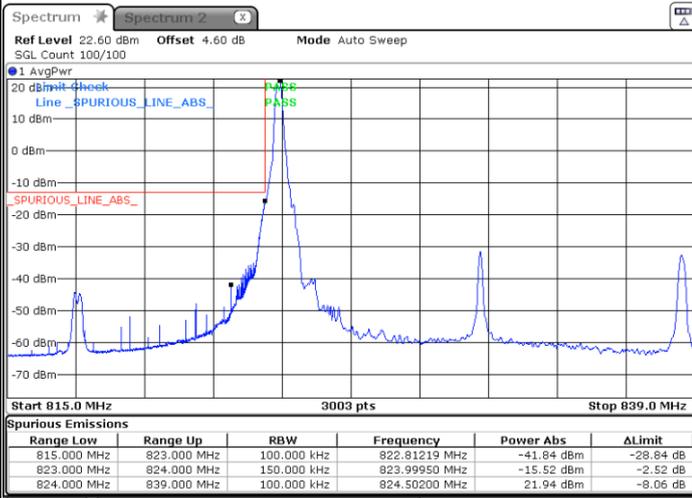
Date: 12 JAN 2021 15:47:59



FR1 n5 / 15MHz / DFT-s-OFDM / PI/2 BPSK

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

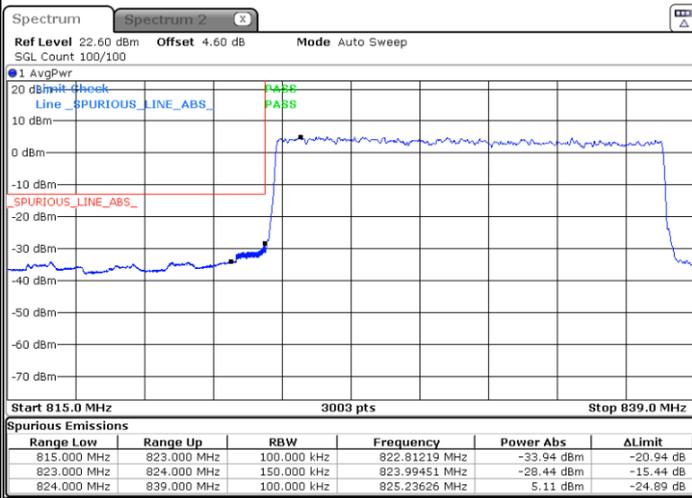


Date: 12 JAN 2021 16:02:27

Date: 12 JAN 2021 16:11:59

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 16:03:11

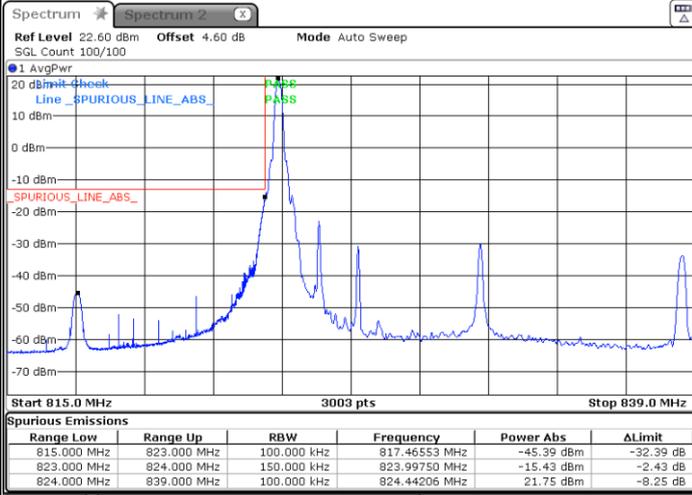
Date: 12 JAN 2021 16:23:38



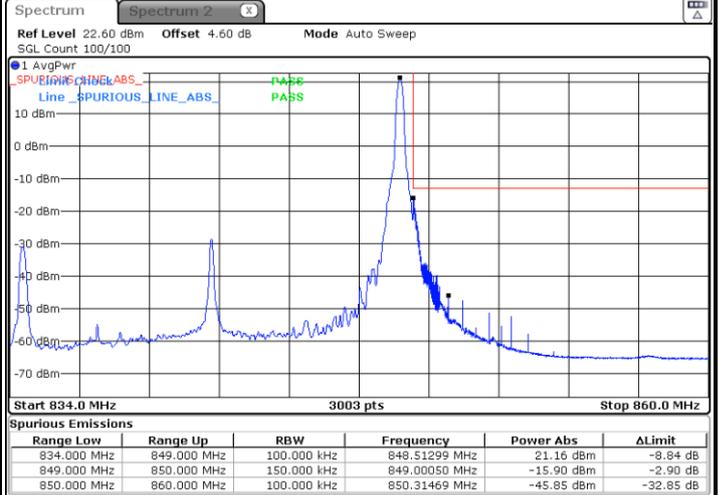
