

# TEST REPORT

**Report Number:** R14607588-E3

**Applicant :** AMANTYA TECHNOLOGIES PRIVATE LIMITED  
12TH FLOOR, TOWER B, UNITECH CYBER PARK, SECTOR 39  
GURUGRAM, INDIA 122003

**Model :** 5GTP202SSHCn256677

**FCC ID :** 2BASDAMTBN20233

**EUT Description :** Dual Cell High Capacity Sub6

**Test Standard(s) :** FCC CFR 47 Part 2, Part 22, Part 24, Part 27

**Date Of Issue:**

2023-08-07

**Prepared by:**

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2023-07-19	Initial Review	Noah Bennett
V2	2023-08-02	TCB Feedback: -Added Statement to section 8 covering equipment calibration dates. -General formatting improvements.	Noah Bennett
V3	2023-08-04	TCB Feedback: -Clarified naming convention of RF Cards. -Added Test procedure sections to 10.5, Clarified Results section. -Updated results section of 11.1.	Noah Bennett
V4	2023-08-07	-Corrected Emission Designators in Section 6.2	Noah Bennett

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** AMANTYA TECHNOLOGIES PRIVATE LIMITED  
12TH FLOOR, TOWER B, UNITECH CYBER PARK, SECTOR 39  
GURUGRAM, INDIA 122003

**EUT DESCRIPTION:** Dual Cell High Capacity Sub6

**MODEL:** 5GTP202SSHCn256677

**SERIAL NUMBER:** 2BASDAMTBN20233

**SAMPLE RECEIPT DATE:** 2023-04-18

**DATE TESTED:** 2023-06-27 to 2023-07-11

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC CFR 47 Part 22H, Part 24E, Part 27	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by a2La, NIST, or any agency of the U.S. government.

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## 2. SUMMARY OF TEST RESULTS

This report contains data provided by the customer which can impact the validity of results. UL LLC. is only responsible for the validity of results after the integration of the data provided by the customer. Below is a list of the data provided by the customer:

1. Antenna Gain, colocation and Type (section 6.4)
2. Supported Modulations, Data-rates, BWs and RB configs (section 6.5)
3. Data Referencing (Section 7)
4. Power settings, target power, and UL/DL Modes (section 6.5, section 9)

Requirement Description	Band	Requirement Clause Number (FCC)	Result*	Remarks
Effective Radiated Power	n5	22.913 (a)(1)(i)	Complies	500 watts per emissions OR the PSD 400 watts/MHz per sector
Equivalent Isotropic Radiated Power	n2	24.232 (a) (2)	Complies	Antenna height up to 300 meters. Greater than 1MHz channel bandwidth
	n66	27.50 (d) (2)	Complies	Greater than 1MHz channel bandwidth
	n77	27.50 (k) (2), (j) (2)	Complies	
Requirement Description	Requirement Clause Number (FCC)		Result*	Remarks
Occupied Bandwidth	2.1049		Complies	None.
Band Edge and Emission Mask	2.1051, 22.917 (a), 24.238 (a), 27.53 (h), 27.53 (n) (1), 27.53 (l) (1)		Complies	
Out of Band Emissions	2.1051, 22.917 (a), 24.238 (a), 27.53 (h), 27.53 (n) (1), 27.53 (l) (1)		Complies	
Frequency Stability	2.1055, 22.355, 24.235, 27.54		Complies	
Peak-to-Average Ratio	22.913 (d), 24.232 (d), 27.50 (d) (5), 27.50 (k) (4), (j) (4)		Complies	
Field Strength of Spurious Radiation	2.1051, 22.917 (a), 24.238 (a), 27.53 (h), 27.53 (n) (1), 27.53 (l) (1)		Complies	

## 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following:

- ANSI C63.26:2015
- FCC CFR 47 Part 2, Part 22, Part 24, Part 27
- [FCC KDB 971168 D01 v03r01](#): Power Meas License Digital Systems
- [FCC KDB 971168 D02 v02r02](#): Misc Rev Approv License Devices
- [FCC KDB 412172 D01 v01r01](#). Determining ERP and EIRP
- FCC KDB 484596 D01 Referencing Test Data v01

## 4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input checked="" type="checkbox"/>	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A	US0067	2180C	825374

## 5. DECISION RULES AND MEASUREMENT UNCERTAINTY

### 5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

### 5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

### 5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U <sub>Lab</sub>
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Temperature	0.57°C
Humidity	3.39%

Uncertainty figures are valid to a confidence level of 95%.

### 5.4. SAMPLE CALCULATION

#### RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB): 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m



## 6. EQUIPMENT UNDER TEST

### 6.1. DESCRIPTION OF EUT

The EUT is a Dual Cell High Capacity Sub6 fixed station that has 2 SDR radio cards installed, the N310, RF1 and B210, RF2. N310(RF1) supports 4x4 MIMO Only, and the B210(RF2) supports 2x2 MIMO Only, for a total of 6Tx. In this report, the N310 may also be called RF1, and the B210 may also be called RF2.

### 6.2. MAXIMUM OUTPUT POWER

#### EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015  
 KDB 971168 D01 Section 5.6

$$ERP/EIRP = P_{Meas} + GT - LC$$

where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P<sub>Meas</sub>, typically dBW or dBm);

P<sub>Meas</sub> = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation. Please see section 6.4 for antenna gain and correlation explanation.

The transmitter has a maximum average conducted and ERP / EIRP output powers as follows:

#### 5G NR n2

Part 24								
EIRP Limit (W/MHz)		1640.00						
Antenna Gain (dBi)		5.20						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Total Conducted Average (dBm)	Total EIRP Average (dBm)	Total EIRP Average (W)	99% BW (kHz)	Emission Designator
10.0	QPSK	1935.0	1985.0	6.27	11.47	0.014	9319	9M32G7W
	16QAM			6.49	11.69	0.015	9272	9M27D7W
20.0	QPSK	1940.0	1980.0	6.39	11.59	0.014	18857	18M9G7W
	16QAM			6.34	11.54	0.014	18969	19M0D7W
40.0	QPSK	1940.0	1980.0	6.38	11.58	0.014	38617	38M6G7W
	16QAM			6.48	11.68	0.015	38544	38M5D7W

**5G NR n5**

Part 22H								
ERP Limit (W)		500.00						
Antenna Gain (dBi)		0.80						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
10.0	QPSK	874.0	889.0	-8.72	-10.07	0.000	9337	9M34G7W
	16QAM			-8.69	-10.04	0.000	9428	9M43D7W
20.0	QPSK	879.0	884.0	-8.84	-10.19	0.000	19092	19M1G7W
	16QAM			-8.83	-10.18	0.000	19125	19M1D7W

**5G NR n66**

Part 27								
EIRP Limit (W/MHz)		1640.00						
Antenna Gain (dBi)		4.20						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
10.0	QPSK	2115.0	2195.0	19.66	23.86	0.243	8899	8M90G7W
	16QAM			19.76	23.96	0.249	8839	8M84D7W
20.0	QPSK	2120.0	2190.0	19.36	23.56	0.227	18500	18M5G7W
	16QAM			19.56	23.76	0.238	18392	18M4D7W
40.0	QPSK	2120.0	2190.0	19.39	23.59	0.229	38042	38M0G7W
	16QAM			19.46	23.66	0.232	38065	38M1D7W

**5G NR n77**

Part 27								
EIRP Limit (W/MHz)		1640.00						
Antenna Gain (dBi)		3.92						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
10.0	QPSK	3705.0	3975.0	13.69	17.61	0.058	8713	8M71G7W
	16QAM			13.68	17.60	0.058	8679	8M68D7W
20.0	QPSK	3710.0	3970.0	13.71	17.63	0.058	18348	18M3G7W
	16QAM			13.73	17.65	0.058	18373	18M4D7W
40.0	QPSK	3705.0	3975.0	13.54	17.46	0.056	38043	38M0G7W
	16QAM			13.51	17.43	0.055	38058	38M1D7W
100.0	QPSK	3707.5	3972.5	13.21	17.13	0.052	97694	97M7G7W
	16QAM			13.22	17.14	0.052	97725	97M7D7W

### 6.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version:

Operating System: Ubuntu 18.04.1

Kernel: Linux 5.4.0-56-lowlatency

Architecture: x86-64.

### 6.4. MAXIMUM ANTENNA GAIN

The antenna(s) gain, as provided by the manufacturer' are as follows:

Per manufacturer's declaration: Antenna is co-polarized and uncorrelated.

Uncorrelated Directional Gain=  $G_{ant}$

$G_{ant}$ : Gain of Individual Antennas (Same for Each Antenna)

WWAN Bands	Frequency range (MHz)	Antenna 1 Peak Gain (dBi)	Antenna 2 Peak Gain (dBi)	Antenna 3 Peak Gain (dBi)	Antenna 4 Peak Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
5G NR n2	1930-1990	5.2	5.2	5.2	5.2	5.2
5G NR n5	869-894	0.8	0.8	0.8	0.8	0.8
5G NR n66	2110-2200	4.2	4.2	4.2	4.2	4.2
5G NR n77	3700-3980	3.92	3.92	3.92	3.92	3.92

## 6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports the following 5G NR bands:

Radio Card	Band	SCS	Modulations	Bandwidths	RB Configuration
N310	n2	15/30kHz	QPSK/16QAM/64QAM	10/20/40MHz	Full RB Only.
	n5			10/20MHz	
	n66			10/20/40MHz	
	n77			10/20/40/100MHz	
B210	n2			10/20MHz	
	n5				
	n66				

The EUT is a desktop device, transmit antennas orientation was investigated in 3 orientations, 0, 45 and 90 Degrees, all final testing is tested with antenna orientation as below as worst case:

- 5G NR n5 (Low Band): 90 degrees
- 5G NR n2 & n66 (Mid Band): 90 degrees
- 5G NR n77 (High Band): 0 degrees

Investigation on the N310 and B210 has been performed based upon conducted average output power to find the worst-case SCS and modulation modes. The following was found to be worst case. Therefore, only these modes were tested for conducted antenna port tests. For Radiated Emissions, both QPSK and 16QAM modes were investigated, but only the worst-case mode is reported.

Radio Card	Band	Worst-Case SCS	Worst-Case Modulation	Worst-Case Bandwidth
N310	n2	15kHz	16QAM	10MHz
	n5			
	n66	30kHz	QPSK	20MHz
	n77		16QAM	
B210	n2, n5, n66	30kHz	QPSK	20MHz

The Power settings used by the N310 and B210 are as follows:

Radio Card	Band	Frequency	sdrTx_Gain_dB	TxGain
N310	n2	1930-1990	55	750
	n5	869-894	35	800
	n66	2110-2200	60/(55=Low Ch)	1000
	n77	3700-3980	65/(60=100M BW)	1000
B210	n2	1930-1990	76	1200
	n5	869-894	70	1000
	n66	2110-2200	82	1200/1000 (10/20MHz BW)

The following scans were investigated for simultaneous transmission:

Scan #	Config 1: N310	Config 2: B210
1	5G FR1 n2 15kHz SCS, 10Mhz BW, 4Tx	16QAM FR1 n2 20MHz, 30kHz SCS, 2Tx
2	5G FR1 n5 15kHz SCS, 10MHz BW, 4Tx	16QAM FR1 n5 20MHz, 30kHz SCS, 2Tx
3	5G FR1 n66 30kHz SCS, 10MHz BW, 4Tx	QPSK FR1 n66 20MHz, 30kHz SCS, 2Tx
4	5G FR1 n77 30kHz SCS, 20MHz BW, 4Tx	16QAM FR1 n5 20MHz, 30kHz SCS, 2Tx

## 6.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Keyboard	Logitech	YU0042	2250MR1881B8	-
Mouse	Logitech	M-U0026	2206HS094MV8	-
Monitor	Dell	SE2222H	NA	-
Support Laptop	Lenovo	Yoga 7	NA	-
Network Switch	Linksys	GS108	NA	-

### I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	HS Ethernet	1	RJ45	Shielded	<3m	Connected to Network Switch
2-1 to 2-4	LS Ethernet	5	RF45	Shielded	<3m	2-1 Connected to Support Laptop outside of chamber. 2-2 thru 2-4 connected to network switch
3-1, 3-2	USB-A	2	USB	Shielded	<3m	Connected to keyboard and mouse.
4	HDMI	1	Display	Shielded	<3m	Used to populate monitor to internal EUT port.
5-1 thru 5-3	AC Mains	1	NEMA Type B	Shielded	<3m	Used to power the device and related support equipment.

### TEST SETUP

EUT is powered by AC/DC adapter, connected to support equipment. Test software exercise the radio to transmit.

See R1407588-EP2 for Setup Photos and Setup Diagram

## 7. REUSE OF TEST DATA

### 7.1. INTRODUCTION

According to the manufacturer, the Software Defined Radio cards installed in this EUT are electrically identical to the same cards installed in other variant EUTs. The enclosure and other components, such as power supply and CPU, may be different. FCC ID: 2BASDAMTBB20232 has 2 of the SDR card 'B210' installed, and the FCC ID: 2BASDAMTBN20233 has the SDR card 'B210' and SDR card 'N310' installed. Since the manufacturer configures the SDR cards the same with the same power settings when installed in different enclosures, The FCC ID: 2BASDAMTBB20232 conducted test data shall remain representative of FCC ID: 2BASDAMTBN20233 so, FCC ID: 2BASDAMTBN20233 leverages conducted test data from FCC ID: 2BASDAMTBB20232.

The applicant takes full responsibility that the test data as referenced in this section represents compliance for this FCC ID.

### 7.2. DEVICE DIFFERENCES

Difference between FCC ID: 2BASDAMTBB20232, and FCC ID: 2BASDAMTBN20233:

According to the manufacturer, the SDR cards are electrically identical when installed in an end user device. Power settings, and configuration settings are programmed identically. Therefore, the following conducted licensed testing of licensed band for 2BASDAMTBB20232 can be re-used to 2BASDAMTBN20233.

### 7.3. REFERENCE DETAIL

Equipment Class	Reference FCC ID	Report Title	Referenced Testing
Licensed (WWAN)	2BASDAMTBB20232	R14607588-E1 v3 FCC WWAN REPORT LC2 - FINAL	5G NR n2, n5, n66

\*Notes:

1. Full radiated testing was done on all 5G NR Bands. Full Unintentional Emissions, and WWAN Rx testing was done on each EUT.
2. Conducted output power was spot-checked on the worst-case configuration per band to verify the EUT remained in tune-up. Power below is summed between chains on only 1 B210 SDR, and not both RF cards, since this EUT is to only have 1 B210 SDR installed.

### 7.4. SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device 2BASDAMTBN20233 for Conducted output power. The data from the application has been verified through appropriate spot checks to demonstrate compliance for this device as shown in the summary.

2BASDAMTBN20233 SPOT CHECK RESULTS						
Technology	RB/BW/SCS	Data Rate	Measured Frequency (MHz)	2BASDAMTBB20232	2BASDAMTBN20233	Delta (dB)
				Summed Conducted Output Power (dBm)	Summed Conducted Output Power (dBm)	<+2dB Margin
5G FR1 n2	Full/10MHz/30kHz	QPSK	1935MHz	1.15	1.75	-0.60
5G FR1 n5			874MHz	-2.56	-4.05	1.49
5G FR1 n66	Full/10MHz/15kHz		2115MHz	7.4	6.95	0.45

## 8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

### Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
<b>Common Equipment</b>					
<b>Conducted Room 2</b>					
81018	Spectrum Analyzer	Keysight Technologies	E4446A	2022-08-02	2023-08-02
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
Power Software	Boonton Power Analyzer	Boonton	Version 3.0.13.0	NA	NA
<b>Conducted Room 1</b>					
90410	Spectrum Analyzer	Keysight Technologies	N9030A	2023-06-14	2024-06-14
207726	Temp/Humid Chamber	Thermotron	SM-32-8200	2023-01-20	2024-01-20
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
<b>Additional Equipment used</b>					
PWS016 (SN:12001)	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5008	2022-11-07	2023-11-07
211057	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5008	2022-10-20	2023-10-20
211058	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5008	2022-11-07	2023-11-07
169863	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	55006	2022-09-27	2023-09-27

Test Equipment Used - Wireless Conducted Attenuators, Cables, and Couplers

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
<b>Common Equipment</b>					
<b>Cables</b>					
CBL098	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz, 39.3", Connectors 2	Carlisle Interconnect Technologies	UFA147A-0-0180-200200	2023-02-17	2024-02-17
CBL099	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz, 39.3", Connectors 2	Carlisle Interconnect Technologies	UFA147A-0-0180-200200	2023-02-17	2024-02-17
CBL105	Micro-Coax UTiFLEX Cable Assembly, Low Loss	Carlisle Interconnect Technologies	UFB-197C-0-0160-300300	2023-02-17	2024-02-17
CBL102	Armored Test Cable, 40GHz Male	Mini-Circuits	KBL-1.5FT-LOW+	2022-06-27	2023-06-27
CBL091	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2023-02-17	2024-02-17
CBL093	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2022-08-24	2023-08-24
226560	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2023-02-16	2024-02-16



Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
<b>0.009-30MHz</b>					
135144	Active Loop Antenna	ETS-Lindgren	6502	2023-01-17	2024-01-17
<b>30-1000 MHz</b>					
159203	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2023-01-23	2024-01-23
<b>1-18 GHz</b>					
206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-04-06	2024-04-06
<b>18-40 GHz</b>					
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-626	2022-07-11	2023-07-11
<b>Gain-Loss Chains</b>					
91974	Gain-loss string: 0.009-30MHz	Various	Various	2023-05-16	2024-05-16
91976	Gain-loss string: 25-1000MHz	Various	Various	2023-05-16	2024-05-16
91979	Gain-loss string: 1-18GHz	Various	Various	2023-05-16	2024-05-16
135999	Gain-loss string: 18-40GHz	Various	Various	2023-05-16	2024-05-16
<b>Receiver &amp; Software</b>					
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-02-02	2024-02-02
72823	Spectrum Analyzer	Agilent	E4446A	2022-06-30	2023-06-30
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
<b>Additional Equipment used</b>					
200539	Environmental Meter	Fisher Scientific	15-077-963 s/n 18474341	2022-10-05	2023-10-05
92492 (HPF012)	1GHz high-pass filter, 2W, Fhigh = 18GHz	Micro-Tronics	HPM18129	2023-02-15	2024-02-29
169107 (BRF009)	1.8-2.0GHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50707-01	2023-02-15	2024-02-29
169109 (BRF012)	3.4-3.8GHz notch filter, 2W, Fhigh = 18GHz	Micro-Tronics	BRM50711-01	2023-02-15	2024-02-29
169108 (BRF010)	1.85-1.97GHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50714-01	2023-02-15	2024-02-29
77414 (BRF003)	2.4GHz notch filter, 2W, Fhigh = 18GHz	Micro-Tronics	BRM50702	2023-02-15	2024-02-29
169106 (BRF008)	1710-1785MHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50713-01	2023-02-15	2024-02-29
78368 (BRF006)	1.8-2.0GHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50707-01	2023-02-15	2024-02-29

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	<b>1-18 GHz</b>				
88761	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-09-13	2023-09-13
	<b>18-40 GHz</b>				
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-626	2022-07-11	2023-07-11
	<b>Gain-Loss Chains</b>				
91977	Gain-loss string: 1-18GHz	Various	Various	2023-06-06	2024-06-06
136042	Gain-loss string: 18-40GHz	Various	Various	2023-06-06	2024-06-06
	<b>Receiver &amp; Software</b>				
90416	Spectrum Analyzer	Keysight	N9030A	2023-06-09	2024-06-30
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	<b>Additional Equipment used</b>				
200540	Environmental Meter	Fisher Scientific	15-077-963 s/n 181474409	2022-10-05	2023-10-05
82635 (HPF009)	1GHz high-pass filter, 2W, Fhigh = 10GHz	Micro-Tronics	HPM17672	2023-02-15	2024-02-29
169108 (BRF010)	1.85-1.97GHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50714-01	2023-02-15	2024-02-29
92492 (HPF012)	1GHz high-pass filter, 2W, Fhigh = 18GHz	Micro-Tronics	HPM18129	2023-02-15	2024-02-29
78368 (BRF006)	1.8-2.0GHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50707-01	2023-02-15	2024-02-29
169109 (BRF012)	3.4-3.8GHz notch filter, 2W, Fhigh = 18GHz	Micro-Tronics	BRM50711-01	2023-02-15	2024-02-29
169106 (BRF008)	1710-1785MHz notch filter, 2W, Fhigh = 9GHz	Micro-Tronics	BRM50713-01	2023-02-15	2024-02-29
150716 (LPF008)	DC-1000MHz low-pass filter	Pasternack	PE8720	2023-02-15	2024-02-29

**Notes**

- For tests involving equipment listed above that has a calibration due date during the testing period, the testing was completed before said due date.

## 9. RF OUTPUT POWER VERIFICATION

### AVERAGE OUTPUT POWER TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

### PEAK OUTPUT POWER TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable connected to a power meter via wideband peak power sensor. Peak output power was read directly from power meter.

### RESULTS

<b>Test Engineer ID:</b>	22797/44389	<b>Test Date:</b>	2023-06-28
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**5G NR n2**

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	RF1 Port 1 Measured Avg Power (dBm)	RF1 Port 2 Measured Avg Power (dBm)	RF1 Port 3 Measured Avg Power (dBm)	RF1 Port 4 Measured Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)
n2	15	10	QPSK	387000	1935	0.87	0.12	0.01	-0.06	6.27
				392000	1960	0.63	0.10	-0.04	-0.07	6.18
				397000	1985	0.74	0.11	-0.23	0.00	6.19
			16QAM	387000	1935	0.83	0.60	0.09	0.33	<b>6.49</b>
				392000	1960	1.05	0.23	0.05	-0.12	6.35
				397000	1985	1.00	0.25	-0.16	-0.10	6.29
			64QAM	387000	1935	1.00	0.18	0.15	-0.04	6.36
				392000	1960	0.98	0.09	-0.39	-0.08	6.20
				397000	1985	0.87	0.25	-0.14	-0.11	6.26
		20	QPSK	388000	1940	0.64	0.52	-0.17	0.29	6.35
				392000	1960	0.75	0.49	-0.17	0.37	6.39
				396000	1980	0.51	0.45	-0.30	0.27	6.26
			16QAM	388000	1940	0.61	0.53	-0.23	0.34	6.34
				392000	1960	0.56	0.50	-0.22	0.34	6.33
				396000	1980	0.49	0.46	-0.34	0.32	6.27
			64QAM	388000	1940	0.64	0.59	-0.27	0.45	6.39
				392000	1960	0.60	0.57	-0.25	0.45	6.38
				396000	1980	0.52	0.52	-0.39	0.43	6.31
		40	QPSK	390000	1950	0.74	0.48	-0.10	0.26	6.38
				392000	1960	0.49	0.21	-0.33	0.06	6.14
				394000	1970	0.74	0.48	-0.33	0.09	6.28
			16QAM	390000	1950	1.07	0.22	0.02	-0.16	6.33
				392000	1960	0.81	0.58	0.08	0.34	6.48
				394000	1970	0.77	0.56	0.03	0.33	6.45
			64QAM	390000	1950	0.53	0.19	-0.38	0.00	6.12
				392000	1960	0.89	0.56	-0.01	0.37	6.49
				394000	1970	0.78	0.57	0.05	0.34	6.46

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	RF1 Port 1 Measured Avg Power (dBm)	RF1 Port 2 Measured Avg Power (dBm)	RF1 Port 3 Measured Avg Power (dBm)	RF1 Port 4 Measured Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)
n2	30	10	QPSK	387000	1935	0.47	0.40	0.05	0.16	6.30
				392000	1960	0.47	0.44	0.11	0.20	6.33
				397000	1985	0.47	0.42	0.07	0.19	6.31
			16QAM	387000	1935	0.44	0.41	0.07	0.24	6.31
				392000	1960	0.42	0.39	0.24	0.28	6.35
				397000	1985	0.41	0.39	0.09	0.26	6.31
			64QAM	387000	1935	0.46	0.40	0.10	0.21	6.32
				392000	1960	0.49	0.40	0.16	0.22	6.34
				397000	1985	0.49	0.39	0.12	0.22	6.33
		20	QPSK	388000	1940	0.43	0.40	0.04	0.16	6.28
				392000	1960	0.45	0.41	0.08	0.17	6.30
				396000	1980	0.44	0.40	0.06	0.19	6.29
			16QAM	388000	1940	0.44	0.40	0.05	0.18	6.29
				392000	1960	0.44	0.42	0.08	0.20	6.31
				396000	1980	0.44	0.41	0.07	0.19	6.30
			64QAM	388000	1940	0.45	0.42	0.04	0.14	6.29
				392000	1960	0.45	0.42	0.08	0.16	6.30
				396000	1980	0.45	0.43	0.07	0.16	6.30
		40	QPSK	390000	1950	0.38	0.33	0.01	0.14	6.24
				392000	1960	0.37	0.34	0.03	0.15	6.25
				394000	1970	0.38	0.34	0.04	0.16	6.25
			16QAM	390000	1950	0.35	0.38	0.03	0.15	6.25
				392000	1960	0.36	0.37	0.04	0.16	6.25
				394000	1970	0.35	0.38	0.04	0.16	6.26
			64QAM	390000	1950	0.38	0.34	0.01	0.10	6.23
				392000	1960	0.37	0.34	0.02	0.11	6.23
				394000	1970	0.36	0.31	0.02	0.11	6.22

**5G NR n5**

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	RF1 Port 1 Measured Avg Power (dBm)	RF1 Port 2 Measured Avg Power (dBm)	RF1 Port 3 Measured Avg Power (dBm)	RF1 Port 4 Measured Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)		
n5	15	10	QPSK	174800	874	-14.50	-14.77	-15.03	-14.76	-8.74		
				176300	881.5	-14.47	-14.70	-15.07	-14.76	-8.72		
				177800	889	-14.48	-14.74	-15.11	-14.79	-8.75		
			16QAM	174800	874	-14.49	-14.68	-14.97	-14.73	-8.69		
				176300	881.5	-14.48	-14.69	-15.06	-14.72	-8.71		
				177800	889	-14.47	-14.78	-15.10	-14.78	-8.76		
			64QAM	174800	874	-14.46	-14.67	-15.02	-14.76	-8.70		
				176300	881.5	-14.47	-14.68	-15.01	-14.76	-8.70		
				177800	889	-14.50	-14.74	-15.05	-14.86	-8.76		
		20	QPSK	175800	879	-14.64	-14.78	-15.14	-14.91	-8.84		
				176300	881.5	-14.65	-14.95	-15.16	-14.90	-8.89		
				176800	884	-14.64	-14.91	-15.17	-14.87	-8.87		
			16QAM	175800	879	-14.61	-14.89	-15.13	-14.80	-8.83		
				176300	881.5	-14.61	-14.80	-15.15	-14.86	-8.83		
				176800	884	-14.61	-14.84	-15.16	-14.85	-8.84		
			64QAM	175800	879	-14.67	-14.76	-15.15	-14.82	-8.83		
				176300	881.5	-14.66	-14.97	-15.16	-14.84	-8.88		
				176800	884	-14.66	-14.96	-15.18	-14.83	-8.88		
		n5	30	10	QPSK	174800	874	-14.71	-14.88	-15.13	-14.85	-8.87
						176300	881.5	-14.71	-14.85	-15.17	-14.83	-8.87
						177800	889	-14.72	-14.83	-15.21	-14.91	-8.89
16QAM	174800				874	-14.73	-14.49	-15.11	-14.73	-8.74		
	176300				881.5	-14.73	-14.82	-15.15	-14.75	-8.84		
	177800				889	-14.74	-14.88	-15.19	-14.80	-8.88		
64QAM	174800				874	-14.73	-14.70	-15.08	-14.82	-8.81		
	176300				881.5	-14.72	-14.84	-15.12	-14.84	-8.86		
	177800				889	-14.72	-14.76	-15.14	-14.79	-8.83		
20	QPSK			175800	879	-14.71	-14.80	-15.17	-14.99	-8.89		
				176300	881.5	-14.71	-15.03	-15.19	-15.00	-8.96		
				176800	884	-14.70	-15.04	-15.20	-14.98	-8.96		
	16QAM			175800	879	-14.70	-14.97	-15.16	-14.85	-8.90		
				176300	881.5	-14.69	-14.86	-15.18	-14.83	-8.87		
				176800	884	-14.70	-14.35	-15.20	-14.81	-8.73		
	64QAM			175800	879	-14.68	-14.76	-15.17	-14.99	-8.87		
				176300	881.5	-14.69	-14.77	-15.19	-15.03	-8.89		
				176800	884	-14.69	-14.67	-15.20	-14.81	-8.82		

**5G NR n66**

Note: Low channel had its power setting reduced to meet compliance standards. See section 6.5 for power settings used.

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	RF1 Port 1 Measured Avg Power (dBm)	RF1 Port 2 Measured Avg Power (dBm)	RF1 Port 3 Measured Avg Power (dBm)	RF1 Port 4 Measured Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)
n66	15	10	QPSK	423000	2115	11.68	11.03	10.36	11.22	17.12
				431000	2155	13.92	13.20	11.00	12.53	18.81
				439000	2195	13.85	13.74	12.53	12.78	19.28
			16QAM	423000	2115	11.54	11.49	10.39	11.16	17.19
				431000	2155	13.92	12.19	10.87	12.53	18.53
				439000	2195	13.85	13.71	12.54	12.81	19.28
			64QAM	423000	2115	11.52	11.66	10.54	11.36	17.31
				431000	2155	13.95	13.77	13.29	13.61	19.68
				439000	2195	14.02	13.85	12.77	12.73	19.40
		20	QPSK	424000	2120	11.53	11.62	10.42	10.95	17.18
				431000	2155	13.49	12.85	10.43	12.09	18.38
				438000	2190	13.83	13.89	12.79	12.96	19.42
			16QAM	424000	2120	11.48	11.55	10.31	10.85	17.10
				431000	2155	13.50	12.85	12.09	12.09	18.69
				438000	2190	13.88	13.90	12.80	13.02	19.45
			64QAM	424000	2120	11.72	11.63	10.29	11.06	17.23
				431000	2155	13.82	13.44	12.46	12.99	19.23
				438000	2190	13.85	13.91	12.79	12.96	19.43
		40	QPSK	426000	2130	11.50	11.51	10.25	11.28	17.19
				431000	2155	13.27	12.66	12.92	13.29	19.06
				436000	2180	13.79	13.81	12.87	13.06	19.42
			16QAM	426000	2130	11.63	11.57	10.43	10.80	17.16
				431000	2155	13.28	12.66	12.95	13.31	19.08
				436000	2180	13.81	13.82	12.89	13.05	19.43
64QAM	426000		2130	11.54	11.58	10.36	11.39	17.27		
	431000		2155	13.77	13.80	13.30	13.19	19.54		
	436000		2180	13.81	13.84	12.87	13.03	19.43		

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	RF1 Port 1 Measured Avg Power (dBm)	RF1 Port 2 Measured Avg Power (dBm)	RF1 Port 3 Measured Avg Power (dBm)	RF1 Port 4 Measured Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)
n66	30	10	QPSK	423000	2115	11.58	11.52	10.51	11.31	17.27
				431000	2155	14.54	13.97	12.66	13.16	19.66
				439000	2195	13.84	14.07	12.63	12.78	19.40
			16QAM	423000	2115	11.64	11.64	10.32	11.15	17.24
				431000	2155	14.45	13.90	13.30	13.17	19.76
				439000	2195	13.79	13.98	12.65	12.78	19.36
			64QAM	423000	2115	11.56	11.71	10.28	11.20	17.24
				431000	2155	13.78	13.99	12.89	13.10	19.49
				439000	2195	13.81	14.15	12.69	12.82	19.43
		20	QPSK	424000	2120	11.69	11.54	10.56	11.05	17.25
				431000	2155	13.67	13.60	12.70	12.16	19.10
				438000	2190	13.79	13.85	12.66	12.93	19.36
			16QAM	424000	2120	11.69	11.49	10.51	11.07	17.23
				431000	2155	14.14	13.56	12.87	13.49	19.56
				438000	2190	13.82	13.84	12.68	12.94	19.37
			64QAM	424000	2120	11.67	11.71	10.26	10.87	17.19
				431000	2155	13.81	13.85	12.92	13.33	19.51
				438000	2190	13.82	13.87	12.77	12.90	19.39
		40	QPSK	426000	2130	11.63	11.56	10.57	11.40	17.33
				431000	2155	13.93	13.40	12.57	12.99	19.27
				436000	2180	13.76	13.78	12.86	13.00	19.39
			16QAM	426000	2130	11.54	11.73	10.55	11.05	17.26
				431000	2155	14.20	13.68	12.90	12.81	19.46
				436000	2180	13.81	13.78	12.87	13.04	19.42
			64QAM	426000	2130	11.50	11.58	10.52	11.23	17.25
				431000	2155	13.83	13.79	12.98	13.13	19.47
				436000	2180	13.75	13.80	12.85	12.99	19.39



**5G NR n77**

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	RF1 Port 1 Measured Avg Power (dBm)	RF1 Port 2 Measured Avg Power (dBm)	RF1 Port 3 Measured Avg Power (dBm)	RF1 Port 4 Measured Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)
n77	15	10	QPSK	647000	3705	7.60	7.01	8.40	6.50	13.46
				656000	3840	7.58	7.08	8.29	6.58	13.45
				665000	3975	7.55	7.12	8.35	6.47	13.45
			16QAM	647000	3705	7.55	7.09	8.37	6.42	13.44
				656000	3840	7.49	7.05	8.36	6.45	13.41
				665000	3975	7.54	7.12	8.24	6.59	13.44
			64QAM	647000	3705	7.46	7.17	8.33	6.41	13.42
				656000	3840	7.59	7.17	8.20	6.49	13.43
				665000	3975	7.61	7.14	8.19	6.50	13.42
		20	QPSK	647333	3709.995	7.54	7.09	8.31	6.59	13.45
				656000	3840	7.57	7.07	8.32	6.53	13.44
				664666	3969.99	7.55	7.04	8.33	6.56	13.44
			16QAM	647333	3709.995	7.53	7.15	8.35	6.55	13.47
				656000	3840	7.56	7.14	8.33	6.56	13.47
				664666	3969.99	7.59	7.10	8.31	6.49	13.44
			64QAM	647333	3709.995	7.55	7.06	8.34	6.55	13.45
				656000	3840	7.60	7.10	8.32	6.50	13.45
				664666	3969.99	7.58	7.07	8.30	6.54	13.44
		40	QPSK	648000	3720	7.40	6.97	8.38	6.35	13.36
				656000	3840	7.44	6.87	8.20	6.40	13.30
				664000	3960	7.45	7.07	8.04	6.46	13.31
			16QAM	648000	3720	7.51	7.04	8.12	6.36	13.33
				656000	3840	7.45	6.95	8.20	6.43	13.33
				664000	3960	7.41	7.05	8.03	6.44	13.29
64QAM	648000		3720	7.52	6.95	8.12	6.33	13.30		
	656000		3840	7.46	6.99	8.19	6.39	13.33		
	664000		3960	7.38	7.03	8.28	6.34	13.33		

