TEST REPORT

Report Number: R14607588-E1

Applicant	:	Amantya Technologies Private Limited 12th Floor, Tower B, Unitech Cyber Park, sector 39 Gurugram, India 122003
Model	:	5GPT202SSn2566
FCC ID	:	2BASDAMTBB20232
EUT Description	:	Dual Cell Low Capacity Sub6
Test Standard(s)	:	FCC CFR 47 Part 2, Part 22, Part 24, Part 27

Date Of Issue:
2023-06-22

Prepared by:
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ACCREDITED
CERT #0751.06

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2023-06-01	Initial Review	Noah Bennett
V2	2023-06-14	Revised emission designators in section 6.2	Brian Kiewra
V3	2023-06-22	TCB Feedback: -Marked Fundamental on n66 RSE data	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 Low Capacity Sub6
MODEL:	5GTP202SSn2566
SERIAL NUMBER:	03SS-5GSS-XXXX
SAMPLE RECEIPT DATE:	2023-04-18
DATE TESTED:	2023-04-19 to 2023-05-19

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 and Type (section 6.4)
2. Supported Modulations, Data-rates, BWs and RB configs (section 6.5)
3. Power settings, target power, and UL/DL Modes. (section 6.5, section 8)

Requirement Description	Band	Requirement Clause Number (FCC)	Result*	Remarks
Effective Radiated Power	5	22.913 (a)(1)(i)	Complies	500 watts per emissions OR the PSD 400 watts/MHz per sector
Equivalent Isotropic Radiated Power	2	24.232 (a) (2)	Complies	Antenna height up to 300 meters. Greater than 1MHz channel bandwidth
	66	27.50 (d) (2)	Complies	Greater than 1MHz channel bandwidth
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 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01. Determining ERP and EIRP

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
☐	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_{Lab}
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
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

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 Dual Cell Low Capacity Sub6 fixed station that supports 5G NR n2, n5, n66 bands. The EUT has 2 SDR radio cards in it that are declared as identical. The EUT supports 2x2 MIMO only, on both cards, for a total of 4Tx.

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. 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	3.95	9.15	0.008	11314	11M3G7D
	16QAM			3.97	9.17	0.008	11304	11M3W7D
20.0	QPSK	1940.0	1980.0	3.93	9.13	0.008	22643	22M6G7D
	16QAM			3.88	9.08	0.008	22686	22M7W7D

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	0.25	-1.10	0.001	11335	11M3G7D
	16QAM			0.24	-1.11	0.001	11293	11M3W7D
20.0	QPSK	879.0	884.0	0.32	-1.03	0.001	18341	18M3G7D
	16QAM			0.22	-1.13	0.001	18503	18M5W7D

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	9.95	14.15	0.026	11115	11M1G7D
	16QAM			9.92	14.12	0.026	10986	11M0W7D
20.0	QPSK	2120.0	2190.0	0.69	4.89	0.003	22664	22M7G7D
	16QAM			0.72	4.92	0.003	22716	22M7W7D

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)

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, full RB configuration only.

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

Investigation has been performed based upon conducted average output power, and 30kHz SCS is determined as worse case. All measurements were tested on 30kHz SCS only.

The EUT has 2 identical radio cards that support the same bands and output powers. Conducted Average Output power measurements were performed on both cards, along with a client declaration stating the cards are identical, and it was found that the RF1 radio card was identical to the RF2 radio card. Therefore, antenna port test results of the RF1 card may represent RF2. Radiated emissions was performed with both RF1 and RF2 set to Tx.

Each Radio Card installed in the EUT supports 2x2 MIMO mode only. Additionally, each radio card can transmit simultaneously on the same band and channel. Therefore, for radiated emissions, both radio cards were set to Tx on the same channel, making them 4Tx scans. Since each card is stacking fundamentals, this shall represent simultaneous transmissions investigations as well.

The Worst-Case modulation for all bands was found to be QPSK, based upon total average output power of both chains. Therefore, only QPSK modulation was tested for conducted antenna port testing to represent worst-case. For Radiated Emissions, both QPSK and 16QAM modes were investigated, but only the worst case mode, QPSK, is reported.

The Power settings used by the EUT are as follows:

Band	Frequency	sdrTx_Gain_dB	TxGain
N2	1930-1990	76	1200
N5	869-894	70	1000
N66	2110-2200	82	1200/1000 (10/20MHz BW)

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Support Laptop	Lenovo	T14s	NA	NA
AC Adaptor	Lenovo	ADLX65YLC2D	NA	NA
Mouse	Logitech	M-U0026	NA	NA
Keyboard	Logitech	K120	NA	NA
Monitor	Dell	SE2222H	CN-0V22NY-FCC00-288-ADCX-A02	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	Ethernet	Unshielded	<3m	Used for Port population.
2	LS Ethernet	4	Ethernet	Unshielded	<3m	Used for EUT Programming
3	USB-A	2	USB-A	Shielded	<3m	Goes to Mouse and Keyboard
4	HDMI	1	HDMI	Shielded	<3m	Fiber HDMI Cable
5	Power	3	AC Power	Shielded	<3m	EUT to Power Support laptop to Pwr Monitor to Pwr.

TEST SETUP

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

SETUP DIAGRAMS

Please see Setup Photos Exhibit R14607588-EP1 for Setup Diagrams and Setup Photos.

7. 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.
	Common Equipment				
PWM003	RF Power Meter	Keysight Technologies	N1911A	2022-09-10	2023-09-10
PWM004 (PRE0137346)	RF Power Meter	Keysight Technologies	N1911A	2022-09-10	2023-09-10
PWS005	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-06-15	2023-06-15
PWS003	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2022-06-14	2023-06-14
PWS001 (PRE0137347)	Peak and Avg Power Sensor, 50MHz to 18GHz	Keysight Technologies	N1921A	2022-07-07	2023-07-07
PWS004 (PRE0126443)	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2022-08-04	2023-08-04
SA0026	Spectrum Analyzer	Keysight Technologies	N9030A	2022-08-02	2023-08-02
SA0027	Spectrum Analyzer	Keysight Technologies	N9030A	2022-05-24	2023-05-24
CBL093	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2022-08-24	2023-08-24
CBL105	Micro-Coax UTiFLEX Cable Assembly, Low Loss	Carlisle Interconnect Technologies	UFB-197C-0-0160-300300	2023-02-17	2024-02-17
HI0096	Environmental Meter	Fisher Scientific	181562858	2022-09-22	2023-09-22
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
76023 (EC0225)	Temp/Humid Chamber	Cincinnati Sub-Zero	ZPH-8-3.5-SCT/AC	2023-01-20	2024-01-20

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
88761	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-09-13	2023-09-13
	Gain-Loss Chains				
91977	Gain-loss string: 1-18GHz	Various	Various	2022-05-10	2023-05-31
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-04-10	2024-04-10
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
200540	Environmental Meter	Fisher Scientific	15-077-963 s/n 181474409	2022-10-05	2023-10-05
169108 (BRF010)	1.85-1.97GHz notch filter, 2W, F_{high} = 9GHz	Micro-Tronics	BRM50714-01	2023-02-15	2024-02-29
78368 (BRF006)	1.8-2.0GHz notch filter, 2W, F_{high} = 9GHz	Micro-Tronics	BRM50707-01	2023-02-15	2024-02-29

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
135144	Active Loop Antenna	ETS-Lindgren	6502	2023-01-17	2024-01-17
	30-1000 MHz				
90629	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2023-01-06	2024-01-06
	1-18 GHz				
86408	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2022-05-24	2023-05-24
	Gain-Loss Chains				
207638	Gain-loss string: 0.009-30MHz	Various	Various	2022-05-20	2023-05-20
207639	Gain-loss string: 25-1000MHz	Various	Various	2022-05-20	2023-05-20
207640	Gain-loss string: 1-18GHz	Various	Various	2022-05-20	2023-05-20
	Receiver & Software				
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-03-24	2024-03-24
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
21642	Environmental Meter	Fisher Scientific	15-077-963 (s/n 210701692)	2021-08-16	2023-08-16
150716 (LPF008)	DC-1000MHz low-pass filter	Pasternack	PE8720	2023-02-15	2024-02-29

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

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-04-06	2024-04-06
	18-40 GHz				
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-626	2022-07-11	2023-07-11
204705	Horn Antenna, 26-40GHz	Com-Power	AH-640	2022-07-11	2023-07-11
	Gain-Loss Chains				
91979	Gain-loss string: 1-18GHz	Various	Various	2022-12-02	2023-12-02
135999	Gain-loss string: 18-40GHz	Various	Various	2022-05-05	2023-05-31
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-02-02	2024-02-02
72823	Spectrum Analyzer	Agilent	E4446A	2022-06-08	2023-06-08
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
200539	Environmental Meter	Fisher Scientific	15-077-963 s/n 18474341	2022-10-05	2023-10-05
92492 (HPF012)	1GHz high-pass filter, 2W, F_{high} =18GHz	Micro-Tronics	HPM18129	2023-02-15	2024-02-29

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 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

Test Engineer ID:	22797/44389	Test Date:	2023-04-19; 2023-04-20; 2023-04-26; 2023-05-04; 2023-05-19

Note: Since RF1 and RF2 can transmit on the same band and frequency together, power is taken on both radio cards, and summed. For example,

- $RF1_{Ant1}$ (dBm) + $RF1_{Ant2}$ (dBm) = $RF1_{Total}$ (dBm)
- $RF2_{Ant1}$ (dBm) + $RF2_{Ant2}$ (dBm) = $RF2_{Total}$ (dBm)
- $RF_{Overall}$ (dBm) = $RF1_{Total}$ (dBm) + $RF2_{Total}$ (dBm)

8.1. 5G NR n2

8.1.1. RF1

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	-1.90	-3.46	0.40
				392000	1960	-2.08	-3.18	0.42
				397000	1985	-1.86	-3.18	0.54
			16QAM	387000	1935	-1.97	-3.31	0.42
				392000	1960	-2.01	-3.17	0.46
				397000	1985	-1.77	-3.24	0.57
			64QAM	387000	1935	-2.06	-3.02	0.50
				392000	1960	-1.90	-3.20	0.51
				397000	1985	-1.77	-3.21	0.58
		20	QPSK	388000	1940	-2.26	-3.06	0.37
				392000	1960	-2.47	-3.22	0.18
				396000	1980	-2.21	-3.26	0.31
			16QAM	388000	1940	-2.32	-3.01	0.36
				392000	1960	-2.34	-3.12	0.30
				396000	1980	-2.24	-3.54	0.17
			64QAM	388000	1940	-2.33	-3.09	0.32
				392000	1960	-2.27	-3.22	0.29
				396000	1980	-2.11	-3.30	0.35
	30	10	QPSK	387000	1935	-1.71	-2.95	0.72
				392000	1960	-1.61	-3.16	0.69
				397000	1985	-1.58	-3.04	**0.76**
			16QAM	387000	1935	-1.66	-2.93	0.76
				392000	1960	-1.60	-2.98	**0.77**
				397000	1985	-1.54	-3.23	0.71
			64QAM	387000	1935	-1.71	-2.91	**0.74**
				392000	1960	-1.68	-3.06	0.69
				397000	1985	-1.64	-3.09	0.71
		20	QPSK	388000	1940	-1.79	-3.51	0.44
				392000	1960	-1.73	-3.12	0.64
				396000	1980	**-1.43**	-3.30	**0.75**
			16QAM	388000	1940	**-1.61**	-3.32	0.63
				392000	1960	-1.73	**-3.06**	0.67
				396000	1980	-1.44	-4.17	0.42
			64QAM	388000	1940	-1.81	-3.54	0.42
				392000	1960	**-1.75**	-3.08	0.65
				396000	1980	-2.99	-3.37	-0.17

8.1.2. RF2

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	-1.33	-3.60	0.69
				392000	1960	-0.96	-3.94	0.81
				397000	1985	-0.98	-3.97	0.79
			16QAM	387000	1935	-0.95	-3.89	0.83
				392000	1960	-1.00	-3.74	0.85
				397000	1985	-1.18	-3.93	0.67
			64QAM	387000	1935	-0.99	-3.86	0.82
				392000	1960	-0.93	-3.72	0.91
				397000	1985	-1.01	-3.77	0.84
		20	QPSK	388000	1940	-1.39	-3.62	0.65
				392000	1960	-1.41	-3.65	0.62
				396000	1980	-1.34	-3.62	0.68
			16QAM	388000	1940	-1.45	-3.60	0.62
				392000	1960	-1.41	-3.82	0.56
				396000	1980	-1.38	-3.65	0.64
			64QAM	388000	1940	-1.62	-3.70	0.47
				392000	1960	-1.42	-3.74	0.58
				396000	1980	*-1.48*	-3.71	0.56
	30	10	QPSK	387000	1935	-0.64	-3.56	**1.15**
				392000	1960	-0.72	-3.65	1.07
				397000	1985	-0.66	-3.62	1.12
			16QAM	387000	1935	*-0.66*	-3.54	**1.14**
				392000	1960	-0.71	-3.58	1.10
				397000	1985	-0.67	-3.55	1.13
			64QAM	387000	1935	-0.67	-3.61	**1.11**
				392000	1960	*-0.79*	-3.69	1.01
				397000	1985	-0.74	-3.50	1.11
		20	QPSK	388000	1940	-0.75	-3.47	1.11
				392000	1960	-0.72	-3.64	1.07
				396000	1980	-0.70	-3.62	1.09
			16QAM	388000	1940	-0.79	-3.91	0.93
				392000	1960	-0.76	-3.61	1.06
				396000	1980	-0.73	-3.59	1.08
			64QAM	388000	1940	-0.84	-3.59	1.01
				392000	1960	-0.81	-3.66	1.01
				396000	1980	-0.78	-3.64	1.03

8.1.3. RF1 + RF2 Summed Output Power

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Total Antenna Conducted Avg Power (dBm)
n2	15	10	QPSK	387000	1935	3.56
				392000	1960	3.63
				397000	1985	3.68
			16QAM	387000	1935	3.64
				392000	1960	3.67
				397000	1985	3.63
			64QAM	387000	1935	3.67
				392000	1960	3.72
				397000	1985	3.72
		20	QPSK	388000	1940	3.52
				392000	1960	3.42
				396000	1980	3.51
			16QAM	388000	1940	3.50
				392000	1960	3.44
				396000	1980	3.42
			64QAM	388000	1940	3.41
				392000	1960	3.45
				396000	1980	3.46
	30	10	QPSK	387000	1935	**3.95**
				392000	1960	3.90
				397000	1985	3.95
			16QAM	387000	1935	**3.97**
				392000	1960	3.95
				397000	1985	3.94
			64QAM	387000	1935	**3.94**
				392000	1960	3.86
				397000	1985	3.92
		20	QPSK	388000	1940	3.80
				392000	1960	3.87
				396000	1980	3.93
			16QAM	388000	1940	3.79
				392000	1960	3.88
				396000	1980	3.77
			64QAM	388000	1940	3.74
				392000	1960	3.84
				396000	1980	3.48

8.2. 5G NR n5

8.2.1. RF1

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	-6.23	-6.08	-3.14
				176300	881.5	-6.31	-6.15	-3.22
				177800	889	*-6.59*	-6.19	-3.38
			16QAM	174800	874	-6.94	-6.06	-3.47
				176300	881.5	-6.05	-6.11	-3.07
				177800	889	*-6.13*	-6.48	-3.29
			64QAM	174800	874	-6.35	-6.27	-3.30
				176300	881.5	-6.27	-6.11	-3.18
				177800	889	*-6.11*	-6.32	-3.20
		20	QPSK	175800	879	-6.30	-6.20	-3.24
				176300	881.5	-7.37	-6.06	-3.66
				176800	884	*-6.86*	-6.28	-3.55
			16QAM	175800	879	-6.46	-6.09	-3.26
				176300	881.5	-6.31	-6.16	-3.22
				176800	884	*-6.86*	-6.16	-3.49
			64QAM	175800	879	-6.52	-6.10	-3.29
				176300	881.5	-6.31	-6.34	-3.31
				176800	884	*-6.91*	-6.59	-3.74
	30	10	QPSK	174800	874	*-5.59*	-6.82	-3.15
				176300	881.5	-5.71	-6.43	-3.04
				177800	889	-5.75	-6.12	-2.92
			16QAM	174800	874	*-5.73*	-6.25	-2.97
				176300	881.5	-5.64	-6.29	**-2.94**
				177800	889	-5.90	-6.34	-3.10
			64QAM	174800	874	-5.65	-6.26	-2.93
				176300	881.5	*-5.68*	-6.47	-3.05
				177800	889	-5.56	-6.35	-2.93
		20	QPSK	175800	879	-5.54	-6.10	**-2.80**
				176300	881.5	-5.97	-6.51	-3.22
				176800	884	*-5.54*	-6.13	-2.81
			16QAM	175800	879	*-5.63*	-6.54	-3.05
				176300	881.5	-5.60	-6.48	-3.01
				176800	884	-5.82	-6.40	-3.09
			64QAM	175800	879	-6.33	-6.59	-3.45
				176300	881.5	*-5.63*	-6.12	**-2.86**
				176800	884	-5.66	-6.46	-3.03

8.2.2. RF2

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	-5.39	-6.26	-2.79
				176300	881.5	-5.45	-6.24	-2.82
				177800	889	-5.40	-6.11	-2.73
			16QAM	174800	874	-5.36	-6.22	-2.76
				176300	881.5	-5.39	-6.04	-2.69
				177800	889	-5.40	-6.12	-2.73
			64QAM	174800	874	-5.35	-6.24	-2.76
				176300	881.5	-5.38	-6.14	-2.73
				177800	889	-5.42	-6.14	-2.75
		20	QPSK	175800	879	-5.66	-6.11	-2.87
				176300	881.5	-5.66	-6.11	-2.87
				176800	884	-5.67	-6.15	-2.89
			16QAM	175800	879	-5.67	-6.12	-2.88
				176300	881.5	-5.68	-6.15	-2.90
				176800	884	-5.64	-6.01	-2.81
			64QAM	175800	879	-5.69	-6.13	-2.89
				176300	881.5	-5.68	-6.15	-2.90
				176800	884	-5.69	-6.46	-3.05
	30	10	QPSK	174800	874	-5.13	-6.06	**-2.56**
				176300	881.5	-5.15	-6.08	-2.58
				177800	889	-5.17	-6.10	-2.60
			16QAM	174800	874	-5.16	-6.11	-2.60
				176300	881.5	-5.17	-6.09	-2.60
				177800	889	-5.20	-6.11	-2.62
			64QAM	174800	874	-5.19	-6.26	-2.68
				176300	881.5	-5.21	-6.10	-2.62
				177800	889	-5.23	-6.14	-2.65
		20	QPSK	175800	879	-5.16	-6.06	-2.58
				176300	881.5	-5.17	-6.08	-2.59
				176800	884	-5.19	-6.11	-2.62
			16QAM	175800	879	-5.17	-6.13	-2.61
				176300	881.5	-5.17	-6.05	**-2.58**
				176800	884	-5.20	-6.09	-2.61
			64QAM	175800	879	-5.23	-6.05	-2.61
				176300	881.5	-5.21	-6.07	**-2.61**
				176800	884	-5.28	-6.02	-2.62

8.2.3. RF1 + RF2 Summed Output Power

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Total Antenna Conducted Avg Power (dBm)
n5	15	10	QPSK	174800	874	0.05
				176300	881.5	0.00
				177800	889	-0.03
			16QAM	174800	874	-0.09
				176300	881.5	0.13
				177800	889	0.01
			64QAM	174800	874	-0.01
				176300	881.5	0.06
				177800	889	0.04
		20	QPSK	175800	879	-0.04
				176300	881.5	-0.23
				176800	884	-0.20
			16QAM	175800	879	-0.06
				176300	881.5	-0.05
				176800	884	-0.12
			64QAM	175800	879	-0.08
				176300	881.5	-0.09
				176800	884	-0.37
	30	10	QPSK	174800	874	0.16
				176300	881.5	0.20
				177800	889	0.25
			16QAM	174800	874	0.23
				176300	881.5	**0.24**
				177800	889	0.15
			64QAM	174800	874	0.20
				176300	881.5	0.18
				177800	889	0.22
		20	QPSK	175800	879	**0.32**
				176300	881.5	0.12
				176800	884	0.30
			16QAM	175800	879	0.18
				176300	881.5	0.22
				176800	884	0.17
			64QAM	175800	879	0.00
				176300	881.5	**0.28**
				176800	884	0.19

8.3. 5G NR n66

8.3.1. RF1

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	4.46	3.67	7.09
				431000	2155	4.59	4.17	**7.40**
				439000	2195	4.47	3.84	7.18
			16QAM	423000	2115	4.40	3.84	7.14
				431000	2155	4.30	4.02	7.17
				439000	2195	4.49	3.96	7.24
			64QAM	423000	2115	4.54	3.66	7.13
				431000	2155	4.60	3.78	7.22
				439000	2195	4.53	3.31	6.97
		20	QPSK	424000	2120	**-4.49**	-5.98	-2.16
				431000	2155	-4.54	-5.70	-2.07
				438000	2190	-4.80	-5.84	-2.28
			16QAM	424000	2120	-5.17	-6.01	-2.56
				431000	2155	-5.01	-5.97	-2.45
				438000	2190	-4.91	-5.76	-2.30
			64QAM	424000	2120	-4.74	-6.29	-2.44
				431000	2155	-4.95	-6.04	-2.45
				438000	2190	-5.20	**-5.67**	-2.42
	30	10	QPSK	423000	2115	**4.93**	3.49	7.28
				431000	2155	4.88	3.62	7.31
				439000	2195	4.64	3.76	7.23
			16QAM	423000	2115	4.78	3.39	7.15
				431000	2155	4.62	3.50	7.11
				439000	2195	4.53	**3.97**	**7.27**
			64QAM	423000	2115	4.92	3.36	7.22
				431000	2155	4.73	3.77	**7.29**
				439000	2195	4.27	3.50	6.91
		20	QPSK	424000	2120	-4.55	-5.72	-2.09
				431000	2155	-4.68	-5.01	-1.83
				438000	2190	-5.34	-5.97	-2.63
			16QAM	424000	2120	-4.66	-4.89	-1.76
				431000	2155	-4.70	-5.13	-1.90
				438000	2190	-4.89	-5.42	-2.14
			64QAM	424000	2120	-4.50	-4.76	-1.62
				431000	2155	-5.20	-6.01	-2.58
				438000	2190	-5.01	-5.34	-2.16

8.3.2. RF2

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	4.49	2.53	6.63
				431000	2155	3.90	2.74	6.37
				439000	2195	3.35	2.70	6.05
			16QAM	423000	2115	4.51	2.54	6.65
				431000	2155	4.18	2.75	6.53
				439000	2195	3.37	2.76	6.09
			64QAM	423000	2115	4.21	1.46	6.06
				431000	2155	3.89	2.69	6.34
				439000	2195	3.74	2.69	6.26
		20	QPSK	424000	2120	-5.15	-7.13	-3.02
				431000	2155	-5.31	-6.94	-3.04
				438000	2190	-5.73	-7.87	-3.66
			16QAM	424000	2120	-5.17	-7.42	-3.14
				431000	2155	-5.40	-7.02	-3.12
				438000	2190	-5.74	-7.70	-3.60
			64QAM	424000	2120	-5.27	-7.23	-3.13
				431000	2155	-5.38	-6.97	-3.09
				438000	2190	-5.79	-7.01	-3.35
	30	10	QPSK	423000	2115	4.41	2.52	6.58
				431000	2155	4.04	2.64	6.41
				439000	2195	3.75	2.73	6.28
			16QAM	423000	2115	4.53	2.54	6.66
				431000	2155	4.13	2.57	6.43
				439000	2195	3.50	2.61	6.09
			64QAM	423000	2115	4.44	2.46	6.57
				431000	2155	3.98	2.03	6.12
				439000	2195	3.57	2.73	6.18
		20	QPSK	424000	2120	-5.30	-6.02	-2.63
				431000	2155	-5.92	-5.85	-2.88
				438000	2190	-5.39	-6.42	-2.86
			16QAM	424000	2120	-5.21	-6.75	-2.90
				431000	2155	-5.79	-7.02	-3.35
				438000	2190	-5.56	-6.98	-3.20
			64QAM	424000	2120	-6.13	-5.68	-2.89
				431000	2155	-5.78	-5.24	-2.49
				438000	2190	-5.93	-5.74	-2.82

8.3.3. RF1 + RF2 Summed Output Power

5G NR Band	SCS (kHz)	Bandwidth (MHz)	Modulation	Channel	Frequency (MHz)	Total Antenna Conducted Avg Power (dBm)
n66	15	10	QPSK	423000	2115	9.88
				431000	2155	9.92
				439000	2195	9.66
			16QAM	423000	2115	9.91
				431000	2155	9.88
				439000	2195	9.71
			64QAM	423000	2115	9.64
				431000	2155	9.81
				439000	2195	9.64
		20	QPSK	424000	2120	0.44
				431000	2155	0.48
				438000	2190	0.10
			16QAM	424000	2120	0.17
				431000	2155	0.23
				438000	2190	0.11
			64QAM	424000	2120	0.24
				431000	2155	0.25
				438000	2190	0.15
	30	10	QPSK	423000	2115	**9.95**
				431000	2155	9.89
				439000	2195	9.79
			16QAM	423000	2115	**9.92**
				431000	2155	9.79
				439000	2195	9.73
			64QAM	423000	2115	**9.92**
				431000	2155	9.75
				439000	2195	9.57
		20	QPSK	424000	2120	0.66
				431000	2155	0.69
				438000	2190	0.26
			16QAM	424000	2120	0.72
				431000	2155	0.44
				438000	2190	0.37
			64QAM	424000	2120	0.80
				431000	2155	0.48
				438000	2190	0.53

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.

