TEST REPORT

Report Number. : 14012814-E1V3

Applicant	:	AMANTYA TECHNOLOGIES PRIVATE LIMITED 12TH FLOOR, TOWER B, UNITECH CYBER PARK, SECTOR 39, GURUGRAM, INDIA 122003
Model	:	5GTP202SSn256677
Brand	:	verizon
FCC ID	:	2BASDAMTB20231
EUT Description	:	SINGLE CELL SUB6
Test Standard(s)	:	FCC CFR 47 PART 2, PART 22, PART 24 AND PART 27

Date Of Issue:
2023-05-09

Prepared by:
UL VERIFICATION SERVICES INC.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

ACCREDITED
CERT #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2023-05-01	Initial Review	--
V2	2023-05-02	Added standards on Page 1 and Page 5	Tina Chu
V3	2023-05-09	Updated Section 2 to address TCB's question	Tina Chu

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	AMANTYA TECHNOLOGIES PRIVATE LIMITED 12TH FLOOR, TOWER B, UNITECH CYBER PARK, SECTOR 39, GURUGRAM, INDIA 122003
Model	5GTP202SSn256677
Brand	verizon
FCC ID	2BASDAMTB20231
EUT Description	SINGLE CELL SUB6
Serial Number	01SS-5GSS-0006
Sample Receipt Date	2021-10-25
Date Tested	2023-04-04 to 2023-04-25
Applicable Standards	FCC CFR 47 PART 2, PART 22, PART 24 AND PART 27
Test Results	COMPLIES

UL Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document.

Approved & Released By:	Reviewed By:	Prepared By:
		
Dan Coronia Operations Leader UL Verification Services Inc.	Tina Chu Senior Project Engineer UL Verification Services Inc.	Glenn Escano Senior Test Engineer UL Verification Services Inc.

2. SUMMARY OF TEST RESULTS

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. 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 and type (see section 6.4)

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

Requirement Description	Requirement Clause Number (FCC)	Result*	Remarks
Occupied Bandwidth	2.1049	Complies	
Band Edge and Emission Mask	2.1051, 22.917 (a), 24.238 (a), 27.53 (h)	Complies	
Out of Band Emissions	2.1051, 22.917 (a), 24.238 (a), 27.53 (h)	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)	Complies	
Field Strength of Spurious Radiation	2.1051, 22.917 (a), 24.238 (a), 27.53 (h)	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 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01. Determining ERP and EIRP

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #0751.05, 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
☒	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☐	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA			

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_{Lab}
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.84 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Unwanted Emissions, Conducted	1.94 dB
Occupied Channel Bandwidth	1.22 %
Adjacent Channel Power Using SA	0.33 dB
Temperature	2.26%
Supply voltages	0.57 %
Time Domain Measurement Using SA	3.39 %
RF Power Measurement Direct Method Using Power Meter	1.3 dB (PK) / 0.45 dB (AV)

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a Verizon Auto-Certification Platform-5G Sub6 fixed station that supports 5G NR n2, n5, n66 bands.

6.2. MAXIMUM OUTPUT POWER

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.6

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = 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.

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	9.28	14.48	0.028	11021	11M0G7W
	16QAM			9.27	14.47	0.028	11028	11M0D7W
	64QAM			9.26	14.46	0.028	11033	11M0D7W
20.0	QPSK	1940.0	1980.0	9.31	14.51	0.028	21620	21M6G7W
	16QAM			9.26	14.46	0.028	21690	21M7D7W
	64QAM			9.20	14.40	0.028	21680	21M7D7W

5G NR n5 (FCC)

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	-3.44	-4.79	0.00033	8583.9	8M58G7W
	16QAM			-3.41	-4.76	0.00033	8593.9	8M59D7W
	64QAM			-3.44	-4.79	0.00033	8546.4	8M55D7W
20.0	QPSK	879.0	884.0	-3.38	-4.73	0.00034	18203	18M2G7W
	16QAM			-3.42	-4.77	0.00033	18291	18M3D7W
	64QAM			-3.44	-4.79	0.00033	18197	18M2D7W

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	8.81	13.01	0.020	11180	11M2G7W
	16QAM			8.77	12.97	0.020	11088	11M1D7W
	64QAM			8.77	12.97	0.020	11009	11M0D7W
20.0	QPSK	2120.0	2190.0	8.90	13.10	0.020	21930	21M9G7W
	16QAM			8.85	13.05	0.020	21984	22M0D7W
	64QAM			8.81	13.01	0.020	21799	21M8D7W

6.3. SOFTWARE AND FIRMWARE

The firmware/software version:

Operating System: Ubuntu 18.04.6 LTS

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)

LTE Bands	Frequency range (MHz)	Antenna 1 Peak Gain (dBi)	Antenna 2 Peak Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
5G NR n2	1930-1990	5.2	5.2	5.2
5G NR n5	869-894	0.8	0.8	0.8
5G NR n66	2110-2200	4.2	4.2	4.2

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports the following 5G NRs:
5G NR n2, n5, n66, 15kHz/30kHz SCS, QPSK/16QAM/64QAM, 10MHz and 20MHz bandwidth.

The EUT is a desktop device, transmit antennas orientation was investigated in outward/ upright/ 90 degree/270 degree, all final testing is tested with antenna orientation as below as worst case:

- 5G NR n2: 90 degree
- 5G NR n5: 270 degree
- 5G NR n66: 90 degree

Investigation has been performed and 30kHz SCS is determined as worse case. All measurements were tested on 30kHz SCS only.

Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 18GHz. There were no emissions found with less than 20dB of margin from 9kHz to 30MHz, 30MHz-1GHz and above 18GHz.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/ DoC**
EUT AC/DC adapter	Shenzhen Fujia Appliance Co., Ltd.	FJ-SW202812012500	204000149	DoC
USB type A keyboard	Dell	KB216p	CN-0P1YDR-PRC00-18H-0IR4-A07	DoC
USB type A mouse	Dell	MS116p	CN-05NT8R-PRC00-18N-06XN	Doc
Monitor	LG	22MK400H	109NTKFK8725	DoC
Monitor AC/DC adapter	LG	ADS-18FSG-19 19016GPI	EAY63032012	DoC

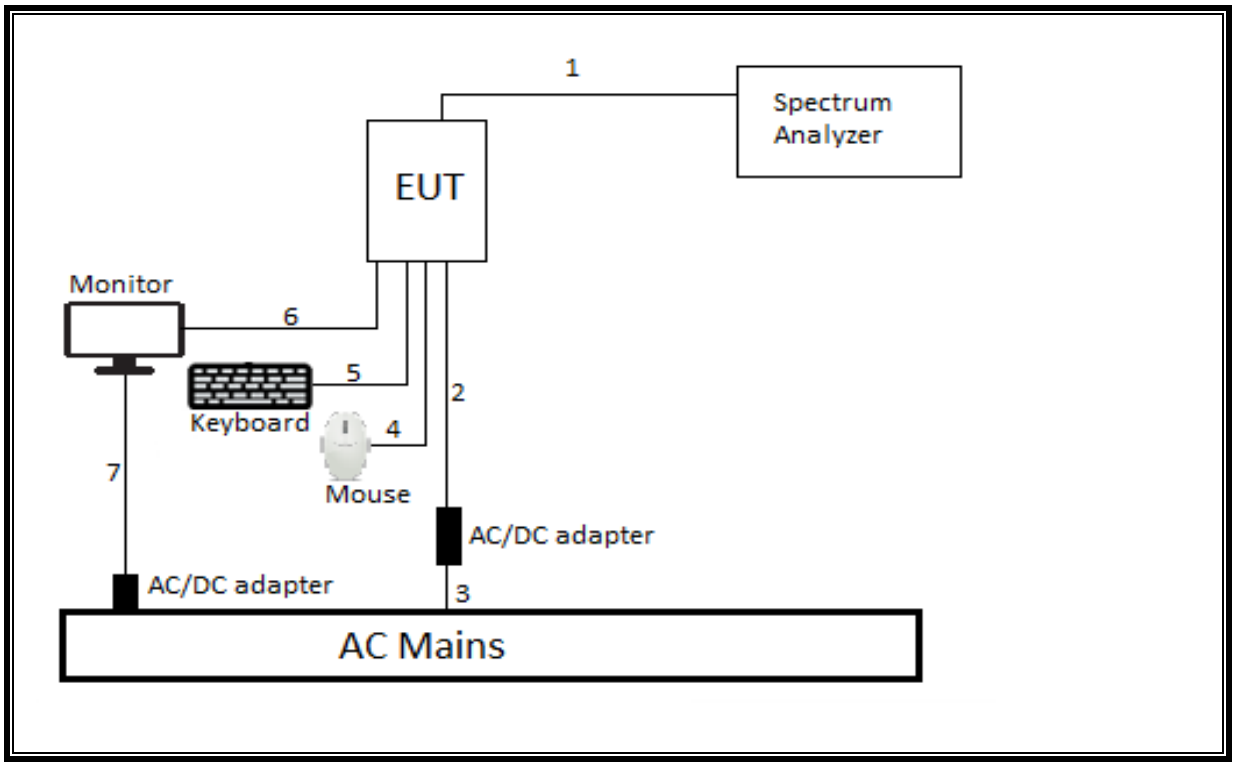
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Antenna Port	1	SMA	Shielded	0.5	N/A
2	DC	1	4 pin DC power	Shielded	1.5	N/A
3	AC	1	AC power cord (3-Prong Grounded Male)	Unshielded	1.8	N/A
4	DC	1	USB Type A	Unshielded	1.8	N/A
5	DC	1	USB Type A	Unshielded	1.8	N/A
6	HDMI	1	HDMI	Shielded	1.5	N/A
7	AC	1	AC power cord (3-Prong Grounded Male)	Unshielded	1.8	N/A