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	RF1 Port 1 Measured Avg Power (dBm)	RF1 Port 2 Measured Avg Power (dBm)	RF1 Port 3 Measured Avg Power (dBm)	RF1 Port 4 Measured Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)
30	10	10	QPSK	647000	3705	7.75	7.28	8.57	6.75	13.66
				656000	3840	7.78	7.35	8.58	6.78	13.69
				665000	3975	7.77	7.26	8.55	6.75	13.65
			16QAM	647000	3705	7.78	7.27	8.63	6.74	13.68
				656000	3840	7.75	7.30	8.60	6.76	13.68
				665000	3975	7.82	7.26	8.42	6.81	13.64
			64QAM	647000	3705	7.76	7.28	8.68	6.79	13.71
				656000	3840	7.78	7.35	8.66	6.78	13.72
				665000	3975	7.74	7.32	8.64	6.76	13.69
		20	QPSK	647333	3709.99	7.76	7.33	8.67	6.76	13.71
				656000	3840	7.80	7.29	8.63	6.82	13.71
				664666	3969.99	7.77	7.32	8.57	6.80	13.68
			16QAM	647333	3709.995	7.80	7.36	8.57	6.81	13.70
				656000	3840	7.77	7.30	8.62	6.81	13.70
				664666	3969.99	7.82	7.29	8.68	6.84	13.73
			64QAM	647333	3709.995	7.77	7.32	8.67	6.79	13.71
				656000	3840	7.82	7.39	8.62	6.77	13.72
				664666	3969.99	7.84	7.34	8.61	6.72	13.70
		40	QPSK	648000	3720	7.75	7.20	8.33	6.63	13.54
				656000	3840	7.65	7.12	8.41	6.60	13.52
				664000	3960	7.61	7.28	8.36	6.60	13.53
			16QAM	648000	3720	7.74	7.07	8.32	6.63	13.51
				656000	3840	7.53	7.15	8.41	6.56	13.49
				664000	3960	7.57	7.09	8.48	6.57	13.51
			64QAM	648000	3720	7.65	7.24	8.31	6.50	13.49
				656000	3840	7.57	7.07	8.37	6.47	13.45
				664000	3960	7.62	7.04	8.41	6.57	13.49
		100	QPSK	650000	3750	7.31	6.79	8.08	6.28	13.19
				656000	3840	7.30	6.80	8.11	6.30	13.20
				662000	3930	7.37	6.73	8.09	6.36	13.21
			16QAM	650000	3750	7.31	6.84	8.12	6.19	13.19
				656000	3840	7.26	6.72	8.20	6.27	13.19
				662000	3930	7.24	6.80	8.17	6.36	13.22
			64QAM	650000	3750	7.35	6.75	8.09	6.24	13.18
				656000	3840	7.34	6.64	8.04	6.28	13.15
				662000	3930	7.31	6.70	8.13	6.27	13.18

## 10. CONDUCTED TEST RESULTS

### 10.1. OCCUPIED BANDWIDTH

#### RULE PART(S)

FCC: §2.1049

#### LIMITS

For reporting purposes only.

#### TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the middle channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

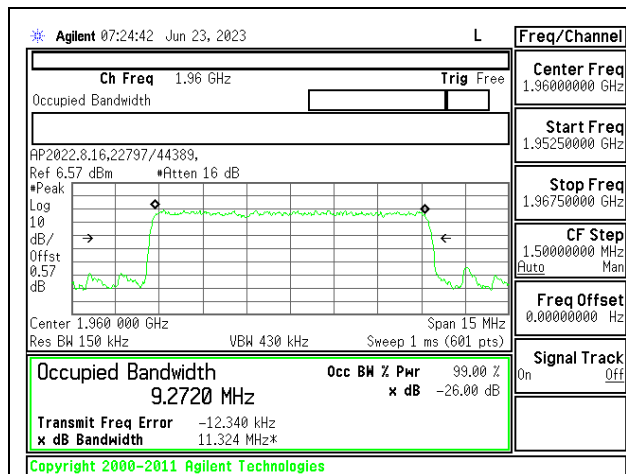
#### RESULTS

There is no limit required and power is the same for low, middle and high channel; therefore, only middle channel was tested.

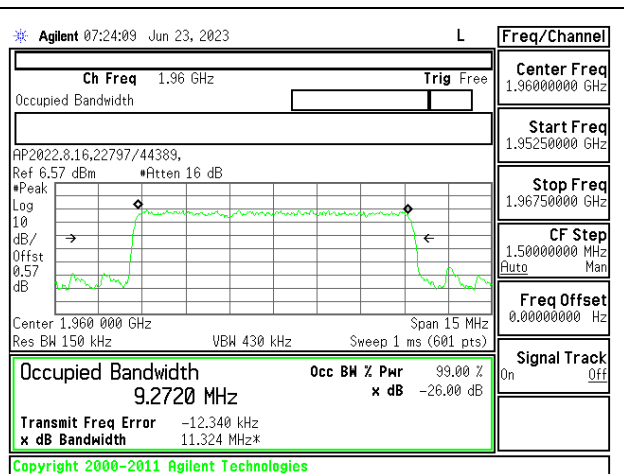
<b>Test Engineer ID:</b>	22797/44389, 27465/22389	<b>Test Date:</b>	2023-06-23, 2023-06-27, 2023-06-29
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10.1.1. 5G NR n2

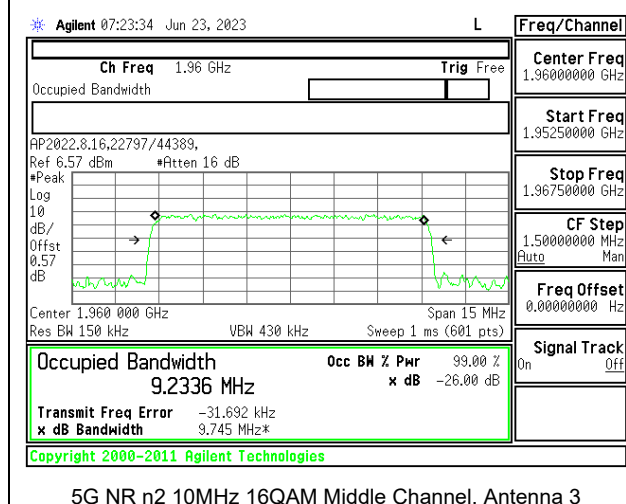
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	99% BW (MHz)	99% BW (MHz)
			Antenna 1	Antenna 2	Antenna 3	Antenna 4
5G NR n2	10MHz, QPSK	1960	9.274	9.295	9.182	9.319
	10MHz, 16QAM		9.272	9.272	9.234	9.181
	20MHz, QPSK		18.832	18.857	18.641	18.836
	20MHz, 16QAM		18.755	18.814	18.820	18.969
	40MHz, QPSK		38.617	38.405	38.561	38.545
	40MHz, 16QAM		38.459	38.471	38.515	38.544
	Mode		-26dB BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
	Antenna 1		Antenna 2	Antenna 3	Antenna 4	
	10MHz, QPSK		10.789	10.822	9.559	9.600
	10MHz, 16QAM		11.324	11.324	9.745	10.803
	20MHz, QPSK		24.370	19.579	21.554	19.571
	20MHz, 16QAM		20.292	19.526	23.117	21.507
	40MHz, QPSK		43.011	55.788	40.898	40.214
	40MHz, 16QAM		42.941	43.018	39.927	44.109



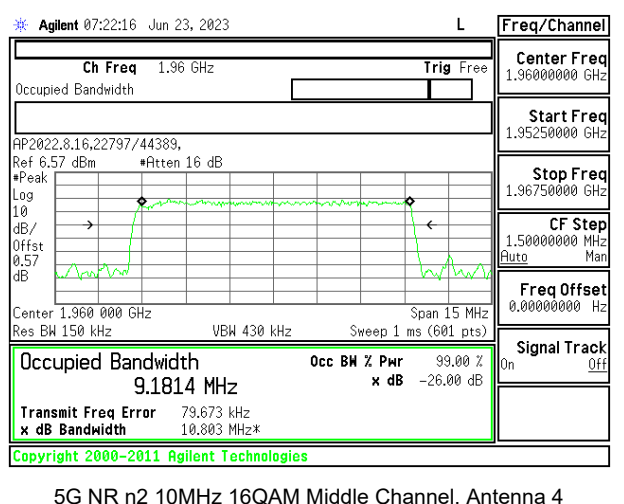
5G NR n2 10MHz 16QAM Middle Channel, Antenna 1



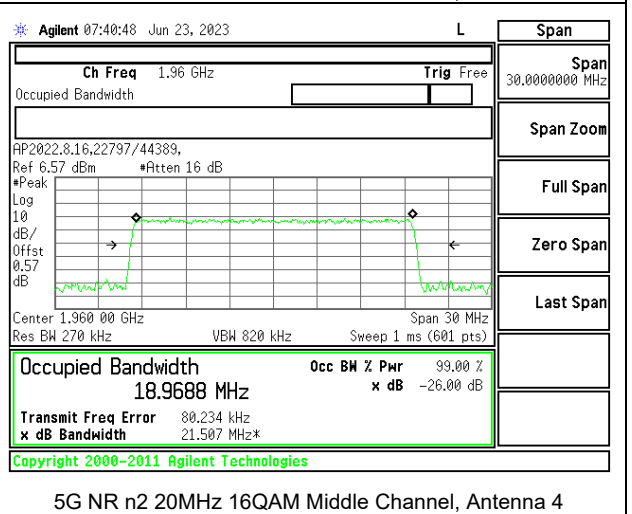
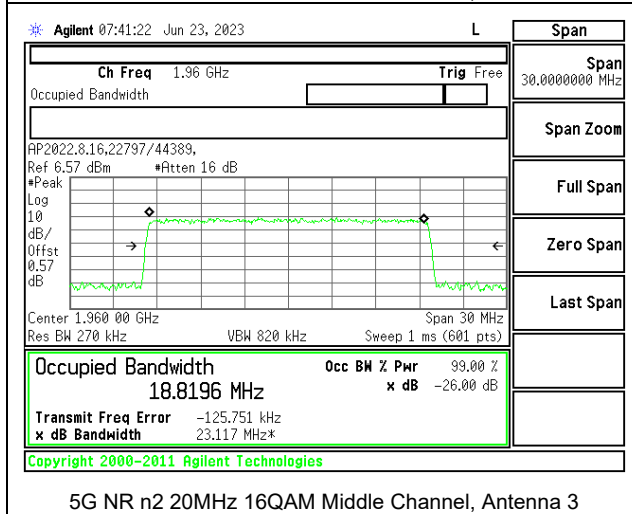
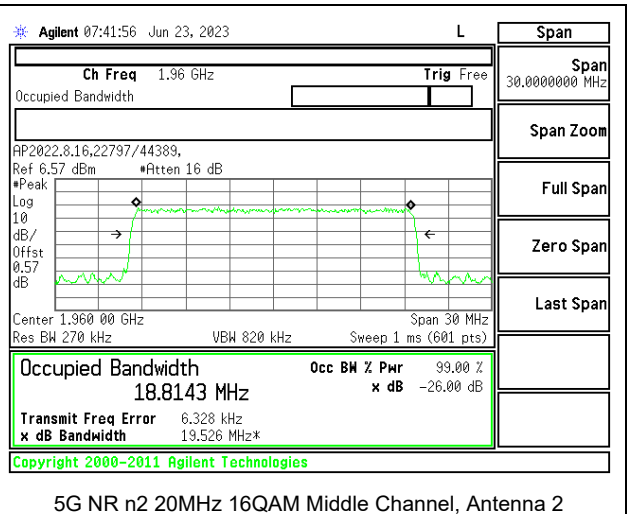
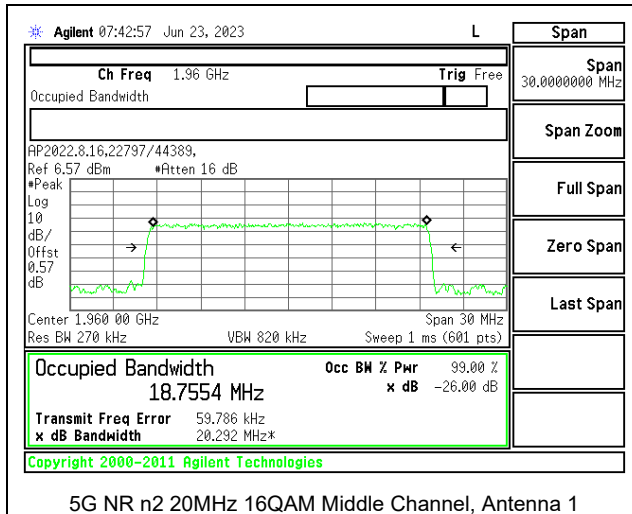
5G NR n2 10MHz 16QAM Middle Channel, Antenna 2

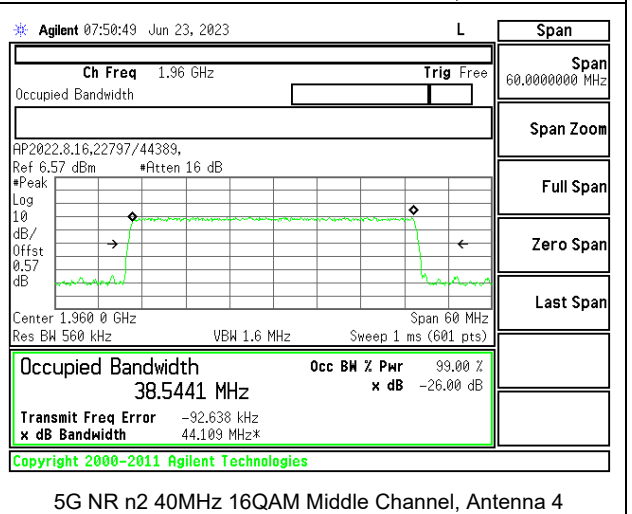
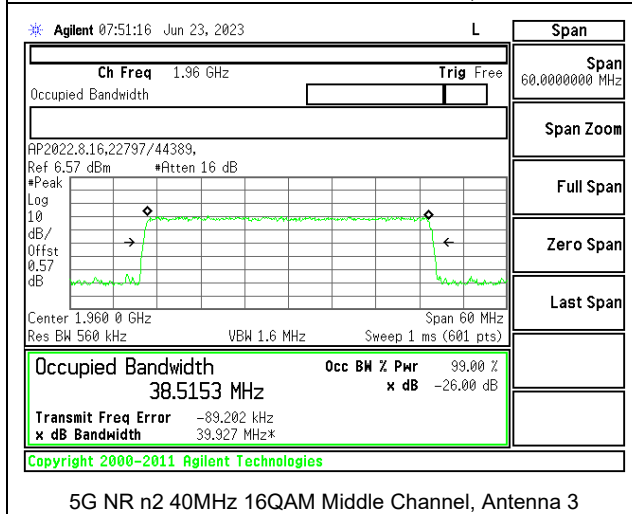
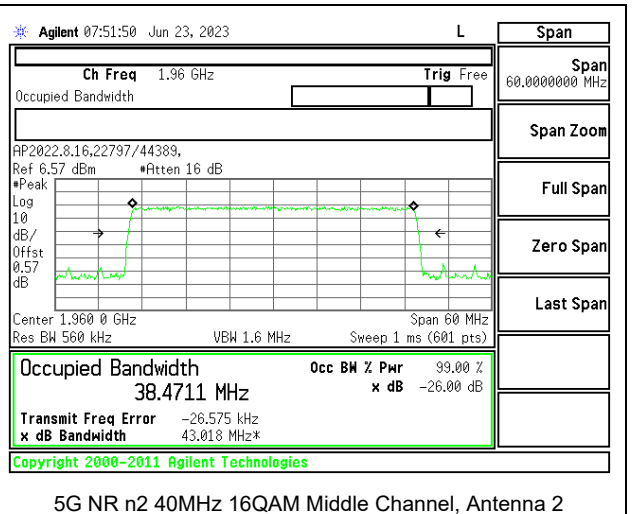
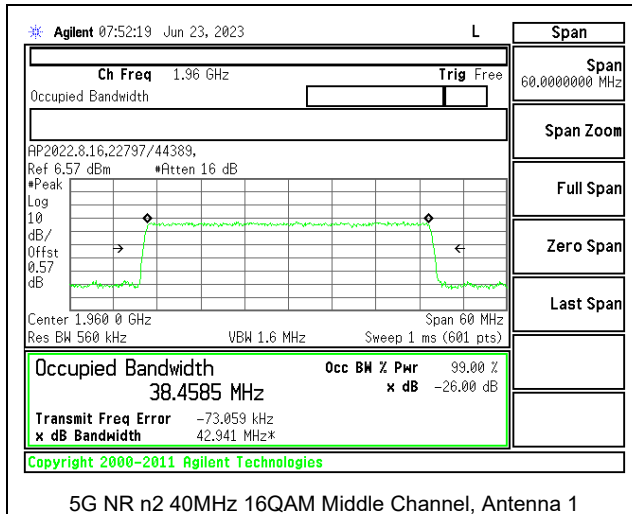