FR1 n5/ 15MHz / DFT-s-OFDM / QPSK

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX



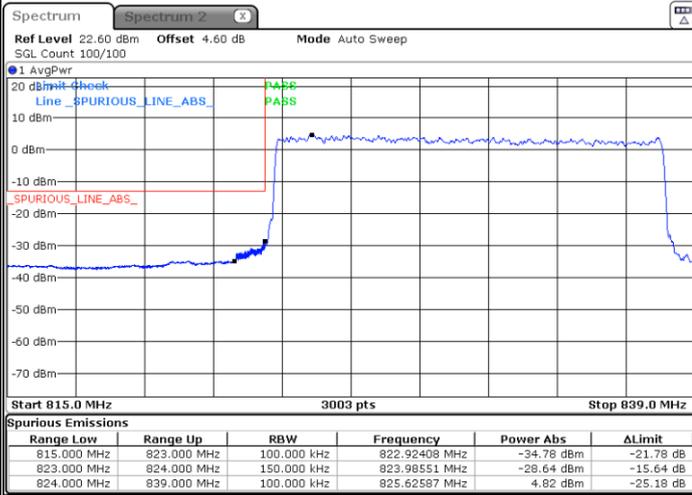
Date: 12 JAN 2021 15:56:45



Date: 12 JAN 2021 16:12:40

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 15:54:24



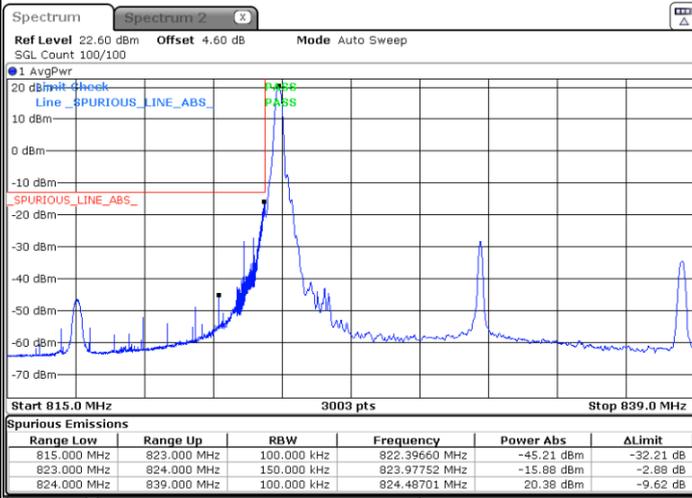
Date: 12 JAN 2021 16:22:54



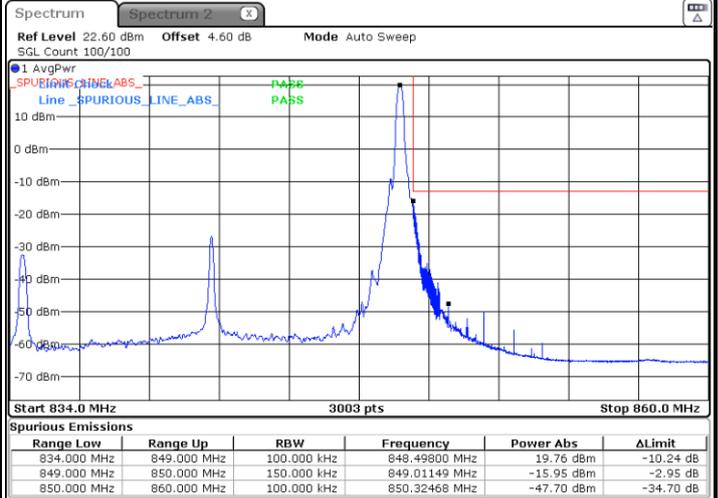
FR1 n5 / 15MHz / DFT-s-OFDM / 16QAM

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX



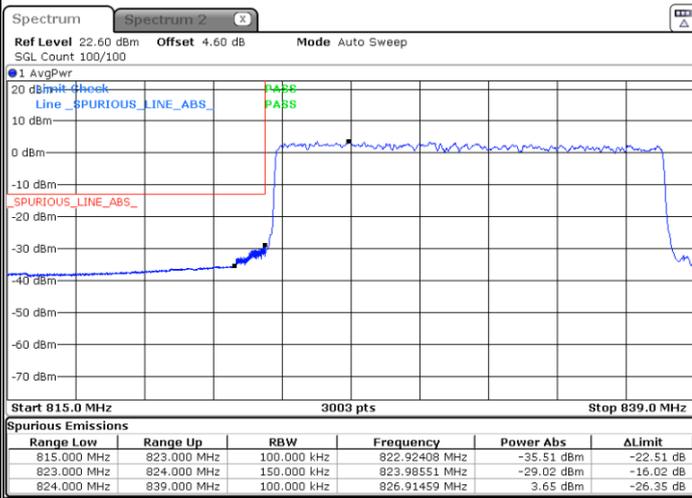
Date: 12 JAN 2021 15:57:36



Date: 12 JAN 2021 16:13:30

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 15:53:35



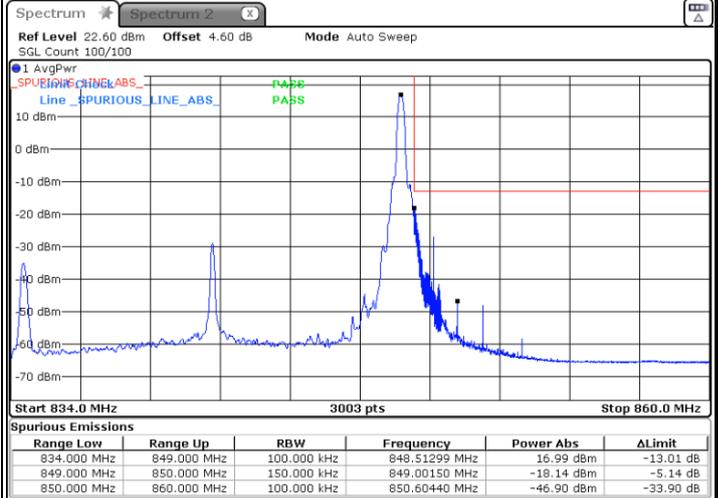
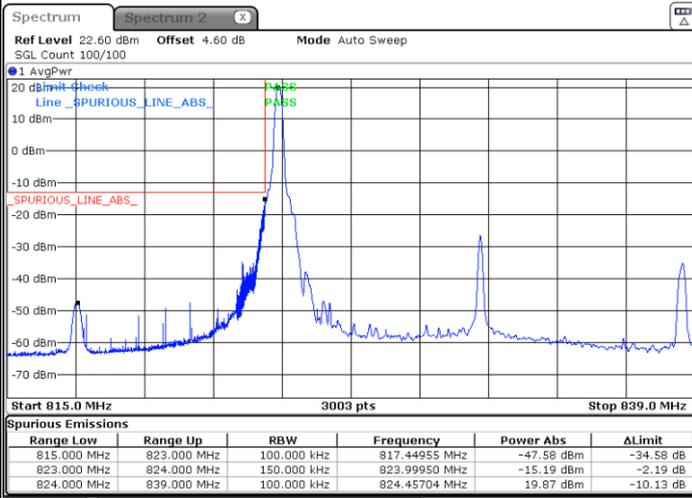
Date: 12 JAN 2021 16:22:14



FR1 n5 / 15MHz / DFT-s-OFDM / 64QAM

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

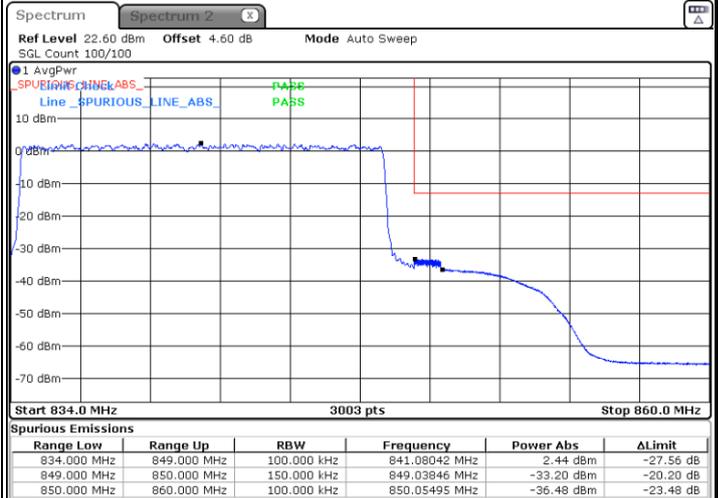
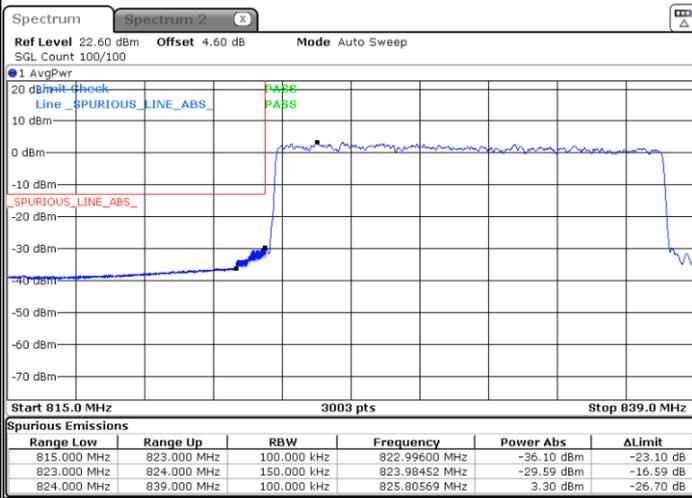