I/O CABLES (RF RADIATED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	LAN	1	RJ45	Shielded	>3	N/A
2	DC	1	4 pin DC power	Shielded	1.5	N/A
3	AC	1	AC power cord (3-Prong Grounded Male)	Unshielded	1.8	N/A
4	DC	1	USB Type A	Unshielded	1.8	N/A
5	DC	1	USB Type A	Unshielded	1.8	N/A
6	HDMI	1	HDMI	Shielded	1.5	N/A
7	AC	1	AC power cord (3-Prong Grounded Male)	Unshielded	1.8	N/A

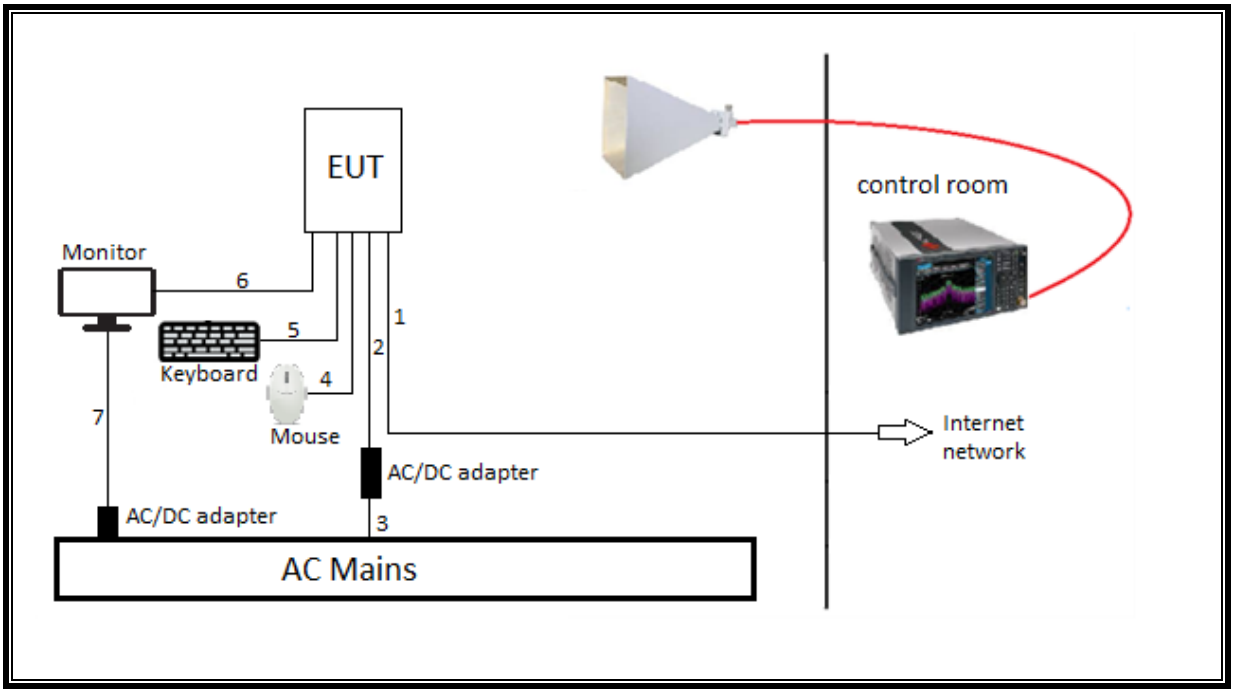
TEST SETUP

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

CONDUCTED SETUP



RADIATED SETUP



7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	170014	2023-07-19
Antenna, Passive Loop 100KHz - [illegible]	ELECTRO METRICS	EM-6872	170016	2023-07-19
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	232075	2024-03-31
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	2024-03-31
RF Filter Box, 1-18GHz	UL-FREMONT	SAC-L1	171013	2023-06-24
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	206806	2023-10-07
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	225688	2024-02-29
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	191429	2024-02-29
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	172353	2023-06-01
Amplifier 18-26.5GHz, +5Vdc, 60dB min	AMPLICAL	AMP18G26.5-60	171583	2024-02-29
Antenna, Horn 26.5GHz to 40GHz	ARA	MWH-2640/B	172367	2023-06-01
Link File, RF Amplifier Assembly, 26-40GHz, 65dB Gain	AMPLICAL	AMP26G40-65	172346	2024-02-29
Environmental Chamber	Thermotron Industries	SE-600-10-10	79361	2023-04-30
AC Power Source	Ametek Inc	CW2501	80470	N/A
Power Meter, P-series single channel	Keysight Technologies [illegible]	N1911A	90718	2024-01-31
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	81319	2024-01-31
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	80396	2024-01-31
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	N/A	Verified/characterized before use
High-pass filter, 1.2GHz	Micro-Tronics	HPM50108	152043	2023-10-20
High-pass filter, 2.7-18GHz	Micro-Tronics	HPM20552	204773	2023-08-15
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Rev 9.5 03 Mar 2023; Rev 9.5 18 Jan 2023	
Antenna Port Software	UL	UL RF	Ver 2022-08-16	

8. 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 with 10dB attenuator (band n2 and n66 only, n5 has low output power that does not need a 10dB attenuator) connected to a power meter via wideband power sensor.

ANSI C63.10, Section 5.2.4.2 General procedure for measuring average power with an average power meter

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurements be performed only over durations of active transmissions at maximum output power level applies. Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.
If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98%), then the following options can be implemented to facilitate measurement of the average power with an average power meter:

b) A conventional average power meter with no signal gating capability can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than or equal to ±2%) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to [10 log (1/duty cycle)].

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 with 10dB attenuator (band n2 and n66 only, n5 has low output power that does not need a 10dB attenuator) connected to a power meter via wideband peak power sensor. Peak output power was read directly from power meter.

ANSI C63.10, Section 5.2.3.2 Measurement of peak power with a peak power meter

The total peak output power may best be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the EUT OBW, and utilize a fastresponding diode detector.

RESULTS

Test Engineer ID:	27966 PV	Test Date:	2023-04-04 TO 2023-04-06

5G NR n2

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Antenna 1 Meas Conducted Avg Power (dBm)	Antenna 2 Meas Conducted Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)
n2	15	10	QPSK	387000	1935	6.44	4.54	***8.60***
				392000	1960	6.38	4.21	8.44
				397000	1985	6.30	4.12	8.36
			16QAM	387000	1935	6.43	4.42	***8.55***
				392000	1960	6.36	4.06	8.37
				397000	1985	6.27	4.10	8.33
			64QAM	387000	1935	6.42	4.46	***8.56***
				392000	1960	6.40	4.05	8.39
				397000	1985	6.25	4.10	8.32
		20	QPSK	388000	1940	6.15	4.38	8.36
				392000	1960	6.10	4.01	8.19
				396000	1980	6.02	4.03	8.15
			16QAM	388000	1940	6.11	4.43	8.36
				392000	1960	6.06	3.95	8.14
				396000	1980	6.00	4.05	8.14
			64QAM	388000	1940	6.11	4.37	8.34
				392000	1960	6.07	3.85	8.11
				396000	1980	5.99	4.02	8.13
	30	10	QPSK	387000	1935	6.98	5.43	9.28
				392000	1960	7.00	5.00	9.12
				397000	1985	6.85	4.91	9.00
			16QAM	387000	1935	7.00	5.36	***9.27***
				392000	1960	6.99	5.08	9.15
				397000	1985	6.84	4.96	9.01
			64QAM	387000	1935	6.96	5.41	***9.26***
				392000	1960	6.92	5.01	9.08
				397000	1985	6.80	4.90	8.96
		20	QPSK	388000	1940	**7.01**	**5.45**	***9.31***
				392000	1960	6.92	5.12	9.12
				396000	1980	6.86	5.03	9.05
			16QAM	388000	1940	6.95	5.42	9.26
				392000	1960	6.90	5.10	9.10
				396000	1980	6.82	5.07	9.04
			64QAM	388000	1940	6.90	5.35	9.20
				392000	1960	6.84	4.97	9.02
				396000	1980	6.78	5.04	9.01