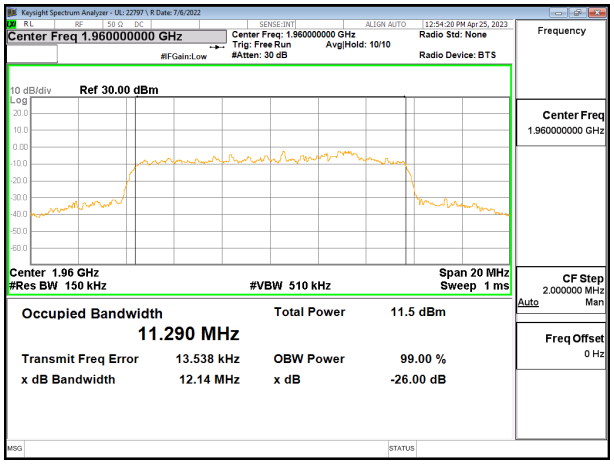
RESULTS

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

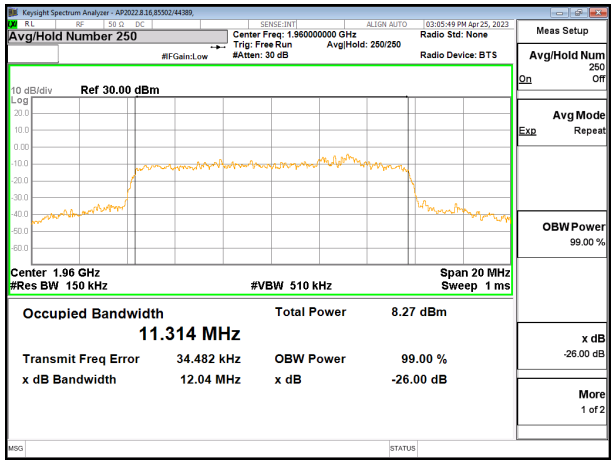
Test Engineer ID:	22797/44389	**Test Date:**	2023-04-24; 2023-04-25; 2023-04-26; 2023-05-19

5G NR n2

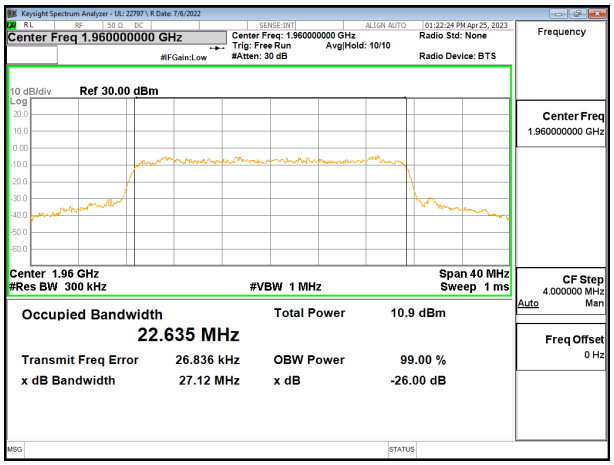
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
			Antenna 1	Antenna 2	Antenna 1	Antenna 2
5G NR n2	10MHz, QPSK	1960	11.290	11.314	12.14	12.04
	10MHz, 16QAM		11.293	11.304	12.12	12.10
	20MHz, QPSK		22.635	22.643	27.12	24.12
	20MHz, 16QAM		22.646	22.686	24.37	24.14



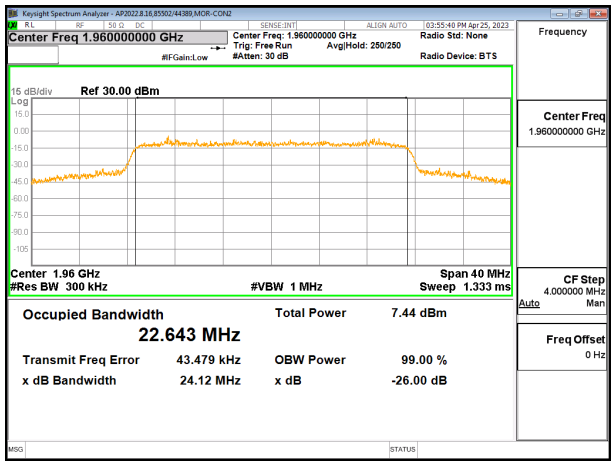
5G NR n2 10MHz QPSK Middle Channel, Antenna 1



5G NR n2 10MHz QPSK Middle Channel, Antenna 2



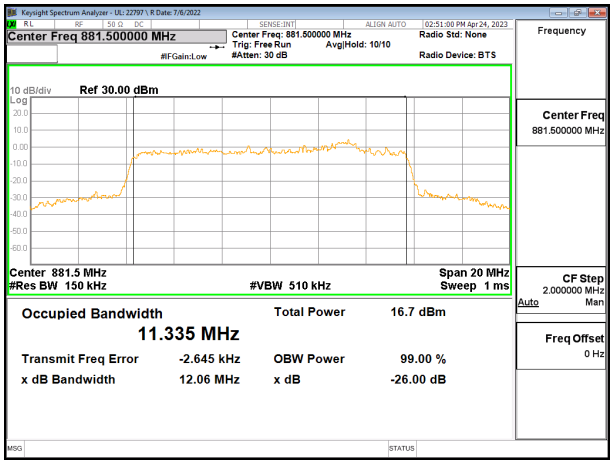
5G NR n2 20MHz QPSK Middle Channel, Antenna 1



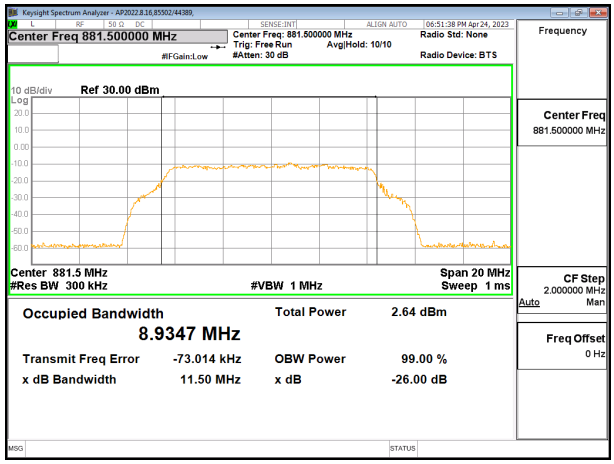
5G NR n2 20MHz QPSK Middle Channel, Antenna 2

5G NR n5

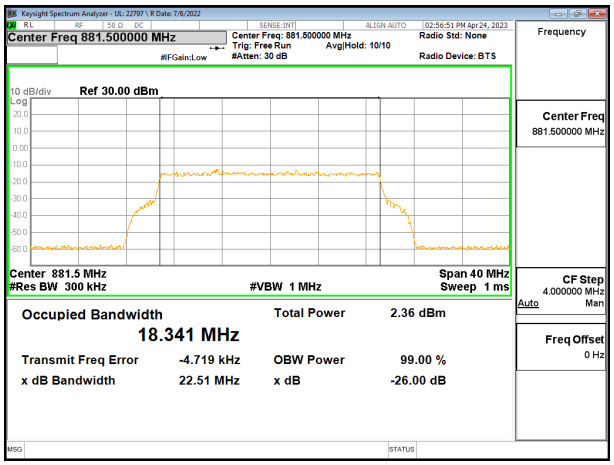
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
			Antenna 1	Antenna 2	Antenna 1	Antenna 2
5G NR n5	10MHz, QPSK	881.5	11.335	8.9347	12.05	11.50
	10MHz, 16QAM		11.293	9.0176	12.12	11.63
	20MHz, QPSK		18.341	18.320	22.51	22.43
	20MHz, 16QAM		18.496	18.503	22.94	22.90



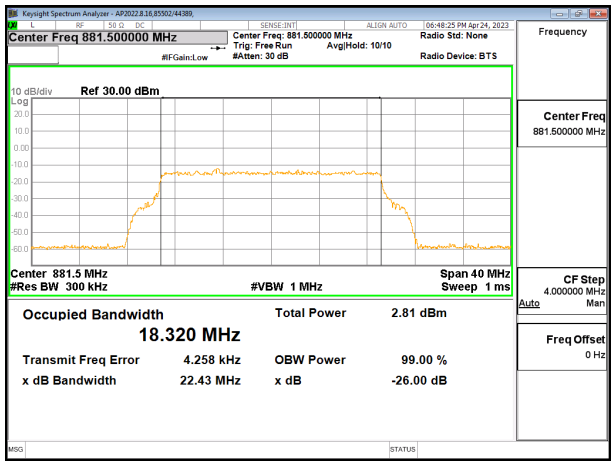
5G NR n5 10MHz QPSK Middle Channel, Antenna 1



5G NR n5 10MHz QPSK Middle Channel, Antenna 2



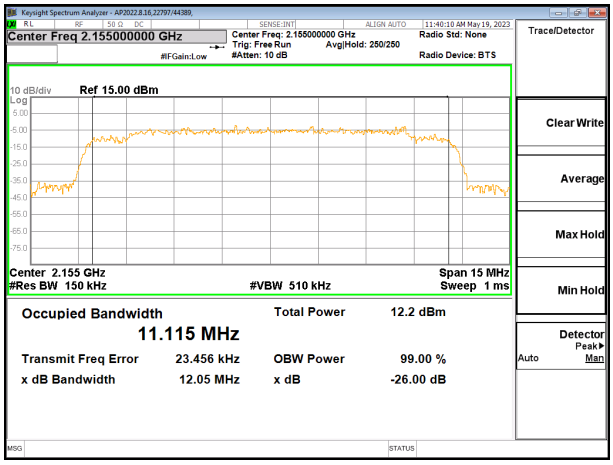
5G NR n5 20MHz QPSK Middle Channel, Antenna 1



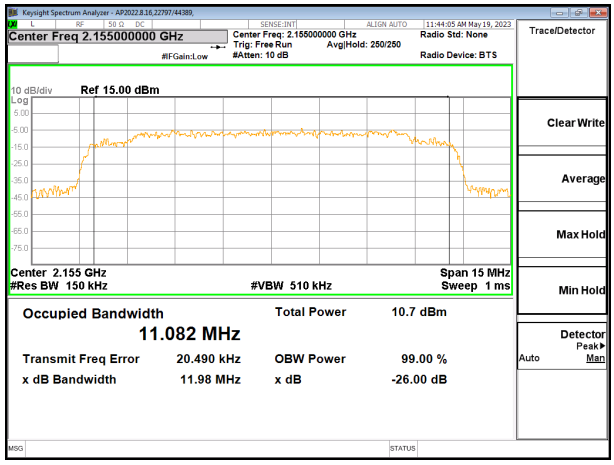
5G NR n5 20MHz QPSK Middle Channel, Antenna 2

5G NR n66

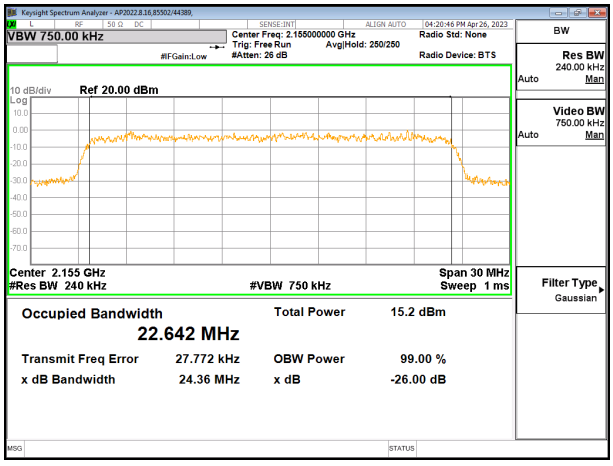
Band	Mode	f(MHz)	99% BW (MHz)	99% BW (MHz)	-26dB BW (MHz)	-26dB BW (MHz)
			Antenna 1	Antenna 2	Antenna 1	Antenna 2
5G NR n66	10MHz, QPSK	2155	11.115	11.082	12.05	11.98
	10MHz, 16QAM		10.986	10.963	11.97	11.98
	20MHz, QPSK		22.642	22.664	24.36	24.00
	20MHz, 16QAM		22.716	22.039	24.32	23.85



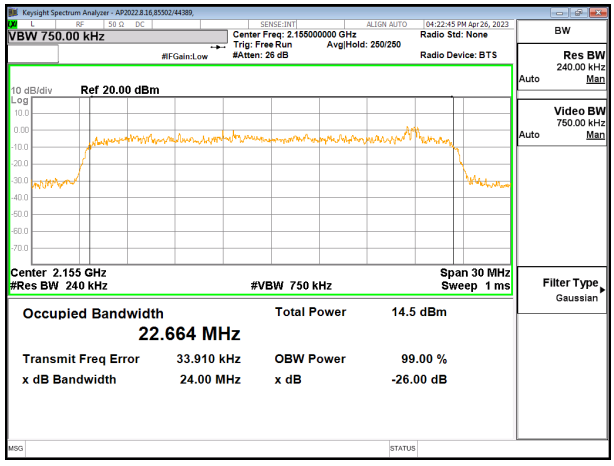
5G NR n66 10MHz QPSK Middle Channel, Antenna 1



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

Test Engineer ID:	22797/44389	**Test Date:**	2023-04-24; 2023-04-25; 2023-04-26

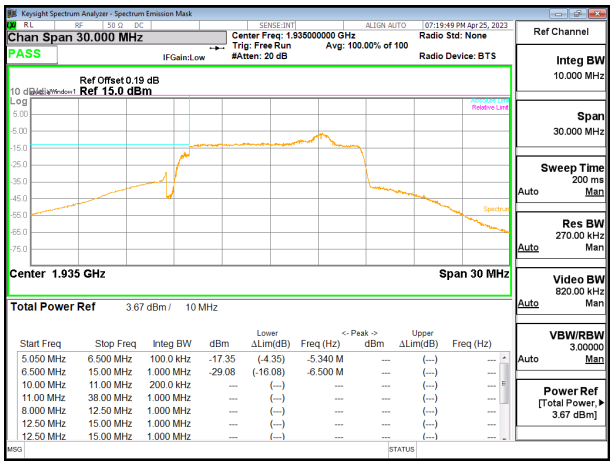
Both antenna ports are measured on QPSK only as worst case.

9.2.1. 5G NR n2 EMISSION MASK

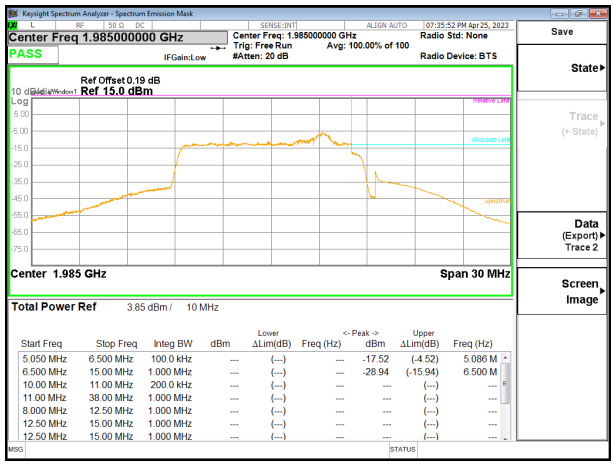
LIMITS

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.

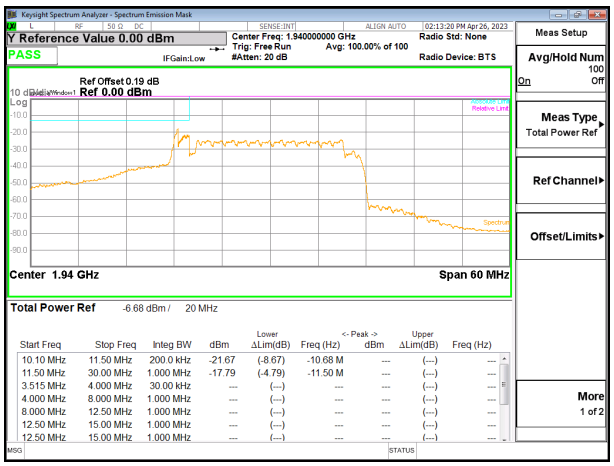
Antenna 1



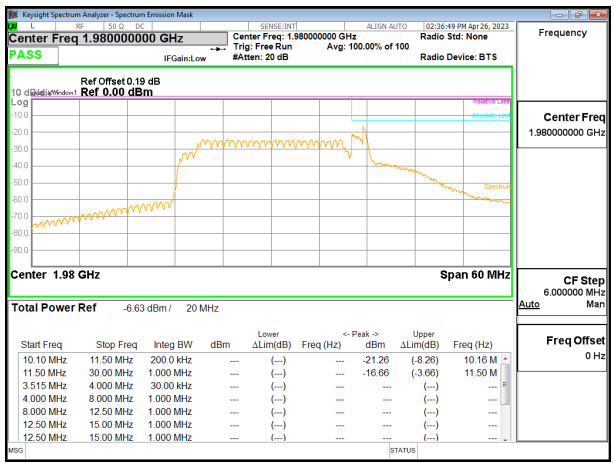
5G NR n2 10MHz QPSK Low Channel



5G NR n2 10MHz QPSK High Channel

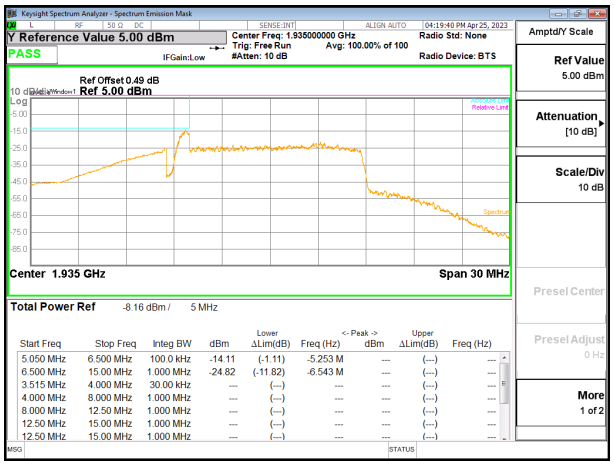


5G NR n2 20MHz QPSK Low Channel

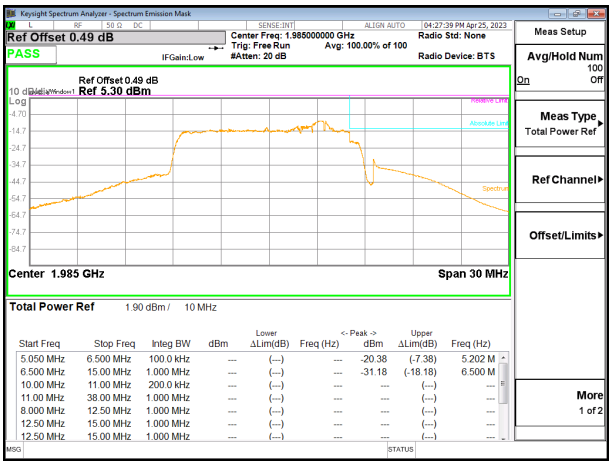


5G NR n2 20MHz QPSK High Channel

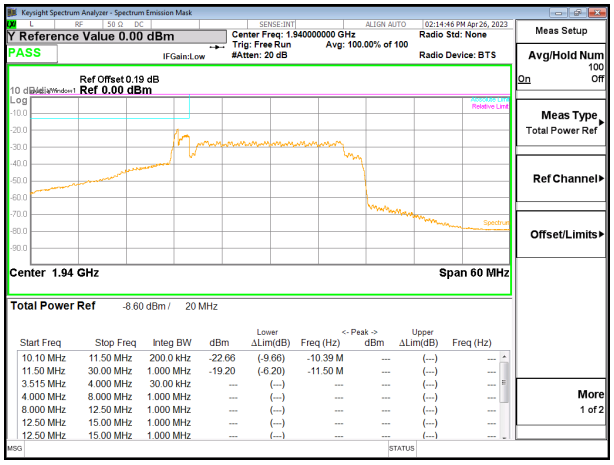
Antenna 2



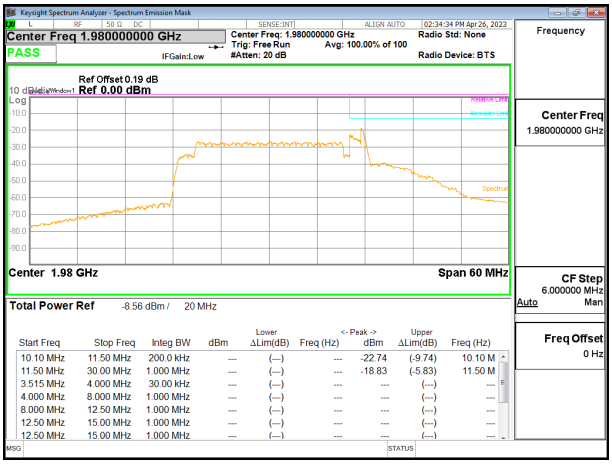
5G NR n2 10MHz QPSK Low Channel



5G NR n2 10MHz QPSK High Channel



5G NR n2 20MHz QPSK Low Channel



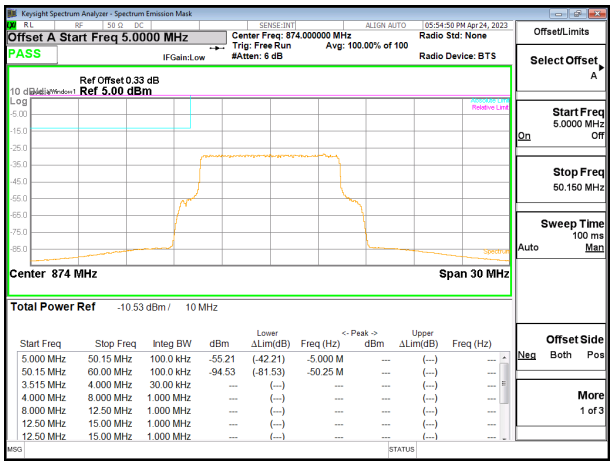
5G NR n2 20MHz QPSK High Channel

9.2.2. 5G NR n5 EMISSION MASK

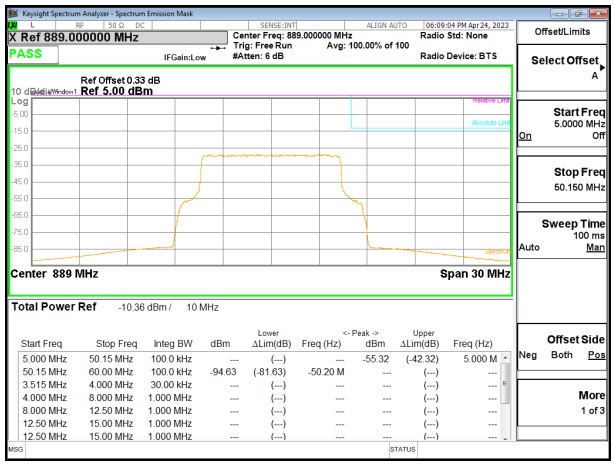
LIMITS

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.