Date: 12 JAN 2021 15:58:15

Date: 12 JAN 2021 16:20:46

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 15:52:14

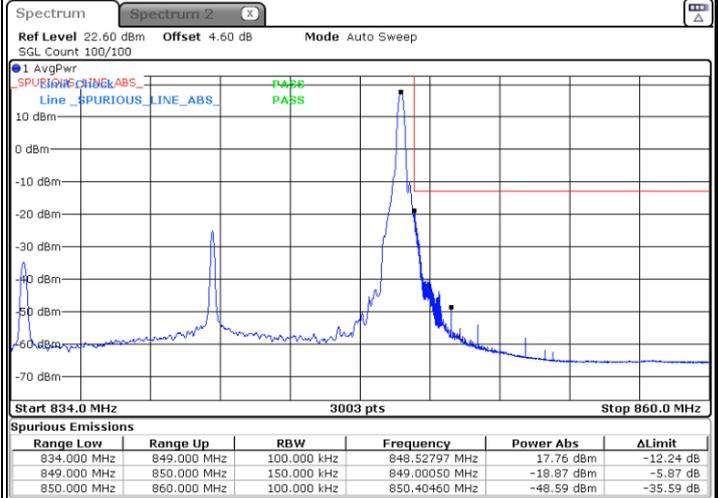
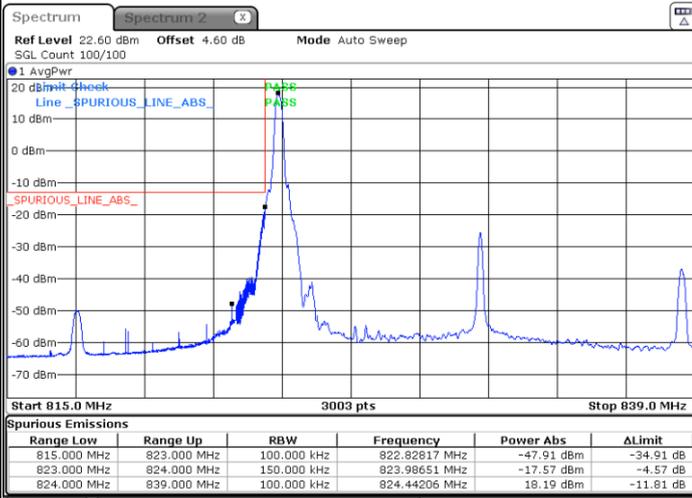
Date: 12 JAN 2021 16:21:32



FR1 n5/ 15MHz / DFT-s-OFDM / 256QAM

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

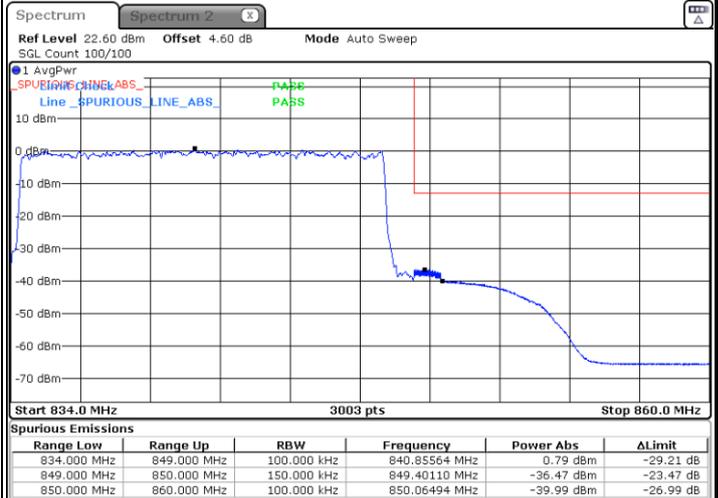
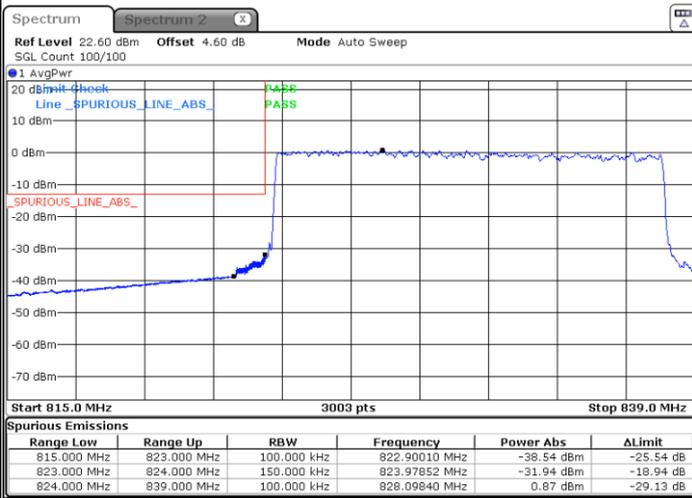