5G NR n5

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Antenna 1 Meas Conducted Avg Power (dBm)	Antenna 2 Meas Conducted Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)
n5	15	10	QPSK	174800	874	-6.95	-7.36	***-4.14***
				176300	881.5	-6.98	-7.40	-4.17
				177800	889	-6.99	-7.46	-4.21
			16QAM	174800	874	-6.96	-7.38	***-4.15***
				176300	881.5	-6.99	-7.41	-4.18
				177800	889	-7.00	-7.45	-4.21
			64QAM	174800	874	-6.95	-7.40	***-4.16***
				176300	881.5	-6.98	-7.43	-4.19
				177800	889	-7.00	-7.47	-4.22
		20	QPSK	175800	879	-7.20	-7.45	-4.31
				176300	881.5	-7.24	-7.48	-4.35
				176800	884	-7.25	-7.49	-4.36
			16QAM	175800	879	-7.23	-7.46	-4.33
				176300	881.5	-7.25	-7.50	-4.36
				176800	884	-7.28	-7.49	-4.37
			64QAM	175800	879	-7.24	-7.50	-4.36
				176300	881.5	-7.28	-7.52	-4.39
				176800	884	-7.27	-7.51	-4.38
	30	10	QPSK	174800	874	-6.41	-6.51	-3.45
				176300	881.5	-6.35	-6.55	-3.44
				177800	889	-6.37	-6.64	-3.49
			16QAM	174800	874	-6.33	-6.52	***-3.41***
				176300	881.5	-6.37	-6.57	-3.46
				177800	889	-6.40	-6.61	-3.49
			64QAM	174800	874	-6.37	-6.53	***-3.44***
				176300	881.5	-6.40	-6.58	-3.48
				177800	889	-6.42	-6.62	-3.51
		20	QPSK	175800	879	**-6.31**	**-6.46**	***-3.38***
				176300	881.5	-6.38	-6.47	-3.41
				176800	884	-6.40	-6.50	-3.44
			16QAM	175800	879	-6.40	-6.47	-3.42
				176300	881.5	-6.39	-6.47	-3.42
				176800	884	-6.39	-6.49	-3.43
			64QAM	175800	879	-6.41	-6.50	-3.44
				176300	881.5	-6.43	-6.52	-3.46
				176800	884	-6.44	-6.53	-3.47

5G NR n66

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Antenna 1 Meas Conducted Avg Power (dBm)	Antenna 2 Meas Conducted Avg Power (dBm)	Total Antenna Conducted Avg Power (dBm)
n66	15	10	QPSK	423000	2115	5.26	3.85	7.62
				431000	2155	5.4	4.5	7.99
				439000	2195	5.42	4.71	***8.09***
			16QAM	423000	2115	5.24	3.9	7.63
				431000	2155	5.4	4.47	7.97
				439000	2195	5.41	4.72	***8.09***
			64QAM	423000	2115	5.21	3.83	7.58
				431000	2155	5.38	4.45	7.95
				439000	2195	5.42	4.71	***8.09***
		20	QPSK	424000	2120	4.98	3.84	7.46
				431000	2155	5.15	4.41	7.81
				438000	2190	5.15	4.7	7.94
			16QAM	424000	2120	4.95	3.82	7.43
				431000	2155	5.1	4.4	7.77
				438000	2190	5.14	4.66	7.92
			64QAM	424000	2120	4.94	3.83	7.43
				431000	2155	5.13	4.3	7.75
				438000	2190	5.08	4.65	7.88
	30	10	QPSK	423000	2115	5.84	4.68	8.31
				431000	2155	6.0	5.4	8.70
				439000	2195	6	5.6	8.81
			16QAM	423000	2115	5.82	4.65	8.28
				431000	2155	**6.02**	5.35	8.71
				439000	2195	5.98	5.53	8.77
			64QAM	423000	2115	5.75	4.63	8.24
				431000	2155	5.96	5.31	8.66
				439000	2195	5.96	5.56	8.77
		20	QPSK	424000	2120	5.84	4.83	8.37
				431000	2155	6.01	5.5	8.77
				438000	2190	6	**5.78**	***8.90***
			16QAM	424000	2120	5.8	4.82	8.35
				431000	2155	5.97	5.5	8.74
				438000	2190	5.94	5.74	***8.85***
			64QAM	424000	2120	5.77	4.79	8.32
				431000	2155	5.91	5.4	8.68
				438000	2190	5.92	5.67	***8.81***

9. CONDUCTED TEST RESULTS

9.1. 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 for both antenna ports, all modulation QPSK, 16QAM and 64QAM.

5G NR n2

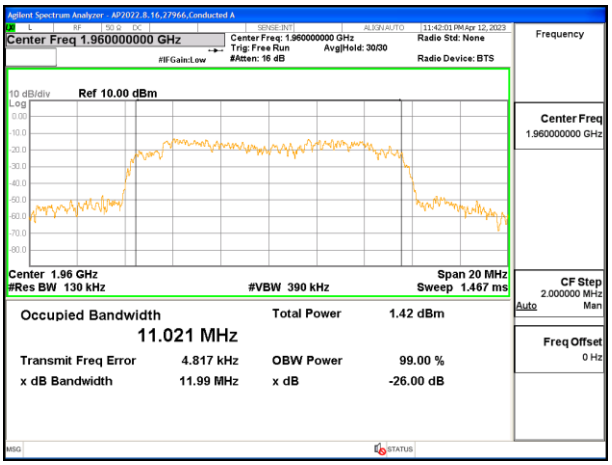
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
			Antenna 1	Antenna 2	Antenna 1	Antenna 2
5G NR n2	10MHz, QPSK	1960	11.021	11.002	11.99	11.88
	10MHz, 16QAM		11.028	11.016	11.99	11.93
	10MHz, 64QAM		11.033	10.991	11.94	11.93
	20MHz, QPSK		21.62	21.566	23.78	23.85
	20MHz, 16QAM		21.69	21.577	23.68	23.76
	20MHz, 64QAM		21.68	21.568	23.62	23.73

5G NR n5

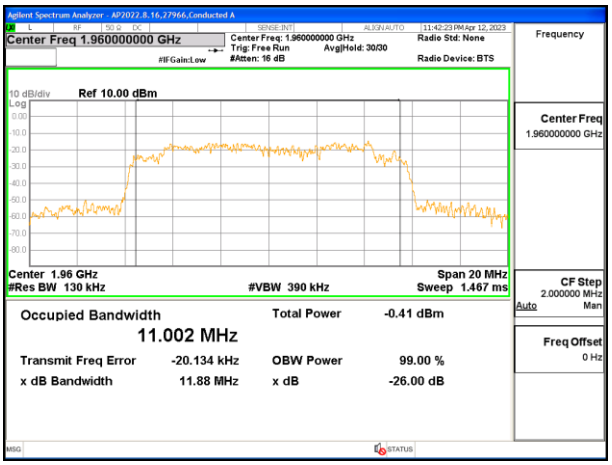
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
			Antenna 1	Antenna 2	Antenna 1	Antenna 2
5G NR n5	10MHz, QPSK	881.5	8.5407	8.5839	10.64	9.831
	10MHz, 16QAM		8.5939	8.5462	10.82	9.78
	10MHz, 64QAM		8.5254	8.5464	9.817	10.66
	20MHz, QPSK		18.203	18.203	19.73	19.73
	20MHz, 16QAM		18.291	18.123	20.64	20.97
	20MHz, 64QAM		18.197	18.197	19.78	19.78

5G NR n66

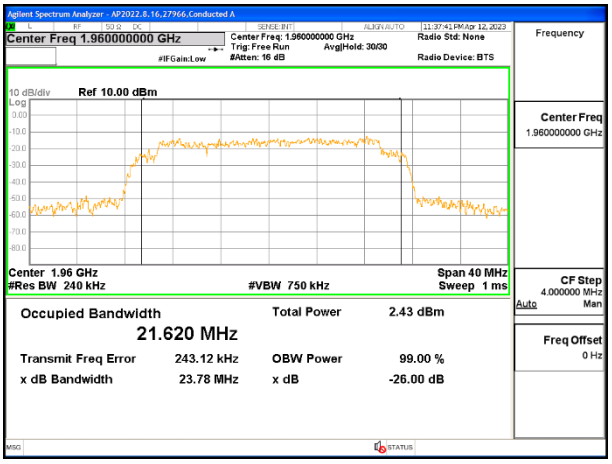
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
			Antenna 1	Antenna 2	Antenna 1	Antenna 2
5G NR n66	10MHz, QPSK	2155	11.18	10.816	12.03	11.88
	10MHz, 16QAM		11.088	10.886	11.94	11.89
	10MHz, 64QAM		11.009	10.879	11.92	11.89
	20MHz, QPSK		21.93	21.648	23.80	23.95
	20MHz, 16QAM		21.984	21.771	23.90	23.88
	20MHz, 64QAM		21.799	21.565	23.80	23.70