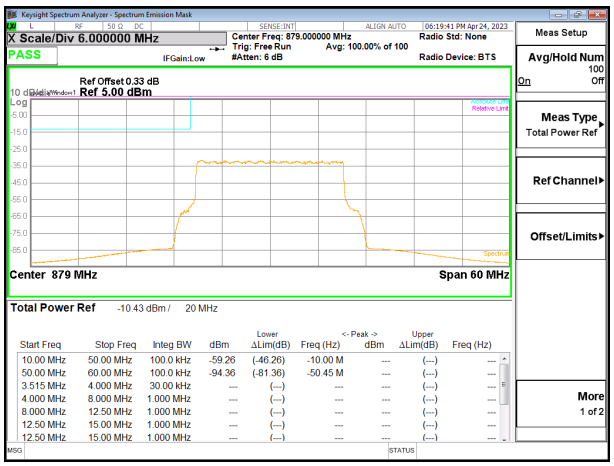
Antenna 1



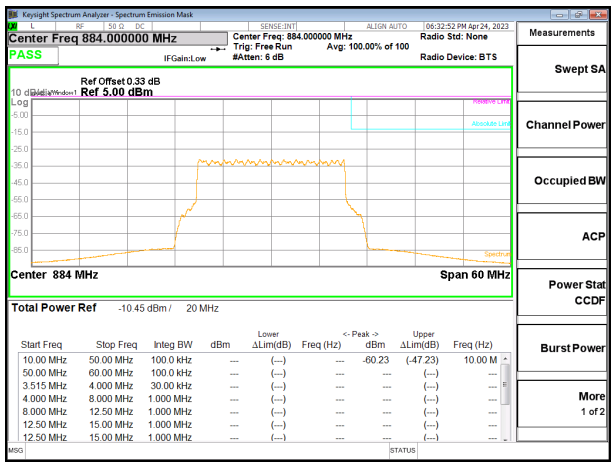
5G NR n5 10MHz QPSK Low Channel



5G NR n5 10MHz QPSK High Channel

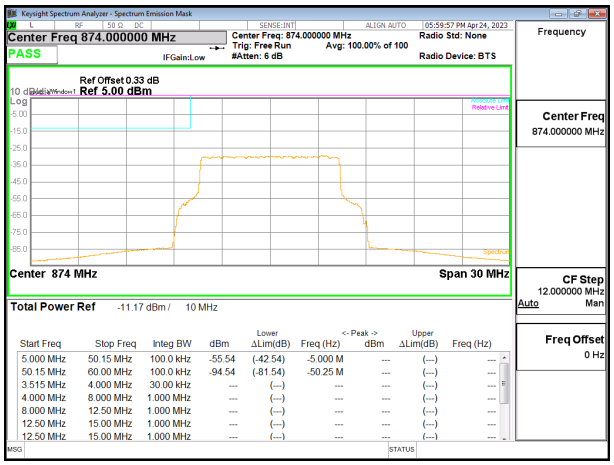


5G NR n5 20MHz QPSK Low Channel

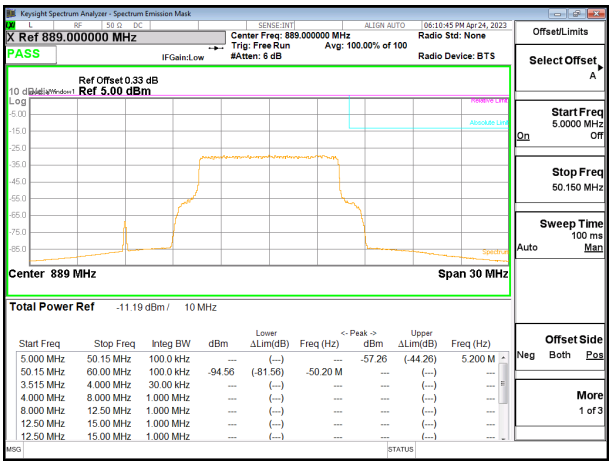


5G NR n5 20MHz QPSK High Channel

Antenna 2

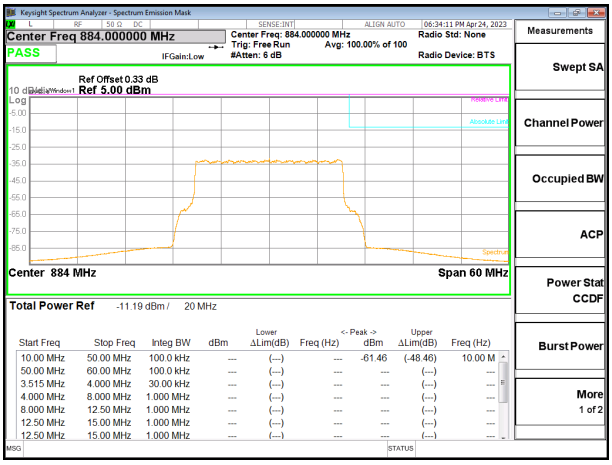


5G NR n5 10MHz QPSK Low Channel



5G NR n5 10MHz QPSK High Channel

5G NR n5 20MHz QPSK Low Channel



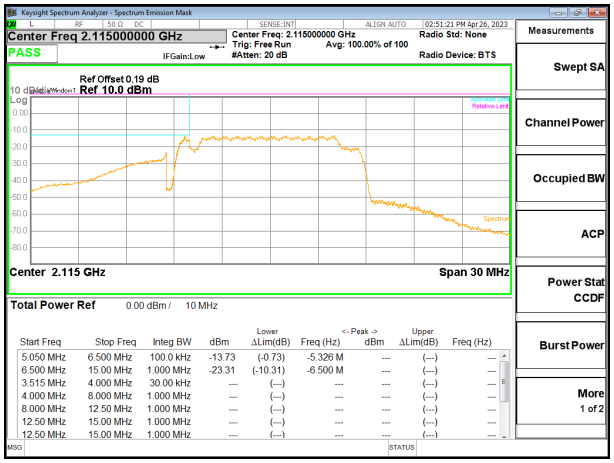
5G NR n5 20MHz QPSK High Channel

9.2.3. 5G NR n66 EMISSION MASK

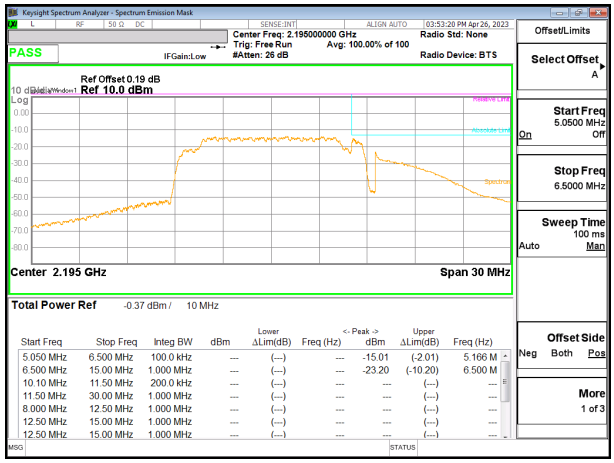
LIMITS

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.

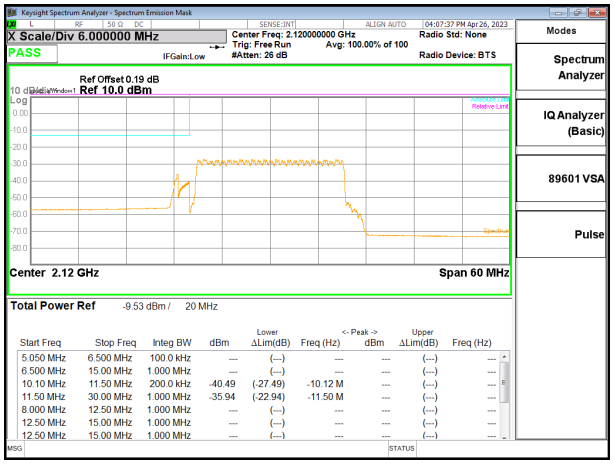
Antenna 1



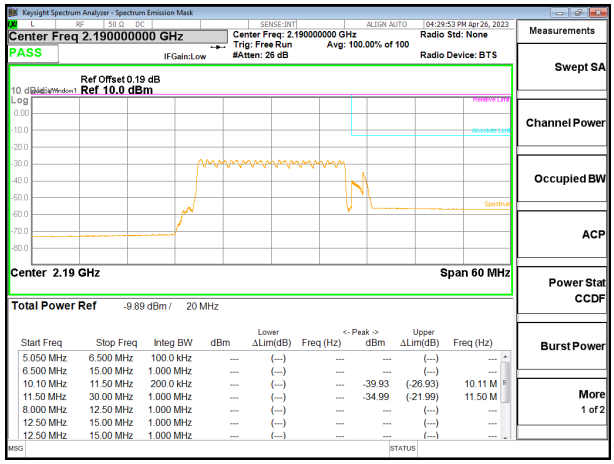
5G NR n66 10MHz QPSK Low Channel



5G NR n66 10MHz QPSK High Channel

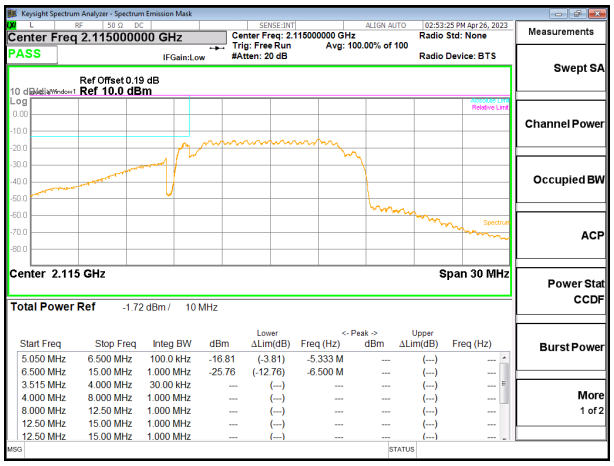


5G NR n66 20MHz QPSK Low Channel

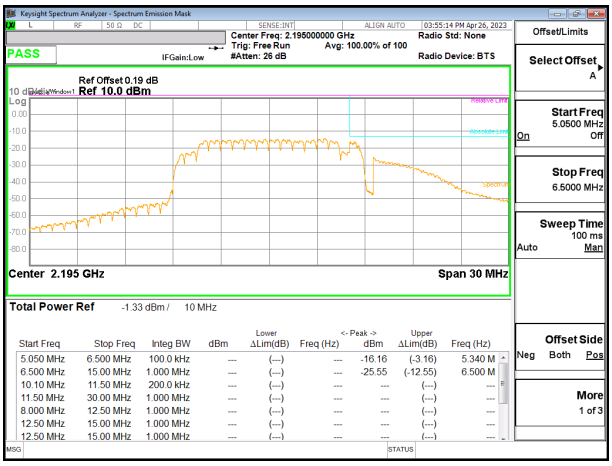


5G NR n66 20MHz QPSK High Channel

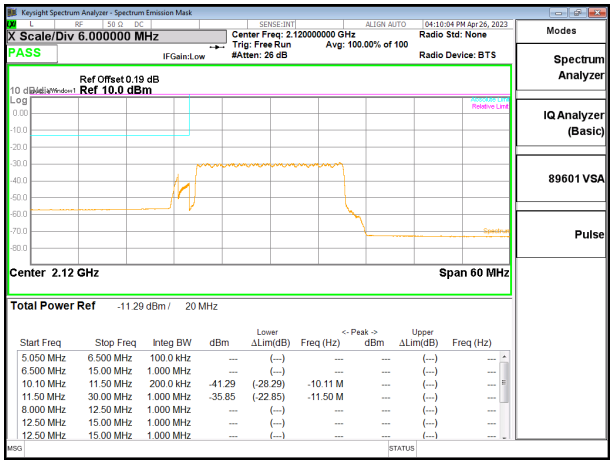
Antenna 2



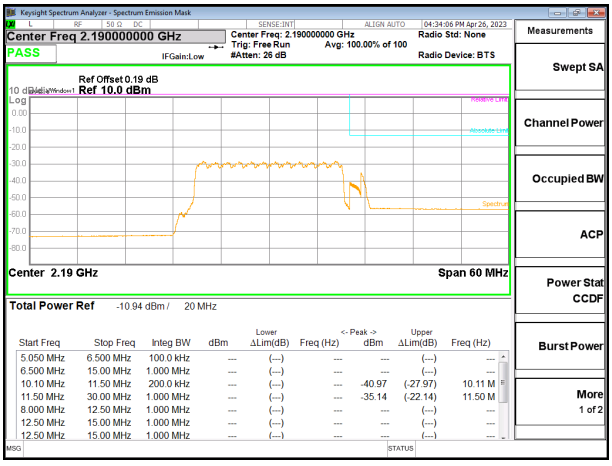
5G NR n66 10MHz QPSK Low Channel



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

Test Engineer ID:	22797/44389	**Test Date:**	2023-04-24; 2023-04-25; 2023-04-26

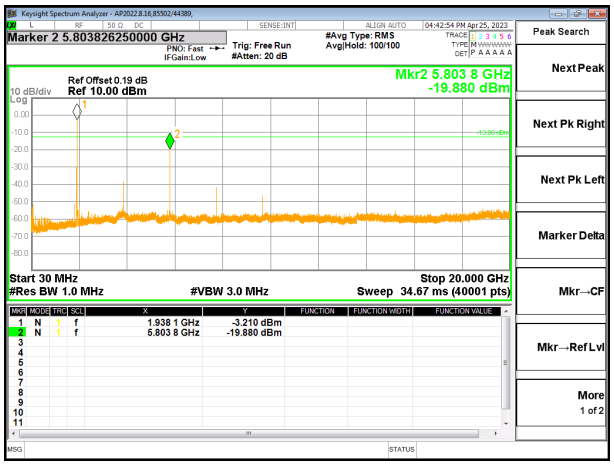
Both antenna ports are measured on QPSK only as worst case.

9.3.1. 5G NR n2

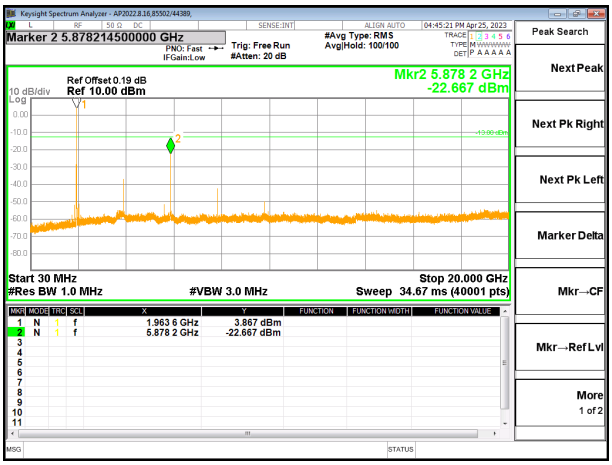
LIMITS

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.