5G NR n2 10MHz 16QAM Middle Channel, Antenna 3



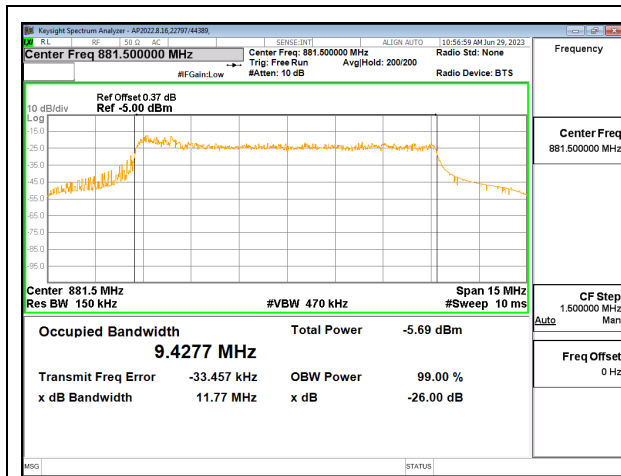
5G NR n2 10MHz 16QAM Middle Channel, Antenna 4



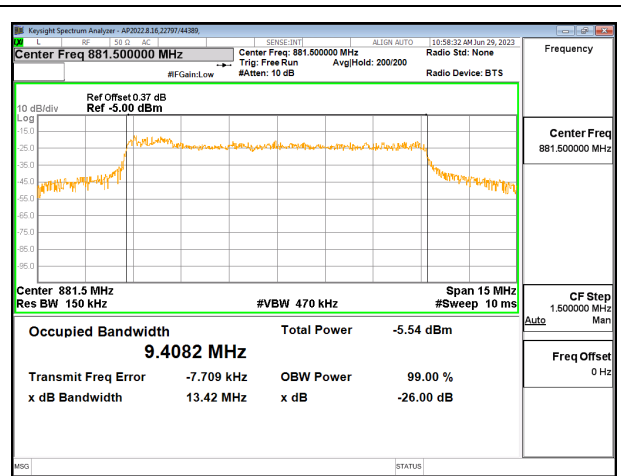


10.1.2. 5G NR n5

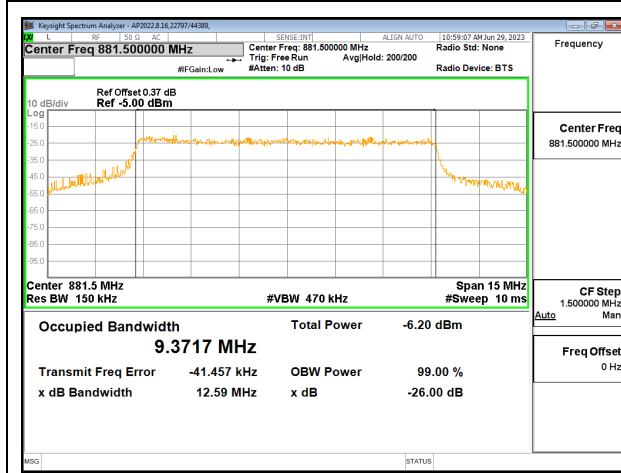
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	99% BW (MHz)	99% BW (MHz)
			Antenna 1	Antenna 2	Antenna 3	Antenna 4
5G NR n5	10MHz, QPSK	881.5	9.180	9.337	9.160	9.204
	10MHz, 16QAM		9.428	9.408	9.372	9.389
	20MHz, QPSK		19.092	19.014	19.089	19.063
	20MHz, 16QAM		19.125	19.077	19.018	19.111
	Mode		-26dB BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
	Antenna 1		Antenna 2	Antenna 3	Antenna 4	
	10MHz, QPSK		9.772	12.925	9.843	10.337
	10MHz, 16QAM		11.77	13.42	12.59	11.45
	20MHz, QPSK		23.32	28.24	28.53	22.99
	20MHz, 16QAM		23.49	25.71	23.33	23.01



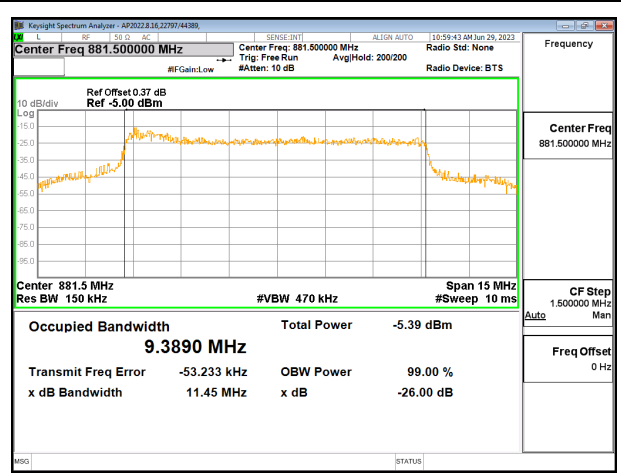
5G NR n5 10MHz 16QAM Middle Channel, Antenna 1



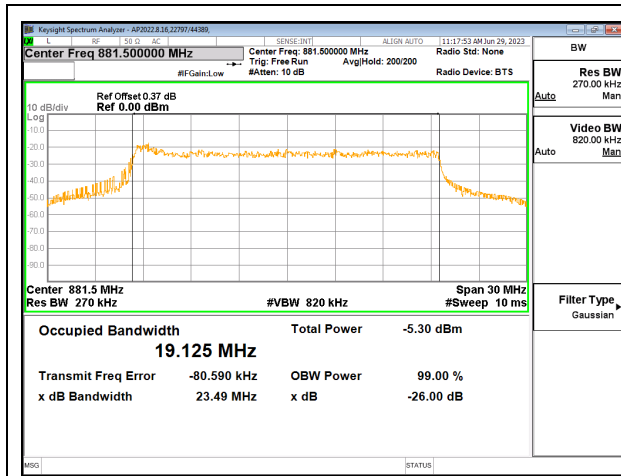
5G NR n5 10MHz 16QAM Middle Channel, Antenna 2



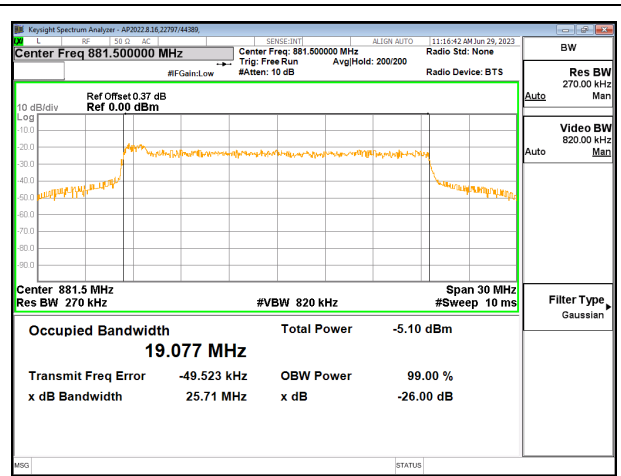
5G NR n5 10MHz 16QAM Middle Channel, Antenna 3



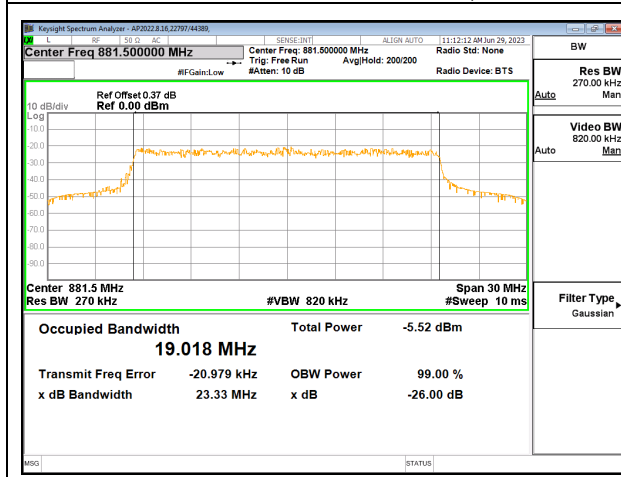
5G NR n5 10MHz 16QAM Middle Channel, Antenna 4



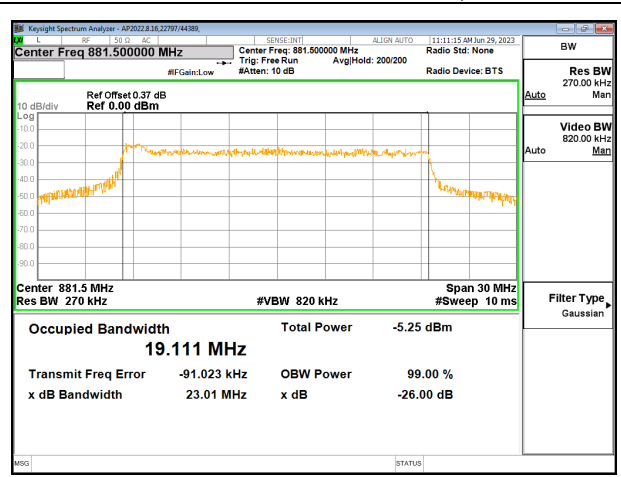
5G NR n5 20MHz 16QAM Middle Channel, Antenna 1



5G NR n5 20MHz 16QAM Middle Channel, Antenna 2



5G NR n5 20MHz 16QAM Middle Channel, Antenna 3

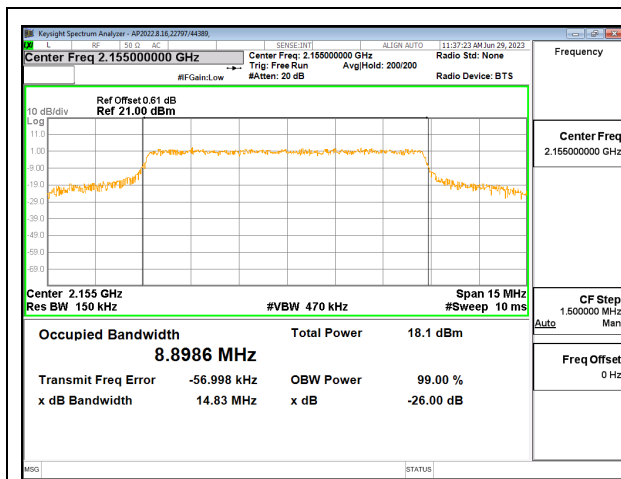


5G NR n5 20MHz 16QAM Middle Channel, Antenna 4

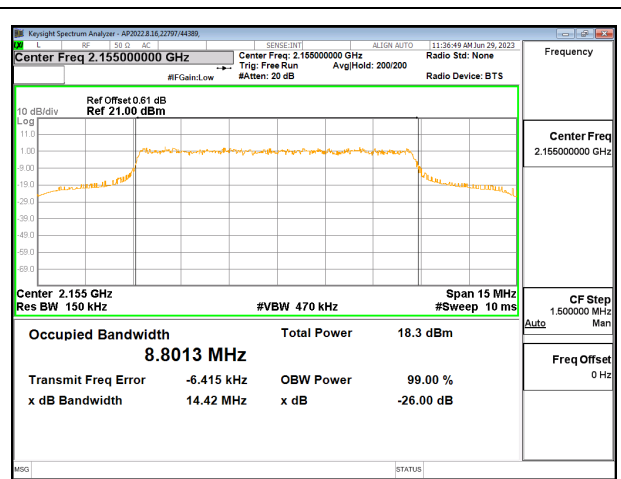


10.1.3. 5G NR n66

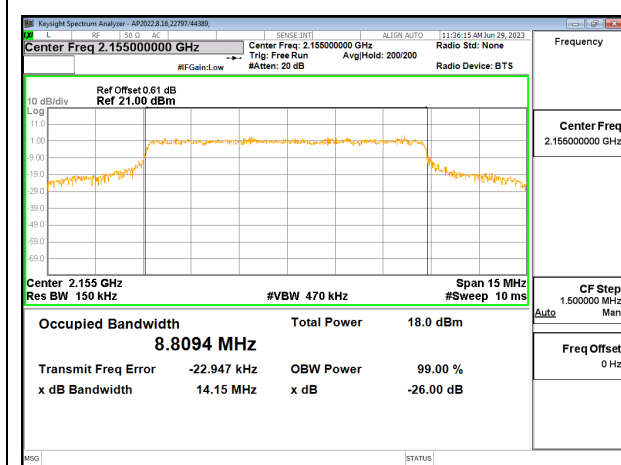
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	99% BW (MHz)	99% BW (MHz)
			Antenna 1	Antenna 2	Antenna 3	Antenna 4
5G NR n66	10MHz, QPSK	2155	8.899	8.801	8.809	8.785
	10MHz, 16QAM		8.839	8.767	8.750	8.737
	20MHz, QPSK		18.365	18.479	18.388	18.500
	20MHz, 16QAM		18.360	18.392	18.320	18.376
	40MHz, QPSK		38.027	38.042	37.983	38.024
	40MHz, 16QAM		38.017	38.010	38.065	38.048
	Mode		-26dB BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
	Antenna 1		Antenna 2	Antenna 3	Antenna 4	
	10MHz, QPSK		14.83	14.42	14.15	14.53
	10MHz, 16QAM		14.26	14.69	14.75	14.76
	20MHz, QPSK		28.51	28.77	27.94	29.77
	20MHz, 16QAM		24.45	28.28	26.86	28.62
	40MHz, QPSK		45.42	49.23	45.27	46.41
	40MHz, 16QAM		44.64	51.14	48.39	51.74



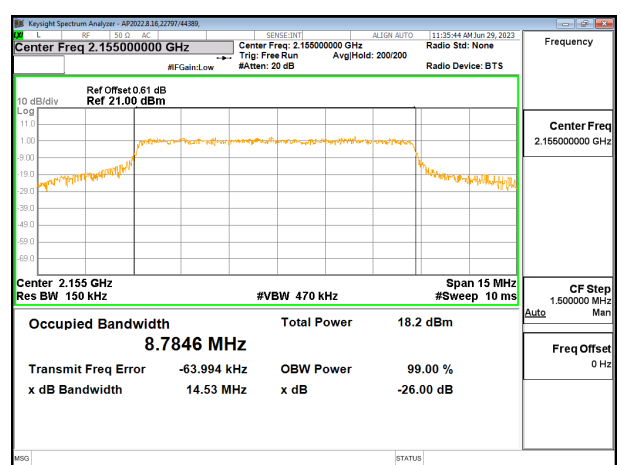
5G NR n66 10MHz QPSK Middle Channel, Antenna 1



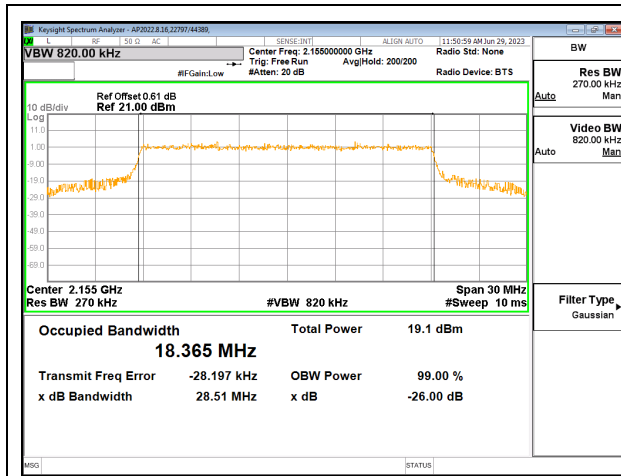
5G NR n66 10MHz QPSK Middle Channel, Antenna 2



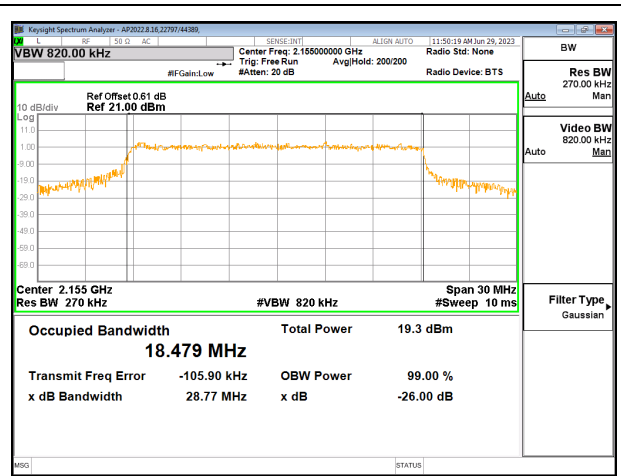
5G NR n66 10MHz QPSK Middle Channel, Antenna 3



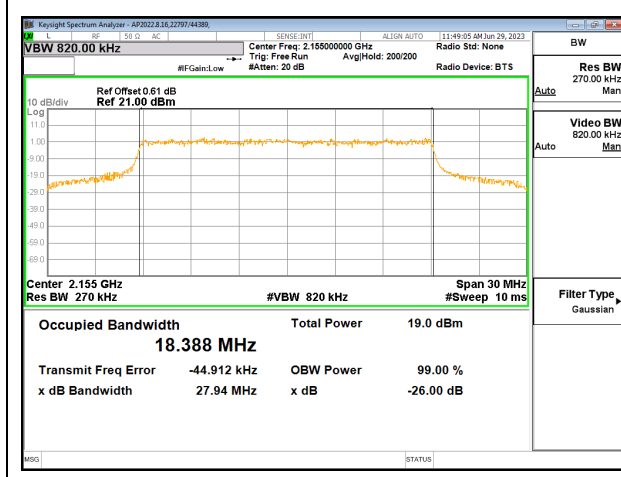
5G NR n66 10MHz QPSK Middle Channel, Antenna 4