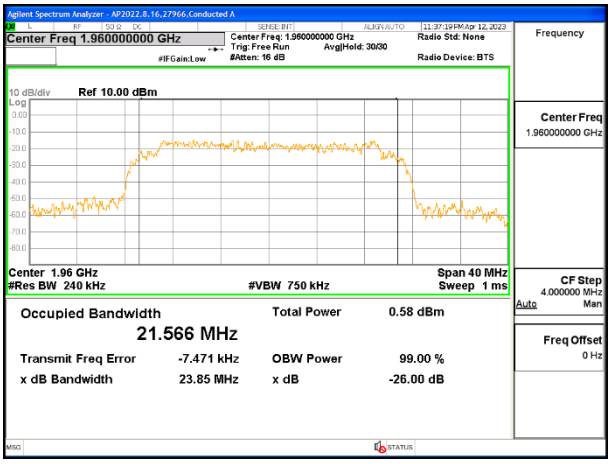
5G NR n2 10MHz QPSK Middle Channel (Antenna 1)



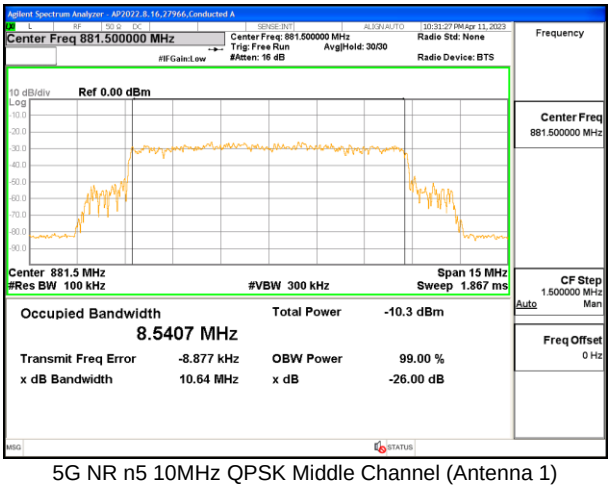
5G NR n2 10MHz QPSK Middle Channel (Antenna 2)



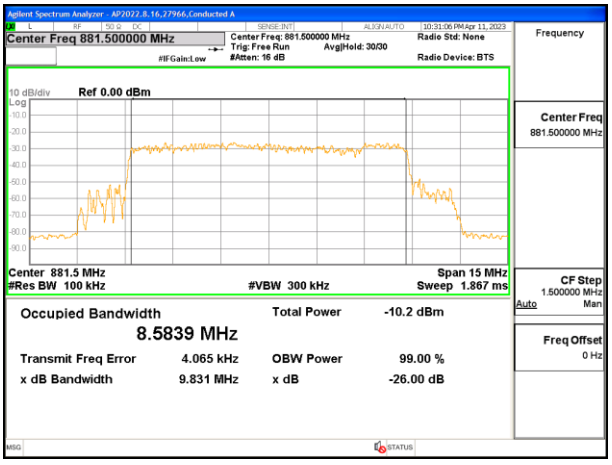
5G NR n2 20MHz QPSK Middle Channel (Antenna 1)



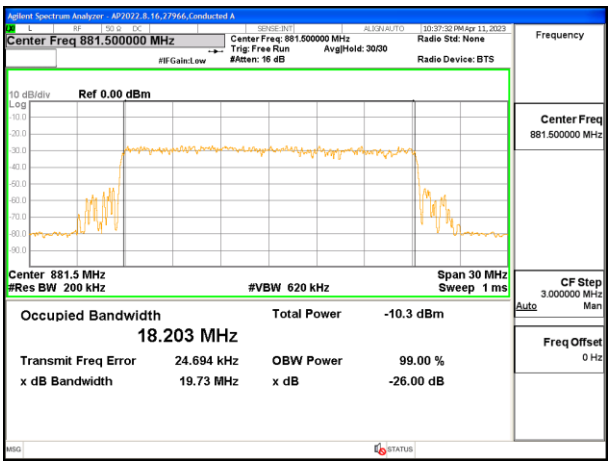
5G NR n2 20MHz QPSK Middle Channel (Antenna 2)



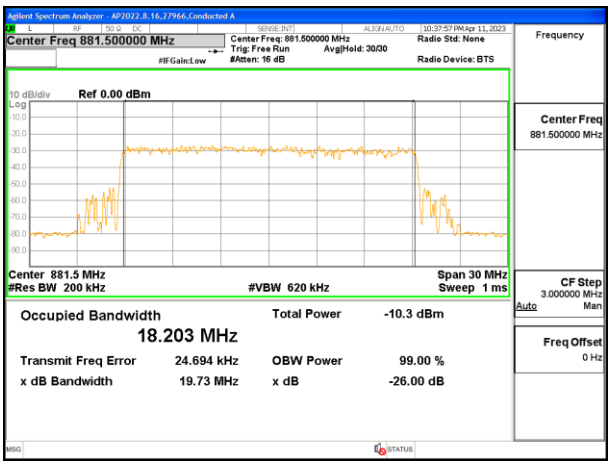
5G NR n5 10MHz QPSK Middle Channel (Antenna 1)



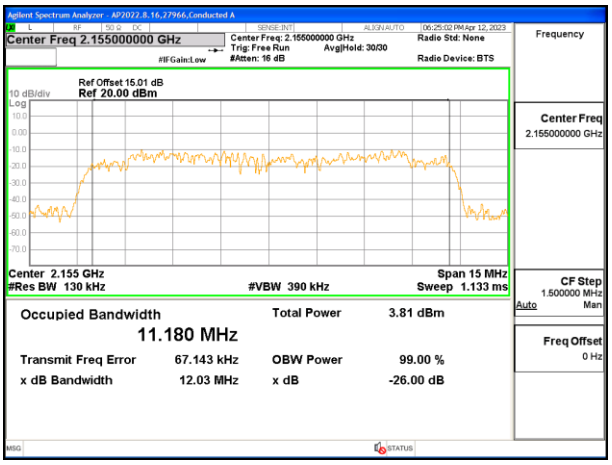
5G NR n5 10MHz QPSK Middle Channel (Antenna 2)



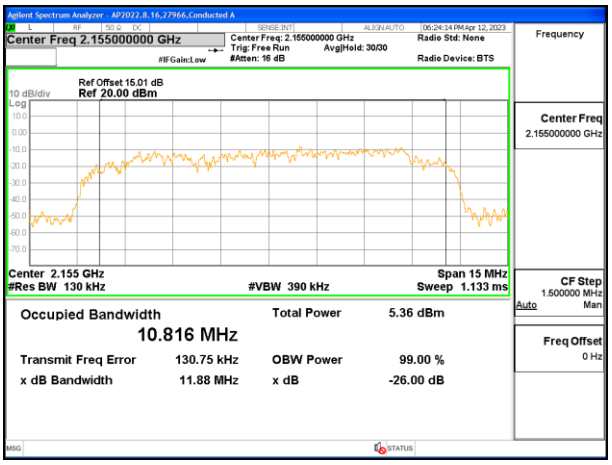
5G NR n5 20MHz QPSK Middle Channel (Antenna 1)



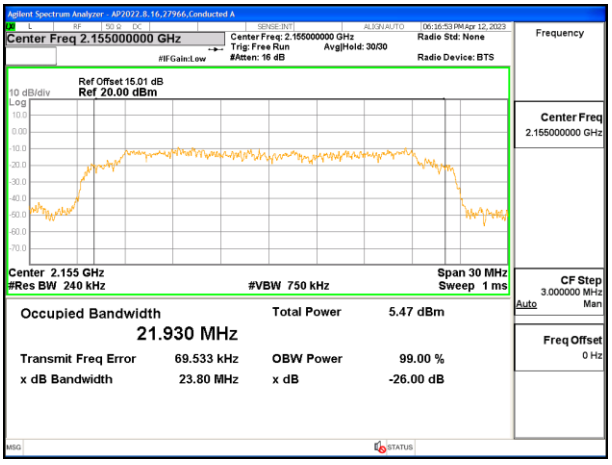
5G NR n5 20MHz QPSK Middle Channel (Antenna 2)