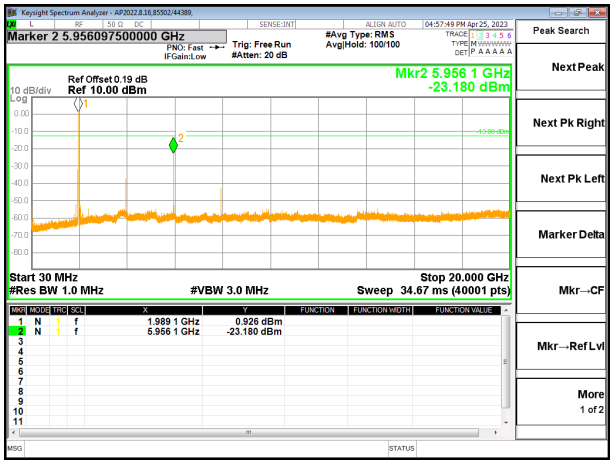
Antenna 1



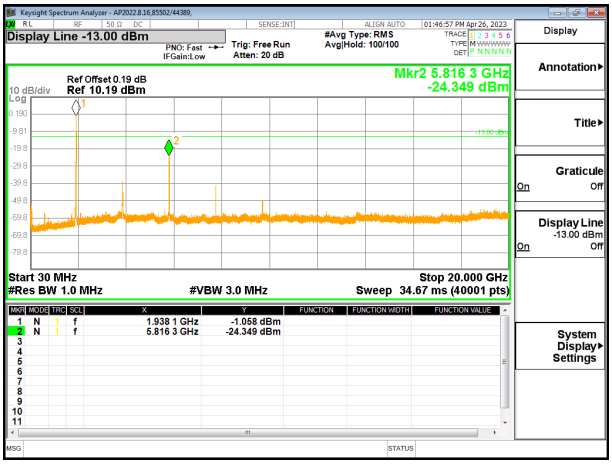
5G NR n2 10MHz QPSK Low Channel



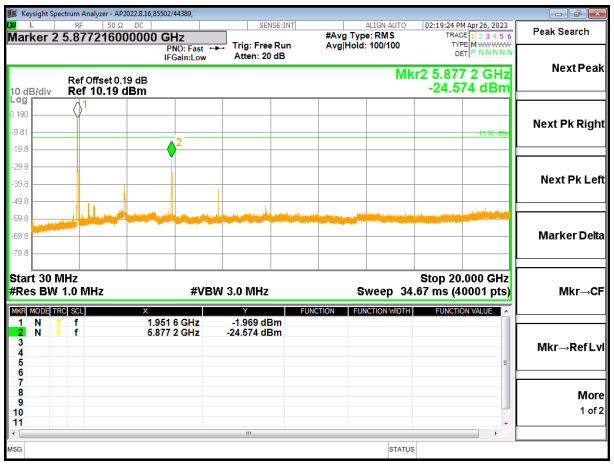
5G NR n2 10MHz QPSK Middle Channel



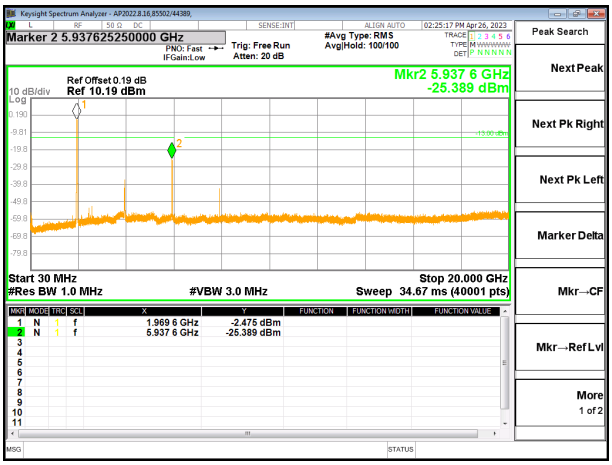
5G NR n2 10MHz QPSK High Channel



5G NR n2 20MHz QPSK Low Channel

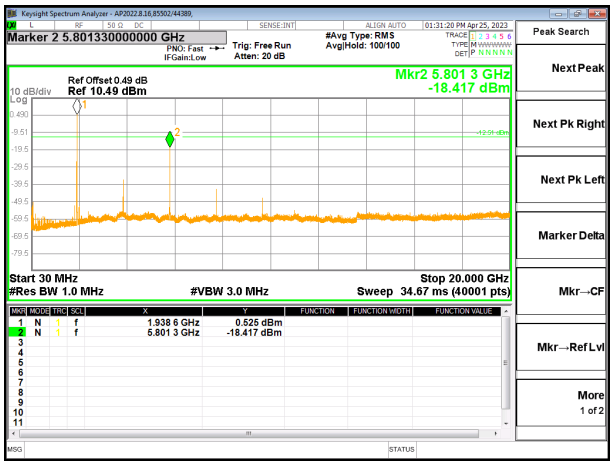


5G NR n2 20MHz QPSK Middle Channel

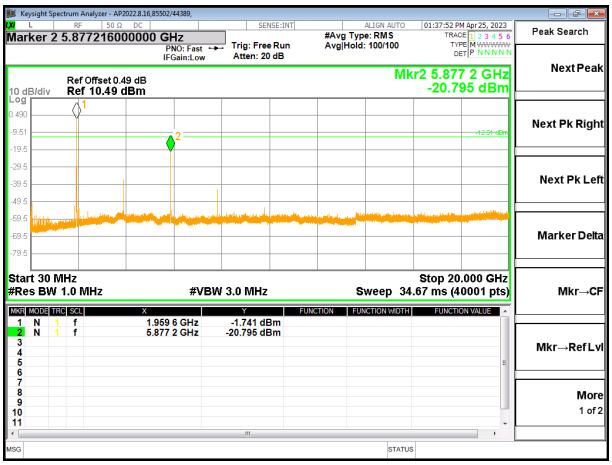


5G NR n2 20MHz QPSK High Channel

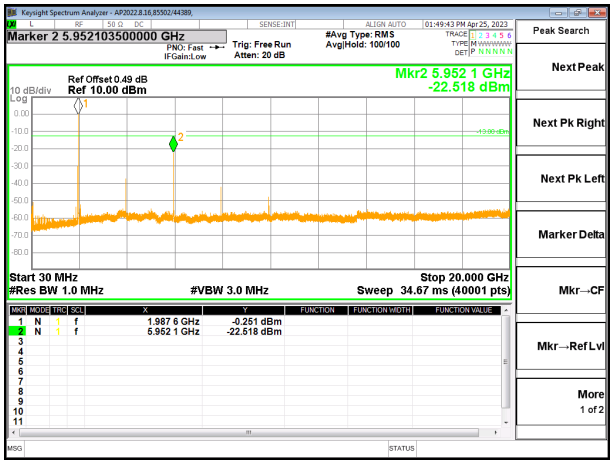
Antenna 2



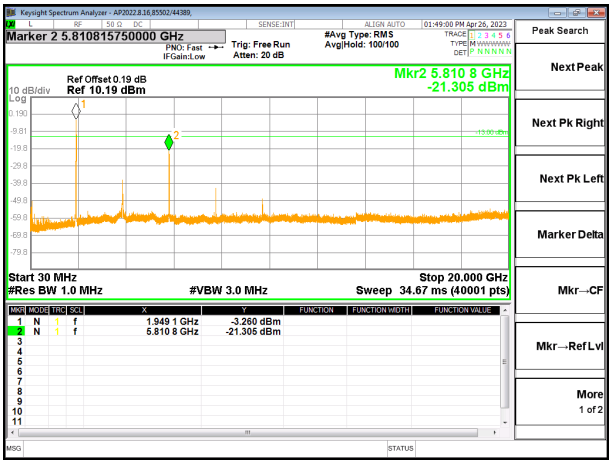
5G NR n2 10MHz QPSK Low Channel



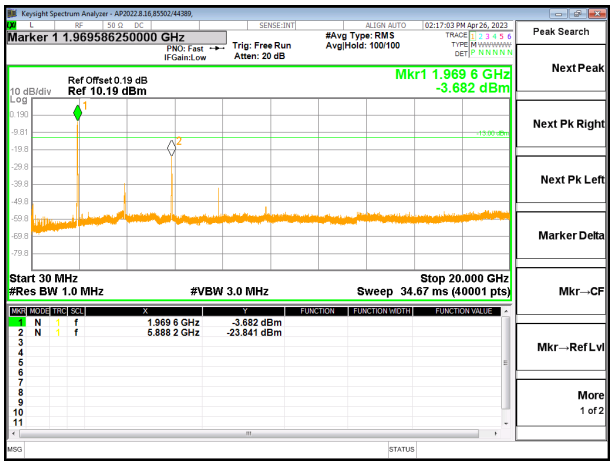
5G NR n2 10MHz QPSK Middle Channel



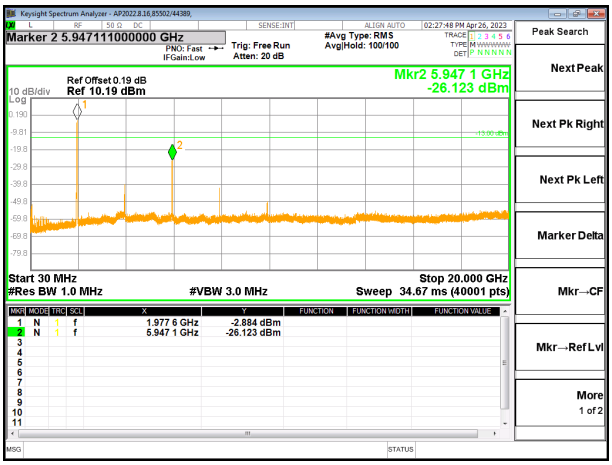
5G NR n2 10MHz QPSK High Channel



5G NR n2 20MHz QPSK Low Channel



5G NR n2 20MHz QPSK Middle Channel



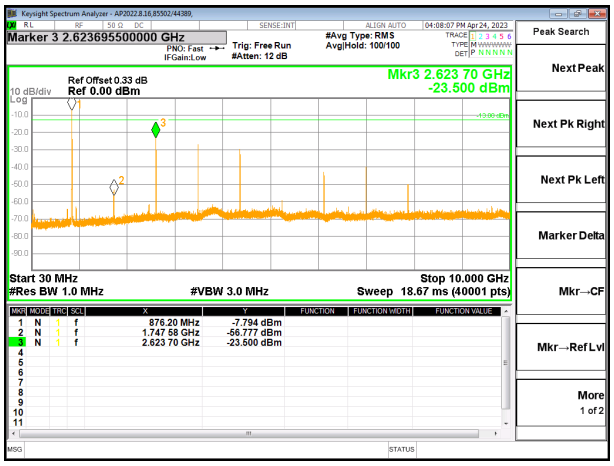
5G NR n2 20MHz QPSK High Channel

9.3.2. 5G NR n5

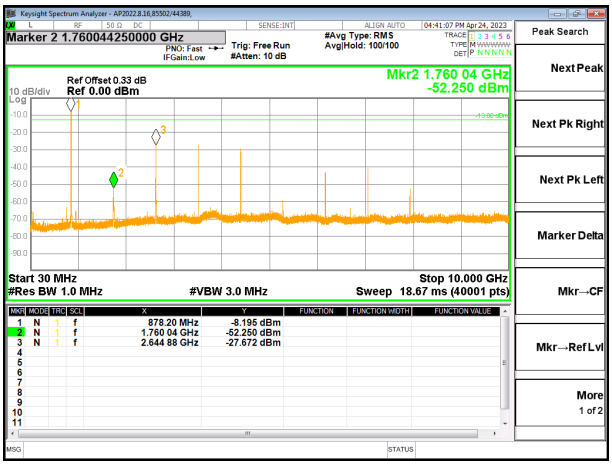
LIMITS

FCC: §22.917 (a)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

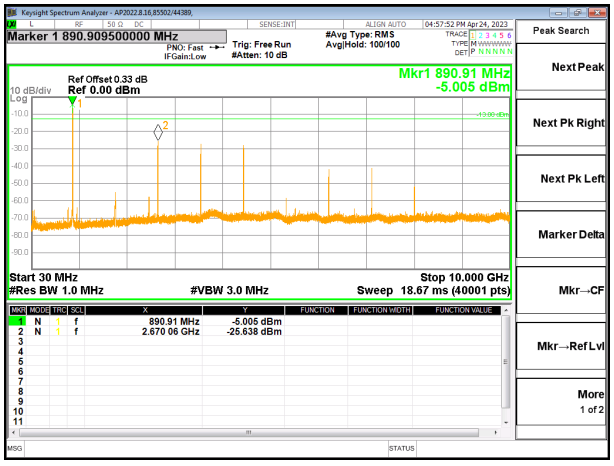
Antenna 1



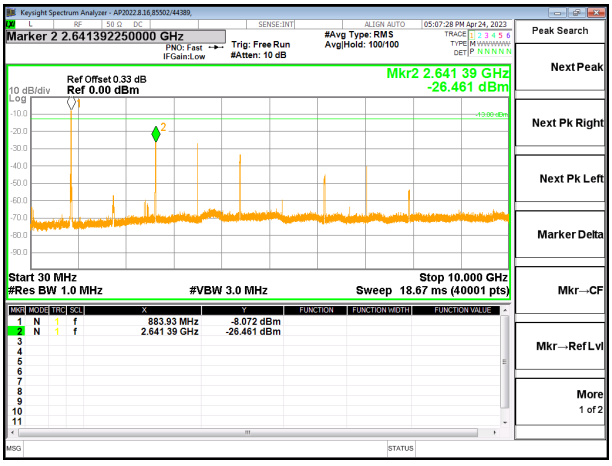
5G NR n5 10MHz QPSK Low Channel



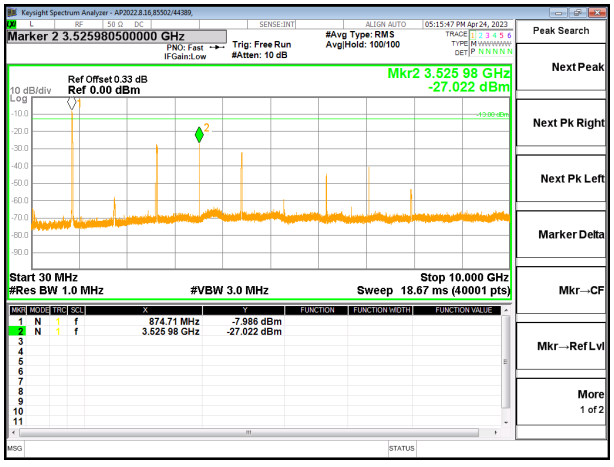
5G NR n5 10MHz QPSK Middle Channel



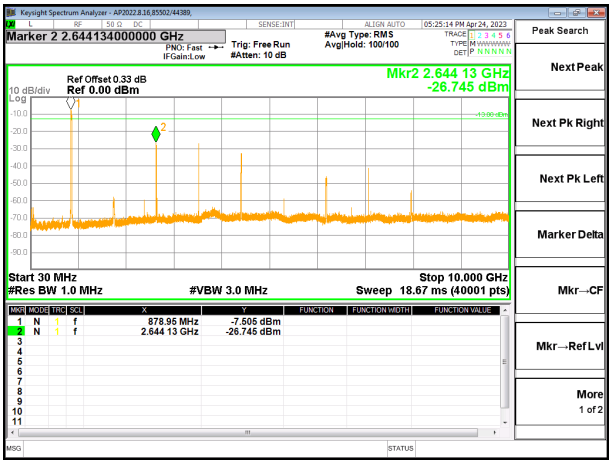
5G NR n5 10MHz QPSK High Channel



5G NR n5 20MHz QPSK Low Channel

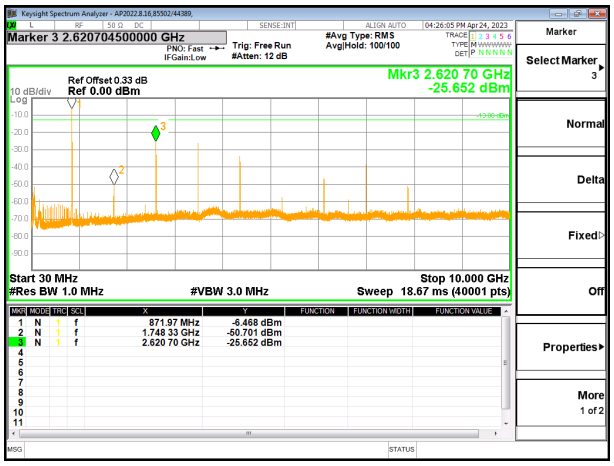


5G NR n5 20MHz QPSK Middle Channel

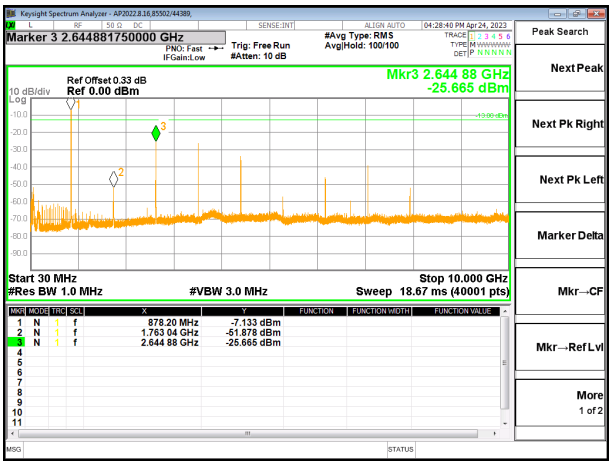


5G NR n5 20MHz QPSK High Channel

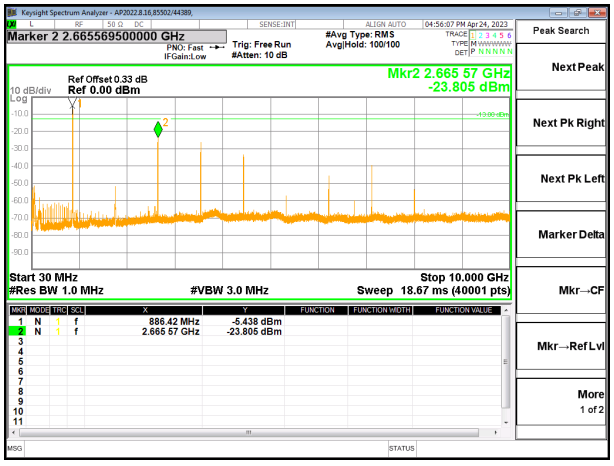
Antenna 2



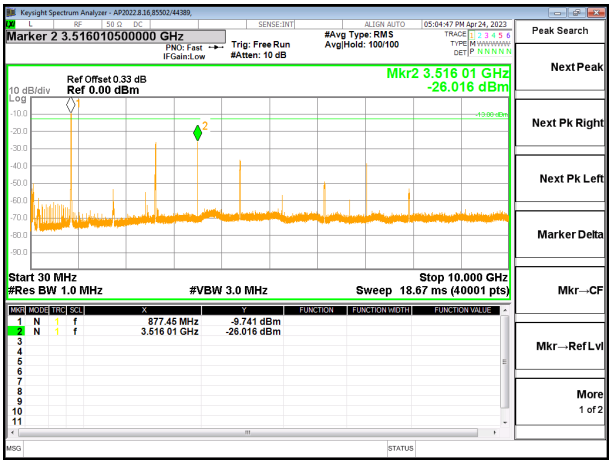
5G NR n5 10MHz QPSK Low Channel



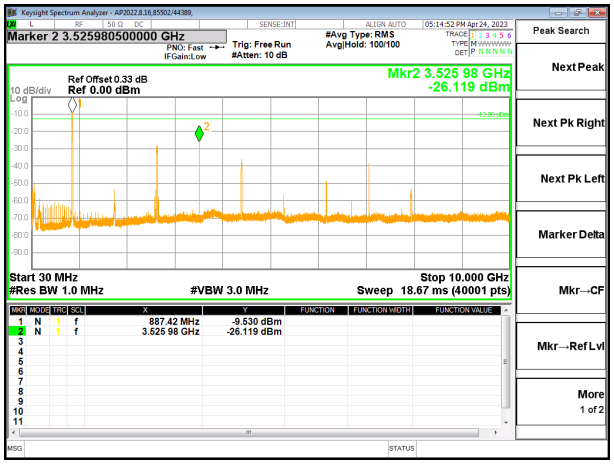
5G NR n5 10MHz QPSK Middle Channel



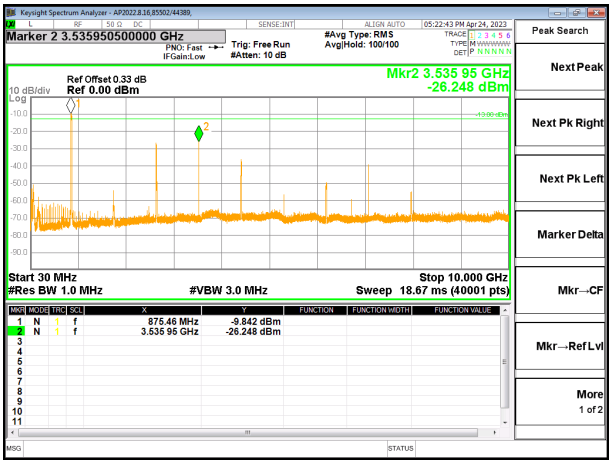
5G NR n5 10MHz QPSK High Channel



5G NR n5 20MHz QPSK Low Channel



5G NR n5 20MHz QPSK Middle Channel



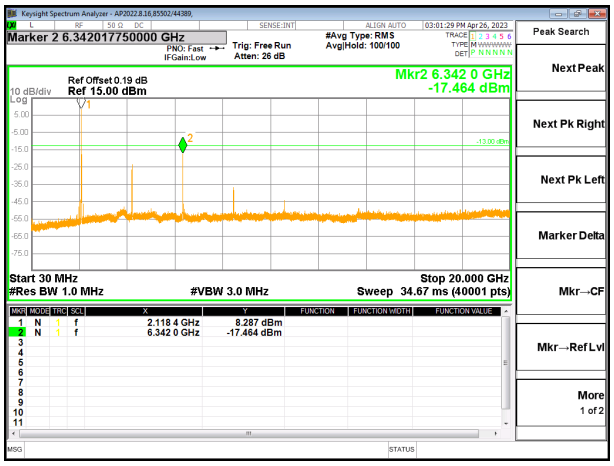
5G NR n5 20MHz QPSK High Channel

9.3.3. 5G NR n66

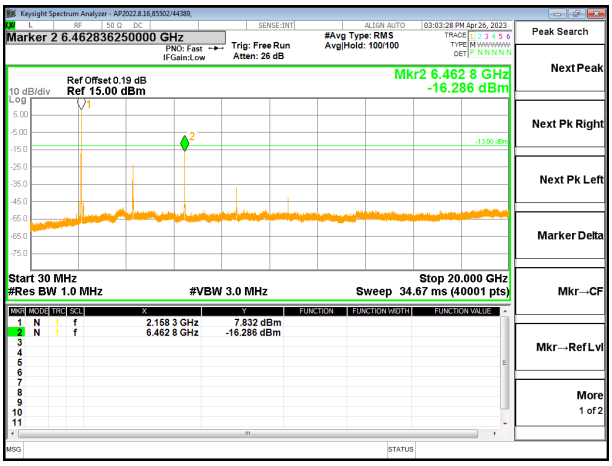
LIMITS

FCC: §27.53 (h)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

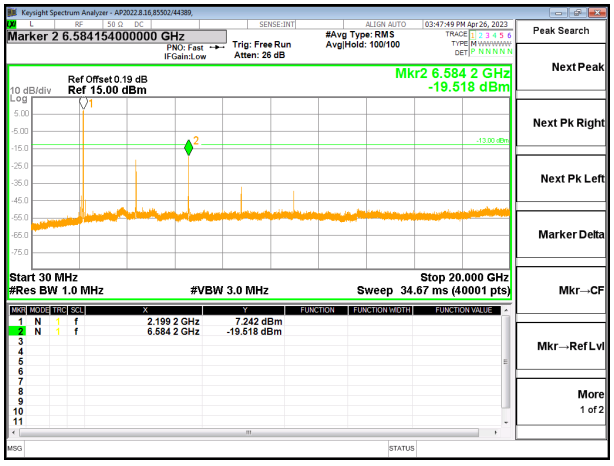
Antenna 1



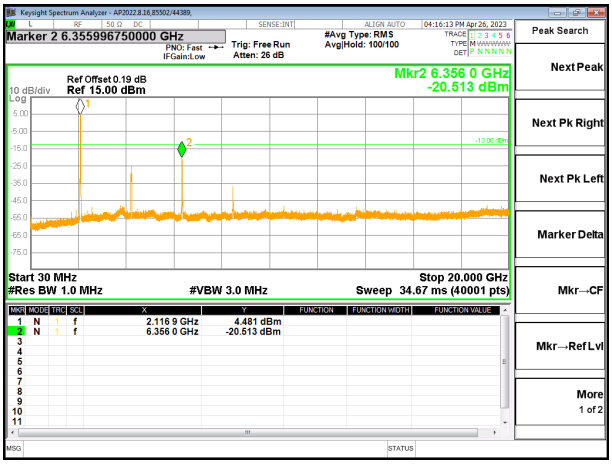
5G NR n66 10MHz QPSK Low Channel



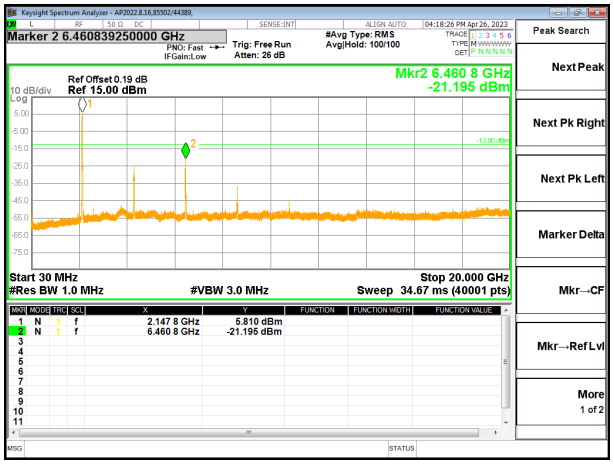
5G NR n66 10MHz QPSK Middle Channel



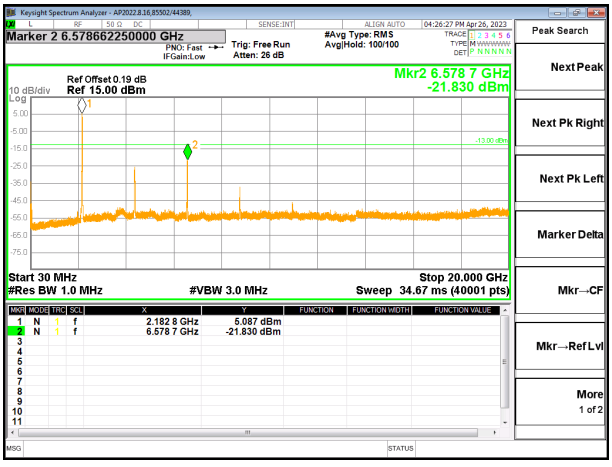
5G NR n66 10MHz QPSK High Channel



5G NR n66 20MHz QPSK Low Channel

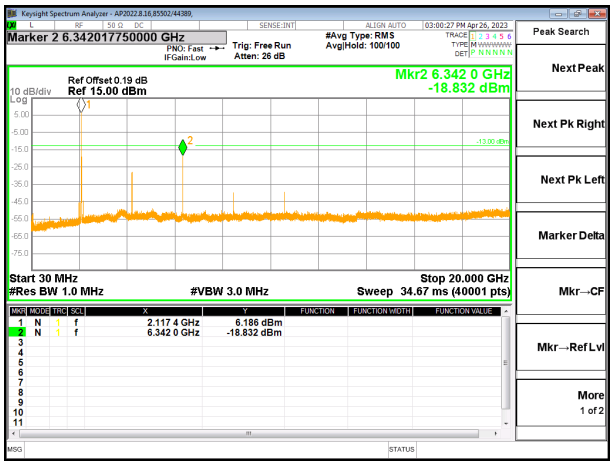


5G NR n66 20MHz QPSK Middle Channel

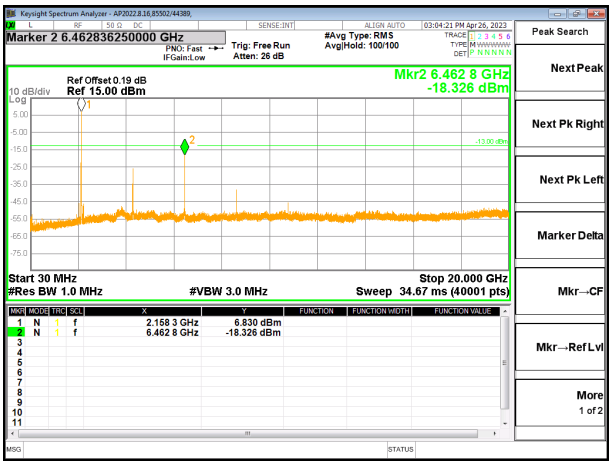


5G NR n66 20MHz QPSK High Channel

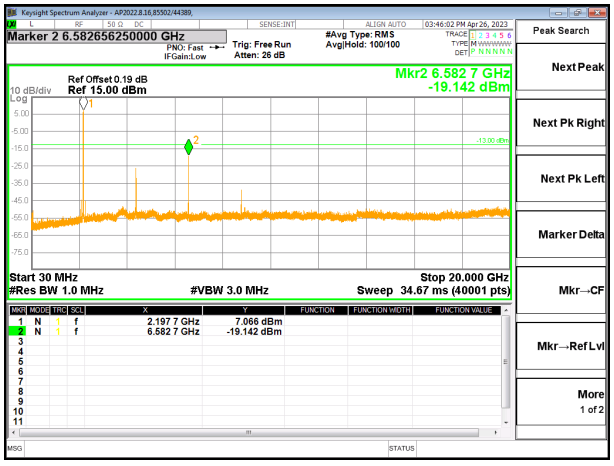
Antenna 2



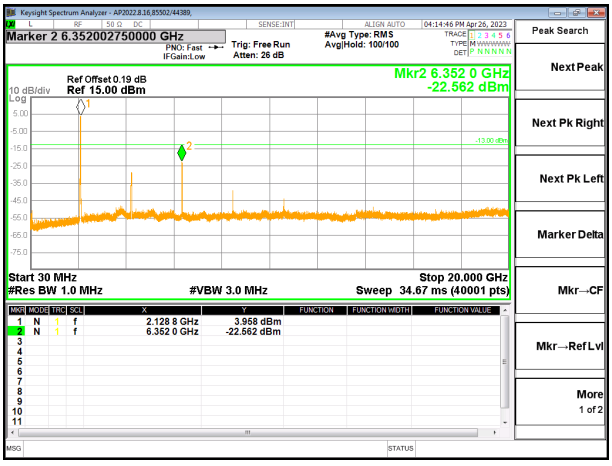
5G NR n66 10MHz QPSK Low Channel



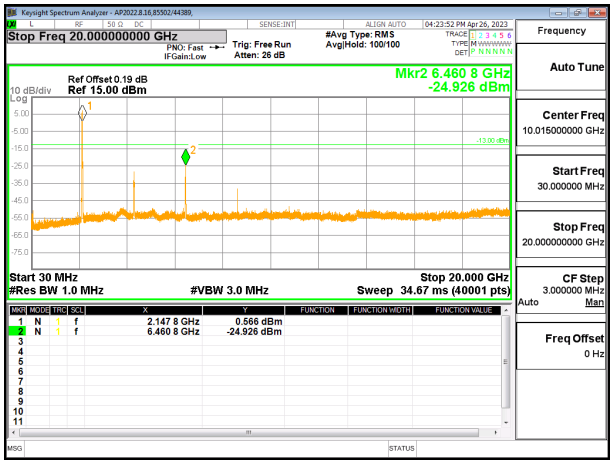
5G NR n66 10MHz QPSK Middle Channel



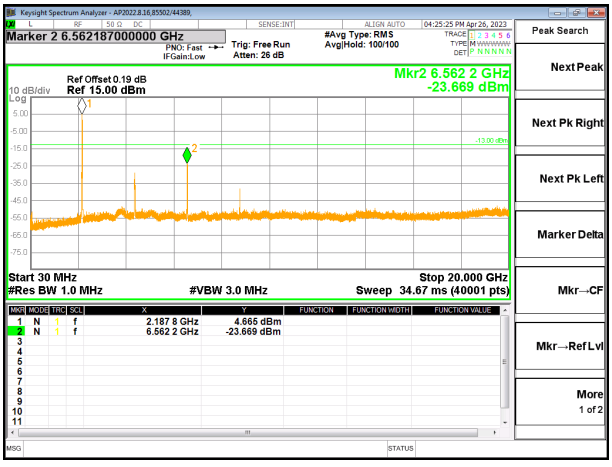
5G NR n66 10MHz QPSK High Channel



5G NR n66 20MHz QPSK Low Channel



5G NR n66 20MHz QPSK Middle Channel



5G NR n66 20MHz QPSK High Channel

9.4. FREQUENCY STABILITY

TEST PROCEDURE

FCC §2.1055

- Temp. = 0°C to +50°C
- Voltage = (85% - 115%)

Low voltage, 102VAC, Normal, 120VAC and High voltage, 138VAC.