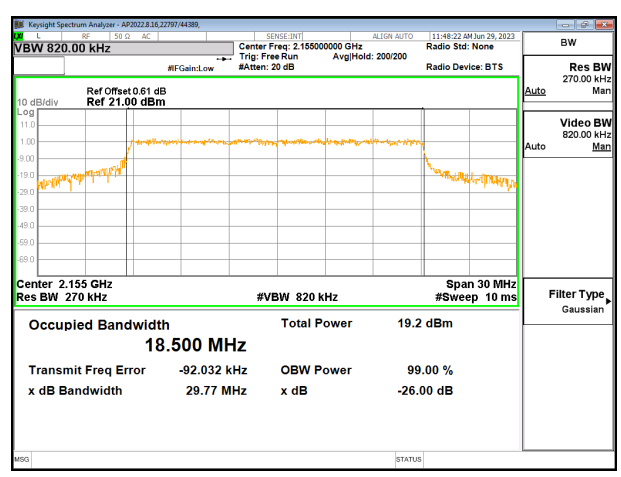
5G NR n66 20MHz QPSK Middle Channel, Antenna 1



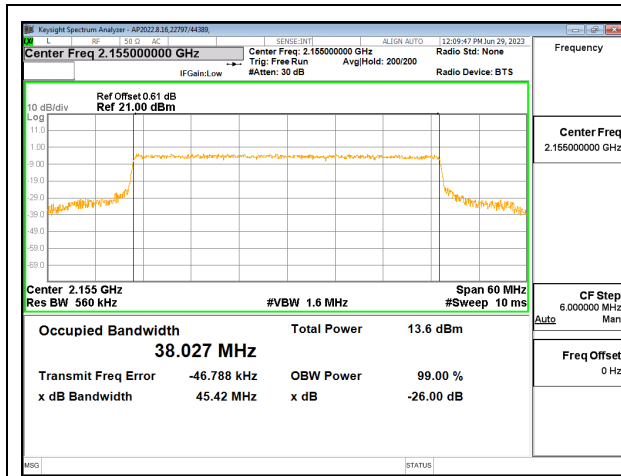
5G NR n66 20MHz QPSK Middle Channel, Antenna 2



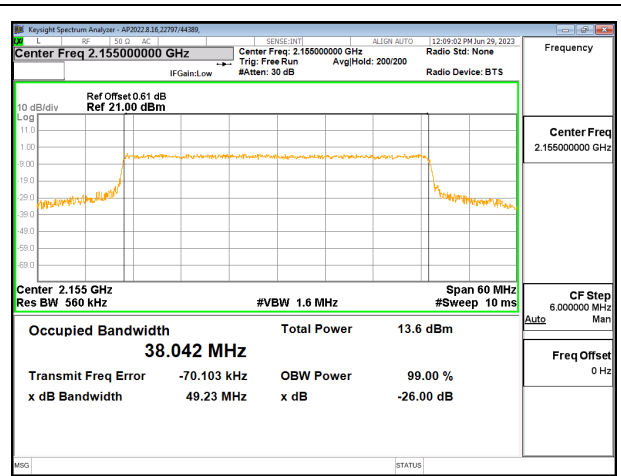
5G NR n66 20MHz QPSK Middle Channel, Antenna 3



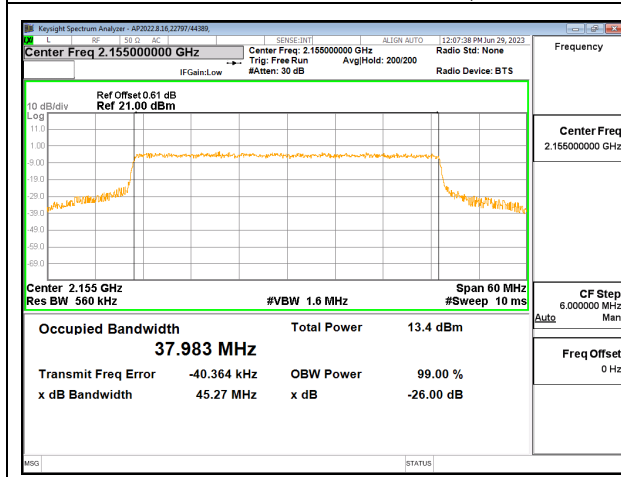
5G NR n66 20MHz QPSK Middle Channel, Antenna 4



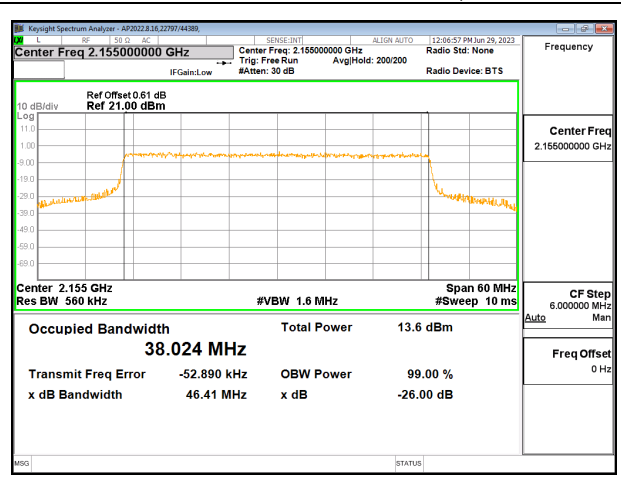
5G NR n66 40MHz QPSK Middle Channel, Antenna 1



5G NR n66 40MHz QPSK Middle Channel, Antenna 2



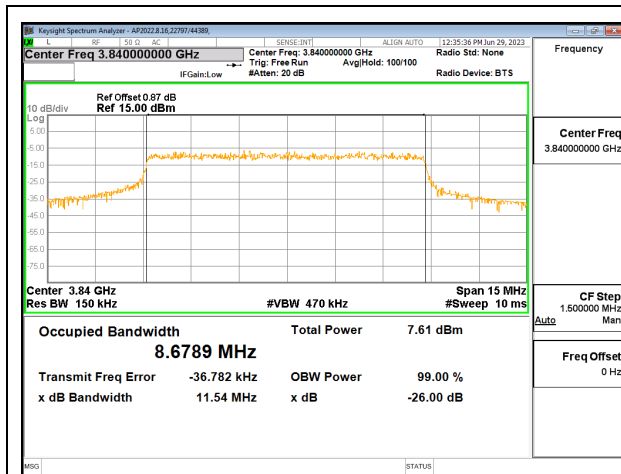
5G NR n66 40MHz QPSK Middle Channel, Antenna 3



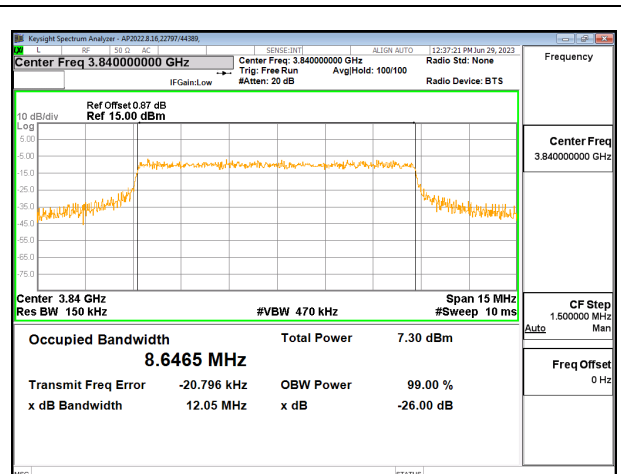
5G NR n66 40MHz QPSK Middle Channel, Antenna 4

10.1.4. 5G NR n77

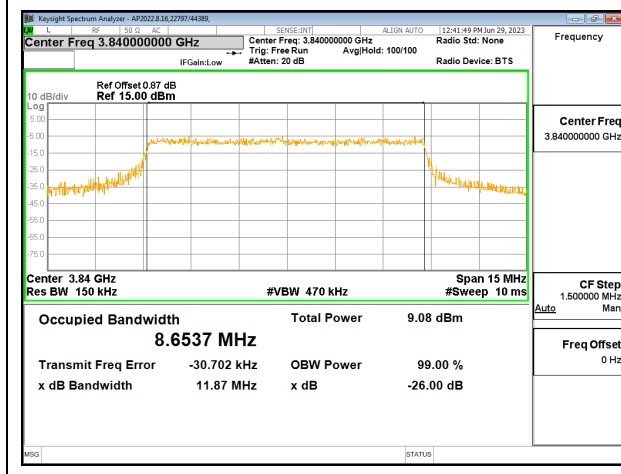
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	99% BW (MHz)	99% BW (MHz)
			Antenna 1	Antenna 2	Antenna 3	Antenna 4
5G NR n77	10MHz, QPSK	3840	8.690	8.676	8.708	8.713
	10MHz, 16QAM		8.679	8.647	8.654	8.640
	20MHz, QPSK		18.319	18.348	18.326	18.324
	20MHz, 16QAM		18.319	18.344	18.313	18.373
	40MHz, QPSK		37.997	38.020	37.953	38.043
	40MHz, 16QAM		38.008	38.058	37.978	38.019
	100MHz, QPSK		97.582	97.599	97.509	97.694
	100MHz, 16QAM		97.725	97.602	97.575	97.541
	Mode		-26dB BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
	Antenna 1		Antenna 2	Antenna 3	Antenna 4	
	10MHz, QPSK		12.88	11.84	13.52	13.40
	10MHz, 16QAM		11.54	12.05	11.87	12.56
	20MHz, QPSK		26.87	28.47	28.83	29.83
	20MHz, 16QAM		26.38	27.24	26.20	28.70
	40MHz, QPSK		48.47	48.15	49.98	48.38
	40MHz, 16QAM		47.06	52.83	49.35	47.54
	100MHz, QPSK		103.6	102.2	103.8	105.4
	100MHz, 16QAM		107.3	104.8	108.9	105.8



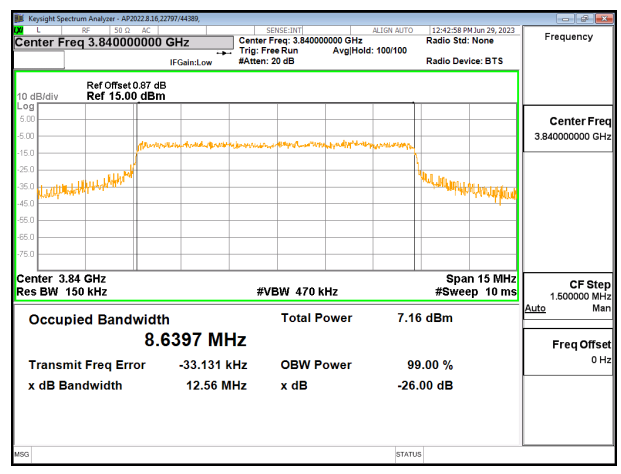
5G NR n77 10MHz 16QAM Middle Channel, Antenna 1



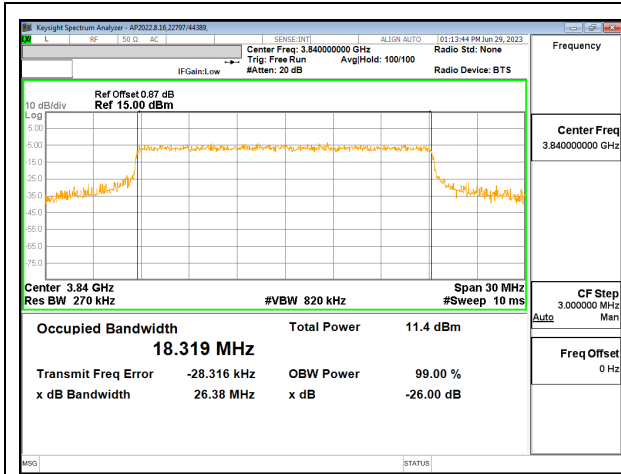
5G NR n77 10MHz 16QAM Middle Channel, Antenna 2



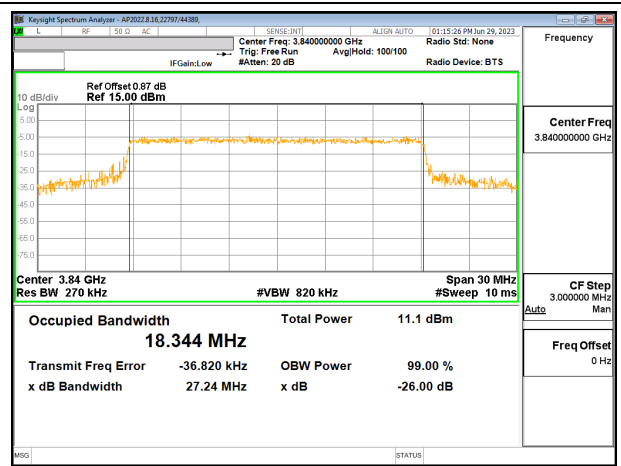
5G NR n77 10MHz 16QAM Middle Channel, Antenna 3



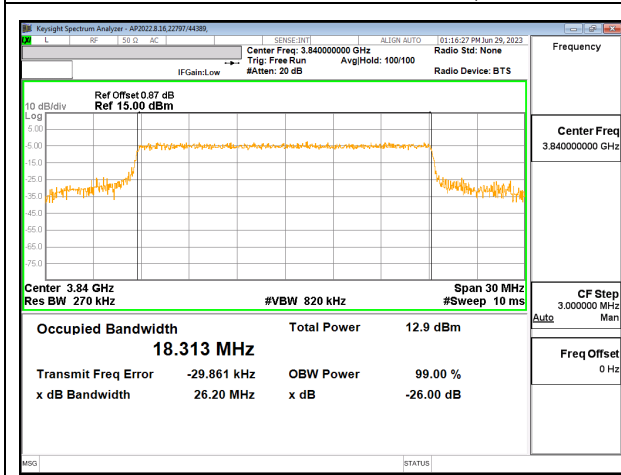
5G NR n77 10MHz 16QAM Middle Channel, Antenna 4



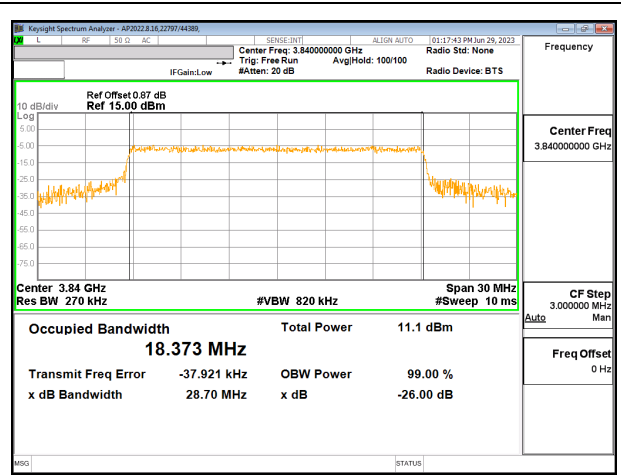
5G NR n77 20MHz 16QAM Middle Channel, Antenna 1



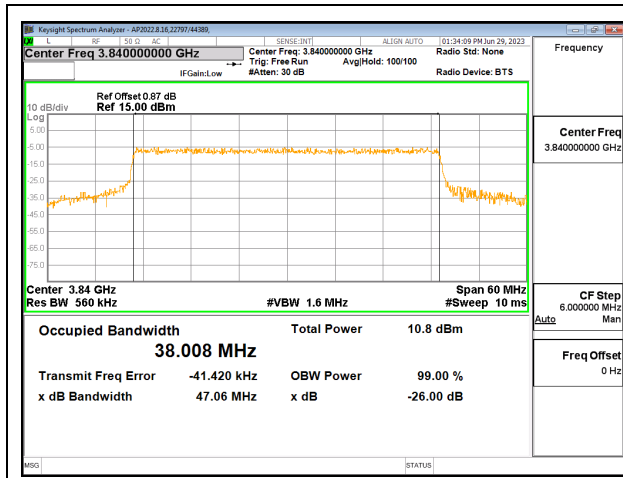
5G NR n77 20MHz 16QAM Middle Channel, Antenna 2



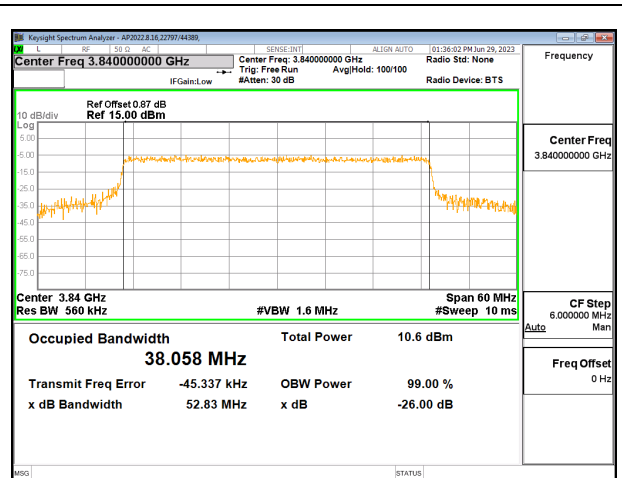
5G NR n77 20MHz 16QAM Middle Channel, Antenna 3



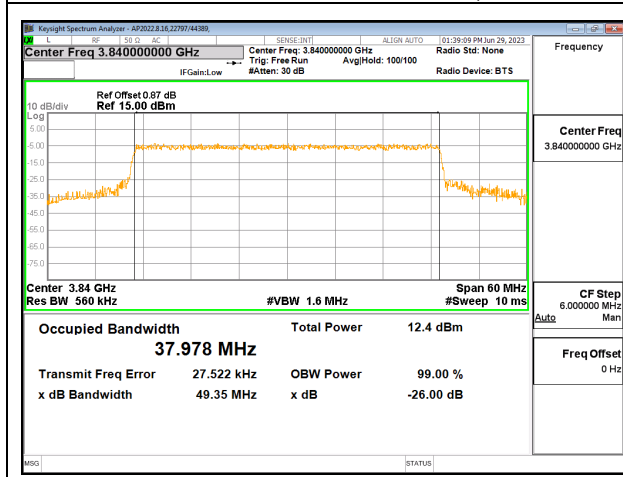
5G NR n77 20MHz 16QAM Middle Channel, Antenna 4