Date: 12 JAN 2021 15:58:56

Date: 12 JAN 2021 16:26:01

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 15:51:15

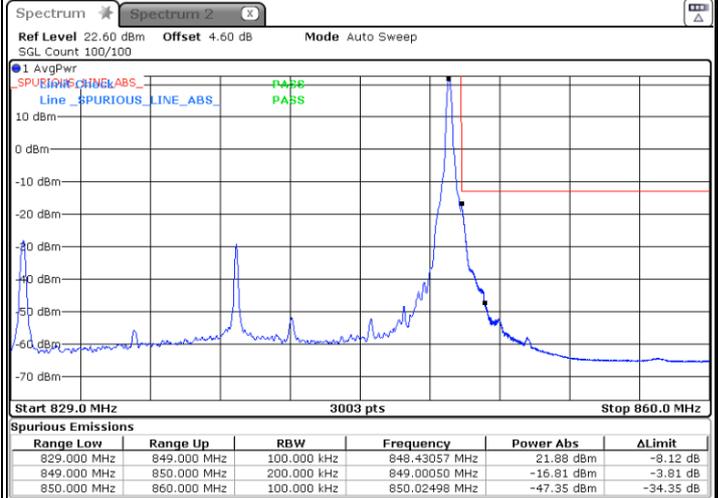
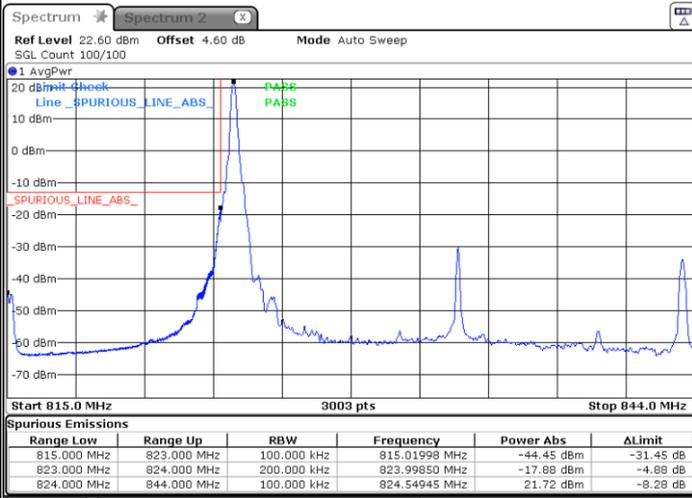
Date: 12 JAN 2021 16:25:12