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

RESULTS

See the following pages. Antenna port 1 is measured on QPSK only as worst case.

9.4.1. 5G NR n2

LIMITS

FCC: §24.235
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Engineer ID:	22797/44389	Test Date:	2023-04-27

5G NR n2 QPSK (20MHz BANDWIDTH)

Band	n2	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		1930	1990		N/A	
		Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage					
Normal (20°C)	Normal	1939.9935	1979.9839			
Extreme (50°C)		1940.0549	1980.0454	61449	N/A	Yes
Extreme (40°C)		1940.0609	1980.0514	67470	N/A	Yes
Extreme (30°C)		1940.0230	1980.0134	29489	N/A	Yes
Extreme (10°C)		1940.0158	1980.0063	22349	N/A	Yes
Extreme (0°C)		1940.0173	1980.0078	23849	N/A	Yes
20°C	15%	1940.0082	1979.9986	14716	N/A	Yes
	-15%	1940.0117	1980.0022	18279	N/A	Yes

9.4.2. 5G NR n5

LIMITS

FCC: §22.355
The carrier frequency shall not depart from the reference frequency in excess of ±1.5 ppm for Base, fixed.

Test Engineer ID:	22797/44389	Test Date:	2023-05-23

5G NR n5 QPSK (20MHz BANDWIDTH)

Band	5	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		869	894		± 1.5	
Temperature	Voltage	Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Normal (20°C)	Normal	869.7173	893.2440			
Extreme (50°C)		869.7165	893.2433	-710	-0.805	Yes
Extreme (40°C)		869.7161	893.2428	-1181	-1.340	Yes
Extreme (30°C)		869.7164	893.2432	-818	-0.928	Yes
Extreme (10°C)		869.7168	893.2435	-452	-0.513	Yes
Extreme (0°C)		869.7161	893.2429	-1133	-1.285	Yes
20°C	15%	869.7163	893.2431	-926	-1.050	Yes
	-15%	869.7159	893.2427	-1308	-1.484	Yes

9.4.3. 5G NR n66

LIMITS

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Engineer ID:	22797/44389	Test Date:	2023-04-27

5G NR n66 QPSK (20MHz BANDWIDTH)

Band	n66	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		2110	2200		N/A	
		Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage					
Normal (20°C)	Normal	2119.9948	2189.9931			
Extreme (50°C)		2120.0061	2190.0045	11384	N/A	Yes
Extreme (40°C)		2119.9855	2189.9839	-9250	N/A	Yes
Extreme (30°C)		2120.0093	2190.0077	14540	N/A	Yes
Extreme (10°C)		2119.9993	2189.9977	4538	N/A	Yes
Extreme (0°C)		2120.0073	2190.0057	12524	N/A	Yes
20°C	15%	2120.0148	2190.0132	20045	N/A	Yes
	-15%	2119.9779	2189.9763	-16843	N/A	Yes

9.5. PEAK-TO-AVERAGE POWER RATIO

LIMIT

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

TEST PRODECURE

ANSI C63.10 Section 5.2.6 Peak-to-average power ratio
Some regulatory requirements specify a PAPR limit when the output power limits are specified in terms of average power. If it becomes necessary to provide measurement data to demonstrate compliance to a PAPR limit, then the appropriate procedure from those provided in 5.2.3 shall be utilized to determine the peak power (or peak PSD) and the appropriate procedure from those provided in 5.2.4 shall be used to determine the average power (or average PSD). The data from these measurements is then used in Equation (2) to determine the PAPR of a narrowband CW-like signal. See 5.2.3.4 for guidance on determining the PAPR of a broadband noise-like signal.

$$PAPR\ (dB) = P_{Pk}\ (dBm\ or\ dBW) - P_{Avg}\ (dBm\ or\ dBW) \quad (2)$$

Where

PAPR peak-to-average power ratio, in dB
P_{Pk} measured peak power or peak PSD level, in dBm or dBW

P_{Avg} measured average power or average PSD level, in dBm or dBW

RESULT

Both antenna ports are measured on worst case mode, bandwidth, and SCS only as worst case.

The results from all CCDF measurements are passed with 13dB peak-to-average power ratio criteria.

9.5.1. 5G NR n2

Antenna 1 RF1

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n2	20MHz	1960.0	30	QPSK	5.28	-1.73	7.01
				16QAM	5.30	-1.73	7.03
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

Antenna 2 RF1

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n2	20MHz	1960.0	30	QPSK	3.98	-3.12	7.10
				16QAM	3.98	-3.06	7.04
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

Antenna 1 RF2

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n2	20MHz	1960.0	30	QPSK	6.60	-0.72	7.32
				16QAM	7.12	-0.76	7.88
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

Antenna 2 RF2

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n2	20MHz	1960.0	30	QPSK	3.19	-3.64	6.83
				16QAM	3.82	-3.61	7.43
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

9.5.2. 5G NR n5

Antenna 1 RF1

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n5	20MHz	881.5	30	QPSK	5.34	-5.97	11.31
				16QAM	5.27	-5.6	10.87
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

Antenna 2 RF1

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n5	20MHz	881.5	30	QPSK	4.44	-6.51	10.95
				16QAM	4.29	-6.48	10.77
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

Antenna 1 RF2

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n5	20MHz	881.5	30	QPSK	3.64	-5.17	8.81
				16QAM	3.45	-5.17	8.62
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

Antenna 2 RF2

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n5	20MHz	881.5	30	QPSK	0.89	-6.08	6.97
				16QAM	1.00	-6.05	7.05
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

9.5.3. 5G NR n66

Antenna 1 RF1

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n66	10MHz	2155.0	30	QPSK	11.21	4.88	6.33
				16QAM	11.39	4.62	6.77
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

Antenna 2

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n66	10MHz	2155.0	15	QPSK	11.72	4.17	7.55
				16QAM	10.78	4.02	6.76
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

Antenna 1 RF2

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n66	10MHz	2155.0	30	QPSK	11.41	4.04	7.37
				16QAM	11.76	4.13	7.63
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

Antenna 2

Band	Bandwidth (MHz)	Frequency (MHz)	SCS (kHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
n66	10MHz	2155.0	30	QPSK	10.68	2.64	8.04
				16QAM	10.46	2.57	7.89
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading							

10. RADIATED TEST RESULTS

Radiated measurement using the Field Strength Method

Using the test configuration shown in Figure 6 below, We measure the radiated emissions directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits. As stated in 5.5.1 of ANSI C63.26-2015, the field strength measurement method using a test site validated to the requirements of ANSI C63.4 is an alternative to the substitution measurement method.

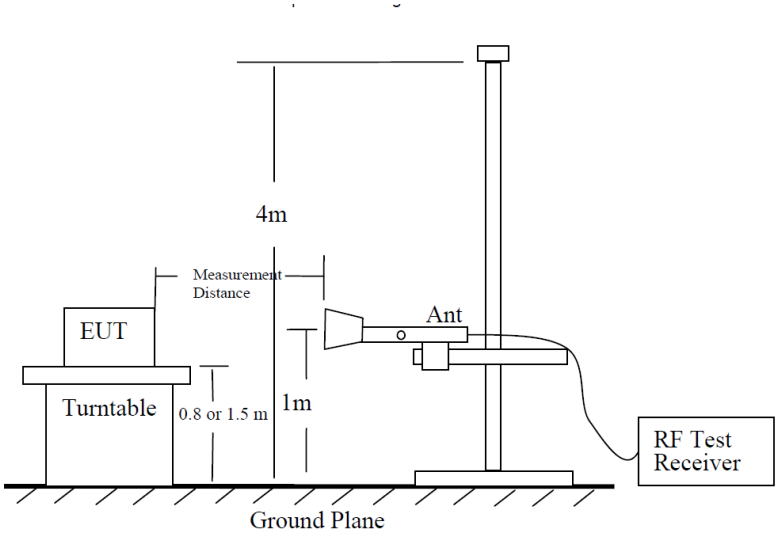


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

Radiated Power Measurement Calculation According to ANSI C63.26-2015

a) E (dBμV/m) = Measured amplitude level (dBμV) + Cable Loss (dB) + Antenna Factor (dB/m).

b) E (dBμV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).

c) E (dBμV/m) = EIRP (dBm) − 20log(D) + 104.8; where D is the measurement distance (in the far field region) in m.

d) EIRP (dBm) = E (dBμV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m.

So, from d)

The measuring distance is usually at 3m, then 20*Log(3)=9.5424

Then, EIRP (dBm) = E (dBμV/m) + 9.5424 − 104.8 = E (dBμV/m) – 95.2576

Note: Confidence check of each chamber is performed daily to see if any degradation from expected/normal reading reference data. Ambient check of each chamber is performed monthly.

10.1. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02/r01

All tests above 1GHz were done with a Resolution Bandwidth of 1MHz, and a Video Bandwidth of 3MHz

RESULTS

Both QPSK and 16QAM modes are tested, widest QPSK bandwidths results are reported as worst case for FR1 bands.

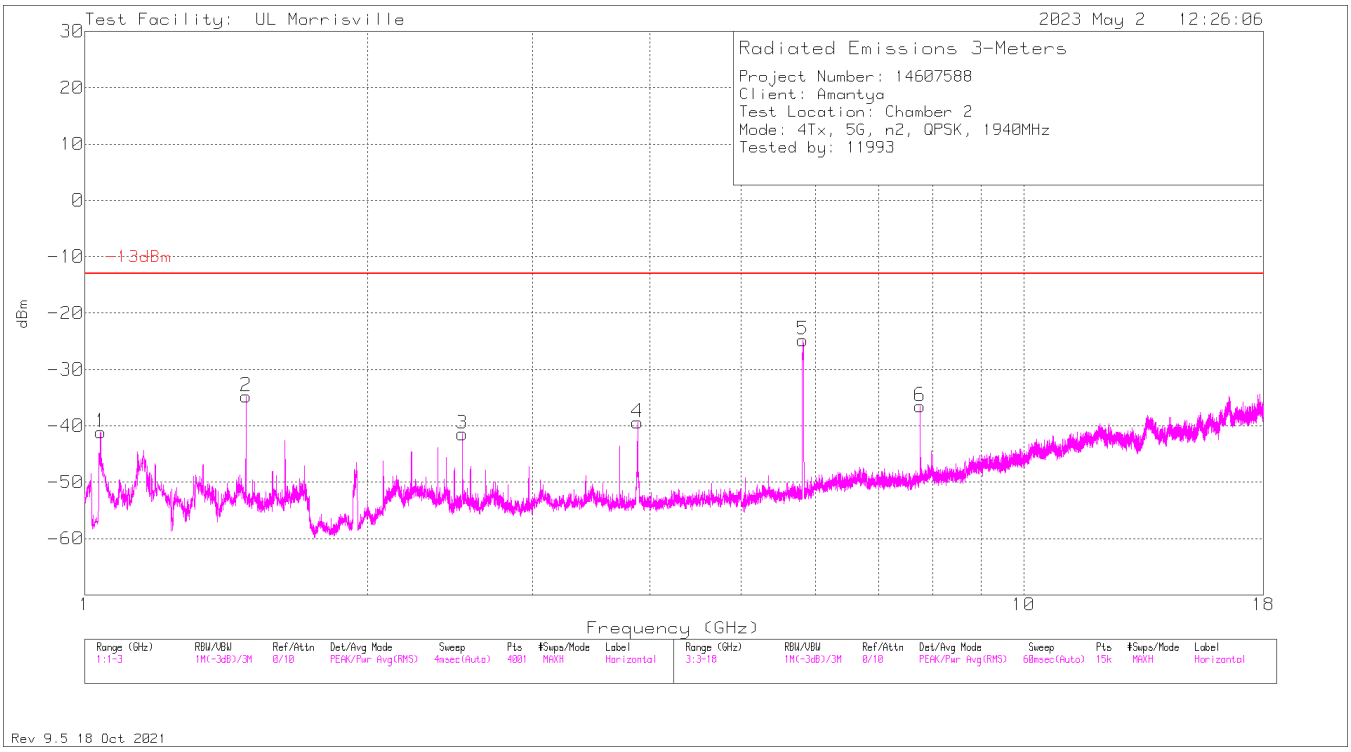
10.1.1. 5G NR n2

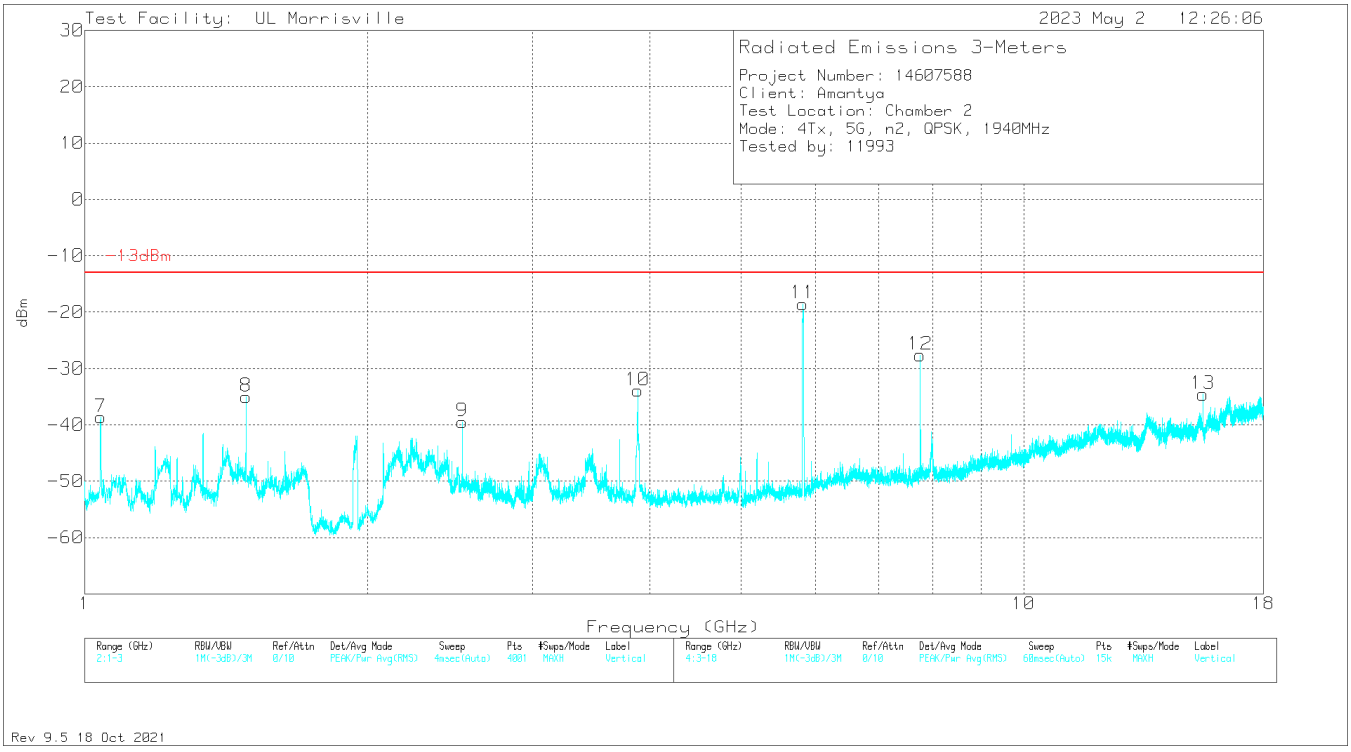
LIMITS

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.

5G NR n2 QPSK (20.0MHZ BANDWIDTH)

Low Channel

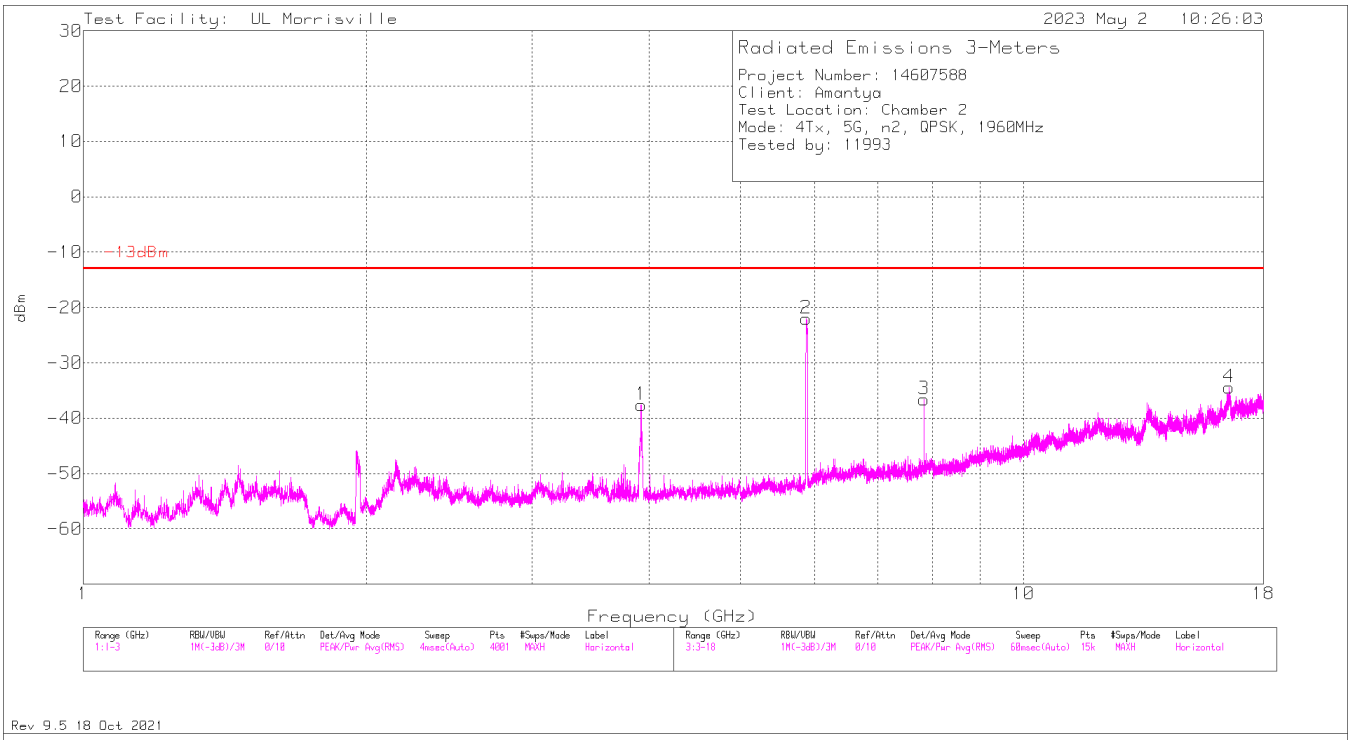


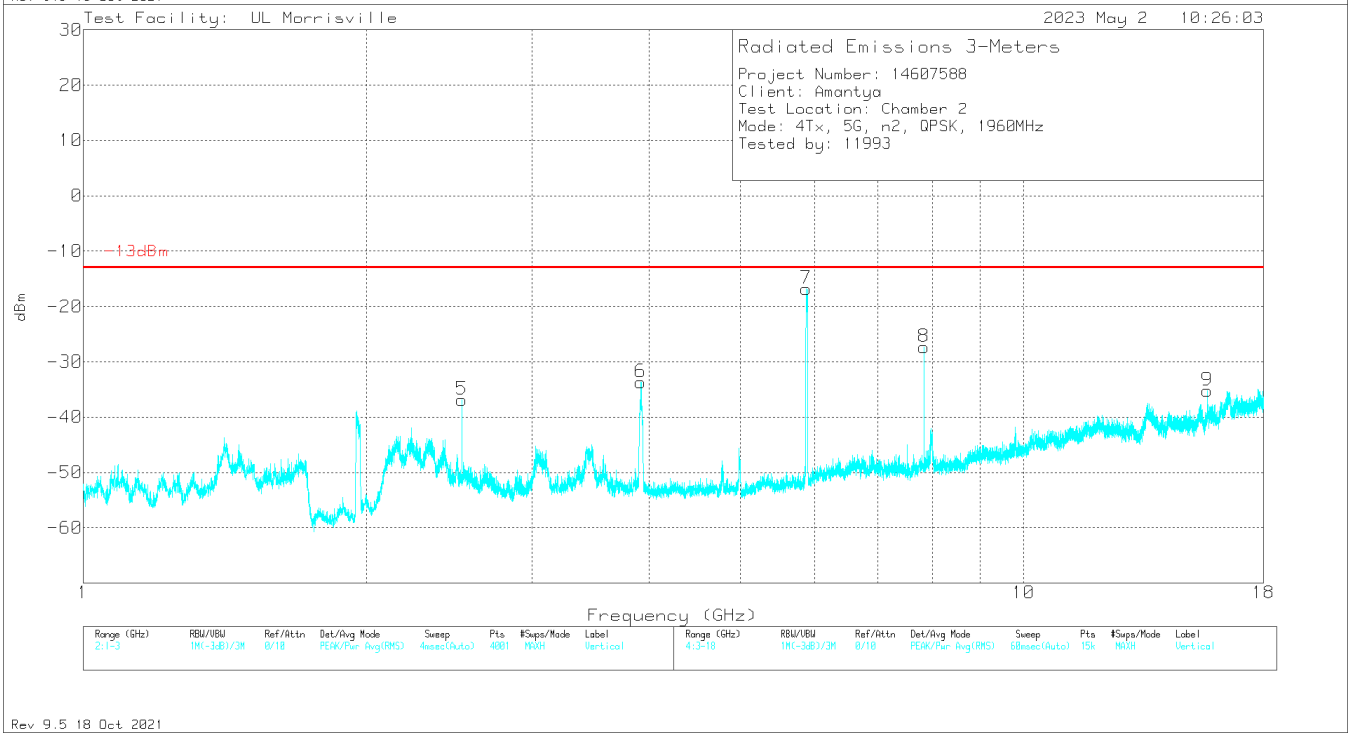


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	88761 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	3.879	-53.07	Pk	33.4	-31.5	11.8	0	-39.37	-13	-26.37	0-360	200	H
10	3.88	-47.6	Pk	33.4	-31.5	11.8	0	-33.9	-13	-20.9	0-360	300	V
11	5.81483	-31.71	Pk	34.7	-30.1	11.8	0	-15.31	-13	-2.31	29	369	V
5	5.817	-41.15	Pk	34.7	-30.1	11.8	0	-24.75	-13	-11.75	0-360	101	H
6	7.76	-57.39	Pk	35.8	-26.7	11.8	0	-36.49	-13	-23.49	0-360	200	H
12	7.76	-48.5	Pk	35.8	-26.7	11.8	0	-27.6	-13	-14.6	0-360	200	V
13	15.52	-63.06	Pk	40	-23.3	11.8	0	-34.56	-13	-21.56	0-360	200	V
1	1.0395	-44.61	Pk	26.7	-35.2	11.8	.2	-41.11	-13	-28.11	0-360	101	H
7	1.0395	-42.14	Pk	26.7	-35.2	11.8	.2	-38.64	-13	-25.64	0-360	101	V
2	1.485	-40.65	Pk	28.1	-34.8	11.8	.8	-34.75	-13	-21.75	0-360	101	H
8	1.485	-40.9	Pk	28.1	-34.8	11.8	.8	-35	-13	-22	0-360	200	V
3	2.5245	-52.22	Pk	32.5	-34	11.8	.5	-41.42	-13	-28.42	0-360	101	H
9	2.5245	-50.24	Pk	32.5	-34	11.8	.5	-39.44	-13	-26.44	0-360	101	V