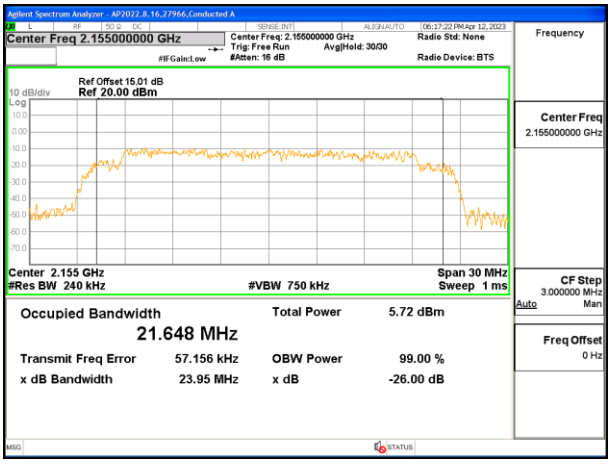
5G NR n66 10MHz QPSK Middle Channel (Antenna 1)



5G NR n66 10MHz QPSK Middle Channel (Antenna 2)



5G NR n66 20MHz QPSK Middle Channel (Antenna 1)



5G NR n66 20MHz QPSK Middle Channel (Antenna 2)

9.2. EMISSION MASK AND ADJACENT CHANNEL POWER

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

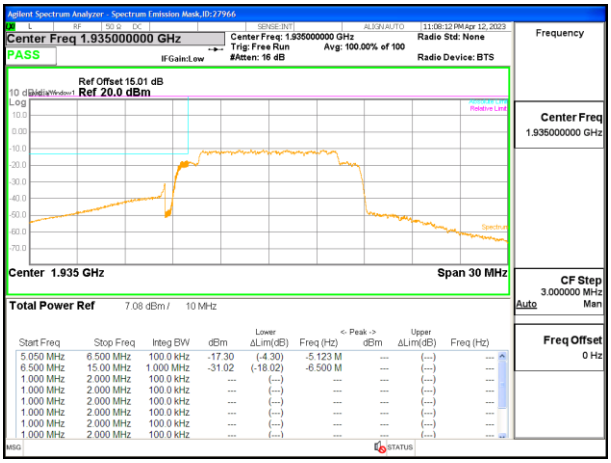
Both antenna ports are measured on the QPSK only as worst case.

9.2.1. 5G NR n2 EMISSION MASK

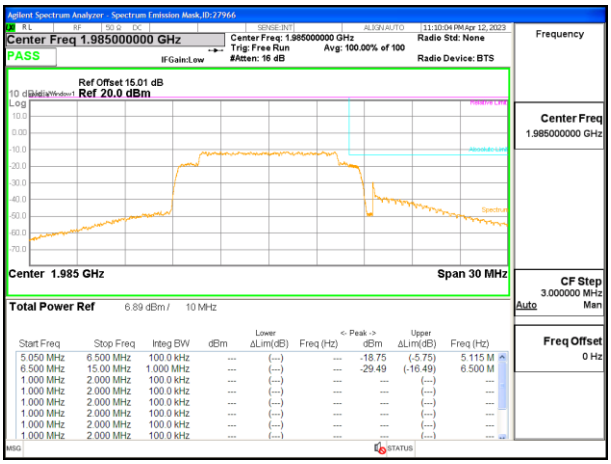
LIMITS

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.