FR1 n5 / 20MHz / DFT-s-OFDM / PI/2 BPSK

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

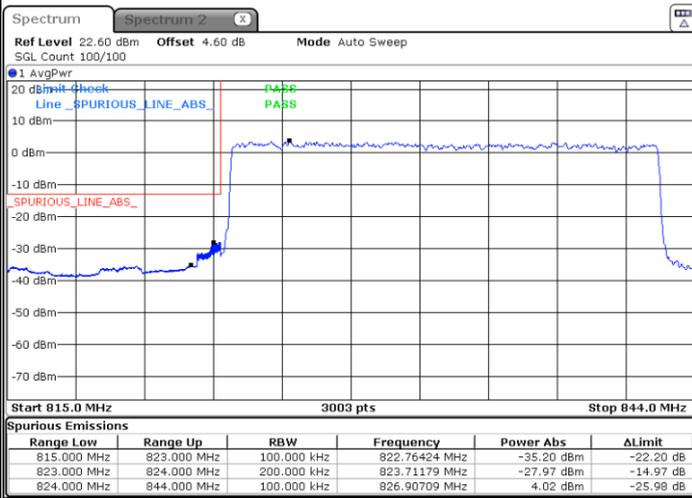


Date: 12 JAN 2021 16:34:37

Date: 12 JAN 2021 17:02:08

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 16:35:16

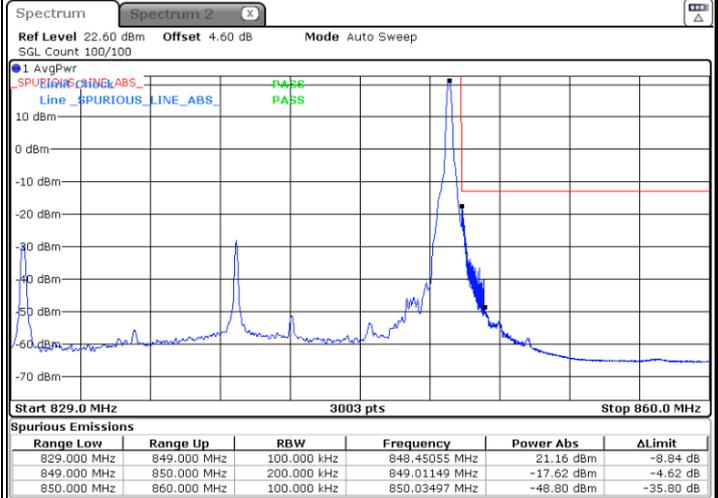
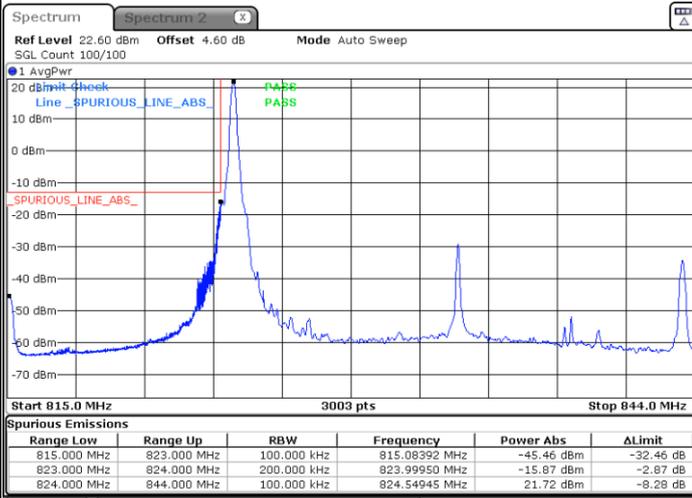
Date: 12 JAN 2021 17:00:15



FR1 n5/ 20MHz / DFT-s-OFDM / QPSK

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

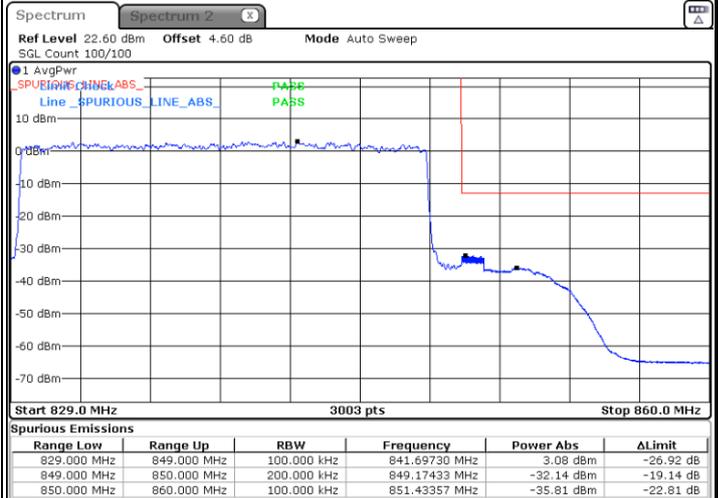
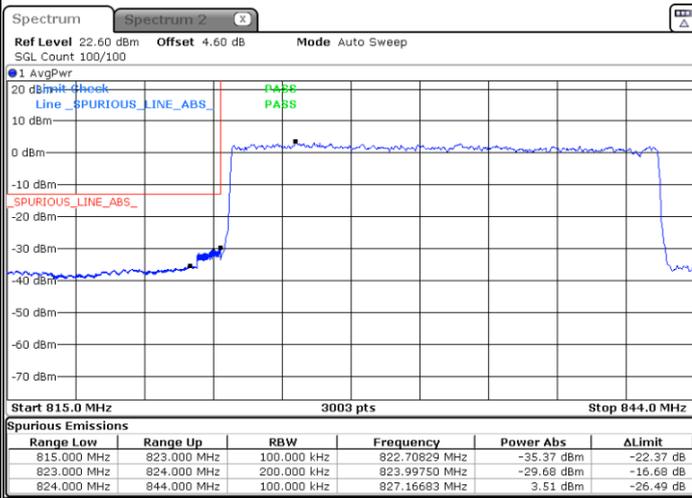