Pk - Peak detector

Mid Channel

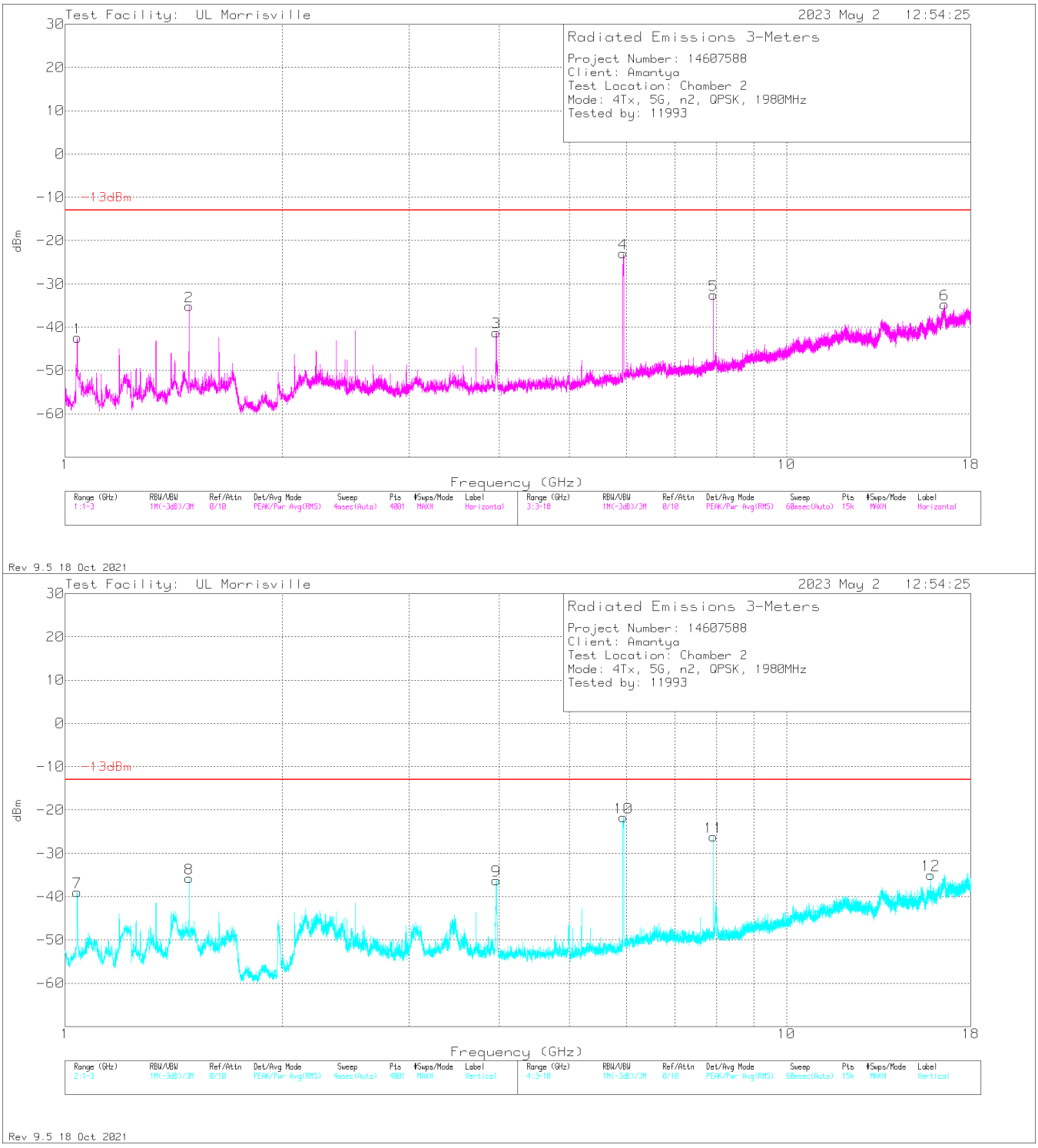




Marker	Frequency (GHz)	Meter Reading (dBm)	Det	88761 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	3.919	-47.27	Pk	33.4	-31.6	11.8	0	-33.67	-13	-20.67	0-360	299	V
5	2.5285	-47.54	Pk	32.4	-34	11.8	.5	-36.84	-13	-23.84	0-360	101	V
1	3.92	-51.19	Pk	33.4	-31.6	11.8	0	-37.59	-13	-24.59	0-360	200	H
7	5.87161	-30.85	Pk	34.8	-29.4	11.8	0	-13.65	-13	-.65	35	325	V
2	5.878	-39.46	Pk	34.9	-29.2	11.8	0	-21.96	-13	-8.96	0-360	100	H
3	7.84	-56.92	Pk	35.7	-27.2	11.8	0	-36.62	-13	-23.62	0-360	200	H
8	7.84	-47.67	Pk	35.7	-27.2	11.8	0	-27.37	-13	-14.37	0-360	200	V
9	15.68	-64.16	Pk	40.2	-23	11.8	0	-35.16	-13	-22.16	0-360	200	V
4	16.551	-66.35	Pk	41.3	-21.2	11.8	0	-34.45	-13	-21.45	0-360	300	H

Pk - Peak detector

High Channel



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	88761 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	1.039	-42.48	Pk	26.7	-35.2	11.8	.2	-38.98	-13	-25.98	0-360	101	V
1	1.0395	-45.9	Pk	26.7	-35.2	11.8	.2	-42.4	-13	-29.4	0-360	200	H
2	1.485	-41.07	Pk	28.1	-34.8	11.8	.8	-35.17	-13	-22.17	0-360	200	H
8	1.485	-41.68	Pk	28.1	-34.8	11.8	.8	-35.78	-13	-22.78	0-360	101	V
3	3.96	-54.79	Pk	33.4	-31.6	11.8	0	-41.19	-13	-28.19	0-360	200	H
9	3.96	-49.85	Pk	33.4	-31.6	11.8	0	-36.25	-13	-23.25	0-360	300	V
4	5.934	-41.35	Pk	35	-28.4	11.8	0	-22.95	-13	-9.95	0-360	200	H
10	5.941	-39.8	Pk	35	-28.7	11.8	0	-21.7	-13	-8.7	0-360	300	V
5	7.92	-53.04	Pk	35.8	-27.1	11.8	0	-32.54	-13	-19.54	0-360	200	H
11	7.92	-46.69	Pk	35.8	-27.1	11.8	0	-26.19	-13	-13.19	0-360	200	V
12	15.841	-64.09	Pk	40.4	-23.1	11.8	0	-34.99	-13	-21.99	0-360	300	V
6	16.559	-65.7	Pk	41.3	-22.1	11.8	0	-34.7	-13	-21.7	0-360	101	H

Pk - Peak detector

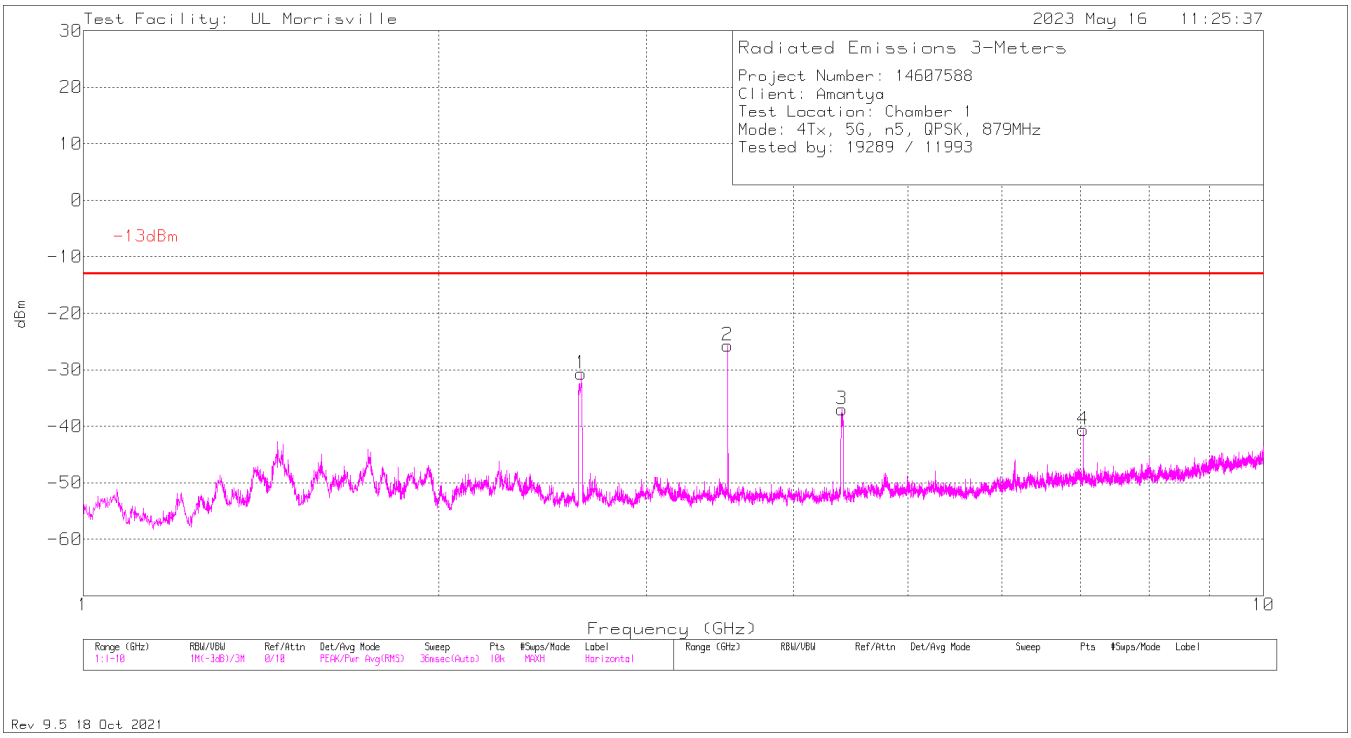
10.1.2. 5G NR n5

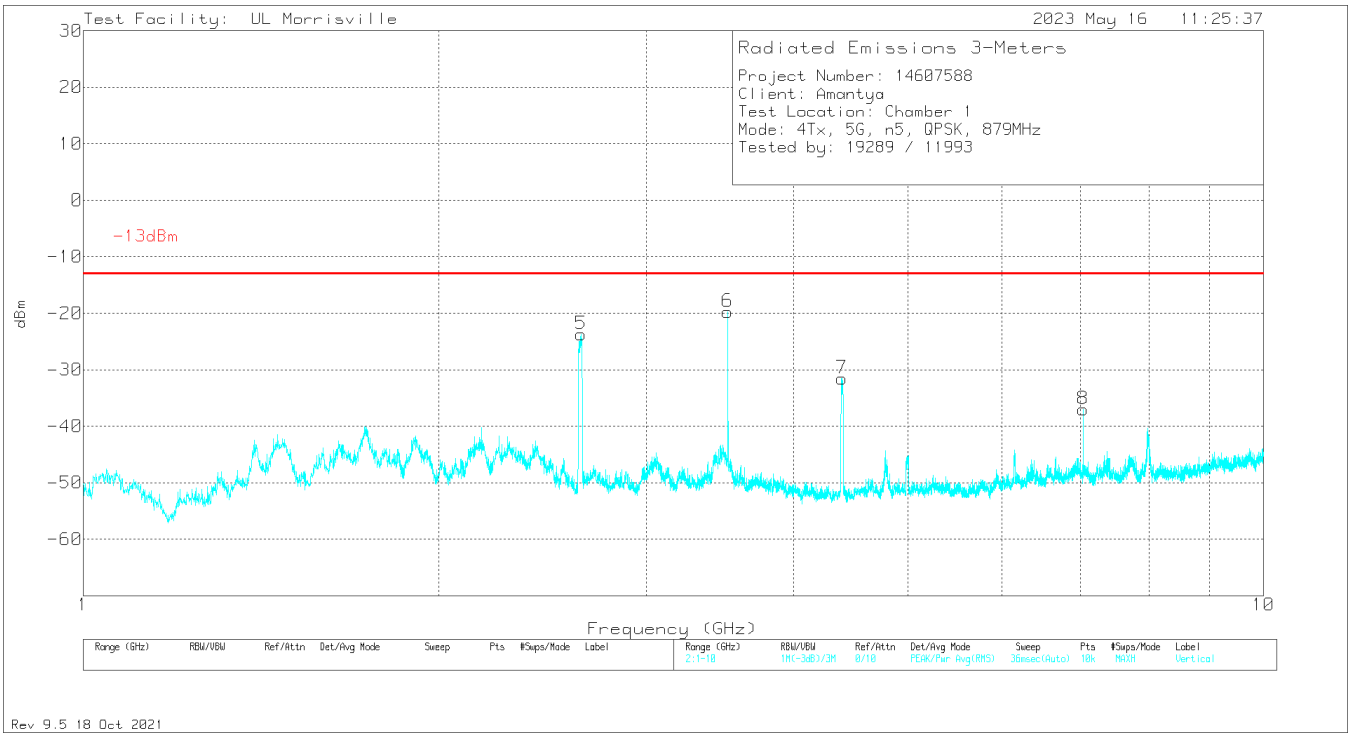
LIMITS

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.

5G NR n5 QPSK (20.0MHZ BANDWIDTH)

Low Channel

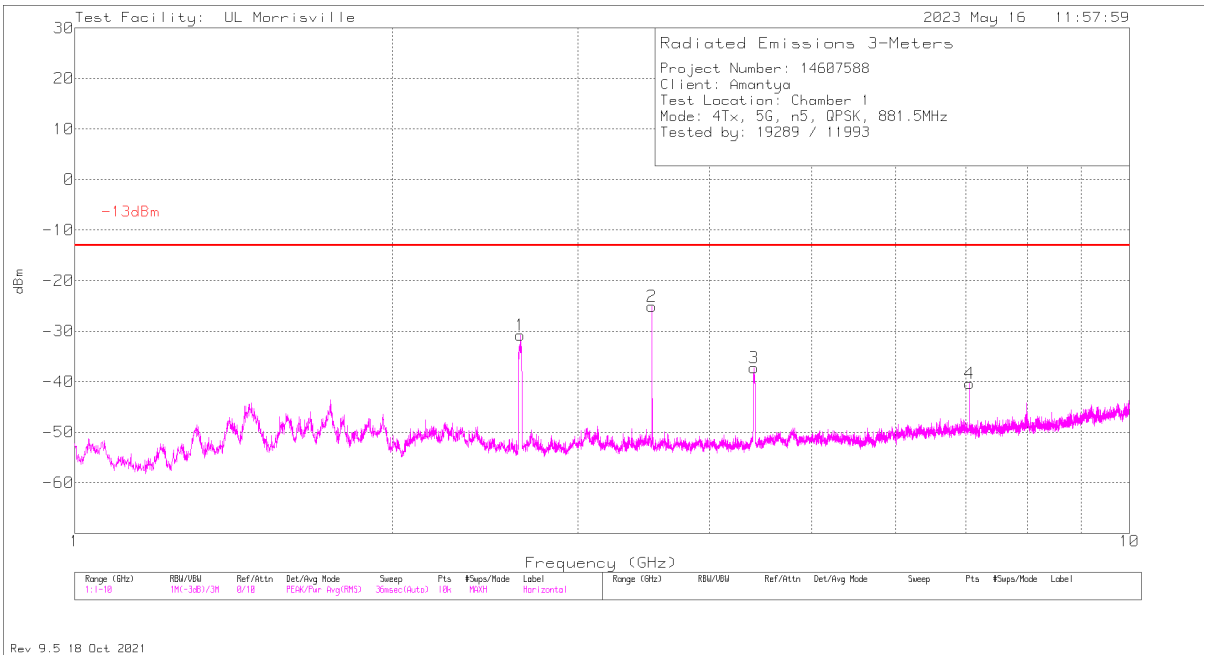


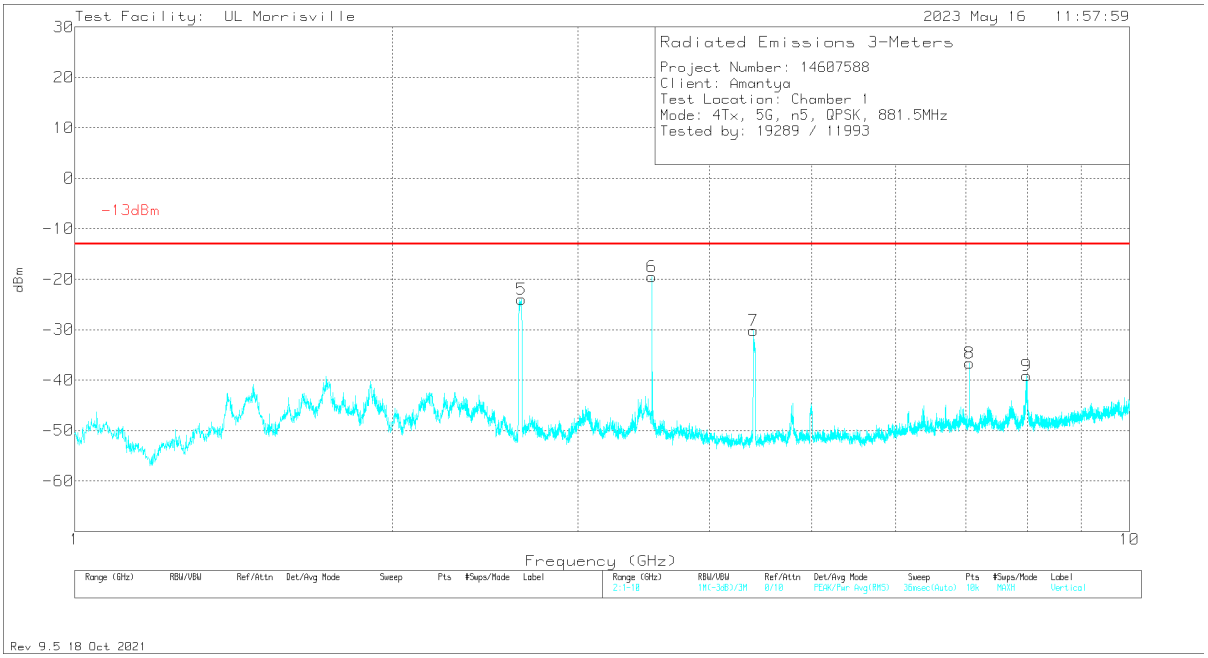


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Gain/Loss (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.6407	-40.92	Pk	32.1	-34.2	.5	11.8	-30.72	-13	-17.72	0-360	199	H
5	2.6407	-33.98	Pk	32.1	-34.2	.5	11.8	-23.78	-13	-10.78	0-360	101	V
2	3.5155	-37.54	Pk	32.7	-33	.3	11.8	-25.74	-13	-12.74	0-360	199	H
6	3.5155	-31.56	Pk	32.7	-33	.3	11.8	-19.76	-13	-6.76	0-360	300	V
3	4.3912	-51.03	Pk	33.7	-31.9	.4	11.8	-37.03	-13	-24.03	0-360	100	H
7	4.3912	-45.54	Pk	33.7	-31.9	.4	11.8	-31.54	-13	-18.54	0-360	300	V
4	7.0318	-57.65	Pk	35.6	-31	.6	11.8	-40.65	-13	-27.65	0-360	100	H
8	7.0327	-54.09	Pk	35.6	-30.9	.6	11.8	-36.99	-13	-23.99	0-360	201	V