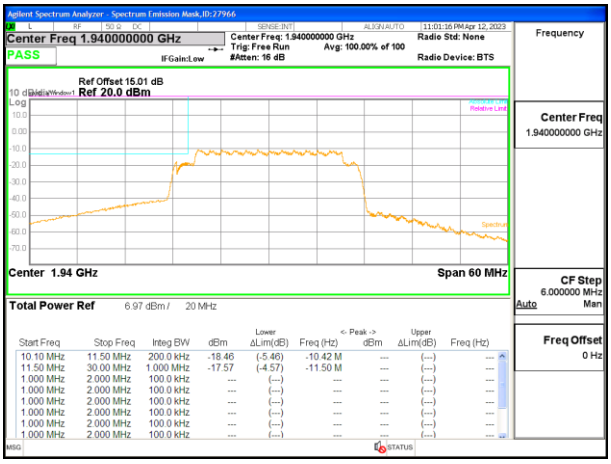
Antenna 1



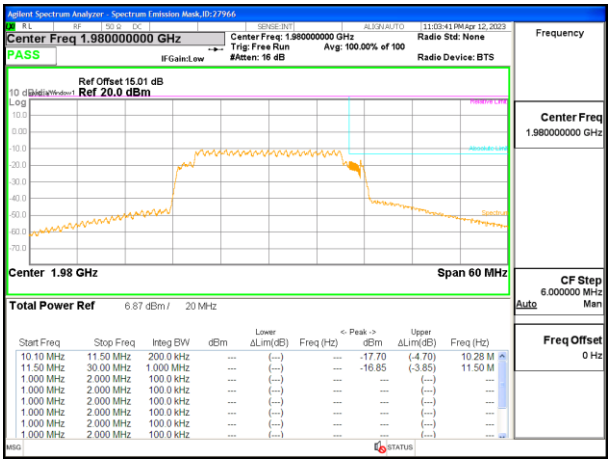
5G NR n2 10MHz QPSK Low Channel



5G NR n2 10MHz QPSK High Channel

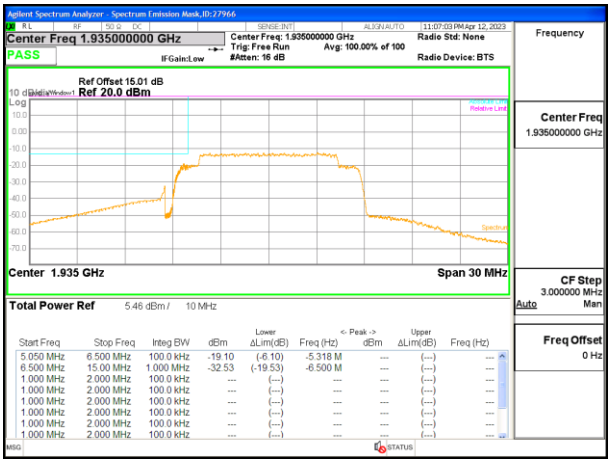


5G NR n2 20MHz QPSK Low Channel

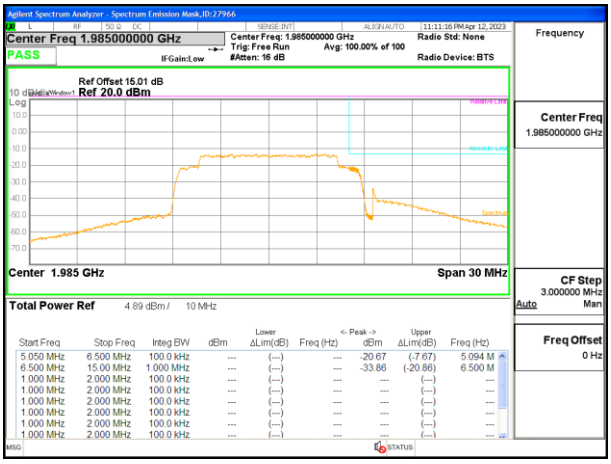


5G NR n2 20MHz QPSK High Channel

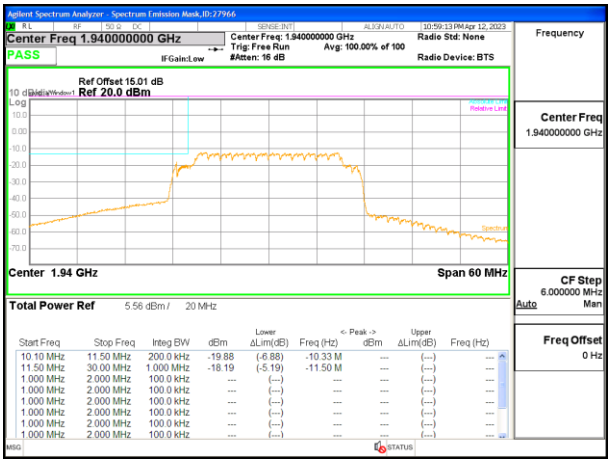
Antenna 2



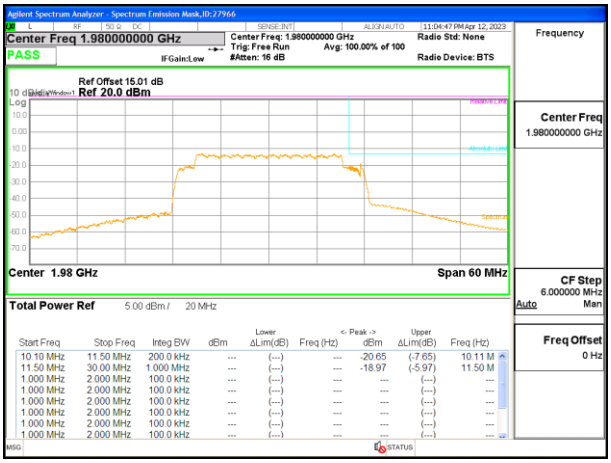
5G NR n2 10MHz QPSK Low Channel



5G NR n2 10MHz QPSK High Channel



5G NR n2 20MHz QPSK Low Channel



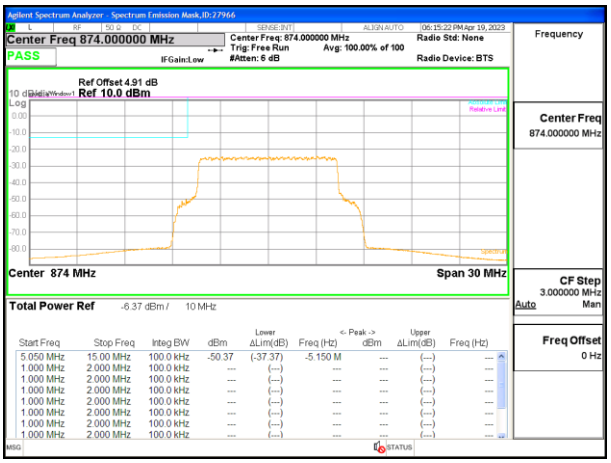
5G NR n2 20MHz QPSK High Channel

9.2.2. 5G NR n5 EMISSION MASK

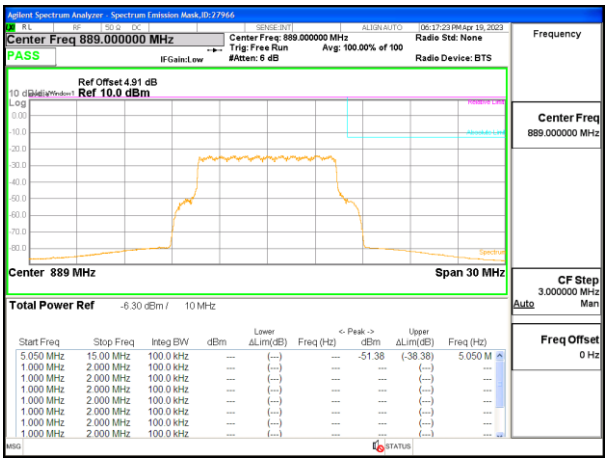
LIMITS

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.

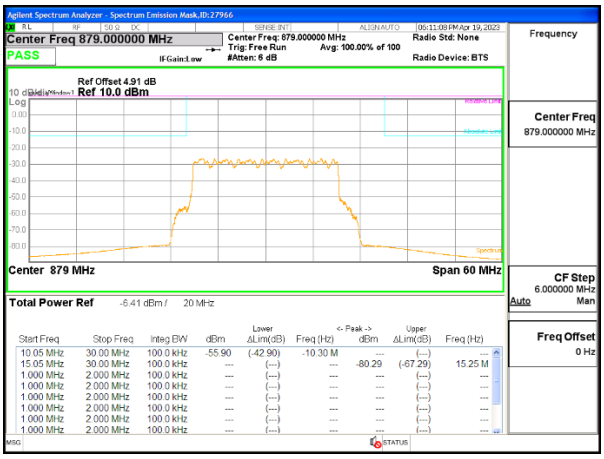
Antenna 1



5G NR n5 10MHz QPSK Low Channel



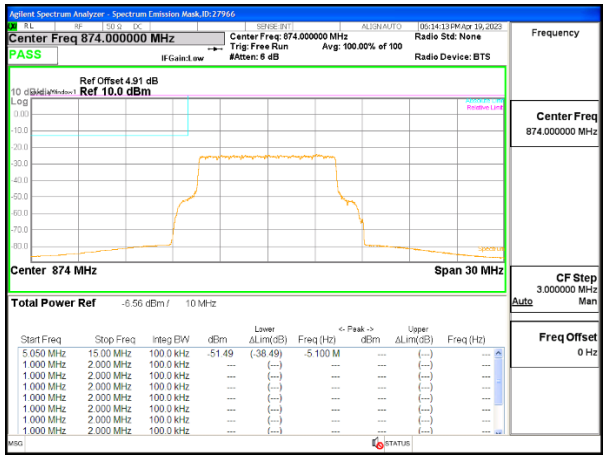
5G NR n5 10MHz QPSK High Channel



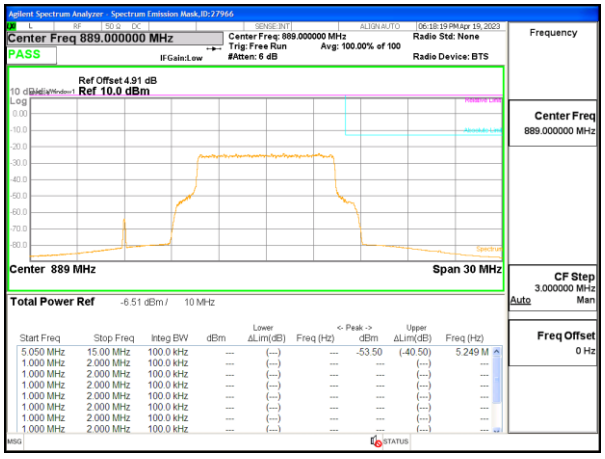
5G NR n5 20MHz QPSK Low Channel

5G NR n5 20MHz QPSK High Channel

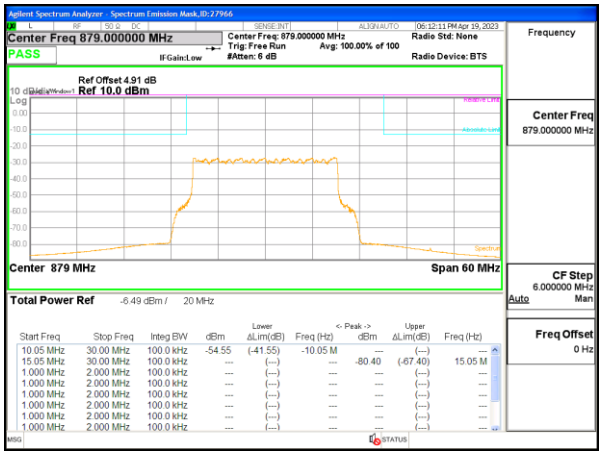
Antenna 2



5G NR n5 10MHz QPSK Low Channel



5G NR n5 10MHz QPSK High Channel



5G NR n5 20MHz QPSK Low Channel

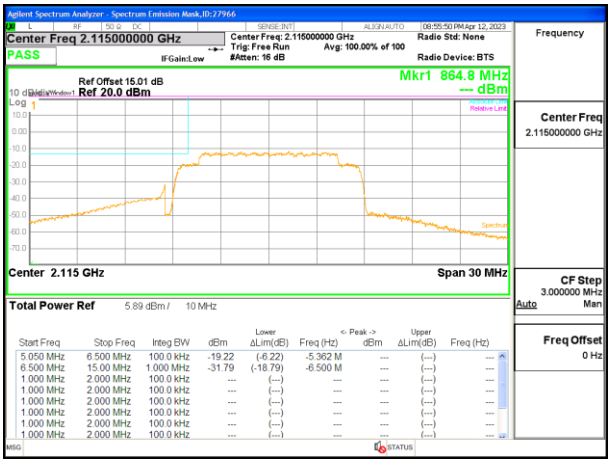
5G NR n5 20MHz QPSK High Channel

9.2.3. 5G NR n66 EMISSION MASK

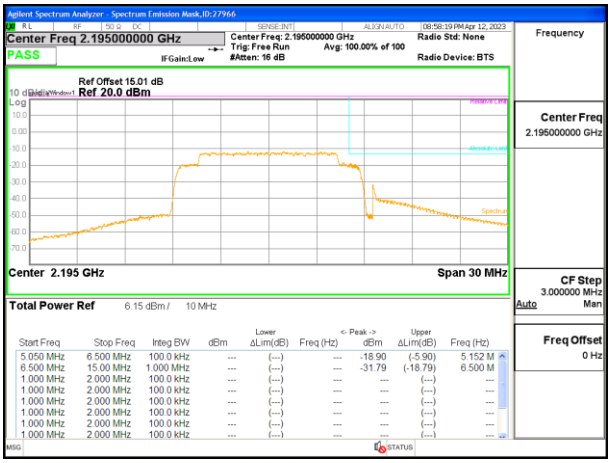
LIMITS

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.