Date: 12 JAN 2021 16:30:33

Date: 12 JAN 2021 16:49:40

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 16:29:50

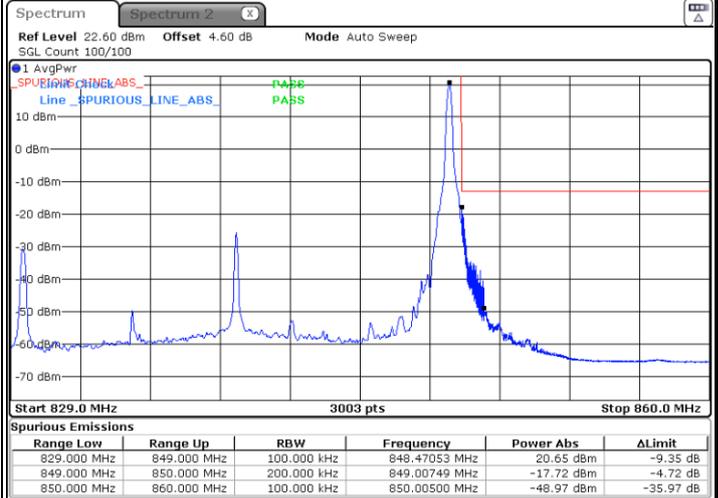
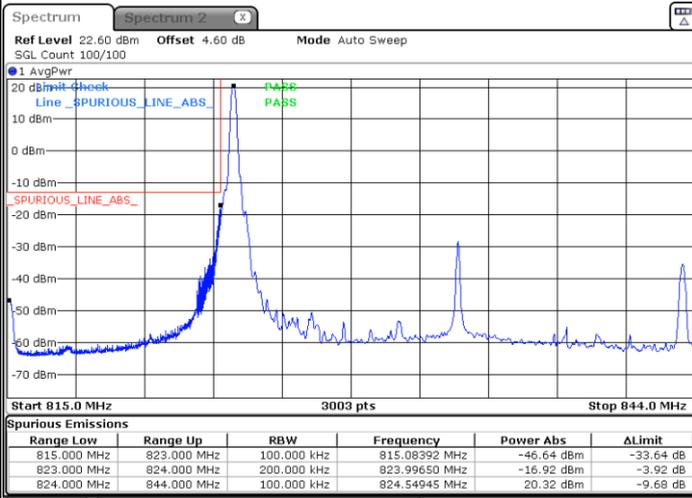
Date: 12 JAN 2021 16:56:38



FR1 n5 / 20MHz / DFT-s-OFDM / 16QAM

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

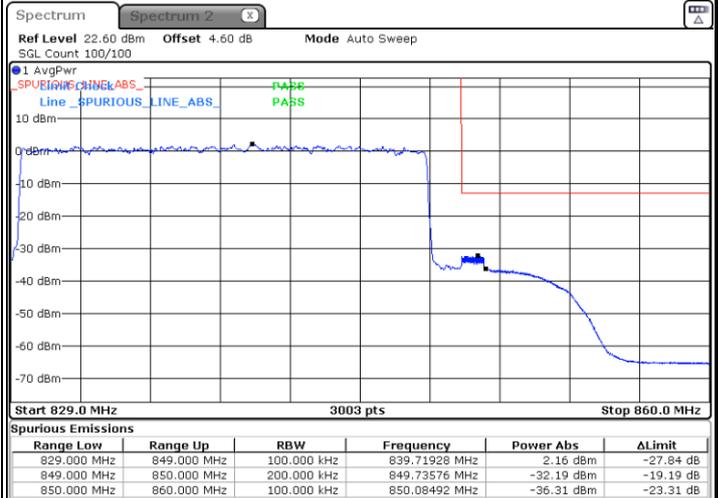
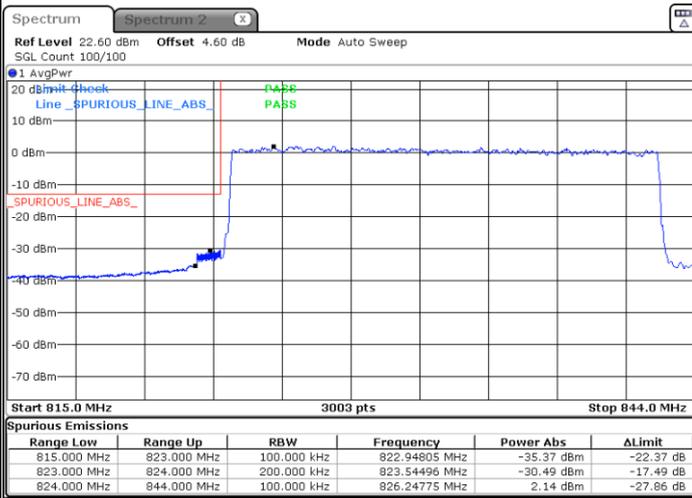