Pk - Peak detector

Mid Channel

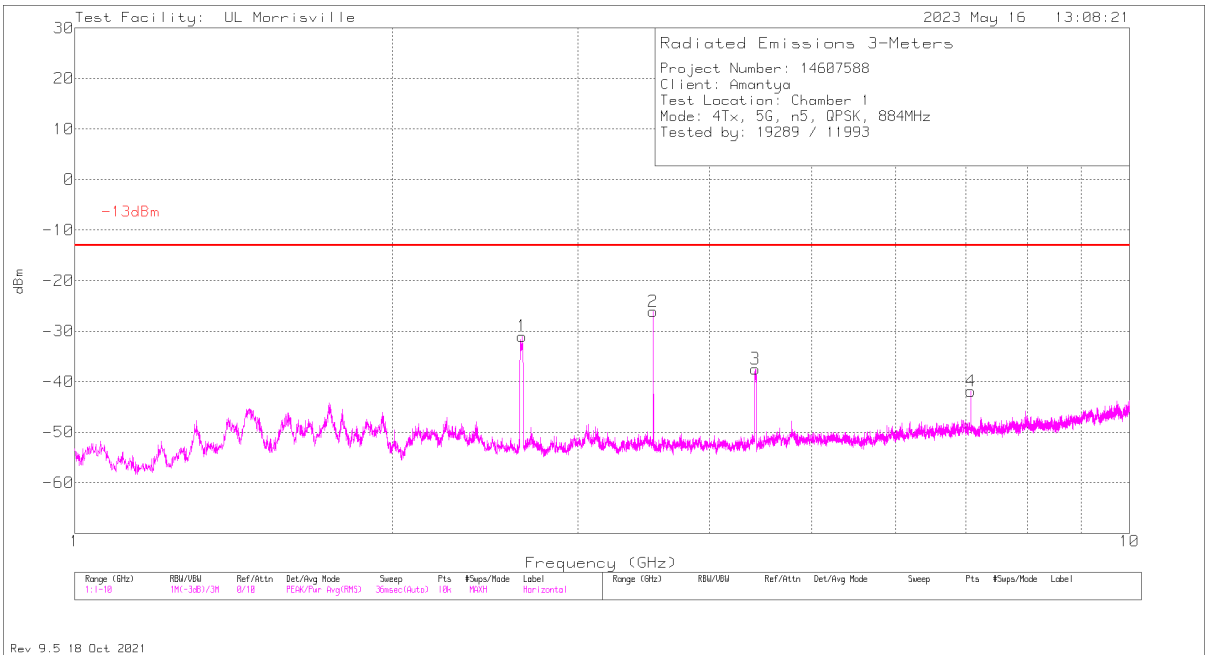


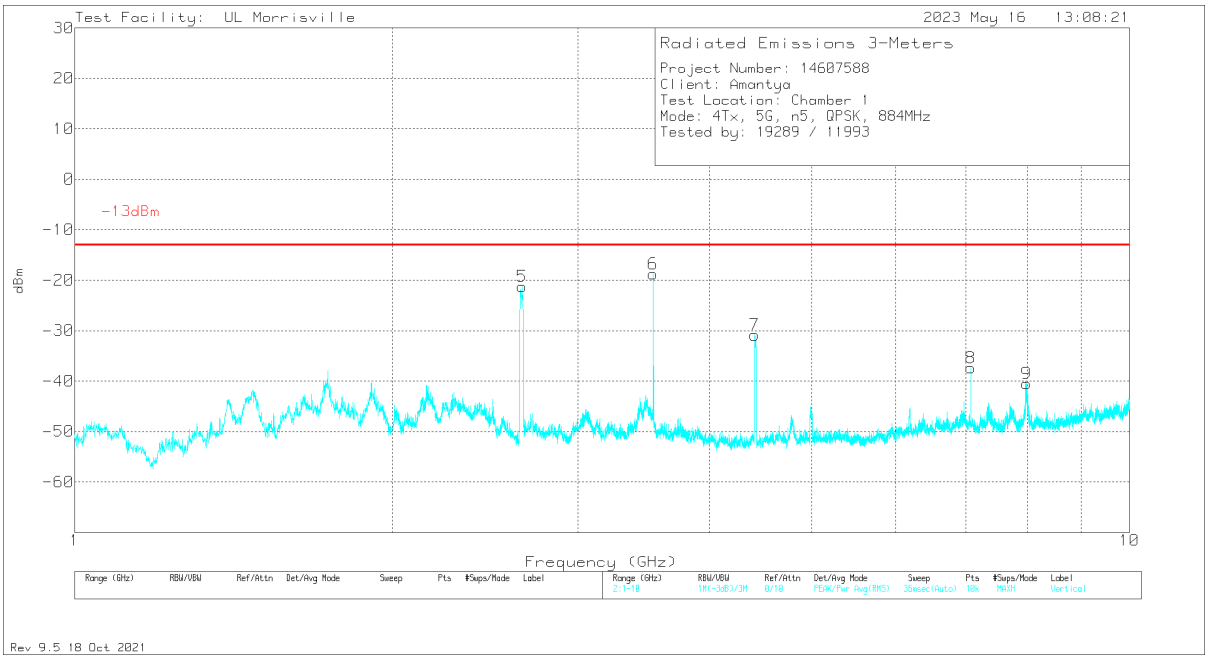


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Gain/Loss (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.6461	-41.09	Pk	32.1	-34.1	.5	11.8	-30.79	-13	-17.79	0-360	200	H
5	2.6533	-34.2	Pk	32	-34.1	.5	11.8	-24	-13	-11	0-360	101	V
2	3.5263	-37.27	Pk	32.7	-32.6	.3	11.8	-25.07	-13	-12.07	0-360	200	H
6	3.5263	-31.75	Pk	32.7	-32.6	.3	11.8	-19.55	-13	-6.55	0-360	300	V
7	4.402	-43.99	Pk	33.7	-32.1	.4	11.8	-30.19	-13	-17.19	0-360	300	V
3	4.4038	-50.95	Pk	33.7	-32.2	.4	11.8	-37.25	-13	-24.25	0-360	101	H
4	7.0525	-58.23	Pk	35.6	-30.2	.7	11.8	-40.33	-13	-27.33	0-360	101	H
8	7.0525	-54.53	Pk	35.6	-30.2	.7	11.8	-36.63	-13	-23.63	0-360	201	V
9	7.9885	-57.21	Pk	35.8	-30	.5	11.8	-39.11	-13	-26.11	0-360	101	V

Pk - Peak detector

High Channel





Marker	Frequency (GHz)	Meter Reading (dBm)	Det	206211 (dB/m)	Gain/Loss (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	2.656	-31.47	Pk	32	-34.1	.5	11.8	-21.27	-13	-8.27	0-360	101	V
1	2.6569	-41.29	Pk	32	-34.1	.6	11.8	-30.99	-13	-17.99	0-360	200	H
2	3.5362	-37.74	Pk	32.7	-33.1	.3	11.8	-26.04	-13	-13.04	0-360	200	H
6	3.536	-30.66	Pk	32.7	-33	.3	11.8	-18.86	-13	-5.86	146	302	V
7	4.4128	-44.56	Pk	33.7	-32.2	.4	11.8	-30.86	-13	-17.86	0-360	300	V
3	4.4182	-51.35	Pk	33.7	-32	.4	11.8	-37.45	-13	-24.45	0-360	300	H
4	7.0723	-59.21	Pk	35.6	-30.8	.7	11.8	-41.91	-13	-28.91	0-360	200	H
8	7.0723	-54.63	Pk	35.6	-30.8	.7	11.8	-37.33	-13	-24.33	0-360	300	V
9	7.9867	-58.48	Pk	35.8	-30.1	.5	11.8	-40.48	-13	-27.48	0-360	101	V

Pk - Peak detector

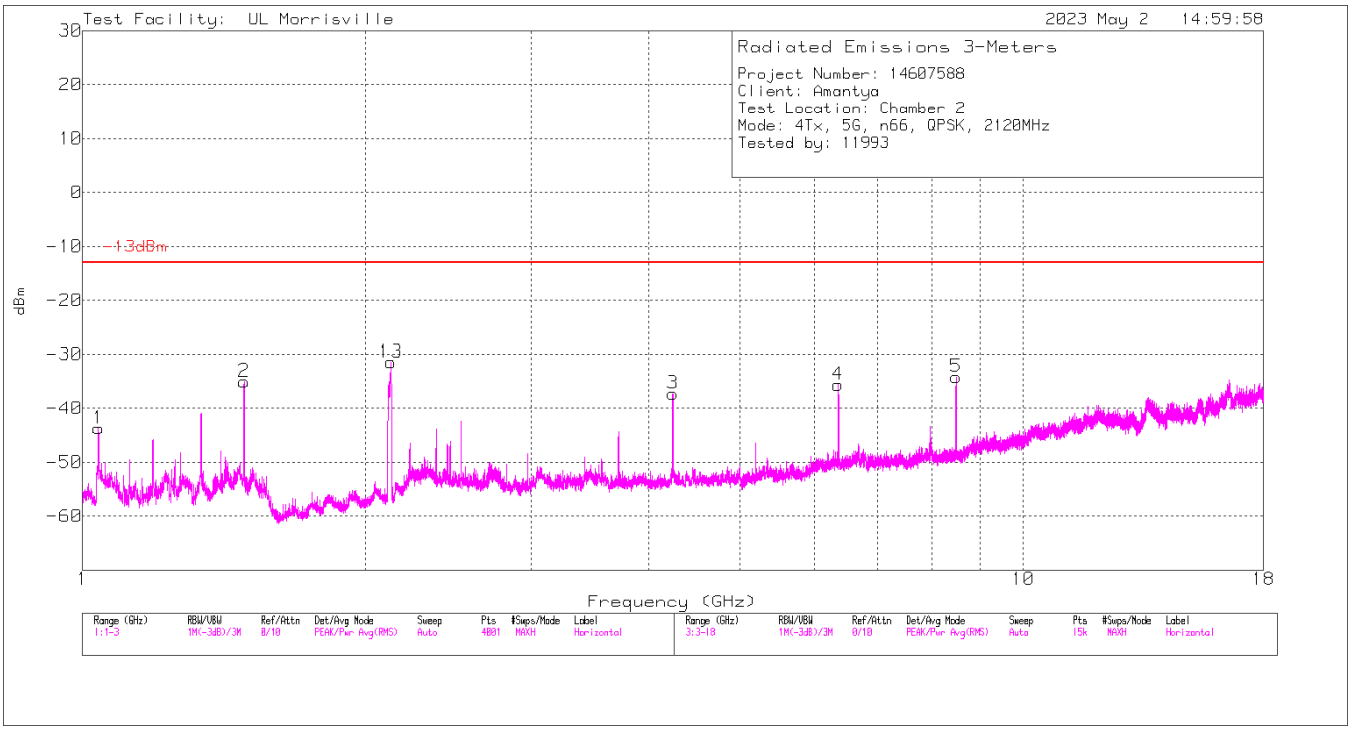
10.1.3. 5G NR n66

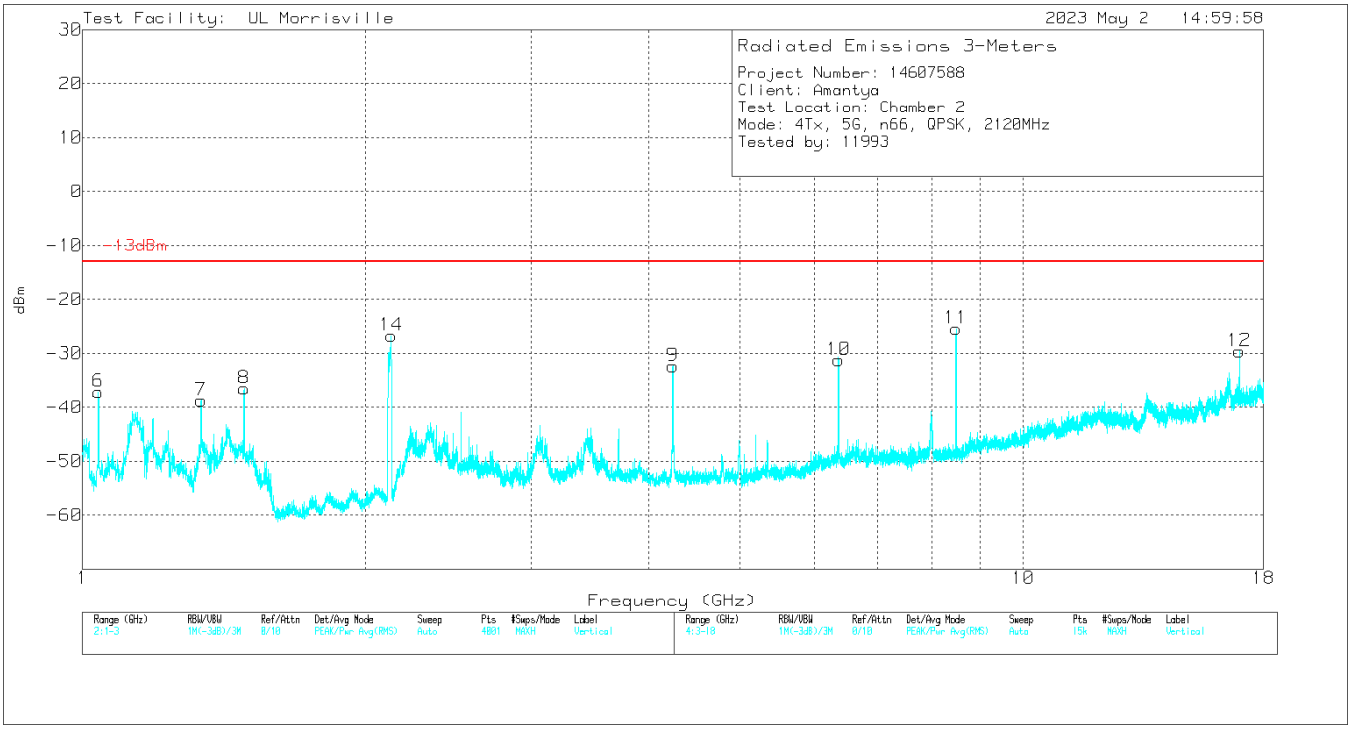
LIMITS

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.

5G NR n66 QPSK (20.0MHZ BANDWIDTH)

Low Channel



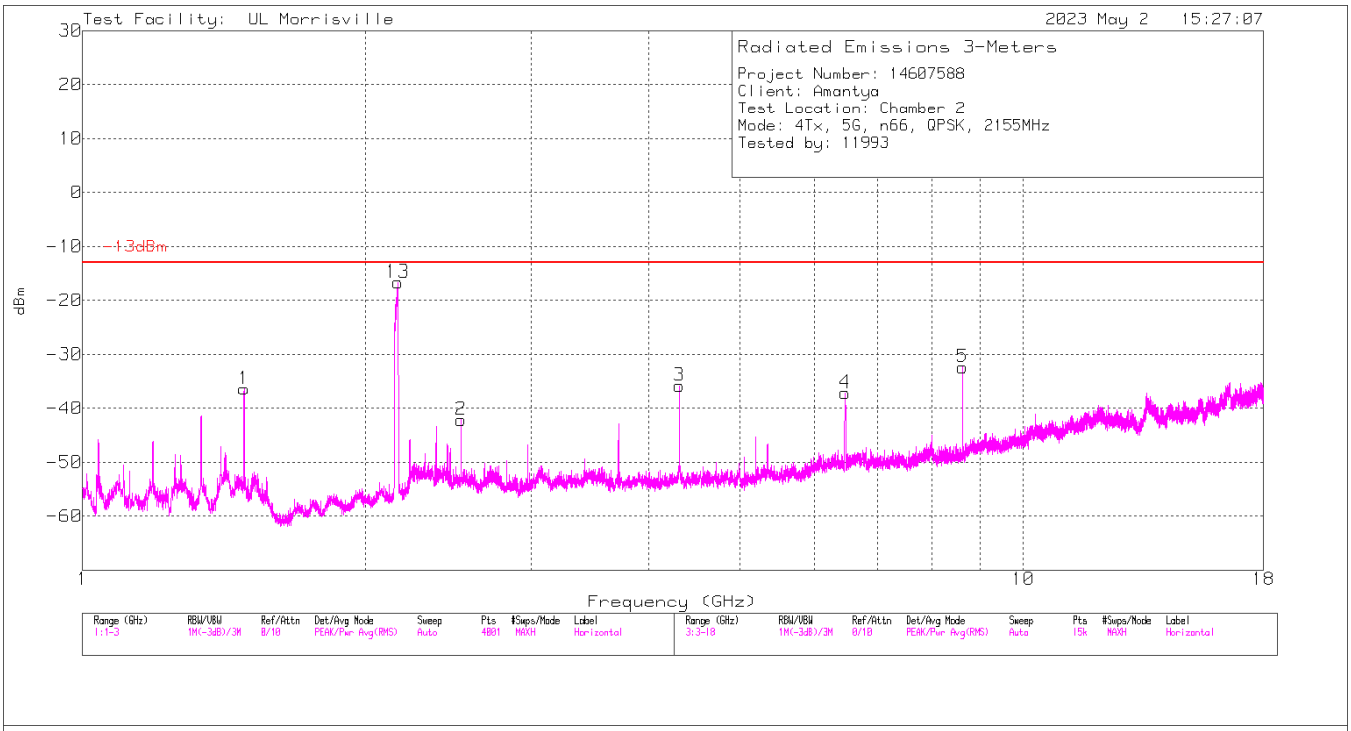


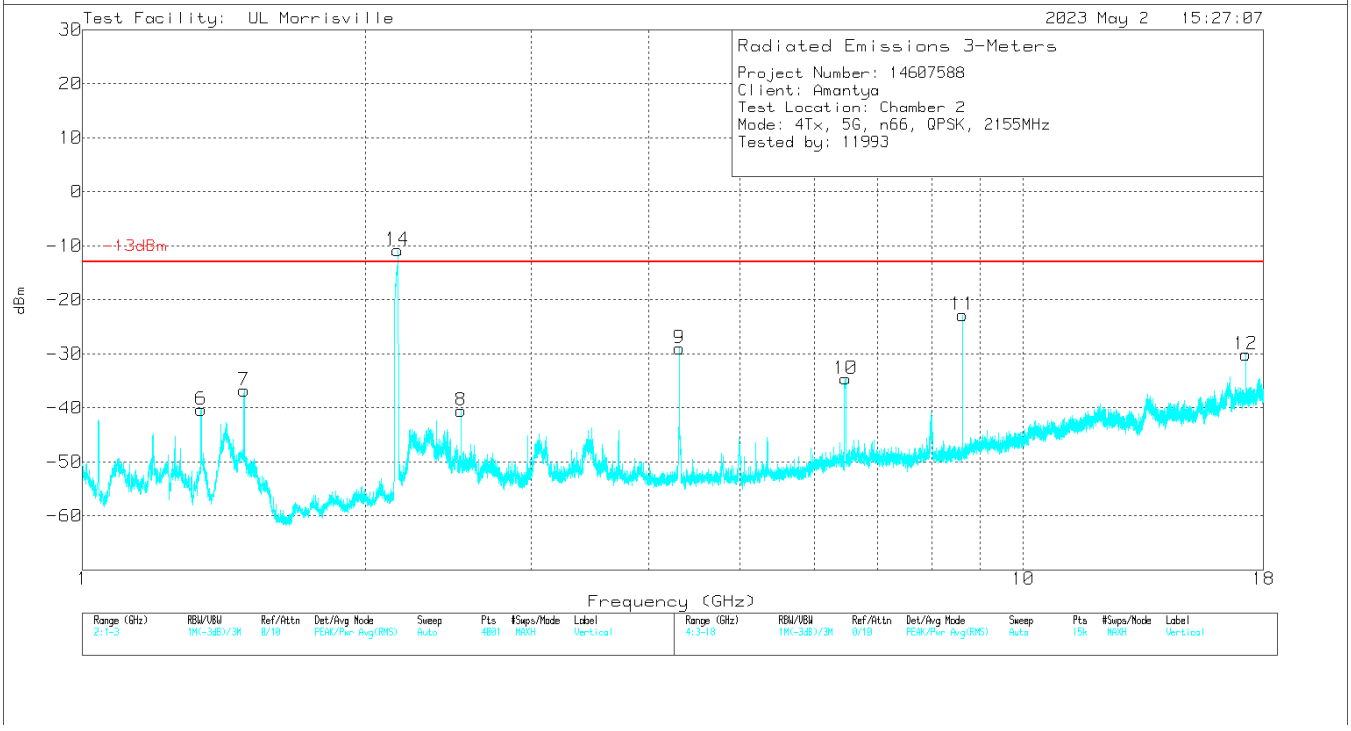
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	88761 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	1.03925	-40.78	Pk	26.7	-35.2	11.8	.3	-37.18	-13	-24.18	0-360	101	V
1	1.0395	-47.35	Pk	26.7	-35.2	11.8	.3	-43.75	-13	-30.75	0-360	101	H
7	1.3365	-45.15	Pk	28.9	-35.1	11.8	.8	-38.75	-13	-25.75	0-360	101	V
2	1.485	-41.2	Pk	28.1	-34.8	11.8	1	-35.1	-13	-22.1	0-360	200	H
8	1.485	-42.64	Pk	28.1	-34.8	11.8	1	-36.54	-13	-23.54	0-360	101	V
13	2.1275 (DL)	-41.94	Pk	31.5	-34.1	11.8	1.2	-31.54	-	-	0-360	200	H
14	2.1285 (DL)	-37.15	Pk	31.5	-34.1	11.8	1.2	-26.75	-	-	0-360	200	V
3	4.239	-52.13	Pk	33.4	-30.4	11.8	0	-37.33	-13	-24.33	0-360	299	H
9	4.24	-47.17	Pk	33.4	-30.4	11.8	0	-32.37	-13	-19.37	0-360	299	V
4	6.352	-55.15	Pk	35.5	-27.8	11.8	0	-35.65	-13	-22.65	0-360	199	H
10	6.364	-50.53	Pk	35.5	-28	11.8	0	-31.23	-13	-18.23	0-360	200	V
5	8.48	-55.43	Pk	35.8	-26.4	11.8	0	-34.23	-13	-21.23	0-360	199	H
11	8.48	-46.63	Pk	35.8	-26.4	11.8	0	-25.43	-13	-12.43	0-360	200	V
12	16.96	-60.32	Pk	41.5	-22.6	11.8	0	-29.62	-13	-16.62	0-360	200	V

Pk - Peak detector

DL - Fundamental

Mid Channel



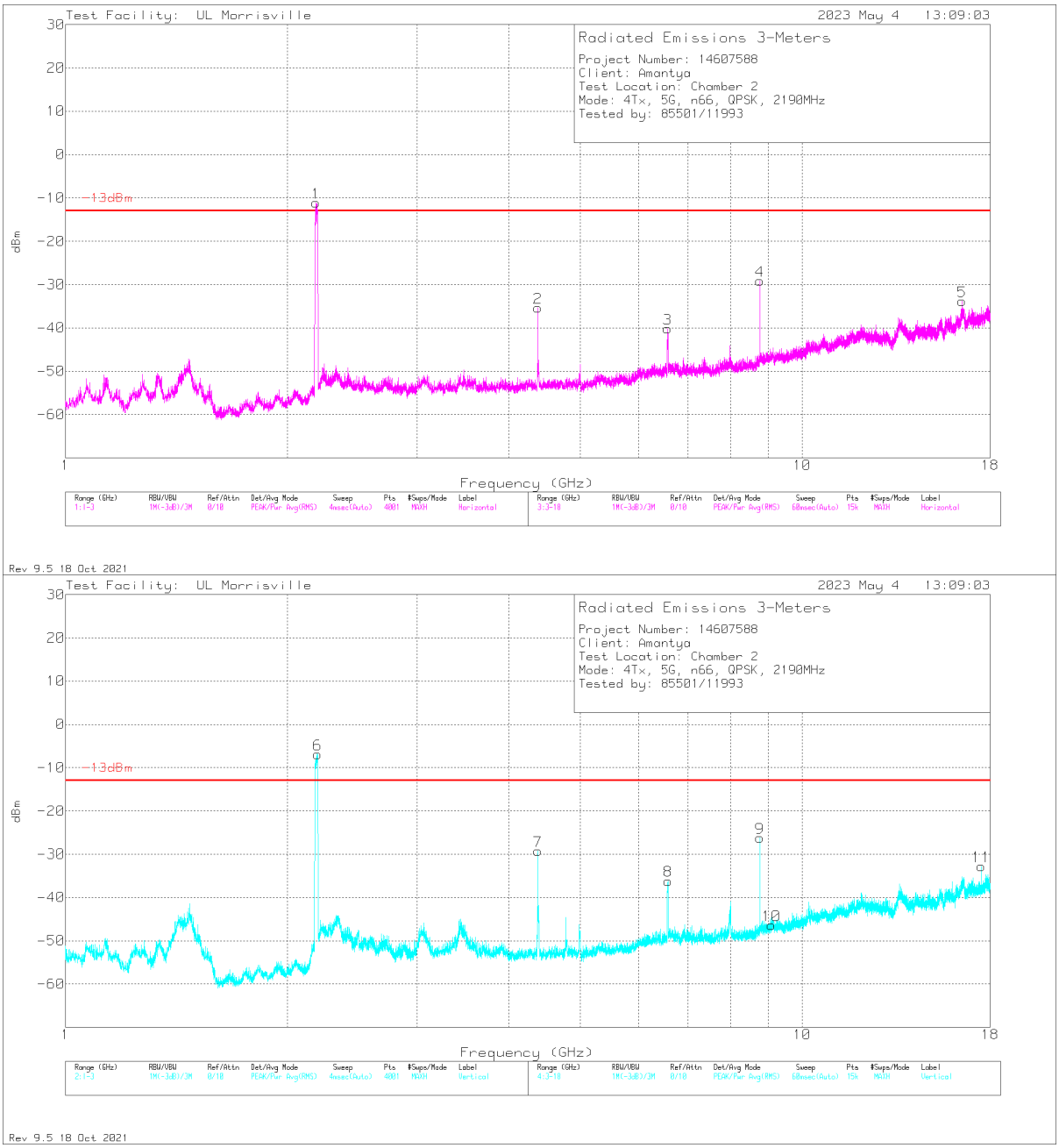


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	88761 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	1.3365	-46.74	Pk	28.9	-35.1	11.8	.8	-40.34	-13	-27.34	0-360	101	V
1	1.485	-42.53	Pk	28.1	-34.8	11.8	1	-36.43	-13	-23.43	0-360	101	H
7	1.485	-42.91	Pk	28.1	-34.8	11.8	1	-36.81	-13	-23.81	0-360	101	V
14	2.1625 (DL)	-21.28	Pk	31.5	-34.1	11.8	1.2	-10.88	-	-	0-360	101	V
13	2.1635 (DL)	-27.11	Pk	31.5	-34.1	11.8	1.2	-16.71	-	-	0-360	200	H
8	2.5245	-51.72	Pk	32.5	-34	11.8	.9	-40.52	-13	-27.52	0-360	101	V
2	2.525	-53.35	Pk	32.5	-34	11.8	.9	-42.15	-13	-29.15	0-360	101	H
3	4.31	-50.07	Pk	33.5	-31.1	11.8	0	-35.87	-13	-22.87	0-360	101	H
9	4.31	-43.18	Pk	33.5	-31.1	11.8	0	-28.98	-13	-15.98	0-360	299	V
4	6.463	-55.93	Pk	35.5	-28.6	11.8	0	-37.23	-13	-24.23	0-360	200	H
10	6.471	-53.34	Pk	35.5	-28.6	11.8	0	-34.64	-13	-21.64	0-360	200	V
5	8.62	-53.27	Pk	35.8	-26.7	11.8	0	-32.37	-13	-19.37	0-360	200	H
11	8.62	-43.76	Pk	35.8	-26.7	11.8	0	-22.86	-13	-9.86	0-360	200	V
12	17.24	-60.91	Pk	41.2	-22.2	11.8	0	-30.11	-13	-17.11	0-360	200	V