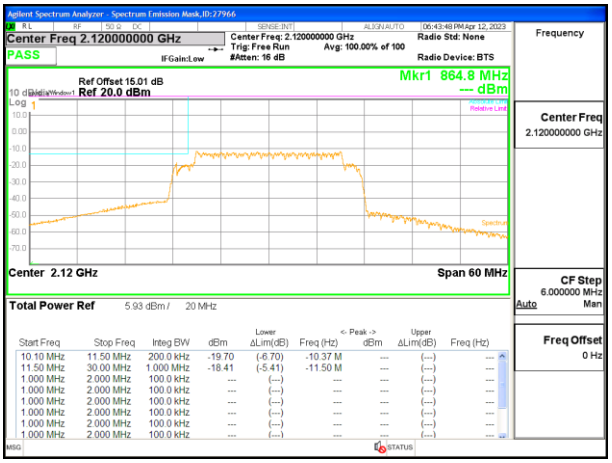
Antenna 1



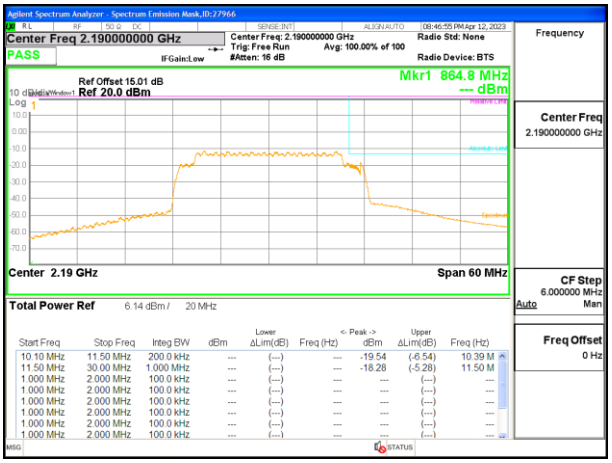
5G NR n66 10MHz QPSK Low Channel



5G NR n66 10MHz QPSK High Channel

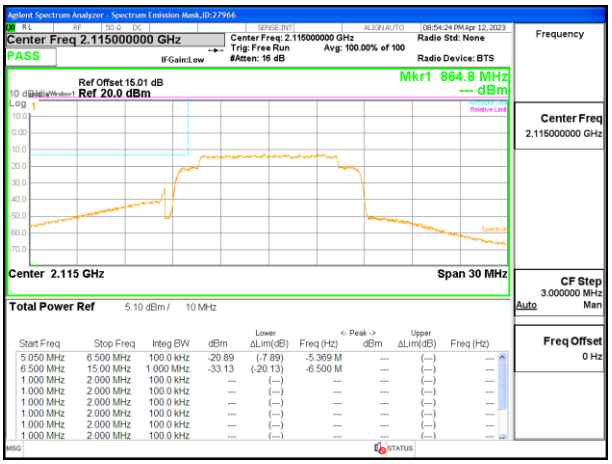


5G NR n66 20MHz QPSK Low Channel

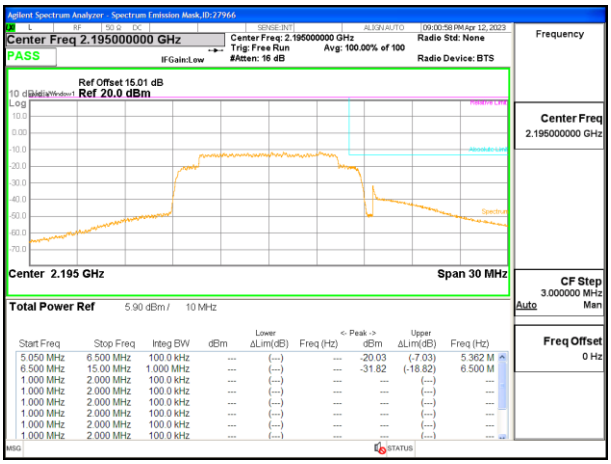


5G NR n66 20MHz QPSK High Channel

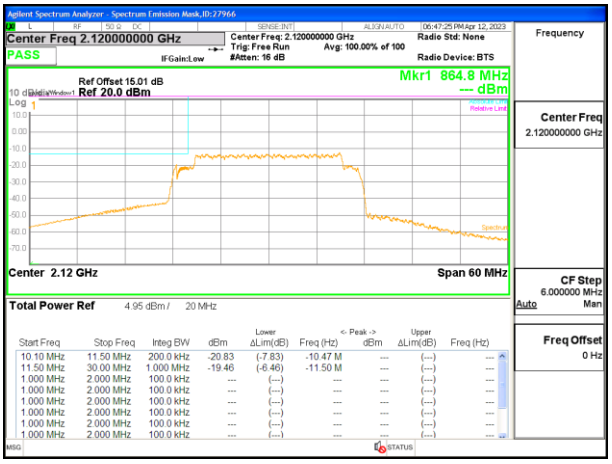
Antenna 2



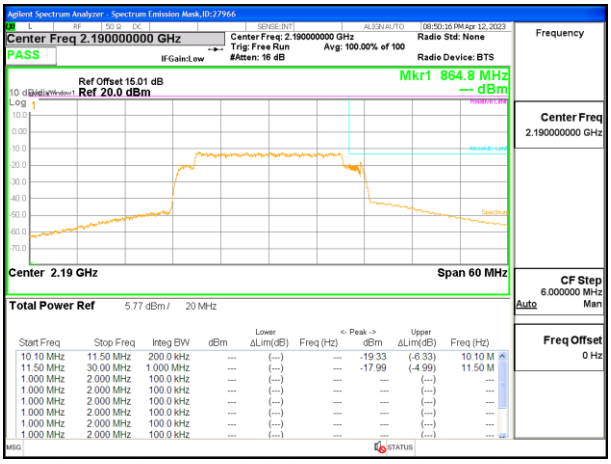
5G NR n66 10MHz QPSK Low Channel



5G NR n66 10MHz QPSK High Channel



5G NR n66 20MHz QPSK Low Channel



5G NR n66 20MHz QPSK High Channel

9.3. OUT OF BAND EMISSIONS

TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at -13 dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

RESULTS

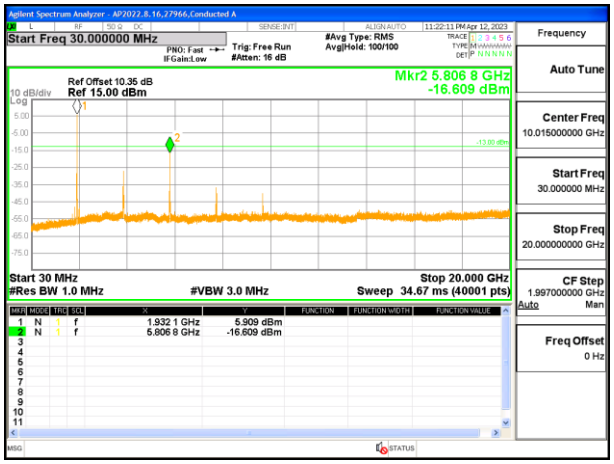
Both antenna ports are measured on the QPSK only as worst case.