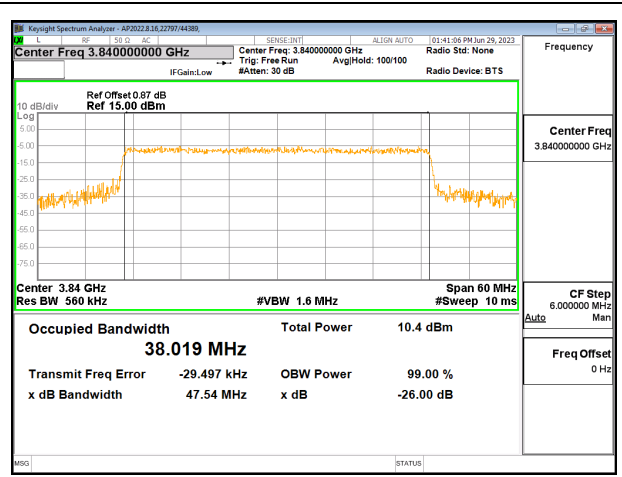
5G NR n77 40MHz 16QAM Middle Channel, Antenna 1



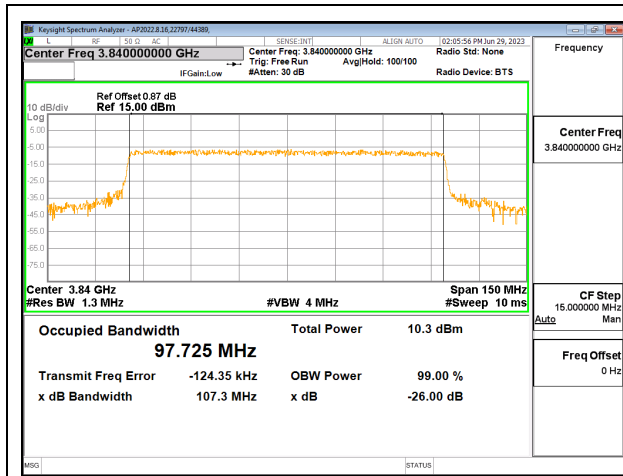
5G NR n77 40MHz 16QAM Middle Channel, Antenna 2



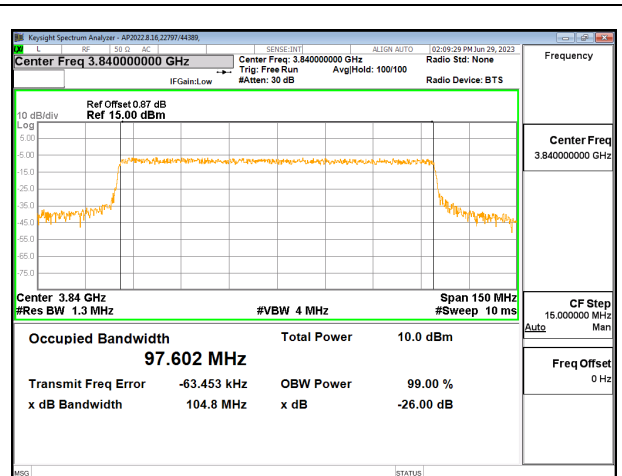
5G NR n77 40MHz 16QAM Middle Channel, Antenna 3



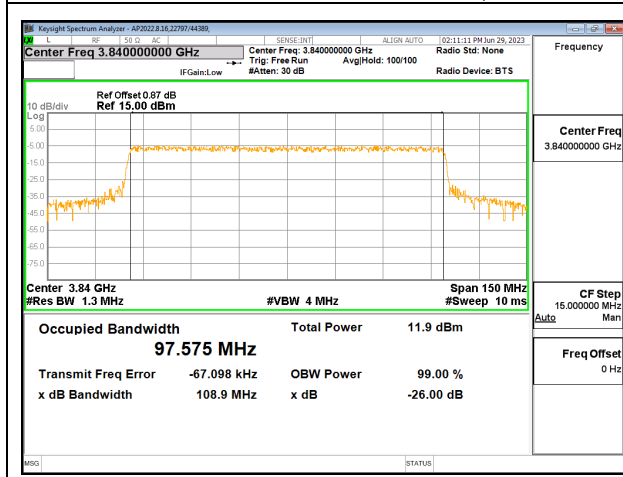
G NR n77 40MHz 16QAM Middle Channel, Antenna 4



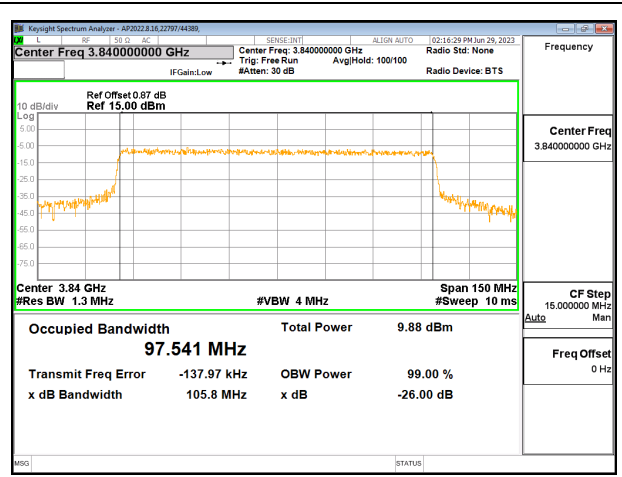
5G NR n77 100MHz 16QAM Middle Channel, Antenna 1



5G NR n77 100MHz 16QAM Middle Channel, Antenna 2



5G NR n77 100MHz 16QAM Middle Channel, Antenna 3



5G NR n77 100MHz 16QAM Middle Channel, Antenna 4

## 10.2. EMISSION MASK AND BAND EDGE

For Spectrum Emission Mask plots, the Keysight PXA N9030A is configured to sweep with a moving integration window, the width of which can be adjusted to different sizes across the sweep. The window width is configured to be greater than or equal to the required reference bandwidth. The center frequencies of the integration window for the different integration windows was set such that the upper and lower edges of the windows are aligned with the transition points in the reference bandwidths. This is achieved by setting the start / stop frequencies of the window with an offset equal to the reference bandwidth / 2 from the transition point.

### **TEST PROCEDURE**

The transmitter output was configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

1. Set the spectrum analyzer span to include the block edge frequency.
2. Set a marker to point the corresponding band edge frequency in each test case.
3. Set display line at -13 dBm,
4. Set resolution bandwidth to at least 1% of emission bandwidth.

### **RESULTS**

<b>Test Engineer ID:</b>	22797/44389, 27465/44389	<b>Test Date:</b>	2023-06-29, 2023-06-30, 2023-07-05, 2023-07-06, 2023-07-07
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All antenna ports are measured on WC modulation and SCS only.



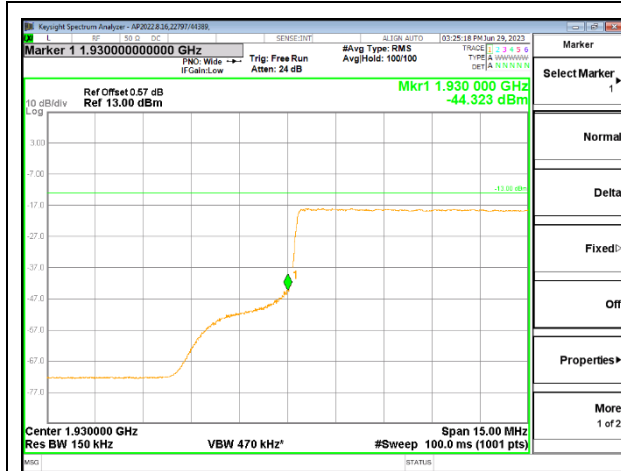
## 10.2.1. 5G NR n2 BAND EDGE

### LIMITS

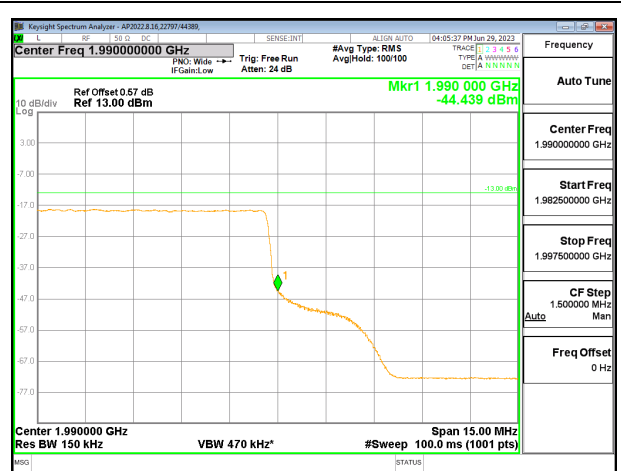
FCC: §24.238 (a)