Pk - Peak detector

DL - Fundamental

High Channel



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	88761 (dB/m)	Gain/Loss (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.1875 (DL)	-21.29	Pk	31.5	-34.3	11.8	1.2	-11.09	-	-	0-360	200	H
6	2.1975 (DL)	-17.37	Pk	31.5	-34	11.8	1.2	-6.87	-	-	0-360	300	V
2	4.38	-49.34	Pk	33.6	-31.4	11.8	0	-35.34	-13	-22.34	0-360	299	H
7	4.38	-43.21	Pk	33.6	-31.4	11.8	0	-29.21	-13	-16.21	0-360	299	V
3	6.569	-59.37	Pk	35.5	-28.1	11.8	0	-40.17	-13	-27.17	0-360	200	H
8	6.574	-55.66	Pk	35.5	-27.8	11.8	0	-36.16	-13	-23.16	0-360	199	V
4	8.76	-51.07	Pk	36	-25.9	11.8	0	-29.17	-13	-16.17	0-360	299	H
9	8.76	-48.15	Pk	36	-25.9	11.8	0	-26.25	-13	-13.25	0-360	101	V
10	9.088	-69.06	Pk	36.2	-25.3	11.8	0	-46.36	-13	-33.36	0-360	199	V
5	16.492	-64.37	Pk	41.2	-22.4	11.8	0	-33.77	-13	-20.77	0-360	299	H
11	17.521	-64.44	Pk	41.1	-21.2	11.8	0	-32.74	-13	-19.74	0-360	199	V

Pk - Peak detector

DL – Fundamental

11. Worst Case Emissions

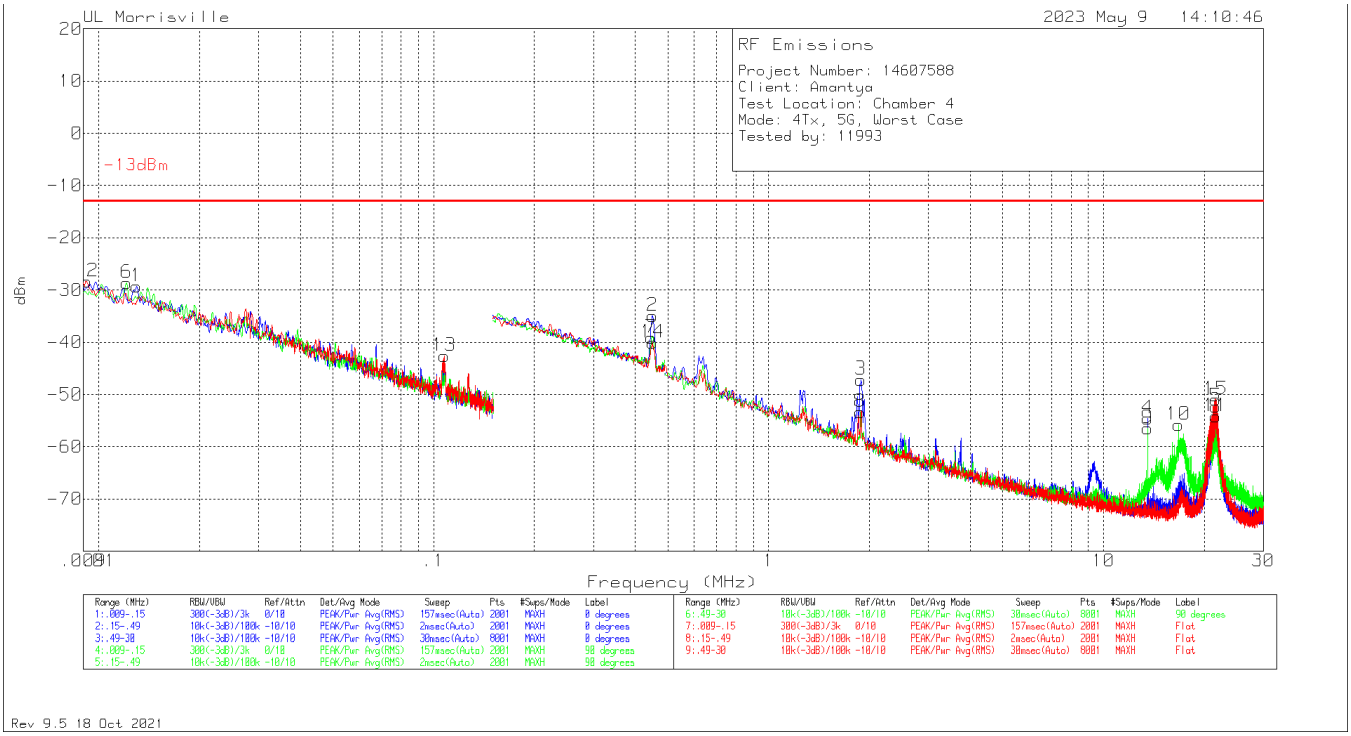
11.1. FIELD STRENGTH OF SPURIOUS RADIATION, WORST CASE

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02/r01

RESULTS

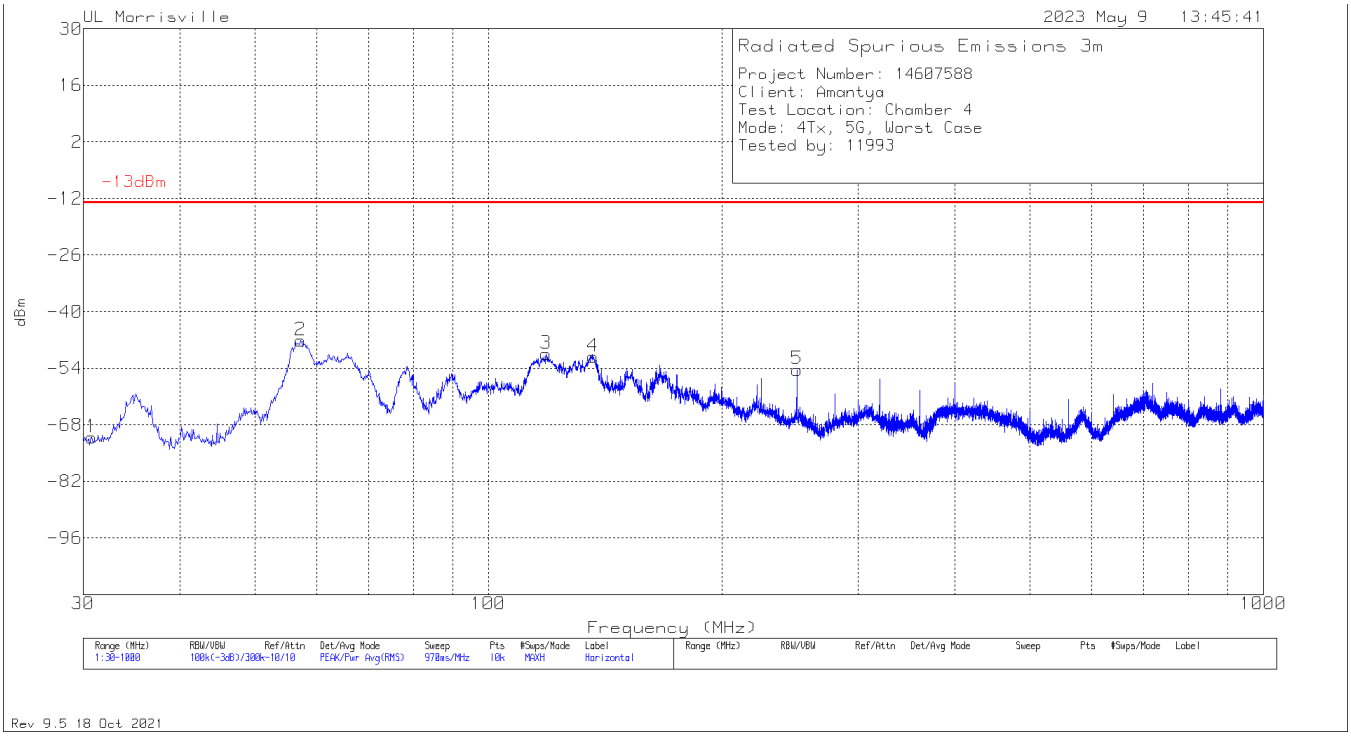
11.1.1. BELOW 30MHz

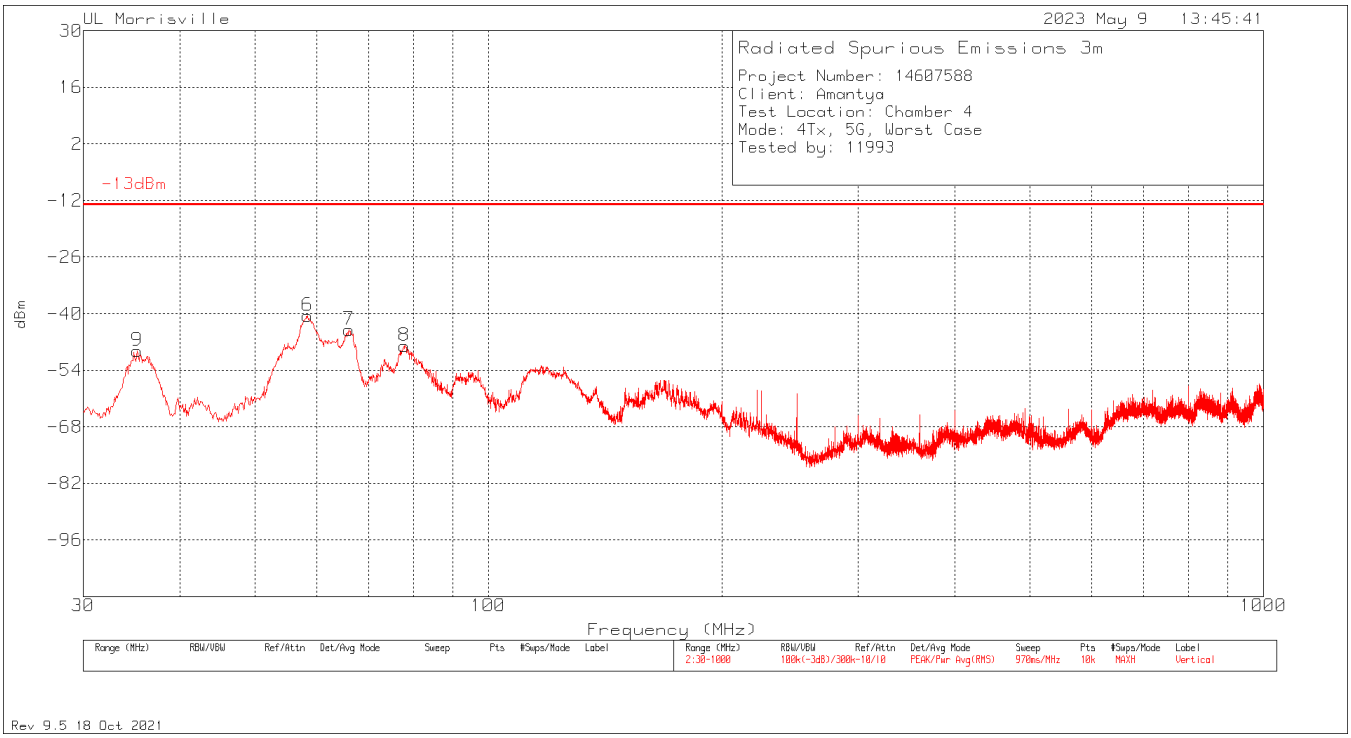


Marker	Frequency (MHz)	Meter Reading (dBm)	Det	135144 (dB/m)	Gain/Loss (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
12	.00921	-60.01	Pk	19.9	0	11.8	-28.31	-13	-15.31	0-360	400	Flat
6	.01212	-58.78	Pk	18.4	0	11.8	-28.58	-13	-15.58	0-360	400	90 degs
1	.01298	-59.12	Pk	18	0	11.8	-29.32	-13	-16.32	0-360	400	0 degs
13	.10748	-66.71	Pk	12.2	.1	11.8	-42.61	-13	-29.61	0-360	400	Flat
7	.44716	-63.2	Pk	12.2	.1	11.8	-39.1	-13	-26.1	0-360	400	90 degs
2	.44997	-59	Pk	12.2	.1	11.8	-34.9	-13	-21.9	0-360	400	0 degs
14	.44997	-64.19	Pk	12.2	.1	11.8	-40.09	-13	-27.09	0-360	400	Flat
8	1.88075	-77.66	Pk	12.3	.2	11.8	-53.36	-13	-40.36	0-360	400	90 degs
3	1.88813	-71.43	Pk	12.3	.2	11.8	-47.13	-13	-34.13	0-360	400	0 degs
4	13.56013	-77.71	Pk	10.6	.7	11.8	-54.61	-13	-41.61	0-360	400	0 degs
9	13.56013	-79.57	Pk	10.6	.7	11.8	-56.47	-13	-43.47	0-360	400	90 degs
10	16.7216	-78.54	Pk	10.2	.8	11.8	-55.74	-13	-42.74	0-360	400	90 degs
5	21.57632	-74.53	Pk	9.5	.9	11.8	-52.33	-13	-39.33	0-360	400	0 degs
11	21.57632	-76.36	Pk	9.5	.9	11.8	-54.16	-13	-41.16	0-360	400	90 degs
15	21.57632	-73.14	Pk	9.5	.9	11.8	-50.94	-13	-37.94	0-360	400	Flat

Pk - Peak detector

11.1.2. BELOW 1GHz

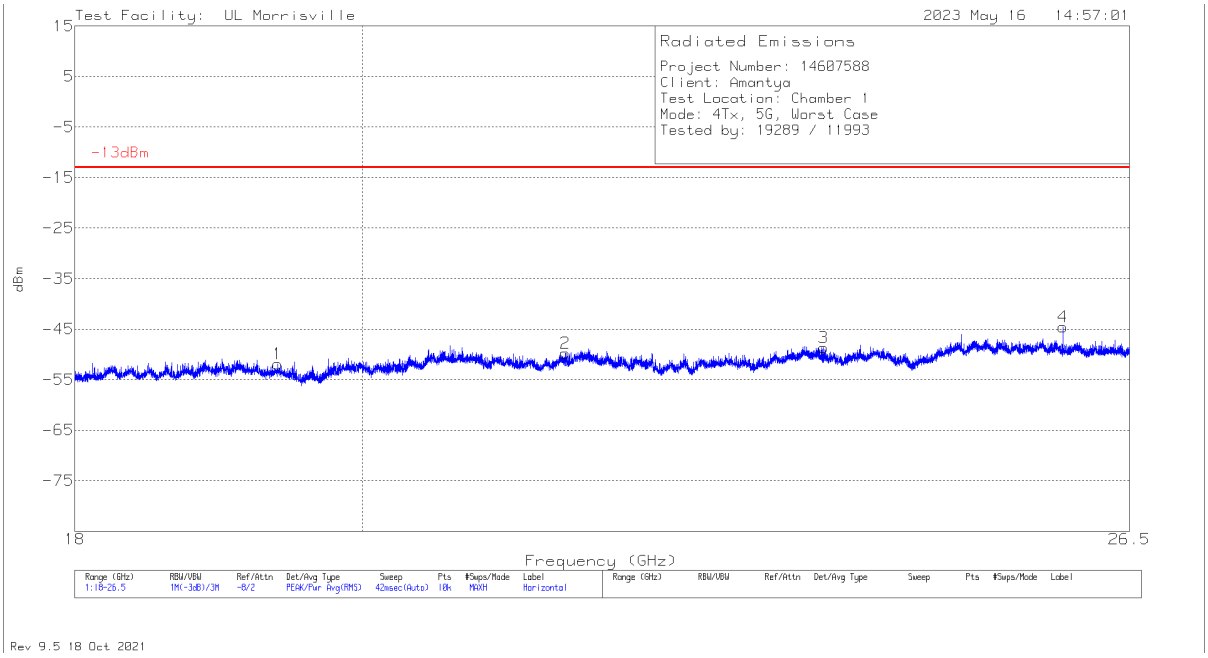


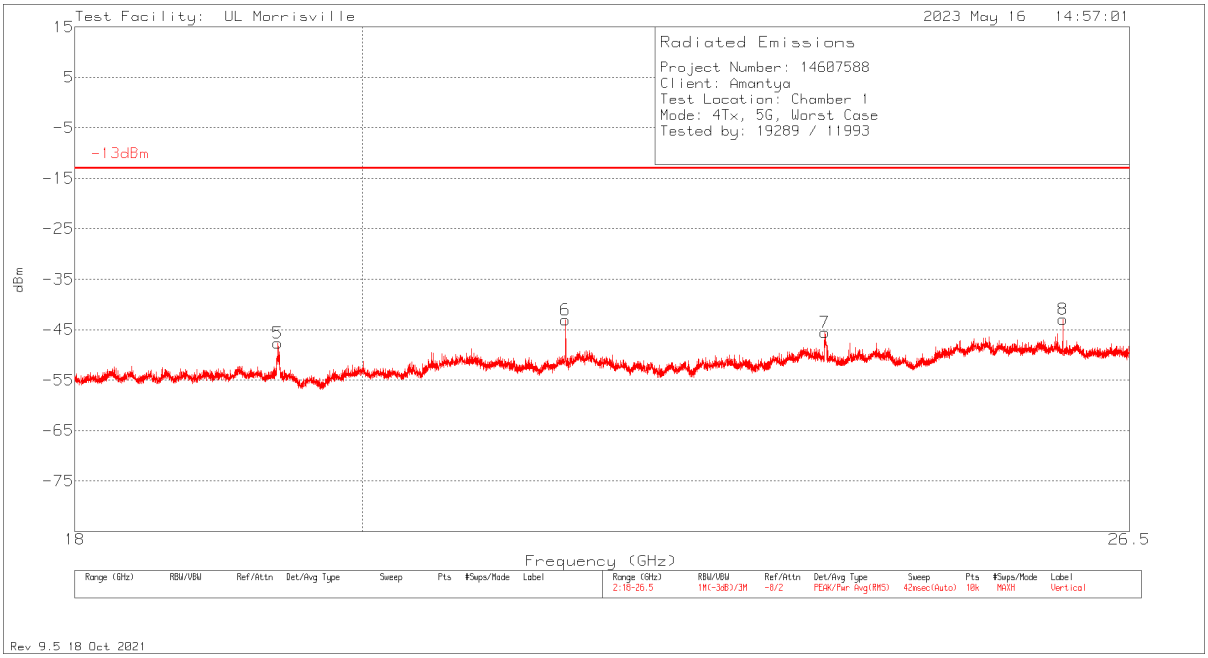


Marker	Frequency (MHz)	Meter Reading (dBm)	Det	90629 (dB/m)	Gain/Loss (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.776	-75.85	Pk	26.5	-31.7	.2	9.7	-71.15	-13	-58.15	0-360	100	H
9	35.238	-51.02	Pk	23.4	-31.5	.2	9.7	-49.22	-13	-36.22	0-360	100	V
2	57.257	-39.18	Pk	13.5	-31.4	.2	9.7	-47.18	-13	-34.18	0-360	300	H
6	58.421	-32.7	Pk	13.5	-31.2	.2	9.7	-40.5	-13	-27.5	0-360	100	V
7	66.084	-36.89	Pk	14.2	-31.2	.2	9.7	-43.99	-13	-30.99	0-360	100	V
8	77.821	-41.42	Pk	14.4	-31	.3	9.7	-48.02	-13	-35.02	0-360	100	V
3	118.561	-49.95	Pk	19.9	-30.5	.4	9.7	-50.45	-13	-37.45	0-360	100	H
4	136.506	-50.09	Pk	19.3	-30.4	.4	9.7	-51.09	-13	-38.09	0-360	100	H
5	249.996	-52.64	Pk	17.5	-29.4	.5	9.7	-54.34	-13	-41.34	0-360	100	H

Pk - Peak detector

11.1.3. 18GHz to 26.5GHz





Marker	Frequency (GHz)	Meter Reading (dBm)	Det	204704 (dB/m)	Gain/Loss (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	19.39131	-54.3	Pk	33.6	-38.8	11.8	-47.7	-13	-34.7	0-360	101	V
1	19.39216	-58.5	Pk	33.6	-38.8	11.8	-51.9	-13	-38.9	0-360	101	H
2	21.54925	-56.31	Pk	34	-39.3	11.8	-49.81	-13	-36.81	0-360	249	H
6	21.5501	-49.62	Pk	34	-39.3	11.8	-43.12	-13	-30.12	0-360	250	V
3	23.68763	-56.36	Pk	35.2	-39.3	11.8	-48.66	-13	-35.66	0-360	149	H
7	23.69868	-53.4	Pk	35.2	-39.2	11.8	-45.6	-13	-32.6	0-360	250	V
4	25.86001	-54.42	Pk	35.9	-37.8	11.8	-44.52	-13	-31.52	0-360	200	H
8	25.86001	-52.8	Pk	35.9	-37.8	11.8	-42.9	-13	-29.9	0-360	200	V

Pk - Peak detector

12. SETUP PHOTOS

Please see Setup Photos Exhibit R14607588-EP1 for Setup Diagrams and Setup Photos.

END OF REPORT