9.3.1. 5G NR n2

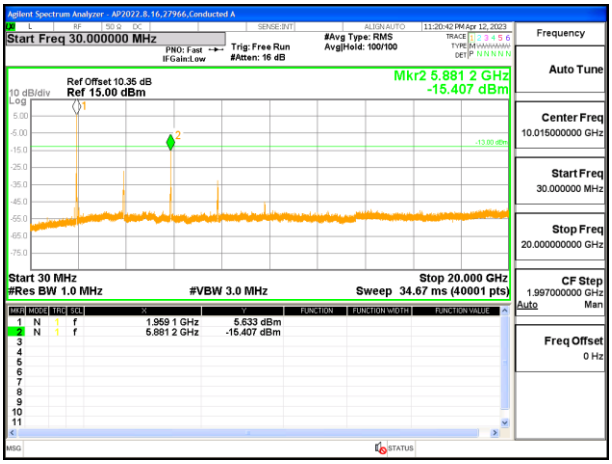
LIMITS

FCC: §24.238 (a)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

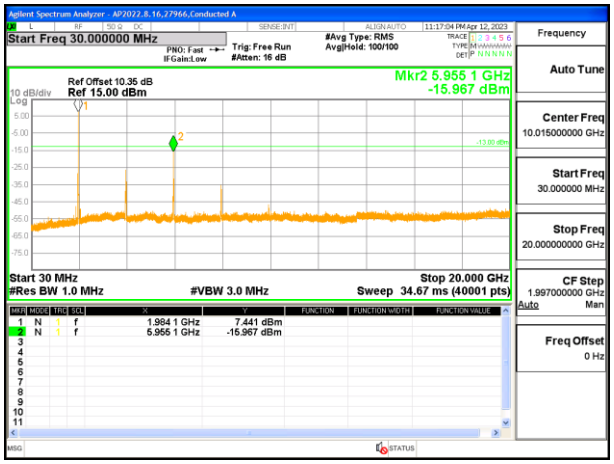
Antenna 1



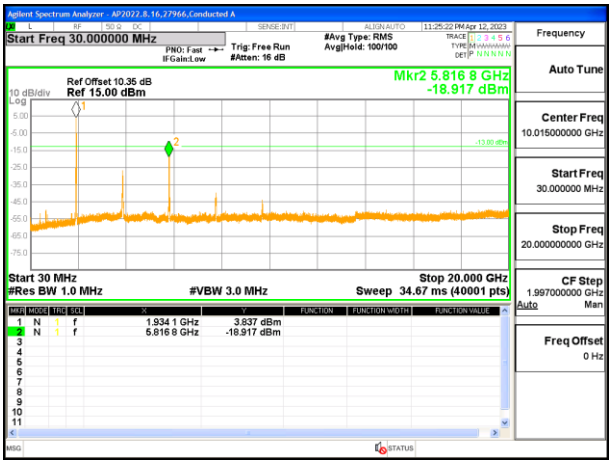
5G NR n2 10MHz QPSK Low Channel



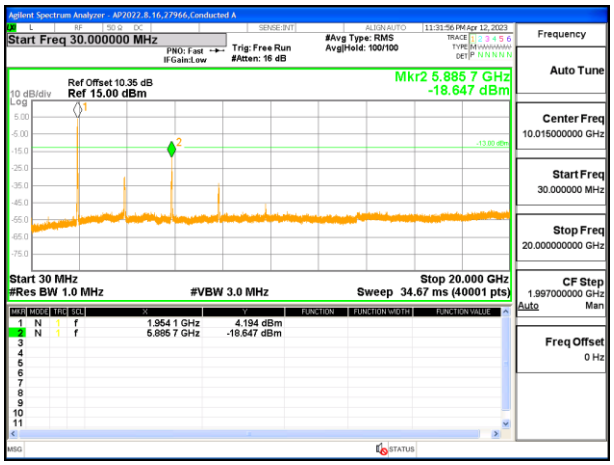
5G NR n2 10MHz QPSK Middle Channel



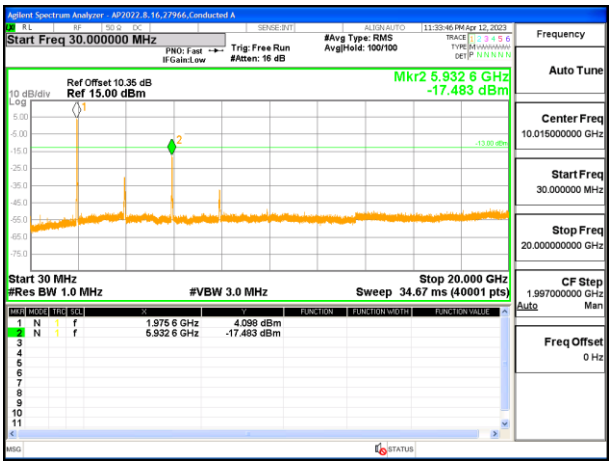
5G NR n2 10MHz QPSK High Channel



5G NR n2 20MHz QPSK Low Channel

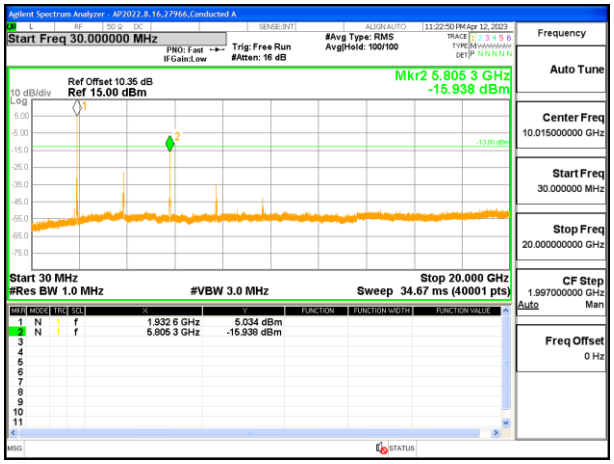


5G NR n2 20MHz QPSK Middle Channel

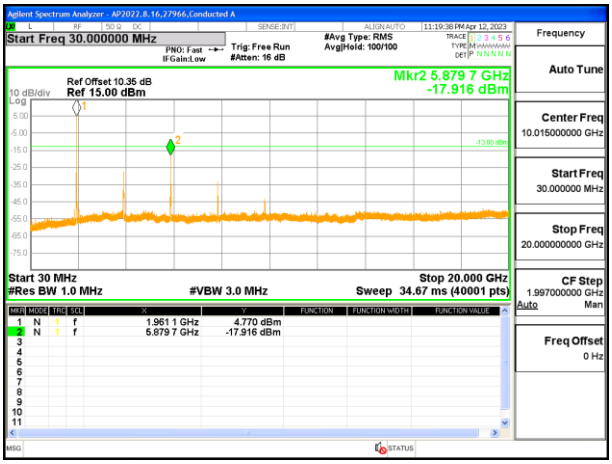


5G NR n2 20MHz QPSK High Channel

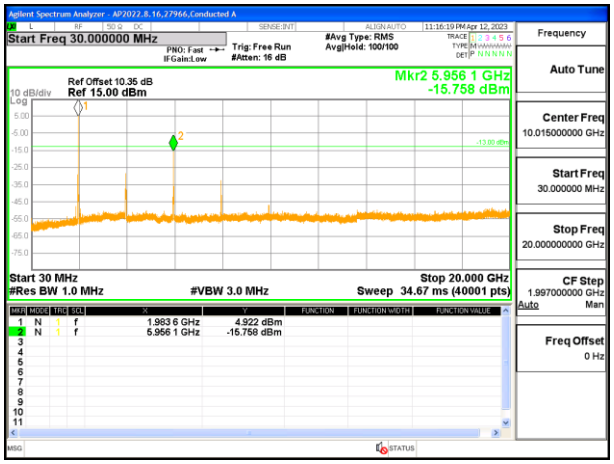
Antenna 2



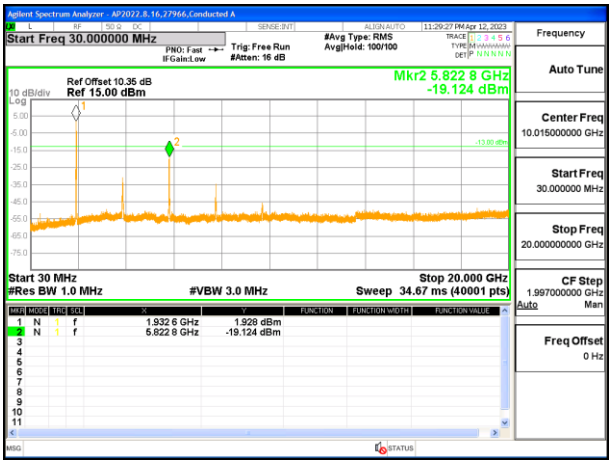
5G NR n2 10MHz QPSK Low Channel



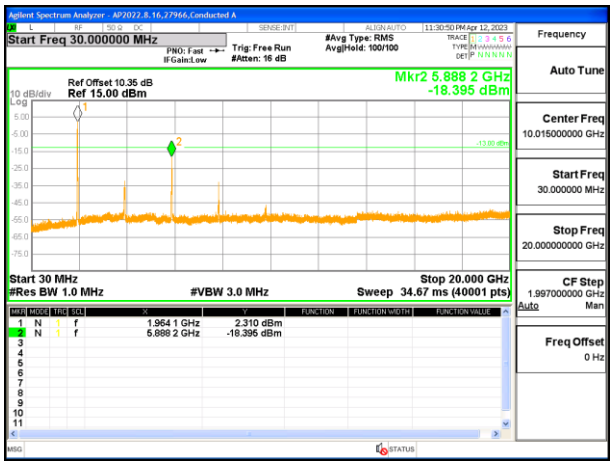
5G NR n2 10MHz QPSK Middle Channel



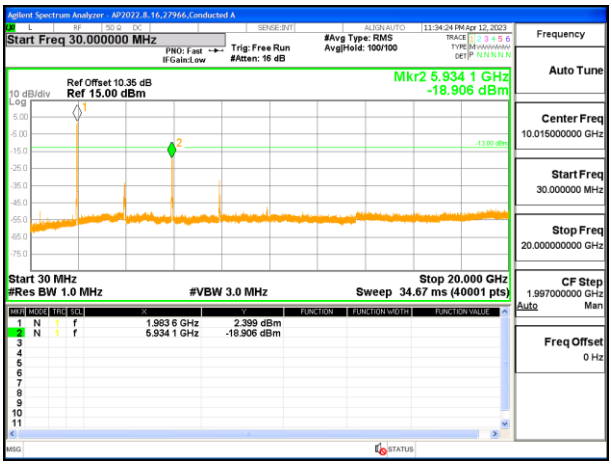
5G NR n2 10MHz QPSK High Channel



5G NR n2 20MHz QPSK Low Channel



5G NR n2 20MHz QPSK Middle Channel



5G NR n2 20MHz QPSK High Channel