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

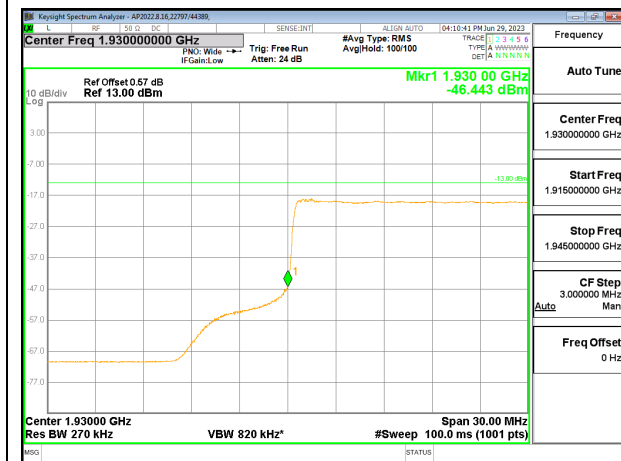
**Antenna 1**



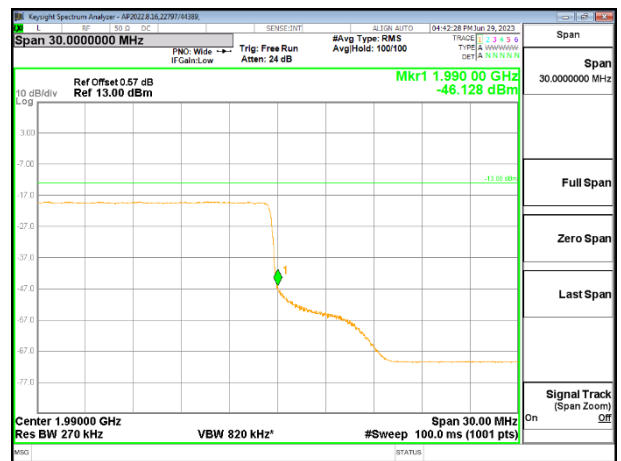
5G NR n2 10MHz 16QAM Low Channel



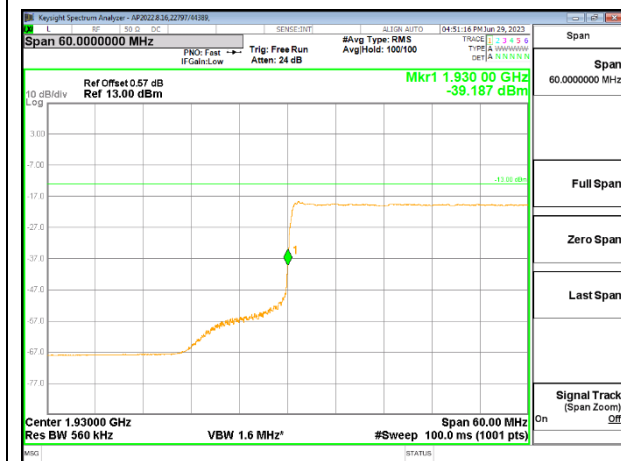
5G NR n2 10MHz 16QAM High Channel



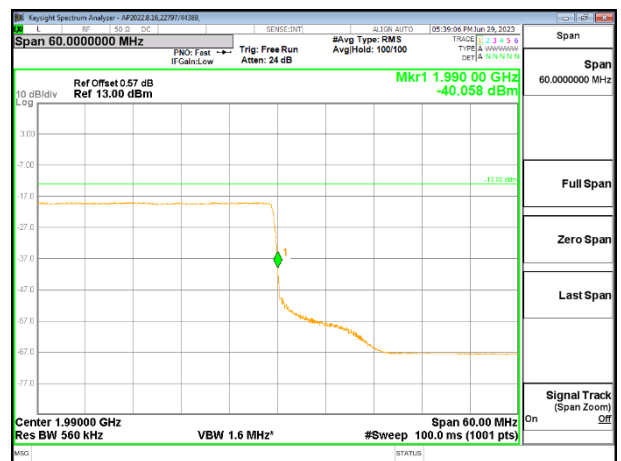
5G NR n2 20MHz 16QAM Low Channel



5G NR n2 20MHz 16QAM High Channel

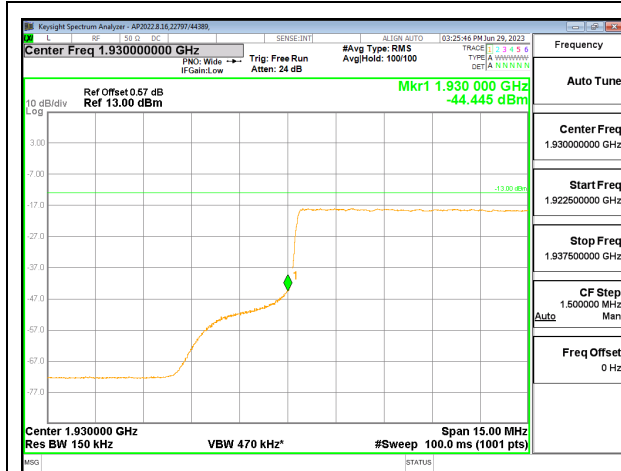


5G NR n2 40MHz 16QAM Low Channel

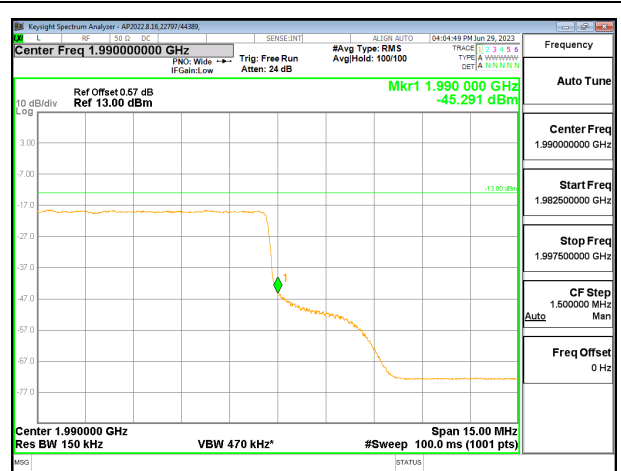


5G NR n2 40MHz 16QAM High Channel

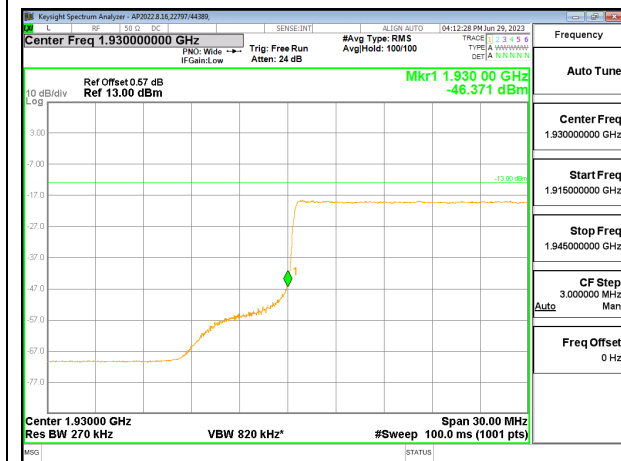
Antenna 2



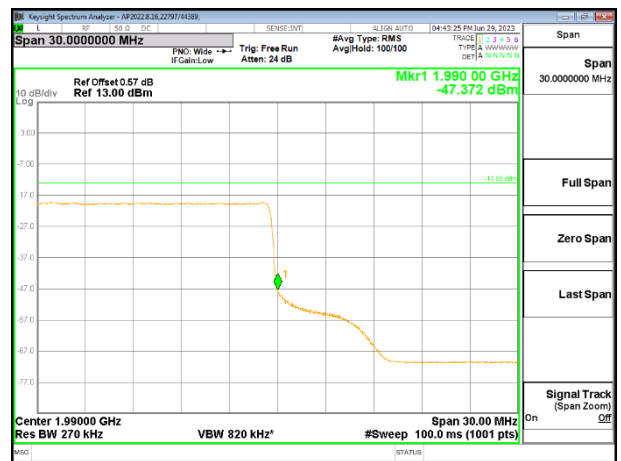
5G NR n2 10MHz 16QAM Low Channel



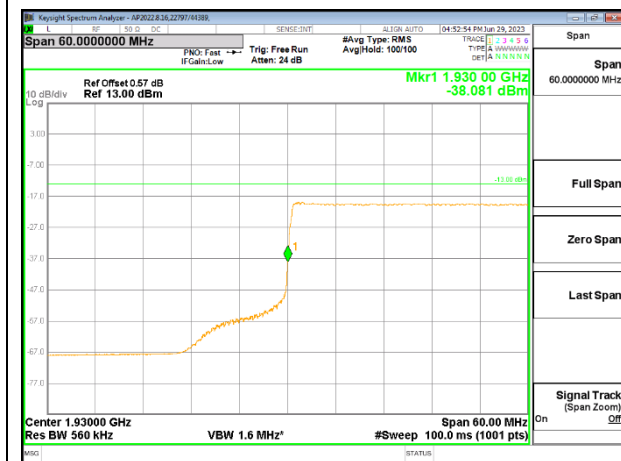
5G NR n2 10MHz 16QAM High Channel



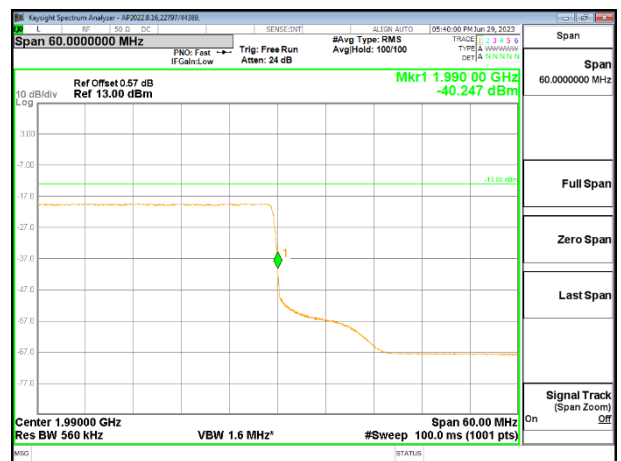
5G NR n2 20MHz 16QAM Low Channel



5G NR n2 20MHz 16QAM High Channel

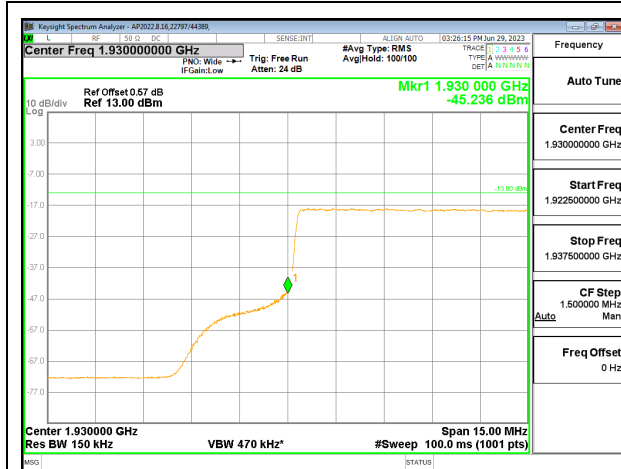


5G NR n2 40MHz 16QAM Low Channel

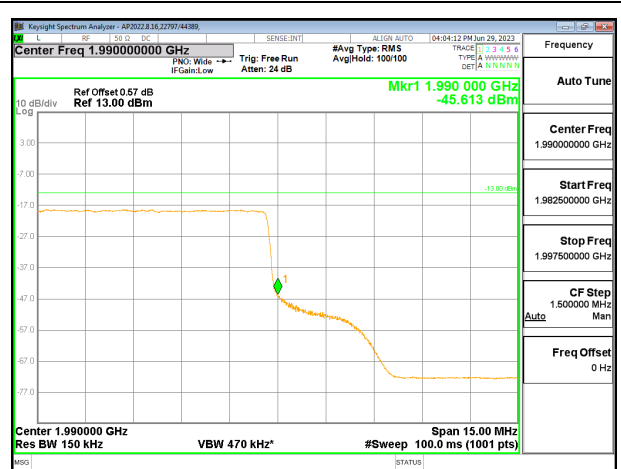


5G NR n2 40MHz 16QAM High Channel

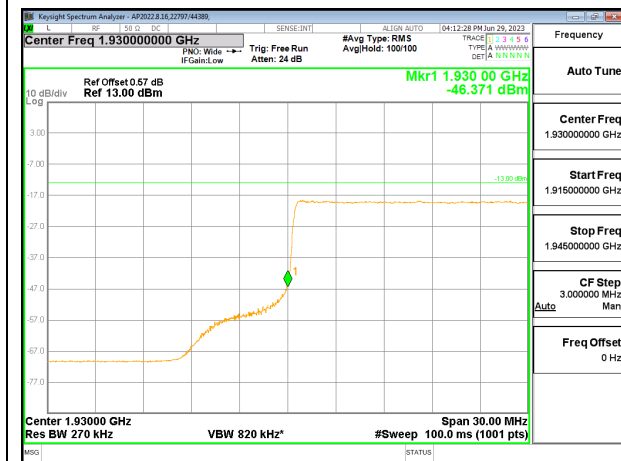
**Antenna 3**



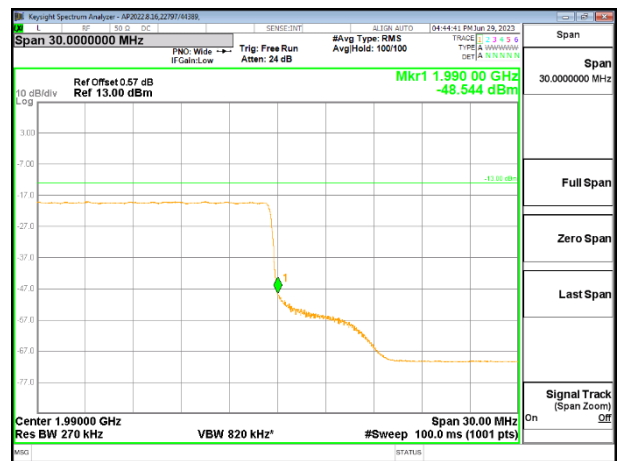
5G NR n2 10MHz 16QAM Low Channel



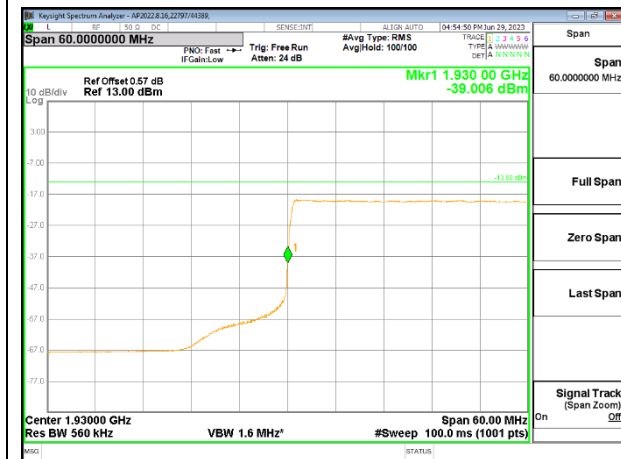
5G NR n2 10MHz 16QAM High Channel



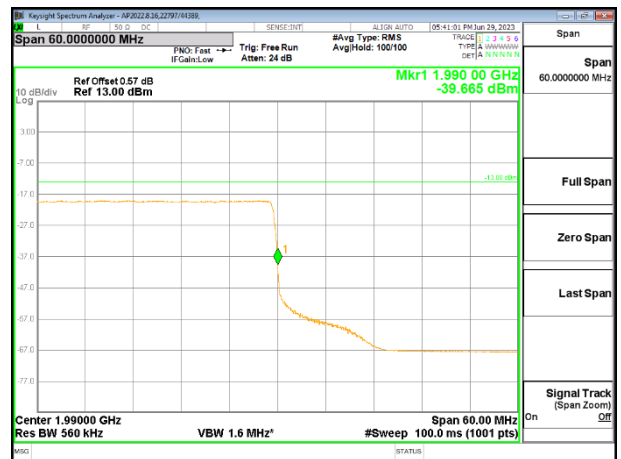
5G NR n2 20MHz 16QAM Low Channel



5G NR n2 20MHz 16QAM High Channel

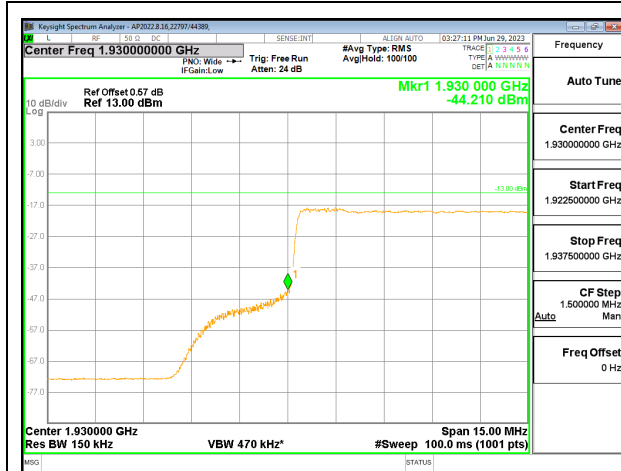


5G NR n2 40MHz 16QAM Low Channel

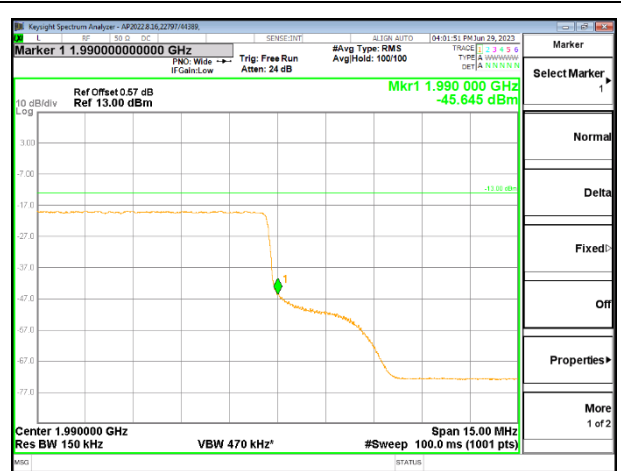


5G NR n2 40MHz 16QAM High Channel

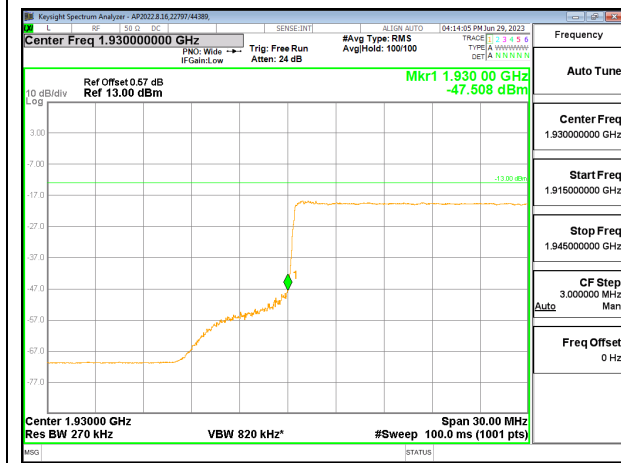
**Antenna 4**



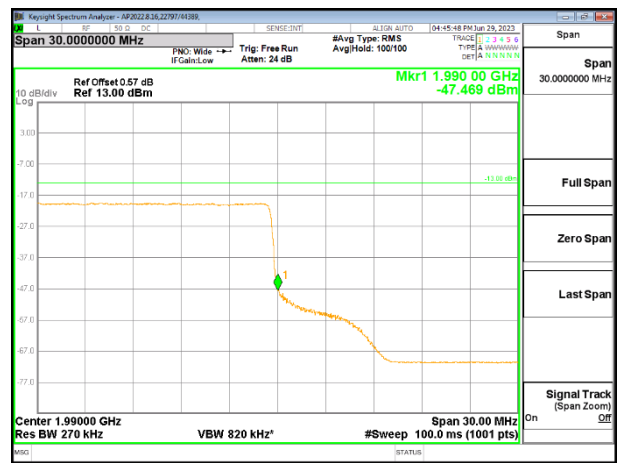
5G NR n2 10MHz 16QAM Low Channel



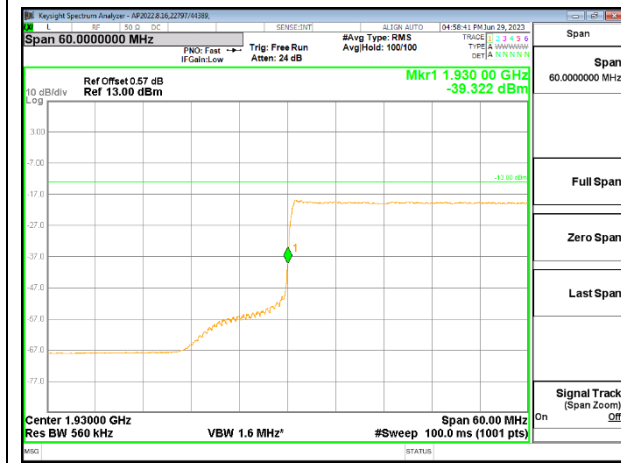
5G NR n2 10MHz 16QAM High Channel



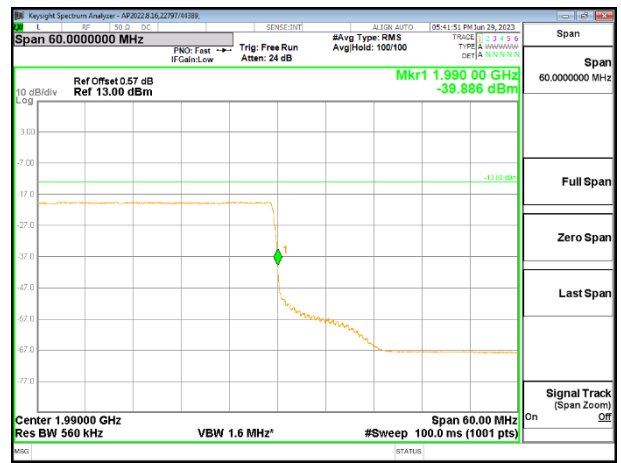
5G NR n2 20MHz 16QAM Low Channel



5G NR n2 20MHz 16QAM High Channel



5G NR n2 40MHz 16QAM Low Channel



5G NR n2 40MHz 16QAM High Channel

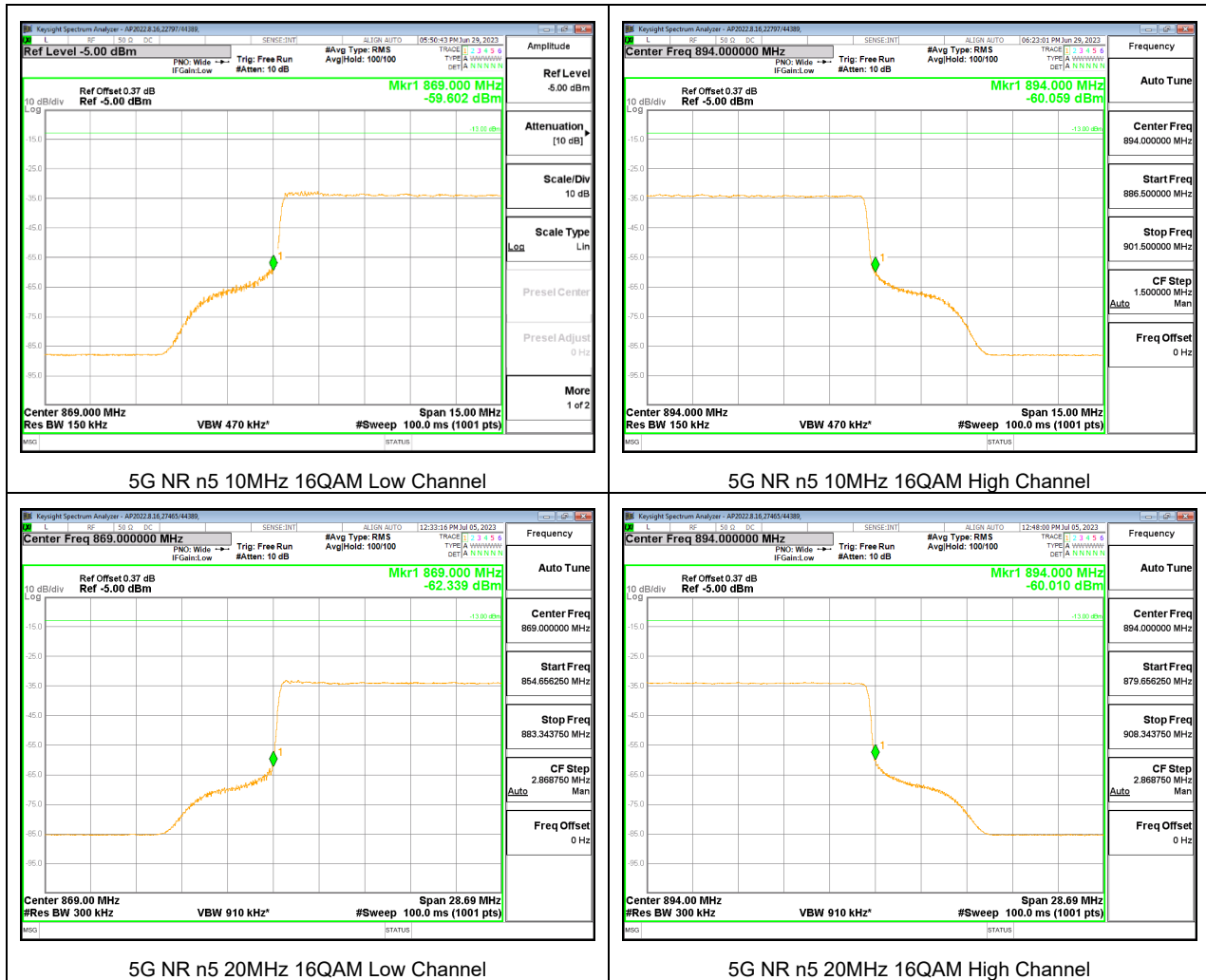
## 10.2.2. 5G NR n5 BAND EDGE

### LIMITS

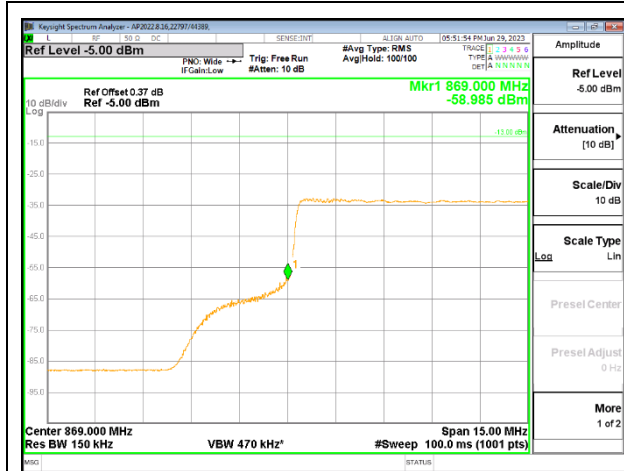
FCC: §22.917 (a)