Date: 12 JAN 2021 16:31:22

Date: 12 JAN 2021 16:50:34

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 16:29:04

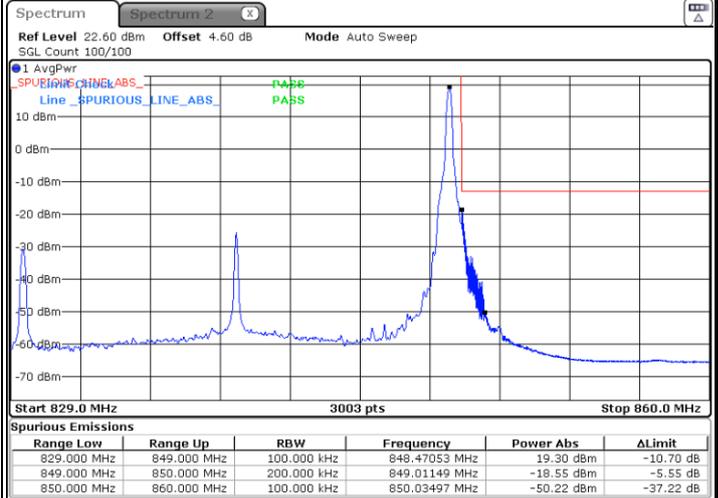
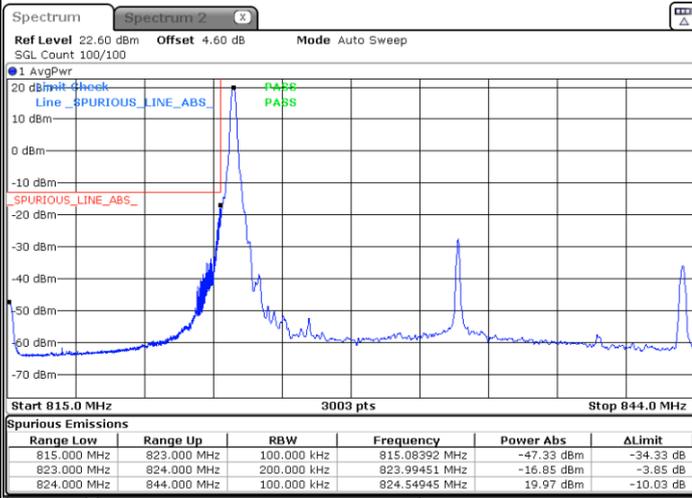
Date: 12 JAN 2021 16:57:17



FR1 n5 / 20MHz / DFT-s-OFDM / 64QAM

Lowest Band Edge / 1RB0

Highest Band Edge / 1RBMAX

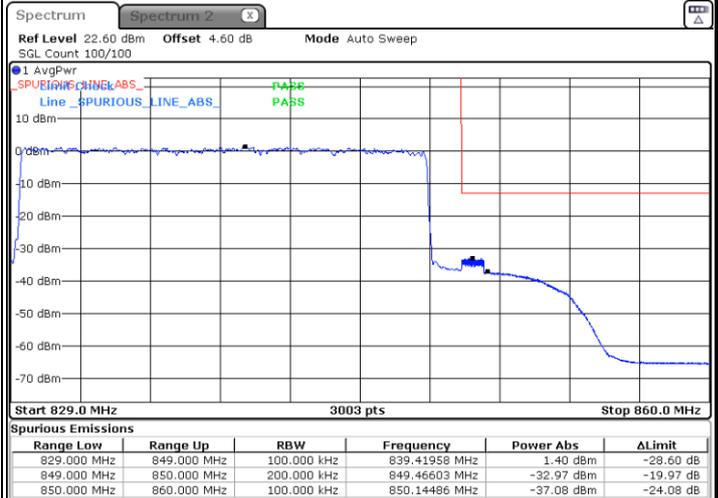
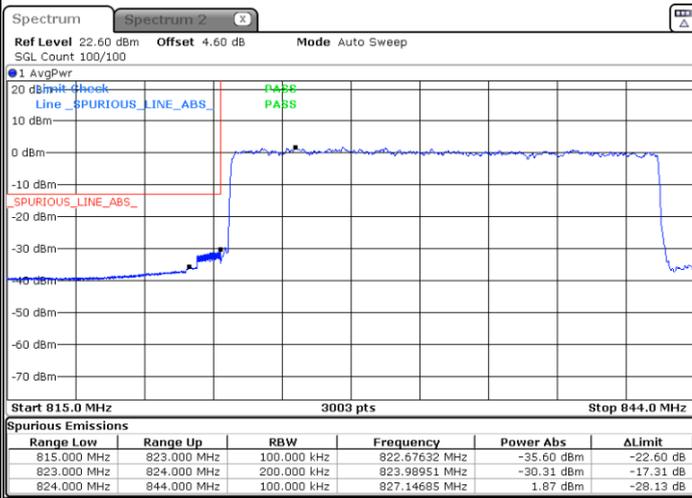


Date: 12 JAN 2021 16:32:04

Date: 12 JAN 2021 16:51:17

Lowest Band Edge / Full RB

Highest Band Edge / Full RB



Date: 12 JAN 2021 16:28:26

Date: 12 JAN 2021 16:58:13