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

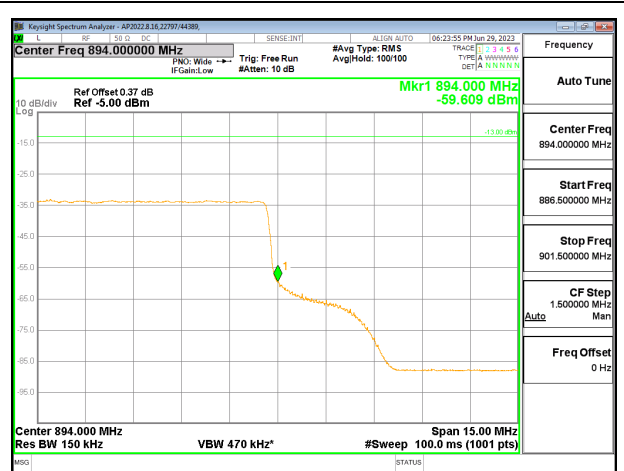
### Antenna 1



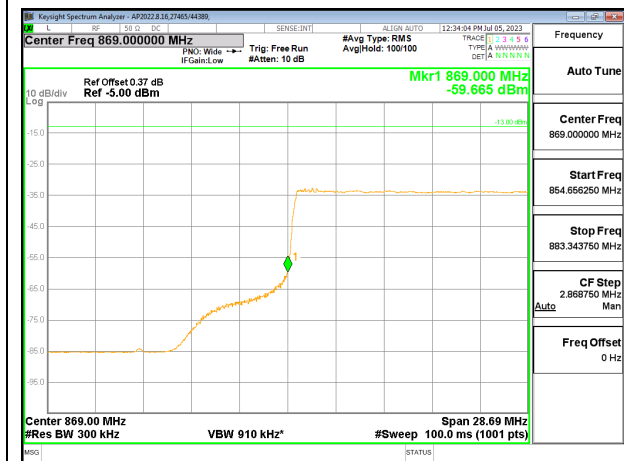
**Antenna 2**



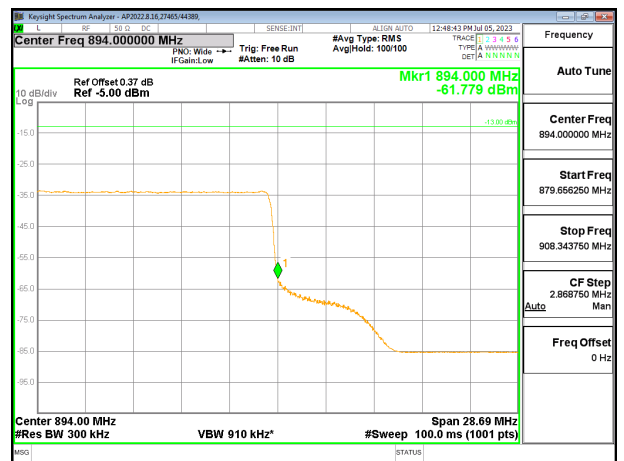
5G NR n5 10MHz 16QAM Low Channel



5G NR n5 10MHz 16QAM High Channel

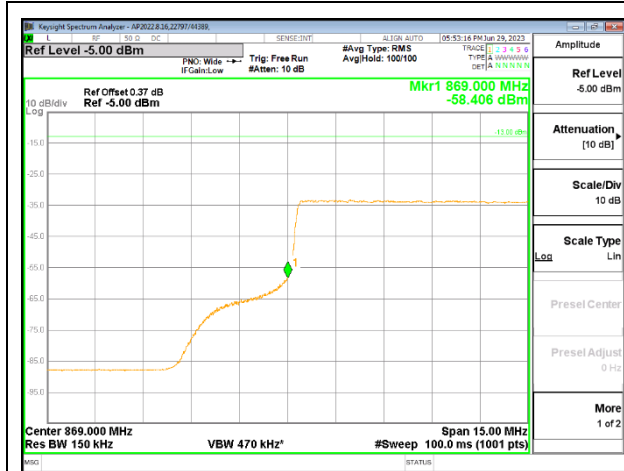


5G NR n5 20MHz 16QAM Low Channel

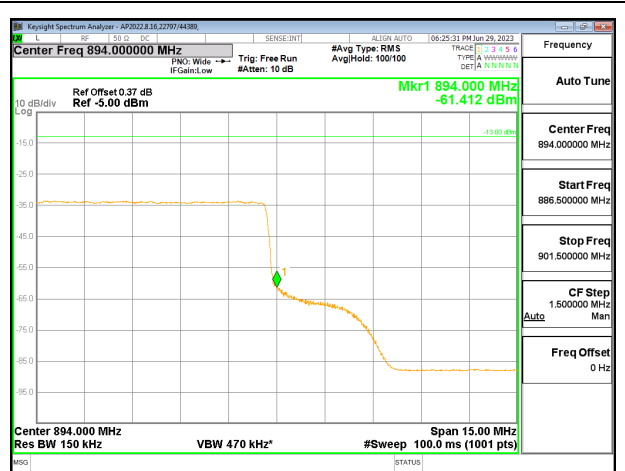


5G NR n5 20MHz 16QAM High Channel

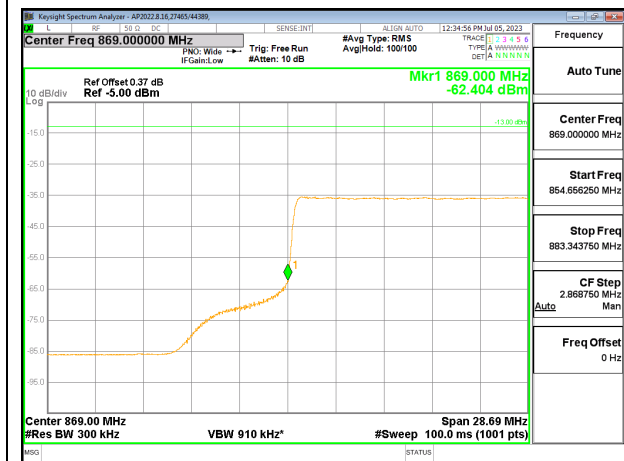
**Antenna 3**



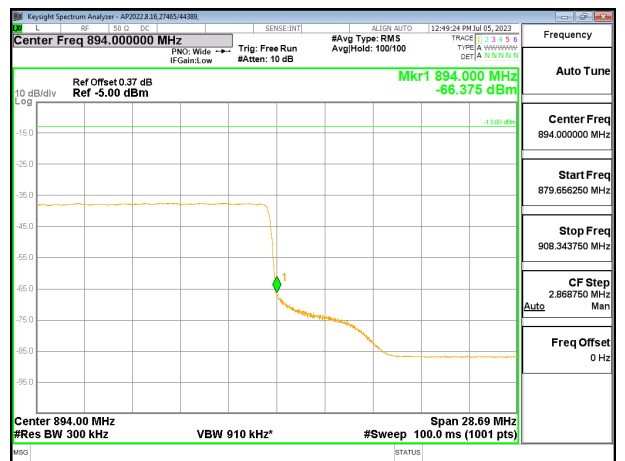
5G NR n5 10MHz 16QAM Low Channel



5G NR n5 10MHz 16QAM High Channel



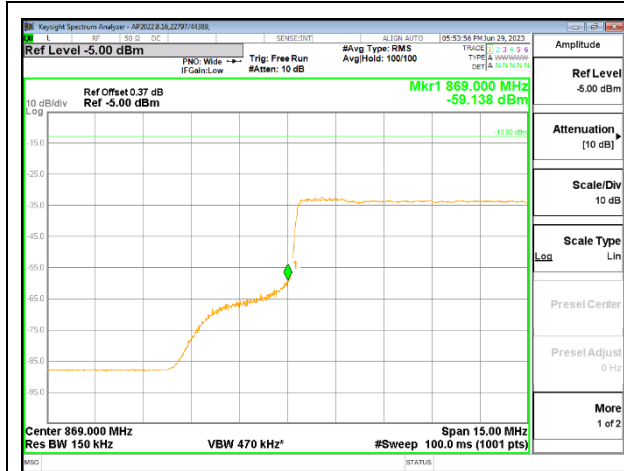
5G NR n5 20MHz 16QAM Low Channel



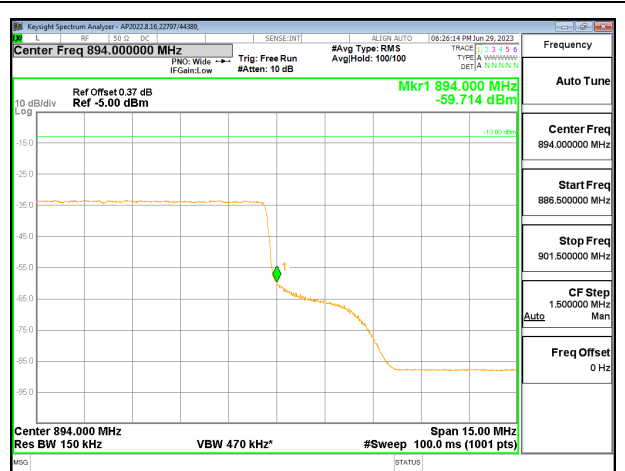
5G NR n5 20MHz 16QAM High Channel



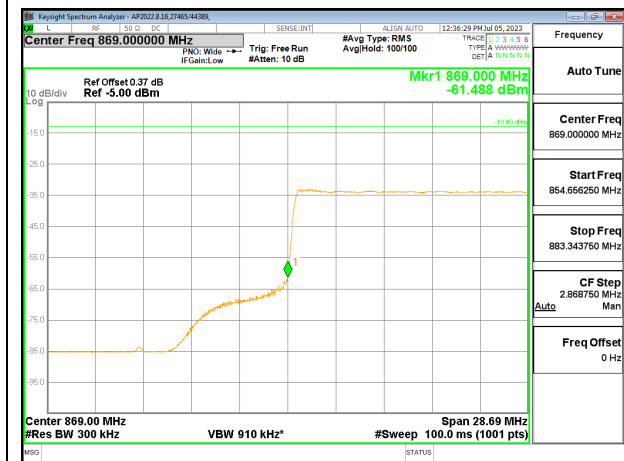
**Antenna 4**



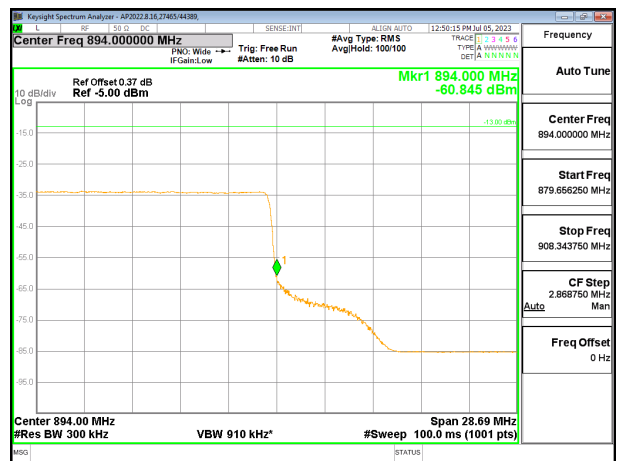
5G NR n5 10MHz 16QAM Low Channel



5G NR n5 10MHz 16QAM High Channel



5G NR n5 20MHz 16QAM Low Channel



5G NR n5 20MHz 16QAM High Channel

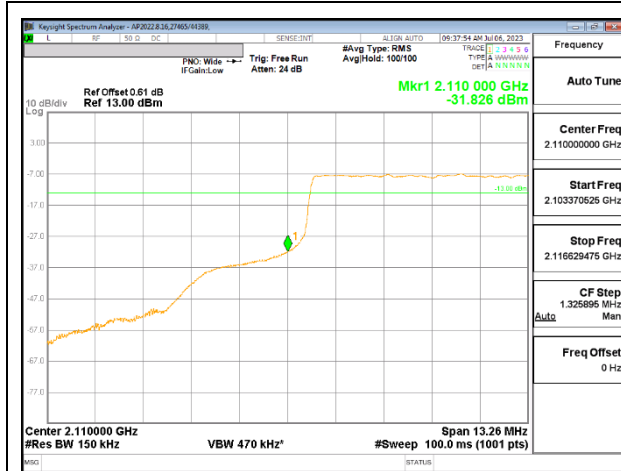
### **10.2.3. 5G NR n66 BAND EDGE**

#### **LIMITS**

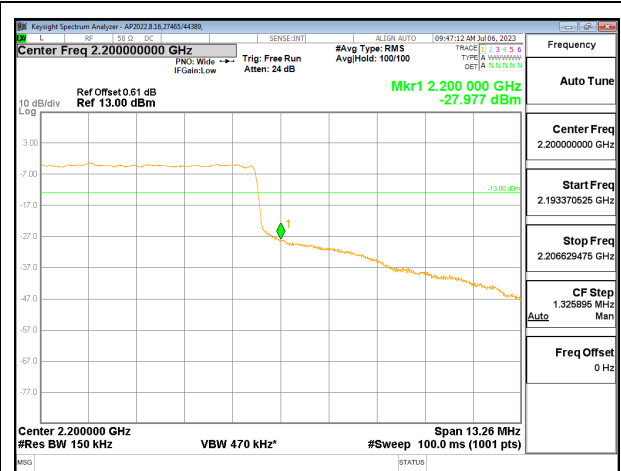
FCC: §27.53(h)

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

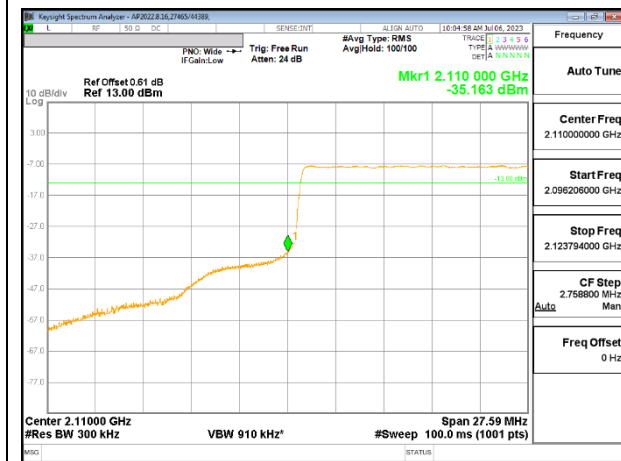
**Antenna 1**



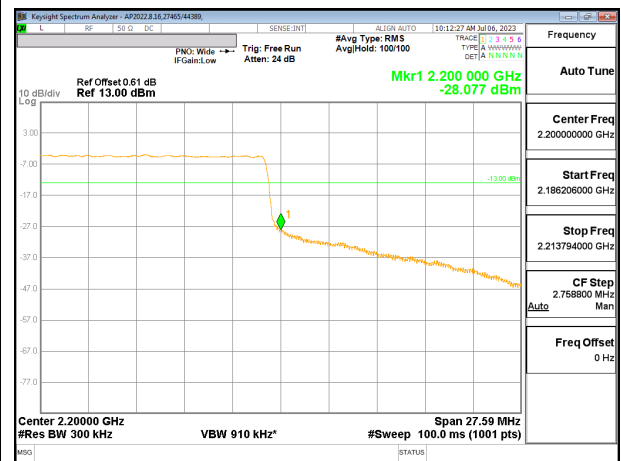
5G NR n66 10MHz QPSK Low Channel



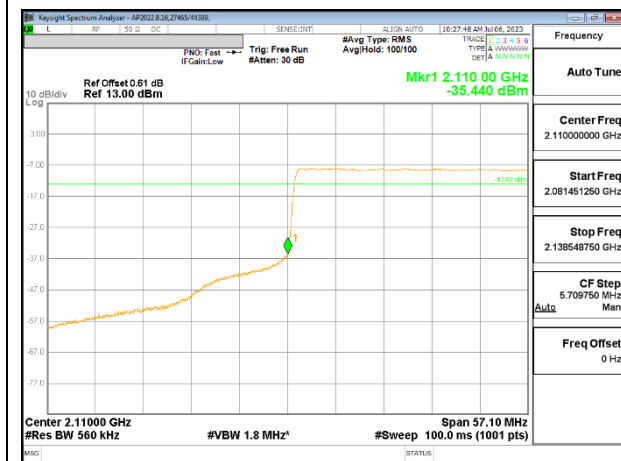
5G NR n66 10MHz QPSK High Channel



5G NR n66 20MHz QPSK Low Channel



5G NR n66 20MHz QPSK High Channel



5G NR n66 40MHz QPSK Low Channel



5G NR n66 40MHz QPSK High Channel